# 1989 BMW 325i Convertible Electrical Troubleshooting Manual

BMW of North America, Inc.
Woodcliff Lake, New Jersey

## FOREWORD

In the interests of continuing technical development work we reserve the right to modify designs and equipment.

Printed in USA



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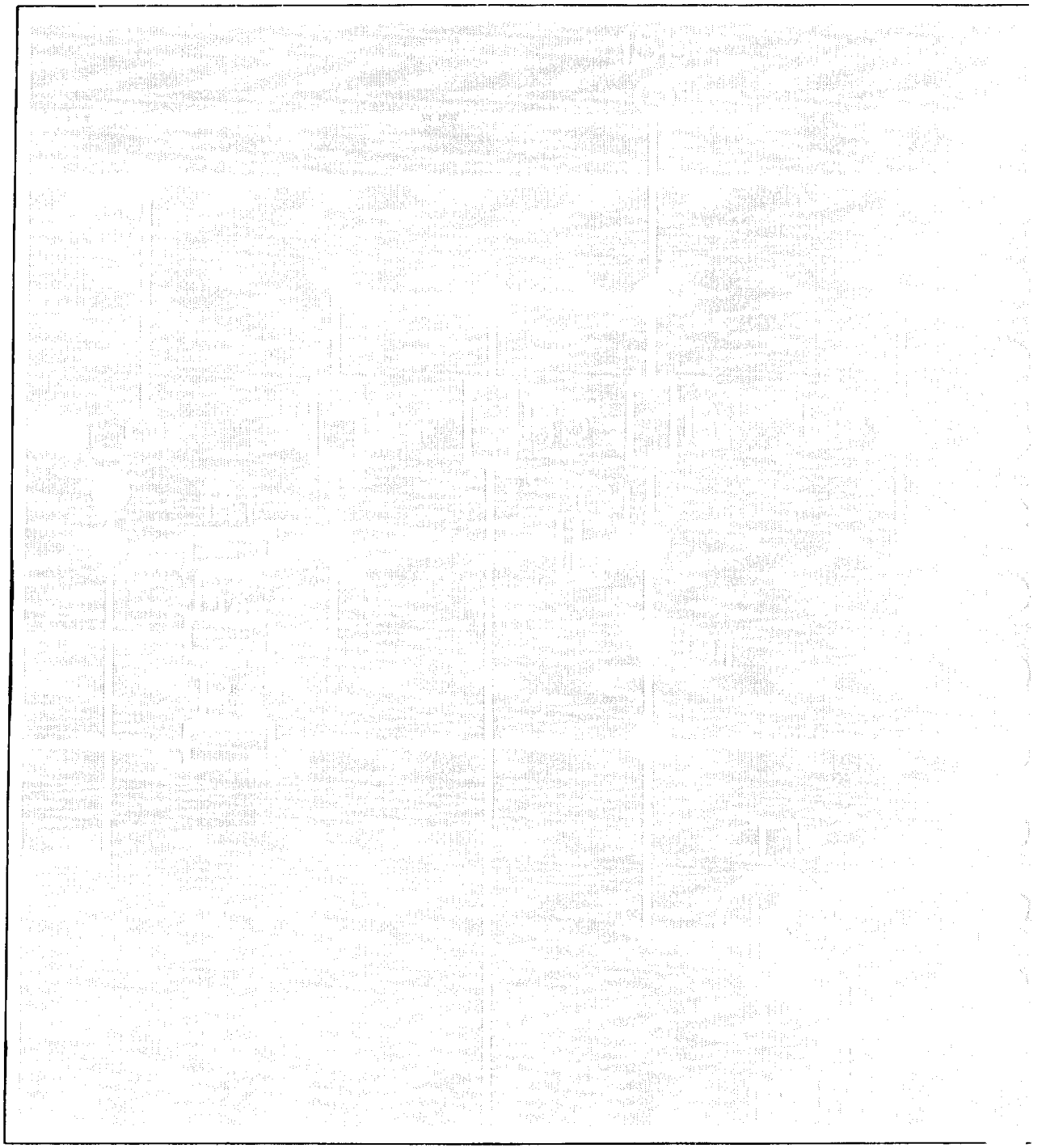
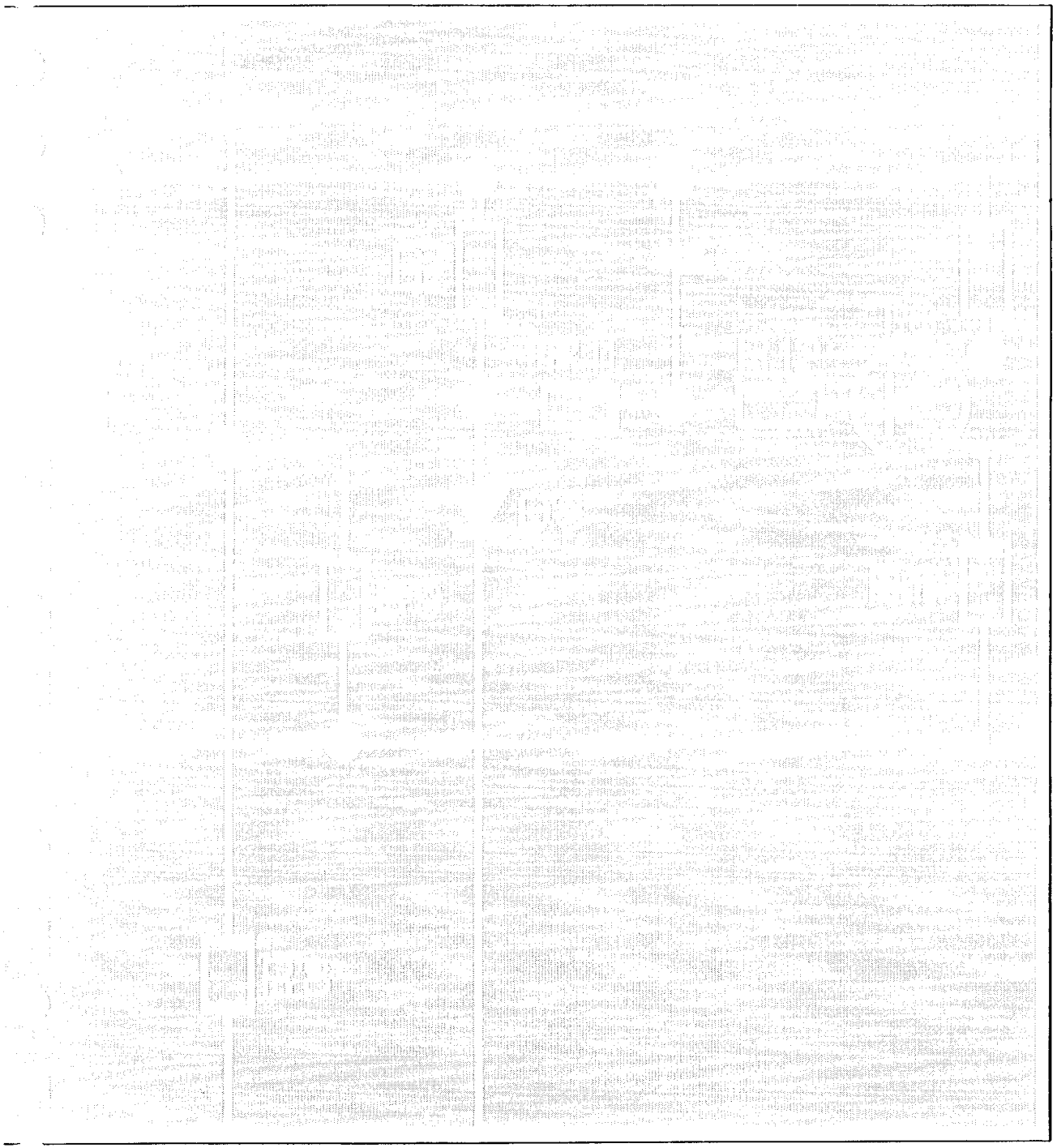




# 1989
# BMW 325i Convertible
# Electrical
# Troubleshooting
# Manual

## CONTENTS

## Index — Alphabetical Listing of Electrical Circuits

The purpose of this manual is to show electrical schematics in a manner that makes electrical troubleshooting easier. Electrical components which work together are shown together on one schematic. The Wiper-Washer schematic, for example, shows all of the electrical components in one diagram. At the top of the page is the fuse (positive) that powers the circuit. The flow of current is shown through all wires, connectors, switches, and motors to ground (negative) at the bottom of the page.

