

**1990
BMW 735i/735iL/750iL (E32)
Electrical
Troubleshooting
Manual
Vehicles Produced: 6/89 TO 8/90**

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| Cellular Telephone (Provisions) | 6501-00 |
| Central Body Electronics (ZKE) | 6100-00 |
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The purpose of this manual is to provide information to aid in electrical troubleshooting. It consists of schematics, component location information, harness routing views and connector views.

The manual is divided into sections called cells. In each cell electrical components that work together are shown together on one or more schematics. 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 that describe how or when switches and other components work.

The Power Distribution schematics show the current feed through all the connections from the Battery and Alternator to each fuse and the Ignition and

Light Switches. If a 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 vehicles; however, the wiring is not drawn to scale. To aid in understanding electrical operation, wiring inside complicated components has been simplified. Further information regarding schematic symbols and references can be found in cell 0140 (Symbols).

With this car, BMW introduces the Central Body Electronics System. This system incorporates the use of a single module that controls many apparently unrelated functions. For instance, the Sunroof and Windshield Wipers are controlled by the same module. However, only the portion of the module that controls the Sunroof will appear in the Sunroof schematics.

BMW INTRODUCTION

Component Identification Information begins in cell 7000 and consists of the Component Location List, Component Location Photographs, and Harness Connector Faces. The Component Location List helps you find where the parts of the circuit are in the vehicle. A brief description of the location is given along with a reference to the photograph that shows the component and its connecting wires. The Harness Connector Faces show the cavity or terminal locations of all connectors having three or more pins. Harness Connector Faces help you locate test points. The drawings show the connector faces you see after the harness connector has been disconnected from a component.

TROUBLESHOOTING PROCEDURES

Diagnostic procedures for many of the circuits in this manual are included with the schematics. These procedures are based on a logical problem-solving procedure. The steps listed below are provided for those circuits that do not include diagnostic procedures. Following these steps will enable you to make a quick diagnosis of the problem.

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

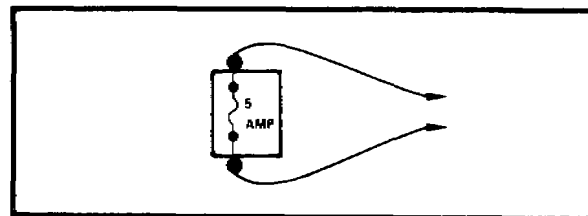
Operate the circuit to check for satisfactory circuit operation. Good repair practice calls for rechecking all circuits you have worked on.

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.

Fused Jumper Wire

A jumper wire is made up of an in-line fuse holder connected to a set of test leads. It should have a five ampere fuse. Use it for bypassing open circuits. Never use a jumper wire across any load (motors, etc.). This direct battery short will blow the fuse.



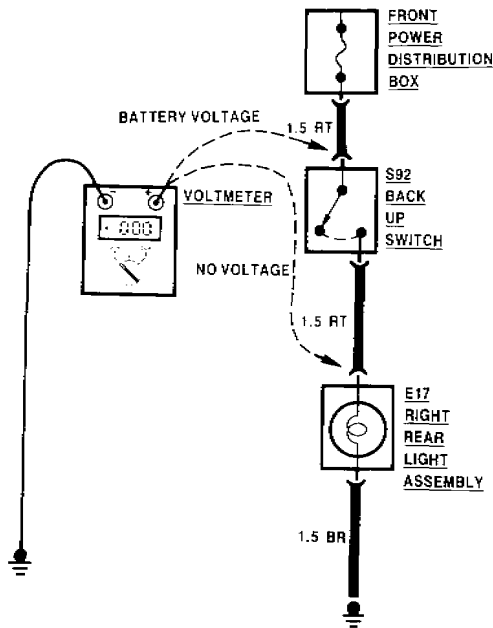
Fused Jumper Wire

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.

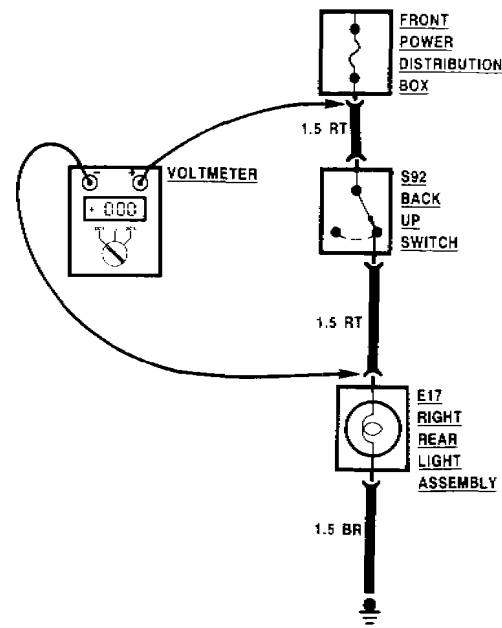


Voltage Test

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.

