

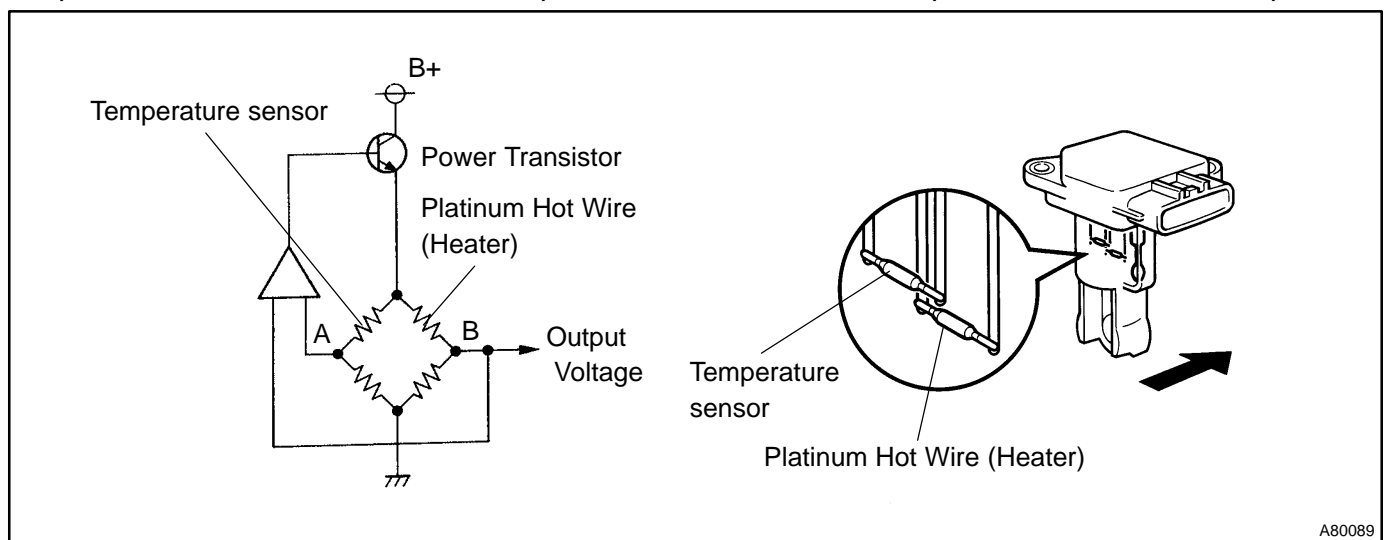
DTC	P0100	MASS OR VOLUME AIR FLOW CIRCUIT
DTC	P0102	MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT
DTC	P0103	MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT

CIRCUIT DESCRIPTION

The Mass Air Flow (MAF) meter measures the amount of air flowing through the throttle valve. The ECM uses this information to determine the fuel injection time and provide a proper air fuel ratio. Inside the MAF meter, there is a heated platinum wire exposed to the flow of intake air.

By applying a specific current to the wire, the ECM heats this wire to a given temperature. The flow of incoming air cools the wire and an internal thermister, 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. The ECM interprets this voltage as the intake air amount.

The circuit is constructed so that the platinum hot wire and temperature sensor provide a bridge circuit, with the power transistor controlled so that the potential of A and B remains equal to maintain the set temperature.



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DTC No.	DTC Detection Condition	Trouble Area
P0100	When MAF meter circuit has an open or a short for more than 3 seconds under 4,000 rpm engine speed	<ul style="list-style-type: none"> • Open or short in MAF meter circuit • MAF meter • ECM
P0102	When MAF meter circuit has an open for more than 3 seconds under 4,000 rpm engine speed	<ul style="list-style-type: none"> • Same as DTC No. P0100
P0103	When MAF meter circuit has a short for more than 3 seconds under 4,000 rpm engine speed	<ul style="list-style-type: none"> • Same as DTC No. P0100

HINT:

After confirming DTC P0100, P0102 or P0103, use the hand-held tester or the OBD II scan tool to confirm the MAF ratio from the ALL menu (to reach the ALL menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL).

