FOREWORD

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

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PN 89 89 1 000 274
# 1988 BMW M3 Electrical Troubleshooting Manual

## CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index</td>
<td>2</td>
</tr>
<tr>
<td>How To Use This Manual</td>
<td>3</td>
</tr>
<tr>
<td>Symbols</td>
<td>4</td>
</tr>
<tr>
<td>Wire Size Conversion Chart</td>
<td>3</td>
</tr>
<tr>
<td>Systematic Troubleshooting</td>
<td>6</td>
</tr>
<tr>
<td>Connector Views</td>
<td>8500-0</td>
</tr>
<tr>
<td>Power Distribution Box</td>
<td>0670-0</td>
</tr>
<tr>
<td>Fuse Data</td>
<td>0670-1</td>
</tr>
<tr>
<td>Component Location Chart</td>
<td>9000-0</td>
</tr>
<tr>
<td>Component Location Views</td>
<td>7000-0</td>
</tr>
<tr>
<td>Splice Location Views</td>
<td>8000-0</td>
</tr>
</tbody>
</table>
## INDEX

Index – Alphabetical Listing of Electrical Circuits

<table>
<thead>
<tr>
<th>Circuit Description</th>
<th>Page</th>
<th>Circuit Description</th>
<th>Page</th>
<th>Circuit Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Check Control</td>
<td>6216-0</td>
<td>— G201</td>
<td>0670-14</td>
<td>— Headlights</td>
<td>6312-0</td>
</tr>
<tr>
<td>A/C Air Delivery Control</td>
<td>6421-0</td>
<td>— G300</td>
<td>0670-15</td>
<td>— Instrument Cluster</td>
<td>6300-1</td>
</tr>
<tr>
<td>A/C Blower Controls</td>
<td>6413-0</td>
<td>Horns</td>
<td>6100-0</td>
<td>— Interior</td>
<td>6330-0</td>
</tr>
<tr>
<td>A/C Compressor Controls</td>
<td>6452-0</td>
<td>Ignition Key Warning</td>
<td>6131-0</td>
<td>— License</td>
<td>6320-0</td>
</tr>
<tr>
<td>A/C Temperature Control</td>
<td>6411-0</td>
<td>Indicators</td>
<td></td>
<td>— Map Reading Light</td>
<td>6100-1</td>
</tr>
<tr>
<td>Antilock Brake</td>
<td>3450-0</td>
<td>— ABS</td>
<td>3450-0</td>
<td>— Rear Ashtray</td>
<td>6300-1</td>
</tr>
<tr>
<td>Auto-Charging Flashlight</td>
<td>6100-1</td>
<td>— Active Check Control Alarm</td>
<td>6216-1</td>
<td>— Rear Side Marker</td>
<td>6320-0</td>
</tr>
<tr>
<td>Auxiliary Fan</td>
<td>6454-0</td>
<td>— &quot;Brake Lights&quot; Fault</td>
<td>6216-1</td>
<td>— Stop</td>
<td>6325-0</td>
</tr>
<tr>
<td>Auxiliary Fuse</td>
<td>0670-2</td>
<td>— &quot;Brake Lining&quot; Wear</td>
<td>3435-0</td>
<td>— Tail</td>
<td>6314-0</td>
</tr>
<tr>
<td>Brake Warning System</td>
<td>3435-0</td>
<td>— &quot;Brake Warning&quot;</td>
<td>3435-0</td>
<td>— Trunk</td>
<td>6320-0</td>
</tr>
<tr>
<td>Central Locking</td>
<td>5126-0</td>
<td>— Charge</td>
<td>6210-0</td>
<td>— Turn/Park</td>
<td>6313-1</td>
</tr>
<tr>
<td>Charge System</td>
<td>1230-0</td>
<td>— &quot;Coolant&quot; Level Fault</td>
<td>6216-2</td>
<td>Light Switch Details</td>
<td>6300-0</td>
</tr>
<tr>
<td>Cigar Lighter</td>
<td>6100-1</td>
<td>— &quot;Engine Oil&quot; Fault</td>
<td>6216-2</td>
<td>On-Board Computer</td>
<td>6581-0</td>
</tr>
<tr>
<td>Component Location Chart</td>
<td>9000-0</td>
<td>— Fasten Seatbelts</td>
<td>6216-2</td>
<td>Power Antenna</td>
<td>6500-0</td>
</tr>
<tr>
<td>Component Location Views</td>
<td>7000-0</td>
<td>— Fog Lights</td>
<td>6312-0</td>
<td>Power Distribution</td>
<td>0670-0</td>
</tr>
<tr>
<td>Connector Views</td>
<td>8500-0</td>
<td>— High Beam</td>
<td>6210-0</td>
<td>Power Distribution Box</td>
<td>0670-0</td>
</tr>
<tr>
<td>Cruise Control</td>
<td>6571-0</td>
<td>— Inspection</td>
<td>6210-0</td>
<td>Power Mirrors</td>
<td>5116-0</td>
</tr>
<tr>
<td>Fuel Gauge</td>
<td>6210-2</td>
<td>— LH Turn</td>
<td>6210-0</td>
<td>Power Windows</td>
<td>5133-0</td>
</tr>
<tr>
<td>Fuse Data Chart</td>
<td>0670-1</td>
<td>— &quot;License Plate&quot; Fault</td>
<td>6216-1</td>
<td>Radio</td>
<td>6500-0</td>
</tr>
<tr>
<td>Fuse Details</td>
<td></td>
<td>— &quot;Low Beam&quot; Fault</td>
<td>6216-0</td>
<td>Rear Defogger</td>
<td>6100-2</td>
</tr>
<tr>
<td>— Fuse 4</td>
<td>0670-6</td>
<td>— Low Fuel Warning</td>
<td>6210-2</td>
<td>Seatbelt Warning</td>
<td>6131-0</td>
</tr>
<tr>
<td>— Fuse 5</td>
<td>0670-6</td>
<td>— Oil Pressure Warning</td>
<td>6210-4</td>
<td>Service Interval Indicator</td>
<td>6210-1</td>
</tr>
<tr>
<td>— Fuse 6</td>
<td>0670-6</td>
<td>— Oil Service</td>
<td>6210-1</td>
<td>Speedometer</td>
<td>6210-0</td>
</tr>
<tr>
<td>— Fuse 8</td>
<td>0670-7</td>
<td>— &quot;Park Brake&quot;</td>
<td>3435-0</td>
<td>Splice Location Views Index</td>
<td>8000-0</td>
</tr>
<tr>
<td>— Fuse 9</td>
<td>0670-11</td>
<td>— &quot;Rear Lights&quot; Fault</td>
<td>6216-1</td>
<td>Start</td>
<td>1240-0</td>
</tr>
<tr>
<td>— Fuse 10</td>
<td>0670-8</td>
<td>— RH Turn</td>
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<td>Sunroof</td>
<td>5413-0</td>
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<td>— Fuse 20</td>
<td>0670-9</td>
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<td></td>
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</tr>
<tr>
<td>— Fuse 21</td>
<td>0670-10</td>
<td>Injection Electronics S14 Engine Lights</td>
<td>1364-0</td>
<td>Tachometer</td>
<td>6210-3</td>
</tr>
<tr>
<td>— Fuse 27</td>
<td>0670-11</td>
<td>Instrument Cluster</td>
<td>6210-0</td>
<td>Temperature Gauge</td>
<td>6210-2</td>
</tr>
<tr>
<td>Gauges</td>
<td>6210-2</td>
<td>— A/C Control Power</td>
<td>6300-1</td>
<td>Warnings</td>
<td></td>
</tr>
<tr>
<td>Ground Distribution</td>
<td></td>
<td>— Backup</td>
<td>6322-0</td>
<td>— Ignition Key/Seatbelt</td>
<td>6131-0</td>
</tr>
<tr>
<td>— G103</td>
<td>0670-12</td>
<td>— Cigar Lighter</td>
<td>6300-1</td>
<td>Wiper/Washer</td>
<td>6160-0</td>
</tr>
<tr>
<td>— G104</td>
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<td>— Fog</td>
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<td>— G106</td>
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<td>— Front Ashtray</td>
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<tr>
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<td>— Front Turn/Park</td>
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<td>— Glove Box</td>
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<tr>
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<td>— Hazard Switch</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>METRIC (CROSSECTONAL AREA IN MM²)</th>
<th>AWG (AMERICAN WIRE GAUGE)</th>
</tr>
</thead>
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<tr>
<td>.75</td>
<td>18</td>
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<tr>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>1.5</td>
<td>14</td>
</tr>
<tr>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>2.5</td>
<td>12</td>
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<td>10</td>
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<td>8</td>
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</tr>
</tbody>
</table>

**WIRE INSULATION**

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<th>ABBREVIATIONS</th>
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</tr>
</thead>
<tbody>
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<td>BK</td>
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<tr>
<td>BR</td>
<td>BROWN</td>
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<tr>
<td>RD</td>
<td>RED</td>
</tr>
<tr>
<td>YL</td>
<td>YELLOW</td>
</tr>
<tr>
<td>GN</td>
<td>GREEN</td>
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<tr>
<td>BU</td>
<td>BLUE</td>
</tr>
<tr>
<td>VI</td>
<td>VIOLET</td>
</tr>
<tr>
<td>GY</td>
<td>GRAY</td>
</tr>
<tr>
<td>WT</td>
<td>WHITE</td>
</tr>
<tr>
<td>PK</td>
<td>PINK</td>
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</tbody>
</table>
SYMBOLS

- **Entire Component Shown**
- **Part of a Component Shown**
- **Component with Screw Terminals**
- **Solid State (includes only electronic parts)**

- **Fuse**
  - **Fuse 5, 1 amp**
  - **Fuse 6, 3 amp**

- **Connector Reference Number for Component Location Chart**
  - Connector 1 (C104)
  - Pin Number 1

- **Wire Insulation**
  - One color
  - With another color stripe (red with brown)

- **Wire Size in mm²**
  - 1.5 mm²
  - 0.8 mm²

- **Diode**
  - Current can flow only in the direction of the arrow

- **Circuit Reference**
  - A wire which connects to another circuit

- **2.5 BK (Manual Transmission)**
- **2.5 BK/YL (Automatic Transmission)**

- **.75 GY/YL**
- **Active Check Control**
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.

