1971

CHEVY VAN SPORTVAN

SERVICE MANUAL

SERIES 10-30

ST 140-71

Bulb Service

Due to the different types of lamps, there are several different procedures covering bulb replacement. The bulb sockets for the parking lamps unsnap and pull out of the housings. All lamps on the rear of the vehicle have lenses only that are attached directly to the lamp body. To remove the bulb after access has been gained, push bulb in slightly and turn it counterclockwise as far as possible and pull it out of its socket. To install new bulb, line up pins on sides of bulb with the grooves in socket and push in place and turn clockwise to lock it in. Reassemble lamp and be careful of lamp lens seal (if so equipped).

COOLANT RECOMMENDATIONS

The inhibited year-around engine coolant, used to fill the cooling system at the factory is a high quality solution that meets General Motors Specification 1899-M. This factory-fill coolant solution is formulated to withstand two full calendar years of normal operation without draining or adding inhibitors, provided the same concentration of coolant is added if the system needs additional fluid between drain periods. The original factory fill coolant provides freezing protection to -20°F. (-32°F. in Canada).

Every two years, the coolant system should be serviced as follows:

1. Drain coolant, when hot, through the radiator drain valve.
2. Close valve and add sufficient plain water to fill system.
3. Run engine until normal operating temperature is reached.
4. Drain and refill the system as described in steps 1, 2, and 3 a sufficient number of times until the drained liquid is colorless.
5. Allow system to drain completely and then close radiator drain valve tightly.
6. Add the necessary amount of high quality inhibited glycol base coolant meeting GM Specification 1899-M to provide the required freezing and corrosion protection (at least to 0°F.)
7. Run engine until normal operating temperature is reached.
8. Check and adjust level of coolant after system has cooled sufficiently to remove radiator cap.

The freeze protection should be at a level commensurate with the temperatures which may occur in the area in which the vehicle will be operated. Regardless of whether freezing temperatures are or are not expected, cooling system protection should be maintained at least to 0°F. to provide adequate corrosion protection and proper temperature indicating light operation. With glycol content less than requirement for 0°F. protection, coolant boil point temperature is reduced. When adding solution due to loss of coolant for any reason or in areas where temperatures lower than -20°F. (-32°F. in Canada) may occur, a sufficient amount of an ethylene glycol base coolant meeting GM Specification 1899-M should be used.

NOTE: Alcohol or methanol base coolants or plain water are not recommended for your vehicle at any time.

The coolant level should be approximately three inches below bottom of the filler neck when engine is cold. DO NOT OVERFILL.

CAUTION: When the engine is at normal operating temperature or above, the internal pressure built up in the cooling system will blow out scalding fluid and vapors if the radiator cap is suddenly removed. To prevent loss of coolant and to avoid the danger of being burned, the coolant level should be checked or coolant added only when the engine is cool. If the cap must be removed when the engine is hot, place a cloth over the cap and rotate the cap slowly counterclockwise to first stop and allow pressure to escape completely. Then turn cap again slowly counterclockwise to remove.

NOTE: Do not remove the radiator cap when engine is excessively hot, do not put water in an overheated engine, and do not run engine when indicator is above "H" or red indicator light comes on.

Thermostat

The cooling system is protected and controlled by a thermostat installed in the engine coolant outlet to maintain a satisfactory operating temperature of the engine. This thermostat is designed for continuous use through both winter and summer and need not be changed seasonally.

Radiator Pressure Cap

The radiator cap, a 15-lb. pressure type, must be installed tightly, otherwise coolant may be lost and damage to engine may result from overheating. Radiator pressure caps should be checked periodically for proper operation.

FUEL SYSTEM

Inline Filter

Replace entire filter every 24,000 miles.

Fuel Pump

The fuel pump should be checked regularly to make sure the mounting bolts and inlet connections are tight.

Carburetor

Tighten the carburetor to manifold and the manifold to cylinder head stud nuts to prevent air leaks. Keep the carburetor clean externally and completely overhauled at regular intervals.

Carburetor and Throttle Linkage

Lubricate with engine oil every 12,000 miles.

Fuel Filter Element–The gasoline fuel filter element must be replaced in the event of carburetor flooding. The filter element located in the carburetor inlet is to be replaced every 12 months or 12,000 miles, whichever occurs first.

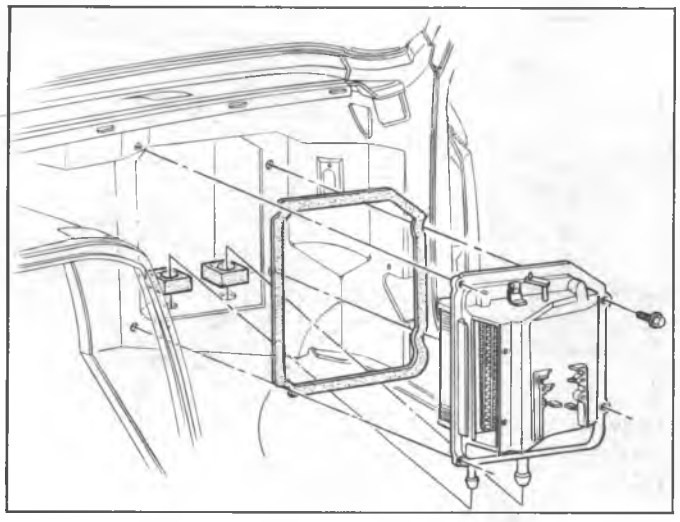

Fig. 4—Heater Core Case and Core

4. Pry off the temperature door cable eyelet clip and then remove the bowden cable attaching screw.
5. Remove the distributor duct to heater case screws and pull the duct rearward out of the heater case retainer.
6. Remove the four heater case to dash screws and then remove the heater case and core as an assembly. Tilt the case assembly rearward at the top while lifting up until the core tubes clear the dash openings.
7. Remove the core retaining strap screws and remove the core.
8. To install a new core, reverse Steps 1-7 above.

HEATER HOSES

Heater hoses are routed from the water pump and thermostat housing to the core inlet and outlet pipes as shown in Figure 5. Hoses are attached at each end with screw type clamps.

Replacement

The heater core can be easily damaged in the area of the core tube attachment seams whenever undue force is exerted on them. Whenever the heater core hoses do not readily come off the tubes, the hoses should be cut just forward of the core tubes. The portion of the hose remaining on the core tube should then be split longitudinally. Once the hoses have been split, they can be removed from the tubes without damage to the core.

CENTER DISTRIBUTOR DUCT

Replacement (Fig. 6.)

1. Disconnect the battery ground cable.
2. Unsnap the engine cover front latches. Remove the two cover to floorpan screws and remove the cover.
3. Remove the heater core case and core as an assembly (see "Heater Core Case and Core–Replacement").
4. Disconnect the right hand heater outlet hose and the two defroster hoses from the distributor duct.
5. Disconnect the air and defroster door cables by prying off the eyelet clips and removing the cable attaching screws.

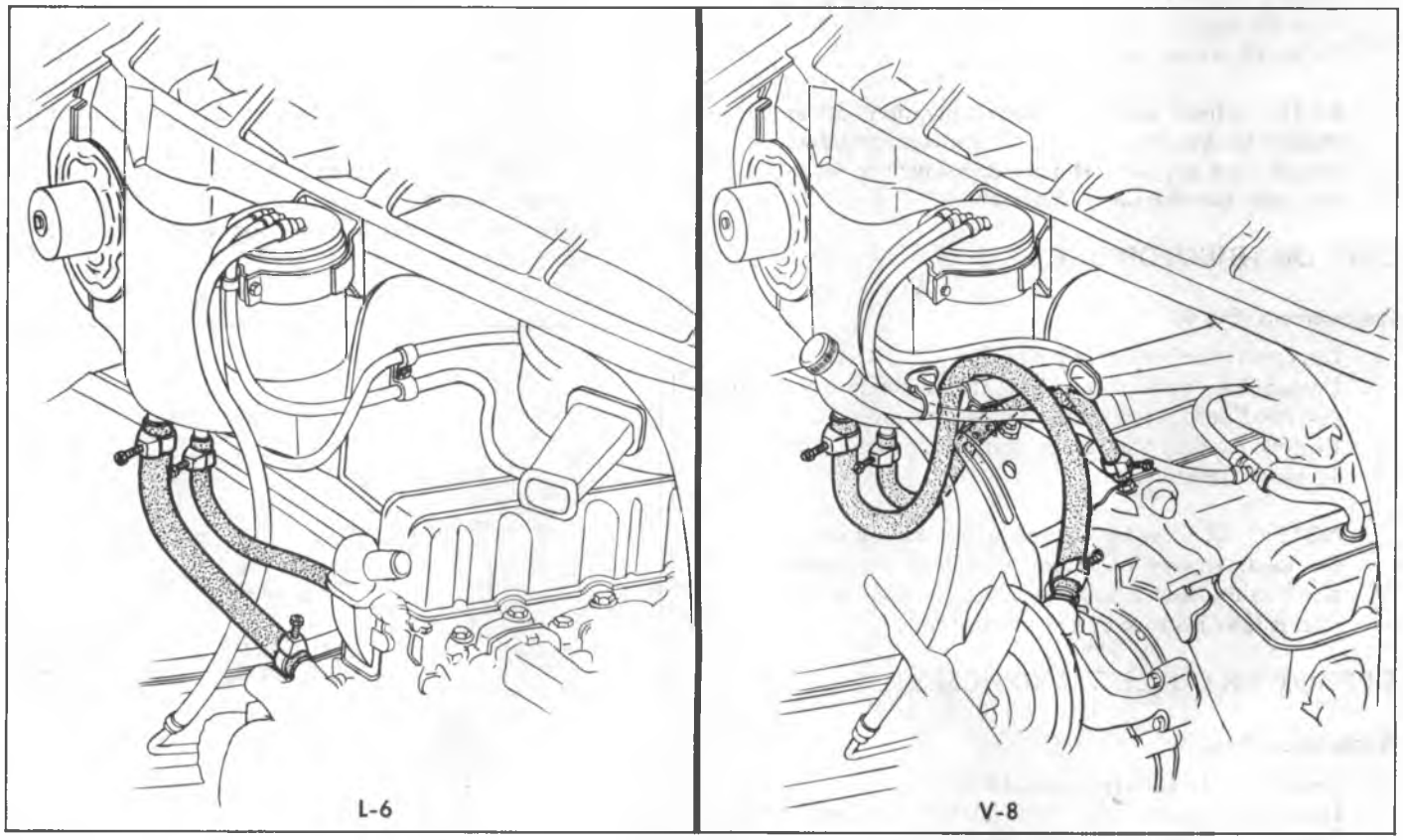

Fig. 5—Heater Hose Routings

Fig. 7—Windshield Glass, Weatherstrip and Sealing

3. Place protective covering over plenum grille, front fenders and hood.
4. Place windshield and weatherstrip assembly in opening. With one technician lightly pushing in on windshield, another technician within the cab should pull on the cord as follows:
   a. Pull on loose ends (fig. 9) until each is within 2" of its respective upper corner.
   b. Pull on loop until cord is within 2" of the upper corners.
   c. Finish seating corners by simultaneously pulling on both ends of the cord at each corner. This will insure proper positioning of the critical upper corners.
   d. Seal windshield to weatherstrip and weatherstrip to body.

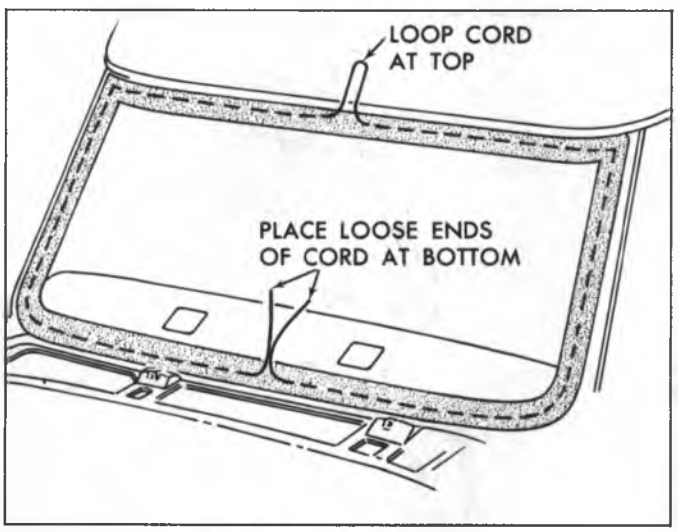

Fig. 8—Cord Installation

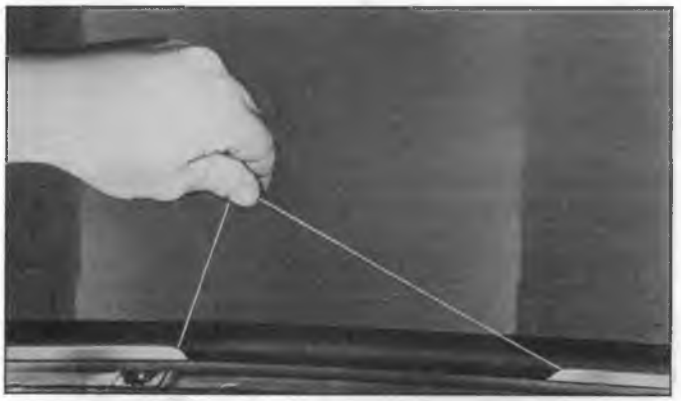

Fig. 9—Pulling String to seal Rubber Lip

Cowl Side Ventilator Valve Assembly (Fig. 10)

Removal

1. Remove screws retaining valve guide to panel.
2. Remove valve assembly by depressing pins at top and bottom of valve.

Installation

1. Depress pins at top and bottom of valve and insert into panel.
2. Install screws retaining valve guide to panel.

Instrument Panel Trim

NOTE: Instrument panel trim consists of four separate pieces. Each piece is retained by nuts under the instrument panel. The following procedure, then, is typical.

Removal

1. From under the instrument panel, remove nuts retaining the trim panel and its insert and remove trim.
2. Separate trim from insert.

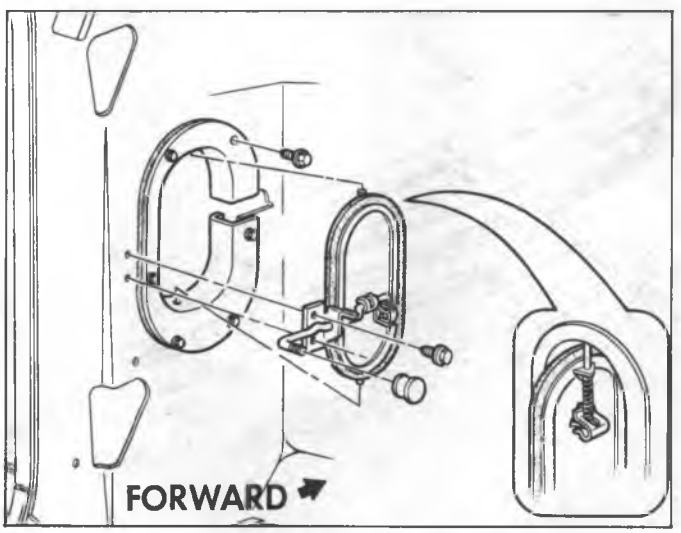

Fig. 10—Side Cowl Ventilator

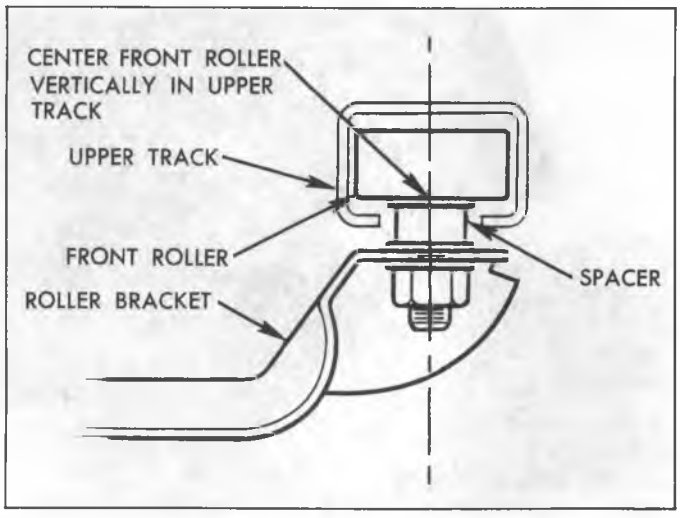

Fig. 28—Centering Upper Front Roller

Front and Rear Striker Adjustment

Front Striker (Fig. 29)

1. Loosen front striker.
2. Visually align latch to striker relationship and adjust if necessary.
3. Slide door forward slowly. Guide on door (just above latch) must fit snugly within rubber lined opening on striker assembly.
4. Assure that latch catches fully. Add or delete shims behind striker as necessary.

