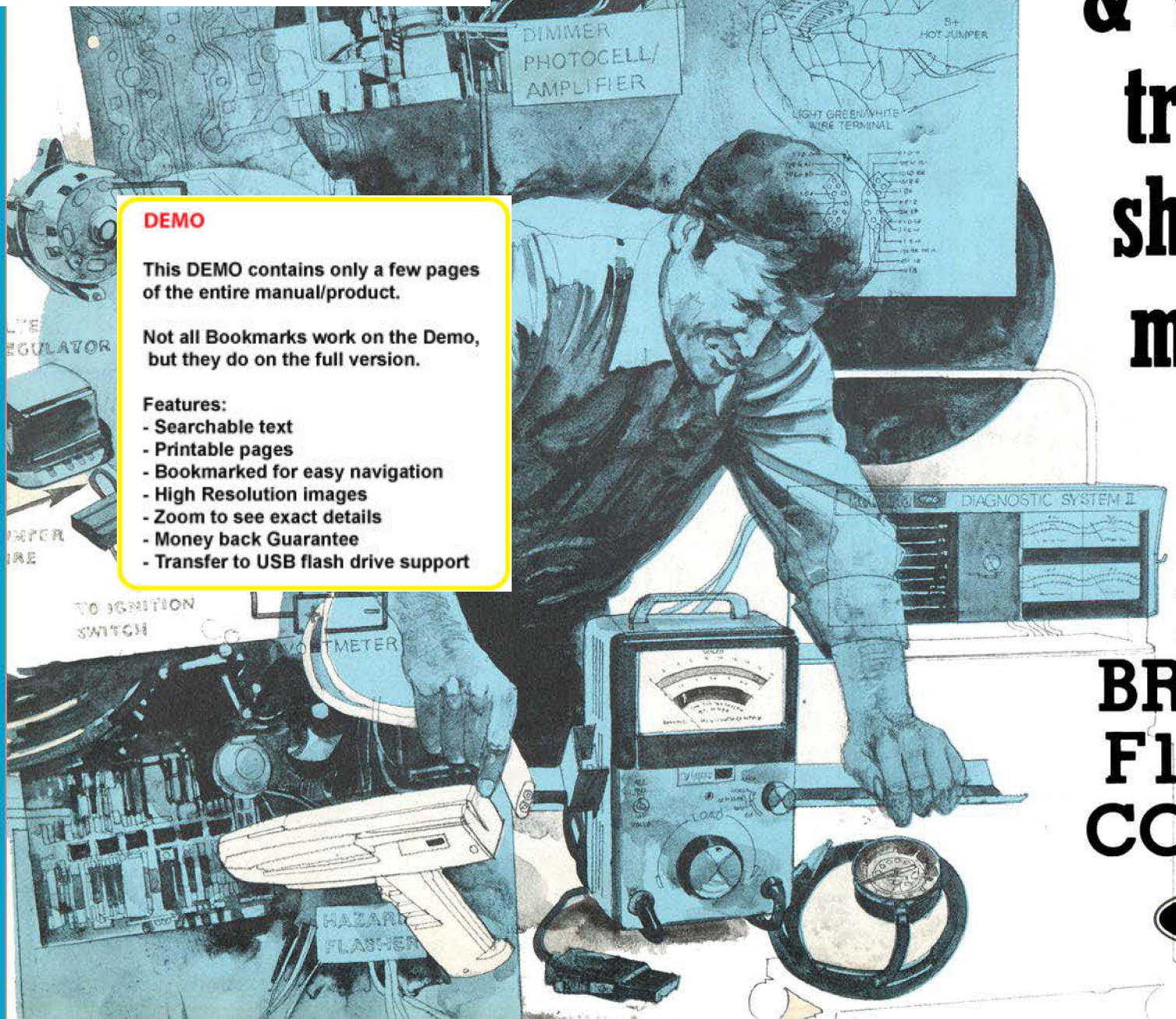
electrical & vacuum trouble-shooting manual



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1981 BRONCO F100/350 COURIER

Ford

1981 BRONCO/F100/350/COURIER

1981 Bronco F-100/F-350 Courier Electrical & Vacuum Trouble-Shooting Manual (EVTM)

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IMPORTANT SAFETY NOTICE

Appropriate service methods and proper repair procedures are essential for the safe, reliable operation of all motor vehicles, as well as the personal safety of the individual doing the work. This Manual provides general directions for accomplishing service and repair work with tested, effective techniques. Following them will help assure reliability.

There are numerous variations in procedures, techniques, tools, and parts for servicing vehicles, as well as in the skill of the individual doing the work. This Manual cannot possibly anticipate all such variations and provide advice or cautions as to each. Accordingly, anyone who departs from the instructions provided in this Manual must first establish that he compromises neither his personal safety nor the vehicle integrity by his choice of methods, tools or parts.

2 HOW TO USE THIS MANUAL

The **Purpose** of this manual is to show electrical and vacuum circuits of these vehicles in a clear and simple fashion to make trouble-shooting easier. With each circuit is a description of *How the Circuit Works*, and some *Troubleshooting Hints*. A *Component Location* chart lists components, connectors and grounds in that circuit. The chart includes a description of where each item is located, and references to pictures in the manual.

Wiring Diagrams give a schematic picture of when and how the circuit is powered, what the current path is to circuit components, and how the circuit is grounded. Each circuit component is named (underlined titles) and wire colors are listed.

WIRE COLOR ABBREVIATIONS

BL	Blue	N	Natural
BK	Black	O	Orange
BR	Brown	PK	Pink
DB	Dark Blue	P	Purple
DG	Dark Green	R	Red
GR	Green	T	Tan
GY	Gray	W	White
LB	Light Blue	Y	Yellow
LG	Light Green		

Where two colors are shown for a wire, the first color is the basic color of the wire. The second color is the dot, hash, or stripe marking. If **D** or **H** is given, the second color is dots or hash marks. If there is no letter after the second color, the wire has a stripe.

For example:

BR/O is a brown wire with an orange stripe.
R/Y D is a red wire with yellow dots.
BK/W H is a black wire with white hash marks.

Components which work together are shown together. For example, all electrical components used in any circuit are shown on one diagram. The circuit breaker or fuse is shown at the top of the page. All wires, connectors, splices, switches, and motors are shown in the flow of current to ground at the bottom of the page. Notes are included which describe how switches and other components work. If a component is used in several different circuits, it is shown in several places. For example, the **Light Switch** is an electrical part of many circuits, and is repeated on many pages. In some cases, however, a component may seem by its name to belong on a page where it has no electrical connection. For example, **Radio Illumination** is electrically part of **Instrument Illumination.** Since it has no electrical connection at all with the actual **Radio** circuit, it is not shown on the **Radio** page.

Troubleshooting Hints point the technician in a general direction, but are not intended as a step-by-step procedure. Ignition trouble-shooting is an exception to this. It includes a step-by-step procedure of basic quick checks to locate some of the more common **Ignition System** problems. Read the Shop Manual for more detailed repair procedures.

The **Grounds** pages show detailed views of multiple component ground points. This is useful for checking interconnections among the ground circuits of different diagrams.

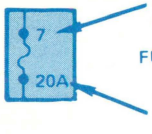
Notes, Cautions and **Warnings** appear in boxes on text pages and contain important car and mechanic safety information.

Notes give added information to help complete a particular procedure. Cautions are included to prevent making an error that could damage the vehicle. Warnings highlight areas where carelessness can cause personal injury. The following list contains some general **Warnings** that should be followed when working on a vehicle.

- Always wear safety glasses for eye protection.
- Use safety stands whenever a procedure requires being under a vehicle.
- Be sure that the **Ignition Switch** is always in the OFF position, unless otherwise required by the procedure.
- Set the parking brake when working on any vehicle. An automatic transmission should be in PARK. A manual transmission should be in NEUTRAL.
- Operate the engine only in a well-ventilated area to avoid the danger of carbon monoxide.
- Keep away from moving parts when the engine is running, especially the fan and belts.
- To prevent serious burns, avoid contact with hot metal parts such as the radiator, exhaust manifold, tail pipe, catalytic converter and muffler.
- Do not allow flame or sparks near the battery. Gases are always present in and around the battery cell. An explosion could occur.
- Do not smoke.
- To avoid injury, always remove rings, watches, loose hanging jewelry, and loose clothing.

COMPONENT SHOWN IN TWO PLACES OR PART OF A COMPONENT

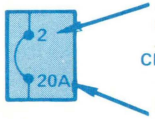
COMPONENT WITH CONNECTORS



POSITION NUMBER

FUSE

CURRENT RATING



POSITION NUMBER

CIRCUIT BREAKER

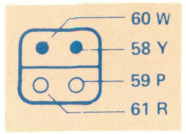
CURRENT RATING

SCREW TERMINAL ON COMPONENT

SEALED ELECTRONIC COMPONENT

ANY CIRCUITRY SHOWN INSIDE THE BOX IS A FUNCTIONAL EQUIVALENT ONLY, AND IS NOT EXACT.

GAGE



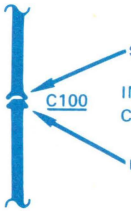
COMPONENT CONNECTOR END VIEW

SHOWS PINS OR SOCKETS ON A COMPONENT TO AID IN BENCH TESTING

WIRE COLORS ARE LABELED FOR MATING HARNESS CONNECTOR

PIN TERMINAL TYPES

SOCKET TYPES



IN-LINE CONNECTOR

SPLICE OR CRIMP TERMINAL

GROUND CONNECTION

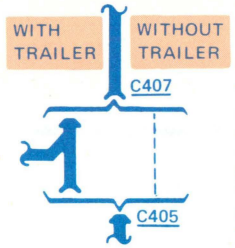
FUSE LINK

SOLID WIRE

STRIPED WIRE

DOTTED WIRE

HASHED WIRE

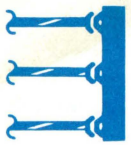


ALTERNATE CIRCUIT PATH OR OPTIONAL WIRING BRACKETS

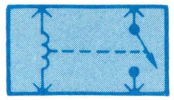
DASHED LINE MEANS C405 CONNECTS DIRECTLY TO C407 WITHOUT TRAILER

CANDELABRA CONNECTOR

ACCEPTS SINGLE-PIN CONNECTORS



JUNCTION BLOCK



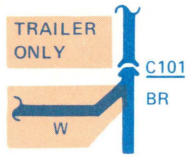
RELAY

CONTACTS CLOSE WITH CURRENT THROUGH COIL

DASHED LINE SHOWS MECHANICAL CONNECTIONS

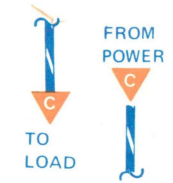
DIODES

CURRENT FLOWS IN DIRECTION OF ARROW ONLY



OPTIONAL WIRING RUBY

BR WIRE IS ON ALL VEHICLES BUT WIRE W IS NOT



"CUT" WIRES REFERENCED BETWEEN PAGES

ARROWS SHOW CURRENT FLOW FROM POWER TO GROUND

"REFERENCE" WIRES

COMPLETE WIRING SHOWN ON ANOTHER PAGE

REFERENCE NUMBER

REPEATED AT EACH POINT CIRCUITRY REPEATS OR OVERLAPS

A DASHED WIRE INDICATES THAT THE CIRCUITRY IS NOT SHOWN IN COMPLETE DETAIL, BUT IS COMPLETE ON ANOTHER PAGE.

TROUBLESHOOTING STEPS

These six steps present an orderly method of troubleshooting:

Step 1. Verify the problem.

- Operate the complete system and see all symptoms for yourself in order to:
  - —check the accuracy and completeness of the customer's complaint.
  - —learn more that might give a clue to the nature and location of the problem.

Step 2. Narrow the problem.

- Using the EVTM, narrow down the possible causes and locations of the problem in order to more quickly find the exact cause.
- Read the description of *How the Circuit Works* and study the wiring diagram. You should then know enough about the circuit operation to figure out where to check for this trouble.

Step 3. Test the cause.

- Use electrical test procedures to find the specific cause of the symptoms.
- *Troubleshooting Hints* will give some helpful ideas.
- The *Component Location* charts and the pictures will help you find components, grounds, and connectors.

Step 4. Verify the cause.

- Confirm the fact that you have found the correct cause through operating the parts of the circuit you think are good.

Step 5. Make the repair.

- Repair or replace the faulty component.

Step 6. Verify the repair.

- Operate the system as in Step 1 and check that your repair has removed all symptoms, and also has not caused any new symptoms.

Some engine circuits may need special test equipment and special procedures. See the *Shop Manual* and other service books for details. You will find the circuits in this manual to be helpful with these special tests.

TROUBLESHOOTING TOOLS

JUMPER WIRE

This is a test lead used to connect two points of a circuit. A **Jumper Wire** can complete a circuit by bypassing an open.

Uses: Bypassing Switches or Open Circuits

WARNING

Never use a jumper wire across loads (motors, etc.) connected between hot and ground. This direct battery short may cause injury or fire.

VOLTMETER

A DC **Voltmeter** measures circuit voltage. Connect negative (- or black) lead to ground, and positive (+ or red) lead to voltage measuring point.