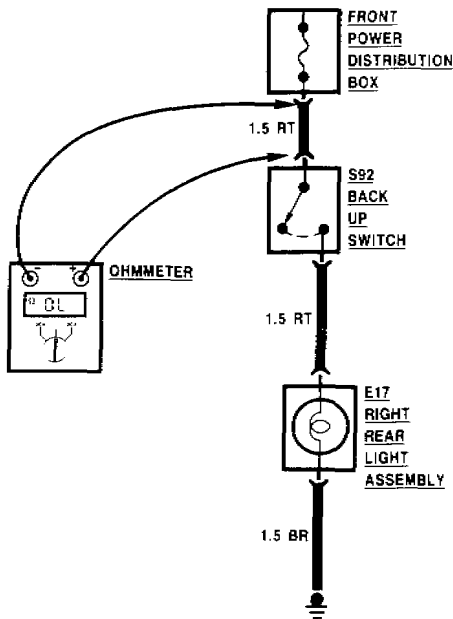
To test for voltage drop, connect the voltmeter leads to connectors at either end of the circuit's suspected problem area. The positive lead should be connected to the connector closest to the power source. The voltmeter will show the voltage drop between these two points. Any switches in the circuit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



Voltage Drop Test

Continuity Test

To perform a continuity test, first disconnect the car battery. Then, while holding the leads together, adjust the ohmmeter to read zero. 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. This test can also be performed with a self-powered test light.

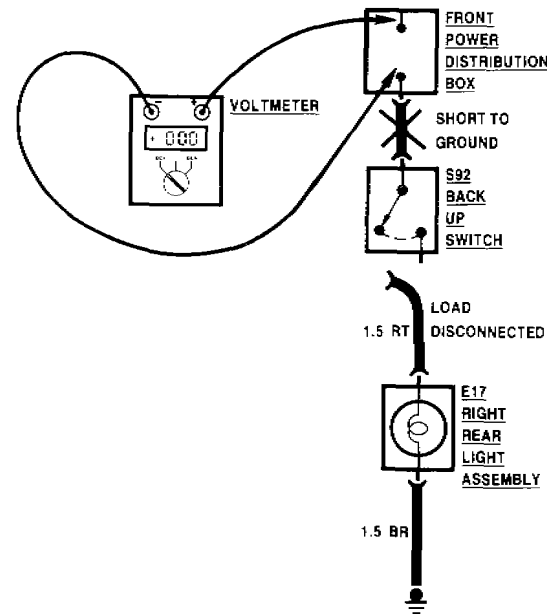


Continuity Test

Short Test Using voltmeter

To locate a wiring short to ground, 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.

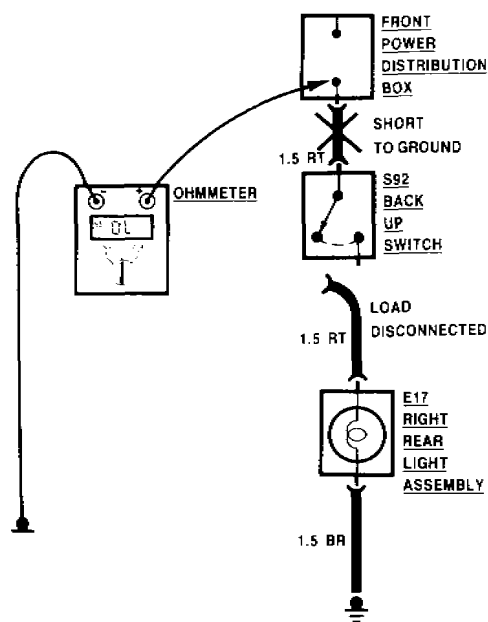
Starting near the FRONT POWER DISTRIBUTION BOX, move the wire harness back and forth and watch the voltmeter reading. If the voltmeter registers a reading, there is a short to ground in the wiring. Somewhere in the area of the harness being moved, the wire insulation is worn away and the circuit is grounding.



Short Test Using Voltmeter

Short Test Using Ohmmeter

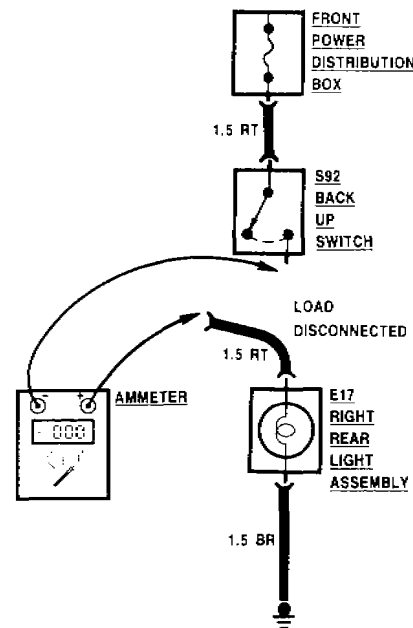
Disconnect the battery. While holding the leads together, adjust the ohmmeter to read zero. Remove the blown fuse and disconnect the load. Connect one lead of the ohmmeter to the fuse terminal that is closest to the load. Connect the other lead to a known good ground. Starting near the FRONT POWER DISTRIBUTION 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