![Diagram of Voltage Test](image-url)
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.

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.

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 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.

---

**BATTERY DISCONNECTED**

---

**POWER DISTRIBUTION BOX (FUSE REMOVED)**

---

**SHORT TO GROUND**

---

**OHMMETER**

---

**LOW FLUID SWITCH**

---

**LOAD DISCONNECTED**

---

**LOW FLUID INDICATOR**

---

1.5 OR

---

1.5 WIRE

---

Short Test Using Ohmmeter
<table>
<thead>
<tr>
<th>FUSE NO.</th>
<th>SIZE/ COLOR</th>
<th>CIRCUIT NAME</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>7.5A</td>
<td>Headlights (also fuses 2, 13, 14).</td>
</tr>
<tr>
<td>2</td>
<td>7.5A</td>
<td>Headlights (also fuses 1, 13, 14).</td>
</tr>
<tr>
<td>3</td>
<td>15A</td>
<td>Auxiliary Fan (also fuses 18, 19, 20).</td>
</tr>
<tr>
<td>4</td>
<td>15A</td>
<td>Lights: Turn/Hazard (also fuse 24); Active Check Control (also fuses 6, 10, 21, 22, 23).</td>
</tr>
<tr>
<td>5</td>
<td>30A</td>
<td>Wiper/Washer.</td>
</tr>
<tr>
<td>6</td>
<td>7.5A</td>
<td>Stop Lights; Map Reading Light; Cruise Control; Active Check Control (also fuses 4, 10, 21, 22, 23); Antilock Braking System.</td>
</tr>
<tr>
<td>7</td>
<td>15A</td>
<td>Horn.</td>
</tr>
<tr>
<td>8</td>
<td>30A</td>
<td>Rear Defogger (also fuse 23).</td>
</tr>
<tr>
<td>9</td>
<td>15A</td>
<td>Injection Electronics (also fuse 21).</td>
</tr>
<tr>
<td>10</td>
<td>7.5A</td>
<td>Seatbelt Warning (also fuse 21); Service Interval Indicator (also fuse 21); Tachometer/Fuel Economy Gauges (also fuse 21); Gauges/Indicators; Brake Warning System; Back Up Lights; On-Board Computer (also fuses 12, 21, 23, 27); Start; Injection Electronics (also fuses 11, 21); Active Check Control (also fuses 4, 6, 21, 22, 23).</td>
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<td>Injection Electronics.</td>
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<td>14</td>
<td>7.5A</td>
<td>Headlights (also fuses 1, 2, 13).</td>
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<td>16</td>
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<td>Not Used.</td>
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<td>17</td>
<td>30A</td>
<td>Sunroof; Power Windows.</td>
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<tr>
<td>18</td>
<td>30A</td>
<td>Auxiliary Fan (also fuses 3, 19, 20).</td>
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<tr>
<td>19</td>
<td>7.5A</td>
<td>Auxiliary Lights (also fuses 3, 18, 20); Interior Lights (also fuses 6, 21, 27); Power Mirrors.</td>
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<td>20</td>
<td>30A</td>
<td>Heater/Air Conditioning; Auxiliary Fan (also fuses 3, 18, 19).</td>
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<td>Auto-Charging Flashlight; Glove Box Light; Ignition Key Warning/Seatbelt Warning (also fuse 10); Injection Electronics (also fuses 10, 11); Interior Lights (also fuses 19, 27); Radio/Antenna (also fuses 12, 27, 28); Trunk Light; Active Check Control (also fuses 4, 6, 10, 22, 23); Service Interval Indicator (also fuse 10); On-Board Computer (also fuses 10, 12, 23, 27); Tachometer/Fuel Economy Gauge (also fuse 10).</td>
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<td>22</td>
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<td>Active Check Control (also fuses 4, 6, 10, 21, 23); Lights: Front Park/Tail (also fuse 23); Lights: Front Side Marker (also fuse 23).</td>
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<td>7.5A</td>
<td>Lights: Dash; Lights: Front Park/Tail (also fuse 22); Lights: Front Side Marker (also fuse 22); Lights: Rear Marker/License; Active Check Control (also fuses 4, 6, 10, 21, 22); Rear Defogger (also fuse 6).</td>
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<td>Lights: Turn/Hazard (also fuse 4).</td>
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<td>26</td>
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<td>7.5A</td>
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<td>Fog Lights (also fuse 29).</td>
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<th>AMPS</th>
<th>CIRCUIT NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Windows</td>
<td>25A</td>
<td>Power Windows</td>
</tr>
</tbody>
</table>
NOTE
CHARGE INDICATOR PROVIDES EXCITATION CURRENT TO FIELD COIL. RESISTOR ALLOWS ALTERNATOR TO CHARGE IF BULB BURNS OUT.
NOTE
UNLOADER RELAY COILS ARE GROUNDED THROUGH STARTING MOTOR EXCEPT WHEN STARTING. WHEN STARTING, BATTERY VOLTAGE IS APPLIED TO BOTH SIDES OF UNLOADER RELAY COILS AND RELAYS ARE DE-ENERGIZED.

1240-0 START

10 RD

TO INSTRUMENT CLUSTER PAGES 1364-3, 3435-0, 6210-3 AND 6581-1

4 RD POWER DISTRIBUTION

DIAGNOSTIC CONNECTOR

CHARGING SYSTEM

STARTER

TO MOTRONIC CONTROL UNIT PAGE 1364-6
CENTRAL LOCKING  5126-1

CAUTION
DO NOT OPERATE THE SYSTEM MORE THAN 8 TIMES IN QUICK SUCCESSION TO PREVENT DAMAGE TO THE CENTRAL LOCKING CONTROL UNIT.

IGNITION SWITCH

POWER DISTRIBUTION

GAS FILLER LOCK MOTOR

TRUNK LID LOCK MOTOR

GROUND DISTRIBUTION

NOT AT ALL TIMES

2.5 GN

C280

C302 (ACCESSORY CONNECTOR)

INERTIA SWITCH
C5

AUTOMATIC UNLOCK REQUEST

SOLID STATE UNLOCK REQUEST INPUT

CENTRAL LOCKING CONTROL UNIT

LOCKING ROD

LOCK UNLOCK

LOCKING ROD

G200

S342

C405

C10

75 BR/BK (NOT USED)

75 BR/BU (NOT USED)
TROUBLESHOOTING HINTS
1. Check Fuse by operating the Interior Light Timer for either Dome Light.
2. If all locks stay in UNLOCK INHIBIT, check the wires to terminal 10 of the Central Locking Control Unit for a short to ground.

SYSTEM CHECK
- Operate controls in sequence listed in the System Check Table.
- Refer to Repair Action for the Response received (tests follow the System Check Table).
- After any repair, repeat System Check to verify proper system operation.

NOTE: Before replacing any system component, check all connectors, splices, and wiring to that component.

