

# SECTION 8

## ELECTRICAL SYSTEMS

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The 1964 Corvair electrical systems are basically the same as outlined in the 1961 Corvair Shop Manual, except for the following changes.

## BATTERY

A 9 plate (per cell) 42 ampere hour battery (fig. 8-1) is now used for standard production models. Maintenance and service procedures are the same except as follows:

### SLOW CHARGE

Adjust electrolyte to proper level by adding distilled water, then charge battery at 5 amperes for a minimum of 10 hours. Full charge of the battery is indicated when three hourly hydrometer readings show no increase in specific gravity. Due to the slow charge rate, periods of 24 hours or more are often encountered.

### THE FULL CHARGE HYDROMETER TEST

1. Make sure battery is fully charged as described under "Slow Charge." Hydrometer readings taken on partially charged batteries are unreliable for the following test.

2. Measure specific gravity of electrolyte in each cell and compare readings with the following:

- If cell readings range between 1230 and 1310, the battery is ready for use. Any variation in the specific gravity between cells within this range does not indicate a defective battery.



Fig. 8-1—Battery

## GENERATOR

The increased capacity 1964 Corvair generator has a larger cooling fan and pulley unit which must be removed before disassembling the generator from the engine. It is also necessary to remove the oil pressure switch and disconnect the fuel inlet line at the fuel pump prior to the pulley unit removal. The removal and installation procedures are included in this section.

Other maintenance and service procedures remain the same as outlined in the 1961 Corvair Shop Manual.

### REMOVAL

1. Disconnect ground cable from battery.
2. Disconnect the armature and field terminal wires from the generator.

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- Loosen idler pulley bracket to permit removal of belt from generator pulley.
- Disconnect fuel inlet line at the fuel pump.
- Remove oil pressure sending unit from top of oil filter bracket.
- Remove pulley shaft nut and pulley from generator

**NOTE:** It is important to remember that the nut on the end of the shaft has a left hand thread.

- Remove three bolts securing generator to engine and remove generator from vehicle.

### INSTALLATION

- Place generator in position and install bracket, bolts, lockwashers and nuts. Secure the generator as follows:
  - Tighten the two generator-to-engine oil filter and generator adapter attaching bolts and nut (at drive end of generator) to 15-22 ft. lbs. torque.
  - Loosely assemble mounting bracket to generator bolt and nut (at commutator end of generator)—do not tighten so that bracket cannot move.
  - Finger tighten the two bracket to cylinder head bolts.
  - Tighten mounting bracket to generator bolt and nut (at commutator end of generator) to 8-11 ft. lbs. torque.

- Tighten generator bracket to engine front bolt to 15-22 ft. lbs. torque.
  - Tighten generator bracket to engine front bolt to 15-22 ft. lbs. torque.
- Install generator pulley and shaft nut. Torque the pulley attaching nut to 50-60 ft. lbs.
  - Install oil pressure sending unit in top of oil filter adapter bracket.
  - Install fuel inlet pipe to fuel pump.
  - Place blower belt over generator drive pulley and adjust the idler pulley so that there will be a  $\frac{3}{8}$ " deflection with a 15 lb. push midway between blower and idler pulley. Tighten idler pulley.
  - Connect brown positive generator lead to generator armature terminal, dark blue field lead to generator field terminal.

**CAUTION:** On radio equipped cars connect radio by-pass condenser to generator armature (A) terminal, NOT to the generator field (F) terminal.

- Polarize the generator by momentarily connecting a jumper wire between the BAT and GEN terminals on the regulator.
- Start the engine. If brushes squeak, seat them by placing brush seating paste on the commutator. The soft abrasive material of the paste will be carried under the brushes and wear the brush faces the commutator contour in a few seconds. Fill the cavity through hinge cap oiler on commutator drive end frame.

## DISTRIBUTOR

### (ALL MODELS)

The distributor used on turbo-supercharged engines is different in that a pressure retard unit replaces the ordinary advance unit. This unit retards the spark during the time the manifold is pressurized, partially opposing centrifugal advance at high engine rpm. The curve is as shown in figure 8-2.

Service operations are the same as on regular distributor except for those operations relating to the vacuum advance unit.

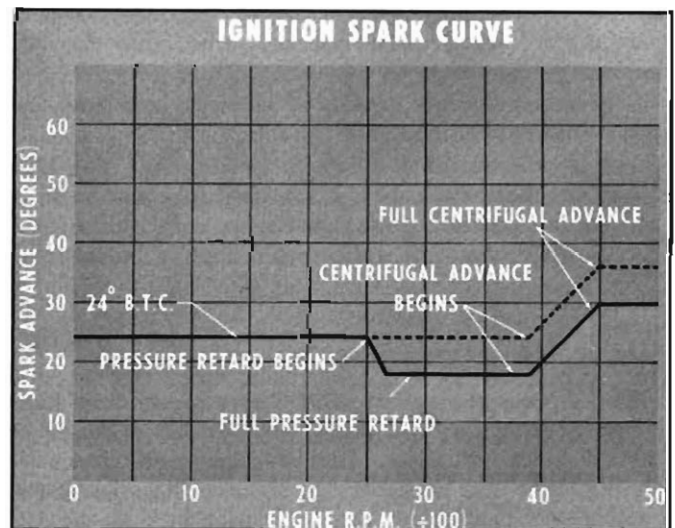


Fig. 8-2—Distributor Spark Curve

## MAINTENANCE AND ADJUSTMENTS

### CONTACT POINT REPLACEMENT

Refer to Figures 8-3 through 8-5

1. Release distributor cap hold-down screws, remove cap and place it out of work area.

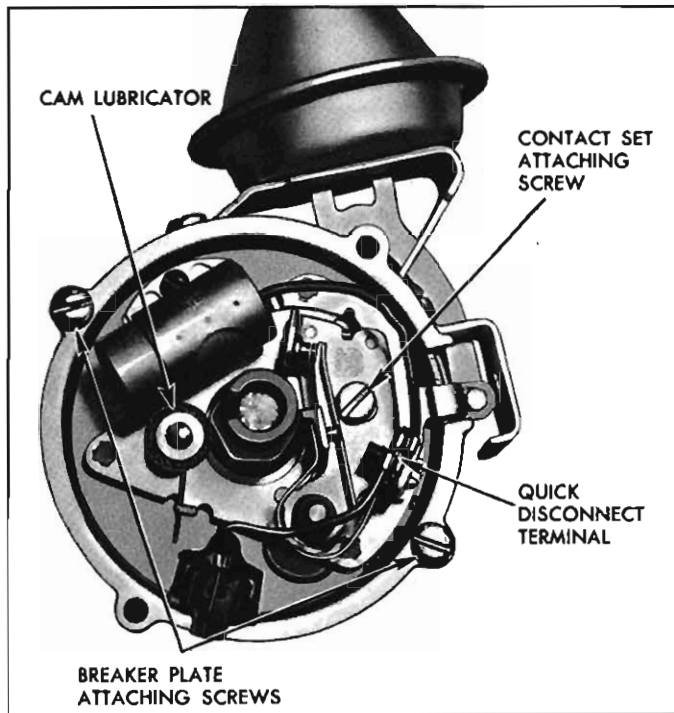


Fig. 8-3—Breaker Plate and Attaching Parts

11. Reinstall dust shield, rotor, position and lock distributor cap to housing.
12. Check and set ignition timing. (See Engine Tune-Up, Section 7.)

### CONDENSER REPLACEMENT

Refer to Figure 8-3

1. Release distributor cap hold-down screws, remove cap and place it out of work area.
2. Remove rotor and dust shield.
3. Disconnect condenser lead wire from contact point quick disconnect terminal.
4. Remove condenser attaching screw, lift condenser from breaker plate. Wipe breaker plate clean.
5. Install new condenser using reverse of procedure outlined above.

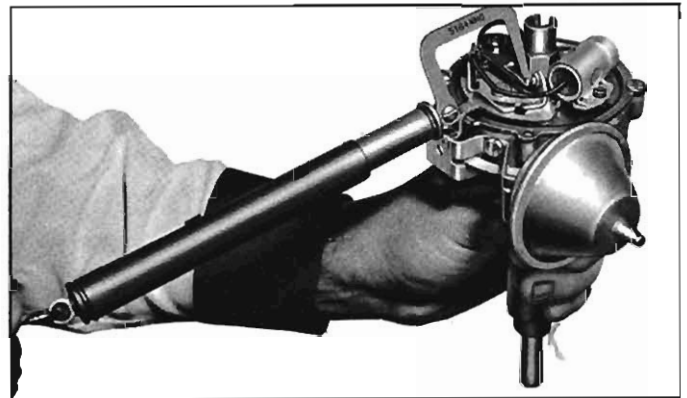


Fig. 8-4—Checking Breaker Arm Spring Tension

2. Remove rotor and dust shield.
3. Pull primary and condenser lead wires from contact point quick-disconnect terminal (fig. 8-3).
4. Remove contact set attaching screw, lift contact point set from breaker plate (fig. 8-3).
5. Clean breaker plate of oil smudge and dirt.
6. Place new contact point assembly in position on breaker plate, install attaching screw.

**CAUTION:** Carefully wipe protective film from point set prior to installation.

**NOTE:** Pilot on contact set must engage matching hole in breaker plate.

7. Connect primary and condenser lead wires to quick disconnect terminal on contact point set.
8. Check and adjust points for proper alignment and breaker arm spring tension (fig. 8-4). Use an aligning tool to bend stationary contact support if points need alignment.
9. Set point opening (.019" for new points) (fig. 8-5).
10. Rotate cam lubricator 90° (fig. 8-3).

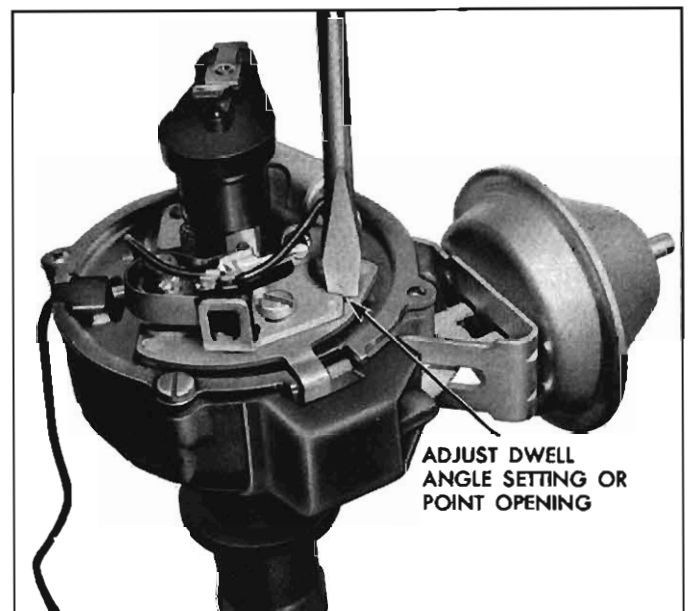


Fig. 8-5—Setting Point Opening

## SERVICE OPERATIONS

### REMOVAL

1. Release distributor cap hold-down screws, remove cap and place it out of work area.

**NOTE:** If necessary to remove secondary leads from distributor cap, mark position on cap tower for lead to No. 1 cylinder. This will aid in reinstallation of leads in cap.

2. Disconnect distributor primary lead from coil terminal.
3. Scratch a realignment mark on distributor in line with rotor segment (fig. 8-3).

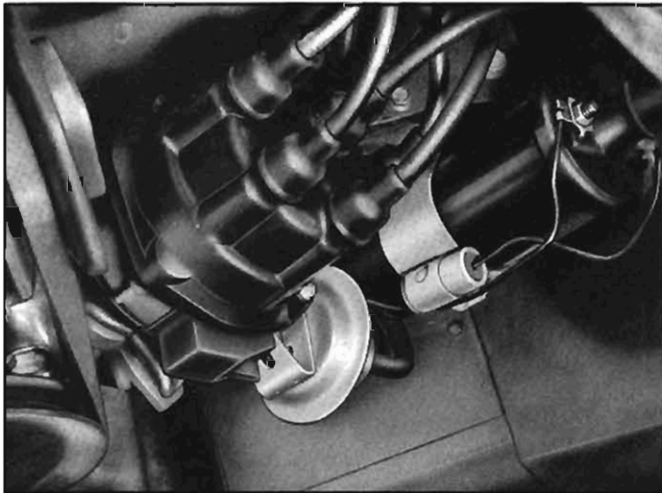


Fig. 8-6—Distributor Installed

4. Disconnect vacuum line from vacuum control assembly (retard unit on turbo-charged engines), remove distributor hold-down bolt and clamp, remove distributor from engine. Note position of vacuum advance assembly relative to engine for correct reinstallation (fig. 8-6).

**CAUTION:** Avoid rotating engine with distributor removed as ignition timing will be upset.

### DISASSEMBLY

With the distributor removed from the vehicle it is advisable to place it in a distributor testing machine or synchroscope.

**CAUTION:** When mounting the distributor in any distributor testing machine or synchroscope, extreme care must be taken not to score or otherwise damage the lower distributor shaft with the testing machine drive mechanism. A protective adapter, with bushing, available from the manufacturers of such testing machines for use with the Corvair distributor, must be used over the lower 1 3/8" of the distributor shaft.

Test the distributor for variation of spark, correct centrifugal and vacuum advance and condition of contacts. This test will give valuable information on distributor condition and indicate parts replacement which may be necessary. Check area on breaker plate just beneath breaker points. A smudgy line indicates that oil or crankcase vapors have been present between points.

