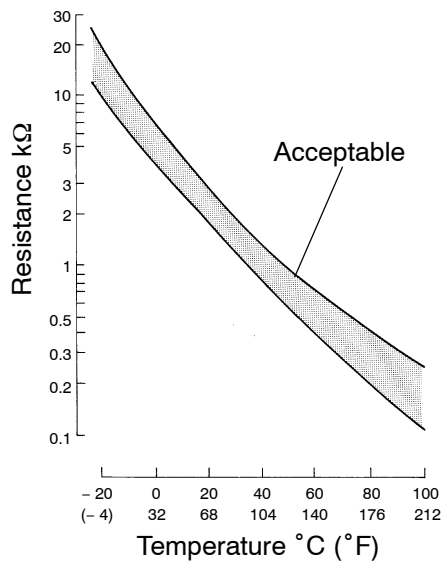
DTC	P0110/24	INTAKE AIR TEMPERATURE CIRCUIT

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 is built into the Mass Air Flow (MAF) meter and senses the atmospheric temperature. A thermistor built in the sensor changes the resistance value according to the intake air temperature. The lower the atmospheric temperature is, the greater the thermistor resistance value is, and the higher the atmospheric temperature is, the lower the thermistor resistance value is (see Fig. 1).

The IAT sensor is connected to the ECM. The 5 V power source voltage in the ECM is applied to the IAT sensor from terminal THA via a resistor R. The resistor R and the IAT sensor are connected in series. When the resistance value of the IAT sensor changes in accordance with changes in the IAT, the voltage at terminal THA also changes. Based on this signal, the ECM increases the fuel injection volume to improve driveability during cold engine operation.

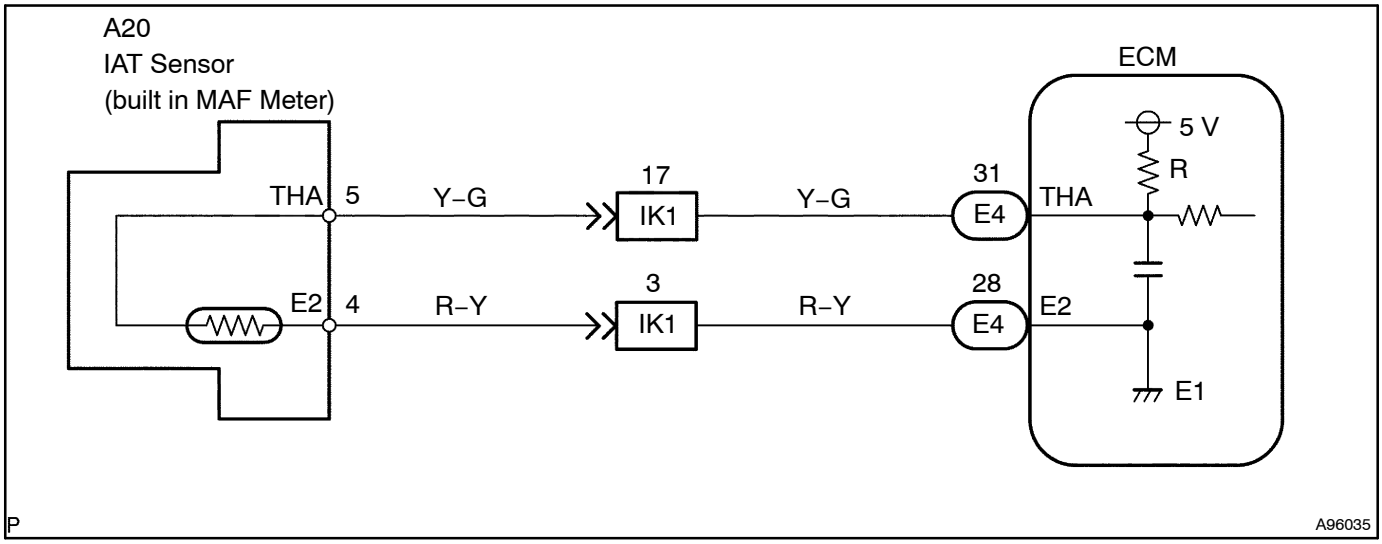
DTC No.	Proceed to	DTC Detection Condition	Trouble Area
P0110/24	Step 1	Open or short in IAT sensor circuit for 0.5 seconds	• Open or short in IAT sensor circuit • IAT sensor (built in MAF meter) • ECM
P0112/24	Step 4	Short in intake IAT sensor circuit for 0.5 secconds	Same as DTC No. P0110/24
P0113/24	Step 2	Open in IAT sensor circuit for 0.5 seconds	Same as DTC No. P0110/24

HINT:

After confirming DTC ”P0110/24, P0112/24 or P0113/24, use the hand–held tester to confirm the IAT from the intake air menu (to reach the INTAKE AIR menu: DIAGNOSIS / OBD/MOBD / DATA LIST / ALL / INTAKE AIR).

