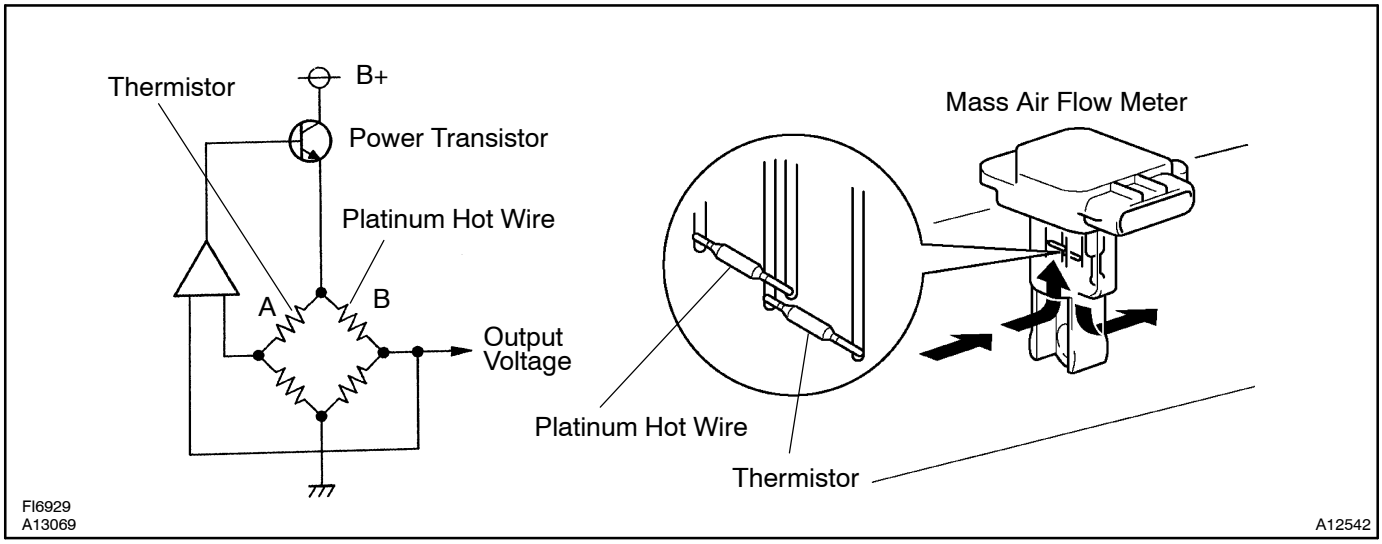
DTC 31 AIR FLOW METER CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION

The mass air flow meter uses a platinum hot wire. The hot wire mass air flow meter consists of a platinum hot wire, thermistor and a control circuit installed in a plastic housing. The hot wire mass air flow meter works on the principle that the hot wire and thermistor located in the intake air bypass of the housing detect any changes in the intake air temperature.

The hot wire is maintained at the set temperature by controlling the current flow through the hot wire. This current flow is then measured as the output voltage of the mass air flow meter.

