

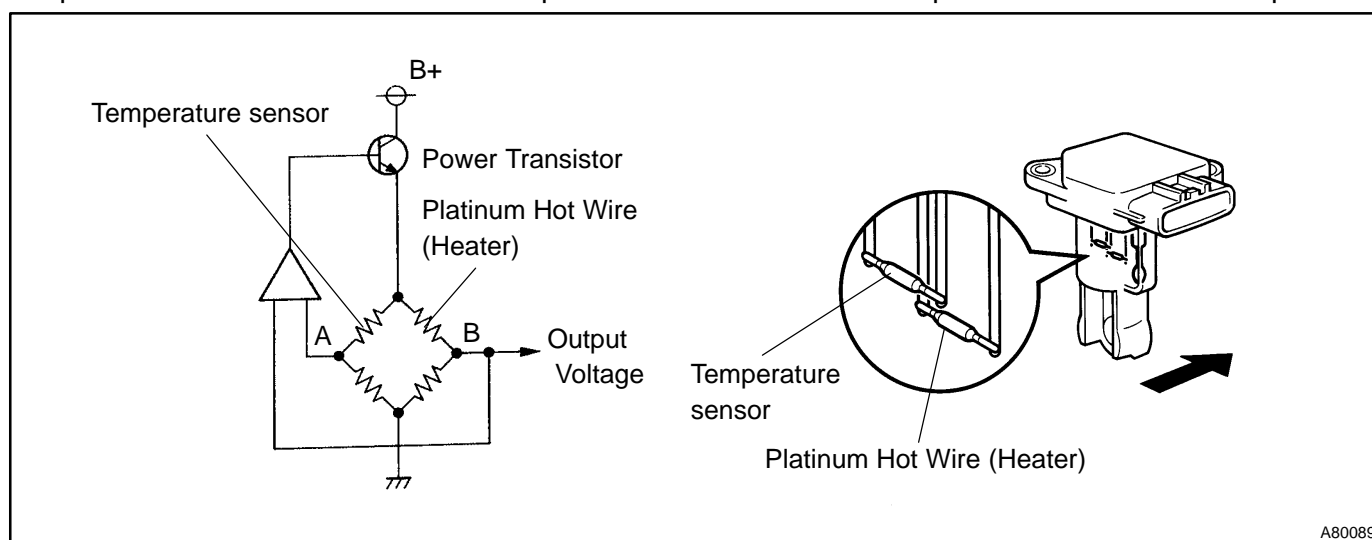
| | | |
|------------|--------------|---|
| DTC | P0100 | MASS OR VOLUME AIR FLOW CIRCUIT |
| DTC | P0102 | MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT |
| DTC | P0103 | MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT |

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.



A80089

| 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"> • Open or short in MAF meter circuit • MAF meter • ECM |
| 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"> • Open or short in MAF meter circuit • MAF meter • ECM |

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 (gm/s) | Malfunction |
|-----------------------|---|
| Approx. 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 05-507 |
|--|---------------------------------|

TYPICAL MALFUNCTION THRESHOLDS

P0100:

| | |
|-------------------|-------------------------------------|
| MAF meter voltage | Less than 0.2 V, or more than 4.9 V |
|-------------------|-------------------------------------|

P0102:

| | |
|-------------------|-----------------|
| MAF meter voltage | Less than 0.2 V |
|-------------------|-----------------|

