

DTC	P0100	Mass or Volume Air Flow Circuit
DTC	P0102	Mass or Volume Air Flow Circuit Low Input
DTC	P0103	Mass or Volume Air Flow Circuit High Input

DESCRIPTION

The Mass Air Flow (MAF) meter is a sensor that measures the amount of air flowing through the valve. The ECM uses this information to determine the fuel injection time and to provide appropriate air-fuel ratio.

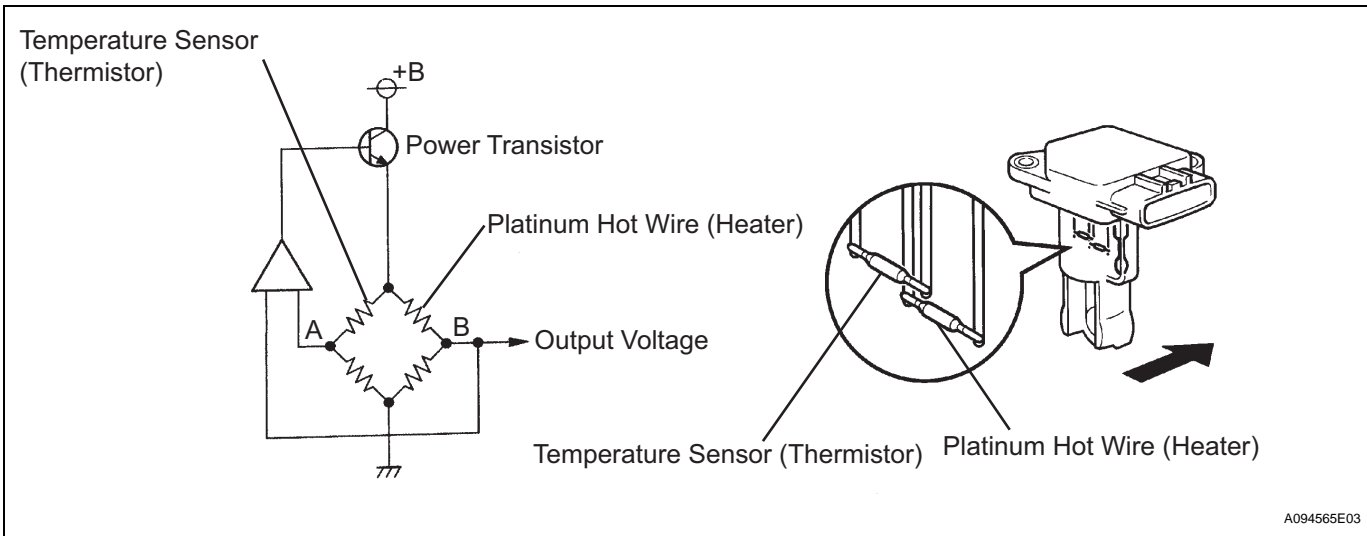
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Inside the MAF meter, there is a heated platinum wire which is exposed to the flow of intake air. By applying a specific electrical current to the wire, the ECM heats it to a given temperature. The flow of incoming air cools both the wire and an internal 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.



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DTC No.	DTC Detection Condition	Trouble Area
P0100	Open or short in Mass Air Flow (MAF) meter circuit for more than 3 seconds at engine speed of less than 4,000 rpm	<ul style="list-style-type: none"> Open or short in Mass Air Flow (MAF) meter circuit MAF meter ECM
P0102	Open in Mass Air Flow (MAF) meter circuit for more than 3 seconds at engine speed of less than 4,000 rpm	<ul style="list-style-type: none"> Open in MAF meter circuit Short in MAF meter circuit MAF meter ECM
P0103	Short in Mass Air Flow (MAF) meter circuit for more than 3 seconds at engine speed of less than 4,000 rpm	<ul style="list-style-type: none"> Short in MAF meter circuit (+B circuit) MAF meter ECM

HINT:

When any of these DTCs are set, check the air-flow rate by entering the following menus on the intelligent tester: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / MAF.

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

MONITOR DESCRIPTION

If there is a defect in the MAF meter or an open 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 output voltage remains at 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.