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



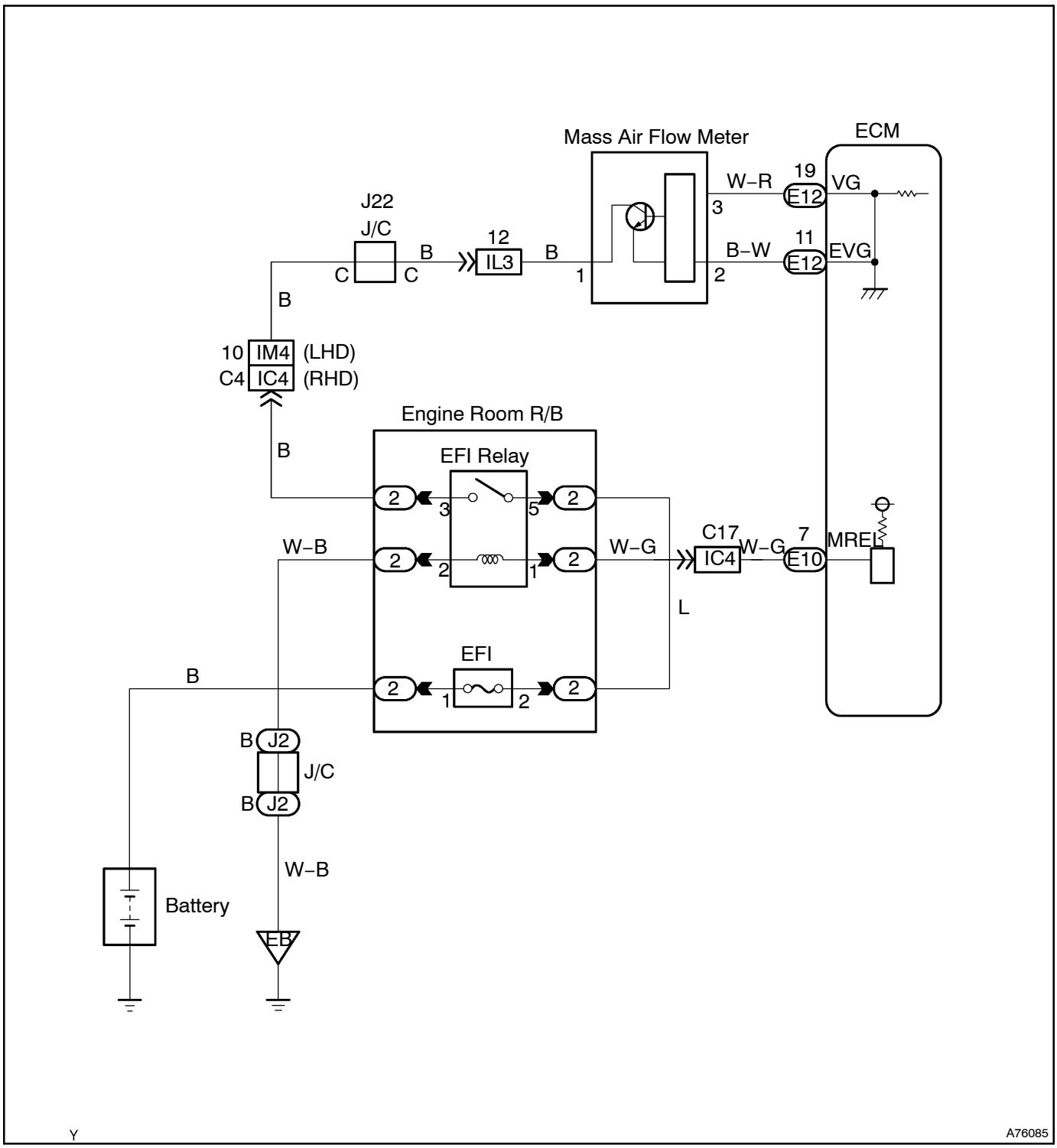
DTC No.	DTC Detection Condition	Trouble Area
31	Open or short in mass air flow meter circuit with more than 3 sec.	• Open or short in mass air flow meter circuit • Mass air flow meter • ECM

HINT:

After confirming DTC 31, use the hand–held tester to confirm the air flow ratio from the CURRENT DATA.

Air Flow Value (gm/sec.)	Malfunction
Approx. 0.0	• Mass air flow meter power source circuit open • VG circuit open or short
184.0 or more	• EVG circuit open

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand–held tester, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, etc. at the time of the malfunction.

When using hand–held tester

1 READ VALUE OF HAND–HELD TESTER(MASS AIR FLOW RATE)

(a) Read the air flow rate on the hand–held tester.

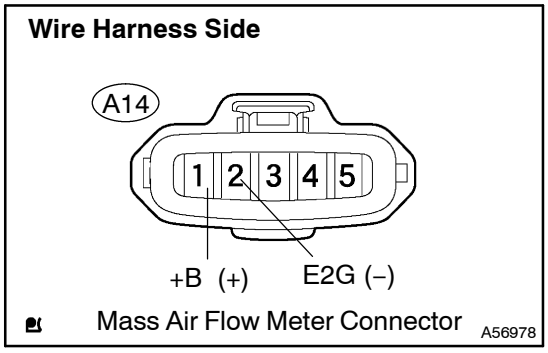
Result:

Air Flow Rate (g/s)	Proceed
0.0	A
271.0 or more	B

B → **Go to step 6**

A

2 INSPECT MASS AIR FLOW METER(POWER SOURCE VOLTAGE)



(a) Disconnect the mass air flow meter connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage between the terminals of the mass air flow meter connector.

