

DTC	P0115	Engine Coolant Temperature Circuit Malfunction
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DTC	P0117	Engine Coolant Temperature Circuit Low Input
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DTC	P0118	Engine Coolant Temperature Circuit High Input
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DESCRIPTION

A thermistor is built into the Engine Coolant Temperature (ECT) sensor, of which the resistance value varies according to the ECT.

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The structure of the sensor and its connection to the ECM are the same as those of the Intake Air Temperature (IAT) sensor.

HINT:

When any of DTCs P0115, P0117 and P0118 are set, the ECM enters fail-safe mode. During fail-safe mode, the ECT is estimated to be 80°C (176°F) by the ECM. Fail-safe mode continues until a pass condition is detected.

DTC No.	DTC Detection Condition	Trouble Area
P0115	Open or short in ECT sensor circuit for 0.5 seconds (1 trip detection logic)	<ul style="list-style-type: none"> • Open or short in ECT sensor circuit • ECT sensor • ECM
P0117	Short in ECT sensor circuit for 0.5 seconds (1 trip detection logic)	<ul style="list-style-type: none"> • Short in ECT sensor • ECT sensor • ECM
P0118	Open in ECT sensor circuit for 0.5 seconds (1 trip detection logic)	<ul style="list-style-type: none"> • Open in ECT sensor circuit • ECT sensor • ECM

HINT:

When any of these DTCs are set, check the ECT by entering the following menus on the intelligent tester: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.

Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
140°C (284°F) or higher	Short circuit

MONITOR DESCRIPTION

The Engine Coolant Temperature (ECT) sensor is used to monitor the ECT. The ECT sensor has a thermistor with a resistance that varies according to 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. These variations in resistance are reflected in the output voltage from the sensor. The ECM monitors the sensor voltage and uses this value to calculate the ECT. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a fault in the ECT sensor and sets a DTC.

Example:

If the sensor output voltage is 4.91 V for 0.5 seconds or more, the ECM determines that there is an open in the ECT sensor circuit, and sets DTC P0118. Conversely, if the voltage output is more than 0.14 V for 0.5 seconds or more, the ECM determines that there is a short in the sensor circuit, and sets DTC P0117. If the malfunction is not repaired successfully, a DTC is set 0.5 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0115: Engine coolant temperature sensor range check (Fluctuating) P0117: Engine coolant temperature sensor range check (Low resistance) P0118: Engine coolant temperature sensor range check (High resistance)
Required sensors/components (Main)	Engine coolant temperature (ECT) sensor
Required sensors/components (Related)	-
Frequency of Operation	Continuous
Duration	0.5 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	None
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TYPICAL MALFUNCTION THRESHOLDS

P0115:

ECT sensor voltage	Less than 0.14 V, or more than 4.91 V
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P0117:

ECT sensor voltage	Less than 0.14 V
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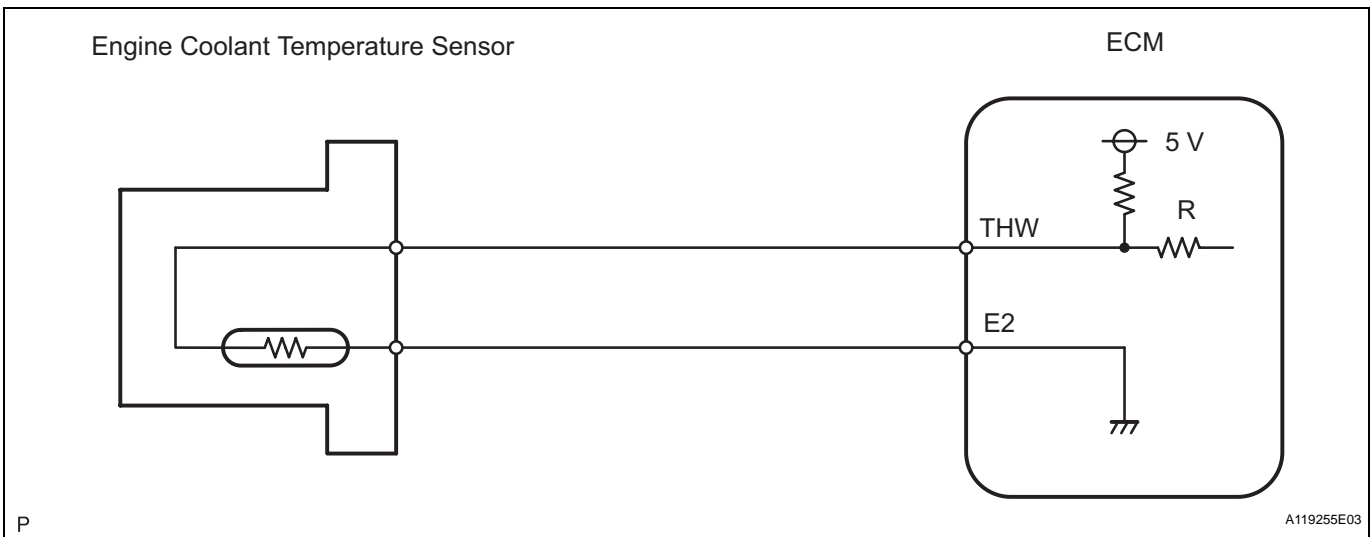
P0118:

