GROUP 19

STEERING (MANUAL, POWER, PUMPS AND LINKAGE)

CONTENTS

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SPECIFICATIONS

MANUAL STEERING

Type	Worm and Three Tooth Roller
Ratio	20.4 to 1
Gear Shaft Bearings	2 Needle Roller Bearings
Worm Shaft Bearings	Tapered Roller
High Point (Wheels Straight Ahead)	Notch on Steering Column Tube Straight Up
Steering Arm Length (Centerline of holes)	Approximately 5 3/8 inches

SPECIFICATIONS—(Continued)

POWER STEERING

Ratio	16 to 1
Fluid Capacity of Hydraulic System	2 Quarts
Type of Fluid	Power Steering Fluid MoPar Part No. 2084329
Steering Arm Length (Centerline to Centerline of Holes) Chrysler	Approximately 6 7/16 inches
Imperial	Approximately 6 7/8 inches

POWER STEERING PUMP

Type	Constant Displacement
Maximum Pump Pressure VC-1, VC-2, VC-3	1000 to 1100 psi
VY-1	1150 to 1300 psi
Maximum Fluid Flow	2¼ gallons
Type of Fluid	Power Steering Fluid MoPar Part No. 2084329

SPECIAL TOOLS

Tool No.	Tool Name
C-760	Pliers—Snap Ring
C-3128	Pliers—Snap Ring
C-3211	Hose—High Pressure
C-3229	Pliers—Snap Ring
C-3309B	Gauge—Pressure Check
C-3318	Hose—Low Pressure
C-3323	Fixture—Steering Gear Holding
C-3388	Hose—Coupling
C-3428A	Pulley—Steering Wheel
C-3633	Nut Wrench—Gear Shaft Retaining
C-3634	Nut Wrench—Power Train Retaining
C-3637	Nut (Splined)—Worm Shaft Turning
C-3638	Remover—Gear Worm Shaft Seal
C-3643	Stand—Pump Shaft Supporting
C-3646	Puller—Steering Arm (Replaces C-3402)
C-3649	Tool—Spacer to Housing Aligning
C-3650	Driver—Gear Worm Shaft Seal
C-3676	Remover and Installer—Power Train Piston Ring
C-3782	Driver—Pump Shaft Seal Installer (1.2 Pump)
C-3783	Puller—Pump Shaft Seal (1.2 Pump)
C-3875	Remover, Adapter, Installer and Arbor—Gearshaft Needle Bearings
C-3879	Installer—Steering Column Shaft Bearing
C-3880	Remover and Installer—Gear Shaft Oil Seal
C-3885A	Gauge—Power Steering Pump Flow Test
C-3891	Puller—Steering Column Shaft Bearing
C-3894	Puller—Tie Rod, Steering Arm and Idler Arm Ends
C-3929	Arbor—Steering Gear Worm Shaft Bearing
C-3934	Puller—Power Steering Pump Pulley
C-3949	Bar—Aligning Steering Gear Housing "Imperial Only"
MTU-36	Ounce Pull Scale

TORQUE REFERENCE

MANUAL STEERING

	Foot-Pounds
Intermediate Steering Arm Pit Nut	50
Steering Gear to Frame Bolt	50
Steering Gear Pitman Arm Nut	120
Steering Wheel Nut (VC-1, VC-2, VC-3)	24
Steering Knuckle Tie Rod Clamp Bolt	15
Steering Knuckle Tie Rod End Ball Nut	40
Steering Idler Arm Bolt Nut	60

TORQUE REFERENCE—(Continued)

POWER STEERING

Pressure Control Valve Body Screws	10
Pump Inlet Fitting	30
Reservoir to Pump Body Bolts	10-15
Steering Wheel Nut (VC-1, VC-2, VC-3, VY-1)	24
Steering Arm Nut	120
Steering Gear Housing to Frame Bolt	50
Steering Valve End Plug	25
Steering Valve Body Attaching Bolts	15
Steering Column Support Nut	110 to 200
Steering Gear Shaft Cover Nut	110 to 200
Steering Gear Shaft Adjusting Screw Lock Nut	50

POWER STEERING PUMP

Pump Inlet Fitting	30
Pump to Pump Bracket Bolts	30
Reservoir to Pump Body Bolt	10-15

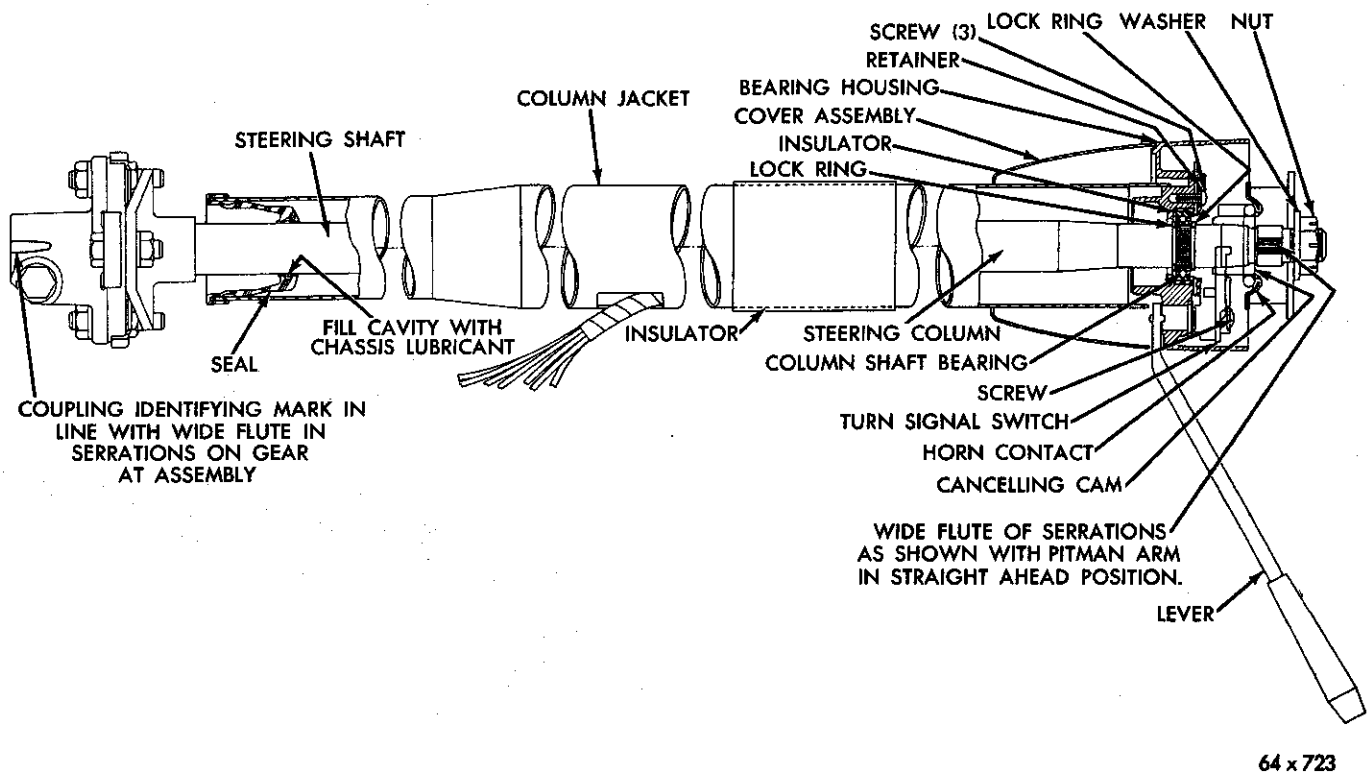

Fig. 1—Steering Column—(Cross-Section)