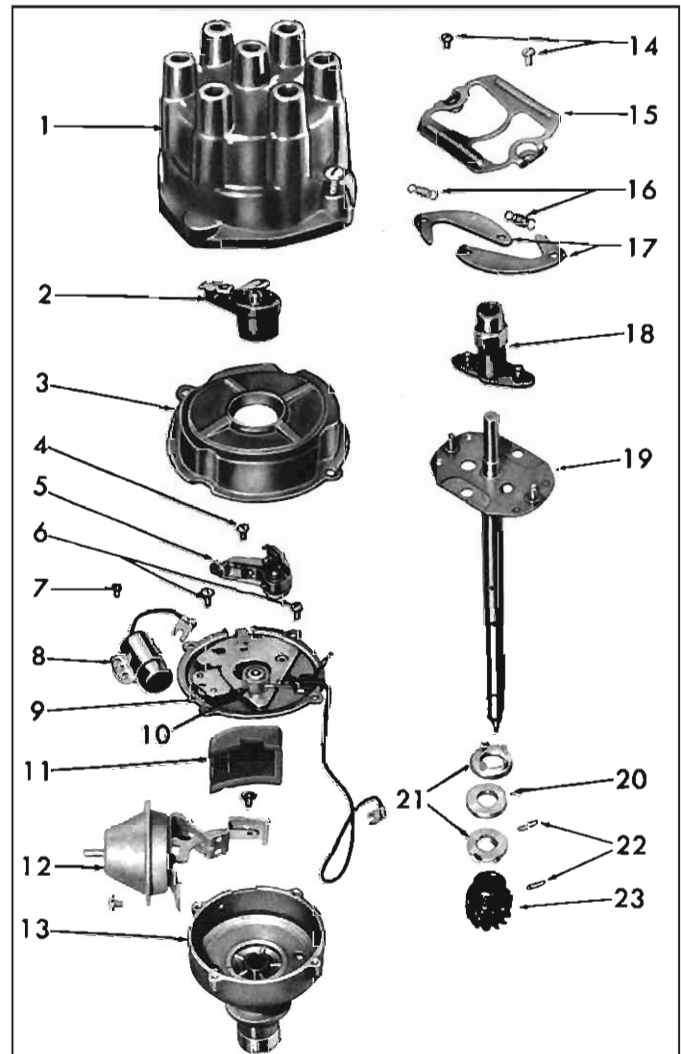


Fig. 8-7—Distributor Exploded View

- |                                   |                                  |
|-----------------------------------|----------------------------------|
| 1. Cap                            | 13. Housing                      |
| 2. Rotor                          | 14. Weight Cover Attaching Screw |
| 3. Dust Shield                    | 15. Weight Cover                 |
| 4. Contact Point Attaching Screw  | 16. Weight Springs               |
| 5. Contact Point Assembly         | 17. Advance Weights              |
| 6. Breaker Plate Attaching Screws | 18. Cam Assembly                 |
| 7. Condenser Attaching Screw      | 19. Mainshaft Assembly           |
| 8. Condenser                      | 20. Washer                       |
| 9. Breaker Plate Assembly         | 21. Thrust Washers               |
| 10. Cam Lubricator                | 22. Roll Pins                    |
| 11. Vacuum Advance Linkage Boot   | 23. Drive Gear                   |
| 12. Vacuum Control Assembly       |                                  |

Refer to Figure 8-7 for exploded view of distributor.

1. Remove rotor and dust shield.
2. Remove vacuum control assembly linkage cover and retaining screws, remove unit from distributor housing.
3. Disconnect primary and condenser leads from contact point quick disconnect terminal, remove contact point set attaching screw, condenser attaching screw, remove point set and condenser from breaker plate.
4. Remove breaker plate attaching screws, remove breaker plate from distributor housing (fig. 8-3).  
**NOTE: Do not disassemble breaker plate any further.**
5. Remove roll pins retaining driven gear and thrust washers to mainshaft, slide gear and washers from shaft.
6. Slide cam and mainshaft from distributor housing.
7. Remove weight cover and stop plate screws, remove cover, weight springs, weights, and slide cam assembly from mainshaft.

### CLEANING AND INSPECTION

1. Wash all parts in cleaning solvent except cap, rotor, condenser, breaker plate assembly, cam lubricator and vacuum control assembly. Degreasing compounds may damage condenser insulation or plastic insulators on the breaker plate assembly.
2. Inspect breaker plate assembly for damage or wear and replace if necessary.
3. Inspect mainshaft for wear, check its fit in the bushing in the distributor housing. If the shaft or bushing is worn, the shaft and distributor body should be replaced.

**NOTE: Distributor housing bushing not serviced separately.**

4. Mount the shaft in "V" blocks and check the shaft alignment with a dial gauge. The runout should not exceed .002".
5. Inspect the governor weights for wear or burrs and free fit on their pins.
6. Inspect the cam for wear or roughness. Then check its fit on the end of the shaft. It should be absolutely free, without any looseness.
7. Inspect the condition of the distributor points (see Distributor Contact Points). Dirty points should be cleaned and badly pitted points should be replaced.
8. Test the condenser for series resistance, microfarad capacity (.18 to .23), leakage or breakdown, following the instructions given by the manufacturer of the test equipment used.
9. Inspect the distributor cap and spark plug wires for damage.

### ASSEMBLY

Refer to Figure 8-7 for exploded view of distributor.

1. Replace cam assembly to mainshaft.

**NOTE: Lubricate top end of shaft with light engine oil prior to replacing.**

2. Install weights on their pivot pins, replace weight springs. Install weight cover and stop plate (fig. 8-8).
3. Lubricate mainshaft, install it in distributor housing.



Fig. 8-8—Weights, Weight Cover Installed

4. Install thrust washers and driven gear to mainshaft, insert retaining roll pins. Check to see that shaft turns freely.

**NOTE: Install driven gear with mark on hub in line with rotor segment.**

5. Position breaker plate assembly in housing and attach retaining screws (see fig. 8-3).
6. Attach condenser and contact point set in proper location with appropriate attaching screws. Connect primary and condenser leads to contact set quick disconnect terminal.

**NOTE: Contact point set pilot must engage matching hole in breaker plate.**

7. Attach vacuum control or retard unit assembly to distributor housing using upper mounting holes and install vacuum advance linkage cover.
8. Install cam lubricator.
9. Install dust shield and rotor to cam assembly.

**Installation—Engine Not Disturbed**

1. Turn rotor approximately  $\frac{1}{8}$  turn counterclockwise past mark previously scratched on distributor housing.
2. Work distributor down into position in engine block with distributor positioned as noted prior to removal—vacuum control unit in same relative position to engine.

**NOTE:** It may be necessary to move rotor slightly to start gear into mesh with crankshaft gear, but rotor should line up with the mark when distributor is down in place.

3. Replace distributor hold-down clamp and bolt. Connect primary lead to coil terminal. Replace distributor cap. Also install spark plug and coil secondary wires if removed (fig. 8-9).

**CAUTION:** Care should be used in tightening distributor cap screws to prevent cracking the cap.

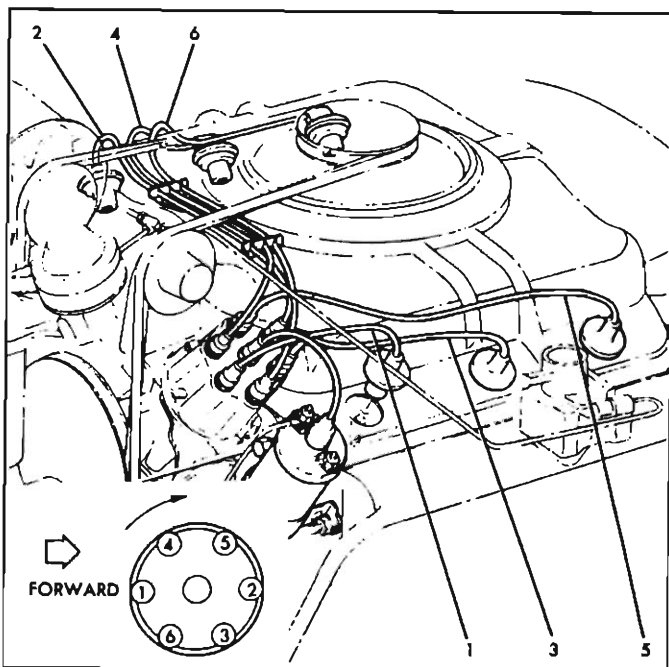


Fig. 8-9—Distributor, Spark Plug Wires Installed

**NOTE:** Wires must be installed as indicated to prevent cross-firing.

4. Set points and time ignition as outlined under Engine Tune-Up, Section 7.
5. Connect vacuum hose to control unit.

**Installation—Engine Disturbed**

1. Locate Number 1 piston in firing position by either of two methods described below.
  - a. Remove Number 1 spark plug and with compression gauge on plug hole crank engine until compression is indicated in Number 1 cylinder. Continue cranking until crankshaft pulley timing notch lines up with "O" timing mark on engine rear housing pad or . . .
  - b. Remove right bank rocker cover and crank engine until Number 1 intake valve closes and continue to crank slowly until "O" pointer lines up with timing notch on crankshaft pulley.
2. Position distributor to opening in block in normal installed attitude.
3. Position rotor to point toward harmonic balancer of engine (with distributor housing held in installed attitude), then turn rotor clockwise approximately  $\frac{1}{8}$  turn more toward left cylinder bank and push distributor down to engage crankshaft. It may be necessary to rotate rotor slightly until crankshaft engagement is felt.
4. While pressing firmly down on distributor housing, kick starter over a few times to make sure oil pump shaft is engaged. Install hold-down clamp and bolt and snug up bolt.
5. Turn distributor body slightly until points just open and tighten distributor clamp bolt.
6. Place distributor cap in position and check to see that rotor lines up with terminal for Number 1 spark plug.
7. Install cap, check all high tension wire connections and connect spark plug wires if they have been removed (see fig. 8-9). It is important that the wires be installed in their proper location in the supports.
8. Connect vacuum line to distributor and distributor primary wire to coil terminal.
9. Start engine and set timing as described under Tune-up in Section 7.

**LIGHTING SYSTEM**

New increased life headlamp unit and increased life miniature bulbs for parking, backing, and stop, tail and directional signal lamps, cluster illumination lamps and indicator lamps are used with the 1964 Corvair

lighting system. Accordingly, replacement headlamp and lamp bulbs should conform to the specifications at the end of this section. Maintenance and Service procedures remain the same as 1961 models.

**WIRING HARNESS**

Wiring harnesses will be new due to the new standardized color code common to all vehicles. Under the new color code, the color of the wire will designate a particular circuit. The harness name title will indicate

a type of harness, single or multiple wire, and also describe the location of the harness. Composite wiring diagrams and a wiring circuit color code chart are included at the end of this section.

## DIRECTIONAL SIGNAL

The Corvair 95 uses a new design directional signal assembly (fig. 8-10). The switch mechanism is an electrically operated self-contained unit having the cancelling mechanism and the electrical switching in one plastic assembly. The new directional signal control is one complete plastic assembly using a stamped bowl instead of an integral cast bowl. The bowl serves only as a housing.

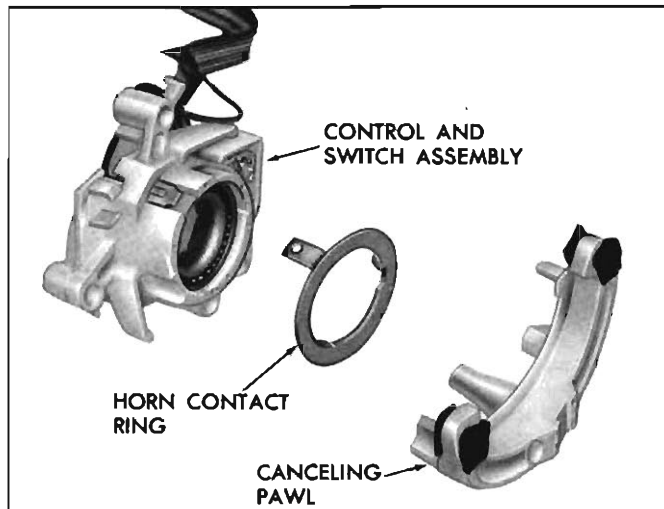


Fig. 8-10—Directional Signal Control

The 1964 Corvair sedans continue to use the same directional signal control and switch assembly as 1961 Corvair passenger models. Removal and installation procedures remain the same as the 1961 models.

### ADJUSTMENTS

The directional signal mechanism requires no adjustments due to its simplicity of design. However, if any malfunction of this mechanism should occur, the steering wheel may be removed and the mechanism checked for defective parts. Refer to the Trouble Diagnosis at the end of this section for a few of the more common directional signal troubles and their probable causes.

### REMOVAL AND INSTALLATION

(Refer to Figure 8-11)

1. Remove steering wheel (Refer to Section 4, Steering).
2. Disconnect signal control and horn wiring assembly at harness quick disconnect.
3. Remove steering column mast jacket upper support clamp.
4. Remove directional signal lever and three screws attaching control assembly to the retaining plate.
5. Remove directional signal control assembly retaining plate and signal housing from steering column.
6. To install, reverse removal procedures.