OHMMETER

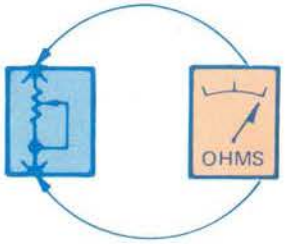


Figure 1— Resistance Check

An **Ohmmeter** shows the resistance between two connected points (Figure 1).

TEST LIGHT

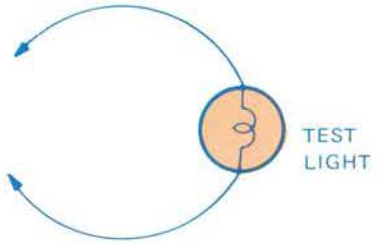


Figure 2 —Test Light

A **Test Light** is a 12-volt bulb with two test leads (Figure 2).

Uses: Voltage Check, Short Check

SELF-POWERED TEST LIGHT

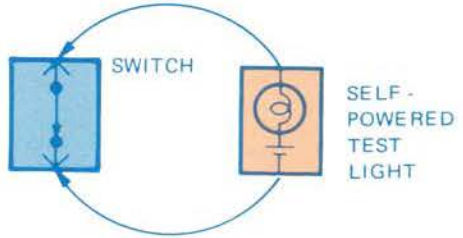


Figure 3—Continuity Check

The **Self-Powered Test Light** is a bulb, battery and set of test leads wired in series (Figure 3). When connected to two points of a continuous circuit, the bulb glows.

Uses: Continuity Check, Ground Check

CAUTION

When using a self-powered test light or ohmmeter, be sure power is off in circuit during testing. Hot circuits can cause equipment damage and false readings.

TROUBLESHOOTING CHECKS

SWITCH CIRCUIT CHECK

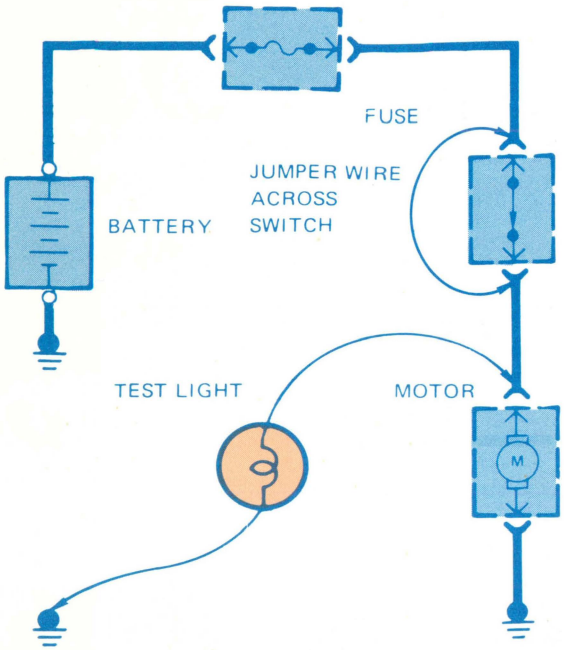


Figure 4—Switch Circuit Check and Voltage Check

In a bad circuit with a switch in series with the load, jumper the terminals of the switch to power the load. If jumping the terminals powers the circuit, the switch is bad (Figure 4).

CONTINUITY CHECK (Locating open circuits)

Connect one lead of **Self-Powered Test Light** or **Ohmmeter** to each end of circuit (Figure 3). Light will glow if circuit is closed. Switches and fuses can be checked in the same way.

VOLTAGE CHECK

Connect one lead of **Test Light** to a known good ground, or the negative (-) battery terminal. Test for voltage by touching the other lead to the test point. Bulb goes on when the test point has voltage (Figure 4).

SHORT CHECK (short to ground)

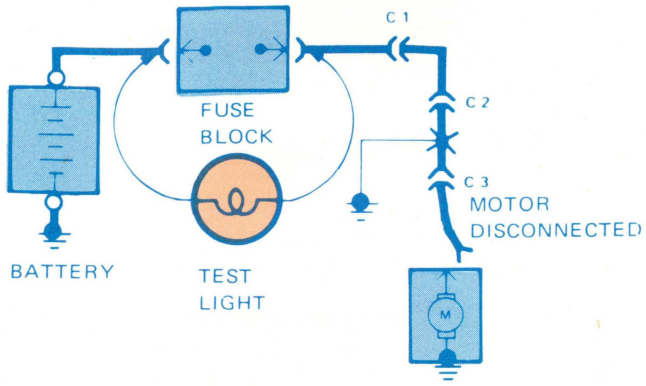


Figure 5— Short Check

A fuse that repeatedly blows is usually caused by a short to ground. It's important to be able to locate such a short quickly (Figure 5).

1) Turn off everything powered through the fuse.
2) Disconnect other loads powered through the fuse:
   - Motors: disconnect motor connector.
   - Lights: remove bulbs.
3) Turn **Ignition Switch** to RUN (if necessary) to power fuse.
4) Connect one **Test Light** lead to hot end of blown fuse. Connect other lead to ground. Bulb should glow showing power to fuse. *(This step is just a check to be sure you have power to the circuit.)*
5) Disconnect the **Test Light** lead from ground and reconnect it to the load side of the fuse.
   - If the **Test Light** is off, the short is in the disconnected equipment.
   - If the **Test Light** goes on, the short is in the wiring. You must find the short by disconnecting the circuit connectors one at a time until the **Test Light** goes out. For example: with a ground at X, the bulb goes out when C1 or C2 is disconnected, but stays on after disconnecting C3. This means the ground is between C2 and C3.

"GOOD GROUND" CHECK

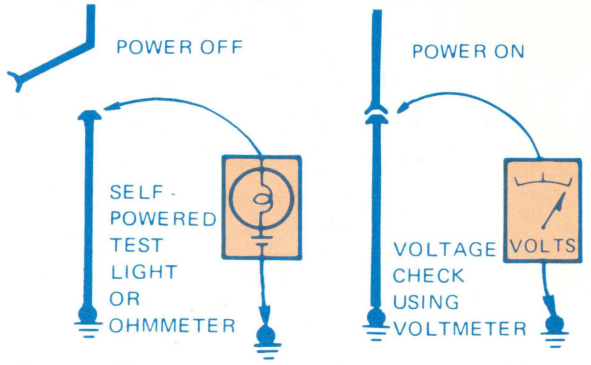


Figure 6 — Grounds Checks

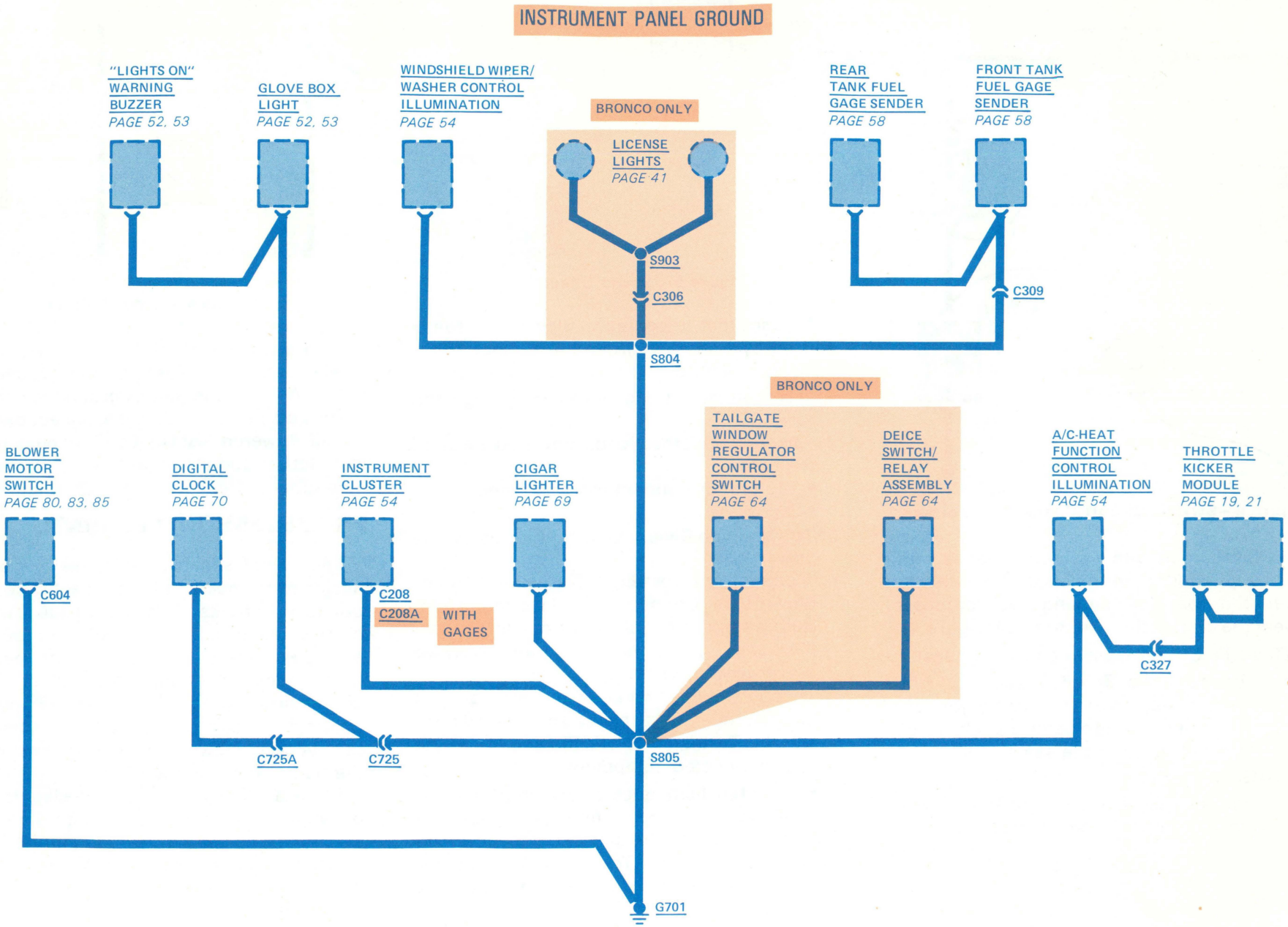
Turn on power to circuit. Perform Voltage Check between suspected bad ground and frame. Any voltage means ground is bad.

Turn off power to circuit. Connect one lead of **Self-Powered Test Light** or **Ohmmeter** to wire in question, and the other to known ground. If bulb glows, circuit ground is OK (Figure 6).

TROUBLESHOOTING HINTS

The circuit schematics in this manual are designed to make it easy to identify common points in circuits. This knowledge can help narrow the problem to a specific area. For example, if several circuits fail at the same time, check for a common power or ground connection. (See *Power Distribution* or *Grounds).* If part of a circuit fails, check the connections between the part that works and the part that doesn't work.

For example, if low beam headlights work, but high beams and the indicator light don't work, then power and ground paths must be good. Since the dimmer switch is the component which switches this power to the high beam lights and indicator, it is most likely the cause of failure.


INSTRUMENT PANEL GROUND
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GLOVE BOX LIGHT
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WINDSHIELD WIPER/ WASHER CONTROL ILLUMINATION
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BRONCO ONLY
LICENSE LIGHTS
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FRONT TANK FUEL GAGE SENDER
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C306
C309
S804
BRONCO ONLY
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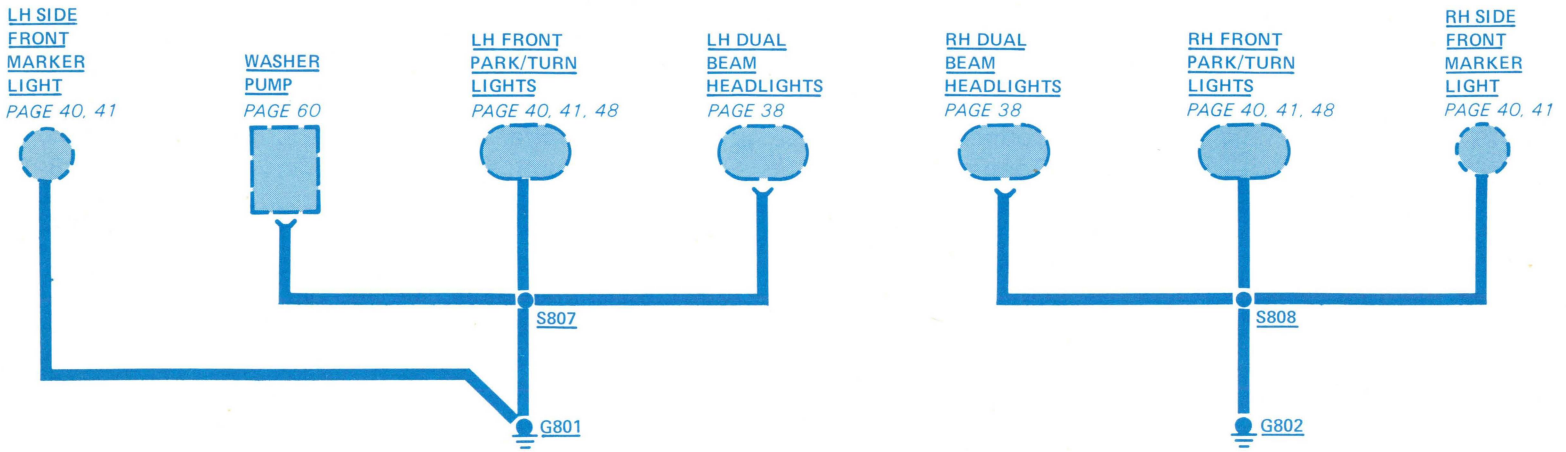
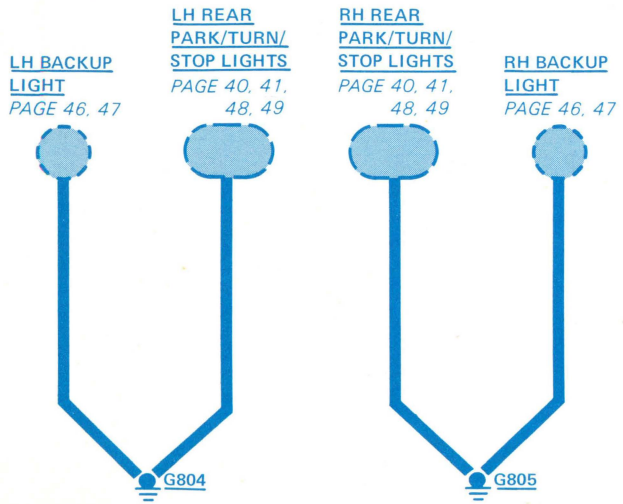
C208A
WITH GAGES
C327
C725A
C725
S805
G701

