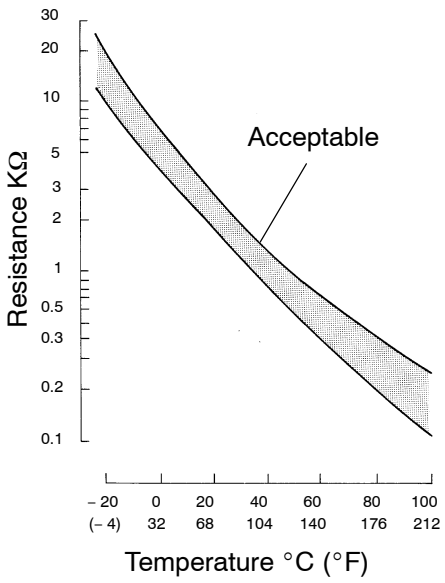
| DTC | P0110 | INTAKE AIR TEMPERATURE CIRCUIT |
|---|---|---|

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

| DTC | P0113 | 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 intake air temperature. When the intake 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 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 intake air temperature, 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. | Proceed to | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0110 | Step 1 | Open or short in IAT sensor circuit for 0.5 seconds (1 trip detection logic) | • IAT sensor circuit<br>• IAT sensor (built in MAF meter)<br>• ECM |
| P0112 | Step 2 | Short in IAT sensor circuit for 0.5 seconds (1 trip detection logic) | • IAT sensor circuit<br>• IAT sensor (built in MAF meter)<br>• ECM |
| P0113 | Step 4 | Open in IAT sensor circuit for 0.5 seconds (1 trip detection logic) | • IAT sensor circuit<br>• IAT sensor (built in MAF meter)<br>• ECM |

HINT:

After confirming DTC P0110, P0112 or P0113, confirm the intake air temperature using Data List on the Intelligent Tester II. Enter the following menus: Enter/ Diagnosis/ OBD·MOBD/ Power train/ Engine and ECT/ Data List.

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

## MONITOR DESCRIPTION

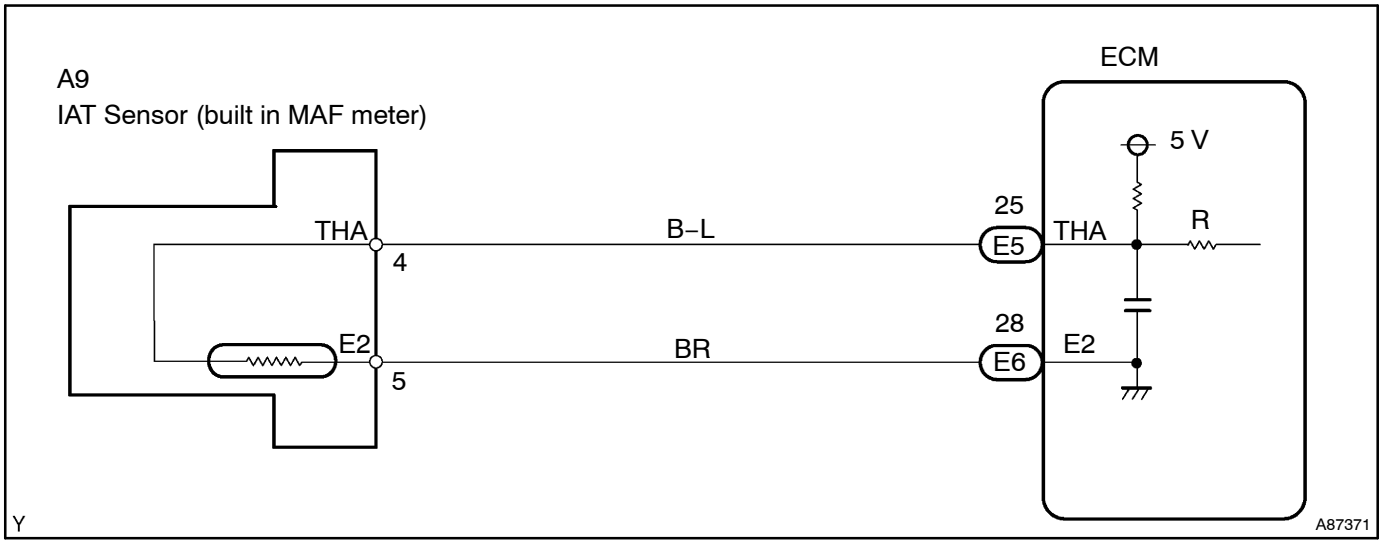
The ECM monitors the sensor voltage and uses this value to calculate the intake air temperature. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a fault in the IAT sensor and sets a DTC.

