

# SECTION C

## SIGNAL SYSTEMS

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## DIVISION I SPECIFICATIONS AND ADJUSTMENTS

### 120-14 SIGNAL SYSTEMS SPECIFICATIONS

Stop Light Switch, Type .....	Mechanical
Stop Light Switch, Location .....	Pedal Mounting Bracket
Direction Signal Switch, Make .....	Delco-Remy
Direction Signal Flasher, Make .....	Signal Stat & Tung-Sol
Location .....	Parking Brake Bracket
For 2-32 CP Lamp Load .....	383639
For 3-32 CP Lamp Load .....	3866804
Flash Rate, Cycles per Min. ....	60 to 120
Hazard Warning Flasher (Heavy Duty) .....	3883794
Lamp Bulbs—No. and Candle Power .....	See Fig. 120-9 & 10
Direction Signal and Stop Light Fuse .....	See Fig. 120-9 & 10
Horn—Make and Type .....	Delco-Remy, Solenoid
Horn Amperage Draw at 12 Volts (Either Horn) .....	4.5 to 5.5

120C-1

## DIVISION II

### DESCRIPTION AND OPERATION

#### 120-15 HORNS AND CONTROL CIRCUIT

##### a. Horns and Relay

The Delco-Remy electrically operated vibrator type horns are mounted in the engine compartment. The horns are operated simultaneously by a horn relay which is controlled by the horn switch on the

steering wheel. One horn is high pitched and the other is low pitched, so that together they produce a pleasant blended tone.

The horn relay is an electrical switch which closes the circuit between the

battery and the horns when the push button is pressed and opens the circuit when the button is released. The relay permits control of the horns with a small amount of current passing through the horn switch contacts.

When the horn switch contacts are closed, a small amount of current flows through the relay winding to ground at the horn switch contact. This magnetizes the relay core which attracts the flat steel relay armature. The armature has a contact point which makes contact with a stationary point to close the horn circuit. When horn switch is released, current stops flowing through relay winding so that the core loses its magnetism; the armature spring then causes contact points to be separated.

#### b. Horn Relay Ground Circuit

The steering wheel has an actuator bar mounted across the steering wheel. Fastened to the base of the actuator bar, but insulated from it, is a contact plate which is "hot" at all times. When the actuator bar is rocked, the contact plate contacts a ground plate on the steel hub of the steering wheel to ground the horn relay winding, close the relay contacts, and blow the horns. When the actuator bar is released, two springs move the actuator bar and contact plate assembly clear of the ground plate.

Current is supplied to the contact plate by a spring-loaded brush which rides on the contact ring which is located at the upper end of the steering column. A wire attached to the contact ring runs down the steering column jacket and out under the instrument panel. The wire from the horn relay connects at this point.

### 120-16 DIRECTION SIGNAL AND HAZARD WARNING FLASHER SYSTEMS

#### a. Direction Signal Lamps and Indicators

The front direction signal light is produced by the 32 CP filament in the dual purpose bulb mounted in the front parking lamp. The rear direction signal light is produced by the 32 CP filament in the bulb of the rear lamp assembly. This filament also serves as a stoplight.

When the ignition switch is turned on and the direction signal switch is manually operated to indicate a turn, the front and rear signal lights flash on and off on the side of car for which a turn is indicated. The flashing of signal lights is caused by a flasher which is connected into the proper signal circuit by contacts made in the direction switch when switch is set for a turn.

When the direction signal lights are flashing, a signal indicator bulb on the instrument panel also flashes. These indicator lights are connected to the front half of the direction signal circuit only.

#### b. Direction Signal Switch Operation

The direction or turn signal switch is mounted in a housing at the upper end of the steering column mast jacket, just below the steering wheel. The turn signal actuating plate (on the inner end of the control lever) is mounted to a pivot just over and

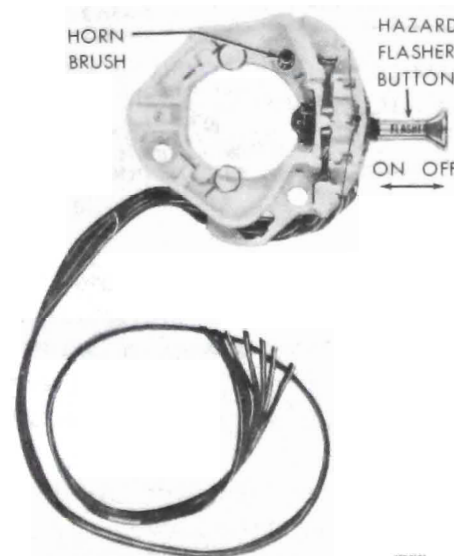


Figure 120-14 - Direction Signal and Hazard Warning Flasher Switch Assembly

contacting the turn signal switch. This switch is integral with an eight wire harness (about 1-1/2 feet long) and a multiple connector. The switch and a spring-loaded horn brush are both mounted in the switch plate base. See Figure 120-14.