PART 1 - MANUAL STEERING

The manual steering (Fig. 1) incorporates a flexible coupling (Fig. 2) which consists of a rubber-fabric disc assembled between the two hubs installed between the steering gear worm shaft and the steering tube which provides alignment of the steering gear to the frame side rail and the vehicle body. The steering gear chuck has a stub worm shaft which extends up a short distance above the gear housing. The flexible coupling attaches to the worm shaft by a serrated connection and clamp bolt. The worm shaft has a master serration that matches with the master serration in the lower hub of the flexible coupling. The upper hub of the flexible coupling is integral with the steering tube. The jacket tube is held in alignment in the vehicle body by the lower jacket clamp assembly which attaches to the brake bracket and the instrument panel clamp. The face of the steering gear housing is machined flat to position the gear flush to the frame.

NOTE: On vehicles equipped with an Automatic Transmission, a 1¼ inch x 7/16 inch x ⅛ inch washer is added to the housing to the frame side rail bolt to compensate for the omission of the clutch torque rod mounting bracket.

SERVICE PROCEDURES

1. STEERING COLUMN (Fig. 1)

Removal

(1) Disconnect the negative (ground) cable from the battery.

(2) Compress and turn the horn button ¼ turn counterclockwise to release the button from the retainer.

(3) Disconnect the horn wire at the horn blowing switch.

(4) Remove the three (3) screws and insulators attaching the horn ring and horn blowing switch to the steering column. Remove the horn ring and switch.

(5) Loosen the steering wheel nut several turns and install the steering wheel puller Tool C-3428-A and remove the steering wheel nut and steering wheel.

(6) Remove the screw attaching the directional switch lever to the directional switch and remove the lever.

(7) Disconnect the directional switch wiring at the steering column jacket tube below the instrument panel.

NOTE: Attach a piece of string or fine wire to the directional switch wiring before removing the switch from the steering column. When the switch is removed leave the string or wire in the steering column jacket tube as an aid to replacement of the wiring.

(8) Remove the screws attaching the directional switch to the steering column and remove the switch from the top of the steering column.

(9) Move the trim cap up on the steering jacket tube and release the floor carpet to expose the floor panel.

(10) Remove the screws attaching the dust pad to the floor panel and slide the dust pad up on the jacket tube.

(11) Remove the two nuts holding the lower jacket tube clamp to the steering column jacket bracket.

(12) Remove the clamp bolt from the steering column shaft lower coupling.

(13) Remove the two bolts attaching the steering jacket tube clamp at the instrument panel and remove the clamp.

(14) Carefully lift the steering column toward the dash, tapping the lower coupling lightly with a mallet until it is free of the worm shaft splines.

(15) Slide the steering gear jacket tube assembly rearward and remove the complete assembly through the driver's compartment.

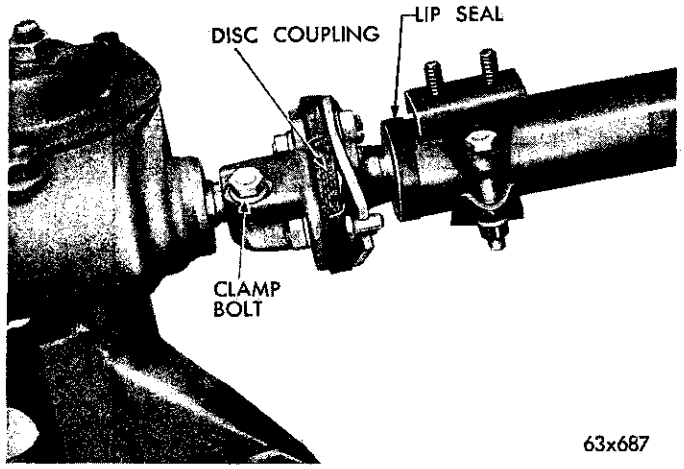

Fig. 2—Steering Gear and Flexible Coupling

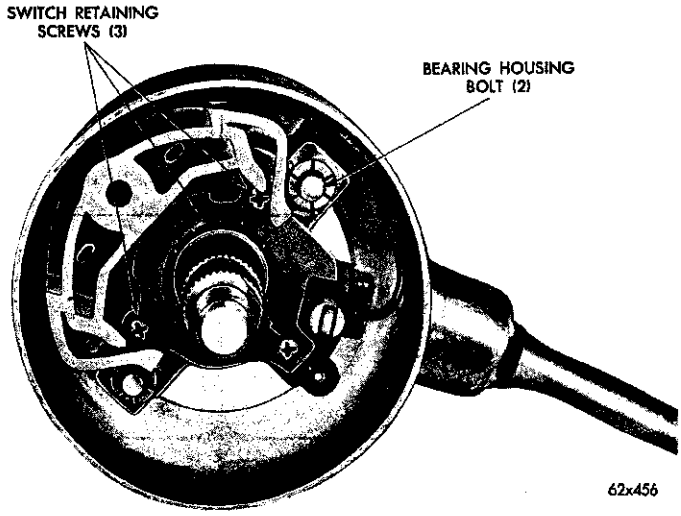

Fig. 3—View of the Steering Column-Upper End

Steering Column Disassembly

NOTE: Disassemble, repair and assemble the steering column assembly on a clean, padded bench to protect the finish on the column jacket and related parts.

(1) Remove the 3 recessed head switch retaining screws, as shown in Figure 3.

(2) Pull the turn signal switch and switch plate up and out, feeding the wires and connectors through the steering column jacket.

(3) Disengage the column jacket lower seal from the lip on the jacket, and slide the seal down toward the coupling.

