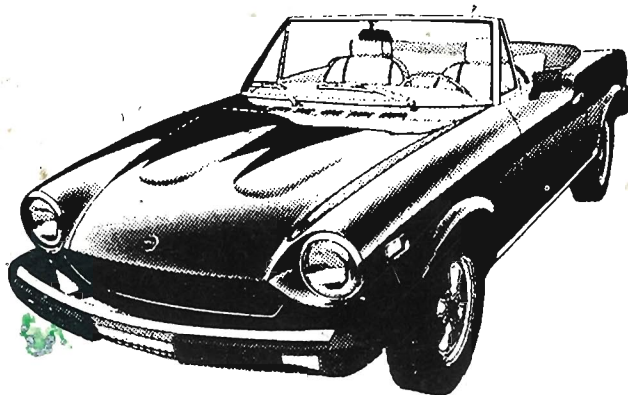


FIAT



SPIDER 2000
ELECTRICAL DIAGNOSTIC MANUAL
1980-1981

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These electrical diagrams have been designed to make troubleshooting easier. Components which work together are shown together. For example, all electrical components used in the Starter circuit are shown on one simple diagram. The IGNITION SWITCH 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. For example, on the Courtesy Lights diagram the DRIVER'S DOOR JAMB SWITCH includes this note: "closed with door open." Switches and sensors are usually shown in the "at rest" position, as if the engine were warm but the IGNITION SWITCH were "Off."

The Charge/Power Distribution diagram shows all connections from the BATTERY and GENERATOR to the IGNITION SWITCH, LIGHT SWITCH and fuses. If you combine the Charge/Power Distribution diagram with any other circuit diagram, you will have a complete picture of how the circuit gets its voltage and how it works. Ground diagrams show how several circuits are connected to common grounds.

The Circuit Operation description covers unusual features of each circuit. Circuit Operation also explains the flow of electricity through each circuit from voltage source to ground.

Read Troubleshooting for hints on how to find the cause of the problem and repair it. Read the "If" statements and find the one which describes the problem you are working on.

Component Location charts are included on the first page of circuit operation text for each circuit. Use the Component Location charts to find electrical components on the car. Each component is listed with a description of where to find it on the car, and a page/figure reference to a drawing or photo.

General information is also included: 1) a list of electrical symbols and wiring connections; 2) instruction in Electrical Troubleshooting; 3) a Fuse Block drawing, and 4) a table giving conversions from metric to American Wire Gage sizes.

Location References

References to LH, RH, front and rear are made from the driver's seat, looking forward.

WIRE COLOR ABBREVIATIONS	
(Alphabetical Listing)	
BLK	BLACK
BRN	BROWN
DK BLU	DARK BLUE
GRN	GREEN
GRY	GRAY
LT BLU	LIGHT BLUE
ORN	ORANGE
PNK	PINK
RED	RED
VIO	VIOLET
WHT	WHITE
YEL	YELLOW

METRIC SIZE	AWG SIZE
.8	18
1	16
1.5	14
2.5	12
4	10
6	8
10	6
32.0	2

Figure 1 — Wire Size Conversion Table

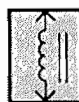
SYMBOLS



COMPONENT SHOWN
COMPLETE AND
ONLY ONCE



COMPONENT
SHOWN IN
MORE THAN
ONE PLACE
OR PART OF
A COMPONENT



**COLD START
VALVE**
SUPPLIES
ADDITIONAL
FUEL FOR
COLD STARTS

NAME OF
COMPONENT

DETAILS ABOUT
COMPONENT
OR ITS
OPERATION

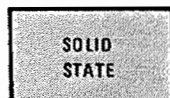


COMPONENT
CASE IS DIRECTLY
ATTACHED TO
METAL PART OF
CAR (GROUNDED)

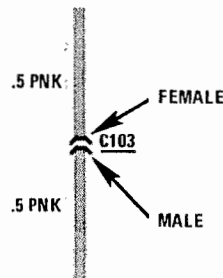


WIRE IS ATTACHED TO
METAL PART OF CAR
(GROUNDED)

GROUND IS NUMBERED
FOR REFERENCE ON
COMPONENT LOCATION CHART

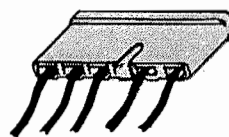


INCLUDES ONLY
ELECTRONIC PARTS

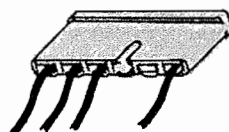


CONNECTOR REFERENCE
NUMBER FOR COMPONENT
LOCATION CHART,

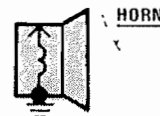
CHART ALSO SHOWS
TOTAL NUMBER OF
PINS POSSIBLE. ALL
CAVITIES MAY NOT
BE USED. SEE
EXAMPLES BELOW



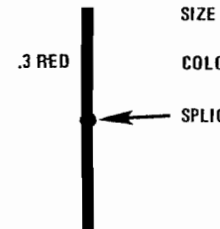
5 CAVITY
CONNECTOR
(5 OUT OF 5 CAVITIES
ARE USED)



5 CAVITY
CONNECTOR
(4 OUT OF 5
CAVITIES ARE USED)

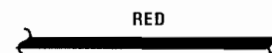


COMPONENT
CONNECTOR
ATTACHED
TO WIRE (PIGTAIL)

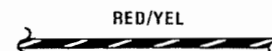


SIZE — WIRE SIZE IS LABELED IN
SQUARE MM (MILLIMETERS)
COLOR — INSULATION COLOR IS
SHOWN AND LABELED
SPLICE — A SPLICE SHOWS THE
CONNECTION OF TWO
OR MORE WIRES

IF NO WIRE SIZE IS
LABELED REPLACE WITH
MATCHING WIRE SIZE



A BREAK IN WIRE
IS SHOWN BY A
WAVY LINE
WIRE INSULATION
IS ONE COLOR



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



FROM
CHOKE
HEATER
RELAY
PAGE 900



TO GENERATOR
PAGE 800

TWO ENDS OF ONE
WIRE SHOWN IN TWO
DIFFERENT PLACES.
ARROW SHOWS POINT
OF BREAK AND
DIRECTION OF
CURRENT FLOW

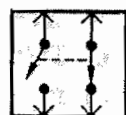


A WIRE WHICH
CONNECTS TO
ANOTHER
CIRCUIT

LIGHTS: TURN/HAZARD/STOP/
FRONT PARK/FRONT MARKER

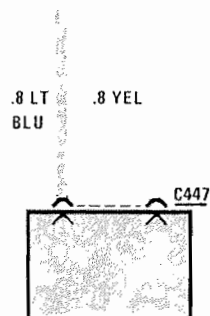


ONE POLE,
TWO POSITION
SWITCH



SWITCHES THAT
MOVE TOGETHER

DASHED LINE SHOWS
AN OPERATIONAL
CONNECTION
BETWEEN PARTS



TWO CONNECTOR
CAVITIES IN THE
SAME CONNECTOR

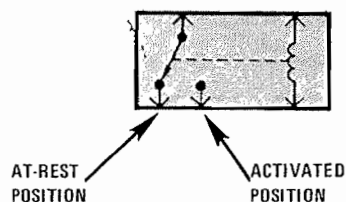
DASHED LINE SHOWS
A PHYSICAL
CONNECTION
BETWEEN PARTS



"EXHAUST GAS"
SENSOR INDICATOR
DISPLAYS THE
LIGHTED WORDS
"EXHAUST GAS"

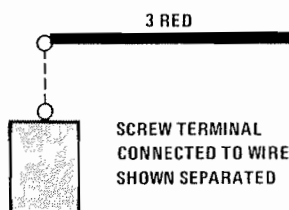


CONNECTOR
ATTACHED TO
COMPONENT

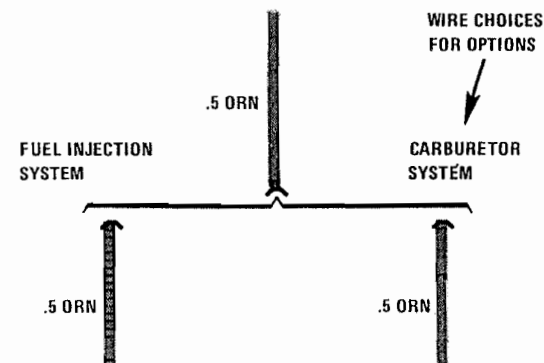


RELAY SHOWN
WITH NO
CURRENT
FLOWING
THROUGH
COIL

WHEN CURRENT FLOWS
THROUGH COIL, CONTACT
MOVES FROM AT-REST TO
ACTIVATED POSITION



SCREW TERMINAL
CONNECTED TO WIRE,
SHOWN SEPARATED



SINGLE
FILAMENT
BULB



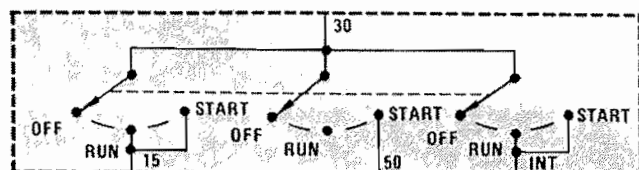
DOUBLE
FILAMENT
BULB



RESISTOR

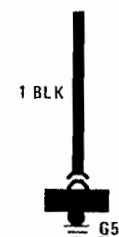


DIODE
CURRENT CAN
FLOW ONLY IN
THE DIRECTION
OF THE ARROW



THREE POLE,
THREE POSITION SWITCH

DASHED LINE SHOWS
OPERATIONAL CONNECTION
BETWEEN PARTS



GROUNDING JUNCTION

ELECTRICAL TROUBLESHOOTING

TROUBLESHOOTING PROCEDURE

1. Check the Problem

Operate the problem circuit yourself to be sure you understand what's wrong. Don't waste time fixing part of the problem!

2. Read the Electrical Diagram

Study the diagram to understand how the circuit should work. Read the detailed description.

3. Find the Cause and Repair It

Use the Troubleshooting section with each circuit.

4. Test the Repair

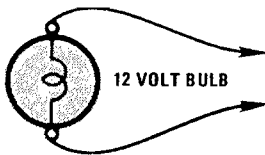
Operate the repaired circuit in all ways to be sure you have fixed the whole problem.

TROUBLESHOOTING TOOLS

The troubleshooting procedures described here require the use of common electrical test equipment.

Test Light: A 12-volt bulb with a set of test leads.

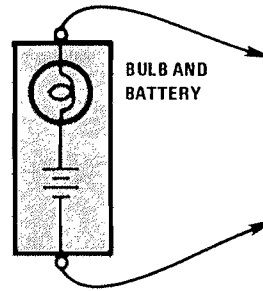
Used for voltage check, short check.



Test Light

Self-Powered Test Light: a bulb, battery, and set of test leads wired in series.

Used for continuity check, ground check.

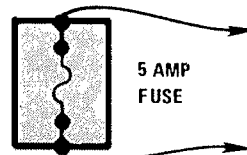


Self-Powered Test Light

Jumper Wire: a fuse holder with a set of test leads.

Used for bypassing open circuits.

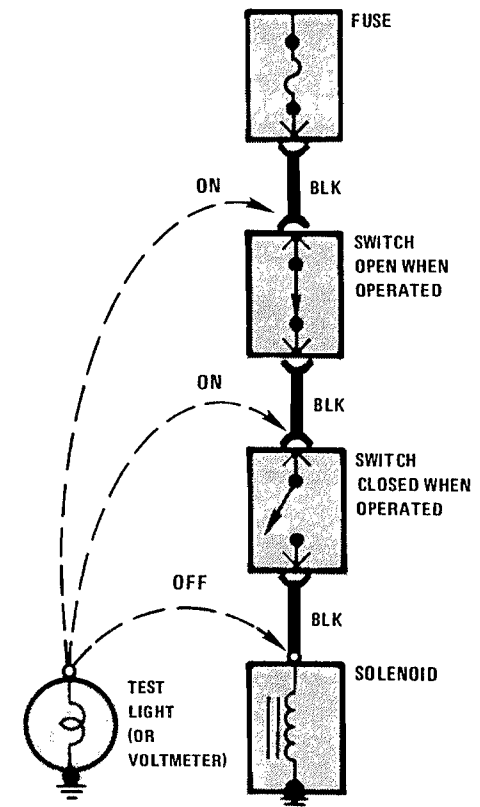
CAUTION: Never use a jumper wire across any load (motors, etc.). This direct battery short may cause personal injury or fire.



Jumper Wire

VOLTAGE CHECK

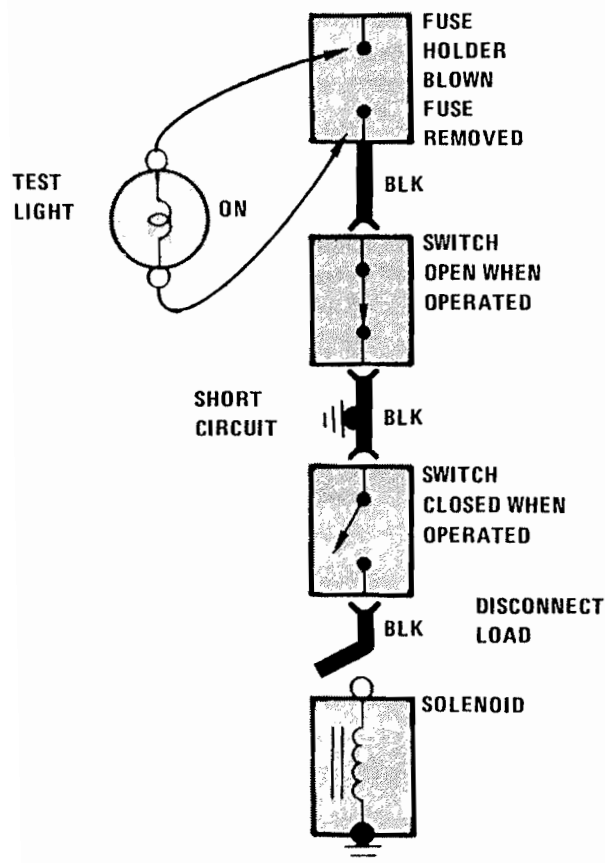
1. Connect one lead of Test Light to a known good ground or negative (-) battery terminal.
2. Connect other lead of Test Light to connector or terminal.
3. If bulb goes on, there is voltage present.



Voltage Check

FINDING A SHORT

1. Remove blown fuse and disconnect load.
2. Connect Test Light across fuse terminals.
3. Beginning near the fuse block, move the harness from side to side while watching the Test Light.
4. If bulb goes on, there is a short to ground in the wiring. Somewhere in that area the wire insulation has worn away and the circuit is grounding.

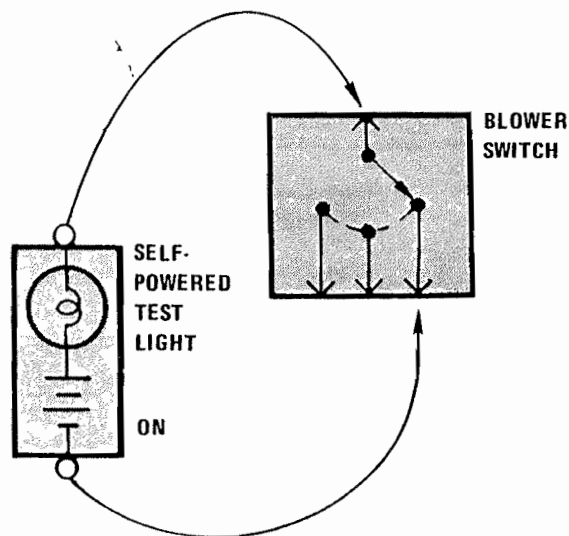


Finding a Short

CONTINUITY CHECK

NOTICE: Be sure no voltage is present in circuit during this test to avoid over-current and damage to parts.

1. Connect one lead of Self-Powered Test Light to one end of the circuit, and the other lead to the other end.
2. If bulb goes on, there is continuity. Switches can be checked the same way.



Continuity Check

GROUND CHECK

NOTICE: Be sure no voltage is present in circuit during this test to avoid over-current and damage to parts.

1. Connect one lead of Self-Powered Test Light to a known good ground, and the other lead to the wire in question.
2. If bulb goes on, there is a good ground.
3. If bulb stays off, there is no ground.

GENERAL TROUBLESHOOTING HINTS

If several circuits fail at the same time, chances are the power (fuse) or ground circuit is faulty.

Use the Fuse Block and Charging System/Power Distribution information to find out which circuits are powered through each fuse.

Use the Ground Distribution diagrams to find out which circuits have a common ground. Many car electrical problems are grounding faults.

FUSE DATA

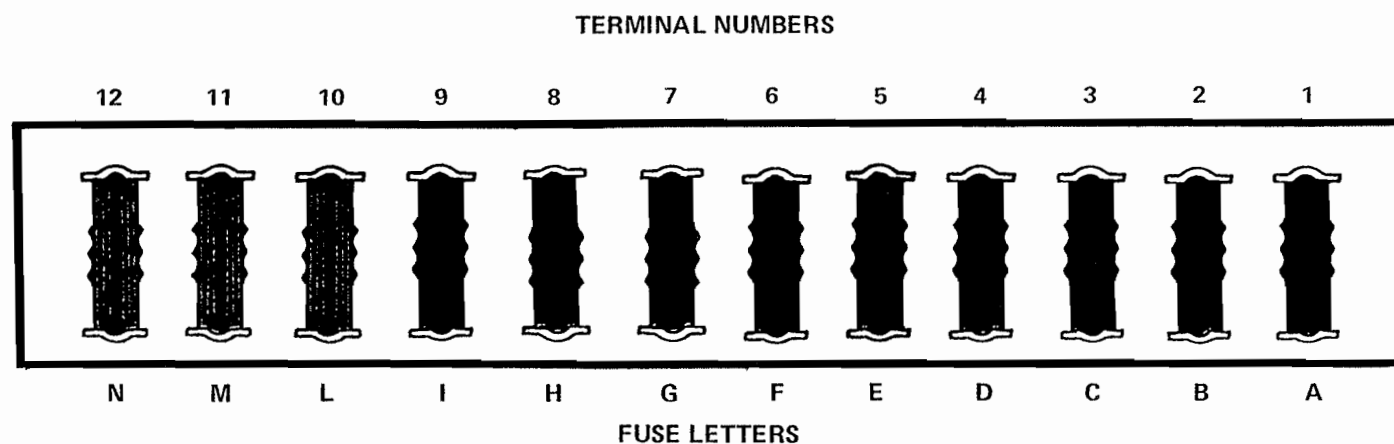


Figure 1 - Fuse Block

PROTECTED CIRCUITS

Fuse A (8-Amps)

Brake indicator
Fasten seatbelt indicator
Seatbelt timer
Seatbelt relay coil
Gear selector light
Backup/stop lights
Fuel warning indicator
Fuel gauge
Coolant temperature gauge
Tachometer
Oil pressure warning indicator
Turn lights
"Exhaust Gas" sensor indicator

Fuse B (8-Amps)

Windshield wiper/washer switch assembly
Windshield washer pump
Windshield wiper motor assembly
Heater fan switch
Lambda sensor switch unit

Fuse C (8-Amps)

LH headlight, hi beam

Fuse D (8-Amps)

RH headlight, hi beam

Fuse E (8-Amps)

LH headlight, lo beam

Fuse F (16-Amps)

RH headlight, lo beam

Fuse G (8-Amps)

LH rear marker light
LH tail light
LH license light

Fuse H (8-Amps)

RH rear marker light
RH tail light
RH license light
Dash panel lights
Lights-on indicator

Fuse I (8-Amps)

Accessory socket
Courtesy light
Clock
Seatbelt chime
Power antenna
Hazard lights
Hi-Lo beam switch

Fuse L (16-Amps)

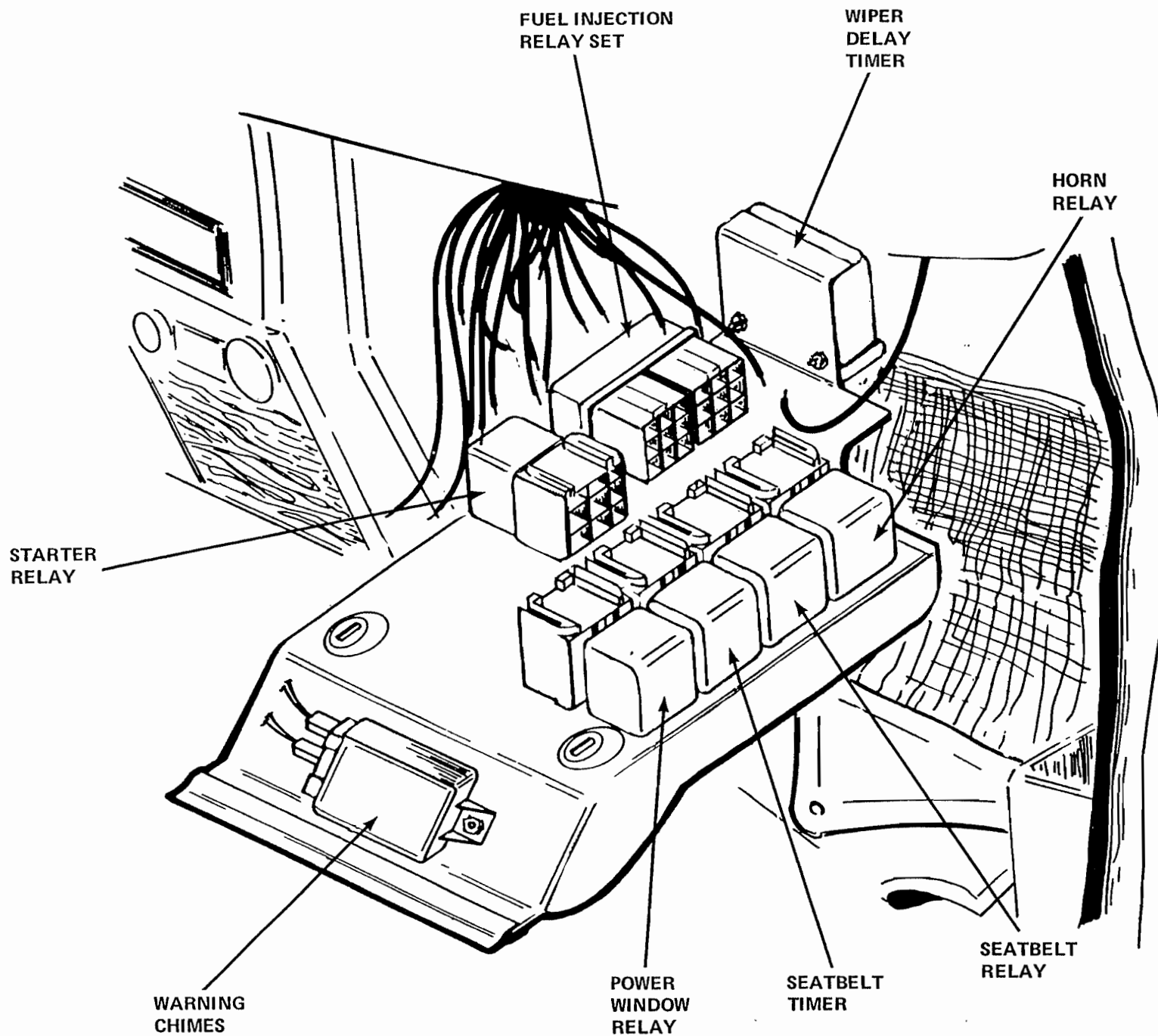
Horn relay
Cooling fan motor

Fuse M (16-Amps)

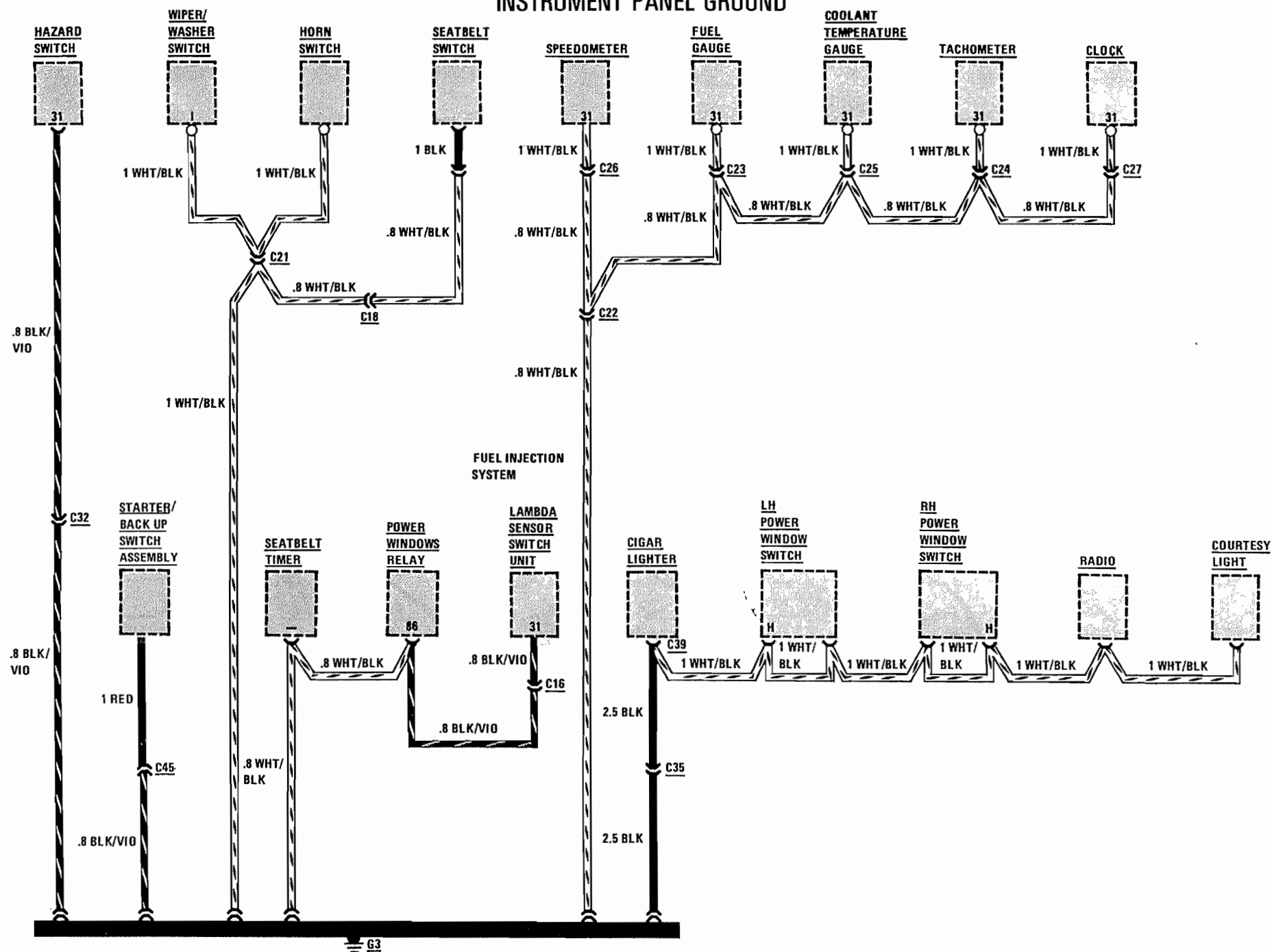
LH power windows

Fuse N (16-Amps)

