1964

CHEVROLET

shop manual

SUPPLEMENT

1964

Chevrolet SHOP MANUAL SUPPLEMENT

FOREWORD

This supplement has been prepared for use with the 1961 Passenger Car Shop Manual and covers service information peculiar to the 1964 Chevrolet.

Summaries of new Special Tools and new or revised specifications for vehicle components are included at the end of each major section.

All information, illustrations and specifications contained in this literature are based on the latest product information available at the time of publication approval. The right is reserved to make changes at any time without notice.

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CHEVROLET MOTOR DIVISION

General Motors Corporation

DETROIT, MICHIGAN

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SECTION 1
GENERAL INFORMATION

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The 1964 Chevrolet model line-up has been expanded as shown in the following chart to 15 models and four series through the addition of an Impala Super Sport Series.

MODEL IDENTIFICATION

	Biscayne		Bel Air		Impala		Impala SS	
	6 Cyl.	V-8	6 Cyl.	V-8	6 Cyl.	V-8	6 Cyl.	V-8
11—2 Door Sedan	1111	1211	1511	1611	—	—	—	—
35—4 Door Station Wagon (6 Pass.)	1135	1235	1535	1635	1735	1835	—	—
39—4 Door Sport Sedan	—	—	—	—	1739	1839	—	—
45—4 Door Station Wagon (9 Pass.)	—	—	1545	1645	1745	1845	—	—
47—2 Door Sport Coupe	—	—	—	—	1747	1847	1347	1447
67—Convertible	—	—	—	—	1767	1867	1367	1467
69—4 Door Sedan	1169	1269	1569	1669	1769	1869	—	—

ENGINE DATA

Engine and Carburetion	Cubic Inch Displacement	Horsepower	Compression Ratio	Bore	Stroke
6 Cyl. Turbo Thrift 230—1 BBL	230	140 @ 4400	8.5:1	3.875	3.25
V-8 Turbo-Fire 283—2 BBL	283	195 @ 4800	9.25:1	3.875	3.0
V-8 Turbo-Fire 327—4 BBL	327	250 @ 4400	10.5:1	4.00	3.25
V-8 Turbo-Fire 327—4 BBL	327	300 @ 5000	10.5:1	4.00	3.25
V-8 Turbo-Fire 409—4 BBL	409	340 @ 5000	10.0:1	4.313	3.50
V-8 Turbo-Fire 409—4 BBL	409	400 @ 5800	11.0:1	4.313	3.50
V-8 Turbo-Fire 409—2 x 4 BBL	409	425 @ 6000	11.0:1	4.313	3.50

AXLE RATIOS

	Engine	Transmission	Axle Ratio
6 Cyl.	Turbo-Thrift 230–1 BBL.	3 Speed, Powerglide Coupes and Sedans	3.08:1
		Convertibles	3.36:1
		Station Wagons	3.55:1
		Overdrive	3.70:1
V-8	Turbo-Fire 283–2 BBL.	3 Speed, Powerglide; Sedans	3.08:1
		Station Wagons & 14-1800 Models	3.36:1
		Overdrive	3.70:1
V-8	Turbo-Fire 327–4 BBL.	3 Speed	3.36:1
		4 Speed	3.36:1
		Powerglide	3.08:1
V-8	Turbo-Fire 327–4 BBL.	3 Speed	3.36:1
		4 Speed	3.36:1
		Powerglide	3.36:1
V-8	Turbo-Fire 409–4 BBL.	3 Speed	3.36:1
		4 Speed	3.36:1
		Powerglide	3.36:1
V-8	Turbo-Fire 409–4 BBL.	3 Speed	3.36:1
		4 Speed (Close Ratio)	3.36:1
		4 Speed	3.36:1
V-8	Turbo-Fire–2 x 4 BBL.	3 Speed	3.36:1
		4 Speed (Close Ratio)	3.36:1
		4 Speed	3.08:1

UNIT AND SERIAL NUMBER LOCATIONS

Body style, vehicle, and Powerglide Transmission serial numbers are shown in Figures 1, 2 and 3. The vehicle serial number tag (fig. 2) has been revised to provide a space for dealer delivery date. The source data code number for the four-speed transmission is stamped on the left side of the case at lower rear of the cover (fig. 4).

Positraction Identification—Positraction units are not visibly distinguished from the conventional differential, that is both are contained within the same type carrier. However, positraction units require special lubricant (see Section 2) and are identified by the prefix "P" stamped with the serial number on the left front side of differential carrier. Further identification is provided in the form of a metal tag affixed to the filler plug opening.

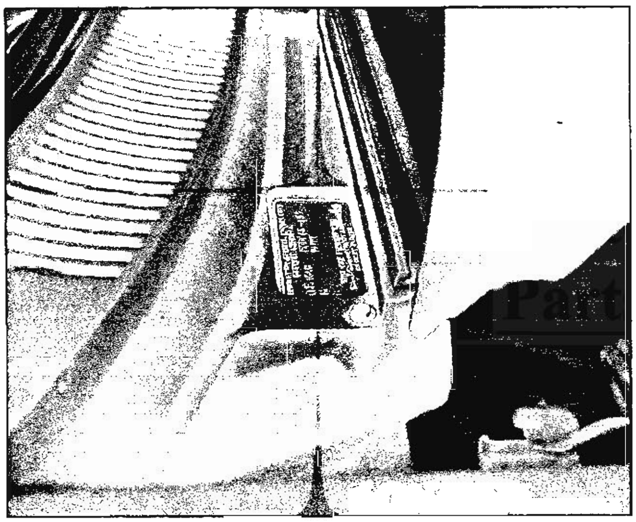

Fig. 1—Body Style, Body Number, Trim and Paint Combination Under Cowl Grille on Top Right Hand Plenum Chamber

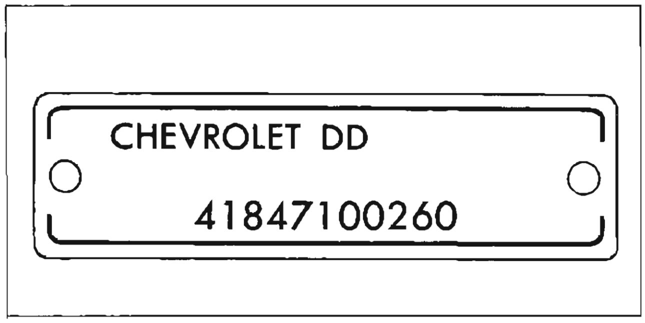

Fig. 2—Vehicle Serial Number Located on Left Front Body Hinge Pillar

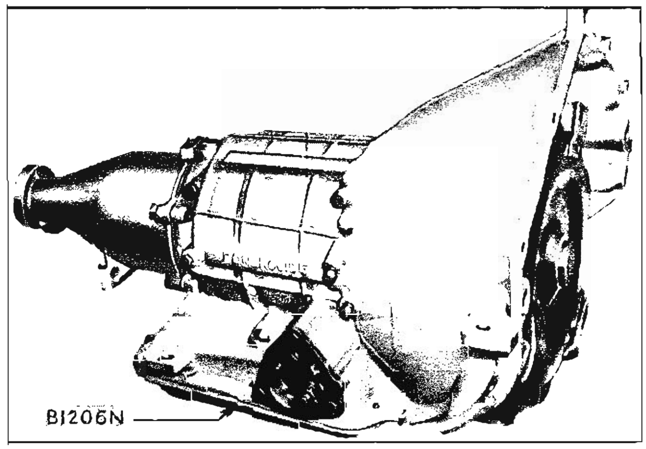

Fig. 3—Powerglide Serial Number Location on Bottom of Oil Pan

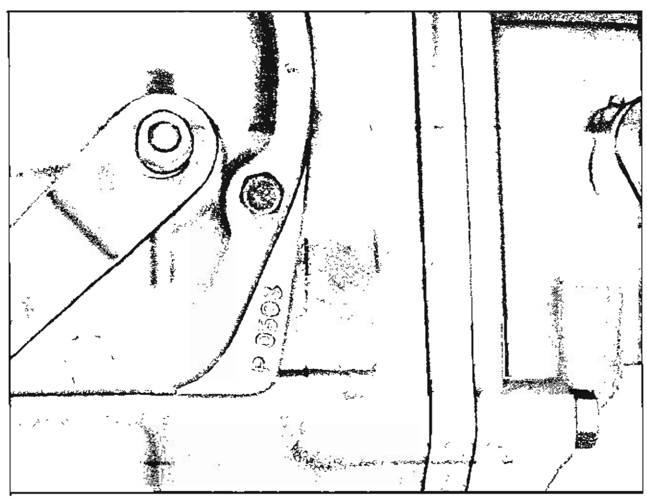

Fig. 4—4-Speed Transmission Source Data Code Location

CAPACITIES

Fuel Tank

Station Wagon .... 19 gal.
All other models .... 20 gal.

Crankcase

6 Cylinder .... 4 qt.
8 Cylinder (283) .... 4 qt.
8 Cylinder (327) .... 4 qt.
8 Cylinder (409) .... 5 qt.
When changing oil filter, add .... 1 qt.

Cooling System

	6 Cyl.	283 V-8	327 V-8	409 V-8
Without Heater	11 qt.	16 qt.	15 qt.	21 qt.
With Heater	12 qt.	17 qt.	16 qt.	22 qt.

Air Conditioned

	6 Cyl.	283 V-8	327 V-8	409 V-8
Without Heater	13 qt.	18 qt.	17 qt.	23 qt.
With Heater	14 qt.	19 qt.	18 qt.	24 qt.

Transmission

3 Speed	2 pt.
3 Speed with overdrive	3 pt.
4 Speed	3 pt.

Tire Information

Type: Tubeless

Size: Regular production except station wagons

and Convertible	7.00 x 14
Convertible	7.50 x 14
Station Wagons	8.00 x 14
All 327 Engine Equipped Vehicles (Except Station Wagons)	7.50 x 14
All 409 Engine equipped vehicles	8.00 x 14

SELECTION OF GASOLINE

Chevrolet Hi-Thrift, 6 cylinder (8.5:1 compression ratio) and Turbo-Fire V-8 (9.25:1 compression ratio) engines are designed to operate efficiently on Regular grade gasolines. Chevrolet High-Performance V-8 engines with 10.5:0 compression ratio are designed to operate efficiently on Premium grade gasolines. Chevrolet High-Performance engines with 11.0:1 compression ratio require Super-Premium gasolines for proper performance and efficiency. The use of Regular grade gasolines in the 10.5:1 compression ratio engine or the use of Regular or Premium grade gasolines in the 11.0:1 compression ratio engines will result in excessive knocking, which may lead to engine damage. The use of an incorrect grade of gasoline constitutes misuse of the engine.

DIMENSIONS

Length	210.4 inches
Wheelbase	119.0 inches
Width	79.2 inches

Height

Convertible	55.2 inches
Sedan and Coupe	54.5 inches
Station Wagon	56.2 inches

SECTION 2

LUBRICATION

The 1964 Chevrolet engine and chassis lubrication requirements are described below. The time or mileage intervals are intended as a guide for establishing regular maintenance and lubrication periods. Sustained heavy duty or high speed operations or operation under adverse conditions may necessitate more frequent servicing.

ENGINE OIL

Oil and Filter Change Intervals

NOTE: Under prolonged dusty driving conditions, it is recommended that these operations be performed more often.

Change engine oil filter every 6,000 miles or every 6 months, whichever comes first. Change engine oil every 60 days or 6,000 miles, whichever comes first.

Oil Level

Regardless of the change interval being followed check the oil level on the dipstick regularly. This level is satisfactory if, while the engine is hot, it falls anywhere between the marks FULL and ADD OIL. It is not necessary to keep the level at the FULL mark. DO NOT OVERFILL.

Oil Viscosity and Quality

It is recommended that you use an oil which, according to the label on the can is (1) intended for service "MS" and (2) passes car makers' tests or meets General Motors Standard GM 4745-M.

Lowest Anticipated Temperature During Time Oil Will Be in Crankcase	Recommended SAE Viscosity Oils	Recommended SAE Multi-Viscosity Oils
32° F.	SAE 20 or 20W	SAE 10W-30
0° F.	SAE 10W	SAE 10W-30
Below 0° F.	SAE 5W	SAE 5W-20

SAE 30 or 10W-30 is recommended when most of the driving is at high speeds and/or at temperatures above 90° F.

CRANKCASE BREATHER CAP

Clean and re-oil at every oil change.

DISTRIBUTOR CAM LUBRICATOR

6-Cylinder Engine – Remove distributor cap and rotate lubricator ½ turn at 12,000 mile intervals. Replace at 24,000 mile intervals.

8-Cylinder Engine–Change cam lubricator end for end at 12,000 mile intervals. Replace at 24,000 mile intervals.

CRANKCASE VENTILATION

Valve Type

At every oil change test valve and replace when necessary.

Fixed Orifice Type

At every oil change check orifice. If dirty or plugged clear with suitable drill. Twist drill by hand to remove any sludge or carbon formation.

AIR CLEANER

NOTE: Under prolonged dusty driving conditions, it is recommended that these operations be performed more often.

Polyurethane Type–Every 12,000 miles clean element in solvent, squeeze out solvent, then soak in engine oil and squeeze out excess.

Paper Element Type–First 12,000 miles inspect or test element; if satisfactory, re-use element but recheck every 6,000 miles until replaced. Element must not be washed, oiled, tapped or cleaned with an air hose.

FUEL FILTER

If carburetor flooding occurs, replace element located in carburetor inlet.

If engine is equipped with bowl type filter, replace element every 12,000 miles.

BATTERY TERMINALS

Clean and oil battery terminals and oil felt washers every 6,000 miles.

TRANSMISSION

3-Speed and Overdrive—4-Speed

Check fluid level at operating temperature every 6,000 miles and fill as necessary to level of filler plug hole with SAE 80-90 or SAE 90 Multi-purpose gear lubricant meeting requirements of U.S. Ordnance Spec. MIL-L-2105B.

Powerglide

Check fluid level every 6,000 miles with engine idling, selector lever in "N" position, parking brake set and transmission at operating temperature. Add Automatic Transmission Fluid Type "A" bearing the mark AQ-ATF, followed by a number and suffix "A" to full mark on dipstick. DO NOT OVERFILL.

Lubricate the Powerglide shift linkage at frame and transmission with water resistant EP lube.

REAR AXLE

Check level every 6,000 miles and keep filled to filler plug hole level with SAE 90 or SAE 80-90 Multi-purpose gear lubricant meeting requirements of U S Ordnance Spec. MIL-L-2105B. In Positraction axles use special Positraction rear axle lubricant GM #3755205.

BRAKE MASTER CYLINDER

Check level every 6,000 miles and maintain ¼" below filler opening with G.M. Hydraulic Brake Fluid, Super No. 11.

PARKING BRAKE

Every 6,000 miles apply water resistant EP lube to pulley bearing area, cable at the pulleys, cable guides just behind frame "X" member and at all operating link and levers.

STEERING GEAR

Check lube level every 36,000 miles. Add lubricant as needed to level of filler plug hole.

POWER STEERING PUMP

Check fluid level in pump reservoir every 6,000 miles or 6 months and fill as required with Automatic Transmission Fluid Type "A" with AQ-ATF-A mark. Oil should be at operating temperature and wheels in straight ahead position.

FRONT SUSPENSION

Every 6,000 miles or 6 months lubricate 4 ball joint fittings with water resistant EP lube.

STEERING LINKAGE

Manual—Every 6,000 miles or 6 months lubricate fitting at each tie rod and at relay rod (4 fittings) with water resistant EP lube.

Power—Same as manual plus fittings at valve adapter and cylinder (6 fittings).

FRONT WHEEL BEARINGS

Every 36,000 miles clean and repack with high melting point wheel bearing lubricant.

CLUTCH CROSS-SHAFT

Periodic lubrication of the clutch cross shaft is not required. At 30,000 miles or sooner, if necessary; remove plug, install lubrication fitting and lubricate with water resistant EP lube.

AIR CONDITIONING

Every 6,000 miles check sight glass under the hood after the system has been in operation for several minutes. Sight glass should be clear. Bubbles or dirt indicate a leak which should be corrected immediately.

Every week—during winter months—run the system for 10 to 15 minutes to insure proper lubrication of the seals and moving parts.

SECTION 3

FRAME AND SUSPENSION

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FRAME

The 1964 Chevrolet passenger car frame is a carry-over of the all-welded, X-type frame used in 1961. All specifications, checking and service procedures on the 1964 frame, remain the same as outlined in the 1961 Passenger Shop Manual, Section 3.

SUSPENSION

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GENERAL DESCRIPTION

The 1964 Chevrolet Passenger Car short-long arm front suspension design and service operations remain the same as outlined in the 1961 Passenger Car Shop Manual, Section 3, with the exception of revised front wheel bearing adjusting specifications, front alignment specifications, and the addition of a revised steering knuckle service procedure. Improved front suspension spherical joints permit extended lubrication periods. The four-link, coil spring rear suspension is a carry-over from 1961 and all service operations remain the same as outlined in the 1961 Passenger Car Shop Manual, Section 3.

MAINTENANCE AND ADJUSTMENTS

LUBRICATION

The control arm spherical joints (ball studs) used on the 1964 Chevrolet, while similar in appearance to those used in 1961, incorporate improvements which permit the lubrication interval to be increased. The new spherical joints may be identified by the large rubber boot on the stud end of the joint. Front wheel bearing lubrication intervals have also been increased. See Section 2 of this manual for complete lubrication information.

Special self threading type lube fittings are used in the spherical joint assemblies. If it is necessary to replace a fitting a standard threaded type may be used. However, replacement spherical joint assemblies are supplied less the lube fitting. Therefore it will be necessary to install a self threading type fitting into the untapped hole provided when replacing the entire assembly.

FRONT WHEEL BEARINGS—ADJUST

The proper adjustment of the front wheel bearings is one of the important service operations that has a definite bearing on safety. A car with improperly adjusted front wheel bearings lacks steering stability, has a tendency to wander or shimmy and causes excessive tire wear. In an effort to provide for more accurate adjustments the spindles are drilled both vertically and horizontally and the adjusting nuts are slotted on all six sides.

NOTE: Do not repack or readjust front wheel bearings as part of New Car Conditioning. This will seriously affect the proper mating-in of these close tolerance bearings.

1. Jack up front end of vehicle. Remove hub cap and dust cap. Remove cotter pin from end of spindle.
2. Tighten spindle nut to 15 ft. lbs. (or 180 in. lbs.) torque while rotating wheel.
3. Back off adjusting nut on flat and insert cotter pin.
4. If slot and cotter pin hole do not align, back off adjusting nut an additional ½ flat or less as required to insert cotter pin.
5. Spin the wheel to make sure that it rolls freely. Properly lock the cotter pin by spreading the end and bending it around.

NOTE: These tapered roller wheel bearings should have zero preload and .000" to .007" end movement when properly adjusted.

Install the dust cap and hub cap or wheel disc.

6. Remove jack.

FRONT WHEEL ALIGNMENT

Front wheel alignment consists of the inspection, maintenance and adjusting of all the inter-related steering angles of the front suspension system. The correct adjustment of these angles (camber, caster, ball joint inclination, toe-out on turns and toe-in) must be maintained to assure ease and stability of steering and satisfactory tire life.

Alignment Preliminary Steps

There are several different types of front end alignment machines, all of which outline proper procedure for checking factors of front wheel alignment. The instructions furnished with each type of machine should be followed. All checks must be made with the vehicle level and at curb weight (no passengers, full tank of gas, recommended tire pressures). Preliminary inspection of the vehicle before checking front wheel alignment should include:

1. Loose or improperly adjusted steering gear.
2. Steering gear housing to frame mounting.
3. Excessive wear in spherical joints or steering shaft coupling.
4. Tie rod or steering connections.
5. Front riding heights. (See Figure 1)

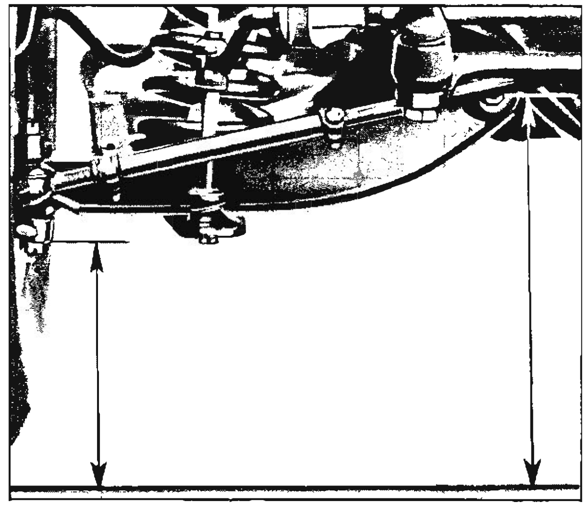

Fig. 1—Checking Riding Height

6. Tire inflation.
7. Wheel and tire balance.
8. Wheel bearing adjustment.
9. Shock absorber operation.

Toe-out on turns should be checked only after caster, camber and toe-in have been checked and adjusted to specifications.

Riding Height and Front Coil Spring Sag

If the front suspension is visibly sagging during the alignment preliminary checks, the following procedure should be followed to determine whether the front spring heights are within correct limits.

1. Position car on smooth, level floor.
2. Bounce and rock the car several times and allow it to settle to a normal height.
3. Measure the distance from the floor to the center of the front inner pivot of lower control arm (fig. 1). Record this measurement.
4. Measure the distance from the floor to the lower face of the lower steering knuckle boss for the spherical joint on the same side of the vehicle. Record this measurement.
5. The difference between these two measurements, should be as given in the specifications at the end of this section.
6. Measure the opposite side of the vehicle in a similar manner. It is essential that the two differences be within ½".

NOTE: Before adjusting caster and camber angles after complaint of excessive tire wear or poor handling, the front bumper should be depressed and quickly released to allow car to return to its normal height.

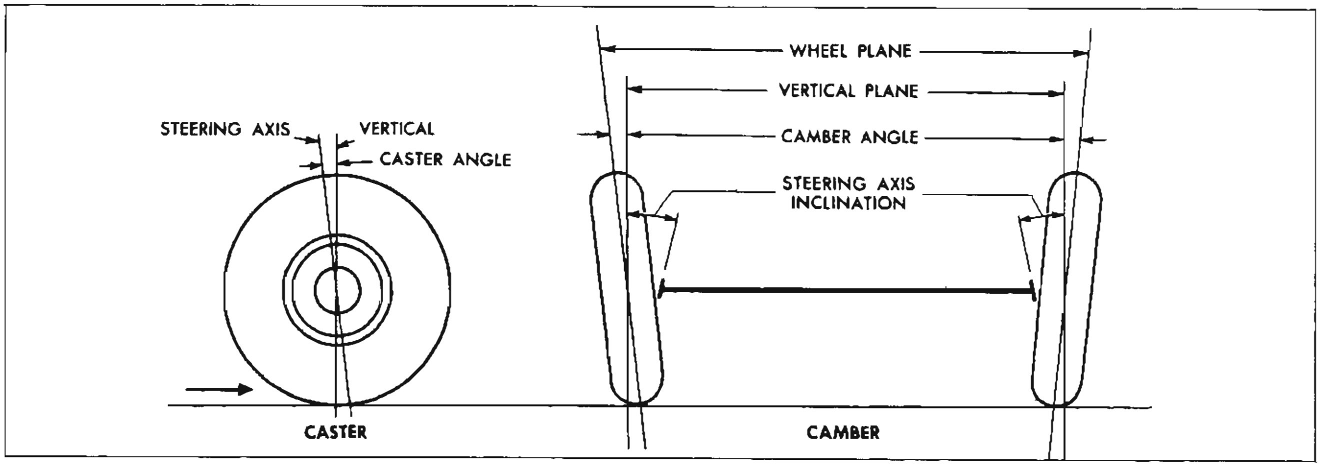

Fig. 2—Caster and Camber Angles

Caster

The caster angle (fig. 2) is the angle measured between a true vertical line through the center of the wheel and the center line through the upper and lower ball joints. The correct caster angle or positive backward tilt will be found in the specifications which follow this section. Caster adjustments are made by means of shims between the upper control arm inner support shaft and the frame side rail support bracket. The addition of shims at the front bolt or removal of shims at the rear bolt will decrease positive (backward) caster. A 1/32" shim will change caster angle 1/4°.

Camber

Positive camber is the amount in degrees that the front wheels are tilted outward at the top from a vertical position. The correct camber angle or outward tilt of the front wheels will be found in the specifications which follow this section. Adding or removing shims at both front and rear bolts of upper control arm support shaft will adjust camber. A 1/32 shim will vary camber 1/6°.

NOTE: Both caster and camber can be adjusted in one operation.

Steering Axis Inclination

Steering axis inclination, comparable to king pin inclination in vehicles using king pins, is the inward tilt of the steering knuckle. From this definition, and from the definition of camber (outward tilt of the wheels), it is evident that one cannot be corrected without changing the other. The correct steering axis inclination will be found in the specifications which follow this section. If it is not within these limits, the steering knuckle is bent and should be replaced. If a new knuckle is installed, front end alignment must be readjusted. See Service Operations this section for steering knuckle replacement.

Toe-In Adjustment

Toe-in, or the inward pointing of both front wheels, is checked with the wheels in a straight ahead position. It is the difference of the distance measured between the extreme front of both front wheels and the distance measured between the extreme rear of the wheels. Correct total toe-in will be found in the specifications which follow this section.

If the equipment being used measures the toe-in of each wheel individually, the following procedure should be used:

1. Set steering gear on high point, mark 12 o'clock position on steering shaft, and position steering wheel for straight ahead driving.
2. Loosen clamp bolt at each end of each tie rod and adjust to the total specified toe-in (fig. 3).
3. Position inner tie rod clamp bosses forward to 90° down to avoid stabilizer link bolt interference.

If a tram gauge is used, the following procedure should be used:

1. Set front wheels in a straight ahead position.
2. Loosen clamp bolts on one tie rod and adjust for the total specified toe-in.
3. Loosen other tie rod clamp bolts. Turn both rods the same amount and in the same direction to place the steering gear on its high point and position the steering wheel for straight ahead driving.
4. Position inner tie rod clamp bosses toward the front of the vehicle and not more than 45° up or down from horizontal to avoid stabilizer link bolt interference.

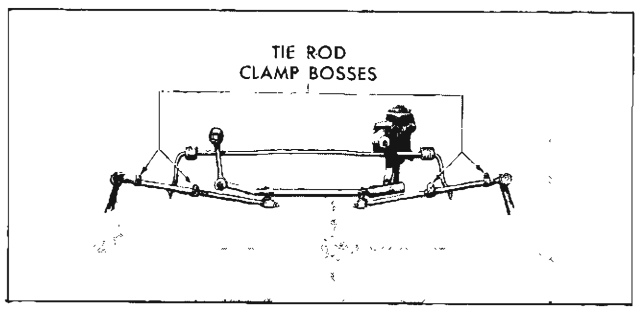

Fig. 3—Toe-In Adjustment

Cornering Wheel Relationship

Cornering wheel relationship, or toe-out on turns, is determined by the angle of the steering arms and is not adjustable. If this measurement does not fall within the limits given in the specifications which follow this section, it will be necessary to replace the steering arm on the wheel side that does not fall within limits. See Section 4, Steering, for steering arm replacement.

SERVICE OPERATIONS

STEERING KNUCKLE

NOTE: It is recommended that vehicle be raised and supported on a twin-post hoist so that the front coil spring remains compressed, yet the wheel and steering knuckle assembly remain accessible. If a frame hoist is used, support lower control arm with an adjustable jackstand to safely retain spring in its curb height position.

Removal

1. Raise vehicle and support lower control arm as noted above.
2. Remove hub cap, wheel hub dust cover, cotter pin adjusting nut and washer, withdraw wheel and tire, brake drum, and wheel hub and bearing assembly from steering knuckle spindle.
3. Disengage brake shoe return springs and remove brake shoe hold-down clips. Remove brake shoes from backing plate.

   CAUTION: Keep brake shoes clean and dry.
4. Remove brake anchor pin and two bolts securing brake backing plate and steering arm to steering knuckle.
5. Withdraw steering arm and brake backing plate from steering knuckle. Wire backing plate to frame. Do not disconnect brake line.

   NOTE: Refer to Section 4—Steering, Service Operation entitled Steering Linkage—Tie Rod, for further steering arm service operations.
6. Remove upper and lower ball stud cotter pins and remove ball stud nuts. Free steering knuckle from ball studs by rapping steering knuckle bosses. Withdraw steering knuckle.

Installation

1. Place steering knuckle in position and insert upper and lower ball studs into knuckle bosses.
2. Install ball stud nuts and tighten upper nut 42-47 ft. lbs., lower nut 60-94 ft. lbs. Insert new cotter pins.

   NOTE: If necessary, tighten one more notch to insert cotter pins.
3. Place brake backing plate and wheel cylinder in position on steering knuckle and insert anchor pin.
4. Place steering arm in position on back of steering knuckle and insert two bolts through backing plate, steering knuckle and steering arm. Install lock nuts and tighten 45-55 ft. lbs.
5. Torque brake anchor pin to 90-125 ft. lbs.
6. Install brake shoes, brake shoe hold-down clips and return springs.
7. Install wheel hub, brake drum, wheel and tire assembly over spindle.
8. Insert outer wheel bearing race and roller assembly, washer and nut. Adjust front wheel bearing as shown under Maintenance and Adjustments in this section. Install new cotter pin, dust cap and hub cap.
9. Lower vehicle, recheck and readjust wheel alignment where necessary.

SPHERICAL JOINTS

New lower control arm spherical joints are used in the 1964 Chevrolet suspension system but the inspection method remains as recommended in the 1961 Passenger Car Shop Manual except that the difference in the measurements should be no more than $\frac{1}{16}''$ (.0625).

WHEELS AND TIRES

All 1964 Passenger Car models carry disc wheels and 4-ply rating tubeless tires of the same design and operation as used in 1961.

Tire usage on the various 1964 models is as follows:

Regular Production except Station Wagons and Convertibles	7.00-14
Convertible	7.50-14
Station Wagons	8.00-14
All 327 Engine equipped vehicles except Station Wagons	7.50-14
All 409 Engine equipped vehicles	8.00-14

The five-stud wheels pilot on machined pilot diameters on the wheel hubs and axle shafts, instead of the stud bolt circle as in 1961. All service operations are the same as outlined in the 1961 Passenger Car Shop Manual, Section 3-19.

SPECIFICATIONS

Caster	$0° \pm \frac{1}{2}°$
Camber	Pos. $\frac{1}{2}° \pm \frac{1}{2}°$
Steering Axis Inclination	$7\frac{1}{4}° \pm \frac{1}{2}°$
Camber + Steering Axis Inclination	$7\frac{3}{4}° \pm \frac{1}{2}°$
Toe-in (Total)	$\frac{1}{16}''$ to $\frac{3}{16}''$
Riding Height (see page 3-2)	
With L-6 Engine	$4\frac{1}{2}'' \pm \frac{1}{2}''$
With V-8 Engine	$4\frac{7}{16}'' \pm \frac{5}{16}''$

SECTION 4

STEERING

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STANDARD STEERING

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GENERAL DESCRIPTION

The standard steering system incorporates extended interval lubrication features for the steering linkage, using new tie rod ends and a new pitman arm assembly. The hole for lubrication fittings in the replacement tie rod sockets, front suspension ball studs, steering connecting rods and various other parts will not be threaded. This will make it necessary to use the new self-threading lubrication fittings where applicable. Certain other parts have been changed from the 1961 design and others have been restudied in the area of service procedures.

The service procedures affected by these changes are outlined in the following pages. Those parts not covered herein may be assumed to be serviced as outlined in the 1961 Shop Manual.

MAINTENANCE AND ADJUSTMENTS

MAST JACKET LOWER BEARING ADJUSTMENT

1. With steering shaft spring stop clamp bolt loosened, position a 1/32 shim gauge between spring coils, (fig. 1).

NOTE: Shim gauge can be made by cutting a 13/16 opening out of a 1/32 front end caster camber shim, see insert of Figure 1.

2. Slide stop clamp up compressing spring to zero clearance. Secure by tightening clamp bolt.
3. Remove 1/32 shim gauge.

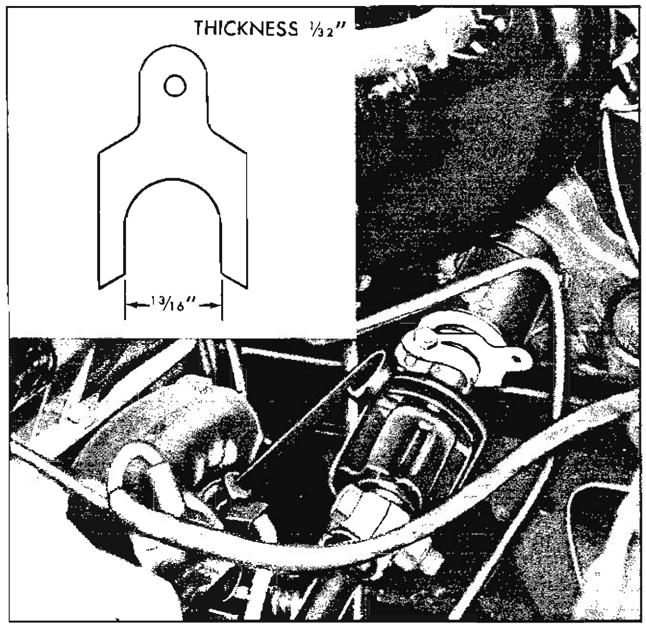

Fig. 1—Mast Jacket Lower Bearing Adjustment

SERVICE OPERATIONS

MAST JACKET

Removal

1. Disconnect transmission linkage from shift levers.
2. Remove the screws securing the rubber boot seal adjacent to the shifter levers on the firewall.
3. Loosen or remove the steering upper U joint-to-intermediate shaft clamp.
4. Remove the mast jacket screw and clamp assembly at the firewall inside the vehicle.
5. Remove the nuts from the reinforcement plate at the back of the instrument panel and remove the extension trim assembly.
6. Also remove the screws at the bottom of the cover where the mast jacket joins the instrument panel.
7. Disconnect directional signal wiring harness at chassis connector. (Also disconnect back up light wires and neutral safety switch wires at the switch if so equipped.)
8. Unfasten the welded-on clamp at the instrument panel; remove the screw and slowly bend the clamp to one side while lowering the mast jacket away from the dash. Remove seals at instrument panel opening.
9. Adjust front seat to the rear as far as possible.

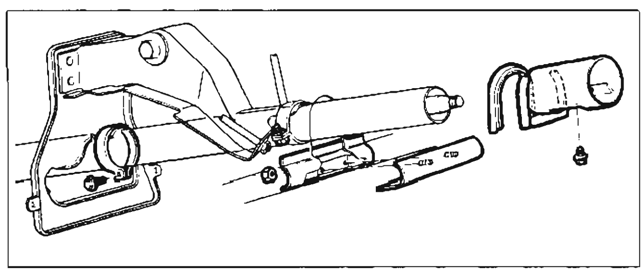
Fig. 2—Mast Jacket Attachment

10. Slowly remove mast jacket assembly by pulling it towards you while stopping to assist the rubber boot and actuating levers through the firewall.

Installation

Reverse removal procedure making certain that the short lip of the instrument panel opening seal is on the outside of the cover; also tighten the forward cover screw first.

UPPER MAST JACKET BEARING

Removal

1. Remove steering wheel as outlined in this section.
2. Remove directional signal handle by removing attaching screw.

3. Remove three directional signal switch attaching screws.
4. Guide directional wiring while pulling out directional switch assembly far enough to clear steering shaft.
5. Carefully pry out horn contact plate from directional signal switch.

   CAUTION: Contact plate will bend easily.

6. Pull upper mast jacket bearing from directional signal switch assembly.

Installation

1. Replace all component parts in reverse order of removal.

UPPER STEERING COUPLING

The design of the upper steering coupling has been changed to incorporate a single spring which is placed between the two bearing blocks, tending to spread them apart and automatically take up wear. Service may be performed as outlined on Page 4-4 of 1961 Passenger Car Shop Manual, except that references to wave washers no longer apply. Figures 3 and 4 show installed and relative positions of the new spring.

Note that if steering shaft pin is found to be worn or damaged, the entire steering upper shaft must be replaced. This may be accomplished as follows:

UPPER STEERING SHAFT

Removal

1. Remove mast jacket assembly as previously outlined.
2. Remove steering wheel as outlined in this section under "Steering Wheel Removal."
3. Withdraw steering shaft from forward end of mast jacket.

Installation (Fig. 5)

1. Install spring stop clamp and spring on steering shaft.

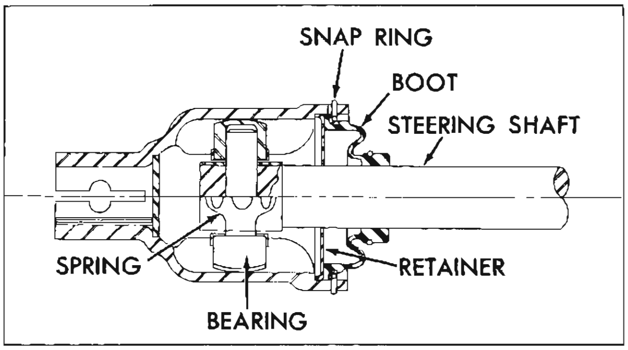

Fig. 3—Cross Section of Upper Steering Coupling

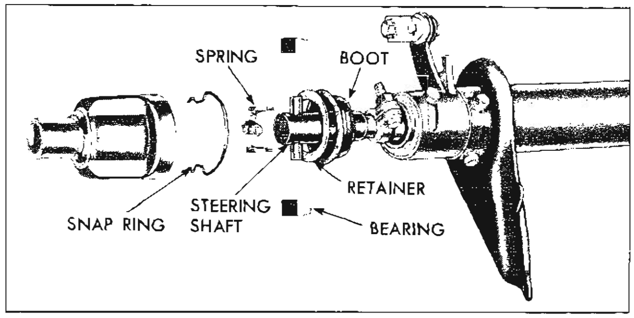

Fig. 4—Exploded View of Upper Steering Column

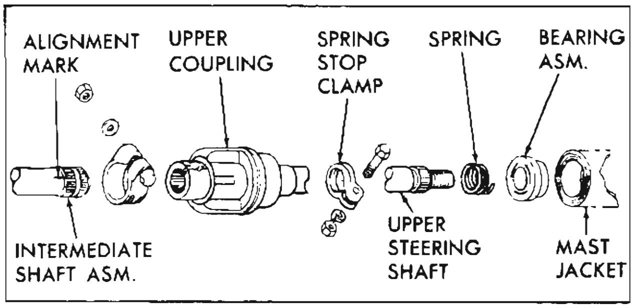

Fig. 5—Installation of Upper Steering Coupling

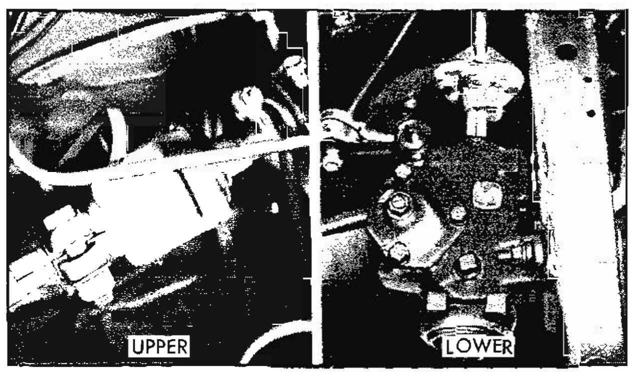

Fig. 6—Steering Shaft Alignment Points

2. Insert splined end of steering shaft in forward end of mast jacket and pass shaft up through jacket so that splined end protrudes from top.
3. Install steering wheel as outlined in this section.
4. Adjust lower bearing as outlined under "Maintenance and Adjustments" in this section.
5. Attach intermediate shaft, if removed, to upper coupling, aligning the marks as shown in Figure 5.

LOWER STEERING COUPLING AND INTERMEDIATE SHAFT ASSEMBLY

The lower coupling-shaft assembly now has the coupling parts riveted together in manufacture as shown in Figure 7. When service of the coupling parts is required, the rivets may be removed by drilling or cutting, the faulty parts replaced, and the coupling

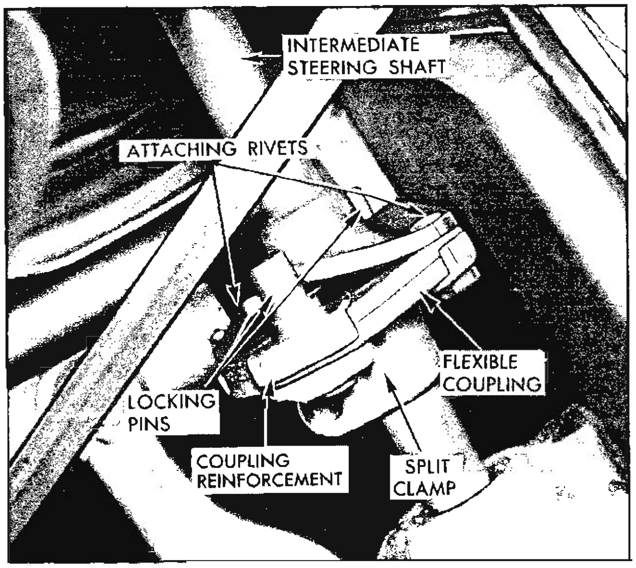

Fig. 7—Lower Steering Coupling

reassembled using the special bolts, nuts, lockwashers and reinforcements available as a repair unit through regular Chevrolet part outlets.

The intermediate shaft assembly may be removed and replaced as follows:

Removal

1. With the front wheels straight ahead, remove the upper coupling clamp bolt (fig. 5), then push the upper coupling toward the dash as required to free the upper end of the intermediate shaft.

   Further upward movement may be obtained if necessary by loosening steering shaft spring stop clamp (fig. 5).

2. Using a 7/16" - 12 point socket, remove and save the special clamp bolt securing the lower coupling to the steering gear wormshaft and remove the intermediate shaft and coupling.

Installation

1. Install new intermediate steering shaft and lower coupling assembly by connecting lower coupling to wormshaft with the cast pointer on the coupling aligned with the mark on the wormshaft (fig. 6). Secure coupling by installing special clamp bolt. Tighten clamp bolt to 20-25 ft. lbs. using a 7/16" - 12 point socket.

2. Complete installation by engaging upper end of intermediate shaft to the upper coupling. The split in the upper coupling clamp must be aligned to the mark on the upper end of the intermediate shaft to maintain steering wheel centering with steering gear hi-point. See Figure 6. Secure attachment by tightening the upper coupling clamp bolt, nut and washer to 20-25 ft. lbs. If spring stop clamp was loosened, adjust lower bearing as outlined under "Maintenance and Adjustments" in this section.

STEERING GEAR

Ball Nut Servicing

The ball guides used in the 1964 steering gear have been modified to ease insertion of the balls into the ball nut channels.

Figure 8 shows the 1964 ball guides installed. It will be noted that it is no longer necessary to pack each ball guide with petroleum jelly and load the balls before installation. It is now possible to place the guides in the ball nut first and load all balls through the holes in the guides. It is suggested that the worm, inside of ball nut and guides be coated with steering gear lube before assembly. Installation of the guide clamp closes the holes in the guides. Do not substitute 1961 type guide clamp for 1964 clamp with coined hole closures.

The service procedure for the ball nut remains the same as for 1961 except for references to the old type closed ball guides.

STEERING LINKAGE

Steering Arms

If, through collision or other damage, it becomes necessary to remove and replace either steering arm, proceed as follows:

Removal

1. Remove tie rod from steering arm as outlined under "Steering Linkage - Tie Rod - Removal" Operations 1 and 2, Page 4-20 of 1961 Passenger Car Shop Manual.
2. Remove front wheel, hub and brake drum as a unit by removing hub cap and dust cap, cotter pin from spindle nut and the spindle nut. Pull

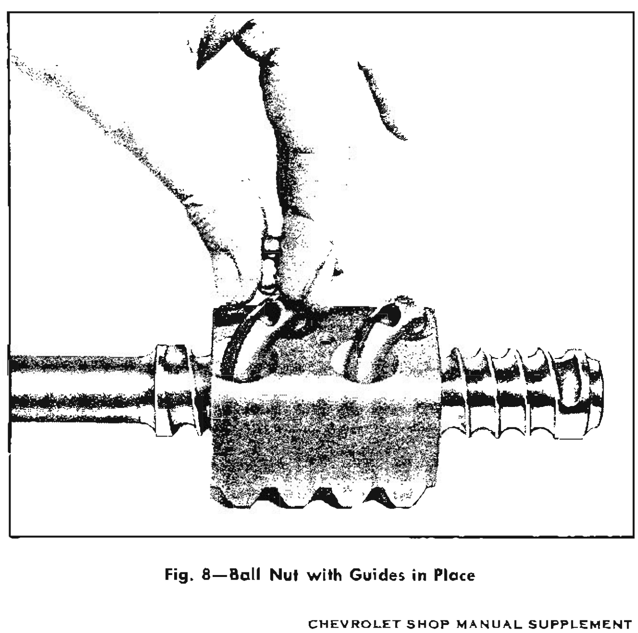

Fig. 8—Ball Nut with Guides in Place

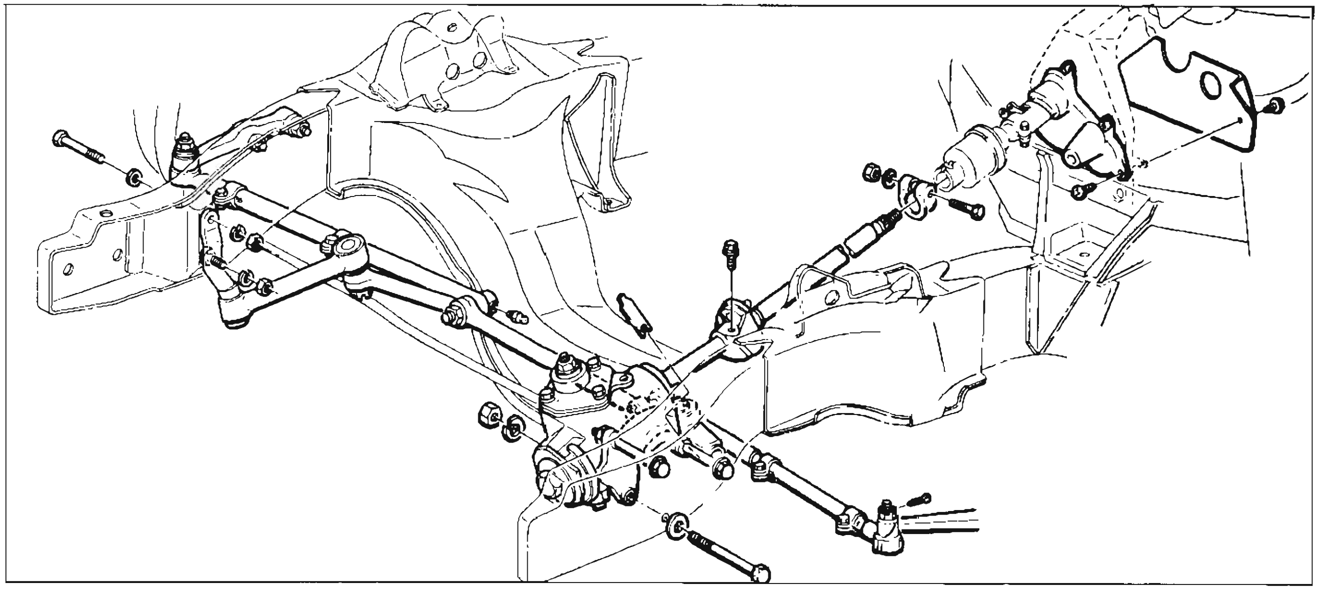

Fig. 9—Steering Gear and Linkage

assembly toward outside of vehicle. If removal is difficult, it may be necessary to back off brake adjustment to increase brake shoe-to-drum clearance; see Hydraulic Brake Adjustment, Section 6.

3. With wheel and drum assembly removed, steering arm retaining bolt heads are accessible and removal of steering arm from vehicle may be accomplished by removing retaining nuts.

Installation

1. Place steering arm in position on vehicle and install retaining bolts. Note that longer bolt is installed in forward hole.
2. Install nuts and torque to 40-50 ft. lbs. Use only the special locknut listed for this use in the Chevrolet Parts Catalog.
3. Pack wheel bearings using a high quality wheel bearing lubricant. Install bearings and wheel-hub-brake drum assembly removed previously.
4. Install keyed washer and spindle nut. Proceed as outlined on Page 3-3 of 1961 Passenger Car Shop Manual under "Front Wheel Bearings - Adjust."
5. Install tie rod ball stud in steering arm. Be sure that the dust cover is in place on ball stud.
6. Install castellated nut on ball stud, tighten securely and install cotter pin.
7. Following directions given on Page 3-5 of 1961 Passenger Car Shop Manual, check cornering wheel relationship and toe-in; correct as required.

Relay Rod, Pitman Arm and Idler Arm

Removal

1. Remove ends of tie rods from relay rod as described in 1961 Shop Manual, Pages 4-20.
2. Remove cotter pin from pitman or idler arm ball stud and remove nut.
3. To loosen relay rod from stud, tap on side of rod with a hammer while using a heavy hammer or similar tool as a backing. Pull down on relay rod to remove from stud.
4. Slide washer and seal off end of stud.
5. Remove idler arm and spacer from frame, or pitman arm from steering gear as outlined in 1961 Shop Manual.

Installation

1. Install idler arm and spacer to frame, or pitman arm to steering gear.
2. Install seal and washer and position relay rod on stud, then install and tighten nut to 45 ft. lbs. Advance nut just enough to align castellation with cotter pin hole and install pin.
3. Install inner ends of tie rods to relay rod.

1964 STEERING WHEEL

Regular Production

Removal

1. Disconnect directional signal switch harness from chassis wiring harness at connector.
2. Pull out horn button on 1100-1200 standard series models. On remaining models pull out center ornament from horn ring.
3. Remove three screws from the receiving cup or horn ring.
4. Remove the receiving cup or horn ring, belleville spring, bushing and on deluxe wheels the pivot ring.

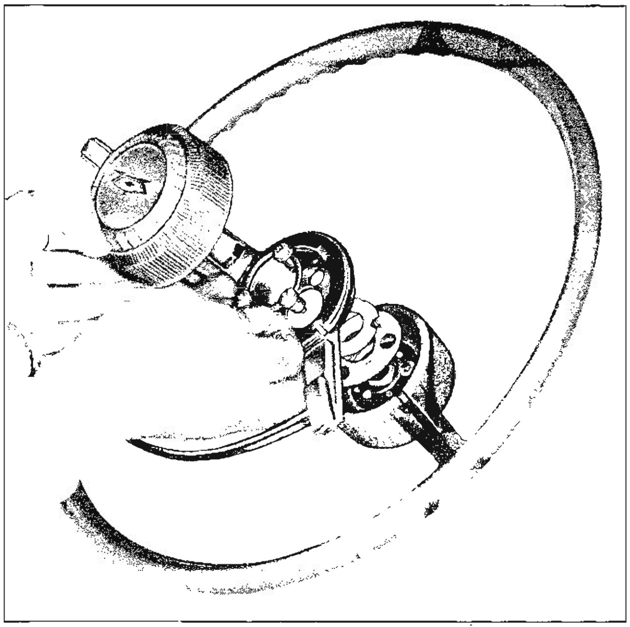

Fig. 10—Horn Ring Attachments (1300 thru 1800 Series)

5. Remove the steering wheel nut and washer.
6. Using Tool J-2927 install centering adapter on steering shaft, thread puller anchor screws into threaded holes provided in steering wheel. Turn center bolt of tool clockwise to remove steering wheel.

Installation

NOTE: Before installing steering wheel make certain to loosen spring stop clamp.

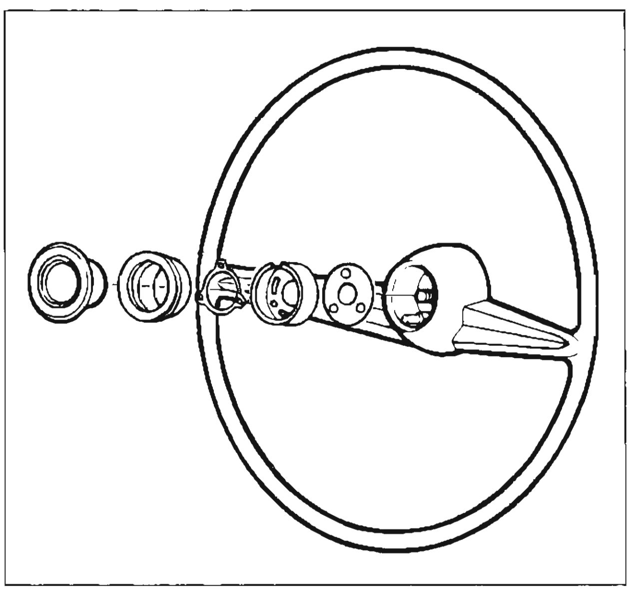

Fig. 11—Horn Button Attachments (1100 and 1200 Series)

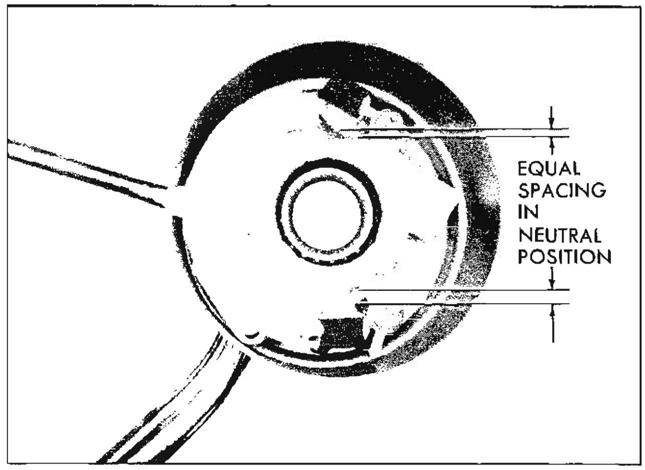

Fig. 12—Turn Signal Lever Position Before Installing Wheel

1. Replace all components in the reverse order of removal.

   NOTE: Direction signal control assembly must be in neutral position when assembling steering wheel to prevent damage to cancelling cam and control assembly (fig. 12).

2. Also align the steering wheel by placing the wheels in a straight ahead position, then measure the distance of each spoke to the horizontal centerline of the steering wheel. This measurement should be equal within 1⅛ inch (fig. 13).
3. Readjust the spring stop clamp as outlined in this section under "Maintenance and Adjustments."

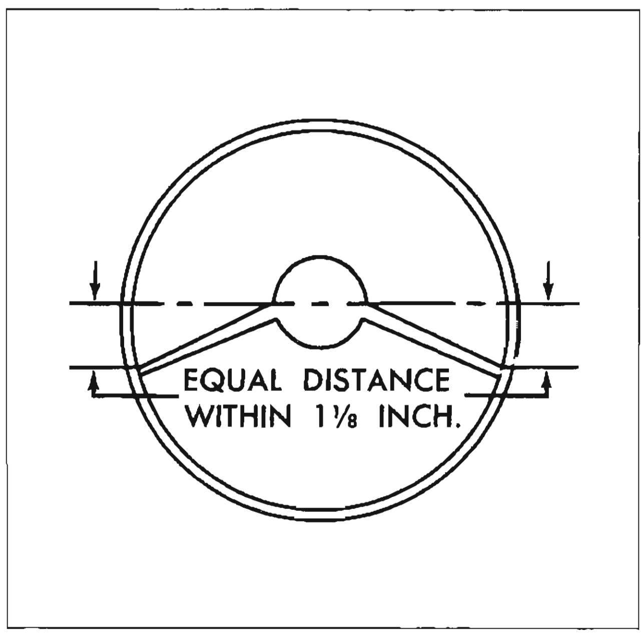

Fig. 13—Wheel Alignment

Simulated Wood Option (Fig. 14)

Removal

1. Disconnect direction signal switch harness from chassis wiring harness at connector.
2. Remove horn cap assembly by pulling up.
3. Remove steering wheel nut and washer.
4. Remove three contact assembly attaching screws and remove contact assembly.

   NOTE: Step 5 is not necessary for assembly removal.

5. Remove remaining six screws from steering wheel and remove wheel from hub assembly.
6. Using Tool J-2927 install centering adapter on steering shaft, thread puller anchor screws into threaded holes provided in hub assembly. Turn center bolt of tool clockwise to remove hub assembly.

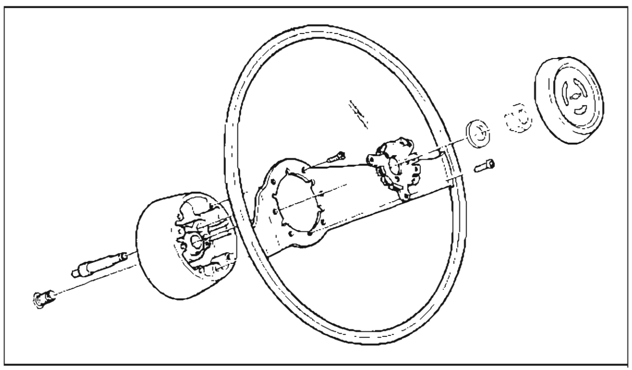

Fig. 14—Simulated Wood Steering Wheel and Attaching Parts

Installation

NOTE: Before installing steering wheel hub assembly make certain to loosen spring stop clamp.

1. Replace all components in the reverse order of removal.

   NOTE: Directional signal control assembly must be in neutral position when assembling steering wheel hub assembly to prevent damage to cancelling cam control assembly.

2. Align mark on steering wheel hub assembly with mark on steering shaft when assembling.
3. Readjust the spring stop clamp.

TILT WHEEL ASSEMBLY AND MAST JACKET

The service operations which follow mast jacket removal will be covered as bench operations. However, with the exception of the automatic transmission shift tube removal, all operations may be performed as well with the mast jacket on the vehicle.

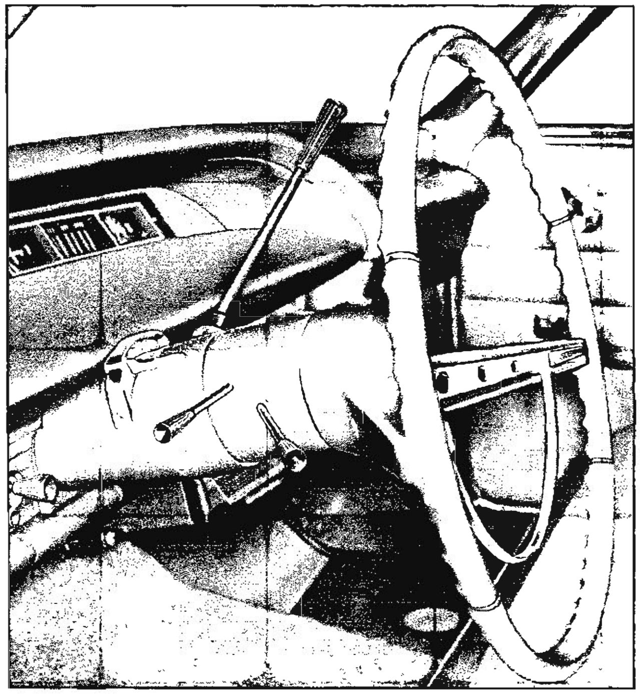

Fig. 15—Tilt Wheel Assembly in Vehicle

Removal (Fig. 18)

In the Engine Compartment:

1. Disconnect the transmission linkage from shift lever (powerglide only).
2. Remove the screws attaching the seal assembly to the firewall.
3. Remove the two lower flange coupling attaching bolts and nuts.

Within the Vehicle:

4. Remove the cover assembly from the firewall.
5. Remove the mast jacket clamp assembly at firewall.

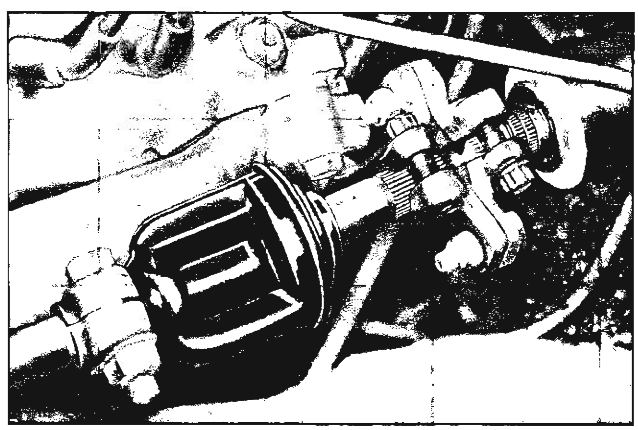

Fig. 16—Steering Shaft (Tilt Wheel Only)

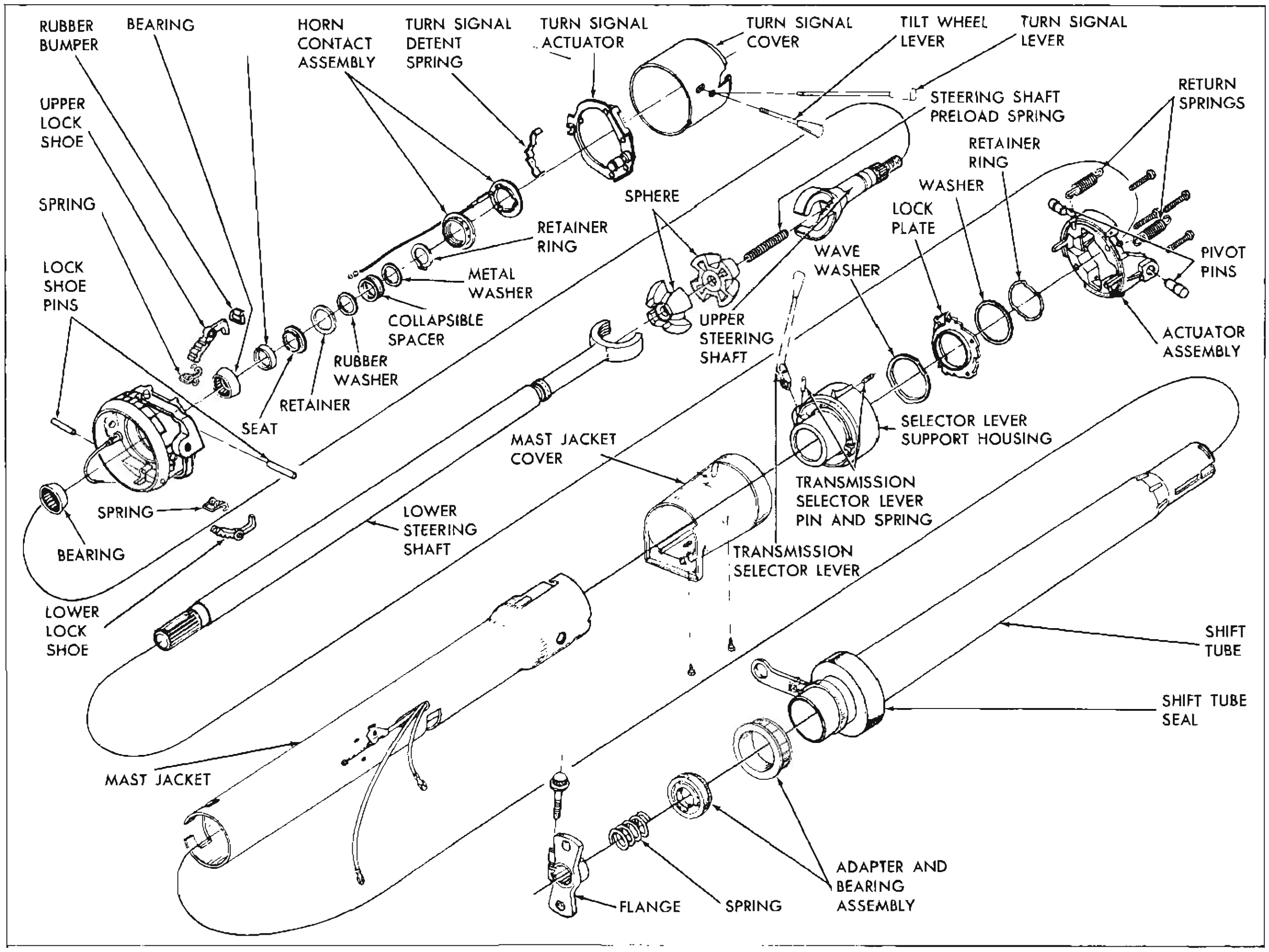

Fig. 17—Exploded View of Tilt Wheel Steering Column (as used with Powerglide)

6. Remove the nuts from the reinforcement plate behind the instrument panel flange and remove the extension trim assembly and the reinforcement plate.

7. Disconnect directional signal wiring at the switch, and horn wire at the chassis connector, (on Powerglide Models with steering column shift only) also disconnect neutral safety, back up light, and shift indicator light wires.

8. Remove the nut and bolt from the welded-on clamp at the instrument panel and bend the clamp carefully down and to one side and remove clip. Lower the mast jacket away from the instrument panel and remove the seals at the instrument panel opening.

9. Adjust the front seat as far rearward as it will go, then slowly pull the mast jacket assembly rearward turning as necessary to assist the rubber boot and, on powerglide models, the shift lever through the firewall.

Disassembly

1. Remove the turn signal switch, neutral safety switch (on powerglide equipped with steering column shift vehicles), and back up lamp switch (if present) from the mast jacket.

2. Remove the steering wheel (if not previously removed) using Tool J-2927.

3. With the column in the centered position, remove the turn signal lever and the tilt lever.

4. Remove the turn signal cover using Tool J-21486 with slide hammer J-6585 and puller bolt J-9539. Tap cover off carefully (fig. 19).

5. Pry out the horn contact assembly from the turn signal actuator housing and remove the contact and wire assembly.

6. Remove the snap ring, metal washer, collapsible spacer, rubber washer, retainer, seat, inner race and steering shaft upper bearing (fig. 20).

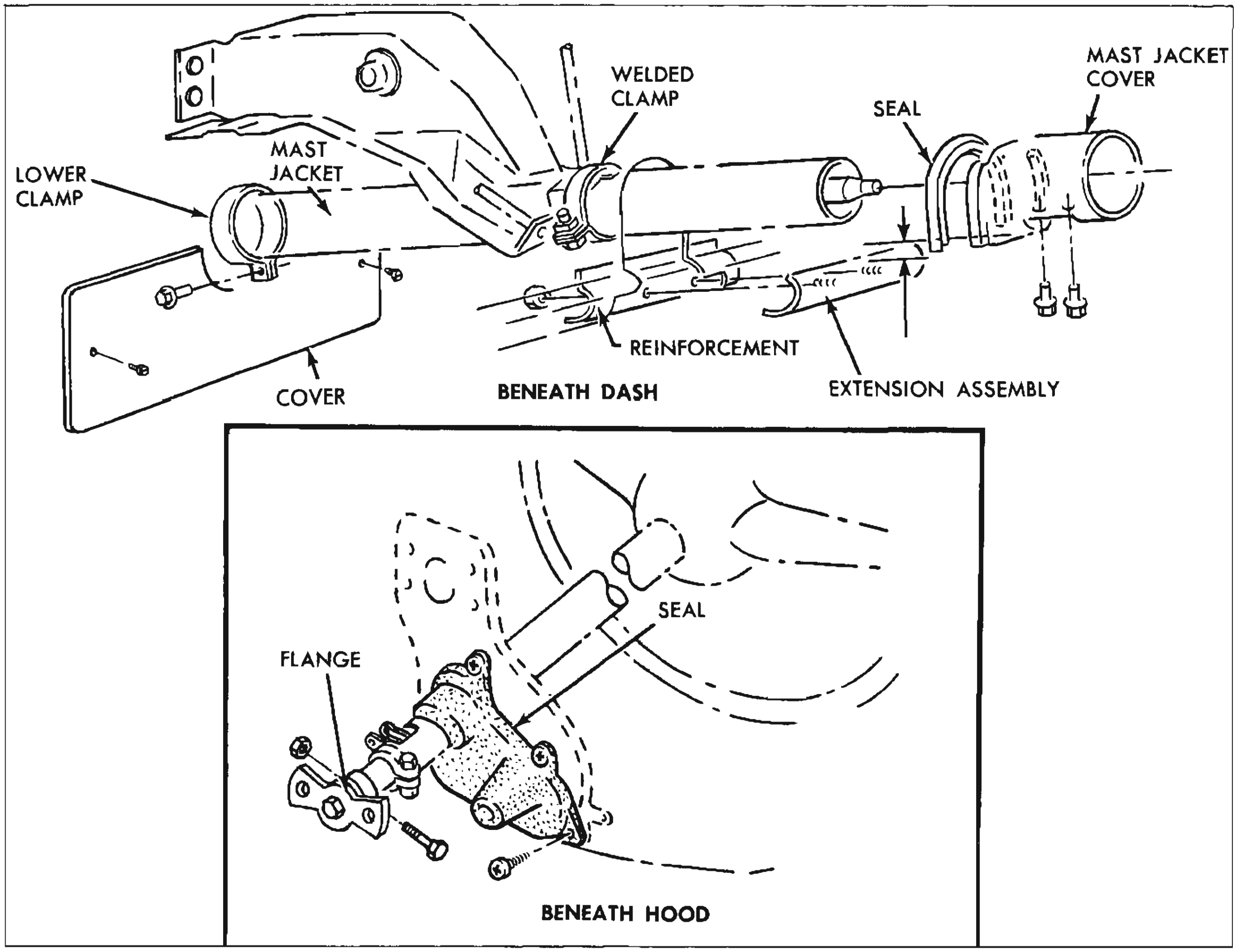

Fig. 18—Mast Jacket Removal

NOTE: Discard the collapsible spacer. Upon reassembly, a new spacer must be used.

7. Remove the turn signal actuator yoke and detent spring and the turn signal cable clamp attaching screw. Disconnect the cable from the turn signal bell crank.

8. Install the tilt release lever and move it so the tilt mechanism swings to its fully "up" position.

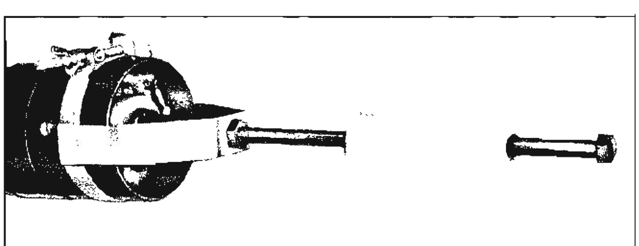

Fig. 19—Removing the Turn Signal Cover

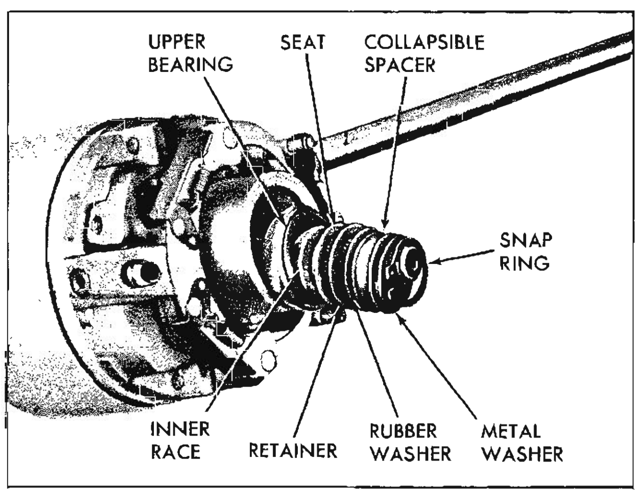

Fig. 20—Upper Bearing Attaching Parts

CAUTION: The unit will "snap" to the up position. Keep fingers clear.

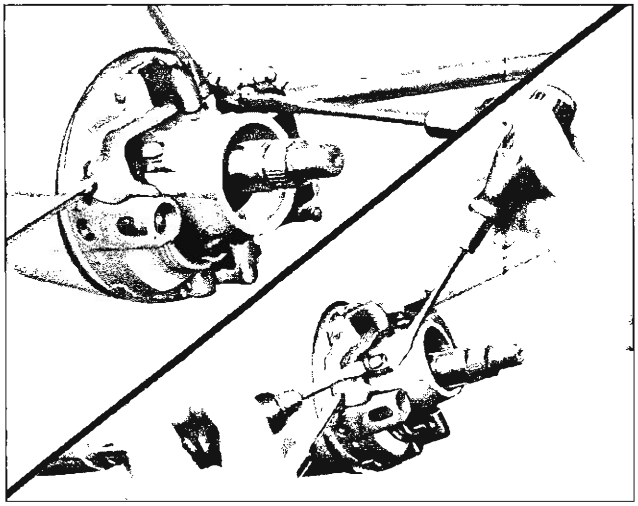

Fig. 21—Unseating Return Springs

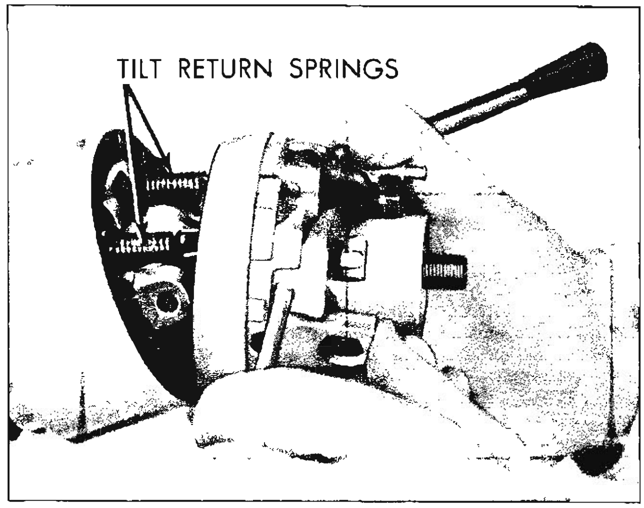

Fig. 23—Removing the Actuator Assembly

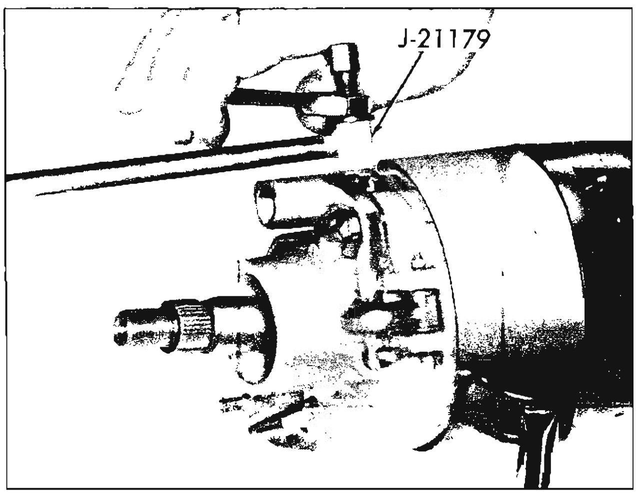

Fig. 22—Removal of Pivot Pins

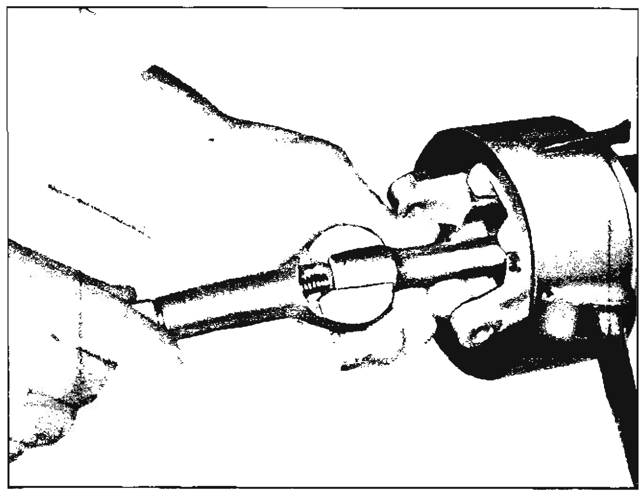

Fig. 24—Removing the Steering Shaft

9. Using a screwdriver, unseat the upper ends of the tilt return springs (fig. 21).
10. Using Tool J-21179, remove the two pivot pins as follows: Install the nut and washer on the stud as shown and place the stud into the tool so it extends through the chamfered end of the hole in the tool. Position the tool between the locating bosses on the support assembly and thread the stud into the pivot pin. Hold the stud and turn the nut to remove the pin. Remove the second pin in the same manner (fig. 22).
11. Lift the tilt lever to disengage the lock shoes from the support locking pins and remove the actuator assembly, leaving the turn signal cable in the mast jacket (fig. 23).

NOTE: During this operation it will be necessary to carefully guide the turn signal cable clamp down through the actuator assembly.

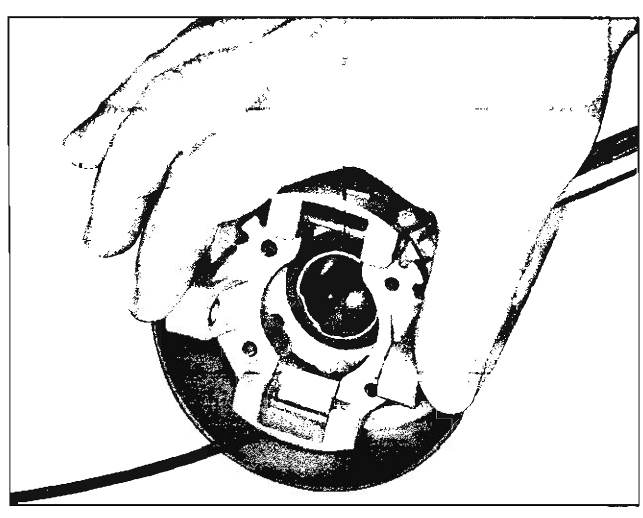

Fig. 25—Actuator Support

12. Remove the tilt springs from the support.
13. Carefully remove the lower bearing from the upper steering shaft taking care that bearing does not catch on snap ring groove.
14. Remove the flange attaching bolt at the lower end of the steering shaft and remove flange and spring.
15. Remove the steering shaft assembly upward through the mast jacket (fig. 24).
16. Remove the four actuator support screws and the support from the mast jacket (fig. 25).
17. Remove the turn signal switch control cable after first removing the two mast jacket cover attaching bolts.
18. From the top of the shift tube, remove the shift tube retainer ring and washer (fig. 26).
19. From the lower end of the mast jacket, remove the shift tube bearing retainer (fig. 26).
20. Remove the shift tube downward through the column as follows: support the mast jacket on the edge of a wood block and drive against the inner end of the lower shift lever with a hammer and metal rod. Perform this operation carefully so that the shift lever is not bent or distorted (fig. 27).
21. Remove the lock plate, wave washer and selector lever support housing from the upper end of the mast jacket (fig. 28).
22. If desired, the selector pivot pin, lever and spring may be removed from the selector lever support housing.
23. Remove the mast jacket cover.

Actuator Housing

Disassembly

1. Back up the lock shoe pivot pin boss in the actuator housing, with a suitable support, inboard of the pivot pins.

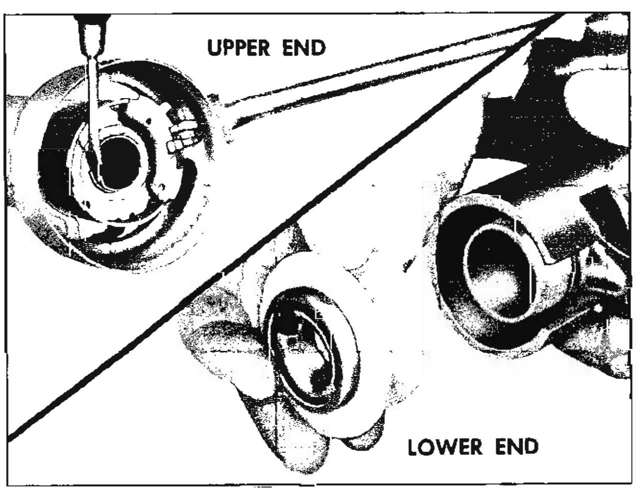

Fig. 26—Shift Tube Retainer Ring, Washer and Lower Bushing

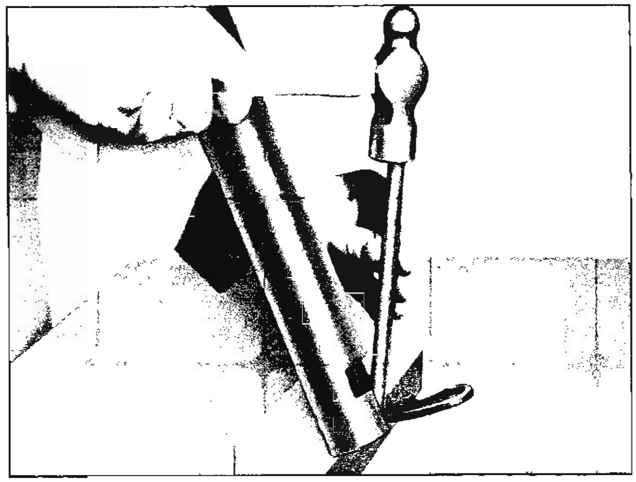

Fig. 27—Removing the Shift Tube

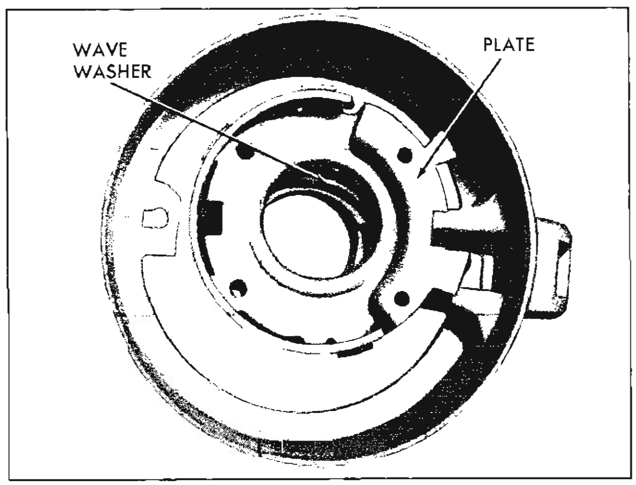

Fig. 28—Lock Plate, Wave Washer and Shift Lever Support Housing

2. Drive the upper and lower lock shoe pivot pins from the actuator housing with an 1/8" straight punch.
3. Remove the lock shoes and springs by pushing the upper end of the lock shoe through the openings in the actuator housing (fig. 29).

   NOTE: The upper shoe may be identified by the rubber bumper installed on it and by its three notches. There are four notches in the lower shoe.

The actuator assembly should be disassembled no further. The shoe release actuator and the turn signal bellcrank must be serviced as part of the actuator assembly.

Assembly

1. To reassemble the lock shoes and springs, install the springs on the upper end of the lock shoes, then install shoes in the actuator assembly and retain with the dowel pins.

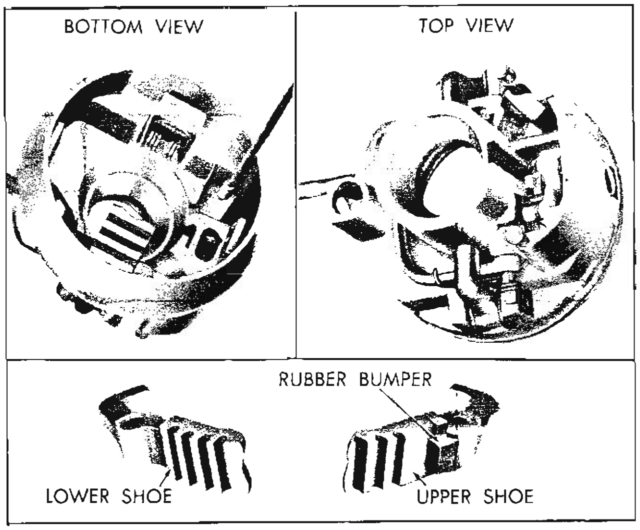

Fig. 29—Actuator Housing and Lock Shoes

NOTE: The upper lock shoe has three notches and a rubber bumper, whereas, the lower shoe has four notches (fig. 29).

Steering Shaft

Disassembly

1. Clamp the steering shaft in brass jawed vise.
2. Move the upper shaft fully from center line of lower shaft.
3. Using two narrow bladed screwdrivers through the coils of the spring, compress spring enough to remove the upper end from the upper seat (fig. 30).

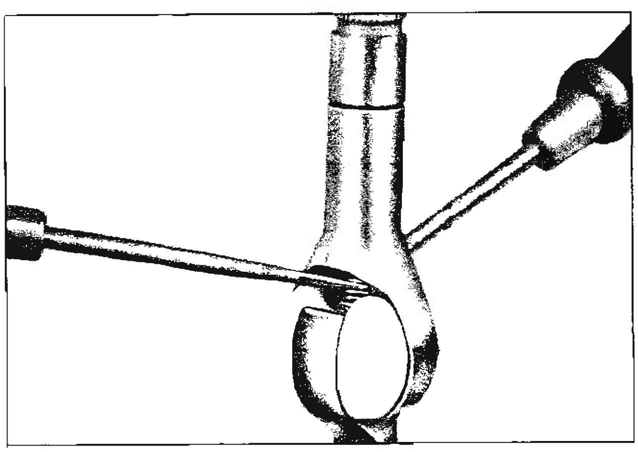

Fig. 30—Removing Spherical Joint Spring

4. Move the upper shaft to the opposite side and allow the spring to snap out of the opening between the shaft and the sphere. Remove the spring.
5. Turn the upper shaft 90° from the center line of the lower shaft and remove the upper shaft and sphere from the lower shaft.
6. Remove the sphere from the upper shaft by rotating so flats on sphere align with socket.

Assembly

1. Apply front wheel bearing lube to the centering spheres and the steering shaft sockets and place the spheres in the upper shaft socket.
2. Turn the spheres so the lower shaft may be installed over the grooves.

NOTE: The locating mark on the end of the upper shaft should be on the same side as the flat on the lower shaft.

3. Insert the joint preload spring through the spheres into the lower shaft. Then, using the upper shaft to hold the spring in place, carefully feed the spring into the upper shaft joint with a narrow bladed screwdriver (fig. 31).

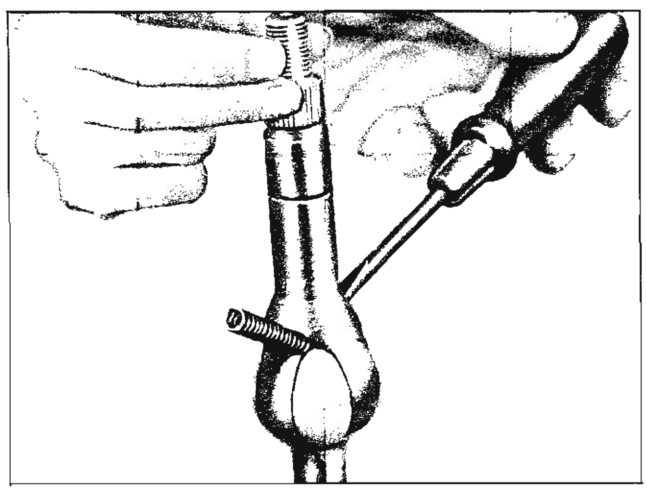

Fig. 31—Installing Spherical Joint Spring

Assembly

When assembling the steering column apply a thin coating of bearing lube to all friction parts.

1. If removed, install the selector lever spring, lever and retaining pin.
2. Loosely install mast jacket cover and slide the lower seal assembly over the lower end of the mast jacket.
3. Install the selector lever support housing on the mast jacket, place the wave washer over the mast jacket and slide the lock plate into position so the tang on the locking plate engages the slot in the mast jacket (fig. 32).

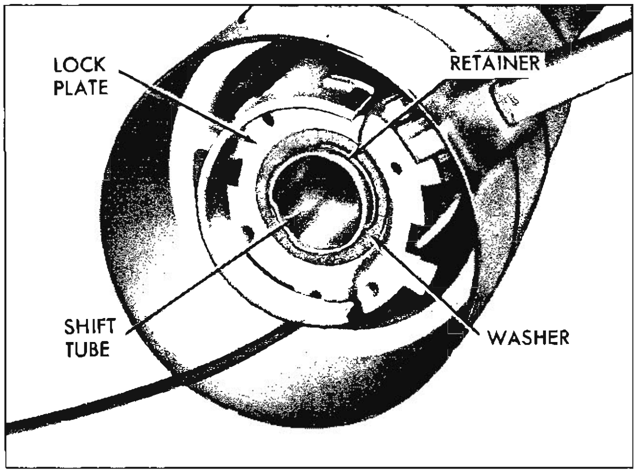

Fig. 32—Lock Plate Installed

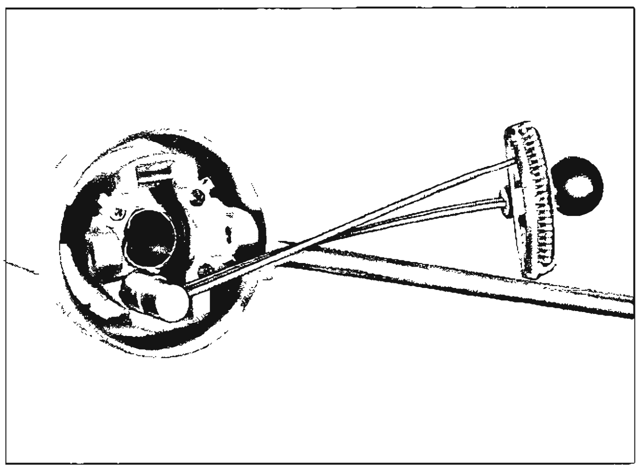

Fig. 33—Installing Actuator Support

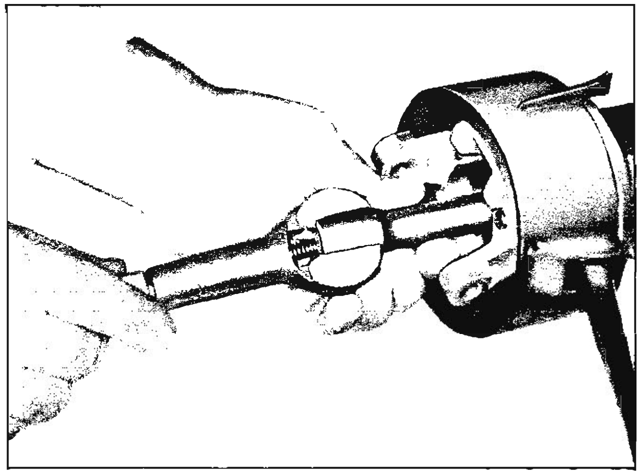

Fig. 34—Steering Shaft Installation

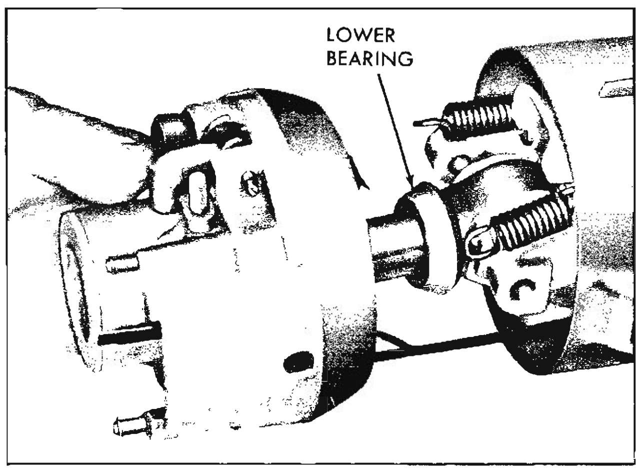

Fig. 35—Installing Actuator

4. Slide the shift tube assembly, felt seal in place, into the mast jacket from the lower end. With the shift tube properly lined up with the keyway in the support housing, tap shift tube into place. Install washer and retainer.

5. Install the actuator support on the upper end of the mast jacket. Torque attaching screws, larger (left hand) screws first, to 30-40 in. lbs. (fig. 33).

6. Install the steering shaft assembly into the upper end of the mast jacket (fig. 34).

7. At the lower end of the mast jacket install the lower bearing assembly carefully, taking care not to damage the bearing as it passes over the splines on the shaft.

8. Install the lower bearing on the upper shaft (fig. 35).

9. Place the horn contact assembly on the actuator assembly and insert wires through the actuator and into mast jacket along with the turn signal control cable.

10. Install two return springs in the support.

11. Install the tilt lever and, holding the lever back to prevent lock shoes from engaging the locking pins, install actuator carefully over shaft, then release lever (fig. 35).

12. Align the actuator assembly pivot pin holes with the pin holes in the support assembly and install the pivot pins flush with the surface of the actuator assembly.

13. With the tilt wheel mechanism tilted fully "up," install the upper ends of the return springs on the actuator using Tool J-21181 and then set tilt wheel mechanism in center position (fig. 36).

NOTE: If the return springs were distorted during their removal it is best to discard them and reinstall new springs.

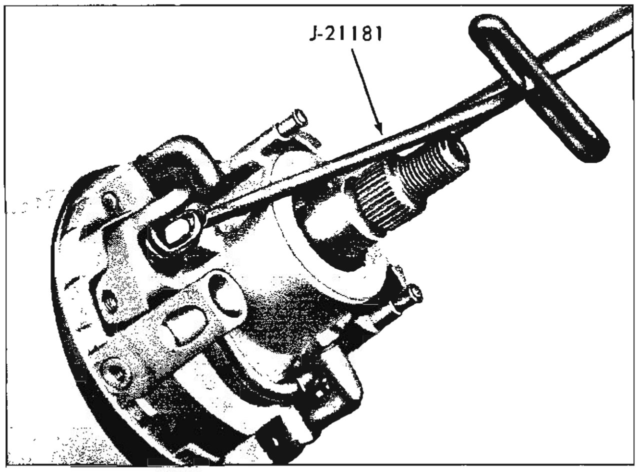

Fig. 36—Installing Return Springs

14. Pry out the horn contact assembly and allow it to hang free. Then install the steering shaft upper bearing, inner race, seat, retainer, rubber washer, a new collapsible spacer, washer, and, using snap ring pliers J-4880, install a new retainer ring over the steering shaft (fig. 37).

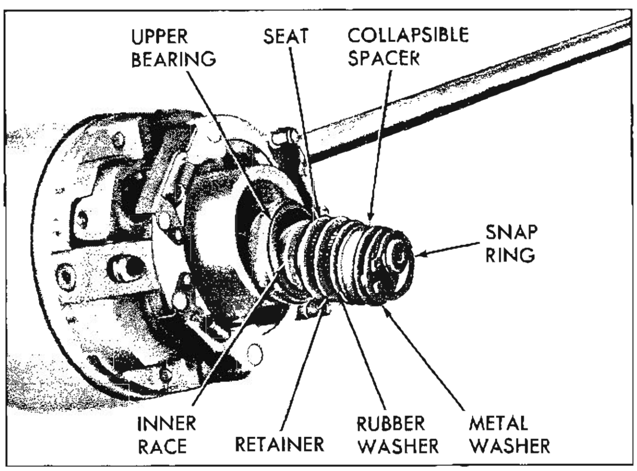

Fig. 37—Bearing Preload Parts

15. Place Tool J-21179 over the shaft and, using the steering wheel nut, turn down until the notch in the tool is in line with the upper edge of the retainer ring groove in the shaft. Remove the nut and Tool J-21179 and tap the snap ring into the groove (fig. 38).

16. Place mast jacket cover in position and secure with 2 attaching screws.

17. Install spring and flange on lower end of steering shaft and secure with attaching bolt. Before tightening bolt, adjust lower flange to ½ inch gap between bottom of bearing and upper edge of flange (fig. 39). Lock flange attaching bolt and torque to 25-35 ft. lbs.

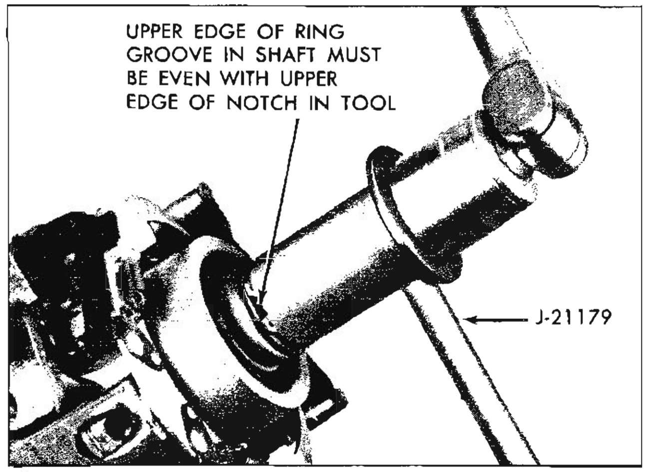

Fig. 38—Preloading Bearing

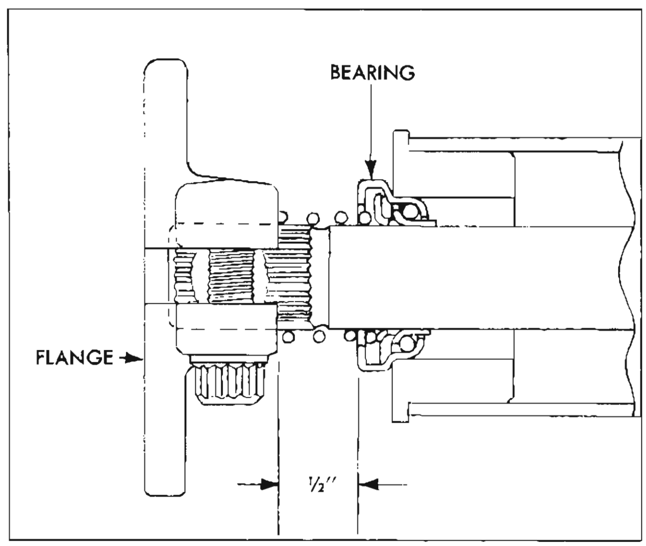

Fig. 39—Location of Lower Flange

18. Check the torque of the steering shaft in each tilt wheel position. Torque should be from 35-45 inch ounces. If the torque is too high repeat step 15, being careful to properly compress the spacer. If torque is too low the spacer has been over-compressed and must be replaced (fig. 40).

NOTE: When checking torque, the steering shaft must not be connected to the steering gear.

19. Seat the horn contact assembly in the actuator. Coat the contact ring with lubriplate or equivalent.

20. Install the turn signal yoke assembly and detent spring. Be sure the cable is attached to the bell crank (with the coil end toward bell crank) and that the other end of the bell crank is properly engaged in the yoke assembly bracket.

21. Remove the tilt release lever and, after aligning

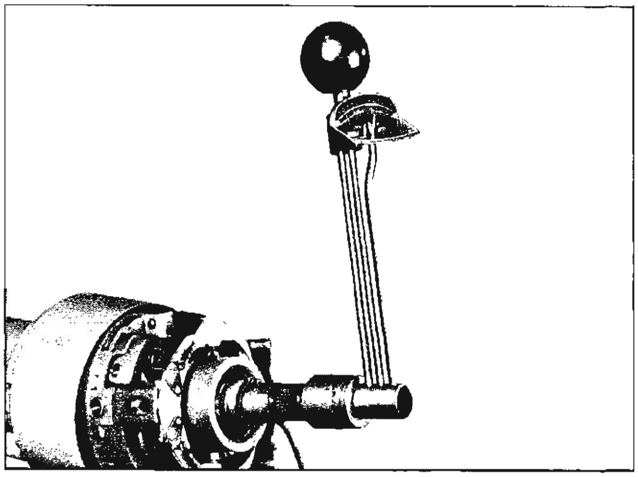

Fig. 40—Checking Steering Shaft Torque

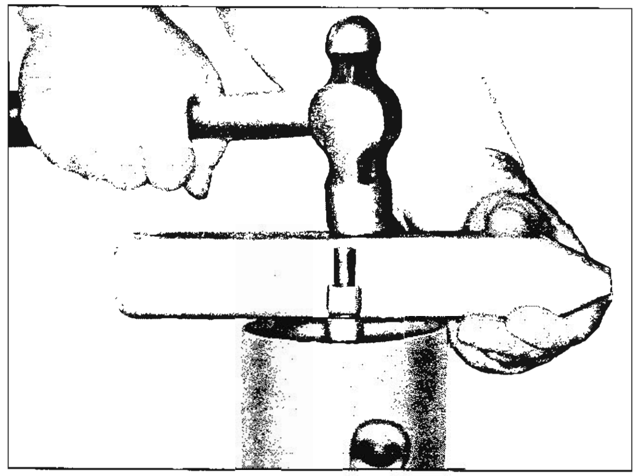

Fig. 41—Installing Turn Signal Cover

the turn signal cover properly, tap it into place using a block of wood (fig. 41).

22. Install the turn signal switch, the neutral safety switch and the backup light switch if present.
23. Install the turn signal lever and the tilt levers.

Installation

To install this unit reverse the removal procedure.

NOTE: When installing the lower flange attaching bolts, be sure to use special washer insert lock nuts and torque to 14-22 ft. lbs.

Troubles and Remedies

LOCATION	CAUSE	REMEDY
Steering wheel loose—center position	a. Flange on spring seat is rolled over and washer retainer is cupped. b. Excessive clearance between holes in support and pivot pin diameter. c. Collapsible spacer retainer ring is unseated.	a. Install new seat, retainer and collapsible spacer. b. Replace support and pivot pins. c. Replace collapsible spacer and retainer ring.
Steering wheel loose—every other position	a. If wheel is loose at the 5° and 15° positions either above or below center, the lower shoe is faulty. Looseness at 10°, either above or below center, indicates a faulty upper shoe.	a. Install new shoe and pivot pin.
Wheel fails to return freely to top tilt position	a. Pivot pins bound up. b. Tilt springs defective.	a. Remove pins and check for burrs. Install new pins. b. Replace tilt springs.
Noise when steering wheel returns to top tilt position	a. Tilt wheel stop on upper shoe has failed.	a. Install upper shoe assembly.
Poor returnability of steering wheel	a. Deformed felt mast jacket seal. b. Too much bearing preload.	a. Install new seal. b. Correctly adjust collapsible spacer.
Noise in gearshift mechanism	a. Wave washer damaged or omitted. b. Selector lever support housing driven too far on shift tube.	a. Install new wave washer. b. Install new shift tube.
Noise in steering shaft	a. Column improperly aligned in car. b. Flange not tightened on shaft.	a. Relocate top pan cover on floor board, aligning steering shaft properly. b. Torque flange to 25-35 ft. lbs.
Dust entering through column	a. Felt seal deformed or out of position.	a. Install new seal.

POWER STEERING

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GENERAL DESCRIPTION

The 1964 power steering incorporates few changes to the proven design used in 1961. Those parts which have changed in design so as to affect service procedures are covered here in the order used in the 1961 Passenger Car Shop Manual. Also outlined are several procedures which have changed through restudy.

Included in this section is a new hydraulic system diagnosis, power steering pump service information and detailed hydraulic hose installation instructions.

Components not covered may be considered unchanged for 1964 and will be serviced as outlined in the 1961 Passenger Car Shop Manual.

MAINTENANCE AND ADJUSTMENTS

Fig. 42—Checking Power Steering Pump Belt Tension

HYDRAULIC SYSTEM DIAGNOSIS

The following procedure outlines methods to identify and isolate power steering hydraulic circuit difficulties. This test is divided into two parts. Test number one provides means of determining whether power steering system hydraulic parts (pump and/or control valve and hydraulic lines) are actually faulty. If test number one results in readings indicating faulty hydraulic operation, test number two will identify the faulty part. Before performing hydraulic circuit test, carefully check belt tension and condition of driving pulley. Strand tension of belt should be 75 lbs. on new belts and 70 lbs. on old belts, as indicated by Tool J-7316 (fig. 42).

Test Number One-Oil Circuit Open

Engine must be at normal operating temperature. Inflate front tires to correct pressure. All tests are made with engine idling, so adjust engine idle speed to correct specifications listed in Engine, Section ● and proceed as follows.

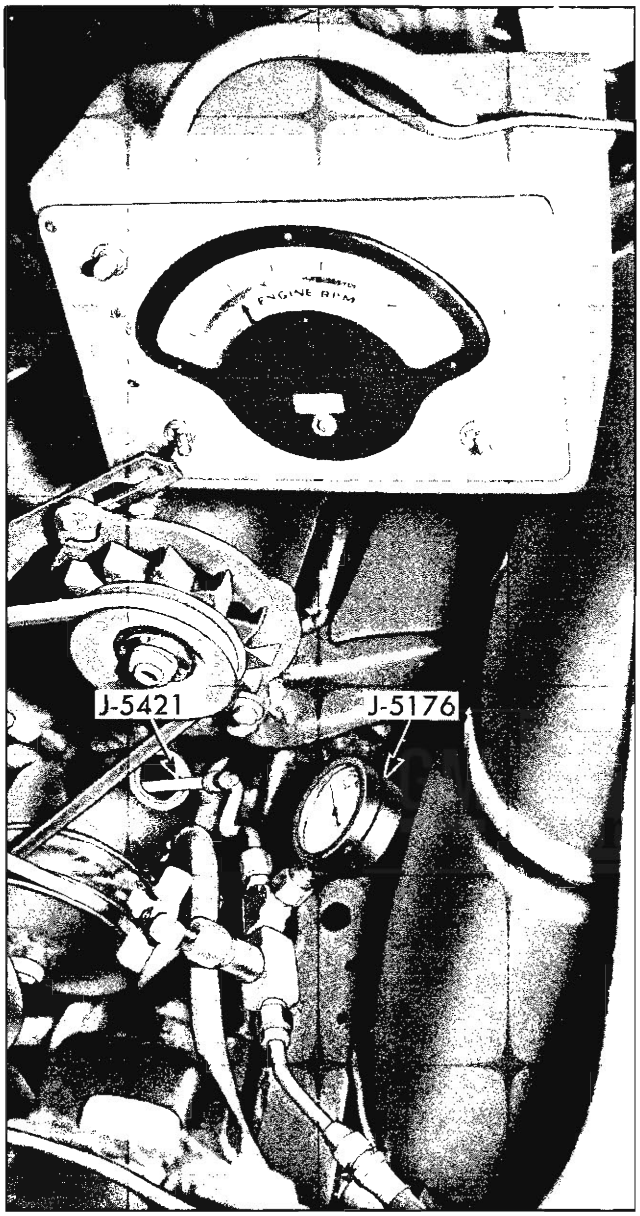

Fig. 43—Power Steering Diagnosis

A. With engine not running, disconnect flexible pressure line from steel pressure line of pump and install Tool J-5176 as shown in Figure 43. Gauge must be between shut-off valve and pump. Shut-off valve must be open.

B. Remove filler cap from pump reservoir and check fluid level. Fill pump reservoir to full mark on dipstick. Start engine and, holding steering wheel against stop, check connections at Tool J-5176 for leakage. Insert thermometer (Tool J-5421) in reservoir filler opening. Move steering wheel from stop to stop several times until thermometer indicates that hydraulic fluid in reservoir has reached temperature of 150° to 170°.

CAUTION: To prevent scrubbing flat spots on tires, do not turn steering wheel more than five times without rolling car to change tire-to-floor contact area.

C. Hold steering wheel against a stop momentarily and read pressure gauge. If the maximum pressure is below 800 psi, a faulty hydraulic circuit is indicated. To determine which part is faulty, proceed with test number two.

Test Number Two-Oil Circuit Closed

A. Slowly turn shut-off valve on J-5176 to closed position and read pressure indicated on gauge. If indicated pressure is less than 850 psi, pump output is below requirements and pump may be considered faulty. If pressure indicated is 850 psi or more, it may be safely assumed that the control valve is not functioning properly.

NOTE: If pump proves faulty in test number two, test should be repeated after pump is repaired and installed in vehicle. This will provide a means of checking the repairs made to the pump and the condition of the control valve, which may also be faulty.

SERVICE OPERATIONS

POWER STEERING PUMP

The pump pressure port fitting and the substitution of studs for the cap screws are now used to secure the reservoir to the cast housing. Figures 44 and 45 show the new parts in installed and relative positions. The studs retaining the reservoir allow adjustments to be made and removal of the pump from the vehicle without disturbing reservoir sealing.

Disassembly and Assembly

The pump is disassembled and assembled in the same manner as in 1961 except that all references in the 1961 manual to reservoir retaining bolts no longer apply. Assembly of the reservoir on the housing, the studs should be torqued 25-40 ft. lbs.

Installation on Vehicle

The pumps are installed and removed in much the

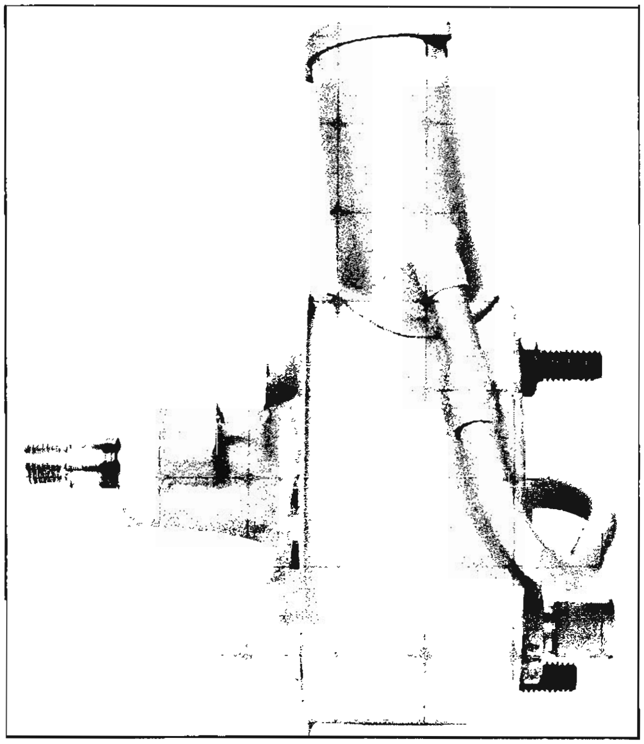

Fig. 44—Power Steering Pump Assembled—(V-8 Shown—Typical)

same manner as outlined in the 1961 Passenger Car Shop Manual. Figure 46 shows the mounting for 6 cylinder engines. The pump mounting on V-8 engines is shown in Figure 47.

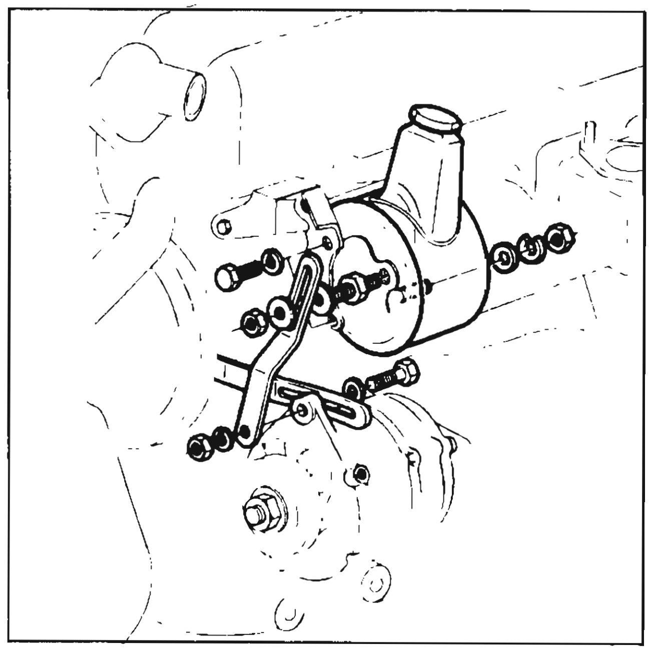

Fig. 46—Power Steering Pump Mounting—6 Cylinder Engine

POWER STEERING HOSES

It is important that the power steering hoses be correctly installed. Hoses installed out of position may be subjected to chafing or other abuse during sharp turns. Always make hose installations with front wheels in straight ahead position. Do not impart any unnecessary twist to hoses during installation. Remove and replace hoses as follows:

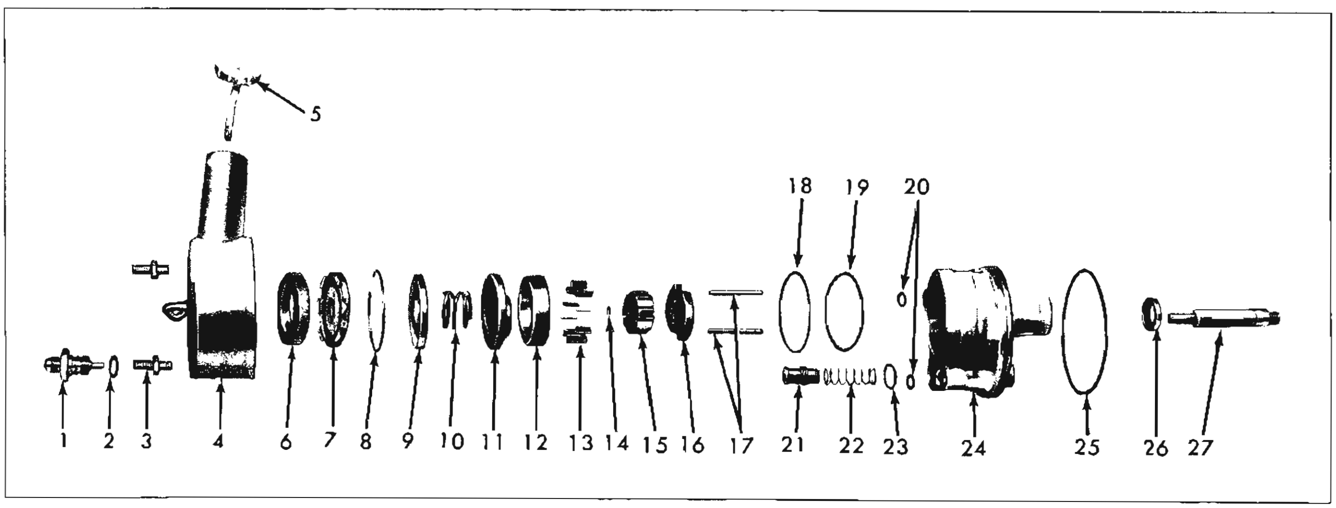

Fig. 45—Power Steering Pump Components

1. Union
2. Seal
3. Mounting Bolts
4. Reservoir
5. Dip Stick and Cover
6. Filter
7. Cage Assembly
8. End Plate Retaining Ring
9. End Plate
10. Spring
11. Pressure Plate
12. Pump Ring
13. Vanes
14. Drive Shaft Retaining Ring
15. Rotor
16. Thrust Plate
17. Dowel Pins
18. End Plate "O" Ring
19. Pressure Plate "O" Ring
20. Mounting Bolt "O" Ring Seals
21. Flow Control Valve
22. Flow Control Valve Spring
23. Flow Control Valve "O" Ring Seal
24. Pump Housing
25. Reservoir "O" Ring Seal
26. Shaft Seal
27. Shaft

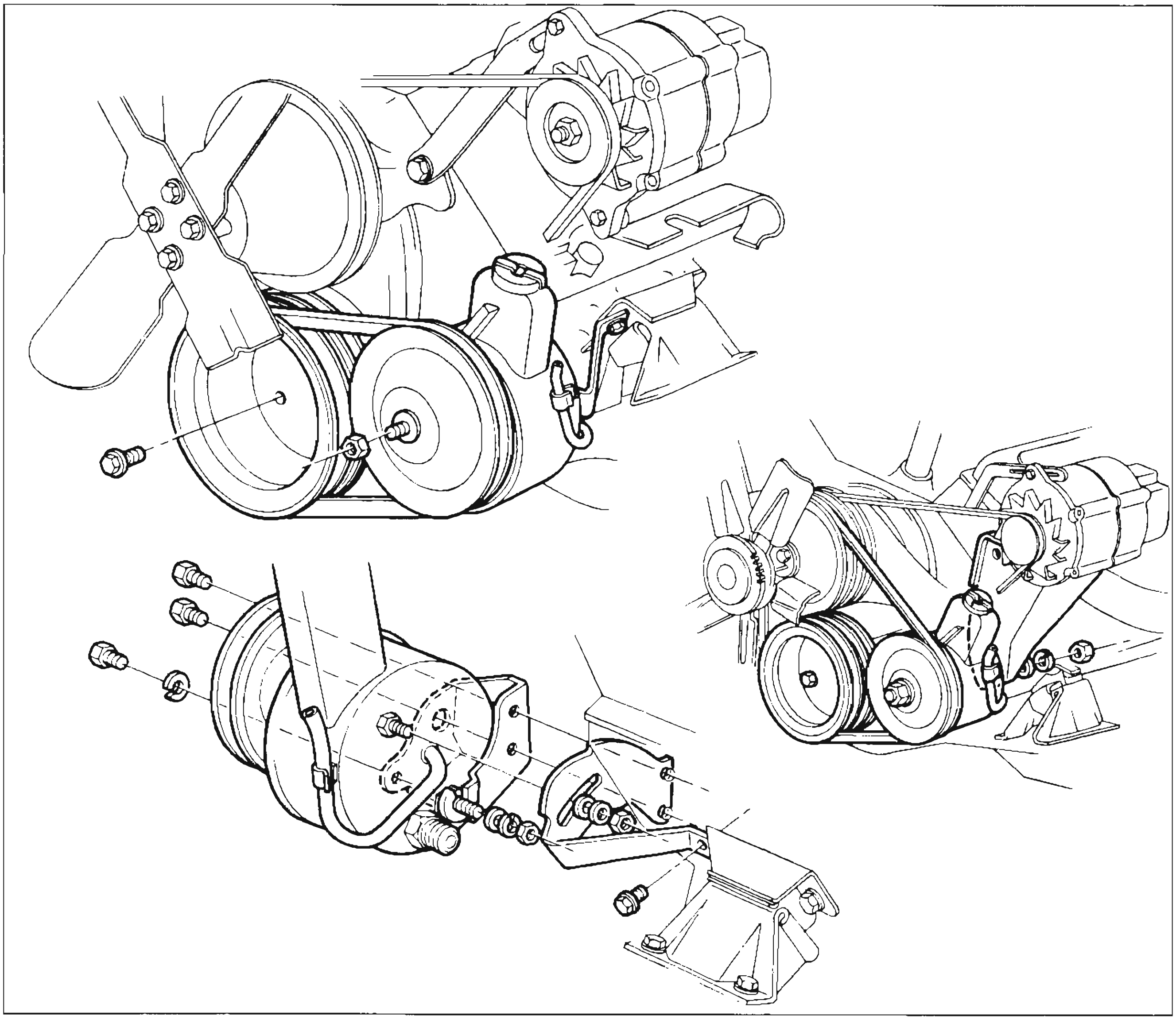

Fig. 47—Power Steering Pump Installed—8 Cylinder Engine

Removal (All Hoses)

1. Disconnect hose from valve, cylinder or pump.
2. If removing either pump-to-valve hose, loosen and remove clamp which secures hose to frame form.
3. Withdraw hose from car.

CAUTION: Do not start engine with any power steering hose removed or disconnected.

Installation (All Hoses)

Refer to Figures 48, 49 and 50

1. Carefully route hose through chassis and body parts (pump-to-valve hoses only) being careful of clamps and supports. Note position of sponge rubber protector.
2. Loosely install flare fittings in appropriate components. Carefully adjust position of hose so that no undue twisting occurs. Be sure that pump return hose clamp does not interfere with lower steering coupling on 409 V-8 Models. Install as shown.
3. On pump-to-valve hoses, align green stripe on hose with inboard edge of wide clamp as shown in Figure 49. Tighten clamp.
4. Tighten flare fittings and bleed hydraulic system as outlined in 1961 Passenger Car Shop Manual, Page 4-24.

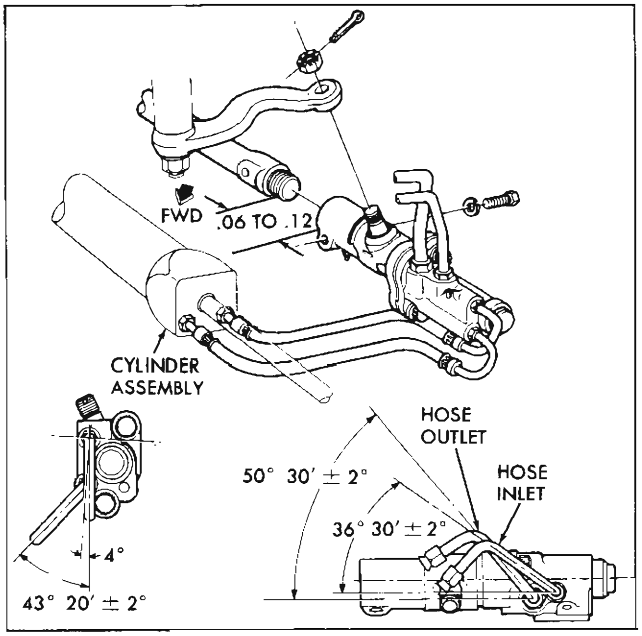

Fig. 48—Power Steering Control Valve and Hoses

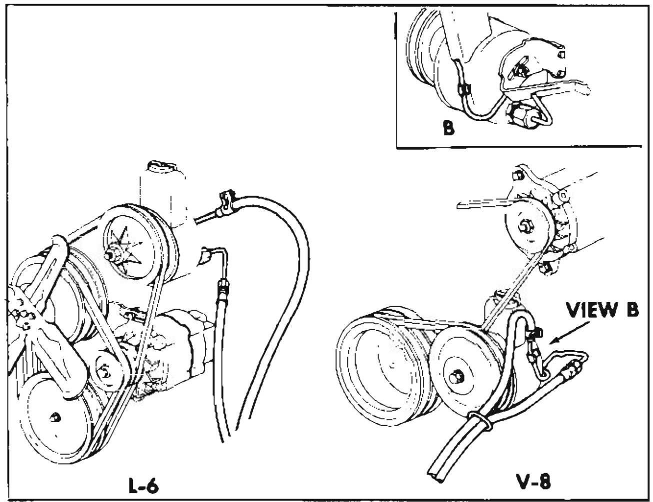

Fig. 50—Power Steering Routing—Pump to Control Valve

1964 CONTROL VALVE AND ADAPTER ASSEMBLY

Ball Stud Seal Replacement

A new ball stud seal is used on the power steering control valve. To replace the seal:

1. Remove the retaining nut from the ball stud to pitman arm connection and disconnect the control valve from the pitman arm.
2. Remove clamp by removing nut, bolt and spacer or, if crimped type clamp is used, straighten clamp ends and pull clamp and seal off end of stud.
3. Install new seal and clamp over stud so lips on seal mate with clamp. (A nut and bolt attachment type clamp replaces the crimped type for service.)
4. Center the ball stud, seal and clamp at opening in adapter housing, then install spacer, bolt and nut.

Valve Body Gasket and "O" Ring

A new gasket has been added between the adapter assembly and annulus spacer. This gasket can be removed after separation of the valve housing and adapter by removal of the valve mounting bolts. Assemble the gasket between the adapter and spacer, then install the valve housing mounting bolts to secure the gasket, spacer and adapter. An "O" ring has been added in the valve housing end next to the annulus spacer.

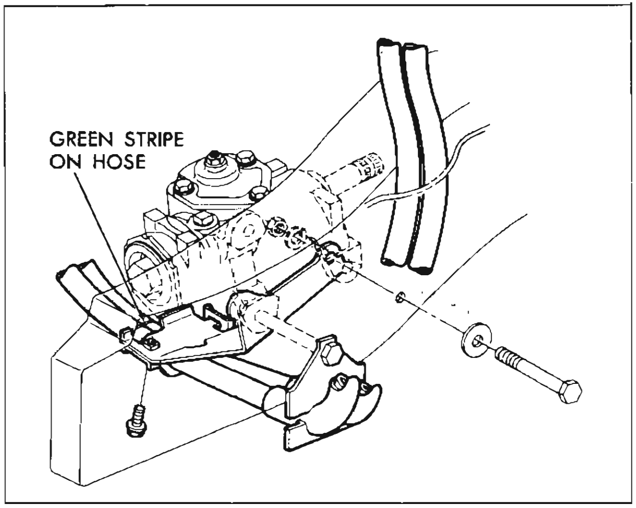

Fig. 49—Power Steering Hose Routing to Hydraulic Pump

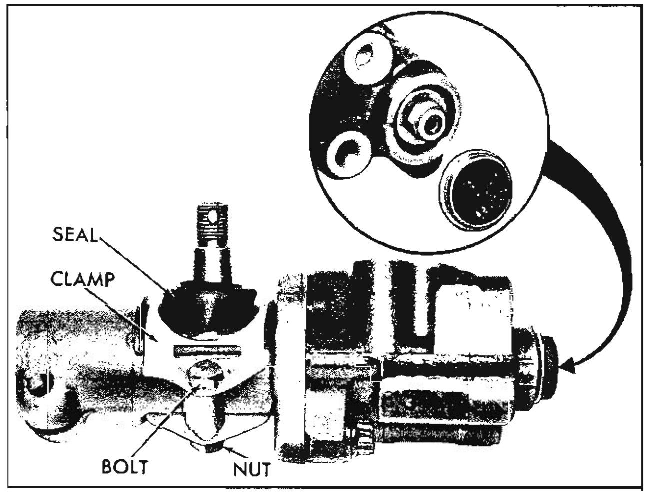

Fig. 51—Power Steering Control Valve Ball Stud Seal Replacement (Service)

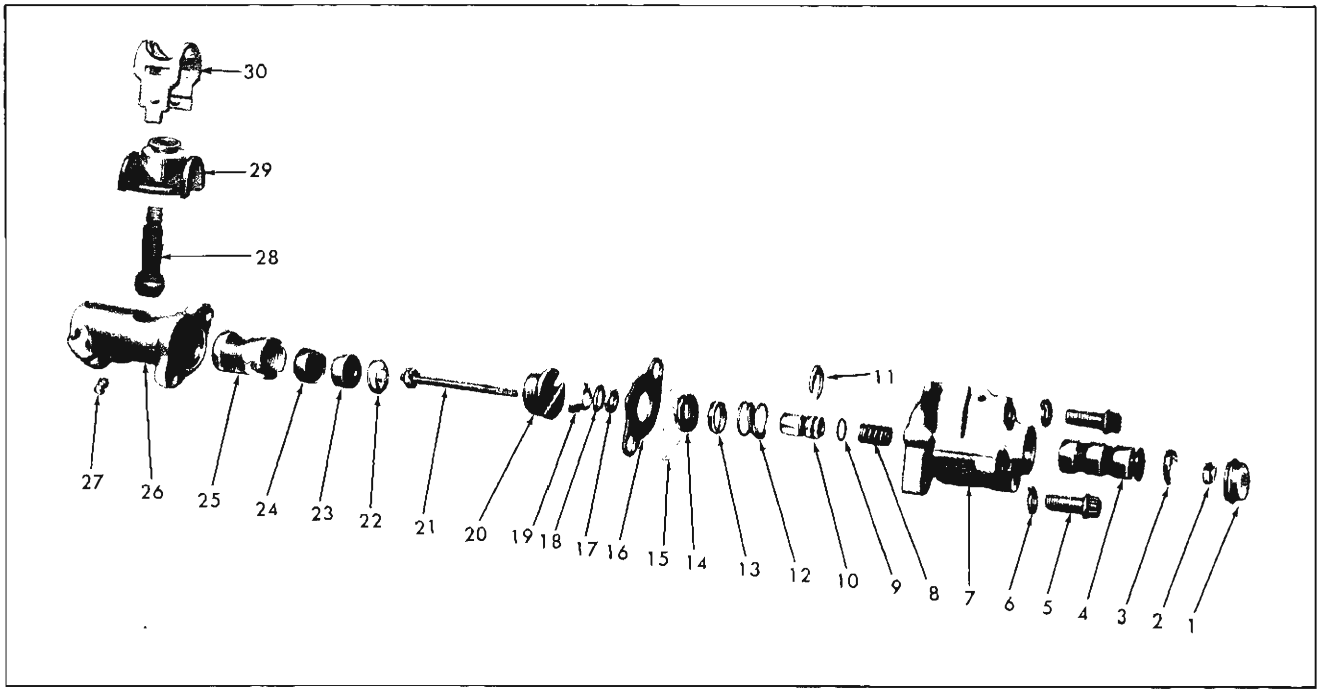

Fig. 52—Power Steering Control Valve and Adapter Assembly

1. Dust Cover
2. Adjusting Nut
3. Vee Block Seal
4. Valve Spool
5. Valve Mounting Bolts
6. Lock Washer
7. Valve Housing
8. Valve Adjustment Spring
9. "O" Ring Seal
10. Valve Reaction Spool
11. Spring Thrust Washer
12. Valve Spring
13. Spring Retainer
14. Annulus Seal
15. Annulus Spacer
16. Gasket
17. Valve Shaft Washer
18. "O" Ring Seal
19. Plug to Sleeve Key
20. Ball Adjuster Nut
21. Valve Shaft
22. Ball Seat Spring
23. Ball Seat
24. Ball Seat
25. Sleeve Bearing
26. Adapter Housing
27. Lubrication Fitting
28. Ball Stud
29. Seal
30. Clamp

1964 POWER CYLINDER

The power cylinder for 1964 has been revised at stud end.

Removal

1. Disconnect the two hydraulic lines connected to the power cylinder and drain fluid into a container. Do not reuse.
2. Remove cotter pin, nut, retainer and grommet from power cylinder rod attached to the frame bracket (fig. 53).
3. Also remove grommet and retainer from bracket if replacement parts are required.
4. Remove cotter pin, nut and tap out ball stud at relay rod.
5. Remove the power cylinder from the vehicle.

Inspection

1. Inspect the seals for leaks; if leaks are present, replace the seals using the procedure outlined under "Disassembly."
2. Examine the brass fitted hose connection seats for cracks or damage and replace if necessary.
3. For service other than ball seat or seal replacement and ball stud removal, replace the power cylinder.
4. Check the frame bracket parts for wear.

Disassembly (fig. 54)

1. To remove the piston rod seal remove the snap ring; then pull out on the rod, being careful not to spray oil.
2. Remove the piston rod scraper and scraper element, back up washer and piston rod seal from the rod.
3. At the ball stud end of the cylinder, remove the ball stud seal.
4. Remove the snap ring retaining the end plug with the lube fitting.
5. Push on the end of the ball stud and remove the end plug, spring, spring seat; and ball stud.

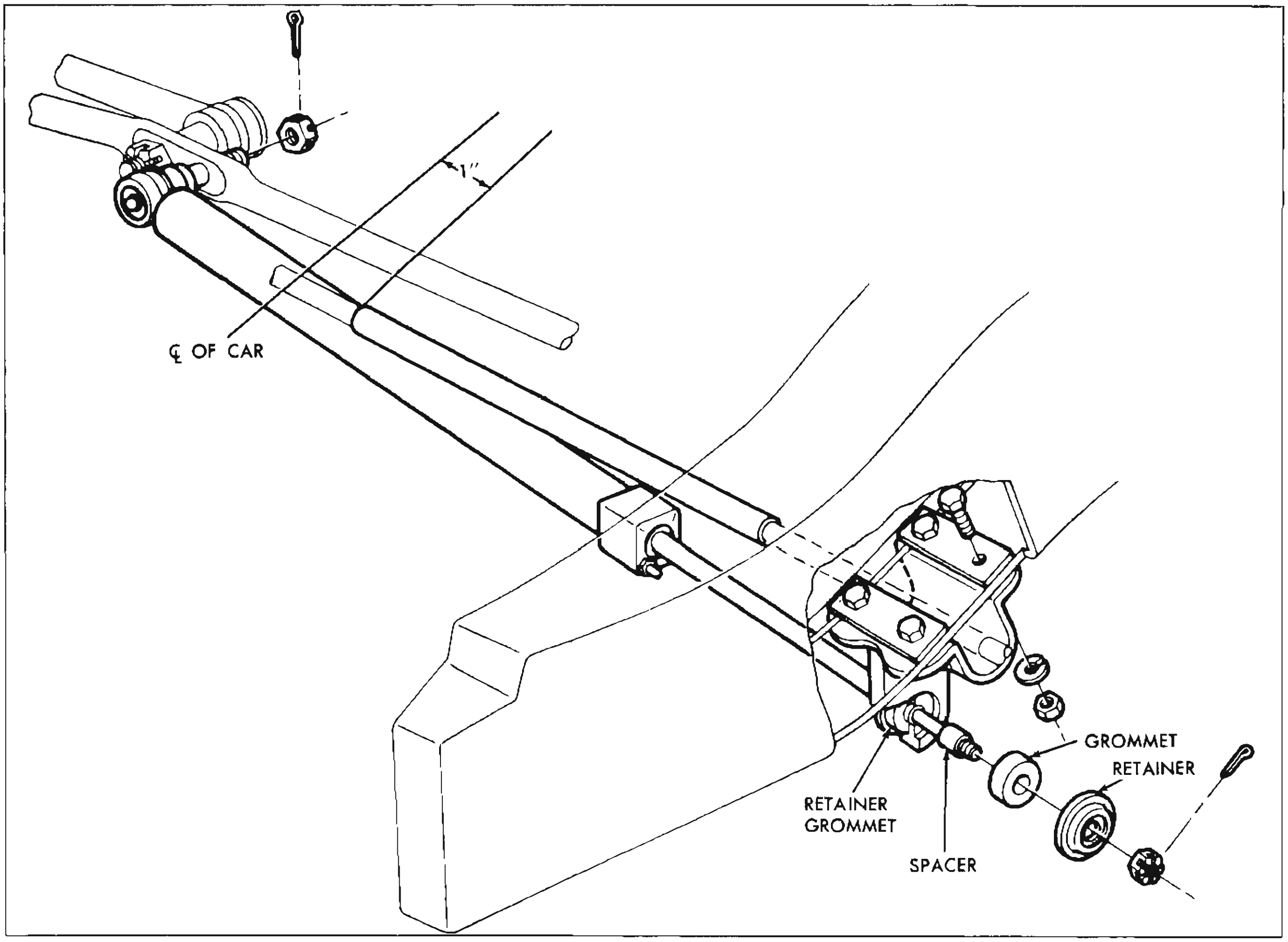

Fig. 53—Power Steering Cylinder Attachment

6. Remove the "O" ring from the lip of the power cylinder ball stud opening.
7. If the ball seat is to be replaced, it must be pressed out using Tool J-8937.

Assembly

1. Reassemble the piston rod seal components by reversing the disassembly procedure. Apply a thin coat of Lubriplate or equivalent on the inner surfaces of the seal and scraper before assembly.
2. Reverse the disassembly procedure when reassembling the ball stud.
3. In each case be sure that the snap ring is securely seated in the ring groove.

Installation

1. Install the power cylinder on the vehicle by reversing the removal procedure.
2. Reconnect the two hydraulic lines, fill the system with fluid and bleed out air using the procedure outlined under "Maintenance and Adjustments." Grease ball joint.

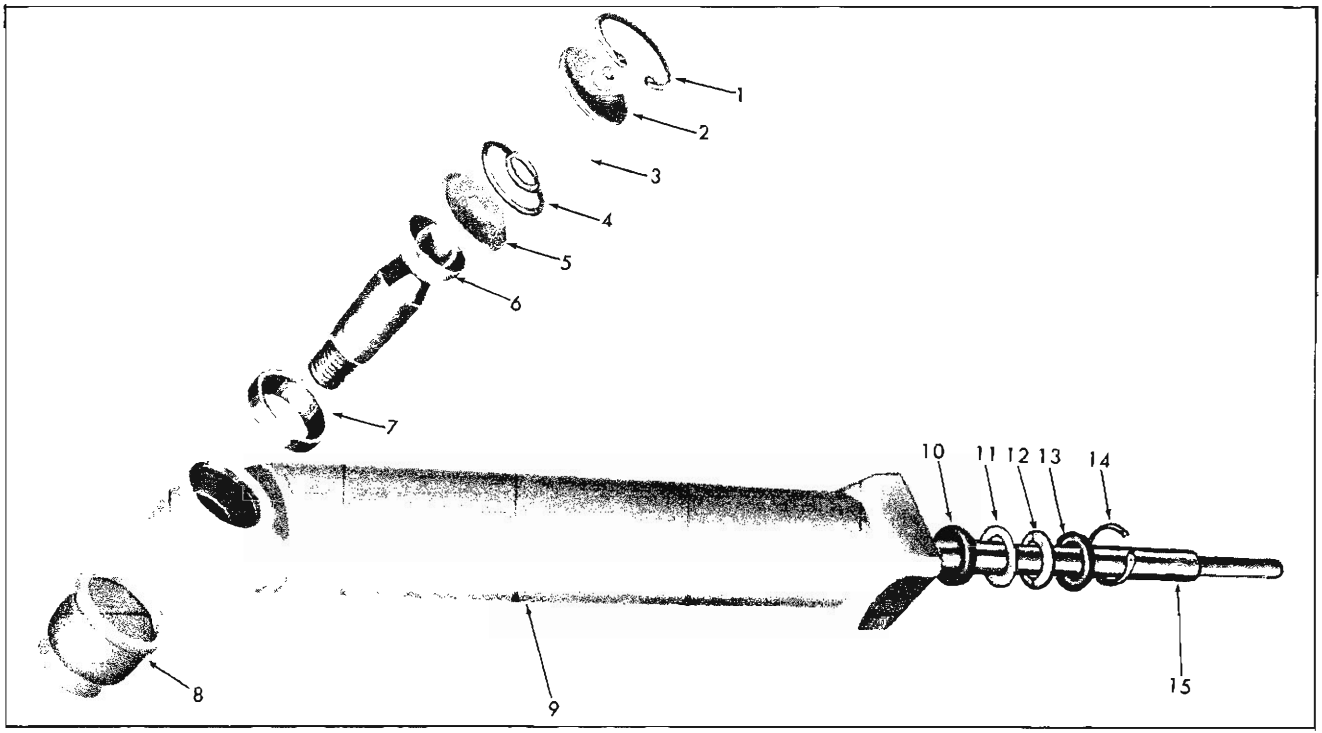

Fig. 54—Power Steering Power Cylinder Components

1. Snap Ring
2. End Plug and Lube Fitting
3. "O" Ring
4. Spring
5. Spring Seat
6. Ball Stud
7. Ball Seat
8. Ball Stud Seal
9. Piston Body
10. Piston Rod Seal
11. Backup Washer
12. Scraper Element
13. Piston Rod Scraper
14. Snap Ring
15. Piston Rod

SPECIFICATIONS

MANUAL STEERING GEAR

Type ....Semi-reversible recirculating ball

Gear Ratio 24:1

Overall Ratio (approx.) 28:1

Turning Diameters:

Outside front:

Right and left wall to wall ....44.1 ft.

Right and left curb to curb ....40.8 ft.

Inside rear:

Right and left wall to wall ....24.2 ft.

Right and left curb to curb ....24.5 ft.

Number of wheel turns:

To steering gear stop......................6.14

To wheel stops on control arm 5.80

Linkage

Type ....Relay

Location ....To front of wheels

Tie Rods 2

Adjustments

Lash Adjustment (High Point) ....⅞ to 1½ lbs.

End clearance–Adjuster to Sector Shaft. .022" Max.

Worm Bearing Adjustment ....⅜ to ⅝ lbs. to keep wheel in motion

POWER STEERING

Type ....Hydraulic

Pump:

Type ....Vane

Mounting ....On bracket below generator

Drive:

Vee belt ....From crankshaft pulley

Maximum pump pressure ....870-1000 psi

Fluid capacity ....1.5 pts.

Belt size:

Reg prod 6-cyl engine ... .310 x 44.50 pitch length

Reg prod 8-cyl engine ... .310 x 56.00 pitch length

Power Application ....Double acting piston in power cylinder is actuated by control valve after approximately 3 pounds of pressure is exerted at the steering wheel.

Overall Ratio 24:1

Steering Gear Ratio 20:1

SPECIAL TOOLS

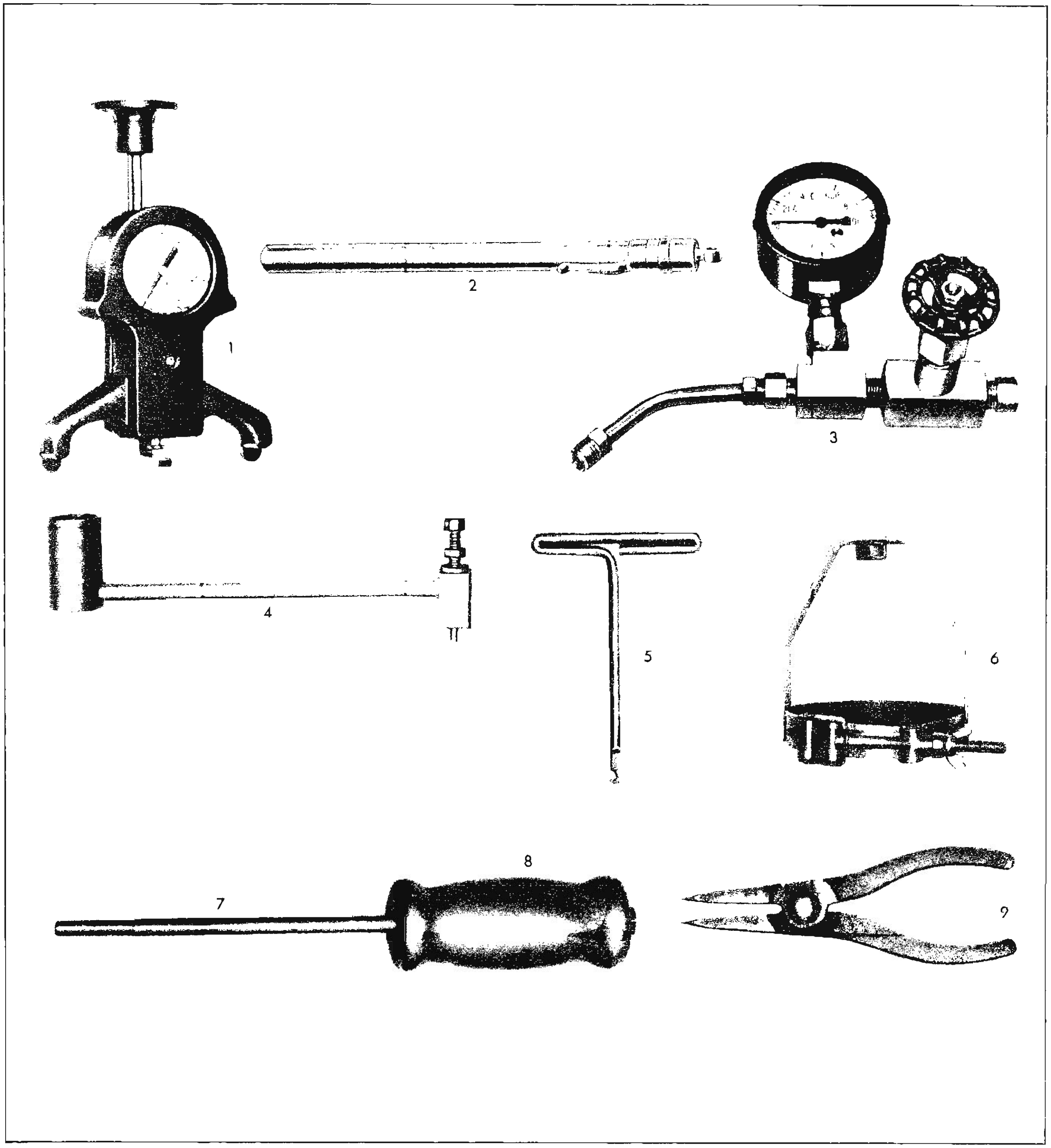

Fig. 55—Special Tools

1. J-5178 Belt Tension Gage
2. J-5421 Thermometer
3. J-5176 Pressure Gage
4. J-21179 Retaining Ring Installer
5. J-21181 Spring Installer
6. J-21486 Tilt Wheel Housing Puller
7. J-9539 Bolt
8. J-6585 Slide Hammer
9. J-4880 Snap Ring Pliers

SECTION 5

REAR AXLE

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Propeller Shafts and Universal Joints	5-3

REAR AXLE

The 1964 Chevrolet Passenger Car Axle Assembly design and service operations remain as outlined in the 1961 Passenger Car Shop Manual, Section 5.

MAINTENANCE AND ADJUSTMENTS

LUBRICANT

Lubricant level should be periodically checked and maintained at the filler plug level. The axle is filled with lubricant at the factory and should be drained only when the differential carrier assembly is removed. Periodic draining of the axle is not recommended.

SERVICE OPERATIONS

AXLE WHEEL BEARING AND/OR OIL SEAL REPLACEMENT

To emphasize the importance of proper installation procedures, service operations pertaining to axle wheel bearings and/or oil seal replacement are included in this supplement.

When performing wheel bearing seal replacement, it is always necessary to remove the bearing assembly from the axle shaft, for the following reasons:

a. The bearing seals being of synthetic rubber composition are sensitive to cutting and abrasion. The bearing retaining ring is larger (and considerably rougher) than the seal running surface.

b. With the bearing installed on the axle shaft, it is not possible to adequately clean, inspect or repack the bearing with lubricant.

The following procedures should be utilized when replacing axle wheel bearings and/or seals. Repacking the bearing with too much lubricant can cause premature failure of the bearing, particular attention should be directed to the bearing lubrication instructions under "Bearing Seal Replacement".

BEARING ASSEMBLY REMOVAL

1. Remove axle shaft assembly from vehicle following instructions presented on page 5-2 of 1961 Passenger Car Shop Manual.

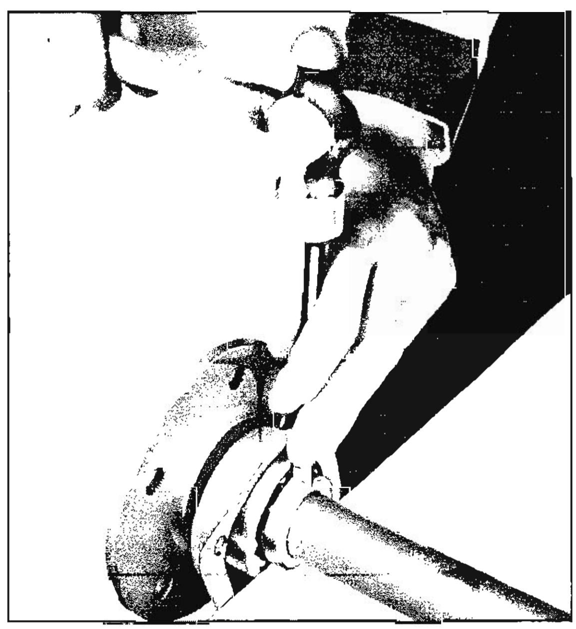

Fig. 1—Splitting Bearing Retaining Ring

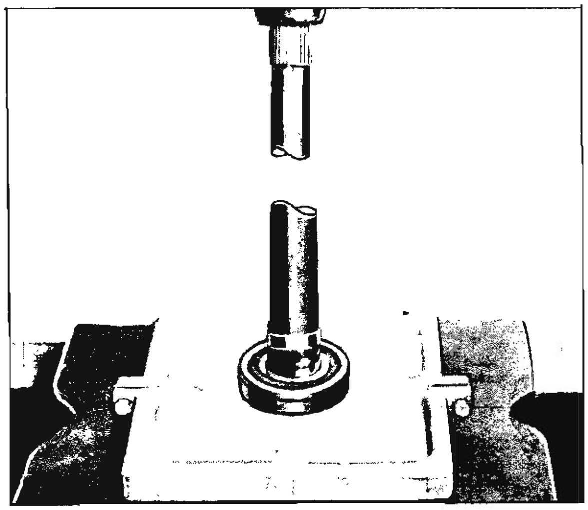

Fig. 2—Removing Axle Shaft Wheel Bearing

2. Remove bearing retainer ring by splitting with chisel, as shown in Figure 1.

   CAUTION: Under no circumstances should heat be applied to aid in the removal of the retaining ring.

3. Install press plate, Tool J-5741, between bearing and axle retainer plate (fig. 2). It will be necessary to remove axle retainer plate attaching bolts to permit installation of Tool J-5741 between retainer and bearing.

4. Press bearing from shaft with press plate parting line positioned on press bed, as shown in Figure 2.

BEARING SEAL REPLACEMENT

1. Remove bearing from axle shaft as explained in the foregoing procedures.

2. Pry out old seal with screwdriver. Use care to avoid damage to bearing ball and especially the inner race.

3. Thoroughly clean grease from bearing, using an approved cleaning solvent, and inspect bearing for damage. If the bearing was not previously noisy and no damage can be detected, repack with a high-melting point wheel bearing lubricant.

   CAUTION: Fill only about 40% of bearing cavity with grease (about 1 ½ teaspoonsful). Packing bearing with more than recommended quantity of lubricant will cause early failure.

4. Carefully start the new seal squarely onto the bearing; then place a smooth, heavy metal plate

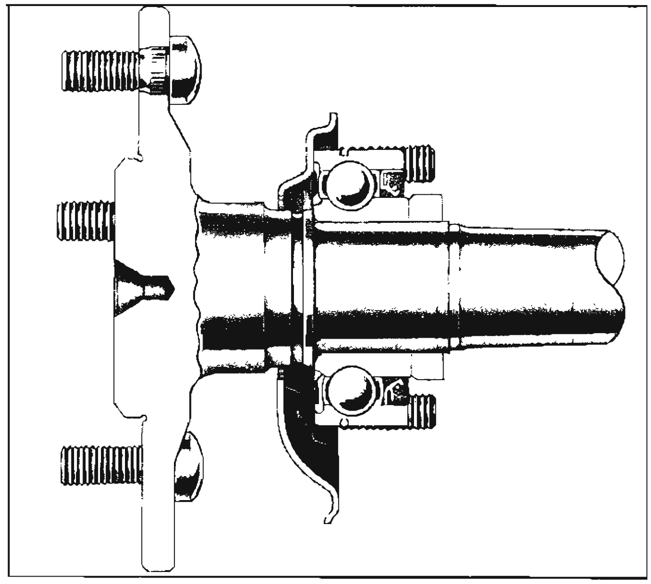

Fig. 3—Rear Axle Shaft and Bearing Detail

over the entire seal and press seal into the bearing until the rim of the seal case is flush with the top surface of bearing outer race. Refer to Figure 3 for correct seal position.

BEARING ASSEMBLY INSTALLATION

1. Install axle shaft retainer plate attaching bolts, position retainer plate on shaft and down against the axle shaft flange.

2. Position bearing assembly on axle shaft with seal toward splined end of shaft, as shown in Figure 3.

3. Install bearing by seating bearing in Tool J-6661 and pressing axle shaft into bearing until inner race contacts shoulder on axle shaft (fig. 4).

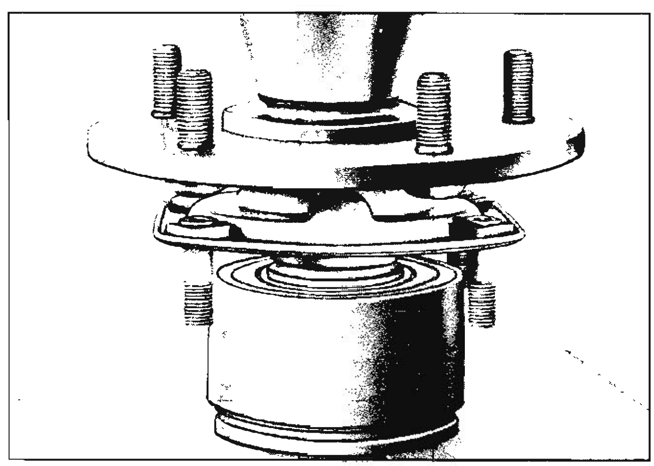

Fig. 4—Installing Axle Shaft Wheel Bearing

PROPELLER SHAFTS AND UNIVERSAL JOINTS

MAINTENANCE AND ADJUSTMENTS

UNIVERSAL JOINTS

The universal joints are of the lube-for-life design and do not require periodic inspection or lubrication; however, when servicing components that require disassembly of these universal joints, repack bearings with a high-melting point wheel bearing lubricant and replace the trunnion assembly dust seals.

DRIVE LINE ANGLES

Drive line adjustment procedures remain as outlined in the 1961 Passenger Car Shop Manual. Drive line angles for the 1964 vehicle are as listed below.

ANGLE CHECK AND MEASUREMENT

	Front Joint Angle A	Center Joint Angle B*	Rear Joint Angle C	Axle to Frame Height
All Models Except SS and Sta. Wag.	2°40′ ± ½°	−1°29′ ± ½°	3°15′ ± ½°	6.52″ ± ¼″
Station Wagons	1°40′ ± ½°	−2°17′ ± ½°	3°15′ ± ½°	7.65″ ± ¼″
Super Sport	3°00′ ± ½°	−0°14′ ± ½°	3°15′ ± ½°	5.64″ ± ¼″

*For all vehicles which are normally and continuously driven at maximum load conditions, angle B may be increased approximately ¼° to ½° in negative direction for more satisfactory results.

SERVICE OPERATIONS

PROPELLER SHAFTS

REPAIRS

Universal Joints

Removal and installation of bearing cap and trunnion remains as outlined in 1961 Passenger Car Shop Manual; however, redesign of trunnion and seal provides a press fit between seal and trunnion.

Installation of trunnion dust seal is accomplished as follows:

Place new seal on trunnion—cavity of seal toward end of trunnion—then position Tool J-21548 over end of trunnion and into cavity portion of seal. Press seal onto trunnion until Tool bottoms against trunnion finger (fig. 5).

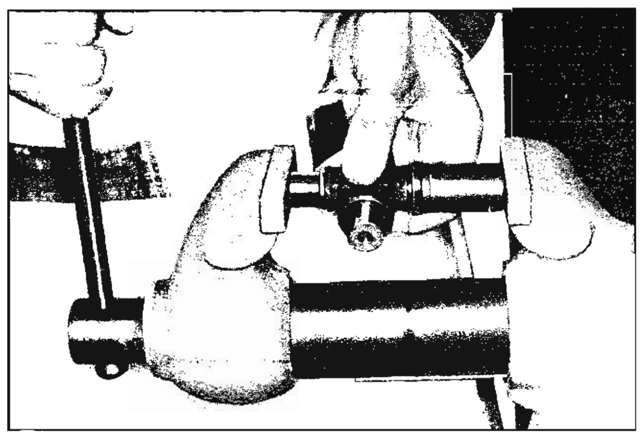

Fig. 5—Installing "U" Joint Trunnion Dust Seal

Note: Installation of seal is critical to proper sealing—use specified tool during installation to prevent seal distortion and to assure proper seating of seal on trunnion.

SECTION 6

BRAKES

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STANDARD BRAKES

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GENERAL DESCRIPTION

Service of the 1964 passenger car hydraulic brakes will essentially be accomplished as outlined in the 1961 Passenger Car Shop Manual. Various design changes have been incorporated in the 1964 models; however, these changes will not effect over-all service procedures except as described below or outlined under "Service Operations" in this section.

SELF-ADJUSTING FEATURE

Brake shoe adjustment takes place when brakes are applied with a firm pedal effort while vehicle is backing up. Applying the brakes moves an actuator which turns the star wheel and lengthens the adjusting screw assembly (fig. 1). This action adjusts the shoes until clearance between the lining and drum is within proper limits.

Should low pedal heights be encountered, it is recommended that numerous forward and reverse stops be performed with a firm pedal effort until a satisfactory brake pedal height results.

NOTE: Frequent usage of an automatic transmission forward range to halt reverse vehicle motion may prevent the automatic adjusters from functioning, thereby inducing low pedal heights.

BRAKE DRUM

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 (fig. 2).

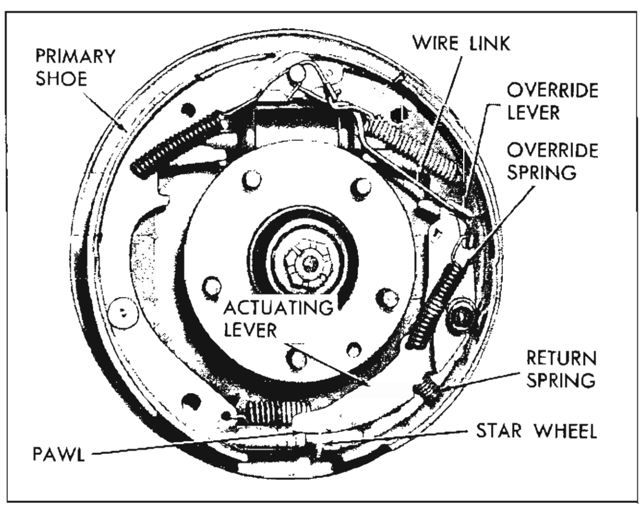

Fig. 1—Self-Adjusting Brakes

MAINTENANCE AND ADJUSTMENTS

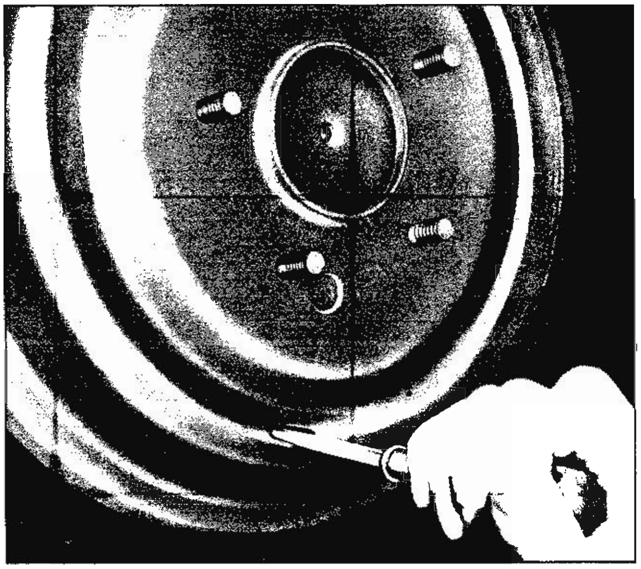

Fig. 2—Brake Drum Access Hole

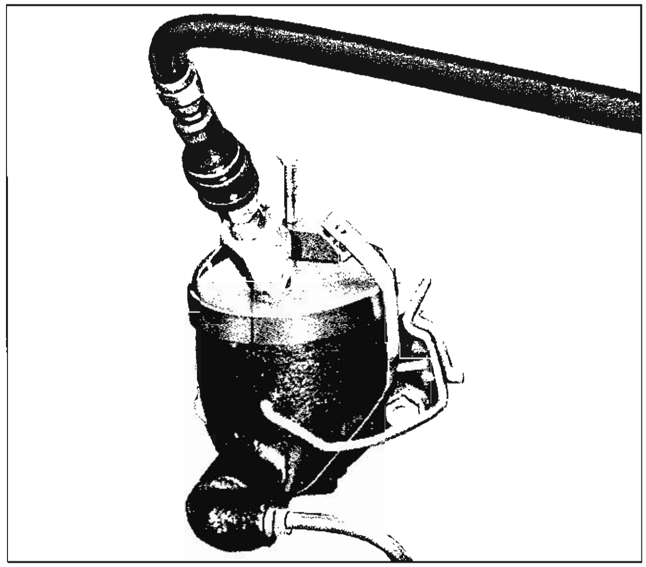

Fig. 4—Brake Pressure Bleeding Adapter Installed

MAIN CYLINDER

The brake main cylinder (fig. 3) is functionally the same as past models, but due to design of the reservoir, a special adapter is required for pressure bleeding. The main cylinder bleeding adapter (fig. 4) is designed to allow filling of the reservoir to the proper level (1/4" from the reservoir rim) during the bleeding operation.

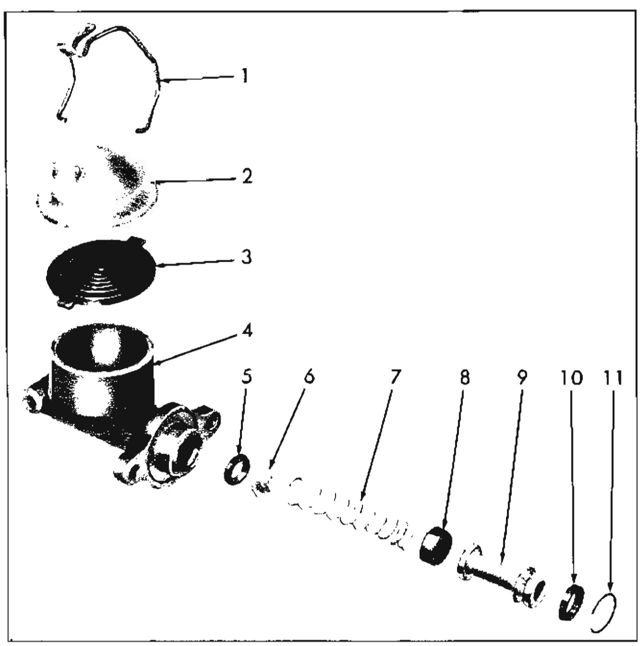

Fig. 3—Main Cylinder

1. Bail Wire
2. Reservoir Cover
3. Seal
4. Body
5. Valve Seat
6. Valve Assembly
7. Spring
8. Primary Cup
9. Piston
10. Secondary Cup
11. Lock Ring

PARKING BRAKE

Adjustment

1. Raise the rear of the vehicle.
2. Depress Parking Brake pedal to *first notch.*
3. Adjust front cable to position idler lever to 1" ± 1/4" forward of rear edge of bracket (fig. 5).
4. Adjust rear cable to obtain a moderate brake drag on rear wheels.
5. Release Parking Brake—No brake shoe drag should be felt.

HYDRAULIC BRAKE HOSE

Replacement

When replacing hydraulic brake hose, follow pro-

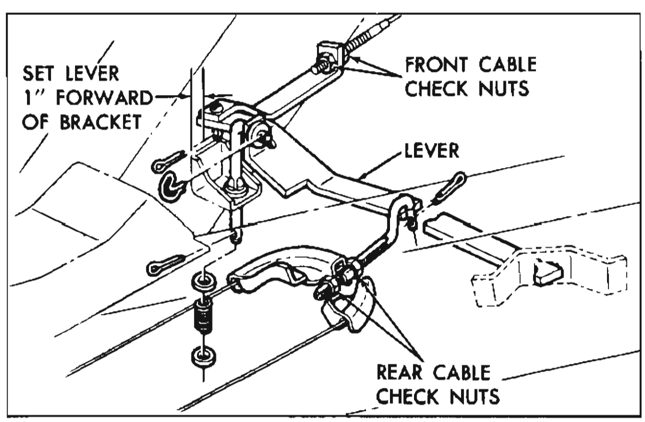

Fig. 5—Parking Brake Idler Lever

cedure outlined in 1961 Passenger Car Shop Manual and the following.

Inspect hose installation by removing weight completely from wheel and turn wheels from lock to lock, while observing hose position. Be sure that hose does not touch other parts during suspension or wheel travel. If contact occurs, remove hose retainer and rotate female hose end in support bracket in appropriate direction, replace retainer, and reinspect.

CAUTION: Under no circumstances should brake hoses be tightened at the wheel cylinder with the female hose end in the support bracket. Always remove hose from support bracket, tighten hose at wheel cylinder, then install hose in support bracket.

HYDRAULIC BRAKE TUBING

Hydraulic brake tubing used on all models is a double layer annealed steel, copper coated and tin plated tubing which resists corrosion and also stands up under the high pressures which are developed when applying the brakes. All models use $\frac{3}{16}''$ tubing, except on the brake main cylinder pipe and front crossover pipe which are $\frac{1}{4}''$. In making up hydraulic brake pipes, it is important that the proper size flaring tool be used to flare the ends of the tubing for the compression couplings. Unless the tubing is properly flared, the couplings will leak and the brakes will become ineffective.

CAUTION: When necessary to replace brake tubing, always use special metal tubing which is especially designed to withstand high pressure and resist corrosion. For this reason, ordinary copper tubing is not satisfactory and should not be used.

This safety steel tubing must be double-lap flared at the ends in order to produce a strong leak-proof joint.

SERVICE OPERATIONS

The service operations which differ from those outlined in the 1961 Passenger Car Shop Manual are described below.

BRAKE DRUMS, SHOES AND LININGS

NOTE: If brake drums are worn severely, it may be necessary to retract the adjusting screw. To gain access to the adjusting screw star wheel, knock out the lanced area in the web of the brake drum using a chisel or similar tool.

CAUTION: After knocking out the metal, be sure to remove it from the inside of the drum and clean all metal from the brake compartment. A new hole cover must be installed when drum is reinstalled.

Removal

1. Raise the vehicle and place on stand jacks.
2. Loosen check nuts at forward end of parking brake cable sufficiently to remove all tension from brake cable.
3. Remove brake drums.

NOTE: Since boots are recessed in grooves on wheel cylinders to prevent pistons from leaving cylinders, it is not necessary to install wheel cylinder clamps when brake shoes are removed; however, brake pedal must not be depressed while drums are removed.

4. Unhook brake shoe pull back springs from anchor pin and link end, using Tool J-8049 (fig. 6).
5. Remove the actuator return spring.
6. Disengage the link end from the anchor pin and then from the secondary shoe.
7. Remove hold-down pins and springs (fig. 7).
8. Remove the actuator assembly.

NOTE: The actuator, pivot and override spring are an assembly. It is not recommended that they be disassembled for service purpose, unless they are broken. It is much easier to assemble and disassemble the brakes by leaving them intact.

9. Separate the brake shoes by removing adjusting screw and spring.

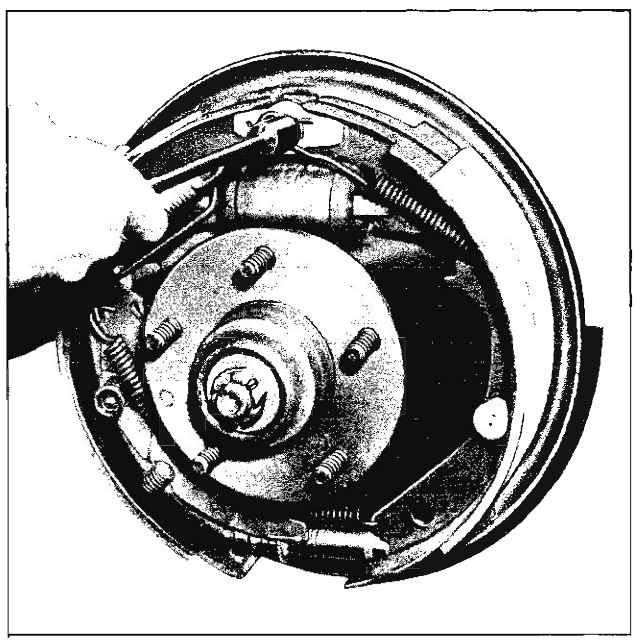

Fig. 6—Unhook Pull Back Spring

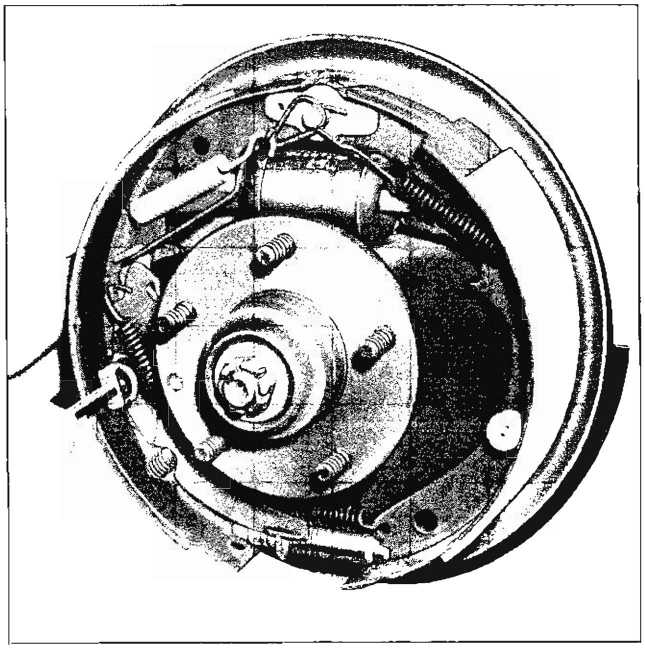

Fig. 7—Removing Hold-Down Springs and Pins

10. Remove parking brake lever from secondary brake shoe (rear only).
11. Clean dirt out of brake drum using care to avoid getting dirt into front wheel bearings. Inspect drums for roughness, scoring or out-of-round. Replace or recondition drums as necessary.
12. Inspect wheel bearings and oil seal and replace any necessary parts.
13. Carefully pull lower edges of wheel cylinder boots away from cylinders and note whether interior is wet with brake fluid. Excessive fluid at this point indicates leakage past piston cups requiring overhaul of wheel cylinder.

NOTE: A slight amount of fluid is nearly always present and acts as lubricant for the piston.

14. If working at rear wheels, inspect backing plate for oil leakage past axle shaft oil seals. Install new seals if necessary.
15. Check all brake flange plate attaching bolts to make sure they are tight. Clean all rust and dirt from shoe contact faces on flange plate, using fine emery cloth.

Installation

CAUTION: Make certain to install recommended shoe and lining assemblies. Otherwise, serious fade or permanent failure may occur.

1. Inspect new linings and make certain there are no nicks or burrs or bonding material on shoe edge where contact is made with brake flange plate or on any of the contact surfaces.

NOTE: Keep hands clean while handling brake shoes. Do not permit oil or grease to come in contact with linings.

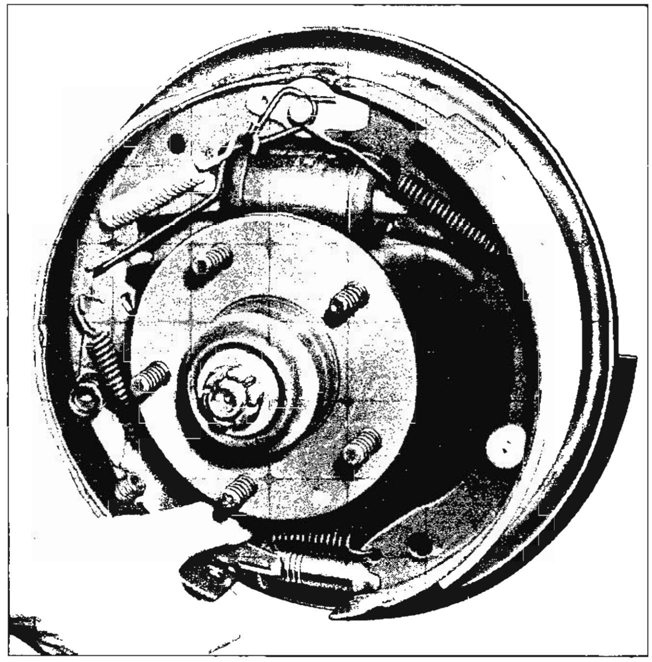

Fig. 8—Checking Operation of the Actuating Lever

2. If working on rear brakes, lubricate parking brake cable.
3. On rear brakes only, lubricate fulcrum end of parking brake lever and the fulcrum pin with brake lube, then attach lever to secondary shoe with pin, spring washer and snap ring.
4. Before installation, make sure that lever moves freely (fig. 8) and the adjusting screw is clean and lubricated properly (fig. 9).

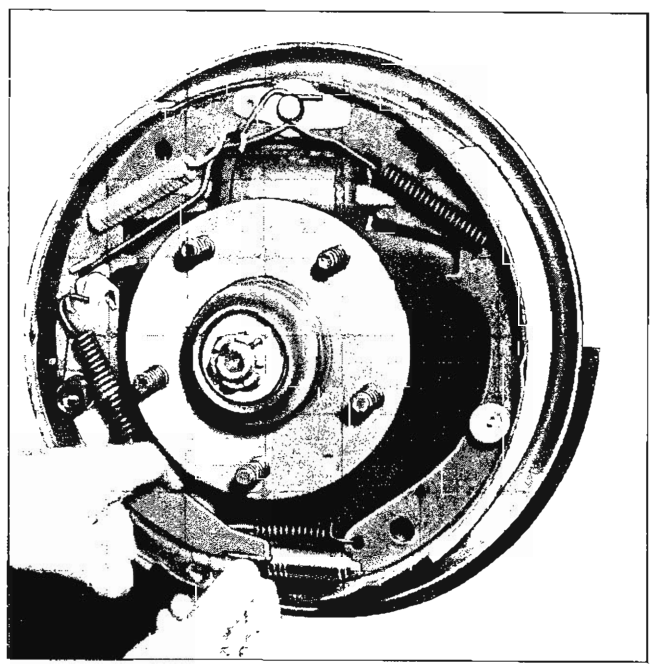

Fig. 9—Inspecting for Proper Lubrication

NOTE: Loose adjustment may occur from an adjusting screw that is not properly operating. If the lubrication in the adjusting screw of assembly is contaminated or destroyed, the adjusting screw should be thoroughly cleaned and lubricated.

5. Connect brake shoes together with adjusting screw spring, then place adjusting screw, socket and nut in position.

   CAUTION: Make sure the proper adjusting screw is used ("L." for left side of vehicle, "R" for right side of vehicle). The star wheel should only be installed with the star wheel nearest to the secondary shoe and the adjusting screw spring inserted to prevent interference with the star wheel.

6. Install parking brake cable (rear only).
7. Secure the primary brake shoe (short lining—faces forward) first with the hold-down pin and spring using a pair of needle nose pliers. Engage shoes with the wheel cylinder connecting links.
8. Install and secure the actuator assembly and secondary brake shoe with the hold-down pin and spring using a pair of needle nose pliers, (on rear position parking brake strut and strut spring).
9. Install guide plate over anchor pin.
10. Install the wire link.

    NOTE: Do not hook the wire link over the anchor pin stud with the regular spring hook tool. This may damage the cylinder boot seals. Fasten the wire link to the actuator assembly first, and then place over the anchor pin stud by hand while holding the adjuster assembly in full down position.

11. Install actuator return spring.

    NOTE: Do not pry actuator lever to install return spring. Ease it in place using the end of a screwdriver or other suitable flat tool.

12. If old brake pull back (return) springs are nicked, distorted, or if strength is doubtful, install new springs.
13. Hook springs in shoes using Tool J-8049 by installing the primary spring from the shoe over the anchor pin and then spring from secondary shoe over the wire link end (fig. 10).
14. Pry shoes away from the backing plate and lubricate shoe contact surfaces with a thin coating of brake lube (fig. 11).

    CAUTION: Be careful to keep lubricant off facings.

15. After completing installation, make certain the actuator lever functions easily by hand operating the self-adjusting feature.

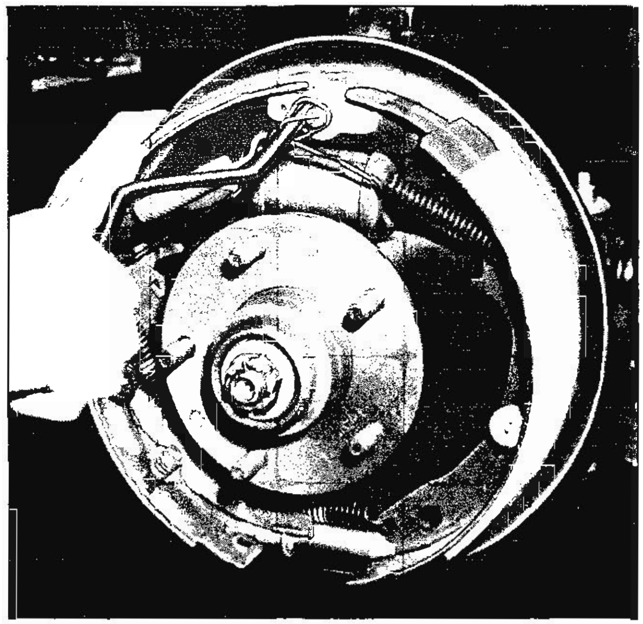

Fig. 10—Installing Pull Back Springs

16. Follow the above procedure for all brakes.
17. Adjust the service brakes as outlined below, then adjust the parking brake.

ADJUSTMENT

Although the brakes are self-adjusting, a preliminary or initial adjustment may be necessary after the brakes have been relined or replaced, or whenever the length of the adjusting screw has been changed. The

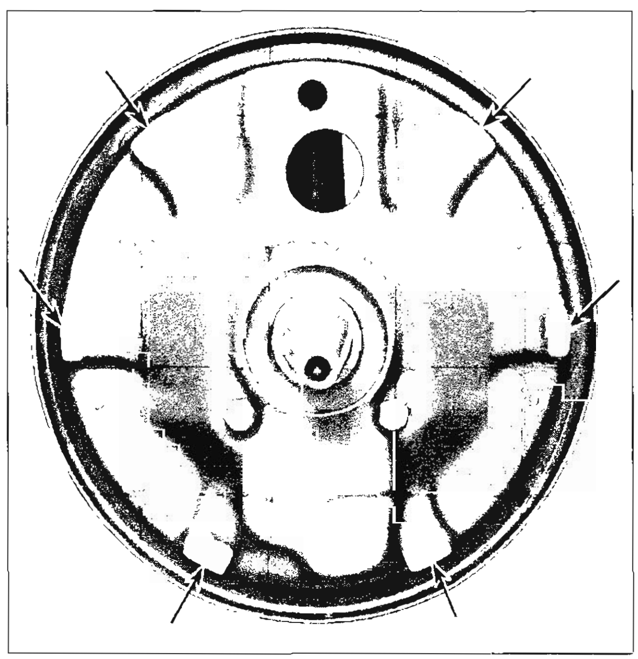

Fig. 11—Backing Plate Contact Faces

final adjustment is made by using the self-adjusting feature.

1. With brake drum off, disengage the actuator from the star wheel and rotate the star wheel by spinning or turning with a small screwdriver.
2. **Recommended:**
   a. Use special Tool J-21177, Drum-to-Brake Shoe Clearance Gauge, to check the diameter of the brake drum clearance surface (fig. 12).
   b. Turn the tool to the opposite side and fit over the brake shoes by turning the star wheel until the gauge just slides over the linings (fig. 13).
   c. Rotate the gauge around the brake shoe lining surface to assure proper clearance.

   Alternate:
   a. Using the brake drum as an adjustment fixture, turn the star wheel until the drum slides over the brake shoes with a slight drag.
   b. Turn the star wheel 1¼ turns to retract the shoes. This will allow sufficient lining-to-drum clearance so final adjustment may be made as described in Step 4.
3. Install the drum and wheel.

   NOTE 1: If lanced area in brake drum was knocked out, be sure all metal has been removed from brake compartment. Install new hole cover in drum to prevent contamination of the brakes.

   NOTE 2: Make certain when installing drums that drums are installed in the same position as when removed with the drum locating tang in line with the locating hole in the wheel hub (fig. 14).

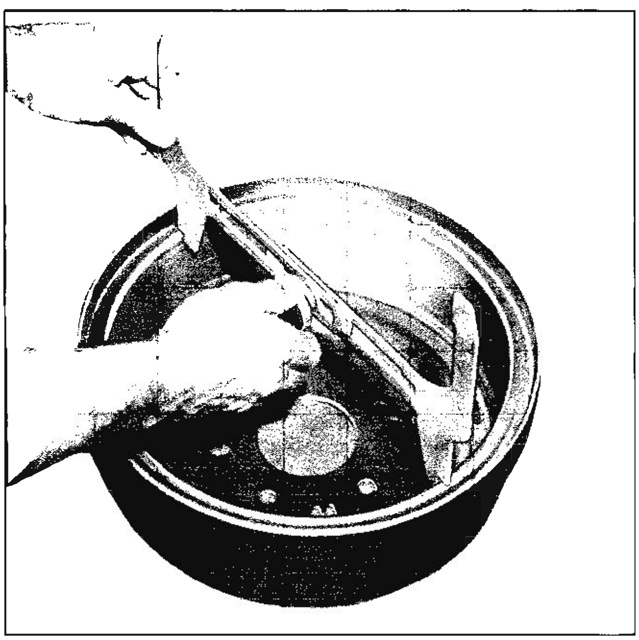

Fig. 12—Using Drum-to-Brake Shoe Clearance Gauge

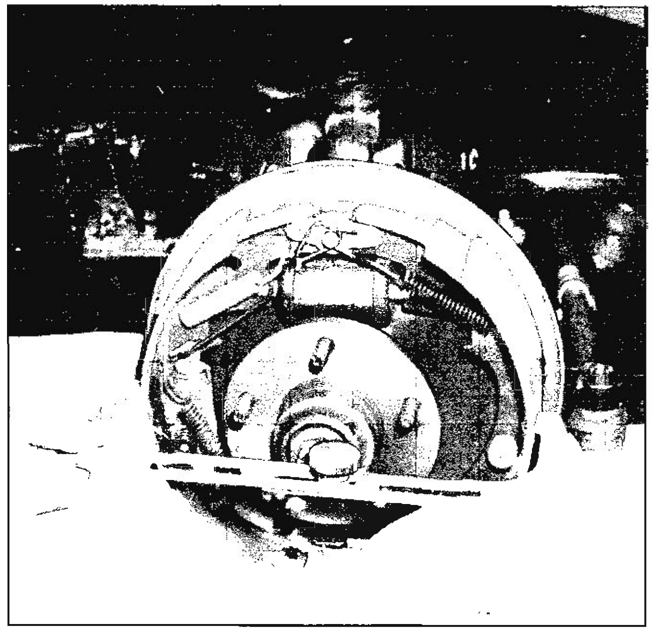

Fig. 13—Checking Brake Shoe Lining Clearance

4. Make final adjustment by driving and stopping vehicle until satisfactory brake pedal height is obtained as described under "Self-Adjusting Feature" earlier in this section.

CLUTCH AND BRAKE PEDAL

Removal

1. Disconnect clutch pedal return spring (located in engine compartment).

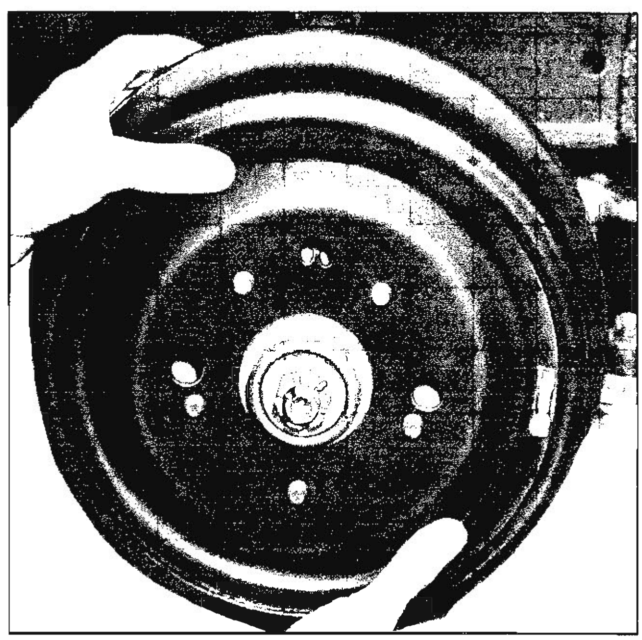

Fig. 14—Aligning Drum Tang with Wheel Hub

2. Remove clip and clevis retainer pin from brake pedal arm (fig. 15).
3. Remove retainer and washer from clutch pedal push rod, and disengage push rod from clutch pedal bracket.
4. Remove retainer clip and spring washer from right side of clutch pedal pivot shaft.
5. Slide the clutch pedal assembly to the left and remove from panel brace. Brake pedal arm and tension spring will be free for removal when pivot shaft clears panel brace.
6. Withdraw brake pedal and all nylon bushings.

Inspection

1. Clean all metal parts with a good nontoxic cleaning solvent.
2. Wipe the nylon bushings clean with a clean cloth.

CAUTION: Nylon bushings should not be treated with cleansing agent of any nature.

3. Inspect all nylon bushings for wear and damage.
4. Inspect all mating surfaces of bushings for wear and damage—replace parts as required.

Installation

1. Install nylon bushings on clutch pedal pivot shaft, right side of panel brace cutout and through both ends of brake pedal bore.
2. Position the brake pedal return spring on pedal arm, and place pedal assembly in panel brace (index return spring in panel brace cutout).
3. Slide clutch pedal pivot shaft through panel brace and brake pedal bore.
4. Install spring washer and retainer clip to right side of clutch pedal pivot shaft.
5. Connect clutch pedal push rod to clutch pedal bracket, and install washer and retainer.
6. Position main cylinder push rod clevis to brake pedal arm, and install clevis retainer pin and clip.
7. Adjust brake pedal free play to $\frac{1}{16}$ to $\frac{1}{4}$ inch, and check stop light switch position—adjust if necessary so that electrical contact is made when pedal is depressed $\frac{5}{8}$ inch.
8. Connect clutch pedal return spring.

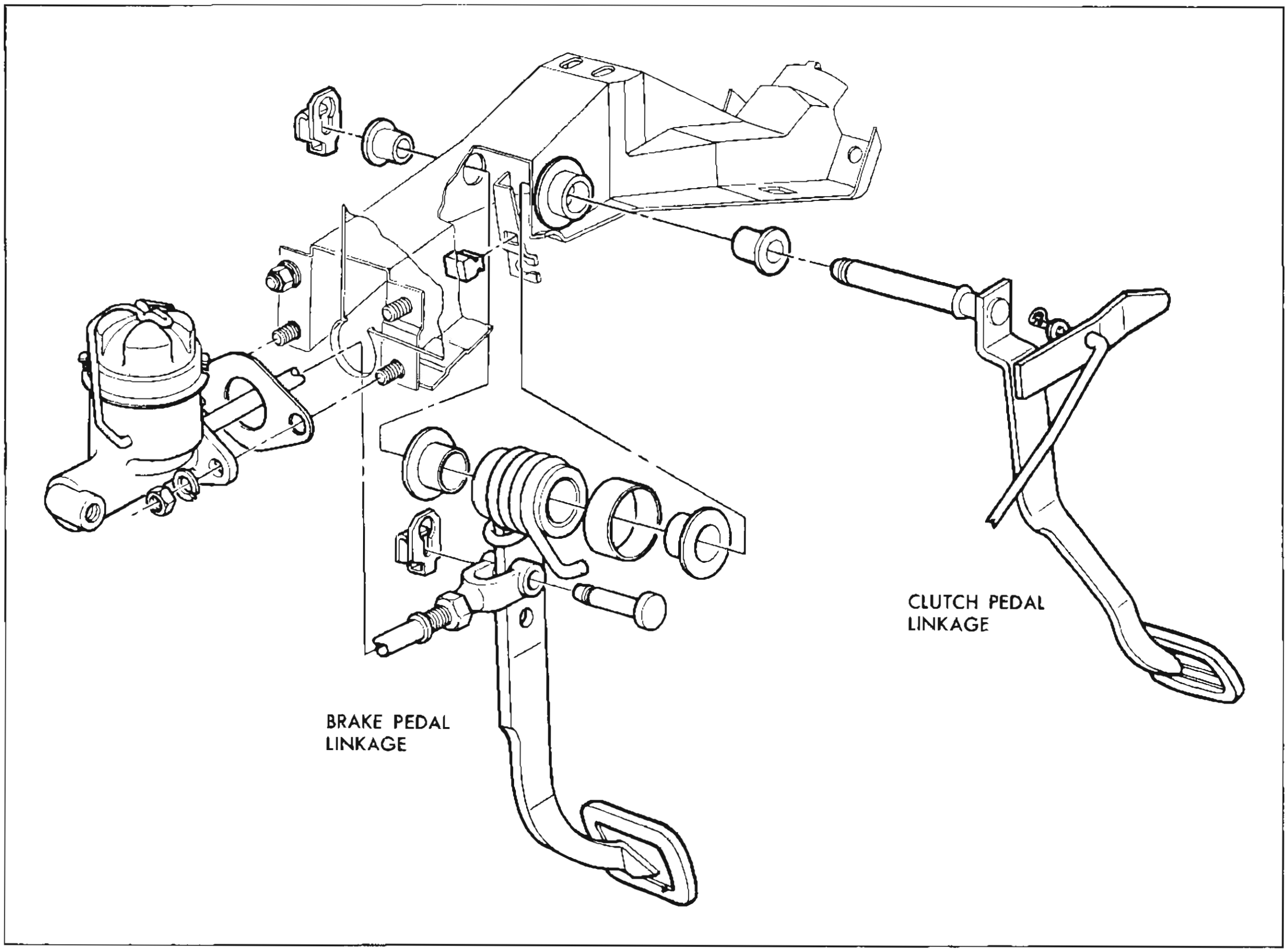

Fig. 15—Clutch and Brake Pedal Installation

METALLIC BRAKES

Metallic brake linings which use special heat resistant brake springs are available as an option. Service operations are the same as for standard brakes; however, when new linings are installed, the linings should be seated as described below.

NOTE: Brake shoes with metallic linings require specially finished brake drums (honed to a 20 micro-inch finish). Metallic linings are not recommended for service replacement on vehicles with standard brake drums that have not been honed to specified finish.

Seating Metallic Linings

After the brakes have been adjusted, the following recommended "lining seating" is as follows:

1. Make six to eight stops from 30 mph with moderate pedal pressure to aid in seating and to modulate any tendency to dive.
2. Make six to eight complete stops from maximum legal highway speed at approximately one mile intervals to fully seat the linings.

Identification of Worn Lining

The metallic shoe assembly incorporates a number of segmented pads with each pad consisting of two layers of dissimilar material. The top layer is the braking material and the lower layer is a metal bonding agent used to weld the brake facing material to the shoe proper.

During brake inspection, one can be misled easily since the bonding pad does not appear to be much different from the brake facing pad.

Close inspection of the shoes, however, will indicate the difference between a worn and satisfactory shoe. When the bonding pad begins to appear through the brake facing material a bright finish will appear. (Fig. 16).

To preclude the possibility of excessively worn shoes damaging the drum, it is recommended that metallic brake shoes be replaced whenever segment thickness becomes less than $\frac{3}{32}''$ measured at the heel or toe of the pad.

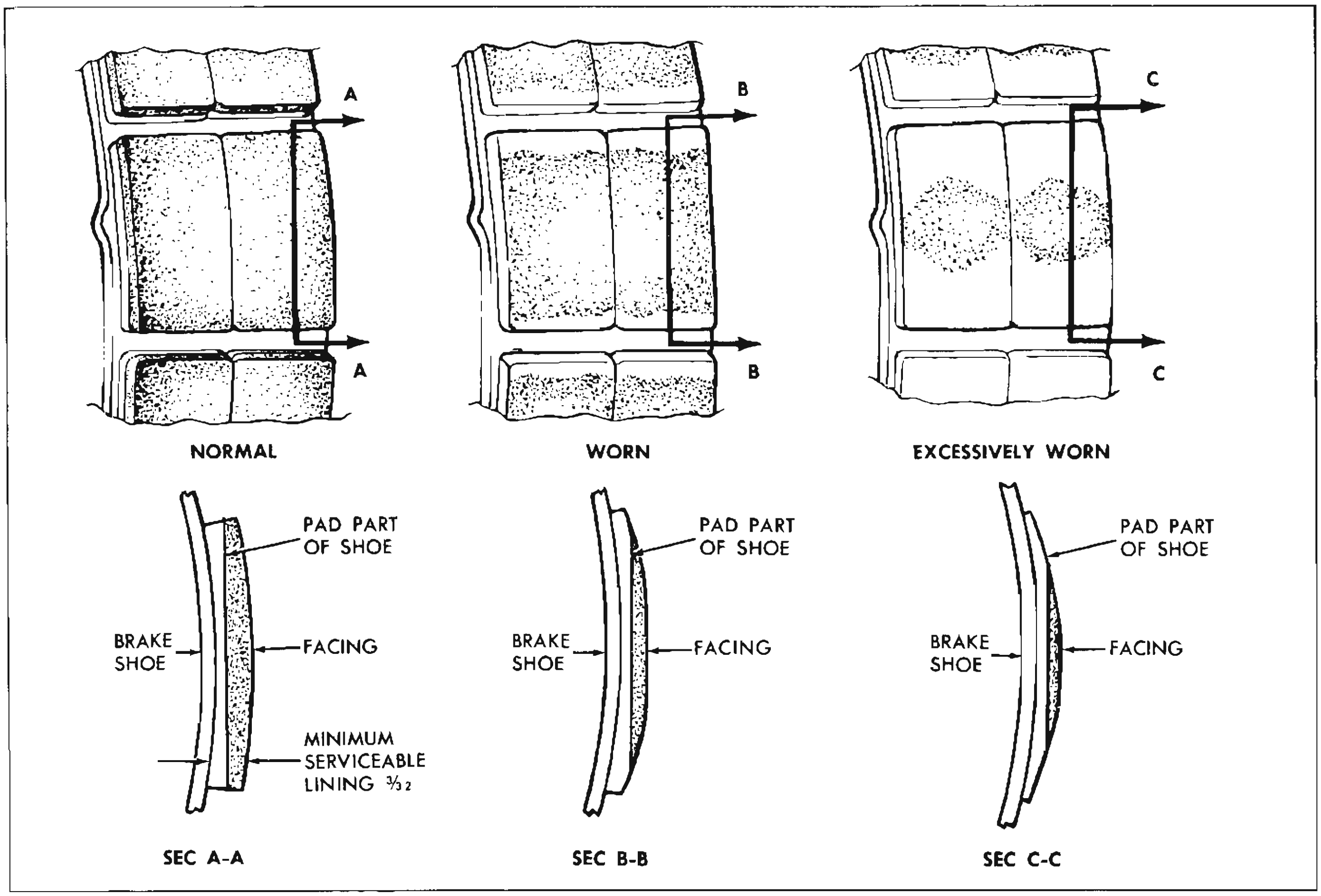

Fig. 16—Identification of Worn Metallic Brake Lining

BENDIX POWER BRAKES

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GENERAL DESCRIPTION

The Master-Vac (fig. 17) is a self-contained hydraulic and vacuum unit for power braking, utilizing manifold vacuum and atmospheric pressure for its power.

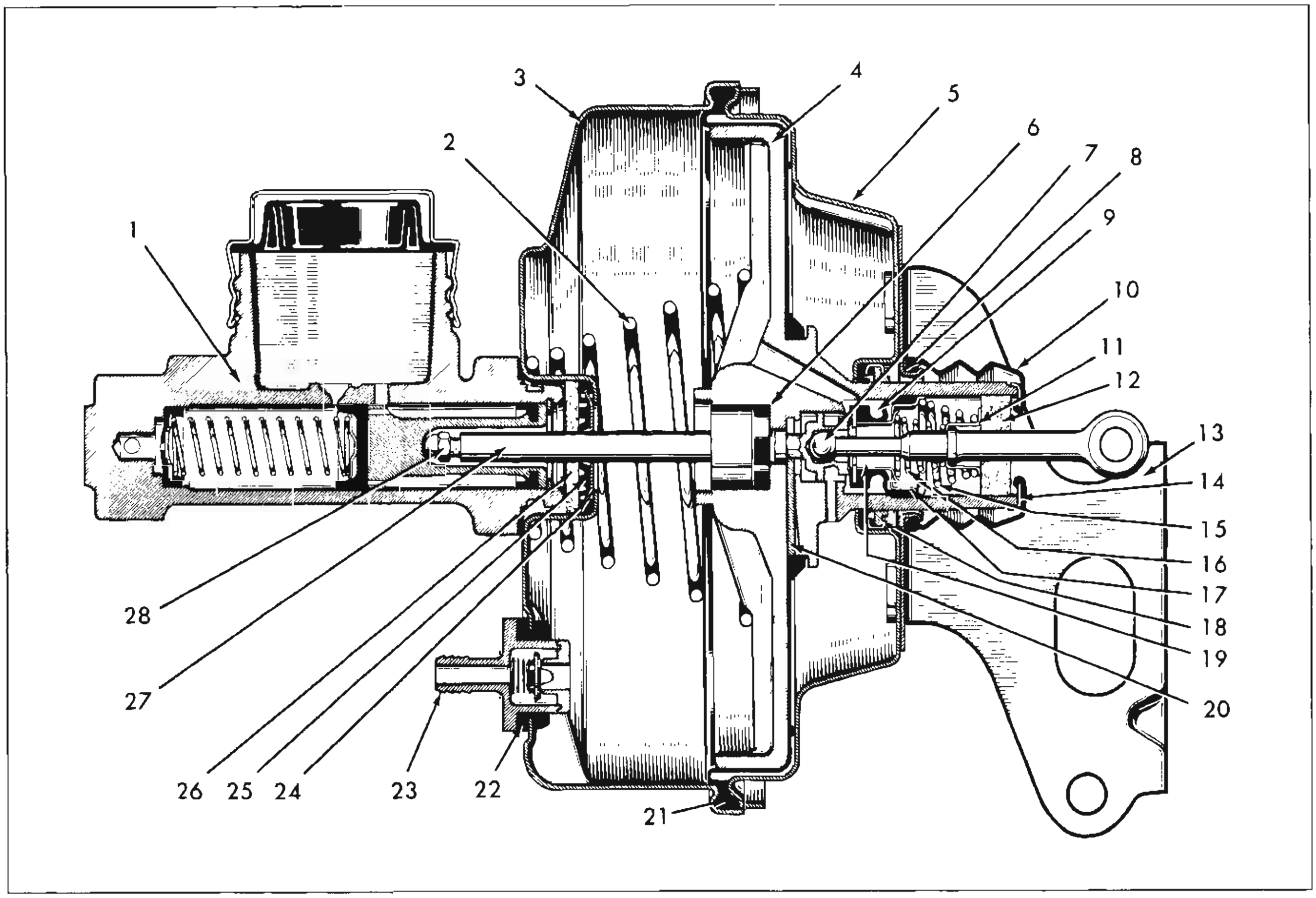

Fig. 17—Bendix Power Brake Unit

1. Main Cylinder
2. Power Piston Return Spring
3. Front Shell
4. Diaphragm Plate
5. Rear Shell
6. Reaction Disc
7. Air Valve Push Rod Assembly
8. Retainer Plate
9. Poppet
10. Rubber Boot
11. Spring Retainer
12. Air Cleaner Filter
13. Bracket
14. Filter Retainer
15. Poppet Return Spring
16. Air Valve Return Spring
17. Poppet Retainer
18. Bearing Seal
19. Air Valve Spring Retainer
20. Air Valve Lock
21. Rolling Diaphragm
22. Grommet
23. Check Valve
24. Seal Support
25. Push Rod Seal
26. Main Cylinder Filter
27. Hydraulic Push Rod
28. Adjusting Screw

The Master-Vac power brake unit permits the use of a low brake pedal as well as less pedal effort than is required with the conventional (nonpower) hydraulic brake system. Only two external line connections are necessary—one a vacuum connection from manifold to check valve located on front shell; the other a hydraulic connection from the main cylinder outlet directly into the hydraulic system. The unit is mounted on the engine side of the fire wall and connected to the brake pedal through an auxiliary lever and rod.

MAINTENANCE AND ADJUSTMENTS

Inspections

1. Check vacuum line and vacuum line connections as well as vacuum check valve in front shell of power unit for possible vacuum loss.
2. Inspect all hydraulic lines and connections at the wheel cylinders and main cylinder for possible hydraulic leaks.
3. Check brake assemblies for scored drums, grease or brake fluid on linings, worn or glazed linings, and make necessary adjustments.
4. Check the brake fluid level in the hydraulic reservoir. The reservoir should be filled to within ¼" of the top of the filler cap opening. Inspect the reservoir cover for fluid leaks at gasket.
5. Check for loose mounting bolts at main cylinder and at power section.
6. Check air cleaner filter located in the power piston extension—replace filter if necessary.
7. Check brake pedal for bending and misalignment between pedal and push rod.

Lubrication

The Master-Vac power brake unit is lubricated at assembly and needs no further lubrication other than maintaining normal reservoir fluid level. The reservoir should be filled as described in this section, using only recommended brake fluid.

Bleeding Instructions

The power system may be bled manually or with a pressure bleeder as outlined in this section. If pressure bleeding method is to be used follow procedure outlined under "Standard Brakes."

Use only recommended brake fluid. Do not use power assist while bleeding. The engine should not be running and the vacuum reserve should be reduced to zero, by applying the brake several times before starting the bleeding procedure.

Air Cleaner Service

The air cleaner filter used with the power brake unit should be cleaned at least twice a year. To clean, remove air cleaner element and wash thoroughly in cleaning solvent—allow element to dry before reinstalling.

SERVICE OPERATIONS

Removal

1. Disconnect push rod clevis at brake pedal arm.

   NOTE: If clearance hole through fire wall is not large enough, it may be necessary to remove clevis from push rod. Note approximate location of clevis on rod.

2. Remove vacuum hose from check valve.
3. Disconnect hydraulic line at main cylinder.
4. Remove four nuts and lockwashers securing power unit to fire wall, and remove power unit from engine compartment.

Disassembly

The following procedure applies to the power section of the power brake unit only—for service of the main cylinder refer to applicable portion of "Standard Brakes."

1. Remove main cylinder from power section, and place main cylinder aside.
2. Remove main cylinder filter, piston seal assembly and main cylinder push rod from front shell (fig. 18)—pulling the push rod from front shell will also remove the filter and seal assembly.
3. Position and secure Tool J-9576-1 (fig. 19) to main cylinder mounting studs, and place tool and power unit in a vise. Be sure to align tool so that check valve in front shell is not damaged.
4. Disconnect linkage at air valve push rod, and remove mounting bracket from rear shell.
5. Remove rubber boot and retainer plate from rear shell.

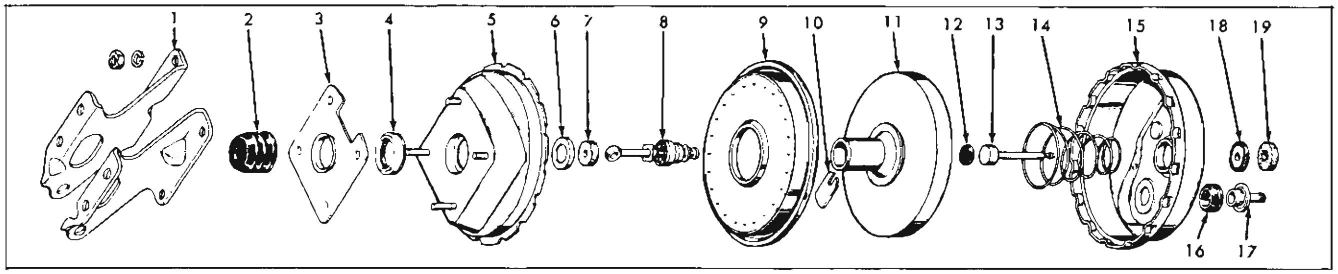

Fig. 18—Component Exploded View

1. Mounting Bracket
2. Rubber Boot
3. Retainer Plate
4. Bearing Seal
5. Rear Shell
6. Filter Retainer
7. Air Cleaner Filter
8. Air Valve Push Rod Assembly
9. Rolling Diaphragm
10. Air Valve Lock
11. Diaphragm Plate
12. Reaction Disc
13. Hydraulic Push Rod
14. Power Piston Return Spring
15. Front Shell
16. Grommet
17. Check Valve
18. Push Rod Seal
19. Main Cylinder Filter

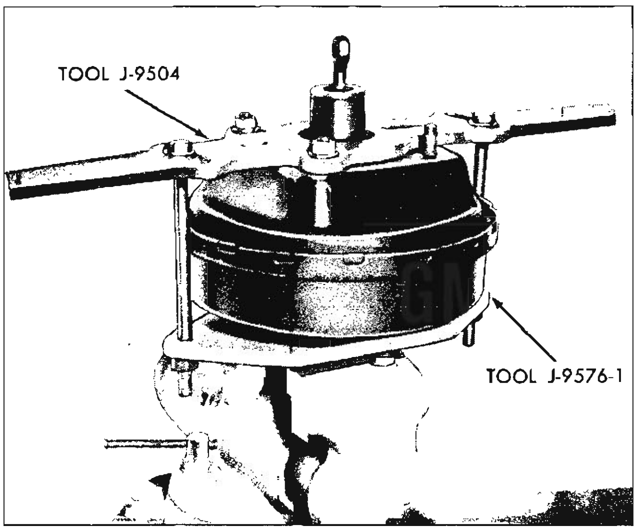

Fig. 19—Separating Shells with Tools J-9504 and J-9576-1

6. Remove filter retainer from end of diaphragm plate extension, and remove air filter element from location within the diaphragm plate extension.

NOTE: To prevent chipping of the plastic diaphragm plate, exercise extreme caution when removing the air filter retainer. Use a small screwdriver or other suitable tool, and pry at several peripheral locations until the retainer is freed.

7. Scribe alignment mark across surface of front and rear shells.

8. Position bar wrench (Tool J-9504) over studs of the rear shell so that holes in bar wrench line up with holes in holding fixture (Tool J-9576-1). Install through bolts in aforementioned holes, and tighten nuts until a slight compression is obtained.

9. Rotate Tool J-9540 until cutouts of rear shell are aligned with lances in front shell.

10. Loosen, but do not remove, the nuts on the through bolts. The shells should begin to separate as the nuts are loosened. If shells do not begin to separate, tap rear shell with a soft faced hammer. After shells begin to separate, remove nuts from through bolts.

CAUTION: Hold rear shell firmly when removing nuts from through bolts. Pressure exerted by internal diaphragm spring may cause rear shell to fly off when shells are in the released position.

11. Remove power piston from front shell, separate power piston from rear shell, and remove Tool J-9504 from unit.

12. Disassemble power piston. (See Figure 20).

    a. Remove rolling diaphragm from the groove in the diaphragm plate hub.

    b. Hold the diaphragm plate so that the push rod is in its normal (horizontal) installed position, depress the push rod slightly (approximately $\frac{1}{16}$ inch), and rotate piston so the air valve lock will fall from its location in the piston hub.

    c. Remove the air valve push rod assembly from the piston.

    d. Remove the reaction disc from its location in the diaphragm plate bore. (Insert the main cylinder push rod or other suitable tool through diaphragm plate extension and push disc from its seat.) Exercise care so as not to chip surface of passages in the diaphragm plate.

NOTE: Perform Step 13 only if seal is defective and a new seal is available. Do not reuse seal once it has been removed from the unit.

13. Support outer surface of rear shell on blocks of wood or other suitable material and drive out seal with a punch or a thin blade screwdriver. Discard seal.

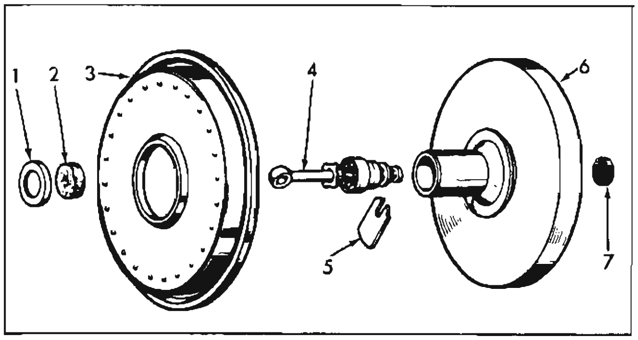

Fig. 20—Power Piston

1. Filter Retainer
2. Air Cleaner Filter
3. Rolling Diaphragm
4. Air Valve Push Rod Assembly
5. Air Valve Lock
6. Diaphragm Plate
7. Reaction Disc

14. Remove check valve from grommet; then remove grommet from front shell.
15. Remove front shell and holding fixture from vise; then remove holding fixture from front shell.

Cleaning

Use an approved nontoxic cleaning solvent to clean all metal parts. Use alcohol or an approved commercial cleaning solvent for cleaning rubber and plastic parts. Immerse parts in cleaning solvent and use a hair brush to remove foreign matter. Blow out all passages, orifices and valve holes. Air dry and place cleaned parts on clean paper or lint-free cloth. If slight rust is found on inside surface of power cylinder housing, polish clean with crocus cloth or fine emery cloth, then follow with a thorough cleaning.

The use of gasoline, kerosene, antifreeze alcohol or any other cleaner with even a trace of mineral oil will damage rubber parts. Be particularly careful during reassembly that no grease or mineral oil comes in contact with these rubber parts.

Inspection

Carefully inspect each part for damage and wear inspect rubber parts for cuts, nicks and distortion. These rubber parts are the key to control of air flow and should account for the majority of trouble traceable to leakage. If there is any question whatever as to serviceability of any part, replace it.

Assembly

The following procedure refers to the power section of the power brake unit only—for assembly procedure of the main cylinder, refer to applicable portion of "Standard Brakes."

During assembly, make sure all parts are free of foreign material before applying lubricant. If there is any doubt of cleanliness, rewash and air dry. When applying lubricant as specified in assembly procedure, use an approved lubricant of known quality and composition that will not be harmful to rubber and plastic materials.

1. Install check valve grommet in front shell—beveled edge of grommet is to be inside shell. Dip check valve in clean alcohol and install in grommet—check valve stem is to be outside shell.
2. Position and secure Tool J-9576-1 (fig. 19) to main cylinder mounting studs, and place tool and front shell in a vise. Be sure to align tool so that check valve is not damaged.

   NOTE: If either or both of the shells are replaced, make sure alignment marks are transferred to new shell.
3. Place rear shell on block, to back up plate around center hole, and position bearing seal in center hole. Use Tool J-9540 (fig. 21) to seat seal in recess of rear shell. Tool bottoms against shell when seal is in place.
4. Assemble the power piston assembly. (See Figure 20.)
   a. Apply lubricant to outside diameter of diaphragm plate and extension, to bearing surfaces of valve and plunger, and to outer edge of valve poppet. Insert valve and rod assembly in extension of diaphragm plate.
   b. Depress the push rod slightly, and install the air valve lock. Make sure the lock indexes and retains the air valve.
   c. Install the rolling diaphragm in the groove of diaphragm plate hub.
   d. Apply lubricant to surface of reaction disc and position disc in center bore of diaphragm plate. Use main cylinder push rod to seat disc in bore. Make sure disc is fully seated before removing push rod.

   NOTE: If reaction disc is not fully seated, it will result in an erroneous push rod height adjustment.
5. Apply lubricant to ID of bearing seal and diaphragm bead contact surface of rear shell. Install power piston assembly in rear shell.
6. Position bar wrench (Tool J-9504) over studs of rear shell so that holes in bar wrench will line up with holes in holding fixture (Tool J-9576-1).
7. Place power piston return spring in front shell and position rear shell assembly on front shell. Position rear shell so that when shells are locked scribe marks on front and rear shells will be in alignment.
8. Depress rear shell assembly and install through bolts to the fixture. Tighten through bolts suffi-

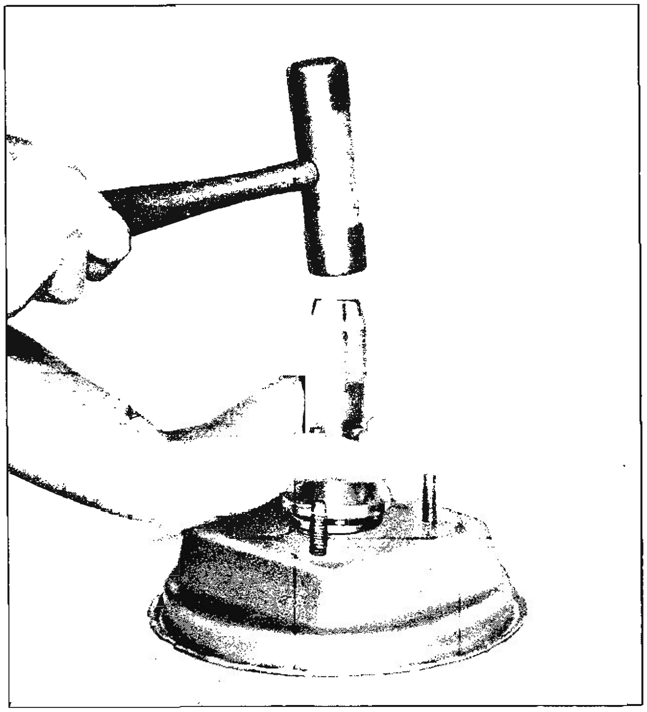

Fig. 21—Installing Piston Bearing Seal

ciently to bring scallops on rear shell slightly below lances on front shell. Rotate Tool J-9504 until scribe marks on front and rear shells are in alignment. Remove Tool J-9504 from unit.

9. Install air cleaner element and retainer to piston extension.

10. Install boot retainer and boot over piston extension and secure boot to air cleaner retainer.

11. Align and install mounting bracket to rear shell. Connect linkage to air valve push rod.

12. Remove unit from holding fixture (Tool J-9576-1).

13. Apply lubricant sparingly to the hydraulic push rod, keeping lubricant away from adjusting screw end of rod. Guide push rod into center bore of power piston until it is fully seated against reaction disc.

14. Install seal and main cylinder filter and press filter and seal into front shell until seal is bottomed in recess of shell.

15. Place Tool J-7723-01 over the push rod so that it fits between studs on front shell (fig. 22). Gauge should be parallel to studs and resting on surface of front shell. Cutout portion of gauge should just match height of push rod. Any variation may be compensated for by turning adjusting screw.

NOTE: If push rod height adjustment gauge is not available, the required dimensions for fabrication are given in Figure 23.

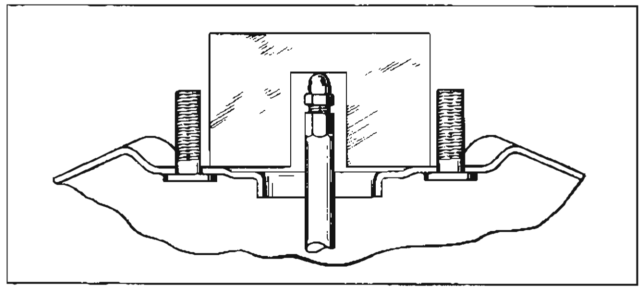

Fig. 22—Adjustment of Push Rod

16. After push rod adjustment is correct, assemble main cylinder to front shell and securely tighten retaining nuts.

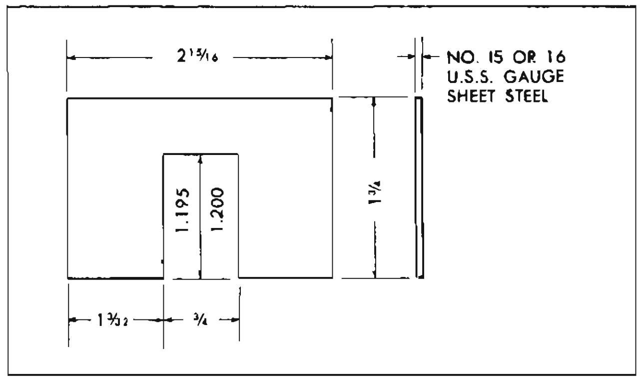

Fig. 23—Push Rod Gauge

Installation

1. Mount the power brake assembly in place and install four attaching nuts and lockwashers. Be certain to place push rod through cutout in fire wall.

2. Attach vacuum line to check valve.

3. Secure hydraulic line to main cylinder.

4. Adjust push rod clevis to brake pedal assembly. Adjust pedal height by means of clevis on brake pedal push rod at pedal. Pedal height is obtained by measuring from floor covering at toe pan to top of pedal pad. Correct heights are:

   Biscayne and Bel Air.................... 4 7/8"

   Impala .... 4 5/8"

   NOTE: Check operation of stop light after adjusting pedal height.

5. Bleed brakes as outlined in this section.

   NOTE: After completing the bleeding operation, make sure reservoir fluid level is at correct height. The reservoir should be filled to 1/4 inch of the filler cap opening.

6. Check operation of the brakes as outlined in this section.

MORAINE POWER BRAKES

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GENERAL DESCRIPTION

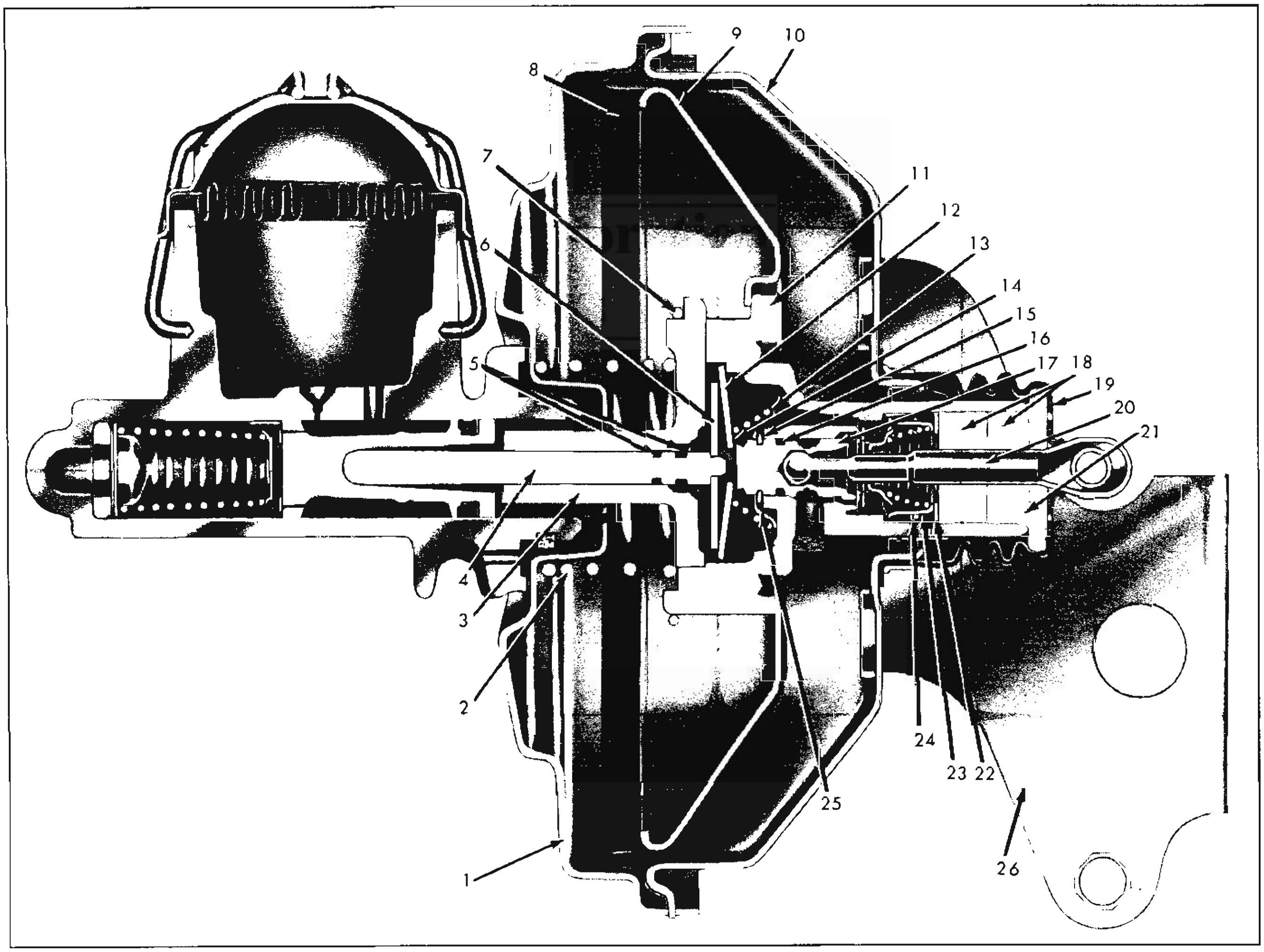


Fig. 24—Moraine Vacuum Power Cylinder

1. Front Shell
2. Power Piston Return Spring
3. Reaction Retainer
4. Master Cylinder Piston Rod
5. "O" Ring
6. Reaction Plate
7. Lock Ring
8. Diaphragm
9. Support Plate
10. Rear Shell
11. Power Piston
12. Reaction Levers
13. Air Valve Spring
14. Reaction Bumper
15. Snap Ring
16. "O" Ring
17. Air Valve
18. Air Filters
19. Boot
20. Push Rod
21. Silencer
22. Limiter Washer
23. Floating Control Valve Assembly
24. Floating Control Valve Retainer
25. Air Valve Spring Retainer
26. Bracket

The Moraine power brake unit is composed of two main sections—the vacuum power cylinder (fig. 24) and the hydraulic main cylinder.

The vacuum power cylinder contains the power piston assembly, which houses the control valve and reaction mechanism, and the power piston return spring. The control valve is made of the air valve and the floating control valve assembly. The reaction mechanism consists of a hydraulic piston reaction plate and a series of levers. The vacuum check valve is located on the forward shell of the power cylinder and provides a hose connection to accommodate the vacuum line. The air cleaner element is contained within the extended portion of the power piston housing.

MAINTENANCE AND ADJUSTMENTS

Inspections

1. Check vacuum line and vacuum line connections as well as vacuum check valve in front shell of power unit for possible vacuum loss.
2. Inspect all hydraulic lines and connections at the wheel cylinders and main cylinder for possible hydraulic leaks.
3. Check brake assemblies for scored drums, grease or brake fluid on linings, worn or glazed linings, and make necessary adjustments.
4. Check the brake fluid level in the hydraulic reservoir. The reservoir should be filled to within ¼ inch of the reservoir rim.
5. Check for loose mounting bolts at main cylinder and at power section.
6. Check air cleaner filter in power piston extension, and replace filter if necessary.
7. Check brake pedal for binding and misalignment between pedal and push rod.

Lubrication

The Moraine power brake unit is lubricated at assembly and needs no further lubrication other than maintaining normal reservoir fluid level. The reservoir should be filled as described in this section, using only recommended brake fluid.

Bleeding Instructions

The power system may be bled manually or with a pressure bleeder as outlined in this section. Use only recommended brake fluid. Do not use the power assist while bleeding. The engine should not be running and the vacuum reserve should be reduced to zero by applying the brake several times before starting the bleeding procedure.

Air Cleaner Service

Servicing of the air cleaner is recommended and the element replaced when restriction becomes severe enough to affect power brake response. At any other time, if cleaning of the filter is felt necessary, it should be shaken free of dirt or washed in soap and water and thoroughly dried.

SERVICE OPERATIONS

Removal

1. Remove vacuum hose from vacuum check valve.
2. Disconnect hydraulic line at main cylinder.
3. Disconnect push rod at brake pedal assembly.
4. Remove four nuts and lockwashers securing power unit to fire wall, and remove power unit from engine compartment.

Disassembly

The following procedure applies to the power section of the power brake unit only—for service of the main cylinder refer to applicable portion of "Standard Brakes".

1. Place the unit in a vise and firmly clasp the vise on the main cylinder reservoir.

   NOTE: Scribe alignment marks on top center of front and rear shell to facilitate reassembly.

2. Using 2 adjustable wrenches (at least 10″ long) place one wrench on the top edge of one bracket

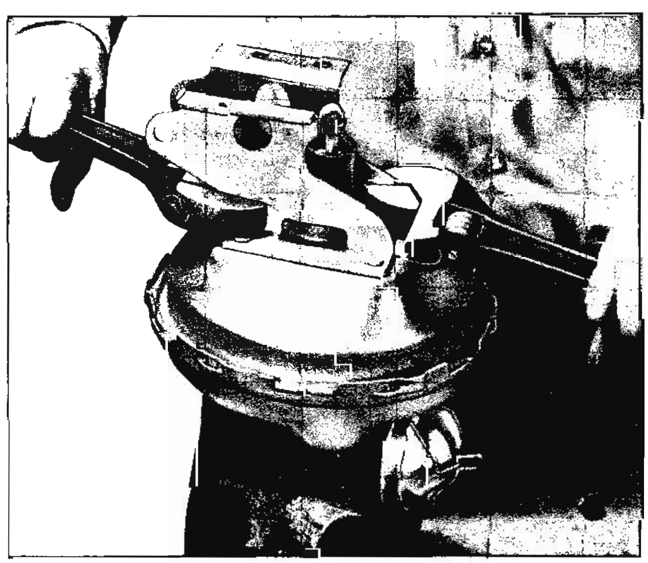


Fig. 25—Separating Front and Rear Shells

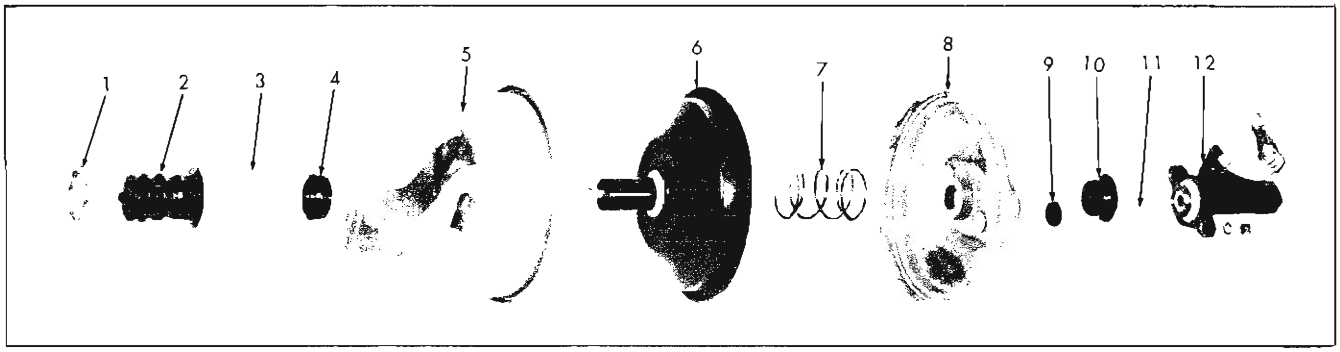


Fig. 26—Component Parts—Exploded View

1. Boot Retainer
2. Boot
3. Silencer
4. Seal
5. Rear Housing
6. Power Piston Assembly
7. Power Piston Return Spring
8. Front Housing
9. Check Valve Grommet
10. Front Housing Seal
11. Vacuum Check Valve
12. Main Cylinder Assembly

and the other wrench on the bottom of opposite bracket. Press down and rotate the rear shell counterclockwise until it is separated from the front shell. (Fig. 25)

CAUTION: Care must be exercised not to damage or loosen studs in shell. Also, take care that no pressure is brought to bear on plastic power piston extension.

3. Lift the power piston assembly and rear housing from the unit.
4. Remove the boot retainer and boot from the rear housing.
5. Remove the silencer from inside the boot.
6. Remove the power piston return spring from the front housing.
7. Reposition the main cylinder assembly in the vise and remove the main cylinder from the power brake unit and place main cylinder aside.
8. Remove the front housing seal from the center of the front housing.
9. Remove the check valve and grommet from the front housing.

CAUTION: Extreme care must be taken in handling the diaphragm of the power piston assembly (fig. 27). The diaphragm should be guarded against grease, oil, foreign matter and must be protected from nicks, scratches and gouges.

10. Remove the lock ring from the power piston by prying one of the ends out from under the large divided locking lug, and then pull it from under the remaining two small lugs.
11. Remove the reaction retainer, piston rod, reaction plate, three reaction levers, air valve spring, small reaction bumper, and air valve spring retainer.
12. Place square shank of tool J-21524 in a vise and position the assembly down on the tool so that the three lugs on the tool fit into the three notches in the power piston.
13. Pull the diaphragm edges away from the support plate and grip the steel support plate by hand, press down and rotate counterclockwise to separate the plate from the power piston. (Fig. 28)

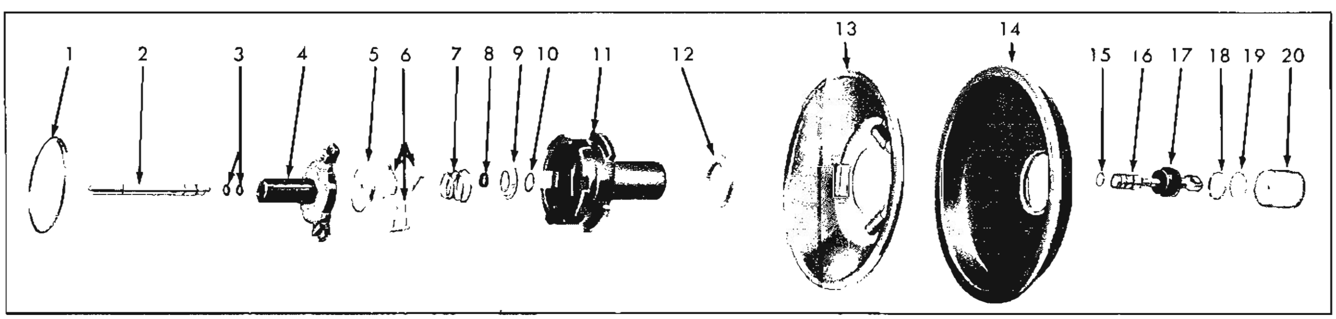


Fig. 27—Power Piston and Component Parts

1. Lock Ring
2. Master Cylinder Piston Rod
3. "O" Ring
4. Reaction Retainer
5. Reaction Plate
6. Reaction Levers
7. Air Valve Spring
8. Reaction Bumper
9. Air Valve Spring Retainer
10. Snap Ring
11. Power Piston
12. Silencer
13. Support Plate
14. Diaphragm
15. "O" Ring
16. Air Valve
17. Floating Control Valve
18. Floating Control Valve Retainer
19. Limiter Washer
20. Air Filters

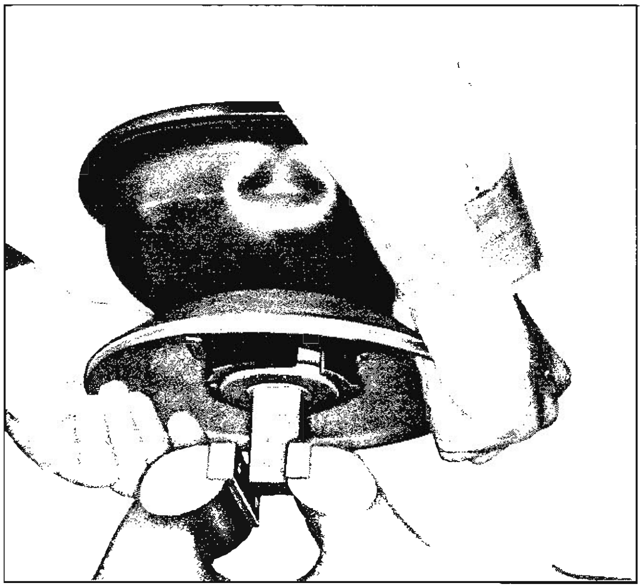


Fig. 28—Separating Power Piston from Support Plate

14. Remove the diaphragm from the support plate and lay both parts aside.
15. Remove the silencer from the neck of the power piston tube.
16. Position the power piston in a vise padded with shop-towels, with the tube down. (Fig. 29)
17. Using pliers J-4880 remove the snap ring from the air valve.
18. Place the power piston with tube down in an arbor press. Using a rod not exceeding ½" in diameter press the air valve assembly from the power piston. (Fig. 30)

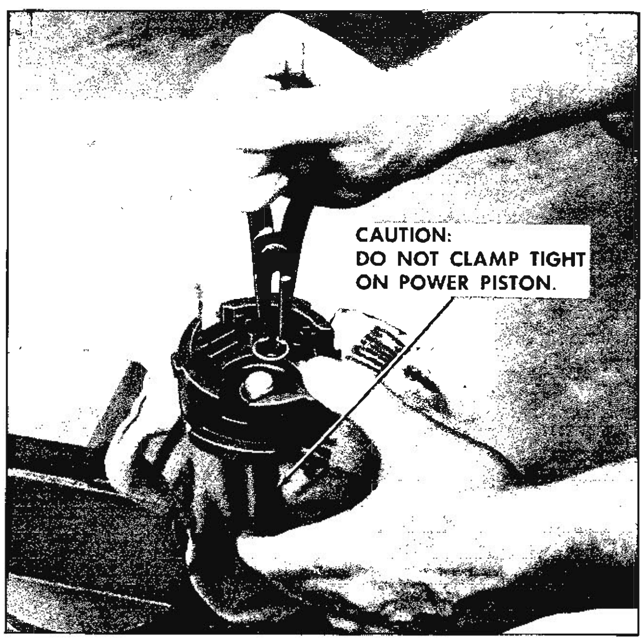


Fig. 29—Removing Air Valve Snap Ring

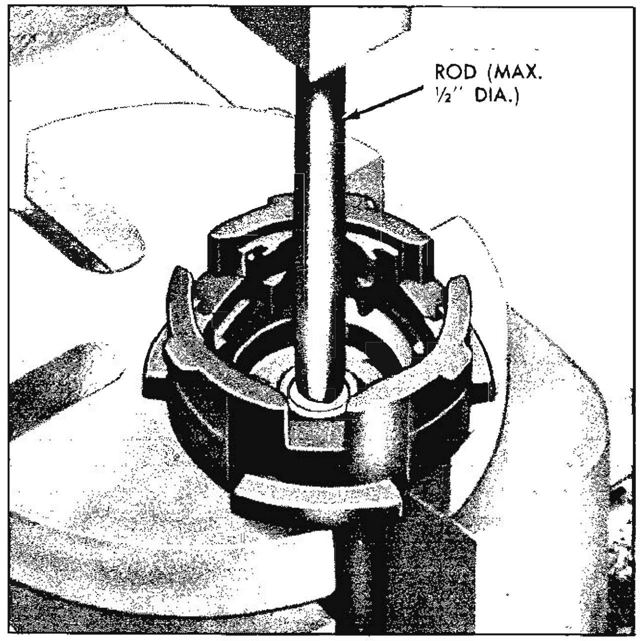


Fig. 30—Remove Air Valve Assembly from Power Piston

NOTE: A new valve assembly should always be used whenever it is removed from the power piston.

19. Push the master cylinder piston rod from the reaction retainer and remove the two "O" rings from the rod.

Cleaning

Use "Declene" or clean brake fluid to clean all metal, plastic and rubber parts of the power cylinder. Immerse parts in cleaning fluid and use a hair brush to remove foreign matter. Blow out all passages, orifices and valve holes. Air dry and place cleaned parts on clean paper or lint-free cloth. If slight rust is found on inside surface of power cylinder housing, polish clean with crocus cloth or fine emery cloth, then follow with a thorough cleaning.

Dirt is the major cause of trouble and wear in service. Be certain to keep parts completely clean until reassembly.

If there is any suspicion of contamination or evidence of corrosion, completely flush hydraulic brake system as described in this section. Failure to clean hydraulic system can result in early repetition of trouble.

Use of gasoline, kerosene, antifreeze alcohol or any other cleaner with even a trace of mineral oil will damage rubber parts. Be particularly careful during reassembly that no grease or mineral oil comes in contact with these rubber parts.

Inspection

Wipe cleaning fluid from all parts and carefully inspect each part for damage and wear. Inspect rubber parts for cuts, nicks and distortion. These rubber parts are the key to control of air flow and should account for the majority of trouble traceable to leakage. If there is any question whatever as to serviceability of any part, replace it.

Assembly (Fig. 24, 26 and 27)

Be sure that all parts are clean. If there is any doubt of cleanliness, rewash and air dry. Lubricate rubber parts with an approved rubber lubricant. Lubricate all plastic and metal friction points with an approved lubricant.

1. Replace the vacuum check valve, using a new grommet, if old one is cracked or damaged.
2. Place new front housing seal in the center of the front housing so that the flat surface of the cup lies against the bottom of depression in the housing.
3. Assemble the master cylinder onto the front housing with the scribe mark on the top of the housing lining up with the center of the master cylinder cover. Install lock washers and nuts and tighten finger tight only.
4. Install a new "O" ring in the groove on the main cylinder piston rod. Apply a thin film of lubricant to "O" ring.