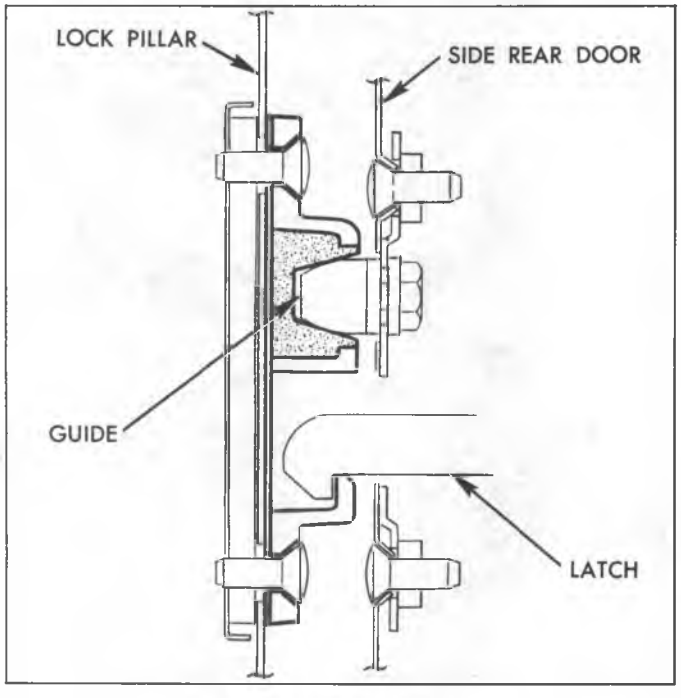

Fig. 29—Front Striker Adjustment

Rear Striker

NOTE: The rear striker is adjustable vertically and transversly after loosening with Tool J-23457. Also, loosen door wedge located below striker. Fore and aft adjustment is obtained by adding or deleting washers between the bolt and body pillar. The striker must enter the lock freely.

Up and Down Adjustment

1. Loosen striker with Tool J-23457 (Fig. 19).
2. Center striker vertically to door striker opening.
3. Adjust laterally to match door outer panel and body side outer surfaces.
4. Adjust door wedge by aligning wedge on door with its striker on pillar. Centerline of wedge must enter centerline of striker opening on pillar.

Fore and Aft Adjustment

5. Smear grease or paint on striker.
6. Gently push door in until lock just contacts striker enough to make an impression in the grease.
7. Open door and measure distance from rear of striker head to the impression. Distance should be a minimum of .20" and .30" maximum. (Fig. 30)
8. Adjust striker by adding or deleting washers between striker and pillar.
9. Torque striker and wedge to specifications.

Upper Left Door Hinge Striker and Latch Adjustment (On Body)

CAUTION: If door has been removed and is being reinstalled adjust striker to lower hinge lever before closing door. Failure to do so may cause possible lever breakage.

1. Adjust hinge lower lever to striker contact by adding or deleting shims between the striker and body to provide at least .10 inch of lever contact. (Fig. 31). Also, striker

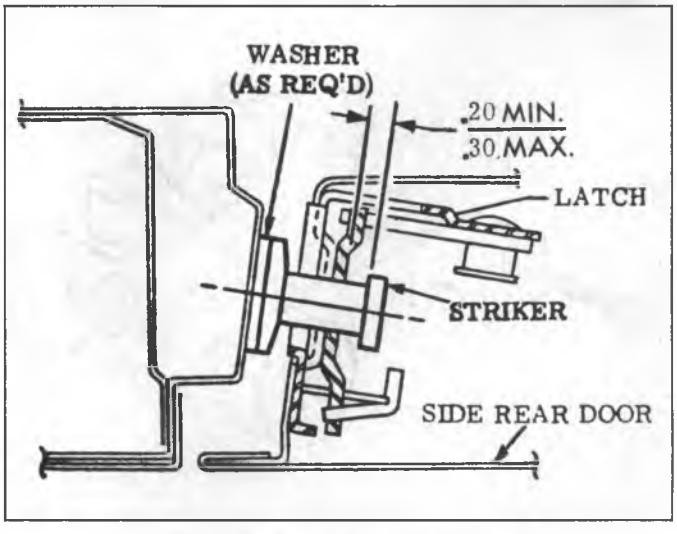

Fig. 30—Rear Striker Adjustment

MAINTENANCE AND ADJUSTMENTS

NOTE: All front suspension attachments are important attaching parts in that they could affect the performance of vital components and systems, and/or could result in major repair expense. They must be replaced with parts of the same part numbers or with equivalent parts if replacement becomes necessary. Do not use replacement parts of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.

WHEEL BEARINGS—ADJUST

1. Jack up front end of vehicle and remove wheel and tire assembly. Remove dust cap from end of hub and withdraw spindle cotter pin.
2. Tighten adjusting nut to 15 lb. ft. while rotating hub in both directions.
3. Back off nut one flat (1/6 turn) and insert new cotter pin. If nut and spindle hole do not line up, back off slightly (1/6 turn) to align cotter pin. This adjustment provides for .001" to .008" bearing end clearance.
4. Spin hub to make sure it turns freely. Lock cotter pin by spreading the end and bending it inboard. Install dust cap, and wheel and tire assembly.
5. Lower vehicle.

FRONT END ALIGNMENT

Correct alignment of the front suspension must be maintained to insure efficient steering and satisfactory tire life. Check alignment at regular intervals and particularly after front suspension has been subjected to extremely heavy service or severe impact loads.

Before checking and adjusting alignment, such components as wheel bearings, spring height, tie rods, steering gear, shock absorbers and tire inflation should be inspected and corrected where necessary.

Caster and Camber—Figure 2

Positive caster is the amount in degrees of the backward tilt of the knuckle. Positive camber is the amount in degrees that the front wheels are tilted outward at the top from a vertical position. Both angle adjustments are necessary for steering stability and safe vehicle handling.

Caster and camber adjustments are made by means of shims located between the upper control arm shaft and the mounting bracket attached to the suspension crossmember.

Measure caster and camber as follows (refer to Figure 3):

Caster

1. Using a bubble protrator measure frame angle "B" at location shown in Figure 3.
2. Check caster angle on alignment machine.
3. Add angle "B" and caster angle to determine frame corrected angle.
4. Measure dimension "A."
5. Using dimension "A" and the caster-camber chart (fig. 4) for the appropriate vehicle, shown below, find the recommended caster angle.
6. The frame corrected angle, Step 3 above, should correspond to the recommended angle on the chart within ±1/4°. Make changes as necessary to bring caster angle within limits.

Camber

1. Determine vehicle camber angle on alignment machine.
2. Measure dimension "A."
3. Using dimension "A" and the caster-camber chart for the appropriate vehicle, shown below, find the recommended camber angle.

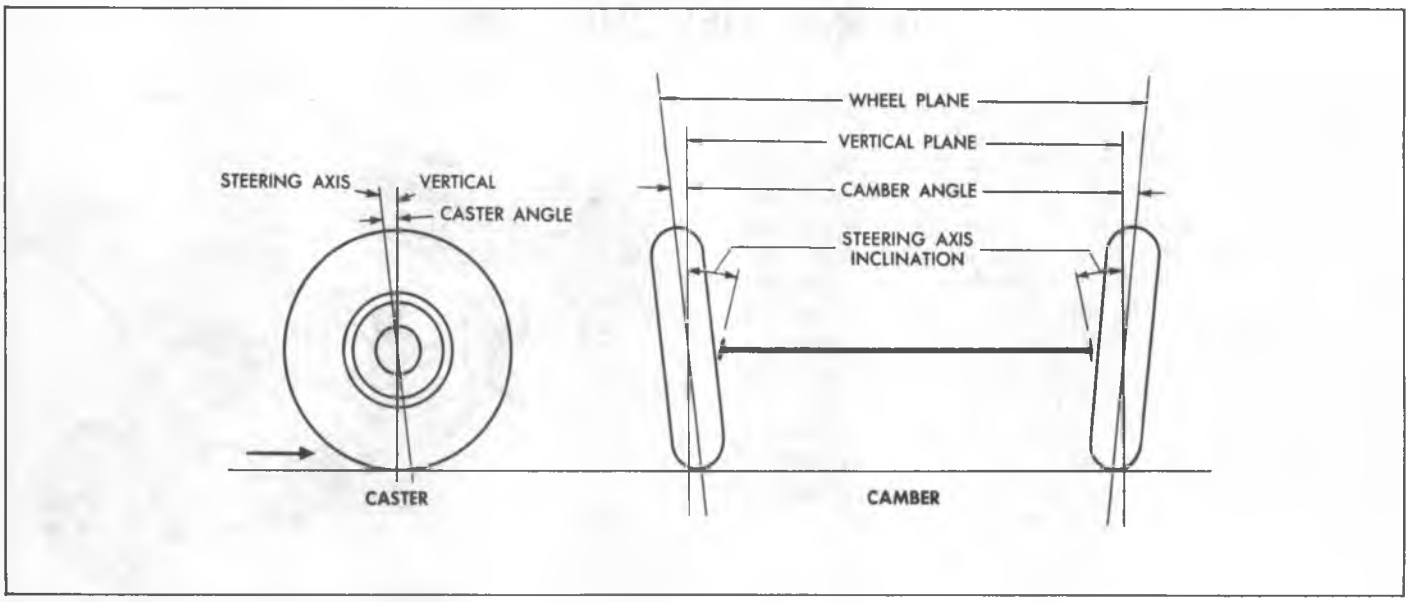

Fig. 2—Front End Alignment

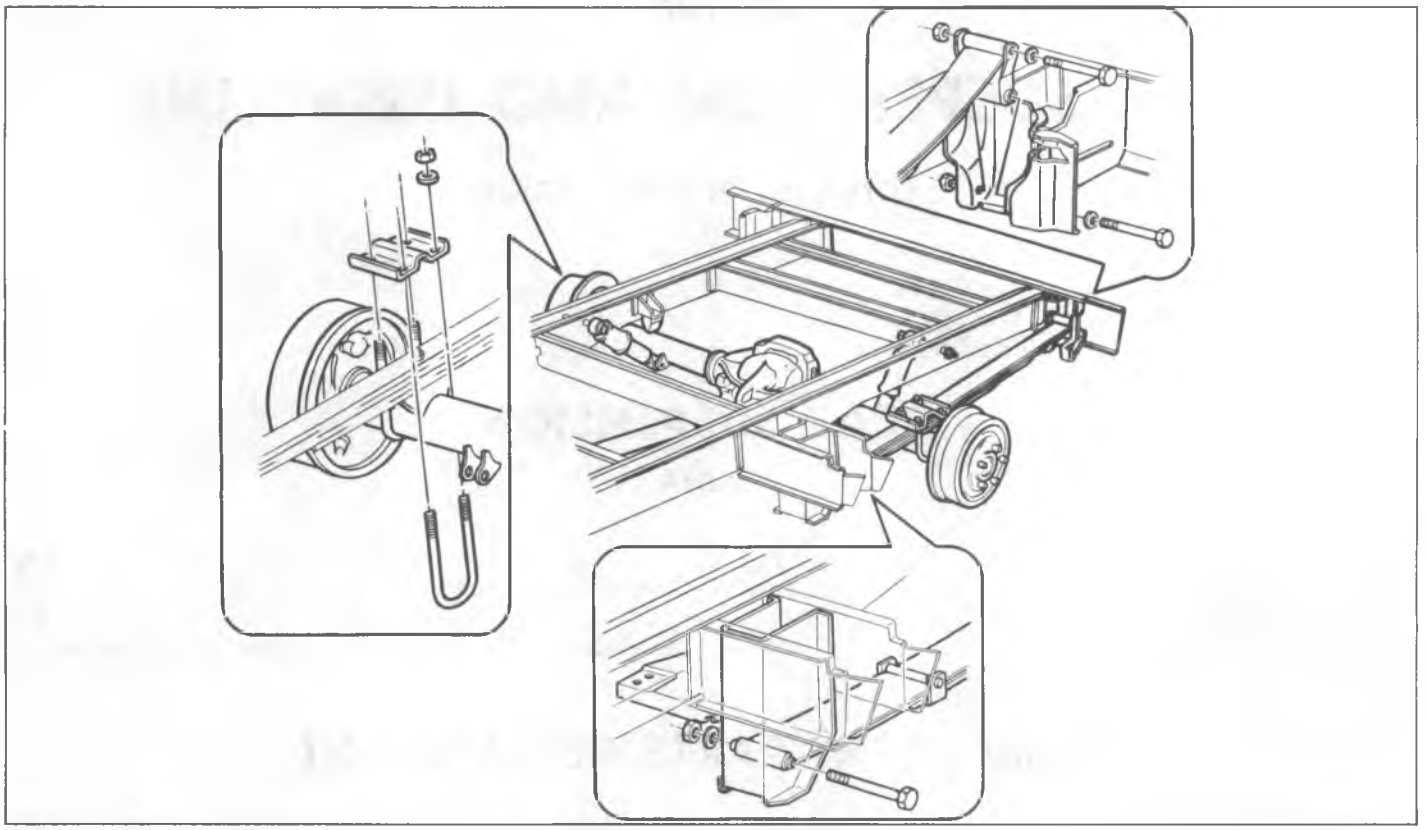

Fig. 2—Spring Installation

NOTE: The shackle assembly must be attached to the rear spring eye before installing shackle to rear hanger.

2. Install shackle bolt and nut and position spring aligning front eye—install front eye bolt and nut.
3. Install spring retainer plate and "U" bolts.
4. Torque all bolts to specifications.
5. Lower vehicle so that weight of vehicle is on suspension components and torque affected suspension parts to specifications.
6. Lower vehicle and remove from hoist.

Bushing Replacement

1. Remove spring as previously outlined.
2. Place spring on press and press out bushing using a suitable rod, pipe or tool.
3. Press in new bushing; assure that tool presses on steel outer shell of bushing.

Spring Leaf

Replacement

1. Place spring assembly in a bench mounted vise and remove spring clips.
2. Position spring in vise jaws, compressing leaves at center and adjacent to center bolt.
3. File peened end of center bolt and remove nut. Open vise slowly to allow spring assembly to expand.
4. Wire brush and clean spring leaves. Inspect spring leaves to determine if replacement is required; also replace defective spring leaf liners at this time.
5. Align center holes in spring leaves by means of a long drift and compress spring leaves in a vise.
6. Remove drift from center hole and install a new center bolt—peen bolt to retain nut.
7. Align spring leaves by tapping with hammer, then bend spring clips into place or install bolts and spacer if so equipped.

NOTE: Spring clips should be bent sufficiently to maintain alignment, but not tight enough to bind spring action.

