

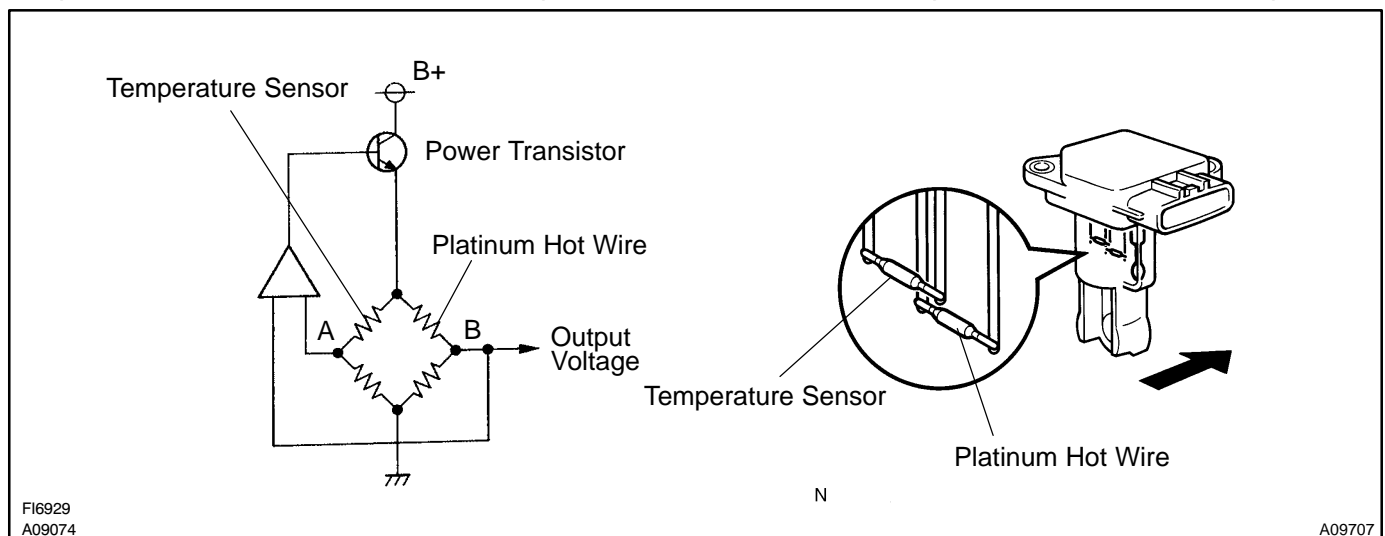
DTC	P0100	Mass or Volume Air Flow Circuit
DTC	P0102	Mass or Volume Air Flow Circuit Low Input
DTC	P0103	Mass or Volume Air Flow Circuit High Input

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 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. 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.



DTC No.	DTC Detection Condition	Trouble Area
P0100	Open or short in mass air flow meter circuit for more than 3 sec.	<ul style="list-style-type: none"> • Open or short in mass air flow meter circuit • Mass air flow meter • ECM
P0102	Open or short in mass air flow meter circuit for more than 3 sec.	
P0103	Open in mass air flow meter circuit for more than 3 sec. (EVG circuit) Short in mass air flow meter circuit for more than 3 sec. (+B circuit)	

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).

Mass Air Flow Value (gm/sec.)	Malfunction
Approx. 0.0	<ul style="list-style-type: none"> • Mass air flow meter power source circuit open • VG circuit open or short
271.0 or more	<ul style="list-style-type: none"> • EVG circuit open

MONITOR DESCRIPTION

If there is a defect in the MAF (Mass Air Flow) meter 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 MAF meter voltage output is less than 0.2 V, or more than 4.9 V, and if either the condition continues for more than 3 sec.