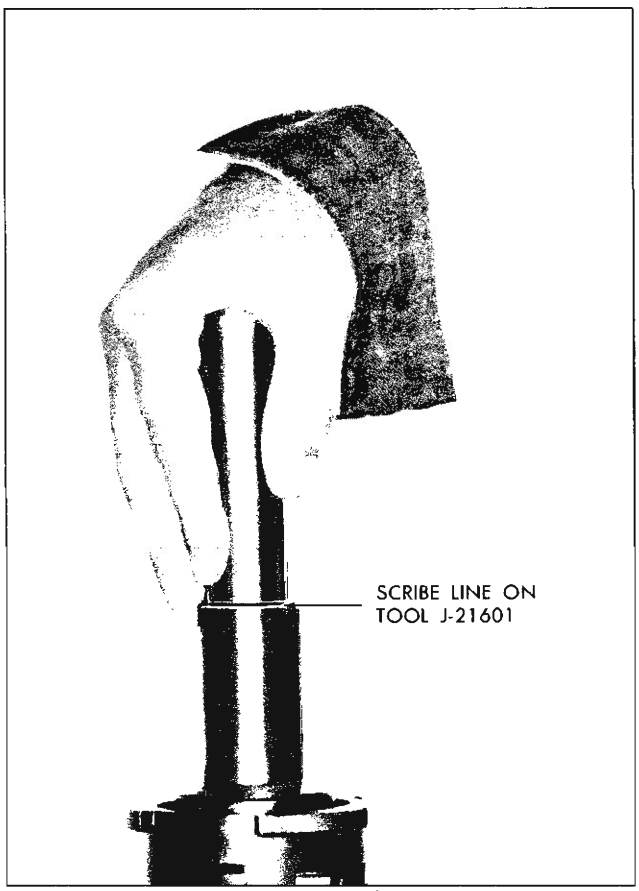


Fig. 31—Installing Air Valve and Retainer

5. Insert main cylinder piston rod through the reaction retainer with round end of rod at tube end of retainer.
6. Place the square shank of tool J-21524 in a vise and position power piston on tool with the three lugs fitting into the notches of the power piston.
7. Install a new "O" ring on the air valve in the second groove from the push rod end.
8. Coat the new floating control valve rubber and the air valve "O" ring with a thin film of lubricant.
9. Press the air valve assembly (air valve first) to its seat in the power piston tube.
10. Install a new floating control valve retainer over the push rod, (flat side toward the floating control valve).
11. Start the floating control valve and retainer into the power piston tube.
12. Seat retainer in the power piston tube by hand pressing it in place with tool J-21601. (Scribe line on tool should line up with top edge of power piston tube, Figure 31.)
13. Install the push rod limiter washer over the push rod and then the two air filter elements.
14. Install the power piston diaphragm on the support plate (opposite side of locking tang). (Fig. 32).

NOTE: Make sure the support plate is in the groove in the center flange of the diaphragm.

15. Holding the support plate on the bare metal, with locking tangs down, place the support plate assembly over the tube of the power piston.

NOTE: The flange of the diaphragm will fit into the groove on the power piston.

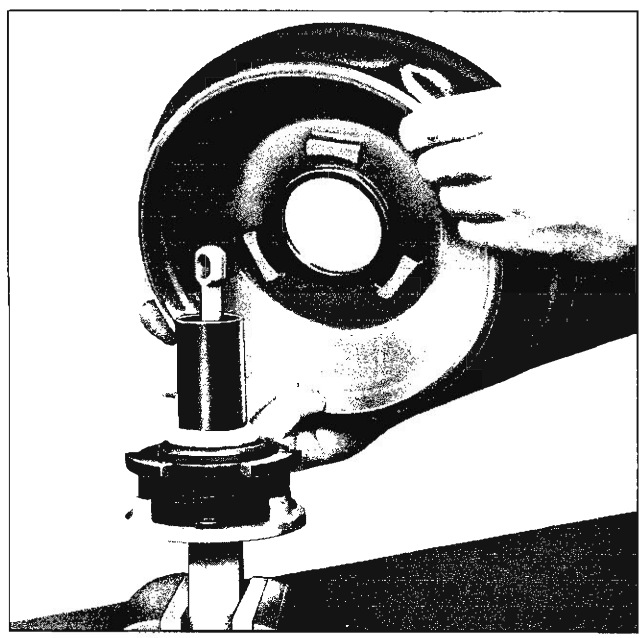


Fig. 32—Installing Power Piston to Support Plate

16. Press down and rotate the support plate assembly clockwise, until the lugs and the power piston come against the stops on the support plate.
17. Place this assembly tube down in a padded vise, **(Do Not Clamp).**
18. Install snap ring in groove of air valve with pliers J-4880. (Fig 29)
19. Install the air valve spring retainer to seat on the snap ring.
20. Install the reaction bumper into the groove in the end of the air valve.
21. Position the air valve return spring, (large end down) on the spring retainer.
22. Install the 3 reaction levers into the slots of the power piston with the small end resting on the air valve return spring.
23. Install main cylinder piston rod through the reaction retainer with round end out tube side.
24. Center reaction plate on the reaction levers (numbered side up), and place reaction retainer down on power piston. (Make sure small end of push rod engages in center hole of reaction plate). (Fig. 33)
25. Push reaction retainer down and line up the lugs with the notches in the power piston.
26. Secure with lock ring making sure ends of lock ring are set in place on the large divided lug of the power piston, (one end on each side of lug). (Fig. 34)
27. Install a new power piston bearing in the center of the rear housing (large flange of bearing on stud side of housing). Lubricate the inside of the bearing.

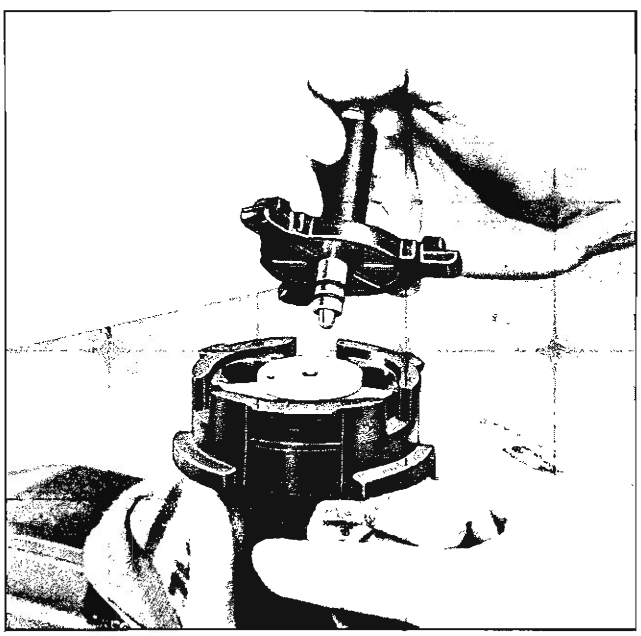


Fig. 33—Installing Reaction Retainer on to Power Piston

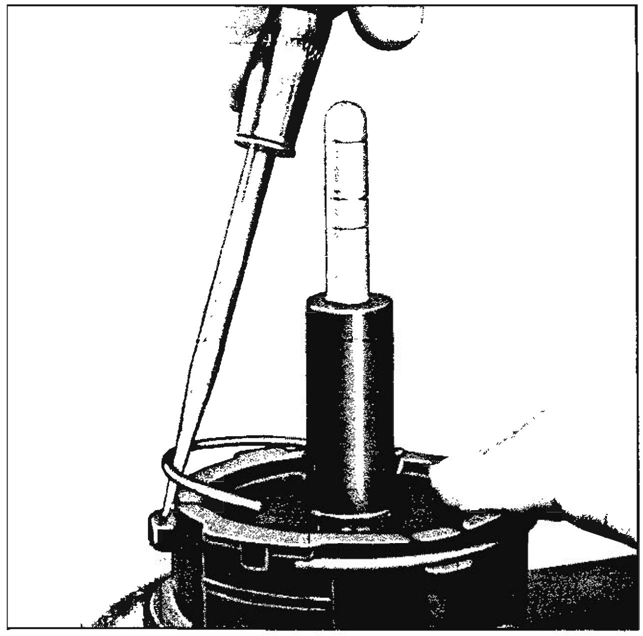


Fig. 34—Installing Retainer Ring

NOTE: Make sure flange on rear housing is engaged in groove of power piston bearing.

28. Install air silencer over the holes on the power piston tube and lubricate tube.
29. Install power piston tube through rear housing, (from side opposite of studs).
30. Clamp front housing in a vise with main cylinder down and place power piston return spring over the inset in the front housing.
31. Lubricate the I.D. of the support plate seal and the reaction retainer tube. Talcum powder the beaded edge of the diaphragm.
32. Place the rear housing assembly over the front housing assembly (with main cylinder push rod down), and align the scribed marks of the two housings so they will match when in locked position.
33. Position adjustable wrenches on rear shell brackets; press down and check to be sure that bead on edge of rolling diaphragm is positioned correctly between the shells. If this is satisfactory, apply additional downward pressure and rotate rear shell clockwise into locked position.

NOTE: If unit is not easily locked, hold shells together and apply vacuum to check valve in front shell. Do not put pressure on power piston extension.

34. Place a felt silencer in the end of the push rod boot and place boot retainer over the boot. Then install boot over push rod and on to housing.
35. Remove unit from vise and remove main cylinder from power cylinder assembly.

36. Place power unit in a vise so that main cylinder push rod is up.
37. Place tool J-7723-01 over the push rod so that it fits between the studs on front housing. Gauge should be parallel to studs on resting on surface of housing. The cutout portion of the gauge should never be lower than the end of the piston rod, and the gap should never be more than .010 inch. (Fig. 22)
38. Any variation beyond these two limits would require replacement of the piston rod with the service adjustable piston rod, and adjusting the screw in the end of the rod to match the height of the gauge.
39. Position main cylinder to power cylinder. Install lockwashers and nuts and torque to 15-20 foot pounds.

Installation

CAUTION: After replacing the unit on the vehicle, start the engine and allow vacuum to build up before applying the brake.

1. Mount the power brake assembly in place and install four attaching nuts and lockwashers.
2. Attach vacuum line to check valve.
3. Secure hydraulic line to main cylinder.
4. Attach push rod to brake pedal assembly, and check operation of stop light.
5. Bleed brakes as outlined in this section.

SYSTEM TESTS AND DIAGNOSIS

SYSTEM TESTS

1. Road test brakes by making a brake application at about 20 mph to determine if vehicle stops evenly and quickly. If pedal has a spongy feel when applying the brakes, air may be present in the hydraulic system. Bleed system as described in this section.
2. With engine stopped and transmission in neutral, apply brakes several times to deplete all vacuum reserve in the system. Depress brake pedal, hold light foot pressure on pedal and start engine. If the vacuum system is operating, pedal will tend to fall away under foot pressure, and less pressure will be required to hold pedal in applied position. If no action is felt, vacuum system is not functioning.
3. Stop engine and again deplete all vacuum reserve in system. Depress brake pedal and hold foot pressure on pedal. If pedal gradually falls away under foot pressure, the hydraulic system is leaking.
4. If the brake pedal travels to within 1" of the toeboard, brakes require adjustment or brake shoes require relining.
5. Start engine. With brakes off, run to medium speed and turn off ignition, immediately closing throttle. This builds up vacuum. Wait no less than 90 seconds, then try brake action. If not vacuum assisted for three or more applications, vacuum check valve is faulty.

DIAGNOSIS

The same types of brake trouble are encountered with power brakes as with standard brakes. Before check of power brake system for source of trouble, refer to "Troubles and Remedies" of standard brakes in this section. After these possible causes have been eliminated, check for cause as outlined below:

Hard Pedal

a. Vacuum Failure Due to
    1. Faulty vacuum check valve.
    2. Collapsed vacuum hose to manifold.
    3. Plugged or loose vacuum fittings.
b. Bound Up Pedal Mechanism
c. Power Brake Unit Trouble
    1. Jammed air valve.
    2. Vacuum leaks in unit caused by loose support plate screws, faulty air valve seal or support plate seal. Also, a damaged floating control valve, bad seal of main cylinder or mounting studs. Bad seal of the diaphragm between shells or at power piston. Faulty power piston insert seal rings or check valve grommet.
    3. Defective rolling diaphragm.
    4. Restricted air filter element.
    5. Worn or badly distorted reaction plate or levers.
    6. Cracked or broken power piston or reaction retainer.

Grabby Brakes (Apparent On-and-Off Condition)

a. Power brake unit valve trouble
    1. Sticking air valve.
    2. Restricted diaphragm passage.
b. Reaction system
    1. Dislodged reaction levers.
    2. Broken air valve spring.
    3. Worn or distorted levers or plates.

Pedal Goes to Floor (Or Almost to Floor)

a. Fluid in reservoir needs replenishing.
b. Power brake hydraulic leakage.

1. Defective primary or secondary cup.
2. Cracked main cylinder casting.
3. Leaks at wheel cylinder, brake pipes or connections.

c. Faulty main cylinder check valve.

d. Main cylinder compensating port restricted.

e. Brakes need adjustment.

Brakes Fail to Release

a. Faulty hydraulic check valve.

b. Blocked passage in power piston.

c. Air valve sticking shut.

d. Broken piston return spring.

e. Broken air valve spring.

f. Tight pedal linkage.

SPECIAL TOOLS

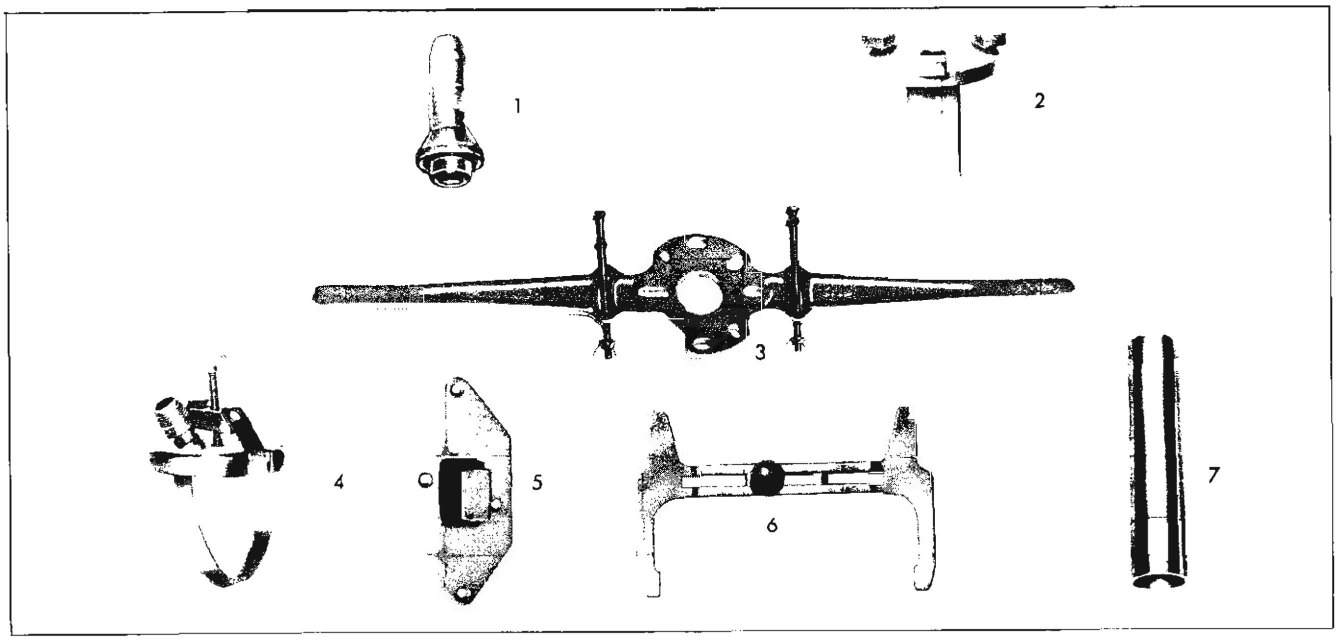


Fig. 35—Brake Special Tools

1. J-9540 Vacuum Power Cylinder Seal Installer
2. J-21524 Power Piston Remover and Installer
3. J-9504 Vacuum Power Cylinder Spanner Wrench
4. J-21479 Pressure Bleeder Adapter
5. J-9576-1 Vacuum Power Cylinder Holder and Compressor
6. J-21177 Drum-to-Brake Shoe Clearance Gauge
7. J-21601 Power Brake Retainer Installer

SPECIFICATIONS

Service Brakes

Type..............Duo-Servo, four wheel hydraulic, Self Adjusting

Brake Lining:

Material.....................Full molded asbestos composition

Dimension after grinding:

Width, front brakes 2.75

Width, rear brakes 2.00

Length, primary shoe 9.34

Length, secondary shoe 11.75

Method of attachment to shoe..............Bonded

Clearance ....Adjust to a light drag and back off seven notches.

Wheel Cylinders:

Mounting.....Front: on steering knuckle—Rear: on backing plate.

Front, inside diameter 1.1875

Rear, inside diameter 1.00

Service Brakes (Metallic Linings)

Size of Segments:

Front .... 1.64 x 1.37

Rear .... 2.00 x 1.00

Segments per shoe:

Primary—Front and rear 6

Secondary—Front 12

Secondary—Rear 10

Master Cylinder Piston diameter................ .875

SECTION 7

ENGINE TUNE-UP

This section outlines the 1964 engine tune-up procedures that differ from procedures outlined in the 1961 Shop Manual.

All engines are equipped with positive crankcase ventilation systems and Delcotron AC charging systems.

CARBURETOR ADJUSTMENTS

Carburetor adjustments for new remote choke carburetors and the low silhouette 4GC are outlined in Section 10 of this manual, as are their specifications.

FAN BELT ADJUSTMENT

Fan belt adjustment should be measured using a strand tension gauge (tool J-7316) midway between pulleys (fig. 1). Adjust the belt to obtain a gauge reading of 75±5 lbs.

DELCOTRON GENERATOR AND REGULATOR CHECK

An instrument test of delcotron output and regulator setting should not be made as a regular tune-up test; THE CONDITION OF THE BATTERY INDICATES THAT THESE TESTS BE MADE. Overcharging is indicated by excessive use of water and undercharging by slow cranking speeds, low hydrometer reading etc. At each tune-up period therefore a battery hydrometer and light load test (outlined in Section 9) should be made, followed by any indicated electrical circuit tests.

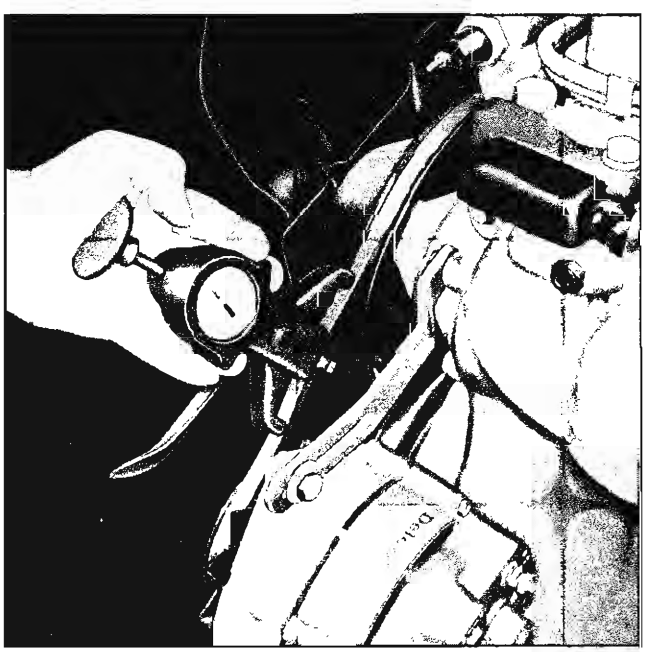


Fig. 1—Fan Belt Adjustment

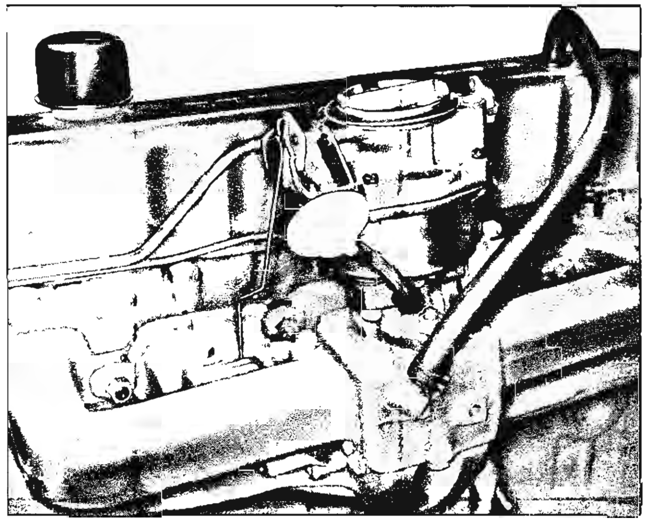


Fig. 2—Positive Ventilation (L-6)

POSITIVE CRANKCASE VENTILATION SYSTEM

(refer to figures 2, 3 and 4)

All 1964 Chevrolet engines have either "positive" or "closed" positive ventilation systems utilizing manifold vacuum to draw fumes and contaminating vapors into the combustion chamber where they are burned. The crankcase ventilation system has an important function and should be understood and serviced properly.

In both positive and closed crankcase ventilation, air is drawn through the engine, through a regulating valve and into the manifold, drawing crankcase vapors and fumes with it to be burned. Positive ventilation uses a vented oil filler cap for clean air intake to the engine, while the closed positive ventilation system draws the clean air from the carburetor air cleaner and has a non-vented oil filler cap.

Crankcase ventilation is closed positive through a fixed metered orifice at the carburetor base and air is routed from the clean air side of the air cleaner, to the rear of the block, through the push-rod cavity (under the intake manifold), to the oil filler tube and then through a hose to the orifice at carburetor flange.

The oil filler cap is non-vented.

The orifice should be cleaned at each tune-up period and can be tested in the same manner as the valve was in 1963 if desired.

Positive ventilation valves are designed specifically for each engine to control the amount of flow from the crankcase to the manifold. VALVES SHOULD NEVER BE CHANGED FROM ONE SIZE ENGINE TO ANOTHER.

The crankcase ventilation valve and the vented oil filler cap will eventually plug and become ineffective, therefore, the valve should be tested and the vented oil filler cap should be washed in solvent, blown dry with compressed air and be re-oiled at regular intervals. (See section 0).

Two methods for testing the ventilation valve are as follows:

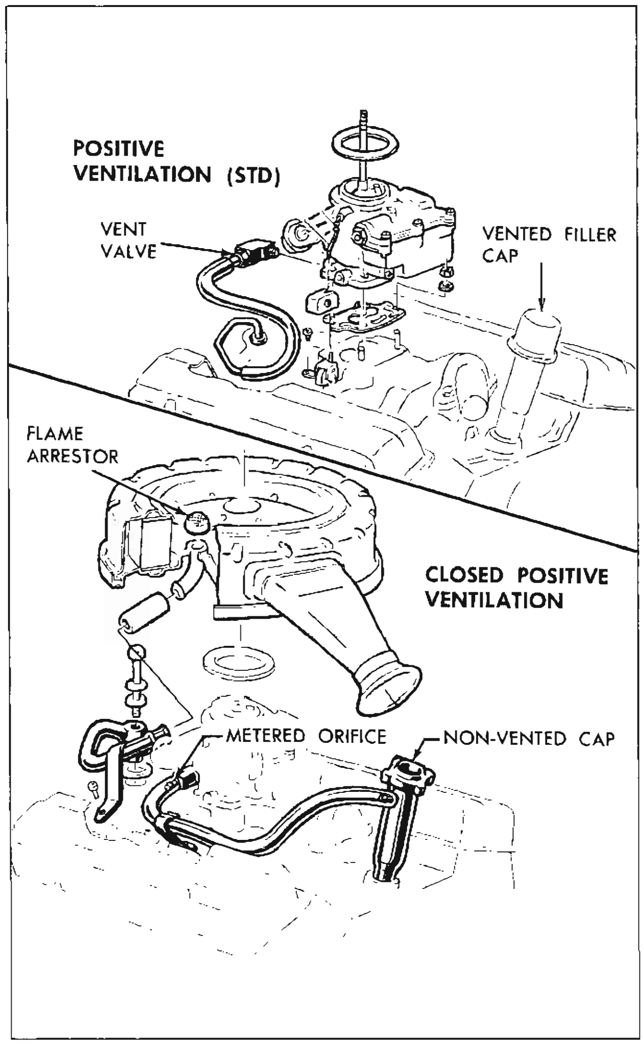
ENGINE RPM DROP METHOD:

1. Connect tachometer and vacuum gauge as for idle speed and mixture adjustment.
2. Set parking brake and start engine.
3. a. 4 and 6 cylinder engines–Remove valve from rocker arm cover (with hose still connected), plug the open end of the valve and read engine rpm change.
   b. 8 cylinder engine–Disconnect ventilation hose at valve (or orifice) on carburetor base, block vacuum opening and read engine rpm change.
4. A change of less than 50 rpm indicates a plugged ventilation metering hole–replace the valve or clean fixed orifice and adjust idle speed and mixture.

CRANKCASE VENTILATION TESTER METHOD: (A.C. TYPE CT-1 TESTER)

1. Remove oil filler cap and install tester adapter with tube connector.
2. Remove oil gauge dipstick and seal the opening with a plug or tape.
3. (Closed Positive Ventilation System)–Disconnect air cleaner (to oil filler tube or rocker cover) hose at air cleaner and plug the end of hose with tape or a plug.
4. Connect rubber hose to tester base and to filler cap adapter, then adjust the selector knob (on base of tester) for valve being tested. (see chart below)
5. Start engine and allow to run at normal idle.
6. Hold tester upright and make sure there are no kinks in the hose. Look directly into viewing windows and observe indicator color.
7. A reading of green indicates a proper functioning valve. Any other reading should be verified by installing a new valve and retesting to be sure the valve was at fault rather than engine seals. A green reading with new valve indicates first valve was bad–a duplication of first reading, with new valve, indicates other engine trouble, the original valve was good.

ENGINE		230 6 Cyl.	283 327 V-8
Part No.	Production	5649998	5649996
	Service Pkg.	6418440	5649689
Valve Type No.		CV 607	CV 590
LABEL Color Code		White Print on Red	Red Print on White
CT-1 Tester Setting		4	2



Figs. 3 and 4—Crankcase Ventilation

1964 PASSENGER CAR ENGINE TUNE-UP SPECIFICATIONS

ENGINE	230	283	327	327	409	409	409
H.P.	140	195	250	300	340	400	425
Carburetors	BC	2GC	WCFB or 4GC	AFB	4GC	AFB	Dual AFB
Compression PSI Note 1	130	150	160	160	150	150	150
SPARK PLUGS — Make and Number — Colder	AC—44N	AC—44	AC—43		AC—C42N		
SPARK PLUGS — Make and Number — STD.	AC—46N	AC—45	AC—44		AC—43N		
SPARK PLUGS — Make and Number — Hotter	—		AC—45		AC—44N		
SPARK PLUGS — Gap	.035"						
Ignition Distributor — Point Dwell	31°-34°	28°—32°					
Ignition Distributor — Point Gap	.019" New—.016" Used						
Ignition Distributor — Point Arm Spring Tension	Preset at 19—23 oz.						
Ignition Distributor — Condenser	.18—.25 Microfarad						
Fan Belt	75 ± 5 Lbs. Using Strand Tension Gauge						
Air Cleaner Note 2	Polyurethane wash and Reoil	Paper Element				Polyurethane Wash and Reoil	Paper Replace
TAPPET CLEARANCE — Inlet	Hydraulic—One Turn to Center Plunger					Mech.—.012 (.018③)	
TAPPET CLEARANCE — Exhaust	Hydraulic—One Turn to Center Plunger					Mech.—.020 (.030③)	
Ignition Timing Note No. 4	4° BTDC Nominal Range 4°—8°			8° BTDC Nominal Range 6°—12°	6° BTDC Nominal	12° BTDC Nominal	
Engine Idle RPM — Syn.	500					750	750
Engine Idle RPM — Auto. (In Drive)	500					—	—
FUEL PUMP — Press.	3½ T. 4½ PSI	5¼ to 6½ PSI				7¼ to 8½ PSI	
FUEL PUMP — Vol.	One Pint in 30 to 45 Seconds						
Cooling System Radiator Pressure	13 PSI (15 PSI on Air Conditioned Vehicles)						
Crankcase Vent Valve	⑤A.C. CV-607	AC—CV-590⑤			Fixed Metered Orifice		

Note 1—All plugs removed and throttle wide open.

Note 2—Paper element—check at 1st 12,000 and each 6,000 miles thereafter. Polyurethane each 12,000 miles.

③Note 3—Sustained high speed.

Note 4—Spark advance line disconnected and vacuum opening plug.

⑤Note 5—Optional metered orifice.

SECTION 8

ENGINE MECHANICAL

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SIX CYLINDER ENGINE

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GENERAL DESCRIPTION

A completely new six cylinder engine (fig. 2) is used on 1964 passenger cars. It has seven main bearings, hydraulic valve lifters and hollow push rods operate, and supply oil to, individually mounted rocker arms in the valve train.

An automatic choke system and closed crankcase ventilation (fig. 3) are standard equipment in 1964.

A gear type oil pump supplies oil through a full-flow oil filter to the main oil gallery (along hydraulic lifters) which supplies the main and cam bearings.

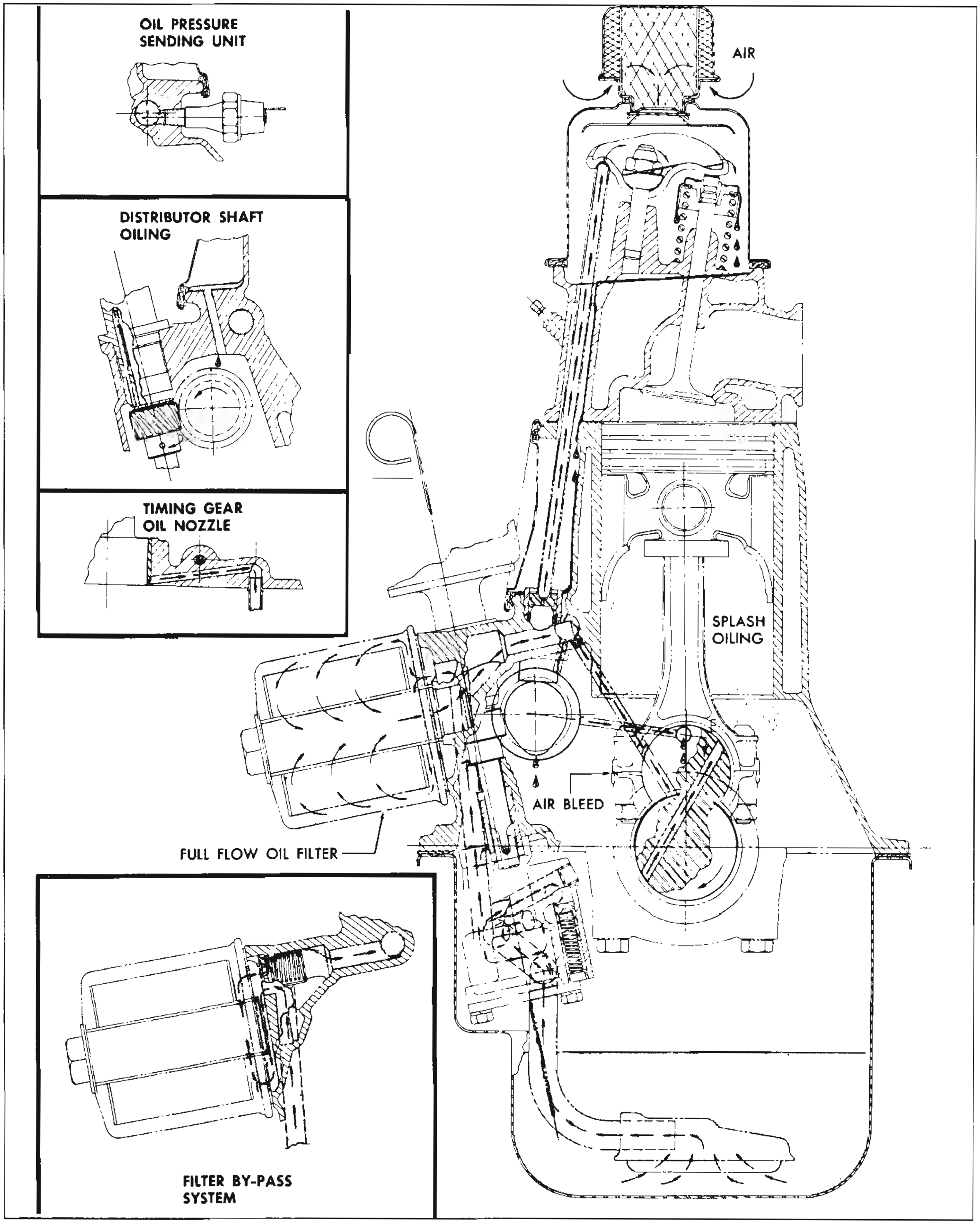

Fig. 1—Oil System Diagram

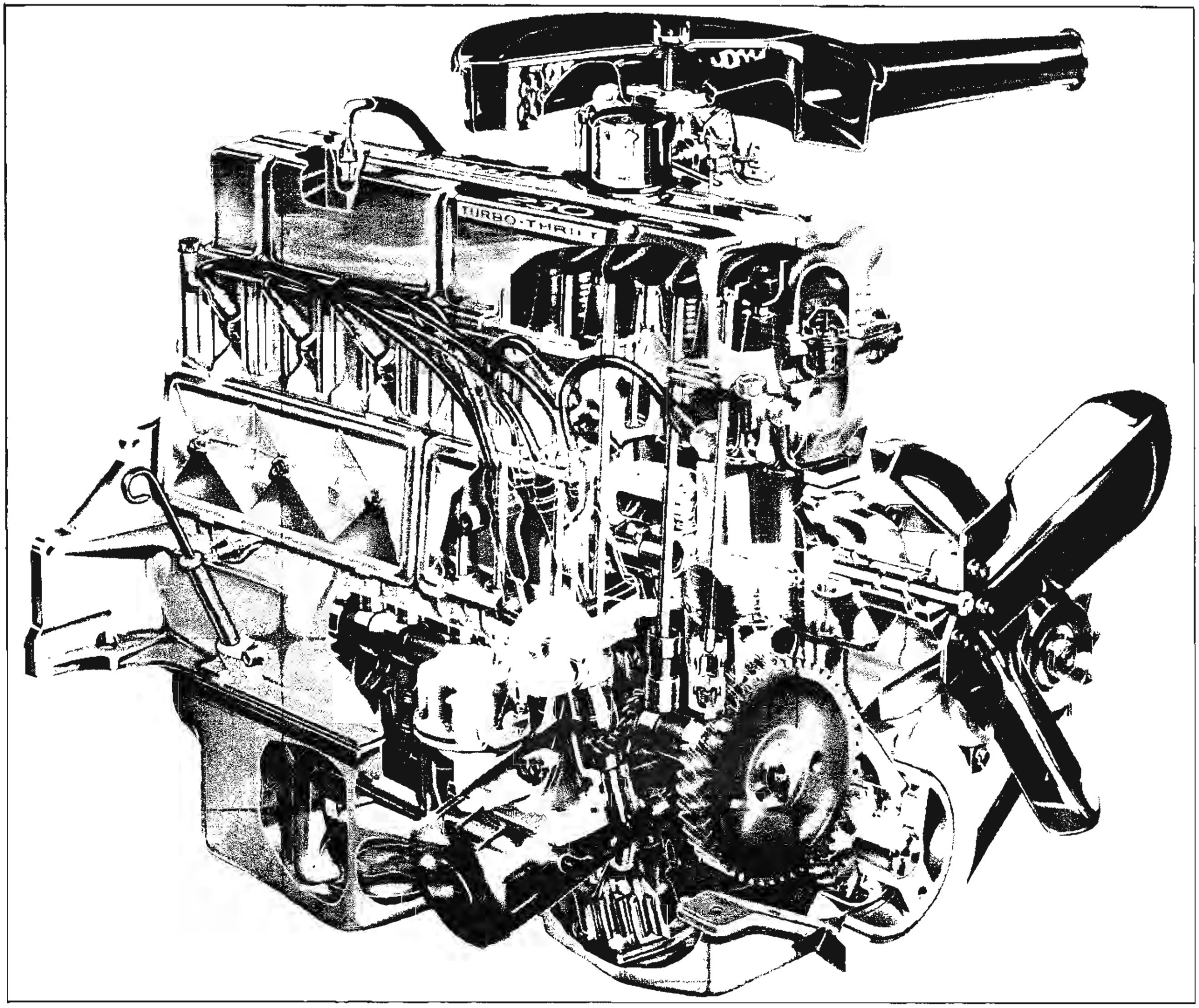

Fig. 2—Phantom Cross-Section

MAINTENANCE AND ADJUSTMENTS

Engine maintenance consists of lubrication, service and inspection performed at regular intervals to keep the engine performing to its design level. These procedures are outlined in Section 2, Lubrication, and Section 7, "Tune-Up" of this manual.

SERVICE OPERATIONS

Service operations include the removal, disassembly, cleaning, inspection, repair, assembly, and installation or replacement of component parts. Items have been listed in order of engine disassembly whenever possible.

INTAKE AND EXHAUST MANIFOLDS

Removal

1. Remove air cleaner wing nut and air cleaner.
2. Disconnect both throttle rods at bell crank and remove throttle return spring.
3. Disconnect fuel vacuum lines from carburetor. On 6 cylinder engine remove clean air tubes to choke
4. Remove carburetor.
5. Disconnect exhaust pipe at manifold flange.
6. Remove manifold to head attaching bolts and clamps and remove manifolds as an assembly.

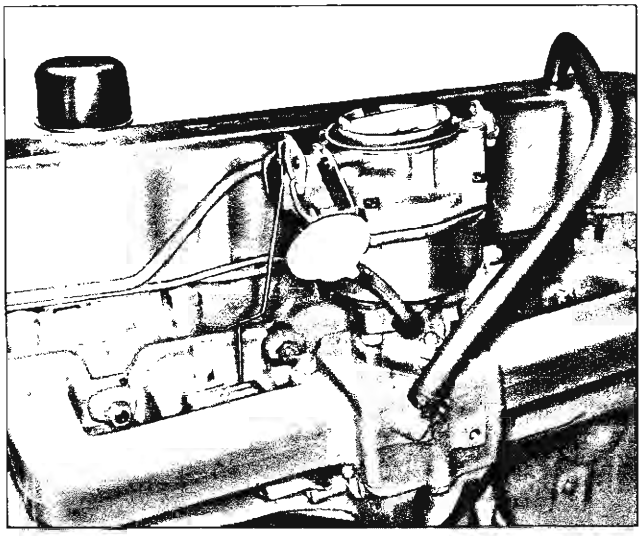

Fig. 3—Automatic Choke System and Positive Ventilation

Repair

1. Clean gaskets flanges on cylinder head and manifolds.
2. Check for cracks on manifold castings.
3. **If necessary** to replace either intake or exhaust manifold, separate them by removing 1 attaching bolt and 2 nuts at center of assembly. Reassemble manifolds using new gasket. Tighten finger tight and torque 15-30 ft. lbs. **after** assembly to cylinder head.

Installation

1. Position new gaskets over manifold end studs on head and carefully install the manifold in position making sure the gaskets are in place.
2. Install bolts and clamp while holding manifold in place with one hand.
3. Tighten center clamp bolts to 25-30 ft. lbs. and end bolts to 15-20 ft. lbs. (fig. 4).

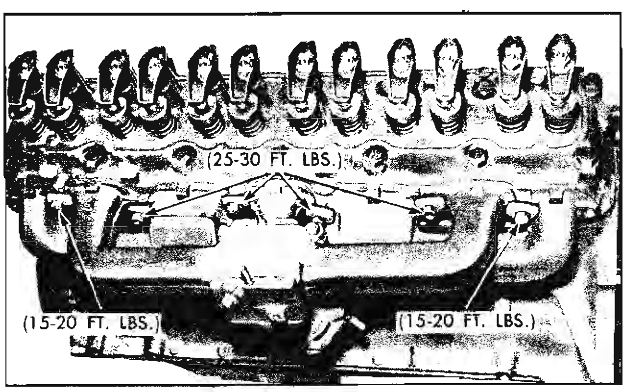

Fig. 4—Manifold Torque Sequence

4. Connect exhaust pipe to manifold using a new packing seal.
5. Reverse Steps 1-4 of Removal to complete installation procedure.

MANIFOLD HEAT RISER VALVE

Check manifold heat control valve (fig. 5) for freedom of operation. If shaft is sticking, free it up with G.M. Manifold Heat Control Solvent or its equivalent.

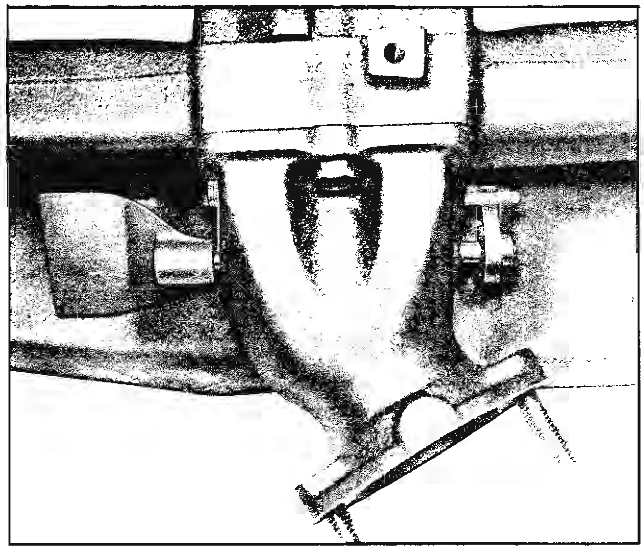

Fig. 5—Manifold Heat Riser Valve

VALVE LIFTERS

Hydraulic valve lifters very seldom require attention. The lifters are extremely simple in design, readjustments are not necessary, and servicing of the lifters require only that care and cleanliness be exercised in the handling of parts.

The easiest method for locating a noisy valve lifter is by use of a piece of garden hose approximately four feet in length. Place one end of the hose near the end of each intake and exhaust valve with the other end of the hose to the ear.

In this manner, the sound is localized making it easy to determine which lifter is at fault.

Another method is to place a finger on the face of the valve spring retainer. If the lifter is not functioning properly, a distinct shock will be felt when the valve returns to its seat.

The general types of valve lifter noise are as follows:

1. Hard Rapping Noise – Usually caused by the plunger becoming tight in the bore of the lifter body to such an extent that the return spring and

oil pressure combined can no longer push the plunger back up to working position. Probable causes are:

a. Excessive varnish or carbon deposit causing abnormal stickiness.

b. Galling or "pick-up" between plunger and bore of lifter body, usually caused by an abrasive piece of dirt or metal wedging between plunger and lifter body.

2. Moderate Rapping Noise—Probable causes are:

a. Excessively high leakdown rate.

b. Leaky check valve seat.

c. Improper lash adjustment.

3. General Noise Throughout the Valve Train—This will, in almost all cases, be a definite indication of insufficient oil supply, or improper lash adjustment.

4. Intermittent Clicking—Probable causes are:

a. A microscopic piece of dirt momentarily caught between ball seat and check valve ball.

b. In rare cases, the ball itself may be out-of-round or have a flat spot.

c. Improper lash adjustment.

In most cases where noise exists in one or more lifters, all lifter units should be removed, cleaned in a solvent, reassembled, and reinstalled in the engine. If dirt, varnish, carbon, etc. is shown to exist in one unit, it more than likely exists in all the units, thus it would only be a matter of time before all lifters caused trouble.

In instances where parts are damaged, particularly the plunger or lifter body, the complete lifter unit should be replaced. However, in rare or emergency cases an Arkansas hard stone may be used to remove metal scratches or humps; and if after correcting, the plunger will operate freely in the lifter body, the parts may be thoroughly cleaned and the unit assembled and installed.

A few precautions to follow when servicing the valve lifters are:

1. Plungers are not interchangeable, they are a selective fit at the factory. Should a plunger or lifter body become damaged, it is necessary to replace the whole unit.
2. The plunger must be free in the lifter body. A simple test for this is to be sure the plunger will drop of its own weight in the body.
3. There must be no excessive leakdown and there must be no ball check valve leakage.

Removal

1. Disconnect crankcase vent hose and remove rocker arm cover.
2. Note threads showing above rocker arm nuts, then loosen nuts and pivot the rocker arms free of the push rods.
3. Disconnect spark plug wires at plugs and high tension lead from coil.
4. Remove distributor primary lead from coil, note distributor rotor position and remove distributor. (Mark distributor housing with chalk at point of rotor.)
5. Remove push rod cover and gasket.
6. Remove push rods and valve lifters.

NOTE: Valve lifters and push rods should be placed in a rack in their proper sequence so they can be reinstalled in the same positions in the cylinder block.

Disassembly and Assembly

1. Hold plunger down with a push rod and using the blade of a small screwdriver, remove plunger and push rod seat retainer.
2. Remove push rod seat, plunger and ball check valve assembly and plunger lifter spring. Figure 6 shows a layout of the parts.

NOTE: It is not necessary to remove ball check valve from plunger for cleaning. Figure 7 shows a cross-section of lifter.

3. Thoroughly clean all parts in cleaning solvent, then inspect them carefully. If any parts are damaged, the entire lifter assembly should be replaced.
4. To reassemble drop lifter spring into lifter body.
5. Install plunger and ball check valve assembly in lifter body, being careful to line up the feed holes in lifter body and plunger.
6. Fill assembly with SAE 10 oil, then insert end of Tool J-4272 into plunger and press down solid, at

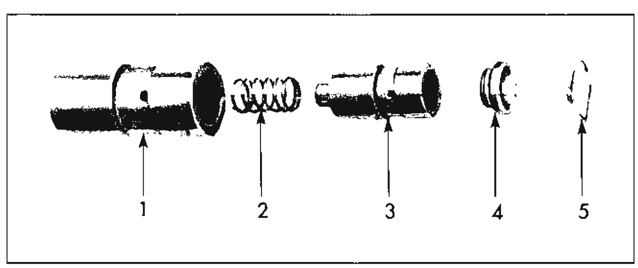

Fig. 6—Valve Lifter Components

1. Body
2. Spring
3. Plunger & Ball Check Valve
4. Push Rod Seat
5. Retainer

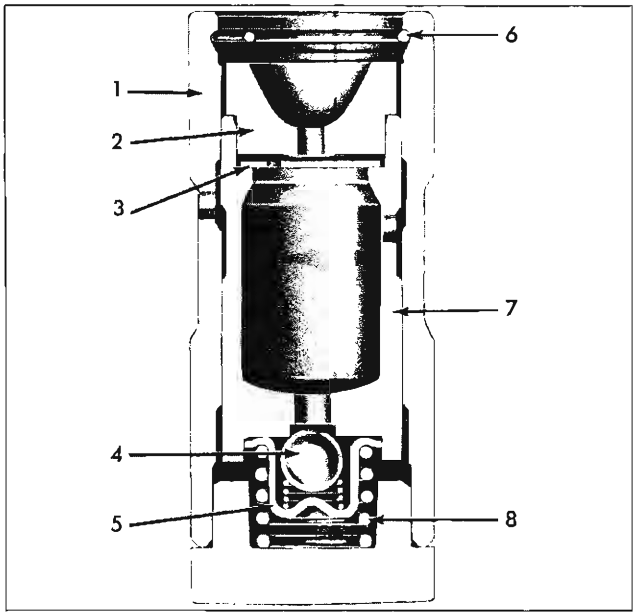

Fig. 7—Valve Lifter Cross-Section

1. Lifter Body
2. Push Rod Seat
3. Metering Valve
4. Check Ball
5. Ball Retainer
6. Push Rod Seat Retainer
7. Plunger
8. Plunger Spring

which point holes in lifter body and plunger assembly will be aligned.

7. Insert pin which is part of Tool J-4274-2 through both holes to hold plunger down against lifter spring tension. Remove tool from top of lifter.
8. Fill assembly with SAE 10 oil, install push rod seat and spring retainer.
9. Press down on push rod seat and remove pin Tool J-4274-2. The hydraulic lifter is now completely assembled, loaded with oil and ready for installation.

Installation

1. Install valve lifters in cylinder block.
2. Install push rods onto lifters and install push rod cover with a new gasket.
3. Install distributor (position rotor to mark on housing). Install spark plug and coil wires.
4. Pivot rocker arms in place and turn adjusting nuts the amount necessary to eliminate lash.
5. Adjust valve lash when lifter is on base circle of cam as follows:
   a. Remove distributor cap and crank engine until distributor rotor points to number one cylinder terminal with breaker points open. In this position the piston in number one cylinder is at top center on compression stroke with both lifters on base circle of cam and both valves can be adjusted.
   b. Turn adjusting nut until all lash is removed from valve train. This can be determined by checking push rod side play by hand while turning adjustment nut slowly (fig. 8). At this point, turn adjusting nut one more turn to place the lifter plunger in center of its travel.

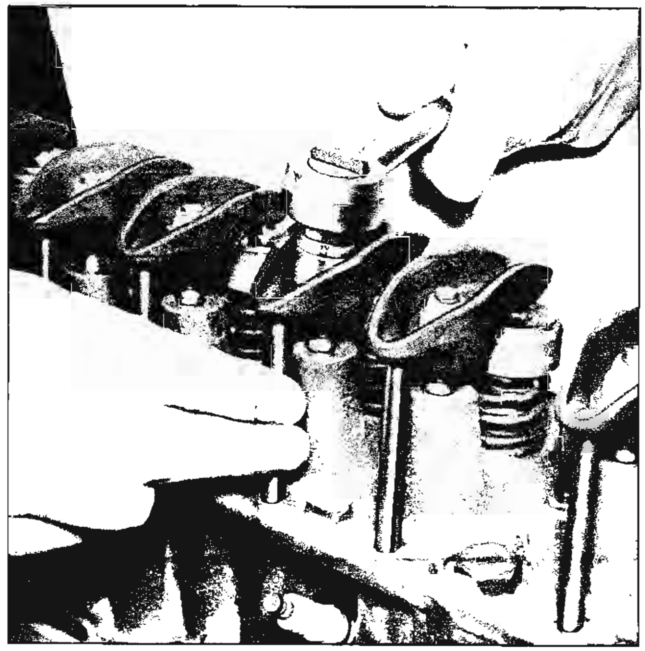

Fig. 8—Adjust Valve Lash

   c. Follow Steps a and b for each cylinder in order of firing order and adjust remaining valves one cylinder at a time. No further adjustment is necessary.
6. Install rocker cover gasket, cover and ventilation hose.
7. Start engine and check for oil leaks, and listen for noisy lifter.

NOTE: If lifters are noisy, refer to "Valve Lash," under "Tune-Up Procedures," Section 7.

CYLINDER HEAD AND VALVE MECHANISM

The condition of the cylinder head and valve mechanism, significantly determines the power, performance and economy of a valve-in-head engine. Extreme care should be exercised when conditioning the cylinder head and valves to maintain correct valve stem to guide clearance, correctly ground valves, valve seats of correct width and correct valve adjustment.

Removal

1. Drain cooling system and remove air cleaner.
2. Disconnect accelerator pedal rod at bell crank on manifold, fuel and vacuum lines at carburetor, and crankcase vent hose at rocker cover.
3. Disconnect exhaust pipe at manifold flange, then remove manifold bolts and clamps and remove manifolds and carburetor as an assembly.
4. Remove fuel and vacuum line retaining clip from water outlet and disconnect wire harness from temperature sending unit and coil leaving harness clear of clips on rocker arm cover.
5. Disconnect radiator hose at water outlet housing and battery ground strap at cylinder head.
6. Disconnect wires and remove spark plugs, disconnect coil to distributor primary wire lead at coil and remove coil.
7. Remove rocker arm cover. Back off rocker arm nuts, pivot rocker arms to clear push rods and remove push rods.
8. Remove the cylinder head bolts, cylinder head and gasket. Place cylinder head on blocks of wood to prevent damage.

Disassembly

1. Remove rocker arm nuts, ball seats and rocker arms.
2. Using Tool J-8062, compress the valve spring and remove valve keys (fig. 9). Release the spring compressor tool and remove spring caps, spring seats, oil seals, springs and spring dampers.

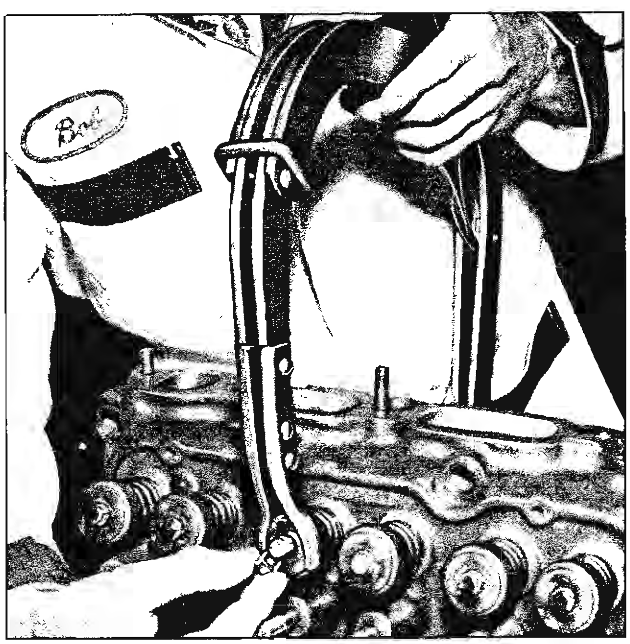

Fig. 9—Compressing Valve Springs

3. Remove valves from bottom of cylinder head and place them in a rack in their proper sequence so they can be assembled in their original positions.
4. Remove water outlet and thermostat, then remove thermostat housing.

Cleaning

1. Clean all carbon from combustion chambers and valve ports using Tool J-8089 (fig. 10).

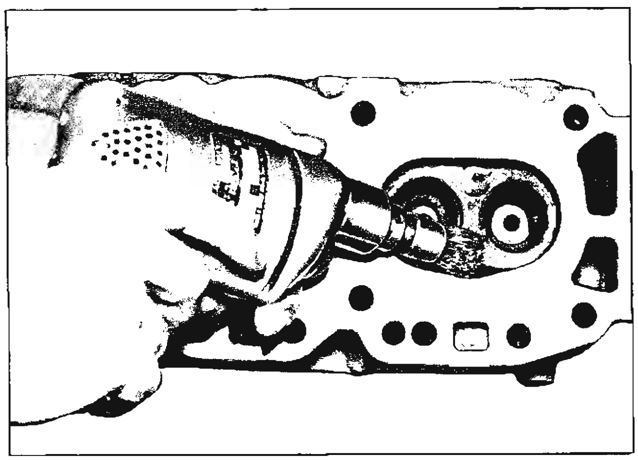

Fig. 10—Removing Carbon from Combustion Chamber

2. Thoroughly clean the valve guides using Tool J-8101 (fig. 11).
3. Clean all carbon and sludge from push rods and rocker arms.
4. Clean valve stems and heads on a buffing wheel.
5. Clean carbon deposits from head gasket mating surfaces.
6. Wash all parts in cleaning solvent and dry them thoroughly.

Inspection

1. Inspect the cylinder head for cracks in the exhaust ports, combustion chambers, or external cracks to the water chamber.
2. Inspect the valves for burned heads, cracked faces or damaged stems.
3. Check fit of valve stems in their respective bores.

NOTE: Excessive valve stem to bore clearance will cause lack of power, rough idling and noisy valves, and may cause valve breakage. Insufficient clearance will result in noisy and

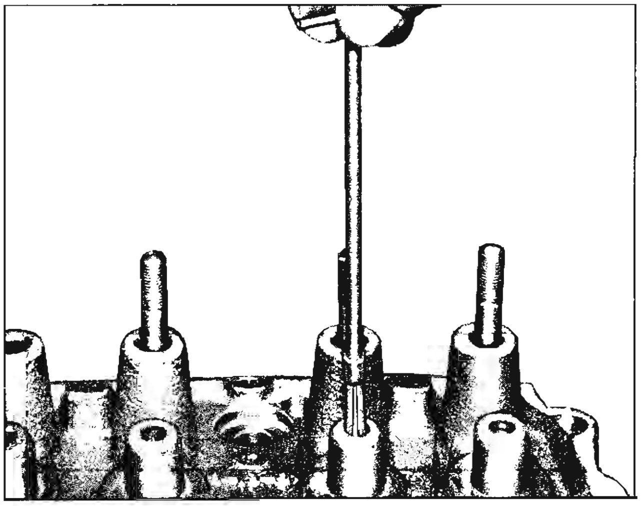

Fig. 11—Cleaning Valve Guide Bores

sticky functioning of the valve and disturb engine smoothness of operation. Intake valve stem to bore clearance should be .001" to .003" while exhaust stem clearance should be .002" to .004". By using a micrometer and a suitable telescope hole gauge check the diameter of the valve stem in three places top, center and bottom. Insert telescope hole gauge in valve guide bore, measuring at the center. Subtract highest reading of valve stem diameter from valve guide bore center diameter to obtain valve to valve guide clearance. If clearance is not within limits use next oversize valve and ream bore to fit using suitable reamer of Tool set J-7049.

4. Check valve spring tension with Tool J-8056 spring tester (fig. 12).

   NOTE: On all models, springs should be compressed to 1-21/32" at which height it should check 84-92 pounds. Weak springs affect power and economy and should be replaced if below 70 pounds.

5. Check valve lifters for free fit in block. The end that contacts the camshaft should be smooth. If this surface is worn or rough the lifter should be replaced.

Repairs

Valve Guide Bore

Valves with oversize stems are available for inlet and exhaust valves in the following sizes, .003", .015", and .030". Use the 3/8" diameter reamer sizes from

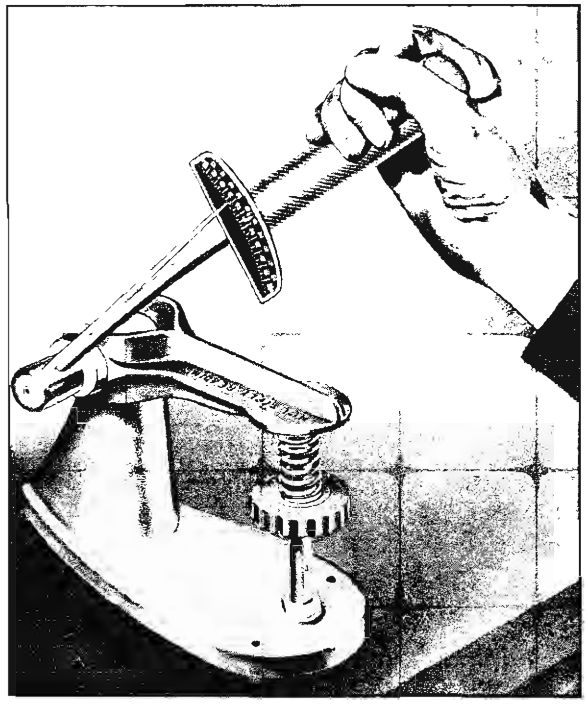

Fig. 12—Checking Valve Spring Tension

Reamer Tool Set J-5830 to ream the bores for new valves (fig. 13).

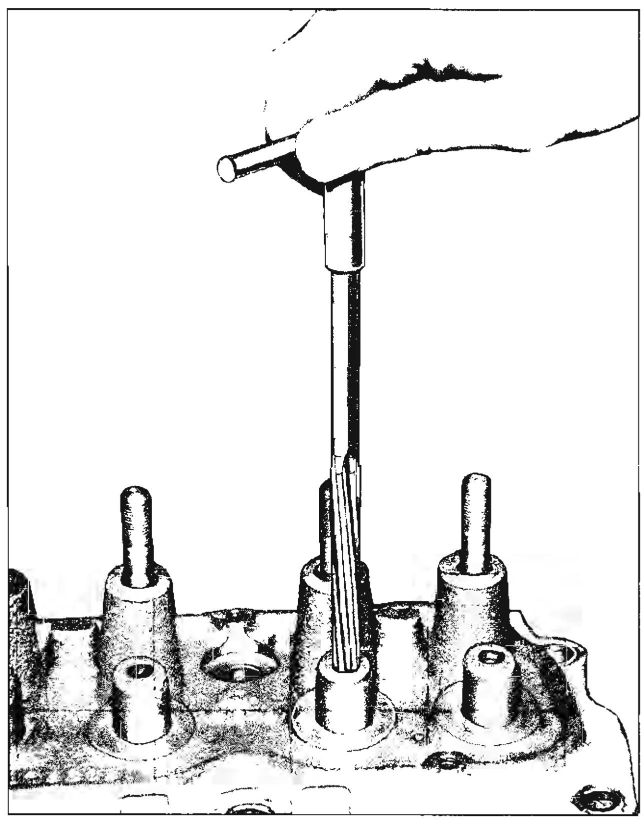

Fig. 13—Reaming Valve Guide Bores

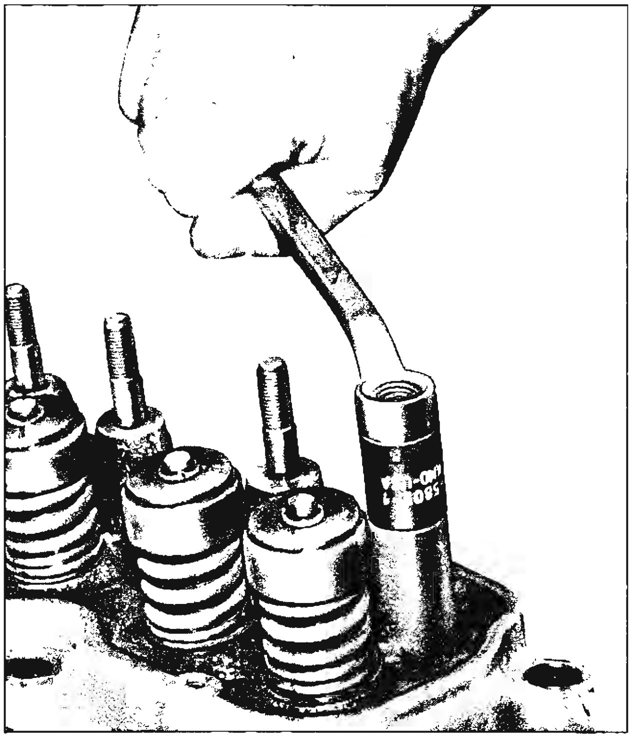

Fig. 14—Remove Rocker Arm Stud

Rocker Arm Studs

Rocker arm studs that have damaged threads may be replaced with standard studs. If the studs are loose

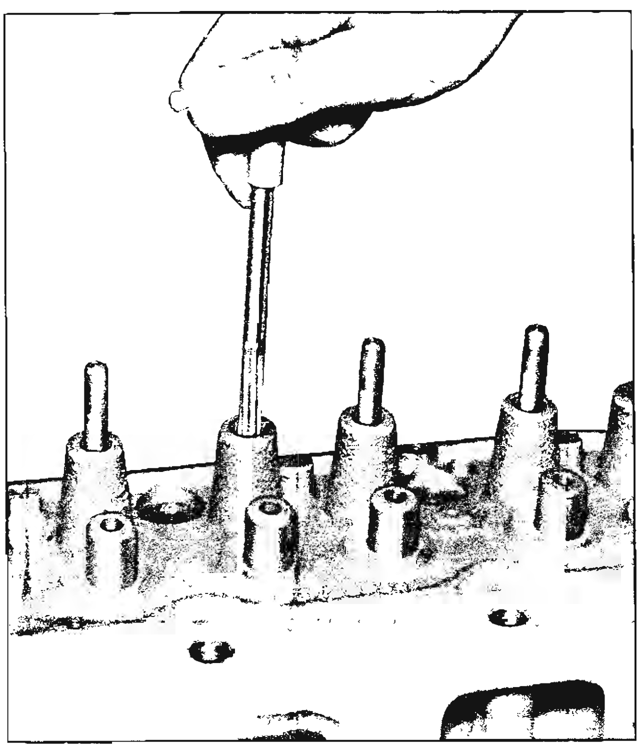

Fig. 15—Reaming Rocker Arm Stud Hole

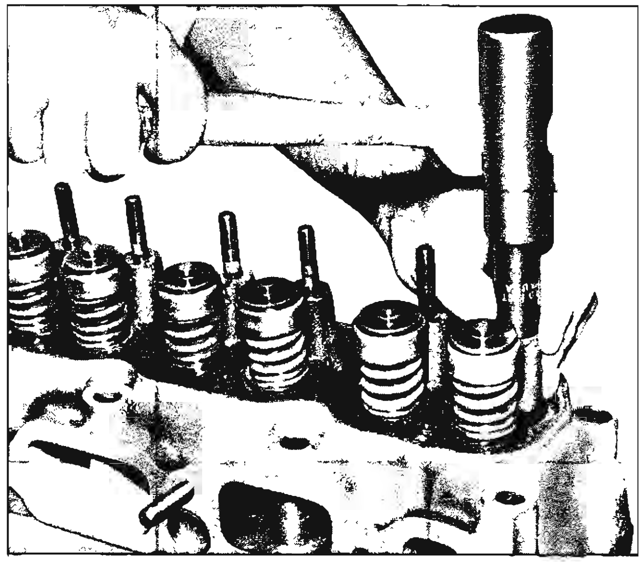

Fig. 16—Installing Rocker Arm Stud

in the head oversize studs, available in .003" or .013" oversize, may be installed after reaming the holes with Tool J-5715 for .003" oversize and Tool J-6306 for .013" oversize as follows:

1. Remove old stud by placing Tool J-5802 over the stud, installing nut and flat washer and removing stud by turning nut (fig. 14).
2. Ream hole for oversize stud, using Tool J-5715 for .003" oversize and Tool J-6036 for .013" oversize (fig. 15).
3. Coat press-fit area of stud with hypoid axle lubricant. Install new stud using Tool J-6880. Tool should bottom on head (fig. 16).

Valve Seats (Cylinder Head)

Reconditioning the valve seats is very important, because the seating of the valves must be perfect for the engine to deliver the power and performance built into it.

Another important factor is the cooling of the valve heads. Good contact between each valve and its seat in the head is imperative to insure that the heat in the valve head will be properly carried away.

Several different types of equipment are available for reseating valve seats; the recommendations of the manufacturer of the equipment being used should be carefully followed to attain proper results.

Regardless of what type of equipment is used, however, it is essential that valve guides be free from carbon or dirt to insure proper centering of pilot in the guide.

1. Install expanding pilot in the valve guide bore and expand pilot by tightening nut on top of pilot.
2. Place roughing stone or forming stone over pilot and just clean up the valve seat. Use a 46° stone for the inlet and exhaust valve seats.

3. Remove roughing stone or forming stone from pilot, install finishing stone on pilot and cut just enough metal from the seat to provide a smooth finish.
4. Narrow down the valve seats to the proper width of $\frac{1}{16}''$ to $\frac{3}{32}''$ for the intake and exhaust.

NOTE: This operation is done by grinding the port side with a 30° stone to lower seat and a 60° stone to raise seat.

5. Remove expanding pilot and clean cylinder head carefully to remove all chips and grindings from above operations.

NOTE: Valve seats should be concentric to within .002" total indicator reading (fig. 17).

Fig. 17—Checking Valve Seat Concentricity

Valves

Valves that are pitted can be refaced to the proper angle, insuring correct relation between the head and stem on a valve refacing machine. Valve stems which show excessive wear, or valves that are warped excessively should be replaced. When a valve head which is warped excessively is refaced, a knife edge will be ground on part or all of the valve head due to the amount of metal that must be removed to completely reface. Knife edges lead to breakage, burning or pre-ignition due to heat localizing on this knife edge. If the edge of the valve head is less than $\frac{1}{32}''$ thick after grinding, replace the valve.

1. If necessary, dress the valve refacing machine grinding wheel to make sure it is smooth and true. Set chuck at 45° mark for grinding valves (fig. 18).
2. Clamp the valve stem in the chuck of the machine.
3. Start the grinder and move the valve head out in line with the grinder wheel by moving the lever to the left.

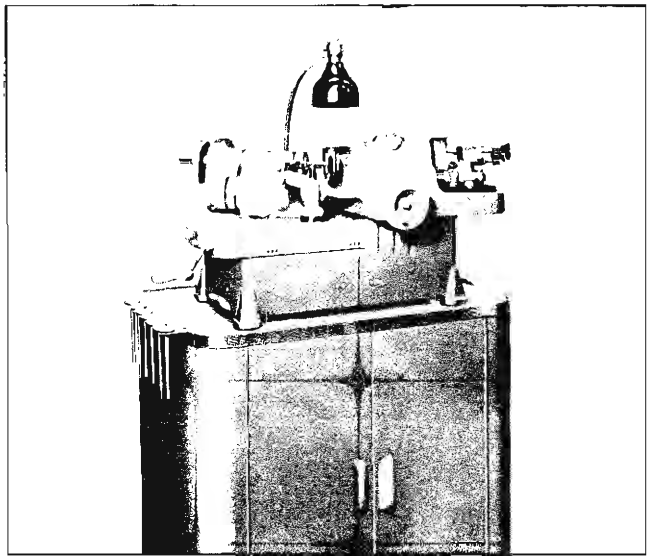

Fig. 18—Valve Refacing Machine

4. Turn the feed screw until the valve head just contacts wheel. Move valve back and forth across the wheel and regulate the feed screw to provide light valve contact.
5. Continue grinding until the valve face is true and smooth all around the valve. If this makes the valve head thin the valve must be replaced as the valve will overheat and burn.
6. Remove valve from chuck and place stem in "V" block. Feed valve squarely against grinding wheel to grind any pit from rocker arm end of stem.

NOTE: Only the extreme end of the valve stem is hardened to resist wear. Do not grind end of stem excessively.

7. After cleaning valve face and cylinder head valve seat of grinding particles, make pencil marks about ¼" apart across the valve face, place the valve in cylinder head and give the valve ½ turn in each direction while exerting firm pressure on head of valve.
8. Remove valve and check face carefully. If all pencil marks have not been removed at the point of contact with the valve seat, it will be necessary to repeat the refacing operation and again recheck for proper seating.
9. Grind and check the remaining valves in the same manner.

Assembly

1. Starting with No. 1 cylinder, place the exhaust valve in the port and place the valve spring and cap in position. Place spring, shield, and cap on exhaust valves. Then using Tool J-8062, compress the spring and install the oil seal and valve keys.

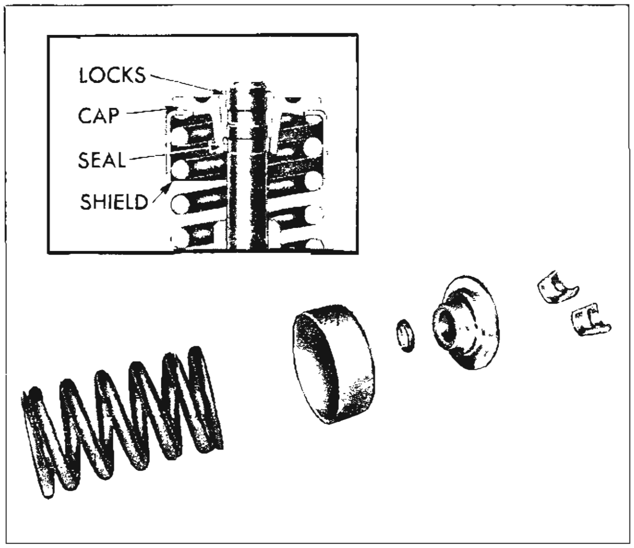

Fig. 19—Valve Installation

See that the seal is flat and not twisted in the valve stem groove and that the keys seat properly in the valve stem groove (fig. 19).

NOTE: Place valve springs in position with the closed coil end toward the cylinder head.

2. Assemble the remaining valves, valve springs, shields, spring caps, oil seals and valve keys in the cylinder head using Tool J-8062. Check seals by placing a vacuum cup, shown in Figure 20, over valve stem and cap, squeeze vacuum cup to make sure no oil leaks past oil seal.

NOTE: A vacuum cup can be made from a small syringe and a high voltage shield.

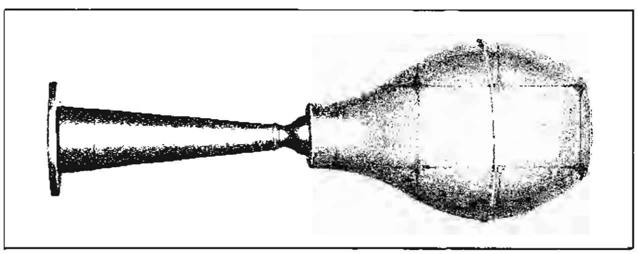

Fig. 20—Vacuum Cup

Valve Spring Installed Height

Check the installed height of the valve springs, using a narrow, thin scale to measure from the top of the shim or spring seat, in the head to the top of the valve spring shield. If this is found in excess of $1\frac{23}{32}''$, install a valve spring seat shim, approximately $\frac{1}{16}''$ thick. At no time should the spring be shimmed to give an installed height of less than $1\frac{21}{32}''$ (fig. 21).

NOTE: If springs are to be changed with cylinder head installed, Tool J-5892 may be used to compress springs for removal or installation.

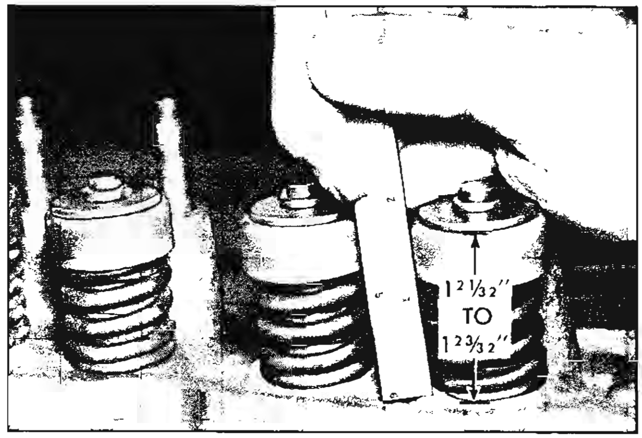

Fig. 21—Checking Valve Spring Installed Height

Compressed air or a screwdriver, may be used to hold the valves in place, used through the spark plug hole.

Installation

1. Place a new cylinder head gasket in position over dowel pins in cylinder block (fig. 22).

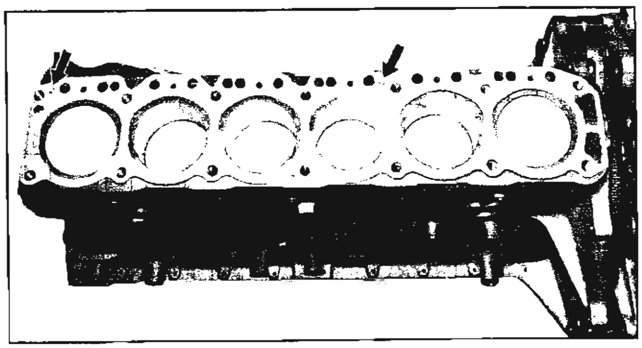

Fig. 22—Installing Head Gasket

2. Carefully guide cylinder head into place over dowel pins and gasket (fig. 23).
3. Use sealer on threads of cylinder head bolts, install and run them down to the block.
4. Tighten the cylinder head a little at a time with a torque wrench in the sequence shown in Figure 24. The final torque should be 90 to 95 ft. lbs.
5. Install valve push rods down through openings in the cylinder head and seat them in lifter sockets.
6. Install rocker arms, balls and nuts and tighten rocker arm nuts until all push rod play is taken up (fig. 25).
7. Install thermostat housing, thermostat and water outlet using new gaskets and connect radiator hose.
8. Install temperature sending switch and tighten to 15-20 ft. lbs.

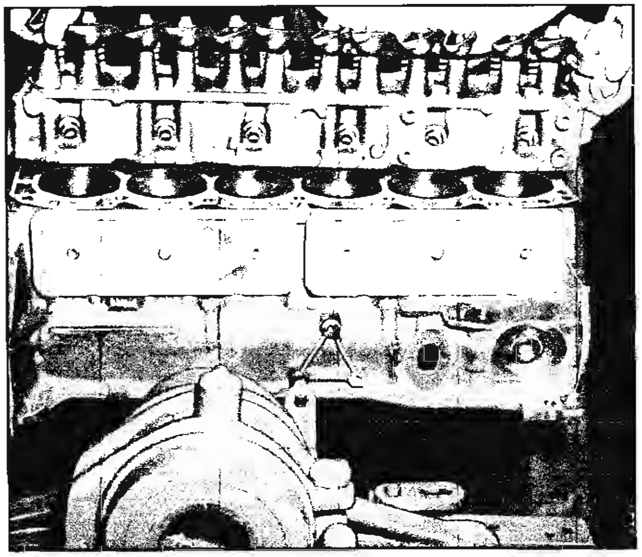

Fig. 23—Installing Cylinder Head

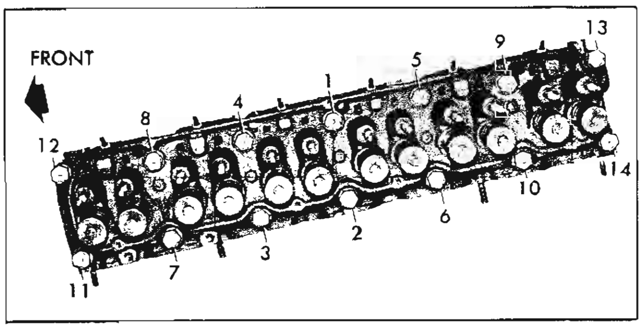

Fig. 24—Cylinder Head Torque Sequence

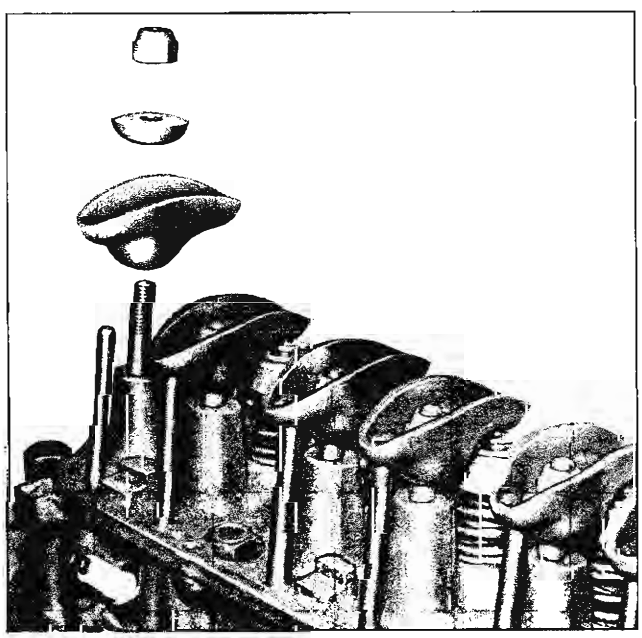

Fig. 25—Rocker Arm Installation

9. Clean all spark plugs with abrasive-type cleaner, inspect for damage and set the gap at .035" using a wire gauge.
10. Place new gaskets on plugs and install. Tighten to 20-25 ft. lbs. If torque wrench is not available, tighten finger tight and ½ turn additional.
11. Install coil then connect temperature sending unit and coil primary wires, and connect battery ground cable at cylinder head.
12. Clean manifold gasket surfaces and install new gasket over manifold studs. Position manifold and slide it into place over the studs, making sure it seats against the gasket. Install bolts and clamps and tighten as shown in Figure 4.
13. Connect throttle linkage and choke rod and adjust as outlined in Section 6M.
14. Connect fuel and vacuum lines to carburetor and install lines in clip at water outlet.
15. Fill cooling system and check for leaks.
16. Adjust valve lash as outlined under "Valve Lifters" in preceding pages.
17. Install rocker arm cover, position wiring harness in clips on cover.
18. Clean and install air cleaner.
19. Install and check crankcase vent valve.

CHECKING CAMSHAFT LOBE LIFT

NOTE: Procedure is similar to that used for checking valve timing. If improper valve operation is indicated, check the lift of each lobe in consecutive order and record the readings.

1. Remove valve rocker covers and gaskets.
2. Remove rocker arms and balls.
3. Attach Tool J-8520 to stud.
4. Position clamp and indicator with ball socket adapter of Tool J-8520 to push rod.

   NOTE: Make sure push rod is in the lifter socket.

5. Rotate the crankshaft balancer slowly in the direction of rotation until the lifter is on the heel of the cam lobe. At this point, the push rod will be in its lowest position.
6. Set dial indicator on zero, then rotate crankshaft slowly, or attach an auxiliary starter switch and "bump" the engine over, until the push rod is in the fully raised position.

   NOTE: Ground primary wire on coil, when cranking engine.

7. Compare the total lift recorded from the dial indicator Tool J-8520 with specifications.
8. Continue to rotate the engine until the indicator reads zero. This will be a check on the accuracy of the original indicator setting.

9. If camshaft readings for all lobes are within specifications, remove dial indicator assembly Tool J-8520 from cylinder head stud.
10. Install all push rods and valve rocker arms and balls. Adjust valve as outlined in this section.
11. Replace valve rocker covers and gaskets.

HARMONIC BALANCER

(6 Cylinder Engine)

Removal

1. Drain radiator and disconnect radiator hoses at radiator.
2. Remove radiator core and fan belt.
3. Install Tool J-6978 to balancer and turn puller screw to remove balancer (fig. 26). Then remove tool from balancer.

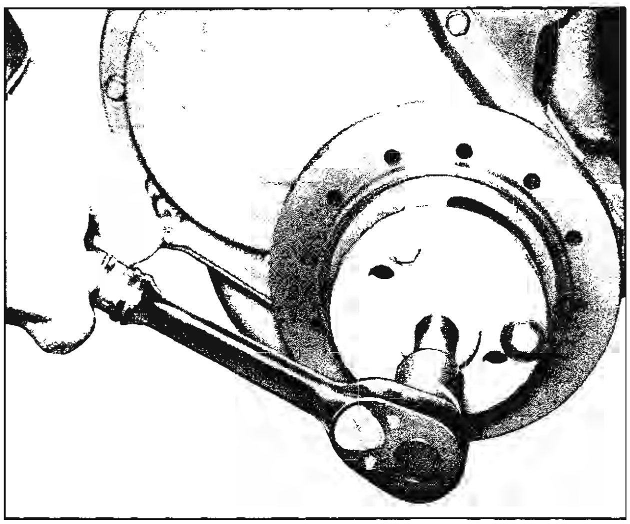

Fig. 26—Removing Harmonic Balancer

Installation

1. Coat front cover oil seal contact area of balancer with engine oil.
2. Attach balancer installer Tool J-8792 to balancer as shown in Figure 27.

NOTE: This tool is used differently for 8 cylinder engines. Assemble as shown (fig. 28) for use here.

3. Position balancer on crankshaft and drive into position until it bottoms against crankshaft gear. Remove installer tool.
4. Install fan belt and adjust using strand tension gauge.
5. Install radiator core and connect radiator hoses.
6. Fill cooling system and check for leaks.

TIMING GEAR COVER

Removal

1. Drain and remove radiator.

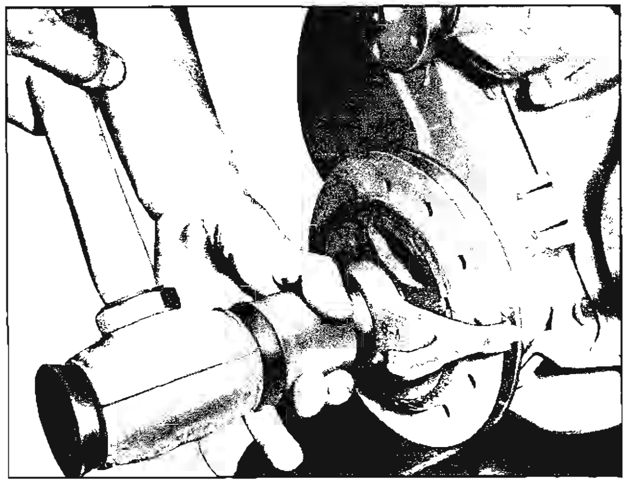

Fig. 27—Installing Harmonic Balancer

2. Remove harmonic balancer using Tool J-6978.
3. Drain engine oil and remove oil pan.
4. Remove timing gear cover attaching screws and remove cover and gasket.

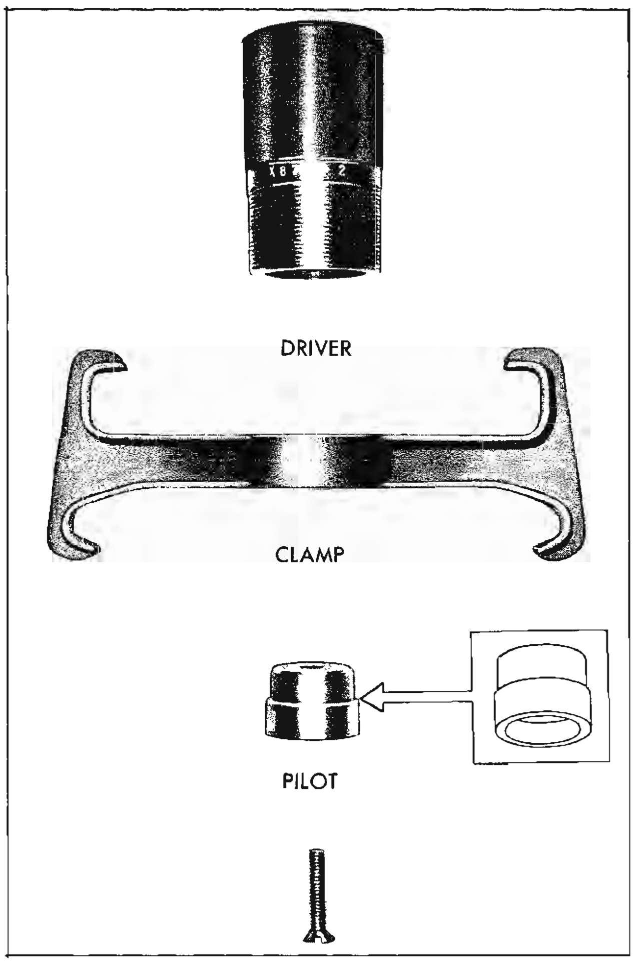

Fig. 28—Installer Tool Assembly

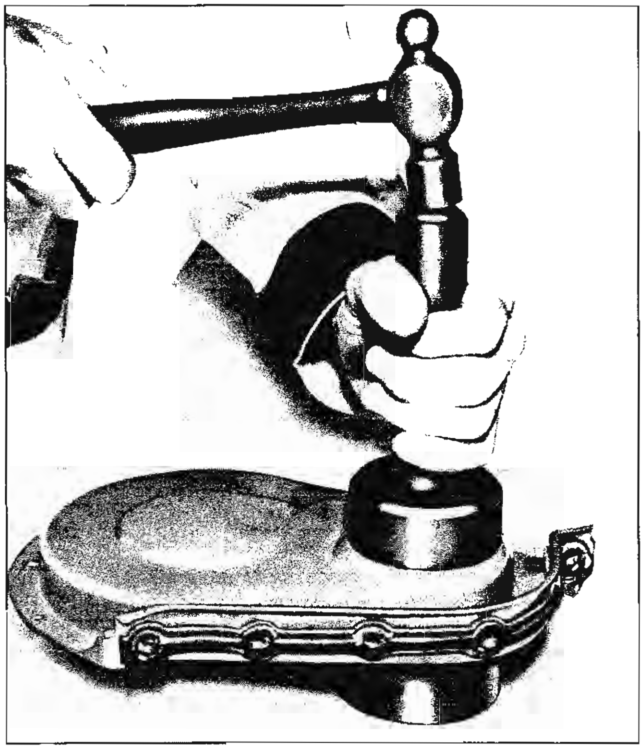

Fig. 29—Installing Timing Gear Cover Oil Seal

Oil Seal Replacement

There are two methods of replacing the timing gear cover oil seal as outlined below:

a. **Timing cover removed.**

1. After removing timing gear cover, pry oil seal out of cover from front with a large screwdriver.
2. Install new lip seal with lip (open side of seal) inside of cover and drive or press seal into place with Tool J-0995 (fig. 29).

b. **Timing cover installed.**

1. After removing harmonic balancer, pry seal out of cover with a large screwdriver.
2. Install new lip seal with lip toward inside of cover and drive it into position with Tool J-8340.

Oil Nozzle Replacement

1. Remove nozzle with pliers (fig. 30).
2. Drive new nozzle in place (oil hole in vertical position) using a suitable light plastic or rubber hammer.

Installation

1. Clean gasket surfaces on block and cover.
2. Install centering Tool J-0966 over end of crankshaft.
3. Coat the gasket with light grease and stick a new cover gasket in position on block with light grease.
4. Install cover over centering tool (fig. 31) and install cover screws. Torque screws to 6 to 8 ft. lbs. Remove centering tool.

NOTE: It is important that centering gauge be used to align cover so that harmonic balancer installation will not damage seal and to position seal to seal evenly around balancer hub surface.

5. Install harmonic balancer.
6. Install oil pan with new gaskets and seals.

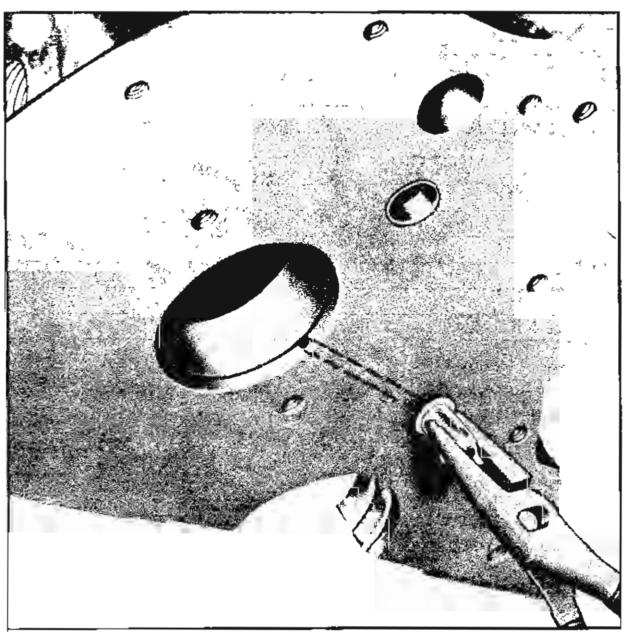

Fig. 30—Timing Gear Oil Nozzle Removal

Fig. 31—Timing Gear Cover Installation

7. Install radiator, connect hoses, fill cooling system and check for leaks.

CAMSHAFT

Removal

1. Drain crankcase and radiator.
2. Remove radiator as described under "Engine Cooling."
3. Remove grille assembly. See "Front End Sheet Metal," Section 11.
4. Remove valve cover and gasket, loosen valve rocker arm nuts and pivot rocker arms clear of push rods.
5. Remove distributor noting position of rotor.
6. Remove coil and side cover and gasket. Remove push rods and valve lifters.
7. Remove harmonic balancer using Tool J-6978. Remove oil pan and timing gear cover.
8. Remove the two camshaft thrust plate screws by working through holes in the camshaft gear (fig. 32).

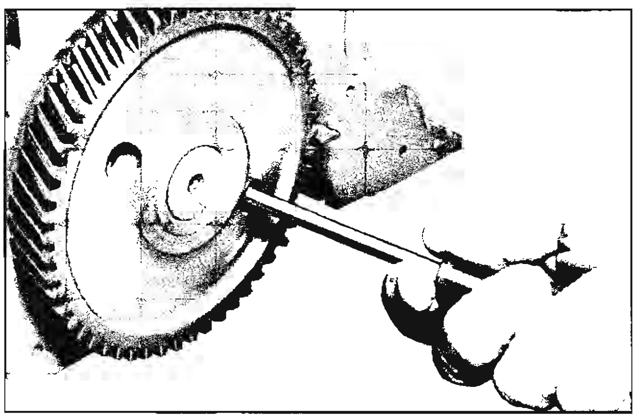

Fig. 32—Removing Camshaft Thrust Plate Screws

9. Remove the camshaft and gear assembly by pulling it out through the front of the block.

NOTE: Support shaft carefully when removing so as not to damage camshaft bearings.

Inspection

The camshaft is cast alloy iron with bearing journal sizes all of the same dimension: 1.8692-1.8682.

These dimensions should be checked with a micrometer for an out-of-round condition. If the journals exceed .001" out-of-round, the camshaft should be replaced.

The camshaft should also be checked for alignment. The best method is by use of "V" blocks and a dial indicator (fig. 33). The dial indicator will indicate the exact amount the camshaft is out of true. If it is out more than .002" dial indicator reading, the camshaft should be replaced. When checking, the high reading of the dial indicator indicates the high point of the shaft. Examine the camshaft bearings and if any bearing needs replacement, replace all bearings.

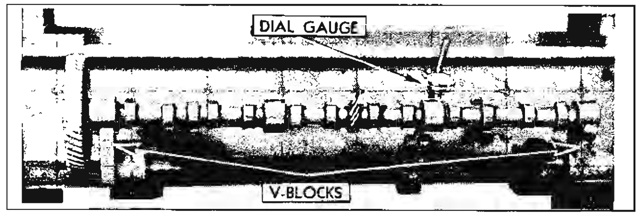

Fig. 33—Checking Camshaft Alignment

Gear and Thrust Plate

If the inspection indicated that the camshaft, gear and thrust plate were in good condition, the camshaft end play should be checked (fig. 34). This clearance should be .001" to .005".

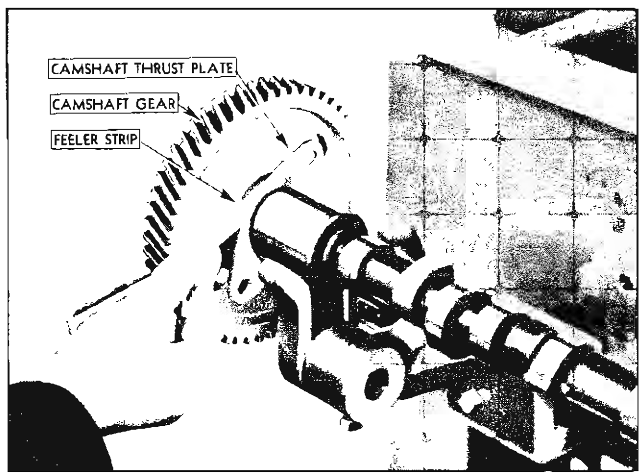

Fig. 34—Checking Camshaft End Play

Disassembly

1. If the inspection indicated that the shaft, gear or plate should be replaced, the gear must be removed from the shaft. This operation requires the use of camshaft gear remover Tool J-791.
2. Place the camshaft through the gear remover, place end of remover on table of a press and press shaft out of gear (fig. 35).

CAUTION: Thrust plate must be so positioned that woodruff key in shaft does not damage it when the shaft is pressed out of gear. Also, support the hub of the gear or the gear will be seriously damaged.

Assembly

To assemble camshaft gear, thrust plate and gear spacer ring to camshaft, proceed as follows:

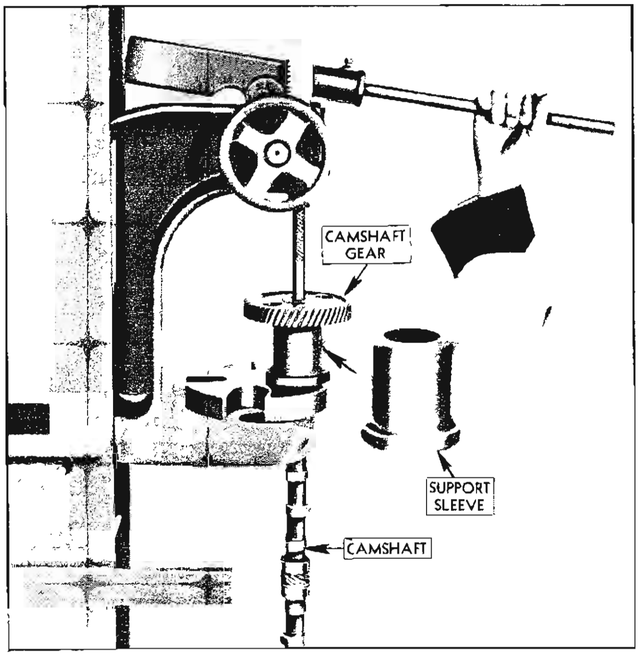

Fig. 35—Removing Camshaft Gear

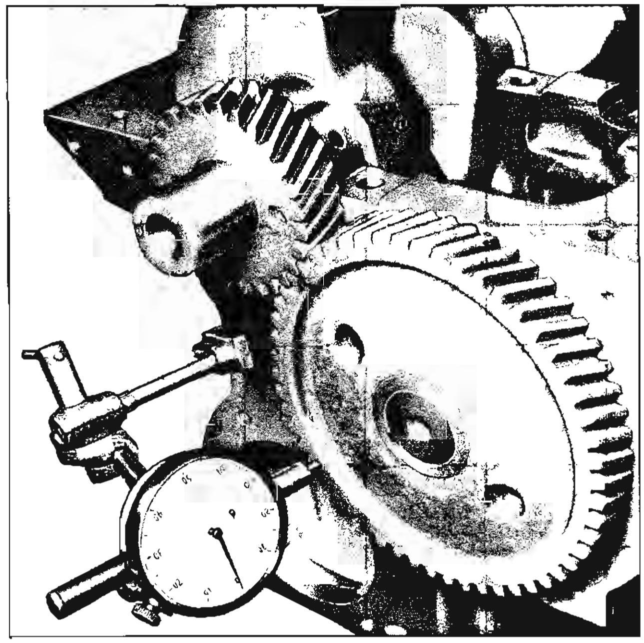

Fig. 36—Checking Camshaft Gear Runout

1. Firmly support shaft at back of front journal in an arbor press.
2. Place gear spacer ring and thrust plate over end of shaft, and install woodruff key in shaft keyway.
3. Install camshaft gear and press it onto the shaft until it bottoms against the gear spacer ring. The end clearance of the thrust plate should be .001" to .005".

Installation

1. Install the camshaft assembly in the engine block, being careful not to damage bearings or cams.
2. Turn crankshaft and camshaft so that the valve timing marks on the gear teeth will line up (fig. 73), push camshaft into position. Install camshaft thrust plate to block screws and tighten 6-7½ ft. lbs.
3. Check camshaft and crankshaft gear runout with a dial indicator (fig. 36). The camshaft gear runout should not exceed .004" and the crankshaft gear runout should not exceed .003".
4. If gear runout is excessive, the gear will have to be removed and any burrs cleaned from the shaft or the gear replaced.
5. Check the backlash between the timing gear teeth with a narrow feeler gauge (fig. 37). The backlash should not be less than .004" nor more than .006".
6. Install timing gear cover and gasket.
7. Install oil pan with new gaskets.
8. Install harmonic balancer, using harmonic balancer installer Tool J-8792.
9. Line up keyway in balancer with key on crankshaft and drive balancer onto shaft until it bottoms against crankshaft gear, using Tool J-5590.
10. Install valve lifters and push rods. Install side cover with a new gasket. Attach coil and wires. Then install distributor, positioning rotor to mark as when removed.
11. Pivot rocker arms over push rods and lash valves as described under "Service Operations—Cylinder Head and Valve Mechanism" in this section.

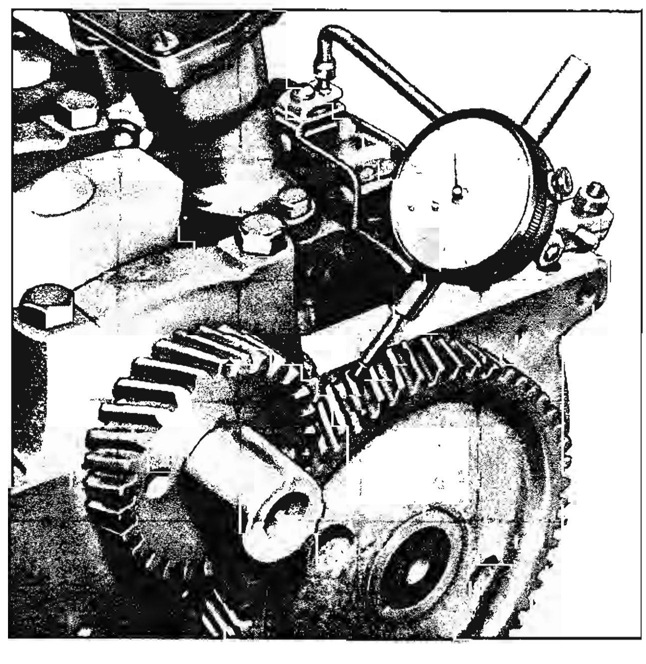

Fig. 37—Checking Timing Gear Backlash

12. Add oil to engine. Install the fan belt and adjust using tension gauge.
13. Install the radiator as described under "Engine Cooling."
14. Install grille assembly. See "Front End Sheet Metal," Section 14.
15. Add cooling solution to radiator, start engine and check for leaks.
16. Check and adjust timing.

CAMSHAFT BEARINGS

Removal

Camshaft bearings can be replaced while the engine is disassembled for overhaul, or without complete disassembly of the engine after camshaft and flywheel have been removed. Operation is easier if crankshaft is removed also.

1. With camshaft and flywheel removed, drive out expansion plug from rear cam bearing by driving from inside.
2. Position bearing pilot in inner bearing.
3. Install nut on puller screw far enough so puller screw can be threaded into pilot while nut extends out front of block.
4. Install remover section onto puller screw and then install screw through cam bore and thread it into pilot.
5. Using two wrenches, hold screw shaft and turn puller nut to remove bearing (fig. 38).
6. Repeat operation on other inner bearing from rear of engine.

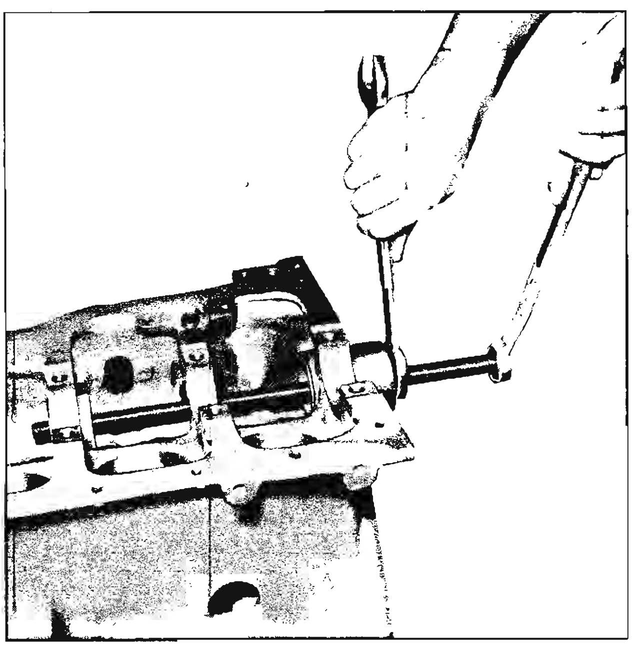

Fig. 38—Removing Camshaft Bearings

7. Remove pilot from shaft and install on driver handle with shoulder to handle, then drive out front and rear bearings from outside to inside of block.

Installation

Inner bearings should be installed first to prevent damaging end bearings with screw shaft.

NOTE: Bearing O.D.'s (#1 & #4) are 2.009-2.011 (#2 & #3) are 1.999-2.001.

1. Remove handle from pilot. Install inner bearing on pilot.
2. Position inner bearing and pilot to rear of inner bearing bore and install screw shaft (with remover adapter on it) through the block from front of engine into pilot.
3. Align oil hole on bearing with oil hole from oil gallery. Snug puller nut against adapter.
4. Using two wrenches, hold screwshaft and turn puller nut to pull bearing into place (fig. 39).

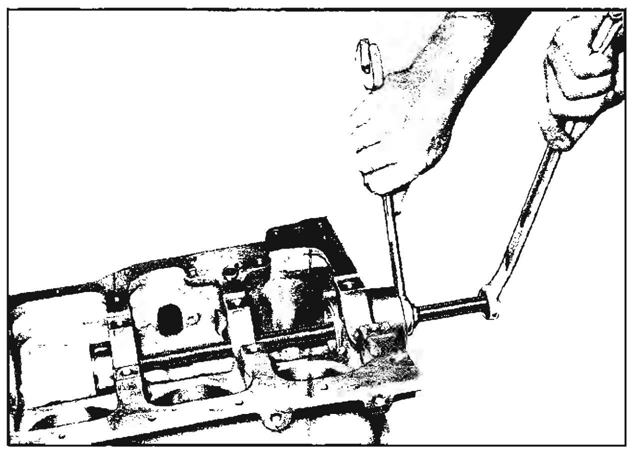

Fig. 39—Installing Camshaft Center Bearings

NOTE: Oil hole is on top side of bearing shell and cannot be seen during installation, so first align bearing shell oil hole with oil hole in bore and mark opposite side of bearing and block at bore to easily index oil hole during installation.

5. Repeat operation from rear of engine to install other inner bearing.
6. Install new number 1 bearing on pilot with drive handle attached.
7. Align oil hole on bearing with oil hole from oil gallery and drive bearing in from front of engine (fig. 40).

NOTE: The front bearing must be driven approximately 1/8" behind front of cylinder block to uncover oil hole to timing gear oil nozzle (fig. 41).

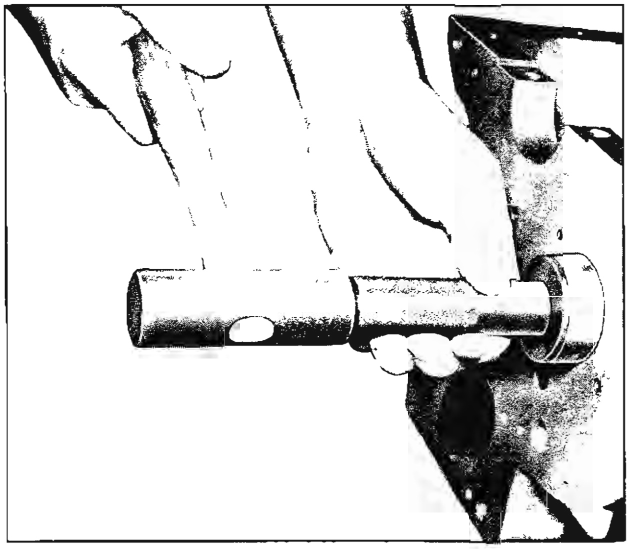

Fig. 40—Installing Front or Rear Bearing

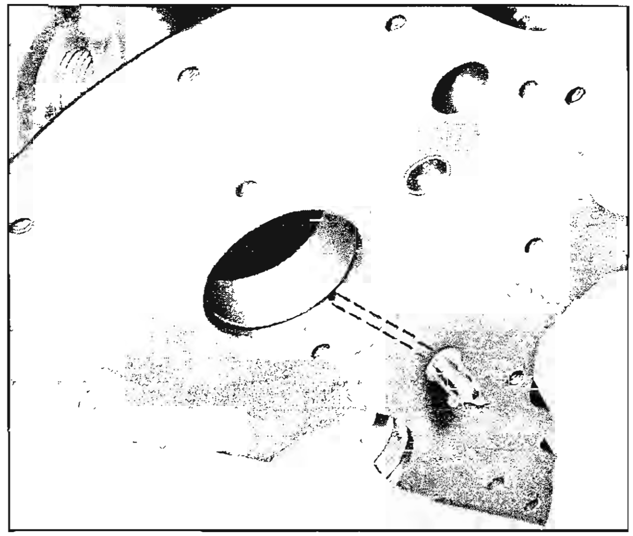

Fig. 41—Timing Gear Oil Nozzle Oil Passage

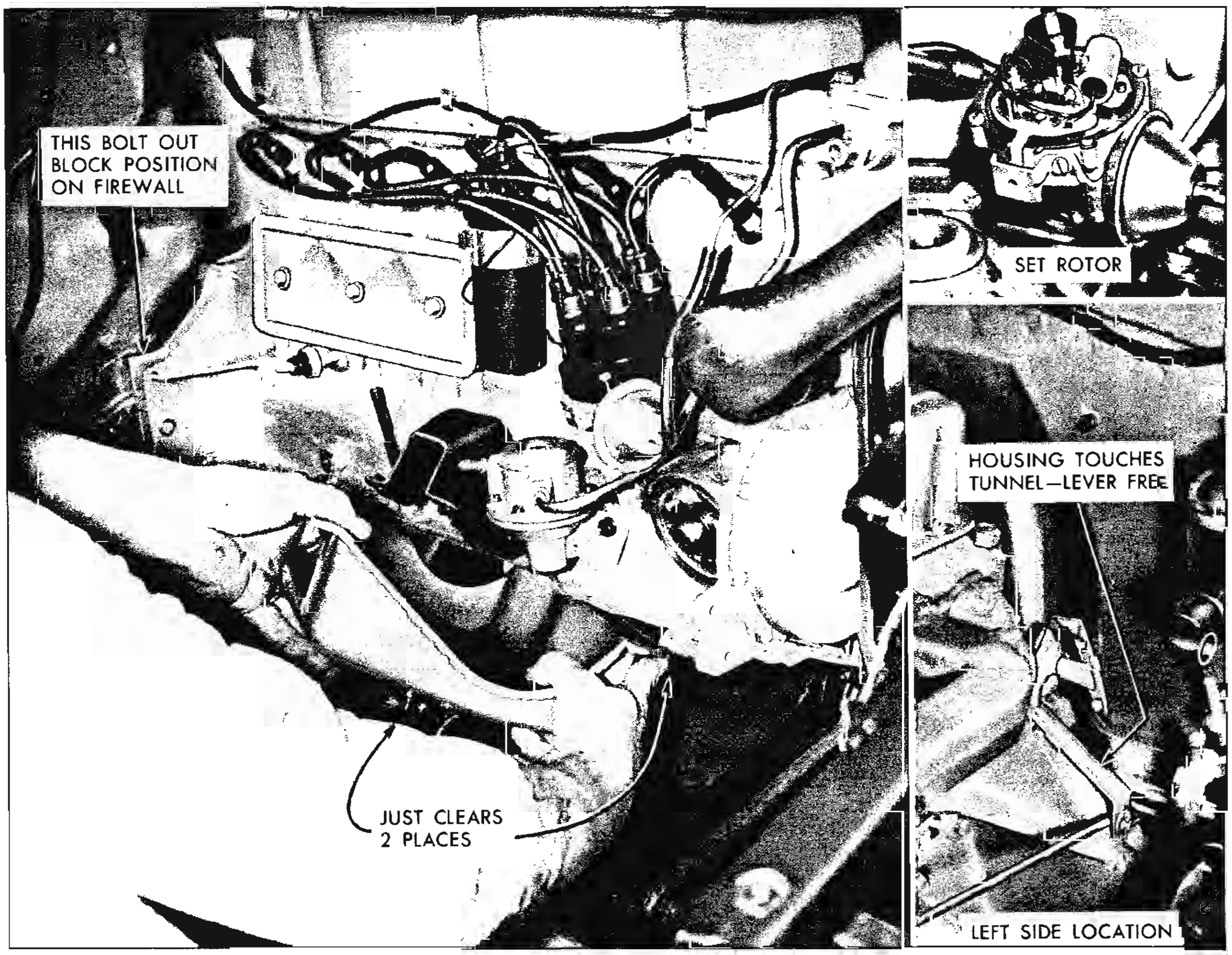

Fig. 42—Oil Pan Removal Position

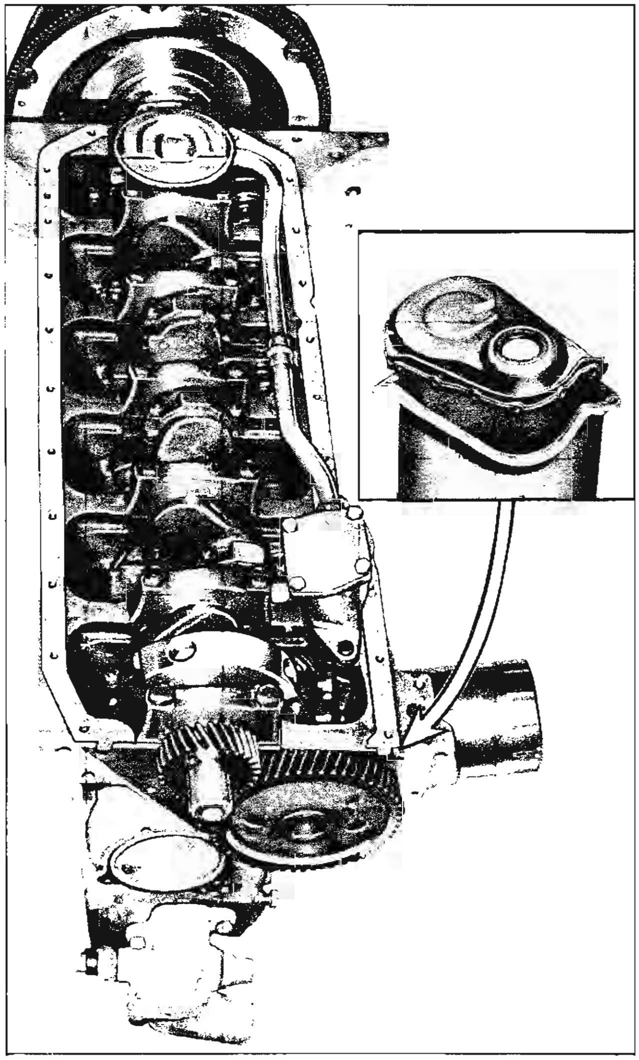

Fig. 43—Oil Pan Gaskets and Seals

8. Repeat previous Operations 6 and 7 to drive rear bearing into position from rear of block.

   NOTE: Rear bearing installed position is flush with inner edge of rear cam bearing bore in block.

9. Install a new expansion plug at rear bearing.

OIL PAN

Oil Pan Removal (with Synchromesh Transmission)

Refer to Figures 42 and 43

The oil pan can be removed by either of two methods: (1) After engine removal or (2) with engine in vehicle as follows:

1. Drain radiator and oil pan.
2. Disconnect:
   a. Gas tank line at fuel pump.
   b. Upper and lower radiator hose at radiator.
3. **Remove clutch housing-to-engine block bolt above dowel on right side.** Raise vehicle (on hoist or place on jack stands).
   a. Rotate engine to align distributor rotor between #3 and 5 plug wires. (This gets #6 crankthrow part way up.)
4. Remove starter assembly and flywheel front cover plate.
5. Remove front mount through bolts. (**DO NOT LOOSEN REAR MOUNT.**)
6. Install Tool J-6978 onto harmonic balancer and use it as a crankshaft extension for jacking engine.
7. Jack engine as high as it will go with left side of clutch housing flange riding in body tunnel and right side just clearing tunnel and riding against firewall.

   NOTE: The engine will raise at an angle needed to remove pan.

8. Remove front engine mount frame bracket on right side and remove oil filter.
9. Remove oil pan screws and lower oil pan to frame.
10. Remove oil pump to gain pan removal clearance, then remove oil pan by sliding and rotating front of pan to right of engine then rearward, down and out at an angle to left rear corner of engine.
11. If oil pan gasket needs replacement, there is adequate clearance to clean gasket surfaces and oil pan without removing pan from vehicle.

Oil Pan Removal (with Powerglide Transmission)

1. Drain radiator and crankcase.
2. Disconnect:
   a. Gas tank line at fuel pump.
   b. Radiator hoses at radiator.
3. **Remove the clutch housing-to-engine block bolt above dowel pin on each side.**
4. Rotate engine to place distributor rotor between #3 and 5 plug wires. This gets #1 crankthrow part way up.
5. Raise vehicle (on hoist or place on jack stands).
6. Remove converter cover pan and starter assembly.
7. Remove front mount through bolts (**DO NOT LOOSEN REAR MOUNT BOLTS**), and disconnect transmission vacuum modulator line at modulator (so line is not crimped in tunnel).
8. Install Tool J-6978 onto harmonic balancer hub and use it as a crankshaft extension for jacking engine.
9. Raise engine as high as it will go with rocker arm cover resting against firewall (modulator vacuum line will be snug in tunnel but not crimped, and accelerator linkage should be free or just touching modulator line).
10. Remove oil pan screws and lower to frame.
11. Remove oil pump and screen assembly, then remove oil pan downward and rearward.

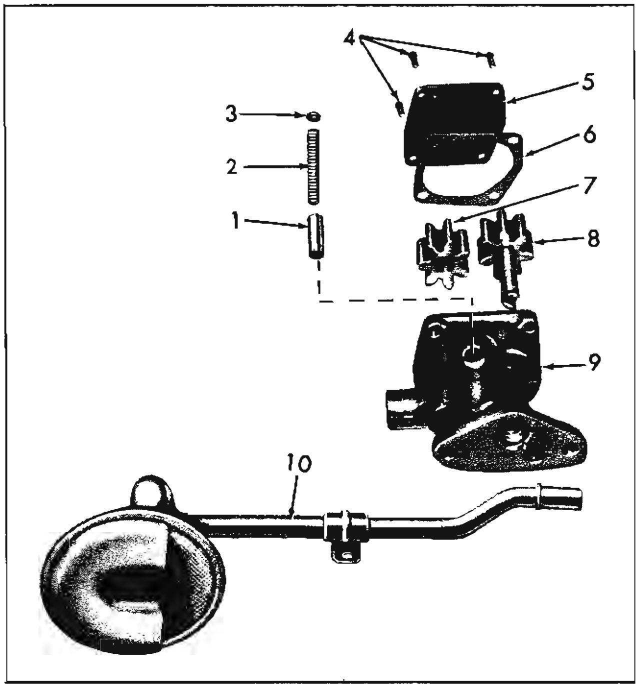

Fig. 44—Oil Pump Components

1. Pressure Control Valve
2. Spring
3. Retaining Pin
4. Screws (cover)
5. Cover
6. Cover Gasket
7. Idler Gear
8. Drive Gear and Shaft
9. Pump Body
10. Pick-up Screen and Pipe

NOTE: Oil pan front seal curvature should straddle front main bearing cap and rear of oil pan will then just clear flywheel.

OIL PUMP

Oil pump (fig. 44), consists of two gears and a pressure relief valve enclosed in a two-piece housing and driven from the distributor drive shaft which in turn is driven by a helix gear on the camshaft.

It is flange mounted to the cylinder block with 2 bolts and piloted on the outside of the lower distributor bronze bearing.

Oil pressure passes through an opening in mounting flange to cylinder block, then into the full flow oil filter.

The pump cover is equipped with the pressure regulator valve that regulates oil pressure at approximately 35 psi. @ 2000 rpm.

The pump intake is of the fixed screen type. A mesh screen filters out small particles of dirt and sludge which may be present.

NOTE: A baffle incorporated on the intake screen has been designed to eliminate pressure loss due to sudden surging stops.

In the event that a screen becomes plugged a steel grommet opens and by-passes oil to the pump.

Inasmuch as the oil pump is serviced on an exchange basis, no repair operations other than disassembly and inspection operations are covered in this manual.

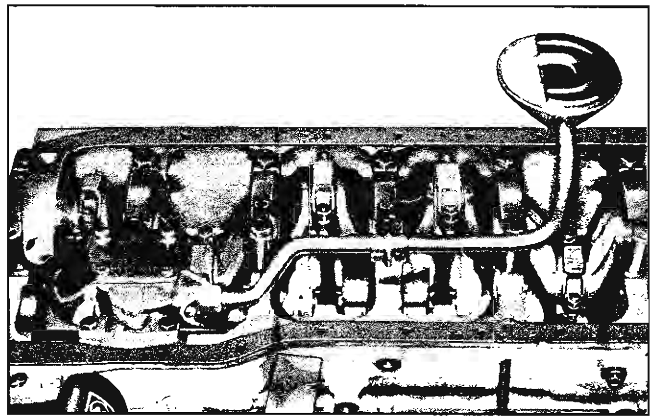

Fig. 45—Oil Pump Installed

Removal and Disassembly

1. Drain oil, remove front engine mount through bolts, raise engine front end and place a 2 inch block between mount and support.
2. Remove starter.
3. Remove oil pan screws, lower pan to frame and tilt to left side of engine for access to oil pump.
4. Remove two flange mounting bolts, pickup pipe service bolt, and remove pump and screen as an assembly (fig. 45).
5. Remove 4 cover attaching screws, cover, gasket, idler gear and drive gear and shaft.
6. Remove pressure regulator valve and valve parts.
7. If necessary, remove oil pump suction pipe and screen by pulling from pump housing.

   CAUTION: Do not disturb oil pickup pipe on screen. This pipe is located at assembly.

8. Wash all parts in cleaning solvent and dry using compressed air.

Inspection

Should any of the following conditions be found during inspection operations, the pump assembly should be replaced.

1. Inspect pump body for cracks or excessive wear.
2. Inspect oil pump gears for excessive wear or damage.
3. Check shaft for looseness in the housing.
4. Check inside of cover for wear that would permit oil to leak past the ends of gears.
5. Check the oil pick-up screen for damage to screen, or relief grommet.
6. Check pressure regulator valve plunger for fit in housing.

Assembly and Installation

1. Place drive gear and shaft in pump body.
2. Install idler gear so that smooth side of gear will be toward the cover.
3. Install a new GENUINE Chevrolet gasket to as-

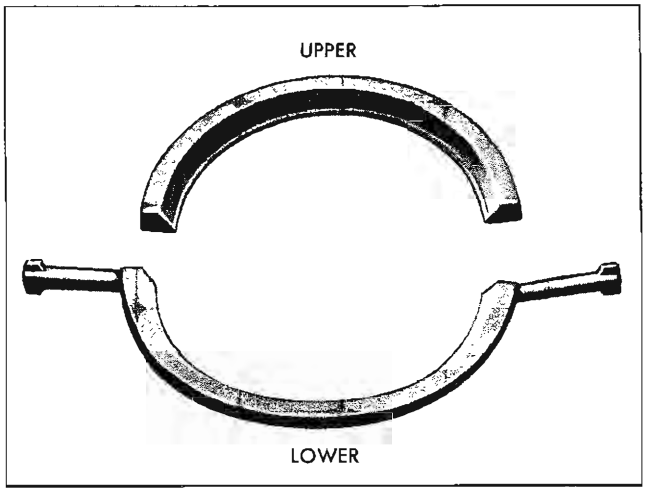

Fig. 46—Rear Main Bearing Oil Seal

sure correct end clearance of the gears.

4. Install suction pipe and screen assembly to housing with sealer and install cover and attaching screws. Tighten screws 6 to 9 ft. lbs. torque and check to see that shaft turns freely.
5. Install regulator valve plunger, spring, retainer and pin.
6. Align oil pump drive shaft slot to match with distributor tang, then install oil pump to block positioning flange over distributor lower bushing. Use no gasket.

NOTE: Oil pump should slide easily into place. If not, remove and relocate slot or locate other problem.

7. Install oil pan using new gaskets and seals as outlined under "Oil Pan Installation."

REAR MAIN BEARING OIL SEAL

Removal and Installation

The rear main bearing oil seal, shown in Figure 46, can be removed (both halves) without removal of the crankshaft.

NOTE: Always replace upper and lower seal as a unit.

1. Drain crankcase and remove oil pan.
2. Remove rear main bearing cap.
3. Remove oil seal from groove, prying from bottom, using a small screwdriver.

NOTE: Always clean crankshaft surface before installing a new seal.

4. Insert a new seal well lubricated with engine oil in bearing cap groove (keep oil off of parting line surface, this surface is treated with glue) gradually push with a hammer handle until seal is rolled into place.
5. To replace the upper half of the seal, use a small hammer and brass pin punch to tap one end of seal until it protrudes far enough to be removed with pliers as shown in Figure 47.

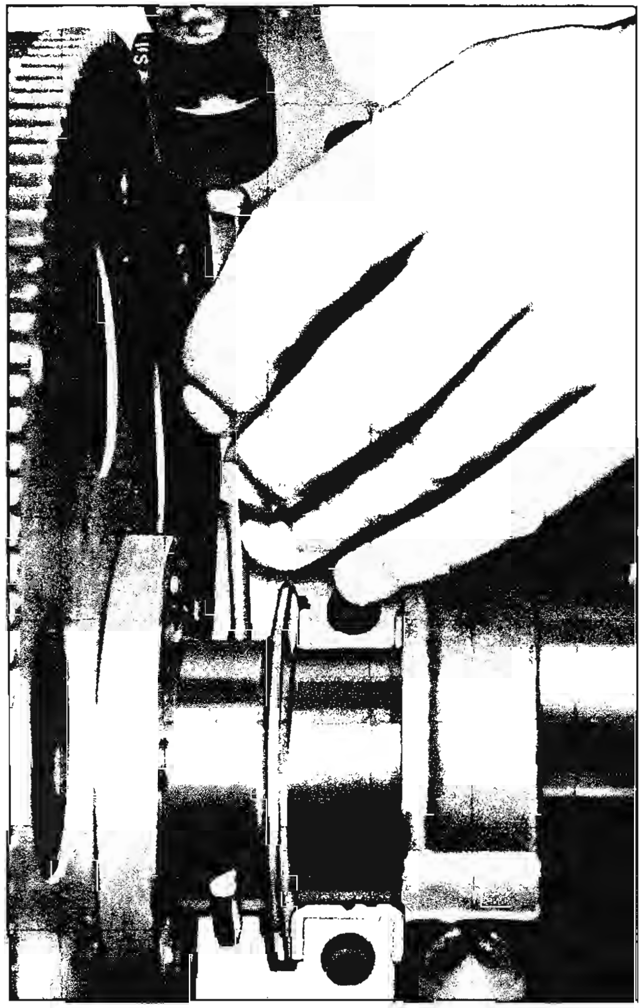

Fig. 47—Removing Oil Seal (Upper Half)

6. Install new seal by rolling seal into groove similar to installing main bearing.

NOTE: Lip of seal goes to front of engine.

7. Install bearing cap and torque bearing cap bolts 60-70 ft. lbs.
8. Install oil pan and refill with engine oil.

MAIN BEARINGS

The main bearings are of the precision insert type and do not utilize shims for adjustment. If the clearances are found to be excessive, a new standard or undersize bearing insert, both upper and lower halves, will be required.

NOTE: if, for any reason, main bearing caps are replaced, shimming may be necessary. Laminated shims for each cap are available for service. Shim requirement will be determined by bearing clearance.

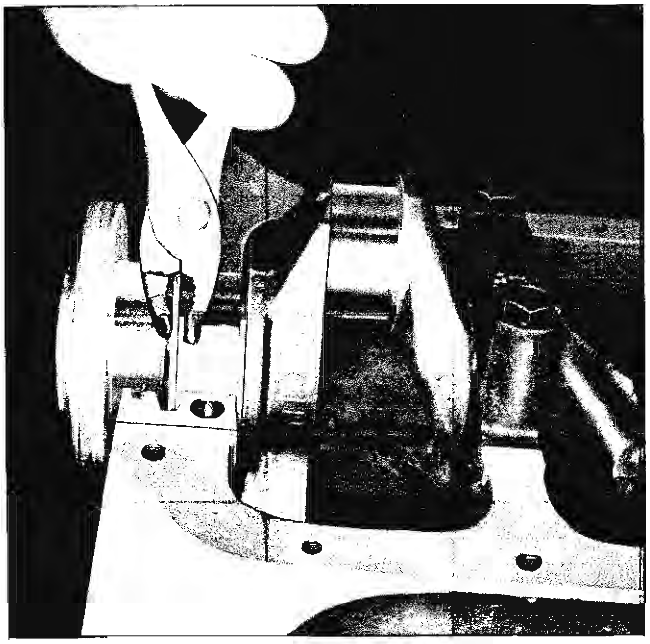

Fig. 48—Rear Main Bearing Removal (Upper Shell)

The clearance may be checked with the engine in the vehicle by the plastigage method (see "Main Bearing Clearance" below). When one bearing is being checked, all the other main bearing caps must be in place and at required torque. The inspection and end play check should also be made as outlined under "Engine Overhaul."

Bearing Replacement—Engine in Vehicle

NOTE: Main bearings may be replaced without removing the crankshaft.

1. Remove oil pan.
2. Remove spark plugs.
3. Remove cap on main bearing requiring replacement and remove bearing from shell.
4. Install a main bearing shell removing and installing tool in the oil hole in the crankshaft.

   NOTE: If such a tool is not available, a cotter pin may be bent as required to do the job.

5. Rotate the crankshaft clockwise as viewed from front of engine. This will roll upper bearing shell out of engine.
6. Oil new upper bearing shell and insert plain (unnotched) end of shell between crankshaft and indented or notched side. Rotate the bearing into place.
7. Install new bearing shell in bearing cap.
8. The rear main bearing journal has no oil hole drilling. To remove the upper bearing half proceed as follows after cap is removed:
   a. Use a small drift punch and hammer to start the bearing rotating out of block.
   b. Then use a pair of pliers to hold the bearing thrust surface to the oil slinger and rotate the crankshaft to pull bearing out (fig. 48).
   c. To install start the bearing (side not notched) into notched side of block by hand, then use pliers as before to turn shell half into place.
   d. The last ¼" movement may be done by holding just the slinger with pliers (taped jaws) or tap in place with a drift punch.
9. Check bearing clearance as outlined under "Main Bearing Clearance."
10. Install oil pan.
11. Install spark plugs.

Bearing Replacement—Engine Removed

The main bearings used as service replacement are of high quality with close tolerances of fit and will not require line reaming on installations. The close dimensional tolerances assure an equalized bearing surface at all points on the crankshaft when replaced in sets.

1. Remove main bearing caps and connecting rod caps and lift crankshaft out of cylinder block. Push pistons to top of bores.
2. Inspect the crankshaft. All main bearing journals are ground to 2.2978"-2.2988", and crankpin journals to 1.999"-2.000".

   These dimensions should be checked with a micrometer for out-of-round, taper or undersize. If the journals exceed .001" out-of-round or taper the crankshaft should be replaced or reconditioned to an undersize figure that will enable the installation of undersize precision type bearings.

   The crankshaft should also be checked for runout. To perform this operation, support the crankshaft at the front and rear main bearing journals in "V" blocks and indicate the runout of both the rear intermediate and front intermediate journals, using a dial indicator. The runout limit of each of these journals is .002". If the runout exceeds .002" the crankshaft must be repaired or replaced.

3. Remove old bearing shells from cylinder block and caps.
4. Remove rear main bearing oil seal.
5. Install new bearing shells in the cylinder block and caps.

   NOTE: Main bearing shells with oil holes are the upper halves of the bearing shells and are inserted between the crankshaft and cylinder block.

6. Carefully place the crankshaft in the bearings.
7. Install the bearing caps as outlined under "Engine Overhaul".

   NOTE: The caps are marked with an arrow for identification purposes. The caps are to be installed with the arrows pointing to the front of the engine.

8. Check crankshaft end clearance as outlined under "Engine Overhaul".

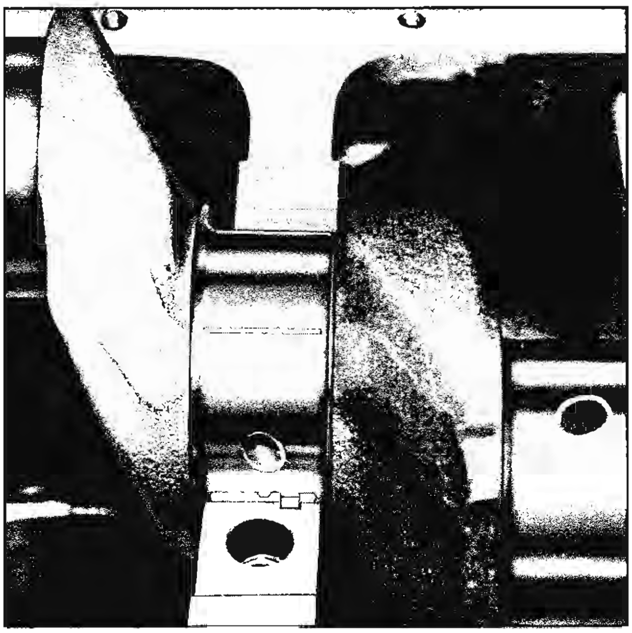

Fig. 49—Plastigage on Journal

9. Check main bearing clearance as outlined below.
10. Check new rear bearing oil seal.
11. Install connecting rod bearings and caps.

Main Bearing Clearance

Plastigage consists of a wax-like plastic material which will compress evenly between the bearing and journal surfaces without damaging either surface. To obtain the most accurate results with Plastigage, certain precautions should be observed. If the engine is out of the chassis and upside down, the crankshaft will rest on the upper bearings and it can be assumed that the total clearance can be measured between the cap bearing and journal.

NOTE: To assure the proper seating of the crankshaft, the rear main bearing oil seal should be removed and all bearing cap bolts should be at their specified torque. In addition preparatory to checking fit of bearings, the surface of the crankshaft journal and bearing should be wiped clean of oil.

1. Starting with the rear main bearing, remove bearing cap and wipe oil from journal and bearing cap.
2. Place a piece of Plastigage the full width of the bearing (parallel to the crankshaft) on the journal (fig. 49).

CAUTION: Do not rotate the crankshaft while the Plastigage is between the bearing and journal.

3. Install the bearing cap and evenly tighten the retaining bolts to 60-70 lb. ft. torque.
4. Remove bearing cap. The flattened Plastigage will be found adhering to either the bearing shell or journal. On the edge of Plastigage packing envelope there is a graduated scale which is correlated in thousands of an inch.
5. Without removing the Plastigage, check its compressed width (at the widest point) with the graduations on the Plastigage envelope (fig. 50).

NOTE: Normally, main bearing journals wear evenly and are not out-of-round. However, if a bearing is being fitted to an out-of-round journal be sure to fit to the maximum diameter of the journal. If the bearing is fitted to the minimum diameter of the journal and the journal is out-of-round .001" or more, interference be-

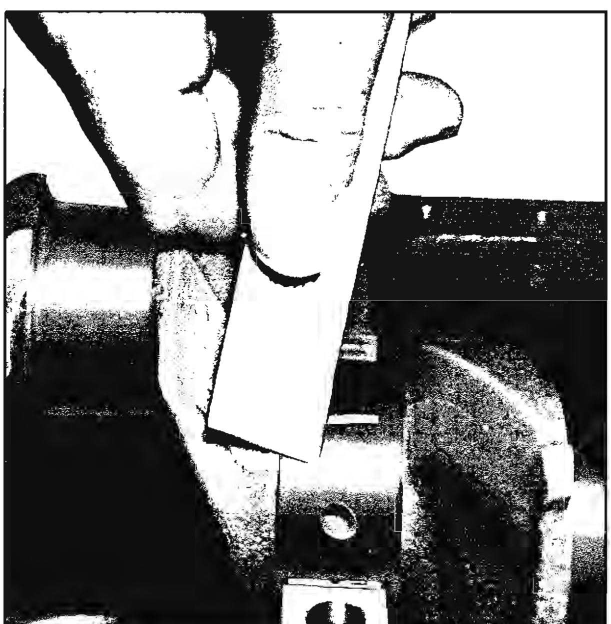

Fig. 50—Measuring Plastigage

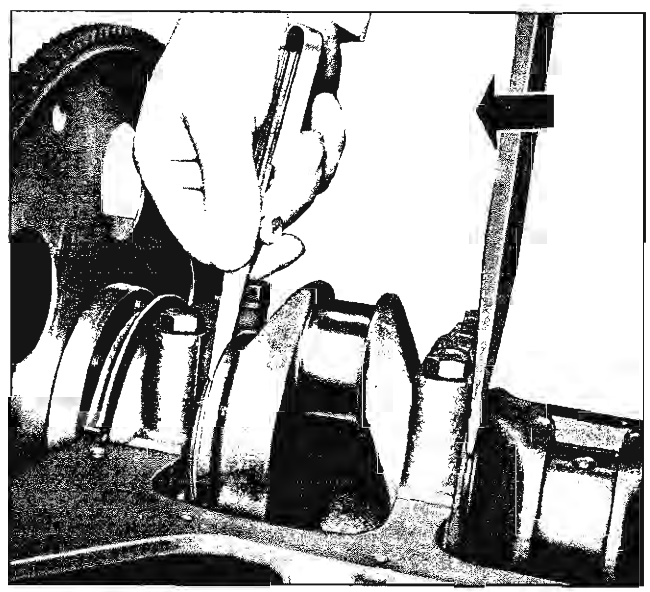

Fig. 51—Measuring Crankshaft End Play

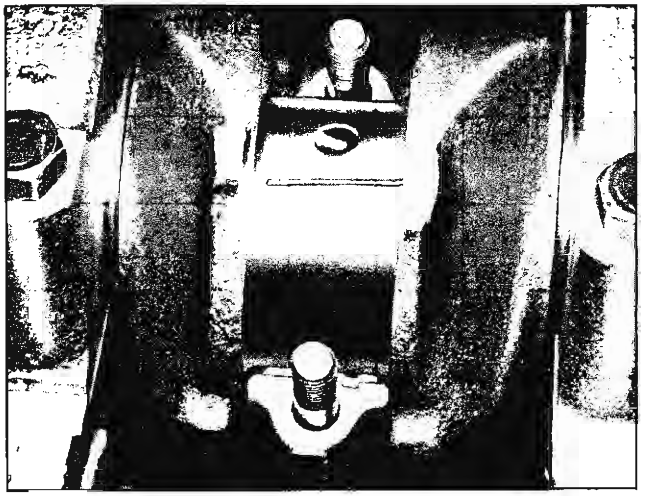

Fig. 52—Plastigage on Crankpin

tween the bearing and journal will result in rapid bearing failure. If the flattened Plastigage tapers toward the middle or ends, there is a difference in clearance indicating a taper, low spot or other irregularity of the bearing or journal. Be sure to check the journal with a micrometer if the flattened Plastigage indicates more than .001″ difference.

6. If the bearing clearance is not over .004″ (worn) or .003″ (new) or less than .001″ the bearing insert is satisfactory. If the clearance is not within these limits replace the insert.

   NOTE: If a new bearing cap is being installed and clearance is less than .001″, check for burrs or nicks; if none are found then install shims as required.

7. A .002″ undersize bearing may produce the proper clearance. If not, it will be necessary to regrind the crankshaft journal for use with the next undersize bearing.

   NOTE: Bearings are available in standard sizes and .002″, .010″, .020″ and .030″ undersize.

8. Proceed to the next bearing. After all bearings have been checked rotate the crankshaft to see that there is no excessive drag.
9. Check the end play by forcing the crankshaft to its extreme front position. Check at the front side of the rear main bearing with a feeler gauge (fig. 51). This clearance should be from .002″ to .006″.
10. Install a new rear main bearing oil seal in the cylinder block and main bearing cap.

CONNECTING ROD BEARINGS

(Service in Vehicle)

Connecting rod bearing inserts are available in standard sizes and undersizes of .001″, .002″, .010″ and .020″. These bearings are not shimmed and when clearances become excessive the next undersize bearing insert

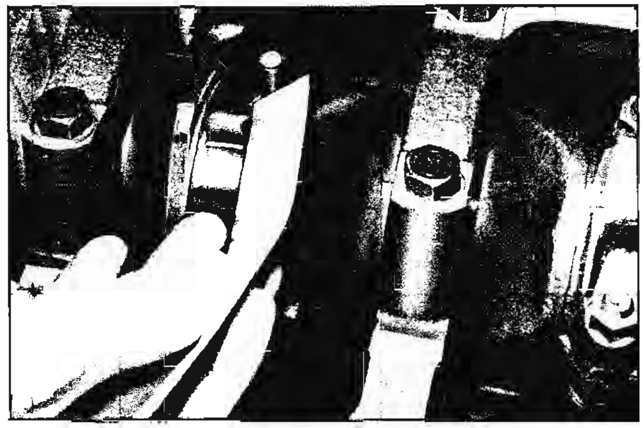

Fig. 53—Measuring Plastigage

should be used. DO NOT FILE ROD OR ROD CAPS.

1. Drain oil and remove oil pan.
2. Remove the connecting rod bearing cap.
3. Wipe bearing insert shell and crankpin clean of oil.
4. Place a piece of Plastigage the full width of the bearing on crankpin (parallel to the crankshaft) (fig. 55).
5. Reinstall the bearing cap and evenly tighten the retaining nuts to 35-45 ft. lbs. torque.

   CAUTION: Do not turn crankshaft with the Plastigage installed.

6. Remove the bearing cap and without removing the Plastigage, check its width at the widest point with the Plastigage scale (fig. 53).

   NOTE: If the crankpin is out-of-round be sure to fit the bearing to the maximum diameter of the crankpin. If the flattened plastic is not uniform from end to end in its width, the crankpin or bearing is tapered, has a low spot or some other irregularity. Check the crankpin with a micrometer for taper if the flattened Plastigage indicates more than a .001″ difference.

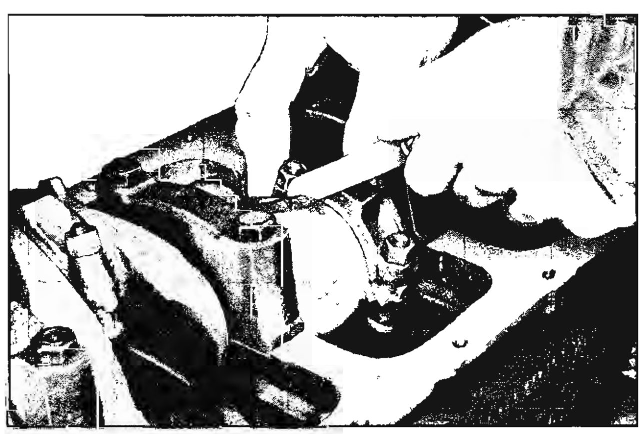

Fig. 54—Check Connecting Rod Side Clearance

7. If the reading is not over .004" or not less than .001" the fit is satisfactory. If however, the clearances are not within these limits, replace the bearing with the proper undersize bearing.

   NOTE: The insert bearing shells are not adjustable and no attempt should be made to adjust by filing the bearing cap.

   New bearing shell insert clearance should be .003" maximum and .001" minimum.
8. Rotate the crankshaft after bearing adjustment to be sure the bearings are not too tight.
9. Check connecting rod end clearance between connecting rod cap and side of crankpin (fig. 54). See engine specifications for clearance.
10. Install oil pan with new gaskets and seals and refill with engine oil.

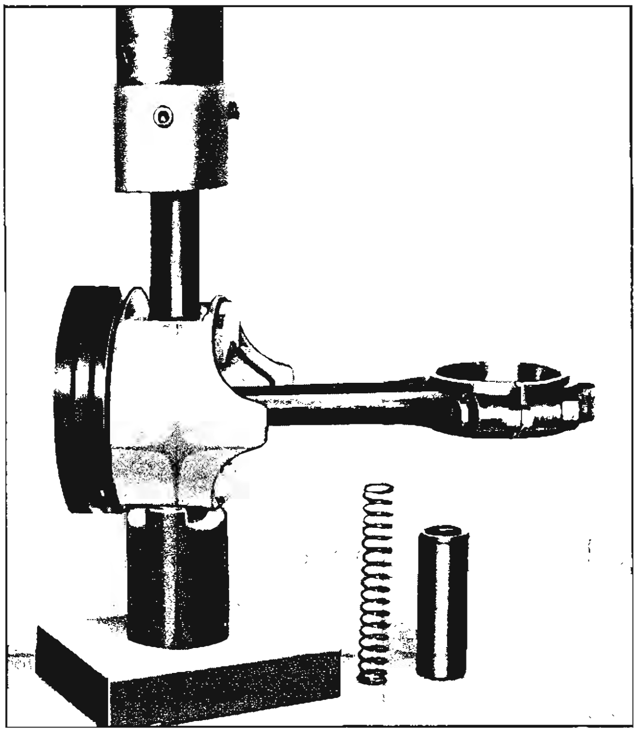

Fig. 55—Removing Piston Pin

PISTON AND CONNECTING ROD

Removal

1. Drain cooling system and remove cylinder head.
2. Drain crankcase oil and remove oil pan.
3. Remove any ridge and/or deposits from the upper end of the cylinder bores with a ridge reamer.

   NOTE: Move piston to the bottom of its travel and place a cloth on top of piston to collect the cuttings. After ridge and/or deposits are removed, turn crankshaft until piston is at the top of its stroke and carefully remove cloth with the cuttings.

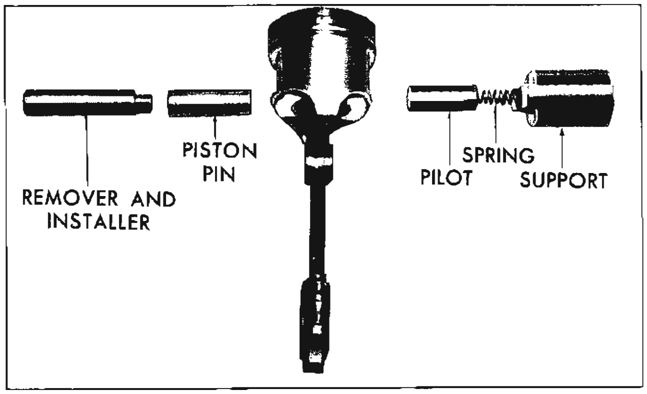

Fig. 56—Piston Pin Installation

4. Check connecting rods and pistons for cylinder number identification and if necessary, mark them.
5. Remove connecting rod cap nuts and caps. Push the rods away from the crankshaft and install caps and nuts loosely to their respective rods.
6. Push piston and rod assemblies away from crankshaft and out of the cylinders.

   NOTE: It will be necessary to turn the crankshaft slightly to disconnect some of the rods and to push them out of the cylinder.

Disassembly

1. Install pilot of piston pin Removing and Installing Tool J-9510 on piston pin.
2. Install piston and connecting rod assembly on support and place assembly in an arbor press as shown in Figure 55. Press pin out of connecting rod.
3. Remove assembly from press and remove piston pin from support and remove tool from piston and rod.

Inspection

Inspect the connecting rods for out-of-round or taper at either bore and for signs of fracture. Then use a suitable alignment fixture and check the rod for bend and twist, following the instructions of the fixture manufacturer. If the bend or twist is not within specifications (see page 44), straighten or replace the rod as necessary.

Piston Pin Fit

Piston pins are a matched fit to the piston and are not available separately. Piston pins will not become loose enough to cause a knock or tapping until after very high mileage and in such cases a new piston and pin assembly should be installed. Wear limit for pin clearance is .0011 maximum.

New piston pins should be capable of supporting their own weight in either pin boss when coated with light engine oil and at 60° F. Higher or lower temperatures will cause false indications. Pistons and pins are serviced as assemblies.

Assembly

1. Lubricate piston pin holes in pistons and connecting rod to facilitate installation of pin.
2. Position connecting rod in its respective piston so

that flange or heavy side of rod at the bearing end will be towards front of piston (cast depression in top of piston head).
3. Install piston pin on installer and pilot spring and pilot in support (fig. 56).
4. Install piston and rod on support, indexing pilot through piston and rod.
5. Place support on arbor press, start pin into piston and press on installer until pin pilot bottoms.
6. Remove installer and support assembly from piston and connecting rod assembly.
7. Check piston pin for freedom of movement in piston bore.

PISTON RINGS

Chevrolet piston rings are furnished in standard sizes as well as .020", .030" and .040" oversizes.

Oil Control Rings

The oil control rings used on all engines consist of two segments (rails) and an expander spacer.

Compression Rings

All compression rings are marked with the letters "GM" cast in the upper side of the ring. When installing compression rings, make sure the side marked "GM" is toward the top of the piston.

Removal

1. Remove piston rings by expanding them and sliding them off the ends of the piston. Tool J-8020 is available for this purpose.
2. Clean piston ring grooves by carefully removing all particles of carbon. Also check for burrs or nicks that might cause rings to hang up.

Installation

1. Select rings comparable in size to the piston being used.

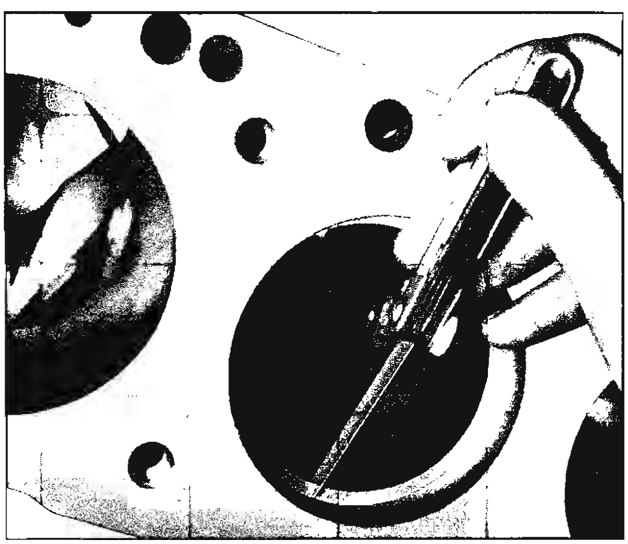

Fig. 57—Checking Ring Gap

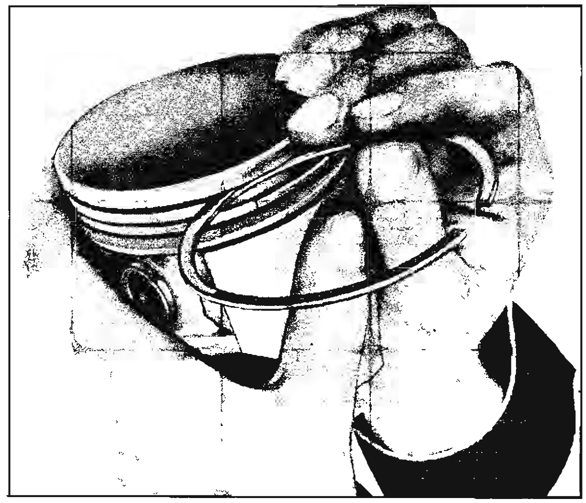

Fig. 58—Rolling Ring in Groove

NOTE: It is important that each ring be fitted to its indivdual cylinder for proper gap spacing and to its individual piston and groove for proper groove clearance.

2. Slip the ring in the cylinder bore; then using the head of a piston, press the ring down into the cylinder bore about two inches.

NOTE: Using a piston in this way will place the ring square with the cylinder walls.

3. Check the space or gap between the ends of the ring with a feeler gauge (fig. 57).
4. If the gap between the ends of the ring is below specifications (see "Engine Specifications" in Section 15), remove the ring and try another for fit.
5. Fit each ring separately to the cylinder in which it is going to be used.
6. New pistons, rings and cylinder bores wear considerably during seating and gaps widen quickly; however, engine operation will not become seriously affected if ring gaps do not become greater than 1/32".
7. Carefully remove all particles of carbon from the ring grooves in the piston and inspect the grooves carefully for burrs or nicks that might cause the rings to hang up.
8. Slip the outer surface of the compression ring into the piston ring groove and roll the ring entirely around the groove to make sure that the ring is free and does not bind in the groove at any point (fig. 58). If binding occurs, the cause should be determined and removed by carefully dressing with a fine cut file. However, if the binding is caused by a distorted ring, install a new ring.
9. Install the oil ring spacer in the oil ring groove and position gap in line with piston hole. Hold spacer ends butted and install steel rail on top side of spacer. Position gap at least 1" to left of spacer gap, then install second rail on lower side of spacer. Position gap at least 1" to right of spacer gap.

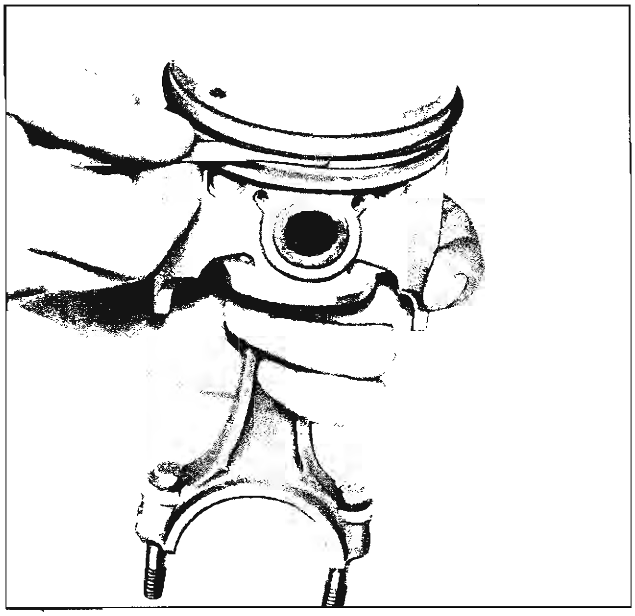

Fig. 59—Checking Groove Clearance

10. Flex the oil ring assembly in its groove to make sure ring is free and does not bind in the groove at any point. If binding occurs, the cause should be determined and removed by carefully dressing with a fine cut file. However, if the binding is caused by a distorted ring, install a new ring.
11. Proper clearance of the piston ring in its piston ring groove is very important in maintaining engine performance and in preventing excessive oil consumption. Therefore, when fitting new rings, the clearances between the top and bottom surfaces of the ring grooves should be inspected (fig. 59). Refer to "Engine Specifications" in Section 14 for correct clearances.
12. The compression rings should be fitted so that the clearance is .0012" to .0032" (fig. 57) for new parts and up to .005" allowable wear limit.
13. Assemble the rings to the pistons as they are fitted and make a final test of the ring fit in the grooves by repeating the fitting procedure given above.

    Expander ends must not align with the ring gap.

NOTE: Identification marks on compression rings must always be *up*.

CYLINDER BLOCK

Inspection

1. Check the cylinder block for cracks in the cylinder walls, water jacket and main bearing webs.
2. Check the cylinder walls for taper, out-of-round or excessive ridge at top of ring travel. This should be done with a dial indicator (fig. 60). Set the gauge so that the thrust pin must be forced in about 1/4" to enter gauge in cylinder bore. Center gauge in cylinder and turn dial to "0." Carefully work gauge up and down cylinder to determine taper and turn it to different points around cylinder wall to determine the out-of-round condition. If cylinders were found to have more than .002 out-of-round, boring will be necessary.

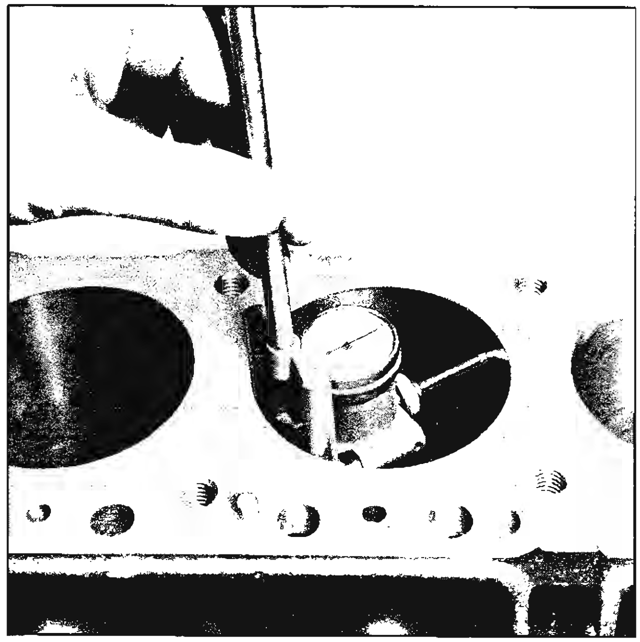

Fig. 60—Checking Cylinder Out-of-Round and Taper

Repair

The performance of the following operations is contingent upon engine condition at time of repair.

If the cylinder block inspection indicated that the block was suitable for continued use except for out-of-round or tapered cylinders, they can be conditioned by honing or boring and honing.

High limit standard size pistons are available for service use so that proper clearances can be obtained for slightly worn cylinder bores and blocks requiring only light honing to clean up the bores. There are four standard size pistons available for service under two part numbers. These aluminum pistons are selected by size and are unitized in groups of six for service usage. In addition, aluminum pistons are serviced in .020", .030" and .040" oversizes. If the cylinders were found to have less than .005" taper or wear they can be conditioned with a hone and fitted with the high limit standard size pistons. A cylinder bore of less than .005" wear or taper may not entirely clean up when fitted to a high limit position. If it is desired to entirely clean up the bore in these cases, it will be necessary to rebore for an oversize piston. If more than .005" taper or wear they should be bored and honed to the smallest oversize that will permit complete resurfacing of all cylinders. The use of a dial gauge set up with a pair of micrometers to the standard cylinder bore size as outlined under "Cylinder Block-Inspection," will aid in determining the size pistons for which the cylinders must be bored.

Boring

1. Before using any type boring bar, the top of the

cylinder block should be filed off to remove any dirt or burrs. This is very important. Otherwise, the boring bar may be tilted which would result in the rebored cylinder wall not being at right angles to the crankshaft.

2. The piston to be fitted should be checked with a micrometer, measuring just below the lower ring groove and at right angles to the piston pin. The cylinder should be bored to the same diameter as the piston and honed to give a clearance of .0006" to .0010".
3. The instructions furnished by the manufacturer of the equipment being used should be carefully followed.

Honing and Piston Fitting

Replacement pistons are available in standard and in .020", .030" and .040" oversizes. Each available size piston is supplied with 4 pistons to cover the size range (example: High limit standard pistons). When pistons are being replaced and minimum cylinder honing is necessary, measure (mike) the cylinder bore and refer to the selection chart to obtain the closest clearance, then check the fit using the feeler strip method. When boring to oversize piston, fit the cylinder to the piston by honing the last .002", and checking fit with feeler method.

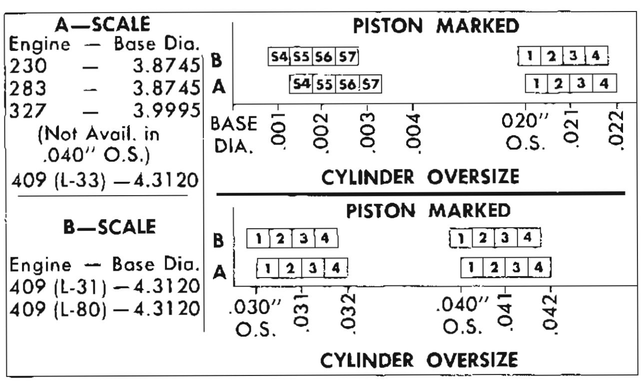

Fig. 61—Piston Selection Chart

1. When the cylinders are to be honed only for use of standard high limit piston or for final finishing after they have been rebored to within .002" of the desired size, they should be finished with a hone. Rough stones may be used at first and fine stones for the final operation.
2. Place the hone into a cylinder bore and expand the stones until the hone can just be turned by hand. Connect a ½" electric drill to the hone and drive hone at drill speed while moving hone up and down entire length of cylinder until hone begins to run free. During this operation a liberal amount of kerosene should be used as a cutting fluid to keep the stones of the hone clean. Move hone slowly up and down with rough stones but move hone up and down rapidly with the fine stones in the final operation. Final bore finish should show very fine uniform surface scratches in a cross-hatch pattern approximately 45° to 60° included angle shown in Figure 62. (Cross-hatch pattern should be clean cut but not sharp, free from torn or folded metal and imbedded particles.)

Fig. 62—Cross-Hatch Finish Pattern

3. Expand the stones against the cylinder bore and repeat the honing operation until the desired bore diameter is obtained.
4. Occasionally during the honing operation, the cylinder bore should be thoroughly cleaned and the piston selected for the individual cylinder checked for correct fit.
5. Check fit of the aluminum pistons in the following manner:
   a. Invert the piston, skirt end up, and place a .0015" by ½" wide feeler ribbon, part of Tool J-5513 on the side of the piston 90° from the piston pin holes.

NOTE: Thoroughly clean cylinder bores with soap and hot water to remove all grit particles.

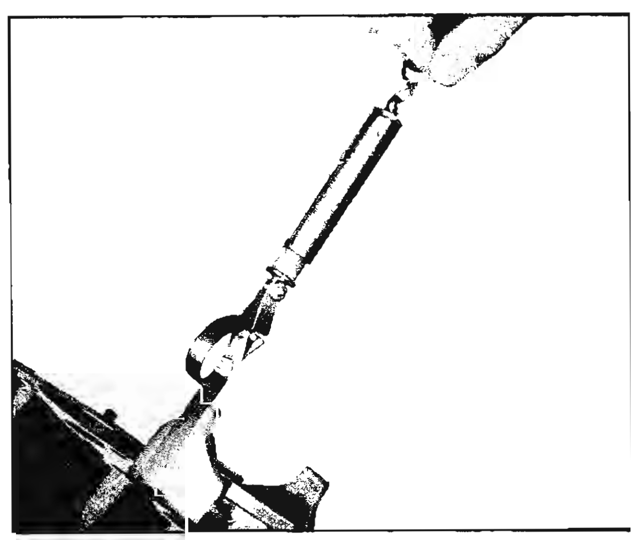

Fig. 63—Checking Piston Fit

b. Insert the feeler ribbon and inverted piston into the cylinder bore so that the center of the piston pin is flush with the top surface of the cylinder block. Keep the feeler ribbon straight up and down and keep the piston pin parallel with the crankshaft axis.
c. Pull the feeler gauge straight up and out, noting at the same time the scale reading which should be between 7 and 18 pounds (fig. 63).
d. If the scale reading is greater than the maximum allowable pull, try another piston or lightly hone the cylinder bore to obtain the proper fit.
e. Should the scale reading be less than the minimum allowable pull, try another piston, or if standard size, try a standard high limit piston. If proper fit cannot be obtained, it will be necessary to rebore the cylinder to the next oversize piston.
f. Mark each piston after fitting to correspond with the cylinder to which it has been fitted. Proceed to hone cylinders and fit the remaining pistons.

CAUTION: Handle the pistons with care and do not attempt to force them through the cylinder until the cylinder has been bored to correct size as this type piston can be distorted through careless handling.

6. Thoroughly clean the cylinder bores with hot water and soap. Scrub well with a stiff bristle brush and rinse thoroughly with hot water. It is extremely essential that a good cleaning operation be performed. If any of the abrasive material is allowed to remain in the cylinder bores, it will rapidly wear the new rings and cylinder bores in addition to the bearings lubricated by the contaminated oil. The bores should be swabbed several times with light engine oil and a clean cloth and then wiped with a clean dry cloth. Cylinders should not be cleaned with kerosene or gasoline. Clean the remainder of the cylinder block to remove the excess material spread during the honing operation.

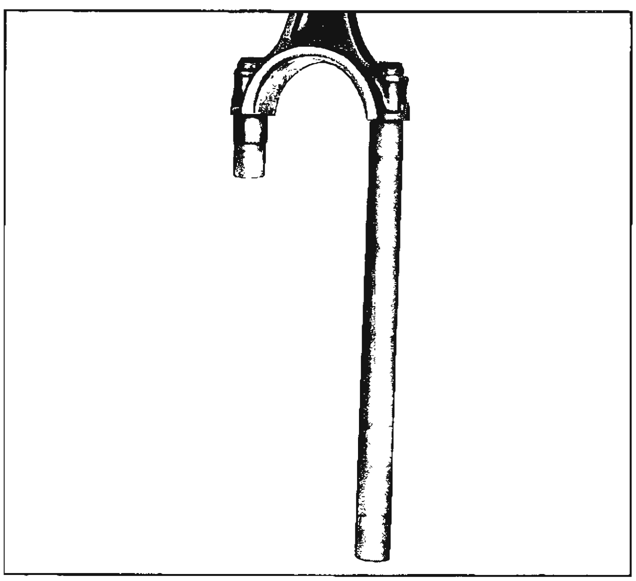

Fig. 64—Guide Tool Installed

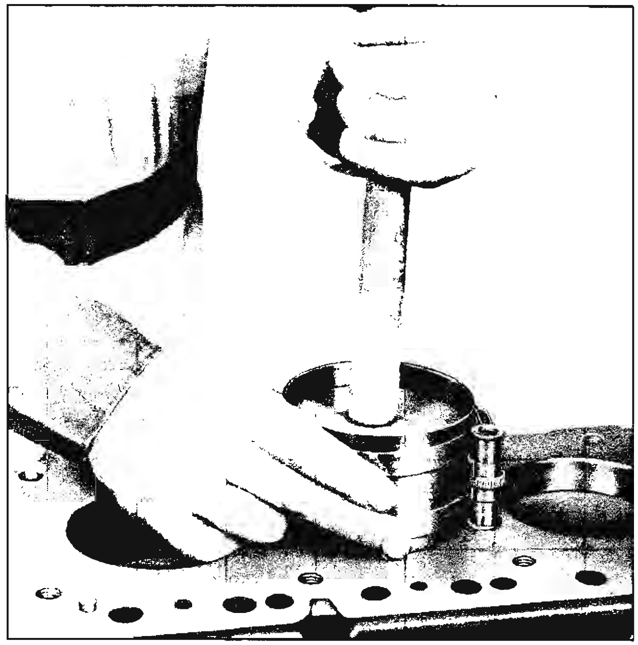

Fig. 65—Installing Piston in Cylinder

Piston and Connecting Rod

Installation

1. Lightly coat pistons, rings and cylinder walls with light engine oil.

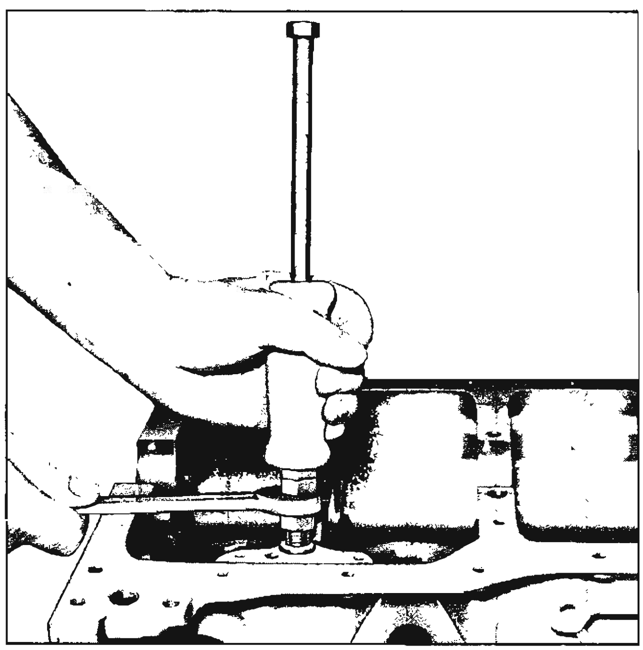

Fig. 66—Removing Distributor Lower Bushing

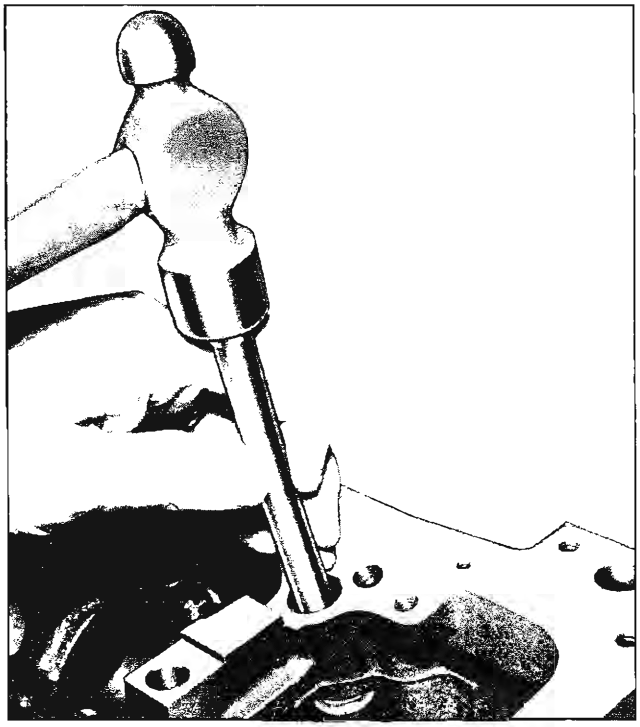

Fig. 67—Removing Distributor Shaft Thrust Washer

2. With bearing caps removed, install Tool J-5239 on bearing cap bolts as protection against nicking crankpins.
3. Be sure ring gaps are spaced around piston, then install each piston in its respective bore, using Tool J-5239 on each assembly (fig. 65). The side of the piston with the cast notch in the top edge of head should be to the front of the cylinder block and the oil hole on connecting rod towards the camshaft side of the engine. Guide the connecting rod bearing into place on the crankshaft journals with the long detail of Tool J-5239 (fig. 64).
4. Install bearing caps and check the bearing clearance as described under Connecting Rod Bearings —Service in Vehicle.
5. Install oil pan gaskets, seals and oil pan.
6. Install cylinder head gasket and head (refer to Cylinder Head Installation).
7. Refill crankcase and cooling system and check for leaks.

DISTRIBUTOR LOWER BEARING

The distributor lower bearing is a bronze bushing pressed into the lower side of the engine block. Its upper inside diameter pilots the distributor shaft and the outside diameter extending below the block pilots the oil pump.

Some engines have a thrust washer at the upper end of the bushing bore. The thrust washer, where used, may be replaced at the same time the bushing is replaced.

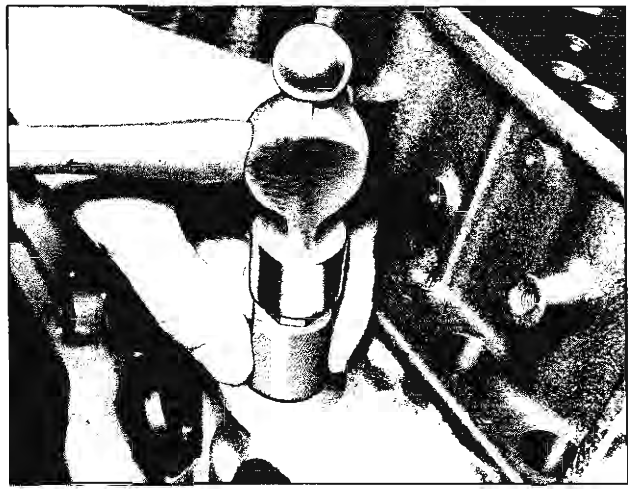

Fig. 68—Installing Distributor Shaft Thrust Washer

The lower bushing will ordinarily require only a clearance or wear check during engine overhaul. When distributor shaft-to-bushing clearance exceeds .0035", the bushing should be replaced as follows with oil pump and distributor removed:

1. Install Tool J-9534 into bushing and using a slide hammer, remove the bushing (fig. 66).
2. Using a drift up through bushing bore, drive thrust washer (if installed) out of bore and remove from block (fig. 67).

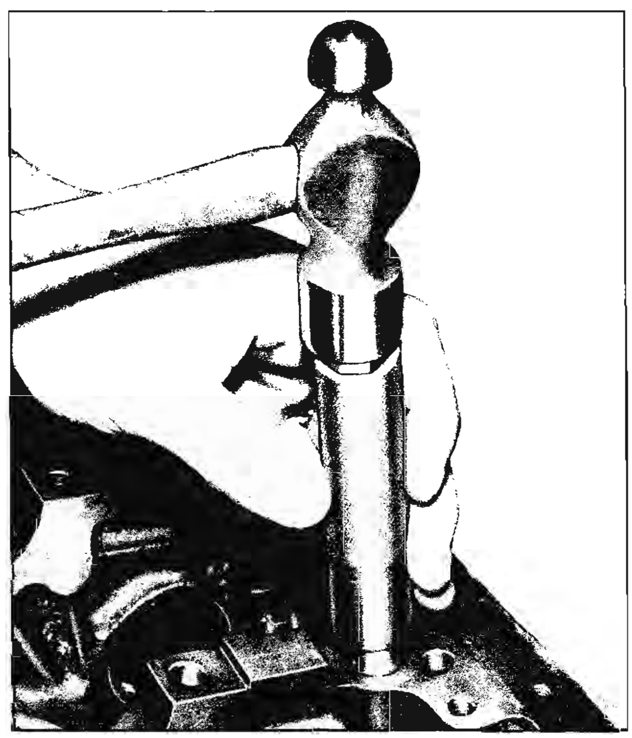

Fig. 69—Installing Distributor Lower Bushing

3. Clean bushing bore in block and check for burrs or damage.
4. If thrust washer was removed, start new washer in position in bore and drive into place using Tool J-9535 (fig. 68).
5. Using Tool J-9535 with driver-bolt in driver handle, install driver into new bushing from large inside diameter.
6. Position bushing and driver to block and drive the bushing in position (fig. 69), which is determined by tool bottoming against the block.
7. Remove tool from bushing. It is possible that the bushing with minimum I.D. will collapse enough, during installation, to slightly seize the installer arbor. If this happens, remove installer tool using slide hammer in driver bolt hole of driver handle.

NOTE: This will not damage the bushing and tool is designed for this purpose, should it occur.

ENGINE MOUNTINGS

Engine mounts are the nonadjustable type, and seldom require service. Broken or deteriorated mounts should be replaced immediately because of added strain placed on other mounts and driveline components.

Front Mounts—Replace (fig. 70)

1. Remove engine bracket-to-mount thru bolt nut and washer.
2. Raise engine slightly to clear mount and remove frame bracket-to-frame bolts, then lift out bracket and mount assembly.
3. Install new mount to frame bracket.
4. Install frame bracket and new mount assembly to frame finger tight.

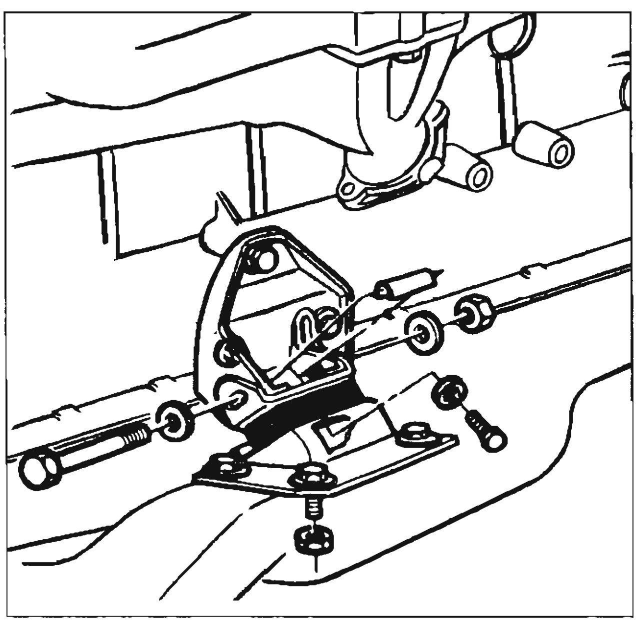

Fig. 70—Engine Front Mount Assembly

5. Lower engine into place and install thru bolt. Completely lower engine and tighten all mount bolts.

Rear Mount

See Sections 12 and 13 of this manual.

ENGINE OVERHAUL

Engine Removal

1. Drain cooling system and crankcase.
2. Remove air cleaner and disconnect battery cables at battery.
3. Scribe around hinges, then remove hood.
4. Remove radiator and fan blades.
5. Disconnect wires at:
   a. Starter solenoid.
   b. Generator.
   c. Temperature switch.
   d. Oil pressure switch.
6. Disconnect:
   a. Accelerator linkage at manifold bellcrank.
   b. Exhaust pipe flange at manifold.
   c. Gas tank line at fuel pump.
   d. Vacuum line to power brake unit at manifold.
   e. Power steering pump lines at pump end.
7. Raise vehicle and place on jack stands.
8. Drain transmission if propshaft opening plug is not available.
9. Remove propshaft.
10. Disconnect:
    a. Shift linkage at transmission.
    b. Speedometer cable at transmission.
    c. Clutch linkage at cross-shaft (Synchromesh only).
11. Remove clutch cross-shaft engine bracket.
12. Remove rocker arm cover and attach lifting device.
13. Remove front mount through bolts.
14. Raise engine to take weight off front mounts, then remove rear mount bolts.
15. Remove engine-transmission assembly from vehicle as a unit.

TRANSMISSION AND CLUTCH REMOVAL

Manual Transmission

1. Remove clutch housing cover plate screws.
2. Remove bolts attaching the clutch housing to engine block. Remove transmission and clutch housing assembly.

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.

3. Remove starter and clutch housing cover plate.
4. Loosen clutch-to-flywheel 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.

Automatic Transmission

1. Lower the engine, secured by the hoist, and support engine on blocks.
2. Remove converter housing underpan bolts. Remove pan.
3. Remove flywheel-to-converter assembly attaching bolts.
4. Support transmission and extension on blocks.
5. Remove transmission-to-engine mounting bolts.
6. With the hoist attached, remove blocks from the engine only and slowly guide the engine from the transmission.

ENGINE DISASSEMBLY

1. Mount engine in stand Tool J-5856-02 and clamp securely.
2. Remove engine ground strap, and oil dipstick.
3. Disconnect spark plug wires and primary wire at coil.
4. Remove the distributor hold-down clamp, disconnect vacuum line from vacuum spark control and lift the distributor up out of the engine.
5. Remove spark plugs and coil.
6. Disconnect fuel line and vacuum line from fuel pump, remove fuel pump bolts and fuel pump.
7. Disconnect fuel and vacuum lines and choke rod at carburetor.
8. Remove the lines by sliding them from the retaining clip at the cylinder head water outlet.
9. Disconnect choke stove clean air tube and choke stove heat tube at carburetor and remove tubes from the manifold.
10. Remove generator mounting bolts, generator and fan belt.
11. Remove the fan and water pump pulley.
12. Remove water pump and generator attaching brace.

Attach puller Tool J-6978 to harmonic balancer and turn puller screw to remove balancer.

15. Remove two bolts attaching water outlet to thermostat housing and remove water outlet and thermostat.
16. Remove thermostat housing from cylinder head.
17. Remove carburetor throttle rod and return spring from manifold pivot lever.
18. Remove throttle and accelerator levers from manifold.
19. Remove carburetor attaching nuts and carburetor.

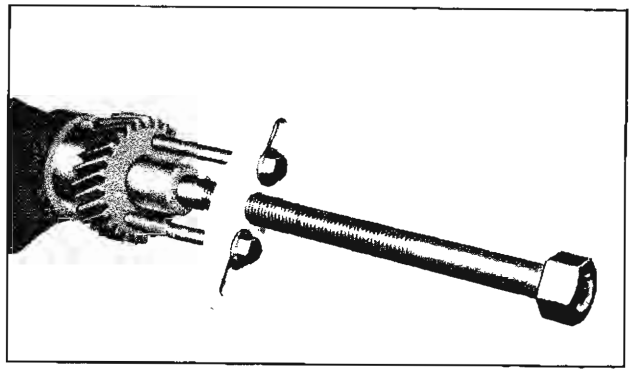

Fig. 71—Removing Crankshaft Gear

20. Remove bolts and retaining clamps attaching manifold to cylinder head and remove intake and exhaust manifold as an assembly.
21. Remove push rod cover.
22. Loosen rocker arm adjustment nuts, pivot rocker arms and remove push rods and valve lifters.
23. Remove cylinder head attaching bolts and cylinder head.
24. Remove the timing gear cover attaching screws and remove cover and gaskets.
25. Remove two camshaft thrust plate screws through holes in the camshaft gear and remove camshaft gear and camshaft through the front of the block.

NOTE: Support shaft carefully when removing so as not to damage camshaft bearings.

26. Remove crankshaft gear with gear puller Tool J-8105 (fig. 71).
27. Remove starter.
28. Remove oil pan.
29. Remove oil pump and pickup pipe retaining screws and pump assembly.
30. Clean cylinder ridge with ridge reamer.
31. Check the connecting rods and pistons for cylinder number identification and if necessary, mark them.
32. Remove connecting rod nuts and rod caps. Push rods away from the crankshaft and out of cylinders. Install caps and nuts loosely to their respective rods.

NOTE: It will be necessary to turn the crankshaft slightly to disconnect some of the rods and to push them out of the cylinder.

33. Remove piston rings by expanding them and sliding them off the ends of the pistons.
34. Remove main bearing cap bolts and remove the bearing caps.
35. Lift the crankshaft with the flywheel attached out of the block and place it where it will not get damaged.
36. Lift bearing shells from block and bearing cap.

Cleaning and Inspection

1. Wash all parts thoroughly in cleaning solvent.
2. Remove oil gallery plugs, located one at front and one at rear face of cylinder block. These plugs may be removed with a sharp punch or they may be drilled and pried out. This oil passage should be thoroughly cleaned either by using compressed air or wire brush.
3. Clean all oil passages in the cylinder block and crankshaft by blowing them out with compressed air. It is good practice to blow them out separately. On the block this can be done by plugging the holes in three of the bearings and placing the nozzle of the air gun in the oil inlet of the cylinder block and blowing through the remaining bearing oil passages. Continue this until all passages are clean. Blow through the passage to the camshaft bearings.
4. Run a fine wire through the lubrication holes in each connecting rod.
5. Blow out the rocker arm shaft oil line and the passage up from the camshaft bearing.
6. Clean carbon from piston heads, ring grooves and inside of piston head.
7. Check the cylinder block for cracks in the cylinder walls, water jacket and main bearing webs.
8. Inspect the connecting rod bearings for fatigue, pitted or damaged.
9. Determine whether or not pistons are to be replaced. New piston assemblies with pins and rings are required when the cylinders are to be honed or rebored. If the pistons are to be used again, check the piston pin fit in the pin bores. Refer to "Connecting Rod, Bearings, Pistons and Rings."
10. Inspect the timing gears for excessive tooth wear and for loose hub in camshaft gear. Inspect the camshaft thrust plate for excessive wear.
11. Check the cylinder head for being warped, for having clogged water passages, cracked valve seats or worn valve guides.
12. Inspect the manifolds for excessive carbon in the ports. Check the operation of the heat control valve and make sure that the gasket between the manifolds is in good condition.
13. Inspect the oil pump gears for wear, check the shaft for looseness in the housing and the inside of cover for wear that would permit oil to leak past end of gears. Check screen for damage.

NOTE: Instructions for inspection and repair of the fuel pump, carburetor, air cleaner, generator, starting motor, distributor, clutch and water pump will be found in their respective sections of this manual.

14. Check camshaft bearings for wear and if necessary replace as previously outlined.

Bearing and Journal Inspection

In general, the lower half of the bearing shows a greater wear and the most distress from fatigue. If upon inspection the lower half is suitable for use, it can safely be assumed that the upper half is also satisfactory. If the lower half shows evidence of fatigue, distress, abrasion, erosion, scoring or the like, both upper and lower halves should be replaced. Never should one half be replaced without replacing the other half.

If the running clearance of a bearing is too great with the used inserts, it will be necessary to install both upper and lower bearing halves. Should this become necessary, the crankshaft journals should be checked with a micrometer for out-of-round, taper or undersize. If out-of-round more than .001" or tapered, the shaft should be replaced or reconditioned. Check the crankshaft thrust faces at the rear main bearing for scoring or excessive wear. Experience has shown that clearance increase from wear in main bearings is not only due to bearing wear, but is also due in part to crankshaft journal wear.

ASSEMBLY

1. Install a new rear main bearing oil seal in cylinder block and bearing cap, and install main bearing upper halves (shell-half with oil hole) in cylinder block.
2. Carefully lower crankshaft into place. Be careful not to damage the bearing surfaces.
3. Check clearance of each main bearing following procedure outlined under "Main Bearing Clearance" in this section. If the bearing clearances are satisfactory, apply a light coat of engine oil to the journals and bearings.
4. Install all bearing caps and bolts. Torque all main bearing cap bolts, except the rear main bearing 60 to 70 ft. lbs. When tightening rear main bearing

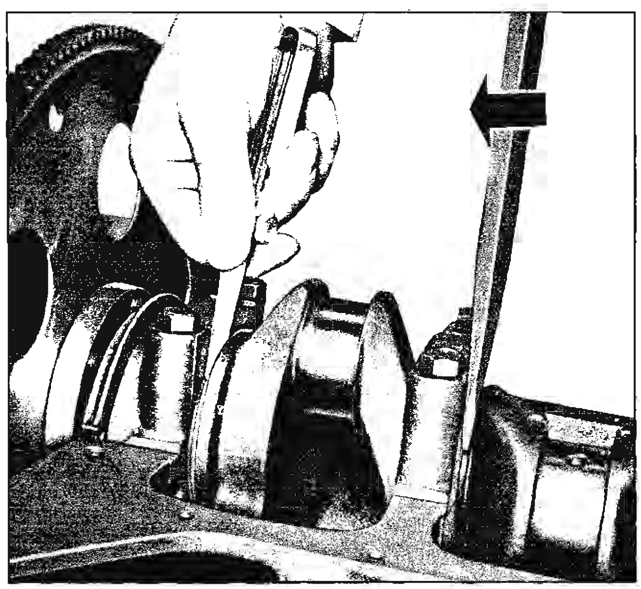

Fig. 72—Checking Crankshaft End Play

cap, torque bolts 10 to 12 ft. lbs. first, then tap end of crankshaft rearward with a lead hammer (this will locate bearing cap and bearing). Then tap crankshaft forward (this will line up both upper and lower crankshaft bearing thrust surfaces). Proceed with final tightening of all main bearing cap bolts—60 to 70 ft. lbs. torque.

5. Check crankshaft end play by forcing the crankshaft to its extreme front position. Check at the front side of the rear main bearing with a feeler gauge (fig. 72). Clearance should be from .002" to .006" with a new bearing. If greater than a maximum .009" clearance, the rear main bearing must be replaced.
6. Make necessary repairs or replacements on piston rings or pins and install piston and connecting rod assembly as previously outlined.
7. Install oil pump over distributor lower bearing and bolt in place. Torque to 9 to 11 ft. lbs.
8. Install new oil gallery plugs in front and rear surfaces of cylinder block.
9. Install camshaft carefully to prevent damage to bearing, align timing marks (fig. 73) and install thrust plate retaining screws through camshaft gear.
10. Install timing gear cover oil seal in cover.
11. Install timing gear cover gasket on block with grease and install cover over centering Tool J-0966. Install cover screws and torque to 6-7½ ft. lbs. Remove centering tool.
12. Install harmonic balancer as previously outlined.
13. Install oil pan with new gaskets and seals and install starter.
14. Install cylinder head gasket and cylinder head and torque to 90 to 95 ft. lbs.
15. Install exhaust and intake manifold assembly. Torque in sequence shown in Figure 4.
16. Install valve lifters, push rods and push rod cover.

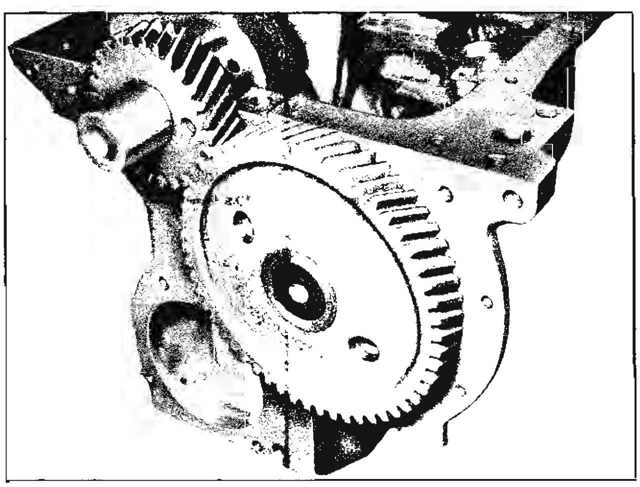

Fig. 73—Align Timing Marks

17. Install rocker arms, pivot balls and stud nuts. Turn nuts down enough to remove lash.
18. Turn crankshaft to align pulley timing mark at TDC when push rods of number one cylinder are down. Install distributor with rotor to number one spark plug wire terminal. Tighten distributor clamp.
19. Install spark plugs, coil, distributor cap and high tension wires.
20. Install water pump and generator attaching brace.
21. Install thermostat housing, thermostat and water outlet. Install temperature sending unit.
22. Install water pump pulley loosely.
23. Install generator and fan belt.
24. Install carburetor and connect choke rod from manifold.
25. Install fuel pump and fuel line from carburetor to fuel pump. Install vacuum spark line from carburetor to distributor and route both fuel and vacuum lines through clip on water outlet.
26. Install oil pressure sending unit.
27. Install flywheel—Line up dowel hole in flywheel with dowel hole in crankshaft flange and bolt flywheel in place (fig. 74). Torque to 45-50 ft. lbs. (Powerglide flywheel must be installed as shown in (fig. 75).
28. On manual transmission models:
    a. Install clutch disc, pressure plate, throwout bearing, clutch housing and transmission as outlined in Section 12.
    b. Install clutch housing cover plate and starter.

    On automatic transmission models:
    a. Install transmission to engine as outlined in Section 13.
    b. Install starter and converter cover.

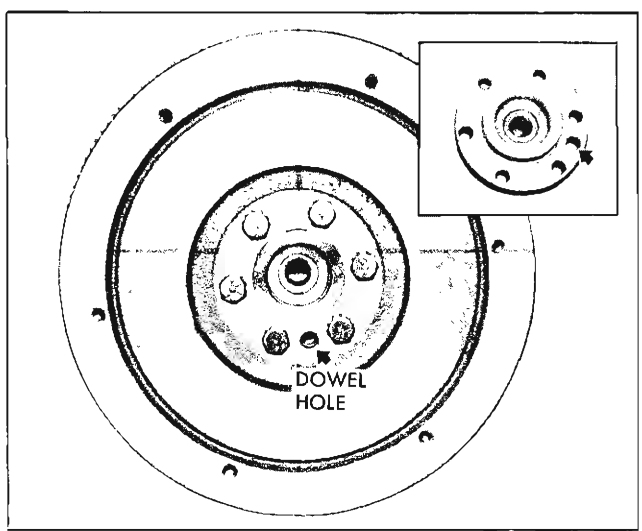

Fig. 74—Flywheel Installation (Syn.)

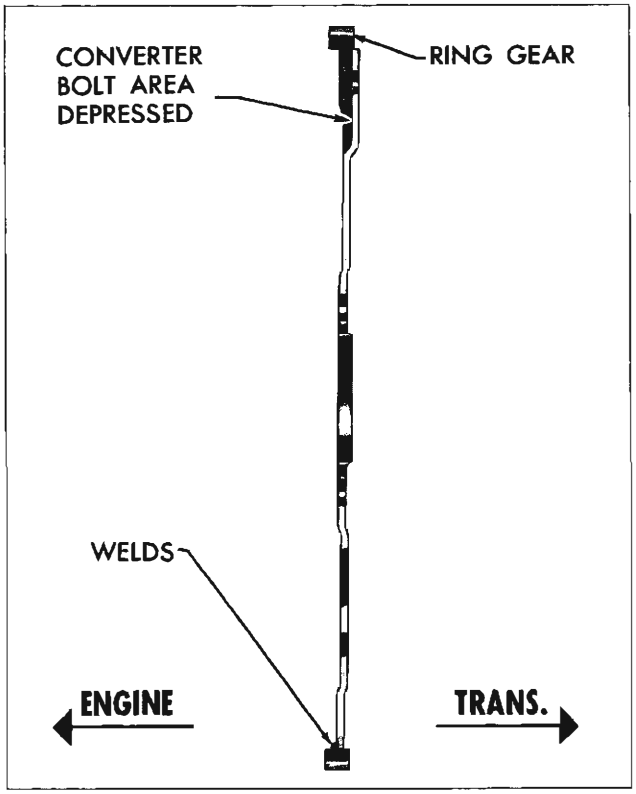

Fig. 75—Flywheel Installation (P.G.)

ENGINE INSTALLATION

1. Position engine in engine compartment as follows:
   a. Install engine lifting Tool J-4536-A to engine and lower engine and transmission into chassis as a unit guiding engine to align front engine mounts with mounts on frame.
   b. Install one rear transmission crossmember side bolt, swing crossmember up under transmission mount and install bolt in opposite side rail.
   c. Align and install rear mount bolts.
   d. Install engine front mount bolts and remove lifting tool from engine.

On manual transmission models:

   a. Install clutch cross shaft. Connect pedal and clutch fork push rods. Install return spring from clutch fork to left engine mount.
   b. Connect transmission control rods to shifter levers on transmission side cover. Adjust control rods as outlined in TRANSMISSION SECTION.

On automatic transmission models:

   a. Connect transmission control rod and throttle valve rod at transmission and adjust as outlined in TRANSMISSION SECTION.
   b. Install transmission filler tube and dipstick.

4. Connect carburetor linkage.
5. Connect speedometer cable at transmission.
6. Check transmission lubricant level. Fill if necessary.
7. Connect exhaust pipe to manifold and tighten securely.
8. Connect wire harness to temperature sending unit; oil pressure sending unit and coil primary terminal.
9. Attach armature and field wires to generator.
10. Attach fuel line to fuel pump.
11. Attach wires and battery cable to starter solenoid.
12. Install radiator assembly and fan.
13. Refill radiator and crankcase.
14. Replace hood assembly, aligning previously scribed marks.
15. Adjust valve lash and perform necessary tune-up procedures and check for oil and coolant leaks.
16. Install rocker arm cover gasket, cover and crankcase ventilation hose.

V-8 ENGINES

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283 and 327 Cubic Inch V-8 Engines

The 283 cubic inch V-8 for 1964 (fig. 78) is equipped with a new remote choke 2 barrel carburetor, single exhaust system and 327 cu. in. cylinder heads raising compression ratio to 9:25:1.

Two 327 cubic inch engines (RPO L-30 and L-74) are a further development of the 327 cubic inch engine design incorporating dual exhaust systems and 4 barrel carburetors, thermo-modulated cooling fan, 10.5 to 1 compression ratio and requiring premium fuel. Option L-30 has a WCFB or 4GC carburetor, hydraulic lifters, and 2" exhaust, while option L-74 has an AFB aluminum carburetor, mechanical lifters and 2½" exhaust.

Both 283 and 327 cubic inch engines have Delcotron A.C. charging systems and positive crankcase ventilation a standard equipment. They have the Chevy II type 360° aluminum clutch housing for synchromesh transmission usage or use the aluminum powerglide. Both engines have pad mounted starters.

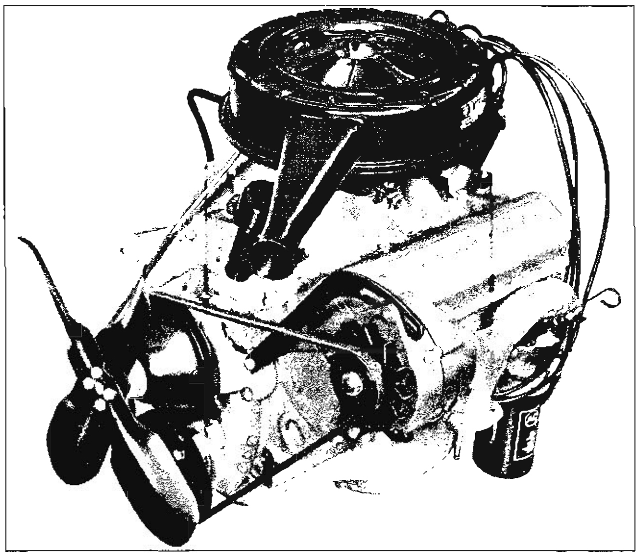

Fig. 76—V-8 283 Engine

409 Cubic Inch Engines (fig. 81)

Three 409 cubic inch engines, offered in 1964, are equipped with 2½" dual exhaust systems, thermo-modulated cooling fan, Delcotron A.C. charging system and positive ventilation system.

RPO L-33 engine has a Rochester 4GC carburetor, hydraulic valve lifters, cast iron inlet manifold and is teamed with a 3-speed, 4-speed or Powerglide transmission.

RPO L-31 engine has an AFB carburetor, solid valve lifters, special camshaft, aluminum inlet manifold and is teamed with 3-or 4-speed transmission.

RPO L-80 is L-31 engine with dual AFB carburetion.

Push Rod Assembly

On engines that use push rods with a hardened insert at one end, the hardened end is identified by a color stripe and should always be installed toward the rocker arm during assembly. The 409 cubic inch engine exhaust push rods are longer than the intake and carry different color stripe for further identification.

PISTON PIN INSTALLATION (283 and 327 cu. in.)

Piston pins are pressed into the connecting rod as in 1961 but a new support tool is necessary due to piston design changes. Tool J-9510 is used for both 283 and 327 cubic inch engines (figs. 79 & 80).

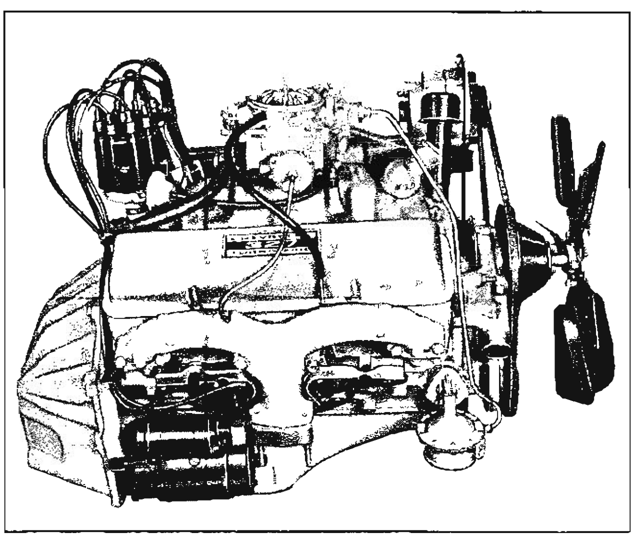

Fig. 77—V-8 327 Engine

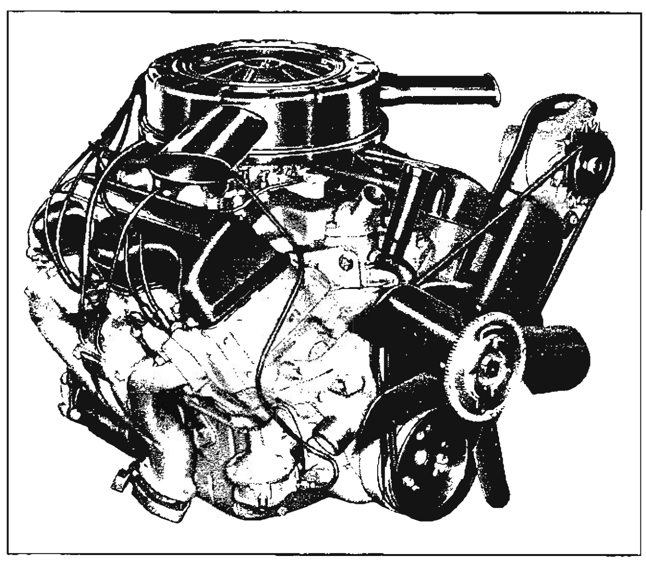

Fig. 78—V-8—409 Engine

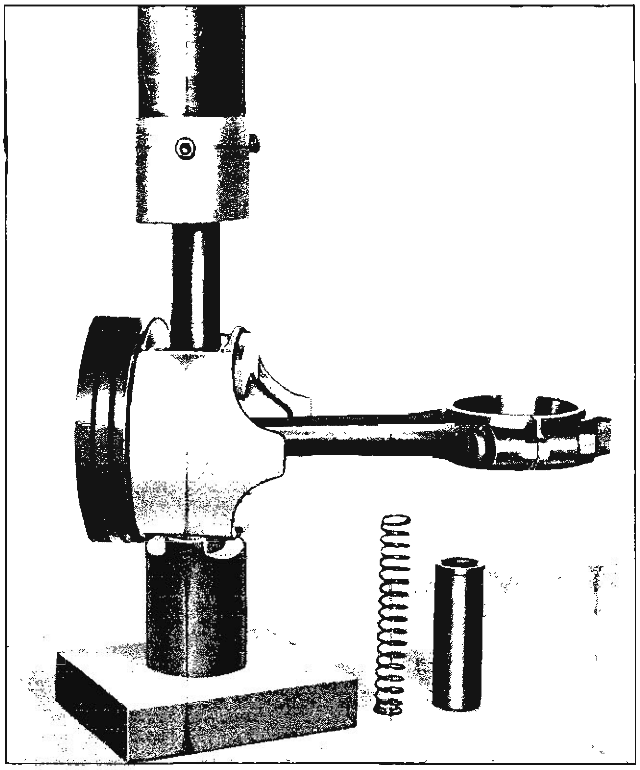

Fig. 79—Piston Pin Removal (V)

PISTON PIN INSTALLATION (409 cu. in.)

Piston pins are pressed in the connecting rod as in 348 cubic inch engines but a new support tool is required to clear lower ring land on the larger 4⁵⁄₁₆" piston. See Tool J-6994-5 (figs. 81 & 82).

Check Piston Pin Fit

Pin fit on 283 and 327 cubic inch engines and 409 hydraulic lifter engine is .00015 to .00025 in production. These new pistons should support the weight of the pin in the boss when coated with light engine oil.

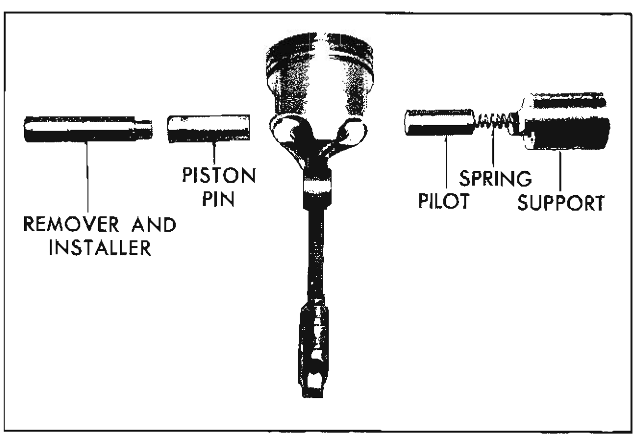

Fig. 80—Piston Pin Installation (V)

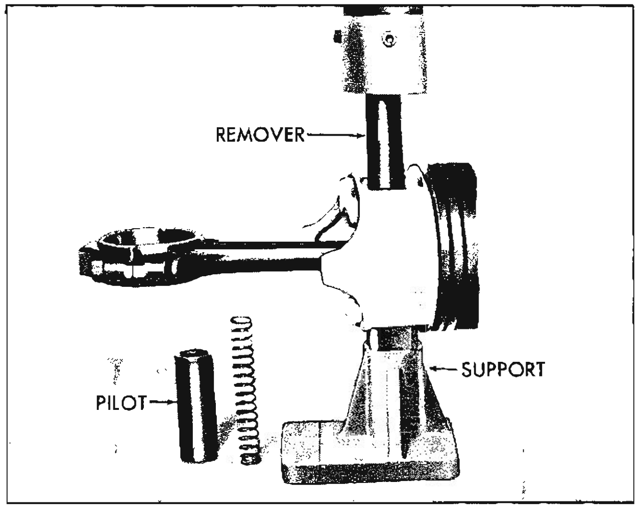

Fig. 81—Piston Pin Removal (W)

The .001" wear allowance prohibits this method of checking to determine if wear is excessive. The 409 high perf. cubic inch engine pin clearance is .00045" to .00055" and also cannot be checked in previous method. The recommended method for checking pin fit on used pistons is with a dial bore gauge or inside micrometer for the pin bore and a micrometer for the pin size. The pin and bores should be free of varnish and scuffing when measuring.

The piston and pin assemblies are serviced as a unit and should be replaced should the clearance exceed production specifications plus .001" wear tolerance.

Cylinder Honing

When finish honing a cylinder bore to fit a piston, the hone should be moved up and down at a speed to obtain very fine uniform surface finish marks in a cross-hatch pattern of approximately 45° to 65° included angle (fig. 83). The finish marks should be clean cut but not sharp, free from imbedded particles and torn or folded metal.

Replacement pistons are available in standard and in .020", .030" and .040" oversizes. Each available size

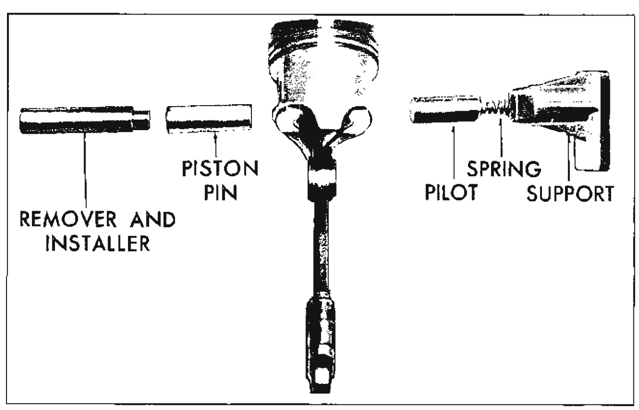

Fig. 82—Piston Pin Installation (W)

piston is supplied with 4 pistons to cover the size range (example: High limit standard pistons). When pistons are being replaced and minimum cylinder honing is necessary, measure (mike) the cylinder bore and refer to the selection chart to obtain the closest clearance, then check the fit using the feeler strip method. When boring to oversize piston, fit the cylinder to the piston by honing the last .002", and checking fit with feeler method.

Piston Fitting—409 Engines

When fitting replacement pistons, the piston should be selected and the bore honed to provide a piston-

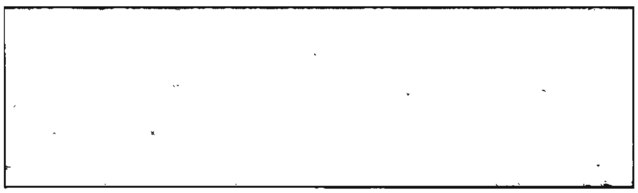

Fig. 83—Cylinder Finish Pattern

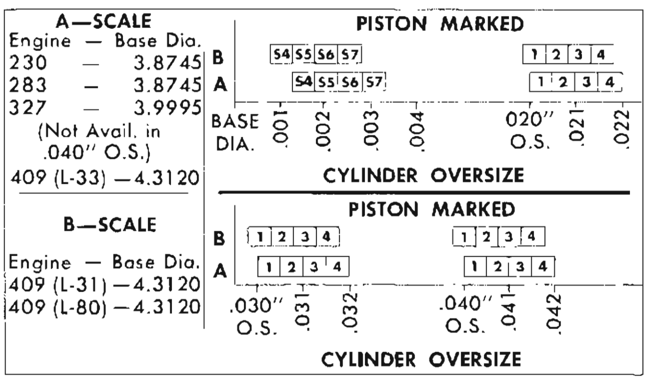

Fig. 84—Piston Selection Chart

to-cylinder wall clearance fit of .0035 to .0042 on the passenger car 409 High-performance engine.

To obtain the proper piston fit by the scale tension method, use Piston Fitting Scale J-5513 and attach a seven to eight inch ribbon of ½" wide .004 feeler stock to the scale, then proceed as follows:

NOTE: The J-5513 spring scale is furnished with a .0015" feeler strip for piston fitting on other Chevrolet engines.

1. Wipe the cylinder, piston and feeler strip surfaces clean and dry. The presence of oil on any of these surfaces would cause an uneven pull on the feeler strip.
2. Insert the .004 feeler ribbon in the cylinder and start the inverted piston into the bore with the feeler strip positioned adjacent to a piston pin boss. While keeping the feeler ribbon straight in the bore rotate the piston down into the cylinder until the piston pin is parallel to the crankshaft axis, and the center of the pin is flush with the top of the cylinder bore (fig. 63).
3. Slowly pull the scale straight up until the feeler strip starts to move, then pull steadily while noting the tension necessary to keep the ribbon moving. The scale reading should be in the range of 7 to 17 lbs. on hi performance 409 cu. in. engines.
4. Hone the cylinder to fit the piston within the range specified in Step 3.

FLYWHEEL INSTALLATION

(Refer to g. 85)

The crankshaft flywheel flange does not have a dowel pin to align flywheel during installation but the

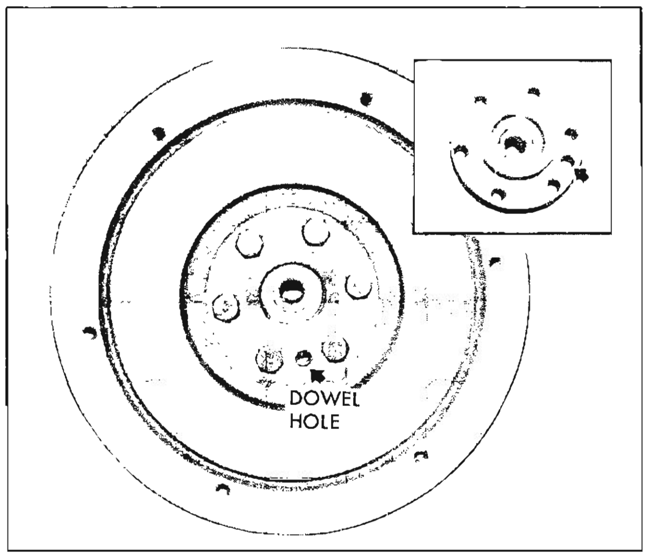

Fig. 85—Align Dowel Holes

dowel hole is still in the flange. To install flywheel, line up dowel hole in crankshaft flange with dowel hole in flywheel using a drift punch, then install flywheel mounting bolts.

HARMONIC BALANCER INSTALLATION

On V-8 engines equipped with a balancer having the inertia weight pressed on the hub, it is necessary to use installer Tool J-8792 to prevent the inertia weight section from "walking" off the hub during installation of balancer. This tool is designed to be used on L-6 engines as well as V-8 and care should be taken to proceed as follows when installing the balancer:

1. Thread the driver section of Tool into clamp section from shallow fingers to deep fingers (fig. 86).
2. Arrange adapter pilot into end of driver with flat end out and lock in place with screw.

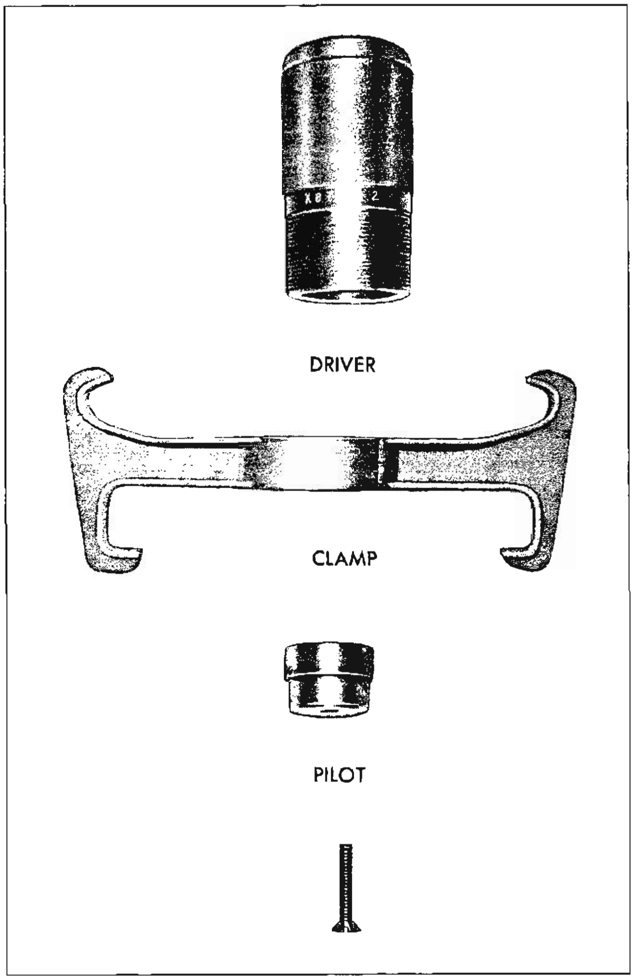

Fig. 86—Balancer Installer Tool

3. Install tool over balancer as shown in Figure 87 with pilot adapter in the bore of hub. Tighten threaded driver only finger tight to keep from pulling balancer apart.

1963 409 ENGINE REMOVAL

(with transmission as an assembly)

1. Drain cooling system, crankcase and transmission.
2. Scribe alignment marks around hood hinges and remove hood.
3. Remove air cleaner and cover carburetor with a cloth.
4. Air Conditioned Only–Remove air conditioning compressor from engine mounting and tie it to fender near battery.
5. Disconnect:
   a. Battery cables at battery.
   b. Wires at starter solenoid.
   c. Wires at generator.

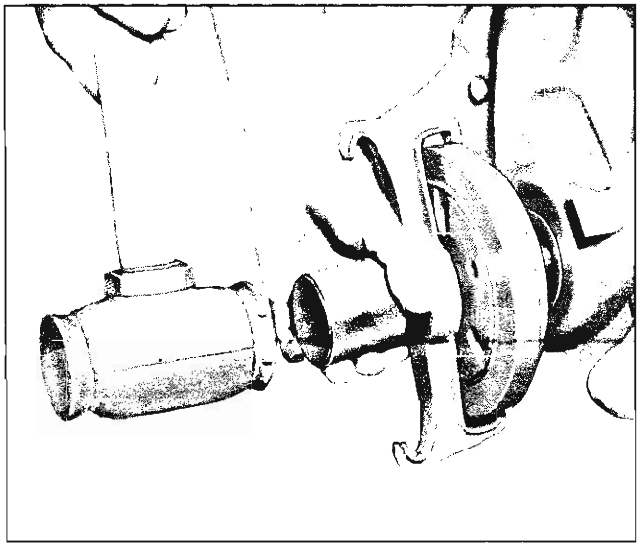

Fig. 87—Installer Tool in Place

   d. Engine-to-body ground straps.
   e. Oil pressure indicator lead at engine.
   f. Temperature indicator lead at sending unit.
   g. Coil leads at coil (tachometer leads at coil if equipped).
   h. Spark plug wires at plugs.
   i. Both gas lines at fuel pump.
   j. Radiator hoses at engine ends.
   k. Throttle control rod at pedal bellcrank.
   l. Heater hoses at engine end.
   m. (Powerglide only) Powerglide cooling lines at radiator and plug open ends.
6. Remove fan and fan pulley assembly.
7. Remove radiator core and shroud as assembly.
8. a. Remove power steering pump mount bolts and swing pump into opening behind left headlight.
   (or)
   b. Disconnect pump lines and plug open ends.
9. Remove distributor cap (with all high tension leads attached) and cover distributor with a cloth.
10. Power Brake Vehicle Only – Disconnect brake pedal push rod at broke cylinder push rod pin, then dismount power brake unit and move to side against fender (about 3-4 inches).

CAUTION: Do not push downward or twist the unit or fluid line damage may result.

11. Raise vehicle and place on jack stands.
12. Remove rocker arm covers and install lifting Tool J-4536 to engine (using center cylinder head bolt on each bank) and attach engine lifting device.

13. Remove clutch cross-shaft (frame bracket end first, then slide it off engine ball stud.)
14. Disconnect exhaust pipes at manifold flange.
15. Disconnect shift linkage and speedometer cable at transmission.
16. Remove fuel pump then remove engine front mount through bolts.
17. Remove transmission mount bolts then remove mount from between crossmember and transmission.
18. Raise engine and move it forward and upward alternately while sliding transmission from propeller shaft, then raise engine-transmission assembly from vehicle.

Engine Removal (without Transmission)

The engine may be removed separately from the transmission following the same procedure through Step 14, then proceed as follows:

15. Remove fuel pump, then remove front mount through bolts.
16. (Powerglide Transmission)—Disconnect transmission TV rod at bellcrank.
17. Remove clutch cross-shaft.
18. Place floor-type jack under transmission.
19. Remove converter underpan (Powerglide) or flywheel cover bolts (Synchromesh).
20. Remove clutch housing-to-engine bolts (2 hold TV bellcrank on Powerglide models).
21. (Powerglide Models)—Install holding bracket on converter.
22. Move engine forward and upward alternately (raise transmission jack also) to slide engine from clutch gear shaft, then raise and guide engine out of vehicle.
23. Install engine on engine stand.

Installation to Vehicle

Reverse removal proceedure to install the engine. Then check:

1. Crankcase oil level.
2. Transmission oil level.
3. Cooling system liquid level.
4. Engine tune up as needed.
5. Power steering fluid (if equipped).
6. Brake fluid (power unit was moved).
7. Air conditioning hose connection.
8. Check engine for leaks of any kind while running.
9. Battery water level.

Oil Pan Removal (1962 through 1964—409 cu. in.)

To perform any operation on 409 engine requiring oil pan removal, the engine must be removed from the vehicle. Use either method as outlined above for removal, then remove starter and oil pan.

Oil Pan Removal (283 and 327 cu. in. engines)

The flange-mounted starter on these engines must be removed for clearance to oil pan screws; follow oil pan removal in 1961 Shop Manual and remove starter after lowering exhaust system.

Oil Pump

The 1964 409 engine oil pump has a pin locking the pickup tube and screen to the pump cover. Remove the tube assembly using Tool J-8369 as shown in fig. 88 to drive the tube out of the cover. This will also move the pin outward for installation of a new tube assembly. Drive the pin flush with cover to lock new tube in place, then stake the pin with a center punch.

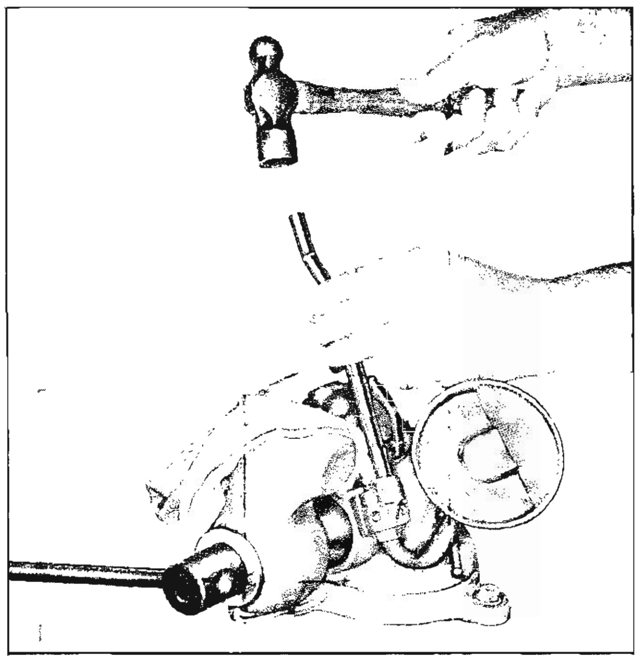

Fig. 88—Removing Oil Pickup Tube and Screen

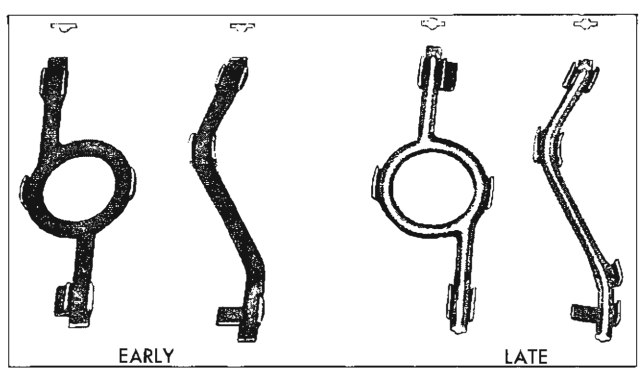

Fig. 89—Manifold Seals

Intake Manifold Seals

The end seals on the intake manifold on the 283 and 327 Cu. In. Engines have a seal ridge on both sides (fig. 89). A pilot tool (mode of wood) can be used in the distributor hole to guide the manifold down squarely into place. This would eliminate possibility of the seal rolling out of position if the manifold needed to be shifted for alignment. Fig. 90 shows use of pilot tool.

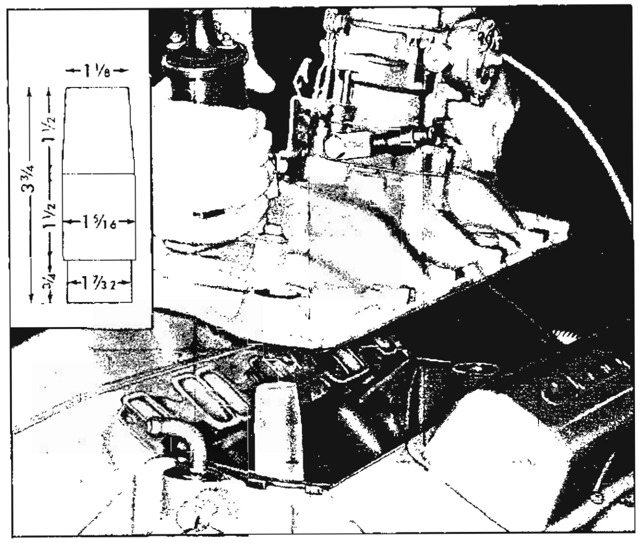

Fig. 90—Installing Manifold Using Pilot

COOLING SYSTEM

Cooling systems on 1963 engines are essentially the same as outlined in 1961 Passenger Shop Manual except for fan hub location during assembly procedures.

The new 6 cylinder engine uses fan hub locating gauge Tool J-9583 as shown in Figure 91.

The 283 and 327 engines use the end of Tool J-9608 and 409 engines use step of same tool. Service pumps for V-8 engines will have hubs located for 1962 and 1963 engines and should be relocated when used on 1961 or earlier engines. Existing tools (J-5775 for 283 pumps and J-7034 for 348 pumps) should be used for this purpose.

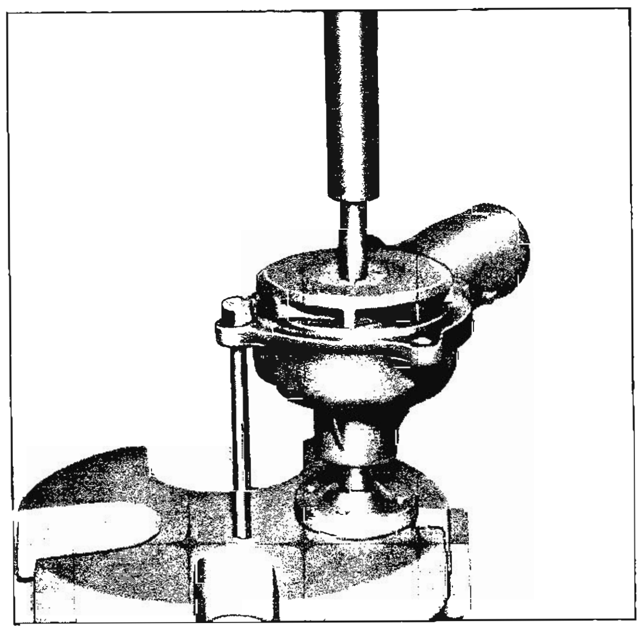

Fig. 91—Installing Fan Hub Using Locating Tool

SPECIFICATIONS

ENGINE	Displacement	230	283	327	327	409	409	409
	Equipment	BV	2GV	4 Bbl	AFB & Spec. Cam	4GC	AFB Spec. Cam	2-AFB Spec. Cam
Horsepower @ rpm		140 @ 4400	195 @ 4800	250 @ 4400	300 @ 5000	340 @ 5000	400 @ 5800	425 @ 6000
Torque @ rpm		220 @ 1600	285 @ 2400	350 @ 2800	360 @ 3200	420 @ 3200	425 @ 3600	425 @ 4200
Type		In-Line	V-8 Overhead Valve Engine					
Number of Cylinders		6	8					
Bore		3 7/8"		4"		4 5/16"		
Stroke		3 1/4"	3"	3 1/4"		3 1/2"		
No. System (Front to Rear)	Left Bank	1-2-3-4-5-6	1-3-5-7					
	Right Bank		2-4-6-8					
Firing Order		1-5-3-6-2-4	1-8-4-3-6-5-7-2					
Compression Ratio		8.5:1	9.25:1	10.5:1		10:1	11:1	

ENGINE		Displacement	230	283	327	327	409	409	409
		Equipment	BV	2GV	4 Bbl.	AFB & Spec. Cam	4 GC	AFB Spec. Cam	2-AFB Spec. Cam
CYLINDER BORE:									
Out of Round (max.)			.002″						
Taper (max.)			.005″						
Diameter (base)			3.8745		3.9995		4.3120		
PISTONS:									
Oversizes Available			High Limit Std., .010″, .020″, .030″, .040″ (Note 1)						
Clearance Limits to Cylinder	Top Land		.0345″-.0435″		.0295″-.0365″		.026″-.035″	.042″-.051″	
Clearance Limits to Cylinder	Skirt		.0005″-.0011″				.0009″-.0015″	.0035″-.0042″	
Ring Groove Depth	Compression		.200″-.208″		.2055″-.2135″		.223″-.231″		
Ring Groove Depth	Oil		.194″-.202″		.1875″-.1975″		.1965″-.2045″		
PISTON RINGS:									
Compression	Width		.0775″-.0780″				.077″-.078″		
Compression	Clearance in Groove		.0012″ to .005″ (max.)						
Compression	Gap		.010″-.020″		.013″-.023″		.015″-.025″		
Oil Ring	Width		.184″-.188″						
Oil Ring	Clearance in Groove		.0012″ to .005″ (max.)						
Oil Ring	Gap		.015″-.055″						
PISTON PINS:									
Length			2.990″-3.010″				3.250″-3.270″		
Diameter			.9270″-.9273″				.9895″-.9898″		
Clearance	In Piston	New	.00015″-.00025″				.00025″-.00035″	.00045″-.00055″	
Clearance	In Piston	Wear Limit	.001″						
Clearance	In Rod		Press Fit						
CONNECTING RODS:									
Bearing	Clearance	New	.0007″-.0028″				.0009″-.0030″		
Bearing	Clearance	Wear Limit	.004″						
Bearing	End Play		.008″-.014″				.015″-.021″		
CRANKSHAFT:									
End Play			.002″-.006″				.004″-.012″		
End Thrust Taken by			Rear Main Bearing						
Main Bearing Journal	Diameter		2.2983″-2.2993″	2.2978″-2.2988″		2.2983″-2.2993″	2.4980″-2.4990″ (1-4) 2.4977″-2.4987 (5)		
Main Bearing Journal	Clearance (min.-max.)		.0008″-.0040″				.0009″-.0045″		
Main Bearing Journal	L. Runout (max.)		.001″						
Main Bearing Journal	Taper (max.)		.001″						
Crankpin Journal	Diameter		1.999″-2.000″				2.1988″-2.1998″		
Crankpin Journal	Taper		.001″						
Crankpin Journal	Runout		.001″						
CAMSHAFT:									
Lobe Lift Measured at Push Rod	Intake		.1914″	.2658″			.2288″	.2896″	
Lobe Lift Measured at Push Rod	Exhaust		.1914″	.2658″			.2354″	.2963″	
Journal Diameter			1.8682″-1.8692″						
Journal Runout (max.)			.001″						

NOTE 1—327 not available in .040″ O.S.—409 not available in .020″ or .040″ O.S.

ENGINE		Displacement	230	283	327	327	409	409	409
		Equipment	BV	2GV	4 Bbl	AFB & Spec. Cam	4GC	AFB Spec. Cam	2-AFB Spec. Cam
VALVE SYSTEMS									
Lifters Type			Hydraulic					Mechanical	
Rocker Arm Ratio			1.75:1	1.5:1			1.75:1		
Valve Lash	Intake (Hot)		One turn down from "No Lash"					.012" (.018") ②	
	Exhaust (Hot)		One turn down from "No Lash"					.020" (.030") ②	
Intake	Face Angle		45°						
	Seat Runout (max.)		.002"						
	Seat Angle		46°						
	Recommended Seat Width		1/32"-1/16"						
	Stem to Guide Clearance		.0010"-.0027"						
	Stem Oversize Available		.003", .010", .020", .030"						
	Lift ③		.335"	.3987"			.400"	.5068"	
Exhaust	Face Angle		45°						
	Seat Runout (max.)		.002"						
	Seat Angle		46°						
	Recommended Seat Width		1/16"-3/32"						
	Stem to Guide Clearance		.0016"-.0033"				.0025"-.0042"		
	Stem Oversizes Available		.003", .010", .020", .030"						
	Lift ③		.335"	.3987"			.4119"	.5185"	
Valve Springs	Outer Spring Press. and Length	Free Length	2.03"	2.08"			2.03"	2.06"	
		Pressure lb. @ in.	84-92 @ 1.660"	78-86 @ 1.660			84-92 @ 1.660	130-138 @ 1.68"	
		Pressure lb. @ in.	166-176 @ 1.330	170-180 @ 1.260			166-176 @ 1.330	273-285 @ 1.290	
	Inner Spring or Damper		—	.045 x .250 Flat Wound			20-24 @ 1.488	.055 x .250 Flat Wound	
			—	Approx. 4 Coils			55-61 @ 1.106	Aprox. 4 Coils	
	Installed Height		1 21/32 ± 1/32						

② Competition use.
③ Measured At Valve Stem.

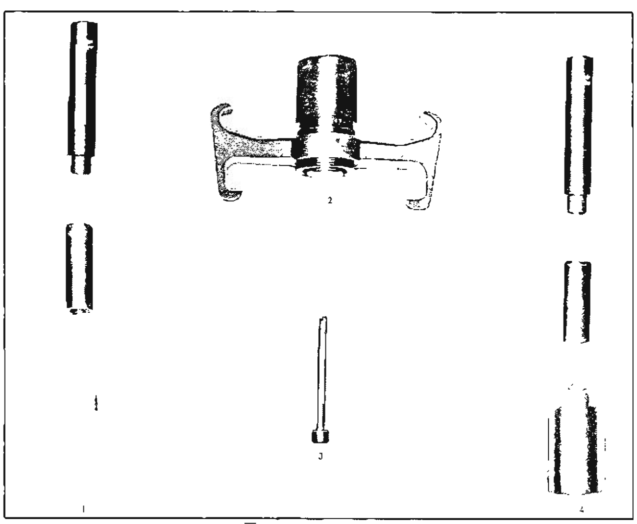

Fig. 92—Special Tools—V-8

1. J-6994 Piston Pin Replacer (W-8)
2. J-8792 Harmonic Balancer Installer
3. J-9608 Fan Hub Locating Tool
4. J-9510 Piston Pin Replacer (V-8)

SPECIAL TOOLS

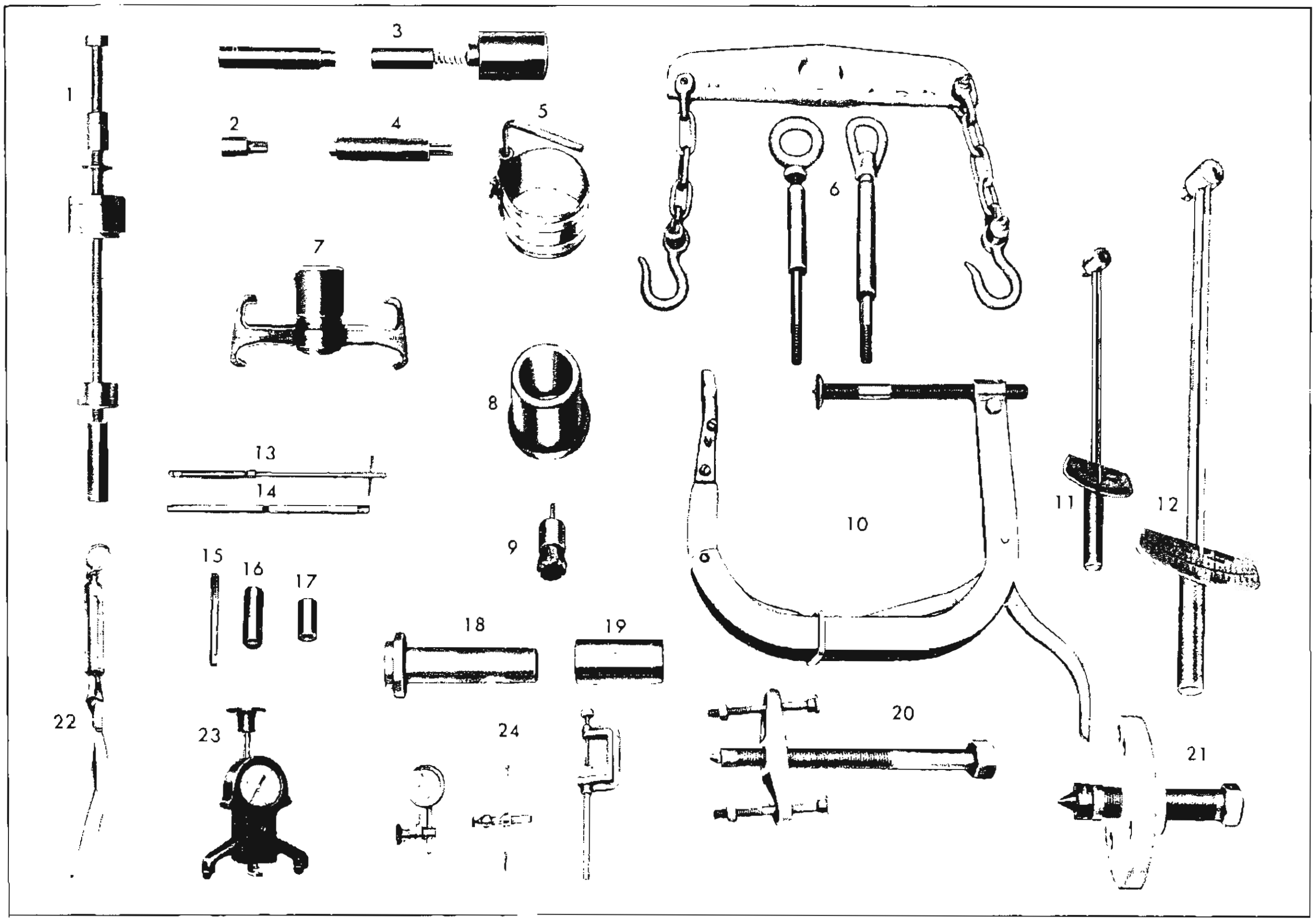

Fig. 93—Engine Special Tools—6-Cylinder Engine

1. J-6098 Cam Bearing Replacer
2. J-9534 Distributor Lower Bushing Remover
3. J-9510 Piston Pin Remover and Installer
4. J-9535 Distributor Lower Bushing Installer
5. J-8037 Piston Ring Compressor
6. J-4536 Lift Kit
7. J-8792 Harmonic Balancer Installer
8. J-0971 Camshaft Gear Remover
9. J-8089 Carbon Removing Brush
10. J-8062 Valve Spring Compressor
11. J-8058 0-50 ft. lbs. Torque Wrench
12. J-1264 0-200 ft. lbs. Torque Wrench
13. J-8101 Valve Guide Cleaner
14. J-5830 Valve Guide Reamer Set
15. J-5715 J-6036 Rocker Arm Stud Hole Reamer
16. J-6880 Rocker Arm Stud Installer
17. J-5802 Rocker Arm Stud Remover
18. J-0995 Timing Gear Cover Oil Seal Replacer
19. J-0966 Timing Gear Cover Centering Gauge
20. J-8105 Crankshaft Gear Puller
21. J-6978 Harmonic Balancer Puller
22. J-5513 Piston Fitting Scale
23. J-7316 Fan Belt Tension Gauge
24. J-8001 Indicator Set
    J-8690-01 Universal Engine Adapter (Not Shown)
    J-6585 Slide Hammer (Not Shown)

SECTION 9

ELECTRICAL SYSTEMS

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ENGINE ELECTRICAL

BATTERY

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GENERAL DESCRIPTION

The source of electrical power for operating the electrical current consuming automotive components may be either the battery or generator or, under certain conditions, both the battery and the generator. It is the role of the battery to furnish electrical power for the electrical accessories when the engine and generator are not in operation. The battery (fig. 1) not only furnishes the electrical power necessary for cranking the engine, but must also help in cases where generator output is not sufficient to handle the electrical loads.

The "dry charge" battery contains fully charged positive and negative plates separated by high-quality separators. The battery contains no electrolyte until it is activated for service in the field and therefore leaves the factory dry.

COMMON CAUSES OF FAILURE

When a battery fails, the cause of failure may lie outside the battery itself. For this reason when a battery failure is encountered, do not be satisfied to merely recharge or replace it. Find the cause of failure and prevent recurrence of the trouble. Listed below are some of the common causes of battery failure:

1. Defect in the generating system such as high resistance, slipping fan belt, faulty generator or regulator.
2. Overloads caused by defective starting or excessive use of accessories.
3. Driver habits or driving conditions such as using the vehicle only for short drives.

Liquid level in the battery should be checked regularly. If the liquid level is found to be low, colorless, odorless drinking water should be added to each cell until the liquid level rises to the bottom of the split ring in the cell filler well.

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 colorless, odorless drinking water.

The top of the battery should be clean and the battery hold-down bolts properly tightened. Particular

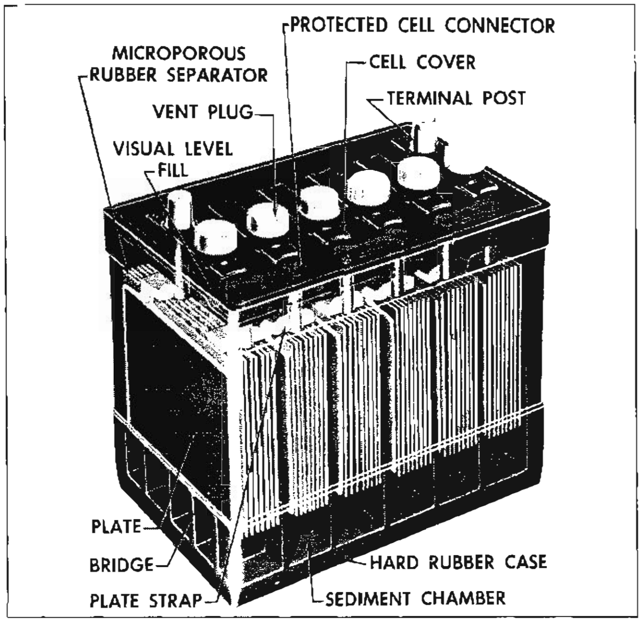

Fig. 1—Battery

care should be taken to see that the tops of the 12-volt batteries are kept clean of acid film and dirt because of the high voltage between the battery terminals. For best results when cleaning batteries, wash first with a dilute ammonia or soda solution to neutralize any acid present and then flush off with clean water. Care must be taken to 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 the battery terminal felt washer. If the battery posts or cable terminals are corroded, the cables should be cleaned separately with a soda solution and a wire brush. After cleaning and before installing clamps, apply a thin coating of petrolatum to the posts and cable clamps to help retard corrosion. See Figure 2 for correct installation of cable terminal clamps.