GROUNDS (G801, G802, G804, G805, G1001, G1002,G1004)

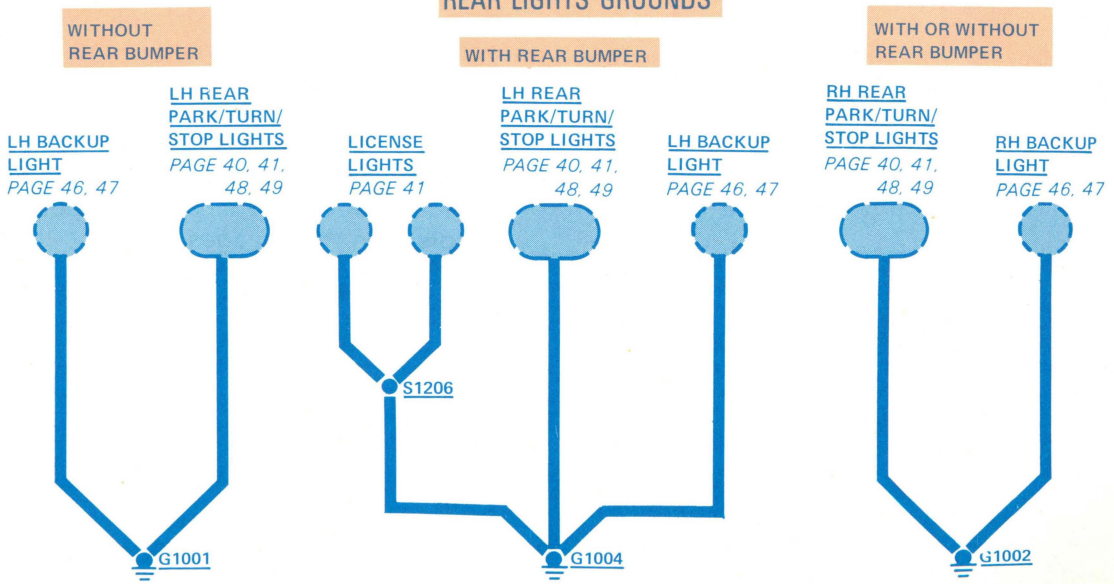
FRONT LIGHTS GROUNDS



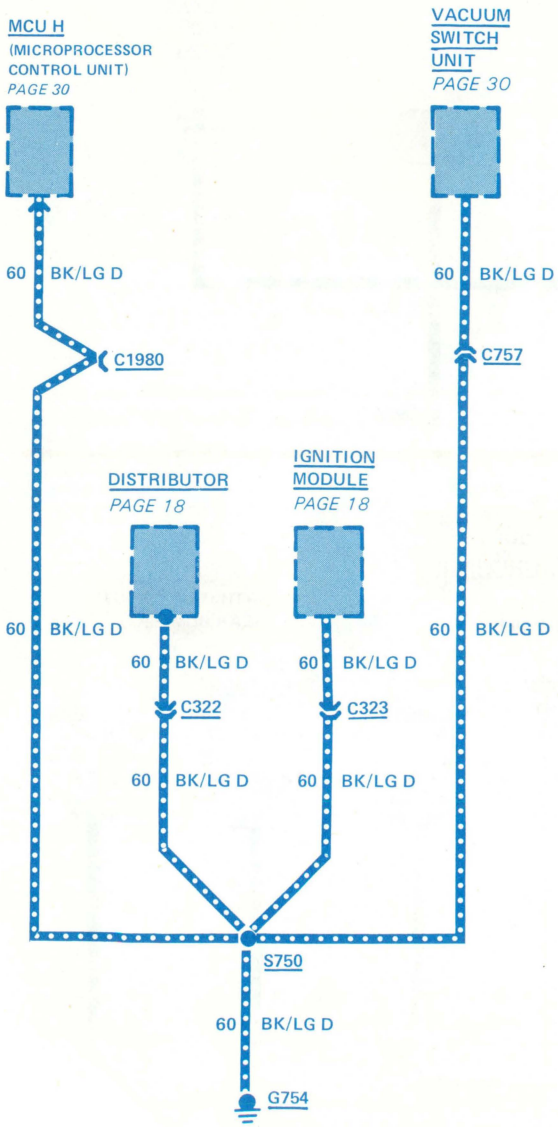
BRONCO REAR LIGHTS GROUNDS



F100-F350 REAR LIGHTS GROUNDS



ENGINE GROUND
6 CYL WITH MCU



COMPONENT LOCATION

		Page-Figure	Color	Terminals
Connector C208	Attached to instrument cluster	55-1	GY	14
Connector C208A	Attached to instrument cluster	55-1	GY	18
Connector C306	At LH side of dash panel	44-1	GY	11
Connector C322	At distributor	28-1	BK	3
Connector C323	At ignition module	9-3	BK	4
Connector C327	Behind center of I/P	55-1	GY	3
Connector C604	At blower resistors	83-1		
Connector C725	Behind center of I/P	55-1	GY	4
Connector C725A	Behind center of I/P	55-1	GY	4
Connector C757	Near vacuum switch unit	28-1		
Connector C1980	Near ignition module	9-3		
Ground G701	Behind I/P near RH side of radio	55-1		
Ground G754	LH side of engine near oil filter	28-1		
Ground G801	On LH inner fender behind headlights	38-2		
Ground G802	On RH inner fender behind headlights	38-1		
Ground G804	On frame forward of LH rear light assembly	47-2		
Ground G805	On frame forward of RH rear light assembly	47-1		
Ground G1001	On frame forward of LH rear light assembly	47-2		
Ground G1002	On frame forward of RH rear light assembly	47-1		
Ground G1004	On frame forward of LH rear light assembly	45-1		

The ground circuits shown here are complete, and connect several components together to screw terminal ground points. On other pages only parts of these circuits may be shown. Partial ground circuits are shown dashed on those pages.

All simple or component ground circuits are shown on the individual circuit pages, and are complete on those pages.

All wires are **57 BK** unless otherwise noted.

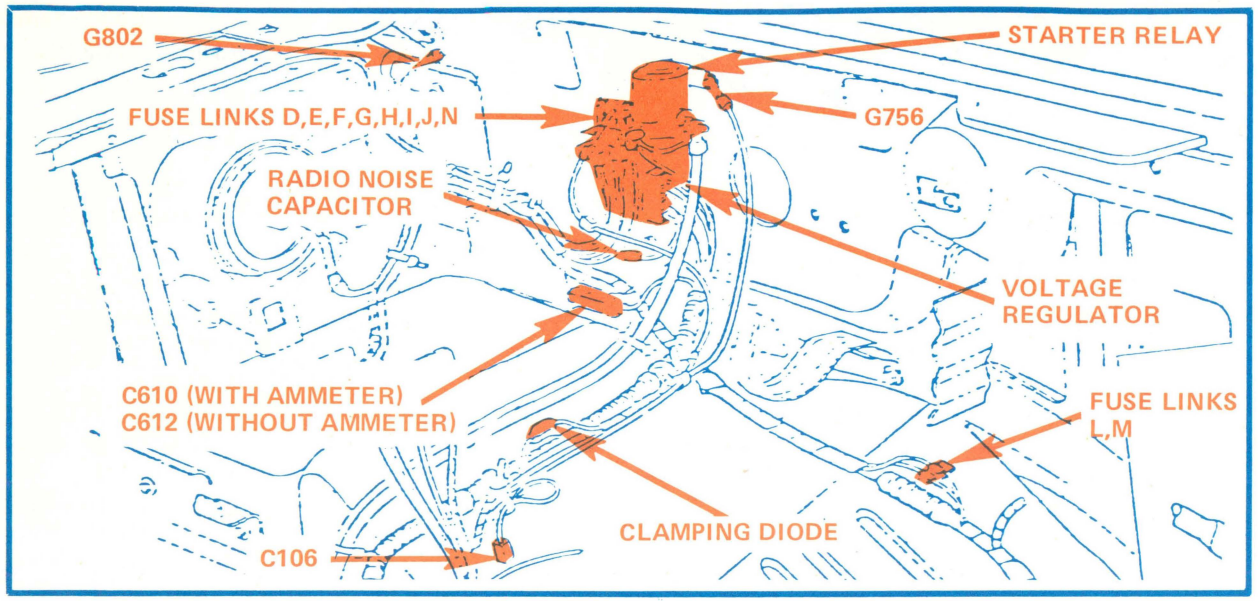


Figure 1 - RH Front Fender Apron

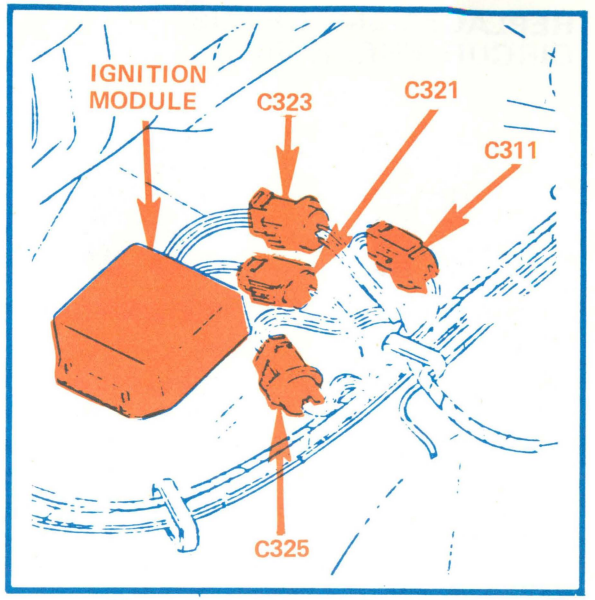


Figure 2 - At LH Inner Fender Well

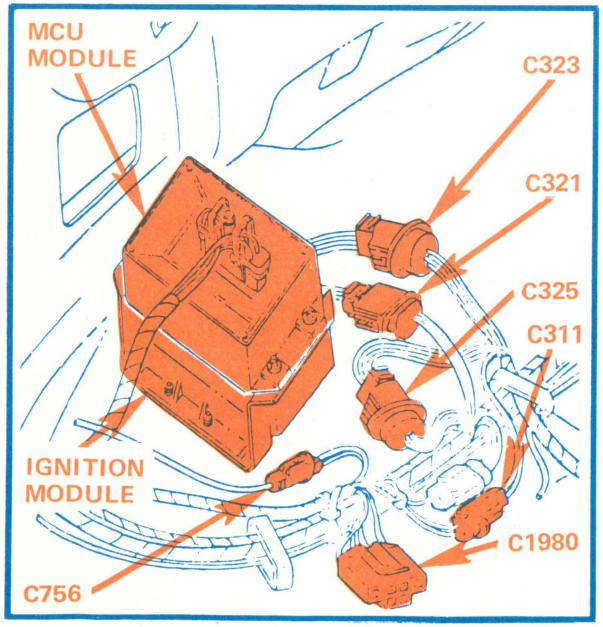


Figure 3 - At LH Inner Fender Well (With MCU)

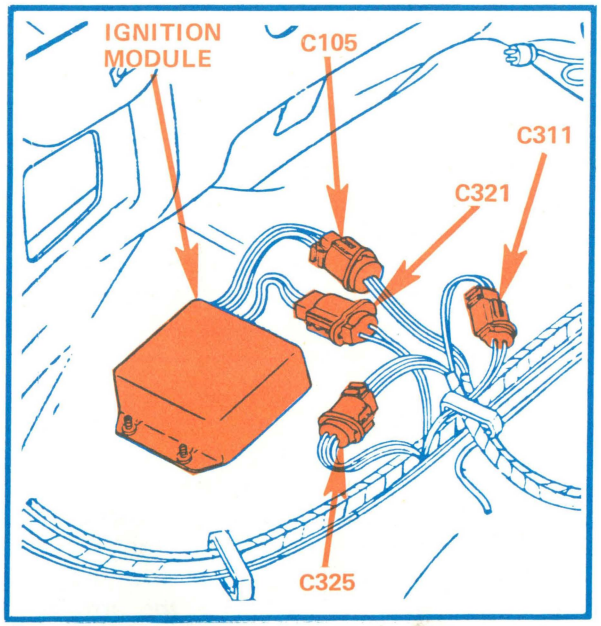


Figure 4 - LH Inner Fender Well (With EEC)

