INTRODUCTION

The 1981 Mercedes-Benz Electrical Troubleshooting Manual is divided into seven sections:

240D
300D/300CD/300TD
300SD
280E/280CE
380SL/380SLC
380SEL
Automatic Climate Control Data

Each of the six car groups begins with page 101 and has its own index. Each group contains schematic diagrams of the circuits found on the car(s) covered in that group. Also within each group, starting with page 201, are component location tables and photographs. These give information to help you locate components on the vehicle.

Automatic Climate Control data for all cars is contained in one section. This data includes schematic diagrams, comprehensive troubleshooting procedures, and component location data. Refer to the ACC index on page 301 for the listing of ACC data by car.

HOW TO USE THIS MANUAL

How to Read Schematic Diagrams

Electrical components which work together are shown together. Schematic drawings are arranged so that current flows from positive at the top of the page, to negative at the bottom. Fuses are shown at the top of the page. All wires, connectors, switches and motors are shown in the flow of current to ground at the bottom of the page. The "hot" labels appearing at the top of fuses or components show the IGNITION SWITCH positions which supply power to that point.

The terminal number "30" appearing on the IGNITION SWITCH and LIGHT SWITCH means that these teminals are always supplied with power. The terminal number "15/54" on the IGNITION SWITCH means that this terminal is supplied with power only when the IGNITION SWITCH is in the "Run" or "Start" positions.

Component and Wire Representation

All wiring between components is shown exactly as it exists on the vehicle. Wiring inside complicated components has been simplified to aid in understanding their electrical operation. Transistorized components are shown as plain boxes labeled "solid state." Switches and sensors are shown "at rest," as if the IGNITION SWITCH were off. Notes are included which describe how switches and other components work.

Circuits Which Share Power and/or Grounds

Each circuit is shown completely and independently on one schematic diagram. Other circuits which get their power from the same point, or which ground at the same point as the circuit you are looking at, are not shown. However, if other circuits actually share a wire or wires **within** the schematic diagram, they are partially represented.

Power Distribution and Ground Distribution Diagrams

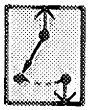
The Power Distribution diagrams show connections from the BATTERY and ALTERNATOR to the fuses, and to the IGNITION SWITCH and LIGHT SWITCH. This will tell you how each circuit gets its power, and what circuits share common fuses. Ground Distribution diagrams show how several circuits are connected to common grounds.

Component Identification

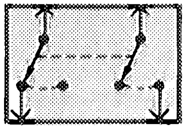
Component names are found underlined next to or above each component. The name is followed, in many cases, by some detail about the component or its operation. Below the component name, in parentheses, you may find a "code" number. This is the factory harness marking number. It is printed on tape wrapped around the branch of the wiring harness which feeds that component.

Some Automatic Climate Control components have a number with an asterisk above the component name. This is the ACC training number for that component.