QUICK-IN-THE-VEHICLE TESTS

1. Visual Inspection
2. Light Load Test

VISUAL INSPECTION

Inspect for signs of corrosion on battery, cables and surrounding area, loose or broken carriers, cracked cases, dirt and acid, electrolyte leakage and low electrolyte level. Fill cells to proper level with colorless, odorless drinking water.

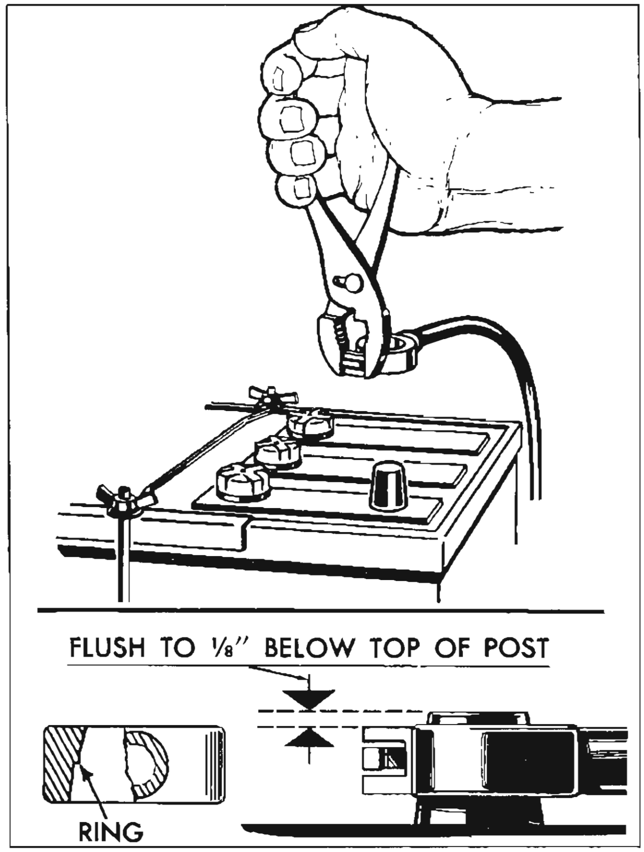

Fig. 2—Installing Battery Cable Terminals

LIGHT LOAD TEST

Check electrical condition of battery cells as follows:

1. Check electrolyte level in each cell, and, if needed, adjust to proper level by adding water.
2. Place load on battery by holding ignition switch in the "Start" position for 3 seconds or until engine starts. If engine starts, turn off ignition immediately.
3. Turn on headlights (low beam). After 1 minute, with lights still "ON," read voltage of each battery cell with voltmeter, noting exact voltages (.01 volt division). It is necessary to remember only the highest and lowest cell voltage.

Uniform Readings

If all cells read 1.95 volts or more and the difference between the highest and lowest cells is less than .05 volts, battery is good and sufficiently charged.

However, if any cell reads less than 1.95 volts and difference between the highest and lowest cells is less than .05 volts, battery is good but should be fully recharged for good performance. Refer to "Battery Charging Rates."

Non-Uniform Readings

If any cell reads 1.95 volts or more and there is a difference of .05 volts or more between the highest and lowest cell, the battery should be replaced.

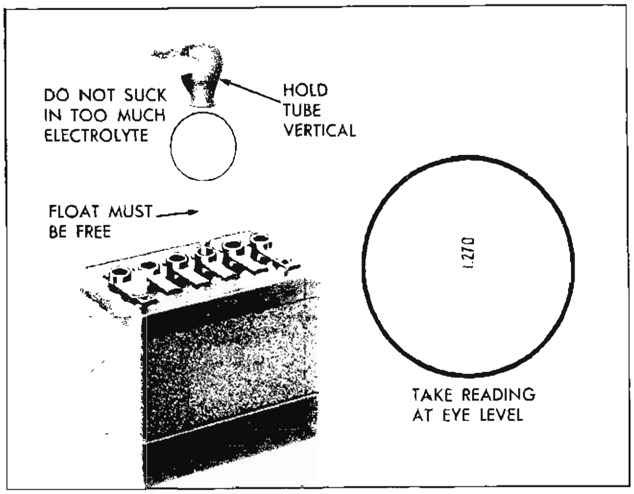

Fig. 3—Testing Specific Gravity of Battery

Low Readings

If all cells read less than 1.95 volts, battery is too low to test properly. FAILURE OF THE METER TO REGISTER ON ALL CELLS DOES NOT INDICATE A DEFECTIVE BATTERY. Boost charge battery and repeat Light Load Test (Refer to "Battery Charging Rates"). If battery is found to be good after boosting, it should be fully recharged for good performance.

If none of the cells come up to 1.95 volts after the first boost charge, the battery should be given a second boost. Batteries which do not respond after second boost charge should be replaced.

NOTE: If any battery found to be good by the Light Load Test does not perform satisfactorily in subsequent service, it should again be tested by the Light Load Test and if it still tests "good," it should be removed from the car and tested as outlined under OUT-OF-THE-VEHICLE CHARGING AND TESTING.

OUT-OF-THE-CAR CHARGING AND TESTING

The procedures outlined below under Slow Charging and The Full Charge Hydrometer Test should be used on:

Any battery originally found to be "good" by the Light Load Test, but which has since failed to perform satisfactorily in service and which still tests "good" by the Light Load Test.

CAUTION: The "Full Charge Hydrometer Test" is not valid unless battery has been tested and found to be good by the Light Load Test.

SLOW CHARGING

- Adjust electrolyte to proper level by adding water, then charge battery at 5 amperes until fully charged. Full charge of the battery is indicated when all cell gravities do not increase when checked at three intervals of one hour and all cells are gassing freely.
- Due to the low rate during slow charging, plenty of time must be allowed. Charge periods of 24 hours or more are often required.

FULL CHARGE HYDROMETER TEST

1. Make sure battery is fully charged as described under "Slow Charging" above. HYDROMETER READINGS TAKEN ON PARTIALLY CHARGED BATTERIES ARE UNRELIABLE FOR THE FOLLOWING TEST:
2. Measure specific gravity of electrolyte in each cell (fig. 3) and compare readings with the following:
   - If cell readings range between 1.250 and 1.290, the battery is ready for use. (Readings should be corrected to 80°F for comparison.) All it needed was a full charge. Any variation in the specific gravity between cells within this range does not indicate a defective battery.
   - If the specific gravity of any cell or cells falls outside this range, (1.250 to 1.290), replace the battery.

BATTERY CHARGING RATES (SUGGESTED)

1. For those batteries which require a boost charge for the "Light Load Test" procedure.
2. For those batteries which have become discharged and require charging. It should be recognized that slow charging is the best and only method of completely recharging batteries. However, since time is often of importance to the battery owner two other methods are offered for partial battery re-charge.
3. For those dry charged batteries being activated with electrolyte at a temperature under 60°F or those batteries which are expected to go into immediate operation in below freezing weather.

12 VOLT BATTERY RE-CHARGE

(100 Amp/hr or Less Capacity)

TYPE OF CHARGE	LENGTH OF TIME	CHARGING RATE
Boost Charge for Light Load Test	20 Minutes	50 Amps
Slow Charge	24 Hours	4 Amps
Fast Charge	1½ Hours	40-50 Amps
Quick Boost	30 Minutes	40-50 Amps
Dry Charge Warm-up Boost	10 Minutes	15 Amps

CHARGING SYSTEM

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GENERAL DESCRIPTION

The charging system includes the battery, generator, regulator, telltale light, and necessary wiring to connect these components. The Delcotron is offered as standard equipment, although there are various capacities available on all models.

The Delcotron continuous output A.C. generator

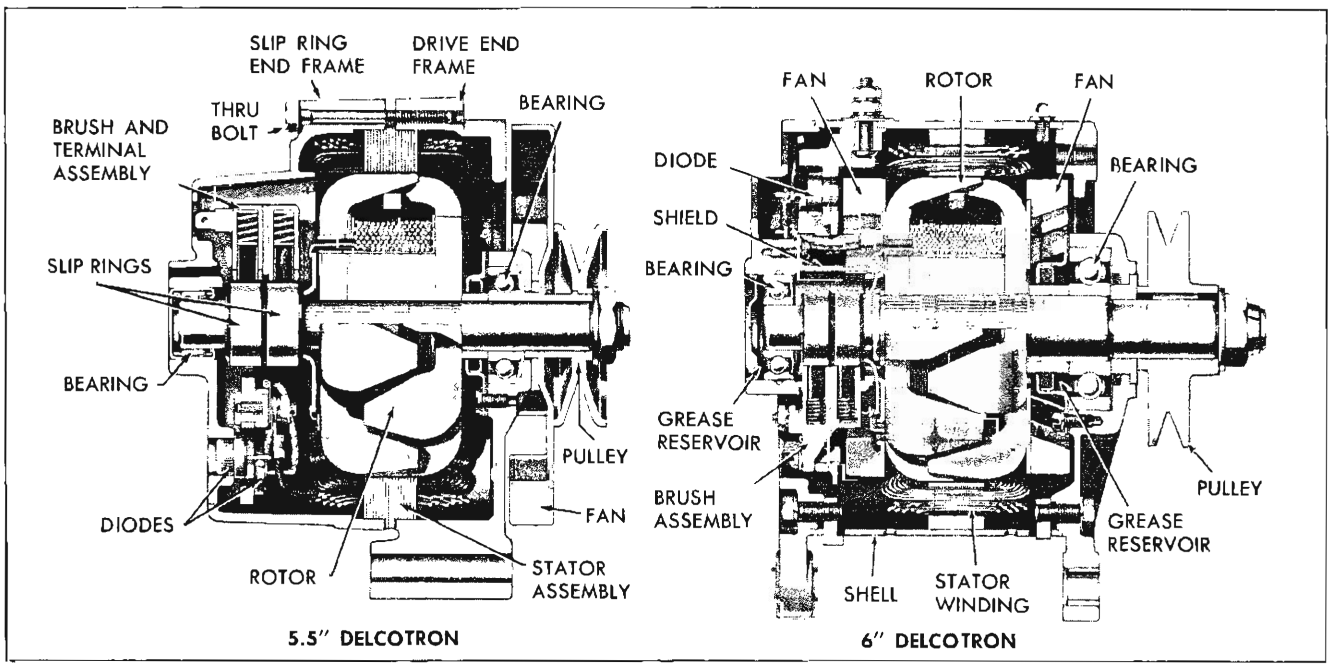
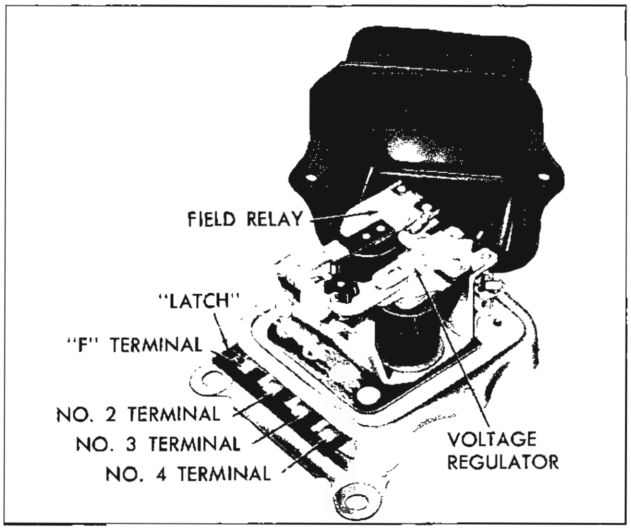
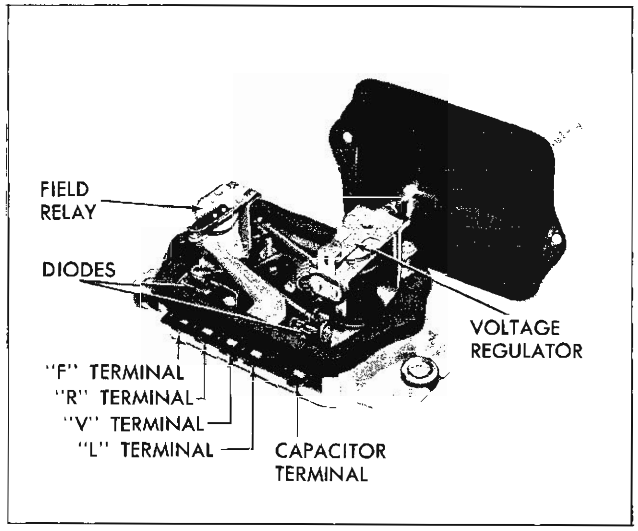


Fig. 4—Delcotron Cross-section View



Double Contact Regulator



Transistorized Regulator

Fig. 5—Two Unit Voltage Regulator Assemblies

(fig. 4) consists of two major parts, a stator and a rotor. The stator is composed of a large number of windings assembled on the inside of a laminated core that is attached to the generator frame. The rotor revolves within the stator on bearings located in each end frame. Two brushes are required to carry current through the two slip rings to the field coils wound concentric with the shaft of the rotor. Six rectifier diodes are mounted in the slip ring end frame and are joined to the stator windings at three internally located terminals.

Diodes are mounted in heat sinks to provide adequate heat dissipation. The six diodes replace the separately mounted rectifier as used in other types of application. The diodes change the Delcotron A.C. current to D.C. current.

Two regulators are available on the 1964 vehicles. The function of these regulators in the charging system is to limit the generator voltage to a pre-set value by controlling the generator field current (fig. 5). Both regulators are two unit type (voltage regulator and field relay). The field relay unit allows the lamp to light (as a bulb check) with the ignition key on and engine not running. When the engine is started and the generator begins to charge, the indicator light goes out indicating that the system is operating normally.

The double-contact regulator assembly (fig. 6) consists of a double contact voltage regulator unit and a field relay unit. This unit uses two sets of contact points on the voltage regulator unit to obtain desired field excitation under variable conditions. A wiring diagram of the regulator internal circuits is illustrated in Figure 6.

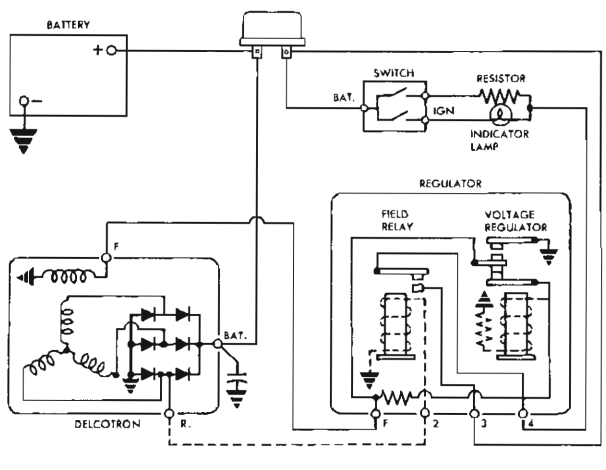


Fig. 6—Circuitry—Double Contact Regulator

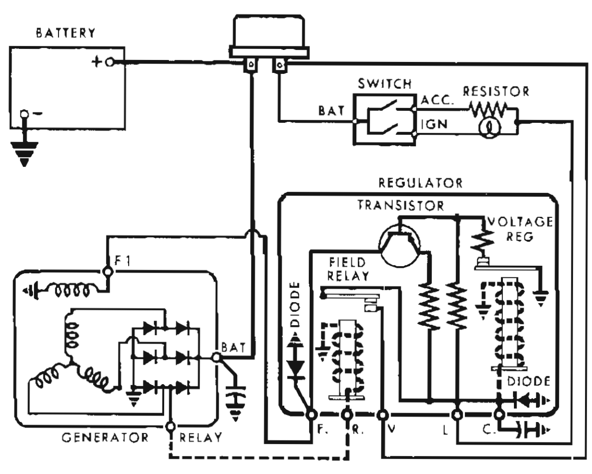


Fig. 7—Circuitry—Two Unit Transistorized Regulator

The transistorized regulator (fig. 7) contains one transistor, two diodes, a single contact conventional voltage unit and a field relay. The transistor works in conjunction with the voltage unit to limit voltage to a pre-set value. The diodes prevent damage from transient voltages which may occur in the system. A wiring diagram of this regulator's internal circuits is shown in Figure 7.

MAINTENANCE AND ADJUSTMENTS

At regular intervals, inspect the terminals for corrosion and loose connections, and the wiring for frayed insulation. Check mounting bolts for tightness. Check the drive belt for alignment, proper tension and wear. Because of the higher inertia and load capacity of the rotor used in A.C. generators, **PROPER BELT TENSION** is more critical than on D.C. generators.

Since the Delcotron and its companion regulator are designed for use on negative polarity systems only, the following precautions must be observed. **Failure to observe these precautions may result in serious damage to the charging system.**

1. When installing a battery, always make absolutely sure the ground polarity of the battery, generator and regulator is the same.
2. When connecting a booster battery, make certain to connect the correct battery terminals together.
3. When connecting a charger to the battery, connect the correct charger leads to the battery terminals.
4. Never operate the generator on an uncontrolled open circuit. Make absolutely certain all connections in the circuit are secure.
5. Do not short across or ground any of the terminals on the generator or regulator.
6. Do not attempt to polarize the generator.

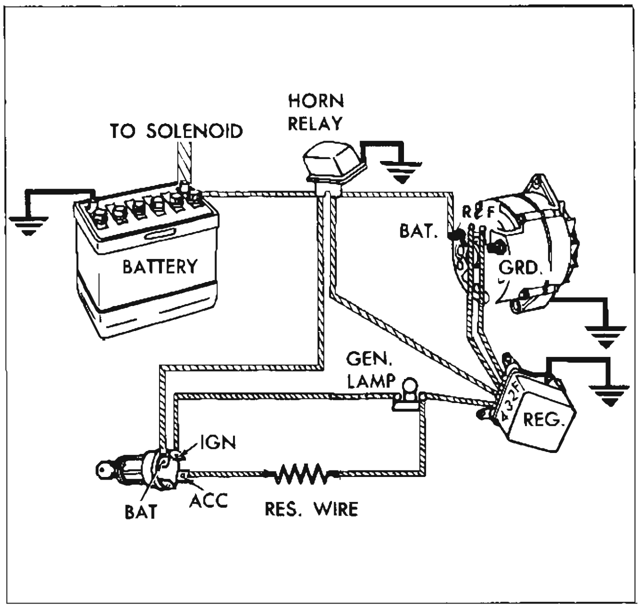


Fig. 8—Typical Wiring Diagram Showing Lead Connections

Trouble in the A.C. charging system will usually be indicated by one or more of the following conditions:

1. Faulty indicator lamp operation.
2. An undercharged battery (usually evidenced by slow cranking speeds).
3. An overcharged battery (usually evidenced by excessive battery water usage).

Described below are a series of **on-the-vehicle** quick checks which are designed to assist the service technician in locating troubles within the various components of the engine electrical system. Additional checks, adjustments and overhaul procedures of these components are also described in the "Charging Systems—Service Operations Section" and should be referred to as necessary.

STATIC CHECKS

Before making any electrical checks, perform the following static checks:

1. Check for loose fan belt.
2. Check for defective battery. (Refer to Battery.)
3. Inspect all connections, including the slip-on connectors at the regulator and Delcotron.

NOTE: Do not short field to ground to check if generator is charging since this will seriously damage the charging system.

SYSTEM CONDITION TEST

This test is used to indicate the overall condition of the charging system (both good and defective) and to isolate the malfunctioning unit if the system is defective.

1. With ignition off, perform the prescribed Static Checks outlined in this section. Then set hand brake and shift transmission into neutral.
2. Connect a voltmeter from junction block on horn relay to ground at regulator base.

   CAUTION: Be sure meter clip does not touch a resistor or terminal extension under regulator.

3. Connect a tachometer on engine.
4. **Standard Models equipped with Indicator Lamp:** Turn ignition switch to "ON" position and check indicator lamp. If lamp fails to glow, perform appropriate tests and corrections (Indicator Lamp Circuit Tests) before continuing.

   Super Sports Models equipped with Ammeter: Turn ignition switch to "ACC" with all accessories

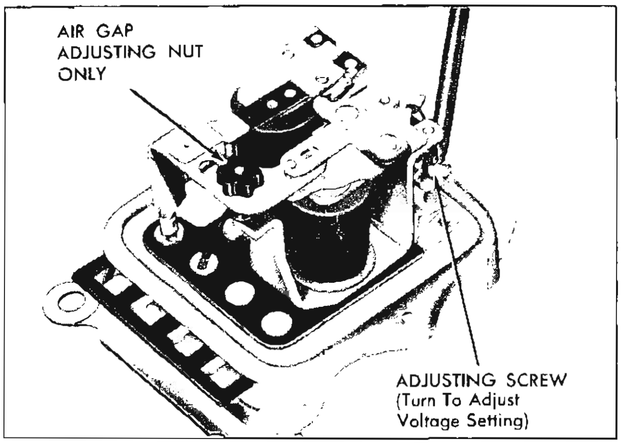


Fig. 9—Adjust Voltage Setting

off and check ammeter. If ammeter fails to read discharge, perform Field Circuit Resistance Check before continuing.

5. **Standard Models equipped with Indicator Lamp:** If lamp glows, start the engine and run it at 1500 rpm or above. Check indicator lamp. If lamp fails to go out, perform appropriate test and corrections (Indicator Lamp Circuit Test) before continuing. **Super Sports Models equipped with Ammeter:** If ammeter reads discharge, start the engine and observe ammeter. If meter fails to move toward charge (from original position), perform appropriate test and corrections (Field Circuit Tests) before continuing.

NOTE: At this point a field circuit has been established and any other problem will lie in generator or regulator.

6. Turn on high-beam headlights and heater blower motor to high speed, run engine at or above 1500 rpm (for a few minutes, if necessary) and read the voltage on meter.

NOTE: Voltage will not greatly exceed 12½ volts until the battery develops a surface charge, a few minutes generally, unless the battery is severely discharged or is hot.

If reading is:

a. 12½ volts or more, turn off electrical loads, stop engine and proceed to step 7.

b. Less than 12½ volts, perform "Delcotron Output Test—Voltmeter Method."

   1. **Delcotron tests bad**—refer to "Service Operations" and repair Delcotron, then repeat step 6.

   2. **Delcotron tests good**—disconnect regulator connector, remove regulator cover and reconnect the connector. Then repeat step 6 and turn voltage adjusting screw (fig. 9) to raise setting to 12½ volts. Turn off loads, stop engine and proceed to step 7. If 12½ volts cannot be obtained, install a new regulator and repeat step 6.

7. Connect a ¼ ohm-25 watt fixed resistor (purchased commercially) into the charging circuit at horn relay junction block as shown in Figure 10.

NOTE: Be sure to connect both the battery and vehicle load leads to the resistor.

8. Run engine at 1500 rpm or above for at least 15 minutes of warm-up, then cycle regulator voltage control by disconnecting and connecting four terminal connector and read voltage. If voltage is 13.5 to 15.2, the regulator is okay.

   If voltage is not within 13.5 to 15.2 volts, leave

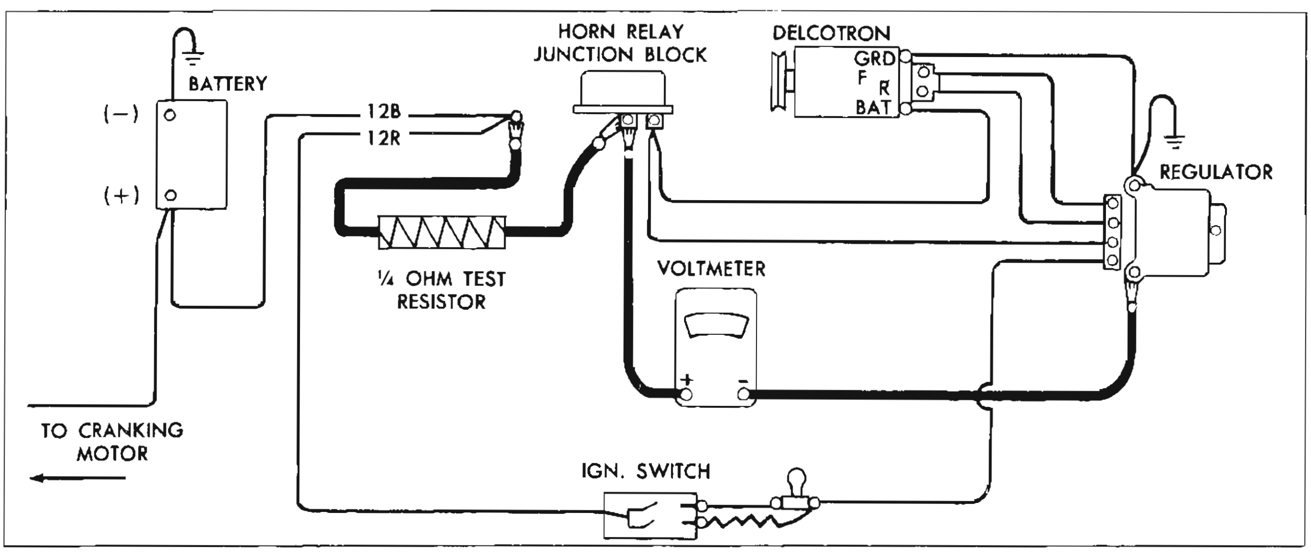


Fig. 10—Voltage Setting Test Connections

engine running at 1500 rpm or above and:

a. Disconnect four terminal connector and remove regulator cover. Then re-connect four terminal connector and adjust voltage to 14.2 to 14.6.

b. Disconnect four terminal connector and reinstall regulator cover, then reinstall connector.

c. Continue running engine at 1500 rpm for 5-10 minutes to re-establish regulator internal temperature.

d. Cycle regulator voltage control by disconnecting and connecting four terminal connector. Read voltage. A reading between 13.5 and 15.2 indicates a good regulator.

CAUTION: Be sure four terminal regulator connector or battery ground cable is disconnected when removing or installing cover. This is to prevent regulator damage by short circuits.

SYSTEM COMPONENT CHECKS

DELCOTRON OUTPUT TEST (Fig. 11)

Voltmeter Method

1. Disconnect the four-terminal connector from the regulator.
2. Disconnect the two-terminal connector from the Delcotron F and R terminals.
3. Connect a jumper wire from the Delcotron BAT terminal to the Delcotron F terminal. This provides full field excitation.
4. Connect a voltmeter from the Delcotron BAT terminal to the Delcotron GRD terminal.
5. Start engine and turn on high beam headlights and high speed heater blower motor. Run engine 1500 RPM or above and note whether voltage exceeds 12.5 volts. If voltage exceeds 12.5 volts within a few minutes, Delcotron output is O.K. Stop engine, turn off all electrical loads, and reconnect wiring.

NOTE: If battery is in a normal state of charge, voltage will exceed 12.5 volts as soon as engine speed is increased.

6. If voltage is less than 12.5 volts, perform Diode and Field tests outlined below and make necessary other tests and repairs outlined in Service Operations.

DELCOTRON DIODE AND FIELD TEST (Fig. 12)

NOTE: These tests will indicate good, shorted or open field or shorted diode but will not indicate a failed open diode. If output was low and following tests show good, refer to service operations to determine cause and repair.

1. Disconnect battery ground cable at battery.
2. Positive diodes (Test A) connect an ohmmeter between "R" terminal and "BAT" terminal and note reading, then reverse the leads at same terminals and note this reading. Meter should read high resistance in one direction and low in the other.
3. Negative diodes (Test B) connect ohmmeter between "R" terminal and "GRD" and note reading, then reverse the leads and note this reading. Meter should read high in one direction and low in the other.

NOTE: A high or low reading in both directions indicates a defective diode.

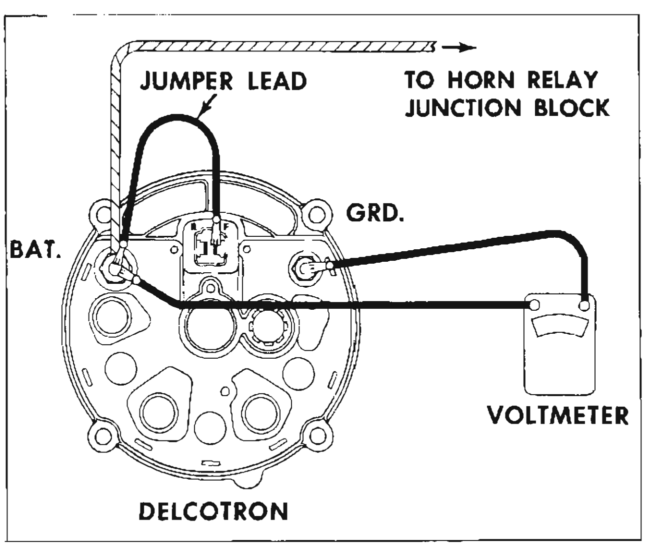


Fig. 11—Output Test Connections

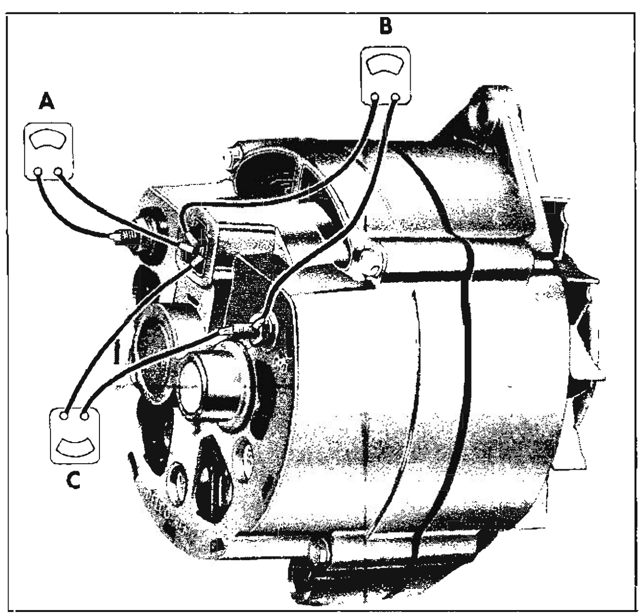


Fig. 12—Delcotron Diode and Field Test

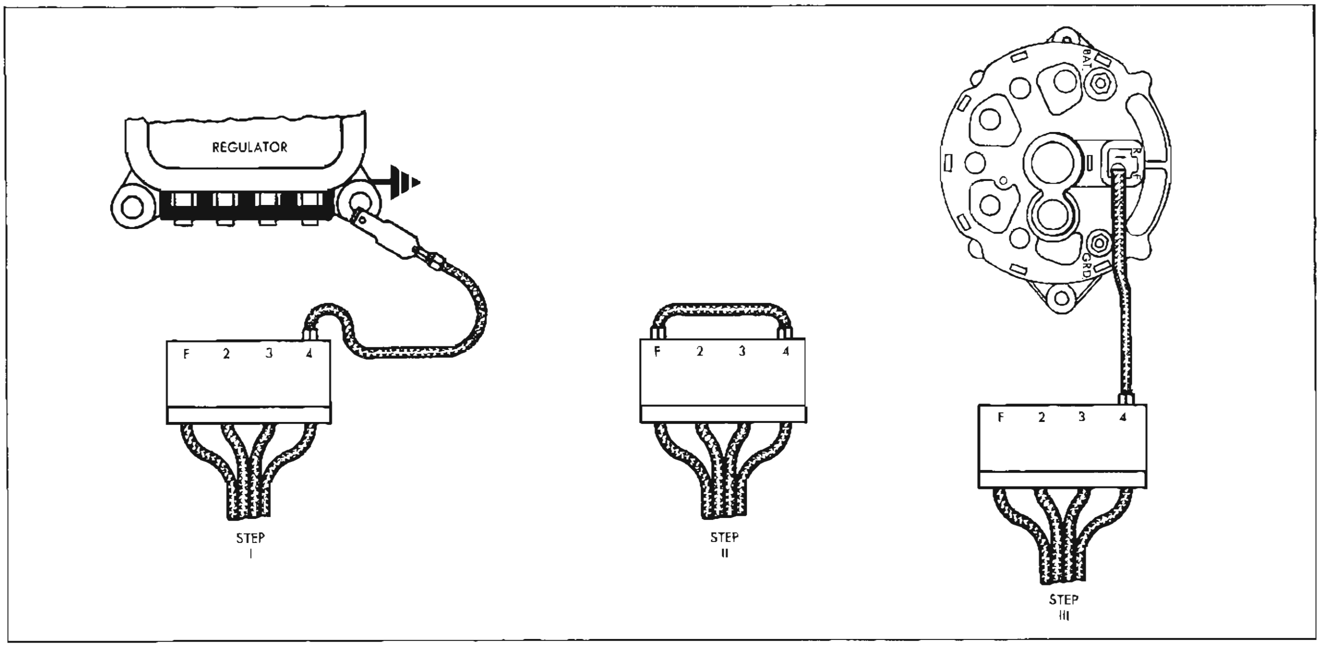


Fig. 13—Indicator Lamp Circuit Tests

4. Open Field Check:
   a. Connect an ohmmeter from "F" terminal to "GRD" terminal stud and note reading on the lowest range scale. Meter should read 7 to 20 ohms.
   b. If meter reads zero or excessively high resistance, the Delcotron is faulty.
5. If above tests indicate a defective Delcotron, remove and completely check Delcotron as outlined under "Service Operations."

INDICATOR LAMP CIRCUIT TESTS

The indicator lamp circuit (fig. 13) provides initial field excitation (causing lamp to glow). The light is cancelled by closing the field relay which applies battery voltage to both sides of bulb (bulb goes out).

The indicator light should glow when ignition switch is "ON" and go out almost immediately when engine starts.

- **If lamp fails to glow the possible causes are:**

1. Faulty bulb.
2. Faulty bulb socket.
3. An open circuit in wiring, regulator, or field.
4. A shorted positive diode—(may also cause glow with ignition switch "OFF").

Test as Follows:

1. Disconnect connector from regulator and connect a jumper lead from connector terminal "4" to ground (Figure 13, Step 1).
2. Turn ignition switch to "ON" momentarily and note indicator lamp:
   a. Lamp fails to glow—check for faulty bulb, socket or open circuit between switch and regulator connector. Repair as needed.
   b. Light goes on—failure is in regulator, Delcotron or wire between "F" terminals on regulator and Delcotron. Go to Step 3.
3. Disconnect jumper lead at ground end and connect between connector "F" and "4" terminals, (Figure 13, Step 2) then turn switch to "ON" momentarily and note lamps:
   a. Lamp glows—Problem is in regulator. An open circuit in regulator or relay is stuck closed. See "Service Operations" for repair.
   b. Fails to glow—Problem is in wire between "F" terminals on generator and regulator or in field windings. Go to Step 4.
4. Disconnect jumper at connector "F" terminal and connect to "F" terminal on Delcotron (Figure 13, Step 3), then turn switch on momentarily and note lamp:
   a. Lamp glows—an open circuit in wire between "F" terminals—correct as needed.
   b. Fails to glow—Delcotron field has open circuit, see "Service Operations" to repair.

- **If lamp fails to go out the possible causes are:**

1. Loose drive belt—adjust as necessary.
2. Faulty field relay—(see relay test and adjustment).
3. Defective Delcotron—(see Delcotron output test).
4. At normal idle—parallel resistance wire open (see Resistance test).
5. Switch off—positive diode shorted (see Diode test).

FIELD CIRCUIT TESTS (W/AMMETER)

The field circuit (fig. 13) provides initial field excitation through the ignition switch accessory terminal and resistor wire (causing ammeter to read discharge). The initial circuit is cancelled by closing the field relay which applies battery voltage to both sides of the resistance wire.

The ammeter should show slight discharge when ignition switch is in "ACC" location and charge almost immediately when engine starts.

- **If ammeter fails to show discharge, the possible cause is an open circuit in wiring, regulator, or field.**

Test as follows:

1. Disconnect connector from regulator and connect a jumper lead from connector terminal "4" to ground (Figure 13, Step 1).
2. Turn ignition switch to "ACC" (with all accessories off) momentarily, and note ammeter:
   a. Ammeter does not move—check for open circuit between switch and regulator connector. Repair as needed.
   b. Ammeter moves—failure is in regulator, Delcotron or wire between "F" terminals on regulator and Delcotron. Go to Step 3.
3. Disconnect jumper lead at ground end and connect between connector "F" and "4" terminals (Figure 13, Step 2) then turn switch to "ACC" (with accessories off) momentarily and note ammeter.
   a. Ammeter needle moves—problem is in regulator. An open circuit in regulator or relay is stuck closed. See "Service Operations" for repair.
   b. Fails to move—problem is in wire between "F" terminals on generator and regulator or in field windings. Go to Step 4.
4. Disconnect jumper at connector "F" terminal and connect to "F" terminal on Delcotron (Figure 13, Step 3), then turn switch to "ACC" (with all accessories off) momentarily and note lamp:
   a. Ammeter moves—an open circuit in wire between "F" terminals—correct as needed.
   b. Fails to move—Delcotron field has open circuit, see "Service Operations" to repair.

- **If ammeter fails to move toward charge the possible causes are:**

1. Loose drive belt—adjust as necessary.
2. Faulty field relay—(see relay test and adjustment).
3. Defective Delcotron—(see Delcotron output test).

FIELD CIRCUIT RESISTANCE WIRE CHECKS

The check for an open resistor (connected to the ignition switch "ACC" terminal) is as follows:

1. Connect a voltmeter from the wiring harness connector to ground as shown in Figure 14.

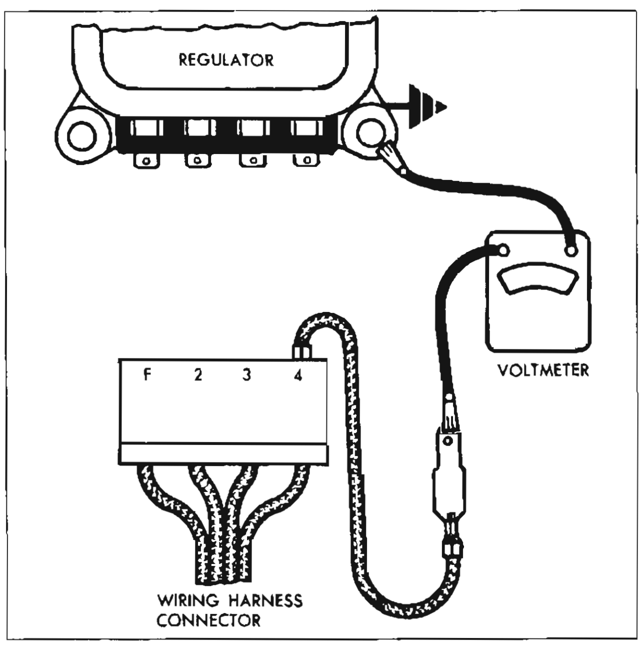


Fig. 14—Indicator Circuit Resistance Test

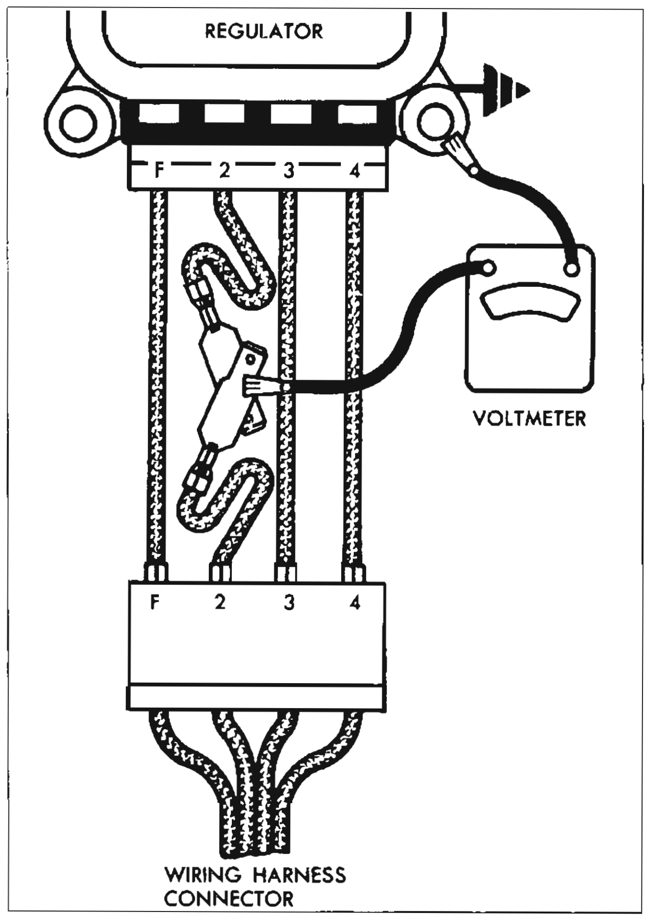


Fig. 15—Checking Field Relay

2. Turn the ignition switch to the "ACC" position.
3. If the voltmeter reads zero, the resistor is open. The resistance wire is an integral part of the ignition harness. However, the resistance wire is not solderable; it must be spliced with a crimp-type connector. It is rated at 10 ohms, 6.25 watts minimum.

OTHER HARNESS CHECKS

Other wires in the charging system harness need be checked for continuity by use of an ohmmeter or a test light (12 Volt). Connect the test so the wire in question is in series in the test circuit.

FIELD RELAY CHECKS AND ADJUSTMENT

To check for a faulty relay proceed as follows:

1. Connect a voltmeter into the system at the regulator No. 2 terminal to ground (fig. 15).
2. Operate the engine at fast idle (1500 to 2000 rpm) and observe voltmeter reading.
3. If voltage exists at regulator (3.5 to 6.5 volts) and light remains on, regulator field relay is faulty. Check and adjust regulator as outlined under "Voltage Regulator Checks and Adjustments."

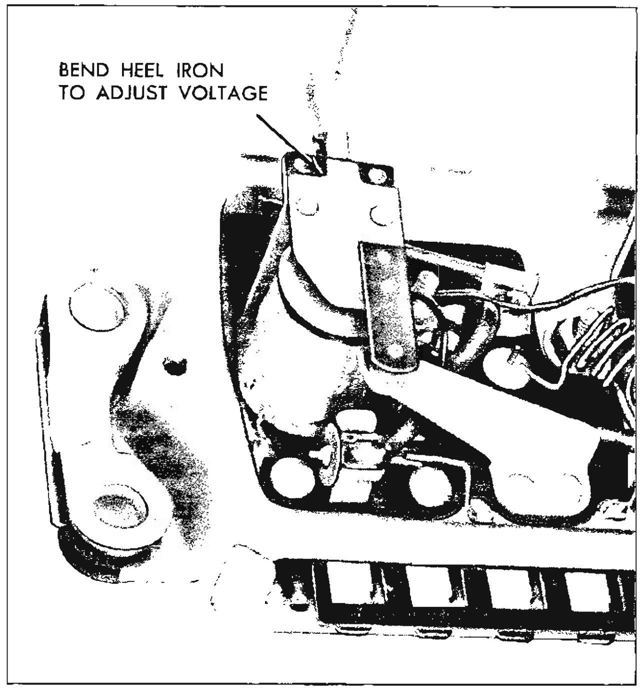


Fig. 17—Adjusting Field Relay Closing Voltage

4. If voltmeter shows zero voltage at regulator, check circuit between No. 2 terminal on regulator to "R" terminal on Delcotron.

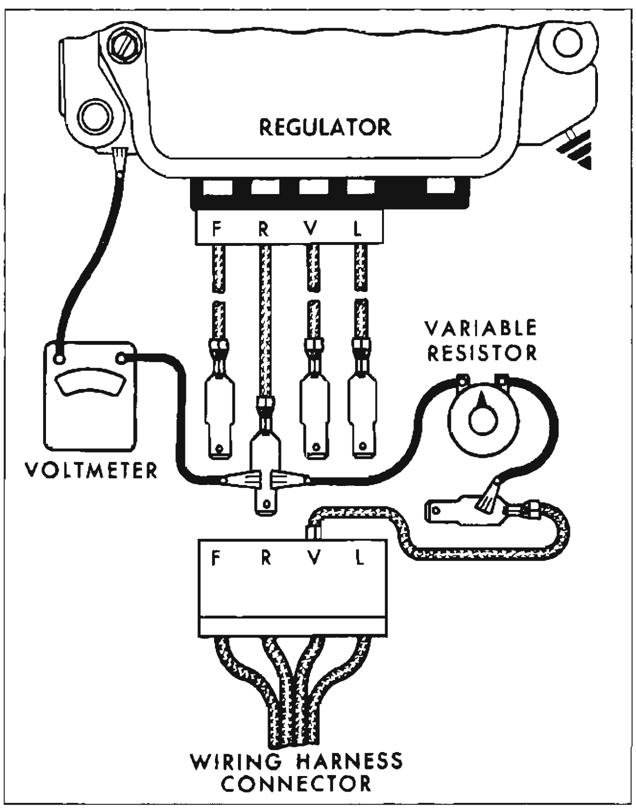


Fig. 16—Checking Field Relay Closing Voltage

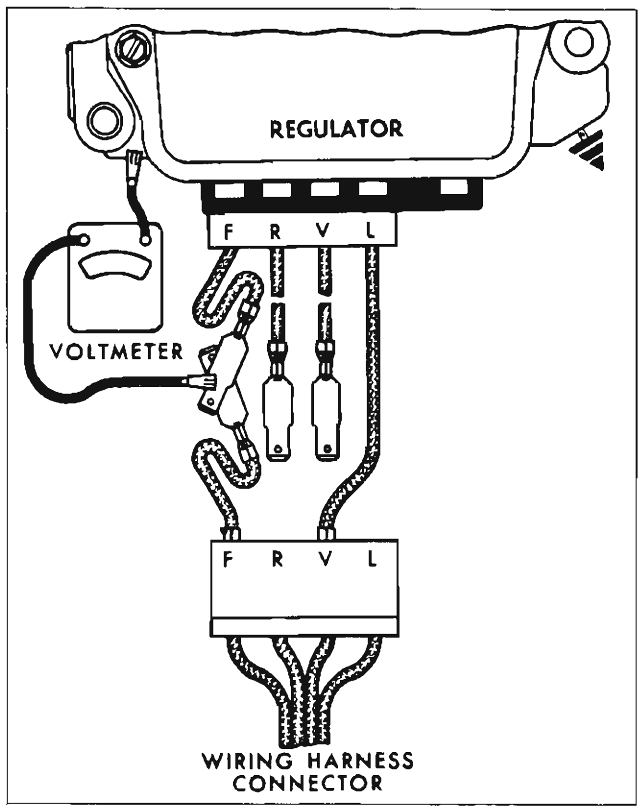


Fig. 18—Checking Open and Shorted Transistor

To adjust field relay closing voltage proceed as follows:

1. Make connections as shown in Figure 16 using a 50 ohm variable resistor.
2. Turn resistor to "open" position.
3. Turn ignition switch off.
4. Slowly decrease resistance and note closing voltage of the relay. Adjust by bending heel iron in the manner illustrated in Figure 17.

NOTE: If adjustment cannot be obtained, see "Service Operations" and adjust point opening and air gap, then reset closing voltage.

OPEN TRANSISTOR

Check for open transistor by making connections shown in Figure 18. If the voltmeter reads 9 volts or above, the regulator is not defective and the cause of the undercharged battery condition is probably a low voltage setting. If reading is less than 9 volts, either the transistor and/or a resistor in the regulator are burned open. To replace transistor and/or resistor, refer to "Service Operations."

SHORTED TRANSISTOR

To check for a shorted transistor, make connections as shown in Figure 18, remove the regulator cover, **do not run engine.** hold the voltage contacts open, and note the reading. If the reading is above 9 volts, the transistor is shorted and must be replaced. To replace the transistor, remove the two attaching screws and unsolder the connections directly above the transistor.

CAUTION: Limit solder time to a minimum as transistors can be damaged by excessive heat.

SERVICE OPERATIONS

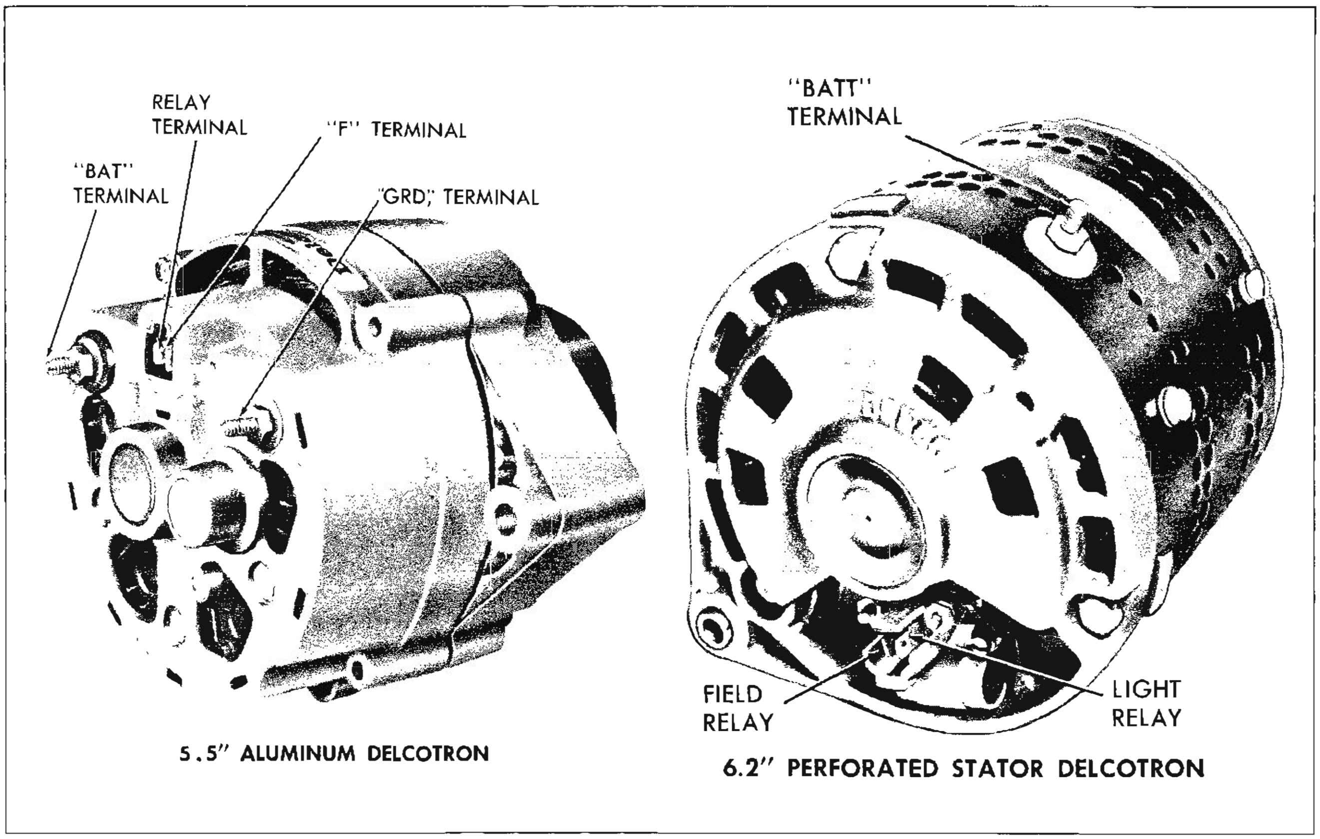


Fig. 19—Delcotrons—Full View

Service operations described below are for the 6" perforated stator and 5.5" aluminum Delcotrons (fig. 19). Where important differences in testing and/or service operations are encountered, separate mention will be made of the two generators.

GENERATOR

PULLEY REPLACEMENT

Single Groove Pulley

1. Place $1\frac{5}{16}$" box wrench on retaining nut and

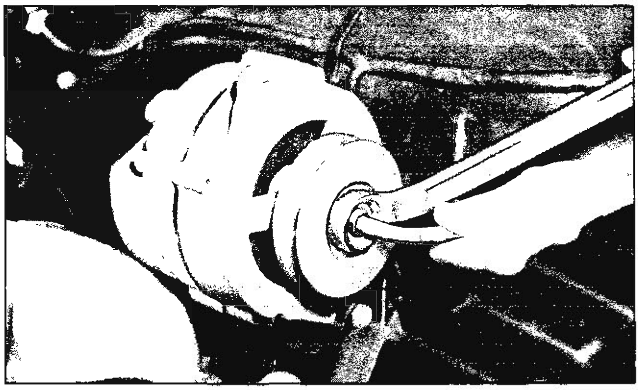


Fig. 20—Pulley Removal

insert a $\frac{5}{16}''$ allen wrench into shaft to hold shaft while removing nut (fig. 20).

2. Remove washer and slide pulley from shaft.
3. Reverse steps 1 and 2 to install, use a torque wrench with a craw-foot adapter (instead of box wrench) and torque the nut to 50 ft. lbs. (fig. 21).

Double Groove Pulley

1. Place a $\frac{15}{16}''$ socket (with wrench flats on the end or use adapter J-21501 and a box wrench) on retaining nut, insert a $\frac{5}{16}''$ allen wrench through socket and adapter into hex on shaft to hold the shaft while removing the nut.
2. Remove washer and slide pulley from shaft.
3. To install, slide pulley and washer on shaft and start the nut.
4. Use the socket and adapter with a torque wrench and tighten nut to 50 ft. lbs. torque.

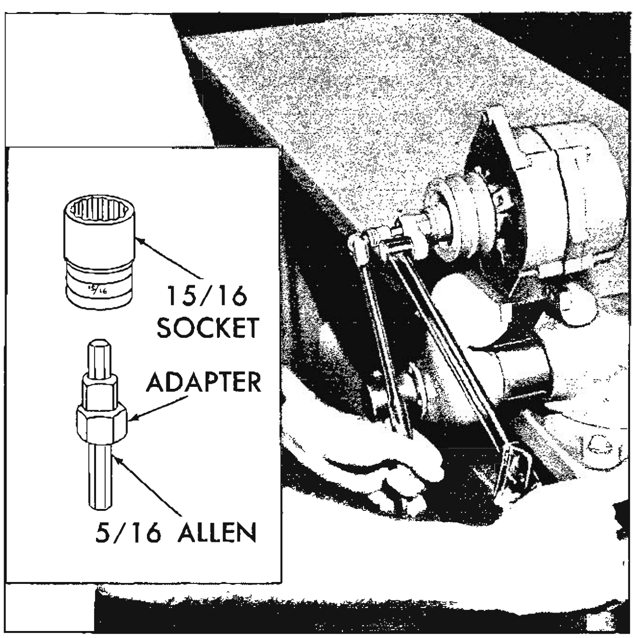


Fig. 21—Torquing Pulley Nut

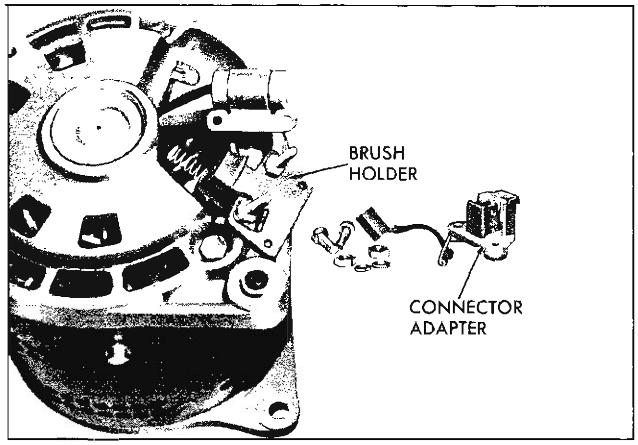


Fig. 22—Wire Lead Location

BRUSH REPLACEMENT

6" Perforated Stator Delcotron

1. Remove two nuts retaining the blade connectors and remove the connectors (fig. 22). Slide the indicator light relay wire from the terminal post.
2. Remove two screws retaining the capacitor and brush holder to rear end frame. Remove brush holder.

NOTE: Capacitor lead is connected inside the generator. Allow capacitor to remain with the generator to avoid undue strain on the lead wire.

3. Inspect brushes for wear. If they are worn halfway, replace. Inspect brush springs for distortion or weakening. If brushes appear satisfactory and move freely in brush holder, springs may be reused.

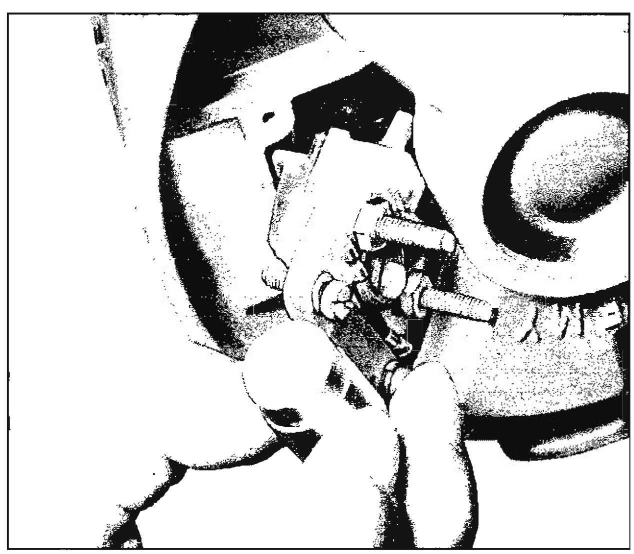


Fig. 23—Brush Holder Removal and Installation

4. To install, push brushes up into holder and loop the brush leads over the catcher (fig. 23) to keep the brushes in the holder. Attach the assembly to the end frame and lift the brush leads off the catcher to allow brushes to ride on slip rings.

REMOVAL AND INSTALLATION

1. Disconnect the battery ground strap at battery to prevent damaging diodes.
2. Disconnect wiring leads at Delcotron.
3. Remove generator brace bolt, (if power steering equipped, loosen pump brace and mount nuts) then detach drive belt (belts).
4. Support the generator and remove generator mount bolt (6.2" Delcotron uses 2 mount bolts) or bolts and remove from vehicle.
5. Reverse the removal procedure to install then adjust drive belt.

DISASSEMBLY

5.5" Delcotron

1. Hold generator in a vise, clamping the mounting flange lengthwise.
2. Remove 4 thru bolts then break loose the end frames by prying at bolt locations.
3. Remove the slip-ring end frame and stator (as an assembly) from drive end and rotor assembly.
4. Place a piece of tape over the slip ring end frame bearing to prevent entry of dirt or other foreign matter.

CAUTION: Brushes may drop onto rotor shaft and become contaminated with bearing lubricant. Clean brushes prior to installing with a non-toxic cleaner such as tri-chlorethylene.

5. Remove the three stator lead attaching nuts and separate stator from end frame.
6. Remove screws, brushes and holder assembly.
7. Remove heat sink from end frame by removing "batt" and "grd" terminals and one attaching screw (fig. 29).
8. Remove slip ring end frame bearing (if necessary) by removing inner seal and slide.
9. Remove drive pulley as outlined previously, then remove rotor and spacers from end frame assembly.
10. Remove drive end frame bearing retainer plate and bearing assembly from frame.

6.2" Delcotron

1. Support Delcotron on drive end by placing 2x4's to space the pulley from bench.
2. Remove 2 nuts and field and relay terminal holder assembly, then lift relay lead from terminal.
3. Remove brush holder and capacitor mounting screws, slide capacitor to the side and remove brush holder and brushes from end frame.
4. Remove three slip ring end frame attaching bolts and tab nuts.
5. Carefully pry the end frame and case apart (using a screw driver) slowly all the way around the circumference to remove the end frame.
6. Remove the three drive end frame attaching bolts and tab nuts and remove the end frame, rotor and pulley as an assembly.
7. Remove the pulley from rotor shaft as previously outlined, then slide rotor from end frame.
8. Remove drive end frame bearing retainer plate and bearing from end frame.
9. To remove slip ring end frame bearing from rotor shaft, use Tool J-6627 as shown in Figure 31.
10. Disconnect stator winding leads from diodes by unsoldering the leads at diodes, separating the diode pigtail, stator lead and diode connecting lead.

NOTE: Separating these three leads will allow diode and stator tests outlined in this section.

11. Remove heat sink-to-case retaining screws and remove heat sinks. Insulated heat sink (with batt terminal) holds positive diodes.

CLEANING AND INSPECTION

With generator completely disassembled, except for removal of diodes, the components should be cleaned and inspected.

1. Wash all metal parts except stator and rotor assemblies.

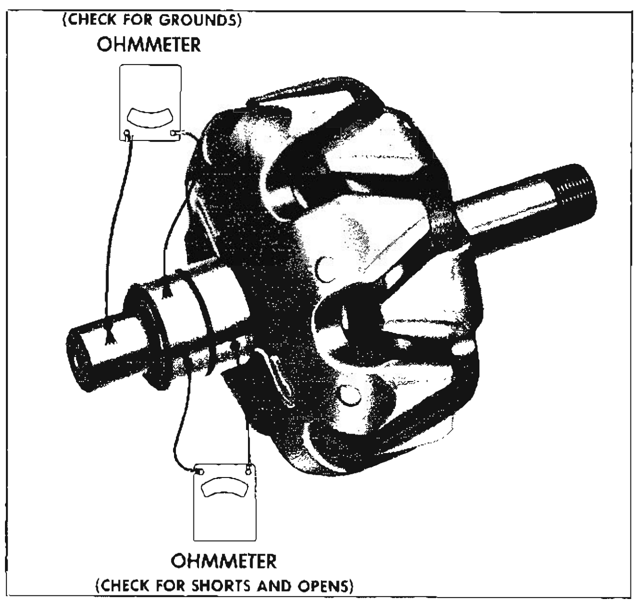


Fig. 24—Checking Rotor for Grounds or Opens

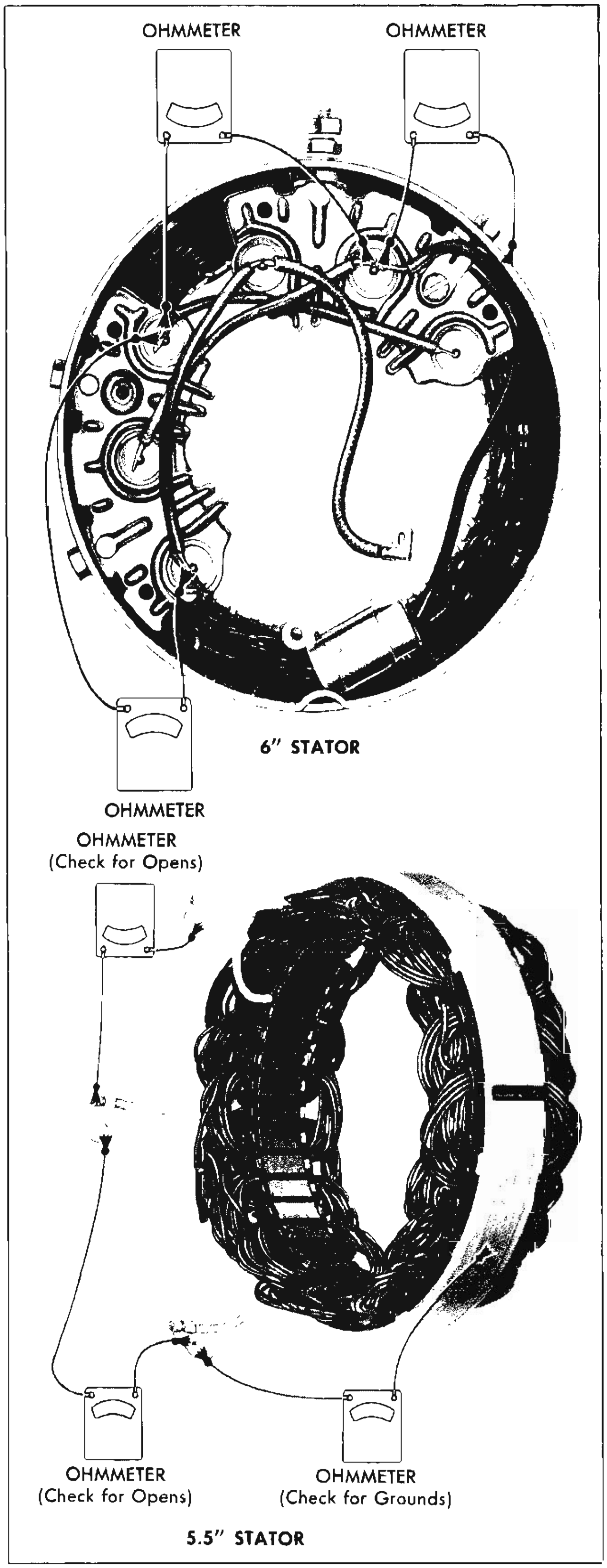


Fig. 25—Checking Stator for Grounds or Opens

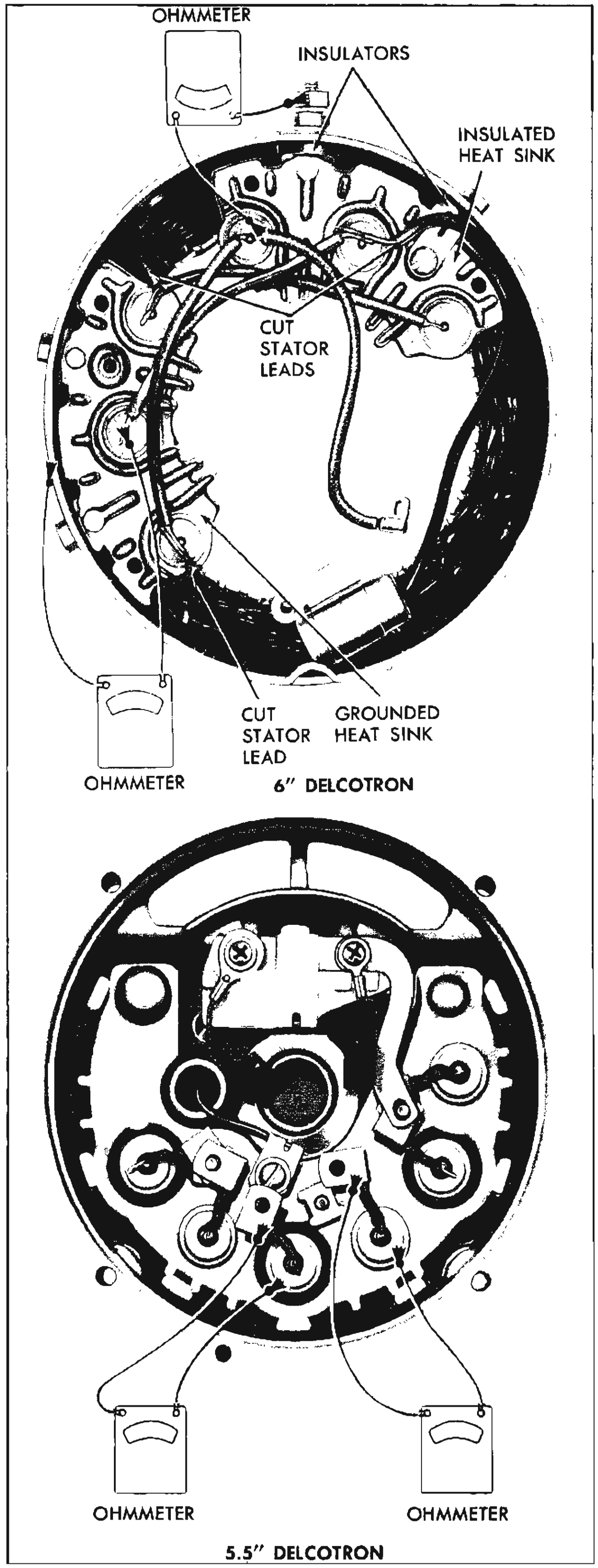


Fig. 26—Checking Diodes

2. Clean bearings and inspect for sealing, pitting or roughness.
3. Inspect rotor slip rings, they may be cleaned with 400 grain polishing cloth. Rotate rotor for this operation to prevent creating flat spots on slip rings.
4. Slip rings which are out of round may be trued in a lathe to .001" maximum indicator reading. Remove only enough material to make the rings smooth and concentric. Finish with 400 grain polishing cloth and blow dry.
5. Slip rings are not replaceable—excessive damage will require rotor assembly replacement.

TESTING ROTOR

The rotor may be checked electrically with a 110-volt test lamp or an ohmmeter.

Grounds

Connect test lamp or ohmmeter from either slip ring to the rotor shaft or to the rotor poles. If the lamp lights or if the ohmmeter reading is low, the field windings are grounded (fig. 24).

Opens

Connect one test lamp or ohmmeter lead to each slip ring. If the lamp fails to light or if the ohmmeter reading is high, the windings are open (fig. 24).

If the resistance reading is below 5 ohms, the winding is shorted.

Short Circuits

The windings are checked for shorts by connecting a 12 volt battery and an ammeter in series with the two slip rings. Note the ammeter reading. An ammeter reading above 1.5 amps indicates shorted windings.

TESTING STATOR

Grounds

Connect a 110-volt test lamp or an ohmmeter from any stator lead to the stator frame. If test lamp lights or if ohmmeter reads low, the windings are grounded (fig. 25).

Opens

If lamp fails to light or if ohmmeter reads high when successively connected between each pair of stator leads, the windings are open (fig. 25).

Short Circuit

A short in the stator windings is difficult to locate without special test equipment due to the low resistance of the windings. However, if all other electrical checks are normal and the generator fails to supply rated output, shorted stator windings are indicated.

TESTING DIODES

Two methods may be used to check diodes for shorts or opens, an ohmmeter or 12-volt test lamp.

CAUTION: Do not use a 110-volt test lamp to test diodes.

Ohmmeter

Use an ohmmeter with a 1½ volt cell and use the lowest range scale.

With the stator previously disconnected, check a diode in the heat sink by connecting one of the ohmmeter leads to the heat sink and the other lead to the diode lead and note the reading (fig. 26). Reverse the ohmmeter leads and note the reading. If both readings are very low, or if both readings are very high, the diode is defective. A good diode will give one low reading and one high reading. Check the other two diodes in the heat sink in the same manner.

To check a diode mounted in the end frame, connect one ohmmeter lead to the end frame and the other ohmmeter lead to the diode lead (fig. 26), and note the reading. Reverse the ohmmeter lead connections, and note the readings. If both readings are very low, or if both readings are very high, the diode is defective. A good diode will give one low reading and one high reading. Check the other two diodes in the end frame in the same manner.

Test Lamp (12 Volt Only)

Check as above with a 12-volt test lamp. When checking a diode the lamp will light in only one of the diode directions. If lamp lights or fails to light in both directions, the diode is defective.

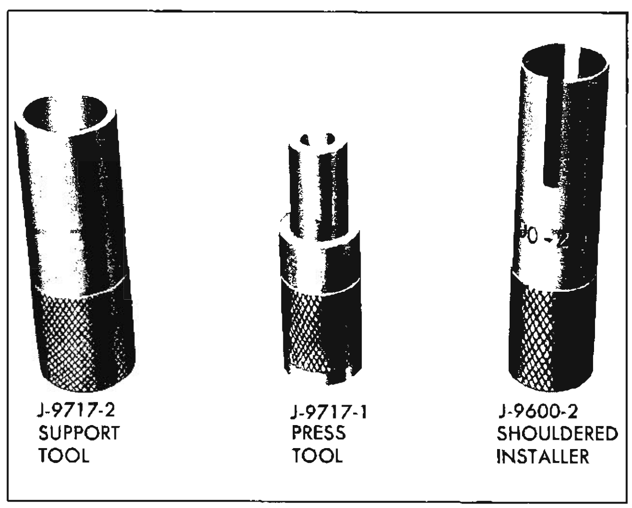


Fig. 27—Diode Remover and Installer Tools

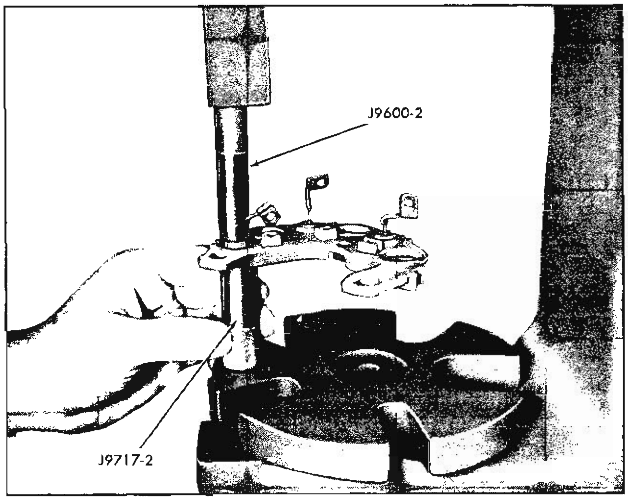


Fig. 28—Installing Diodes with Press Tools

REPAIRS

Diode Replacement

1. Support end frame with support Tool J-9717-2 and press out diode with diode removal Tool J-9717-1 and an arbor press (fig. 27).

   CAUTION: Do not strike diode as shock may damage other diodes.

2. Select diode with proper color marking.

   NOTE: Diodes in the heat sink are positive (red markings) and those in the end frame are negative (black markings).

3. Support outside end of frame around diode hole on a flat, smooth surface and press diode into position with J-9600-2 and an arbor press. Make sure diode is square with end frame and started straight (fig. 28).

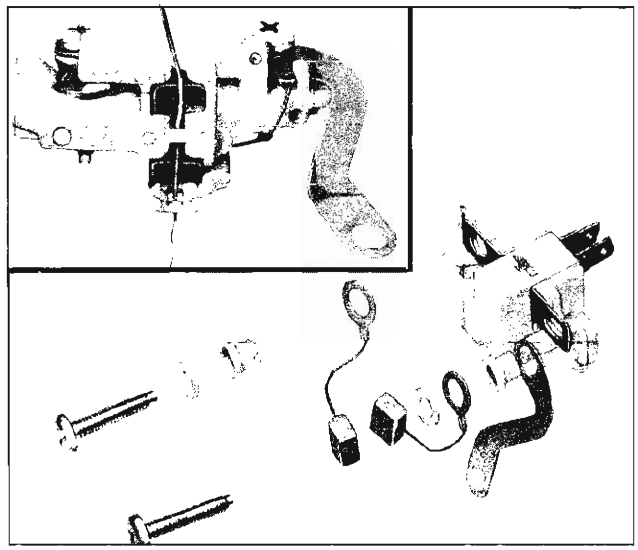


Fig. 30—Brush Assembly—5.5" Delcotron

CAUTION: Avoid bending or moving diode stem as excessive movement can cause internal damage and result in diode failure.

Heat Sink Replacement

1. Detach heat sink from end frame by removing the two terminal bolts. Note carefully the proper stack-up of parts so that the "BAT" and "GRD" terminal bolts can be reassembled in the same manner (fig. 29).
2. Replace diodes, if necessary, as outlined in "Diode Replacement."
3. Assemble heat sink to the end frame, following carefully the proper stack-up of parts as noted in step 1.

Brush Replacement (5.5 Delcotron (fig. 30)

1. After through bolts are removed and Delcotron

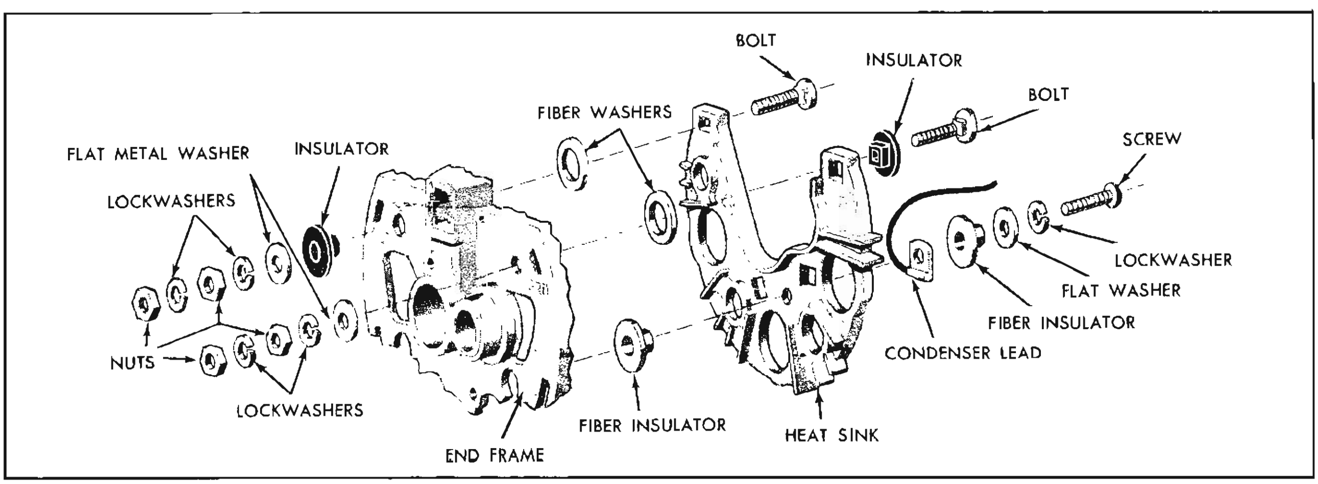


Fig. 29—Heat Sink—Parts Location

has been separated, remove stator lead nut that also holds relay connector.

2. Remove screws, brushes and holder assembly.
3. Reverse removal to install.

End Frame Replacement

1. Remove heat sink as outlined in "Heat Sink Replacement."
2. Attach brush holder assembly to the new end frame noting carefully proper parts stack-up (fig. 30) and insert pin or wire through the hole to hold the brushes in the holder (5.5" Delcotron). After the unit has been completely assembled, withdraw the pin or wire from the end frame hole to allow the brushes to drop down onto the slip rings.
3. Replace heat sink to end frame as outlined in "Heat Sink Replacement."

Bearing Replacement—Drive End Frame

1. The drive end frame bearing can be removed by detaching the retainer plate bolts and separating retainer plate from end frame, and then pressing bearing out using suitable tube or pipe on outer race.
2. Refill bearing one-quarter full with Delco-Remy No. 1948791 grease or equivalent. Do not overfill.
3. Press bearing into end frame using tube or pipe as in step 1.
4. Install retainer plate. Use new retainer plate if felt seal is hardened or excessively worn.

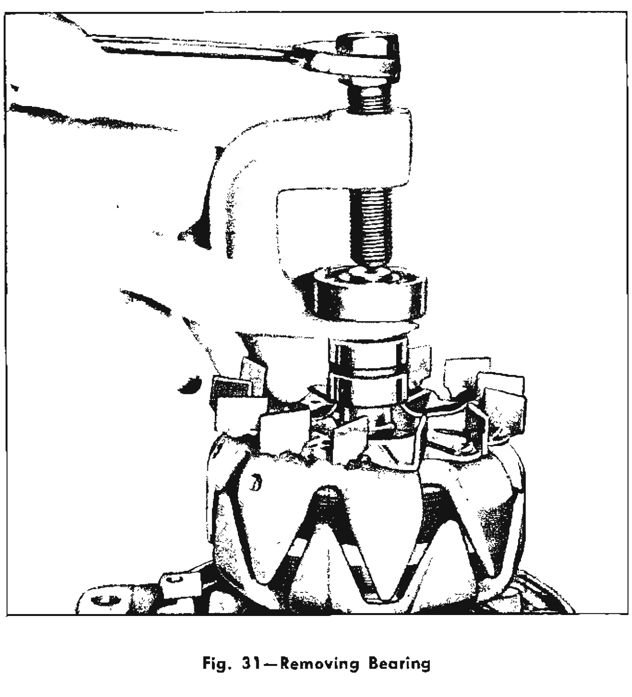


Fig. 31—Removing Bearing

Bearing Replacement—Slip Ring End Frame

6" Perforated Stator Delcotron

1. Remove bearing from rotor shaft using Tool J-6627 as shown in Figure 31.
2. Install bearing over shaft using Tool J-9610 or tube or pipe of suitable diameter over inner race and press to locate bearing even with end of shaft.

5.5" Aluminum Delcotron

1. Replace the bearing if the grease supply is exhausted. Make no attempt to re-lubricate and reuse the bearing.
2. Press out from inside of housing, using suitable tool over outer race of bearing.
3. To install, place a flat plate over the bearing and press in from outside of housing until bearing is flush with the outside of the end frame. Support inside of end frame around bearing bore with a suitable tool to prevent distortion. Use extreme care to avoid misalignment.

ASSEMBLY

1. Install stator assembly in slip ring end frame and locate diode connectors over the relay, diode and stator leads, and tighten terminal nuts.
2. Install the front end frame over rotor.
3. Install pulley spacer, pulley, lockwasher and nut.
4. Place torque wrench and adaptor on shaft nut and insert allen wrench into opening at end of drive shaft. Tighten shaft nut to 56-60 ft. lbs. on 6.2" and 40-50 on 5.5" Delcotron.

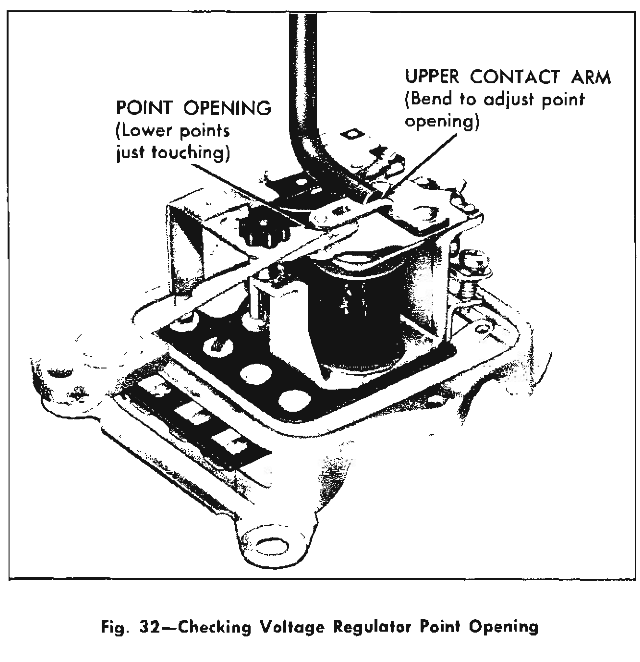


Fig. 32—Checking Voltage Regulator Point Opening

DOUBLE CONTACT REGULATOR

While most regular adjustments are made on the vehicle as outlined under "Maintenance and Adjustments," the regulator may be removed for field relay point cleaning and air gap adjustment. However, voltage regulator contacts should never be cleaned as they are made of special material that may be destroyed by cleaning with any abrasive material.

NOTE: A sooty or discolored condition of the contacts is normal after a relatively short period of operation.

REMOVAL AND INSTALLATION

To remove the regulator assembly, disconnect the battery ground cable and the wiring harness connector at the regulator, then remove the screws securing the regulator to the vehicle.

Electrical settings must be checked and adjusted after making mechanical adjustments. Before installing regulator cover, make sure the rubber gasket is in place on the regulator base.

CLEANING FIELD RELAY CONTACT POINTS

To clean field relay contacts use a thin fine-cut file. Remove only enough material to clean the points.

CAUTION: Never use emery cloth or sandpaper to clean contact points.

MECHANICAL ADJUSTMENTS

Voltage Regulator Adjustment

1. **Point Opening:** With the lower contacts touching, measure the point opening between the upper contacts as shown in Figure 32. Adjust by bending the upper contact arm.
2. **Air Gap:** Measure the air gap with a feeler gauge placed between the armature and core when the lower contacts are touching as shown in Figure 33. To adjust the air gap, turn the nylon nut located on the contact support.

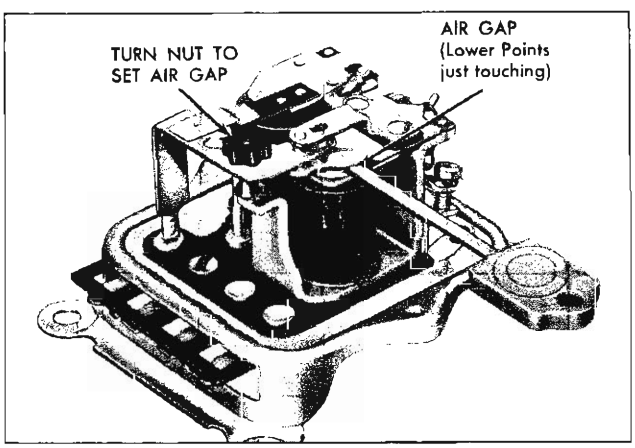


Fig. 33—Checking Voltage Regulator Air Gap

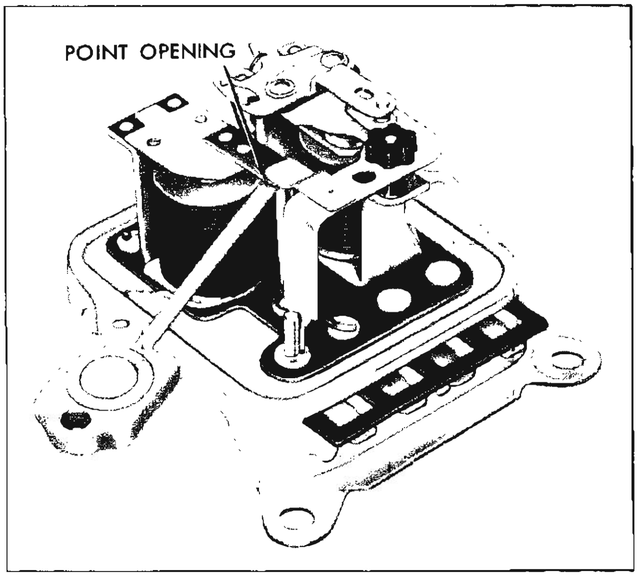


Fig. 34—Checking Field Relay Point Opening

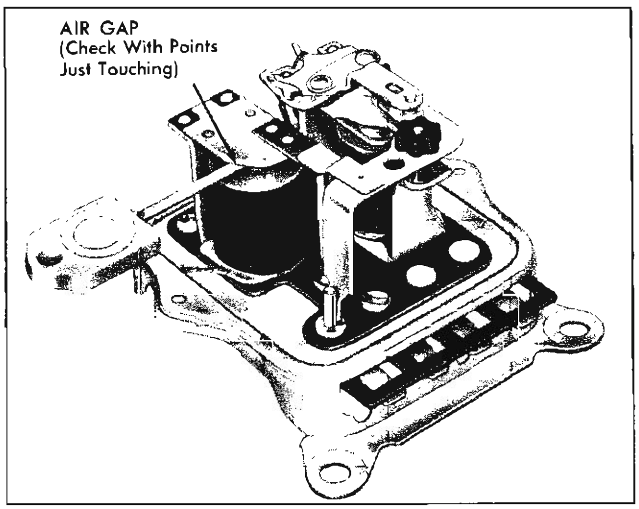


Fig. 35—Checking Field Relay Air Gap

NOTE: Only an approximate voltage regulator air gap setting should be made by the "feeler gauge" method.

Field Relay Adjustment

1. **Point Opening:** The point opening is checked as illustrated in Figure 34. If adjustment is necessary, carefully bend the armature stop.
2. **Air Gap:** Check the air gap with the points just touching (fig. 35). The air gap normally need not be adjusted. If the point opening and closing voltages are within specifications, the relay will operate satisfactorily even though the air gap may not be exactly according to specifications. If adjust-

ment is necessary, carefully bend the flat contact spring.

TRANSISTORIZED REGULATOR

REMOVAL AND INSTALLATION

Remove and install regulator from vehicle using the same procedure as outlined under "Double-Contact Regulator–Removal and Installation."

MECHANICAL ADJUSTMENTS

Voltage Regulator Air Gap

With the regulator removed from the vehicle, the air gap may be adjusted as illustrated in Figure 36. Push the armature (not the flat spring) down against a suitable gauge, and adjust the upper contact support so that the contacts are aligned squarely and just touch when the contact support screws are tightened.

Cleaning Contact Points

On voltage regulator units, the large contact point, when mounted on the armature, should be cleaned with a spoon or riffler file in the manner illustrated in Figure 37.

If the large contact is mounted on the upper contact support, the support must be removed for the cleaning operation. All oxides should be removed, but it is not necessary to remove any cavity that may have developed.

The small soft-alloy contact does not oxidize and may be cleaned with crocus cloth or other fine abrasive material. After contacts have been cleaned, they should be washed with trichlorethylene or some other non-toxic cleaning solution to remove any foreign material. Never use emery cloth to clean contacts.

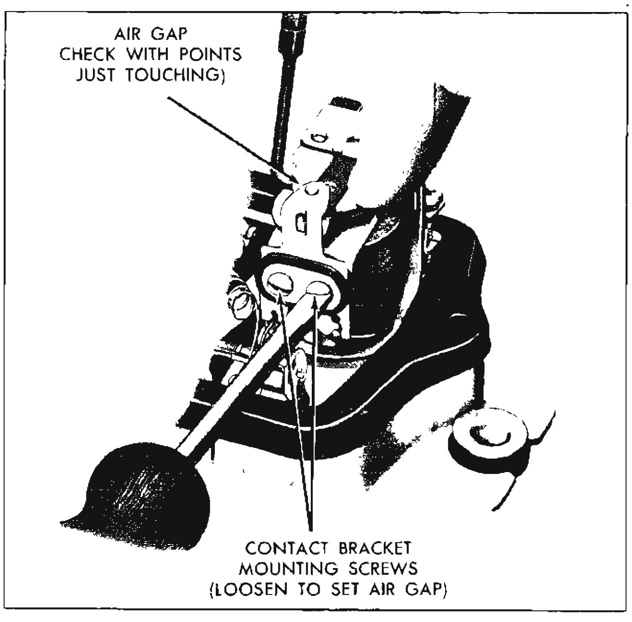


Fig. 36—Adjusting Voltage Regulator Air Gap

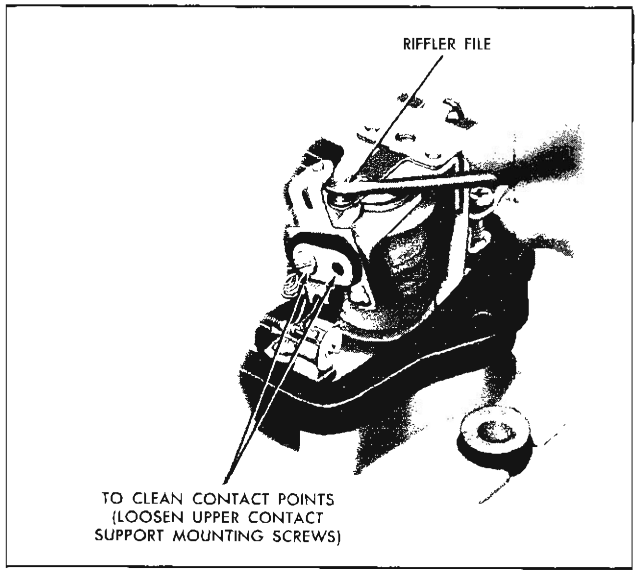


Fig. 37—Cleaning Contact Points

Field relay contacts may be cleaned with a thin fine-cut file. Remove only enough material to clean the points.

Since contact point cleaning often changes mechanical adjustments and electrical settings, it is necessary to make new adjustments and settings as described in preceding paragraphs after the cleaning operation.

Field Relay Unit

Air Gap:

With the regulator removed from the vehicle, check the air gap with the points just touching as shown in Figure 38. If adjustment is necessary, carefully bend the flat contact support spring.

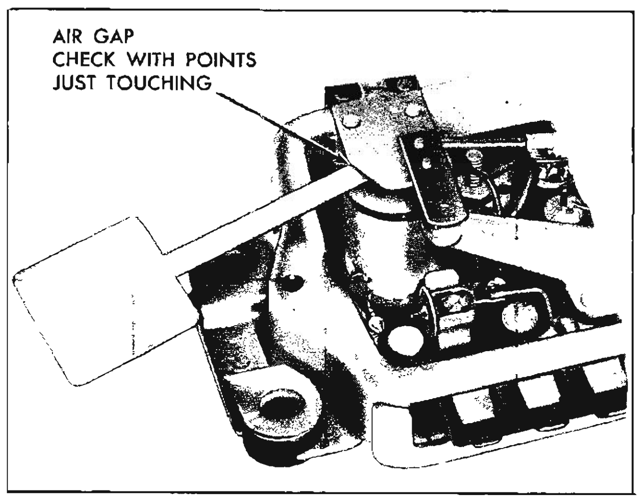


Fig. 38—Checking Field Relay Air Gap

Repairs

Refer to appropriate section covering diode and transistor checking and replacing.

DIODE CHECK

To check the diodes, remove regulator from vehicle, remove cover, and unsolder the diode leads. Then connect an ohmmeter to the field discharge diode as illustrated in Figure 39, and note the reading. Then reverse the ohmmeter lead connections to the field discharge diode, and note the reading. If both readings are less than two ohms, the diode is defective. Also, the diode is defective if both readings are very high (infinite). A normal diode will give one low reading and one high reading. Check the suppression diode in the same manner. Use the ohmmeter with 1½ volt cell, and use the lowest range scale on the ohmmeter. When replacing the diode, limit solder time to a minimum as excessive heat may damage the diode.

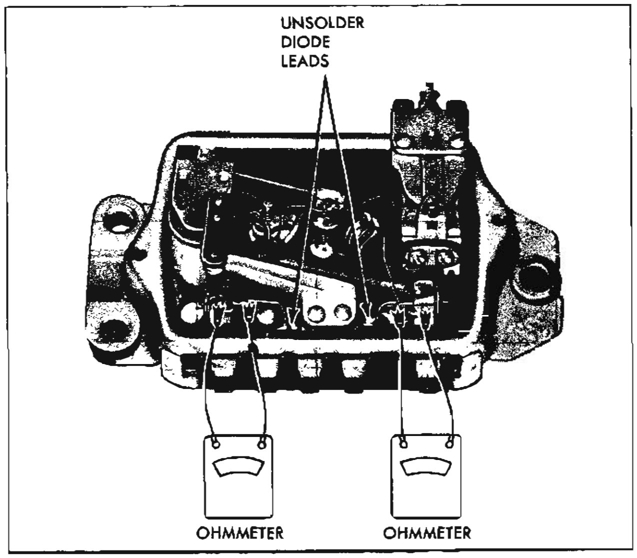


Fig. 39—Regulator Diode Check

TROUBLE DIAGNOSIS

Undercharged Battery

1. Loose drive belt
2. Defective battery
3. Faulty field relay
4. Low voltage settings
5. Loose connections
6. Corroded connections
7. Defective wiring
8. Defective Delcotron
9. Faulty resistor

Overcharged Battery

1. Shorted battery cell
2. High voltage settings

Faulty Indicator Lamp Operation

1. Burned out bulb
2. Defective socket
3. Defective wiring
4. Positive diode failure
5. Defective regulator
6. Loose drive belt
7. Low voltage setting

STARTING CIRCUIT

GENERAL DESCRIPTION

The 1964 starting system includes pad mounting type starting motors (fig. 40) and new color coded motor and solenoid wiring assemblies on all L-6 and V-8 engine models. Composite wiring diagrams and specifications are included at the end of this section. Otherwise, the starting system remains basically unchanged and the maintenance and serve procedures will apply as outlined in the 1961 shop manual.

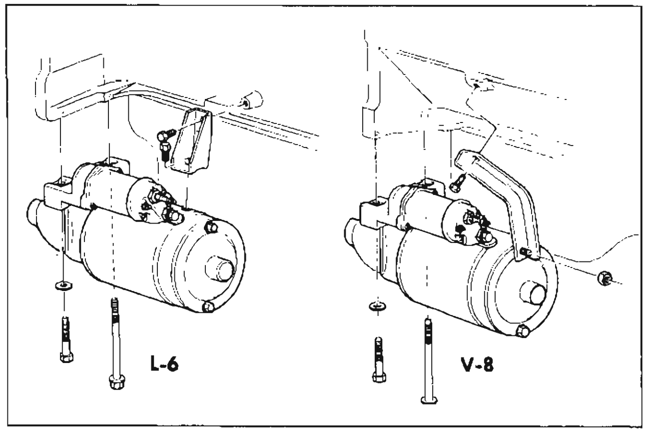


Fig. 40—Starting Motor Mounting

IGNITION CIRCUIT

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DISTRIBUTORS

MAINTENANCE AND ADJUSTMENTS

V-8 ENGINES

Distributor lubrication is accomplished by a reservoir of lube surrounding the main shaft opening (fig. 41).

The distributor used with the 409 cubic inch engine incorporates single contacts and a vacuum advance.

Service operations are otherwise basically the same as described in the 1961 Chevrolet Shop Manual.

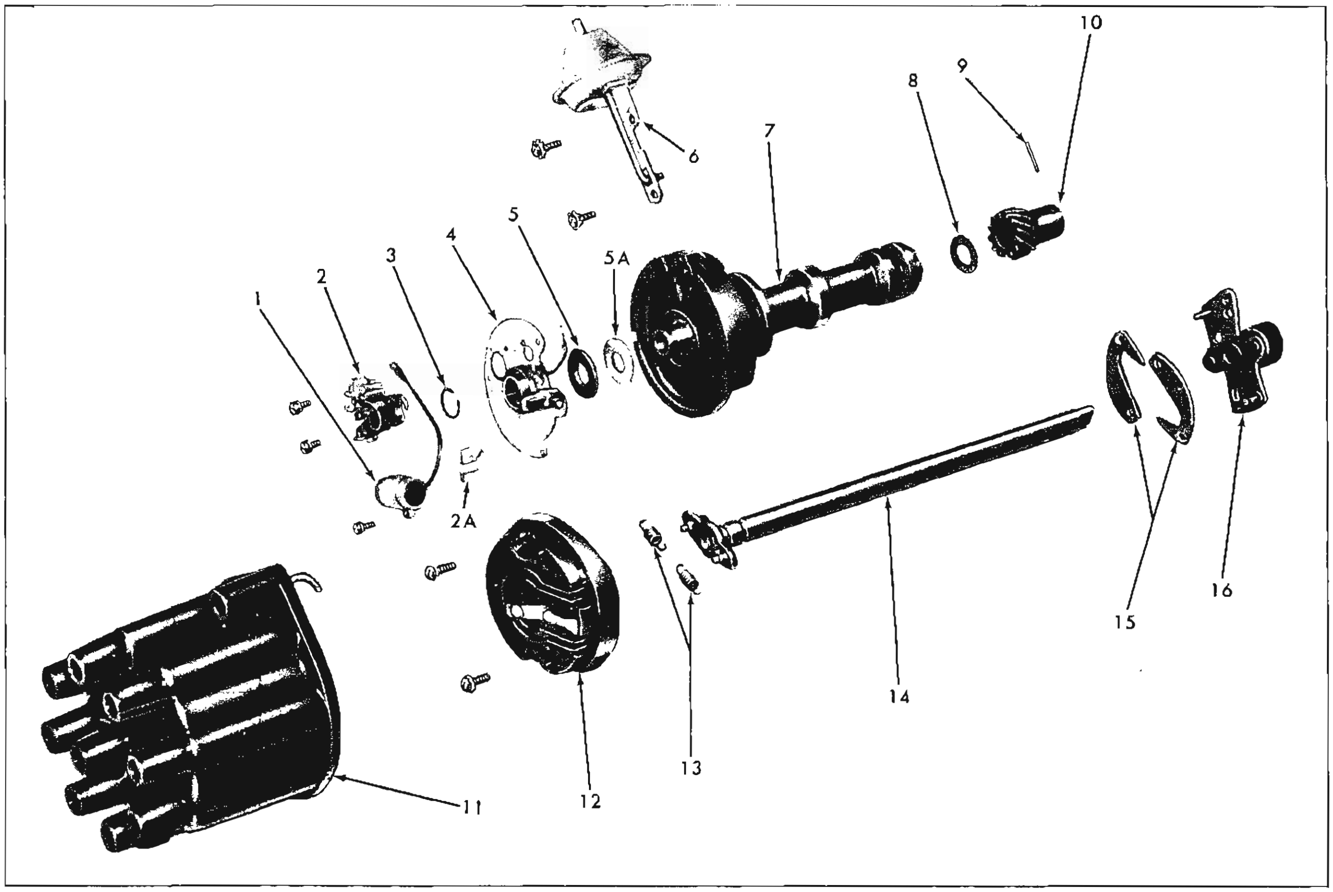

Fig. 41—Distributor Exploded View—V-8 Engine

1. Condenser
2. Contact Point Assembly
2a. Cam Lubricator
3. Retaining Ring
4. Breaker Plate
5. Felt Washer
5a. Plastic Seal
6. Vacuum Advance Unit
7. Housing
8. Shim Washer
9. Drive Gear Pin
10. Drive Gear
11. Cap
12. Rotor
13. Weight Springs
14. Shaft
15. Advance Weights
16. Cam Weight Base Assembly

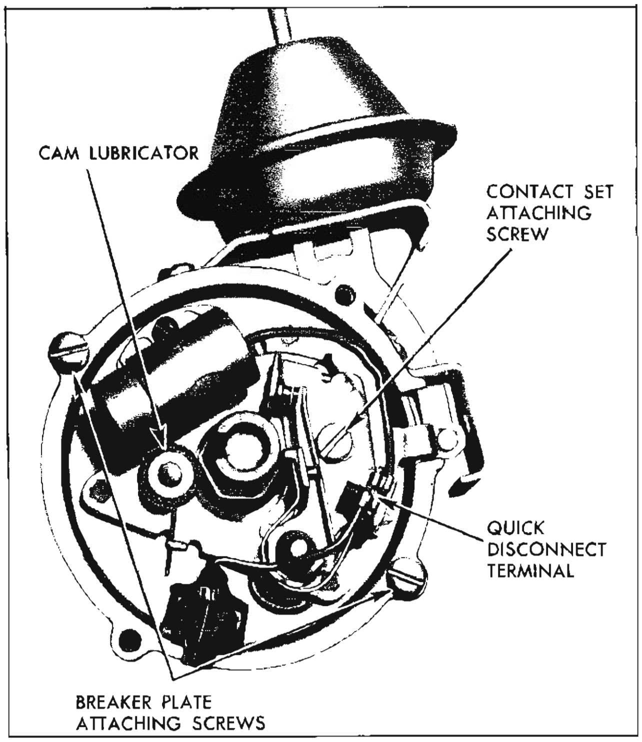

Fig. 42—Breaker Plate and Attaching Parts

L-6 ENGINE

CONTACT POINT REPLACEMENT

Refer to Figures 42 through 44

1. Release distributor cap hold-down screws, remove cap and place it out of work area.
2. Remove rotor.
3. Pull primary and condenser lead wires from contact point quick disconnect terminal (fig. 42).
4. Remove contact set attaching screw, lift contact point set from breaker plate.
5. Clean breaker plate of oil smudge and dirt.

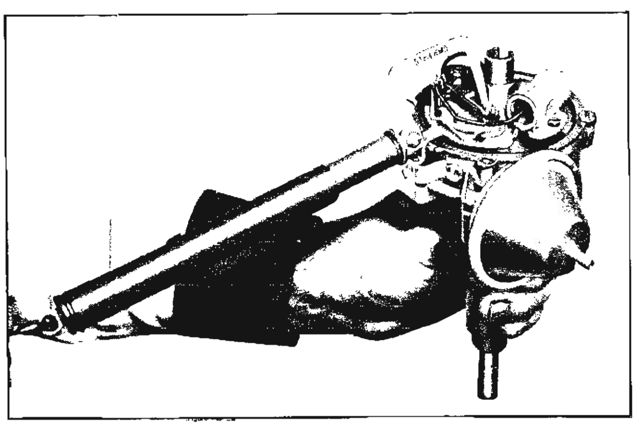

Fig. 43—Checking Breaker Arm Spring Tension

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. 43). Use an aligning tool to bend stationary contact support if points need alignment.
9. Set point opening (.019" for new points) (fig. 44).
10. Reinstall rotor, position and lock distributor cap to housing.
11. Check and set ignition timing. (See Engine Tune-Up, Section 7.)

CONDENSER REPLACEMENT

Refer to Figure 42.

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

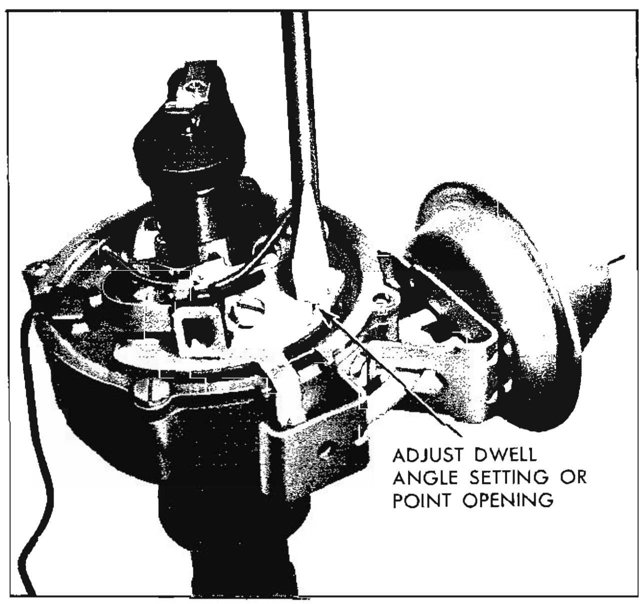

Fig. 44—Setting Point Opening

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. 42).
4. Disconnect vacuum line from vacuum control assembly, remove distributor hold-down bolt and clamp, remove distributor from engine. Note position of vacuum advance assembly relative to engine for correct reinstallation (fig. 44).

   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. When mounting distributor for tests, first secure the gear in the drive mechanism, then push distributor housing down toward the gear to take up end play between the gear and the housing, and finally secure the housing in the tester.

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.

Refer to Figure 45 for exploded view of distributor.

1. Remove rotor.
2. Remove vacuum control assembly 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.

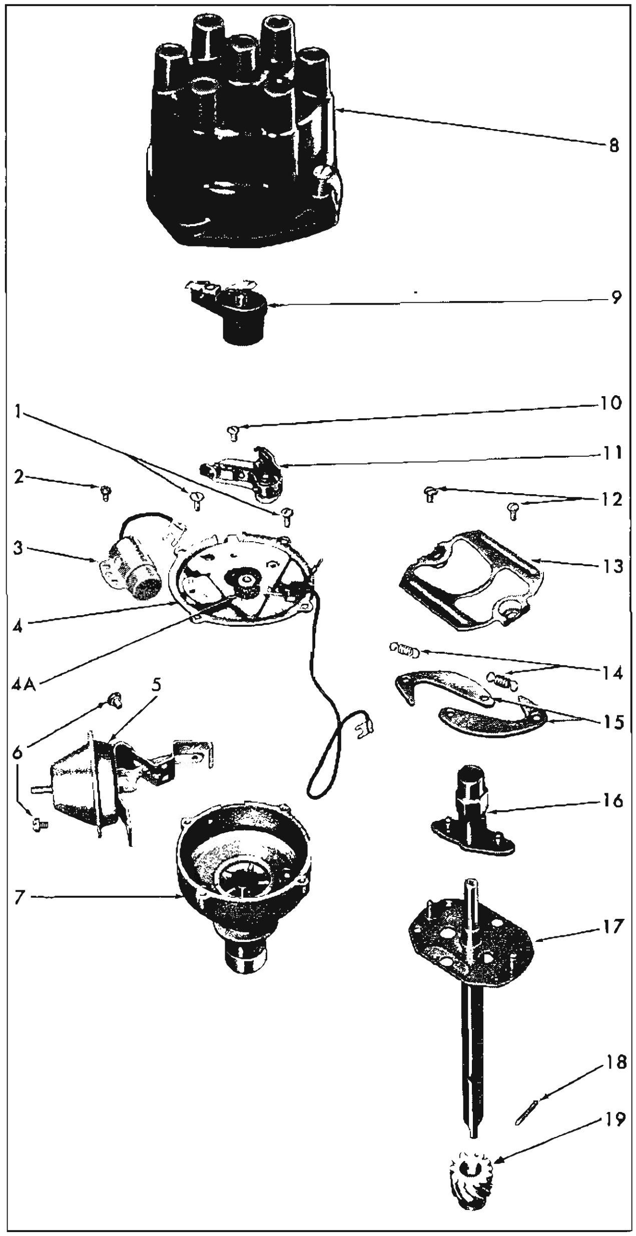

Fig. 45—Distributor Exploded View—Six Cylinder

1. Breaker Plate Attaching Screws
2. Condenser Attaching Screw
3. Condenser
4. Breaker Plate Assembly

4A. Lubricator

5. Vacuum Control Assembly
6. Vacuum Control Attaching Screws
7. Housing
8. Cap
9. Rotor
10. Contact Point Attaching Screw
11. Contact Point Assembly
12. Weight Cover Attaching Screws
13. Weight Cover
14. Weight Springs
15. Advance Weights
16. Cam Assembly
17. Mainshaft Assembly
18. Washer
19. Drive Gear

NOTE: Do not disassemble breaker plate any further.

5. Remove roll pin retaining driven gear to mainshaft, slide gear 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.
8. Remove vacuum advance attaching screws, plate ground lead and vacuum advance assembly.
9. Remove main shaft bushing felt washer from housing.

NOTE: Mainshaft bushings in housing are not serviced separately. Housing and bushings are serviced as complete assembly.

10. Remove gasket from shaft housing.

CLEANING AND INSPECTION

1. Wash all parts in cleaning solvent except cap, rotor, condenser, breaker plate assembly and vacuum control unit. Degreasing compounds may damage insulation of these parts or saturate the lubricating felt in the case of the breaker plate assembly.
2. Inspect the breaker plate assembly for damage or wear and replace if necessary.
3. Inspect the shaft for wear, and check its fit in the bushings in the distributor body. If the shaft or bushings are worn, the shaft and distributor body should be replaced.
4. Mount the shaft in "V" blocks and check the shaft alignment with a dial gauge. The run-out 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. 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 45 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. 46).
3. Lubricate mainshaft, install it in distributor housing.
4. Install distributor driven gear to mainshaft, insert retaining roll pin. 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.
6. Attach condenser and contact point set in proper location with appropriate attaching screws.

NOTE: Contact point set pilot must engage matching hole in breaker plate. Connect primary and condenser leads to contact set quick disconnect terminal.

7. Attach vacuum control assembly to distributor housing using upper mounting holes.
8. Install rotor to cam assembly.

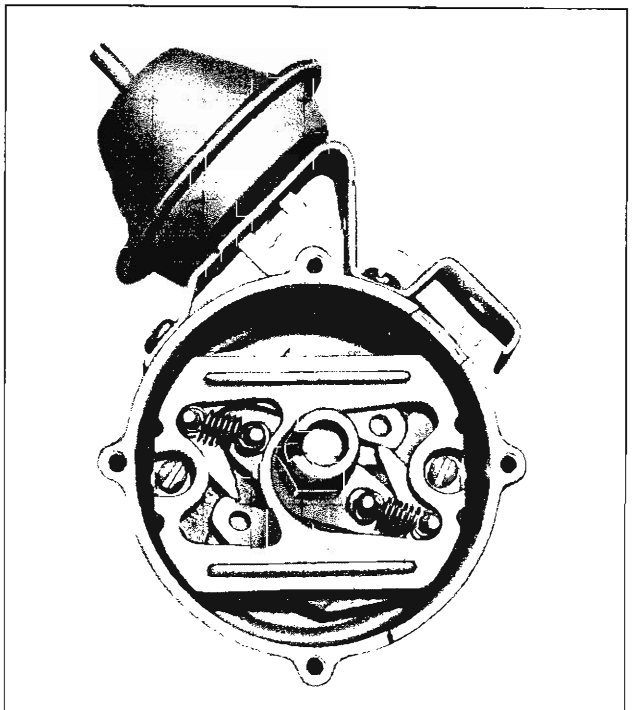

Fig. 46—Weights, Weight Cover Installed

INSTALLATION

Engine Not Disturbed

1. Turn rotor approximately ⅛ turn in a counterclockwise direction past mark previously scratched on distributor housing.

2. Work distributor down into position in engine block with distributor positioned as noted during removal—vacuum advance unit in same relative position prior to removal.

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

3. Replace and tighten distributor hold-down bolt and clamp. Connect primary lead to coil. Also install spark plug and coil secondary wires if removed (fig. 47).

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

4. Time ignition as outlined under Engine Tune-Up (Section 7).

   NOTE: Seal vacuum line prior to starting engine.

5. Connect vacuum hose to distributor vacuum control unit.

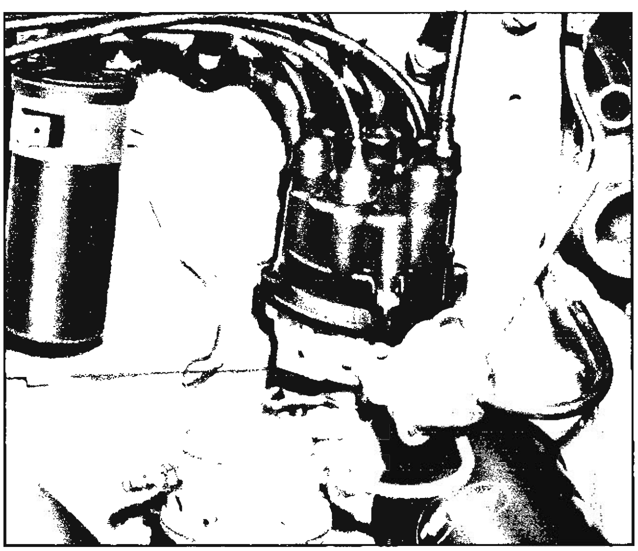

Fig. 47—Distributor Installed

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 finger on plug hole, crank engine until compression is felt in Number 1 cylinder. Continue cranking until pointer lines up with timing mark on crankshaft pulley or . . .

   b. Remove rocker cover and crank engine until Number 1 intake valve closes and continue to crank slowly until pointer lines up with timing mark on crankshaft pulley.

2. Position distributor to opening in block in normal installed attitude, noting position of vacuum control unit.

3. Position rotor to point toward front of engine (with distributor housing held in installed attitude), then turn rotor counterclockwise approximately ⅛ turn more toward left and push distributor down to engage camshaft. It may be necessary to rotate rotor slightly until camshaft 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, distributor primary lead to coil, check all high tension wire connections and connect spark plug wires if they have been removed (see fig. 47). It is important that the wires be installed in their proper location in the supports.

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

8. Start engine and set timing as described under Tune-up in Section 7.

   NOTE: Seal vacuum line prior to starting engine.

9. Connect vacuum hose to distributor vacuum control assembly.

IGNITION SWITCH

REPLACEMENT

The new ignition switch and harness-to-switch connector features a three tang (theft resistant) lock on assembly (fig. 48). The switch assembly is removed from the dash in the same way as in 1961 but the locking legs require use of a thin screwdriver (fig. 49) or other suitable tool to hold the lock tangs inward to clear switch lugs.

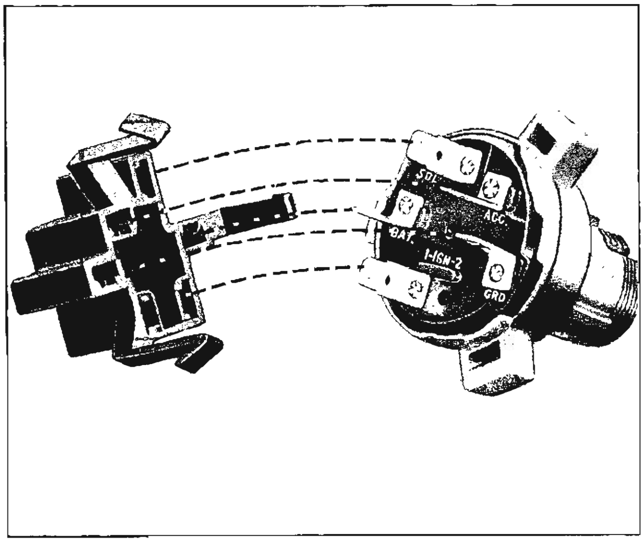

Fig. 48—Ignition Switch Assembly (Typical)

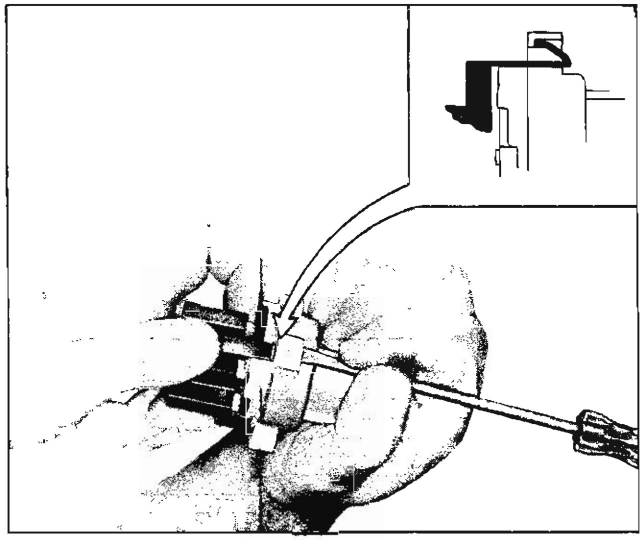

Fig. 49—Removing Connector from Switch

BODY AND CHASSIS ELECTRICAL

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LIGHTING SYSTEM

New increased life headlamp units and increased life miniature bulbs for parking, backing, and stop, tail and directional signal lamps and cluster illumination and indicator lamps are used with the 1964 Passenger Car lighting system. Accordingly, replacement of the headlamp and lamp bulbs should conform to the released specifications at the end of this section. Maintenance and Service procedures remain the same as 1961 models.

HEADLAMPS

Sealed beam unit replacement remains the same as for 1961 models except for the bezel removal. The headlamps for 1964 models each have an individual bezel retained by two screws and a nylon retainer.

Safety aimer and headlamp adjustment procedures are identical to 1961 model instructions after bezel removal.

PARKING LAMP SERVICE

The new design parking and directional signal lamp assembly located in the bumper incorporates an amber color lens. To replace bulb or lens:

1. Remove 2 parking lamp lens retaining screws, lens and/or bulb.
2. To install new lens or bulb, reverse above procedure.

DOME LAMP REPLACEMENT

1. On Impala Sport Coupe, grasp plastic lens gently squeezing to release locking tabs and pull out from bezel.

1a. On all other models grasp lamp bezel and gently pull downward. On switch models lift bezel away from switch.

CAUTION: Do not use a screwdriver, knife or other similar tool to remove bezel or lens. This can result in damage to lens, bezel or headlining.

2. Replace lamp.
3. To install lens or bezel reverse removal procedure.

NOTE: If bezel is removed, align locating tabs on bezel with cutouts on mounting bracket.

PARKING BRAKE ALARM SWITCH REPLACEMENT (Fig. 50)

1. Disconnect wiring connector at switch terminals.
2. Remove switch retaining screw and switch from dash brace.
3. To install, reverse removal procedure.

NOTE: Adjust switch so brake pedal in "off" position will depress plunger approximately 3/16".

BACKING LAMP SWITCH REPLACEMENT

3-speed Transmission (Fig. 51)

1. Disconnect wiring connector at switch terminals.
2. Remove switch attaching screws and switch from mast jacket.
3. To install, reverse removal procedure.

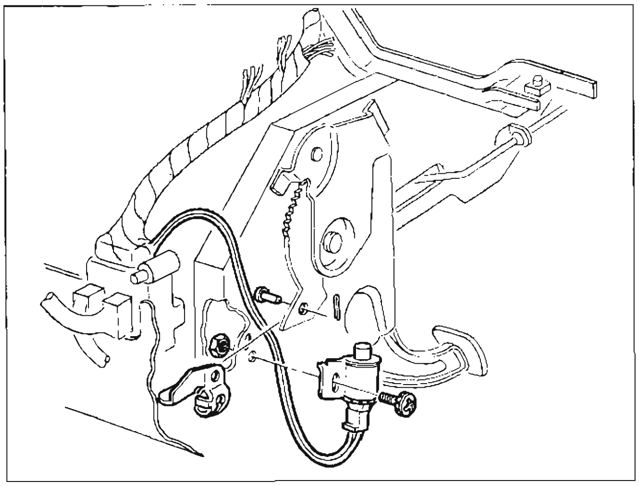

Fig. 50—Parking Brake Alarm Switch

NOTE: Position gear shift in neutral before assembling switch to mast jacket.

4-Speed Transmission (Fig. 52)

1. Raise vehicle.
2. Remove screws retaining wiring terminals to switch.
3. Remove wire clip retaining reverse lever rod to switch.
4. Remove screws retaining switch assembly to transmission.
5. To install, reverse removal procedure.

NEUTRAL SAFETY SWITCH REPLACEMENT

Column Shift

1. Disconnect wiring connectors at switch terminals.

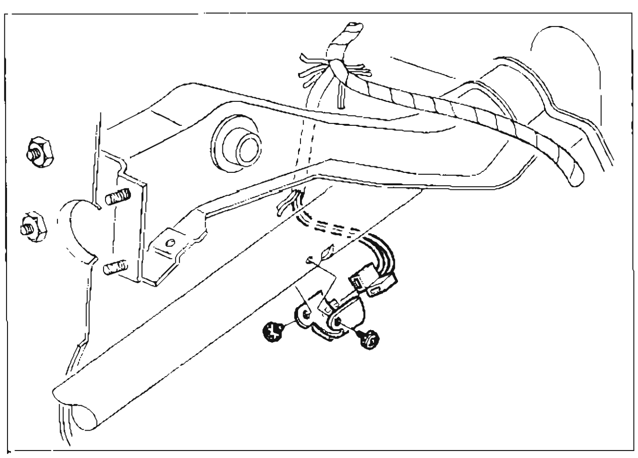

Fig. 51—Backing Lamp (3-Speed)

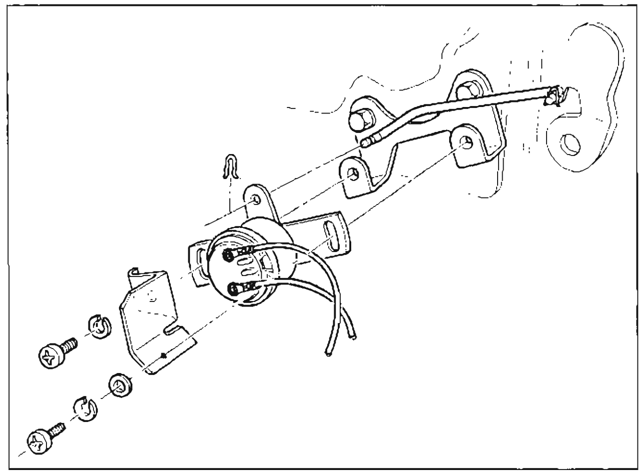

Fig. 52—Backing Lamp (4-Speed)

2. Remove switch retaining screws and switch from mast jacket.
3. To install, reverse removal procedure.

NOTE: Place contact support drive slot over shifter tube drive tang before tightening screws.

Floor Shift (Fig. 53)

To Remove:

1. Raise vehicle.
2. Disconnect wiring connectors at switch.
3. Remove switch retaining nuts and switch.

To Install:

1. Clamp pawl rod against contact point "B" of detent.

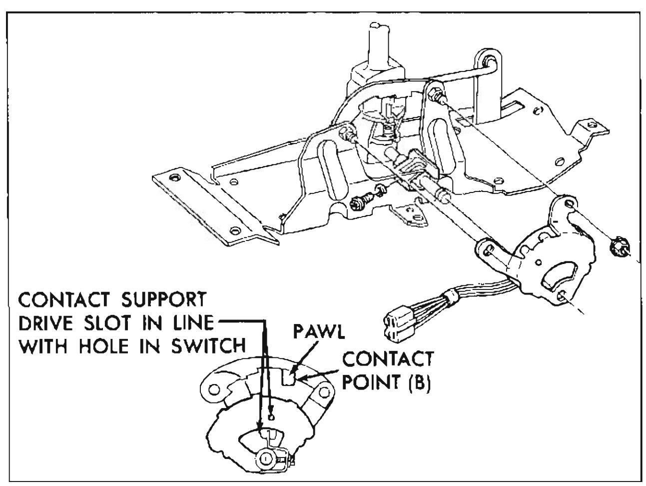

Fig. 53—Neutral Safety Switch (Floor Shift)

2. Align slot in contact support with drive hole in switch and insert pin to hold support in place.
3. Install switch to lever and bracket assembly with lever engaged in contact support.
4. Remove clamp and pin.

INSTRUMENT PANEL COMPARTMENT LAMP AND SWITCH REPLACEMENT

Refer to Figure 54

1. Disconnect Battery Ground Cable.
2. Reach into glove box, depress bulb and turn it counterclockwise. Remove bulb.
3. Push switch out of mounting hole. Carefully pull wire and terminal out of switch housing.
4. Insert wire and terminal into new switch.
5. Push switch into place and install bulb by setting in place, depressing and turning it clockwise.

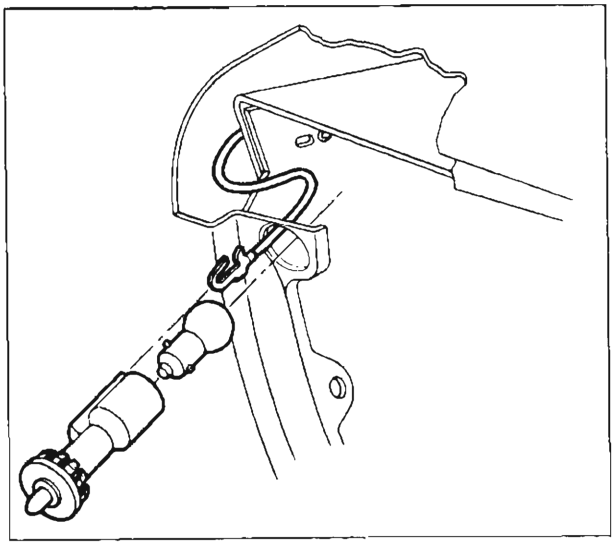
Fig. 54—Instrument Panel Compartment Switch and Lamp Assembly

INSTRUMENTS AND GAUGES

WIRING

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 related wire color code are included at the end of this section.

The underdash harness consists of two separate assemblies with the instrument cluster having its own harness. Figure 55 shows all console wiring connections. Also, the main harness incorporates a resistance wire which eliminates the need for a light relay coil in the voltage regulator (see Charging Systems under Engine Electrical).

INSTRUMENT CONSOLE

Removal and Installation

1. Unscrew speedometer cable from back of speedometer.
2. Remove nine screws attaching console to instrument panel and lean console forward onto mast jacket.

   NOTE: Protect mast jacket with suitable material.

3. Reach behind console at driver side and disconnect the two multiple lead instrument cluster harness connectors (fig. 55).
4. Lift console forward and upward to remove from the vehicle completely and place on a protected bench.
5. To install reverse removal procedure.

   NOTE: Be sure to attach the single ground washer on one of the nine console attaching screws.

INSTRUMENT CLUSTER

Removal—Refer to Figure 56

To remove the speedometer, the console **must be removed** from the vehicle. It is not necessary to remove instrument cluster from console to individually remove fuel gauge or clock. These units may be removed with console in vehicle.

Fuel Gauge

1. Disconnect wiring harness and light bulb from gauge.
2. Remove the two gauge attaching screws and remove gauge from cluster housing.

Clock

1. Remove clock set shaft (fig. 56).
2. Disconnect wiring harness and light bulb from clock.
3. Remove the clock attaching screws.

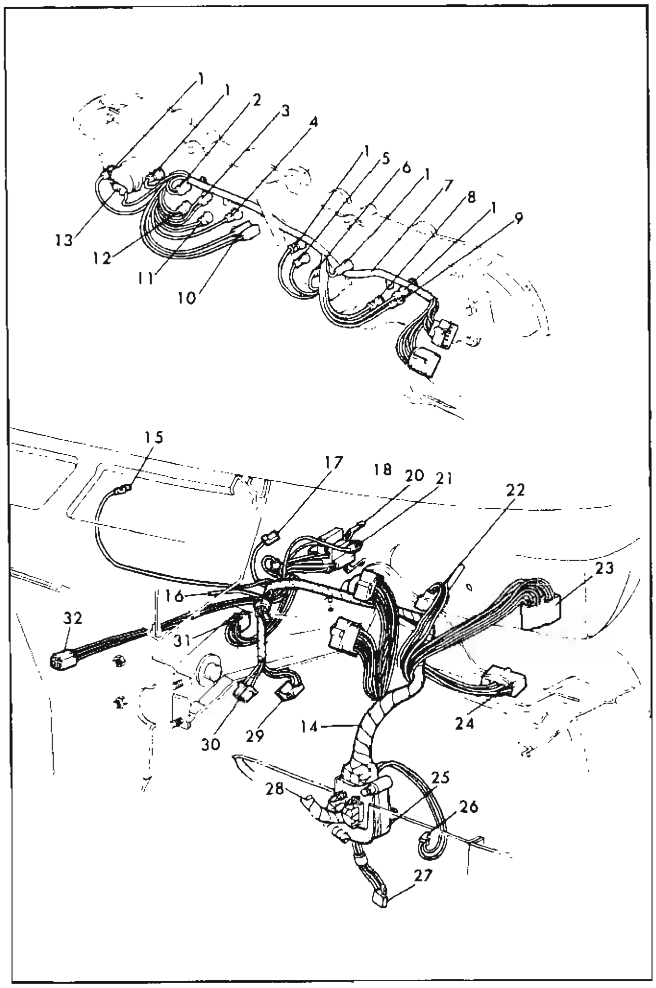

Fig. 55—Instrument Cluster Wiring

1. Instrument Cluster Light
2. Generator Indicator Light
3. Oil Pressure Indicator Light
4. Gas Gauge Light
5. Directional Indicator Light (Right)
6. Parking Brake Alarm Light
7. Instrument Cluster Harness Assembly
8. High Beam Indicator Light
9. Directional Indicator Light (Left)
10. Gas Gauge Connector
11. Temperature "Hot" Indicator Light
12. Temperature "Cold" Indicator Light
13. Clock Connector
14. Harness Assembly
15. Instrument Panel Compartment Switch
16. To Right Hand Door Jamb Switch
17. To Cigarette Lighter
18. Heater Control Light
19. Radio Lead
20. To Ignition Switch
21. Ignition Switch Light
22. To Directional Signal Switch Connectors
23. To Light Switch
24. To Fisher Body Connector
25. Fuse Panel
26. To Parking Brake Alarm
27. To Dimmer Switch
28. Engine Harness
29. To Back-Up Lamp Switch
30. To Stop Lamp Switch
31. To Heater Control Switch
32. To Heater Resistor

Speedometer Cluster

1. After removing console, disconnect all indicator lights and electrical connectors from the cluster (fig. 55).
2. Remove the five instrument cluster assembly-to-console attaching screws and remove instrument cluster.
3. Remove eight instrument cluster cover retaining screws and remove speedometer assembly.

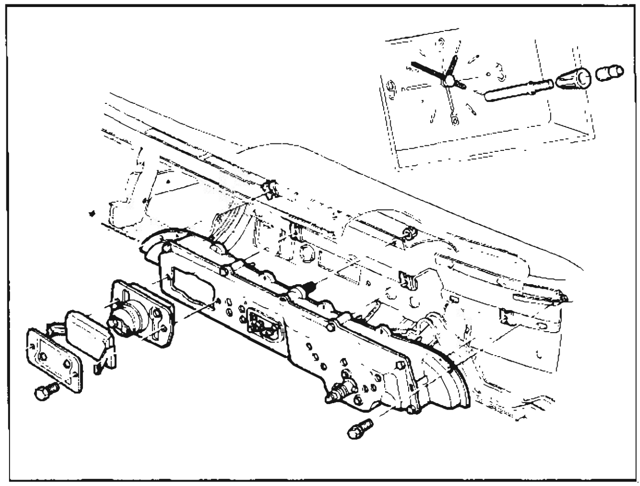

Fig. 56—Instrument Cluster

Installation

To install the instrument cluster, fuel gauge or clock reverse the removal procedure.

TEMPERATURE INDICATOR

The temperature indicator consists of two lights. A green light appears when the engine is cold and remains on until the engine begins to approach operating temperature. A red light will appear when the engine becomes overheated. To check the bulb operation, the red light will momentarily flash on while cranking the engine. When both lights are off, normal engine operating temperature is indicated.

- BULB REPLACEMENT consists of merely snapping socket assembly out from rear of gauge and inserting new bulb.
- TO REPLACE ENGINE SENDER UNIT—
  1. Drain engine cooling system to a level below unit.
  2. Remove sender unit, replace with new unit.
  3. Refill cooling system and check operation of unit.

A.C. GENERATOR INDICATOR

Ignition on, engine not running and telltale light off—

1. Indicator bulb burned out, replace bulb.
2. Open circuit or loose connection in the telltale light circuit.

Telltale light stays on after engine is started—

1. If indicator light does not go out at engine idle speed, refer to Charging Systems under Engine Electrical, Section 6Y.

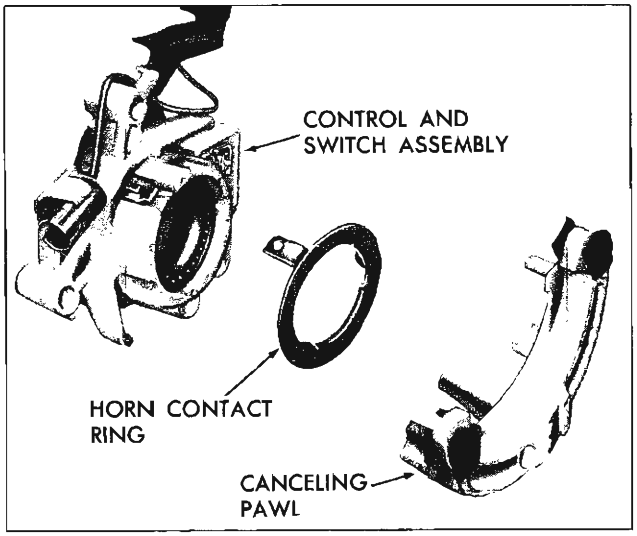

Fig. 57—Directional Signal Switch

DIRECTIONAL SIGNAL

The 1964 Chevrolet Passenger Car has a new design directional signal assembly (fig. 57). The switch mechanism is an electrically operated self-contained unit having the cancelling mechanism and the electrical switching in one plastic assembly. The new switch is one complete plastic assembly using a stamped bowl instead of an integral cast bowl. The bowl serves only as a housing.

Special note should be taken of the fact that two different directional signal flashers are used in the 1964 Chevrolet.

- **A "two-bulb" flasher** for use in Biscayne and Bel Air Passenger Cars and Station Wagons. This indicates that the flasher must operate only two bulbs, the front parking lamp and the tail lamp.
- **A "three-bulb"** flasher for use in Impala Passenger Cars and Station Wagons. In this case, the flasher must operate the front parking lamp and two tail lamps for a total of three bulbs.

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.

REMOVAL AND INSTALLATION—REFER TO FIGURE 58

1. Remove steering wheel (refer to Section 4, Steering).
2. Remove lever arm attaching screw and lever from cancelling mechanism.
3. Remove shift control lever retaining pin and lever (column shift only).
4. Disconnect directional signal, horn and shift indicator light (automatic only) wiring assembly at harness quick disconnect.
5. Remove instrument panel trim cover plate and mast jacket upper clamp bolt. Bend clamp from steering column.
6. Remove three screws attaching directional signal control to signal housing.

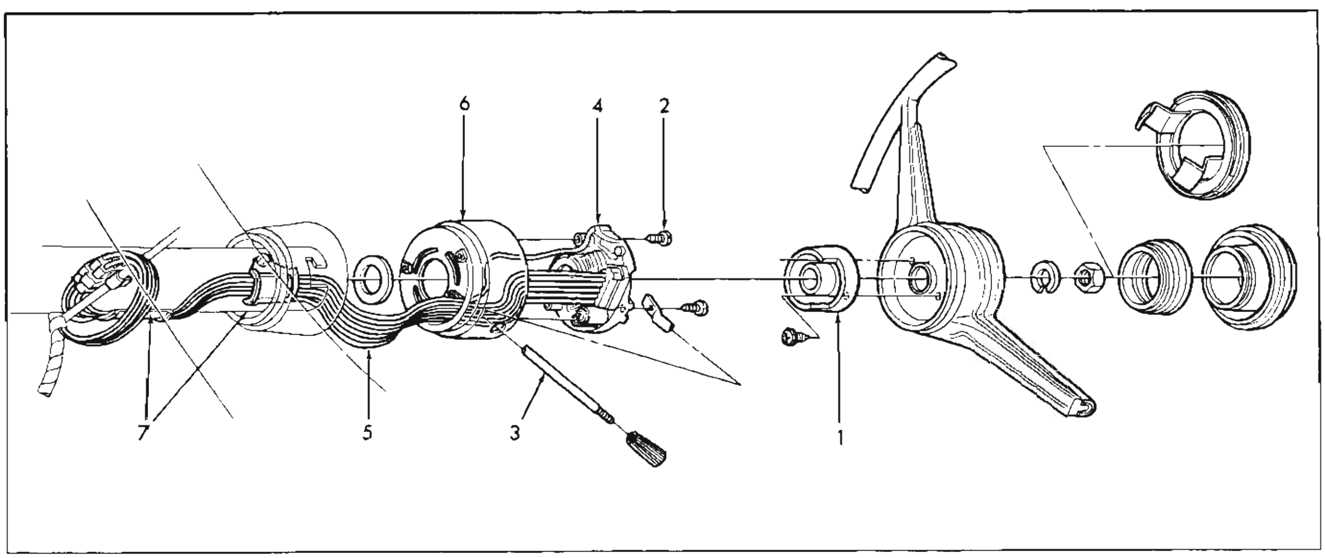

Fig. 58—Directional Signal Assembly

1. Canceling Cam
2. Control Attaching Screw
3. Lever
4. Control Unit
5. Wiring Assy.
6. Control Housing
7. Harness Clamps

7. Remove wiring assembly retaining clamps (slide components upward on steering to expose upper clamp).
8. Remove directional signal assembly and housing, shift lever housing and mast jacket cover extension from steering column.
9. Disconnect shift indicator light and horn wires from multiple connector.
10. Remove turn signal assembly from signal and shift lever housings and mast jacket.
11. Remove upper shaft bearing and horn assembly from directional signal control assembly.
12. To install reverse removal procedure.

HORNS AND HORN RELAY

QUICK CHECK FOR HORN TROUBLE

If the battery checks GOOD, then the horn trouble may be caused by:

1. Defective relay, horn button, or wiring.
2. Defects within the horn.

To locate the trouble, connect a jumper lead to the "1" and "3" terminals of the relay (see Figure 59 for terminal location). If the horn blows, the trouble is in the relay, horn button, or wiring. Proceed with relay, horn button, or wiring checks. If the horn fails to blow or operates intermittently, the trouble is in the horn. Proceed with horn checks.

Relay, Horn Button or Wiring Checks

To determine whether the relay, horn button, or wiring is at fault, ground the "2" terminal of the relay (see Figure 59 for terminal location). If the horn blows, the horn button or wiring is at fault. If the horn does not blow and the wiring between the battery and relay is not defective, connect a voltmeter between horn terminal and the horn mounting nut. Again connect the jumper lead to the "1" and "3" terminals of the relay and note the voltmeter reading.

If no voltmeter reading is obtained, the wiring between the relay and horn is open or the horn is not grounded. If the voltmeter reading is less than 7.0 volts, the trouble is due to high resistance connections in the wiring or a faulty horn. If the reading is above 7.0 volts, the trouble is due to a faulty horn which should be replaced.

Horn Check

Check to insure current supply at the horn terminal and a good ground at the horn mounting screw. If the horn still fails to blow, hold the horn button down to energize horn. While energized, tap horn lightly. If the horn begins to blow, and can then be repeatedly blown normally without tapping, foreign material between the contacts caused the trouble and no adjustment is needed. If horn blows only when tapped, use pliers to slowly turn the serrated current adjustment screw 1/4 turn counter clockwise. If the horn is still inoperative or has poor tone, replace the horn.

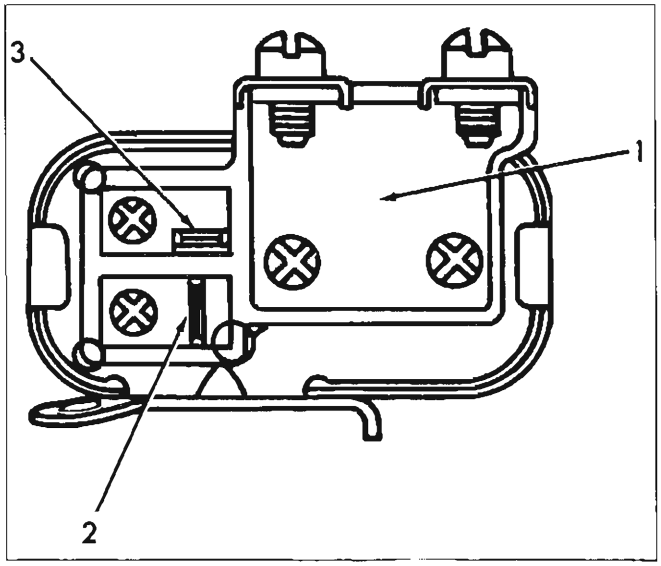

Fig. 59—Horn Relay Terminals

CAUTION: This adjustment is very sensitive. Do not turn screw more than 1/4 turn or in wrong direction. Misadjustment will require removing the horn for adjustment on bench.

WINDSHIELD WIPERS

The regular production, single-speed electric windshield wiper assembly incorporates a non-depressed type (blades park approximately 2″ above windshield moulding) motor and gear drive. Also, the wiper has a new direct drive 4 lobe cam system to actuate the washer pump. 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 shaft assembly. The crank arm is attached to the output gear shaft.

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

The optionally available 1964 model two-speed electric windshield wiper and washer assembly remains basically the same as 1961 models in construction and principle of operation. It differs in physical appearance from the 1961 models in that it has a 3 grommet type mounting instead of the 4 grommet type designed to fit a new mounting location at the driver side of the vehicle and also a new washer unit. Overhaul procedures are essentially the same as

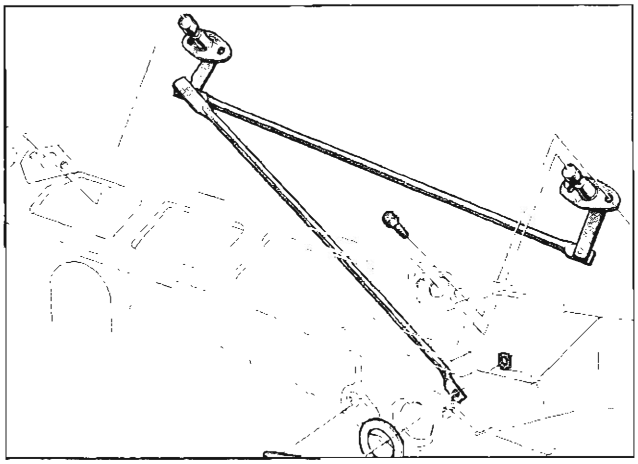

Fig. 60—Wiper Transmission Removal

described in the 1961 Chevrolet Passenger Car Shop Manual. Removal and installation procedures are the same as for the single-speed motor.

WIPER TRANSMISSION ASSEMBLY

Removal and Installation (fig. 60)

1. Make certain motor is in park position, remove wiper rod and blade assemblies from transmission shaft.
2. Remove plenum chamber ventilator grille.
3. Remove wiper motor and disconnect special clip retaining transmission drive arm to motor crank arm (Fig. 56). See Wiper Motor Removal.
4. Remove clip retaining left transmission drive link to right transmission.
5. Remove transmission retaining screws and lower transmission into plenum chamber.
6. Remove transmission and linkage from plenum chamber through cowl opening.
7. To install reverse removal procedure.

WIPER MOTOR ASSEMBLY

Removal and Installation (fig. 61)

1. Make certain motor is in parked position.
2. Remove washer hoses, if present, and all electrical connectors.
3. Remove three motor retaining bolts, remove motor from vehicle and detach clip retaining wiper transmission drive arm to motor crank arm.
4. To install, check sealing gaskets at motor and retaining bolts; replace as necessary. Then use reverse of above procedure to install motor.

   NOTE: Check wiper operation prior to installing chamber ventilator grille. Make sure motor is properly grounded.

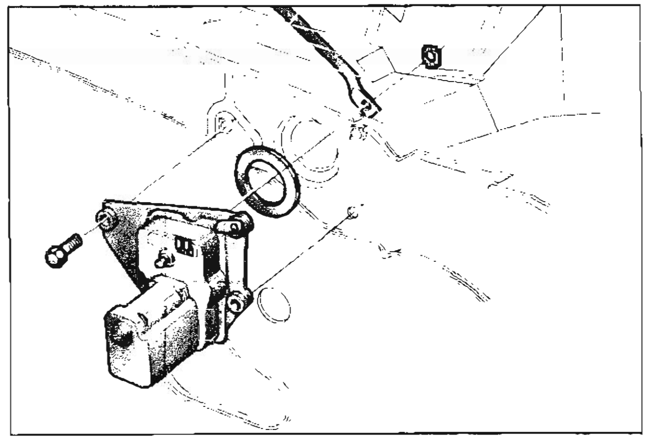

Fig. 61—Wiper Motor Removal

Gear Box Disassembly—Refer to Figure 62

1. For wipers equipped with a washer pump, remove the two washer pump mounting screws (fig. 63) and lift pump off washer.
2. Remove washer pump drive cam as required (fig. 64). The cam is pressed on the shaft but can be wedged off by using two screwdrivers between cam and plate.
3. Clamp crank arm in a vise and remove crank arm retaining nut.

   CAUTION: Failure to clamp crank arm may result in stripping wiper gears.

4. Remove crank arm, seal cap, Tru-Arc retaining ring, and end-play washers.

   NOTE: Seal cap should be cleaned and repacked with a water-proof type grease before reassembly.

5. Drill out gear box cover retaining rivets, remove cover from gear train.

   NOTE: Screws, nuts and lockwashers for reassembling cover to wiper are contained in a service repair package.

6. Remove output gear and shaft assembly, then slide intermediate gear and pinion assembly off shaft.
7. If necessary, remove terminal board and park switch assembly as follows:
   a. Unsolder motor leads from terminals. Coding of motor leads is not necessary on single-speed wipers.
   b. Drill out rivets securing terminal board and park switch ground strap to mounting plate.

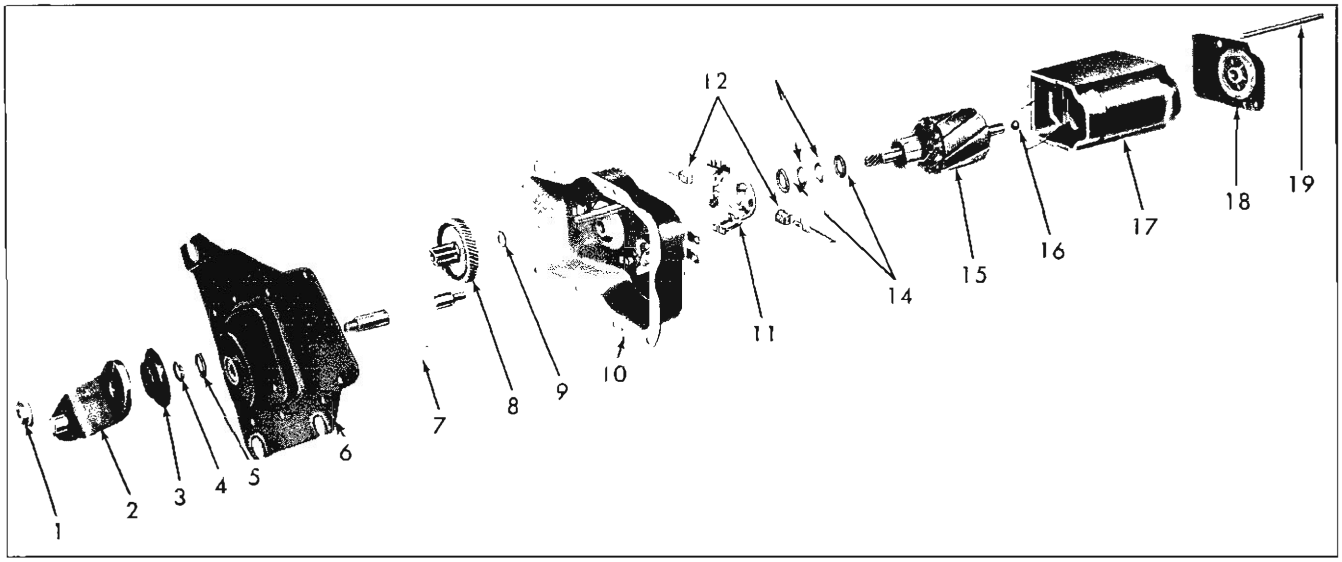

Fig. 62—Wiper Motor and Gear Box Exploded View—Assembly

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)

NOTE: Screws, nuts and washers for attaching a replacement terminal board-park switch assembly are included with the replacement assembly.

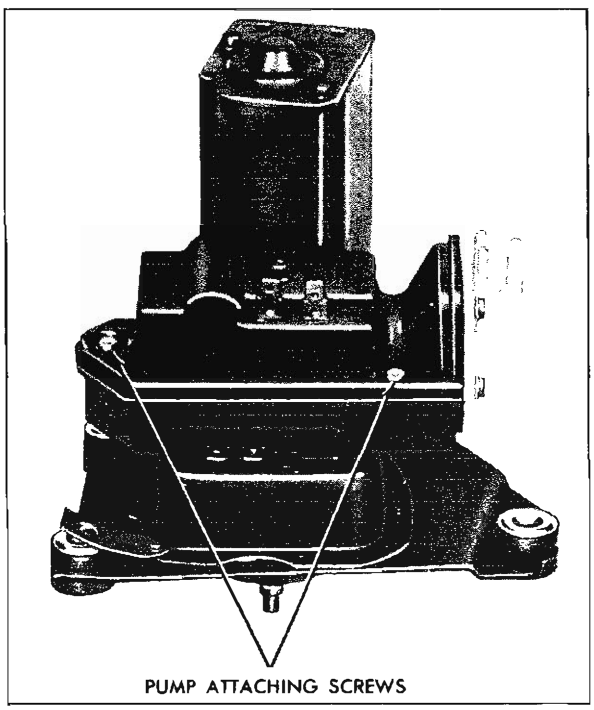

Fig. 63—Washer Pump Mounting Screws

Motor Disassembly—Refer to Figure 62

1. Follow Steps 1 thru 7b under gear box disassembly.
2. Remove motor thru bolts, tap motor frame lightly, and remove motor from mounting plate.
3. Release brush spring tension (fig. 65), slide armature and end plate from motor frame. Pull end plate from armature.

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

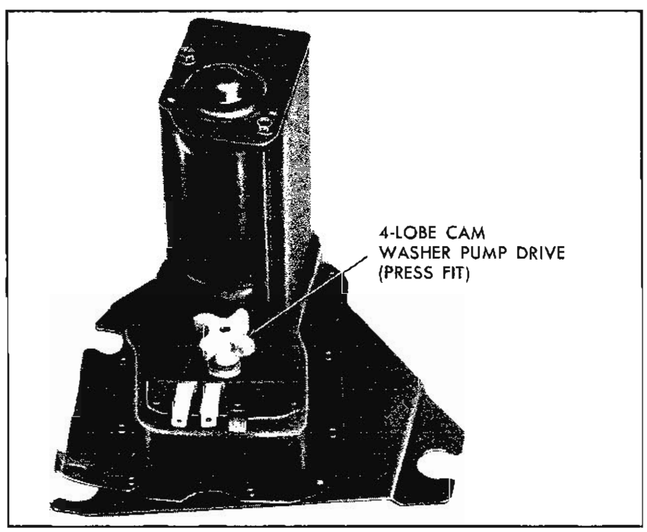

Fig. 64—Washer Pump Drive Cam

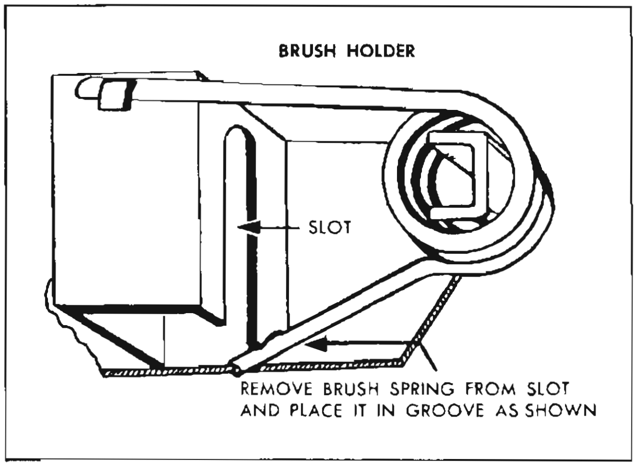

Fig. 65—Releasing Brush Spring Tension

4. 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

Refer to Figure 62 for exploded view of motor and gear train.

Reassemble motor using reverse of disassembly procedures.

> **NOTE: Armature end play is controlled by end play washers. See Figure 66 for proper assembly of end play washers. Lubricate armature shaft bushings with light machine oil.**

Assemble gear box using reverse of disassembly procedure.

> **NOTE: Lubricate gear teeth with Delco Cam and Ball Bearing lubricant. Be sure cover is properly located over dowel pins and be sure to reinstall ground strap.**

1. Place wiper in park position and install crank arm output shaft, rotate crank so alignment marks line up with those on cover (fig. 67).
2. Replace retaining nut, place crank arm in vise, tighten retaining nut.

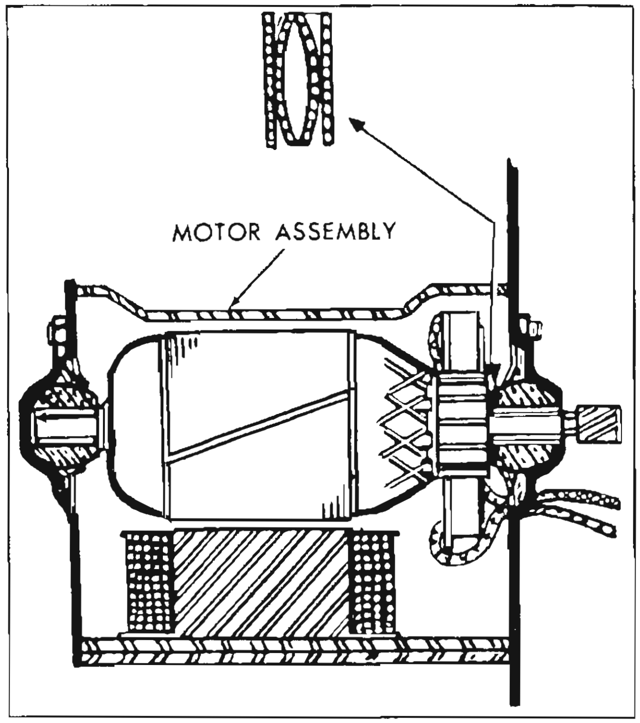

Fig. 66—End Play Wave Washer Installation

WINDSHIELD WASHERS

SINGLE SPEED WIPER

The windshield washer pump used on the one speed wiper motor differs considerably in appearance from the 1961 integral type pump, but the basic pumping

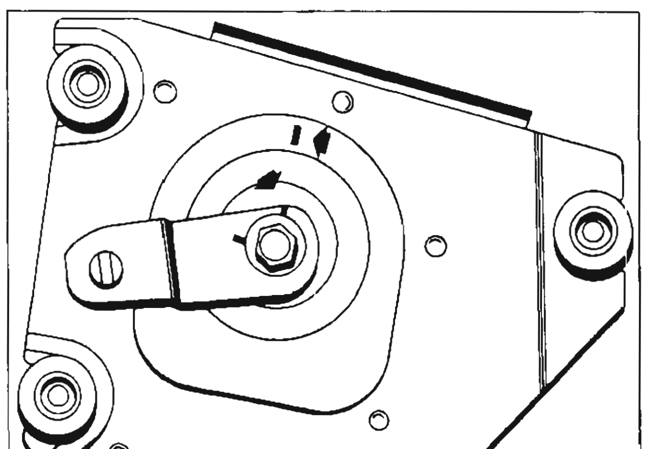

Fig. 67—Wiper Crank Arm in Park Position

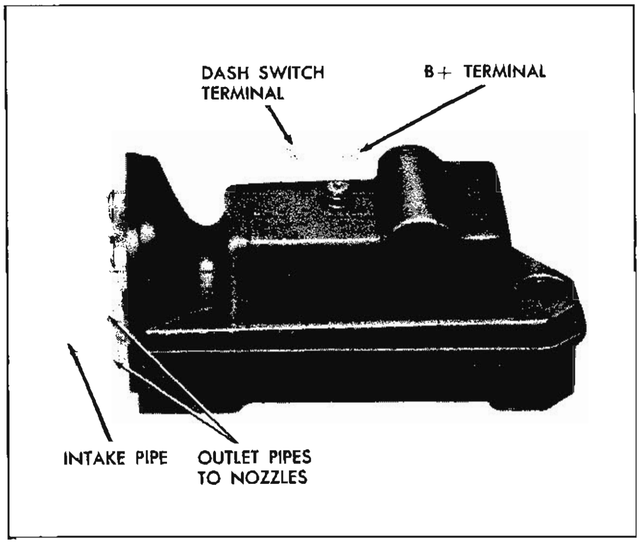

Fig. 68—Washer Pump

action and valve arrangement remain the same (fig. 68). As with the 1961 pump, the new model is a positive displacement type pump employing a small bellows, bellows spring and valve arrangement. The pumping mechanism is actuated by a four lobe cam driven directly by the wiper motor (fig. 69). Thus, when the wiper is operated, this rotor cam is always turning with the gear.

Removal and Installation

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

1. Disconnect wiring harness and washer hoses from washer.

   NOTE: Mark washer hoses for correct identification.

2. Remove the two pump-to-wiper retaining screws, remove washer from wiper (fig. 63).
3. Reverse removal procedure to install assembly.

Disassembly—Assembly—Refer to Figure 70

1. Remove washer pump cover.
2. 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.

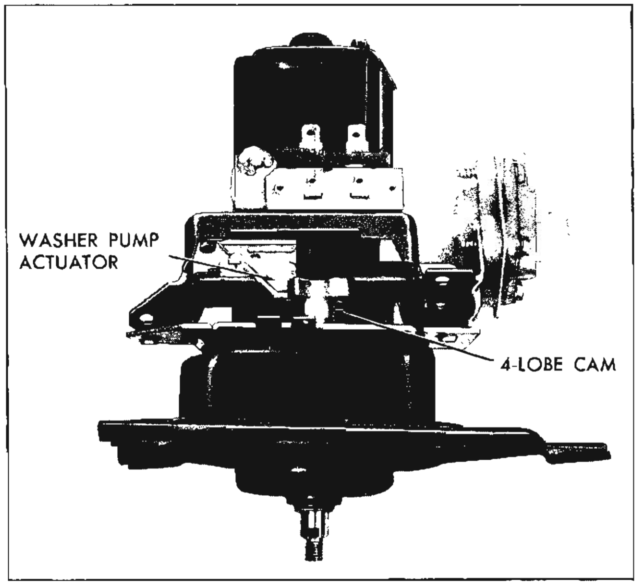

Fig. 69—Washer Pump Cam Drive System

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

   b. Remove "E" ring and slide ratchet pawl off shaft.
4. Valve Assembly
   a. To remove valve assembly remove four screws that secure valve assembly to bellows housing.

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

5. Bellows
   a. To remove bellows first remove valve assembly.
   b. Manually operate pump clockwise to release pump from "lock-out" position (fig. 71).

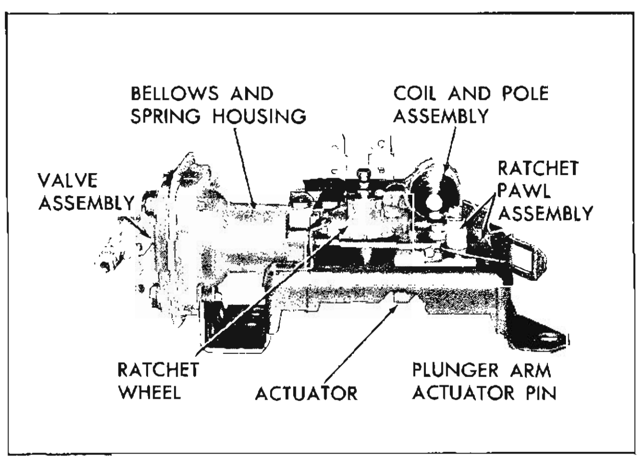

Fig. 70—Washer Pump Mechanism

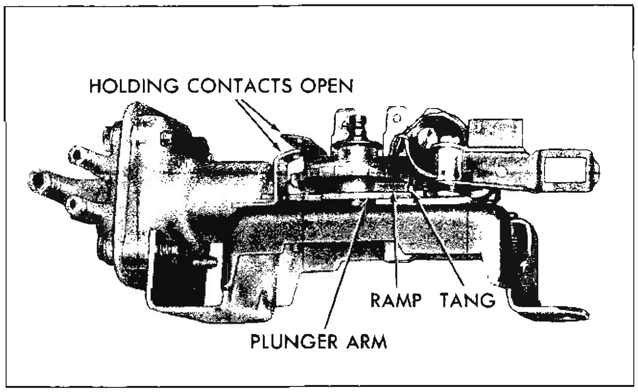

Fig. 71—Releasing Pump From Lockout Position

c. Hold bellows plunger arm from moving, then push in against bottom of bellows with thumb and twist bellows 90° to remove bellows and bellows spring from housing.

6. Reverse above procedure to assemble washer.

TWO SPEED WIPER

The optionally available two speed wiper incorporates a new design washer pump (fig. 72). The washer pump and/or valve assembly may be removed from the wiper assembly as a unit; therefore, it is not necessary to remove the wiper assembly from the vehicle if only the washer pump and/or valve assembly requires service.

When the pump is removed from the wiper assembly, all working parts are readily accessible and may easily be serviced as required. An exploded view of the washer pump is shown in Figure 73 for reference during disassembly and assembly.

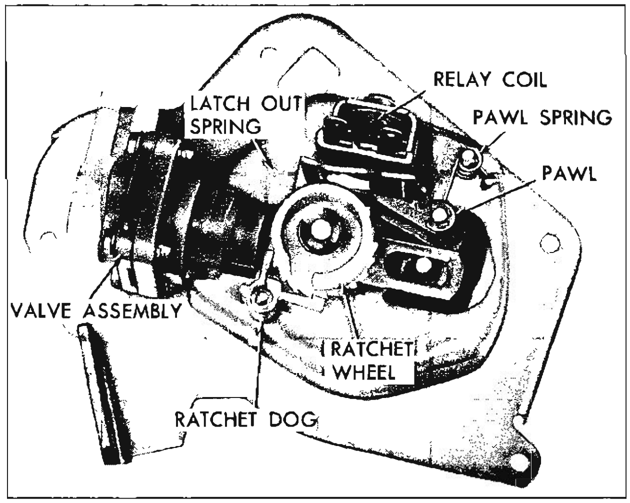

Fig. 72—Washer Pump Assembly

1. Raise vehicle hood.
2. Disconnect washer hoses and electrical connections from assembly.
3. Remove four screws securing washer pump and cover to wiper assembly. Remove pump from wiper gear box.
4. Install new washer pump and cover assembly so that slot in the washer pump cam fits over the pin on the wiper unit drive plate.
5. Install the washer pump to gear box retaining screws.
6. Connect washer hoses to valve assembly and wiring leads to pump and wiper terminals.
7. Check operation of unit.

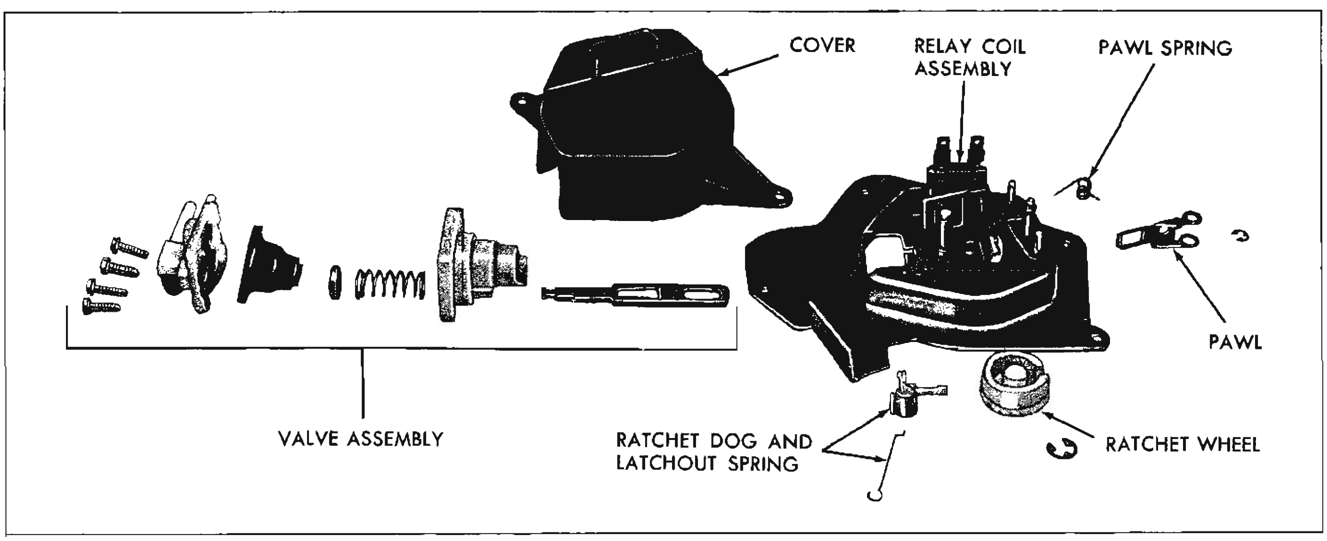

Fig. 73—Exploded View Washer Pump Unit

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 deenergize 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. Inspect condition of wiper blades and arm tension when complaint of this type occurs.

<table>
<tr><th rowspan="2">Problem</th><th colspan="2">What To Look For</th></tr>
<tr><th>Wiper Installed In Car</th><th>Wiper Detached</th></tr>
<tr><td>A. Wiper Inoperative

IMPORTANT: Ignition switch must be on to make electrical tests.</td><td>1. Check the following:
(1) Car wiring harness is properly attached to wiper terminals and dash switch.
(2) Wiper ground strap properly connected to wiper and car body.
(3) Dash switch is mounted securely in dash.
(4) Check fuse.
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 75. No voltage indicates defective car wiring.
CAUTION: DO NOT connect hot line to No. 1 Terminal.
3. Connect 12 volt supply to No. 2 wiper terminal and connect a jumper wire from terminal No. 1 to ground (fig. 75). 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.</td><td>—Current Draw—0
1. Check solder connection at terminal board.
2. Disassemble motor section and check all splice connections (fig. 74).

—Current Draw—1-1.5 amps
1. Disassemble motor and check for the following items:
a. Open armature.
b. Brushes sticking.
c. Brush springs improperly positioned (See fig. 65).
d. Loose or frayed brush pigtail connections at splice joints (fig. 74).

—Current Draw—10-12 Amps.
1. Check for open shunt field circuit.
2. Check for broken gear.</td></tr>
<tr><td>B. Wiper Will Not Shut Off</td><td>1. Disconnect wiring from dash switch. If wiper shuts off, a defective dash switch is indicated.
2. If wiper still operates in Step 1, disconnect wiring from wiper and connect 12 volt supply direct to wiper terminal No. 2 (fig. 75).
DO NOT connect any jumper wire to terminal No. 1.
—Wiper shuts off correctly—check for grounded lead that extends between wiper terminal No. 1 and dash switch.
—Wiper fails to shut off—remove wiper from car and follow instructions under "Trouble Shooting Wiper Detached."</td><td>Wiper crank arm fails to stop in park position when jumper wire is removed from wiper Terminal No. 1, Figure 75.
1. Check that park switch contacts are opening.
2. Check for grounded condition in the internal motor lead that connects to terminal No. 1, Figure 75.</td></tr>
<tr><td>C. Intermittent Operation</td><td>1. Check the following: Loose ground strap, loose dash switch mounting, loose connection.</td><td>1. Check for sticking brushes, loose splice joints, etc.</td></tr>
<tr><td>D. Blades Do Not Return To Park Position When Wiper Is Turned Off</td><td>1. Check wiper ground strap connection to car body.
2. Remove wiper from car and check for a dirty or broken park switch.</td><td>1. Check for dirty, bent or broken park switch contacts.</td></tr>
</table>

Problem	What To Look For
E. Wiper Runs Slow Vibrates and Current Draw Approx. 7-9 Amps.	1. Check for binds in gear train. 2. Check for shorted armature. (Armature may be checked on a growler.)
F. Wiper Shuts off Before Crank Arm Reaches Park Position	Wiper crank arm stops rotating immediately when jumper wire is disconnected from wiper terminal No. 1 (fig. 75). **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. 67).** 1. Check for dirty, broken or bent part switch contacts.

WASHER PUMPS

	Washer Pump on Car	Washer Pump Detached
A. Washer Inoperative	1. Check the following items: (1) Jar has adequate quantity of water solution. (2) Hoses are not damaged and hose connections are tight. (3) Screen at end of jar cover hose is not plugged. (4) Electrical connections to washer pump and dash switch. (5) Nozzles are not plugged. 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. 78). No voltage indicates defective wiring. If "click" is heard, proceed to step 4. 3. If correct voltage was found in step No. 2, connect a jumper wire from terminal No. 1 to ground (fig. 78) 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. 4. If relay "click" is heard in Step 2, listen for the soft clicking as the pump ratchet wheel is rotated. —If "soft clicking" is not heard, the pump mechanism is faulty and should be removed from the wiper motor and checked. —If soft clicking is heard but no pumping action occurs, replace the valve assembly and recheck pump. 5. Check for proper gear engagement. Check to see that cam gear teeth are not damaged.	Check Pump Operation as Follows: 1. Remove washer pump cover and connect 12 volt power supply to washer pump as shown in Figure 77. Connect jumper wire from terminal No. 1 to ground. Turn ratchet pawl to the position shown in Figure 78. Ratchet pawl should be pulled toward relay pole and engage ratchet teeth. Failure to do as described above indicates an open relay coil. 2. If relay and ratchet pawl perform correctly in Step 1, manually actuate the slide and ratchet pawl to turn the ratchet wheel one tooth. Observe if relay holding contacts close (fig. 76) and the pump plunger arm is released from its lock-out position. (Figure 71 shows plunger arm in lock-out position.) 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. 4. If pump performs correctly in Step 3, continue to manually actuate the slide and ratchet pawl 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. 71). Check Valve Assembly as follows: 1. Attach a hose to the large or intake pipe. You should be able to blow through it but not draw through it. 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.
B. Washer Pump Will Not Shut Off	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 broke broken or misaligned.	

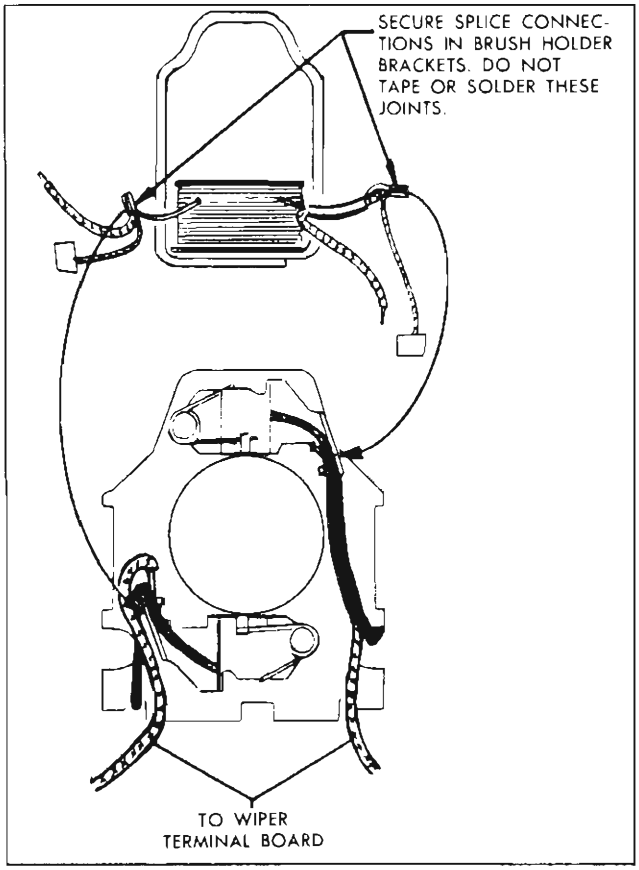

Fig. 74—Cleaning Motor Splice Connections

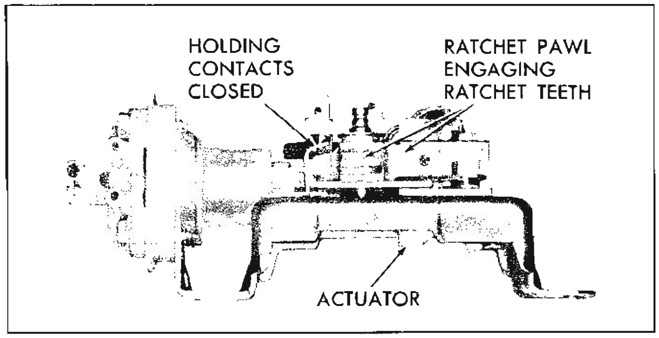

Fig. 76—Washer Holding Contacts Closed

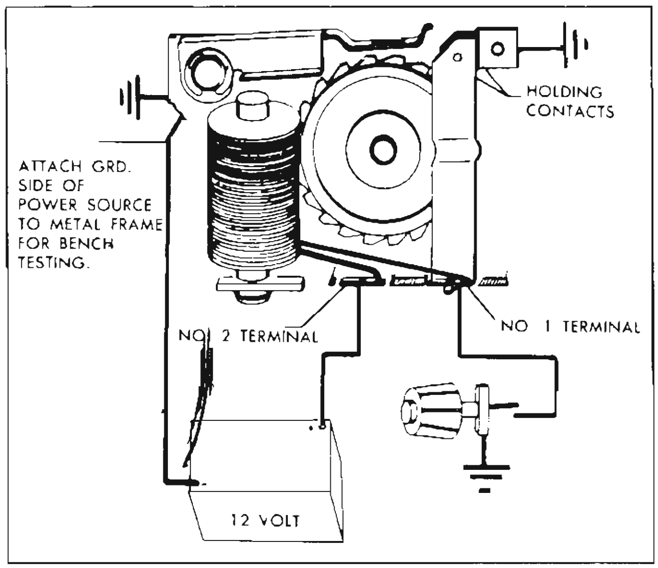

Fig. 77—Bench Checking Pump Operations

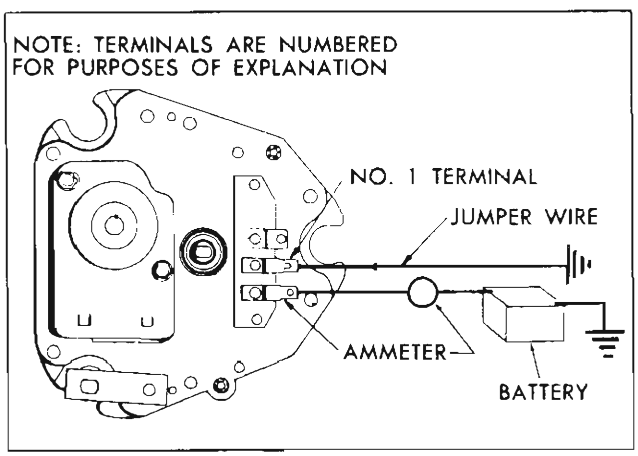

Fig. 75—Checking Single Speed Wiper Circuit

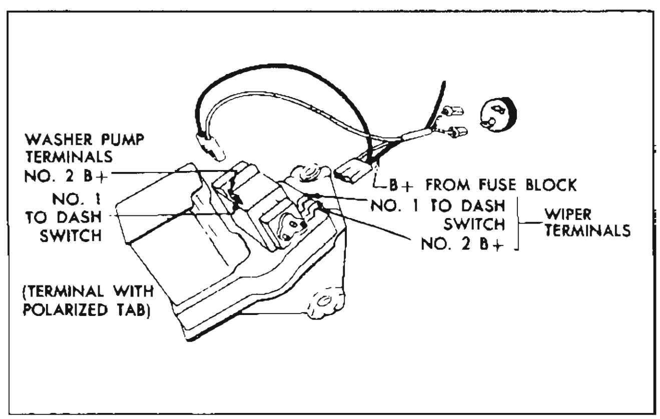

Fig. 78—Checking Washer Operating Voltage

INSTRUMENTS AND GAUGES

Problem:	Check	Possible Trouble
Green Light		
a. Ignition switch in run position – bulb stays on after warm-up.	1. Disconnect sender lead wire, bulb stays on–	Short in sender lead wire.
	2. Disconnect sender lead wire, bulb goes off.	Defective sender unit.
b. Ignition switch off–bulb lights.	1. Check continuity between ignition switch battery terminal and gauge lead terminal–should have no reading with switch off.	Defective ignition switch.
c. Ignition switch in run position – bulb does not light.	1. Engine temperature above 110°.	Normal condition.
	2. Remove and check bulb – should light.	Bulb defective.
	3. Engine cold, bulb checked good–ground lead at sender unit – bulb should light.	Sender unit defective.
	4. Engine cold, bulb checked good, ground lead at sender unit, bulb stays off.	Open in sender unit lead wire.
Red Light		
a. Ignition switch in start position–bulb lights.	Normal testing procedure to check	bulb operation–bulbs should light.
b. Ignition switch in start position – bulb does not light.	1. Remove and check bulb.	Bulb defective.
	2. Disconnect and ground lead at sender unit–bulb should light.	Poor ignition switch ground or defective switch.
c. Ignition switch in run position – bulb stays on.	1. Check and repair engine cooling system as necessary.	Engine overheated.
	2. Disconnect sender and ignition lead wires–bulb stays on.	Short in wiring.
	3. Engine temp normal – disconnect sender unit lead wire – light goes off.	Sender unit defective.
	4. Engine temp normal – lead wires check good – disconnect sender lead wire – light stays on.	Defective ignition switch.

DIRECTIONAL SIGNAL

Problem	Possible Trouble
When signalling a turn, the indicator light comes on but does not flash.	1. Check for burned out parking or tail lamp on that side. 2. Check for the wrong flasher (3-bulb instead of 2-bulb flasher).
When signalling a turn either 1. Both turn indicators come on and stay on. 2. Neither turn indicator comes on. 3. In either case no "clicking" is heard.	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.
When signalling a turn, a "clicking" is heard but the indicator light does not flash.	Replace the indicator bulb.
When signalling a turn, the indicator light operation is very rapid.	Check for the wrong flasher.
Turn signal will not cancel.	Remove steering wheel and check for broken cancelling pawl.
Flashing and cancelling of lights is erratic.	This condition usually results from the turn signal switch being faulty. 1. Check switch-to-chassis wiring harness connection for loose or damaged connection. 2. Remove steering wheel, cancelling pawl, and inspect switch for defective parts.

SPECIFICATIONS

ENGINE ELECTRICAL

BATTERY MODEL	1980458 OR 1983502	1980554 OR 1983504	1980558 OR 1983506	1980568 OR 1983508
Application	Deluxe and Custom Air Cond.	230 L-6 283 V-8	327 V-8 409 V-8	Optional
Ground	Neg.	Neg.	Neg.	Neg.
Plates	54	54	66	66
Capacity (20 Hour Rate)	53	44	61	70

GENERATOR MODEL	1100668	1100669	1100665	1117765	1100684
Application	All Models (Base)	Optional	Deluxe Cool Pack, All Weather A/C and Optional	Optional	Optional
Field Amp. Draw	1.9-2.3	1.9-2.3	1.9-2.3	3.7-4.4	2.8-3.2
Cold Output—Amps.	37	42	55	62	60
Cold Output—Volts	14	14	14	14	14

REGULATOR MODEL	1119515	9000595	1116366*
Application	All except with Gen. 1117765 & 1100648	With Gen. 1117765 only	With Gen. 1100684 only
Field Relay:			
Air Gap	.015	.015	.011-.018
Point Opening	.030	.027	.020-.030
Closing Voltage	2.3-3.7	2.3-3.7	2.5-3.5
Voltage Regulator:			
Air Gap	.067	.075	—
Point Opening	.014	—	—
Voltage Setting	13.8-14.8 @ 85° F.	13.8-14.8 @ 85° F.	13.7-14.4 @ 85° F. 0″ position of adjusting screw

*Full Transistor Regulator uses Field & Light Relay #1115827.

CRANKING MOTOR MODEL		1107259	1107260	1107247	1107320	1107289
Application		230 L-6 3-Speed	230 L-6 Powerglide	283 V-8	327 V-8	409 V-8
Brush Spring Tension, oz.		40	35	35	35	35
Free Speed:	Volts	10.6	10.6	10.6	10.6	10.6
	Amperes	49-76*	49-76*	49-76*	65-100*	65-100
	RPM	6200-9400	6200-9400	6200-9400	3600-5100	3600-5100
Resistance Test Armature Locked:	Volts	4.3	4.3	4.3	3.5	2
	Amperes	270-310*	270-310*	270-310*	300-360*	290-370*

ENGINE ELECTRICAL

DISTRIBUTOR	**1110280**	**1111015**	**1111016**	**1111023**
Application	230 L-6	283 V-8	327 V-8	409 V-8
Cam Angle	31°-34°	28°-32°	28°-32°	28°-32°
Centrifugal Advance Engine Degrees @ Engine RPM	0° @ 800 rpm	0° @ 800 rpm	0° @ 700 rpm	0° @ 700 rpm
	10° @ 1200 rpm	7° @ 1200 rpm	11° @ 1600 rpm	11° @ 1600 rpm
	15° @ 1500 rpm	20° @ 2400 rpm	24° @ 4600 rpm	24° @ 4600 rpm
	30° @ 3000 rpm	30° @ 4000 rpm	—	—
Vacuum Advance (In Engine degrees)	0° @ 6″	0° @ 8″	0° @ 8″	0° @ 8″
	23° @ 12″	15° @ 15.5″	15° @ 15.5″	15° @ 15.5″

IGNITION COIL		**1115184**	**1115115**	**1115083**	**1115107**
Application		All L-6	283 & 327 V-8	409 V-8 Hyd. Cam	409 V-8 Mech. Cam
Resistance	Primary—ohms	1.45-1163	1.28-1.42	1.28-1.42	1.03-1.13
	Secondary—ohms	56-6900	7200-9500	7200-9500	8000-10,500
	Ignition Resistor	In Wiring Harness			Ballast Type
	Resistance at 80° F.	1.8 ohms			

SPARK PLUGS					
Application		230 L-6	283 V-8	327 V-8	409 V-8
Make and Number	Standard	AC-46N	AC-45	AC-44	AC-43N
	Colder	AC-44N	AC-44	AC-43	AC-C42N
	Hotter	—	—	AC-45	AC-44N
GAP			.035″		

BODY AND CHASSIS ELECTRICAL

Bulbs	Candle-power	Number
Headlamp Unit (Sealed Beam)		
Outer—High Beam	37½ W	4002 L
Outer—Low Beam	55 W	4001 L
Inner—High Beam Only	37½ W	4001
Parking Lamp and Front Directional Signal	4-32	1157
Tail and Stop and Rear Directional Signal Lamps	4-32	1157
Tail Lamp (Belair)	4	1155
Back-up Lamp	32	1156
Instrument Lamps	2	1895
Instrument Panel Compartment Lamp	2	1895
Seat Separator Console Lamp (Cartridge Type)		
Temperature Indicator Lamp	2	1895
Oil Pressure Indicator Lamp	2	1895
Generator Indicator Lamp	2	1895
Headlamp Hi-Beam Indicator Lamp	2	1895
Directional Signal Indicator Lamp	1	1445
Automatic Transmission Quadrant Lamp	1	1445
Ignition Lock Lamp	1	1445
Heater Control Panel Lamp	1	1445
Tachometer Lamp	1	1445
Dome Lamp	15	1004
Side Rail Lamp—Sport Coupe and Sport Sedan	6	90
Courtesy Lamp (Convertible) or Rear Quarter Lamp (9 Passenger Station Wagon)	6	631
Super Sports Console		
License Plate Lamp	4	1155
Radio Dial Lamp	2	1893
Clock Lamp	2	1895
Brake Alarm Lamp	2	257

Fuses and Circuit Breaker:

A 30 amp. Circuit Breaker in the light control switch protects the headlamp circuit, thus eliminating one fuse. Where current load is too heavy, the circuit breaker rapidly opens and closes, protecting the circuit until the cause is found and eliminated.

Fuses, located in the Junction Block beneath the dash, are:

Instrument and Clock Lights	3AC/AGC—3 amp.
Tail, Stop, Courtesy, Glove Box, License Plate, Dome Lights and Clock	3AC/AGC—15 amp.
Radio (Manual and Push Button)	3AG/AGC—2.5 amp.
Heater	3AG/AGC—10 amp.
Air Conditioning (including Heater)	SAE—20 amp.
Backup Light, Brake Signal Light	3AG/AGC—10 amp.
Spotlight	3AG/AGC—15 amp.

Overdrive Fuse—3AG/AGC-15. Located in wiring harness on engine side of the dash panel just forward of the instrument panel.

WIPER MOTOR

Single Speed:

Current Draw

Free Speed	3 amp. max.
Dry Windshield	3 amp. max.

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/OR	Black with Orange Stripe
B/P	Black with Pink Stripe
B/W	Black with White Stripe
B/Y	Black with Yellow Stripe
BRN	Brown
BRN/W	Brown with White Stripe
DBL	Dark Blue
DG	Dark Green
GY	Gray
LBL	Light Blue
P	Pink
PPL	Purple
PPL/W	Purple with White Stripe
OR	Orange
R	Red
T	Tan
T/W	Tan with White Stripe
W	White
W/OR/PPL	White with Orange and Purple Stripes (Resistance Wire)
W/R&B	White with Red and Black Stripes (Resistance Wire)
Y	Yellow

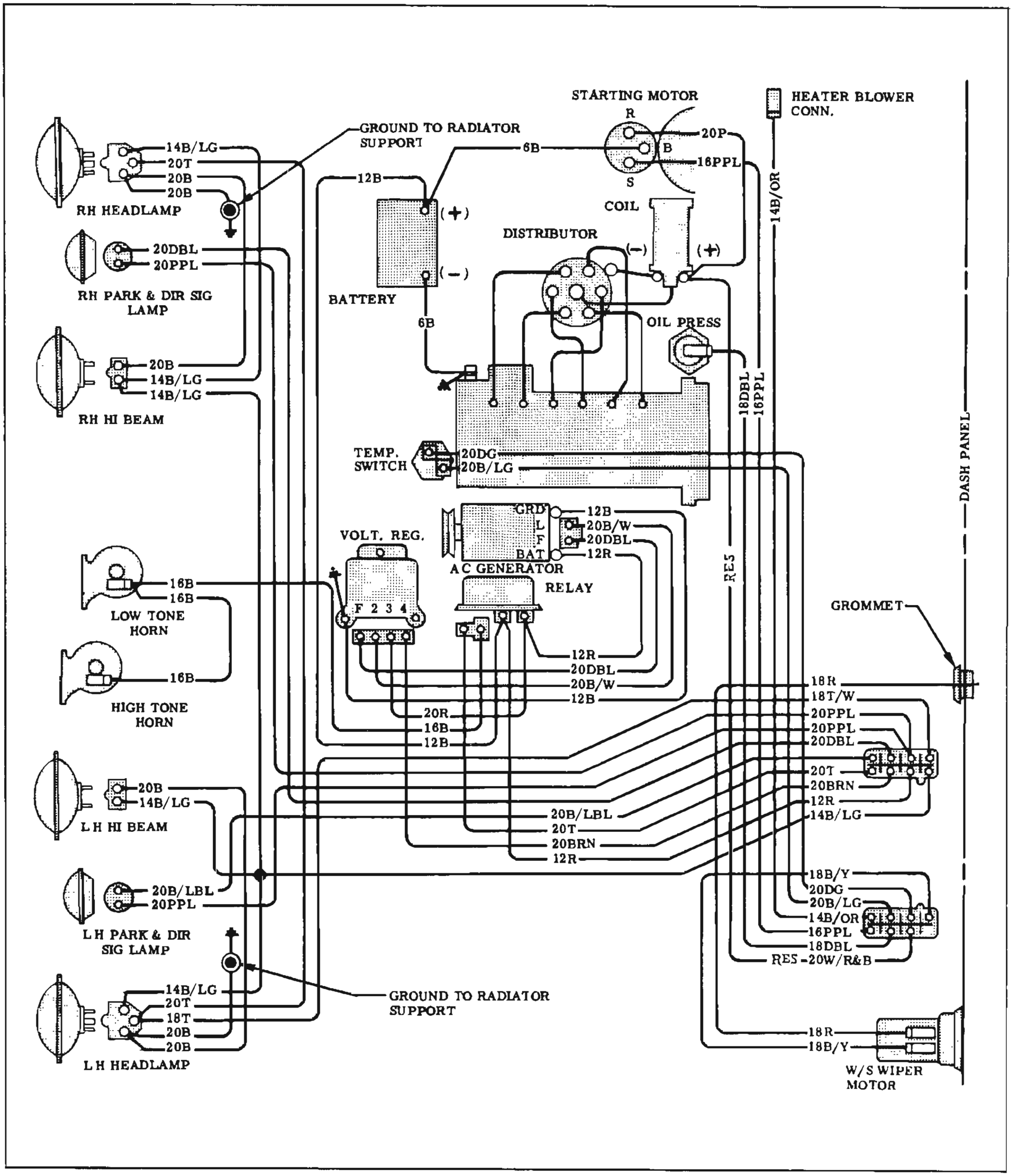

Fig. 79—L-6 Engine Compartment

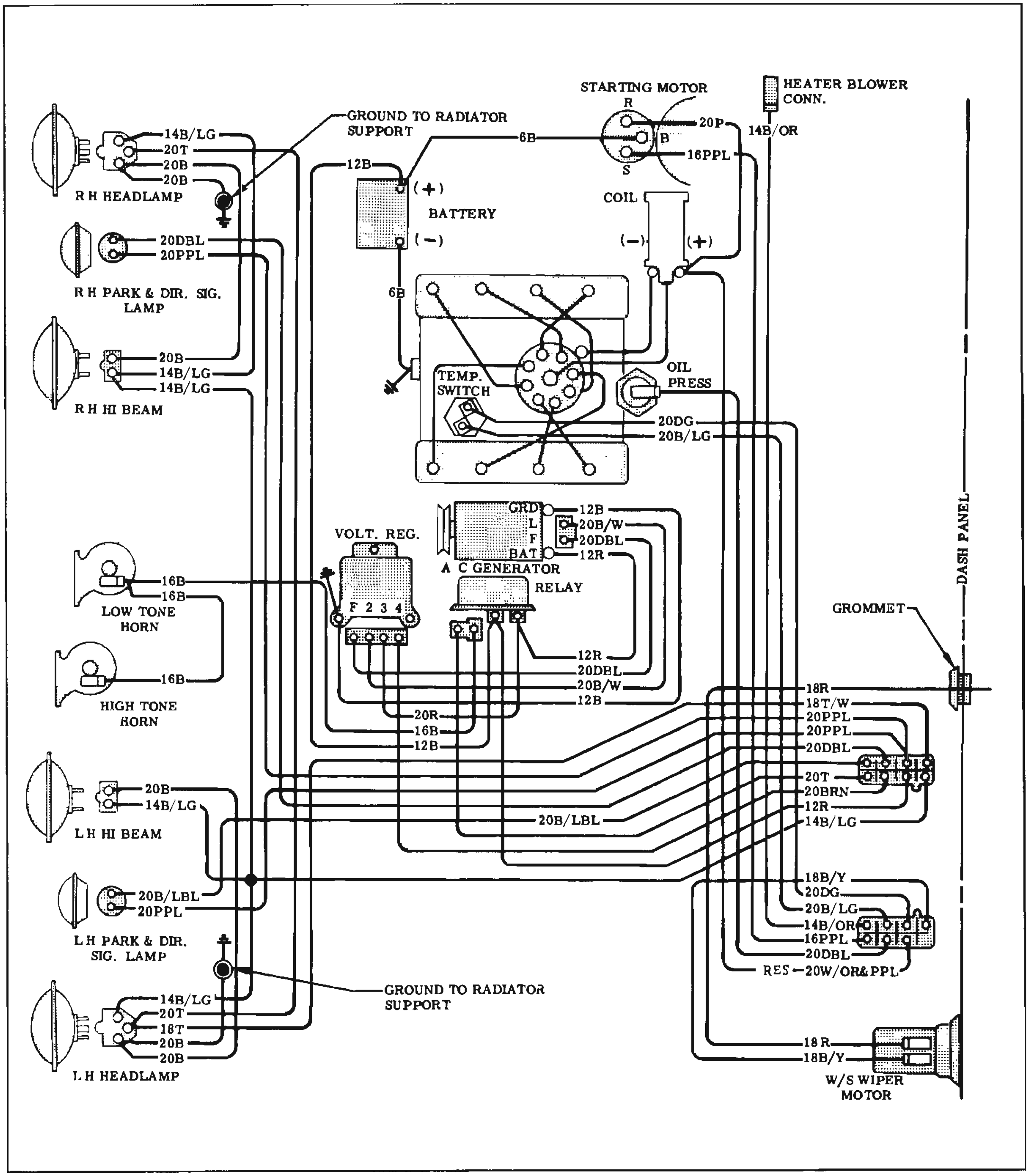

Fig. 80—V-8 Engine Compartment

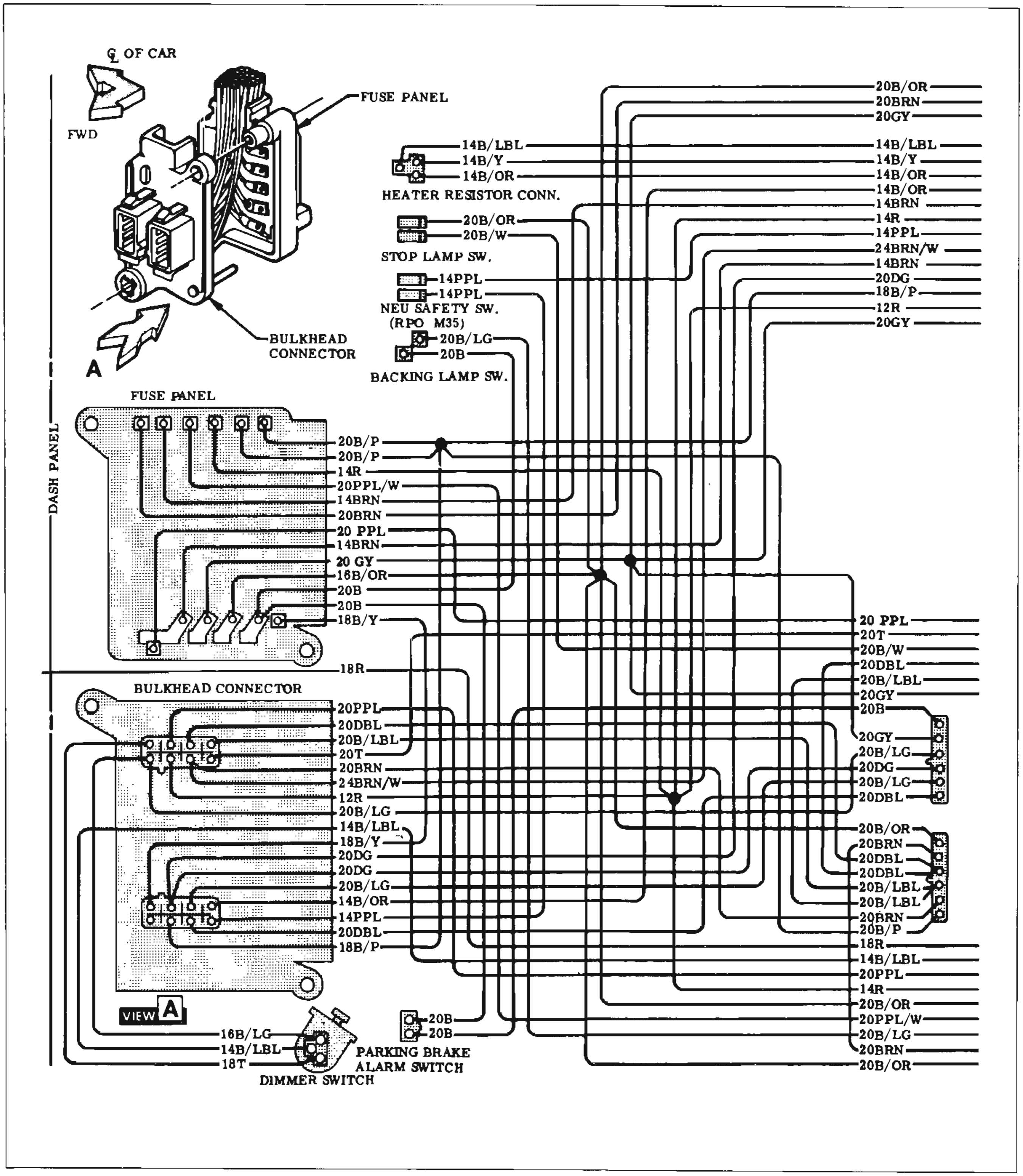

Fig. 81—Fuse Panel

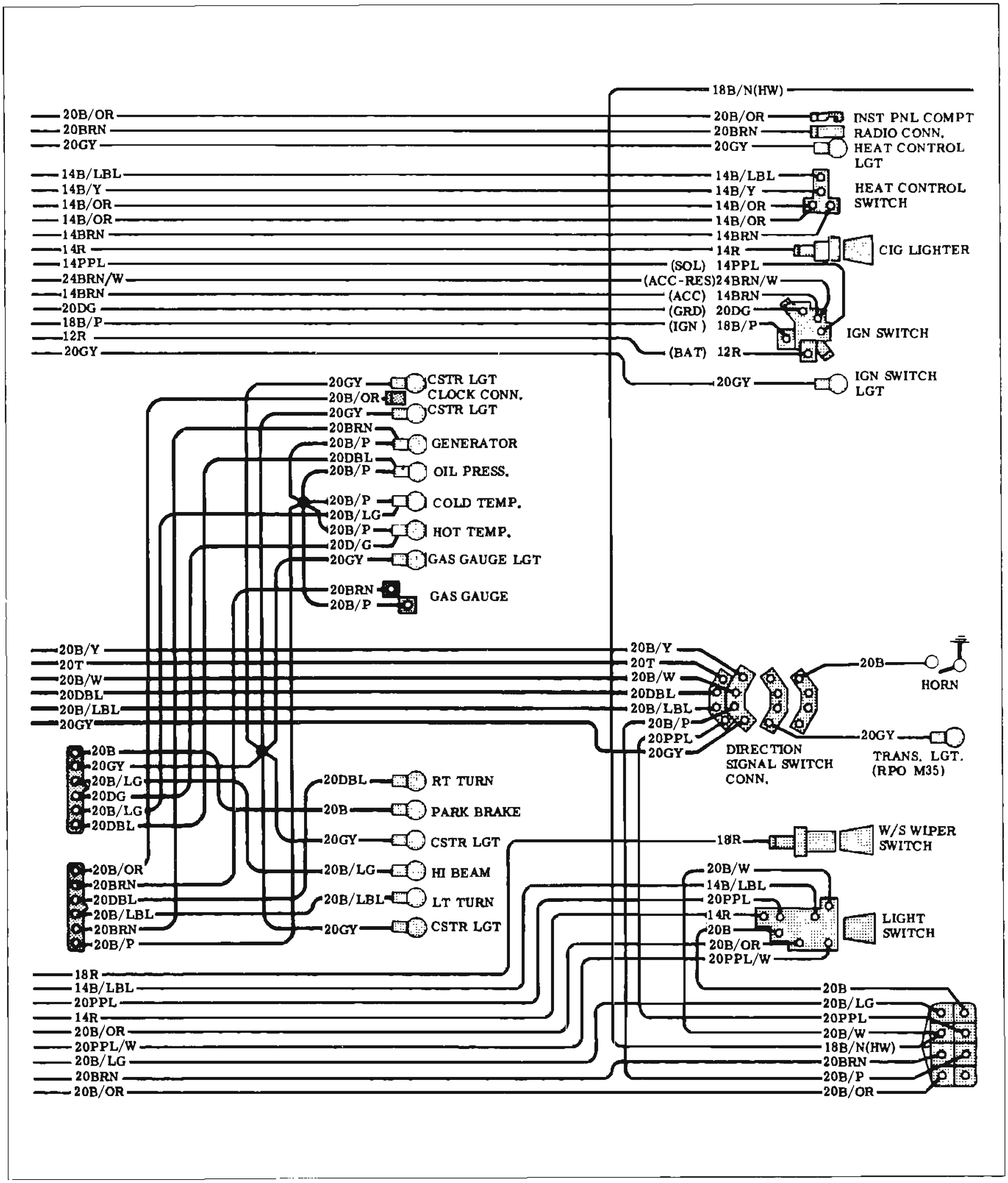

Fig. 82—Instrument Panel and Cluster

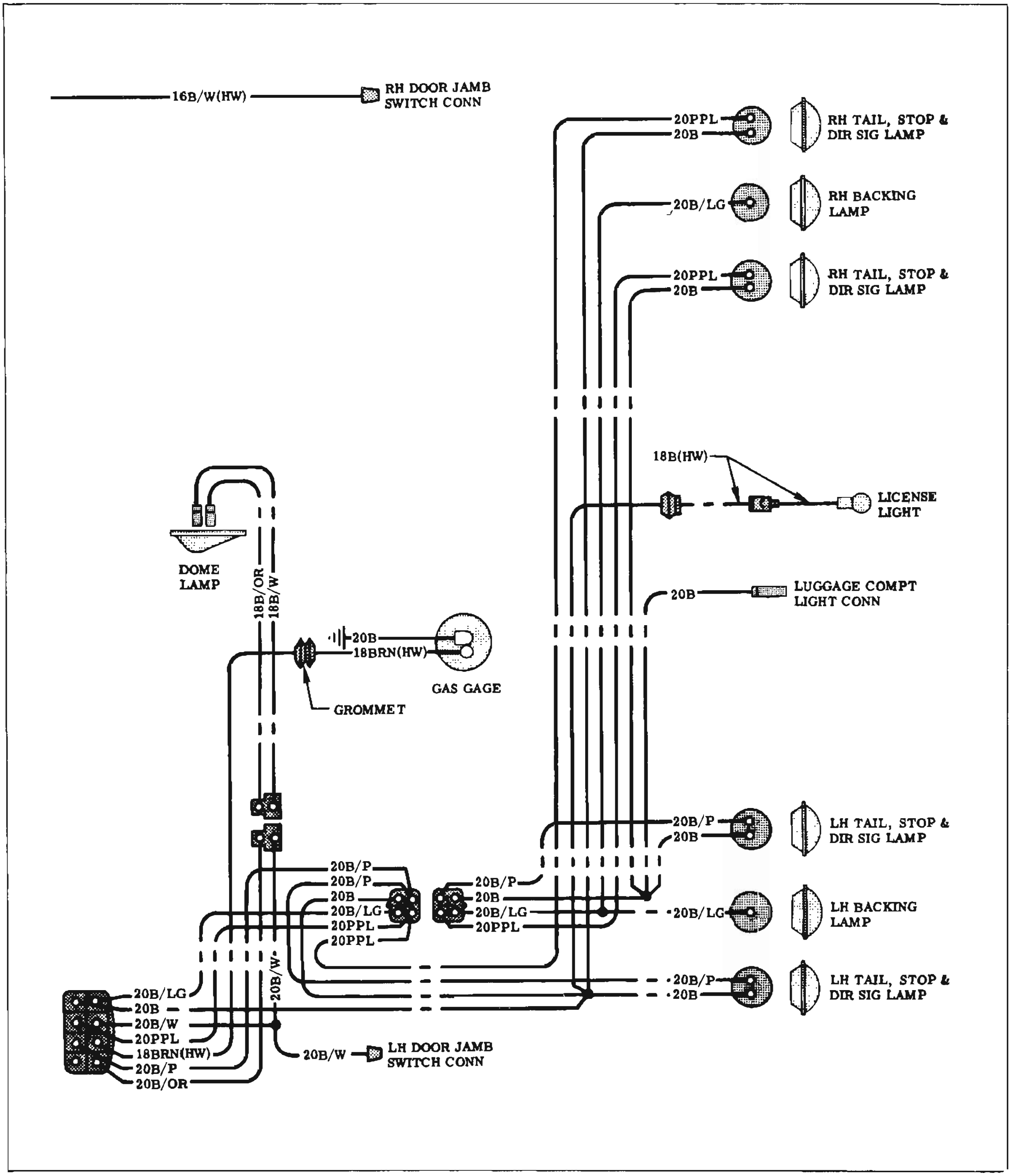

Fig. 83—Body and Rear End Lighting

SECTION 10

FUEL AND EXHAUST SYSTEMS

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ROCHESTER MODEL BV CARBURETORS

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GENERAL DESCRIPTION

The Rochester "BV" Carburetor (fig. 1) incorporates a new automatic choke arrangement (fig. 2). The temperature sensing choke coil is mounted in a cast depression on the exhaust manifold and provides ex-

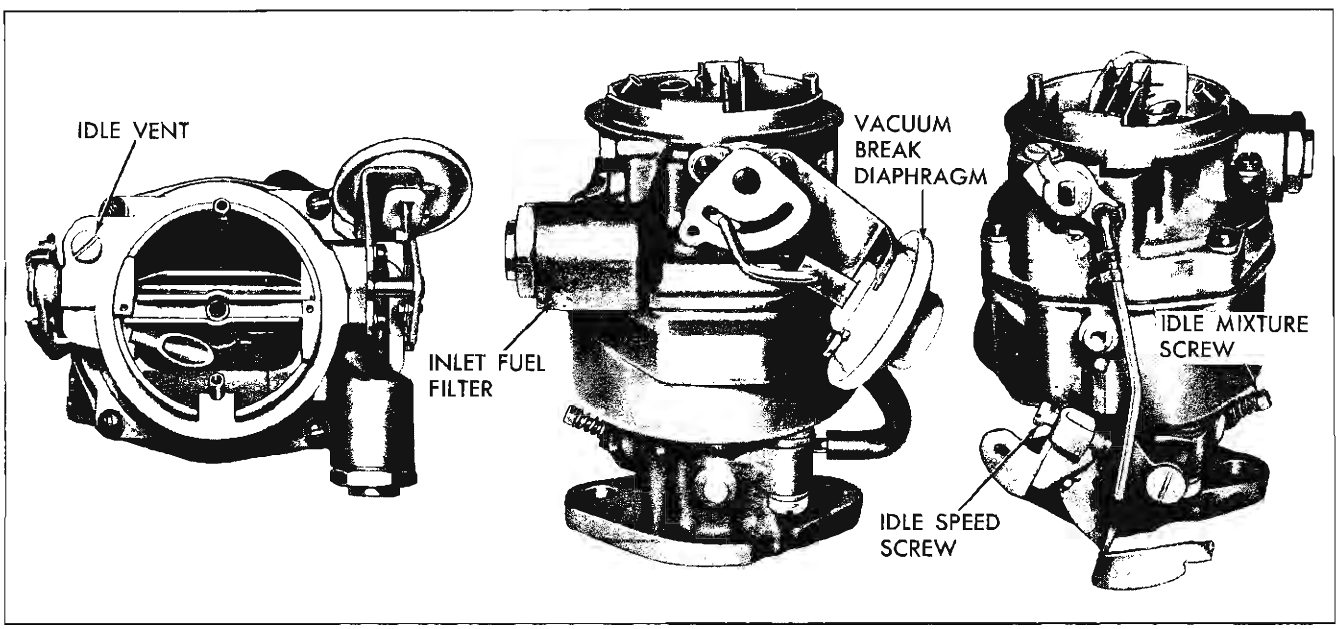

Fig. 1—Rochester BV Carburetor

cellent choke valve response thereby allowing accurate mixture proportions related to engine requirements. A vacuum diaphragm, mounted on the carburetor, acts as a choke valve break during engine warmup periods.

The spark advance on powerglide engine is full vacuum and also operates the transmission vacuum modulator. The synchromesh is partial vacuum and therefore to switch carburetors would affect transmission shaft pattern.

MAINTENANCE AND ADJUSTMENTS

THROTTLE LINKAGE ADJUSTMENT

1. Disconnect throttle rod swivel at bellcrank lever on manifold. (On Powerglide vehicles disconnect TV rod at bellcrank.)
2. Hold carburetor throttle valve in wide open position, pull throttle rod forward (to position accelerator pedal at the floor mat) and adjust swivel to just enter hole in bellcrank lever.
3. Connect swivel to bellcrank lever and install cotter pin.
4. On Powerglide vehicle hold throttle rod in full throttle position, push TV rod to full detent position and adjust swivel on TV rod to just enter hole on throttle bellcrank, then connect TV rod swivel at bellcrank.

IDLE SPEED AND MIXTURE ADJUSTMENT (Fig. 1)

This adjustment should be performed with engine at operating temperature and parking brake applied.

1. Disconnect spark advance at distributor and plug opening of tube.
2. Connect tachometer at coil.
3. Connect vacuum gauge to diaphragm hose adapter on base of carburetor (pry hose off with screw driver).
4. With engine running (choke wide open) adjust idle speed screw to bring idle speed to 475 rpm (Powerglide in drive, manual transmission in neutral).
5. Adjust idle mixture screw to obtain highest steady vacuum at idle speed.

   CAUTION: Do not turn idle mixture screw tightly against seat or damage may result.

6. Repeat Steps 4 and 5 as needed for final adjustment.

CHOKE ADJUSTMENT (Fig. 3)

AUTOMATIC CHOKE ADJUSTMENT

1. Remove air cleaner and disconnect choke rod from choke lever at carburetor.
2. Hold choke valve closed and pull choke rod up against stop in thermostat housing, while checking and adjusting rod length as follows:
   a. Nominal (Index) setting is provided when the bottom edge of the choke rod end aligns with the top edge of the hole in the choke lever (equivalent to one rod diameter above the hole).

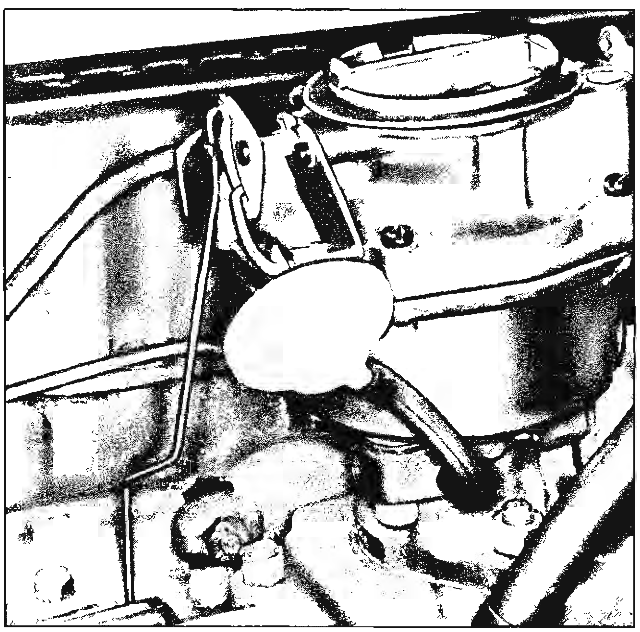

Fig. 2—Automatic Choke Arrangement

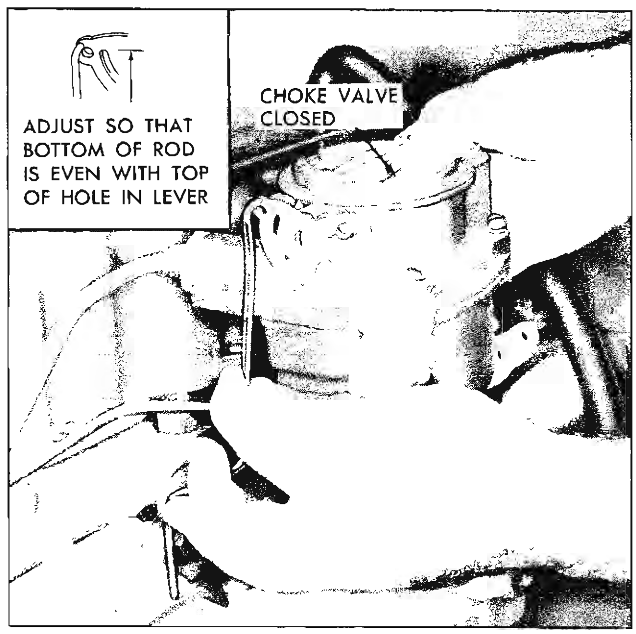

Fig. 3—Choke Adjustment

b. Leaner settings, if desired, can be made by bending the choke rod in the offset area to decrease rod effective length. At the maximum allowable lean setting, AT LEAST the upper quarter of the rod end should overlap the top edge of the lever hole.

NOTE: After making any change in choke rod length, check for free operation as interferences may exist at the manifold end of the rod. If a lean adjustment is made, make sure that it is possible for the choke valve to fully close at the new setting.

c. To adjust for a choke setting equivalent to "2 notches" rich, the choke rod should be bent at the rod offset area to effectively lengthen the rod and bring the rod end 2 rod diameters above the hole in the choke lever.

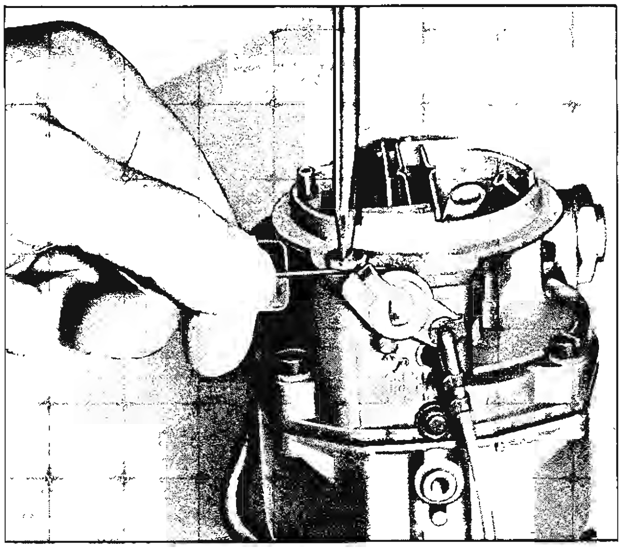

Fig. 4—Idle Vent Adjustment

IDLE VENT ADJUSTMENT (Fig. 4)

1. Remove air cleaner.
2. Place carburetor lever on low step of fast idle cam (regular idle position—choke valve open).
3. Measure clearance between valve and casting using Tool J-21216 (.050").
4. If necessary, adjust by turning valve in required direction with a screwdriver.
5. Install air cleaner.

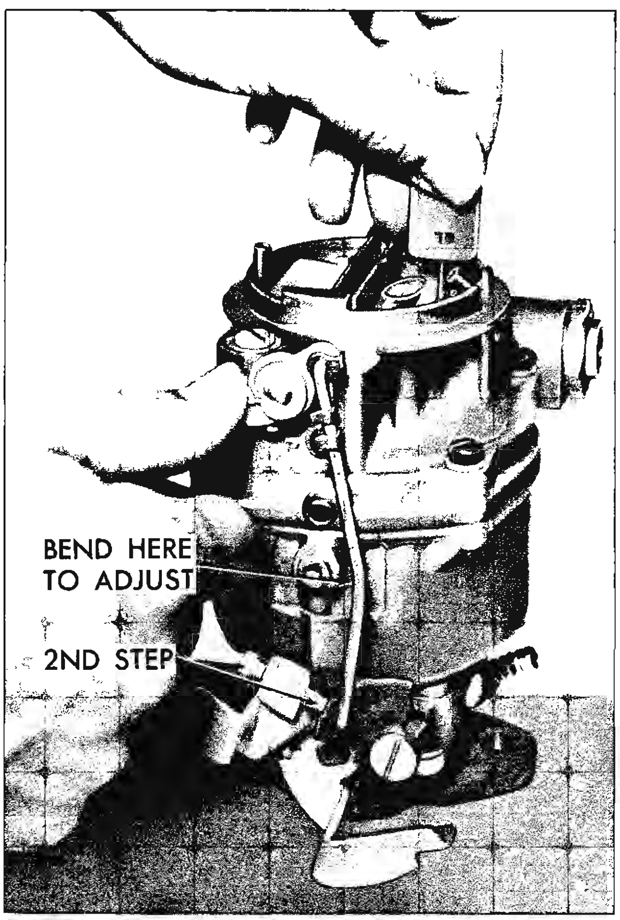

Fig. 5—Fast Idle Rod Adjustment

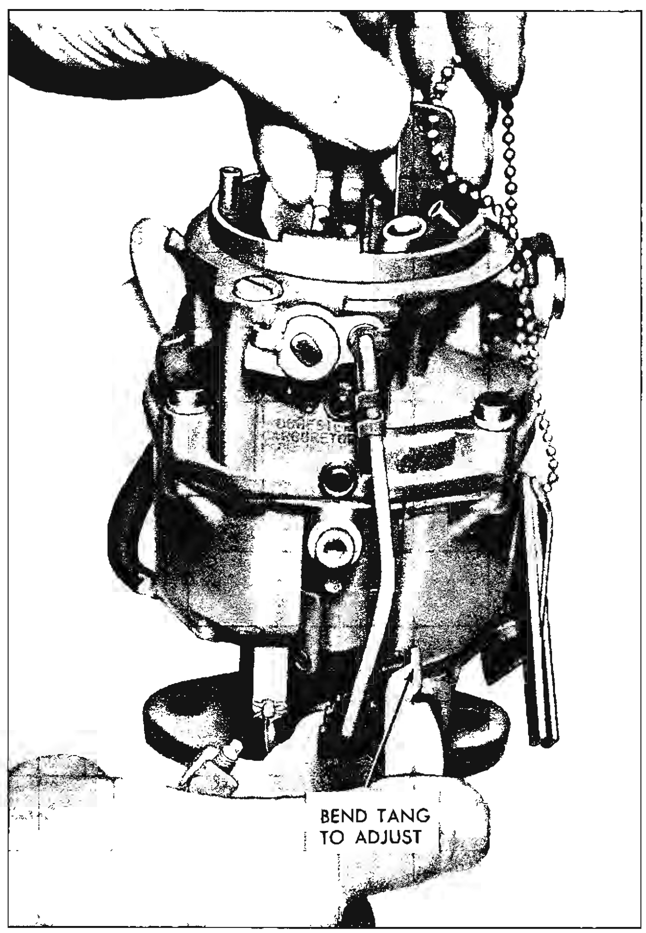

Fig. 6—Unloader Adjustment

FAST IDLE AND CHOKE VALVE RELATIONSHIP

The steps on the fast idle cam are correctly proportioned to give the correct speed steps above normal speed. It is necessary to have the correct relationship between the fast idle cam position and the choke valve position. To check and adjust this setting, proceed as follows:

1. Place end of idle adjusting screw on the next to highest step of the fast idle cam. Using Tool J-9580, see if .050 gauge slides easily (.070 gauge should not fit) between lower edge of choke valve and bore of carburetor (fig. 5).
2. If necessary, bend choke rod using Tool J-4552 until required clearance as measured in Step 1 is obtained.

UNLOADER ADJUSTMENT

1. Place throttle in wide open position.
2. Using Tool J-9580, see if small step of gauge .230/.270 slides freely between lower edge of choke valve and bore of carburetor (fig. 6).

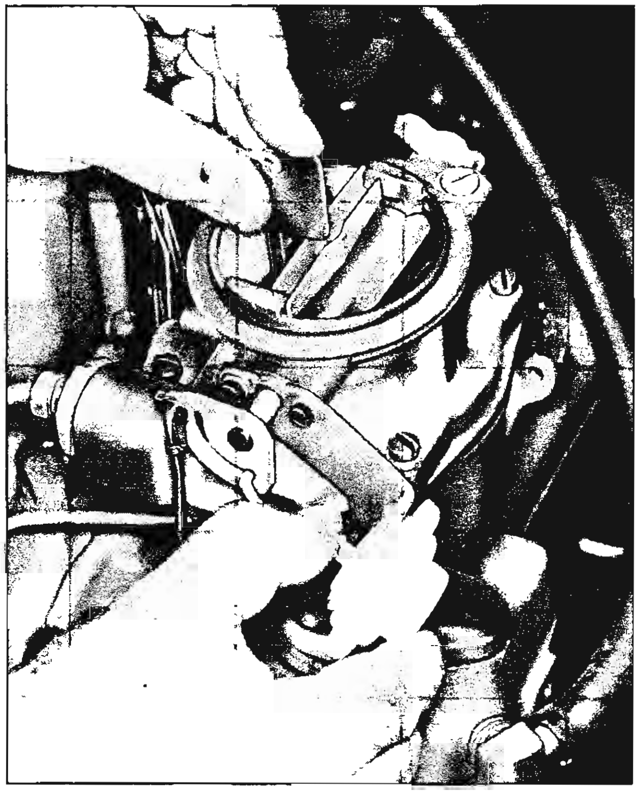

Fig. 7—Vacuum Break Adjustment

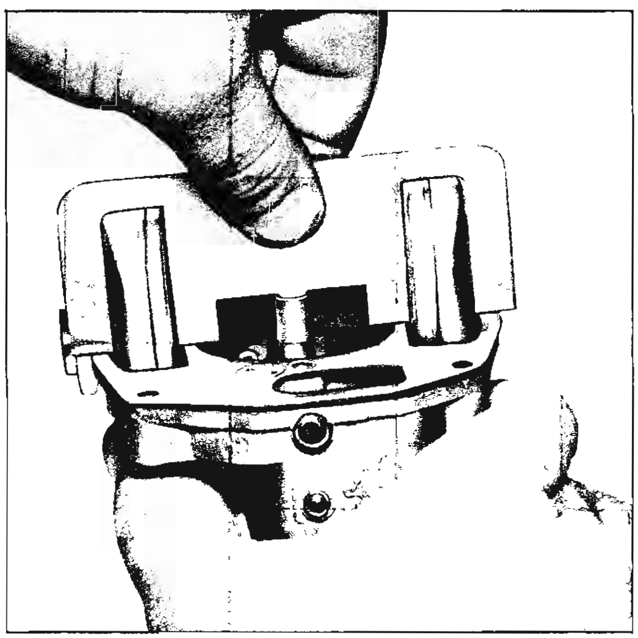

Fig. 8—Float Level Adjustment

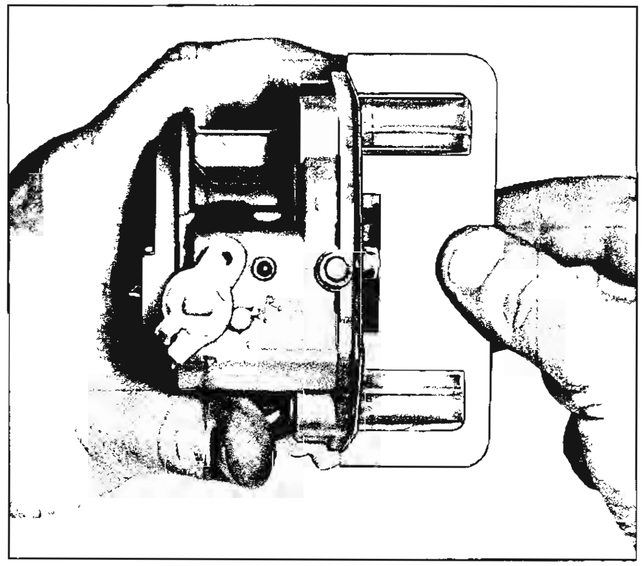

Fig. 9—Float Alignment

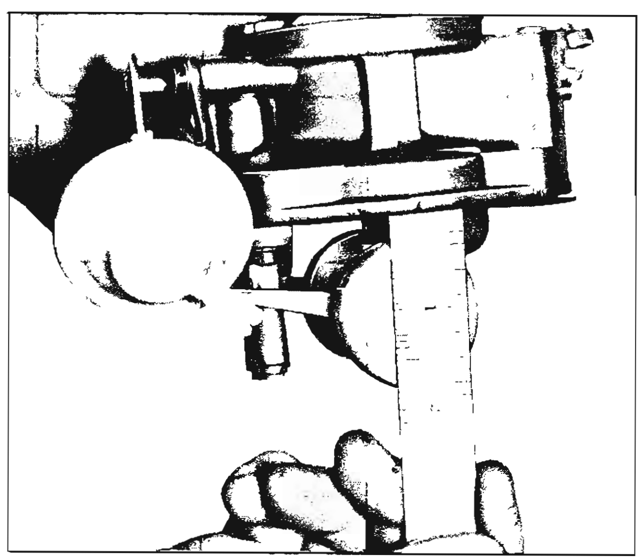

Fig. 10—Float Drop Adjustment

3. If necessary, bend tang of throttle lever with Tool J-4552 to obtain necessary clearance.

VACUUM BREAK ADJUSTMENT (Fig. 7)

1. Hold diaphragm lever against diaphragm to bottom diaphragm.
2. Measure clearance between lower edge of choke valve and wall of air horn using Tool J-21616. Clearance should be .136" to .154" on Power Glide vehicles and .154" to .173" on Synchromesh transmission vehicles.
3. If necessary to adjust bend diaphragm link.

FLOAT ADJUSTMENTS

1. Remove air cleaner.
2. Disconnect:
   a. Fuel line at carburetor.
   b. Fast idle rod and cam to choke kick lever.
   c. Vacuum hose at diaphragm assembly.
   d. Choke rod at choke lever.
3. Remove bowl cover screws and carefully lift cover from carburetor assembly (if new gasket is needed, replace before making adjustments).
4. Invert cover assembly and measure float level (fig. 8) using Tool J-21216. Bend float arms to adjust.
5. Hold cover sideways and check float centering using same gauge. Floats should not touch gauge legs (fig. 9).
6. Hold cover in upright position and check float drop measurement between gasket and lower edge of float (fig. 10).
   a. Measurement should be 1¾".
   b. Adjust by bending stop tang.
7. Install bowl cover on carburetor, install cover screws and tighten securely.
8. Connect:
   a. Vacuum hose at diaphragm.
   b. Fuel line at carburetor.
   c. Choke rod at choke lever.
   d. Fast idle rod at choke lever.
9. Install air cleaner and check operation of engine.

INLET FUEL FILTER

Remove and Replace

1. Remove fuel line connection at inlet fuel filter nut.
2. Remove inlet fuel filter nut from carburetor inlet fuel filter with a 1" box wrench or socket.
3. Remove filter element and spring.
4. Clean element by washing in solvent and blowing out.

   NOTE: Element should be replaced every 15,000 miles or before if flooding occurs.

5. Reverse the above procedure for replacement.

SERVICE OPERATIONS

The perfect carburetor delivers the proper gasoline and air ratios for all speeds of the particular engine for which it was designed. By completely disassembling at regular intervals, which will allow cleaning of all parts and passages, the carburetor can be returned to its original condition and it will then deliver the proper ratios as it did when new.

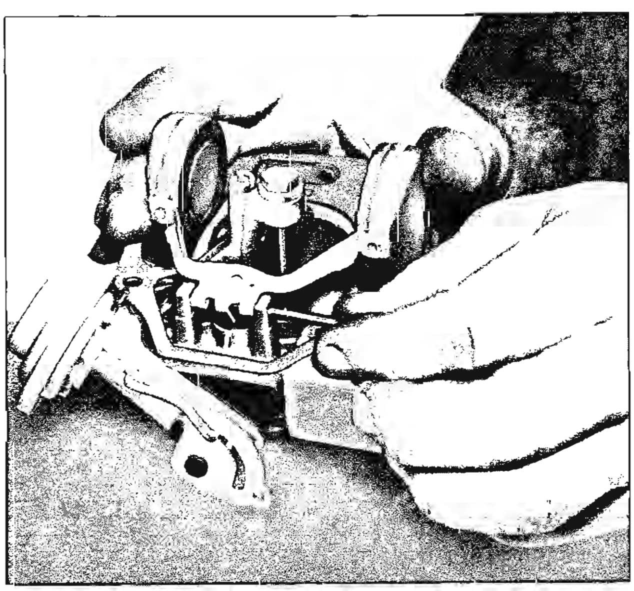

Fig. 11—Removing Float

Because of the simplicity of design of the Model "BC" carburetor, few parts are used which will require replacement. Accurate calibration of passages and discharge holes, require that extreme care be taken in cleaning. Use only carburetor solvent and compressed air to clean all passages and passage discharge holes. Never use wire or other pointed instrument to clean as calibration of carburetor will be affected.

Removal

1. Remove air cleaner.
2. Disconnect fuel and vacuum lines from carburetor.
3. Disconnect choke rod at carburetor end.
4. Disconnect throttle rod from throttle shaft lever.
5. Remove the two carburetor flange to manifold stud nuts and lift carburetor off.

Disassembly

1. Disconnect choke diaphragm vacuum hose at diaphragm.
2. Disconnect fast idle rod at choke lever.

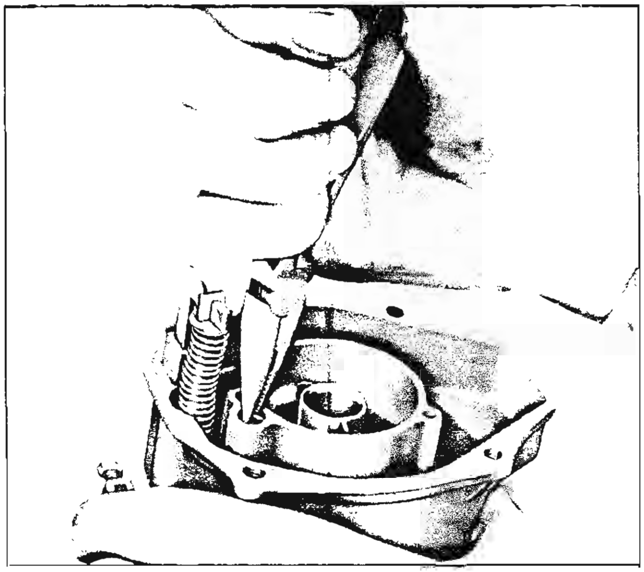

Fig. 12—Removing Pump Discharge Guide

3. Remove fuel line fitting, gasket, bronze fuel filter and spring from bowl cover.
4. Remove choke shaft lever screw (diaphragm side), remove two diaphragm bracket screws and remove diaphragm.
5. Remove four cover screws.
6. Lift cover straight up to prevent damage to floats.
7. Place cover up-ended on flat surface and remove float hinge pin, floats and float needle (fig. 11).
8. Using screw driver of proper width, remove float needle seat and red fibre gasket.
9. Remove main metering jet and power valve assembly from main well support.

NOTE: Use care when removing power valve not to lose small spring and ball.

10. Remove main well support attaching screw and remove support. Lift straight up to prevent damage to main well support tube.
11. Lift power piston and spring from cover.
12. Lift air horn gasket from cover.
13. Holding accelerating pump plunger all the way down, remove cotter pin or hairpin retainer from

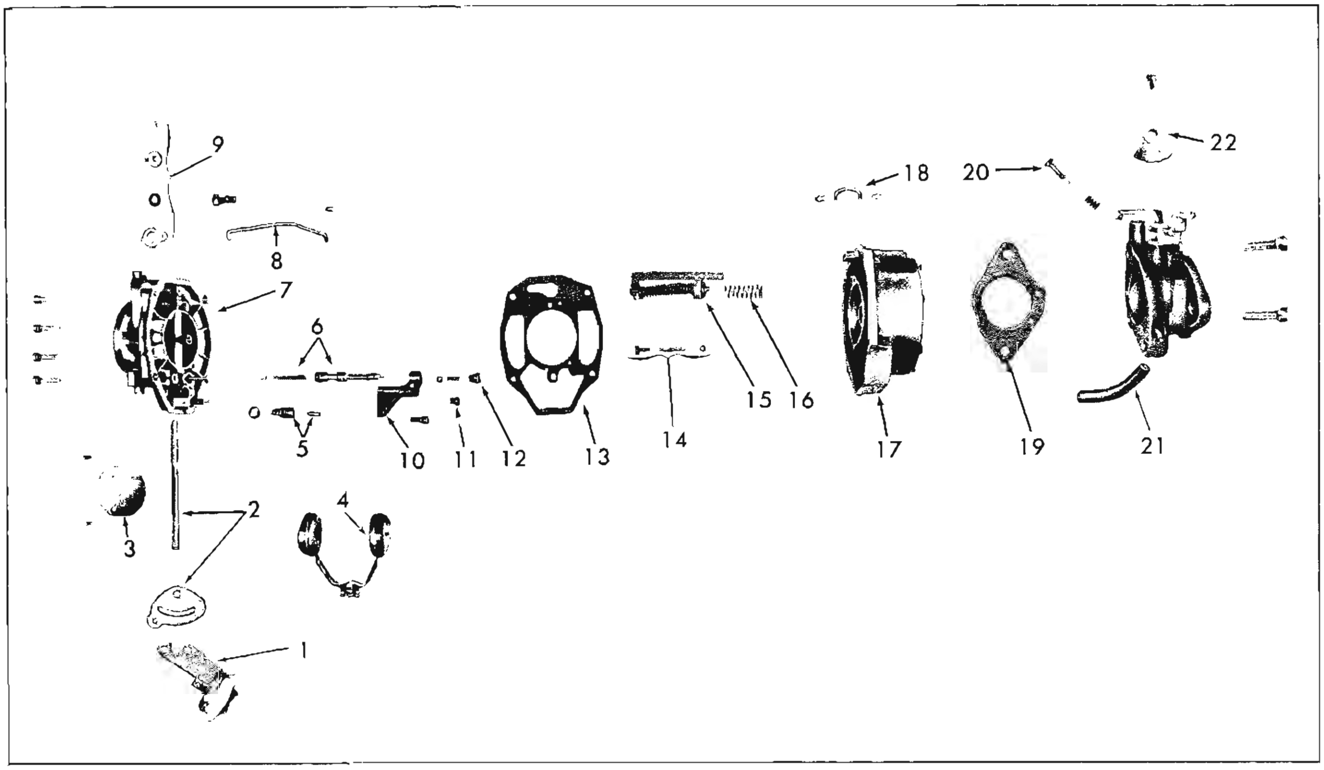

Fig. 13—Carburetor Disassembled

1. Vacuum Diaphragm
2. Choke Shaft
3. Choke Valve
4. Float
5. Needle and Seat
6. Power Piston and Spring
7. Bowl Cover or Air Horn
8. Choke Rod
9. Choke Lever and Trip Lever
10. Main Well Support
11. Main Metering Jet
12. Power Valve
13. Air Horn Gasket
14. Pump Discharge Ball Check
15. Accelerating Pump
16. Pump Return Spring
17. Bowl
18. Pump Connecting Rod
19. Throttle Body Gasket
20. Idle Mixture Needle
21. Throttle Body
22. Fast Idle Cam

pump link and remove pump link from throttle lever and pump plunger. Pump plunger may now be lifted from bowl. Place plunger in gasoline or kerosene to prevent leather from drying out.

14. Lift pump spring from pump well.
15. With small needlenose pliers, remove pump discharge guide (fig. 12). Pump discharge spring and ball check will fall from bowl when turned upside down.
16. With bowl upside down, remove 2 throttle body attaching screws and remove throttle body assembly.
17. Remove idle adjusting needle and spring from throttle body.
18. Figure 13 illustrates carburetor completely disassembled.

Inspection

1. Wash all metal parts thoroughly in carburetor solvent and dry with compressed air.
2. Check all parts and passages for carbon deposits.
3. Blow out all drilled passages with compressed air and check to make sure they are clean.

NOTE: Do not, under any circumstances, use wire or other pointed instrument to clean drilled passages or calibrated holes in carburetor. Holes and passages are carefully calibrated and use of wire or other cleaning instrument will destroy calibration of carburetor.

4. Inspect pump plunger. If the leather or its expanding spring is damaged, in any way, the plunger assembly should be replaced. Shake the plunger to determine if by-pass ball check is free.