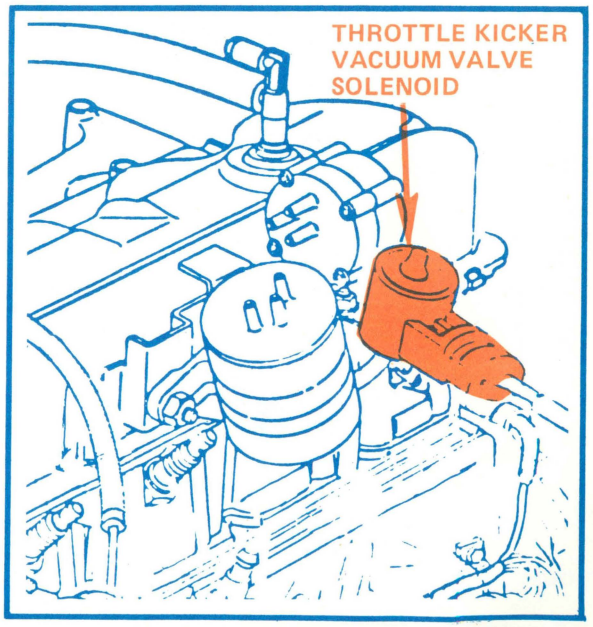


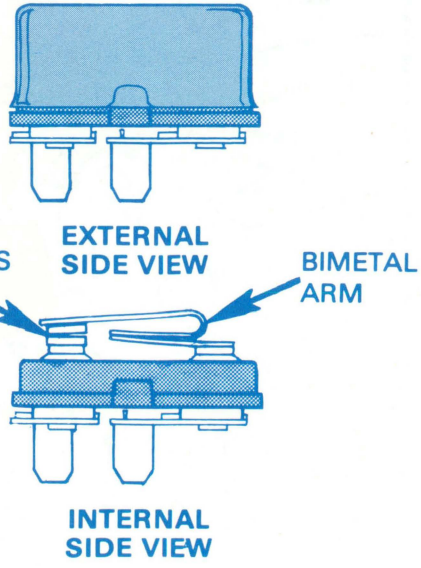
Figure 5 - LH Rear Of 4.9 L Engine

REPLACEMENT OF FUSES/ CIRCUIT BREAKERS

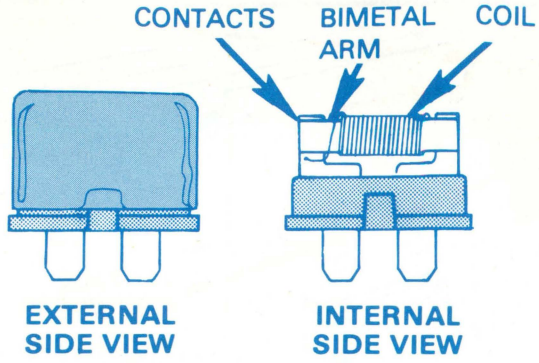
GOOD FUSE BLOWN FUSE

Fuses are mounted either in the **Fuse Block** or in-line. They are identified by the numbered value in amperes, and by a color code. Some positions may have either a fuse with adapter or a circuit breaker. Be sure to replace a fuse or circuit breaker with the same kind of unit and with the same ampere rating. Remove fuses in order to check them.

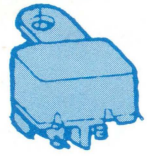
CIRCUIT BREAKER OPERATION



Cycling Fuse Block Type



Non-Cycling Fuse Block Type



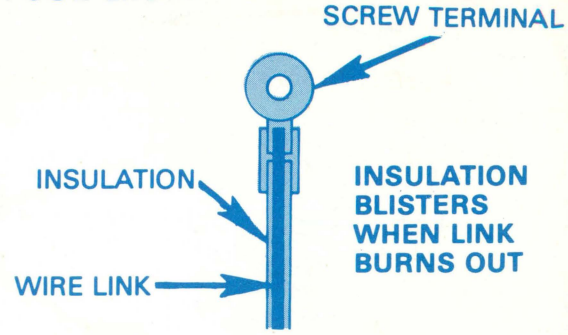
Cycling In-Line Type

Some circuits are protected by circuit breakers. (Abbreviated "c.b." in fuse chart.) They can be **Fuse Block** mounted or in-line. Like fuses, they are rated in amperes.

Each circuit breaker conducts current through an arm made of two types of metal fastened together (bimetal arm). If the arm starts to carry too much current, it heats up. As one metal expands faster than the other the arm bends, opening the contacts. Current flow is broken. In the cycling type, the arm cools and straightens out. This closes the circuit again. This cycle repeats as long as the overcurrent exists, with power applied.

In the non-cycling type, there is also a coil wrapped around the bimetal arm. When an overcurrent exists and the contacts open, a small current passes through the coil. This current through the coil is not large enough to operate a load, but it does heat up both the coil and bimetal arm. This keeps the arm in the open position until power is removed.

FUSE LINKS



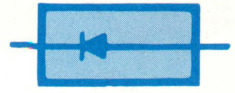
The fuse link is a short length of wire smaller in gage than the wire in the protected circuit. The wire is covered with a thick non-flammable insulation. An overload causes the link to heat and the insulation to blister. If the overload remains, the link will melt, causing an open circuit. The links are color coded for wire size as follows:

COLOR CODE

BLUE	20 GA
RED	18 GA
ORANGE	16 GA
GREEN	14 GA

When replacing, make tight crimp joints or hot solder joints for good connections.

DIODES



Diodes are electrical devices that permit current to flow in one direction only. The current flows in the direction indicated by the arrow.

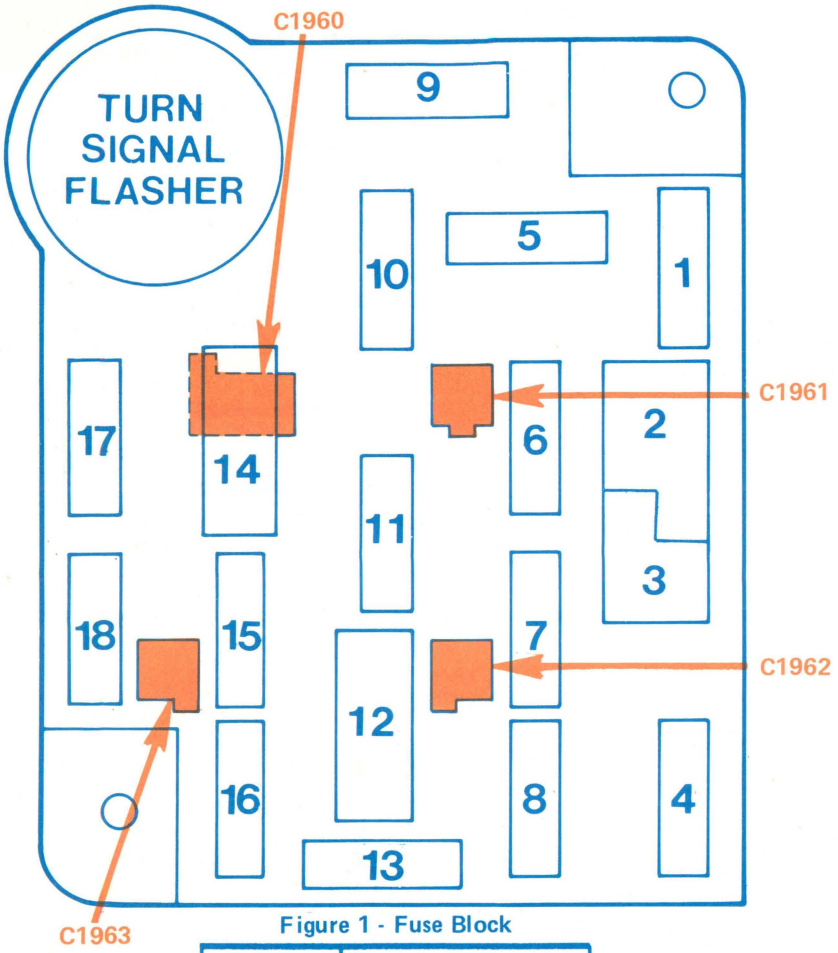


Figure 1 - Fuse Block

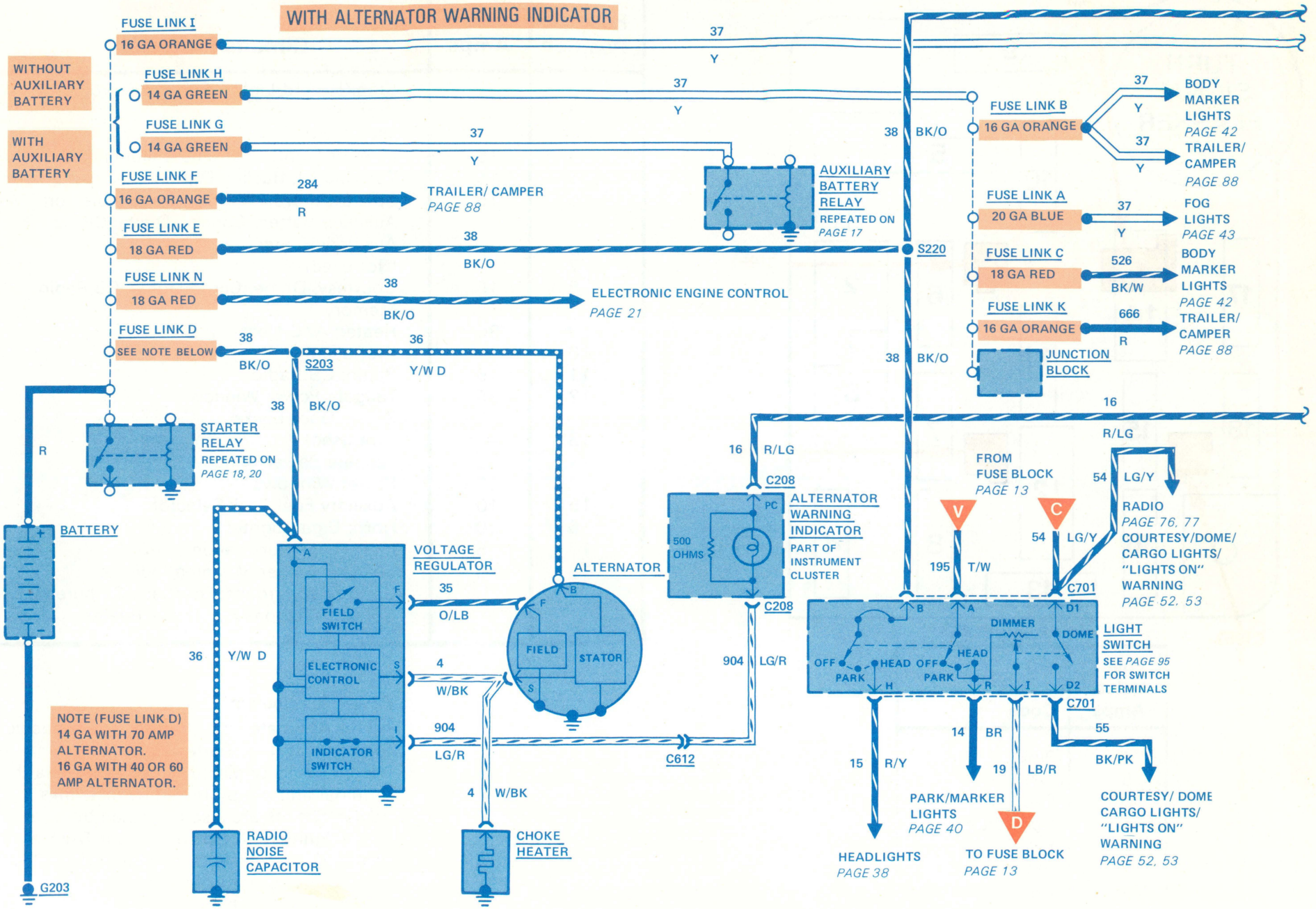
Fuse Value Amps	Color Code
4	Pink
5	Tan
10	Red
15	Light Blue
20	Yellow
25	Natural
30	Light Green

Fuse Position	Amps	Circuits Protected
1	20	Stop/Hazard Lights; Speed Control
2	--	(Not used)
3	--	(Not used)
4	15	Exterior Lights; Instrument Illumination
5	15	Turn Lights; Backup Lights
6	15	Speed Control; 4-Wheel Drive Indicator; Auxiliary Battery Control; Digital Clock; Auxiliary Heater
7	--	(Not used)
8	15	Courtesy, Dome, Cargo Lights; CB Radio Memory
9	30	Heater; A/C-Heat
10	--	(Not used)
11	15	Radio; CB Radio
12	25	Tailgate Power Window
	30 c.b.	Power Door Locks
13	--	(Not used)
14	25	Tailgate Power Window
	20 c.b.	Power Windows
15	10	Auxiliary Fuel Tank Selector
16	20	Horn; Cigar Lighter
17	5	Instrument Illumination
18	15	Seatbelt Buzzer; Warning Indicators; Carburetor Circuits; Feedback Carburetor Control; Tachometer; Choke Heater