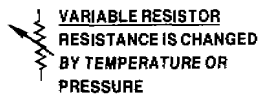
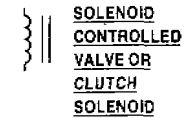
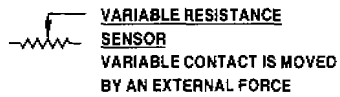
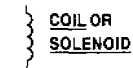
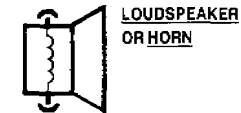
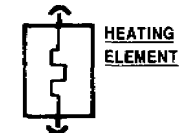
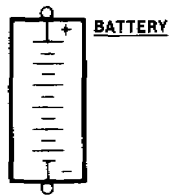
Current Test Using Ammeter

To measure the current, connect the ammeter leads to the connector or terminals in series with the circuit. The ammeter will show the current through the circuit.



Current Test Using Ammeter

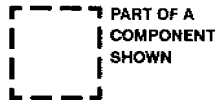
SYMBOLS



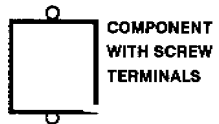
BMW
7 **SYMBOLS**



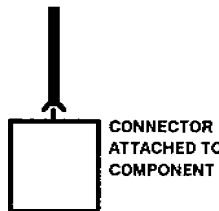
ENTIRE COMPONENT SHOWN



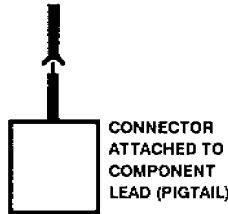
PART OF A COMPONENT SHOWN



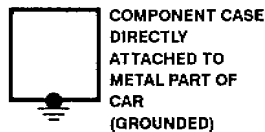
COMPONENT WITH SCREW TERMINALS



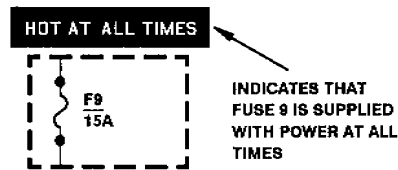
CONNECTOR ATTACHED TO COMPONENT



CONNECTOR ATTACHED TO COMPONENT LEAD (PIGTAIL)

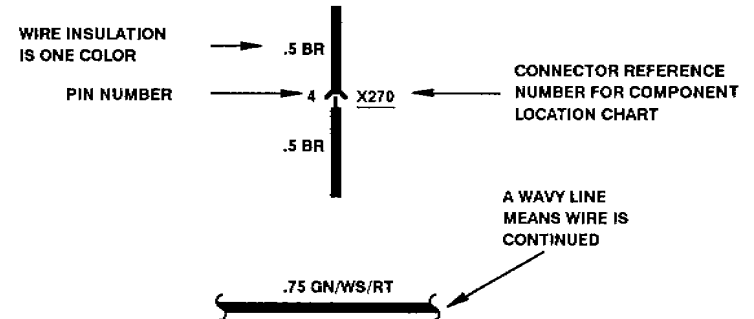


COMPONENT CASE DIRECTLY ATTACHED TO METAL PART OF CAR (GROUNDED)

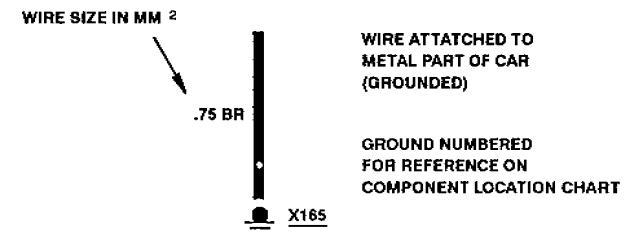
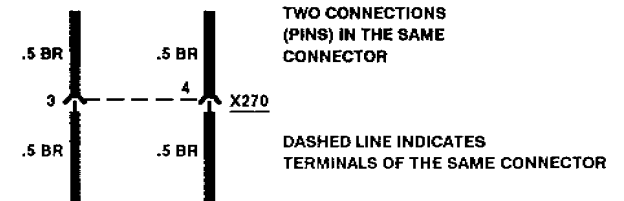