A plastic cancelling cam assembly fits over the steering shaft; the lower end of the cam contacts the steering shaft upper bearing and the upper face of the cam engages the steering wheel hub, causing the cam to turn with the wheel. At the outer edge of the cam there is a horn contact ring in a position to depress the horn brush. See Figure 120-15.

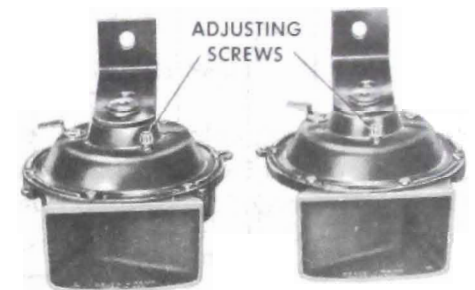


Figure 120-15 - Matched Horn Set

Whenever the control lever is in either turn position, a projection on the cancelling cam contacts a spring on the actuating plate once per revolution of the steering wheel. Rotation of the cam in one direction simply snaps the spring but does not move the actuating plate; rotation in the other direction causes the actuating plate to be pushed back to neutral position.

#### c. Direction Signal and Hazard Warning Flasher Circuits

When signaling for a turn, the selected direction signal lights are supplied with current from the ignition switch, through a "DIR. SIG." fuse, through a direction signal flasher mounted on a spring clip on the parking brake bracket, and through standard contacts in the direction signal switch. See Figure 120-16.