Hub and Drum (Fig. 20)

Removal

1. Remove wheel assembly and axle shaft as specified in applicable "Axle Shaft Removal" procedure of this section.
2. Disengage tang of nut lock from slot or flat of locknut, then remove locknut from housing tube, using J-2222 tool (fig. 21).
3. Disengage tang of nut lock from slot of flat of adjusting nut and remove nut lock from housing tube.
4. Use tool as specified in Step 2 to remove adjusting nut from housing tube.

NOTE: Remove thrust washer from housing tube.

5. Pull hub and drum assembly straight off axle housing.

NOTE: The hub oil seal should be replaced whenever the hub is removed for any reason.

6. Remove oil seal.

Cleaning

1. Immerse bearing cone and roller assemblies in cleaning solvent. Clean with stiff brush to remove old lubricant. Blow bearings dry with compressed air, directing air stream across bearing. Do not spin bearings while blowing them dry.

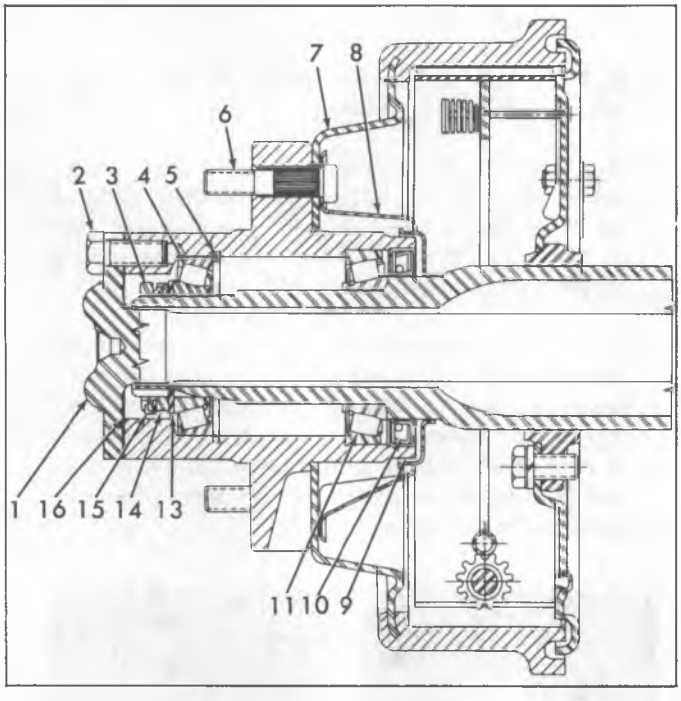

Fig. 20—Hub and Drum Details

1. Axle Shaft
2. Axle Shaft-to-Wheel Bolt
3. Adjusting Nut Locknut
4. Hub Outer Bearing Assembly
5. Hub Outer Bearing Retainer
6. Wheel Bolt
7. Drum
8. Oil Deflector
9. Oil Deflector
10. Oil Seal
11. Hub Inner Bearing Assembly
12. Drum-to-Hub Retaining Screw
13. Thrust Washer
14. Bearing Adjusting Nut
15. Adjusting Nut Lock
16. Gasket

NOTE: To remove inner and outer bearings and cups see "Bearing Cup Replacement" for various axles.

2. Thoroughly clean all lubricant off axle housing tube and out of inside the hub, wipe dry. Make sure all particles of gasket are removed from outer end of hub, axle shaft, and hub cap.
3. Scrape old sealing compound out of oil seal bore in the hub.

Inspection

1. Inspect bearing rollers for excessive wear, chipped edges, and other damage. Slowly move rollers around cone to detect any flat or rough spots on rollers or cone.
2. Examine bearing cups in hub for pits, cracks, and other damage.
3. Examine axle shaft flange studs, wheel studs, hub splines, hub bore, and tapped holes for evidence of damage–clean up threads or replace parts where required.
4. Examine oil seal sleeve for evidence of wear or roughness, check axle housing oil deflector and brake drum oil deflector for evidence of damage–replace parts where required.
5. Examine brake drum for excessive scoring and other damage. To replace brake drum refer to "Brake Drum Replacement."

Bearing Cup

Replacement

Replace inner cup and outer bearing cup as follows:

1. Cut a suitable length of 1/2 inch steel bar stock for press-out tool as shown in Figure 22.
2. Place appropriate press-out tool behind bearing cup, index tool in provided notches, and press out cup with an arbor press.

NOTE: Hub outer bearing cannot be replaced with inner bearings in position; therefore, replace outer bearings (if required) before proceeding.

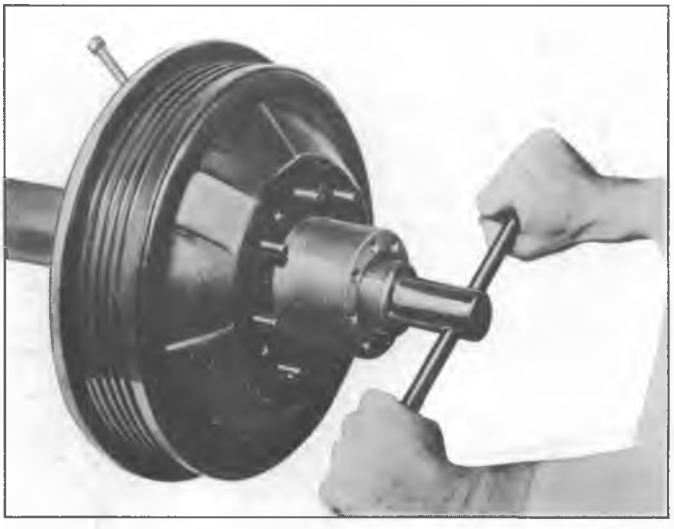

Fig. 21—Bearing Adjustment Nut Removal (Typical)

MAINTENANCE AND ADJUSTMENTS

In any service operation it is extremely important that absolute cleanliness be observed. Any foreign matter in the hydraulic system will tend to clog the lines, ruin the rubber cups of the main and wheel cylinders and cause inefficient operation or even failure of the braking system. Dirt or grease on a brake lining may cause that brake to grab first on brake application and fade out on heavy brake application.

The split system consists basically of two separate brake systems. When a failure is encountered on either, the other is adequate to stop the vehicle. If one system is not functioning, it is normal for the brake pedal lash and pedal effort to substantially increase. This occurs because of the design of the master cylinder which incorporates an actuating piston for each system. When the rear system loses fluid, its piston will bottom against the front piston. When the front system loses fluid, its piston will bottom on the end of the main cylinder body. The pressure differential in one of the systems causes an uneven hydraulic pressure balance between the front and rear systems. The brake pipe distribution and switch assembly, near the main cylinder, detects the loss of pressure and illuminates the brake alarm indicator light on the instrument panel. The pressure loss is felt at the brake pedal by an apparent lack of brakes for most of the brake travel and then, when failed chamber is bottomed, the pedal will harden.

If a vehicle displays these symptoms, it is a good indication that one of the systems contains air or has failed, and it is necessary to bleed or repair the brakes.

HYDRAULIC BRAKE FLUID

Use GM Hydraulic Brake Fluid, Supreme No. 11 or equivalent when servicing brakes. This brake fluid is satisfactory for any climate and has all the qualities necessary for proper operation, such as a high boiling point to prevent vapor lock and the ability to remain fluid at low temperatures.

In the event that improper fluid has entered the system, it will be necessary to service the system as follows:

1. Drain the entire system.
2. Thoroughly flush the system with denatured alcohol, or a hydraulic system cleaning fluid such as "Declene" or equivalent.
3. **Replace all rubber parts of the system, including brake hoses.**
4. Refill the system.
5. Bleed the system.

BLEEDING HYDRAULIC SYSTEM

The hydraulic brake system must be bled whenever, any line has been disconnected or air has in some way entered the system. A "spongy" pedal feeling when the brakes are applied may indicate presence of air in the system. The system must be absolutely free of air at all times. Bleeding of brake system may be performed by one of two methods—either pressure or manual.

PRESSURE BLEEDING (Figs. 5 and 6)

1. Clean all dirt from top of main cylinder and remove cylinder cover and rubber diaphragm.
2. Reduce fluid level in main cylinder until reservoirs are approximately half full.

   NOTE: Make sure brake fluid in bleeder equipment is at operating level and that the equipment is capable of exerting 30 to 50 lbs. hydraulic pressure on the brake system.

3. Install brake bleeder adapter J-23518 on main cylinder. Connect hose from bleeder equipment to bleeder adapter and open release valve on bleeder equipment.
4. Install brake bleeder wrench, Tool J-21472 on bleeder valve at wheel cylinder and install one end of bleeder hose on bleeder valve.
5. Pour a sufficient amount of brake fluid into a transparent container to ensure that end of bleeder hose will remain submerged during bleeding. Place the loose end of bleeder hose into the container. Be sure the hose end is submerged in the fluid.
6. Open wheel cylinder bleeder valve by turning Tool J-21472 counterclockwise approximately 1/3 of a turn and observe flow of fluid at end of bleeder hose.
7. Close bleeder valve tight as soon as bubbles stop and brake fluid flows in a solid stream from the bleeder hose.
8. Remove brake bleeder wrench and bleeder hose from wheel cylinder bleeder valve.
9. Repeat Steps 4 through 8 on the remaining wheel cylinders.
10. Disconnect bleeder equipment from brake bleeder adapter.
11. Remove bleeder adapter. Wipe all areas dry if fluid was spilled during adapter removal.
12. Fill master cylinder reservoirs to within 1/4" of reservoir rims as shown in Figure 7.

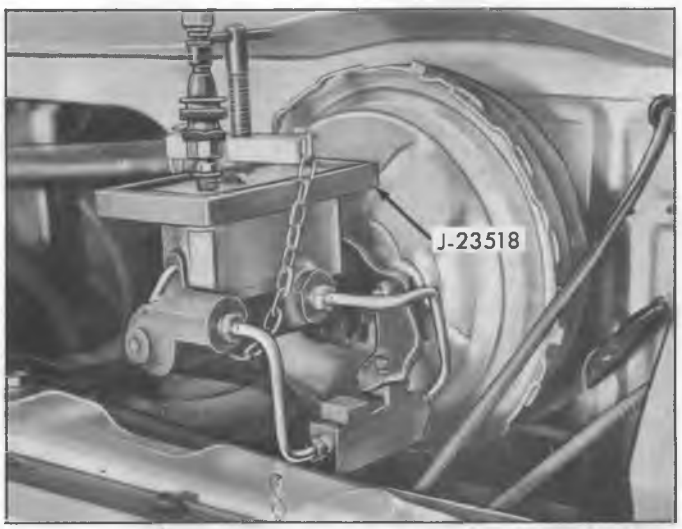

Fig. 5—Pressure Bleeder J-23518 Installed

CAUTION: NEVER USE MINERAL-BASE CLEANING SOLVENT SUCH AS GASOLINE, KEROSENE, CARBON-TETRACHLORIDE, ACETONE, PAINT THINNER OR UNITS OF LIKE NATURE AS THESE SOLVENTS DETERIORATE RUBBER PARTS, CAUSING THEM TO BECOME SOFT AND SWOLLEN IN AN EXTREMELY SHORT TIME.

The wheel cylinder boots should be removed from a cylinder body only when they are visibly damaged or leaking fluid. Wheel cylinders having torn, cut, or heat-cracked boots should be completely overhauled.

Wheel Cylinder Repair

Wheel cylinders should not be disassembled unless they are leaking or unless new cups and boots are to be installed. It is not necessary to remove the brake cylinder from the backing plate to disassemble, inspect, and overhaul the cylinder. Removal is necessary only when the cylinder is damaged or scored beyond repair.

Removal for Overhaul

1. Place car on hoist.
2. Remove wheel and tire assembly. Back off brake adjustment, if necessary, and remove drum.
3. Disconnect brake system hydraulic line from cylinder.
4. Remove brake shoe pull back springs.
5. Remove screws securing wheel cylinder to flange plate. Disengage cylinder push rods from brake shoes and remove cylinder.

Disassembly (Fig. 30)

1. Remove boots from cylinder ends.
2. Remove pistons and cups.

Inspection and Cleaning

NOTE: Staining is not to be confused with corrosion. Corrosion can be identified with pits or excessive bore roughness.

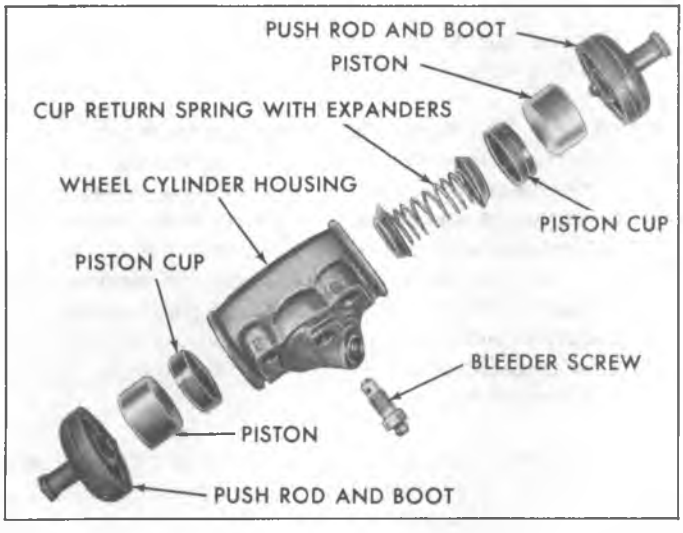

Fig. 30—Wheel Cylinder—Explode

1. Inspect cylinder bore. Check for staining and corrosion. Discard cylinder if corroded.
2. Polish any discolored or stained area with crocus cloth by revolving the cylinder on the cloth supported by a finger. Do not slide the cloth in a lengthwise manner under pressure.

NOTE: Before washing parts, hands must be clean. Do not wash hands in gasoline or oil before cleaning parts. Use soap and water to clean hands.

3. Wash the cylinder and metal parts in denatured alcohol.
4. Remove excess cleaning fluid from the cylinder. Do not use a rag to dry the cylinder as lint from the rag cannot be kept from the cylinder bore surfaces.
5. Check piston for scratches or other visual damage; replace if necessary.

Assembly (Fig. 30)

1. Lubricate the cylinder bore with clean brake fluid and insert spring-expander assembly.
2. Install new cups with flat surface toward outer ends of cylinder. Be sure cups are lint and dirt free before insertion. Do not lubricate cups prior to assembly.
3. Install new pistons into cylinder with flat surfaces toward center of cylinder. Do not lubricate pistons before installation.
4. Press new boots onto cylinder by hand. Do not lubricate boots prior to installation.

Installation

1. Position wheel cylinder to brake flange plate. Install screws and tighten securely.

NOTE: All brake attachments are important attaching parts in that they could affect the performance of vital components and systems, and/or could result in major repair expense. They must be replaced with parts of the same part numbers or with equivalent parts if replacement becomes necessary. Do not use replacement parts of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.

2. Install all push rods and pull back springs.
3. Connect hose or line to wheel cylinder.
4. Install all parts removed for accessability and remove vehicle from hoist.

BRAKE DRUMS

Front brake drums are the demountable type; that is they can be removed without removing the hub. Rear brake drums are demountable and may be removed without removing the axle shaft.

A lanced "knock out" area is provided in the web of the brake drum for servicing purposes in the event retracting of the brake shoes is required in order to remove the drum.