MONITOR STRATEGY

Related DTCs	P0100	Mass air flow meter circuit range check (Fluttering)
	P0102	Mass air flow meter circuit range check (Low voltage)
	P0103	Mass air flow meter circuit range check (High voltage)
Required sensors/components	Mass air flow meter	
Frequency of operation	Continuous	
Duration	3 sec.	
MIL operation	Immediate (When engine speed is at less than 4,000 rpm) 2 driving cycles (When engine speed is at 4,000 rpm or more)	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present	See page DI-437
The typical enabling condition is not available	–

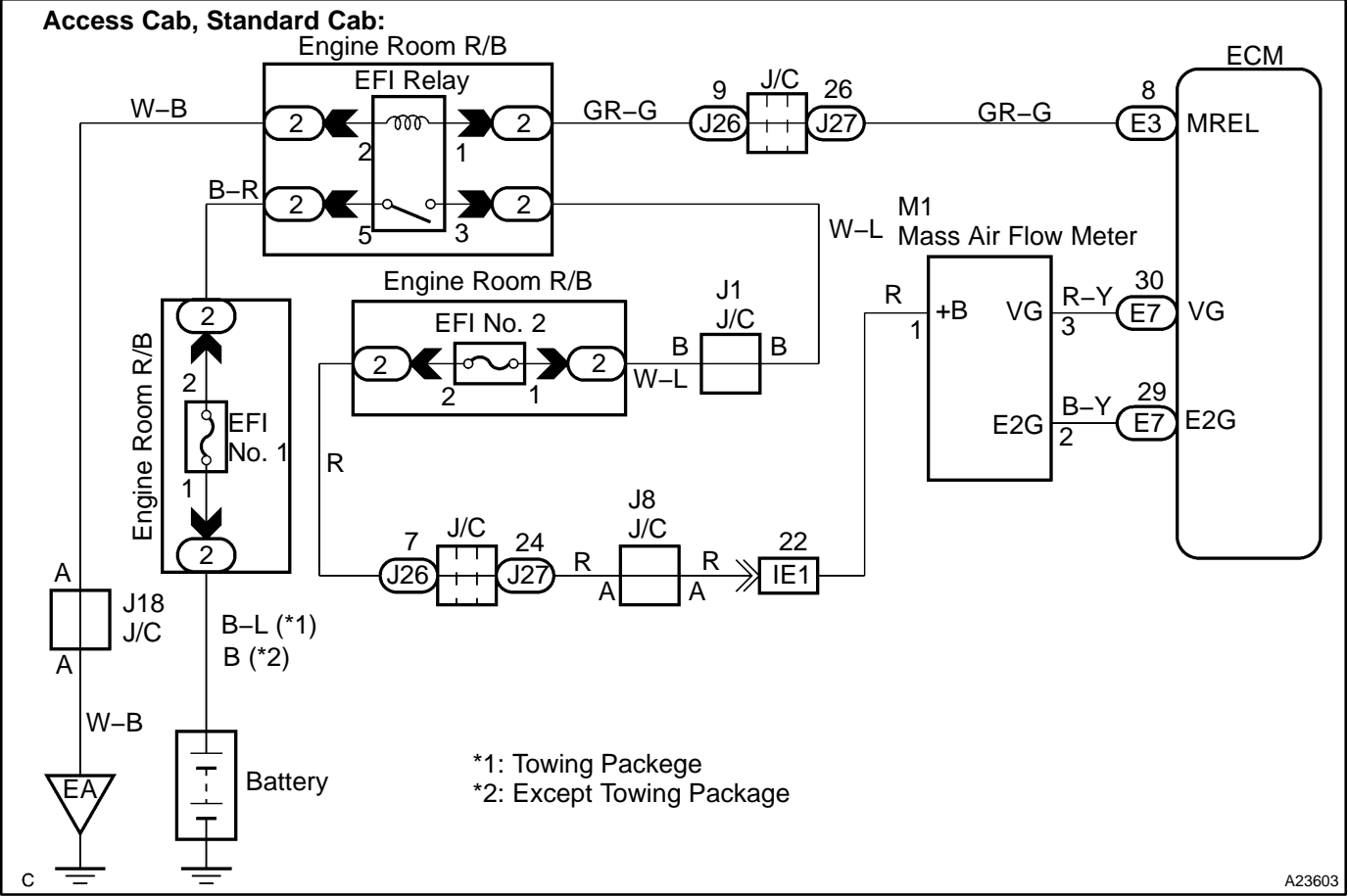
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0100:	
Mass air flow meter voltage	Less than 0.2 V, or more than 4.9 V
P0102:	
Mass air flow meter voltage	Less than 0.2 V
P0103:	
Mass air flow meter voltage	More than 4.9 V

