

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 throttle valve.

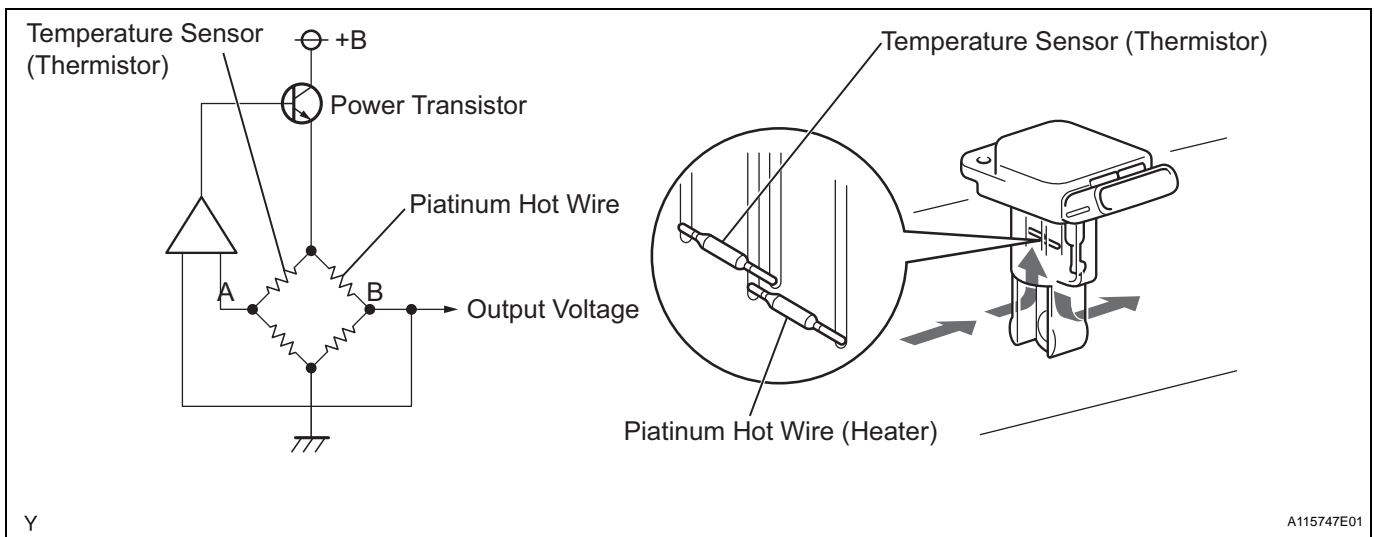
The ECM uses this information to determine the fuel injection time and to provide appropriate air-fuel ratio.

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 Mass Air Flow (MAF) meter circuit for 3 seconds (1 trip detection logic)	<ul style="list-style-type: none"> Open or short in MAF meter circuit MAF meter ECM
P0102	Open in Mass Air Flow (MAF) meter circuit for 3 seconds (1 trip detection logic)	<ul style="list-style-type: none"> Open in MAF meter circuit Short in ground circuit MAF meter ECM
P0103	Short in Mass Air Flow (MAF) meter circuit for 3 seconds (1 trip detection logic)	<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 selecting the following menu items on an 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 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:**