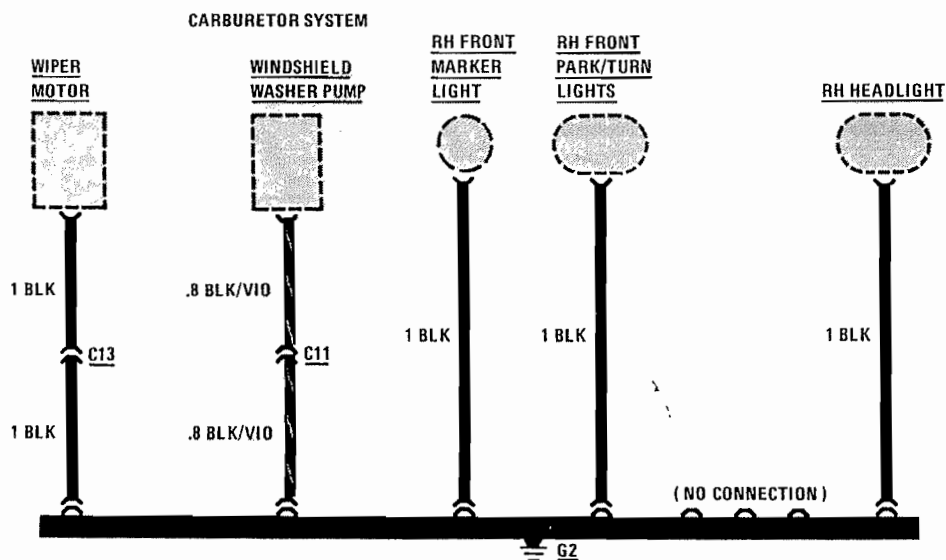
RH power windows



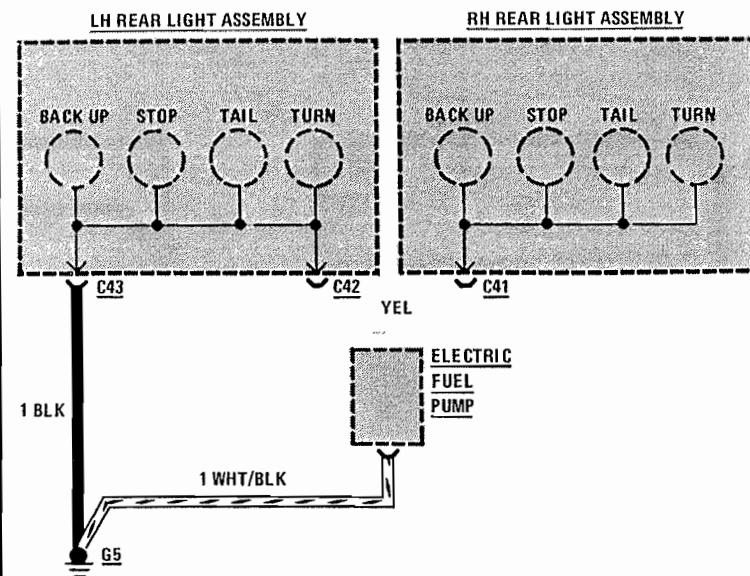
INSTRUMENT PANEL GROUND



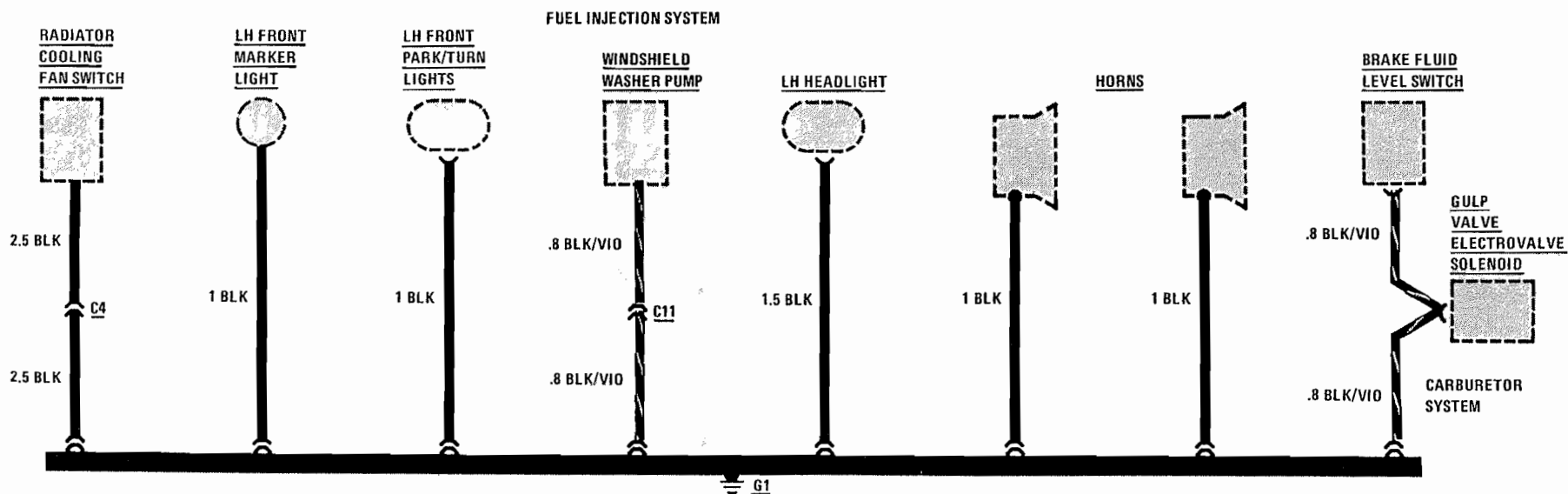
RH FRONT GROUNDING JUNCTION



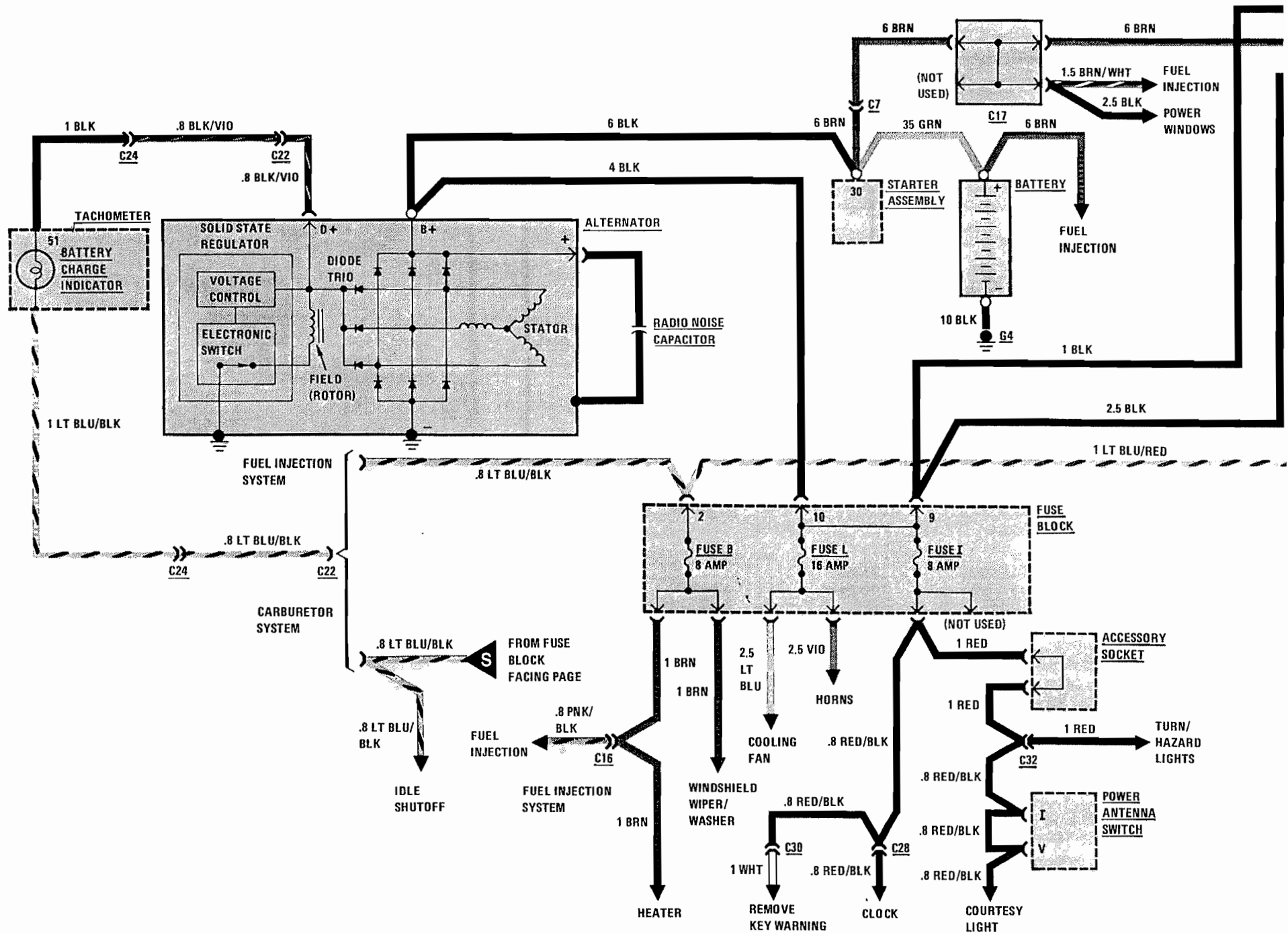
REAR LIGHTS GROUND



LH FRONT GROUNDING JUNCTION



CHARGE/POWER DISTRIBUTION



CIRCUIT OPERATION

Charge

With the IGNITION SWITCH in "Run," 12 volts are applied through the GRN wire, BRN wire, IGNITION SWITCH terminals 30 and INT and the BATTERY CHARGE INDICATOR.

If the ALTERNATOR is not working, current flows through the BATTERY CHARGE INDICATOR and the ALTERNATOR D terminal to ground. The bulb goes on.

If the ALTERNATOR is working, it powers all car electrical equipment and charges the BATTERY. Alternating current is generated by the stator as the field rotates. The rectifier bridges change the alternating current to direct current. Equal voltage is applied through terminal D to the other side of the indicator bulb. The indicator bulb does not go on.

The amount of DC voltage produced by the ALTERNATOR is controlled by the regulator. When the ALTERNATOR output voltage is low, the regulator increases current flowing through the field. This increases the ALTERNATOR output voltage (at terminal B). Field current is supplied directly from the stator's output through the diode trio.

Power Distribution

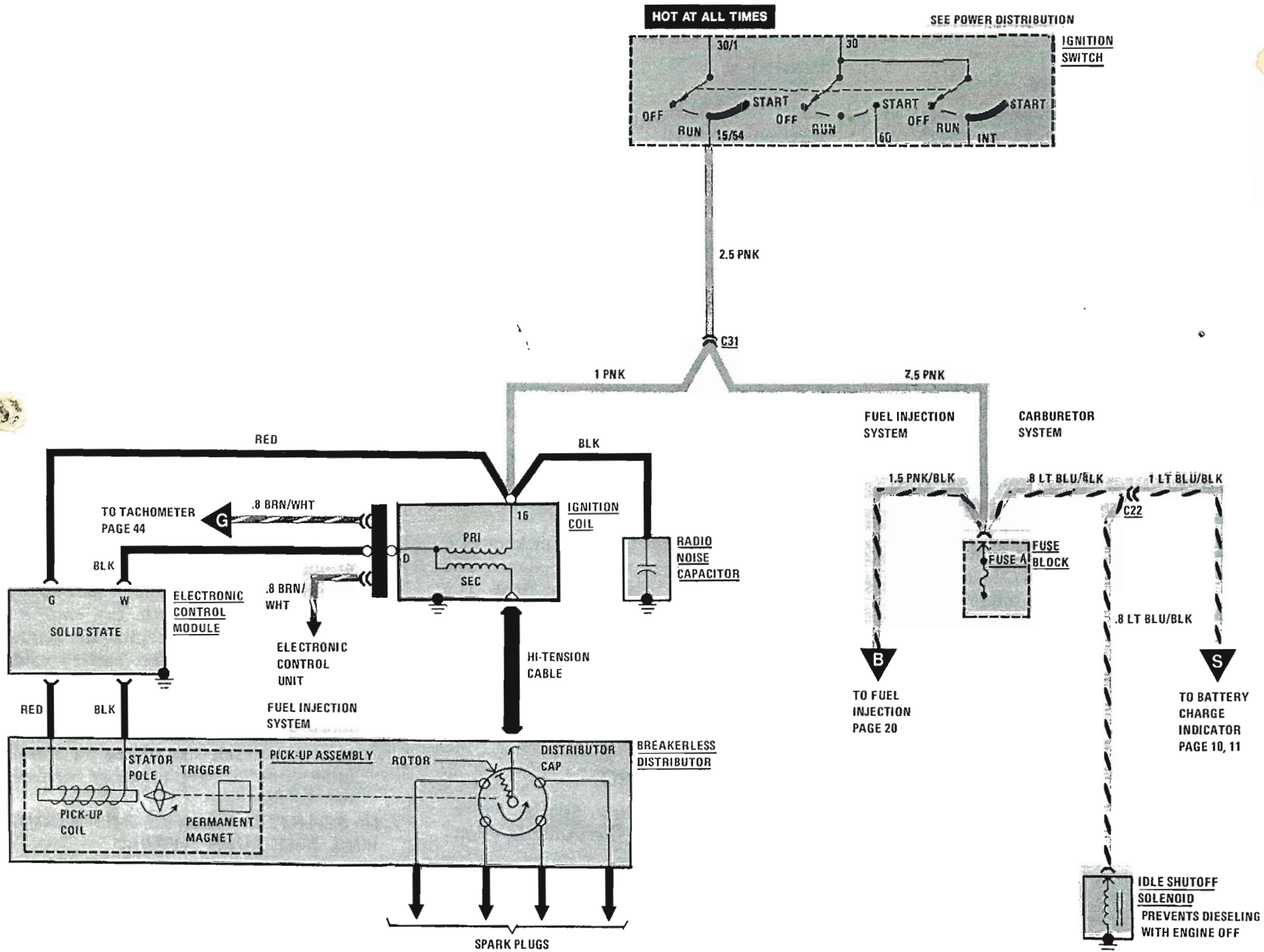
These pages show circuits with common power feeds. FUSES C, D, E and F are not shown here since they are used only in the Headlights circuit. FUSES M and N are also not shown here since they are used only in Power Windows. Use these pages as

COMPONENT LOCATION

Page-Figure

Accessory Socket	Steering column support, behind fuse block ..	30-1
Cigar Lighter		
In-Line Fuse	Under dash panel, behind fuse block	35-1
Fuse Block	Under LH side of dash panel	6-1
Ignition Switch	Lower RH side of steering column	18-5
Light Switch	Dash panel, to left of fuel gauge	37-1
Power Antenna Switch	Center console, below radio	55-2
Radio Capacitor	Behind center of dash panel, near radio	
Seatbelt Timer	Mounted on RH side of relay panel	7-1, 49-4
Starter Assembly	Lower LH rear side of engine	
C7 (1 cavity)	LH front fender, behind alternator	18-2
C16 (5 cavities)	Under RH side of dash panel, above LH side of relay panel	58-2
C17 (4 cavities)	Under dash panel at base of steering column support	36-1
C18 (12 cavities)	Under dash panel at base of steering column support	35-1
C20 (8 cavities)	Behind instrument cluster	31-1
C22 (11 cavities)	Behind instrument cluster	31-1
C24 (7 cavities)	Behind instrument cluster	35-2
C28 (3 cavities)	Behind instrument cluster	31-1
C30 (2 cavities)	Below dash panel, behind ignition switch....	18-5
C31 (5 cavities)	Below dash panel, behind ignition switch....	18-5
C32 (7 cavities)	Behind center of dash panel	55-1
C33 (7 cavities)	Behind center of dash panel	55-1
C36 (8 cavities)	Behind center console, near heater fan.....	58-1
C37 (2 cavities)	Under console, near shift selector	37-2
G4	Attached to right of battery	18-4

a reference when you have a problem that can't be solved by looking at an individual circuit page.



IGNITION

CIRCUIT OPERATION

The Marelli Ignition System consists of an IGNITION COIL, ELECTRONIC CONTROL MODULE, and a BREAKERLESS DISTRIBUTOR. Power is available to the IGNITION SYSTEM when the IGNITION SWITCH is in "Run" or "Start."

Ignition Coil

Voltage is applied to the IGNITION COIL primary from the IGNITION SWITCH. The coil current is regulated by the ELECTRONIC CONTROL MODULE, which is triggered by the PICK-UP ASSEMBLY. The PICK-UP ASSEMBLY sends impulses to the module. At the start of each impulse, the module grounds the IGNITION COIL primary through the BLK wire and terminal W. When the primary coil circuit is switched "On," a strong magnetic field is developed across the primary coil. At the end of each impulse, the circuit is switched "Off." The strong magnetic field collapses and induces a high voltage in the secondary coil. This high voltage is distributed to spark plugs through the distributor rotor and cap.

Electronic Control Module

The module switches the IGNITION COIL'S primary circuit "On" and "Off." It incorporates a constant current limiter to prevent damage to the coil primary circuit. The module also analyzes the impulses from the distributor's pick-up assembly to provide proper dwell time and spark timing regardless of engine rpm. The coil also provides the rpm signal to the tachometer, and to the ELECTRONIC CONTROL UNIT (in cars with Fuel Injection).

COMPONENT LOCATION

Page-Figure

Breakerless

Distributor.....	Above rear of RH valve cover	15-2
Radio Capacitor	Behind center of dash panel, near radio	
Electronic Control		
Module	Between ignition coil and RH front fender ..	24-2
Idle Shutoff Solenoid.....	LH side carburetor	18-3
Ignition Coil	Attached to RH front fender	43-1
C22 (11 cavities)	Behind instrument cluster	31-1
C24 (7 cavities)	Behind instrument cluster	35-2
C31 (5 cavities)	Below dash panel, behind ignition switch....	18-5

Breakerless Distributor

The distributor is driven by the camshaft of the engine. The distributor shaft has a trigger in place of a breaker cam. The PICK-UP ASSEMBLY mounted in the distributor is electrically connected to the ELECTRONIC CONTROL MODULE.

Pick-Up Assembly

The assembly consists of a pick-up coil, stator pole, and a permanent magnet. The assembly creates a magnetic field. The trigger has four teeth, 90 degrees apart. As a tooth passes through the magnetic field, it causes an electrical impulse in the pick-up coil. This impulse is fed to the ELECTRONIC CONTROL MODULE for controlling the coil primary circuit.

TROUBLESHOOTING

NOTICE: The following **Special Notes** apply to the Marelli Electronic Ignition System:

- **Do Not** energize the ignition unless the coil support base is properly grounded.
- **Do Not** crank the engine with the coil wire disconnected;

- **Do Not** disconnect the coil wire with the engine running.
- **Do Not** start the engine with the instrument cluster disconnected.
- **Do Not** ground the coil lead to the tachometer (black wire), or use diagnostic equipment (or jumper wires) to ground the primary circuit.
- **Do Not** test for current or voltage by "flashing" terminals to each other or to ground.
- The leads to the distributor pick-up may be disconnected while the engine is running without damaging the system.
- **Do Not** disconnect the battery cables while the engine is running; although the ignition system can withstand a peak of 300 volts (for a period of microseconds), the charging system (alternator/ electronic voltage regulator) will be damaged.

IF STARTER CRANKS BUT ENGINE WILL NOT TURN OVER:

- Check for 12V at terminal 16 of the IGNITION COIL.
- Check for proper grounding of the IGNITION COIL support mounting using an ohmmeter. Connect meter between coil

support mounting and negative terminal of battery. Resistance should read .2 ohms or less.

- Check IGNITION COIL resistance with ohmmeter. First disconnect wires from coil. To measure primary coil, read between terminal 16 and terminal D. Reading should be 0.75 to 0.81 ohms. To measure secondary coil read between terminal D and output to distributor. Reading should be 10,000 to 11,000 ohms.
- Check distributor pick-up coil. Remove connector from the ELECTRONIC CONTROL MODULE and, with an ohmmeter, measure resistance of pick-up coil. The reading between the pins of the connector should be 700 to 800 ohms. Then move one of the meter leads to the distributor body to check pick-up insulator. Meter should read infinity (∞).
- Check the gap between stator pole and the teeth of the trigger with a non-magnetic feeler gauge. Reading should be 0.020-0.024 in. (0.5 to 0.6mm).
- Check the ELECTRONIC CONTROL MODULE. Should only be checked after the pick-up coil has been checked to be good.

WARNING: Use insulated pliers to hold HI-TENSION CABLE while testing for spark. A high voltage shock is possible.

Disconnect the HI-TENSION CABLE from the distributor cap. Position the end of the cable approximately less than a 1/4 of an inch from the engine block. Rotate the engine manually and look for a spark as each tooth of the trigger passes the pick-up. This check can also be made with the distributor removed by manually rotating the distributor shaft.

IDLE SHUTOFF

(Carburetor System)

CIRCUIT OPERATION

With the IGNITION SWITCH in "Start" or "Run," current flows through the IDLE SHUTOFF SOLENOID to ground. The solenoid operates and allows fuel to flow in the carburetor idle circuit. When the IGNITION SWITCH is turned to "Off," the solenoid does not operate and fuel flow in the idle circuit is shut off to prevent dieseling.

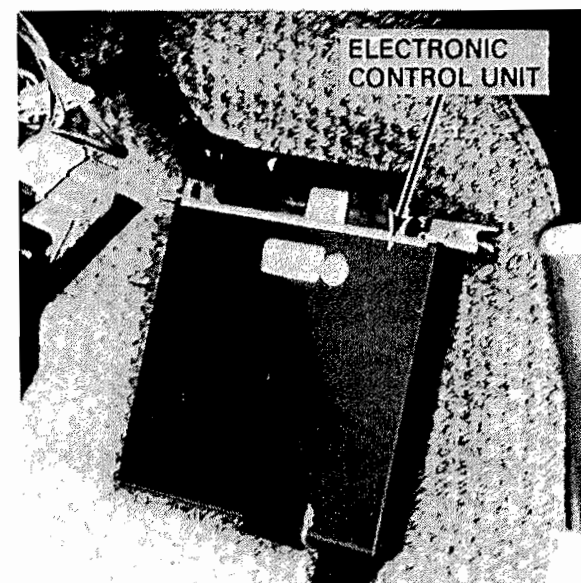


Figure 1 - Under RH Side of Dash Panel

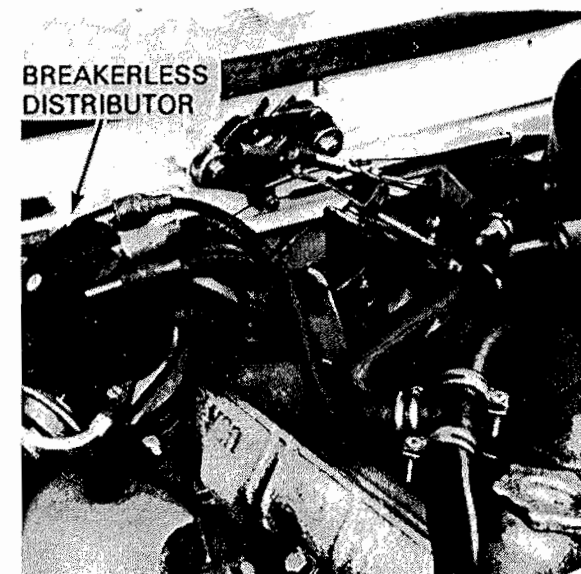
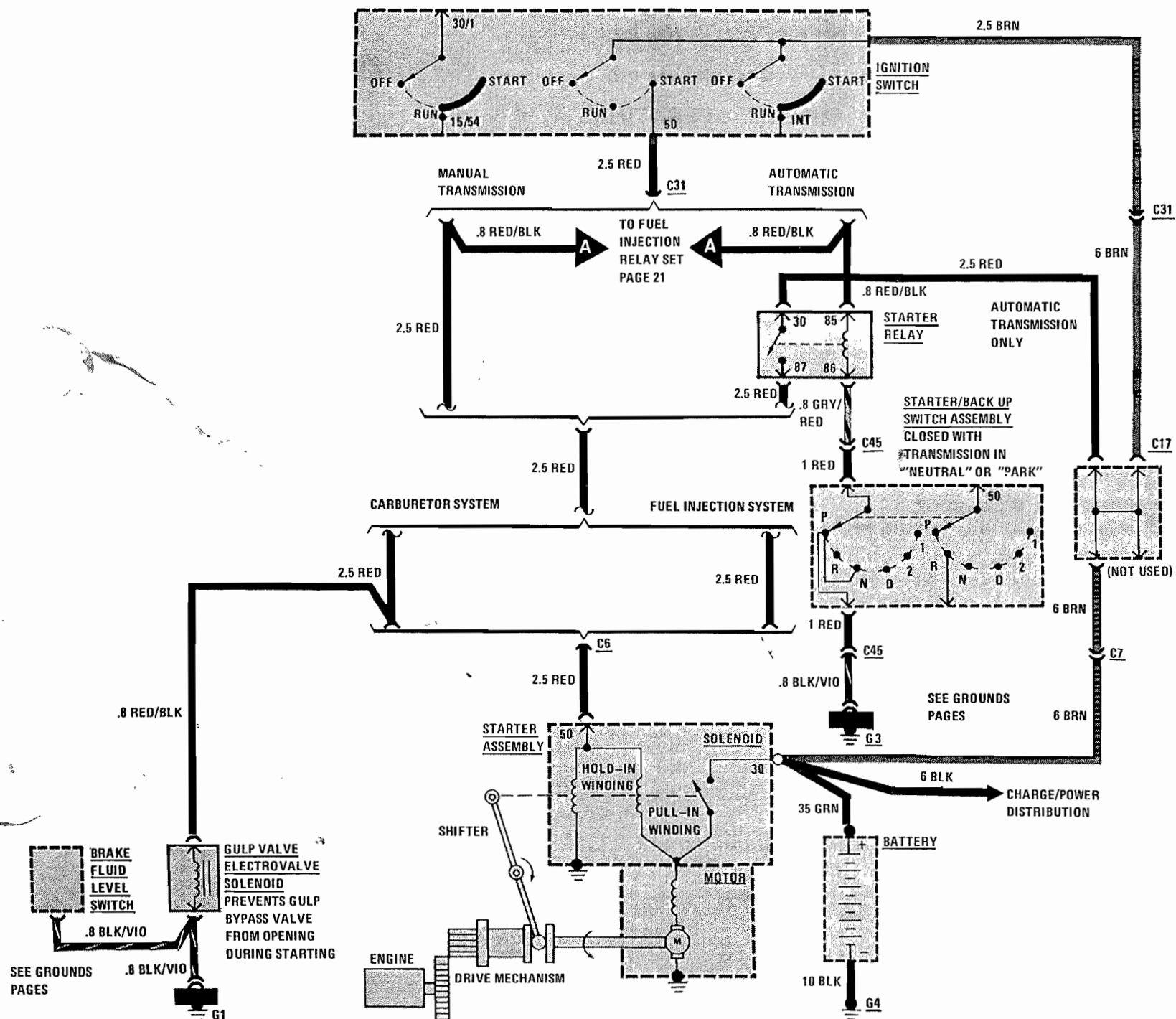


Figure 2 - Top RH Rear of Engine With Carburetor (Fuel Injection Similar)



CIRCUIT OPERATION

With Manual Transmission

Battery voltage is applied at all times to terminal 30 of the SOLENOID, and terminal 30 of the IGNITION SWITCH.

