

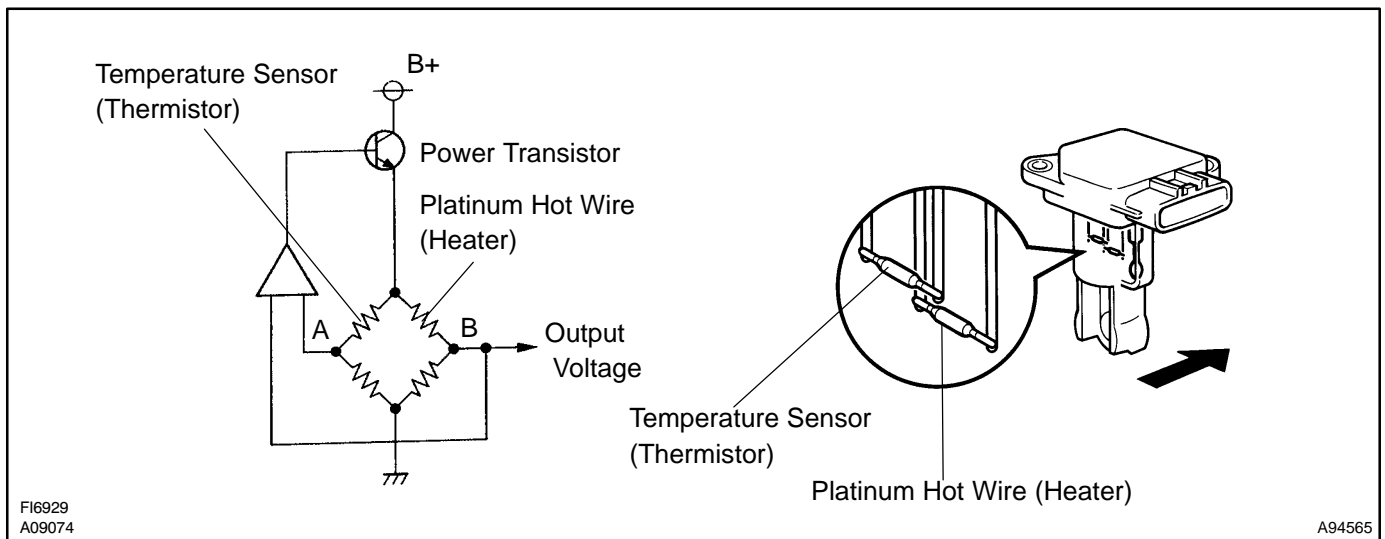
<b>DTC</b>	<b>P0100</b>	<b>MASS OR VOLUME AIR FLOW CIRCUIT</b>
<b>DTC</b>	<b>P0102</b>	<b>MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT</b>
<b>DTC</b>	<b>P0103</b>	<b>MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT</b>

### CIRCUIT DESCRIPTION

The Mass Air Flow (MAF) meter is a sensor that measures the amount of air flowing through the throttle valve. The ECM uses this information to determine the fuel injection time and to provide appropriate air-fuel ratio. Inside the MAF meter, there is a heated platinum wire which is exposed to the flow of intake air. By applying a specific electrical current to the wire, the ECM heats it to a given temperature. The flow of incoming air cools both the wire and an internal thermistor, affecting their resistance. To maintain a constant current value, the ECM varies the voltage applied to these components in the MAF meter. The voltage level is proportional to the airflow through the sensor, and the ECM uses it to calculate the intake air volume. The circuit is constructed so that the platinum hot wire and the temperature sensor provide a bridge circuit, and the power transistor is controlled so that the potentials of A and B remain equal to maintain the predetermined temperature.

**HINT:**

When any of these DTCs are set, the ECM enters fail-safe mode. During fail-safe mode, the ignition timing is calculated by the ECM, according to the engine RPM and throttle valve position. Fail-safe mode continues until a pass condition is detected.