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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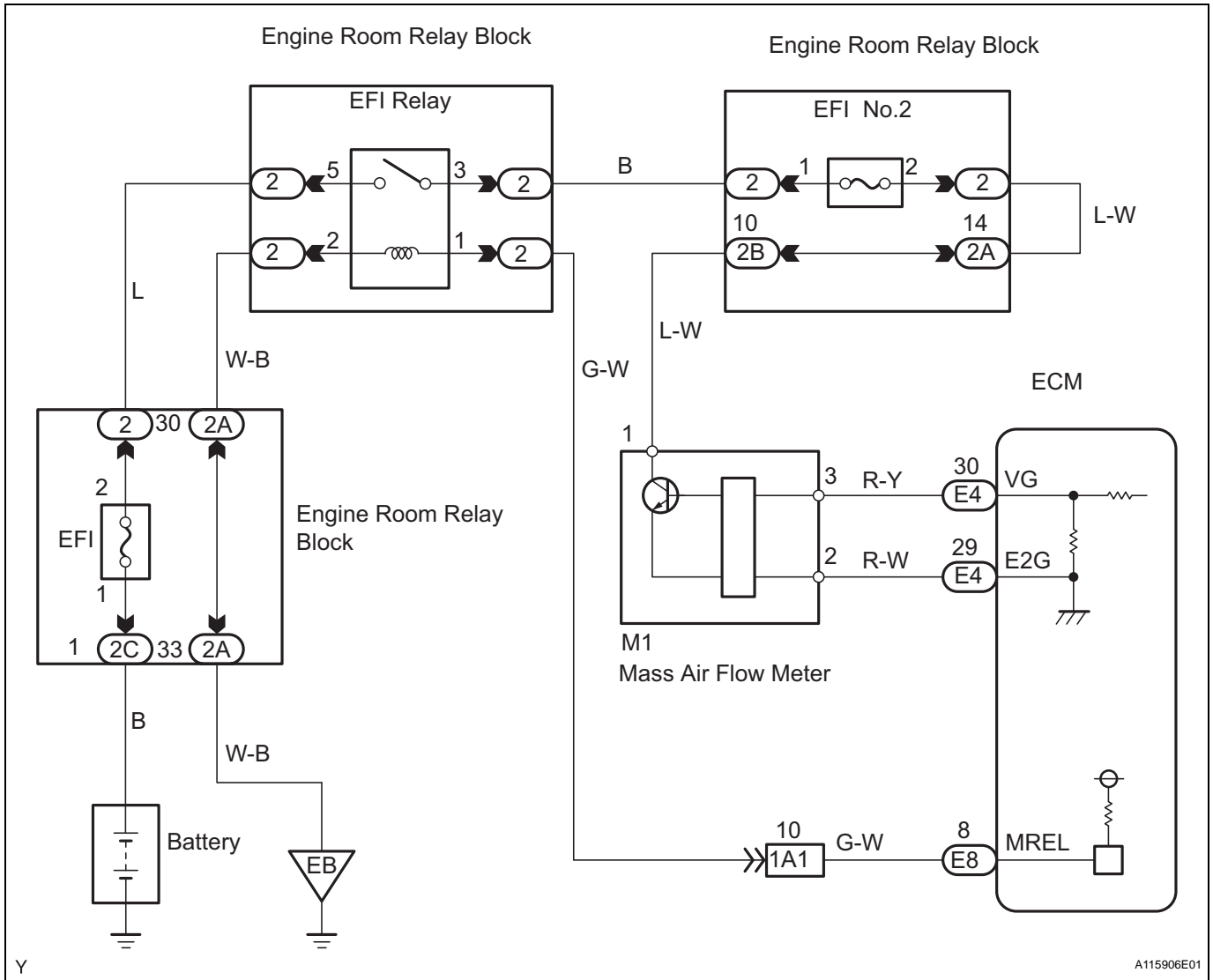
P0103:

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

Mass air flow meter voltage	Between 0.4 V and 2.2 V
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WIRING DIAGRAM



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HINT:

Read freeze frame data using an intelligent tester. 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 INTELLIGENT TESTER (MASS AIR FLOW RATE)

- (a) Connect an intelligent tester to the DLC3.
- (b) Start the engine.
- (c) Turn the tester ON.
- (d) Select the following menu items: 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 (*1)	C

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

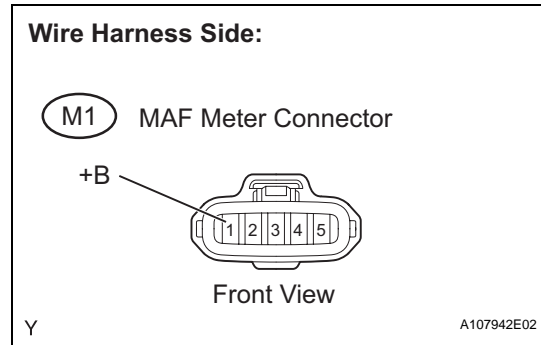
B → **Go to step 6**

C → **CHECK FOR INTERMITTENT PROBLEMS**

A

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2 INSPECT MASS AIR FLOW METER (POWER SOURCE VOLTAGE)



