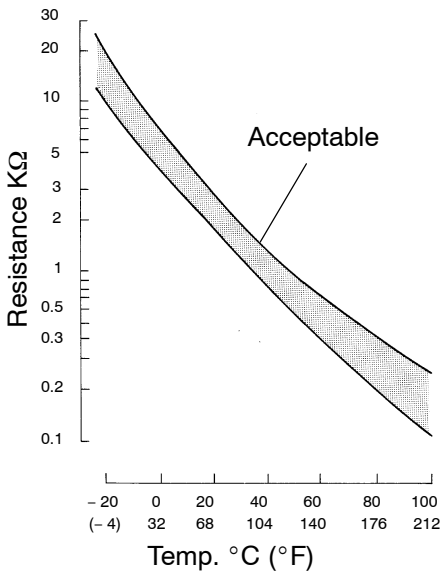
| DTC | P0110/24 | INTAKE AIR TEMPERATURE CIRCUIT |
|---|---|---|

| DTC | P0112/24 | INTAKE AIR TEMPERATURE CIRCUIT LOW INPUT |
|---|---|---|

| DTC | P0113/24 | INTAKE AIR TEMPERATURE CIRCUIT HIGH INPUT |
|---|---|---|

## CIRCUIT DESCRIPTION

(Fig.1)



