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

CIRCUIT DESCRIPTION

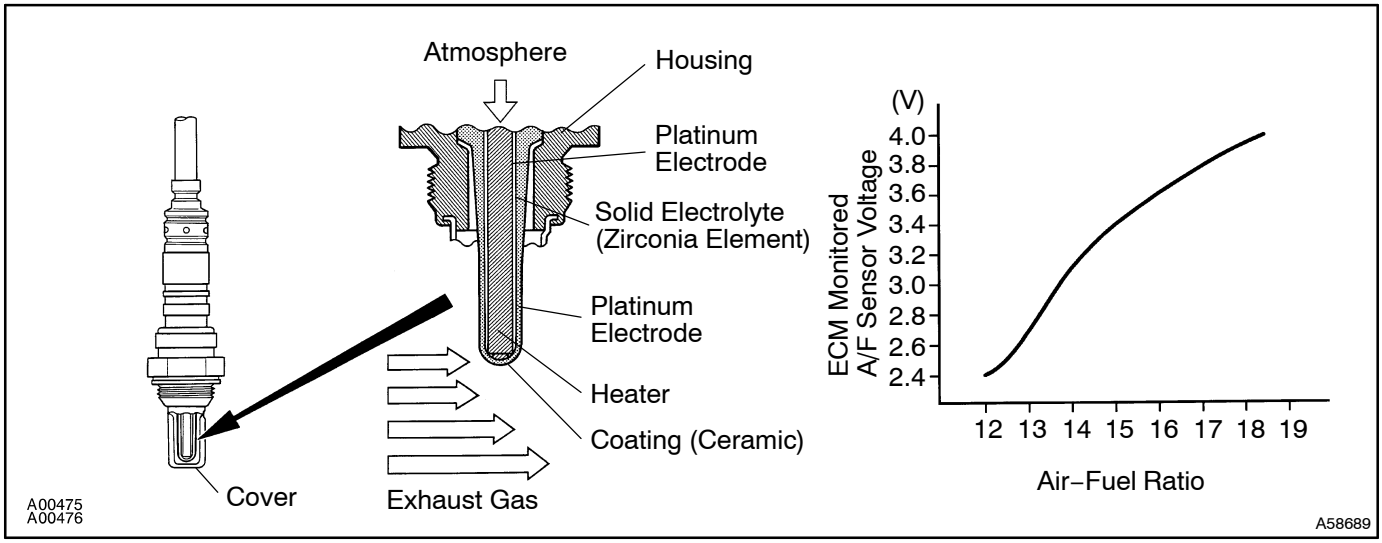
To obtain a high purification rate of the CO, HC and NOx components of the exhaust gas, a three–way catalytic converter is used. For the most efficient use of the three–way catalytic converter, the air–fuel ratio must be precisely controlled so that it is always close to the stoichiometric air–fuel ratio.

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.