Air Flow Value (g/s)	Malfunction
Approximately 0.0	<ul style="list-style-type: none"> • MAF meter power source circuit open • VG circuit open or short
271.0 or more	<ul style="list-style-type: none"> • E2G circuit open

MONITOR DESCRIPTION

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

Example:

When the sensor voltage output is less than 0.2 V or more than 4.9 V and if either condition continues for more than 3 seconds.

MONITOR STRATEGY

Related DTCs	P0100: MAF Meter Range Check (Chattering) P0102: MAF Meter Range Check(Low voltage) P0103: MAF 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 is less than 4,000 rpm 2 driving cycles: Engine RPM is 4,000 rpm or more
Sequence operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-16
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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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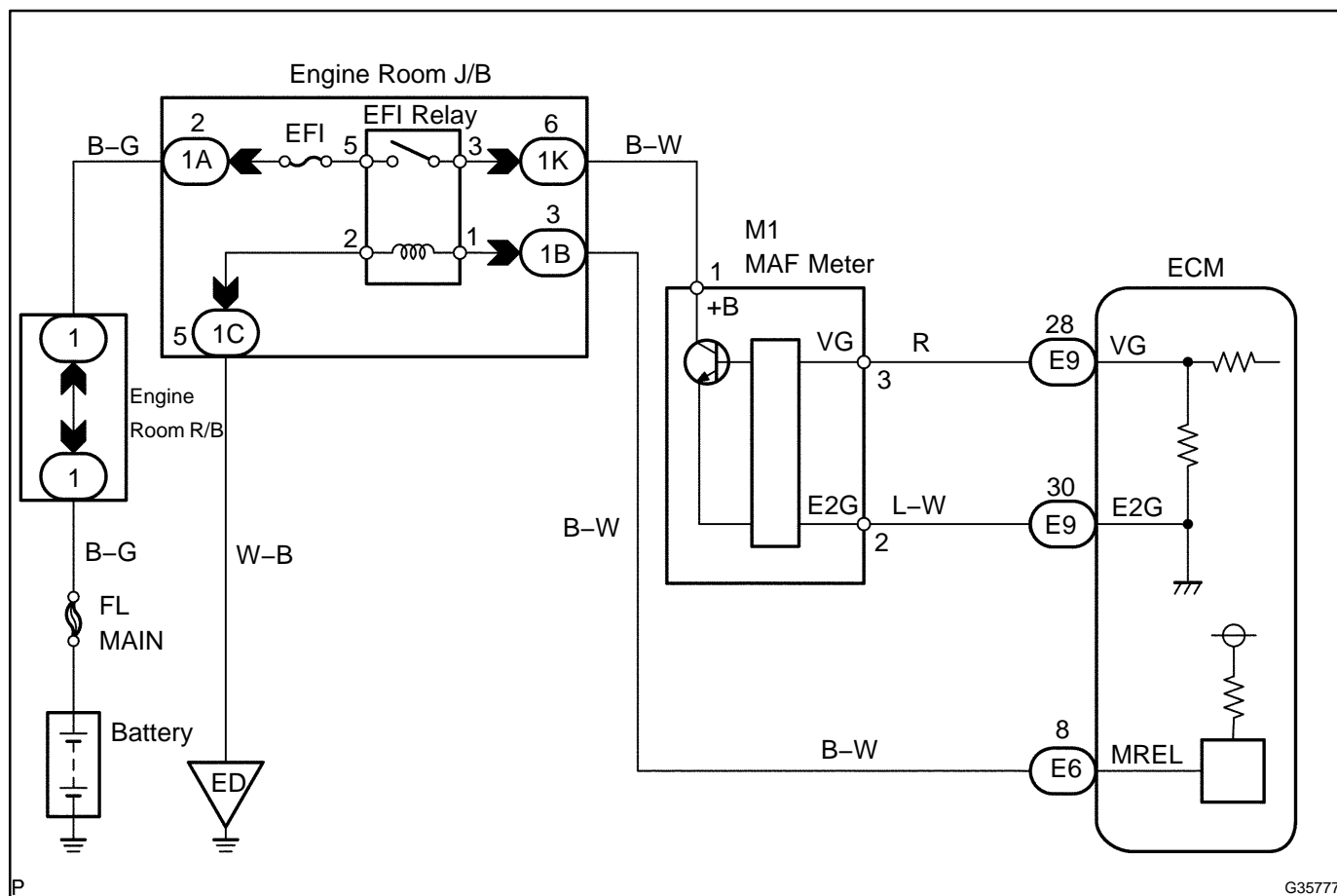
P0103:

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 the hand-held tester or the OBD II scan tool. 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 HAND-HELD TESTER OR OBD II SCAN TOOL (MAF RATE)

- (a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
- (b) Start the engine.
- (c) Push the hand-held tester or the OBD II scan tool main switch ON.
- (d) On the hand-held tester or the OBD II scan tool, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / MAF. Read the values.

Result:

Air Flow Rate (gm/second)	Proceed to
0.0	A
271.0 or more	B
MAF rate greater than 1 but less than 270.0 (*1)	C

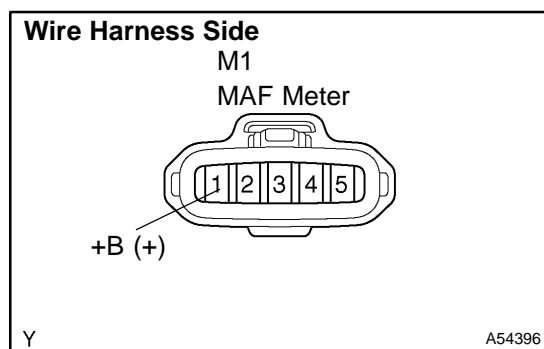
*1: The value must change when the throttle valve is opened or closed.

B Go to step 6

C CHECK FOR INTERMITTENT PROBLEMS
(See page 05-9)

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2 CHECK MASS AIR FLOW METER (POWER SOURCE VOLTAGE)



- (a) Turn the ignition switch ON.
- (b) Disconnect the M1 MAF meter connector.
- (c) Check the voltage of the wire harness side connector.

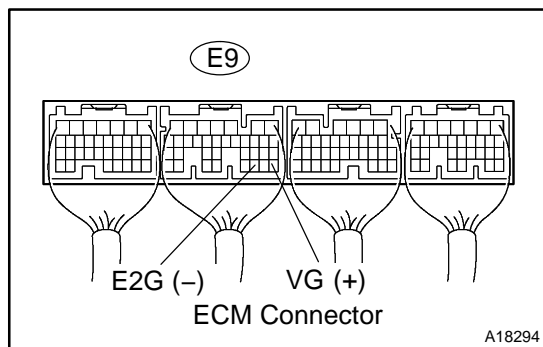
Standard:

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

NG Go to step 5

OK

3 INSPECT ECM (VG VOLTAGE)



- Start the engine.
- Check the voltage between of the E9 ECM connector.

HINT:

The shift position should be P or N and the A/C switch should be turned OFF.

Standard:

Tester Connection	Condition	Specified Condition
E9-28 (VG) - E9-30 (E2G)	Engine is idling	0.5 to 3.0 V

OK

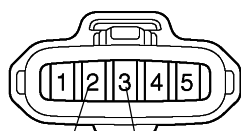
REPLACE ECM (See page 10-9)

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4 CHECK WIRE HARNESS (ECM - MAF METER)

Wire Harness Side:

(M1) Mass Air Flow Sensor Connector



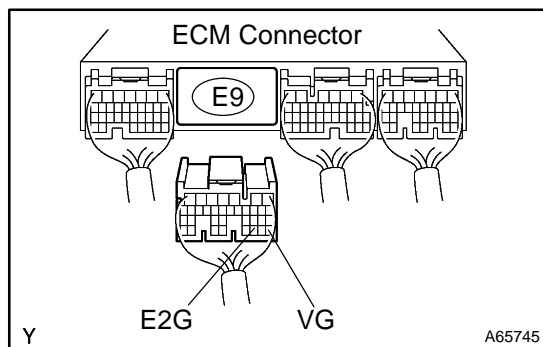
E2G VG
Front View

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- Disconnect the M1 MAF meter connector.
- Disconnect the E9 ECM connector.
- Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
M1-3 (VG) - E9-28 (VG) M1-2 (E2G) - E9-30 (E2G)	Below 1 Ω
M1-3 (VG) or E9-28 (VG) - Body ground	10 k Ω or higher