SYMBOLS

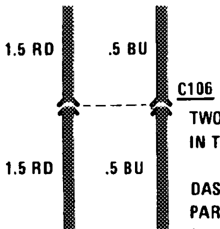


ONE POLE, TWO POSITION SWITCH



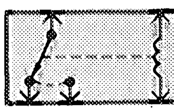
SWITCHES THAT MOVE TOGETHER

DASHED LINE SHOWS A MECHANICAL CONNECTION BETWEEN SWITCHES



TWO CONNECTIONS (PINS) IN THE SAME CONNECTOR

DASHED LINE SHOWS PARTS OF THE SAME CONNECTOR

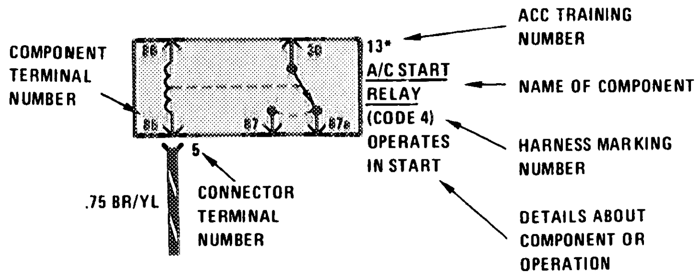


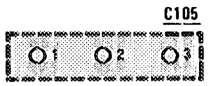
RELAY SHOWN WITH NO CURRENT FLOWING THROUGH COIL

WHEN COIL IS ENERGIZED, SWITCH IS PULLED CLOSED

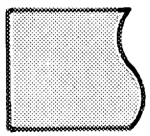
DIODE

CURRENT CAN FLOW ONLY IN THE DIRECTION OF THE ARROW

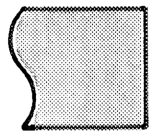




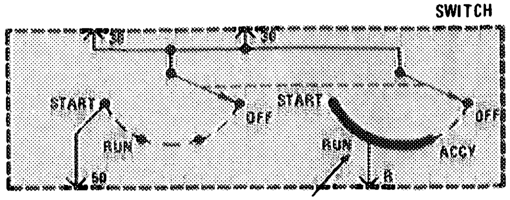
SCREW TERMINAL BLOCK



TWO PARTS OF THE SAME COMPONENT



TWO POLE, FOUR POSITION SWITCH

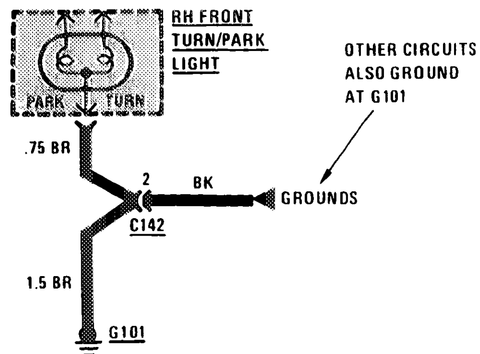


IGNITION SWITCH

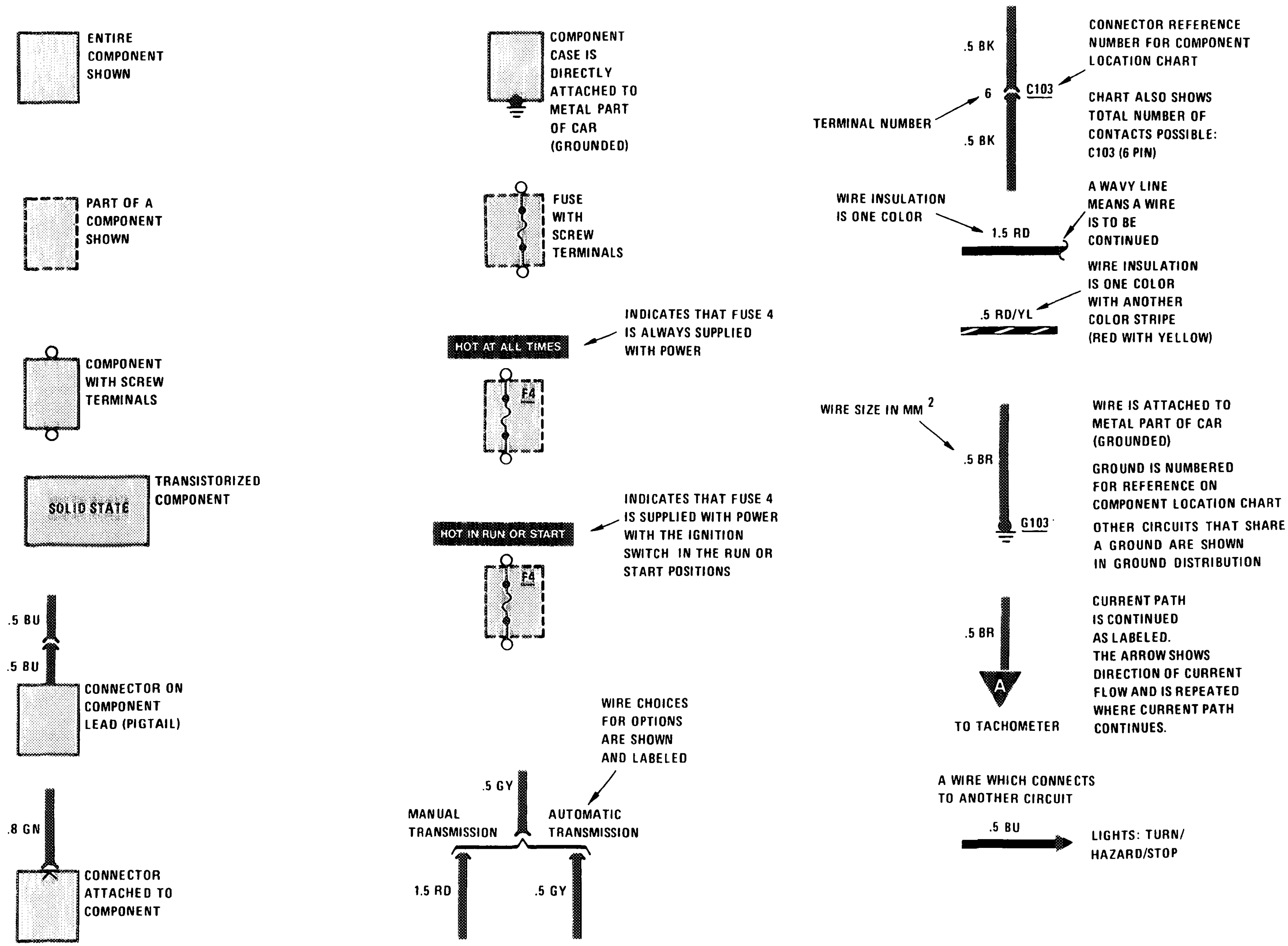
"R" IS ENERGIZED IN ACCY, RUN OR START

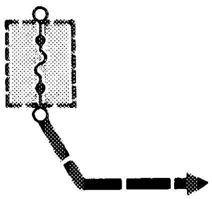
WIRE INSULATION	
COLOR	ABBREVIATIONS
BLACK	BK
BROWN	BR
RED	RD
YELLOW	YL
GREEN	GN
BLUE	BU
VIOLET	VI
GRAY	GY
WHITE	WT
PINK	PK

WIRE SIZE CONVERSION CHART	
METRIC (CROSSECTIONAL AREA IN MM^2)	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



SYMBOLS

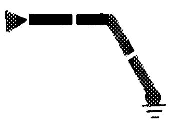

ENTIRE COMPONENT SHOWN
PART OF A COMPONENT SHOWN
COMPONENT WITH SCREW TERMINALS
SOLID STATE
TRANSISTORIZED COMPONENT
.5 BU
.5 BU
CONNECTOR ON COMPONENT LEAD (PIGTAIL)