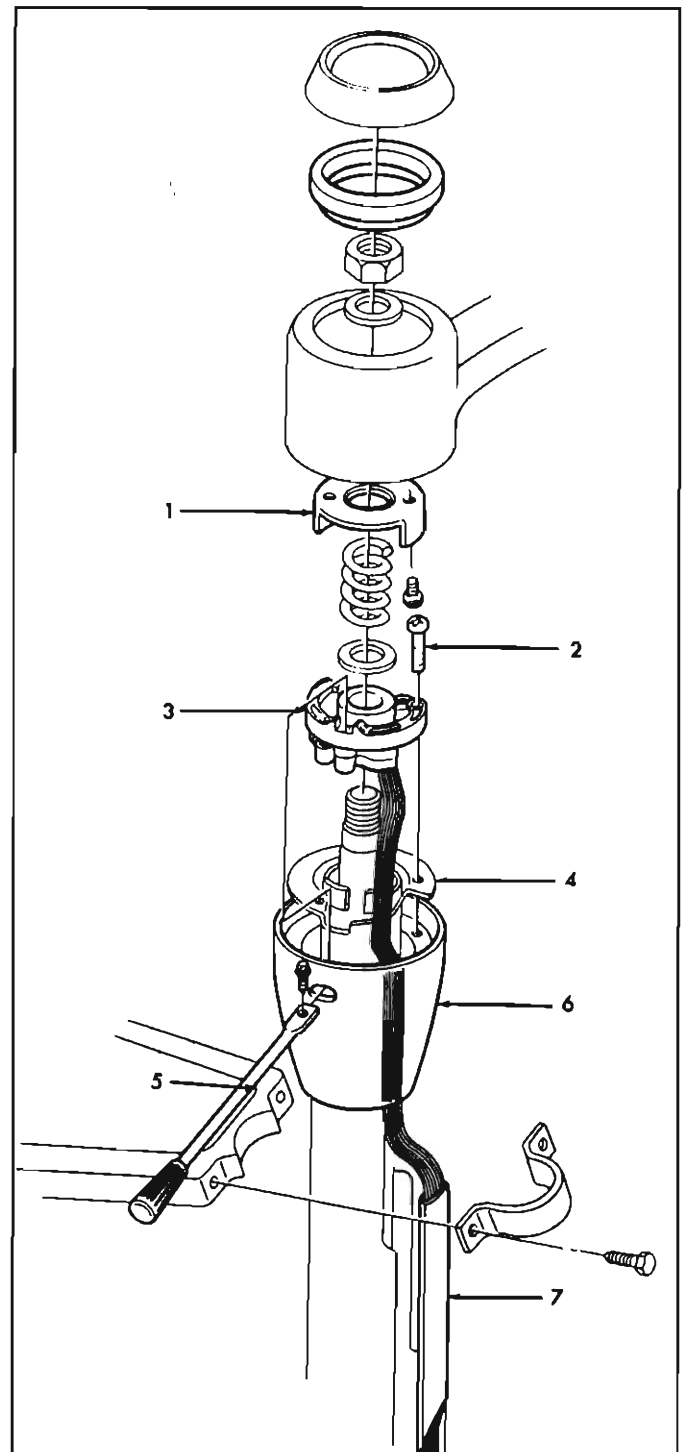


Fig. 8-11—Directional Signal Assembly

- |                             |                         |
|-----------------------------|-------------------------|
| 1. Canceling Cam            | 5. Lever                |
| 2. Attaching Screw          | 6. Housing              |
| 3. Control and Switch Assy. | 7. Wiring Harness Cover |
| 4. Retaining Plate          |                         |

### SPYDER INSTRUMENTS AND GAUGES INSTRUMENT CLUSTER

All instruments, gauges or indicators are located in

the instrument cluster (fig. 8-12). The cluster must be removed from the opening above the steering wheel prior to individual instrument removal.

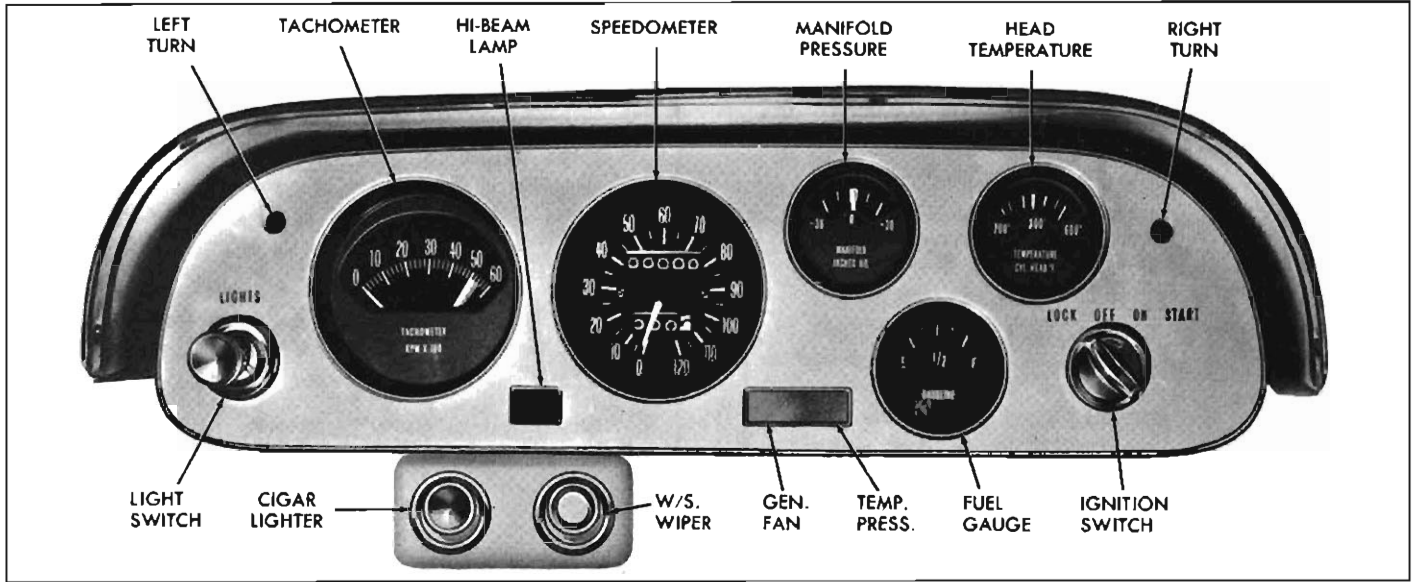


Fig. 8-12—Instrument Cluster Used on Monza Spyder

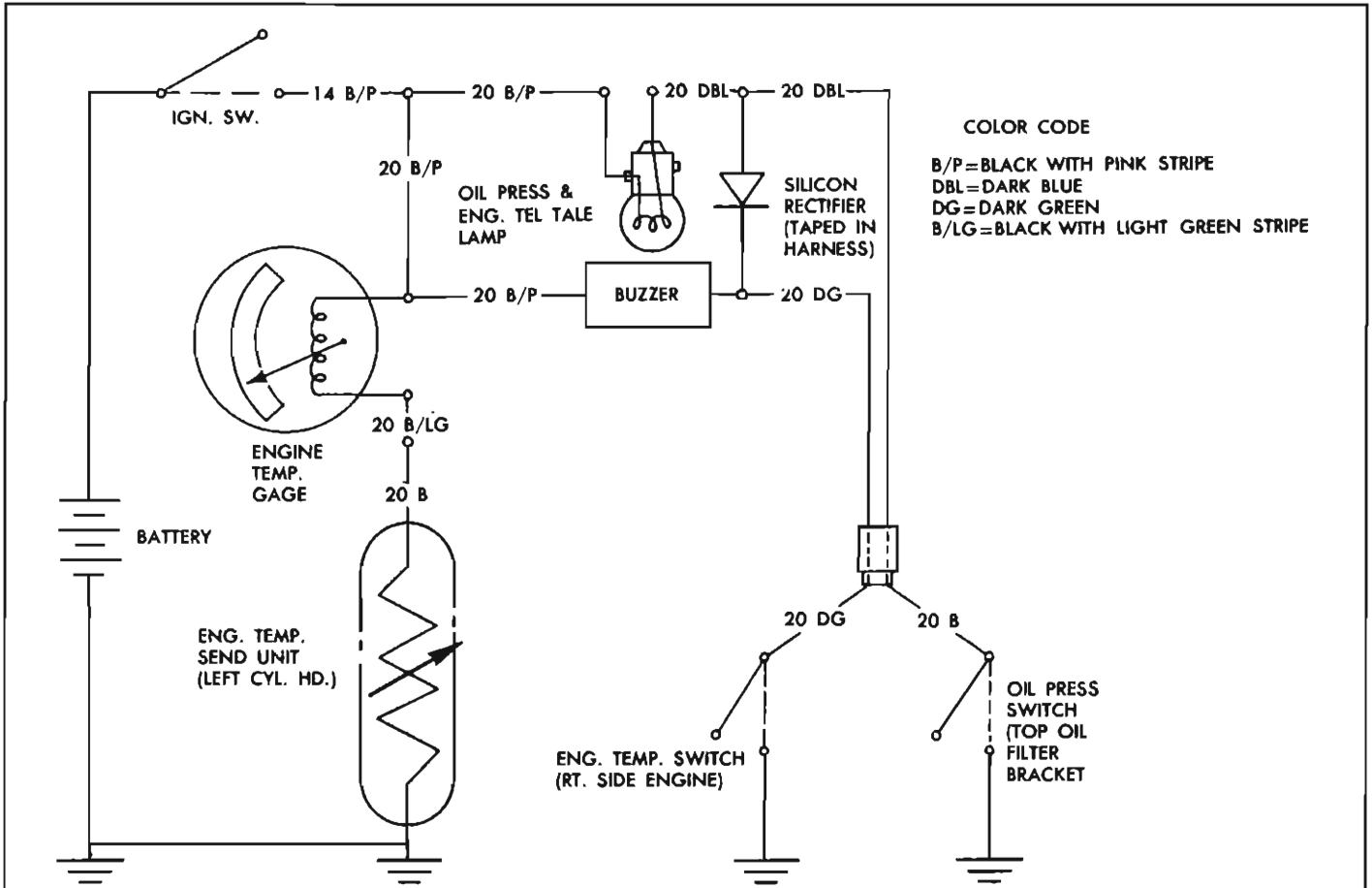


Fig. 8-13—Oil Pressure and Engine Temperature Tell-tale Lamp, Temperature Gauge and Warning Buzzer Wiring



## ENGINE WARNING SYSTEM

The instrument cluster used on the Monza Spyder has in addition to the standard Corvair warning lights, a cylinder head temperature gauge and an engine overheat warning buzzer.

The gauge indicates cylinder head temperature anytime the ignition switch is "ON." Should the engine overheat, the "TEMP-PRESS" light and the buzzer will operate.

**NOTE:** If oil pressure is low, only the "TEMP-PRESS" light operates. If the engine temperature is too high, both the light and the buzzer operate. **THIS IS THE POSITIVE WARNING SYSTEM.** If the gauge needle travels past range, or the light and/or buzzer operate, follow the instructions in the Corvair Owner's Guide.

Figure 8-13 shows the engine warning system circuit. The Silicon Rectifier located between the light circuit and the buzzer circuit allows the light current to flow to ground through the closed engine temperature switch, but prevents the oil pressure switch from completing the buzzer circuit.

## WIRING DIFFERENCES

Tachometer leads are attached at coil in engine compartment. Temperature indicator lamp, gauge and warning buzzer are connected as shown in wiring dia-

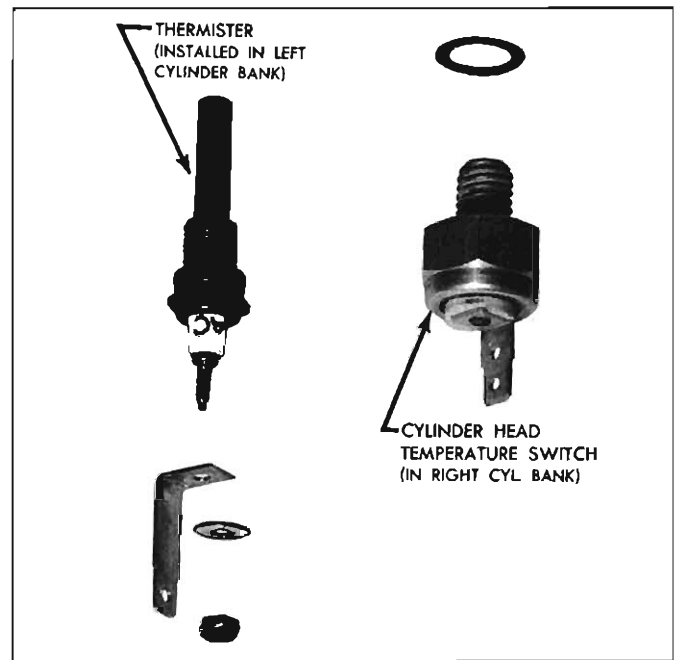


Fig. 8-14—Cylinder Head Temperature Sensing Units

gram (fig. 8-13). The thermister unit (fig. 8-14) is installed on the left cylinder head, the temp pickup in the right head and the warning buzzer and diode are located under dash panel (the diode in wire harness).

## WINDSHIELD WIPER GENERAL DESCRIPTION

The regular production, single-speed electric windshield wiper assembly available on the 1964 Corvair Passenger Cars and Trucks incorporates a non-depressed type (blades park approximately 2" above windshield moulding) motor and gear train. The rectangular, 12 volt, shunt wound motor is similar to 1961 models, but is coupled to a new type gear train consisting of a helical drive gear at the end of the motor armature shaft, an intermediate gear and pinion assembly, and an output gear and shaft assembly. The crank arm is attached to the output gear shaft.

The optionally available two-speed, non-depressed wiper and washer assembly is of a new design incorporating a rectangular, compound wound (series and shunt field) motor adapted to the same type gear train as that used with the new single-speed wipers.

Two switches, connected in parallel, control the starting, stopping and parking of both types of wiper motors. The manually operated start, stop switch is located on the dash panel, while the cam operated park switch is located in the wiper gear box.

## SERVICE OPERATIONS

### WIPER TRANSMISSION ASSEMBLY

Removal and Installation procedures remain the same as 1961 Corvair Passenger and Truck Models.

### WIPER MOTOR ASSEMBLY

Removal and Installation procedures remain the same as 1961 Corvair Passenger and Truck Models, except for location on Corvair Passenger.

### DISASSEMBLY

#### Gear Box

Refer to Figure 8-15 for explode of motor and gear train.