ES**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:**

Mass air flow meter voltage	Less than 0.2 V or more than 4.9 V
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P0102:

Mass air flow meter voltage	Less than 0.2 V
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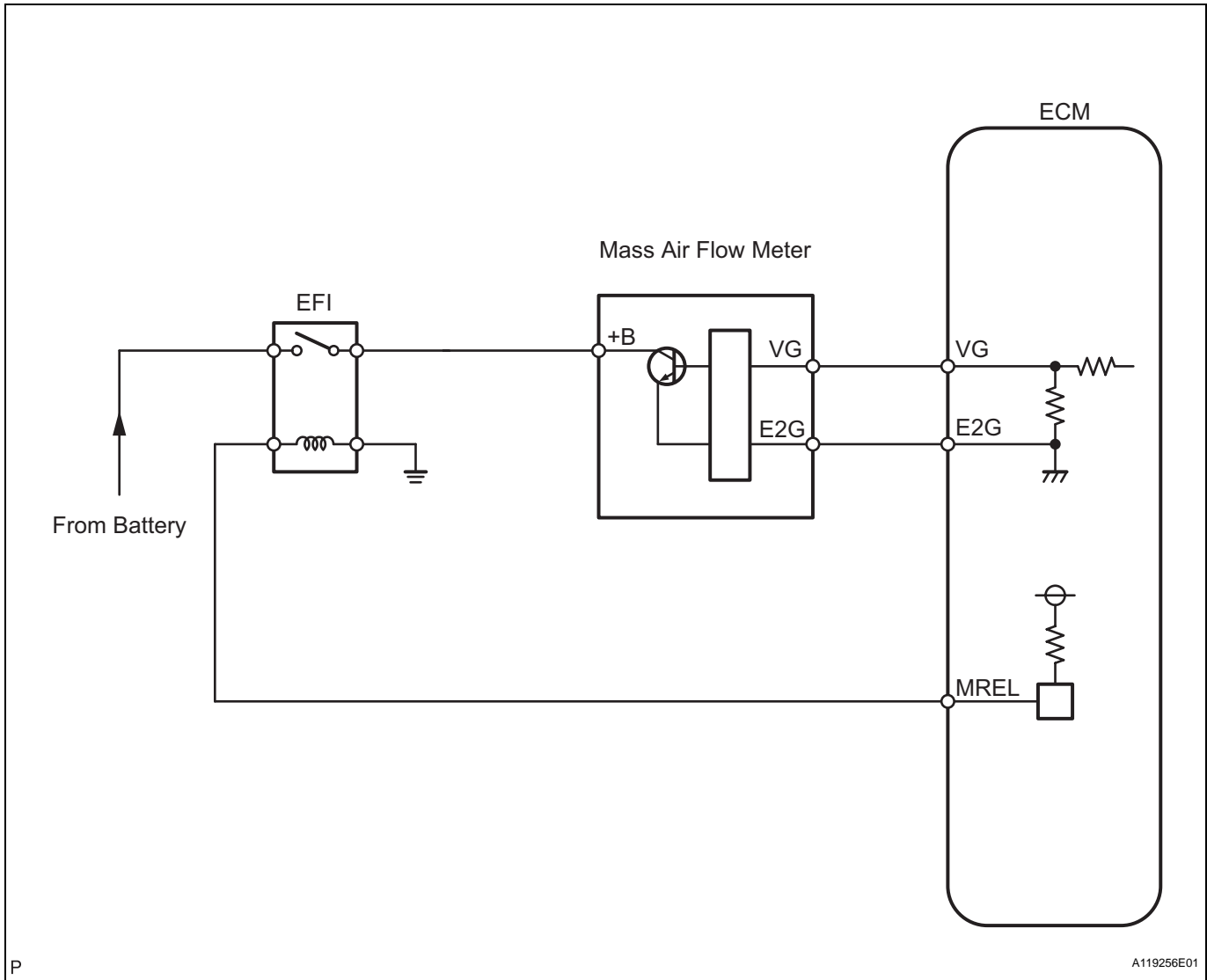
P0103:

Mass air flow meter voltage	More than 4.9 V
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COMPONENT OPERATING RANGE

Mass air flow meter voltage	0.2 to 4.9 V
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WIRING DIAGRAM



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HINT:

Read freeze frame data using the intelligent tester. Freeze frame data records the engine conditions 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 OF INTELLIGENT TESTER (MASS AIR FLOW RATE)

- (a) Connect the intelligent tester to the DLC3.
- (b) Start the engine.
- (c) Turn the tester ON.
- (d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / MAF.
- (e) Read the values displayed on the tester.

