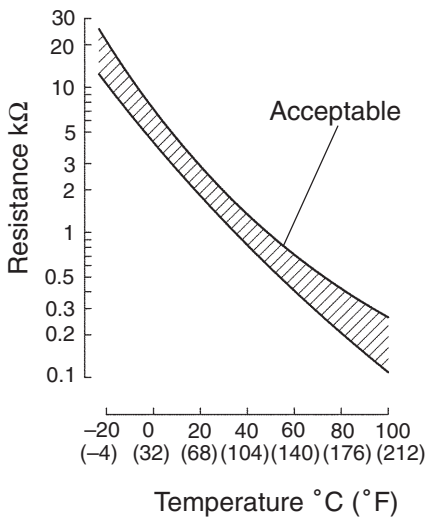
DTC	P0110/24	INTAKE AIR TEMPERATURE CIRCUIT

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 IAT. 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 communicated to the ECM as changes in voltage (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 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 the driveability during cold engine operation.

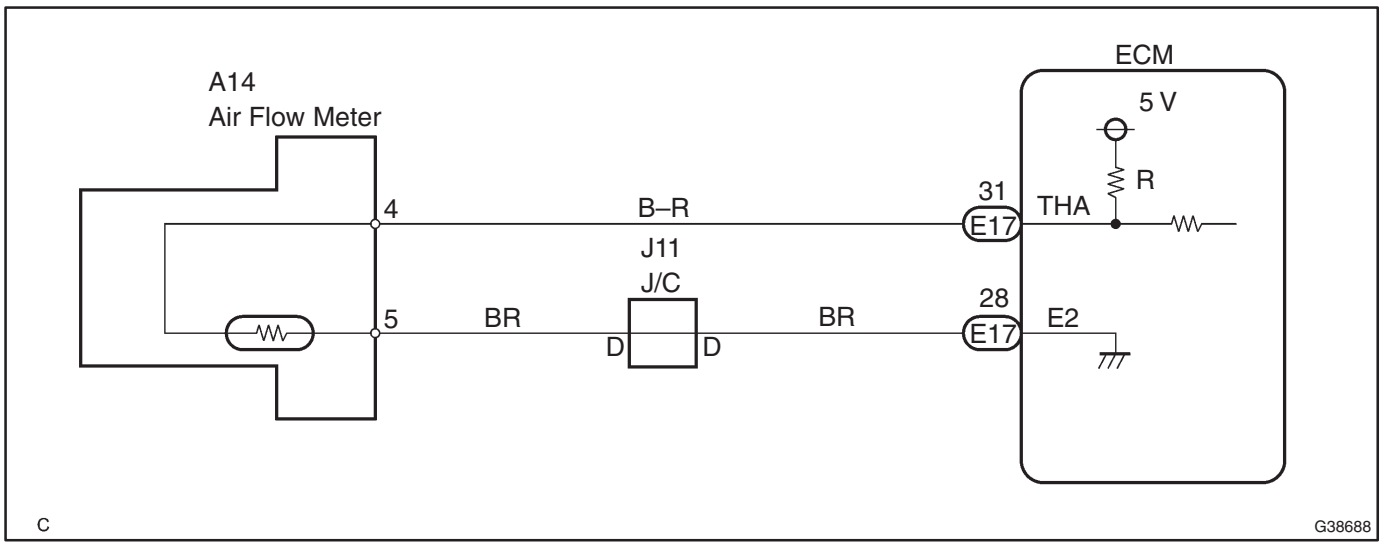
DTC No.	DTC Detection Condition	Trouble Area	Proceed to
P0110/24	Open or short in IAT sensor circuit for 0.5 seconds (1 trip detection logic)	• Open or short in IAT sensor circuit • IAT sensor (built into MAF meter) • ECM	Step 1
P0112/24	Short in IAT sensor circuit for 0.5 seconds (1 trip detection logic)	• Open or short in IAT sensor circuit • IAT sensor (built into MAF meter) • ECM	Step 4
P0113/24	Open in IAT sensor circuit for 0.5 seconds (1 trip detection logic)	• Open or short in IAT sensor circuit • IAT sensor (built into mass air flow meter) • ECM	Step 2