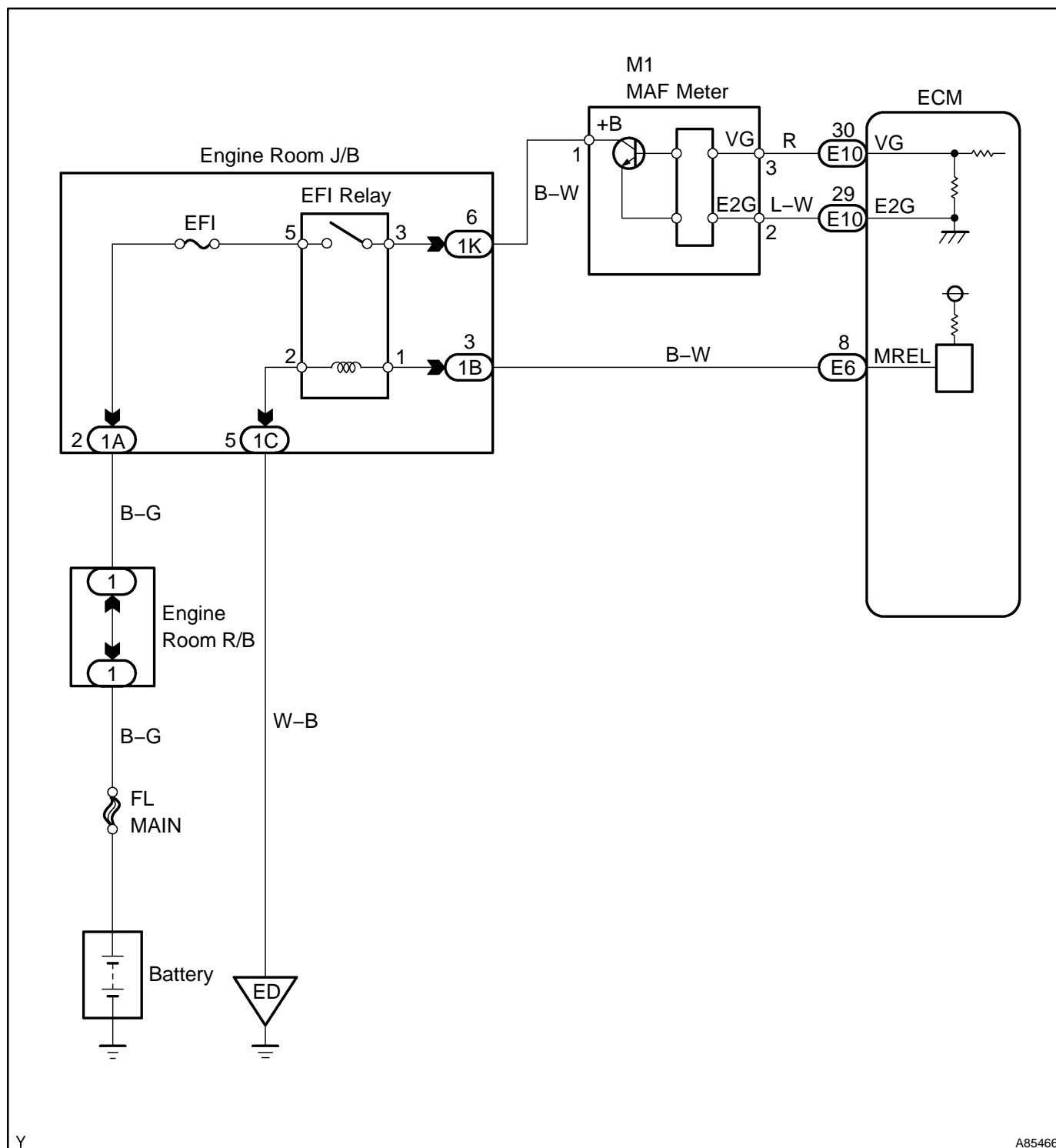
P0103:

| | |
|-------------------|-----------------|
| MAF meter voltage | More than 4.9 V |
|-------------------|-----------------|

COMPONENT OPERATING RANGE

| | |
|-------------------|-----------------------|
| MAF meter voltage | Between 0.4 and 2.2 V |
|-------------------|-----------------------|

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:

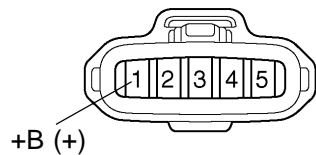
| Air Flow Rate (gm/s) | Proceed to |
|--|------------|
| 0.0 | A |
| 271.0 or more | B |
| MAF rate greater than 1 but less than 270.0 *1 | C |

