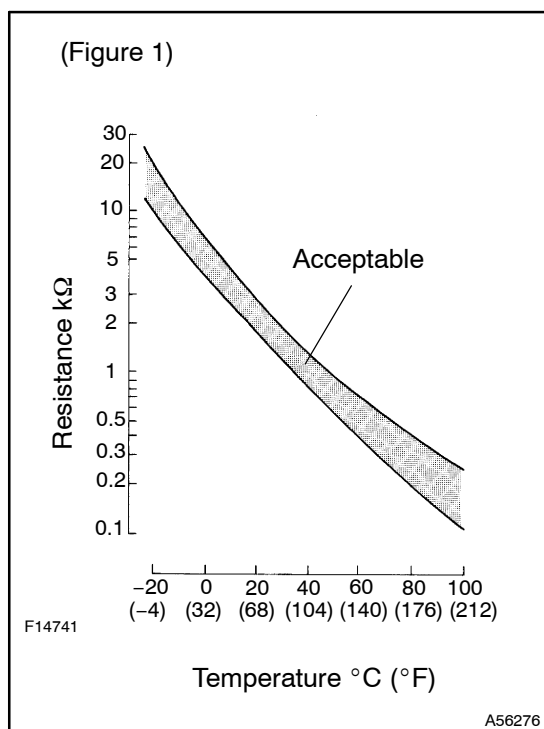


<b>DTC</b>	<b>P0110/24</b>	<b>INTAKE AIR TEMPERATURE CIRCUIT</b>
<b>DTC</b>	<b>P0112/24</b>	<b>INTAKE AIR TEMPERATURE CIRCUIT LOW INPUT</b>
<b>DTC</b>	<b>P0113/24</b>	<b>INTAKE AIR TEMPERATURE CIRCUIT HIGH INPUT</b>

## CIRCUIT DESCRIPTION



The intake air temperature (IAT) sensor is built into the mass air flow (MAF) meter, and monitors the intake air temperature. The IAT sensor has a built-in 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 ECM terminal (see figure 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.

That is, 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 intake air temperature, the voltage at terminal THA also changes. Based on this signal, the ECM increases the fuel injection volume to improve the drivability during cold engine operation.