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

Standard Voltage

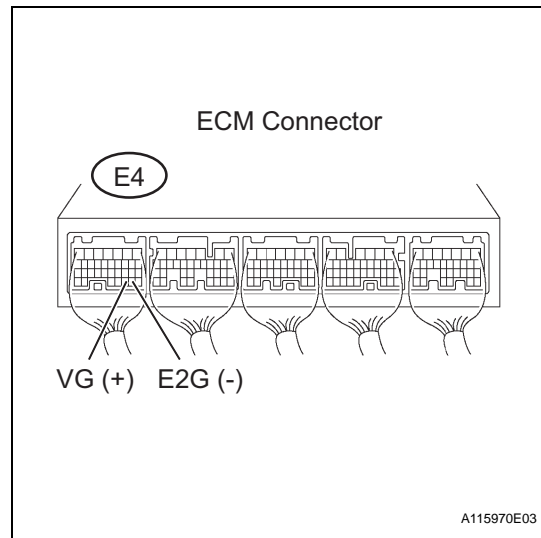
Tester Connections	Specified Conditions
+B (M1-1) - Body ground	9 to 14 V

- (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 E4 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.

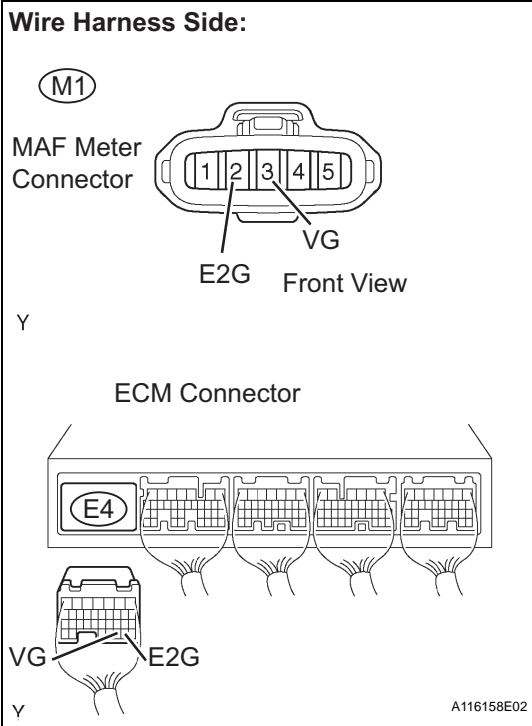
Standard Voltage

Tester Connections	Conditions	Specified Conditions
VG (E4-30) - E2G (E4-29)	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)



- (a) Disconnect the M1 MAF meter connector.
- (b) Disconnect the E4 ECM connector.
- (c) Check the resistance.

Standard Resistance (Check for open)

Tester Connections	Specified Conditions
VG (M1-3) - VG (E4-30)	Below 1 Ω
E2G (M1-2) - E2G (E4-29)	

Standard Resistance (Check for short)

Tester Connections	Specified Conditions
VG (M1-3) or VG (E4-30) - Body ground	10 kΩ or higher

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

NG **REPAIR OR REPLACE HARNESS OR CONNECTOR**

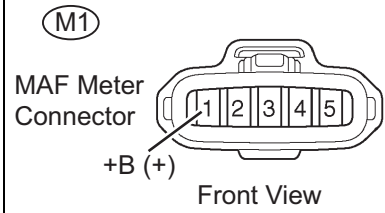
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OK