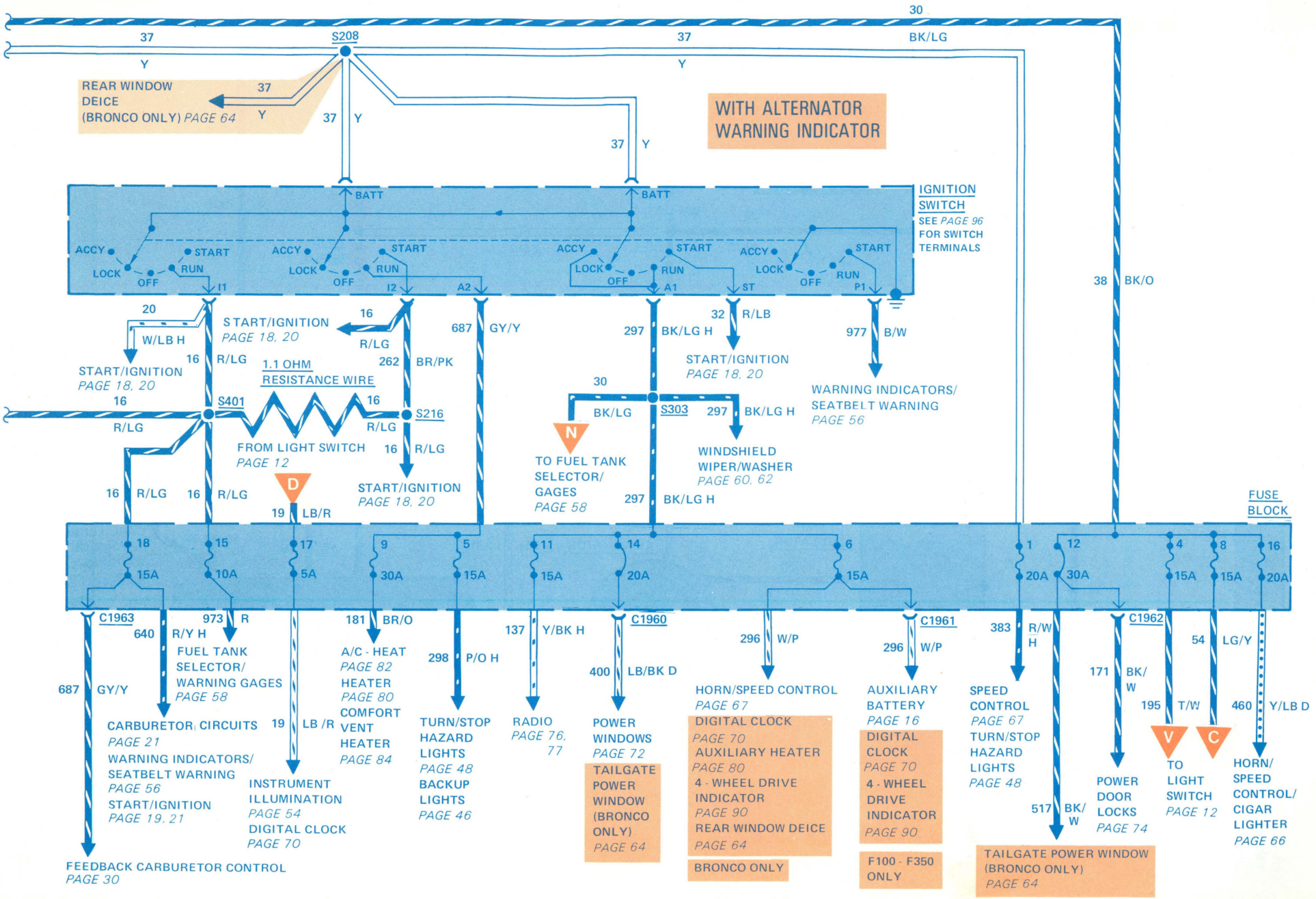
Power Distribution

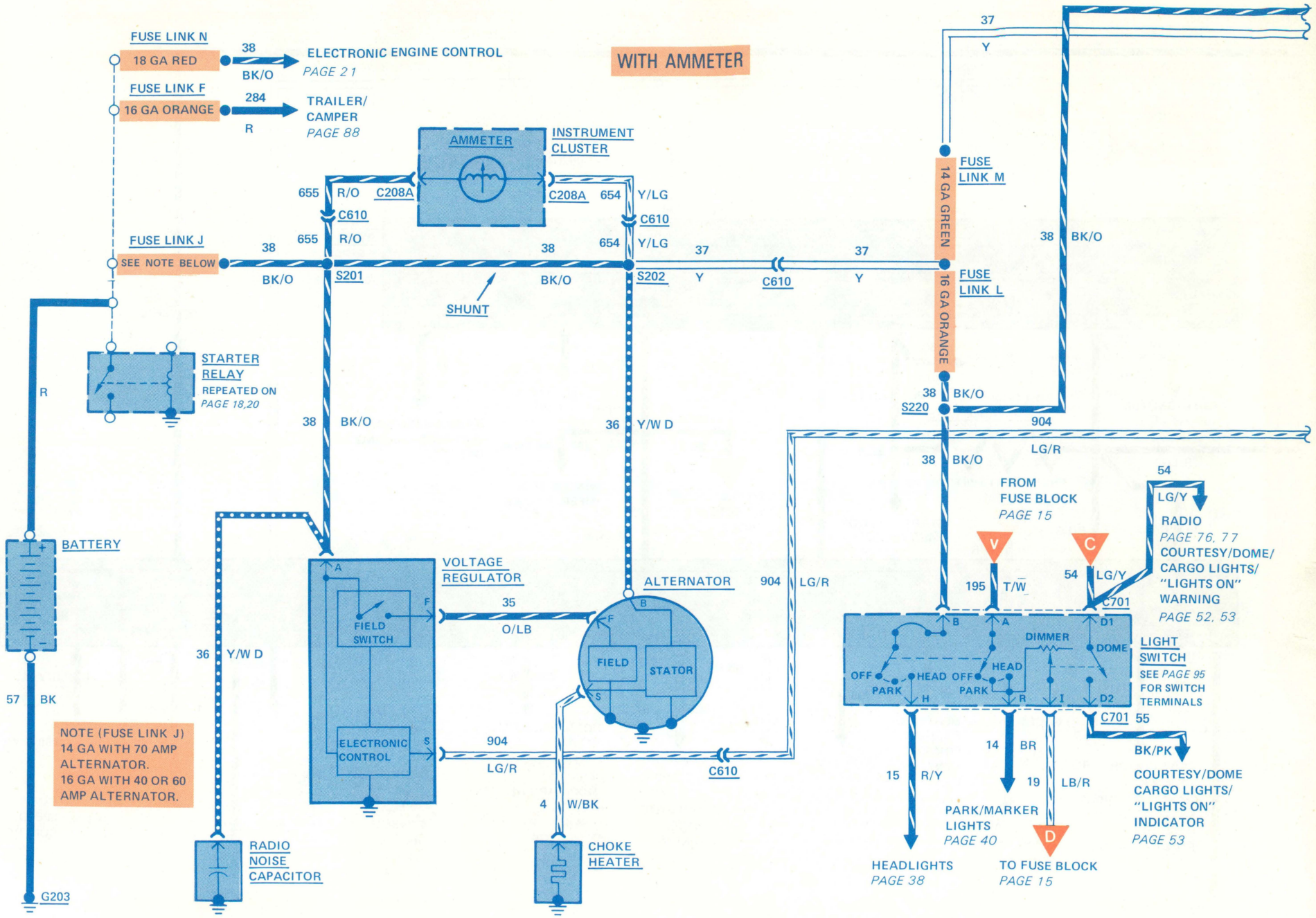
The **Alternator** and **Battery** are connected together at the **Starter Relay** hot terminal. Other circuits originate at the **Starter Relay** hot terminal and are protected by fuse links. Low power circuits are also protected by fuses.

The **Ignition Switch** and **Light Switch** are powered at all times as are **Fuses 1, 4, 8, 10,** and **16.** The other fuses are powered through the **Ignition Switch** or the **Light Switch.**

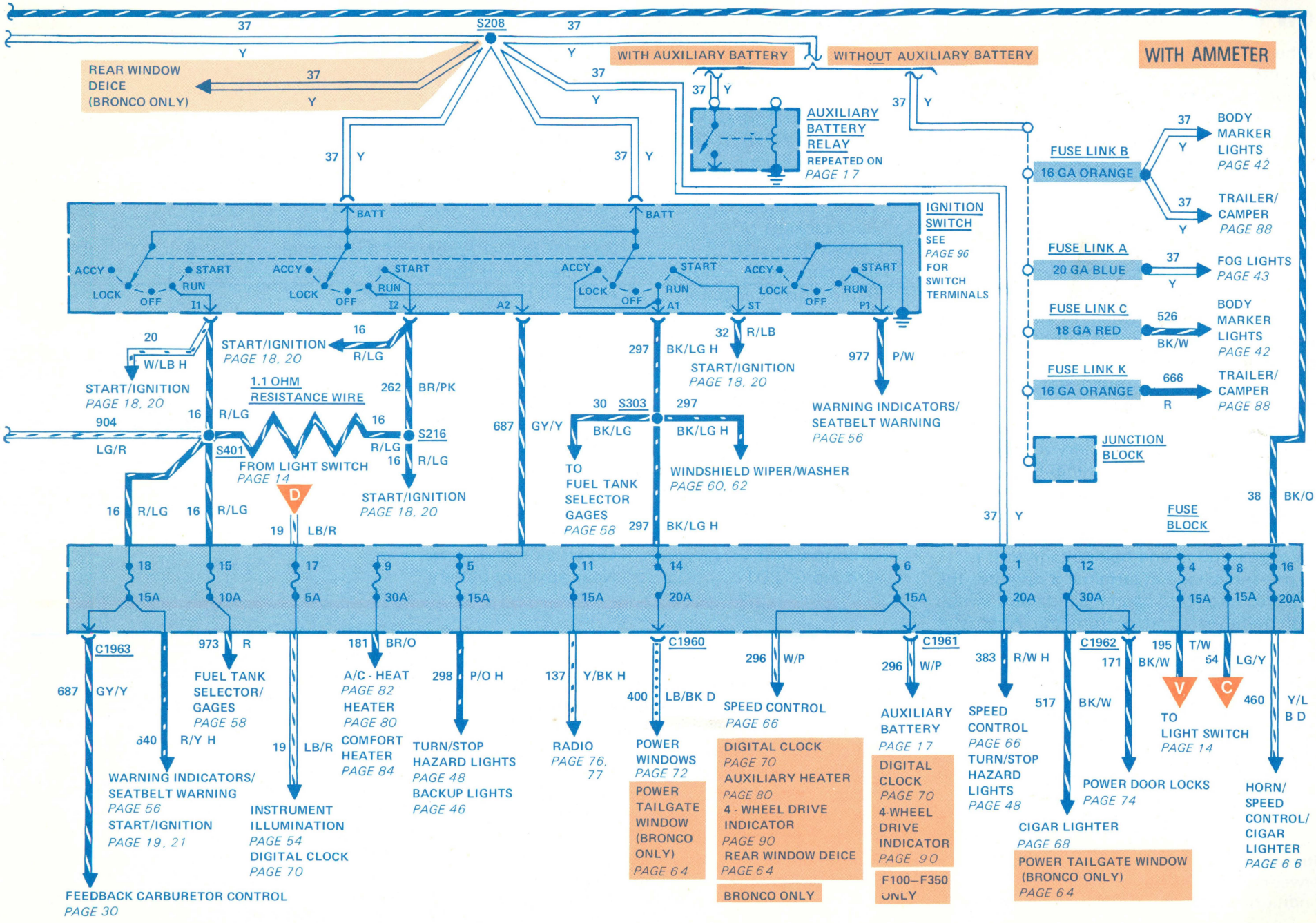

WITH ALTERNATOR WARNING INDICATOR
WITHOUT AUXILIARY BATTERY
WITH AUXILIARY BATTERY
FUSE LINK I
16 GA ORANGE
FUSE LINK H
14 GA GREEN
FUSE LINK G
14 GA GREEN
FUSE LINK F
16 GA ORANGE
FUSE LINK E
18 GA RED
FUSE LINK N
18 GA RED
FUSE LINK D
SEE NOTE BELOW
37
Y
284
R
38
BK/O
36
Y/W D
TRAILER/ CAMPER
PAGE 88
AUXILIARY BATTERY RELAY
REPEATED ON PAGE 17
ELECTRONIC ENGINE CONTROL
PAGE 21
S203
S220
FUSE LINK B
16 GA ORANGE
BODY MARKER LIGHTS
PAGE 42
TRAILER/ CAMPER
PAGE 88
FUSE LINK A
20 GA BLUE
FOG LIGHTS
PAGE 43
FUSE LINK C
18 GA RED
526
BK/W
BODY MARKER LIGHTS
PAGE 42
FUSE LINK K
16 GA ORANGE
666
R
TRAILER/ CAMPER
PAGE 88
JUNCTION BLOCK
16
R/LG
FROM FUSE BLOCK
PAGE 13
54
LG/Y
RADIO
PAGE 76, 77
COURTESY/DOME/ CARGO LIGHTS/ "LIGHTS ON" WARNING
PAGE 52, 53
195
T/W
C701
LIGHT SWITCH
SEE PAGE 95 FOR SWITCH TERMINALS
OFF
PARK
HEAD
DIMMER
DOME
STARTER RELAY
REPEATED ON PAGE 18, 20
BATTERY
G203
VOLTAGE REGULATOR
FIELD SWITCH
ELECTRONIC CONTROL
INDICATOR SWITCH
35
O/LB
4
W/BK
904
LG/R
ALTERNATOR
FIELD
STATOR
C208
500 OHMS
ALTERNATOR WARNING INDICATOR
PART OF INSTRUMENT CLUSTER
C612
RADIO NOISE CAPACITOR
CHOKE HEATER
NOTE (FUSE LINK D)
14 GA WITH 70 AMP ALTERNATOR.
16 GA WITH 40 OR 60 AMP ALTERNATOR.
15
R/Y
14
BR
19
LB/R
55
BK/PK
HEADLIGHTS
PAGE 38
PARK/MARKER LIGHTS
PAGE 40
TO FUSE BLOCK
PAGE 13
COURTESY/ DOME CARGO LIGHTS/ "LIGHTS ON" WARNING
PAGE 52, 53