*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 05-500)

A

2 CHECK MASS AIR FLOW METER (POWER SOURCE)**Wire Harness Side**

M1
MAF Meter

Y

A54396

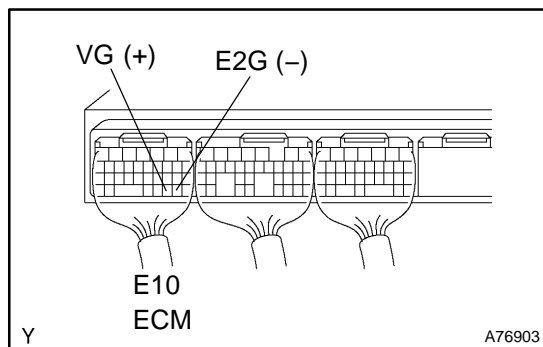
- (a) Turn the ignition switch ON.
- (b) Disconnect the M1 MAF meter connector.
- (c) Check the voltage of the wire harness side connector.

Standard:

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

NG Go to step 5

OK

3 CHECK ECM (VG VOLTAGE)

- (a) Start the engine.
 (b) Check the voltage of the ECM connector.

HINT:

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

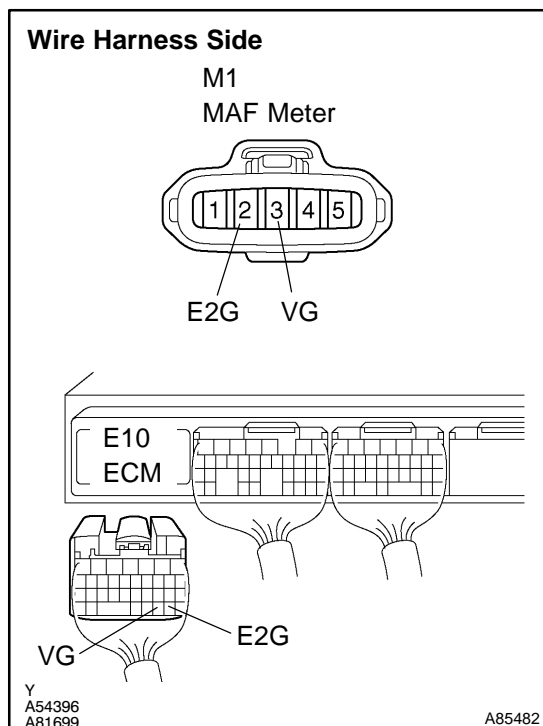
Standard:

| Tester Connection | Condition | Specified Condition |
|----------------------------|------------------|---------------------|
| E10-30 (VG) – E10-29 (E2G) | Engine is idling | 0.5 to 3.0 V |

OK

REPLACE ECM (See page 10-25)

NG

4 CHECK WIRE HARNESS (MAF METER – ECM)

- (a) Disconnect the M1 MAF meter connector.
 (b) Disconnect the E10 ECM connector.
 (c) Check the resistance of the wire harness side connectors.

Standard:

| Tester Connection | Specified Condition |
|--|-------------------------|
| M1-3 (VG) – E10-30 (VG) M1-2 (E2G) – E10-29 (E2G) | Below 1 Ω |
| M1-3 (VG) or E10-30 (VG) – Body ground | 10 k Ω or higher |

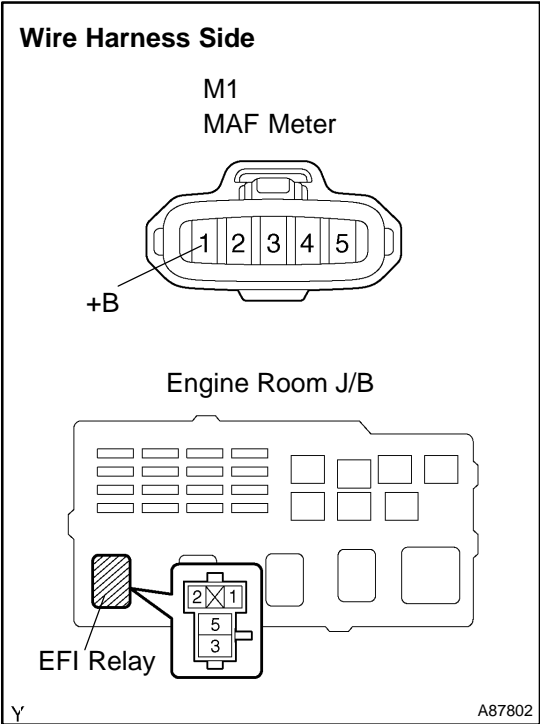
NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE MASS AIR FLOW METER