Within the schematic, all switches and sensors are shown "at rest," as though the Ignition Switch were off. For identification, component names are underlined and placed next to or above each component. Notes are included, describing how switches and other components work.

The power distribution schematic shows the current feed through all the connections from the Battery and Alternator to each fuse and the Ignition and Light Switches. If the Power Distribution schematic is combined with any other circuit schematic, a complete picture is made of how that circuit works. The Ground Distribution schematics show how several circuits are connected to common grounds.

All wiring between components is shown exactly as it exists in the vehicle; however, the wiring is not drawn to scale. To aid in understanding electrical operation, wiring inside complicated components has been simplified. The "Solid State" label designates electronic components.

**WIRE SIZE CONVERSION CHART**

| METRIC (CROSSECTIONAL AREA IN MM²) | AWG (AMERICAN WIRE GAUGE) |
|---|---|
| .5 | 20 |
| .75 | 18 |
| 1 | 16 |
| 1.5 | 14 |
| 2 | 14 |
| 2.5 | 12 |
| 4 | 10 |
| 6 | 8 |
| 8 | 8 |
| 16 | 4 |
| 20 | 4 |
| 25 | 2 |
| 32 | 2 |

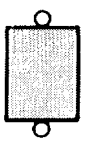
**WIRE INSULATION**

| ABBREVIATIONS | COLOR |
|---|---|
| BK | BLACK |
| BR | BROWN |
| RD | RED |
| YL | YELLOW |
| GN | GREEN |
| BU | BLUE |
| VI | VIOLET |
| GY | GRAY |
| WT | WHITE |
| PK | PINK |

# 4 SYMBOLS

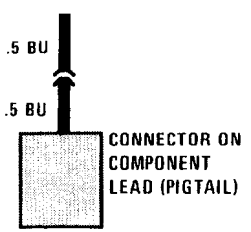
ENTIRE COMPONENT SHOWN

PART OF A COMPONENT SHOWN

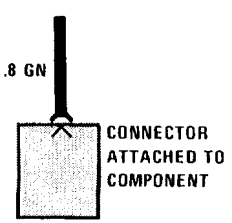


COMPONENT WITH SCREW TERMINALS


SOLID STATE (INCLUDES ONLY ELECTRONIC PARTS)

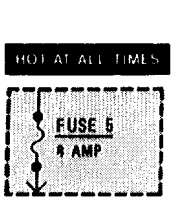



CONNECTOR ON COMPONENT LEAD (PIGTAIL)

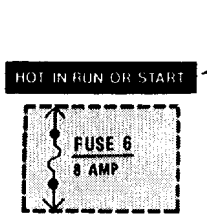



CONNECTOR ATTACHED TO COMPONENT

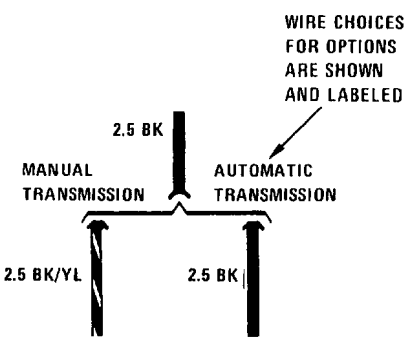
COMPONENT CASE IS DIRECTLY ATTACHED TO METAL PART OF CAR (GROUNDED)