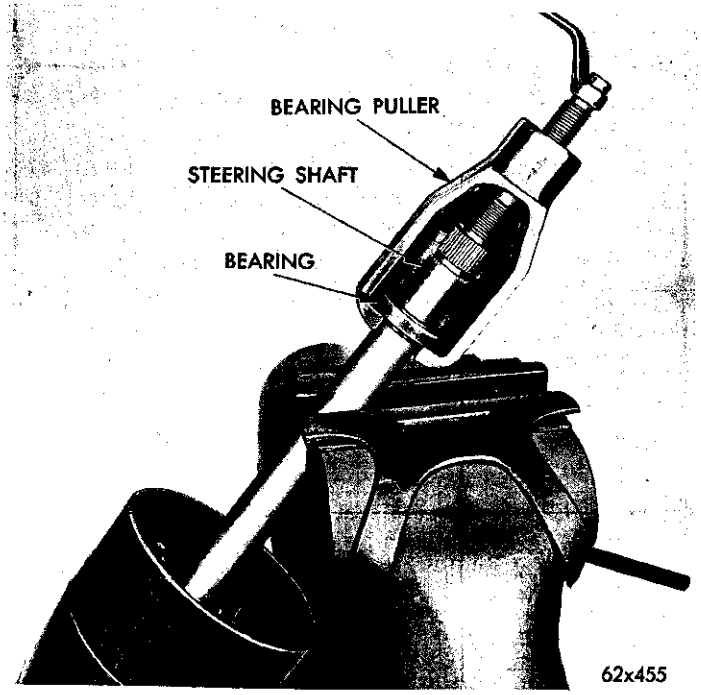

Fig. 4—Removing the Steering Shaft Bearing

(4) Exert an upward force on the steering shaft to force the steering column jacket upper bearing and insulator up out of the counterbore in the bearing housing. Remove the insulator from the bearing.

(5) Using snap ring pliers, Tool C-3128, remove the bearing upper snap ring from the upper groove in the steering shaft.

(6) Using bearing puller Tool C-3891, remove the steering column upper bearing, as shown in Figure 4.

(7) Remove the lower snap ring and slide the steering shaft and coupling assembly down, and out of the steering column jacket assembly.

(8) Remove the column jacket lower seal from the steering shaft.

Steering Column Assembly

(1) Place the two bearing housing retaining bolts in position in the housing, and just start the nuts on them.

(2) Slide the dust plate into position over the jacket tube.

(3) Stand the column assembly upright, and lower the bearing housing into position, engaging the bolt heads in the slots in the column jacket.

(4) Tighten the two retainer bolt nuts alternately and evenly in steps to prevent unseating the bolt heads from the slots. Tighten to 50 inch pounds torque.

(5) Apply wheel bearing lubricant to the nylon rings and lip of the jacket tube seal and position the seal cup and nylon rings on the jacket tube large diameter of the nylon rings butt and are retained by the recess caused by the seal lip (Figs. 1 and 5).

(6) Slide the seal onto the steering shaft, and down against the coupling, with the lip at the outside diameter facing upward, so the seal can be positioned on the lower end of the column jacket during assembly.

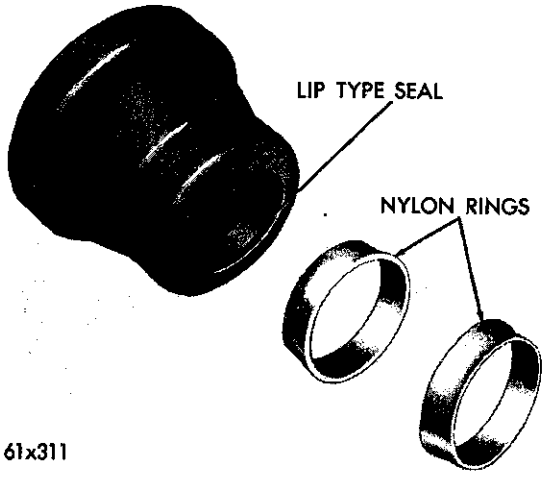

Fig. 5—Nylon Rugs and Lip Type Seal

(7) Slide the steering shaft into the column assembly, and install the horseshoe shaped lower snap ring in the lower groove on the steering shaft.

(8) Place the steering column upper bearing on the steering shaft.

(9) Position the wavy upper snap ring against the top of the bearing.

(10) Place the bearing installing sleeve Tool C-3879 and the steering wheel retaining washer and nut, on the top end of the steering shaft in that order (Fig. 6).

NOTE: Never press the bearing into position with a sleeve that exerts pressure against the outer race, since this would damage the bearing. Do not drive the bearing into place with a hammer, since damage to the bearing and steering shaft coupling will occur.

(11) Turn the steering wheel retaining nut to exert pressure on the installing sleeve, upper snap ring, and bearing, pressing the bearing down onto the knurled section of the steering tube and against the lower snap ring.

NOTE: The steering column upper bearing has approximately .001" interference fit at the knurled section of the steering shaft.

(12) Exert sufficient pressure against the upper snap ring to flatten it against the bearing so it can enter the groove in the steering tube. Be sure the snap ring is firmly seated in the groove.

(13) Place the bearing insulator over the bearing column upper bearing, and position the bearing and insulator in the counterbore provided in the bearing housing.

Installation (In the Vehicle)

(1) Enter the jacket tube and steering column shaft assembly through the dash panel from the driver's side and index the lower coupling of the steering gear shaft with the steering gear worm shaft.

(2) Index the master groove of the steering gear worm shaft with the filed notch on the lower coupling. Tap the coupling down over the worm shaft splines.

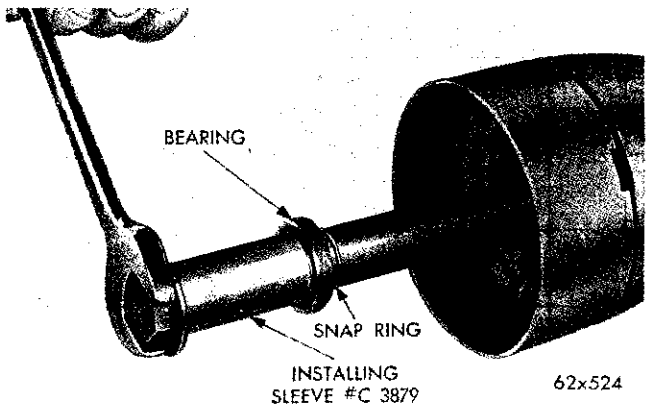

Fig. 6—Installing the Steering Column Upper Bearing

(3) Install and tighten the coupling clamp bolt securely.

(4) Align the jacket tube at the instrument panel and install the jacket tube clamp and attaching screws. Tighten the screws finger tight.

(5) Install the two nuts attaching the lower jacket tube clamp to the steering column jacket bracket. **Be sure** the jacket tube clamp bolt is securely tightened.

(6) Slide the dust pad down into position on the dash panel and install the attaching screws.

(7) Position the floor carpet under the dust pad and position the trim cap.

(8) Attach the string or wire, that was left in the steering column jacket tube during removal, to the directional switch wiring and carefully pull the string or wire down through the column jacket tube until the directional switch wires can be connected. Position the directional switch in the steering column jacket tube and install the retainer plate and attaching screws and connect all wire connections.

(9) Install the directional switch lever.

(10) Install the steering wheel and the steering wheel nut, tighten to 24 foot-pounds torque. Test the operation of the cancelling lever.

(11) Install the horn blowing switch, horn ring, insulators and attaching screws. Connect the horn wire.

(12) Install the horn button by compressing and turning ¼ turn clockwise to lock the horn button on the retainer.

