DTC P0170 Fuel Trim Malfunction

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.	Diagnostic Trouble Code Detecting Condition	Trouble Area
P0170	When the air fuel ratio feedback is stable after engine warming up, the fuel trim is considerably in error on the RICH side or the LEAN side (2 trip detection logic)	• Air intake (hose loose) • Fuel line pressure • Injector blockage, leak • Heated oxygen sensor malfunction • Mass air flow meter • Engine coolant temp. sensor

HINT:

- If the vehicle runs out of fuel, the air–fuel ratio is LEAN and DTC P0170 is detected. The MIL then comes on.
- If the total of the short–term fuel trim value and long–term fuel trim value is within +30% and –35%, the system is functioning normally.

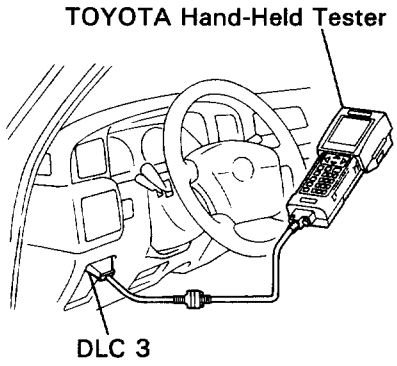
INSPECTION PROCEDURE

1 **Check air induction system (See page EG–130).**

OK

NG → **Repair or replace.**

2 Check for heated oxygen sensor data.



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P (1) Connect the OBDII scan tool or TOYOTA hand–held tester to the DLC3.
(2) Warm up engine to normal operating temperature.

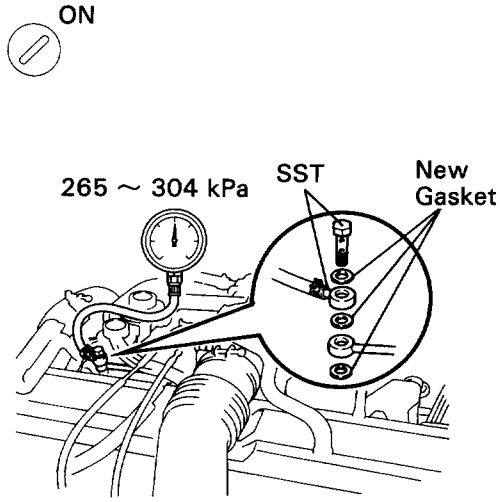
C Read the heated oxygen sensor output voltage and short–term fuel trim.

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	

①, ② → ③ **Check for heated oxygen sensor (See page EG–265).**

3 Check fuel pressure.



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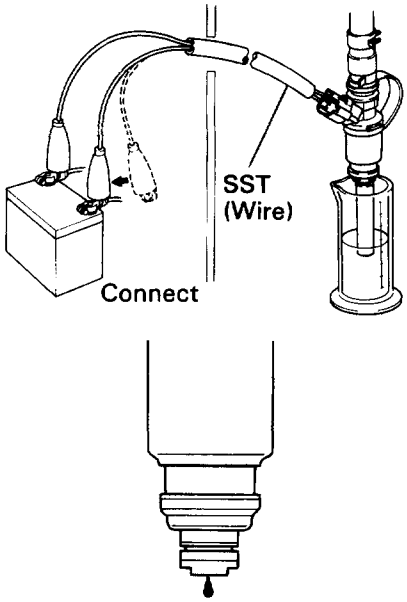
P (1) Install the SST (pressure gauge) to the delivery pipe with the gasket and SST (union bolt). (See page EG–136).
SST 09268–45012
(2) Turn ignition switch ON.
(3) Connect the TOYOTA hand–held tester to DLC3.
(4) Use ACTIVE TEST mode to operate the fuel pump.
(5) If you have no TOYOTA hand–held tester, connect the positive (+) and negative (–) leads from the battery to the fuel pump connector (See page EG–137).

C Measure the fuel pressure

OK **Fuel pressure:**
265 ~ 304 kPa (2.7 ~ 3.1 kgf/cm^2, 38 ~ 44 psi)

OK → NG **Check and repair fuel pump, pressure regulator, fuel pipe line and filter. (See page EG–135).**

4 Check injector injection.



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P Remove the delivery pipe and injectors from the bank that has the malfunction.
(See page EG–147).

C Check injection volume of injector (See page EG–150).

OK **Injection volume:**
66 ~ 82 cm^3/15 sec. (4.0 ~ 5.0 cu in.)
Difference between each injector:
Less than 5 cm^3 (0.3 cu in.)
Fuel drop (leakage): 1 drop or less per minute.

OK → **NG** → **Replace injector.**

5 Check mass air flow meter and engine coolant temp. sensor (See page EG–244, 253).

OK → **NG** → **Repair or replace.**

6 Check for spark and ignition (See page IG–3).

OK → **NG** → **Repair or replace.**

Check and replace ECM (See page IN–31).