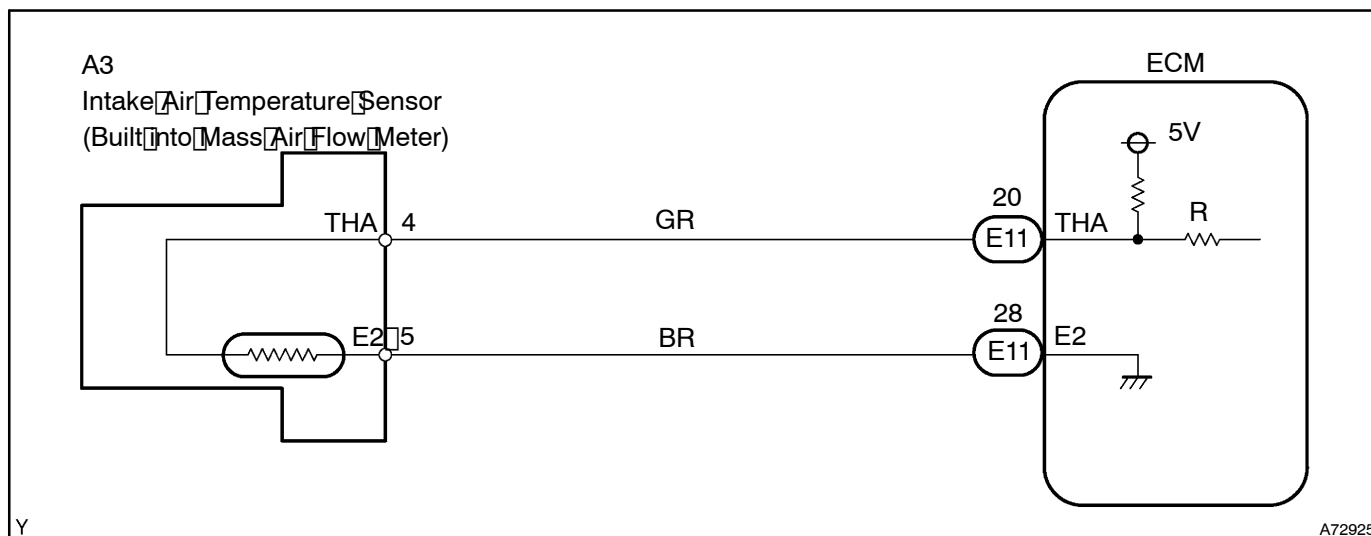
DTC No.	Proceed To	DTC Detection Condition	Trouble Area
P0110/24	Step 1	Open or short in intake air temperature sensor circuit for 0.5 second	<ul style="list-style-type: none"> <li>• Open or short in intake air temperature sensor circuit</li> <li>• Intake air temperature sensor (built into mass air flow meter)</li> <li>• ECM</li> </ul>
P0112/24	Step 4	Short in intake air temperature sensor circuit for 0.5 second	<ul style="list-style-type: none"> <li>• Short in intake air temperature sensor circuit</li> <li>• Intake air temperature sensor (built into mass air flow meter)</li> <li>• ECM</li> </ul>
P0113/24	Step 2	Open in intake air temperature sensor circuit for 0.5 second	<ul style="list-style-type: none"> <li>• Open in intake air temperature sensor circuit</li> <li>• Intake air temperature sensor (built into mass air flow meter)</li> <li>• ECM</li> </ul>

### HINT:

When DTC P0110/24, P0112/24 or P0113/24 is detected, check the intake air temperature by selecting Powertrain / Engine and ECT / Data List / Intake Air on the intelligent tester II.

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 record the engine condition 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.

### When using intelligent tester II:

#### 1 READ VALUE OF INTELLIGENT TESTER II (INTAKE AIR TEMPERATURE)

- Connect the intelligent tester II to the DLC3.
- Turn the ignition switch to ON and turn the intelligent tester II ON.
- Select the following menu items: Powertrain / Engine and ECT / Data List / Intake Air.
- Read the value.

#### OK:

Temperature value: Same 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 the actual intake air temperature)	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

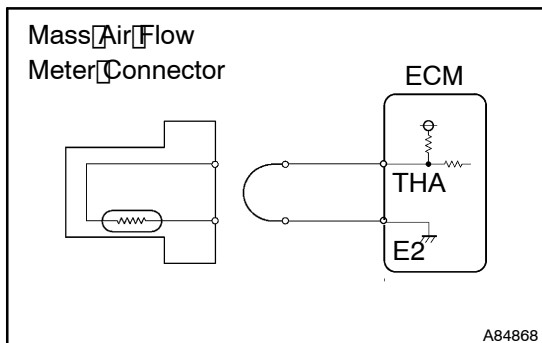
Go to step 4

C

CHECK FOR INTERMITTENT PROBLEMS  
(See page 05-259)

A

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

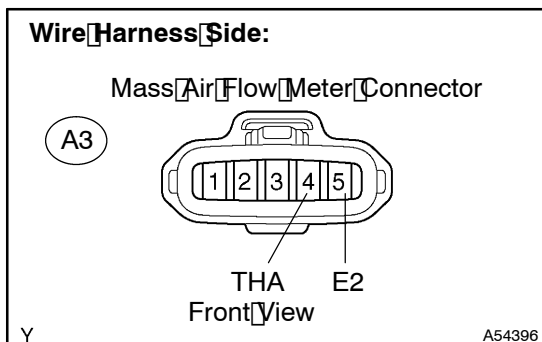


- Disconnect the A3 mass air flow meter connector.
- Connect terminals THA and E2 of the mass air flow meter wire harness side connector.
- Turn the ignition switch to ON and turn the intelligent tester to ON.
- Select the following menu items: Powertrain / Engine and ECT / Data List / Intake Air.
- Read the value.