<table>
<thead>
<tr>
<th>OPERATION</th>
<th>RESPONSE</th>
<th>REPAIR ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Insert the key in the Driver's door and turn to LOCK</td>
<td>All doors lock</td>
<td>None, proceed to Operation 2</td>
</tr>
<tr>
<td></td>
<td>Some doors lock</td>
<td>Repair/replace the suspect Door Lock Motor circuit</td>
</tr>
<tr>
<td></td>
<td>No doors lock</td>
<td>Proceed to Operation 4</td>
</tr>
<tr>
<td>2. Turn the key to UNLOCK INHIBIT (clockwise until key is horizontal)</td>
<td>All doors double lock (Safety Catch Buttons cannot be pulled up by hand)</td>
<td>None, proceed to Operation 3</td>
</tr>
<tr>
<td></td>
<td>Driver's door double locks and only some of the other doors double lock</td>
<td>Repair/replace the suspect Door Lock Motor</td>
</tr>
<tr>
<td></td>
<td>Driver's door double locks but all the other doors do not double lock</td>
<td>Perform Test B</td>
</tr>
<tr>
<td></td>
<td>Driver's door does not double lock</td>
<td>Mechanical problem, see BMW Troubleshooting Manual</td>
</tr>
<tr>
<td>OPERATION</td>
<td>RESPONSE</td>
<td>REPAIR ACTION</td>
</tr>
<tr>
<td>-----------</td>
<td>----------</td>
<td>---------------</td>
</tr>
<tr>
<td>Turn the key to UNLOCK</td>
<td>All doors unlock</td>
<td>None, proceed to Operation 4</td>
</tr>
<tr>
<td></td>
<td>Some doors unlock</td>
<td>Repair/replace the suspect Door Lock Motor circuit</td>
</tr>
<tr>
<td></td>
<td>No doors unlock</td>
<td>Proceed to Operation 5</td>
</tr>
<tr>
<td>Insert the key in the Passenger’s door and turn to LOCK</td>
<td>All doors lock</td>
<td>If the doors did not lock in Operation 1, repair/replace the Driver’s Door Lock Switch, otherwise proceed to Operation 5</td>
</tr>
<tr>
<td></td>
<td>Some doors lock</td>
<td>Repair/replace the suspect Door Lock Motor circuit</td>
</tr>
<tr>
<td></td>
<td>No doors lock</td>
<td>If all the doors locked in Operation 1, repair/replace the Right Front Door Microswitch. If the doors did not lock in Operation 1, perform Test A</td>
</tr>
<tr>
<td>Insert the key in the Passenger’s door and turn to UNLOCK</td>
<td>All doors unlock</td>
<td>If all the doors did not unlock in Operation 3, repair/replace the Driver’s Door Lock Switch, otherwise proceed to Operation 6</td>
</tr>
<tr>
<td></td>
<td>Some doors unlock</td>
<td>Repair/replace the suspect Door Lock Motor</td>
</tr>
<tr>
<td></td>
<td>No doors unlock</td>
<td>If all the doors unlocked in Operation 3, repair/replace the Passenger’s Door Lock Switch. If the doors did not unlock in Operation 3, perform Test C</td>
</tr>
<tr>
<td>Get in the car and close and lock all doors</td>
<td>Doors remain locked</td>
<td>None, proceed to Operation 7</td>
</tr>
<tr>
<td>Turn the Ignition Switch to RUN</td>
<td>Doors unlock</td>
<td>Repair/replace the Central Locking Control Unit</td>
</tr>
<tr>
<td>Get out of the car</td>
<td>All doors can be unlocked</td>
<td>None, proceed to Operation 8</td>
</tr>
<tr>
<td>Insert the key in the Driver’s door and turn to LOCK</td>
<td>All doors remain secure</td>
<td>Disconnect the connector from the Central Locking Control Unit and check for a short to ground in the wires at terminal 11.</td>
</tr>
<tr>
<td>Unlock each of the doors by pulling up the Safety Catch Buttons</td>
<td></td>
<td>• If short to ground is not present, replace the Central Locking Control Unit.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If short to ground is present isolate wiring from Door Lock Motors one at a time to find short</td>
</tr>
</tbody>
</table>
**SYSTEM CHECK TABLE (CONT'D)**

<table>
<thead>
<tr>
<th>OPERATION</th>
<th>RESPONSE</th>
<th>REPAIR ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Insert the key in the Trunk Cylinder Switch. Turn the key to LOCK</td>
<td>Trunk locks</td>
<td>None, proceed to Operation 9</td>
</tr>
<tr>
<td></td>
<td>Trunk does not lock</td>
<td>If the doors lock, repair/replace the Trunk Lock Motor Circuit or Trunk Lock Motor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If the doors do not lock, repair/replace the Trunk Switch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Repair/replace the Central Locking Control Unit if the Trunk Switch Circuit is OK</td>
</tr>
<tr>
<td>9. Turn the key to UNLOCK</td>
<td>Trunk unlocks</td>
<td>None, proceed to Operation 10</td>
</tr>
<tr>
<td></td>
<td>Trunk does not unlock</td>
<td>If the doors unlock, repair/replace the Trunk Lock Motor circuit or Trunk Lock Motor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If the doors do not unlock, repair/replace the Trunk Switch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Repair/replace the Central Locking Control Unit if the Trunk Switch Circuit is OK</td>
</tr>
<tr>
<td>10. Turn the key back to LOCK</td>
<td>Gas Filler locks</td>
<td>None, proceed to Operation 11</td>
</tr>
<tr>
<td></td>
<td>Gas Filler does not lock</td>
<td>Repair/replace the Gas Filler Lock Motor circuit</td>
</tr>
<tr>
<td>11. Turn the key to UNLOCK</td>
<td>Gas Filler unlocks</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Gas Filler does not unlock</td>
<td>Repair/replace the Gas Filler Lock Motor circuit</td>
</tr>
</tbody>
</table>

- If all results are normal, the system is OK.

**SYSTEM DIAGNOSIS**

- Do the following tests when directed by the System Check Table.

**A: CONTROL UNIT LOCK TEST (TABLE 1)**

<table>
<thead>
<tr>
<th>Measure: VOLTAGE At: CONTROL UNIT CONNECTOR (Connected)</th>
<th>Measure Between</th>
<th>Correct Voltage</th>
<th>For Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3 &amp; Ground</td>
<td>Battery</td>
<td>See 1</td>
</tr>
<tr>
<td></td>
<td>3 &amp; 4</td>
<td>Battery</td>
<td>See 2</td>
</tr>
</tbody>
</table>

- If the voltages are correct, proceed to Table 2.
  1. Check the wire to terminal 3 for an open.
  2. Check the wire from terminal 4 for an open to ground (see schematic).

**A: CONTROL UNIT LOCK TEST (TABLE 2)**

<table>
<thead>
<tr>
<th>Connect: A FUSED JUMPER At: CONTROL UNIT CONNECTOR (Connected)</th>
<th>Jumper Between</th>
<th>Correct Result</th>
<th>For Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7 &amp; Ground</td>
<td>Doors lock</td>
<td>See 1</td>
</tr>
</tbody>
</table>

- If the result is correct, repair/replace the switches and related wiring (see schematic).
  1. Proceed to Table 3.
A: CONTROL UNIT LOCK TEST
(TABLE 3)

<table>
<thead>
<tr>
<th>Jumper Between</th>
<th>Correct Result</th>
<th>For Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 &amp; 3</td>
<td>Doors lock</td>
<td>See 1</td>
</tr>
<tr>
<td>2 &amp; 4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- If the result is correct, replace the Central Locking Control Unit.

1. Check the wire from terminal 1 to splice and the wire from terminal 3 to splice for opens (see schematic).

B: UNLOCK INHIBIT TEST

<table>
<thead>
<tr>
<th>Jumper Between</th>
<th>Correct Result</th>
<th>For Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 &amp; Ground</td>
<td>Doors double lock</td>
<td>See 1</td>
</tr>
</tbody>
</table>

- If the result is correct, check the wires from terminal 10 to ground for opens (see schematic). Replace the Unlock Inhibit Switch if the wires and connections are OK.

1. Check the wires from terminal 11 for opens (see schematic). Replace the Central Locking Control Unit, if the wires and connections are OK.

C: CONTROL UNIT UNLOCK TEST

<table>
<thead>
<tr>
<th>Jumper Between</th>
<th>Correct Result</th>
<th>For Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 &amp; Ground</td>
<td>Doors unlock</td>
<td>See 1</td>
</tr>
</tbody>
</table>

- If the result is correct, repair/replace the switches and related wiring (see schematic).

1. Replace the Central Locking Control Unit.

CIRCUIT DESCRIPTION

The Central Locking System is controlled by the Central Locking Control Unit. This unit senses when a lock switch is moved by a key, and sends the appropriate signal to drive the Motors. The Central Locking Control Unit controls the Door Locks, Gas Filler Lock and Trunk Lock. The unit also has an Inertia Switch which closes on impact greater than 5g. If in RUN or START the locks are then unlocked.

Unlock

When the key is turned counterclockwise, terminal 6 of the Central Locking Control Unit is grounded through the Lock Switch. The Central Locking Control Unit then activates the Unlock Relay and applies voltage from Fuse 27, through terminal 2 to the Lock Motor. The motor is grounded through the Central Locking Control Unit terminal 1. The polarity is reversed and the motor pushes the lock up.

Unlock Inhibit

When the key is inserted into the Driver's Lock and turned clockwise past the LOCK position, the Unlock Inhibit mechanism is engaged. This mechanically inserts a bar into the driver's lock and prevents unlocking through use of the Safety Catch Button. When in the Unlock Inhibit position, ground is applied to the Unlock Inhibit motors in the other lock units. The Central Locking Control Unit is grounded at terminal 10 and then activates the Lock Relay. Voltage is applied to the Unlock Inhibit motors through terminal 1. They are now activated and engage the other Unlock Inhibit mechanisms. The direction of the motors is reversed when the doors are unlocked (see Unlock).

Lock

When the Key is inserted into a lock and turned clockwise, the Lock switch moves to LOCK and grounds terminal 7 of the Central Locking Control Unit. The unit then activates the Lock Relay and applies voltage from Fuse 27 to the Lock Motor, which is grounded through the Central Locking Control Unit terminal 2. The Lock Motor then pulls the lock down. The door locks also control the Trunk Lock and Gas Filler Lock.

Trunk Lock

The Trunk Lock operates in a manner similar to the Door Locks.
ACTIVE CHECK CONTROL

1. When the Ignition Switch is initially placed in "Run," the Active Check Control Arm Indicator flashes, and the Active Check Control Unit Brake Light LED and panel light illuminate for test purposes. Depressing the brake pedal clears the display.

2. When the Ignition Switch is placed in "Run," fault monitoring begins. To monitor the low beams, rear lights, or license lights, these circuits must be on. The brake lights are monitored only while the brake pedal is depressed. An exception to this is when all brake light circuits are open. A fault will be indicated with the ignition switch in "RUN".

