DTC	P0125/91	INSUFFICIENT COOLANT TEMP. FOR CLOSE LOOP FUEL CONTROL

CIRCUIT DESCRIPTION

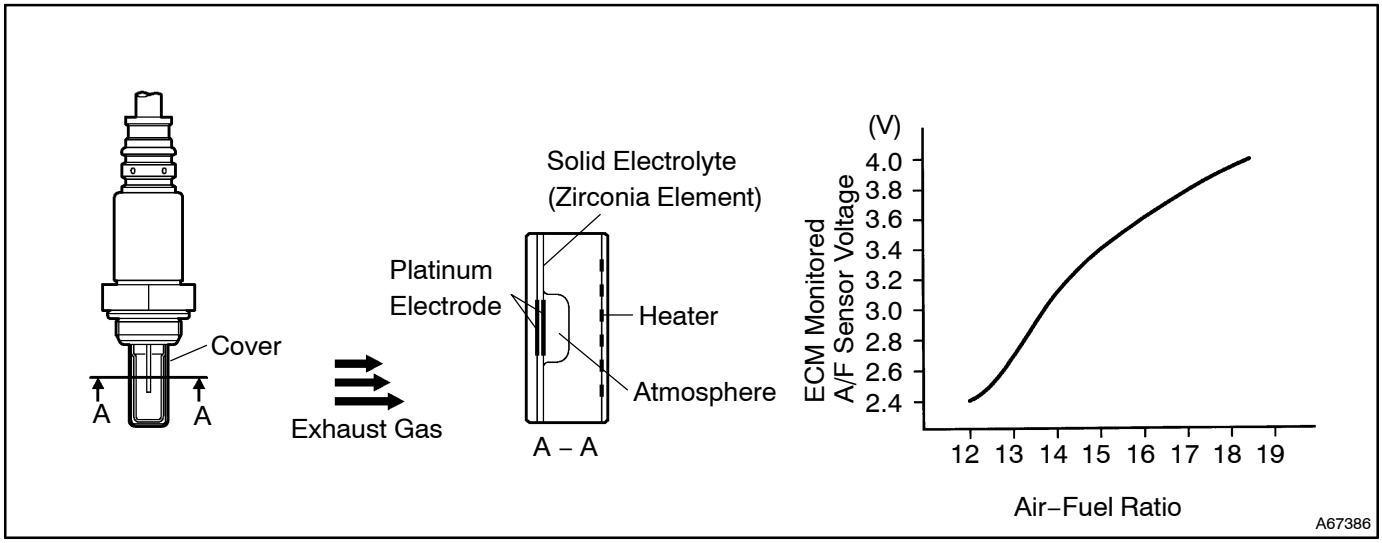
To obtain a high purification rate of the CO, HC and NOx components of the exhaust gas, a three–way catalytic converter is used. For the most efficient use of the three–way catalytic converter, the air–fuel ratio must be precisely controlled so that it is always close to the stoichiometric air–fuel ratio.

The A/F sensor has the characteristic that it provides output voltage* being approximately proportional to the existing air–fuel ratio. The A/F sensor output voltage* is used to provide feedback for the ECM to control the air–fuel ratio.

By the A/F sensor output, the ECM can determine the deviation amount from the stoichiometric air–fuel ratio and control the proper injection time immediately. If the A/F sensor is out of order, ECM is unable to perform the accurate air–fuel ratio control.

The A/F sensor is equipped with a heater which heats the zirconia element. The heater is controlled by the ECM. When the intake air volume is low (the temperature of the exhaust gas is low), the current flows to the heater to heat the sensor for the accurate oxygen concentration detection.

*: The voltage value changes at the inside of the ECM only.