   To check pump system: Pour ½ inch of gasoline into carburetor bowl. Take pump plunger from can of gasoline or kerosene and slide into pump cylinder. Place the discharge check ball into body. Raise plunger and press lightly on shaft to expel air from the pump passage. Using a small clean brass rod, hold the discharge ball down firmly on its seat. Again raise plunger and press downward. No fuel should be emitted from either the intake or discharge passage. If any fuel does emit from either passage, the presence of dirt or a damaged check ball are indicated. Clean the passage again and repeat the test. If leakage is still present, replace the check valve.
5. Check floats for dents and wear on lip and hinge pin. Also check cover for wear in hinge pin holes.
6. Check float needle. If wear is noted on float needle, install new float needle assembly consisting of matched and tested needle and seat and new fibre washer.
7. Check power piston for burrs or other damage. Piston must move freely in cover bore.
8. Check throttle arm for looseness on the shaft and for excessive wear at throttle rod connection.
9. Check throttle shaft for excessive looseness in throttle body.

NOTE: Any damage or excessive wear in throttle arm or shaft necessitates replacement of the throttle body assembly. This is due to the close tolerance of throttle valve fit required and the fact that the idle discharge and spark advance holes are drilled in relation to a proper fitting valve.

10. Check the choke valve for freedom of operation in cover.
11. Check bronze fuel filter for chips or cracks.

Assembly

1. Install idle needle and spring finger-tight in throttle body. As a temporary idle adjustment, back needle out 1½ turns.
2. Using a new throttle body gasket, attach bowl to throttle body. Tighten screws evenly and securely.
3. Place pump return spring into pump well and center it by depressing with finger.
4. Install pump plunger and connect pump link to throttle lever and pump rod. Install cotter pin or hairpin retainers at both upper and lower ends.
5. Drop large steel ball into pump discharge cavity of bowl and place bronze color spring on top of ball (fig. 14).
6. Index end of pump discharge guide into bronze color spring and press down until guide is flush with bowl surface.
7. Place new air horn gasket on air horn.

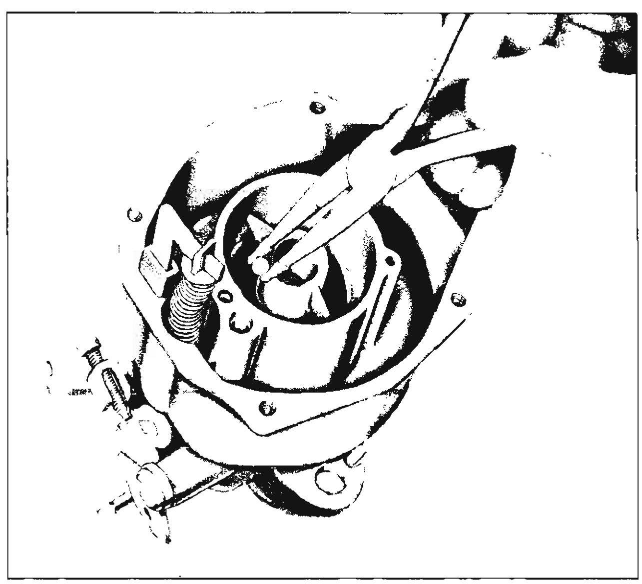

Fig. 14—Installing Pump Discharge Ball

8. Place power piston spring and power piston in air horn cavity and attach main well support to air horn.
9. Install main metering jet and tighten securely.
10. Hold power piston stem down and install power ball, spring and plug and tighten securely.
11. Install float needle seat using new fibre washer and install float needle.
12. Attach float with hinge pin.

    NOTE: Float tang must face cover.

13. Adjust float setting as outlined under "Maintenance and Adjustments," Float Level Adjustment.
14. Install spring and bronze fuel filter with opening away from spring and attach fuel line fitting with gasket shown in Figure 1.
15. Place cover assembly on bowl. Install attaching screws and tighten securely.
16. Install vacuum diaphragm, two bracket screws and choke valve lever.
17. Install choke vacuum diaphragm hose fitting securely.
18. Reconnect fast idle rod at choke lever.
19. Adjust unloader and vacuum break (adjustment as in "Maintenance and Adjustments").

Installation

1. Place carburetor in position on manifold studs and install retaining nuts. Tighten evenly and securely.
2. Connect fuel and vacuum lines to carburetor.
3. Connect throttle rod to throttle shaft lever.
4. Connect choke rod to choke lever.
5. Adjust idle speed and mixture as outlined under "Maintenance and Adjustments."

ROCHESTER 4GC AND CARTER WCFB CARBURETORS

A clean air system to the automatic choke housing minimizes any tendency toward sticking parts due to dirt.

Clean air is drawn from an adapter tube in the carburetor air horn through a tube to the manifold choke stove, then through another tube to choke housing cover (fig. 15).

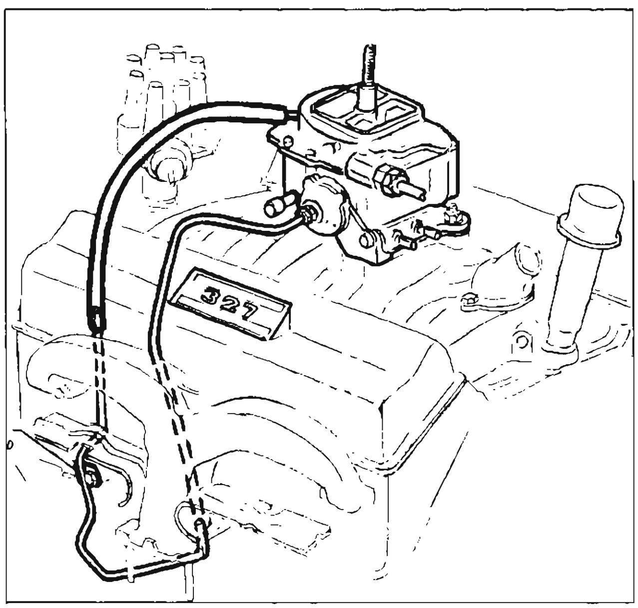

Fig. 15—Choke Clean Air System

Rochester 4GC carburetor have been revised to relocate the distributor vacuum advance tube.

The Carter WCFB carburetor (fig. 16) has been revised to relocate distributor vacuum advance tube and the fuel inlet has been lowered to use a lower air cleaner.

Service procedures remain essentially the same as in 1961 shop manual. 1964 Specifications are shown in rear of this section.

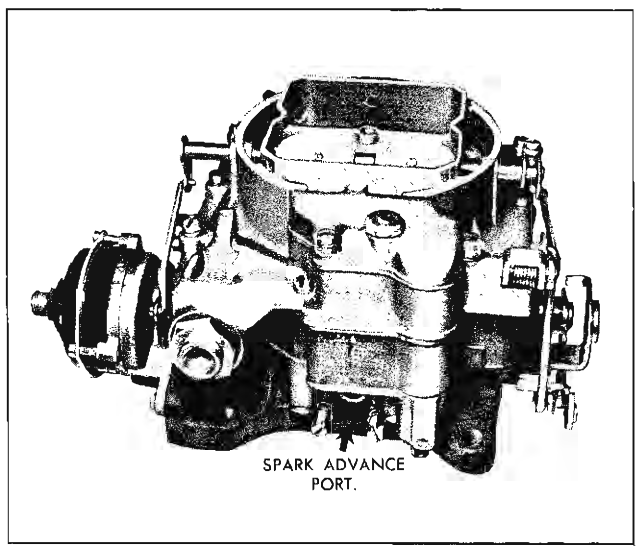

Fig. 16—WCFB Carburetor

MODEL "2GV" CARBURETOR

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GENERAL DESCRIPTION

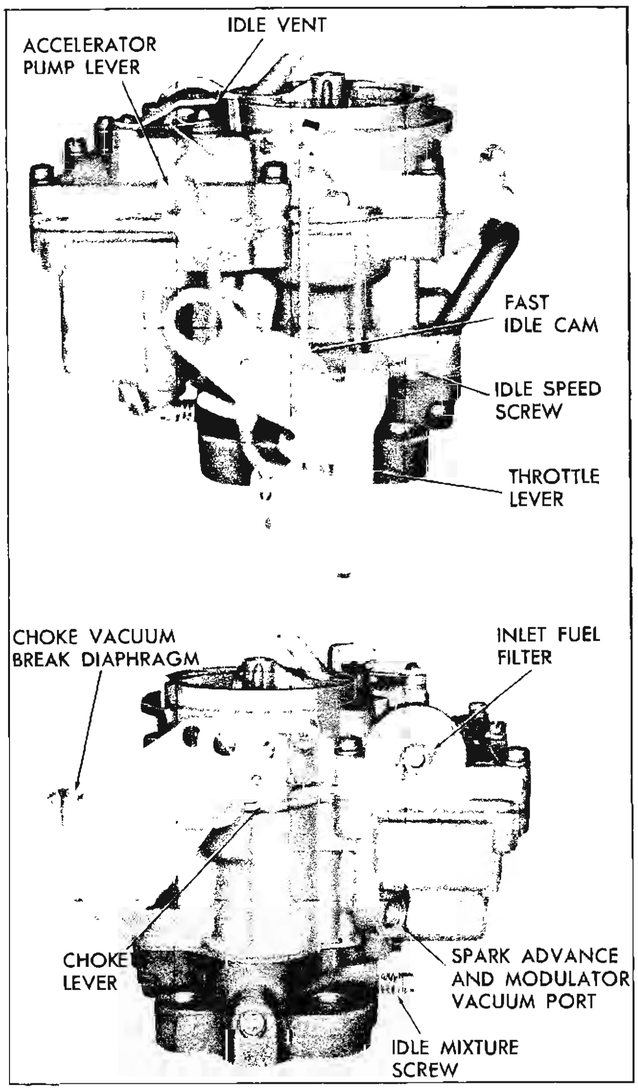

Fig. 17—2 GV Carburetor Nomenclature

A new Rochester "2GV" carburetor (fig. 17) used on V-8 engines, incorporates a new automatic choke arrangement (fig. 18). The temperature sensing choke

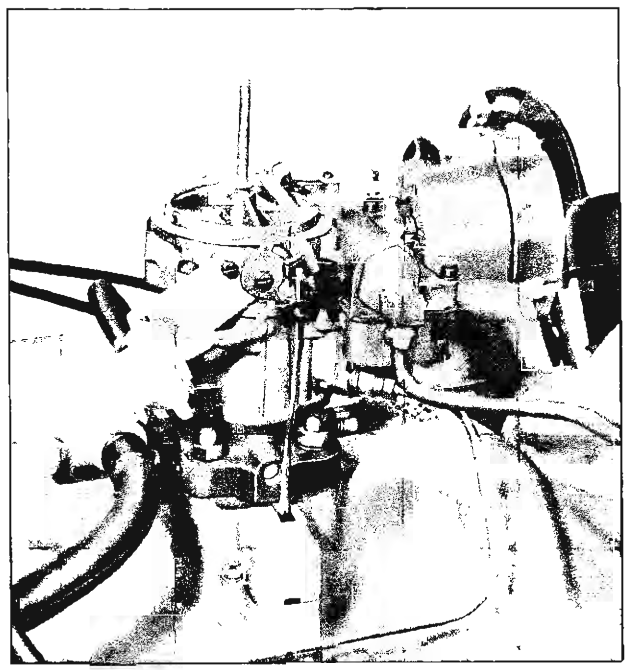

Fig. 18—Automatic Choke Arrangement

coil is remotely mounted on the intake manifold directly over the exhaust crossover passage. The coil, connected to the choke lever by a rod, provides excellent choke valve response thereby allowing accurate mixture proportions in relation to engine requirements. A vacuum diaphragm (fig. 19), mounted on the carburetor, acts as a choke valve break during engine warmup periods. The spark advance and Powerglide vacuum modulator line connection is made at a port

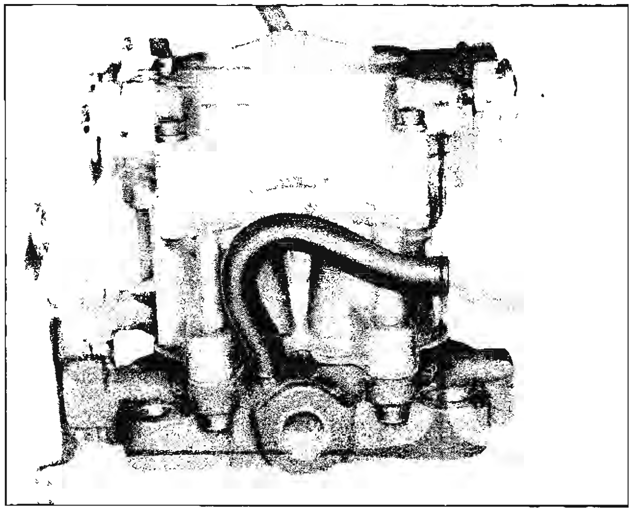

Fig. 19—Diaphragm Vacuum Take Off

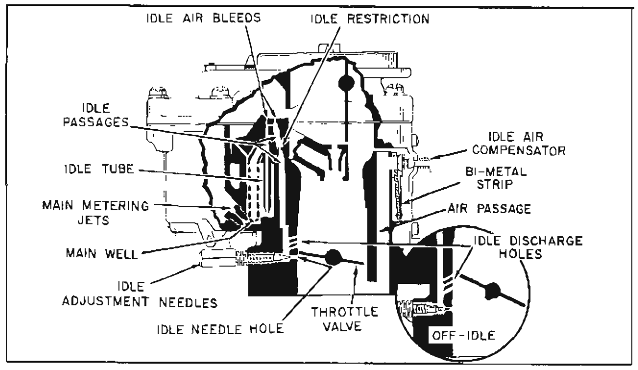

Fig. 20—Idle Compensator

in a boss cast at the right front corner of the carburetor body.

On carburetors for air-conditioned cars, an idle compensator (fig. 20) is used as an additional aid to prevent stalling during prolonged hot idle periods. This is simply a thermostatic controlled air bleed which supplies additional idle air to the idle mixture.

The idle compensator consists of a bi-metal strip, a valve, and a mounting bracket. It is mounted on the rear of the carburetor bowl between the large venturi. The valve is completely enclosed in a cavity in the bowl casting and has a protective cover and gasket held in place by mounting screws. The valve itself seats on a hole which is connected by an air passage to a point below the throttle valves.

In operation, when idling hot for long periods, the bi-metal strip will expand outward, forcing the compensator valve off its seat. This allows additional air, supplied from inside the carburetor bore above the large venturi, to by-pass the compensator valve and be added at a point below the throttle valves, offsetting the enrichening effects of high engine temperatures.

When underhood temperatures decrease, the compensator valve closes and idle operation returns to normal.

MAINTENANCE AND ADJUSTMENTS

The carburetors are carefully designed and calibrated to meet engine requirements. They are tested and adjusted at the factory to meet specifications. It is a common practice to blame the carburetor for many engine problems, and before making carburetor adjustments, there are several items to be checked.

INLET FUEL FILTER

Remove and Replace

1. Remove fuel line connection at inlet fuel filter nut.
2. Remove inlet fuel filter nut from carburetor inlet fuel filter with a 1" box wrench or socket.
3. Remove filter element and spring.
4. Clean element by washing in solvent and blowing out.

   NOTE: Element should be replaced every 15,000 miles or before if flooding occurs.

5. Reverse the above procedure for replacement.

   NOTE: In proper installation of fuel filter element, small section of cone faces inlet fuel filter nut.

PRELIMINARY CHECKS

1. Thoroughly warm-up engine. If the engine is cold, allow to run for at least 15 minutes.
2. Inspect torque of carburetor to intake manifold bolts and intake manifold to cylinder head bolts to exclude the possibility of air leaks.
3. Inspect manifold heat control valve for freedom of action and correct spring tension.

NOTE: For float level and pump lever operations, warm-up is not required.

THROTTLE LINKAGE ADJUSTMENT

1. Disconnect throttle rod swivel at bellcrank lever on manifold. (On Powerglide vehicles disconnect TV rod at bellcrank.)
2. Hold carburetor throttle valve in wide open position, pull throttle rod forward (to position accelerator pedal at the floor mat) and adjust swivel to just enter hole in bellcrank lever.
3. Connect swivel to bellcrank lever and install cotter pin.

4. On Powerglide vehicle hold throttle rod in full throttle position, push TV rod to full detent position and adjust swivel on TV rod to just enter hole on throttle bellcrank, then connect TV rod swivel at bellcrank.

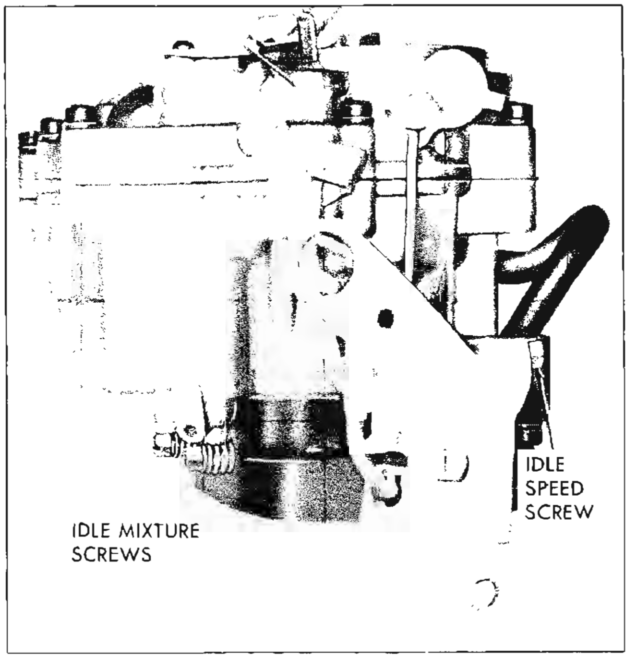

Fig. 21—Idle Speed and Mixture Adjustment

IDLE SPEED AND MIXTURE ADJUSTMENT (Fig. 21)

This adjustment should be performed with engine at operating temperature and parking brake applied.

1. Remove Air Cleaner.
2. Connect tachometer and vacuum gauge to engine, then set hand brake and shift transmission into neutral.
3. As a preliminary adjustment, turn idle mixture screws lightly to seat and back out 1½ turns.

CAUTION: Do not turn idle mixture screw tightly against seat or damage may result.

4. With engine running (choke wide open) adjust idle speed screw to bring idle speed to 500 rpm (Powerglide in drive, manual transmission in neutral).
5. Adjust idle mixture screw to obtain highest steady vacuum at idle speed.

NOTE: On air conditioned vehicles, hold idle compensator closed during adjustment.

6. Repeat Steps 4 and 5 as needed for final adjustment.
7. Shut down the engine, remove gauges and install air cleaner.

PUMP ROD ADJUSTMENT (Fig. 22)

1. Back off idle screw until throttle valves are completely closed.
2. Holding throttle valves closed, check the distance from the top of the pump housing on the air horn to top of pump rod with the float gauge as shown in Figure 22. This distance should be $^{57}/_{64}$".

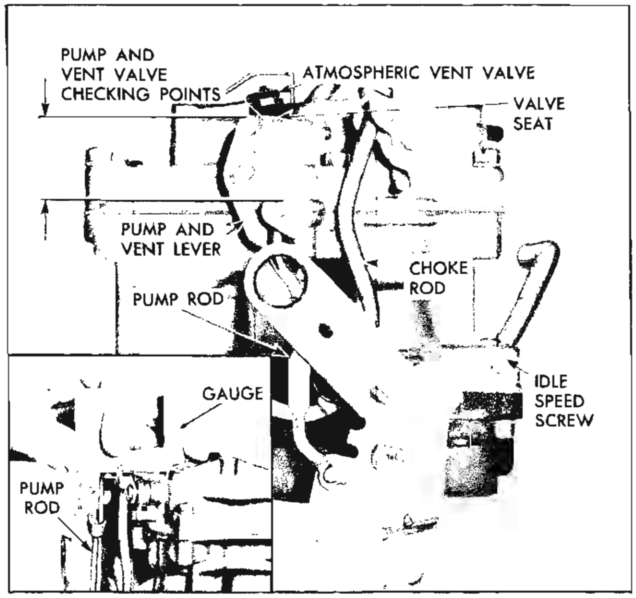

Fig. 22—Pump Rod Adjustment

3. Leg of gauge marked "pump" should just touch top of pump rod.
4. The accelerator pump rod may be carefully bent to obtain the correct adjustment.

ATMOSPHERIC VALVE ADJUSTMENT (Fig. 23)

NOTE: Always make pump rod adjustment before checking and adjusting Atmospheric Vent valve.

1. Place float gauge in chain gauge set J-21607 on top of pump housing on air horn as shown in Figure 23.
2. Slowly open throttle valves to a point where the atmospheric valve just closes on its seat (fig. 23 inset).
3. Holding the throttle valves in this position, leg of gauge marked "vent" should just touch top of pump rod.
4. Bend the tang on the pump lever with bending Tool J-5197 to adjust.

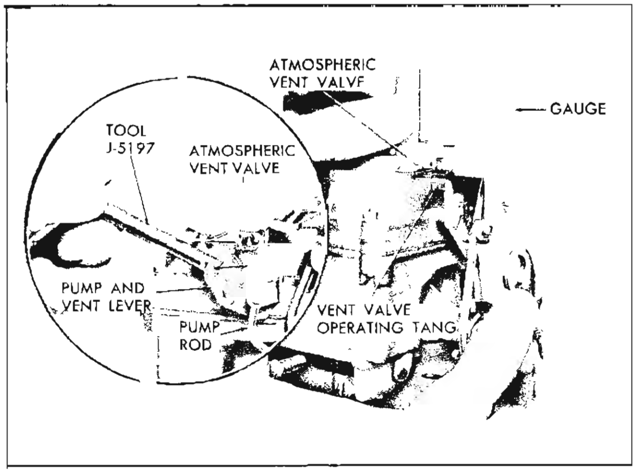

Fig. 23—Atmospheric Valve Adjustment

AUTOMATIC CHOKE ADJUSTMENT (Fig. 24)

1. Remove Air Cleaner and check to see that choke valve and rod move freely.
2. Disconnect choke rod at choke lever.

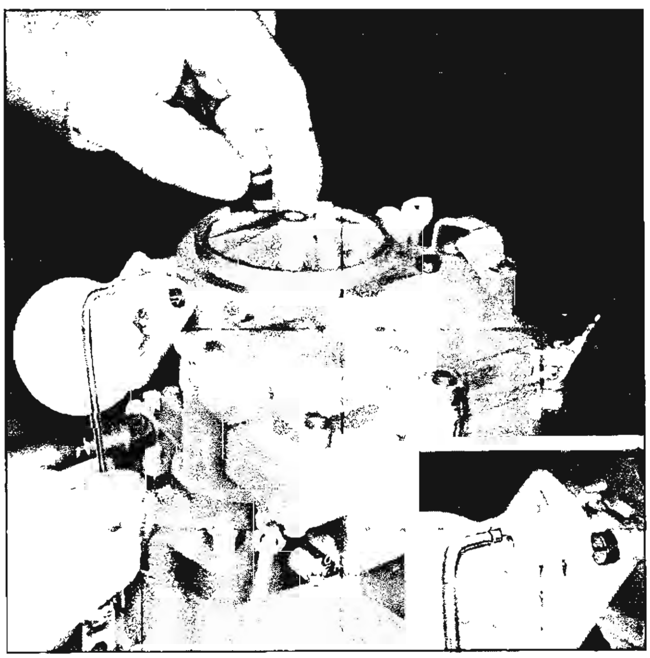

Fig. 24—Automatic Choke Adjustment

3. Hold choke valve closed and pull rod up against stop in thermostat housing. The top of choke rod end should be approximately ½ rod diameter above top of hole in choke valve lever as shown to assure choke valve closing.
4. If necessary, adjust rod length by bending rod at offset bend. (Bend must be such that rod enters choke lever hole freely and squarely.)
5. Connect rod at choke lever and install air cleaner.

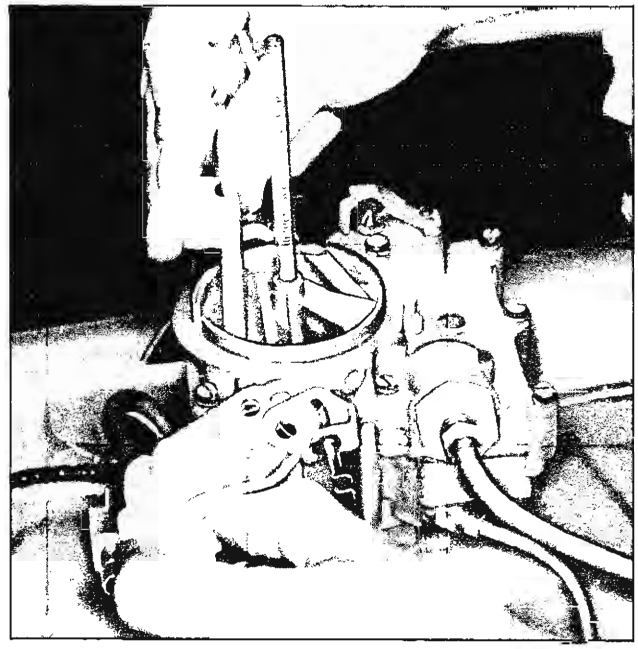

Fig. 25—Vacuum Break Adjustment

VACUUM BREAK ADJUSTMENT (Fig. 25)

1. Hold diaphragm arm in against diaphragm to bottom against housing.
2. Measure clearance between upper edge of choke valve and wall of air horn using Tool J-21607. Clearance should be .080 to .105 on Power Glide vehicles and .108 to .133 on Synchromesh transmission vehicles.
3. If necessary to adjust bend diaphragm link.

FAST IDLE CAM—CHOKE VALVE RELATIONSHIP (Fig. 26)

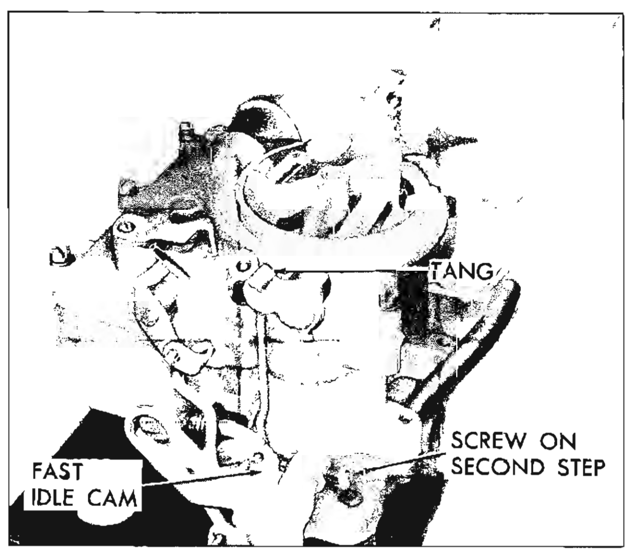

Fig. 26—Fast Idle Cam-Choke Valve Relationship

No adjustment of the fast idle speed is provided since the steps on the fast idle cam are correctly proportioned to give the correct speed steps above normal idle speed. It is necessary, however, to have the correct relationship between the fast idle cam position and the choke valve position. To check and adjust this setting, proceed as follows:

1. Place end of idle adjusting screw on the next to highest step of the fast idle cam. Using gauge in chain gauge set, J-21607, see if small end of tool just slides easily between upper edge of choke valve and bore of carburetor at the center.
2. If necessary, bend tang of choke rod kick lever to adjust relationship.

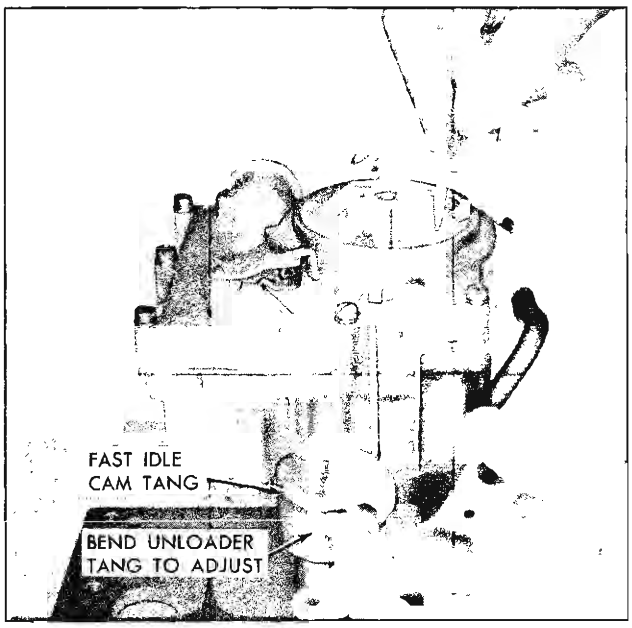

Fig. 27—Unloader Adjustment

UNLOADER ADJUSTMENT (Fig. 27)

Check and make necessary correction of the unloader as follows:

1. Hold throttle lever in wide open position so unloader tang pushes against tank on fast idle cam.

   NOTE: On a hot engine it may be necessary to hold choke valve toward closed position.

2. Using Tool J-21607, measure distance between upper edge of choke valve and bore of carburetor.
3. If necessary to adjust, bend tang of throttle lever to obtain needed clearance.

FLOAT LEVEL AND FLOAT DROP

1. Remove air cleaner, stud and gasket.
2. Disconnect fuel line at inlet nut and choke rod at choke lever.
3. Remove pump rod clip and rod then remove fast idle cam and disengage rod from choke kick lever.
4. Disconnect vacuum diaphragm hose at flange end (use screwdriver to pry off if necessary).
5. Remove 8 bowl cover screws and remove cover.
6. Invert the cover on a flat surface. Place float gauge (Tool J-21607) over float as shown in Figure 28.

Fig. 28—Float Level Adjustment

7. Bend float hinge arm as required until the highest part of the float just clears the gauge step. The scale dimension, bottom of float to gasket, is $^{23}/_{64}$".
8. Hold bowl in an upright position and measure the distance from the gasket to the bottom of the float, as shown in Figure 29. This dimension should be

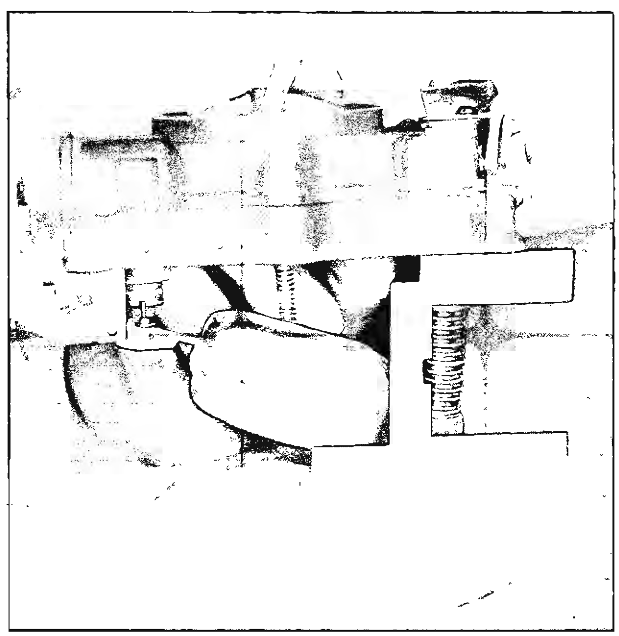

Fig. 29—Float Drop Adjustment

$1\frac{29}{32}$". Bend the tang at the end of the float hinge arm to obtain the correct drop, recheck both settings after this adjustment.

9. Reverse steps 1-5 to install bowl cover.
10. Check and readjust if necessary, the choke rod adjustment and the idle speed and mixture.

CHOKE COIL REPLACEMENT

The temperature sensing choke coil needs replacement when it no longer fully opens the choke valve, is broken or is warped to the point of binding. The heat shield snaps down over the coil and the two slot-shaped indentations index with oversize slots in the coil mounting bracket (fig. 30). These oversize slots allow shield movement in all directions to provide a close fit with manifold surfaces.

Fig. 30—Choke Coil Installed

Replace the coil as follows:

1. Remove shield by prying with screwdriver in cut-out provided (fig. 31).
2. Disconnect choke rod upper end clip and remove rod.
3. Remove coil bracket screw and coil assembly.
4. Install new coil assembly with indexing tab side inboard, then install mounting screw.
5. Check to see that choke rod eye of coil is below the stop tab on the bracket, then install choke rod and adjust if necessary. (See Adjustment Procedures.)
6. Install heat shield over choke coil and move shield to best fit against manifold.

NOTE: It may be necessary to pinch the bottom edges together slightly to pass by mounting screw.

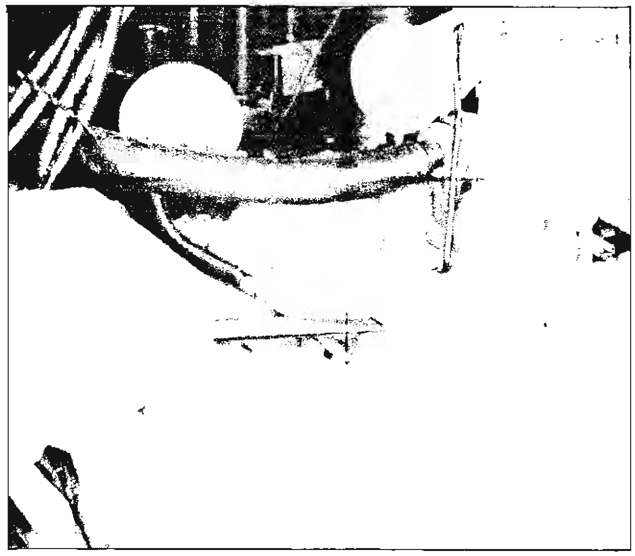

Fig. 31—Removing Choke Cover

7. Make sure choke rod moves freely from full open to full closed choke.
8. Start and warm-up the engine and check operation of choke.

Flooding, stumble or 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.

REMOVAL FROM VEHICLE

1. Remove air cleaner, gasket and stud (on vehicles with closed positive ventilation, disengage the vent hose from cleaner body).
2. Disconnect:
   a. Choke rod at choke lever.
   b. Fuel line at inlet nut.
   c. Spark advance line at carburetor end.
   d. PCV line and power brake connection at carburetor flange.
   e. Accelerator linkage at throttle lever.
   f. P.G. only—TV. linkage at the throttle lever.
3. If fuel filter is to be removed, break loose the nut now, then remove carburetor flange to manifold nuts and washers (on overdrive models, lay kick-down switch aside without disconnecting wires).
4. Lift carburetor off manifold and discard gasket.

DISASSEMBLY

Bowl Cover (refer to Figure 33)

1. Remove pump rod retaining clip (throttle lever end) then remove rod.
2. Remove fast idle cam, rotate rod to align tang with groove at choke kick lever end, then remove cam and rod.
3. Remove choke lever screw, disengage lever from choke shaft and let it hang from diaphragm rod, then remove diaphragm mounting screws and remove the assembly.
4. Remove fuel filter inlet nut, filter, spring and two gaskets.
5. Remove idle vent and bracket.
6. Remove 8 bowl cover screws (fig. 32) and lift cover from bowl.
7. Place the cover top-down on bench and remove float hinge pin, float and float needle.
8. Remove float needle seat and gasket with wide blade screwdriver.
9. Remove power piston by depressing shaft and allowing spring to snap, thus forcing piston from casting.
10. Remove retainer on pump plunger shaft, remove plunger assembly from pump arm. Place plunger in gasoline or kerosene to prevent leather from drying out. The pump lever and shaft may be removed by loosening set screw or inner arm and removing outer lever and shaft.

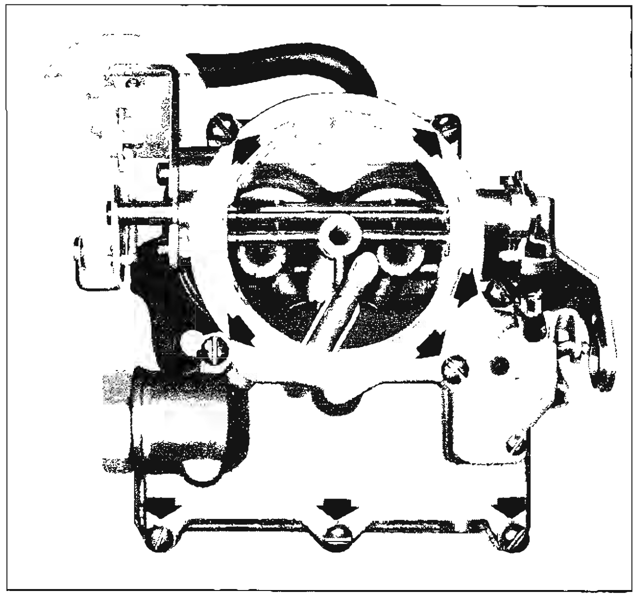

Fig. 32—Bowl Cover Removal

NOTE: The pump plunger may be further disassembled by compressing the spring and removing the retainer.

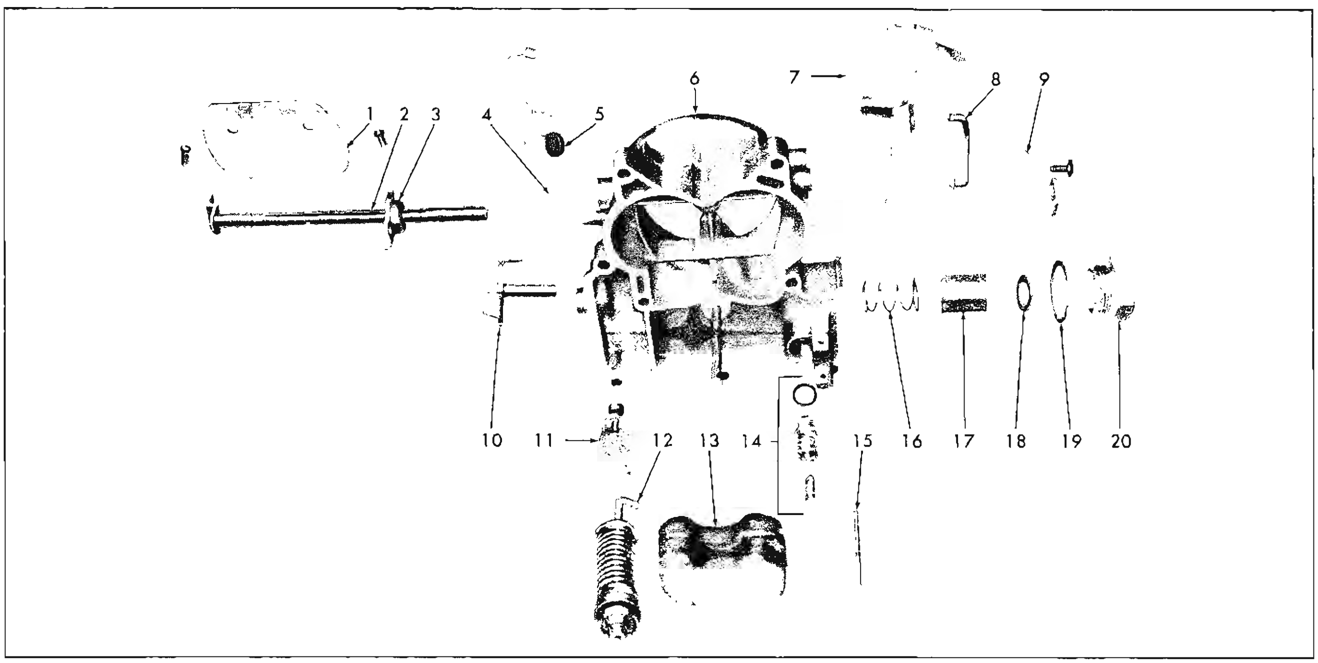

Fig. 33—Bowl Cover—Exploded View

1. Choke Plate
2. Choke Shaft
3. Choke Kick Lever
4. Vent Shield
5. Vent Valve
6. Air Horn
7. Vacuum Diaphragm
8. Diaphragm Link
9. Choke Lever
10. Pump Outer Lever
11. Pump Inner Lever
12. Accelerator Pump
13. Float
14. Needle and Seat Assembly
15. Float Hinge Pin
16. Filter Spring
17. Inlet Fuel Filter
18. Gasket—Filter
19. Gasket—Inlet Nut
20. Inlet Nut

11. Remove the cover gasket. Figure 33 shows the bowl cover exploded.
12. Ordinarily this is all the disassembly needed for cleaning purposes. If choke shaft or valve need replacement, remove two choke valve screws, then remove choke valve and slide shaft from cover.

Bowl and Throttle Body (fig. 34)

1. Remove pump plunger return spring from pump well, and baffle plate from bowl.
2. Remove main metering jets and power valve.
3. Remove three screws on top of cluster, then remove cluster and gasket and main well inserts.
4. Using a pair of long nose pliers, remove the pump discharge spring retainer. Then the spring and check ball may also be removed.
5. Up-end carburetor and remove three large bowl to throttle body attaching screws. Throttle body and gasket may now be removed.
6. Remove idle adjusting needles and springs from throttle body. Figure 34 shows the bowl and throttle body exploded.

Cleaning and Inspection

Dirt, gum, water, or carbon contamination in or on the exterior moving parts of a carburetor are often responsible for unsatisfactory performance. For this reason, efficient carburetion depends upon careful cleaning and inspection while servicing.

CAUTION: Vacuum diaphragm and pump plunger should not be immersed in solvent. Clean the plunger in clean gasoline—clean the diaphragm unit by wiping with a rag only.

1. Thoroughly clean carburetor castings and metal parts in clean cleaning solvent.
2. Blow all passages in castings dry with compressed air and blow off all parts until they are dry.

   CAUTION: Do not pass drills or wires through calibrated jets or passages as this may enlarge orifice and seriously affect carburetor calibration.

3. Check all parts for wear. If wear is noted, defective parts must be replaced. Note especially the following:
   a. Check float needle and seat for wear. If wear is noted the assembly must be replaced.
   b. Check float lip for wear and float for dents. Check floats for leaks by shaking.
   c. Check throttle and choke shaft bores in throttle body and cover castings for wear or out of round.
   d. Inspect idle adjusting needles for burrs or ridges. Such a condition requires replacement.
   e. If wear is noted on steps of fast idle cam, it should be replaced as it may upset engine idle speed during the choking period.
   f. Inspect pump plunger leather. Replace plunger if rubber is damaged.
4. Inspect gaskets to see if they appear hard or brittle or if the edges are torn or distorted. If any such condition is noted they must be replaced.
5. Check filter for dirt or lint. Clean and if it is distorted or remains plugged, replace.
6. If for any reason parts have become loose or damaged in the cluster casting, it must be replaced.

Assembly

Throttle body and Bowl (fig. 34)

1. Screw idle adjusting needles and springs into throttle body until finger tight. Back out screw 1½ turns as a temporary idle adjustment.

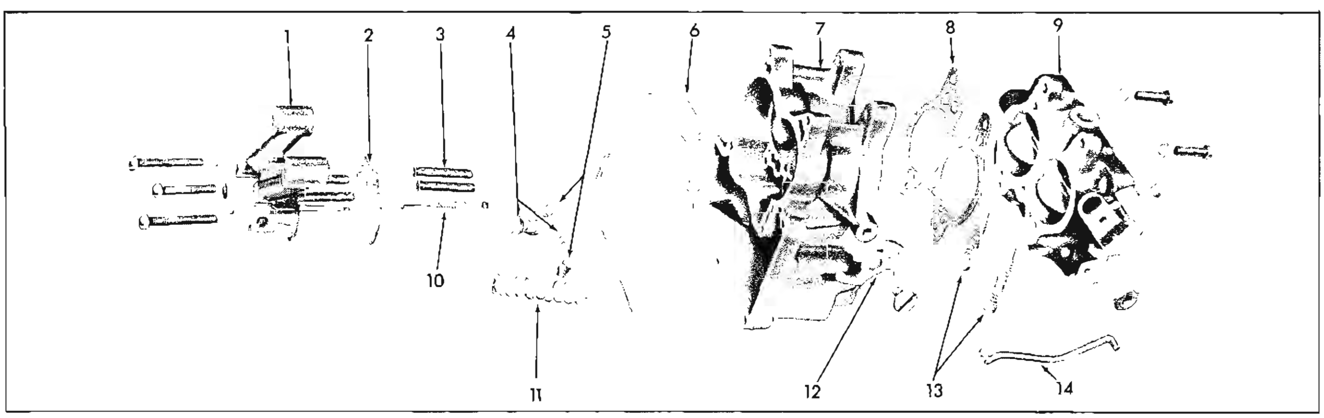

Fig. 34—Bowl and Throttle Body—Exploded View

1. Nozzle Block Assembly
2. Gasket
3. Splash Shield—Main Well
4. Power Valve Assembly
5. Main Jets
6. Bowl Cover Gasket
7. Bowl Assembly
8. Flange to Bowl Gasket
9. Flange Assembly
10. Pump Discharge Check Assembly
11. Accelerator Pump Spring
12. Fast Idle Cam
13. Idle Mixture Screws
14. Choke Rod

CAUTION: Do not force needle against seat or damage will result.

2. Up-end bowl, place new throttle body gasket in position and attach throttle body to bowl. Tighten screws evenly and securely.
3. Drop pump discharge check ball into discharge hole. Ball is $\frac{3}{16}''$ diameter steel. Install spring and retainer.
4. Install main well inserts gasket and cluster assembly, tighten screws evenly and securely. Make certain center screw is fitted with red fibre gasket.
5. Install main metering jets and power valve gasket and power valve. Figure 35 shows the bowl and throttle body at this stage of assembly.

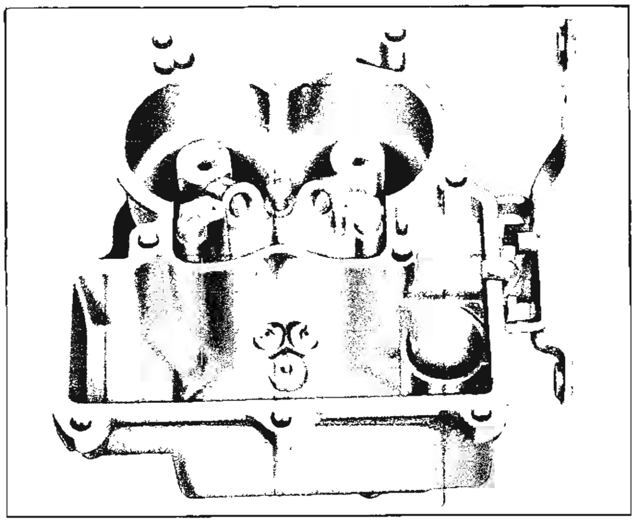

Fig. 35—Bowl Assembly Parts Location

6. Install pump return spring, pressing with finger to center it in pump well. Install baffle plate.

Bowl Cover (fig. 33)

1. Install pump lever assembly.

   NOTE: Lubricate pump shaft bearing surface with lubriplate before installation.

2. Install float needle seat and gasket, using wide blade screw driver.
3. Replace power piston in vacuum cavity; piston should travel freely in cavity. Lightly stake retainer in place.
4. Attach plunger shaft with retainer, with shaft end pointing inward.
5. Install cover gasket.
6. Attach needle to float, carefully position float and insert float hinge pin. Figure 36 shows the bowl cover assembled.

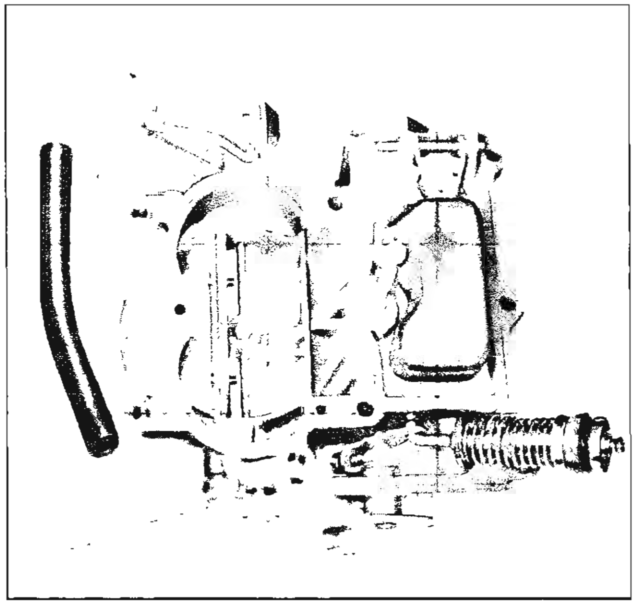

Fig. 36—Bowl Cover Assembled

7. Adjust float as previously outlined.
8. Place cover on bowl, making certain that accelerator pump plunger is positioned and will move freely. Raise cover and lower straight down to insure proper installation.
9. Install and tighten 8 cover screws evenly and securely.
10. Install pump rod and retainer.
11. Install vacuum diaphragm with bracket screws, then install choke lever on end of choke shaft and retain with screw. Connect vacuum hose at flange.
12. Install vent valve and shield.
13. Install fuel inlet filter spring, filter, gaskets and inlet nut. (Cone end outboard.)
14. Install fast idle rod in choke kick lever, then fast idle cam at the other end, rotate the rod and install cam on bowl.

    NOTE: The rod offset end goes toward fast idle cam.

Test Before Installation on Engine

It is good shop practice to fill the carburetor bowl before installing the carburetor. This reduces the strain on the starting motor and battery and reduces the possibility of backfiring while attempting to start the engine. A fuel pump clamped to the bench, a small supply of fuel and the necessary fittings enable the carburetor to be filled and the operation of the float and intake needle and seat to be checked. Operate the throttle several times and check the discharge from the pump jets before installing the carburetor.

INSTALLATION ON ENGINE

1. Be certain throttle body and intake manifold gasket surfaces are clean.

   NOTE: Check and remove any coke in manifold heat crossover ports.

2. Install new carburetor to manifold gasket over manifold carburetor studs.
3. Start distributor vacuum tube fitting into carburetor fittings.
4. Lower carburetor onto manifold studs, choke lever to right side of vehicle.
5. Install and tighten securely four washers and nuts, using a short, open end wrench. (On overdrive models, install and adjust kickdown switch, see Transmission Section 12.)
6. Tighten distributor vacuum tube fitting, connect and tighten the fuel line.
7. Install throttle rod and throttle return spring. (On automatic models, install transmission control rod.)
8. Adjust and connect choke rod.
9. Connect P.C.V. hose and power brake hose at carburetor fitting.
10. Install air cleaner gasket, stud, air cleaner and wing nut. Tighten securely.
11. Adjust idle speed and mixture.

ROCHESTER "LOW SILHOUETTE" 4GC CARBURETOR

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GENERAL DESCRIPTION

The Rochester "Low Silhouette" 4GC Carburetor (fig. 37), used on the hydraulic lifter 409 cubic inch engine, has throttle bore diameters of $1\frac{7}{16}$ (primary) and $1\frac{11}{16}$ (secondary), a vacuum assisted primary float, a float balance spring on the secondary side, a shallower fuel bowl assembly, a hot idle compensator. This carburetor is used in conjunction with an external bowl type fuel filter and a metered fuel bypass line that maintains a continued flow of fuel in the lines to eliminate possible vapor lock conditions. An idle compensator (fig. 38) is used as an additional aid to prevent stalling during prolonged hot idle periods. The idle compensator is a thermostatic controlled air bleed which supplies additional idle air to the idle mixture.

The idle compensator consists of a bi-metal strip, a valve and a mounting bracket. The compensator is mounted between the venturi on the secondary side where the valve seats on a hole which is drilled through the center of the throttle body attaching bolt hole, which opens into a passage leading from the secondary side below the primary throttle valves.

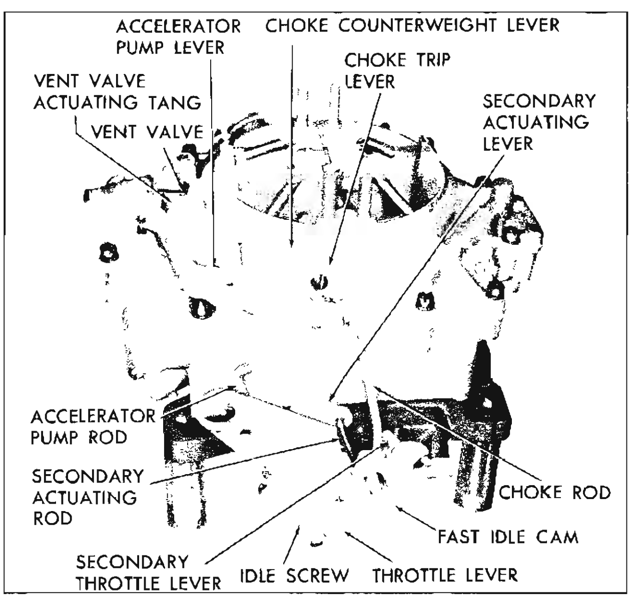

Fig. 37—Low Silhouette "4GC"

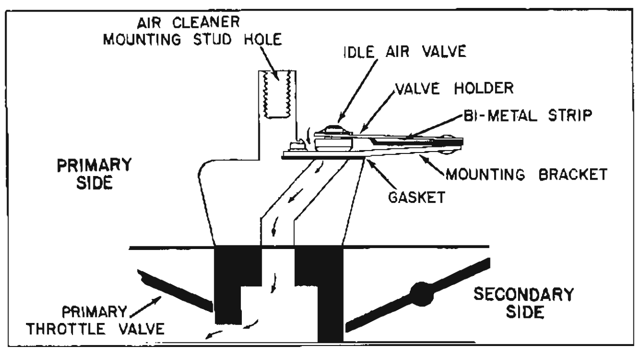

Fig. 38—Idle Compensator

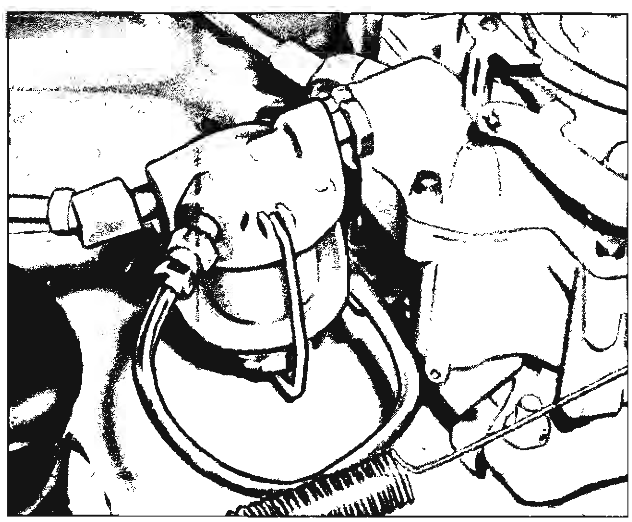

Fig. 39—Fuel Filter Installed

MAINTENANCE AND ADJUSTMENTS

FUEL FILTER (Fig. 39)

The fuel filter used with this 4GC Carburetor is a separate glass bowl unit installed between carburetor inlet and fuel line to carburetor.

1. Loosen hole nut and glass bowl and paper filter element.
2. Replace paper filter element.
3. Reinstall with new gasket.

ADJUSTMENTS ON THE CAR

All adjustments listed below can be done without removing the carburetor from the engine. They should be performed in the following sequence:

1. Accelerator Linkage
2. Idle Speed and Mixture
3. Automatic Choke

If trouble cannot be corrected with previous adjustments, continue with the following adjustments:

5. Float
6. Intermediate Choke Rod
7. Choke Rod
8. Unloader
9. Accelerator Pump Rod
10. Idle Vent
11. Repeat Adjustments 1, 2 and 3

Accelerator Linkage

The length of the throttle linkage is adjustable to assure wide-open throttle with full accelerator pedal depression. To check, depress accelerator pedal fully and check to see if throttle is wide open. If not, adjust threaded swivel at throttle lever to suit. With the accelerator pedal fully depressed and the carburetor throttle valve fully open the threaded swivel should be adjusted for free entry into the throttle lever. The swivel should then be turned two full turns to lengthen the control rod.

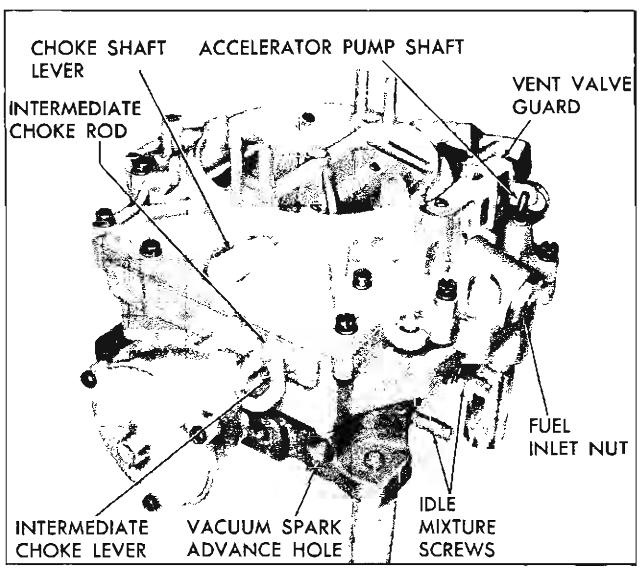

Fig. 40—Idle Speed and Mixture Adjustment

Idle Speed and Mixture

1. Connect tachometer and vacuum gauge to engine. Set parking brake. Start engine, allow to idle and place transmission in neutral on manual shift and drive on automatic models.
2. With a thoroughly warmed-up engine, remove air cleaner, check to see that choke is fully off and carburetor is on slow idle.
3. Adjust the speed adjustment screw (fig. 40) to give proper idle speed shown in tune-up chart.
4. Adjust each idle mixture adjustment screw to give peak steady vacuum at given idle speed.
5. Install air cleaner and disconnect instruments.

NOTE: If engine idles erratic, hold idle air valve (fig. 38) closed with a pencil or a small wooden dowel, while adjusting idle mixture screws.

NOTE: Never bend or adjust bi-metal strip. If malfunctioning, replace complete idle compensator valve.

Automatic Choke

Make sure the scribe mark on the coil housing is in line with the center notch in the choke housing (fig. 41).

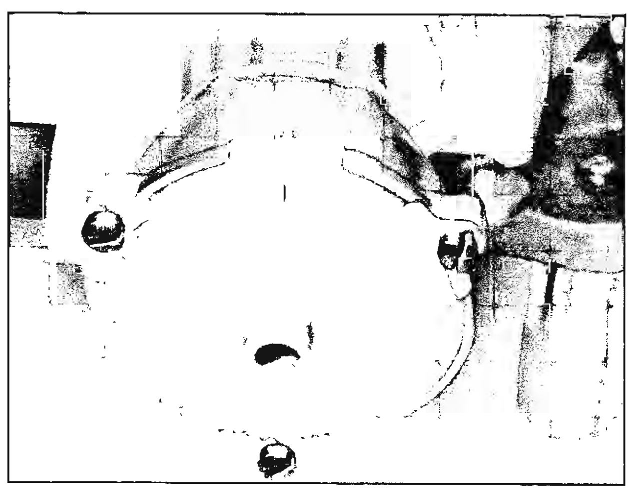

Fig. 41—Automatic Choke Adjustment

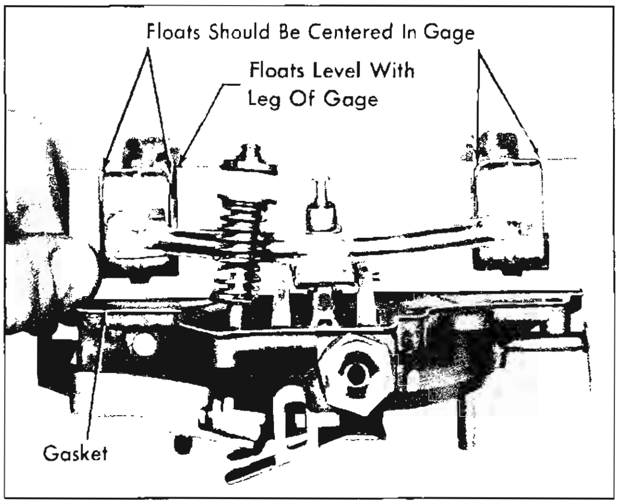

Fig. 42—Primary Float Level Adjustment

1. Loosen housing cover clip screws and heat tube fitting.
2. Rotate the cover to adjust, then tighten clip screws and heat tube fitting.

Float

Remove and install carburetor bowl cover as outlined under "Service Operations" to perform following adjustments.

A. Float Level Adjustment Primary (Figs. 10-42 and 10-43)

1. All float level adjustments should be made with bowl cover gasket in place.
2. With bowl cover inverted, center Float Level Gage, J-21608, on face of cover and position under heel of primary floats.
3. With gage held vertical, lower surface of each float should just even with gage legs. This dimension is 1½" and is not measured to the seam.
4. If necessary to adjust, bend float arm at center with Bending Tool, J-7182-2, Figure 43. Use caution to prevent bending power piston stem.
5. Slide float gage to toe of primary floats. Lower surface of each float should just touch gage.
6. If adjustment is necessary at either float, carefully bend float arm as required. Lower surface of each float should be parallel with cover casting. Recheck float level.

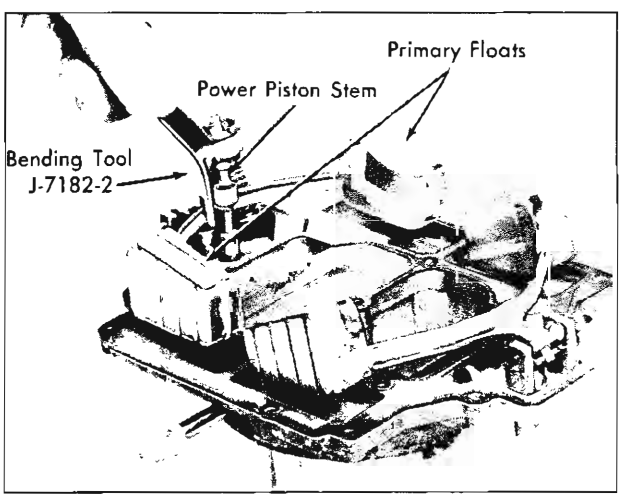

Fig. 43—Bending Primary Float Arm

B. Float Alignment—Primary Side (Fig. 42)

1. Hold Gage vertical under float and centered with bowl cover casting.
2. Float should be centered in cutout position of gage.
3. If adjustment is necessary, bend float arms horizontally as required. Slide float assembly from side to side on hinge pin to make sure floats do not touch gage. Recheck float level if float alignment is necessary.

C. Float Level Adjustment—Secondary Side (Figs. 44 and 45)

1. With gasket in place and bowl cover inverted, install Float Level Gage, J-21608, over heel of secondary float.
2. Highest point of floats should just touch gage.
3. If necessary to adjust, bend float arm at center with Bending Tool, J-7182-2. This dimension is $1\frac{5}{16}$".
4. Measure distance from dimple on side of each

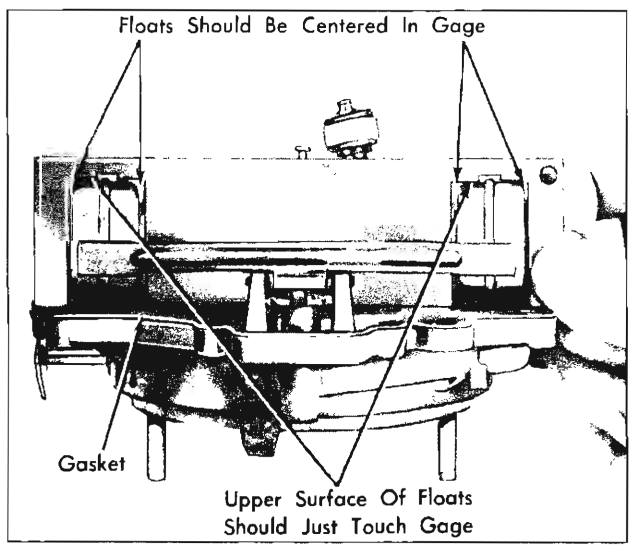

Fig. 44—Secondary Float Level Adjustment

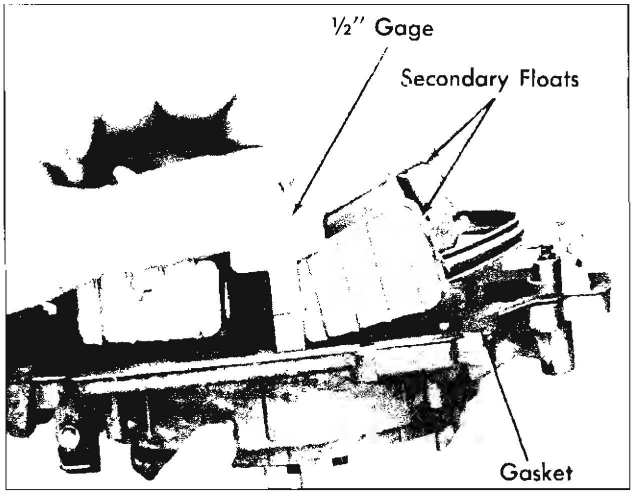

Fig. 45—Secondary Float Toe Adjustment

float at toe to bowl cover gasket, using ½" Gage, J-21608, Figure 45.

5. If adjustment is necessary, bend float arm at float as required, then recheck float level.

D. Float Alignment—Secondary Side (Fig. 44)

1. Hold Float Level Gage, J-21608, over floats at heel.
2. Center gage in bowl cover; each float should be centered in gage.
3. If adjustment is necessary, bend float arm horizontally to center float in gage.
4. Slide float assembly from side to side on hinge pin to make sure floats do not touch gage.

E. Vacuum Assist Spring Adjustment (Figs. 46 and 47)

This adjustment will affect fuel level in the bowl because the spring tension varies the fuel level.

1. Hold bowl cover so floats are hanging down.

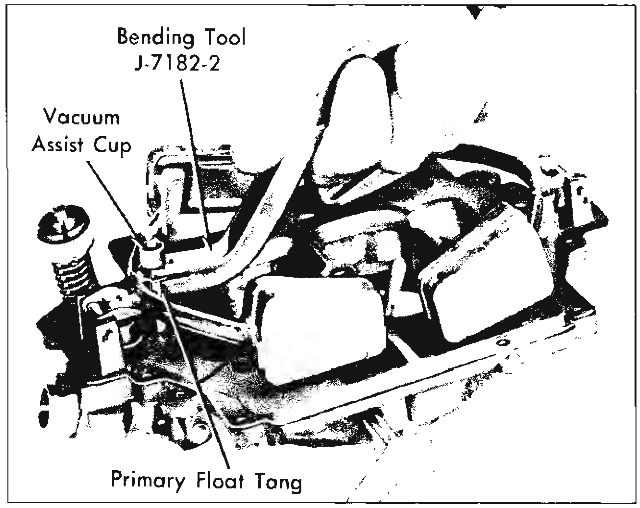

Fig. 47—Bending Primary Float Tang

2. Hold power piston in full up position by placing thumb nail at brass portion of power piston.
3. Bounce floats lightly to make sure cup retainer on vacuum assist spring is not binding on power piston stem.
4. Measure distance from gasket to center of dimple on side of primary float at toe, using 1$\frac{7}{32}$" leg of Float Gage, J-21608.
5. If adjustment is necessary, bend slotted tang at center of float arms, up to increase float drop, and down to decrease float drop. Hold vacuum assist cup up to install Bending Tool, J-7182-2, on tang, Figure 47.

F. Float Drop Adjustment—Primary Side (Fig. 48)

1. Hold bowl cover so floats are hanging down. Do not hold power piston.
2. With power piston stem released and fully extended, measure distance from gasket to center of dimple on float at toe, using 1½" leg of Float

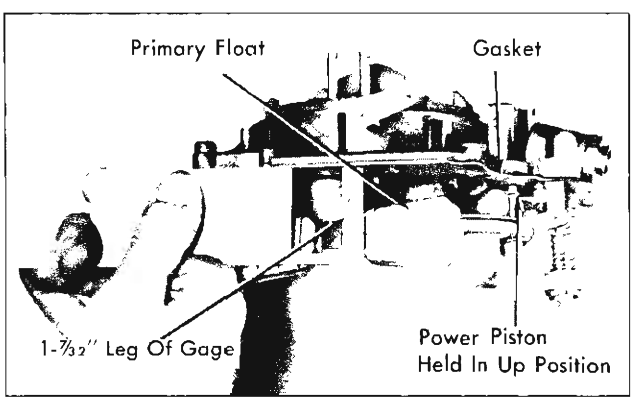

Fig. 46—Vacuum Assist Spring Adjustment

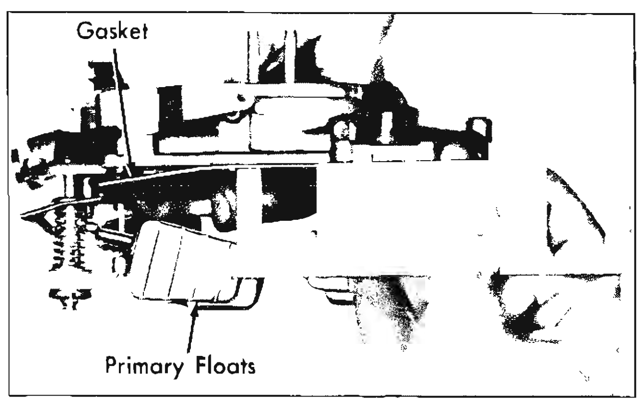

Fig. 48—Primary Float Drop Adjustment

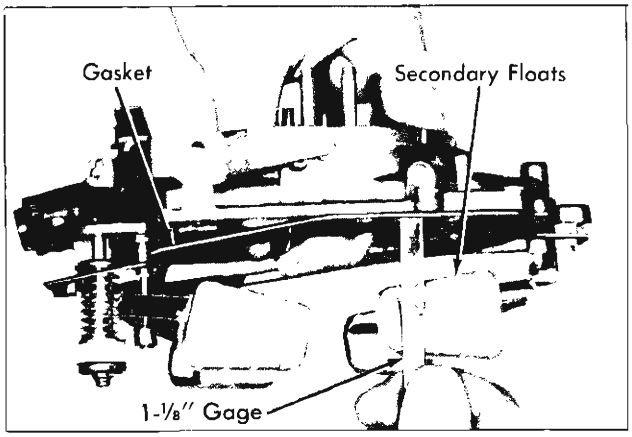

Fig. 49—Secondary Float Drop Adjustment

Gage, J-21608. Bounce floats lightly before measuring distance.

3. If adjustment is necessary, bend tang at rear of float arm toward needle seat to decrease drop, and away from seat to increase drop.

G. Float Drop Adjustment—Secondary Side (Fig. 49)

1. Hold bowl cover so floats are hanging down. Bounce floats lightly before measuring distance.
2. Measure distance from gasket to center of dimple on side of float at toe, using 1⅛" Gage, J-21608.
3. If adjustment is necessary, bend tang at rear of float arm away from balance spring to increase drop or toward spring to lessen drop.

Accelerator Pump Rod Adjustment (Fig. 50)

1. If carburetor is mounted on engine, disconnect throttle rod so that throttle check will not keep throttle valves from closing, and manually open wide choke valve so that throttle valves will close in their bores.
2. Hold throttle in the full closed position and carefully place Gage, J-21608, on bowl cover with side marked "pump" closest to pump lever.
3. With throttle closed and gage resting on top of bowl cover, pump plunger rod should enter hole in gage freely.
4. To adjust, bend pump rod at upper angle until pump rod will enter gage freely. Correct dimension for pump rod adjustment is 1" from top of bowl cover casting to bottom of pump plunger rod.

Atmospheric Vent Valve Adjustment (Fig. 51)

1. To check and adjust atmospheric vent valves, always make accelerator pump rod adjustment and fast idle adjustment first.

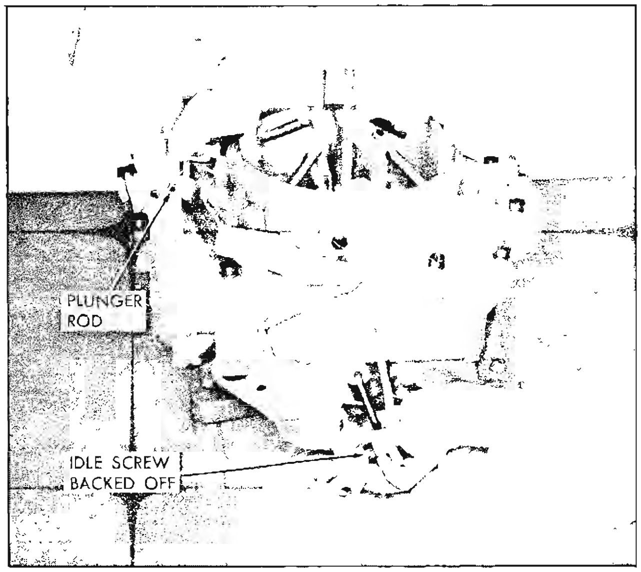

Fig. 50—Accelerator Pump Adjustment

2. Position fast idle cam so that fast idle screw is on the highest step of cam.
3. Vent valve actuating tang on pump lever should be contacting vent valve so that rubber disc is just off its seat.
4. To adjust, bend actuating tang up or down using Bending Tool, J-5197.

Intermediate Choke Rod Adjustment (Fig. 52)

Choke vacuum piston must be properly positioned with respect to vacuum slots in choke housing bore to provide proper choke pull-off action.

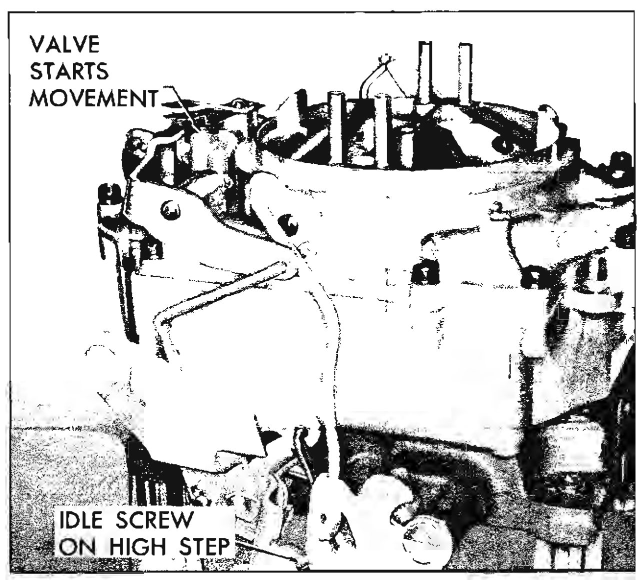

Fig. 51—Atmospheric Valve Adjustment

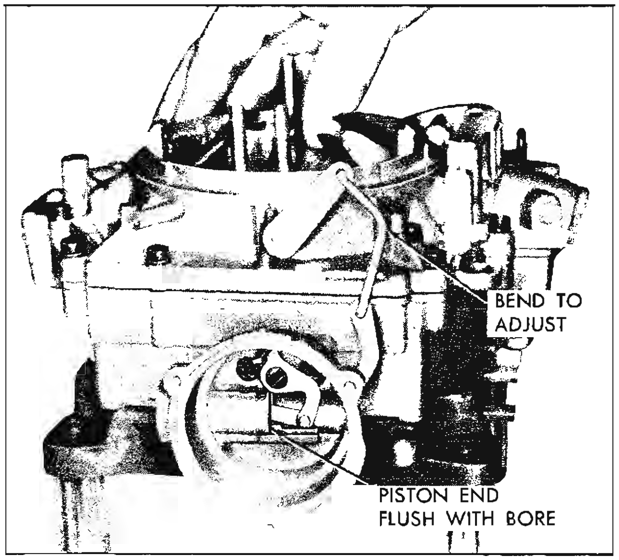

Fig. 52—Intermediate Choke Rod Adjustment

1. Remove 3 screws and choke coil cover, gasket and baffle plate.
2. Hold choke valve closed, push lightly on end of choke piston to remove all lash in linkage. Then check to see if choke piston is flush with choke piston bore.
3. Bend intermediate choke rod if necessary to correctly position choke piston.

Choke mechanism must be absolutely free in any position. Mechanism is free if choke will fall open from its own weight.

4. Install choke baffle plate.
5. Install choke cover and gasket. Rotate counterclockwise until cover choke valve is just closed and index marks align. Set one notch rich, and tighten 3 cover retaining screws.

Choke Rod Adjustment (Fig. 53)

1. Position fast idle screw on second step of fast idle cam, with screw resting against shoulder of highest step.
2. Hold choke valve closed so that choke trip lever is in contact with choke counterweight lever.
3. With fast idle screw and cam in this position, carefully bend choke rod to obtain a clearance of .040", as measured with .040" Wire Gage, J-21608, between top edge of choke valve and dividing wall in air horn. Use Bending Tool, J-1137.

Choke Unloader Adjustment (Fig. 54)

1. With choke trip lever in contact with choke counterweight, move throttle to full open position.
2. Hold in this position and carefully bend tang of fast idle cam to obtain a clearance of 1/8" or .125", as measured with .125" Gage, J-21608, between top edge of choke valve and dividing wall in cover. Use Bending Tool, J-5197 (fig. 54) on fast idle cam tang.

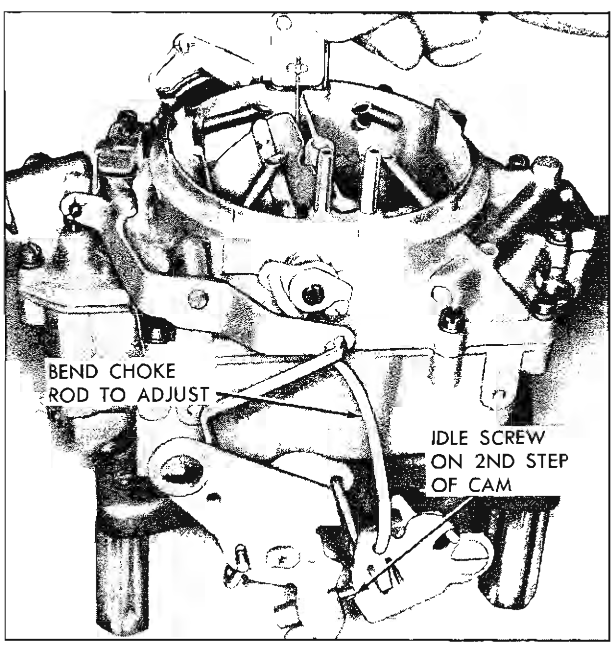

Fig. 53—Choke Rod Adjustment

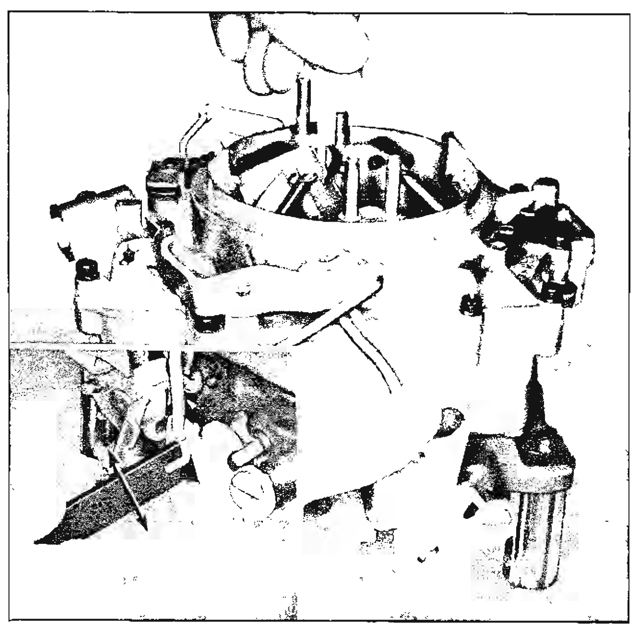

Fig. 54—Choke Unloader Adjustment

SERVICE OPERATIONS

Removal from Vehicle

1. Disconnect PCV valve hose at air cleaner then remove air cleaner, stud and gasket.

2a. Check fuel filter bowl and if element is to be replaced, carefully loosen bale wire, remove glass bowl with element and gasket. Discard the gasket and element and empty the fuel bowl. This is a precaution against fuel spilling on hot engine.

OR

2b. If element need not be replaced, break loose the fuel inlet fitting and bypass fitting at filter and the inlet fitting at carburetor then carefully remove the filter assembly to avoid possible spillage.

3. Disconnect.
   a. Choke heat tube at choke housing.
   b. Choke clean air tube at air horn.
   c. Spark advance line at carburetor flange.
   d. PCV hose and power brake hose at fitting on carb flange.
   e. Accelerator rod at throttle lever.
   f. P.G. only—TV rod at throttle lever.
   g. Throttle return spring at throttle lever.

4. Remove carburetor to manifold stud nuts and lift carburetor from manifold.

5. Remove gaskets and insulator from manifold and discard the gaskets. The insulator may be re-used if it is not warped or cracked and if it can be easily cleaned up.

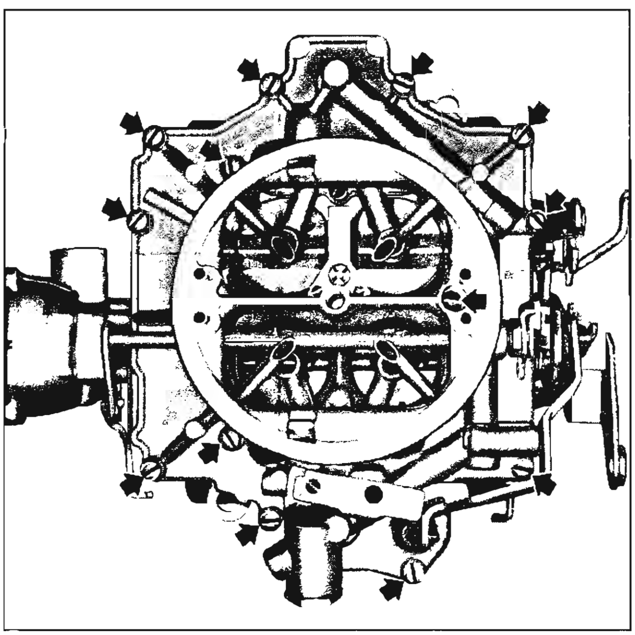

Fig. 55—Bowl Cover Attaching Screws

Disassembly

Bowl Cover (fig. 56)

1. Remove fuel inlet nut, screen and gasket.
2. Remove intermediate choke rod hairpin clips then remove rod.
3. Disconnect accelerator pump rod hairpin clips first then remove rod.
4. Remove choke rod hairpin clips and remove choke rod.
5. Remove idle vent shield and vent assembly by removing attaching screw.
6. Remove 13 cover attaching screws (fig. 55) and break cover loose using finger pressure only. Do not pry the cover loose.
7. Lift the bowl cover assembly straight up from the bowl section to avoid damage to float assemblies.
8. Invert the cover on bench then remove float hinge pins, floats and needles. Remove needles from floats; they are attached with small wire clips.

NOTE: Keep parts from primary side separated from secondary parts.

9. Remove and discard bowl cover gasket.

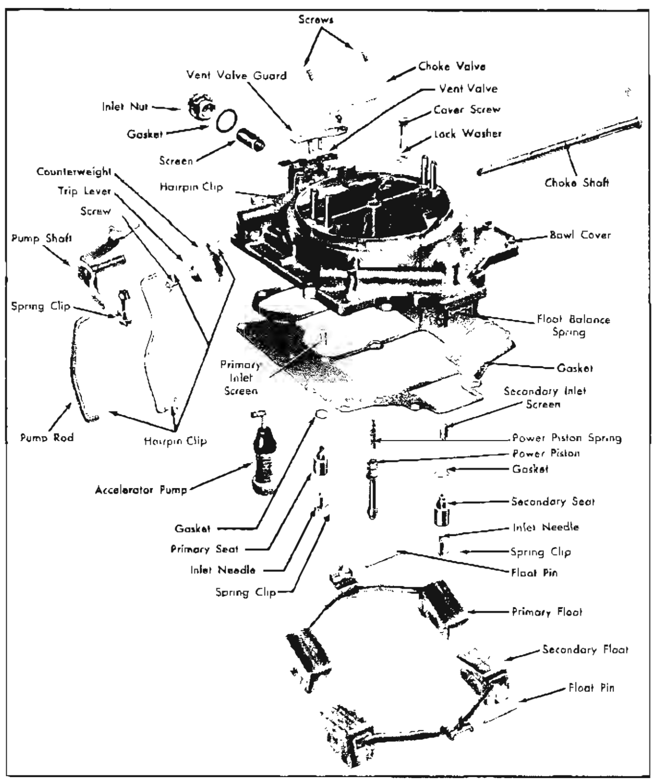

Fig. 56—Bowl Cover—Exploded View

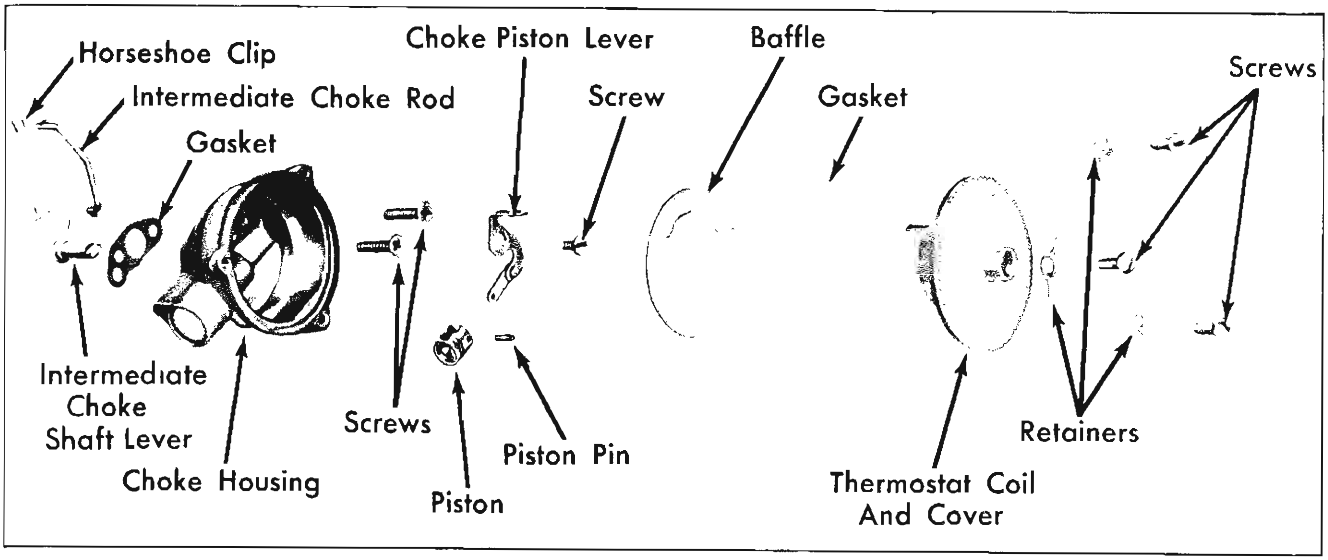

Fig. 57—Choke Assembly—Disassembled

10. If necessary, remove vacuum power piston from bowl cover by depressing plunger and allowing it to snap back several times. It may be necessary to remove burrs around power piston bore caused by staking. Remove piston spring. Be careful not to damage vacuum assist spring and cup retainer on power piston stem.
11. Disconnect accelerator pump from pump lever, then remove pump plunger and boot (as an assembly) downward out of bowl cover.

NOTE: If accelerator pump plunger is to be re-used (see Inspection Procedures), place it in some gasoline to keep the leather from hardening.

12. Use a large, wide-blade screwdriver and remove needle seats, gaskets and screens. Secondary float spring need not be removed.

NOTE: If needle and seats are to be re-used it is particularly important that the mating parts be kept in original order.

13. This is as far as is ordinarily necessary to disassemble the bowl cover for cleaning. If it is necessary to remove choke valve or shaft:
    a. Remove choke shaft trip lever screw and remove trip and kick levers from choke shaft.
    b. File off the staked ends of choke valve screws and remove screws.
    c. Remove valve then slide shaft out of air horn.
    d. Install new parts using new choke valve screws. Support the shaft and stake the screw ends after installation.

g. Choke Disassembly (fig. 57)

1. Remove choke coil cover screws and retainers, and remove cover. Do not remove thermostatic coil from shaft in cover, as they are matched and come as a complete assembly.
2. Remove cover gasket and choke baffle plate.
3. Remove choke piston lever screw and slide choke piston out of its cylinder.
4. Disconnect choke piston from choke piston lever by tapping piston and allowing piston pin to fall into cupped hand.
5. Remove choke housing from bowl by removing two inner attaching screws.
6. Remove intermediate choke shaft lever from choke housing. Remove and discard choke housing gasket.

Bowl Disassembly (figs. 58 and 59)

1. Remove accelerator pump spring.
2. Remove pump inlet screen retainer.
3. Remove power valve and gasket with large screwdriver.
4. Remove primary and secondary venturi clusters by removing 3 attaching screws and lockwashers from each. Remove gaskets from clusters. Baffles in main wells under primary cluster may be removed. Do not attempt to remove idle tubes or nozzles from venturi cluster.
5. Remove hot idle compensator and gasket from secondary side by removing two small self-tapping screws. Discard gasket. Do not bend or distort bi-metal strip. Idle compensator cannot be repaired or recalibrated in the field. If defective, it must be replaced.

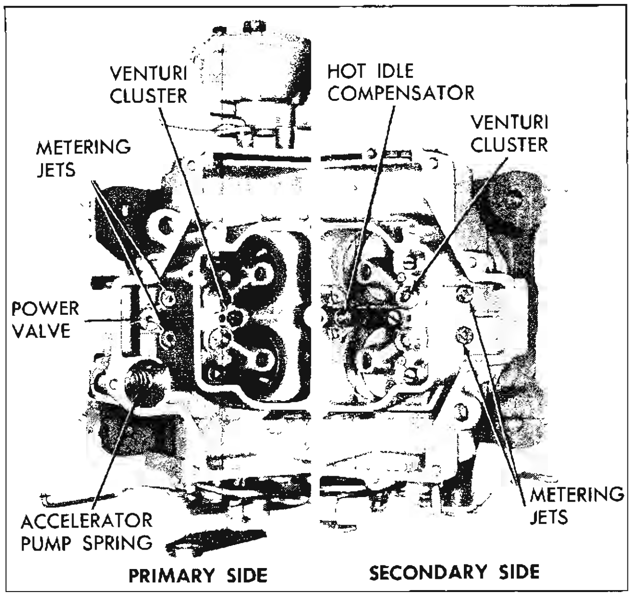

Fig. 58—Bowl Assembly Parts Location

6. Remove primary and secondary main metering jets using a large screwdriver.
7. Remove "T" shaped pump discharge check valve retainer from primary side with needle nosed pliers. Remove copper spring. Invert bowl and catch pump discharge check ball, inlet check ball and pump inlet screen.

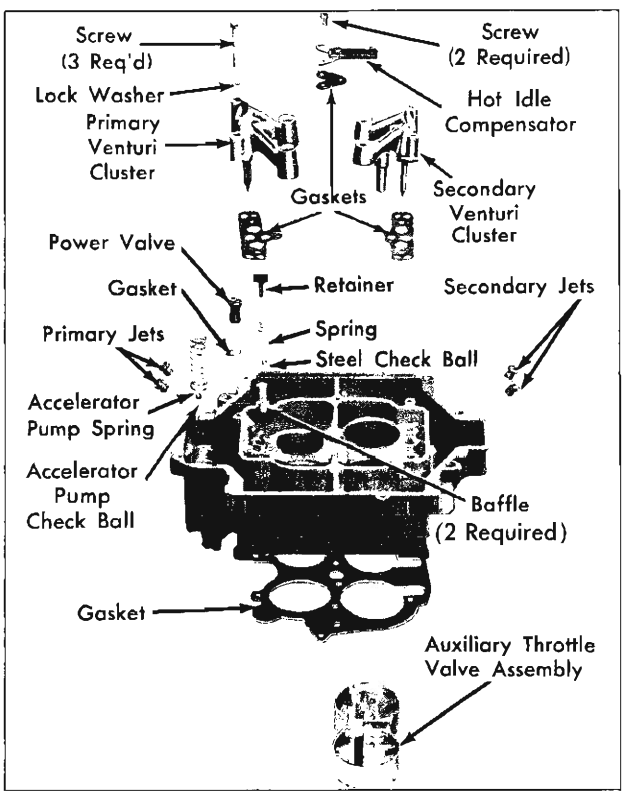

Fig. 59—Bowl Assembly—Exploded View

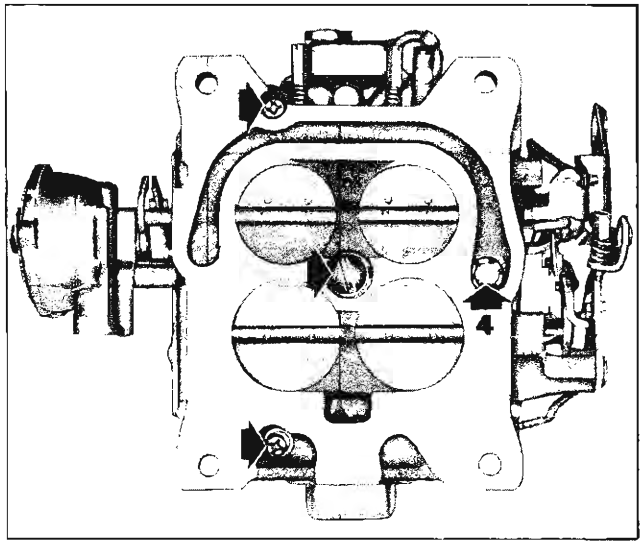

Fig. 60—Throttle Flange Screw Location

Throttle Body Removal and Disassembly (figs. 60 and 61)

1. Invert carburetor on work bench.
2. Remove idle mixture screws and springs.
3. Remove idle air by-pass screw and spring.
4. Remove large screw and lockwasher from counterbore in center of throttle body.
5. Remove three small attaching screws and lockwashers. Screw in short passage is protected by asbestos pad.
6. Break throttle body loose from bowl with finger pressure only. Do not attempt to pry bowl loose.

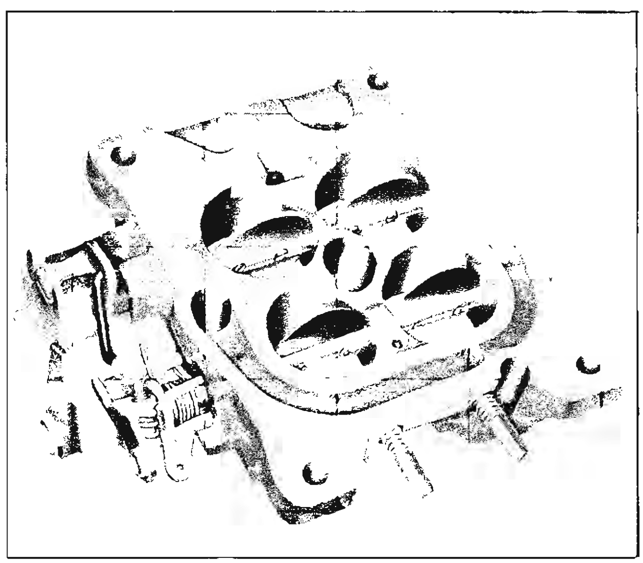

Fig. 61—Throttle Flange—Exploded View

7. Remove and discard throttle body-to-bowl gasket.
8. Remove auxiliary throttle assembly by sliding it out of bowl.

Carburetor Inspection and Cleaning

1. Thoroughly clean all metal parts of carburetor in cleaning solvent, with exceptions noted below, and dry with compressed air.

   CAUTION: Do not wash accelerator pump plunger assembly, pump boot, rubber vent valve, or choke thermostatic coil housing in cleaning solution. Wash these parts in clean solvent only.

2. Clean and blow out all passages with compressed air. Remove any gum deposits which may have accumulated within carburetor parts. Clean carbon out of throttle body heat passage.
3. Make sure all calibrated restrictions, such as idle ports, air bleeds, or vents are clean, but do not pass drills through these passages. Use compressed air only.
4. Check all shafts and their corresponding bores for wear. Check each piston in its respective cylinder. Check for worn or damaged jets and worn holes in the ends of the various levers.
5. Inspect accelerator pump plunger leather, replacing plunger as an assembly if leather is creased or cracked. Inspect check ball in pump for free movement. If stuck, replace pump.
6. Inspect rubber vent valve and replace if it is cracked, swollen, or damaged.
7. Examine float needles and seats. If a needle appears grooved, replace entire set with a factory matched needle, seat, and gasket.
8. Inspect idle mixture adjusting screws for burrs, ridges, or grooves. If wear is evident, replace screws.
9. Inspect floats for dents or leaks. If floats have any liquid in them, replace float. Inspect hinge pin bores for burrs or wear. Check hinge pins for straightness.
10. Clean strainer screens of dirt and lint. If distorted or plugged, these screens should be replaced.
11. Inspect auxiliary valve assembly. Shaft must be straight and must not bind.
12. Carefully check body assembly and valve assembly for wear at throttle valves and bores, and between shafts and their bores. Check for loose valve on their shafts.

Assembly

NOTE: Carburetor should be completely cleaned and inspected before assembly as outlined in Note 18.

Always use new gaskets when reassembling carburetor.

Throttle Body Assembly

1. Install idle speed screw and spring, Figure 61. Initial adjustment should be 3 complete turns from fully seated position.
2. Install idle mixture screws and springs. Tighten screws carefully so as not to groove needles or enlarge seats. Back out each screw 2 turns from lightly seated position for initial mixture adjustment.

Throttle Body Installation

1. Invert bowl assembly.
2. Install auxiliary valve assembly in bowl with spring cavity opening facing down, Figure 59.
3. Place new throttle body-to-bowl gasket on bottom surface of bowl.

   NOTE: Gasket is not reversible. Largest projecting tab must be placed on primary side of bowl, surrounding vacuum passage to power piston.

4. Place throttle body assembly on bowl and start 3 cross head attaching screws and lockwashers through gasket into bowl, Figure 60.
5. Install and tighten large center screw and lockwasher.
6. Tighten 3-outer screws uniformly.

Bowl Assembly

1. With bowl upright, drop large steel pump outlet check ball and copper spring into bore under primary venturi cluster location. Install "T" retainer in slot in bore, compressing spring.
2. Position smaller aluminum check ball on its seat in bottom of pump well.
3. Place pump spring in pump bore and compress into position with finger pressure.
4. Install idle compensator and new gasket, using two small self-tapping screws, Figure 58.
5. Install baffles in primary main wells, if removed, with projections toward primary bores. Place new gaskets on primary and secondary venturi clusters and install clusters in bowl, using 3 screws and lockwashers.

6. Install primary and secondary main metering jets in bowl. Primary jets have smaller holes than secondary jets and are installed in pump side of carburetor bowl.
7. Install power valve and gasket.
8. Install small pump inlet screen and retainer in bottom of fuel bowl next to pump well.

Choke Assembly

1. Place new choke housing gasket on choke housing.
2. Install intermediate choke shaft lever in choke housing from side toward carburetor.
3. Install choke housing with self-locking attaching screws.
4. Install choke piston on lever with piston pin.
5. Install piston assembly into housing with tang facing outward. Slide piston into vacuum cylinder. Place piston lever over intermediate choke lever shaft, and retain with screw while holding lever toward choke housing.
6. Install intermediate choke rod in choke shaft lever. Grooved end of rod goes into choke shaft lever. Retain with clip.

Bowl Cover Assembly

1. Invert bowl cover.
2. Install power piston and spring. Do not damage vacuum assist spring and cup retainer.
3. Install primary and secondary needle seats, gaskets, and screens.
4. Install new bowl cover gasket.
5. Secure needles to floats with clips and install float assemblies using hinge pins.

NOTE: Balance spring must be installed so as to assist closing the needle. Spring must be between float tang and needle seat.

6. Perform float adjustments outlined in "Adjustments," page 10-21.

Bowl Cover Installation

1. Install accelerator pump assembly in bowl.
2. Holding bowl cover assembly in upright position, carefully lower into bowl.

NOTE: Be careful not to hold bowl cover in such a manner as to press against floats with hand when installing.

3. Install 13 bowl cover screws and lockwashers; tighten inner 3 screws first. Install identification tag under corner screw above choke cam.
4. Place choke rod and choke counterweight lever on choke shaft, with collar inward and tang pointing outward and toward secondary side of carburetor, Figure 55.
5. Install choke trip lever with letters "RP" facing outward and with lever projecting above tang on choke lever. Install retaining screw.
6. Place small amount of lubricant on pump shaft and install boot.
7. Lubricate pump arm shaft and install.
8. Install accelerator pump shaft in pump arm and retain with clip.
9. Install pump arm shaft clip.
10. Install pump rod and spring clip.
11. Install vent valve assembly with guard, using small screw.

NOTE: Be careful not to distort idle vent valve with tang on pump lever. Tang should be positioned underneath spring metal strip.

12. Perform the following adjustments as outlined under "Maintenance and Adjustments":
    - Accelerator pump rod adjustment
    - Idle vent adjustment
    - Choke rod adjustment
    - Unloader adjustment
    - Intermediate choke rod
    - Automatic choke setting
13. Check and correct, if necessary, the following adjustments.

Secondary Throttle Opening Adjustment

1. With carburetor inverted, move choke to fully opened position.
2. Rotate primary throttle to fully open position.
3. Check opening of secondary throttle valves. They should reach wide open position at the same time as primary valve.
4. Check wide open stops on primary and secondary throttle shafts, and bend tangs with heavy pliers as required to obtain wide open positions. Tangs should contact stops at same instant.

Secondary Throttle Lockout Adjustment (Figs. 62 and 63)

1. Position fast idle cam and secondary lockout lever with choke valve partially closed, Figure 62.
2. Check clearance between upper edge of lever and cam with .015" Wire Gage, J-21608.
3. Use Tool J-6058 to bend secondary lockout lever to obtain proper clearance.

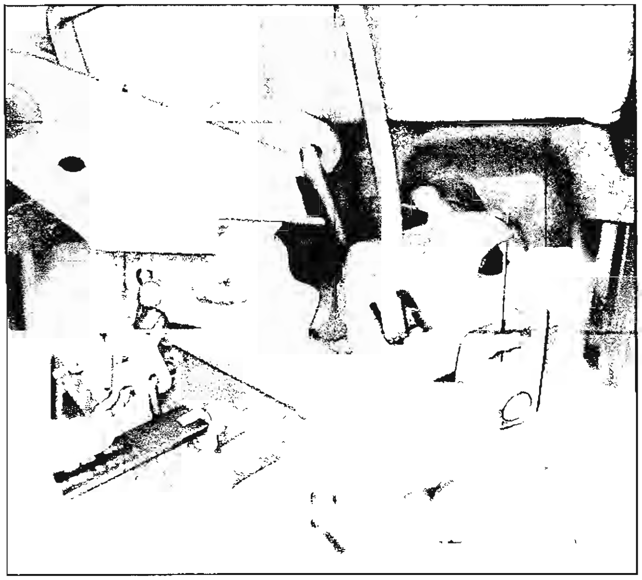

Fig. 62—Secondary Throttle Lockout Adjustment

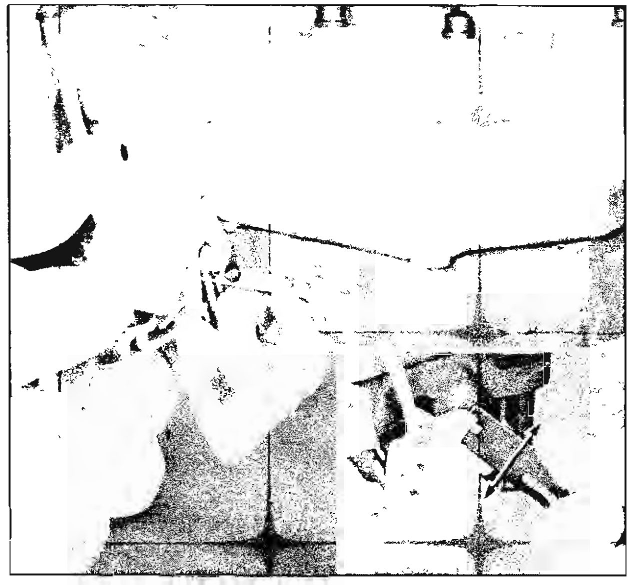

Fig. 63—Secondary Contour Adjustment

4. Open choke valve and open secondary throttle slightly to position lockout lever over fast idle cam, Figure 63.

5. Measure clearance between lever and cam in this position with .015" Wire Gage, J-21608, and bend with Tool J-6058 to obtain specified clearance.

CARTER AFB CARBURETOR

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GENERAL DESCRIPTION

The Carter AFB (Aluminum Four-Barrel) Carburetor (fig. 64) is used as standard equipment on 409 cubic inch engines and as a high performance option on the 327 cubic inch engine. This carburetor is a 4-barrel downdraft type which provides the advantages of a dual 2-barrel installation in one compact unit. It is used in conjunction with a dual exhaust system on both engines.

A clean air system to the automatic choke housing minimizes any tendency toward sticking parts due to dirt.

Clean air is drawn from an adapter tube in the carburetor air horn through a tube to the manifold choke heat tube, then through another tube to choke housing cover.

The 409 engine uses a fuel bypass line to the fuel tank from a metered fitting at the fuel filter. Continual flow through the bypass serves to maintain a cooler fuel supply at carburetor.

MAINTENANCE AND ADJUSTMENTS

FUEL FILTER (Fig. 65)

The fuel filter used with AFB Carburetors is a separate glass bowl unit installed between carburetor inlet and fuel line to carburetor.

1. Loosen male nut, then remove the glass bowl and paper filter element.
2. Replace filter element.
3. Reinstall with new gasket.

ADJUSTMENTS ON THE CAR

All adjustments listed below can be done without removing the carburetor from the engine. They should be performed in the following sequence:

1. Accelerator Linkage
2. Idle Speed and Mixture
3. Automatic Choke
4. Fast Idle

If trouble cannot be corrected with previous adjustments, continue with the following adjustments:

5. Float
6. Intermediate Choke Rod
7. Accelerator Pump
8. Unloader
9. Closing Shoe
10. Secondary Throttle Opening
11. Secondary Throttle Lockout
12. Repeat Adjustments 1, 2 and 3

Accelerator Linkage

The length of the throttle linkage is adjustable to assure wide-open throttle with full accelerator pedal depression. To check, depress accelerator pedal fully and check to see if throttle is wide open. If not, adjust threaded swivel at throttle lever to suit. With the accelerator pedal fully depressed and the carburetor throttle valve fully open the threaded swivel should be adjusted for free entry into the throttle lever (fig. 66). The swivel should then be turned two full turns to lengthen the control rod.

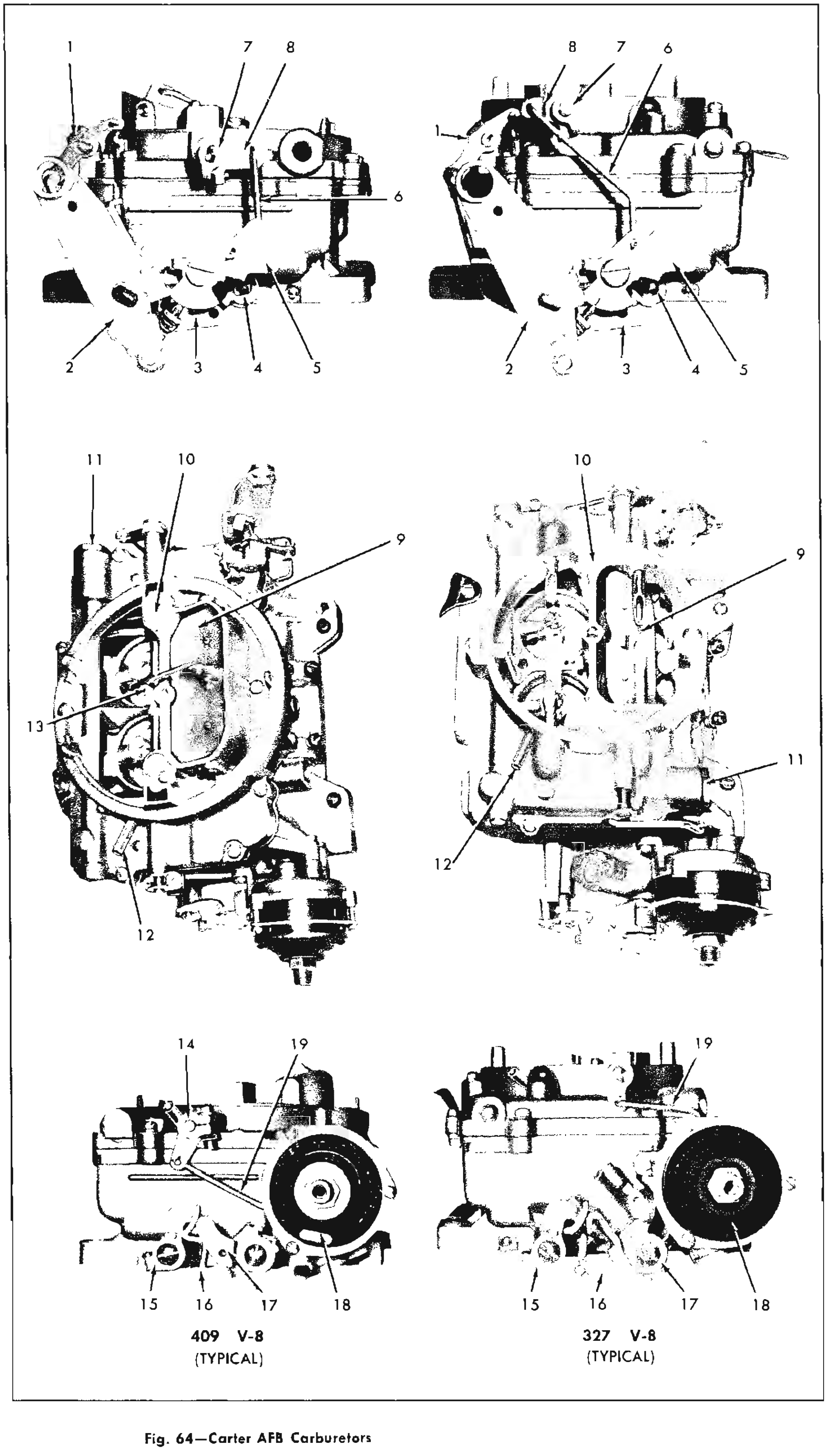
Idle Speed and Mixture

NOTE: Idle mixture adjustment should be performed with air cleaner installed.

1. Connect tachometer and vacuum gauge to engine. Set parking brake. Start engine, allow to idle and place transmission in neutral on manual shift and drive on automatic models.
2. With a thoroughly warmed-up engine, check to see that choke is fully off and carburetor is on slow idle.
3. Adjust idle speed adjustment screw (fig. 67) to give proper idle speed shown in tune-up chart.
4. Adjust each idle mixture adjustment screw to give peak steady vacuum at given idle speed.

Automatic Choke

Make sure the scribe mark on the coil housing is in line with the center notch in the choke housing (fig. 68).



1. Pump Lever
2. Primary Throttle Shaft Lever
3. Secondary Throttle Lockout Lever
4. Secondary Throttle Shaft Lever
5. Fast Idle Cam
6. Fast Idle Rod
7. Choke Shaft Outer Lever
8. Choke Shaft Kick Lever
9. Choke Valve
10. Piston Cover Plate
11. Fuel Inlet Fitting
12. Choke Clean Air Pickup Tube
13. Choke Valve Actuating Link
14. Choke Actuating Shaft Clamp Lever
15. Secondary Throttle Shaft Dog Lever
16. Secondary Throttle Trip Lever
17. Primary Throttle Shaft Lever
18. Choke Coil & Housing Cover
19. Intermediate Choke Rod

Fig. 64—Carter AFB Carburetors

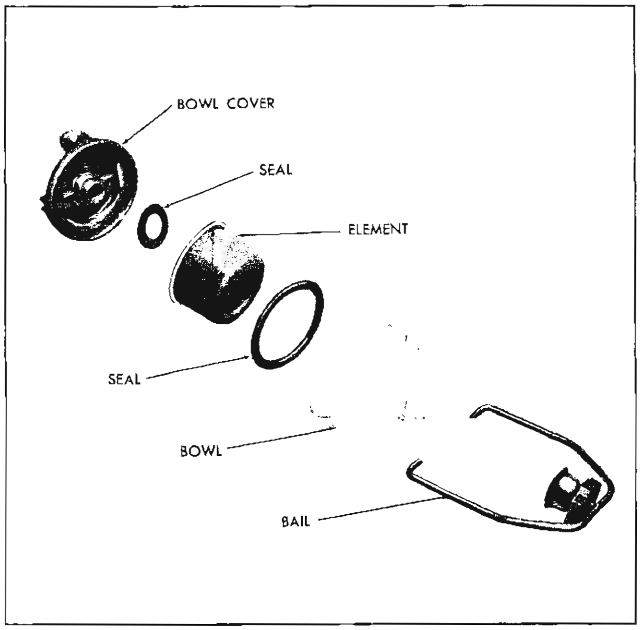


Fig. 65—Fuel Filter Assembly

Fast Idle

(Refer to Figure 69)

1. While holding choke valve closed, fast idle cam index mark should line up with fast idle adjustment screw. If necessary, bend fast idle rod at lower angle (using Tool J-5197) to adjust.
2. Start engine and attach tachometer. With fast idle screw on index of cam, adjust fast idle screw to obtain approximately 1750 rpm with warm engine.

Float

1. Remove air cleaner.
2. Disconnect intermediate choke rod, fast idle rod and accelerator pump rod at levers on bowl cover.
3. Remove step-up piston cover plates, pistons and metering rods (fig. 70).
4. Remove bowl cover attaching screws and carefully remove bowl cover (figs. 71 and 72).
5. Align Float. Sight down side of float to determine if side is parallel with outer edge of air horn. If adjustment is necessary, bend float lever by apply-

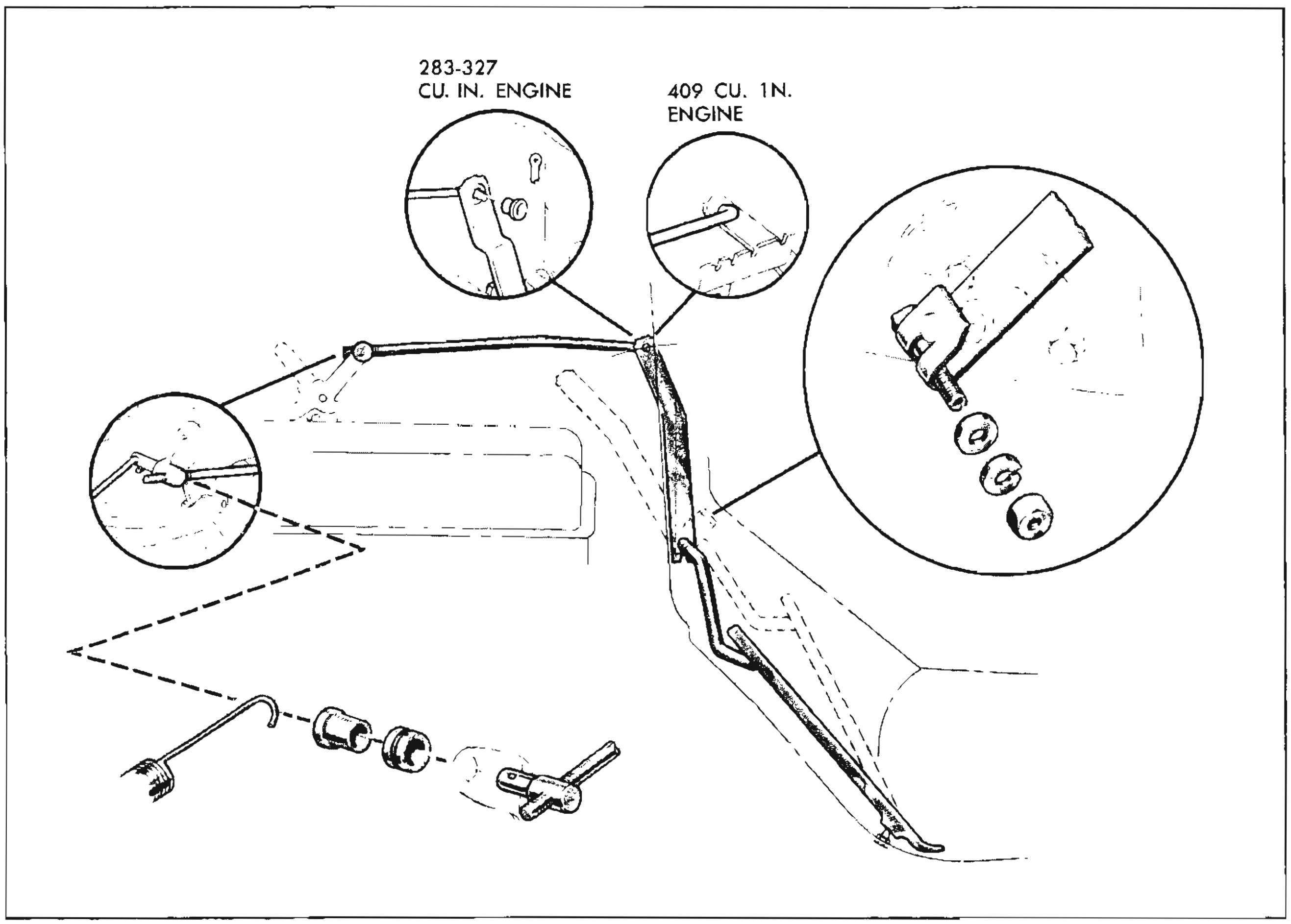


Fig. 66—Accelerator Linkage—V-8 Engine

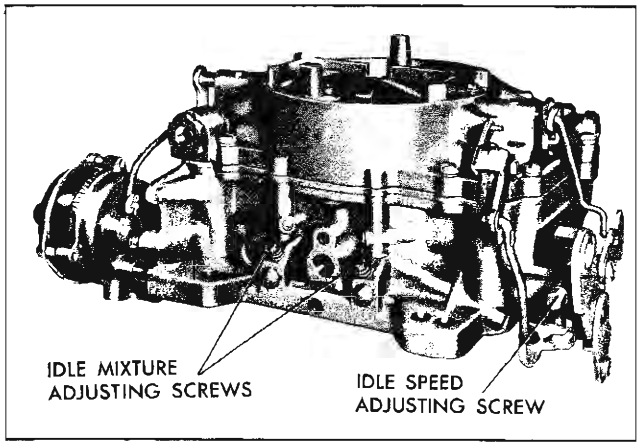


Fig. 67—Idle Speed and Mixture Adjustments

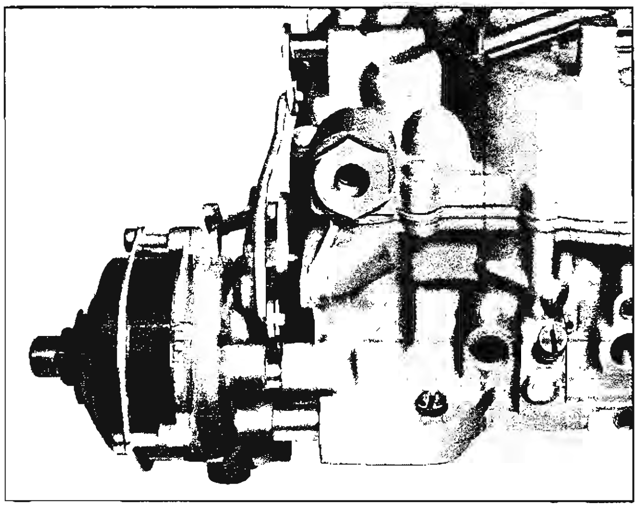


Fig. 68—Automatic Choke Adjustment

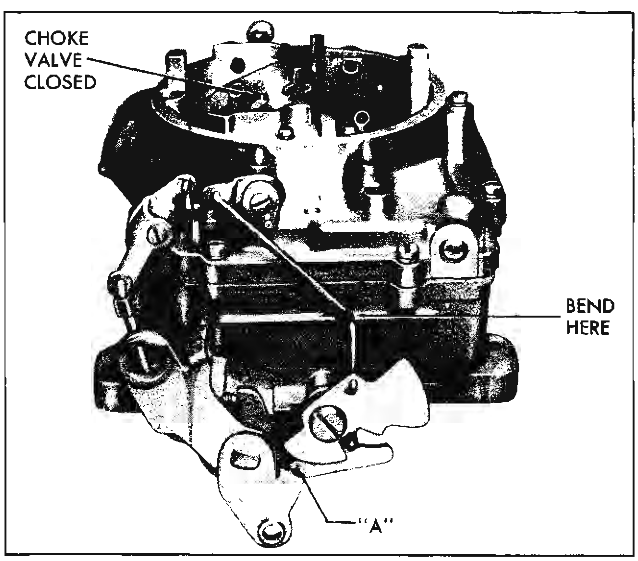


Fig. 69—Fast Idle Adjustment

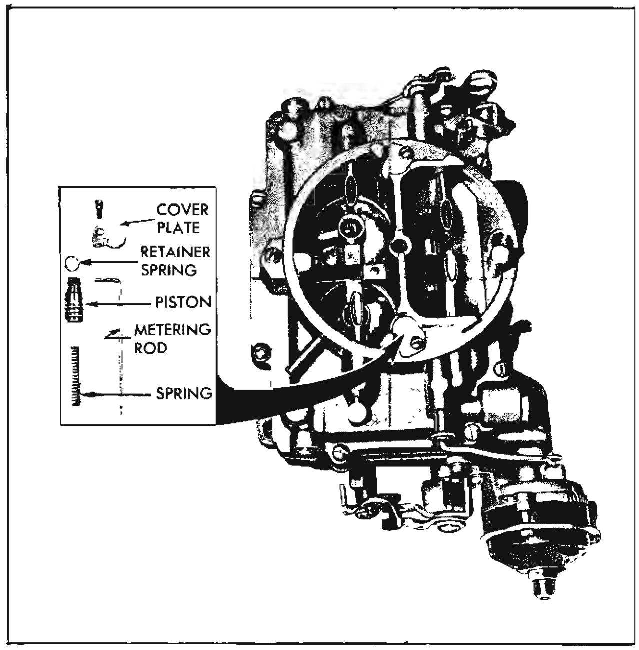


Fig. 70—Metering Rod Removal

ing pressure to end of float with fingers while supporting float lever with thumb (fig. 73).

Remove any excess clearance between arms of float lever and lugs on air horn by bending float lever arms. Arms should also be parallel to inner surface of lugs. After aligning, each float must operate freely.

6. Adjust Float Level. With air horn inverted and air horn gasket in place, check clearance between each float (at outer end) and air horn gasket using Float Gauge J-9550 chain set (7/32″) or a 7/32″ drill (fig. 74). To adjust, bend float lever. After any adjustment, recheck float alignment.

7. Adjust Float Drop. With air horn held in upright position, measure vertical distance from air horn gasket to outer end of each float using a scale. Bend float arm tang as required to obtain 3/4″ measurement (fig. 75).

8. Reverse Steps 1, 2, 3 and 4 to reassemble.

Intermediate Choke Rod

1. Remove three choke coil housing screws and remove retainer ring, and choke coil housing assembly.

2. Remove coil housing gasket and baffle plate.

3. Open choke valve and insert .026″ wire gauge, J-9550 between bottom of slot in piston and top of slot in choke piston housing (fig. 76). Close

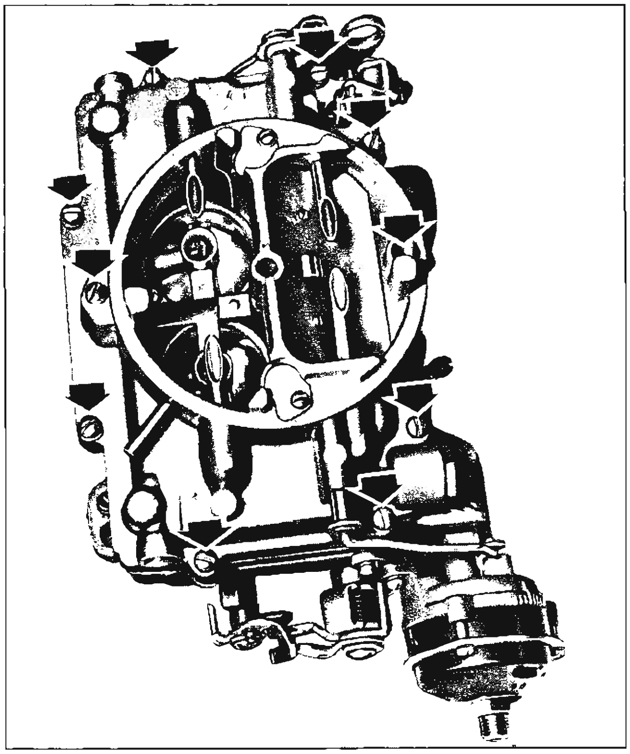


Fig. 71—Bowl Cover Attaching Screws

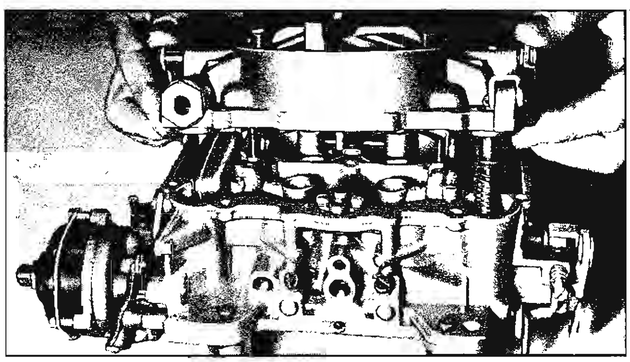


Fig. 72—Removing Bowl Cover

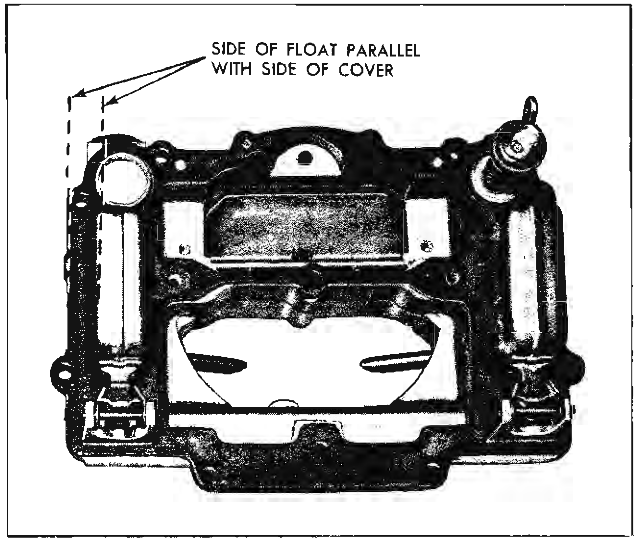


Fig. 73—Aligning Floats

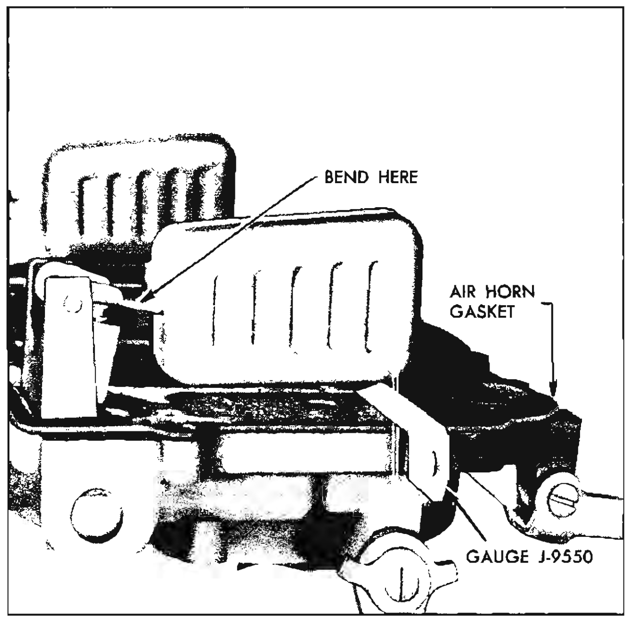


Fig. 74—Adjusting Float Level

choke piston against this gauge (using a rubber band doubled will keep tension of piston against wire gauge leaving one hand free for adjustment while gauging choke valve, and check clearance between top of choke valve and web of air horn casting, using proper J-9550 wire gauge for each carburetor (see specifications).

4. If adjustment is required bend intermediate choke rod using Bending Tool J-4552 on 327 AFB. On 409 AFB loosen choke control shaft clamp lever screw and rotate lever on shaft, then tighten screw.
5. Remove gauges and rubber band from choke piston lever.
6. Install choke baffle plate, gasket and thermostatic coil housing assembly retainer ring and screws.
7. Adjust index on coil housing to index on choke housing.

Accelerator Pump

Push fast idle cam aside and back out throttle stop screw until throttle valves seat in throttle bores. Measure from air horn to top of plunger shaft with scale.

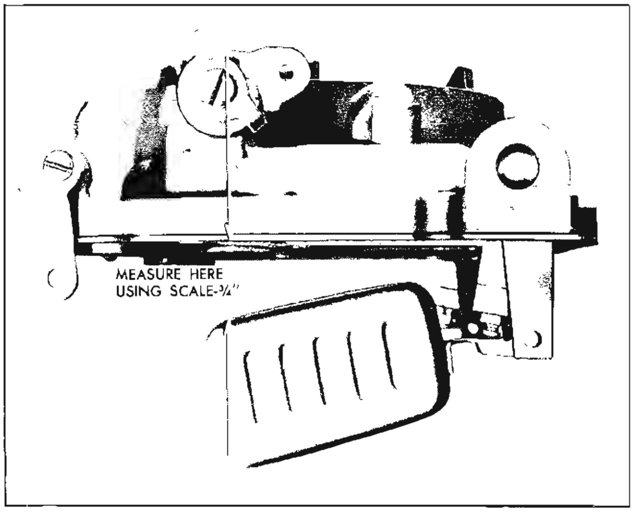


Fig. 75—Adjusting Float Drop

Bend pump rod at lower angle as required to obtain ½" measurement using Tool J-4452 (fig. 77). Turn throttle stop screw in (from fully closed throttle position ½ turn which should provide an initial idle adjustment.

Unloader

Hold throttle wide open and check clearance between upper edge of choke valve and inner wall of air horn using a $\frac{3}{16}$" drill. Bend unloader tang on throttle shaft lever as required to obtain clearance (fig. 78).

Closing Shoe

With primary and secondary throttle valves closed, check clearance between positive closing shoes on primary and secondary throttle levers using chain gauge J-9550 or a .020" feeler gauge. Bend secondary closing shoe as required to obtain this clearance (fig. 79).

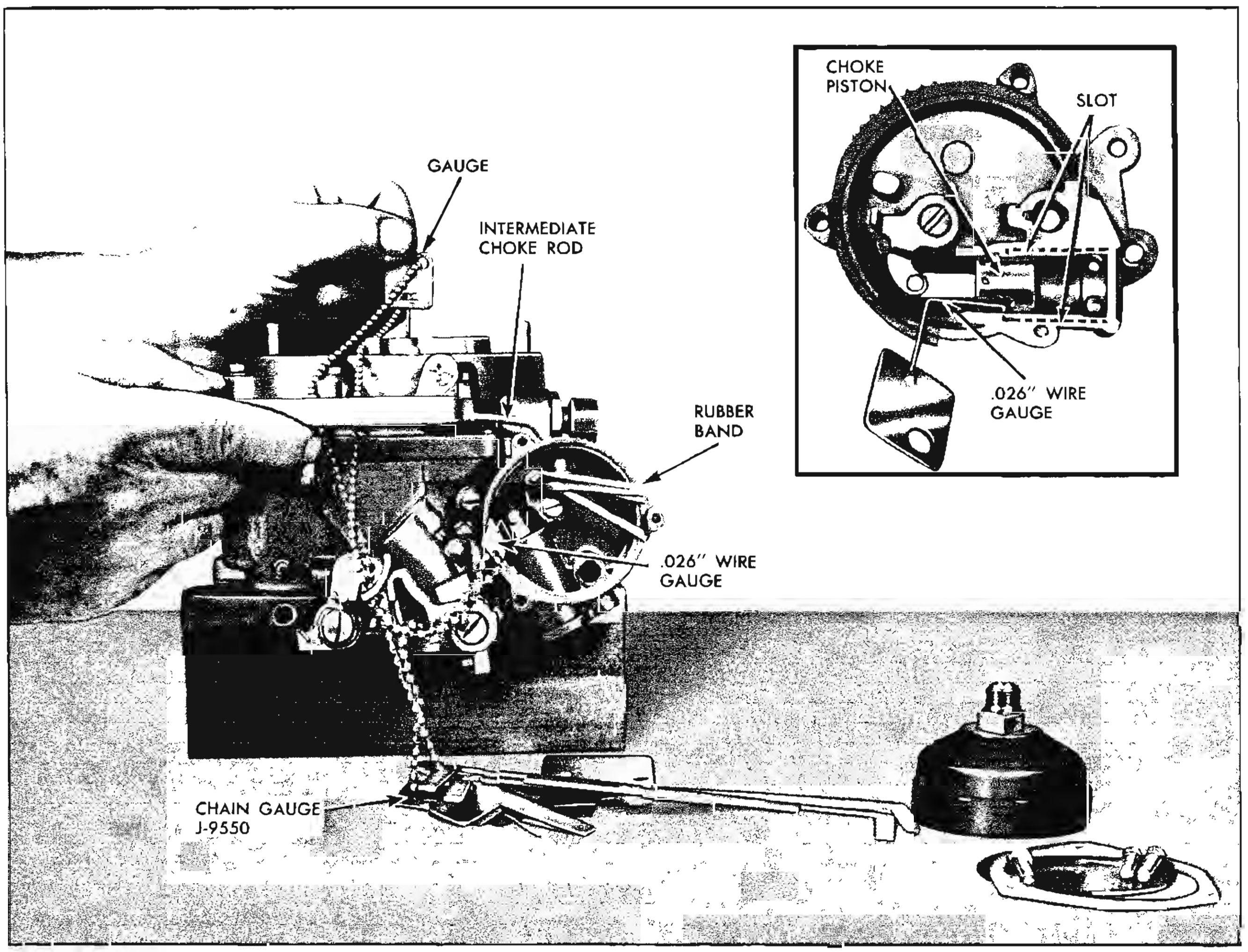


Fig. 76—Intermediate Choke Rod Adjustment

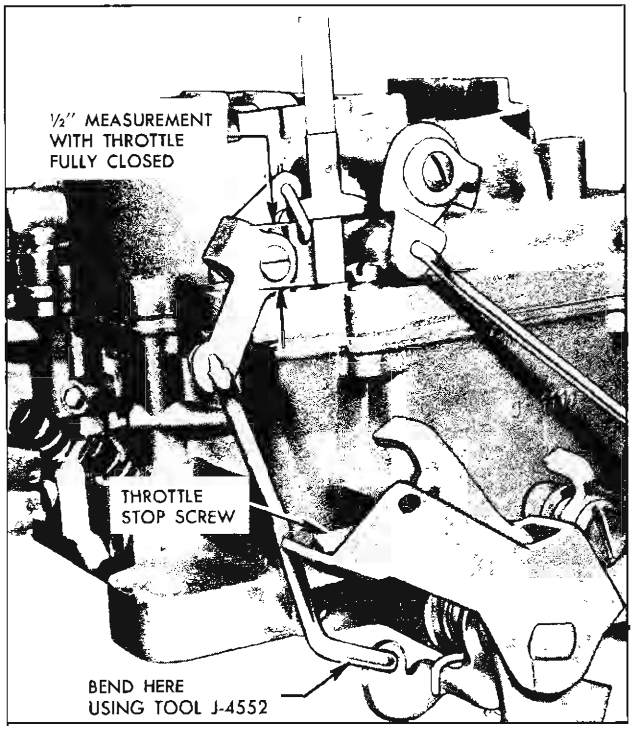


Fig. 77—Pump Adjustment

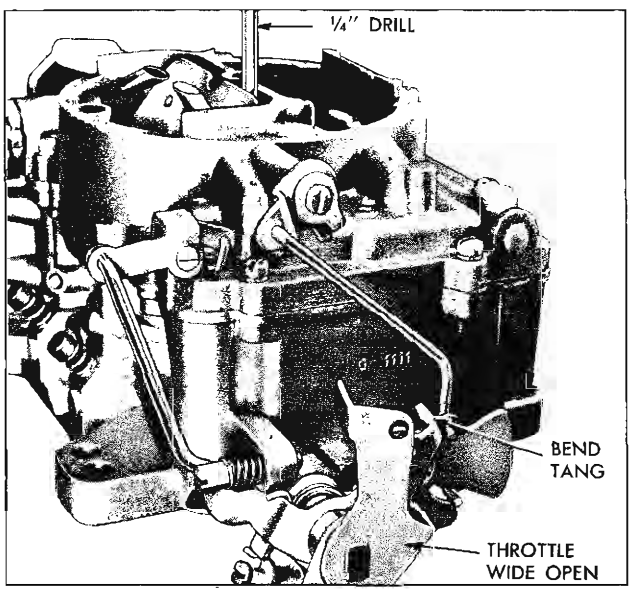


Fig. 78—Unloader Adjustment

Secondary Throttle Opening

The pick-up lever located on the primary throttle shaft has two points of contact with the loose lever on the primary shaft. Caution should be taken that the pick-up lever contacts the loose lever at both points at the same time (fig. 80). If they do not make this conduct, bend pick-up lever to obtain proper engagement.

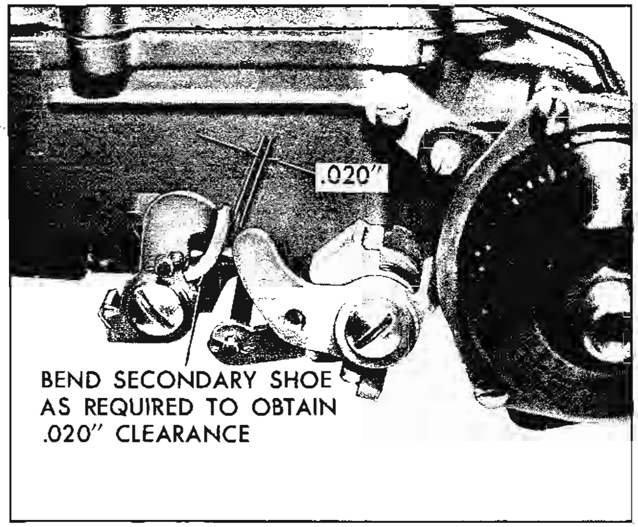


Fig. 79—Closing Shoe Adjustment

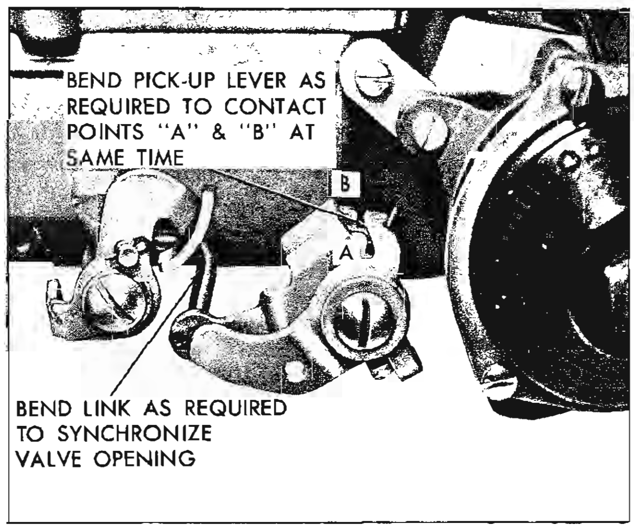


Fig. 80—Secondary Throttle Opening Adjustment

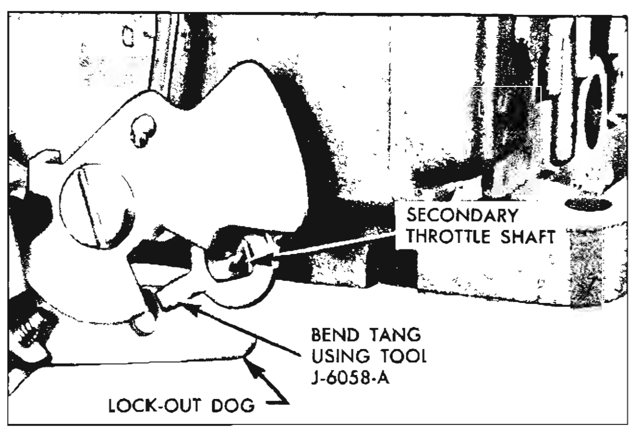


Fig. 81—Secondary Throttle Lock-Out Adjustment

The primary and secondary throttle valve must come to the wide open position simultaneously. If the secondary throttle valve opening is not synchronized with that of the primary, bend the connecting link.

Secondary Throttle Lock-Out

Open primary throttle valves slightly and manually open and close choke valve. Tang on secondary throttle lever should freely engage in notch of lockout dog while barely missing edge of notch. If necessary to adjust, bend tang on secondary throttle lever using Tool J-9550 (fig. 81).

Additional Adjustments

If additional adjustments are necessary, repeat accelerator linkage, idle speed and mixture, automatic choke and fast idle adjustments.

SERVICE OPERATIONS

REMOVAL FROM ENGINE

1. Remove air cleaner, gasket and stud.
2. Disconnect vacuum, fuel and choke pipes at carburetor. (On models equipped with positive ventilation, disconnect ventilation hose at fitting on carburetor base.)
3. Disconnect accelerator rod and throttle return spring at carburetor. (On automatic transmission models, disconnect TV rod at carburetor.)
4. Remove mounting nuts and lift carburetor from manifold.

DISASSEMBLY

Bowl Cover Components

(Refer to Fig. 82)

1. Remove retainer from upper end of pump rod and disconnect pump rod from arm.
2. (327) Remove hairpin clip from upper end of intermediate choke rod and disconnect rod.

   (409) Remove hairpin clip from upper end of fast idle rod and disconnect rod. Replace clip on rods for safe keeping.
3. (327) Remove screw from end of choke shaft and remove outer lever and washer. Then remove inner lever and fast idle rod from carburetor as an assembly.

   (409) Loosen choke control shaft clamp lever screw and remove lever and intermediate choke rod from carburetor as an assembly.
4. Remove screws holding two step-up position cover plates to air horn and remove cover, piston, step-up rod and spring (fig. 70).
5. Remove fuel inlet fitting, gasket and strainer. Remove bowl cover screws and carefully lift cover from Body Section (fig. 72) to avoid damaging floats or pump plunger.
6. Remove float lever pins and floats. Remove float needles, seats and gaskets. Keep float system parts separate so they may be reinstalled with minimum adjustment.
7. Remove pump plunger lever screw and lever. Remove "S" link and plunger. Remove cover gasket.

   Ordinarily the carburetor bowl covers are disassembled as far as is necessary during an overhaul procedure. The choke valve and shaft (or shafts) should not be removed unless shaft is binding or valve is damaged. If either condition exists, disassemble as follows:
8. (327) File choke valve screws (staked ends) level with shaft to avoid damaging threads in shaft; then remove the screws and choke valve. Slide shaft from cover.

   (409) Remove link from choke valve end and rotate to remove from control shaft. Proceed as above to remove choke valve and shaft. To remove choke control shaft, remove link lever screw and slide shaft from cover.

BODY COMPONENTS

(Refer to Fig. 83)

1. Remove accelerator pump lower spring.
2. Check the fuel in the bowl for contamination by dirt, gum or other foreign matter, then empty fuel from bowl.

   NOTE: A magnet swept around the bottom of the bowl while fuel is still present will pick up iron oxide dust or metal particles which have a tendency to cause leakage at needle seats.
3. Remove choke housing cover retainer, cover, cover gasket, and baffle plate.
4. Remove choke housing mounting screws and housing. Remove "O" ring seal from vacuum opening of housing mounting boss.
5. Remove choke piston lever screw and remove piston and two levers.
6. Remove pump cluster attaching screws, pump cluster and gasket. Remove pump discharge needle.
7. Remove venturi cluster attaching screws and clusters. (On 327 carburetor also remove idle compensator over secondary clusters.)

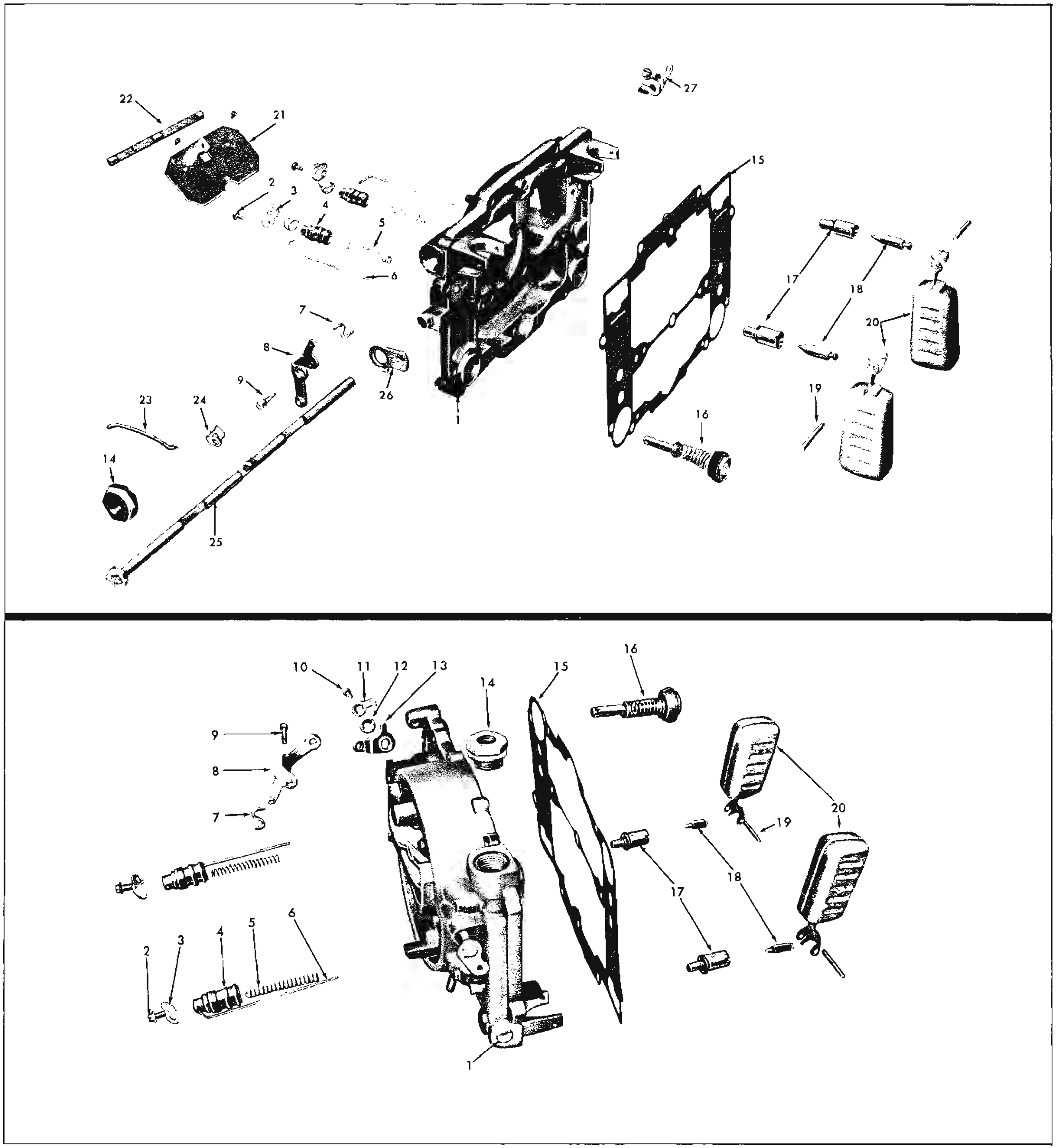


Fig. 82—Bowl Cover Components

1. Bowl Cover Assembly
2. Screw
3. Piston Cover Plate
4. Power Piston
5. Spring
6. Metering Rod
7. Pump Link
8. Pump Lever
9. Pump Lever Pivot Screw
10. Screw
11. Choke Shaft Outer Lever
12. Washer (Spacer)
13. Choke Shaft Kick Lever
14. Fuel Inlet Fitting
15. Cover Gasket
16. Pump Plunger Assembly
17. Float Needle Seat
18. Float Needle
19. Float Hinge
20. Float
21. Choke Valve
22. Choke Valve Shaft
23. Choke Valve Actuating Link (409 only)
24. Choke Valve Actuating Shaft Lever (409 only)
25. Choke Valve Actuating Shaft (409 only)
26. Kick Lever (409 only)
27. Choke Actuating Shaft Clamp Lever

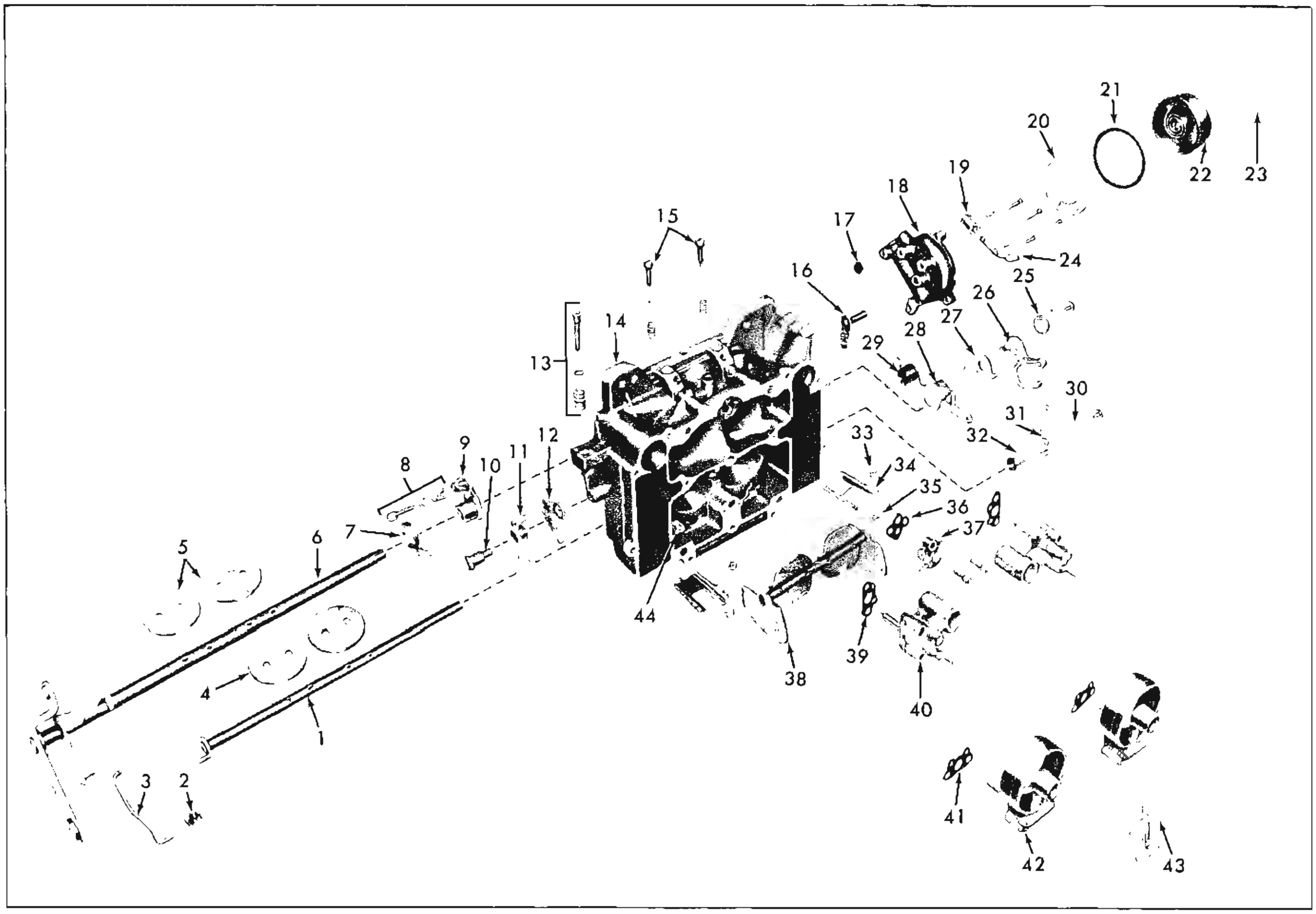


Fig. 83—Body Components

1. Secondary Throttle Shaft
2. Clip
3. Fast Idle Rod
4. Secondary Throttle Valve
5. Primary Throttle Valves
6. Primary Throttle Shaft
7. Primary Throttle Shaft Spring
8. Fast Idle Screw Assembly
9. Fast Idle Screw Plate
10. Screw
11. Fast Idle Cam
12. Secondary Throttle Lockout Lever
13. Idle Speed Screw Assembly
14. Carburetor Body
15. Idle Mixture Screws
16. Choke Piston Outer Lever
17. "O" Ring Seal
18. Choke Housing
19. Choke Piston
20. Choke Baffle Plate
21. Gasket
22. Choke Coil and Housing Cover
23. Retainer Ring
24. Choke Piston Inner Lever
25. Washer
26. Primary Throttle Shaft Arm
27. Throttle Shaft Spring Pick-Up Lever
28. Secondary Throttle Trip Lever
29. Spring
30. Washer
31. Secondary Throttle Shaft Dog Lever
32. Spring
33. Primary Metering Jet
34. Fuel Splash Shield
35. Secondary Metering Jet
36. Pump Discharge Nozzle Gasket
37. Pump Discharge Nozzle
38. Auxiliary Valves
39. Primary Venturi Cluster Gasket
40. Primary Venturi Cluster
41. Secondary Venturi Cluster Gasket
42. Secondary Venturi Cluster
43. Idle Compensator
44. Pump Inlet Ball and Check Valve

NOTE: Each venturi assembly is different and can be assembled to body in one location only.

NOTE: Primary venturi gaskets are different from secondary.

8. Lift secondary auxiliary valves from carburetor body.

9. Remove idle mixture screws and springs.

10. Remove all four metering jets.

NOTE: Primary metering jets are larger because metering rods (step-up rods) are used in them.

11. Remove pump intake check ball and seat assembly.

For normal cleaning and inspection, it is not necessary to disassemble the carburetor body any further. However, if throttle valves or linkage are worn or damaged, complete disassembly as follows:

12. Remove fast idle cam screw and cam.

13. Remove primary to secondary connecting link. Remove primary and secondary throttle dog lever screws and remove levers, and springs.

14. File off staked ends of throttle valve attaching screws and remove screws and throttle valves from bores. Slide throttle shafts from carburetor body.

CLEANING AND INSPECTION

The most frequent causes of carburetor malfunction are gum, dirt, carbon, and water. For this reason, carefully clean and inspect all parts and castings while the carburetor is being serviced.

1. a. Wash all parts in carburetor cleaning solution except coil housing assembly and pump plunger.
   b. Choke coil housing assembly should be cleaned in gasoline.
2. Inspect holes in all operating levers and castings for excessive wear.
3. Inspect bearing surfaces of all shafts for excessive wear.

NOTE: If excessive wear is noted to the extent of improper operation of the carburetor, the worn parts should be replaced.

4. Inspect floats for bad dents and/or possible leaks.
5. Inspect pump plunger leather for cracks or creases. To check pump system: Pour ½ inch of gasoline into carburetor bowl. Take pump plunger from can of gasoline or kerosene and slide into pump cylinder. Place the discharge check ball into body. Raise plunger and press lightly on shaft to expel air from the pump passage. Using a small clean brass rod, hold the discharge ball down firmly on its seat. Again raise plunger and press downward. No fuel should be emitted from either the intake or discharge passage. If any fuel does emit from either passage, the presence of dirt or a damaged check ball are indicated. Clean the passage again and repeat the test. If leakage is still present, replace the check valve.
6. If choke piston sticks in cylinder, remove welch plug in bottom of housing for inspection of cylinder and air slots. If carbon or dirt is present, remove carbon from cylinder with sandpaper (DO NOT USE EMERY CLOTH) and clean slots. Carefully install new welch plug. Be certain welch plug seat is carefully cleaned before installing new plug.

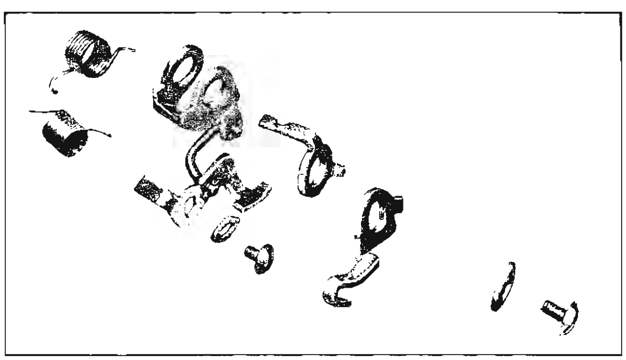


Fig. 84—Throttle Shaft Levers

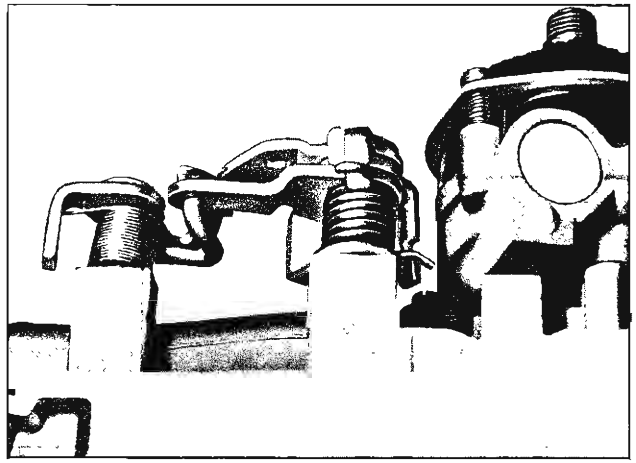


Fig. 85—Throttle Shaft Levers Installed

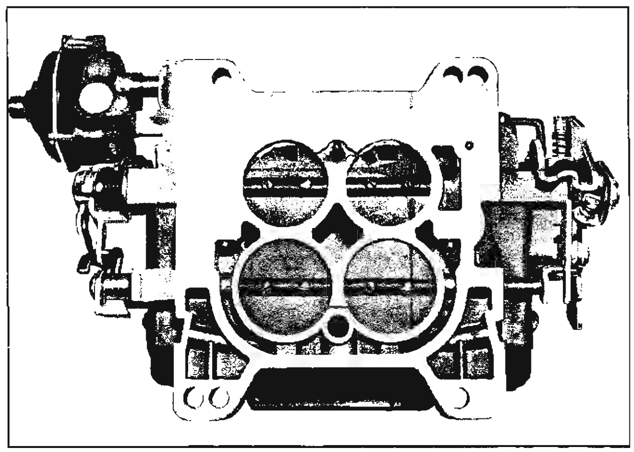


Fig. 86—Throttle Valve Position

NOTE: Removal of the welch plug to clean the choke piston housing should be done only if the choke piston does not move freely in its cylinder.

7. Inspect float needles and seals for burrs and ridges. If present, replace both the needle and seat; never replace either alone.
8. Inspect metering rods and jets. If either are bent, burred, or distorted, replace both rod and jet.
9. Inspect edges of primary and secondary throttle valves for gouges and other deformations. If these or any other conditions exist which would prevent full seating, replace the faulty valve.
10. Check pump plunger return spring and vacuum piston spring for weakness and distortion.
11. Inspect all mating surfaces of choke housing, bowl cover, carburetor body, and throttle flange for burrs, gouges, or other surface irregularities. All surfaces must be smooth to prevent leaks.

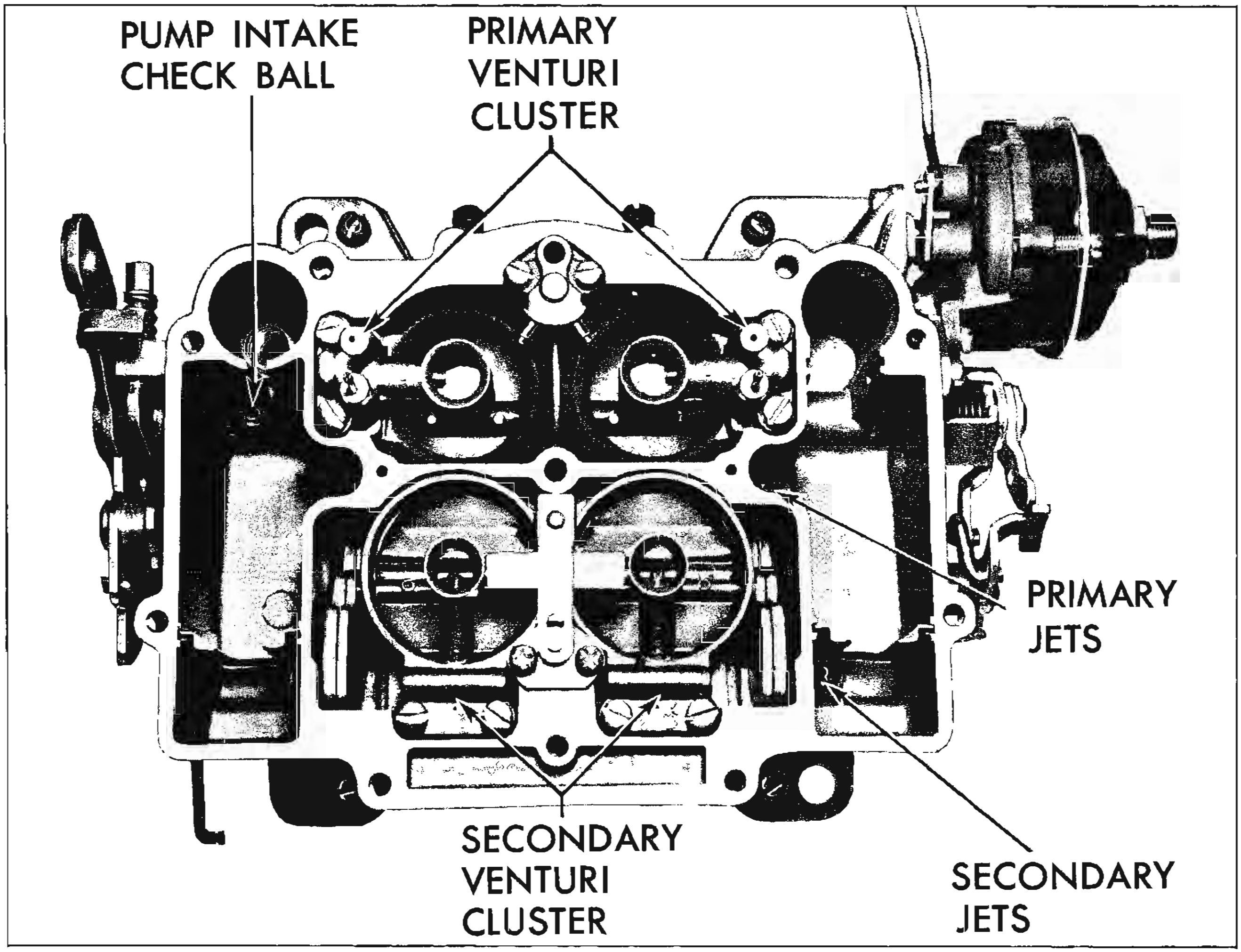


Fig. 87—Body Components

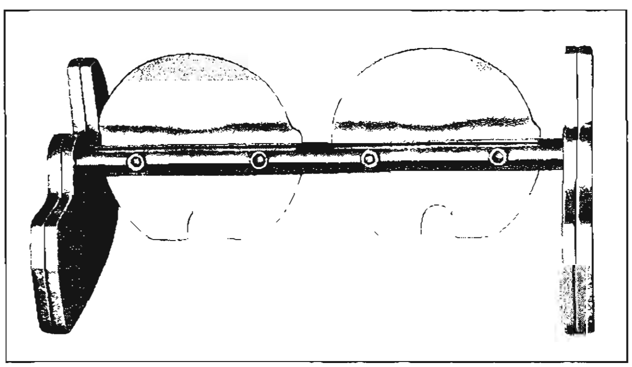


Fig. 88—Auxiliary Valve Assembly

ASSEMBLY ADJUSTMENT

During assembly of carburetor, use all new gaskets and any additional new parts found to be necessary during inspection. Calibrated parts must be as specified for carburetor CODE number which is stamped in red on mounting flange at rear center.

Carburetor Body

1. Install primary and secondary throttle shafts.
2. Install primary throttle shaft dog levers and spring (fig. 84).
3. Install secondary throttle shaft dog lever and spring. Wind spring one turn (fig. 85).
4. Install throttle valves in shafts with part number identification toward bottom of flange and secure with new screws (fig. 86).
5. Install pump intake check ball and ball seat assembly with a new gasket (fig. 87). Install primary and secondary metering jets and tighten securely.

NOTE: The primary jets are the two having the larger orifices.

6. Install pump discharge check needle point down. Install pump jet housing and gasket.
7. Install auxiliary valve assembly with screw heads

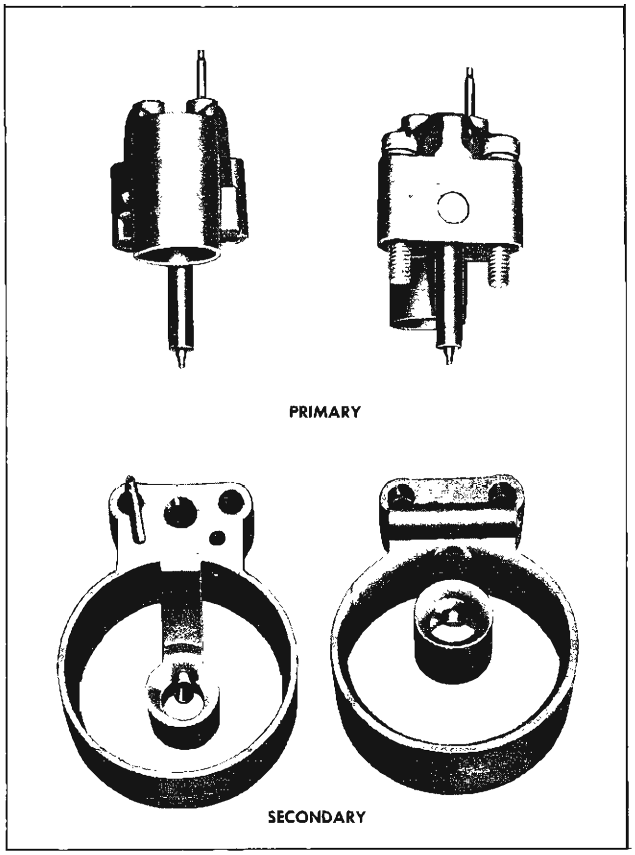


Fig. 89—Venturi Identification

down (fig. 88). Then install secondary and primary venturi assemblies, using new gaskets (fig. 89).

NOTE: If a primary venturi assembly does not fit in place, flush with top of main body, it belongs on the other side.

8. Install idle mixture adjustment screws. Seat lightly and back out 1½ turns, which will provide an average initial adjustment.
9. Install choke piston housing shaft, lever and rod assembly in piston housing with lever and rod pointing away from heat pipe connector. Install small round rubber gasket in housing recess, then install piston housing on main body using three screws. Install choke piston, pin link, and lever assembly in piston housing. Install piston lever on flats of shaft in such a way that inner and outer levers are pointing in same general direction. Then install special washer and screw.

Carburetor Bowl Cover

1. Place pump plunger assembly in position in air horn and install pump link. Install pin spring in upper end of link. Invert air horn and install new air horn gasket.
2. Install float needle seats and gaskets. Install float needles, floats, and lever pins, making sure they are installed in original locations.
3. Perform float adjustments as outlined under "Maintenance and Adjustments."
4. Place lower pump spring in pump well. Install bowl cover assembly on main body, using care to avoid distortion of floats. Install bowl cover screws and tighten evenly. (Two longer screws go in middle holes.) Install fuel inlet strainer in fuel inlet and install inlet in air horn.
5. Install choke shaft in air horn with attached lever toward choke piston housing. Install choke valve with markings up and install new screws loosely. Align choke valve by working choke shaft endwise while maintaining an upward pressure on choke shaft lever. Tighten and stake choke valve screws. Check for uniform clearance and freedom from sticking, as improper fit or binding may cause hard starting. Mechanism is free if choke valve will fall open from its own weight.
6. Install assembled fast idle rod and choke lever by first engaging fast idle rod in fast idle cam. Then place lever over end of choke shaft so that it points toward accelerator pump. Install special washer on shaft and then install choke shaft outer lever so that tang on outer lever is above tang on inner lever when choke valve is open.
7. Install two step-up piston springs. Install each assembled step-up piston, rod and rod retainer spring. Carefully push down on each step-up piston and rod until rod enters metering jet. Use care to avoid bending metering rods. Then install cover plates, holding plates down while tightening screws.
8. Install upper end of pump rod in pump arm.
9. Install upper end of choke rod in choke shaft lever, using pin spring on rod.
10. Perform the following adjustments as described in "Maintenance and Adjustments."
    - Accelerator Pump
    - Intermediate Choke Rod Adjustment
    - Automatic Choke Adjustment
    - Fast Idle Rod
    - Unloader
    - Closing Shoe
    - Secondary Throttle Opening
    - Secondary Throttle Lockout

TEST BEFORE INSTALLATION ON ENGINE

It is good shop practice to fill the carburetor bowl before installing the carburetor. This reduces the strain on the starting motor and battery and reduces the possibility of backfiring while attempting to start the engine. A fuel pump clamped to the bench, a small supply of fuel and the necessary fittings enable the carburetor to be filled and the operation of the float and intake needle and seat to be checked. Operate the throttle several times and check the discharge from the pump jets before installing the carburetor.

INSTALLATION

1. Be certain throttle flange and intake manifold gasket surfaces are clean.
2. Install new carburetor to manifold gasket over manifold carburetor studs.
3. Start vacuum line fitting into carburetor fitting.
4. Lower carburetor onto manifold studs, choke housing to right side of vehicle.
5. Install and tighten securely four nuts, using a short open end wrench.
6. Tighten vacuum line fitting and connect and tighten choke heat tube, and fuel line.
7. Install throttle rod and throttle return spring.
8. Install air cleaner gasket, stud, air cleaner and two wing nuts. Tighten securely.
9. Adjust idle speed and mixture.
10. Adjust fast idle.

DUAL CARBURETORS (409 ENGINE)

RPO 587 (409 cubic inch) engine is equipped with two Carter AFB carburetors. The rear carburetor only is equipped with an automatic choke and clean air system (fig. 90). These carburetors are similar to the single 4 barrel AFB. Follow service and adjustment procedures outlined for single AFB installation except as follows:

ACCELERATOR LINKAGE ADJUSTMENT

1. Remove carpet adjacent to area around accelerator pedal to allow for clearance and measurement between toe-board and accelerator pedal.
2. Remove air cleaner (fig. 91) and both throttle pullback springs.
3. Disconnect front carburetor throttle rod at rear carburetor.
4. With rear carburetor at wide open throttle, accelerator pedal should be ½" to ¾" from the toeboard measured at middle of pedal.
5. If necessary to adjust, disconnect accelerator rod at carburetor and adjust swivel so it freely enters hole in carburetor throttle lever (fig. 92), then connect and secure accelerator rod with retainer clip.
6. With both carburetors held at wide open throttle, front carburetor throttle rod trunnion eye should slide freely over accelerator rod swivel pin.
7. If necessary to adjust, loosen trunnion lock nut and adjust trunnion, then tighten lock nut while holding

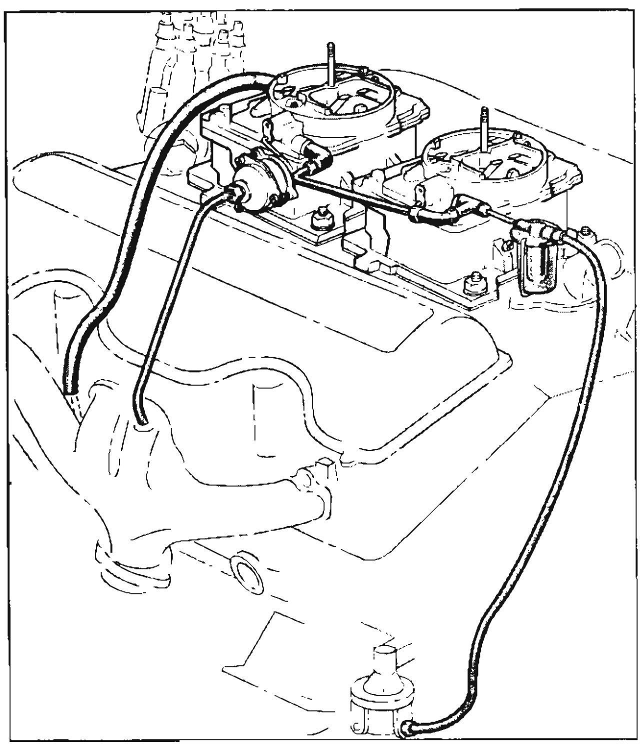


Fig. 90—Carburetor Installation

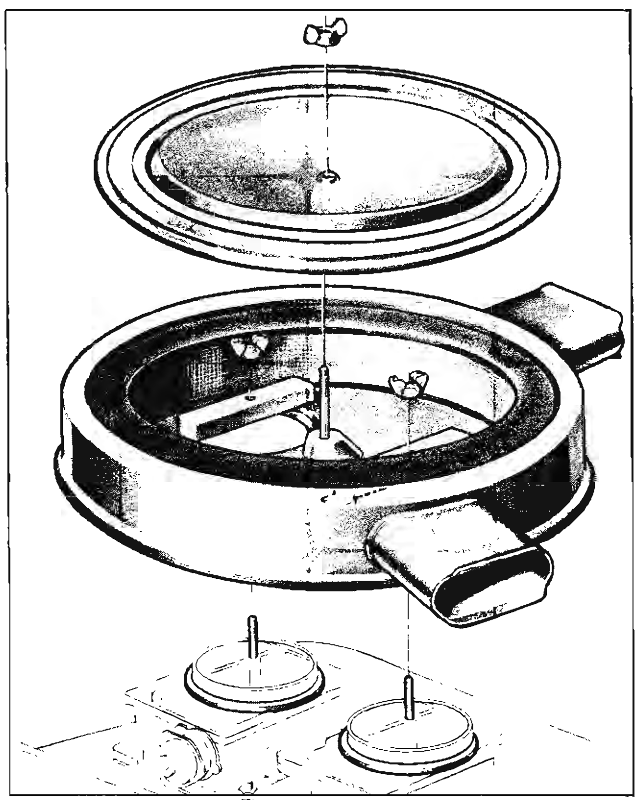


Fig. 91—Air Cleaners

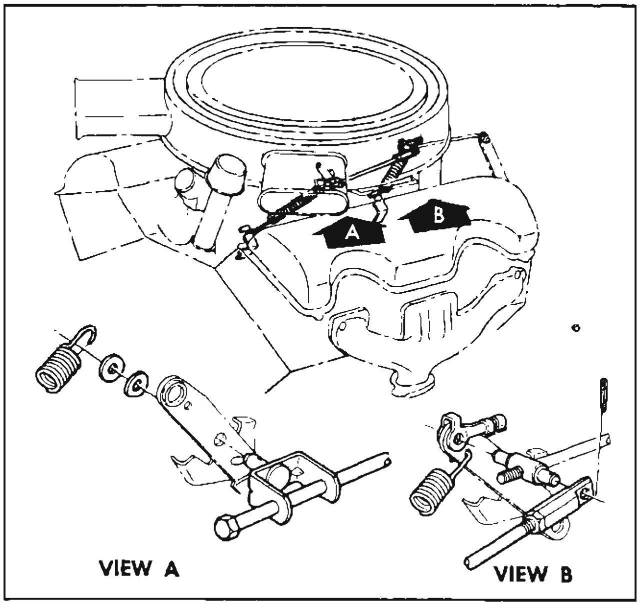


Fig. 92—Accelerator Linkage

front throttle rod hex head at front carburetor.

8. When linkage is properly adjusted, front carburetor will begin to open when rear carburetor is at approximately half throttle.

9. Reinstall accelerator return springs and air cleaner.

IDLE SPEED AND MIXTURE ADJUSTMENT

(Air Cleaner Removed)

1. Open and close throttle several times to make sure valves seat properly.
2. Connect tachometer and vacuum gauge.
3. As an initial adjustment, turn both mixture screws on rear carburetor equally ¾ turns open from their seats.
4. Back idle speed screw just off from throttle lever, then turn in 1½ to 2 turns as an initial setting.
5. With transmission in neutral, start engine and bring to normal operating temperature. Adjust both idle speed screws equally to obtain 750 rpm.
6. Adjust each idle mixture screw separately to obtain highest vacuum and engine rpm. Readjust idle speed screws equally to maintain idle speed while adjusting mixture screws.

NOTE: Best idle will be obtained by repeating above adjustment.

FAST IDLE ADJUSTMENT

Adjust fast idle (on rear carburetor only) to obtain 1750 rpm with fast idle screw aligned with index mark on fast idle cam.

AIR CLEANER

GENERAL DESCRIPTION

Paper element air cleaners are used on V-8 engines except RPO L-31, 409 cu. in. engine.

A new oil wetted polyurethane element air cleaner (figs. 50 and 51) is standard equipment on L-6 and 409 cu. in. (RPO L-31) engines. This type cleaner element is reusable and should be removed, cleaned, re-oiled and reinstalled at regular intervals (See Section 2). During dusty or other adverse driving conditions, the element should be cleaned more often.

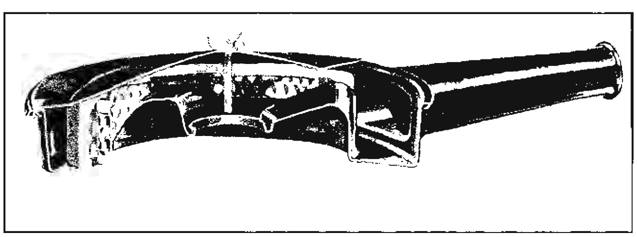


Fig. 93—Polyurethane Air Cleaner

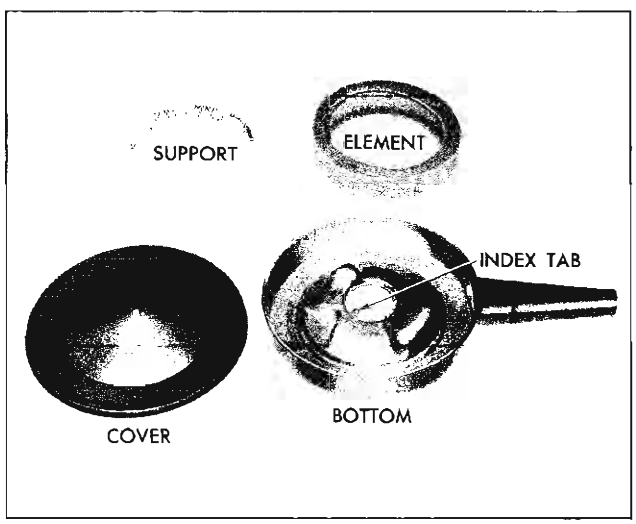


Fig. 94—Six-Cylinder Engine Air Cleaner

SERVICE OPERATIONS

Operations outlined in this section are for the polyurethane air cleaner only. For service procedures on paper element, refer to the 1961 Passenger Car Shop Manual.

POLYURETHANE ELEMENT AIR CLEANERS

1. Remove cover wing nut, cover and filter element.
2. Visibly check the element for tears or rips and replace if necessary.
3. Clean all accumulated dirt and grime from air cleaner body and cover. Discard air horn to air cleaner gasket.
4. Remove support screen from element and wash element in kerosene or mineral spirits; then squeeze out excess solvent (fig. 95).

   NOTE: Never use a hot degreaser or any solvent containing acetone or similar solvent.
5. Dip element into light engine oil and squeeze out excess oil.

   NOTE: Never shake, swing or wring the element to remove excess oil or solvent as this may tear the polyurethane material. Instead, "squeeze" the excess from the element.
6. Replace element onto screen support.
7. Using a new gasket, replace air cleaner body over carburetor air horn.
8. Replace the element in the air cleaners. Care must be taken that the lower lip of the element is properly placed in the assembly and that the filter material is not folded or creased in any manner that would cause an imperfect seal. Take the same precautions when replacing the cover that the upper lip of the element is in proper position.
9. Replace cover and wing nut.

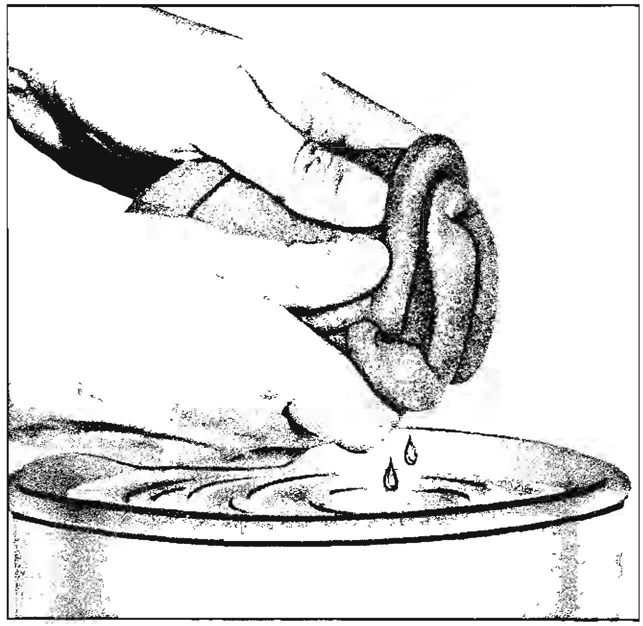


Fig. 95—Cleaning Polyurethane Element

FUEL PUMP

GENERAL DESCRIPTION

The V-8 fuel pump is essentially the same as in 1961. Refer to 1961 Shop manual for procedures.

The 6 cylinder engine fuel pump for 1963 engines incorporates a new seal, seal retainer and spring seat assembly similar to that used on Chevy II engines. Maintenance and adjustments are not changed but service procedures change as outlined below.

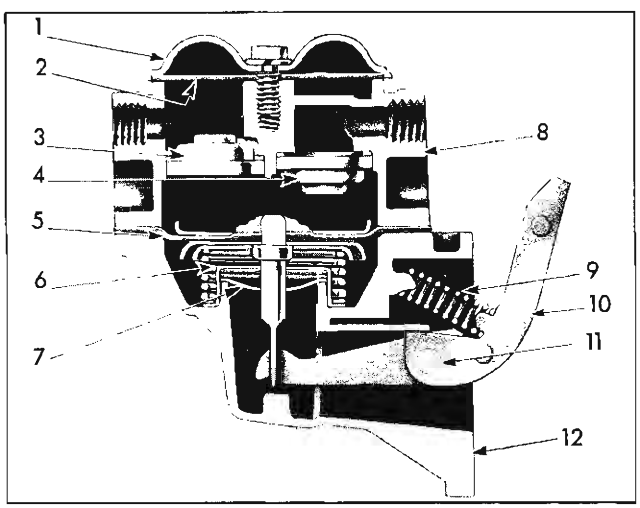


Fig. 96—Six Cylinder Engine Fuel Pump

1. Pulsator Cover
2. Pulsator Diaphragm
3. Outlet Valve
4. Inlet Valve
5. Diaphragm Assembly
6. Diaphragm and Seal Retainer
7. Oil Seal
8. Fuel Cover
9. Rocker Arm Return Spring
10. Rocker Arm and Lever Assembly
11. Pivot Pin
12. Pump Body

SERVICE OPERATIONS

FUEL PUMP

Removal

1. Disconnect fuel inlet and outlet pipes at fuel pump and fuel cover.
2. Remove two fuel pump mounting bolts and lock-washers, and remove pump and gasket.

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

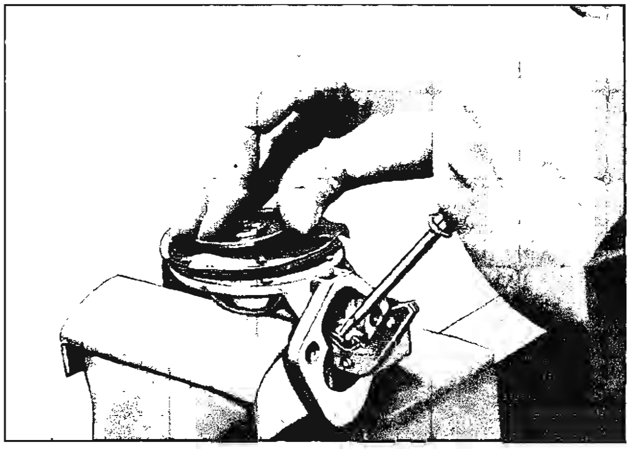


Fig. 97—Raising Fuel Link

Disassembly

1. Remove pulsator diaphragm cover and pulsator diaphragm from valve body and fuel cover by removing the bolt and lockwasher.
2. At this point in disassembly, it is important to mark the edges of the valve body and fuel cover and pump body with a file or other suitable means. The parts can then be reassembled in the same relative position for correct fuel line installation.
3. Remove valve body and fuel cover screws. Separate the valve body and fuel cover from the pump body by jarring cover loose with a light plastic hammer.
4. Raise the fuel pump link with a screwdriver (fig. 97). Unhook the diaphragm from the link by press-

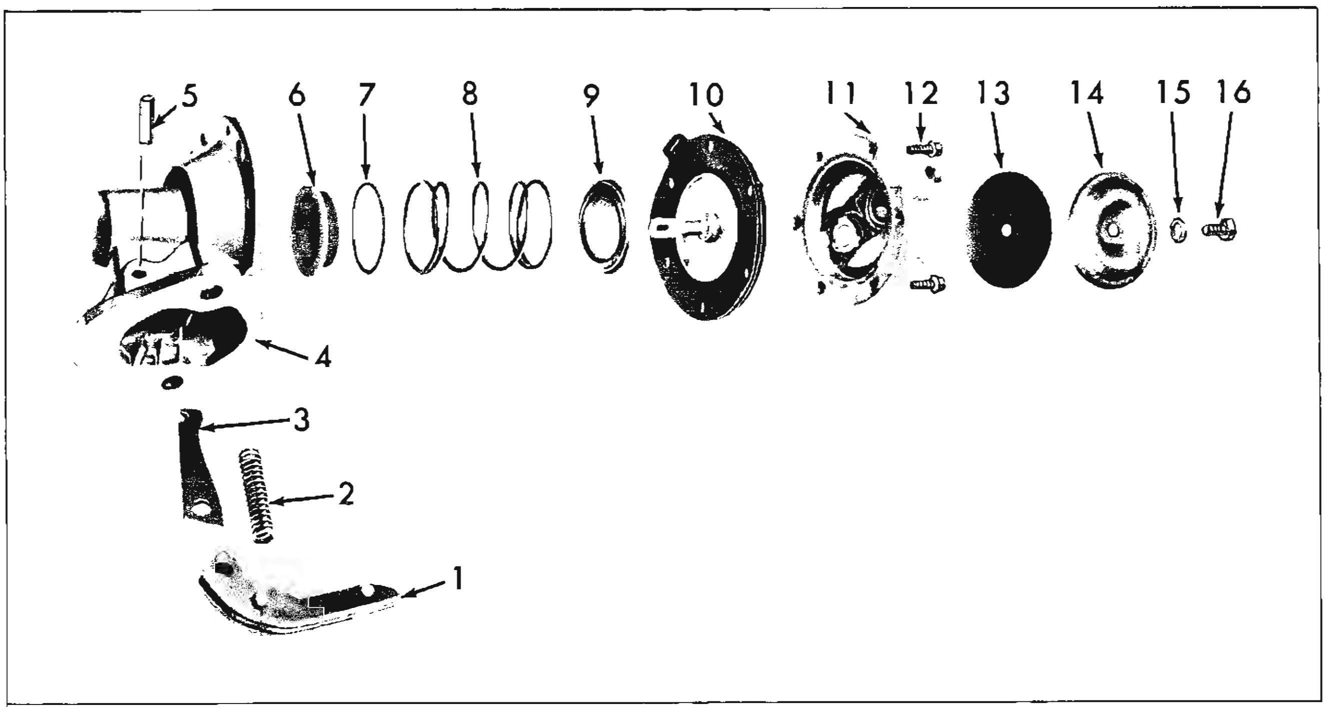


Fig. 98—Fuel Pump Components

1. Rocker Arm
2. Rocker Arm Return Spring
3. Actuating Lever
4. Pump Body
5. Arm and Lever Pivot Pin
6. Oil Seal
7. Oil Seal Retainer
8. Diaphragm and Seal Retainer Spring
9. Diaphragm Spring Seat
10. Diaphragm Assembly
11. Valve Body and Fuel Cover
12. Valve Body and Fuel Cover Screws
13. Pulsator Diaphragm
14. Pulsator Cover
15. Pulsator Cover Lockwasher
16. Pulsator Cover Bolt

ing down and away from the rocker arm side. Remove oil seal, retainer, spring and spring retainer.

NOTE: Figure 98 shows the fuel pump disassembled.

Cleaning and Inspection

1. Clean and rinse all metal parts in solvent. Blow out all passages with air hose.
2. Inspect pump body and fuel cover for cracks, breakage and distorted flanges. Examine all screw holes for stripped or crossed threads. Replacement of pump assembly is advisable if one of the main castings is not serviceable.
3. Inspect the rocker arm and link for excessive wear and for loose hinge pin.
4. Replace diaphragm.
5. Replace rocker arm spring and diaphragm and oil seal spring, as removed. Old springs may be distorted, weak or corroded.
6. Check the condition of the valves in the valve body and fuel cover by pushing each valve slightly off its seat with a thin rod or equivalent. Carefully inserted, a hooked wire through the inlet opening and move the fuel inlet valve off its seat. If a valve sticks to its seat, if it moves off its seat and does not rebound, or if the cage is damaged, the complete valve must be replaced. To remove the valves, clear the staked metal with a sharp chisel, file or suitable scraper and pull valve out with a hook shaped tool.

Assembly

1. Install the oil seal over the pump body opening, place the oil seal retainer over the lip of the oil seal and secure in place with the diaphragm and seal retainer spring.
2. With the seal, retainer and spring assembled, place the spring seat over the spring and carefully insert diaphragm into the pump body.

NOTE: It is extremely important to seal the pump from any leakage of oil that might come up from the crankcase. Make sure that the rubber seal and retainer are properly seated before assembling to the pump body.

3. Raise the pump lever with a screwdriver (fig. 97), install the diaphragm push rod and hook over the end of the lever.
4. If either valve was removed from the valve body and fuel cover, install by placing gasket in recess and pressing valve into place. See position of valves in Figure 96. Secure valve assembly by staking cover metal in four places around valve.
5. Place a new pulsator diaphragm over the fuel cover opening, install cover and retain with the bolt and lockwasher.
6. With the pump body and valve body and fuel cover assembled, install the valve body and fuel cover assembly to the pump body, making sure that the file marks on the fuel cover line up with those on the pump body.
7. Push on rocker arm until diaphragm is flat across the body flange. Install screws. Push rocker arm through its full stroke to flex diaphragm and hold in that position while tightening screws securely.

CAUTION: Diaphragm must be flexed to its full stroke while tightening cover screws or pump diaphragm protector will not be properly centered, resulting in diaphragm wear due to rubbing on pump body casting.

Installation

1. Install fuel pump gasket and fuel pump. Clean block opening for a good seal.
2. Connect fuel lines to pump.
3. Start engine and check for leaks.

TROUBLES AND REMEDIES

FUEL PUMP

Symptoms and Probable Cause	Probable Remedy
Fuel Pump Leaks—Fuel	
a. Loose housing screws.	a. Tighten housing screws.
b. Ruptured or torn diaphragm.	b. Install new diaphragm.
c. Loose fittings.	c. Tighten fittings
d. Stripped thread on inlet and outlet fittings.	d. Replace fittings.
Fuel Pump Leaks—Oil	
a. Hole in diaphragm.	a. Install new diaphragm.
b. Leak at mounting flange.	b. Install new mounting gasket and tighten fuel pump mounting bolts.
c. Damaged oil seal.	c. Replace oil seal.
Insufficient Fuel Delivery	
a. Loose fuel line fittings.	a. Tighten fittings.
b. Damaged diaphragm.	b. Install new diaphragm.
c. Cracked or broken fuel line.	c. Replace line.
d. Damaged or binding valves.	d. Clean or replace valves.
Fuel Pump Noise	
a. Pump loose at mounting.	a. Tighten fuel pump mounting bolt.
b. Worn rocker arm.	b. Replace.
c. Broken or weak rocker arm spring.	c. Install new rocker arm spring.

SPECIAL TOOLS

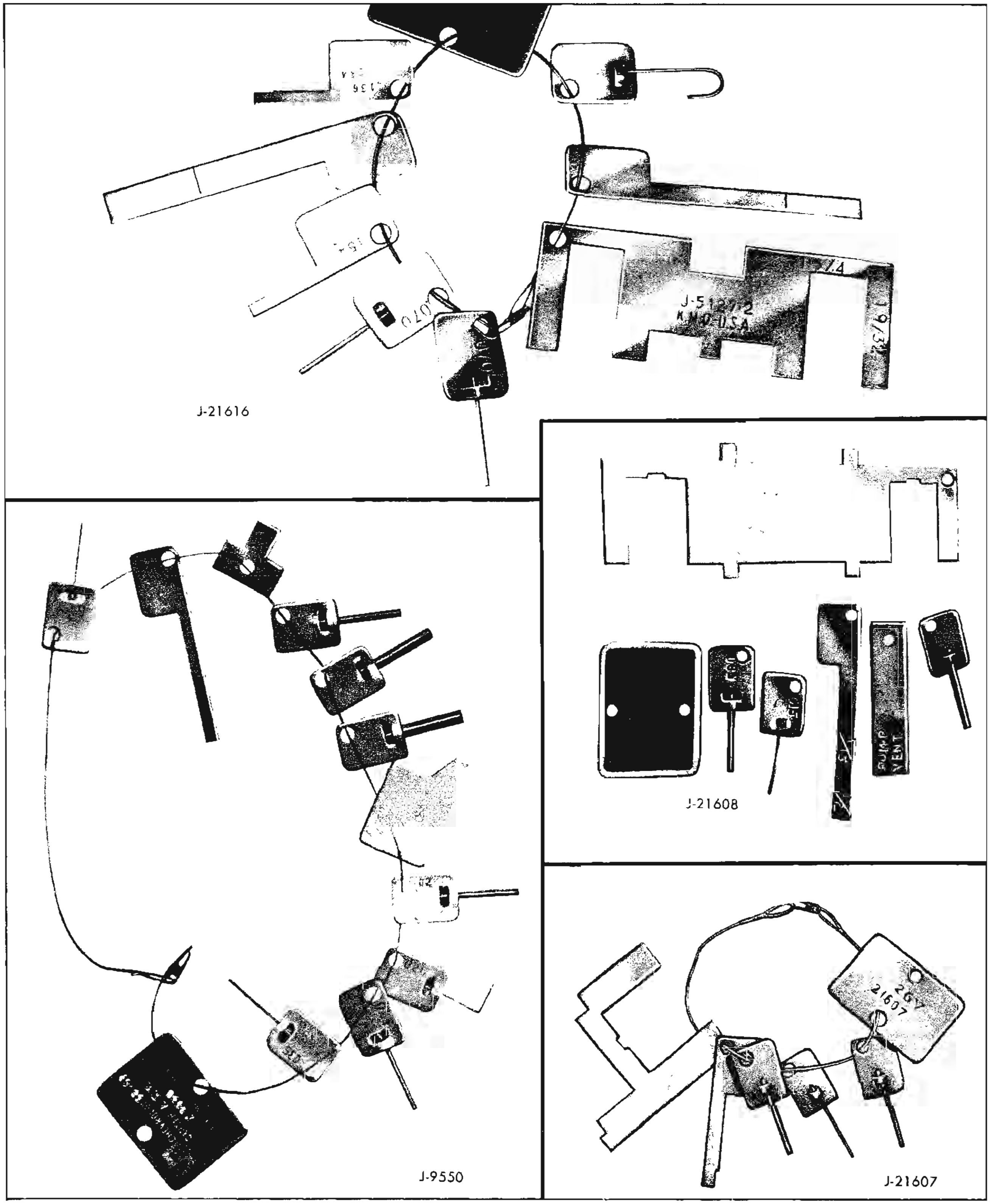


Fig. 99—Special Tools

SPECIFICATIONS

ROCHESTER CARBURETORS

CARBURETOR	Model	BC		2GV		4GC		4GC (Low Silhouette)	
	Part No.	7023000	7023003	7024101 7023007	7024100 and 7024102 w/Air Cond.	7024121 and 7024122 w/Air Cond. 327		7024123—Syn. 7024124—PG. 409 (RPO L-33)	
		230—P.G.	230—SYN.	238—SYN.	283—P.G.	Primary	Secondary	Primary	Secondary
Float Level		1 9/32"		1 23/64"		1 33/64"	1 33/64"	Heel—1½" Toe —13/16"	Heel—1 5/16" Toe — ½"
Float Drop		1¾"		1 29/32"		2¼"	2¼"	1½"	1⅛"
Pump Rod		—		57/64"		1 1/16"	—	1"	—
Idle Vent		.050 @ Idle Position		49/64"		31/32"	—	29/32"	—
Automatic Choke Setting		Normal Setting— 1 Rod. Dia. Interference to Lever		Normal Setting— ½ Rod Dia. Interference to Lever		Index	—	Index	—
Choke Rod		.050-.070"		.070"		.055"	—	.089"	—
Unloader		.350"		.187-.228"		.235"	—	.130"	—
Bowl Vents		3 Inside—1 External Idle		1 Inside—1 External Idle		4 Inside—1 External Idle		8 Internal—1 External	
Choke Piston Vacuum Break Adjustment		.154"-.173"		.108"-.133"	.080"-.105"	Piston Flush When Choke Valve Is Closed			
Main Metering Jet		—		.056"	.055"	.057"	.067"	Syn.—.062" P.G.—.063"	.080" .081"
Throttle Bore		1 9/16"		1 7/16"		1 7/16"	1 7/16"	1 9/16"	1 11/16"
Main Venturi		1 11/32"		1 3/32"		1⅛"	1¼"	1 5/16"	1 15/32"
Small Venturi		19/32"		⅛"		⅛"	¼"	¼"	¼"
Pump Discharge Jet		.025" (2)		.026"		.026"	—	.026" (2)	—
Idle Speed Jet (Idle Tube)		.059"		.029"	.027"	.026"	—	Syn.—.029" P.G.—.026"	.030" .030"

CARTER CARBURETORS

CARBURETOR MODEL	WCFB		WCFB		AFB		AFB		AFB		AFB			
	327—SYN.		327—P.G.		327—SYN.		327—P.G.		409—SYN.		409—2 x 4—Front		409—2 x 4—Rear	
	3846247 (3697S)		3846246 (3626S)		3851761 (3721S)		3751762 (3720S)		3827324 (3499S)		3815403 (3361S)		3815404 (3362S)	
	Primary	Secondary	Primary	Secondary	Primary	Secondary	Primary	Secondary	Primary	Secondary	Primary	Secondary	Primary	Secondary
Float Level	7/32"	¼"	7/32"	¼"	7/32"	7/32"	7/32"	7/32"	7/32"	7/32"	7/32"	7/32"	7/32"	7/32"
Float Drop	¾"	¾"	¾"	¾"	¾"	¾"	¾"	¾"	¾"	¾"	¾"	¾"	¾"	¾"
Pump Rod	½"	—	½"	—	½"	—	½"	—	½"	—	½"	—	½"	—
Idle Vent	3/32"	—	3/32"	—	—	—	—	—	—	—	—	—	—	—
Automatic Choke Setting	Index	—	Index	—	1 NL	—	1 NL	—	2 NL	—	—	—	2 N.R.	—
Choke Rod	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unloader	3/16"	—	3/16"	—	¼"	—	¼"	—	¼"	—	—	—	¼"	—
Fast Idle Setting	1750 rpm Hot on Car		1750 rpm Hot on Car		1750 rpm Hot on Car		1750 rpm Hot on Car	—	1750 rpm Hot on Car	—	—	—	1750 rpm Hot on Car	—
Throttle Lockout Adj.	.020	—	.020	—	.020	—	.020	—	.020	—	.020	—	.020	—
Bowl Vents	5 Inside 1 External Idle		5 Inside 1 External Idle		4 Inside 1 Outside		1 Outside 4 Inside	—	2 Outside 2 Inside	—	1 Outside 4 Inside	—	1 Outside 4 Inside	—
Choke Piston Vacuum Break Adj.	.060	—	.035	—	.070	—	.070	—	.190	—	—	—	.090	—
Main Metering Jet	.086	.0635	.086	.0635	.104	.0689	.104	.0689	.1015	.084	.1015	.0635	.1015	.0635
Metering Rod (Sizes)	.042 .067	—	.042 .067	—	.060 .069	—	.060 .069	—	.044 .060	—	.063 .069	—	.063 .069	—
Throttle Bore	1 7/16"	1 7/16"	1 7/16"	1 7/16"	1 9/16"	1 11/16"	1 9/16"	1 11/16"	1⅝"	1 11/16"	1 9/16"	1 11/16"	1 9/16"	1 11/16"
Main Venturi	1 1/16"	1¼"	1 1/16"	1¼"	1¼"	1 9/16"	1¼"	1 9/16"	1 11/32"	1 9/16"	1¼"	1 9/16"	1¼"	1 9/16"
Pump Discharge Jet	.021	—	.021	—	.028	—	.028	—	.028	—	.028	—	.028	—
Idle Speed Jet	.031	—	.031	—	.035	—	.035	—	.040	—	.053	—	.035	—

SECTION 11

CLUTCH

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GENERAL DESCRIPTION

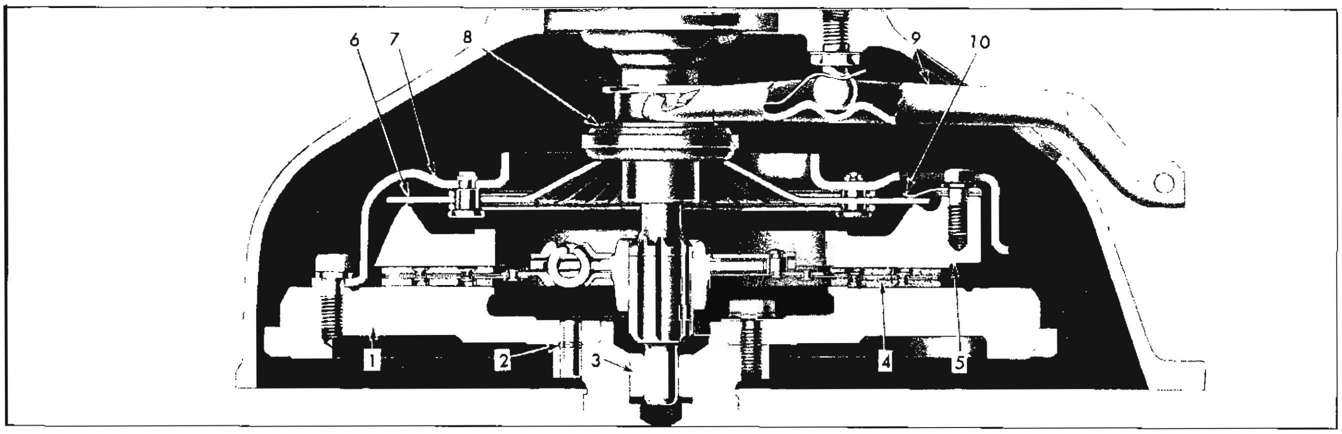

Fig. 1—Bent Finger Clutch Cross-Section

1. Flywheel
2. Dowel-hole
3. Pilot Bushing
4. Driven Disc
5. Pressure Plate
6. Diaphragm Spring
7. Cover
8. Throwout Bearing
9. Fork
10. Retracting Spring

The clutch linkage used in 1964 has no over-center spring or clutch pedal sleeve assembly, and pedal adjustment is made at the lower end of the pedal push rod in the engine compartment. The clutch assembly is enclosed in a 360° bell housing which must be removed to gain access to the clutch.

The 327 and 409 engines use a bent-finger diaphragm type clutch assembly, (fig. 1). All its integral release fingers are bent to gain a centrifugal boost and insure quick re-engagement at high engine speeds.

This type of clutch has the advantage of increasing pressure plate load as the driven plate wears, and low pedal efforts with high plate loads without requiring over center booster springs on the clutch linkage. The pressure plate is a high tensile strength iron designed for maximum speed conditions.

Due to the clutch property of load increase with wear, a new clutch should be properly worn or seated in before being used for maximum performance. This can be accomplished by making 20 to 50 normal starts or by placing a .010″ shim between the clutch cover and the flywheel at each bolt location.

The clutch release bearing used with the bent finger diaphragm clutch (fig. 2) has an overall length of approximately 1¼″. A longer bearing will cause inability to obtain free pedal travel, especially as the clutch wears, resulting in slippage and rapid wear.

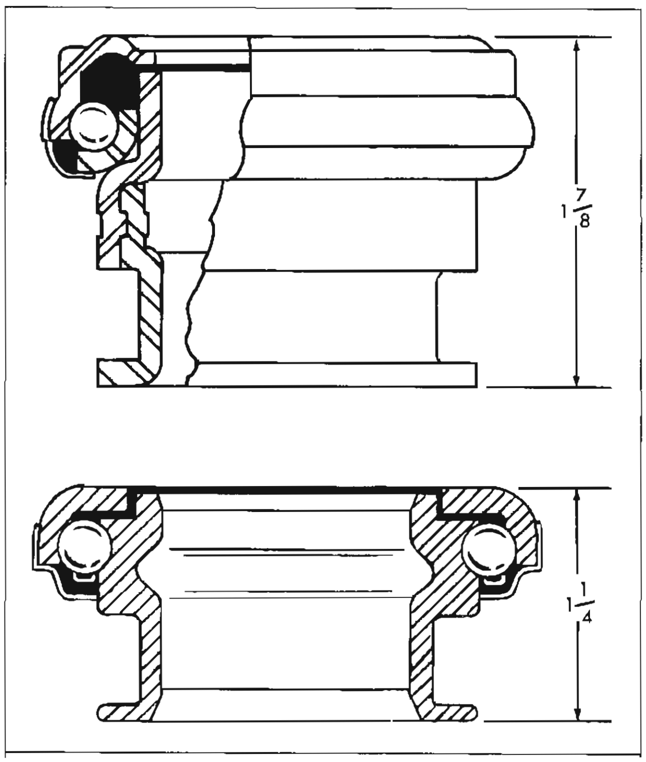

Fig. 2—Clutch Release Bearing Comparison

MAINTENANCE AND ADJUSTMENTS

CLUTCH LINKAGE ADJUSTMENT
(Refer to Figure 3)

Clutch adjustment, for all normal wear, is made at swivel on lower end of pedal push rod as follows:

1. Remove clutch pedal return spring.
2. Loosen nut "B" and back off from swivel approximately ½ inch.
3. Hold clutch pedal push rod (1) so pedal is against bumper stop and cross-shaft lever (2) in the opposite direction so the throw-out bearing is against clutch fingers. Adjust nut "B" to obtain approximately ¼" clearance between nut "B" and upper edge of swivel.
4. Release push rod and cross-shaft lever and tighten nut "A" to lock swivel against nut "B".

   NOTE: Free pedal play should be ⅞" to 1⅛".

5. Install pedal return spring.

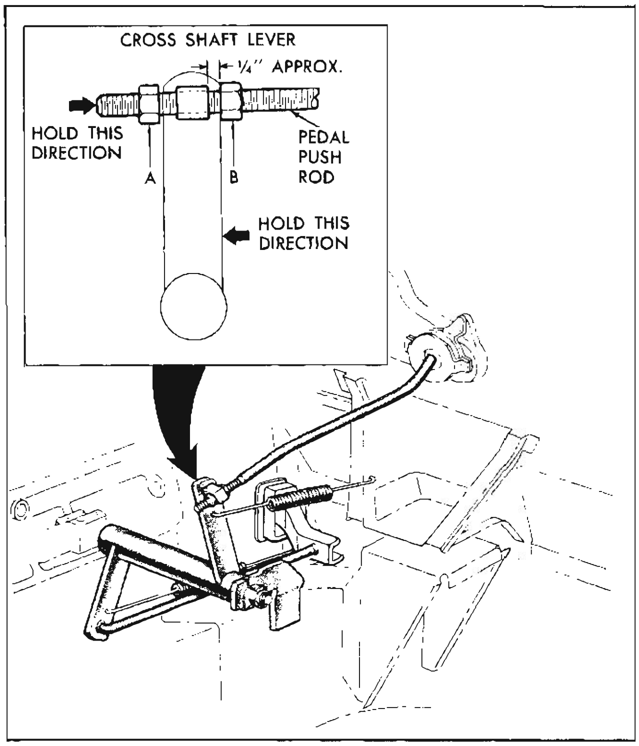

Fig. 3—Clutch Linkage

SERVICE OPERATIONS

CLUTCH AND BRAKE PEDAL
(Refer to Figure 4)

Removal

1. Remove retainers and disconnect push rods from pedals.
2. Remove clutch pivot shaft retainer from end of shaft.
3. Remove clutch pedal by moving it out far enough to clear bumper bracket, then rotate pedal upward to clear push rod and remove pedal completely.

   NOTE: Brake pedal will also fall free and push rod will hang from boot on master cylinder.

Inspection

1. Clean all metal parts with a good solvent.
2. Wipe nylon bushings clean with a clean cloth.

   CAUTION: Nylon bushings should not be treated with cleansing agents of any kind.

3. Inspect nylon bushings for wear or damage. Replace if necessary.
4. Inspect the mating surfaces of the bushings and replace necessary parts.

Installation

1. Install one nylon bushing on clutch pedal pivot shaft and one in right side of panel brace.
2. Position brake pedal, making sure two bushings are in brake pedal hub. Index the spring tip in notch of support brace and brake pedal push rod in master cylinder.
3. Reverse removal steps to complete installation.
4. Check clutch pedal free play and adjust if necessary.
5. Check brake pedal adjustment and adjust push rod if necessary.

   NOTE: Check stop light switch adjustment for electrical contact when brake pedal is depressed approximately ⅝.

CLUTCH ASSEMBLY

The clutch assembly is enclosed in a 360° aluminum housing which must be removed to gain access to the clutch assembly.

1. Remove transmission as outlined in Transmission Section 13.
2. Disconnect clutch linkage spring from clutch fork and let push rod hang free of fork.
3. Remove throwout bearing from fork.
4. Remove clutch housing cover plate screws and clutch housing bolts, then remove housing (on V-8 engines, the screw at oil filter may be removed last while supporting the housing during removal).

   NOTE: The cover plate will now hang from starter gear housing.

5. Install Tool J-5824 to support the clutch assembly during removal.
6. Loosen the 6 clutch attaching bolts evenly, a little at a time, until clutch diaphragm spring tension is released; then remove bolts, clutch assembly and pilot tool.
7. Slide clutch fork from ball stud and remove fork from dust boot.

   NOTE: Ball stud is threaded into clutch housing and is easily replaced, if necessary.

8. Inspect clutch fork for wear at ball socket and release bearing surfaces. Check ball spring tension. This spring may be bent toward fork if necessary to tighten tension.
9. Clean the fork and lubricate ball socket and release bearing surfaces with graphite grease then reinstall in clutch housing.
10. Reverse removal procedure to install clutch then adjust linkage.

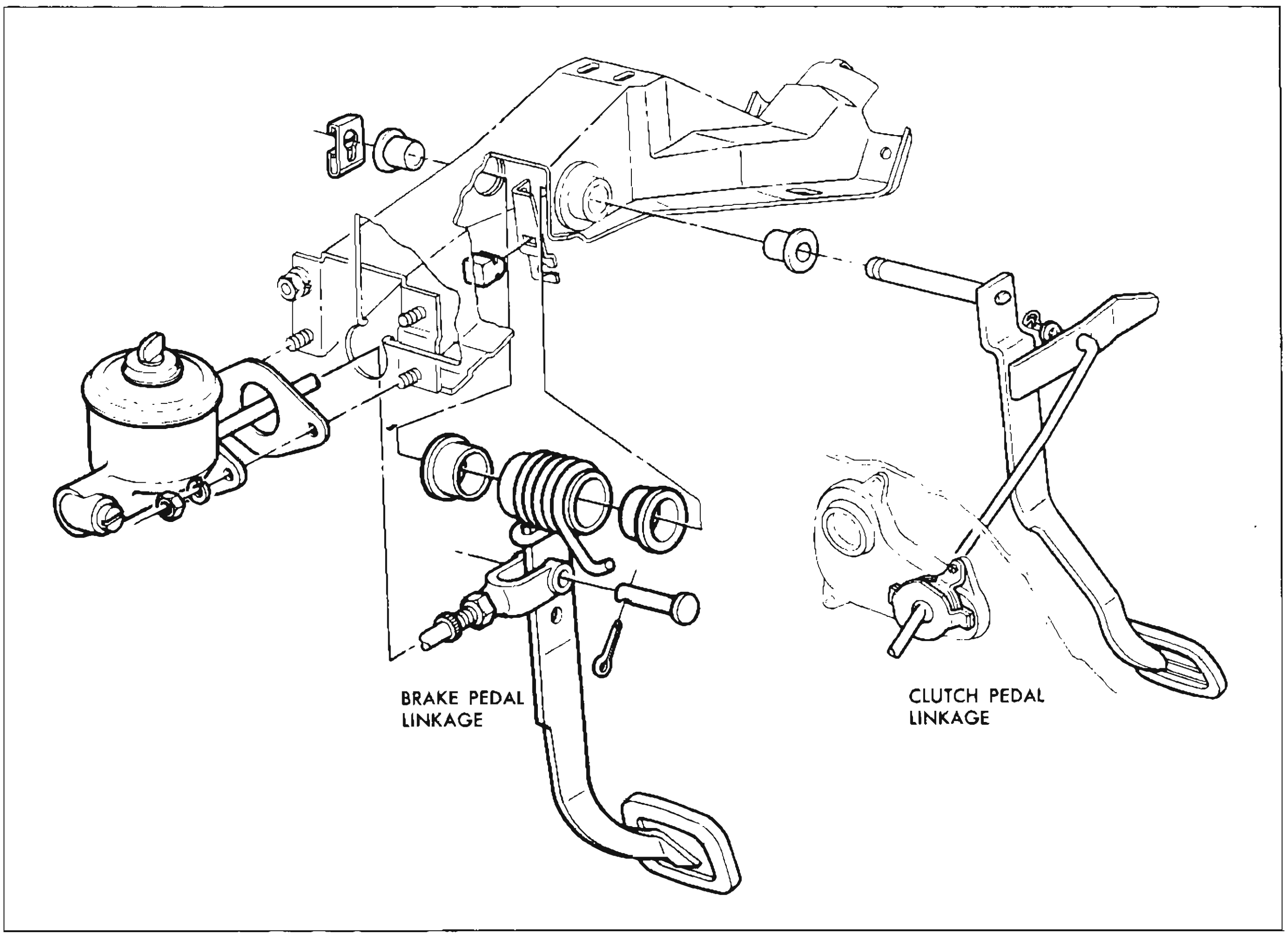

Fig. 4—Clutch and Brake Pedal

TROUBLES AND REMEDIES

Symptoms and Probable Cause	Probable Remedy
Fails to Release (Pedal pressed to floor—shift lever does not move freely in and out of reverse gear)	
a. Improper linkage adjustment (excessive lash).	a. Adjust linkage.
b. Improper pedal travel.	b. Trim bumper stop and adjust linkage.
c. Loose or broken cross shaft lever.	c. Tighten or replace ball studs or replace cross shaft.
d. Worn bearing area on clutch gear retainer sleeve.	d. Replace retainer.
e. Faulty driven disc.	e. Replace disc.
f. Fork off ball stud.	f. Install properly and lubricate fingers at throwout bearing.
g. Clutch disc hub binding on clutch gear spline.	g. Repair or replace clutch gear.
Slipping	
a. Improper adjustment (no lash).	a. Adjust linkage.
b. Oil soaked driven disc.	b. Install new disc and correct oil leak at its source.
c. Facing torn from disc or worn into rivets.	c. Replace disc.
d. Warped pressure plate or flywheel.	d. Replace same.
e. Driven plate not seated in.	e. Make 20-50 normal starts.
f. Driven plate overheated.	f. Allow to cool—Check lash.
Grabbing	
a. Oil on facing or burned or glazed facings.	a. Install new disc.
b. Burned or smeared resin on flywheel or pressure plate.	b. Replace or repair as needed.
c. Linkage worn, broken or improperly installed.	c. Tighten or replace mountings.
d. Loose engine mountings.	d. Replace pressure plate or flywheel.
e. Warped pressure plate or flywheel.	e. Sand off if superficial, replace burned or heat checked parts.
Rattling—Transmission Click	
a. Oil in driven plate damper.	a. Replace driven disc.
b. Throwout fork loose on ball stud or in bearing groove.	b. Check ball stud and retaining spring and replace if necessary.
c. Driven plate damper spring failure.	c. Replace driven disc.
Throwout Bearing Noise with Clutch Fully Engaged	
a. Improper adjustment.	a. Adjust linkage.
b. Throwout bearing binding on transmission.	b. Clean, relubricate, check for burrs, nicks, etc.
c. Insufficient tension between clutch fork spring and ball stud.	c. Replace fork.
d. Fork improperly installed.	d. Install properly.
e. Weak linkage return spring.	e. Replace spring.
Noisy	
a. Worn throwout bearing.	a. Replace bearing.
b. Fork off ball stud (Heavy clicking)	b. Install properly and lubricate fork fingers at bearing.
High Pedal Effort	
a. Bind in linkage	a. Lubricate and free up linkage.
b. Linkage out of adjustment.	b. Adjust.
c. Clutch gear bearing retainer gauled.	c. Replace (use cast iron retainer).

SECTION 12

MANUAL TRANSMISSIONS

THREE-SPEED TRANSMISSION

Although the three speed transmission has been improved for 1964, the basic design, operation and service procedures remain the same as covered in the 1961 Passenger Car Shop Manual.

A brief description of what is new is given below.

GEARS

All gears are wider with greater helix angles.

CLUTCH DRUM AND MAINSHAFT

The mainshaft, and the second and third speed clutch drum are new with a change in clutch drum spline angles to match with the greater helix angle of the gear teeth. The output end of the mainshaft is changed from a 16 tooth to a 27 tooth spline.

CASE AND THRUST WASHERS

The case machining is changed and the thrust washers made thinner to provide room for the wider gears.

CLUTCH GEAR AND BEARING

The large diameter bearing retainer formerly used with 409 V-8 engines is used.

SHIFT LINKAGE ADJUSTMENT

In cases where the gearshift linkage has been disconnected it should be adjusted as follows:

1. Move both transmission shift levers until transmission is in neutral. Neutral detents in transmission cover must both be engaged to make this adjustment correctly. (To check, start engine with clutch disengaged, and release clutch slowly.)
2. Move selector lever to neutral position. Align first and reverse shifter tube lever with the second and third shifter tube lever on the mast jacket (Fig. 1, View C).
3. Install both control rods on transmission shifter levers and secure with retaining clips (Fig. 1, View A).
4. Place swivel on end of first and reverse shifter control rod and adjust until swivel is in position to enter mast jacket shifter lever hole. Place retaining clamp on swivel, install swivel in lever hole and secure with swivel nut (Fig. 1, View C).
5. Install second and third lower rod to frame mounted idler lever (View B).
6. Similarly, install upper second and third shifter control rod as outlined in Step 4 to frame idler (View B) and to mast jacket shifter lever (View C). (Be sure shifter tube levers remain aligned in neutral.)
7. Move selector lever through all positions to check adjustment and to insure over-travel in all positions.

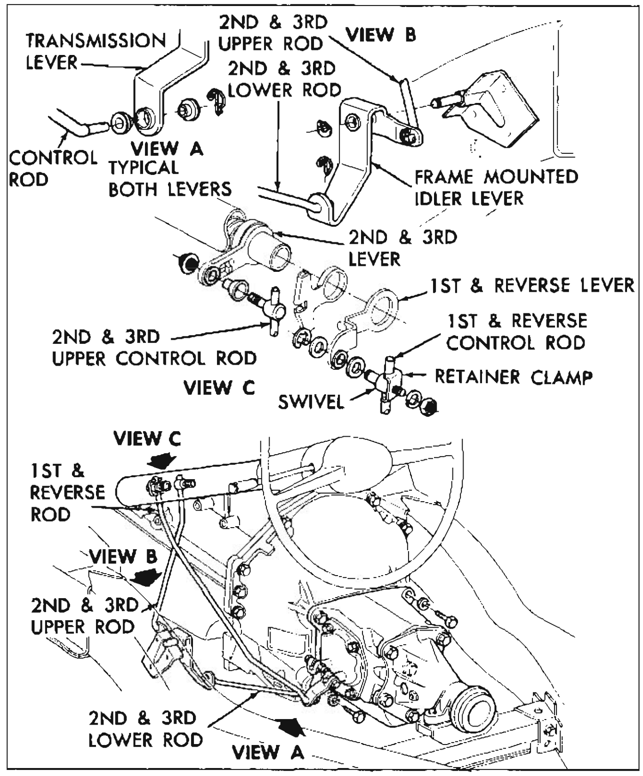

Fig. 1—Shift Linkage Adjustment

NOTE: If mast jacket lower dash clamp has been disturbed at its mounting on dash, its adjustment to the steering mainshaft should be checked as outlined in the procedure in Section 4 of this manual.

OVERDRIVE TRANSMISSION

No changes affecting service procedures have been made on the Overdrive Transmission. The information included in the 1961 Passenger Car Shop Manual will therefore apply as well to the 1964 model.

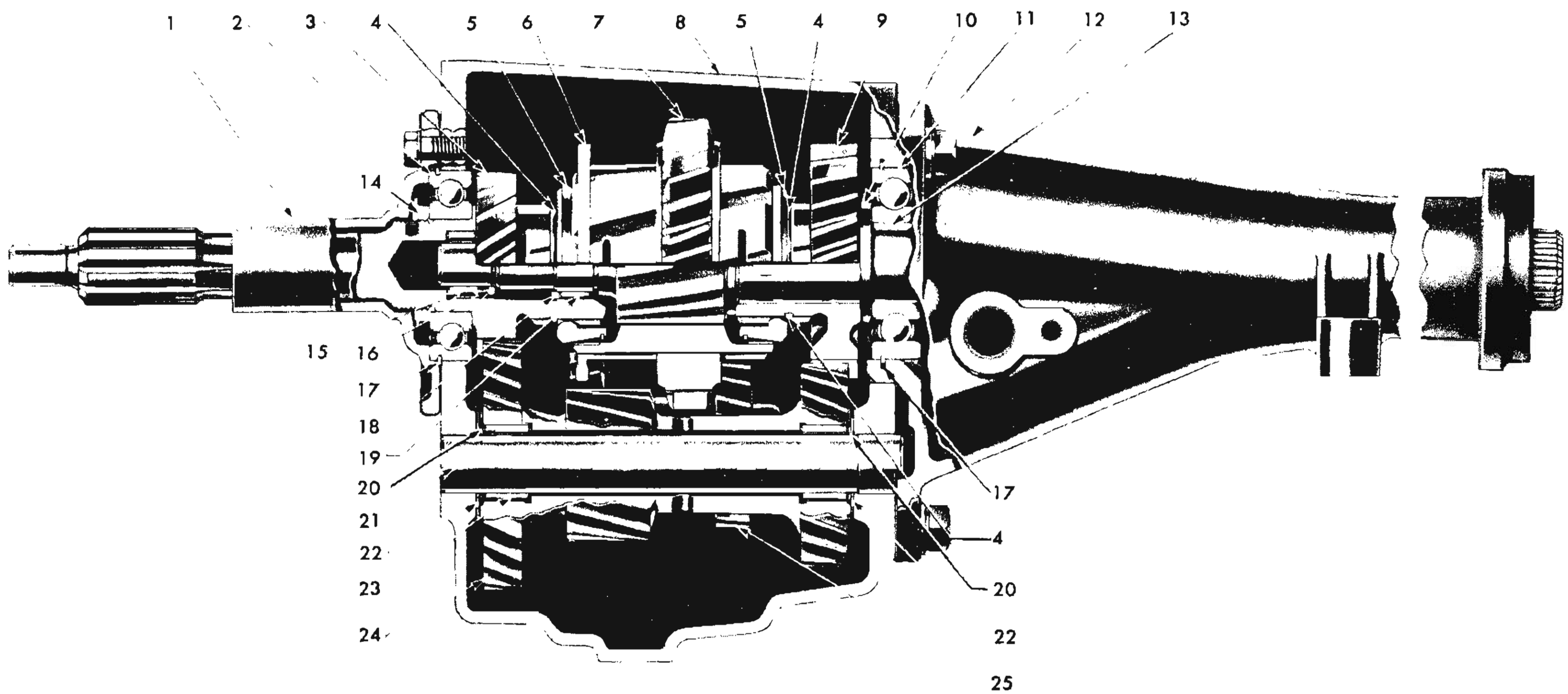

Fig. 2—Three-Speed Transmission Cross-Section (Typical Side View)

1. Clutch Gear Bearing Retainer
2. Clutch Gear Bearing
3. Clutch Gear
4. Energizing Spring
5. Synchronizer Ring
6. Second and Third Speed Clutch
7. First and Reverse Sliding Gear
8. Transmission Case
9. Second Speed Gear
10. Thrust Washer
11. Mainshaft Rear Bearing
12. Extension
13. Mainshaft
14. Clutch Gear Bearing Nut
15. Front Pilot Bearing Rollers
16. Thrust Washer
17. Snap Ring
18. Thrust Washer
19. Rear Pilot Bearing Rollers
20. Roller Thrust Washer
21. Countershaft
22. Thrust Washer
23. Roller Bearing
24. Countergear
25. Reverse Idler Gear

FOUR-SPEED TRANSMISSION

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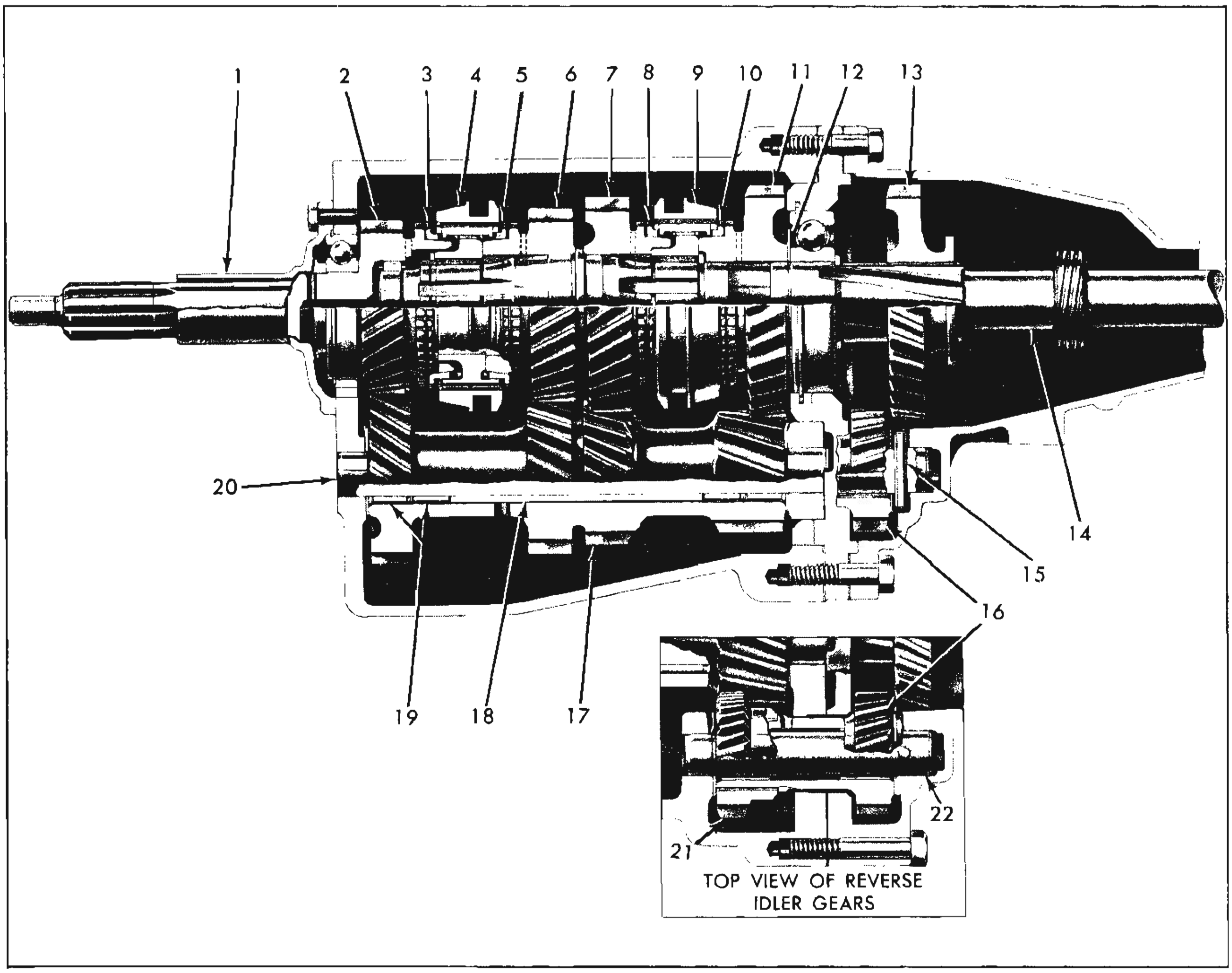

Fig. 1M—Four-Speed Transmission Cross Section

1. Bearing Retainer
2. Main Drive Gear
3. Fourth Speed Synchronizing Ring
4. Third and Fourth Speed Clutch Assembly
5. Third Speed Synchronizing Ring
6. Third Speed Gear
7. Second Speed Gear
8. Second Speed Synchronizing Ring
9. First and Second Speed Clutch Assembly
10. First Speed Synchronizing Ring
11. First Speed Gear
12. Thrust Washer
13. Reverse Gear
14. Mainshaft
15. Reverse Idler Shaft Roll Pin
16. Reverse Idler Gear (Rear)
17. Countergear
18. Countershaft Bearing Roller Spacer
19. Countershaft Bearing Roller
20. Countershaft
21. Reverse Idler Gear (Front)
22. Reverse Idler Shaft

GENERAL DESCRIPTION

The four-speed synchromesh transmission (fig. 1M), incorporates helical gears throughout specially designed to provide high torque capacity without additional weight, and gear teeth proportioned to operate at high speeds with neither excessive heat generation nor excessive frictional losses. Shafts, bearings, high capacity clutches and other precision parts are held to close limits, providing proper clearances necessary for durability during extended heavy usage.

The main drive gear is supported by a heavy-duty ball bearing at the front end of the transmission case and is piloted at its front end in an oil impregnated bushing mounted in the engine crankshaft. The front end of the main-shaft is piloted in a row of roller bearings set into the hollow end of the main drive gear and the rear end is carried by a heavy-duty ball bearing mounted at the rear end of the transmission case in a retainer casting.

The counter gear is carried on a double row of rollers at both ends while thrust is taken on thrust washers located between the ends of the gear and the thrust bosses in the case.

The two-piece reverse idler gear is carried on bronze bushings while thrust is taken on thrust washers located between the front of the gear and the back of the reverse idler thrust boss and between the rear of the gear and the reverse idler shaft boss in the case extension.

Gearshifting is manual through shift control rods to the transmission cover shifter levers for first through fourth gears, and to the reverse lever located in the case extension. The shifter lever to the rear of the transmission cover controls first and second gears while the lever to the front controls third and fourth gears. All four forward gears are fully synchronized. The transmission may be used as an aid in deceleration by downshifting in sequence without double clutching or gear clashing. Reverse is not synchronized, however it is a helical gear to insure quiet operation.

MAINTENANCE AND ADJUSTMENTS

SHIFT LINKAGE ADJUSTMENT (fig. 2M)

1. Set Transmission Levers (M) (P) and (S) in neutral detent position.
2. Move Shift Lever Stud (A) to neutral detent position and insert a 5/16" Locating Pin (B) into Control Lever Bracket Assembly.
3. Install Rod (V) with retainer on Lever (D).
4. Maintaining Lever (D) against Locating Pin, adjust Clevis (T) at Lever (S) until clevis pin freely passes through holes in Clevis and Lever.
5. Install clevis pin, washer, and cotter pin. Tighten Jam Nut (U) against Clevis.
6. Install Rod (H) with retainer on Lever (W).
7. With Jam Nuts (J) and (L) and Swivel (K) loose on Rod (H), insert and attach Swivel with washer and retainer to Lever (M).
8. Maintaining Lever (W) against Locating Pin (B) and while holding Swivel (K), run Jam Nut (J) against Swivel until Nut contacts Swivel. Then tighten Jam Nut (L) against Swivel.
9. Install Rod (R) with retainer on Lever (P).
10. With Jam Nuts (E) and (G) and Swivel (F) loose on Rod (R), insert and attach Swivel with retainer to Lever (C).
11. Maintaining Lever (C) against Locating Pin (B) and while holding Swivel (F), run Jam Nut (G) against Swivel until Nut contacts Swivel. Then tighten Jam Nut (E) against Swivel.
12. Remove Locating Pin and check shifts to insure proper operation. Readjust clevis and swivels if necessary.

SPEEDOMETER DRIVEN GEAR AND OIL SEAL

Replacement

Disconnect speedometer cable, remove retainer to housing bolt and lock washer and remove retainer. Insert screwdriver in slot in fitting and pry fitting, gear and shaft from housing. Pry "O" ring from groove in fitting.

Install new "O" ring in groove and insert shaft. Hold the assembly so slot in fitting is toward boss on housing and install in housing. Push fitting into housing until retainer can be inserted in groove and install retainer lock washer and bolt.

TRANSMISSION SIDE COVER

Removal

1. Disconnect control rods from levers.
2. Shift transmission into second speed **before** removing cover, by moving 1-2 (Rear Cover) shifter lever into forward detent position.
3. Remove cover assembly from transmission case carefully and allow oil to drain.

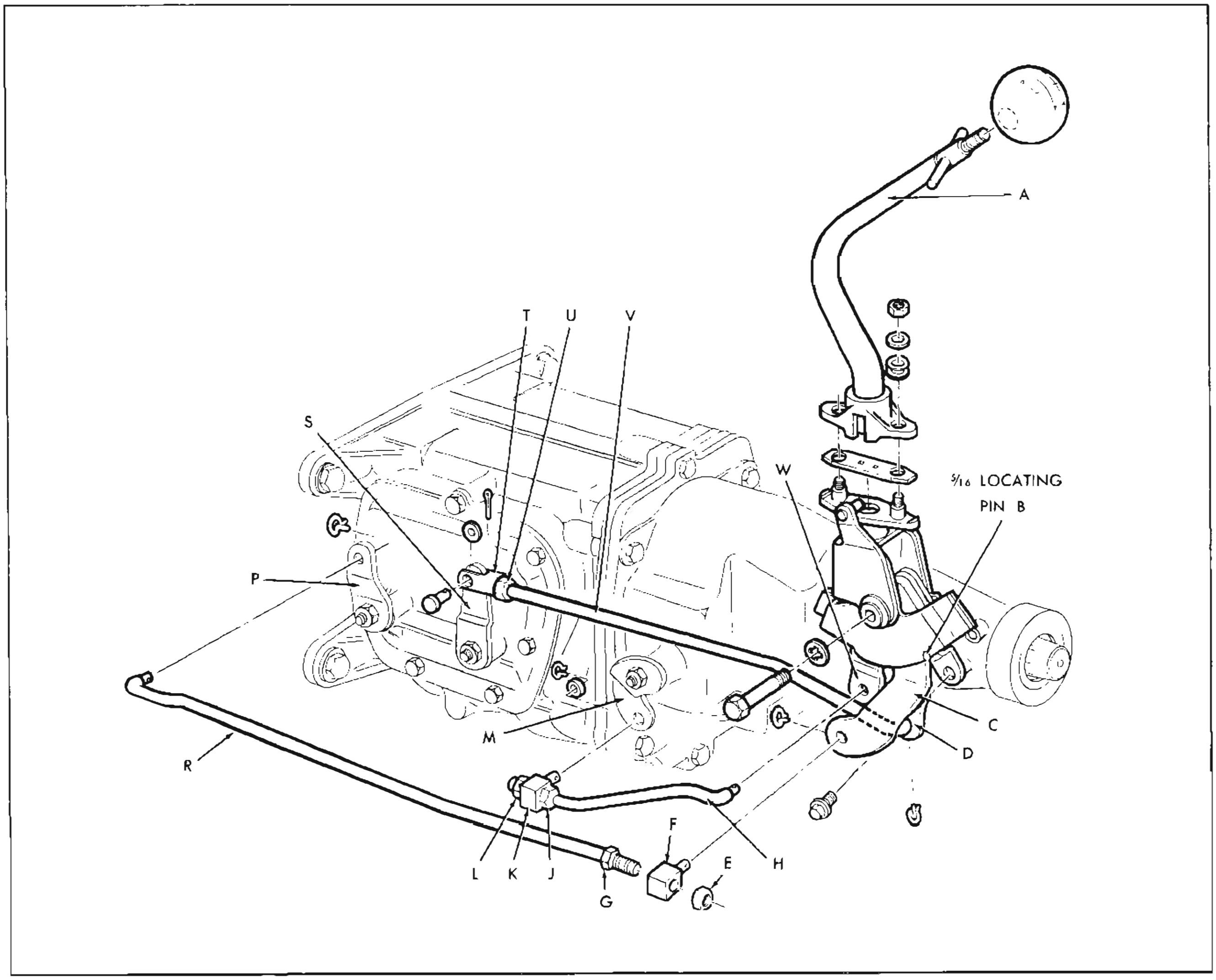

Fig. 2M—Four-Speed Transmission Gearshift Linkage

Disassembly (fig. 3M)

1. Remove the outer shifter lever nuts, lock washers and flat washers. Pull levers from shafts.

2. Remove both shift forks from shifter shaft and detent plate assemblies. Remove both shifter shaft assemblies from cover. Lip seals in side cover may now be pryed out if replacement is required because of damage.