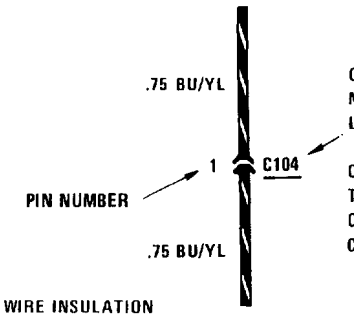



INDICATES THAT FUSE 5 IS ALWAYS SUPPLIED WITH POWER



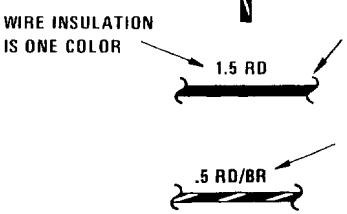

INDICATES THAT FUSE 6 IS SUPPLIED WITH POWER WITH THE IGNITION SWITCH IN THE RUN OR START POSITIONS



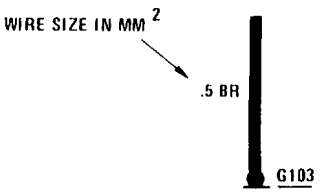

CONNECTOR REFERENCE NUMBER FOR COMPONENT LOCATION CHART

CHART ALSO SHOWS TOTAL NUMBER OF CONTACTS POSSIBLE: C103 (6 PIN)




A WAVY LINE MEANS A WIRE IS CONTINUED

WIRE INSULATION IS ONE COLOR WITH ANOTHER COLOR STRIPE (RED WITH BROWN)

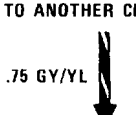



WIRE IS ATTACHED TO METAL PART OF CAR (GROUNDED) GROUND IS NUMBERED FOR REFERENCE ON COMPONENT LOCATION CHART

OTHER CIRCUITS THAT SHARE A GROUND ARE SHOWN IN GROUND DISTRIBUTION

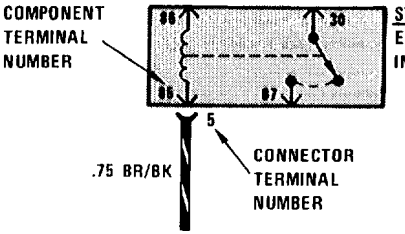
DIODE
CURRENT CAN FLOW ONLY IN THE DIRECTION OF THE ARROW

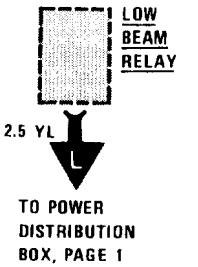
CIRCUIT REFERENCE – A WIRE WHICH CONNECTS TO ANOTHER CIRCUIT

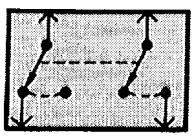



ACTIVE CHECK CONTROL

ONE POLE,
TWO POSITION
SWITCH



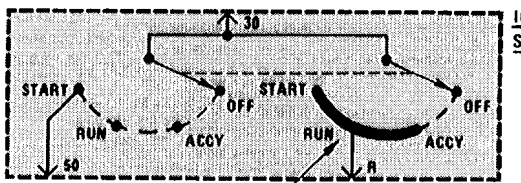



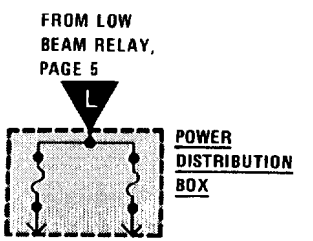
SWITCHES THAT
MOVE TOGETHER

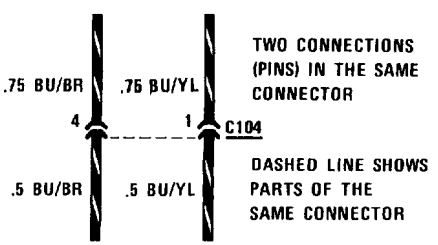
DASHED LINE SHOWS
A MECHANICAL
CONNECTION
BETWEEN SWITCHES

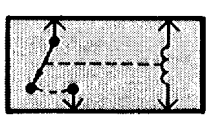
CURRENT PATH
IS CONTINUED
AS LABELED.
THE ARROW SHOWS
DIRECTION OF CURRENT
FLOW AND IS REPEATED
WHERE CURRENT
PATH CONTINUES.

