DTC	P0115/22	ENGINE COOLANT TEMPERATURE CIRCUIT

DTC	P0117/22	ENGINE COOLANT TEMPERATURE CIRCUIT LOW INPUT

DTC	P0118/22	ENGINE COOLANT TEMPERATURE CIRCUIT HIGH INPUT

CIRCUIT DESCRIPTION

A thermistor is built in the engine coolant temperature sensor and changes the resistance value according to the engine coolant temperature.

The structure of the sensor and connection to the ECM is the same as those of the intake air temperature sensor.

HINT:

If the ECM detects the DTC "P0115/22, P0117/22 or P0118/22" it operates the fail-safe function in which the engine coolant temperature is assumed to be 80 °C (176 °F).

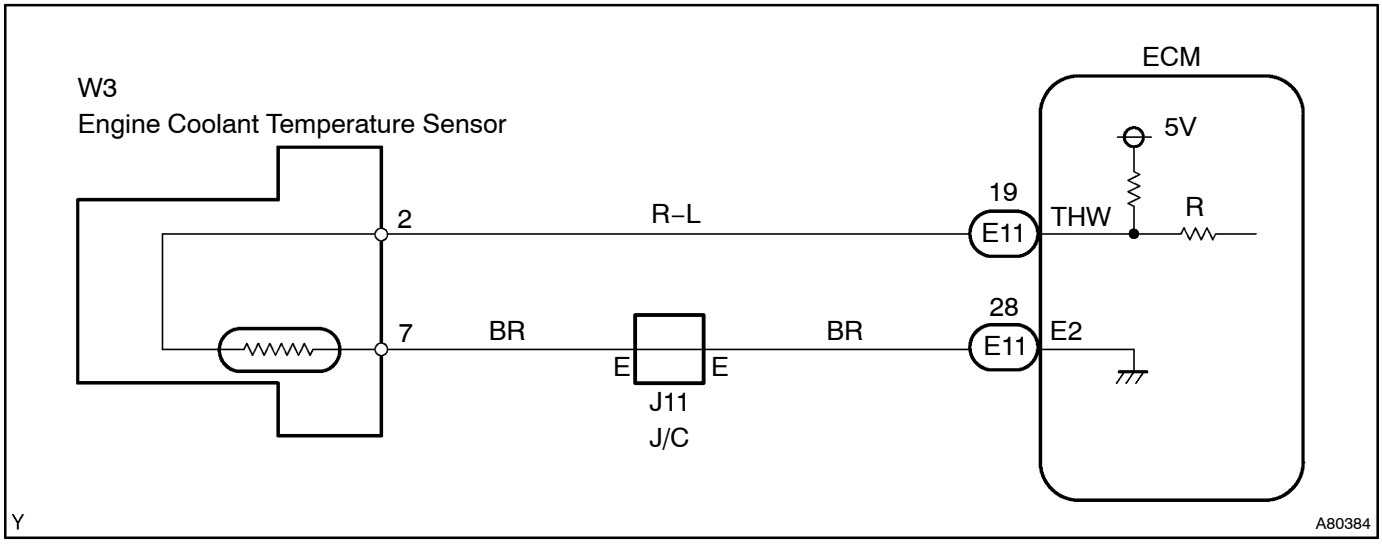
DTC No.	Proceed to	DTC Detection Condition	Trouble Area
P0115/22	Step 1	Open or short in engine coolant temp. sensor circuit for 0.5 sec.	• Open or short in engine coolant temp. sensor circuit • Engine coolant temp. sensor • ECM
P0117/22	Step 4	Short in engine coolant temp. sensor circuit for 0.5 sec.	
P0118/22	Step 2	Open in engine coolant temp. sensor circuit for 0.5 sec.	

HINT:

After confirming DTC "P0115/22, P0117/22 or P0118/22", use the hand-held tester to confirm the engine coolant temperature in the "DIAGNOSIS / OBD/MOBD / DATA LIST / ALL".

Temperature Displayed	Malfunction
−40°C (−40°F)	Open circuit
140°C (284°F) or more	Short circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If different DTCs that are related to a different system are output simultaneously while terminal E2 is used as a ground terminal, terminal E2 may be open.
- Read freeze frame data using the hand–held tester, as freeze frame data records the engine conditions when a 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 VALUE OF HAND–HELD TESTER (ENGINE COOLANT TEMPERATURE)

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON and push the hand–held tester main switch ON.

(c) Select the item "DIAGNOSIS / OBD/MOBD / DATA LIST / ALL / COOLANT TEMP" and read its value displayed on the hand–held tester.

Temperature: Same value as the actual engine coolant temperature.

Result:

Temperature Displayed	Proceed to
–40°C (–40°F)	A
140°C (284°F) or more	B
OK (Same as present temperature)	C

HINT:

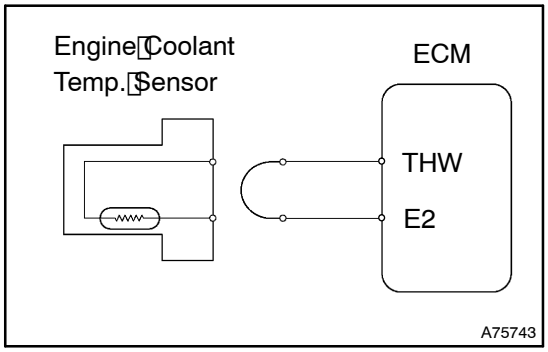
- If there is an open circuit, the hand–held tester indicates –40°C (–40°F).
- If there is a short circuit, the hand–held tester indicates 140°C (284°F) or more.