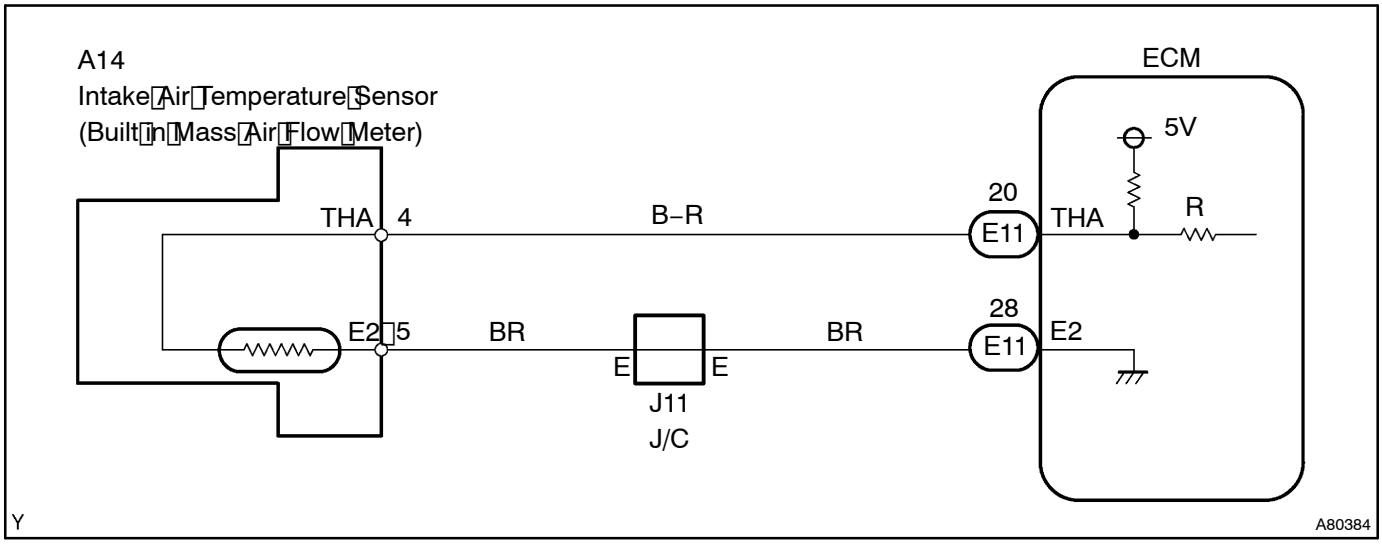

The intake air temperature sensor is built in the mass air flow meter and senses the intake air temperature.
A thermistor built in the sensor changes the resistance value according to the intake air temperature.
The lower the intake air temperature is the greater the thermistor resistance value becomes and the higher the intake air temperature is the lower the thermistor resistance value becomes (See Fig. 1).
The intake air temperature sensor is connected to the ECM (See below ). The 5 V power source voltage in the ECM 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 potential at terminal THA (THAR) also changes. Based on this signal, the ECM 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 temp. sensor circuit for 0.5 sec. | • Open or short in intake air temperature sensor circuit<br>• Intake air temperature sensor (built in mass air flow meter)<br>• ECM |
| P0112/24 | Step 4 | Short in intake air temp. sensor circuit for 0.5 sec. | |
| P0113/24 | Step 2 | Open in intake air temp. sensor circuit for 0.5 sec. | |

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 |

## WIRING DIAGRAM




## INSPECTION PROCEDURE

HINT:

- If different DTCs that are related to a different system are output simultaneously while terminal E2 is used as a ground terminal, terminal E2 may be open.
- Read freeze frame data using the hand–held tester, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air–fuel ratio was lean or rich, etc. at the time of the malfunction.

### When using hand–held tester:

| | |
|---|---|
| 1 | READ VALUE OF HAND–HELD TESTER (INTAKE AIR TEMPERATURE) |

(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) Select the item "DIAGNOSIS / OBD/MOBD / DATA LIST / ALL / INTAKE AIR" and read its value displayed on the hand–held tester.

**Temperature: 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 present temperature) | C |

HINT:

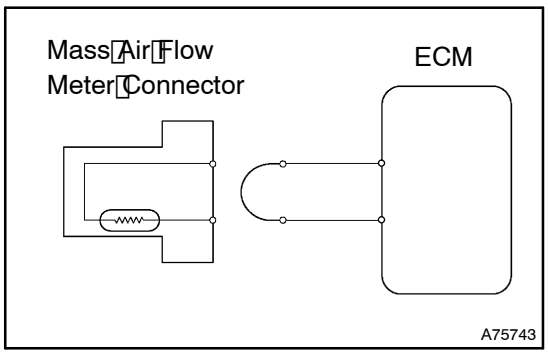
- If there is an open circuit, the hand–held tester indicates –40°C (–40°F).
- If there is a short circuit, the hand–held tester indicates 140°C (284°F) or more.

**B** → **Go to step 4**

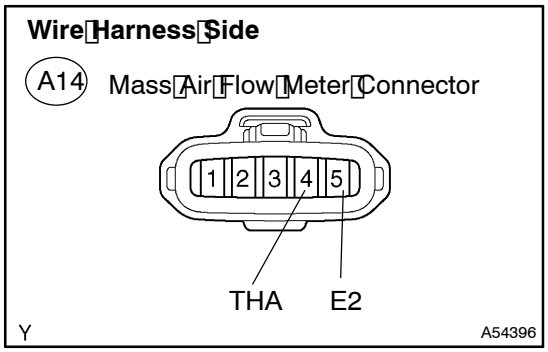
**C** → **CHECK FOR INTERMITTENT PROBLEMS (See page 05–7)**

**A**

| 2 | READ VALUE OF HAND–HELD TESTER (CHECK FOR OPEN IN WIRE HARNESS) |
|---|---|



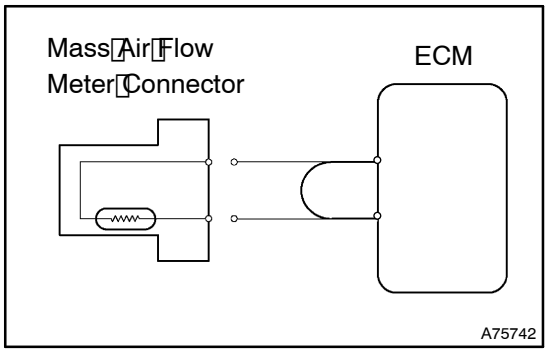

(a) Disconnect the mass air flow meter connector.
(b) Connect terminals THA and E2 of the mass air flow meter wire harness side connector.
(c) Turn the ignition switch ON.
(d) Select the item "DIAGNOSIS / OBD/MOBD / DATA LIST / ALL / INTAKE AIR" and read its value displayed on the hand–held tester.
**Temperature value: 140°C (284°F) or more**




