

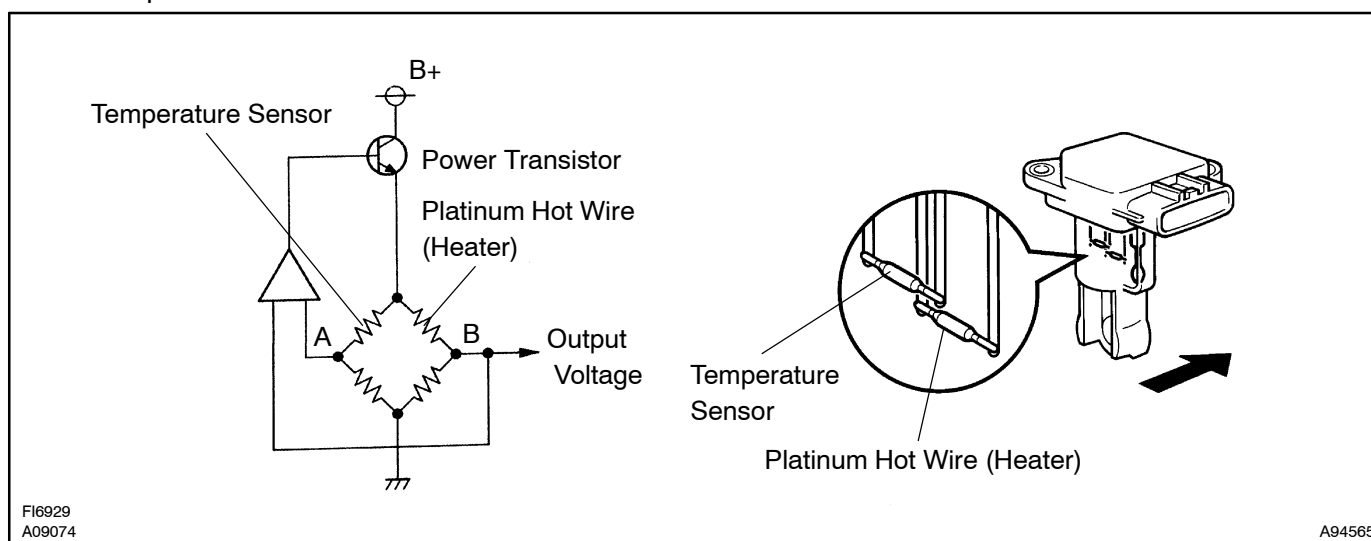
<b>DTC</b>	<b>P0100/31</b>	<b>MASS OR VOLUME AIR FLOW CIRCUIT</b>
<b>DTC</b>	<b>P0102/31</b>	<b>MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT</b>
<b>DTC</b>	<b>P0103/31</b>	<b>MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT</b>

## CIRCUIT 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 provides 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 flow of the air passing 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, and the power transistor is controlled so that the potential of A and B remains equal to maintain the predetermined temperature.



