DI1LF–15

DTC	P0 115/22	Engine Coolant Temperature Circuit

DTC	P0 117/22	Engine Coolant Temperature Circuit Low Input

DTC	P0 118/22	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 engine control ECU is the same the Intake Air Temperature (IAT) sensor.

HINT:

If the engine control ECU detects the DTC "P0 115/22, P0 117/22 or P0 118/22", it operates the fail –safe function in which the ECT 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 temperature sensor circuit for 0.5 sec. (ECT equal to –40° C (–40° F) or more than 140° C (284 ° F)) (1 trip detection logic)	• Open or short in engine coolant temperature sensor circuit • Engine coolant temperature sensor • Engine control ECU
P0117/22	Step 4	Short in engine coolant temperature sensor circuit for 0.5 sec. (ECT is more than 140° C (284 ° F)) (1 trip detection logic)	
P0118/22	Step 2	Open in engine coolant temperature sensor circuit for 0.5 sec. (ECT is –40° C (–40° F)) (1 trip detection logic)	

HINT:

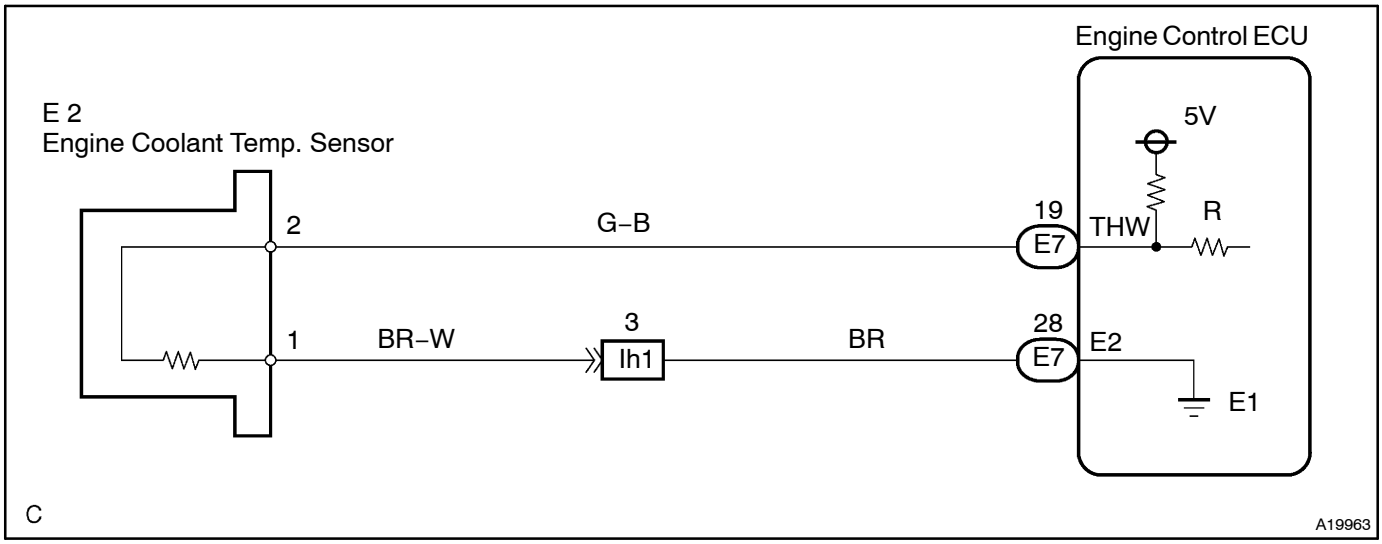
After confirming DTC "P0 115, P0 117 o r P 0118," use the hand –held tester to confirm the engine coolant temperature from the DIAGNOSIS / OBD/MOBD / DATA LIST / ALL.

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

MONITOR DESCRIPTION

The ECT (Engine Coolant Temperature) sensor is used to monitor the engine coolant temperature. The ECT sensor has a thermistor that varies its resistance depending on the temperature of the engine coolant. When the coolant temperature is low, the resistance in the thermistor increases. When the temperature is high, the resistance drops. The variations in resistance are reflected in the voltage output from the sensor.
The engine control ECU monitors the sensor voltage and uses this value to calculate the engine coolant temperature. When the sensor output voltage deviates from the normal operating range, the engine control ECU interprets this as a fault in the ECT sensor and sets a DTC.
Example:
When the engine control ECU calculates that the ECT is less than –40°C (–40°F), or more than 140°C (284°F), and if either the condition continues for 0.5 sec. or more, the engine control ECU will set a DTC.
This monitor runs 0.5 seconds after the ignition switch turned ON.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- Read freeze frame data using the hand–held tester. 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, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Connect hand–held tester, and read value of engine coolant temperature.**

PREPARATION:

(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) When using hand–held tester, enter the following menus: DIAGNOSIS / OBD/MOBD / DATA LIST / ALL / COOLANT TEMP.

CHECK:

Read the temperature value on the hand–held tester.