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

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTCs that are related to different systems are output simultaneously while terminal E2 is used as a ground terminal, terminal E2 may have an open circuit.
- 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.

When using hand–held tester:

1	READ VALUE OF DATA LIST (IAT)

(a) Connect the hand–held tester (with 24 V VIM) to the DLC3.
(b) Turn the ignition switch ON and turn the hand–held tester ON.
(c) On the hand–held tester, enter the following menus: DIAGNOSIS / OBD/MOBD / DATA LIST / ALL / INTAKE AIR. Read the values.
Standard: Same value as the actual intake air temperature.
Result:

Temperature Displayed	Proceed to
–40°C (–40°F)	A
140°C (284°F) or more	B
OK (same as air temperature near to intake manifold)	C

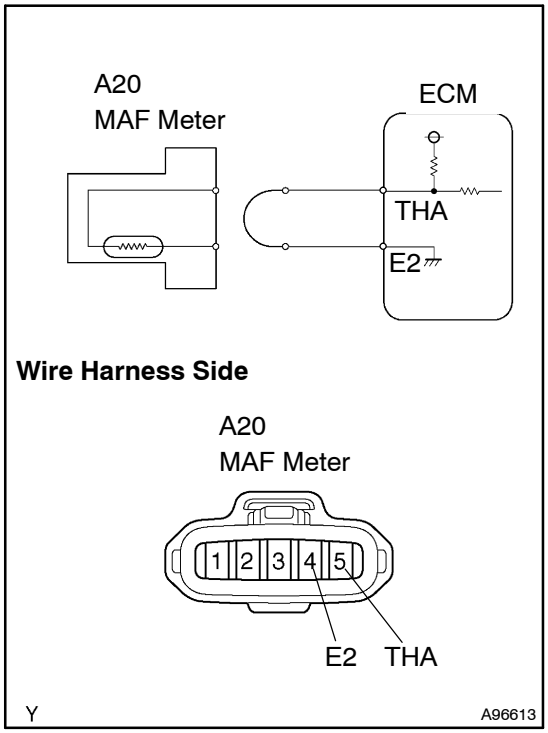
HINT:

- 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 05–10)**

A

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

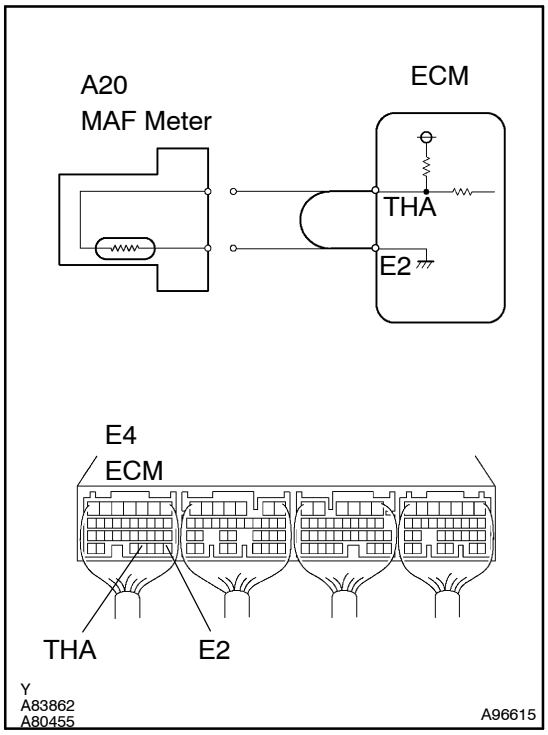


(a) Disconnect the A20 MAF meter connector.
(b) Connect terminals 4 and 5 of the MAF meter wire harness side connector.
(c) Turn the ignition switch ON.
(d) On the hand–held tester, enter the following menus: DIAGNOSIS / OBD/MOBD / DATA LIST / ALL / INTAKE AIR. Read the values.
Standard: 140°C (284°F) or more