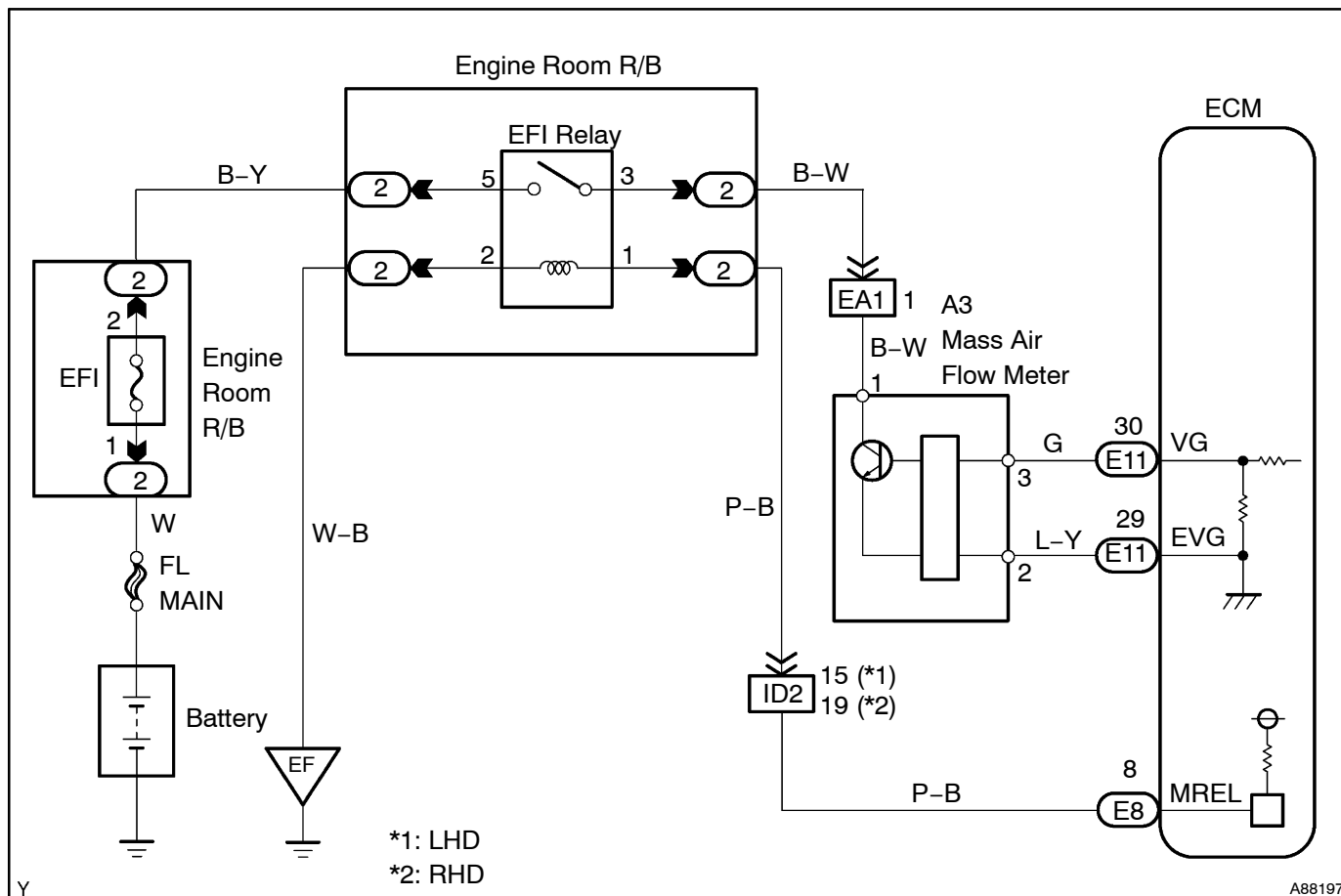
DTC No.	DTC Detection Condition	Trouble Area
P0100/31	When the mass air flow meter circuit has an open or a short for more than 3 seconds	<ul style="list-style-type: none"> <li>• Open or short in mass air flow meter circuit</li> <li>• Mass air flow meter</li> <li>• ECM</li> </ul>
P0102/31	When the mass air flow meter circuit has an open for more than 3 seconds	<ul style="list-style-type: none"> <li>• Open in mass air flow meter circuit</li> <li>• Mass air flow meter</li> <li>• ECM</li> </ul>
P0103/31	When the mass air flow meter circuit has a short for more than 3 seconds	<ul style="list-style-type: none"> <li>• Short in mass air flow meter circuit</li> <li>• Mass air flow meter</li> <li>• ECM</li> </ul>

## HINT:

When DTC P0100/31, P0102/31 or P0103/31 is detected, check the air-flow ratio by selecting Powertrain / Engine and ECT / Data List / AFM on the intelligent tester II.

Air Flow Value (gm/second)	Malfunction
Approximately 0.0	<ul style="list-style-type: none"> <li>• Open in mass air flow meter power source circuit</li> <li>• Open or short in VG circuit</li> </ul>
271.0 or more	<ul style="list-style-type: none"> <li>• Open in EVG circuit</li> </ul>

## WIRING DIAGRAM



## INSPECTION PROCEDURE

## HINT:

Read freeze frame data using the intelligent tester II. 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.

When using Intelligent Tester II:

1 READ VALUE OF INTELLIGENT TESTER II (MASS AIR FLOW RATE)

- (a) Connect the Intelligent Tester II to the DLC3.
- (b) Start the engine.
- (c) Turn the Intelligent Tester II ON.
- (d) Select the following menu items: Powertrain / Engine and ECT / Data List / AFM.
- (e) Read the values.

Result:

Mass Air Flow Rate (g/second)	Proceed To
0.0	A
271.0 or more	B
Between 1.0 and 270.0 (*1)	C

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

B

Go to step 6

C

CHECK FOR INTERMITTENT PROBLEMS  
(See page 05-9)

A

2 INSPECT MASS AIR FLOW METER (POWER SOURCE)

Wire Harness Side:

Mass Air Flow Meter Connector

A3

+B(+)

Front View

Y

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- (a) Disconnect the A3 mass air flow meter connector.
  - (b) Turn the ignition switch to ON.
  - (c) Measure the voltage between the terminal of the wire harness side connector and body ground.
- Standard:
- | Tester Connection       | Specified Condition |
|-------------------------|---------------------|
| +B (A3-1) – Body ground | 9 to 14 V           |
- (d) Reconnect the mass air flow meter connector.