Example:

When the sensor voltage output is –40°C (–40°F) (P0113) or more than 140°C (284°F) (P0112) and if either condition continues 0.5 seconds or more.

This monitor runs 0.5 seconds after the ignition switch is turned ON (1 trip detection logic).

## 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, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

| 1 | READ VALUE OF INTELLIGENT TESTER II |
|---|---|

(a) Connect the Intelligent Tester II to the DLC3.
(b) Select the item "Enter / Diagnosis / OBD·MOBD / Power train / Engine and ECT / Data List / All Data / Intake Air".
(c) Read the Intake Air value.
**Result:**

| Intake Air Temperature | Proceed to |
|---|---|
| –40°C (–40°F) | A |
| 140°C (284°F) or more | B |
| OK (same as present temperature) | C |

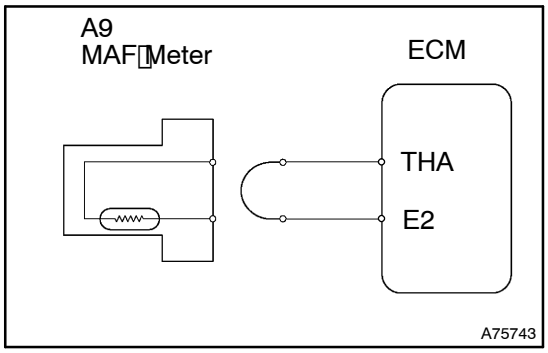
HINT:
- If there is an open circuit, the tester should indicate –40°C (–40°F).
- If there is a short circuit, the tester should indicate 140°C (284°F) or more.

**B** → **Go to step 4**

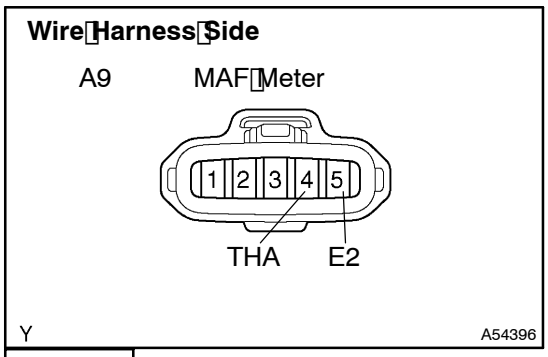
**C** → **CHECK FOR INTERMITTENT PROBLEMS (See page 05–11)**

**A**

| 2 | READ VALUE OF INTELLIGENT TESTER II (CHECK FOR OPEN IN WIRE HARNESS) |
|---|---|



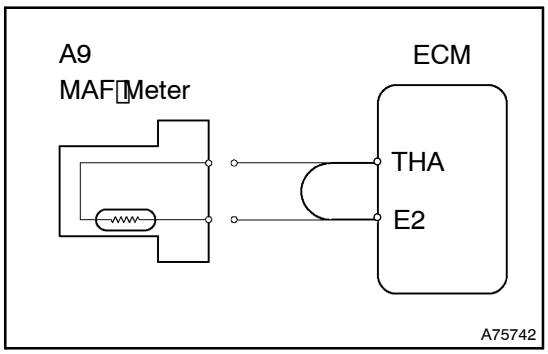

(a) Disconnect the A9 MAF meter connector.
(b) Connect terminals THA and E2 of the MAF meter wire harness side connector.
(c) Turn the ignition switch ON.
(d) Read the Intake Air.
**Standard: 140°C (284°F) or more**