.8 GN
CONNECTOR ATTACHED TO COMPONENT
COMPONENT CASE IS DIRECTLY ATTACHED TO METAL PART OF CAR (GROUNDED)
FUSE WITH SCREW TERMINALS
HOT AT ALL TIMES
F4
INDICATES THAT FUSE 4 IS ALWAYS SUPPLIED WITH POWER
HOT IN RUN OR START
F4
INDICATES THAT FUSE 4 IS SUPPLIED WITH POWER WITH THE IGNITION SWITCH IN THE RUN OR START POSITIONS
WIRE CHOICES FOR OPTIONS ARE SHOWN AND LABELED
.5 GY
MANUAL TRANSMISSION
AUTOMATIC TRANSMISSION
1.5 RD
.5 GY
.5 BK
6
C103
.5 BK
TERMINAL NUMBER
CONNECTOR REFERENCE NUMBER FOR COMPONENT LOCATION CHART
CHART ALSO SHOWS TOTAL NUMBER OF CONTACTS POSSIBLE: C103 (6 PIN)
WIRE INSULATION IS ONE COLOR
1.5 RD
A WAVY LINE MEANS A WIRE IS TO BE CONTINUED
.5 RD/YL
WIRE INSULATION IS ONE COLOR WITH ANOTHER COLOR STRIPE (RED WITH YELLOW)
WIRE SIZE IN MM 2
.5 BR
G103
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
.5 BR
A
TO TACHOMETER
CURRENT PATH IS CONTINUED AS LABELED. THE ARROW SHOWS DIRECTION OF CURRENT FLOW AND IS REPEATED WHERE CURRENT PATH CONTINUES.
A WIRE WHICH CONNECTS TO ANOTHER CIRCUIT
.5 BU
LIGHTS: TURN/ HAZARD/STOP



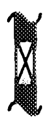
THIS FUSE FEEDS OTHER CIRCUITS WHICH ARE NOT SHOWN HERE. THESE CIRCUITS ARE IDENTIFIED IN "POWER DISTRIBUTION"

POWER DISTRIBUTION

GROUNDS

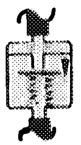


CIRCUITS NOT SHOWN HERE SHARE THIS GROUND. THESE CIRCUITS ARE IDENTIFIED IN "GROUND DISTRIBUTION."



