DI1LE–15

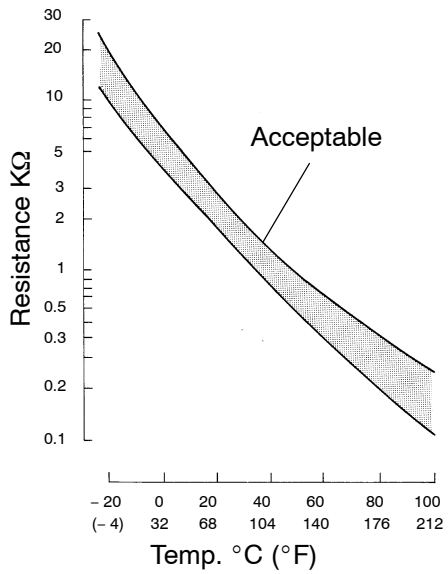
DTC	P0110/24	Intake Air Temperature Circuit

DTC	P0112/24	Intake Air Temperature Circuit Low Input

DTC	P0113/24	Intake Air Temperature Circuit High Input

CIRCUIT DESCRIPTION

(Fig.1)



The intake air temperature (IAT) sensor, mounted on the mass air flow (MAF) meter, monitors the intake air temperature. The IAT sensor has a thermistor that varies its resistance depending on the temperature of the intake air. When the air temperature is low, the resistance in the thermistor increases. When the temperature is high, the resistance drops. The variations in resistance are reflected as voltage changes to the engine control ECU terminal.
(See Fig. 1).
The intake air temperature sensor is connected to the engine control ECU (See below). The 5 V power source voltage in the engine control ECU is applied to the intake air temperature sensor from terminal THA (THAR) via resistor R.
That is, the resistor R and the intake air temperature sensor are connected in series. When the resistance value of the intake air temperature sensor changes in accordance with changes in the intake air temperature, the voltage at terminal THA (THAR) also changes. Based on this signal, the engine control ECU increases the fuel injection volume to improve the driveability during cold engine operation.

DTC No.	Proceed to	DTC Detection Condition	Trouble Area
P0110/24	Step 1	Open or short in intake air temperature sensor circuit for 0.5 sec. (IAT equal to –40˚C (–40˚F) or more than 140˚C (284˚F)) (1 trip detection logic)	• Open or short in intake air temperature sensor circuit • Intake air temperature sensor (built in mass air flow meter) • Engine control ECU
P0112/24	Step 4	Short in intake air temperature sensor circuit for 0.5 sec. (IAT is more than 140˚C (284˚F)) (1 trip detection logic)	
P0113/24	Step 2	Open in intake air temperature sensor circuit for 0.5 sec. (IAT is –40˚C (–40˚F)) (1 trip detection logic)	

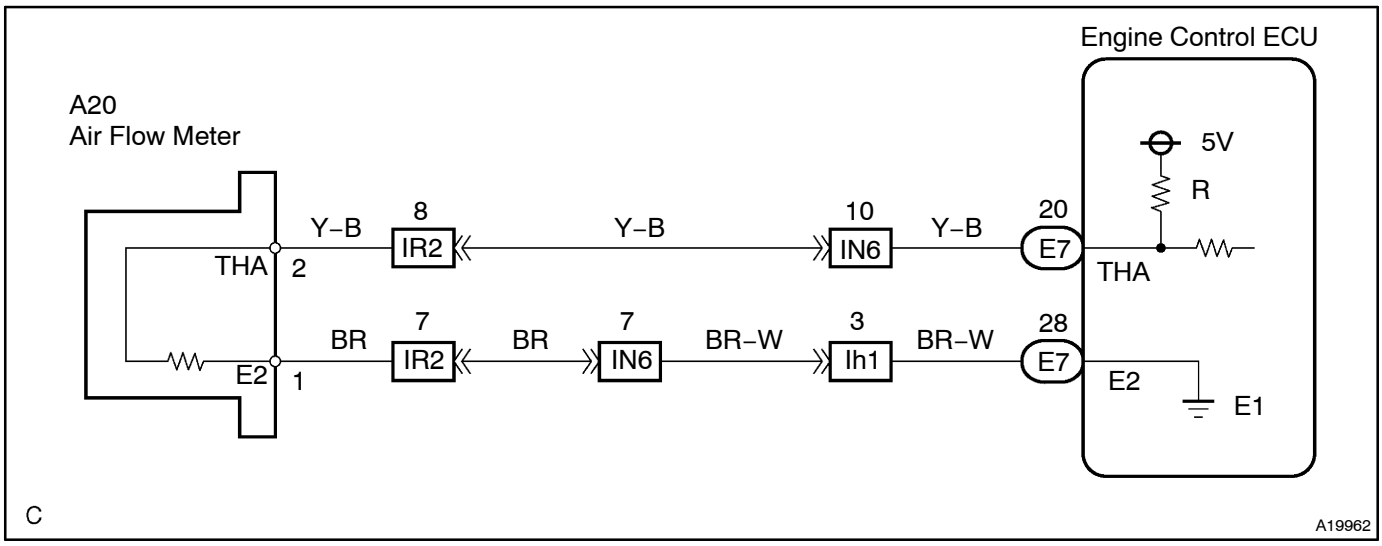
HINT:
After confirming DTC ”P0110/24, P0112/24 or P0113/24”, use the hand–held tester to confirm the intake air temperature in the ”DIAGNOSIS / OBD/MOBD / DATA LIST / ALL”.