TWO POLE, FOUR
POSITION SWITCH



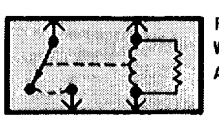



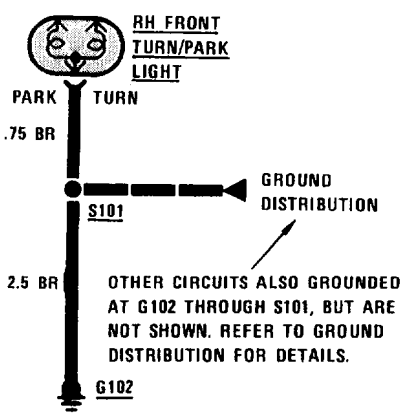
RELAY SHOWN
WITH NO
CURRENT
FLOWING
THROUGH
COIL

WHEN COIL IS
ENERGIZED, SWITCH
IS PULLED CLOSED



RELAY SHOWN
WITH RESISTOR
ACROSS COIL

RESISTOR ACROSS COIL
IS FOR NOISE
SUPPRESSION




LIGHT
EMITTING
DIODE

## TROUBLESHOOTING PROCEDURE

### 1. Verify the Problem

Operate the problem circuit to check the accuracy of the complaint. Note the symptoms of the inoperative circuit.

### 2. Analyze the Problem

Refer to the schematic of the problem circuit in the ETM. Determine how the circuit is supposed to work by tracing the current path(s) from the power feed through the circuit components to ground. Then based on the symptoms you noted in step 1 and your understanding of circuit operation, identify one or more possible causes of the problem.

### 3. Isolate the Problem

Make circuit tests to prove or disprove the preliminary diagnosis made in step 2. Keep in mind that a logical simple procedure is the key to efficient troubleshooting. Test for the most likely cause of failure first. Try to make tests at points which are easily accessible.

### 4. Repair the Problem

Once the specific problem is identified, make the repair using the proper tools and safe procedures.

### 5. Check the Problem

Operate the circuit to check for satisfactory circuit operation. Good repair practice calls for rechecking all circuits you have worked on.

## TROUBLESHOOTING TOOLS

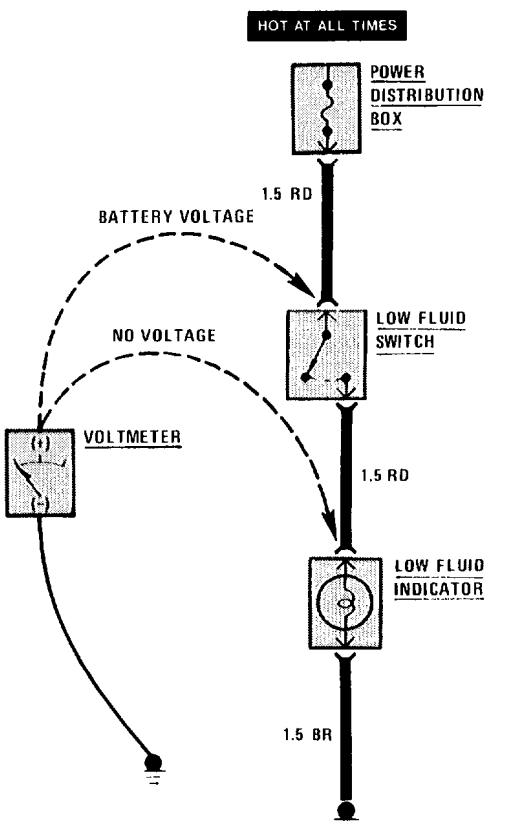
Isolating the problem (Step 3 of TROUBLESHOOTING PROCEDURES) requires the use of a **voltmeter** and/or **ohmmeter.** A voltmeter measures voltage at selected points in a circuit. An ohmmeter measures a circuit's resistance to current flow. It has an internal battery that provides current to the circuit under test. Disconnect the car battery when using an ohmmeter because the battery voltage will cause the ohmmeter to give false readings. Also, do not use an ohmmeter on solid-state components. The voltage that the ohmmeter applies to the circuit could damage these components.

## TROUBLESHOOTING TESTS

### Voltage Test

This test measures voltage in a circuit. By taking measurements at several points (terminals or connectors) along the circuit, you can isolate the problem.

To take a voltage measurement, connect the negative lead of the voltmeter to the battery's negative terminal or other known good ground. Then connect the positive lead of the voltmeter to the point you want to test. The voltmeter will measure the voltage present at that point in the circuit.