HINT:

When DTC P0110/24, P0112/24 or P0113/24 is detected, check the intake air temperature by entering the following menus on the intelligent tester II: Powertrain / Engine / Data List / 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 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 (INTAKE AIR 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 / Intake Air.
(d) Read the values.
OK: Same value as the actual 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

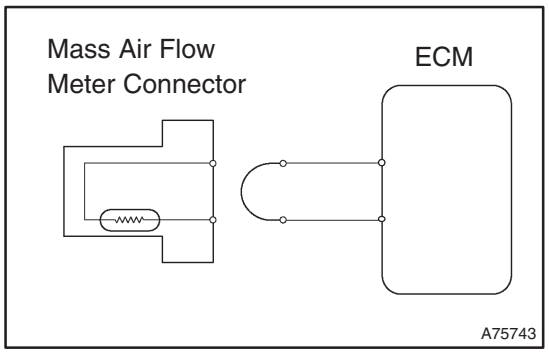
HINT:

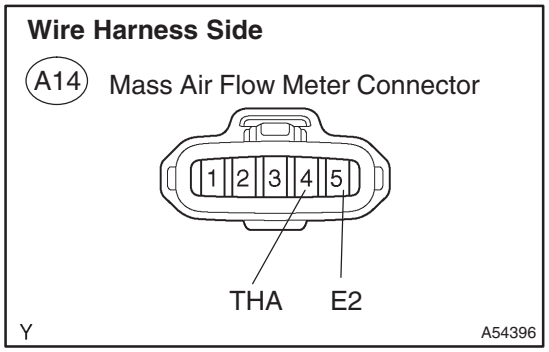
- If there is an open circuit, the intelligent tester II indicates –40°C (–40°F).
- If there is a short circuit, the intelligent tester II indicates 140°C (284°F) or more.

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)



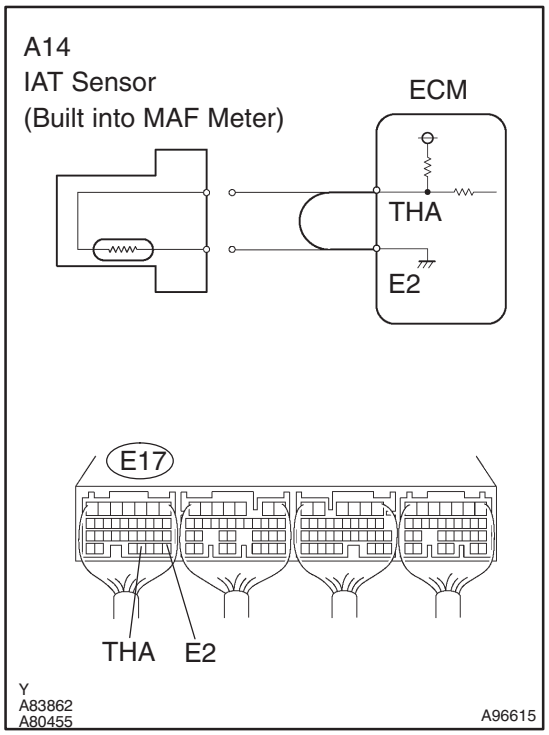


(a) Disconnect the A14 MAF meter connector.
(b) Connect terminals 4 and 5 of the MAF meter wire harness side connector.
(c) Connect the intelligent tester II to the DLC3.
(d) Turn the ignition switch ON and turn the intelligent tester II ON.
(e) Enter the following menus: Powertrain / Engine / Data List / Intake Air.
(f) Read the values.
OK: 140°C (284°F) or more