1. Clamp crank arm in a vise and remove crank arm retaining nut.

**NOTE:** Remove washer pump assembly and washer drive cam on wipers so equipped.

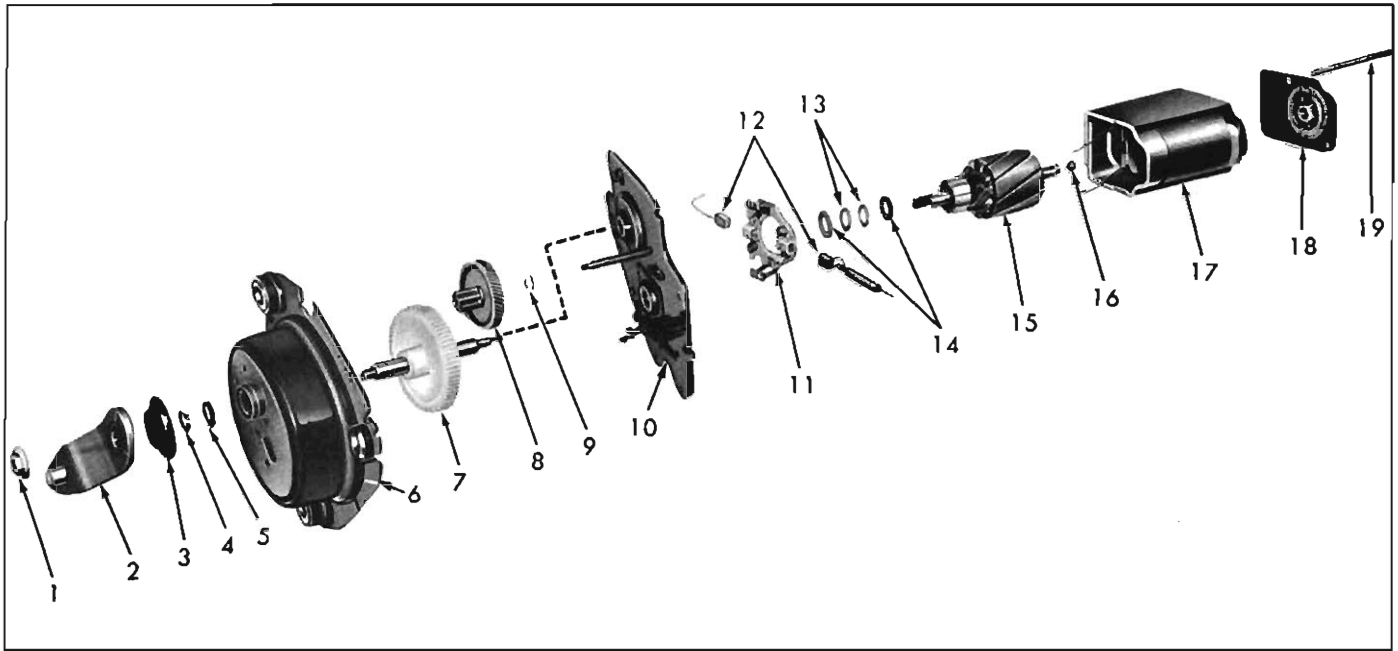


Fig. 8-15—Wiper Motor and Gear Box Exploded View (Typical)

- 1. Nut
- 2. Crank Arm
- 3. Seal Cap
- 4. Retaining Ring
- 5. Washer

- 6. Gear Box Cover
- 7. Output Gear and Shaft Assembly
- 8. Intermediate Gear
- 9. Wave Washer

- 10. Gear Box Housing
- 11. Brush Plate Assembly and Mounting Brackets
- 12. Brushes
- 13. Wave Washers

- 14. Flat Washers
- 15. Armature
- 16. Thrust Plug
- 17. Frame and Field
- 18. End Plate
- 19. Tie Bolts (Two required)

Drive cam can be pried off using suitable tool (fig. 8-16).

2. Remove crank arm, seal cap, Tru-Arc retaining ring, flat washer and shims where applicable.
3. Drill out gear box cover retaining rivets, remove cover from gear train.

**NOTE:** Mark ground strap location for proper reinstallation.

4. Remove output gear and shaft assembly and slide intermediate gear and pinion assembly off shaft. **NOTE: Wave washer located on intermediate gear and pinion shaft.**
5. When necessary, remove terminal board and park switch assembly as follows:
  - a. Unsolder motor leads from terminals. Coding of motor leads not necessary on Type "E" single-speed wipers.
  - b. Drill out rivets securing terminal board and

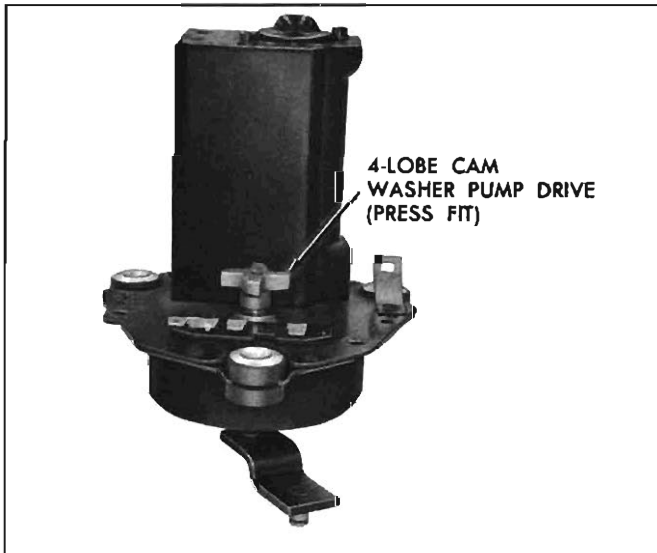


Fig. 8-16—Washer Pump Drive Cam Location

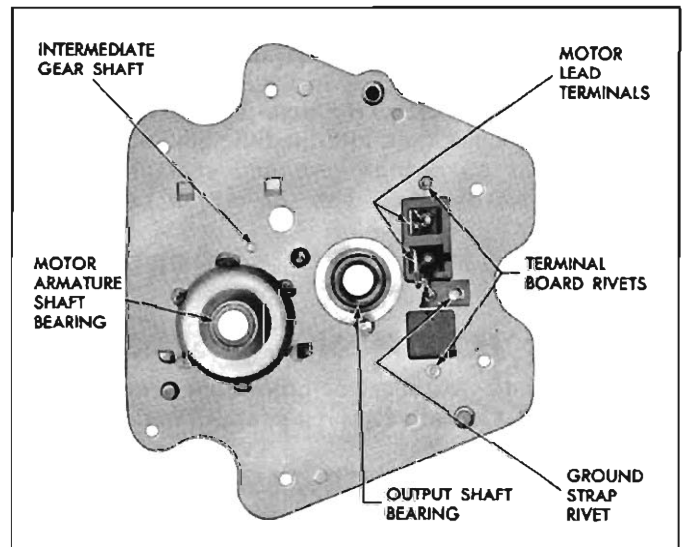


Fig. 8-17—Terminal Board—Single Speed Wiper

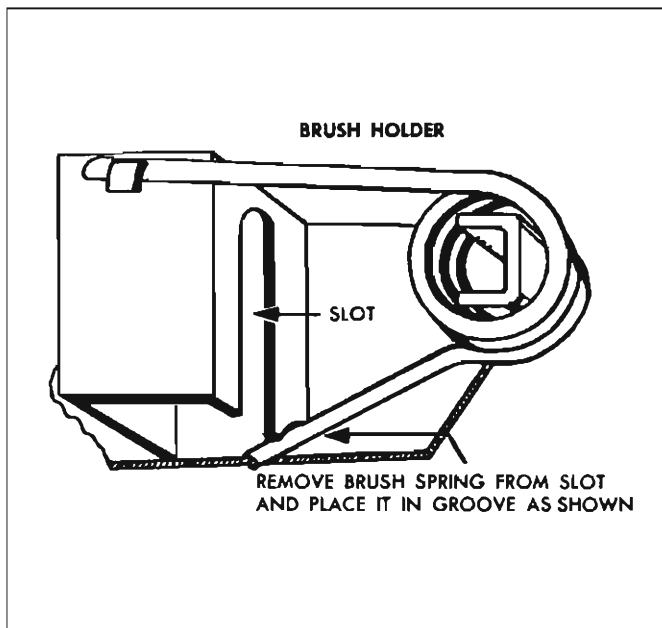


Fig. 8-18—Releasing Brush Spring Tension

park switch ground strap to mounting plate (fig. 8-17).

### Motor

Refer to Figure 8-15.

1. Remove motor thru bolts, tap motor frame lightly, remove motor from mounting plate.
2. Release brush spring tension (fig. 8-18), slide

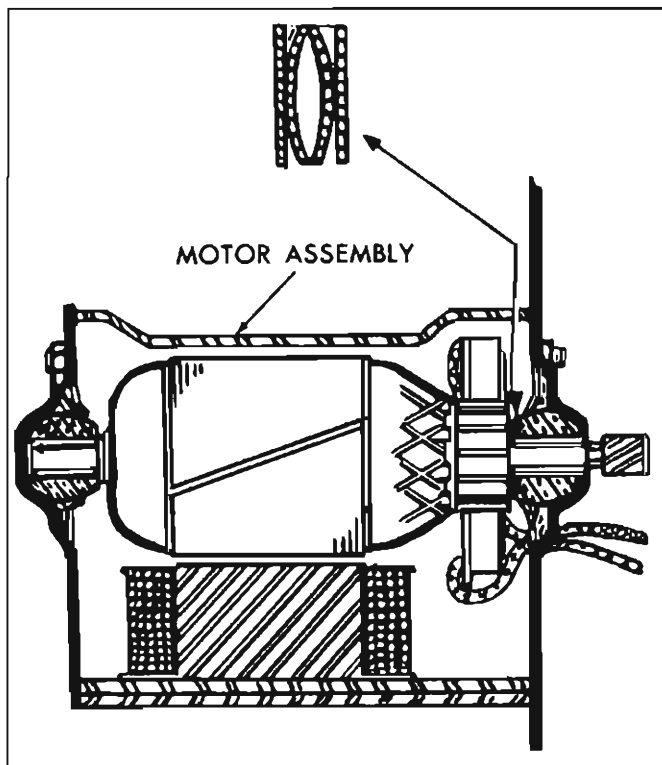


Fig. 8-19—End Play Washers Installed

armature and end plate from motor frame. Pull end plate from armature.

**NOTE:** Thrust plug located between armature shaft and end plate.

3. Remove end play adjusting washers from armature, noting arrangement for proper reinstallation.

### INSPECTION

Check and inspect all parts for serviceability, replace as necessary. All parts can be replaced individually except motor frame and field, which is serviced as an assembly. Service kits also provide screws, nuts, and washers to replace gear cover and terminal board rivets.

### ASSEMBLY

#### Motor

Refer to Figure 8-15 for explode of motor and gear train.

1. Reassemble motor using reverse of disassembly procedure outlined above.

**NOTE:** Lubricate armature shaft bushings with light machine oil. Armature end play is automatically adjusted by the proper installation of end play wave washers (fig. 8-19).

#### Gear Box

Refer to Figure 8-15 for explode of gear box.

1. Assemble gear box using reverse of disassembly procedure.

**NOTE:** Lubricate gear teeth with Delco Cam

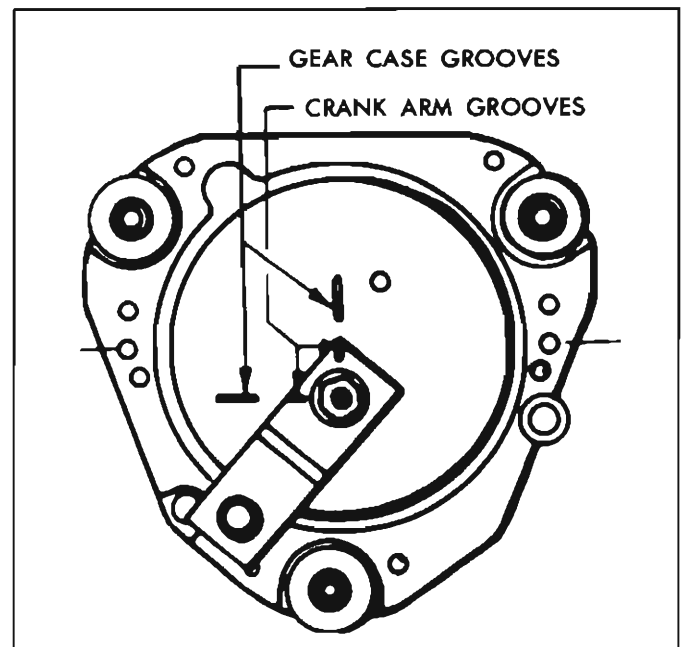


Fig. 8-20—Wiper Crank Arm in Park Position

and Ball Bearing Lubricant. Be sure cover is properly located over dowel pins and be sure to reinstall ground strap.

2. Operate wiper to park position and install crank

arm on output shaft so alignment marks line up with those on cover (fig. 8-20). Replace retaining nut, place crank arm in vise, tighten retaining nut.

## WINDSHIELD WASHER

### GENERAL DESCRIPTION

The positive displacement washer pumps used on the one and two speed non-depressed park wipers differ considerably in appearance from the 1961 integral type pump (fig. 8-21), but the basic pumping action and valve arrangement remains the same. The pump mechanism consists of a small bellows, bellows

spring and valve arrangement driven by a 4 lobe nylon cam and pin assembly (fig. 8-22). The wiper motor drives the cam (fig. 8-23). Programming is accomplished electrically and mechanically by a relay assembly and ratchet wheel arrangement.

### SERVICE OPERATIONS

#### REMOVAL AND INSTALLATION

Removal of the washer pump from the wiper motor consists of:

1. Disconnect wiring harness from washer.
- NOTE:** Mark washer hoses for correct reinstallation.
2. Remove washer mounting bracket to wiper retaining screws, remove washer from wiper.
  3. Reverse above procedure to install assembly.