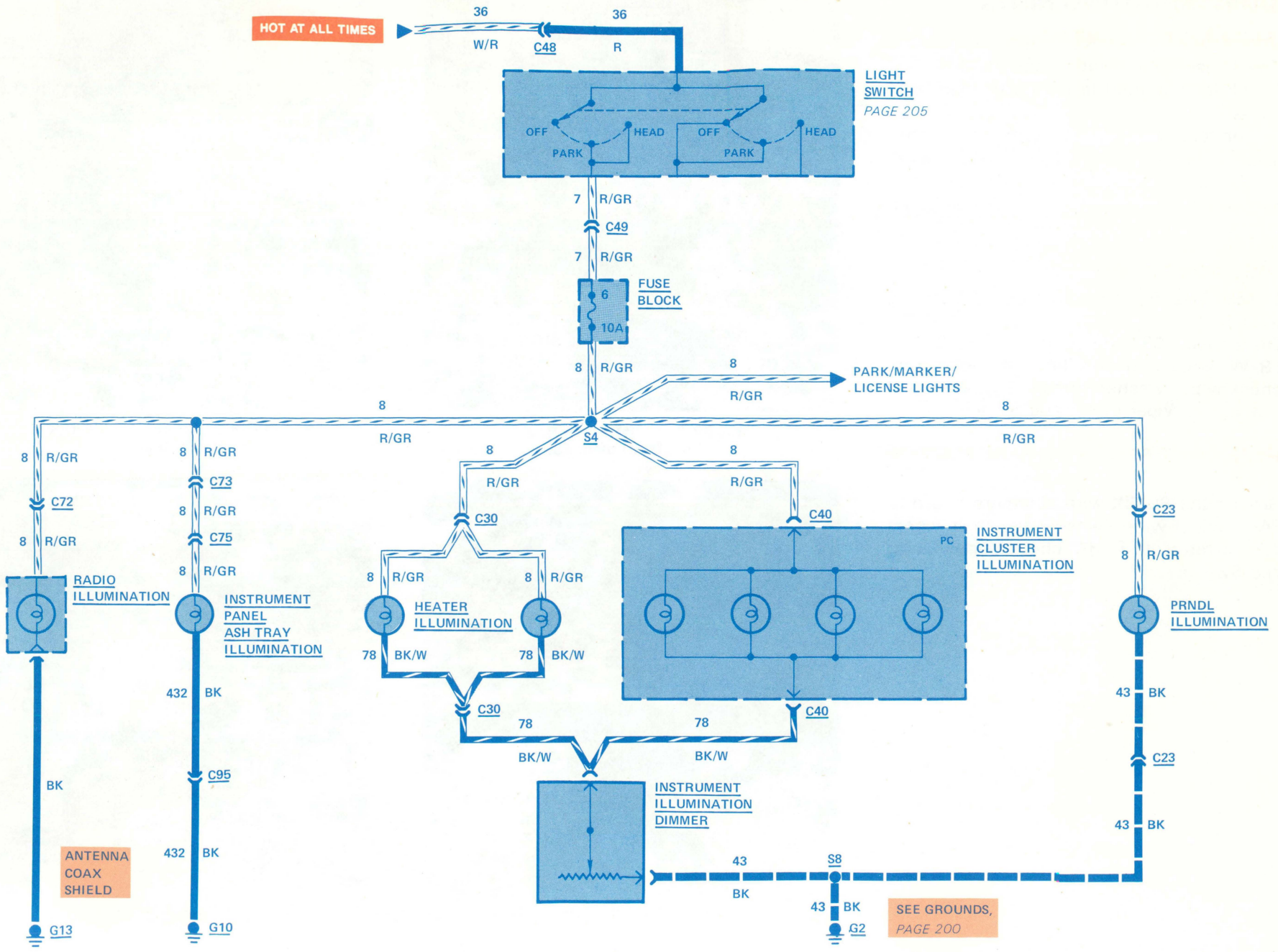
CHARGE/POWER DISTRIBUTION (WITH ALTERNATOR WARNING INDICATOR)




WITH AMMETER
FUSE LINK N
18 GA RED
38
BK/O
ELECTRONIC ENGINE CONTROL
PAGE 21
FUSE LINK F
16 GA ORANGE
284
R
TRAILER/
CAMPER
PAGE 88
AMMETER
INSTRUMENT
CLUSTER
655
R/O
C208A
C208A
654
Y/LG
C610
C610
FUSE LINK J
SEE NOTE BELOW
38
BK/O
655
R/O
38
654
Y/LG
37
Y
37
Y
S201
S202
C610
SHUNT
38
BK/O
FUSE
LINK M
14 GA GREEN
FUSE
LINK L
16 GA ORANGE
37
Y
38
BK/O
38
BK/O
S220
904
LG/R
38
BK/O
STARTER
RELAY
REPEATED ON
PAGE 18,20
R
38
BK/O
36
Y/W D
BATTERY
57
BK
G203
NOTE (FUSE LINK J)
14 GA WITH 70 AMP
ALTERNATOR.
16 GA WITH 40 OR 60
AMP ALTERNATOR.
VOLTAGE
REGULATOR
A
F
FIELD
SWITCH
S
ELECTRONIC
CONTROL
35
O/LB
ALTERNATOR
B
F
FIELD
S
STATOR
904
LG/R
C610
36
Y/W D
904
LG/R
4
W/BK
RADIO
NOISE
CAPACITOR
CHOKE
HEATER
FROM
FUSE BLOCK
PAGE 15
V
C
54
LG/Y
RADIO
PAGE 76, 77
COURTESY/DOME/
CARGO LIGHTS/
"LIGHTS ON"
WARNING
PAGE 52, 53
195
T/W
54
LG/Y
C701
B
A
D1
DIMMER
DOME
OFF
HEAD
PARK
H
OFF
HEAD
PARK
R
I
D2
LIGHT
SWITCH
SEE PAGE 95
FOR SWITCH
TERMINALS
C701
55
BK/PK
COURTESY/DOME
CARGO LIGHTS/
"LIGHTS ON"
INDICATOR
PAGE 53
15
R/Y
14
BR
19
LB/R
PARK/MARKER
LIGHTS
PAGE 40
D
HEADLIGHTS
PAGE 38
TO FUSE BLOCK
PAGE 15

CHARGE/POWER DISTRIBUTION (WITH AMMETER)




HOT AT ALL TIMES
36
W/R
C48
36
R
LIGHT SWITCH
PAGE 205
OFF
HEAD
PARK
OFF
HEAD
PARK
7 R/GR
C49
7 R/GR
FUSE BLOCK
6
10A
8 R/GR
8
R/GR
PARK/MARKER/ LICENSE LIGHTS
8 R/GR
8 R/GR
C72
8 R/GR
8 R/GR
C73
8 R/GR
C75
8 R/GR
S4
8 R/GR
8 R/GR
8 R/GR
8 R/GR
C30
C40
C23
8 R/GR
RADIO ILLUMINATION
INSTRUMENT PANEL ASH TRAY ILLUMINATION
8 R/GR
HEATER ILLUMINATION
8 R/GR
78 BK/W
78 BK/W
PC
INSTRUMENT CLUSTER ILLUMINATION
PRNDL ILLUMINATION
432 BK
C30
78 BK/W
78 BK/W
C40
43 BK
C23
BK
C95
INSTRUMENT ILLUMINATION DIMMER
43 BK
ANTENNA COAX SHIELD
432 BK
43
BK
S8
43 BK
G13
G10
G2
SEE GROUNDS, PAGE 200

TROUBLESHOOTING HINTS

NO INSTRUMENT ILLUMINATION WORKS

- Check **Fuse 6** by operating **Park Lights.**
- Check **Light Switch** if **Park Lights** also don't work but **Fuse 6** is **OK.**

DIMMER DOESN'T WORK

- Remove connectors from **Instrument Illumination Dimmer** and check resistance of dimmer.
- Check in-line connectors.

ONE LIGHT NOT WORKING

- Check bulb and socket.
- Check continuity to ground.

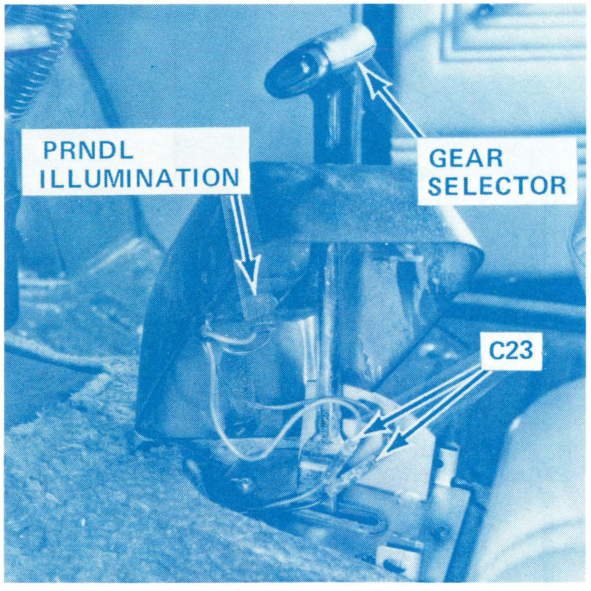


Figure 1 - Under Transmission Selector

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Light Switch	Top LH side of steering column			
Connector C23	Under shifter lever trim cover	229-1	clear	1
Connector C30	Behind RH side of instrument cluster below heater controls	229-2	W	2
Connector C40	Attached behind instrument cluster	229-2	W	12
Connector C48	Under LH side of instrument panel near steering column	227-3	W/BLK	1
Connector C49	Under LH side of instrument panel near steering column	227-3	W/BLK	6
Connector C72	Behind center of instrument panel attached to radio assembly	229-2	BLK	2
Connector C73	Behind LH side of instrument panel taped to harness if not used	229-2	W	3
Connector C95	Behind center of instrument panel above ash tray assembly	229-2	BLK	3
Ground G2	Under LH side of instrument panel at turn signal mounting bracket	227-1		
Ground G10	Behind center of instrument panel			
Ground G13	At antenna mounting on fender			