5 CHECK WIRE HARNESS (MAF METER - 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:**

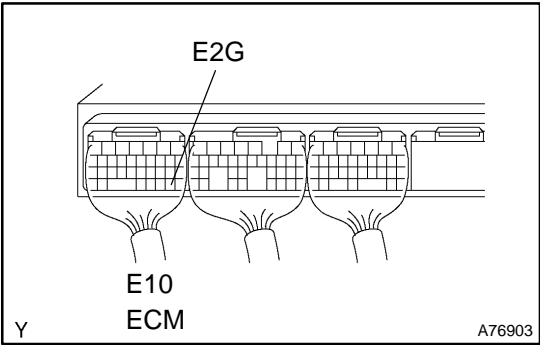
| Tester Connection | Specified Condition |
|---|-------------------------|
| M1-1 (+B) - J/B EFI relay terminal 3 | Below 1 Ω |
| M1-1 (+B) or J/B EFI relay terminal 3 - Body ground | 10 k Ω or higher |

NG REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

INSPECT ECM POWER SOURCE CIRCUIT (See page 05-853)

6 INSPECT ECM (SENSOR GROUND)



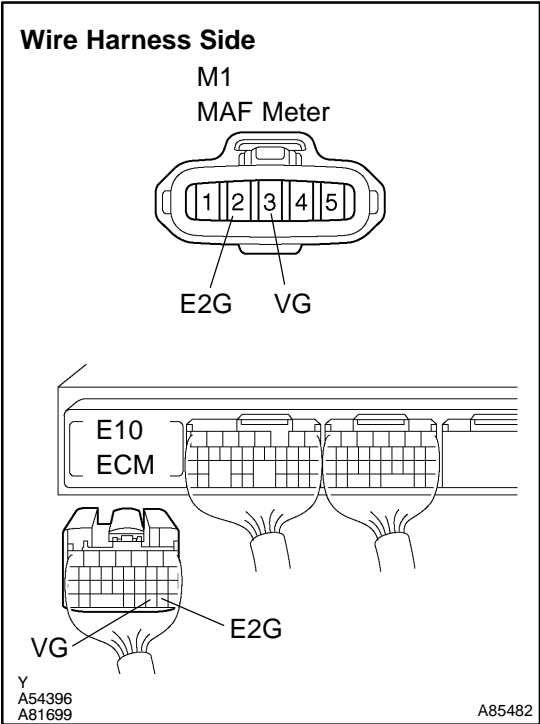
- (a) Check the resistance of the ECM connector.
- Standard:**

| Tester Connection | Specified Condition |
|----------------------------|---------------------|
| E10-29 (E2G) - Body ground | Below 1 Ω |

NG REPLACE ECM (See page 10-25)

OK

7 | CHECK WIRE HARNESS (MAF METER - ECM)



- (a) Disconnect the M1 MAF meter connector.
- (b) Disconnect the E10 ECM connector.
- (c) Check the resistance of between the wire harness side connectors.

Standard:

| Tester Connection | Specified Condition |
|--|-------------------------|
| M1-3 (VG) - E10-30 (VG) | Below 1 Ω |
| M1-2 (E2G) - E10-29 (E2G) | |
| M1-3 (VG) or E10-30 (VG) - Body ground | 10 k Ω or higher |

NG **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE MASS AIR FLOW METER