3. When a fault occurs, the alarm indicator flashes, the appropriate LED fault indicator lights, and the panel light goes on for five seconds. Depressing the test button will clear the alarm indicator, but the LED fault indicator remains on.

4. To test the unit, depress the test button. The LED fault indicators and the panel lights should go on.

Figure 1: Active Check Control Unit Above Rear View Mirror
NOTE:
Resistor dims the hazard switch light when the light switch is in "head" or "park" and the hazard switch is off.
**SYSTEM CHECK**

This procedure provides an overall check of the Heating and Air Conditioning System. Each of the steps can be performed without disassembly or the use of tools.

Complete this procedure with the temperature outside the car above 60 degrees F (16 degrees C) and the engine warm and running at idle.

**SYSTEM CHECK TABLE**

<table>
<thead>
<tr>
<th>ACTION</th>
<th>NORMAL RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotate Blower Speed Control through steps 1 to 4</td>
<td>Blower speed increases at each step to maximum speed at Step 4</td>
</tr>
<tr>
<td>Press Fresh/Recirculating Air Switch to release it (OFF)</td>
<td>Fresh/Recirculating button is no longer lit. Outside air is drawn into car. (The sound of Flap Door Motors may be heard repositioning flaps.)</td>
</tr>
<tr>
<td>Rotate Temperature Control at least 1/4 turn clockwise</td>
<td>Air flow becomes warm</td>
</tr>
<tr>
<td>Depress A/C button (ON)</td>
<td>A/C button lights. A/C Compressor runs. Auxiliary Cooling Fans runs.</td>
</tr>
<tr>
<td>Move Center Slide Lever to the extreme left</td>
<td>A/C button is no longer lit. A/C Compressor turns off. Auxiliary Cooling Fan turns off.</td>
</tr>
<tr>
<td>Move Bottom Slide Lever to the center</td>
<td>A/C button lights. A/C Compressor turns off. Auxiliary Cooling Fan runs.</td>
</tr>
<tr>
<td>Press A/C button to release it (OFF)</td>
<td>A/C button is no longer lit. A/C Compressor turns off. Auxiliary Cooling Fan turns off.</td>
</tr>
<tr>
<td>Set Blower Speed Control to 0 (OFF)</td>
<td>Blower turns off</td>
</tr>
</tbody>
</table>

- If all of the steps can be completed as described, the Heating and Air Conditioning System is operating normally.
HEATING AND AIR CONDITIONING (HOT WATER CONTROL)

HOT IN RUN ONLY FROM UNLOADER RELAY K7

- FUSE 20
- 30 AMP

POWER DISTRIBUTION BOX

- 4 GALLONS PER BRUTON (GALLONS PER BRUNO)
- 2.5 GALLONS PER BRUTON
- 0.5 GALLONS PER BRUTON

FUSE DETAILS

HOT WATER CUT-OFF SWITCH

SWITCH IS OPENED WHEN ROTARY TEMPERATURE CONTROL KNOB IS ROTATED BY MORE THAN 20° FROM COLDEST POSITION.

- 0.5 BU

A/C IN-LINE FUSE

- 2 AMP

- 0.5 BU

WATER SHUT-OFF SOLENOID

SHUTS WATER OFF TO HEATER CORE WHEN ENERGIZED.

- 0.5 BU

GROUND DISTRIBUTION

S209

- 2.5 BU

C204

- 2.3 BU

G200

A/C CONTROL PANEL

HOT WATER

ON

OFF

20°
CIRCUIT OPERATION

The Water Shut-Off Solenoid controls the flow of engine coolant through the heater core. When the solenoid is energized, coolant flow is shut off to allow maximum cooling from the air conditioning system. The Water Shut-Off Solenoid is controlled by the Hot Water Cut-Off Switch, which is part of the A/C Control Panel TEMP Control.

Battery voltage is applied through Fuse 20 to the Hot Water Cut-Off Switch when the Ignition Switch is in RUN. The Hot Water Cut-Off Switch is closed when the TEMP Control is rotated fully counterclockwise (coldest position), and opens when the control is rotated more than 20 degrees in a clockwise direction. When the switch is closed, battery voltage is applied through the A/C In-Line Fuse to the Water Shut-Off Solenoid. The solenoid is energized and shuts off the coolant flow through the heater core.

The Water Shut-Off Solenoid and A/C In-Line Diode are protected by the A/C In-Line Fuse. If any failures occur in the solenoid, the fuse will isolate them to prevent the failures from affecting other parts of the heating and air conditioning circuits.

TROUBLESHOOTING HINTS

- Try the following checks before doing the System Diagnosis.
  1. Check that Water Shut-Off Solenoid connector is firmly seated.
  2. Check the A/C In-Line Fuse.
  3. Go to Heating and Air Conditioning (6410A-0) System Check for a guide to normal operation.
  4. Go to System Diagnosis for diagnostic tests.

SYSTEM DIAGNOSIS

- Do the following test if the Water Shut-Off Solenoid does not operate normally.

WATER SHUT-OFF SOLENOID TEST (TABLE 1)

<table>
<thead>
<tr>
<th>Measure: VOLTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>At: WATER SHUT-OFF SOLENOID CONNECTOR (Disconnected)</td>
</tr>
<tr>
<td>Conditions:</td>
</tr>
<tr>
<td>- Ignition Switch: RUN</td>
</tr>
<tr>
<td>- A/C Control Panel TEMP Control: FULLY COUNTERCLOCKWISE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measure Between</th>
<th>Correct Voltage</th>
<th>For Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>BU &amp; Ground</td>
<td>Battery</td>
<td>See 1</td>
</tr>
<tr>
<td>BU &amp; or BR</td>
<td>Battery</td>
<td>See 2</td>
</tr>
<tr>
<td>Rotate A/C Control Panel TEMP Control to Mid-Position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BU &amp; Ground</td>
<td>0 Volts</td>
<td>See 3</td>
</tr>
</tbody>
</table>

(Water Shut-Off Solenoid Test (Table 2)

Measure: VOLTAGE
At: HOT WATER CUT-OFF SWITCH CONNECTOR (Disconnected)
Conditions:
- Ignition Switch: RUN
- Water Shut-Off Solenoid: CONNECTED

<table>
<thead>
<tr>
<th>Measure Between</th>
<th>Correct Voltage</th>
<th>For Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>GN/BR &amp; Ground</td>
<td>Battery</td>
<td>See 1</td>
</tr>
<tr>
<td>GN/BR &amp; BU</td>
<td>Battery</td>
<td>See 2</td>
</tr>
</tbody>
</table>

- If both voltages are correct, replace the A/C Control Panel TEMP Control.
  1. Check the GN/BR wire for an open back to Fuse 20.
  2. Check the BU wire for an open.

(Continued from previous column)
CIRCUIT OPERATION

With the Ignition Switch in RUN, battery voltage is applied to the Control Switches and the Blower Speed Control through the GN/BR wires. If either the A/C Select Switch or the Fresh/Recirculating Air Switch are ON or the Blower Speed Control is in position 1, battery voltage is applied through the YL wire to the Blower Resistors and the Blower Motor.

The Blower Motor is a variable speed motor which runs at a speed proportional to the voltage applied to it. With all of the Blower Resistors in the circuit, the voltage applied to the Motor is reduced so the Motor runs at a low speed.

As the Blower Speed Control is moved through positions 2 and 3, some of the Resistors are bypassed, allowing more voltage to be applied to the Blower Motor, which then runs at a higher speed. When the Blower Speed Control is moved to position 4, battery voltage is applied directly to the Blower Motor, which then runs at maximum speed.

The Blower Resistors dissipate heat because of the current flowing through them. They are cooled by the air flow from the Blower. If there is insufficient air flow to cool the Resistors, the Safety Switch will open, shutting the Blower Motor off until the Resistors have cooled.

TROUBLESHOOTING HINTS

- Try the following checks before doing the System Diagnosis.
  1. Check Fuse 20 by visual inspection.
  2. If Blower will run in high only, check the Blower Resistors' Safety Switch for an open.
- Go to Heating and Air Conditioning (6410A-0) System Check for a guide to normal operation.
- Go to System Diagnosis for diagnostic tests.

SYSTEM DIAGNOSIS

- Do the tests listed for your symptom in the Symptom Table below.
- Tests follow the Symptom Table.

SYMPTOM TABLE

<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>DO TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blower Motor does not run in any speed setting.</td>
<td>B</td>
</tr>
<tr>
<td>Blower runs only in HIGH (does not run in any other speed setting).</td>
<td>B</td>
</tr>
<tr>
<td>Blower does not run in some modes.</td>
<td>A</td>
</tr>
<tr>
<td>Blower does not run with A/C ON or in Recirculating mode.</td>
<td>A</td>
</tr>
<tr>
<td>A/C Select Switch or Fresh/Recirculating Air Switch does not light.</td>
<td>A</td>
</tr>
</tbody>
</table>

(Continued from previous column)

| 1 (GN/BR) & 3 (YL) | Battery | See 2 & 4 |
| 7 (GN/BR) & Ground | Battery | See 1 |
| 7 (GN/BR) & 5 (YL) | Battery | See 2 & 4 |
| 7 (GN/BR) & 6 (BR/WT) | Battery | See 3 |

- If all voltages are correct, do Test B.
  1. Check the GN/BR wire for an open.
  2. Check the YL wire for an open.
  3. Check the BR/WT wire for an open.
  4. If voltage is not present between the GN/BR wire and both the YL wires (terminals 3 and 5), do Test B.