DTC No.	DTC Detection Conditions	Trouble Areas
P0100	Open or short in MAF meter circuit for 3 seconds	<ul style="list-style-type: none"> <li>• Open or short in MAF meter circuit</li> <li>• MAF meter</li> <li>• ECM</li> </ul>
P0102	Open in MAF meter circuit for 3 seconds	<ul style="list-style-type: none"> <li>• Open in MAF meter circuit</li> <li>• MAF meter</li> <li>• ECM</li> </ul>
P0103	Short in MAF meter circuit for 3 seconds	<ul style="list-style-type: none"> <li>• Short in MAF meter circuit</li> <li>• MAF meter</li> <li>• ECM</li> </ul>

**HINT:**

When any of these DTCs are set, check the air-flow rate by selecting the following menu items on a hand-held tester: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / MAF. If using an OBD II scan tool, refer to the instruction manual.

Mass Air Flow Rate (gm/s)	Malfunctions
Approximately 0.0	<ul style="list-style-type: none"> <li>• Open in Mass Air Flow (MAF) meter power source circuit</li> <li>• Open or short in VG circuit</li> </ul>
271.0 or more	<ul style="list-style-type: none"> <li>• Open in EVG circuit</li> </ul>

**MONITOR DESCRIPTION**

If there is a defect in the MAF meter or an open or short circuit, the voltage level deviates from the normal operating range. The ECM interprets this deviation as a malfunction in the MAF meter and sets a DTC.

Example:

When the sensor voltage output remains less than 0.2 V, or more than 4.9 V, for more than 3 seconds, the ECM sets a DTC.

If the malfunction is not repaired successfully, a DTC is set 3 seconds after the engine is next started.

**MONITOR STRATEGY**

Related DTCs	P0100: Mass air flow meter range check (Fluctuating) P0102: Mass air flow meter range check (Low voltage) P0103: Mass air flow meter range check (High voltage)
Required Sensors/Components (Main)	MAF meter
Required Sensors/Components (Related)	Crankshaft position sensor
Frequency of Operation	Continuous
Duration	3 seconds
MIL Operation	Immediate: Engine RPM less than 4,000 rpm 2 driving cycles: Engine RPM 4,000 rpm or more
Sequence of Operation	None

**TYPICAL ENABLING CONDITIONS**

Monitor runs whenever following DTCs not present	None
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**TYPICAL MALFUNCTION THRESHOLDS****P0100:**

MAF meter voltage	Less than 0.2 V, or more than 4.9 V
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**P0102:**

MAF meter voltage	Less than 0.2 V
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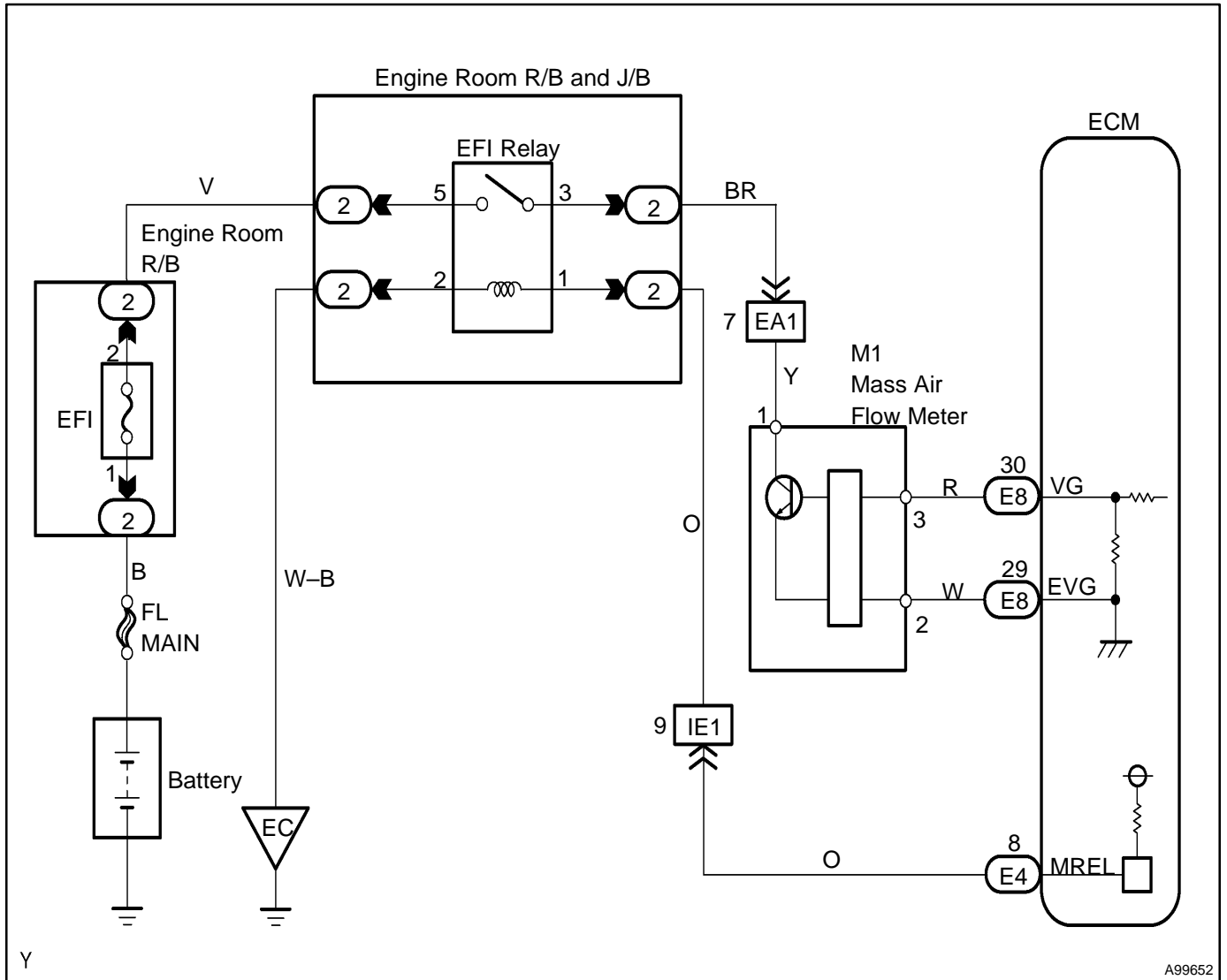
**P0103:**