REPLACE MASS AIR FLOW METER

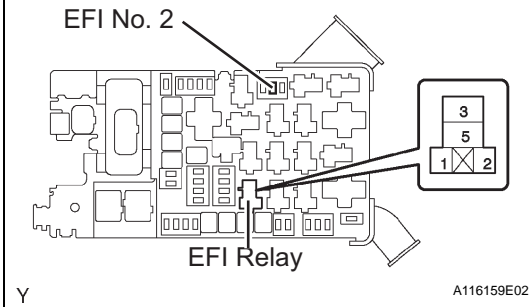
5 CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER - EFI RELAY)

Wire Harness Side:



Y

Engine Room R/B:



Y

A116159E02

- (a) Inspect the EFI NO. 2 fuse.
 - (1) Remove the EFI NO. 2 fuse from the engine room relay block.
 - (2) Check the EFI NO. 2 fuse resistance.
Standard Resistance:
Below 1 Ω
 - (3) Reinstall the EFI NO. 2 fuse.
- (b) Disconnect the M1 MAF meter connector.
- (c) Remove the EFI relay from the engine room relay block.
- (d) Check the resistance.
Standard Resistance (Check for open)

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

Standard Resistance (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.

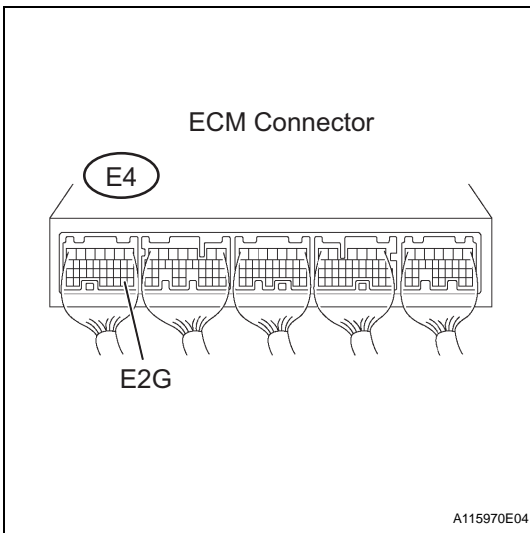
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REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

CHECK ECM POWER SOURCE CIRCUIT

6 INSPECT ECM (SENSOR GROUND)



- (a) Check the resistance.
Standard Resistance

Tester Connections	Specified Conditions
E2G (E4-29) - Body ground	Below 1 Ω

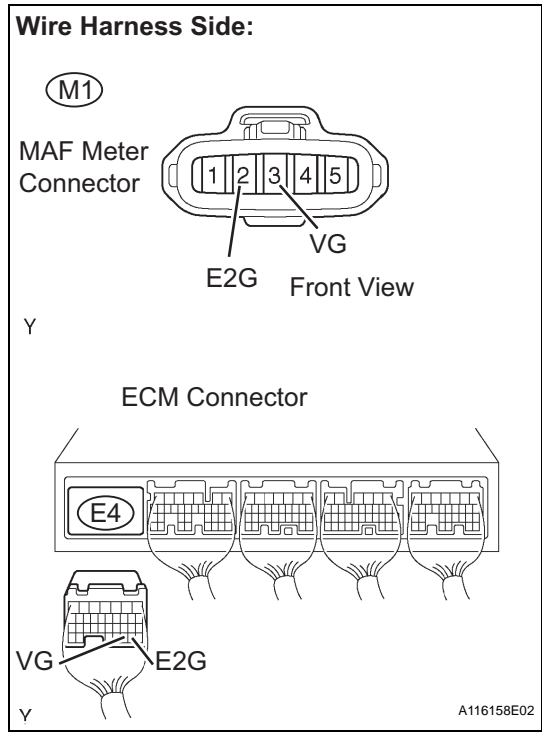
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REPLACE ECM

OK

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



- (a) Disconnect the M1 MAF meter connector.
- (b) Disconnect the E4 ECM connector.
- (c) Check the resistance.

Standard Resistance (Check for open)

Tester Connections	Specified Conditions
VG (M1-3) - VG (E4-30)	Below 1 Ω
E2G (M1-2) - E2G (E4-29)	

Standard Resistance (Check for short)

Tester Connections	Specified Conditions
VG (M1-3) or VG (E4-30) - 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

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