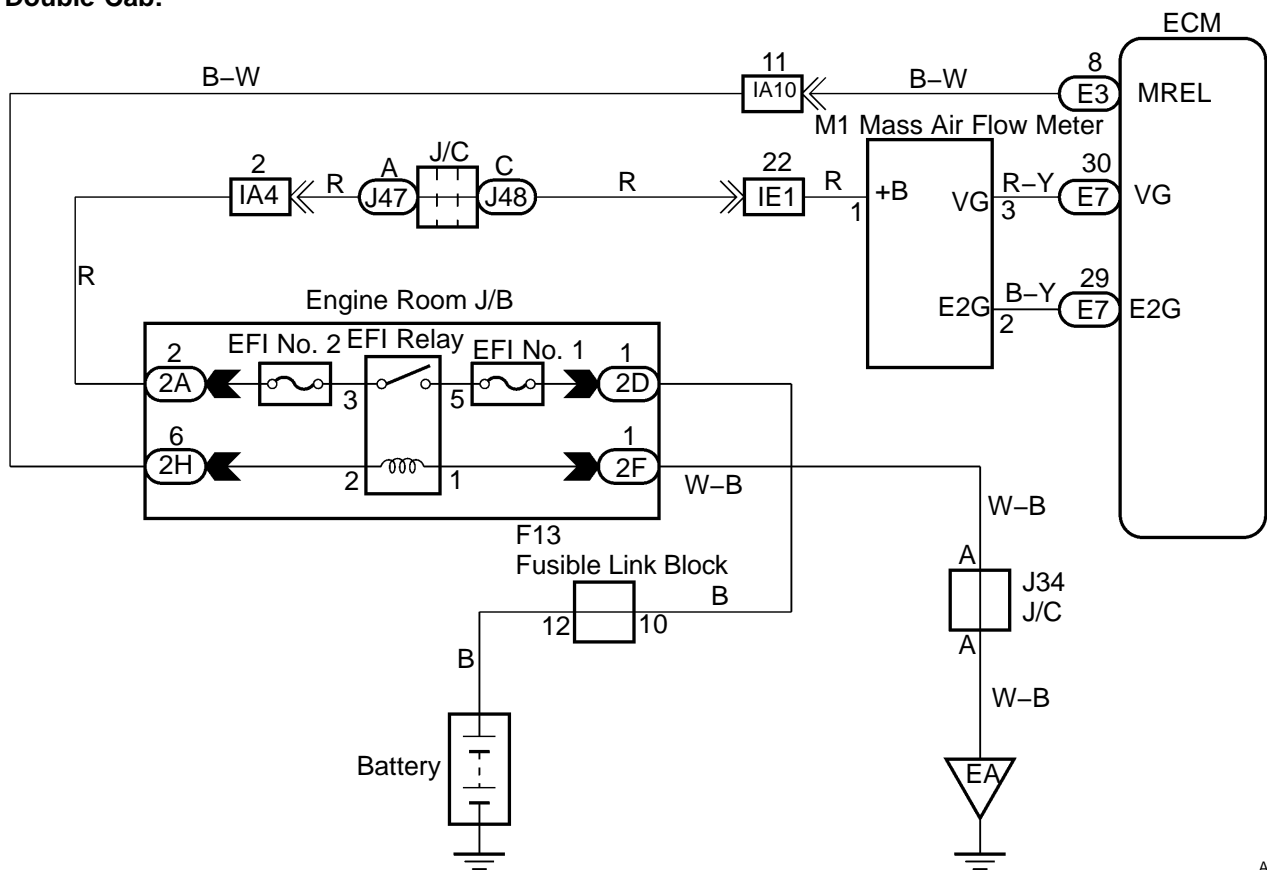
COMPONENT OPERATING RANGE

Parameter	Standard Value
Mass air flow meter voltage	0.4 to 2.2 V

WIRING DIAGRAM



Double Cab:



A23604

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand–held tester. 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, as well as other data from the time when a malfunction occurred.