3. Remove detent cam spring and pivot retainer "C" ring. Remove both detent cams.

4. Replace necessary parts.

Assembly (fig. 3M)

1. Install 1-2 detent cam to cover pivot pin first, then install 3-4 detent cam so the detent spring notches

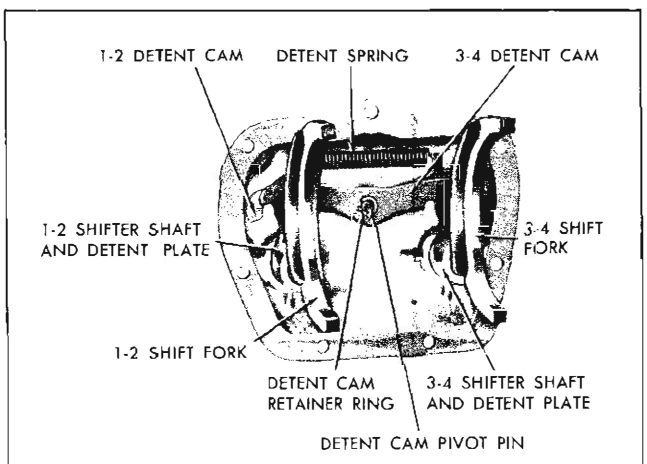

Fig. 3M—Transmission Side Cover, Shift Fork and Detent Assembly are offset or opposite each other. Detent cam notches must be facing downward.

2. Install detent cam retaining "C" ring to pivot shaft, and hook spring into detent cam notches.

3. Install both shifter shaft assemblies in cover being careful not to damage lip seals. Install both shift forks to detent plates, lifting up on detent cam to allow forks to fully seat into position.

4. Install outer shifter levers, flat washers, lock washers and nuts.

Installation (fig. 4M)

1. Shift 1-2 shifter lever into second speed (forward) position. Position cover gasket on case.

2. Carefully position side cover into place making sure the shift forks are aligned with their respective mainshaft clutch sliding sleeves.

3. Install cover attaching bolts and tighten evenly to 15-20 ft. lbs. torque.

4. Remove filler plug and add lubricant to level of filler plug hole.

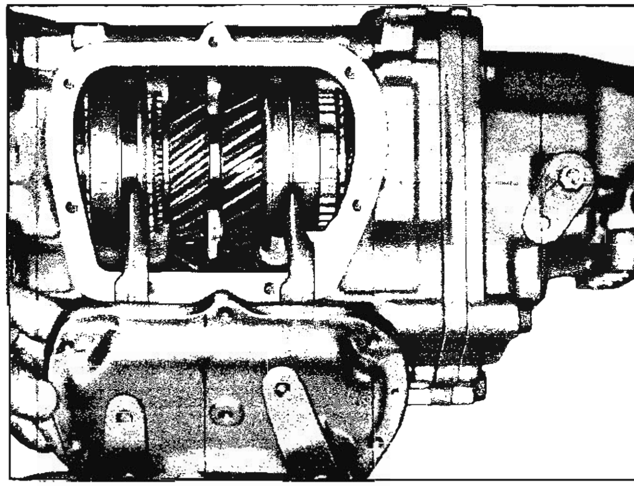

Fig. 4M—Installing Side Cover Assembly

EXTENSION OIL SEAL

Replacement

1. Remove propeller shaft.
2. Pry out the extension oil seal.
3. Press new oil seal carefully into place in extension using J-5154 or similar tool.

   CAUTION: Do not excessively force the seal against the seat in the extension.

SERVICE OPERATIONS

REMOVAL FROM VEHICLE

1. Remove shift lever trim plate and dust boot.
2. Remove shift lever assembly.
3. Raise vehicle to desired working height.
4. Disconnect the speedometer cable from speedometer driven gear fitting.
5. Remove propeller shaft, then support engine at the oil pan rail with a jack or other suitable support capable of supporting the engine when transmission is removed.
6. Disconnect shift lever bracket assembly from extension housing and remove all 3 transmission shifter levers to shifter shafts, (leave linkage connected to levers) and remove bracket assembly levers and linkage.
7. Remove extension mount-to-crossmember attaching bolts. Remove shims and note quantity so same amount may be reinstalled.
8. Loosen transmission crossmember frame side rail bracket bolts, removing one bolt completely allowing support crossmember to swing downward.
9. Remove the transmission-to-clutch housing retaining bolts and install two guide pins, J-1126, in top holes.
10. Slide the transmission straight back until the input shaft is free of splines in the clutch disc.
11. Slide the transmission rearward to allow sufficient clearance of input shaft and clutch housing. Then tilt input shaft end of transmission downward and withdraw transmission from vehicle.

DISASSEMBLY

1. Remove transmission side cover as outlined under "Maintenance and Adjustments."

2. Remove four bolts from front bearing retainer and remove retainer and gasket.

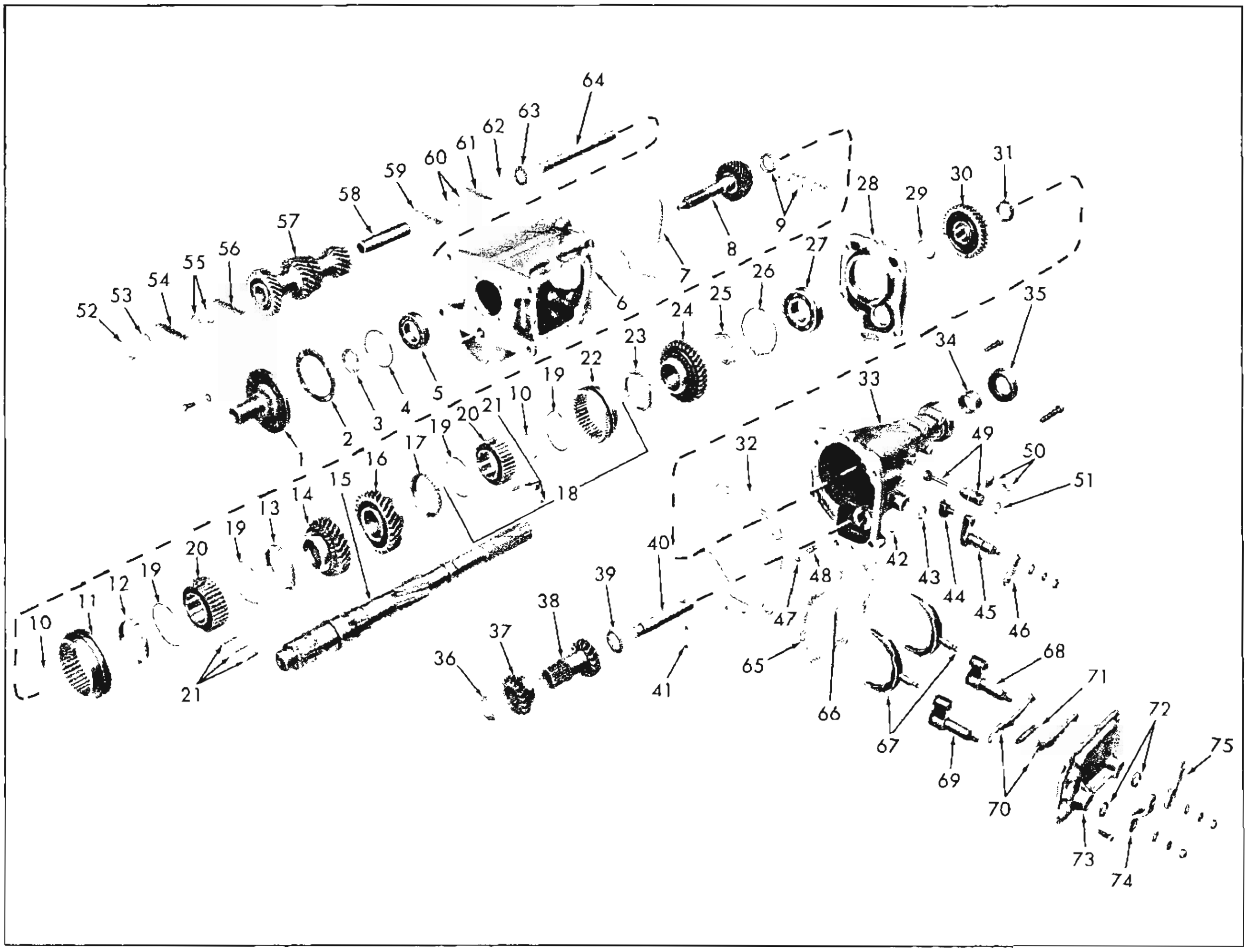

Fig. 5M—Four-Speed Transmission—Exploded View

1. Bearing Retainer
2. Gasket
3. Bearing Retaining Nut
4. Bearing Snap Ring
5. Main Drive Gear Bearing
6. Transmission Case
7. Rear Bearing Retainer Gasket
8. Main Drive Gear
9. Bearing Rollers (17) & Cage
10. Snap Ring
11. Third and Fourth Speed Clutch Sliding Sleeve
12. Fourth Speed Gear Synchronizing Ring
13. Third Speed Synchronizing Ring
14. Third Speed Gear
15. Mainshaft
16. Second Speed Gear
17. Second Speed Gear Synchronizing Ring
18. First and Second Speed Clutch Assembly
19. Clutch Key Spring
20. Clutch Hub
21. Clutch Keys
22. First and Second Speed Clutch Sliding Sleeve
23. First Speed Gear Synchronizing Ring
24. First Speed Gear
25. First Speed Gear Thrust Washer
26. Rear Bearing Snap Ring
27. Rear Bearing
28. Rear Bearing Retainer
29. Selective Fit Snap Ring
30. Reverse Gear
31. Speedometer Drive Gear
32. Rear Bearing Retainer to Case Extension Gasket
33. Case Extension
34. Extension Bushing
35. Rear Oil Seal
36. Reverse Idler Front Thrust Washer (Tanged)
37. Reverse Idler Gear (Front)
38. Reverse Idler Gear (Rear)
39. Flat Thrust Washer
40. Reverse Idler Shaft
41. Reverse Idler Shaft Roll Pin
42. Reverse Shifter Shaft Lock Pin
43. Reverse Shifter Shaft Lip Seal
44. Reverse Shift Fork
45. Reverse Shifter Shaft and Detent Plate
46. Reverse Shifter Lever
47. Reverse Shifter Shaft Detent Ball
48. Reverse Shifter Shaft Ball Detent Spring
49. Speedometer Driven Gear and Fitting
50. Retainer and Bolt
51. "O" Ring Seal
52. Tanged Washer
53. Spacer (.050")
54. Bearing Rollers (20)
55. Spacers (2—.050")
56. Bearing Rollers (20)
57. Countergear
58. Countergear Roller Spacer
59. Bearing Rollers (20)
60. Spacers (2—.050")
61. Bearing Rollers (20)
62. Spacer (.050")
63. Tanged Washer
64. Countershaft
65. Gasket
66. Detent Cams Retainer Ring
67. Forward Speed Shift Forks
68. First and Second Speed Gear Shifter Shaft and Detent Plate
69. Third and Fourth Speed Gear Shifter Shaft and Detent Plate
70. Detent Cams
71. Detent Cam Spring
72. Lip Seals
73. Transmission Side Cover
74. Third and Fourth Speed Shifter Lever
75. First and Second Speed Shifter Lever

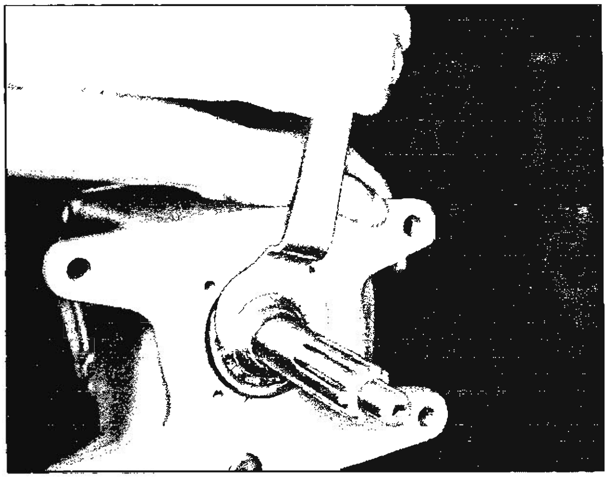

Fig. 6M—Removing Main Drive Gear Retaining Nut

3. Remove the main drive gear retaining nut (fig. 6M) using Tool J-0933, after locking up transmission by shifting into two gears.
4. With transmission gears in neutral, drive lock pin from reverse shifter lever boss, as shown in Figure 7M, and pull shifter shaft out about 1/8". This disengages the reverse shift fork from reverse gear.

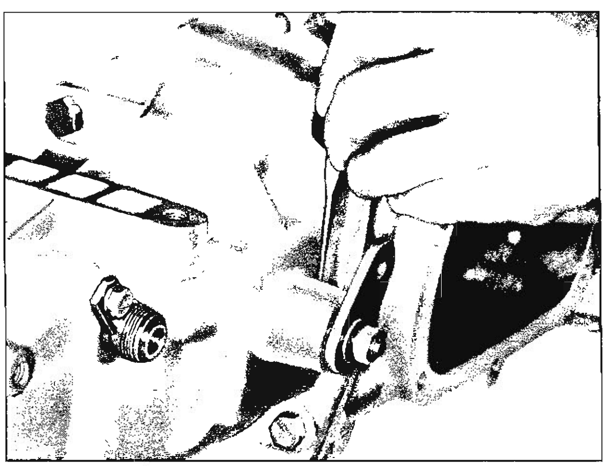

Fig. 7M—Removing Reverse Shifter Shaft Lock Pin

5. Remove six bolts attaching the case extension to the case. Tap extension with soft hammer in a rearward direction to start. When the reverse idler shaft is out as far as it will go, move extension to left so reverse fork clears reverse gear and remove extension and gasket.
6. The rear reverse idler gear, shaft and flat thrust washer may now be removed.
7. Remove speedometer gear and reverse gear. The speedometer gear may be removed using Tool J-5814 as shown in Figure 8M.

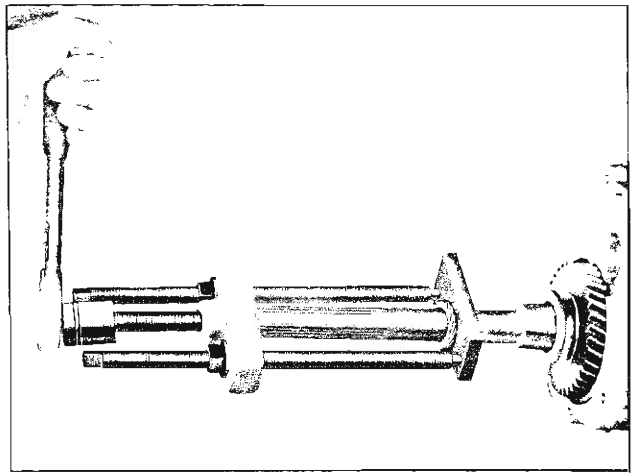

Fig. 8M—Removing Speedometer Gear with J-5814

NOTE: Slide 3-4 synchronizer clutch sleeve to 4th speed gear position (forward) before trying to remove mainshaft assembly from case (fig. 9M).

8. Carefully remove the rear bearing retainer and entire mainshaft assembly from the case by tapping bearing retainer with a soft hammer.
9. Unload bearing rollers from main drive gear and remove fourth speed synchronizer blocker ring.
10. Lift the front half of reverse idler gear and its tanged thrust washer from case.
11. Press main drive gear down from front bearing (fig. 10M).
12. From inside case, tap out front bearing and snap ring.

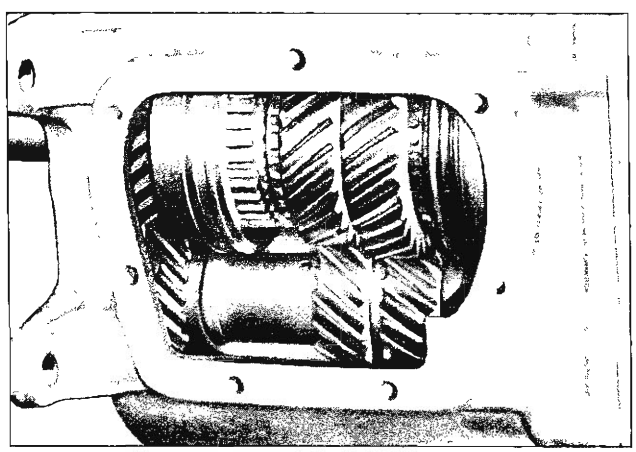

Fig. 9M—Third and Fourth Speed Synchronizer Clutch Sleeve in Fourth Gear Position

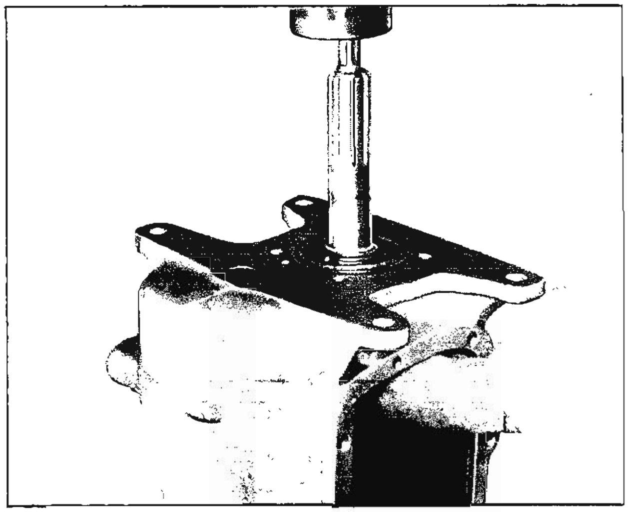

Fig. 10M—Removing Main Drive Gear

13. From the front of the case, press out the countershaft (fig. 11M) using Tool J-5589; then remove the countergear and both tanged washers.
14. Remove the 80 rollers, six .050" spacers and roller spacer from countergear.
15. Remove mainshaft front snap ring as shown in Figure 12M and slide third and fourth speed clutch assembly, third speed gear and synchronizing ring from front of mainshaft.
16. Spread rear bearing retainer snap ring and press mainshaft out of the retainer (fig. 13M).
17. Remove the mainshaft rear snap ring. Support first speed gear as shown in Figure 14M and press against rear of mainshaft to remove shaft from rear bearing, first speed gear thrust washer, first speed gear and synchronizing ring.

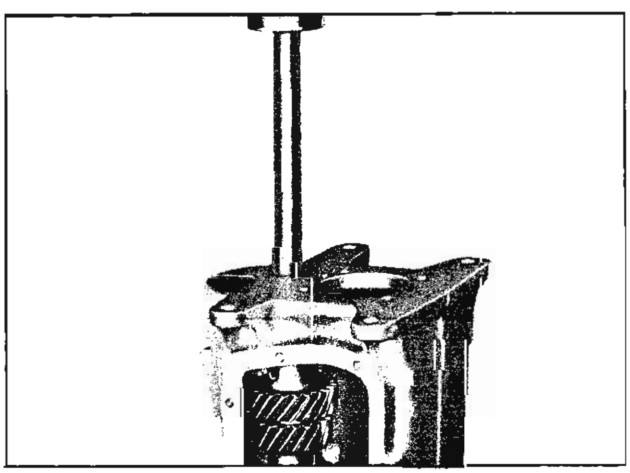

Fig. 11M—Removing Countershaft with J-5589

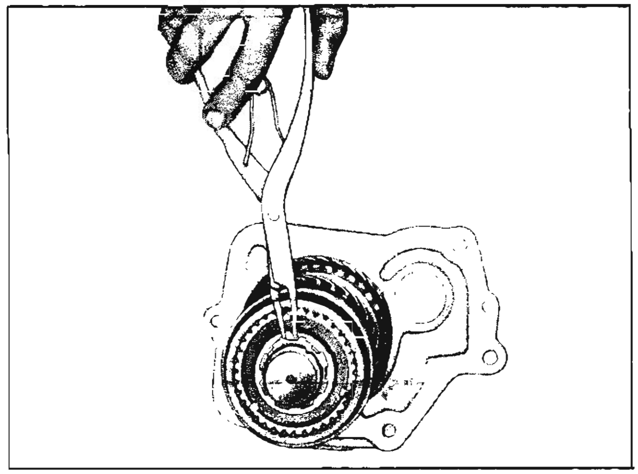

Fig. 12M—Removing Mainshaft Front Snap Ring

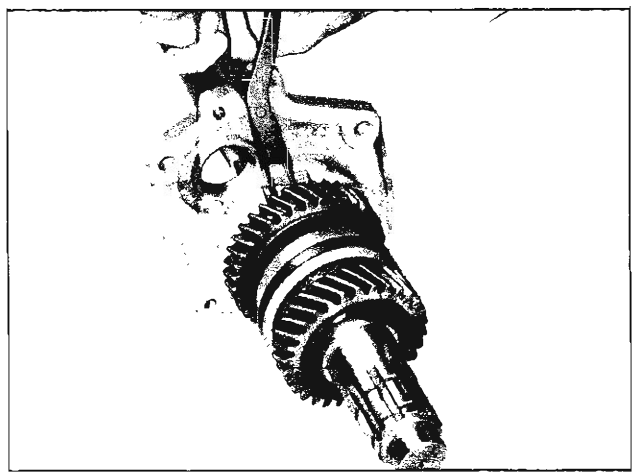

Fig. 13M—Removing Rear Bearing Retainer

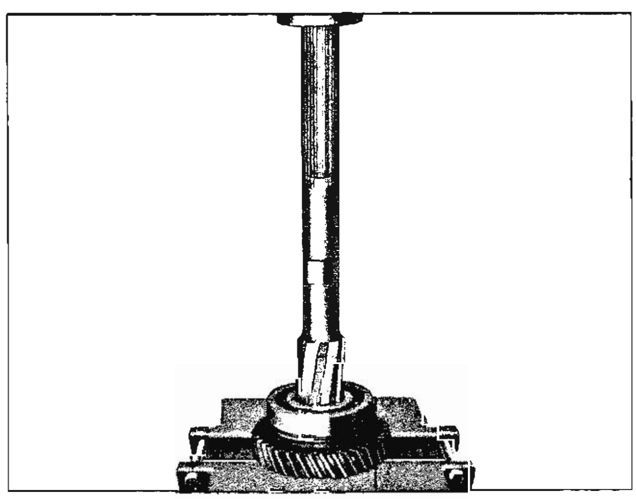

Fig. 14M—Removing Mainshaft from Rear Bearing and First Speed Gear

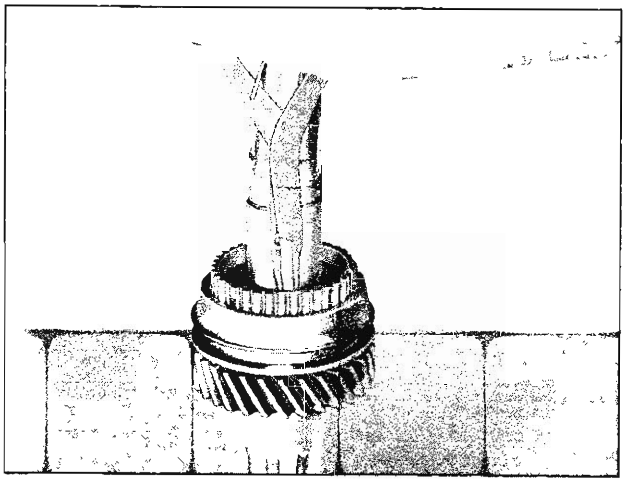

Fig. 15M—Removing 1-2 Speed Synchronizer Clutch Assembly Retainer Snap Ring

18. Remove 1-2 speed synchronizer clutch assembly retaining snap ring (fig. 15M) and remove 1-2 synchronizer assembly, second speed synchronizer ring and second speed gear from mainshaft.

CLEANING AND INSPECTION

Transmission Case

Wash the transmission case inside and out with a cleaning solvent and inspect for cracks.

Inspect the front face which fits against clutch housing for burrs and if any are present, dress them off with a fine cut mill file.

Front and Rear Bearings

1. Wash the front and rear bearings thoroughly in a cleaning solvent.
2. Blow out bearings with compressed air.

   CAUTION: Do not allow the bearings to spin, but turn them slowly by hand. Spinning bearings will damage the race and balls.

3. Make sure bearings are clean, then lubricate them with light engine oil and check them for roughness. Roughness may be determined by slowly turning the outer race by hand.

Bearing Rollers and Spacers

All main drive gear and countergear bearing rollers should be inspected closely and replaced if they show wear. Inspect countershaft at the same time and replace if necessary. Replace all worn spacers.

Gears

Inspect all gears and replace all that are worn or damaged.

Reverse Idler

1. The bushings used in the idler gear are pressed into the gear then peened into holes in the bores, and are bored in place. This insures the positive alignment of the bushings and their shafts, as well as proper meshing of the gears. Because of the high degree of accuracy to which these parts are machined, the bushings are not serviced separately.
2. Check bushings for excessive wear by using a narrow feeler gauge between the shaft and the bushing or use a micrometer. The proper clearance is from .003″ to .005″.

REPAIRS

Reverse Shifter Shaft and Seal

Replacement

1. With case extension removed from transmission the reverse shifter shaft lock pin will already be removed. (See Step 4 under Disassembly.)
2. Remove shift fork.
3. Carefully drive shifter shaft into case extension, allowing ball detent to drop into case. Remove shaft and ball detent spring.
4. Place ball detent spring into detent spring hole and from inside extension install shifter shaft fully into its opening until the detent plate is butted against inside of extension housing.
5. Place detent ball on spring (fig. 16M) and, holding ball down with your thumb or a suitable tool push the shifter shaft back in away from case until it is directly over the ball and turn until the ball drops into detent on the shaft detent plate.
6. Install shift fork.

   NOTE: Do not drive the shifter shaft lock pin into place until the extension has been installed on the transmission case.

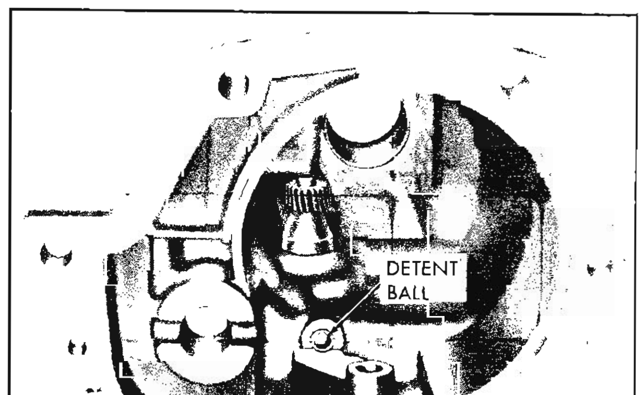

Fig. 16M—Installing Reverse Shifter Shaft and Detent Ball

Extension Oil Seal or Bushing

If bushing in rear of extension requires replacement, remove oil seal and use Tool J-5778 to drive bushing into case extension. Using the same tool, drive new bushing in from the rear. Coat I.D. of bushing with transmission lubricant, then install new oil seal using Tool J-5154.

Clutch Keys and Springs

NOTE: The clutch hubs and sliding sleeves are a selected assembly and should be kept together as originally assembled, but the three keys and two springs may be replaced if worn or broken.

Replacement

1. Push the hub from the sliding sleeve. The keys will fall free and the springs may be easily removed.
2. Place the two springs in position (one on each side of the hub), so all three keys are engaged by both springs. Place the keys in position and, holding them in place, slide the hub into the sleeve.

ASSEMBLY

Mainshaft Assembly

1. From the rear of the mainshaft, assemble the second speed gear (with hub of gear toward rear of shaft).
2. Install 1-2 Synchronizer clutch assembly to mainshaft (sliding clutch sleeve taper toward the rear, hub to the front); together with a synchronizing ring on either side so their keyways line up with the clutch keys (fig. 17M). Install smaller of two synchronizer retaining snap rings to mainshaft with ends of snap ring behind spline teeth.

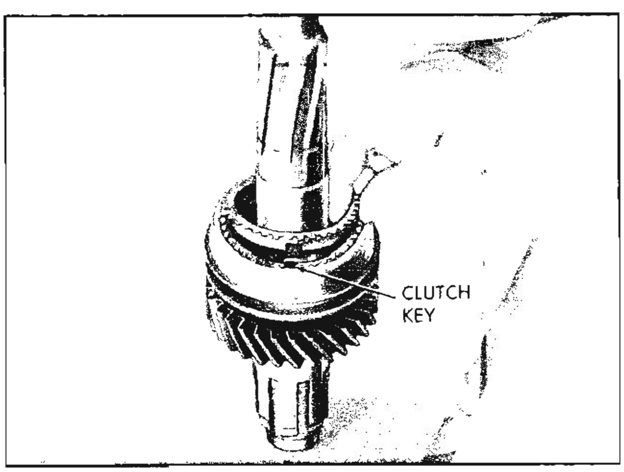

Fig. 17M—Installing Synchronizing Ring

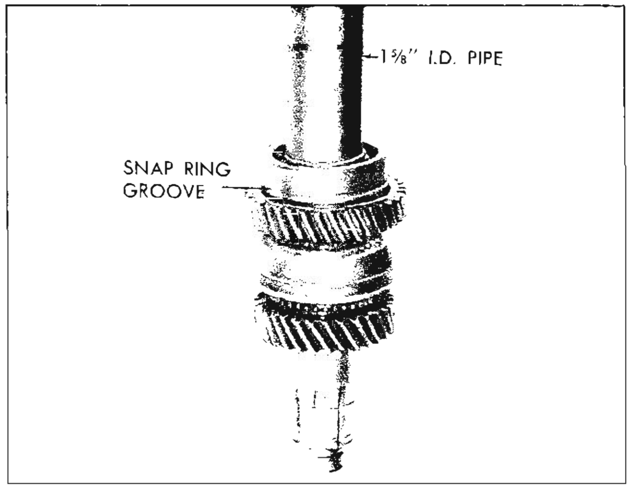

Fig. 18M—Installing Rear Bearing

3. Install the first speed gear (with hub toward front) and first speed gear thrust washer.
4. Using 1⅝" I. D. pipe cut to a suitable length, press on the rear bearing with the snap ring groove toward the front of the transmission (fig. 18M). Firmly seat the bearing.
5. Choose the correct selective fit snap ring (.084", .087", .090", .093", or .096") and install it in the groove in mainshaft behind the rear bearing. With proper ring, **maximum** distance between snap ring and rear face of bearing will be from zero to .005".

   NOTE: Always use new snap rings when reassembling transmission and do not expand the snap ring further than is necessary for assembly.

6. Install the third speed gear (hub to front of transmission) and the third speed gear synchronizing ring (notches to front of transmission).
7. Install the third and fourth speed gear clutch assembly (hub and sliding sleeve) with both sleeve taper and hub toward the front, making sure the keys in the hub correspond to the notches in the third speed gear synchronizing ring.
8. Install snap ring in the groove in mainshaft in front of the third and fourth speed clutch assembly, with ends of snap ring seated behind spline teeth.
9. Install the rear bearing retainer (fig. 13M). Spread the snap ring in the plate to allow the snap ring to drop around the rear bearing and press on the end of the mainshaft until the snap ring engages the groove in the rear bearing.
10. Install the reverse gear (shift collar to rear)
11. Press speedometer drive gear onto the mainshaft using a suitable press plate such as J-1453. Position the speedometer gear to get a measurement of $4\frac{5}{16}$" from the forward side of the gear to the

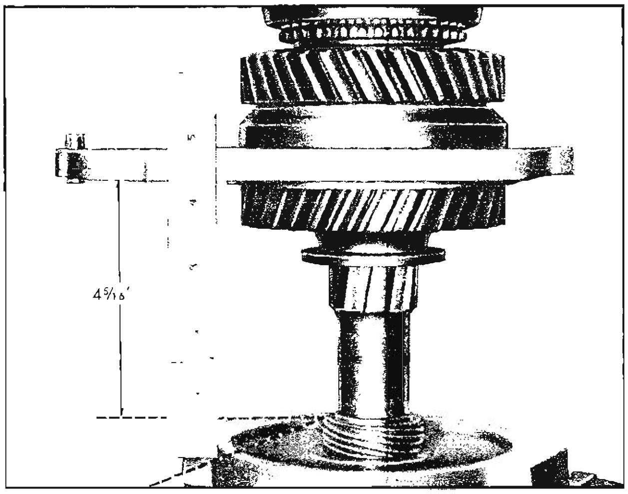

Fig. 19M—Installing Speedometer Drive Gear

flat surface of the rear bearing retainer (fig. 19M) or until centered on the mainshaft speedometer drive gear boss.

Countergear Assembly

1. Install roller spacer in countergear.
2. Using heavy grease to retain the rollers, install 20 rollers in either end of the countergear, two .050" spacers, 20 more rollers, then one .050" spacer. Install in the other end of the countergear, 20 rollers, two .050" spacers, 20 more rollers, and another .050" spacer (fig. 20M).
3. Insert Tool J-5589 into countergear.

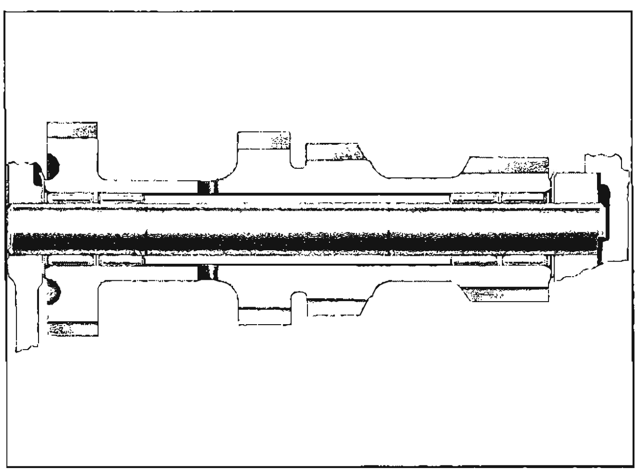

Fig. 20M—Cross-Section of Countergear Assembly

Transmission Assembly

1. Rest the transmission case on its side with the side cover opening toward the assembler. Put countergear tanged thrust washers in place, retaining them with heavy grease, making sure the tangs are resting in the notches of the case.

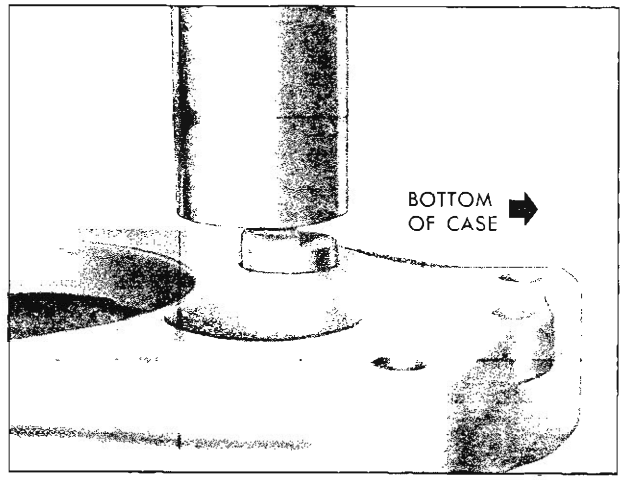

Fig. 21M—Installing Countershaft

2. Set countergear in place in bottom of transmission case, making sure that tanged thrust washers are not knocked out of place.
3. Position the transmission case resting on its front face.
4. Lubricate and insert countershaft in rear of case. Turn countershaft so flat on end of shaft is horizontal and facing bottom of case.

NOTE: The flat on shaft must be horizontal and toward the bottom to mate with rear bearing retainer when installed.

5. Align countergear with shaft in rear and hole in front of case, and press countershaft into case (pushing assembly tool out front of case) until flat on shaft is flush with rear of case. Be sure thrust washers remain in place (fig. 21M).
6. Attach a dial indicator as shown in Figure 22M and check end play of the countergear. If end play is greater than .025" new thrust washers must be installed.

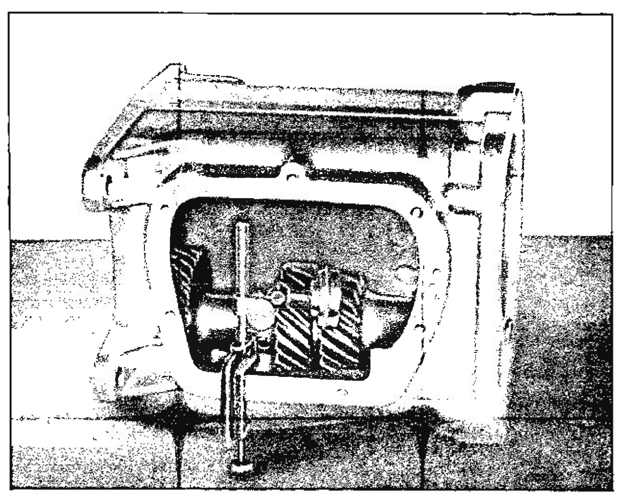

Fig. 22M—Checking Countergear End Play

7. Install the seventeen roller bearings into main drive gear, using heavy grease to hold the bearings and cage in place.
8. Install main drive gear and pilot bearings through the side cover opening and into position in transmission front bore.
9. Place gasket in position on front face of rear bearing retainer.
10. Install the fourth speed synchronizing ring on main drive gear with the notches toward the rear of the transmission.
11. Position the reverse idler gear thrust washer (tanged) on the machined face of the ear cast in the case for the reverse idler shaft and hold with heavy grease. Position the front reverse idler gear next to the thrust washer, with the hub facing toward rear of the case.

    CAUTION: Before attempting to install mainshaft assembly to case, slide the 3-4 synchronizing clutch sleeve forward into fourth speed detent position (fig. 9M).

12. Lower the mainshaft assembly into the case making certain the notches on the fourth speed synchronizing ring correspond to the keys in the clutch assembly (fig. 23M).

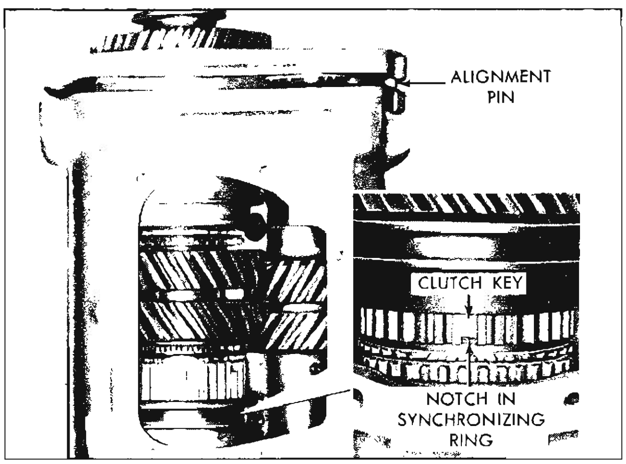

Fig. 23M—Installing Mainshaft Assembly

13. With the guide pin in rear bearing retainer aligned with hole in rear of case, tap rear bearing retainer into position with a soft hammer.
14. From the rear of the case, insert the rear reverse idler gear, engaging the splines with the portion of the front gear inside the case.
15. Using heavy grease, place gasket in position on rear face of rear bearing retainer.
16. Install the remaining flat thrust washer on reverse idler shaft. If new idler shaft is being used, drive out the roll pin and press it into new shaft.
17. Install reverse idler shaft, roll pin, and thrust washer into gears and front boss of case. Make sure to pick up front tanged thrust washer.

    NOTE: Roll pin should be in a vertical position.

18. Pull reverse shifter shaft to left side of extension and rotate shaft to bring reverse shift fork forward in extension (reverse detent position). Start the extension onto the transmission case (fig. 24M), while slowly pushing in on the shifter shaft to engage the shift fork with the reverse gear shift collar. Then pilot the reverse idler shaft into the extension housing permitting the extension to slide onto the transmission case.

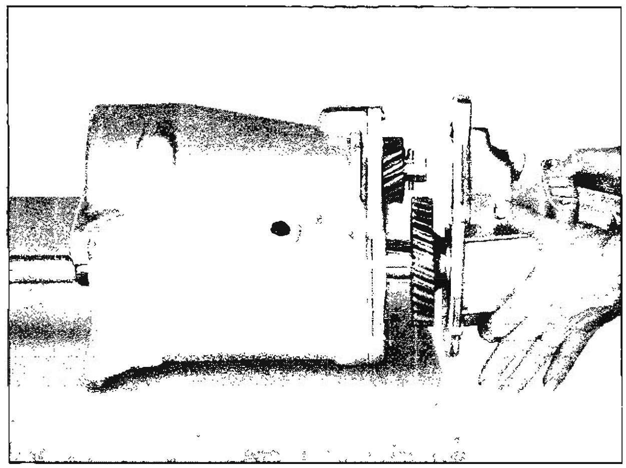

Fig. 24M—Installing Case Extension

19. Install 6 extension and retainer-to-case attaching bolts. Torque upper 3 bolts to 15-25 ft. lbs.; lower 3 bolts to 25-35 ft. lbs.
20. Push or pull reverse shifter shaft to line up groove in the shaft with the holes in the boss and drive in the lock pin. Install shifter lever.
21. Press bearing onto main drive gear (snap ring groove to front) and into case until several main drive gear retaining nut threads are exposed.
22. Lock transmission up by shifting into two gears. Install main drive gear retaining nut on the gear shaft and draw it up tight using Tool J-0933. Be sure bearing fully seats against shoulder on gear. Torque retaining nut to 40 ft. lbs. and lock in place by staking securely into main drive gear shaft hole with a center punch. Care must be used to avoid damaging the threads on the shaft.
23. Install the main drive gear bearing retainer, gasket and four attaching bolts using a suitable sealer on bolts. Torque to 15 to 20 ft. lbs.
24. Shift mainshaft 3-4 sliding clutch sleeve into neutral position and 1-2 sliding clutch sleeve into second gear (forward) detent position. Shift side cover 3-4 shifter lever into neutral detent and 1-2 shifter lever into second gear detent position.

25. Install side cover gasket and carefully position side cover into place. There is a dowel pin in the cover to assure proper alignment with the case. Install attaching bolts and tighten evenly to avoid side cover distortion. Torque to 15-20 ft. lbs.

INSTALLATION IN VEHICLE

1. Raise transmission and rotate as necessary to start input shaft into clutch disc and slide transmission forward until it bottoms against clutch housing. Remove guide pins.
2. Install the transmission-to-clutch housing retaining bolts. Torque all four retaining bolts to 40-50 ft. lbs.
3. Raise engine, position transmission cross-member, and install the retaining bolts. Torque to 25-35 ft. lbs.
4. Install the same shims removed or an equivalent amount, then remove temporary support from engine, install and torque the extension mount retaining bolts to 35-40 ft. lbs.
5. Install propeller shaft.
6. Connect speedometer cable to driven gear fitting and tighten securely.
7. Install control lever bracket assembly to transmission extension and connect shifter levers to shifter shafts.
8. Fill transmission to level of filler plug hole with correct lubricant.
9. Lower vehicle and install shift lever assembly, check shift pattern and adjust linkage as required.
10. Install trim plate and dust boot.

TROUBLES AND REMEDIES

SYMPTOM AND PROBABLE CAUSE	PROBABLE REMEDY
Shifts Hard	
a. Clutch not releasing engine or slow to release.	a. Adjust or repair clutch.
b. Shift linkage binding or selector not properly adjusted.	b. Free up and adjust as required.
Shifts Hard on Downshift	
a. Downshifting at too high an engine speed.	a. Shifting into low gear above 45 MPH and second above 65 MPH causes extra work for synchronizers and will require extra time or more force on lever to complete. There is also danger of overspeeding the engine if low or second is used at high car speeds.
Disengages from Gear	
a. Improperly adjusted linkage.	a. Adjust linkage.
b. Transmission loose at clutch housing.	b. Tighten mounting bolts.
c. Dirt between transmission case and clutch housing.	c. Clean mating surfaces.
d. Clutch gear bearing retainer broken or loose.	d. Tighten or replace clutch gear bearing retainer.
e. Damaged mainshaft pilot bearing rollers.	e. Replace pilot bearing rollers.
f. Clutching teeth worn or defective and/or clutch hub spline worn.	f. Replace gear, clutch sleeve and clutch hub.
g. Clutch housing misaligned with engine.	g. Shim transmission or replace clutch housing.
Noisy in All Gears	
a. Insufficient lubricant.	a. Fill to filler plug opening level.
b. Worn countergear bearings.	b. Replace countergear bearings and shaft.
c. Worn or damaged clutch gear and countershaft drive gear.	c. Replace worn or damaged gears.
d. Damaged clutch gear or mainshaft ball bearings.	d. Replace damaged bearings.
e. Damaged speedometer gears.	e. Replace damaged gears.
Noisy in High Gear	
a. Damaged clutch gear bearing.	a. Replace damaged bearing.
b. Damaged mainshaft bearing.	b. Replace damaged bearing.
c. Damaged speedometer gears.	c. Replace speedometer gears.
Noisy in Neutral with Engine Running	
a. Damaged clutch gear bearing.	a. Replace damaged bearing.
b. Damaged mainshaft pilot bearing rollers.	b. Replace bearing rollers.
Noisy in All Reduction Gears	
a. Insufficient lubricant.	a. Fill to filler plug opening level.
b. Worn or damaged clutch gear or counter gear.	b. Replace faulty or damaged gears.

SYMPTOM AND PROBABLE CAUSE	PROBABLE REMEDY
Noisy in One Gear Only	
a. Damaged or worn mainshaft constant mesh gear.	a. Replace damaged gear.
b. Damaged or worn countergear teeth.	b. Replace countergear.
Excessive Backlash in All Reduction Gears	
a. Worn countergear bearings.	a. Replace countergear bearings and shaft.
b. Excessive end play in countergear.	b. Replace countergear thrust washers.
Leaks Lubricant	
a. Excessive amount of lubricant in transmission.	a. Drain to correct level.
b. Loose or broken clutch gear bearing retainer.	b. Tighten or replace retainer.
c. Clutch gear bearing retainer gasket damaged.	c. Replace gasket.
d. Cover loose or gasket damaged.	d. Tighten cover or replace gasket.
e. Shifter shaft seal leaks.	e. Replace shifter shaft lip seal.
f. Countershaft loose in case.	f. Replace case.
g. Lack of sealant on bolts.	g. Coat bolts with sealant.
h. Worn extension oil seal.	h. Replace seal.

SPECIAL TOOLS

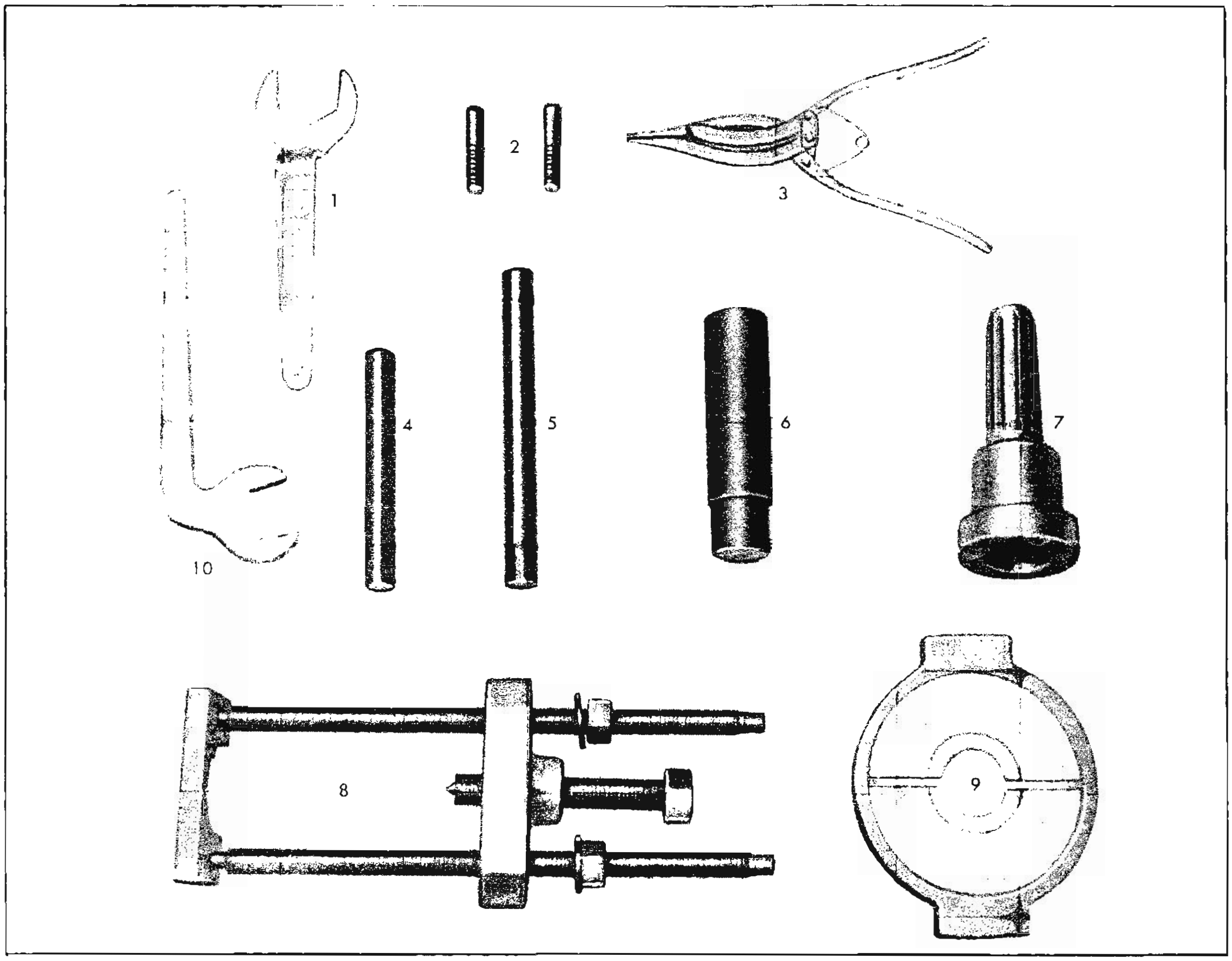

Fig. 25M—Manual Transmission Special Tools

1. J-0933 Clutch Gear Bearing Retainer Wrench
2. J-1126 Transmission Guide Pins
3. J-8059 Retainer Snap Ring Pliers
4. J-5777 Countergear Loading Tool (3-Speed)
5. J-5589 Countergear Loading Tool (4-Speed)
6. J-5778 Extension Housing Bushing Remover and Installer
7. J-5154 Extension Housing Seal Installer
8. J-5814-15 Speedometer Drive Gear Remover
9. J-1453-01 Speedometer Drive Gear Press Plates
   J-358-1 Press Plate Holder
10. J-4653 Overdrive Governor Wrench

SPECIFICATIONS

3-SPEED MANUAL TRANSMISSION

Engine Combinations			L-6 230 V-8 283	V-8 327 V-8 409
Number of forward speeds			3	
Transmission ratios	In first		2.94	2.58
	In second		1.68	1.48
	In third		1.0	
	In fourth		—	
	In reverse		2.94	2.58
Synchronous meshing, specify gears			2nd and 3rd	
Shift lever location			Steering Column	
Lubricant	Capacity (pt.)		2	
	Type recommended		Meeting Military Specification Mil-L-2105-B	
	SAE viscosity number	Summer	SAE 80	
		Winter	SAE 80	
		Extreme cold	SAE 80	

MANUAL TRANSMISSION WITH OVERDRIVE

For transmission data see manual transmission section

Overdrive	Type (planetary or other)			Planetary
	Manual lockout (yes, no)			Yes
	Downshift accelerator control (yes, no)			Yes
	Minimum cut-in speed			27 MPH
	Gear ratio			0.7:1
	Lu-bri-cant	Capacity (pt.) (Overdrive only)		1
		Separate filler (yes, no)		No
		Type recommended		Meeting Military Specification Mil-L-2105-B
		SAE vis-cosity number	Summer	SAE 80
			Winter	SAE 80
			Ext. Cold	SAE 80

4-SPEED MANUAL TRANSMISSION

			All Engines	Optional with V-8 409
Number of forward speeds			4	
Transmission ratios	In first		2.56	2.20
	In second		1.91	1.64
	In third		1.48	1.28
	In fourth		1.0	
	In reverse		2.64	2.27
Synchronous meshing, specify gears			2nd and 3rd	
Shift lever location			Steering Column	
Lubricant	Capacity (pt.)		3	
	Type recommended		Meeting Military Specification Mil-L-2105-B	
	SAE viscosity number	Summer	SAE 80	
		Winter	SAE 80	
		Extreme cold	SAE 80	

SECTION 13

AUTOMATIC TRANSMISSIONS

ALUMINUM POWERGLIDE

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GENERAL DESCRIPTION

The aluminum Powerglide transmission, available as the automatic transmission option on all Passenger Cars, is a transmission embodying many of the proven features of previous Chevrolet transmissions. Use of a one piece aluminum case and an aluminum case extension allows a weight saving of about 35% over comparable cast iron components.

Driving characteristics of the transmission remain the same as found in the familiar cast iron Powerglide with the single shift occurring between low and drive.

The conventionally arranged torque converter is a welded unit, eliminating the possibility of internal servicing. Low (band clutch) and drive (disc clutch) functions are performed by the clutch drum assembly which incorporates multiple release springs. The planetary gearset, except for the redesigned parking lock gear, is similar to the cast iron Powerglide gearset. The reverse clutch is of the disc type operated by a reverse clutch piston and incorporating multiple return springs. The governor, installed around the output shaft, spins with the shaft and utilizes the centrifugal forces thus produced to regulate governor pressure. The valve body is located at the bottom of the case where service operations on it may be performed without the necessity of removing the transmission from the vehicle.

The converter, bolted to the engine flywheel, drives through the two-speed planetary gearset.

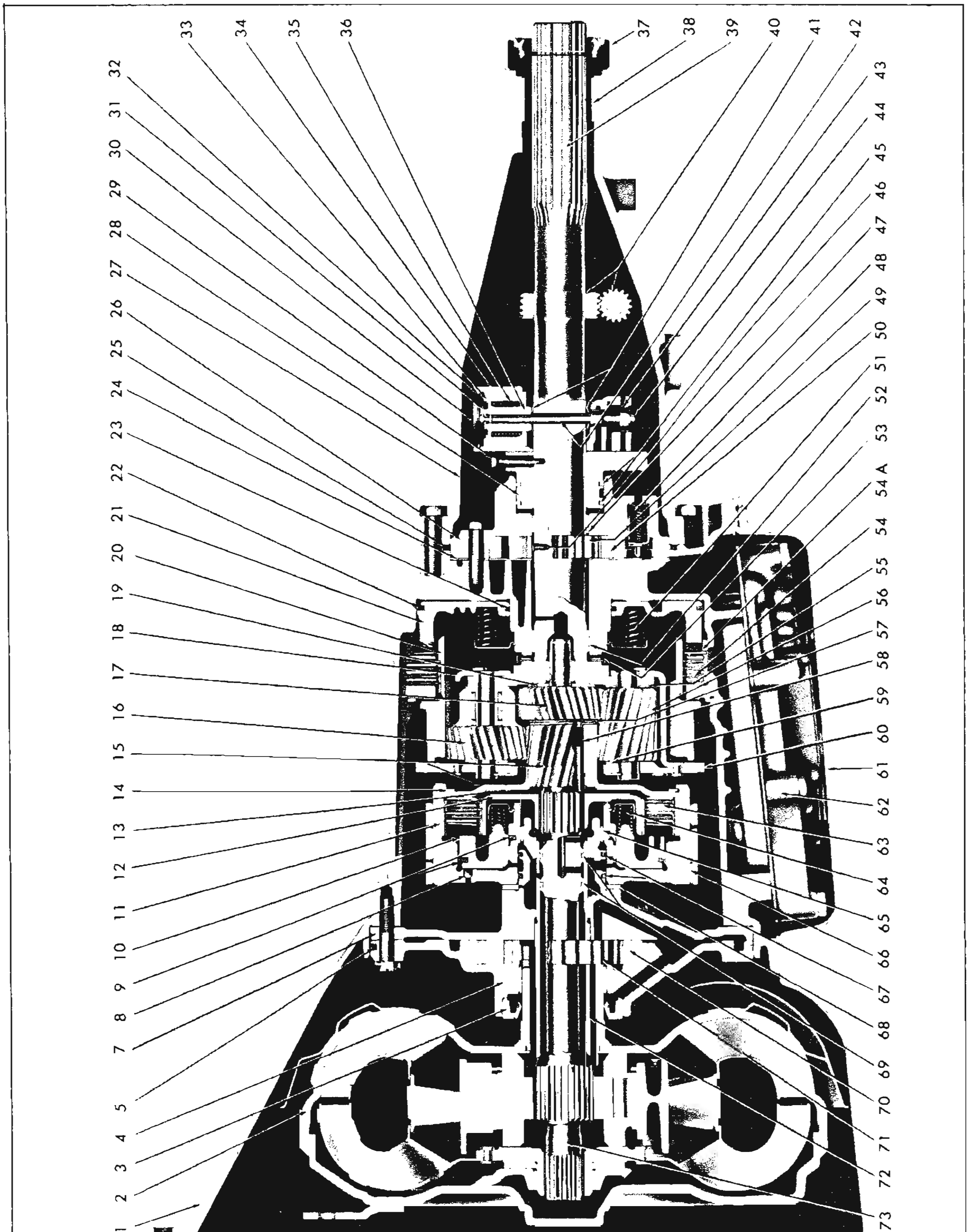

Fig. 1PG—Aluminum Powerglide—Typical Sectioned View

1. Transmission Case
2. Welded Converter
3. Front Oil Pump Seal Assembly
4. Front Oil Pump Body
5. Front Oil Pump Body Square Ring Seal
7. Front Oil Pump Cover
8. Clutch Relief Valve Ball
9. Clutch Piston Inner and Outer Seal
10. Clutch Piston
11. Clutch Drum
12. Clutch Hub
13. Clutch Hub Thrust Washer
14. Clutch Flange Retainer Ring
15. Low Sun Gear and Clutch Flange Assembly
16. Planet Short Pinion
17. Planet Input Sun Gear
18. Planet Carrier
19. Planet Input Sun Gear Thrust Washer
20. Ring Gear
21. Reverse Piston
22. Reverse Piston Outer Seal
23. Reverse Piston Inner Seal
24. Extension Seal Ring
25. Rear Pump Wear Plate
26. Rear Pump
27. Extension
28. Governor Hub
29. Governor Hub Drive Screw
30. Governor Body
31. Governor Shaft Retainer Clip
32. Governor Outer Weight Retainer Ring
33. Governor Inner Weight Retainer Ring
34. Governor Outer Weight
35. Governor Spring
36. Governor Inner Weight
37. Extension Rear Oil Seal
38. Extension Rear Bushing
39. Output Shaft
40. Speedometer Drive and Driven Gear
41. Governor Shaft Belleville Springs
42. Governor Shaft
43. Governor Valve
44. Governor Valve Retaining Clip
45. Governor Hub Seal Rings
46. Rear Pump Drive Pin
47. Rear Pump Bushing
48. Rear Pump Priming Valve
49. Rear Pump Drive Gear
50. Rear Pump Driven Gear
51. Reverse Piston Return Springs, Retainer and Retainer Ring
52. Transmission Rear Case Bushing
53. Output Shaft Thrust Bearing
54. Reverse Clutch Pack
54A. Reverse Clutch Cushion Spring (Waved)
55. Pinion Thrust Washer
56. Planet Long Pinion
57. Low Sun Gear Needle Thrust Bearing
58. Low Sun Gear Bushing (Splined)
59. Pinion Thrust Washer
60. Parking Lock Gear
61. Transmission Oil Pan
62. Valve Body
63. High Clutch Pack
64. Clutch Piston Return Spring, Retainer and Retainer Ring
65. Clutch Drum Bushing
66. Low Brake Band
67. High Clutch Seal Rings
68. Clutch Drum Thrust Washer (Selective)
69. Turbine Shaft Seal Rings
70. Front Pump Driven Gear
71. Front Pump Drive Gear
72. Stator Shaft
73. Input Shaft

MAINTENANCE AND ADJUSTMENTS

OIL REQUIREMENTS

The Aluminum Powerglide transmission requires an oil known as Automatic Transmission Fluid, "Type A" bearing an "AQ-ATF-A" mark.

Oil Level

The transmission oil level should be checked periodically as recommended in Section 2. Oil should be added only when the level is near 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.

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.

If the transmission is found consistently low on oil, a thorough inspection should be made to find and correct all external oil leaks. Transmission oil leakage is now easily identified as all automatic transmission fluid used in Chevrolet production is dyed red. The mating surfaces of servo cover, converter housing, transmission case and transmission case extension should be carefully examined for signs of leakage. The vacuum modulator must also be checked to insure that the diaphragm has not ruptured as this would allow transmission oil to be drawn into the intake manifold. Usually, the exhaust will be excessively smoky if the diaphragm ruptures due to the transmission oil added to the combustion. The transmission case extension rear oil seal should also be checked. All test plugs should be checked to make sure that they are tight and that there is no sign of leakage at these points. The converter underpan should also be removed. Any appreciable quantity of oil in this area would indicate leakage at the front pump square seal ring, front pump seal assembly, or front pump bolt "O" ring seals.

Draining and Refilling

Transmission fluid installed at the assembly plant is good for the life of the vehicle. It is not necessary to replace the fluid except to make additions when needed to bring it to the proper level.

When the transmission is to be removed from the vehicle for repairs, drain and refill as follows:

To drain the transmission, carefully loosen the oil pan bolts. Position a pan or can to catch the draining oil. If the transmission is to be removed from the vehicle for repairs, the draining operation may be performed after removal if desired.

To refill the transmission, remove dipstick from oil filler tube and refill transmission with Automatic Transmission Fluid Type A with an AQ-ATF-A mark using filler tube and funnel J-4264. 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 dipstick. Total capacity including converter is 17.7 pts. for L-6 and 20.1 pts. for V-8 models.

SERVICE ADJUSTMENTS

Four service adjustments are required for Aluminum Powerglide equipped cars: Shift linkage, throttle valve linkage, neutral safety switch and throttle return check valve (Dashpot) adjustment.

Conventional Shift Linkage Check and Adjustment

1. The tube and lever assembly (B) must be free in the mast jacket.

   NOTE: No bind can be tolerated when making this adjustment.

2. Assemble grommet, washers, ring, swivel, retainer, washer and nut on tube and lever assembly loosely. See view A.
3. Set transmission lever (A) in drive position.

   NOTE: Obtain drive position by moving Transmission Lever counterclockwise to low detent, then clockwise one detent position to drive.

4. Set tube and lever assembly to the reverse position and then bring lever down to insert rod in swivel and retainer. See view A.
5. Set tube and lever assembly in drive position and tighten nut (D). See view A.

   NOTE: When above procedure is adhered to, the following conditions must be met by manual operation of the steering column shift lever: From reverse to drive position travel, the transmission detent feel must be noted and related to indicated position on dial.

   When in drive and reverse position, pull lever upward (toward steering wheel, and then

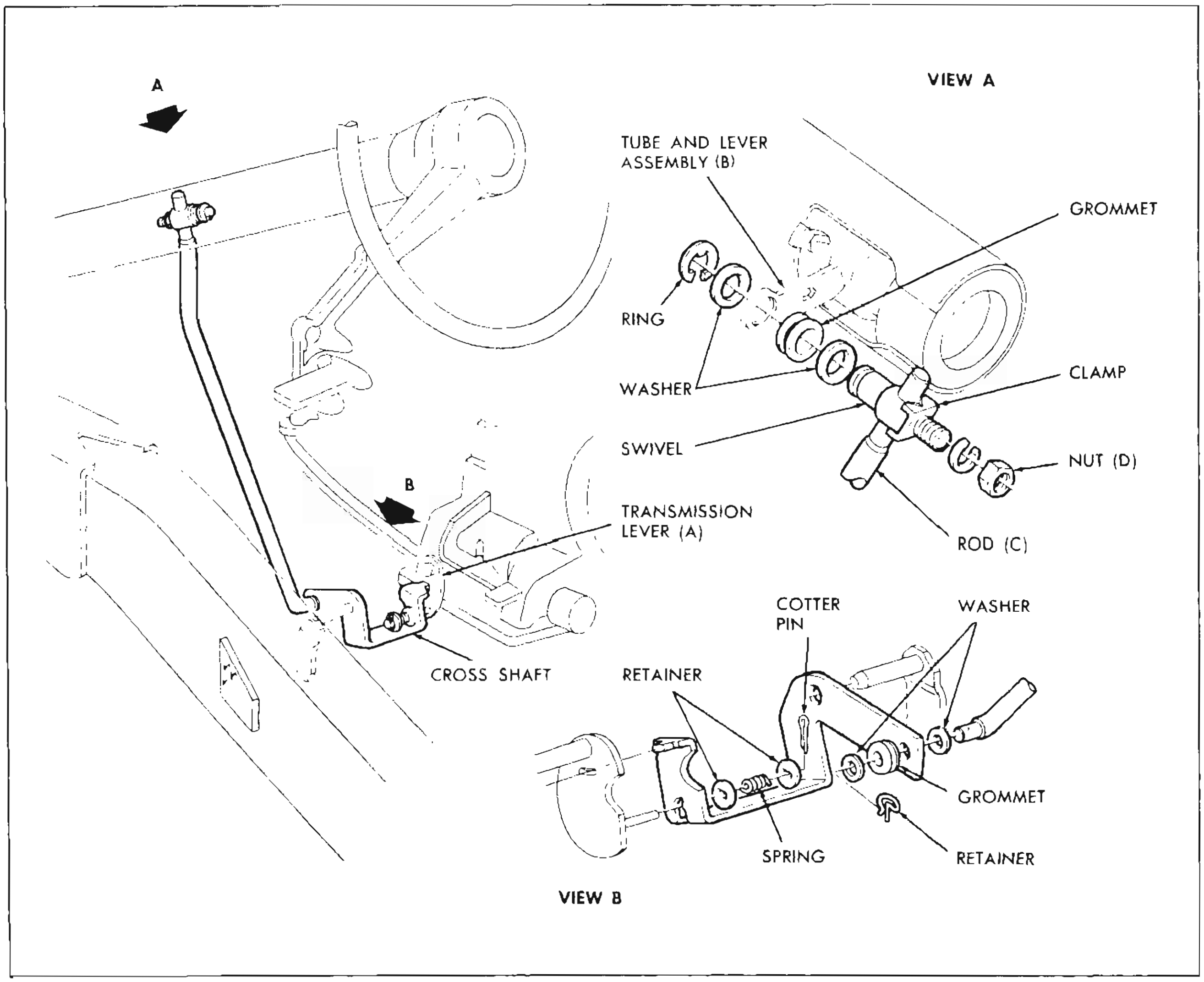

Fig. 2PG—Conventional Shift Linkage Adjustments

release. It must drop back into position with no restriction.

CAUTION: ***Any inaccuracies in the above adjustment may result in premature failure of the transmission due to operation without controls in full detent. Such operation results in reduced oil pressure and in turn partial engagement of the affected clutches. Partial engagement of the clutches with sufficient pressure to cause apparent normal operation of the vehicle will result in failure of the clutches or other internal parts after only a few miles of operation.***

FLOOR SHIFT LINKAGE (Fig. 3PG)

1. Assemble nuts (A) and (B) on lower rod (C) loosely.
2. Set transmission lever (D) in drive position.

   NOTE: Obtain drive position by moving Transmission Lever counterclockwise to low detent, then clockwise one detent position to drive.

3. Set control pawl lever rod (E) in the neutral or drive notch of detent (F). See view A.
4. Apply load in direction of arrow (Y) on actuating lever (G) until pawl rod comes in contact with detent at contact point (Z). See view A.
5. Place $\frac{7}{64}''$ spacer (H) between nut (A) and swivel (J), run nut (A) until it touches spacer. Remove spacer and apply load in the direction on arrow (X) until it touches nut (A). Tighten nut (B) against swivel and lock swivel between nuts (A) and (B). See view B.

The foregoing procedure will provide a $\frac{3}{32}''$ over travel gap in notches of detent (F).

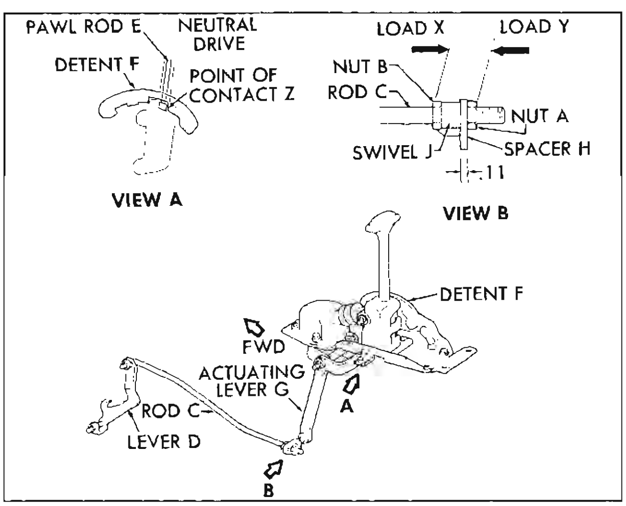

Fig. 3PG—Floor Shift Linkage Adjustment

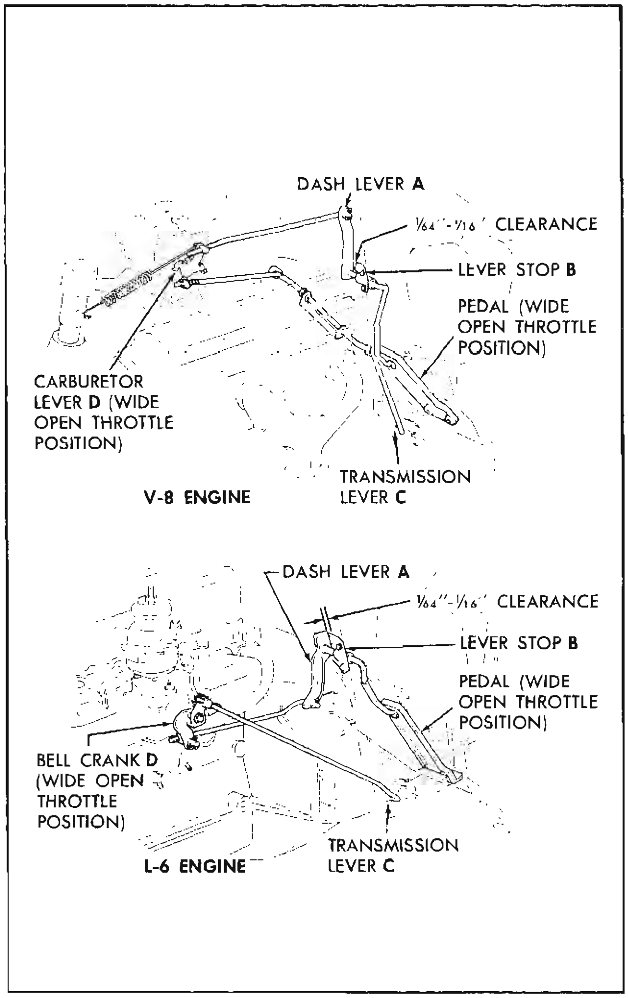

Fig. 4PG—TV Linkage Adjustments

Throttle Valve Linkage Adjustment (See Fig. 4PG)

With accelerator pedal depressed, bell crank on L-6 models or carburetor lever on V-8 models, (D) must be wide open throttle position.

Dash lever (A) must be $\frac{1}{64}''$ -$\frac{1}{16}''$ off lever stop (B) and transmission lever (C) must be against transmission internal stop.

Neutral Safety Switch Adjustment

The adjustment of the neutral safety switch is described in the Electrical Section 12.

Throttle Return Check Valve (Dashpot) Adjustment

The adjustment of the throttle return check valve is described in Section 6M for each carburetor installation.

SERVICE OPERATIONS

TRANSMISSION

Removal

1. Raise car on hoist (preferably) or on stand jack and remove oil pan to drain oil, then replace pan using several bolts.

   NOTE: If desired, the oil may be drained after transmission removal.

2. Disconnect the oil cooler lines, vacuum modulator line and the speedometer drive cable fitting at the transmission. Tie lines out of the way.
3. Disconnect manual and TV control lever rods from transmission.
4. Disconnect propeller shaft from transmission.
5. Install suitable transmission lift equipment to jack or other lifting device and attach on transmission.
6. Disconnect engine rear mount on transmission extension, then remove the transmission support crossmember. Observe that crossmember is attached to frame bracket at lower attaching holes.

   NOTE: Use care to remove any shims which may be installed between the extension mounting boss and the crossmember. It is vital that exactly the same number of shims be reinstalled as these effect drive line angles.

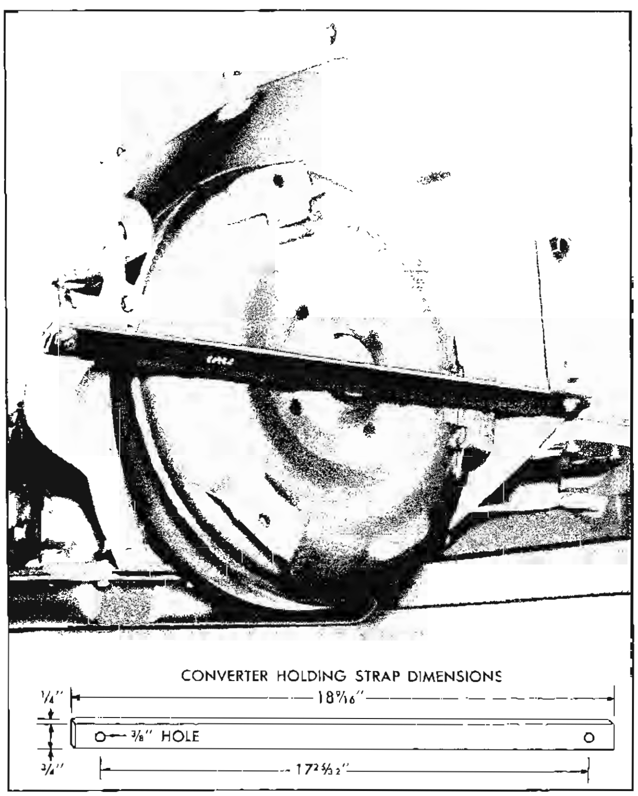

Fig. 5PG—Converter Holding Tool

7. Remove converter underpan, scribe flywheel-converter relationship for assembly, then remove the flywheel-to-converter attaching bolts.

   NOTE: The "light" side of the converter is denoted by a "blue" stripe painted across the ends of the converter cover and housing. This marking should be aligned as closely as possible with the "white" stripe painted on the engine side of the flywheel outer rim (heavy side of engine) to maintain balance during assembly.

8. Support engine at the oil pan rail with a jack or other suitable brace capable of supporting the engine weight when the transmission is removed.
9. Lower the rear of the transmission slightly so that the upper transmission housing-to-engine attaching bolts can be reached using a universal socket and a long extension. Remove upper bolts.

   CAUTION: On V-8 engines, care must be taken not to lower rear of transmission too far as the distributor housing may be forced against the dash causing damage to the distributor. It is best to have an assistant observe clearance of all upper engine components while the transmission rear end is being lowered.

10. Remove remainder of transmission housing-to-engine attaching bolts.
11. Remove the transmission by moving it slightly to the rear and downward, then remove from beneath the car and transfer to a work bench.

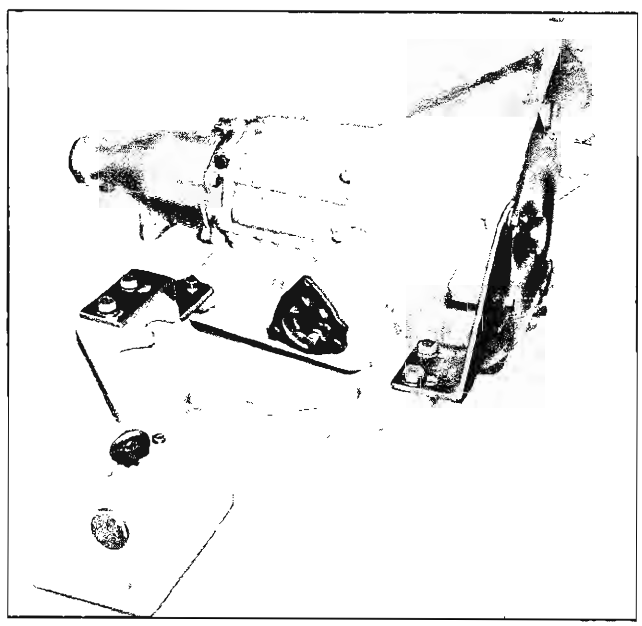

Fig. 6PG—Transmission Mounted in Fixture

NOTE: Observe converter when moving the transmission rearward. If it does not move with the transmission, pry it free of flywheel before proceeding.

CAUTION: Keep front of transmission upward to prevent the converter from falling out. Install converter Tool J-9549 (or a similar tool constructed as shown in Figure 5PG, or, in an emergency, a length of strong wire may be used) immediately after removal from the engine.

Disassembly

1. Place transmission in holding fixture J-3289-01 and adapters J-9506 (fig. 6PG).

NOTE: Cleanliness is an important factor in the overhaul of the transmission. Before attempting any disassembly operation, the exterior of the case should be thoroughly cleaned to prevent the possibility of dirt entering the transmission internal mechanism. During disassembly, all parts should be thoroughly cleaned in cleaning fluid and then air dried. Wiping cloths or rags should not be used to dry parts as lint may be deposited on the parts which may cause later trouble.

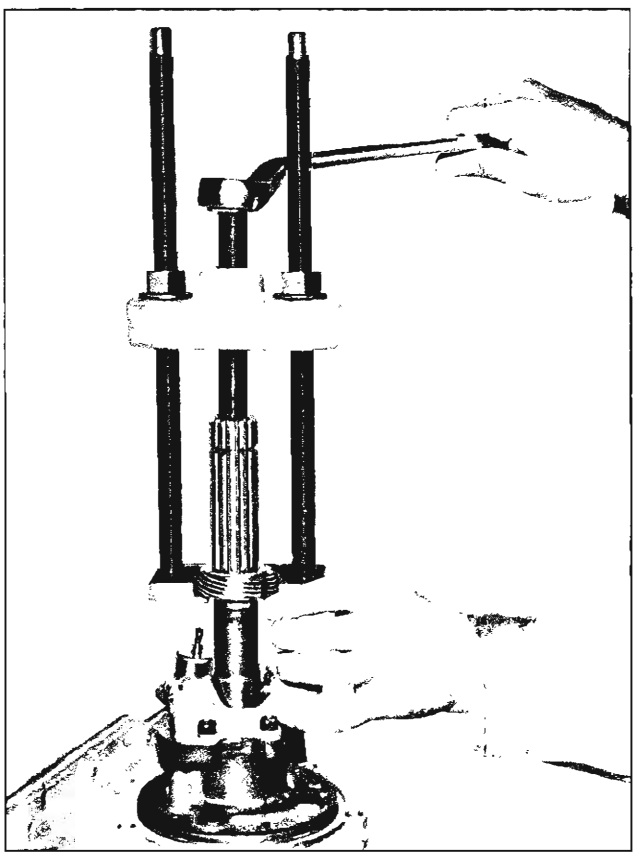

Fig. 7PG—Removing Speedometer Drive Gear

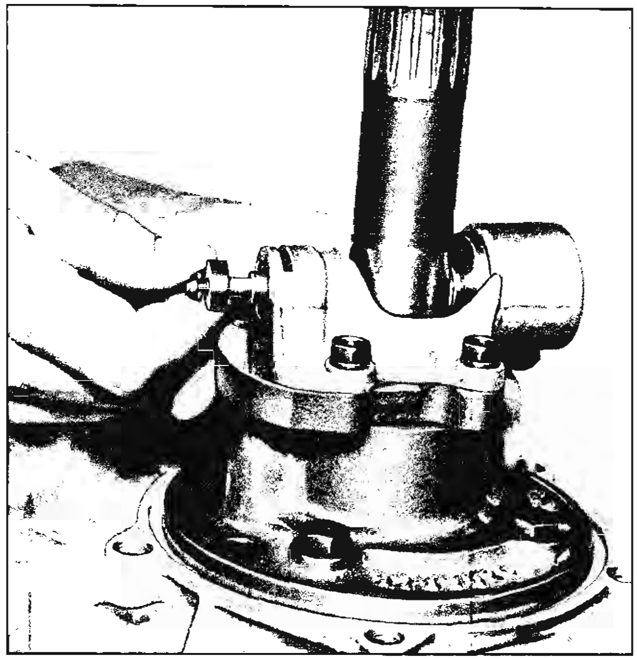

Fig. 8PG—Removing Governor Valve and Shaft

CAUTION: Do not use solvents which could damage rubber seals or clutch plate facings.

2. Remove converter holding tool previously installed and remove converter assembly.

EXTENSION, GOVERNOR AND REAR OIL PUMP

3. If replacement is necessary, remove speedometer driven gear. Loosen capscrew and retainer clip holding speedometer driven gear in extension and remove gear.
4. Remove transmission extension by removing five bolts retaining extension to case. Note seal ring on rear pump body.
5. Remove the speedometer drive gear from output shaft, using J-5814 (fig. 7PG).
6. Remove the "C" clip from the governor shaft on the weight side of the governor, then remove the shaft and governor valve from the opposite side of the governor assembly (fig. 8PG) and the two belleville springs.
7. Loosen the governor drive screw and remove the governor assembly over the end of the output shaft (fig. 9PG).
8. Remove the four bolts retaining the rear oil pump to the transmission case and remove the pump body, and drain back baffle extension seal ring, drive and driven gears.

CAUTION: When the drive gear is removed, the drive pin may fall out if the hole is on the bottom of the shaft and the shaft is horizontal.

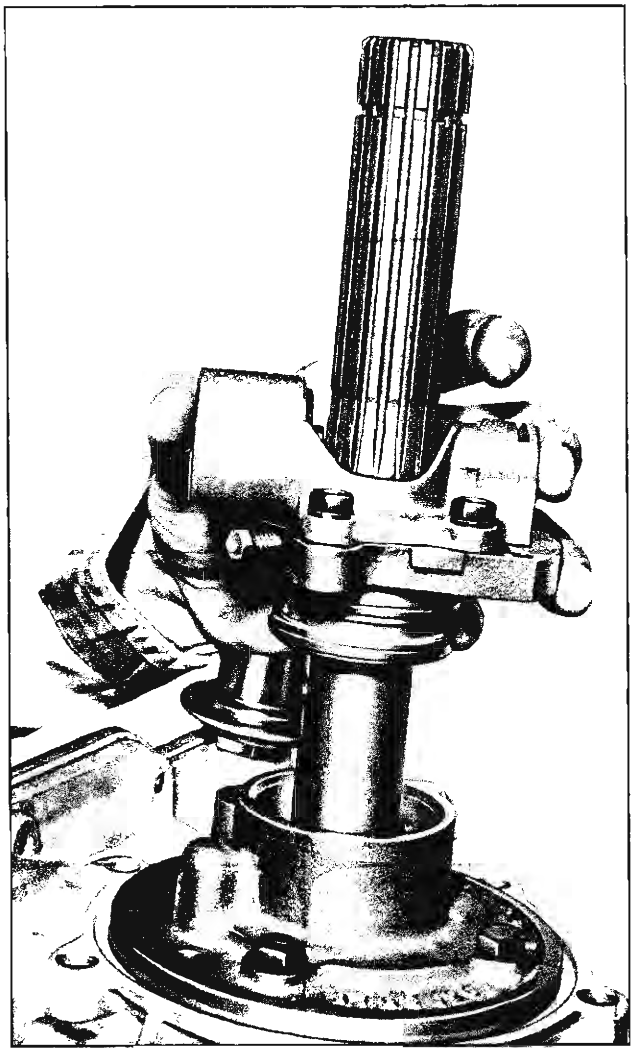

Fig. 9PG—Removing Governor Assembly

9. Remove the oil pump drive pin (fig. 10PG). This is of extreme importance. Do not fail to remove this drive pin.
10. After removing the drive pin, remove the rear pump wear plate.

TRANSMISSION INTERNAL COMPONENTS

11. Rotate the holding fixture until the front of the transmission is pointing up and remove the seven front oil pump bolts. The bolt holes are offset to facilitate proper location upon installation.
12. Remove the front oil pump and stator shaft assembly and the selective fit thrust washer using J-9539 (or two 3/8"–16" x 10" stove bolts) and the slide weights from Tool J-6585 (fig. 11PG). Note the two threaded holes in the pump to mount the pullers. Remove the front pump ring seal and gasket.

NOTE: The front pump bolts have special "O" rings or washers which must be in place upon installation.

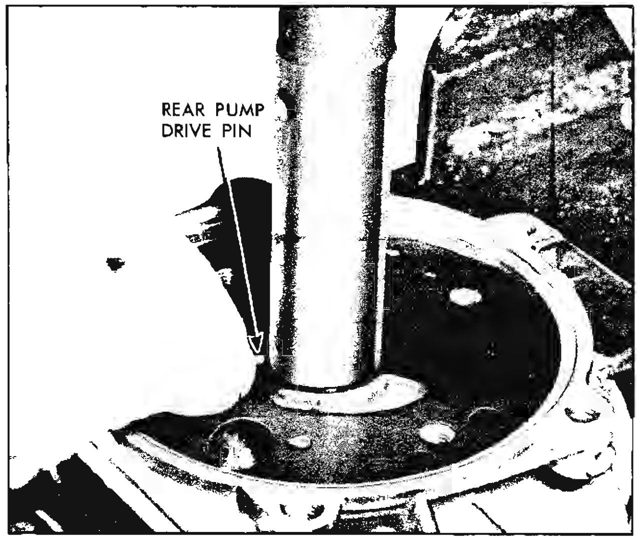

Fig. 10PG—Removing Rear Oil Pump Drive Pin

13. Release the tension on the low band adjustment, then, with transmission horizontal, grasp the transmission input shaft and carefully work it and the clutch assembly out of the case (fig. 12PG). Use care so as not to lose the low sun gear (splined) bushing from the input shaft. The low sun gear thrust washer will probably remain in the planet carrier.

CAUTION: Use care so as not to damage the machined face on the front of the clutch drum.

14. The low brake band and struts may now be removed.

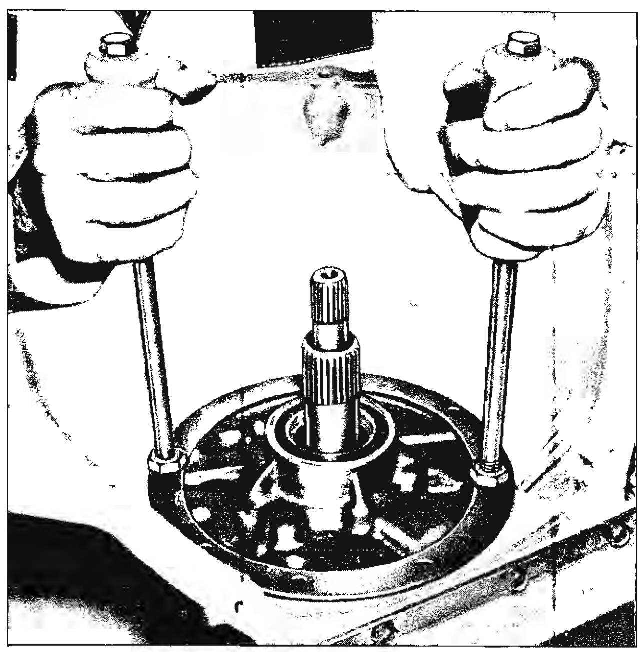

Fig. 11PG—Removing Front Oil Pump

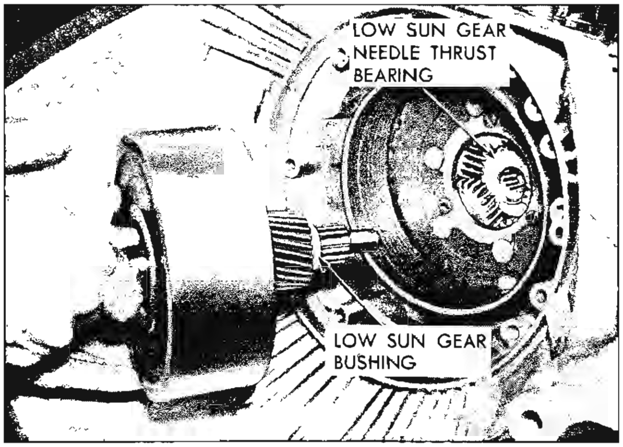

Fig. 12PG—Removing Clutch Drum and Input Shaft

15. Make certain that the rear pump drive pin has been removed (Step 9 above), then remove the planet carrier and the output shaft thrust caged bearing from the front of the transmission.
16. Remove the reverse ring gear if it did not come out with the planet carrier.
17. Using a large screwdriver, remove the reverse clutch pack retainer ring and then lift out the reverse clutch plates and the (wave) cushion spring.

NOTE: If difficulty is experienced in getting the snap ring past the shoulder on the reverse pack pressure plate, a feeler gauge may be used as a guide.

Fig. 13PG—Removing Rear Piston Spring Retainer Snap Ring

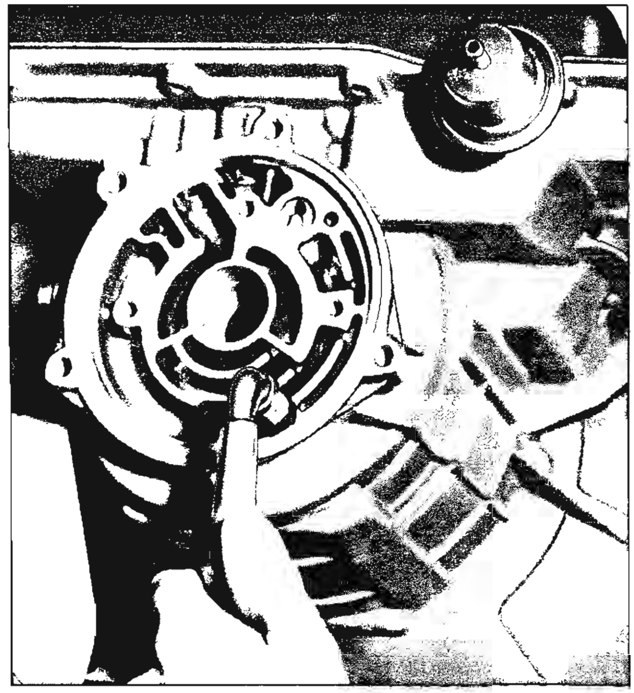

Fig. 14PG—Applying Air to Remove Rear Piston

18. Install Tool J-9542 through the rear bore of the case with the flat plate on the rear face of the case and turn down the wing nut to compress the rear piston spring retainer and springs, then remove the snap ring (fig. 13PG). Tool J-8039 may be used to remove the snap ring if desired.
19. Remove Tool J-9542, the reverse piston spring retainer and the 17 piston return springs.

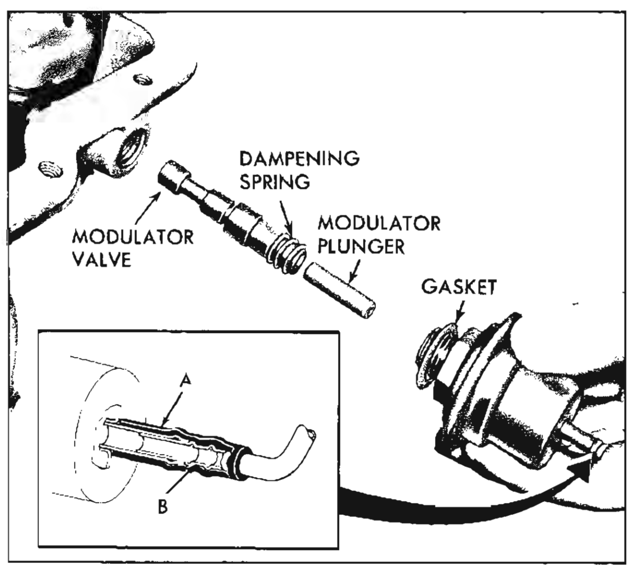

Fig. 15PG—Vacuum Modulator, Dampening Spring, Plunger and Valve

20. Remove the rear piston by applying air to the reverse port in the rear of the transmission case as shown in Figure 14PG. Remove the inner and outer seals.
21. Remove the three servo cover bolts, servo cover, piston and spring.

OIL PAN AND VALVE BODY

NOTE: The oil pan and valve body may be serviced without the necessity of removing the extension and internal components covered in the preceding steps.

22. Rotate the holding fixture until the transmission is upside down and the oil pan is at the top. Remove the oil pan attaching bolts, oil pan and gasket.
23. Remove the vacuum modulator and gasket, and the vacuum modulator plunger, dampening spring and valve (fig. 15PG).
24. Remove the two bolts attaching the detent guide plate to the valve body and the transmission case. Remove the guide plate and the range selector detent roller spring.
25. Remove the remaining valve body-to-transmission case attaching bolts (indicated by arrows in Figure 16PG) and carefully lift out the valve body and gasket, disengaging the servo apply tube from the transmission case as the valve body is removed.
26. If necessary, the TV, shift and parking actuator assembly levers, and the parking pawl and bracket (fig. 17PG) may be removed.

This completes the entire transmission disassembly procedure. Component parts disassembly and repair procedures will be found in succeeding pages of this manual.

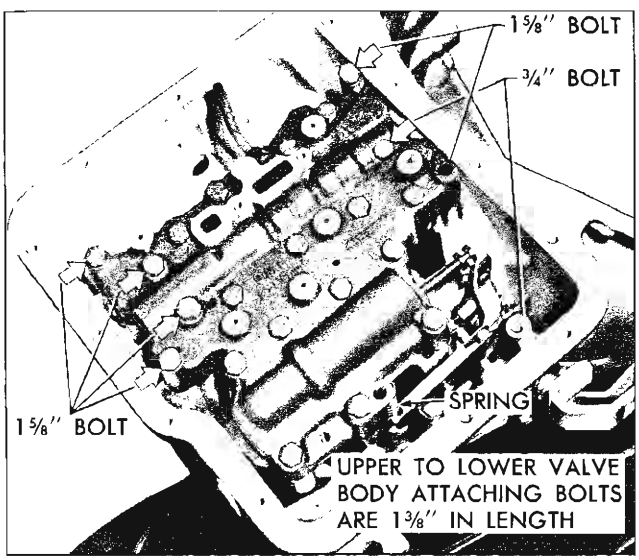

Fig. 16PG—Valve Body Removal

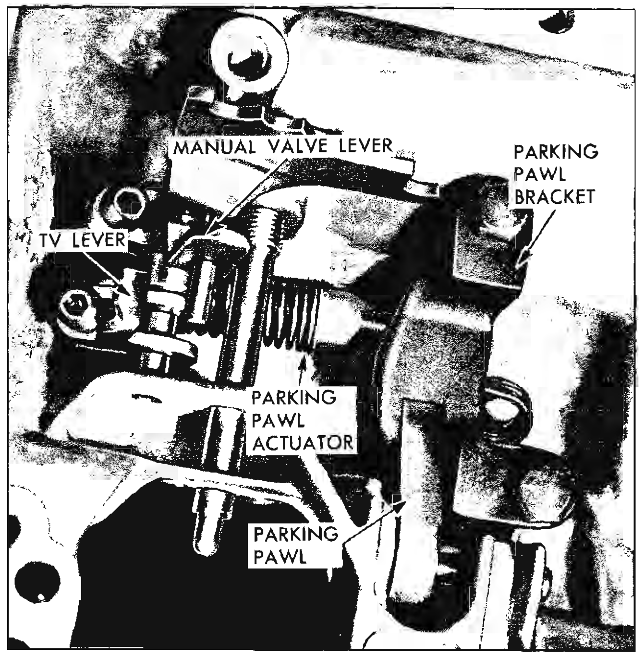

Fig. 17PG—Inner Control Levers, Parking Pawl and Bracket

OVERHAULING UNIT ASSEMBLIES

CONVERTOR AND STATOR

The converter is a welded assembly and no internal repairs are possible. Check the seams for stress or breaks and replace converter if necessary.

FRONT PUMP

Seal Replacement

If the front pump seal requires replacement, remove the pump from the transmission, pry out and replace the seal. (Drive new seal into place, fully seated in counterbore, using J-6839.) Then, if no further work is required on the front pump, reinstall it in the case.

NOTE: Outer diameter of the seal should be coated with non-hardening sealer prior to installation.

Disassembly

1. Remove bolts attaching pump cover to body and remove the cover.
2. Remove pump gears from body.

CAUTION: Do not drop or nick gears. These gears are not heat treated.

3. Remove the rubber seal ring from the pump body.

NOTE: See Figure 19PG for a layout of pump parts.

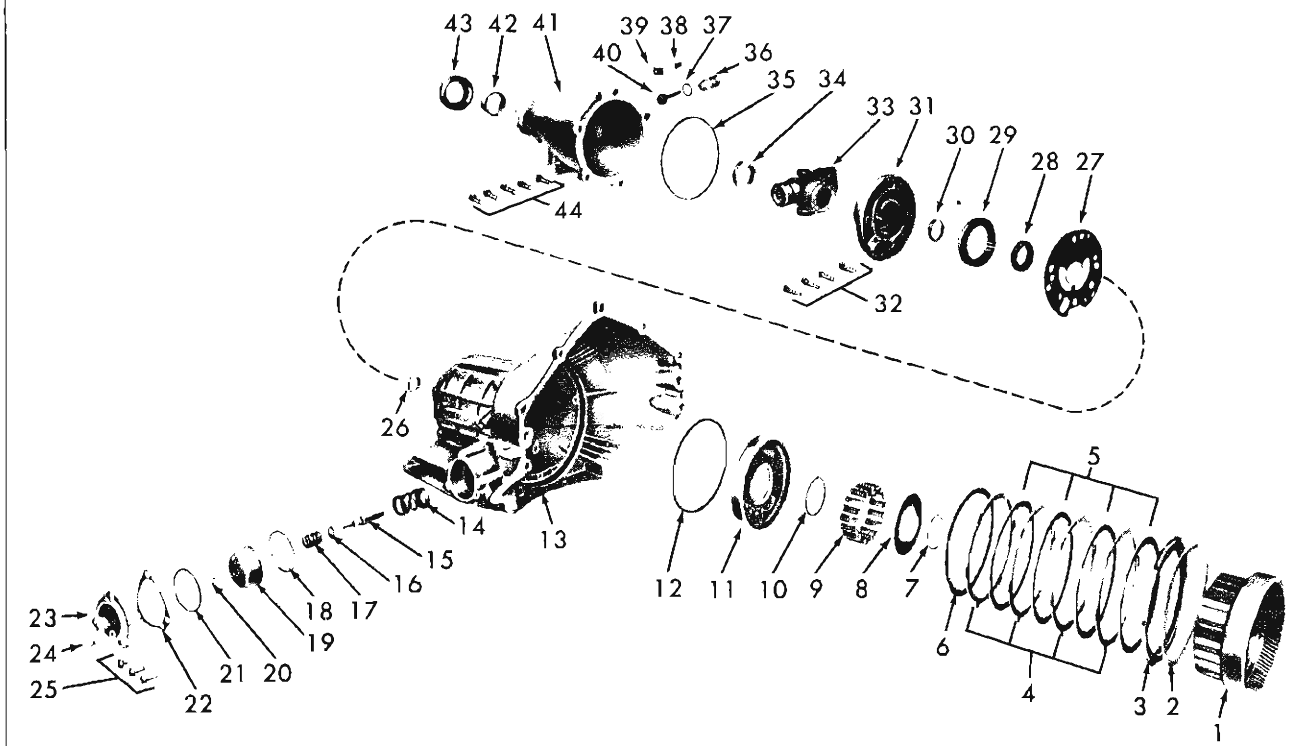

Fig. 18PG—Transmission Case—Exploded View (Typical)

1. Reverse Ring Gear
2. Reverse Clutch Pack Snap Ring
3. Reverse Clutch Pressure Plate
4. Reverse Clutch Reaction Plates
5. Reverse Clutch Drive Plates
6. Reverse Clutch Cushion Spring
7. Reverse Clutch Piston Return Spring Retainer Snap Ring
8. Reverse Clutch Piston Return Spring Retainer
9. Reverse Clutch Piston Return Springs
10. Reverse Clutch Piston Inner Seal
11. Reverse Clutch Piston
12. Reverse Clutch Piston Outer Seal
13. Transmission Case
14. Servo Piston Return Spring
15. Servo Piston Rod
16. Servo Piston Apply Spring Seal
17. Servo Piston Apply Spring
18. Servo Piston Seal Ring
19. Servo Piston
20. Servo Piston Rod Spring Retainer
21. Servo Cover Seal
22. Servo Cover Gasket
23. Servo Cover
24. Servo Cover Plug
25. Servo Cover Bolts
26. Transmission Case Bushing
27. Rear Pump Wear Plate
28. Rear Pump Drive Gear
29. Rear Pump Driven Gear
30. Rear Pump Body Bushing
31. Rear Pump Body
32. Rear Pump Assembly to Case Attaching Bolts
33. Governor Assembly
34. Speedometer Drive Gear
35. Rear Pump Seal
36. Speedometer Shaft Fitting
37. Speedometer Shaft Fitting Oil Seal
38. Lock Plate Attaching Screw
39. Lock Plate
40. Speedometer Driven Gear
41. Transmission Extension
42. Extension Bushing
43. Extension Oil Seal
44. Extension to Case Attaching Screws

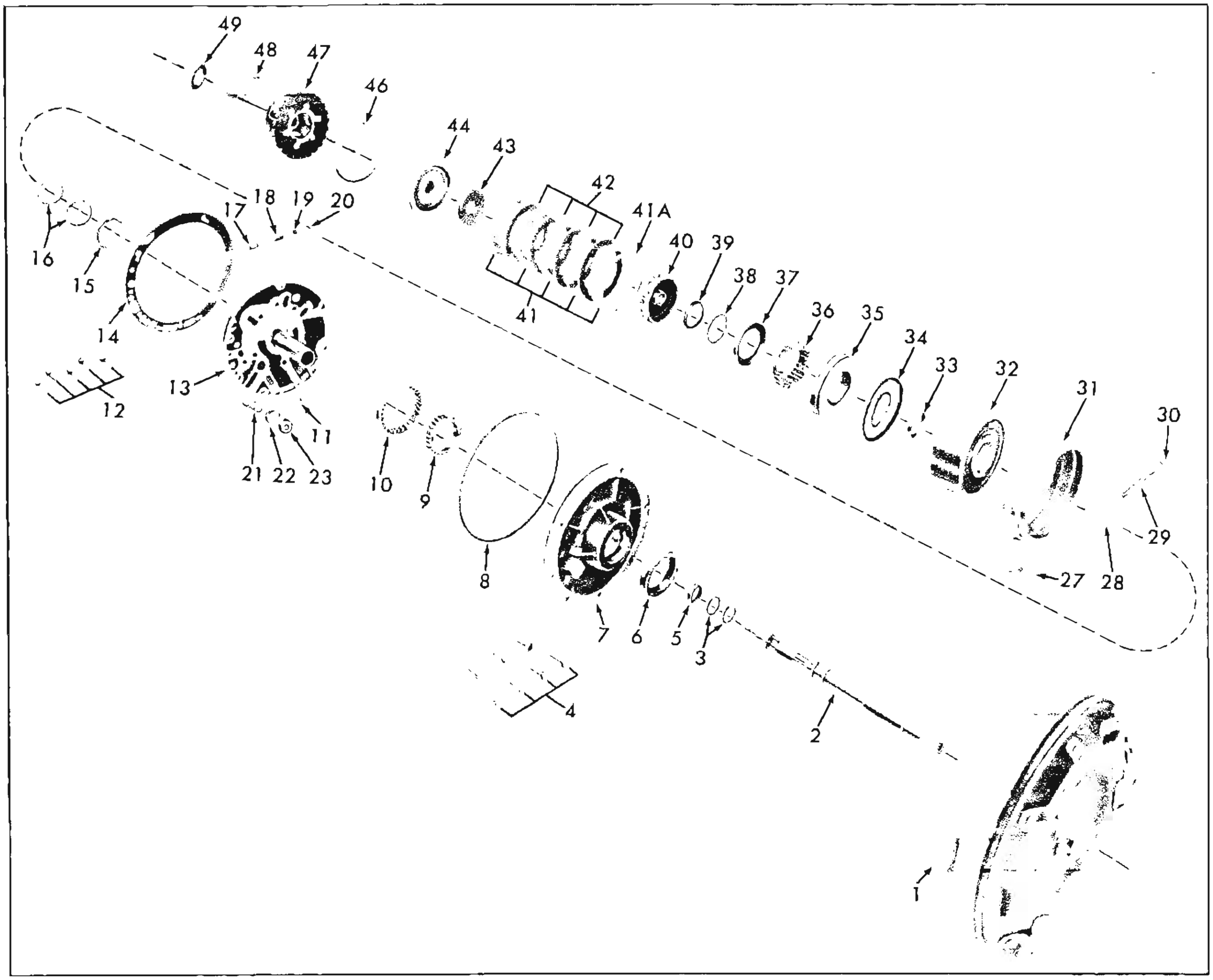

Fig. 19PG—Internal Mechanism—Exploded View (Typical)

1. Converter Assembly
2. Input Shaft
3. Input Shaft Oil Seals
4. Front Pump to Case Attaching Bolts and "O" Ring Seals
5. Low Sun Gear Bushing
6. Front Pump Oil Seal
7. Front Pump Body
8. Front Pump to Case Oil Seal
9. Front Pump Drive Gear
10. Front Pump Driven Gear
11. Downshift Timing Valve
12. Front Pump Cover to Pump Body Attaching Screws
13. Front Pump Cover and Converter Stator Shaft
14. Front Pump Gasket
15. Clutch Drum Thrust Washer
16. High Clutch Seal Rings
17. Front Pump Priming Valve
18. Front Pump Priming Valve Spring
19. Front Pump Priming Valve Spring Washer
20. Front Pump Priming Valve Spring Retaining Pin
21. Oil Cooler By-Pass Valve Spring
22. Oil Cooler By-Pass Valve
23. Oil Cooler By-Pass Valve Seat
27. Band Apply Strut
28. Band Anchor Strut
29. Band Anchor Adjusting Screw
30. Band Anchor Adjusting Screw Nut
31. Low Brake Band
32. Clutch Drum
33. Clutch Drum Bushing
34. Clutch Piston Outer and Inner Seals
35. Clutch Piston
36. Clutch Return Springs
37. Clutch Spring Seat
38. Clutch Spring Snap Ring
39. Clutch Hub Front Thrust Washer
40. Clutch Hub
41. Clutch Driven Plates (Flat)

41A. Clutch Cushion Spring (Wave) (Exc. 5 Plate Packs)

42. Clutch Drive Plates (Waved)
43. Clutch Hub Rear Thrust Washer
44. Low Sun Gear and Clutch Flange Assembly
46. Clutch Flange Retainer Ring
47. Planet Carier and Output Shaft Assembly
48. Rear Pump Drive Pin
49. Output Shaft Thrust Bearing

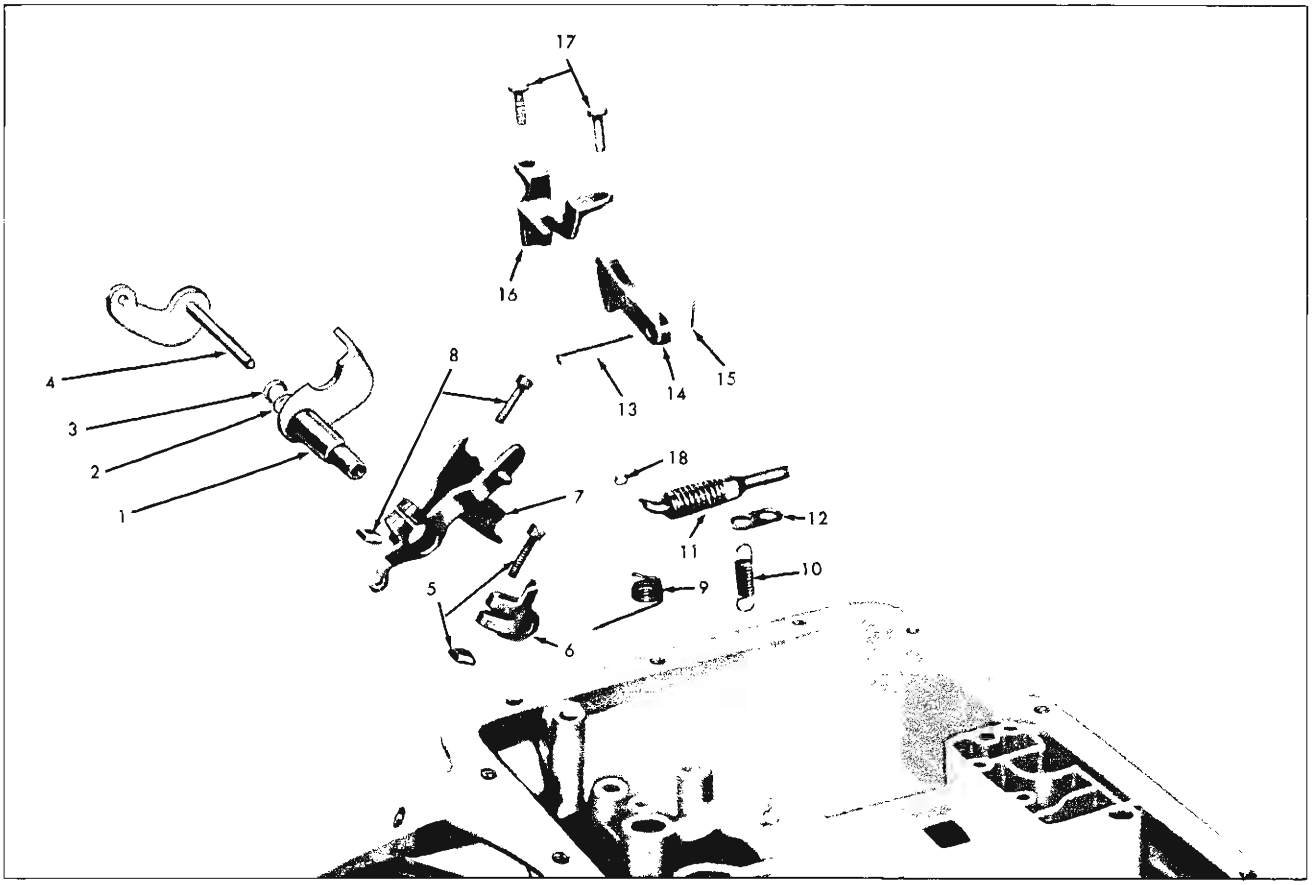

Fig. 20PG—Manual Levers—Exploded View

1. Park Lock and Range Selector Outer Lever and Shaft
2. Throttle Valve Control Shaft Oil Seal
3. Throttle Valve Control Shaft Washer
4. Throtte Valve Control Lever and Shaft
5. Throttle Valve Control Inner Lever to Control Shaft Attaching Screw and Nut
6. Throttle Valve Control Inner Lever
7. Park Lock and Range Selector Inner Lever
8. Park Lock and Range Selector Inner Lever Attaching Screw and Nut
9. Park Lock Pawl Disengaging Spring
10. Range Selector Detent Roller Spring
11. Park Lock Actuator Assembly
12. Range Selector Detent Roller Spring Retainer
13. Park Lock Pawl Shaft
14. Park Lock Pawl
15. Park Lock Pawl Shaft Retaining Pin or Ring
16. Park Lock Pawl Reaction Bracket
17. Park Lack Pawl Reaction Bracket Attaching Bolts
18. Park Lock Actuator to Park Lock and Range Selector Inner Lever Retaining Clip

Inspection

1. Wash all parts in cleaning solvent and blow out all oil passages. DO NOT USE RAGS TO DRY PARTS.

   CAUTION: Some solvents may be harmful to rubber seals.

2. Inspect pump gears for nicks or damage.
3. Inspect body and cover faces for nicks or scoring. Inspect cover hub O.D. for nicks or burrs which might damage clutch drum bushing journal.
4. Check operation of the priming valve and replace if necessary.
5. Inspect body bushing for galling or scoring. Check clearance between body bushing and converter pump hub (fig. 21PG). Maximum clearance is .005". If the bushing is damaged, the front pump body should be replaced.
6. Inspect converter housing hub O.D. for nicks or burrs which might damage front pump seal or bushing. Repair or replace as necessary.
7. If oil seal is damaged or is leaking (and the pump body is otherwise suitable for reuse), pry out and install a new seal, fully seated in counterbore, using seal driver J-6839.

   NOTE: Outer diameter of seal should be coated with a non-hardening sealer prior to installation.

8. On V-8 models, check condition of oil cooler by-pass valve and replace if valve leaks excessively. For removal, an "Easy Out" or its equivalent may be used.

For installation tap seat in place with soft hammer or brass drift so it is flush to .010" below the surface.

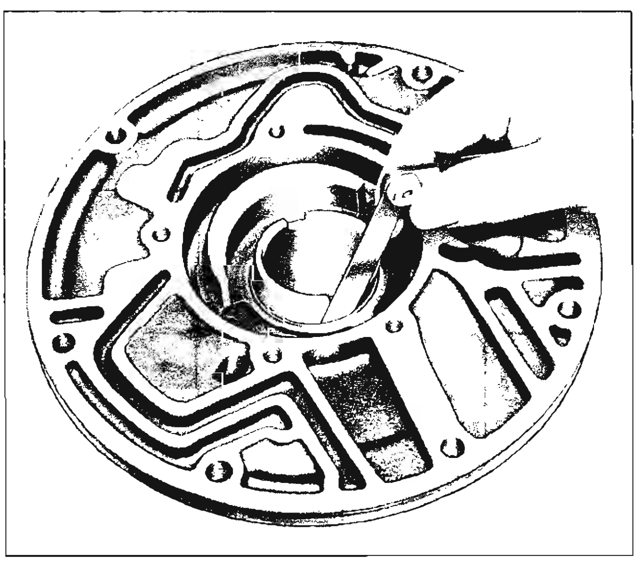

Fig. 21PG—Checking Pump Body Bushing to Converter Pump Hub Clearance

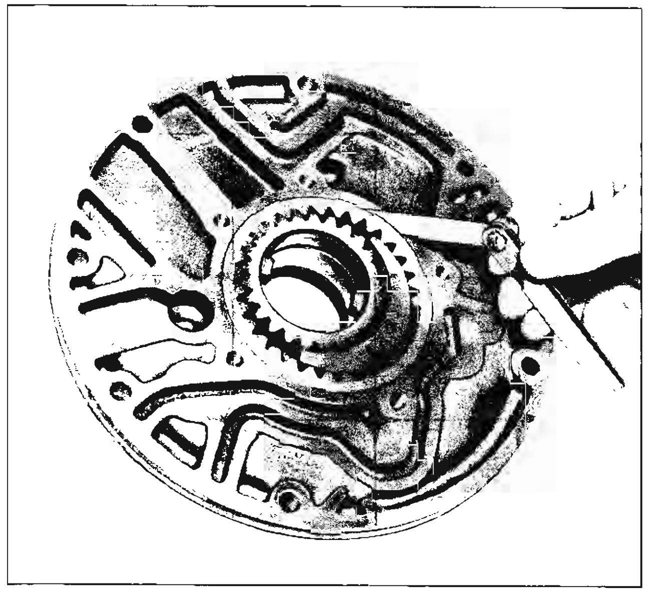

Fig. 22PG—Checking Driven Gear to Pump Body Clearance

9. With parts clean and dry, install pump gears and check:
   a. Clearance between O.D. of driven gear and body should be .0035"-.0065" (fig. 22PG).
   b. Clearance between I.D. of driven gear and crescent should be .003"-.009" (fig. 23 PG).
   c. Gear end clearance (fig. 24PG) should be .0005"-.0015".

Assembly

With the transmission facing up, proceed as follows:

1. Remove the input shaft, clutch drum, low band and struts as outlined under "Transmission-Disassembly."

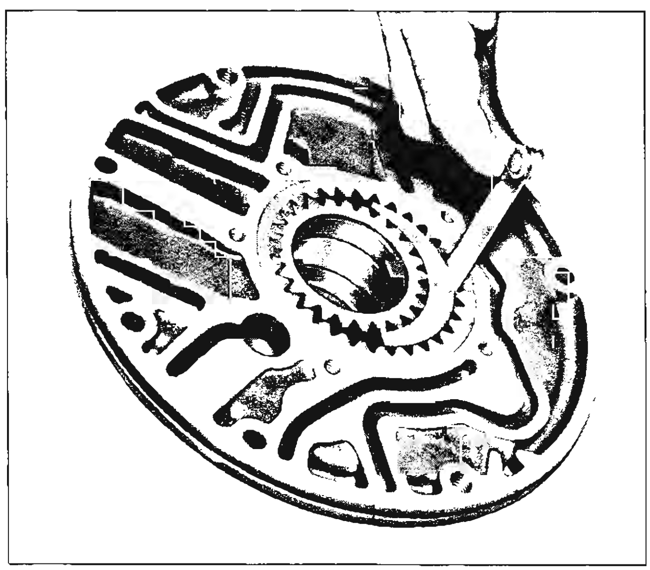

Fig. 23PG—Driven Gear to Crescent Clearance

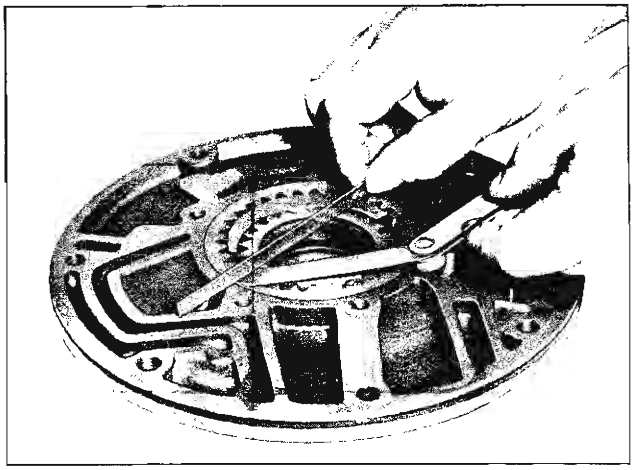

Fig. 24PG—Checking Gear End Clearance

2. Install the downshift timing valve, conical end out, into place in the pump cover to a height of $1\frac{7}{32}''$ measured from the shoulder of the valve assembly to face of pump cover.

3. Oil drive and driven gears generously and install in the pump body.

4. Carefully set the pump cover in place over the body and loosely install 2 attaching bolts.

5. Place the pump assembly, less the rubber seal ring, upside down into the pump bore of the case (use guide pins if desired). Install remaining attaching bolts and torque to 15 to 20 ft. lbs.

6. Remove pump assembly from case bore. Replace the clutch drum and input shaft, low band and struts as outlined under "Transmission-Assembly."

NOTE: If necessary, remove two bolts and use J-6585 pullers and J-6585 adapters to remove pump assembly. Replace and re-torque bolts.

7. Replace rubber seal ring in its groove in the pump body and install the pump assembly properly in place in the case bore, using a new gasket, being sure that the selective fit thrust washer is in place.

8. Install the attaching bolts, using new bolt "O" rings if necessary.

REAR PUMP

The rear pump is removed and disassembled as described in the "Transmission-Disassembly" procedures earlier in this section. General cleaning and clearance check information will remain the same as for the front pump. Assembly of the rear pump is described in the "Transmission-Assembly" procedure later in this section.

NOTE: When reinstalling the rear pump priming valve, retain the washer, spring and valve in the bore with the retaining seat, installed small hole first. Install retaining seat flush to .02" below surface of pump face. When properly installed the tip of the valve must extend above the face of the pump to insure priming valve operation.

Rear Pump Bushing Replacement

If the rear pump bushing must be replaced, it may be removed using Tool J-9557 (and handle J-7079) and reinstalled using Tool J-6582, pressing or driving the bushing in from the front of the pump.

CLUTCH DRUM

Disassembly

CAUTION: When working with the clutch drum, use extreme care that the machined face on the front of the drum (fig. 19PG) not be scratched, scored, nicked or otherwise damaged during any of the following service operations. This machined face must be protected whenever it must be brought to bear on a press or tool of any sort.

1. Remove retainer ring and low sun gear and clutch flange assembly from the clutch drum.
2. Remove the hub rear thrust washer.
3. Lift out the clutch hub, then remove the clutch pack and the hub front thrust washer.
4. Remove the spring retainer using J-9542 as shown in Figure 25PG, or if using an arbor press, use J-5133 and J-7782 adapter ring. Compress the

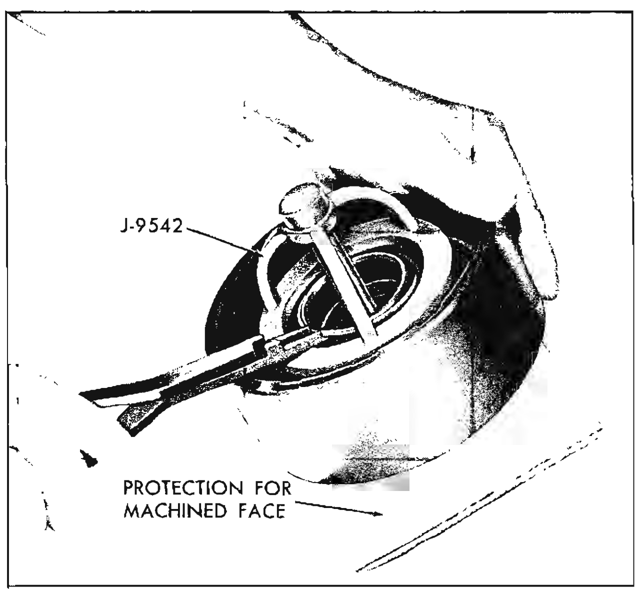

Fig. 25PG—Removing Clutch Spring Retainer Snap Ring springs far enough to allow removal of the retainer snap ring; then, releasing pressure on the springs, remove the retainer and the springs.

NOTE: When using J-9542, place a piece of cloth or cardboard between the tool and the front side of the clutch drum as protection for the machined face.

5. Lift up on the piston with a twisting motion to remove from the drum, then remove the inner and outer seals.

Inspection

1. Wash all parts in cleaning solvent (air dry).

   CAUTION: Do not use rags to dry parts.

2. Check drum bushing for scoring or excessive wear.
3. Check the steel ball in the clutch drum that acts as a relief valve. Be sure that it is free to move in the hole and that the orifice leading to the front of the drum is open. If the clutch relief valve check ball in the clutch drum is loose enough to come out or not loose enough to rattle, replace the clutch drum as an assembly. Replacement or restaking of the ball should not be attempted.
4. Check fit of clutch flange in drum slots. There should be no appreciable radial play between these two parts. Also check low sun gear for nicks or burrs and bushing for wear.
5. Check clutch plates for burning and wear.

Bushing Replacement (fig. 26PG)

1. Remove the old bushing with Tool J-9546 using care not to damage the bushing bore or the machined face on the front of the clutch drum.
2. Use the same tool to install the new bushing. Press (do not hammer) the bushing into the clutch drum from the machined face side of the clutch drum. Press only far enough so that the tool meets the clutch drum. Do not force the tool against the clutch drum machined face.

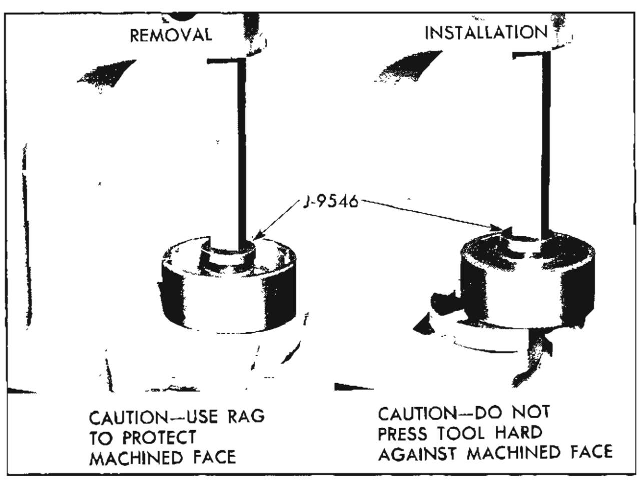

Fig. 26PG—Removing and Installing Clutch Drum Bushing

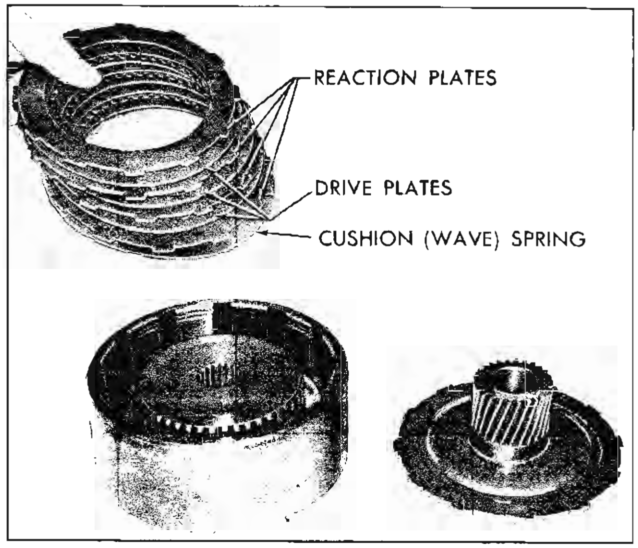

Fig. 27PG—Installing Clutch Drum Plates (Typical)

Assembly

1. Install new piston inner seal in hub of clutch drum with seal lip downward (toward front of transmission).
2. Install a new piston seal in clutch piston. Seal lips must be pointed toward the clutch drum (front of transmission). Lubricate seals generously and install piston in clutch drum with a twisting motion.
3. Place the springs in position on the piston, then place the retainer in place on the springs.
4. Usings Tools J-5133 and J-7782 and a press, or J-9542 as a hand operation, depress the retainer plate and springs far enough to allow installation of the spring retainer snap ring in its groove on the clutch drum hub.
5. Install the hub front washer with its lip toward the clutch drum, then install the clutch hub.
6. Install (wave) cushion spring except on 5 plate clutch packs where this spring is not used.
7. Install the steel reaction plates and faced drive plates alternately, beginning with a steel reaction plate (fig. 27 PG). L-6 engine models have 4 reaction and 3 drive plates, while most V-8 engine models have 5 reaction and 4 drive plates. Hi-Performance 327 and 409 models use 6 reaction and 5 drive plates.
8. Install the rear hub thrust washer with its flange toward the low sun gear, then install the low sun gear and flange assembly and secure with retainer ring. When installed, the openings in the

retainer ring should be adjacent to one of the lands of the clutch drum.

9. Check the assembly by turning the clutch hub to be sure it is free to rotate.

LOW BAND

The brake band used in the Aluminum Powerglide transmission has bonded linings which, due to the transmission characteristics and band usage, should require very little attention. However, whenever a transmission is disassembled the band should be cleaned of metal particles and inspected.

1. Check lining for evidence of scoring or burning.
2. Check band and lining for cracks.
3. Check all band linkage for excessive wear.

PLANET ASSEMBLY AND INPUT SHAFT

Inspection

1. Wash planet carrier and input shaft in cleaning solvent, blow out all oil passages and air dry.

   CAUTION: Do not use rags to dry parts.

2. Inspect planet pinions for nicks or other tooth damage.
3. Check end clearance of planet gears. This clearance should be .006"-.030" (fig. 28 PG).
4. Check input sun gear for tooth damage, also check input sun gear rear thrust washer for damage.
5. Inspect output shaft bearing surface for nicks or scoring and inspect input pilot bushing.
6. Inspect input shaft splines for nicks or damage and check fit in clutch hub and input sun gear. Also check fit of splines in turbine hub.
7. Check oil seal rings for damage; rings must be free in input shaft ring grooves. Remove rings and insert in stator support bore and check to see that hooked ring ends have clearance. Replace rings on shaft.

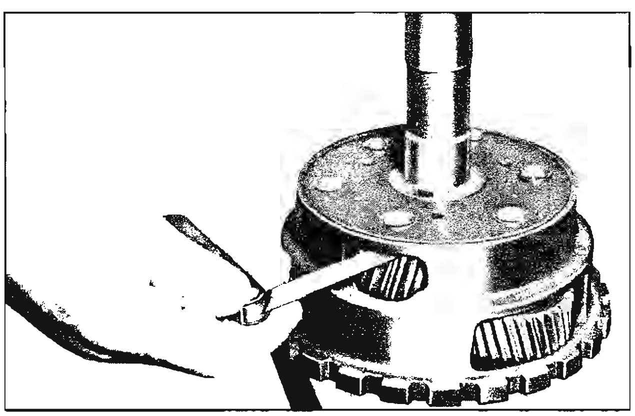

Fig. 28PG—Checking Planet Gear End Clearance

Repairs

NOTE: The *large* planet carrier assembly now has the pinion shafts flared at each end for retention into the carrier. No overhaul of the *large* planet carrier assembly should be attempted.

Small Planet Carrier Assembly—Overhaul

If during inspection, the planet pinions, pinion needle bearing, pinion thrust washers, input sun gear, and/or input sun gear thrust washer should show evidence of excessive wear or damage, they should be replaced using the following procedure:

Refer to Figure 29 PG.

1. Place the planet carrier assembly in a fixture or vise so that the front (parking lock gear end) of the assembly faces up.
2. Using prick punches or other similar means, mark each pinion shaft and also the planet carrier assembly (fig. 30 PG), so that reassembling, each pinion shaft will be reinstalled in the same location from which it was removed.

   NOTE: The pinion shafts are not selectively fit but it is good practice to reinstall them in their original locations.

3. Remove the pinion shaft lock plate screws and rotate the lock plate counterclockwise sufficiently to remove it.
4. Starting with a short planet pinion, and using a soft steel drift, drive on the lower end of the pinion shaft until the pinion shaft is raised above the press fit area of the output shaft flange. Feed J-4599 into the short planet pinion from the lower end, pushing the planet pinion shaft ahead of it until the tool is centered in the pinion and the pinion shaft is removed from the assembly.

   NOTE: Planet pinion remover and replacer tool, J-4599, comes in two pieces, both alike. Only one is used when removing the planet pinion; two, however, must be used when reassembling.

5. Remove the short planet pinion from the assembly.
6. Remove J-4599, needle bearings and needle bearing spacers (3) from short planet pinion.

   Caution: Use care so as not to lose any of the planet pinion needle bearings. Twenty needle bearings are used in each end and are separated by a bearing spacer in the center.

7. By following the procedure as outlined in steps 4, 5, and 6, remove the adjacent long planet pinion that was paired by thrust washers to the short planet pinion now removed.

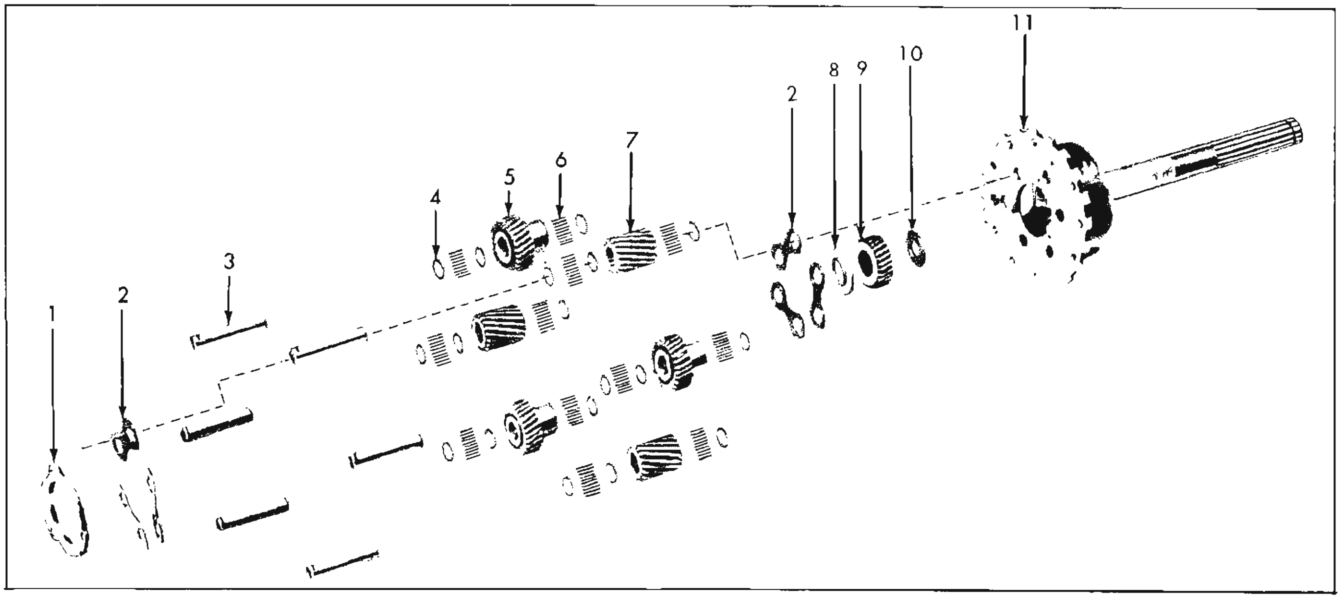

Fig. 29PG—Planet Carrier Assembly—Exploded View (Small Gear Set Shown)

1. Pinion Shaft Lock Plate
2. Pinion Thrust Washer
3. Pinion Shaft
4. Needle Bearing Washer
5. Short Planet Pinion Gear
6. Needle Bearings
7. Long Planet Pinion Gear
8. Low Sun Gear Thrust Bearing
9. Input Sun Gear
10. Input Sun Gear Thrust Washer
11. Carrier and Output Shaft

NOTE: Twenty needle bearings are used in each end of the long pinion, separated by a bearing spacer in the center.

8. Remove the upper and lower thrust washers.
9. Remove and disassemble the remaining planet pinions, in pairs, by first removing a short planet pinion and then the adjacent long planet pinion.
10. Remove low sun gear needle thrust bearing, input sun gear and input sun gear thrust washer.
11. Wash all parts in cleaning solvent and air dry.
12. Recheck the planet pinion gears and input sun gear for nicks or other tooth damage; also check the planet pinion thrust washers and input sun gear thrust washer. Check low sun gear needle thrust bearing for spalled needles. Replace worn or damaged parts.
13. Inspect the planet pinion needle bearings closely and if excessive wear shows, all the needle bearings must be replaced. Also inspect pinion shafts closely and if worn replace the worn shafts.
14. Inspect the input shaft bushing installed in the base of the output shaft. If damaged, it may be removed by threading Tool J-9534 into the bushing and pulling the bushing out using slide hammer J-6585. New bearing can be installed by pressing in flush or below thrust surface with the pilot end of input shaft as press tool.
15. Using J-4599, assemble needle bearing spacer and needle bearings (20 in each path) in one of the long planet pinions (fig. 29 PG). Use petroleum jelly to aid in assembling and holding the needle bearings in position.
16. Position the long planet pinion with J-4599, centered in the pinion assembly and with thrust washers at each end, in the planet carrier. Oil grooves on thrust washers must be toward gears.

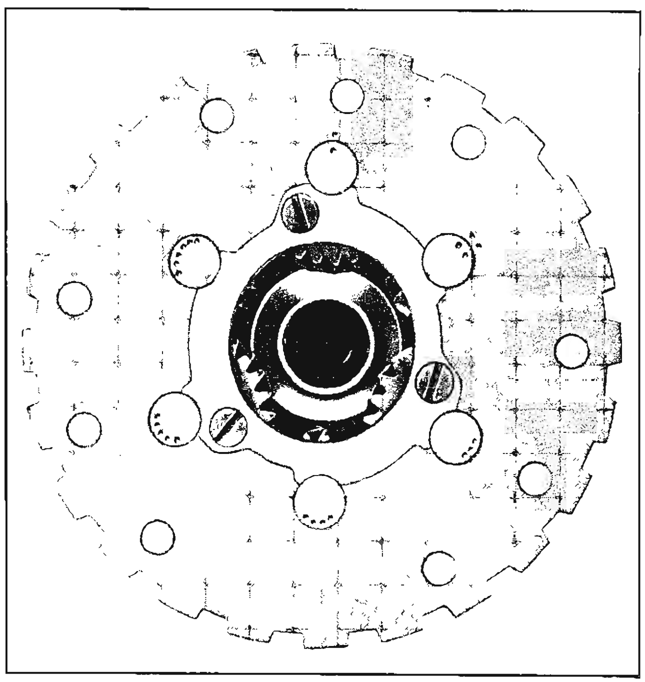

Fig. 30PG—Suggested Pinion Shaft Markings (Small Gear Set)

NOTE: The long planet pinions are located opposite the closed portions of the carrier, while the short planet pinions are located in the openings.

17. Feed the second J-4599 in from the top picking up the upper thrust washer and the planet pinion and pushing the already installed Tool J-4599 out the lower end. As the first tool is pushed down, check that it picks up the lower thrust washer.

18. Select the proper pinion shaft, as marked in step 2, lubricate the shaft and install it from the top, pushing the assembling tools ahead of it.

19. Turn the pinion shaft so that the slot or groove at the upper end faces the center of the assembly.

20. With a brass or soft steel drift, drive the pinion shaft in until the lower end is flush with the lower face of the planet carrier.

21. Following the same general procedure as outlined in steps 15 through 20, assemble and install a short planet pinion in the planet carrier adjacent to the long planet pinion now installed.

NOTE: The thrust washers already installed with the long planet pinion also suffice for this short planet pinion as the two pinions are paired together on one set of thrust washers.

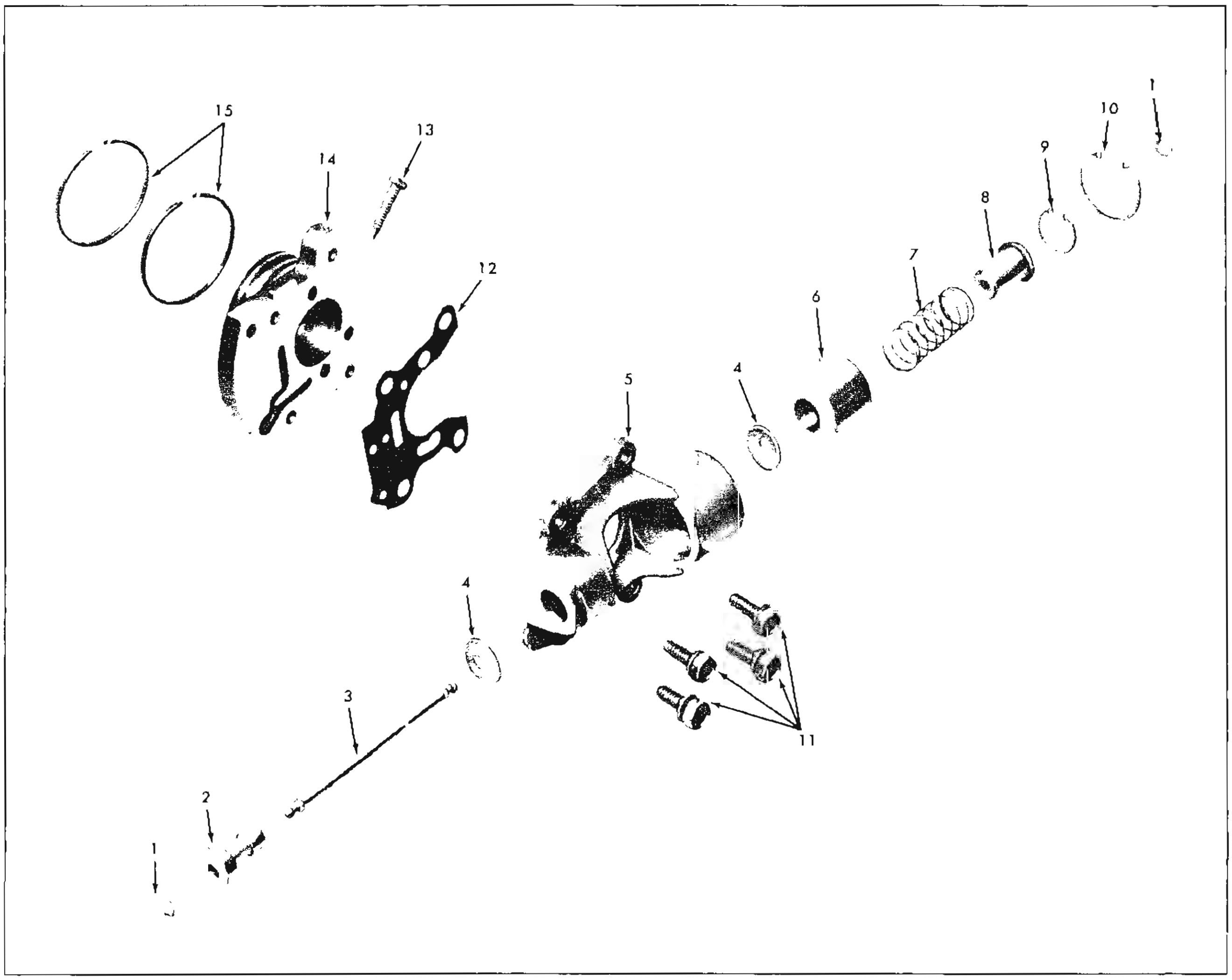

Fig. 31PG—Governor—Exploded View

1. Valve to Shaft and Inner Weight to Shaft Retaining Snap Ring
2. Valve
3. Shaft
4. Damping Springs
5. Body
6. Outer Weight
7. Spring
8. Inner Weight
9. Inner Weight Retaining Snap Ring
10. Outer Weight Retaining Snap Ring
11. Body to Hub Screws and Lock Washers
12. Gasket
13. Hub Drive Screw
14. Hub
15. Hub Oil Seal Rings

22. Install the input sun gear thrust washer, the input sun gear and low sun gear needle thrust bearing.
23. Assemble and install the remaining planet pinions, in pairs, by first installing the long planet pinion and then the adjacent short planet pinion.
24. Check end clearance of planet gears. This clearance should be .006"-.030" (fig. 28PG).
25. Place the pinion shaft lock plate in position, then with the extended portions of the lock plate aligned with slots in the planet pinion shafts, rotate the lock plate clockwise until the three attaching screw holes are accessible.
26. Install the pinion shaft lock plate attaching screws and tighten to 2½-3 ft. lbs.

GOVERNOR

The governor assembly is a factory balanced unit. If body replacement is necessary, the two sections must be replaced as a unit. Remove the governor as outlined under "Transmission-Disassembly."

Disassembly

NOTE: The governor valve and shaft were already disassembled from the assembly during the removal procedures.

1. Remove the outer weight assembly by sliding toward center of body.
2. Remove the smaller inner weight retaining snap ring and remove the inner weight and spring.
3. If it is considered necessary, remove the four body assembly bolts and separate the body, hub and gasket. Remove the two seal rings.

Inspection

Clean all parts thoroughly in a solvent and air dry. Check condition of all component parts of the assembly. Replace any bent, damaged or scored parts. Body and hub must be replaced as a unit.

Assembly

1. Reassemble governor weights and reinstall in body bore. Replace seal rings on hub.
2. Slide hub into place on output shaft and lock into place with the drive screw. Install gasket and governor body over output shaft, install governor shaft, line up properly with output shaft and install body attaching bolts. Torque to 6 to 8 ft. lbs.

NOTE: Place transmission selector lever in PARK to keep shaft from turning while tightening these bolts.

3. Check the governor weight for free fit in body after the four attaching bolts are torqued. If the weight sticks or binds, loosen the bolts and retorque.

VALVE BODY

Removal

Remove valve body as described under "Transmission-Disassembly." If performing the operation on the vehicle, the vacuum modulator and valve, oil pan and gasket, guide detent plate and range selector detent roller spring need to be removed in order to remove the valve body from the transmission.

Disassembly

1. Remove the manual valve, suction screen and gasket.
2. Remove valve body bolts and carefully remove lower valve body and transfer plate from upper valve body. Discard gaskets.
3. Remove the front and rear pump check valves and springs.
4. From the upper valve body, remove the TV and detent valves and the downshift timing valve as follows:
   a. TV and Detent Valve—Remove the retaining pin by wedging a thin screwdriver between its head and the valve body, then remove the detent valve assembly and throttle valve spring. Tilt the valve body to allow the throttle valve to fall out. If necessary, remove the "C" clip and disassemble the detent valve assembly.

   CAUTION: Do not disturb the setting of the adjustment hex nut on the detent valve assembly. This is a factory adjustment and should not normally be changed. However, some adjustment is possible if desired. See "Throttle Valve Adjustment."

   b. Downshift Timing Valve—Drive out the roll pin, remove the valve spring and the downshift timing valve.
5. From the lower valve body, remove the low-drive shift valve and the pressure regulator valve as follows:
   a. Low-Drive Shift Valve—Remove the snap ring and tilt the valve body to remove the low-drive regulator valve sleeve and valve assembly, valve springs and the shifter valve.
   b. Pressure Regulator Valve—Remove the snap ring, then tilt valve body to remove the hydraulic modulator valve sleeve and valve, pressure regulator valve spring seat, spring, damper valve, spring seat and valve.

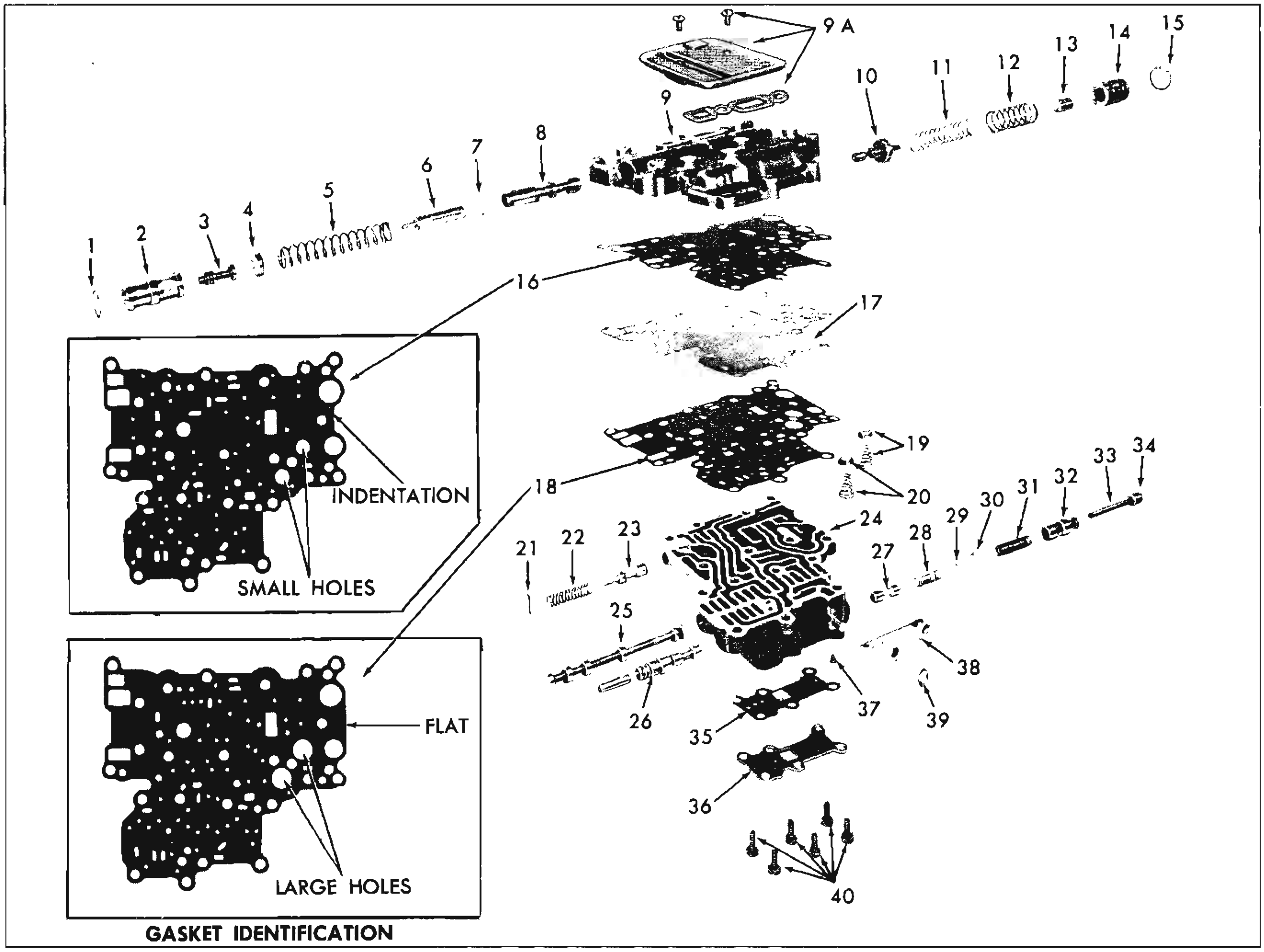

Fig. 32PG—Valve Body—Exploded View

1. Snap Ring
2. Hydraulic Modulator Valve Sleeve
3. Hydraulic Modulator Valve
4. Pressure Regulator Spring Retainer
5. Pressure Regulator Spring
6. Pressure Regulator Damper Assembly (5 Plate Clutch Packs Only)
7. Pressure Regulator Spring Seat
8. Pressure Regulator Valve
9. Lower Valve Body

9A. Suction Screen, Gasket and Attaching Screws

10. Low and Drive Valve
11. Low and Drive Valve Inner Spring
12. Low and Drive Valve Outer Spring
13. Low and Drive Regulator Valve
14. Low and Drive Regulator Valve Sleeve and Cap
15. Snap Ring
16. Transfer Plate to Lower Valve Body Gasket—9471
17. Transfer Plate
18. Transfer Plate to Upper Valve Body Gasket—9469
19. Front Pump Check Valve and Spring
20. Rear Pump Check Valve and Spring
21. High Speed Down Shift Timing Valve Stop Pin
22. High Speed Down Shift Timing Valve Spring
23. High Speed Down Shift Timing Valve
24. Upper Valve Body
25. Manual Control Valve
26. Vacuum Modulator Valve
27. Throttle Valve
28. Throttle Valve Spring
29. Throttle Valve Spring Seat
30. Throttle Valve Spring Regulator Guide Washer
31. Detent Valve Spring
32. Detent Valve
33. Throttle Valve Spring Regulator
34. Throttle Valve Spring Regulator Nut
35. Upper Valve Body Plate Gasket
36. Upper Valve Body Plate
37. Detent Valve and Spring Retaining Stud
38. Range Selector Detent Lever
39. Snap Ring
40. Upper Valve Body Plate to Upper Valve Body Attaching Bolts and Washers

Inspection

Since most valve failures are caused initially by dirt or other foreign material preventing a valve from functioning properly, a thorough cleaning of all parts in clean solvent is mandatory. Check all valves and their bores for burrs or other deformities which could result in valve hang-up.

Assembly

1. Replace valve components in the proper bores, reversing the disassembly procedures given above and checking Figure 32 PG, if necessary.
2. Place front and rear pump check valves and springs into place in the upper valve body and install the gasket and transfer plate.

NOTE: See Figure 32 PG for upper and lower valve body gasket identification.

3. Carefully install the lower valve body and gasket and install 15 1⅜″ attaching bolts. Torque to 13 to 15 ft. lbs.

Installation

Install the valve body onto the transmission as outlined under "Transmission-Assembly."

VACUUM MODULATOR

The vacuum modulator is mounted on the left rear of the transmission and can be serviced from beneath the vehicle.

Removal

1. Remove the vacuum line at the vacuum modulator.
2. Unscrew the vacuum modulator from the transmission using J-9543, if available, or any thin 1" tappet type wrench.
3. Remove the vacuum modulator plunger, dampening spring and valve (fig. 15 PG) from the transmission case.

Inspection and Repairs

Check the vacuum modulator plunger and valve for nicks and burrs. If such cannot be repaired with a slip stone, replace the part.

The vacuum modulator can be checked with a vacuum source for leakage. However, leakage normally results in transmission oil pull-over and results in oil smoky exhaust and continually low transmission oil. No vacuum modulator repairs are possible; replace as an assembly.

Installation

1. Install vacuum modulator valve, dampening spring and plunger in bore of transmission.
2. Place a new gasket on vacuum modulator. The gasket has centering tabs to hold it centered during installation.
3. Install vacuum modulator, tighten firmly, and install vacuum line as follows (fig. 15PG): Rubber tubing "A" should bottom against modulator cam. Pipe assembly "B" should bottom against the modulator extension.

TRANSMISSION CASE

Inspection

1. Wash case throughly with cleaning solvent, air dry and blow out all oil passages.

   CAUTION: Do not use rags to dry parts.

2. Inspect case for cracks which may contribute to leakage.
3. Inspect case rear bushing for damage or excessive wear.

   NOTE: This is a precision bushing and if damaged or worn excessively must be replaced.

4. Check shifter shaft seal. If it shows signs of damage or leaking, pry it out and install a new seal. The new seal must be firmly seated in case counterbore.

Repairs

Rear Bushing—Replacement

Transmission case rear bushing is a precision bushing which requires no reaming or finishing after assembly.

1. Remove bushing by driving or pressing from within case using J-9557 and handle J-7079.
2. To install new bushing, drive or press bushing into place from rear of case using Tool J-9557 and handle J-7079 (fig. 33PG).

   CAUTION: Install bushing only until shoulder of J-9557 contacts the rear face of the case. Excessive force, either hammering or pressing may crack or otherwise damage the aluminum case.

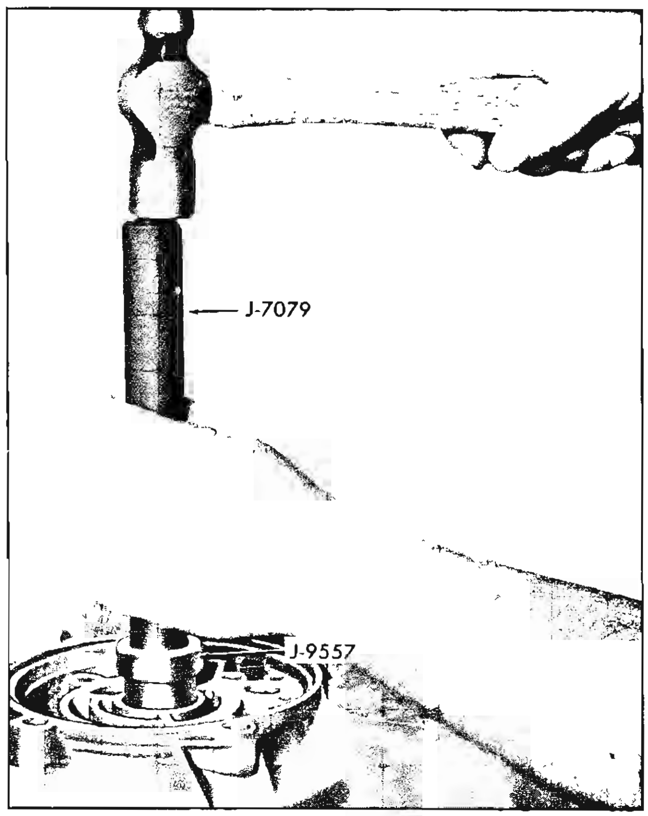

Fig. 33PG—Installing Case Rear Bushing

TRANSMISSION EXTENSION

Inspection

1. Wash extension thoroughly with cleaning solvent and air dry.

   CAUTION: Do not use rags to dry parts.

2. Inspect extension for cracks that may contribute to leakage.
3. Inspect extension rear bushing for damage or excessive wear.
4. Inspect rear oil seal and replace if damaged or worn.

Repairs

Rear Bushing—Replacement

For service, the transmission extension rear bushing is of a precision type which requires no reaming or finishing after installation.

1. Place transmission extension in an arbor press rear end up.
2. Using J-5778, press old bushing from extension.
3. Place new bushing on pilot end of J-5778 and press it into place.
4. Replace extension rear oil seal.

TRANSMISSION

Assembly

NOTE: Use only transmission oil or petroleum jelly as lubricants to retain bearings or races during assembly. Lubricate all bearings, seal rings and clutch plates prior to assembly.

If removed, assemble manual linkage to case as described in Step 1-7.

1. Install the parking lock pawl and shaft and insert a new "E" ring retainer.
2. Install the parking lock pawl pull-back spring over its boss to the rear of the pawl. The short leg of the spring should locate in the hole in the parking pawl.
3. Install the parking lock pawl reaction bracket with its two bolts.
4. Fit the actuator assembly between the parking lock pawl and the bracket.
5. Insert the outer shift lever into the case (being careful of the shaft seal, and pick up the inner shift lever and parking lock assembly and tighten allen head screw.

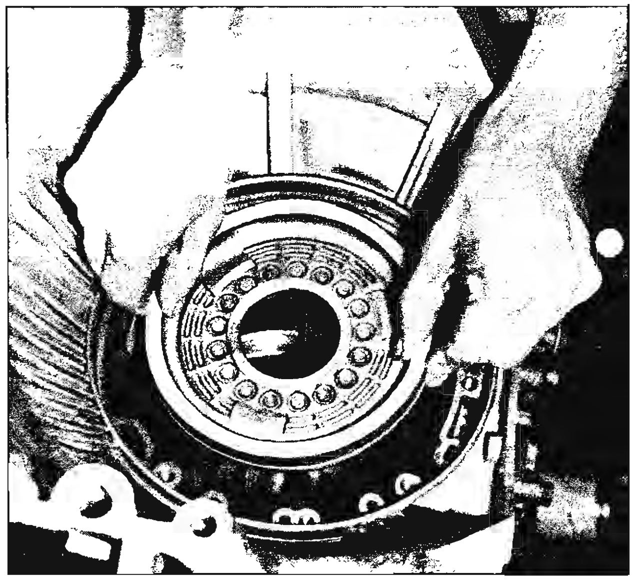

Fig. 34PG—Installing Reverse Piston

6. Insert outer TV lever and shaft, special washer and "O" ring into case and pick up inner TV lever. Tighten allen head nut.
7. Thread the low band adjusting screw into case.

   NOTE: The above internal components are shown in their proper relationship in Figure 20PG.

Transmission Internal Components

8. Install the inner and outer rear piston seals on the reverse piston and, lubricating the piston and case with transmission oil, install the piston into the case (fig. 34PG). If necessary, carefully slide a feeler gauge around the outer diameter of the piston to start the seal ring into the bore.

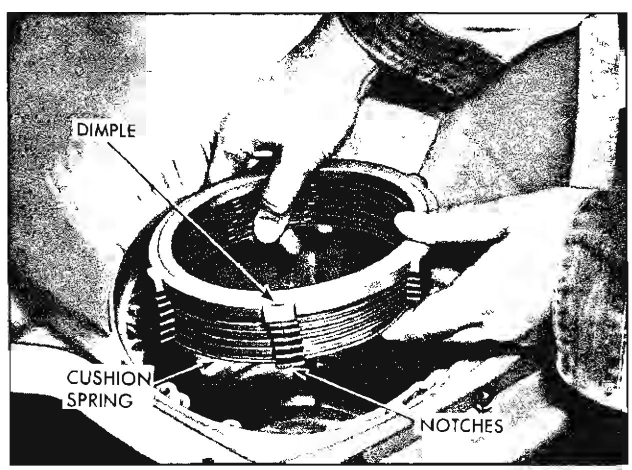

Fig. 35PG—Installing Clutch Plates (Typical)

9. With the support fixture turned so that the transmission case is facing up, install the 17 reverse piston return springs and their retainer ring.

10. Carefully install Tool J-9542 over the retainer ring and through the rear bore of the case. With the flat plate on the rear face of the case, turn down on the wing nut to compress the return springs and allow the retaining ring snap ring to be installed. Remove Tool J-9542.

    CAUTION: Use care when performing this operation that the spring retainer is correctly guided over the case internal hub and is not damaged by catching on the edge of the hub or in the snap ring groove.

11. Install the large (waved) cushion spring.

12. Lubricate and install the reverse clutch pack (fig. 35PG) beginning with a reaction (spacer) plate and alternating with the drive plates (faced) until all reaction plates and all drive plates are in place. The notched lug on each reaction plate is installed in the groove at the 7 o'clock position in the case. Then install the thick pressure plate which has a "dimple" in one lug to align with the same slot in the case as the notched lugs on the other reaction plates.

    L-6 engine models have 4 reaction and 4 drive plates. 283 cu. in. V-8 engine models have 5 reaction and 5 drive plates. 327 and 409 cu. in. V-8 engine models have 6 reaction and 6 drive plates.

13. Install the clutch plate retaining ring.

14. With the rear of the transmission case downward, align the internal lands and grooves of the reverse clutch pack faced plates, then engage the reverse ring gear with these plates. This engagement must be made by "feel" while jiggling and turning the ring gear.

15. Place the output shaft thrust bearing over the output shaft and install the planetary carrier and output shaft into the transmission case (fig. 36PG).

16. On large gearset carrier assemblies, install the low sun gear thrust washer on the sun gear in the planetary gear set with the flange of the thrust washer toward the front of the transmission.

17. Move the transmission into a horizontal position. The two input shaft seal rings should be in place on the shaft. Install the clutch drum (machined face first) onto the input shaft and install the low sun gear bushing (splined) against shoulder on shaft.

18. Install clutch drum and input shaft assembly into case, aligning thrust needle bearing on input shaft and indexing low sun gear with the short pinions on the planet carrier.

19. Remove the rubber seal ring from the front pump body and, using guide studs from J-3387 set, install front pump and gasket and selective fit thrust washer into case. Install two pump-to-case bolts.

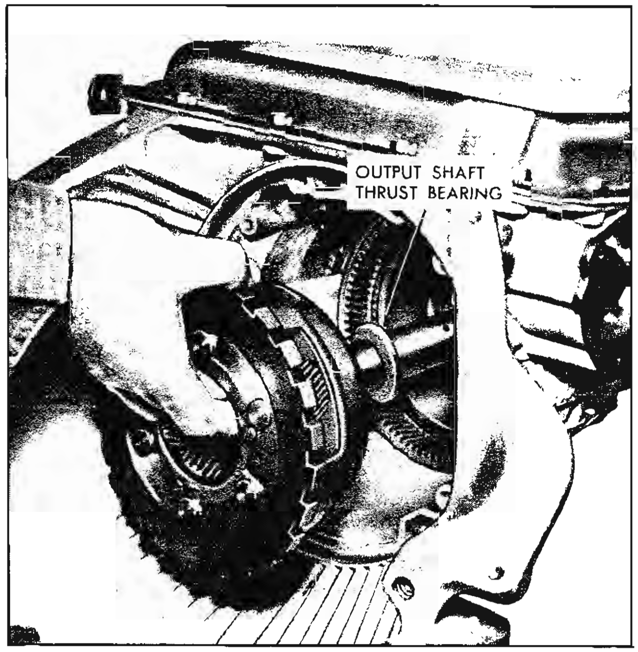

Fig. 36PG—Installing Gearset

20. To check for correct thickness of the selective fit thrust washer, move transmission so that output shaft points down and proceed as follows:

    a. Mount a dial indicator so that plunger of indicator is resting on end of the input shaft. J-5492 may be used to support the dial indicator as shown in Figure 37PG. Zero the indicator.

    b. Push up on the transmission output shaft and observe the total indicator movement.

    c. The indicator should read .030" to .054". If the reading is within limits, the proper selective fit washer is being used. If the reading is not within limits, it will be necessary to remove the front pump, change to a thicker or thinner selective fit thrust washer, as required to obtain the specified clearance, and repeat the above checking procedure.

    NOTE: Selective fit washers are available in thicknesses of .061", .078", .092" and .106".

21. Install the servo piston, piston ring, and spring into the servo bore. Then, using a new gasket and "O" ring, install the servo cover. See that gasket is properly aligned with the three bolt holes and the drain back passage in the case.

22. Remove the front pump and the selective fit washer from the case, and install the low brake band, anchor and apply struts into the case. Tighten the low band adjusting screw enough to prevent struts from falling out of case.

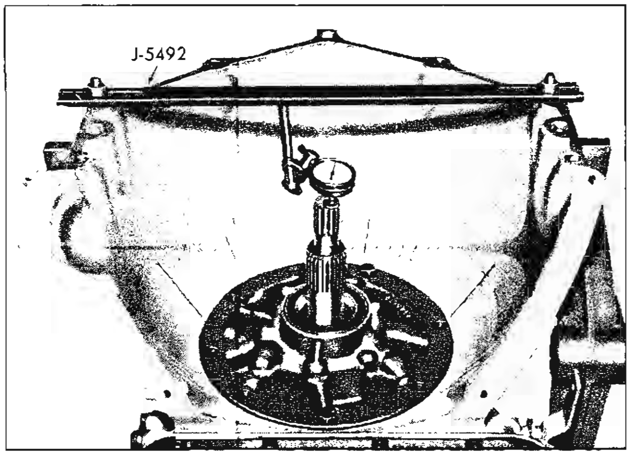

Fig. 37PG—Checking End Play for Proper Thrust Washer Selection

23. Place the seal ring in the groove around the front pump body and the two seal rings on the pump cover extension. Install the pump, gasket and thrust washer into case. Remove guide pins and install all pump bolts, replacing any damaged bolt "O" rings necessary and torque bolts to 13-17 ft. lbs.

EXTENSION, GOVERNOR AND REAR OIL PUMP

24. Turn transmission so that shaft points upward. Install rear pump wear plate, drive pin, and drive gear, indexing gear to drive pin.
25. Install rear pump body and driven gear drain back baffle, and pump to case attaching bolts. Bolt holes are positioned so that the pump may be assembled only in the proper position.
26. Install governor over output shaft. (See "Governor-Assembly" for body to hub installation.)

Fig. 38PG—Installing Valve Body

Install governor shaft and valve, two Belleville washers (concave side of washers against output shaft), and retaining "C" clips. Center shaft in output shaft bore and tighten governor hub drive screw.

27. Using Tool J-5814, install speedometer gear into output shaft.
28. Place extension seal ring over rear pump body and install transmission extension and five retaining bolts
29. If removed, replace speedometer driven gear.

OIL PAN AND VALVE BODY

30. With transmission upside down, and manual linkage installed as previously described, and the selector lever detent roller installed, install the valve body (servo apply tube installed) and a new gasket. Carefully guide the servo apply line into its boss in the case as the valve body is set into place (fig. 38 PG). Install six mounting bolts and range selector detent roller spring shown in Figure 16 PG.

NOTE: Position the manual valve actuating lever fully forward when installing valve body to more easily pick up the manual valve.

31. Install the guide plate (fig. 39 PG) making sure that the inner lever properly picks up the manual valve. Install attaching bolts.
32. Install the vacuum modulator valve and the vacuum modulator and gasket.
33. Install the oil pan, using a new gasket, and the oil pan attaching bolts.
34. Install converter and safety holding strap J-9549 or a suitable substitute.

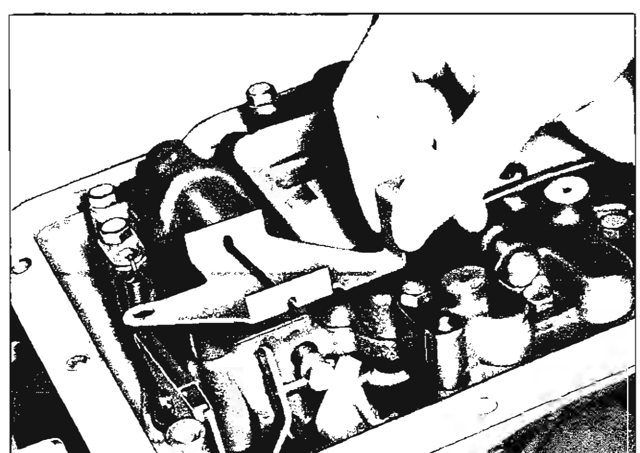

Fig. 39PG—Installing Detent Guide Plate

Low Band Adjustment

Tighten the low servo adjusting screw to 40 inch lbs. using torque wrench J-5853 (fig. 40 PG). The input and output shaft must be rotated simultaneously to properly center the low band on the clutch drum. Then back off four (4) complete turns, and tighten the lock nut to 13-17 ft. lbs. torque.

CAUTION: The amount of back-off is not an approximate figure, it must be exact.

Throttle Valve Adjustment

No provision is made for checking TV pressures. However, if operation of the transmission is such that some adjustment of the TV is indicated, pressures may be raised or lowered by adjusting the position of the jam nut on the throttle valve assembly (fig. 41 PG). To raise TV pressure 3 psi, back-off the jam nut one (1) full turn. This increases the dimension from the jam nut to the throttle valve assembly stop. Conversely, tightening the jam nut one (1) full turn lowers TV pressure 3 psi. A difference of 3 psi in TV pressure will cause a change of approximately 2 to 3 mph in the wide open throttle upshift point. Smaller pressure adjustments can be made by partial turns of the jam nut. The end of TV adjusting screw has an allen head so the screw may be held stationary while the jam nut is moved.

NOTE: Use care when making this adjustment since no pressure tap is provided to check TV pressure.

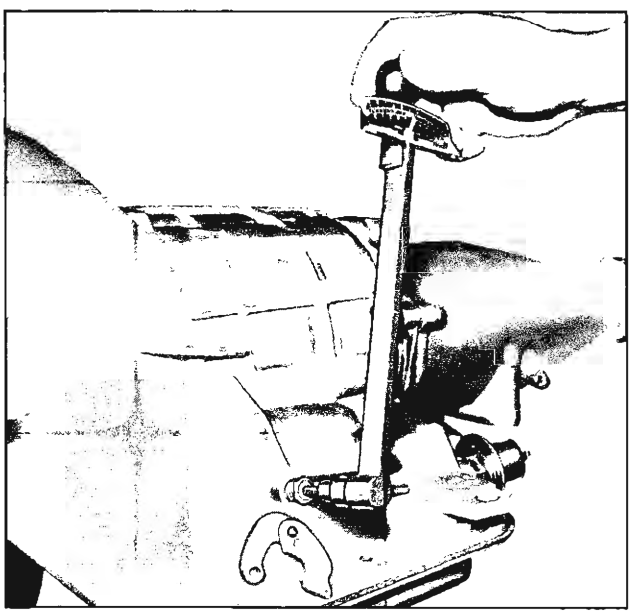

Fig. 40PG—Low Band Adjustment

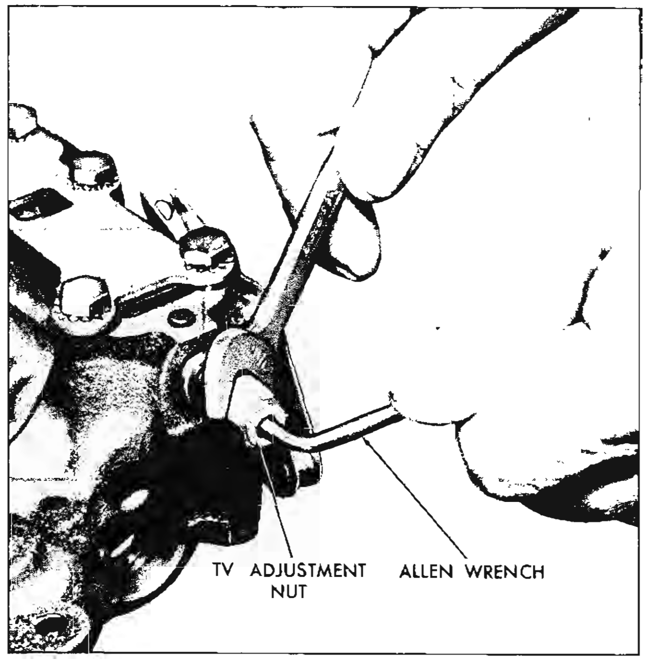

Fig. 41PG—TV Adjustment Nut

Installation

NOTE: The "light" side of the converter is denoted by a "blue" stripe painted across the ends of the converter cover and housing. This marking should be aligned as closely as possible with the "white" stripe painted on the engine side of the flywheel outer rim, denoting the "heavy" side of the engine.

1. Mount transmission on transmission lifting equipment installed on jack or other lifting device.
2. Remove converter holding tool.

   CAUTION: Do not permit converter to move forward after removal of holding tool.

3. Raise transmission into place at rear of engine and install transmission case to engine upper mounting bolts, then install remainder of the mounting bolts. Torque bolts to 25-30 ft. lbs.
4. Remove support from beneath engine, then raise rear of transmission to final position.
5. Through flywheel cover opening align as closely as possible the "white" flywheel balance mark stripe and the "blue" painted stripe on the end of converter cover and housing. If scribed during removal, align scribe marks on flywheel and converter cover. Install converter to flywheel attach-bolts. Torque bolts to 15-20 ft. lbs.
6. Install flywheel cover.

7. Reinstall transmission support cross member to transmission and frame, using the lower set of attaching holes to secure the cross member to the frame bracket.

   NOTE: Reinstall same number of shims between transmission extension and cross member as removed to maintain correct driveline angle relationship.

8. Remove transmission lift equipment.
9. Connect propeller shaft to transmission.
10. Connect manual and TV control lever rods to transmission.
11. Connect oil cooler lines (V-8 Models), vacuum modulator line, and speedometer drive cable to transmission.
12. Refill transmission through filler tube, using funnel J-4264 and following the recommended procedure provided earlier in this section.
13. Check transmission for proper operation and for leakage. Check and, if necessary, adjust linkage.

DIAGNOSIS

Proper operation of the Powerglide transmission may be affected by a number of factors, all of which must be considered when trouble in the unit is diagnosed.

Proper trouble diagnosis can only be accomplished when performed in a thorough step by step procedure. The following procedure has been devised and tested and is recommended for all trouble diagnosis complaints and if the service man will follow this checking procedure, accurate and dependable diagnosis may be accomplished. This will result in a savings of time, not only to the service man, but to the customer as well.

WARMING UP TRANSMISSION

Before attempting to check and/or correct any complaints on the Powerglide transmission, it is absolutely essential that the oil level be checked and corrected if necessary. An oil level which is either too high or too low can be the cause of a number of abnormal conditions from excessive noise to slippage in all ranges.

It must be remembered that cold oil will slow up the action of the hydraulic controls in the transmission. For this reason a trouble or oil leak diagnosis should not be attempted until the transmission has been warmed up by either of the following procedures:

Shop Warm Up

1. Connect tachometer to engine.
2. Set parking brake tight and start engine.
3. Place selector lever in "D" (drive) range.
4. Adjust carburetor idle speed adjusting screw to run engine at approximately 750 rpm and operate in this manner for two minutes. At the end of two minutes of operation, the transmission will be sufficiently warmed up for diagnosis purposes.

   NOTE: At this point, readjust the engine idle speed to 450-475 rpm in "D" range.

Road Warm Up

Drive the car approximately 5 miles with frequent starts and stops.

NOTE: At this point, make sure the engine idle speed is set to 450-475 rpm in "D" range.

CHECKING FLUID LEVEL

After transmission has been warmed up, check the fluid level with the engine idling, parking brake set and control lever in "N" (neutral). If the fluid level is low, add fluid to bring level up to the full mark on gauge rod.

CAUTION: If fluid level is too high, fluid may be aerated by the planet carrier. Aerated fluid will cause turbulence in the converter which will result in lost power, lower stall speed and lower pressures in control circuits. Lower fluid level to full mark, then shut off engine to allow air bubbles to work out of fluid.

BASIC PRESSURE CHECKS

Four basic pressure checks are used for diagnosis and operational checks for the Aluminum Powerglide transmission. All checks should be made only after thoroughly warming up the transmission.

- Wide Open Throttle Upshift Pressure.
- Idle Pressure in "Drive" Range.
- Manual "Low" Range Pressure.
- "Drive" Range Overrun (Coast) Pressure.

It is not recommended that stall tests be conducted which would result in engine vacuum falling below 10" Hg.

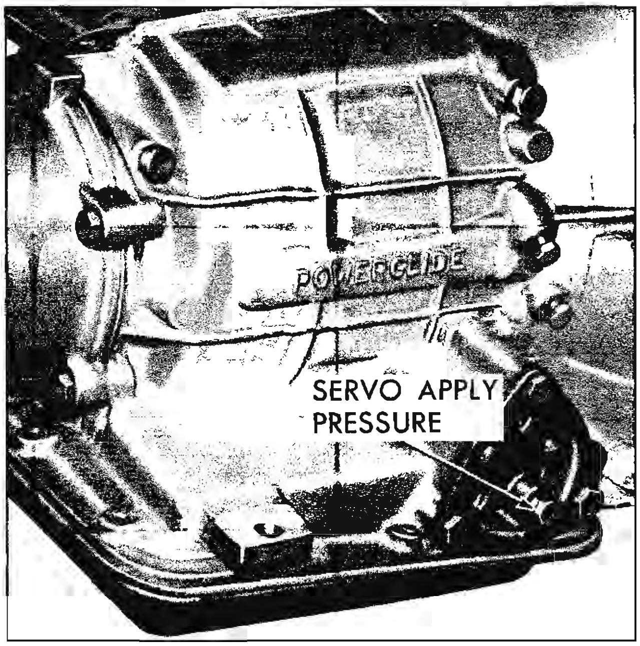

Fig. 42PG—Pressure Test Plug

Pressure gauge hose connections should be made at the low servo apply (main line) test point (fig. 42 PG). Run the gauge line into the driving compartment by pushing aside the mast jacket seal. Tie line out of the way of the drivers feet and connect to gauge set J-4872-4.

• Wide Open Throttle Upshift Pressure Check

Wide open throttle upshift should occur at 106-117 psi for 327 V-8 engines and at 86-105 psi for Hi Performance models, as indicated on the low servo apply (main line) gauge. For 283 V-8 engines upshift should occur at 94-106 psi. 230 L-6 engines upshift should occur at 98-108 psi. 409 V-8 models should upshift between 106-117 psi.

• Idle Pressure in "Drive" Range

In addition to the oil pressure gauges, a vacuum gauge is needed for this check.

With the parking brake applied and the shift selector lever in "Drive", low servo apply (main line) pressure should be as follows:

Vacuum	Low Servo Apply (Mainline) Pressure
16″ Hg.	63-72
10″ Hg.	90-99

If pressures are not within these ranges, the following items should be checked for oil circuit leakage:

1. Pressure regulator valve stuck.
2. Vacuum modulator valve stuck.
3. Hydraulic modulator valve stuck.
4. Leak at low servo piston ring (between ring and bore).
5. Leak at low servo piston rod (between rod and bore).
6. Leak at valve body to case gasket.
7. Leak at valve body gaskets.
8. Front pump clearances.
9. Check passages in transmission case for porosity.

• Manual "Low" Range Pressure Check

Connect a tachometer, apply the parking brake, place the selector lever in "Low" range, and adjust the engine speed to 1000 rpm. with the car stationary.

Low servo apply (main line) pressure should be 127-136 psi.

Pressures not within this range can indicate the following possibilities:

1. Partially plugged oil suction screen.
2. Broken or damaged ring in low servo.
3. Pressure regulator valve stuck.
4. Leak at valve body to case gasket.
5. Leak between valve body gaskets.
6. Leak at servo center.
7. Front pump clearances.

• Drive Range Overrun (Coast) Pressure

With the vehicle coasting in "Drive" range at 20-25 mph with engine vacuum at approximately 20″ Hg., low servo apply (main line) pressure should be 49-53 psi.

POWERGLIDE SHIFT POINTS

ENGINE	*230 L-6		*283 V-8		*327 V-8		**327 V-8 Hi-Perf.	
Throttle Position	Up	Down	Up	Down	Up	Down	Up	Down
Closed	14-18	13-17	14-18	13-17	15-18	13-17	14-17	13-16
Detent Touch	41-52	22-35	46-56	16-24	48-60	16-26	48-61	17-24
Through Detent	50-58	46-55	55-63	52-60	59-67	56-63	61-69	58-65

* 3.08 AXLE   ** 3.36 AXLE

NOTE: Shift points as indicated on the speedometer are not affected by tire size.

DIAGNOSIS GUIDE

No drive in any selector position; cannot load engine

- Low oil level.
- Clogged oil suction screen.
- Defective pressure regulator valve.
- Front pump defective.
- Input shaft broken.
- Front pump priming valve stuck.

Engine speed flares on standstill starts but acceleration lags.

- Low band partially applied:
  a. Low oil level.
  b. Clogged oil suction screen.
  c. Improper band adjustment.
  d. Servo apply passage blocked.
  e. Servo piston ring broken or leaking.
  f. Band facing worn.
  g. Low band apply linkage disengaged or broken.
  h. Converter stator not holding (rare).

Engine speed flares on upshifts.

- Low oil level.
- Improper band adjustment.
- Clogged oil suction screen.
- High clutch partially applied - blocked feed orifice.
- High clutch plates worn.
- High clutch seals leak.
- High clutch piston hung up.
- High clutch drum relief ball not sealing.
- Vacuum modulator line plugged.

Transmission will not upshift.

- Low band not releasing, probably due to:
  a. Stuck low-drive valve.
  b. Defective governor.
  c. No rear pump output caused by stuck priming valve, sheared drive pin or defective pump.
  d. Throttle valve stuck or maladjusted.
  e. Maladjusted manual valve lever.

Upshifts harsh.

- Incorrect carburetor-to-transmission TV rod adjustment.
- Improper low band adjustment.
- Vacuum modulator line broken or disconnected.
- Vacuum modulator diaphragm leaks.
- Vacuum modulator valve stuck.
- Hydraulic modulator valve stuck.

Closed throttle (coast) downshifts harsh.

- Improper band adjustment.
- High engine idle speed.
- Downshift timing valve malfunction.
- High mainline pressure. Check:
  a. Vacuum modulator line broken or disconnected.
  b. Modulator diaphragm ruptured.
  c. Sticking hydraulic modulator valve, pressure regulator valve or vacuum modulator valve.

Will not downshift.

- Sticking low-drive shift valve.
- Low-drive shift plug stuck.
- High governor pressure.
- Low TV pressure.

Clutch failure—burned plates.

- Low band adjusting screw backed off more than specified.
- Improper order of clutch plate assembly.
- Extended operation with low oil level.
- Clutch drum relief ball stuck.
- Abnormally high speed upshift:
  a. Improper governor action.
  b. Transmission operated at high speed in manual "low."

Car creeps excessively in Drive.

- Idle speed too high.

Car creeps in Neutral.

- Incorrect manual valve lever adjustment.
- High clutch or low band not released.

No drive in Reverse.

- Incorrect manual valve lever adjustment.
- Reverse clutch piston stuck.
- Reverse clutch plates worn out.
- Reverse clutch leaking excessively.
- Blocked reverse clutch apply orifice.

Improper shift points (see Chart).

- Incorrectly adjusted carburetor - to - transmission linkage.
- Incorrectly adjusted throttle valve.
- Governor defective.
- Rear pump priming valve stuck.

Unable to push start.

- Rear pump drive gear not engaged with drive pin on output shaft.
- Drive pin sheared off.
- Rear pump priming valve not sealing.

Oil leaks.

- Transmission case and extension
  a. Extension oil seal.
  b. Shifter shaft oil seal.
  c. Speedometer driven gear fitting.
  d. Pressure taps.
  e. Oil cooler pipe connections.
  f. Vacuum modulator assembly and case.

A very smoky exhaust indicates a ruptured vacuum modulator diaphragm.

- Transmission oil pan gasket.
- Convertor cover pan.
  a. Front pump attaching bolts.
  b. Front pump seal ring.
  c. Front pump oil seal.
  d. Oil drain in front pump plugged.
  e. Porosity in transmission case.

Oil forced out of filler tube.

- Oil level too high, aeration and foaming caused by planet carrier running in oil.
- Water in oil.
- Leak in pump suction circuits.

TORQUE SPECIFICATIONS

Transmission Case to Engine	25 to 30 ft. lbs.
Transmission Oil Pan to Case	7 to 10 ft. lbs.
Transmission Extension to Case	20 to 30 ft. lbs.
Speedometer Gear Housing Retainer	3½ to 5 ft. lbs.
Servo Cover to Transmission Case Bolts	15 to 20 ft. lbs.
Front Pump to Transmission Case Bolts	13 to 17 ft. lbs.
Front Pump Cover to Body Attaching Bolts	15 to 20 ft. lbs.
Pinion Shaft Lock Plate Attaching Screws	2½ to 3 ft. lbs.
Governor Body to Hub Attaching Bolts	6 to 8 ft. lbs.
Governor Hub Drive Screw	6 to 8 ft. lbs.
Rear Pump to Transmission Case Bolts	8 to 11 ft. lbs.
Valve Body to Transmission Case Bolts	8 to 11 ft. lbs.
Valve Body Suction Screen Attaching Screws	2½ to 3½ ft. lbs.
Upper Valve Body Plate Bolts	3½ to 5 ft. lbs.
Lower to Upper Valve Body Attaching Bolts	13 to 15 ft. lbs.
Inner Control Lever Allen Head Nuts	6 to 8 ft. lbs.
Parking Lock Pawl Reaction Bracket Attaching Bolts	8 to 11 ft. lbs.
Oil Cooler Connections or Plugs at Transmission Case	5 to 7 ft. lbs.
Pressure Test Point Plugs	5 to 7 ft. lbs.
Low Band Adjustment Lock Nut	13 to 17 ft. lbs.
Converter to Engine Bolts	15 to 20 ft. lbs.

POWERGLIDE SPECIFICATIONS

Engine Combinations		L-6 230 V-8 283	V-8 327 V-8 409
Trade name		Powerglide	
Type describe		Torque Converter with Planetary Gears	
Method of Selection (Lever, Push Button or other)		Lever-(Floor mounted on 13-1400 models, steering column mounted for all others)	
Selector Pattern		P-R-N-D-L	
List gear ratios, Selector Pattern and indicate which are used in each selector position		D-1.82:1 and 1:1 L-1.82:1 R-1.82:1	D-1.76:1 and 1:1 L-1.76:1 R-1.76:1
Torque convertor	Number of elements	3	
	Max. ratio at stall	2.10	
	Type of cooling (air, water)	L-6 230–Air; V-8 Models–Water	
Lubricant	Capacity—refill (pt.)	3	
	Type recommended	Type A, Suffix A	

SPECIAL TOOLS

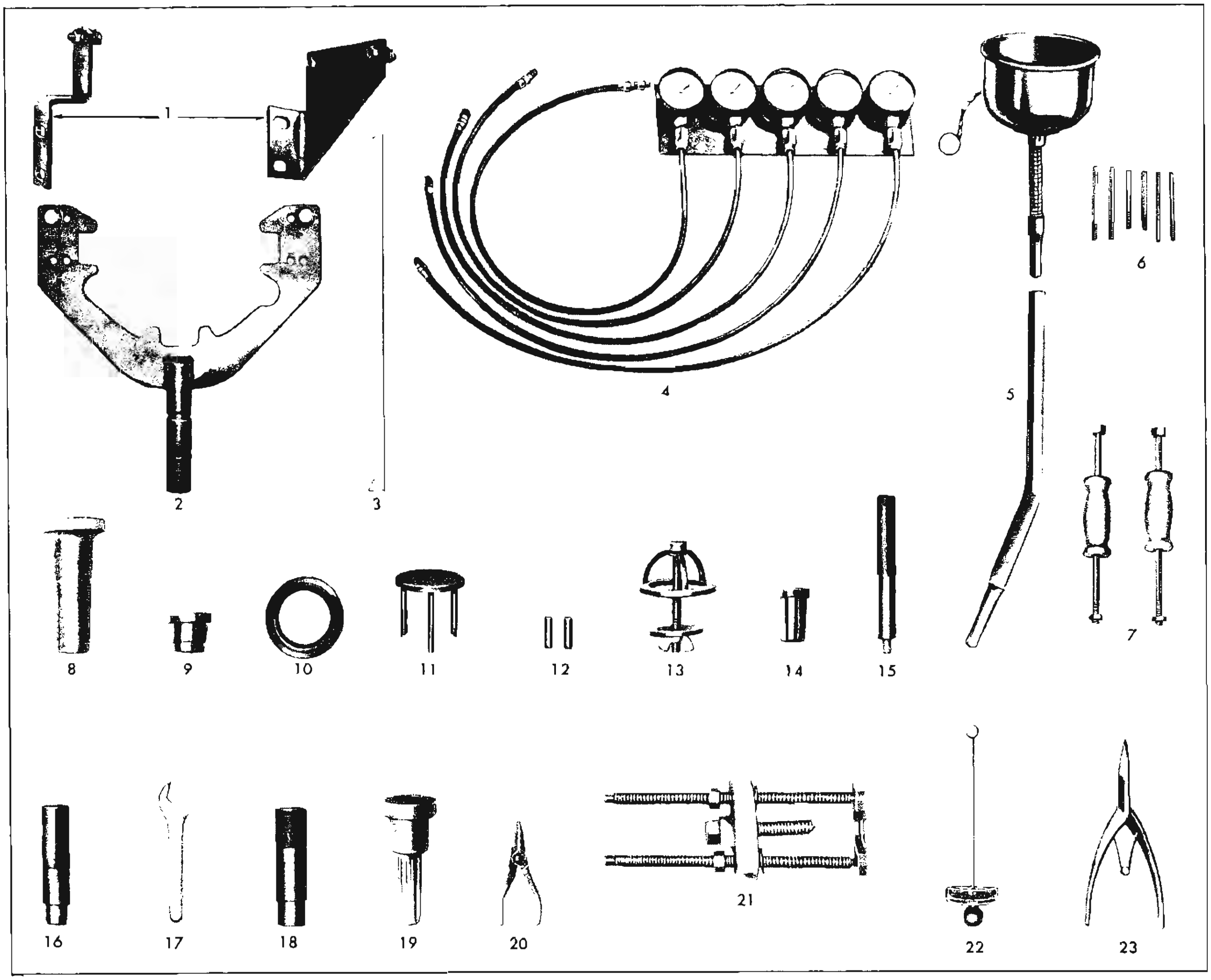

Fig. 43PG—Aluminum Powerglide Special Tools

1. J-9506 Holding Fixture Adapters
2. J-3289-01 Holding Fixture (Use with J-3289-20 Base)
3. J-9549 Converter Safety Strap
4. J-4872 Transmission Pressure Gauges
5. J-4264 Oil Filler Tube and Funnel
6. J-3387 Pilot Stud Set
7. J-9539 Front Pump Puller Bolts (Use with weights from Slide Hammers J-6585)
8. J-6839 Front Pump Seal Driver
9. J-9546 Clutch Drum Bushing Remover and Installer
10. J-7782 Clutch Spring Compressor Adapter Plate
11. J-5133 Clutch Spring Compressor
12. J-4599 Planet Pinion Assembly Tool Set
13. J-9542 Reverse Piston Spring Compressor
14. J-9557 Transmission Case Rear Bushing Remover and Installer and Rear Pump Bushing Remover
15. J-7079 Handle
16. J-6582 Rear Pump Bushing Installer
17. J-9543 Vacuum Modulator Wrench
18. J-5778 Extension Bushing Remover and Installer
19. J-5154 Extension Oil Seal Installer
20. J-5403 Snap Ring Pliers
21. J-5814 Speedometer Drive Gear Remover and Installer
22. J-5853 Torque Wrench
23. J-8039 Snap Ring Pliers

J-8001 Dial Indicator (Not Illustrated)
J-5492 Dial Indicator Support Strap (Not Illustrated)
J-6585 Slide Hammers (Not Illustrated)
J-6585-3 Slide Hammer Adapters (Not Illustrated)
J-9534 Bushing Remover (Not Illustrated)

SECTION 14

BODY AND SHEET METAL

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GENERAL DESCRIPTION

Throughout this section, the various body styles will be referred to by number. The following chart lists these numbers and relates them to body descriptions. If service information refers only to one particular body style, or group of body styles, it will be so stated in the headings (large size type) preceding each service outline. Service procedures not covered herein may be performed as outlined in the 1961 Shop Manual.

	Biscayne		Impala Super Sport		Bel Air		Impala		PASSENGERS
SERIES	1100	1200	1300	1400	1500	1600	1700	1800	
NO. CYLS.	6	8	6	8	6	8	6	8	
BODY STYLE									
2 Dr. Sedan	11	11			11	11			6
4 Dr. Sedan	69	69			69	69	69	69	6
4 Dr. Sport Sedan							39	39	6
Sport Coupe							47	47	5
Sport Coupe			47	47					4
Convertible			67	67					4
Convertible							67	67	5
4 Dr. Sta. Wagon	35	35			35	35	35	35	6
4 Dr. Sta. Wagon					45	45	45	45	9

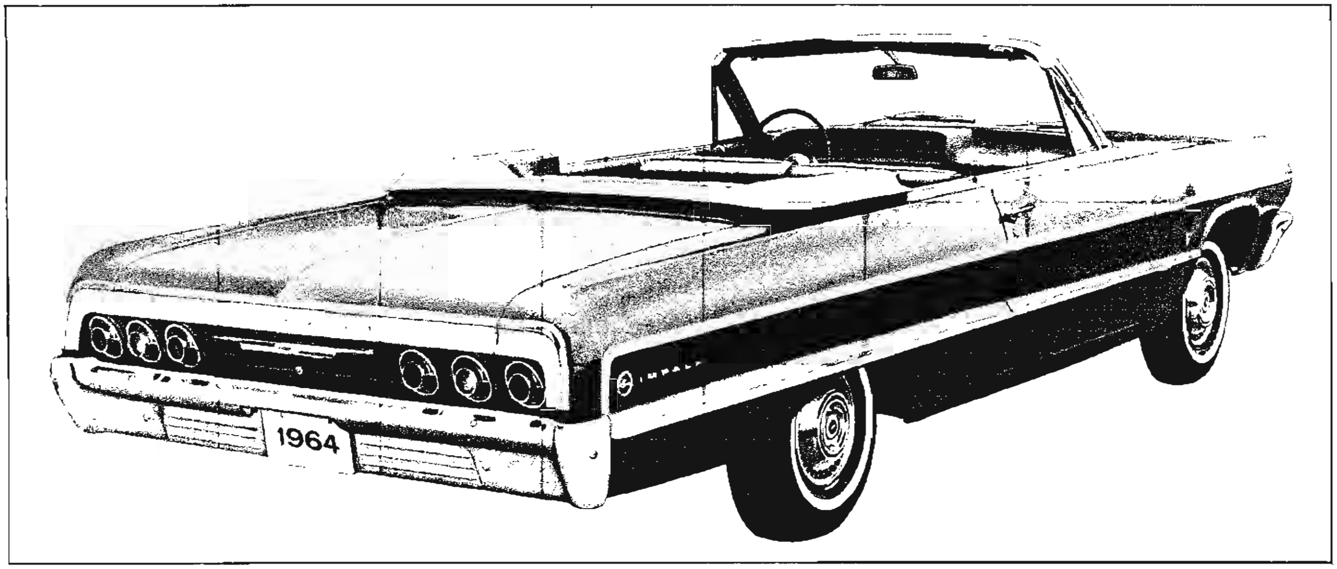


Fig. 1—1964 Impala Convertible

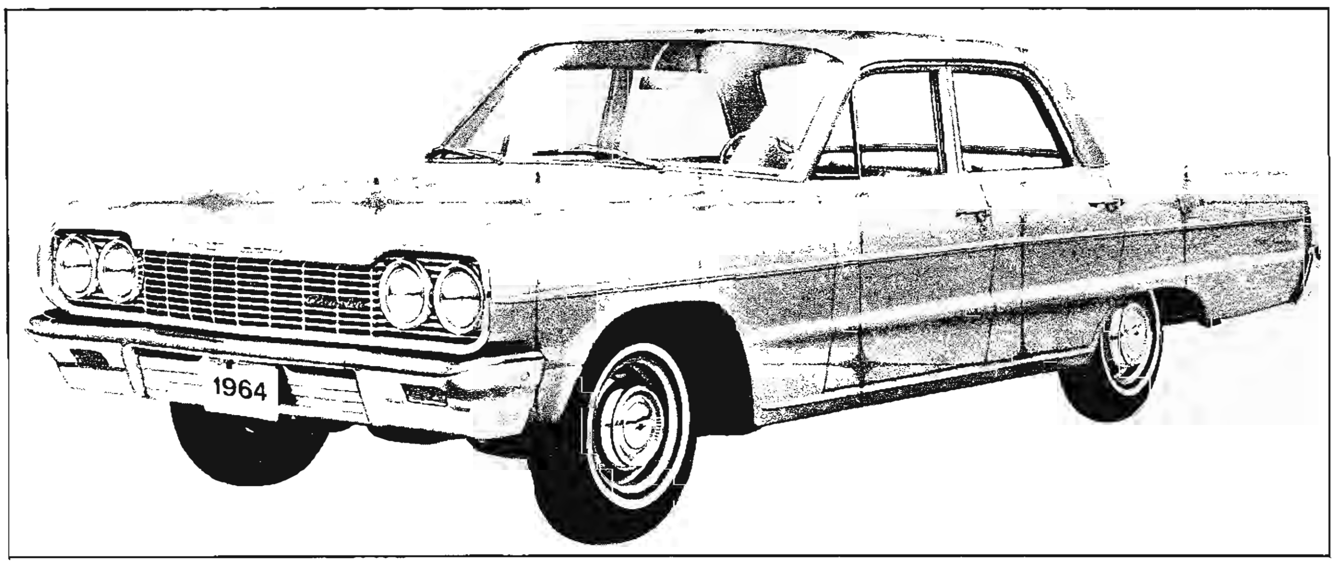


Fig. 2—1964 Four Door Sedan

SERVICE OPERATIONS

CLEANING SOFT TRIM

There are four general types of trim materials used in automotive bodies:

1. Fabrics that may be either plain fabrics (broadcloth, gabardine, etc.) or pattern fabrics which are manufactured with natural or snythetic (nylon orlon, rayon, viscose, etc.) fabrics.
2. Genuine leather.
3. Coated fabrics (vinyl or mylar).
4. Polyurethane foam.

Dust and dirt particles that accumulate on the upholstery of a car should be removed every few weeks, or oftener if the car is given constant hard use. This is done with a whisk broom or vacuum cleaner.

> ***CAUTION: Do not use a whisk broom on fabrics having raised tapestry patterns since damage to the fine threads may result. On polyurethane foam material use only a soft bristle brush—do not use a whisk broom or vacuum cleaner.***

Before attempting to remove spots or stains from upholstery fabrics, determine as accurately as possible:

1. Nature and age of the spot or stain.
2. The effect of stain removing agents on the color structure and general appearance of the fabric.

For best results, stains should be removed from upholstery as soon as possible after they have been made. If they are allowed to stand for some time, they often become set, and removal becomes more difficult --frequently, impossible.

There are three basic types of acceptable cleaners available:

1. Volatile cleaners (colorless liquids).
2. Synthetic detergents.
3. Neutral soap (nonalkaline).

The volatile cleaners are recommended since they have great solvent powers for grease, oils and general road grime. Synthetic detergents generally loosen up stains satisfactorily; however, the use of improper type detergents involves risk of damage to the color or finish of fabrics.

PROCEDURE FOR CLEANING FABRICS WITH VOLATILE CLEANERS

Care should be taken not to use too much solvent and to apply it only with clean cloths. It is the solvent that does the work--so only a minimum of pressure should be applied.

1. Brush away all loose particles of dirt and soil.
2. Dampen a clean cloth (cheese cloth may be used) with the volatile cleaner. Open the cloth and allow a portion of the cleaner to evaporate so that the cloth is **just slightly damp.**
3. Using very light pressure and circular lifting motion, rub the stained area, starting at the outer edge and working toward the center until the entire area has been covered. Change to a clean portion of the cloth every few strokes.
4. Before proceeding, wait several minutes to allow most of the volatile cleaner to evaporate. This will avoid the danger of the cleaner penetrating to the padding under the upholstery. Certain cleaners will deteriorate sponge rubber which is often used as padding.
5. It may be necessary to repeat Steps No. 2, 3, and 4 several times before the stain has been satisfactorily removed. Each time a clean cloth should be used.
6. If a ring should form on the fabric when removing a stain, the entire area of the trim assembly should be cleaned as described in the preceding steps.
7. The cleaned upholstery should be allowed to dry completely before using.

Some volatile cleaners are toxic and harmful; therefore, the following safety precautions should be used:

1. Always use in a well ventilated area. Car windows and garage doors must be open when such cleaners are used.
2. Avoid prolonged or repeated breathing of vapors from cleaner.
3. Avoid prolonged or repeated contact with the skin.
4. Keep away from eyes and mouth.
5. Some cleaners are flammable, and every precaution and care must be exercised in handling these cleaners.

PROCEDURE FOR CLEANING FABRICS WITH SYNTHETIC DETERGENTS

1. Make a solution of the synthetic detergent in luke warm water, working up a thick, frothy suds.
2. With a clean cloth or sponge, dampened with lukewarm water, apply **suds only** to the surface of the upholstery using light to medium pressure, repeating several times, applying more suds with a clean portion of the cloth or sponge.
3. With a second clean cloth, dampened with lukewarm water, rub over the area with medium pressure to remove excess detergent and loose material.
4. With a clean dry cloth, wipe off all excess moisture. A vacuum cleaner may also be used.
5. Allow the upholstery to dry partially; then repeat the above treatment if necessary to remove stain.
6. When the upholstery is satisfactorily cleaned, allow to dry completely before using.

PRECAUTIONS FOR CLEANING FABRICS

1. Solutions containing water are not recommended for general cleaning of broadcloths. Water has great destructive powers on the high face or high gloss finish of broadcloths, causing the nap to curl and roughen to such an extent that the finish is destroyed or made very unsightly. However, in some cases where it is necessary to use a solution containing water to remove a stain, the resultant disturbance to the finish of material may be preferable to the stain.
2. Do not use as a cleaning solvent any gasoline which is colored or which contains tetraethyl lead.
3. Do not use solvents such as acetone, lacquer thinners, enamel reducers and nail polish remover, as a cleaning solvent.
4. Do not use laundry soaps, bleaches or reducing agents, such as the following: chloride of lime, javelle water, hydrogen peroxide, sodium hydrosulphite, potassium permanganate, chlorine or chlorine water, sulphurous acid (sulphur dioxide), sodium thiosulphate (Photographers' hypo). The use of these agents tends to weaken fabric and to change its color.
5. Do not use too much cleaning fluid; some interior trim assemblies are padded with rubber, and volatile cleaners are generally solvents for rubber. The application of too much cleaner may destroy these rubber pads.

PROCEDURE FOR CLEANING GENUINE LEATHER AND COATED FABRICS

Care of genuine leather and coated fabrics (includes vinyl coated formed headlining) is a relatively simple but important matter. The surface should be wiped occasionally with a dry cloth, and whenever dirt accumulates, the following cleaning instructions should be used:

1. Lukewarm water and a neutral soap should be used. Apply a thick suds, worked up on a piece of gauze or cheesecloth, to the surface.
2. The operation should be repeated, using only a damp cloth and no soap.
3. The surface should then be wiped dry with a soft cloth.

Polishes and cleaners used for auto body finishes, volatile cleaners, furniture polishes, oils, varnishes or household cleansing and bleaching agents should never be used.

PROCEDURE FOR CLEANING POLYURETHANE FOAM MATERIAL

Normal soilage such as dirt and finger prints can be removed with a cleaning solution of approximately two (2) ounces of white detergent powder mixed in a gallon of water. Immerse a clean cellulose sponge in cleaning solution. Wring the sponge out thoroughly leaving suds only; then clean soiled area carefully. Rinse off the cleaned area with sponge and clean water —DO NOT soak the cleaned area.

Soilage such as cements, sealers, and grease can be removed by first cleaning the soiled area with a detergent solution as described above—DO NOT RINSE. Leaving suds on the soiled area, clean area with a clean cloth that has been dipped in a good volatile upholstery cleaner and thoroughly wrung out. Then clean soiled area with detergent suds and rinse as described above.

PROCEDURE FOR CLEANING VICODEC FOLDING TOP MATERIAL

The top should be washed frequently with neutral soap suds, lukewarm water and a brush with soft bristles. Rinse top with sufficient quantities of clear water to remove all traces of soap.

If the top requires additional cleaning after using soap and water, a mild foaming cleanser can be used. Rinse the whole top with water; then apply a mild foaming type cleanser on an area of approximately two square feet. Scrub area with a small soft bristle hand brush, adding water as necessary until the cleanser foams to a soapy consistency. Remove the first accumulated soilage with a cloth or sponge before it can be ground into the top material. Apply additional cleanser to the area and scrub until the top is clean. Care must be exercised to keep the cleanser from running onto body finish as it may cause streaks if allowed to run down and dry. After the entire top has been cleaned, rinse the top generously with clear water to remove all traces of cleanser. If desired, the top can be supported from the underside during the scrubbing operations.

After cleaning always be sure the top is thoroughly dry before it is lowered. Lowering the top while it is still wet or damp may cause mildew and unsightly wrinkles.

Do not use volatile cleaners or household bleaching agents on the top material.

PROCEDURE FOR CLEANING FLOOR CARPETS

Thoroughly brush or vacuum the floor carpet. In many instances the floor carpet may require no further cleaning. If carpet is extremely soiled remove carpet from car and thoroughly vacuum to remove loose dirt; then with a foaming type upholstery cleaner, clean approximately one (1) square foot of carpet at a time. After each area is cleaned, remove as much of the cleaner as possible with a vacuum cleaner. After cleaning the carpet use an air hose to "fluff" the carpet pile, then dry the carpet. After the carpet is completely dried, use an air hose to again fluff the carpet pile.

NOTE: If the carpet is not extremely soiled, the carpet may be cleaned in the car by applying a sparing amount of foaming type upholstery cleaner with a brush.

If oil or grease spots are still present on the carpet they may be removed by using a volatile cleaner.

INSTRUCTIONS FOR THE REMOVAL OF SPECIFIC STAINS FROM AUTOMOTIVE UPHOLSTERY MATERIALS

Some types of stains and soilage, including blood, ink, chewing gum, etc., require special consideration for most satisfactory results. For these, and other stains, specific instructions are outlined in succeeding paragraphs. It must be expected, particularly where water treatment is specified, that discoloration and finish disturbance may occur. In some cases fabric disturbance may be considered preferable to the stain itself. By following the procedures outlined with normal care and caution, reasonably satisfactory results can be expected.

Battery Acids

Apply ordinary household ammonia water with a brush or cloth to the affected area, saturating it thoroughly. Permit the ammonia water to remain on the spot about a minute, so that it will have ample time to neutralize the acid. Then rinse the spot by rubbing with a clean cloth saturated with cold water.

This treatment will suffice for both old and new stains. However, no type of treatment will repair damage to fibers resulting from the action of the acids on the fibers—particularly after the spot has dried.

Blood

Do not use hot water or soap and water on blood stains since they will set the stain, thereby making its removal practically impossible.

Rub the stain with a clean cloth saturated with cold water until no more of the stain will come out. Care must be taken so that clean portions of cloth are used for rubbing the stain.

This treatment should remove all of the stain. If it does not, apply a small amount of household ammonia water to the stain with a cloth or brush. After a lapse of about one minute, continue to rub the stain with a clean cloth dipped in clear water.

If the stain remains after the use of water and ammonia, a thick paste of corn starch and cold water may be applied to the stained area. Allow the paste to remain until it has dried and absorbed the stain. Then pick off the dry starch. Brush the surface to remove starch particles that remain. For bad stains, several applications of starch paste may be necessary.

Candy

Candy stains, other than candy containing chocolate, can be removed by rubbing the affected area with a cloth soaked with very hot water. If the stain is not completely removed, rub area lightly (after drying) with a cloth wet with a volatile cleaner. This will usually remove the stain.

Candy stains resulting from cream and fruit-filled chocolates can be removed more easily by rubbing with a cloth soaked in lukewarm soap-suds (mild neutral soap) and scraping, while wet, with a dull knife. This treatment is followed with a rinsing by rubbing the spot with a cloth dipped in cold water.

Stains resulting from chocolate or milk chocolate can be removed by rubbing the stain with a cloth wet with lukewarm water. After the spot is dry, rub it lightly with a cloth dipped in a volatile cleaner.

Chewing Gum

Harden the gum with an ice cube, and scrape off particles with a dull knife. If gum cannot be removed completely by this method, moisten it with a volatile cleaner and work it from the fabric with a dull knife, while gum is still moist.

Fruit, Fruit Stains, Liquor and Wine

Practically all fruit stains can be removed by treatment with very hot water. Wet the stain well by applying hot water to the spot with a clean cloth. Scrape all excess pulp, if present, off the fabric with a dull knife; then rub vigorously with a cloth wet with very hot water. If the stain is very old or deep, it may be necessary to pour very hot water directly on the spot, following this treatment with the scraping and rubbing. Direct application of hot water to fabrics is not recommended for general use since discoloration usually results.

If the above treatments do not remove stain, allow fabric to dry thoroughly; then rub lightly with a clean cloth dipped in a volatile cleaner. This is the only further treatment recommended.

Soap and water are not recommended since they will probably set the stain and cause a permanent discoloration. Drying the fabric by means of heat (such as the use of an iron) is not recommended.

Grease and Oil

If grease has been spilled on the material, as much as possible should be removed by scraping with a dull knife or spatula before further treatment is attempted.

Grease and oil stains may be removed by rubbing lightly with a clean cloth saturated with a volatile cleaner. Be sure all motions are toward the center of the stained area to decrease the possibility of spreading the stain.

Ice Cream

The same procedure is recommended for the removal of ice cream stains as that used in removing fruit stains.

If the stain is persistent, rubbing the spot with a cloth wet with warm soap suds (mild neutral soap) may be used to some advantage after the initial treatment with hot water. This soap treatment should be followed with a rinsing, by rubbing with a clean cloth wet with cold water. After this dries, rubbing lightly with a cloth wet with volatile cleaner will clear up the last of the stain, by removing fatty or oily matter.

Nausea

Sponge with a clean cloth, dipped in clear cold water. After most of the stain has been removed in this way, wash lightly with soap (mild neutral), using a clean cloth and lukewarm water. Then rub with another clean cloth dipped in cold water. If any of the stain remains after this treatment, gently rub clean with a cloth moistened with a volatile cleaner.

Shoe Polish and Dressings

On types of shoe dressings which contain starch or dextrine or some water soluble vehicle, allow the polish to dry; then brush the spot vigorously with a brush. This will probably be all the treatment that is necessary. If further treatment is required moisten the spot with cold water and after it has dried, repeat the brushing operation.

Paste or wax type shoe polishes may require using a volatile cleaner. Rub the stain gently with a cloth wet with a volatile cleaner until the polish is removed. Use a clean portion of the cloth for each rubbing operation and rub the stained area from outside to center.

Tar

Moisten the spot slightly with a volatile cleaner, and then remove as much of the tar as possible with a dull knife. Follow this operation by rubbing the spot lightly with a cloth wet with the cleaner until the stain is removed.

Urine

Sponge the stain with a clean cloth saturated with lukewarm soap suds (mild neutral soap) and then rinse well by rubbing the stain with a clean cloth dipped in cold water. Then saturate a clean cloth with a solution of one part household ammonia water and five parts water. Apply the cloth to the stain and allow solution to remain on affected area for one minute; then rinse by rubbing with a clean wet cloth.

Lipstick

The compositions of different brands of lipstick vary, making the stains very difficult to remove. In some instances a volatile cleaner may remove the stain. If some stain remains after repeated applications of the volatile cleaner, it is best to leave it rather than try other measures.

FRONT END

WINDSHIELD ASSEMBLY BODY VENTILATING SYSTEM

1961 service information is applicable to 1964 vehicles. Note, however, that the windshield garnish molding removal and installation procedure differs from 1961.

The windshield checking blocks are designed to fit over the pinchweld flange. The new blocks may also be used in place of the older style on earlier vehicles.

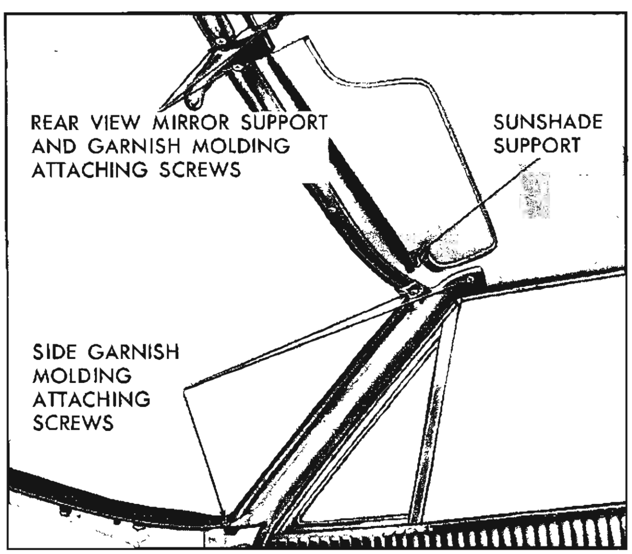


Fig. 3—Garnish Moldings

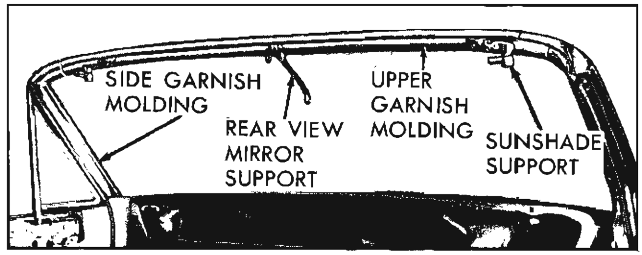


Fig. 4—Garnish Moldings

Windshield Garnish Moldings

The windshield garnish moldings consist of an upper right and left, side right and left and lower garnish molding. All moldings are secured by screws except the lower garnish molding which is a one-piece molding and is attached by clips.

Removal and Installation

1. Place protective covering over front seat and instrument panel.
2. Remove moldings in following order: side, lower and upper moldings.

   The lower garnish molding is attached by clips. Remove side moldings and, with a suitable tool inserted in hole at the left end of the molding, slide the molding toward the left until the retaining tabs are disengaged from the clips (fig. 5) and remove the molding.

   On "67" styles remove the side garnish molding attaching screws. Raise top, remove screw attaching side reveal to windshield header, pry up corner of side reveal molding overlapping windshield

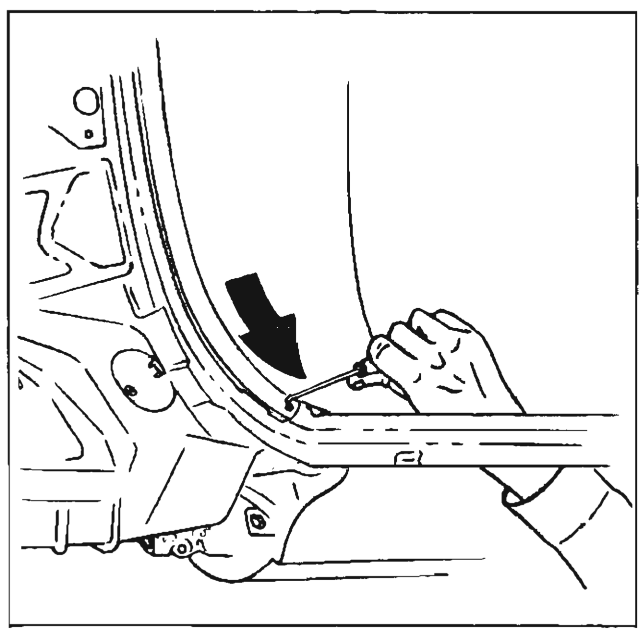


Fig. 5—Lower Garnish Molding Removal

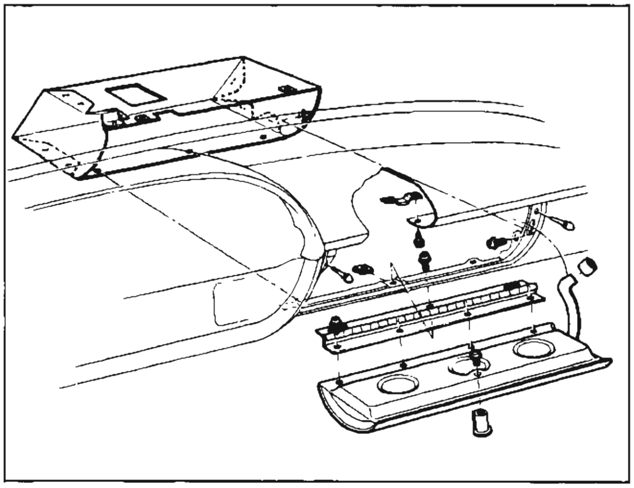


Fig. 6—Instrument Panel Compartment

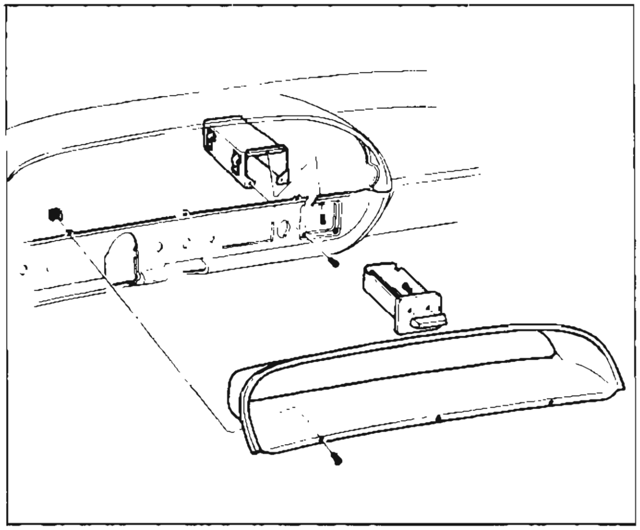


Fig. 8—Instrument Console and Ash Tray

header and remove side garnish molding. Remove sunshade supports prior to removing upper garnish moldings.

3. To install the lower molding, mark the location of molding clips that are attached to the instrument panel on the outside of the windshield. Place molding along front edge of the instrument panel, aligning retaining tabs on molding, press molding down into place until retaining tabs engage with clips.

Instrument Panel Assembly

Instrument panel trim procedures are basically the same as covered in the 1961 Passenger Car Shop Manual. Figures 6 through 8 will provide sufficient information to perform any necessary service on the instrument panel.

The instrument panel cover attachment differs from that covered in the 1961 manual and will be covered here.

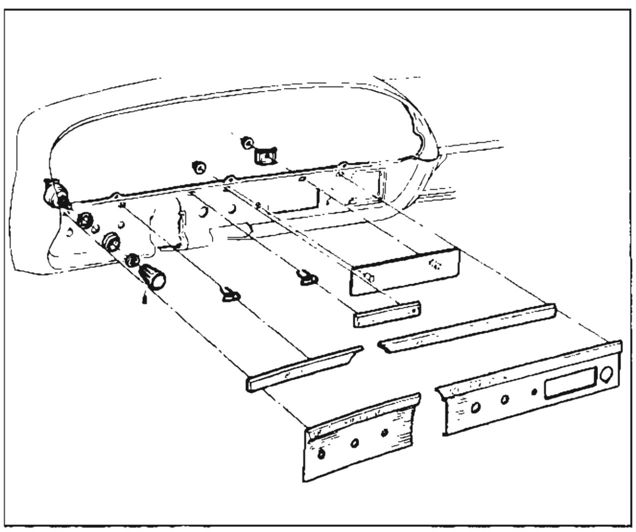


Fig. 7—Instrument Panel Trim Moldings

Instrument Panel Cover

The instrument panel cover is secured to the instrument panel by studs and nuts (fig. 9).

The studs are an integral part of the cover assembly.

Removal and Installation

1. Remove side and lower garnish moldings.
2. Loosen or remove any necessary instrument items, glove box, etc.
3. From underside of instrument panel remove the ten (10) attaching stud nuts and carefully remove the cover assembly.
4. To install, reverse the removal procedure making certain cover is properly aligned before securing in place.

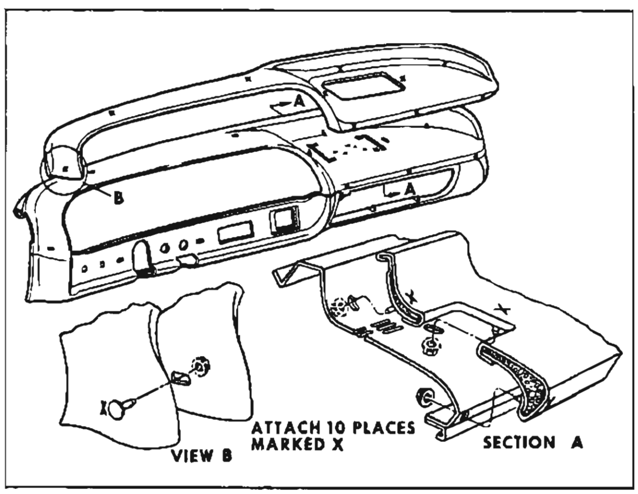


Fig. 9—Instrument Panel Cover

DOORS AND CENTER PILLAR

Service operations for doors are covered in the following sections:

A. **Service operations which are the same or similar for both front and rear doors.**

B. **Service operations for front doors only.**

C. **Service operations for rear doors only.**

D. **Service operations for side roof rail weatherstrips except convertible styles.**

FRONT AND REAR DOORS

Front and Rear Door Window Glass Run Channel Inner and Outer Strip Assemblies

Glass run channel strip assemblies are used on all doors on all styles incorporating a dropping window and are designed to prevent cold air and water from entering the body between the door window lower sash channel and door inner and outer panels. The inner strip assembly is constructed of a pile fabric material with a metal backing and is secured to top of door trim pad by a series of staples. The inner strip is not normally removed separately for service procedures. The outer strip assembly is constructed of a molded rubber and is secured to a metal retainer by a series of staples. On styles equipped with a door window belt reveal molding, the metal retainer is an integral part of this molding which is attached to the door outer panel by three screws. On styles not equipped with a molding the outer strip assembly is attached to the door outer panel by a series of attaching clips and is further retained by two attaching screws.

On all styles, the inner strip assembly remains in a stationary position during operation of door glass. On the outer strip assembly, however, the inboard section of the sealing lip is lifted and held in position by the door window lower sash channel or filler when door glass is raised. The outer strip assembly has been increased in length and thickness for the 1963 model and is an effective weatherseal with glass in the fully closed position (fig. 10).

Removal and Installation

1. Lower door window and apply masking tape over door outer panel adjacent to outer strip assembly to protect paint finish.
2. Check outer strip assembly for location of attaching screws. This location varies with style and size of door, however; on most styles, the front door ventilator will have to be removed to gain access to forward attaching screw. If necessary, remove the front door ventilator assembly as described in the "Front Door" section of the body service manual.

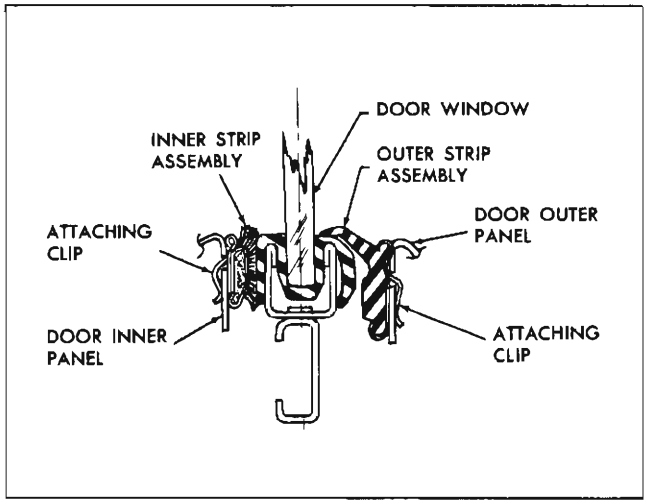


Fig. 10—Front and Rear Glass Run Channel Inner and Outer Strip Assembly

3. On some styles it may be necessary to remove the door window lower stop or stop bumper and lower door window as far down as possible to gain access to the outer strip assembly attaching screws.
4. Remove all outer strip assembly attaching screws (three screws on styles equipped with a belt reveal molding and two screws on all other styles). See Figure 11 for styles with a belt reveal molding and Figure 12 for all other styles.
5. On styles equipped with a belt reveal molding, the outer strip assembly and molding can now be removed.

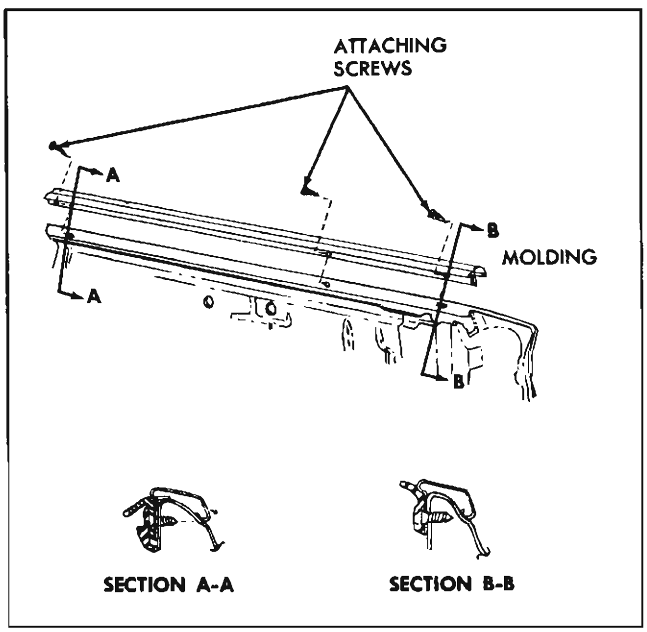


Fig. 11—Door Window Glass Run Channel Outer Strip Assemblies (With Belt Reveal Molding)

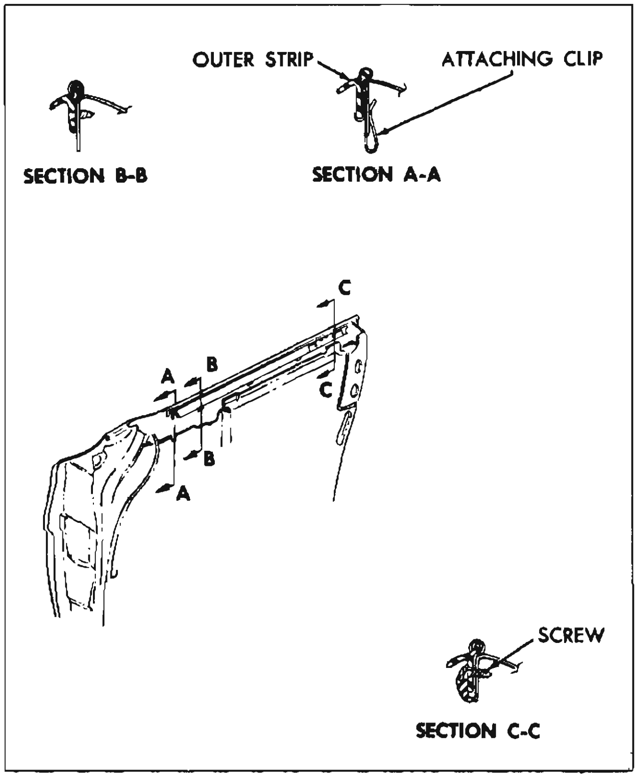


Fig. 12—Door Window Glass Run Channel Outer Strip Assemblies (Without Belt Reveal Molding)

6. On all other styles, firmly press outer strip assembly in a downward motion to disengage attaching clips from door outer panel return flange and remove strip assembly from door outer panel.
7. To install, reverse removal procedure.

Front and Rear Door Inside Handles

Removal and Installation

a. On styles equipped with door inside remote control "paddle" handles, proceed as follows:
   1. Remove door arm rest as described under "Front and Rear Door Arm Rests."
   2. Remove handle-to-remote attaching bolt and remove handle from door.
   3. To install, reverse removal procedure.

b. On styles not equipped with "paddle" handles and for removal of manually operated door ventilator and window inside handles, proceed as follows:
   1. Depress door trim assembly at handle sufficiently to install tool J-7797 between handle and bearing plate.
   2. Push handle retaining spring out of engagement and remove handle and bearing plate from door.
   3. To install, position retaining spring on handle and bearing plate over regulator spindle. Position handle on spindle at same angle as handle on opposite door and push handle until spring is engaged (fig. 13).

   NOTE: Handles are installed in a horizontal position with open end forward when glass is in a full up position.

Front and Rear Door Arm Rest Assemblies

Removal and Installation

1. Remove screws securing arm rest to door inner panel and remove assembly from door (fig. 14).
2. To install, reverse removal procedure. It may be necessary to seal arm rest attaching screw holes in door inner panel with body caulking compound prior to installation.

Front and Rear Door Trim Assemblies

All door trim assemblies are the hang-on type and are further secured by attaching screws along bottom edge and by retaining nails inserted into plastic retaining cups in the door inner panel (see Views "D" and "E" in Figure 15)..

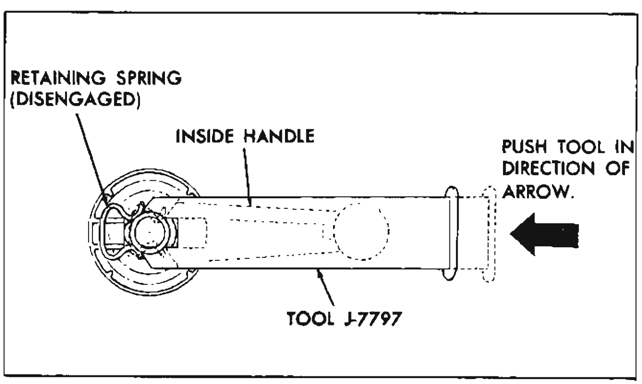


Fig. 13—Disengaging Handle Retaining Spring

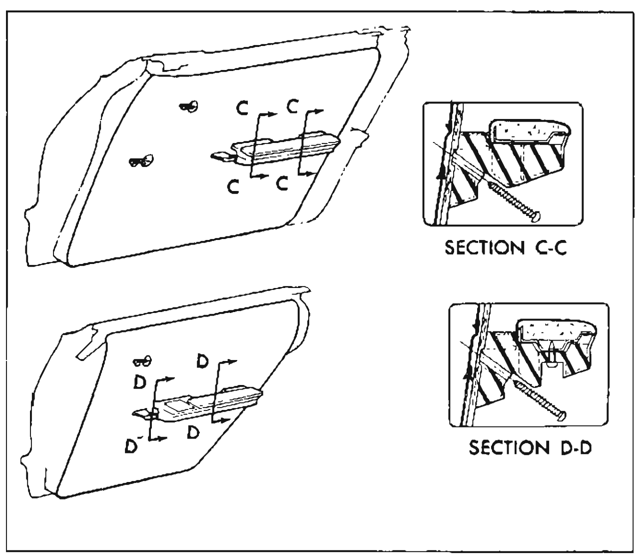


Fig. 14—Door Arm Rest Assemblies

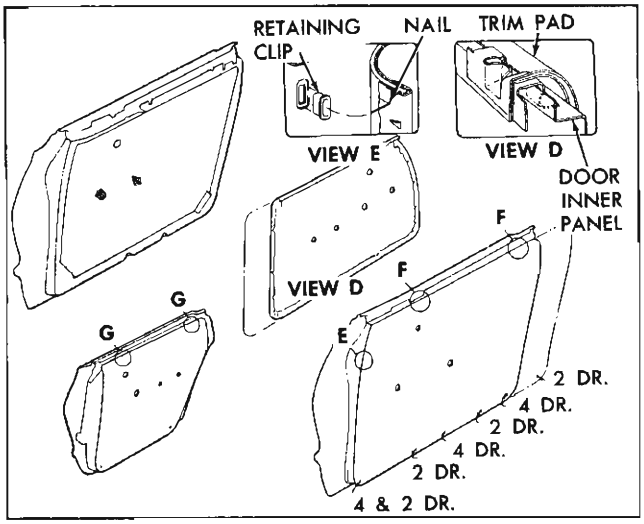


Fig. 15—Door Trim Assembly

Removal and Installation

1. Remove door inside hardware, locking rod knob and arm rest assembly.
2. Remove screws securing trim assembly to door inner panel (fig. 15).
3. With a clean rubber mallet, tap trim assembly along front and rear edges to free trim assembly retaining nails in slots.
4. Place tool J-6335, or other suitable flat-bladed tool, between water deflector and door trim assembly at lower edge of trim assembly. Working upward, carefully loosen front and rear edges of door trim assembly from door inner panel.

   NOTE: Exercise care not to disturb inner panel water deflector.

5. Lift trim assembly upwards and carefully disengage trim from top of door inner panel; then remove trim assembly from door.

   NOTE: On styles equipped with electric window regulator, after trim assembly is disengaged from top of door inner panel, disconnect switch terminal block(s) from switch assembly(s).

6. To install, reverse removal procedure. Broken retaining nails should be replaced with repair tabs, which are available as service parts.

Front and Rear Door Water Deflectors

A waterproof paper deflector is used to seal the door inner panel and prevent entry of water into body. The polyethylene (black) side of the deflector is placed against the inner panel. The deflector fits into a retaining slot at the lower section of the door inner panel and deflects water to bottom of door and out door bottom drain holes. The deflector is further secured by a string loaded sealing material along both front and rear edges and by the application of waterproof sealing tape at front and rear lower corners.

Whenever work is performed on front or rear doors where the water deflector has been disturbed, the deflector must be properly resealed and taped to the inner panel to prevent serious waterleaks. It is important that all service personnel performing door hardware adjustments or sealing operations are aware of the importance of using the specified material and the recommended removal and installation or replacement procedures.

For service sealing, body caulking compound is recommended if additional sealing material is required.

When access to the door inner panel is required to perform service operations, the deflector may be partially detached or completely removed from the inner panel. If the existing water deflector is damaged so that it will not properly seal the door inner panel, replacement of deflector is absolutely necessary.

The following procedure covers complete removal and installation of the water deflector. If only partial detachment is required, perform only those steps which are necessary to expose the required area of the door inner panel.

Removal

1. Remove door trim assembly.
2. Remove strips of waterproof body tape securing lower corners of water deflector.
3. With a putty knife, or other suitable flat-bladed tool, carefully break cement bond securing upper corners of water deflector to door inner panel. Make sure string, located within sealer, is against water deflector and carefully slide putty knife between sealer and door inner panel along both sides of door to disengage sides of water deflector from door inner panel.
4. Disengage lower edge of water deflector from retaining slot in door inner panel and remove water deflector.

Installation

1. Inspect water deflector and repair any tears or holes with waterproof body tape applied to both sides of deflector. If bond between polyethylene and deflector paper has been torn, cut or damaged, apply waterproof body tape to both sides of deflector over damaged area to prevent water from wicking on uncoated side of deflector paper.
2. If a new deflector is to be installed, use old water deflector as a template to trim new deflector to proper size and to cut holes for door inside hardware. If old sealer does not effect an adequate seal, remove all old cement from door inner panel and replace with a continuous bead of body caulking compound (approximately $\frac{3}{16}''$ diameter).