Result

Mass Air Flow Rate (g/sec.)	Proceed to
0.0	A
271.0 or more	B

Mass Air Flow Rate (g/sec.)	Proceed to
Between 1.0 and 270.0*	C

*: The value must change when the throttle valve is open or closed.

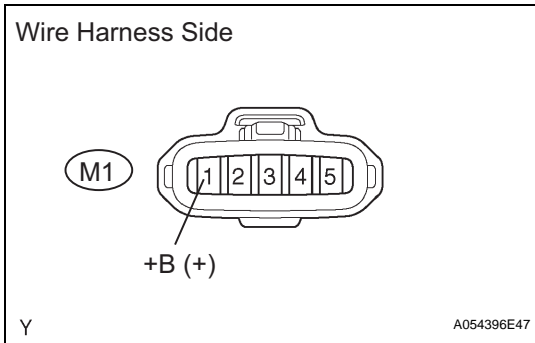
B Go to step 6

C CHECK FOR INTERMITTENT PROBLEMS

A

2 INSPECT MASS AIR FLOW METER (POWER SOURCE VOLTAGE)

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

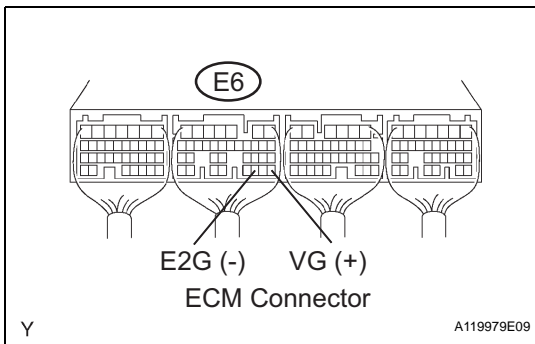
Standard voltage

Tester Connection	Specified Condition
+B (M1-1) - Body ground	9 to 14 V

NG Go to step 5

OK

3 INSPECT ECM (VG VOLTAGE)



- (a) Start the engine.
 - (b) Measure the voltage of the 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 voltage**

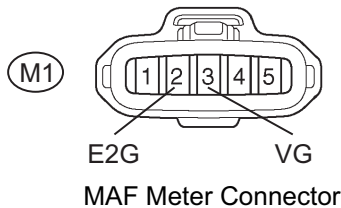
Tester Connection	Condition	Specified Condition
VG (E6-28) - E2G (E6-30)	Engine idling	0.5 to 3.0 V

OK REPLACE ECM

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

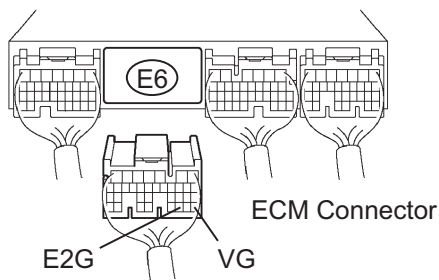
Wire Harness Side



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- (a) Disconnect the M1 MAF meter connector.
- (b) Disconnect the E6 ECM connector.



Y

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- (c) Measure the resistance of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
VG (M1-3) - VG (E6-28)	Below 1 Ω
E2G (M1-2) - E2G (E6-30)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
VG (M1-3) or VG (E6-28) - Body ground	10 kΩ or higher

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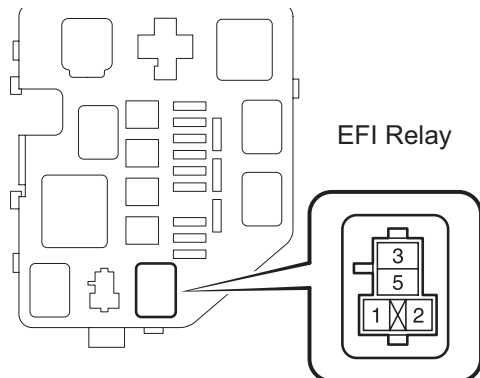
REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE MASS AIR FLOW METER