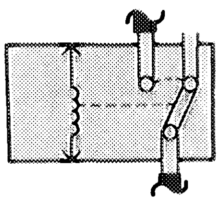
VACUUM RESTRICTOR

VACUUM RESTRICTORS ARE POROUS BRASS PLUGS IN THE VACUUM HOSE. THE RESTRICTOR SLOWS THE VACUUM FLOW.



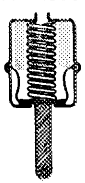
CHECK VALVE

VACUUM CAN FLOW EASILY IN THE DIRECTION OF THE ARROW. VACUUM CANNOT FLOW AGAINST THE ARROW.



A SWITCHOVER VALVE IS A SOLENOID OPERATED VACUUM VALVE. THE VALVE IS VENTED WHEN THE COIL OF THE SOLENOID IS DE-ENERGIZED.

NO VACUUM



VACUUM ELEMENTS PUSH OR PULL A SHAFT BETWEEN TWO FIXED POSITIONS. WHEN VACUUM IS APPLIED. THE SHAFT IS PULLED IN. WHEN NO VACUUM IS PRESENT, THE SHAFT IS PUSHED OUT BY A SPRING.

TROUBLESHOOTING PROCEDURE

1. VERIFY THE COMPLAINT
   Operate the problem circuit in all modes to check the accuracy of the complaint. This may give a clue as to the extent, nature, and location of the problem.
2. CHECK THE FUSE AND RELATED CIRCUITS
   Determine the extent of the problem by operating circuits which share the same fuse. If the other circuits work, the fuse is good. The cause must be within the wiring unique to the problem circuit.
3. REFER TO THE E.T.M. AND ANALYZE THE CIRCUIT
   Study the circuit schematic to learn how the circuit should operate. The schematic will tell you:
   — Where the circuit receives current
   — What circuit protection is involved
   — What switches control current flow
   — How the loads operate
   Understanding the total circuit is necessary if you are to troubleshoot efficiently. Determine possible problem areas and testing locations. The Component Location table tells where components and ground points are located.
4. SYSTEMATICALLY TEST THE CIRCUIT IN ORDER TO ISOLATE THE PROBLEM
   As a general guideline:
   — If the fault affects a single component of a circuit, start to test at that component.
   — If the fault affects a number of components of a circuit, start to test at the point where the circuit gets its power.
5. MAKE THE REPAIR
   After you have narrowed the problem down to a specific cause, repair as necessary.
6. VERIFY CIRCUIT OPERATION
   First operate the repaired circuit in all modes to be sure you have fixed the entire problem. Next, operate all circuits which share the same fuse. Be sure that this does not cause the problem to reappear.

TESTING TOOLS

A VOLTMETER is used to measure voltage at various points within a circuit. If an analog VOLTMETER is used, it must have a resistance of at least 20,000 ohms per volt in the low range. Any digital VOLTMETER may be used.

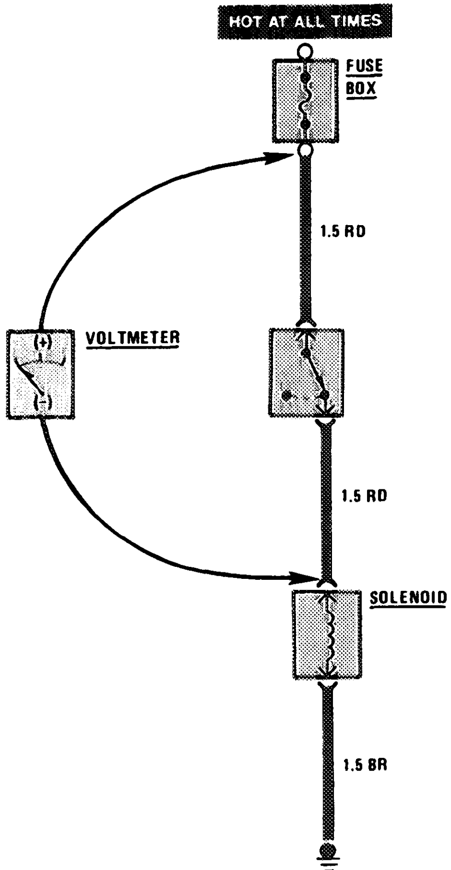
Use of an OHMMETER should be limited to harness wiring, connections and switches. It should not be used on solid state components or relays. An OHMMETER measures a circuit for its resistance to current flow. Since an OHMMETER has an internal battery that provides current to the circuit under test, it is first necessary to disconnect the car battery. This will ensure that there is no voltage already present in the circuit.