B: BLOWER SPEED CONTROL TEST

Measure: VOLTAGE
At: BLOWER SPEED CONTROL CONNECTOR (Disconnected)

Conditions:
- Ignition Switch: RUN
- A/C Select Switch: ON (Depressed)
- Fresh/Recirculating Air Switch: FRESH (Not Depressed)

<table>
<thead>
<tr>
<th>Measure Between</th>
<th>Correct Voltage</th>
<th>For Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 (GN/BR) &amp; Ground</td>
<td>Battery</td>
<td>See 1</td>
</tr>
<tr>
<td>7 (YL) &amp; Ground</td>
<td>Battery</td>
<td>See 2</td>
</tr>
</tbody>
</table>

- A/C Select Switch: OFF (Not Depressed)

| 7 (YL) & Ground | 0 Volts | See 3 |

(Continued in next column)
C: BLOWER MOTOR TEST

Measure: VOLTAGE
At: BLOWER MOTOR CONNECTOR
(Disconnected)
Conditions:
- Ignition Switch: RUN
- A/C Select Switch: ON
- Blower Speed Control: HIGH

<table>
<thead>
<tr>
<th>Measure Between</th>
<th>Correct Voltage</th>
<th>For Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>BU &amp; Ground</td>
<td>Battery</td>
<td>See 1</td>
</tr>
<tr>
<td>BU &amp; BR</td>
<td>Battery</td>
<td>See 2</td>
</tr>
</tbody>
</table>

• If both voltages are correct, replace the Blower Motor.
  1. Check the BU wire for an open. If wire is good, recheck Test B.
  2. Check the BR wire to ground G200 for an open.

(Continued from previous page)

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4 (GN/BR) &amp; 7 (YL)</td>
<td>Battery</td>
<td>See 4, 8, 9, &amp; 10</td>
</tr>
<tr>
<td>4 (GN/BR) &amp; 1 (BK)</td>
<td>Battery</td>
<td>See 5, 8, 9, &amp; 10</td>
</tr>
<tr>
<td>4 (GN/BR) &amp; 2 (GN)</td>
<td>Battery</td>
<td>See 6, 8, 9, &amp; 10</td>
</tr>
<tr>
<td>4 (GN/BR) &amp; 3 (BU)</td>
<td>Battery</td>
<td>See 7 &amp; 10</td>
</tr>
</tbody>
</table>

• If all voltages are correct, replace the Blower Motor.
  1. Check the GN/BR wire for an open.
  2. Check the YL wire for an open between Blower Speed Control and splice S231.
  3. Check the YL wire for a wire to wire short to voltage.
  4. Check the YL wire for an open between splice S231 and the Blower Resistors.
  5. Check the BK wire for an open.
  6. Check the GN wire for an open.
  7. Check the BU wire for an open.
  8. If voltage is not present at the YL wire, but is present at the GN wire or BK wire, replace the Blower Resistors.
  9. If voltage is not present at the YL, BK or GN wires, check for an open Blower Resistors' Safety Switch.
  10. If voltage is not present at the YL, BK, GN and BU wires, do Test C.
CIRCUIT OPERATION

When the Ignition Switch is in RUN, battery voltage is applied to terminal 7 of the Control Switches, the normally open contacts of the LH Fresh/Recirculating Air Relay, and the normally closed contacts of the RH Fresh/Recirculating Air Relay. If the Fresh/Recirculating Air Switch is not depressed (open), battery voltage is applied through the normally closed contacts of the RH Fresh/Recirculating Air Relay to both Fresh/Recirculating Air Flap Door Motors and then to ground through the normally closed contacts of the LH Fresh/Recirculating Air Relay. Both motors operate and move the Fresh/Recirculating Air Flap Doors to position A, allowing fresh air to enter the blower.

When the Fresh/Recirculating Air Switch is depressed (closed), battery voltage is applied through the switch to both the LH and RH Fresh/Recirculating Air Relay coils. Both relays are energized. Battery voltage is then applied through the closed contacts of the LH Fresh/Recirculating Air Relay to the Flap Door Motors, and to ground through the closed contacts of the RH Fresh/Recirculating Air Relay. Since the voltage is now applied to the Flap Door Motors in the opposite direction, the motors reverse direction and move the Fresh/Recirculating Air Flap Doors to position B, allowing only recirculating air to enter the blower. Both of the Air Flap Door Motors remain energized continuously. When the doors reach the end of their travel, the motors stall and hold the doors in position.

TROUBLESHOOTING HINTS

- Try the following checks before doing the System Diagnosis.

1. Check that LH and RH Fresh/Recirculating Air Relays are firmly seated.
2. Check that LH and RH Fresh/Recirculating Air Relay pigtail connectors are properly mated.
3. Go to Heating and Air Conditioning (6410A-0) System Check for a guide to normal operation.
4. Go to System Diagnosis for diagnostic tests.

SYSTEM DIAGNOSIS

- Do the tests below if the Fresh/Recirculating Air Flap Doors do not operate.

A: FRESH/RECIRCULATING AIR FLAP DOOR MOTOR VOLTAGE TEST

<table>
<thead>
<tr>
<th>Measure Between</th>
<th>Correct Voltage</th>
<th>For Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>WT and Ground</td>
<td>Battery</td>
<td>See 1</td>
</tr>
<tr>
<td>WT and YL</td>
<td>Battery</td>
<td>See 2</td>
</tr>
<tr>
<td>YL and Ground</td>
<td>Battery</td>
<td>See 3</td>
</tr>
</tbody>
</table>

(B: FRESH/RECIRCULATING AIR RELAY VOLTAGE TEST)

Measure: VOLTAGE
At: FRESH/RECIRCULATING AIR RELAY CONNECTOR (Disconnected)
Conditions:
- Ignition Switch: RUN
- Fresh/Recirculating Air Switch: DEPRESSED (RECIRCULATING)
- Fresh/Recirculating Air Flap Door Motor Connectors: CONNECTED

<table>
<thead>
<tr>
<th>Measure Between</th>
<th>Correct Voltage</th>
<th>For Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>87 (GN/BR) and Ground</td>
<td>Battery</td>
<td>See 1</td>
</tr>
<tr>
<td>86 (GN) and Ground</td>
<td>Battery</td>
<td>See 2</td>
</tr>
<tr>
<td>86 (GN) and 85 (BR)</td>
<td>Battery</td>
<td>See 3</td>
</tr>
<tr>
<td>86 (GN) and 87a (BR)</td>
<td>Battery</td>
<td>See 3</td>
</tr>
</tbody>
</table>

(Continued on next page)
(Continued from previous page)

- If all voltages are correct, replace the suspect Fresh/Recirculating Air Relay.
  1. Check the GN/BR wire for an open.
  2. Check the GN wire back to the Control Switches for an open. If wire is good, do Test C.
  3. Check the BR wire for an open.

C: CONTROL SWITCHES VOLTAGE TEST

<table>
<thead>
<tr>
<th>Measure</th>
<th>Correct Voltage</th>
<th>For Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure Between</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 (GN/BR) &amp; Ground</td>
<td>Battery</td>
<td>See 1</td>
</tr>
<tr>
<td>7 (GN/BR) &amp; 8 (GN)</td>
<td>Battery</td>
<td>See 2</td>
</tr>
</tbody>
</table>

- If both voltages are correct, replace the Control Switches.
  1. Check the GN/BR wire for an open. If wire is good, check that connector C204 is properly mated.
  2. Check the GN wire for an open between the Control Switches and the LH and RH Fresh/Recirculating Air Relays.
CIRCUIT OPERATION

When the Ignition Switch is in RUN, battery voltage is applied through Fuse 20 to the A/C Select Switch. When the A/C Select Switch is pressed, voltage is applied to terminal 3 of the Evaporator Temperature Regulator. The Evaporator Temperature Regulator applies voltage from terminal 2 to the Compressor Clutch through the High Pressure Cut-Out Switch, the Low Pressure Cut-Out Switch, and the Temperature Switch.

The High Pressure Cut-Out Switch will disengage the Compressor Clutch when refrigerant pressure rises above 385 PSI (26.6 Bar). The Evaporator Temperature Regulator will detect the High Pressure Cut-Out Switch opening at terminal 5 and will turn off the output voltage at the Compressor Control terminal. The Evaporator Temperature Regulator will not allow the Compressor Clutch to be turned on again until circuit continuity has been restored between terminals 5 and 2. The regulator tests for continuity by momentarily applying voltage at the Compressor Control every 8 to 10 seconds. Voltage at the A/C Clutch Monitor Input indicates continuity. The Evaporator Temperature Regulator will continue to apply voltage at the Compressor Control output, which will energize the Compressor.

The Temperature Switch opens to remove the compressor load from the engine if the engine coolant temperature rises above 226°F (108°C). The Evaporator Temperature Sensor signals the Evaporator Temperature Regulator to de-energize the Compressor Clutch when evaporator temperature is low enough for freezing to result.

Clutch Diode

Whenever the Compressor Clutch is de-energized, the collapsing magnetic field induces a voltage in the winding. The Clutch Diode provides a path for the resulting current.