**CAUTION:** Install washer multiplug harness connector with battery lead on terminal with no tang (fig. 8-21). Incorrect installation of connector will result in direct ground and destroy wiper motor fuse.

#### DISASSEMBLY-ASSEMBLY

Refer to Figure 8-22.

1. Remove washer pump cover.

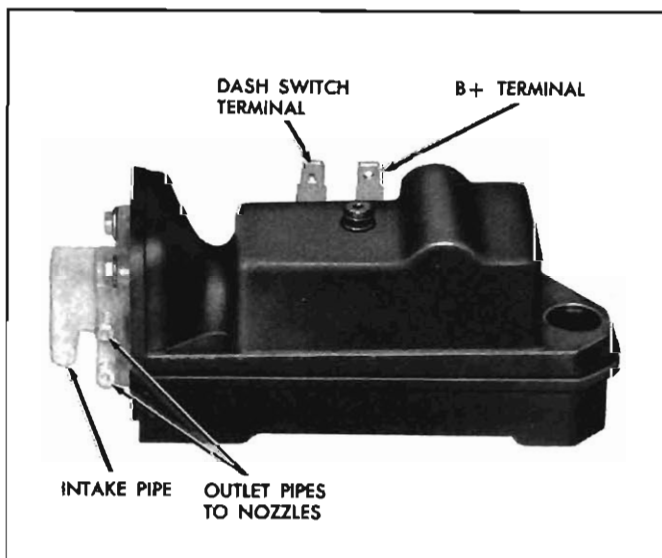


Fig. 8-21—Washer Pump

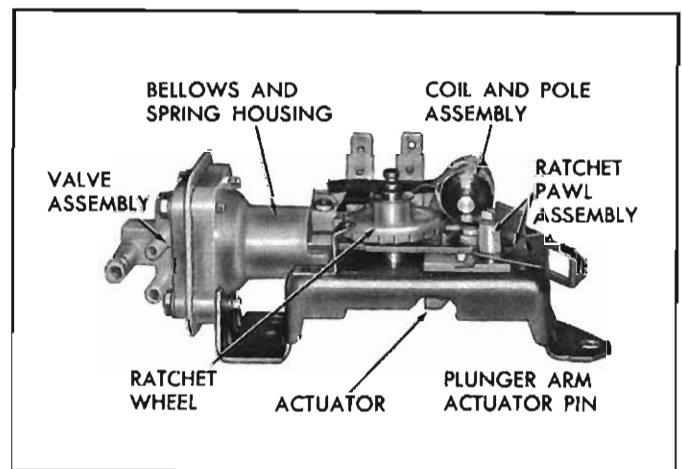


Fig. 8-22—Washer Pump Mechanism

2. Remove Relay.
  - a. To remove relay unsolder coil leads from terminals.

**NOTE:** No coil polarity is necessary when resoldering coil leads.

  - b. Remove coil retainer clip and slip coil assembly out of mounting bracket.
3. Ratchet Pawl.
  - a. To remove ratchet pawl, disengage spring from ratchet pawl.

**CAUTION:** Be sure spring is properly assembled before replacing washer pump cover.

  - b. Remove "E" ring and slide ratchet pawl off shaft.
4. Terminal Board.
  - a. Remove two attaching screws and relay terminal board assembly from washer base.
5. Ratchet Wheel.

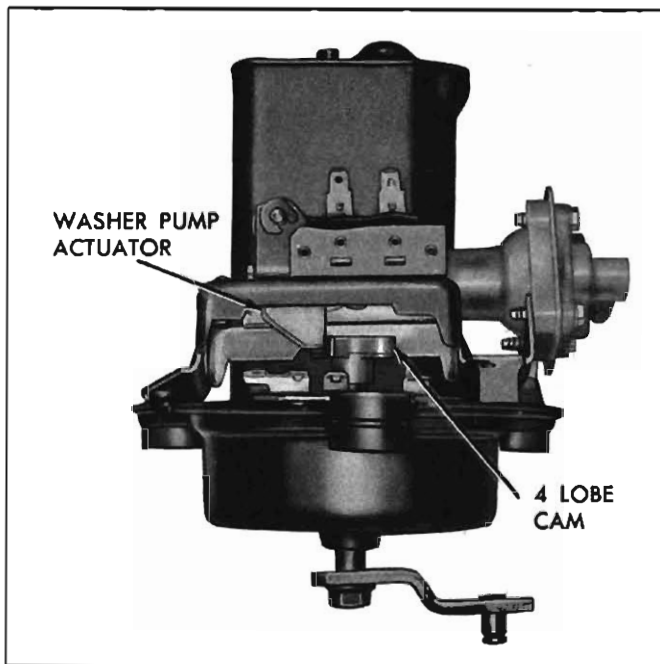


Fig. 8-23—Washer Drive Mechanism

- a. Remove retaining ring and slide the wheel from the shaft.
6. Valve Assembly.
  - a. To remove valve assembly, remove 4 screws that secure valve assembly to bellows housing.
 

**CAUTION: It may be necessary to carefully pry bellows lip out of the valve body groove.**

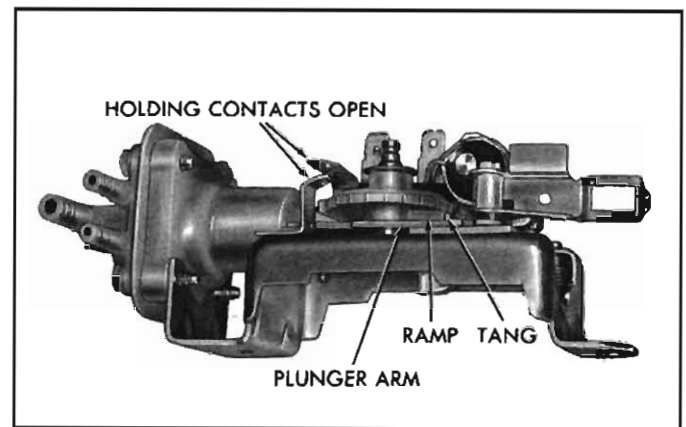


Fig. 8-24—Releasing Pump From Lockout Position

7. Bellows.
  - a. To remove bellows first remove valve assembly.
  - b. Manually operate pump clockwise to release pump from "lock-out" position (fig. 8-24).
  - c. Hold bellows plunger arm from moving, then push in against bottom of bellows with thumb and twist 90° to remove bellows and bellows spring from housing.
8. Actuator Drive Pin.
  - a. Remove actuator spring.
  - b. Slide actuator drive from washer base.
9. To assemble washer unit, reverse above procedures.

# TROUBLE DIAGNOSIS

## SINGLE SPEED WIPER

**NOTE:** Should the wiper motor stall under severe operating conditions, the wiper blades will not necessarily return to park position automatically and motor will continue to operate. Turning the dash switch "off"

will not de-energize the circuit and the wiper arms will have to be parked manually or the wiper motor must be allowed to cool. The wiper motor will recover without damage after cooling.

Trouble Condition	What To Look For	
	WIPER INSTALLED IN CAR	WIPER DETACHED
<b>A. WIPER INOPERATIVE</b> —Important: Ignition switch must be on to make electrical tests.	1. Check the following: <ol style="list-style-type: none"> <li>(1) Car wiring harness is properly attached to wiper terminals and dash switch.</li> <li>(2) Dash switch is mounted securely in dash.</li> <li>(3) Check fuse.</li> </ol>	—Current Draw—0 <ol style="list-style-type: none"> <li>1. Check solder connection at terminal board.</li> <li>2. Disassemble motor section and check all splice connections (fig. 8-26).</li> </ol>
	2. If everything checks out in Step 1 and wiper fails to operate, disconnect wiring harness from wiper and check for 12 volts at harness terminal that connects to wiper terminal No. 2, Figure 8-25. No voltage indicates defective car wiring.	—Current Draw—2-3 amps <ol style="list-style-type: none"> <li>1. Disassemble motor and check for the following items:               <ol style="list-style-type: none"> <li>a. Open armature.</li> <li>b. Brushes sticking.</li> <li>c. Brush springs improperly positioned (See fig. 8-18).</li> <li>d. Loose or frayed brush pig-tail connections at splice joints.</li> </ol> </li> </ol>
	<b>CAUTION: DO NOT connect hot line to No. 1 Terminal.</b>	—Current Draw—10-12 Amps. <ol style="list-style-type: none"> <li>1. Check for open shunt field circuit.</li> <li>2. Check for broken gear.</li> </ol>
	3. Connect 12 volt supply to No. 2 wiper terminal and connect a jumper wire from terminal No. 1 to ground (fig. 8-21). If wiper operates, the dash switch or wiring between dash switch and wiper is defective.	
4. If wiper fails to operate in Step 3 remove body parts as required to disconnect wiper transmission from wiper crank arm. Recheck wiper operation as explained in Step 3. If wiper operates correctly a defective transmission or binding condition exists. If wiper still fails to operate, remove wiper from car and follow instructions under trouble shooting—wiper detached.		

Trouble Condition	What To Look For	
	WIPER INSTALLED IN CAR	WIPER DETACHED
B. WIPER WILL NOT SHUT OFF.	<ol style="list-style-type: none"> <li>1. Disconnect wiring from dash switch. If wiper shuts off, a defective dash switch is indicated.</li> <li>2. If wiper still operates in Step 1, disconnect wiring from wiper and connect 12 volt supply direct to wiper terminal No. 2 (fig. 8-25). DO NOT connect any jumper wire to terminal No. 1. <ul style="list-style-type: none"> <li>—Wiper shuts off correctly—check for grounded lead that extends between wiper terminal No. 1 and dash switch.</li> <li>—Wiper fails to shut off—remove wiper from car and follow instructions under "Trouble Shooting Wiper Detached."</li> </ul> </li> </ol>	<p>Wiper crank arm fails to stop in park position when jumper wire is removed from wiper Terminal No. 1. Figure 8-25.</p> <ol style="list-style-type: none"> <li>1. Check that park switch contacts are opening.</li> <li>2. Check for grounded condition in the internal motor lead that connects to terminal No. 1, Figure 8-25.</li> </ol>
C. INTERMITTENT OPERATION	<ol style="list-style-type: none"> <li>1. Check the following: Loose ground strap, loose dash switch mounting, loose connection.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check for sticking brushes, loose splice joints, etc.</li> </ol>
D. BLADES DO NOT RETURN TO PARK POSITION WHEN WIPER IS TURNED OFF.	<ol style="list-style-type: none"> <li>1. Check wiper ground strap connection to car body.</li> <li>2. Remove wiper from car and check for a dirty or broken park switch. (See fig. 8-17 for park switch location).</li> </ol>	<ol style="list-style-type: none"> <li>1. Check for dirty, bent or broken park switch contacts.</li> </ol>
E. WIPER RUNS SLOW, VIBRATES AND CURRENT DRAW APPROX. 7-9 AMPS.		<ol style="list-style-type: none"> <li>1. Check for binds in gear train.</li> <li>2. Check for shorted armature. (Armature may be checked on a growler).</li> <li>3. Check armature bearings for lubricant.</li> </ol>
F. WIPER SHUTS OFF BEFORE CRANK ARM REACHES PARK POSITION.		<p>Wiper crank arm stops rotating immediately when jumper wire is disconnected from wiper terminal No. 1 (fig. 8-25). Note: When crank arm has reached park position the crank arm index grooves will lineup approx. with the ridges on the gear box cover (fig. 8-20).</p> <ol style="list-style-type: none"> <li>1. Check for dirty, broken or bent part switch contacts.</li> </ol>