When the hazard warning flasher is turned on, however, the normal

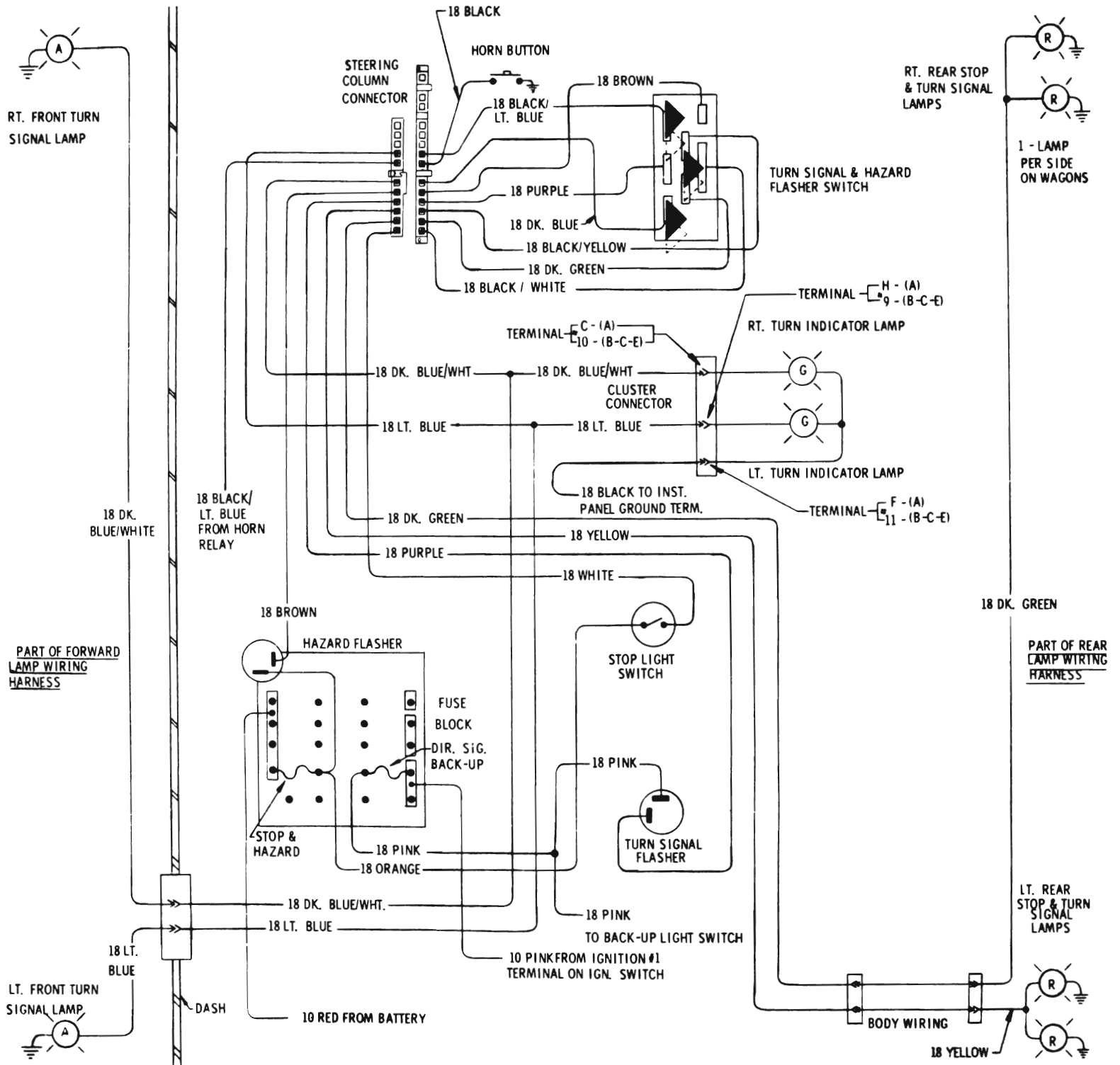


Figure I20-16 - Turn Signal and Hazard Flasher Wiring Diagram

direction signal supply is disconnected at the direction signal switch and a new supply circuit is connected into the switch directly from the battery. This new hazard flasher circuit comes through a stop and hazard flasher fuse and through a special heavy duty flasher mounted on the fuse block to the direction signal switch, which now has all contacts closed. See Figure 120-14.

#### d. Hazard Warning Flasher

The hazard warning feature (standard on all cars) is a system which, when turned on, causes all turn signal lamps to flash simultaneously. This system makes use of the regular turn signal wiring and light bulbs, but has a separate supply wire, flasher unit and off-on switch. This makes it possible, when leaving a car with the hazard flasher operating, to lock the ignition switch and car doors. See Figure 120-20.

The hazard warning flasher is turned on by pushing in on the "FLASHER" button located just below the steering wheel on the right side of the steering column. See Figure 120-16. The hazard flasher system should always be turned off, by pulling the button out, before the car is driven.

#### e. Cornering Lights

Cornering lights (optional equipment) provide extra light in the direction the car is turning. They operate from a special combined turn signal and cornering lamp switch. When either the parking lights or the headlights are on, moving the turn signal lever to indicate a turn causes a cornering light to come on in the direction of the turn. This light does not blink, but remains on steadily until the turn is completed. Each cornering lamp contains a 50 CP bulb. The cornering light circuit is protected along with the tail light circuit by the "TAIL LGT." fuse on the fuse block.

## DIVISION IV

### TROUBLE DIAGNOSIS

#### 120-17 TROUBLE DIAGNOSIS AND ADJUSTMENT OF HORNS

If a horn switch contact is constantly grounded, the horns will not stop blowing or if a contact cannot be grounded, the horns will not blow.

There are two basic troubles, which may be caused by a defective horn relay. If neither horn will blow at all, this trouble may be caused by the relay points not making contact. Or if horns will not stop blowing, this trouble may be caused by relay points sticking.

##### a. Horns Will Not Blow

When horns fail to blow, first check wiring circuit and relay because even a faulty horn will generally make some sort of noise if current is getting to it. If horns are at fault, or tone is poor, adjust each horn for specified current draw as instructed in subparagraph e.

1. Break circuit at steering column connector and ground black with light blue stripe wire coming from horn relay. If horn now blows, horn relay ground circuit in steering wheel has an open. Reconnect steering column connector and check horn wire and horn contacts. Circuit from steering column connector to contacts in steering wheel must be complete.

2. If horns still do not blow when wire at steering column is grounded, substitute a known good relay. If horns now blow, original relay is defective and must be replaced.

3. If horns still will not blow with new horn relay, trouble is elsewhere. Check wiring connections and wiring throughout horn circuit. See Figures 120-124 through 126 for wiring diagrams.

##### b. Horns Will Not Stop Blowing

1. Break circuit at steering column connector. If horns stop blowing, relay is OK but horn control circuit into steering wheel is grounded. Check horn wire and contacts in steering wheel.

2. If horns still do not stop blowing, substitute a known good horn relay.

3. If horns now stop blowing, original relay contacts are sticking and relay must be replaced. However, if horns still do not stop blowing, control circuit is grounded between relay and steering column connector.