When the IGNITION SWITCH is moved to "Start," current flows through terminal 50 of the SOLENOID, and both the hold-in and pull-in windings (to ground). The hold-in and pull-in windings work together magnetically to pull in the shifter. Current through the pull-in winding also flows through the MOTOR. The MOTOR begins to turn slowly to insure easy meshing of the gear teeth. As the gears mesh, the SOLENOID contacts close. This applies full battery voltage directly to the MOTOR through terminal 30.

When the IGNITION SWITCH is released from "Start," current from the IGNITION SWITCH stops. Current from the BATTERY through the SOLENOID contacts now flows in the reverse direction through the pull-in winding, then continues in normal direction through the hold-in winding. The magnetic force of the hold-in winding is opposed and cancelled by the reverse current through the pull-in winding. The drive mechanism is spring-released and opens the SOLENOID contacts. Voltage to the MOTOR is cut off.

With Automatic Transmission

With automatic transmission, battery voltage is also applied to terminal 30 of the STARTER RELAY at all times. When the IGNITION SWITCH is moved to "Start," voltage is applied through the STARTER RELAY coil, GRY/RED wire, and RED

COMPONENT LOCATION

Page-Figure

Brake Fluid Level Switch	Inside brake fluid reservoir.....	18-3
Gulp Valve Electrovalve Solenoid	LH front fender, behind G1	27-1
Ignition Switch.....	Lower RH side of steering column	18-5
Starter Assembly.....	Lower LH side of engine.....	
Starter/Back Up Switch Assembly (automatic).....	At base of shift selector.....	37-1
Starter Relay.....	LH side dash panel, attached to rear panel .	7-1, 18-1
C6 (1 cavity)	LH front fender, behind alternator.....	18-2
C7 (1 cavity)	LH front fender, behind alternator.....	18-2
C31 (5 cavities)	Below dash panel, behind ignition switch....	18-5
C45 (2 cavities)	Under console, near shift selector	37-2
G1	Attached to front LH fender	49-2
G3.....	Attached under dash panel, above ignition switch.....	18-5
G4.....	Attached to right of battery.....	18-4

wire to the STARTER/BACK UP SWITCH ASSEMBLY. If this switch assembly is closed, current flows through the relay coil to ground. The relay contacts close, and current flows through relay terminal 87, SOLENOID terminal 50 and operates the MOTOR as described above for manual transmission.

With Carburetor System

During starting, voltage is also applied to the GULP VALVE ELECTROVALVE SOLENOID. This prevents the gulp bypass valve from opening.

With Fuel Injection System

During starting, voltage is directed through the RED/BLK wire to the Fuel Injection circuit.

TROUBLESHOOTING

IF STARTER MOTOR DOESN'T RUN:

- Check BATTERY for full charge.
- Check that G4 is clean and tight.
- Check that STARTER ASSEMBLY terminal 30 and BATTERY connections are clean and tight.

IF GULP VALVE ELECTROVALVE DOESN'T ENERGIZE IN "START":

- Check that G5 is clean and tight.
- Check C6.

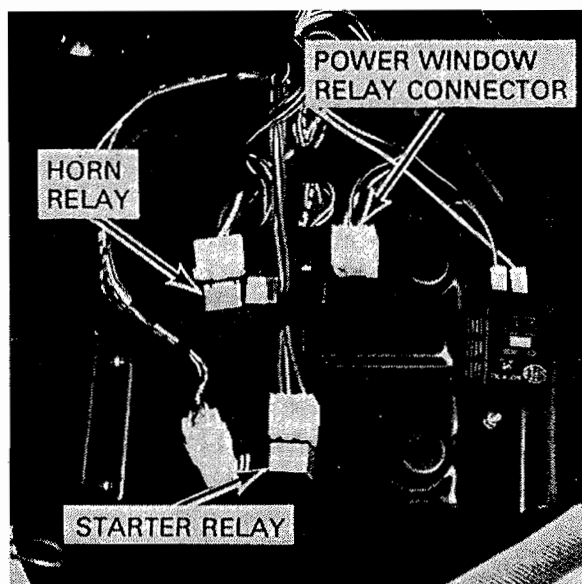


Figure 1 - Top of Relay Panel

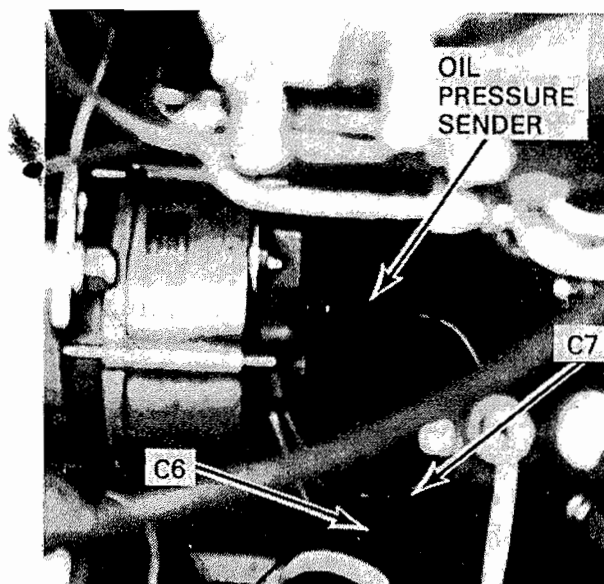


Figure 2 - Behind Alternator - Fuel Injection
(With Carburetor Similar)

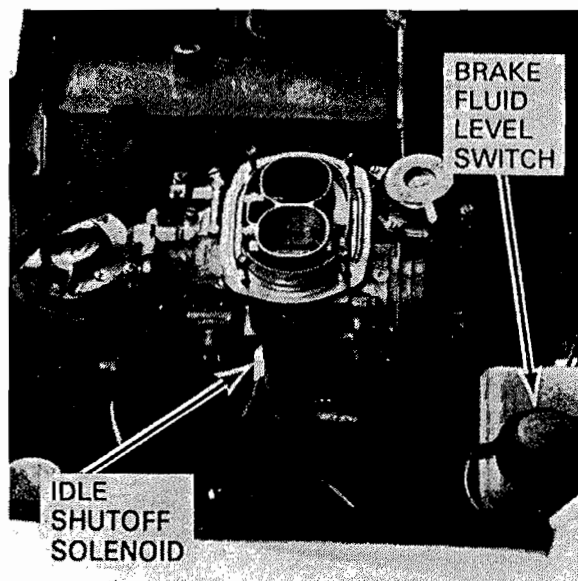


Figure 3 - Top LH Rear Side of Engine - With
Carburetor (Fuel Injection Similar)

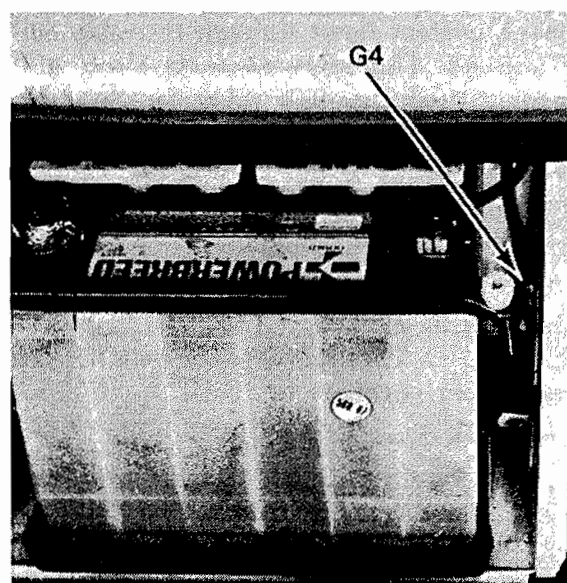


Figure 4 - Front of Trunk

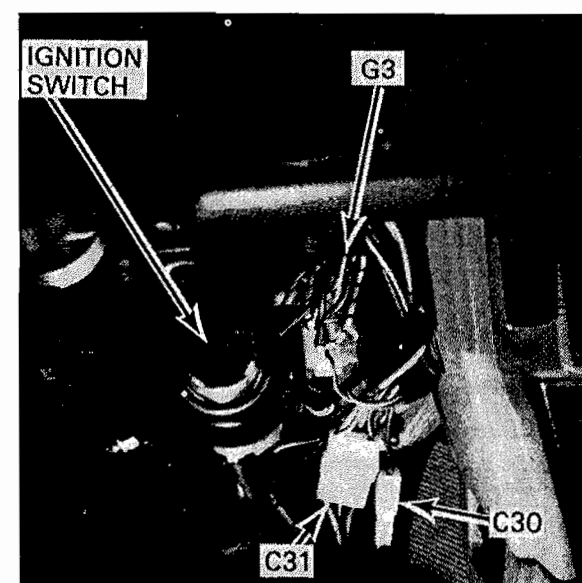
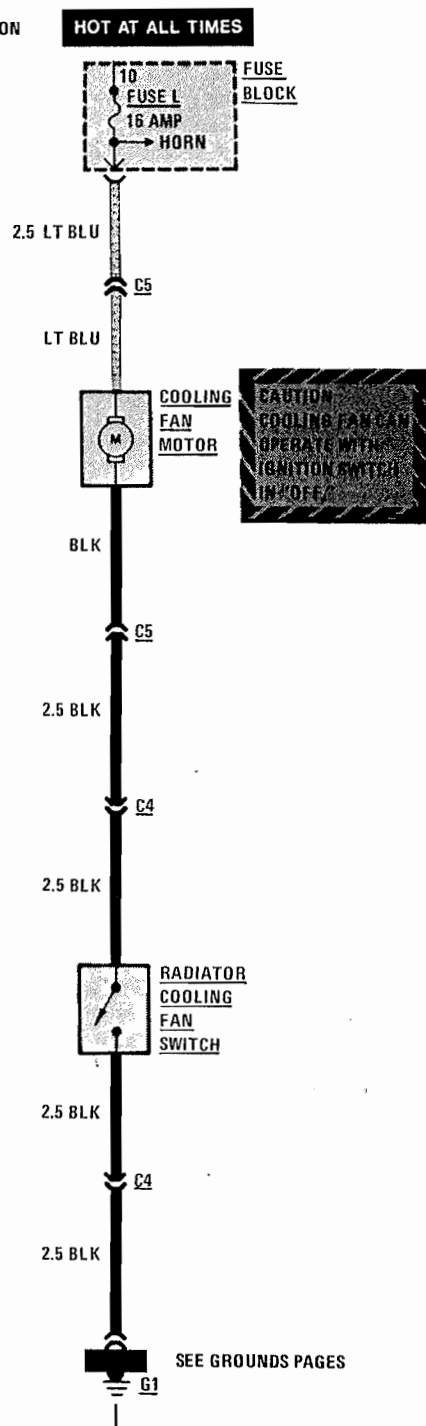


Figure 5 - To Right of Steering Column

SEE POWER DISTRIBUTION



COMPONENT LOCATION

Cooling Fan Motor.....	Behind radiator.....	
Fuse Block	Under LH side of dash panel.....	6-1
Radiator Cooling Fan Switch.....	Lower LH rear corner of radiator.....	19-2
C4 (2 cavities).....	Forward LH front fender apron.....	19-1
C5 (2 cavities).....	Behind LH side of radiator, below radiator hose.....	43-2
G1.....	Attached to front LH fender	49-2

CIRCUIT OPERATION

Voltage is applied at all times through FUSE L and the COOLING FAN MOTOR to the RADIATOR COOLING FAN SWITCH. If the coolant is too hot, the switch closes, grounding the motor through G1.

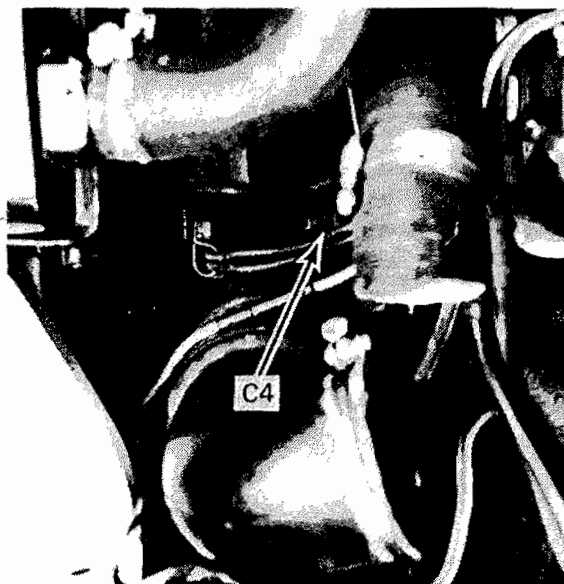


Figure 1 - Behind LH Side of Radiator - With Fuel Injection (Carburetor Similar)

TROUBLESHOOTING

IF COOLING FAN DOESN'T RUN:

- Check FUSE L by sounding HORN.
- Check RADIATOR COOLING FAN SWITCH by disconnecting C4 and grounding the BLK wire with SWITCH IGNITION "Run."

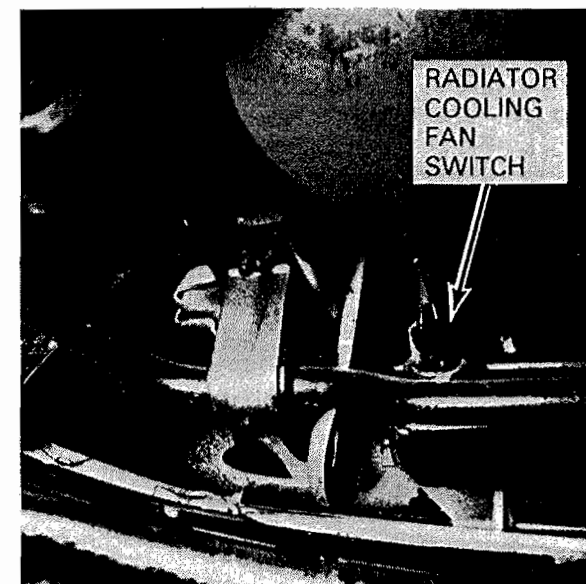
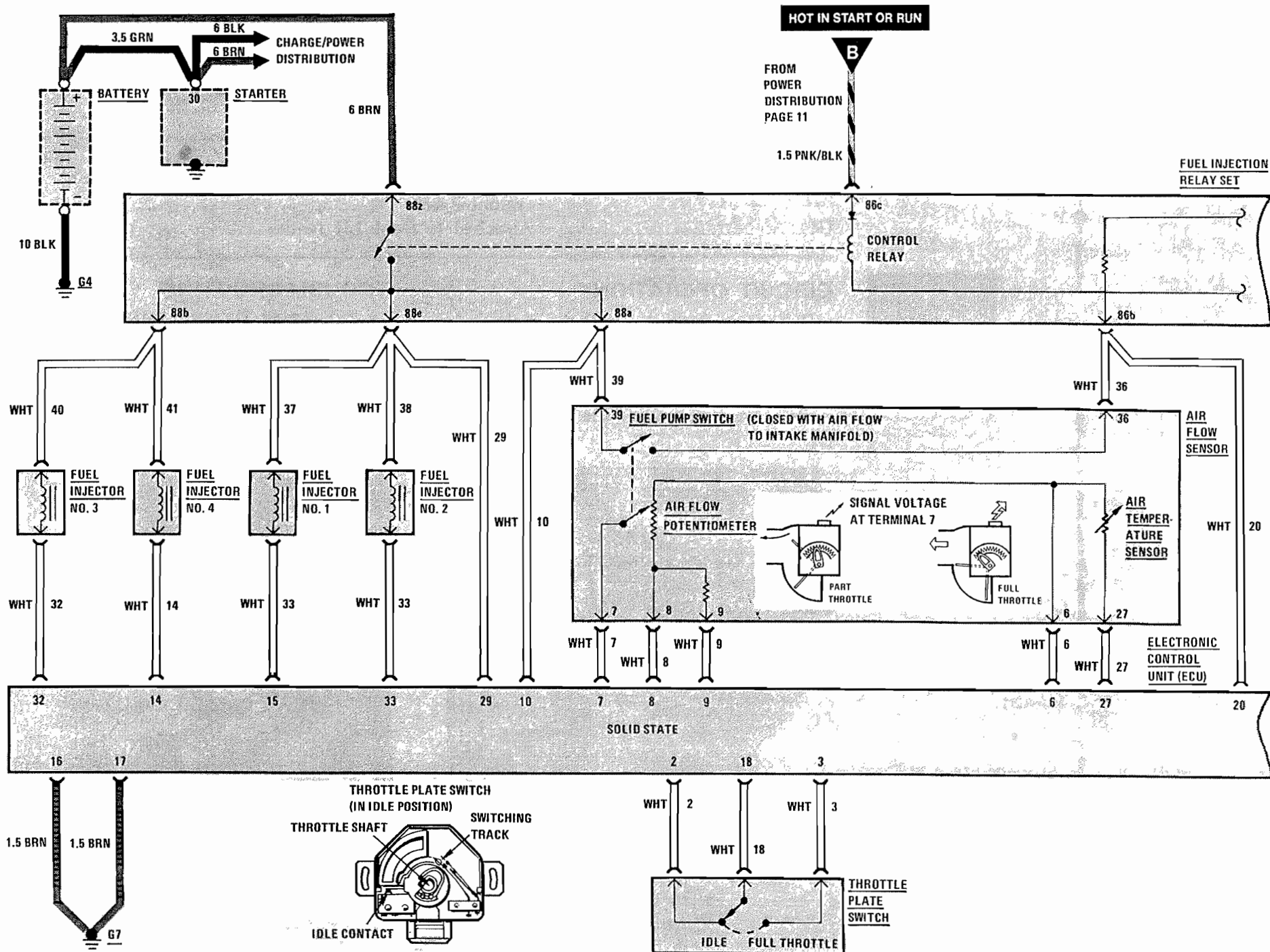
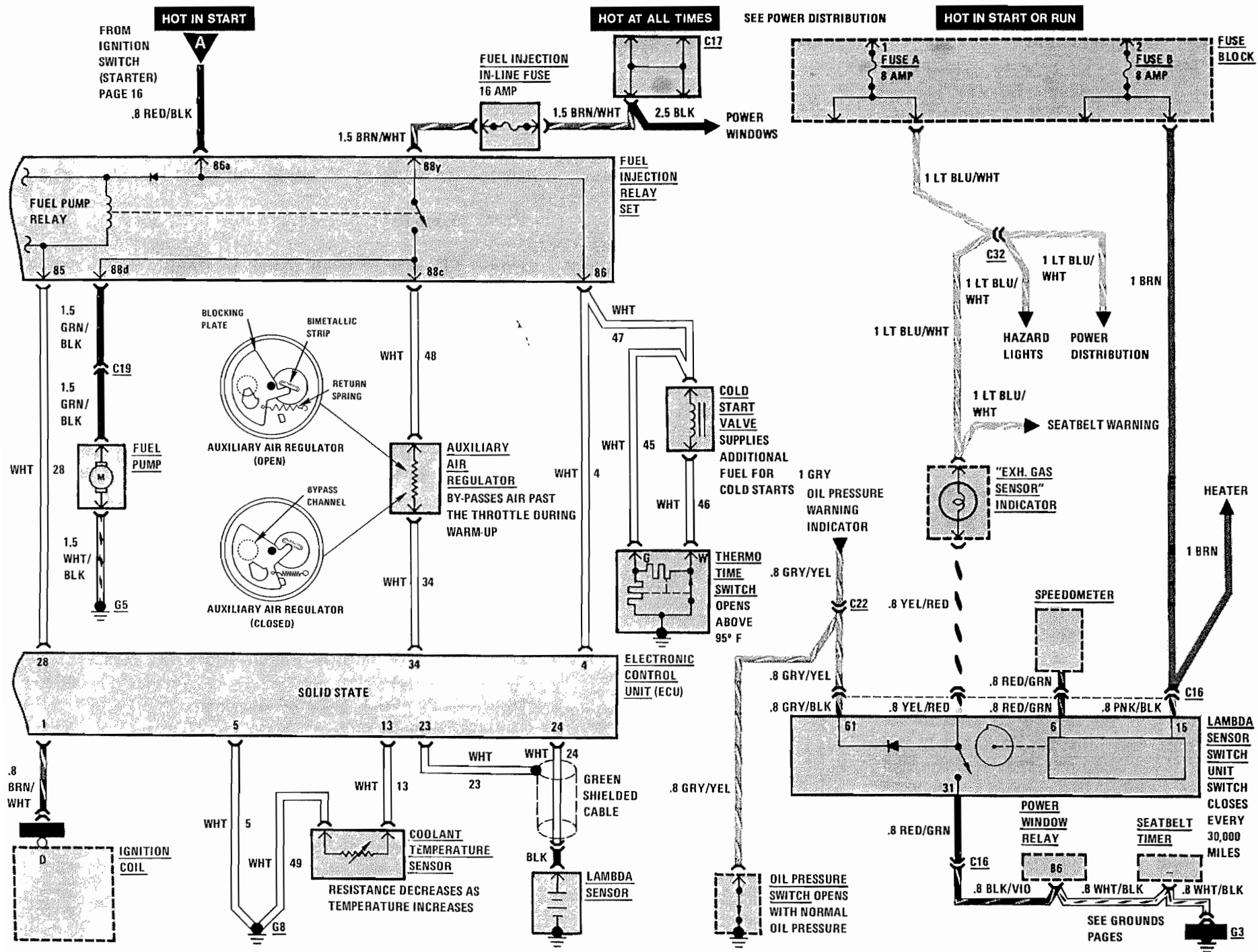


Figure 2 - Behind Lower LH Side of Radiator

FUEL INJECTION





CIRCUIT OPERATION

The Fuel Injection System senses the amount of fuel needed for the proper air/fuel mixture. The fuel is sprayed into the air stream in the intake manifold. Fuel Injection is made up of three major systems: the fuel system, air system and electrical system.

A brief description of each major system will aid in understanding how the entire Fuel Injection System operates electrically.

Fuel System

The fuel system consists of four FUEL INJECTORS, one for each cylinder. The injectors deliver pulses of fuel at the correct pressure to the intake manifold and are controlled by the ELECTRONIC CONTROL UNIT (ECU).

The system also provides additional fuel for cold starting. This is done by the COLD START VALVE, which is controlled by the THERMO TIME SWITCH. The COLD START VALVE operates with the IGNITION SWITCH in "Start" and the THERMO TIME SWITCH closed.

Air System

The air system measures the amount of air drawn into the engine, as well as its temperature, and provides this data to the ECU as input signals. The system also provides bypass air circuits for cold starting.

The AIR FLOW SENSOR contains an AIR FLOW POTENTIOMETER, FUEL PUMP SWITCH and an AIR TEMPERATURE SENSOR.