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

NG

3 READ DATA LIST (CHECK FOR OPEN IN ECM)



(a) Disconnect the A14 MAF meter connector.
(b) Connect terminals THA 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 / Intake Air.
(f) Read the values.
OK: 140°C (284°F) or more

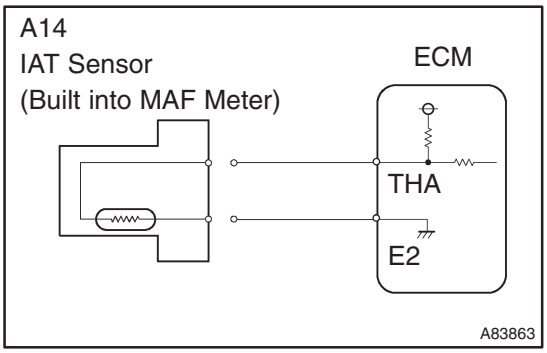
OK	**REPAIR OR REPLACE HARNESS AND CONNECTOR**

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)

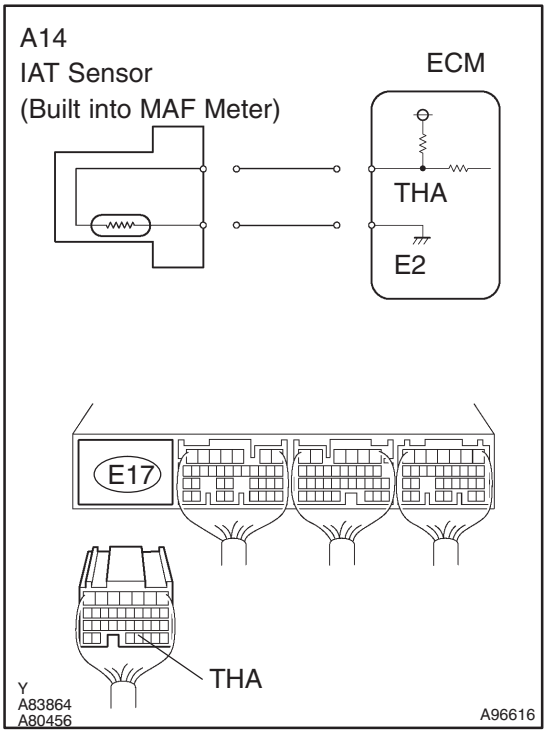


(a) Disconnect the A14 MAF meter connector.
(b) Connect the intelligent tester II to the DLC3.
(c) Turn the ignition switch ON and turn the intelligent tester II ON.
(d) Enter the following menus: Powertrain / Engine / Data List / Intake Air.
(e) Read the values.
OK: –40°C (–40°F)

OK	**REPLACE MASS AIR FLOW METER**

NG

5 READ DATA LIST (CHECK FOR SHORT IN ECM)



(a) Disconnect the E17 ECM connector.
(b) Disconnect the A14 MAF meter 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 / Intake Air.
(f) Read the values.
OK: –40°C (–40°F)

OK	**REPAIR OR REPLACE HARNESS AND CONNECTOR**

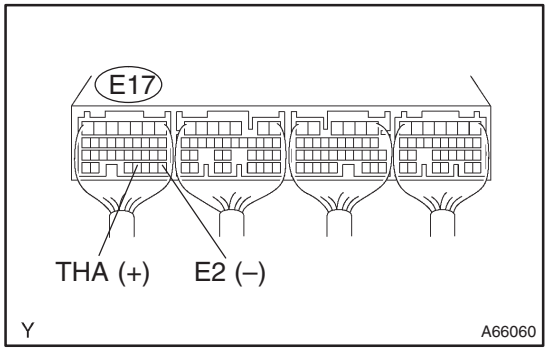
NG

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.