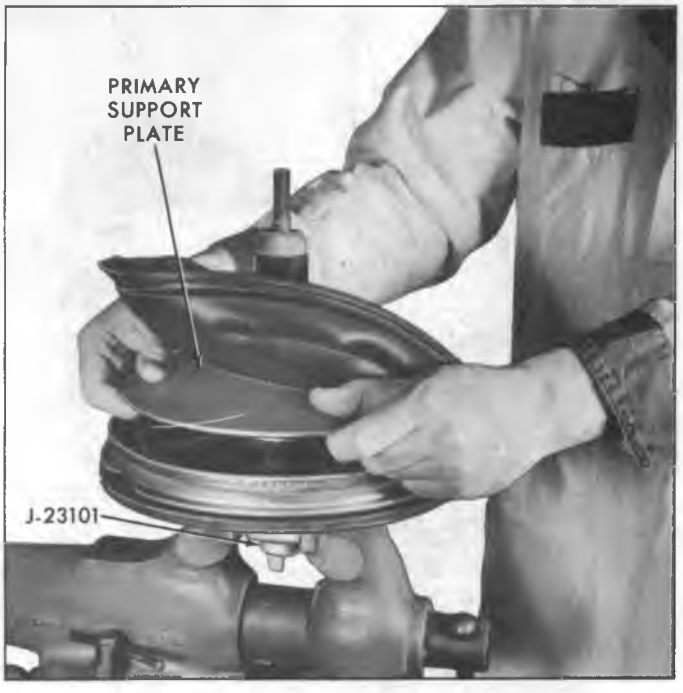

Figure 41—Locking or Unlocking Primary and Secondary Power Pistons

Figure 43—Removing Reaction Piston and Reaction Disc From Secondary Power Piston

13. Remove the air filter and push rod limiter washer from the tubular section of the primary power piston.
14. Remove the power head silencer from the neck of the power piston tube.
15. Remove the rubber reaction bumper from the end of the air valve.
16. Using Truarc No. 2 pliers (J-4880), remove the retaining ring from the air valve (Fig. 46).
17. Remove the air valve-push rod assembly from the tube end of the primary power piston. The following removal method is recommended:

    Place the primary power piston in an arbor press, and press the air valve push rod assembly out the bottom of the power piston tube with a rod not exceeding 1/2" in diameter.
18. Removal of the air valve push rod assembly will disassemble the control valve retainer.
19. Remove the "O" ring seal from the air valve.

Figure 42—Locking or Unlocking Secondary Support Plate and Secondary Power Piston

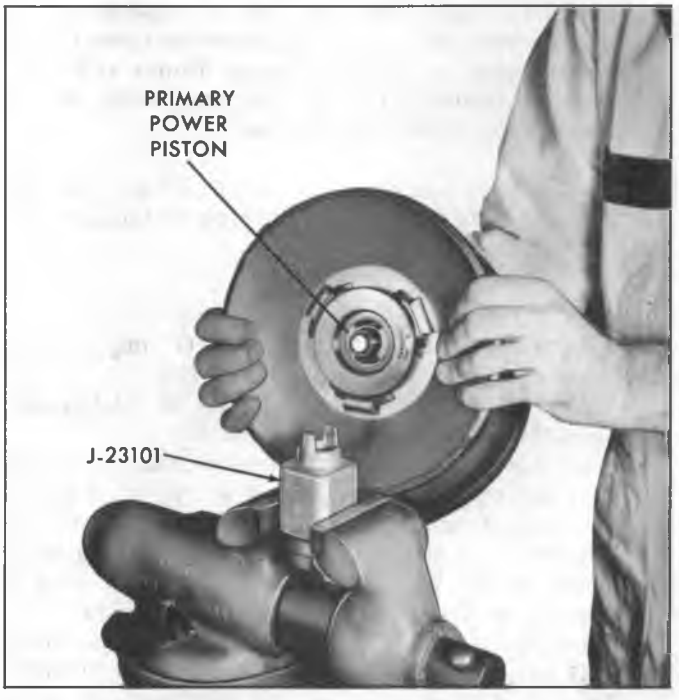

Figure 44—Positioning Primary Power Piston In Tool J-23101 (Small Dia. End Up)

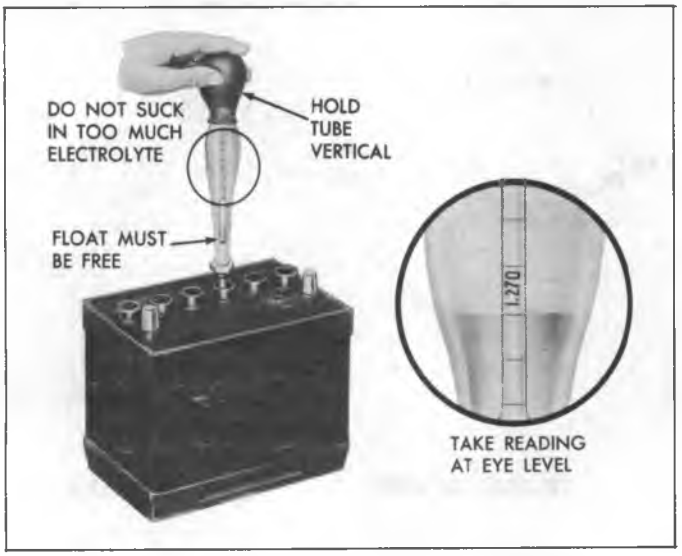

Fig. 7—Testing Specific Gravity of Battery

3. Inspect for signs of corrosion on battery, cables and surrounding area, loose or broken carriers, cracked or bulged cases, dirt and acid, electrolyte leakage and low electrolyte level. Fill cells to proper level with distilled water or water passed through a "demineralizer".

   The top of the battery should be clean and the battery hold-down bolts properly tightened. Particular care should be taken to see that the top of the battery is kept clean of acid film and dirt. When cleaning batteries, wash first with a dilute ammonia or soda solution to neutralize any acid present and then flush off with clean water. Keep vent plugs tight so that the neutralizing solution does not enter the cell. The hold down bolts should be kept tight enough to prevent the battery from shaking around in its holder, but they should not be tightened to the point where the battery case will be placed under a severe strain.

   To insure good contact, the battery cables should be tight on the battery posts. Oil battery terminal felt washer. If the battery posts or cable terminals are corroded, the cables should be cleaned separately with a soda solution and wire brush. After cleaning and before installing clamps, apply a thin coating of petrolatum to the posts and cable clamps to help retard corrosion.

   If the battery has remained undercharged, check for loose or defective fan belt, defective Delcotron, high resistance in the charging circuit, oxidized regulator contact points, or a low voltage setting.

   If the battery has been using too much water, the voltage output is too high.

Service Delcotron and Regulator

The Delcotron and regulator tests during tune up consist of the above battery tests; the condition of the battery indicating further tests and adjustments as outlined in Section 6Y.

Service Belts (Fig. 8)

Inspect belt condition.

Check and adjust if necessary for correct tension of belt, as follows:

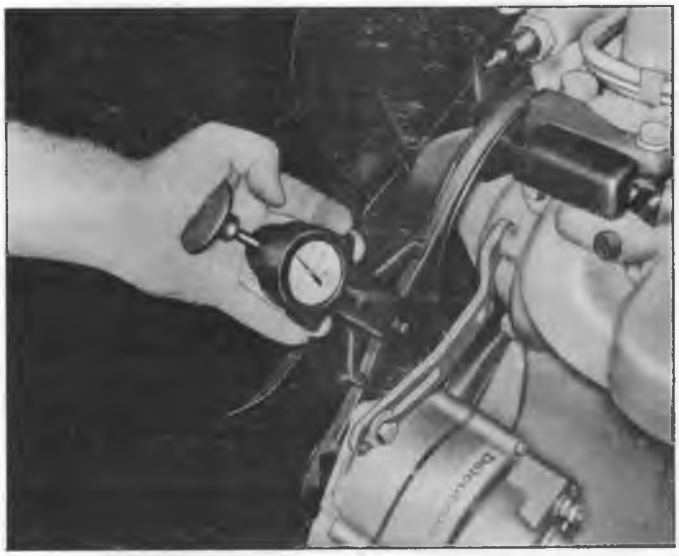

Fig. 8—Checking Belt Tension

- Using a strand tension gauge, check the belt tension.
- If belt is below the minimum, adjust until the specified tension is reached. (See Tune Up Chart in Specification section.)

Service Manifold Heat Valve (Fig. 9 or 10)

Check manifold heat control valve for freedom of operation. If shaft is sticking, free it up with GM Manifold Heat Control Solvent or its equivalent.

NOTE: Tap shaft end to end to help free it up.

Tighten Manifold

Tighten intake manifold bolts to specifications in the sequence outlined on Torque Sequence Chart located at end of

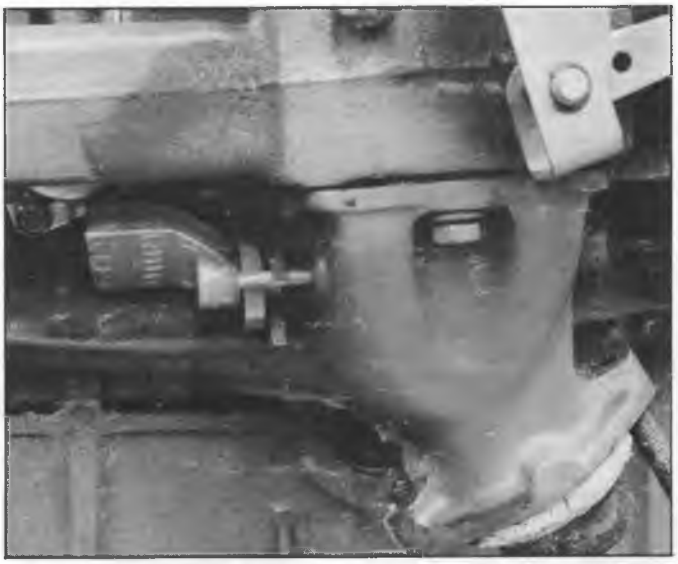

Fig. 9—Manifold Heat Control Valve (In Line)

10. Position a piece of corrugated cardboard between radiator and fan to prevent fan-to-radiator contact.
11. Raise vehicle on hoist and disconnect:

- Fuel line (from tank) at fuel pump.
- Power steering pump with lines intact—tie pump out of way.
- Oil pressure gage line, if so equipped.
- Accelerator linkage at pedal rod.
- Ground strap at engine.
- Exhaust pipe at manifold and at pipe hangers—then remove exhaust system from vehicle.
- Electrical leads at starter.
- Transmission cooler lines at both ends, if so equipped.
- Evaporation Control System lines as required.
- Speedometer cable at transmission.

12. Remove clutch cross shaft.
13. Remove the engine front mount-to-crossmember bracket bolts.
14. Raise front of engine and install blocks of wood (2 x 4) between engine mount and brackets (fig. 1L).
15. Remove propeller shaft from vehicle and install a suitable transmission plug in extension.
16. Support transmission at rearward portion of extension and remove rear crossmember and engine rear mount.
17. Place a suitable jack, with engine cradle Tool J-21741 attached, under the engine (fig. 2L) then take weight off front mounts and remove blocks of wood and crossmember mount brackets.

NOTE: Position the cradle so that the forward legs of the cradle straddle the fifth pan bolt from the rear of the engine, then install the safety chain over the flywheel housing.

18. Remove engine from vehicle as follows:

CAUTION: Check often during engine removal to be sure that all necessary disconnects have been made.

Fig. 1L—Engine Blocked for Removal

Fig. 2L—Engine Removal Tool Installed

- Lower the engine and transmission assembly slowly, pulling to the rear to clear the front crossmember.
- Move engine and transmission assembly out from under vehicle.

19. If engine is to be mounted in an engine stand perform the following:

- Remove the rocker arm cover as outlined.
- Attach lifting adapter at proper cylinder head bolt location.
- Attach lifting device and remove engine assembly from engine cradle.
- Remove synchromesh transmission and clutch (if so equipped).

a. Remove clutch housing rear cover bolts.
b. Remove bolts attaching the clutch housing to engine block then remove transmission and clutch housing as a unit.

NOTE: Support the transmission as the last mounting bolt is removed and as it is being pulled away from the engine, to prevent damage to clutch disc.

c. Remove starter and clutch housing rear cover.
d. Loosen clutch mounting bolts a turn at a time (to prevent distortion of clutch cover) until the spring pressure is released. Remove all bolts, clutch disc and pressure plate assembly.

- Remove automatic transmission (if so equipped).

a. Lower engine, secured by the hoist, and support engine on blocks.
b. Remove starter and converter housing underpan.
c. Remove flywheel-to-converter attaching bolts.
d. Support transmission on blocks.
e. Disconnect throttle linkage and vacuum modulator on Powerglide. Disconnect detent cable on Turbo Hydra-Matic.
f. Remove transmission-t-engine mounting bolts.

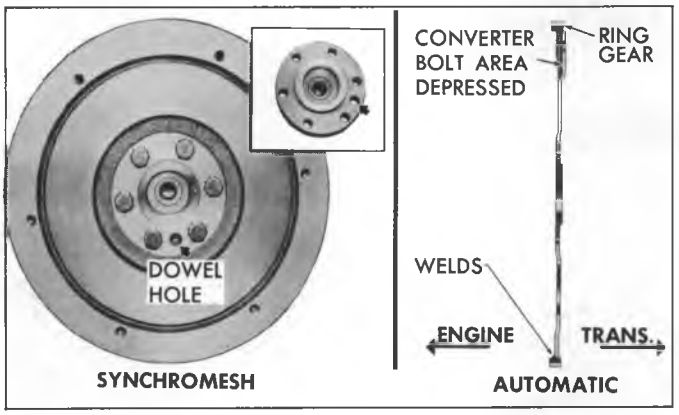

Fig. 22L—Flywheel Installation (Typical)

5. Install new rear mount and torque bolts to specifications.

6. Position support crossmember to cross rail, install bolts then loosely install crossmember-to-mount retaining bolts.

7. Remove support from rear of transmission, torque remaining bolts to specifications and lower vehicle on hoist.

Fig. 23L—Front Mount Replacement

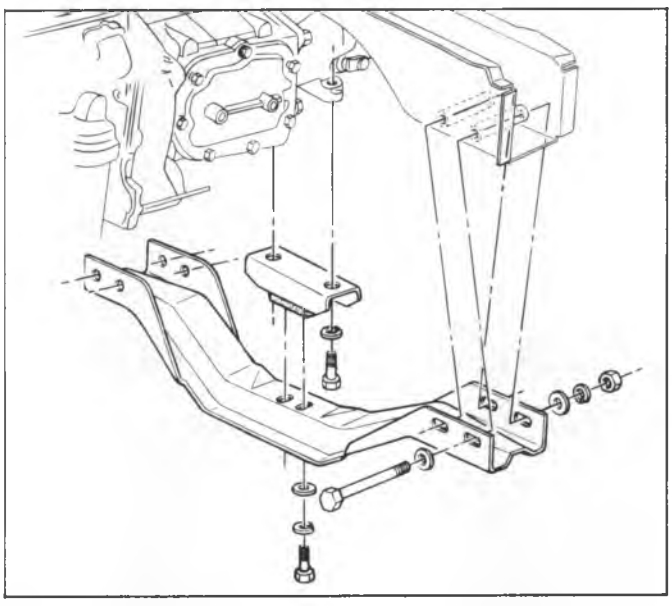

Fig. 24L—Rear Mount Replacement

Fig. 13V—Installing Oil Seal (Cover Removed)

Without Cover Removed

1. With torsional damper removed, pry seal out of cover from the front with a large screwdriver, being careful not to damage the surface on the crankshaft.
2. Install new seal so that open end of seal is toward the inside of cover and drive it into position with Tool J-23042 (fig. 14V).