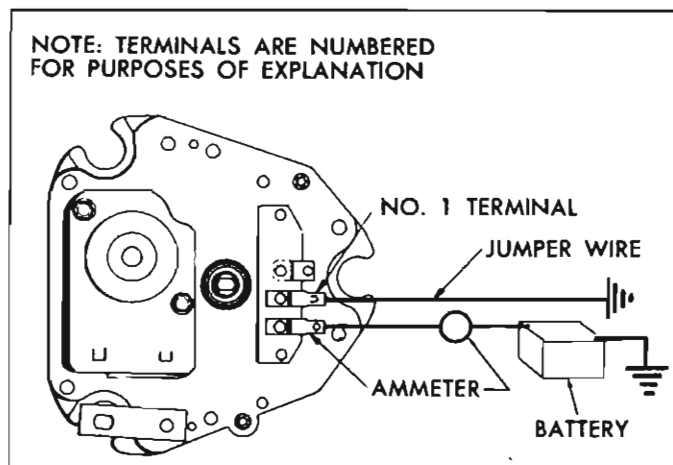


Fig. 8-25—Checking Single Speed Wiper Circuit

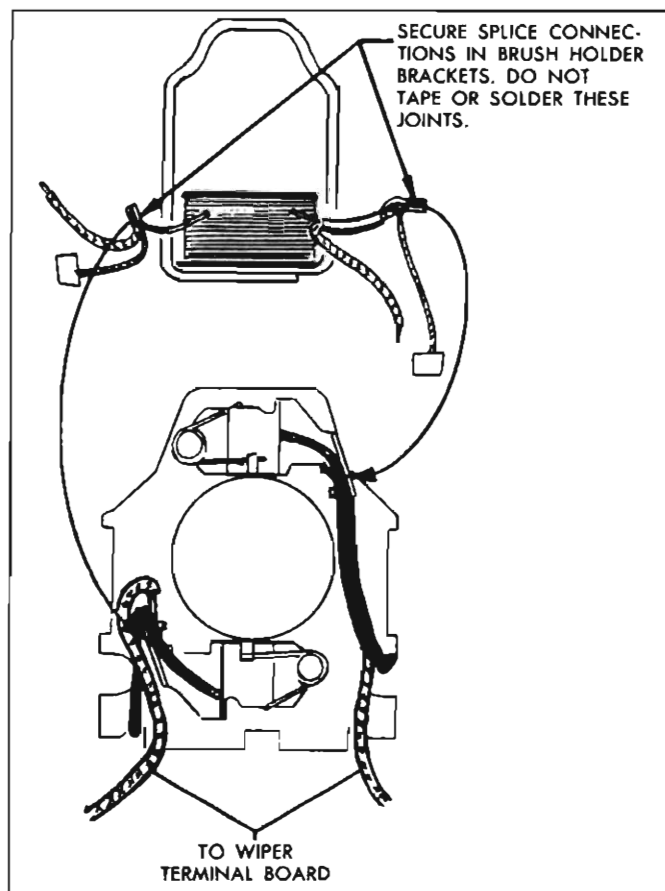


Fig. 8-26—Checking Motor Splice Connections

## TWO SPEED WIPER

Trouble Condition	What To Look For	
	<b>WIPER INSTALLED IN CAR</b>	<b>WIPER DETACHED</b>
A. WIPER INOPERATIVE <b>IMPORTANT</b> —Be sure and use an ammeter capable of reading at least 30 amperes in the feed wire circuit.	1. Check for defective fuse.	Connect up wiper to operate in "Lo" speed and observe current draw. Current draw ratings shown below will provide a hint as to the possible source of trouble.
	2. Check that wiring harness is properly connected to wiper and dash switch; wiper ground strap is connected securely to car body; and dash switch is securely mounted.	
	3. With ignition switch on, check for 12 volts at harness terminal that connects to number (2) terminal (fig. 8-27).	
	4. To determine if dash switch or car wiring is at fault, disconnect harness from wiper motor and try operating wiper as shown in Figure 8-27. If wiper fails to operate, remove body parts as required, disconnect transmissions from wiper crank arm and recheck wiper operation. If wiper still fails to perform, correctly, remove wiper from car and check wiper according to procedure under trouble shooting wiper detached.	
	<b>Ammeter Reading (Amps)</b>	<b>Possible Trouble</b>
	0	(1) Loose solder connection at wiper terminal No. 2 (Fig. 8-27). (2) Loose splice joints (Fig. 8-26).
	1-1.5	(1) Open armature. (2) Brushes sticking. (3) Loose splice joint.
	11.0	(1) Broken gear or some other condition that will stall the wiper.



Trouble Condition	What To Look For									
	WIPER INSTALLED IN CAR	WIPER DETACHED								
<b>B. WIPER WILL NOT SHUT OFF</b> If wiper still fails to operate correctly in Step 2, remove it from car and check it per instructions under trouble shooting—wiper detached.	1. Determine if wiper has both "Lo" and "Hi" speeds, "Lo" speed only, or "Hi" speed only. (Important—wiper must operate in "Lo" speed during parking cycle). 2. Disconnect wiring harness from wiper motor and try operating wiper independently of dash switch as shown in Figure 8-27. —If wiper operates correctly independently of the dash switch, (i.e. shuts off correctly with crank arm in park position) refer to the table below for possible trouble location—	<table border="1"> <thead> <tr> <th>Condition</th> <th>Possible Trouble</th> </tr> </thead> <tbody> <tr> <td>Wiper has both speeds</td> <td>(1) Park switch contacts not opening. (2) Internal wiper motor lead that connects to wiper terminal No. 1 grounded</td> </tr> <tr> <td>Wiper has "Lo" speed only</td> <td>(1) Internal wiper motor lead that connects to wiper terminal No. 3 grounded (2) Shunt field coil grounded.</td> </tr> <tr> <td>Wiper has "Hi" speed only</td> <td>(1) Internal wiper motor lead that connects to wiper terminal No. 3 open. (2) Shunt field open.</td> </tr> </tbody> </table>	Condition	Possible Trouble	Wiper has both speeds	(1) Park switch contacts not opening. (2) Internal wiper motor lead that connects to wiper terminal No. 1 grounded	Wiper has "Lo" speed only	(1) Internal wiper motor lead that connects to wiper terminal No. 3 grounded (2) Shunt field coil grounded.	Wiper has "Hi" speed only	(1) Internal wiper motor lead that connects to wiper terminal No. 3 open. (2) Shunt field open.
	Condition	Possible Trouble								
Wiper has both speeds	(1) Park switch contacts not opening. (2) Internal wiper motor lead that connects to wiper terminal No. 1 grounded									
Wiper has "Lo" speed only	(1) Internal wiper motor lead that connects to wiper terminal No. 3 grounded (2) Shunt field coil grounded.									
Wiper has "Hi" speed only	(1) Internal wiper motor lead that connects to wiper terminal No. 3 open. (2) Shunt field open.									
<table border="1"> <thead> <tr> <th>Step 2 Diagnosis</th> <th>Possible Trouble</th> </tr> </thead> <tbody> <tr> <td>Wiper has both speeds</td> <td>(1) Lead between wiper terminal No. 1 and dash switch grounded. (2) Defective dash switch.</td> </tr> <tr> <td>Wiper has "Lo" speed only</td> <td>(1) Lead between wiper terminal No. 3 and dash switch grounded. (2) Defective dash switch.</td> </tr> <tr> <td>Wiper has "Hi" speed only</td> <td>(1) Lead between wiper terminal and dash switch open. (2) Defective dash switch.</td> </tr> </tbody> </table>	Step 2 Diagnosis	Possible Trouble	Wiper has both speeds	(1) Lead between wiper terminal No. 1 and dash switch grounded. (2) Defective dash switch.	Wiper has "Lo" speed only	(1) Lead between wiper terminal No. 3 and dash switch grounded. (2) Defective dash switch.	Wiper has "Hi" speed only	(1) Lead between wiper terminal and dash switch open. (2) Defective dash switch.		
Step 2 Diagnosis	Possible Trouble									
Wiper has both speeds	(1) Lead between wiper terminal No. 1 and dash switch grounded. (2) Defective dash switch.									
Wiper has "Lo" speed only	(1) Lead between wiper terminal No. 3 and dash switch grounded. (2) Defective dash switch.									
Wiper has "Hi" speed only	(1) Lead between wiper terminal and dash switch open. (2) Defective dash switch.									
<b>C. WIPER HAS ONE SPEED—FAST</b>	1. Check for a defective dash switch or open lead between terminal Number 3 and dash switch.	—See Typical Trouble (B) above.								
<b>D. WIPER HAS ONE SPEED SLOW AND SHUTS "OFF" WITH DASH SWITCH IN "HI" SPEED POSITION</b>	1. Reverse harness leads that connect to wiper terminals 1 and 3.	—See Typical Trouble (B) above.								
<b>E. BLADES DO NOT RETURN TO PARK POSITION WHEN WIPER IS TURNED "OFF"</b>	1. Check wiper ground strap connection to car body. 2. Remove wiper from car and check for dirty, bent or broken park switch contacts.	1. Check for dirty, bent or broken park switch contacts.								
<b>F. WIPER SPEED NORMAL IN "LO" BUT TOO FAST IN "HI"</b>	1. Remove wiper from car and check for an open terminal board resistor.	1. Check for open 24 ohm resistor on back of wiper terminal board.								
<b>G. INTERMITTENT OPERATION</b>	1. Check for loose wiper ground strap connections and/or loose dash switch mounting.	1. Check for sticking brushes, loose splice joints, etc.								

## WASHER PUMP

Trouble Condition	What To Look For	
	WASHER PUMP ON CAR	WASHER PUMP DETACHED
<b>A—WASHER INOPERATIVE:</b>	<ol style="list-style-type: none"> <li>1. Check the following items:               <ol style="list-style-type: none"> <li>(1) Jar has adequate quantity of water solution.</li> <li>(2) Hoses are not damaged and hose connections are tight.</li> <li>(3) Screen at end of jar cover hose is not plugged.</li> <li>(4) Electrical connections to washer pump and dash switch.</li> <li>(5) Nozzles are not plugged.</li> </ol> </li> <li>2. If all items in step No. 1 check out, start wiper motor only, then push washer button and listen for "click" as washer relay pulls in. If no "click" is heard, check for 12 volts at terminal No. 2 (fig. 8-30). No voltage indicates defective wiring. If "click" is heard, proceed to step 4.</li> <li>3. If correct voltage was found in step No. 2, connect a jumper wire from terminal No. 1 to ground (fig. 8-30) and operate wiper. If washer relay "click" is heard and pump functions correctly, a defective dash switch or an open circuit between washer pump and dash switch is indicated — "No Click" indicates an open relay coil.</li> <li>4. If relay "click" is heard in Step 2, listen for the soft clicking as the pump ratchet wheel is rotated.               <ul style="list-style-type: none"> <li>—If "soft clicking" is not heard, the pump mechanism is faulty and should be removed from the wiper motor and checked.</li> <li>—If soft clicking is heard but no pumping action occurs, replace the valve assembly and recheck pump.</li> </ul> </li> <li>5. Check for proper gear engagement. Check to see that cam gear teeth are not damaged.</li> </ol>	<p>Check Pump Operation as Follows:</p> <ol style="list-style-type: none"> <li>1. Remove washer pump cover and connect 12 volt power supply to washer pump as shown in Figure 8-28. Connect jumper wire from terminal No. 1 to ground. Turn ratchet pawl to the position shown in Figure 8-29. Ratchet pawl should be pulled toward relay pole and engage ratchet teeth. Failure to do as described above indicates an open relay coil.</li> <li>2. If relay and ratchet pawl perform correctly in Step 1, manually rotate the 3 lobe cam one lobe in a clockwise direction (looking at the cam). Observe if relay holding contacts close (fig. 8-29) and the pump plunger arm is released from its lock-out position. (Fig. 8-24 shows plunger arm in lock-out position.)</li> <li>3. Disconnect jumper wire from terminal No. 1. Relay coil should remain energized and hold ratchet pawl against ratchet wheel. Failure to do so indicates open or dirty holding contacts.</li> <li>4. If pump performs correctly in Step 3, continue to manually rotate the 3 lobe cam until the ratchet wheel has been turned through 360° or 21 teeth. After the ratchet wheel has been rotated 21 teeth, the holding contacts should be opened by a "hump" on the wheel and the pump plunger arm should be in the "lock-out" position (fig. 8-24).</li> </ol> <p>Check Valve Assembly as Follows:</p>

Trouble Condition	What To Look For	
	WASHER PUMP ON CAR	WASHER DETACHED
A-WASHER INOPERATIVE CONTINUED		<ol style="list-style-type: none"> <li>1. Attach a hose to the large or intake pipe. You should be able to blow through it but not draw through it.</li> <li>2. Attach a hose individually to each of the small or exhaust pipes. You should be able to draw through them but not blow through them. If any of three valves allow air to pass in both directions, the valve assembly is defective.</li> </ol>

**B. WASHER PUMP  
OPERATES  
CONTINUOUSLY**

With wiper motor running and washer operating continuously, check the following:

1. Contact point adjustment—points should be open when ratchet wheel ramp is engaged. Points should be closed when not engaged with ramp.
2. Continuity of coil and pole assembly.
3. Ratchet pawl spring broken or disengaged.
4. Ratchet wheel brake broken or misaligned.

