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

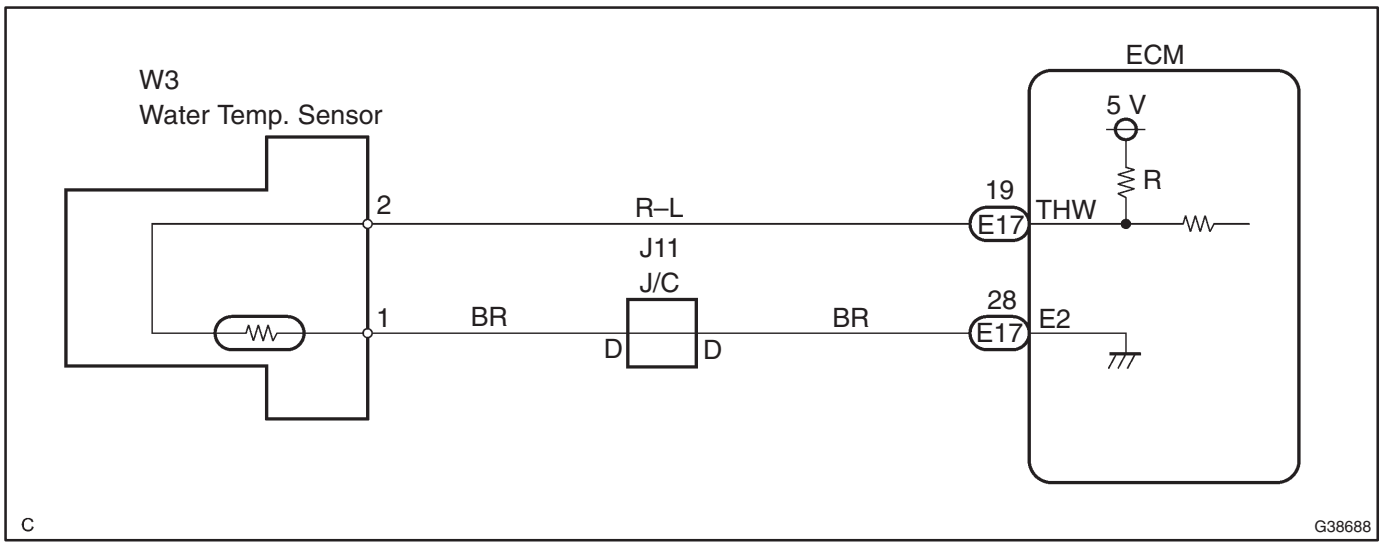
A thermistor is built in the Engine Coolant Temperature (ECT) sensor and changes the resistance value according to the engine coolant temperature.
The structure of the sensor and connection to the ECM is the same as the intake air temperature sensor.
HINT:
If the ECM detects the DTC P0115/22, P0117/22 or P0118/22, it operates the fail–safe function in which the ECT is assumed to be 80°C (176°F).

DTC No.	DTC Detection Condition	Trouble Area	Proceed to
P0115/22	Open or short in ECT sensor circuit for 0.5 seconds (1 trip detection logic)	• Open or short in ECT sensor circuit • ECT sensor • ECM	Step 1
P0117/22	Short in ECT sensor circuit for 0.5 seconds (sensor resistance value less than 79 Ω) (1 trip detection logic)	• Open or short in ECT sensor circuit • ECT sensor • ECM	Step 4
P0118/22	Open in ECT sensor circuit for 0.5 seconds (sensor resistance value more than 156 kΩ) (1 trip detection logic)	• Open or short in ECT sensor circuit • ECT sensor • ECM	Step 2

HINT:
When DTC P0115/22, P0117/22 and/or P0118/22 is detected, check the engine coolant temperature by entering on the intelligent tester II: Powertrain / Engine / Data List / Coolant Temp.

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

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTCs related to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.
- Read freeze frame data using the intelligent tester II. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, and other data from the time the malfunction occurred.