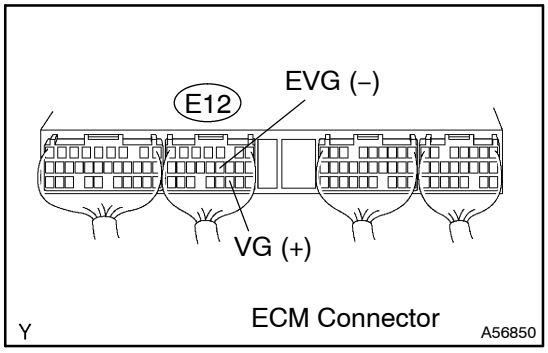
Voltage:

Symbols (Terminal No.)	Specified condition
+B (A14 – 1) ⇔ E2G (A14 – 2)	9 – 14 V

NG → **Go to step 5**

OK

3 INSPECT ECM(CHECK VOLTAGE)



(a) Start the engine.
(b) Measure the voltage between the terminals of the ECM E12 connector.

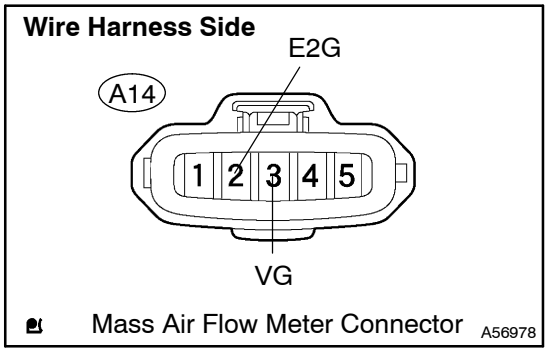
Voltage:

Symbols (Terminal No.)	Condition	Specified condition
VG (E12 – 19) ⇔ EVG (E12 – 11)	Idling	0.5 – 3.0 V

NG → **CHECK AND REPLACE ECM**

OK

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



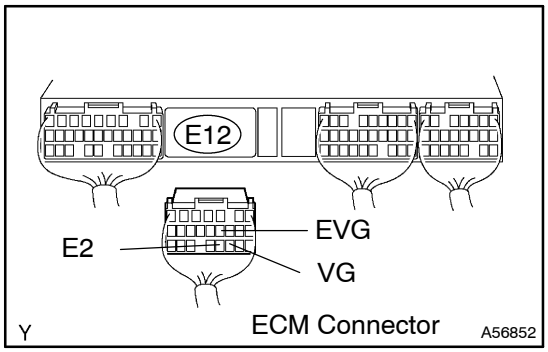
(a) Disconnect the mass air flow meter connector.
(b) Disconnect the ECM E12 connector.
(c) Check the continuity between the wire harness side connector.

Standard (Check for open):

Symbols (Terminal No.)	Specified condition
VG (A14 – 3) ⇔ VG (E12 – 19)	Continuity
E2G (A14 – 2) ⇔ EVG (E12 – 11)	

Standard (Check for short):

Symbols (Terminal No.)	Specified condition
VG (E12 – 19) ⇔ EVG (E12 – 11)	No continuity
VG (E12 – 19) ⇔ E2 (E12 – 20)	

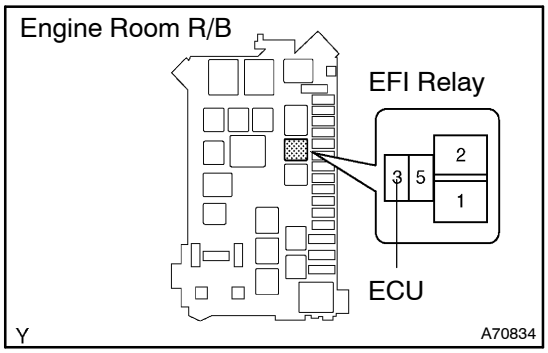


NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MASS AIR FLOW METER

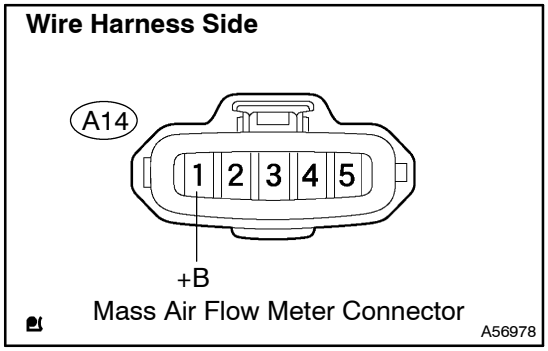
5 CHECK HARNESS AND CONNECTOR(AIR FLOW METER +B CIRCUIT)



(a) Remove the EFI relay from the engine room R/B.
(b) Disconnect the mass air flow meter connector.
(c) Check the continuity between the wire harness side connector.