##### c. Horn Tone is Poor

If either horn blows only part of the time or tone is poor, adjust current draw at horn, subparagraph e.

##### d. Voltage Test at Horn

An improperly operating horn and its wiring circuit can be tested by connecting a voltmeter between the horn terminal and ground and noting the voltage while the horn button is pressed. The voltage at the horn gives an indication of the cause of trouble as follows:

1. No voltage indicates trouble in horn button, relay, wiring, or ground.

2. Less than 9 volts indicates resistance in wiring or excessive current draw due to short circuit in horn.

3. Voltage between 9 and 11 indicates that wiring is okay. Look for sticking or improper adjustment of horn.

4. Voltage above 11 indicates improper adjustment or open circuit in horn due to broken coil lead.

##### e. Adjustment of Horns

1. Remove horn from car.

2. Connect an ammeter in series with

horn and a fully charged 12 volt battery to measure current draw while horn is blowing. Current draw for each horn (either high or low note) should be between 4.5 and 5.5 amperes at 12.0 volts.

3. Adjust to specified current draw if necessary, by turning adjusting screw clockwise to decrease or counter-clockwise to increase current draw. Turn only 1/4 of a turn at a time. If adjustment loosens screw excessively, it may be staked with a prick punch. See Figure 120-15.

Increasing the current draw increases the horn volume. Too much current will cause a high cut-in voltage which will cause a sputtering sound and may cause horn to stick in cold weather.

4. After each horn has been adjusted individually, sound both horns together to check for proper blend of tone. If adjustment does not provide a satisfactory tone, horn contacts are pitted, making horn replacement necessary.

5. With horns reinstalled on car, connect a volt- meter between each horn terminal and ground to check voltage while both horns are blowing. This should be between 9 and 11 volts.

## 120-18 TROUBLE-SHOOTING DIRECTION SIGNAL AND HAZARD WARNING FLASHER SYSTEMS

### a. Trouble-Shooting Direction Signal System

When either a front or rear signal bulb is burned- out, the indicator light for that direction will stay on.

This immediately notifies the driver when any signal light quits operating.

Standard flashers are made to operate either two lamps or three lamps. If one of the lamp bulbs in the circuit burns out, the decreased current draw causes the flasher contacts to close and stay closed. In the same way, if a three lamp flasher is installed by mistake in a car having only two lamp bulbs per side, the lights will light but won't flash. Conversely, if a two lamp flasher is used on a car having three lamps, the too high current draw will cause the lights to flash too fast.

1. *No Signal Anywhere.* If there is no signal at any front, rear, or indicator light, first check fuse on fuse block marked "DIR. SIG."

If fuse checks OK, next eliminate flasher unit by substituting a known good flasher. If new flasher does not cure trouble, check signal system wiring connections at fuse block and at steering column connector. Next, remove steering wheel and check signal switch contacts.

2. *Signals One Direction Only.* If signal works properly on one side, but there is no signal at front, rear, or indicator light on other side, trouble is in signal switch. If trouble cannot be easily corrected, replace switch assembly.

3. *Signal Stays On One Direction.* If the indicator light stays on in one direction (does not flash), check for a burned-out light bulb or an open circuit in wire to bulb not lighting.

**NOTE:** *If brake stop lights function properly, rear signal light bulbs are OK.*

flasher fuse is OK. Next, substitute a known good flasher. If new flasher does not cure trouble, check hazard flasher system connections at fuse block and at steering column connector. Next, remove steering wheel and check hazard flasher switch contacts.

2. *All Lights Stay On.* Defective flasher. Substitute a known good flasher.

3. *One or More Lights Don't Flash.* Try operating direction signal lights. If same light again fails to operate, check for a burned-out light bulb; if bulb is OK, check for an open circuit in wire to bulb not lighting. If certain lights operate on direction signal system, but not on hazard flasher system, remove steering wheel and check hazard flasher switch contacts.

4. *Fails to Cancel After Completion of Turn.* If signal lights do not turn off after completion of turn, check for worn or broken switch actuator parts or for a broken cancelling cam.

**NOTE:** *It is necessary to remove steering wheel to service switch actuator parts.*

### b. Trouble-Shooting Hazard Warning Flasher System

Since the hazard warning flasher (mounted on the fuse block) is of the heavy duty type, it will flash any number of bulbs (from one to six bulbs) at a constant rate. Therefore, flashing indicator lights do not necessarily mean that *all* signal bulbs are flashing.

1. *No Lights Flash.* Check "STOP-HAZARD FLASHER" fuse on fuse block. Since this fuse also protects the stop light system, functioning stop lights show that the hazard