(13) Connect the battery cable at the battery negative terminal.

(14) Inspect the steering gear shaft for alignment in the steering column seal and steering jacket alignment as outlined under "Steering Gear Alignment".

(15) Measure the **up** or **down** deflection of the flexible disc as follows: If the deflection exceeds $\frac{1}{16}$ inch, the column jacket should be moved up or down to where the deflection of the disc is less than $\frac{1}{16}$ inch with the column jacket tube clamped in place.

(16) Slip the rubber lip-type seal into place on the jacket tube.

(17) Tighten the instrument panel to jacket tube clamp bolts to 95 inch-pounds.

2. STEERING GEAR

Removal

(1) Disconnect the battery cable at the battery negative terminal.

(2) Remove the steering arm nut and washer and remove the steering arm from the steering gear cross shaft with puller, Tool C-3646.

(3) Remove the bolt and washer attaching the lower coupling to the steering gear worm shaft.

(4) Loosen the jacket tube lower clamp bolt.

(5) Loosen the steering jacket clamp screw at the instrument panel. Do Not Remove.

(6) Tap the coupling assembly upward and carefully lift the steering column and jacket up and off the end of the worm shaft.

(7) Remove the three nuts, washers and bolts attaching the steering gear to the frame side rail.

(8) Remove the gear through the engine compartment by lowering the upper end of gear towards the driver's compartment, then raise rear end of the gear up and remove the gear.

Disassembly

(1) Remove the gear shaft oil seal from the steering housing with puller, Tool C-3350. See "Gear Shaft Oil Seal Replacement". If the shaft is corroded or dirty, clean the portion between the oil seal and the serrations to avoid binding in the bearings.

NOTE: Position gear shaft bearing remover and installer arbor Tool C-3786 over the gear shaft threads and while withdrawing the gear shaft, follow with the arbor. This arbor will keep the bearing rollers from dropping out of their cages.

(2) Remove the gear shaft adjusting screw lock nut,

(3) Remove the cover and shim from the bottom cover gasket and the steering gear shaft assembly. of the housing.

(4) Remove the steering shaft and worm assembly, bearings and cups.

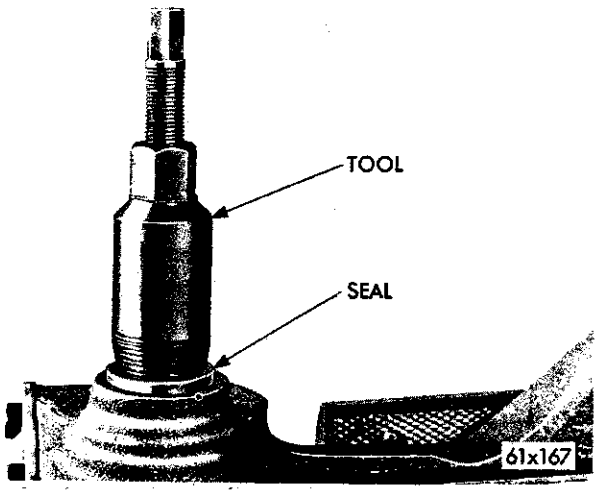

Fig. 7—Removing the Worm Shaft Oil Seal

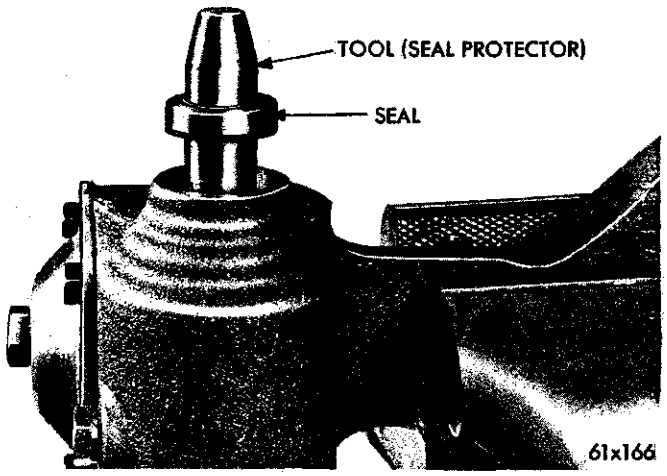

Fig. 8—Installing the Oil Seal Using the Seal Protector

(5) If it is necessary to remove the housing bearings, drive the bearings from the steering gear housing with the gear shaft bearing remover and installer arbor, Tool C-3786.

Inspection

Clean all parts in a suitable solvent. Inspect all parts for wear.

NOTE: Assemble parts without lubrication. Lubrication should be done after adjustments are completed. The needle bearings are grease-packed from the factory.

If either of the worm thrust roller bearings are damaged, replace both bearings. Use new oil seals.

Worm Shaft Oil Seal Replacement

(1) Thread Tool C-3819 far enough into the oil seal to engage the metal portion of the seal (Fig. 7). Turning the tool center screw while holding the tool

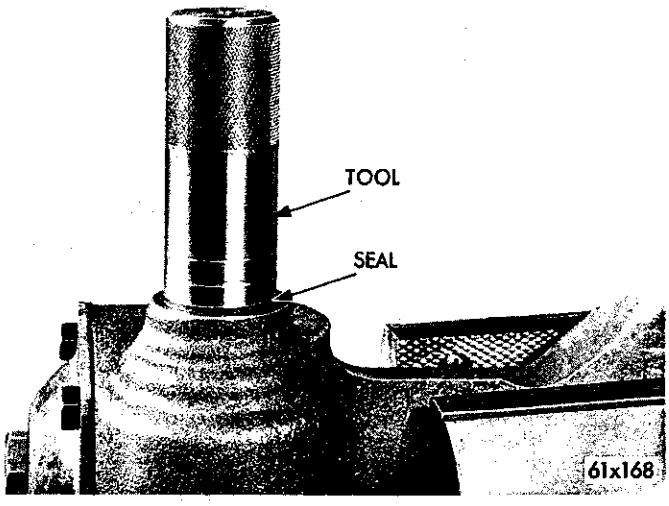

Fig. 9—Installing the Worm Shaft Oil Seal

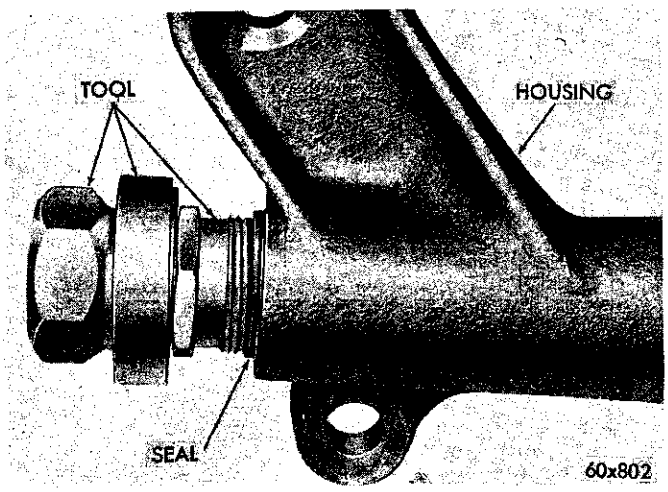

Fig. 10—Removing the Gear Shaft Oil Seal

body will withdraw the seal assembly from the housing bore.