ECT sensor voltage	More than 4.91 V
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COMPONENT OPERATING RANGE

ECT sensor voltage	0.14 to 4.91 V
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WIRING DIAGRAM



HINT:

- If other DTCs relating 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. Freeze frame data records the engine conditions when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, 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 READ VALUE OF INTELLIGENT TESTER (ENGINE COOLANT TEMPERATURE)

- Connect the intelligent tester to the DLC3.
- Turn the ignition switch ON and turn the tester ON.
- Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.
- Read the value displayed on the tester.

Standard:

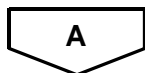
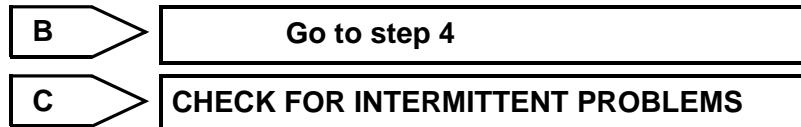
Between 80°C and 97°C (176°F and 207°F) with warm engine.

Result

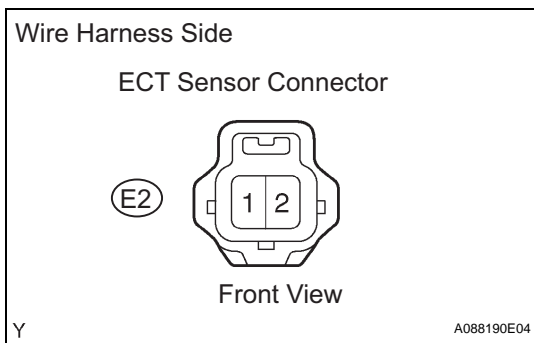
Temperature Displayed	Proceed to
-40°C (-40°F)	A
140°C (284°F) or higher	B
Between 80°C and 97°C (176°F and 207°F)	C

HINT:

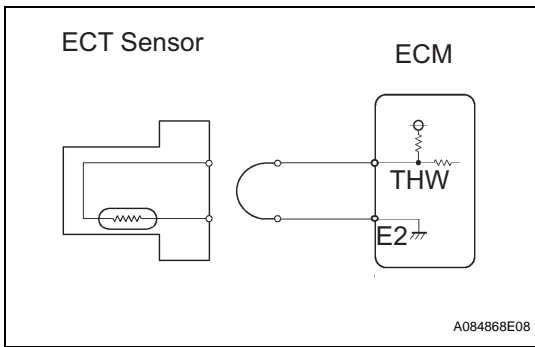
- If there is an open circuit, the intelligent tester indicates -40°C (-40°F).
- If there is a short circuit, the intelligent tester indicates 140°C (284°F) or higher.



2 READ VALUE OF INTELLIGENT TESTER (CHECK FOR OPEN IN WIRE HARNESS)



- Disconnect the E2 Engine Coolant Temperature (ECT) sensor connector.



- (b) Connect terminals 1 and 2 of the ECT sensor connector on the wire harness side.
- (c) Connect the intelligent tester to the DLC3.
- (d) Turn the ignition switch ON and turn the tester ON.
- (e) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.
- (f) Read the value displayed on the tester.

Standard:

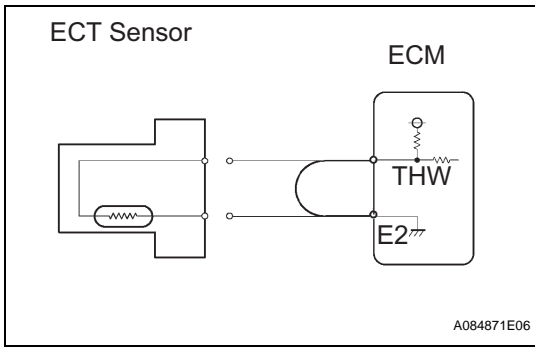
140°C (284°F) or higher.