An ACC Adaptor Switch is used to test circuits in the new Automatic Climate Control system. To use this tester, first unplug the connector from the ELECTRONIC UNIT FOR TEMPERATURE CONTROL. Then plug this connector to the Adaptor Switch (M-B part no. 126 589 03 21 00). A voltmeter-ohmmeter is then connected to the Adaptor Switch. Specific testing instructions are given in the Automatic Climate Control section of this manual.

TESTS

Voltage Drop Test

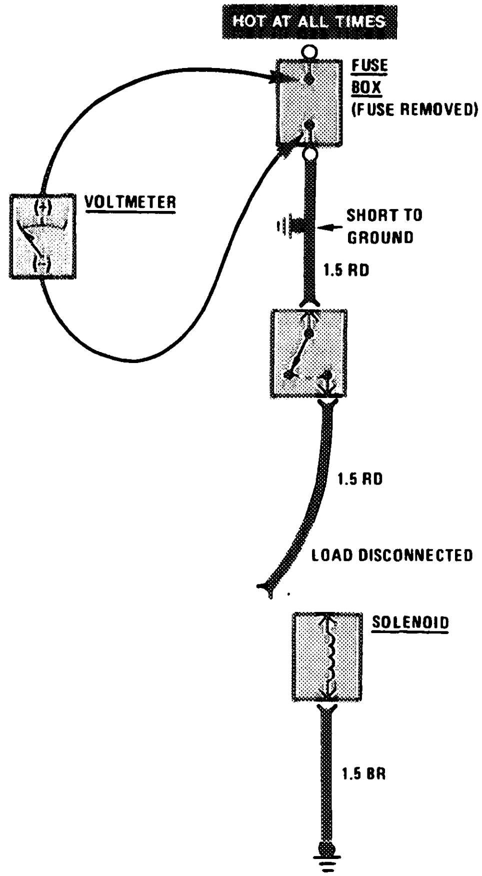
This test checks for voltage being lost along a wire, or through a connection or switch. Connect the positive lead of the VOLTMETER to the end of the wire, or to the side of the connection which is closest to the battery. Connect the negative lead to the other end of the wire, or the other side of the connection. When the circuit is operated, the VOLTMETER will show the difference in voltage between the two points. A difference (or drop) of more than one volt indicates a problem.



Voltage Drop Test

Testing For Short to Ground With a Voltmeter

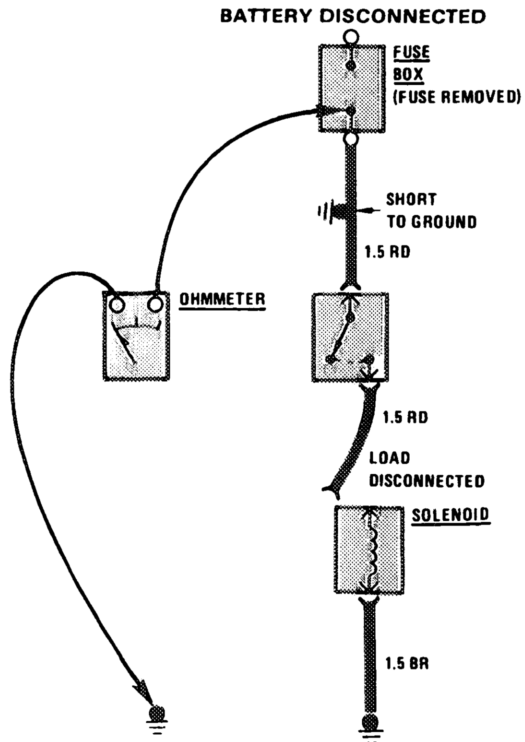
1. Remove the blown fuse and disconnect the load.
2. Connect the VOLTMETER across the fuse terminals.
3. Beginning near the fuse box, move the harness from side to side while watching the VOLTMETER.
4. If the meter registers, there is a short to ground in the wiring.