MAF meter voltage	More than 4.9 V
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**COMPONENT OPERATING RANGE**

MAF meter voltage	Between 0.4 and 2.2 V
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**WIRING DIAGRAM**



**INSPECTION PROCEDURE**

**HINT:**

Read freeze frame data using a hand-held tester or OBD II scan tool. 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.

**1 READ VALUE USING HAND-HELD TESTER OR OBD II SCAN TOOL(MASS AIR FLOW RATE)**

- (a) Connect a hand-held tester or OBD II scan tool to the DLC3.
- (b) Start the engine.
- (c) Turn the tester or scan tool ON.
- (d) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / MAF.
- (e) Read the values displayed on the tester.
- (f) If using an OBD II scan tool, refer to the instruction manual.

**Result:**

Mass Air Flow Rate (gm/s)	Proceed To
0.0	A
271.0 or more	B
Between 1.0 and 270.0 (*1)	C

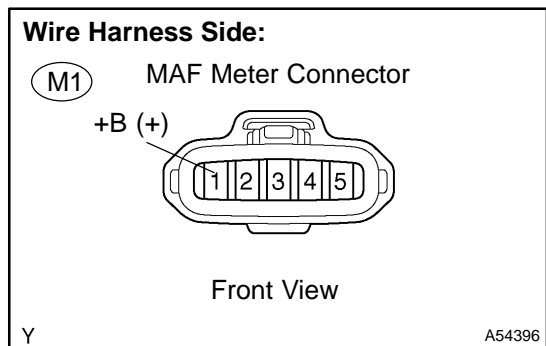
\*1: The value must be changed when the throttle valve is open or closed.

**B** Go to step 6

**C** CHECK FOR INTERMITTENT PROBLEMS  
(See page 05-12)

**A**

**2 INSPECT MASS AIR FLOW METER(POWER SOURCE VOLTAGE)**



- (a) Disconnect the M1 Mass Air Flow (MAF) meter connector.
- (b) Turn the ignition switch to ON.
- (c) Measure the voltage between the terminal of the wire harness side connector and body ground.