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

NG

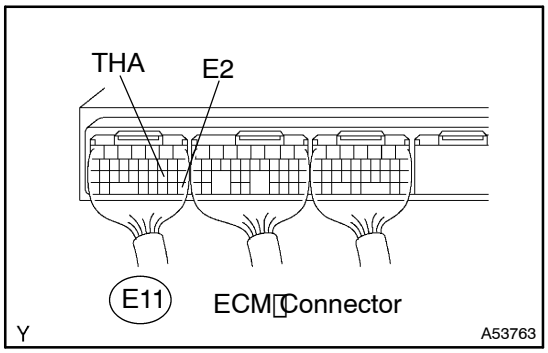
| 3 | READ VALUE OF HAND–HELD TESTER (CHECK FOR OPEN IN ECM) |
|---|---|




(a) Disconnect the mass air flow meter connector.
(b) Connect terminals THA and E2 of the E11 ECM connector.

HINT:
Before checking, do a visual and contact pressure check for the ECM connector.

(c) Turn the ignition switch ON.
(d) Select the item "DIAGNOSIS / OBD/MOBD / DATA LIST / ALL / INTAKE AIR" and read its value displayed on the hand–held tester.
**Temperature value: 140°C (284°F) or more**

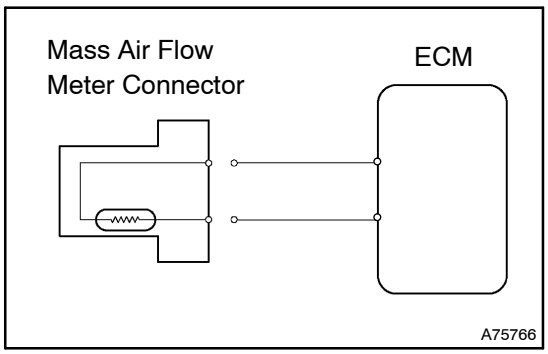



| OK | REPAIR OR REPLACE HARNESS OR CONNECTOR |
|---|---|

NG

**CONFIRM GOOD CONNECTION AT ECM. IF OK, CHECK AND REPLACE ECM (See page 01–35)**

| 4 | READ VALUE OF HAND–HELD TESTER(CHECK FOR SHORT IN WIRE HARNESS) |
|---|---|

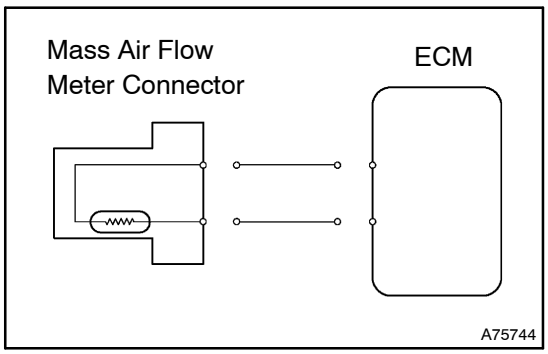



(a) Disconnect the mass air flow meter connector.
(b) Turn the ignition switch ON.
(c) Select the item ”DIAGNOSIS / OBD/MOBD / DATA LIST / ALL / INTAKE AIR” and read its value displayed on the hand–held tester.
**Temperature value: –40°C (–40°F)**

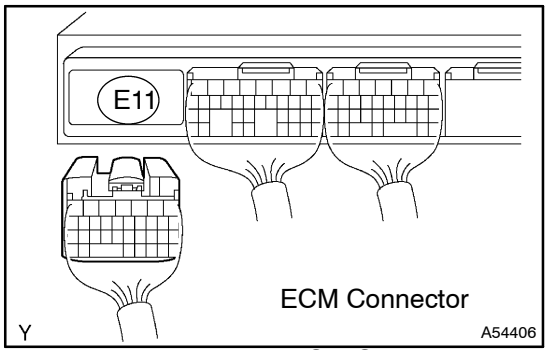
**OK** → **REPLACE MASS AIR FLOW METER**