A/C On Input

When the Compressor Clutch is turned on, voltage is applied to terminal 29 of the Motronic Control Unit. The Motronic Control Unit uses this signal to increase idle speed to compensate for the increased engine load from the Compressor Clutch engaging.

TROUBLESHOOTING HINTS

- Try the following checks before doing the System Diagnosis.
  1. Check Fuse 20 by visual inspection.
  2. Check that Compressor Clutch connector is firmly seated.
  - Go to Heating and Air Conditioning (6410A-0) System Check for a guide to normal operation.
  - Go to System Diagnosis for diagnostic tests.

SYSTEM DIAGNOSIS

- Do the tests listed for your symptom in the Symptom Table below.
- Tests follow the Symptom Table.

<table>
<thead>
<tr>
<th>SYMPTOM TABLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressor Clutch does not engage</td>
</tr>
<tr>
<td>Engine idle speed is not high enough when Compressor Clutch engages (325 engine only)</td>
</tr>
</tbody>
</table>

A: A/C ISOLATION TEST (TABLE 1)

Measure: VOLTAGE
At: EVAPORATOR TEMPERATURE REGULATOR (Disconnected)
Conditions:
  - Ignition Switch: RUN (Engine need not be running)
  - A/C Selector Switch: Depressed (ON)

<table>
<thead>
<tr>
<th>Measure Between</th>
<th>Correct Voltage</th>
<th>For Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 &amp; Ground</td>
<td>Battery</td>
<td>See 1</td>
</tr>
</tbody>
</table>

- If voltage is correct, go to Table 2.
  1. Go to Test E.
### A: A/C ISOLATION TEST (TABLE 2)

**Connect**: FUSED JUMPER  
**At**: EVAPORATOR TEMPERATURE REGULATOR (Disconnected)

**Conditions**:
- Ignition Switch: RUN  
- A/C Selector Switch: Depressed (ON)

<table>
<thead>
<tr>
<th>Connect Across</th>
<th>Correct Result</th>
<th>For Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 &amp; 3</td>
<td>Compressor Clutch Engages</td>
<td>See 1</td>
</tr>
</tbody>
</table>

- If result is correct go to Test C.  
1. Go to Test B.

### B: PRESSURE SWITCH TEST

**Measure**: RESISTANCE  
**At**: EVAPORATOR TEMPERATURE REGULATOR CONNECTOR (Disconnected)

**Conditions**:
- Ignition Switch: OFF  
- Negative Battery Terminal: DISCONNECTED

<table>
<thead>
<tr>
<th>Measure Between</th>
<th>Correct Resistance</th>
<th>For Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 &amp; Ground</td>
<td>Approximately 3 to 4 ohms</td>
<td>See 1</td>
</tr>
</tbody>
</table>

- If measurement is correct replace the Evaporator Temperature Regulator.  
1. Check for an open Low Pressure Cut-Out Switch, High Pressure Cut-Out Switch, A/C Temperature Switch, or associated wiring (see schematic). If High Pressure Cut-Out Switch is open, replace it. If Low Pressure Cut-Out Switch is open, check refrigerant pressure to be sure it is normal before replacing the switch. Replace the A/C Temperature Switch if it is open and engine coolant temperature is below 226°F (108°C). If the switches and related wiring is OK, replace the Compressor Clutch.

### C: EVAPORATOR TEMPERATURE REGULATOR VOLTAGE AND RESISTANCE TEST

**Measure**: RESISTANCE  
**At**: EVAPORATOR TEMPERATURE REGULATOR CONNECTOR (Disconnected)

**Conditions**:
- Ignition Switch: OFF  
- Negative Battery Terminal: DISCONNECTED

<table>
<thead>
<tr>
<th>Measure Between</th>
<th>Correct Resistance</th>
<th>For Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 &amp; Ground</td>
<td>Approximately 3.5K to 4.5K ohms at 70°F (21°C)</td>
<td>See 1</td>
</tr>
<tr>
<td>4 &amp; Ground</td>
<td>Less than 0.5 ohms</td>
<td>See 2</td>
</tr>
<tr>
<td>6 &amp; Ground</td>
<td>Less than 0.5 ohms</td>
<td>See 2</td>
</tr>
<tr>
<td>5 &amp; 2</td>
<td>Less than 0.5 ohms</td>
<td>See 3</td>
</tr>
</tbody>
</table>

- If all resistances are correct but Compressor Clutch does not operate normally, replace the Evaporator Temperature Regulator.
1. Check the BK/WT wire for an open or a short to ground (see schematic). Check the BR wire for an open (see schematic). If wires are good, replace the Evaporator Temperature Sensor.  
2. Check the BR wire for an open (see schematic).  
3. Check BK/YL for an open between terminal 5 and the Low Pressure Cut-Out Switch.
**D: IDLE SPEED CONTROL VOLTAGE TEST**

Measure: VOLTAGE  
At: MOTRONIC CONTROL UNIT  
CONNECTOR (Connected — Universal Adapter)  

Conditions:  
- Ignition Switch: RUN  
- A/C Control Panel: A/C ON  
- Temperature Outside Car: Above 60 degrees F (16 degrees C)  

<table>
<thead>
<tr>
<th>Measure Between</th>
<th>Correct Voltage</th>
<th>For Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>29 BL/WT &amp; Ground</td>
<td>Battery</td>
<td>See 1</td>
</tr>
</tbody>
</table>

- If the voltage is correct, repair/replace the Motronic Control Unit.  
1. Check for an open in the BL/WT and BK/RD wires.

**E: A/C SELECT SWITCH VOLTAGE TEST**

Measure: VOLTAGE  
At: CONTROL SWITCHES CONNECTOR (Connected)  

Conditions:  
- Ignition Switch: RUN  
- A/C Control Panel: A/C ON  
- Temperature Outside Car: Above 60 degrees F (16 degrees C)  

<table>
<thead>
<tr>
<th>Measure Between</th>
<th>Correct Voltage</th>
<th>For Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 (WT) &amp; Ground</td>
<td>Battery</td>
<td>See 1</td>
</tr>
<tr>
<td>2 (BK/VI) &amp; Ground</td>
<td>Battery</td>
<td>See 2</td>
</tr>
</tbody>
</table>

- If both voltages are correct, check connections at Evaporator Temperature Regulator.  
1. Check for an open in the WT and GN/BR wires.  
2. Replace the A/C Select Switch.
CIRCUIT OPERATION

With the Ignition Switch in ACCY, RUN or START, Fuse 12 provides voltage to turn on the three components in the system. When the Radio Switch is on, voltage is applied to the Radio and the Amplifier. This voltage is used to control the individual unit's main power supply.

Fuse 21 constantly supplies voltage to the Memory Power Input of the Radio. This allows the Radio to maintain the present settings while it is turned off.

The Amplifier receives constant power at terminal 11 from Fuse 27. When the Radio is on, voltage is applied to terminal 13 to enable the Amplifier.

The actual Radio signal originates at the Antenna. It is supplied to the Radio, processed, and output from the Left Channel and Right Channel Outputs to the Fader Control. The Fader Control alters the front to rear volume by decreasing the resistance to the desired higher volume outputs. The signal is then input to the Left Front, Left Rear, Right Front and Right Rear Inputs to the Amplifier. After amplification, the signal is output to the corresponding speakers.

TROUBLESHOOTING HINTS

- Try the following checks before doing the System Check.
  1. Check power input to the Radio by observing if Instrument Cluster Indicators light.
  2. Check memory power to Radio by checking operation of the Glove Box Light.
  3. Check power input to the Amplifier.
  4. If Fader Control has no effect, but sound is heard from all speakers, replace the Fader Control.
  5. Check that the Antenna is properly connected.
  6. Before troubleshooting a suspect Speaker, check all connections to that Speaker.
  7. If display shows "CODE" and Radio will not operate, the individual Anti-Theft Code must be entered. Refer to "Anti-Theft" instruction booklet.
  8. Check Radio Fuse located on back of Radio.
  9. Check Amplifier Fuse located on back of Amplifier.
- Go to System Check for a guide to normal operation.
- Go to System Diagnosis for diagnostic tests.

SYSTEM CHECK

- Use the System Check Table as a guide to normal operation.
- Refer to System Diagnosis for a list of symptoms and diagnostic steps.

SYSTEM CHECK TABLE

<table>
<thead>
<tr>
<th>ACTION</th>
<th>NORMAL RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>With Ignition Switch in RUN, turn Radio ON.</td>
<td>Digital display lights. Sound is emitted from all Speakers.</td>
</tr>
<tr>
<td>Operate Fader Control.</td>
<td>Sound volume varies from front to rear.</td>
</tr>
</tbody>
</table>

- Refer to System Diagnosis when a result is not normal.

SYSTEM DIAGNOSIS

- Do the tests listed for your symptom in the Symptom Table below.
- Tests follow the Symptom Table.