Timing Chain and/or Sprockets

Replacement

1. Remove torsional damper and crankcase front cover as outlined.

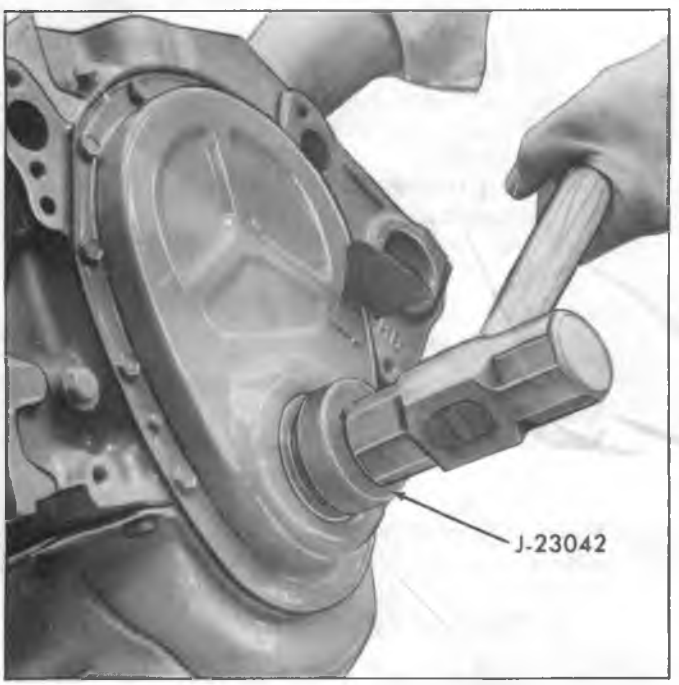

Fig. 14V—Installing Oil Seal (Cover Installed)

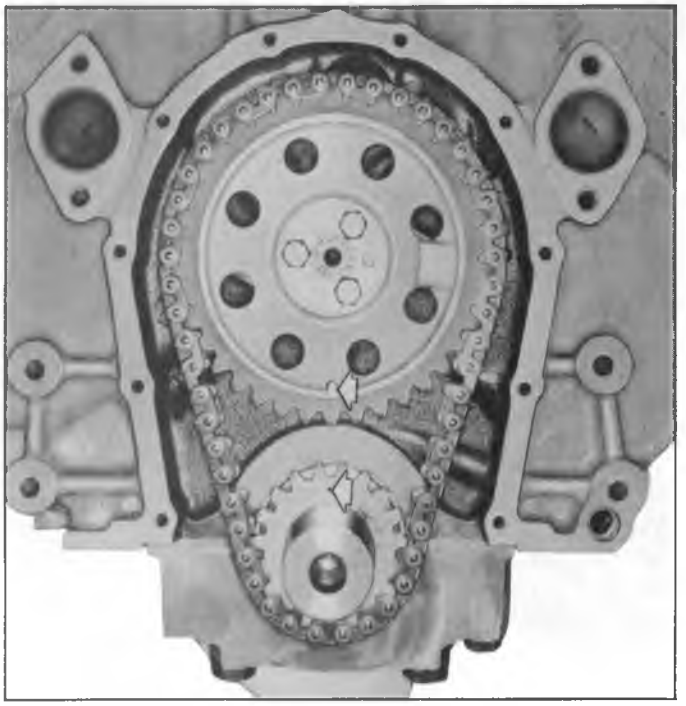

Fig. 15V—Timing Sprocket Marks

2. Crank engine until marks on camshaft and crankshaft sprockets are in alignment (fig. 15V).
3. Remove camshaft sprocket to camshaft bolts.
4. Remove camshaft sprocket and timing chain together. Sprocket is a light press fit on camshaft. If sprocket does not come off easily, a light blow on the lower edge of the sprocket (with a plastic mallet) should dislodge the sprocket.
5. If crankshaft sprocket is to be replaced, remove sprocket using Tool J-5825 (fig. 16V). Install new sprocket using a 7/16"-20 x 5" bolt and nut (fig. 17V).

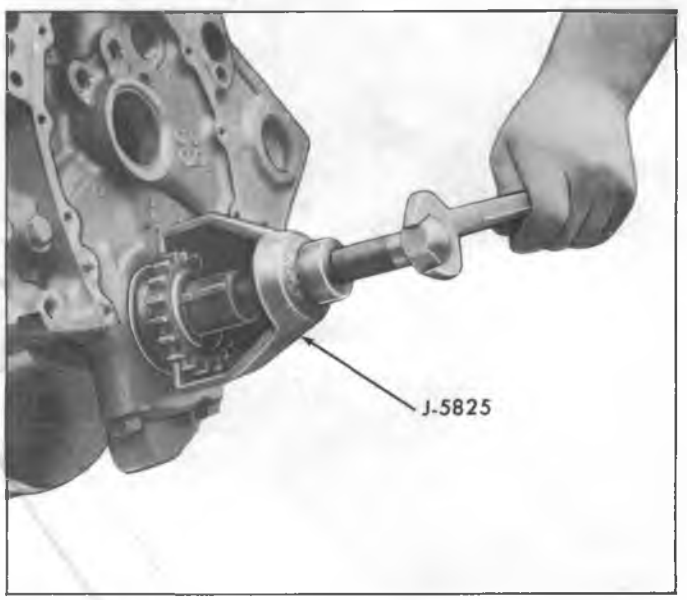

Fig. 16V—Removing Crankshaft Sprocket

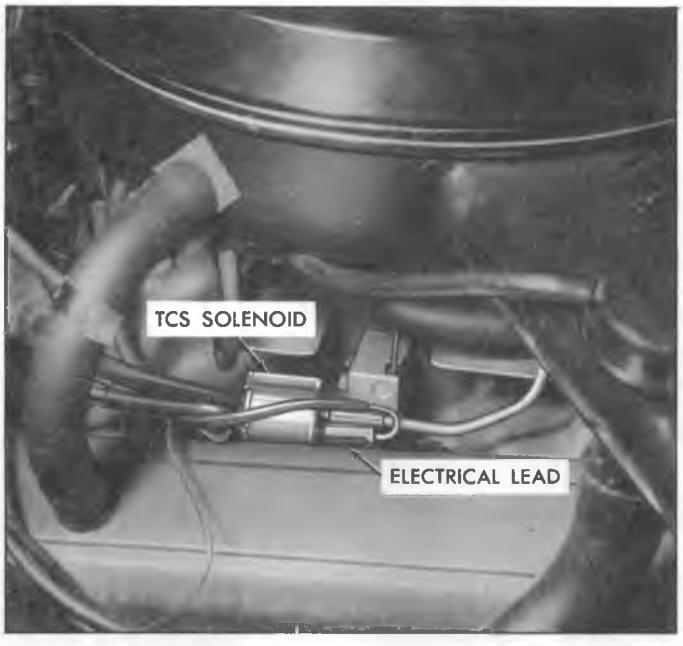

Fig. 1c—Transmission Controlled Spark Electrical Lead

3. Remove choke rod from choke lever and install a rubber band to the lever in such a manner as to react on the lever in a direction to close the choke blade.
4. Slowly open accelerator until choke closes (choke will not fully close due to the vacuum break link's reaction on it) and idle is determined by high step of fast idle cam. Release accelerator.
5. With idle determined by fast idle cam and vacuum break link acting on the choke lever, insert specified gauge (hold vertical) between the carburetor air horn and choke blade.
6. Adjust vacuum break setting as necessary by bending rod or tang.

Throttle Return Check Valve Adjustment (Fig. 5c)

1. With carburetor choke closed and fast idle screw on high step of fast idle cam, loosen lock nut and adjust valve to just contact throttle lever.

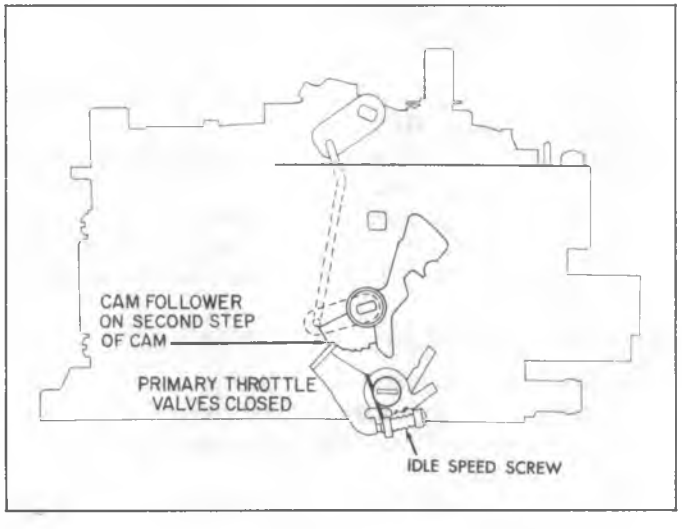

Fig. 2c—Fast Idle Adjustment (Rochester 4MV)

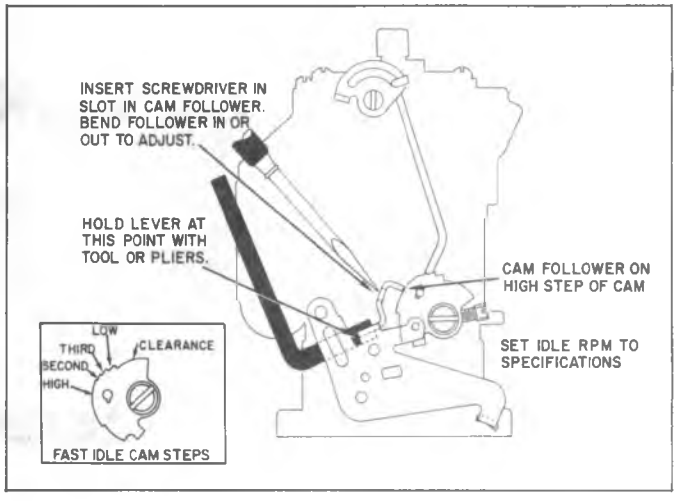

Fig. 3c—Fast Idle Adjustment (Rochester MV)

2. Adjust lock nut to lock valve in position. Tighten nut to 90-130 in. lbs.
3. With choke wide open, operate throttle lever and observe action of valve plunger—plunger should be depressed when throttle lever returns to closed position.

Additional Adjustments

The following adjustments may be made without removing the carburetor from the engine. For procedure refer to Section 6M of the Overhaul Manual under the carburetor being serviced.

Rochester MV

- Float
- Choke Rod
- Choke Unloader

Rochester 2GV

- Float
- Accelerator Pump
- Idle Vent
- Choke Rod
- Choke Unloader

Carburetor Removal

Flooding, stumble on acceleration and other performance complaints are, in many instances, caused by the presence of dirt, water, or other foreign matter in the carburetor. To aid in diagnosing the cause of the complaint, the carburetor should be carefully removed from the engine without draining the fuel from the bowl. The contents of the fuel bowl may then be examined for contamination as the carburetor is disassembled.

1. Remove air cleaner and gasket.
2. Disconnect fuel and vacuum lines from carburetor.
3. Disconnect choke rod.
4. Disconnect accelerator linkage.
5. If equipped with Powerglide transmission, disconnect TV linkage.
6. Remove carburetor attaching nuts and remove carburetor.

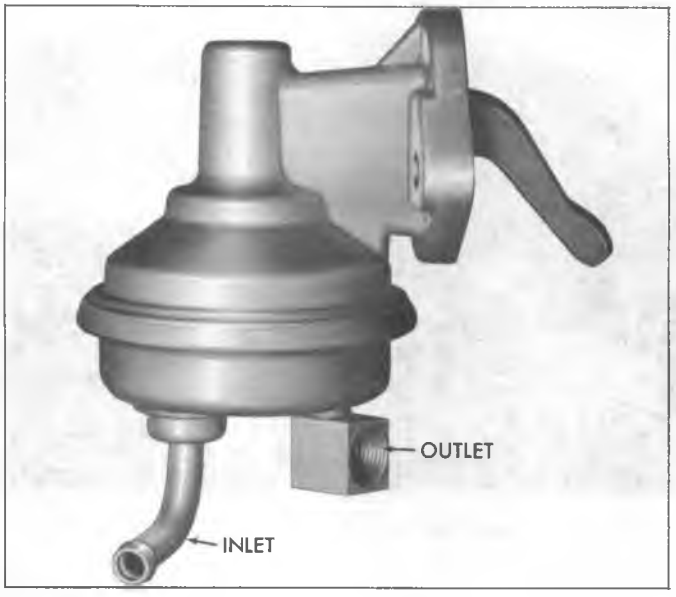

Fig. 1p—Fuel Pump

4. If fuel flows from pump in good volume from pipe at carburetor, check fuel delivery pressure to be certain that pump is operating within specified limits as follows:
   a. Attach a fuel pump pressure test gauge to disconnected end of pipe.
   b. Run engine at approximately 450-1,000 rpm (on gasoline in carburetor bowl) and note reading on pressure gauge.
   c. If pump is operating properly the pressure will be within specifications and will remain constant at speeds between 450-1,000 rpm. If pressure is too low, too high, or varies materially at different speeds, the pump should be replaced.

Removal

1. Disconnect fuel inlet and outlet pipes at fuel pump.
2. Remove fuel pump mounting bolts and remove pump and gasket.

Fig. 2p—Installing V8 Engine Fuel Pump

3. On V-8 engines: if push rod is to be removed, remove fuel pump adapter and gasket then remove push rod.
4. If a new fuel pump is to be installed, transfer fittings.

NOTE: After removal of pump from engine and before disassembly is started, plug all openings and thoroughly wash exterior of pump with cleaning solvent to remove all dirt and grease.

Installation

1. On V-8 engines: if removed, install fuel pump push rod and fuel pump adapter. Use gasket sealer on gasket.
2. Install fuel pump using a new gasket and tighten securely. Use sealer on fuel pump mounting bolt threads.

NOTE: On V-8 engines, a pair of mechanical fingers or heavy grease may be used to hold fuel pump push rod up while installing fuel pump (fig. 2P).