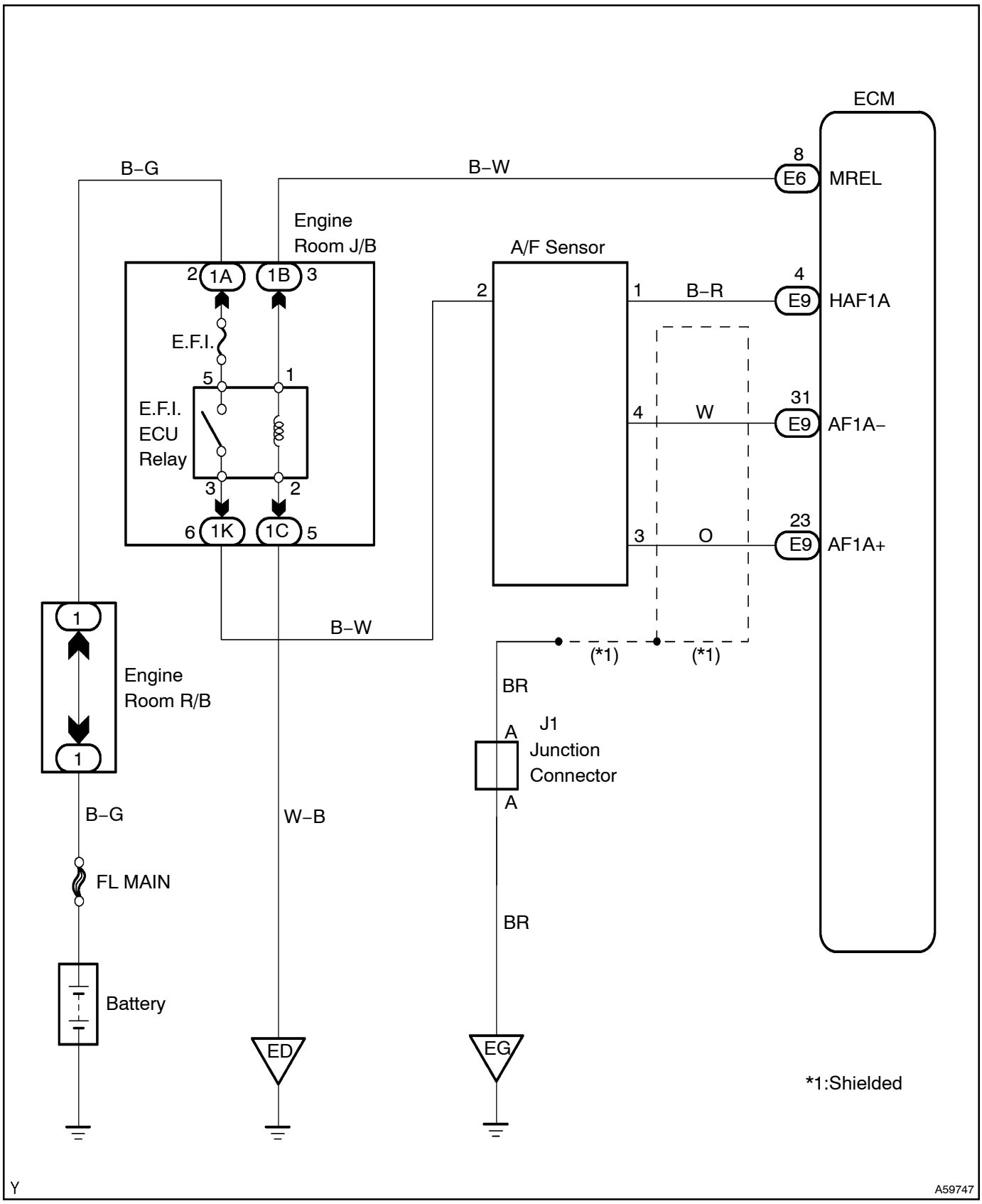


DTC No	DTC Detecting Condition	Trouble Area
P0125/91	After engine is warmed up, A/F sensor output* does not change when conditions (a), (b), (c) and (d) continue for at least 1.5 min: *: Output value changes at inside of the ECM only (c) Engine speed: 1,500 rpm or more (d) Vehicle speed: 40 – 100 km/h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

HINT:

- After confirming DTC P0125/91, use the hand–held tester to confirm output voltage of the A/F sensor from the CURRENT DATA.
- The ECM controls the voltage of the AF1A+, AF1A– and 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.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand–held tester, as freeze frame data 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	READ OUTPUT DTC(BESIDES P0125/91)

Result:

	A	B
RESULT	Only P0125/91 is output.	P0125/91 and other codes are output.

HINT:
If any other cord besides P0125/91 are output, perform the troubleshoot on that DTC before.

B → **GO TO RELEVANT DTC CHART**

A

2	READ VALUE OF HAND–HELD TESTER(OUTPUT VOLTAGE OF A/F SENSOR)

(a) Warm up the oxygen 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 AF1A+ terminal of the ECM is fixed at 3.3 V and the voltage of the AF1A– terminal is fixed at 3.0 V, therefore it is impossible to check the A/F sensor output voltage at the terminals (AF1A+, AF1A–) of the ECM.

A/F sensor output voltage:
Alternates repeatedly between less than 0.4 V and more than 0.55 V (See the following table)

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
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:
- Although there is a case that the output voltage of the A/F sensor is below 2.8 V (0.56 V*) during fuel enrichment, it is normal.
- Although there is a case that the output voltage of the A/F sensor is above 3.8 V (0.76 V*) during fuel cut, 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.

OK → **Go to step 9**

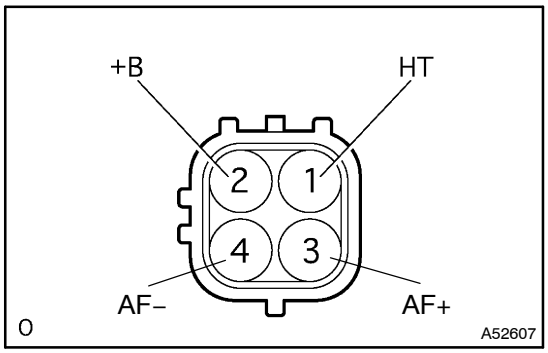
NG

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

NG → REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR

OK

4	INSPECT AIR FUEL RATIO SENSOR(A/F SENSOR HEATER RESISTANCE)



(a) Disconnect the air fuel ratio sensor connector.
(b) Measure resistance between the terminals HT and +B of the air fuel ratio sensor.
Resistance: 0.9 – 1.2 Ω (20°C)

NG → REPLACE AIR FUEL RATIO SENSOR

OK

5	CHECK AIR INDUCTION SYSTEM (See page 10–7)

NG → REPAIR OR REPLACE AIR INDUCTION SYSTEM

OK

6	CHECK FUEL PRESSURE (See page 11–29)

NG → REPAIR OR REPLACE FUEL SYSTEM

OK

7	INSPECT FUEL INJECTOR ASSY (See page 11–29)

NG → REPLACE FUEL INJECTOR ASSY

OK

8	CHECK EXHAUST GAS LEAK

NG → REPAIR OR REPLACE EXHAUST GAS LEAKAGE POINT

OK

REPLACE AIR FUEL RATIO SENSOR

9	PERFORM CONFIRMATION DRIVING PATTERN (See page 05–173)

GO

10	READ OUTPUT DTC(BESIDES P0125/91)

Result:

	A	B
RESULT	P0125/91 is not output.	P0125/91 is output.

B → CHECK FOR INTERMITTENT PROBLEMS

A

11	CONFIRM VEHICLE RUNS OUT OF FUEL IN THE PAST

NO → CHECK AND REPLACE ECM

YES

DTC IS CAUSED RUNNING OUT OF FUEL

When not using Hand–held Tester:

1	READ OUTPUT DTC(BESIDES P0125/91)

YES → GO TO RELEVANT DTC CHART

NO

REPLACE AIR FUEL RATIO SENSOR