DTC	P0171/25	SYSTEM TOO LEAN (FUEL TRIM)

DTC	P0172/26	SYSTEM TOO RICH (FUEL TRIM)

DTC	P0174/25	SYSTEM TOO LEAN (BANK2)

DTC	P0175/26	SYSTEM TOO RICH (BANK2)

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 check engine warning (CHK ENG) lights up.

DTC No.	DTC Detecting Condition	Trouble Area
P0171/25 P0174/25	When air fuel ratio feedback is stable after warming up engine, fuel trim is considerably in error on RICH side (2 trip detection logic)	• Air intake (hose loose) • Fuel line pressure • Injector blockage • Open or short in A/F sensor circuit • A/F sensor malfunction • Intake air flow meter • E.F.I. engine coolant temperature sensor • Gas leakage on exhaust system
P0172/26 P0175/26	When air fuel ratio feedback is stable after warming up engine, fuel trim is considerably in error on LEAN side (2 trip detection logic)	• Air induction system • Fuel line pressure • Injector blockage • Open or short in A/F sensor circuit • A/F sensor malfunction • Intake air flow meter • E.F.I. engine coolant temperature sensor • Gas leakage on exhaust system

HINT:

If the total of the short–term fuel trim value and long–term fuel trim value is within ± 25 %, the system is functioning normally.

WIRING DIAGRAM

Refer to DTC P0125 on page 05–333.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

when using Hand–held Tester:

1	CHECK AIR INDUCTION SYSTEM (See page 11–49)

NG → REPAIR OR REPLACE AIR INDUCTION SYSTEM

OK

2	INSPECT FUEL INJECTOR ASSY (See page 11–55)

NG → REPLACE FUEL INJECTOR ASSY

OK

3	INSPECT INTAKE AIR FLOW METER SUB–ASSY (See page 10–14)

NG → REPLACE INTAKE AIR FLOW METER SUB–ASSY

OK

4	INSPECT E.F.I. ENGINE COOLANT TEMPERATURE SENSOR (See page 10–14)

NG → REPLACE E.F.I. ENGINE COOLANT TEMPERATURE SENSOR

OK

5	CHECK FOR SPARK AND IGNITION (See page 18–5)

NG → GO TO IGNITION SYSTEM

OK

6	CHECK FUEL PRESSURE (See page 11–52)

NG → GO TO FUEL SYSTEM

OK

7	CHECK EXHAUST GAS LEAK

NG → **REPAIR OR REPLACE EXHAUST GAS LEAKAGE POINT**

OK

8	READ VALUE OF HAND–HELD TESTER(AIR FUEL RATIO SENSOR)

(a) Connect the hand–held tester to the DLC3.
(b) Warm up the A/F sensor with the engine speed at 2,500 rpm for approx. 90 sec.
(c) Read the voltage value of the A/F sensor on the screen of hand–held tester when you perform all the following conditions.

HINT:
The voltage of the AFR+ or AFL+ terminal of the ECM is 3.3 fixed the AFR– or AFL– terminal is 3.0 V fixed. Therefore, it is impossible to check the A/F sensor output voltage at the terminals (AFR+, AFL+/AFR–, AFL–) of the ECM.

Air fuel ration sensor output voltage:

Condition	A/F Sensor Voltage value
Engine idling	• Not remains at 3.30 V (0.660 V*) • Not remains at 3.8 V (0.76 V*) or more • Not remains at 2.8 V (0.56 V*) or less *: When you use the hand–held tester.
Engine racing	
Driving at engine speed 1,500 rpm or more and vehicle speed 40 km/h (25 mph) or more, and operate throttle valve open and close	

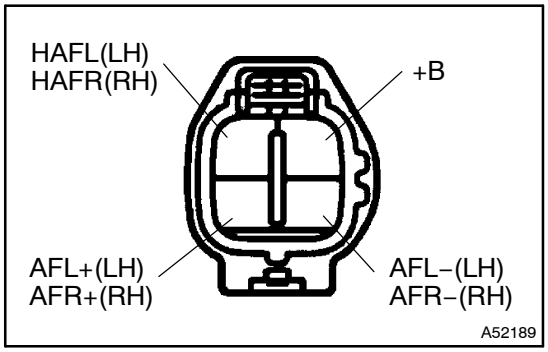
HINT:
- During fuel enrichment, there is a case that the output voltage of the A/F sensor is below 2.8 V (0.56 V*), it is normal.
- During fuel cut, there is a case that the output voltage of the A/F sensor is above 3.8 V (0.76 V*), it is normal.
- If the output voltage of the A/F sensor remains at 3.30 V (0.660 V*) even after performing all the above conditions, the A/F sensor circuit may be open.
- If the output voltage of the A/F sensor remains at 3.8 V (0.76 V*) or more, or 2.8 V (0.56 V*) or less even after performing all the above conditions, the A/F sensor circuit may be short.