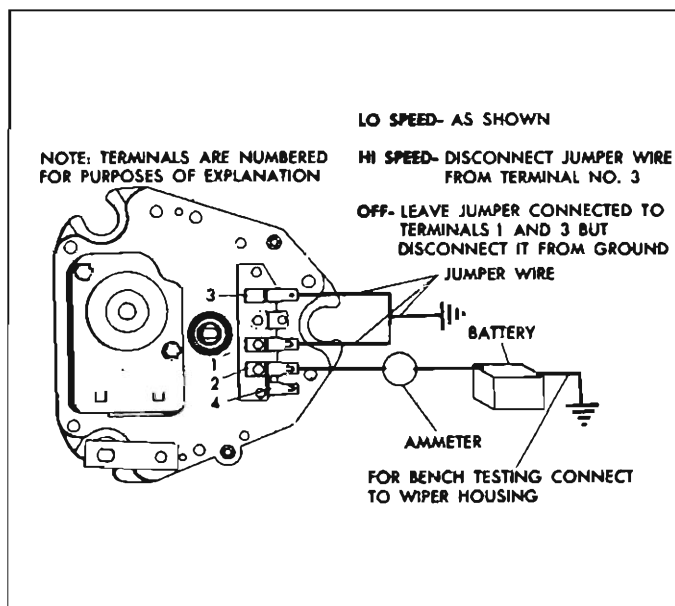


Fig. 8-27—Checking Two-Speed Wiper Circuit

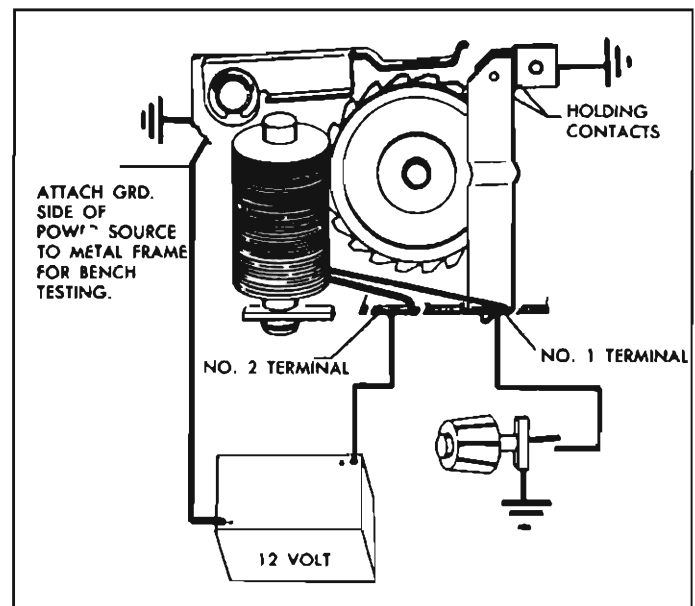


Fig. 8-28—Bench Checking Pump Operation

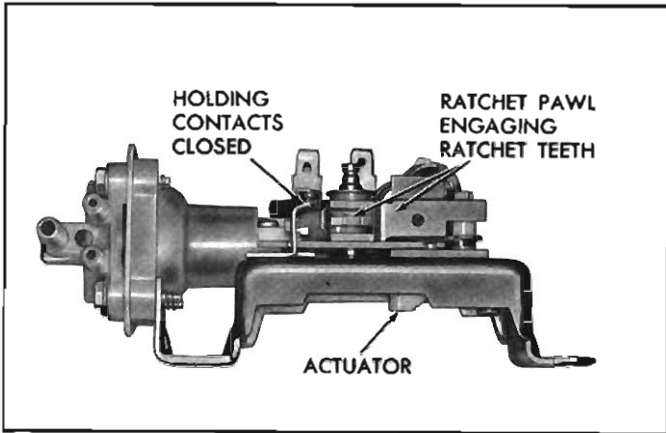


Fig. 8-29—Washer Holding Contacts Closed

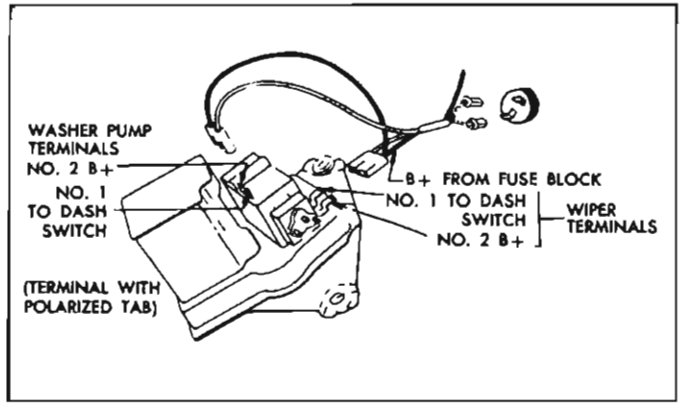


Fig. 8-30—Checking Washer Operating Voltage

## DIRECTIONAL SIGNAL

Problem	Possible Trouble
<p>When signalling a turn, the indicator light comes on but does not flash.</p>	<ol style="list-style-type: none"> <li>1. Check for burned out parking or tail lamp on that side.</li> <li>2. Check for the wrong flasher (3-bulb instead of 2-bulb flasher).</li> </ol>
<p>When signalling a turn either</p> <ol style="list-style-type: none"> <li>1. Both turn indicators come on and stay on.</li> <li>2. Neither turn indicator comes on.</li> <li>3. In either case no "clicking" is heard.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace the flasher. Be sure to replace with the same type flasher removed. Always replace with a series type flasher. Magnetic type flashers are not recommended.</li> <li>2. Check for defective parking or tail lamp.</li> </ol>
<p>When signalling a turn, a "clicking" is heard but the indicator light does not flash.</p>	<p>Replace the indicator bulb.</p>
<p>When signalling a turn, the indicator light operation is very rapid.</p>	<p>Check for the wrong flasher.</p>
<p>Turn signal will not cancel.</p>	<p>Remove steering wheel and check for broken cancelling pawl.</p>
<p>Flashing and cancelling of lights is erratic.</p>	<p>This condition usually results from the turn signal switch being faulty.</p> <ol style="list-style-type: none"> <li>1. Check switch-to-chassis wiring harness connection for loose or damaged connection.</li> <li>2. Remove steering wheel, cancelling pawl, and inspect switch for defective parts.</li> </ol>

# SPECIFICATIONS

## ENGINE ELECTRICAL

### BATTERY

Make .....	Delco-Remy	Voltage .....	12
Plates per Cell .....	9	Maximum permissible specific gravity variation between cells with specific gravity over 1.215.....	.025
Ampere Hour Capacity .....	42		
(at 20 hour rate)			

### GENERATOR

Model	1102336	1105135
Application.....	Base	Optional (Lo-Cut in)
Brush Spring Tension (oz.) .....	28	28
Cold Output.....	35 ampere @ 14V, 2630 rpm	35 ampere @ 14V, 1730 rpm
Field Current Draw @ 12V, 80° F.....	1.69-1.79	2.73-3.0

### REGULATOR

Model	1119002	1119604
Application.....	For Gen. 1102336	For Gen. 1105135
V-R Air Gap.....	.075	.067
V-R Setting @ 125° F.....	13.8-14.7	13.8-14.6
C-R Air Gap.....	.075	.075
C-R Setting @ 125° F.....	31.0-35.5	31.0-35.5
Cutout Relay Air Gap.....	.020	.020
Cutout Relay Point Opening.....	.020	.020
Cutout Relay Closing Voltage.....	11.8-13.5	11.8-13.0

### STARTING MOTOR

Model	1108306	1108307
Application.....	Std. Trans.	Auto. Trans.
Brush Spring Tension (oz.).....	35	35
Free Speed		
Volts.....	10.6	10.6
Amperes.....	58	58
Rpm.....	6750-10,500	6750-10,500
Resistance Test		
(Armature Locked)		
Volts.....	4.0	4.0
Amperes.....	280	280
Torque-Mounting Pad Bolts (Ft.-lbs.) ..	20-30	20-30
Solenoid		
Hold-in Windings.....	10.5-12.5 Amperes @ 10V	
Both Windings.....	42-49 Amperes @ 10V	

### IGNITION COIL

Application .....	All
Primary Resistance, Ohms .....	1.28-1.42
Secondary Resistance, Ohms .....	7200-9500

### IGNITION RESISTOR

Type .....	Special Wire—Part of Harness
Resistance .....	1.8 Ohms

### SPARK PLUGS

TYPE	AC-44FF	AC-46FF
Application	Super Turbo-Air and Turbo-Charger	Turbo-Air
Size	14 mm.	14 mm.
Plug Gap	.030"	.035"
Torque	15—20 lb. ft.	



**FUSES AND CIRCUIT BREAKER**

A 15 ampere circuit breaker in the light control switch protects the headlamp circuit, thus eliminating one fuse.

Fuses located in the junction block beneath the dash are:

- Heater Blower  
Glove Compartment Lamp—3AG/AGC-10 Amp
- Heater (Gasoline)—3AG/AGC-20 Amp  
(Where Used)
- Tail and Stop Lamps, Dome Lamp  
Cigarette Lighter—3AG/AGC-10 Amp
- Heater (Total)  
Back-Up Lamp—3AG/AGC-20 Amp
- Radio—3AG/AGC—2.5 Amp
- Instrument Panel Lamp  
Radio Panel Lamp  
Heater Control Panel Lamp—3AG/AGC-3 Amp
- Windshield Wiper—3AG/AGC-20 Amp

Air Conditioner Fuses.....3AG/AGC—15 Amp.  
(Located in 14 GA and 12 GA gray wires in area of ignition switch.)

**WIPER MOTOR**

**Single Speed**

- Type ..... Electric
- Crank Arm Rotation  
(looking at the crank arm) .....CCW
- Crank Arm Speed (No Load) ..... 43 rpm
- Operating Voltage ..... 12 VDC
- Current Draw (Free Speed) .....3.0 amp Max.  
(Dry Windshield) ....3.5 amp Max.
- Stall Current ..... 11 amp

**Two Speed**

- Operating Volts ..... 12 VDC
- Gear Ratio .....36:1
- Crank Arm Rotation (looking at Crank Arm) CCW
- Crank Arm Speed (RPM's) (No Load):  
Lo ..... 34 Min.  
Hi ..... 65 Min.
- Current Draw: Amps  
No Load (Lo Speed) ..... 3.6  
Installed in Car—(Dry Glass) ..... 4.5  
Stall ..... 12
- Shunt Field Resistance ..... 24

**WASHER PUMP**

- Number of "squirts" at full pressure .....12
- Pressure (PSI) .....11-15
- Coil Resistance (ohms) .....20

**WIRING CIRCUIT COLOR CODE**

DIAGRAM KEY	WIRE COLOR
B	Black
B/LG	Black with Light Green Stripe
B/LBL	Black with Light Blue Stripe
B/P	Black with Pink Stripe
B/OR	Black with Orange Stripe
B/W	Black with White Stripe
B/Y	Black with Yellow Stripe
BRN	Brown
DBL	Dark Blue
DG	Dark Green
PPL	Purple
R	Red
T	Tan
GY	Gray
W/OR/P	White with Orange and Pink Stripes