**OK:**

**Temperature value: 140°C (284°F) or more**

- Reconnect the mass air flow meter connector.

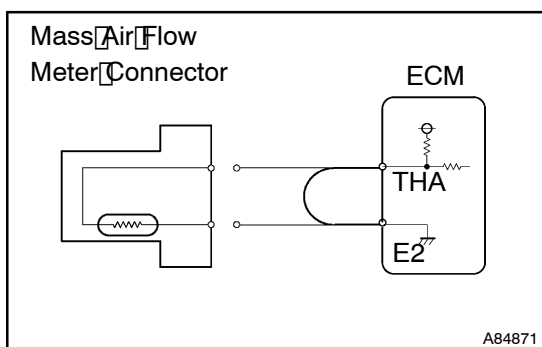


**OK**

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

**NG**

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



- Disconnect the A3 mass air flow meter connector.
- Connect terminals THA and E2 of the E11 ECM connector.

**HINT:**

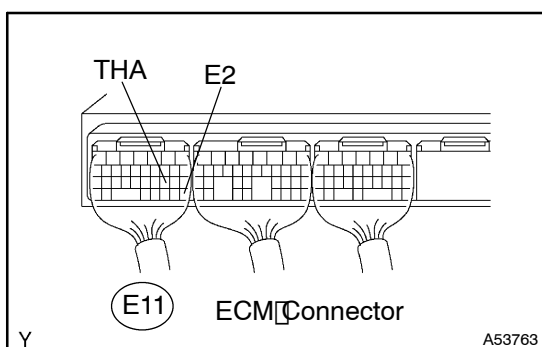
Before checking, do a visual and contact pressure check on the ECM connector.

- Turn the ignition switch to ON and turn the intelligent tester to ON.
- Select the following menu items: Powertrain / Engine and ECT / Data List / Intake Air.
- Read the value.

**OK:**

**Temperature value: 140°C (284°F) or more**

- Reconnect the mass air flow meter connector.



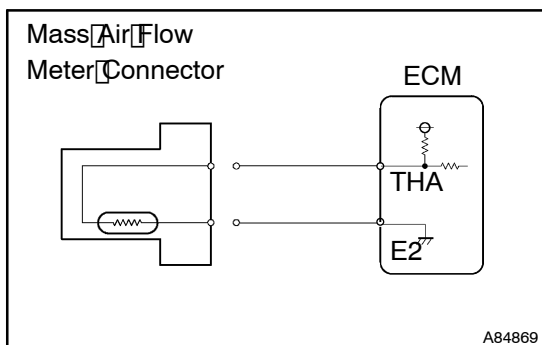
**OK**

**REPAIR OR REPLACE HARNESS OR CONNECTOR**

**NG**

**CONFIRM GOOD CONNECTION AT ECM. IF OK, REPLACE ECM (See page 10-30)**

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

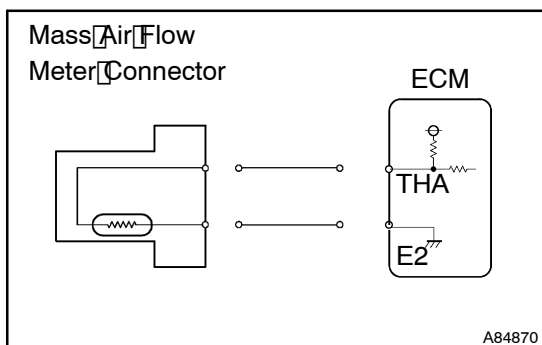


- Disconnect the A3 mass air flow meter connector.
  - Turn the ignition switch to ON and turn the intelligent tester ON.
  - Select the following menu items: Powertrain / Engine and ECT / Data List / Intake Air.
  - Read the value.
- OK:**  
**Temperature value: -40°C (-40°F)**
- Reconnect the mass air flow meter connector.