INDICATES THAT FUSE 9 IS SUPPLIED WITH POWER AT ALL TIMES

| TERMINAL NUMBER | DESCRIPTION |
|-----------------|---|
| 50 | VOLTAGE: IGNITION SWITCH IN START |
| 30 | VOLTAGE: SUPPLIED AT ALL TIMES |
| 15 | VOLTAGE: IGNITION SWITCH IN RUN OR START |
| 15E | VOLTAGE: IGNITION SWITCH IN RUN |
| R | VOLTAGE: IGNITION SWITCH IN ACCESSORY, RUN OR START |
| 31 | GROUND |



1. FIRST COLOR IS THE WIRE INSULATION.
2. SECOND COLOR IS THE "TRACER" OR "STRIPE" COLOR.
3. THIRD COLOR IS THE "DOTS" COLOR

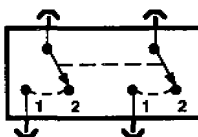




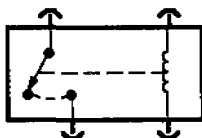
SYMBOLS



ONE POLE,
TWO POSITION
SWITCH

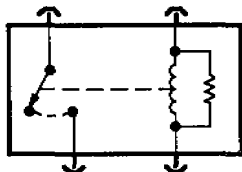


SWITCHES THAT
MOVE TOGETHER
DASHED LINE SHOWS
A MECHANICAL
CONNECTION
BETWEEN SWITCHES

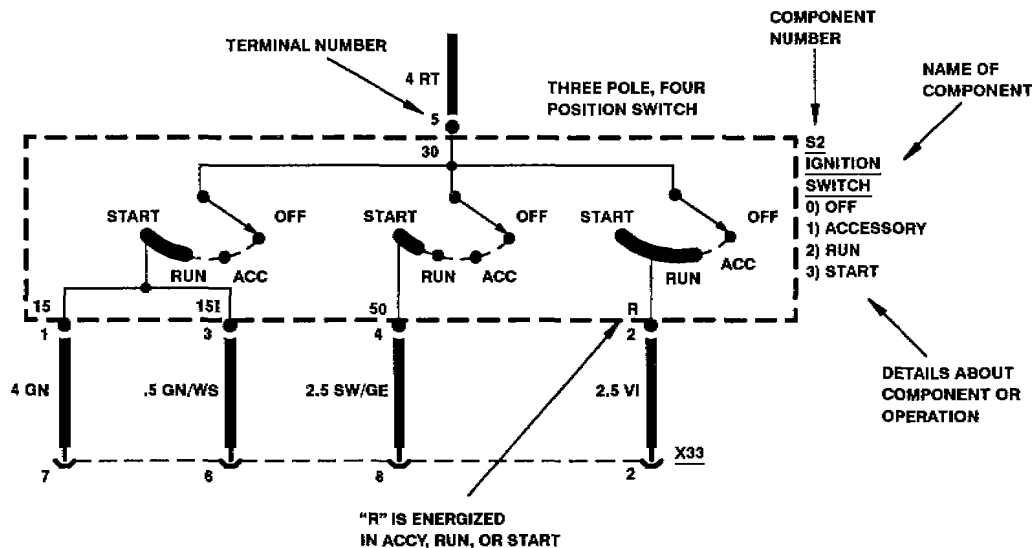


RELAY WITH NO CURRENT
FLOWING THROUGH COIL

WHEN COIL IS
ENERGIZED, SWITCH
IS PULLED CLOSED



RELAY WITH
RESISTOR ACROSS
COIL



**TERMINAL
NUMBER**

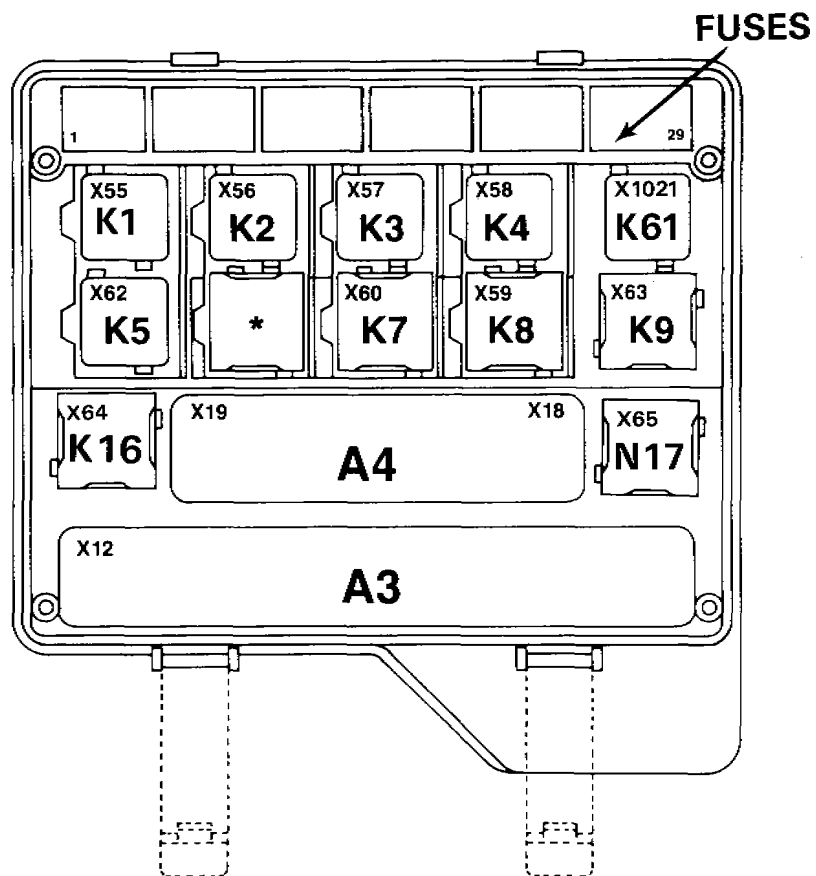
| TERMINAL NUMBER | DESCRIPTION |
|-----------------|--|
| 50 | VOLTAGE: IGNITION SWITCH IN START |
| 30 | VOLTAGE: SUPPLIED AT ALL TIMES |
| 15 | VOLTAGE: IGNITION SWITCH IN RUN OR START |
| 15I | VOLTAGE: IGNITION SWITCH IN RUN |
| R | VOLTAGE: IGNITION SWITCH IN ACCESSORY, RUN, OR START |
| 31 | GROUND |