When using intelligent tester II:

1	READ DATA LIST (ENGINE COOLANT TEMPERATURE)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the ignition switch ON and turn the intelligent tester II ON.
(c) Enter the following menus: Powertrain / Engine / Data List / Coolant Temp.
(d) Read the values.
OK: 75 to 95°C (167 to 203°F) after warming up the engine.
Result:

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

HINT:

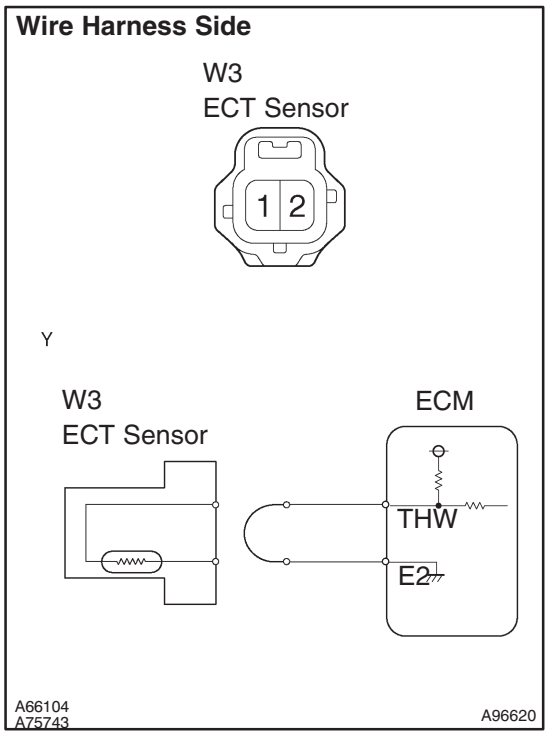
- If there is an open circuit, the intelligent tester II indicates –40°C (–40°F).
- If there is a short circuit, the intelligent tester II indicates 140°C (284°F) or more.

B	Go to step 4

C	CHECK FOR INTERMITTENT PROBLEMS (See page 05–439)

A

2 READ DATA LIST (CHECK FOR OPEN IN WIRE HARNESS)

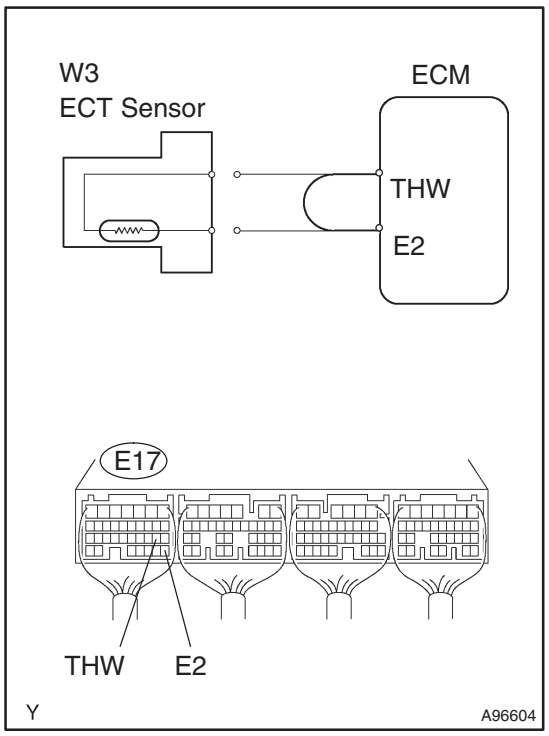


(a) Disconnect the W3 ECT sensor connector.
(b) Connect terminals 1 and 2 of the ECT sensor wire harness side connector.
(c) Connect the intelligent tester II to the DLC3.
(d) Turn the ignition switch ON and turn the intelligent tester II ON.
(e) Enter the following menus: Powertrain / Engine / Data List / Coolant Temp.
(f) Read the values.
Standard: 140°C (284°F) or more

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

NG

3 READ DATA LIST (CHECK FOR OPEN IN ECM)



(a) Disconnect the W3 ECT sensor connector.
(b) Connect terminals THW and E2 of the E17 ECM connector.

HINT:
Before checking, perform a visual and contact pressure check on the ECM connector.

(c) Connect the intelligent tester II to the DLC3.
(d) Turn the ignition switch ON and turn the intelligent tester II ON.
(e) Enter the following menus: Powertrain / Engine / Data List / Coolant Temp.
(f) Read the values.
Standard: 140°C (284°F) or more