When not using intelligent tester II:

1 CHECK ECM (THA VOLTAGE)



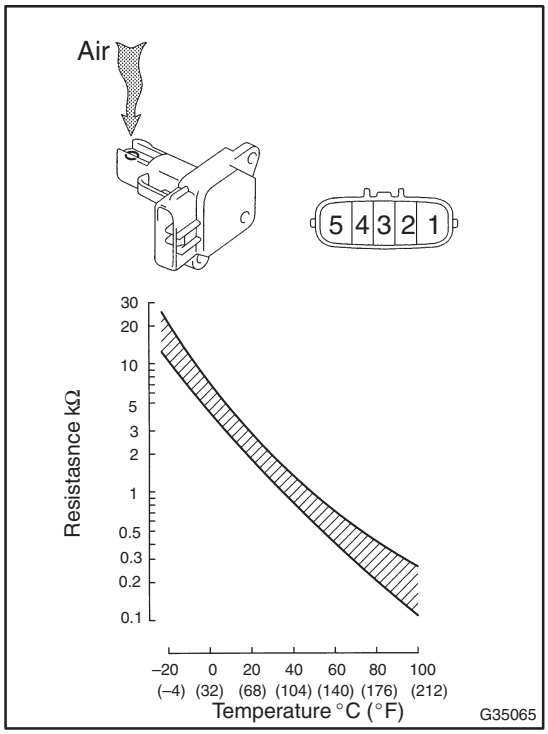
(a) Start the engine.
(b) Measure the voltage of the ECM connector.
Standard:

Tester Connection	Condition	Specified Condition
E17–31 (THA) – E17–28 (E2)	Idling, IAT at 20˚C (68˚F)	0.5 to 3.4 V

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

NG

2 INSPECT INTAKE AIR TEMPERATURE SENSOR



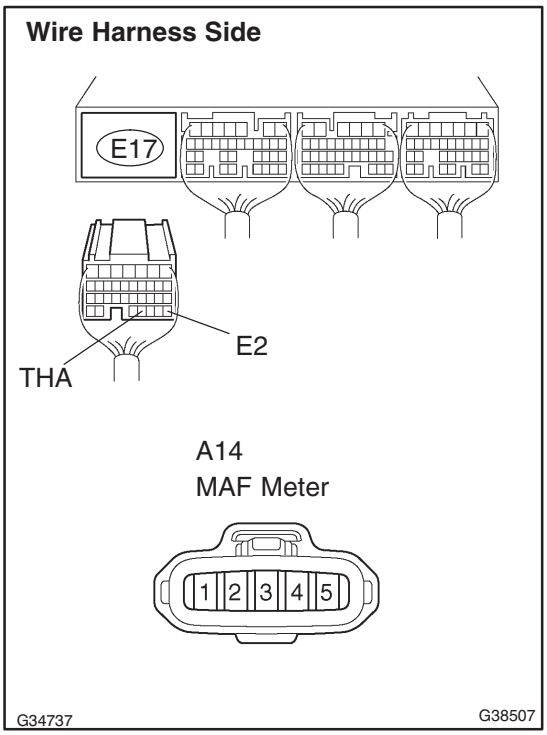
(a) Check the IAT sensor
(1) Remove the MAF meter.
(2) Measure the resistance of the sensor.
Standard:

Tester Connection	Condition	Specified Condition
4 – 5	–20°C (–4°F)	13.6 to 18.4 kΩ
4 – 5	20°C (68°F)	2.21 to 2.69 kΩ
4 – 5	60°C (140°F)	0.49 to 0.67 kΩ

NG → **REPLACE MASS AIR FLOW METER**

OK

3 CHECK WIRE HARNESS (ECM – INTAKE AIR TEMPERATURE SENSOR)



(a) Disconnect the E17 ECM connector.
(b) Disconnect the A14 MAF meter connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
A14–4 – E17–31 (THA)	Below 1 Ω
A14–5 – E17–28 (E2)	Below 1 Ω
A14–4 or E17–31 (THA) – Body ground	10 kΩ or higher
A14–5 or E17–28 (E2) – 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.