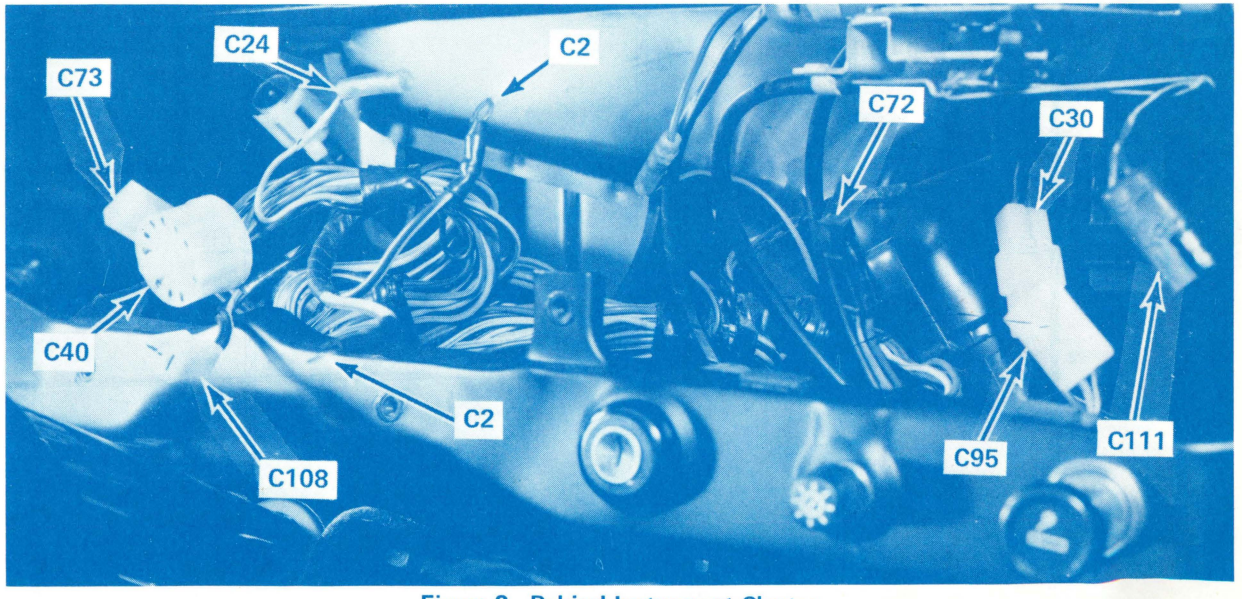
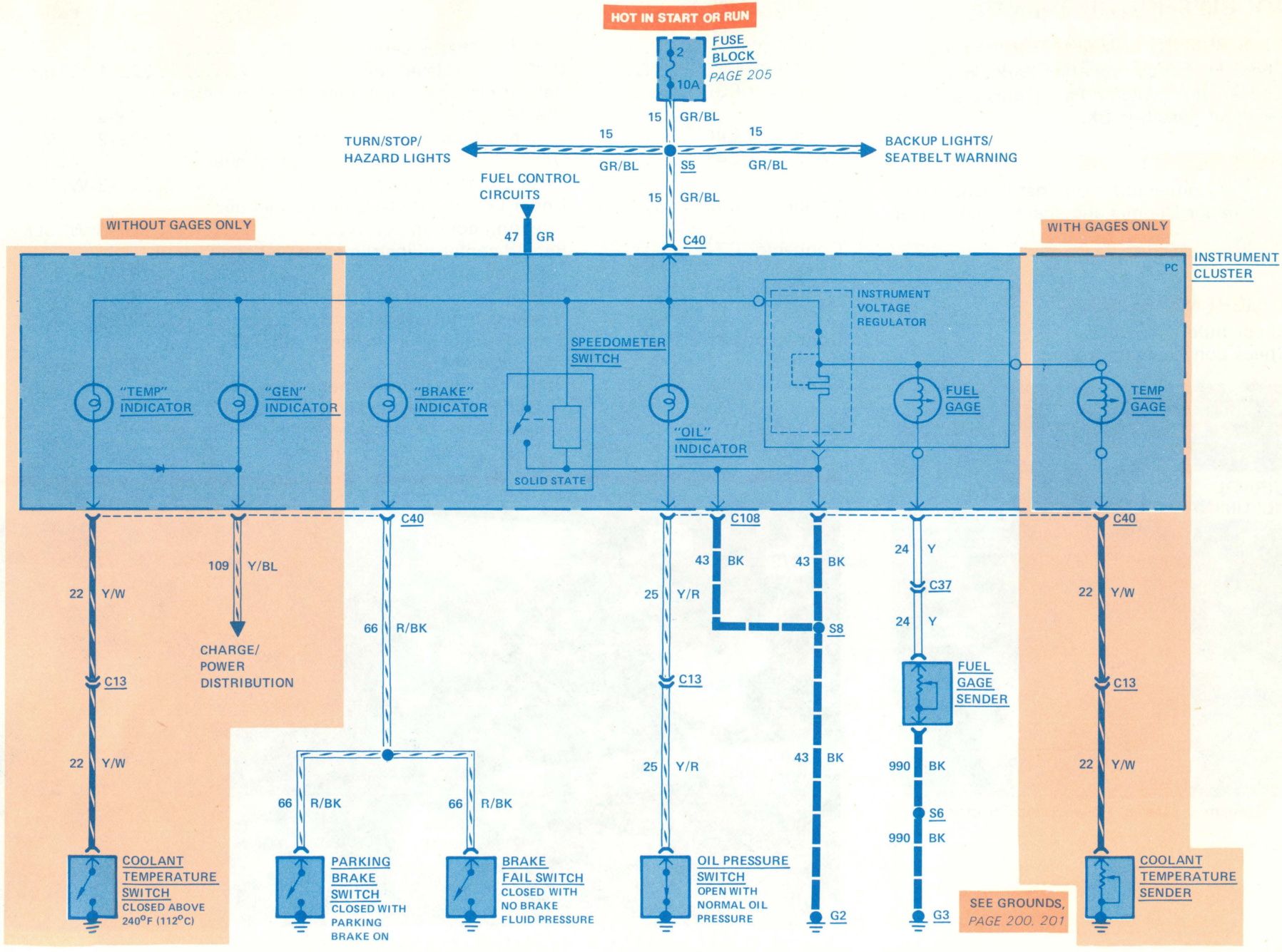


Figure 2 - Behind Instrument Cluster


HOT IN START OR RUN
FUSE BLOCK
PAGE 205
2
10A
15 GR/BL
TURN/STOP/ HAZARD LIGHTS
15 GR/BL
S5
15 GR/BL
BACKUP LIGHTS/ SEATBELT WARNING
FUEL CONTROL CIRCUITS
15 GR/BL
47 GR
C40
WITHOUT GAGES ONLY
WITH GAGES ONLY
INSTRUMENT CLUSTER
PC
INSTRUMENT VOLTAGE REGULATOR
SPEEDOMETER SWITCH
"TEMP" INDICATOR
"GEN" INDICATOR
"BRAKE" INDICATOR
SOLID STATE
"OIL" INDICATOR
FUEL GAGE
TEMP GAGE
C40
C108
C40
109 Y/BL
22 Y/W
66 R/BK
43 BK
43 BK
25 Y/R
24 Y
C37
24 Y
22 Y/W
CHARGE/ POWER DISTRIBUTION
C13
S8
C13
FUEL GAGE SENDER
C13
22 Y/W
25 Y/R
43 BK
990 BK
S6
990 BK
22 Y/W
66 R/BK
66 R/BK
COOLANT TEMPERATURE SWITCH
CLOSED ABOVE 240°F (112°C)
PARKING BRAKE SWITCH
CLOSED WITH PARKING BRAKE ON
BRAKE FAIL SWITCH
CLOSED WITH NO BRAKE FLUID PRESSURE
OIL PRESSURE SWITCH
OPEN WITH NORMAL OIL PRESSURE
G2
G3
SEE GROUNDS, PAGE 200, 201
COOLANT TEMPERATURE SENDER

HOW THE CIRCUIT WORKS

With the **Ignition Switch** in START or RUN, current can flow through **Fuse 2** to the **Brake Indicator** and **Oil Indicator.**

The Oil Indicator goes on with the **Oil Pressure Switch** closed (low oil pressure).

The **Brake Indicator** will go on: 1) with the **Brake Fail Switch** closed (no brake fluid pressure); 2) with the **Parking Brake Switch** closed.

For the circuit operation of the **Speedometer Switch,** refer to the **Fuel Control** circuit.

In START or RUN, current can also flow through the instrument voltage regulator to the **Fuel Gage.** The instrument voltage regulator supplies a pulsating output voltage (5.0 volts average) to power the gage. The **Fuel Gage** is connected to the **Fuel Gage Sender.** The sender is a variable resistor connected to a float in the fuel tank. When the fuel is low, resistance is high; when fuel is high, resistance is low.

With Gages

The **Temp Gage** is powered by the instrument voltage regulator and is connected to the **Coolant Temperature Sender.** When temperature is low, resistance is high. When temperature is high, resistance is low.

Without Gages

With the **Ignition Switch** in RUN, the **Temp Indicator** goes on if the **Coolant Temperature Switch** closes, showing high coolant temperature.

With the **Ignition Switch** in START or RUN, the **Gen Indicator** goes on. The indicator is grounded in the **Charge** circuit.

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Brake Fail Switch	Top RH side of engine cowl			
Coolant Temperature Sender/Switch (2.0 liter)	Top LH front side of cylinder head			
(2.3 liter)	LH rear of engine below oil pressure switch	217-2		
Fuel Gage Sender	Top center of fuel tank			
Instrument Cluster	LH side of instrument panel	227-3		
Oil Pressure Switch (2.0 liter)	Lower RH side of engine at oil filter extension	217-6		
(2.3 liter)	Upper LH rear side of cylinder head	217-2		
Parking Brake Switch	Top of parking brake support	211-4		
Connector C5 (2.0 liter only)	LH fender apron below fuse block	213-2	W	6
Connector C13 (2.3 liter)	LH fender apron near fuse block	233-1	W	8
Connector C37	LH fender apron near fuse block	233-1	W	6
Connector C40	Attached behind instrument cluster	229-2	W	12
Ground G2	Under LH side of instrument panel at turn signal mounting bracket	227-1		
Ground G3 (2.0 liter)	Center of LH fender apron below fuse block	213-2		
(2.3 liter)	LH fender apron at lower ignition coil mounting bracket	202-3		

TROUBLESHOOTING HINTS

ANY WARNING INDICATOR DOESN'T GO ON

- Check bulb. Check continuity from PC to ground.
- Check for voltage at **GR/BL** wire of PC.
- Remove and check PC.

FUEL GAGE ERRATIC, HIGH, OR LOW

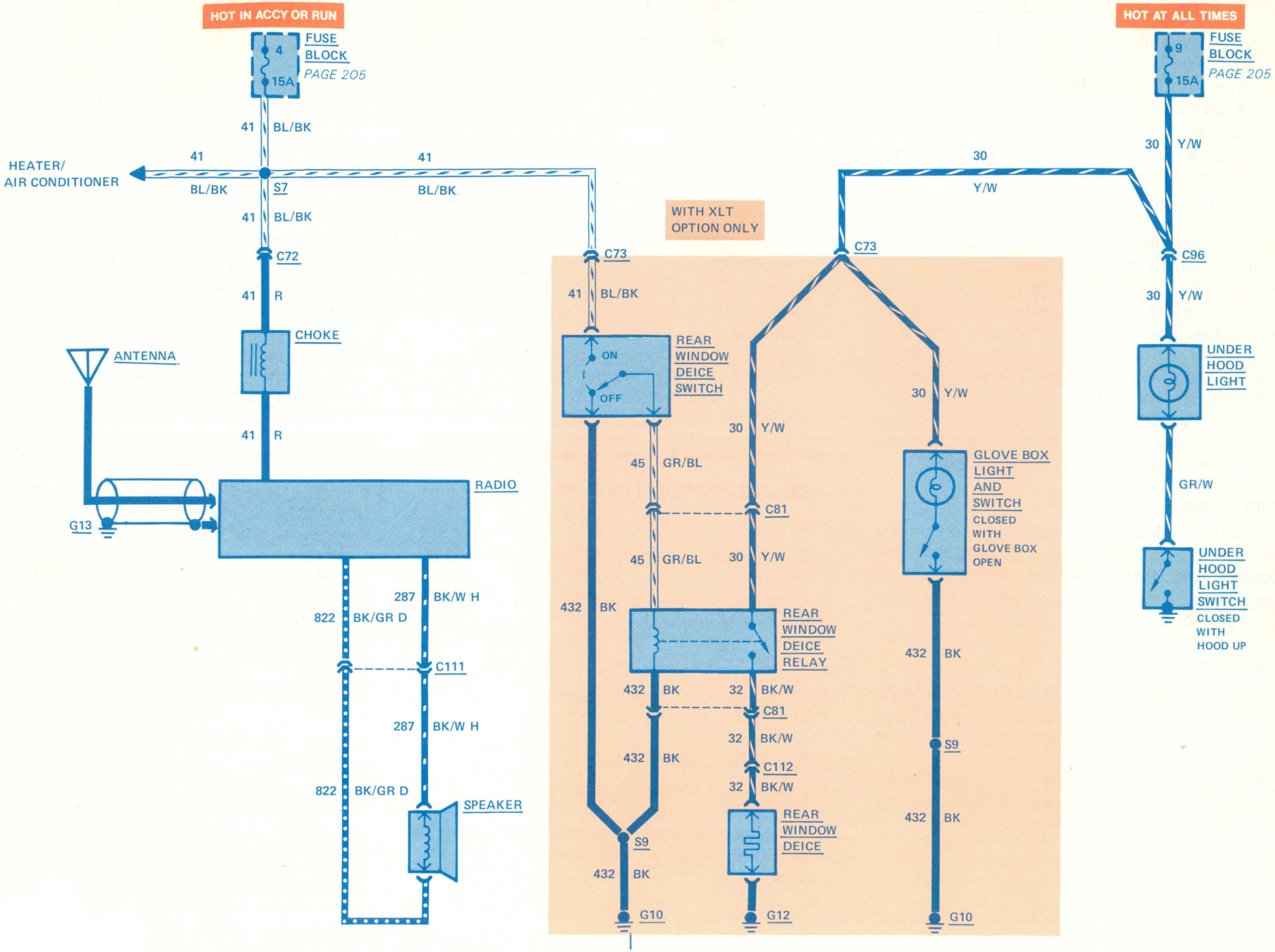
- Check voltage regulator ground.
- Bench test voltage regulator.

FUEL GAGE DOESN'T WORK

- Disconnect **Y** wire at sender. Connect one lead of voltmeter or test light to **Y** wire. Connect other meter (light) lead to ground. A pulsating light or varying voltage should appear.
- If light stays on, or voltage reading is steady, replace voltage regulator. If no voltage appears, check for open circuit in gage or wiring.
- Perform Gage "Calibration Test" in Shop Manual.
- Check that resistance of sender is 10 to 73 ohms.