POWER DISTRIBUTION CHARTS

FRONT POWER DISTRIBUTION BOX

FRONT POWER DISTRIBUTION BOX



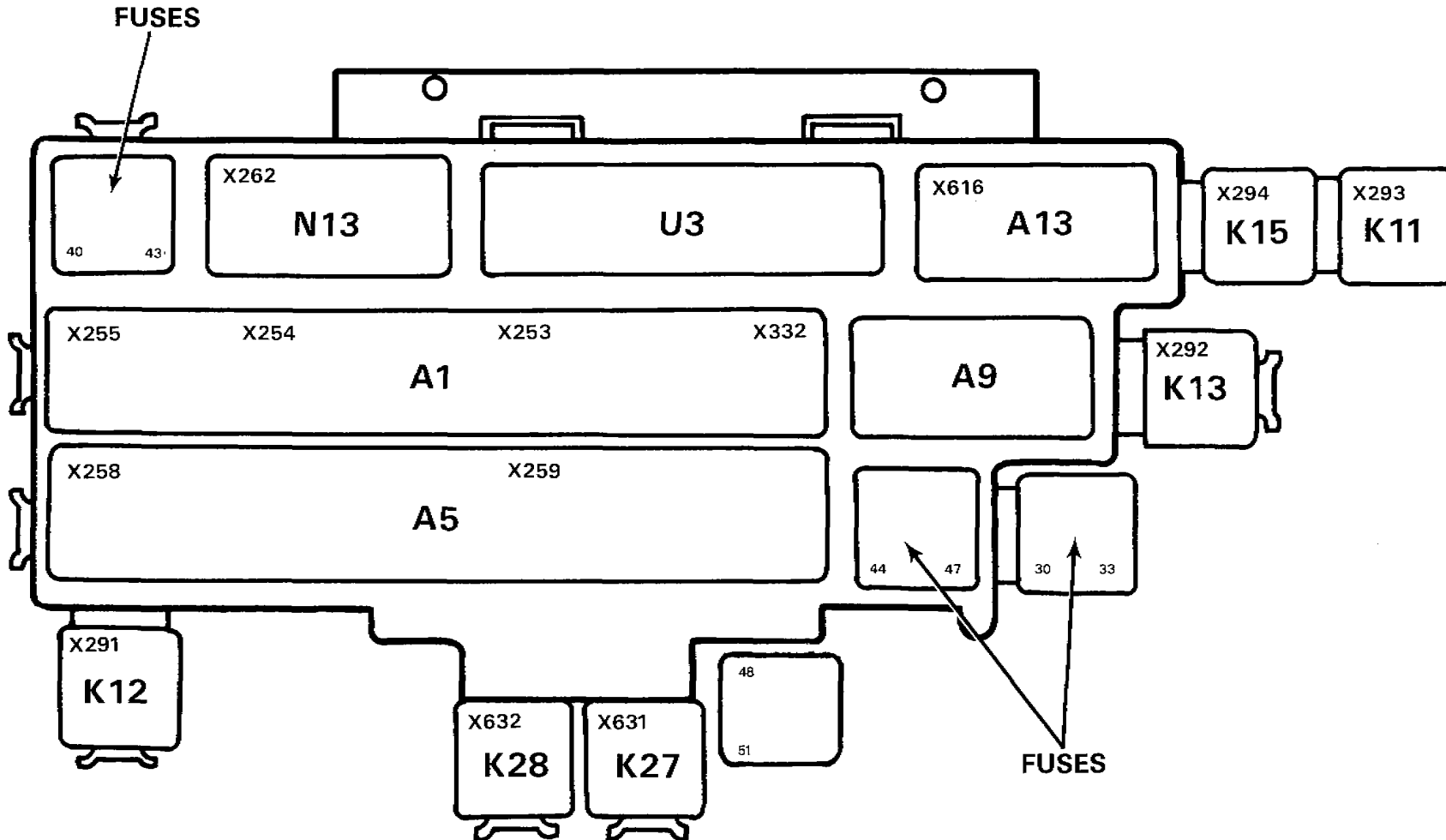
| COMPONENTS IN FRONT POWER DISTRIBUTION BOX | | |
|--|-----------|----------------------------------|
| NUMBER | CONNECTOR | DESCRIPTION |
| A3 | X12 | LAMP CONTROL MODULE |
| A4 | X18, X19 | CHECK CONTROL MODULE |
| K1 | X55 | STARTER RELAY (AUTO) |
| K2 | X56 | HORN RELAY |
| K3 | X57 | UNLOADER RELAY, KLR |
| K4 | X58 | BLOWER RELAY |
| K5 | X62 | WASHER PUMP RELAY |
| K7 | X60 | PARKING LIGHT MONITOR RELAY |
| K8 | X59 | FRONT DEFOGGER/WATER PUMP RELAY |
| K9 | X63 | UNLOADER RELAY, KL15 |
| *K10 (750iL) | X54 | ABS OVERVOLTAGE PROTECTION RELAY |
| K16 | X64 | HAZARD FLASHER RELAY |
| *K51 (735i, 735iL) | X941 | PHONE ALERT RELAY |
| K61 | X1021 | UNLOADER RELAY, KL61 |
| N17 | X65 | CRASH CONTROL UNIT |