**OK** → **CONFIRM GOOD CONNECTION AT SENSOR. IF OK, REPLACE MAF meter**

**NG**

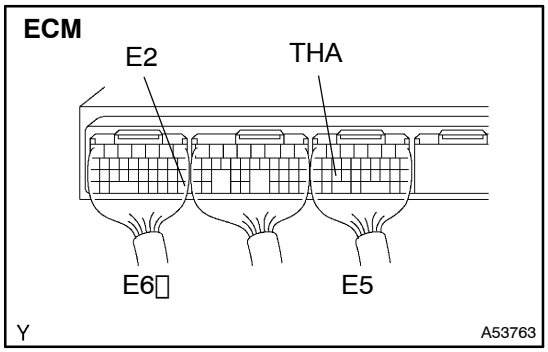
| 3 | READ VALUE OF INTELLIGENT TESTER II (CHECK FOR OPEN IN ECM) |
|---|---|




(a) Disconnect the A9 MAF meter connector.
(b) Connect terminals THA of the E5 ECM connector and E2 of the E6 ECM connector.

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

(c) Turn the ignition switch ON.
(d) Read the Intake Air value.
**Standard: 140°C (284°F) or more**

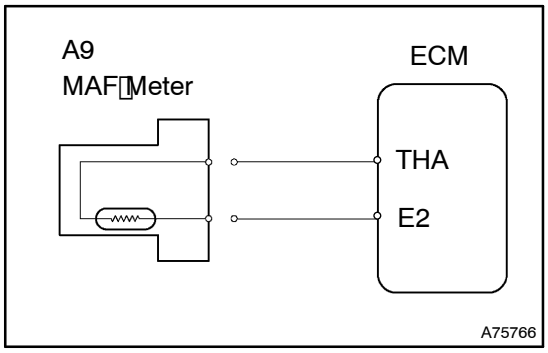



NG → **REPLACE ECM (See page 10–21)**

OK

**REPAIR OR REPLACE HARNESS AND CONNECTOR**

| 4 | READ VALUE OF INTELLIGENT TESTER II (CHECK FOR SHORT IN WIRE HARNESS) |
|---|---|

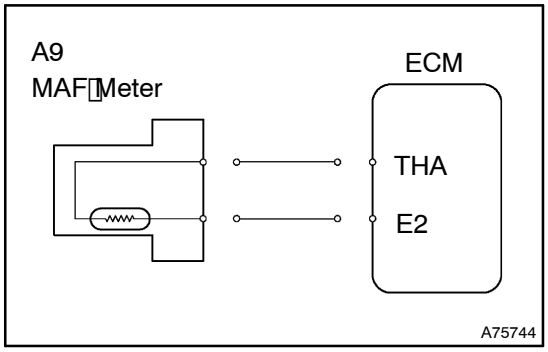



(a) Disconnect the A9 MAF meter connector.
(b) Turn the ignition switch ON.
(c) Read the Intake Air value.
**Standard: –40°C (–40°F)**

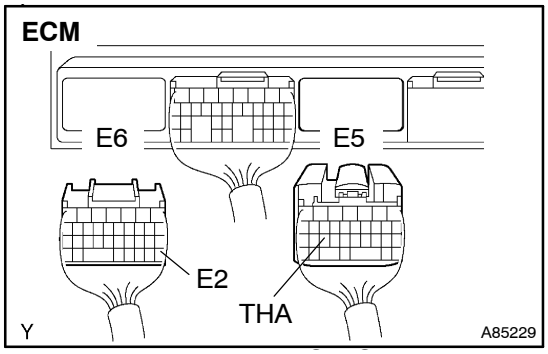
OK → **REPLACE MAF METER**

NG

| 5 | READ VALUE OF INTELLIGENT TESTER II (CHECK FOR SHORT IN HARNESS OR ECM) |
|---|---|




(a) Disconnect the A9 MAF meter connector.
(b) Disconnect the E5 and E6 ECM connectors.
(c) Turn the ignition switch ON.
(d) Read the Intake Air value.
**Standard: –40°C (–40°F)**
(e) Reconnect the ECM connectors.




NG → **REPLACE ECM (See page 10–21)**

OK →

**REPAIR OR REPLACE HARNESS AND CONNECTOR**