FUEL GAGE OUT OF CALIBRATION

- Perform "Fuel Gage and Instrument Voltage Regulator Calibration Test" in Shop Manual.


HOT IN ACCY OR RUN
FUSE BLOCK
4
15A
PAGE 205
41 BL/BK
HEATER/
AIR CONDITIONER
41 BL/BK
S7
41 BL/BK
41 BL/BK
C72
41 R
CHOKE
ANTENNA
41 R
RADIO
G13
287 BK/W H
822 BK/GR D
C111
287 BK/W H
822 BK/GR D
SPEAKER
WITH XLT
OPTION ONLY
C73
41 BL/BK
ON
OFF
REAR WINDOW DEICE SWITCH
45 GR/BL
45 GR/BL
432 BK
REAR WINDOW DEICE RELAY
432 BK
S9
432 BK
G10
30 Y/W
C81
30 Y/W
32 BK/W
C81
32 BK/W
C112
32 BK/W
REAR WINDOW DEICE
G12
C73
30 Y/W
30 Y/W
GLOVE BOX LIGHT AND SWITCH
CLOSED WITH GLOVE BOX OPEN
432 BK
S9
432 BK
G10
HOT AT ALL TIMES
FUSE BLOCK
9
15A
PAGE 205
30 Y/W
C96
30 Y/W
UNDER HOOD LIGHT
GR/W
UNDER HOOD LIGHT SWITCH
CLOSED WITH HOOD UP

RADIO

HOW THE CIRCUIT WORKS

With the **Ignition Switch** in ACCY or RUN, current can flow through **Fuse 4** to operate the **Radio.**

TROUBLESHOOTING HINTS

Radio

RADIO DOESN'T WORK

- Check **Fuse 4 by operating heater.**
- Check **Antenna** ground (G13).

SPEAKER DOESN'T WORK

- Check for resistance of 2 to 4 ohms across **Speaker. Speaker** will click when voltage is applied.

NOISY RECEPTION

- Check **Suppression Capacitor.**
- Check antenna connections.

REAR WINDOW DEICE

HOW THE CIRCUIT WORKS

With the **Ignition Switch** in RUN, or ACCY, voltage is applied through **Fuse 4** to the **Rear Window Deice Switch.** Voltage is applied at all times through **Fuse 9** to the **Rear Window Deice Relay** contact. When the deice switch is pressed to ON, the relay operates and the contacts close. Current flows through the contacts, the **Rear Window Deice** element and to ground. The rear window deice operates.

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Glove Box Light and Switch	Inside of glove box			
Rear Window Deice	Part of rear window			
Rear Window Deice Relay				
Rear Window Deice Switch	LH side of instrument panel			
Under Hood Light Switch	Front RH side of hood			
Connector C72	Behind center of instrument panel attached to radio assembly	229-2	BLK	2
Connector C73	Behind LH side of instrument panel, taped to harness if not used	229-2	W	3
Connector C81	Attached to deice relay		—	4
Connector C96	LH side of dash panel under rear corner of hood	233-1	clear	1
Connector C111	Attached to speaker		—	2
Connector C112	Behind LH kick-panel		—	2
Ground G10	Behind center of instrument panel			
Ground G12	On frame near rear window			
Ground G13	At antenna mounting on fender			

TROUBLESHOOTING HINTS

WEAK OR NO SIGNAL

- Check antenna lead wire continuity and isolation from ground.

DEICE DOESN'T WORK

- Check for click at relay when switch is turned ON and OFF.
- Check for voltage at **Y/W** wire of **C81.**
- Check that **G12** is clean and tight.

UNDER HOOD/ GLOVE BOX LIGHTS

HOW THE CIRCUIT WORKS

Voltage is applied at all times through the **Glove Box Light** to its switch and also through the **Under Hood Light** to its switch. When either switch is closed, its bulb goes on.

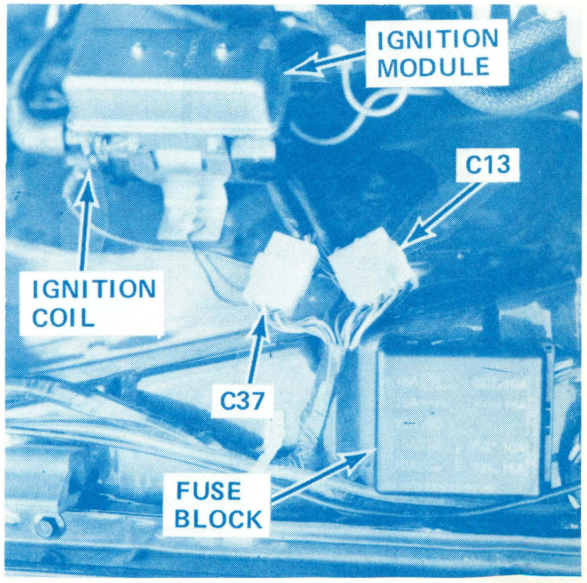
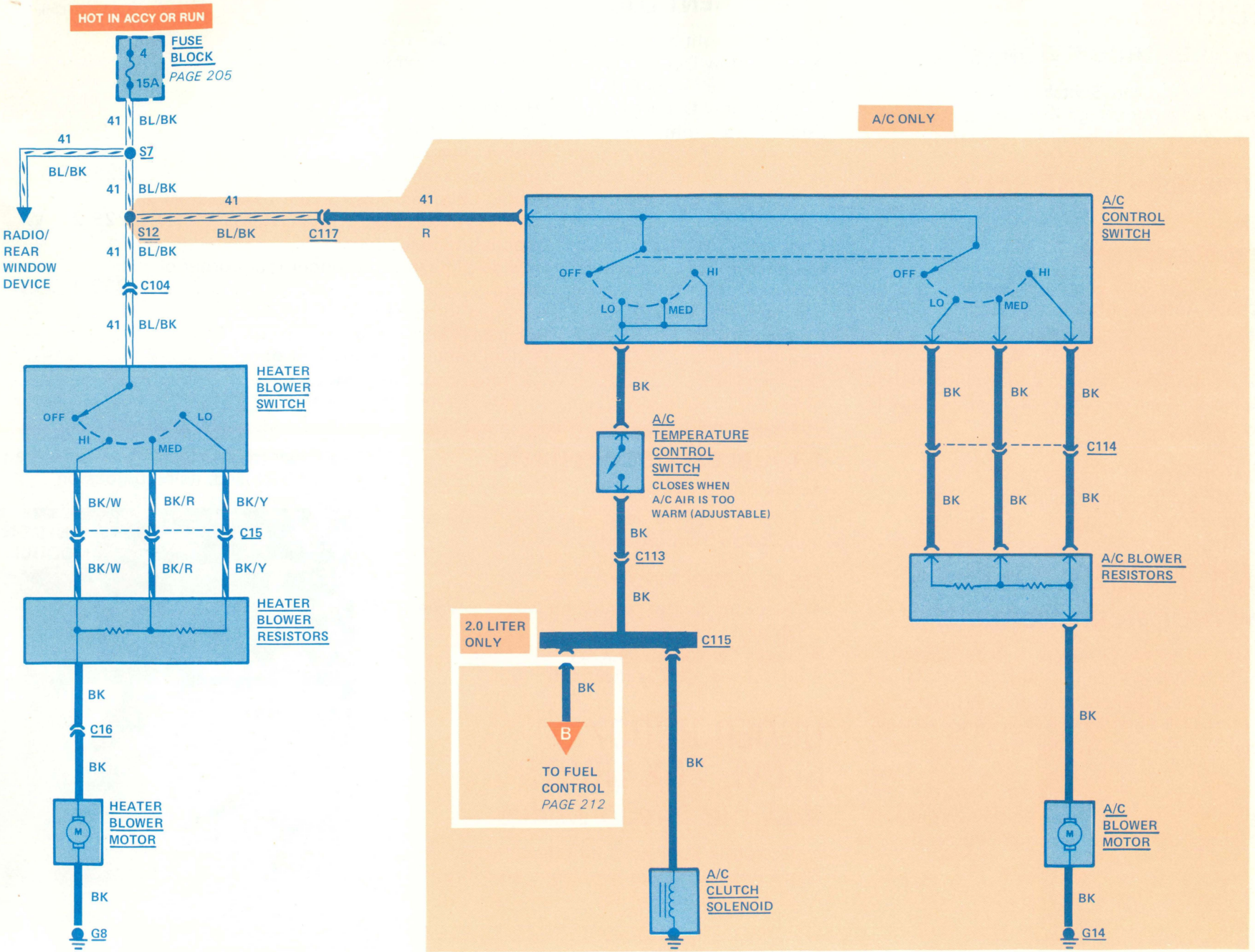


Figure 1 - Rear Of LH Fender Apron (2.3 Liter)


HOT IN ACCY OR RUN
4
15A
FUSE BLOCK
PAGE 205
41 BL/BK
41
S7
BL/BK
41 BL/BK
41
S12
BL/BK
C117
41
R
RADIO/ REAR WINDOW DEVICE
41 BL/BK
C104
41 BL/BK
HEATER BLOWER SWITCH
OFF
LO
HI
MED
BK/W
BK/R
BK/Y
C15
BK/W
BK/R
BK/Y
HEATER BLOWER RESISTORS
BK
C16
BK
HEATER BLOWER MOTOR
BK
G8
A/C ONLY
A/C CONTROL SWITCH
OFF
HI
LO
MED
OFF
HI
LO
MED
BK
A/C TEMPERATURE CONTROL SWITCH
CLOSES WHEN A/C AIR IS TOO WARM (ADJUSTABLE)
BK
C113
BK
2.0 LITER ONLY
C115
BK
B
TO FUEL CONTROL
PAGE 212
BK
A/C CLUTCH SOLENOID
BK
BK
BK
BK
C114
BK
BK
BK
A/C BLOWER RESISTORS
BK
A/C BLOWER MOTOR
BK
G14

HEATER

HOW THE CIRCUIT WORKS

With the **Ignition Switch** in ACCY or RUN, current flows through **Fuse 4** and the **Heater Blower Switch** to operate the **Heater Blower Motor.**

The blower switch controls the speed of the motor. In HI, power flows directly to the motor; in MED, through one blower resistor; in LO, both resistors.

TROUBLESHOOTING HINTS

BLOWER DOESN'T WORK

- Check **Fuse 4.**
- Separate **C15.** Set blower switch to OFF. Check for continuity to ground (less than 3 ohms) at all terminals of connector. If bad, check continuity of **Heater Blower Motor** and **Heater Blower Resistors.**
- Check connectors for corrosion (voltage drop).
- Check that **G8** is clean and tight.
- Check continuity of switch and connectors.
- Check resistance of resistors.

A/C-HEAT

HOW THE CIRCUIT WORKS

With the **Ignition Switch** in ACCY or RUN, current flows through **Fuse 4** and the **A/C Control Switch** to operate the **A/C Blower Motor,** the **A/C Clutch Solenoid** and **Fuel Control.** The **A/C Control Switch** controls the speed of the motor. In HI, power flows directly to the motor; in MED, through one blower resistor; in LO, both resistors.

COMPONENT LOCATION

		Page-Figure	Color	Terminals
A/C Blower Motor	RH side of blower assembly			
A/C Blower Resistors	RH side of blower assembly			
A/C Clutch Solenoid	Part of A/C compressor assembly			
A/C Control Switch	Center of blower assembly			
A/C Temperature Control Switch	Center of blower assembly			
Heater Blower Motor	Under center of I/P	217-4		
Heater Blower Resistors	Under center of I/P, to left of blower motor	217-4		
Heater Blower Switch	Part of heating and ventilation controls			
Connector C15	Below center of I/P, near heater blower motor	217-4	BLK	3
Connector C16	Near heater blower motor	217-4	clear	1
Connector C104	Behind center of I/P, near blower motor		BLK	3
Connector C113	Under center of I/P	211-2	RED	1
Connector C114	Under center of I/P	211-2	—	2
Connector C115	LH side of engine cowl near three-way solenoid valve		—	2
Ground G8	Under center of I/P, to left of blower motor	217-4		
Ground G14	RH rear I/P mounting bracket	211-3		

The **A/C Control Switch** also controls the operation of the **A/C Clutch Solenoid** and the **Fuel Control** circuits. The **A/C Temperature Control Switch** closes with warm air flowing through the A/C system to supply power to the **A/C Clutch Solenoid** and the **Fuel Control** circuits. The **Fuel Control System** increases engine idle speed when the air conditioning is operated. Refer to **Fuel Control** circuit for details.

TROUBLESHOOTING HINTS

COMPRESSOR CLUTCH DOES NOT WORK

- Check **Fuse 4** by operating **Heater Blower Motor.** Make sure ground point at **A/C Clutch Solenoid** is clean and tight.
- Separate **C115.** Check for continuity to ground across clutch solenoid field.
- Separate connector at **A/C Temperature Control Switch.** With temperature control in coldest position and warm air blowing through the system, check continuity across switch.
- Check circuit continuities. Check all connectors for corrosion.

NO COOLING OR NOT ENOUGH COOLING

- Check for current at **A/C Clutch Solenoid.**
- Check continuity of the **A/C Temperature Control Switch** and **A/C Control Switch.**
- Check **A/C Compressor** drive belt tension.
- Check refrigerant pressures.

BLOWER DOESN'T WORK