The AIR FLOW POTENTIOMETER is linked to a plate which senses air flow into

COMPONENT LOCATION

Page-Figure

Air Flow Sensor	To left of RH front fender	25-4
Auxiliary Air Regulator	Top of engine, behind belt assembly	24-4
Cold Start Valve	Connected to front of intake manifold	24-1
Coolant Temperature Sensor	Front of engine	25-3
Electronic Control Unit (ECU)	Under RH side of dash panel, to right of component board	24-2
Fuel Injection In-Line Fuse	Under dash panel, behind fuse block	30-1
Fuel Injection Relay Set	Top LH front corner of relay panel	58-2
Fuel Injectors	LH side of engine, below intake manifold ...	25-6
Fuel Pump	Under LH rear of car	
Ignition Coil	Attached to RH front fender	43-1
Lambda Sensor	Connected to rear of exhaust manifold	25-2, 25-3
Lambda Sensor Switch Unit	Under LH side of dash panel, above accelerator pedal	24-3
Oil Pressure Sender	Lower LH side of engine, above oil filter	18-2
Thermo Time Switch	LH side of engine, below fuel injectors	25-5
Throttle Plate Switch	RH side of intake manifold, on front of throttle assembly	24-1
C16 (5 cavities)	Under RH side of dash panel, above LH side of relay panel	58-2
C19 (1 cavity)	Under dash panel, base of steering column support	30-1
C22 (11 cavities)	Behind instrument cluster	31-1
C32 (7 cavities)	Behind center of dash panel	55-1
G3	Attached under dash panel, above ignition switch	18-5
G4	Attached to right of battery	18-4
G5	In trunk, near LH rear lights	30-2
G7	Attached to RH side of intake manifold	25-5
G8	Attached to RH side of intake manifold	25-5

the engine. The potentiometer senses the position of the plate and sends a voltage signal to the ECU for fuel metering.

When air flow is present, the FUEL PUMP SWITCH closes. This energizes the fuel pump relay coil. The relay contacts close and the FUEL PUMP is operated.

The AIR TEMPERATURE SENSOR measures air temperature and provides an input signal to the ECU. The ECU uses the signal to adjust the amount of time each FUEL INJECTOR is open (to compensate for cold air intake).

The AUXILIARY AIR REGULATOR controls air flow thru a bypass around the throttle plate. This provides additional air during cold starts and warm up. The ECU responds to this additional air by metering more fuel to the engine, raising the idle speed.

Electrical System

The electrical system controls the flow of fuel in order to have the correct air/fuel ratio for all operating conditions. The ECU receives the input signals and computes the correct output signal to the control relay.

With the IGNITION SWITCH in "Start" or "Run," current flows through terminal 86c of the FUEL INJECTION RELAY SET (relay set), the coil of the control relay, terminal 28 of the ECU to G7. The control relay contacts close. Current then flows from the BATTERY through the contacts of the control relay, the FUEL INJECTORS, and the ECU to G7. Because the engine is not yet running, there is no air flow and the FUEL PUMP SWITCH remains open.

With the IGNITION SWITCH in "Start," current also flows through terminal 86a of the relay set and follows three paths: 1) the coil of the fuel pump relay, terminal 85, the ECU to G7; 2) terminal 86, the control unit, to G8; and 3) terminal 86 to the COLD START VALVE and the THERMO TIME SWITCH.

Path 1 causes the contacts of the FUEL PUMP RELAY to close. Current then flows through C17 (from the BATTERY), the FUEL INJECTION IN-LINE FUSE, the contacts of the relay, terminal 88d of the relay set, the FUEL PUMP, to G5. Current also flows through terminal 88c of the relay set, the AUXILIARY AIR REGULATOR, the ECU, to G7.

Path 2 powers a start signal to the control unit at terminal 4. The ECU is then allowed to ground the FUEL INJECTORS (through G7), allowing them to operate.

Path 3 powers the COLD START VALVE through the THERMO TIME SWITCH (when starting with the coolant temperature below 95°F). The switch remains closed and the COLD START VALVE operates, until: 1) the coolant temperature goes above 95°F; or 2) the current flow through the heater in the switch generates enough heat to open the switch.

With the IGNITION SWITCH in "Run," current no longer flows from terminal 86a to operate the fuel pump relay. With the engine running, however, there is air flow to the intake manifold. This causes the contacts of the FUEL PUMP SWITCH to close. Current then flows from the BATTERY, through the contacts of the control relay, terminal 88a of the relay set,

the FUEL PUMP SWITCH, terminal 86b of the relay set, the fuel pump relay coil, control unit terminal 28, to G7. The fuel pump relay contacts remain closed and the FUEL PUMP operates. If the engine stops or stalls, the FUEL PUMP SWITCH opens, stopping the FUEL PUMP.

The COOLANT TEMPERATURE SENSOR provides an input signal that tells the ECU to provide the extra fuel necessary during warm up.

The IGNITION COIL sends an input signal to the ECU that provides engine speed information. The ECU constantly controls the FUEL INJECTORS according to this signal. During deceleration, the IGNITION COIL also transmits a deceleration mode signal to the ECU to stop injection of fuel.

The THROTTLE PLATE SWITCH is located on the throttle shaft (which is operated by the accelerator pedal). The switch indicates whether the throttle is at idle, full throttle, or in between. The switch then signals the ECU accordingly.

The LAMBDA SENSOR is located in the exhaust system. It is an oxygen sensor which measures the oxygen concentration of the exhaust gases, and sends an input signal to the ECU.

When the car is moving, the SPEEDOMETER sends pulses to the LAMBDA SENSOR SWITCH UNIT. The LAMBDA SENSOR SWITCH UNIT contact closes every 30,000 miles. This grounds the "EXH. GAS SENSOR" INDICATOR to remind the owner of the need to replace the LAMBDA SENSOR. When the engine is being started, the OIL PRESSURE SWITCH grounds the indicator to test its bulb.

TROUBLESHOOTING

For troubleshooting, refer to the Fuel Injection Diagnosis Manual.

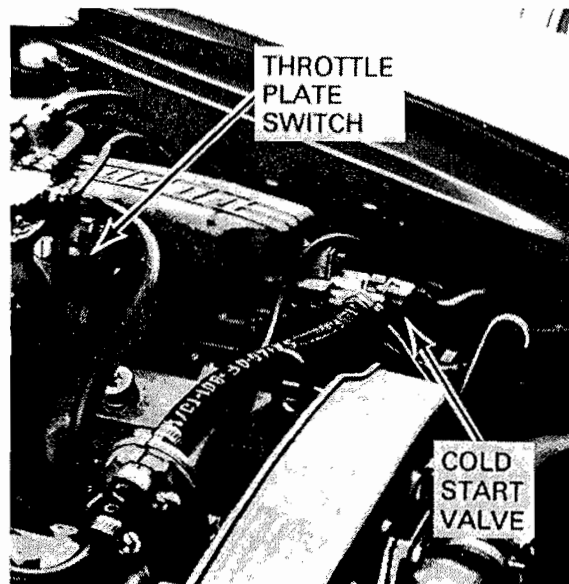


Figure 1 - Top Front of Engine

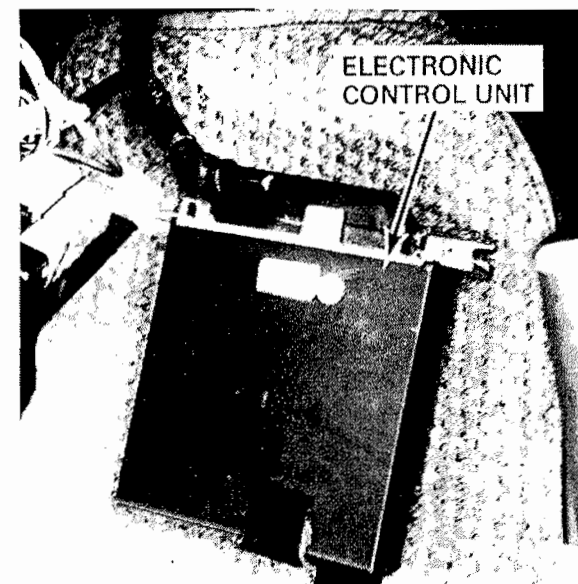


Figure 2 - Under RH Side of Dash Panel

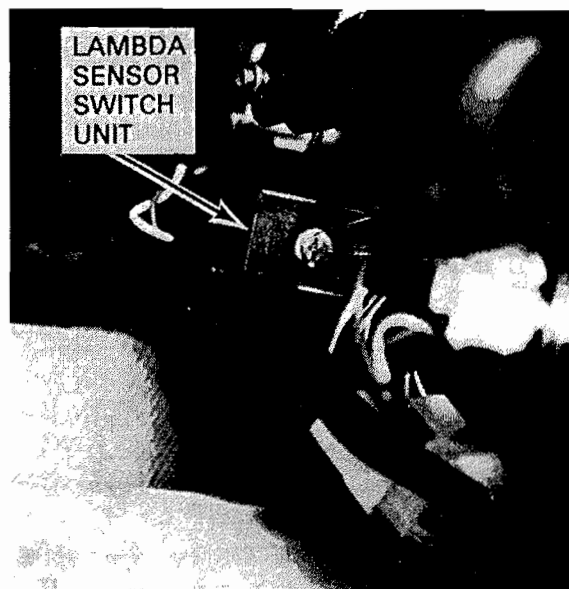


Figure 3 - Under LH Side of Dash Panel,
Right of Steering Column

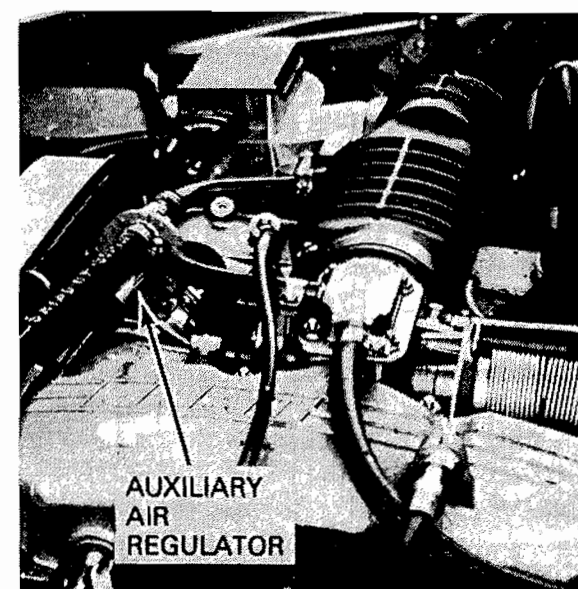


Figure 4 - Top Front of Engine

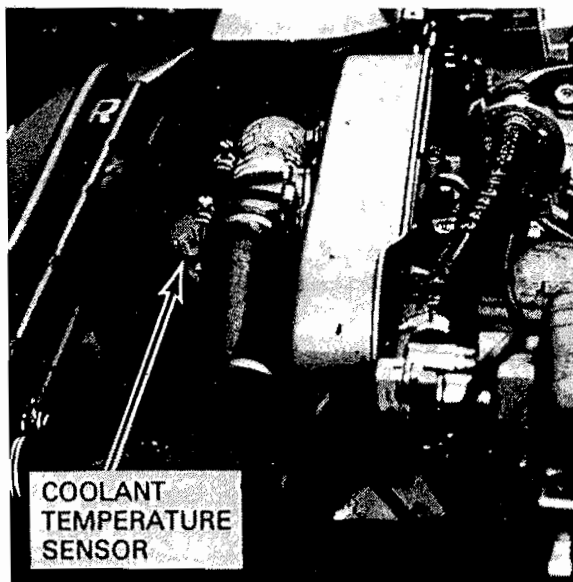


Figure 1 - Behind Radiator

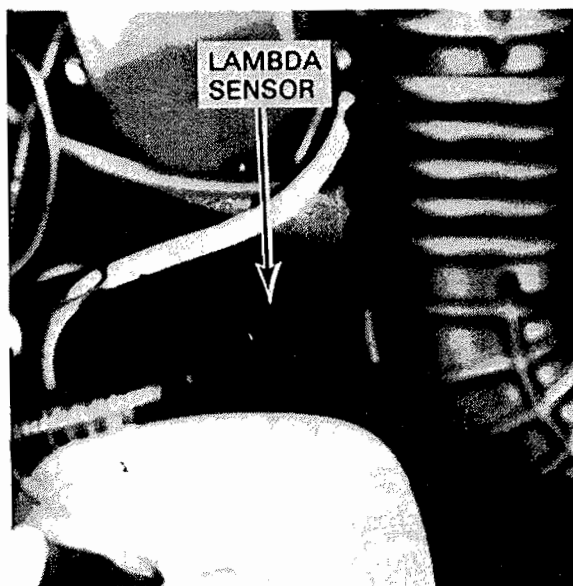


Figure 2 - Lower RH Side of Engine

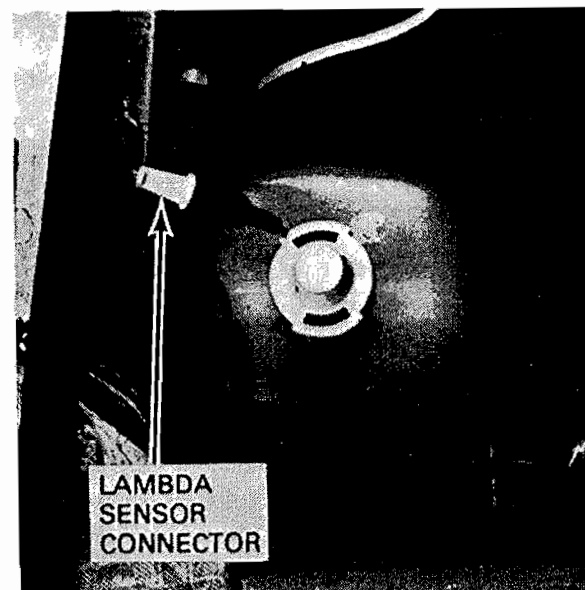


Figure 3 - Above Windshield Washer Reservoir

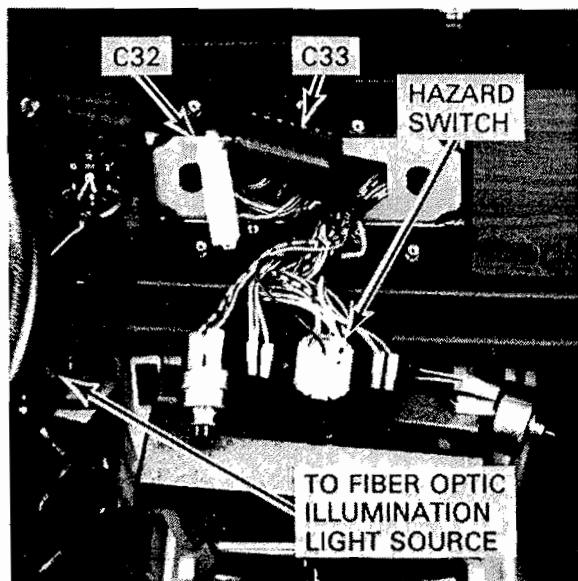


Figure 4 - RH Front Fender

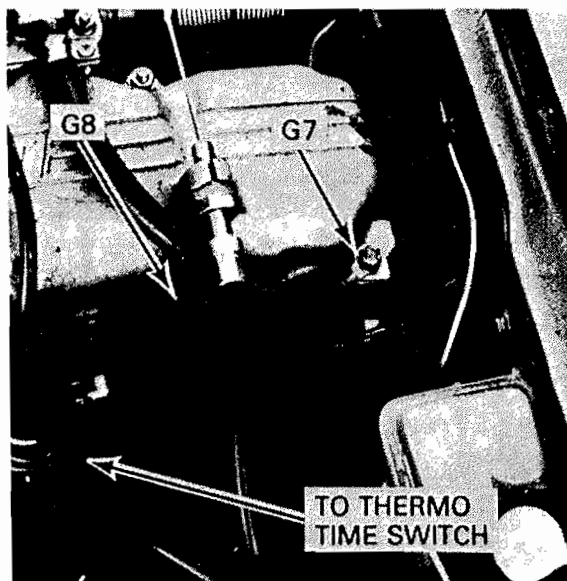


Figure 5 - Lower LH Side of Engine

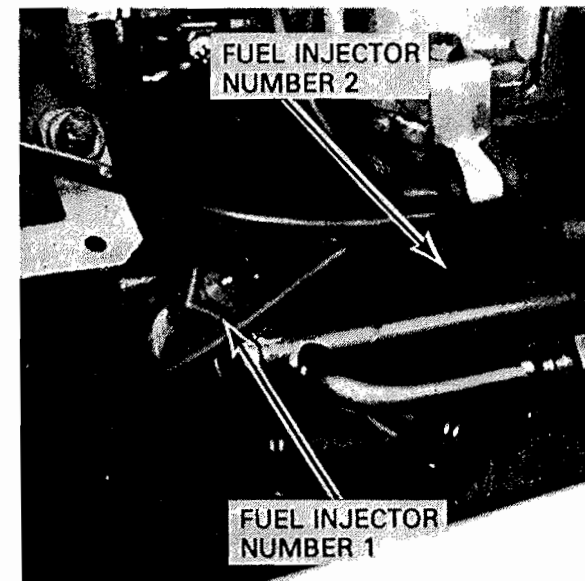
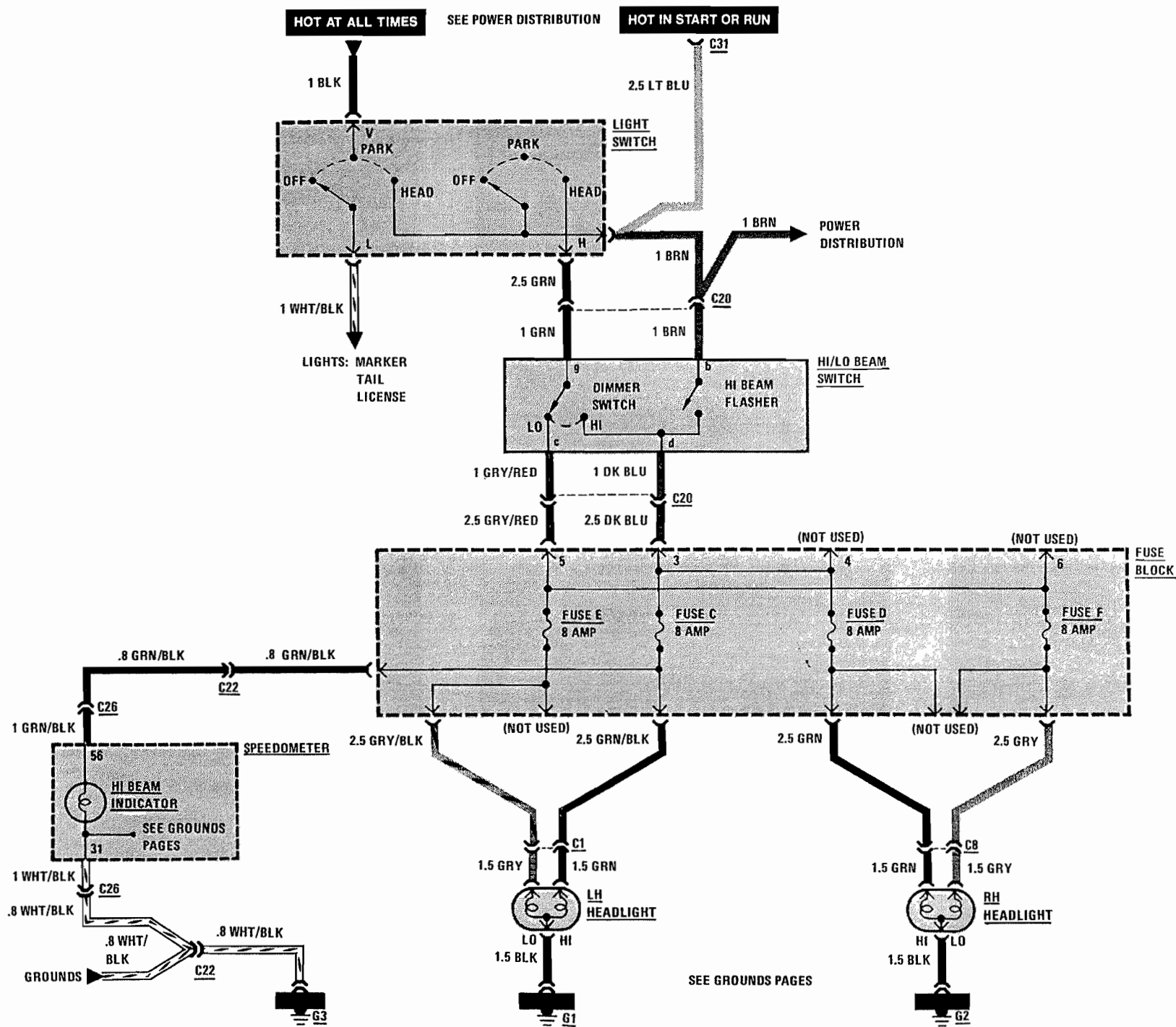


Figure 6 - LH Side of Engine

HEADLIGHTS



CIRCUIT OPERATION

With the IGNITION SWITCH in "Start" or "Run," voltage is applied to the LIGHT SWITCH and hi-beam flasher of the HI/LO BEAM SWITCH.

With the LIGHT SWITCH in "Head," the dimmer switch of the HI/LO BEAM SWITCH directs current through the FUSE BLOCK to either the "Lo" or "Hi" HEADLIGHT filaments and HI-BEAM INDICATOR. With the dimmer switch in "Lo," current flows through FUSES E and F, the "Lo" HEADLIGHT filaments and to ground. With the dimmer switch in "Hi," current flows through FUSES C and D, the "Hi" HEADLIGHT filaments (to ground) and the HI BEAM INDICATOR.

Voltage available through the BRN wire is used for the hi-beam flasher regardless of the position of the LIGHT SWITCH. With the flasher closed, current flows through the DK BLU wire, and to the "Hi" HEADLIGHTS filaments in the same manner as dimmer switch in "Hi."

TROUBLESHOOTING

IF ONE HEADLIGHT DOESN'T WORK IN EITHER "HI" OR "LO":

- Check its ground.

IF THE "HI" OR "LO" FILAMENT OF ONE HEADLIGHT DOESN'T WORK:

- Check its FUSE.
- Check the lamp.

IF BOTH HEADLIGHTS DON'T WORK IN "LO":

- Check continuity of dimmer switch in "Lo."

COMPONENT LOCATION

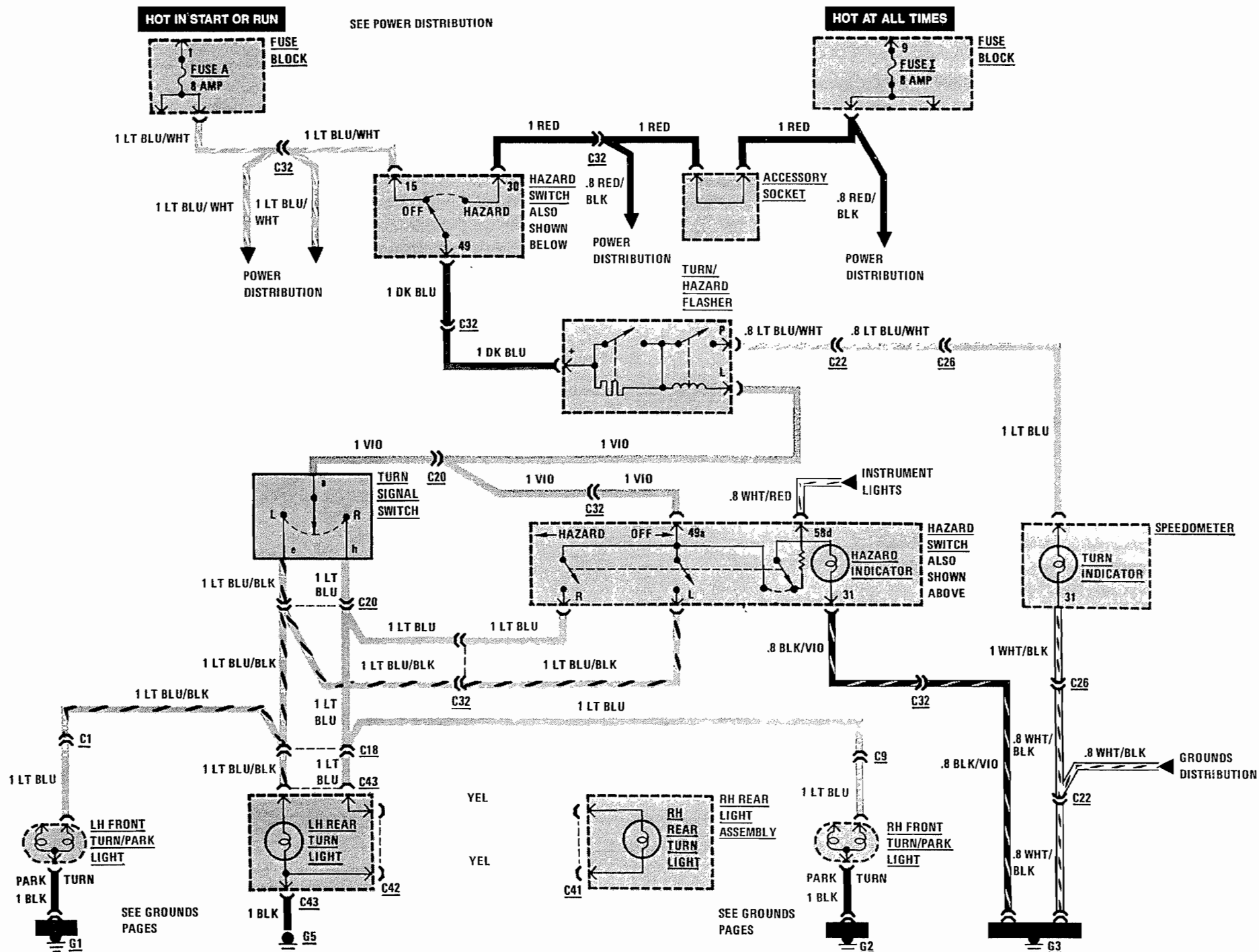
		Page-Figure
Fuse Block	Under LH side of dash panel	6-1
Hi/Lo Beam Switch	Upper LH side of steering column	31-1, 37-1
Light Switch	Dash panel, to left of fuel gauge	31-3, 37-1
C2 (2 cavities)	LH front fender, near early fuel evaporation canister	27-1
C8 (2 cavities)	RH front fender, near ignition coil	33-1
C20 (8 cavities)	Behind instrument cluster	31-1
C22 (11 cavities)	Behind instrument cluster	31-1
C26 (5 cavities)	Behind instrument cluster	35-2
C31 (5 cavities)	Below dash panel, behind ignition switch....	18-5
G1	Attached to front LH fender	49-2
G2	Attached to front RH fender	33-1
G3	Attached under dash panel, above ignition switch	18-5

IF BOTH HEADLIGHTS DON'T WORK IN "HI":

- Check dimmer switch by operating hi-beam flasher.