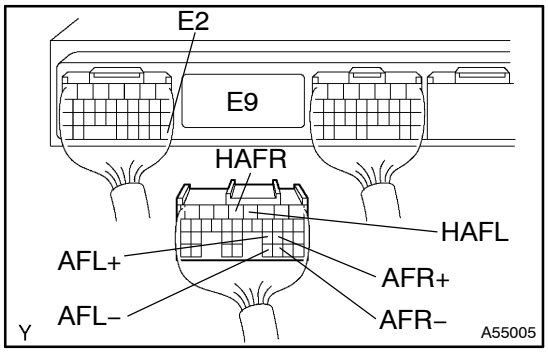
*: When you use the hand–held tester.

OK → **Go to step 10**

NG

9	CHECK HARNESS AND CONNECTOR (ECM – A/F SENSOR)





(a) Disconnect the air fuel ratio sensor connector.
(b) Disconnect the ECM E9 connector.
(c) Check for open between the terminals HAFL of the ECM connector and HAFL of the air fuel ratio sensor connector.
Resistance: 1 Ω or less
(d) Check for open between the terminals AFL+ of the ECM connector and AFL+ of the air fuel ratio sensor connector.
Resistance: 1 Ω or less
(e) Check for open between the terminals AFL– of the ECM connector and AFL– of the air fuel ratio sensor connector.
Resistance: 1 Ω or less
(f) Check for open between the terminals HAFR of the ECM connector and HAFR of the air fuel ratio sensor connector.
Resistance: 1 Ω or less
(g) Check for open between the terminals AFR+ of the ECM connector and AFR+ of the air fuel ratio sensor connector.
Resistance: 1 Ω or less
(h) Check for open between the terminals AFR– of the ECM connector and AFR– of the air fuel ratio sensor connector.
Resistance: 1 Ω or less
(i) Check for short between the terminals HAFL, HAFR, AFL+, AFR+, AFL–, AFR– and E2 of the ECM connector.
Resistance: 1 MΩ or more

NG	REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE AIR FUEL RATIO SENSOR

10	PERFORM CONFIRMATION DRIVING PATTERN (See page 05–333)

GO

11	CHECK READ OUTPUT DTC (BESIDES DTC P0171,P0172,P0174 AND P0175 OUTPUT AGAIN)

YES	CHECK AND REPLACE ECM

NO

12	CONFIRM VEHICLE RUNS OUT OF FUEL IN THE PAST

NO → CHECK FOR INTERMITTENT PROBLEMS

YES

DTC IS CAUSED RUNNING OUT OF FUEL

When not using Hand–held Tester:

1	CHECK AIR INDUCTION SYSTEM (See page 11–49)

NG → REPAIR OR REPLACE AIR INDUCTION SYSTEM

OK

2	INSPECT FUEL INJECTOR ASSY (See page 11–55)

NG → REPLACE FUEL INJECTOR ASSY

OK

3	INSPECT INTAKE AIR FLOW METER SUB–ASSY (See page 10–14)

NG → REPLACE INTAKE AIR FLOW METER SUB–ASSY

OK

4	INSPECT E.F.I. ENGINE COOLANT TEMPERATURE SENSOR (See page 10–14)

NG → REPLACE E.F.I. ENGINE COOLANT TEMPERATURE SENSOR

OK

5	CHECK FOR SPARK AND IGNITION (See page 18–5)

NG → GO TO IGNITION SYSTEM

OK

6	CHECK FUEL PRESSURE (See page 11–52)

NG → GO TO FUEL SYSTEM

OK

7	INSPECT AIR FUEL RATIO SENSOR (CHECK RESISTANCE) (See page 12–13)

NG → REPLACE AIR FUEL RATIO SENSOR

OK

CHECK AND REPLACE ECM