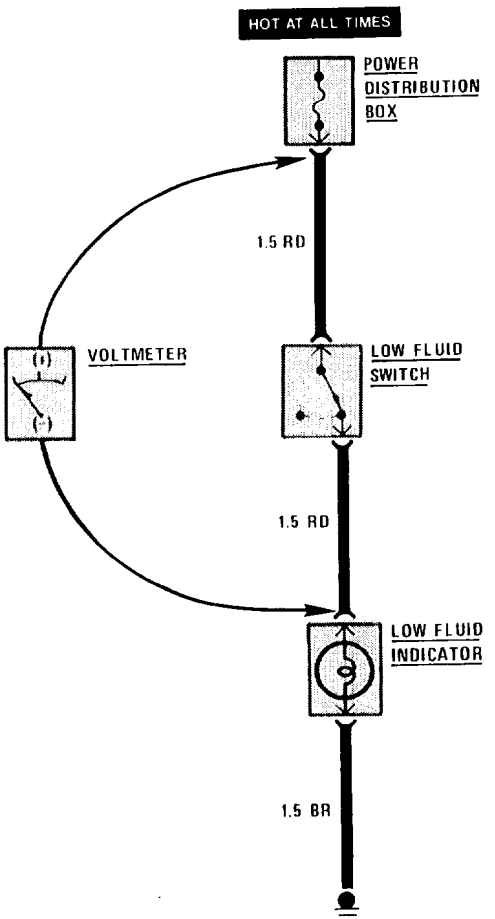



Voltage Test

## Voltage Drop Test

Wires, connectors, and switches are designed to conduct current with a minimum loss of voltage. A voltage drop of more than one volt indicates a problem.

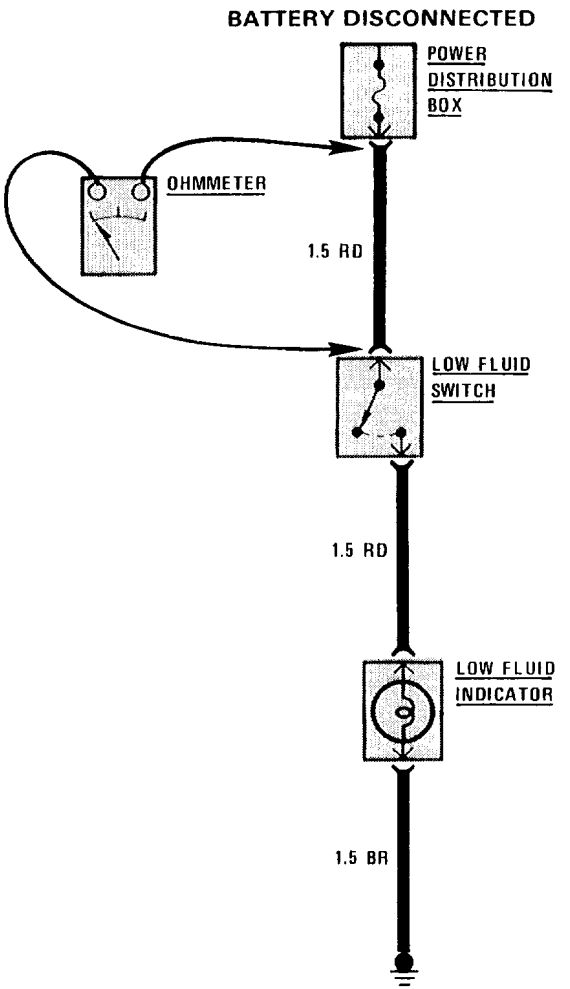
To test for voltage drop, connect the voltmeter leads to connectors at either end of the circuit's suspected problem area. The positive lead should be connected to the connector closest to the power source. The voltmeter will show the voltage drop between these two points.




Voltage Drop Test

## Continuity Test

To perform a continuity test, first disconnect the car battery. Then adjust the ohmmeter to read zero while holding the leads together. Connect the ohmmeter leads to connector or terminals at either end of the circuit's suspected problem area. The ohmmeter will show the resistance across that part of the circuit.