B → **Go to step 4**

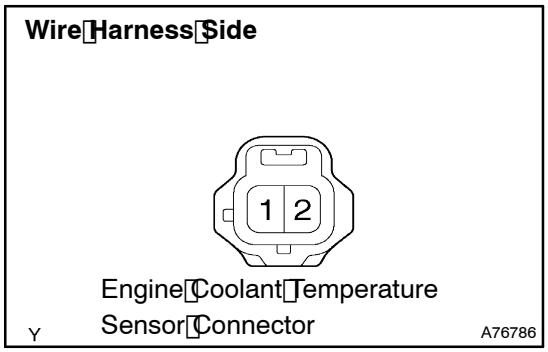
C → **CHECK FOR INTERMITTENT PROBLEMS (See page 05–7)**

A

2 READ VALUE OF HAND–HELD TESTER (CHECK FOR OPEN IN WIRE HARNESS)



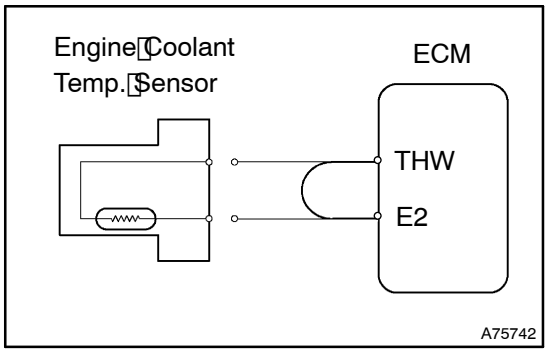
(a) Disconnect the engine coolant temperature sensor connector.
(b) Connect terminals 1 and 2 of the engine coolant temperature sensor wire harness side connector.
(c) Turn the ignition switch ON.
(d) Select the item "DIAGNOSIS / OBD/MOBD / DATA LIST / ALL / COOLANT TEMP" and read its value displayed on the hand–held tester.
Temperature value: 140°C (284°F) or more



OK	CONFIRM GOOD CONNECTION AT SENSOR. IF OK, REPLACE ENGINE COOLANT TEMP. SENSOR

NG

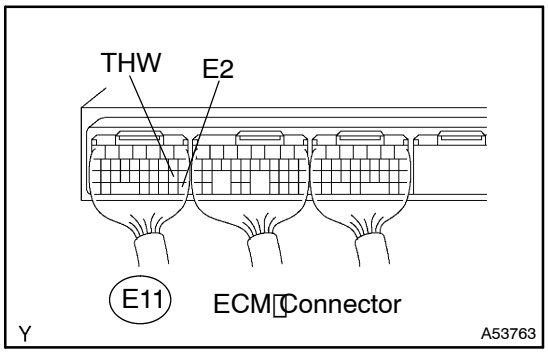
3 READ VALUE OF HAND–HELD TESTER (CHECK FOR OPEN IN ECM)



(a) Disconnect the engine coolant temperature sensor connector.
(b) Connect terminals THW and E2 of the E11 ECM connector.

HINT:
Before checking, do a visual and contact pressure check for the ECM connector.

(c) Turn the ignition switch ON.
(d) Select the item "DIAGNOSIS / OBD/MOBD / DATA LIST / ALL / COOLANT TEMP" and read its value displayed on the hand–held tester.
Temperature value: 140°C (284°F) or more

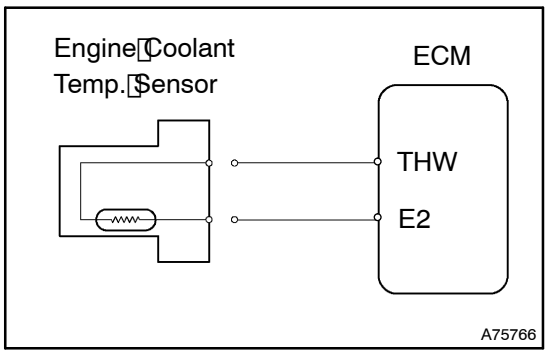


OK	REPAIR OR REPLACE HARNESS OR CONNECTOR

NG

CONFIRM GOOD CONNECTION AT ECM. IF OK, CHECK AND REPLACE ECM (See page 01–35)