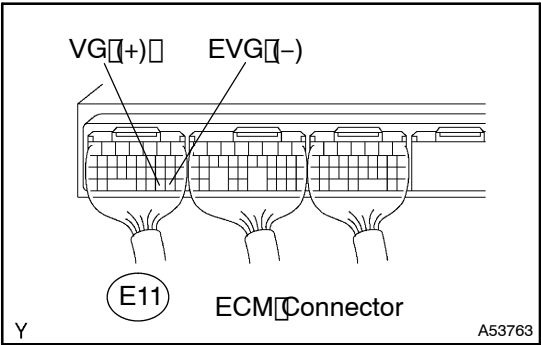
NG

Go to step 5

OK

3

INSPECT ECM (VG VOLTAGE)



- (a) Start the engine.
- (b) Measure the voltage between the specified terminals of the E11 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
VG (E11-30) – EVG (E11-29)	Engine idling	0.5 to 3.0 V

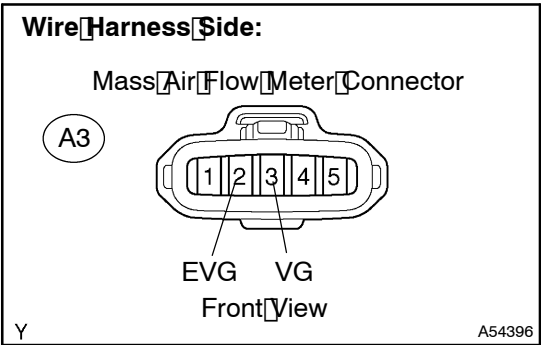
OK

REPLACE ECM (See page 10-30)

NG

4

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



- (a) Disconnect the A3 mass air flow meter connector.
- (b) Disconnect the E11 ECM connector.
- (c) Check the resistance.

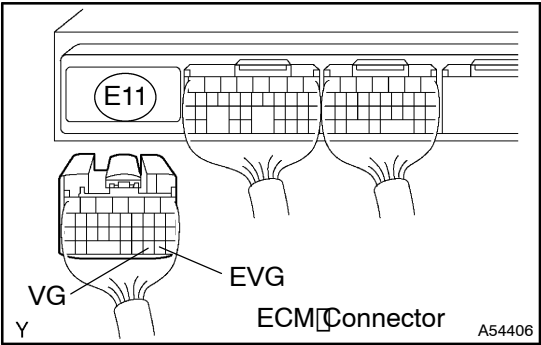
**Standard (Check for open):**

Tester Connection	Specified Condition
VG (A3-3) – VG (E11-30)	Below 1 Ω
EVG (A3-2) – EVG (E11-29)	Below 1 Ω

**Standard (Check for short):**

Tester Connection	Specified Condition
VG (A3-3) or VG (E11-30) – Body ground	10 kΩ or higher

- (d) Reconnect the mass air flow meter connector.
- (e) Reconnect the ECM connector.



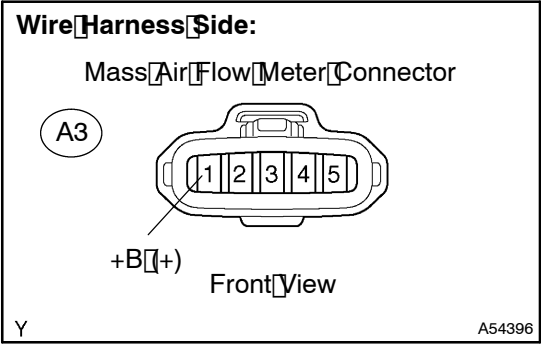
NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE MASS AIR FLOW METER

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



- (a) Disconnect the A3 mass air flow meter connector.
- (b) Remove the EFI relay from the engine room R/B.
- (c) Check the resistance.

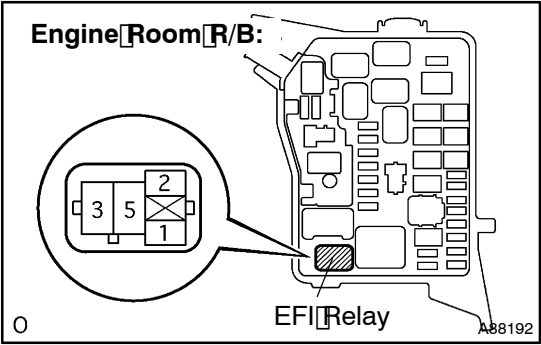
**Standard (Check for open):**

Tester Connection	Specified Condition
+B (A3-1) - EFI relay (3)	Below 1 $\Omega$

**Standard (Check for short):**

Tester Connection	Specified Condition
+B (A3-1) or EFI relay (3) - Body ground	10 k $\Omega$ or higher

- (d) Reconnect the mass air flow meter connector.
- (e) Reinstall the EFI relay.