3. If the door arm rest attaching screw holes are located in the door inner panel, seal these holes with body caulking compound.
4. Position water deflector to door inner panel with polyethylene coated side (black) of deflector against inner panel. Insert lower edge of deflector in retaining slot and firmly roll or press sealed areas to obtain a good bond between deflector and door inner panel.
5. Seal lower corners of water deflector with 2" or 2½" waterproof body sealing tape.
6. Clean off any excessive cement or caulking compound and install previously removed door trim and inside hardware.

Spring Clips

A spring clip is used to secure remote control connecting rods and inside locking rod connecting links to door levers. A slot in the clip provides for disengagement of the clips, thereby, facilitating detachment of linkage.

To disengage a spring clip, use a screwdriver, or other suitable tool, to slide clip out of engagement.

Front and Rear Door Outside Handle Assembly

Removal and Installation:

1. Raise door window. Remove door trim assembly and detach upper rear corner of inner panel water deflector sufficiently to gain access to door outside handle attaching screws.
2. Remove screws and door lock handle and gaskets from outside of body.
3. To install, reverse removal procedure.

Assembly and Disassembly of Door Outside Handle Push Button

1. Remove door outside handle.
2. Depress retainer slightly and turn one-quarter (¼) turn. Remove retainer, spring, push button and shaft and sealing ring from handle.
3. To assemble, reverse disassembly procedure (fig. 16).

FRONT DOORS

Front Door Weatherstrip

A new type of front door weatherstrip assembly has been designed which incorporates nylon component fasteners. This new fastener takes the place of wire clips and attaching clip sealing plugs used on rear door weatherstrip assemblies.

A significant change is the incorporation of the component nylon fastener. This fastener is the same size at all locations (3/16" diameter) and is available as a service part.

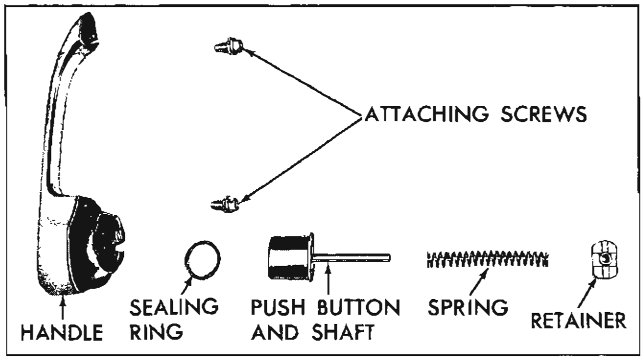


Fig. 16—Front-Rear Door Outside Handle Disassembled

Tool J-21104 is designed for removal of the new weatherstrip. If this tool is not available, it can be fabricated from any other comparable metal tool as shown in Figure 17.

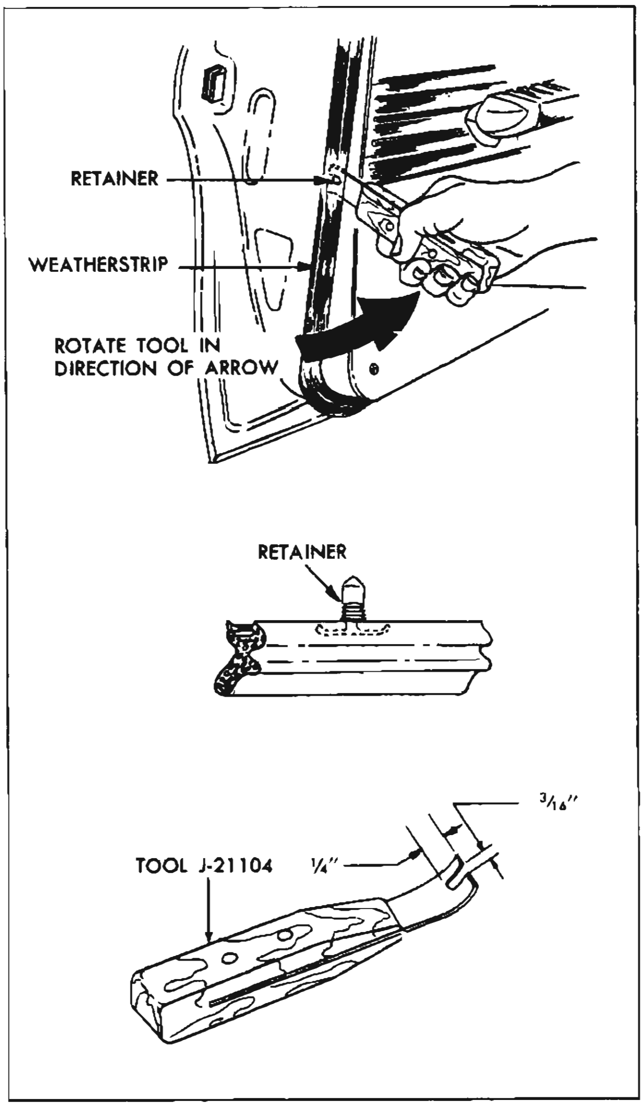


Fig. 17—Front Door Weatherstrip Removal

When a removal tool is fabricated, make sure all sharp edges or metal burrs are removed so as not to damage weatherstrip or paint finish during its usage.

Removal

1. Remove snap fasteners securing ends of weatherstrip at belt line of door hinge and lock pillar panels (fig. 18).
2. Carefully break cement bonds securing weatherstrip to door. A flat-bladed tool, such as a putty knife, will prove helpful in breaking cement bond (fig. 19).
3. Slide tool J-21104, or other suitable tool, under weatherstrip at a fastener location and grip fastener as close to door panel as possible. Then gently pry fastener out of its respective door piercing (fig. 20).

CAUTION: Exercise care not to damage serrations or fasteners during removal as they are necessary to maintain a good weatherseal.

Installation

1. Check weatherstrip nylon fasteners for damage and replace, if necessary.
2. Clean off old cement from door to insure a clean cementing surface. Apply a bead of an approved weatherstrip adhesive to lock pillar facing of door. Begin adhesive application at belt line and continue down door for approximately seven to nine inches (fig. 19).

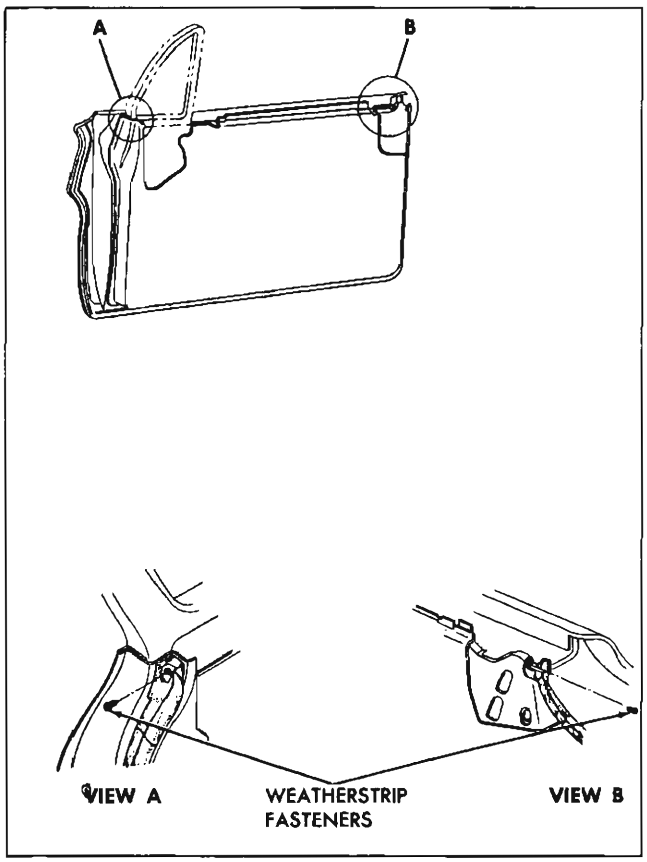


Fig. 18—Front Door Weatherstrip

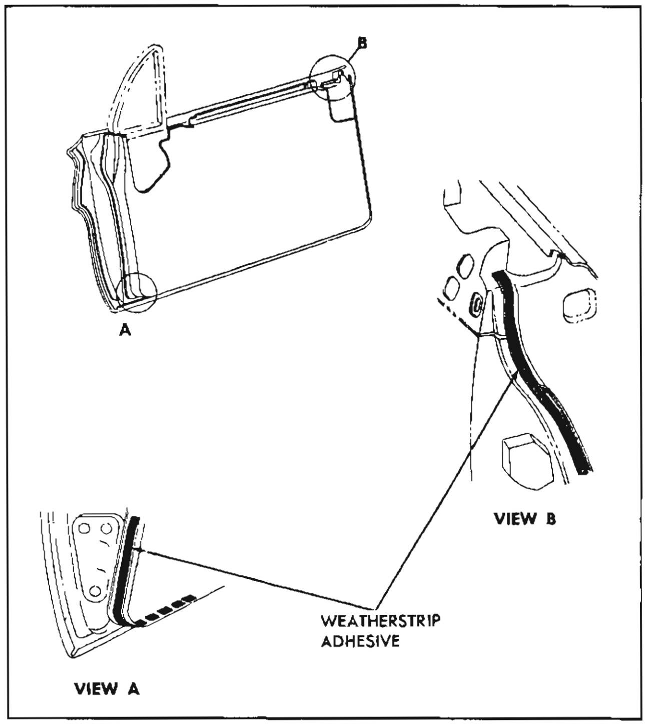


Fig. 19—Front Door Weatherstrip Cementing

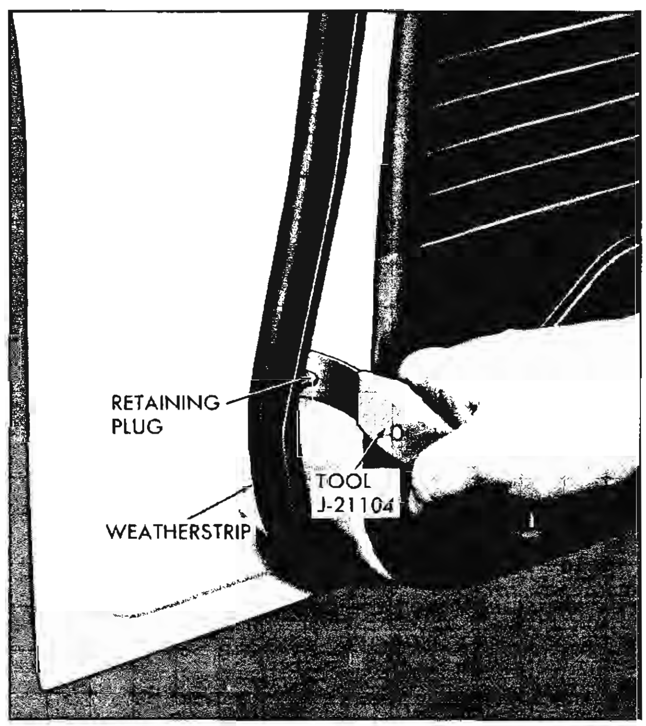


Fig. 20—Using Weatherstrip Removal Tool

NOTE: Cement usage is usually limited to door lock pillar panel (at belt line) and at forward lower corner of door. Cement, however, can be applied at any point where additional retention of weatherstrip is needed.

3. Beginning at either front or rear section of door, install snap fasteners. Install weatherstrip fasteners by pressing fasteners into door panel piercings. A protected hammer can also be used if necessary.

NOTE: In the event a weatherstrip becomes damaged at a fastener location and will not properly retain the fastener, remove fastener and cement weatherstrip into place. If, however, two or more consecutive fasteners will not remain engaged in the weatherstrip, replacement of the weatherstrip will probably be necessary.

All door weatherstrips are impregnated with a silicone lubricant and additional lubrication is not required.

Removal

1. Carefully break cement bond securing weatherstrip to door. If necessary, a flat-bladed tool, such as a putty knife, can be used to help break cement bond (fig. 21).
2. Slide tool J-21104, or other suitable tool, under weatherstrip at a fastener location and grip fastener as close to door panel as possible; then, gently pry fastener out of its respective door piercing (fig. 20).

CAUTION: Exercise care not to damage serrations of fasteners during removal as they are necessary to maintain a good weatherseal.

Installation

1. Check weatherstrip nylon fasteners for damage and replace, if necessary.

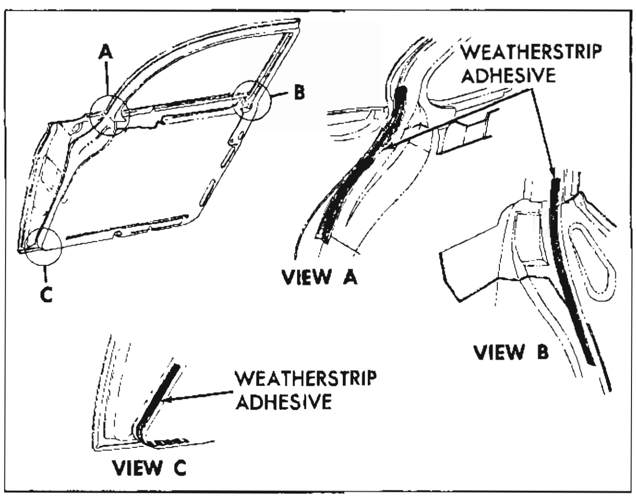


Fig. 21—Front Door Weatherstrip Adhesive Application

2. Clean off old cement from door to insure a clean cementing surface. Apply a bead of an approved weatherstrip adhesive to hinge and lock pillar facing of door. Begin adhesive application slightly above belt line and continue down door for approximately seven to nine inches. If necessary, weatherstrip adhesive can also be applied to lower forward corner of door (fig. 21).

NOTE: Cement usage is usually limited to door hinge and lock pillar panel (at belt line) and at forward lower corner of door. Cement, however, can be applied at any point where additional retention of weatherstrip is needed.

3. Position front door weatherstrip so that preformed section is at upper rear corner of door header and install weatherstrip fasteners by pressing fasteners into door panel piercings. A protected hammer can also be used if necessary.

NOTE: In the event a weatherstrip becomes damaged at a fastener location and will not properly retain the fastener, remove fastener and cement weatherstrip into place. If, however, two or more consecutive fasteners will not remain engaged in the weatherstrip, replacement of the weatherstrip will probably be necessary.

4. Clean off any excess weatherstrip adhesive.

NOTE: All door weatherstrips are impregnated with a silicone lubricant and additional lubrication is not required.

Front Door Hardware

47-67-39 Styles

Figure 22 is typical of hard top coupe and sedan style front doors with the trim assembly and inner panel water deflector removed. This illustration identifies the component parts of the front door assembly, their relationship and various attaching points.

11-35-45-69 Styles

Figure 23 is typical of all closed style front doors, illustrating the proper position of a fully lowered door window for maximum glass stability.

Front Door Assembly and Hinges

The front door hinges are the swing-out type with an integral door check on the top hinge assembly and a two position hold open on the lower hinge assembly. The hinges are attached to the front body hinge pillar and to the door assembly with bolts and anchor plates. Either of two methods may be used to remove the door from the body.

a. The door and hinges can be removed as an assembly from the body hinge pillar.
b. The door can be removed from the hinge straps.

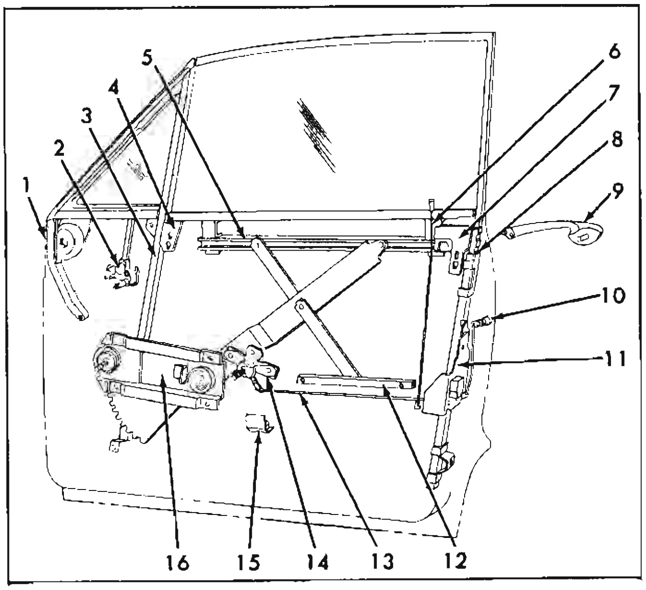


Fig. 22—Front Door Assembly—39, 47, 67 Styles

1. Front Door Ventilator Extension (Casting)
2. Front Door Ventilator Assembly
3. Front Door Ventilator Division Channel
4. Front Door Window Front Up-Stop
5. Front Door Window Lower Sash Channel Cam
6. Front Door Lock to Locking Lever Rod
7. Front Door Window Rear Up-Stop
8. Front Door Window Rear Guide Assembly
9. Front Door Outside Handle Assembly
10. Front Door Lock Cylinder and Connecting Rod
11. Front Door Lock Assembly
12. Front Door Window Inner Panel Cam
13. Front Door Remote Control to Lock Connecting Rod
14. Front Door Remote Control Assembly
15. Front Door Window Lower Stop
16. Front Door Window Regulator Assembly

Removal

1. Place a protective covering over front fender at door opening to protect paint finish.
2. If door and hinges are to be removed from body pillar, additional access may be obtained at lower hinge by loosening front fender lower rear attaching bolt.
3. Mark hinge locations on door or hinge pillar depending on method of removal being used.

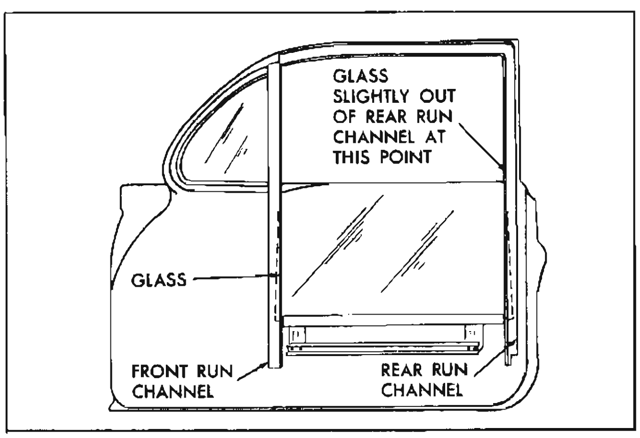


Fig. 23—Proper Position of Fully Lowered Door Window

4. On bodies equipped with electrically powered window regulators, proceed as follows:
   a. Remove door trim assembly and detach inner panel water deflector sufficiently to gain access to wire connector(s) at motor(s).
   b. Detach wire harness from inner panel as required and disconnect motor(s) from harness at connector(s).
   c. Remove electric conduit from door and remove wire harness from between door panels through opening in door hinge pillar.
5. With door properly supported, remove bolts securing upper and lower hinges to front body hinge pillar or door hinge pillar. With aid of a helper, remove door assembly from body (fig. 24).

Installation

1. As an anti-squeak precaution, before installing door, coat attaching surface of hinge with heavy-bodied sealer.
2. With aid of a helper, reinstall door to body opening. Align hinges within scribe marks and tighten bolts. Check door for proper alignment.
3. On bodies equipped with electrically-operated window regulators proceed as follows:

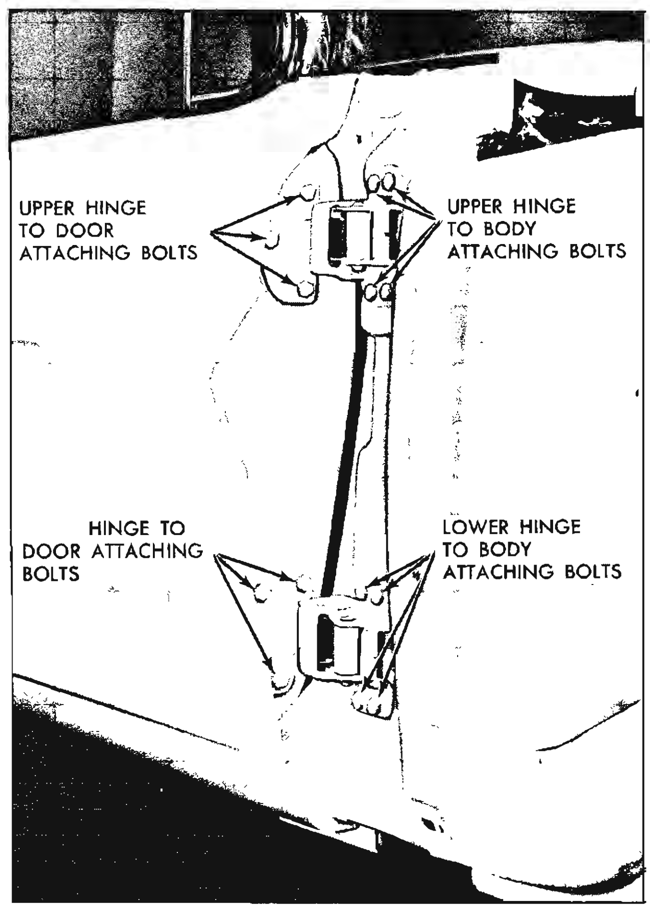


Fig. 24—Front Door Hinge Attachment

a. Install wire harness between door panels and reinstall harness to door inner panel. Connect regulator motor.

b. Install conduit to door inner panel. Check operation of electric window assembly.

4. Where required, seal door inner panel water deflector as specified in "DOOR INNER PANEL WATER DEFLECTOR" and reinstall previously removed parts.

5. For lubrication information see "LUBRICATION SECTION."

Adjustments

In or out or up and down adjustments are provided at door hinge pillar. Fore and aft adjustments are provided at front body hinge pillar.

NOTE: After performing any door adjustments on 39-47-67 styles, the front door ventilator and window should be checked for proper alignment with the side roof rail weatherstrip and adjusted as required. In addition, the door lock to striker engagement should be checked and adjusted if necessary.

1. For in and out or up and down adjustments, loosen hinge to door pillar attaching bolts (fig. 24). Adjust door as required and tighten bolts.

   NOTE: When performing in and out adjustments, adjust one hinge at a time so as not to disturb up and down adjustment.

2. To adjust door fore or aft, loosen hinge to body pillar attaching bolts (fig. 24). Adjust door as required and tighten bolts.

   NOTE: One or more of the attaching bolts are not accessible due to inadequate wrench clearance. When fore and aft adjustments are performed, therefore, the recommended procedure is to remove the obstructing attaching bolt and perform adjustments with the remaining three bolts. After satisfactory adjustments have been made, replace the previously removed bolt. The removal of the obstructing bolt and subsequent adjustments can best be accomplished with a racheting box end wrench.

Front Door Lock Strikers

Removal and Installation

1. With a pencil, mark position of striker on body pillar.

2. Remove three door lock striker attaching screws and remove striker and adjusting plates from pillar.

3. To install, seal all striker plate attaching screw clearance holes with body caulking compound.

4. Apply a 1/8" bead of body caulking compound around entire back surface of striker plate. No skips must exist in caulking compound. Place striker and adjusting plates within marks on pillar and install striker plate attaching screws.

   IMPORTANT: Whenever a door has been removed and installed, or realigned, the door SHOULD NOT be closed completely until a visual check is made to determine if lock extension will engage in striker notch. Where required, door lock striker service spacers should be installed so that door can be closed and an accurate check made to determine spacer requirements.

5. Clean off all excess caulking compound.

Adjustments

To adjust striker up or down or in or out, loosen striker plate attaching screws and shift striker and adjusting plates as required, then tighten screws.

Dimensional Specifications for Use of Door Lock Striker Service Spacers

1. Door should be properly aligned before checking door spacer requirements.

2. To determine if door lock striker emergency spacers are required, apply modeling clay or body caulking compound in door lock striker notch where lock extension engages and then close door to form a measurable impression in clay or caulking compound (fig. 25).

Fig. 25—Striker Engagement Check

When dimension "A" from rear face of striker teeth to rear edge of depression in clay is less than $^{11}/_{32}$", install service spacers and proper length striker attaching screws as indicated.

Dimension "A"	No. of Spacers Required	Spacer Thickness	Striker Attaching Screws*
$^{11}/_{32}$" to $^{9}/_{32}$"	1	$^{1}/_{16}$"	Original
$^{9}/_{32}$" to $^{7}/_{32}$"	1	$^{1}/_{8}$"	($^{1}/_{8}$" longer)
$^{7}/_{32}$" to $^{5}/_{32}$"	1-($^{1}/_{16}$" Spacer) 1-($^{1}/_{8}$" Spacer)	$^{3}/_{16}$"	($^{1}/_{8}$" longer)
$^{5}/_{32}$" to $^{3}/_{32}$"	2-($^{1}/_{8}$" Spacer)	$^{1}/_{4}$"	($^{1}/_{4}$" longer)

*Zinc or cadmium-plated flat-head cross recess screw with countersunk washer.

NOTE: Dimension "B" in the illustration should never be less than $^{1}/_{8}$".

Front Door Lock Cylinder Assembly

Removal and Installation

1. Raise door window. Remove door trim assembly and detach inner panel water deflector sufficiently to expose large access hole.
2. Through access hole, with a screwdriver or other suitable tool, disengage door lock cylinder to lock connecting rod from door lock (See "DOOR LOCK SPRING CLIP").
3. On all except "39" models, with a suitable flat-bladed tool, slide lock cylinder retaining clip forward from door lock pillar facing sufficiently to permit removal of lock cylinder with attached connecting rod from door. On "39" models, disengage spring clip from inside of door.

NOTE: Door lock cylinder connecting rod may be removed from lock cylinder as a bench operation or prior to removing cylinder.

4. To install, reverse removal procedure. Check operation of lock cylinder and lock prior to installing inner panel water deflector.

Disassembly and Assembly

1. Remove lock cylinder assembly from door.
2. Remove pawl retaining clip, pawl and lock cylinder retaining clip (fig. 26).
3. To assemble, reverse disassembly procedure.

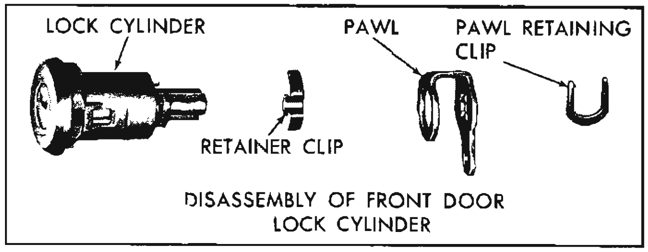


Fig. 26—Disassembly of Front Door Lock Cylinder

NOTE: The lock cylinder housing scalp used in production is usually damaged when removed and must be replaced by a new scalp which is available as a service part. The service lock cylinder housing scalp is secured by tabs.

Front Door Inner Panel Cam Assembly

Removal and Installation

1. Raise door window. Remove door trim assembly and detach inner panel water deflector.
2. Remove bolts securing door inner panel cam assembly and disengage cam from regulator balance arm and remove cam from door (fig. 27).
3. To install, reverse removal procedure. Prior to installation, lubricate entire length of cam with 630 AAW Lubriplate or equivalent.

Adjustments

To correct a condition where the glass is cocked in the glass run channels, loosen inner panel cam attaching screws, adjust either end of cam up or down as required and tighten screws.

Front Door Lock Assembly

All the locks are the rotary bolt type lock with the safety interlock feature. With the safety interlock fea-

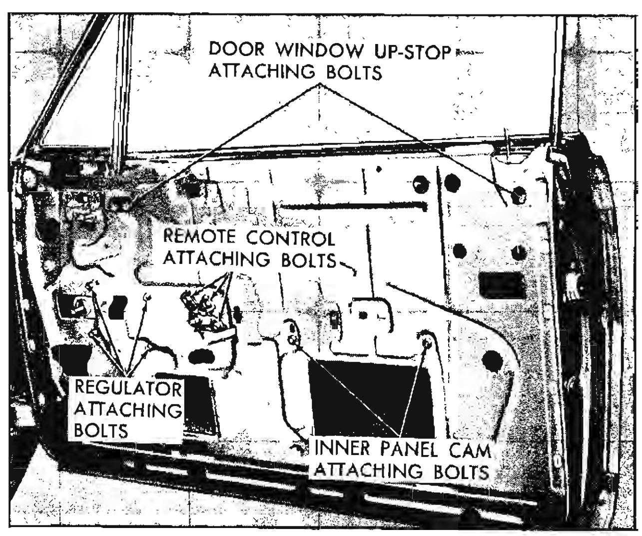


Fig. 27—Front Door Hardware—Hardtop Styles

ture it is important that the lock extension and housing engages properly in the door lock striker and that, where necessary, striker emergency spacers of the proper thickness are used to obtain proper engagement.

Removal and Installation

1. Raise door window. Remove door trim assembly and detach inner panel water deflector.
2. Through access hole, disengage spring clips securing lock cylinder rod, remote control connecting rod and inside locking rod to lock and disengage rods from lock (See "DOOR LOCK SPRING CLIPS").
3. On 39-47-67 styles, remove door window rear glass run channel lower attaching screw and loosen upper attaching screws on lock pillar facing of door and at top of door inner panel to permit removal of lock.
4. On 11-19-35-45-69 styles, from inside of door, remove rear glass run channel lower attaching nut or screw and pull channel forward to permit removal of lock.
5. Remove door lock attaching screws from lock pillar facing of door and remove lock assembly from door (fig. 28).
6. To install, reverse removal procedure. Prior to installation, apply a ribbon of medium-bodied sealer (approximately 1/4" in diameter) across face of lock frame. Check unit for proper operation and, if necessary, adjust glass run channel for proper alignment prior to installation of inner panel water deflector.

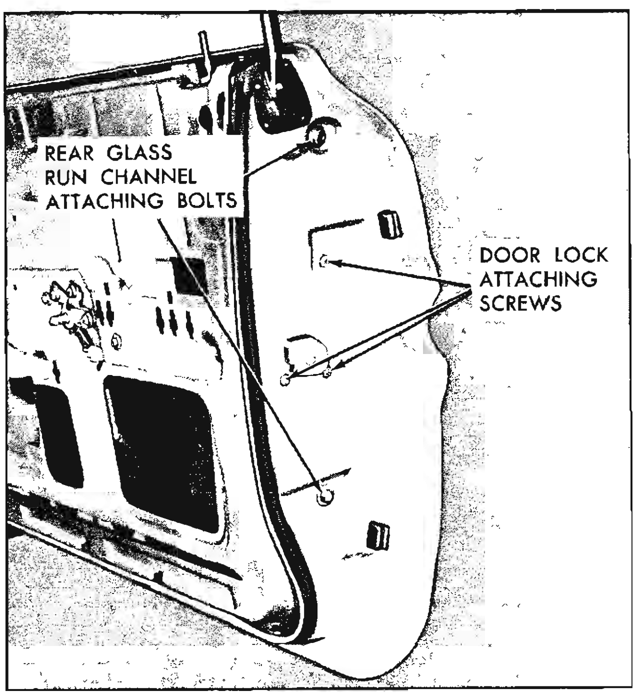


Fig. 28—Front Door Lock Pillar

Front Door Remote Control Assembly and Connecting Rod

Removal and Installation

1. Raise door window. Remove door trim assembly and detach inner panel water deflector.
2. Remove remote control attaching screws and disengage remote control from connecting rod (fig. 27).
3. To remove remote control connecting rod, carefully disengage spring clip securing rod to lock and remove rod from lock. Disengage rod from spring clip on door inner panel where necessary, and remove rod.
4. To install, reverse removal procedure. Check door lock and remote control assemblies for proper operation prior to installing inner panel water deflector.

Front Door Wedge Plates

Door wedge plates are used as a positive "hold" of front doors with doors in the closed position. Wedge plates are retained by two screws and are installed at the top section of the door and body lock pillars. The body wedge plate is constructed of metal and the door wedge plate is constructed of nylon. If necessary shims can be installed under the door wedge plate. These shims are available as a service part.

Removal and Installation

1. Remove two screws securing wedge plate to body panel and remove wedge plate (See Figure 29).
2. To install, reverse removal procedure.

Front Door Ventilator Regulator—Manual and Electric

Removal and Installation

1. Raise door window. Remove door trim assembly and detach inner panel water deflector sufficiently to gain access to regulator attaching bolts.
2. On styles equipped with electric ventilator regulators, disconnect regulator motor wires at connector.
3. Remove ventilator tee shaft attaching bolt and ventilator regulator attaching bolts (fig. 30).
4. Disengage ventilator regulator shaft from ventilator tee shaft and remove regulator and motor assembly from door through access hole.
5. To install, reverse removal procedure. Check operation of ventilator assembly prior to installing inner panel water deflector.

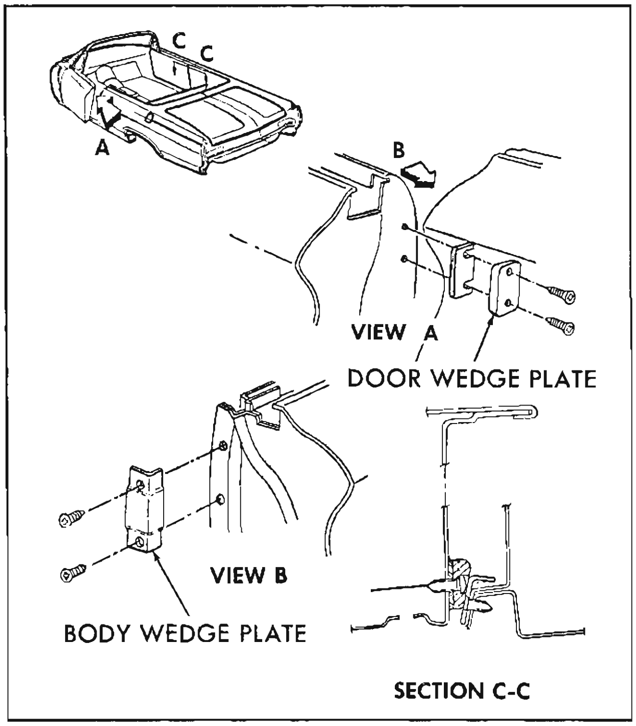


Fig. 29—Body Wedge Plates

Front Door Ventilator Regulator Adjustments

Excessive "play" (flutter) of ventilator at pivot shaft, when ventilator is in an open position, can be corrected by tightening ventilator "T" shaft to regulator attaching bolt (fig. 30).

NOTE: Bolt should be tightened carefully to avoid stripping threads in regulator spiral gear shaft.

Front Door Ventilator Assembly— Manual and Electric

39-47-67 Styles

Removal and Installation

1. Remove door trim assembly and detach inner panel water deflector.
2. Lower door window. Remove ventilator to door outer panel return flange attaching screw (fig. 30).
3. At front of ventilator assembly, break cement bond securing front door hinge pillar sealing strip (at belt) to ventilator assembly.
4. Remove ventilator division channel lower adjusting stud and nut (fig. 30).
5. On styles equipped with electrically operated ventilator assemblies, disconnect motor and regulator assembly from ventilator frame and remove motor and regulator unit through large access hole in door inner panel.

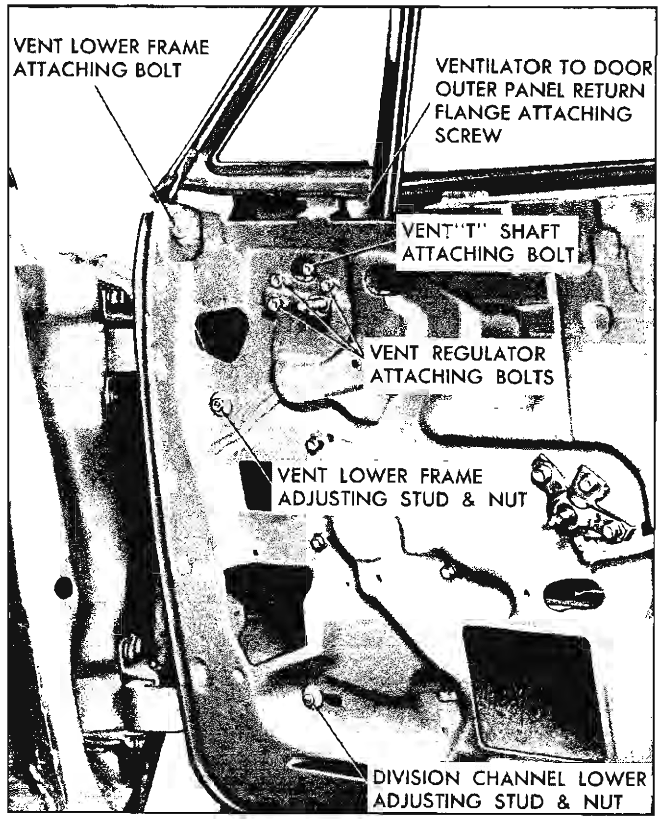


Fig. 30—Front Door Ventilator Assembly Adjustments

6. Remove ventilator lower frame attaching bolt and ventilator lower frame adjusting stud nut (fig. 30).
7. Remove ventilator regulator.
8. Lift ventilator assembly upward and remove from door.
9. To install, reverse removal procedure. Prior to installation of ventilator assembly, apply a bead of body caulking compound to door outer panel return flange along area contacted by ventilator assembly. Adjust ventilator assembly as described under "FRONT DOOR VENTILATOR ADJUSTMENTS."

Front Door Ventilator Adjustments

39-47-67 Styles

The front door ventilator assembly can be adjusted up or down and in or out at the top and forward section for alignment in the door opening and proper weatherstrip contact in the ventilator area. The lower portion of the ventilator division channel can be adjusted in or out and fore and aft for alignment with the door window glass.

To adjust the ventilator assembly, proceed as follows:

1. Remove door trim assembly and detach inner panel water deflector.

2. Remove ventilator frame to outer panel attaching screw.
3. Loosen ventilator lower frame attaching bolt.
4. Loosen ventilator division channel lower adjusting stud nut and ventilator lower frame adjusting stud nut.
5. a. To adjust ventilator assembly fore or aft to windshield pillar side roof rail weatherstrip, position lower frame adjusting stud and nut and division channel stud and nut as required and tighten attaching nuts.
   b. To adjust ventilator assembly in or out, turn adjusting studs on either the lower frame, division channel or both, as required, and tighten nuts.
   c. After the necessary adjustments have been performed, tighten all nuts and bolts and replace ventilator to door outer panel attaching screw.

   NOTE: In some cases it may be necessary to relocate ventilator to door outer panel return flange attaching screw.
6. Seal water deflector to door inner panel and install door trim and inside hardware.

Front Door Ventilator Assembly
11-35-45-69 Styles

Removal and Installation

1. Remove door trim assembly and detach inner panel water deflector.
2. Remove ventilator regulator assembly.
3. Lower door window. Remove ventilator to door outer panel return flange attaching screw.
4. Remove ventilator division channel lower adjusting stud and nut.
5. Remove ventilator upper attaching screws along window frame (fig. 31).
6. Lower ventilator assembly sufficiently to tilt assembly inward; then lift ventilator assembly upward and remove from door.
7. To install, reverse removal procedure.

Adjustments

To adjust ventilator division channel in or out or fore or aft, remove door trim assembly and detach inner panel water deflector sufficiently to loosen division channel lower adjusting stud nut. Adjust stud in or out as required or position channel fore or aft as required; then tighten stud nut.

Front Door Ventilator Assembly Weatherstrip

Removal and Installation

1. Remove front door ventilator assembly.
2. Remove ventilator glass and sash channel from ventilator frame by opening glass approximately 90° and pushing glass downward slightly to disengage glass unit from ventilator frame at upper pivot point and then upward to disengage lower tee shaft from frame (See Figure 32).
3. Remove ventilator division channel upper rubber bumper attaching screw.
4. Remove two attaching screws securing ventilator casting to frame and separate ventilator casting from frame so that the ventilator weatherstrip can be removed (See Figure 32).

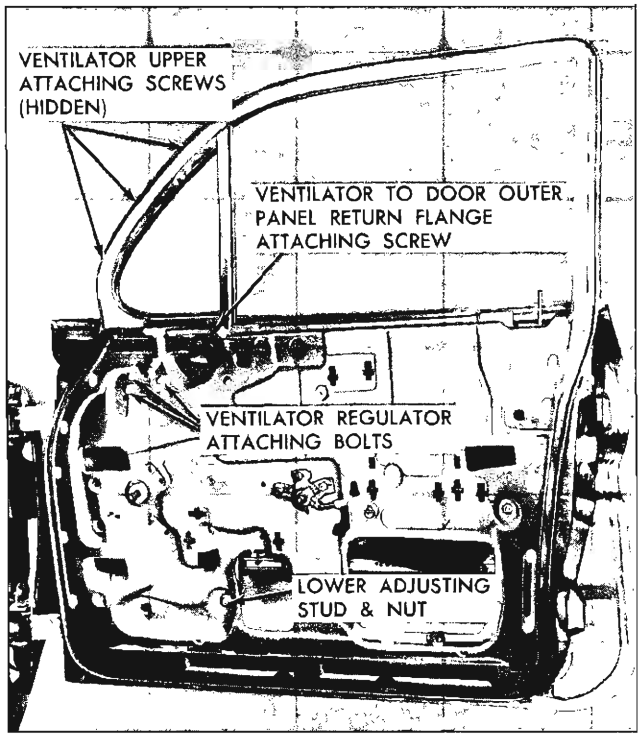


Fig. 31—Front Door Ventilator Assembly Attachments

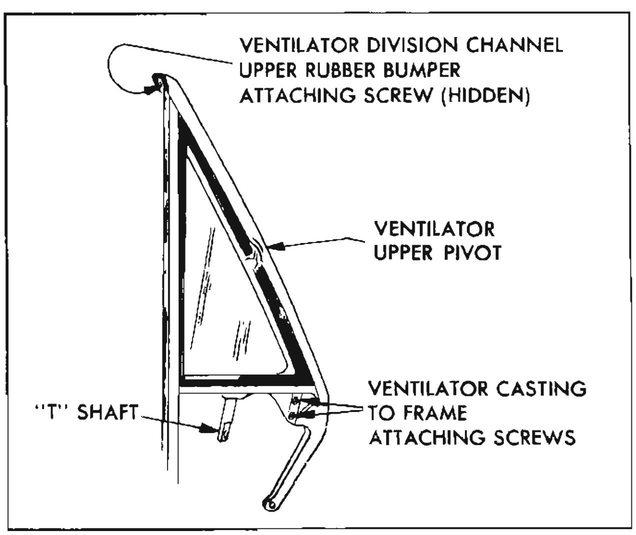


Fig. 32—Disassembly of Front Door Ventilator

5. To install, reverse removal procedure. Prior to installation, however, a ribbon of medium bodied sealer should be applied between ventilator weatherstrip and casting.

Front Door Window Assembly— Manual and Electric

39-47-67 Styles

Removal and Installation

1. Raise door window. Remove door trim assembly and detach inner panel water deflector.
2. Through holes in inner panel, remove screw securing window assembly front and rear stops to lower window sash channel. Then lower window slightly and remove stops (fig. 27).
3. Lower door window to expose window lower sash channel cam attaching screws. Then on styles equipped with electric window regulators, disconnect wiring harness feed wire from regulator motor at connector.

NOTE: It may be necessary to loosen the ventilator frame and tilt it forward to facilitate removal of door window.

4. Remove window lower sash channel cam attaching screws and disengage cam from window sash channel. Then lift window assembly upward and remove from door.

CAUTION: DO NOT OPERATE REGULATOR MOTOR after window assembly is disengaged from regulator. Operation of motor with load removed may damage unit.

5. To install, reverse removal procedure. Before installing window lower sash channel cam, lubricate entire length of cam with 630 AAW Lubriplate or equivalent. Check window for proper operation prior to installing inner panel water deflector and door trim pad.

Front Door Window Adjustments

39-47-67 Styles

Adjustments

The door window glass may be adjusted to provide proper contact with the side roof rail weatherstrip. Adjustments have also been provided to relieve a binding door glass due to misalignment of the glass run channels. To perform the following adjustments, remove door trim assembly and detach inner panel water deflector, where necessary, to gain access to hardware attaching points; then proceed as follows:

1. To correct a condition where glass is "cocked" in glass run channels, loosen inner panel cam attaching screws, adjust cam up or down as required and retighten screws (fig. 27).
2. To adjust upper front portion of window assembly in or out for proper contact with side roof rail weatherstrip, adjust ventilator assembly in or out as described under "FRONT DOOR VENTILATOR ADJUSTMENTS."
3. To adjust lower portion of ventilator division channel for alignment with window assembly, lower door window and loosen ventilator division channel adjusting stud nut. Turn adjusting stud in or out or position lower end of channel fore or aft, as required; then, retighten adjusting stud nut (fig. 30).
4. To adjust upper rear of window assembly in or out for proper contact with side roof rail weatherstrip, or to adjust rear of window assembly in or out at belt line, loosen rear glass run channel attaching screws at lock pillar facing of door and screw at top of door inner panel. Position channel in or out as required and tighten screws (fig. 28).

NOTE: Adjustments 2, 3 and 4 must be coordinated to provide a properly operating front door window.

5. To adjust limit of "up" travel of window assembly for proper contact with side roof rail weatherstrip, raise door window and through inner panel access holes loosen door window front and rear stop assembly attaching bolts. Adjust stops up or down as required, then tighten attaching bolts (fig. 27).

Front Door Window Assembly— Manual and Electric

11-35-45-69 Styles

Removal and Installation

1. Lower door window. Remove door trim assembly and detach inner panel water deflector.
2. Remove door ventilator assembly as previously described under "FRONT DOOR VENTILATOR —REMOVAL AND INSTALLATION."
3. On styles equipped with electric window regulators, disconnect wiring harness feed wires from regulator motor at connector.

CAUTION: DO NOT OPERATE REGULATOR MOTOR after window assembly is disengaged from regulator. Operation of motor with load removed may damage unit.

4. Remove screws securing window lower sash channel cam to window assembly and carefully disengage cam from window lower sash channel.
5. Rotate rear edge of window assembly upward and remove window assembly from between inner and outer panels.
6. To install, reverse removal procedure. Check window for proper operation before installing inner

panel water deflector. Prior to installation, lubricate entire length of lower sash channel cam with 630 AAW Lubriplate or equivalent.

Front Door Window Adjustments

11-35-45-69 Styles

Adjustments

1. To correct a condition where glass is "cocked" in glass run channels, loosen inner panel cam attaching screws, adjust cam up or down as required and tighten screws (fig. 31).
2. To adjust lower portion of ventilator division channel for proper alignment with door window assembly, lower door window and loosen ventilator adjusting stud nut. Turn adjusting stud in or out or position lower end of channel fore or aft as required; then tighten adjusting stud nut (fig. 31).
3. To adjust lower portion of window glass run channel in or out for proper alignment with door window, raise door window. From inside door, loosen glass run channel lower attaching nut or screw, adjust channel as required and tighten nut or screw (fig. 31).

Front Door Window Regulator Assembly

39-47-67 Styles

Manual and Electric

Removal and Installation:

1. Remove door trim assembly and detach inner panel water deflector.
2. Remove ventilator division channel lower adjusting stud and nut (fig. 30).
3. On styles equipped with manual window regulators, lower window. Remove window lower sash channel cam attaching screws and disengage sash channel cam from window lower sash channel; then raise window and prop in full up position. Disengage sash channel cam from window regulator arm rollers.
4. On styles equipped with electric window regulators, remove door ventilator assembly and front door window.
5. On styles equipped with electric window regulators, disconnect wire harness feed wires from regulator motor at connector.

CAUTION: DO NOT OPERATE REGULATOR MOTOR after window assembly is disengaged from regulator. Operation of motor with load removed may damage unit.

6. Remove window regulator attaching bolts. Disengage regulator balance arm roller from inner panel cam and carefully remove regular assembly from door (fig. 27).

NOTE: On some models only one end of inner panel cam is open sufficiently to permit removal of regulator arm roller.

7. To install, reverse removal procedure. Check window for proper operation prior to installing inner panel water deflector and door trim pad.

Front Door Window Regulator Assembly

11-35-45-69 Styles

Manual and Electric

Removal and Installation

1. Remove door trim pad and detach inner panel water deflector.
2. Remove ventilator division channel lower adjusting stud and nut (fig. 31).
3. On styles equipped with electric window regulators, disconnect wire harness feed wires from regulator motor at connector.

CAUTION: Do not operate regulator motor with load removed.

4. Remove door window lower sash channel cam (fig. 31).
5. Roll window to a full up position and place a 2" or 2½" piece of body tape over door upper frame and top of door glass on both sides of glass. This is necessary to positively hold the door window in a full up position.
6. Remove inner panel cam and window regulator attaching bolts and carefully remove regulator assembly from door (fig. 31).
7. To install, reverse removal procedure. Check window for proper operation prior to installing inner panel water deflector and door trim pad.

Front Door Window Regulator Electric Motor Assembly

All Styles with Power-Operated Window Assemblies

The electric motor assembly which powers the window regulator on electrically operated windows, is a twelve volt, reversible direction motor with a built-in circuit breaker and a self-locking gear drive. The motor is secured to the regulator assembly by screws.

Removal and Installation

1. Remove front door electric window regulator assembly from door as previously described and clamp it in a vise (fig. 33).

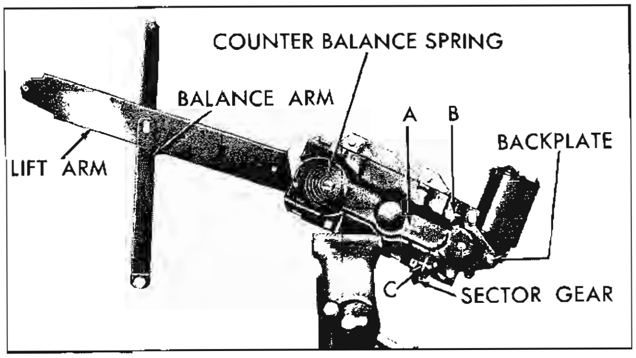


Fig. 33—Door Window Regulator and Motor Assembly

NOTE: The position of regulator assembly in vise will vary with type of regulator and position of lift arm.

2. Drill a 1/4" hole through back plate and sector at location indicated at either A, B, or C, depending on position of lift arm.

   NOTE: Do not drill into motor housing, part of which is indicated by dotted line. In addition, locate hole a sufficient distance from edge of sector to insure proper retention of the sector.

3. Insert 3/16" bolt through hole in back plate and sector and install nut to bolt. Do not tighten nut.

   CAUTION: BE SURE TO PERFORM STEPS #2 and #3 BEFORE ATTEMPTING TO REMOVE MOTOR FROM REGULATOR. The regulator lift arm, which is under tension from the counter-balance spring, can cause serious injury if motor assembly is removed without locking the sector in position with a nut and bolt.

4. Remove motor attaching bolts and remove motor assembly from regulator (fig. 33).

   NOTE: Clean off steel chips from regulator sector and motor pinion gear.

5. To install, reverse removal procedure. If difficulty is encountered when trying to line up motor attaching holes, the regulator lift arm may be moved up or down manually so that motor pinion gear will mesh with teeth on regulator sector and regulator attaching holes will line up.

   NOTE: Be sure to remove temporary nut and bolt from regulator before installing it in door.

Front Door Window Glass Run Channel Assembly 11-35-45-69 Styles

Removal and Installation

1. Lower door window. Remove door trim assembly and detach inner panel water deflector.
2. Remove front door ventilator assembly and slide window forward slightly to expose lock pillar portion of glass run channel.

   NOTE: Exercise care so that exposed front edge of glass does not come in contact with body metal.

3. Through inner panel access hole loosen nut or screw securing lower end of glass run channel (fig. 31).
4. Squeeze glass run channel together along upper and lock pillar sections of window frame and pull or carefully pry channel assembly from window frame. Remove channel assembly from door.
5. To install, reverse removal procedure.

REAR DOORS

Rear Door Weatherstrips

39 Styles

The rear door weatherstrip is a one-piece mechanical retained type. Mechanical retention consists of a series of weatherstrip attaching clips which fit into individual sealing plugs along door bottom and sides. The weatherstrip is also mechanically retained by nylon snap fasteners at belt line of hinge and lock pillar panels. In addition, "39" style rear door weatherstrips are further retained by a single weatherstrip attaching clip and screw at upper radius of lock pillar panel. Cement usage is limited to door lock pillar panels (at belt line) and at forward lower corners of door. Cement, however, can be applied at any point where additional retention of weatherstrip is needed.

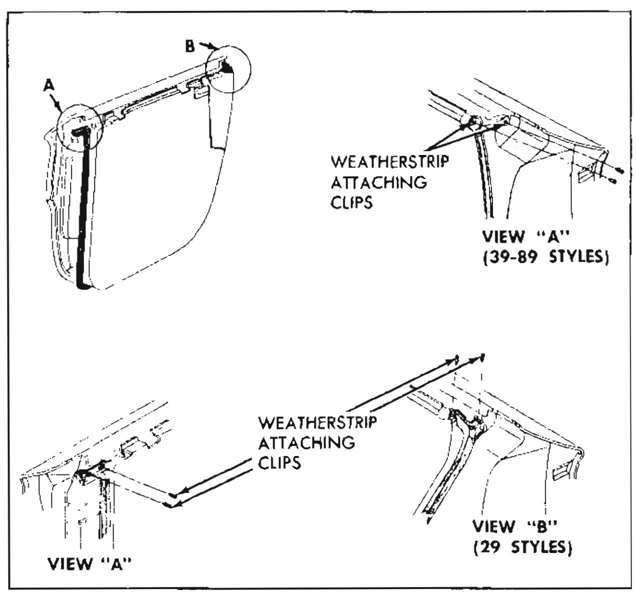


Fig. 34—Rear Door Weatherstrip Attaching Clips

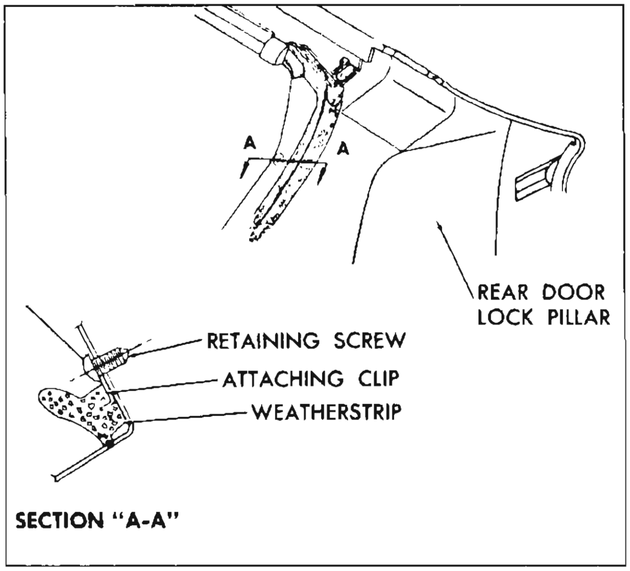


Fig. 35—Rear Door Weatherstrip Attaching Clip Screw

Removal

1. Remove snap fasteners securing ends of weatherstrip at belt line of door hinge and lock pillar panels (fig. 34).
2. On "39" style rear doors, remove the single weatherstrip attaching clip screw located at upper radius of lock pillar (fig. 35).
3. Carefully break cement bond securing weatherstrip to door. A flat-bladed tool, such as a putty knife, will prove helpful in breaking cement bond (fig. 36).

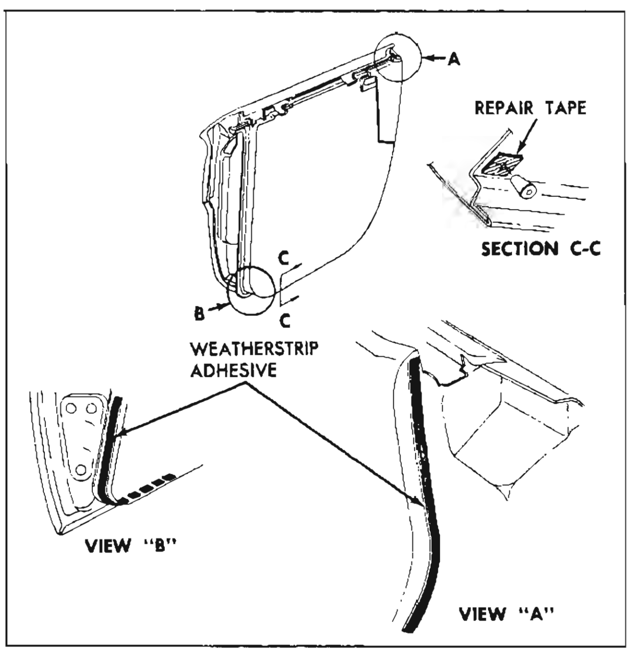


Fig. 36—Rear Door Weatherstrip Adhesive Application

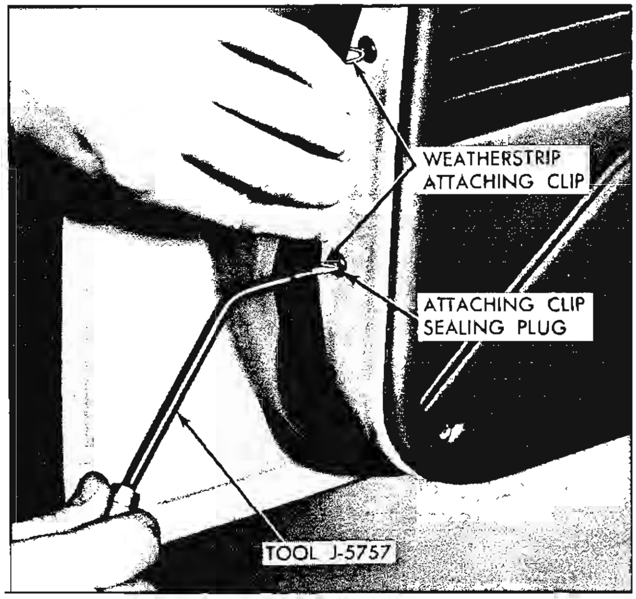


Fig. 37—Usage of Tool J-5757

4. Insert tip of tool J-5757, or any other suitable tool, at retaining clip locations and carefully snap clips from sealing plugs (fig. 37).

Installation

1. Check weatherstrip attaching clips for proper contour and reform, if necessary, using clip reforming tool J-5984 (fig. 38).
2. Inspect all attaching clip sealing plugs. Any missing plugs should be replaced. A plug which is loose and will not remain engaged in the door

Fig. 38—Reforming Weatherstrip Clips

panel piercing can be corrected by installing a ½" by 1" piece of cloth-backed waterproof tape over piercing and making an "X" pattern slit in tape to accommodate sealing plug. If, after this operation, the plug is still loose; install a second piece of tape over the existing repair. This procedure can also be used to repair any waterleaks that develop at sealing plug locations. A damaged sealing plug must be replaced (see Section "D-D" in Figure 36).

3. Clean off old cement from door to insure a clean cementing surface. Apply a bead of an approved weatherstrip adhesive to lock pillar facing of door and at lower front corner of door (see Views "B" and "C" in Figure 36). When applying weatherstrip adhesive to lock pillar facing of door, begin application at belt line and continue down door for approximately seven to nine inches. If necessary, weatherstrip adhesive can also be applied to hinge pillar facing of door.
4. Beginning at either front or rear section of door, install snap fasteners. Install weatherstrip attaching clips into their respective sealing plugs by placing notched end of tool J-5757 into loop of wire clip and pushing clip into sealing plug (fig. 37).

NOTE: Do not distort weatherstrip attaching clips or unsatisfactory weatherstrip retention will result.

All door weatherstrips are impregnated with a silicone lubricant and additional lubrication is not required.

Rear Door Hinge Pillar Sealing Strip (At Belt)

39 Styles

Removal and Installation

1. Remove snap fasteners securing sealing strip to hinge pillar facing of rear door and remove strip (fig. 39).
2. To install, reverse removal procedure.

Rear Door Weatherstrips

35-45-69 Styles

The rear door weatherstrip is a one-piece design, cemented at belt line and retained by weatherstrip attaching clips for the remainder of the door. Around bottom of door, from belt line of hinge pillar to belt line of lock pillar, the attaching clips fit into sealing plugs.

Removal

1. Insert tip of mechanically retained weatherstrip inserting tool J-5757, or other suitable tool, at clip locations and carefully snap clips from sealing plugs (fig. 37).

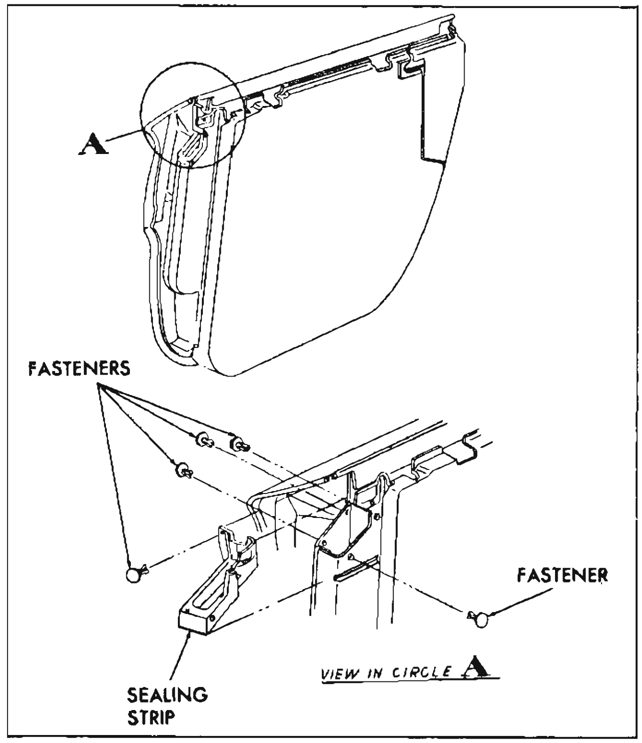


Fig. 39—Rear Door Hinge Pillar Sealing Strip

2. Some weatherstrips may be additionally secured by a two-prong clip, attached to lock and/or hinge pillar of door at belt line. This clip is attached by a single screw and must be removed prior to removal of weatherstrip. When clip is reinstalled, make sure both prongs are positioned over wire located in center of weatherstrip. Figure 40 shows clips attached to a front door weatherstrip but is typical of rear doors. This clip can be satisfactorily used to retain almost any area of a rear door weatherstrip that proves troublesome (fig. 40).
3. Carefully break cement bond securing weatherstrip to door. If necessary, a flat-bladed tool, such as a putty knife, can be used to help break cement bond (fig. 41).

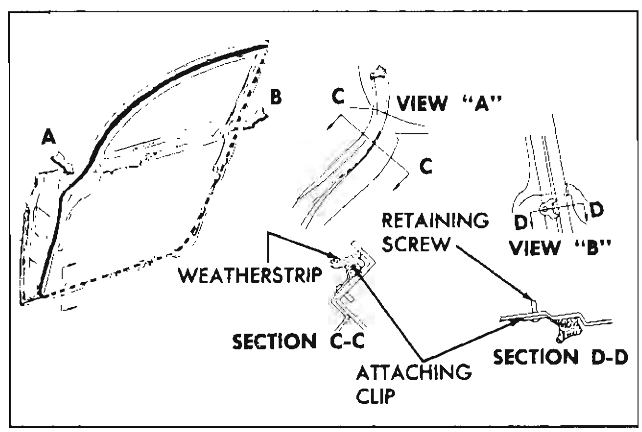


Fig. 40—Two Prong Weatherstrip Attaching Clip

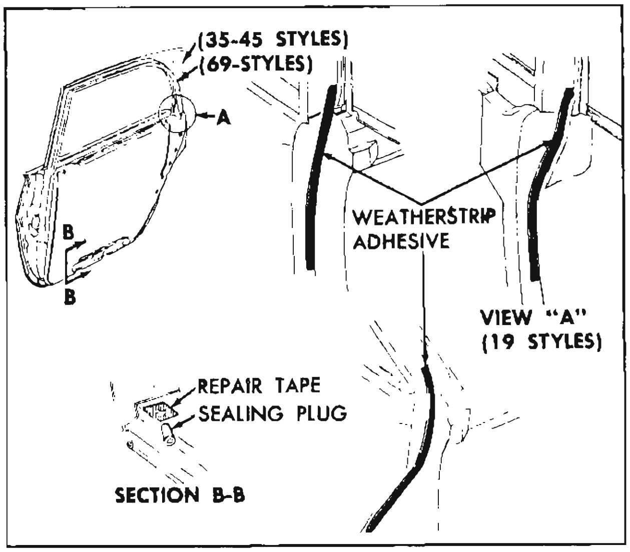


Fig. 41—Rear Door Weatherstrip Adhesive Application

4. Insert tool J-5757 at clip locations on door upper frame and carefully snap clips from piercings and remove weatherstrip from door.

Installation

1. Check all weatherstrip attaching clips for proper contour and reform, if necessary, using clip re-forming tool J-5984 (fig. 38).
2. Inspect all attaching clip sealing plugs. Any missing or damaged plug must be replaced. A plug that is loose and will not remain engaged in the door panel piercing can be corrected by installing a ½" by 1" piece of cloth-backed waterproof tape over piercing and making an "X" pattern slit in tape to accommodate sealing plug. If plug is still loose, repeat this operation by installing a second piece of tape over existing repair.
3. Clean off old cement from door to insure a clean cementing surface. Apply a bead of an approved weatherstrip adhesive to hinge and lock pillar facings of door. Begin adhesive application slightly above belt line and continue down door for approximately seven to nine inches. If necessary, weatherstrip adhesive can also be applied to lower corners of door (fig. 41).
4. Position rear door weatherstrip so that preformed section is at upper front corner of door header.
5. Install weatherstrip into door upper frame by inserting tool J-5757 into loop of wire clips and pushing clips into their respective piercings (fig. 37).
6. Press weatherstrip into place at cemented areas and, if applicable, reinstall weatherstrip two-prong attaching clip. Make sure prongs of clip are inserted over wire of weatherstrip (fig. 40).
7. Install weatherstrip into attaching clip sealing plugs by installing tool J-5757 into loop of wire clips and pushing clips into their respective plugs (fig. 37).

IMPORTANT: Do not distort weatherstrip attaching clips as unsatisfactory weatherstrip reention will result.

8. Clean off any excess weatherstrip adhesive.

NOTE: All door weatherstrips are impregnated with a silicone lubricant and additional lubrication is not required.

Rear Door Hardware

35-39-45-69 Styles

Figure 42 is typical of sedan and station wagon style rear doors with the trim pad and inner panel water deflector removed. This illustration identifies the component parts of the rear door assembly, their relationship and various attaching points.

Figure 43 is typical of a hard top sedan "39" style rear door with the trim assembly and inner panel water deflector removed. This illustration identifies the component parts of the rear door assembly, their relationship and various attaching points.

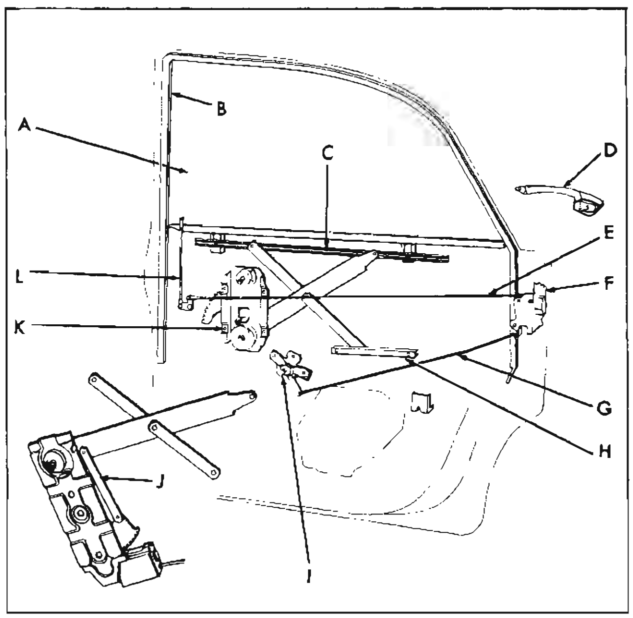


Fig. 42—Typical Closed Style Rear Door Hardware

A. Rear Door Window Assembly
B. Rear Door Window Glass Run Channel
C. Rear Door Window Lower Sash Channel Cam
D. Rear Door Outside Handle Assembly
E. Rear Door Inside Locking to Lock Rod Assembly
F. Rear Door Lock Assembly
G. Rear Door Lock Remote Control to Lock Rod Assembly
H. Rear Door Inner Panel Cam
I. Rear Door Lock Remote Control Assembly
J. Rear Door Window Electric Regulator and Motor Assembly
K. Rear Door Window Regulator Assembly
L. Rear Door Inside Locking Rod

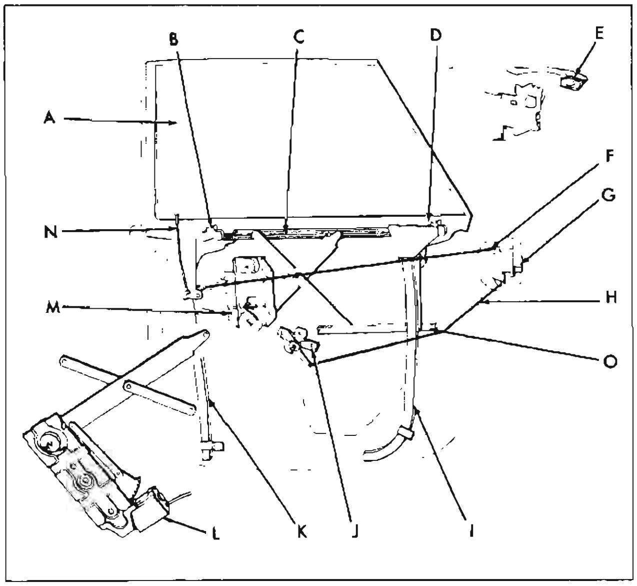


Fig. 43—Typical Hardtop Style Rear Door Hardware

A. Rear Door Window Assembly
B. Rear Door Window Front Female Wedge Plate
C. Rear Door Window Lower Sash Channel Cam
D. Rear Door Window Rear Female Wedge Plate
E. Rear Door Outside Handle Assembly
F. Rear Door Lock to Locking Lever Rod
G. Rear Door Lock Assembly
H. Rear Door Lock Remote Control to Lock Rod Assembly
I. Rear Door Window Rear Guide Cam Assembly
J. Rear Door Lock Remote Control Assembly
K. Rear Door Window Guide Front Cam Assembly
L. Rear Door Window Electric Regulator and Motor Assembly
M. Rear Door Window Regulator Assembly—Manual
N. Rear Door Inside Locking Rod
O. Rear Door Window Inner Panel Cam Assembly

Figure 44 is typical of "69" style rear doors. This illustration indicates a fully lowered door window in proper position for maximum glass stability.

Figure 45 is typical of "35" and "45" style rear doors. This illustration indicates a fully lowered door window in proper position for maximum glass stability.

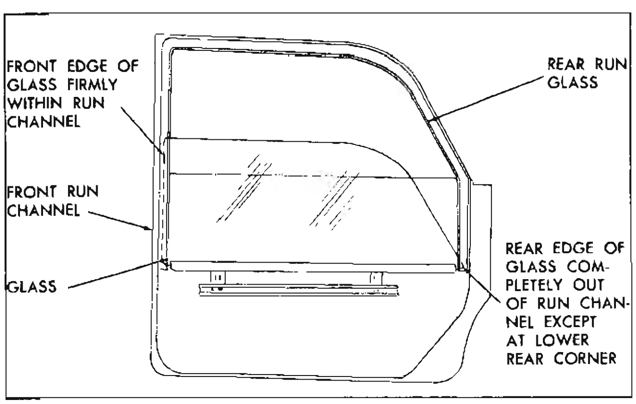


Fig. 44—Proper Lowered Window Positioning—69 Styles

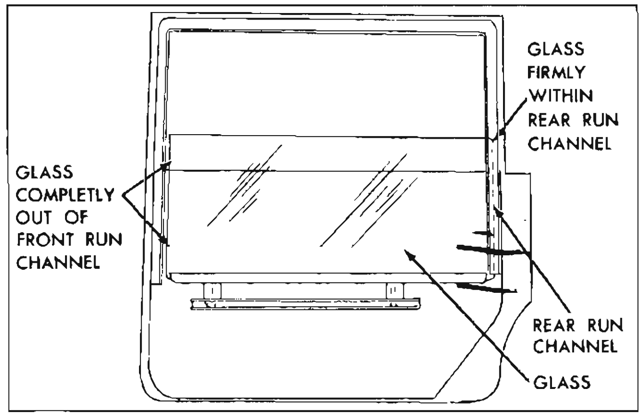


Fig. 45—Proper Lowered Window Positioning—35 and 45 Styles

Rear Door Hinges

The rear door hinges are attached to the center pillar with two butt-type hinges. The hinges are secured to the center pillar and door hinge pillar by screws and anchor plates. The lower hinge incorporates an integral door check and hold-open.

Removal

The door and hinges can be removed as an assembly from the center pillar or the door can be removed from the hinge straps.

1. On "39" styles, lower door window.
2. Clean off excess sealer around each hinge strap and mark location on door hinge pillar or center pillar, depending on method of removal being used.
3. On bodies equipped with electrically powered window regulators, proceed as follows:

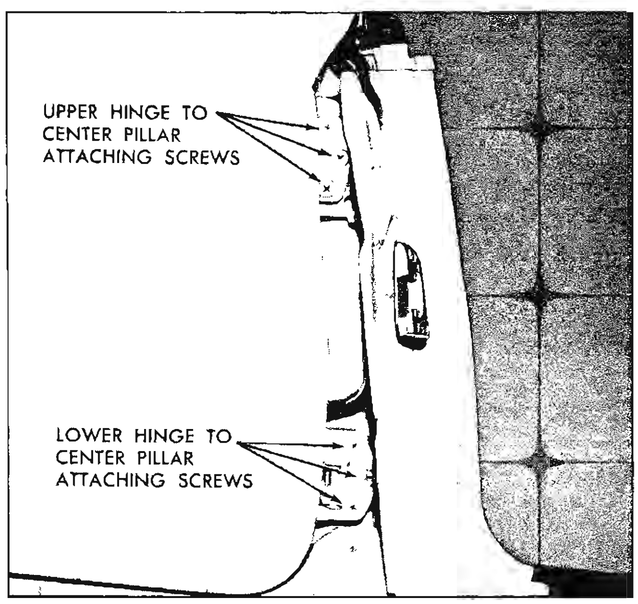


Fig. 46—Rear Door to Center Hinge Pillar Attachment

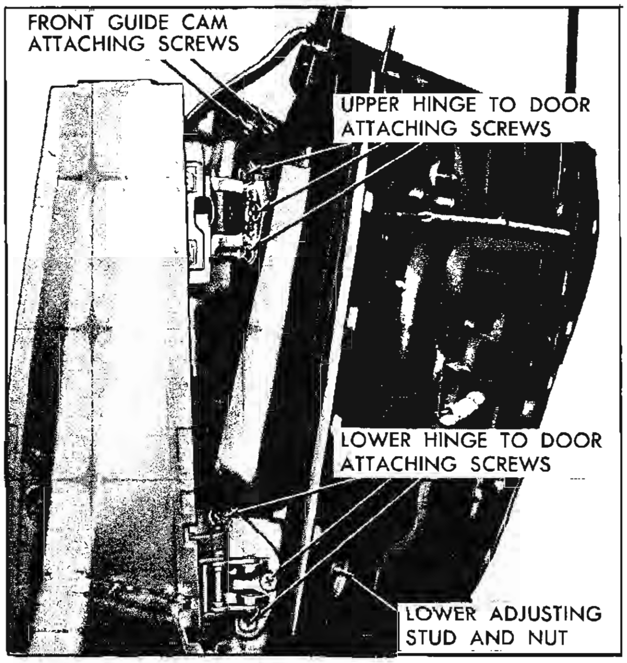


Fig. 47—Rear Door Hinge Attachments

a. Remove door trim assembly and detach inner panel water deflector sufficiently to gain access to wire connector at motor.

b. Detach wire harness from door inner panel and disconnect regulator motor from harness at connector.

c. Remove electrical conduit from door and remove harness from between door panels through opening in door hinge pillar.

4. With door properly supported, remove three upper and lower hinge attaching screws at door hinge pillar or center pillar depending on method of removal (fig. 46).

NOTE: On "39" styles, the rear door lower hinge to center pillar middle attaching bolt is also the rear door jamb switch. Be sure to disconnect wire before removing door.

5. With aid of helper, remove door from body.

Installation

1. With a scraper and mineral spirits, clean off old sealing compound at hinge attaching areas. This operation should be performed carefully to avoid the possibility of soiling adjacent trim material.
2. Apply a coat of heavy-bodied sealer to attaching surfaces of hinge straps or corresponding surfaces of door or body (fig. 48).
3. With a helper, lift door into position. Install screws loosely, align strap within scribe marks on pillar and tighten bolts. Check door for proper alignment.
4. On doors equipped with power operated windows, proceed as follows:

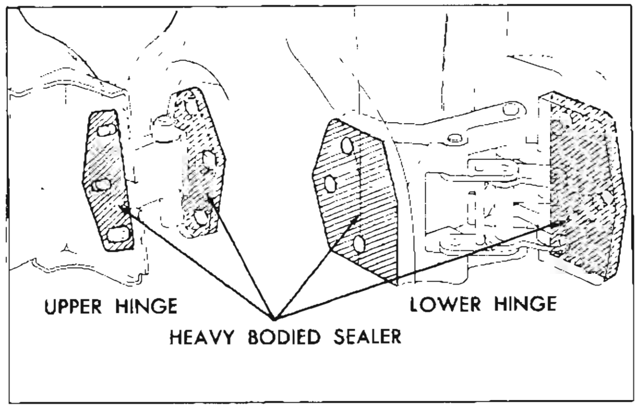


Fig. 48—Door Hinge Assemblies

a. Install wiring harness inside of door. Connect regulator motor and install wiring harness to inner panel.

b. Install conduit to door hinge pillar. Check operation of electric window assembly.

5. Where required, seal door inner panel water deflector as specified in "DOOR INNER PANEL DEFLECTOR" and reinstall all previously removed parts.
6. For lubrication information see "LUBRICATION" section.

Adjustments

In or out or up and down adjustments are provided at door hinge pillar. Fore and aft and a slight up and down adjustment are provided at center pillar. When checking the door for alignment, remove door lock striker from body pillar to allow door to hang free on its hinges.

NOTE: After performing any adjustments, the rear door window on "39" styles should be checked for proper alignment with the side roof rail weatherstrip. In addition, door lock extension to striker engagement should be examined and adjusted if necessary.

1. For in and out or up and down adjustment, loosen hinge to door pillar attaching screws, adjust door as required and tighten screws (fig. 47).

NOTE: When performing in and out or fore and aft adjustments, adjust one hinge at a time so that "up and down" adjustment is maintained.

2. To adjust door fore or aft, loosen hinge to center pillar attaching screws, adjust door fore or aft as required and tighten screws (fig. 46).

CAUTION: The rear door upper hinge on 35-45-69 styles is constructed of die cast aluminum which will break under strain of bending in an attempt to short-cut adjustments. Use only the recommended procedures for adjusting rear doors.

Rear Door Lock Assembly—All Styles

Locks are the rotary bolt type with the safety interlock feature. With the safety interlock feature, it is very important that the lock extension engages properly in the door lock striker notch and that, where necessary, striker emergency spacers of the proper thickness can be used to obtain proper engagement.

Removal and Installation

1. Raise door window. Remove door trim assembly and detach inner panel water deflector.
2. On "35," "45" and "69" styles, through large access hole, remove screw securing lower end of glass run channel at door lock pillar and raise end of channel to expose lock assembly (fig. 49).
3. Through access hole, disengage spring clips and detach inside lock connecting rod and remote control connecting rod from lock assembly (see "DOOR LOCK SPRING CLIPS").
4. At lock pillar facing, remove door lock attaching screws and remove lock assembly through access hole.
5. To install door lock, reverse removal procedure. Check all operations of door lock before installing door trim and inside hardware.

Rear Door Lock Strikers

Removal and Installation

1. With a pencil, mark position of striker on body pillar.
2. Remove three door lock striker attaching screws and remove striker and adjusting plates from pillar.
3. To install, seal all striker plate attaching screw clearance holes with body caulking compound.

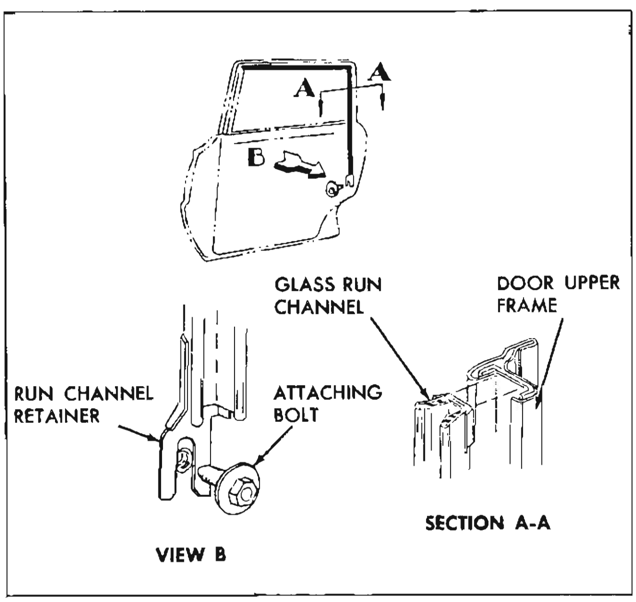


Fig. 49—Rear Door Window Glass Run Channel

4. Apply a 1/8" bead of body caulking compound around entire back surface of striker plate; skips must not exist in caulking compound. Place striker and adjusting plates within marks on pillar and install striker plate attaching screws.

   NOTE: Whenever a door has been removed and installed or realigned, the door should not be closed completely until a visual check is made to determine if lock extension will engage in striker notch. Where required, door lock striker service spacers should be installed so that door can be closed and an accurate check made to determine proper spacer requirements.

5. Clean off all excessive body caulking compound.

Adjustments

To adjust striker up or down or in or out, loosen striker plate attaching screws and shift striker and adjusting plates as required and tighten screws.

Dimensional Specifications For Use of Door Lock Striker Service Spacers

The door lock striker spacer information previously provided under the "FRONT DOORS" heading applies as well to the rear doors.

Rear Door Inner Panel Cam

The inner panel cam is attached to the door inner panel by two 7/16" attaching bolts and is designed as a guide for the door window regulator balance arm.

Removal and Installation

1. Raise door window, remove door trim pad and detach inner panel water deflector sufficiently to expose inner panel cam attaching bolts (fig. 50).
2. Remove inner panel cam attaching bolts and disengage cam from window regulator balance arm roller and remove cam from door.

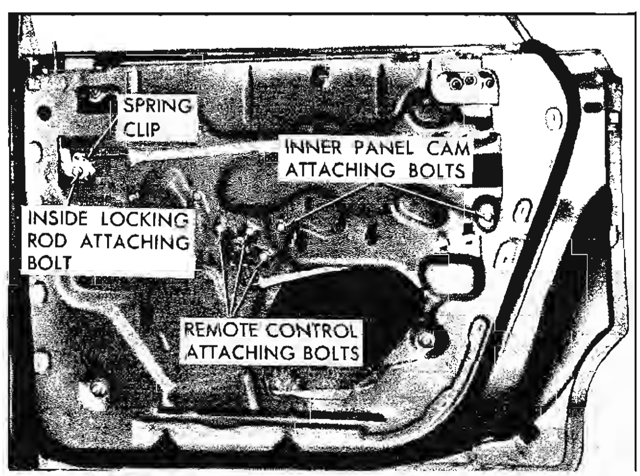


Fig. 50—Rear Door Hardware

3. To install, reverse removal procedure. Prior to installation of inner panel cam, lubricate entire length of cam with 630 AAW Lubricate or equivalent.

NOTE: The forward end of the inner panel cam is adjustable up or down. This adjustment can be used to help correct a rotated or cocked door window.

Rear Door Lock To Locking Lever Rod

Removal and Installation

1. Raise door window, remove door trim pad and detach inner panel water deflector sufficiently to expose locking rod assembly.
2. Remove inside locking rod knob from rod.
3. On 35-45-69 styles, remove screw securing lower end of glass run channel at door hinge pillar to gain access to spring clip securing rod to lock (fig. 49).
4. Disengage spring clip securing inside locking rod assembly to door lock and disengage rod from lock.
5. Disengage rod from spring clip on door inner panel. Remove inside locking rod attaching bolt and remove assembly from door (fig. 50).
6. To install, reverse removal procedure. Check operation of inside locking rod assembly before installing water deflector and door trim pad.

Rear Door Remote Control Assembly and Connecting Rod

Removal and Installation

1. Raise door window. Remove door trim assembly and detach inner panel water deflector sufficiently to gain access to remote control attaching bolts.
2. Remove remote control attaching bolts and remove control from connecting rod (fig. 50).
3. On 35-45-69 styles, remove glass run channel lower attaching screw to gain access to spring clip securing rod to lock (fig. 49).
4. Disengage remote control connecting rod from lock and remove rod from door.
5. To install remote control and connecting rod, reverse removal procedure. Position remote control rearward sufficiently to take up slack in linkage so that all clearances are taken out of linkage in a rearward position. Check all operations of door lock before installing door inner panel water deflector and trim pad.

Rear Door Window Lower Sash Channel Cam

Removal and Installation

1. Remove door trim pad and detach inner panel water deflector.

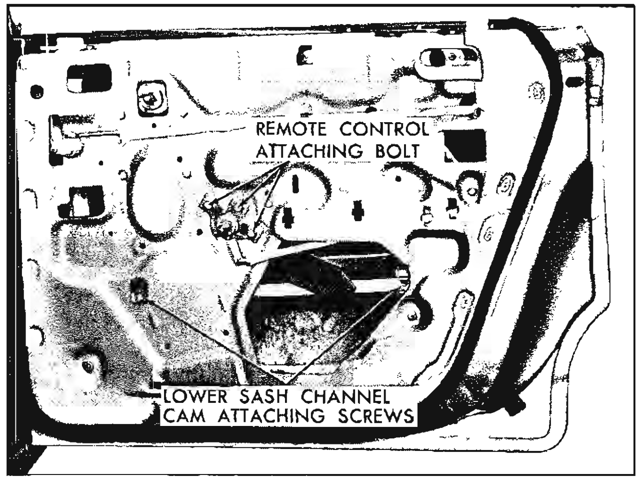


Fig. 51—Rear Door Hardware

2. Lower door window sufficiently to gain access to sash channel cam two attaching screws (through access holes in door inner panel) and remove screws (fig. 51).
3. While supporting window by hand, carefully disengage cam from window lower sash channel and rollers on window regulator arms and remove cam from door.

CAUTION: After removal of lower sash channel cam, carefully lower door window to bottom of door to prevent damage to glass.

4. To install, reverse removal procedure. Prior to installation, lubricate entire length of window lower sash channel cam with 630 AAW Lubriplate or its equivalent. Check operation of window prior to installing inner panel water deflector and door trim pad.

Rear Door Window Regulator Assembly Manual and Electric

Removal and Installation

1. Lower door window. Remove door trim assembly and detach inner panel water deflector.
2. Remove door window lower sash channel cam. Then carefully raise window and prop in a raised position.
3. On styles equipped with electric window regulators, disconnect wiring harness feed wires from regulator motor at connector.
4. On 39 styles, equipped with electric window regulators, loosen rear guide cam upper attaching screw and bolt and remove lower adjusting stud and nut. This is necessary to move lower section of rear guide cam rearward far enough to permit removal of electric window regulator and motor assembly. Figure 52 shows the rear guide cam attachments and is typical of rear guide cams equipped with power windows.

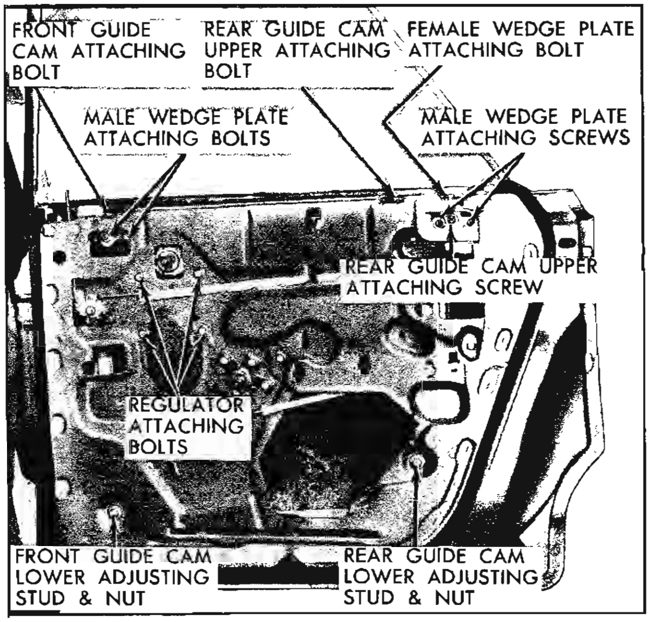


Fig. 52—Rear Door Hardware

CAUTION: Do not operate regulator motor after window assembly is disengaged from regulator. Operation of motor with load removed may damage unit.

5. Remove regulator attaching bolts (four), disengage balance arm from inner panel cam and remove regulator assembly through large access hole (fig. 52).
6. To install, reverse removal procedure. Check operation of window before installing inner panel water deflector and rear door trim pad.

Rear Door Window Regulator Electric Motor Assembly

The electric motor assembly which powers the window regulator on electrically-operated windows is a 12-volt reversible motor with a built-in type circuit breaker and a self-locking gear drive. The motor is attached to the regulator assembly with bolts.

Removal and Installation

1. Remove electric window regulator assembly from door and/or rear quarter and clamp securely in vise (fig. 53).

NOTE: The position of the regulator clamped in the vise will vary with type of regulator and position of lift arm.

CAUTION: BE SURE TO PERFORM STEPS 2 AND 3 BEFORE ATTEMPTING TO REMOVE MOTOR FROM REGULATOR. The regulator lift arm, which is under tension from the counterbalance spring, can cause serious injury if the motor is removed without locking the sector in position.

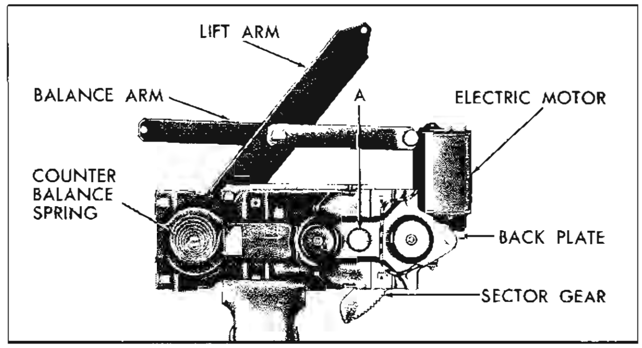


Fig. 53—Rear Door Window Regulator Motor Assembly

2. Drill a ¼" hole through sector and back plate within area indicated by "A" (fig. 53).

NOTE: Locate hole a sufficient distance from edge of sector to insure proper retention of the sector.

3. Insert a 3/16" bolt through hole in back plate and sector and install nut to bolt (do not tighten nut).
4. Remove motor attaching bolts and remove motor assembly from regulator (see fig. 53).

NOTE: Clean off steel chips from regulator sector and motor pinion gear after drilling operation.

5. To install, reverse removal procedure. If difficulty is encountered when trying to line up motor assembly attaching holes, the regulator lift arm may be moved up or down manually so that motor pinion gear will mesh with teeth on regulator sector, and regulator attaching holes will line up.

NOTE: Be sure to remove temporary nut and bolt from regulator before installing it into door or rear quarter panel.

Rear Door Window Assembly 35-45-69 Styles

Removal and Installation

1. Lower door window. Remove door trim assembly and detach inner panel water deflector.
2. Remove lower sash channel cam attaching screws and disengage cam from sash channel (fig. 54).

NOTE: On styles equipped with electric window regulators, disconnect wiring harness electrical feed plug from regulator motor at connector. Do NOT operate regulator motor after window assembly is disengaged from regulator. Operation of motor with load removed may damage unit.

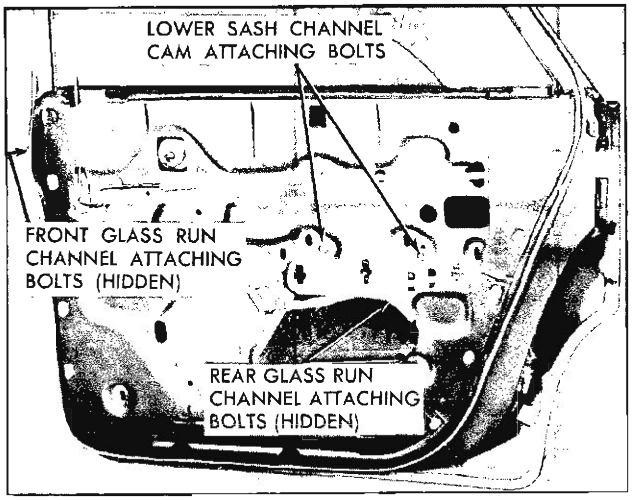


Fig. 54—Rear Door Run Channels and Cam

3. On "69" styles, rotate rear edge of window assembly downward and remove glass from door.
4. To install, reverse removal procedure. Prior to installation of window lower sash channel cam, lubricate entire length of cam with 630 AAW Lubriplate or equivalent. Check operation of window assembly and, where required, adjust window as described under "REAR DOOR WINDOW GLASS RUN CHANNEL ASSEMBLIES AND REAR DOOR INNER PANEL CAM".

Rear Door Window Adjustments

Rear door window glass adjustments are provided to accomplish smooth operation of glass and to effect proper weatherseals.

35-45 Styles

Adjustment

1. Raise door window, remove door trim assembly and detach inner panel water deflector.
2. The rear door window inner panel cam is adjustable at the forward attaching bolt and can be utilized in correcting a rotated (cocked) door window.
3. Closed style rear doors do not provide for mechanical adjustments of the glass run channels. In the event of excessively loose door glass, however, the run channels can be moved closer to glass by adding shim(s) (washers—not a service part) between door lock and/or hinge pillar panel and run channel(s) at attaching bolt locations. Figures 55 and 56 show glass run channel attaching bolt locations on 35-45 styles.

NOTE: Care should be exercised during shimming operations of glass run channels so as not to cause a hard-operating door glass.

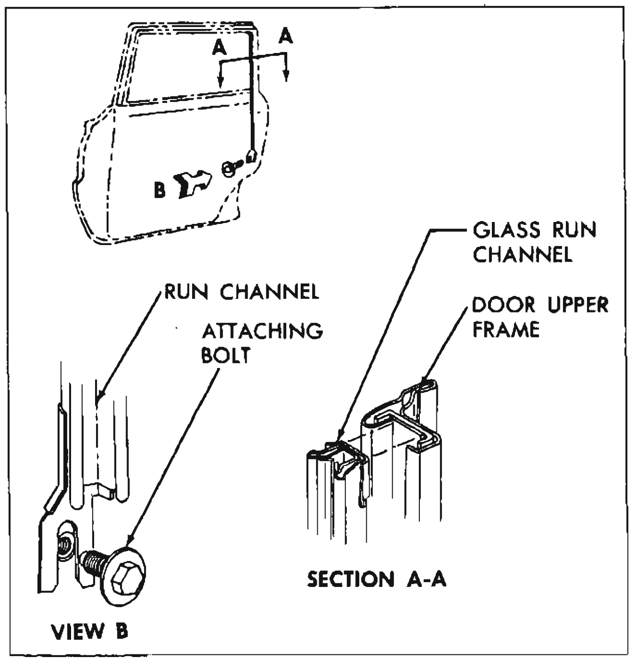


Fig. 55—Rear Door Window Rear Run Channel Attachment

4. Following any door glass adjustments, the window assembly should be cycled up and down to check for proper operation prior to installation of inner panel water deflector and door trim assembly.

69 Styles

Adjustments

1. Raise door window, remove door trim assembly and detach inner panel water deflector.

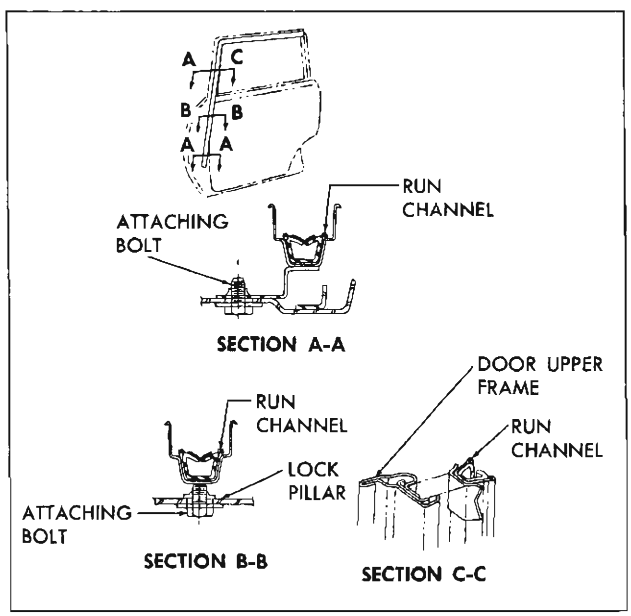


Fig. 56—Rear Door Window Front Glass Run Channel Assembly

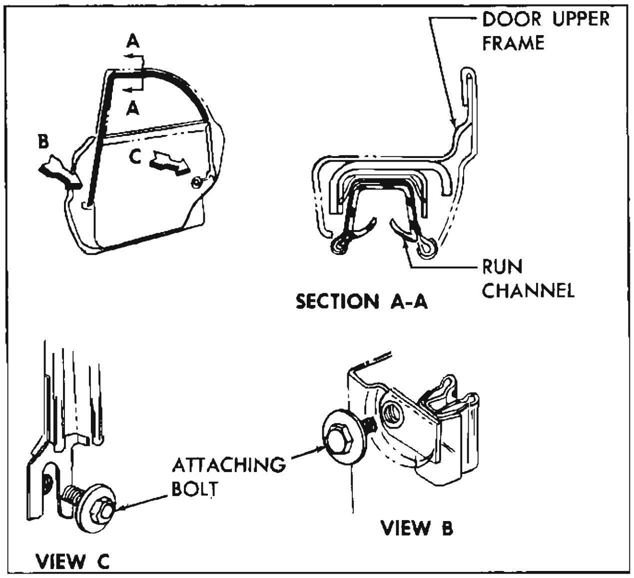


Fig. 57—Rear Door Window Glass Run Channel Assembly

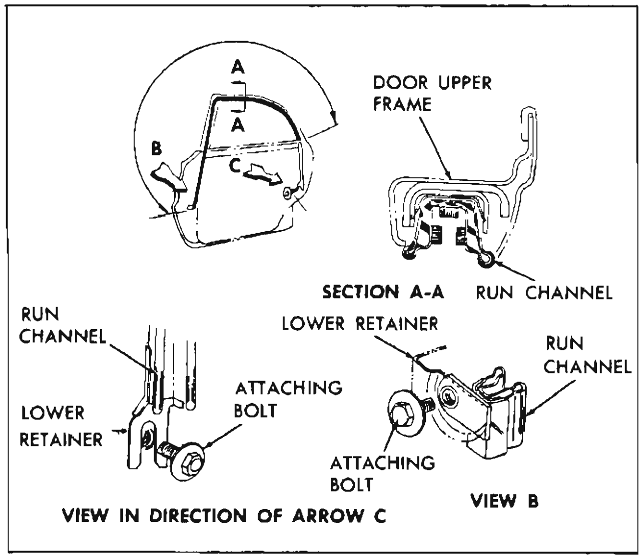


Fig. 58—Rear Door Window Glass Run Channel—69 Styles

2. The rear door window inner panel cam is adjustable at the forward attaching bolt and can be utilized in correcting a rotated (cocked) door window.
3. In the event of an excessively loose door glass, the run channels can be moved closer to glass by adding shim(s) (washers—not a service part) between door lock or hinge pillar panel and run channel at attaching bolt locations. Figure 57 shows glass run channel attaching bolt locations on B-69 styles.

   NOTE: Care should be exercised during shimming operations of glass run channels so as not to cause a hard-operating door glass.

4. Following any door glass adjustments, the window assembly should be cycled up and down to check for proper operation prior to installation of inner panel water deflector and door trim assembly.

Rear Door Window Glass Run Channel 69 Styles

Removal and Installation

1. Remove door trim assembly and detach inner panel water deflector. Disengage lower sash channel cam from window sash channel.
2. Remove door window assembly.
3. Remove front and rear attaching screws from hinge and lock pillar facing of door inner panel (fig. 58).
4. Carefully disengage glass run channel attaching clips. Beginning along front of door window frame, pull glass run channel inboard and upward and remove channel from between inner and outer panels.
5. To install, reverse removal procedure. Check operation of rear door window and, where required, adjust glass run channel for proper operation of window assembly.

Rear Door Window Rear Glass Run Channel 35 and 45 Styles

Removal and Installation

1. Raise door window, remove door trim assembly and detach inner panel water deflector.
2. From inside door, remove bolt securing lower end of glass run channel at door lock pillar facing (fig. 59).
3. Remove screws securing door belt trim support rear finishing plate (three) and remove plate (fig. 60).
4. Remove screws securing rear door window glass run channel rear retainer from rear of window frame assembly and remove retainer.
5. Lower door window. Disengage run channel attaching clips along lock pillar portion of window frame. Then carefully raise rear run channel and remove from door.
6. To install, reverse removal procedure. Check operation of rear door window and adjust rear glass run channel as required before installing water deflector.

Rear Door Window Front Glass Run Channel 35-45 Styles

Removal and Installation

1. Remove rear door window rear glass run channel and remove rear door window assembly.

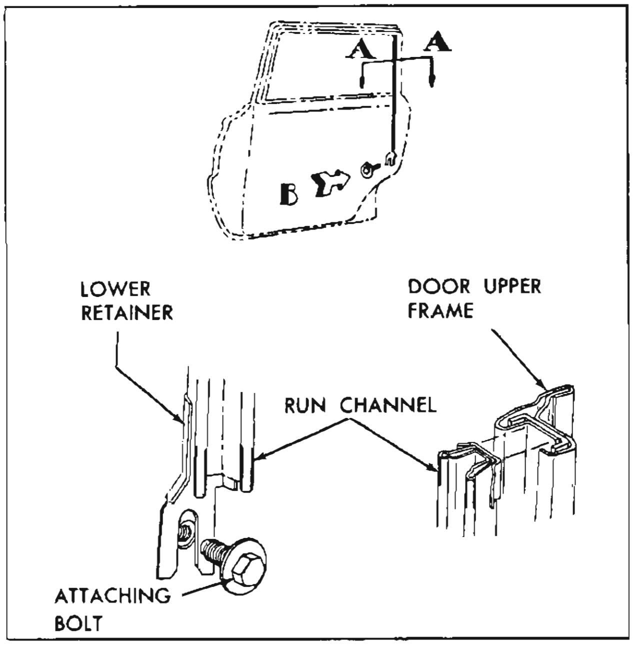


Fig. 59—Rear Door Window Glass Run Channel—35 and 45 Styles

2. Remove glass run channel lower attaching bolts from hinge pillar facing of door.
3. Carefully disengage glass run channel attaching clips along top and hinge pillar portion of window frame. Then pull glass run channel inboard and upward and remove from door.
4. To install, reverse removal procedure. Check operation of rear door window and adjust channel as required.

Rear Door Window Glass Run Channel Adjustments

35-45-69 Styles

To adjust front or rear glass run channel in or out or up or down, loosen channel attaching screw(s), adjust channel as required and tighten screws. After any adjustments, check window for proper operation.

NOTE: Adjustment of both channels must be coordinated to provide proper operation of the rear door window assembly.

Rear Door Window Guide Front Cam Assembly

39 Styles

The window guide front cam assembly incorporates an attaching support bracket at the upper edge of the guide cam which is attached to the door hinge pillar facing by two bolts. The front cam can be removed without removing this attaching bracket.

Removal and Installation

1. Raise door window. Remove door trim assembly and detach inner panel water deflector.

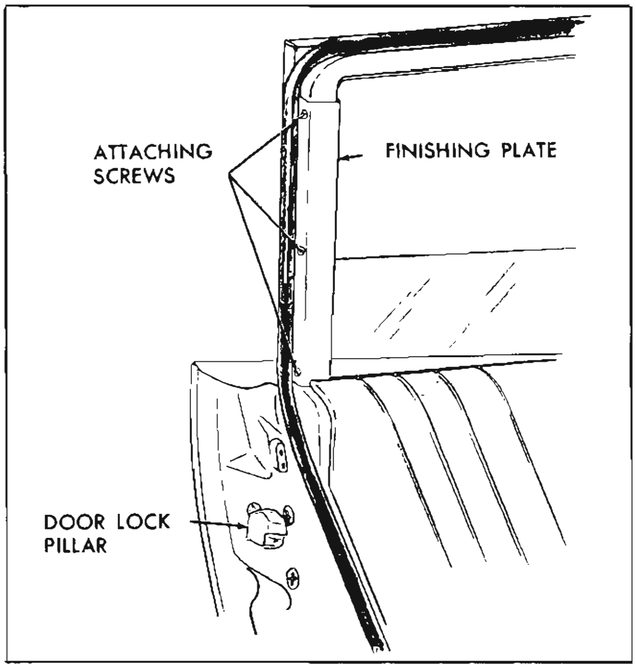


Fig. 60—Rear Door Belt Support Finishing Plate—35 and 45 Styles

2. Through inner panel access hole remove front guide cam upper attaching screw(s) and front guide cam lower adjusting stud and nut (fig. 52).
3. Carefully disengage guide cam from window lower sash channel roller and remove guide cam through access hole.
4. To install, reverse removal procedure. Prior to installation, lubricate entire length of guide cam with 630 AAW Lubriplate or equivalent. Reseal front guide cam lower adjusting stud and nut with body caulking compound.
5. Check operation of window assembly and, where required, adjust window as described under "REAR DOOR WINDOW ADJUSTMENTS".

Rear Door Window Guide Front Cam Support

39 Styles

Removal and Installation

1. Remove door trim assembly and detach inner panel water deflector.
2. Raise door window. Through inner panel access hole remove front guide cam upper attaching bolt (fig. 52).
3. At door hinge pillar facing, remove two screws securing guide cam support and remove support through access hole.
4. To install, reverse removal procedure. Check operation of window assembly and, where required, adjust window as described under "REAR DOOR WINDOW ADJUSTMENTS."

Rear Door Window Guide Rear Cam Assembly

39 Styles

Removal and Installation

1. Raise door window. Remove door trim assembly and detach inner panel water deflector.
2. Remove rear cam upper attaching screws and lower adjusting stud and nut (fig. 52).
3. Carefully disengage cam from roller on window guide assembly and remove rear cam through large access hole.
4. To install, reverse removal procedure. Prior to installation, lubricate entire length of cam with 630 AAW Lubriplate or equivalent. If exposed, seal cam lower adjusting stud and nut with body caulking compound.
5. Check operation of window assembly and, where required, adjust window as described under "REAR DOOR WINDOW ADJUSTMENTS."

Rear Door Window Assembly— Manual and Electric

39 Styles

Removal and Installation

1. Raise door window. Remove door trim assembly and detach inner panel water deflector.
2. Through access holes in door inner panel remove screws securing rear door window front and rear male wedge plates to window lower sash channel and remove wedge plates (fig. 52).
3. Lower door window and remove lower sash channel cam attaching screws (fig. 51).

NOTE: On styles equipped with electric window regulators, disconnect wiring harness electrical feed plug from regulator motor at connector.

CAUTION: DO NOT OPERATE REGULATOR MOTOR **after window assembly is disengaged from regulator. Operation of motor with load removed may damage unit.**

4. Carefully raise door window and remove from door.
5. To install, reverse removal procedure. Check window for proper alignment and, where necessary, align window as described under "REAR DOOR WINDOW ADJUSTMENTS." Prior to installation of window lower sash channel cam, lubricate entire length of cam with 630 AAW Lubriplate or equivalent. Also lubricate lower sash channel cam rollers and pivot area of rear door window rear guide.

Adjustments

IMPORTANT: The rear door assembly should be properly aligned in the body opening before adjusting the rear door window.

Adjustments have been provided to insure proper contact of the rear door window with the side roof rail weatherstrip and the rear door window front frame weatherstrip. Unless otherwise specified, the following window adjustments are for both manually and electrically-operated windows.

NOTE: To perform the following rear door window adjustments, remove door trim assembly and detach inner panel water deflector.

1. Up and down adjustment of door window assembly.
   a. Through inner panel access holes, loosen screws securing front and rear male wedge plates to window lower sash channel.
   b. Reposition window assembly as required, adjust front and rear male wedge plates up or down as required; then tighten wedge plate attaching screws. Check operation of window assembly.

   IMPORTANT: The front or rear of window assembly may be adjusted up or down by adjusting either front or rear male wedge plate up or down as required. In cases of major adjustment, however, both wedge plates should be adjusted.

2. Fore or aft adjustment of rear door window assembly.
   a. Loosen lower adjusting stud nut on both front and rear guide cams (fig. 52).
   b. Loosen screw(s) securing upper end of front and rear guide cams, position window fore or aft as required, then tighten screw(s) and lower stud nut on each cam.
   c. Check window for proper operation and, if necessary, readjust rear door window front and/or rear male wedge plates fore or aft to insure proper contact with female wedge plates on door inner panel.

   NOTE: On styles where lower adjusting stud and nut are not covered by a water deflector, seal stud and nut with body caulking compound.

3. The in and out adjustment of the rear door window assembly can be obtained by adjusting the front and rear guide cams in or out as required. It is desirable, however, to adjust only one guide cam at a time in order to maintain the fore and aft adjustment of the window assembly.
   a. To adjust front of window assembly in or out proceed as follows:
      (1) With window in full up position, loosen front guide cam adjusting stud nut (fig. 52).
      (2) Loosen front female wedge plate attaching screw.
      (3) Loosen two front guide cam support attaching screws on door hinge pillar facing.

(4) Position front of window assembly in or out as required and adjust front female wedge plate accordingly; then tighten wedge plate attaching screw.

(5) Adjust front guide cam lower adjusting stud in or out as required and tighten nut. Tighten front guide cam support attaching screws on door hinge pillar facing.

(6) Reseal lower adjusting stud and nut with caulking compound.

(7) Position window assembly in or out as required; then tighten screws.

(8) Adjust lower adjusting stud in or out as required and tighten stud nut. Check window for proper operation.

NOTE: On styles where lower adjusting stud and nut are not covered by a water deflector, seal stud and nut with body caulking compound.

SIDE ROOF RAIL WEATHERSTRIP

The side roof rail weatherstrip assembly is a one-piece type which is secured to the front body hinge pillar with a snap fastener. The remainder of the weatherstrip is secured to the side roof rail by weatherstrip adhesive and a weatherstrip retainer and reveal molding assembly.

Side Roof Rail Weatherstrips—47 Styles

Removal

1. Remove snap fastener securing weatherstrip at front body hinge pillar.
2. Carefully disengage inner lip of side roof rail weatherstrip from retainer. Using a flat-bladed tool, carefully break cement bond between weatherstrip and weatherstrip retainer and reveal molding assembly.
3. Remove side roof rail weatherstrip from body.

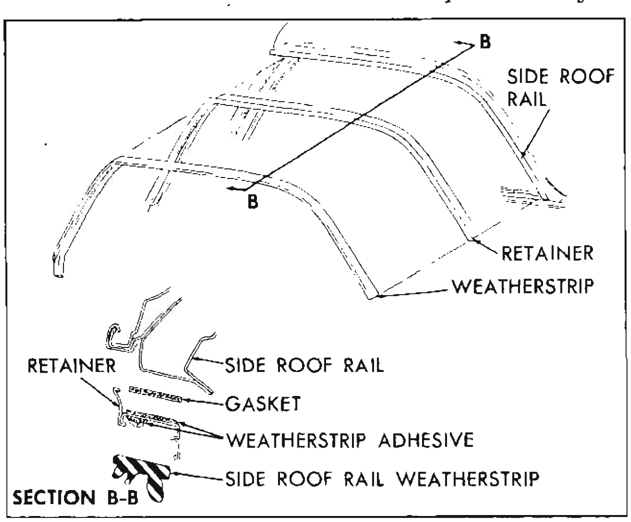


Fig. 61—Side Roof Rail Weatherstrip Assembly—47 Styles

Installation

1. Clean off old cement from side roof rail weatherstrip retainer to insure a clean cementing surface.
2. Apply a continuous bead (approximately $\frac{3}{16}$" diameter) of weatherstrip adhesive along entire outboard surface of side roof rail weatherstrip retainer (See Section "B-B" in Figure 61).
3. With a flat-bladed tool, engage inboard edge of weatherstrip and then outboard edge of weatherstrip into weatherstrip retainer.
4. Install snap fastener at front body hinge pillar and clean off all excessive weatherstrip cement.

Side Roof Rail Weatherstrip 39 Styles

The side roof rail weatherstrip assembly is a one-piece type which is secured to the front body hinge pillar with a snap fastener. The remainder of the weatherstrip is secured to the side roof rail by weatherstrip adhesive and a weatherstrip retainer and reveal molding assembly.

Removal

1. Remove snap fastener securing weatherstrip at front body hinge pillar.
2. Carefully disengage inner lip of side roof rail weatherstrip from retainer. Using a flat-bladed tool, carefully break cement bond between weatherstrip and weatherstrip retainer and reveal molding assembly.
3. Remove side roof rail weatherstrip from body.

Installation

1. Clean off old cement from side roof rail weatherstrip and weatherstrip retainer to insure a clean cementing surface.
2. Apply a continuous bead (approximately $\frac{3}{16}$" diameter) of weatherstrip adhesive along entire outboard surface of side roof rail weatherstrip retainer (see Section "B-B" in Figure 62).

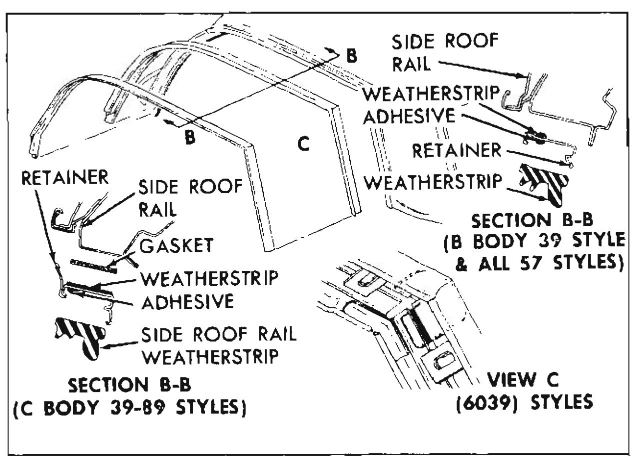


Fig. 62—Side Roof Rail Weatherstrip Assembly—39 and 47 Styles

3. With a flat-bladed tool, engage inboard edge of weatherstrip and then outboard edge of weatherstrip into weatherstrip retainer.
4. Install snap fastener at front body hinge pillar and clean off all excessive weatherstrip cement.

Side Roof Rail Weatherstrip Adjustments 39-47 Styles

With doors and windows closed, front door window and rear door or rear quarter window upper frames should make an even continuous contact with the side roof rail weatherstrip. If necessary, adjust weatherstrip, ventilator assembly, front door window and rear door or rear quarter window to obtain proper weatherstrip contact.

The attaching holes in the side roof rail weatherstrip retainer are elongated, allowing in and out adjustment of the side roof rail weatherstrip; however, the amount of adjustment is small and is not intended to correct improper ventilator or door window alignment. It is necessary to remove the weatherstrip to adjust the retainer.

IMPORTANT: Before attempting to adjust the side roof rail weatherstrip, first check that the body side glass is properly aligned and, where necessary, adjust for proper alignment as directed under Ventilator, Front Door Window, Rear Door Window and Rear Quarter Window Alignment.

1. To adjust the side roof rail weatherstrip "in or out," first determine and mark retainer at area or areas to be adjusted.
2. Remove side roof rail weatherstrip.
3. Loosen retainer attaching screws slightly in area to be adjusted and adjust retainer in or out as required.
4. Tighten retainer attaching screws and install side roof rail weatherstrip.

REAR QUARTER

TRIM AND HARDWARE

Service procedures are arranged according to body style in the following sequence:

Two Door Sedans ("11" Styles)
Two Door Coupes ("47" Styles)
Convertibles ("67" Styles)
Four Door Sedans ("39" and "69" Styles)
Station Wagons ("35" and "45" Styles)

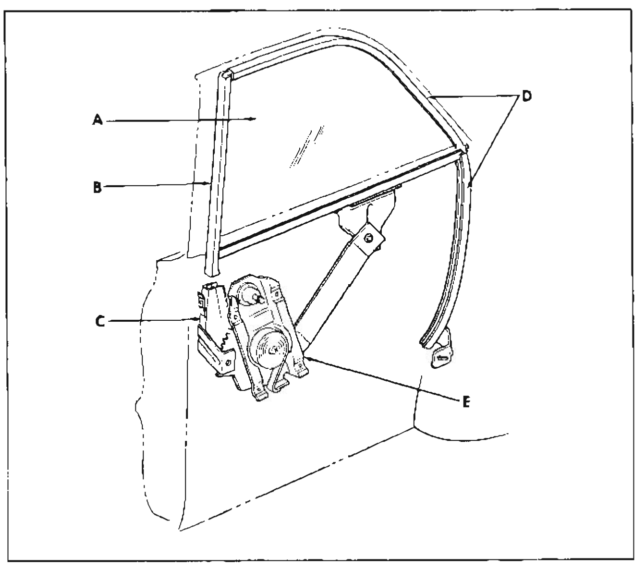


Fig. 63—Rear Quarter Hardware—11 Styles—Manual

A. Rear Quarter Window Assembly.
B. Rear Quarter Window Front Upper Glass Run Channel.
C. Rear Quarter Window Front Lower Glass Run Channel.
D. Rear Quarter Window Rear Glass Run Channel.
E. Rear Quarter Window Regulator.

NOTE: Use caution when performing service operations on or near the rear quarter window as it is made of solid tempered safety plate glass and edge chips or deep scratches can cause it to shatter.

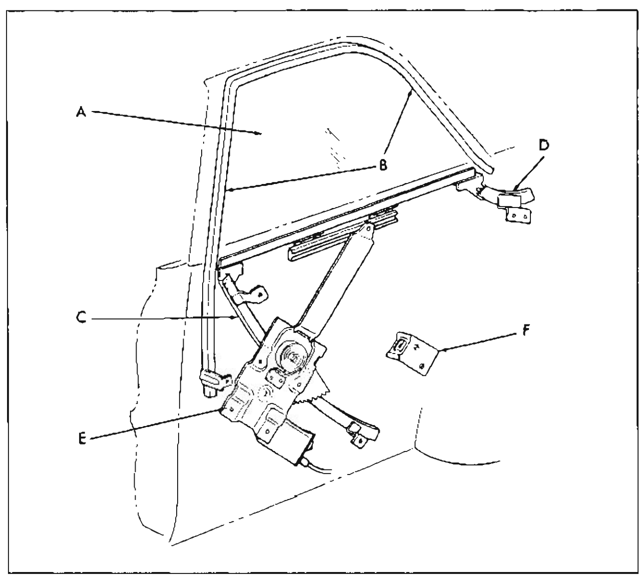


Fig. 64—Rear Quarter Hardware—11 Styles—Electric

A. Rear Quarter Window Assembly.
B. Rear Quarter Window Glass Run Channel.
C. Rear Quarter Window Front Guide.
D. Rear Quarter Window Rear Guide.
E. Rear Quarter Window Regulator.
F. Rear Quarter Window Lower Stop.

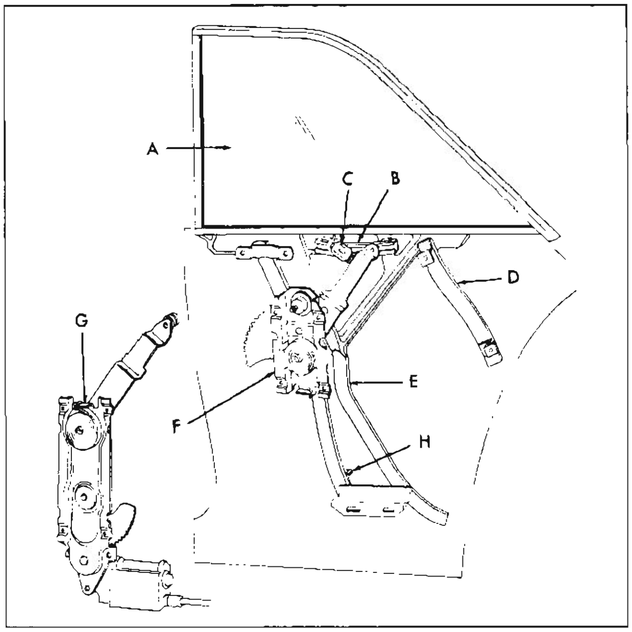


Fig. 65—47 Style Rear Quarter

A. Rear Quarter Window Assembly
B. Rear Quarter Window Lower Sash Channel Cam
C. Rear Quarter Window Upper Stop
D. Rear Quarter Window Rear Guide
E. Rear Quarter Window Front Guide
F. Rear Quarter Window Regulator—Manual
G. Rear Quarter Window Regulator—Electric
H. Rear Quarter Window Lower Stop

Trim Assembly

11 Styles

Removal and Installation

1. Remove rear seat cushion and seat back assemblies.
2. Remove rear quarter garnish moldings and rear quarter arm rest assembly. On styles with manually operated windows, remove window regulator handle.
3. Using a trim panel removing tool (No. J-6335), carefully pry rear quarter trim assembly retaining nails from tacking strip; then lift assembly upwards to disengage from retainers at top of rear quarter inner panel and remove assembly from quarter panel.

NOTE: On styles with electrically-operated windows, disengage trim assembly from retainers at top of inner panel; then disconnect window switch junction block from switch and remove trim assembly.

4. To install rear quarter trim assembly, reverse removal procedure.

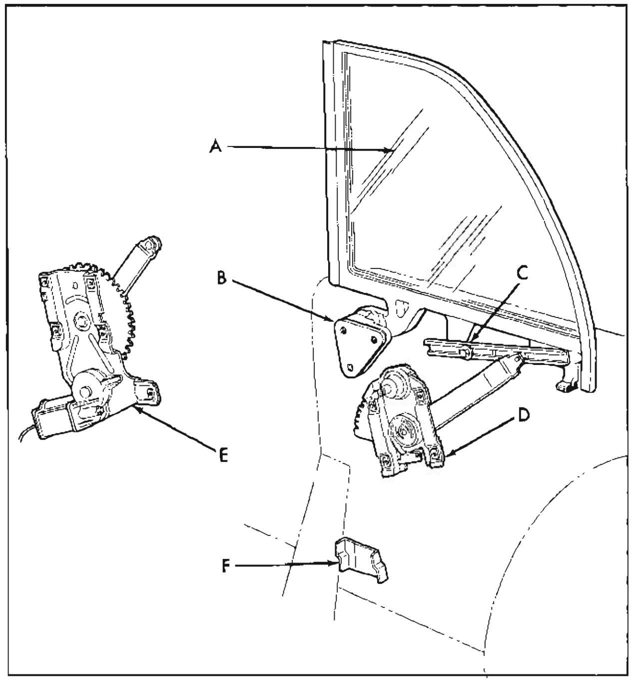


Fig. 66—67 Style Rear Quarter

A. Window Assembly (Includes Lower Sash Channel Cam)
B. Window Hinge Adjusting Plate
C. Window Upper Stop
D. Window Regulator—Manual
E. Window Regulator—Electric
F. Window Lower Stop

Rear Quarter Window—Manual

11 Styles

Removal and Installation

1. Remove rear quarter trim assembly and inner panel access hole cover.
2. Remove snap ring retainer securing regulator lift arm to pivot pin on window lower sash channel (fig. 67).
3. Disengage rear of window from rear glass run channel. Lower window sufficiently to disengage nylon guide on window front sash channel from window front glass run channel.
4. Remove glass from between the panels by lifting it inboard, front edge of glass coming out first.
5. To install, reverse the removal procedure.

Window Adjustments—Manual

11 Styles

1. To obtain proper horizontal alignment so that the window seats properly in the upper glass run channels when the window is operated to the "up" position, proceed as follows:
   a. Operate the window to the "full up" position and loosen the window regulator attaching screws (fig. 67).

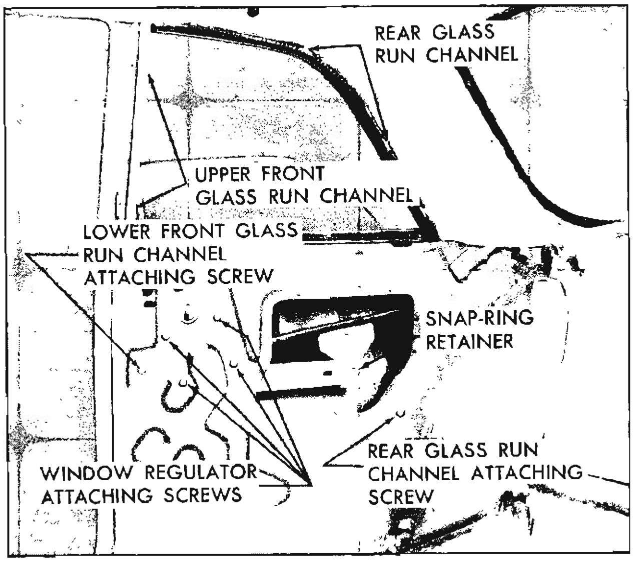


Fig. 67—Rear Quarter Hardware Attachment—11 Styles—Manual

b. Insert a flat-bladed tool under the window lower sash channel and pry the window upward until the lower sash channel is aligned with, and is making good contact with, the outer sealing strip.

c. Operate window regulator handle rapidly back and forth a few times (one-eighth turn each way) to eliminate "slack" or "play" and then tighten regulator attaching screws.

2. To insure proper operation and proper engagement of the window in the rear run channel when the window is operated to the full down position, proceed as follows:

a. Loosen rear glass run channel attaching screw (fig. 67).

b. Operate window to full down position.

c. Adjust rear glass run channel lower end so that it makes slight contact with window assembly and tighten glass run channel attaching screw.

Window Regulator—Manual 11 Styles

Removal and Installation

1. Remove rear quarter trim and inner panel access hole cover.
2. Remove snap ring retainer securing regulator lift arm to pivot pin on window lower sash channel (fig. 67).
3. Support glass with one hand and disengage regulator lift arm from window. Lift window to "full up" and prop it in that position.
4. Remove regulator attaching screws (fig. 67) and remove regulator through access hole.
5. To install, reverse removal procedure. Adjust regulator for proper window operation as described in "Rear Quarter Window Adjustments" for manual "11" styles.

Upper Front Glass Run Channel—Manual 11 Styles

Removal and Installation

1. Remove rear quarter window front and rear garnish moldings. Operate rear quarter window to full down position.
2. Disengage upper forward end of rear glass run channel from side roof rail sufficiently to allow removal of front glass run channel.
3. Using a thin flat-bladed tool inserted between front glass run channel and body upper lock pillar, disengage snap-in type clips on run channel from lock pillar.

NOTE: Make certain prying tool is inserted behind clip to prevent clip from tearing loose from run channel.

4. Pull top of run channel inboard sufficiently to enable lifting channel upward to disengage it from nylon guide on window front sash channel.
5. To install, reverse removal procedure. Prior to installation, apply a bead of body caulking compound to rabbet of lock pillar to effect a weather-tight seal.

Lower Front Glass Run Channel—Manual 11 Styles

Removal and Installation

1. Remove rear quarter trim assembly, and inner panel access hole cover.
2. Remove lower front glass run channel attaching screw (fig. 67) and remove run channel through access hole.
3. To install, reverse removal procedure.

Rear Glass Run Channel—Manual 11 Styles

Removal and Installation

1. Remove rear quarter trim assembly, quarter window garnish moldings, and inner panel access hole cover. Operate window to almost full down position.
2. Remove rear glass run channel attaching screw (fig. 67).
3. Disengage glass run channel retainers from side roof rail by prying inboard at retainer locations. Disengage tab at rear of run channel from side roof rail by moving run channel downward and rearward.

4. Disengage lower end of run channel from window assembly and remove run channel from body.
5. To install, reverse removal procedure. Prior to installation, apply a bead of body caulking compound to rabbet of side roof rail to effect a weathertight seal.

   After installation, adjust glass run channel attaching screw for proper window operation as described under "Rear Quarter Window Adjustments" for manual "11" styles.

Window Glass Run Outer Sealing Strip

11 Styles

Removal and Installation

1. Remove rear quarter trim assembly and inner panel access hole cover.
2. Disengage window assembly from regulator lift arm by removing snap ring retainer (fig. 67).
3. Lower window assembly to bottom of quarter panel and rest it against outer panel.
4. Remove screws at front and rear of sealing strip. Disengage sealing strip clips from quarter outer panel return flange by forcing strip downward at clip locations. Remove sealing strip from body.

   NOTE: Use care not to damage strip assembly or adjacent painted surfaces.

5. To install outer sealing strip, reverse removal procedure.

Rear Quarter Window—Electric

1611 Styles

Removal and Installation

1. Lower rear quarter window. Remove rear quarter window garnish molding. Remove rear quarter arm rest and quarter trim assembly.
2. Remove access hole cover from inner panel. Loosen window front guide upper attaching screw. Remove window rear guide attaching screws and remove guide (fig. 68).
3. Lift rear quarter window assembly upward and rearward and disengage window cam from regulator arm roller. Tilt window inward, disengage window from front guide and remove window from between rear quarter panels.
4. To install rear quarter window assembly, reverse removal procedure. Prior to installing the window lower sash channel cam, lubricate channel of cam with Lubriplate or its equivalent along length of channel.

Adjust rear quarter window for proper alignment and operation as described under "Rear Quarter Window Adjustment" for "11" electric styles.

Seal large access hole cover and front and rear guide attaching screws as specified under "Rear Quarter Inner Panel Sealing" for "11" electric styles.

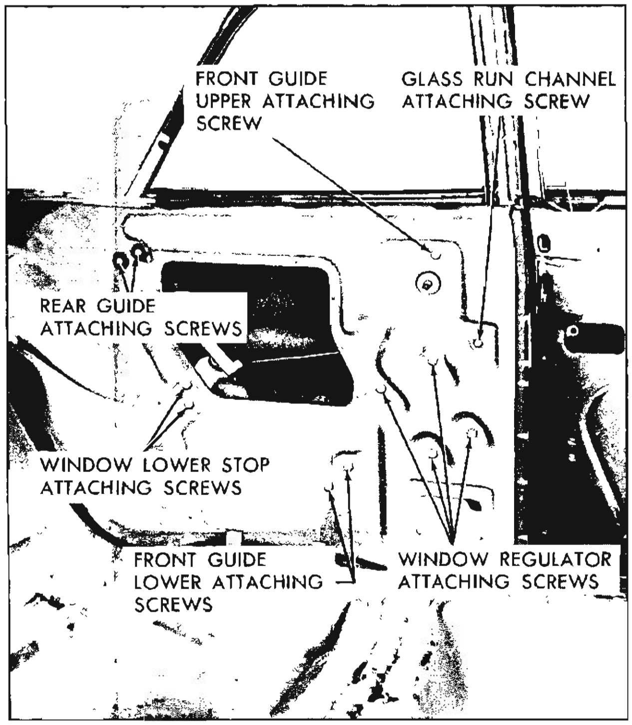


Fig. 68—Rear Quarter Hardware Attachment—1611 Styles—Electric

Window Adjustment—Electric

1611 Styles

The upper front corner of the rear quarter window should seat properly in the front glass run channel through the complete window lowering and raising cycle. To accomplish this, loosen the front and rear guide attaching screws (fig. 68); then adjust the front guide forward and the rear guide upward and forward and retighten the attaching screws.

Window Glass Run Outer Strip Assembly—Electric

1611 Styles

Removal and Installation

1. Remove rear quarter trim assembly and inner panel access hole cover.
2. Remove window lower stop attaching screws and operate window to full down position.
3. Remove screws at front and rear of sealing strip. Disengage sealing strip clips from quarter outer panel return flange by forcing strip downward at clip locations. Remove sealing strip from body.

   NOTE: Use care not to damage strip assembly or adjacent painted surfaces.

4. To install outer sealing strip, reverse removal procedure.

Window Glass Run Channel—Electric

1611 Styles

Removal and Installation

1. Lower rear quarter window. Remove rear quarter window garnish molding, rear quarter trim assembly.
2. Remove rear quarter window glass run channel attaching screw (fig. 68). Carefully disengage glass run channel retainers from lock pillar and side roof rail and remove run channel.
3. To install glass run channel, reverse removal procedure.

Window Front Guide Assembly—Electric

1611 Styles

Removal and Installation

1. Remove rear quarter trim assembly.
2. Remove access hole cover from inner panel.
3. Remove front guide upper and lower attaching screws (fig. 68). Disengage guide from roller on window lower sash channel; move front guide assembly rearward between panels sufficiently to allow upper end of guide to be started out through large access hole; then remove guide assembly.
4. To install front guide assembly, reverse removal procedure. Prior to installing guide, lubricate channel of guide with Lubriplate or its equivalent along entire length of channel.

Adjust rear quarter guide for proper window alignment and operation as described under "Rear Quarter Window Adjustments" for "11" styles. Seal inner panel hole cover and front guide attaching screws as specified under "Rear Quarter Inner Panel Sealing."

Window Rear Guide Assembly—Electric

1611 Styles

Removal and Installation

1. Remove rear quarter trim assembly.
2. Remove large access hole cover from inner panel.
3. Remove rear guide attaching screws (fig. 68).
4. Disengage rear guide from roller on window lower sash channel and remove rear guide from body.
5. To install rear guide assembly, reverse removal procedure. Prior to installation of guide, lubricate channel of guide with Lubriplate or its equivalent. Seal inner panel access hole cover and rear guide attaching screws as specified under "Rear Quarter Inner Panel Sealing."

Window Regulator Assembly—Electric

1611 Styles

Removal and Installation

1. Lower rear quarter window and remove rear quarter trim assembly.
2. Remove access hole cover from inner panel. Remove front guide upper attaching screw and glass run channel attaching screw (fig. 68).
3. Disconnect feed wire plug from electric motor.

   CAUTION: Do not attempt to disengage permanent connector at regulator motor.

4. Disengage wire harness split grommet from inner panel. Feed regulator harness and connector through grommet hole into opening between inner and outer panel.
5. Remove window regulator attaching screws (fig. 68). Disengage regulator arm roller from window lower sash channel cam and remove regulator assembly through large access hole.

   NOTE: The procedure for removing the electric motor from the regulator is described and illustrated under "Rear Door and/or Rear Quarter Window Regulator Electric Motor Assembly" in the Door Section.

6. To install, reverse removal procedure. Seal all broken inner panel seals as specified under "Rear Quarter Inner Panel Sealing."

   Adjust window front guide as specified under "Rear Quarter Window Adjustments" for "11" electric styles.

   Check operation of window prior to installing rear quarter trim and inside hardware.

Rear Quarter Arm Rest Assembly

47 Styles

Removal and Installation

1. Remove rear seat cushion, seat back, and seat back filler panel.
2. Remove attaching screws at front and rear of arm rest.
3. On styles with electrical devices in arm rest assembly carefully detach arm rest from rear quarter inner panel sufficiently to disconnect wire harness connectors.
4. Remove arm rest assembly from rear quarter panel.
5. To install arm rest assembly, reverse removal procedure. Check operation of any electrical devices.

Trim Assembly

47 Styles

Removal and Installation

1. Remove rear seat cushion and seat back assemblies.
2. Remove rear quarter arm rest assembly. Remove quarter belt finishing moldings where present.

3. On styles with manually-operated windows, remove window regulator handle and anti-friction washer.
4. Remove screws securing rear quarter filler panel to quarter panel and remove filler panel.
5. Using a trim panel removing tool (No. J-6335), carefully pry trim assembly retaining nails from tacking strip; then lift trim assembly upward to disengage from retainers at top of rear quarter inner panel and remove assembly from body.
6. To install rear quarter trim assembly, reverse removal procedures.

NOTE: If any retaining nails are broken off, they can be replaced with door trim assembly nailing strip replacement tabs which are available as a service part.

Window Assembly—Manual or Electric 47 Styles

Removal and Installation

1. Remove rear seat cushion and seat back assemblies and rear quarter arm rest and trim assemblies. Remove inner panel access hole cover.

   NOTE: On models equipped with electric window regulators, disconnect regulator harness at in-line connector located on inboard side of inner panel.

   CAUTION: Do not attempt to disconnect permanent connector at regulator motor.

2. Remove rear quarter window rear guide attaching screw (fig. 69). Disengage rear guide from roller on window lower sash channel and remove guide.

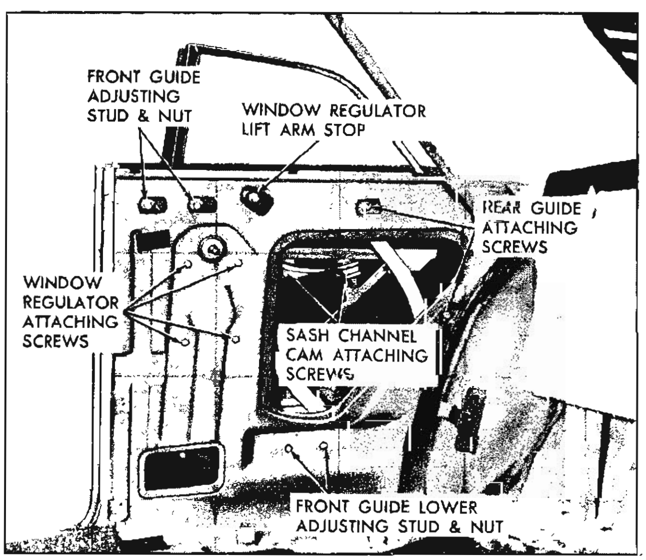


Fig. 69—Rear Quarter Hardware—47 Style—Manual

3. With the rear quarter window in the half-down position, remove the lower sash channel cam attaching screws (fig. 69). Detach cam from roller on regulator arm and remove cam.
4. Remove rear quarter window front guide adjusting stud nuts (fig. 69).
5. With the rear quarter window in the half down position, disengage the front guide adjusting studs from the adjusting stud holes in the rear quarter inner panel, then disengage front guide from rollers on rear quarter window. Remove rear quarter window from between the panels by lifting upward and inward.
6. To install rear quarter window, insert the window between the panels and prop in the "up" position. Engage front guide channels to rollers on window lower sash channel frame. Allow window to drop to the half down position and insert front guide adjusting studs into the adjusting stud holes in the rear quarter inner panel. Install previously removed parts.

Prior to installation of window lower sash channel cam and front and rear guides, lubricate the channels of the cam and guides with Lubriplate or its equivalent along the entire length of the channel.

Adjust rear quarter window for proper alignment and operation as described under "Rear Quarter Window Adjustments" for 47 styles. Seal all hardware attachments that have been disturbed and the inner panel access hole cover, as specified under "Rear Quarter Inner Panel Sealing" for 47 styles.

Window Adjustments 47 Styles

1. Remove rear seat cushion and seat back assemblies. Remove rear quarter arm rest and trim assemblies.
2. To adjust the window fore or aft, loosen the front and rear guide attaching stud nuts (fig. 69). Position the window and guides fore or aft as required; then tighten the attaching stud nuts.
3. To adjust the rear quarter window in or out, loosen the front guide upper attaching stud nuts (fig. 69). Adjust the studs in or out as required; then tighten the stud nuts.
4. To adjust the top of the rear quarter window in or out, loosen the front guide lower attaching stud nut (fig. 69). Adjust the stud in or out as required then tighten the stud nut.
5. To relieve a binding condition between the channels of the front and rear guide, loosen the front and rear guide adjusting stud nuts (fig. 69). Operate window to full up position and tighten upper stud nuts on the front guide and forward attaching screw on rear guide. Operate window to full down and tighten remaining nuts.
6. To limit the forward and upward travel of the

rear quarter window, adjust the regulator lift arm stop as required (fig. 69).

7. To limit the down travel of the rear quarter window, remove the inner panel large access hole cover, loosen the lower stop assembly attaching bolt (located at the lower end of the window front guide cam) and adjust stop up or down as required.

NOTE: After performing window adjustments, seal hardware attaching screws which have been disturbed, as specified under "Rear Quarter Inner Panel Sealing" for 47 styles.

Window Regulator Assembly—Manual or Electric 47 Styles

Removal and Installation

1. Remove rear quarter window as described under "Window Assembly – Manual or Electric – Removal."
2. Disconnect regulator motor wire harness at in-line connector mounted on **inboard side** of quarter inner panel.

   CAUTION: Do not attempt to disengage permanent connector at regulator motor.

3. Disengage wire harness split grommet from inner panel. Feed harness and connector through grommet hole into opening between inner and outer panel.
4. Remove window regulator attaching screws (fig. 69) and remove regulator through large access hole.

   NOTE: The procedure for removing electric motor from window regulator is described and illustrated under "Door and Quarter Window Regulator Electric Motor Assembly" in the Door Section.

5. To install, reverse removal procedure. Seal all broken inner panel seals as specified under "Rear Quarter Inner Panel Sealing."

Window Regulator Electric Motor Assembly 47 Styles

Removal and Installation

See "Rear Door and/or Rear Quarter Window Regulator Electric Motor Assembly" in the Door Section.

Window Front Guide Assembly 47 Styles

Removal and Installation

1. Remove rear seat cushion and seat back. Remove rear quarter arm rest and trim assemblies. Remove rear quarter inner panel large access hole cover.
2. With window in "up" position, remove the window front guide upper and lower attaching stud nuts (fig. 69).
3. Maneuver guide assembly between rear quarter panels so that upper end of guide can be started out of large access hole; then remove guide assembly.
4. To install rear quarter window front guide assembly, reverse removal procedure. Prior to installation of the front guide assembly, lubricate channels of guide with Lubriplate or its equivalent along full length of channels.

   Adjust front guide assembly for proper window alignment and operation as described under "Rear Quarter Window Adjustments" for 47 styles.

   Seal front guide attaching screws as specified under "Rear Quarter Inner Panel Sealing" for "47" styles.

Window Rear Guide Assembly 47 Styles

Removal and Installation

1. Remove rear seat cushion and back assemblies. Remove rear quarter arm rest and trim assemblies. Remove rear quarter inner panel large access hole cover.
2. With the window in the "up" position remove the window rear guide attaching screws (fig. 69). Disengage guide from roller on window lower sash channel and remove guide through access hole.
3. To install, reverse removal procedure. Prior to installation of the rear guide lubricate the entire length of the channel with Lubriplate or its equivalent.

   Adjust rear guide for proper window alignment and operation as described under "Rear Quarter Window Adjustments" for 47 styles.

   Seal rear guide attaching screws as specified under "Rear Quarter Inner Panel Sealing" for 47 styles.

Folding Top Compartment Side Trim Panel Assembly 67 Styles

Removal and Installation

1. Remove rear seat cushion and seat back.
2. Remove attaching screws securing front and rear of side trim panel.
3. Raise trim panel and move it inboard.
4. Disconnect electrical leads, where present, and remove side trim panel.

5. To install folding top compartment side trim panel, reverse removal procedure.

Rear Quarter Trim Assembly 67 Styles

Removal and Installation

1. Remove folding top compartment side trim panel assembly.
2. On styles with manually-operated windows, remove window regulator handle and anti-friction washer.
3. Using a trim panel removing tool (No. J-6335) carefully pry trim assembly retaining nails from tacking strips; then lift assembly upward to disengage from retainers at top of rear quarter inner panel and remove assembly from body.
4. To install rear quarter trim assembly, reverse removal procedure.

NOTE: If any retaining nails are broken off, they can be replaced with door trim assembly nailing strip replacement tabs which are available as a service part.

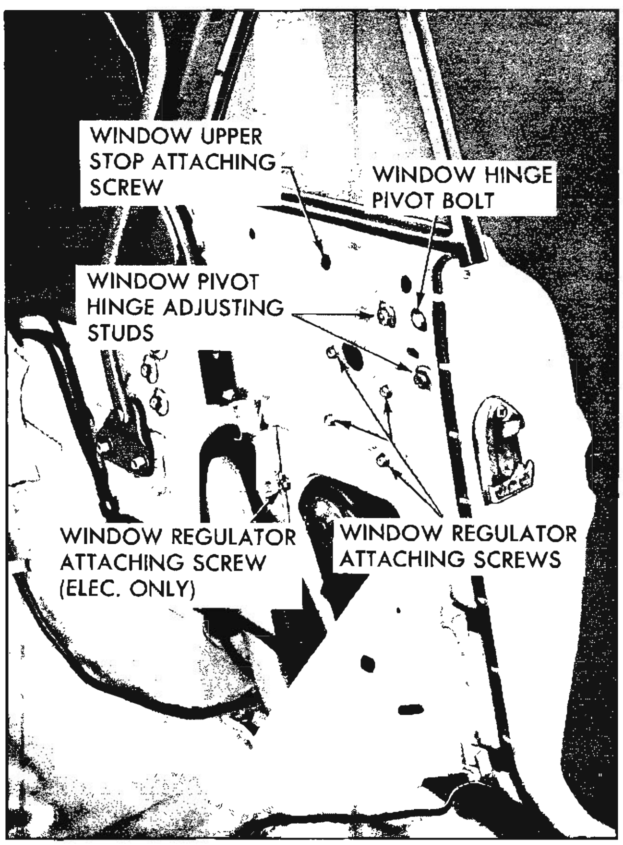


Fig. 70—Rear Quarter Hardware—67 Styles

Quarter Window Assembly—Manual or Electric 67 Styles

Removal and Installation

1. Lower folding top and operate rear quarter window to half down position. Remove rear seat cushion and seat back. Remove folding top compartment side trim panel and rear quarter trim assembly.
2. On styles equipped with electric window regulators disconnect regulator wire harness at the in-line connector mounted on **inboard side** of quarter inner panel.

   CAUTION: Do not attempt to disengage permanent connector at regulator motor.
3. Remove window pivot bolt (fig. 70). Disengage window male hinge from female hinge plate; then raise window to disconnect window lower sash channel cam from roller on window regulator lift arm and remove window.
4. To install rear quarter window assembly, reverse removal procedure. Prior to installation, lubricate pivot hinge and window lower sash channel cam with Lubriplate or its equivalent.

   Adjust rear quarter window for proper alignment and operation, as described under "Rear Quarter Window Adjustments" for "67" styles. Seal window pivot bolt and inner panel access hole cover as specified under "Rear Quarter Inner Panel Sealing" for "67" styles.

Quarter Window Adjustments 67 Styles

1. To adjust the limit of the rear quarter window up travel, loosen the window upper stop attaching screw (fig. 70). Adjust window as desired; then position stop against regulator lift arm roller and tighten stop attaching screw.
2. To adjust the rear quarter window up or down or fore or aft; or to adjust the top or the rear of the window in or out, the folding top compartment side trim panel and rear quarter trim assembly must be removed to gain access to the pivot bolt and adjusting studs.

   a. Up or down or fore or aft window adjustment: Loosen pivot bolt and both adjusting stud nuts (fig. 70). Position window as required; then tighten pivot bolt and stud nuts.

b. In or out adjustment of top of window: Loosen lower adjusting stud nuts and slightly loosen rear stud nut. Adjust lower stud in or out, as required; then tighten both stud nuts (fig. 70).

c. In or out adjustment of rear of window: Loosen pivot hinge rear adjusting stud nut and lower adjusting stud nut (slightly). Adjust rear adjusting stud in or out, as required, then tighten both stud nuts.

NOTE: After performing any rear quarter window adjustment, seal all attaching screws which have been disturbed as specified under "Rear Quarter Inner Panel Sealing" for "67" styles.

Quarter Window Regulator—Manual or Electric 67 Styles

Removal and Installation

1. Remove rear seat cushion and back, folding top compartment side trim panel, rear quarter trim assembly, and inner panel access hole cover.
2. Operate window to "full up" and prop in that position.
3. On styles equipped with electric window regulators, disconnect regulator motor wire harness at in-line connector mounted on **inboard side** of quarter inner panel.

   CAUTION: Do not attempt to disengage permanent connector at regulator motor.

4. Disengage wire harness split grommet from inner panel. Feed harness and connector through grommet hole into opening between inner and outer panel.
5. Remove window regulator attaching screws (fig. 70). Disengage roller on regulator from sash channel cam and remove regulator through large access hole.

   NOTE: The procedure for removing electric motor from window regulator is described and illustrated under "Door and Quarter Window Regulator Electric Motor Assembly" in the Door Section.

6. To install, reverse removal procedure. Seal all broken inner panel seals as specified under "Rear Quarter Inner Panel Sealing."

   Lubricate regulator sector, window cams and pivot hinge with Lubriplate or its equivalent.

   Seal regulator attaching screws and inner panel access hole cover as specified under "Rear Quarter Inner Panel Sealing" for "67" styles.

Quarter Window Regulator Electric Motor Assembly

67 Styles

The procedure for removing the electric motor from the rear quarter window regulator assembly is similar to the procedure described under "Rear Door and/or Rear Quarter Window Regulator Electric Motor Assembly" in the Door Section.

Quarter Window Glass Run Outer Strip Assembly 67 Styles

1. Remove rear quarter window assembly.
2. Remove screws securing sealing strip to outer panel and remove strip.
3. To install rear quarter window glass run outer sealing strip, reverse removal procedure.

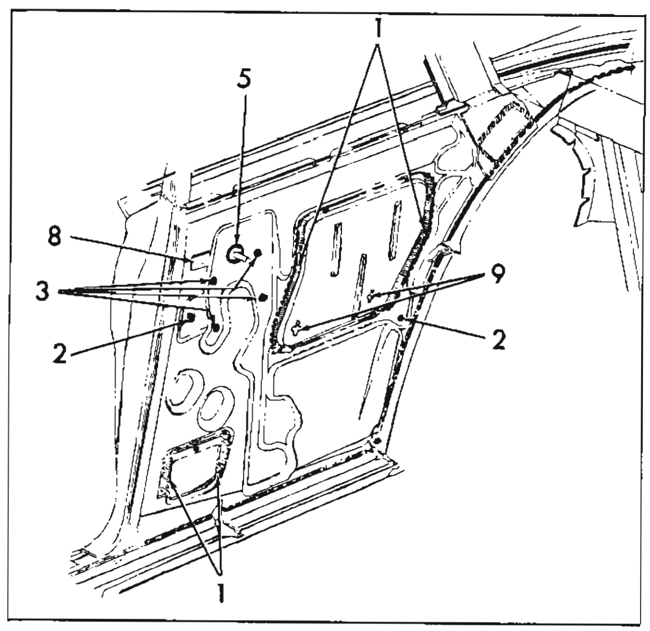


Fig. 71—Rear Quarter Inner Panel Sealing—11 Styles—Manual

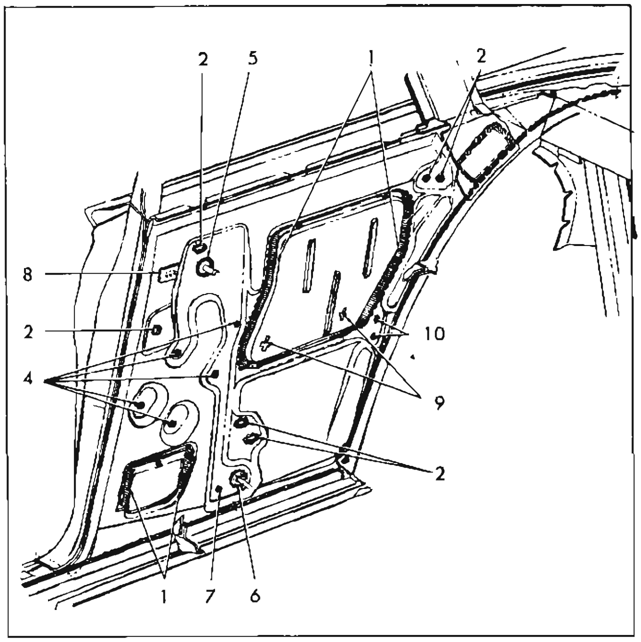


Fig. 72—Rear Quarter Inner Panel Sealing—11 Styles—Electric

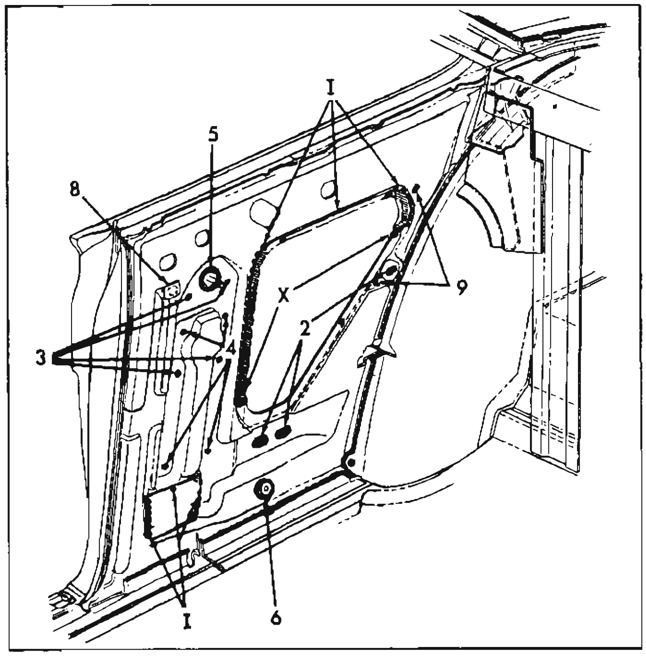


Fig. 73—Rear Quarter Inner Panel Sealing—47 Styles

Rear Quarter Inner Panel Sealing 11-47-67 Styles

Whenever the rear quarter inner panel seals have been disturbed, the area must be resealed before the rear quarter trim is reinstalled.

Following are the rear quarter inner panel openings and hardware attaching locations that must be sealed to prevent water entry and possible trim damage. The item numbers are referenced to illustrations as follows:

"11" styles (Manual)-Figure 71

"11" styles (Electric)-Figure 72

"47" styles-Figure 73

"67" styles-Figure 74

NOTE: When body caulking compound is used, work compound firmly to metal surfaces to obtain good adhesion.

1. Large and Small Access Hole Cover—Prior to installation of access hole cover apply a continuous bead of body caulking compound (1/8" in diameter) across top and down sides of opening contacted by cover.

   After installation of cover, apply body caulking compound at lower corners where cover crosses over to inside of inner panel.

2. Window Guide and Glass Run Channel Attaching Screws—Apply body caulking compound over window guide attaching screws and holes to effect a weathertight seal.

3. Manual Window Regulator Attaching Screws—Apply weatherstrip adhesive (black) over attaching screws.

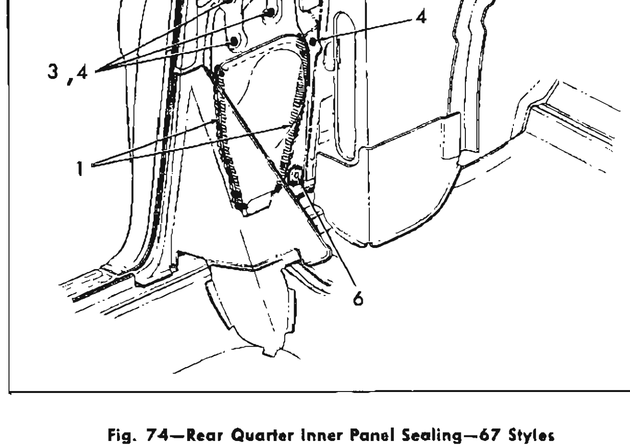


Fig. 74—Rear Quarter Inner Panel Sealing—67 Styles

4. Electric Window Regulator Attaching Screws-Apply weatherstrip adhesive (black) over attaching screws.
5. Window Regulator Spindle Hole Sealing Washer-Apply weatherstrip adhesive over exposed surface of washer to seal pores of sponge rubber and joint between inner panel and washer.

   On convertible coupe styles with electrically operated windows apply weatherstrip adhesive (black) around the manual regulator spindle hole; then apply waterproof body tape over spindle hole.
6. Wire Harness and Grommet Hole (Styles with electrically operated windows)-Apply weatherstrip adhesive (black) around the grommet and wire to effect a seal between wire and grommet and between grommet and inner panel.
7. Wire Harness Clip Hole (Styles with electrically operated window)-Apply weatherstrip adhesive over hole.
8. Gage Slot-Apply waterproof body tape over slot.

Items 9 and 10 for "11" Styles Only

9. Arm Rest Anchor Nut ("11" styles only)-Apply body caulking compound over anchor nut and hole to effect a seal around anchor nut, hole and attaching screw when arm rest is installed.

   Arm Rest Anchor Nut Hole ("11" styles only)-Where anchor nuts are not used, apply waterproof body tape over hole. Press tape firmly to effect a good bond.
10. Window Stop Attaching Screws ("11" styles with electrically operated windows)-Apply weatherstrip adhesive (black) over stop attaching screws.

Item 9 for "47" Styles Only (fig. 73)

9. Seat Back to Quarter Panel Filler Panel Attaching Screw Holes-Apply weatherstrip adhesive (black) over filler panel attaching holes.

Item 9 for "67" Styles Only (fig. 74)

9. Window Hinge Attaching Screws-Apply body caulking compound over hinge attaching screws. Press compound firmly to assure a good bond and watertight seal.

Rear Quarter Lower Trim Assembly 39-69 Styles

Removal and Installation

1. Remove rear seat cushion and back assemblies. Remove back window side garnish molding and side roof rail finishing molding.
2. Remove screw securing metal trim support in upper center of trim assembly ("69" styles only).
3. Using a trim panel removing tool (No. J-6335) carefully pry trim assembly retaining nails from tacking strip; then lift trim assembly upward to disengage from retainers at top of rear quarter inner panel and remove trim from quarter panel.
4. To install rear quarter trim assembly, reverse removal procedure.

Rear Quarter Upper Trim Assembly 39 Styles

Removal and Installation

1. Remove back window side garnish molding and side roof rail rear finishing molding.
2. Carefully break cement bond securing trim foundation to roof extension inner panel; then remove trim assembly.
3. To install, first apply trim cement to contacting surfaces of trim foundation and roof extension inner panel. Position trim and press or roll to assure a good cement bond. Install back window side garnish molding and side roof rail rear finishing molding.

Rear Quarter Upper Trim Assembly 47 Styles

Removal and Installation

1. Remove back window side garnish molding and side roof rail rear finishing molding. Remove quarter belt finishing molding, where present.
2. On styles with courtesy lamps in the upper trim assembly, remove courtesy lamp lens and two (2) screws securing reflector and remove lamp assembly.
3. Carefully insert a trim panel removing tool (J-6335) or other suitable tool between headlining and upper edge of upper trim assembly. Disengage upper trim assembly retaining clips from roof extension inner panel by pulling inboard at clip locations. Remove trim assembly from body.
4. To install, reverse removal procedure.

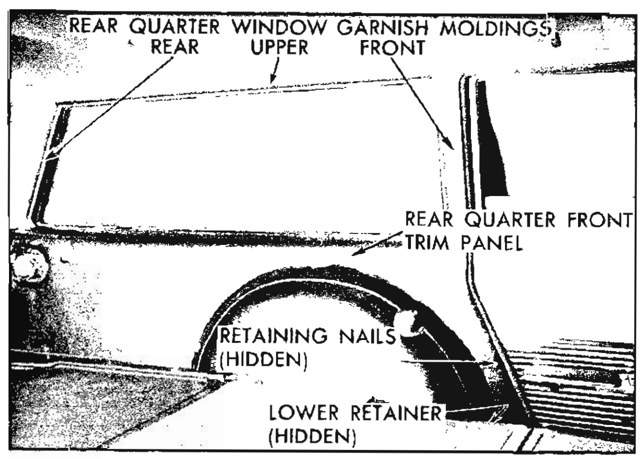


Fig. 75—Quarter Trim Assembly—Left Side

Rear Quarter Front Trim Panel 35-45 Styles

Removal and Installation

1. Remove rear quarter stationary window front garnish molding.
2. Remove rear quarter front trim panel lower retainer.
3. Remove screws securing trim panel to body.
4. With a clean rubber mallet, tap trim assembly along front edge to free trim assembly retaining nails in slots.
5. With a suitable flat-bladed tool, carefully loosen trim assembly from inner panel.
6. Lift panel upwards to disengage from quarter inner panel, and remove assembly from body (fig. 75).
7. To install, reverse removal procedure.

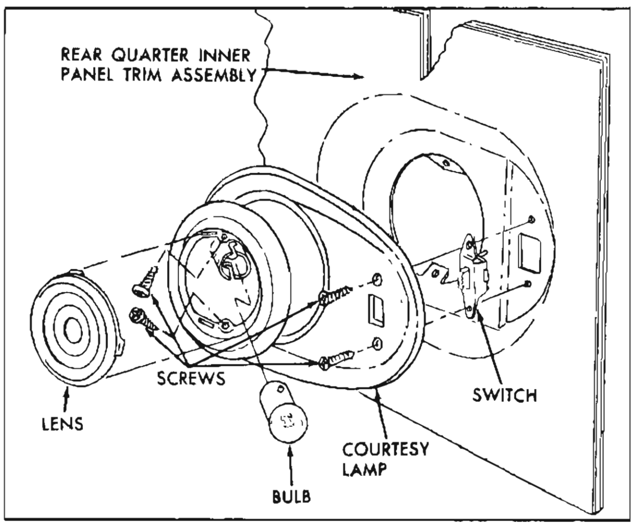


Fig. 76—Rear Quarter Courtesy Light and Switch

Rear Quarter Rear Trim Panel (Left Side) 35-45 Styles

Removal and Installation

1. On "45" styles, remove screws securing courtesy lamp and switch assembly to trim panel and carefully remove assembly sufficiently to disengage wires at rear of lamp and switch. Remove rear finishing panel (fig. 76).
2. Remove top screw in rear quarter front trim panel and all screws in rear quarter rear trim panel.
3. Lift panel slightly upward to disengage from quarter inner panel and rearward to disengage from rearward section of rear quarter front trim panel (fig. 75).
4. On 1235 and 1635 styles, the rear quarter rear trim panel and wheelhouse covering are all one panel. To remove, remove all attaching screws and lift panel upward to disengage from quarter inner panel.
5. To install, reverse removal procedure.

Rear Quarter Wheelhouse Panel Cover (Right Side) 35-45 Styles

Removal and Installation

1. Remove spare tire cover.
2. Remove attaching screw securing trim panel to quarter inner panel and spare tire cover support (fig. 77).

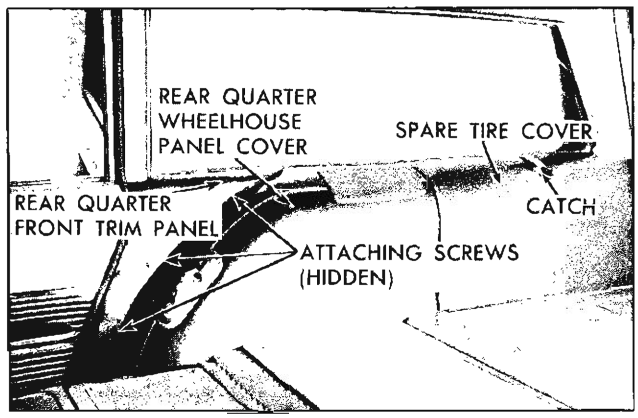


Fig. 77—Rear Quarter Trim Assembly—Right Side

3. Remove rear quarter front trim panel. Remove screws along front edge of wheelhouse cover panel.
4. Lift panel upward to disengage from quarter inner panel and remove panel from body.
5. To install, reverse removal procedure.

Spare Tire Cover Panel 35-45 Styles

The spare tire cover panel is secured to a retainer at the belt line by a folding catch type handle. To remove the panel disengage the catch and lift the panel upward. To install, reverse removal procedure.

Rear Quarter Stationary Window Assembly 35-45 Styles

Removal

1. Remove rear quarter stationary window garnish moldings.
2. Remove rear quarter front trim panels, rear quarter rear trim panel, rear quarter wheelhouse panel cover, spare tire cover, and spare tire cover support (fig. 78).
3. Remove rear quarter stationary window channel lower retainers (one (1) required for right side, two (2) required for left side), (fig. 78).

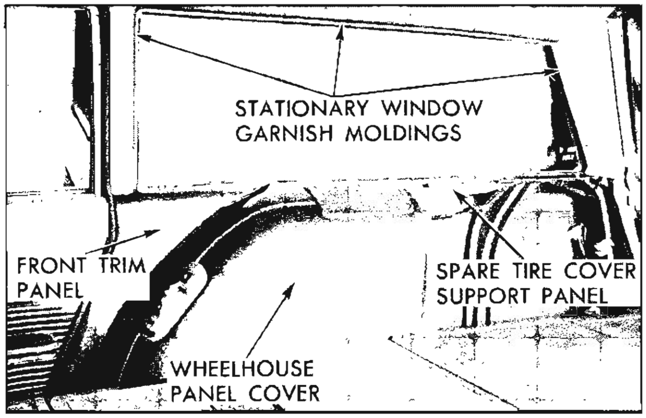


Fig. 78—Stationary Window Assembly

4. Using a suitable tool, carefully break seal between rubber channel and body opening. With aid of helper, carefully push glass and rubber channel inboard and remove assembly from opening.

NOTE: Rubber channel may be removed from glass as a bench operation.

CAUTION: Care should be exercised to make certain glass does not strike body metal during installation. Edge chips can lead to future breaks. Do not attempt to grind glass.

Installation

1. Clean off old sealer from rubber channel and body opening to insure a smooth sealing surface.
2. Apply a ribbon of medium-bodied sealer completely around window opening.
3. Install window assembly and window channel lower retainers.
4. Using a plews oiler or any other suitable applicator, apply an approved weatherstrip adhesive (black) between glass and outer wall of rubber channel completely around window. Clean off excess sealer (fig. 79).
5. Replace all previously removed parts.

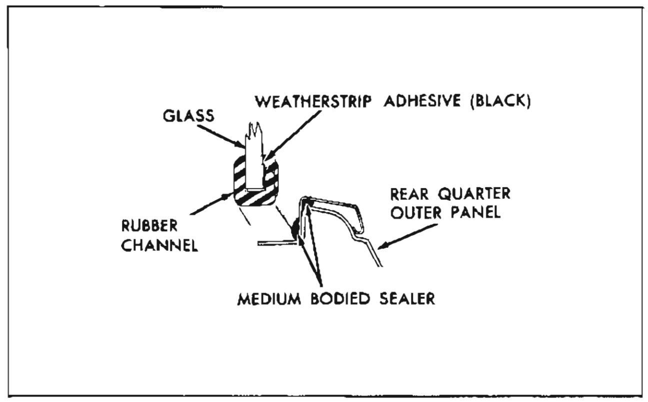


Fig. 79—Stationary Window Sealing

REAR END

BACK WINDOW ASSEMBLY

The back window, made of solid tempered safety plate glass, is retained in the back body opening by a conventional rubber channel that has one cavity to accept the glass and another cavity which "lips over" and accepts the back window opening pinchweld or retaining flange.

To remove the back window and rubber channel assembly, it is necessary to remove the reveal moldings around the periphery of the back window.

Following are the procedures for servicing the back window assembly, including molding removal, back window removal, and back window installation.

Back Window Reveal Molding Retention

The back window reveal moldings are retained by clips which snap over the back window pinchweld or retaining flange and engage, by means of barbed prongs, a flange on the molding, or, as in the case of the lower reveal molding on "47" styles, another clip in the molding.

Figures 80 and 81 illustrate the manner in which the various types of attachment retain the molding.

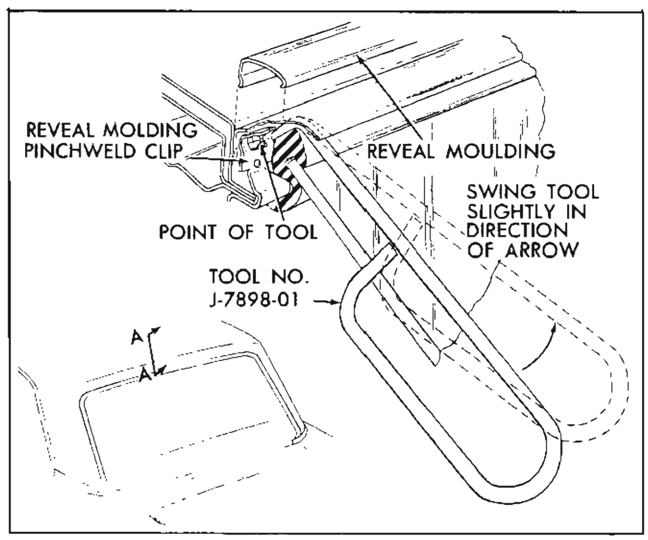


Fig. 80—Back Window Reveal Molding Removal

Figure 80 also illustrates the tool to be used and the proper method for disengaging the molding from the pinchweld type clip.

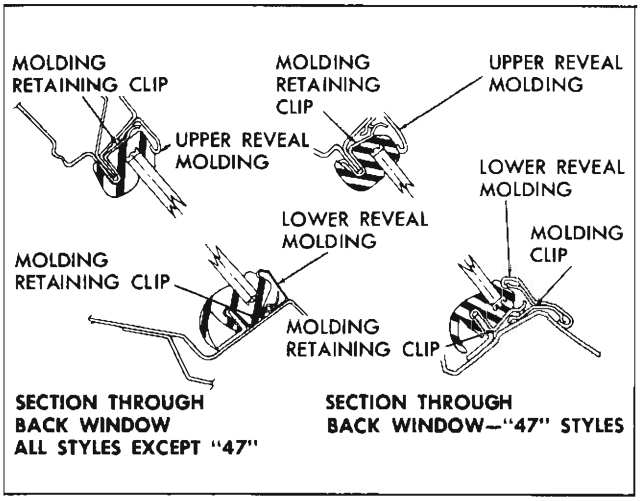


Fig. 81—Back Window Reveal Molding Retention

Pinchweld Clip Disengagement

Insert point of tool J-7898-01 between back window rubber channel and reveal molding. Slide tool along molding until a clip is contacted, then engage point of tool between retaining clip and molding (fig. 80). Swing tool slightly to disengage prongs of clip from moldings and lift molding free of clip. Repeat this operation at each clip location.

NOTE: Do not lift excessively on molding. If clip is disengaged, molding will lift free of clip easily. If clip is not disengaged, any excessive lift on molding will cause prongs of clip to bite harder into molding making disengagement more difficult. If difficulty is being experienced in disengaging clip, push molding at clip location to relieve pressure of clip prongs while continuing efforts to disengage clip.

An occasional application of silicone lubricant to end of tool will help to slide tool between molding and rubber channel.

Lower Reveal Molding

47 Styles

Removal and Installation

Remove belt reveal moldings as described in "Exterior Moldings". Using reveal molding tool J-7898-01 insert point of tool between molding and rubber channel and push or pull **molding** clip sideways to slide it out of engagement from **pinchweld clip** (fig. 81). Perform this operation at each molding clip location and remove molding from body.

Install molding clips in molding so that they will be in position to engage retaining clips on body; then position molding to body and engage clips.

Back Window Assembly

Removal

1. Place protective coverings over rear seat cushion and seat back, over parcel shelf trim and over painted surfaces around back window. Depending on body styles, remove back window garnish moldings or remove headlining retainer finishing lace around back window.
2. Remove back window reveal moldings.
3. From inside body carefully break seal between lip of rubber channel and pinchweld flange completely around back window.
4. Carefully push back window and rubber channel assembly outward until lip of rubber channel is disengaged from body pinchweld flange.
5. With the aid of a helper, lift complete assembly from body opening and place on a protected surface. Remove rubber channel from glass.

IMPORTANT: Care should be exercised to make certain glass does not strike body metal during installation as edge chips can cause solid tempered safety plate glass to shatter. DO NOT attempt to grind glass.

Installation

1. Clean original sealer from back window body opening and rubber channel and install rubber channel to glass.

IMPORTANT: Before installing back window glass, check the back window body opening and pinchweld flange for any irregularities and correct, where necessary.

2. Check installation of reveal molding clips at pinchweld and retaining flanges and replace clips, where necessary. If replacing clips, apply medium-bodied sealer to opening rabbet, prior to installing clips (see "1" in View "A" Figure 82).
3. Apply a continuous $\frac{3}{16}$" diameter ribbon of medium-bodied sealer on wall of rabbet, completely around opening (see "2" in Section "B-B" Figure 82).
4. Insert a strong cord into pinchweld cavity of rubber channel; tie ends together at bottom center and tape to inside surface of glass.
5. Apply a continuous ribbon of medium-bodied sealer (approximately ½ inch wide by ¼ inch thick) to base of rubber channel across top and down sides (see "3" in Section "B-B" Figure 82).
6. With aid of a helper, position back window assembly into body opening. While helper is applying hand pressure to outside surface of glass, use a hooked tool or other suitable tool to pull inner lip of rubber channel (located along lower portion of channel) over retaining flanges along bottom opening.

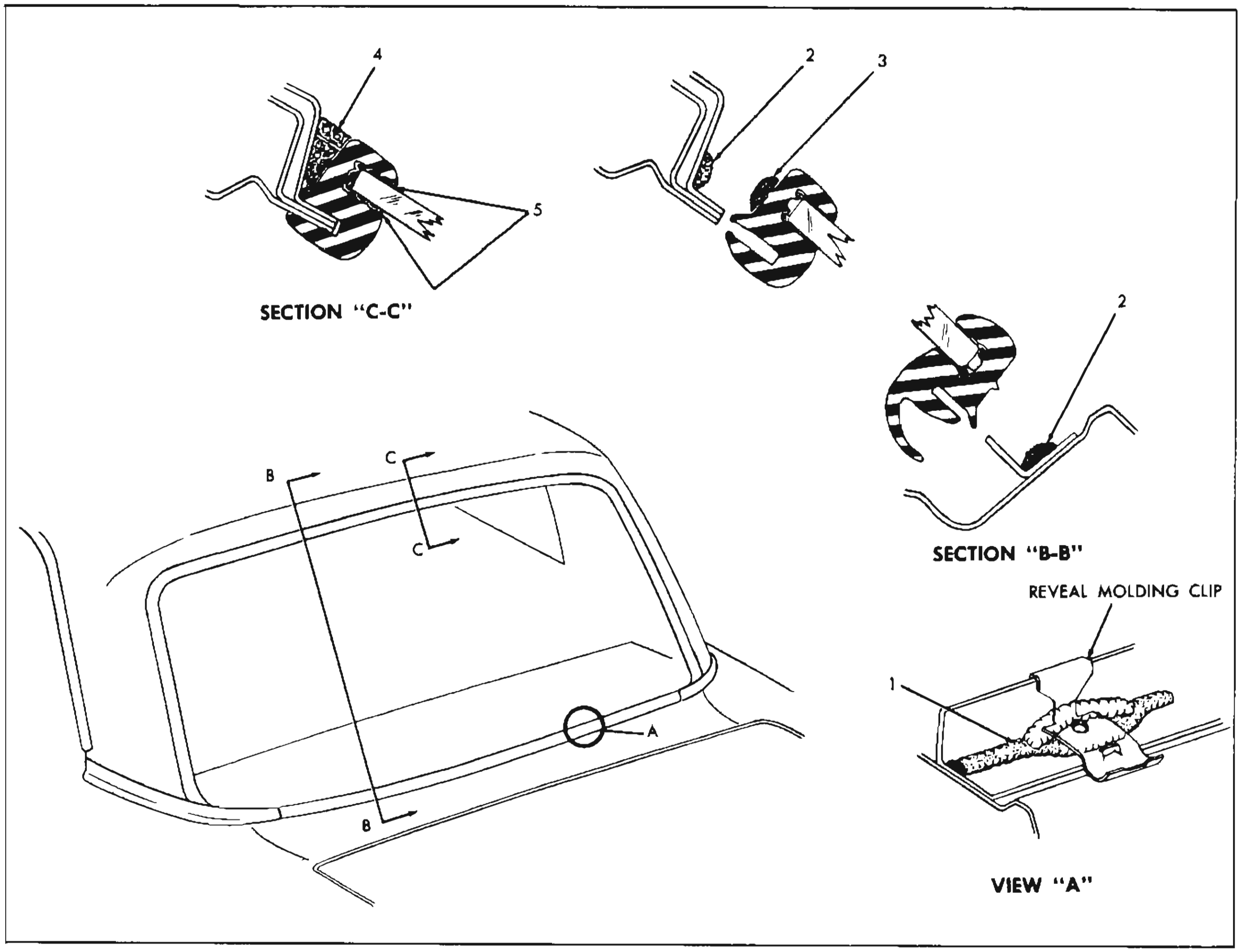


Fig. 82—Back Window Sealing

7. With aid of helper applying hand pressure to outside surface of glass, pull cords in rubber channel and, where necessary, use a hooked tool to seat lip of rubber channel over body flanges across bottom, up sides and across top of window opening.

   IMPORTANT: If, during the string-pulling operation, the rubber lip is not seating properly over the body flange, check for locations where rubber channel is tight against the body flange preventing forward movement of the glass and channel assembly into the opening. Using a hooked tool, seat the rubber lip over the body flange at any tight locations before proceeding with the cord-pulling sequence.

8. Using a pressure-type applicator, apply sufficient medium-bodied sealer to completely fill any openings between rubber channel and body completely around rubber channel (see "4" in Section "C-C" Figure 82).

9. Using a pressure-type applicator (Pistol-type oiler) apply weatherstrip adhesive (black) between rubber channel and glass on inside and outside of glass around entire perimeter of glass (see "5" in Section "C-C" Figure 82). Application of adhesive should be continuous with no skips.

10. Install back window moldings as described under "Back Window Reveal Moldings."

11. Clean off excess sealer and cement; install previously removed parts and remove protective coverings.

REAR COMPARTMENT

The rear compartment lid employs two torsion rods that are mounted between the lid and hinge assemblies to act as a counterbalance and hold-open for the lid. Notches at the hinge end of the rods allow for adjustment of the rods to increase or decrease operating effort of the lid.

The rear compartment lid lock employs a side-action snap-bolt mechanism that has provisions at the attach-

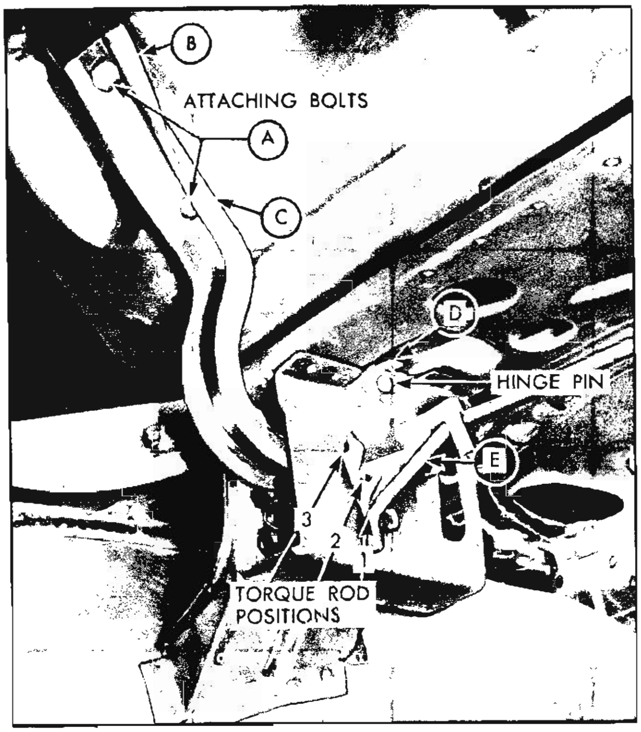


Fig. 83—Rear Compartment Hinge and Torque Rod

ing locations for lateral adjustment. Up and down adjustment is available at the striker attaching locations.

All styles use a single section cement-on type weatherstrip which is cemented to the rear compartment gutter completely around the lid opening.

Rear Compartment Lid

Removal and Installation

1. Open lid and place protective covering along edges of rear compartment opening to prevent damage to painted surface.
2. Disengage wire harness from clips on hinge and rear compartment lid inner panel and remove wire harness from lid where necessary.
3. Mark location of hinge straps on lid inner panel.
4. With aid of helper, remove lid attaching bolts "A" (fig. 83) and remove rear compartment lid.
5. To install rear compartment lid reverse removal procedure. Align lid with scribe marks before tightening hinge attaching bolts.

Rear Compartment Lid Adjustments

1. To adjust compartment lid forward or rearward, or from side to side in body opening, loosen both hinge strap attaching bolts and adjust lid as required; then tighten bolts.
2. To adjust compartment lid at hinge area up or down, install shims between lid inner panel and hinge straps as follows:
   a. To raise front edge of lid at hinge area, place shim between lid inner panel and forward portion of one or both hinge straps at "C" Figure 83.
   b. To lower front edge of lid at hinge area, place shim between lid inner panel and rearward portion of one or both hinge straps at "B" Figure 83.
3. To check lid lock bolt engagement with striker, see "Rear Compartment Lid Lock Striker Engagement Check."

Rear Compartment Lid Hinge

Removal

1. Place protective covering over body around upper portion of rear compartment opening and provide support for lid on side where hinge is to be removed.
2. Remove rear compartment side trim foundation at hinge area if necessary. If left hinge is being removed, disengage wire harness from clip on left hinge.
3. Mark location of hinge strap on lid inner panel and remove bolts securing hinge strap to lid.
4. With a suitable tool disengage torque rod from notched retainer on inboard face of opposite hinge box "E" (fig. 83).

   NOTE: Mark retainer notch before removing torque rod to insure that rod is installed in same position.

5. Disengage opposite end of torque rod from movable portion of hinge strap and remove rod.
6. Bend up hinge pin retaining tab on inboard face of hinge box "D" (fig. 83); remove hinge pin and then remove hinge from box.

Installation

1. Position hinge in hinge box and install hinge pin. Bend over retaining tab to secure hinge pin.
2. Position hinge strap within scribe marks on lid inner panel and install attaching bolts.
3. Install "U" shaped end of torque rod to hinge box making certain outer end of rod is engaged in hole in outboard face of hinge box.
4. Engage torque rod to lower movable portion of hinge and engage other end of rod to correct retaining notch in inboard face of opposite hinge box.
5. Check alignment of rear compartment lid and make any necessary adjustments.
6. Replace wire harness if left hinge was removed.
7. Replace all previously removed trim.

Rear Compartment Torque Rod Adjustment

The amount of effort required to open and close the rear compartment lid is determined by the position of the torque rod in the notches on the inboard face of the hinge boxes. If the torque rod is located in the lowest most forward notch (position #1), the amount of effort required to open the lid is the greatest and the amount of effort required to close the lid is the least. If the torque rod is located in the top or most rearward notch (position #3) the amount of effort to open the lid is the least and the amount of effort to close the lid is the greatest. See "E" (fig. 83).

NOTE: It is not necessary to adjust the left and right hand torque rods at the same time or to the same final position (notch).

Rear Compartment Lid Lock Cylinder

Removal and Installation

1. Open rear compartment lid. Remove lock cylinder retainer attaching screws located on lid inner panel below lock cylinder and adjacent to lid hemming flange.
2. Pull downward on retainer to disengage from lock cylinder and remove retainer from lid. Lock cylinder is now free and can be removed from compartment lid outer panel.
3. To install, reverse removal procedure. Make certain lock cylinder shaft engages with lock and that gasket mates properly with compartment lid outer panel to form a watertight seal. Check lock for proper operation.

Rear Compartment Lid Lock

Removal and Installation

1. Remove rear compartment lid lock cylinder assembly as previously described.
2. Remove rear compartment lid lock attaching screws (fig. 79) and remove lock assembly.
3. To install, reverse removal procedure. Check lock engagement with striker and make any necessary lateral adjustments before tightening screws.

Rear Compartment Lid Lock Striker

Removal and Installation

1. Open rear compartment lid. Mark vertical position of striker by scribing line on striker at top of striker support. Mark horizontal position of striker on striker support.
2. Remove striker attaching screws (fig. 84) and remove striker.
3. To install, reverse removal procedure. Close lid to check lock to striker engagement and make necessary vertical adjustments before tightening striker attaching screws.

Rear Compartment Lid Lock Striker Engagement

IMPORTANT: Since the rear compartment lock frame acts as a guide when entering the striker, make sure rear compartment lid is properly positioned in body opening before performing striker engagement check. To check for proper engagement of rear compartment lid lock bolt with striker, use the following procedure:

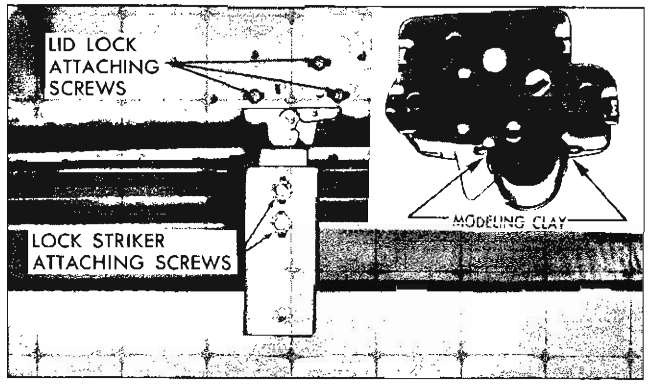


Fig. 84—Rear Compartment Lid Lock and Striker

a. Insert a small quantity of modeling clay on frame of lock at both sides of the lock bolt (fig. 84). Close lid with moderate force.
b. Open lid and check amount of engagement of striker with lock frame as indicated by the compression of the clay. The striker bar impressions in the clay should be even on both sides of the lock frame. Where required, loosen striker or lock attaching screws; adjust lock sideways or striker up or down to obtain proper engagement; then, tighten screws.

TAIL GATE

35-45 Styles

All tail gates incorporate either a manually operated or electrically operated tail gate window which can be lowered into the tail gate or raised into the upper portion of the back body opening. The manually operated tail gate window is operated by means of a window regulator control handle (folding type) located in the tail gate outer panel. The electrically operated tail gate window can be operated from any one of two control switches: (1) control switch located on instrument panel; (2) lock cylinder control switch (key operated) located in tail gate outer panel. In addition, on nine passenger station wagon styles, the window can be operated by a control switch located in the upper portion of the left rear quarter trim assembly. A switch located at the right tail gate lock prevents the up cycle operation of the electrically operated tail gate window when the tail gate is not completely closed.

After lowering the tail gate window the tail gate can be opened by means of a tail gate lock remote control inside handle located at the tail gate belt finishing molding. On styles with the electrically operated tail gate window the tail gate lock remote control incorporates a safety feature which prevents operation of

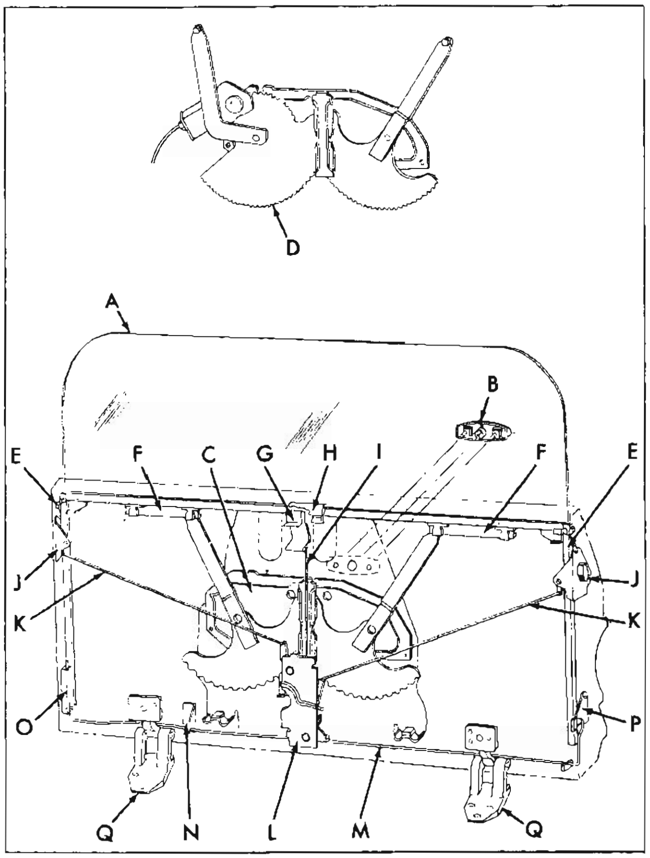


Fig. 85—Tail Gate Assembly Components

A. Tail Gate Window
B. Tail Gate Window Regulator Outside Handle or Lock Cylinder Switch and Escutcheon
C. Tail Gate Window Regulator (Manual)
D. Tail Gate Window Regulator (Electric)
E. Tail Gate Window Glass Side Run Channels
F. Tail Gate Window Lower Sash Channel Cams
G. Tail Gate Window Anti-Rattle Clip
H. Tail Gate Lock Remote Control Inside Handle
I. Tail Gate Lock Remote Control Inside Handle-to-Remote Control Connecting Rod
J. Tail Gate Locks
K. Tail Gate Lock-to-Remote Control Connecting Rods
L. Tail Gate Lock Remote Control
M. Tail Gate Torque Rod
N. Tail Gate Torque Rod Lower Retainer
O. Tail Gate Torque Rod Side Retainer
P. Tail Gate Torque Rod Mounting Plate—On Body Pillar
Q. Tail Gate Hinges

the inside handle unless the tail gate window is in the full down position.

The tail gate hinges are secured to the body rear cross bar and the tail gate inner panel by screws, which are accessible upon removal of the cross bar hinge cover plate and tail gate inner cover panel.

The tail gate is counterbalanced by a single torque rod that is secured at the left rear body opening pillar by a mounting plate and between the tail gate panels by a retainer welded to the tail gate right side facing. When the tail gate is opened the portion of the torque rod inside of the tail gate rotates with the gate while the end of the rod secured to the body pillar remains stationary. This creates an assisting torque to hold the tail gate as the gate approaches and reaches the open position. This torque also assists in closing the tail gate. Figure 85 is a phantom view which identifies and shows the relationship of major component parts of the tail gate assembly.

Tail Gate Assembly

Removal and Installation

1. Open tail gate and remove tail gate inner cover panel lower retainer and inner cover panel.
2. Carefully remove inner panel water deflector. Through small hole in access hole covers disengage remote control to lock connecting rods from clips on access hole covers by lifting rods upward. Remove both large access hole covers.
3. On styles equipped with electrically operated tail gate window remove tail gate window. Remove lock cylinder switch and escutcheon assembly as described under "Lock Cylinder Switch and Escutcheon Assembly—Removal and Installation." Detach harness connector from regulator motor.
4. On all styles, detach harness connectors from tail lights in tail gate and detach harness from clips inside the tail gate; then remove harness from tail gate.
5. Mark position of tail gate hinge (tail gate side) to facilitate installation in same position.
6. Raise tail gate to approximately a vertical position to relieve torque from torque rod. Remove torque rod mounting plate attaching screws (fig. 86) from left body pillar and remove mounting plate.
7. Suitably support tail gate to facilitate detachment of tail gate supports, then remove support attaching screws (fig. 87) from both sides of tail gate and fold supports against body.

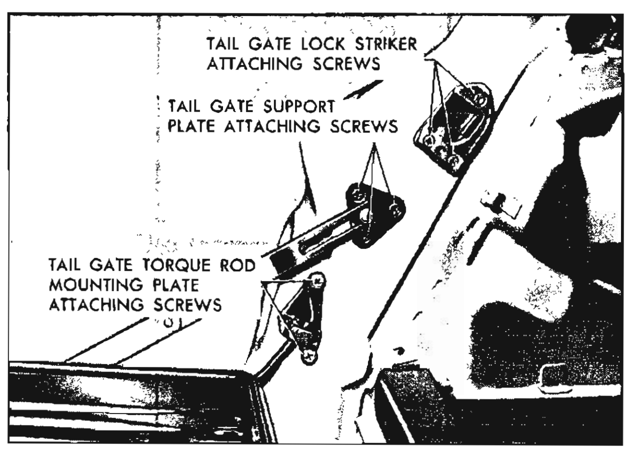


Fig. 86—Tail Gate Support and Torque Rod Attachment

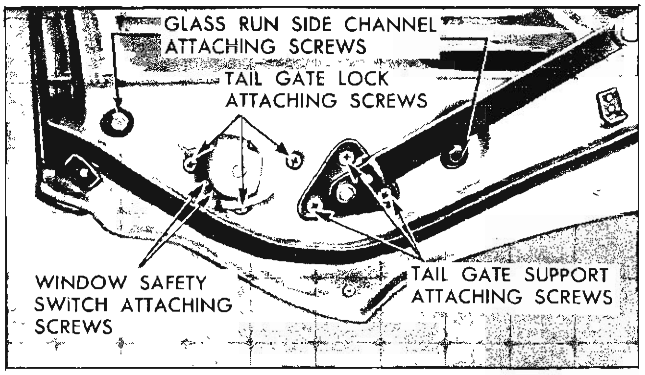


Fig. 87—Tail Gate Lock and Support

8. With the aid of a helper remove tail gate to hinge attaching screws (fig. 88) from both hinges and remove tail gate assembly from body.
9. To install tail gate assembly reverse removal procedure. Prior to installation apply a coat of heavy bodied sealer to surface of hinge straps that contact tail gate inner panel (fig. 89).

Where necessary, adjust tail gate for proper alignment in body opening as specified under "Tail Gate Adjustments."

Tail Gate Adjustments

To adjust the tail gate assembly "up or down" sideways in the body opening loosen the tail gate to hinge attaching screws (fig. 88); shift tail gate to desired position and retighten screws.

To adjust the tail gate assembly forward or rearward in the body opening loosen the tail gate hinge to rear body cross bar attaching screws, shift tail gate assembly to the desired position and retighten the screws.

If "up or down" or "in or out" adjustment of tail gate has affected lock striker engagement, adjust strikers as described under "Tail Gate Lock Striker Adjustment."

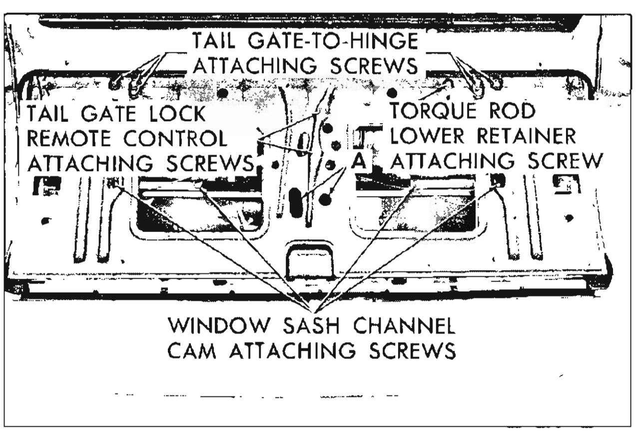


Fig. 88—Tail Gate Hardware

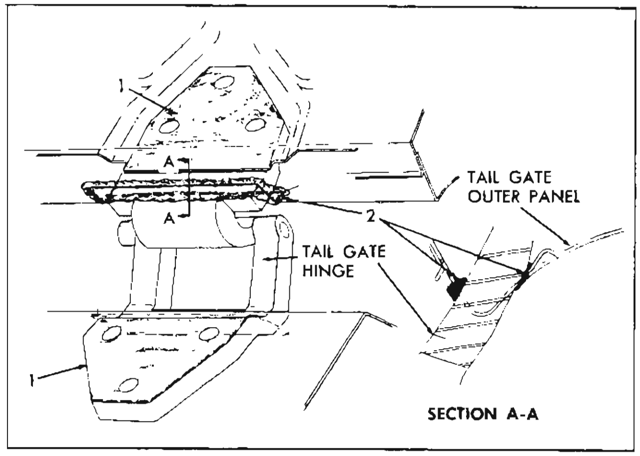


Fig. 89—Tail Gate Hinge Assembly

Tail Gate Torque Rod

Removal and Installation

1. Open tail gate and remove tail gate inner cover panel lower retainer, inner cover panel, inner panel water deflector, and both large access hole covers.
2. Raise tail gate to almost a vertical position to relieve torque from torque rod. Remove torque rod mounting plate attaching screws from left body pillar and remove mounting plate (fig. 86).
3. Lower tail gate to open position. Remove screws securing torque rod bearing plate to tail gate left side lower facing and remove bearing plate and bearing and bearing plate sealing washer through access hole.
4. Remove torque rod lower retainer attaching screw (fig. 88) and remove retainer.
5. Remove remote control assembly attaching screws (fig. 88) and lay remote control assembly on tail gate window.
6. Work torque rod out of tail gate through torque nut entrance hole at left lower corner of tail gate side facing.
7. To install tail gate torque rod, reverse removal procedure. Make sure left end of torque rod is properly engaged in both notches of side retainer at left side of tail gate (fig. 85).

   Lubricate nylon insert in torque rod mounting plate with Lubriplate or its equivalent. Wipe off excess lubricant.

Tail Gate Hinge

Removal and Installation

1. Remove tail gate assembly.
2. On side of body from which hinge is being removed, loosen rear bumper sufficiently to allow hinge to be removed from body.

3. Scribe (mark) position of hinge to facilitate installation in same position.
4. Remove hinge attaching bolts and remove hinge from body.
5. To install tail gate hinge, reverse removal procedure. Prior to installation apply a coat of heavy bodied sealer to surfaces of hinge strap which contact tail gate inner panel and body rear cross bar (fig. 89). Where necessary adjust tail gate for proper alignment in body opening as described under "Tail Gate Adjustments."

Tail Gate Window Assembly—Manual and Electric

Removal and Installation

1. Remove inner cover panel lower retainer and inner cover panel.
2. Detach tail gate inner panel water deflector sufficiently to gain access to window lower sash channel attaching bolts (fig. 88). Remove tail gate inner panel access hole covers.
3. Carefully operate window upward until the window lower sash right and left cam attaching bolts are accessible through access holes (fig. 88).
4. Remove window lower sash channel right and left cam attaching bolts (fig. 88) and disengage cams from window lower sash channel. Remove window assembly from tail gate.

   NOTE: To open the tail gate on styles with electric windows when window assembly is removed, depress tail gate lock remote control locking lever through access hole at location "A," (fig. 88) and at the same time operate the tail gate remote control inside handle.

5. To install tail gate window assembly, reverse removal procedure. Prior to installing window lower sash channel cams, lubricate channel portion of cams with "Lubriplate" or its equivalent. Prior to resealing tail gate inner panel water deflector, check operation of window and tail gate locking mechanisms. Where necessary, adjust tail gate window, tail gate lock strikers or tail gate lock remote control for proper operation. Reseal tail gate inner panel water deflector as specified under "Tail Gate Inner Panel Sealing."

If the tail gate cannot be opened due to the window becoming inoperative while in an up position, proceed as follows:

1. Using an offset screwdriver, remove tail gate inner cover panel attaching screws. Lift panel upward to disengage it from lower retainer.

   NOTE: Due to inaccessibility, it may be necessary to cut lower left cover panel attaching screws by chisel. To make chisel, taper one end of an 18" x 1" x ⅛" piece of steel. Cut lower screws by inserting chisel between tail gate inner panel and tail gate cover panel.

2. Remove inner panel access hole cover upper attaching screws. Loosen access hole cover lower attaching screws and remove cover by lifting it upward.
3. Remove lower sash channel cam attaching screws and lower window assembly into tail gate. Open tail gate.

In the event the window is inoperative in the full "up" position, the window regulator attaching screws can be removed and the window and regulator lowered sufficiently to allow removal of the window lower sash channel cam attaching screws.

Tail Gate Window Adjustments

1. To adjust the tail gate window forward or rearward for proper alignment with the window glass run channels on the body and/or to eliminate a binding condition of the window in the tail gate glass run side channel(s), loosen lower attaching bolt at tail gate lock pillar; move lower end of channel forward or rearward, as required, and tighten lower attaching bolts.

   NOTE: The vertical portion of the tail gate window glass upper run channels are adjustable forward or rearward for proper alignment with the tail gate glass.

2. To correct a condition where the glass is "cocked" in the glass run channels, loosen window regulator attaching screws (fig. 90), rotate regulator assembly clockwise or counterclockwise, as required, to eliminate "cocked" condition.

Tail Gate Window Regulator Assembly—Manual or Electric

Removal and Installation

1. Remove tail gate window assembly, as described under "Tail Gate Window Assembly—Removal and Installation."
2. Detach tail gate lock remote control right connecting rod from remote control at "A" (fig. 90).
3. On styles equipped with electrically operated tail gate window; disconnect tail gate harness connector from regulator motor.

   CAUTION: Do not operate regulator motor after window assembly is disengaged from the regulator or after the regulator is removed from the tail gate. Operation of the motor with the load removed may damage the unit and make it inoperative.

4. Remove regulator attaching screws through access holes at locations shown in Figure 90. Remove regulator assembly through large access hole.

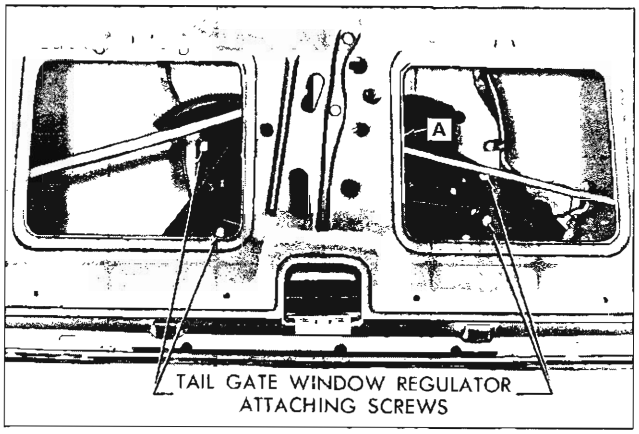


Fig. 90—Tail Gate Window Regulator

NOTE: To remove electric motor from regulator assembly see "Tail Gate Window Regulator Electric Motor Assembly—Removal and Installation."

5. To install tail gate window regulator assembly, reverse removal procedure. Prior to installing regulator, lubricate the teeth on the regulator sectors with "Lubriplate" or its equivalent.

Prior to resealing tail gate inner panel water deflector, check operation of window and tail gate locking mechanism. Where necessary, adjust tail gate window, tail gate lock strikers or tail gate lock remote control for proper operation.

Tail Gate Window Regulator Electric Motor Assembly

Removal and Installation

The following method of removing and installing the tail gate window regulator electric motor assembly can be used whether the motor is operative or inoperative; however, if the motor is inoperative with the window more than approximately half way down it will be necessary to detach the window from the regulator lift arms and lift the glass to gain access to the regulator motor attaching screws.

Removal

1. Open tail gate and remove tail gate inner cover panel.

   NOTE: If tail gate cannot be opened due to an inoperative regulator motor, perform removal operations from inside body.

2. Remove or detach inner panel water deflector. Remove inner panel right access hole cover.
3. Disconnect wire harness connector from motor.

   NOTE: If regular motor is inoperative with window more than half way down, remove inner panel left access hole cover; then remove both right and left window lower sash channel cam attaching screws (fig. 88) and lift window sufficiently to gain access to motor attaching screws. Prop window in up position.

4. **IMPORTANT:** The following operation **must** be performed if the window is removed or disengaged from the regulator lift arms. The regulator lift arms which are under tension from the counterbalance spring can cause serious injury if the motor is removed without locking the sector gears in position.

   Drill a 1/8" hole through regulator sector and back plate (fig. 91)—**DO NOT** drill hole closer than 1/2" to edge of sector or backplate or holes in sector or back plate. Install a pan head sheet metal tapping screw (#10-12 x 5/8) in previously drilled 1/8" hole to lock regulator sector gears and retain counterbalance spring tension.

5. Loosen regulator right attaching screws (fig. 91). Remove three (3) regulator motor attaching screws (fig. 91) and remove motor assembly from regulator and tail gate.

Installation

1. Lubricate motor drive gear and regulator sector teeth with Lubriplate or equivalent.
2. With tail gate in open position, position regulator motor to regulator making sure motor pinion gear teeth mesh properly with sector gear teeth; then, install three (3) regulator motor attaching screws.
3. Tighten regulator upper right attaching screw.
4. **IMPORTANT:** If sector gears were locked, remove screw locking sector gears after motor assembly is secured to regulator.

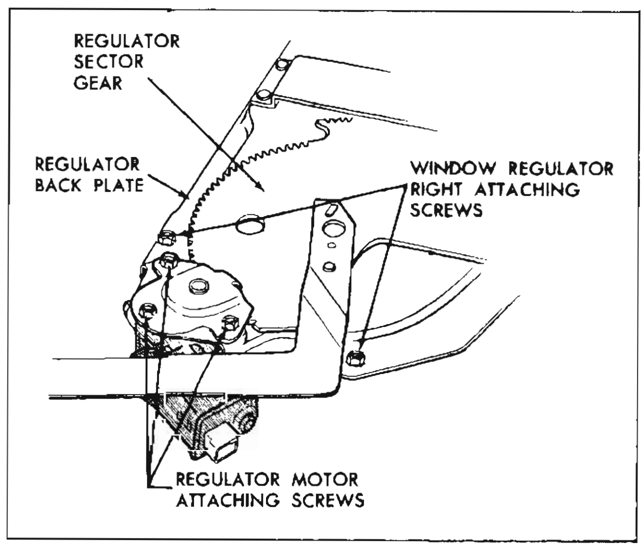


Fig. 91—Window Regulator Motor Removal

5. Connect wire harness connector to motor. Check operation of tail gate window.
6. Install tail gate inner panel access hole over, inner panel water deflector and inner cover panel.

Tail Gate Window Regulator Outside Handle Assembly

Removal and Installation

1. Remove inner cover panel lower retainer and inner cover panel.
2. Detach tail gate inner panel water deflector sufficiently to gain access to holes "A" for removal of handle attaching nuts (fig. 92).

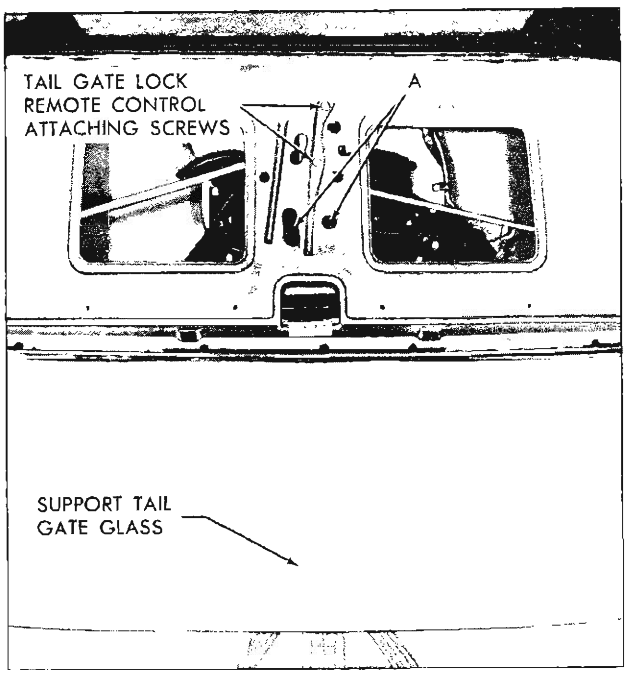


Fig. 92—Outside Handle and Lock Remote Control

3. Carefully raise window until holes in window regulator are aligned with holes "A" in inner panel.

   CAUTION: Support portion of glass extending out of tail gate (fig. 92).

   Through holes "A," remove outside handle attaching nuts and remove outside handle and gasket from tail gate.

   To disassemble tail gate handle assembly, see "Tail Gate Handle Assembly--Disassembly and Assembly."
4. To install tail gate handle, assembly, reverse removal procedure. Make sure sealing gasket is installed between tail gate outer panel and handle escutcheon and make sure handle clutch is properly engaged with window regulator clutch. Check operation of window prior to resealing water deflector. Reseal tail gate inner panel water deflector as specified under "Tail Gate Inner Panel Water Deflector."

Tail Gate Window Regulator Outside Handle Lock Cylinder and Cap Assembly

Removal and Installation

1. Remove tail gate window regulator outside handle assembly from tail gate, as previously described.
2. Remove clutch retaining ring and slide clutch off shaft of handle driver (fig. 93).
3. Insert key in lock cylinder and turn key to lock position. Depress locking pawl (fig. 93), turn key (lock cylinder) approximately ¼ turn counterclockwise and remove lock cylinder assembly, locking pawl and locking pawl spring from handle driver.
4. To install lock cylinder assembly, reverse removal procedure. Prior to installing clutch on handle driver lubricate frictional surfaces with "Lubriplate 630 AAW" or its equivalent.

Tail Gate Window Regulator Outside Handle Assembly

Disassembly and Assembly

1. Remove tail gate window regulator outside handle assembly from tail gate, as previously described.
2. Remove clutch retaining ring and slide clutch off shaft of handle driver (fig. 93).
3. Using a snap ring removal tool, remove retaining ring securing handle assembly (fig. 93), remove washer and spring washer from shaft of handle driver and remove handle assembly from escutcheon.
4. To remove handle and knob assembly, remove handle hinge pin screws (fig. 93) and remove handle and knob assembly from handle driver.
5. To remove lock cylinder and cap assembly, locking pawl or locking pawl spring see "Tail Gate Window Regulator Outside Handle Lock Cylinder and Cap Assembly--Removal and Installation."

   To assemble tail gate window regulator outside handle assembly, reverse disassembly procedure. Prior to assembly lubricate frictional surfaces with "Lubriplate 630 AAW" or its equivalent.

Tail Gate Electric Window Lock Cylinder, Switch and Escutcheon Assembly

Removal and Installation

1. Remove inner cover panel lower retainer and inner cover panel.

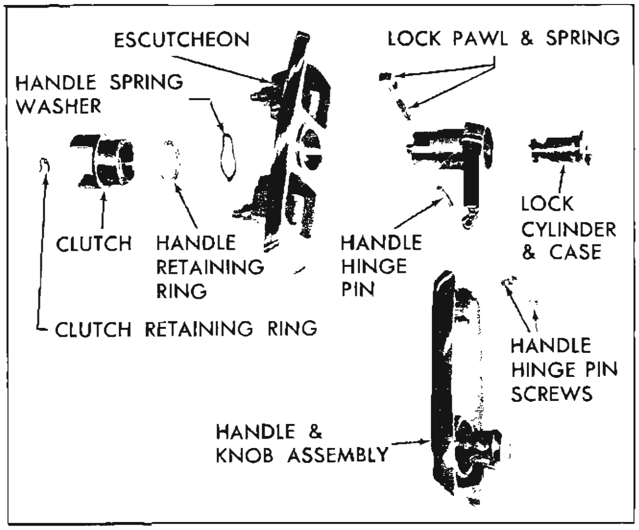


Fig. 93—Tail Gate Window Regulator Outside Handle Assembly

2. Detach tail gate inner panel water deflector sufficiently to gain access to holes "A" for removal of attaching nuts (fig. 92).

3. Carefully operate window upward until holes in window regulator assembly are aligned with holes "A" in inner panel.

   CAUTION: Support portion of glass extending out of tail gate (fig. 92).

   Through holes "A," remove electric window lock cylinder, switch and escutcheon assembly attaching nuts, detach assembly from tail gate sufficiently to disconnect junction block from switch; then, remove assembly and gasket from tail gate.

   To disassemble tail gate electric window lock cylinder, switch and escutcheon assembly see "Tail Gate Electric Window Lock Cylinder, Switch and Escutcheon Assembly—Disassembly and Assembly."

4. To install tail gate electric window lock cylinder, switch and escutcheon assembly, reverse removal procedure.

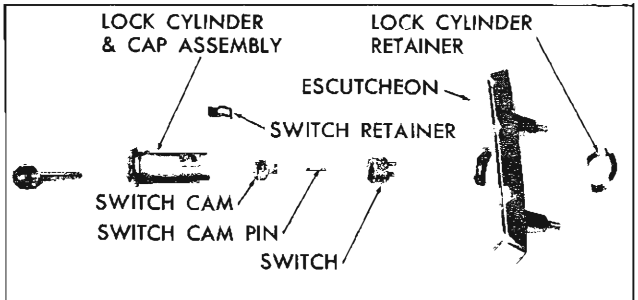
Tail Gate Electric Window Lock Cylinder, Switch and Escutcheon Assembly

Disassembly and Assembly

1. Remove tail gate electric window lock cylinder, switch and escutcheon assembly, as previously described.

2. Disengage lock cylinder and switch retainer (fig. 94) and remove lock cylinder and switch assembly from escutcheon.

3. Using a pointed tool inserted through hole in lock cylinder case, depress tab of switch retainer and remove retainer and switch (fig. 94).



TAIL GATE ELECTRIC LOCK CYLINDER, SWITCH & ESCUTCHEON ASSEMBLY

Fig. 94—Tail Gate Electric Lock Cylinder, Switch and Escutcheon Assembly

4. Using suitable pliers, grasp pin of switch cam firmly and pull switch cam straight out from lock cylinder (fig. 94).

   NOTE: Pin is pressed into lock cylinder and may require a firm pull to release.

5. Using a suitable tool, bend out crimped flange of lock cylinder cap sufficiently to remove cap; then, remove lock cylinder cap and springs.

   NOTE: The crimped flange on production lock cylinder cap necessitates damaging cap during removal from lock cylinder case; however, service replacement caps are available which have four (4) bend over tabs for installation.

6. Prior to assembly of lock cylinder and switch, lubricate frictional surfaces with "Lubriplate" or its equivalent.

   To assemble lock cylinder and switch, first insert lock cylinder in lock cylinder case, place cap and springs in position and install a new service replacement lock cylinder case cap.
   Insert key in lock cylinder and turn key to off position (straight up and down). Carefully insert switch cam into lock cylinder making sure notch in switch cam is engaged with pawl on end of lock cylinder and ends of spring are in cut-out of lock cylinder case. Holding switch cam in position check operation of key (lock cylinder). If lock cylinder operates properly, apply a small amount of cement on serrated end of switch cam pin to assure that pin will be securely retained to lock cylinder; then install pin—press or tap pin in until shoulder of pin is flush against switch cam. Install switch into lock cylinder case. Position lock cylinder and switch assembly into escutcheon and engage retainer.

Tail Gate Support Assembly

Removal and Installation

1. Lower tail gate.
2. Suitably support tail gate to prevent damage to tail gate outer panel.

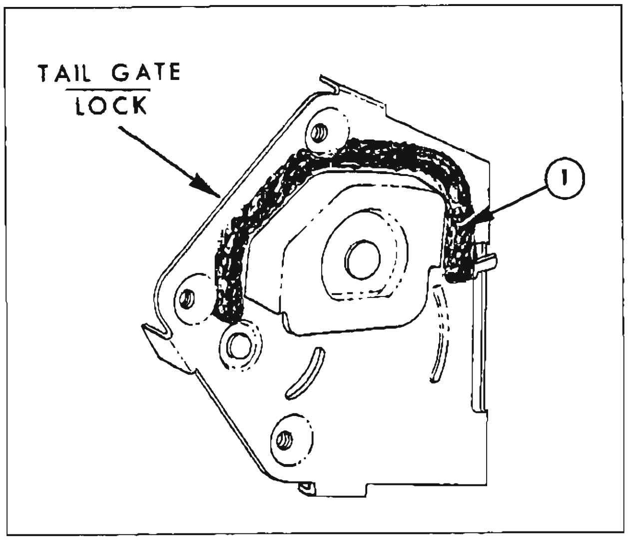


Fig. 95—Tail Gate Lock Sealing

3. Remove tail gate support attaching screws securing support plates to body and tail gate (figs. 86 and 87) and remove support assembly.
4. To install tail gate support assembly, reverse removal procedure. Install support plate to body with positioning dimple towards front of body (fig. 86).

NOTE: Objectionable slack in either tail gate support (when tail gate is open) can be eliminated by rotating one or both support attaching plates at the body pillar(s). The following adjustments can be obtained by rotating the support plate.

Adjustment

1. Positioning dimple towards bottom shortens support approximately 3/8 inch from production installation.
2. Positioning dimple towards top shortens support approximately 3/4 inch from production installation.

Tail Gate Lock Assembly—Right or Left

Removal and Installation

1. Remove tail gate window assembly.
2. Remove tail gate window glass run side channel attaching screws (fig. 87) and remove channel from side of tail gate from which lock is being removed.
3. Disengage spring clip and detach lock remote control connecting rod from lock remote control (fig. 95).
4. Remove tail gate lock attaching screws (fig. 87) and remove tail gate lock with attached connecting rod from tail gate; then detach connecting rod from lock.

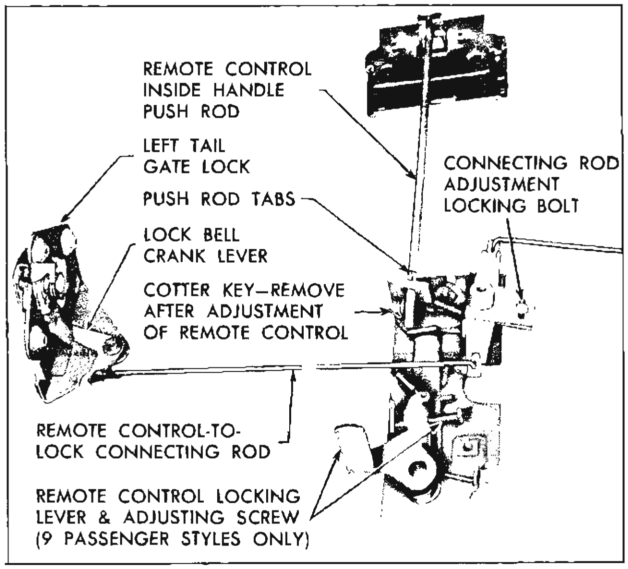


Fig. 96—Tail Gate Lock and Remote Control

5. To install tail gate lock assembly, reverse removal procedure. Prior to installing lock assembly into tail gate, apply a bead of body caulking compound to lock frame along the joint of the lock bolt housing ("1" in Figure 96).

To attach lock connecting rod to remote control lever, first, loosen connecting rod adjustment locking bolt at remote control (fig. 95); then, install rod to lever and tighten locking bolt.

NOTE: Check clips at ends of remote control levers for proper retention of connecting rods and replace if necessary.

Prior to resealing water deflector, check operation of tail gate locking mechanism.

Tail Gate Lock Striker

Removal and Installation

1. Open tail gate and with pencil, mark position of striker on body pillar.
2. Remove lock striker attaching screws and remove striker and adjusting plates from body pillar.
3. To install tail gate lock striker, place striker and adjusting plates within marks on body pillar and install striker attaching screws.

Tail Gate Lock Striker Adjustments

1. To adjust the tail gate lock striker up or down or forward or rearward, loosen striker attaching screws, shift striker and adjusting plates to desired position, then tighten striker attaching screws.
2. DIMENSIONAL SPECIFICATIONS FOR USE OF DOOR LOCK STRIKER EMERGENCY SPACERS.

a. Tail gate should be properly aligned before checking spacer requirements.

b. To determine if tail gate lock striker emergency spacers are required, apply modeling clay or body caulking compound in the lock striker notch where the lock extension engages and then close the tail gate to form a measurable impression in the clay or caulking compound, as shown in Figure 97.

When dimension "A" from inside face of striker teeth to center of lock extension is less than 3/16" install emergency spacers and proper length striker attaching screws as directed.

Dimension "A"	No. of Spacers Required	Spacer Thickness	Striker Attaching Screws*
3/16" to 1/8"	1	1/16"	Original Screw
1/8" to 1/16"	1	1/8"	Emergency Screw (1/8" longer)
1/16" to 0	1 (1/8" Spacer) 1 (1/16" Spacer)	3/16" (Total)	Emergency Screw (1/4" longer)
0 to 1/16" Interference	2 (1/8" Spacer)	1/4" (Total)	Emergency Screw (1/4" longer)

*Zinc or cadmium-plated flat-head cross-recess screw with countersunk washer.

NOTE: Dimension "B" from center of lock extension to inside face of striker should never be less than 1/16".

Tail Gate Lock Remote Control Inside Handle Assembly

Removal and Installation

1. Remove tail gate belt finishing molding and tail gate inner cover panel. Detach inner panel water deflector sufficiently to gain access to inner panel.
2. Loosen tail gate lock remote control attaching screws (fig. 92) and move remote control towards bottom of tail gate sufficiently to disengage end of handle push rod from hole in remote control lever.

NOTE: In some instances it may be necessary to reach into tail gate and actuate remote control lever to disengage push rod from lever.

3. Remove handle attaching screws located under handle and remove handle assembly (includes push rod) from tail gate.
4. To install tail gate lock remote control handle assembly, reverse removal procedure. Lubricate frictional points of inside handle assembly with "Lubriplate" or its equivalent.

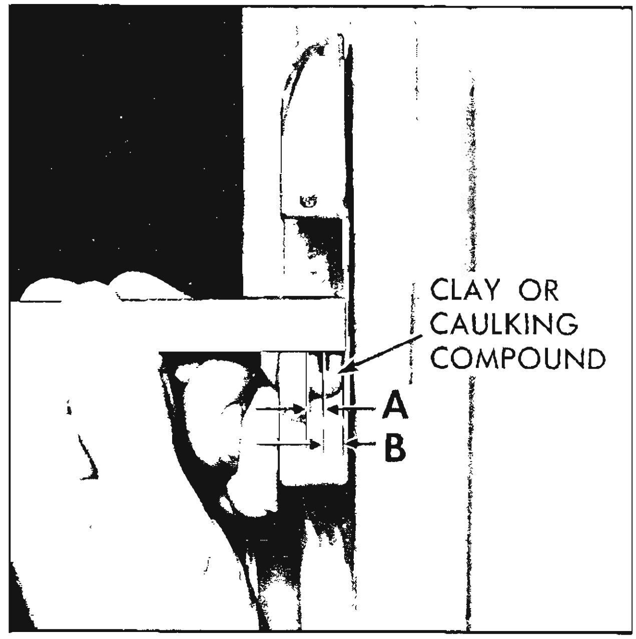


Fig. 97—Tail Gate Striker Engagement Check

NOTE: To engage end of handle push rod into hole in remote control lever, it may be necessary to raise window in tail gate to gain access to lever. Adjust remote control upward until tabs on handle push rod (fig. 95) just contact remote control lever.

Prior to resealing tail gate inner panel water deflector check operation of tail gate lock mechanism and, where necessary, adjust door lock strikers or remote control for proper operation.

Tail Gate Lock Remote Control Assembly

Removal

1. Remove tail gate window assembly.
2. Disengage clips securing lock connecting rods to remote control (fig. 95) and detach connecting rods from remote control.
3. Remove tail gate lock remote control attaching screws (fig. 92). Disengage remote control from inside handle push rod and remove remote control from tail gate.

Installation

1. Engage inside handle push rod into hole in remote control lever.
2. Adjust remote control assembly up or down until tabs on push rod (fig. 95) just contact remote control lever.
3. To attach lock connecting rods to remote control lever, first, loosen connecting rod adjustment lock-

ing bolt (fig. 95); then, install rods to levers and tighten locking bolt.

NOTE: Check clips at ends of remote control levers for proper retention of connecting rods and replace if necessary.

IMPORTANT: If installing a new remote control assembly, remove cotter key (fig. 95) after adjustment, to free locking lever.

4. Check operation of tail gate locking mechanism. To open tail gate when window assembly is removed, depress tail gate lock remote control locking lever at location "B" (fig. 92) and at the same time operate the tail gate remote control inside handle.
5. Install tail gate window assembly as described under "Tail Gate Window Assembly–Installation."
6. Lower window to approximately ½ inch up from full down position; then adjust remote control locking lever adjusting screw (fig. 95) so that lever is just contacting window lower sash channel frame. Check operation of remote control inside handle–handle should remain locked until window is lowered to within ¼ inch of the full down position.

Tail Gate Inner Panel Water Deflector

On all station wagon styles a waterproof paper tail gate inner panel water deflector is sealed to the tail gate inner panel and deflects water into the bottom of the tail gate where it can drain out the bottom drain holes. The bottom of the water deflector is sealed to the inner panel in a manner that will deflect water towards designated access holes where the water can readily enter into the bottom of the tail gate.

IT IS IMPORTANT THAT WHENEVER ANY WORK IS PERFORMED ON THE TAIL GATE WHERE THE WATER DEFLECTOR HAS BEEN DISTURBED, THE DEFLECTOR MUST BE PROPERLY SEALED TO THE TAIL GATE INNER PANEL.

Removal and Installation

1. Remove tail gate inner cover panel lower retainer and inner cover panel.
2. Using a sharp scraper or other suitable tool carefully lift up edge of deflector and detach sealer and water deflector as required.

NOTE: DO NOT TEAR WATER DEFLECTOR.

Installation or Resealing Procedure

1. If installing old deflector or resealing partially detached deflector first inspect water deflector for any tears or holes and, where necessary, repair any tears or holes with waterproof body tape applied to both sides of deflector.

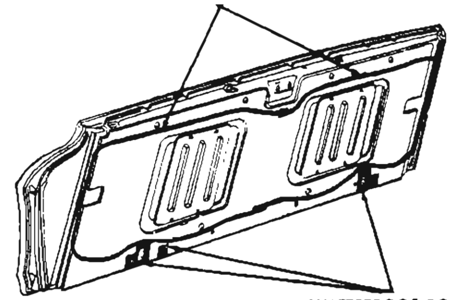


Fig. 98—Tail Gate Inner Panel Sealing

2. If installing new deflector use old deflector or tail gate inner panel to trim new deflector to proper size.
3. Apply a bead of body caulking compound (approximately $\frac{3}{16}''$ diameter) to tail gate inner panel (fig. 98).

IMPORTANT: The body caulking compound should be applied along the lower portion of the tail gate exactly as shown in illustration to assure proper drainage of water through designated inner panel access holes into bottom of tail gate.

4. Position water deflector to tail gate inner panel with polyethylene coated side of deflector against inner panel. Firmly press or roll sealed areas to obtain a good bond between deflector and tail gate inner panel.
5. Clean off all excess caulking compound; then, install previously removed tail gate inner cover panel.

Tail Gate Weatherstrip

A new type tail gate weatherstrip assembly is being used which incorporates nylon component fasteners in place of wire clips. The new nylon fasteners are the same size at all locations and are available as service replacement parts.

Tool J-21104 is designed for removal of the new weatherstrip. If this tool is not available, it can be fabricated from any other comparable metal tool. (See Figure 17 in "FRONT OR REAR DOOR WEATHERSTRIP" Section). When a removal tool is fabricated, make sure all sharp edges or metal burrs are removed so as not to damage weatherstrip or paint finish during its usage.

Removal

1. Remove tail gate belt finishing molding.
2. At both sides of tail gate, disengage button type snap fasteners and screw securing upper ends of weatherstrip.
3. With a sharp scraper, carefully break cement bond securing weatherstrip along tail gate lock pillars.
4. Slide tool J-21104, or other suitable tool under weatherstrip at fastener locations and carefully pry fasteners out of holes (See Figure 20 in "FRONT OR REAR DOOR WEATHERSTRIP" Section).

CAUTION: *Exercise care not to damage serrations on fasteners during removal as they are necessary to maintain a good weatherseal.*

Installation

1. Check weatherstrip nylon fasteners for damage and replace, if necessary.
2. Clean off old cement from tail gate to insure a clean cementing surface. Apply a bead of approved weatherstrip adhesive to lock pillar facing of tail gate starting at belt line and continuing down lock pillar for approximately 18 inches.

NOTE: Weatherstrip adhesive usage is usually limited to lock pillar area; however, weatherstrip adhesive can be applied at any location where additional retention of weatherstrip is required.

3. Install button type fasteners and screw securing upper end of weatherstrip.
4. Install snap fasteners by pressing fasteners into holes in tail gate panel. A protected hammer can also be used, where necessary.

NOTE: In the event the weatherstrip becomes damaged at a fastener location and will not properly retain the fastener, remove fastener and cement weatherstrip in place. If, however, two or more consecutive fasteners will not remain engaged in the weatherstrip, replacement of the weatherstrip will probably be necessary.

All weatherstrips are impregnated with a silicone lubricant and additional lubrication is not required.

Tail Gate Bottom Drain Hole Sealing Strips

Removal and Installation

1. With a flat-bladed tool carefully pry out snap-on fastener at each end of strip and remove sealing strip from tail gate.
2. To install sealing strips, reverse removal procedure. To prevent strip from adhering to the tail gate panel and blocking the drain holes, apply a sparing amount of silicone rubber lubricant on the center section of the sealing strip. (See illustration under "Front and Rear Door Bottom Drain Hole Sealing Strips").

Electric Tail Gate Window Circuit

The 1964 station wagon style power-operated tail gate dropping window is controlled by a window regulator equipped with a rectangular shaped, 12 volt

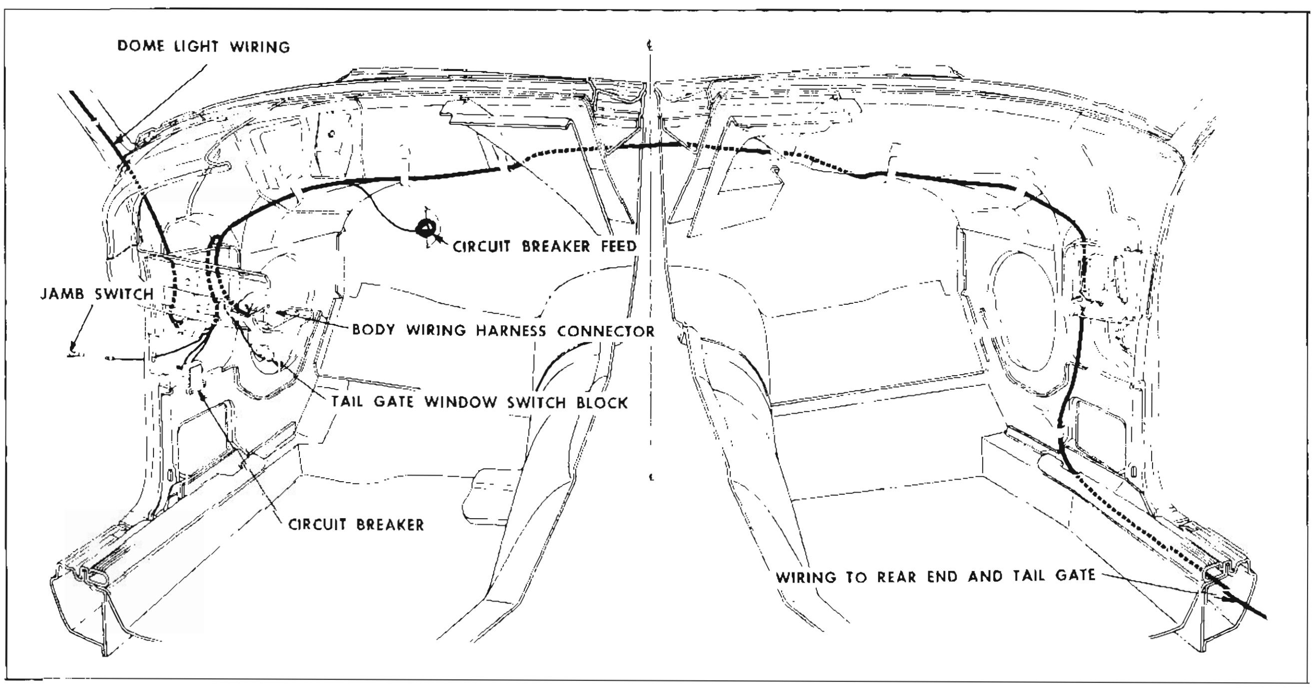


Fig. 99—Body and Power Tail Gate Window Wiring

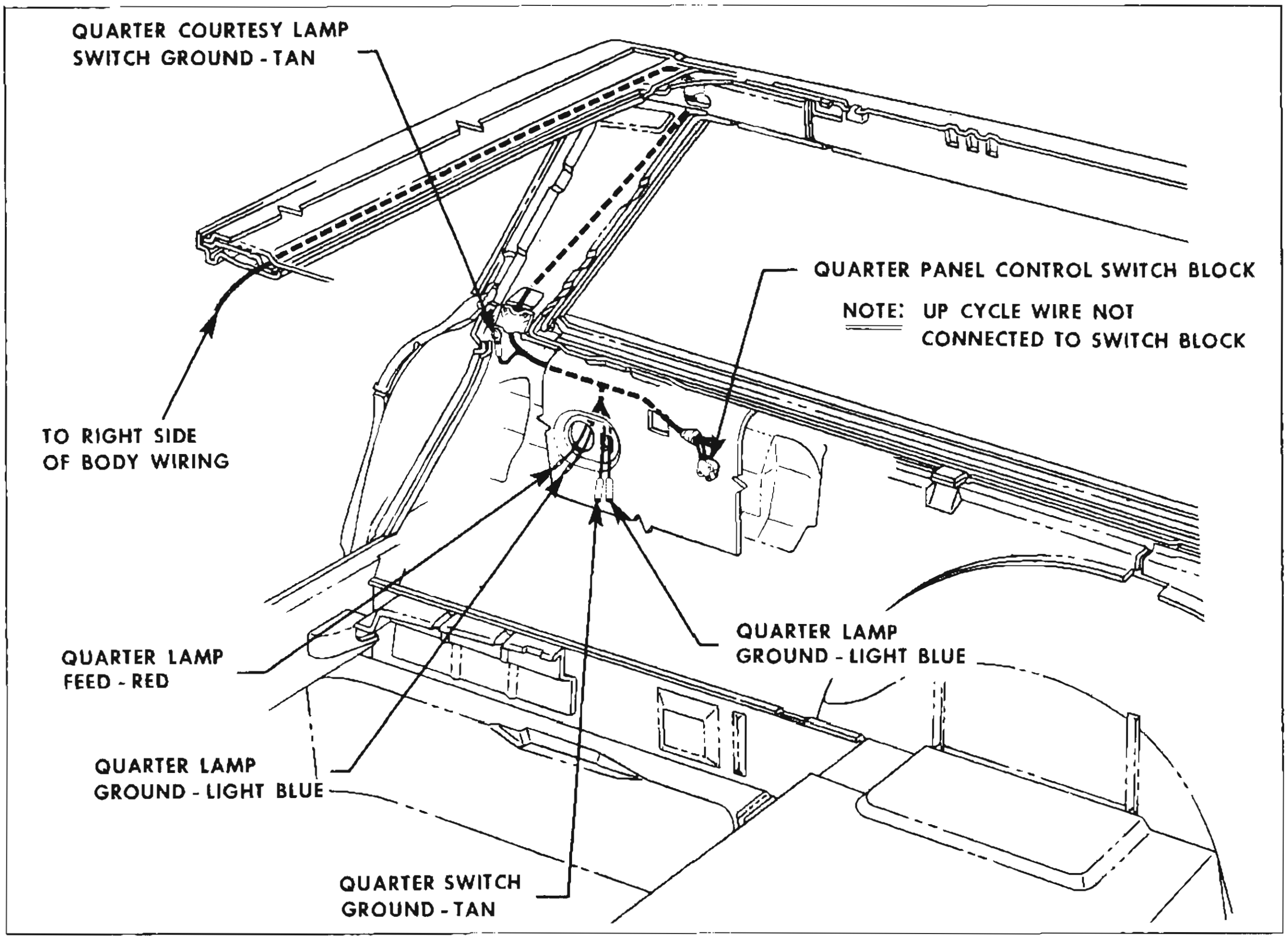


Fig. 100—Left Rear Quarter Tailgate Window Wiring Installation

D.C., reversible direction motor with an internal circuit breaker and a self-locking gear drive. The current for the motor is obtained through the circuit breaker located at left shroud.

The design of the tail gate requires the window to be lowered before the tail gate can be opened. A mechanical safety feature in the tail gate prevents the tail gate handle from being actuated before the window is in the fully lowered position. The window may be lowered from the instrument panel control switch located at the driver's side of the panel, or from the tail gate window lock cylinder switch. The lock cylinder switch is actuated when the key is inserted into the lock cylinder and rotated to open or lower the window. On the nine passenger station wagon styles, a tail gate window control switch is located at the rear of the left rear quarter inner panel trim.

NOTE: The up cycle wire is not engaged to the switch block but may be installed by removing the tape from behind the switch block and inserting the up cycle wire in the switch block.

The tail gate window harness is a component part of the body wiring harness which consists of a front and rear section connected together at the right rear quarter (figs. 99, 100, 101, 102 and 103).