1	Connect hand–held tester, and read value of mass air flow rate.
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PREPARATION:

- (a) Connect the hand–held tester to the DLC3.
- (b) Turn the ignition switch to ON and push the hand–held tester main switch ON.
- (c) Start the engine.
- (d) When using hand–held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / MAF.

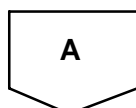
CHECK:

Read the mass air flow rate on the hand–held tester.

RESULT:

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

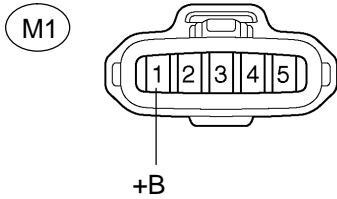
*1: The value must change when the throttle valve is opened or closed.



2 Check voltage of mass air flow meter power source.

Wire Harness Side:

Mass Air Flow Meter Connector



Y

A21226

PREPARATION:

- (a) Disconnect the M1 mass air flow meter connector.
- (b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminal 1 of the mass air flow meter connector and body ground.

OK:

Standard:

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

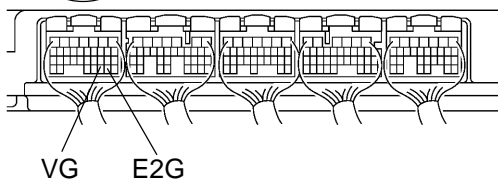
NG

Go to step 5.

OK

3 Check voltage between terminal VG of ECM connector and body ground.

E7 ECM Connector



N

B17411

PREPARATION:

Start the engine.

CHECK:

Measure the voltage between the specified terminal of the E7 ECM connector.

HINT:

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

OK:

Standard:

Tester Connection	Condition	Specified Condition
VG (E7-30) – E2G (E7-29)	Engine is idling	0.5 to 3.0 V

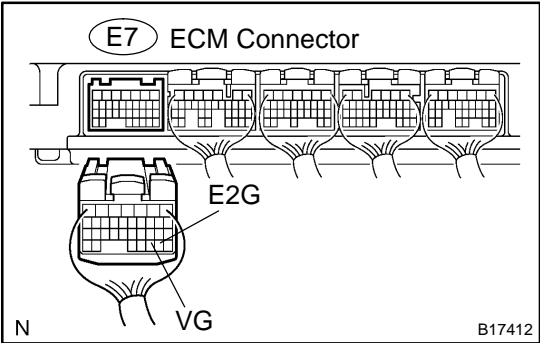
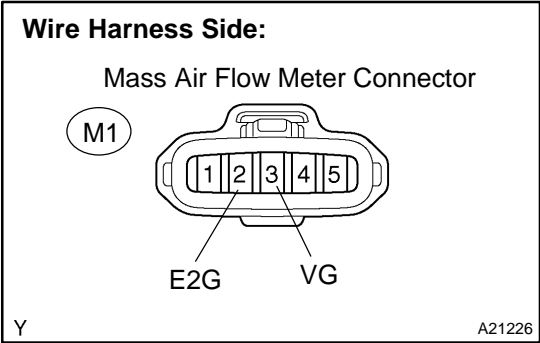
OK

Replace ECM (See page [SF-82](#)).

NG

4

Check for open and short in harness and connector between mass air flow meter and ECM.



PREPARATION:

- (a) Disconnect the M1 mass air flow meter connector.
- (b) Disconnect the E7 ECM connector.

CHECK:

Check the resistance between the wire harness side connectors.

OK:

Standard:

Tester Connection	Specified Condition
VG (M1-3) – VG (E7-30)	Below 1 Ω
E2G (M1-2) – E2G (E7-29)	Below 1 Ω
VG (M1-3) or VG (E7-30) – Body ground	10 kΩ or higher

OK

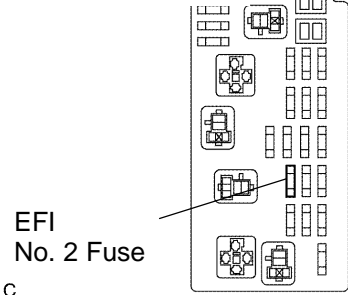
Replace mass air flow meter.

NG Repair or replace harness or connector.

5

Check for open and short in harness and connector between mass air flow meter and EFI relay.

Engine Room J/B:



C

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PREPARATION:

Remove the EFI No. 2 fuse from the engine room J/B.