OK → **CONFIRM GOOD CONNECTION AT SENSOR. IF OK, REPLACE MASS AIR FLOW SENSOR**

NG

3 READ VALUE OF DATA LIST (CHECK FOR OPEN IN ECM)



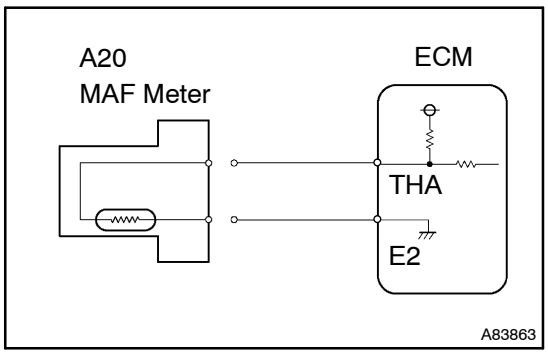
(a) Disconnect the A20 MAF meter connector.
(b) Connect terminals THA and E2 of the E4 ECM connector.
HINT:
Before checking, perform a visual and contact pressure check on the ECM connector.
(c) Turn the ignition switch ON.
(d) On the hand–held tester, enter the following menus: DIAGNOSIS / OBD/MOBD / DATA LIST / ALL / INTAKE AIR. Read the values.
Standard: 140°C (284°F) or more

NG → **CONFIRM GOOD CONNECTION AT ECM. IF OK, REPLACE ECM (See page 10–10)**

OK

REPAIR OR REPLACE HARNESS AND CONNECTOR

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

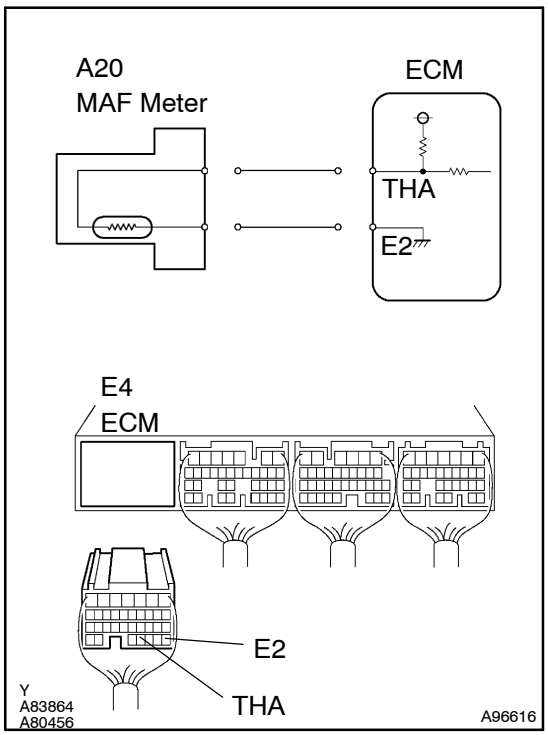


(a) Disconnect the A20 MAF meter connector.
(b) Turn the ignition switch ON.
(c) On the hand–held tester, enter the following menus: DIAGNOSIS / OBD/MOBD / DATA LIST / ALL / INTAKE AIR. Read the values.
Standard: –40°C (–40°F)

OK → **REPLACE MASS AIR FLOW METER**

NG

5	READ VALUE OF DATA LIST (CHECK FOR SHORT IN ECM)



(a) Disconnect the A20 MAF meter connector.
(b) Disconnect the E4 ECM connector.
(c) Turn the ignition switch ON.
(d) On the hand–held tester, enter the following menus: DIAGNOSIS / OBD/MOBD / DATA LIST / ALL / INTAKE AIR. Read the values.
Standard: –40°C (–40°F)

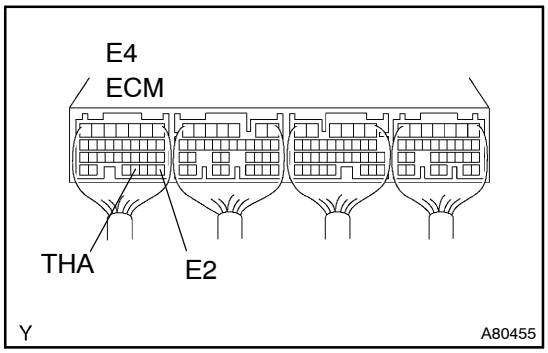
NG → **REPLACE ECM (See page 10–10)**

OK

REPAIR OR REPLACE HARNESS AND CONNECTOR

When not using hand–held tester:

1 CHECK ECM (THA VOLTAGE)



(a) Turn the ignition switch ON.
(b) Measure the voltage of the ECM connector.