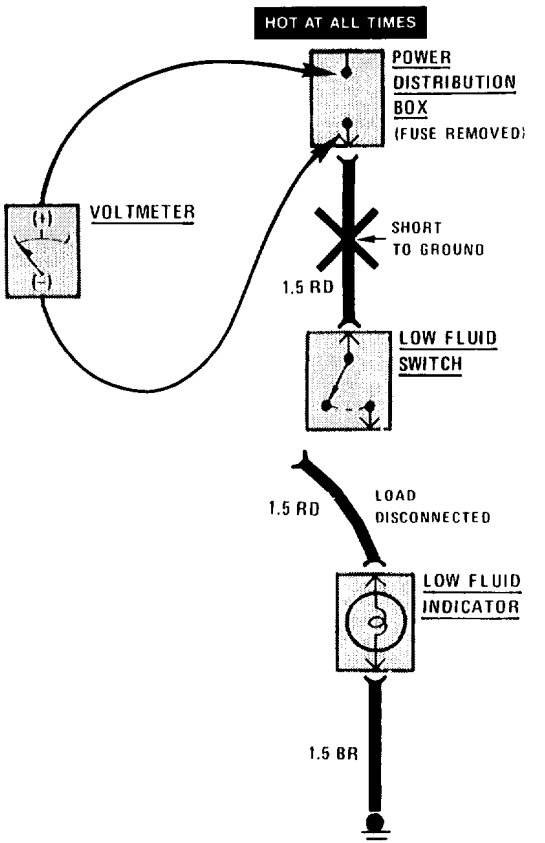



Continuity Test

## Short Test Using Voltmeter

Remove the blown fuse and disconnect the load. Connect the voltmeter leads to the fuse terminals. The positive lead should be connected to the terminal closest to the power source.

Starting near the POWER DISTRIBUTION BOX, move the wire harness back and forth and watch the voltmeter reading. If the voltmeter registers a reading, there is a short to ground in the wiring. Somewhere in the area of the harness being moved, the wire insulation is worn away and the circuit is grounding.

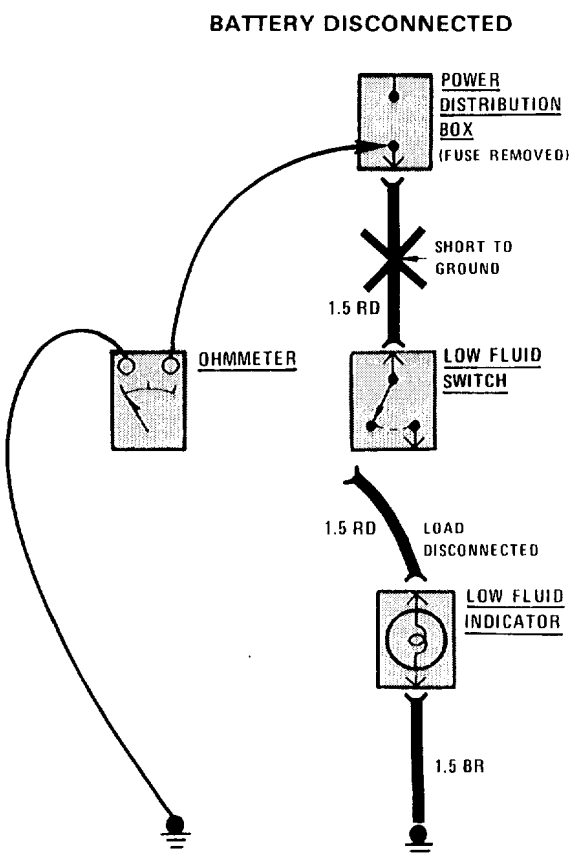



Short Test Using Voltmeter

### Short Test Using Ohmmeter

Disconnect the battery. Adjust the ohmmeter to read zero while holding the leads together. Remove the blown fuse and disconnect the load. Connect one lead of the ohmmeter to the fuse terminal that is closest to the load. Connect the other lead to a known good ground.

Starting near the POWER DISTRIBUTION BOX, move the wire harness back and forth and watch the ohmmeter reading. Low or no resistance indicates a short to ground in the wiring. Infinitely high resistance indicates no short.




Short Test Using Ohmmeter