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

MONITOR DESCRIPTION

The engine control ECU monitors the sensor voltage and uses this value to calculate the intake air temperature. When the sensor output voltage deviates from the normal operating range, the engine control ECU interprets this as a fault in the IAT (Intake Air Temperature) sensor and sets a DTC.
Example:
When the sensor voltage output equal to –40°C (–40°F), or more than 140°C (284°F).
This monitor runs 0.5 seconds after the ignition switch is 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 intake air 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 / INTAKE AIR.

CHECK:

Read the temperature value on the hand–held tester.

OK:

Same as actual intake air 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:

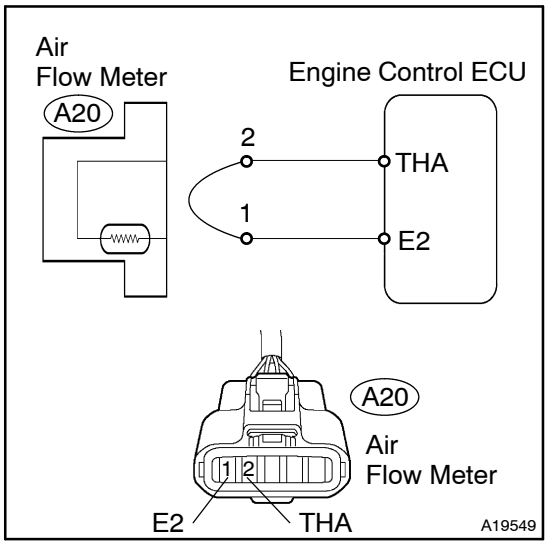
- If there is an open circuit, the hand–held tester indicates –40°C (–40°F).
- If there is a short circuit, the hand–held tester indicates 140°C (284°F) or more.

B → **Go to step 4.**

C → **Check for intermittent problems (See page DI–3).**

A

2	Check for open in harness or engine control ECU.



PREPARATION:

(a) Disconnect the A20 air flow meter connector.
(b) Connect terminals 1 and 2 of the air flow meter 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 / INTAKE AIR.

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 mass air flow meter.

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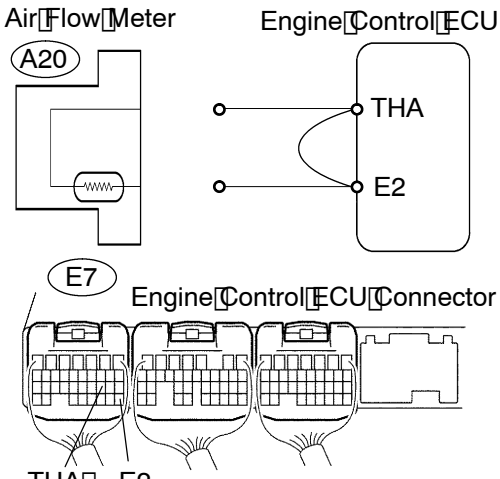
3	Check for open in harness or engine control ECU.



PREPARATION:

(a) Connect terminals THA 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.

(b) Turn the ignition switch ON.

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

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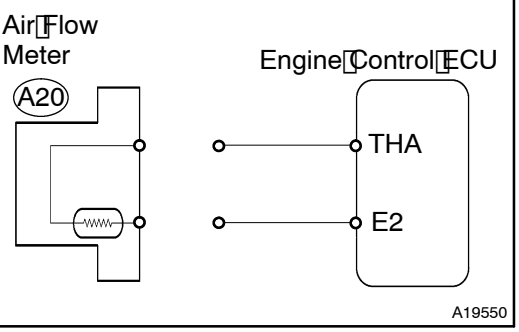
Confirm good connection at engine control ECU. If OK, check and replace engine control ECU (See page IN–20).

4	Check for short in harness and engine control ECU.



PREPARATION:

(a) Disconnect the A20 air flow meter connector.

(b) Turn the ignition switch ON.

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

CHECK:

Read the temperature value on the hand–held tester.

OK:

Temperature value: –40°C (–40°F)

OK	Replace mass air flow meter.

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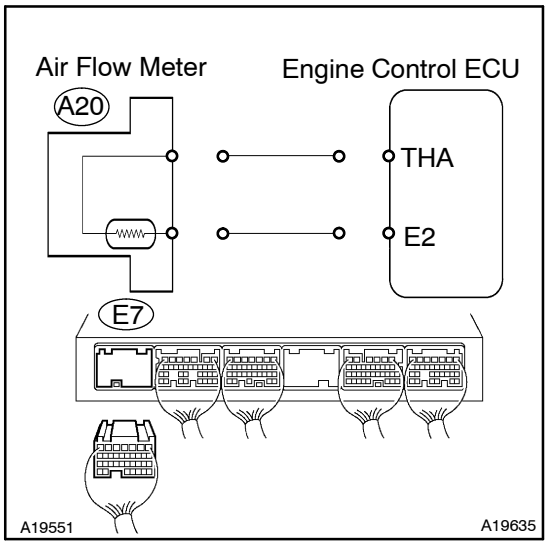
5	Check for short in harness or engine control ECU.



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 / INTAKE AIR.

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).