POWER DISTRIBUTION CHARTS

REAR POWER DISTRIBUTION BOX

REAR POWER DISTRIBUTION BOX





POWER DISTRIBUTION CHARTS

REAR POWER DISTRIBUTION BOX

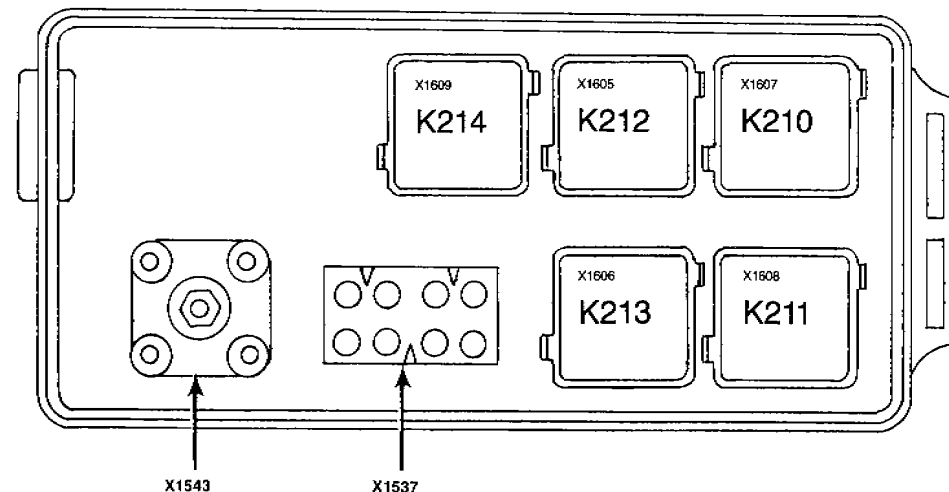
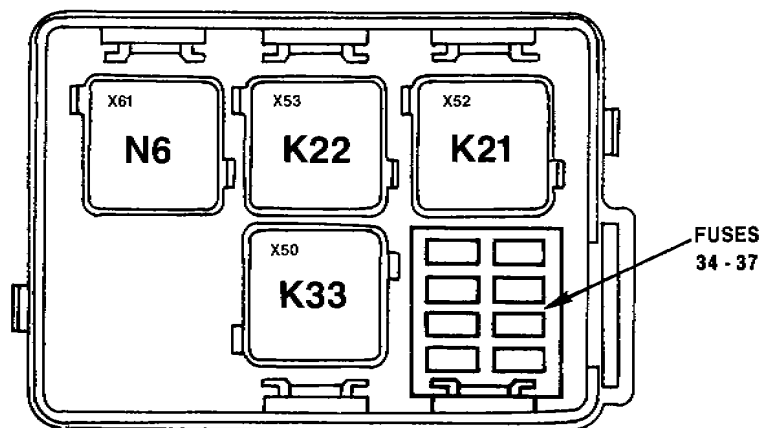
| COMPONENTS IN REAR POWER DISTRIBUTION BOX | | |
|---|------------------------------|--|
| NUMBER | CONNECTOR | DESCRIPTION |
| A1 | X253, X254, X255, X332 | GENERAL MODULE |
| A5 | X258, X259 | RELAY MODULE |
| A9 | | PRESENTLY NOT AVAILABLE |
| A13 | X616 | REAR HEADREST CONTROL UNIT |
| K11 | X293 | WIPER RELAY |
| K12 | | PRESENTLY NOT AVAILABLE |
| K13 | X292 | REAR DEFOGGER RELAY |
| K15 | X294 | ELECTRIC POWER PROTECTION RELAY |
| K27 | X631 | LEFT REAR SEAT HEATING/ POSITION RELAY |
| K28 | X632 | RIGHT REAR SEAT HEATING/ POSITION RELAY |
| N13 | X262 | INFRARED LOCKING CONTROL UNIT |
| U3 | | PRESENTLY NOT AVAILABLE |