**NG**

| 5 | READ VALUE OF HAND–HELD TESTER(CHECK FOR SHORT IN ECM) |
|---|---|




(a) Disconnect the E11 ECM connector.
(b) Turn the ignition switch ON.
(c) Select the item ”DIAGNOSIS / OBD/MOBD / DATA LIST / ALL / INTAKE AIR” and read its value displayed on the hand–held tester.
**Temperature value: –40°C (–40°F)**



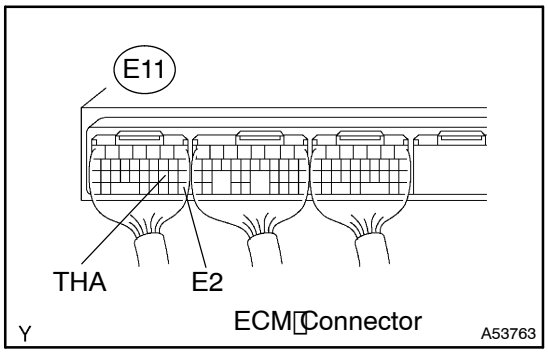

**OK** → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**NG**

**CHECK AND REPLACE ECM (See page 01–35)**

## When not using hand-held tester:

**1 INSPECT ECM (THA VOLTAGE)**




(a) Turn the ignition switch ON.
(b) Measure the voltage between terminals THA and E2 of the ECM connector.

**Voltage:**

| Intake air temp. | Voltage |
|---|---|
| 20°C (68°F) | 0.5 to 3.4 V |
| 60°C (140°F) | 0.2 to 1.0 V |

**OK** → **CHECK FOR INTERMITTENT PROBLEMS (See page 05–7)**

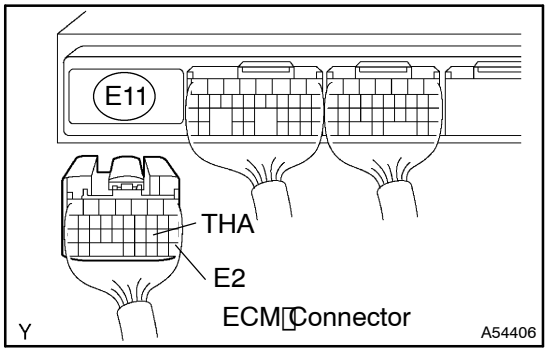
**NG**

**2 INSPECT MASS AIR FLOW METER (See page 10–3)**

**NG** → **REPLACE MASS AIR FLOW METER**

**OK**

**3 CHECK HARNESS AND CONNECTOR (ECM – MASS AIR FLOW METER)**



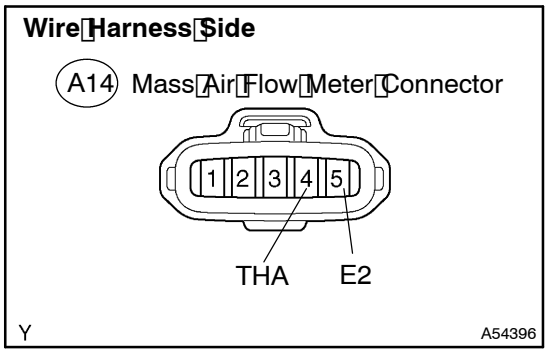

(a) Disconnect the ECM E11 connector.
(b) Disconnect the mass air flow meter connector.
(c) Check for continuity between the wire harness side connector.

**Standard (Check for open):**

| Symbols (Terminal No.) | Specified condition |
|---|---|
| THA (E11–20) – THA (A14–4) | Continuity |
| E2 (E11–28) – E2 (A14–5) | |

**Standard (Check for short):**

| Symbols (Terminal No.) | Specified condition |
|---|---|
| THA (E11–20) or THA (A14–4) – Body ground | No continuity |




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

**OK**

**CHECK AND REPLACE ECM (See page 01–35)**