(2) Place the oil seal protector of Tool C-3821 over the splines of the steering worm shaft and slide the oil seal over the protector with the lip of seal toward the housing (Fig. 8).

(3) Drive the oil seal into the housing bore with Tool C-3821 (Fig. 9).

Gear Shaft Oil Seal Replacement Removal (Fig. 10)

(1) Replace the gear shaft oil seal with Tool C-3350 gear shaft oil seal removing and installing tool set as follows:

(2) Slide the threaded portion of the adapter SP-3056 over the end of the gear shaft and install the threaded nut section of the tool on the gear shaft.

(3) Maintain the pressure on the adapter SP-3056 with the nut of tool, while turning the adapter SP-3056, forcing it into the seal until it engages the metal lip of the seal.

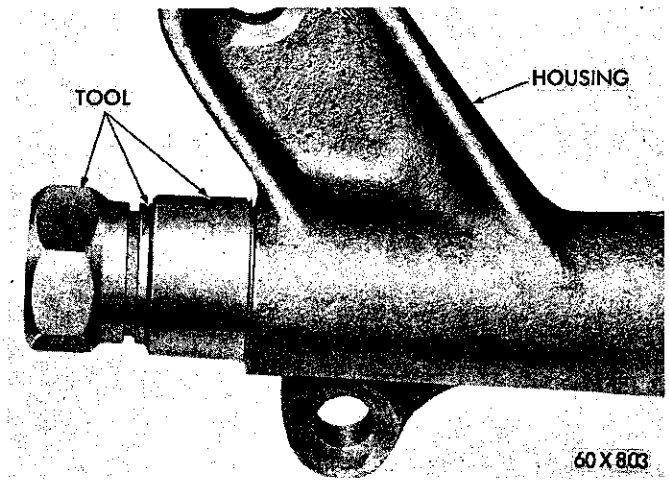

Fig. 11—Installing the Gear Shaft Oil Seal

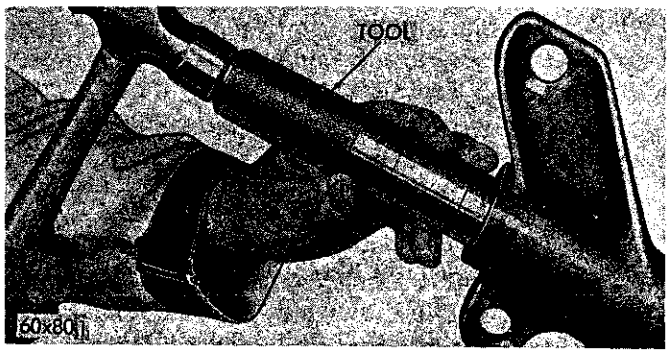

Fig. 12—Installing the Gear Shaft Housing Outer Bearing

(4) Slide the retainer of Tool C-3350 over the adapter, engage the grooves in the adapter and the tool nut with the two half-rings of the tool set and slide the retainer down to hold the half-rings in position.

(5) Turning the puller nut counter-clockwise will pull the oil seal from the housing.

Installation (Fig. 11)

(1) Place the seal on the seal protector sleeve, Tool SP-1601 and install the sleeve over the splines on the gear shaft (lip of seal toward housing).

(2) Place the adapter, Tool SP-1934, over the protector sleeve and against the seal.

(3) Thread the tool nut on the threaded end of the gear shaft and turn the tool nut until the shoulder of the adapter tool contacts the housing.

If the gear shaft bearings have been removed, install the gear shaft outer bearing into the housing with Tool C-3786 (Fig. 12). Drive the outer (lower) bearing to within $\frac{1}{16}$ inch or end of counterbore. Drive the inner (upper) bearing (Fig. 13) flush with the bore face with Tool C-3786.