4 READ VALUE OF HAND–HELD TESTER (CHECK FOR SHORT IN WIRE HARNESS)

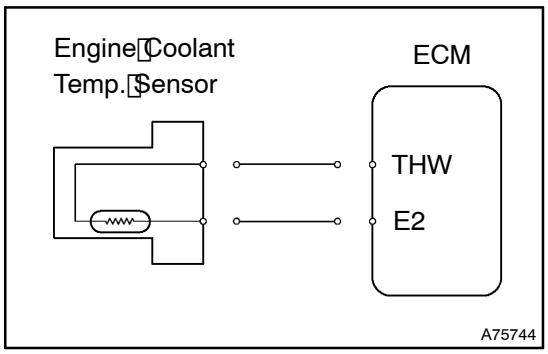


(a) Disconnect the engine coolant temperature sensor connector.
(b) Turn the ignition switch ON.
(c) Select the item "DIAGNOSIS / OBD/MOBD / DATA LIST / ALL / COOLANT TEMP" and read its value displayed on the hand–held tester.
Temperature value: –40°C (–40°F)

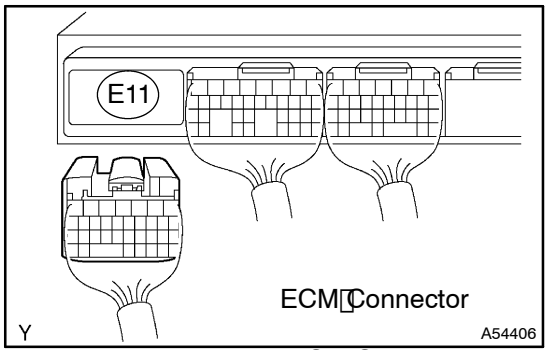
OK	**REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

NG

5 READ VALUE OF HAND–HELD TESTER (CHECK FOR SHORT IN ECM)



(a) Disconnect the E11 ECM connector.
(b) Turn the ignition switch ON.
(c) Select the item "DIAGNOSIS / OBD/MOBD / DATA LIST / ALL / COOLANT TEMP" and read its value displayed on the hand–held tester.
Temperature: –40°C (–40°F)



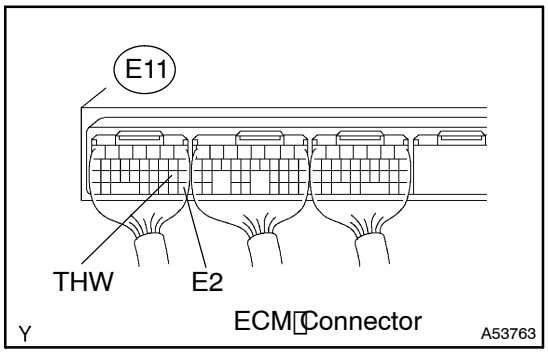
OK	**REPAIR OR REPLACE HARNESS OR CONNECTOR**

NG

CHECK AND REPLACE ECM (See page 01–35)

When not using hand–held tester:

1 INSPECT ECM (THW VOLTAGE)



(a) Turn the ignition switch ON.
(b) Measure the voltage between terminals THW and E2 of the ECM connector.

Voltage:

Engine coolant temp.	Voltage
20°C (68°F)	0.5 to 3.4 V
80°C (176°F)	0.2 to 1.0 V

OK → **CHECK FOR INTERMITTENT PROBLEMS (See page 05–7)**

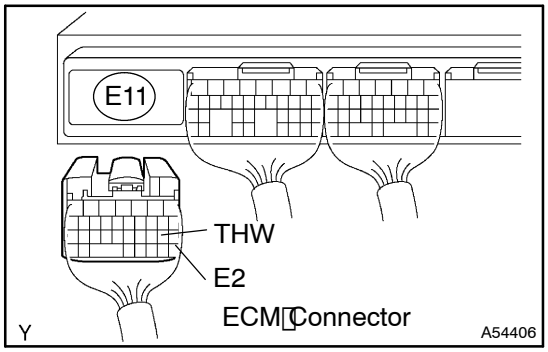
NG

2 INSPECT ENGINE COOLANT TEMPERATURE SENSOR (See page 10–3)

NG → **REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

OK

3 CHECK HARNESS AND CONNECTOR (ECM – ENGINE COOLANT TEMPERATURE SENSOR)



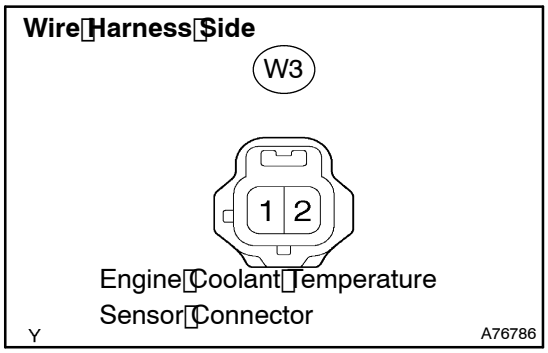
(a) Disconnect the ECM E11 connector.
(b) Disconnect the engine coolant temperature sensor connector.
(c) Check for continuity between the wire harness side connector.

Standard (Check for open):

Symbols (Terminal No.)	Specified condition
THW (E11–19) – Engine coolant temp. sensor (W3–2)	Continuity
E2 (E11–28) – Engine coolant temp. sensor (W3–1)	

Standard (Check for short):

Symbols (Terminal No.)	Specified condition
THW (E11–19) or Engine coolant temp. sensor (W3–2) – Body ground	No continuity



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

CHECK AND REPLACE ECM (See page 01–35)