POWER DISTRIBUTION CHARTS

AUXILIARY RELAY BOX

AUXILIARY RELAY BOX



COMPONENTS IN AUXILIARY RELAY BOX

| NUMBER | CONNECTOR | DESCRIPTION |
|--------|-----------|---------------------------------------|
| K21 | X52 | NORMAL SPEED RELAY |
| K22 | X53 | HIGH SPEED RELAY |
| K33 | X50 | AIR CONDITIONING MOTRONIC RELAY |
| N6 | X61 | HEADLIGHT/FRONT FOGLIGHT MODULE (SRA) |

COMPONENTS IN AUXILIARY RELAY BOX, 750iL ONLY

| NUMBER | CONNECTOR | DESCRIPTION |
|--------|-----------|---------------------|
| K210 | X1607 | FUEL PUMP RELAY I |
| K211 | X1608 | FUEL PUMP RELAY II |
| K212 | X1605 | MAIN RELAY I |
| K213 | X1606 | MAIN RELAY II |
| K214 | X1609 | OXYGEN SENSOR RELAY |
| — | X1537 | CONNECTOR (8 PINS) |
| X1543 | — | B + JUNCTION POST |



FUSE CHARTS

| Fuse No. | Size | Circuit Protected |
|----------|------|--|
| 1 | 15A | Antilock Brake System (ABS) (Also Fuse 17) Automatic Stability Control (ASC) (Also Fuses 17 and 29) Brake Lights Brake Lining Warning (Also Fuses 17 and 20) Cruise Control (Tempomat) (Also Fuse 17) Cruise Control (EML) Electronic Throttle Control (EML 1.2) (Also Fuses 17 and 20) Instrument Cluster/Check Control (Also Fuses 12, 15, 17, 20, 29, and 33) Lamp Monitor (LKM) (Also Fuses 2, 3, 4, 5, 7, 10, 11, 13, and 14) Park/Tail/Underhood Lights (Also Fuses 4, 5, and 20) |
| 2 | 7.5A | Headlights/Fog Lights (Also Fuses 3, 5, 7, 10, 11, 13 and 14) Lamp Monitor (LKM) (Also Fuses 1, 3, 4, 5, 7, 10, 11, 13 and 14) Turn/Hazard Lights (Also Fuses 3, 6, 13 and 14) |
| 3 | 7.5A | Headlights/Fog Lights (Also Fuses 2, 5, 7, 10, 11, 13 and 14) Headlight/Fog Light Washer (ZKE) (Also Fuses 5, 17, 22 and 44) Lamp Monitor (LKM) (Also Fuses 1, 2, 4, 5, 7, 10, 11, 13 and 14) Turn/Hazard Lights (Also Fuses 2, 6, 13 and 14) |
| 4 | 7.5A | Lamp Monitor (LKM) (Also Fuses 1, 2, 3, 5, 7, 10, 11, 13 and 14) Park/Tail/Marker/Underhood Lights (Also Fuses 1, 5 and 20) |