**Standard:**

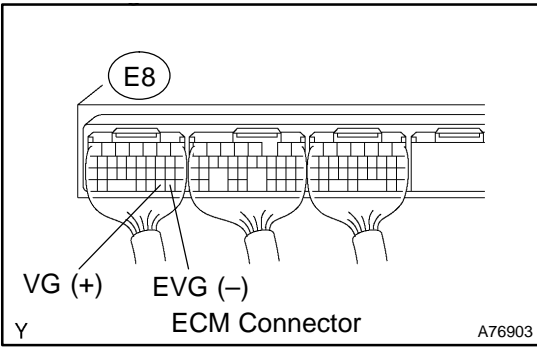
Tester Connections	Specified Conditions
+B (M1-1) - Body ground	Between 9 V and 14 V

- (d) Reconnect the MAF meter connector.

**NG** Go to step 5

**OK**

**3 INSPECT ECM(VG VOLTAGE)**



- (a) Start the engine.
- (b) Measure the voltage between the terminals of the E8 ECM connector.

**HINT:**

The transmission gear selector lever should be in the P or N position and the A/C switch should be turned OFF.

**Standard:**

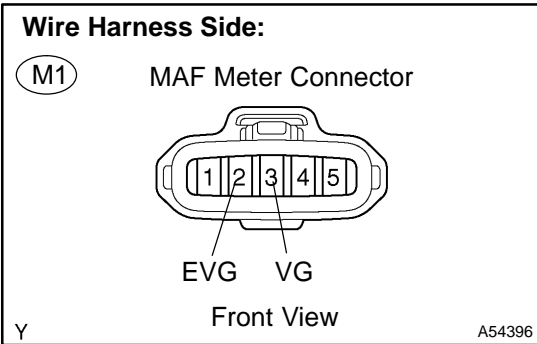
Tester Connections	Conditions	Specified Conditions
VG (E8-30) – EVG (E8-29)	Engine idling	Between 0.5 V and 3.0 V

**NG** → Go to step 4

**OK**

**REPLACE ECM (See page 10-32)**

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



- (a) Disconnect the M1 MAF meter connector.
- (b) Disconnect the E8 ECM connector.
- (c) Check the resistance.

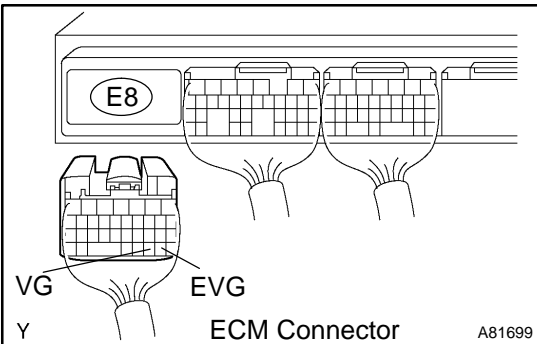
**Standard (Check for open):**

Tester Connections	Specified Conditions
VG (M1-3) – VG (E8-30)	Below 1 Ω
EVG (M1-2) – EVG (E8-29)	Below 1 Ω

**Standard (Check for short):**

Tester Connections	Specified Conditions
VG (M1-3) or VG (E8-30) – Body ground	10 kΩ or higher

- (d) Reconnect the MAF meter connector.
- (e) Reconnect the ECM connector.

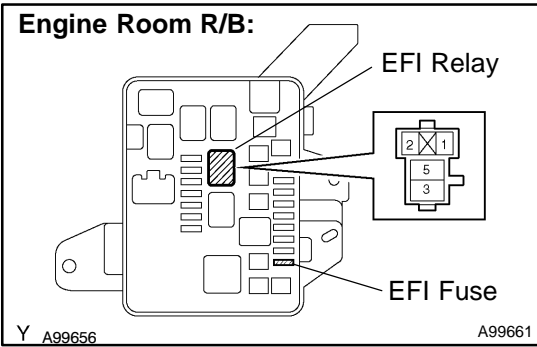


**NG** → REPAIR OR REPLACE HARNESS OR CONNECTOR

**OK**

**REPLACE MASS AIR FLOW METER**

**5 CHECK HARNESS AND CONNECTOR(MASS AIR FLOW METER - EFI RELAY)**



- (a) Inspect the EFI fuse.
  - (1) Remove the EFI fuse from the engine room R/B.
  - (2) Check the EFI fuse resistance.

**Standard: Below 1 Ω**

- (3) Reinstall the EFI fuse.
- (b) Remove the EFI relay from the engine room R/B.
- (c) Disconnect the M1 MAF meter connector.
- (d) Check the resistance.