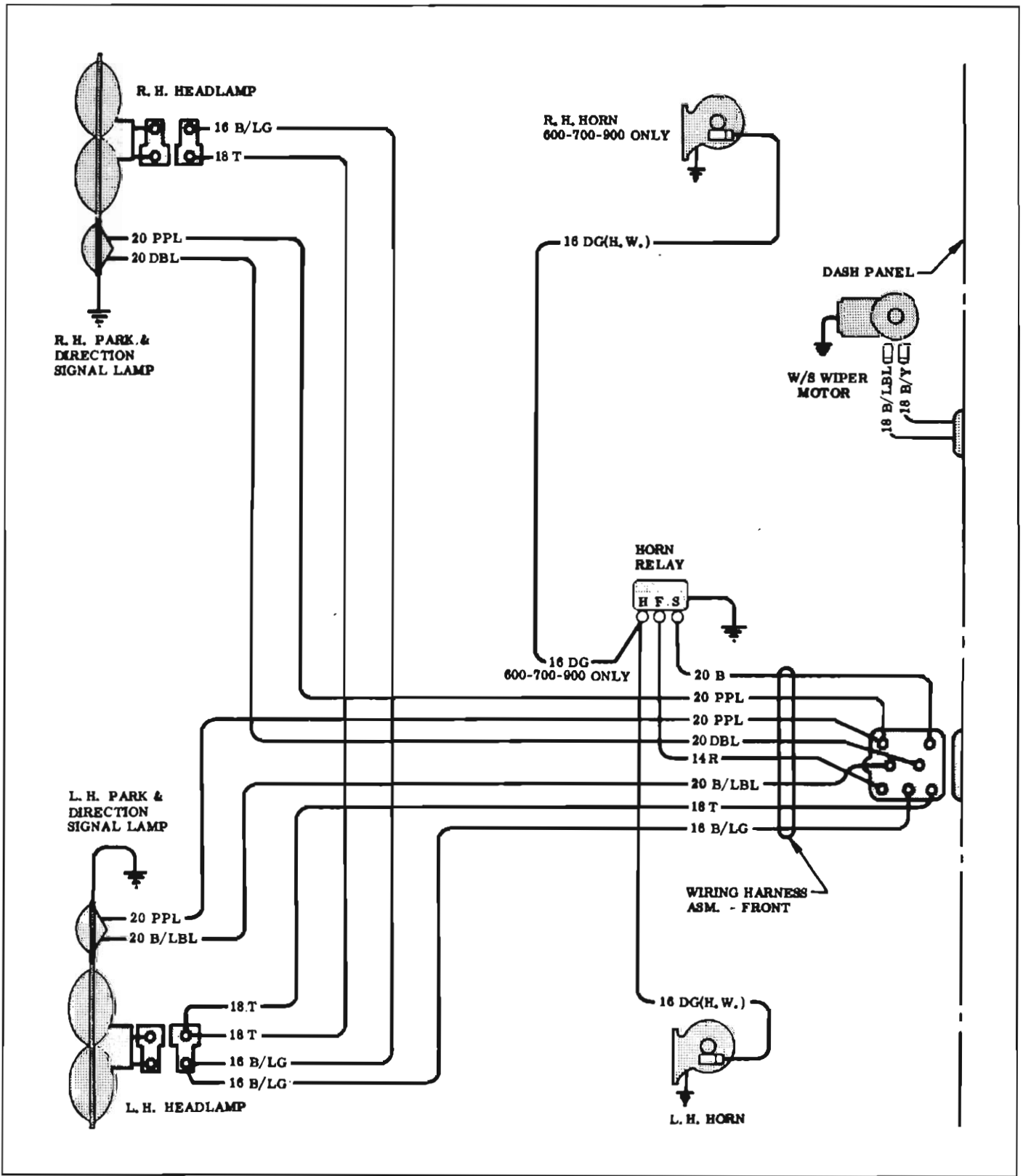


Fig. 8-31—Front and Dash—Corvaair



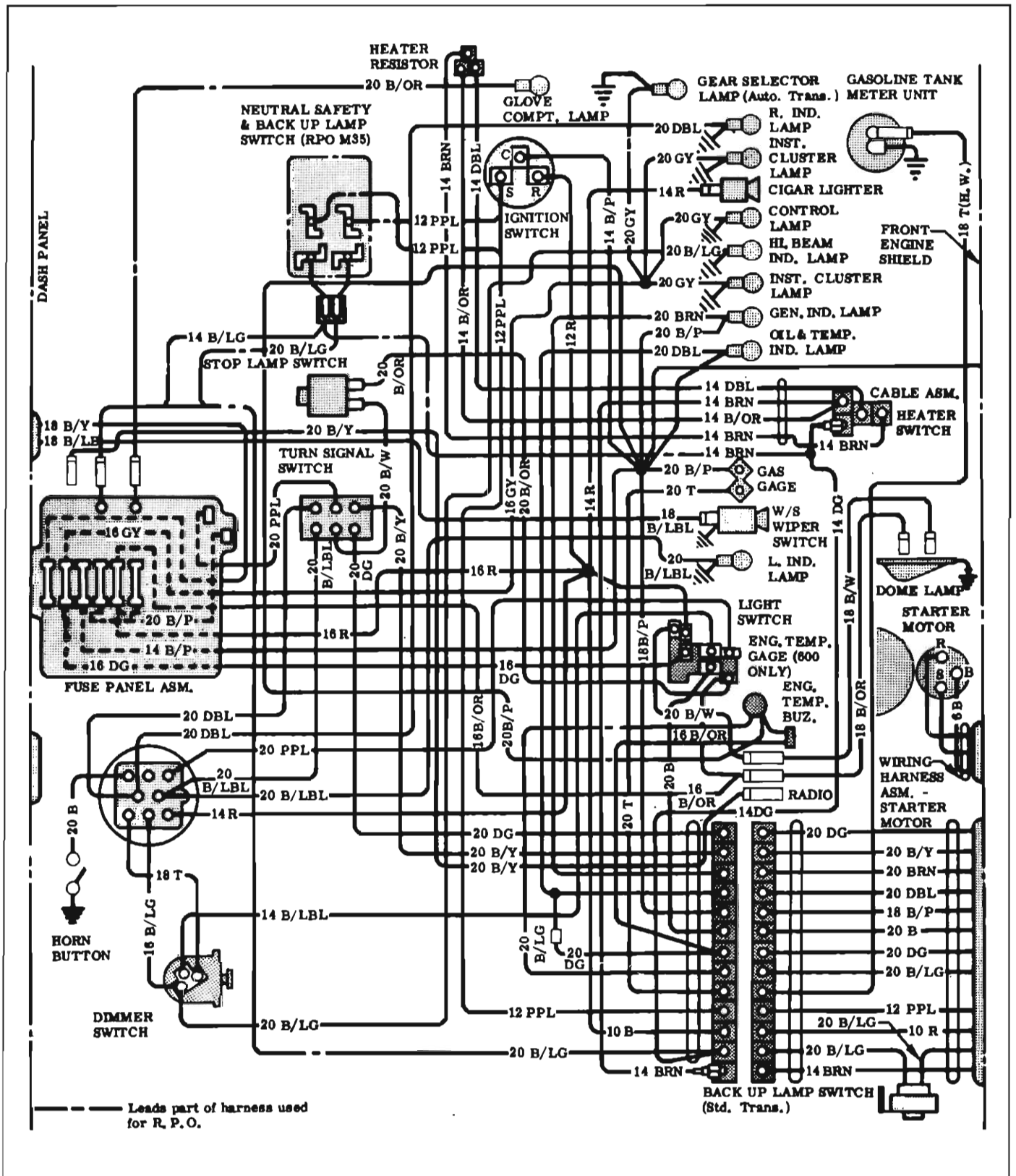


Fig. 8-32—Instrument Panel and Body—Corvair

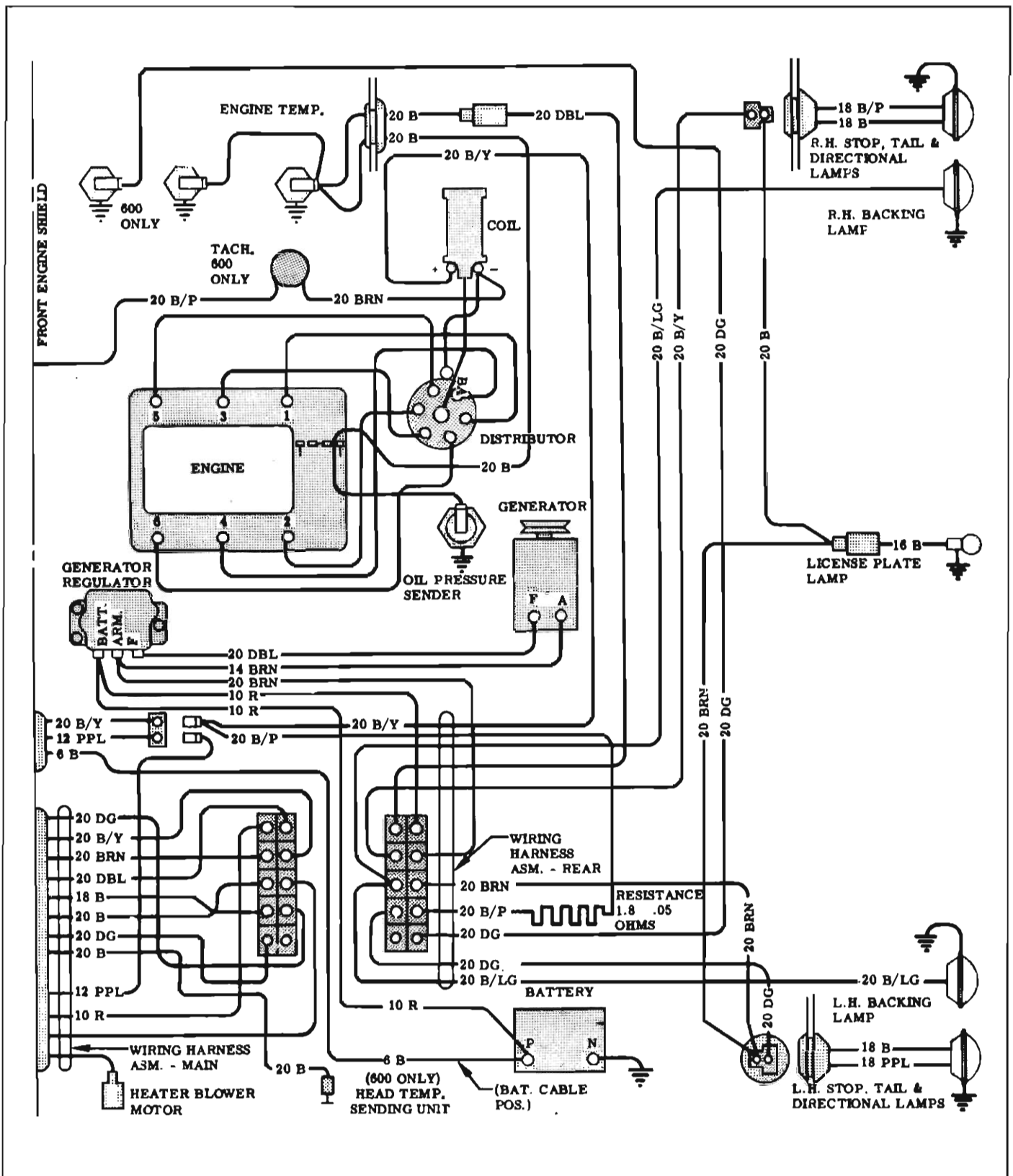


Fig. 8-33—Engine and Tail Lights—Corvair

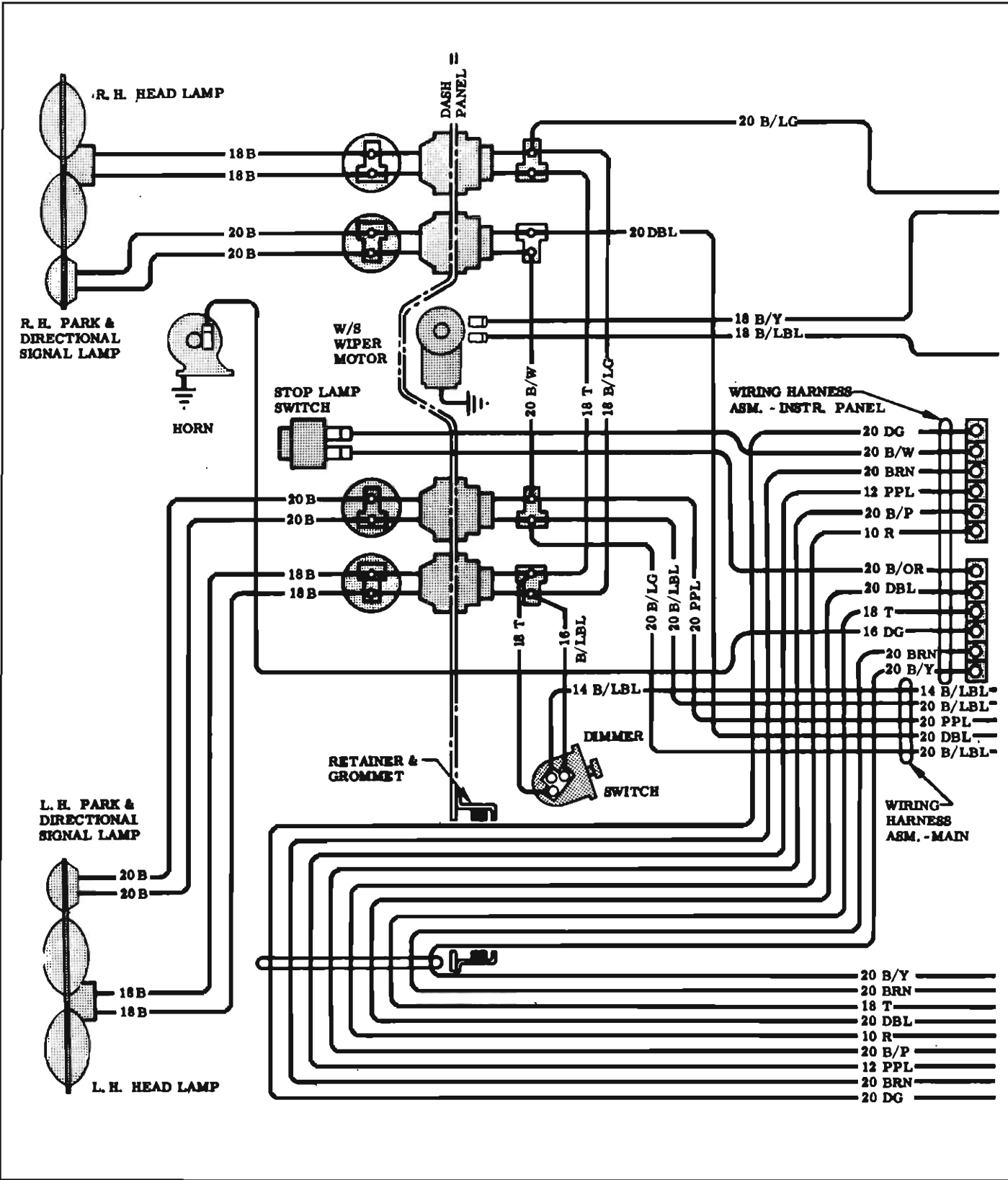


Fig. 8-34—Front and Dash—Corvair 95

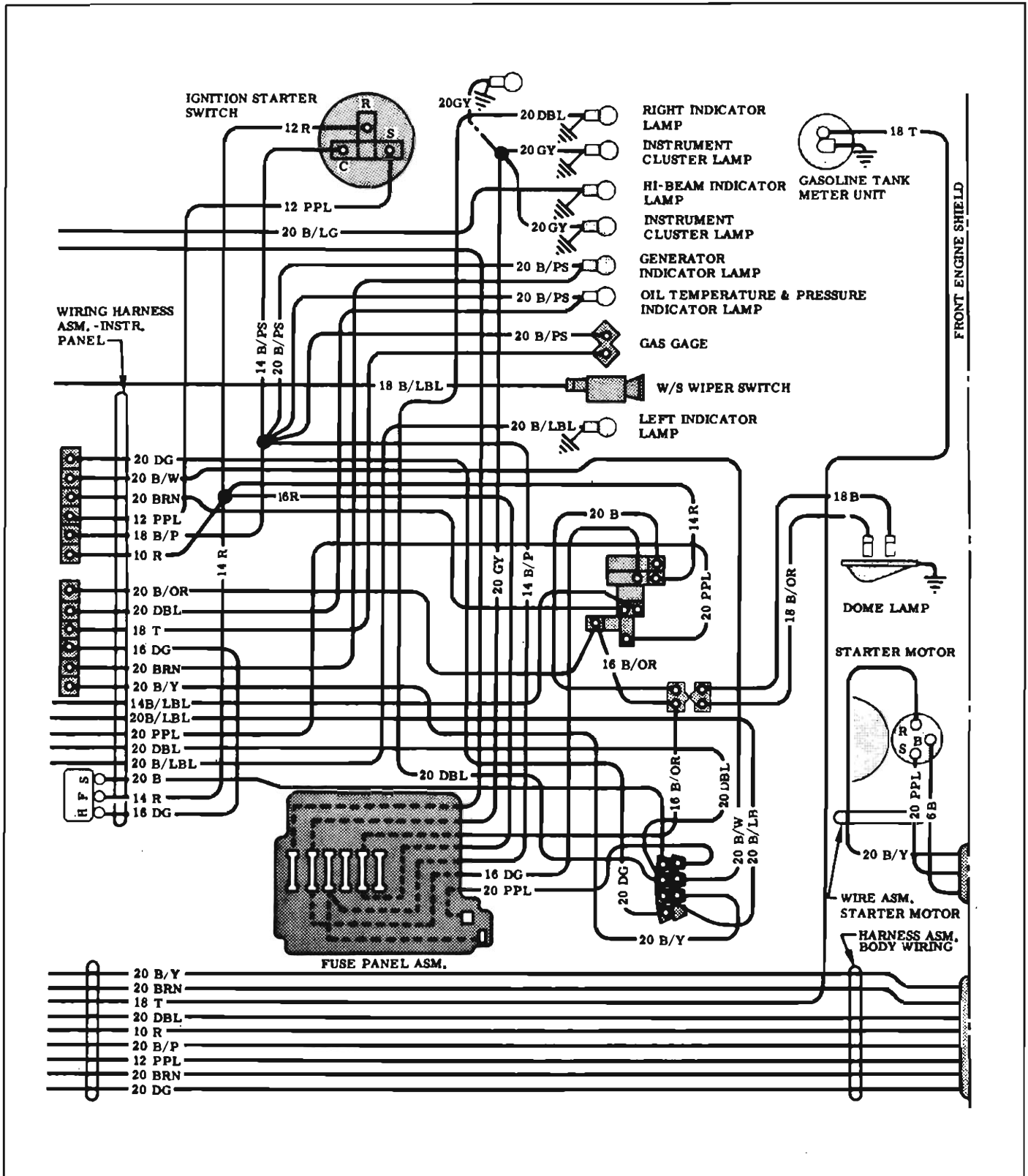


Fig. 8-35—Instrument Panel and Body—Corvair 95