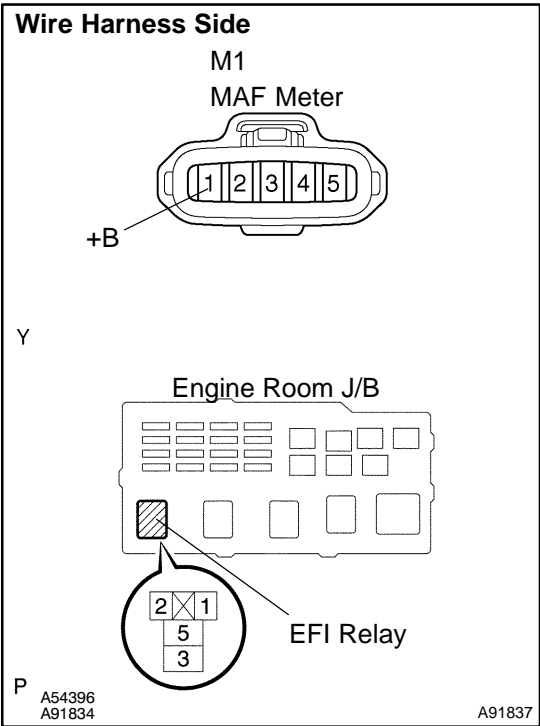
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REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE MASS AIR FLOW METER

5 CHECK WIRE HARNESS (MAF - EFI RELAY)



- (a) Disconnect the M1 MAF meter connector.
- (b) Remove the EFI relay from the engine room J/B.
- (c) Check the resistance of the wire harness side connectors.

Standard:

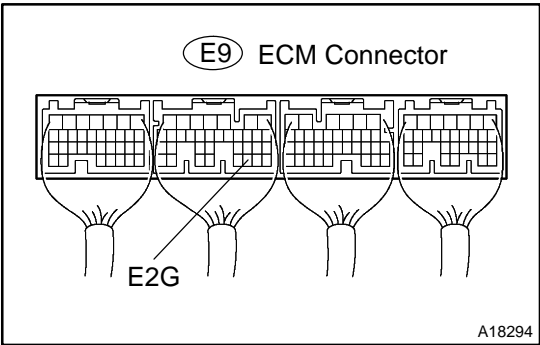
Tester Connection	Specified Condition
M1-1 (+B) - J/B EFI relay terminal 3	Below 1 Ω
M1-1 (+B) or J/B EFI relay terminal 3 - Body ground	10 k Ω or higher

NG **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

INSPECT ECM POWER SOURCE CIRCUIT

6 INSPECT ECM (SENSOR GROUND)



- (a) Check the resistance between of the E9 ECM connector.
- Standard:**

Tester Connection	Specified Condition
E9-30 (E2G) - Body ground	Below 1 Ω

NG **REPLACE ECM (See page 10-9)**

OK

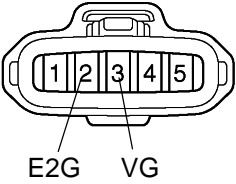
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CHECK WIRE HARNESS (ECM – MAF METER)

Wire Harness Side:

M1

Mass Air Flow Sensor Connector



E2G

VG

Front View

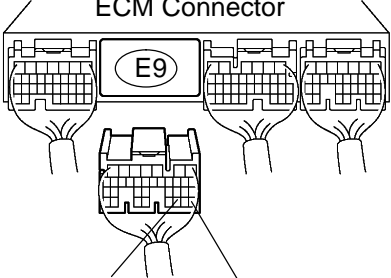
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A54396

- (a) Disconnect the M1 MAF meter connector.
- (b) Disconnect the E9 ECM connector.
- (c) Check the resistance of the wire harness side connectors.
- Standard:

Tester Connection	Specified Condition
M1-3 (VG) – E9-28 (VG) M1-2 (E2G) – E9-30 (E2G)	Below 1 Ω
M1-3 (VG) or E9-28 (VG) – Body ground	10 k Ω or higher

ECM Connector



E9

EVG

VG

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REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE MASS AIR FLOW METER