SYMPTOM TABLE

<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>FOR DIAGNOSIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio does not work (no display, no sound).</td>
<td>Do Test A</td>
</tr>
<tr>
<td>Digital display lights, but there is no sound.</td>
<td>Do Test B</td>
</tr>
<tr>
<td>LH Speakers or RH Speakers do not operate.</td>
<td>Do Test C</td>
</tr>
</tbody>
</table>

(Continued on next page)
(Continued from previous page)

<table>
<thead>
<tr>
<th>A: RADIO POWER TEST</th>
<th>B: AMPLIFIER POWER TEST</th>
<th>C: FADER SIGNAL TEST (TABLE 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>An individual Speaker does not operate.</td>
<td>Measure: VOLTAGE</td>
<td>Measure: VOLTAGE</td>
</tr>
<tr>
<td>Excessive noise comes from all speakers.</td>
<td>At: AMPLIFIER CONNECTOR (Disconnected)</td>
<td>At: FADER CONTROL CONNECTOR (Disconnected)</td>
</tr>
<tr>
<td></td>
<td>Conditions:</td>
<td>Conditions:</td>
</tr>
<tr>
<td></td>
<td>• Ignition Switch: RUN</td>
<td>• Ignition Switch: RUN</td>
</tr>
<tr>
<td></td>
<td>• Radio: ON</td>
<td>• Radio: ON</td>
</tr>
<tr>
<td></td>
<td>Measure Between</td>
<td>Correct Voltage</td>
</tr>
<tr>
<td></td>
<td>11 &amp; Ground</td>
<td>Battery</td>
</tr>
<tr>
<td></td>
<td>11 &amp; 18</td>
<td>Battery</td>
</tr>
<tr>
<td></td>
<td>13 &amp; Ground</td>
<td>Battery</td>
</tr>
<tr>
<td></td>
<td>11 &amp; 10</td>
<td>Battery</td>
</tr>
</tbody>
</table>

- If all voltages are correct, go to Test C.
  1. Check power supply wire for an open.
  2. Check Amplifier ground to Amplifier for an open to ground. Make sure ground G200 is clean and tight.
  4. Check wire from terminal 10 for an open to ground. Make sure ground G106 is clean and tight.

- If both voltages are correct, check for AC voltage at Radio outputs with Radio tuned to a strong signal. If AC voltage is present, go to Table 2. Remove Radio for service if AC voltage is not present.
  1. Check wire from Left Channel on Radio for an open. If wire is good, remove Radio for service.
  2. Check wire from Right Channel on Radio for an open. If wire is good, remove Radio for service.

(Continued on next page)
(Continued from previous page)

**C: FADER SIGNAL TEST (TABLE 2)**

<table>
<thead>
<tr>
<th>Measure Between</th>
<th>Correct Voltage</th>
<th>For Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 &amp; Ground</td>
<td>Approximately 6 Volts</td>
<td>See 1</td>
</tr>
<tr>
<td>15 &amp; Ground</td>
<td>Approximately 6 Volts</td>
<td>See 2</td>
</tr>
<tr>
<td>19 &amp; Ground</td>
<td>Approximately 6 Volts</td>
<td>See 3</td>
</tr>
<tr>
<td>20 &amp; Ground</td>
<td>Approximately 6 Volts</td>
<td>See 4</td>
</tr>
</tbody>
</table>

- If all voltages are correct but sound was not present, remove Amplifier for service.
  1. Check between pin 7 (Fader) to pin 14 (Amplifier) for an open in the wiring. If wire is OK, replace Fader Control.
  2. Check between pin 3 (Fader) to pin 15 (Amplifier) for an open in the wiring. If wire is OK, replace Fader Control.
  3. Check between pin 6 (Fader) to pin 19 (Amplifier) for an open in the wiring. If wire is OK, replace Fader Control.
  4. Check between pin 2 (Fader) to pin 20 (Amplifier) for an open in the wiring. If wire is OK, replace Fader Control.

**D: SUSPECT SPEAKER TEST**

<table>
<thead>
<tr>
<th>Action</th>
<th>Correct Result</th>
<th>For Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connect Ohmmeter across Speaker Terminals</td>
<td>Speaker &quot;pops&quot;</td>
<td>See 1</td>
</tr>
</tbody>
</table>

- If the result is correct, check wires to the Amplifier for opens or shorts. If wires are OK, check the related wire between Fader and Amplifier.
  1. Replace the suspect Speaker.

**E: NOISE DIAGNOSIS**

With Radio on and noise present, unplug the Antenna at the back of the Radio.

- If noise is no longer present, it was being picked up by the Antenna. Perform Antenna Noise Test.
- If noise persists, it is coming in the Radio wiring. Refer to the following Noise Symptom Table.

**ANTENNA NOISE TEST**

<table>
<thead>
<tr>
<th>Measure Between</th>
<th>Correct Resistance</th>
<th>For Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antenna Plug Base &amp; Ground</td>
<td>Less than 3 Ohms</td>
<td>See 1</td>
</tr>
<tr>
<td>Antenna Plug Tip &amp; Antenna Plug Base</td>
<td>Greater than 1 Megaohm (open circuit)</td>
<td>See 2</td>
</tr>
</tbody>
</table>

- If both resistances are correct, check the hood ground strap. If OK, substitute different Antenna at Radio. If good, replace Antenna. If noise is still present, refer to Noise Symptom Table.
  1. Check ground contact at Antenna base. If necessary, install a braided ground strap from the Antenna Base to Chassis ground. Check for an open in the Antenna Cable.
  2. Check for a short to ground at the Antenna or Antenna cable.
<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>POSSIBLE CAUSE</th>
<th>REPAIR ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harsh popping or crackling noise present when ignition on-changes with engine rpm.</td>
<td>Ignition Noise</td>
<td>• Check for proper distributor cap shielding.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check shielding ground strap. If not present, install.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check for defective spark plug or spark plug wire.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reroute spark plug wires laying against anything that could be transmitting noise to the Radio (wiring or sensor leads traveling into the passenger compartment).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check engine/firewall ground strap and engine hood/body ground strap.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check if engine hood is closing properly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Connect dedicated ground strap to Radio.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Replace distributor cap and rotor.</td>
</tr>
<tr>
<td>High whine or howling that changes with engine rpm.</td>
<td>Alternator noise</td>
<td>• Connect dedicated ground strap to Radio.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Run a direct wire from Battery to Alternator.</td>
</tr>
<tr>
<td>AM only is weak and noisy.</td>
<td>AM alignment</td>
<td>• Remove Radio for service.</td>
</tr>
<tr>
<td>FM only is weak and noisy.</td>
<td>FM alignment</td>
<td>• Remove Radio for service.</td>
</tr>
</tbody>
</table>
Figure 1 - Underside of Car, LH Side of Transmission Bell Housing

Figure 2 - LH Front of Trunk

Figure 3 - Middle Rear of Trunk

Figure 4 - RH of Trunk

Figure 5 - Lower LH Rear of Engine
## 8000-0 SPLICING LOCATION VIEWS

### INDEX
This index contains all the splices in the car, what harness each one is in, and the page that the splices appear on. The drawings after the index show how the harness is routed through the car and where the splices are located on the harness.

<table>
<thead>
<tr>
<th>SPICE</th>
<th>HARNESS</th>
<th>PAGE NUMBER</th>
<th>SPICE</th>
<th>HARNESS</th>
<th>PAGE NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>S100</td>
<td>MAIN</td>
<td>8000-1</td>
<td>S240</td>
<td>A/C</td>
<td>NOT SHOWN</td>
</tr>
<tr>
<td>S102</td>
<td>MAIN</td>
<td>8000-1</td>
<td>S241</td>
<td>CRUISE CONTROL</td>
<td>NOT SHOWN</td>
</tr>
<tr>
<td>S103</td>
<td>MAIN</td>
<td>8000-1</td>
<td>S300</td>
<td>DOOR</td>
<td>8000-3</td>
</tr>
<tr>
<td>S104</td>
<td>ENGINE (S14)</td>
<td>8000-2</td>
<td>S301</td>
<td>DOOR</td>
<td>8000-3</td>
</tr>
<tr>
<td>S105</td>
<td>ENGINE (S14)</td>
<td>8000-2</td>
<td>S302</td>
<td>DOOR</td>
<td>8000-3</td>
</tr>
<tr>
<td>S106</td>
<td>ENGINE (S14)</td>
<td>8000-2</td>
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### Diagnostic Connector

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<td>Service Interval Indicator, Service Interval Processor (Reset)</td>
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<td>YL</td>
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<td>Shield</td>
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<td>Ignition, TDC Sensor</td>
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<td>BK</td>
<td>Ignition, TDC Sensor</td>
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<td>11</td>
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<td>Starter, Start (50), Motronic Control Unit</td>
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<td>Charge System, Alternator</td>
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**CIRCUITS USING C302 (ACCESSORY CONNECTOR)**

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<td>O</td>
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<td>C</td>
<td>Not Used</td>
<td>P</td>
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<tr>
<td>D</td>
<td>Central Locking</td>
<td>Q</td>
<td>Power Windows &amp; Sunroof</td>
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<tr>
<td>E</td>
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<td>R</td>
<td>Cruise Control</td>
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<td>F</td>
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<td>G</td>
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<td>H</td>
<td>On-Board Computer</td>
<td>U</td>
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<tr>
<td>I</td>
<td>Not Used</td>
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<td>Radio</td>
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<td>M</td>
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**Figure 1-C302 (Accessory Connector)**