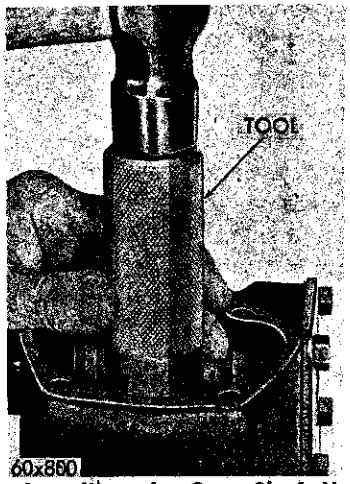

Fig. 13—Installing the Gear Shaft Housing Inner Bearing

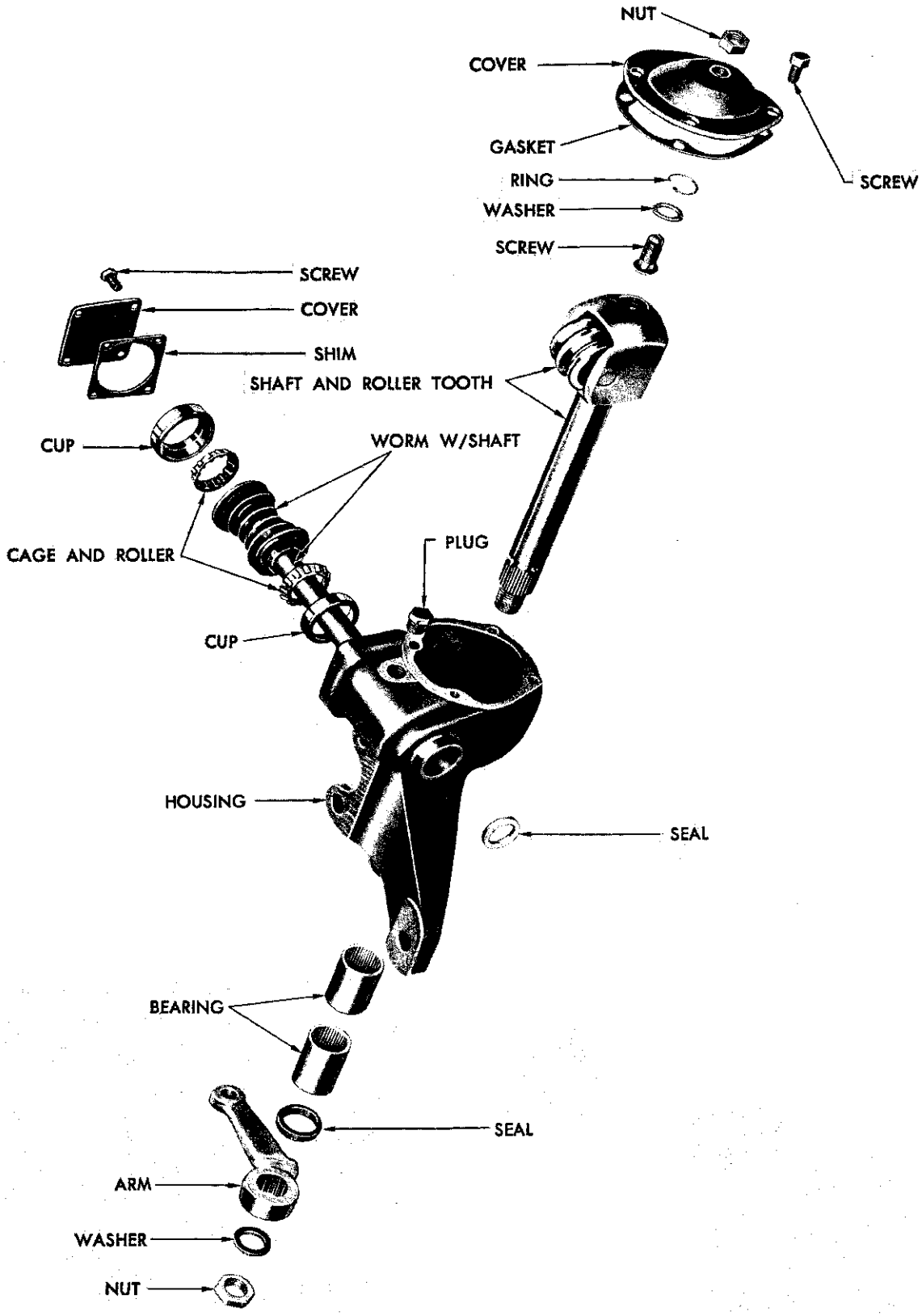

Fig. 14—Steering Gear (Disassembled View)

Steering Gear Assembly (Fig. 14)

(1) Insert the worm and the shaft into the housing with the bearings and cups.

(2) Install the shim and the lower housing cover, making sure the bearings are seated.

NOTE: When tightening the cover, turn the worm tube to be sure no bind exists.

(3) Final tightening of the cover screws should cause the end play to disappear with torque of ⅜ to ¾ pound required to rotate the tube, when measured with a pull scale applied at the rim of the steering wheel. Add or remove shims in the event a bind or excessive end play occurs. Shims are available in .003, .006 and .011 inch.

(4) Install the gear shaft.

(5) Before installing the cover, turn the adjusting screw all the way out.

(6) Rotate the wormshaft in one direction to the end of its travel. Rotate the wormshaft in the other direction to the end of its travel, counting the turns. Rotate the wormshaft back ½ of the full number of turns.

(7) Turn the adjusting screw (clockwise) until all the end play in the gear shaft is gone. Rotate the wormshaft to one end of its travel and apply a torque wrench to rotate the wormshaft. Tension should measure from 9 to 13½ inch pounds. The greatest tension should be felt as the wheel is rotated past the center position (high point). Adjust the torque load by turning the adjusting screw in or out as required.

(8) Install the lock nut and tighten while holding the adjusting screw.

(9) Fill the gear housing with SAE 90 gear lubricant and test for leaks.

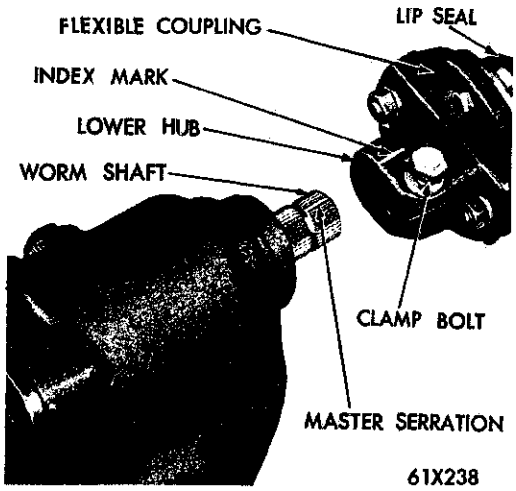

Fig. 15—Aligning the Steering Gear with the Flexible Coupling

Installation (In the Vehicle)

(1) Inspect the steering gear from center by rotating the worm shaft from one end of its travel to the other while counting the number of turns. Turn the worm shaft back one half of the full number of turns. This is the exact center of travel.

(2) Locate the master spline in the outer row of serrations on the worm shaft. Mark the master spline.

(3) Enter the steering gear into the engine compartment.

(4) Align the index mark on the outside of the flexible coupling hub with the master spline on the steering worm shaft (Fig. 15).

(5) Slide the coupling on the worm shaft and install the gear housing to frame side rail attaching the bolts and nuts.

(6) Tighten the steering gear housing to frame bolts evenly to 50 foot-pounds torque.

NOTE: Tightening should be done by alternately tightening the rear and front mounting bolts gradually so that the gear alignment is not disturbed.

(7) Position the flexible coupling bolt hole in line with the groove on the worm shaft and install the bolt and lockwasher.

(8) Tighten the bolt 30 to 35 foot-pounds torque.

NOTE: The horn ground is attached to the underside of the coupling by two bolts to complete the circuit.

3. STEERING GEAR ALIGNMENT (Fig. 16)

Inspect the steering gear shaft for alignment in the steering column seal as follows:

(1) Loosen the steering column clamp bolts at the instrument panel.

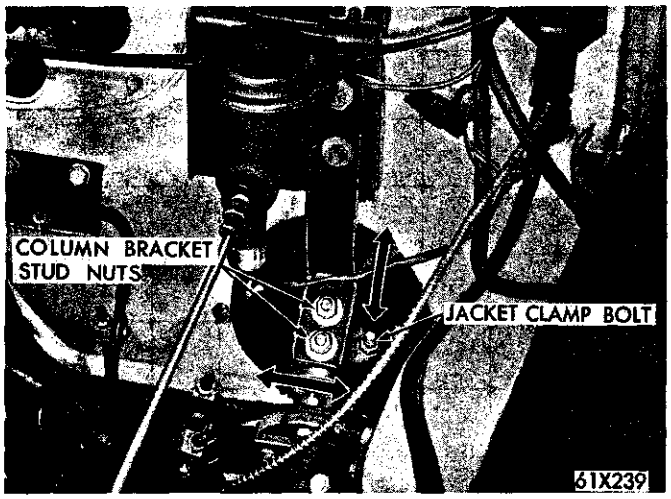

Fig. 16—Steering Gear Alignment

(2) Loosen the lower column clamp bolt and the support bracket at both the dash panel and at the column clamp.

NOTE: A rubber lip type seal is positioned between the upper hub of the flexible coupling and the jacket tube. The outer groove of the seal must be firmly installed on the jacket tube and the two nylon rings (Fig. 16) and the lip of the seal must be well lubricated with a wheel bearing grease.

(3) Hold the steering column so it is centered plus or minus ⅛ inch on the tube while aligning the column support bracket to the dash panel and lower column clamp.