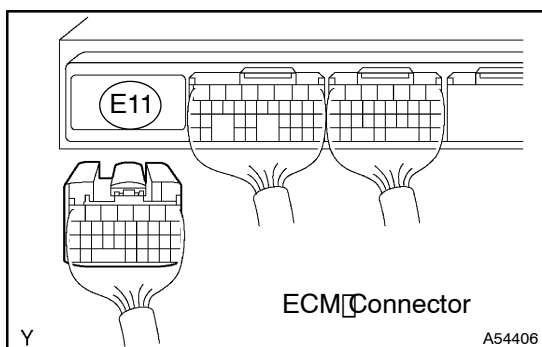
**OK** **REPLACE MASS AIR FLOW METER**

**NG**

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



- Disconnect the E11 ECM connector.
  - Turn the ignition switch to ON and turn the intelligent tester ON.
  - Select the following menu items: Powertrain / Engine and ECT / Data List / Intake Air.
  - Read the value.
- OK:**  
**Temperature value: -40°C (-40°F)**
- Reconnect the ECM connector.



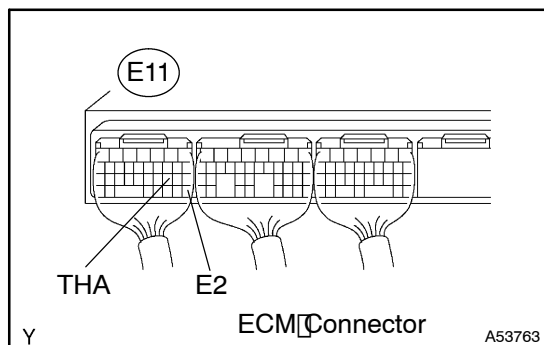
**OK** **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**NG**

**REPLACE ECM (See page 10-30)**

## When not using intelligent tester:

### 1 INSPECT ECM (THA VOLTAGE)



- Turn the ignition switch to ON.
- Measure the voltage between terminals THA and E2 of the ECM connector.

#### Voltage:

Intake Air Temperature	Specified Condition
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 05-259)

NG

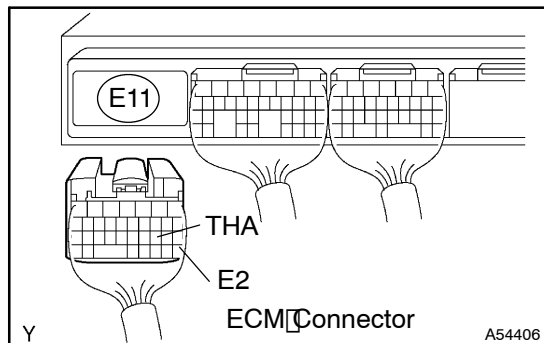
### 2 INSPECT INTAKE AIR TEMPERATURE SENSOR (MASS AIR FLOW METER) (See page 10-3)

NG

**REPLACE MASS AIR FLOW METER**

OK

### 3 CHECK HARNESS AND CONNECTOR (ECM - MASS AIR FLOW METER)



- Disconnect the E11 ECM connector.
- Disconnect the A3 mass air flow meter connector.
- Check the resistance.

#### Standard (Check for open):

Tester Connection	Specified Condition
THA (E11-20) - THA (A3-4)	Below 1 Ω
E2 (E11-28) - E2 (A3-5)	Below 1 Ω

#### Standard (Check for short):

Tester Connection	Specified Condition
THA (E11-20) or THA (A3-4) - Body Ground	10 kΩ or higher

- Reconnect the mass air flow meter connector.
- Reconnect the ECM connector.

NG

**REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

### REPLACE ECM (See page 10-30)