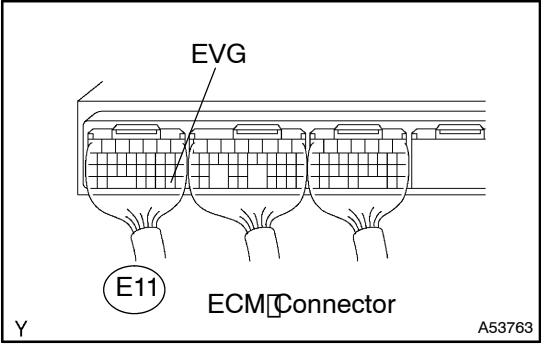


NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

INSPECT ECM POWER SOURCE CIRCUIT (See page 05-218)

6 INSPECT ECM (SENSOR GROUND)



- (a) Check the resistance between the specified terminal of the E11 ECM connector and body ground.

**Standard:**

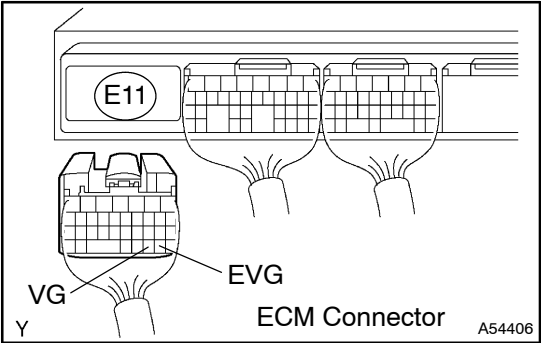
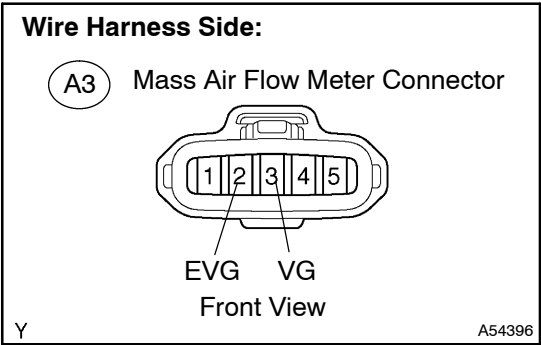
Tester Connection	Specified Condition
EVG (E11-29) - Body ground	Below 1 $\Omega$

NG REPLACE ECM (See page 10-30)

OK

7

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



- (a) Disconnect the A3 mass air flow meter connector.
- (b) Disconnect the E11 ECM connector.
- (c) Check the resistance.

**Standard (Check for open):**

Tester Connection	Specified Condition
VG (A3-3) - VG (E11-30)	Below 1 $\Omega$
EVG (A3-2) - EVG (E11-29)	Below 1 $\Omega$

**Standard (Check for short):**

Tester Connection	Specified Condition
VG (A3-3) or VG (E11-30) - Body ground	10 k $\Omega$ or higher

- (d) Reconnect the mass air flow meter connector.
- (e) Reconnect the ECM connector.

NG

REPAIR OR  
CONNECTOR

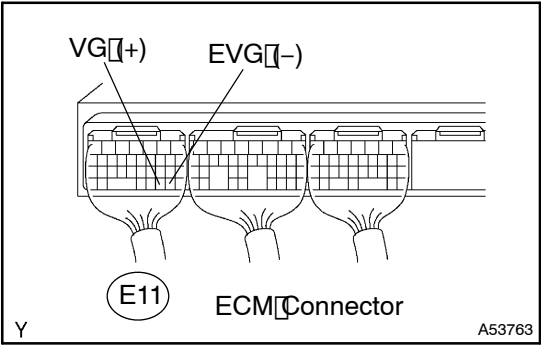
REPLACE HARNESS OR

OK

REPLACE MASS AIR FLOW METER

When not using intelligent tester:

1 INSPECT ECM (VG VOLTAGE)



- (a) Start the engine.
- (b) Measure the voltage between the specified terminals of the E11 ECM connector.