(4) When the column is properly located, tighten the support bracket stud nuts at the dash panel and at the column clamp to 95 inch-pounds torque.

(5) Tighten the steering column to the instrument panel clamp bolts to 15 foot-pounds torque.

(6) Tighten the lower steering column clamp bolt nut to **200** inch-pounds torque.

(7) Reinstall the steering gear arm, washer and nut. Tighten to 120 foot-pounds torque.

4. ADJUSTMENT OF THE ROLLER TOOTH AND WORM (In the Vehicle)

(1) Disconnect the steering gear arm at the link.

(2) Rotate the steering wheel to mid-position and then check for backlash by attempting to move the steering gear arm back and forth.

(3) If backlash exists, loosen the gear shaft adjustment screw lock nut and tighten the adjusting screw enough to eliminate free play. Be sure the roller shaft and the worm do not bind. Recheck the backlash.

(4) Tighten the adjusting screw lock nut while holding the adjusting screw from turning.

(5) Connect the steering gear arm at the link.

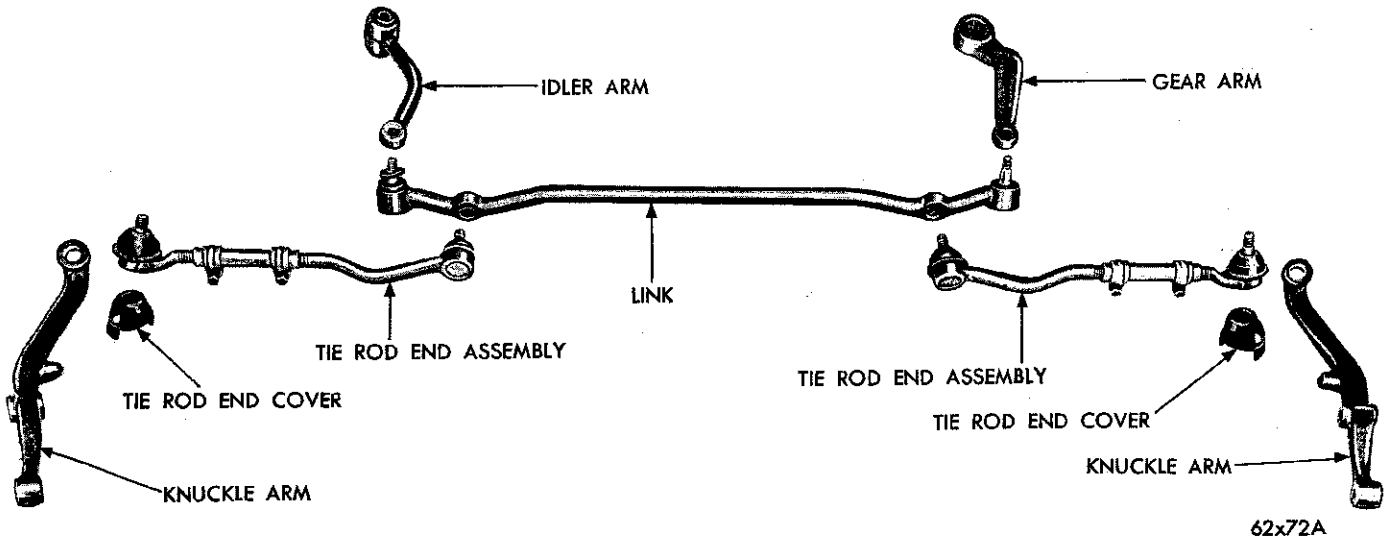

Fig. 1—Steering Linkage (Disassembled View)

PART 2 - STEERING LINKAGE

1. STEERING KNUCKLES

Removal

(1) Place a jack under the lower control arm as near to the wheel as possible. Remove the wheel, tire and drum. **Be sure the brake shoes are covered to prevent dirt or grease from soiling the lining.**

(2) Remove the cotter pins, nuts and lockwashers that attach the steering arm and brake dust shield to the steering knuckle. Remove the steering arm, brake dust shield, brake supports and shoes from the steering knuckle as an assembly but leaving the brake hose attached. **Do not allow the assembly to hang by the brake hose.**

(3) Remove the ball joint studs from the steering knuckles. Lift the steering knuckle out and away from the vehicle.

Installation

(1) Position the upper and lower ball joint studs into the steering knuckle and install the lock washer and nuts. Tighten the upper ball joint stud nut to 100 foot-pounds torque.

Tighten the lower ball joint stud nut to 115 foot-pounds and install the cotter pin.

(2) Slide the brake support plate over the knuckle and into position. Install the lockwashers and nuts on the upper rear and lower front bolts.

(3) Install the upper front and lower rear bolts through the dust shield and steering knuckle. Position the steering arm over the bolts. Install the lockwashers and nuts. Tighten the steering knuckle to brake support bolts 55 foot-pounds torque and the steering knuckle to steering knuckle arm bolts 80 foot-pounds torque. Install the cotter pins.

(4) Remove the covering from the brake shoes. Install the wheel, tire and drum assembly. Adjust the front wheel bearings. Refer to Paragraph "Front Wheel Bearing Adjustment." in the "Front Suspension" Group 2.

2. STEERING LINKAGE (Figure 1)

Removal

When removing the tie rod ends, idler arm or steering gear arm, all seals should be closely inspected for wear or damage. The tie rod ends should be lubricated every 32,000 miles.

Damaged seals necessitate removal of the seal and inspecting the tie rod assembly end at the throat opening. If parts have not lost all the grease, or are not contaminated, worn, or rusted, replace using a new seal and reinstall; otherwise a new complete tie rod end assembly should be installed. Lubricate the tie rod end assembly.

CAUTION: Removal of the tie rod ends from the steering knuckle arm or center link by methods other than using Tool C-3894 will damage the tie rod end seal, necessitating replacement of the complete tie rod end assembly.

(1) Remove the tie rod ends from the steering knuckle arms using Tool C-3894. **Use care not to damage the seals.**

(2) Using Tool C-3894 remove the inner tie rod ends from the link.

(3) Remove the idler arm stud from the link using Tool C-3894.

(4) Remove the idler arm bolt from the crossmember.

(5) Remove the steering gear arm stud from the link using Tool C-3894.

Installation

Replace all the tie rod and steering arm assemblies that are damaged, worn, or may have damaged seals.

(1) Insert the idler arm and bushing assembly into the bracket using care not to damage the bushing. Insert the bolt and tighten to 80 foot-pounds torque.

(2) Insert the center link studs into the idler arm and steering arm and tighten the nut to 40 foot-pounds torque. Insert the cotter pins.

(3) Connect the tie rod ends to the steering knuckle arms. Tighten the nuts to 40 foot-pounds torque. Slide the stone protector into position and install the cotter pins.

(4) Measure and adjust the front wheel toe-in. See "Front Suspension", Group 2.