FUSE CHARTS

| Fuse No. | Size | Circuit Protected |
|----------|------|--|
| 5 | 10A | Glove Box Light/Cigar Lighter/Ashtray Light/Charging Plug (Also Fuses 4, 26 and 33) Headlights/Fog Lights (Also Fuses 2, 3, 7, 10, 11, 13 and 14) Headlight/Fog Light Washer (ZKE) (Also Fuses 3, 17, 22 and 44) Heated Seats (Also Fuse 16) Lamp Monitor (LKM) (Also Fuses 1, 2, 3, 4, 7, 10, 11, 13 and 14) License/Trunk Lights (Also Fuse 33) Lumbar Support (Also Fuse 16) Park/Tail/Underhood Lights (Also Fuses 1, 4 and 20) |
| 6 | 15A | Turn/Hazard Lights (Also Fuses 2, 3, 13 and 14) |
| 7 | 15A | Headlights/Fog Lights (Also Fuses 2, 3, 5, 10, 11, 13 and 14) Lamp Monitor (LKM) (Also Fuses 1, 2, 3, 4, 5, 10, 11, 13 and 14) |
| 9 | 15A | Automatic Climate Control (IHKA) (Also Fuses 9, 19, 20, 21 and 29) Auxiliary Fan (Also Fuses 25 and 29) Cellular Telephone (Provisions) (Also Fuses 18 and 31) Horn |
| 10 | 7.5A | Headlights/Fog Lights (Also Fuses 2, 3, 5, 7, 11, 13 and 14) Lamp Monitor (LKM) (Also Fuses 1, 2, 3, 4, 5, 7, 11, 13 and 14) |
| 11 | 7.5A | Headlights/Fog Lights (Also Fuses 2, 3, 5, 7, 10, 13 and 14) Lamp Monitor (LKM) (Also Fuses 1, 2, 3, 4, 5, 7, 10, 13 and 14) |
| 12 | 15A | Back Up Lights (Also Fuse 20) Instrument Cluster/Check Control (Also Fuses 1, 15, 17, 20, 29 and 33) Memory Mirrors (Also Fuses 16, 17, 18, 30, 42 and 44) |
| 13 | 7.5A | Headlights/Fog Lights (Also Fuses 2, 3, 5, 7, 10, 11 and 14) Lamp Monitor (LKM) (Also Fuses 1, 2, 3, 4, 5, 7, 10, 11 and 14) Turn/Hazard Lights (Also Fuses 2, 3, 6 and 14) |
| 14 | 7.5A | Headlights/Fog Lights (Also Fuses 2, 3, 5, 7, 10, 11 and 13) Lamp Monitor (LKM) (Also Fuses 1, 2, 3, 4, 5, 7, 10, 11 and 13) Turn/Hazard Lights (Also Fuses 2, 3, 6 and 13) |
| 15 | 7.5A | Instrument Cluster/Check Control (Also Fuses 1, 12, 17, 20, 29 and 33) On-Board Computer (Also Fuses 17 and 20) Windshield Washer (ZKE) (Also Fuse 44) Windshield Wipers (ZKE) (Also Fuse 44) |

BMW
7 **FUSE CHARTS**

| Fuse No. | Size | Circuit Protected |
|----------|------|---|
| 16 | 30A | Heated Seats (Also Fuse 5) Lumbar Support (Also Fuse 5) Memory Mirrors (Also Fuses 12, 17, 18, 30, 42 and 44) Memory Seat (Also Fuses 17, 18, 30, 42 and 44) |
| 17 | 7.5A | Antilock Brake System (ABS) (Also Fuse 1) Antitheft System (DWA) (Also Fuses 20 and 51) Automatic Stability Control (ASC) (Also Fuses 1 and 29) Brake Lining Warning (Also Fuses 1 and 20) Central Body Electronics (ZKE) (Also Fuses 30, 44, and 47) Charging System (Also Fuse 28) Cruise Control (Tempomat) (Also Fuse 1) Door Lock Heating (ZKE) (Also Fuse 30) E-Box Fan (Also Fuse 28) Electronic Throttle Control (EML 1.2) (Also Fuses 1 and 20) Electronic Transmission Control (AEGS) Electronic Transmission Control (AEGS/EML) Headlight/Fog Light Washer (ZKE) (Also Fuses 3, 5, 22, and 44) Infrared Locking System (IRS) (Also Fuses 31 and 51) Injection Electronics (DME 1.3) (Also Fuse 23) Injection Electronics (DME/EML 1.2) (Also Fuses 23, 24 and 28) Instrument Cluster/Check Control (Also Fuses 1, 12, 15, 20, 29, and 33) Interior Lights (ZKE) (Also Fuses 18, 30, 33, and 44) Memory Mirrors (Also Fuses 12, 16, 18, 30, 42, and 44) Memory Seat (Also Fuses 16, 18, 30, 42, and 44) On-Board Computer (Also Fuses 15 and 20) Power Windows (ZKE) (Also Fuses 20, 30, 31, and 44) Start Sunroof (ZKE) (Also Fuses 20, 30, 31, and 44) |
| 18 | 15A | Antitheft System (DWA) (Also Fuses 17, 20, and 31) Cellular Telephone (Provisions) (Also Fuses 9 and 31) Interior Lights (ZKE) (Also Fuses 17, 30, 33 and 44) Memory Mirrors (Also Fuses 12, 16, 17, 30, 42, and 44) Memory Seat (Also Fuses 16, 17, 30, 42, and 44) Radio/CD Player (Provisions) (Also Fuse 41) |
| 19 | 30A | Automatic Climate Control (IHKA) (Also Fuses 8, 9, 20, 21, and 29) Park Ventilation (Also Fuses 20 and 21) |

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