Figure 1 - LH Front Fender - With Carburetor (Fuel Injection Similar)



CIRCUIT OPERATION

Turn

With the IGNITION SWITCH in "Start" or "Run," voltage is applied through FUSE A and terminals 15 and 49 of the HAZARD SWITCH to the "+" (positive) terminal of the TURN/HAZARD FLASHER. With the TURN SWITCH in "R," current flows through the VIO wires, TURN SWITCH, and LT BLU wires to both the RH FRONT TURN/PARK LIGHT (to G2) and RH REAR TURN LIGHT (to G5). The TURN/HAZARD FLASHER opens and closes the circuit, flashing the lights. The flasher also directs current through the TURN INDICATOR to G3. With the TURN SWITCH in "L," similar current flow takes place to the LH lights.

The HAZARD INDICATOR glows dimly when supplied from the INSTRUMENT LIGHTS circuit through terminal 58a and the resistor.

Hazard

Voltage is applied at all times through Fuse I to terminal 30 of the HAZARD SWITCH. With the HAZARD SWITCH in "Hazard," current flows through terminal 49, the TURN/HAZARD FLASHER, both HAZARD SWITCH terminals L and R, and the REAR TURN LIGHTS and FRONT TURN/PARK LIGHTS to G1, G2, G3 and G5. The flasher opens and closes the circuit as it does for the turn signals, flashing the lights and TURN INDICATOR. Current also flows through the HAZARD INDICATOR to G3.

COMPONENT LOCATION

		Page-Figure
Accessory Socket	Steering column support, behind fuse block ..	30-1
Fuse Block	Under LH side of dash panel	6-1
Hazard Switch		
(With Carburetor)	Middle of dash panel	55-1
(With Fuel Injection)	Center console	
Turn/Hazard Flasher	Attached to steering column support	
Turn Switch	Upper LH side of steering column	31-3, 37-1
C1 (2 cavities)	Forward LH front fender apron	49-2
C9 (2 cavities)	Forward RH front fender apron	33-1
C18 (12 cavities)	Under dash panel, base of steering column support	35-1
C20 (8 cavities)	Behind LH side of instrument cluster	31-1
C22 (11 cavities)	Behind instrument cluster	31-1
C26 (5 cavities)	Behind instrument cluster	35-2
C32 (7 cavities)	Behind center of dash panel	55-1
C41 (6 cavities)	Connected to LH side of RH rear lights	30-3
C42 (6 cavities)	Connected to RH side of LH rear lights	30-2
C43 (7 cavities)	Connected to LH side of LH rear lights	30-2
G1	Attached to front LH fender	49-2
G2	Attached to front RH fender	33-1
G3	Attached under dash panel, above ignition switch	18-5
G5	In trunk, near LH rear lights	30-2

TROUBLESHOOTING

Turn Lights

IF ALL TURN LIGHTS AND TURN INDICATOR DON'T GO ON:

- Check FUSE A by operating SEATBELT WARNING.
- Check flasher and C32 by operating HAZARD SWITCH.
- Check for continuity between terminals 15 and 49 of HAZARD SWITCH.

IF EITHER REAR TURN LIGHT DOESN'T GO ON:

- Check bulb.

IF BOTH REAR TURN LIGHTS DON'T GO ON:

- Check that G5 is clean and tight.

IF THE LH FRONT TURN/PARK LIGHT DOESN'T GO ON:

- Check bulb.
- Check ground.

IF THE RH FRONT TURN/PARK LIGHT DOESN'T GO ON:

- Check bulb.
- Check G2 by operating the WINDSHIELD WASHER PUMP.

TURN/HAZARD LIGHTS

IF ONLY THE PARK OR TURN FILAMENT OF THE TURN/PARK LIGHT WORKS:

- Check the bulb.

Hazard Lights

IF NO LIGHTS OR INDICATORS GO ON IN "HAZARD":

- Check FUSE I by operating COURTESY LIGHT.
- Check flasher and C32 by operating TURN LIGHTS.
- Check for continuity between terminals 30 and 49 of HAZARD SWITCH.

Indicators (Turn and Hazard)

IF ONLY HAZARD INDICATOR DOES NOT GO ON IN "HAZARD":

- Check continuity between terminals 49a and 31 of HAZARD SWITCH.

IF BOTH INDICATORS DON'T GO ON IN "HAZARD":

- Check that G3 is secure.

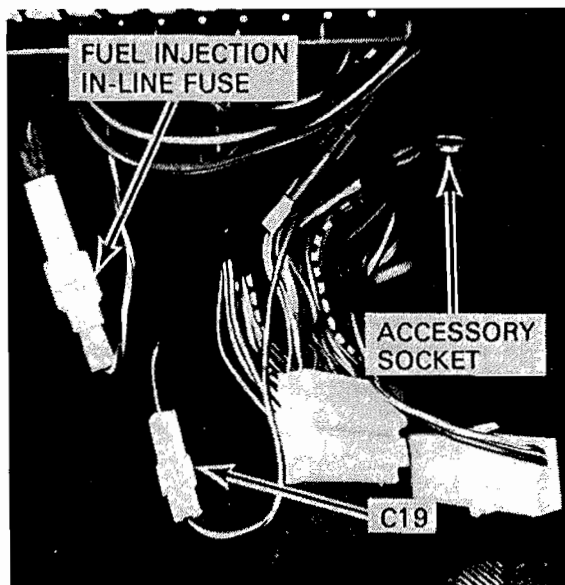


Figure 1 - Under LH Side of Dash Panel

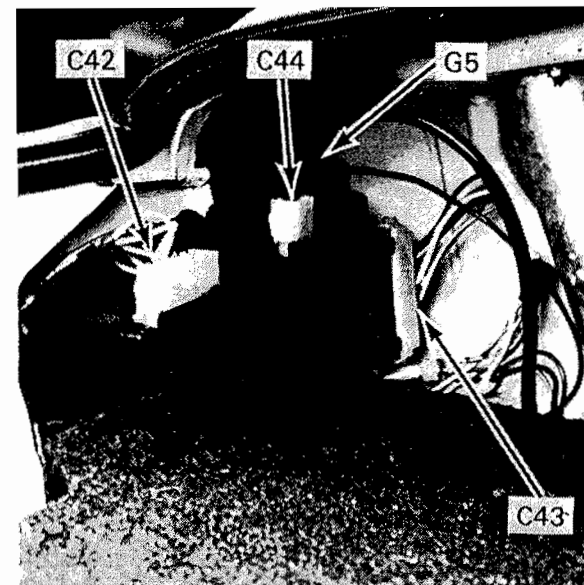


Figure 2 - LH Rear Lights

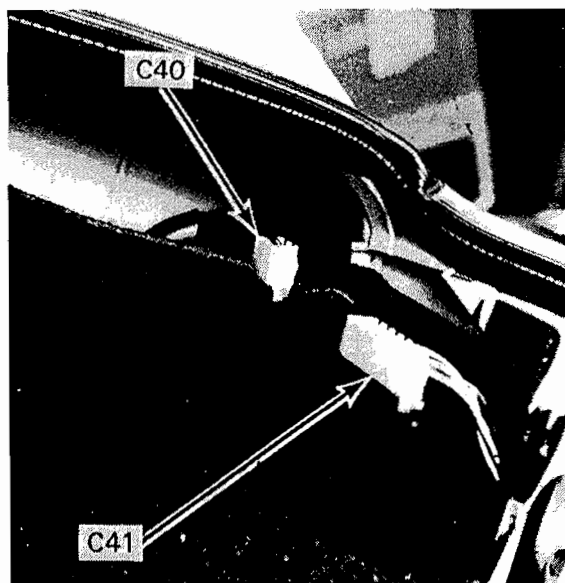


Figure 3 - RH Rear Lights

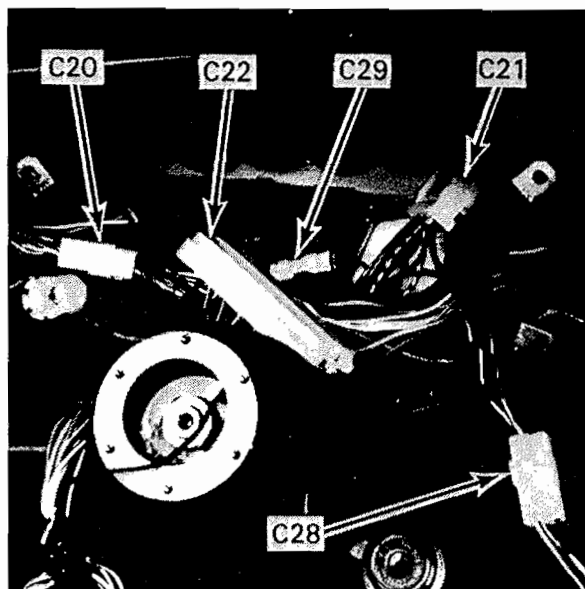


Figure 1 - LH Side of Dash Panel, Behind Instrument Cluster

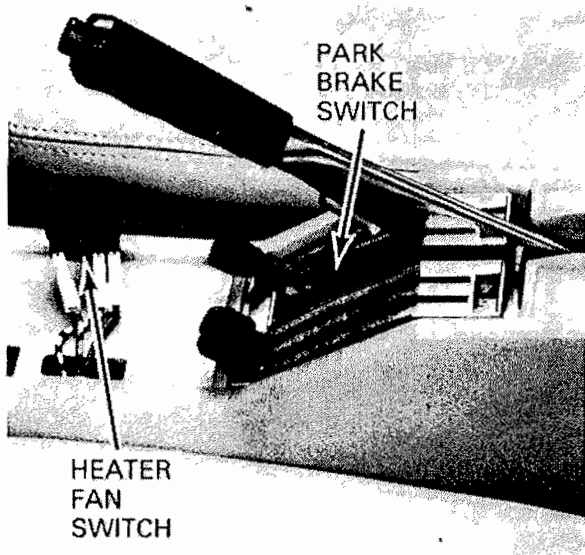


Figure 2 - Base of Park Brake Assembly

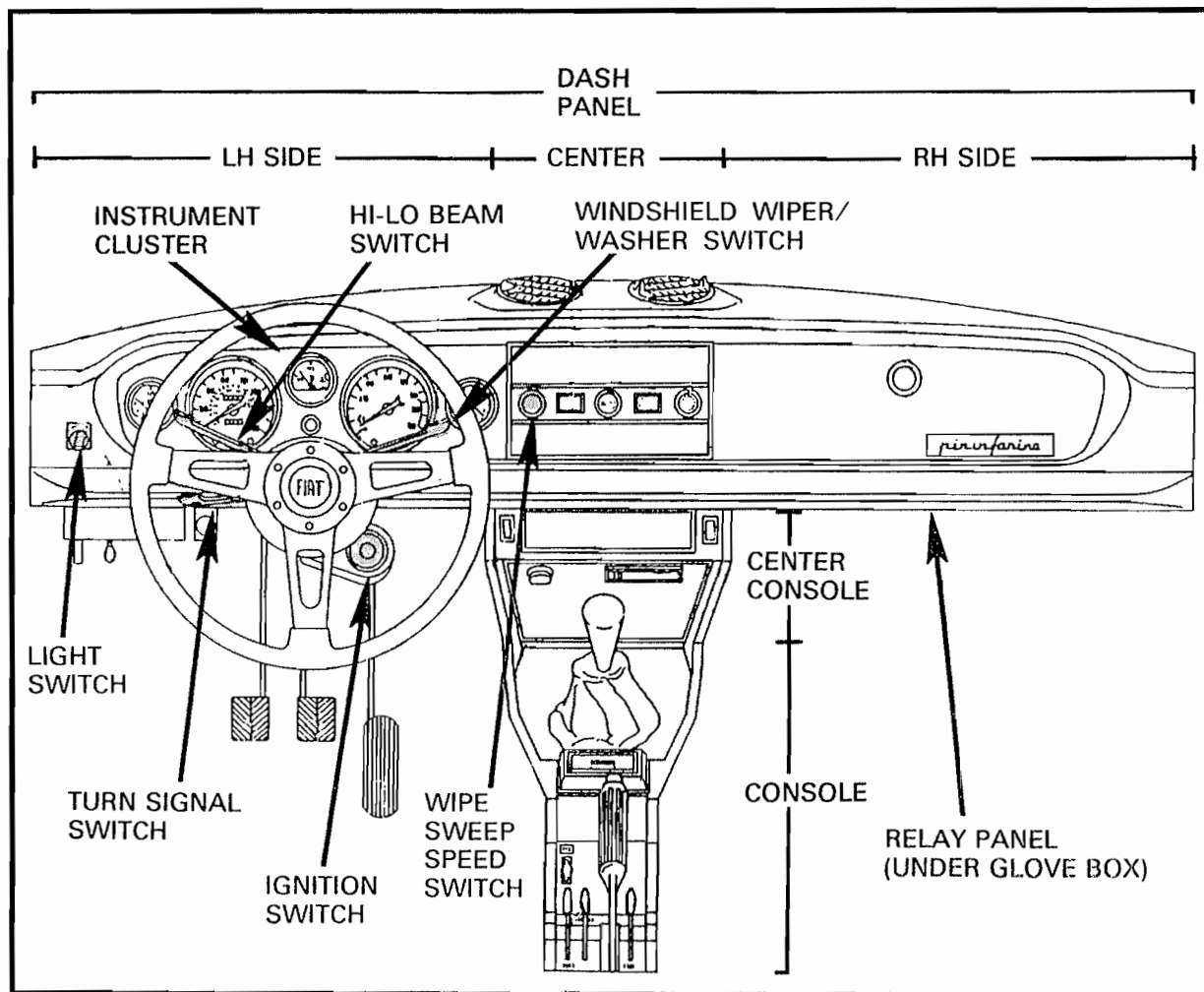
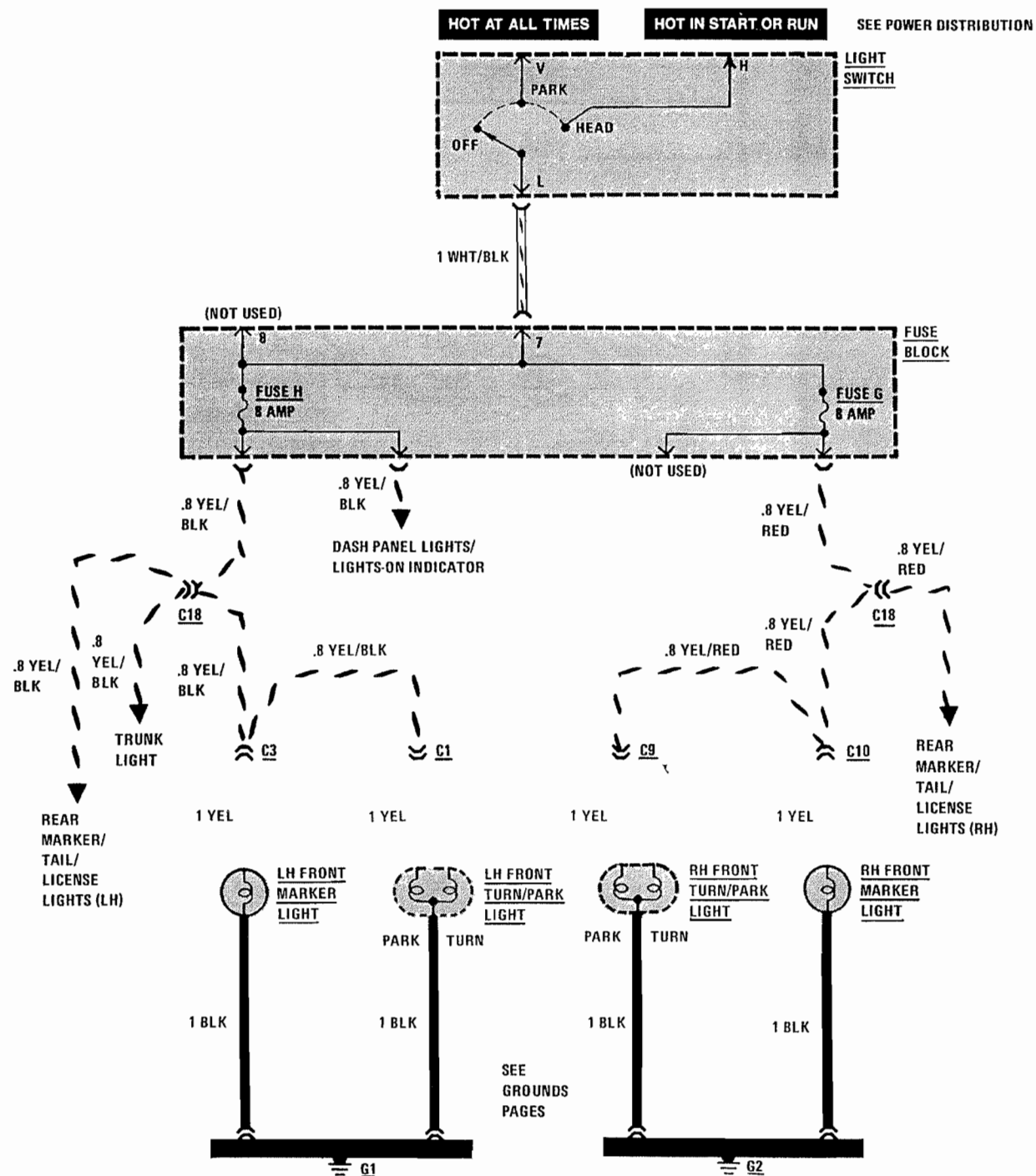


Figure 3 - Dash Panel and Console Assembly

FRONT MARKER/FRONT PARK LIGHTS



CIRCUIT OPERATION

Voltage is applied to the "Park" position of the LIGHT SWITCH at all times. With the switch in "Park," current flows through FUSES H and G, each FRONT MARKER and FRONT TURN/PARK LIGHT to ground.

Voltage is applied to the "Head" position of the LIGHT SWITCH only when the IGNITION SWITCH is in "Start" or "Run." This means that the lights will not go on with the LIGHT SWITCH in "Head" unless the IGNITION SWITCH is in "Start" or "Run."

TROUBLESHOOTING

IF FRONT MARKER OR PARK LIGHTS DON'T GO ON IN "PARK":

- Check continuity of LIGHT SWITCH and FUSE BLOCK by observing REAR TAIL and MARKER LIGHTS.

IF FRONT MARKER OR PARK LIGHTS DON'T GO ON IN "HEAD":

- Check continuity of LIGHT SWITCH and FUSE BLOCK.

IF ONLY THE TURN PORTION OF A TURN/PARK LIGHT WORKS:

- Check the bulb.

IF LH FRONT MARKER AND PARK LIGHTS DON'T GO ON:

- Check FUSE H by observing LH REAR TAIL and MARKER LIGHTS.
- Check that G1 is clean and tight.

IF RH FRONT MARKER AND PARK LIGHTS DON'T GO ON:

- Check FUSE G by operating LH REAR MARKER LIGHTS.

COMPONENT LOCATION

		Page-Figure
Fuse Block	Under LH side of dash panel	6-1
Light Switch	Dash panel to left of fuel gauge	31-3,37-1
C1 (2 cavities)	Forward LH front fender apron	49-2
C3 (1 cavity)	Forward LH front fender apron	49-2
C9 (2 cavities)	Forward RH front fender apron	33-1
C10 (1 cavity)	Forward RH front fender apron	33-1
C18 (12 cavities)	Under dash panel, base of steering column support	35-1
G1	Attached to front LH fender	49-2
G2	Attached to front RH fender	33-1

- Check G2 by operating WINDSHIELD WASHER PUMP.

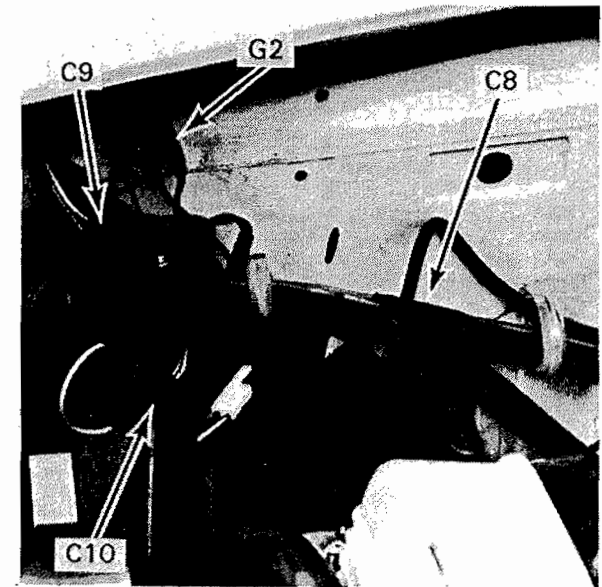
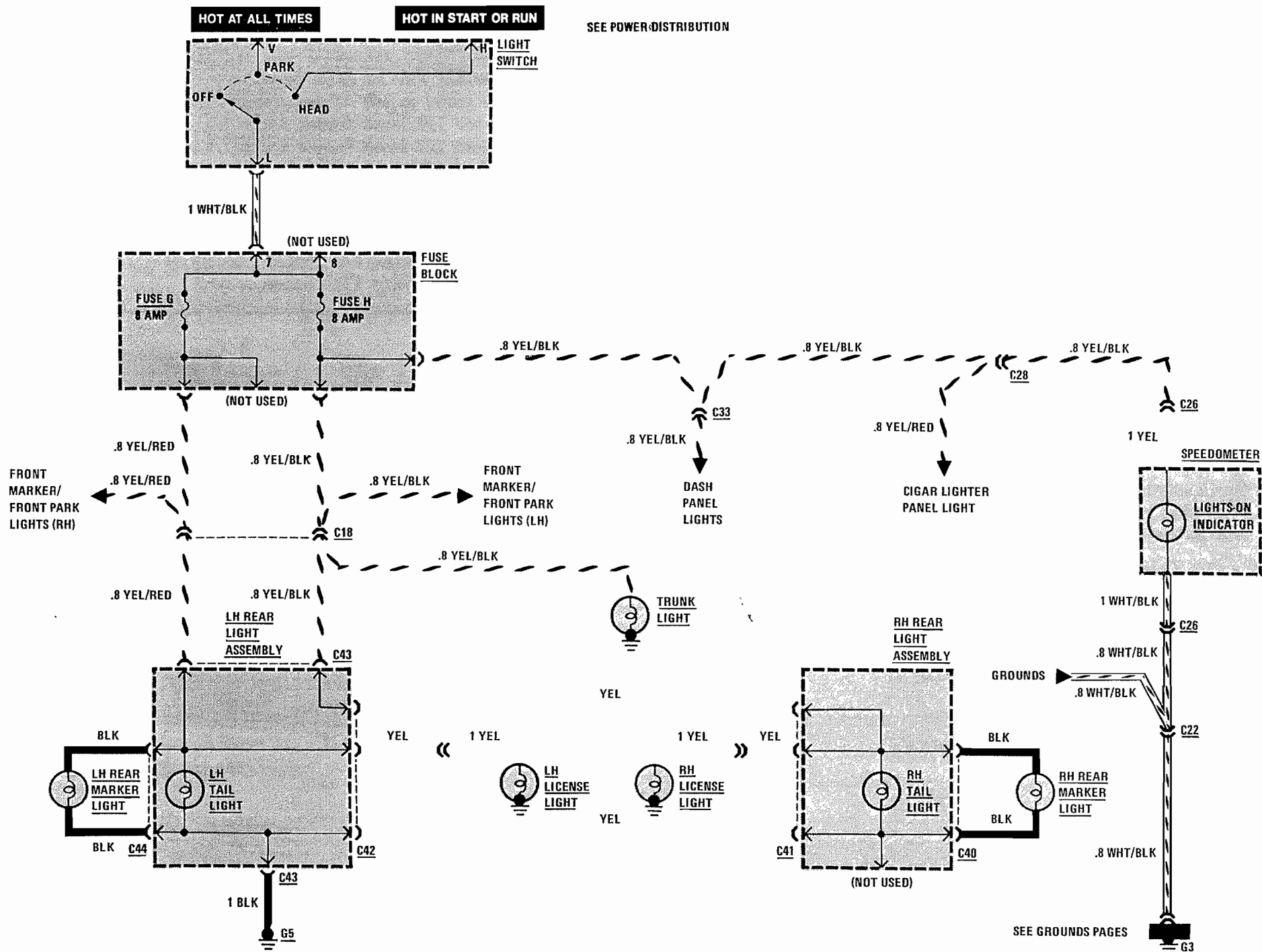


Figure 1 - LH Front Fender - With Carburetor (Fuel Injection Similar)

REAR MARKER/TAIL/LICENSE LIGHTS/LIGHTS-ON INDICATOR TRUNK LIGHT



CIRCUIT OPERATION

Voltage is applied to the "Park" position of the LIGHT SWITCH at all times. With the switch in "Park," current flows through FUSE G to the LH REAR MARKER LIGHT and LH TAIL LIGHT (to G5), and LH LICENSE LIGHT (to case ground). Current also flows through FUSE H and:

- 1) the LIGHTS-ON INDICATOR to G3;
- 2) the TRUNK LIGHT (to case ground);
- 3) the RH LICENSE LIGHT (to case ground) and RH TAIL LIGHT and RH REAR MARKER LIGHT (to G5).