Testing for Short with Voltmeter

Testing For Short to Ground With an Ohmmeter

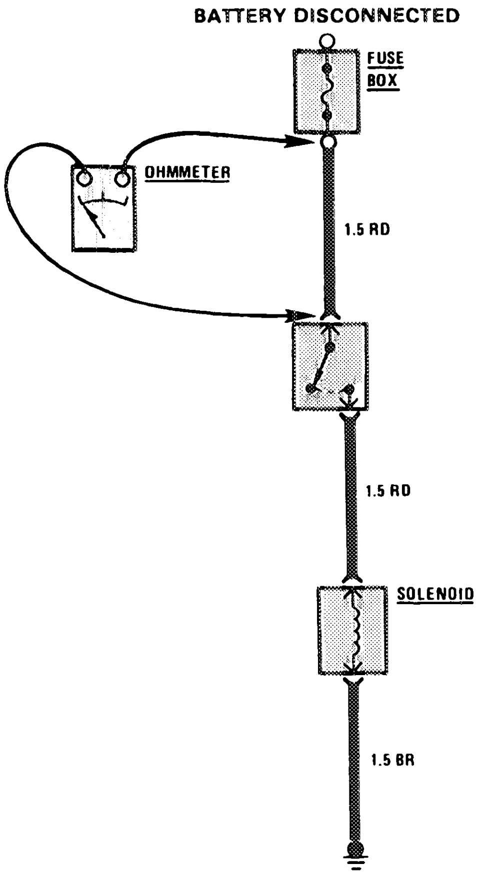
1. Calibrate OHMMETER by adjusting the needle to zero while holding the leads together.
2. Remove the blown fuse and disconnect the battery and load.
3. Connect one lead of the OHMMETER to the fuse terminal on the load side.
4. Connect the other lead to a known good ground.
5. Beginning near the fuse box, move the harness from side to side, while watching the OHMMETER.
6. If there is no short, the meter will show infinitely high resistance. If the meter registers low or no resistance, there is a short to ground in the wiring.



Testing for Short with Ohmmeter

Continuity Test

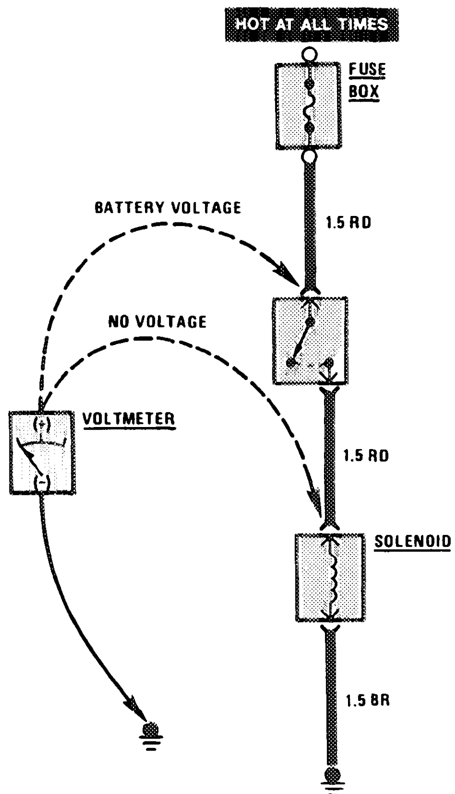
1. Check OHMMETER by adjusting the needle to zero while holding the leads together.
2. Disconnect the car battery.
3. Connect one lead of the OHMMETER to one end of the part of the circuit you wish to test.
4. Connect the other lead to the other end.
5. If the meter shows low or no resistance, there is continuity.



Continuity Test

Voltage Test

1. Connect the negative lead of the VOLTMETER to a known good ground or negative (-) battery terminal.
2. Connect the positive lead of the VOLTMETER to a point (connector or terminal) you wish to test.
3. If the meter registers, there is voltage present. This voltage should be within one volt of measured battery voltage. A loss of more than one volt indicates a problem. A loose connection is a likely cause. Take readings at several points along the circuit to isolate the problem.



Testing Vacuum Components

A VACUUM TESTER is used to apply vacuum to vacuum components. The tester (M-B part no. 589 25 2100) registers in mbar of vacuum. Two Typical applications of this tester are shown below.

PERMISSIBLE LEAKS	
Check Valves	50 mbar in 10 min. at 300 mbar vacuum
Other Vacuum Components	20 mbar/min. at 300 mbar vacuum