3. Connect fuel pipes to pump.
4. Start engine and check for leaks.

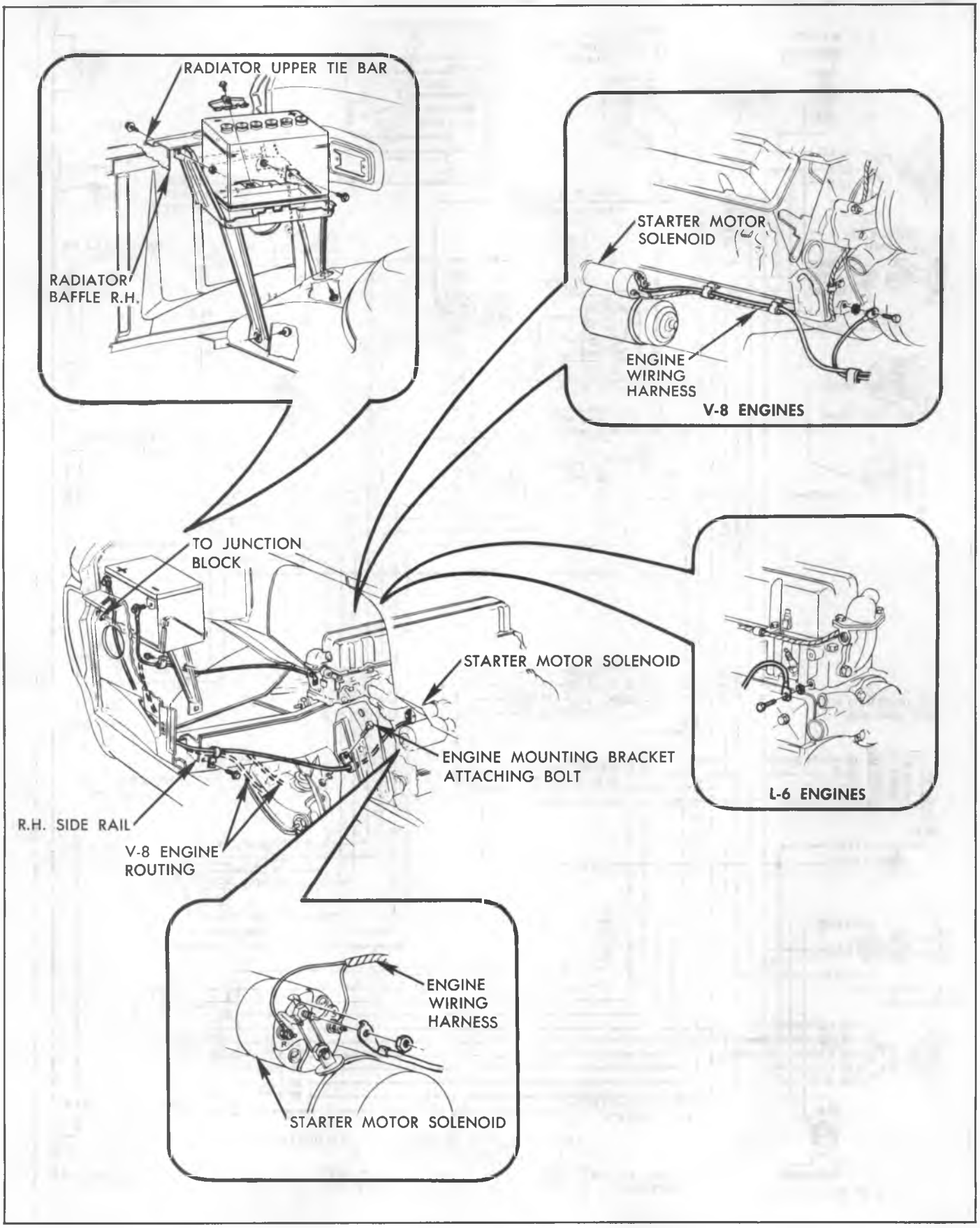

Fig. 8b—Battery Installation

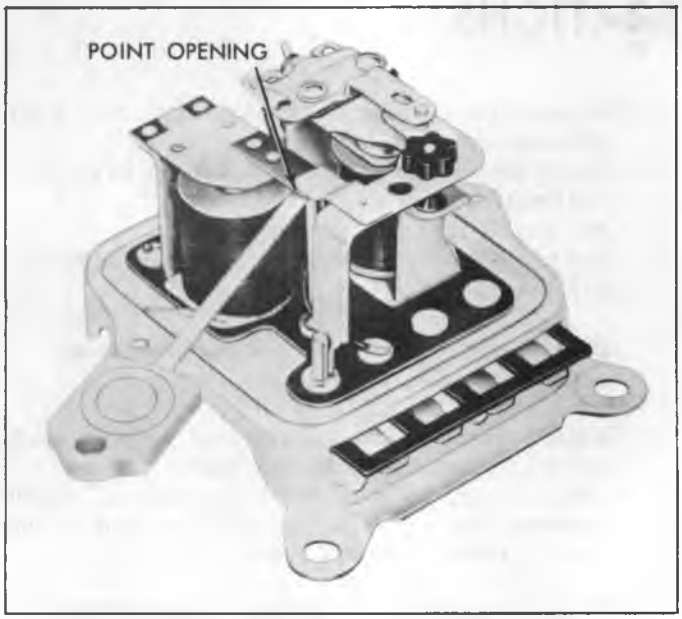

Fig. 14c—Checking Field Relay Point Opening

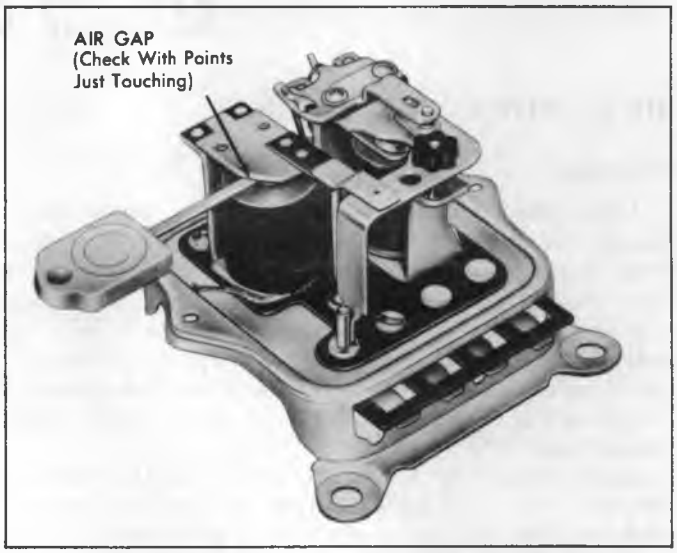

Fig. 15c—Checking Field Relay Air Gap

IGNITION SYSTEMS

INDEX

MAINTENANCE AND ADJUSTMENTS

PERIODIC MAINTENANCE

The distributor breaker points and spark plugs are the only ignition system components that require periodic service. The remainder of the ignition system requires only periodic inspection to check operation of the units, tightness of the electrical connections, and condition of the wiring. When checking the coil, test with a reputable tester.

Breaker type distributors are equipped with cam lubricator and should have the wick replaced at the same time contact point set is replaced. It is not necessary to lubricate the breaker cam when using a cam lubricator. **Do not attempt to lubricate the wick—Replace when necessary.** When installing a new wick, adjust its position so the end of the wick just touches the lobe of the breaker cam.

Distributor shaft lubrication is accomplished by a reservoir of lube around the mainshaft in the distributor body or through a hinge cap oiler on governor type units.

Spark Plugs

Should be removed, inspected, cleaned and regapped at tune-up. Defective plugs should be replaced.

Cables

The low and high tension cables should be examined carefully for brittle or cracked insulation and broken strands. Defective insulation will permit missing or cross firing of the engine. Connections should be clean and tight.

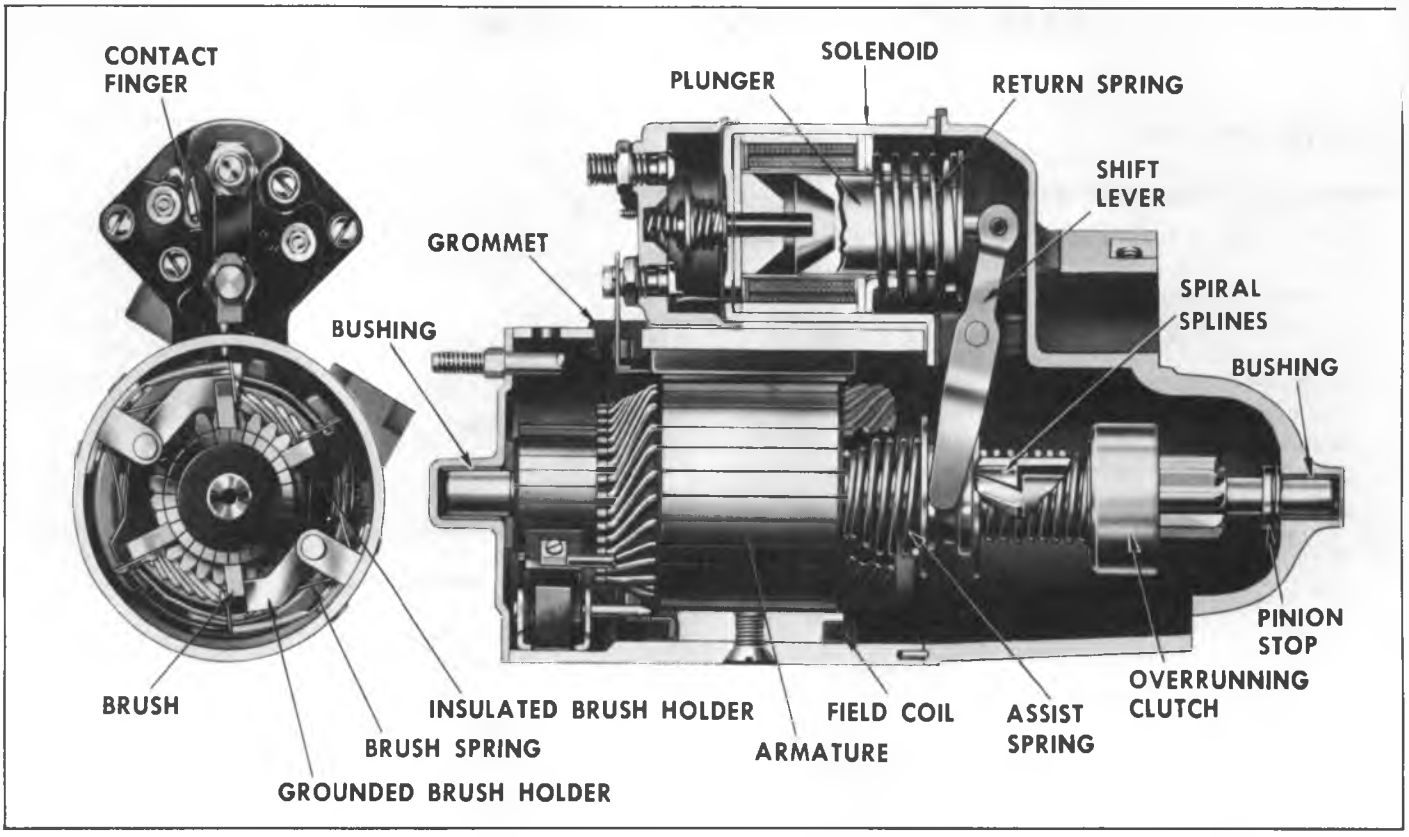

Fig. 1s—Starting Motor Cross Section—Light Duty

points in the cranking circuit as outlined below and observe the reading with the starting switch closed and the motor cranking (distributor primary lead grounded to prevent engine firing).

1. From battery positive post to solenoid battery terminal.
2. From battery negative post to starting motor housing.
3. From solenoid battery terminal to solenoid motor terminal.

If voltage drop is any of above, check exceeds 0.2 volts, excessive resistance is indicated in that portion of starting circuit and the cause of the excessive resistance could be located and corrected in order to obtain maximum efficiency in the circuit.

CAUTION: Do not operate the starting motor continuously for more than 30 seconds to avoid overheating.

When the solenoid fails to pull in, the trouble may be due to excessive voltage drop in the solenoid control circuit. To check for this condition, close the starting switch and measure the voltage drop between the BATTERY terminal of the solenoid and the SWITCH (S) terminal of the solenoid.

1. If this voltage drop exceeds 3.5 volts, excessive resistance in the solenoid control circuit is indicated and should be corrected.
2. If the voltage drop does not exceed 3.5 volts and the solenoid does not pull in, measure the voltage available at the SWITCH terminal of the solenoid.
3. If the solenoid does not feel warm, it should pull in whenever the voltage available at the SWITCH terminal is 7.7 volts or more. When the solenoid feels warm, it will require a somewhat higher voltage to pull in.

STARTING MOTOR AND SOLENOID CHECK

The following checks may be made if the specific gravity of the battery is 1.215 or higher.

1. If the solenoid does not pull in, measure the voltage between the switch (S) terminal of the solenoid and ground with the starting switch closed.

   CAUTION: If the solenoid feels warm, allow to cool before checking.

   If the voltage is less than 7.7 volts, check for excessive resistance in the solenoid control circuit. If the voltage exceeds 7.7 volts, remove the starting motor and check (1) solenoid current draw, (2) starting motor pinion clearance, and (3) freedom of shift lever linkage.
2. If the solenoid "chatters" but does not hold in, check the solenoid for an open "hold–in" winding. Whenever it is necessary to replace a starting motor solenoid, always check starting motor pinion clearance.
3. If motor engages but does not crank or cranks slowly, check for excessive resistance in the external starting circuit, trouble within the starting motor, or excessive engine resistance to cranking.

TRANSMISSION REPLACEMENT

Removal

1. Raise vehicle on hoist and drain lubricant from transmission.
2. Disconnect backing lamp switch, speedometer cable and "T.C.S." switch at transmission.
3. Remove shift lever bolts and shift levers from transmission side cover.
4. Disconnect propeller shaft from transmission as described in Section 4 of this manual.
5. Position a suitable dolly or jack under the vehicle and adjust to carry weight of transmission.
6. Support engine with an adjustable stand at the bell housing and remove engine rear mount to transmission attaching parts.
7. Remove crossmember attaching bolts and crossmember from vehicle.

   NOTE: Visually inspect to determine if other equipment, lines or brackets must be removed to permit removal of transmission.

8. Remove flywheel housing mounting bolts. Remove upper bolts first and install guide pins J-1126.
9. Move the transmission assembly rearward using care to keep transmission main drive gear shift in alignment with clutch disc hub. When unit is clear of housing, remove transmission from under vehicle.

   CAUTION: Do not allow weight of transmission to hang on the clutch disc hub, as the disc will become distorted seriously affecting clutch operation.

10. A careful check of clutch components should be made after the transmission has been removed. If repair is necessary, refer to Clutches, Section 7 of the Chassis Service and Overhaul Manuals.

Installation

1. Apply a light coating of High Temperature Grease to the main drive gear bearing retainer and splined portion of transmission main drive gear shaft to assure free movement of clutch and transmission components during assembly.

   CAUTION: Do not apply an excessive amount of grease in the above areas, as under normal operation this grease would be thrown onto clutch facings resulting in clutch failure.

2. Mount transmission on dolly or jack and move into position under the vehicle.
3. Align the transmission main drive gear shaft with the clutch disc hub by rotating the transmission output shaft. Move the transmission forward, guiding the main drive gear shaft into the clutch disc splines.

   IMPORTANT: Avoid springing the clutch when the transmission is being installed to the engine. Do not force the transmission into the clutch disc hub. Do not let the transmission hang unsupported in the splined portion of the clutch disc.

4. Install flywheel housing-to-transmission mounting bolts and washers.
5. Carefully raise the engine and transmission assembly to normally installed position. Install rear crossmember and rear mount attaching parts. Tighten attaching bolts and nuts to specifications.
6. Remove adjustable jack stand from under the engine and transmission.
7. Connect propeller shaft to transmission as described in "PROPELLER SHAFTS" (Section 4) of this manual. Remove transmission jack.
8. Install flywheel housing underpan. Tighten cap screws firmly.
9. Reconnect speedometer cable back-up lamp switch, and "T.C.S." Switch at transmission.
10. Reinstall shift controls to transmission side cover. Tighten lever bolts to specifications.
11. If other equipment (exhaust pipe, support brackets, etc.) was removed, reinstall these parts.
12. Refill transmission with lubricant recommended in Lubrication, Section "O" of this manual.
13. Check and if necessary, adjust clutch or transmission control linkage to achieve proper operation.

TRANSMISSION ALIGNMENT

In some instances where "excessive" gear whine or high gear hop out, particularly at 50 MPH and up, are encountered; and after all other probable causes have been checked, an alignment check of the transmission and clutch housing may be helpful.

A special tool, on which a dial indicator is mounted, is necessary to check the transmission case rear bore alignment. This tool may be made from a new or good used clutch gear which has a good bearing surface on the crankshaft pilot end and at the front main bearing location.

The splines on the clutch gear shaft and the teeth on the clutch gear should be ground off so the shaft may be rotated in a clutch disc hub without interference when assembled in the car. Weld a piece of 1/4" rod in the mainshaft pilot bore long enough to extend out the case rear bore. Assemble a good bearing on the clutch gear shaft and secure it with the clutch gear bearing snap ring. Attach a suitable dial indicator to the rod.

Procedure

1. Remove the transmission from the vehicle and completely disassemble, except for the reverse idler gear.

   NOTE: In any case where the clutch gear pilot or pilot bearing is excessively loose or worn, the pilot bearing should be replaced before checking the transmission case rear bore alignment by the dial indicator method.