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

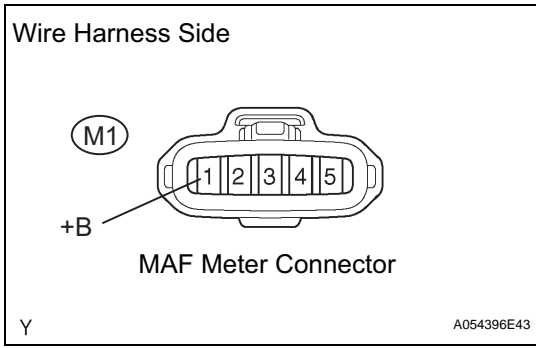
Engine Room Relay Block



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- (a) Remove the EFI relay from the engine room relay block.
- (b) Disconnect the M1 MAF meter connector.



(c) Measure the resistance of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
+B (M1-1) - Engine room relay block (EFI relay terminal 3)	Below 1 Ω

Standard resistance (Check for short)

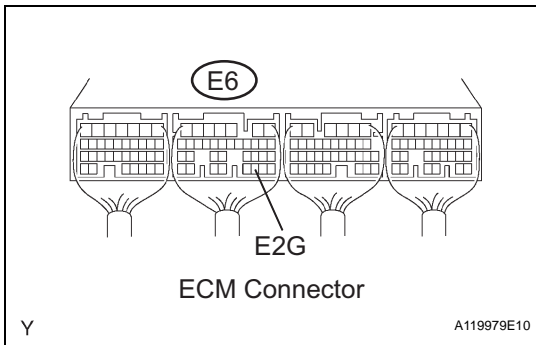
Tester Connection	Specified Condition
+B (M1-1) or Engine room relay block (EFI relay terminal 3) - Body ground	10 kΩ or higher

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

INSPECT ECM POWER SOURCE CIRCUIT

6 INSPECT ECM (SENSOR GROUND)



(a) Measure the resistance of the ECM connector and body ground.

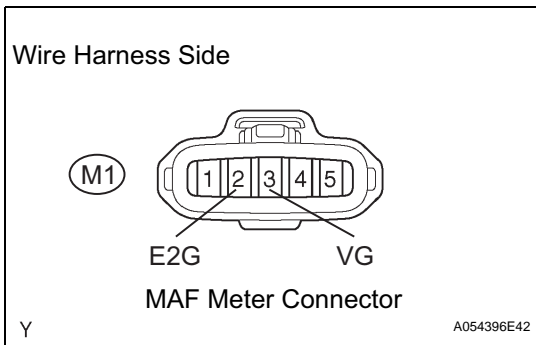
Standard resistance

Tester Connection	Specified Condition
E2G (E6-30) - Body ground	Below 1 Ω

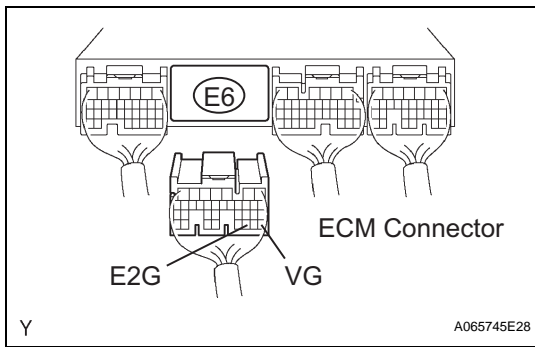
NG REPLACE ECM

OK

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



(a) Disconnect the M1 MAF meter connector.
 (b) Disconnect the E6 ECM connector.



(c) Measure the resistance of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
VG (M1-3) - VG (E6-28)	Below 1 Ω
E2G (M1-2) - E2G (E6-30)	Below 1 Ω

Standard resistance (Check for short)

Tester Connections	Specified Conditions
VG (M1-3) or VG (E6-28) - Body ground	10 kΩ or higher

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REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE MASS AIR FLOW METER