Voltage is applied to the "Head" position of the LIGHT SWITCH only when the IGNITION SWITCH is in "Start" or "Run." This means that the lights will not go on or stay on with the LIGHT SWITCH in "Head" unless the IGNITION SWITCH is in "Start" or "Run."

TROUBLESHOOTING

IF LIGHTS-ON INDICATOR DOESN'T GO ON:

- Check that C28 is tight.
- Check that FUSE BLOCK connectors are tight.

IF ALL SIX LIGHTS AND INDICATOR DON'T GO ON:

- Check continuity of LIGHT SWITCH by operating FRONT MARKER LIGHTS.

IF INDICATOR GOES ON BUT ONE OR MORE REAR LIGHTS DO NOT:

- Check that ground G5 is clean and tight.
- Check FUSE G.
- Check that connectors are tight.

COMPONENT LOCATION

		Page-Figure
Fuse Block	Under LH side of dash panel	6-1
Light Switch	Dash panel, to left of fuel gauge	31-3,37-1
C18 (12 cavities)	Under dash panel, base of steering column support	35-1
C22 (11 cavities)	Behind instrument cluster	31-1
C26 (5 cavities)	Behind instrument cluster	35-2
C28 (3 cavities)	Behind instrument cluster	31-1
C33 (7 cavities)	Behind center of dash panel	25-4
C40 (2 cavities)	Connected to center of RH rear lights	30-3
C41 (6 cavities)	Connected to LH side of RH rear lights	30-3
C42 (6 cavities)	Connected to RH side of LH rear lights	30-2
C43 (7 cavities)	Connected to LH side of LH rear lights	30-2
C44 (2 cavities)	Connected to center of LH rear lights	30-2
G3.....	Attached under dash panel, above ignition switch.....	18-5
G5.....	In trunk, near LH rear lights.....	30-2

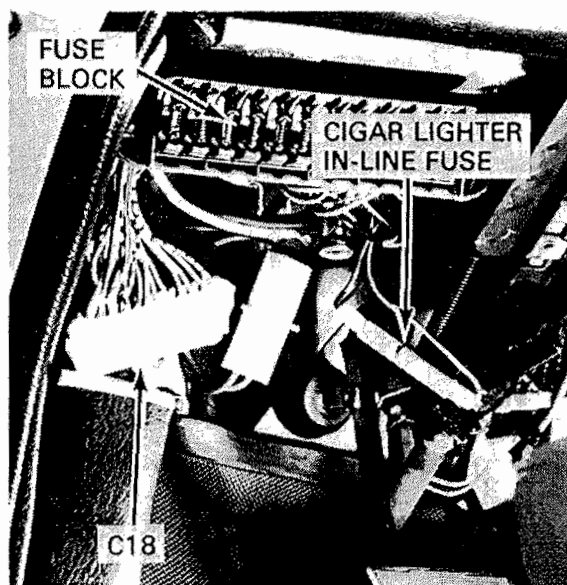


Figure 1 - Under LH Side of Dash Panel

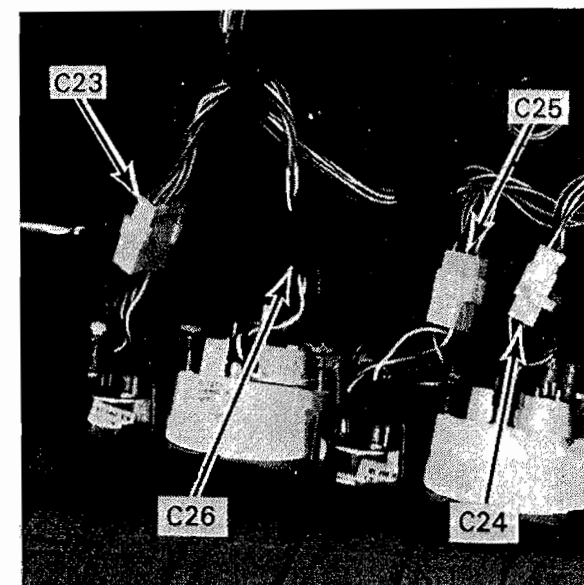
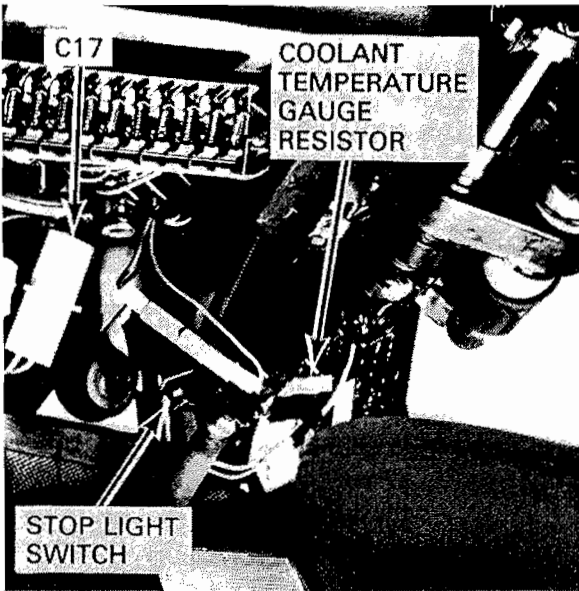


Figure 2 - Behind Instrument Cluster

**26 FIAT SPIDER**

CIRCUIT OPERATIONS

In cars with automatic transmissions, with the IGNITION SWITCH in "Start" or "Run," voltage is applied through FUSE A to the GEAR SELECTOR LIGHT and the STARTER/BACK UP SWITCH ASSEMBLY.

In all cars, with the IGNITION SWITCH in "Start" or "Run," voltage is applied through FUSE A to the BACK UP SWITCH and to the STOP LIGHT SWITCH. When the transmission is shifted to "Reverse," the BACK UP SWITCH closes and current flows through the BACK UP LIGHTS to G5. When the brake pedal is depressed, the STOP LIGHT SWITCH closes and current flows through the STOP LIGHTS to G5.

TROUBLESHOOTING

IF GEAR SELECTOR LIGHT AND ALL THE BACK UP AND STOP LIGHTS DON'T GO ON:

- Check FUSE A by operating SEATBELT WARNING.
- Check that G5 is clean and tight by operating TURN LIGHTS.

COMPONENT LOCATION

Page-Figure

Back Up Switch (Manual)	In transmission	
Fuse Block	Under LH side of dash panel	6-1
Seatbelt Timer	Mounted on RH side of relay panel	49-4
Starter/Back Up Switch Assembly (automatic)	At base of shift selector	37-2
Stop Light Switch	Attached at base of steering column support	
C18 (12 cavities)	Under dash panel, base of steering column support	35-1
C22 (11 cavities)	Behind instrument cluster	31-1
C32 (7 cavities)	Behind center of dash panel	55-1
C37 (2 cavities)	Under console, near shift selector	37-2
C41 (6 cavities)	Connected to LH side of RH rear lights	30-3
C42 (6 cavities)	Connected to RH side of LH rear lights	30-2
C43 (7 cavities)	Connected to LH side of LH rear lights	30-2
G5	In trunk, near LH rear lights	30-2



Figure 1 - LH Side of Dash Panel

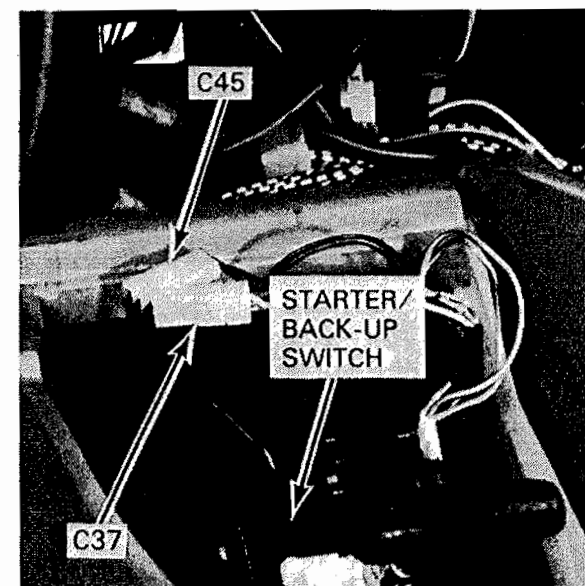
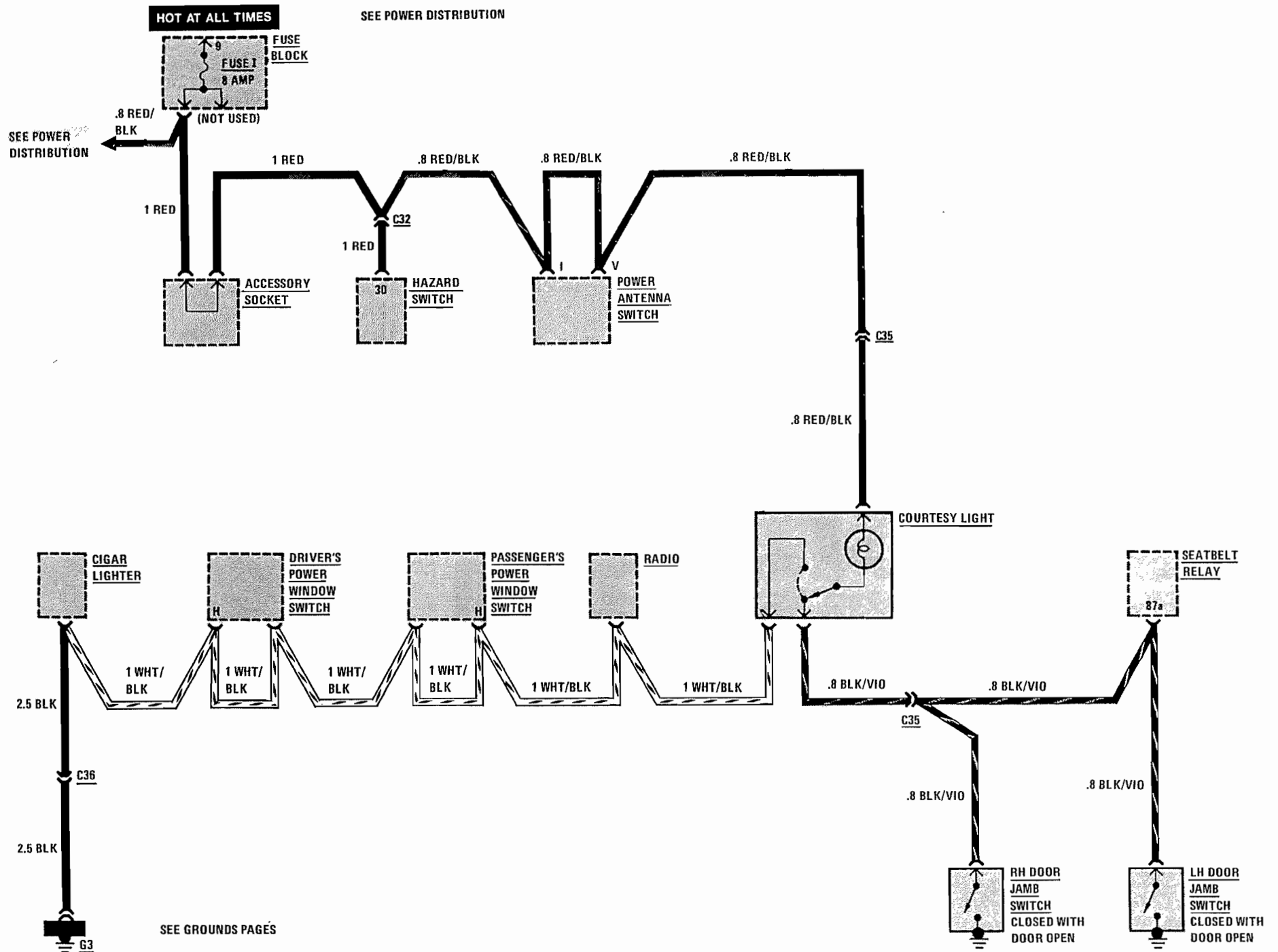


Figure 2 - Console at Gear Shift Selector- Automatic Shown

COURTESY LIGHTS



CIRCUIT OPERATION

Voltage is applied at all times through FUSE I to the COURTESY LIGHT. The light includes a switch which grounds the bulb through G3, or the light can be operated through the LH or RH DOOR JAMB SWITCH.

TROUBLESHOOTING

IF INSTRUMENT PANEL COURTESY LIGHT DOES NOT WORK THROUGH ITS OWN SWITCH:

- Check FUSE I.
- Check in-line connectors.
- Check G3.

IF LIGHT DOES NOT WORK THROUGH DOOR SWITCHES:

- Check case grounds.
- Check continuity of switches.

COMPONENT LOCATION

Page-Figure

Accessory Socket	Steering column support, behind fuse block ..	30-1
Door Jamb Switches	In door jambs	39-2
Fuse Block	Under LH side of dash panel	6-1
Power Antenna Switch	Center console, below radio	55-2
Seatbelt Relay	Top rear of relay panel	7-1,49-4
C32 (7 cavities)	Behind center of dash panel	55-1
C35 (8 cavities)	Behind center console, near heater fan	58-1
G3	Attached under dash panel, above ignition switch	18-5

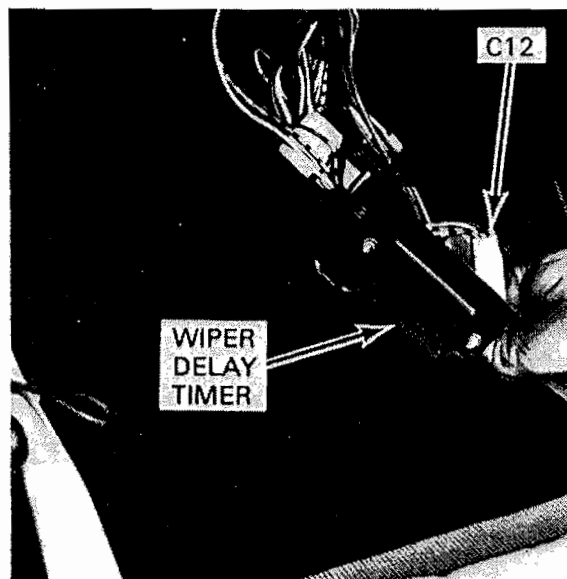


Figure 1 - Rear of Relay Panel

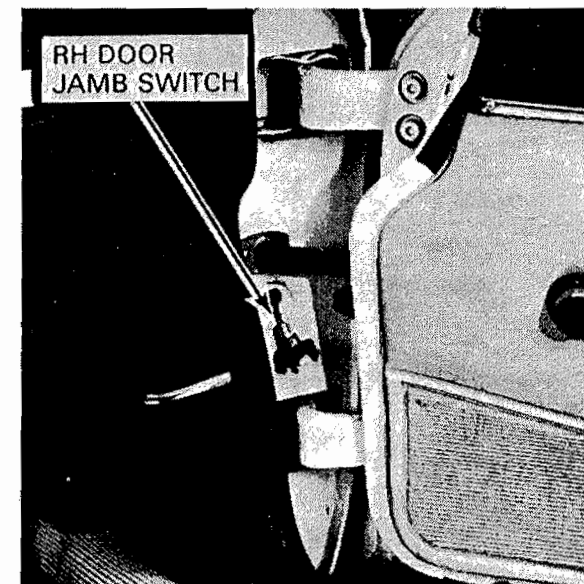
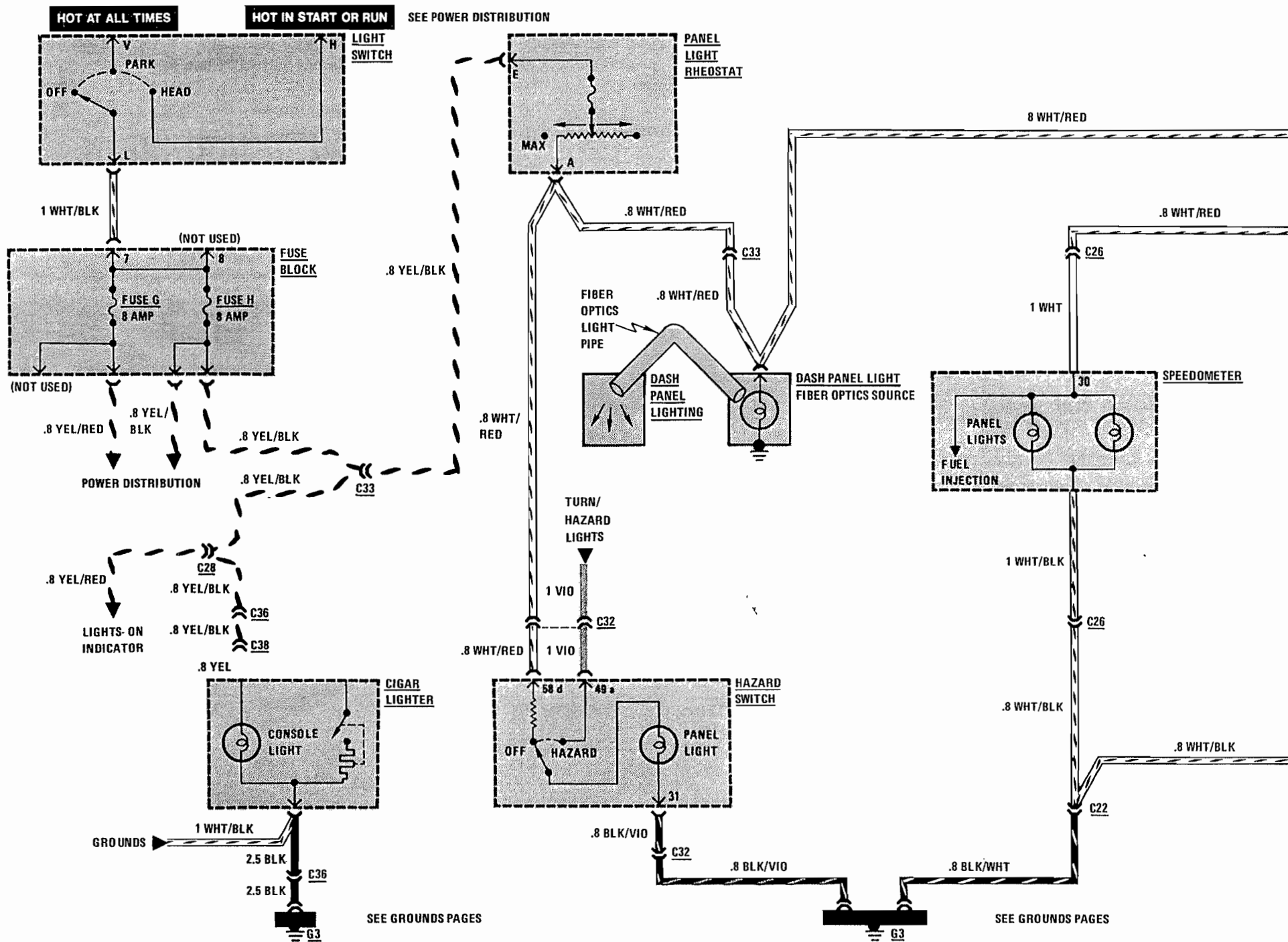


Figure 2 - RH Door Jamb

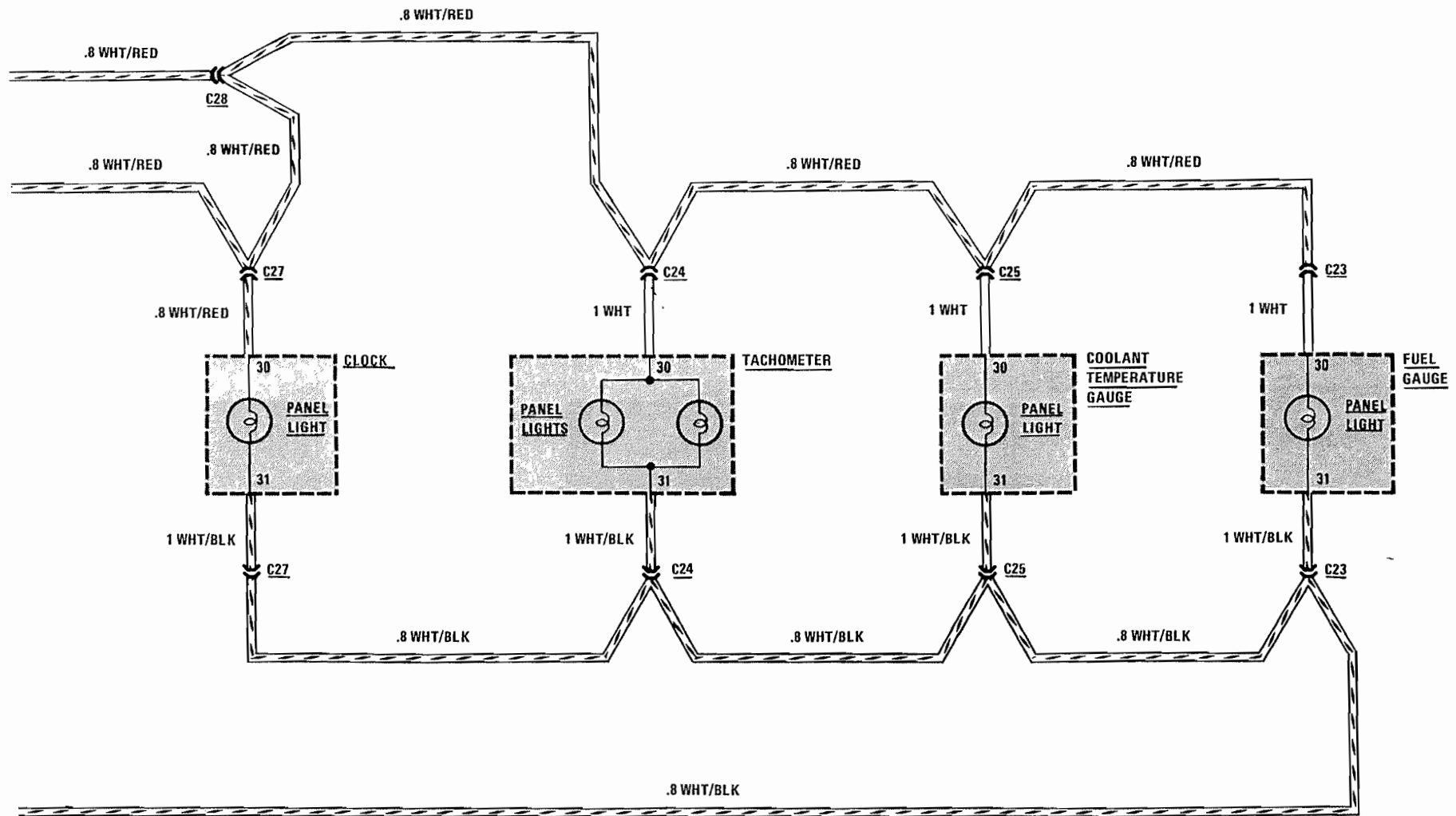
DASH PANEL/CIGAR LIGHTER LIGHTS



SEE GROUNDS PAGES

SEE GROUNDS PAGES

DASH PANEL/CIGAR LIGHTER LIGHTS



DASH PANEL/CIGAR LIGHTER LIGHTS

CIRCUIT OPERATION

Voltage is applied to the "Park" position of the LIGHT SWITCH at all times. With the switch in "Park," current flows through FUSE H to the PANEL LIGHT RHEOSTAT and CIGAR LIGHTER light. The rheostat allows the lights to be dimmed. Current from the rheostat flows to the HAZARD SWITCH panel light to G3. Current from the rheostat also flows through the DASH PANEL LIGHT to ground and through the panel lights in the SPEEDOMETER, CLOCK, TACHOMETER, COOLANT TEMPERATURE GAUGE and FUEL GAUGE to G3.

TROUBLESHOOTING

IF DASH PANEL LIGHTS DON'T GO ON:

- Check FUSE H.
- Check that G3 is tight.
- Check continuity of PANEL LIGHT RHEOSTAT.