2. Carefully install the special tool with the dial indicator in the transmission case with the face of the indicator to the rear of the case and with the tracing finger contacting the

etary gear set. Four multiple-disc clutches, two roller clutch assemblies, and one band provide the friction elements required to obtain the desired function of the planetary gear set.

The torque converter is a simple transmission that couples the engine to the planetary gears through oil and provides hydraulic torque multiplication when required. The compound planetary gear set produces three forward speeds and reverse.

The hydraulic system, pressurized by a gear type pump, provides the working pressure required to operate the friction elements and automatic controls.

The vacuum modulator is of the aneroid type and is used to automatically sense any change in torque input to the transmission. It transmits this signal to the pressure regulator, to the intermediate clutch accumulator valve, and to the shift valves so that all torque and shift speed requirements of the transmission are met and smooth shifts are obtained at all throttle openings and altitude conditions.

The cable operated detent system is designed to ensure positive part throttle or full throttle downshifting depending on throttle position.

External control connections to transmission are:

Manual Linkage–To select the desired operating range.
Engine Vacuum–To operate the vacuum modulator.
Dentent Cable–To operate Dentent System.

The Turbo Hydra-Matic 350 transmission features three forward driving ranges, which can be selected with the shift lever.

Approximate gear ratios of the transmission are as follows:

FIRST–2.5:1
INTERMEDIATE–1.5:1
DIRECT–1.00:1
REVERSE–2.00:1

The selector quadrant has six selector positions–P, R, N, D, L_2, L_1.

P – PARK position positively locks the output shaft to the transmission case, by means of a locking pawl, to prevent the vehicle from rolling in either direction. This position should be selected whenever the driver leaves the vehicle. The engine may be started in Park position.

R – REVERSE enables the vehicle to be operated in a reverse direction.

N – NEUTRAL position enables the engine to be started and run without moving the vehicle.

D – DRIVE RANGE, used for all normal driving conditions and maximum economy, has three gear ratios. Detent downshifts are available for safe passing, by depressing the accelerator to the floor.

L_1 – L_1 RANGE can be selected at any vehicle speed. When selected at speeds over 50 mph, the transmission will shift to second gear and remain in second until vehicle speed is reduced to approximately 50 mph (depending on axle ratio) before shifting to first gear.

L_1 Range position prevents the transmission from shifting out of first gear. This is particularly beneficial for maintaining maximum engine braking when continuous first gear operation is desirable.

L_2 – L_2 RANGE for congested traffic or hilly terrain. L_2 Range has the same starting ratio as Drive Range, but prevents the transmission from shifting above second gear. This retains second speed acceleration when extra performance is desired, and can also be used for engine braking.

L_2 Range can be selected at any vehicle speed, and the transmission will shift to second gear, and remain in second until the vehicle speed or the throttle opening is changed to obtain first gear operation, in the same manner as in Drive Range.

MAINTENANCE AND ADJUSTMENTS

OIL LEVEL CHECK

The transmission oil level should be checked periodically as recommended in Section O. Oil should be added only when level is on or below the "ADD" mark on the dip stick with oil hot or at operating temperature. The oil level dip stick is located at the right rear of the engine compartment. Fill with oil specified in Section O.

In order to check oil level accurately, the engine should be idled with the transmission oil hot and the control lever in neutral (N) position.

It is important that the oil level be maintained no higher than the "FULL" mark on the transmission oil level gauge. DO NOT OVERFILL, for when the oil level is at the full mark on the dip stick, it is just slightly below the planetary gear unit. If additional oil is added, bringing the oil level above the full mark, the planetary unit will run in the oil, foaming and aerating the oil. This aerated oil carried through the various oil pressure passages (low servo, reverse servo, clutch apply, converter, etc.) may cause malfunction of the transmission assembly, resulting in cavitation noise in the converter and improper band or clutch application. Overheating might also occur.

If the transmission is found consistently low on oil, a thorough inspection should be made to find and correct all external oil leaks.

PERIODIC OIL CHANGE

The transmission oil should be changed periodically as recommended in Section O, and whenever transmission is to be removed from the vehicle for repairs.

1. Run engine for one minute in neutral prior to changing.
2. Be sure vehicle is level or raise from the rear only.
3. Remove the oil pan drain plug and allow oil to drain thoroughly into a pan or can.
4. Replace drain plug and refill with approximately two and one half quarts of oil specified in Section O.

NOTE: To refill the transmission, remove dip stick from oil filler tube and refill transmission with oil specified in Section O. Then, after shifting into all ranges at idle speed to fill all oil passages, the engine should be run at 800-1000 rpm with the transmission in Neutral until the oil warms up, then add oil as required to raise the fluid level to the full mark on the dip stick. Refill capacity is approximately 2.5 qts. (U.S. measure) (2 qts. Imperial measure)

SECTION 8

FUEL TANK AND EXHAUST SYSTEMS

CONTENTS OF THIS SECTION

FUEL TANKS

INDEX

SERVICE INFORMATION

The evaporation control system is standard equipment on the 10 Series Model (Fig. 6). It incorporates the following special components which are used only on the 10 Series model and are not interchangeable with the 20 and 30 Series models.

Gasoline Tank Filler Neck Cap

A vacuum-pressure cap is used with this system. No other type of cap is to be used. This cap can be identified by two rings stamped onto the top of the cap. Also, by the words pressure-vacuum stamped on the underside of the cap.

Gasoline Tank

The special gasoline tank incorporates an internal fill limiter and also external hose connections.

Canister and Filter

The canister is mounted in the forward section of the engine compartment. The canister filter is to be replaced in accordance with the recommended maintenance.

Vent Lines and/or Separator

Gasoline tank vent lines route from the tank to the rear side panel where they form a standpipe type separator. From the separator, one line extends to the canister and the others reconnect to the tank.

COMPONENT PART REPLACEMENT

Draining Fuel Tank

If the fuel tank does not incorporate a drain plug, it will be necessary to siphon fuel from the tank when draining is needed. The following procedure is recommended.

1. Obtain approximately 10 feet of 3/8" I.D. hose and cut a flap-type slit 18" from one end. Make this cut in the direction of the shorter end of hose (See Figure 1).
2. Insert a small pipe nipple (slightly larger O.D. than the hose I.D.) into the opposite end of hose.
3. Insert the nipple end of siphon hose into the fuel tank filler neck with the natural curl of the hose pointed down. Insert until the hose is heard to strike the bottom of the tank.
4. With the opposite end of the hose in a suitable container, insert the air hose in the downward direction in the flap-type slit and trigger the flow of fuel.

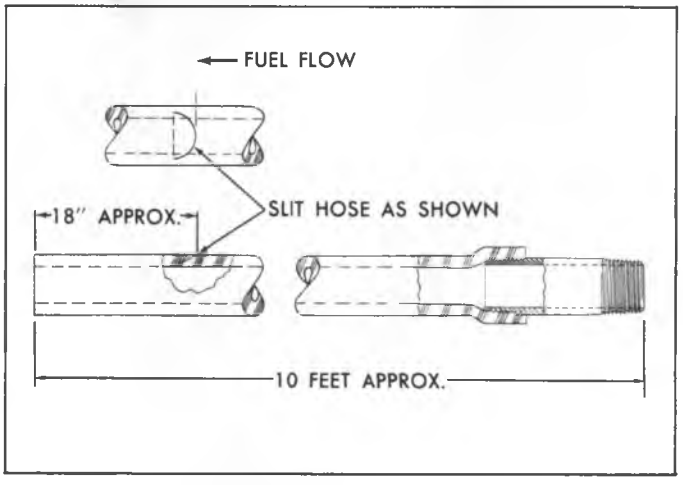

Fig. 1—Siphon Construction

affect the performance of vital components and systems, and/or could result in major repair expense. It must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.

STEERING GEAR AND/OR FLEXIBLE COUPLING

Removal

1. Disconnect the battery ground cable.
2. Set the wheels in a straight ahead position (wormshaft flat will be at 12 o'clock).
3. Remove the steering shaft flange to flexible coupling bolts.
4. Remove the pitman arm to pitman shaft nut. Mark the relationship of the arm to the shaft and then remove the arm from the shaft using Tool J-6632 or J-5504 (fig. 1).
5. Remove the steering gear to frame mounting bolts and remove the steering gear and flexible coupling as an assembly.
6. Remove the flexible coupling clamp bolt and remove the coupling from the wormshaft. It may be necessary to tap the coupling with a soft mallet to remove it from the splined wormshaft.

Installation

NOTE: The pitman arm to pitman shaft nut, steering gear to frame bolts and steering coupling to steering shaft and wormshaft fasteners are important attaching parts in that they could affect the performance of vital components and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.

1. Install the new coupling onto the wormshaft, aligning the flat on the shaft with the flat in the coupling. Push the coupling onto the shaft until the coupling reinforcement bottoms on the shaft. Install the coupling clamp bolt and torque to specifications (fig. 8).

NOTE: The coupling bolt must pass through the shaft undercut.

2. When reinstalling the steering gear assembly, determine the correct mid-position of the wormshaft as follows:
   a. Turn the shaft all the way through its travel, counting the number of turns.
   b. Turn the shaft back one-half of the total number of turns. The gear should now be on high point (wormshaft flat at 12 o'clock).
3. Reinstall the gear and coupling assembly, guiding the alignment pins to the proper position on the steering shaft flange (large pin to large opening–small pin to small opening).

NOTE: A new coupling incorporates plastic spacers on the alignment pins which aid in centering the pins in the flange openings and also serve to maintain the correct coupling to flange dimension (fig. 9). Be sure the spacers are fully installed on the pins.

4. Install the gear to frame bolts and torque to specifications.
5. Install the steering shaft flange to coupling bolts and torque to specifications.
6. Fashion a hook of heavy gauge wire and pull the plastic spacers away from the locking pins (fig. 9).

CAUTION: Under no circumstances should the vehicle be driven until the plastic spacers have been removed from the alignment pins.

NOTE: If plastic alignment pin spacers were not used, check that the flexible coupling to steering shaft flange dimension of .250" to .375" has been maintained. The coupling pins should be centered in the flange slots.

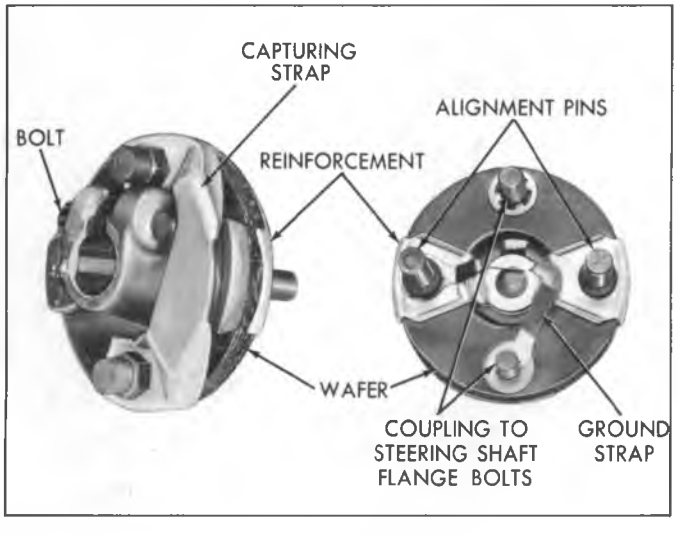

Fig. 8–Flexible Type Steering Coupling

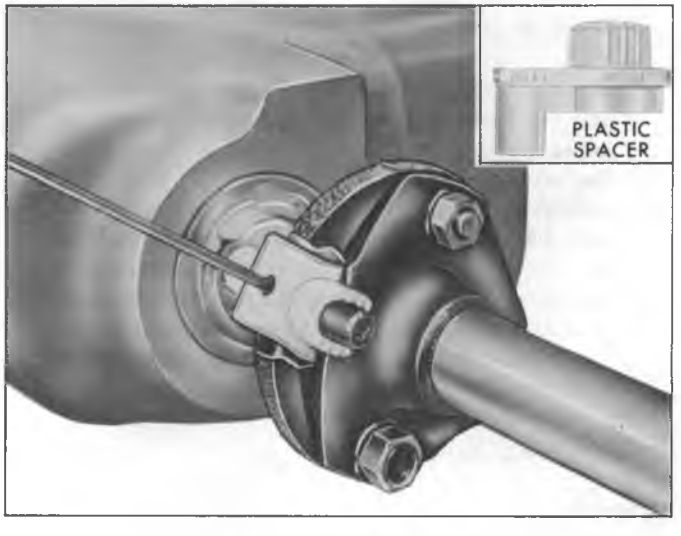

Fig. 9–Removal of Alignment Pin Spacers

Fig. 4—Inserting Tire Iron to Lift Bead

Fig. 6—Inserting Tire Iron in Second Bead

2. Lubricate tire beads, rim flanges, and bead ledge areas with a liberal amount of thin vegetable oil soap solution, or approved rubber lubricant.
3. Insure that air pressure build-up during the bead seating process is not allowed to exceed 40 pounds pressure. If beads have not seated by the time pressure reaches 40 pounds, assembly should be deflated, repositioned on rim, re-lubricated and re-inflated.
4. Make sure valve core is inserted in valve stem prior to inflating.
5. Use an extension gauge with clip on chuck so air pressure buildup can be closely watched and so that you can stand well back from the assembly during the bead seating process.

Tubeless Tires

Tubeless tires mounted on one piece full drop center rims are standard on some Chevrolet trucks. These tires have a safety inner liner which if punctured, tends to cling to the penetrating object forming a partial seal until the object is removed from the tire.

The mounting and demounting of tubeless truck tires will present no problem when a rubber lubricant, such as Ru-Glyde or equivalent is applied to tire beads and rim flanges. Ru-Glyde or equivalent in addition to materially assisting in mounting and demounting also prevents rusting at the tire sealing area and thus prevents tires from adhering to the wheel.

Demounting and Mounting

All tubeless tires used on Chevrolet trucks should be demounted and mounted as described in this section. Sizes may be demounted using present tire machines or standard tire irons following the same procedure employed in servicing tube type tires.

Fig. 5—Lifting Bead Over Rim

Fig. 7—Prying Second Bead from Rim

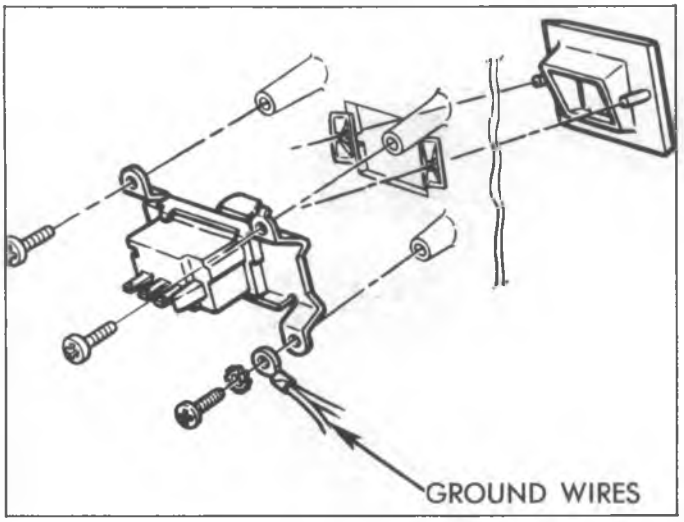

Fig. 5–Wiper-Washer Switch

LIGHT SWITCH REPLACEMENT (Fig. 6)

1. Disconnect battery ground cable.
2. Reaching up behind instrument panel, depress shaft retaining button and remove switch knob-shaft.
3. From front of instrument panel remove switch retaining nut.
4. Push switch from panel opening and remove multiple electrical connector at switch terminals.
5. To install, reverse Steps 1-4, note grounding ring must be installed on switch.