OK:

Same value as 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

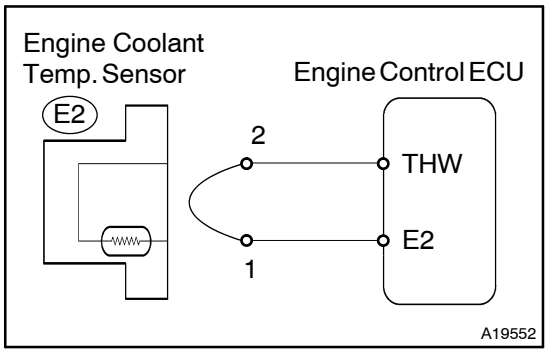
HINT:

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

B	**Go to step 4.**
C	**Check for intermittent problems (See page DI–3).**

A

2	Check for open in harness or engine control ECU.



PREPARATION:

(a) Disconnect the E2 engine coolant temperature (ECT) 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) When using hand –held tester, enter the following menus: DIAGNOSIS / OBD/MOBD / DATA LIST / ALL / COOLANT TEMP.

CHECK:

Read the temperature value on the hand –held tester.

OK:

Temperature value: 140°C (284 °F) or more

OK → **Confirm good connection at sensor. If OK, replace engine coolant temperature sensor.**

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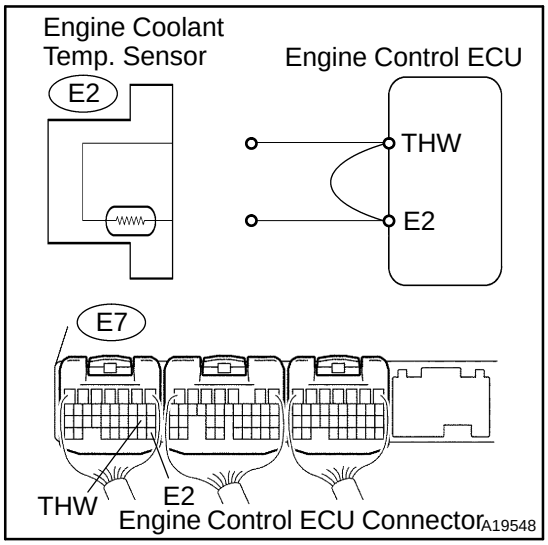
3	Check for open in harness or engine control ECU.



PREPARATION:

(a) Disconnect the E2 engine coolant temperature sensor connector.

(b) Connect terminals THW and E2 of the E7 engine control ECU connector.

HINT:

Before checking, do a visual and contact pressure checks for the engine control ECU connector.

(c) Turn the ignition switch ON.

(d) When using hand−held tester, enter the following menus: DIAGNOSIS / OBD/MOBD / DATA LIST / ALL / COOLANT TEMP.

CHECK:

Read the temperature value on the hand−held tester.

OK:

Temperature value: 140°C (284°F) or more

OK	Repair or replace harness or connector.

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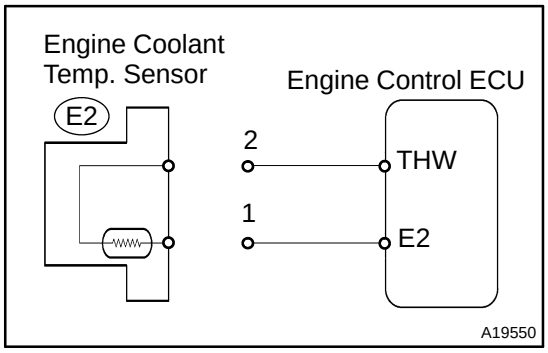
Confirm good connection at engine control ECU. If OK, check and replace engine control ECU (See page IN−20).

4	Check for short in harness and engine control ECU.



PREPARATION:

(a) Disconnect the E2 engine coolant temperature sensor connector.

(b) Turn the ignition switch ON.

(c) When using hand−held tester, enter the following menus: DIAGNOSIS / OBD/MOBD / DATA LIST / ALL / COOLANT TEMP.

CHECK:

Read the temperature value on the hand−held tester.

OK:

Temperature value: −40°C (−40°F)

OK	Replace engine coolant temperature sensor.

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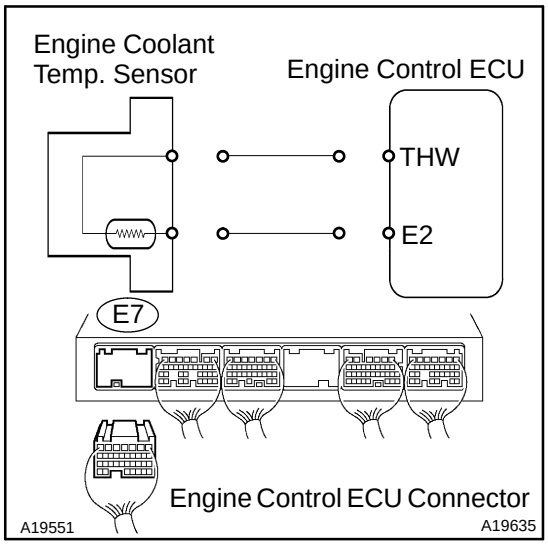
5	Check for short in harness or engine control ECU.



PREPARATION:

(a) Disconnect the E7 engine control ECU connector.
(b) Turn the ignition switch ON.
(c) When using hand−held tester, enter the following menus: DIAGNOSIS / OBD/MOBD / DATA LIST / ALL / COOLANT TEMP.

CHECK:

Read the temperature value on the hand−held tester.

OK:

Temperature value: −40°C (−40°F)

OK	Repair or replace harness or connector.

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Replace engine control ECU (See Pub. No. RM630E, page FI−74).