COMPONENT LOCATION

		Page-Figure
Fuse Block	Under LH side of dash panel	6-1
C22 (11 cavities)	Behind instrument cluster	31-1
C23 (5 cavities)	Behind instrument cluster	35-2
C24 (7 cavities)	Behind instrument cluster	35-2
C25 (4 cavities)	Behind instrument cluster	35-2
C26 (5 cavities)	Behind instrument cluster	35-2
C27 (3 cavities)	Behind instrument cluster	42-1
C28 (3 cavities)	Behind instrument cluster	31-1
C32 (7 cavities)	Behind center of dash panel	55-1
C33 (7 cavities)	Behind center of dash panel	55-1
G3.....	Attached under dash panel, above ignition switch.....	18-5

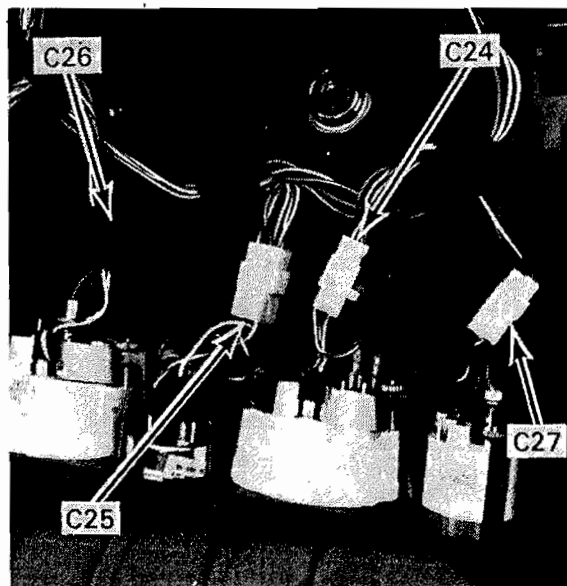


Figure 1 - Behind Instrument Cluster

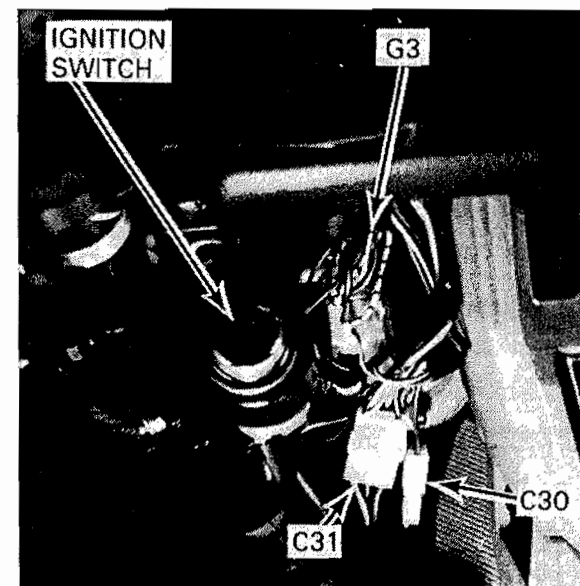


Figure 2 - To Right of Steering Column

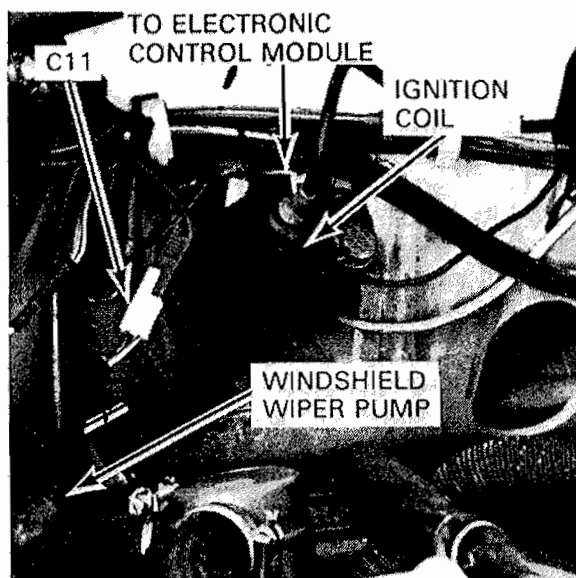


Figure 1 - RH Front Fender-With Carburetor
(Fuel Injection Similar)

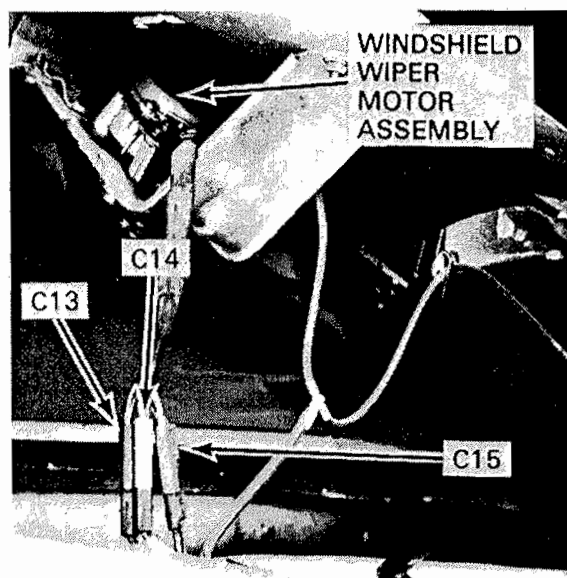


Figure 3 - Under LH Side of Cowl



Figure 4 - Behind LH Kick Panel

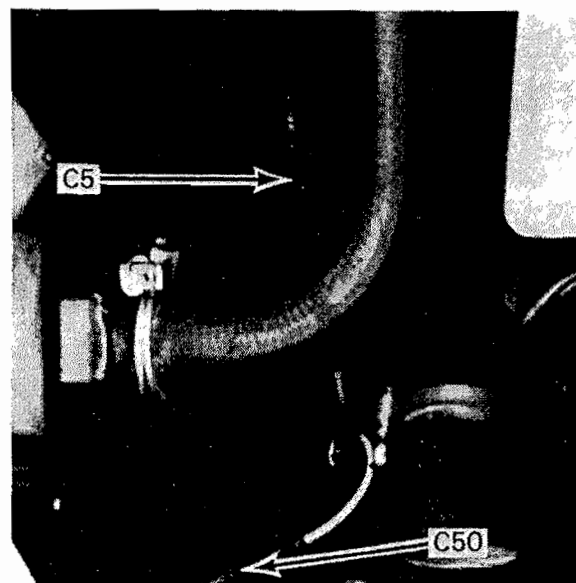


Figure 2 - LH Side of Radiator-With Carburetor
(Fuel Injection Similar)

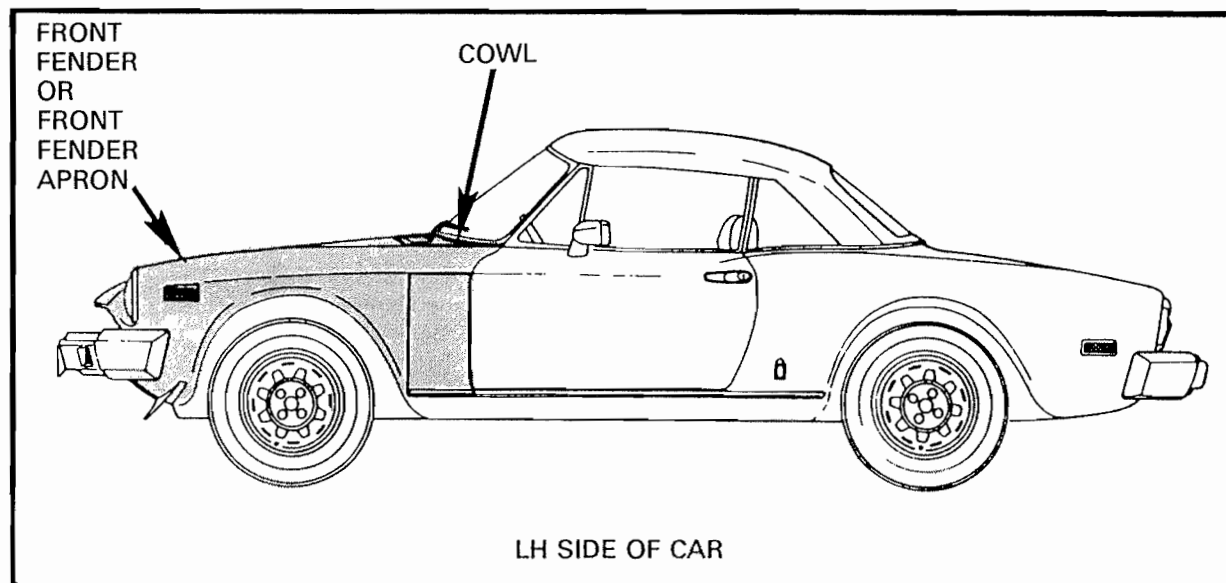
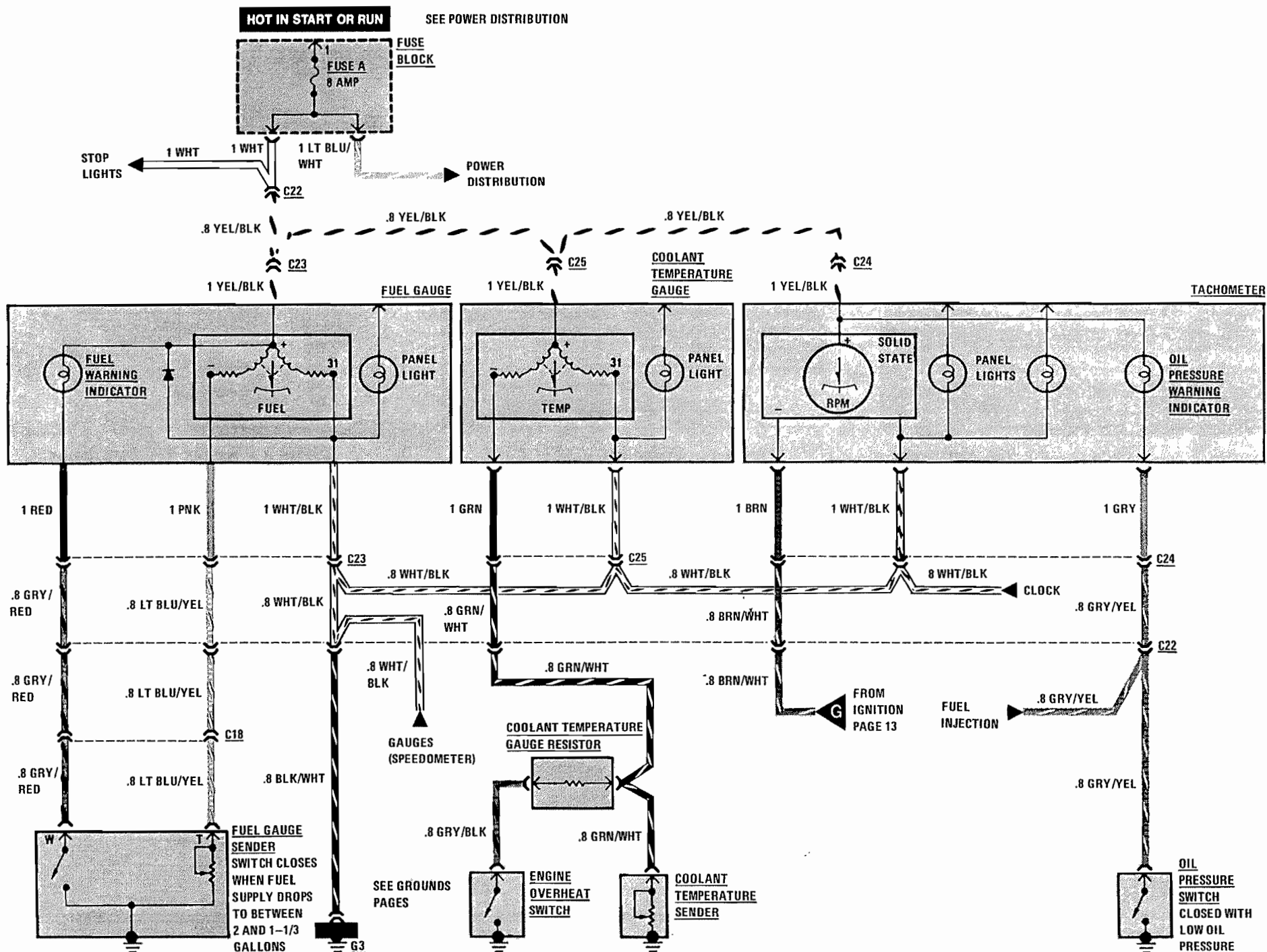


Figure 5 - Body Part Locations (RH Similar)

INDICATORS/GAUGES



CIRCUIT OPERATION

Gauges

With the IGNITION SWITCH in "Start" or "Run," current flows through FUSE A and C22 to the FUEL GAUGE, COOLANT TEMPERATURE GAUGE and the TACHOMETER. The gauges each include two magnetic coils which pull on a pointer in opposite directions. The balancing effect of the two coils prevents errors that would result from varying car voltage. In each gauge, current through one coil also flows through a sender. The sender controls the pointer by changing the amount of current flowing through that coil. The constant current flowing through the other coil flows to G3.

In the solid state TACHOMETER, the IGNITION COIL primary pulses are changed to a varying voltage, which moves the pointer.

Indicators

With the IGNITION SWITCH in "Start" or "Run," voltage is applied to the FUEL WARNING and OIL PRESSURE WARNING INDICATORS. Voltage is applied through C23 and the FUEL WARNING INDICATOR to terminal W of the FUEL GAUGE SENDER. When fuel is low, the switch inside the sender grounds the indicator and the bulb goes on. Voltage is applied through C24 and the OIL PRESSURE WARNING INDICATOR to the OIL PRESSURE SWITCH. When the switch closes, the INDICATOR bulb goes on.

COMPONENT LOCATION

Page-Figure

Coolant Temperature Gauge Sender	Beside spark plug number three.....	45-1
Engine Overheat Switch	Beside spark plug number one	45-1
Fuel Gauge Sender	Inside fuel tank	36-2
Fuse Block	Under LH side of dash panel	6-1
Coolant Temperature Gauge Resistor	Under dash panel, above accelerator pedal ..	36-1
C18 (12 cavities)	Under dash panel, base of steering column support	35-1
C22 (11 cavities)	Behind instrument cluster	31-1
C23 (5 cavities)	Behind instrument cluster	35-2
C24 (7 cavities)	Behind instrument cluster	35-2
C25 (4 cavities)	Behind instrument cluster	35-2
G3.....	Attached under dash panel, above ignition switch.....	18-5

TROUBLESHOOTING

IF FUEL GAUGE AND COOLANT TEMPERATURE GAUGE DON'T WORK:

- Check that G3 is clean and tight.
- Check FUSE A by operating STOP LIGHTS.

IF ONE GAUGE DOESN'T WORK:

- Check its sender by disconnecting it. If its pointer then goes to maximum, the sender is probably broken.

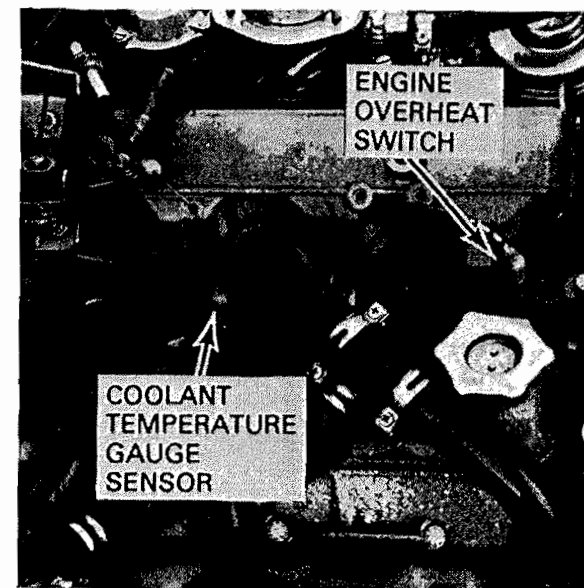
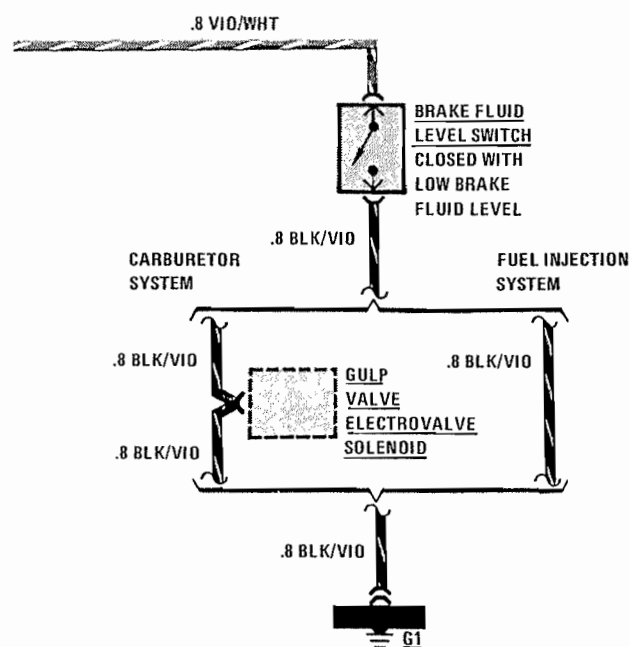


Figure 1 - Top of Engine-With Carburetor (Fuel Injection Similar)

COMPONENT LOCATION

Page-Figure

Door Jamb Switches	In door jambs	39-2
Driver's Seatbelt Switch	Part of driver's seatbelt assembly	49-3
Fuse Block	Under LH side of dash panel	6-1
Exh. Gas Sensor Indicator.	In center dash panel	
Park Brake Switch	Vent controls, center portion	31-2
Remove Key Switch	Part of ignition switch	31-3
Warning Chime	Top rear of relay panel	49-4
Seatbelt Relay	LH side dash panel, attached to relay panel	49-4
Seatbelt Timer	Mounted on RH side of relay panel.....	49-4
C18 (12 cavities)	Under dash panel, base of steering column support	35-1
C21 (6 cavities)	Behind instrument cluster	31-1
C22 (11 cavities)	Behind instrument cluster	31-1
C23 (5 cavities)	Behind instrument cluster	35-2
C24 (7 cavities)	Behind instrument cluster	35-2
C25 (4 cavities)	Behind instrument cluster	35-2
C27 (3 cavities)	Behind instrument cluster	
C28 (3 cavities)	Behind instrument cluster	31-1
C30 (2 cavities)	Below dash panel, behind ignition switch....	18-5
C32 (7 cavities)	Behind center of dash panel	55-1
C33 (7 cavities)	Behind center of dash panel	55-1
C35 (8 cavities)	Behind center console, near heater fan	58-1
C36 (8 cavities)	Behind center console, near heater fan	58-1
C37 (2 cavities)	Under console, near shift selector	37-2
G3	Attached under dash panel, above ignition switch.....	18-5



CIRCUIT OPERATION

Voltage is available at all times through the IN-LINE FUSE to the CIGAR LIGHTER. When the CIGAR LIGHTER is operated, it is grounded through G3.

Current flows at all times through FUSE I to operate the CLOCK.

Remove Key Warning

Voltage is applied at all times through FUSE I to the REMOVE KEY SWITCH. If the key is in the IGNITION SWITCH, the voltage is applied through the WARNING CHIME, SEATBELT RELAY, and BLK/VIO wires to the DOOR JAMB SWITCHES. When either door is opened, its DOOR JAMB SWITCH closes. This grounds the circuit and the WARNING CHIME sounds.

Seatbelt Warning

When the IGNITION SWITCH is turned to "Start" or "Run," current follows three paths through FUSE A to ground: 1) FASTEN SEATBELT INDICATOR, DK BLU/RED wire and SEATBELT TIMER to G3; 2) SEATBELT TIMER terminal to G3; and 3) SEATBELT RELAY coil, DK BLU/RED wire and SEATBELT TIMER to ground. The first path lights the indicator. The second path operates the timer and opens the other two paths after about five seconds. The FASTEN SEATBELT INDICATOR will go off after 5 seconds regardless of the seatbelt switch. The third path operates the relay and pulls in the relay contacts. If the DRIVER'S SEATBELT SWITCH is closed, it grounds the WARNING CHIME. The WARNING CHIME sounds until the belt is buckled or the timer opens the current path.

Brake Warning

When the IGNITION SWITCH is turned to "Start" or "Run," voltage is applied through FUSE A and the BRAKE INDICATOR along three paths: 1) VIO/WHT wires and SEATBELT TIMER to G3; 2) VIO/WHT wires and PARK BRAKE SWITCH to ground; and 3) VIO/WHT wires and BRAKE FLUID LEVEL SWITCH to G1. The first path is closed from SEATBELT TIMER terminal C1 to G3 and current flows. The BRAKE INDICATOR goes on as a bulb test. After about 5 seconds the SEATBELT TIMER opens the current path, and the test ends.

If the park brake is on, current in the second path flows through the PARK BRAKE SWITCH (to ground). The indicator goes on as a warning.

The third path warns of low brake fluid level.

TROUBLESHOOTING*IF ONLY REMOVE KEY WARNING DOESN'T SOUND:*

- Check continuity of DOOR JAMB SWITCHES by the operation of the COURTESY LIGHT.
- Check continuity between terminals 30 and 87A of SEATBELT RELAY. If no continuity, replace relay.

IF ONLY SEATBELT WARNING DOES NOT SOUND:

- Check continuity of DRIVER'S SEATBELT SWITCH.
- Check continuity between terminals 30 and 87 of SEATBELT RELAY. If no continuity, replace relay.

IF WARNING CHIME DOESN'T SOUND FOR REMOVE KEY WARNING OR SEATBELT WARNING:

- Check for voltage at WARNING CHIME.
- Check REMOVE KEY SWITCH.
- Check FUSE I by operating CIGAR LIGHTER.

IF BRAKE INDICATOR DOESN'T WORK EXCEPT WHEN FIRST STARTING:

- Check continuity of PARK BRAKE SWITCH.
- Check BRAKE INDICATOR bulb.

IF FASTEN SEATBELT INDICATOR AND BRAKE INDICATOR STAY ON WHEN FIRST STARTING:

- Check SEATBELT TIMER.

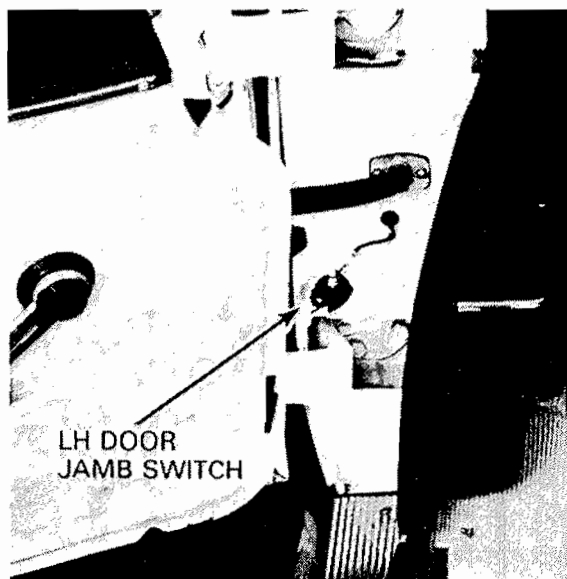


Figure 1 - LH Door Jamb

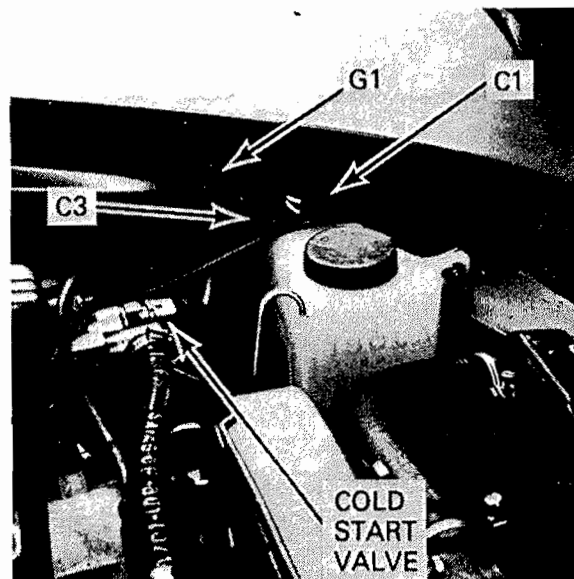


Figure 2 - LH Front Fender-With Fuel Injection (Carburetor Similar)

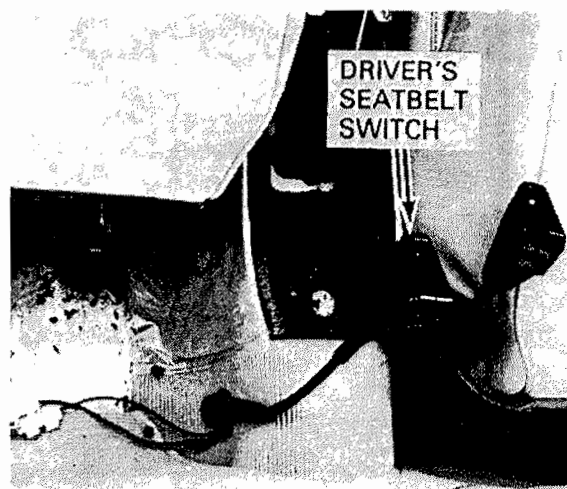


Figure 3 - Behind Driver's Seat

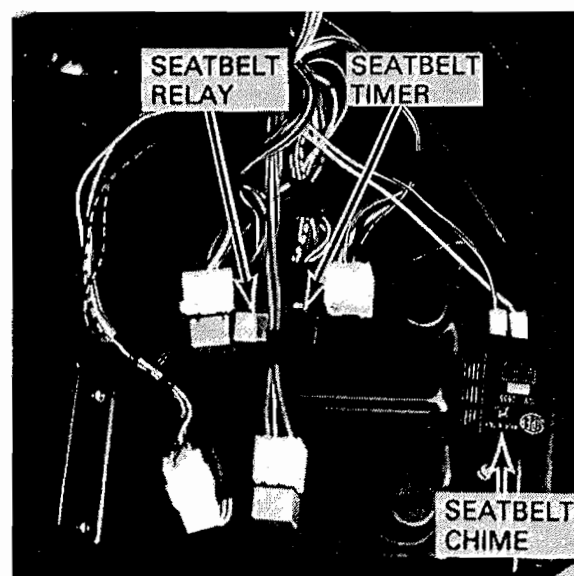


Figure 4 - Top of Relay Panel



CIRCUIT OPERATION

Wiper Operation

With the IGNITION SWITCH in "Start" or "Run," voltage is applied through FUSE B to the wiper switch and to the "Run" contact of the park switch.

Continuous Operation

With the WINDSHIELD WIPER/WASHER SWITCH ASSEMBLY (switch assembly) in "Continuous" and the WIPER SWEEP SPEED SWITCH (speed switch) in "Slow", current flows through terminals m and p of the switch assembly, to (but not through) C12, the GRY/BLK wire, the WIPER SWEEP SPEED SWITCH, LT BLU wire and the wiper motor to ground. When the WIPER SWEEP SPEED SWITCH is placed in "Fast," current is directed through the GRY wire and the motor to ground.

Park Cycle

When the wipers are running, the park switch is in "Run". The park switch is mechanically linked to the motor and moves to "Park" only when the wipers are in park position on the windshield. When the switch assembly is placed in "Off," current to bring the wipers to the park position flows through FUSE B, the BRN wire, the LT BLU/BLK wire, the "Run" contact of the park switch, the GRY/BLK wire, C21, to (but not through) C12, the "Slow" or "Fast" speed switch contact and the motor to ground. The motor continues to run until the run contact opens and the wipers are parked.