STOP LAMP SWITCH REPLACEMENT (Fig. 7)

1. Disconnect wiring harness connector from switch and remove switch retaining nut under instrument panel.
2. Depress brake pedal, place new switch into bracket, install retaining nut and electrical connector.
3. Check switch for operation. Electrical contact should be made when pedal is depressed 3/8" to 5/8" from fully released position.

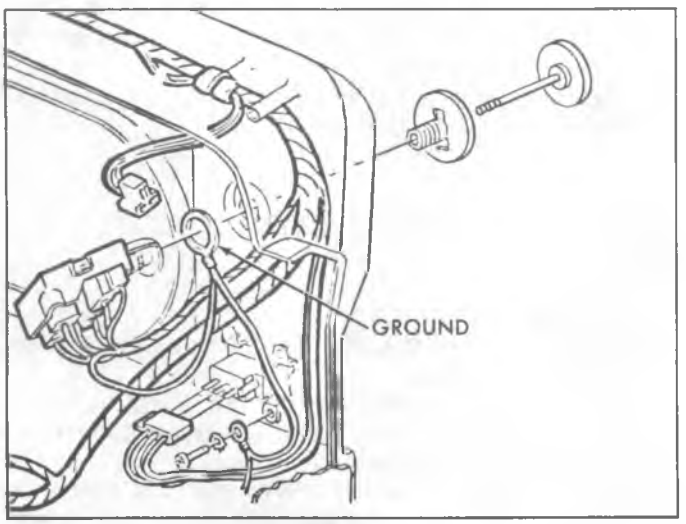

Fig. 6–Lighting Switch

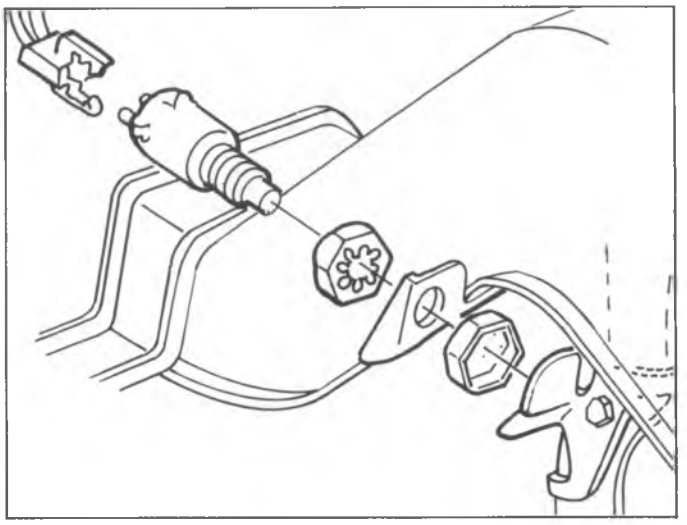

Fig. 7–Stop Lamp Switch

DIMMER SWITCH REPLACEMENT

1. Fold back left side of floor mat and disconnect wiring connector from switch terminals.
2. Remove (2) two screws securing switch to floor pan.
3. Connect electrical plug to replacement switch and check operation.
4. Position switch on floor pan and install retaining screws.
5. Flip floor mat back in place.

NEUTRAL START SWITCH REPLACEMENT (Fig. 8) AUTOMATIC TRANSMISSION

Switch Located on Transmission

1. From under vehicle left side disconnect switch wiring from engine wiring harness.
2. Remove bolt attaching the switch to the transmission and disengage switch from shift lever rod.
3. Position new switch to transmission and install switch attaching bolt.
4. Pin switch lever in NEUTRAL position with a suitable pin.
5. Put transmission shift lever in NEUTRAL.
6. Install rod into switch lever. It may be necessary to adjust swivel on rod to allow free entry of rod into switch lever.
7. Secure rod with retainer to switch, attach switch electrical connector to engine wiring harness and check operation of switch.

BACKING LAMP SWITCH REPLACEMENT (Fig. 9)

Switch Located on Transmission

1. From under vehicle disconnect electrical plug at switch terminals.
2. Remove switch from transmission side cover.
3. Install back-up lamp switch in transmission side cover.
4. Connect electrical plug to switch.
5. Turn on ignition switch and check for operation of back-up lamps when transmission is shifted into reverse only.

Crank Arm Reassembly

1. Operate wiper gear to park position (Figure 21).
2. Position crank arm on gear shaft flats according to position shown in Figure 21.
3. Install crank arm retaining nut finger tight, then clamp crank arm in vise and tighten retaining nut securely.

MOTOR DISASSEMBLY

NOTE: Motor section may be disassembled independently of the gear box.

Brush Plate and Circuit Breaker

Removal

1. Scribe a reference line along the side of the casting and end cap to insure proper reassembly.
2. Remove the two motor thru bolts.
3. Feed exposed excess length of motor leads thru the casting grommet and carefully back the case and field assembly plus the armature away from the casting (Figure 25).

NOTE: It may be necessary to remove the armature end play adjusting screw and insert a rod thru the opening in order to apply pressure against the end of the armature.

4. Unsolder the black cotton-covered lead from circuit breaker (Figure 26).
5. Straighten out the 4 tabs that secure the brush plate to the field coil retainers (Figure 26).

CAUTION: Be careful not to break any of the retainer tabs.

6. Install "U" shaped brush retainer clip over brush holder that has brush lead attached to circuit breaker (Figure 26).
7. Holding the opposite brush from that retained in Step 6, carefully lift the brush holder off the mounting tabs far enough to clear the armature commutator (Figure 27).
8. Allow the brush, held in Step 7, to move out of its holder. Remove the brush spring and lift the brush holder off the armature shaft.

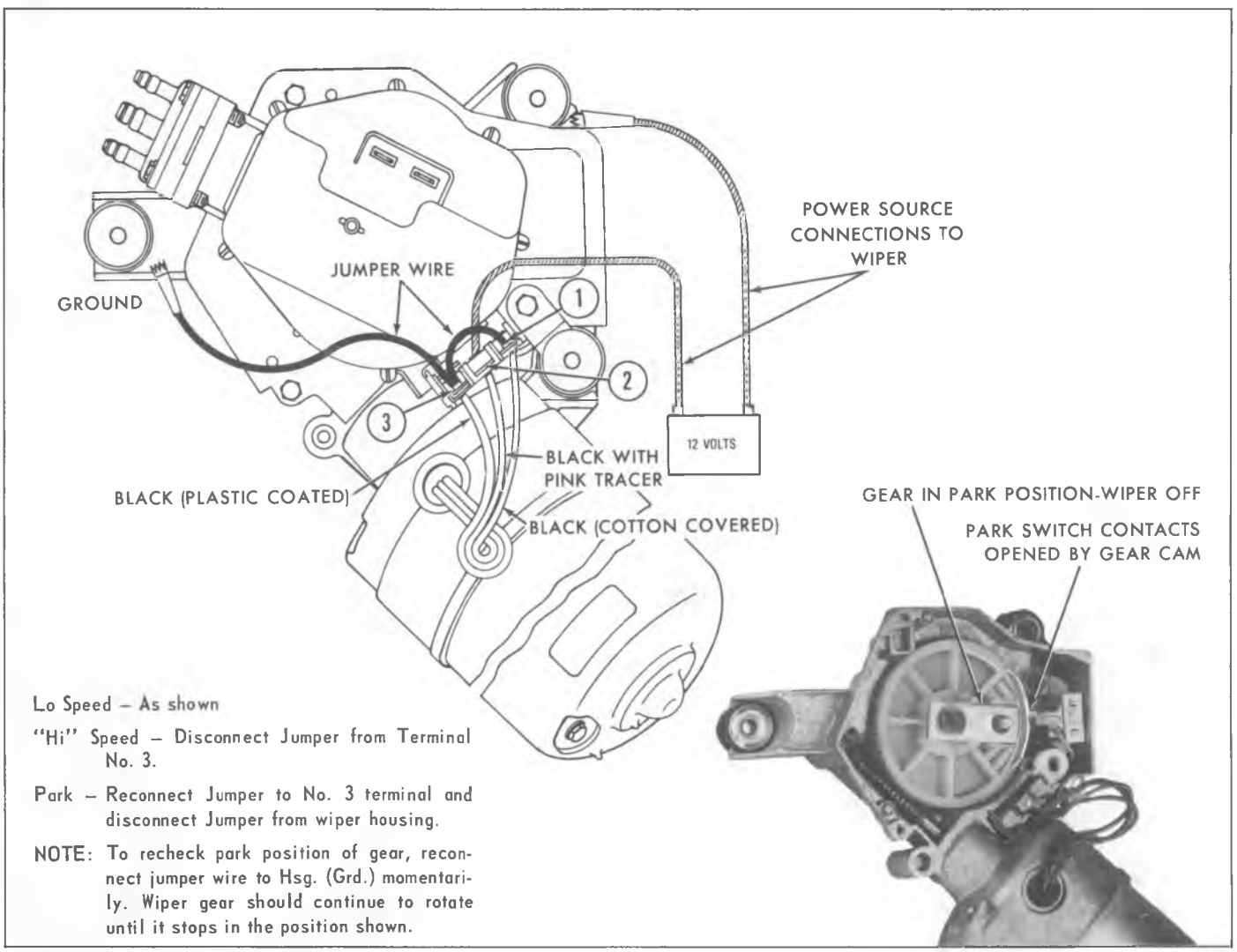

Fig. 18–Wiper Motor Diagnosis Diagram

SECTION 13

RADIATOR AND GRILLE

CONTENTS OF THIS SECTION

RADIATOR SERVICE PROCEDURES

Removal (Figs. 1 and 2)

NOTE: When draining the radiator use a short piece of 3/8 inch I.D. hose over the drain cock and route hose past body parts to a clean container and save anti-freeze for later refill.

1. Drain radiator and remove hoses and transmission lines if equipped.
2. Remove finger guard (6 cylinder engine).
3. Remove upper retainers with fan shroud attached (V-8 engines) and rest fan shroud over engine fan.
4. Lift radiator out of lower retainers.

Installation

Install in reverse order of removal. Be sure lower and upper retainers and mounting pads are properly positioned. Fill cooling system and check for leaks.

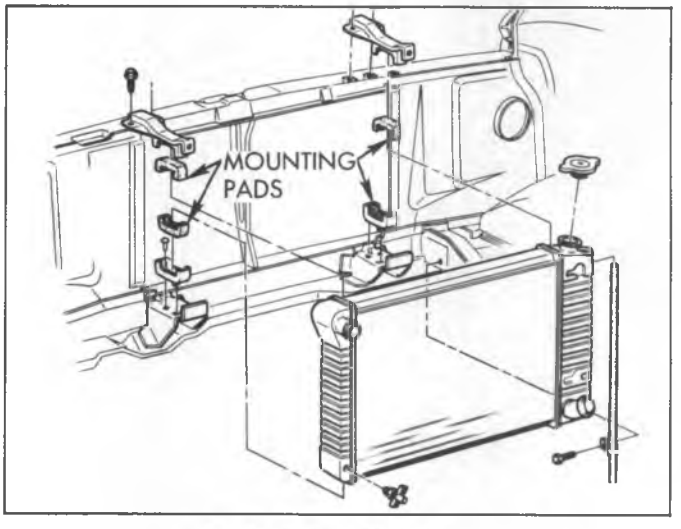

Fig. 2—Radiator Mounting

GRILLE SERVICE PROCEDURES

Removal

1. Remove left and right headlamp bezels.
2. Remove attaching screws. Grille to cross sill, body and radiator support and remove the grille.
3. Separate emblem from grille, if necessary, by removing nuts on rear of emblem.

Installation

Install the grille in reverse order of removal.

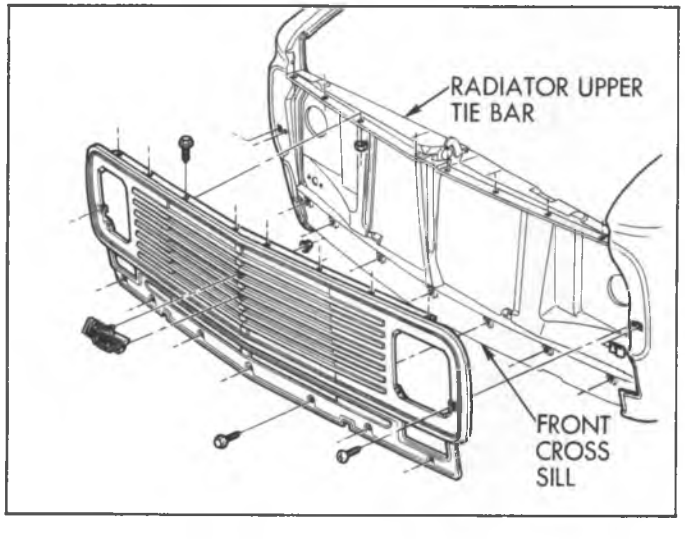

Fig. 1—Radiator Grille

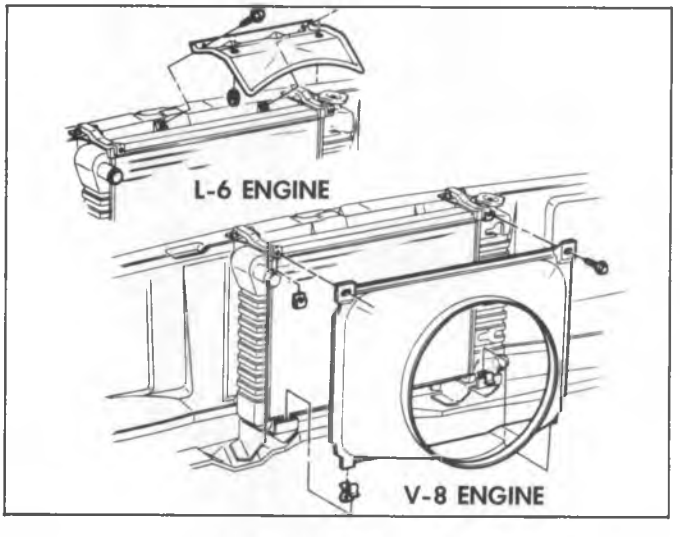

Fig. 3—Radiator Shrouds

ENGINE ELECTRICAL

SECTION 6Y

BATTERY

Model No.	Application	No. of Plates Per Cell	Cranking Power @ 0°F (Watts)	Capacity @ 20 Hour Rate (Amp. Hr.)
1980110*	230 L-6 & 307 V-8	9	2300	44
1980111*	350 V-8	11	2900	61
1980126**	RPO K76 and T-60 Option	15	3750	76

*Side Terminal Energizer
**Side Terminal and Plastic Case Energizer

GENERATORS

Model No.	Application	Delco-Remy Spec. No.	Field Current Amps (80°F)	Cold Output*			Rated Hot Output**-Amps
				Spec Volts	Amps @ 2000 RPM	Amps @ 5000 RPM	
1100834	Base	3395	2.2-2.6	14	25	35	37
1100839	RPOK-79	3396	2.2-2.6	14	28	40	42
1100849	RPOK-76	4500	2.2-2.6	14	33	58	61

*Generator temperature approximately 80°F.
**Ambient Temperature 80°F.

VOLTAGE REGULATOR

Model No.	Field Relay			Voltage Regulator		
	Air Gap	Point Opening	Closing Voltage	Air Gap	Point Opening	Voltage Setting
1119515	.015	.030	2.3-3.7	.067	.014	13.8-14.8 @ 85°F.

STARTING MOTOR

Model No.	Spec. No.	Brush Spring Tension oz.	Free Speed		
			Volts	Amperes	RPM
1108367	3573	35	9	50-80*	5500-10500
1108338, 1108360	2438	35	9	55-80*	3500-6000
1108350, 1108363	2444	35	9	35-75*	6000-9000
1108425	3533	35	9	40-105*	3500-6500

*Includes Solenoid