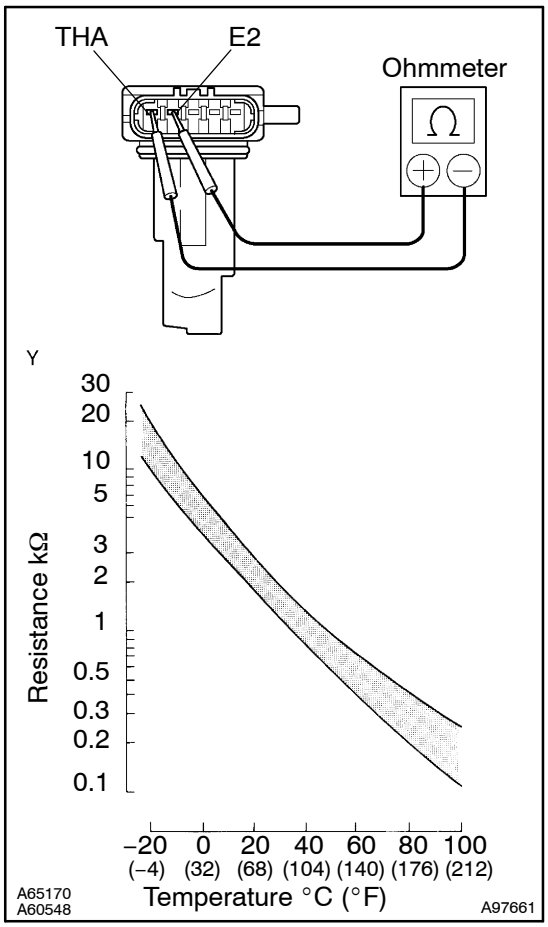
Standard:

Tester Connection	Condition	Specified Condition
E4–31 (THA) – E4–28 (E2)	20°C (68°F)	0.2 to 3.8 V
E4–31 (THA) – E4–28 (E2)	80°C (176°F)	0.1 to 1.5 V

OK → **CHECK FOR INTERMITTENT PROBLEMS** (See page 05–10)

NG

2 INSPECT MASS AIR FLOW METER (IAT SENSOR)



(a) Remove the MAF meter.
(1) Using an ohmmeter, measure the resistance between terminals 4 (E2) and 5 (THA).

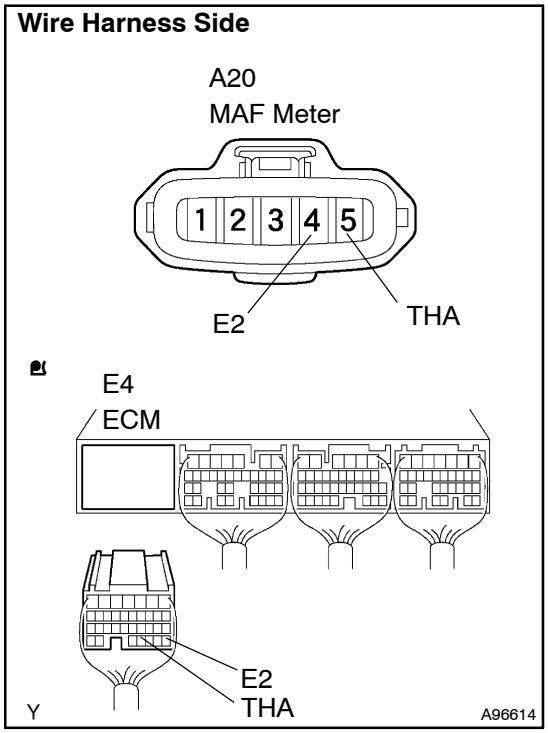
Standard:

Condition	Specified Condition
–20°C (–4°F)	12.5 to 1.69 kΩ
20°C (68°F)	2.19 to 2.67 kΩ
60°C (140°F)	0.5 to 0.68 kΩ

NG → **REPLACE MASS AIR FLOW METER**

OK

3 CHECK WIRE HARNESS (ECM – IAT SENSOR)



(a) Disconnect the A20 MAF meter connector.
(b) Disconnect the E4 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
A20–5 (THA) – E4–31 (THA) A20–4 (E2) – E4–28 (E2)	Below 1 Ω
E4–31 (THA) – E4–28 (E2)	10 kΩ or higher

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

OK

REPLACE ECM (See page 10–10)