COMPONENT LOCATION

		Page-Figure
Fuse Block	Under LH side of dash panel	6-1
Windshield Washer Pump	Inside washer fluid reservoir	43-1
Windshield Wiper		
Motor Assembly	Under RH side of cowl	43-3
Windshield Wiper/Washer		
Switch Assembly	Upper LH side of steering column	31-1
Wiper Delay Timer	Attached to front of relay panel	39-1
Wiper Sweep Speed Switch...	Center of dash panel	31-3
C11 (2 cavities)	Next to washer fluid reservoir	43-1
C12 (4 cavities)	LH side dash panel, above relay panel	39-1
C13 (2 cavities)	Under RH side of cowl, near wiper motor ...	43-3
C14 (2 cavities)	Under RH side of cowl, near wiper motor ...	43-3
C15 (2 cavities)	Under RH side of cowl, near wiper motor ...	43-3
C21 (6 cavities)	Behind instrument cluster	31-1
C29 (1 cavity)	Behind instrument cluster	31-1
C33 (7 cavities)	Behind center of dash panel	55-1
G1	Attached to front LH fender	49-2
G2	Attached to front LH fender	33-1
G3	Attached under dash panel, above ignition switch	18-5

Delay Operation

When the switch is placed in "Delay" and the WIPER SWEEP SPEED SWITCH is in "Slow," current flows through switch assembly terminals m and n, the RED wire and to terminal 3 of the WIPER DELAY TIMER. This current powers the timer. It flows through terminal 4 of the timer, then through switch assembly terminals o and l to ground G3. A pulse of current also flows through terminal 1 of the WIPER DELAY TIMER, C12, the WIPER SWEEP SPEED SWITCH, the LT BLU wire and the motor to ground. This starts the wiper sweep and puts the park switch in "Run." The wipers complete the sweep as a park cycle, and wait for another pulse of current. When the WIPER SWEEP SPEED SWITCH is placed

in "Fast," current is directed through the GRY wire and the motor to ground. wait for another pulse of current. When the WIPER SWEEP SPEED SWITCH is placed in "Fast," current is directed through the GRY wire and the motor to ground.

Washer Operation

With the IGNITION SWITCH in "Run," voltage is applied through FUSE B, the BRN wire and the YEL/BLK wire to the washer switch. When the switch is closed, current flows through the WINDSHIELD WASHER PUMP to G1. The pump squirts fluid onto the windshield as long as the switch is closed.

TROUBLESHOOTING

IF WIPERS DO NOT OPERATE IN "DELAY":

- Check for voltage at LT BLU wire of C12.
- Check for voltage at RED wire of C12, male pin.
- Check for continuity to ground from YEL wire of C12 to G3.

IF WIPERS ONLY MAKE ONE SWEEP AND STOP:

- Check for continuity from C13, through the park switch to LT BLU/WHT wire of C12.

IF WIPER AND WASHER DOES NOT WORK:

- Check FUSE B.

IF WINDSHIELD WIPER WORKS IN "SLOW" BUT NOT "FAST":

- Check voltage at GRY wire. If there is no voltage present, check switch. If there is voltage, check G2 and check motor.

IF WINDSHIELD WASHER PUMP DOES NOT WORK:

- Check continuity between terminals m and t of WINDSHIELD WIPER/WASHER SWITCH ASSEMBLY, and between switch assembly and G1.

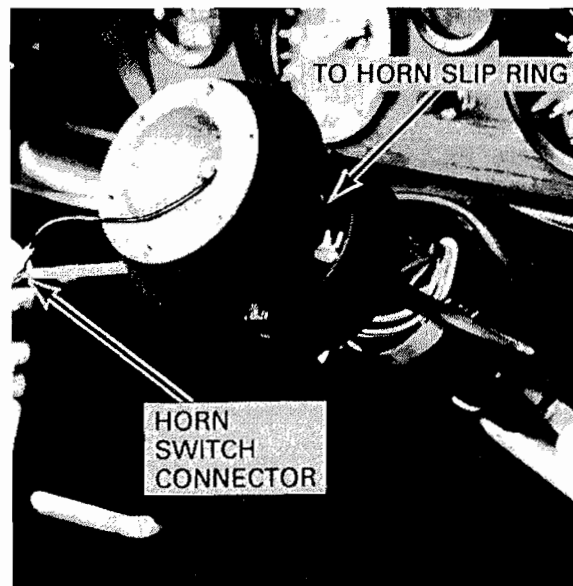


Figure 1 - Top of Steering Column

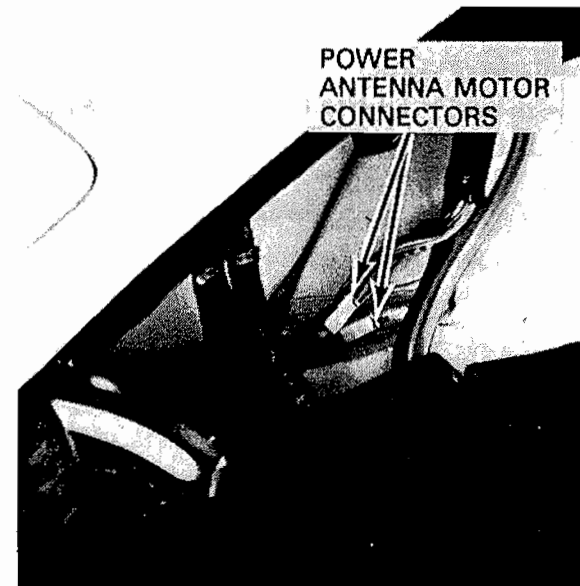


Figure 3 - Behind LH Wheel Well

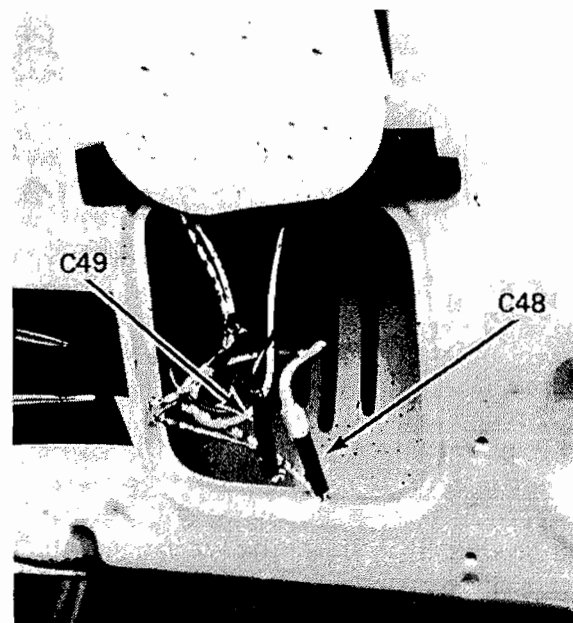
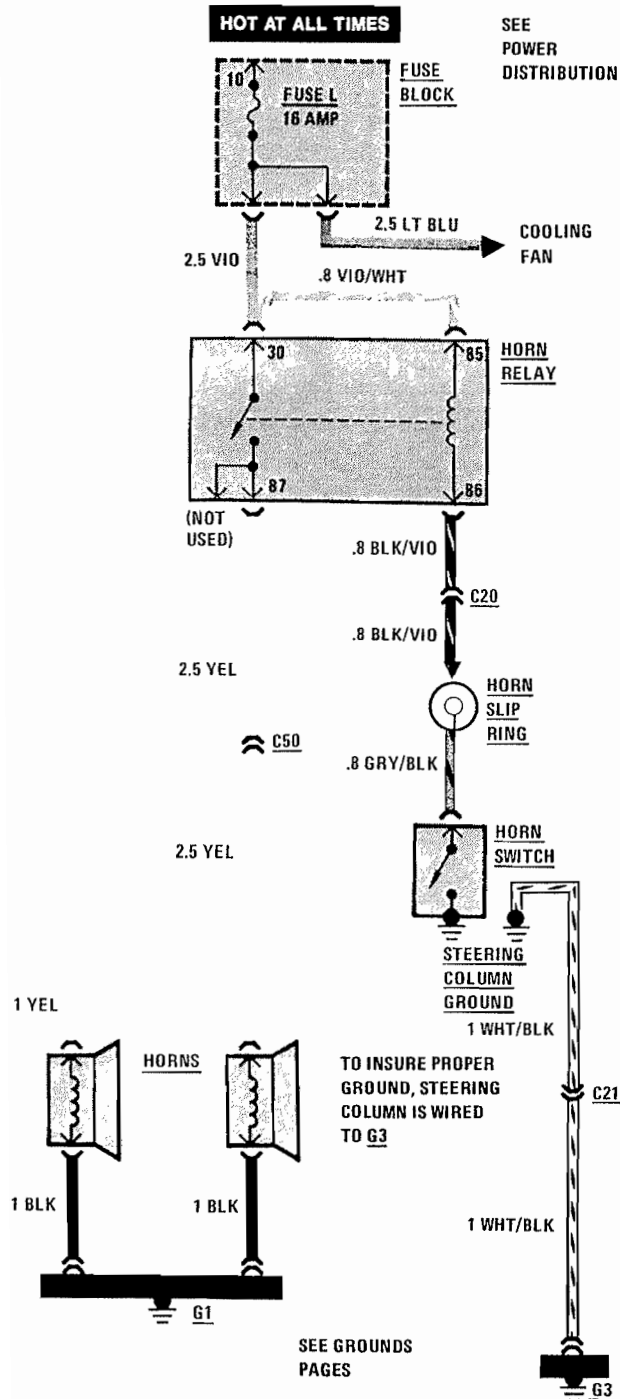


Figure 2 - Inside Front of RH Door



COMPONENT LOCATION

		Page-Figure
Fuse Block	Under LH side of dash panel	6-1
Horn Relay	Attached to relay panel	7-1,18-1
Horn Slip Ring	Center of steering wheel	52-1
Horn Switch	Center of steering wheel	53-1
C20 (8 cavities)	Behind instrument cluster	31-1
C21 (6 cavities)	Behind instrument cluster	31-1
C50 (1 cavity)	To left of radiator	43-2
G1	Attached to front LH fender	49-2
G3	Attached under dash panel, above ignition switch	18-5

CIRCUIT OPERATIONS

Voltage is applied through FUSE L and the HORN RELAY coil to the HORN SWITCH at all times. When the HORN SWITCH is closed, current flows through the relay coil, HORN SLIP RING and HORN SWITCH to G3. The coil then closes the relay contacts, and current flows through the YEL wires and the HORNS to ground G3.

TROUBLESHOOTING

IF THE HORNS DON'T SOUND:

- Check that G3 is clean and tight.
- Check FUSE L.

IF HORNS SOUND AT ALL TIMES:

- Check for stuck or shorted HORN SWITCH.
- Check for "short" to ground in BLK/VIO wires.
- Check for "short" between HORN RELAY terminals 30 and 87.

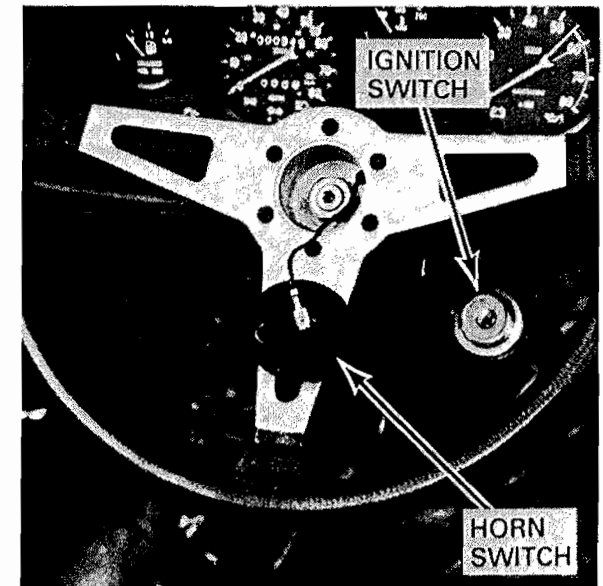


Figure 1 - Front of Steering Wheel

1. *Journal of the American Medical Association*, 1997; 277: 1039-1043.



CIRCUIT OPERATION

With the IGNITION SWITCH in "Run" or "Start," voltage is available to power the RADIO. Voltage is applied at all times through FUSE I to the POWER ANTENNA SWITCH.

When the switch is pressed to "Dn," current flows from POWER ANTENNA SWITCH terminals I to T, the DK BLU/RED wire, the POWER ANTENNA MOTOR, the LT BLU/WHT wire, POWER ANTENNA SWITCH terminal U to case ground.

When the switch is pressed to "Up," current flows from the POWER ANTENNA SWITCH terminals V to U, the LT BLU/WHT wire, the POWER ANTENNA MOTOR, the DK BLU/RED wire, POWER ANTENNA SWITCH terminal T to case ground.

TROUBLESHOOTING

IF ANTENNA DOES NOT RAISE OR LOWER

- Check FUSE I.
- Check case ground on POWER ANTENNA SWITCH.
- Check POWER ANTENNA MOTOR.

IF RADIO DOES NOT WORK:

- Check that G3 is clean and tight.
- Check for voltage at LT BLU/BLK wire of RADIO.

COMPONENT LOCATION

		Page-Figure
Accessory Socket	Steering column support, behind fuse block ..	30-1
Hi/Lo Beam Switch.....	Upper LH side of steering column	31-1
Fuse Block	Under LH side of dash panel	6-1
Hazard Switch		
(With Carburetor)	Middle of dash panel	55-1
(With Fuel Injection)	Center console, RH side	
Ignition Switch.....	Lower RH side of steering column	18-5,31-3
Light Switch	Dash panel, to left of fuel gauge	31-3,37-1
Power Antenna Motor.....	Behind LH rear wheel well	52-3
Power Antenna Switch.....	Center console, below radio	55-2
C18 (12 cavities)	Under dash panel at base of steering column	35-1
C19 (1 cavity)	Under dash panel, base of steering column support	30-1
C20 (8 cavities)	Behind instrument cluster	31-1
C31 (5 cavities)	Below dash panel, behind ignition switch....	18-5
C32 (7 cavities)	Behind center of dash panel	55-1
C35 (8 cavities)	Behind center console, near heater fan	58-1
C36 (8 cavities)	Behind center console, near heater fan	58-1
G3.....	Attached under dash panel, above ignition switch.....	18-5

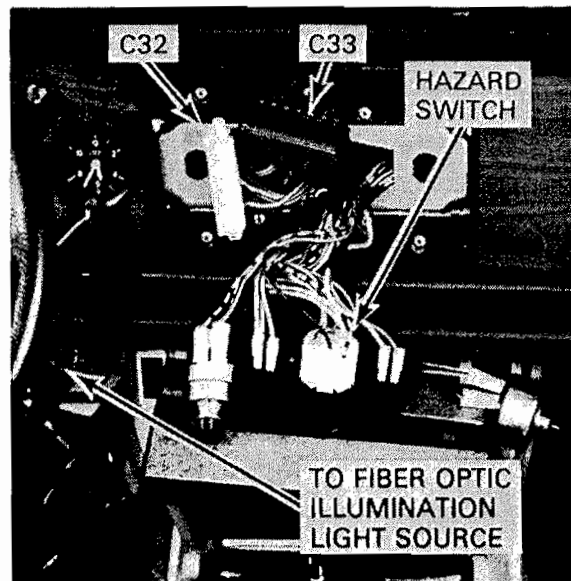


Figure 1 - Behind Center of Dash - With Carburetor (Fuel Injection Similar)

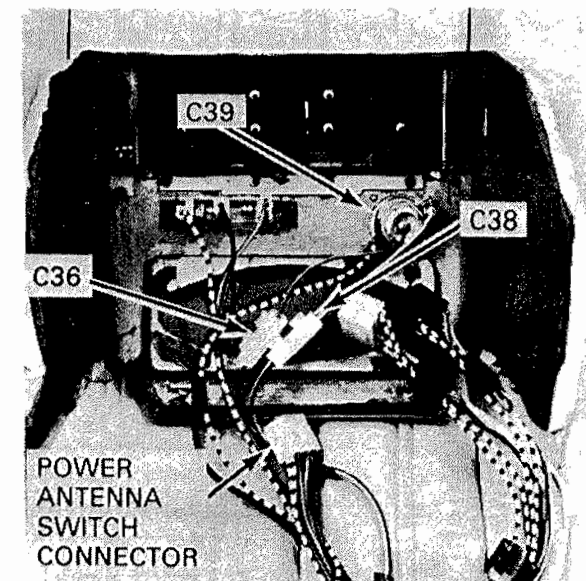


Figure 2 - In Back of Center Console



CIRCUIT OPERATION

Voltage is applied at all times to the POWER WINDOW RELAY contacts. With the IGNITION SWITCH in "Start" or "Run," current flows through the POWER WINDOW RELAY coil to ground G3. The relay contacts close and power is available to operate the POWER WINDOW MOTORS

When the RH POWER WINDOW SWITCH is placed in "Down," current flows through FUSE N, terminals U and D of the switch, the motor, and terminals L and H of the power window switch to ground G3. When the window switch is placed in "Up," current flows through FUSE N, terminals T and L of the switch, the motor, and terminal D to ground. Current flow is similar for the LH POWER WINDOW SWITCH.

TROUBLESHOOTING

IF NEITHER POWER WINDOW WORKS:

- With IGNITION SWITCH in "Start" or "Run," check for 12 volts at FUSE N.
- Check that ground G3 is clean and tight.
- Check that C17, C35 and C36 are tight.

IF ONE POWER WINDOW DOES NOT WORK:

- Check the fuse for that window.
- Check the POWER WINDOW MOTOR connector.
- Check the POWER WINDOW MOTOR circuit breakers.

COMPONENT LOCATION

		Page-Figure
Fuse Block	Under LH side of dash panel	6-1
Power Window Motors	Inside front of doors	
Power Window Relay	Attached to relay panel	7-1,18-1
Power Window Switches	Center console, on both sides of radio	57-1
Seatbelt Timer	Mounted on RH side of relay panel.....	7-1
C17 (4 cavities)	Under dash panel, base of steering column support	36-1
C35 (8 cavities)	Behind center console, near heater fan	58-1
C36 (8 cavities)	Behind center console, near heater fan	58-1
C46 (1 cavity)	Inside LH door, near lower hinge.....	57-2
C47 (1 cavity)	Inside LH door, near lower hinge.....	57-2
C48 (1 cavity)	Inside RH door, near lower hinge.....	52-2
C49 (1 cavity)	Inside RH door, near lower hinge.....	52-2
G3	Attached under dash panel, above ignition switch.....	18-5

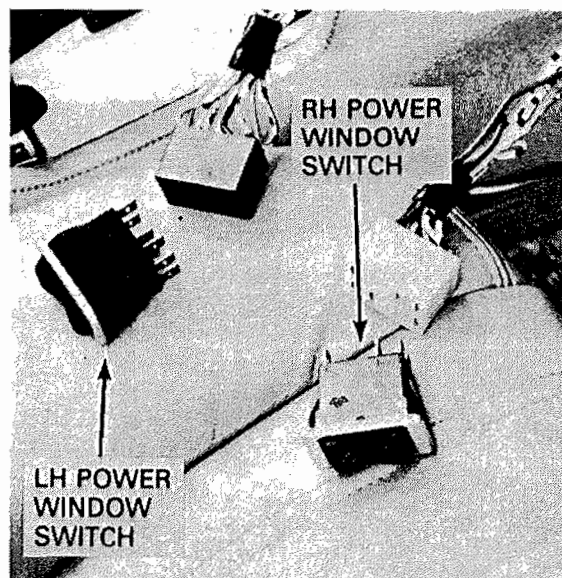


Figure 1 - Window Switches
(Disconnected From Mounts
on Either Side of Radio)

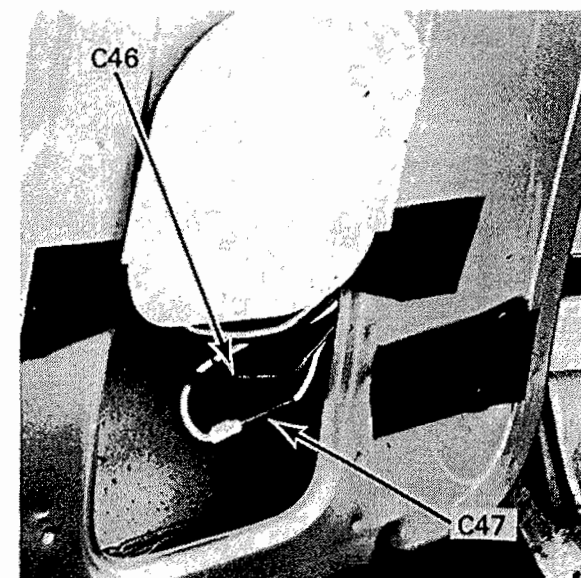
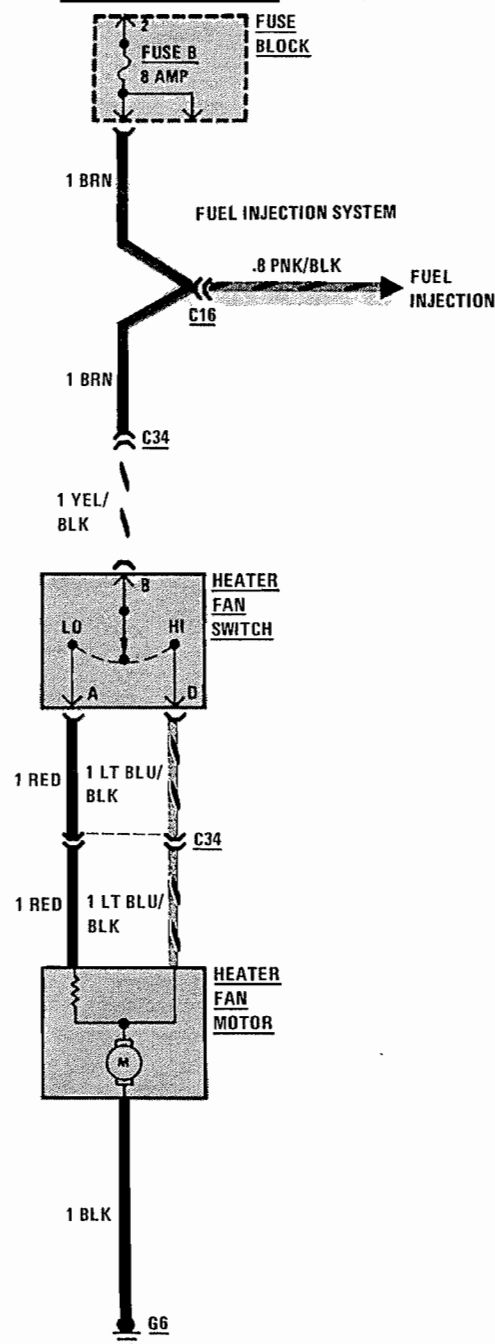


Figure 2 - Inside Front of LH Door

HOT IN START OR RUN

SEE POWER DISTRIBUTION



COMPONENT LOCATION

Fuse Block	Under LH side of dash panel	6-1
Heater Fan Motor	Under dash panel, behind center console ...	58-1
Heater Fan Switch	In front of vent controls	31-2
C16 (5 cavities)	Under LH side of dash panel, above relay panel	58-2
C34 (3 cavities)	Behind center console, near heater fan	58-1
G6	LH rear of heater fan motor casing	

Page-Figure

CIRCUIT OPERATION

With the IGNITION SWITCH in "Start" or "Run," voltage is applied through FUSE B to the HEATER FAN SWITCH. When the HEATER FAN SWITCH is placed in "Lo," current flows through terminals B and A of the switch, and the HEATER FAN MOTOR (including the resistor) to G6. In "Hi," current flows directly through the motor to G6.

TROUBLESHOOTING

NO HEATER FAN OPERATION:

- Check FUSE B by operating windshield wipers.
- Check that ground G6 is clean and tight.
- Check for voltage at C34.

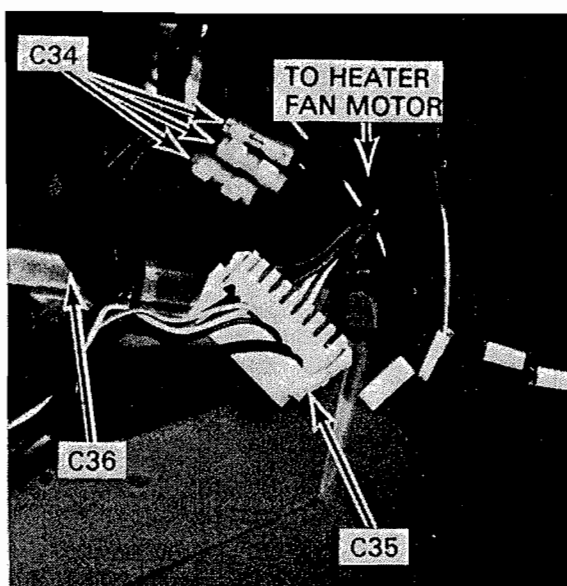


Figure 1 - Behind Center Console

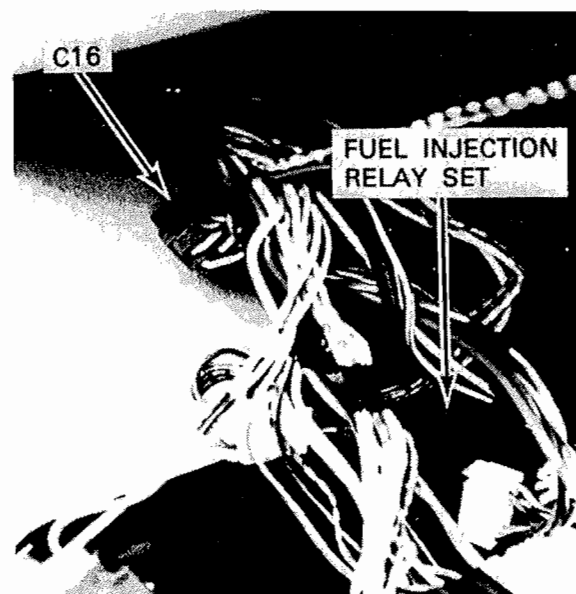


Figure 2 - Under RH Side of Dash Panel

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