To prevent the window from being operated to the up position when the tail gate has been lowered, a safety switch is located adjacent to the right tail gate lock. The safety switch opens the ground circuit of the tail gate window motor, making it inoperative.

Checking Procedures

Before performing an intensive checking procedure to determine the failure in the circuit, be sure to check the connectors at the front and rear body wiring harness for proper installation. The checking procedures below may be used to check the operation of a switch or motor after the cause of the electrical failure has been isolated to a particular part of the circuit. Refer to Figure 104 for the circuit diagram of the power window circuit.

A. Checking Circuit Breaker

This procedure is the same as "Checking the Circuit Breaker" for the power window circuit previously covered.

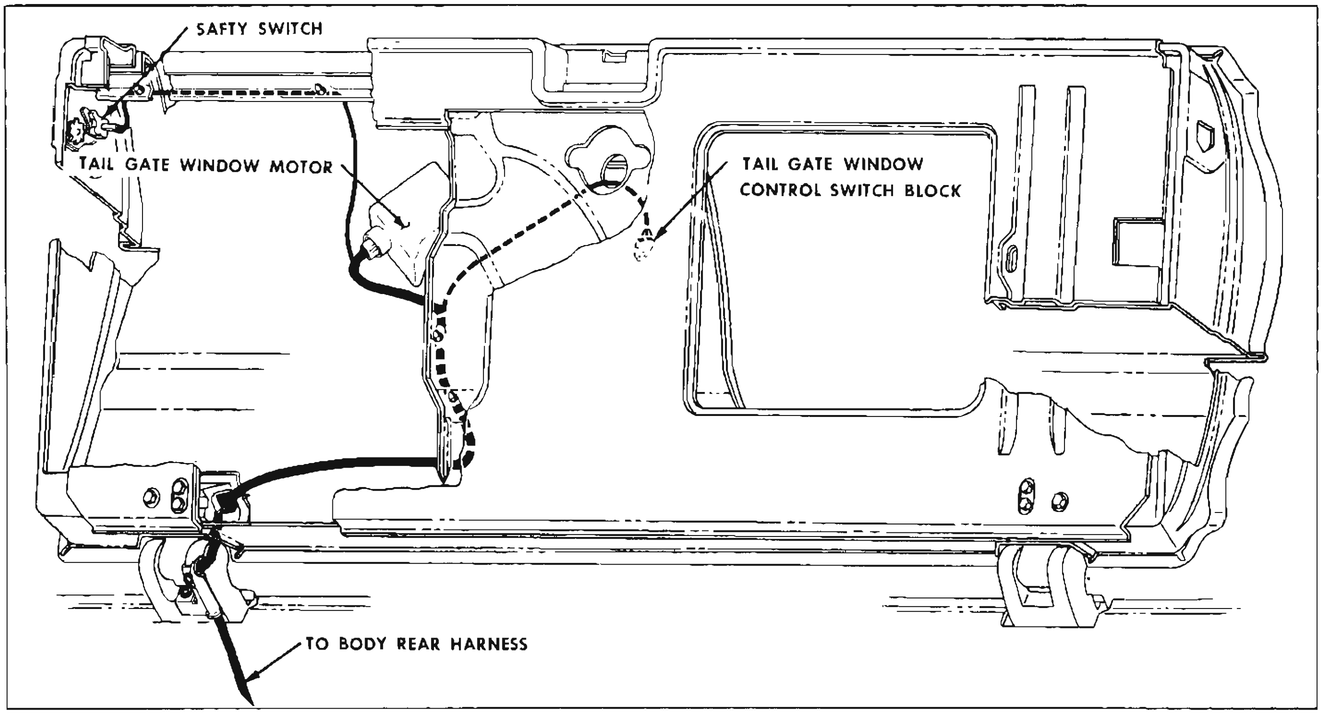


Fig. 101—Tailgate Wiring Installation

B. Checking Feed Circuit Continuity at Control Switch on Instrument Panel

1. Connect one light tester lead to feed terminal of switch block and ground other test lead to body metal.

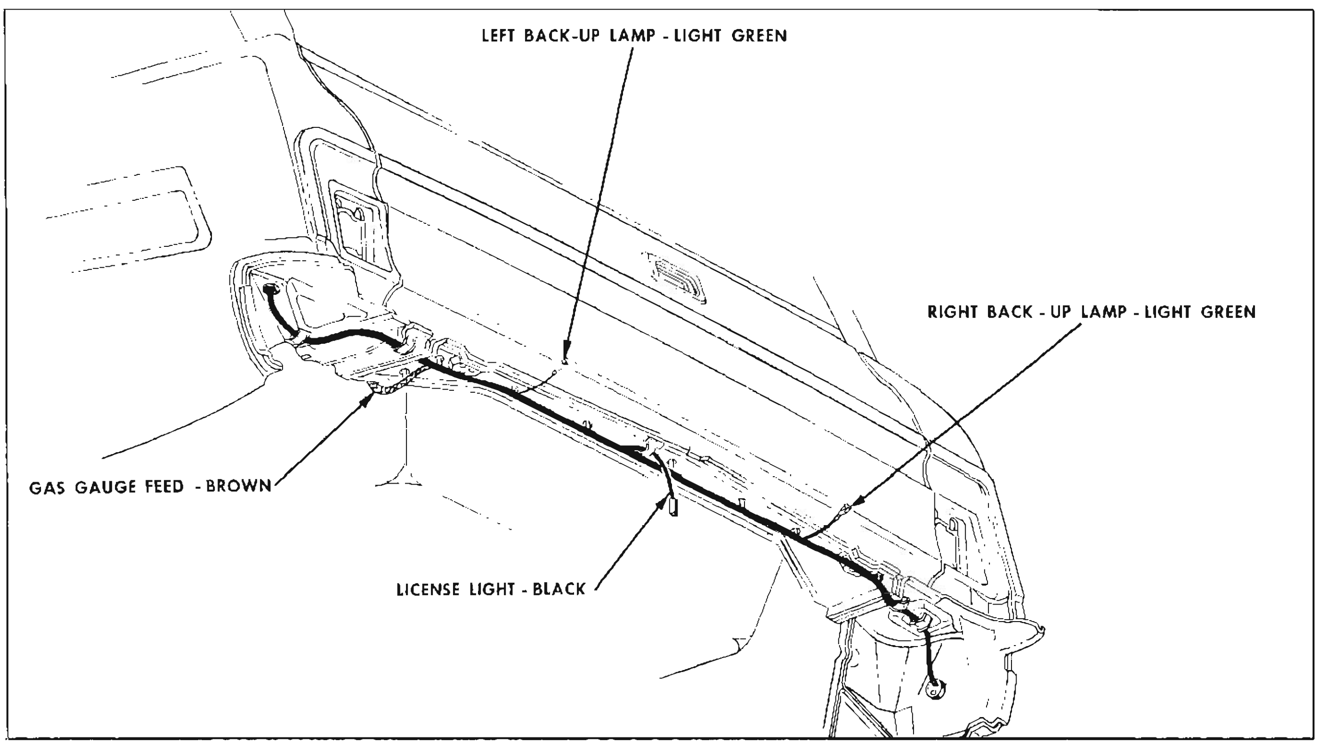


Fig. 102—Rear Cross Bar Wiring Installation

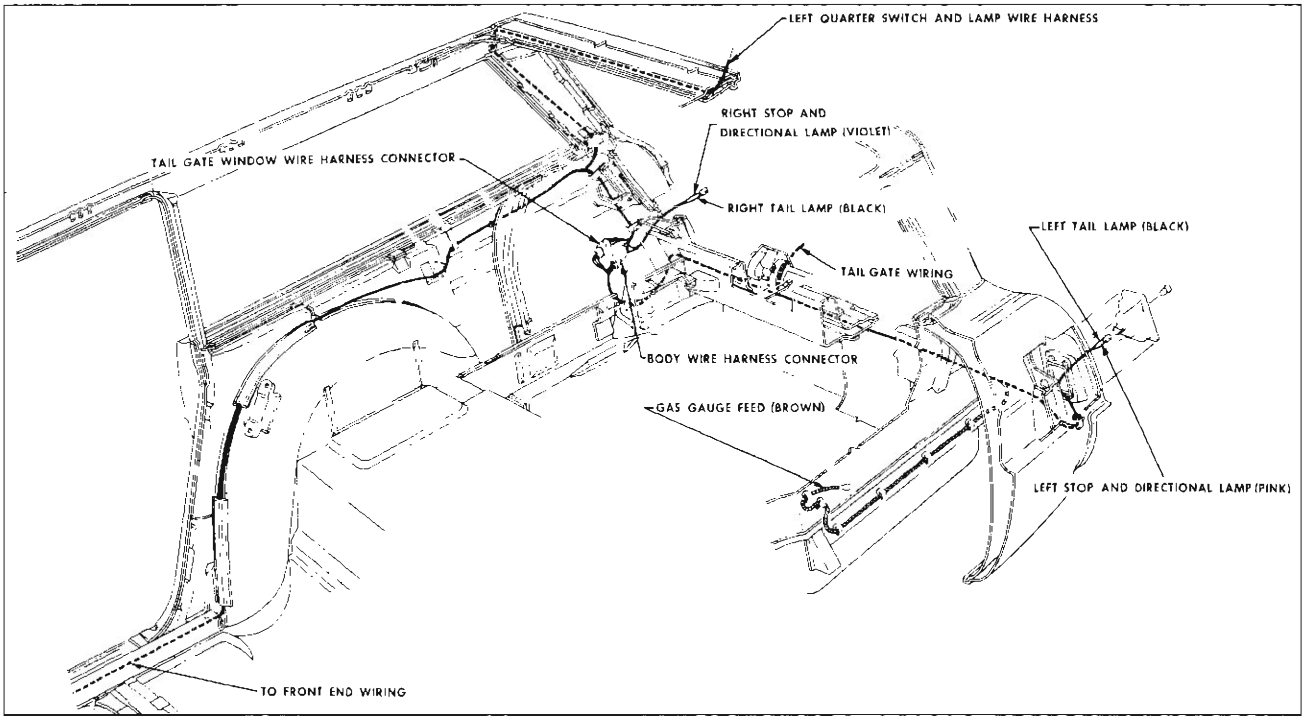


Fig. 103—Rear End Body and Tail Gate Window Wiring Installation

TAIL GATE WINDOW HARNESS		
WIRE NO.	COLOR	FUCTION
8	GRAY	UP CYCLE - TO SAFETY SWITCH
7	DK. GREEN	MOTOR GROUND TO SAFETY SWITCH
19	YELLOW	DOWN CYCLE
1	RED	FEED

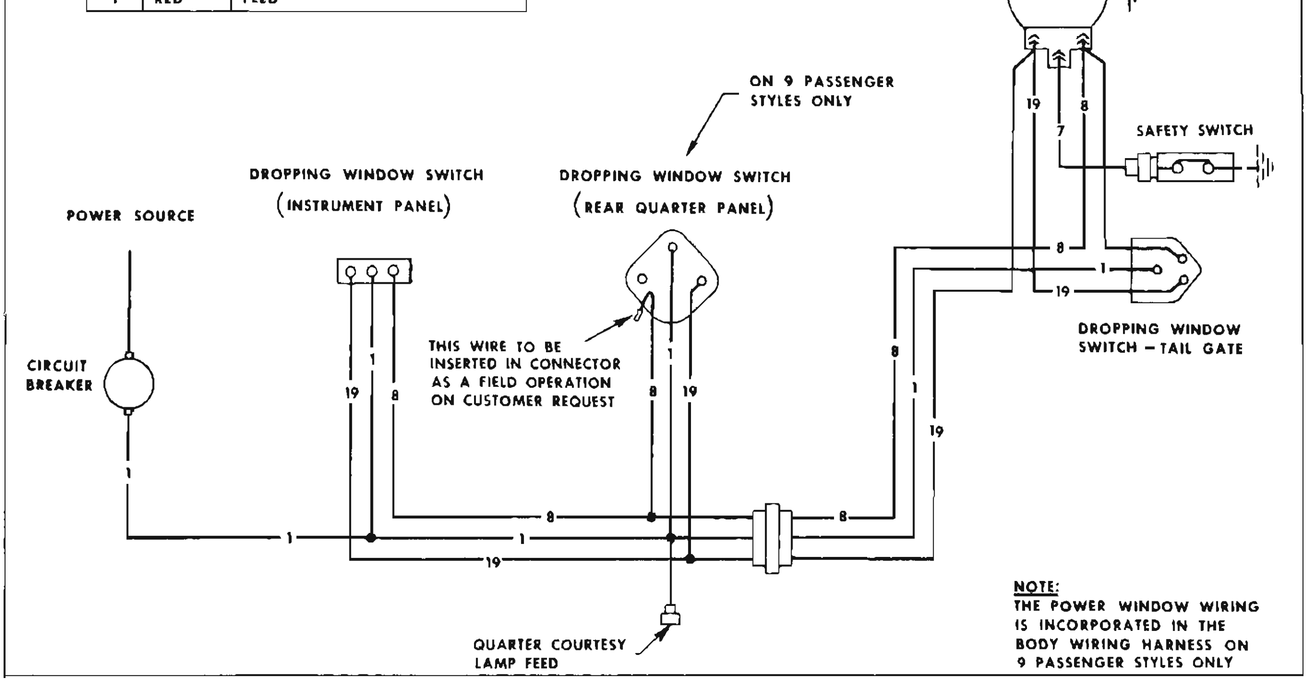


Fig. 104—Tail Gate Window Circuit Diagram

2. If tester does not light, there is an open or short circuit between switch and power source.

NOTE: Pontiac only—See Chassis Manual for Instrument Panel Switch Circuitry.

C. Checking Control Switch at Instrument Panel

1. Disengage harness connector from switch.
2. Use a #12 gauge jumper wire and insert one end into the red wire (feed) terminal and the other end into one of the other terminals. Tail gate window motor should operate.
3. Repeat procedure for the other terminals. If the tail gate window motor operates with the jumper wire but does not operate with the control switch, the switch is defective.

D. Checking Control Switch at Rear Quarter or Tail Gate.

First determine that there is current to the switch terminal block; then use a #12 gauge jumper and perform the same checking procedure as outlined for the door window motor control switch.

E. Checking Circuit Between Front and Rear Harness at Connector.

1. Remove right rear quarter trim to gain access to front and rear connector.
2. Check connector for proper engagement. If connector is engaged properly and motor does not operate, proceed as follows:
   a. Disengage connector and check with test light for power (red). If tester does not light, there is a short of open circuit in the feed wire.
   b. To check up and down cycle circuits, actuate window control switch at instrument panel or quarter trim panel. With test light, check continuity at wire terminal being energized.

F. Checking the Tail Gate Window Motor

1. Disconnect harness connector from motor.
2. Connect the positive side of power source to the gray wire terminal on the motor connector and the negative lead to the dark green (ground) wire terminal. Motor should operate. To check the reverse operation of the motor, connect the power source to the yellow wire terminal.

G. Check Operation of Safety Switch

1. With tail gate open, depress switch to simulate the tail gate being closed. If motor does not operate, either switch is defective or the circuit is open from the motor to the switch.
2. To check for defective switch, connect one end of test light to a source of power and the other lead to the safety switch terminal. If the tester lights when the switch lever is actuated, the switch is operative.

NOTE: Safety switch completes the ground circuit from the motor.

Typical Failures

A. Condition:

The tail gate window operates up and down from the tail gate switch, and the rear quarter switch (9-passenger style), but does not operate from the switch at the instrument panel.

Cause:

1. Open or short circuit from power source to control switch at instrument panel.
2. Defective or inoperative control switch.

Correction:

1. Check affected wiring for open or short circuit and check connector at switch for proper installation.
2. Check operation of switch.

B. Condition:

With the tail gate closed, the window operates downward but does not operate upward when the switch at the instrument panel, rear quarter or tail gate is actuated.

Cause:

1. Open or short circuit in "up" cycle feed wire.

Correction:

1. Check affected wiring for open or short circuit.

C. Condition:

The window will not operate "up" or "down" from any of the control switches.

Cause:

1. Open or short circuit in circuit from power source to switches or motor.
2. Safety switch inoperative or poor ground.
3. Mechanical bind or failure in tail gate window regulator mechanism.
4. Defective tail gate window regulator motor.

Correction:

1. Check operation of circuit breaker.
2. Check affected circuit for open or short circuit. (Check front and rear harness connections for proper engagement.
3. Check connectors to safety switch and motor for proper engagement.
4. Check tail gate mechanical parts for bind or failure.
5. Check operation of tail gate motor.

FRONT SEATS

FRONT SEAT ASSEMBLY (SIX-WAY SEAT)

Description: The electrically-operated six-way front seat assembly can be moved forward, rearward, upward, downward or tilted by means of a manually-operated seat control switch. The large center control knob controls movement of the entire seat assembly horizontally or vertically. The smaller forward control knob controls the vertical movements of the front of the seat assembly causing the seat assembly to "tilt". In the same manner, the rear control knob controls vertical movement of the rear of the seat assembly. To obtain maximum vertical travel, it will be necessary to engage the center vertical control until the limit of travel is reached, then engage the smaller forward or rear control knob to complete the maximum travel.

The seat adjuster operating mechanism incorporates a transmission assembly which includes three solenoids and six drive cables leading to the seat adjusters.

The solenoid which operates the blue drive cable (Fig. 105), controls the vertical movement of the rear edge of the seat. The solenoid which operates the black drive cable, controls the horizontal movement of the seat. The solenoid which operates the yellow drive cable, controls the vertical movement of the front edge of the seat.

When one of the control switch buttons is actuated, the motor and one of the solenoids are energized simultaneously. The solenoid plunger engages the large gears with a driving gear. The driving gear rotates the large gears which rotates the drive cables and operate both adjusters. When the switch contacts are opened, a spring returns the solenoid plunger to its original position, disengaging the large gears from the driving gear.

Front Seat Assembly

Removal and Installation:

1. Operate seat to fully raised and midway position.
2. Under front of seat, disconnect seat wire harness from feed wire harness.
3. Turn back floor carpeting, remove both seat adjuster track covers and remove four seat adjuster-

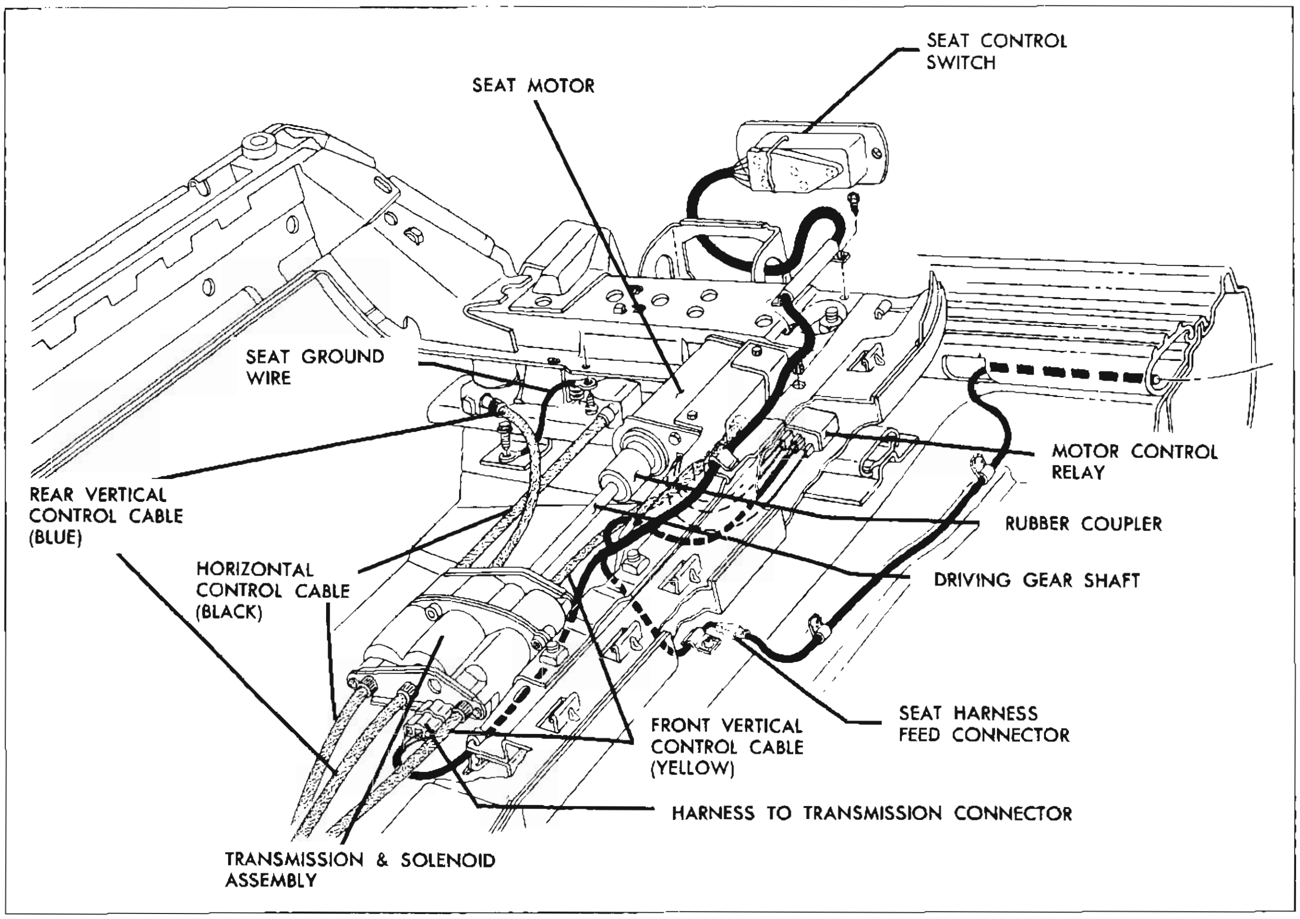


Fig. 105—Six Way Seat Installation

to-floor pan attaching bolts from each adjuster.

4. With aid of a helper, remove seat assembly with attached adjusters, motor and transmission assembly from body.
5. To install seat assembly, reverse removal procedure. Make sure ground wire is securely attached at left seat adjuster and under seat adjuster-to-floor pan attaching bolt.

Front Seat Adjuster Assembly

Removal and Installation:

1. Remove front seat assembly from body with attached adjusters, motor and transmission, and place upside down on a clean protected surface.
2. Detach three power drive cables from adjuster to be removed. (Fig. 105).
3. Remove adjuster-to-seat bottom frame front and rear attaching bolts and remove adjuster from seat assembly.
4. To install seat adjuster assembly, reverse removal procedure. Black cable attaches to horizontal actuator; yellow cable to front vertical gearnut and blue cable to rear vertical gearnut.

IMPORTANT: When installing seat assembly in body, seat adjusters should be parallel and "in phase" with each other. In the event the adjusters are "out of phase" (that is, one adjuster reaches its maximum horizontal or vertical travel in a given direction before the other adjuster), proceed as follows:

a. Horizontal Travel—Operate seat control switch until one adjuster reaches full forward position. Detach horizontal drive cable from adjuster which has reached full forward position. Operate seat forward until other adjuster reaches full forward position; then, connect horizontal drive cable and check horizontal travel of seat.

b. Front or Rear Vertical Travel—Operate seat control switch until one adjuster has reached the fully raised position at both front and rear vertical travel limits. Disconnect both front and rear vertical drive cables from adjuster which has reached the fully raised position. Operate seat control switch until other adjuster reaches the fully raised position at both front and rear vertical travel limits, then, connect previously removed front and rear vertical drive cables. Check vertical travel by operating adjusters through one or two complete cycles. The above operation may be repeated on an "as required" basis if adjusters do not appear to be "in phase" after test cycle.

Figure 106 identifies the components of the six-way seat adjuster. The following service procedures include replacement of all major component parts of this adjuster.

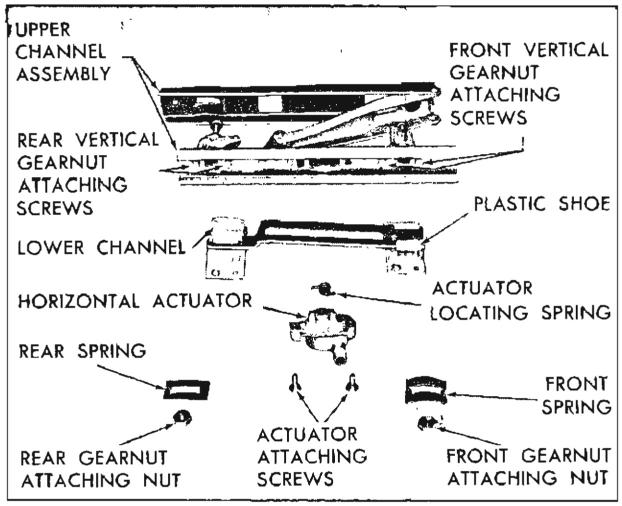


Fig. 106—6-Way Seat Adjuster Components

Front Seat Adjuster Horizontal Actuator

Removal and Installation:

1. Remove seat assembly from body as previously described and place upside down on a clean protected surface.

NOTE: Horizontal Actuator is easily accessible with seat in mid-way or approximate center position.

2. Detach three power drive cables from adjuster to be removed.
3. Remove screws securing seat adjuster to seat bottom frame and remove adjuster from seat assembly.
4. At top of adjuster, remove front and rear vertical gearnut attaching nuts (Fig. 107).
5. Remove front vertical gearnut spring (Fig. 107).

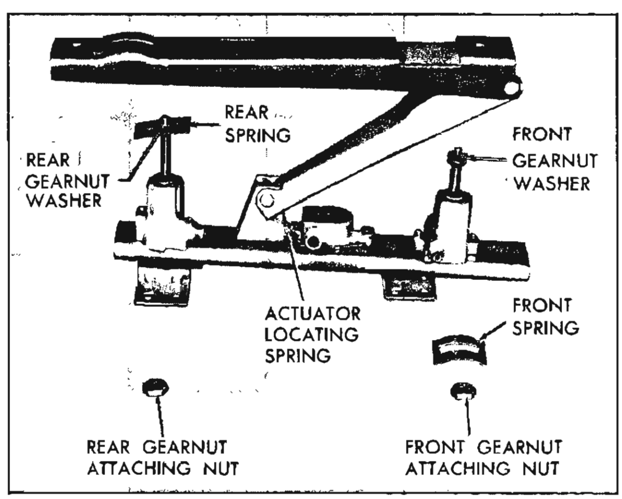


Fig. 107—6-Way Adjuster Gearnut

6. Lift upward on adjuster upper track; then remove rear vertical gearnut spring (Fig. 107).
7. Lay adjuster on its side; then remove screws securing horizontal actuator to adjuster upper channel assembly and remove actuator from adjuster.

IMPORTANT: Horizontal actuator is under tension from spring shown in Fig. 107. When installing actuator, be sure actuator locating spring is properly engaged with actuator assembly.

8. To install, reverse removal procedure. When installing horizontal actuator, be sure actuator drive gear is fully engaged with teeth on lower channel. With tension spring properly installed and actuator attaching screws tight, there should be no free motion between upper and lower adjuster channels. Readjust actuator "as required" until all free motion between channels has been removed. Be sure seat adjusters are "in phase," as previously described before installing seat assembly into body.

Front Seat Adjuster Lower Channel

Removal and Installation:

1. Remove horizontal actuator as previously described.
2. Slide seat adjuster lower channel from upper channel until lower channel is completely disengaged from upper channel.
3. If lower channel is being replaced with a new part, transfer plastic slides to new part. (Fig. 106).
4. Apply "lubriplate" (630 AAW) or equivalent to track portion of upper channel, plastic slides and teeth on lower channel.
5. To install, reverse removal procedure. Be sure adjusters are "in phase" before installing seat assembly into body.

Seat Adjuster Front Vertical Gearnut

Removal and Installation:

1. Operate seat to either full forward or full rearward position.
2. Remove front seat assembly from body as previously described and place upside down on a clean protected surface.
3. Detach three power drive cables from adjuster to be removed.
4. Remove screws securing seat adjuster to seat bottom frame and remove adjuster from seat assembly.
5. At top of adjuster, remove front vertical gearnut attaching nut.
6. Remove front vertical gearnut spring. (Fig. 107).
7. Lay adjuster on its side and remove front vertical gearnut attaching screws (Fig. 106); then remove gearnut from adjuster.
8. If front vertical gearnut is being replaced with a new part, transfer gearnut washer to new gearnut assembly (Fig. 107).
9. To install, reverse removal procedure. Be sure adjusters are "in phase" before installing seat assembly into body.

Seat Adjuster Rear Vertical Gearnut

Removal and Installation:

1. Operate seat to full forward position.
2. Remove front seat assembly from body as previously described and place upside down on a clean protected surface.
3. Detach three power drive cables from adjuster to be removed.
4. Remove screws securing seat adjuster to seat bottom frame and remove adjuster from seat assembly.
5. At top of adjuster, remove rear vertical gearnut attaching nut. (Fig. 107).
6. Lift rear of channel upward and remove rear vertical gearnut spring (Fig. 107).
7. Lay adjuster on its side and remove rear vertical gearnut attaching screws; then remove gearnut from adjuster (Fig. 106).
8. If rear vertical gearnut is being replaced with a new part, transfer gearnut washer to new gearnut assembly (Fig. 107).
9. To install, reverse removal procedure. Be sure rear gearnut spring is properly engaged under adjuster upper channel before tightening rear gearnut upper attaching nut. In addition, be sure adjusters are "in phase," as previously described, prior to installing seat assembly into body.

Front Seat Adjuster Upper Channel

Removal and Installation:

1. Remove seat assembly from body as previously described and place upside down on a clean protected surface.
2. Detach three power drive cables from adjuster to be removed.
3. Remove screws securing seat adjuster to seat bottom frame and remove adjuster from seat assembly.
4. Remove horizontal actuator from upper channel as previously described.
5. Slide lower channel until it is completely disengaged from upper channel; then transfer lower channel to new upper channel.

NOTE: Be sure sliding surfaces of upper and lower channels are properly lubricated with "Lubriplate" (630 AAW) or equivalent.

6. Transfer front and rear gearnuts to new upper channel. (Fig. 106).
7. Install horizontal actuator and actuator locating spring to new upper channel.

8. Install adjuster to seat bottom frame; then check all operations of adjusters. Be sure adjusters are "in phase" as previously described.
9. Install seat assembly into body. Operate seat through several complete cycles to insure proper operation.

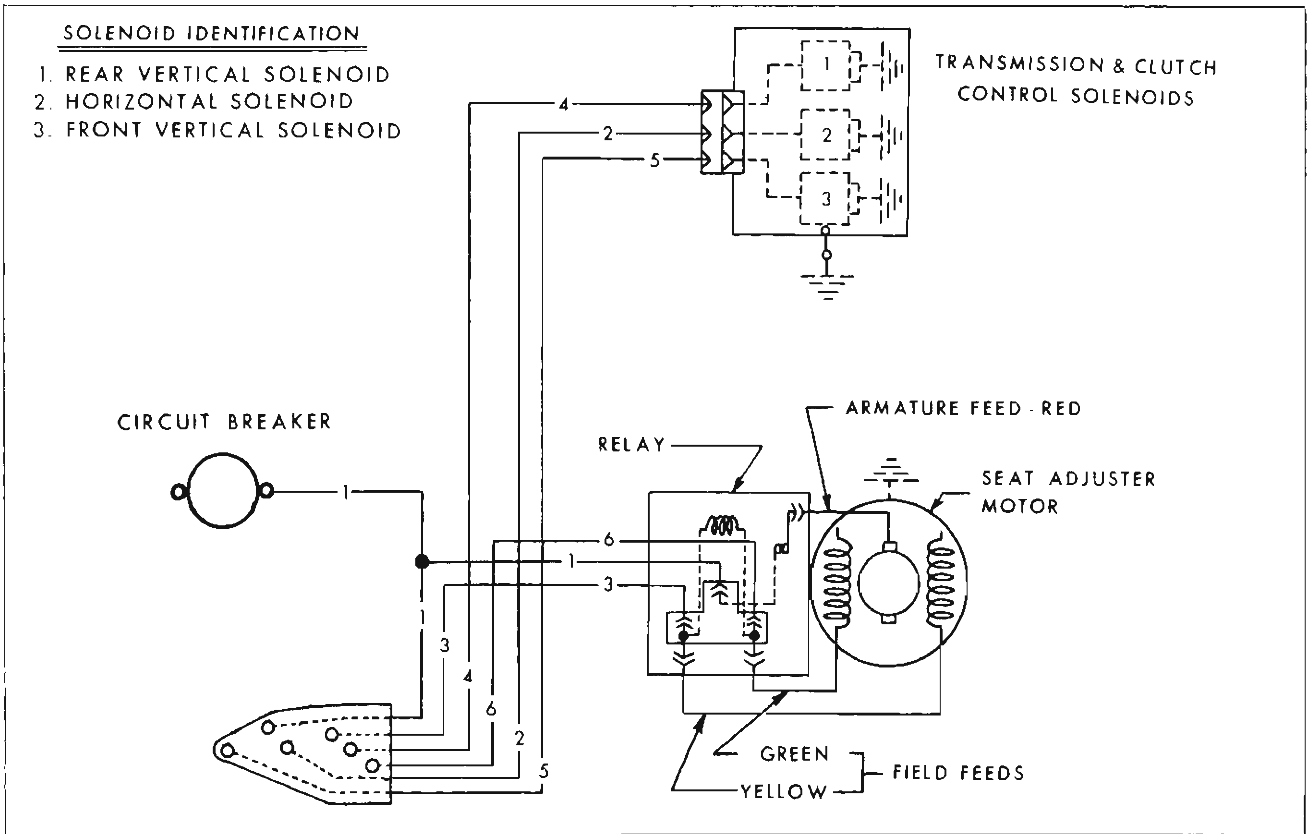
Front Seat Assembly—Electrical Operation (Six-Way Seat)

Description The seat adjusters are actuated by a 12-volt motor installed at the left side of the seat assembly (See Fig. 105). The motor is energized by a (3) button-type control switch located in the left seat side panel.

The electrical portion of the seat operates as follows: See circuit diagram Figure 108 for seat switch in seat side panel. When one of the control switch buttons is actuated, current flows to the transmission solenoid which controls the desired seat movement. The energizing of the solenoid coil results in the solenoid plunger dog engaging the gear mechanism to rotate the control cable. The same switch action which energized the solenoid produces a current flow through the motor control relay to one of the motor field coils. The current flows through the relay, closes the contacts between the relay power source and the armature motor lead wire, and results in the operation of the seat motor. When the control switch lever is released, the switch contacts open, a spring returns the shaft dog and solenoid plunger to their original position disengaging them from the gear dog.

Circuit Checking Procedures

It may be necessary to use only one or all of the procedures outlined to locate an electrical failure in the circuit. If the location of the failure is evident, follow only the steps required to check the affected wire or component. If the location of the failure is not evident,



No	COLOR	FUNCTION
1	RED	FEED
2	DARK BLUE	SOLENOID - HORIZONTAL MOVEMENT
3	PINK	FIELD FEED-REARWARD & DOWN
4	DARK GREEN	SOLENOID - REAR EDGE VERTICAL
5	WHITE	SOLENOID - FRONT EDGE VERTICAL
6	YELLOW	FIELD FEED-FORWARD & UPWARD

Fig. 108—Six Way Seat—Circuit Diagram

follow the procedure as outlined. Before performing any extensive check procedures, check the seat adjuster drive cables for proper attachment. In addition, study the seat circuit diagrams to become familiar with the seat circuit.

A. Check Feed Circuit Continuity at Circuit Breaker

1. Connect one light tester lead to battery side of circuit breaker and ground other lead. Circuit breaker is located at left shroud (Chevrolet). If tester does not light, there is an open or short circuit in feed circuit to breaker.
2. To check circuit breaker, disconnect the output feed wire (the wire opposite the power source feed to the breaker) from the breaker and with light tester check terminal from which wire was disconnected. If tester does not light, circuit breaker is inoperative.

B. Check Feed Circuit Continuity at Seat Control Switch

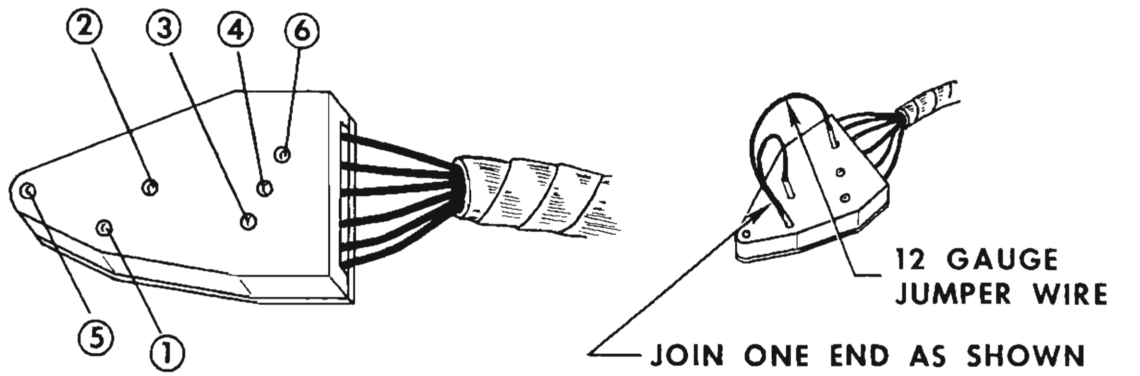
1. Connect one light tester lead to feed terminal of switch block and ground other test lead to body metal. (Figure 109).
2. If tester does not light, there is an open or short circuit between switch and power source.

C. Check Feed Circuit Continuity at Relay on Seat Motor

1. Disengage 3-wire connector body from the seat motor relay terminal.
2. Insert one light tester lead into the relay power feed (red wire) connector slot on the harness, and ground the other light tester lead.
3. If tester does not light, there is no current at end of feed wire. Failure is caused by an open or short in feed circuit.

NOTE: In the following operations which specify the seat control switch to be actuated, a switch that has been checked for proper operation may be connected to the switch block. If a switch is not available, a three-way jumper wire can be made to perform the switch function. The jumper wire and the switch locations are to be connected to obtain a specific movement of the seat. (See Fig. 109). If a jumper wire is used, number the locations on the switch block as indicated in the illustration. Details outlining

SIX-WAY SEAT CONTROL SWITCH BLOCK



LOCATION	WIRE COLOR	FUNCTION
1	RED	SWITCH FEED
2	DARK BLUE	SOLENOID-HORIZONTAL MOVEMENT
3	PINK	FIELD FEED-REARWARD & DOWN CYCLE
4	DARK GREEN	SOLENOID-REAR EDGE VERTICAL CYCLE
5	WHITE	SOLENOID-FRONT EDGE VERTICAL CYCLE
6	YELLOW	FIELD FEED-FORWARD & UP CYCLE

Fig. 109—Six Way Seat Control Switch Check

the making and use of the jumper wire follow the checking procedures.

D. Checking the Seat Control Switch

1. Obtain switch or jumper wire and connect to switch block.
2. Operate switch. If adjusters operate with new switch or jumper wire, but did not operate with original switch, the original switch is defective.
3. Check all six movements of seat adjuster.

E. Checking Wires Between Control Switch and Motor Relay

1. Disengage 3-wire harness connector from relay at motor.
2. Insert one light tester lead into the motor field connector slot on harness and ground the other lead.
3. Actuate seat switch to energize field wire being tested.
4. If tester does not light, there is no current at end of wire. Failure is caused by an open or short circuit between end of wire and switch. Check other motor field wire in the same manner.

F. Check the Relay Assembly

1. Disconnect three (3) motor leads from relay assembly. These are the wires leading from the motor to the relay.
2. Connect one end of a jumper wire to one of the motor field feed studs on the relay and ground the other end of the jumper wire.
3. Connect one end of light tester to motor armature feed stud on relay and ground other light tester lead.
4. With a jumper wire, energize the field stud which is not grounded. If tester does not light the relay is defective.

G. Check the Motor Assembly

1. Disconnect the motor armature feed lead and one of the motor field feeds from the relay assembly.
2. With a jumper wire, energize the armature feed and one of the field feeds.
3. If motor does not operate, it is defective. Check the other motor field feed in the same manner.

H. Checking the Wire Between the Solenoid and Switch

1. Disengage harness connector from transmission.
2. Connect one light tester lead to end of harness wire being tested and ground other lead.
3. Operate switch to energize wire being tested. If tester does not light, there is no current at end of wire. Failure is caused by an open or short circuit between end of wire and switch.

I. Checking the Solenoid

1. Check solenoid ground strap attachment for proper ground.
2. Energize solenoid being checked with jumper wire.

   NOTE: If solenoid is functioning, a "click" should be heard when solenoid plunger operates "in" and "out".

   CAUTION: To prevent damaging the solenoid, do not energize solenoid for more than one minute.

3. With solenoid energized, actuate seat control switch to energize adjuster motor.
4. If adjusters do not operate, and there is no mechanical failure in the seat unit, the solenoid is defective.

Three-Way Jumper Wire for Checking Seat Switch

To make jumper wire, obtain two (2) pieces of #12 gauge wire, each 4½" long, join one end of each wire as shown in Figure 109. The joined end can be inserted in the feed location in the switch block; one of the remaining ends can be inserted into one of the field locations in the switch block; the other end can be inserted into one of the solenoid locations.

NOTE: To obtain a seat movement using a 3-way jumper wire at the switch block, the switch feed location, one of the motor field wire locations and one of the solenoid locations must be connected.

On Bodies with Switch in Seat Side Panel:

1. To raise front edge of seat, place jumper in locations #1, 6 and 5.
2. To lower front edge of seat, place jumper in location #1, 3 and 5.
3. To raise rear edge of seat, place jumper in locations #1, 6 and 4.
4. To lower rear edge of seat, place jumper in locations #1, 3 and 4.
5. To move seat forward, place jumper in locations #1, 2 and 6.
6. To move seat rearward, place jumper in locations #1, 3 and 2

Typical Electrical Failures of Six-Way Seat Circuits

Condition #1

Seat adjuster motor does not operate.

Cause

a. Short or open circuit between power source or switch and motor.

b. Defective motor.

Correction

a. Check circuit from power source and switch to motor to locate failure.

b. Check motor. If defective, repair or replace as required.

Condition #2

Seat adjuster motor operates, but seat adjusters are not actuated

or

Seat adjuster motor operates, front edge of seat moves up and down and seat moves forward and rearward, The rear edge of seat cannot be operated.

Cause

a. Short or open circuit between switch and affected solenoid.
b. Defective solenoid.

Correction

a. Check circuit from switch to solenoid to locate failure.
b. Check solenoid. If defective, repair or replace as required.

Condition #3

Seat adjuster motor operates and seat adjusters move front and rear edge of seat up and forward but will not move the seat down and rearward.

or

Seat adjuster motor operates and seat adjusters move front and rear of seat down and rearward, but will not move the seat up and forward.

Cause

a. Short or open circuit between one of the motor field wires and seat control switch.
b. Defective field coil in motor.

Correction

a. Check circuit between affected motor field wire and seat switch.
b. Check motor. If defective, repair or replace as required.

BUCKET TYPE FRONT SEATS

All seat adjusters are bolted to the seat bottom frame; however, a combination of bolts and/or nuts are used to retain the adjusters to the floor pan assembly.

Bucket Type Front Seat Assembly Driver or Passenger—Manual

Removal and Installation

1. Turn back floor carpeting sufficiently to expose seat adjuster-to-floor pan attaching nuts or bolts.
2. Operate seat assembly to rearward position.
3. Remove attaching nuts.
4. Operate seat assembly to full forward position.
5. At rear of seat, remove adjuster to floor pan attaching nuts or bolts.
6. With aid of helper, remove seat assembly with attaching adjusters from body.
7. To install, reverse removal procedure. Check seat adjusters for proper operation.

Front Seat Adjusters Driver or Passenger—Manual

Removal and Installation

1. Remove front seat assembly as previously described and place upside down on a clean, protected surface.
2. If adjuster to be replaced is equipped with an assist spring, remove spring from adjuster.
3. Operate adjuster so that both front and rear attaching bolts are accessible.
4. Remove adjuster-to-seat bottom frame front and rear attaching bolts and remove adjuster from seat assembly.
5. To install, reverse removal procedure.

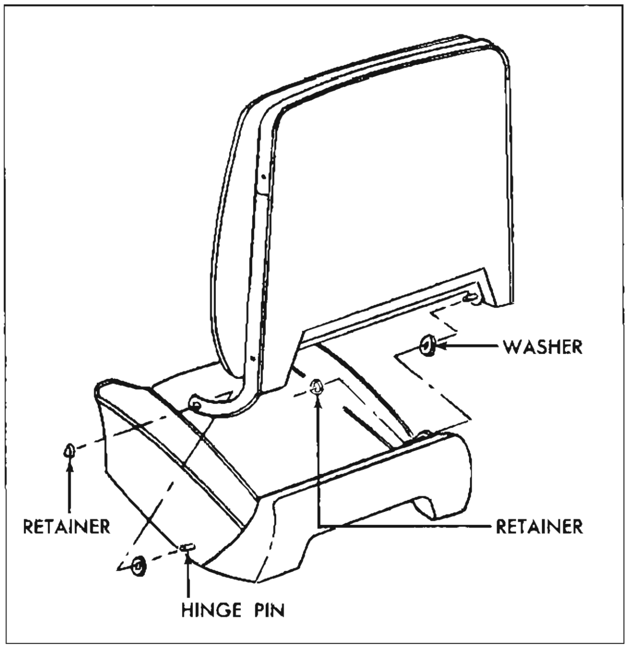


Fig. 110—Bucket Seat Removal

Front Seat Back Assembly

Removal and Installation

1. On all styles, using a flat-bladed tool, carefully remove retainer from outer hinge pin (fig. 110).
2. On all styles, tilt seat back forward and remove retainer from inner hinge pin (fig. 110).
3. On all styles, carefully disengage front seat back outer hinge arm from pin.
4. Move entire seat back assembly inboard until inner hinge pin is disengaged from extension on seat assembly; then, remove seat back from body.
5. To install, reverse removal procedure. Prior to installation of back assembly, be sure inner and outer washers are installed over the hinge pins. (fig. 110).

HEADLINING ASSEMBLY

Description: The headlining assembly is formed to the contour of the roof panel by concealed listing wires (figs. 111, 112, 113 and 114.) Both ends of the listing wires are located in holes in the side roof rails.

The headlining is secured at the windshield by cement and tacks or staples and along the side roof rails by tacks, staples, cement or a pronged retainer. The headlining on "11" and "69" styles is secured at the back window by cement and a finishing lace. On all other styles, the headlining is secured at the back window or back body opening by cement and tacks or staples.

CAUTION: Clean hands and tools are essential when working with headlining material.

Removal

1. Place protective coverings over seat cushions and backs.
2. Prior to removing headlining, remove following hardware and trim assemblies if present.
   a. Windshield side and upper garnish moldings.
   b. Rear view mirror support.

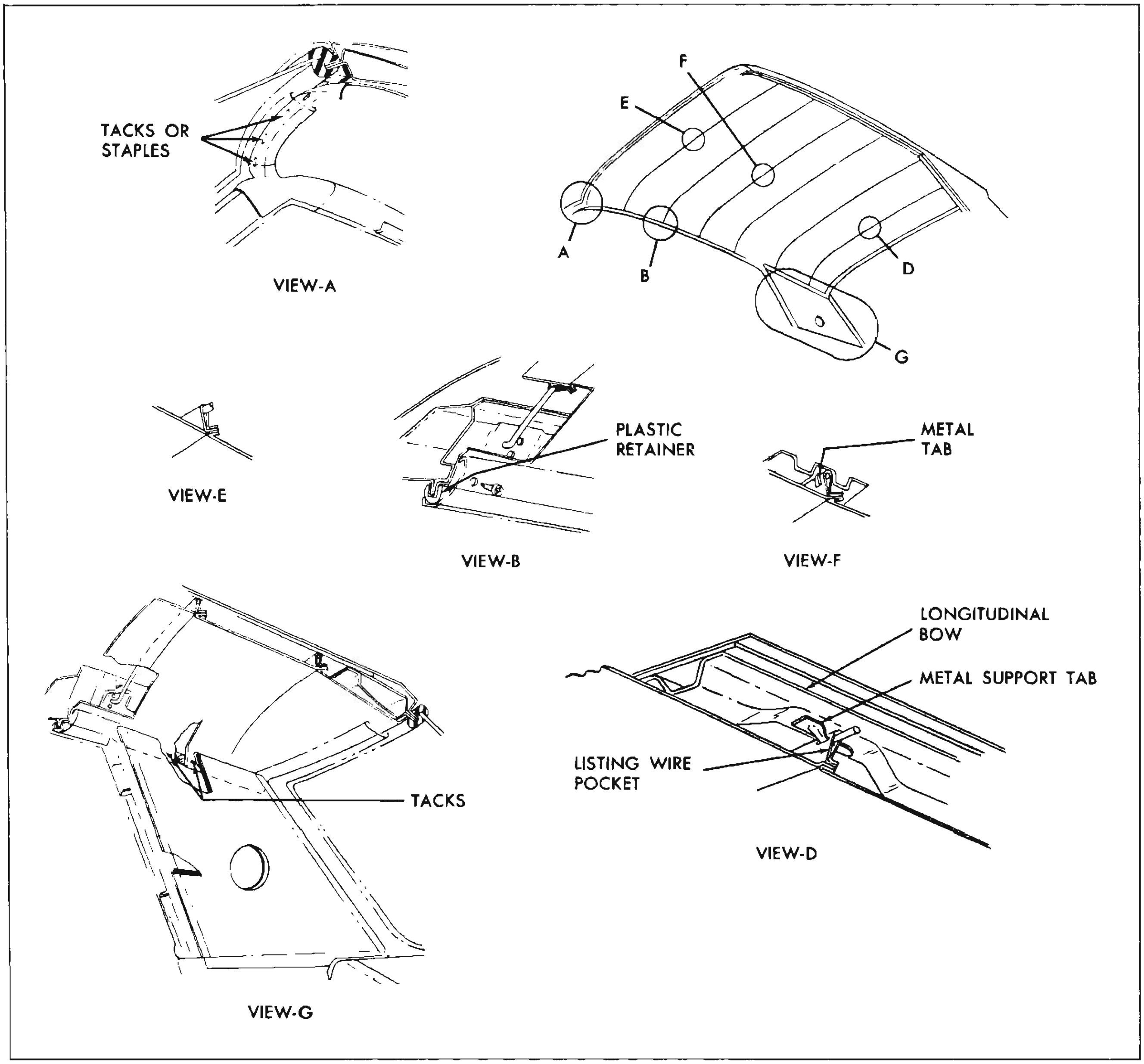


Fig. 111—Headlining Installation—39 Styles

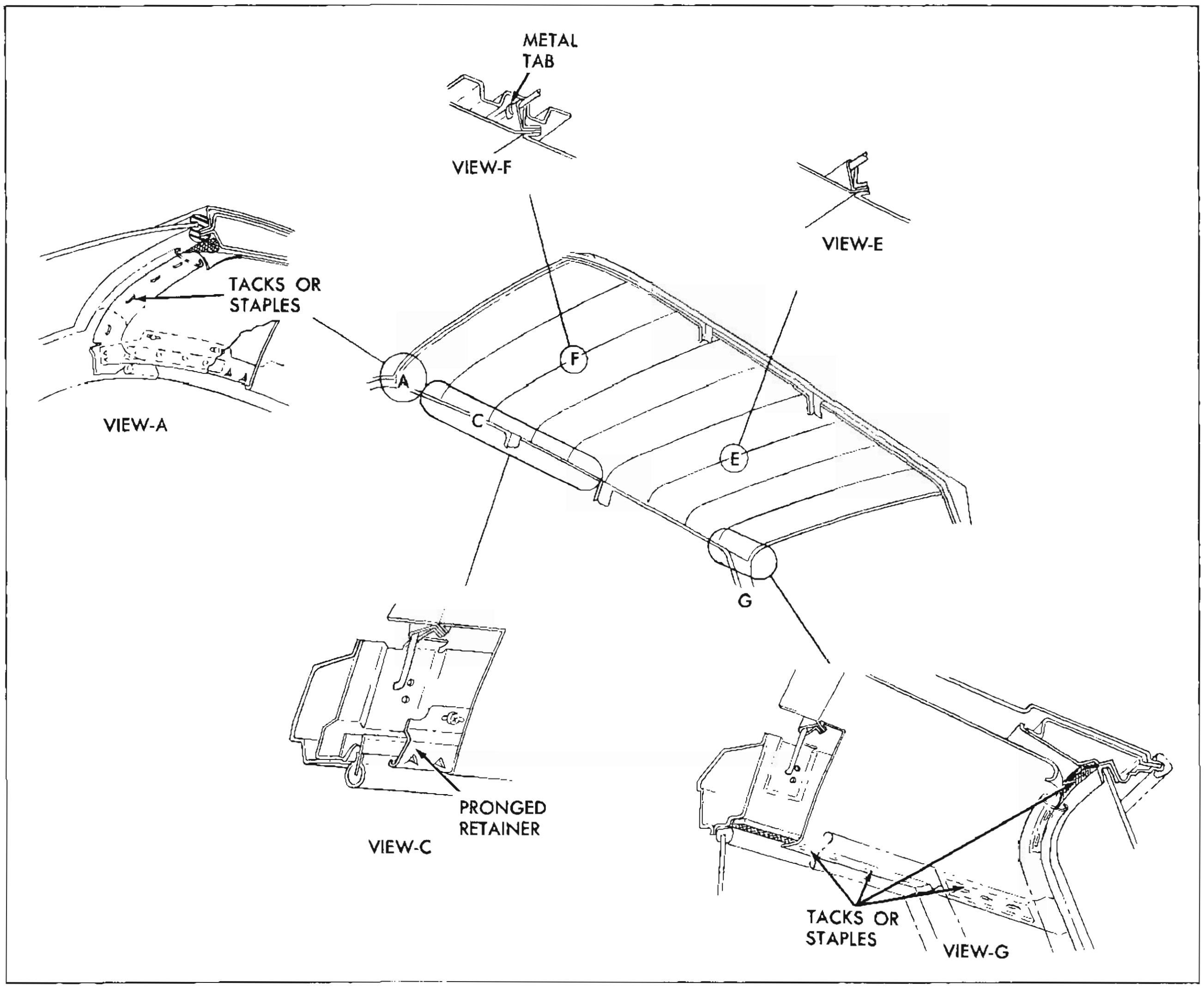


Fig. 112—Headlining Installation—35 & 45 Styles

c. Sunshade supports.
d. Dome or rear quarter courtesy lamps.
e. Coat hooks.
f. Rear quarter window upper garnish moldings (2 door styles).
g. Side roof rail moldings.
h. Back window garnish moldings ("39" and "47" styles).
i. Rear quarter window front, rear and upper moldings ("35" and "45" styles).
j. Back body opening upper and side garnish moldings.
k. Center pillar finishing moldings.
l. Rear quarter trim, where necessary.
m. Back window finishing lace ("11" and "69" styles).

3. Carefully remove tacks or staples securing headlining at windshield and back window or back body openings.
4. On "11", "69", "35" and "45" styles, use headlining inserting tool, J2772 or similar wide-bladed tool and carefully disengage headlining from pronged retainer on side roof rails over door openings (View "C", Fig. 112 and View "C", Fig. 114.
   On "47" style, remove tacks or staples along side roof rails and rear quarter areas (View "K" and "J", Fig. 113).
   On "39" style, remove plastic retainer from side roof rail pinchweld flange (View "B", Fig. 111).
5. On "11", "35" and "45" styles, remove tacks or staples securing headlining at rear quarter windows (View "D", Fig. 114 and View "G", Fig. 112).
6. Remove tacks or staples at roof panel extension areas, as required.
7. Carefully detach cemented edge of headlining around entire perimeter.

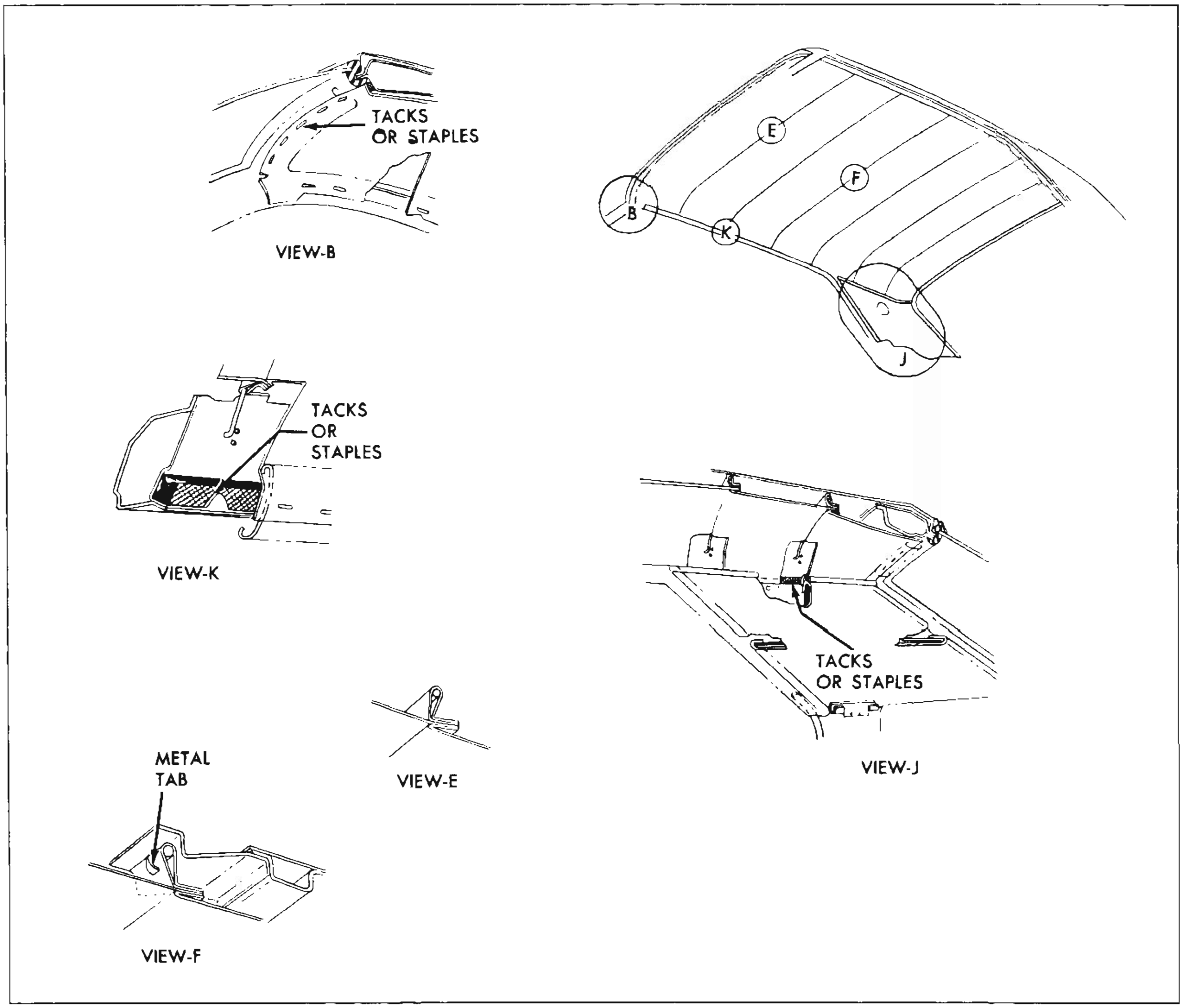


Fig. 113—Headlining Installation—47 Styles

8. Working from front to rear of body, disengage headlining listing wires from side roof rails, gathering or folding headlining with listing wires on outside to keep headlining clean.

IMPORTANT: Note in which holes ends of listing wires are installed in side roof inner rails. Listing wires should be placed in same hole when replacing headlining.

9. At front roof bow, bend down metal tabs securing listing wire (View "F", Fig. 111, Fig. 112, Fig. 114, Fig. 113).
10. On "39" styles, starting at front of body, carefully disengage No. 1 and No. 2 listing wires from holes in side roof inner rail assemblies and supporting tabs on longitudinal (front to rear) bow. In like manner, working from rear of body, disengage No. 6, No. 5, and No. 4 listing wires. (See View "D", Fig. 111). Exercise care to keep headlining material clean.
11. At No. 1 roof bow, bend down metal tabs securing No. 3 listing wire. (See View "F", Fig. 111).
12. If replacing headlining, remove listing wires from pockets of headlining.

IMPORTANT: Listing wires removed from old headlining must be installed in corresponding pockets of new headlining.

Installation:

1. If previously removed, install listing wires into pockets of new headlining assembly.
2. Apply approved trim cement to headlining attaching surface at windshield, side roof rail and back window opening. On "11" and "69" styles, be certain

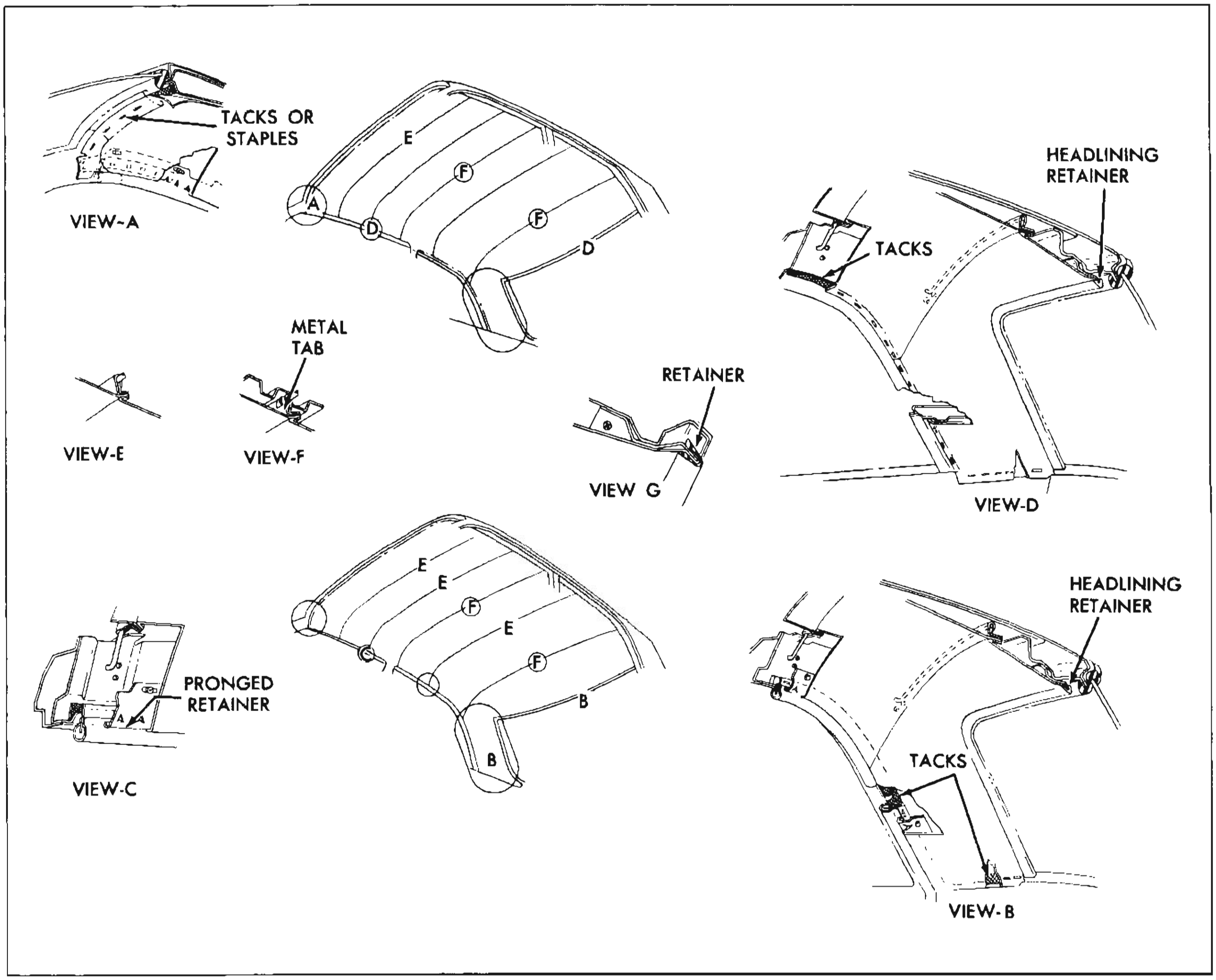


Fig. 114—Headlining Installation—11 and 69 Styles

cement is applied to both sides of retainer (View "G" and "B", Fig. 114).

3. Lift entire headlining assembly into body and install rear listing wire into side roof rails.
4. Center and align rearward end of headlining and where possible, stay tack headlining at center of back window or back body opening.
5. On "11", "35", "45", "47" and "69" styles, working forward, install ends of listing wires into listing wire holes in side roof rails.

NOTE: Each listing wire should rest against roof panel deadener after it is installed. Listing wires may be adjusted up or down by placing in appropriate holes in side roof inner rails.

6. At front roof bow, bend up metal tabs securing listing wire and listing wire pocket (View "F", Fig. 112, Fig. 114 and Fig. 113).
7. Using headlining inserting tool J-2772) or suitable wide-bladed tool, install headlining around back window retainer on "11" and "69" styles. On all other styles, stretch and stay tack headlining at back window or back body opening. Stay tack headlining in rear quarter area where required. (View "G", Fig. 112, View "D" and "B", Fig. 114 and View "J", Fig. 113).
8. Apply approved trim cement to side roof rail edge of headlining except where headlining is secured by pronged retainer. Remove all "fullness" or "draws" from headlining material and secure to side roof rails.
9. Recheck for any "fullness" or "draws" in headlining material and permanently tack headlining at windshield, back window, back body, and rear quarter areas.
10. On "11", "69", "35" and "45" styles, use headlining inserting tool, J-2772, or similar wide-bladed tool and carefully tuck edge of headlining under

pronged retainer along both side roof rails (View "C", Fig. 112 and Fig. 114). Permanently tack or staple headlining at side roof rails on "47" styles. (View "K", Fig. 113).

11. On "39" styles lift entire headlining assembly into body and install No. 3 listing wire and listing wire pocket over metal tabs on No. 1 roof bow. Bend up metal tabs so listing wire is securely fastened to roof bow (View "F", Fig. 111). Be certain headlining material is centered in body.
12. If new headlining assembly is being installed, slit listing wire pockets at each tab location on longitudinal bow (approximately 1½" in length). (See View "D", Fig. 111). Working rearward from No. 3 listing wire, install listing wires into holes in side roof inner rail assemblies and over tabs on longitudinal bow. In like manner, working forward, install No. 2 and No. 1 listing wires.

NOTE: Listing wires may be adjusted up or down by placing them in appropriate holes in side roof inner rails.

13. Apply cement to front edge of headlining and stretch and secure headlining along windshield opening. Temporarily tack headlining across windshield opening, allowing for possible repositioning.
14. Apply cement to rear edge of headlining and stretch and secure headlining at back window and upper rear quarter area. Also, temporarily tack headlining at these areas.
15. Apply cement to side edges of headlining assembly.
16. Using headlining inserting tool, J-2772, or similar wide-bladed tool, permanently install edge of headlining around pinchweld flange of door openings. Stretch and install headlining at seam locations. Then, attach edge of headlining between the seams previously installed.
17. Inspect headlining and remove any draws or wrinkles by stretching and repositioning headlining at attached edges.
18. Trim excess material from edges of headlining around entire perimeter.
19. Permanently secure headlining by tacking at windshield, back window and upper rear quarter areas. (See Views "A" and "G," Figure 111.)
20. Install plastic retainer along pinchweld flange of door openings. (See View "B", Figure 111.) Retainer should be evenly installed.
21. If installing new headlining assembly, locate attaching holes for coat hooks and sunshade supports. Puncture headlining with an awl or suitable tool at these locations and install assemblies.

NOTE: If replacing old headlining assembly, be certain sunshade support and coat hook holes in headlining material line up with attaching provisions on body.

22. Replace all other previously removed inside hardware and trim assemblies.

ROOF PANEL FABRIC COVER

The roof panel fabric cover (available on 1847 styles only) is a vinyl coated fabric covering applied to the metal roof panel. The fabric covering is made of three parts with dielectrically joined center section to side section seams.

The roof cover is attached at the windshield and back window openings by drive nails. Screws (or drive nails) are used at the belt line of the rear quarter area. A flexible retainer secures the fabric cover inside the right and left drip moldings. In addition, the roof panel fabric cover is cemented to the entire surface of the roof panel with a nitrile type non-staining cement.

Removal

1. The following parts must be removed prior to removing the roof panel fabric cover:
   a. Windshield assembly
   b. Back window assembly
   c. Windshield pillar finishing moldings
   d. Roof drip molding scalps
   e. Rear quarter reveal moldings (at belt)
   f. Roof extension panel emblem and/or plate assembly
2. Clean off all excess sealer from windshield and back window openings.
3. Remove drive nails from edge of fabric cover at windshield and back window opening. At roof panel extension (at belt) remove screws or drive nails.

NOTE: Drive nails can best be removed by first driving a screwdriver or suitable tool under the heads of the nails to loosen them. Diagonal cutters or similar tool can then be used to grasp nails and twist them out. Unnecessary enlargement of holes in roof panel should be avoided.

4. Removal of flexible retainers securing fabric cover inside right and left drip moldings can best be completed by inserting tip of screwdriver or similar tool under forward end of retainers. (See View "A" in fig 115.) Working from front to rear of body, disengage fingers of retainers from side roof rail drip molding flanges. Continue above operation until retainers can be removed from body.

NOTE: New retainers should be used when replacing fabric cover.

5. Prior to removing fabric cover, application of heat in rear quarter areas will permit easier loosening of cemented edges.

6. Loosen cemented edges of fabric roof cover at windshield, side roof rails, back window, and rear quarter areas; then, carefully remove fabric cover from remaining cemented area of roof panel.

Installation

1. Check all cementing surfaces on body to insure a smooth surface. Cementing surface must be smooth to prevent "highlighting" of excess cement through fabric cover after new cover has been installed. Clean off old cement as required.

   NOTE: A cleaner such as 3M Adhesive Cleaner or equivalent, should be used to remove or smooth out excess old cement. Apply solvent and allow to soak before rubbing.

   CAUTION: Be certain to follow manufacturer's directions when using cleaner.

2. To permit easier fitting and removing of wrinkles from new cover assembly, where possible, install new cover at room temperature (approximately 72°).

   NOTE: Where new cover is installed at temperatures below 72°, pliers fabricated as shown in Figure 116 will aid in removing wrinkles.

3. Determine center line of roof panel by marking center points on windshield and back window openings with chalk or equivalent.
4. Fold cover lengthwise, precisely at center location. Mark center location at front and rear of cover.
5. Lay cover on roof panel and align to correspond with center line of roof panel. Determine proper material overhang at windshield and back window openings.
6. Place fabric cover on protected surface with inner layer of material exposed.
7. Apply nitrile non-staining vinyl trim adhesive such as 3M Vinyl Trim Adhesive, Permalastic Vinyl Trim Adhesive, or equivalent to entire inner layer of fabric cover. **Allow to dry for a minimum of fifteen minutes.**

If nitrile non-staining cement is not available, neo-

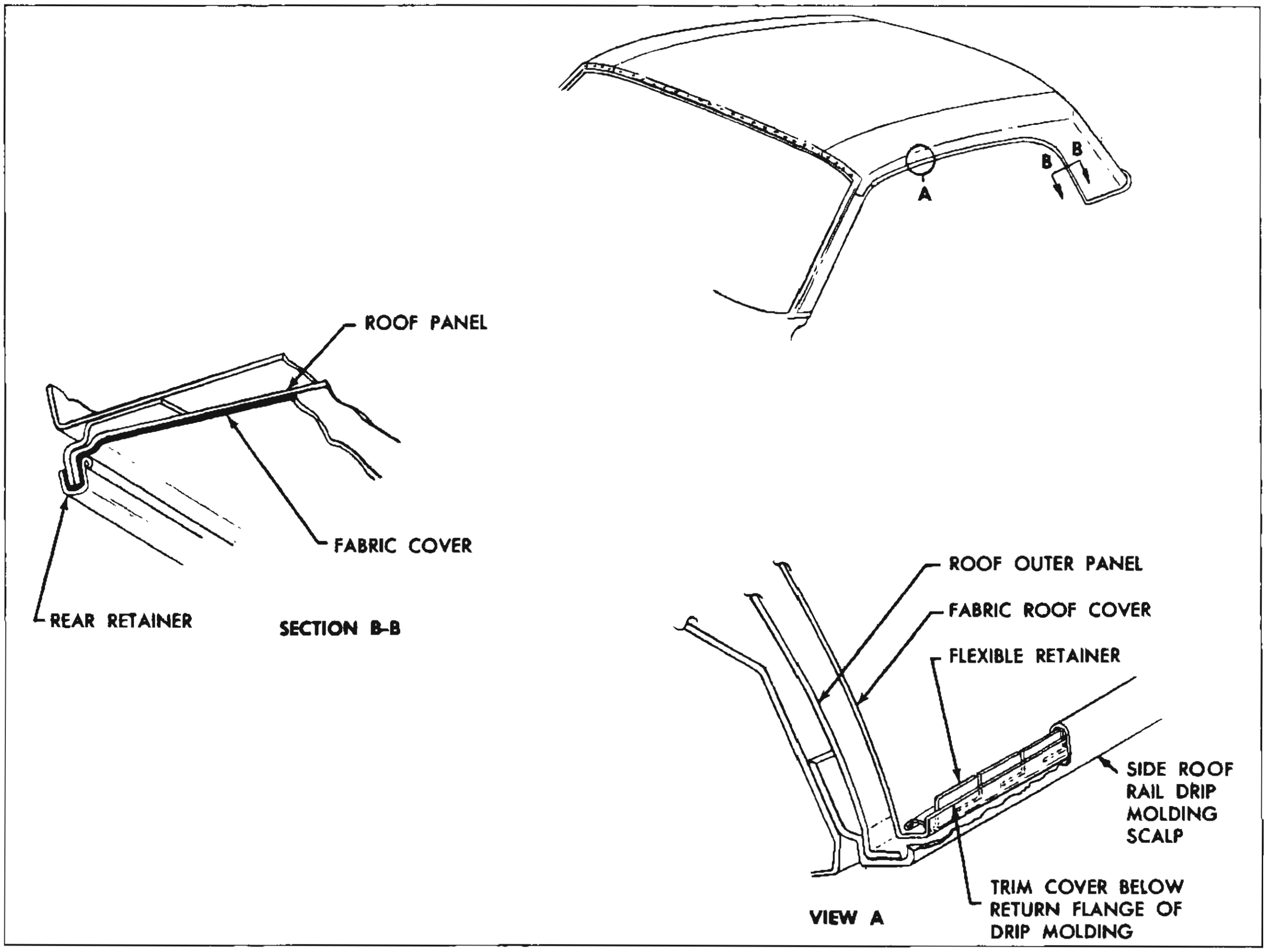


Fig. 115—Body Fabric Roof Cover

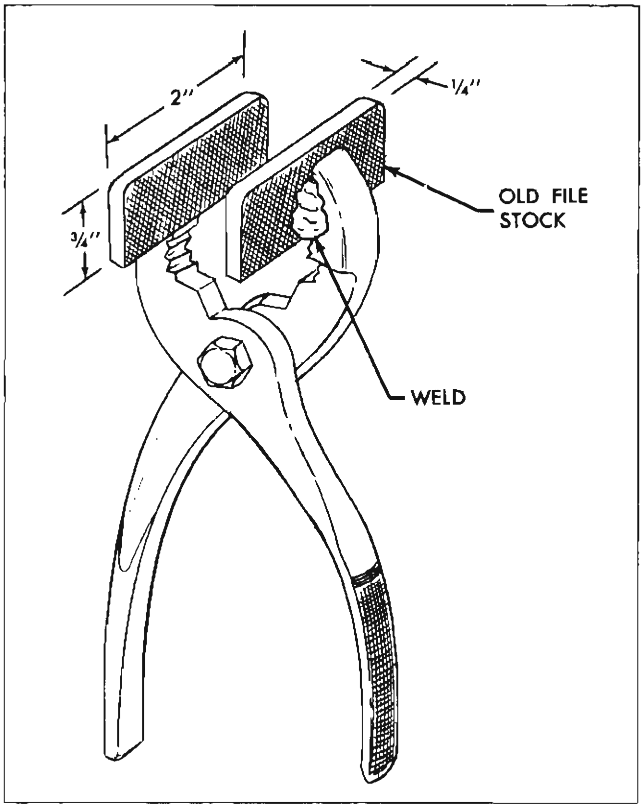


Fig. 116—Fabric Cover Pliers

prene type non-staining weatherstrip cement (3M Super Weatherstrip Cement or equivalent) may be used. Instead of applying neoprene cement to entire inner layer of cover in one application, a step procedure is used. **Do not allow drying period.** Begin by applying an 8" wide strip of cement adjacent to center line of fabric cover to correspond with area shown in Figure 117.

IMPORTANT: Application of *nitrile* vinyl trim adhesive should be as thin as possible, as an excess amount of cement may result in trapped solvents (blisters) between fabric cover and roof panel. Application of neoprene type adhesive should also be as thin as possible as an excess amount of cement may result in "highlights" (cement build-up). For these reasons, a mohair roller or equivalent should be used to apply a thin coat of cement to fabric cover and roof panel; however, if necessary, a brush may be used. Exercise care when applying cement on inner layer of cover to prevent cement from contacting outer layer.

8. Fold cover on center line with inner layer of cover exposed and place on roof panel adjacent to center line. Apply an 8" wide strip of cement (nitrile or neoprene) on roof panel adjucent to center line of roof panel.
9. With aid of helper, slide folded cover to center

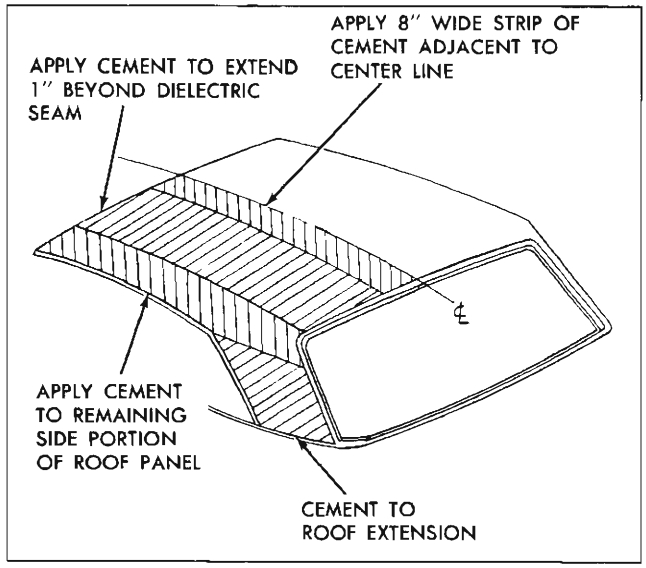


Fig. 117—Fabric Cover Cementing Procedures

line of roof panel. Holding fabric cover securely at windshield and back window opening, turn over folded half of fabric cover and fasten to cemented portion of roof panel.

NOTE: This operation should center fabric cover on roof panel. Center marks on windshield and back window openings must correspond to center marks on fabric cover.

10. Once 8" strip of fabric cover is cemented to roof panel, fold over side portion of fabric cover. Apply nitrile cement to roof panel to extend approximately 1" beyond dielectric seam location. If neoprene type weatherstrip cement is used, apply cement to **fabric cover** and **roof panel** to extend 1" beyond dielectric seam location. (See Fig. 117).

IMPORTANT: Application of cement should not overlap with previously cemented area, as "highlighting" of excess cement through fabric cover will result.

11. Cement prepared portion of fabric cover to roof panel **making certain dielectric seam is straight.**
12. Cement fabric cover to side portion of roof panel (except rear quarter area) and drip molding. See Fig. 117).

NOTE: When installing fabric cover to inside of drip molding, a small thin-edged piece of plastic, or similar material, may be used to insert cover in place inside drip molding. Excerise care to prevent damage to cover when performing this operation.

13. Cement fabric cover in rear quarter area. Be certain fabric cover is cemented at emblem or plate assembly attaching locations.

14. Repeat steps No. 10, 11, 12 and 13 on right side.
15. At windshield and back window openings, cement cover into opening as shown in View "A", Fig. 118. Apply extra bead of cement to each side of dielectric seam between fabric cover and roof panel at windshield and back window openings. View "A", Fig. 118).
16. Using hammer and flat end punch install drive nails at windshield and back window openings. (View "A", fig. 118 shows typical drive nail installation).

NOTE: When installing drive nails, it is best to first use an awl or similar tool to initiate a hole in metal. Strike drive nails only hard enough to seat them. Installation of drive nails should also be as low as possible in windshield and back window opening. This will aid in preventing cutting edge of fabric cover due to a missed hammer blow when drive nails are installed.

17. Install drive nails at belt line of rear quarter area. (Fig. 118).
18. Trim off material at windshield, back window, and rear quarters. View "A" in Fig. 118 shows where trimmed edge should occur in openings.

NOTE: Install fabric cover at windshield pillar area in same manner as original installation.

19. Using fabric cover trimming tool (J-21092), trim fabric cover just under lip of roof drip molding. View "A", Fig. 119).
20. Prior to installing flexible retainers in side roof rail drip moldings, spread them slightly to insure a tight fit.
21. Install flexible retainer starting at radius area above rear door or quarter window. Working toward rear of body, carefully insert retainer into drip molding so that fingers are under drip molding flange (View "A", fig. 119). Use fiber or wood block with slight concave end to push retainer downward. **Do not damage retainer.**
22. Install all previously removed moldings and assemblies.

NOTE: Normally, minor creases or fold marks will gradually disappear after cover assembly has been in service.

IMPORTANT: If nitrile adhesive is used, fabric cover should be allowed to dry approximately four hours after installation. If fabric cover is subjected to extreme direct sunlight or heat immediately after installation, blistering due to trapped solvents may occur.

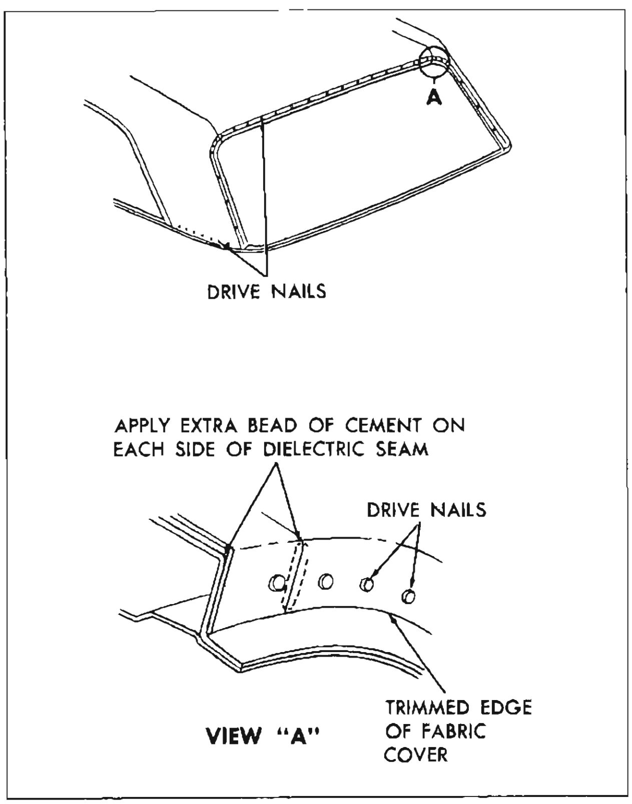


Fig. 118—Drive Nail Installation

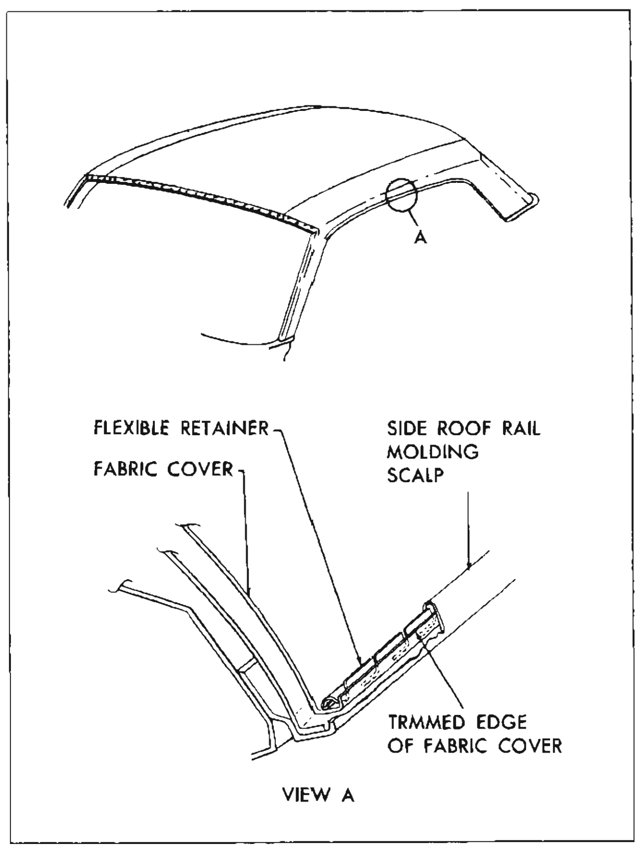


Fig. 119—Fabric Cover Retainer Installation

23. Use mineral spirits, kerosene or equivalent to remove windshield and back window sealer from fabric cover.

IMPORTANT: Do not apply execessive pressure when wiping sealer from cover, as damage may occur to fabric cover.

FOLDING TOP

FOLDING TOP ADJUSTMENT

The folding top linkage consists of three sections of right and left side roof rails and a front roof rail connected by bolts, hinges, and a series of connecting links and bows. The top linkage is attached to the body at the rear quarter area by a male hinge. The hinge is attached directly to the quarter panel brace. The front roof rail is locked at the windshield header by two hook type locks which are an integral part of the two locking handles.

The following information outlines and illustrates procedures which may be used to correct misaligned folding top linkage. To correct some top variations, only a single adjustment is required; other top variations require a combination of adjustments. In conjunction with adjustment of the folding top, it may be necessary to adjust the door, door glass, rear quarter glass, trim sticks or side roof rail weatherstrips.

Adjustment of Top at Front Roof Rail Corner Brace

If the top, when in a raised position, is too far forward or does not move forward enough to allow the guide studs on the front roof rail to enter holes in the striker assemblies, proceed as follows:

1. Unlatch top and raise it above windshield header. Remove side roof rail weatherstrip front attaching screws.
2. Loosen corner brace attaching bolts and adjust front roof rail fore or aft as required. Repeat on opposite side if necessary (fig. 120).

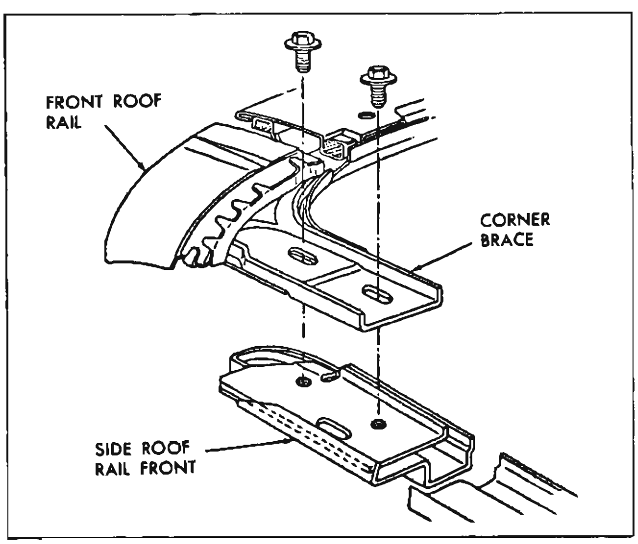


Fig. 120—Roof Rail Corner Brace Attachments

NOTE: This adjustment is limited. If additional adjustment is required, it can be made at the folding top male hinge.

3. When front roof rail corner brace is properly adjusted, tighten attaching bolts and reinstall side roof rail front weatherstrip attaching screws. Check forward section of weatherstrip and reseal if necessary.

Adjustment of Top at Sunshade and Striker Support Assembly

If a difficult locking action, caused by misalignment of the sunshade and striker support assembly is encountered at the front roof rail proceed as follows:

1. Unlatch top and raise it above windshield header.
2. Loosen striker support attaching screws and adjust striker laterally as required; then tighten attaching screws (fig. 121).

If, after adjusting the striker support, the locking action of top is still unsatisfactory, or if a closer fit of the front roof rail to windshield header is desired, the hook lever on the front roof rail lock assembly may be adjusted as follows:

1. To tighten locking action of top, turn hook lever clockwise.
2. To reduce locking effort of top, turn hook lever counterclockwise.

NOTE: Hook lever may be adjusted with finger pressure, no tools are required.

Adjustment of Top Control Link Adjusting Plate

1. With top in up position, if joint between front and center side roof rail is too high or too low, proceed as follows:
   a. Remove folding top compartment side trim panel.
   b. Mark location of control link adjusting plate on folding top compartment brace.
   c. Loosen two bolts securing control link adjusting plate sufficiently to permit adjustment of plate (fig. 122).
   d. Without changing fore and aft location of adjusting plate, adjust side roof rail up or down allowing adjusting plate to move up or down

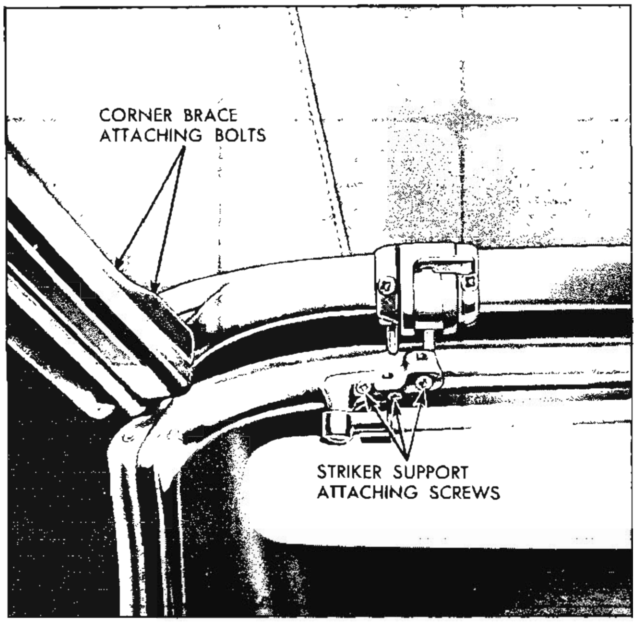


Fig. 121—Front Roof Rail Adjustment

over serrations on support as required; then tighten bolts.

2. If top assembly does not stack properly when top is in down position, proceed as follows:
   a. Mark location of control link adjusting plate on folding top compartment brace.
   b. Loosen bolts securing control link adjusting plate sufficiently to permit adjustment of plate.
   c. Without changing the up or down location of adjusting plate, move adjusting plate forward or rearward (horizontally) over serrations as required to obtain desired height; then tighten bolts.

NOTE: If top cannot be fully lowered, even after control link plate has been adjusted, readjust male hinge assembly as required. Check top for proper operation.

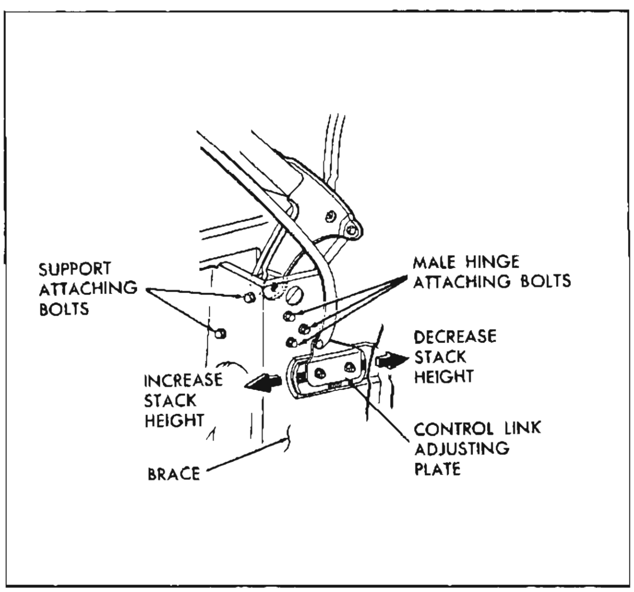


Fig. 122—Adjustment of Control Link Adjusting Plate

Adjustment of Top at Male Hinge Support

Prior to making any adjustment of top linkage at male hinge, loosen two bolts securing folding top rear quarter trim stick to rear quarter panel. This will prevent any possible damage to top when it is raised after adjustment. After making an adjustment at male hinge, check folding top at rear quarter area for proper fit and, if necessary, adjust trim stick assembly.

1. If there is an excessive opening between side roof rail rear weatherstrip and rear of rear quarter window, or if front roof rail is too far forward or rearward, proceed as follows:
   a. Mark location of male hinge attaching bolt washers and control link assembly on folding top compartment brace.
   b. Loosen male hinge assembly bolts (fig. 122).
   c. Move hinge fore or aft as required to obtain proper alignment between side roof rail rear weatherstrip and rear quarter window; then tighten bolts.

   IMPORTANT: The entire male hinge assembly must be adjusted forward or rearward at a 90° angle to vertical line of male hinge attachment. (Use mark at washers as guide). DO NOT allow male hinge to rotate as rotation may cause damage to lift cylinder by allowing piston to bottom or rod to bend after top has been operated.

   d. Lock front roof rail to windshield, (where required, adjust front roof rail as previously described), and check fit of top material at rear quarter trim stick area. If necessary, adjust trim stick; then tighten trim stick attaching bolts.
   e. Check top assembly for proper stack height and proper alignment of side roof rails over door and quarter windows. Where required, adjust control link adjusting plate as previously described. (See steps No. 1 and 2 under "Adjustment of Top Control Link Adjusting Plate").

   NOTE: If top cannot be fully raised or lowered, even after control link plate has been adjusted, readjust male hinge assembly as required. Check top for proper operation.

2. If side roof rail is too high or too low at rear quarter window area, proceed as follows:
   a. Mark location of male hinge attaching bolt

washers and control link on folding top compartment brace.

b. Loosen male hinge assembly attaching bolts fig. 122).

c. Without changing fore and aft location of male hinge, adjust male hinge up or down as required to obtain proper alignment between side roof rails and rear quarter windows.

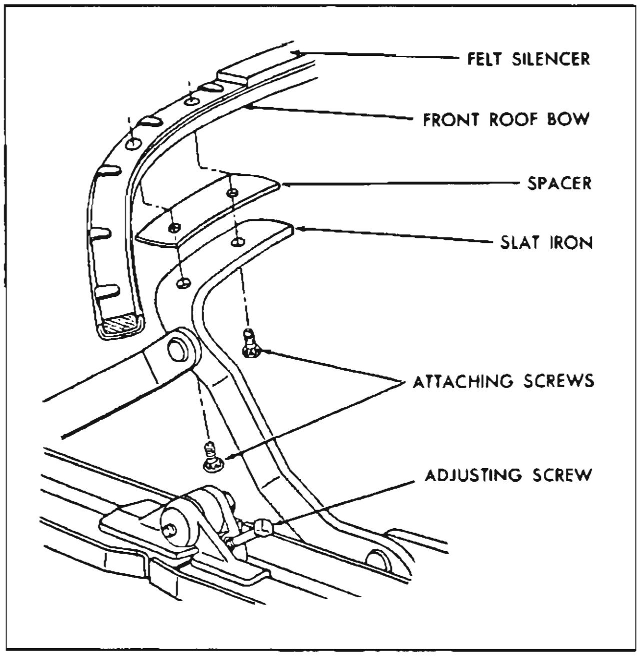


Fig. 123—Center Side Roof Rail and Hinge

IMPORTANT: The entire male hinge assembly must be adjusted straight upward or downward at a 90° angle to horizontal line of male hinge attachment. (Use mark at washers as guide). DO NOT allow male hinge to rotate as rotation may cause damage to lift cylinder by allowing piston to bottom or rod to bend after top has been operated.

d. Tighten attaching bolts, while maintaining proper alignment of vertical scribe marks.

e. Check fit of top material at rear quarter trim stick area and, if necessary, adjust trim stick. If adjustment is not necessary, tighten trim stick attaching bolts.

f. Check top assembly for proper stack height and proper alignment of side roof rails over door and quarter windows. Where required, adjust control link adjusting plate as previously described. (See steps No. 1 and 2 under "Adjustment of Top Control Link Adjusting Plate").

NOTE: If top cannot be fully raised or lowered, even after control link plate has been adjusted, readjust male hinge assembly as required. Check top for proper operation.

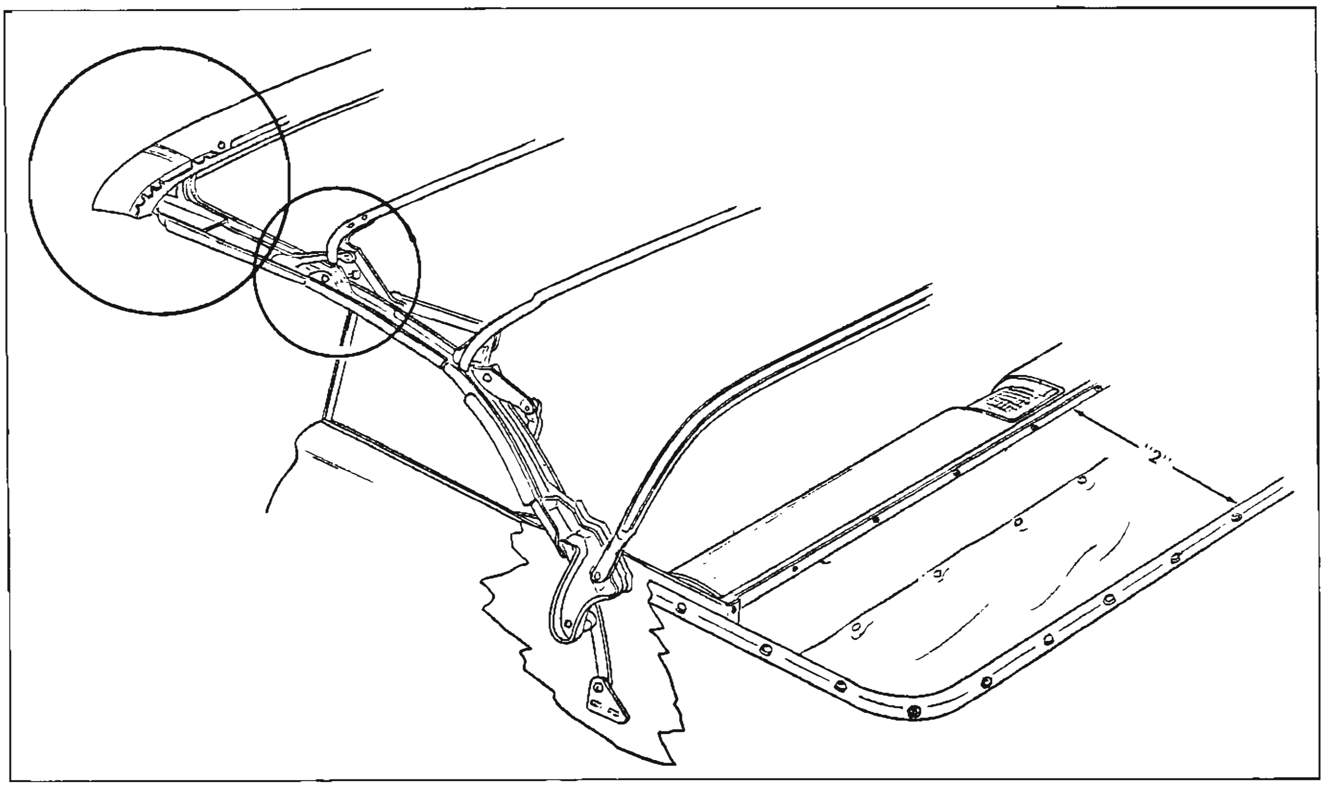


Fig. 124—Folding Top Parts Location

SERVICE DIAGNOSIS

The following procedure describes and illustrates various types of folding top misalignment conditions, their apparent causes and the recommended procedure for their correction.

CONDITION	APPARENT CAUSE	CORRECTION
A. Difficult locking action at front roof rail.	1. Sunshade support misaligned.	Adjust sunshade support laterally.
	2. Lock hook lever improperly adjusted.	Adjust lock hook lever counterclockwise.
	3. Misaligned front roof rail front weatherstrip.	Loosen, realign and retack front roof rail front weatherstrip.
	4. Front roof rail misaligned.	Adjust front roof rail.
B. Top does not lock tight enough to windshield header.	1. Sunshade support misaligned	Adjust sunshade support laterally.
	2. Lock hook lever improperly adjusted.	Adjust lock hook lever clockwise.
	3. Misaligned front roof rail front weatherstrip.	Loosen, realign and retack front roof rail front weatherstrip.
	4. Front roof rail misaligned.	Adjust front roof rail.
C. Top travels too far forward.	1. Front roof rail misaligned.	Adjust front roof rail rearward (fig. 120).
	2. Male hinge assembly misaligned.	Adjust male hinge assembly rearward (fig. 122).
D. Top does not travel forward far enough.	1. Front roof rail misaligned.	Adjust front roof rail forward (fig. 120).
	2. Male hinge assembly misaligned.	Adjust male hinge assembly forward (fig. 122).
	3. Improper spacing between rear trim stick and body metal.	Install an additional spacer between rear trim stick and body metal at each attaching bolt location.
E. Side roof rail rear weatherstrip too tight against rear of rear quarter window.	1. Male hinge assembly misaligned.	Adjust male hinge assembly rearward (fig. 122).
F. Gap between side roof rail rear weatherstrip and rear of rear quarter window.	1. Male hinge assembly misaligned.	Adjust male hinge assembly forward (fig. 122 and/or shim side roof rail rear weatherstrip forward as required.
G. Side roof rail rear weatherstrip too tight against top of rear quarter window.	1. Male hinge misaligned.	Adjust male hinge upward (fig. 122).
H. Gap between side roof rail rear weatherstrip and top of rear quarter window.	1. Male hinge misaligned.	Adjust male hinge downward and/or shim side roof rail weatherstrip downward as required.
I. Sag at front to center side roof rail joint.	1. Control link adjusting plate misaligned.	Adjust control link adjusting plate downward (fig. 122).
	2. Center side roof rail hinge adjusting screw improperly adjusted.	Adjust screw counterclockwise (fig. 123).
J. Front and center side roof rail bows upward at hinge joint.	1. Control link adjusting plate misaligned.	Adjust control link adjusting plate upward (fig. 122).
	2. Center side roof rail hinge adjusting screw improperly adjusted.	Adjust screw clockwise (fig. 123).

CONDITION	APPARENT CAUSE	CORRECTION
K. Folding top dust boot is difficult to install.	1. Improper stack height due to misaligned control link adjusting plate.	Adjust control link plate rearward or forward as required.
	2. Misaligned folding top dust boot female fastener.	Where possible, align female with male fastener.
	3. Rear seat back assembly is too far forward.	Relocate rear seat back panel rearward until dimension "Z" between upper rear edge of rear seat back to forward edge of pinchweld finishing molding is 19½ inches ± 1/16". The dimension is measured at approximate center line of body (fig. 124).
	4. Excessive build-up of padding in side roof rail stay pads.	Repair side stay pads as required.
L. Folding top dust boot fits too closely.	1 Improper stack height due to misaligned control link adjusting plate.	Adjust control link plate forward (fig. 122).
	2. Rear seat back assembly is too far rearward.	Relocate rear seat back panel forward until dimension "Z" between upper rear edge of rear seat back to forward edge of pinchweld finishing molding is 19½ inches ± 1/16". The dimension is measured at approximate center line of body (fig. 124).
M. Top material is too low over windows or side roof rails.	1. Front roof bow improperly shimmed.	*Install one or two ⅛" shims between front roof bow and slat iron (fig. 123).
	2. Excessive width in top material.	If top is too large, detach binding along affected area, trim off excessive material along side binding as required; then hand sew binding to top material.
N. Top material is too high over windows or side roof rails.	1. Front roof bow improperly shimmed.	*Remove one or two ⅛" shims from between front roof bow and slat iron (fig. 123).
	2. Front roof bow felt silencer too high.	Trim silencer to within ⅛" of top of front roof bow (fig. 123).
O. Top material has wrinkles or draws.	1. Rear quarter trim stick improperly adjusted.	Adjust rear quarter trim stick on side affected.
	2. Top material improperly installed to center or rear quarter trim stick.	Retack top material as required.
P. Wind whistle or waterleak along front roof rail.	1. Top does not lock tight enough to windshield header.	Adjust sunshade support laterally and/or adjust lock hook lever clockwise.
	2. Misaligned front roof rail front weatherstrip.	Retack front weatherstrip to front roof rail.
	3. Front roof rail contour does not conform to windshield header.	Contour of front roof rail may be changed slightly by reforming rail.
Q. Wind whistle or air leak between top material and side roof rail stay pads.	1. Top material hold-down cables improperly adjusted.	Adjust top material hold-down cables as required.

*When no shims are required, use attaching screw part #4824789 (¼-28 x ⅝" #12 oval head with external tooth lock washer, type "T" thread cutting chrome finish).
When one shim is required, use attaching screw part #837811 (¼-28 x ¾" #12 oval head with external tooth lock washer, type "T" thread cutting chrome finish).
When two shims are required, use attaching screw part #4824756 (¼-28 x ⅞" #12 oval head with external tooth lock washer, type "T" thread cutting chrome finish).

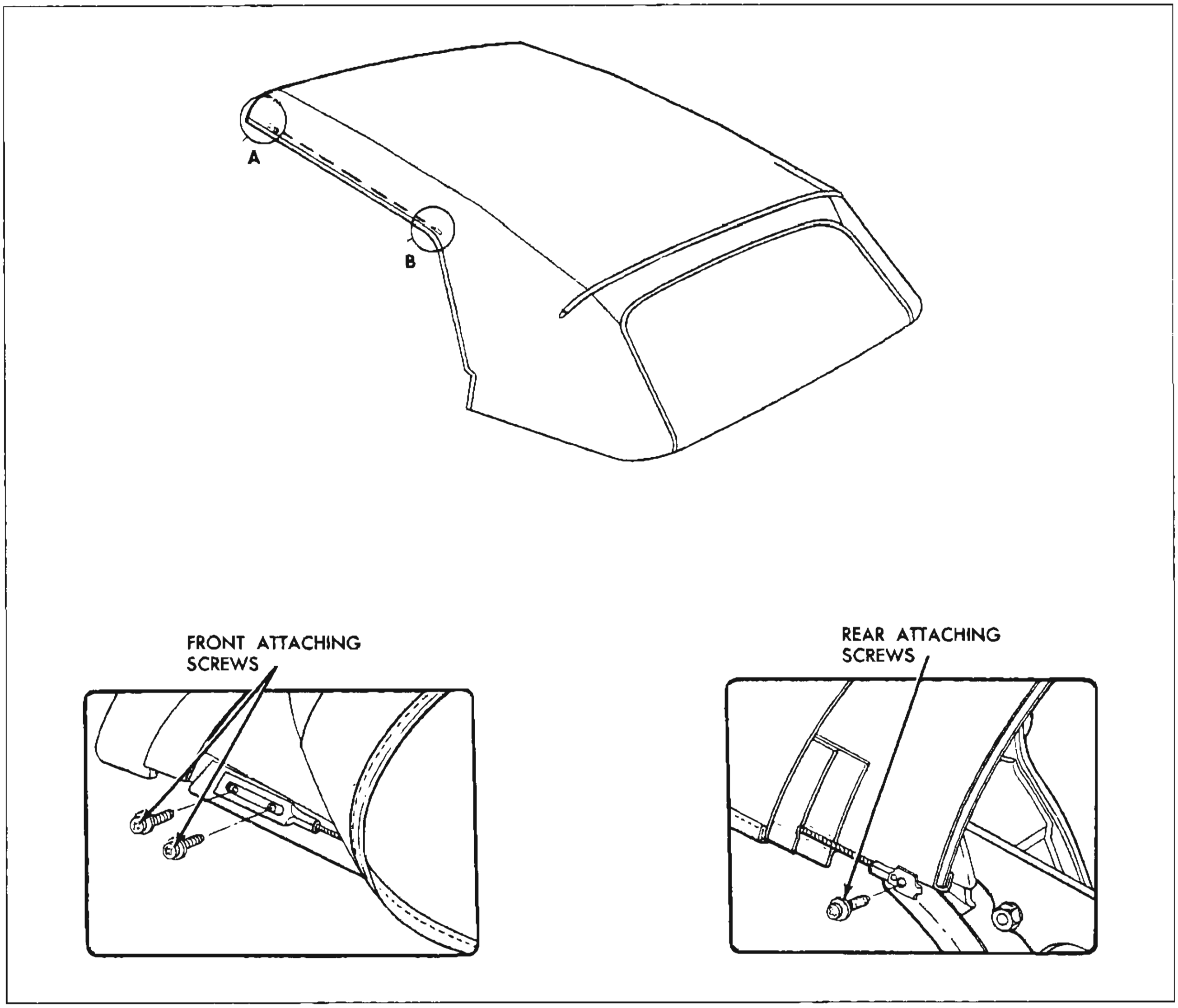


Fig. 125—Hold Down Cable Screws

FOLDING TOP TRIM ASSEMBLY

All 1964 convertible top trim cover assemblies incorporate a top material hold-down cable along the right and left side roof rails. The cables are installed through a retaining pocket in the top material and are fastened at the front and rear side rails by attaching screws. The cables are designed to hold the top material tight against the side roof rail stay pads, thus minimizing air leakage between the top material and the stay pads.

Folding top service operations remain much the same as covered in the 1961 Passenger Car Shop Manual. The following illustrations show minor variations.

Front and rear attaching screws for the hold-down cable are shown in Figure 125.

Figure 126 illustrates marking of both ends of rear and rear quarter trim sticks on the vinyl surface of the top material. These marks should be transferred to the new top material upon installation.

Folding of excess back curtain upper valance material rearward and tacking to rear bow is shown in Figure 127.

FOLDING TOP—HYDRO-LECTRIC SYSTEM

The new high pressure hydro-lectric unit used in 1964 convertible bodies consists of a 12 volt reversible type motor, a rotor type pump, two hydraulic lift cylinders, and an upper and lower hydraulic hose assembly.

NOTE: When servicing the motor assembly or pump end plate assembly, it is extremely important that the small motor shaft "O" ring seal is properly installed over the motor armature shaft and into the pump end plate assembly prior to installing the pump rotors or drive shaft ball.

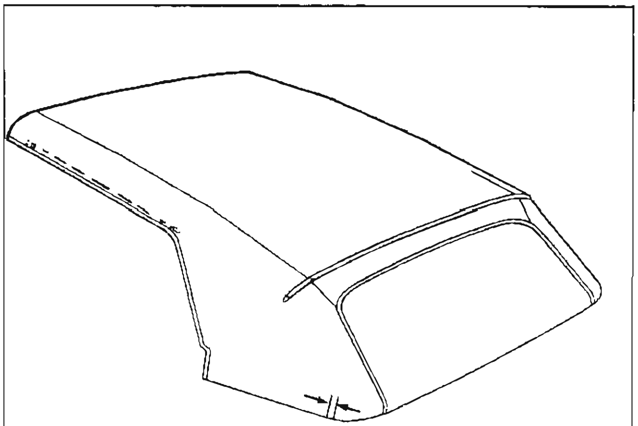


Fig. 126—Marking Material

OPERATION OF PUMP ASSEMBLY AND HYDRAULIC CHECKING PROCEDURE

The motor type pump assembly (fig's. 128 and 129) is designed to deliver a maximum pressure in the range of 340 psi to 380 psi.

NOTE: A difference in pressure readings may exist between the pressure port for top of cylinders and pressure port for bottom of cylinders. This condition is acceptable if both readings are within the limit of 340 psi and 380 psi.

FOLDING TOP LIFT CYLINDER

Removal and Installation

1. Lock top to windshield header.
2. Disconnect positive battery cable to prevent accidental operation of motor and pump, particularly when hydraulic hoses are disconnected from cylinder.

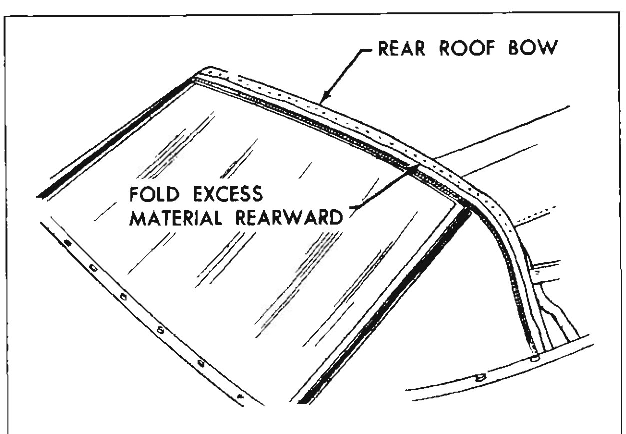


Fig. 127—Back Curtain Installation

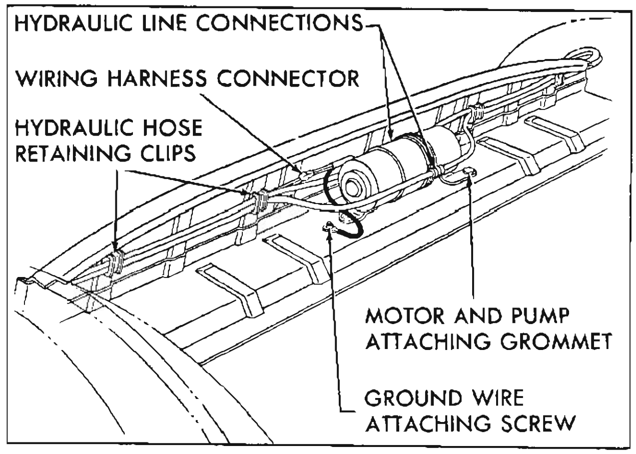


Fig. 128—Hydro-Lectric Motor and Pump Installed (A-B Style Shown)

3. Remove rear seat cushion and seat back.
4. Remove folding top compartment side trim panel assembly on side affected.
5. Fully raise door and rear quarter window on side affected to provide support for side roof rail assembly.
6. Remove attaching nut, bolt, bushing and washer from upper end of cylinder. (Fig. 130).
7. Remove side roof rail to male hinge attaching nut and bolt. (Fig. 130)
8. Mark location of male hinge attaching bolt washers on folding top compartment brace; then remove folding top male hinge attaching bolts (Fig. 130).
9. Carefully pull male hinge with attached cylinder rearward until male hinge is disengaged from side roof rear rail; then move hinge and cylinder assembly to inboard side of top compartment brace.
10. Remove screws securing lift cylinder to male hinge; then remove hinge from cylinder.
11. Prior to disconnecting hydraulic connections, place suitable wiping rags under connections to absorb any drippage of hydraulic fluid.
12. Disconnect hydraulic connections from old cylinder and transfer to new cylinder assembly.
13. Install new cylinder to male hinge.
14. Install male hinge to top compartment brace using previously removed attaching bolts (fig. 130).
15. Connect positive battery cable to battery terminal.
16. Using power, raise cylinder piston rod to extended position.
17. Attach upper end of cylinder to folding top linkage using previously removed nut, bolt, bushing and washer.
18. Operate folding top assembly down and up to insure proper linkage alignment of side rails. Where required, adjust male hinge assembly as described under "Folding Top Adjustments".

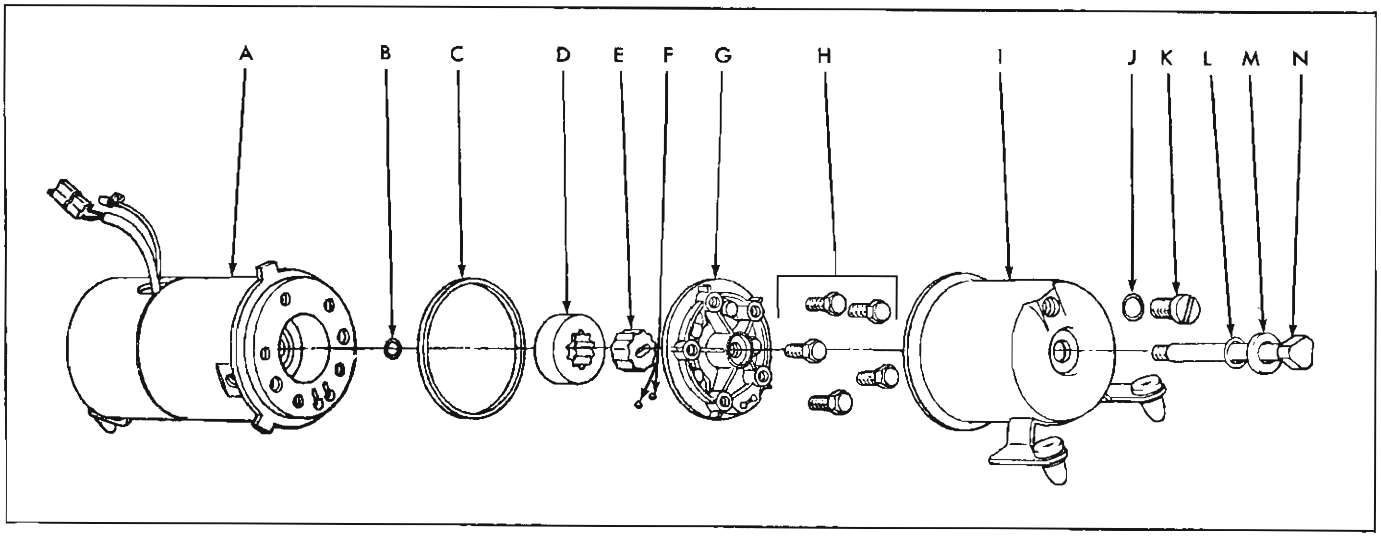


Figure 129—Hydro-Lectric Motor and Pump Disassembled "A", "B" and "C" Styles

A. Motor Assembly
B. Motor Shaft "O" Ring Seal
C. Reservoir Seal
D. Outer Pump Rotor
E. Inner Pump Rotor
F. Fluid Control Valve Balls
G. Pump Cover Plate Assembly
H. Pump Cover Attaching Screws
I. Reservoir Tube and Bracket Assembly
J. Reservoir Filler Plug "O" Ring Seal
K. Reservoir Filler Plug
L. Reservoir End Plate Attaching Bolt "O" Ring Seal
M. Reservoir End Plate Attaching Bolt Washer
N. Reservoir End Plate Attaching Bolt

19. Operate folding top assembly down and up several times, then check and correct level of hydraulic fluid in reservoir. See "Filling of Hydro-Lectric Reservoir".

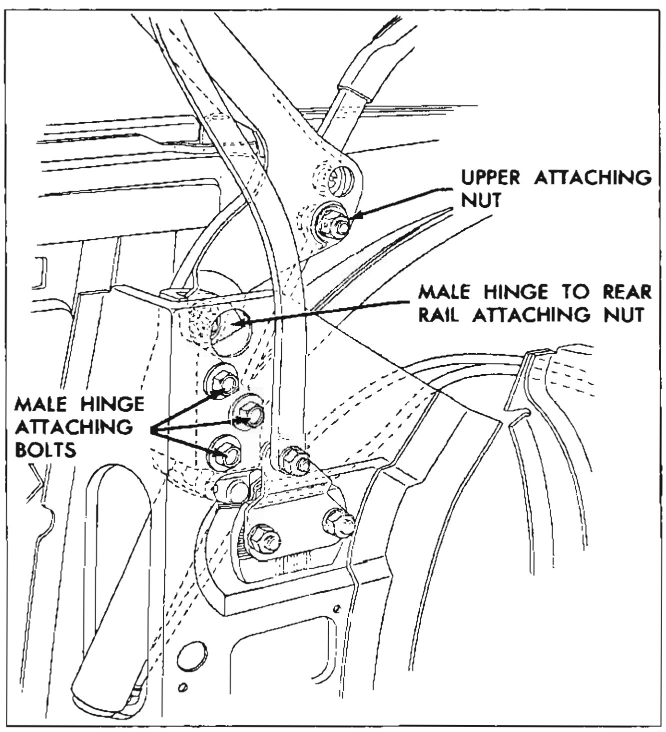


Fig. 130—Lift Cylinder Removal

Filling of Hydro-Lectric Reservoir

This procedure virtually eliminates discharge or spillage of hydraulic fluid and possible trim damage while filling and bleeding system.

1. Filler Plug Adapter
   a. Drill ¼ inch diameter hole through center of spare reservoir filler plug.
   b. Install two inch length of metal tubing (¼" O.D. x $\frac{3}{16}$" I.D.) into center of filler plug and solder tubing on both sides of filler plug to form air tight connection. See Fig. 131.
2. Filling and Bleeding of Reservoir
   a. With top in raised position, remove folding top compartment bag material from rear seat back panel. Remove pump and motor shield, where present.
   b. Place absorbent rags below reservoir at filler

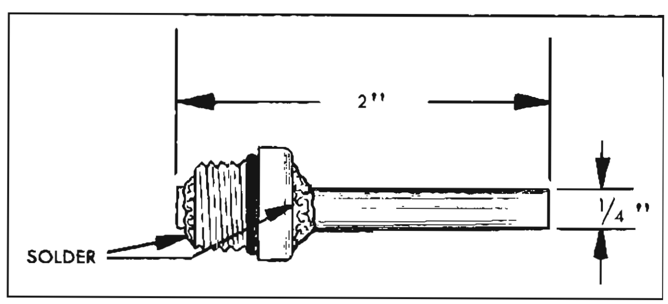


Fig. 131—Reservoir Filler Plug Adapter

plug. Using a straight-bladed screwdriver, slowly remove filler plug from reservoir.

IMPORTANT: When installing new or overhauled motor and pump assembly, as a bench operation, fill reservoir to specified level with hydraulic fluid. This operation is necessary as pump must be primed prior to operation to avoid drawing excessive amount of air into hydraulic system.

c. Install filler plug adapter to reservoir and attach four or five foot length of 3/16 inch I.D. rubber tubing or hose to filler plug tubing.

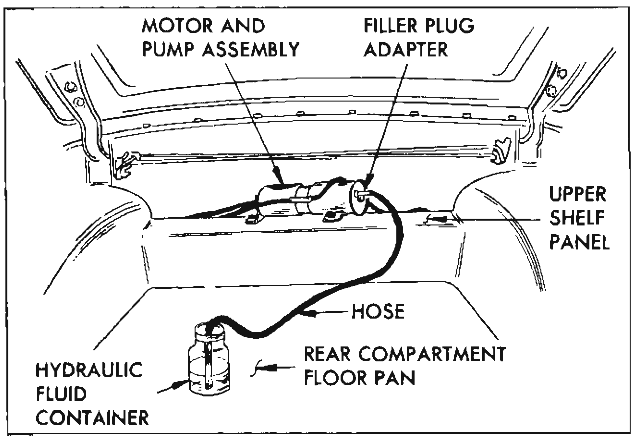


Fig. 132—Filling Reservoir

d. Install opposite end of hose into a container of G.M. Hydraulic Brake Fluid Super #11 or equivalent. See Fig. 132.

NOTE: Container should be placed in rear compartment area of body, below level of fluid in the reservoir. In addition, sufficient fluid must be available in container to avoid drawing air into hydraulic system.

e. Operate top to down or stacked position. After top is fully lowered, continue to operate motor and pump assembly (approximately 15 to 20 seconds), or until noise level of pump is noticeably reduced. Reduction in pump noise level indicates that hydraulic system is filling with fluid.

f. Operate top several times or until operation of top is consistently smooth in both up and down cycles.

g. Remove hose from filler plug tubing and remove filler plug adapter from reservoir.

h. Check level of fluid in reservoir and reinstall original filler hole plug.

NOTE: Fluid level should be within 1/4 inch of lower edge of filler plug hole.

EXTERIOR MOLDINGS

The exterior moldings are identified in Figures 133, 134, 135 and 136. The moldings are secured to the body by any one or a combination of the following attachments:

(a) attaching screws
(b) bolt and clip assemblies with attaching nuts
(c) integral studs with attaching nuts
(d) bath tube type snap-on clips
(e) snap-in studs to pre-installed retainers
(f) snap-in clips

Figure 122 illustrates typical attachments for body side moldings.

Before using the molding charts, the following information will be helpful when installing or removing exterior moldings.

1. Screw locations—the exact location for each screw is not shown or mentioned, but when hidden, the general location is indicated by naming the molding or other part which conceals the screw and, therefore, must be removed to gain access to the screw.
2. When a molding is overlapped the overlapping molding is indicated in the "Engages with other molding" column and must be removed first.

General Precautions

When removing or installing any body exterior moldings certain precautions should be exercised.

1. Adjacent finishes should be protected with masking tape to prevent damage to finish.
2. Proper tools and care should be employed to guard against molding damage.

Sealing Operation

Detailed sealing operations for each individual molding are not described on the "Molding Removal Chart," but the following information is given to permit a satisfactory sealing operation when necessary.

Medium-bodied sealer or body caulking compound are the sealers most frequently used to provide a watertight seal or for anti-rattle measures. Washers and gaskets are also used and should be replaced if damaged.

Holes in body panels for screws, bolts or clips that would permit water to enter the interior of the body should be sealed with body caulking compound or presealed screws, nuts or clips.

Drip moldings require a 1/4" bead of medium-bodied sealer along the full length of the inner attaching sur-

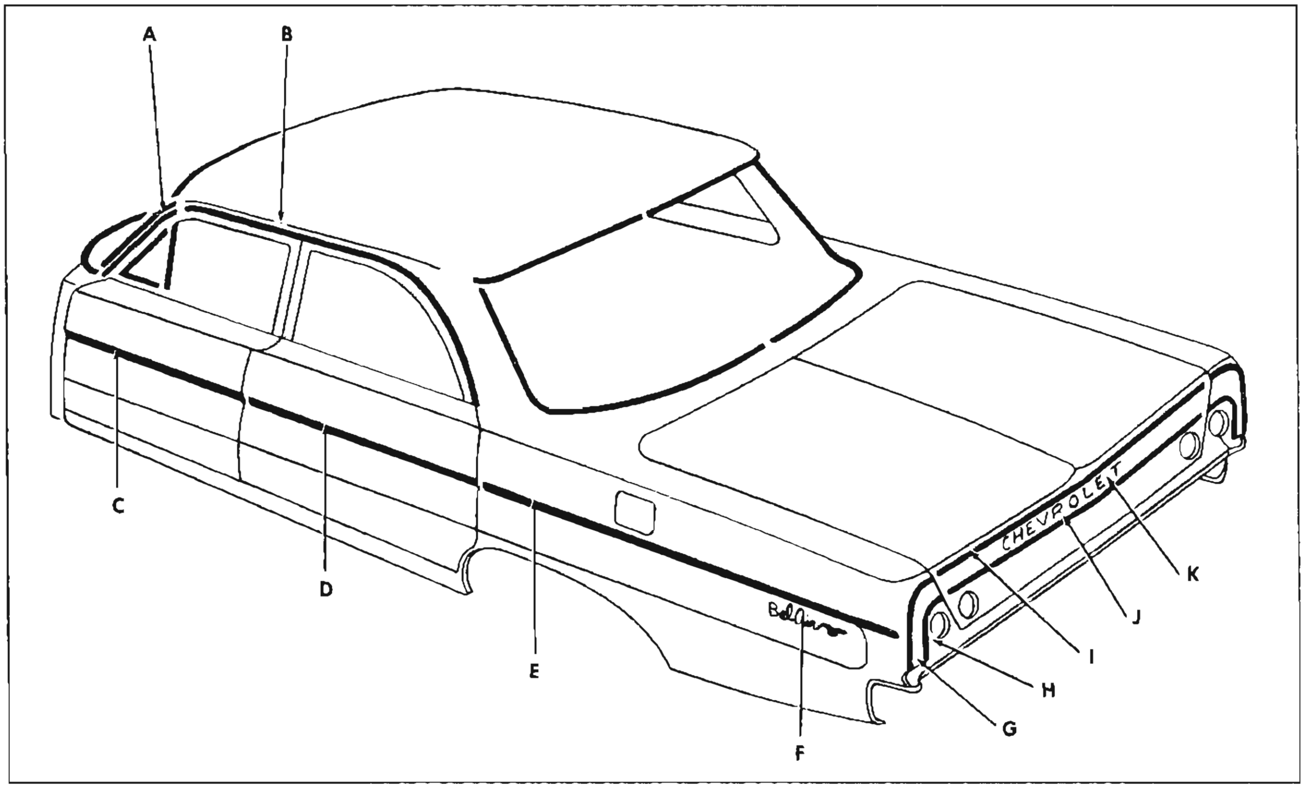


Fig. 133—Body Exterior Moldings—1669 Styles

A. Windshield Pillar Drip Molding Scalp
B. Roof Drip Molding Scalp
C. Front Door Outer Panel Lower Molding
D. Rear Door Outer Panel Lower Molding
E. Rear Fender Lower Molding
F. Rear Fender Emblem
G. Rear of Rear Fender Upper Molding
H. Rear of Rear Fender Lower Molding
I. Rear Compartment Lid Upper Molding
J. Rear Compartment Lid Lower Molding
K. Rear Compartment Lid Name Plate

face. Door window scalps and center pillar scalps require a ⅛" x ¼" x ¼" bead of caulking compound at 5" intervals for anti-rattle purposes. Pinchwelds require medium-bodied sealer on both sides when pinchweld clips are used. The exception is the rear quarter pinchweld on convertible styles which requires waterproof tape over the entire pinchweld, prior to clip installation.

Tools and Care

For ease of molding removal, it is sometimes important to start the removal at a particular location which is generally the "front" or "rear" of the molding. This position is indicated when necessary in the "Starting Location" column of the molding chart.

The following groups of moldings are listed with the name or description of the tool which is suitable for molding removal.

Roof Drip Scalps—pointed hook tool

Door Window Scalps—thin flat-bladed tool (putty knife)

Snap-on Clips—thin flat-bladed tool (putty knife)

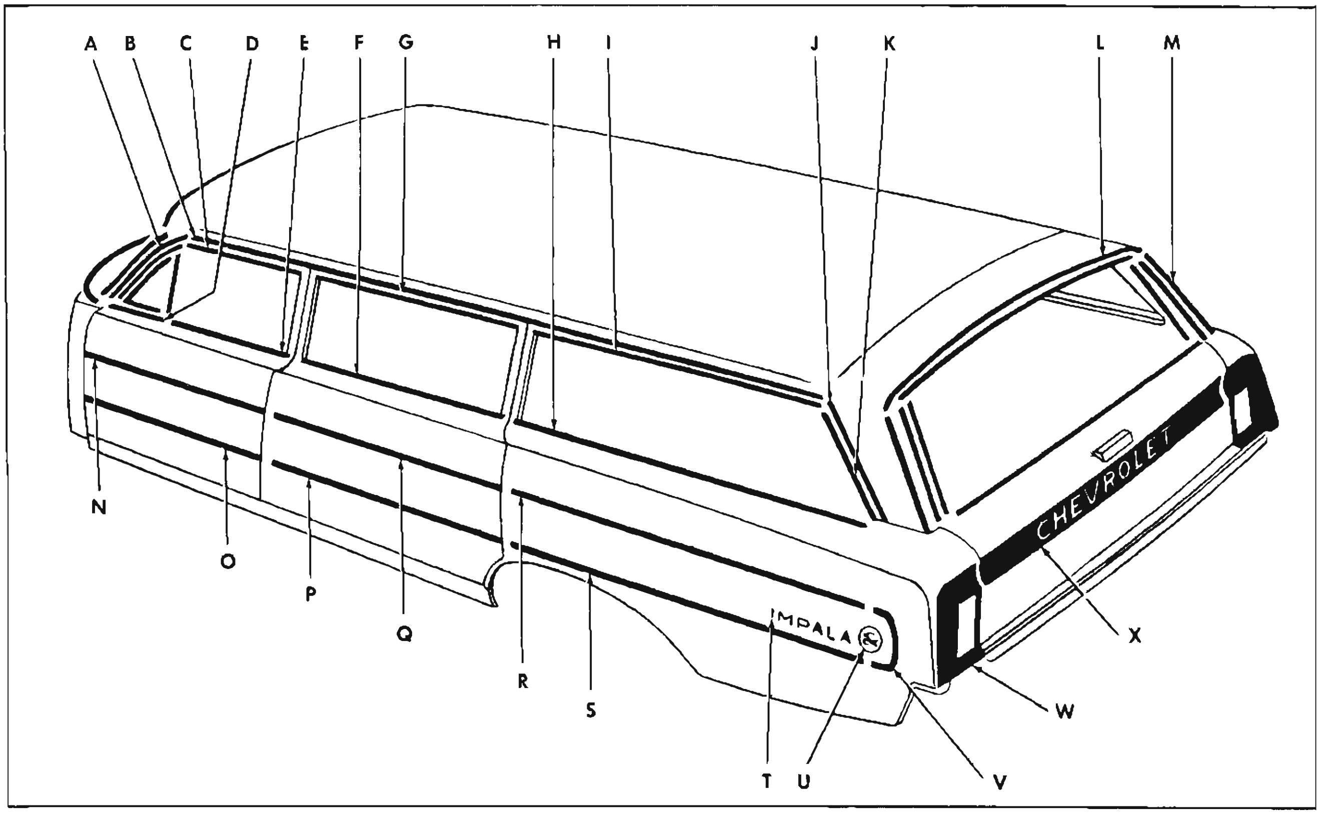


Fig. 134—Body Exterior Moldings—1835-45 Styles

A. Windshield Pillar Drip Molding Scalp
B. Roof Drip Molding Front Scalp
C. Front Door Window Frame Upper Scalp Molding
D. Front Door Window Reveal (At Vent) Molding
E. Front Door Window Reveal Molding
F. Rear Door Window Reveal Molding
G. Rear Door Window Frame Upper Scalp Molding
H. Quarter Window Lower Reveal Molding
I. Quarter Window Upper Reveal Molding
J. Roof Drip Molding Rear Scalp
K. Quarter Window Rear Reveal Molding
L. Back Body Opening Upper Pinchweld Finishing Molding
M. Back Body Opening Side Pinchweld Finishing Molding
N. Front Door Outer Panel Upper Molding
O. Front Door Outer Panel Lower Molding
P. Rear Door Outer Panel Lower Molding
Q. Rear Door Outer Panel Upper Molding
R. Rear Fender Upper Front Molding
S. Rear Fender Lower Front Molding
T. Rear Fender Name Plate
U. Rear Fender Emblem
V. Rear Fender Rear Molding
W. Rear of Rear Fender Molding
X. Tail Gate Outer Panel Lower Molding

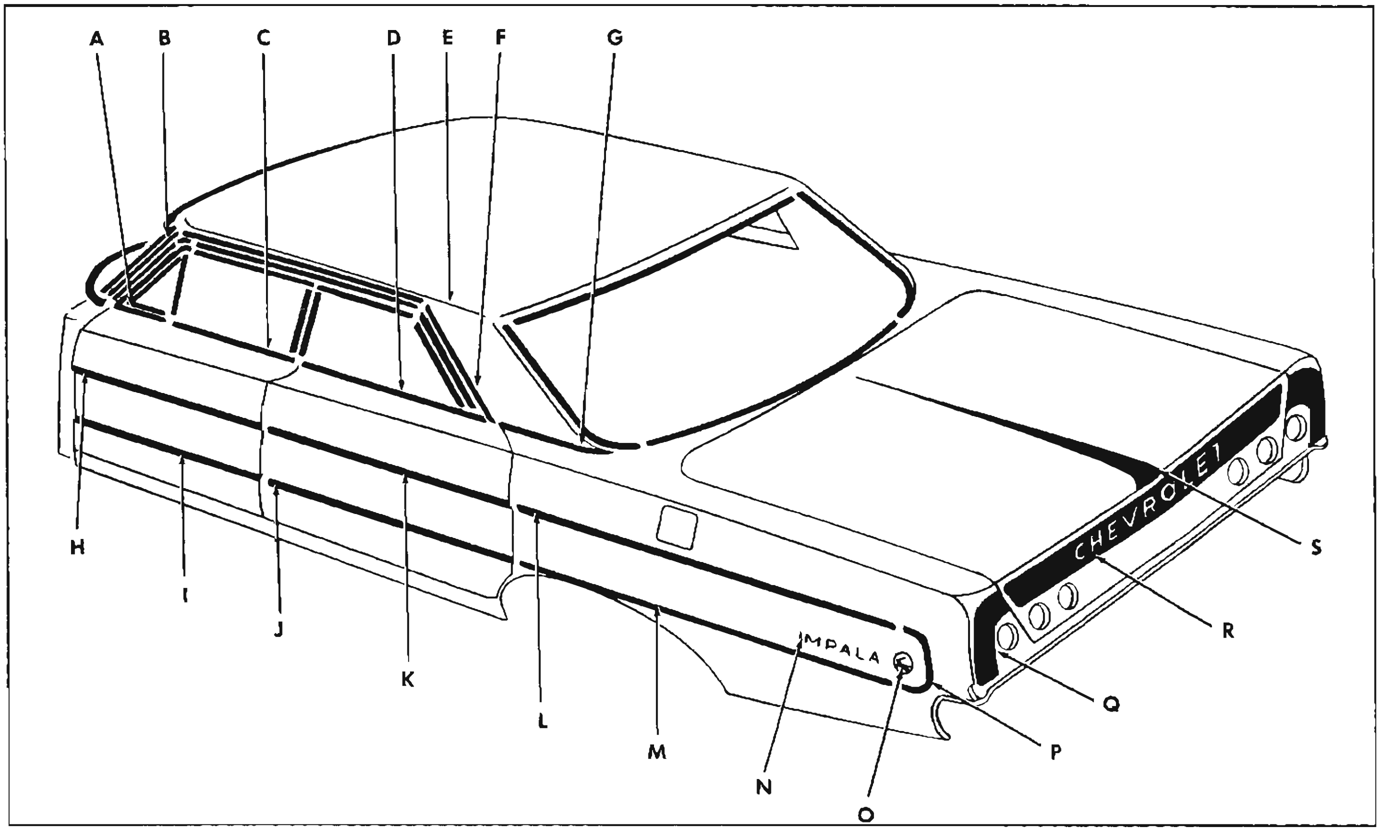


Fig. 135—Body Exterior Moldings—1839 Styles

A. Front Door Window Reveal (At Vent) Molding
B. Windshield Pillar Drip Molding Scalp
C. Front Door Window Reveal Molding
D. Rear Door Window Reveal Molding
E. Roof Drip Molding Front Scalp
F. Roof Drip Molding Rear Scalp
G. Quarter Belt Reveal Molding
H. Front Door Outer Panel Upper Molding
I. Front Door Outer Panel Lower Molding
J. Rear Door Outer Panel Lower Molding
K. Rear Door Outer Panel Upper Molding
L. Rear Fender Upper Front Molding
M. Rear Fender Lower Front Molding
N. Rear Fender Name Plate
O. Rear Fender Emblem
P. Rear Fender Rear Molding
Q. Rear of Rear Fender Molding
R. Rear Compartment Lid Molding
S. Rear Compartment Lid Wind Split Molding

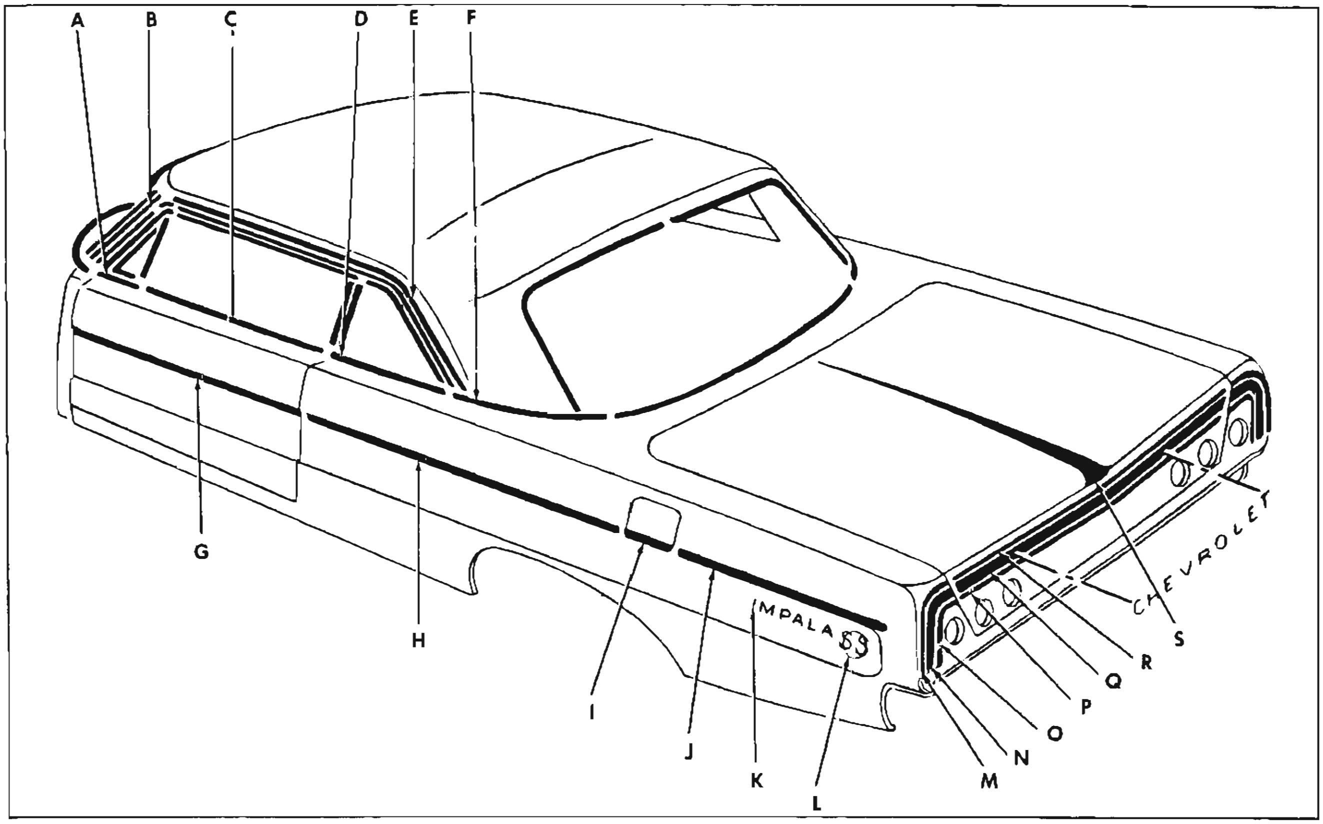
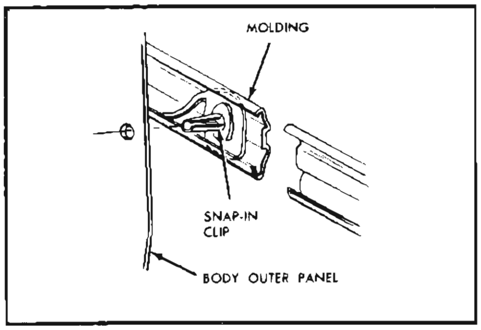
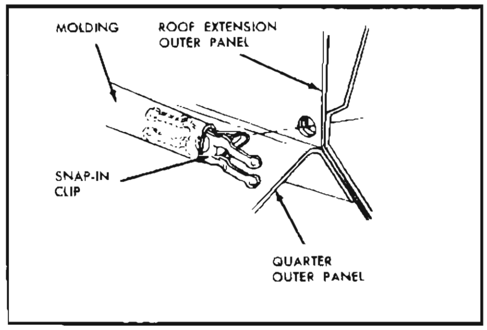


Fig. 136—Body Exterior Moldings—1447 Styles

A. Door Window Reveal Molding (At Vent)
B. Windshield Pillar Drip Molding Scalp
C. Door Window Reveal Molding
D. Quarter Window Reveal Molding
E. Roof Drip Molding Scalp
F. Quarter Belt Reveal Molding
G. Door Outer Panel Lower Molding
H. Rear Fender Lower Front Molding
I. Gas Tank Filler Door Molding
J. Rear Fender Lower Rear Molding
K. Rear Fender Name Plate
L. Rear Fender Emblem
M. Rear of Rear Fender Upper Molding
N. Rear of Rear Fender Insert Molding
O. Rear of Rear Fender Lower Molding
P. Rear Compartment Lid Outer Panel Lower Molding
Q. Rear Compartment Lid Outer Panel Insert Molding
R. Rear Compartment Lid Outer Panel Upper Molding
S. Rear Compartment Lid Outer Panel Wind Split Molding



VIEW A



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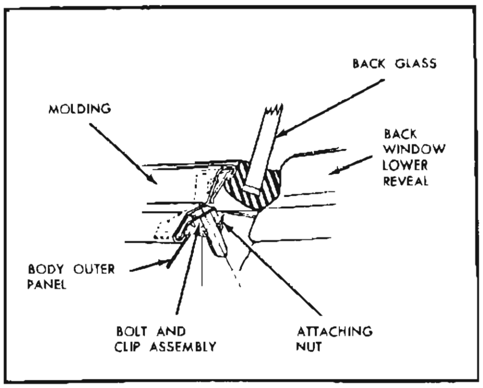

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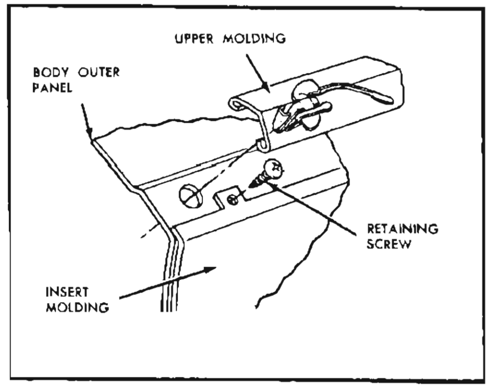

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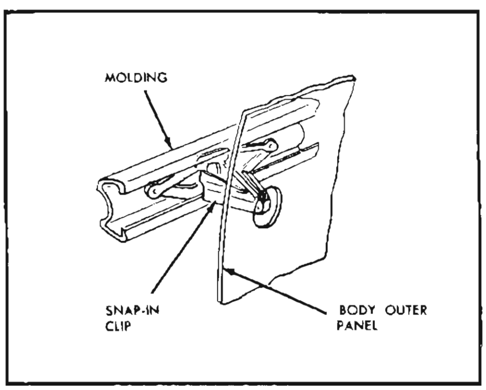

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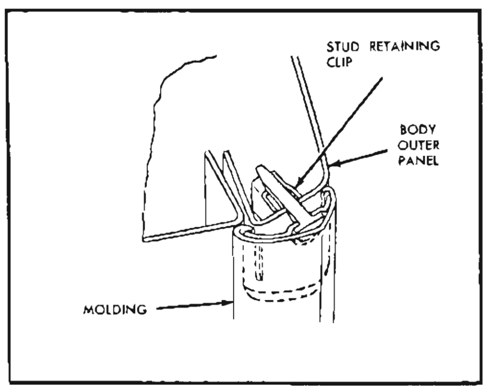

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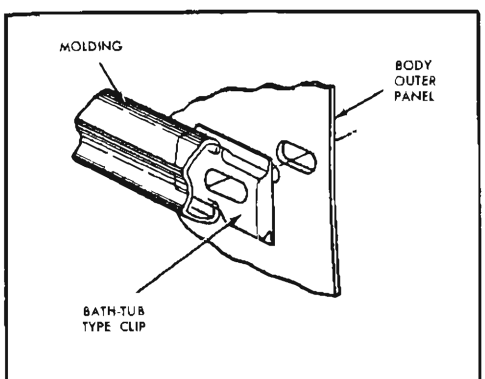

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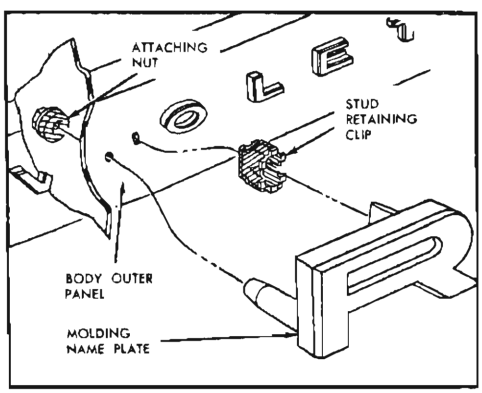

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Fig. 137—Exterior Molding Attachment

EXTERIOR MOLDINGS

Molding Name	Styles	Method of Retention: Screws	Spring (Self-Retained)	Snap-On Clips or Retainers On Panel	Snap-On Clips On Molding	Studs With Attaching Nuts	Engages With Other Moldings	Remove Hardware Or Trim	Starting Location
Windshield Pillar Drip Drip Molding Scalp	1600 1835, 45, 69	—	x	—	—	—	—	—	Lower End Under Drip Molding
Windshield Pillar to Roof Drip Escutcheon	1211, 35, 69	—	x	—	—	—	—	—	Lower Edge
Roof Drip Molding Scalp	1611, 69 1847, 69 1447	—	x	—	—	—	Windshield Pillar Drip Molding Scalp	Side Roof Rail Weather-strip Retainer on 47 Style	Front Lower Edge
Roof Drip Molding Front and Rear Scalp	1635, 45 1835, 45	—	x	—	—	—	Rear Scalp Overlapped by Front Scalp	—	Front Lower Edge
	1839	—	x	—	—	—	Roof Drip Molding Front Scalp	—	Front Edge
Front Door Window Reveal (at vent)	1400, 1800 Series	x	—	—	—	—	—	Vent Upper Attaching Screws	—
Front Door Window Frame Upper Scalp	1835, 45, 69	x	—	—	—	—	—	Door Upper Run Channel	Rear Lower Edge
Front Door Window Lower Reveal	1400, 1800 Series	x	—	—	—	—	—	Door Window Lower Bumper Stop	—
Rear Door Window Frame Upper Scalp	1835, 45, 69	x	—	—	—	—	—	Door Upper Glass Run Channel Also Rear on "69"	—
Quarter Window Upper Scalp	1211, 1611 35 & 45	x	—	—	—	—	—	Quarter Window	—
Quarter Window Rear Scalp	35 & 45	x	—	—	—	—	Quarter Window Upper Scalp	Quarter Window	—
Quarter Window Front Scalp	35 & 45	x	—	—	—	—	Quarter Window Upper Scalp	Quarter Window	—
Quarter Window Front Reveal	1211, 1611	x	—	—	—	—	Quarter Window Upper Scalp	Quarter Window	—
Quarter Window Upper Reveal	1835, 45	x	—	—	—	—	—	Rear Quarter Window	—
Quarter Window Rear Reveal	1835, 45	x	—	—	—	—	Rear Quarter Window Upper Reveal	Rear Quarter Window	—

EXTERIOR MOLDINGS (Continued)

Molding Name	Styles	Method of Retention					Engages With Other Moldings	Remove Hardware Or Trim	Starting Location
		Screws	Spring (Self-Retained)	Snap-On Clips or Retainers On Panel	Snap-On Clips On Molding	Studs With Attaching Nuts			
Quarter Window Lower Reveal	1835, 45	x	—	—	—	—	Quarter Window Front and Rear Reveal	Rear Quarter Window	—
	1447, 67 1847,67	x	—	—	—	—	—	Quarter Window on "67" Quarter Window Lower Stop on "47"	—
Quarter Belt Reveal	1611	—	—	—	x View B	—	—	—	—
	1669, 1869	x	—	—	x View B	—	—	—	—
	1447, 1847	—	—	—	—	x View C	—	—	—
	1839	x	—	—	x	x	Back Window Lower Reveal	Quarter Upper Trim Panel	—
Rear Quarter Pinch-weld Finishing	1467, 1867	x	—	x	—	—	Quarter Window Lower Reveal	Lower Top to Remove Tension on Back Curtain	At Radius
Front Door Outer Panel Lower	1200	x	—	x View G	—	—	—	—	—
	1400	x	—	—	x View E	—	—	—	—
	1600, 1800	x	—	—	x View A	—	—	—	—
Front Door Outer Panel Upper	1800	x	—	x View G	—	—	—	—	—
Rear Door Outer Panel Lower	1200	x	—	x View G	—	—	—	—	—
	1600	x	—	—	x View A	x	—	—	—
	1800	x	—	—	x View A	—	—	—	—
Rear Door Outer Panel Upper	1800	x	—	x View G	—	—	—	—	—
Rear Fender Lower	1200 Exc. 1235 Left Side	—	—	x View G	—	x	—	Spare Tire Cover on "35" Style	—

EXTERIOR MOLDINGS (Continued)

Molding Name	Styles	Method of Retention: Screws	Spring (Self-Retained)	Snap-On Clips or Retainers On Panel	Snap-On Clips On Molding	Studs With Attaching Nuts	Engages With Other Moldings	Remove Hardware Or Trim	Starting Location
	1235 Left Side	—	—	x View G	—	—	—	—	—
	1600 Exc. 1635 Left Side	—	—	—	x View A	x	—	Spare Tire Cover on "35" Style	—
	1635 Left Side	—	—	—	x View A & E	—	—	—	—
Rear Fender Lower	1400 Right Side	—	—	x View G	—	x	—	—	—
Rear Fender Lower Front	1400 Left Side	—	—	x View G	—	—	—	—	—
	1839, 69 1847, 67 1835, 45 Right Side	—	—	—	x View A	x	Rear Fender Rear	Spare Tire Cover on 35 & 45 Style	—
	1835, 45 Left Side	—	—	—	x View A	—	Rear Fender Rear	—	—
Rear Fender Lower Rear	1400 Left Side	—	—	x View G	—	x	—	—	—
Rear Fender Rear	All 1800 Exc. 35, 45 Style Left Side	—	—	—	—	x	Rear Fender Lower Front and Upper Front	Spare Tire Cover on 35, 45 Style	—
	1835, 45 Left Side	—	—	—	x View A	—	Rear Fender Lower Front and Upper Front	—	—
Rear Fender Upper Front	All 1800 Exc. 35, 45 Left Side	—	—	x View G	—	x	Rear Fender Rear	Spare Tire Cover on 35, 45 Style	—
	1835, 45 Left Side	—	—	x View G	—	—	Rear Fender Rear	—	—
Gas Tank Filler Door	1400 Left Side	x	—	—	—	—	—	—	—
Rear Fender Name	1200, 1600	—	—	—	—	x	Left Rear Quarter Trim and Spare Tire Cover on 35 and 45 Style	—	—
	1400, 1800	—	—	x	—	—	—	—	—
Rear Fender Emblem	1400, 1800	—	—	—	—	x	—	—	—
Rear of Rear Fender	1211, 69	—	—	—	—	x	—	—	—
	1235 1635, 45	x	—	x View F	—	—	—	—	—

EXTERIOR MOLDINGS (Continued)

Molding Name	Styles	Method of Retention: Screws	Spring (Self-Retained)	Snap-On Clips or Retainers On Panel	Snap-On Clips On Molding	Studs With Attaching Nuts	Engages With Other Moldings	Remove Hardware Or Trim	Starting Location
	1835, 45	x	—	—	x View E	—	—	—	—
Rear of Rear Fender Upper	1400	—	—	—	—	x	—	—	—
Rear of Rear Fender Lower	1400	—	—	—	—	x	—	—	—
Rear of Rear Fender Insert	1400	x	—	—	—	—	Rear of Rear Fender Upper and Lower	—	—
Rear of Rear Fender Pinchweld Finishing	All	x	—	—	—	—	—	Rear Bumper	—
Rear Compartment Lid Center Windsplit	1400, 1800 Exc. 35, 45 Style	—	—	—	—	x	Rear Compartment Lid Upper	—	—
Rear Compartment Lid	1211, 69 1611, 69 1839, 47, 67, 69	x	—	—	—	x	—	—	—
Rear Compartment Lid Upper	1400	x	—	—	—	x	—	—	—
Rear Compartment Lid Lower	1611, 69 1400	x	—	—	—	x	—	—	—
Rear Compartment Lid Insert	1400	x	—	—	—	—	Rear Compartment Lid Upper and Lower	—	—
Rear Compartment Lid Name Plate	1211, 69	—	—	—	—	x	—	—	—
	1611, 69	—	—	x View H	—	x	—	—	—
Rear Compartment Lid Emblem	1400	—	—	—	—		—	—	—
Back Body Opening Upper Pinchweld Finishing	34-45	—	—	x	—	—	Back Body Opening Side Pinchweld Finishing	—	—
Back Body Opening Side Pinchweld Finishing	35-45	—	—	x	—	—	—	—	—
Tail Gate Outer Panel	1235	x	—	x	—	—	—	—	—
	1835-45	x	—	—	—	x	—	Tail Gate Inner Panel Trim	—
Tail Gate Outer Panel Lower	1635-45	x	—	x	—	—	—	—	—
Tail Gate Outer Panel Upper	1635-45	x	—	x	—	—	—	—	—

SPECIAL TOOLS

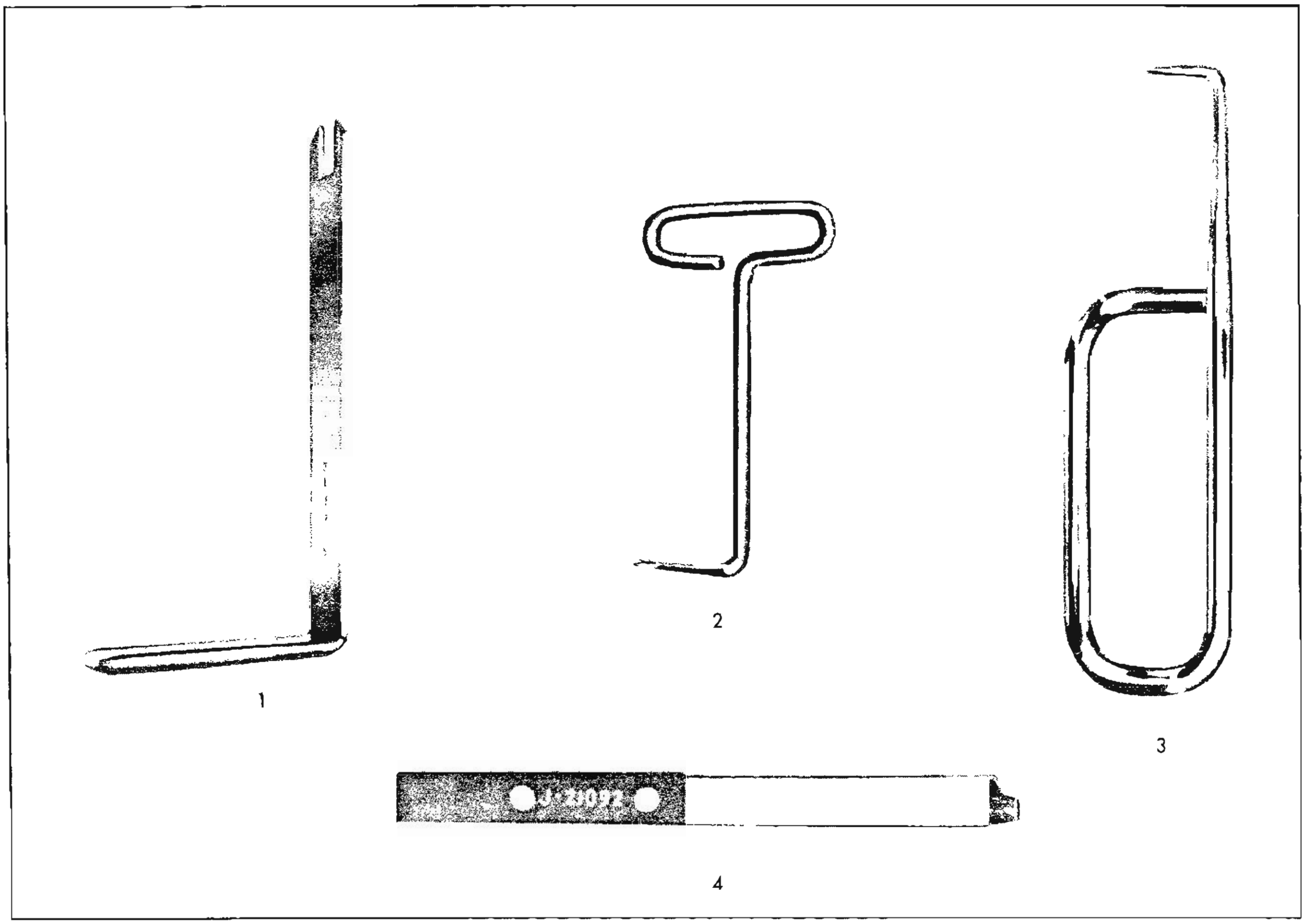

Fig. 138—Body Special Tools

1. J-7797 Door Handle Remover
2. J-6335 Trim Panel Removing Tool
3. J-7898-01 Molding Removing Tool
4. J-21092 Fabric Cover Trimming Tool

CHASSIS SHEET METAL

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GENERAL DESCRIPTION

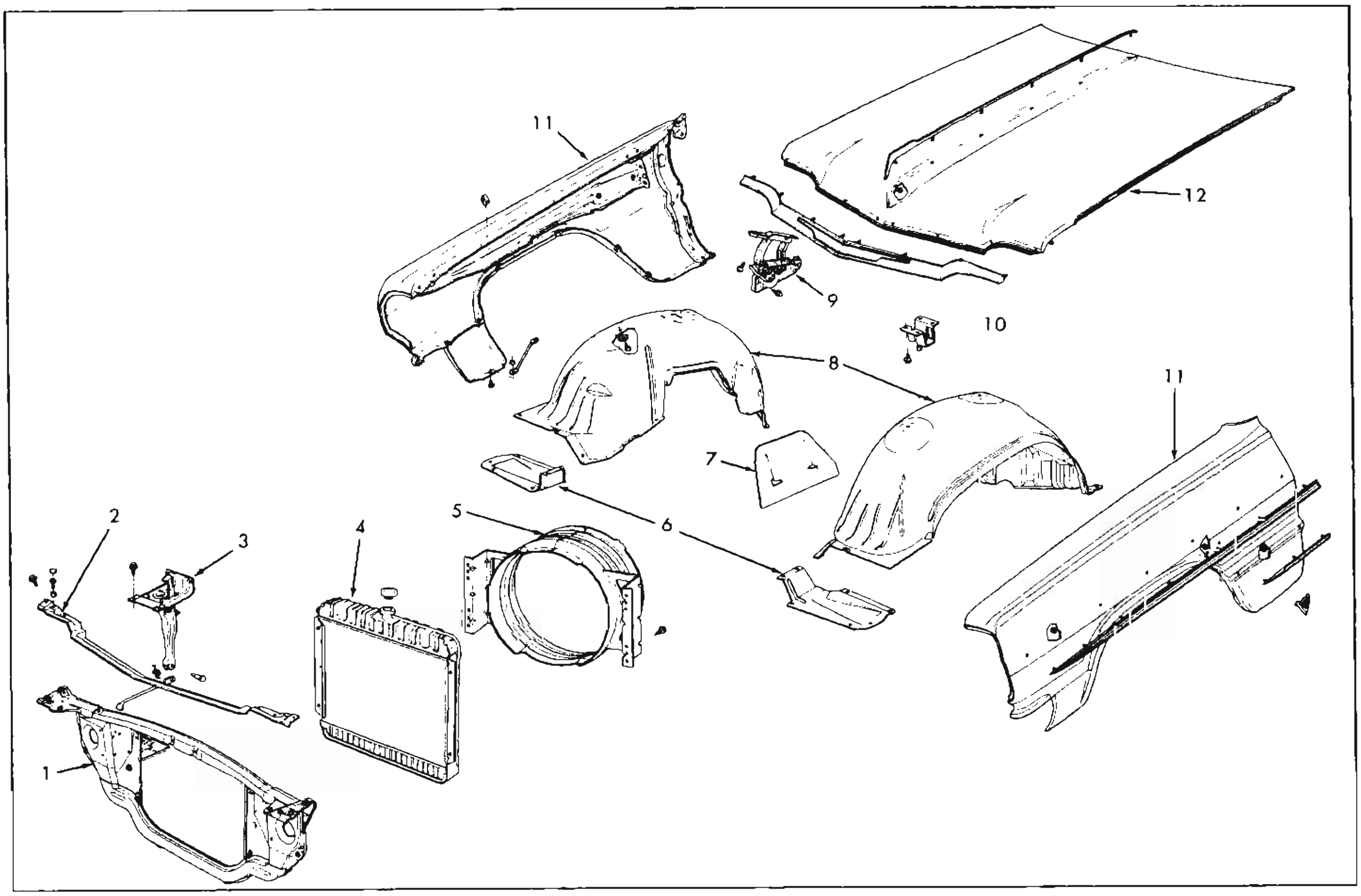

Fig. 1c—Front Sheet Metal

1. Radiator Support
2. Fender Tie Bar
3. Hood Catch Assembly
4. Radiator
5. Radiator Shroud
6. Fender Extensions
7. Skirt Intermediate Seal
8. Left and Right Skirt
9. Hood Hinge Suport
10. Hook Lock
11. Left and Right Fender
12. Hood Assembly

New vehicle appearance is effected through use of new rear quarter panels, deck lid, rear end panels, fenders, hood, radiator grille and front bumper (fig. 1c). Rear bumpers are restyled. A new fender support provides continuity from the dash panel to the radiator support panel.

Many of the above changes do not reflect a revision to service procedures. Maintenance and service operations of the chassis Sheet Metal covered in the following pages are to be used as a supplement in 1964 with the 1961 Passenger Car Shop Manual.

MAINTENANCE AND ADJUSTMENTS

HOOD ADJUSTMENT

The alignment of the hood proper in relation to other sheet metal parts is controlled by the position of the hood hinges and the height of the two bumpers located one at each end of the forward edge of the hood. The adjustments at the hood latch must be made after the hinges and bumpers are positioned to yield the dimensions shown in Figure 4c. Latch adjustments are made so that effort is required to open and close the hood is reasonable and so that the hood alignment obtained by hinge and bumper adjustment is maintained when the hood is closed. Note that the hood latch is not designed or intended to correct basic hood alignment faults.

To align the hood and lock, proceed as follows:

HOOD HINGE (fig. 2c)

1. Note that the mounting holes in the body mounted end of the hinge are slotted to provide up and down movement of the hood assembly while the hood mounted end is slotted to provide fore and aft movement.
2. Scribe a mark around the entire hinge plate which will be involved in the adjustment.
3. Loosen the appropriate screws and shift the position of the hood on the hinge plate the approximate amount to correct misalignment using the scribed marks to check amount of movement. Check condition of adjustment by tightening cap screws and closing hood.

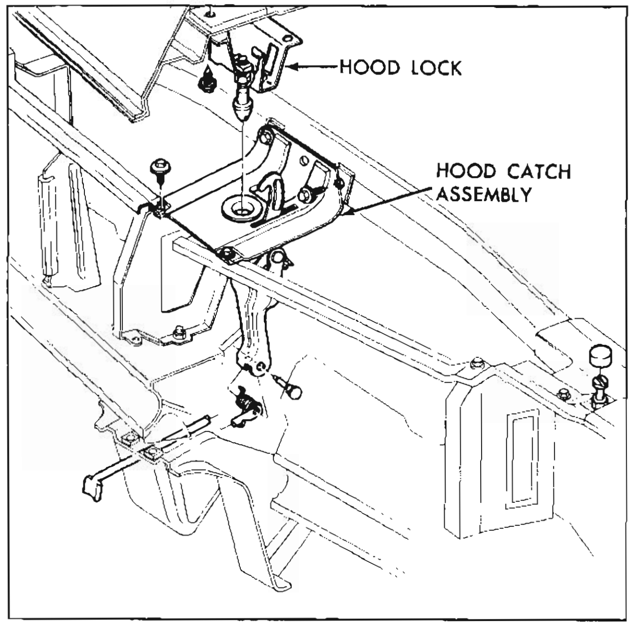

Fig. 3c—Hood Catch Plate and Bumper

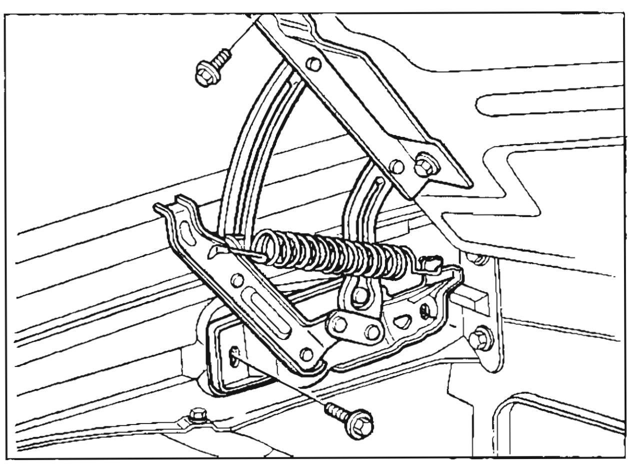

Fig. 2c—Hood Hinge

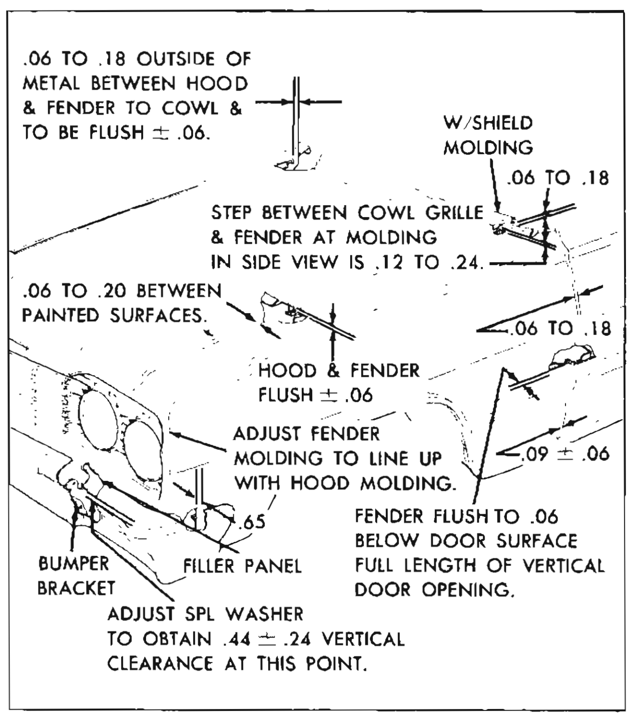

Fig. 4c—Sheet Metal Adjustment (Related Parts)

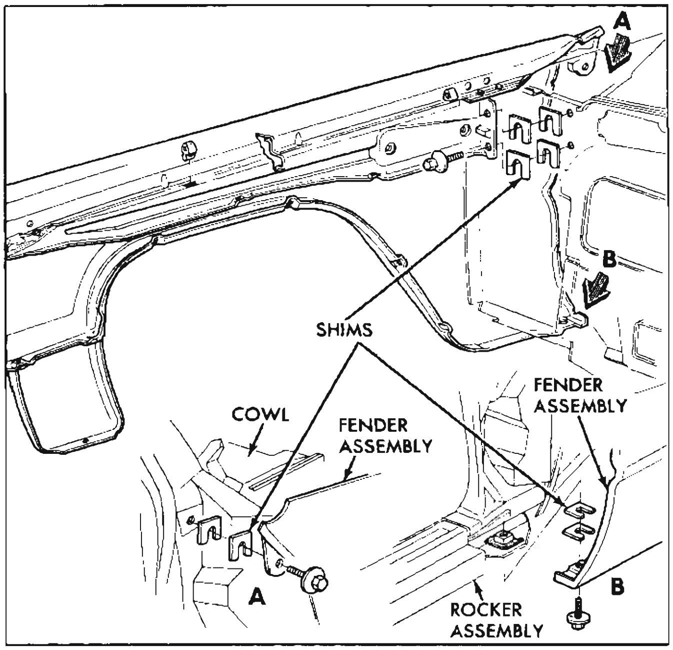

Fig. 5c—Fender to Cowl and Rocker Panel Shimming

HOOD BUMPERS

Hood bumpers must be adjusted so that the hood top surface is flush with the fender top surface.

HOOD CATCH (fig. 3c)

Hood lock plate mounting holes are slotted to provide fore and aft adjustment of the hood lock bolt. The hood lock bolt itself is adjustable for up and down positioning of the lock bolt head so that its proper engagement in the catch assembly may be provided for. The distance that the lock bolt protrudes out of the lock plate should be adjusted so that the hood

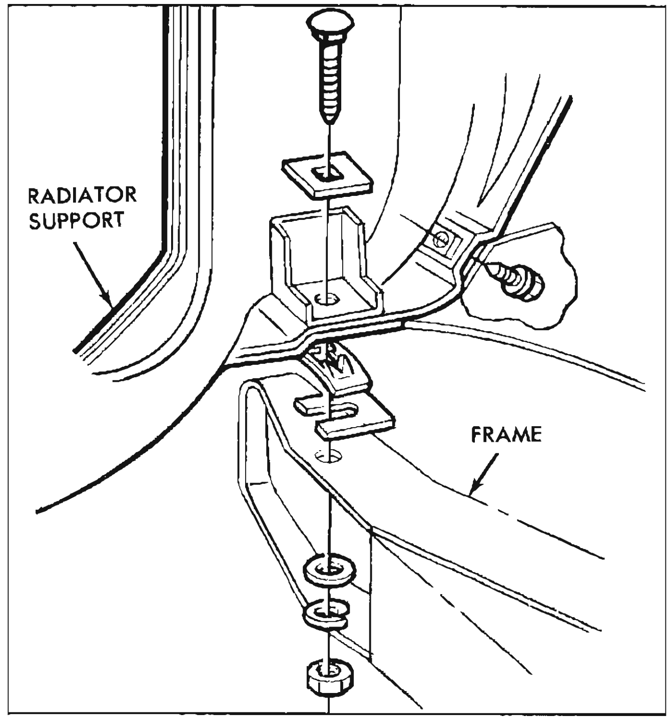

Fig. 6c—Frame to Radiator Support Shimming

bumpers are slightly compressed by the fully latched hood and so that the effort required to release the hood catch is reasonable.

SHEET METAL ADJUSTMENTS

For proper operation of doors and hood, and for presentable appearance, front sheet metal must fit within the tolerances shown in Figure 4c. The sheet metal is adjustable at six points (three on each side of car) by means of spacer shims shown in Figures 5c and 6c.

SERVICE OPERATIONS

FRONT BUMPER ASSEMBLY (fig. 7c)

NOTE: For replacement of the Front Bumper Outer Face Bar and/or L and/or RH, and/or Center Face Bar, first lower the three piece designed bumper and block as shown by Figure 8c.

Removal (fig. 9c)

1. Jack up car.
2. Unplug electrical connection from parking lamp wire.
3. Remove the Front Bumper Mounting Brace L and R forward attaching nuts and bolts (see fig. 10c).
4. Remove the stone shield center panel support lower nut and bolt.
5. With a helper to support the front bumper, carefully remove the front bumper brackets front nuts and bolts, slightly loosen the forward bolts and lower onto block supports for service work. Mark shims for replacement.

NOTE: To completely disengage the complete front bumper from the car, remove the remaining two front bumper bracket rear bolts.

Outer Face Bar—R or L Side (see fig. 10c)

a. Remove two outer nuts, bolts and washers from outer face bar bracket assembly.

b. Remove the forward attachments to the front bumper center face bar and disengage the attaching reinforcement.

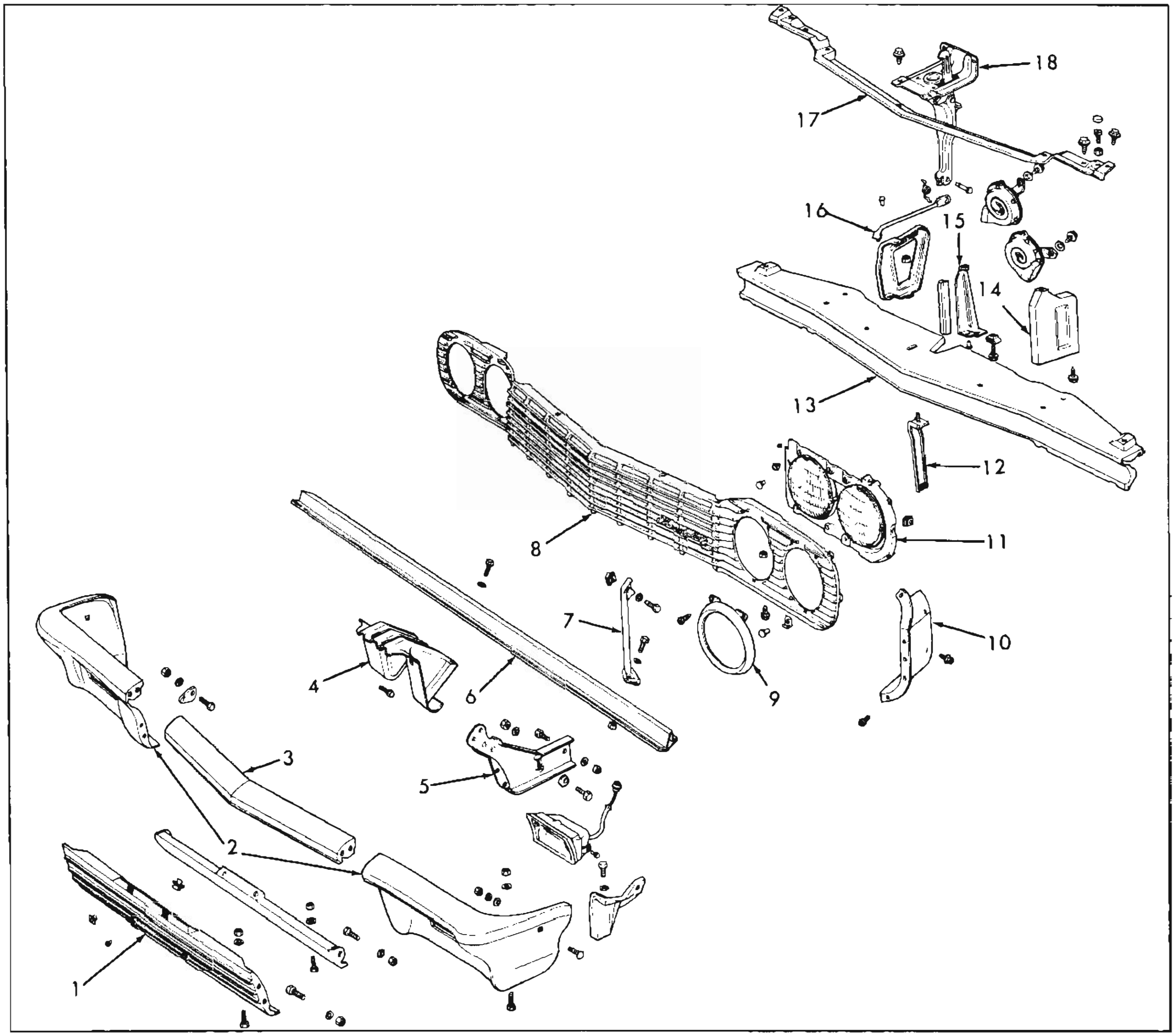

Fig. 7c—Front Bumper and Grille

1. Center Face Bar Panel
2. Outer Face Bar L & RH
3. Center Face Bar
4. Center Face Bracket Assembly
5. Bracket Assembly
6. Filler Panel
7. Skirt Extension Bracket
8. Grille
9. Headlamp Bezel
10. Headlamp Bracket
11. Headlamp Body
12. Filler Panel Brace Assembly
13. Filler Panel
14. Grille End Bracket
15. Filler Panel to Tie Bar Reinforcement
16. Hood Catch Assembly Extension
17. Tie Bar
18. Hood Catch Assembly

c. Remove the outer face bar.

d. Disassemble the electrical parking lamp from the bumper by removing two nuts and bolts.

Center Face Bar (see fig. 10c)

a. Remove the forward attachments to both the R and L outer face bars.

b. Remove front bumper center face bracket. assembly attachments.

c. Remove center face bar.

d. Remove license plate support and parts.

Installation (See fig. 10c)

Reverse removal procedure making certain to replace the bumper bracket shims as required.

NOTE: Do not completely tighten until all bolts have been assembled to the three front bumper pieces.

FRONT BUMPER MOUNTING BAR ASSEMBLY (See fig. 10c)

Removal

1. Follow the above front bumper removal procedure.

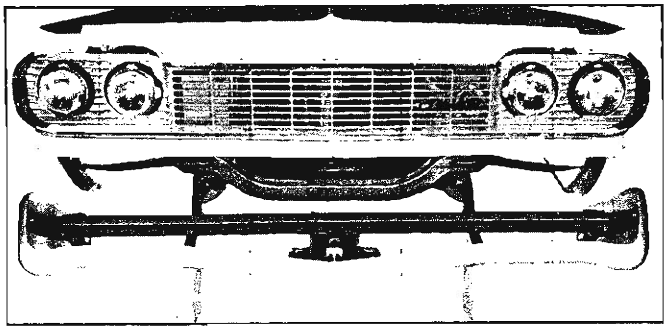

Fig. 8c—Servicing the Front Bumper

2. Remove the bolt attachment at the L and RH outer face bar bracket assembly, at both frame brackets and at the center face bracket assembly.

Installation

Reverse removal procedure.

REAR BUMPER

Removal

1. Remove four bolts (two-per side) retaining bumper brackets to frame horns.

   NOTE: Disconnect license lamp wire.

2. Remove bumper from vehicle.

Disassembly (fig. 11c)

1. Remove license plate lamp by removing two retaining screws.
2. Remove four bolts retaining each mounting bracket to bumper.

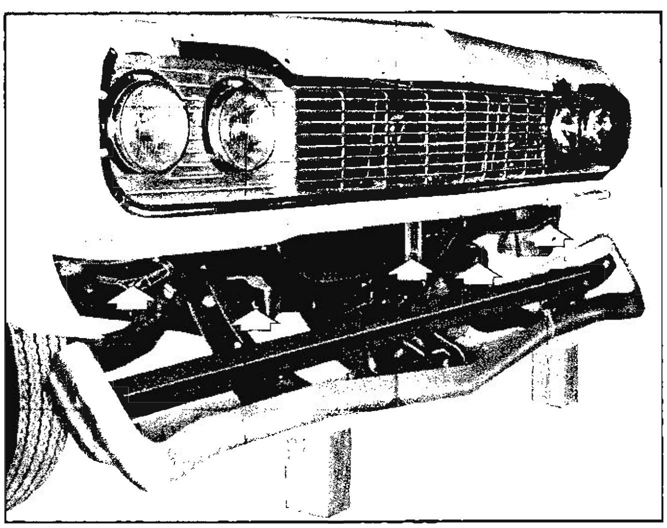

Fig. 9c—Remove Front Bumper Attachment for Service

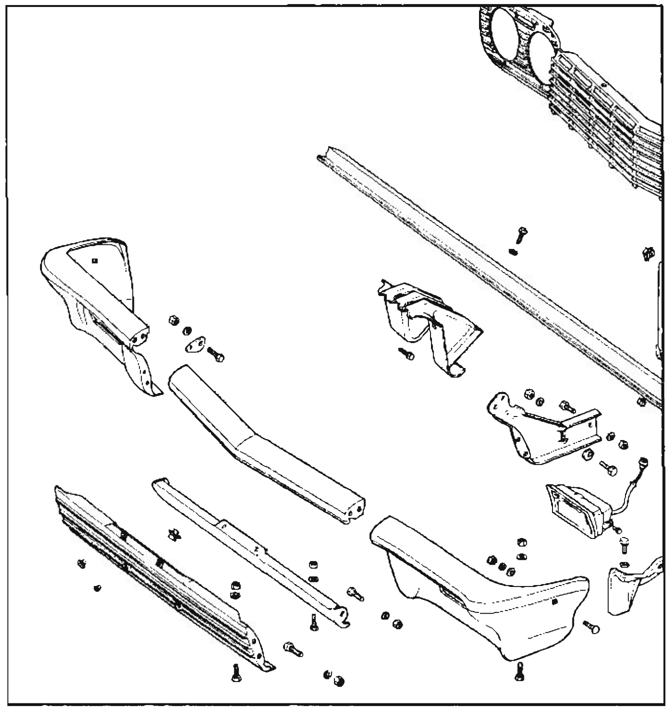

Fig. 10c—Front Bumper

3. Center face panel may be separated from reinforcements by removal of special clips shown in Figure 12c.
4. Separate three sections of face bar by removing bolts shown in Figure 11c.

Assembly

Assemble, following disassembly procedure in reverse order. Install all bolts loosely (do not tighten any bolts until all bolts are installed). Check condition of seal shown in Figure 11c. Replace if necessary. Install license plate lamp on bumper.

Installation

1. Position bumper assembly on vehicle. Align holes and brackets with holes in frame horn. Install all bolts, nuts and washer assemblies loosely.
2. Note that eight-sided washer is installed under head of rearmost mounting bolt. Adjust bumper to desired height by "Dialing" this washer within retaining notches on bumper mounting bracket.
3. With bumper adjusted to desired height, tighten all mounting bolts securely.

BUMPER FILLER PANEL (fig. 13c)

Removal

1. Remove front bumper as outlined in this section.

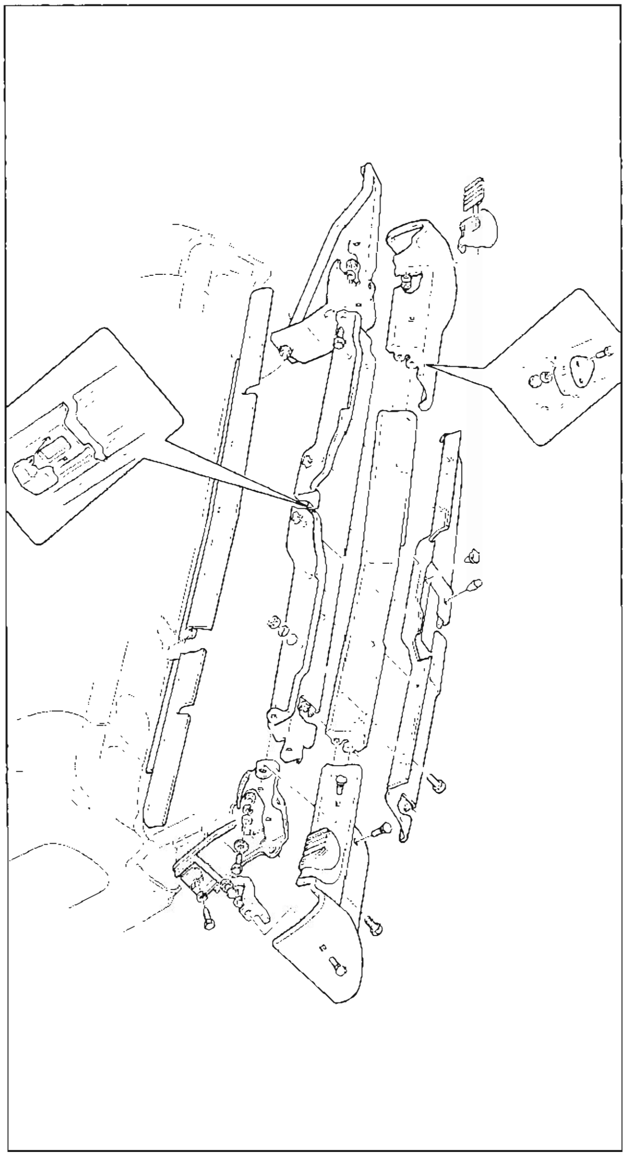

Fig. 11c—Rear Bumper

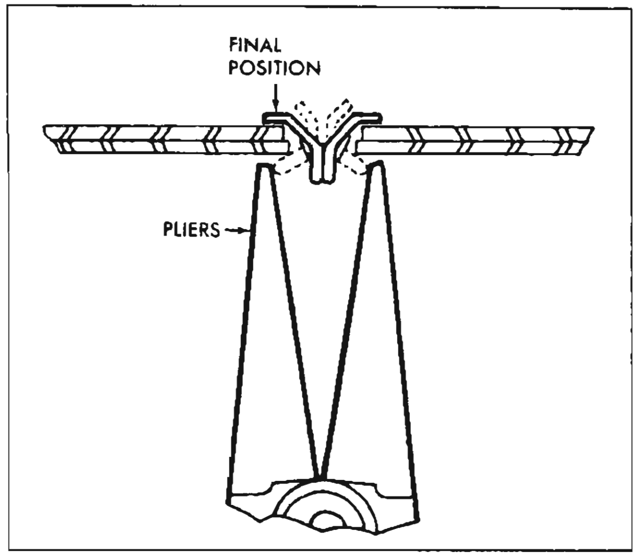

Fig. 12c—Special Clip

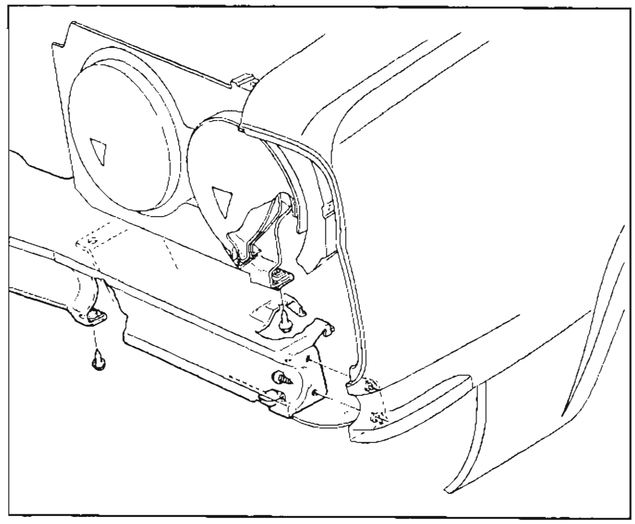

Fig. 13c—Bumper Filler Panel

2. At each end of panel:
   a. Remove one screw retaining head lamp assembly to filler panel.
   b. Remove two screws retaining filler panel to skirt front flange.
   c. Remove two screws retaining filler panel to grille end bracket (baffle).
   d. Remove one screw retaining filler panel to reinforcement.
3. Remove filler panel from vehicle.

Installation

Position filler panel in vehicle, align all screw and bolt holes with drift punch. Install all screws and bolts loosely. Do not tighten any screws or bolts until all are installed. Note that it will be necessary to aim head lamps as outlined in Section 9 of this Shop Manual.

GRILLE ASSEMBLY (figs. 10c and 15c)

Removal

1. Remove front upper and lower fender mouldings.
2. Remove screws from filler panel and grille and baffles-to-radiator support.
3. Disconnect headlight wiring.
4. Remove screws from center mounting bracket and grille upper support-to-radiator support.

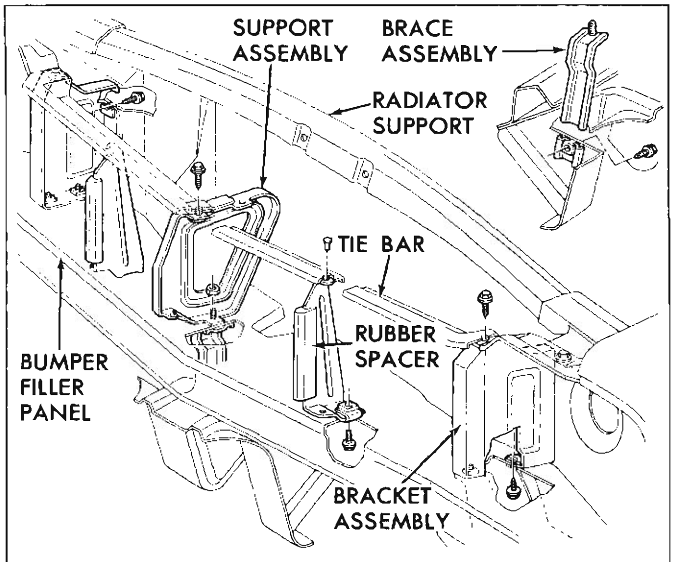

Fig. 14c—Grille Support and Bracket

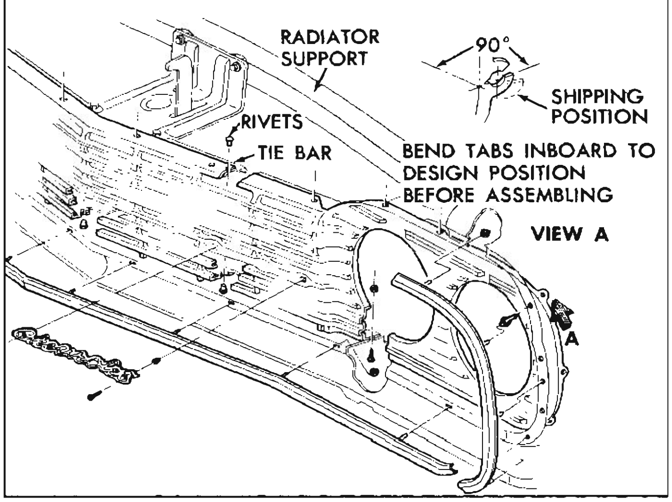

Fig. 15c—Grille and Molding

5. Remove screw holding grille to front fenders and remove grille.

NOTE: Protect filler panel by carefully tilting to remove grille.

Repairs

If hood lock support, end baffle, camber latch support and headlight assemblies are undamaged, they may be transferred to new grille by drilling out and removing the rivets retaining them to the old grille. Attachment to new grille may be made by using either rivets, screws and nuts or patent clips.

Installation

1. Position grille in vehicle aligning all screw holes. Be sure all retaining screws are started before any final tightening is done.
2. Check head lamp aiming as outlined in Section 9 of the shop manual.

BATTERY TRAY

Removal

1. Disconnect battery cables.
2. Remove screw and nut retaining battery hold-down assembly and remove battery from vehicle.
3. Remove screws retaining battery tray assembly to fender skirt and radiator support, and remove battery tray from vehicle.

Installation

1. Position battery tray on fender skirt and install cap screws.
2. Place battery in tray and install retainer assembly.
3. Install battery cables.

RADIATOR SUPPORT (fig. 16c)

Removal

1. Remove bumper assembly, grille assembly, filler panel, horns, voltage regulator, battery tray, etc., as outlined in this section.
2. Remove screws retaining radiator to radiator support. Note that it is not necessary to drain radiator or to disconnect radiator hoses from engine if radiator is supported in vehicle.
3. Remove screws retaining each end of support to fender assembly and hood catch assembly.

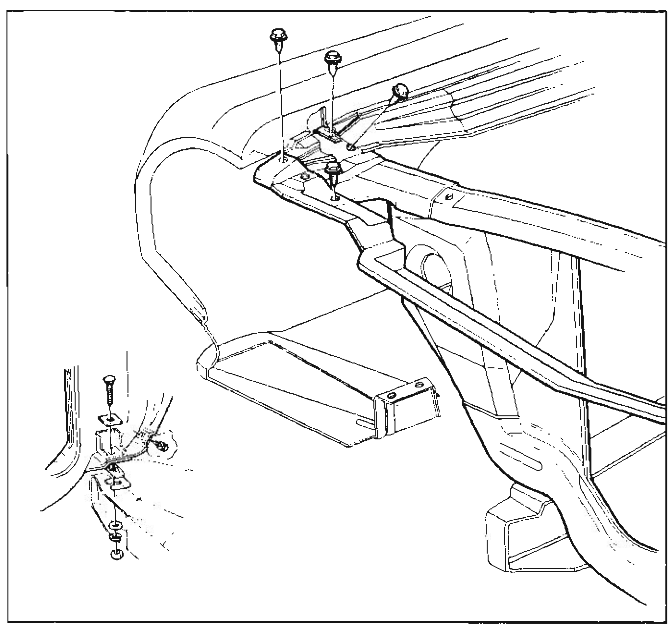

Fig. 16c—Fender to Radiator Support and Tie Bar

4. Remove screw retaining radiator support to forward edge of fender skirt.
5. Remove mounting bolts retaining radiator support to each frame horn. Record number of shims found at each mount.
6. Spread fenders apart enough to allow radiator support to be removed from vehicle.

Installation

1. Position radiator support on vehicle, aligning mounting screw and bolt holes with drift punch.
2. Install cap screws and bolts loosely until all are started.
3. Replace all parts removed in Operation 1 in Removal procedure referring to write-up for part involved.
4. Aim head lamps as outlined in Section 9 of this book.

RADIATOR AND FAN SHROUD

Removal (fig. 17c)

1. Drain radiator.
2. Detach upper and lower hoses.
3. Remove four bolts securing the radiator and shroud to radiator support.

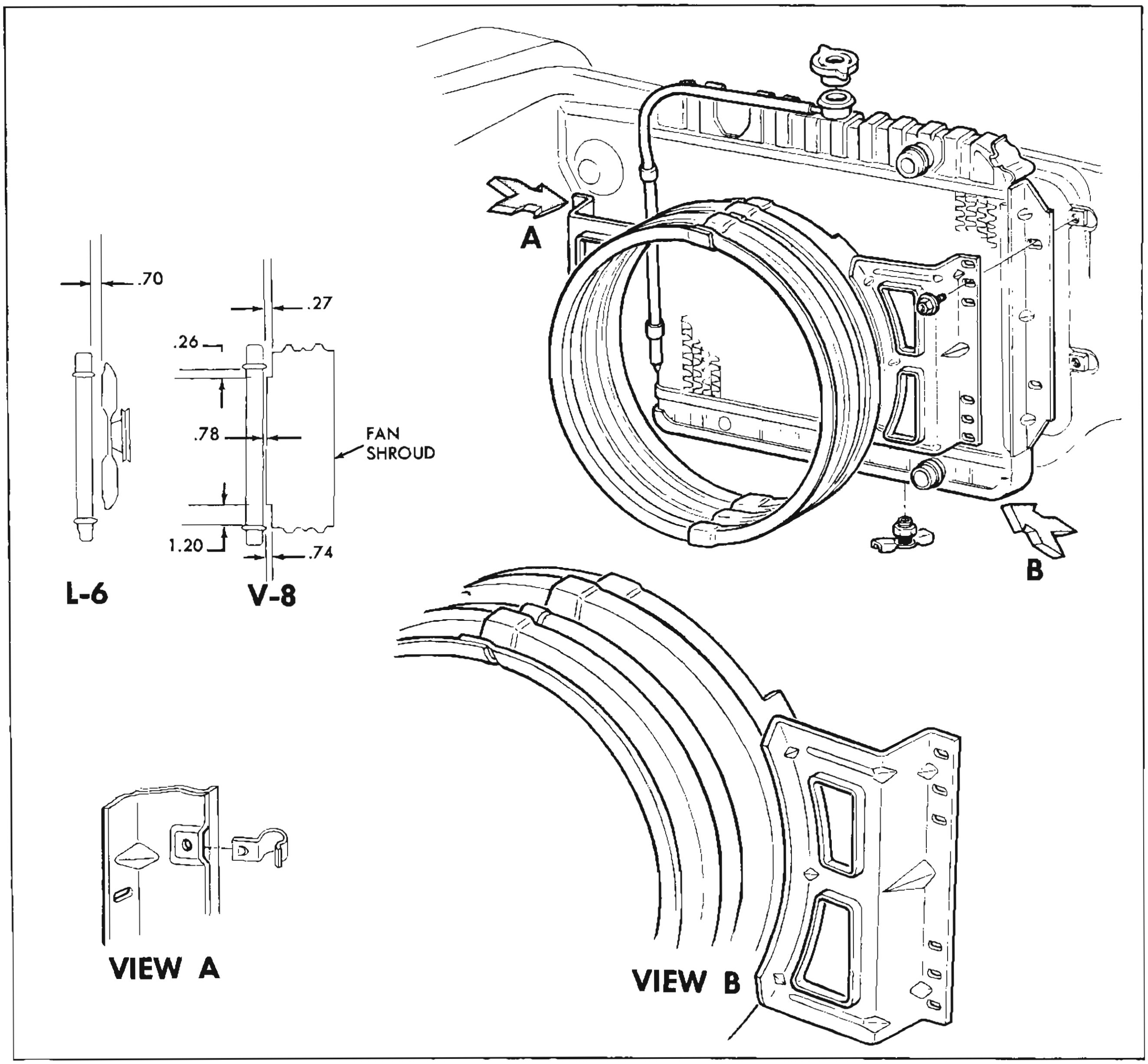

Fig. 17c—Radiator and Fan Shroud

4. Remove radiator and shround.

Installation

NOTE: Refer to Figure 17c for radiator, fan and shroud assembled position and clearances.

Reverse removal procedure.

FRONT FENDER ASSEMBLY

Removal

1. Referring to Figure 16c: Remove two screws retaining fender to radiator support.
2. Referring to Figure 7c: Remove one screw from bumper tip.
3. Remove fender front moulding and grille screws.
4. Referring to Figure 18c: Remove screws retaining fender to skirt.
5. Referring to Figure 5c. Remove one screw retaining fender to rocker panel and record number of shims found at this location. Remove one screw retaining fender to cowl and record number of shims found at this location.
6. Remove two screws retaining fender to hood hinge. Remove fender from vehicle.

Installation

When replacing fender, all screws should be installed loosely. Refer to disassembly procedure for location of screws. The shimmed screws located at rocker panel and cowl should be installed and adjustments should be made before tightening any of the other screws. Always start adjustment with original amount of shims, then add or subtract shims as required.

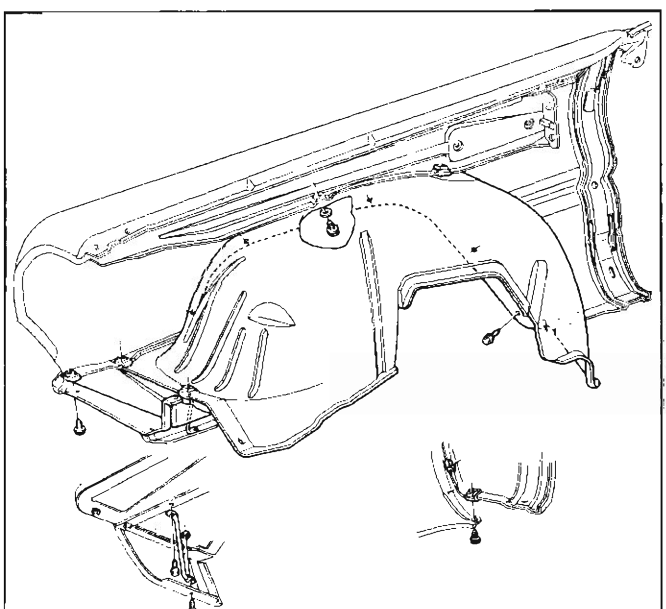

Fig. 18c—Fender-to-Fender Skirt Attachment

FRONT FENDER TRIM

To gain access to spear moulding and wind-split moulding retaining nuts, remove skirt assembly as outlined in the following section, remove rear fender-to-cowl bolts and pry rear fender out several inches from body.

FRONT FENDER SKIRT ASSEMBLY

Removal

1. Jack up front end of vehicle with front suspension hanging free and remove front wheel.
2. Remove all wires, hoses, etc. attached to skirt. Note that it is not necessary to remove battery tray if working on right hand side of car.
3. Remove cap screws retaining skirt to fender, bumper filler panel and hood hinges (in that order). Observe length of screws as they are removed; note that those screws installed at top of wheel opening are somewhat shorter than the others. Note also the location of pointed screws.
4. With all screws removed, lower the skirt toward floor, rotate the upper portion toward you and remove the skirt from the vehicle.

Installation

1. Position skirt on vehicle so that the front flange lies between the fender and bumper filler panel flanges in the area shown in Figure 19c.
2. Align hole in crown of skirt with hole in hood hinge and loosely install cap screw with large cupped washer in place.

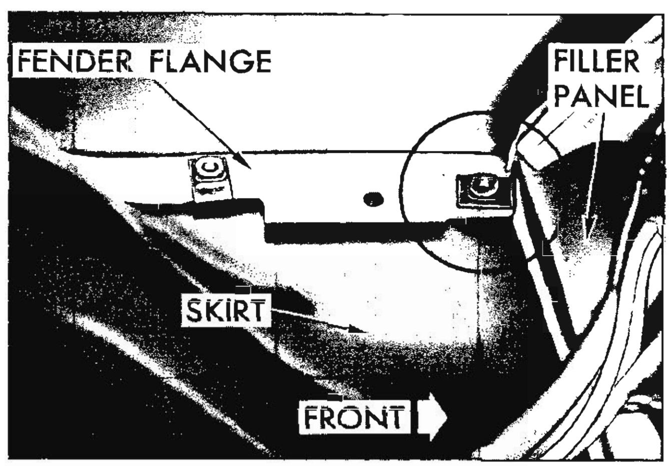

Fig. 19c—Position of Left Front Fender Skirt Typical)

3. Align holes and install remaining screws; do not tighten until all screws are started. Be sure that short screws and pointed screws are installed in locations from which they were removed.
4. Install all wiring and/or hoses removed previously.
5. Install wheel and lower vehicle to floor.

HOOD ASSEMBLY

Hood may be removed either with or without hinges. To shorten aligning time, hood hinge plates may be located by scribing a mark on hood and/or hood mounting bracket which outlines entire plate. See "Maintenance and Adjustments—Hood Hinge" for hood adjustment procedure. Hood hinge springs may be easily and safely removed and installed through the use of Tool J-9559 as follows:

1. With hood opened only far enough to allow passage of mechanic's arm between hood and fender, insert ends of J-9559 (through bolt removed) between coils of spring until barrel of tool contacts outer diameter of spring.
2. Open hood full while still holding spring (with tool installed) in hand; when hood is near fully opened position, spring may be removed as shown in Figure 20c.

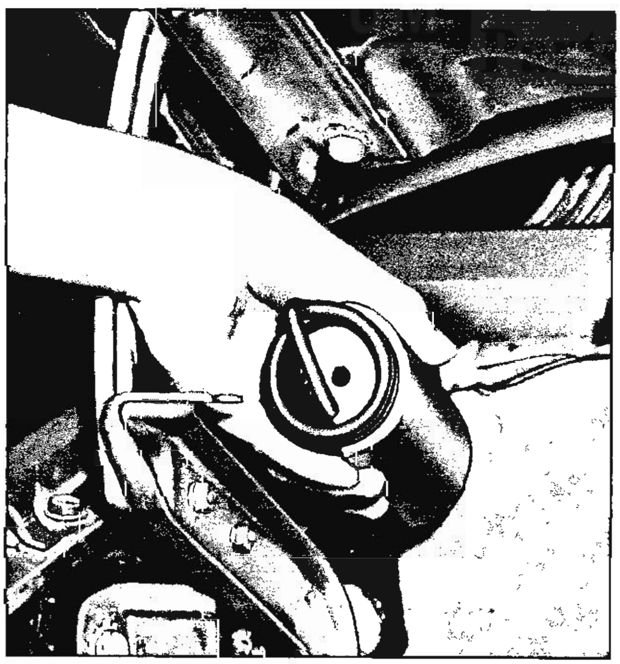

Fig. 20c—Removing Spring with J-9559 (Typical)

3. As soon as spring is removed, insert long bolt supplied with J-9559 through holes in end of tool (passing it through spring) and install nut on bolt.

Spring may be removed from J-9559 or J-9559 may be installed in a new spring by the following method.

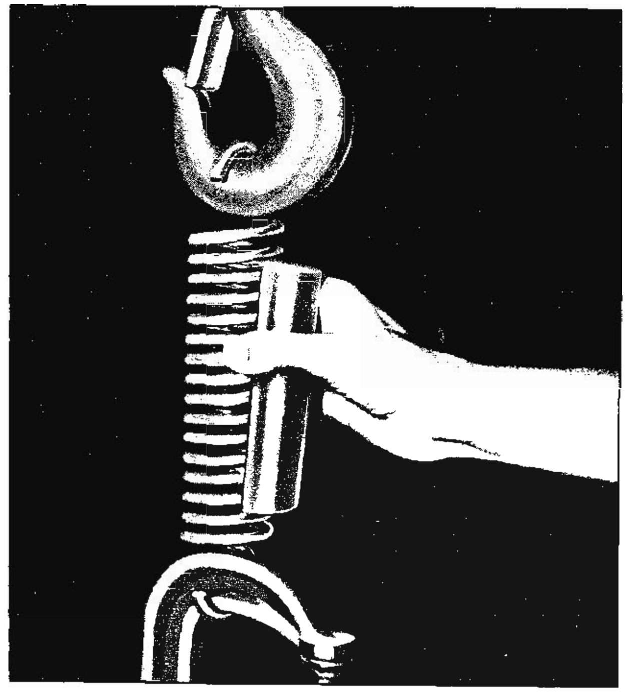

Fig. 21c—Installing J-9559 in New Spring

1. Place a closed 6 or 8 inch "C" clamp in a vice or fasten it to a heavy bench top (bench should be fastened to floor).
2. Hook one end of spring in clamp and the other end in hook of chain hoist, "cherry-picker" or equivalent, as shown in Figure 21c.
3. Stretch the spring enough to allow insertion of J-9559. Install through bolt if spring is not to be installed on hinge at once.

HOOD LOCK ASSEMBLY (fig. 3c)

Removal

1. Remove catch assembly as follows:
   a. Remove two cap screws retaining catch assembly to radiator support.
   b. Remove cap screw retaining catch assembly to catch support assembly.
2. Before removing hood lock plate from hood, locate position on hood by scribing around "feet" of lock plate. Remove four cap screws retaining lock plate to hood and remove lock plate from vehicle.

Installation

1. Install both catch and lock assemblies in reverse order of removal procedure.
2. Align as outlined under "Maintenance and Adjustments—Hood Catch."

HOOD TRIM AND INSULATION

Figure 22c shows the installation details of both the hood ornamentation and insulating pads. The hood emblem and molding retaining nuts may be reached from the underside of the hood panel.

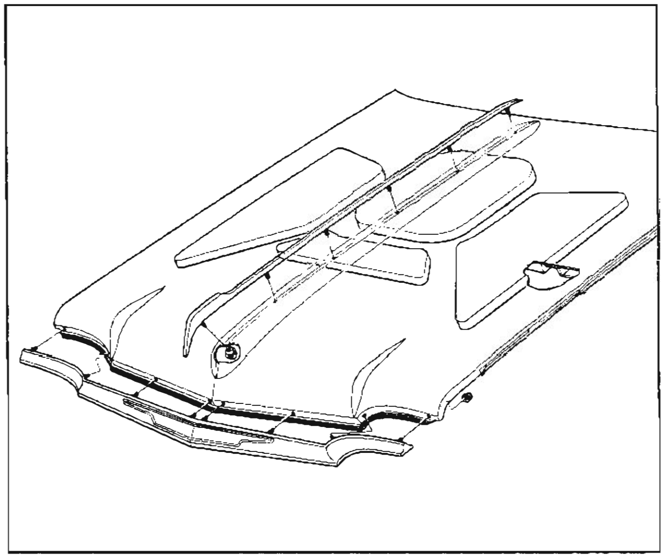

Fig. 22c—Hood Trim and Insulation

SPECIAL TOOLS

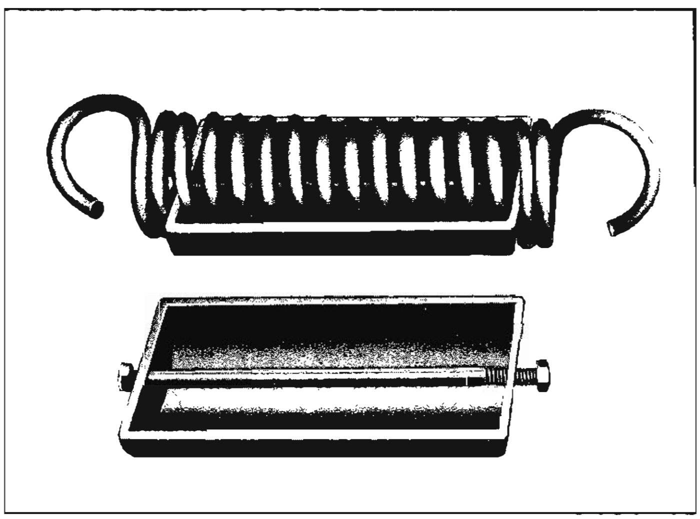

Fig. 23c—Special Tools—Sheet Metal

1. J-9559 Hood Spring Tools

SECTION 15
HEATER AND ACCESSORIES

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AIR CONDITIONING
GENERAL DESCRIPTION

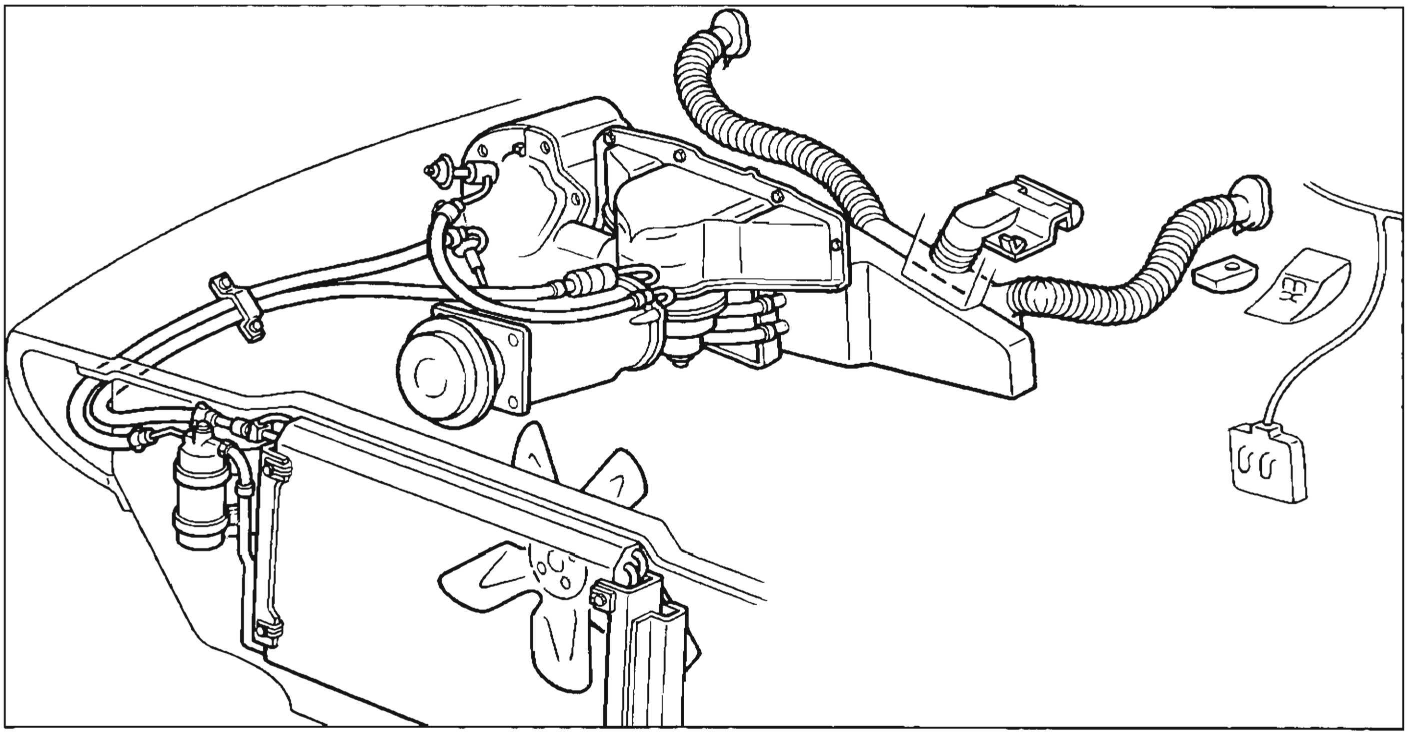


Fig. 1—Deluxe All-Weather System Components

Three air conditioning systems are available for installation on the 1964 Chevrolet. They are:

1. The Deluxe All-Weather Air Conditioning System.
2. The Custom Deluxe Air Conditioning System, new for 1964.
3. The Custom Air Conditioning System.

GENERAL

Underhood components (that is, the compressor, condenser and receiver-dehydrator) are much the same in type, location and method of attachment on each Chevrolet system. The six-cylinder reciprocating compressor is bracket-mounted to the engine and belt driven from the crankshaft pulley. The condenser and receiver-dehydrator are mounted ahead of the engine cooling radiator. All cooling system components are connected by means of flexible refrigerant lines.

Evaporator size and location differ from system to system as do methods of temperature control and air supply and distribution. These differences are covered in the following paragraphs.

DELUXE ALL-WEATHER SYSTEM

Both the heating and cooling functions are performed by this system. Air entering the vehicle must pass through the cooling unit (evaporator) and the heating unit, in that order, and the system is thus referred to as a series system.

The evaporator, located in the right hand cowl plenum chamber, provides maximum cooling of the air passing through the core when the air conditioning system is calling for cooling. A suction throttling valve replaces the hot gas valve which is covered in the 1961 Passenger Car Shop Manual. The suction throttling valve acts in the system only to control evaporator pressure so that minimum possible temperature is achieved without core freeze-up. The STV is preset and has no manual control. A manually operated (by means of the COOL-HOT control lever) vacuum control raises the valve setting to provide a higher evaporator pressure to prevent evaporator core freezup at higher altitudes.

The heater core in the Deluxe All-Weather System will be hot at all times since no water valve is present in the system. A cam-lock device assures positive closing of the COOL-HOT door when heating is not required.

System operation is as follows (see Figure 2): Air, either outside air, recirculated air or a mixture enters the system and is forced through the system by the blower. As the air passes through the evaporator core, it receives maximum cooling if the air conditioning controls are calling for cooling. After leaving the evaporator, the air enters the Heater and Air Conditioner Selector Duct Assembly where, by means of manually operated diverter doors, it is caused to pass through or to bypass the heater core in the proportions necessary to provide the desired outlet temperature. Conditioned airflow then enters the vehicle through either the floor distributor duct or the dash outlets. Notice that the heater core will be hot at all times. A cam-lock device assures that the heat shutoff door maintains complete closure except when the system is calling for heat. When, during cooling operations, the air is cooled by the evaporator to below comfort level, it is then warmed by the heater to the desired temperature; during "heating only" operations the evaporator will not be in operation and ambient air will be warmed to the desired level in the same manner. Linkage is so designed that when the system controls are calling for heat, air will enter the vehicle through the floor distributor duct, and when the system controls call for cooling, air will enter through the three dash outlets. The side dash outlets include damper type shutoff valves which may be used to provide further control of airflow. The barrel type outlet in the center of the dash will direct air in any direction or, if desired, shut it off.

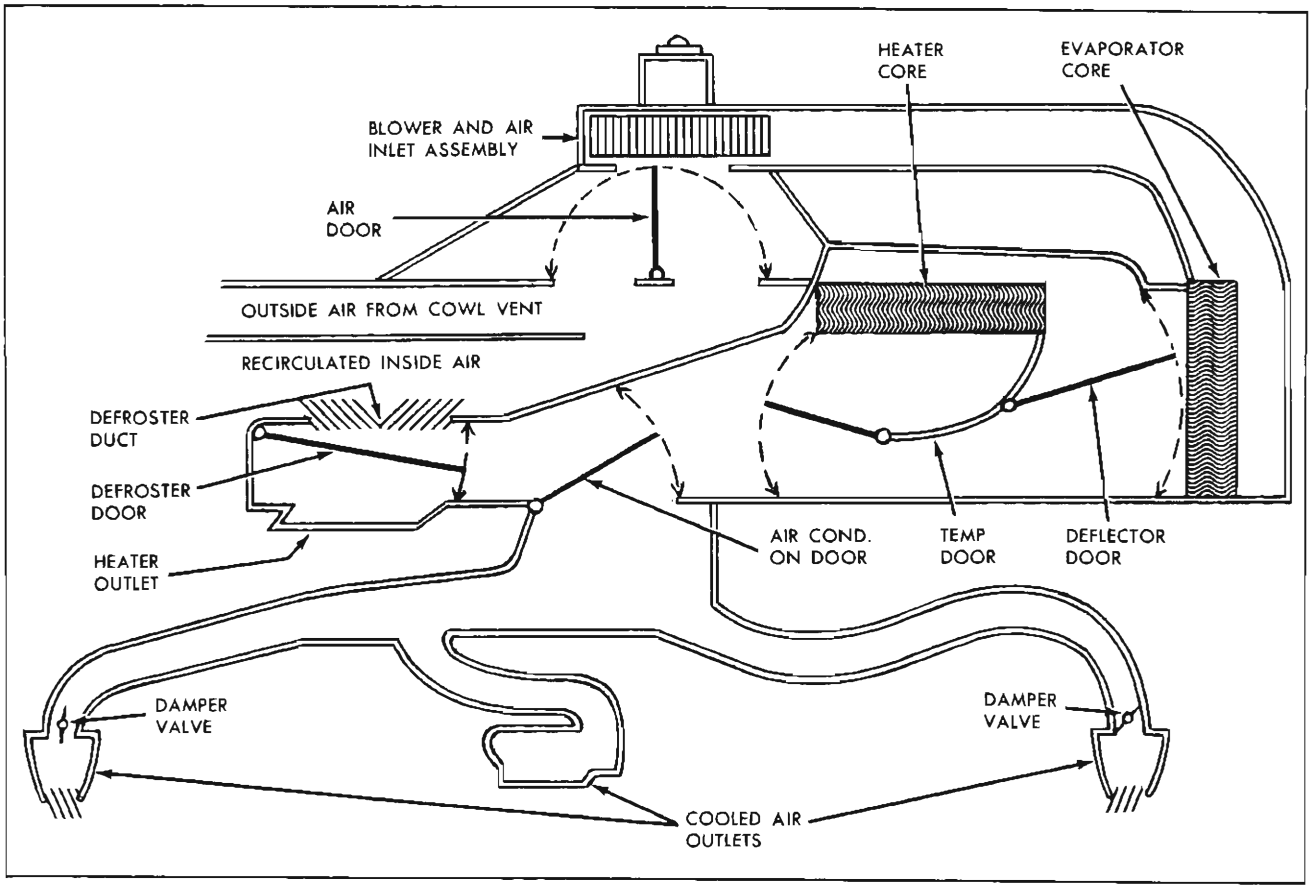


Fig. 2—Airflow Schematic—Deluxe All-Weather System

CUSTOM DELUXE SYSTEM

This system makes use of the same compressor, condenser and receiver-dehydrator components used in the All-Weather system, but has a different evaporator assembly. The evaporator is a completely self-contained unit which attaches to and operates in conjunction with the vehicle heater. System airflow, either outside air or recirculated air passes through the heater and/or, if the system controls are calling for cooling, through the air conditioning evaporator. Temperature control is by means of a thermostatic switch-cycling clutch. System controls include the five lever control panel plus one knob on the evaporator unit.

Heater Operation

System operation is as follows: with the HEATER-AIR COND. lever fully up, outside air, recirculated air or a mixture of each (determined by the positioning of the AIR lever) pass through the blower, which is controlled by the horizontal FAN lever. Part of the airflow enters the heater core, which will be hot whenever the engine is running, and part enters the bypass passage around the core. The temperature door downstream from the heater core is operated by means of the COOL-HOT lever to close off heated airflow from the core, cool airflow from the bypass passage, or to choose the proper proportion of heated and unheated air to temper the outlet air temperature as desired. Since the heater core is hot at all times, a cam-lock device assures that the temperature door positively closes off the heated air passage except when the system is calling for heat. The defroster door, operated by the DEF lever diverts all or part of the airflow through the defroster outlet for defogging or defrosting operation if needed.

Cooling Operation

When cooling is desired the HEATER-AIR COND knob on the control panel is pushed down, positioning a door which routes the heater bypass air through the evaporator core and, at the same time, turns on the air conditioning compressor. Evaporator outlet temperature is controlled by a thermostatic switch operated by the COOL knob on the evaporator case. During cooling operations, the COOL-HOT lever in the heater control panel must be fully up.

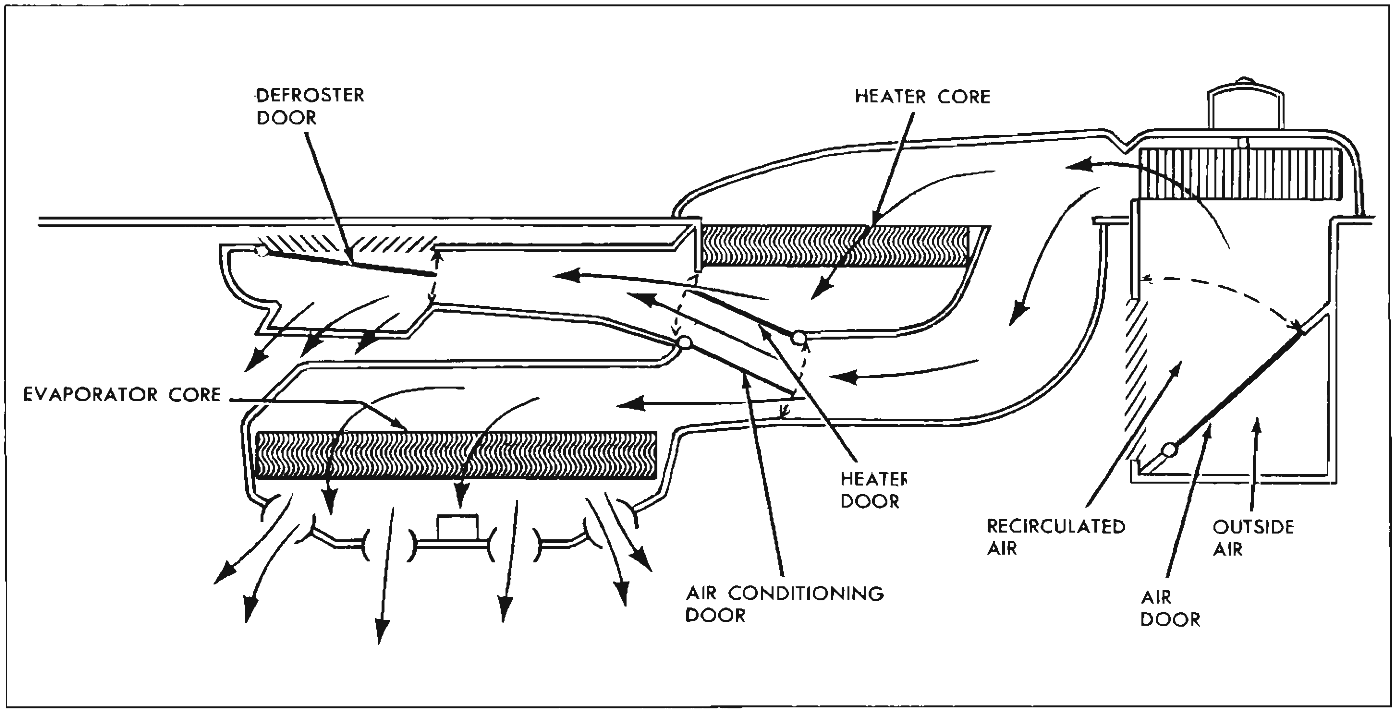


Fig. 3—Airflow Schematic—Custom Deluxe System

CUSTOM SYSTEM

A self-contained unit, the dealer installed Custom System operates on recirculated air only and entirely independent of the vehicle heater. Recirculated inside air is drawn into the unit, passed through the evaporator core and into the car through the adjustable outlets in the evaporator case. The entire unit mounts compactly beneath the dash. Temperature control is by means of a thermostatic switch.

Underhood components are similar in placement to the All-Weather system.

GENERAL INFORMATION

The following paragraphs represent changes or additions to the General Information pages in the 1961 Passenger Car Shop Manual.

FAST IDLE

The manually operated fast idle is not used on 1964 Chevrolet Air Conditioning Systems.

PRECAUTIONS IN HANDLING FREON-12

Discharging large quantities of Freon-12 into a room can usually be done safely as the vapor would produce no ill effects, however, in the event of an accidental rapid discharge of the entire system charge, it is recommended that the inhalation of large quantities of Freon be avoided. This caution is especially important if the area contains a gas heater. While Freon-12 normally is non-poisonous, heavy concentrations of it in contact with a live flame will produce a toxic gas. This same gas will also attack all bright metal surfaces.

LEAK TESTING THE SYSTEM

A Freon leak in the high pressure side of the system may be more easily detected when the air conditioning system is operating. When checking the low pressure side of the system (especially the compressor front seal), a leak may be most easily detected after the engine has been turned off for sufficient time for system pressures to equalize.

REFRIGERANT LINE CONNECTIONS

"O" Rings

Following is a table which includes the latest torque information for use with "O" ring connections.

Metal Tube O.D.	Thread and Fitting Size	Steel Tubing Torque*	Alum. Tubing Torque*
1/4	7/16	10-15	5-7
3/8	5/8	30-35	11-13
1/2	3/4	30-35	11-13
5/8	7/8	30-35	18-21
3/4	1 1/16	30-35	23-28

*Foot Pounds

NOTE: Where steel to aluminum connections are being made, use torque given for aluminum fittings.

HOSE CLAMPS

Follow the instructions covered in the 1961 Shop Manual when working with hose clamp connections except for the following:

- Torque a new hose clamp connection to 35-45 in. lbs. When retorquing a connection, anything above 20 in. lbs. is satisfactory. However, if torque has fallen below 20 in. lbs., retorque to 20-25 in. lbs.
- When cutting the hose to remove it from a connector, use extreme care not to nick or score the sealing heads on the connection. Figure 4 shows the proper method of cutting off the hose. An angle cut as shown greatly lessens the possibility of damage to the connector.

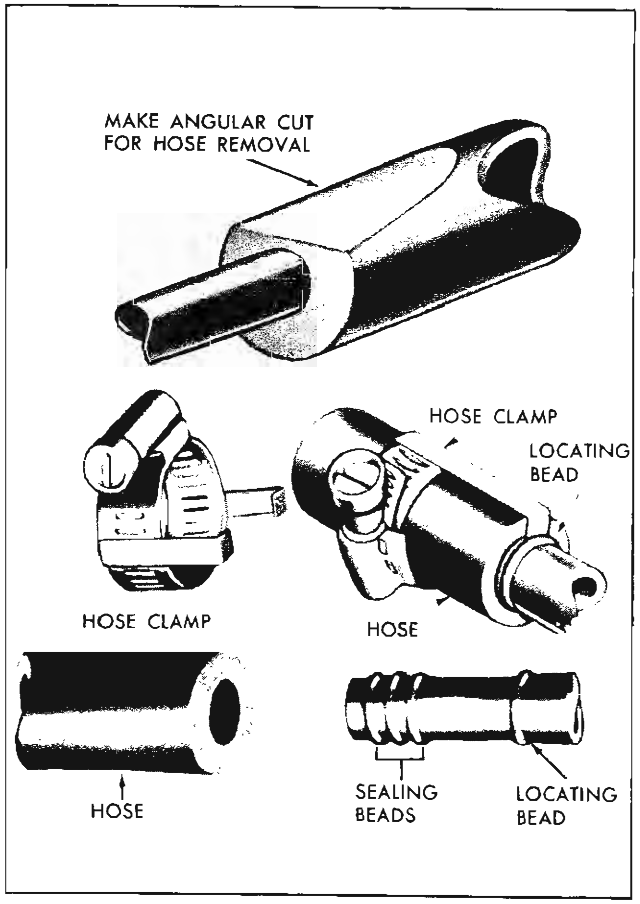


Fig. 4—Hose Clamp Connections

REPAIR OF REFRIGERANT LEAKS

Any refrigerant leaks found in the system should be repaired in the manner given below:

Leaks at "O" Ring Connection—

1. Check the torque on the fitting and, if too loose, tighten to the proper torque. Always use a backing wrench to prevent twisting and damage to the "O" ring. **Do not overtighten.** Again leak test the joint.

2. If the leak is still present, discharge the refrigerant from the system as described under "Evacuating and Charging Procedures."
3. Inspect the "O" ring and the fitting and replace if damaged in any way. Coat the "O" ring being reinstalled with refrigeration oil and install carefully.
4. Retorque the fitting, using a backing wrench, and then add ½ to 1 lb. of Freon-12 to the system and recheck for leaks.

   CAUTION: Do not operate the system with this small Freon charge.
5. Purge the system, thus removing the ½ to 1 lb. installed in step 4 above.
6. Evacuate and charge the system.

Leaks at Hose Clamp Connection—

1. Check the tightness of the clamp itself and tighten if necessary. Recheck for leak.
2. If leak has not been corrected evacuate the system and loosen clamp and remove hose from connection. Inspect condition of hose and connector. Replace scored or damaged parts.
3. Dip end of new hose in refrigerant oil and carefully reinstall over connector. Never push end of hose beyond the locating bead. Properly torque the clamp.
4. Recheck the system for leaks by installing ½ to 1 lb. of Freon into the system. Do not run compressor.
5. Purge the system, thus removing the ½ to 1 lb. installed in step 4 above.
6. Evacuate and charge the system.

Compressor Leaks

If leaks are located around the compressor shaft seal or shell, replacement of necessary seals should be made.

INSPECTION AND PERIODIC SERVICE

The information included in the 1961 Shop Manual under this heading applies as well to the 1964 systems with the following changes and additions:

Predelivery Inspection

Since the hot gas valve is not used in 1964 systems, the note referring to it which follows Step 3 under this heading should be disregarded.

Check all hose clamp connections before leak testing the system. Do not overtighten.

With the present six cylinder compressor it is not possible to check the compressor for oil charge without removing it from the vehicle. Therefore, Step 5 should read:

5. Check the system for any evidence of oil leaks.

1000 Mile Inspection and Periodic Service

Service procedures specified under the above two headings in the 1961 Shop Manual may now be performed at 6000 mile intervals except for the following additional recommendation:

- Every week during the winter months or other periods when the system is not being operated regularly, run the system with the controls set for maximum cooling for 10 or 15 minutes to insure proper lubrication of seals and moving parts.

MAINTENANCE, INITIAL CHECKS AND ADJUSTMENTS

PERFORMANCE TEST

Set up the vehicle as follows to run the performance test on the 1964 Air Conditioning Systems.

1. Car doors and windows closed.
2. Hood up.
3. Vehicle in NEUTRAL and engine running at 2000 rpm.
4. Air Conditioning controls set for—
   a. full inside air (AIR lever fully up).
   b. maximum cooling.
   c. high blower speed.
5. COOL-HOT lever fully up.
6. Gauge set installed.
7. System settled out—run for about 10 minutes.
8. Thermometer in the right hand cold air outlet and another in front of the vehicle grille.

PERFORMANCE DATA

The following data represents a properly functioning system under the conditions set up in the performance test above.

NOTE: Higher temperatures and pressures will occur at higher ambient temperatures. In areas of high humidity it is possible to have thermometer and gauge readings approach but not reach the figures listed in the performance charts and still have a satisfactory operating unit. However, it is important to remember that suction (evaporator) pressure has a direct relationship on nozzle outlet temperature. If suction pressure is too low, ice will gradually form on the evaporator fins, restricting air flow into the passenger area and resulting in insufficient or no cooling.