CHECK:

Check the resistance in the EFI No. 2 fuse.

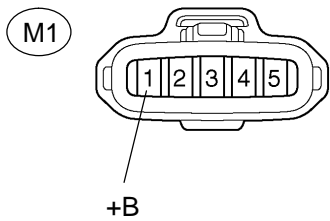
OK:

Standard:

Below 1 Ω

Wire Harness Side:

Mass Air Flow Meter Connector



Y

A21226

PREPARATION:

- (a) Install the EFI No. 2 fuse.
- (b) Disconnect the M1 mass air flow meter connector.
- (c) Remove the EFI relay from the engine room J/B.

CHECK:

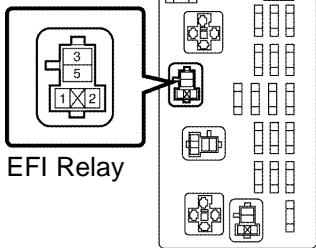
Check the resistance between the wire harness side connectors.

OK:

Standard:

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

Engine Room J/B:



C

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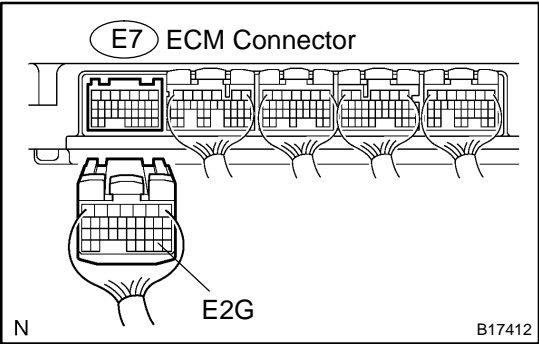
Repair or replace harness or connector.

OK

**Check ECM power source circuit
(See page [DI-918](#)).**

6

Check continuity between terminal E2G of ECM connector and body ground.



CHECK:
Check the resistance between terminal of the E7 ECM connector and body ground.

OK:

Standard:	
Tester Connection	Specified Condition
E2G (E7-29) – Body ground	Below 1 Ω

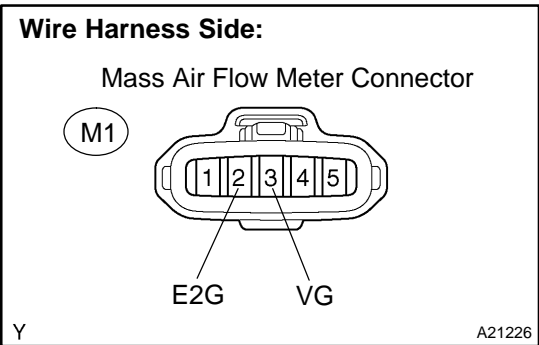
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Replace ECM (See page [SF-82](#)).

OK

7

Check for open in harness and connector between mass air flow meter and ECM.

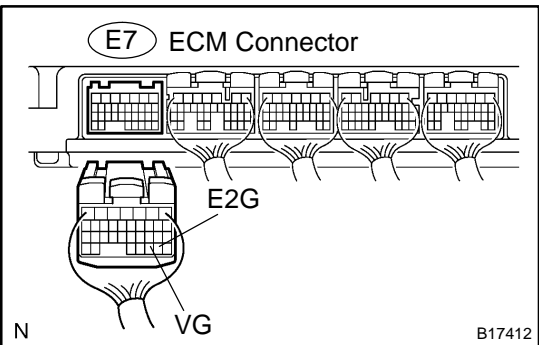


PREPARATION:
(a) Disconnect the M1 mass air flow meter connector.
(b) Disconnect the E7 ECM connector.

CHECK:
Check the resistance between the wire harness side connectors.

OK:

Standard:	
Tester Connection	Specified Condition
VG (M1-3) – VG (E7-30)	Below 1 Ω
E2G (M1-2) – E2G (E7-29)	Below 1 Ω
VG (M1-3) or VG (E7-30) – Body ground	10 kΩ or higher
E2G (M1-2) or E2G (E7-29) – Body ground	10 kΩ or higher



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Repair or replace harness or connector.

OK

Replace mass air flow meter.