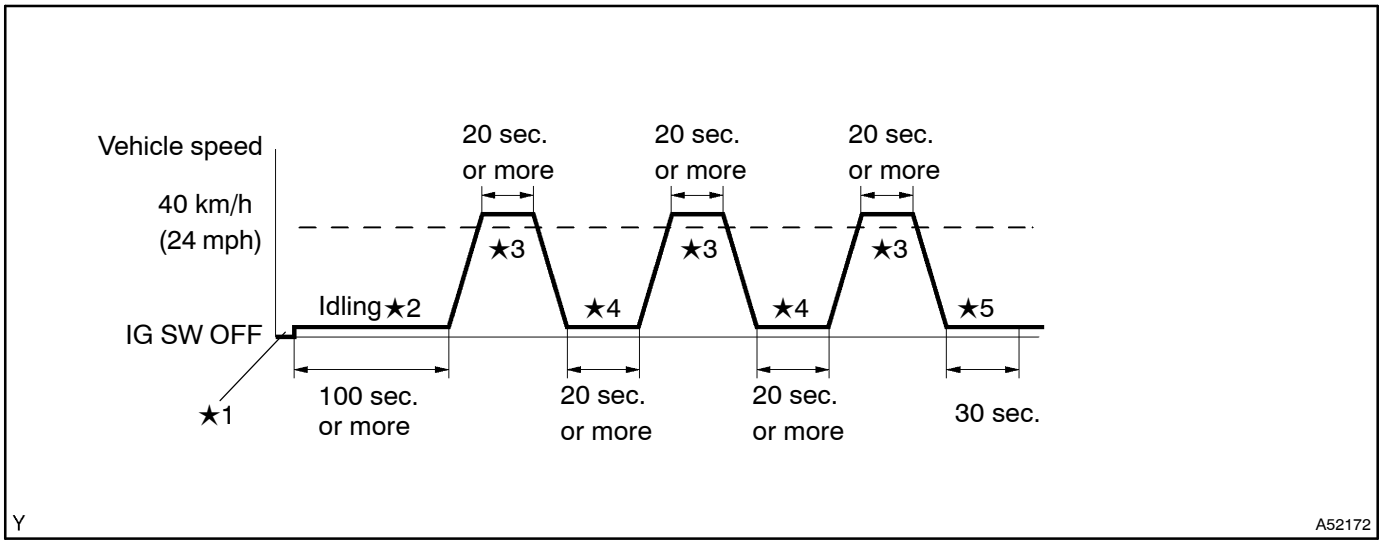


DTC No.	DTC Detecting Condition	Trouble Area
P0125/91	After engine is warmed up, A/F sensor output* does not change when conditions (a), (b), (c) and (d) continue for at least 1.5 min: *: Output value changes at inside of the ECM only (a) Engine speed: 1,500 rpm or more (b) Vehicle speed: 40 – 100 km/h (25 – 62 mph) (c) Throttle valve is not fully closed (d) 140 sec. or more after starting engine	• Open or short in A/F sensor (bank 1, 2 sensor 1) circuit • A/F sensor (bank 1, 2 sensor 1) • Air induction system • Fuel pressure • Injector • Gas leakage on exhaust system • ECM

HINT:

- After confirming DTC P0125, use the hand–held tester to confirm voltage output of the A/F sensor (bank 1, 2 sensor 1) from the CURRENT DATA.
- The ECM controls the voltage of the AFR+, AFL+, AFR– and AFL– terminals of the ECM to the fixed voltage. Therefore, it is impossible to confirm the A/F sensor output voltage without the hand–held tester.
- Hand–held tester displays the one fifth of the A/F sensor output voltage which is displayed on the hand–held tester.

CONFIRMATION DRIVING PATTERN



(a) Switch the hand–held tester from the normal mode to the check mode. (See page 05–290)★1
(b) Start the engine and let the engine idle for 100 seconds or more.★2
(c) Drive the vehicle at 40 km/h (24 mph) or more for 20 seconds or more.★3
(d) Let the engine idle for 20 seconds or more.★4
(e) Repeat the procedure ★3 and ★4 three times.
(f) Let the engine idle for 30 seconds.★5
(g) Check the O2 sensor output voltage.

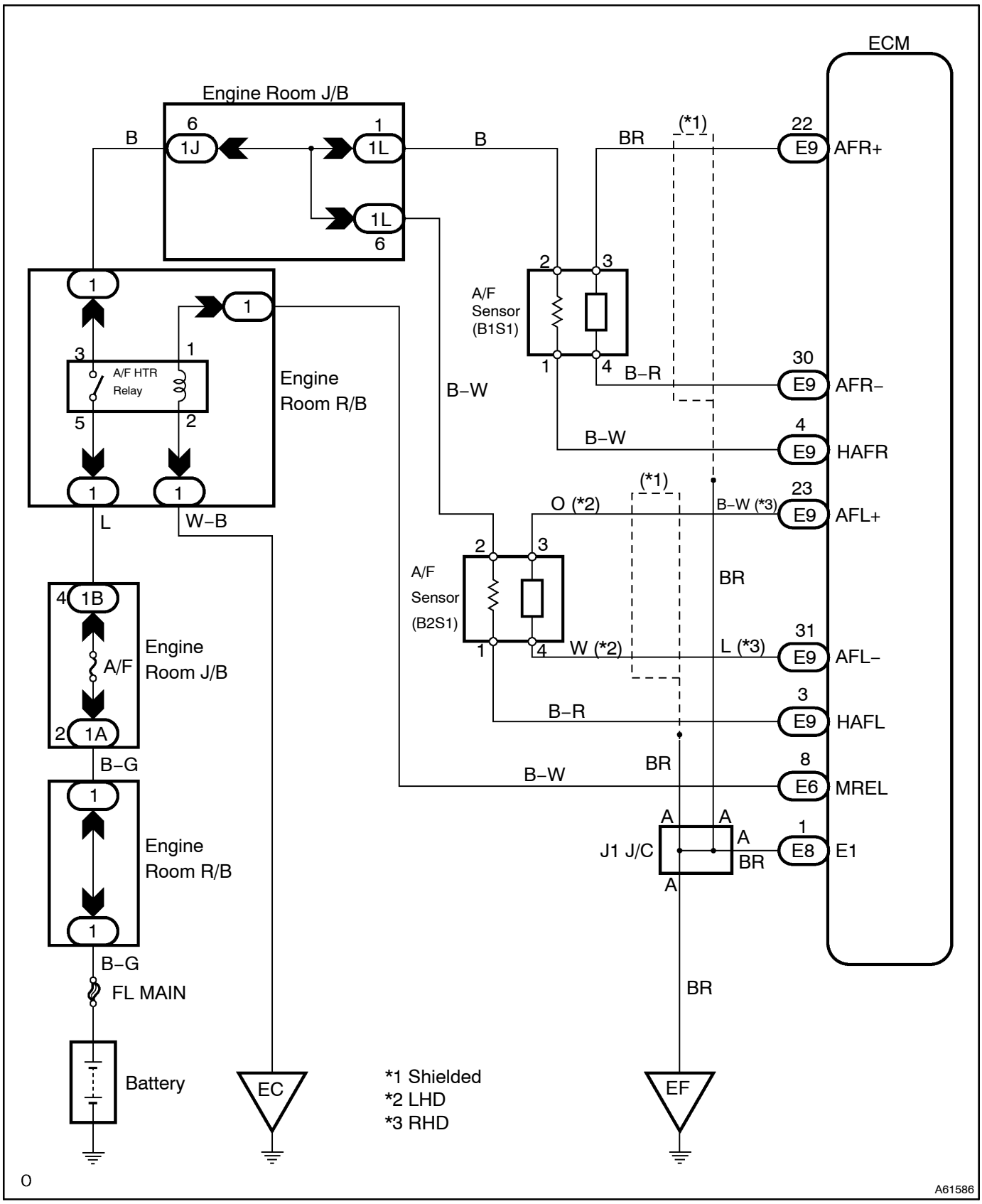
HINT:

If a malfunction exists, the check engine warning light comes on.

NOTICE:

If the conditions on this test are not strictly followed, the malfunction will not be detected.

WIRING DIAGRAM



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 was warmed up or not, the air–fuel ratio was lean or rich, etc. at the time of the malfunction.

When using Hand–held Tester:

1	CHECK OTHER DTC OUTPUT(BESIDES DTC P0125)

YES > GO TO RELEVANT DTC CHART

NO

2	READ VALUE OF A/FS(B1S1,B2S1)

(a) Warm up the A/F sensor with the engine speed at 2,500 rpm for approx. 90 sec.
(b) 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 fixed at 3.3 V and the voltage of the AFR– or AFL– terminal is fixed at 3.0 V. Therefore, it is impossible to check the A/F sensor output voltage at the terminals (AFR+, AFL+/AFR–, AFL–) of the ECM.

Result:

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

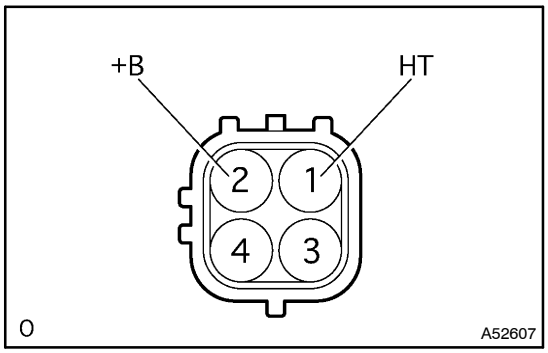
NG

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

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

4	INSPECT AIR FUEL RATIO SENSOR(CHECK HEATER RESISTANCE)



(a) Disconnect the air fuel ratio sensor.
(b) Measure resistance between the terminals HT and +B of the air fuel ratio sensor.
Resistance: 2.16 – 2.88 Ω (20°C)

NG → REPLACE AIR FUEL RATIO SENSOR

OK

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

NG → REPAIR OR REPLACE AIR INDUCTION SYSTEM

OK

6	REPLACE EGR SYSTEM

NG → REPLACE EGR SYSTEM

OK

7	CHECK FUEL PRESSURE (See page 11–52)

NG → REPAIR OR REPLACE FUEL SYSTEM

OK

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

NG → REPLACE FUEL INJECTOR ASSY

OK

9	CHECK EXHAUST GAS LEAK

NG → REPAIR OR REPLACE EXHAUST GAS LEAKAGE POINT

OK

REPLACE AIR FUEL RATIO SENSOR

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

GO

11	READ OUTPUT DTC(BESIDES DTC P0125)

YES → CHECK AND REPLACE ECM

NO

12	CONFIRM VEHICLE RUNS OUT OF FUEL IN THE PAST

NO → CHECK FOR INTERMITTENT PROBLEMS

YES

DTC P0125 IS CAUSED BY RUNNING OUT OF FUEL

When not using Hand–held Tester:

1	CHECK OTHER DTC OUTPUT(BESIDES CORD P0125/91)

YES → GO TO RELEVANT DTC CHART

NO

REPLACE AIR FUEL RATIO SENSOR