Front View—Under LH Side of Dash Ahead of Pedal Assembly
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<tr>
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<tbody>
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<td>Amplifier</td>
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<td>Auto-Charging Flashlight</td>
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<td>Driver's Exterior Door Handle</td>
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<tr>
<td>In rear of LH front door</td>
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<tr>
<td>COMPONENTS</td>
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<td>Fresh/Recirculating Air Flap Door Motors</td>
<td>Behind A/C face plate</td>
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<tr>
<td>Fresh/Recirculating Air Relays</td>
<td>Behind A/C face plate</td>
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<tr>
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<td>High Pressure Cut-Out Switch</td>
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<tr>
<td>Horn Brush/Slip Ring</td>
<td>Near fog lights, behind splash guard</td>
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<td>Horns</td>
<td>Under LH side of dash, near evaporator</td>
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<td>Hot Water Cut-Off Switch</td>
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<tr>
<td>Idle Speed Actuator</td>
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<td>Behind RH headlights</td>
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<td>Over Voltage Protection Relay</td>
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### COMPONENTS

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<td>RH side of bulkhead, behind cover</td>
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<td>Park Brake Switch</td>
<td>At base of parking brake</td>
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<td>At top rear of LH front wheel well</td>
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<td>Power Window Circuit Breaker</td>
<td>On center console, above radio</td>
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<td>Pulse Wheels</td>
<td>On wheel, in brake housing</td>
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<td>Rear Lights Check Relay</td>
<td>In trunk, above LH wheel well</td>
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<td>On top of LH wheel well, near cruise control actuator</td>
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### CONNECTORS

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<tr>
<td>C104</td>
<td>Under RH side of Dash</td>
<td>7000-6-4</td>
</tr>
<tr>
<td>C106</td>
<td>Near washer pump</td>
<td>7000-1-6</td>
</tr>
<tr>
<td>C107</td>
<td>Behind RH side of dash, above glove box</td>
<td></td>
</tr>
<tr>
<td>C113</td>
<td>Behind LH headlights</td>
<td>7000-0-2</td>
</tr>
<tr>
<td>C126</td>
<td>Behind LH headlights</td>
<td>7000-0-2</td>
</tr>
<tr>
<td>C127</td>
<td>Behind RH headlights</td>
<td>7000-1-5</td>
</tr>
<tr>
<td>C128</td>
<td>Behind RH front side marker light</td>
<td>7000-1-5</td>
</tr>
<tr>
<td>C129</td>
<td>Behind LH front side marker light</td>
<td>7000-0-2</td>
</tr>
<tr>
<td>C140</td>
<td>RH rear corner of engine compartment, under coolant reservoir.</td>
<td>7000-6-1</td>
</tr>
<tr>
<td>C141</td>
<td>Under RH side of car, below passenger side</td>
<td>7000-3-3</td>
</tr>
<tr>
<td>COMPONENTS</td>
<td>Description</td>
<td>Page-Figure</td>
</tr>
<tr>
<td>-----------------------</td>
<td>------------------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>C142 (1 pin)</td>
<td>Under LH side of dash, near steering column</td>
<td>7000-5-1</td>
</tr>
<tr>
<td>C143 (1 pin)</td>
<td>Under LH side of dash, near body electrical bracket</td>
<td>7000-4-6</td>
</tr>
<tr>
<td>C150 (2 pins)</td>
<td>On top of LH front wheel well</td>
<td>7000-1-2</td>
</tr>
<tr>
<td>C151 (2 pins)</td>
<td>On top of RH front wheel well</td>
<td>7000-2-1</td>
</tr>
<tr>
<td>C152 (3 pins)</td>
<td>Center of bulkhead, above rear of engine</td>
<td>7000-1-1</td>
</tr>
<tr>
<td>C153 (3 pins)</td>
<td>Center of bulkhead, above rear of engine</td>
<td>7000-1-1</td>
</tr>
<tr>
<td>C154 (3 pins)</td>
<td>Center of bulkhead, above rear of engine</td>
<td>7000-1-1</td>
</tr>
<tr>
<td>C200 (9 pins)</td>
<td>Under LH side of dash, on steering column</td>
<td>7000-5-1</td>
</tr>
<tr>
<td>C201 (6 pins)</td>
<td>Under LH side of dash, on steering column</td>
<td>7000-5-1</td>
</tr>
<tr>
<td>C202 (13 pins)</td>
<td>Under LH side of dash, on steering column</td>
<td>7000-5-1</td>
</tr>
<tr>
<td>C203 (8 pins)</td>
<td>Under LH side of dash</td>
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</tr>
<tr>
<td>C204 (9 pins)</td>
<td>Under LH side of dash, near steering column</td>
<td>7000-5-3</td>
</tr>
<tr>
<td>C208 (2 pins)</td>
<td>Near brake pedal support bracket</td>
<td>7000-4-6</td>
</tr>
<tr>
<td>C209 (7 pins)</td>
<td>Above brake pedal</td>
<td>7000-4-3</td>
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<tr>
<td>C210 (4 pins)</td>
<td>On LH side of steering column</td>
<td>7000-5-1</td>
</tr>
<tr>
<td>C212 (2 pins)</td>
<td>Under LH side of dash, near accessory connector</td>
<td>7000-4-3</td>
</tr>
<tr>
<td>C213 (1 pin)</td>
<td>Center of dash, behind radio</td>
<td>7000-5-5</td>
</tr>
<tr>
<td>C214 (1 pin)</td>
<td>Center of dash, behind radio</td>
<td>7000-5-5</td>
</tr>
<tr>
<td>C215 (2 pins)</td>
<td>Center console, behind radio</td>
<td>7000-5-5</td>
</tr>
<tr>
<td>C217 (1 pin)</td>
<td>Under LH side of dash, near accessory connector</td>
<td>7000-4-4</td>
</tr>
<tr>
<td>C219</td>
<td>In trunk, near LH wheel well</td>
<td></td>
</tr>
<tr>
<td>C235 (3 pins)</td>
<td>Under RH side of dash, near cruise control unit</td>
<td>7000-6-3</td>
</tr>
<tr>
<td>C240 (6 pins)</td>
<td>Under LH side of dash, above body electrical bracket</td>
<td></td>
</tr>
<tr>
<td>C260 (2 pins)</td>
<td>Behind LH side of dash</td>
<td>7000-4-3</td>
</tr>
<tr>
<td>C301 (2 pins)</td>
<td>At base of shift lever</td>
<td>7000-4-3</td>
</tr>
<tr>
<td>C302 (25 pins) Accessory Connector</td>
<td>Upper LH corner of driver's footwell</td>
<td>7000-4-4</td>
</tr>
<tr>
<td>C303 (3 pins)</td>
<td>At base of RH &quot;B&quot; pillar</td>
<td>7000-7-5</td>
</tr>
<tr>
<td>C304 (3 pins)</td>
<td>At base of LH &quot;B&quot; pillar</td>
<td>7000-7-6</td>
</tr>
<tr>
<td>C305 (1 pin)</td>
<td>Under LH side of dash, near accessory connector</td>
<td>7000-4-3</td>
</tr>
<tr>
<td>C351 (1 pin)</td>
<td>Under LH side of dash, near accessory connector</td>
<td>7000-4-3</td>
</tr>
<tr>
<td>C352 (2 pins)</td>
<td>Behind LH side of rear seat</td>
<td>7000-7-1</td>
</tr>
<tr>
<td>C360 (2 pins)</td>
<td>Behind RH side of rear seat</td>
<td>7000-7-2</td>
</tr>
<tr>
<td>C404 (21 pins)</td>
<td>Above RH front door jamb switch</td>
<td>7000-7-3</td>
</tr>
<tr>
<td>C405 (21 pins)</td>
<td>Above LH front door jamb switch</td>
<td>7000-7-4</td>
</tr>
<tr>
<td>C406</td>
<td>Below RH front speaker</td>
<td>7000-8-5</td>
</tr>
<tr>
<td>C407</td>
<td>Below LH front speaker</td>
<td>7000-8-4</td>
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<tr>
<td>C413 (5 pins)</td>
<td>In trunk, near LH wheel well</td>
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<tr>
<td>C500 (1 pin)</td>
<td>Behind LH side of steering column</td>
<td></td>
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<tr>
<td>C503 (3 pins)</td>
<td>In rear of LH front door</td>
<td></td>
</tr>
<tr>
<td>C510 (1 pin)</td>
<td>Behind and above LH front speaker</td>
<td>7000-8-6</td>
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</table>
## COMPONENTS

<table>
<thead>
<tr>
<th>COMPONENTS</th>
<th>Description</th>
<th>Page-Figure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GROUNDS</strong></td>
<td></td>
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</tr>
<tr>
<td>G100</td>
<td>RH rear of trunk, behind battery</td>
<td>7000-9-4</td>
</tr>
<tr>
<td>G103</td>
<td>Lower LH side of engine, above starter</td>
<td></td>
</tr>
<tr>
<td>G104</td>
<td>On inner fender, behind LH headlights</td>
<td>7000-0-1</td>
</tr>
<tr>
<td>G106</td>
<td>In trunk, near LH wheel well</td>
<td>7000-9-2</td>
</tr>
<tr>
<td>G200</td>
<td>Under LH side of dash, above brake pedal</td>
<td>7000-4-5</td>
</tr>
<tr>
<td>G201 (Steering Column Ground)</td>
<td>Upper LH side of steering column</td>
<td>7000-5-4</td>
</tr>
<tr>
<td>G300</td>
<td>Behind LH side of rear seat</td>
<td>7000-7-1</td>
</tr>
<tr>
<td>G600</td>
<td>In windshield header</td>
<td></td>
</tr>
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</table>