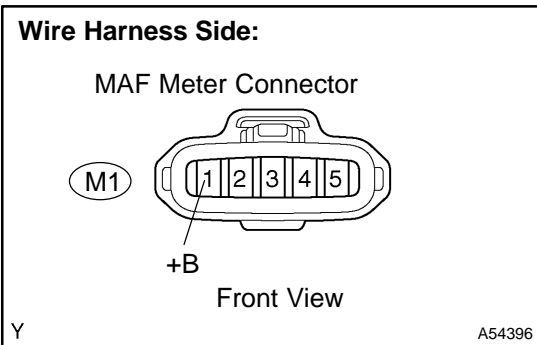
**Standard (Check for open):**

Tester Connections	Specified Conditions
+B (M1-1) - EFI relay (3)	Below 1 Ω

**Standard (Check for short):**

Tester Connections	Specified Conditions
+B (M1-1) or EFI relay (3) - Body ground	10 kΩ or higher

- (e) Reconnect the MAF meter connector.
- (f) Reinstall the EFI relay.

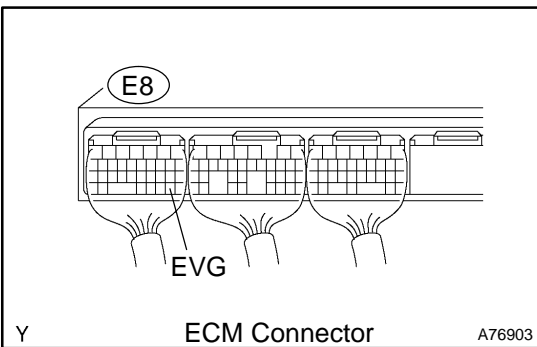


**NG REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK**

**INSPECT ECM POWER SOURCE CIRCUIT (See page 05-374)**

**6 INSPECT ECM(SENSOR GROUND)**



- (a) Check the resistance.

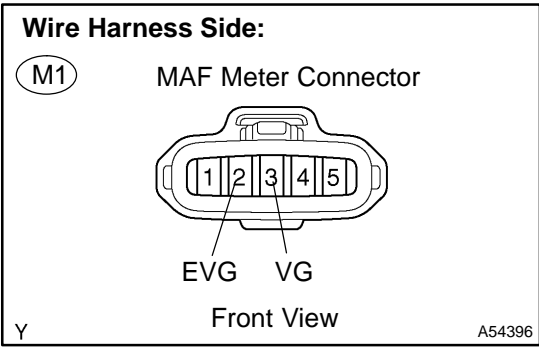
**Standard:**

Tester Connections	Specified Conditions
EVG (E8-29) - Body ground	Below 1 Ω

**NG REPLACE ECM (See page 10-32)**

**OK**

**7 CHECK HARNESS AND CONNECTOR(MASS AIR FLOW METER - ECM)**



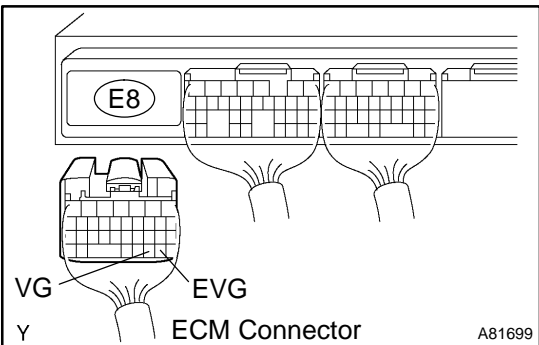
- (a) Disconnect the M1 MAF meter connector.
- (b) Disconnect the E8 ECM connector.
- (c) Check the resistance.

**Standard (Check for open):**

Tester Connections	Specified Conditions
VG (M1-3) - VG (E8-30)	Below 1 Ω
EVG (M1-2) - EVG (E8-29)	Below 1 Ω

**Standard (Check for short):**

Tester Connections	Specified Conditions
VG (M1-3) or VG (E8-30) - Body ground	10 kΩ or higher



- (d) Reconnect the MAF meter connector.
- (e) Reconnect the ECM connector.

**NG REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK**

**REPLACE MASS AIR FLOW METER**