Standard (Check for open):

Symbols (Terminal No.)	Specified condition
ECU (EFI relay terminal 3 of R/B) ⇔ +B (A14 – 1)	Continuity

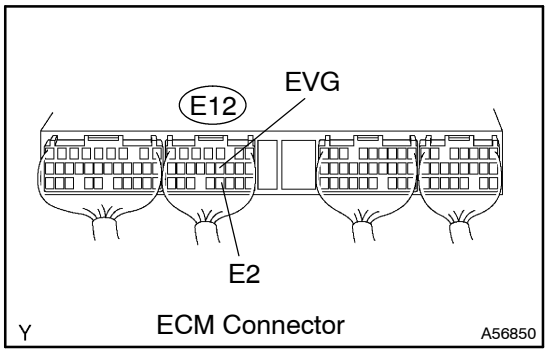


NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

CHECK FOR ECM POWER SOURCE CIRCUIT (See page 05–537)

6 INSPECT ECM



(a) Check the continuity between the terminals of the ECM E12 connector.

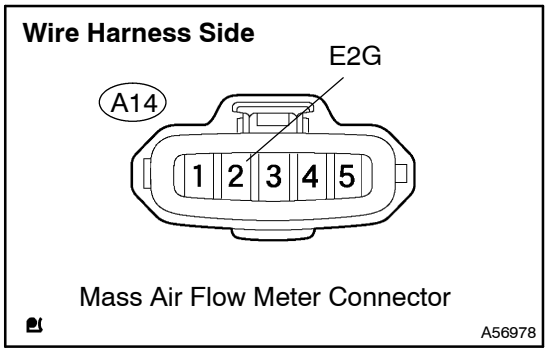
Standard (Check for open):

Symbols (Terminal No.)	Specified condition
EVG (E12 – 11) ⇔ E2 (E12 – 20)	Continuity

NG → **CHECK AND REPLACE ECM**

OK

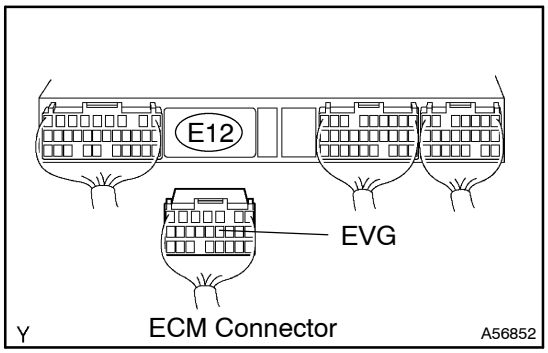
7 CHECK HARNESS AND CONNECTOR(MASS AIR FLOW METER – ECM)



(a) Disconnect the mass air flow meter connector.
(b) Disconnect the ECM E12 connector.
(c) Check the continuity between the wire harness side connector.

Standard (Check for open):

Symbols (Terminal No.)	Specified condition
E2G (A14 – 2) ⇔ EVG (E12 – 11)	Continuity



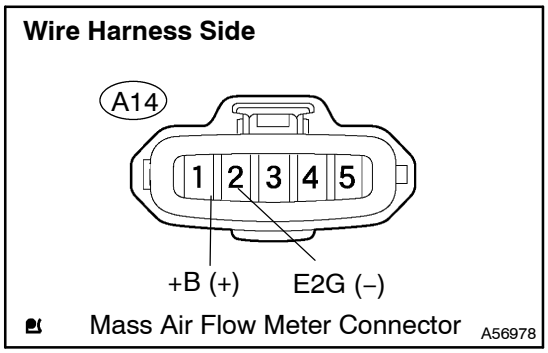
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MASS AIR FLOW METER

When not using hand–held tester

1	INSPECT MASS AIR FLOW METER(POWER SOURCE VOLTAGE)



(a) Disconnect the mass air flow meter connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage between the terminals of the mass air flow meter connector.

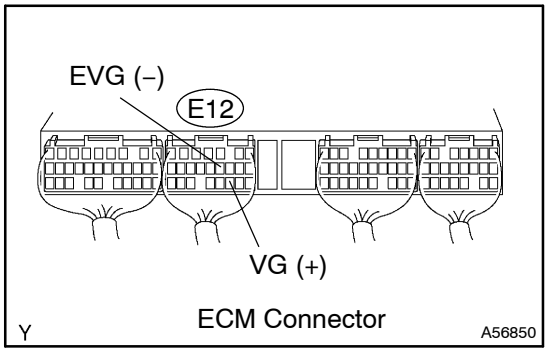
Voltage:

Symbols (Terminal No.)	Specified condition
+B (A14 – 1) ⇔ E2G (A14 – 2)	9 – 14 V

NG → **Go to step 4**

OK

2	INSPECT ECM(CHECK VOLTAGE)



(a) Start the engine.
(b) Measure the voltage between the terminals of the ECM E12 connector.