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

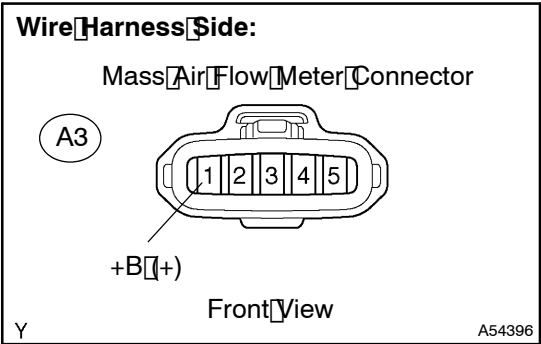
**Standard:**

Tester Connection	Condition	Specified Condition
VG(E11-30) - EVG(E11-29)	Engine idling	0.5 to 3.0 V

**OK** → REPLACE ECM (See page 10-30)

**NG**

2 INSPECT MASS AIR FLOW METER (POWER SOURCE)



- (a) Disconnect the A3 mass air flow meter connector.
- (b) Turn the ignition switch to ON.
- (c) Measure the voltage between the terminal of the wire harness side connector and body ground.

**Standard:**

Tester Connection	Specified Condition
+B (A3-1) - Body ground	9 to 14 V

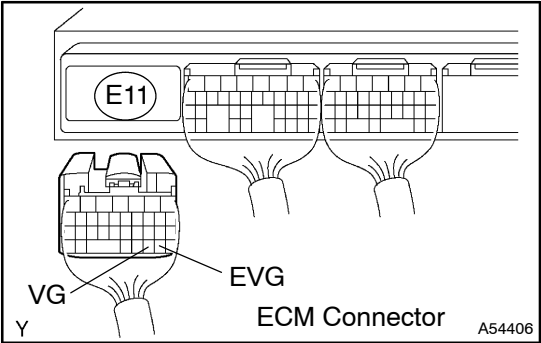
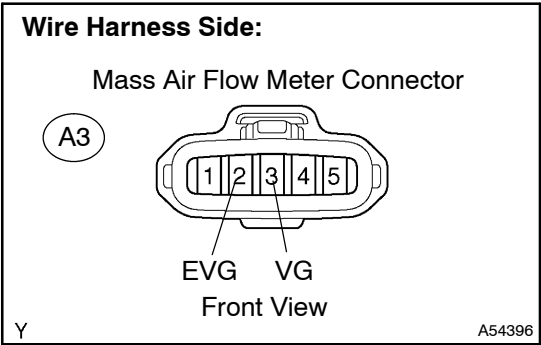
- (d) Reconnect the mass air flow meter connector.

**NG** → Go to step 4

**OK**

3

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



- (a) Disconnect the A3 mass air flow meter connector.
- (b) Disconnect the E11 ECM connector.
- (c) Check the resistance.

Standard (Check for open):

Tester Connection	Specified Condition
VG (A3-3) - VG (E11-30)	Below 1 $\Omega$
EVG (A3-2) - EVG (E11-29)	Below 1 $\Omega$

Standard (Check for short):

Tester Connection	Specified Condition
VG (A3-3) or VG (E11-30) - Body ground	10 k $\Omega$ or higher

- (d) Reconnect the mass air flow meter connector.
- (e) Reconnect the ECM connector.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

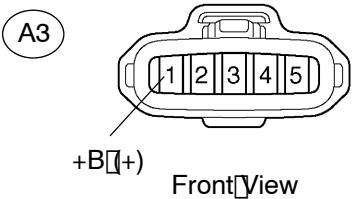
REPLACE MASS AIR FLOW METER



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

Wire Harness Side:

Mass Air Flow Meter Connector



Y

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- (a) Disconnect the A3 mass air flow meter connector.
- (b) Remove the EFI relay from the engine room R/B.
- (c) Check the resistance.

Standard (Check for open):

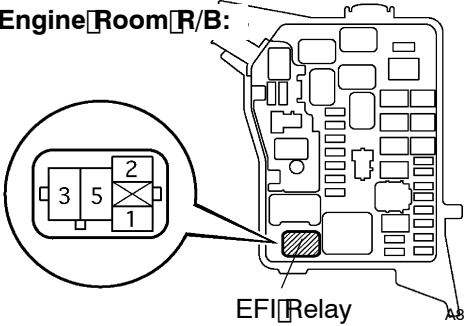
Tester Connection	Specified Condition
+B (A3-1) - EFI relay (3)	Below 1 $\Omega$

Standard (Check for short):

Tester Connection	Specified Condition
+B (A3-1) or EFI relay (3) - Body ground	10 k $\Omega$ or higher

- (d) Reconnect the mass air flow meter connector.
- (e) Reinstall the EFI relay.

Engine Room R/B:



0

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REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

INSPECT ECM POWER SOURCE CIRCUIT (See page 05-218)