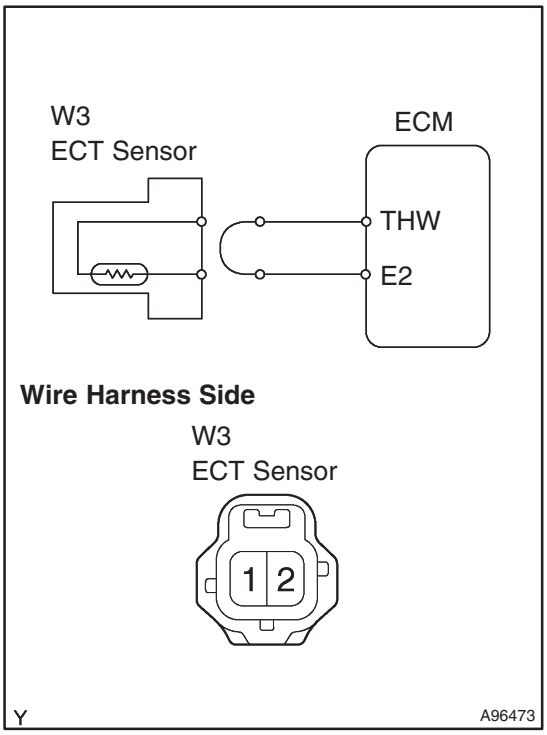
OK	REPAIR OR REPLACE HARNESS AND CONNECTOR

NG

CONFIRM GOOD CONNECTION AT ECM. IF OK, REPLACE ECM (See Pub. No. RM990E, page 10–34)

NOTICE:
After replacing the ECM, allow for ECM learning start the engine and idle it until it is fully warmed up.

4 READ DATA LIST (CHECK FOR SHORT IN WIRE HARNESS)

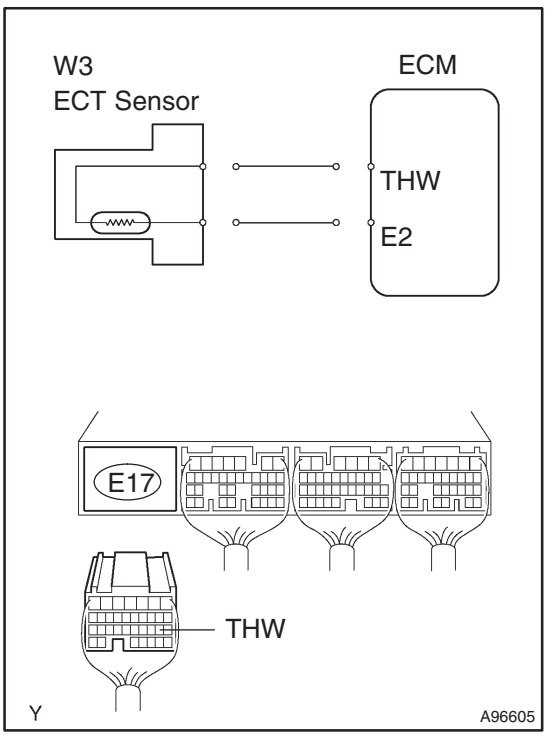


(a) Disconnect the W3 ECT sensor connector.
(b) Connect the intelligent tester II to the DLC3.
(c) Turn the ignition switch ON and turn the intelligent tester II ON.
(d) Enter the following menus: Powertrain / Engine / Data List / Coolant Temp.
(e) Read the values.
Standard: –40°C (–40°F)

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

NG

5 READ DATA LIST (CHECK FOR SHORT IN ECM)



(a) Disconnect the W3 ECT sensor connector.
(b) Disconnect the E17 ECM connector.
(c) Connect the intelligent tester II to the DLC3.
(d) Turn the ignition switch ON and turn the intelligent tester II ON.
(e) Enter the following menus: Powertrain / Engine / Data List / Coolant Temp.
(f) Read the values.
Standard: –40°C (–40°F)

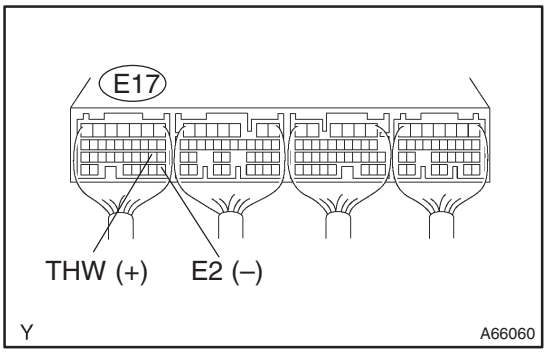
OK	**REPAIR OR REPLACE HARNESS AND CONNECTOR**

NG

REPLACE ECM (See Pub. No. RM990E, page 10–34)

When not using intelligent tester II:

1 CHECK ECM (THW VOLTAGE)



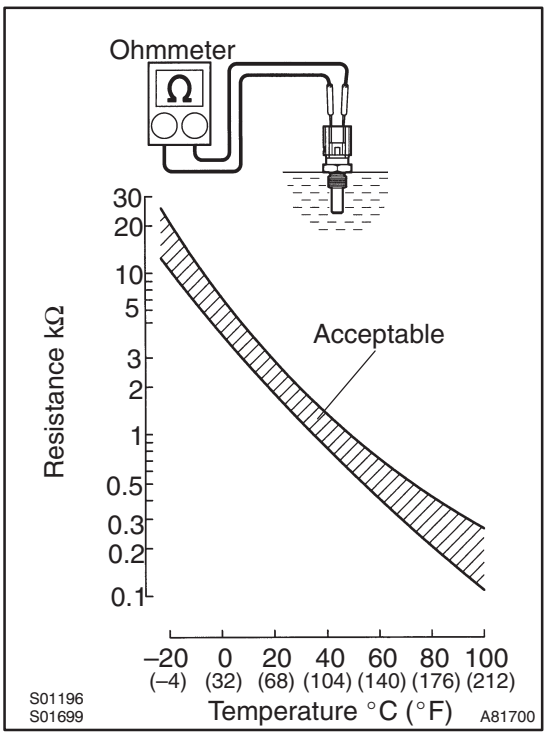
(a) Start the engine.
(b) Measure the voltage of the ECM connector.
Standard:

Tester Connection	Condition	Specified Condition
E17–19 (THW) – E17–28 (E2)	Idling, engine coolant temperature between 60°C and 120°C (140°F and 248°F)	0.2 to 1.0 V

OK → CHECK FOR INTERMITTENT PROBLEMS (See page 05–439)

NG

2 INSPECT ENGINE COOLANT TEMPERATURE SENSOR



(a) Remove the sensor.
(b) Measure the resistance of the sensor.
Standard:

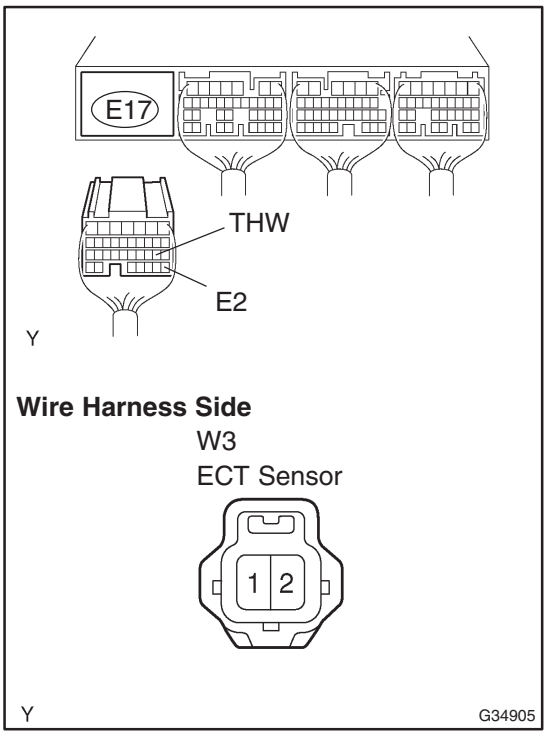
Tester Connection	Condition	Specified Condition
1 – 2	20°C (68°F)	2.32 to 2.59 kΩ
1 – 2	80°C (176°F)	0.310 to 0.326 kΩ

NOTICE:
If checking the ECT sensor in water, keep the terminals dry. After the check, wipe the sensor dry.
HINT:
Alternative procedure: Connect an ohmmeter to the installed ECT sensor and read the resistance. Use an infrared thermometer to measure the engine temperature in the immediate vicinity of the sensor. Compare these values against the resistance/temperature graph. Change the engine temperature (warm up or allow to cool down) and repeat the test.

NG → REPLACE ENGINE COOLANT TEMPERATURE SENSOR

OK

3 CHECK WIRE HARNESS (ECM – ENGINE COOLANT TEMPERATURE SENSOR)



(a) Disconnect the E17 ECM connector.
(b) Disconnect the W3 ECT sensor connector.
(c) Measure the resistance of the harness and connectors.
Standard:

Tester Connection	Specified Condition
E17–19 (THW) – W3–2	Below 1 Ω
E17–28 (E2) – W3–1	Below 1 Ω
E17–19 (THW) or W3–2 – Body ground	10 kΩ or higher
E17–28 (E2) or W3–1 – Body ground	10 kΩ or higher

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

OK

REPLACE ECM (See Pub. No. RM990E, page 10–34)

NOTICE:
After replacing the ECM, allow for ECM learning start the engine and idle it until it is fully warmed up.