All-Weather System

Temperature of Air Entering Condenser	70°	80°	90°	100°	110°	120°
Engine R.P.M.	2000					
Compressor Head Pressure	150-160	170-180	195-205	230-240	270-280	300-310
Suction Pressure at STV	28 Psi					
Discharge Air Temp. at Right Hand Outlet	35-37	36-38	37-39	39-41	41-43	44-46

Custom Deluxe System

Temperature of Air Entering Condenser	70°	80°	90°	100°	110°	120°
Engine RPM	2000					
Compressor Head Pressure	110-120	135-145	170-180	190-200	235-245	265-275
Suction Pressure**	6	6	8	8	14	15
Discharge Air Temperature**	34-38	34-38	34-38	34-38	38-42	38-42

Custom System

Temperature of Air Entering Condenser	70°	80°	90°	110°	110°	120°
Engine R.P.M.	2000					
Compressor Head Pressure	125-135	135-145	165-175	190-200	220-230	245-255
Suction Pressure**	11	13	14	16	16	17
Discharge Air Temperature**	35-40	35-40	36-41	38-43	38-43	40-45

**When compressor clutch disengages.

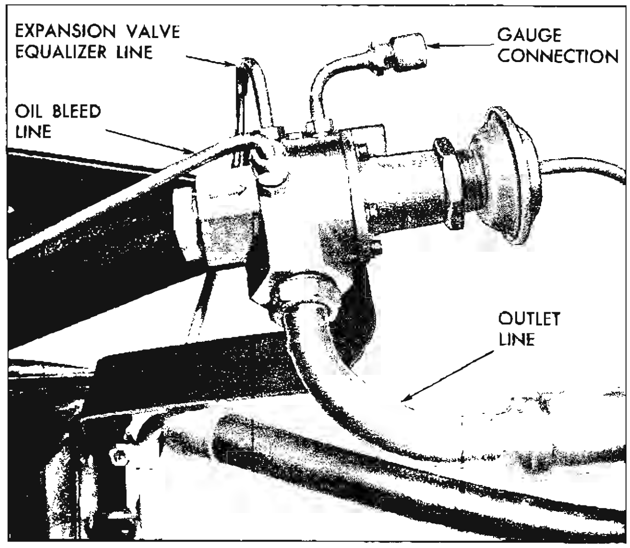


Fig. 5—Suction Throttling Valve

SUCTION THROTTLING VALVE (STV)

(Deluxe All-Weather System Only)

The suction throttling valve determines the temperature of the evaporator core by limiting the minimum evaporator pressure. The valve in this manner also protects the core against freeze-up which would result in a partial or complete loss of cooling capacity. While the system is in operation, the evaporator will be held to a minimum pressure of 28 psi and will provide maximum cooling at all times. The evaporator pressure will hold at this level so long as maximum cooling is desired by the occupants of the car. Should the cold air output begin to become uncomfortable, the COOL-HOT lever may be moved to mix heated air with the maximum cooled air and thus temper the outlet air to a desired temperature. This action, indicating that maximum cooling is no longer needed, acts through the COOL-HOT control cable and linkage to close a vacuum valve through which 4½" of vacuum has been applied to the vacuum head on the STV. Loss of this vacuum increases the internal spring pressure exerted upon the STV piston and effectively increases the minimum evaporator pressure approximately 3 pounds to 31 psi. This results in less evaporator cooling capacity. The primary reason for this feature is to guard against evaporator freeze-up when operating at higher elevations. **NOTE: When operating the system at elevations in excess of 4000 feet the COOL-HOT lever should be depressed about ½".**

Checking for Proper Suction Throttling Valve Operation

To check for proper operation of the suction throttling valve, proceed as follows:

1. Attach the suction pressure gauge to the suction throttling valve gauge connection, using the proper gauge line adapter.

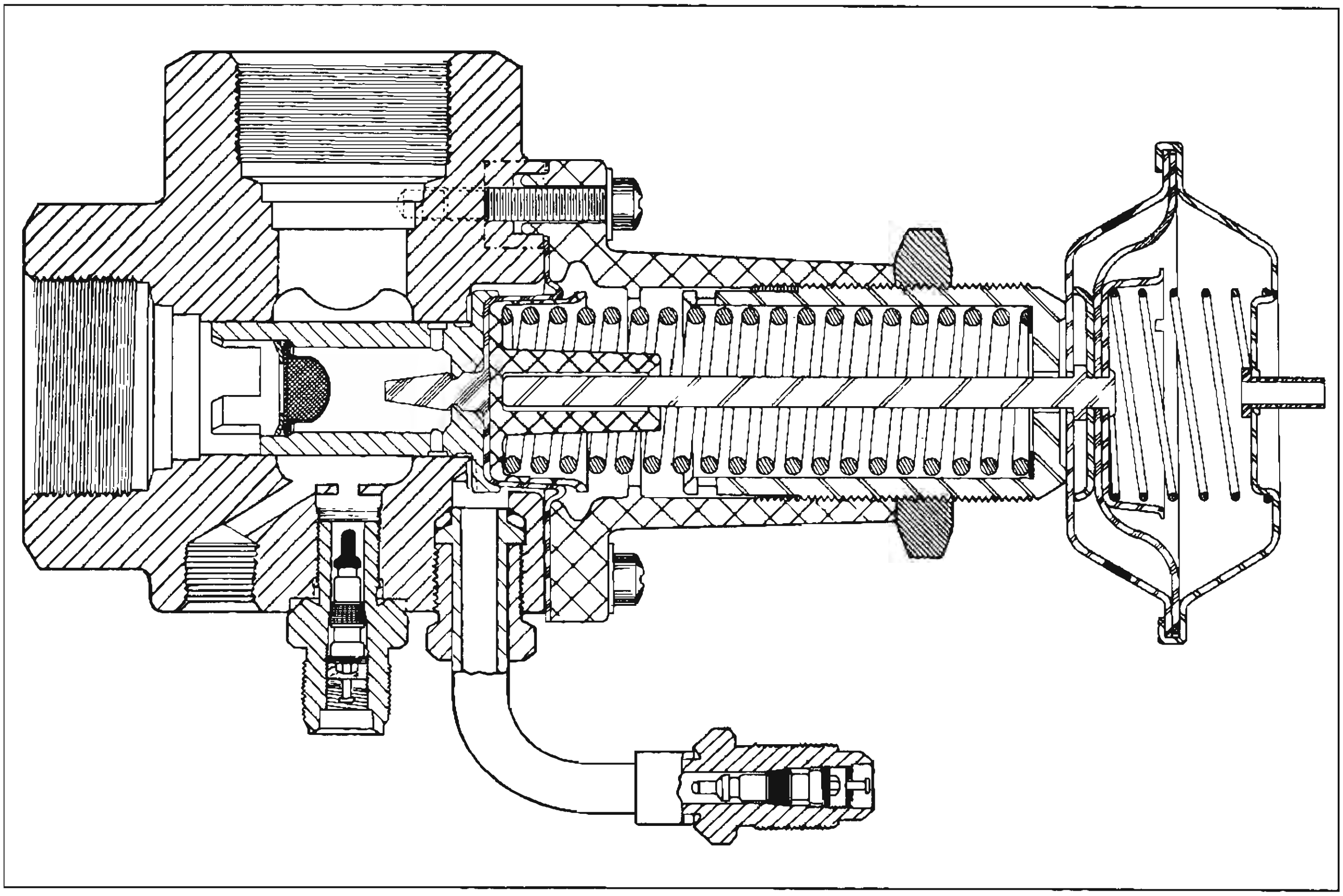


Fig. 6—Suction Throttling Valve—Sectional View

2. With the air conditioning system in operation, check the gauge reading, then depress the COOL-HOT lever about ½". The pressure reading should rise approximately 3 psi. If no change is noted, check the following items.
   a. The vacuum head assembly may be damaged and in need of replacement.
   b. The vacuum hose may be pinched off, broken or unplugged.
   c. The vacuum valve located on the top of the floor distributor duct within the car may be defective or its linkage poorly adjusted.

With evaporator pressure reacting properly (after any necessary repairs or adjustments as indicated in Step 2 above) and with vacuum applied to the vacuum unit (vacuum line connected and COOL-HOT lever fully up), the evaporator pressure reading on the gauge should be 28 psi.

1. If adjustment is necessary, loosen the jam nut and, with the system in operation, rotate the vacuum head assembly (vacuum line in place) until the proper pressure reading is reached. Approximately three turns of the head assembly will result in a 1 psi pressure change. Turn clockwise to raise, counterclockwise to lower the pressure.

NOTE: Be sure that the system is in operation (engine running, HEATER-AIR COND lever fully down and vacuum applied to the vacuum head assembly before attempting this adjustment.

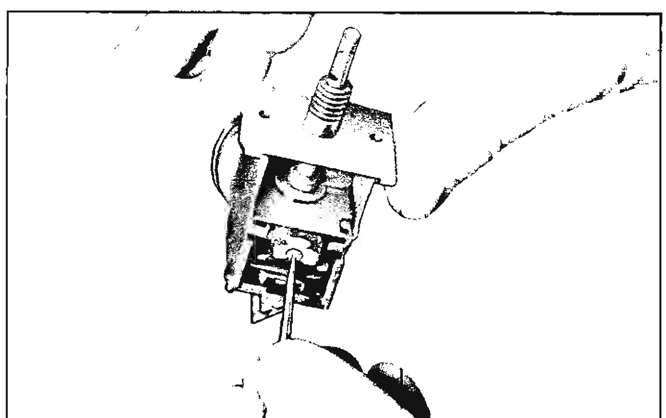


Fig. 7—Thermostatic Switch Adjustment

2. Tighten the jam nut.
3. Recheck operation by depressing the COOL-HOT lever slightly or by pinching off or removing the vacuum line. Evaporator pressure should rise approximately 3 psi above the normal of 28 psi.

THERMOSTATIC SWITCH (CUSTOM AND CUSTOM DELUXE SYSTEM)

Checking and Adjusting

Switch checking and adjustment procedures under "Initial Checks and Adjustments" remain much the same as outlined in the 1961 Passenger Car Shop Manual with the exception of the switch location. Figure 7 illustrates the location of the adjusting screw and the method of adjustment.

EXPANSION VALVE

A malfunction of the expansion valve will be caused by one of the following conditions: valve stuck open, valve stuck closed, broken power element, a restricted screen or an improperly located or installed power element bulb. The first three conditions require valve replacement. The last two may be corrected by replacing the valve inlet screen and by properly installing the power element bulb.

Indications of expansion valve trouble provided by the Performance Test are as follows:

Valve Stuck Open or Broken Power Element

High Suction Pressure and Low Head Pressure.
Noisy Compressor.
No Cooling–Freeze Up.

Valve Stuck Closed or Plugged Screen

Very Low Suction Pressure.
No Cooling.

Poorly Located Power Element Bulb

Normal Pressures.
Poor Cooling.

DIAGNOSIS

Whenever trouble develops in the refrigeration system, the diagnosis procedure listed below for the particular condition encountered, will assist in locating the source of trouble.

Symptoms and Probable Cause	Diagnosis Procedures
Drafts	
a. Poor air distribution.	a. Readjust air outlets.
b. Car temperature too low.	b. Check suction throttling valve or thermostatic switch. Check control panel linkage.
Shortage of Air Supply at Outlets	
a. Car temperature up.	a. Check position of Air Conditioning controls. Check fan speeds. Check cooling coil for air passage.
b. Low fan speed.	b. Check voltage at fan motor. Check motor bearings. Check direction of motor rotation.
c. No high blower speed.	c. Check in-line fuse in engine compartment.
Air Noise	
a. Sharp obstruction in air stream.	a. Check internal surfaces of ducts and smooth out kinks or rough edges.
b. Small slits in ducts (All Weather).	b. Check ducts and close all holes or openings.
c. Obstruction in outlets or ducts.	c. Check for partly covered outlets, loose materials in ducts or fan housing and loose dampers in ducts.
Scraping Noise	
a. Fan hitting fan housing.	a. Adjust fan to turn free on all sides. Check motor bearings. Tighten motor mountings.
Rattle and Vibration Noises	
a. Loose ducts, tubing or compressor mounting.	a. Check duct, tubing, tubing clamps, compressor and compressor mounting for looseness and tighten where required.
b. Cooling coil mounting bolts loose.	b. Tighten or install new bolts.

Symptoms and Probable Cause	Diagnosis Procedures
Water Leaking or Dripping Into Passenger Compartment	
a. Drain tube stopped up.	a. Clean drain tube.
b. Drain tube disconnected from Evaporator (Custom).	b. Connect drain tube.
Hissing Noise at Expansion Valve	
a. Shortage of refrigerant (indicated at sight glass).	a. Locate and repair leak and add refrigerant.
b. Restriction in liquid line.	b. Check receiver-dehydrator for partial stoppage. Check line for kinks. Check filter screen at expansion valve.
Partial Frosting and Sweating of Cooling Unit or Poor Cooling	
a. Improperly installed or adjusted controls.	a. Check all controls for proper installation and adjustment.
b. Shortage of refrigerant (indicated at sight glass).	b. Locate and repair leak and add refrigerant.
c. Restricted or clogged liquid line.	c. Check receiver-dehydrator for partial stoppage. Check line for kinks.
d. STV out of adjustment or malfunctioning.	d. Adjust, repair or replace STV.
e. Thermostatic switch improperly adjusted.	e. Adjust thermostatic switch.
f. Expansion valve malfunctioning.	f. Replace expansion valve.
g. Clutch will not disengage.	g. Check clutch.
Failure to Cool	
a. Faulty STV operation.	a. Check STV adjustment and adjust, repair or replace as necessary.
b. Faulty thermostatic switch.	b. Replace faulty component.
c. Faulty clutch operation.	c. Check clutch actuating coil connections and coil. Check clutch for slippage by watching bolt in center of compressor shaft. Bolt should be turning at same speed as pulley. Check for belt slippage. Remove and check internal parts of clutch and replace where necessary.
d. Lost refrigerant charge (complete charge).	d. Locate and repair leak, process and charge system and check for proper oil level.
e. Blower not operating properly.	e. Check electrical circuit. Check motor and fan.
f. Insufficient air.	f. Check motor speed. Check for restrictions in ducts. Check for dirty evaporator coils. Remove coil to clean as necessary.
g. Stopped up liquid line or receiver dehydrator.	g. Check for stoppage and replace if necessary.
h. Faulty expansion valve.	h. Expansion valve malfunctioning. Replace valve as required. Discharged power element. Replace valve. Stopped up expansion valve filter screen. If screen cannot be cleaned, the valve must be replaced.

Symptoms and Probable Cause	Diagnosis Procedures
Intermittent Failure to Cool	
a. Freeze-up in high humidity areas.	a. Raise low limit of STV or thermostatic switch.
b. Expansion valve loss of bulb charge.	b. Replace expansion valve.
Too Cool	
a. Faulty STV or thermostatic switch.	a. Repair or replace unit as necessary.
High Gauge Reading on High Side of System	
a. Air or excessive refrigerant in system.	a. Check complete system for leaks. Where detected, discharge system, repair leaks, then evacuate and recharge system with a complete charge.
b. Blocked air circulation through condenser.	b. Clean condenser with stiff brush, compressed air or cool water. Never use steam!
c. High engine temperature.	c. Perform required engine maintenance.
Low Gauge Reading on High Side of System	
a. Shortage of refrigerant.	a. Check for shortage, locate leak and repair. Evacuate and recharge system.
b. Faulty compressor.	b. Replace serviceable parts or compressor.
High Gauge Reading on Low Side of System	
a. Clutch slipping.	a. Check clutch and make necessary repairs.
b. Excessively high head or high side pressure.	b. Check system for leaks. Discharge system, repair any leaks found, then evacuate and recharge system.
c. Over-feeding of expansion valve.	c. Check expansion valve for poor bulb contact to suction line. Replace valve if necessary.
d. Faulty compressor.	d. Replace compressor if found to be faulty.
Low Gauge Reading on Low Side of System	
a. Shortage of refrigerant.	a. Check for leak, repair leak and recharge system.
b. Faulty STV operation.	b. Adjust, repair or replace STV.
c. Restriction in liquid line, suction line, receiver-dehydrator or screen at expansion valve.	c. Check lines for kinks and replace lines if kinks are found. Check receiver-dehydrator. If partly stopped up, it will be cold or frosted. Check expansion valve. If partly stopped up, it will be cold or frosted at that point.
d. Cooling coil dirty or iced up.	d. Check cooling coil. If dirty, clean coil with cold water. If iced up defrost coil and check STV and expansion valve.

DIAGNOSIS SUMMARY

High Head Pressure Indications

a. Air in system or overcharge of refrigerant.
b. Blocked air circulation through condenser.
c. High condensing medium temperature.

Low Head Pressure Indications

a. Restricted expansion valve.
b. Faulty compressor—will not pump.
c. Shortage of refrigerant.
d. Low condensing medium temperature.

Shortage of Refrigerant Indications

a. Hissing noise at expansion valve.
b. Sight glass shows bubbles or foam.
c. High coil temperature.
d. Low head pressure.
e. Very little or no sweating.

Poor or No Refrigeration Indications

a. Malfunctioning STV or thermostatic switch.
b. Shortage of refrigerant.
c. Improper adjustment of STV.
d. Expansion valve malfunctioning.
e. Expansion valve bulb improperly located.
f. Discharged thermobulb on expansion valve.
g. Faulty compressor—will not pump.
h. Heavy coating of frost or ice on cooling coil.
i. Partially stopped up receiver-dehydrator, liquid line or suction line.
j. Excessive head pressure.
k. High condensing medium temperature.
l. Clutch slipping.
m. Clutch actuating coil not operating.

Needle Stuck Open in Expansion Valve

a. Frosted or sweating suction line.
b. Poor refrigeration.
c. High head pressure.

Needle Stuck Shut in Expansion Valve

a. No cooling.
b. Very low back pressure reading.
c. No refrigeration in cooling unit.

SYSTEM SERVICE OPERATIONS

1964 Air Conditioning System Capacities

	Freon Charge	Oil Charge
Deluxe All-Weather System	3 lbs., 12 oz.	11 ozs. 525 viscosity
Custom Deluxe System	3 lbs.	11 ozs. 525 viscosity
Custom System	3 lbs.	11 ozs. 525 viscosity

COMPRESSOR

Suction and Discharge Connectors

Compressor connectors in all 1963 Chevrolet Air Conditioning Systems include both the suction and discharge connectors in a single unit. Both connectors on the Custom and Custom Deluxe Systems have a gauge fitting equipped with a valve type core which eliminates the necessity of hand shutoff valves as described in the 1961 Passenger Car Shop Manual. The 1964 All-Weather System has a gauge fitting in the high pressure (compressor inlet) side of the connector only. The connectors include a muffler to reduce pulsations and noise in the system.

INSTALLING THE GAUGE SET TO CHECK SYSTEM OPERATION

Custom and Custom Deluxe Systems

1. Install the gauge adapters (J-5420 or J-9459) onto the high and low pressure hoses of the gauge set.
2. With the engine stopped, remove the caps from the cored valve gauge connectors on the compressor fittings block.
3. Connect the gauge lines with adapters to the threaded connectors on the compressor fittings block.

All Weather System

Installation of the gauge set onto the All-Weather system is accomplished in the same manner as outlined above except that system performance checks must be performed with the low pressure hose line and adapter attached to the fitting on the suction throttling valve. This fitting extends out from beneath the fender. All-Weather charging procedures should be performed with the high pressure gauge line connected to the high pressure gauge fitting of the compressor connector and the low pressure gauge line attached to the STV fitting.

CAUTION: When removing gauge lines from the compressor fittings block be sure to remove the adapters from the fittings rather than the gauge lines from the adapters.

EVACUATING AND CHARGING THE SYSTEM

Procedures outlined in the 1961 Passenger Car Shop Manual for evacuating and charging the system may be used for the 1964 systems except that references to the compressor hand shutoff valves should be disregarded. The adapters mentioned above must be used between the gauge lines and compressor fittings.

CHECKING AND ADDING OIL

Compressors are originally full charged with 10 oz. of Special Frigidaire 525 viscosity refrigeration oil. Design and configuration of the six cylinder compressor require a radical departure from the oil checking procedure used on the five cylinder compressor in past years.

In the six cylinder compressor it is not recommended that the oil be checked as a matter of course. Generally, compressor oil level should be checked only where there is evidence of a major loss of system oil such as might be caused by:

- A broken refrigerant hose.
- A severe hose fitting leak.
- A very badly leaking compressor seal.
- Collision damage to the system components.

To check the compressor oil charge, it is necessary to remove the compressor from the vehicle, drain and measure the oil. Construction of a funnel with a threaded connection to fit the oil fitting on the compressor will greatly simplify installation of compressor oil.

COMPONENT PARTS SERVICE OPERATIONS

Checking Compressor Oil Charge

1. Run the system for 10 minutes at 1000-1500 engine rpm with controls set for maximum cooling and high blower speed.
2. Turn off engine, purge the system, remove compressor from vehicle, place it in a horizontal position with the drain plug downward and drain the oil into a clean container, measure and discard the oil.
3. a. If the quantity drained was 4 fluid oz. or more, add the same amount of new refrigeration oil.
   b. If the quantity drained was less than 4 fluid oz., add 6 fluid oz. of new refrigeration oil.
   c. If a new service compressor is being installed, drain all oil from it and replace only the amount specified in Steps 3a and 3b above.
   d. If a field repaired compressor is being installed, add an additional 1 fluid oz. to the compressor.
4. In the event that it is not possible to idle the compressor as outlined in Step 1 to effect the oil return to it, proceed as follows:
   a. Remove the compressor, drain, measure and discard the oil.
   b. If the amount drained is more than 1½ fluid oz. and the system shows no signs of a major leak, add the same amount to the replacement compressor.
   c. If the amount drained is less than 1½ fluid oz. and the system appears to have lost an excessive amount of oil, add 6 fluid oz. of clean refrigeration oil to replacement compressor (after first draining its oil charge), 7 fluid oz. to a repaired compressor.

If the oil contains chips or other foreign material, replace the receiver-dehydrator and flush or replace all component parts as necessary. Add the full 11 fluid oz. of new refrigeration oil to the replacement compressor.

5. Add additional oil in the following amounts for any system components being replaced.

Evaporator	3 fluid oz.
Condenser	1 fluid oz.
Receiver-dehydrator	1 fluid oz.

NOTE: When adding oil to the compressor, it will be necessary to tilt the rear end of the compressor up so that the oil will not run out of the suction and discharge ports. Do not set the compressor on the shaft end.

CONDENSER AND/OR RECEIVER-DEHYDRATOR

CONDENSER (All Systems)

Replacement

1. Remove the hood lock catch support and catch and both horns.
2. With the system purged of refrigerant, disconnect the inlet hose clamp connection at "D," Fig. 8; the receiver-dehydrator "O" ring outlet connection at "A" and the four condenser to radiator support attaching screws.
3. Remove the condenser and receiver-dehydrator assembly from the vehicle.

NOTE: If it is to be reused, cap or tape the receiver-dehydrator inlet and outlet connections at once.

4. Remove the receiver-dehydrator from the condenser by disconnecting the inlet "O" ring connection at "B" and removing the two receiver to condenser attaching screws "C."

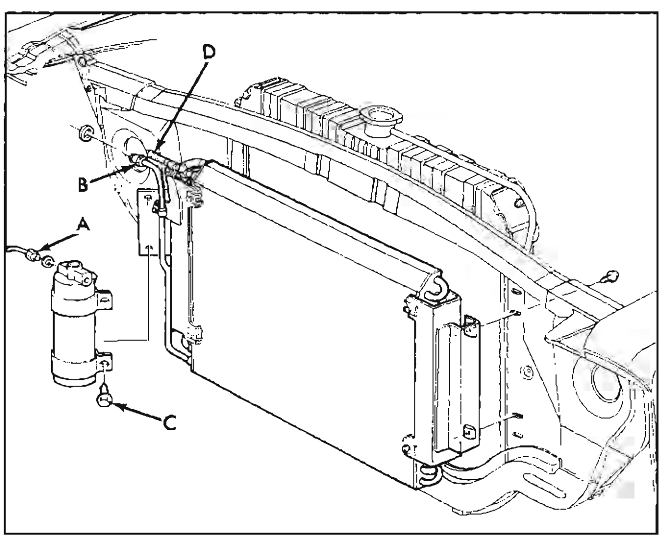


Fig. 8—Condenser

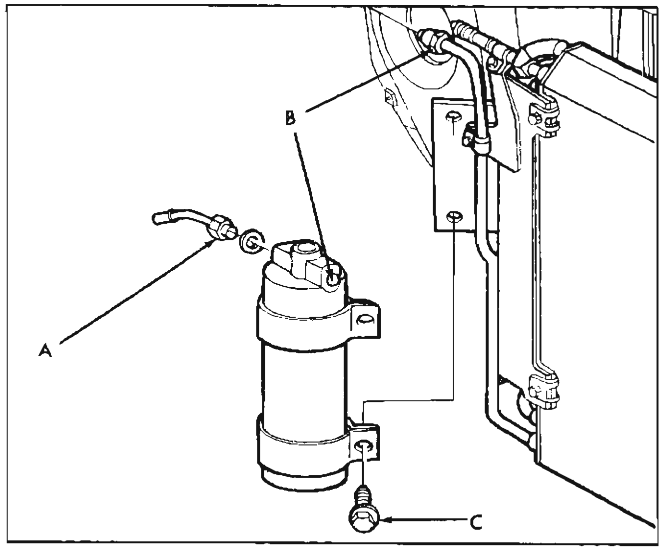


Fig. 9—Receiver-Dehydrator

5. Install receiver-dehydrator on new condenser, position the assembly and install the four radiator support to condenser attaching screws and replace all line connections.
6. Evacuate, charge and check the system.

Receiver-Dehydrator (All Systems)

The receiver-dehydrator may be removed by itself without the necessity of removing grille, grille components or condenser from the vehicle.

Replacement

1. Remove the receiver inlet and outlet connections ("A" and "B," Fig. 9) and the two receiver to condenser attaching screws "C."
2. Carefully remove the receiver-dehydrator from the vehicle.
3. Replace the new receiver-dehydrator assembly in the vehicle and install all attaching screws and refrigerant lines.

EVAPORATOR

Deluxe All-Weather System (Fig. 10 and Fig. 11)

Removal

1. Purge the system of refrigerant, then remove the right fender skirt and the hood hinge. Do not remove the fender.
2. Disconnect the high pressure line (between the condenser and the thermostatic expansion valve) at the condenser, and the suction throttling valve to compressor line at the suction throttling valve. Cap and seal all open lines.
3. Remove the three screws attaching the duct assembly to the evaporator housing and the blower assembly.

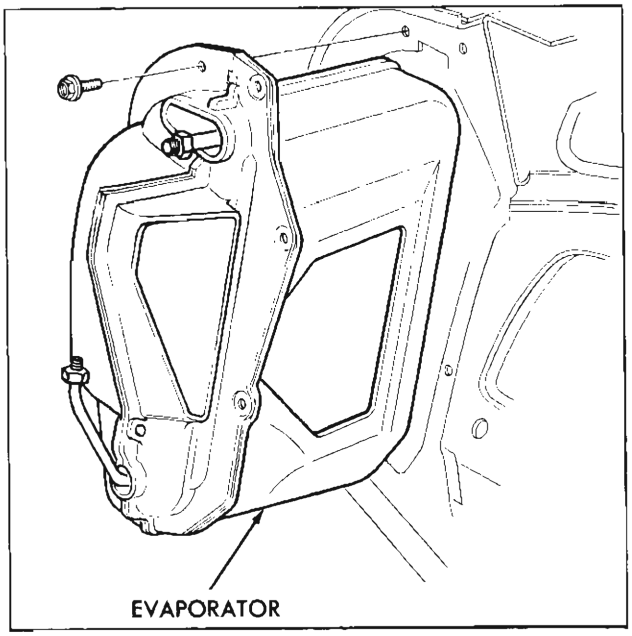


Fig. 10—Evaporator Removal—All Weather System

4. Remove the nine bolts attaching the evaporator assembly to the cowl and carefully pull the assembly from the vehicle. The duct assembly will be removed at this time also.

Core Replacement

1. With the evaporator assembly removed from the vehicle, remove the expansion valve and its bulb.
2. Remove the four nuts and bolts holding the two halves of the evaporator housing together and separate the halves.
3. The evaporator core may now be removed.
4. Leak test the new core and connections, before installing the core in the housing, by installing the expansion valve and all refrigerant lines. Connect a Freon-12 cylinder to the low pressure compressor gauge fitting and charge the system to cylinder pressure, then leak test.
5. After satisfactorily testing the core, install it into the housing and reassemble the two sides of the housing.

Installation

1. Remove the right trim pad and the screws attach-

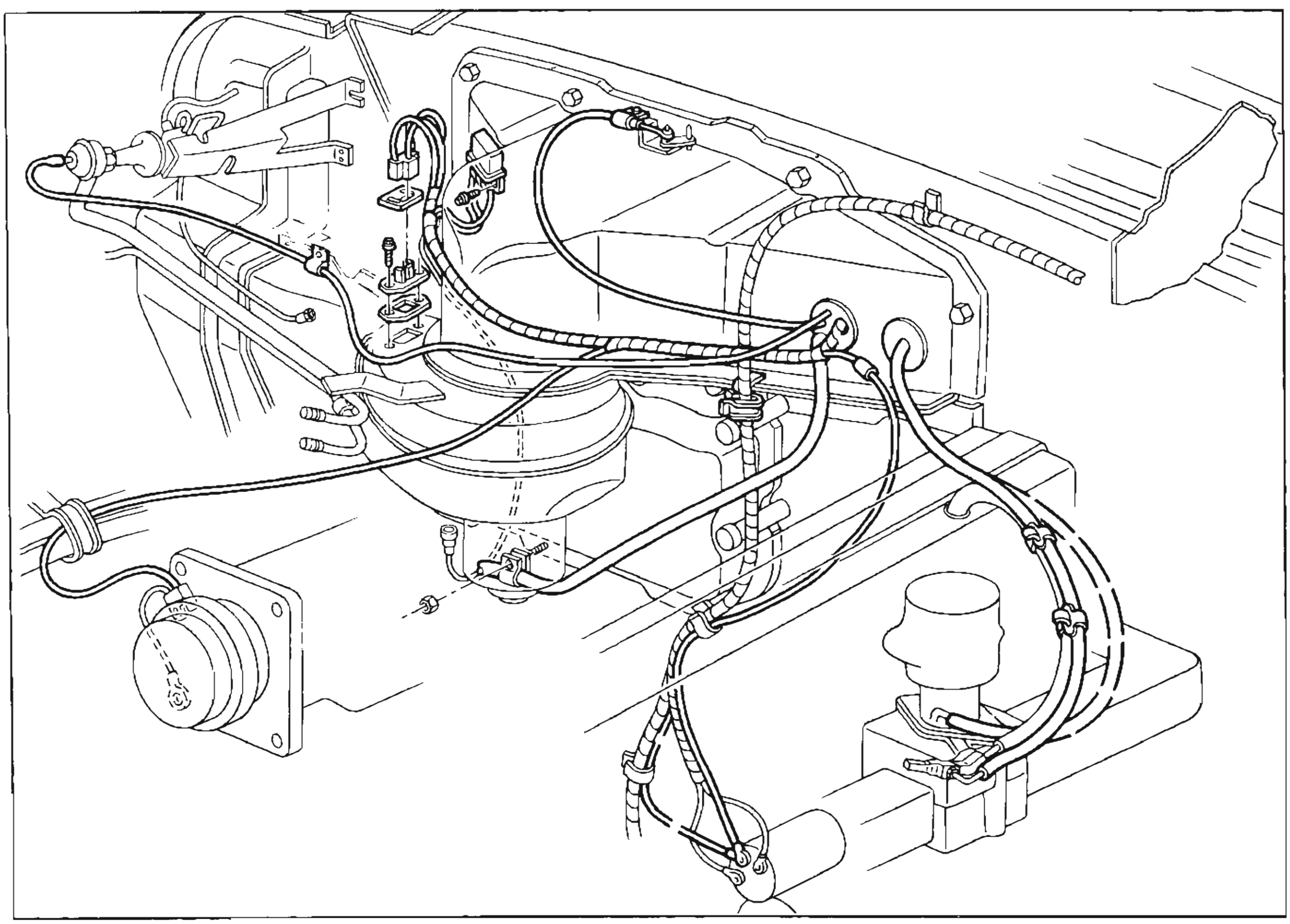


Fig. 11—Wiring and Vacuum Lines—All Weather System

ing the air conditioning duct to the kick panel. This should allow the duct to be pulled slightly loose from the kick panel. If not it may be necessary to loosen the entire duct to obtain the necessary clearance.

2. Install the evaporator in the cowl being sure that the duct assembly is in place between the evaporator housing and the blower assembly.
3. Replace all bolts and screws.
4. Move the interior air conditioning duct until sure that the duct gasket is properly positioned over the evaporator housing flange. Proper gasket fit at this point is of great importance.
5. Replace all refrigerant lines.
6. Evacuate and charge the system.
7. Replace the fender skirt and hood hinge.

THERMOSTATIC EXPANSION VALVE

Replacement (Deluxe All-Weather System)

1. Purge the system and remove the right fender skirt.
2. Remove the expansion valve power element bulb from the low pressure line and the equalizing line from the suction throttling valve.
3. Remove the low and high pressure connectors from the valve, in that order. Remove the screw and bracket attaching the expansion valve to the evaporator case and remove the valve.
4. Before replacing the valve, check to be certain the inlet screen is not clogged. If the screen is plugged, replace it and check valve operation. If screen is clear or if valve still malfunctions after screen replacement proceed with the valve replacement.
5. Install the new valve by connecting the lines. Clamp the power element bulb of the new valve to the top of the low pressure line and the equalizing line to the suction throttling valve.

   NOTE: Be sure to replace the insulation around the power element bulb and that the power element makes good physical contact with the suction line.

6. Evacuate and charge the system.
7. Check the system for proper operation.

EVAPORATOR

Custom Deluxe System (Fig. 12)

Removal

1. Purge the refrigerant from the system.
2. Remove the glove box.
3. Remove the evaporator drain hoses.
4. Remove the bowden cable and electrical connectors from the duct assembly.
5. Remove the compressor switch from the duct assembly.
6. Remove the screws attaching the duct assembly to the heater assembly and remove the duct.
7. Pull the radio antenna lead from the radio receiver.
8. Remove the screw attaching the bracket at the left front corner of the evaporator case to the instrument panel flange.

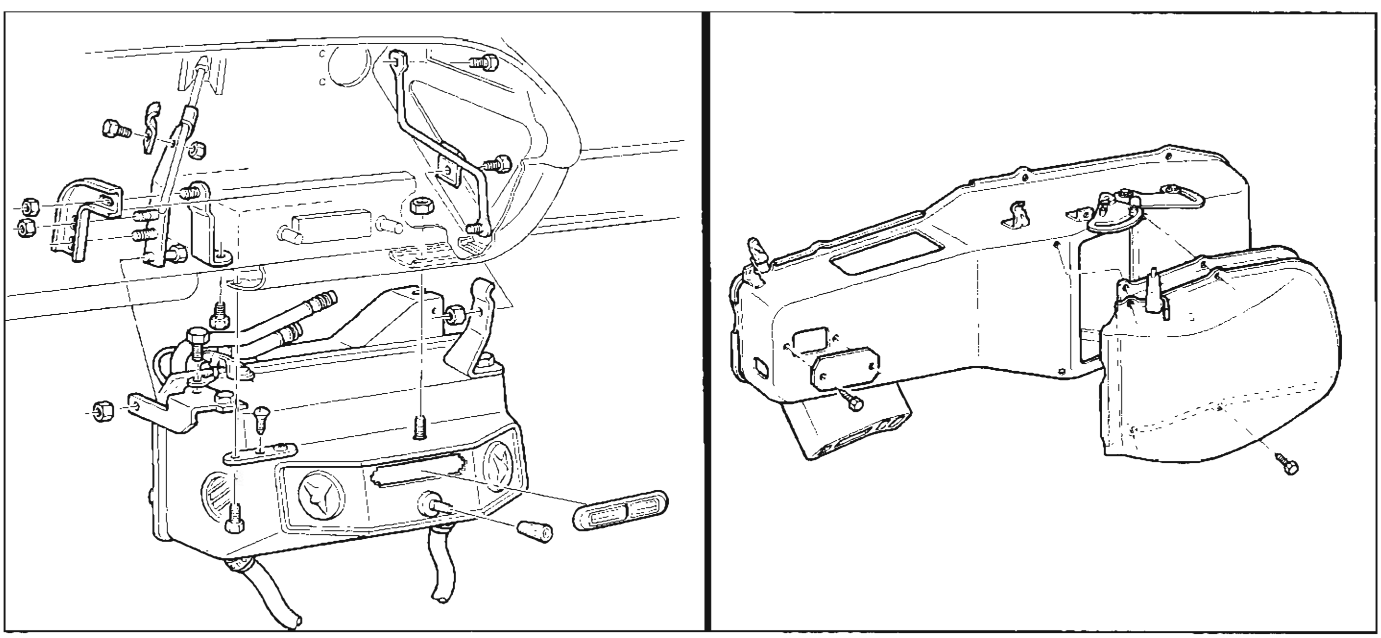


Fig. 12—Evaporator Removal—Custom Deluxe

9. Remove the nut and bolt attaching the bracket at the left rear corner of the evaporator case to the left hand hanging brace and bracket.
10. Remove the nut and bolt attaching the right hand evaporator case bracket to the instrument panel support rod.
11. Remove the nut attaching the evaporator case center stud to the instrument panel flange.
12. Pull the evaporator case down and away from the firewall enough to allow the removal of the refrigerant line hose clamp connections.

    NOTE: Pull the "slack" in the refrigerant hoses through the firewall into the passenger compartment to facilitate this operation.
13. Remove the evaporator unit from the vehicle.
14. The evaporator case duct assembly may now be removed.

Core and/or Expansion Valve Replacement

A defective unit must be replaced since repairs should never be made on the evaporator core. Before replacing the core, however, check to be sure that any leaks present are not located at the hose connections or expansion valve connections. The following procedure assumes that the evaporator unit has been removed from the vehicle as outlined above.

1. Using a small screwdriver, loosen the lock screws and remove the control knob from the front of the evaporator unit. Then use a suitable spanner wrench to remove the bezel beneath the control knob.
2. Turn the outer diffuser outlets so that the faceplate screws are accessible and then remove these screws. Then remove the face plate and, reaching through this opening, carefully remove the plug attaching the thermostatic switch capillary tube to the evaporator core.
3. Turning the unit over, remove the screws attaching the back cover and gasket to the case and remove the cover and gasket.
4. From the top of the case, remove the screws attaching the evaporator core brackets to the case.
5. Carefully draw the core and expansion valve assembly out of the case.
6. Remove the expansion valve power element from the low pressure line.
7. Disconnecting the high pressure and low pressure lines from the valve, remove the valve from the core.
8. At this point either the expansion valve, evaporator core or both may be replaced.
    a. If replacing the expansion valve, use new "O" rings and make the connections carefully to eliminate possible refrigerant leaks. Position the power element bulb so that it lies flush with the low pressure line and has the insulating material properly in place.
    b. If the evaporator core is to be replaced, remove the spacer bracket, nut and screw from the inlet and outlet pipes of the evaporator core and place them in a like position on the replacement core.
9. Replace the core and valve assembly in the evaporator case and install the case-to-core bracket attaching screws.
10. With the gasket in place, install the back cover of the evaporator case and its attaching screws and the seal around the evaporator inlet and outlet tubes.
11. Reach through the face plate opening and, using the plastic plug, attach the thermostatic switch capillary tube to the evaporator core.

Installation

1. Install the evaporator case duct.
2. Place the evaporator case into the vehicle and install the refrigerant line and hose clamp connections.
3. Pull the "slack" in the refrigerant hoses through firewall into the engine compartment.
4. After inserting the evaporator case center stud through its hole in the instrument panel flange, install the attaching nut.
5. Install the nut and bolt attaching the right hand evaporator case bracket to the instrument panel support rod, the nut and bolt attaching the bracket at the left rear corner of the evaporator case to the left hand hanging brace and bracket and the

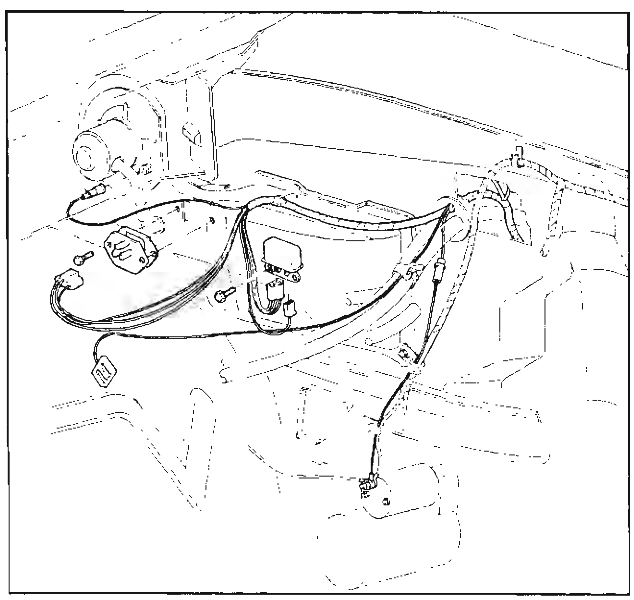


Fig. 13—Underhood Wiring—Custom Deluxe

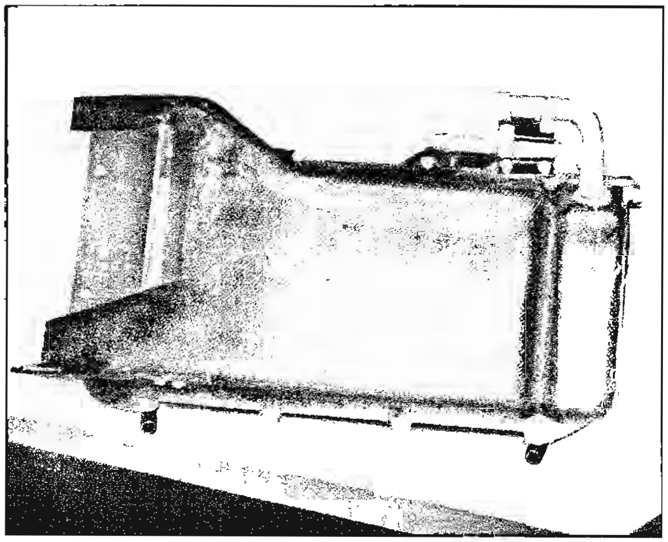


Fig. 14—Evaporator Case—Custom Deluxe

screw attaching the bracket to the left hand front corner of the evaporator case to the instrument panel flange.

6. Route the radio antenna lead between the top of the evaporator case and the refrigerant hoses and plug it into the radio receiver.
7. Install the duct assembly to the heater assembly.
8. Install the compressor switch onto the duct assembly.
9. Replace the bowden cable onto the selector door lever and the electrical connectors onto the compressor switch.
10. Replace the evaporator drain hoses.
11. Replace the glove box.
12. Evacuate and charge the system and check system operation.

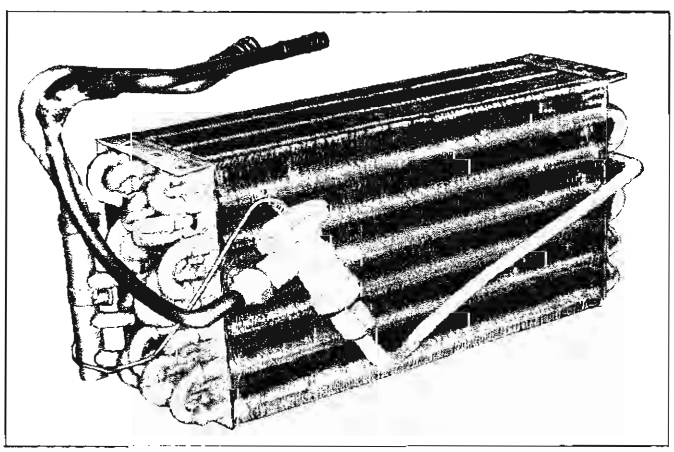


Fig. 15—Evaporator Case Removed

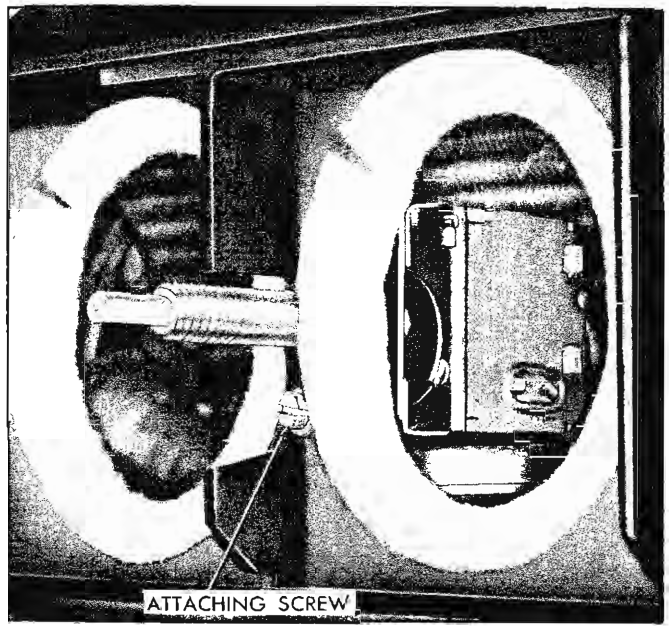


Fig. 16—Thermostatic Switch Removal

THERMOSTATIC SWITCH

Replacement (see fig. 16)

1. Remove both control knob and control stem bezel from the evaporator assembly.
2. Remove the face plate attaching screws and lift off the face plate.
3. Remove the thermostatic switch attaching screw.
4. Disengage the plastic plug attaching the thermostatic switch capillary tubing to the face of the evaporator core.
5. Draw the switch out of the case through the face plate opening, disconnecting the electrical connectors.
6. Reinstall the new switch by reversing the removal procedure.

EVAPORATOR

(Custom System)

Removal (Fig. 17)

1. Purge the refrigerant from the system.
2. Remove the glove box and then the duct-to-blower case attaching screw.
3. Remove the nuts and washers attaching the evaporator assembly stud to the lower instrument panel flange and reinforcement and the bolts attaching the right and left case brackets to the hanger and the panel brace.

4. Disconnect the drain hoses and carefully pull the evaporator unit toward the rear of the vehicle.
5. Remove the refrigerant hoses from the evaporator inlet and outlet connections.
6. Disconnect wiring connectors (see Figure 18) as necessary and remove the evaporator unit from the vehicle. Remove the duct-to-case screw.

Core and/or Expansion Valve Replacement

Since repairs should never be made on the evaporator core, a defective unit must be replaced. Before replacing the core, however, check to be sure that any leaks present are not located at the hose connections or explansion valve connections. The following procedure assumes that the evaporator unit has been removed from the vehicle as outlined above.

1. Using a small screwdriver, loosen the lock screws and remove the two control knobs from the front of the evaporator unit. Then use a suitable spanner wrench to remove the two bezels beneath the control knobs.
2. Remove the screws attaching the face plate to the evaporator case. Then remove the face plate and, reaching through this opening, carefully remove the plugs attaching the thermostatic switch capillary tube to the evaporator core.
3. Turning the unit over, remove the screws (fig. 19) attaching the back cover and gasket to the case and remove the cover and gasket.

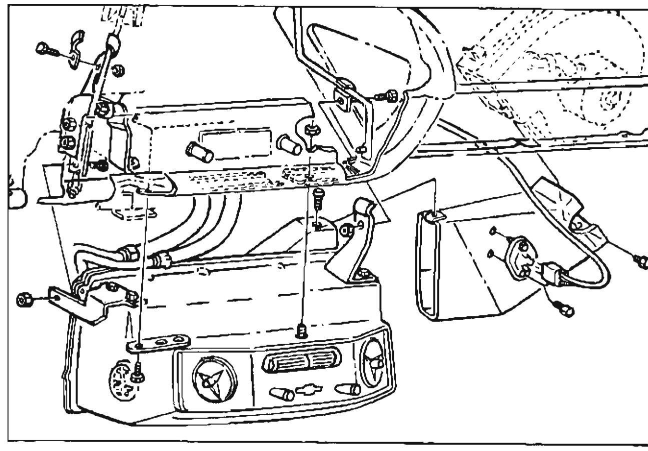


Fig. 17—Evaporator Removal—Custom System

4. From the top of the case, remove the screws attaching the evaporator core brackets to the case.
5. Carefully draw the core and expansion valve assembly out of the case (see fig. 20).
6. Remove the expansion valve power element from the low pressure line.
7. Disconnecting the high pressure and low pressure lines from the valve, remove the valve from the core.
8. At this point either the expansion valve, evaporator core or both may be replaced.

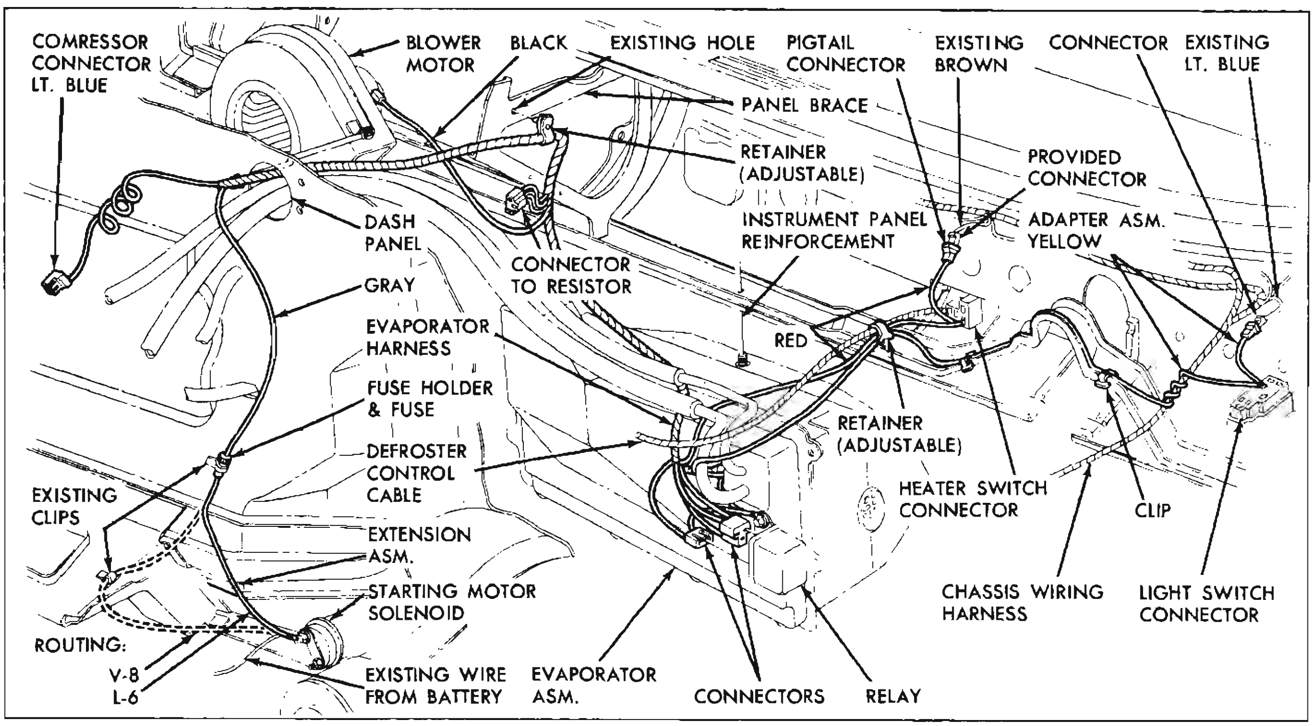


Fig. 18—Underdash Wiring—Custom System

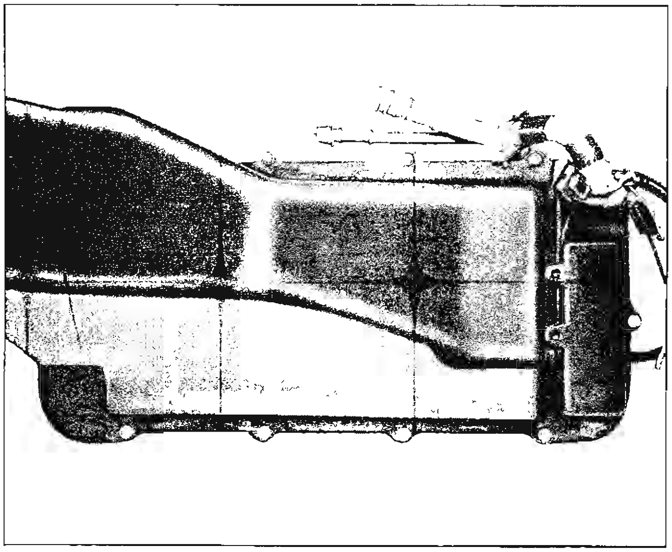


Fig. 19—Evaporator Case—Custom System

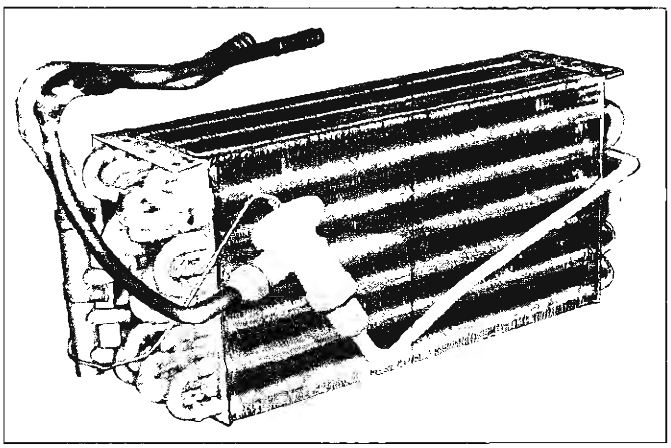


Fig. 20—Evaporator Core Removed

Always use new "O" rings at the expansion valve connections and make the connections carefully to eliminate possible refrigerant leaks. Position the power element bulb so that it lies flush with the low pressure line and has the insulating material properly in place.

9. Replace the core and valve assembly in the evaporator case and loosely install the case-to-core bracket attaching screws from the top of the case.
10. With the gasket in place, install the back cover of the evaporator case and its attaching screws and the seal around the evaporator inlet and outlet tubes.
11. Reach through the face plate opening and, using the plastic plugs, attach the thermostatic switch capillary tube to the evaporator core outlet pipe.

Installation

Within the Car

1. Install duct and attaching screw on evaporator case.
2. Attach system wiring as necessary to the evaporator case.
3. Replace inlet and outlet hoses and hose clamp connections.
4. Fit the case flange into the blower duct.
5. Insert the evaporator studs through the drilled hole in the instrument panel flange and reinforcement and, install the nuts and washers.
6. Replace the screws attaching the two evaporator case brackets to the hanger and panel brace and replace the screw attaching the duct to the blower flange.
7. Replace the drain hoses.

Under the Hood

8. Evacuate and charge the system.
9. Check system performance.

THERMOSTATIC SWITCH (Custom)

Replacement (see Fig. 21)

1. Remove both control knobs and control stem bezels from the evaporator assembly.

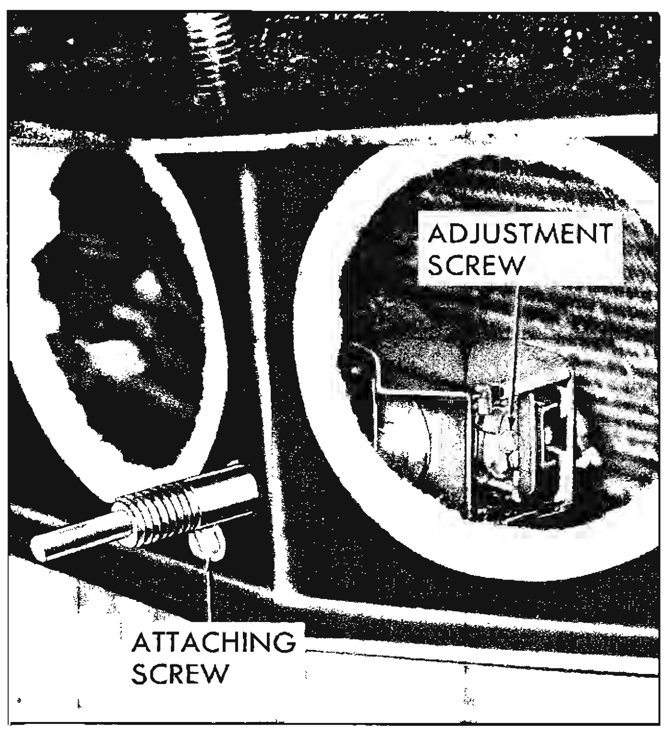


Fig. 21—Thermostatic Switch Removal

2. Remove the face plate attaching screws and lift off the face plate.
3. From the front of the evaporator case remove the two thermostatic switch attaching bolts and remove wiring connectors from the switch.
4. Disengage the plastic plugs attaching the thermostatic switch capillary tubing to the face of the evaporator core.
5. Draw the switch out of the case through the face plate opening.
6. Reinstall the new switch by reversing the removal procedure.

BLOWER MOTOR

Remove the blower motor from the Deluxe All-Weather and Custom Systems as outlined in the 1961 Passenger Car Shop Manual. The Custom Deluxe System makes use of the heater blower motor which is removed and serviced as outlined under "Heater."

COMPRESSOR

The same basic six cylinder reciprocating compressor is used in all 1964 systems. The compressor is completely field serviceable and is so constructed that the entire internal mechanism may be serviced as a unit or may be completely disassembled for replacement of component parts.

With the aid of trained personnel and the proper service tools, these service operations may be simply and easily performed, eliminating the necessity of replacing the entire compressor.

Two variations of the basic compressor are used. One, with a displacement of 12.6 cu. in. is used with the Deluxe All-Weather and Custom Deluxe Systems. The second model, having an effective displacement of 10.8 cu. in. is used with the Custom System. The difference in capacity is achieved by counterboring the face of the pistons used in the 12.6 cu. in. compressor thus reducing the capacity to 10.8 cu. in.

Removal

1. Purge the refrigerant from the system.
2. Remove connector attaching bolt and connector. Seal connector outlets.
3. Disconnect electrical lead to clutch actuating coil.
4. Loosen brace and pivot bolts and detach belt.
5. Remove the nuts and bolts attaching the compressor brackets to the mounting bracket.
6. Before beginning any compressor disassembly, drain and measure oil in the compressor. Check for evidence of contamination to determine if remainder of system requires servicing.

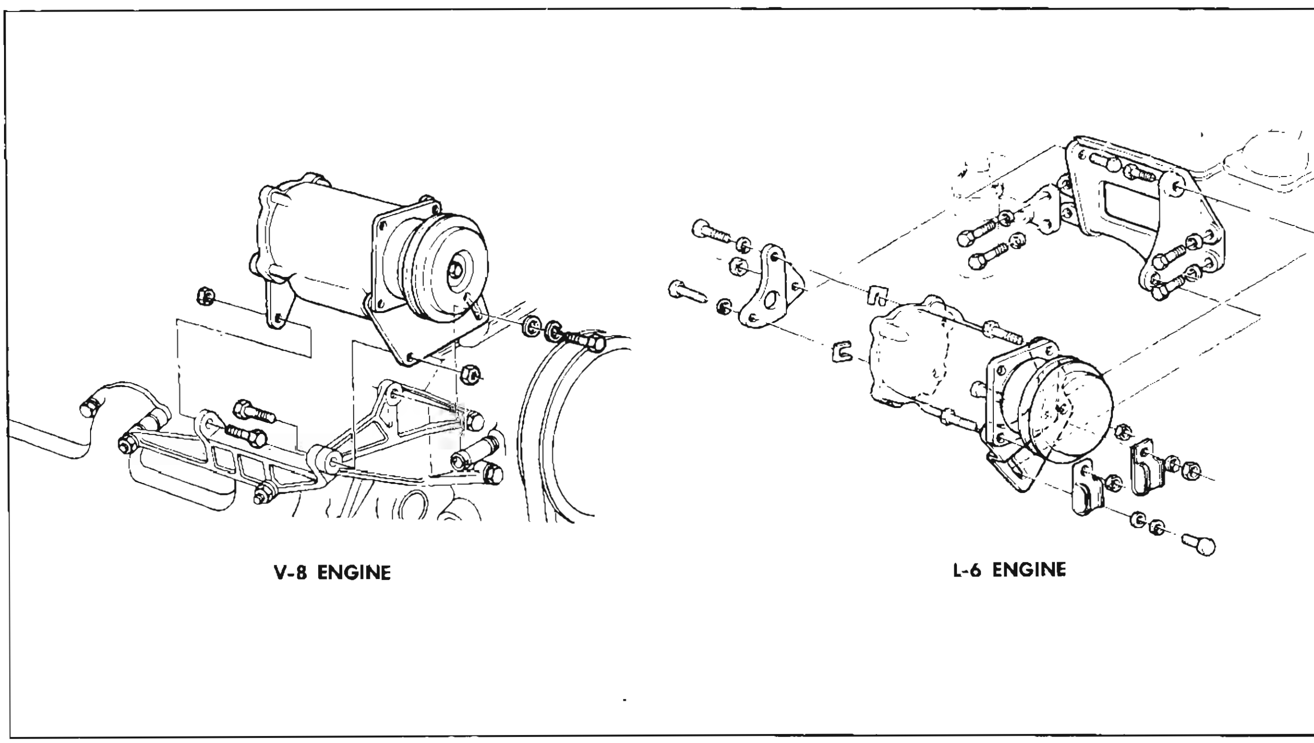


Fig. 22—Compressor Mounting

Installation

1. If oil previously drained from the compressor upon removal shows no evidence of contamination, replace a like amount of fresh refrigeration oil into the compressor before reinstallation. If it was necessary to service the entire system because of excessive contamination in the oil removed, install a full charge of fresh refrigeration oil in the compressor.
2. Position compressor on the mounting bracket and install all nuts, bolts and lockwashers.
3. Install the connector assembly to the compressor rear head, using new "O" rings. Tighten to 17 to 23 ft. lbs. torque.
4. Connect the electrical lead to the coil and install and adjust compressor belt.
5. Evacuate and charge the system.
6. Leak test the system and check for proper operation.

MINOR SERVICE OPERATIONS

Compressor Belt Tension Adjustment

Adjust the compressor belt to give ½" to ¾" deflection under a fifteen lb. load measured midway between the compressor pulley and the crankshaft pulley.

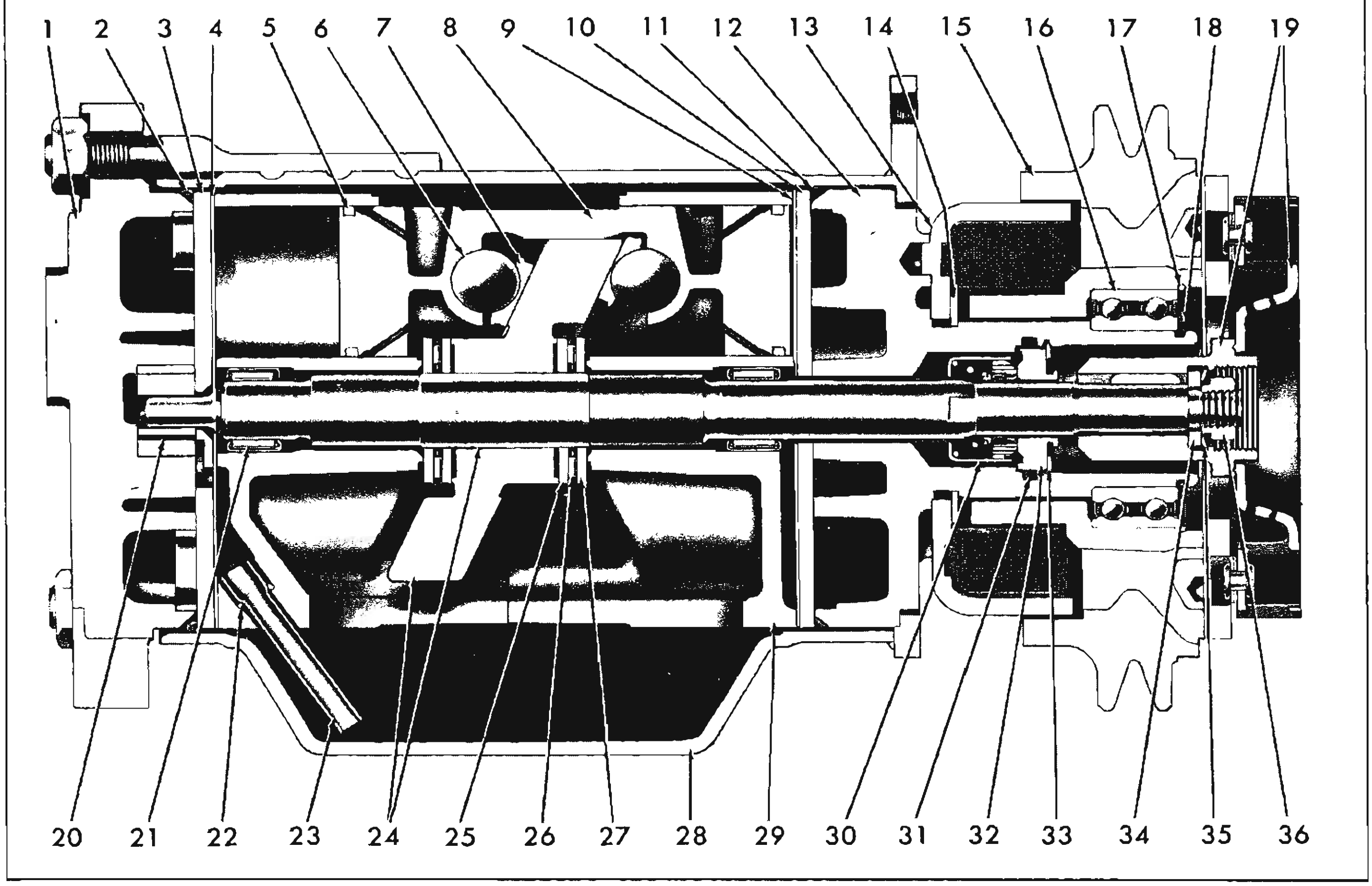


Fig. 23—Six Cylinder Compressor—Cross Section View

1. Rear Head
2. Rear Head to Shell "O" Ring
3. Rear Discharge Valve Plate
4. Rear Suction Reed Plate
5. Piston Ring
6. Piston Drive Ball
7. Ball Seat
8. Piston
9. Front Suction Reed Plate
10. Front Discharge Valve Plate
11. Front Head to Shell "O" Ring
12. Front Head
13. Coil and Housing Assembly
14. Coil Housing Retainer Ring
15. Pulley and Bearing Assembly
16. Pulley Bearing
17. Pulley Bearing Retainer Ring
18. Pulley and Bearing Retainer Ring
19. Clutch Hub and Drive Plate Assembly
20. Oil Pump Gears
21. Mainshaft Bearing (Rear)
22. Oil Inlet Tube "O" Ring
23. Oil Inlet Tube
24. Wobble Plate and Mainshaft Assembly
25. Thrust Race
26. Thrust Bearing
27. Thrust Race
28. Compressor Shell
29. Cylinder Assembly
30. Shaft Seal
31. Shaft Seal Seat "O" Ring
32. Shaft Seal Seat
33. Shaft Seal Seat Retainer Ring
34. Spacer
35. Clutch Hub Retainer Ring
36. Shaft Nut

Hub and Drive Plate, Pulley, and Coil Housing

Service operations may be performed on the hub and drive plate, pulley and bearing assembly and coil housing assembly without the necessity of purging the refrigerant from the system or removing the compressor from the vehicle. The shaft seal assembly may also be serviced without removing the compressor from the vehicle but the refrigerant must first be purged from the system.

Pictures used in describing these operations show the compressor removed from the vehicle to more clearly illustrate the various operations.

Hub and Drive Plate

Removal

1. If disassembly is being performed on a bench, mount support bracket J-9396 in a vice and attach the compressor to the bracket.

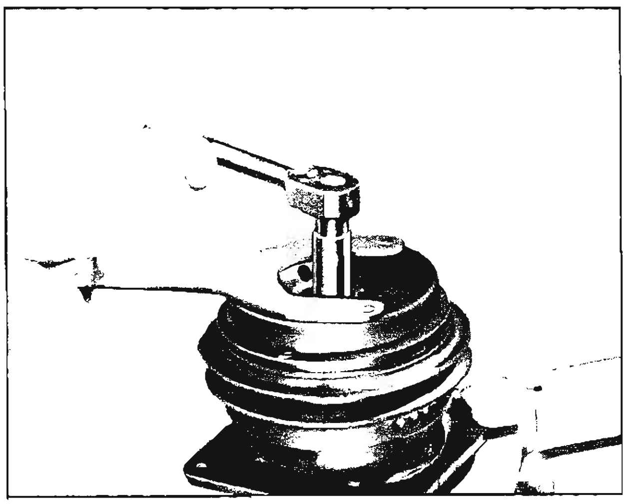


Fig. 24—Removing Shaft Locknut

2. Using drive plate holding Tool J-9403 and socket J-9399, remove the locknut from the shaft (fig. 24). Discard locknut.
3. Tool J-9401 may now be used to remove the hub and drive plate assembly (fig. 25).
4. Use snap ring pliers J-5403 to remove the retainer ring. Then remove the hub spacer.

NOTE: Caiefully snug tool into place with wrench to insure engagement with threads.

Inspection

If the frictional surface shows signs of warpage due to excessive heat, the hub and drive plate should be replaced.

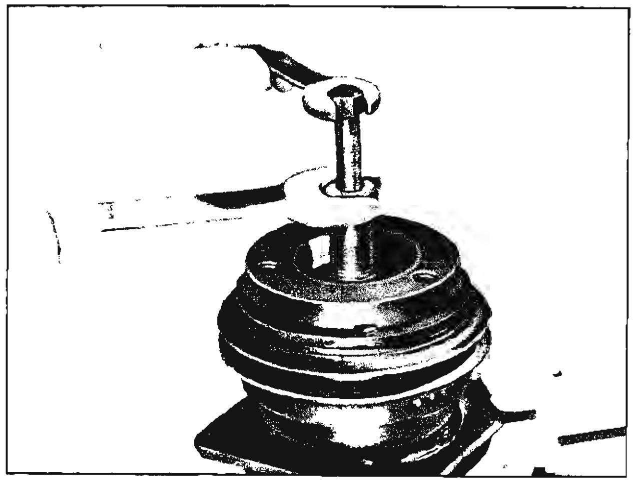


Fig. 25—Removing Hub and Drive Plate Assembly

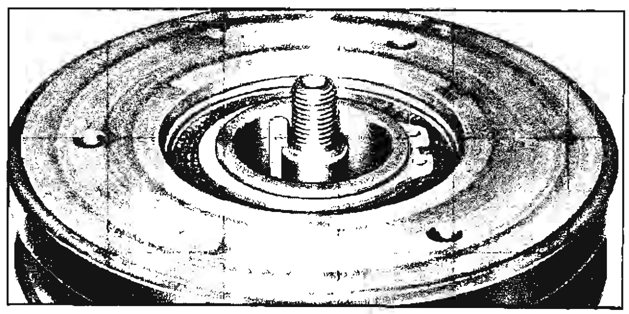


Fig. 26—Drive Plate Key Installed in Keyway

Installation

NOTE: When hub and drive plate assembly is ready for installation, clean its frictional face with a suitable cleaner.

1. Insert the square hub and drive plate key into the keyway in the drive shaft allowing it to project approximately $\frac{3}{16}''$ out of the end of the keyway (fig. 26).
2. Line up the key in the shaft with the keyway in the hub.
3. Using Tool J-9480 and washer J-9480-2 (fig. 27), install the hub and drive plate assembly. Pull the assembly onto the shaft until there is approximately $\frac{3}{32}''$ space between the frictional surfaces of the drive plate and pulley. (A ZERO thrust race is approximately $\frac{3}{32}''$ in thickness and may be used to roughly gauge this operation.)

NOTE: Use Tool J-9403 to hold hub and drive plate if necessary.

4. Install the hub spacer washer and, using snap ring pliers J-5403, install the retainer ring, convex side of ring facing washer.

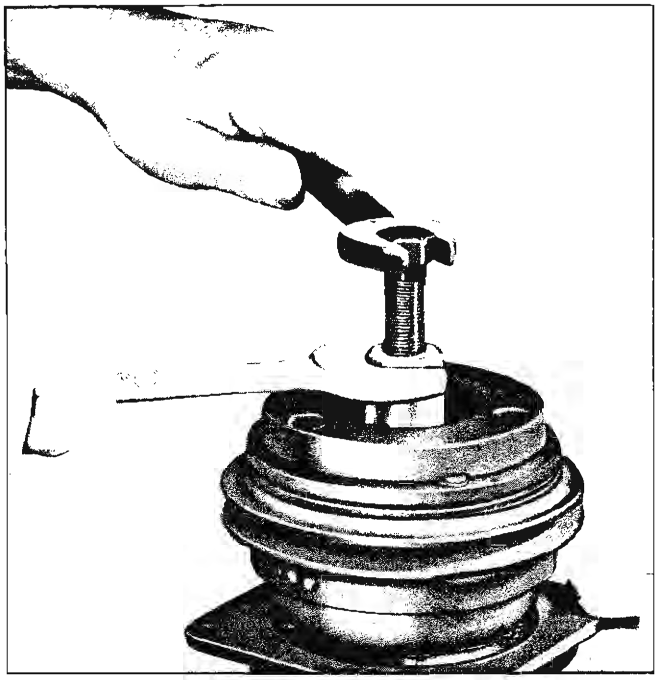


Fig. 27—Installing Hub and Drive Plate Assembly

5. Use J-9399 and J-9403 to install a new locknut. Tighten the nut to 14-16 ft. lbs. torque. Air gap between the frictional faces should now be .022" to .057".

   NOTE: Notch on the locknut must face towards retainer ring.

6. The pulley should now rotate freely.

   CAUTION: Never pound or drive the hub and drive plate into position. Always use the proper tools when removing or replacing clutch parts. Failure to do so may result in serious internal compressor damage.

7. Operate the refrigeration system and rapidly cycle the clutch (by turning the air conditioning off and on at least 20 times at approximately one second intervals) to seat the mating parts of the clutch.

Pulley and Bearing Assembly

Removal

1. Remove the hub and drive plate assembly.
2. Using snap ring pliers J-6435, remove the pulley and bearing retainer ring (fig. 28).
3. Remove shaft key.
4. Place puller pilot J-9395 over the compressor shaft and pull off the pulley assembly using J-8433 pulley puller (fig. 29).

Inspection

Check the appearance of the pulley and bearing assembly. If the frictional surface of the pulley shows signs of warpage due to excessive heat, the pulley should be replaced. If the pulley bearing shows signs of excessive looseness, noise or grease leakage, it should be replaced. The frictional surfaces of the bearing to be used should be cleaned with a suitable solvent before reinstallation.

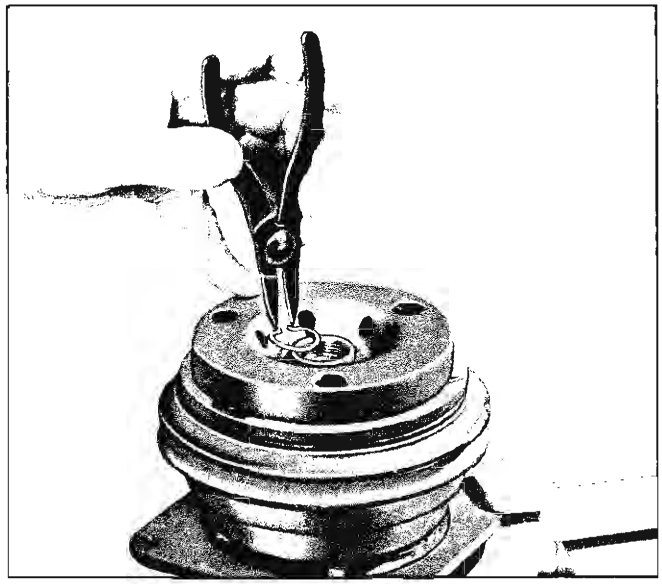


Fig. 28—Removing Pulley and Bearing Assembly Retainer Ring

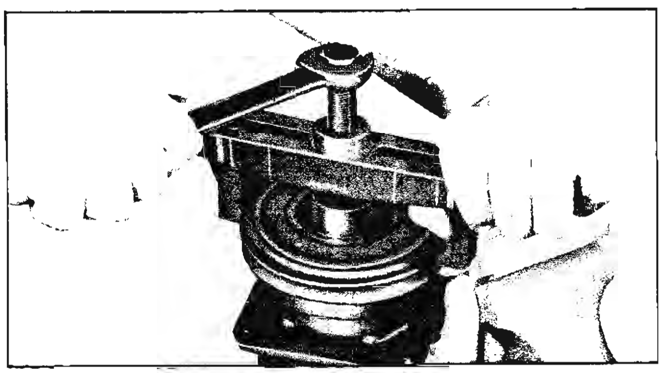


Fig. 29—Removing Pulley

Bearing Replacement

1. With the pulley and bearing assembly removed from the compressor, use a sharp pointed instrument to remove the wire retainer ring.

2. From the rear of the pulley, press or drive bearing out of pulley using Tool J-9398 and handle J-8092.

3. Wipe excess grease from the new bearing.

4. From the front of the pulley and using Tool J-9481 with handle J-8092, press or drive the new bearing into the pulley.

Installation

1. Using Tool J-9481, press or drive the pulley and bearing assembly onto the compressor neck. The pulley should now rotate freely.
2. Install retainer ring using snap ring pliers J-6435.
3. Replace the hub and drive plate assembly. Use proper tools. DO NOT drive or pound on the hub assembly.
4. Install the wire bearing retainer ring.

Fig. 30—Removing Coil Housing Retainer Ring

Coil Housing Assembly

Removal

1. Remove the hub and drive plate assembly, the pulley and bearing assembly, and electrical connector.
2. Scribe the location of the coil housing to the compressor body. This operation is to insure that the electrical terminals will be reassembled in the same position.
3. Using snap ring pliers J-6435, remove the coil housing retainer ring (fig. 30).
4. Remove the coil housing assembly.

Inspection

Check coil for loose connectors or cracked insulation. Amperage should not be more than 3.2 amps at 12 volts D.C. at room temperature.

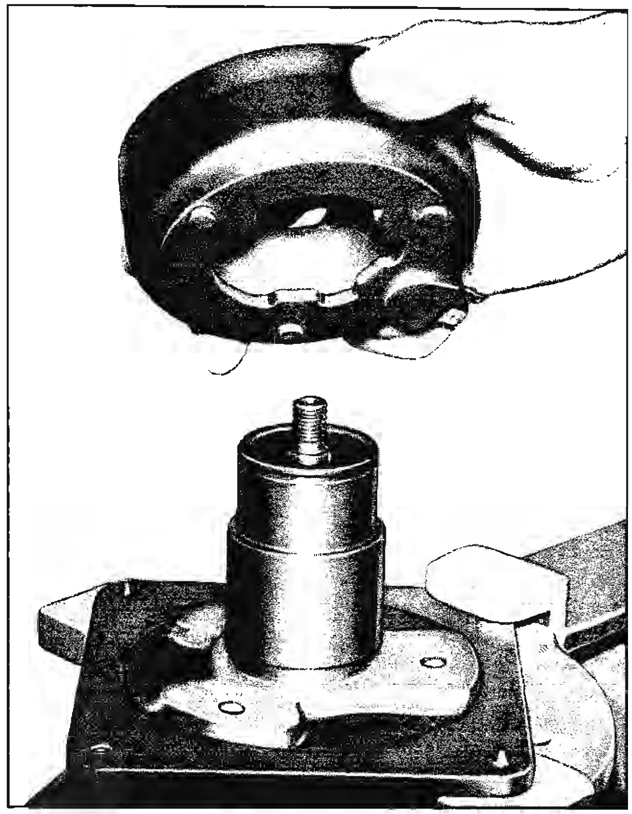


Fig. 31—Installing Coil Housing

Installation

1. Rotate the coil housing to the correct position as indicated by the scribe marks and the location of the electrical terminals and fit into place (fig. 31).
2. Use snap ring pliers J-6435 to install retainer ring.

   NOTE: Install flat surface of the retainer ring facing the coil housing.

3. Replace the pulley and bearing assembly and the hub and drive plate assembly. DO NOT drive or pound on the hub assembly.
4. If the compressor is installed in the vehicle, connect the electrical connections.

MAJOR SERVICE OPERATIONS

The following service procedures are considered major since the refrigeration system must be completely purged of refrigerant before proceeding and because major internal operating and sealing components of the compressor are being disassembled and serviced. A clean workbench, preferably covered with a sheet of clean paper, orderliness in the work area and a place for all parts being removed and replaced is of great importance as is the use of the proper service tools. Any attempt to use make-shift or inadequate equipment may result in damage and/or improper compressor operation.

These procedures are based on the use of the proper service tools and the condition that an adequate stock of service parts is available. This service parts stock should include the following:

1. Major interior mechanism assembly—ready for installation in shell as is.
2. Service cylinder assembly—front and rear halves with main bearings in place and halves dowel pinned together.
3. Standard size piston drive balls.
4. Ball seats—total of 10 sizes, including the ZERO shoe.
5. Thrust races—total of 14 sizes, including the ZERO race.

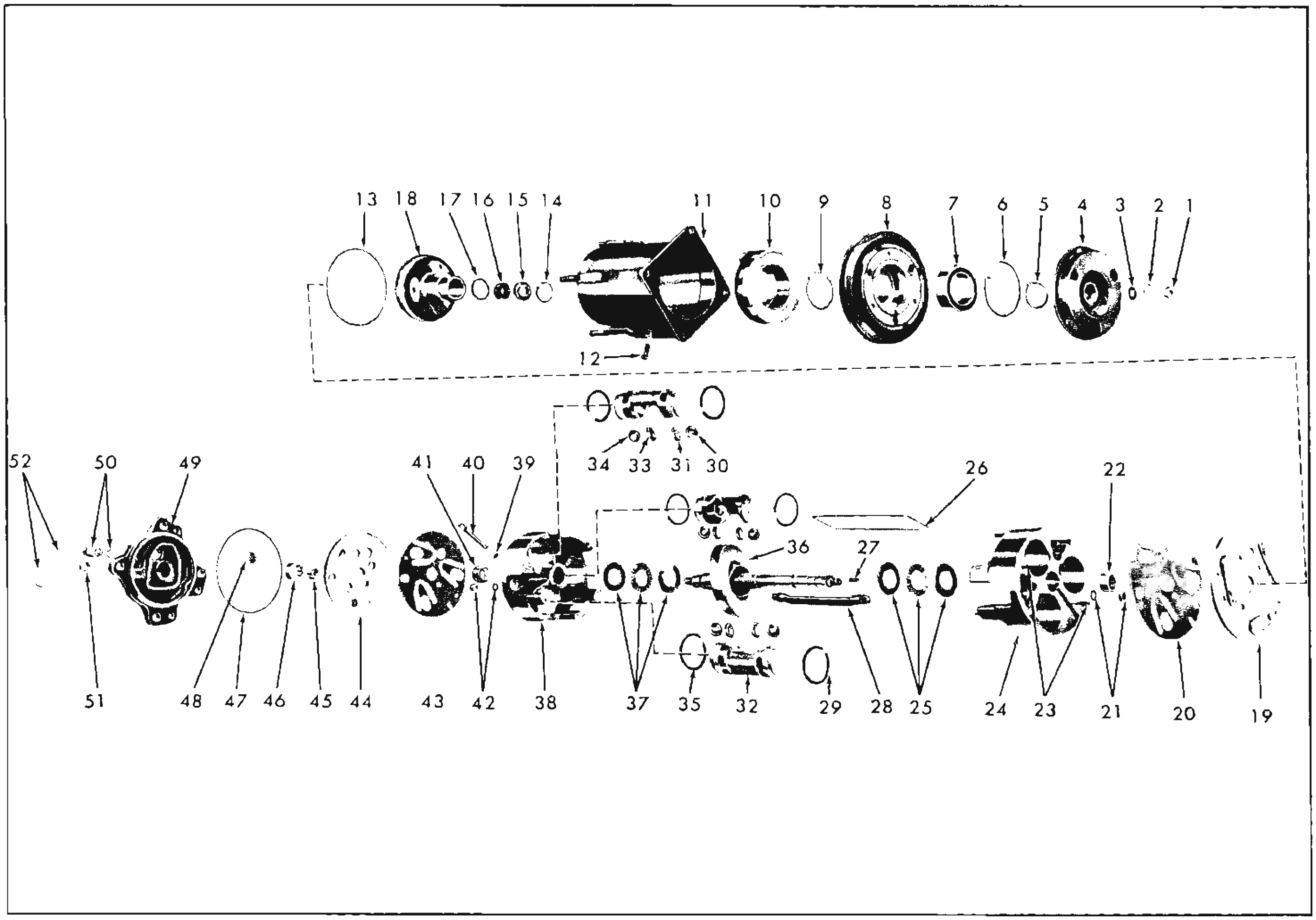


Fig. 32—Six Cylinder Compressor—Exploded View

1. Shaft Nut
2. Clutch Hub Retainer Ring
3. Spacer
4. Clutch Hub and Drive Plate Assembly
5. Pulley and Bearing Retainer Ring
6. Pulley Bearing Retainer Ring
7. Pulley Bearing
8. Pulley
9. Coil Housing Retainer Ring
10. Coil Housing
11. Compressor Shell
12. Oil Drain Plug
13. Front Head-to-Shell "O" Ring
14. Shaft Seal Seat Retainer Ring
15. Shaft Seal Seat
16. Shaft Seal
17. Shaft Seal Seat "O" Ring
18. Compressor Front Head
19. Front Discharge Valve Plate
20. Front Suction Reed Valve
21. Discharge Crossover Tube Front "O" Ring and Spacer
22. Mainshaft Front Bearing
23. Head Locating Pins
24. Front Cylinder Half
25. Front Thrust Race and Bearing Pack
26. Suction Crossover Cover
27. Drive Key
28. Discharge Crossover Tube
29. Piston Ring
30. Piston Front Drive Ball
31. Piston Front Ball Seat
32. Piston
33. Piston Rear Ball Seat
34. Piston Rear Drive Ball
35. Piston Ring
36. Drive Shaft and Wobble Plate Assembly
37. Rear Thrust Race and Bearing Pack
38. Rear Cylinder Half
39. Oil Inlet Tube "O" Ring
40. Oil Inlet Tube
41. Mainshaft Rear Bearing
42. Discharge Crossover Tube Rear "O" Ring and Spacer
43. Rear Suction Reed Plate
44. Rear Discharge Valve Plate
45. Oil Pump Drive Gear
46. Oil Pump Driven Gear
47. Rear Head-to-Shell "O" Ring
48. Strainer Screen
49. Compressor Rear Head
50. High Pressure Relieve Valve and "O" Ring
51. Rear Head-to-Shell Retaining Nuts
52. Compressor-to-Connector "O" Rings

6. Pistons.
7. Main shaft bearings.
8. Thrust bearings.
9. Compressor shaft, wobble plate and Woodruff key assembly.
10. Suction reed valves.
11. Discharge valve plate—front and rear.
12. Seal kit—service—contains all seals and "O" rings. To be used each time a compressor is rebuilt.
13. Shaft seal kit.
14. Nuts—head to shell, and shaft.
15. Retainer rings—all necessary sizes.
16. Cylinder locator (dowel) pins.
17. Valve and head locator (dowel) pins.
18. Service discharge crossover tube kit.

All parts required for servicing are protected by a preservation process and packaged in a manner which will eliminate the necessity of cleaning, washing or flushing of the parts. The parts can be used in the mechanism assembly just as they are removed from the service package.

Piston ball seats and shaft thrust races will be identified on the parts themselves to denote their size and dimension.

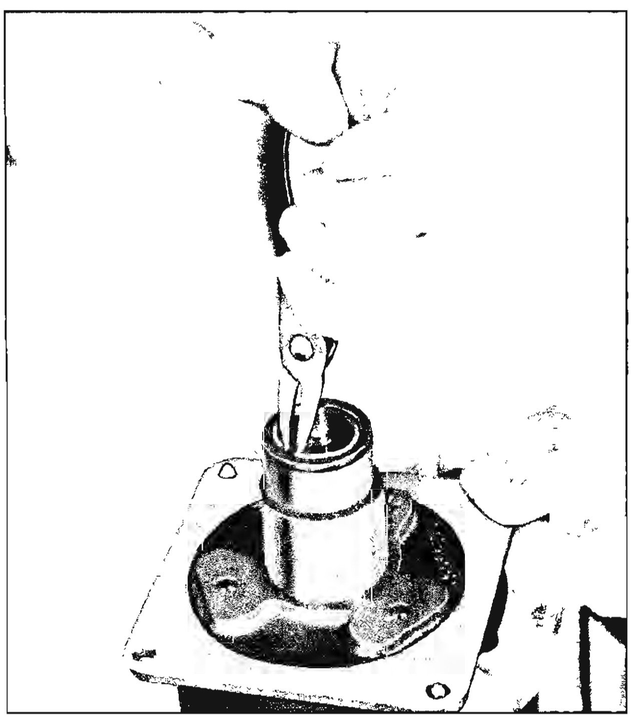


Fig. 33—Removing Seal Seat Retaining Snap Ring

Shaft Seal Assembly

When replacing the shaft seal assembly, even if the compressor remains on the vehicle during the operation, it will be necessary to purge the system of refrigerant as outlined in the 1961 Passenger Car Shop Manual.

Removal

1. After first purging the system of refrigerant, remove the clutch hub and drive plate, and the shaft key.
2. Remove the seal seat retaining ring using snap ring pliers J-5403 (fig. 33).
3. Using Tool J-9393 (1 and 2), grasp the flange on the seal seat and lift out the seal seat (fig. 34).

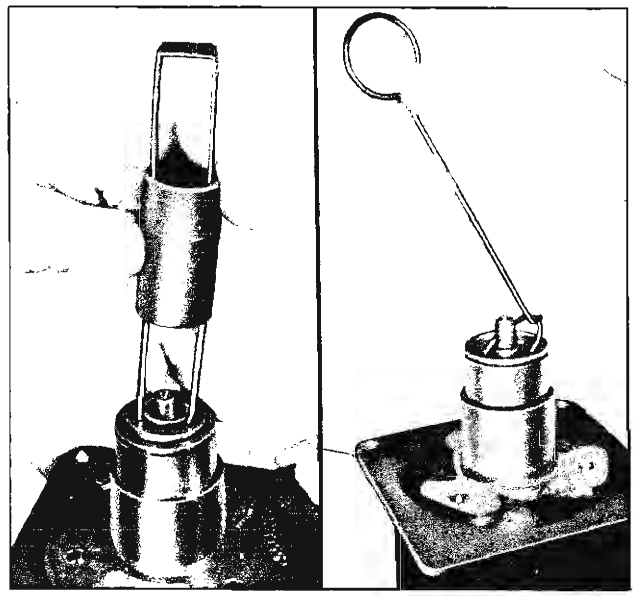


Fig. 34—Removing Seal Seat and "O" Ring

4. Engage the tabs on the seal assembly with the locking tangs on Tool J-9392 by pressing down and twisting the tool, then lift the seal out.
5. Remove the seal seat "O" ring from the housing bore using Tool J-9553 (fig. 34).

Inspection

Check the face of the seal for nicks, gouges or serrations. If damage of any kind is evident, replace the seal. Be extremely careful that the face of the seal which is to be installed is not scratched or damaged in any way.

Installation

1. Engage seal onto the locking tangs of Tool J-9392 (fig. 35) and, with J-21303 installed over the end of the shaft to protect the seal "O" ring, carefully insert the seal and tool over the end of the shaft. Turn seal to engage the flat on the shaft, then remove the tool.

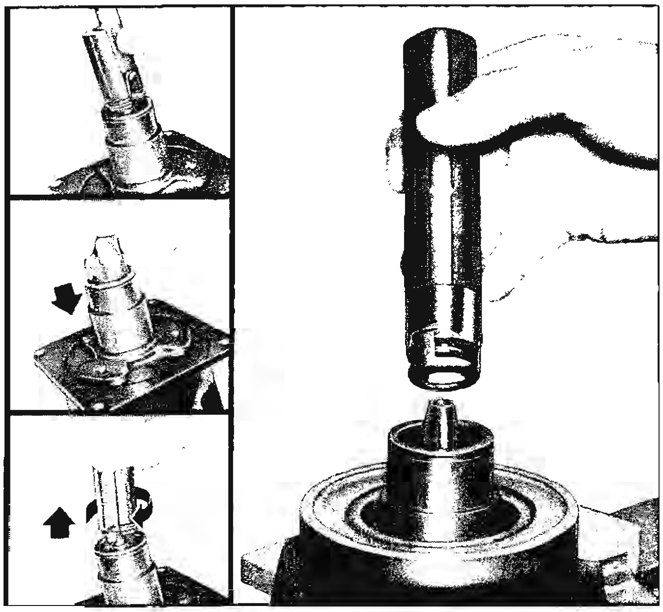


Fig. 35—Replacing Seal and "O" Ring

2. Coat a new "O" ring and the interior of the seal cavity, shaft and seal with clean refrigeration oil and, using Tool J-21508 as shown in Figure 35, install the "O" ring in its groove just above the seal (fig. 35). To install the "O" ring: place "O" ring on tool as shown in Figure 35, insert the tool fully into front head bore, press down slider, twist entire tool to seat "O" ring and then remove tool.
3. Using Tool J-9393, grasp the seal seat and set in place on top of the seal.
4. Using snap ring pliers J-5403, replace the retaining ring.

   NOTE: Install the retaining ring with the flat surface facing the seal seat.

5. Leak test the compressor as described under "Leak Testing the Compressor" in this section.
6. Reinstall the clutch hub and drive plate.
7. Replace the compressor on the vehicle, if it was previously removed, and evacuate and charge the system.

Pressure Relief Valve

When a faulty pressure relief valve, located in the rear head casting, is encountered, the valve assembly should be removed after purging the system and a new valve and gasket installed. The entire system should then be evacuated and recharged.

Compressor Rear Head and Internal Mechanism

Service operations to the rear head or internal mechanism of the compressor should be performed with the compressor removed from the vehicle to insure that the necessary degree of cleanliness may be maintained. Clean hands and a clean bench, preferably covered with clean paper, are of extreme importance.

Rear Head, Oil Pump and Valve Assemblies

Removal

1. Remove the compressor from the vehicle, drain compressor oil into a clean container, clean the exterior of the compressor case and rear head casting with a suitable solvent and mount the compressor, rear head up, in holding fixture J-9396 which should then be mounted securely in a vise.
2. Remove the four nuts from the shell studs. Discard nuts.
3. Remove the rear head. Examine the teflon surface on the casting webs. If this surface is damaged by nicks or scratches, the head should be replaced.
4. Examine the suction screen in the rear head for any damage or contamination. Clean or replace the screen as necessary.
5. Remove and examine the oil pump gears. If either of the gears shows any wear or damage, replace both gears.

   NOTE: Keep the ends of the two oil pump gears matched and replace the same end toward the discharge plate upon reassembly.

6. Remove the rear head-to-shell "O" ring and discard.

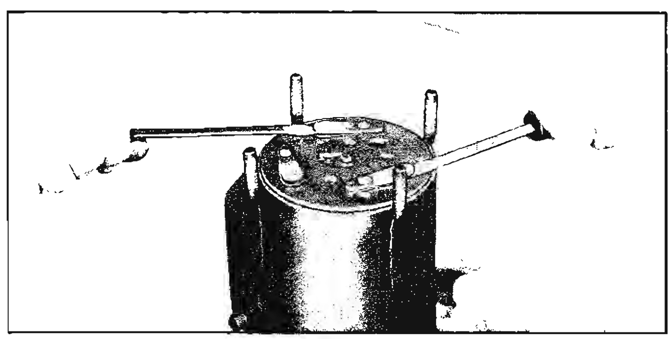


Fig. 36—Removing Rear Discharge Valve Plate

7. With two screwdrivers, carefully pry up on the rear discharge valve plate assembly (fig. 36). Check for broken reeds or damaged seats and replace entire assembly if such is found.
8. Carefully lift off the rear suction reed valve. Valve must be replaced if any damage is evident.

Installation

1. Carefully replace the suction reed valve and the rear discharge plate over the dowel pins and ports in the cylinder assembly.
2. Position the rear head casting to align with the dowel pins. The two lower mounting pads will be in alignment with the oil sump in the shell. Rotate the cylinder assembly back and forth by hand, if necessary, to permit this alignment. Remove the rear head from this trial assembly.
3. Install the inner oil pump gear over the "D" flat on the shaft and place the outer oil pump gear over the inner gear. Position the outer gear as follows:
   a. Observe the position of the oil sump in the shell.
   b. Locate the approximate centerline of this sump.
   c. Facing the centerline of the sump and viewing from the sump side (bottom) of the compressor, move the OUTER gear toward the right (side having the oil test fitting) until it is at approximately 90° (3 o'clock position) from the centerline of the oil sump (fig. 37).

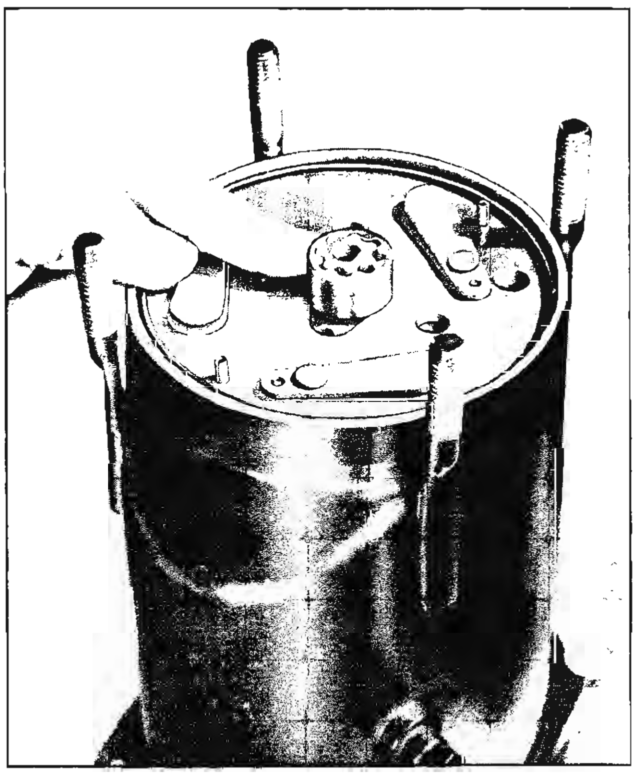


Fig. 37—Proper Oil Pump Gear Positioning

4. Coat the head-to-shell "O" ring with clean refrigeration oil and generously lubricate the area around the outer edge of the valve plate where the "O" ring will be placed. Oil also the oil pump gears, valve reeds and the area where the teflon gasket will contact the valve plate.
5. Install the head-to-shell "O" ring.
6. Be sure that the suction screen is properly positioned in the rear head, then assemble the rear head to the compressor shell being careful not to damage the teflon gasket.

NOTE: As an aid to replacing the head in the proper position, be sure the inlet and outlet ports are toward the top of the compressor.

CAUTION: Be sure head does not bind against oil pump gears when being installed.

7. Install new nuts to the threaded shell studs and tighten to 19-23 ft. lbs. torque.
8. Leak test the compressor as outlined under "Leak Testing the Compressor" in this section.
9. Install compressor as described under "Compressor—Installation."

MAJOR INTERNAL MECHANISM

Removal From Shell

1. Remove the rear head, discharge plate and suction reed valve from the compressor as outlined under "Rear Head and Reed Valve Assemblies" above.

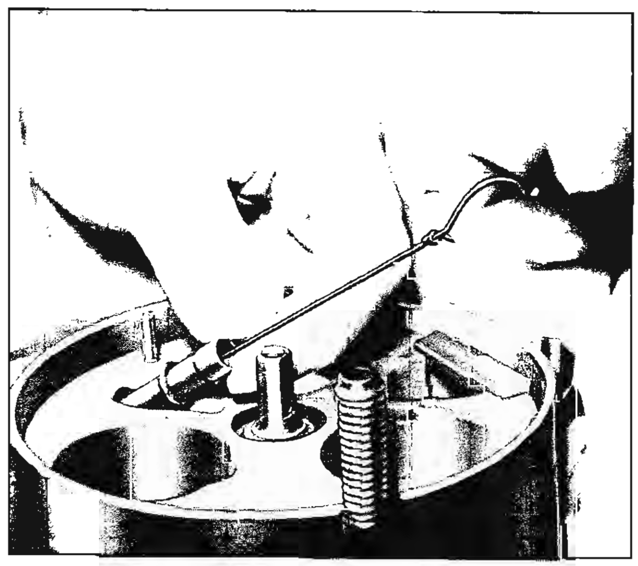


Fig. 38—Removing Oil Inlet Tube and "O" Ring

2. Remove the oil inlet tube and "O" ring with J-5139 as shown in Figure 38.
3. Carefully lay the compressor shell on its side and slide out interior mechanism and front head assembly. Do not hammer or use undue force to remove the mechanism; however, gentle taps on the head casting may aid in removing the assembly.
4. Remove front head casting, front discharge valve plate and suction reed valve from the mechanism. Examine parts for damage and replace if neces-

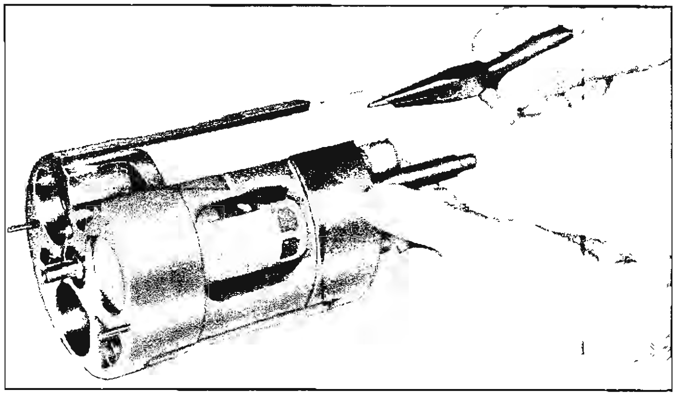


Fig. 39—Removing Suction Crossover Cover

sary. Check particularly for damage to the teflon surfaces on the front head casting webs.

5. Examine the mechanism for any obvious damage.
6. Remove the suction crossover cover (fig. 39).
7. If desired, the mechanism may be assembled in checking cage J-9397 and operated on a motor test stand, or by some other suitable means, to observe sound level and general operation. Tighten cage nuts evenly to 15 ft. lbs. torque.
8. While in the checking cage, make a check of the clearances between each rear piston ball seat and the wobble plate (reading must be between .0005-.0010). Check also the clearance between the rear thrust race and rear thrust bearing. (Maximum clearance should be .0015.) These checks may give some indication of the cause of the trouble.
9. Remove mechanism from the cage.

Disassembly

If the mechanism has sustained major damage, due possibly to loss of refrigerant and/or oil, it may be necessary to replace it with a complete service interior mechanism assembly rather than to replace individual parts. If further disassembly is considered worthwhile, proceed as follows:

1. Before disassembling the cylinder and mechanism, number the pistons and cylinder locations so that all parts may be replaced in their original location. Pistons and cylinder bores may be identified by numbering them 1, 2 and 3 with a pencil.
2. Use J-9492 to drive discharge tube out of cylinder (fig. 40). (Drive toward REAR of cylinder).
3. Drive the cylinder halves apart and free from the dowel pins and discharge crossover tube using a fiber block and mallet (fig. 41). Discard the discharge crossover tube.

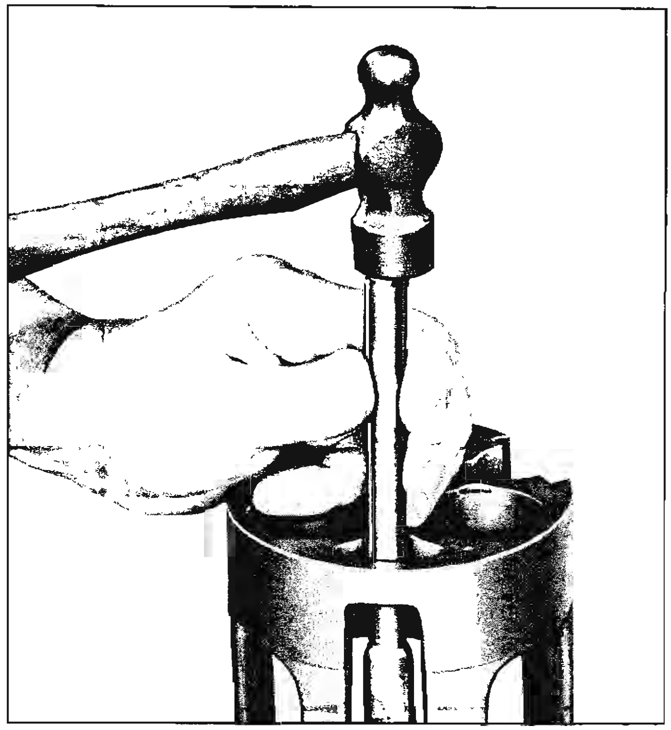


Fig. 40—Unseating Discharge Crossover Tube

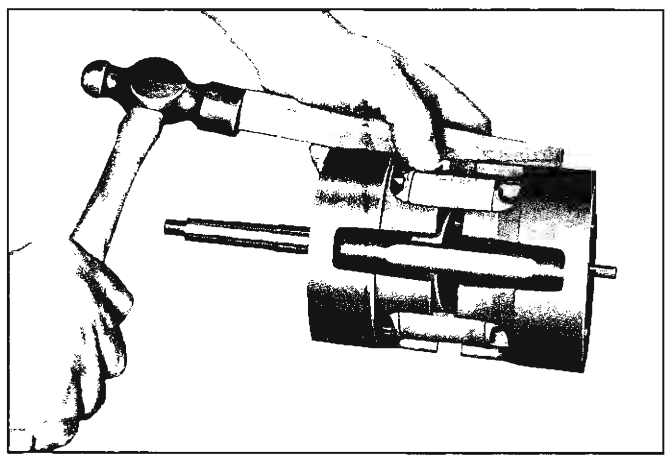


Fig. 41—Separating Cylinder Halves

NOTE: Before driving cylinder apart, position wobble plate so low part is under crossover tube toward rear of cylinder assembly.

4. Carefully remove the rear half of the cylinder from the pistons and set the front cylinder half, with the piston, shaft and wobble plate, in J-9397.
5. Push up on the shaft and, one assembly at a time, remove pistons, rings, seats and balls placing all parts in tray J-9402 in the compartment associated with the proper end of the piston. Discard all piston ball seats.

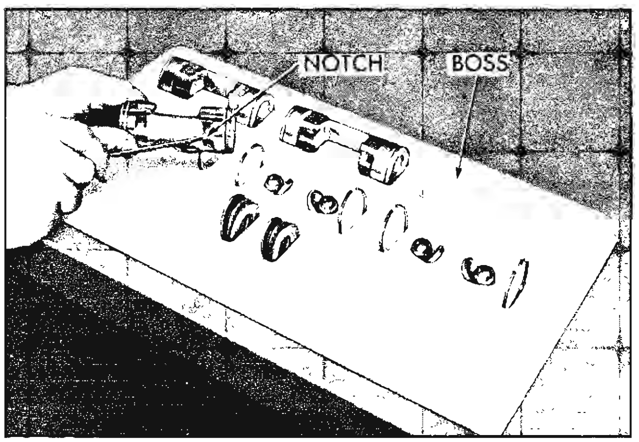


Fig. 42—Notch Identifying Front End of Piston

NOTE: The front of the piston may be identified by a notch in the casting web. See Figure 42. The piston compartments in tray J-9402 have a boss at this notch location to indicate the front.

6. Remove and inspect all piston rings. Replace all broken or damaged rings. Damaged pistons must also be replaced.
7. Examine piston balls. Replace if they show burning or excessive wear.
8. Remove the rear combination of thrust races and bearing from the shaft and discard all three pieces.
9. Remove the shaft and wobble plate assembly from the front half of the cylinder.
10. Remove the front combination of thrust washers and bearing and discard all three pieces.
11. Examine all surfaces of the wobble plate and, if satisfactory, reuse. If it shows signs of excessive wear, replace the shaft and wobble-plate as an assembly. Use care not to move wobble plate on the shaft. This is factory set.
12. Examine the front and rear cylinder halves and replace if cylinder bores are deeply scored or damaged.
13. Wash all parts to be reused in a suitable cleaner. Blow dry all parts.
14. If cylinder main bearings are to be replaced they may be removed and reinstalled at this time using Tool J-9432.

Gauging Procedure

The gauging operations which follow have been worked out on a simple basis to establish and provide necessary running clearances. Two gauging procedures are necessary.

The first gauging operation is made to choose the proper size ball seats to provide, at each piston, a .0005" to .0010" total clearance between the seats and the wobble plate at the tightest place through the 360° rotation of the wobble plate. The bronze ball seats are provided in .0005" variations including a basic ZERO seat.

The second gauging operation, performed at the rear shaft thrust bearing and race pack, is designed to obtain .0005" to .0015" running clearance between the hub surfaces of the wobble plate and the front and rear hubs of the cylinder. A total of 14 steel thrust races, including a basic ZERO race, are provided in increments of .0005" thickness to provide the required clearance.

Proper selection of thrust races and ball seats is of extreme importance. If tolerance is greater than maximum clearance, noisy operation of the compressor will result while tolerance less than minimum clearance could result in galling and seizure of the parts.

1. Secure from service parts stock:
   Four-ZERO thrust races
   Three-ZERO ball seats
   Two-New thrust bearings
2. Assemble a ZERO thrust race, a new needle thrust bearing and another ZERO thrust race, in that order, to the front end of the shaft. (A dab of petroleum jelly will hold the bearing-race pack together and in place on the shaft.) Lubricate front and rear faces of the wobble plate with refrigeration oil.
3. With the front half of the cylinder assembly resting on Tool J-9397, insert the shaft, threaded end through the front main bearing until the thrust race assembly rests on the front cylinder hub.
4. Assemble a ZERO thrust race, a new needle bearing and a second ZERO thrust race in that order, to the rear of the shaft.
5. Apply a light smear of clean petroleum jelly to the ball pockets of each of the three pistons.
6. Place the balls in the piston pockets. The petroleum jelly will hold the balls in place.
7. Apply a light smear of petroleum jelly to the cavity of three new ZERO ball seats and place one seat over each front piston ball. There should now be a ball and seat in the front ball pocket of each piston and a ball only in the rear ball pocket.

NOTE: Do not assemble any of the piston rings at this time.

8. Rotate the shaft and wobble plate until the high point of the wobble plate is directly over the cylinder bore previously designated as No. 1. Lift up slightly on the shaft and wobble plate assembly, insert the front (notched) end of the No. 1 piston into the cylinder bore, and at the same time, place the front ball and seat and the rear ball only over the wobble plate (fig. 43). Hold front thrust bearing pack tight against wobble plate hub while lifting shaft.

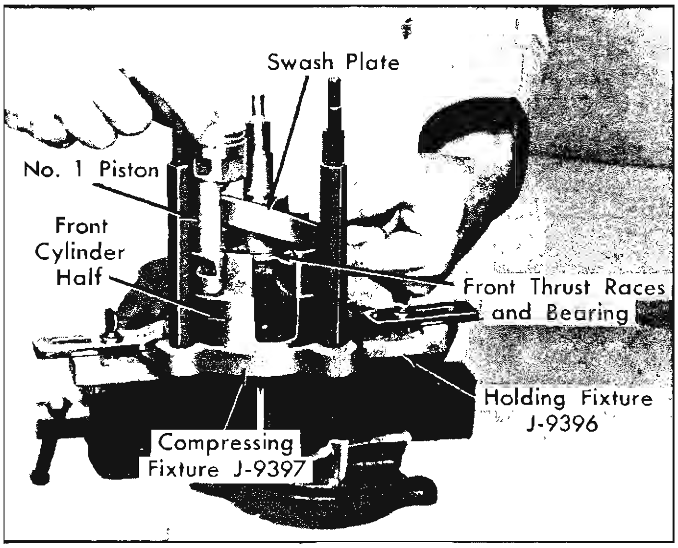


Fig. 43—Installing Piston, Front Ball and Seat and Rear Ball

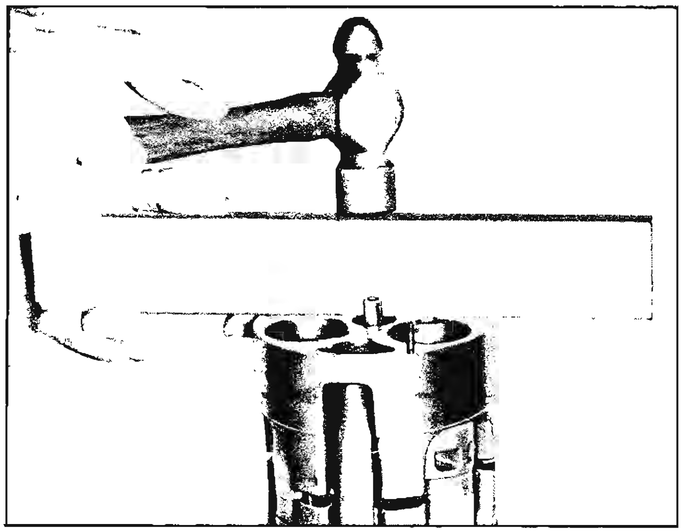


Fig. 44—Assembling Cylinder Halves

9. Repeat this operation with pistons No. 2 and No. 3.

10. Align the rear head casting with bores, suction passage, discharge crossover holes, and dowel pins. Tap into place, using a plastic block and mallet (fig. 44).

11. Place the cylinder assembly in the checking cage with the front of the compressor shaft pointing up, positioning the discharge tube opening between the cage bolts. This will provide access for the feeler gauge. Assemble the cage and tighten all nuts evenly to 19-23 ft. lbs. torque.

12. Use a leaf type feeler gauge and a suitable spring scale to check clearance between the REAR ball and the wobble plate (fig. 45) of the No. 1 piston. Use a suitable combination of feeler gauge leafs until 4 to 8 oz. of force is required to pull gauge from between the ball and the plate.

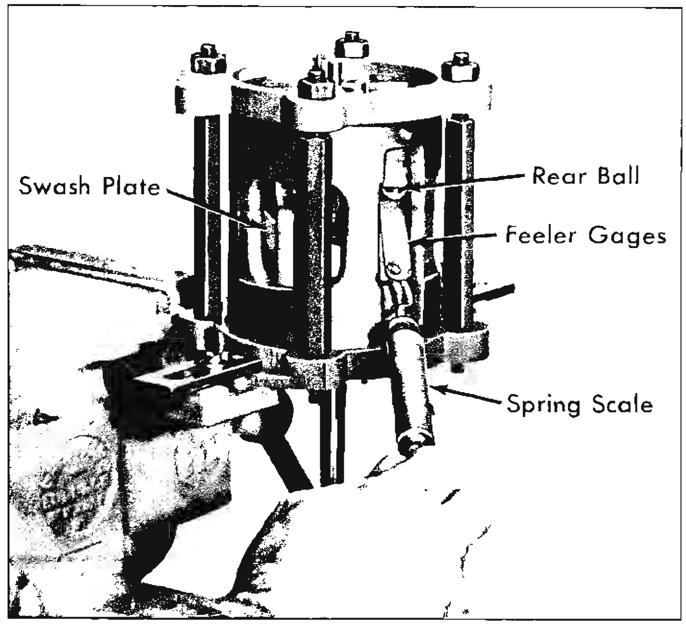


Fig. 45—Checking Clearance Between Rear Ball and Wobble Plate

NOTE: Use undamaged feeler gauges generously lubricated with refrigeration oil. Support the spring scale so that only the actual force required to pull the feeler gauge free is measured.

Rotate the shaft approximately 120° and again check with a feeler gauge between the parts. Rotate the shaft another 120° and make a third check. From this total of three feeler gauge checks, use the MINIMUM reading to select a numbered seat to correspond to the feeler gauge reading (i.e.—if minimum reading was .019, use a No. 19 seat. If reading was .0195, use a No. 19½ seat). Place this seat in the parts tray in the compartment corresponding to the rear ball position of the No. 1 piston.

13. Repeat the operation described in Step 12 for pistons No. 2 and No. 3.

14. The next gauging operation is to determine the space between the REAR thrust bearing and the upper (outer) rear thrust race. Use a suitable combination of feeler gauge leafs so that 4 to 8 oz. of force is required to pull gauge free (fig. 46). Select a numbered thrust race to correspond to this feeler gauge reading and place this race in parts tray in the rear thrust race compartment.

15. Loosen the nuts and ring from the checking cage.

16. Drive the cylinder halves apart, using a fiber block and mallet.

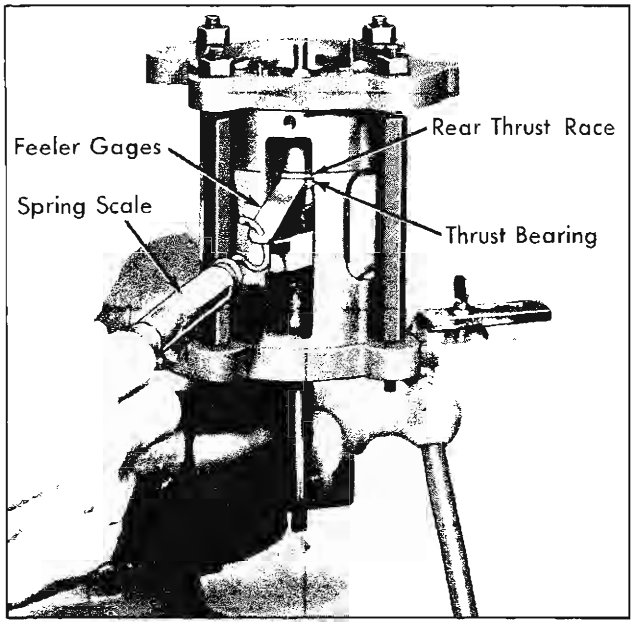


Fig. 46—Checking Clearance Between Rear Thrust Bearing and Outer Thrust Race

17. Carefully remove the rear half of the cylinder and set the front half (including the pistons and shaft and wobble plate assembly) on J-9397.
18. Carefully remove one piston at a time from the wobble plate and the front half of the cylinder. Transfer each piston, ball and seat to its proper place in the parts tray along with the numbered rear seat chosen in Steps 12 and 13 above.

    CAUTION: When the balls and seat are removed from the piston, be sure that they are placed in the proper parts tray pocket so as not to lose the relationship of the balls and seats to the proper end of the piston.

19. Remove the rear outer (upper) ZERO thrust race from the compressor shaft and replace it with the numbered thrust race (determined in Step 14 above) from the parts tray.

    NOTE: This ZERO thrust race may be put aside for reuse in future gauging and/or rebuild operations.

20. The gauging operations are now complete.

Assembly

After properly performing the gauging procedure and choosing the correct ball seats and thrust races as outlined under "Gauging Procedures," the cylinder assembly may be reassembled. Be sure to install all new seals and "O" rings. All are included in the compressor seal service kit.

1. Support the front half of the cylinder assembly on fixture J-9397 and install the shaft and wobble plate, threaded end down, with its front bearing race pack (ZERO race, bearing and ZERO race) and its rear bearing race pack (ZERO race, bearing, numbered race) if this was not already done at the end of the "Gauging Procedure."
2. Assemble a piston ring, scraper groove toward the center of the piston, to each end of the three pistons.
3. Apply a light smear of petroleum jelly to the numbered ball seats chosen in the gauging procedure and install all balls and seats (if removed in Step 18 of the gauging procedure) in their proper place in the piston.
4. Rotate the wobble plate so that the high point is above cylinder bore No. 1. Carefully assemble piston No. 1, complete with ball and ZERO seat on the front and ball and numbered seat on the rear, over the wobble plate. Hold front thrust pack tight against wobble plate hub while lifting hub. Compress and enter the piston ring into the front cylinder half.
5. Repeat this operation for pistons No. 2 and No. 3.
6. Assemble one end of a service discharge crossover tube into the hole in the front cylinder half.
7. Rotate the shaft to position the pistons in a stair-step arrangement, then carefully place the rear cylinder half over the shaft and start the pistons into the cylinder bores.
8. Compress the piston ring on each piston to permit its entrance into the cylinder.
9. When all three pistons and rings are in their respective cylinders, align the end of the discharge crossover tube with the hole in the rear half of the cylinder.

    NOTE: Be sure the flattened portion of this tube faces the inside of the compressor to allow for wobble plate clearance.

10. When all parts are in proper alignment, tap with a fiber block and mallet to seat the rear half of the cylinder over the locating dowel pins. If necessary, clamp the cylinder in J-9397 to complete drawing the cylinder halves together.
11. Generously lubricate all moving parts with clean refrigeration oil and check for free rotation of the parts.

    NOTE: It may be desirable to clamp the cylinder assembly in compressing fixture J-9397 and check on the motor test stand for proper operation before proceeding further. If any improper operation is observed, the mechanism should be regauged to insure proper operation. Complete the assembly procedure when correct operation is obtained.

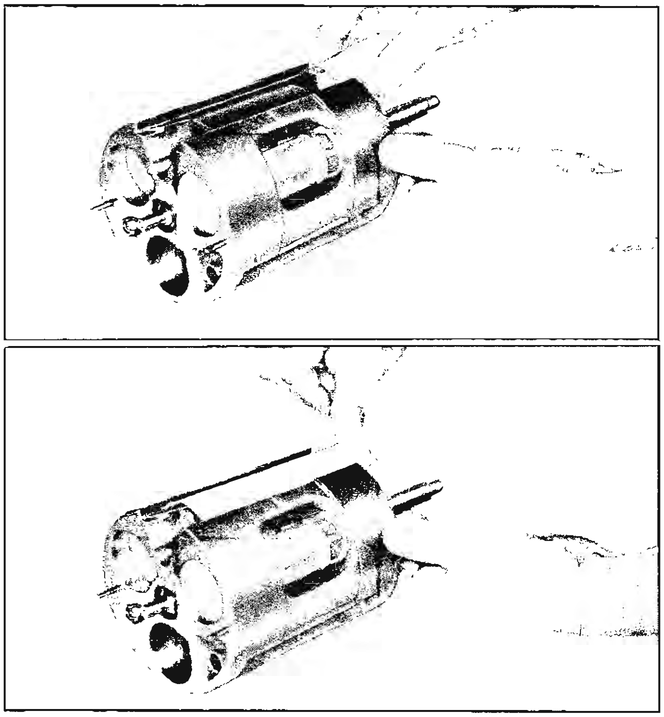


Fig. 47—Installing Suction Crossover Cover

12. Replace the suction crossover cover as shown in Figure 47. Compress the cover as shown to start it into the slot and then press it in until flush on both ends.

Installation Into Shell

1. Support the cylinder on fixture J-9521 with the threaded end of the shaft up.
2. Assemble the two dowel pins in the front cylinder if they are not already in place.

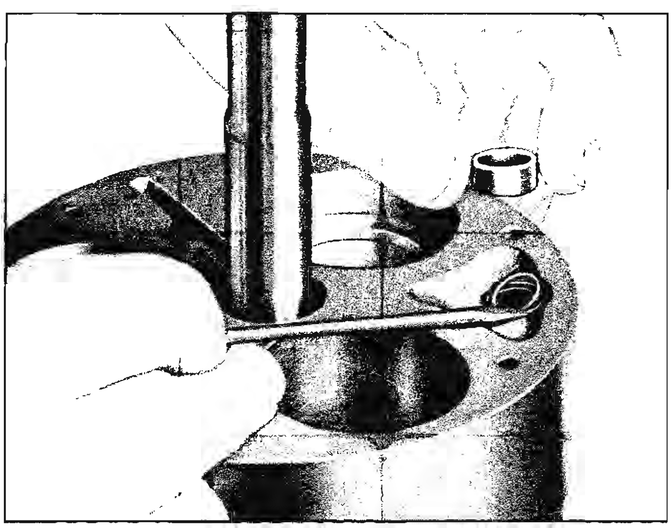


Fig. 48—Installing Discharge Crossover Tube Front "O" Ring and Spacer

NOTE: A rod drilled ¼" deep to the O.D. of the dowel pins will aid in installing.

3. Install the discharge crossover tube front "O" ring and spacer (fig. 48).
4. Aligning the dowel pin holes, discharge crossover and oil return slot, assemble the suction reed valve to the front end of the cylinder.
5. Assemble the front discharge valve plate, aligning the holes with the dowel pins and proper opening in the head.

NOTE: The front discharge plate has a larger diameter hole in the center than the rear discharge plate.

6. Check the teflon surface on the compressor front head casting webs and replace the entire casting if there is any evidence of damage. Discard the "O" ring.
7. Coat the valve plate with clean refrigeration oil. Rotate the front head casting until it is properly positioned over the discharge reed retainers and dowel pins, then set it in place (being careful not to damage the teflon surfaces) and seat it over dowels with light mallet taps.

NOTE: Dowel pin and hole location can be marked with pencil to aid in locating proper position.

8. Apply clean refrigeration oil to a new "O" ring and "O" ring groove at the lower edge of the front head casting and carefully assemble the "O" ring in the groove.
9. Coat the inside machined surfaces of the compressor shell with refrigeration oil.
10. Locate the oil intake tube hole in the rear discharge plate. Line up the oil sump with this hole location and slide the shell down over the mechanism while supporting the mechanism on J-9521 (fig. 49).
11. Place compressor support bracket J-9396 in a vice and, carefully inverting the compressor case with the mechanism inside, mount the front compressor flange on the support bracket.
12. Place a new "O" ring in the oil intake tube hole applying clean refrigeration oil to the oil intake tube hole and the "O" ring. Rotating the compressor mechanism to line up with the hole in the compressor case baffle, install the pickup tube. Be sure that the "O" ring and intake tube are properly seated.
13. Assemble the dowel pins into the rear cylinder.

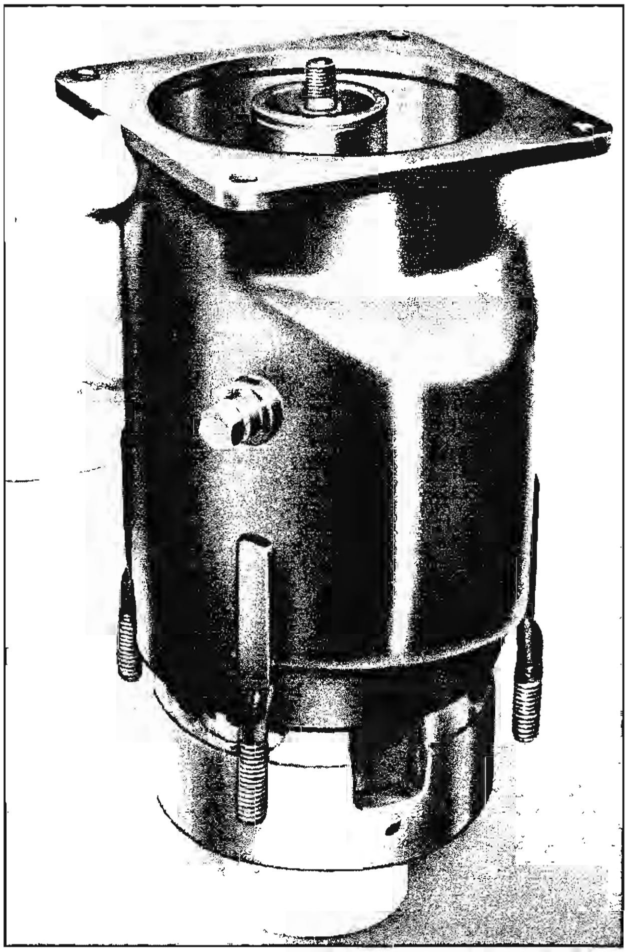


Fig. 49—Installing Shell Over Internal Mechanism

14. Install the discharge crossover tube rear "O" ring and spacer.
15. Replace the rear suction reed valve, rear discharge valve plate, oil pump gears, rear head and head nuts as outlined previously under "Rear Head and Reed Assemblies—Installation."

Leak Testing the Compressor

Whenever service operations are performed on the compressor shaft seal assembly or on the interior mechanism, use the following procedure to leak test the reassembled compressor.

1. Install "O" rings and cover plate J-9527 over the suction and discharge ports on the compressor head.
2. Hook up a Freon-12 container and charging line (using adapter J-5420) to cover plate fitting over the suction port, charge the compressor up to can pressure, and leak test compressor with a leak detector.
3. Turn off the Freon container valve, transfer gauge line and adapter to cover plate fitting over the discharge port and repeat the procedure outlined in Step 2.
4. Correct any leaks present.

SUCTION THROTTLING VALVE (STV)

Dirt and other foreign material in the system and scoring of the piston represent the most frequent causes of sticking and "hanging-up" of the suction throttling valve. A clean, properly installed system represents the best method of assuring proper suction throttling valve operation. If valve malfunctioning occurs, proceed as follows:

Removal

1. Purge the system of refrigerant.
2. Remove the right front fender skirt as outlined in Section 1 of this shop manual.
3. Remove and cap the refrigerant line at the STV outlet and at the thermostatic expansion valve external equalizer and oil bleed line connections at the suction throttling valve.
4. Remove the bracket to STV attaching bolts.
5. Back off on the connector at the STV inlet and remove the valve. Cap the evaporator outlet line.

Disassembly

1. Securely hold the valve, loosen the jam nut and remove the vacuum head and actuating pin assembly.

   CAUTION: The spring is under considerable compression and should be restrained until this force has been removed from it. If this is not done, the spring may pop out.

2. When the spring has been removed the spring retainer cup and thrust washer will drop out freely.
3. Remove the five screws from the flange of the cover and body. Usually the cover will be easily removed from the body, but it may in some cases be necessary to rock the cover slightly back and forth to remove it.
4. The diaphragm and piston assembly can now be removed.

   NOTE: The diaphragm should be handled with care to avoid damage to the rubber and fabric surfaces.

5. Examine the screen and retainer in the lower portion of the piston for any foreign material or contamination. Clean if necessary using an approved solvent. Do not remove the screen.

   NOTE: Solvent should be thoroughly removed from the parts prior to reassembly.

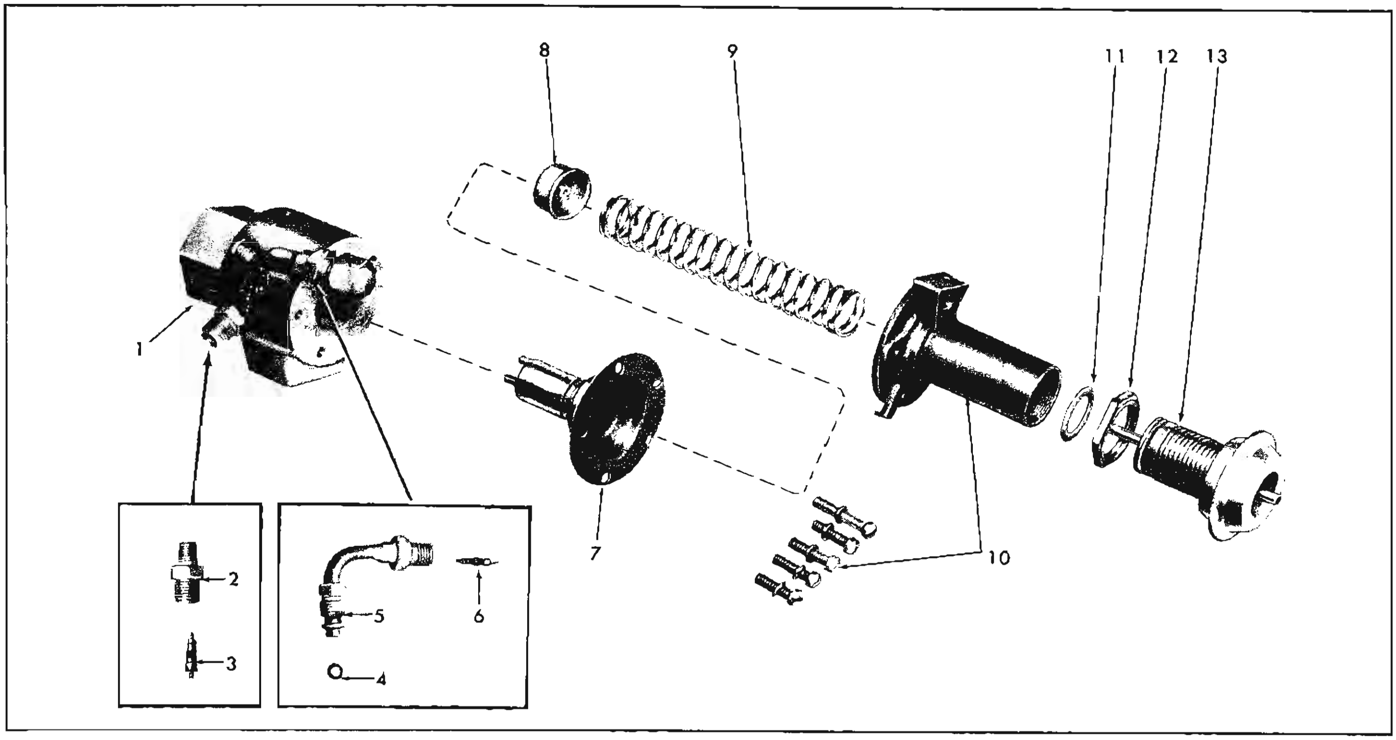


Fig. 50—Suction Throttling Valve—Exploded View

1. Body
2. Oil Bleed Line Connector
3. Oil Bleed Line Connector Valve
4. Evaporator Pressure Gauge Connection "O" Ring
5. Evaporator Pressure Gauge Connection
6. Evaporator Pressure Gauge Connection Valve
7. Piston and Diaphragm Assembly
8. Spring Retainer Cup
9. Spring
10. Cover and Cover Screws
11. Thrust Washer
12. Lock Nut
13. Vacuum Head Assembly

6. Replace the piston if its exterior surface is scored, scratched or nicked.

   NOTE: Do not scrape, stone or crocus cloth these damaged areas due to the close tolerance that is required in the fitting of the parts for proper operation.

7. If either the diaphragm or piston is found to be damaged replace the entire assembly.
8. Examine the body bore surfaces for any surface imperfections, foreign material and any obvious damage that would cause the piston to not operate freely. The body should be replaced if the bore is damaged or if any cross threading or damage has been sustained around the connector ports.

   NOTE: Do not scrape, stone or "dress out" any damage as it may result in improper performance of the valve.

Inspection and Repair

Check valve components for broken or bent parts. Check the piston and valve body for dirt or other foreign material or scored condition. Clean or replace as necessary. When cleaning the valve components, use extreme care not to leave any grit, lint or other foreign material, particularly on the piston or adjacent areas of the valve body. Check the condition of the valve diaphragm and replace the piston and diaphragm assembly if it has been damaged. If the filter screen in the piston is dirty, clean it or replace the assembly. Check the condition of the vacuum head assembly diaphragm by placing the vacuum connection in your mouth and attempting to draw a vacuum. A defective diaphragm will be readily apparent.

Assembly

1. A very light application of powdered Molykote Type Z should be applied to the upper or fabric surface of the depressed section of the diaphragm where the spring retainer cup will fit into it.
2. Apply a light coat of 525 viscosity oil to the wall of the piston and insert it into the body of the valve.
3. Assemble the spring cup to the diaphragm and place the cover in proper location over the diaphragm, being sure the diaphragm holes are in line with the locating protrusions under the cover flange. Start the five screws into the body, but DO NOT TIGHTEN.

4. With the cover and body held loosely in one hand, insert a clean smooth rod, approximately ⅜ in diameter, through the inlet opening so as to contact the screen retainer in the bottom of the piston. Carefully press the piston upward into the cover so as to cause convolution of the diaphragm to position properly into the cavity of the cover and so not become "pinched" under the flange.
5. Remove the rod from the inlet opening and insert it through the upper portion of the cover. It should contact the center post of the cup. Press lightly downward so as to cause the piston to seat against the inner shoulder of the body. While the cup, diaphragm and piston are held down, tighten the five screws to 35 to 40 inch pounds torque.
6. Install the spring into the cup over the center post.
7. After being certain the spring is properly located in the cover, place the thrust washer on top of the outer spring.
8. Insert the vacuum head assembly actuating pin into the cover being sure the small diameter end of the pin enters the hole in the spring retainer cup. Compress the spring until it is possible to start and engage the threads on the vacuum head assembly with the cover. Then run the screw down about one-half of its thread length.

Installation and Adjustment

1. Using a new "O" ring, install the suction throttling inlet to the evaporator outlet connector.
2. Install the bracket to valve attaching bolts.
3. Using new "O" rings, install the STV outlet line, expansion valve equalizer line and oil bleed line to the valve.

CAUTION: Do not over-tighten these connections.

4. Install the vacuum line on the STV.
5. Evacuate and charge the system.
6. With the low pressure gauge line on the STV gauge fitting, adjust the valve (by turning the vacuum head as required) until, with the system in operation, the evaporator pressure holds at 28 psi.

NOTE: Three turns of the head will result in approximately 1 psi pressure difference.

7. Pull the vacuum line off the vacuum can. The evaporator pressure should rise approximately 3 psi. Replace the vacuum hose.
8. Replace the fender.

CONTROLS

All-Weather System

Full control of the All-Weather System is obtained through the use of a single control panel (fig. 51). The control levers, with the exception of the fan lever, make use of bowden cables to activate the various doors and switches necessary for system operation. Therefore, control adjustment is a matter of properly setting these bowden cables. The following paragraphs explain each control.

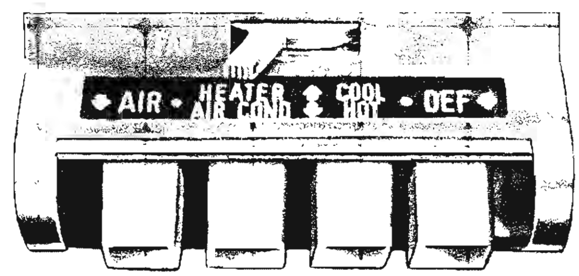


Fig. 51—Deluxe All-Weather System Controls

"Heater-Air Cond." Lever

This lever actuates an air diverter door within the duct assembly which routes airflow when fully "up" to the floor distributor ducts (for heater operation) or when fully "down" to the dash outlets (for cooling operation.

The initial movement of this lever activates, through the diverter door crank lever, the compressor clutch switch which sets the air conditioning system in operation.

This lever also operates a second door called a deflector door by means of a link assembly. When the lever is "up," the deflector door is positioned to divert the major portion of the airflow through the heater core, bypassing just enough ambient air with which to temper the heater airflow as desired. As the lever is pushed "down," this door is moved, with a snap action, so as to allow most of the airflow to bypass the heater core allowing just enough heated airflow to raise the temperature of the cooled airflow as desired.

Cool-Hot Lever

The "COOL-HOT" control lever, through its bowden cable, actuates the door which controls heater output. Since the heater core in this system is hot at all times, this door is necessary to shut off the heat when not wanted as well as to permit mixing of hot and cool air to provide the desired heated air output. A cam lock

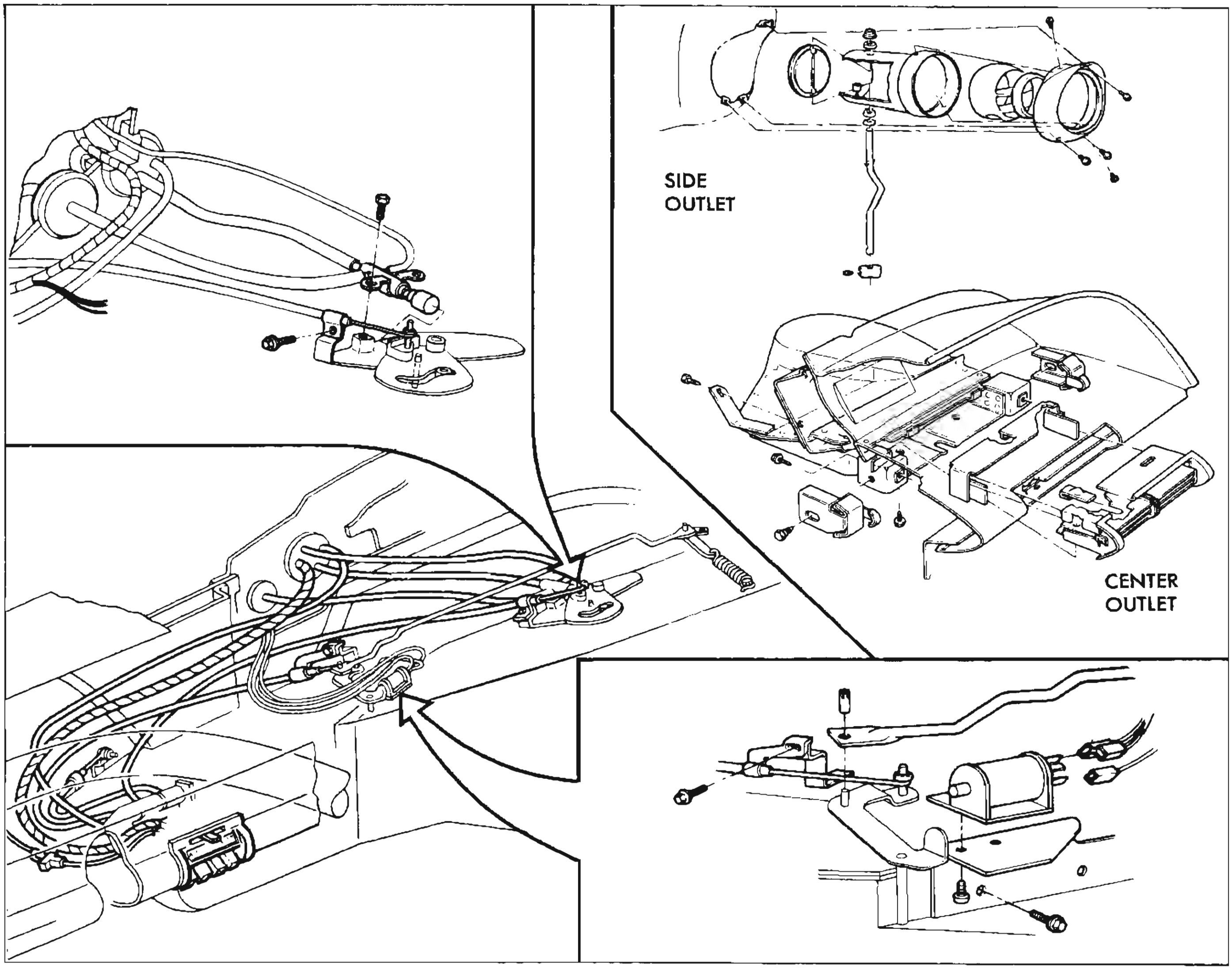


Fig. 52—Deluxe All-Weather System Duct Linkage and Switches

device assures positive closing of this door. As the door opens, more and more heated air is mixed with the air which is bypassing the heater core. This bypass air may be either ambient air (if the "Heater-Air Cond." lever is fully "up"), or air which received maximum cooling as it passed through the evaporator (if the "Heater-Air-Cond." lever is fully "down"). In either case the air will be tempered as desired through the movement of the "COOL-HOT" lever.

The cam lock device may be adjusted as follows: Loosen the two attaching screws. Place the cam in the closed position and insert a pin in the holes provided to lock it in this position. Turn the entire assembly toward the closed position and hold firmly while tightening the two attaching screws. Remove the locking pin.

A cam, which moves as the "COOL-HOT" diverter door is moved, acts to open and close a vacuum valve which supplies vacuum to the STV vacuum head. In operation, the first 5/16" of "COOL-HOT" lever travel will close the vacuum valve. Cutting off the vacuum to the STV in this manner will result in a 3 lb. rise in evaporator pressure, lowering its cooling capacity at a time when, as evidenced by the heat being introduced into the airflow, full capacity is not needed. This is designed to prevent evaporator freeze-up when operating the system at higher elevations of 4000 feet and higher.

NOTE: Owners should be instructed that, when operating at such altitudes, the COOL-HOT lever should be cracked open at least 1/2" even though maximum cooling is desired.

Air Control Lever

The AIR control lever actuates the door within the blower assembly which chooses between recirculated air or outside air. When the lever is properly adjusted,

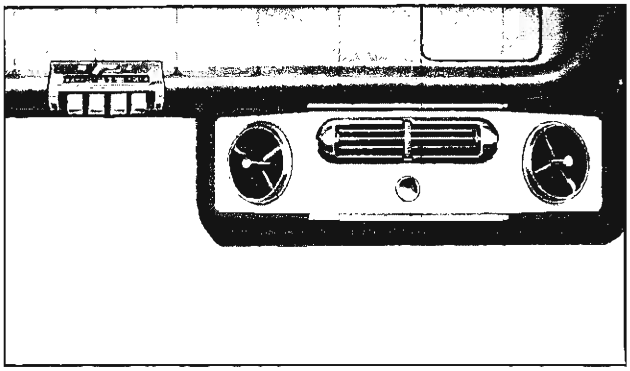


Fig. 53—Custom Deluxe System Controls

full UP position will supply 100% recirculated inside air (for cooling operations during city driving) and full DOWN position will supply 100% outside air (for heating operations). A "detent" position built into the lever linkage supplies a mixture of inside and outside air (for use during most air conditioning operations).

CAUTION: When setting the control to this detent position it is necessary to start from the off (or up) position of the lever.

Fan Lever

The fan lever which moves horizontally across the top of the control panel, controls the three speed blower motor.

Def Control Lever

This lever controls a diverter door which directs airflow to the windshield for defrost, de-fog, or de-icing operations.

Custom Deluxe System

The Custom Deluxe System uses the same control panel as the All Weather System plus a separate cooling control on the conditioning unit. See Figure 53.

"Air" Lever

This lever operates the air door within the right hand kick panel and may be positoned to supply full outside air, full recirculated air or any mixture of the two. The fully "up" position of this lever is the air-off position as well as the recirculated air setting.

"Heater-Air Cond." Lever

Controlling the movement of a selector door in the air distributor, this lever will allow airflow through either the floor outlets or the air conditioning outlets. The lever may also be positioned so that the airflow is divided between the two, thus allowing heated airflow through the floor outlets and cooled airflow from the cooling outlets. Movement of this lever also actuates an electrical switch which puts the compressor in operation and turns the blower on to low speed.

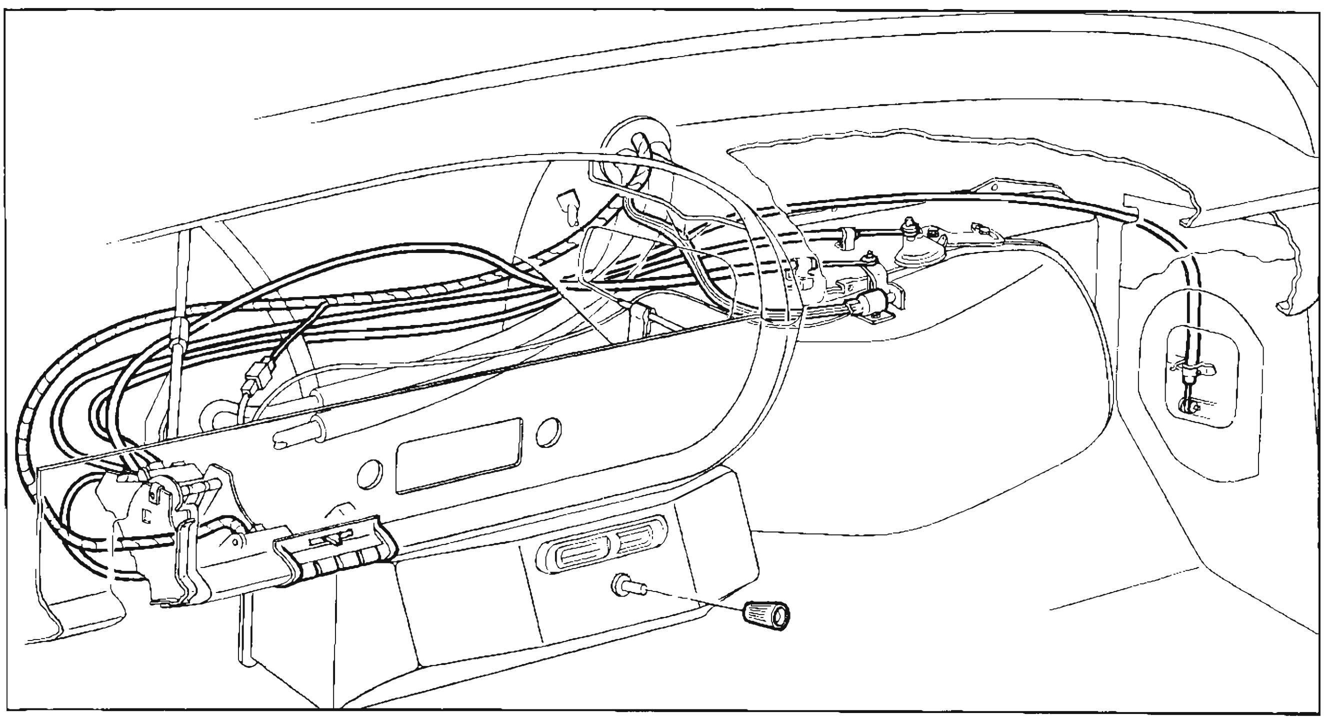


Fig. 54—Custom Deluxe System Linkage and Controls

"Cool-Hot" Lever

This lever acts to move the temperature door in the air distributor to regulate the proportion of heated and ambient air needed to provide the desired heated air temperature. The HEATER-AIR COND lever must be in either the fully up or partially down position before the COOL-HOT lever can vary the heater output temperature. If the HEATER-AIR COND lever is fully down, the bypass ambient airflow needed to temper the heat output will be routed instead through the cooling unit. In this case, only maximum heat will be available from the heater outlets. For maximum cooling this lever must be fully up.

"Def" Lever

The defroster lever serves to divert heated airflow, at least in part if desired, up to the windshield for defog, defrost or deice operation.

"Fan" Lever

Moving horizontally across the top of the control panel, this lever controls the operation of the three speed blower motor.

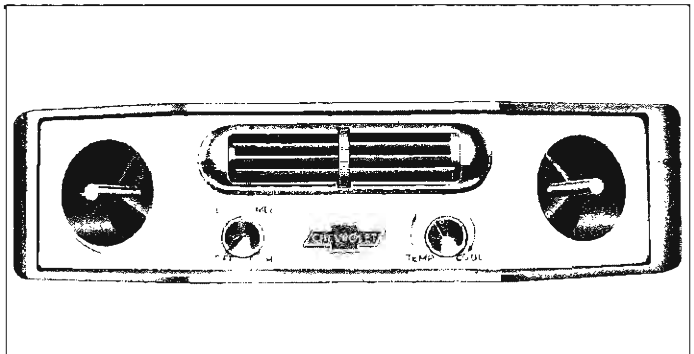


Fig. 55—Custom System Controls

"Cool" Control Knob

This knob, located at the center of the air conditioning unit beneath the center of the dash may be turned as indicated to allow the unit to supply the degree of comfort required. The HEATER-AIR COND lever must be partially or fully down to supply air to the cooling unit before adjusting this knob.

Custom System

Control operation remains the same as described in the 1961 Passenger Car Shop Manual.

BOWDEN CABLE ADJUSTMENT

Adjustment procedure is basically the same on all bowden cables including those used on Chevrolet Air Conditioning Systems.

1. Remove the loop of the bowden cable from its pin on the diverter door lever.
2. Set the control lever and the diverter door lever in the "OFF" position.
3. Loosen the clamp holding the bowden cable and move the cable until the loop on the cable matches the pin on the lever. Then tighten the clamp.
4. Install the loop over the pin.
5. Check for proper operation.

FUSES

The All Weather and Custom Deluxe Systems make use of a 20 amp fuse in the junction block (fuse panel) beneath the instrument panel, and a 30 amp fuse in the electrical line between the starting motor solenoid and the relay near the blower motor.

The Custom System uses the 20 amp fuse in the fuse panel but has a 20 amp in-line fuse between the starter solenoid and the blower relay.

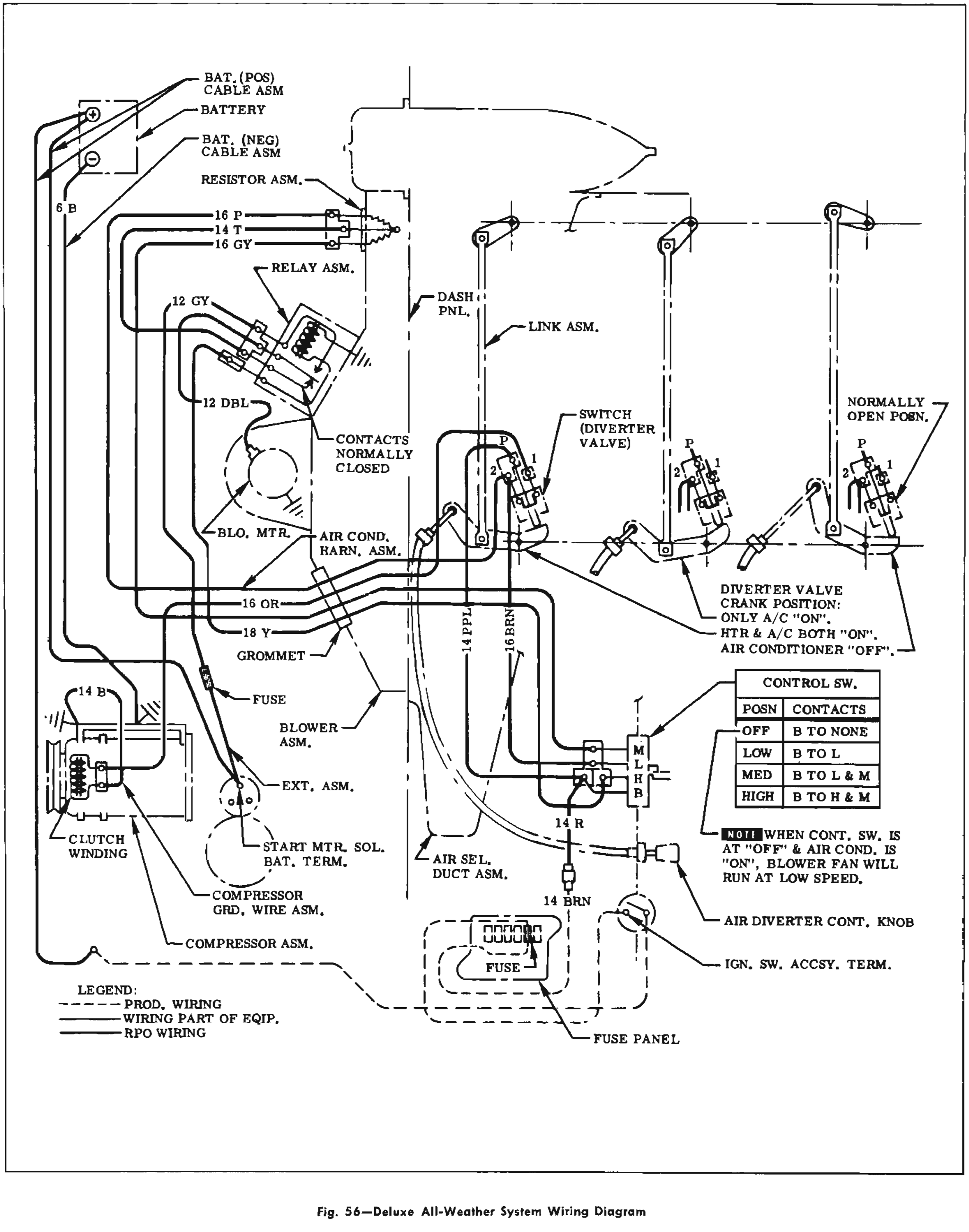
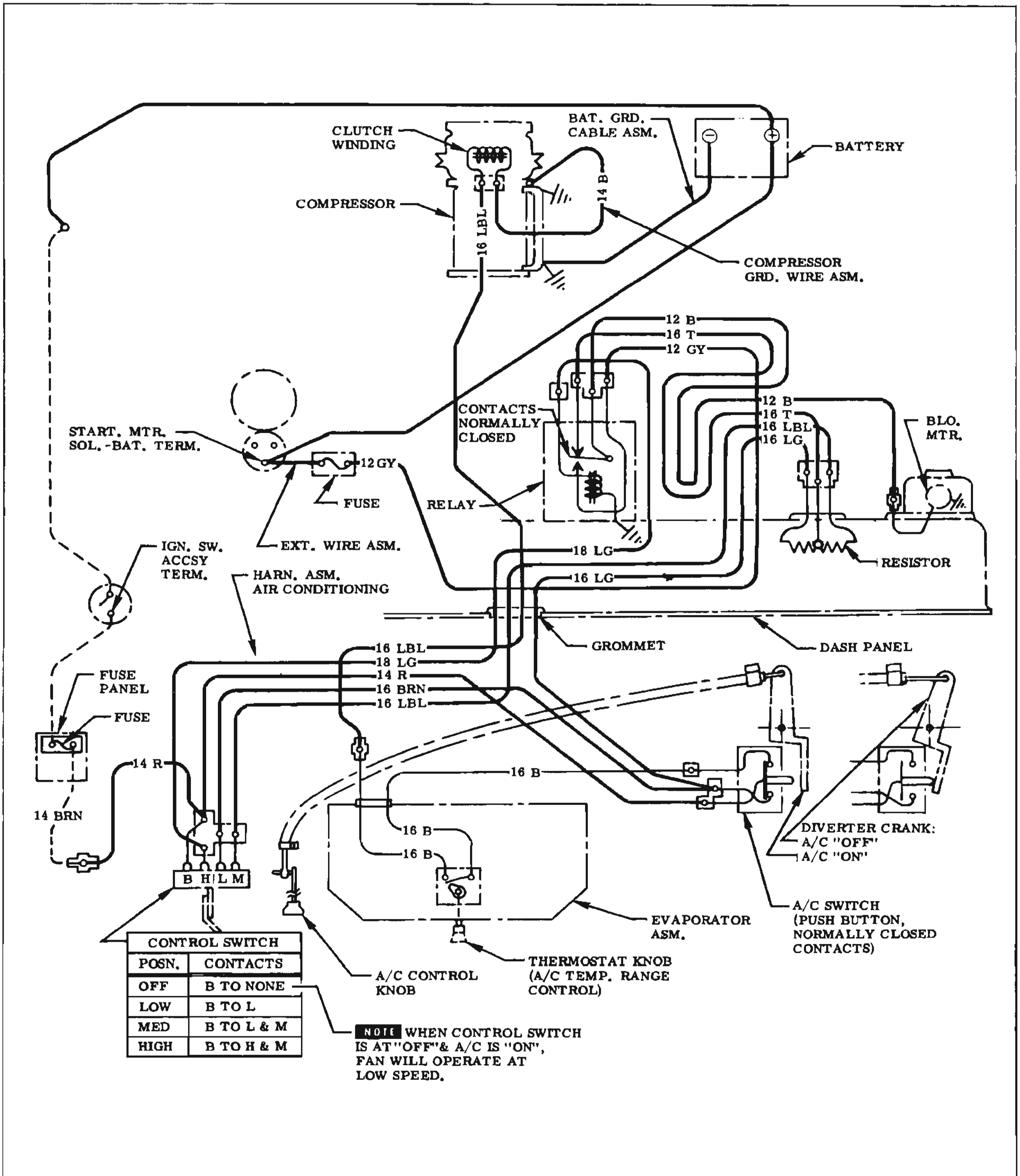
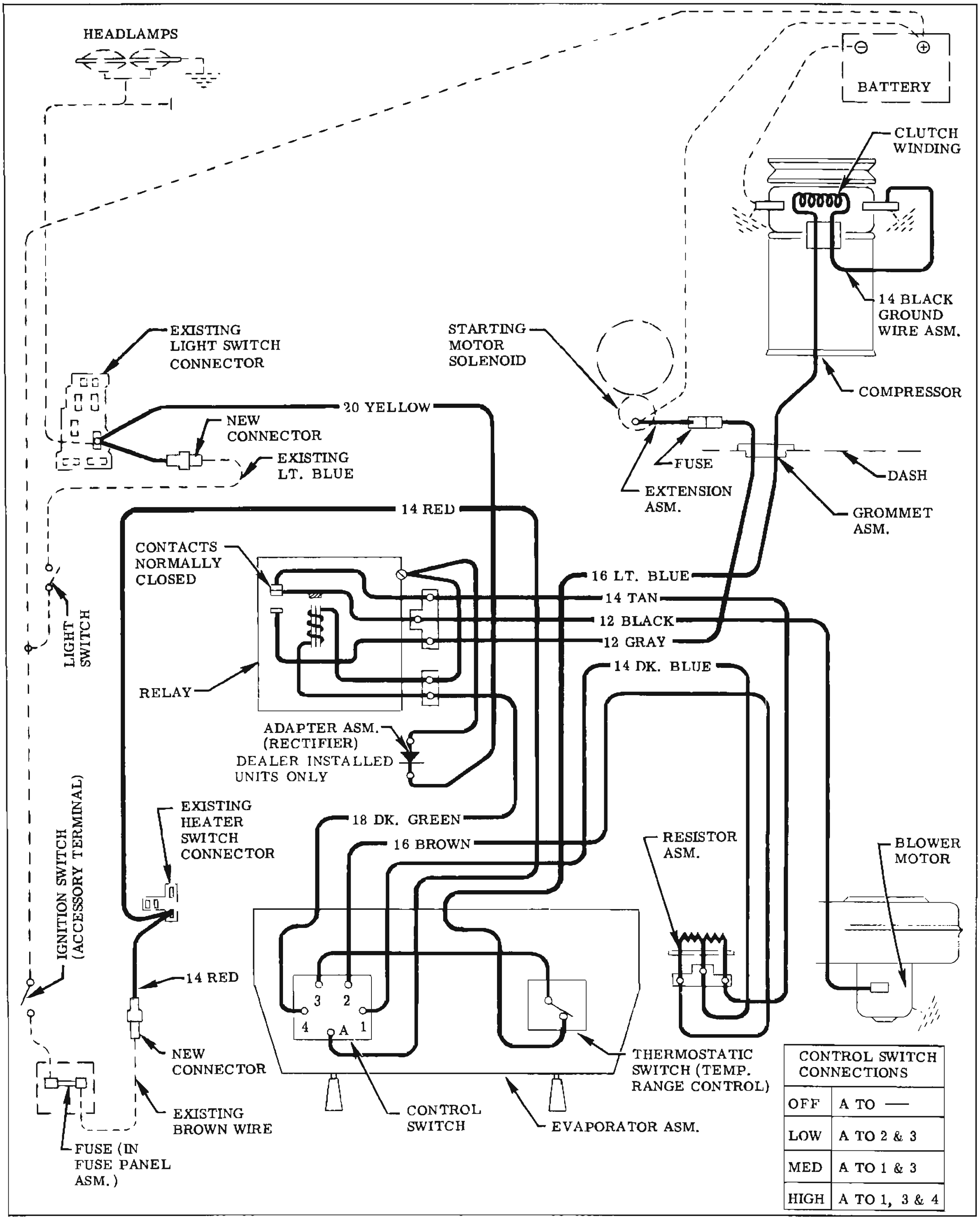


Fig. 56—Deluxe All-Weather System Wiring Diagram



CONTROL SWITCH	
POSN.	CONTACTS
OFF	B TO NONE
LOW	B TO L
MED	B TO L & M
HIGH	B TO H & M

Fig. 57—Custom Deluxe System Wiring Diagram



CONTROL SWITCH CONNECTIONS	
OFF	A TO —
LOW	A TO 2 & 3
MED	A TO 1 & 3
HIGH	A TO 1, 3 & 4

Fig. 58—Custom System Wiring Diagram

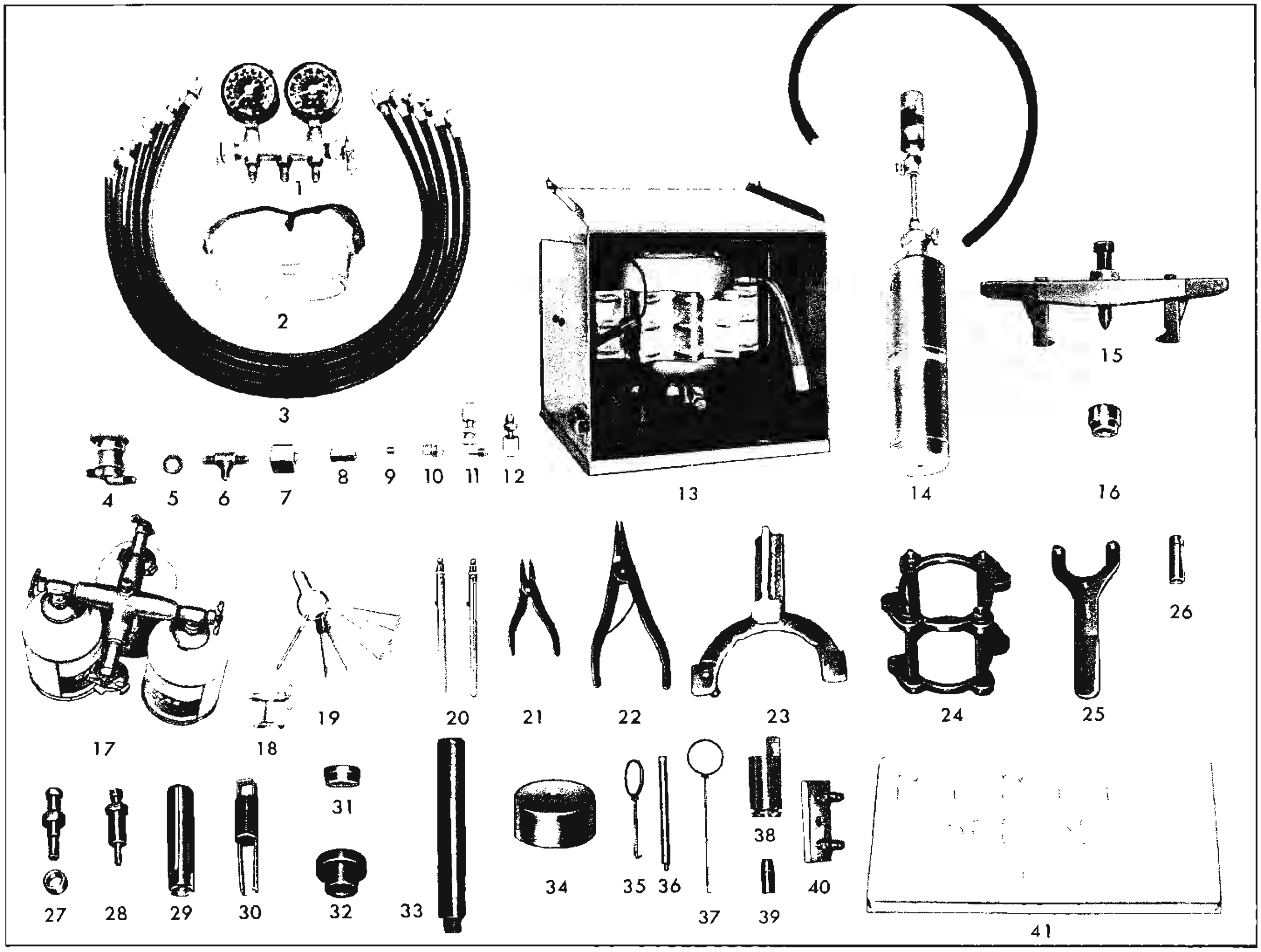


Fig. 59—Air Conditioning Special Tools

1. J-5725-A Gauge Manifold Test Unit
2. J-5453 Goggles
3. J-5418 Gauge Charging Lines (5)
4. J-5462-1 2-Way Valve
5. J-5462-3 Refrigerant Drum Washer
6. J-5462-2 3-Way "T"
7. J-5462-4 Refrigerant Drum Reducer
8. J-5462-7 Female Connection
9. J-5462-8 Ring Seal
10. J-5462-9 Pipe Fitting (¼" x ¼")
11. J-9459 90° Gauge Line Adapter
12. J-5420 Gauge Line Adapter
13. J-5428 Vacuum Pump
14. J-6084 Leak Detector
15. J-8433 Puller
16. J-9395 Puller Pilot
17. J-6272 No. 3 Multi-Opener (3-Can)
18. J-6271 Fitzall Valve (Single Can)
19. J-7151 Non-Magnetic Clutch Shims
20. J-5421 Pocket Thermometers (2)
21. J-5403 #21 Snap Ring Pliers
22. J-6435 #26 Snap Ring Pliers
23. J-9396 Compressor Holding Fixture
24. J-9397 Compressing Fixture
25. J-9403 Clutch Hub Holding Tool
26. J-9399 9/16" Thin Wall Socket
27. J-9401 Hub and Drive Plate Assembly Remover
28. J-9480 Hub and Drive Plate Assembly Installer
29. J-9392 Seal Remover
30. J-9393 Seal Seat Remover
31. J-9398 Pulley Bearing Remover
32. J-9481 Pulley and Bearing Installer
33. J-8092 Handle
34. J-9521 Internal Assembly Support Block
35. J-5139 Oil Pickup Tube Remover
36. J-9432 Needle Bearing Installer
37. J-9553 Seal Seat "O" Ring Remover
38. J-21508 Seal Seat "O" Ring Installer
39. J-21303 Shaft Seal Protector
40. J-9527 Pressure Test Connector
41. J-9402 Parts Tray

HEATER

GENERAL DESCRIPTION

Components of the Chevrolet heater are attached to the firewall on the right side of the vehicle. The blower and air inlet assembly and water hoses are located on the engine side of the firewall while the heater core and distributor duct are on the passenger side.

The heater operates on outside air only with the blower receiving its airflow from the cowl vent plenum chamber.

Since the unit has no water valve, water circulation keeps the core hot at all times. Air passing through the core receives maximum heat from the core at all times.

In operation three levers, AIR, DEF, and TEMP control all heater operations. The AIR lever is a combination control. Moving the lever halfway down opens the AIR door (by means of a bowden cable) to supply fresh air to the heater and the remainder of the lever travel operates the three speed blower switch. The other levers depend on bowden cables to operate their diverter doors located in the distributor duct. These three levers control heater output and operation.

At the heart of the heater operation is the *temperature damper door*. Air from the blower follows parallel paths through the distributor duct, with one path passing through the heater core and the other path bypassing the core. The temperature damper door, operated by the TEMP control lever, is placed in the duct so that when it closes off the path from the heater core, it allows ambient airflow through the parallel path. In the opposite position only heated airflow is allowed. Final heater output temperature is dependent upon the proportion of heated and ambient air blended together according to the setting of this temperature damper door. To insure positive closing of this door when the heat lever is in the off position, a cam lock device is utilized in the TEMP. control linkage.

Just beyond the temperature damper door is the *Air door*, operated by the AIR control lever, which is the air on-or-off control.

The *defroster door*, operated by the DEF lever, acts to divert the heated airflow up through the defroster ducts for de-fogging, defrosting or de-icing operations.

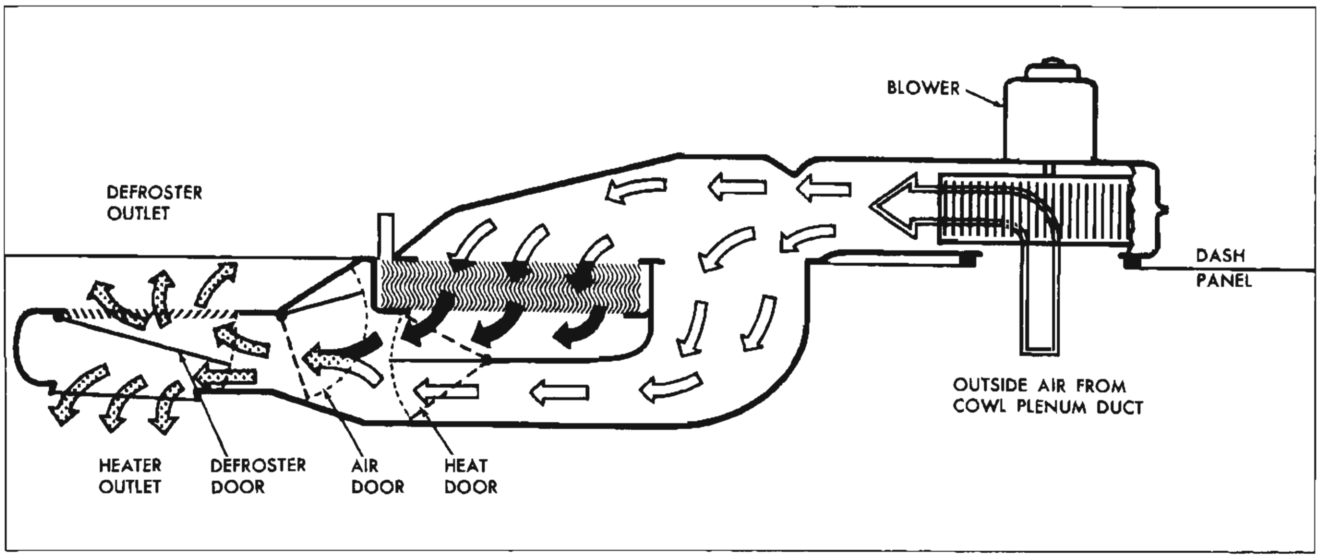


Fig. 60—Heater Air Flow

SERVICE DIAGNOSIS

Poor or No Heating

1. Poorly adjusted bowden cable.
2. Heater hoses kinked or deteriorated.
3. Blower inoperative.
4. Heater core plugged.
5. Poor blower motor ground connection.

Heater Will Not Shut Off

1. Poorly adjusted bowden cable.

Blower Inoperative

1. Check resistor and switch.
2. Check blower motor.

SERVICE OPERATIONS

BLOWER ASSEMBLY

Removal

1. Remove right hood hinge, sheer plate and fender skirt as outlined in Section 14. The entire hood may be removed if desired.
2. Disconnect electrical connection to blower motor.
3. Remove the five nuts and two screws attaching the blower and air inlet assembly to the firewall.
4. Disengage the blower and air inlet assembly from the mounting studs and draw the assembly and sealing gasket out from beneath the fender.

Blower Motor Replacement

1. Remove the screws attaching the motor, mounting plate and blower to the blower assembly.
2. Remove clip attaching blower to the motor shaft.
3. Remove the two screws attaching the motor to the mounting plate.
4. Replace blower, mounting plate and gasket on new motor assembly and reinstall into blower assembly.

Installation

1. Slide the gasket seal and blower and inlet assembly into place in the same manner removed. Replace the two screws and five nuts removed and tighten.

CORE

Replacement

1. Drain radiator.
2. Remove the heater hoses at their connections beside the air inlet assembly.

   NOTE: The hose from the water pump must go to the top heater core pipe; the other hose goes from the thermostat housing to the lower core pipe.

3. Remove the bowden cables and all electrical connectors from the heater and defroster assembly.
4. Remove the dash mat retaining plugs and remove the lower portion of the dash mat. Then remove the air inlet bowden cable from its two clips beneath the upper edge of the floor mat.
5. On the engine side of the dash, remove the two screws and five nuts attaching the air inlet assembly to the dash panel.
6. Inside the vehicle, remove the entire heater and defroster assembly from the vehicle and set on a bench.

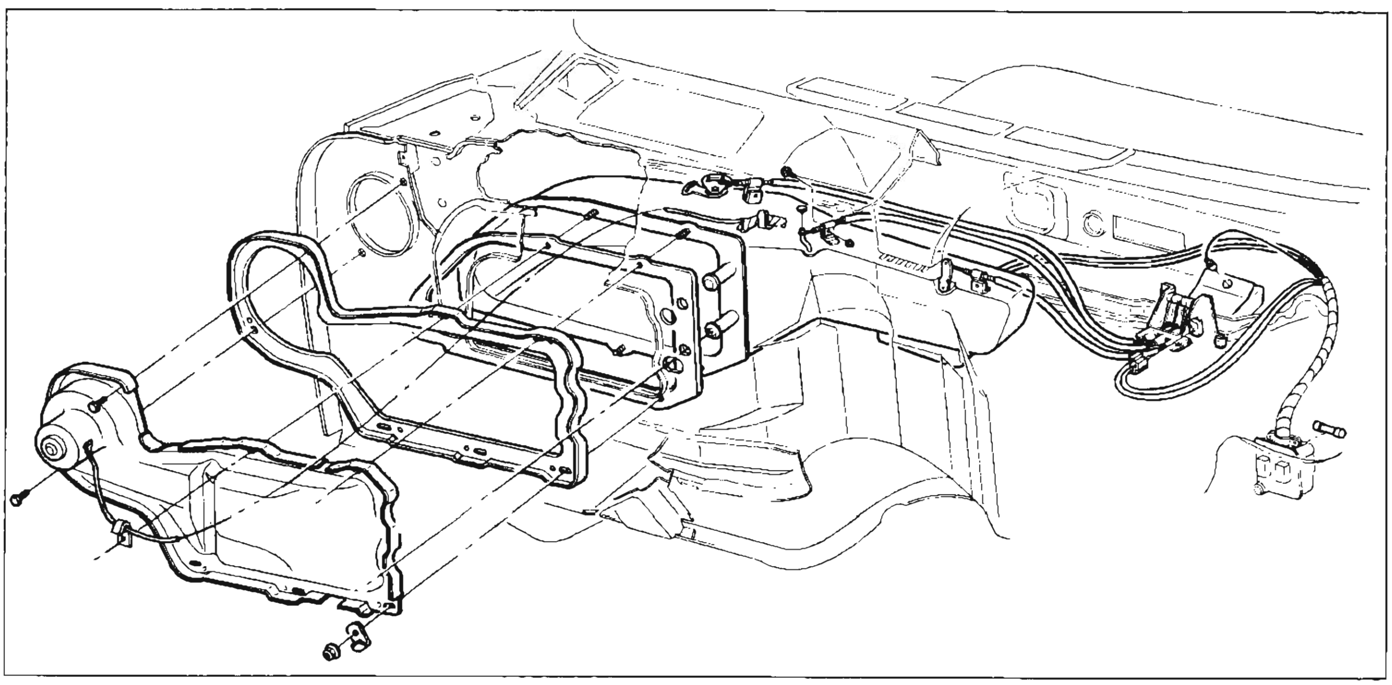


Fig. 61—Heater Blower and Air Inlet Assembly and Floor Distributor

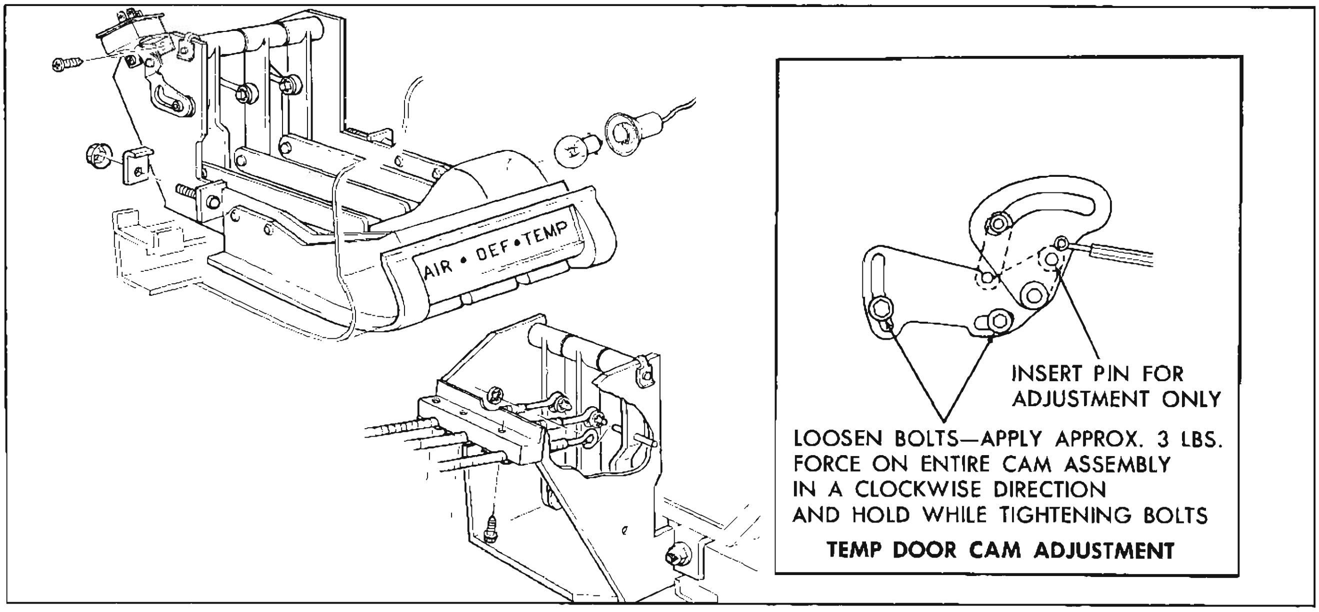


Fig. 62 Control Assembly Installation

7. Remove the core assembly retaining springs and remove the core.
8. Install the replacement core.

   NOTE: Be sure the core to case sealer is intact before replacing core. Replace with new sealer if necessary.

9. Replace the core and core retaining springs.
10. Within the vehicle insert the five studs on the heater and defroster assembly through the holes in the cowl and blower and air inlet assembly. Replace the five stud nuts.
11. Replace bowden cables, electrical connectors, air inlet bowden cable in its clips, dash mat and mat retaining plugs.
12. Replace heater hoses, being careful to reinstall them in their proper location.
13. Refill radiator.

RESISTOR

The resistor assembly is attached to the heater distributor assembly. It should be replaced if low or medium blower speed is inoperative.

CONTROLS

Control Assembly

The control assembly is attached to the dash reinforcement by two screws as shown in Fig. 62.

Fan-Air Lever

Since the heater makes use of outside air only, this lever serves as an "air on or off" control by actuating a damper in the distributor assembly downstream from the heater core. With the lever in the half-way down position, this damper will be open to allow airflow into the vehicle. Moving the lever further down will actuate the three-speed (LOW-MED-HIGH) fan lever which controls the blower motor and determines the volume and force of the air flowing through the heater core into the car.

Temperature Lever

Through its bowden cable, this lever controls the positioning of the temperature door in the distributor duct. This door allows airflow through either the heater core (full DOWN) or the bypass duct around the heater core (full UP). With the water temperature constant, the TEMP lever is an air mixture control, controlling temperature by varying the proportions of hot and cold air blended in the heater distributor duct.

The cam lock device at the damper door operating lever may be adjusted as follows: Loosen the two attaching screws. Place the cam in the closed position and insert a pin through holes provided, locking the cam in this position. Rotate the entire assembly toward the closed position. Hold closed with some force and tighten attaching screws. Remove the locking pin.

Defrost Lever

The defrost lever controls the position of the damper (or deflector) door located in the heater and defroster assembly. In the "up" position full airflow will go to the floor duct for car heating purposes. In the "down" position the diverter door will drop down and divert almost all the airflow to the defroster duct. (This position will seldom be needed except for extreme de-icing requirements.) A "detent" position is built into the linkage of this lever which will provide partial airflow only to the defroster duct and which should be used for all normal defogging operations.

BOWDEN CABLES

Bowden cable adjustment should be made in the following manner:

1. See Figure 62. With the cables attached to the control levers and the control knobs in the "up" position, pull on the cable sheaths (5 lbs. approximately) and attach the sheath clips to the proper brackets on the heater and defroster assembly.
2. Attach the cable wires to the heater and defroster assembly crank arms.

FAN SWITCH

Replacement

1. Remove two control assembly-to-instrument panel reinforcement attaching screws and push the assembly toward the front of the vehicle and down.
2. Remove spring nut, two tapping screws and the electrical connector.
3. Replace switch, tapping screws, spring nut and electrical connector.
4. Place control assembly into instrument panel and replace two screws.

CRUISE CONTROL

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GENERAL DESCRIPTION

Cruise Control is a driver-operated speed regulating device that may be used either as a speed reminder or as an automatic speed control for any car speed above 25 mph.

The major components of Cruise Control are: The power unit, mounted under the hood; and the selector control assembly, located on the upper left side of the instrument panel.

The power unit is driven by a flexible drive cable from the transmission (fig. 63). The drive cable also drives the speedometer cable that runs from the power unit to the speedometer. The selector control assembly is connected to the power unit by means of a bowden cable. Mechanical linkage connects the power unit to the accelerator and carburetor throttle rod.

The selector control assembly is shown in Figure 64. Speed settings are secured by use of a calibrated thumb wheel. The selector dial is numbered with speed markings from 30 mph to 80 mph, in increments of 5 mph.

The slide switch for automatic speed control operation is located to the right of the selector dial. When the switch is in the "off" position, the unit has no effect at any speed. Once the switch has been moved to the center or "on" position, the unit is on and accelerator back pressure will be felt as a warning at the speed the dial is set for. In the "lock" position, the switch closes an electrical circuit, provided foot pressure is maintained on the accelerator pedal. Once the unit is locked in, foot may be removed from pedal if desired.

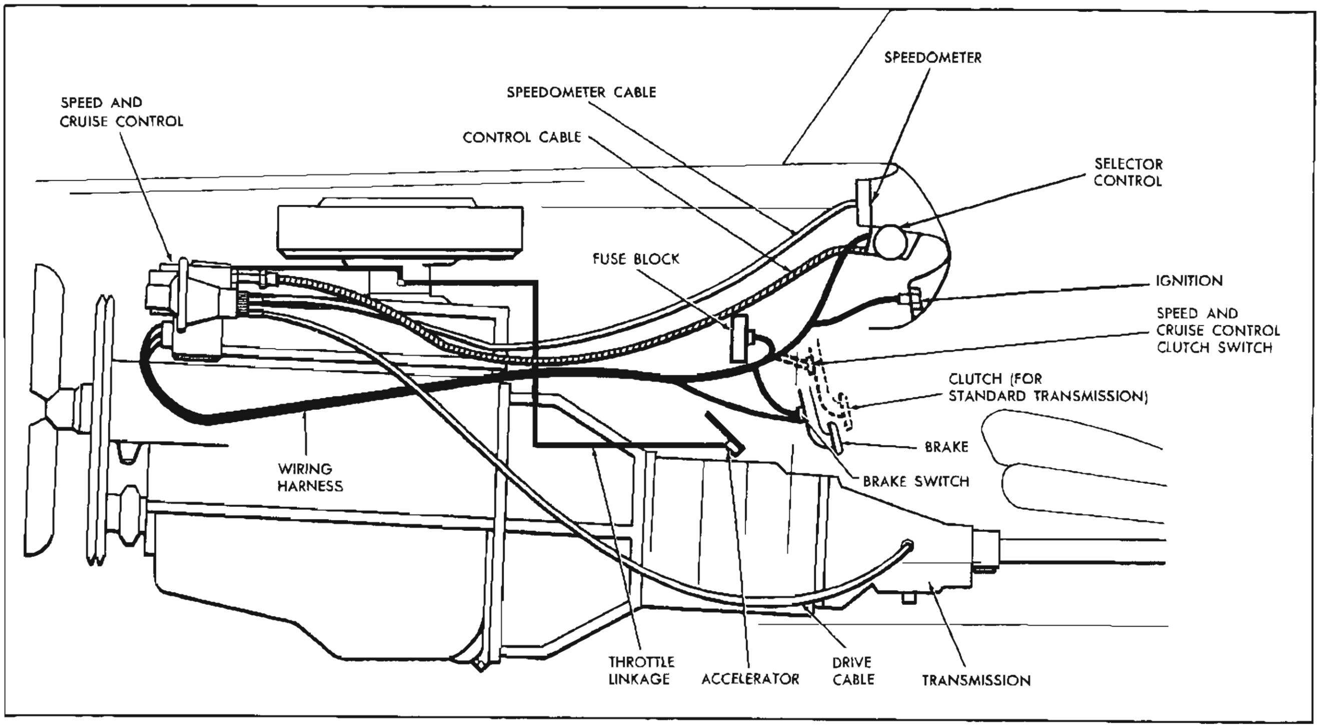

Fig. 63—Cruise Control Installation

The switch, which is spring loaded, will return to the "on" position when released.

The complete electrical circuit for the Cruise Control is shown in Figure 64. A reversible electric motor in the power unit actuates the mechanical linkage between the power unit and the carburetor. Grounding points for forward and reverse energizing of the motor are closed and opened by a governor, under control of a governor spring that is compressed or relaxed to calibrated positions, corresponding to selected speeds, by the bowden cable leading to the selector control.

Speed Reminder Operation

Move the slide switch to "on" position and rotate the selector dial to the desired speed setting, with speed setting visible above the edge of the escutcheon. The Cruise Control will then function as a speed reminder by exerting back pressure on the accelerator pedal whenever the speed setting is reached. The unit will function in the same way whenever the speed setting is changed.

Cruise Control does not interfere with normal acceleration up to the selected speed setting. Further acceleration may be obtained above that speed by pressing the accelerator pedal past the warning back pressure position.

Automatic Speed Control Operation

For automatic speed control, move the slide switch to the "on" position and rotate selector dial to desired speed setting. Accelerate until selected speed is reached and back pressure is felt on the accelerator pedal. Momentarily move slide switch to "lock" position while

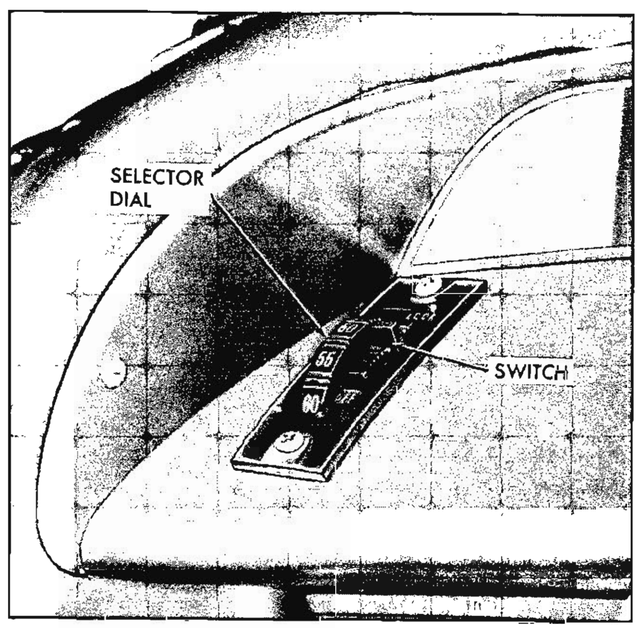

Fig. 64—Selector Control Assembly

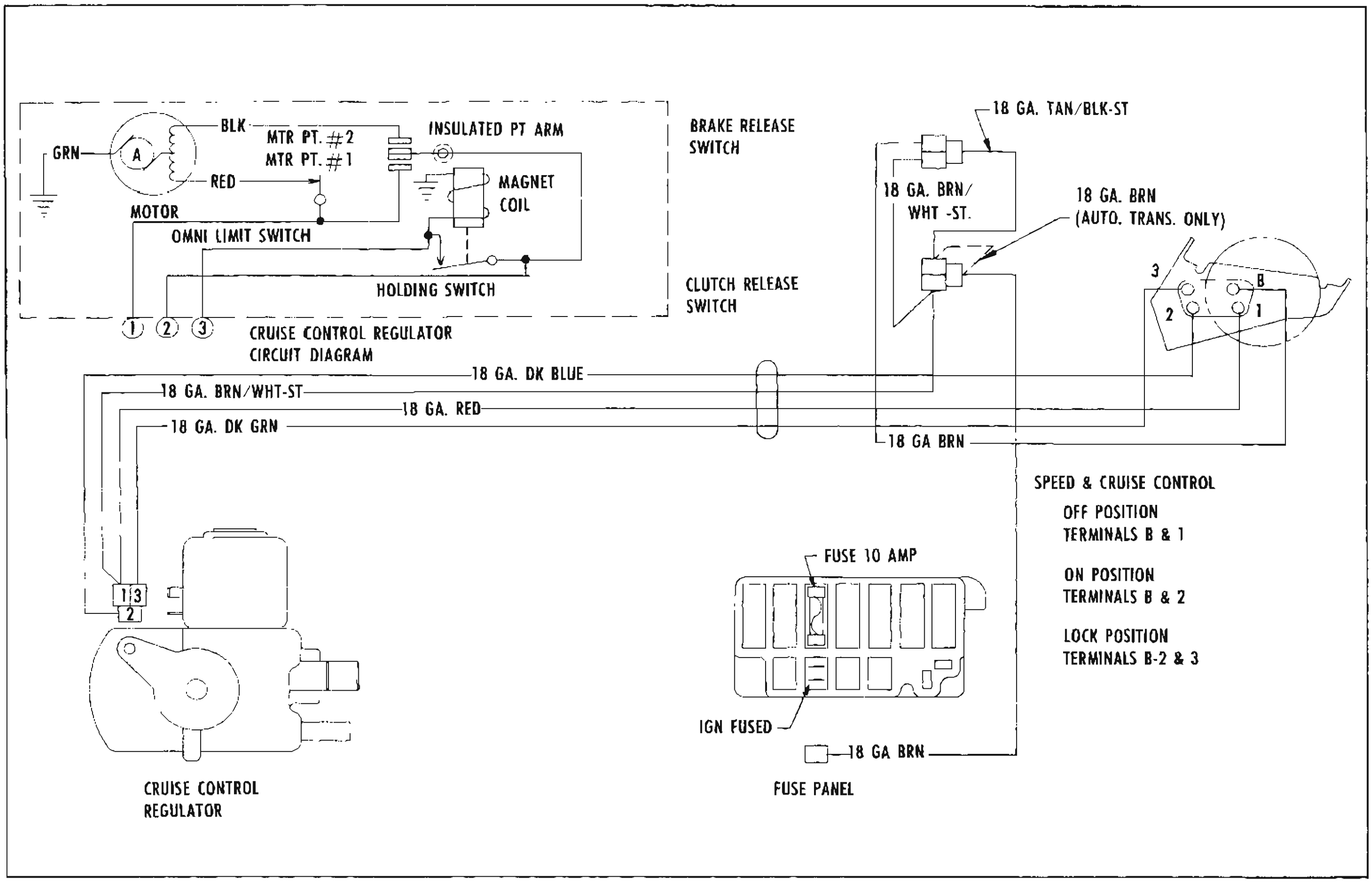

Fig. 65—Cruise Control Wiring Diagram

holding down against accelerator back pressure, and then release switch. The car will now maintain the selected speed automatically and the driver may remove his foot from the accelerator pedal if desired. Selected speed will be maintained regardless of road terrain, within limits of engine performance.

When the unit is in automatic control, car speed can be changed by slowly rotating the selector dial forward to increase speed or rearward to decrease speed.

CAUTION: When changing car speed during automatic control, always rotate dial slowly, to prevent sudden acceleration or deceleration.

Automatic control is disengaged when the brake pedal is depressed. It can be re-engaged by simply accelerating until back pressure is felt, and momentarily pushing slide switch to "lock" position. It is not necessary to rotate the selector dial to re-engage automatic control. The unit can be canceled by turning off the ignition switch and disengaged completely by moving the slide switch to the "off" position, without touching the speed setting.

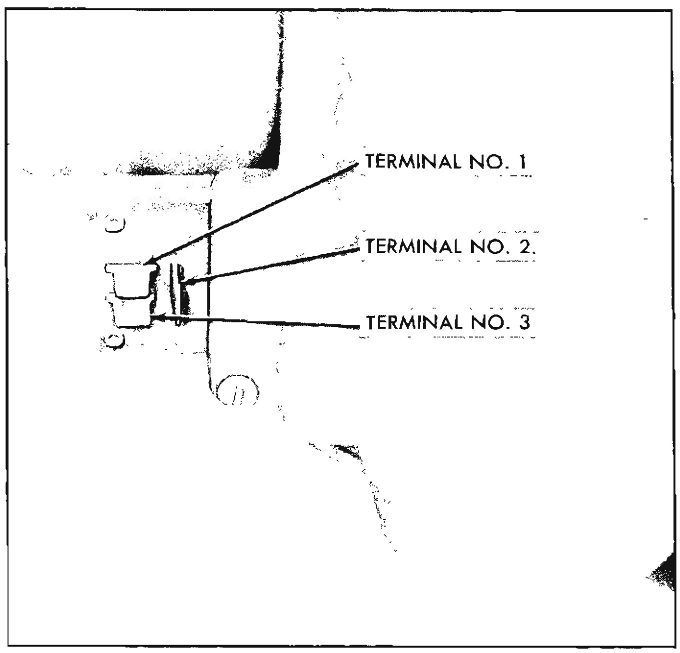

Fig. 66—Electrical Connections

SERVICE OPERATIONS

PRELIMINARY CHECKS

It is not always necessary to remove and disassemble the power unit in cases of an inoperative Cruise Control. The following checks should be performed as part of your diagnosis to determine the cause and correction of Cruise Control trouble and to eliminate unnecessary service work on the power unit.

1. Disconnect multiple connector at power unit.
2. Turn ignition switch on. **Do not start engine.**
3. Push slide switch to "off" position.
4. Using a test lamp, ground one test lamp lead and touch other lead to terminal #1. Test lamp should light. If lamp fails to light, check for blown fuse, improperly adjusted brake or clutch release switch, or defective wiring in selector control assembly.
5. Ground one test lamp lead, touch other lead to terminal #2, and push slide switch to "on" position. Test lamp should light. If lamp fails to light, check for defective wiring in selector control assembly.
6. Ground one test lamp lead and touch other lead to terminal #3. Push slide switch to "lock" position and allow switch to come back to "on" position. Lamp should light when slide switch reaches "lock" position and then should go out when it returns to "on" position. If test lamp fails to operate as described above, check for defective wiring in selector control assembly.
7. Turn ignition switch off and slide switch off.
8. Check adjustment of selector control cable.
9. Check adjustment of accelerator linkage rod.
10. Check selector control dial calibration.

If the above checks fail to locate and correct the Cruise Control trouble, the power unit should be removed for service work.

RELEASE SWITCH ADJUSTMENT

The following procedure applies to both the brake and the clutch pedal switches.

1. Turn ignition switch on. **Do not start engine.**
2. Push slide switch to "off" position.
3. Using a test lamp, ground one test lamp lead and touch other lead to terminal #1.
4. Loosen mounting screw securing release switch to bracket.
5. Adjust switch so that lamp will light when brake or clutch pedal is released and will not light until pedal is depressed approximately ¼ inch. Tighten switch mounting screw.

NOTE: If switch cannot be adjusted, it is defective and should be replaced.

6. Install new switch and repeat step 5.
7. Remove test lamp and turn ignition switch off.

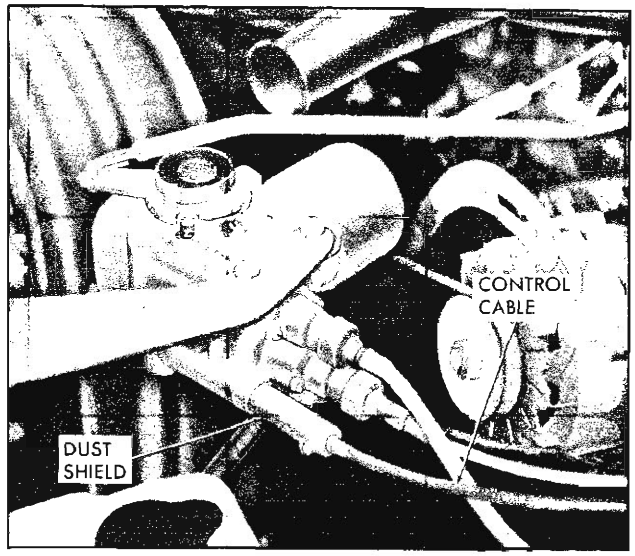

Fig. 67—Control Cable Adjustment

CONTROL CABLE ADJUSTMENT

1. Rotate Selector Dial to low speed as far as it will turn without forcing.
2. Loosen screw on dust shield. (This screw retains control cable in bottom of dust shield).
3. Again try to rotate selector dial to low speed, making certain it is against low speed stop.
4. Push in lightly on Control Cable at dust shield until it stops.

   CAUTION: Do not force cable beyond this position.

5. Hold cable against stop and tighten screw on dust shield securely.

LINKAGE ADJUSTMENT

1. Start engine and operate on slow idle with transmission shift lever in "Park".
2. Remove cotter pin securing swivel on linkage rod to Cruise Control exterior arm. Remove swivel from arm.
3. Insert Sleeve Gage, over stop stud on regulator, and hold exterior arm against gage.
4. Turn swivel on linkage rod until it enters hole in exterior arm freely.
5. Replace cotter pin, remove gage, and shut off engine.

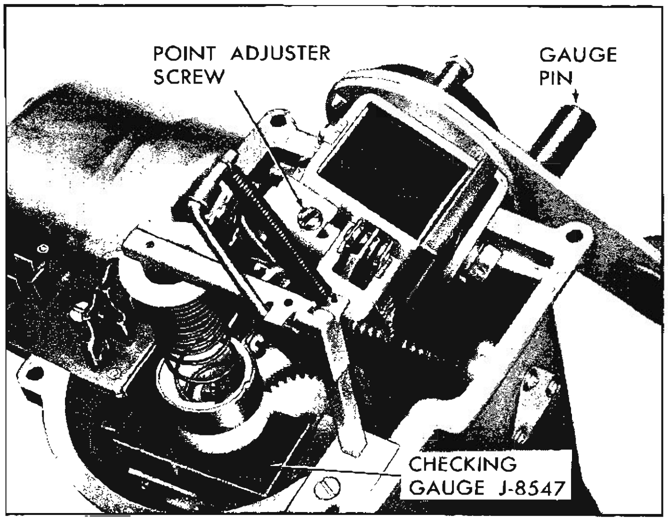

Fig. 68—Centering Contact Points

GROUNDING POINTS ADJUSTMENT (ON CAR)

There are two sets of electrical grounding points that operate the Cruise Control motor in the forward and reverse direction. One grounding point on the motor side of the magnet controls acceleration, while the other grounding point on the locking arm side of the magnet controls deceleration.

The contact arm is energized, and any grounding resulting from contact with a screwdriver or similar tool can cause a short or blow a fuse.

The grounding points are still operative when blackened or pitted; however, any build-up on the points should be removed. When filing points, **use a cloth to catch filings as they could become wedged between the small ball bearings in the nut on the drive screw and cause the drive screw to stick.**

1. Remove four screws securing power unit cover and remove cover.
2. Disconnect drive cable at base of power unit.
3. Move contact arm against either grounding point and use a feeler gage to measure the full gap between contact arm and other point (fig. 68). This gap must be .090 inch ± .010 inch. If gap is not within specifications, carefully bend either grounding point on point adjuster until proper gap is obtained.
4. Loosen screw on actuator clamp and rotate actuator until clamp fingers are at right angles (90°) to actuator cam shoulders. Then tighten actuator clamp screw.

   NOTE: Make certain that clamp fingers are pressed down firmly against actuator cams before tightening clamp screw.
5. Insert Locking Arm Gage, J-7652, over stop stud. Turn ignition switch on and slide switch on. **Do not start engine.**
6. Move contact arm against ground point on locking arm side of magnet. When magnet is in low speed position, disconnect plug from terminal block while still holding contact arm against point. **Do not use screwdriver to turn drive screw.**
7. Turn governor weights until they are parallel with drive screw, then place Governor Weight Wedge, J-8547, between governor weights, pressing down lightly on wedge and actuator until weights are held out to their stop position.
8. Use a feeler gage to measure gap between contact arm and either grounding point on point adjuster. This gap should be approximately one-half of the full gap measurement in Step 3. If gap is not within specifications, contact arm is not centered properly. Loosen screw on point adjuster (fig. 68), and move adjuster until contact arm is centered between the two grounding points on the point adjuster. Then tighten point adjuster screw and recheck gap.
9. Remove Locking Arm Gage and Governor Weight Wedge.
10. Connect multiple connector at power unit.
11. Turn ignition switch off and slide switch off.
12. Connect drive cable to base of power unit.
13. Install cover, making certain that rubber seal and felt seal are properly seated in grooves of cover and housing. Secure cover with four screws.

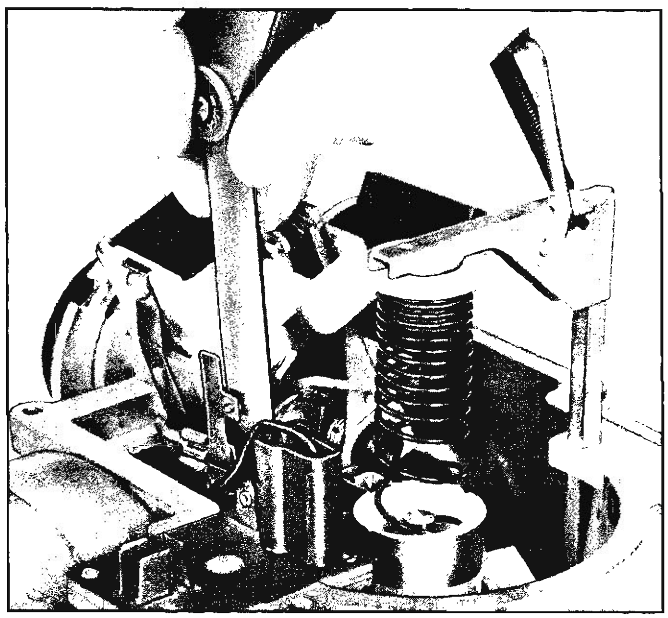

Fig. 69—Omni-Switch Adjustment

OMNI-SWITCH ADJUSTMENT (ON CAR)

1. Remove four screws that hold cover to housing and remove cover.

2. Turn ignition switch "on" and slide switch "on". **Do not start engine.**

3. Hold contact arm against grounding point on locking arm side of magnet assembly until magnet assembly reaches low speed position then release contact arm. Magnet assembly should move to wide open position and open points of omni-switch.

4. Using a feeler gage measure gap opening between points of omni-switch (fig. 69). This gap must be .025 inch ± .010 inch. If gap is not within specifications, bend inboard point (inboard from magnet assembly) until proper gap is obtained and points are aligned.

5. Turn ignition switch "off" and slide switch "off".

6. Install cover, making certain that rubber seal and felt seal are properly seated in grooves of cover and housing. Secure cover with four attaching screws.

SELECTOR DIAL ADJUSTMENT

1. Rotate selector dial to High speed position against its stop.

2. Push slide switch to ON position.

3. Operate car at a steady speed of 50 MPH, as indicated on speedometer.

4. Rotate selector dial rearward until back pressure is felt on accelerator pedal then lock-in Cruise Control by momentarily pushing slide switch to LOCK position.

5. With car speed at 50 MPH, as indicated on speedometer, the numeral 50 on selector dial should be completely visible above the lower edge of the escutcheon. Observe reading on dial then move slide switch to OFF position. **Do not rotate selector dial.**

6. If reading on selector dial agrees with reading on speedometer, selector dial is properly calibrated. If readings do not agree, adjust selector dial as follows:

   a. **With slide switch in OFF position,** rotate dial either forward (if dial reading is on the low side) or rearward (if dial reading is on the high side) against its stop. Then rotate dial by hand beyond its stop the necessary amount of travel as observed in step 5 to correct the selector dial setting.

   b. Repeat complete adjustment procedure until reading on dial agrees with reading on speedometer.

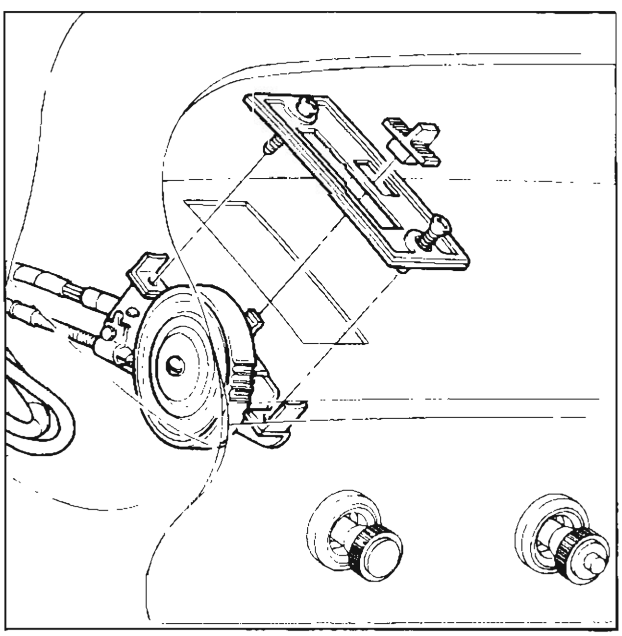

Fig. 70—Control Assembly Installation

SELECTOR CONTROL ASSEMBLY

Removal and Installation

For removal and installation of the selector control assembly and cable, refer to Figure 70.

POWER UNIT

Whenever a power unit is removed, the car can be driven with the speedometer operating by removing the power unit cables from the speedometer and transmission, and installing a standard speedometer cable and housing assembly between the transmission and speedometer.

Removal (fig. 71)

1. Disconnect multiple electric connector at power unit.

2. Disconnect drive cable and speedometer cable from power unit.

3. Loosen set screw at lower end of dust shield.

4. Remove dust shield from housing, then slide dust shield down cable and disconnect end of bowden cable from compressor rod and spring assembly.

5. Disconnect accelerator linkage from exterior arm on power unit.

6. Remove two bolts and nut securing power unit to mounting bracket (and brace on V-8). Remove power unit.

Disassembly (fig. 72)

1. Remove four screws securing cover and remove cover, being careful not to lose rubber seal or felt seal in cover grooves.

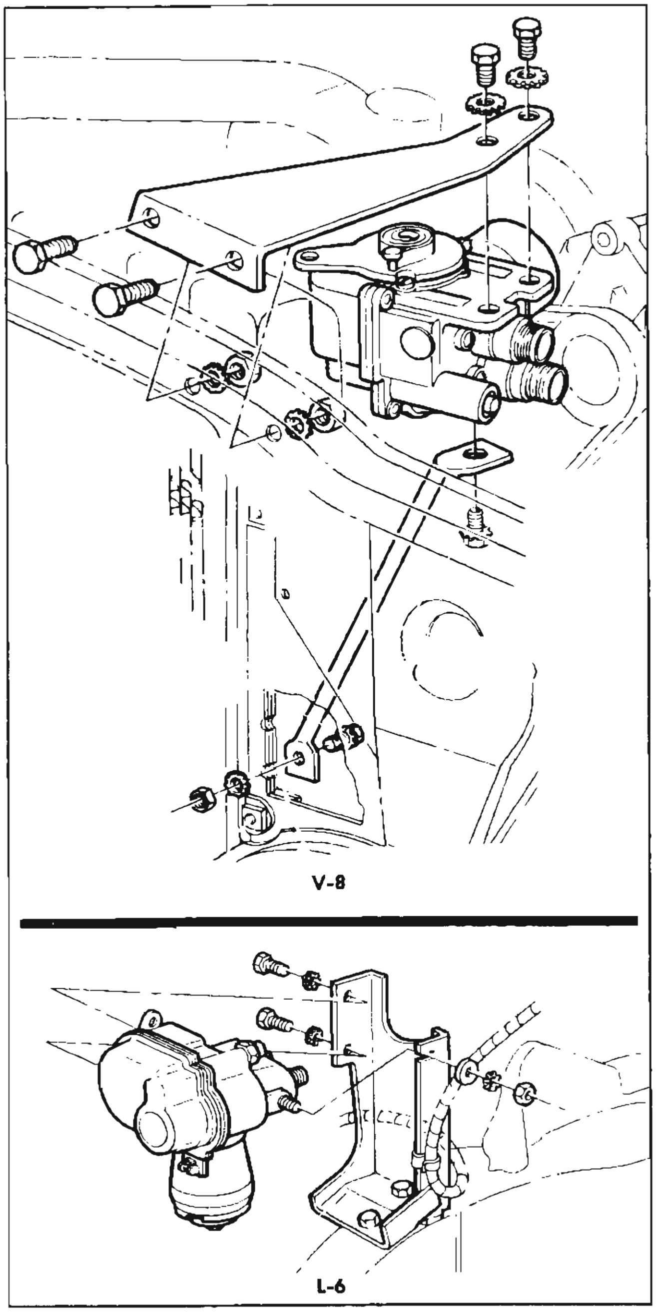

Fig. 71—Power Unit Installation

2. Remove motor mounting stud nut from inside housing and disconnect green motor wire from mounting stud.
3. Remove governor spring and plastic cap.
4. Remove locknut from lower end of compressor rod and spring assembly and remove compressor rod and spring assembly from housing.
5. Remove screw securing compressor rod guide to housing and remove rod guide from housing.
6. Disconnect red and black wires from bottom of grounding points on point adjuster assembly.
7. Disconnect two red wires from omni-switch and black wire from bottom of magnet assembly.

   NOTE: The omni-switch acts as a limit switch which stops travel of magnet assembly and prevents motor from running, when unit is shut off.

8. Remove remaining nut securing motor to housing and remove motor.
9. Disconnect red and black wires from terminal block.
10. Remove screw securing terminal block to housing and remove terminal block.
11. Disconnect torsion spring from exterior arm, and remove spring and exterior arm.
12. Remove locking arm stop stud and washer and two pintle retaining screws and washers located under locking arm.
13. Lift magnet and pintle assembly out of housing, being careful not to lose felt seal in groove of housing.
14. Lift contact arm actuator assembly and clamp off drive shaft.
15. Remove locking arm from pintle shaft and remove wave washer.
16. Remove screw securing point adjuster assembly to point bracket on magnet assembly and remove point adjuster assembly.
17. Remove screw securing grey wire terminal and leaf switch to point bracket on magnet assembly and remove leaf switch.
18. Remove snap ring and fabric washer from end of pintle shaft and remove contact arm from shaft. Discard snap ring.
19. Remove pintle shaft from magnet assembly.

    NOTE: Do not remove secondary armature assembly on the magnet assembly, as it is not serviceable.

20. Remove three screws from serial number plate and remove plate and bushing.
21. Remove snap ring, outer bearing race, bearing and inner bearing race. Then remove drive screw and nut assembly from motor end of housing.

    CAUTION: When handling drive screw assembly, keep parts clean, as dirt particles can become wedged between the small ball bearings on end of shaft or in shaft nut, and cause drive screw to stick.

22. Remove snap ring, spacer, wave washer, and governor weight assembly from drive shaft inside housing.
23. Remove two screws securing speedometer adapter to housing and remove adapter.
24. Remove springrip nut securing plastic gear in housing and remove gear.
25. Remove two screws securing drive adapter to housing and remove adapter.

NOTE: The governor assembly and power unit housing are serviced as a single unit.

Assembly

1. Install drive adapter on bottom of housing and secure with two screws.

   NOTE: The drive adapter and speedometer adapter are interchangeable.

2. Lubricate plastic gear with cam and bearing lubricant, and install gear in housing.
3. Secure gear in housing with springrip nut.
4. Install speedometer adaptor on bottom of housing and secure with two screws.
5. Install governor weight assembly, wave washer, and spacer on drive shaft, secure with new snap ring.
6. Lubricate drive screw assembly sparingly with cam bearing lubricant and install through motor end of housing.
7. Insert end of drive screw through boss in housing and install inner bearing race, bearing, outer bearing race, and new snap ring on end of drive screw.
8. Insert bushing in opening in housing; install serial number plate on housing, and secure with three screws.
9. Insert pintle in magnet assembly, through side opposite grounding points.
10. Install contact arm on end of pintle shaft with actuator pin facing away from magnet and install fabric washer. Then secure with new snap ring.
11. Install leaf switch on point bracket, positioning end of leaf switch between insulated end of secondary armature spring and terminal on back side of magnet assembly. DO NOT BEND LEAF SWITCH.
12. Install grey wire terminal over leaf switch and secure switch and terminal to point bracket with attaching screw.

    NOTE: When properly installed, end of leaf switch should rest against insulated end of secondary armature spring.

13. Install point adjuster assembly on point bracket, positioning the contact arm between the grounding points, and loosely install attaching screw.
14. Install large wave washer on pintle shaft and install locking arm on pintle.
15. Position drive nut in center of drive screw.
16. Attach actuator and clamp assembly on contact arm and install complete assembly in housing, positioning actuator over governor shaft, and align bracket tangs on bottom of magnet assembly with grooves in drive screw nut. Press down on complete assembly until it seats itself in housing.
17. Install two pintle screws and lock washers securing pintle assembly in housing.
18. Install locking arm stop stud and lock washer.
19. Install exterior arm on locking arm shaft with throttle arm end toward serial number plate.
20. Install torsion spring on exterior arm. Using a pair of pliers, tighten spring one complete turn before connecting to stud on arm.
21. Install terminal block on housing with numbered terminals outboard of housing and secure block with attaching screw.
22. Route red wire, attached to grey wire terminal, between magnet assembly and pintle shaft, around pintle shaft and connect to inboard terminal (adjacent to omni-switch) on terminal block.

    CAUTION: Be careful when routing wires so they will not come into contact with leaf switch, or any moving parts.

23. Route black wire from lower connection on magnet assembly (connection on secondary armature spring side of magnet) under pintle shaft, around pintle shaft and connect to outboard terminal on terminal block.
24. Route red wire from upper omni-switch connection under pintle shaft, around pintle shaft, and connect to grounding point on motor side of magnet.
25. Install motor on housing, threading wires through upper hole in housing. Make certain that end of motor shaft engages in slot of drive screw.
26. Connect green motor wire to inside housing motor mounting stud and install mounting nuts and tighten securely.

    NOTE: Do no tighten nuts on motor end cover as this may result in binding of the motor bearings.

27. Route black motor wire under pintle shaft between legs of magnet assembly, and connect wire to bottom of grounding point on locking arm side of magnet.
28. Connect red motor wire to lower terminal on omni-switch.
29. Install compressor rod guide on housing and secure with attaching screw.
30. Lubricate compressor rod with cam and bearing lubricant, install compressor rod through guide

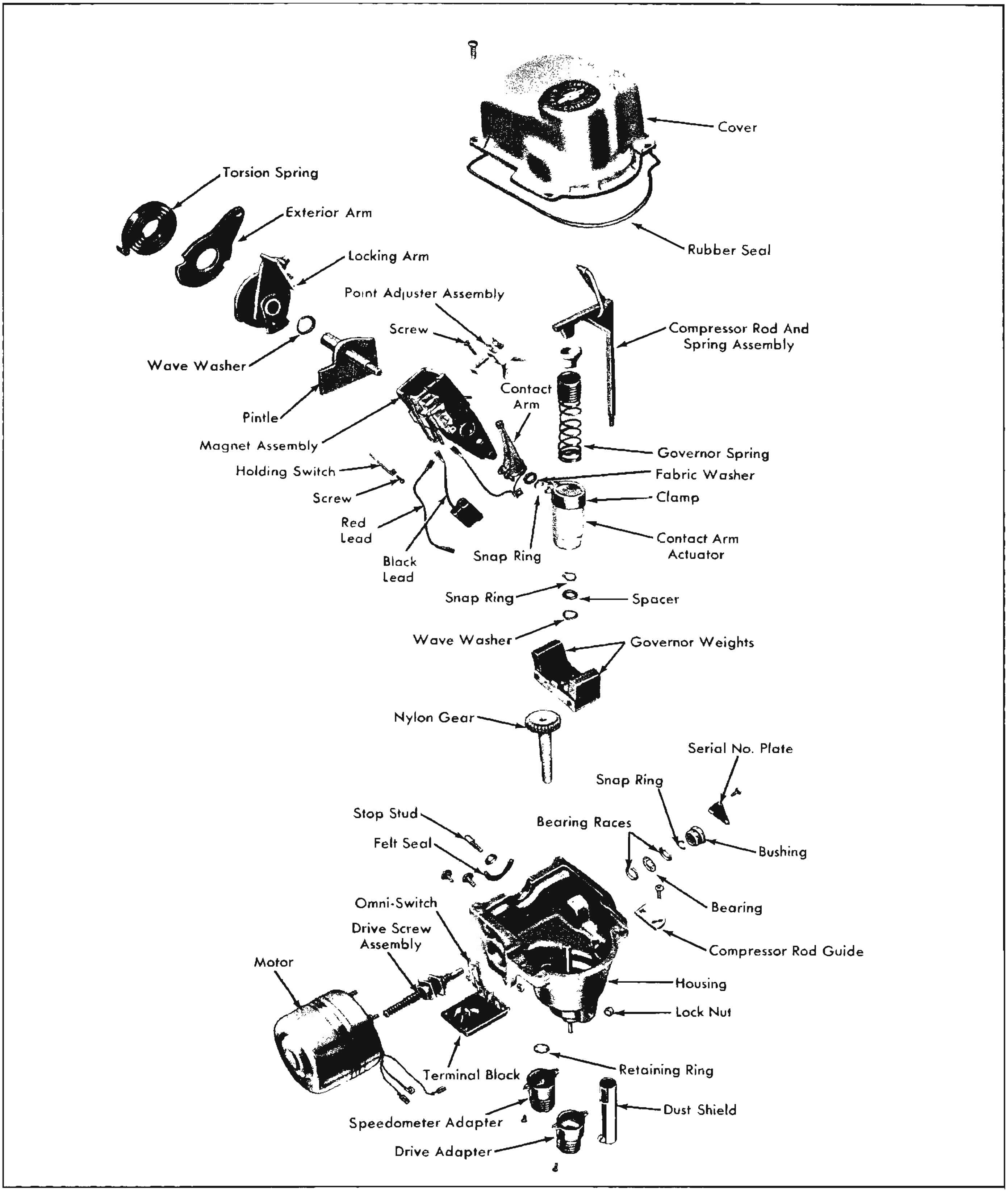

Fig. 72—Power Unit Exploded View

into housing, and install locknut on threaded end of compressor rod.

31. Install governor spring with plastic cap in actuator assembly.
32. Move contact arm against either grounding point and use a feeler gage to measure the gap between contact arm and other point, Figure 68. This gap must be .090 inch ± .010 inch. If gap is not within specifications, carefully bend either grounding point on point adjuster assembly until proper gap is obtained.
33. Loosen screw on actuator clamp and rotate actuator until clamp fingers are at right angles (90°) to actuator cam shoulders. Then tighten actuator clamp screw.

    NOTE: Make certain that clamp fingers are pressed down firmly against actuator cams, before tightening clamp screw.
34. Insert Locking Arm Gage, J-7652, over stop stud. Move magnet assembly to low speed position (magnet away from motor). Turn governor weights until they are parallel with drive screw, then place Governor Weight Wedge, J-8547, between governor weights, pressing down lightly on wedge and actuator until weights are held out to their stop position.
35. Use a feeler gage to measure gap between contact arm and either grounding point on point adjuster assembly, Figure 68. This gap should be approximately one-half of the full gap measurement in Step 32. To obtain this gap measurement move point adjuster assembly until gap is within specifications. Then tighten screw on point adjuster and recheck gap.
36. Remove Locking Arm Gage and Governor Weight Wedge.
37. Move magnet assembly to wide open throttle position (magnet away from locking arm). This must be done to prevent preloading of the governor spring by the contact arm before adjusting the compressor rod.
38. Hold housing in an upright position, and adjust locknut on end of compressor rod until lower edge of compressor rod arm rests against plastic cap without exerting pressure against governor spring. Then back-off locknut two complete turns. This will provide the correct low speed calibration for the power unit.
39. With magnet assembly still in wide open throttle position, measure gap opening between omni-switch points (fig. 69). This gap must be .025 inch ± .010 inch. If gap is not within specifications, bend arm of inboard point (inboard from magnet) until proper gap is obtained and points are aligned.
40. Install cover, making certain that rubber seal and felt seal are properly seated in grooves of cover and housing. Secure cover with four screws.

Installation

1. Position power unit on mounting bracket (and brace on V-8) and secure.
2. Connect accelerator linkage to exterior arm on power unit. Adjust linkage.
3. Connect end of bowden cable to compressor rod and spring assembly.
4. Install dust shield in housing. Dust shield has bayonet type retention. Push in and turn clockwise. Do not tighten set screw on end of dust shield until control cable is properly adjusted.
5. Adjust control cable.
6. Connect drive cable and speedometer cable to power unit.
7. Connect multiple electrical connector at power unit.

DIAGNOSIS

Since Cruise Control is mechanically driven and electrically operated, diagnosis and trouble shooting procedures involve both mechanical and electrical tests. Electrical tests are to be made with ignition "on". **Do not start engine.**

Possible malfunctions requiring service on the Cruise Control unit will fall under one of the following categories:

1. No Cruise Control response.
2. Constant pressure on accelerator pedal regardless of selector setting.
3. No automatic control when slide switch is moved to lock position.
4. Automatic control engages at selected speed without pushing slide switch to lock position.
5. Automatic control remains engaged when brake or clutch pedal is touched.
6. Automatic control remains engaged when slide switch is pushed to the "off" position.
7. Pulsating accelerator pedal.
8. Engine does not return to normal idle.
9. Speedometer does not register or unit does not operate.
10. Noisy speedometer.
11. Blown fuse.
12. Unit does not control at selected speed.

The following mechanical and electrical tests will aid in isolating and correcting the above conditions. Diagnosis and trouble shooting procedures must be followed to make certain that the trouble is in the unit itself, and not in some other component of the system.

Operational Test

1. Turn ignition switch "on". **Do not start engine.**
2. Move Cruise Control selector dial to lowest speed position.
3. Depress accelerator pedal to wide open position.
4. Push slide switch to "lock" position and allow to come back to "on". If accelerator pedal stays in the depressed position, electrical circuit and selector control mechanism is operating properly.
5. Slowly depress brake pedal. If accelerator pedal returns to the idle position, brake pedal switch is operating properly.
6. Perform steps 3 and 4.
7. Turn off ignition switch. If accelerator pedal returns to the idle position, the ignition switch portion of the electrical circuit and latching mechanism is operating properly.
8. Perform steps 3 and 4.
9. Turn slide switch to "off" position. If accelerator returns to idle position, and then can be pushed to the floor without encountering resistance, omni-switch is operating properly.

Checking Motor Operation

1. Turn ignition switch "on" and slide switch "on". **Do not start engine.**
2. Remove four screws securing power unit cover and remove cover.
3. Check accelerator linkage adjustment.
4. Move locking arm against magnet and press down on armature plate to latch unit, simulating automatic control.
5. Move contact arm to touch grounding point on locking arm side of magnet. Motor should rotate drive screw and close the throttle through the accelerator linkage. Motor should move magnet to wide open throttle position when contacts are free.
6. Move contact arm to touch grounding point on motor side of magnet. Motor should rotate drive screw and open the throttle through the accelerator linkage.
7. If motor will not open or close throttle through accelerator linkage, motor may be binding. Check alignment of motor with housing. To check motor for binding, loosen motor from housing without disconnecting motor leads and disengage motor shaft from drive screw. Move contact arm against grounding point on motor side of magnet assembly to check reverse operation, and against grounding point on locking arm side of magnet assembly to check forward operation. If motor does not run free, replace motor. If motor does run free, stall test motor as described below.
8. The drive screw or carburetor linkage may also be binding. To check drive screw for binding, disengage motor shaft from drive screw, insert screwdriver in slotted end of drive screw, and check for free rotation. If drive screw does not rotate freely, it is defective and should be replaced. If motor and drive screw operate satisfactorily, then adjust carburetor linkage.
9. Turn ignition switch "off", and replace power unit cover.

Motor Stall Test

1. Disconnect multiple electrical connector at front of power unit.
2. Remove four screws securing power unit cover to housing and remove cover.
3. Connect red lead of an ammeter tester to positive battery terminal.
4. Insert Locking Arm Gage, J-7652, over stop stud to limit travel of locking arm and prevent rotation of drive screw.
5. Connect black lead of tester to #1 terminal on front of power unit.
6. Hold contact arm against grounding point on locking arm side of magnet and observe reading on ammeter. If reading on ammeter indicates more than 7 amps, motor is drawing too much current and should be replaced.
7. Disconnect tester leads, remove Locking Arm Gage, install cover, and connect multiple connector.

Checking for Damaged Cables and Gears

1. Raise rear end of car and place on jack stands.
2. Start engine and move transmission shift lever to Drive position.
3. Remove speedometer cable at power unit and check to see if nylon gear is turning. This will determine if cable from transmission to power unit is turning and if gear is operating.
4. If nylon gear is turning, cable to speedometer is broken or speedometer is inoperative.
5. If nylon gear is not turning, disconnect transmission cable at power unit.
6. If cable is turning, gears are stripped inside power unit.
7. If cable is not turning, check for a broken cable or stripped transmission speedometer drive gear.
8. Shut off engine and lower car.
9. Replace parts as required.

CRUISE CONTROL DIAGNOSIS CHART

CONDITION	POSSIBLE CAUSE	REMEDY
Speedometer Noise	Cables bent or kinked.	Straighten or replace cables.
	Lack of cable lubrication.	Lubricate.
	Noisy Speedometer head assembly.	Repair.
Blowing Fuses	Short or ground in wiring circuit.	Check for short or ground. Repair or replace if necessary.
	Improper linkage adjustment.	Adjust accelerator linkage.
	Defective motor.	Check operation of motor. If more than 7 amps at 12.5 volts are noted in either direction, replace motor.
	Locked drive screw.	Check drive screw for binding. Replace if necessary.
No Cruise Control Response	Accelerator linkage broken or disconnected.	Connect or replace linkage and adjust.
	Drive cables broken or disconnected.	Connect or replace cables.
	Blown fuse.	Replace and check cause.
	Loose connections or broken wires (internal or external).	Check for current at the unit. Repair wires or tighten wiring connections as required.
No Automatic Control When Using Selector Switch.	Driver riding the brake pedal or driver does not hold accelerator against back pressure when depressing selector button.	Instruct owner.
	No current at #2 terminal.	Correct as required.
	Loose or disconnected ground wire between selector control and #3 terminal.	Tighten or connect ground wire.
Constant Pressure on Accelerator Pedal Regardless of dial setting.	Blown fuse.	Replace fuse and perform Electrical Test.
	No current at #2 terminal.	Correct as required.
	Control cable improperly adjusted.	Adjust cable.
	Control cable defective.	Replace selector control assembly.
	Inoperative motor or locked drive screw.	Check operation of motor and/or drive screw. Replace or repair as necessary.
Automatic Control Engages at Selected Speed without using Selector Switch.	Continuous ground in ground circuit or switch.	Check for ground and repair as required.
		Check Electrical circuit.
Automatic Control Remains Engaged When Brake Pedal is Touched.	Inoperative brake release switch on brake pedal.	Check and adjust brake release switch or replace if necessary.
Unit Does Not Remain Inoperative in the "Off" Position.	Omni-switch not properly adjusted.	Adjust Omni-switch points.

CONDITION	POSSIBLE CAUSE	REMEDY
Pulsating Accelerator Pedal	Speedometer cable or drive cable kinked or lack of lubrication.	Lubricate or replace cables if necessary.
	Improper accelerator linkage adjustment.	Adjust accelerator linkage.
	Improper grounding points adjustment.	Adjust grounding points.
Carburetor Does Not Return to Normal Idle.	Improper carburetor or accelerator linkage adjustment.	Adjust throttle control rod, T.V. rod, and accelerator linkage.
	Weak throttle return spring.	Replace spring.
Unit Does Not Control at Selected Speed.	Improper control cable adjustment.	Adjust control cable.
	Selector dial not installed properly.	Reinstall selector dial.
Speedometer Does Not Register or Unit Does Not Operate.	Speedometer drive gear in transmission defective.	Replace gear.
	Broken drive cable from transmission to power unit.	Replace drive cable.
	Damaged drive gear or nylon gear in power unit.	Replace nylon gear. If metal drive gear is damaged, replace housing assembly.

SPECIFICATIONS

AIR CONDITIONING

Compressor

Make .... Frigidaire
Type .... 6 Cylinder Axial
Displacement
All-weather and Custom Deluxe ...... 12.6 Cu. In.
Custom .... 10.8 Cu. In.
Rotation .... Clockwise

Compressor Clutch Coil

Ohms (at 80°F) 4.18-4.38
Amps (at 80°F) .... 2.86 @ 12 Volts
Refrigerant Freon-12
Compressor Oil .... Frigidaire 525 Viscosity

System Capacities

All Weather
Freon-12 .... 3 lbs., 12 oz.
525 Viscosity Oil .... 11 oz.

Custom and Custom Deluxe
Freon-12 .... 3 lbs.
525 Viscosity Oil .... 11 oz.

Fuses

	All Weather and Custom Deluxe	Custom
In Line	3AG-30	3AG-20
Junction Box	3AG-20	3AG-20

SPEED AND CRUISE CONTROL

Motor .... 12-Volt Reversible
Fuse .... 10 Amp in Junction Block
Accelerator Linkage
Adjustment .... .0625″ (use gauge pin)
Electrical Points .... 4 (Replaceable)
Gap between Contact Arm and Point
(Full Gap) .... .090″ ± .010″
Omni-Switch Point Gap .... .025″ ± .010″

DRILL SIZES

Letter Sizes	Drill Diam. Inches	Wire Gage Sizes	Drill Diam. Inches	Wire Gage Sizes	Drill Diam. Inches	Wire Gage Sizes	Drill Diam. Inches
Z	0.413	1	0.2280	28	0.1405	55	0.0520
Y	0.404	2	0.2210	29	0.1360	56	0.0465
X	0.397	3	0.2130	30	0.1285	57	0.0430
W	0.386	4	0.2090	31	0.1200	58	0.0420
V	0.377	5	0.2055	32	0.1160	59	0.0410
U	0.368	6	0.2040	33	0.1130	60	0.0400
T	0.358	7	0.2010	34	0.1110	61	0.0390
S	0.348	8	0.1990	35	0.1100	62	0.0380
R	0.339	9	0.1960	36	0.1065	63	0.0370
Q	0.332	10	0.1935	37	0.1040	64	0.0360
P	0.323	11	0.1910	38	0.1015	65	0.0350
O	0.316	12	0.1890	39	0.0995	66	0.0330
N	0.302	13	0.1850	40	0.0980	67	0.0320
M	0.295	14	0.1820	41	0.0960	68	0.0310
L	0.290	15	0.1800	42	0.0935	69	0.0292
K	0.281	16	0.1770	43	0.0890	70	0.0280
J	0.277	17	0.1730	44	0.0860	71	0.0260
I	0.272	18	0.1695	45	0.0820	72	0.0250
H	0.266	19	0.1660	46	0.0810	73	0.0240
G	0.261	20	0.1610	47	0.0785	74	0.0225
F	0.257	21	0.1590	48	0.0760	75	0.0210
E	0.250	22	0.1570	49	0.0730	76	0.0200
D	0.246	23	0.1540	50	0.0700	77	0.0180
C	0.242	24	0.1520	51	0.0670	78	0.0160
B	0.238	25	0.1495	52	0.0635	79	0.0145
A	0.234	26	0.1470	53	0.0595	80	0.0135
..	.....	27	0.1440	54	0.0550	...	......

GAGES

GAGE NO.	U. S. STANDARD GAGE* Approx. Thickness—Inches	AMERICAN WIRE or B & S GAGE Thickness—Inches
0000000	0.490	
000000	.460	0.5800
00000	.429	.5165
0000	.398	.4600
000	.368	.4096
00	.337	.3648
0	.306	.3248
1	.2757	.2893
2	.2604	.2576
3	.2451	.2294
4	.2298	.2043
5	.2145	.1819
6	.1991	.1620
7	.1838	.1443
8	.1685	.1285
9	.1532	.1144
10	.1379	.1019
11	.1225	.0907
12	.1072	.0808
13	.0919	.0720
14	.0766	.0641
15	.0689	.0571
16	.0613	.0508
17	.0551	.0453
18	.0490	.0403
19	.0429	.0359
20	.0368	.0320
21	.0337	.0285
22	.0306	.0253
23	.0276	.0226
24	.0245	.0201
25	.0214	.0179
26	.0184	.0159
27	.0169	.0142
28	.0153	.0126
29	.0138	.0113
30	.0123	.0100
31	.0107	.00893
32	.0100	.00795
33	.0092	.00708
34	.0084	.00630
35	.0077	.00561
36	.0069	.00500
37	.0065	.00445
38	.0061	.00397
39	.0057	.00353
40	.0054	.00314
41	.0052	
42	.0050	
43	.0048	
44	.0046	

DECIMAL EQUIVALENTS

1/64	.015625	33/64	.515625
1/32	.03125	17/32	.53125
3/64	.046875	35/64	.546875
1/16	.0625	9/16	.5625
5/64	.078125	37/64	.578125
3/32	.09375	19/32	.59375
7/64	.109375	39/64	.609375
1/8	.125	5/8	.625
9/64	.140625	41/64	.640625
5/32	.15625	21/32	.65625
11/64	.171875	43/64	.671875
3/16	.1875	11/16	.6875
13/64	.203125	45/64	.703125
7/32	.21875	23/32	.71875
15/64	.234375	47/64	.734375
1/4	.25	3/4	.75
17/64	.265625	49/64	.765625
9/32	.28125	25/32	.78125
19/64	.296875	51/64	.796875
5/16	.3125	13/16	.8125
21/64	.328125	53/64	.828125
11/32	.34375	27/32	.84375
23/64	.359375	55/64	.859375
3/8	.375	7/8	.875
25/64	.390625	57/64	.890625
13/32	.40625	29/32	.90625
27/64	.421875	59/64	.921875
7/16	.4375	15/16	.9375
29/64	.453125	61/64	.953125
15/32	.46875	31/32	.96875
31/64	.484375	63/64	.984375
1/2	.5	1	1.