Voltage:

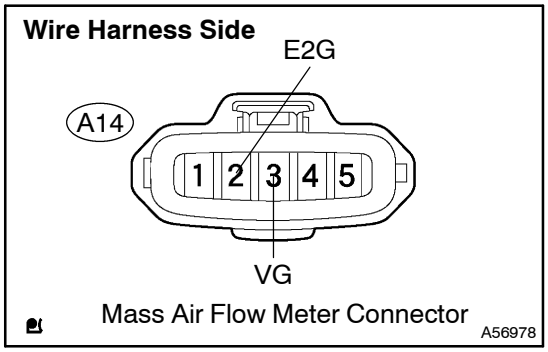
Symbols (Terminal No.)	Condition	Specified condition
VG (E12 – 19) ⇔ EVG (E12 – 11)	Idling	0.5 – 3.0 V

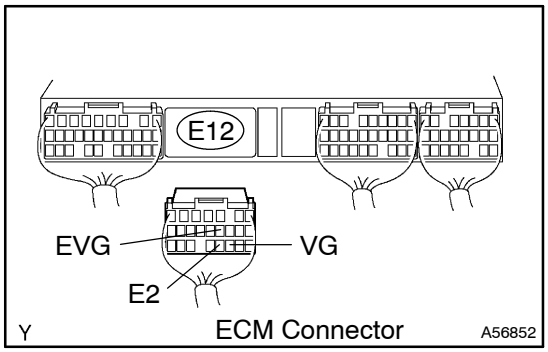
HINT:
The shift position should be P or N and A/C switch should be turned OFF.

NG → **CHECK AND REPLACE ECM**

OK

3 CHECK HARNESS AND CONNECTOR(MASS AIR FLOW METER – ECM)





(a) Disconnect the mass air flow meter connector.
(b) Disconnect the ECM E12 connector.
(c) Check the continuity between the wire harness side connector.

Standard (Check for open):

Symbols (Terminal No.)	Specified condition
VG (A14 – 3) ⇔ VG (E12 – 19)	Continuity
E2G (A14 – 2) ⇔ EVG (E12 – 11)	

Standard (Check for short):

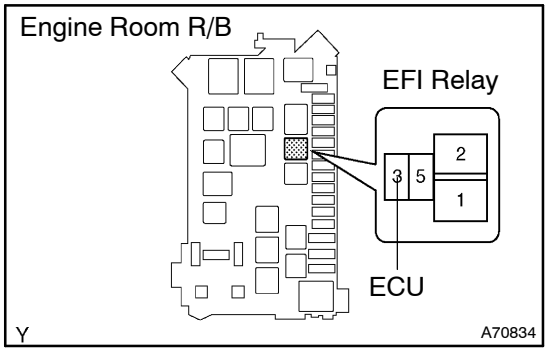
Symbols (Terminal No.)	Specified condition
VG (E12 – 19) ⇔ EVG (E12 – 11)	No continuity
VG (E12 – 19) ⇔ E2 (E12 – 20)	

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MASS AIR FLOW METER

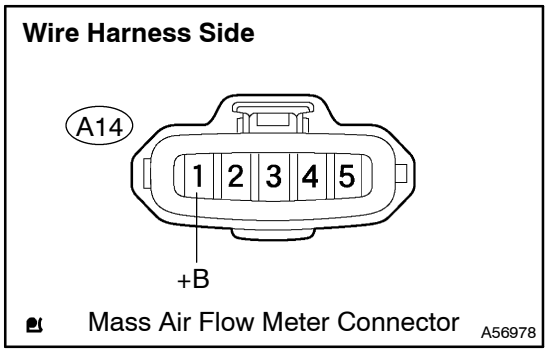
4	CHECK AND REPLACE HARNESS AND CONNECTOR(AIR FLOW METER +B CIRCUIT)



(a) Remove the EFI relay from the engine room R/B.
(b) Disconnect the mass air flow meter connector.
(c) Check the continuity between the wire harness side connector.

Standard (Check for open):

Symbols (Terminal No.)	Specified condition
ECU (EFI relay terminal 3 of R/B) ⇔ +B (A14 – 1)	Continuity



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK →

CHECK FOR ECM POWER SOURCE CIRCUIT (See page 05–537)