OK

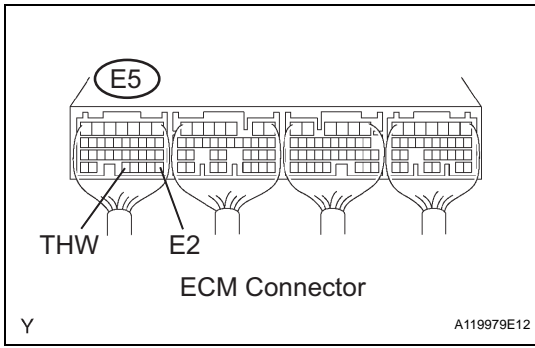
CONFIRM GOOD CONNECTION TO SENSOR. IF OK, REPLACE ENGINE COOLANT TEMPERATURE SENSOR

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3 READ VALUE OF INTELLIGENT TESTER (CHECK FOR OPEN IN ECM)



- (a) Disconnect the E2 ECT sensor connector.



- (b) Connect terminals THW and E2 of the ECM connector.
HINT:
Before checking, perform visual and contact pressure checks on the ECM connector.
- (c) Connect the intelligent tester to the DLC3.
- (d) Turn the ignition switch ON and turn the tester ON.
- (e) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.
- (f) Read the value displayed on the tester.

Standard:

140°C (284°F) or higher.

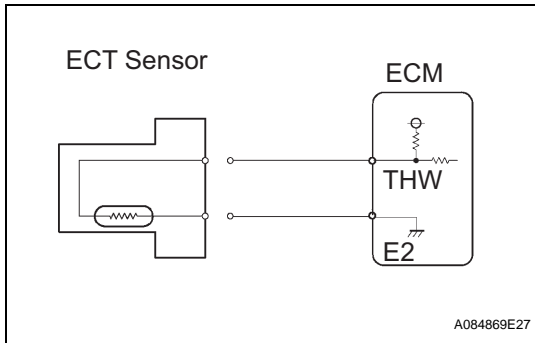
OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

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CONFIRM GOOD CONNECTION TO ECM. IF OK, REPLACE ECM

4 READ VALUE OF INTELLIGENT TESTER (CHECK FOR SHORT IN WIRE HARNESS)



- (a) Disconnect the E2 ECT sensor connector.
- (b) Connect the intelligent tester to the DLC3.
- (c) Turn the ignition switch ON and turn the tester ON.
- (d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.
- (e) Read the value displayed on the tester.

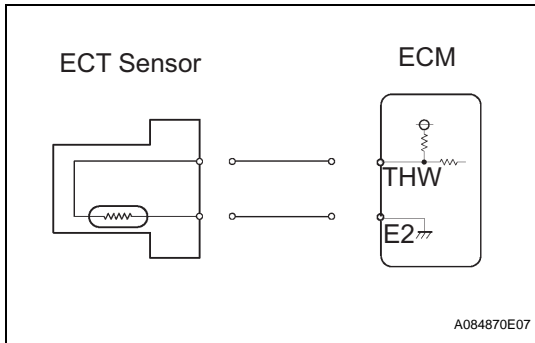
Standard:
-40°C (-40°F)

OK

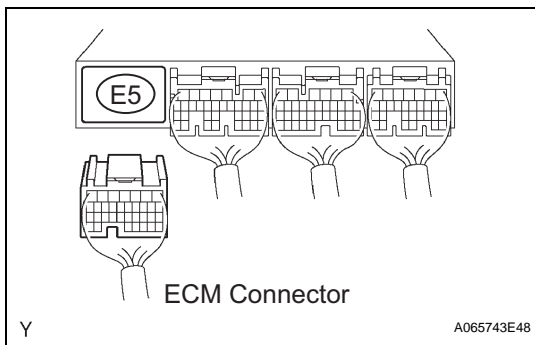
REPLACE ENGINE COOLANT TEMPERATURE SENSOR

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5 READ VALUE OF INTELLIGENT TESTER (CHECK FOR SHORT IN ECM)



- (a) Disconnect the E5 ECM connector.



- (b) Connect the intelligent tester to the DLC3.
- (c) Turn the ignition switch ON and turn the tester ON.
- (d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / INTAKE AIR.
- (e) Read the value displayed on the tester.

Standard:
-40°C (-40°F)

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

NG

REPLACE ECM

ES