PART 3 - POWER STEERING

The power steering gear consists of a gear housing (Fig. 1) containing a gear shaft with sector gear, a power piston with gear teeth milled into the side of the piston is in constant mesh with the gear shaft sector and a worm shaft connects the steering wheel to the power piston. The worm shaft is geared to the piston through a recirculating ball contact (Fig. 2)

SERVICE PROCEDURES

1. GEAR SHAFT ADJUSTMENT (In the Vehicle)

(1) With the gear shaft on center, loosen the gear shaft adjusting screw lock nut ½ turn and tighten the adjusting screw until backlash just disappears. Tighten the screw 1¼ turns from this position and while holding the adjusting screw in this position, tighten the lock nut.

NOTE: This is a temporary adjustment to insure that the piston rack and sector teeth are in full alignment (Fig. 1).

(2) Operate the unit manually for a minimum of 180 degrees from the center in each direction, measured at the worm shaft.

(3) Start the engine and run at idle speed. With hydraulic power to the steering gear unit and with the gear shaft on center plus or minus 2 degrees, readjust the gear shaft backlash. This will require loosening the adjusting screw until the backlash is evident. Retighten the adjusting screw until the backlash just disappears. Continue to tighten ⅜ to ½ turn from this position and tighten the lock nut 50 foot-pounds torque to maintain this setting.

2. GEAR SHAFT OIL SEAL REPLACEMENT

NOTE: The gear shaft oil seal may be replaced in the vehicle or on the work bench. To clearly show the tool application the illustrations show the seal replacement operations on the work bench.

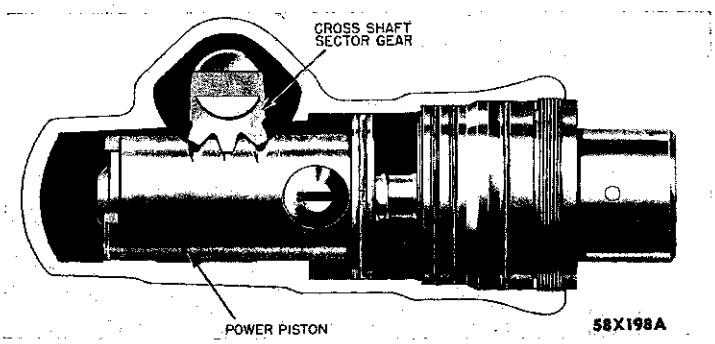

Fig. 1—Steering Gear Housing (Sectional View)

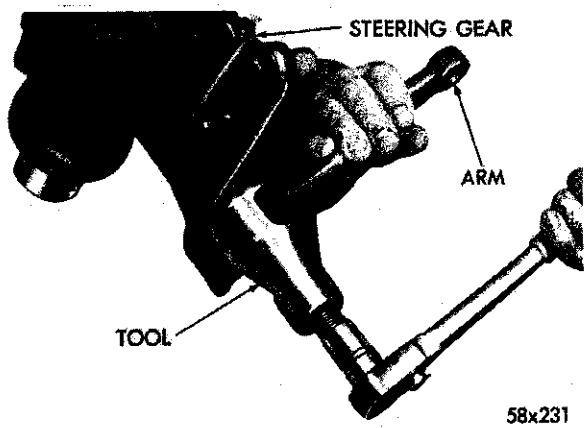

Fig. 2—Removing the Steering Gear Arm

Removal

(1) Raise the vehicle.

(2) Remove the cotter key and nut connecting the steering gear arm to the center link.

(3) Remove the tie rod end with Tool C-3894. (See "Tie Rod End Replacement.")

(4) Remove the steering gear arm nut and washer.

(5) Slide Tool C-3646 upon the arm and place the shoe of the puller behind the steering arm (Fig. 2). Tightening the tool center screw against the gear shaft will pull the steering gear arm from the gear shaft.

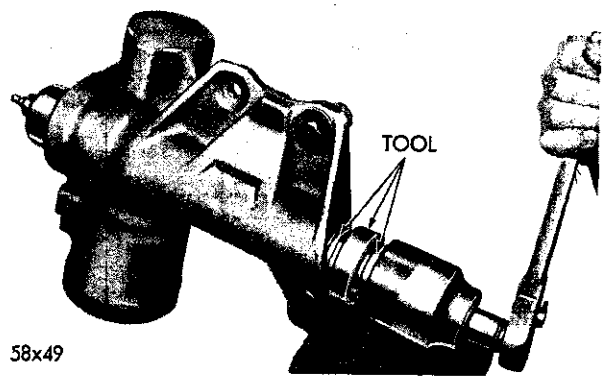

Fig. 3—Removing the Gear Shaft Oil Seal

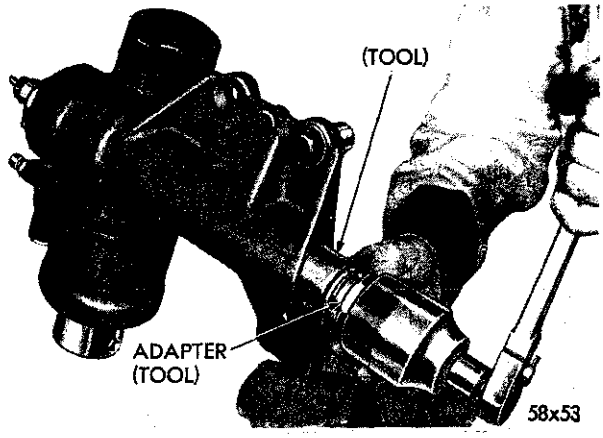

Fig. 4—Installing the Gear Shaft Oil Seal

CAUTION: Do not remove the steering arm by prying with a lever or striking with a hammer as serious steering gear internal damage will result.

(6) Remove the gear shaft, grease retainer with adapter SP-3056 and Tool C-3350 (Fig. 3) as follows:

(a) Slide the threaded position of the adapter SP-3056 over the end of the gear shaft.

(b) Install the nut section of Tool C-3350 on the gear shaft.

(c) Maintain pressure on the adapter SP-3056 with the nut section of Tool C-3350 while turning adapter SP-3056 into the seal until it has bottomed in the seal.

(d) Install the two half-rings and ring retainer of Tool C-3350 over the adapter and nut section of the Tool.

(e) Turn the nut section counter-clockwise; as the hexagon nut is removed from the gear shaft, the oil seal will be pulled from the housing.

(7) Remove the oil seal snap ring with pliers Tool C-3229 and remove the oil seal back up washer and repeat operation a, b, c, d, to remove the inner seal.

Installation

(1) Install the gear shaft inner oil seal into the steering gear housing (lip of seal toward the needle bearings) with the adapter SP-3052 and Tool C-3350 as follows:

(a) Place the long lip of adapter SP-3052 against the seal.

(b) Thread the tool nut on the threaded end of the gear shaft (Fig. 4).

(c) Turn the tool nut on the gear shaft until the shoulder of the adapter tool contacts the housing.

(d) Remove the tools and install the oil seal back-up washer and retainer ring.

CAUTION: Make sure the snap ring is properly seated in the housing groove (Fig. 5).

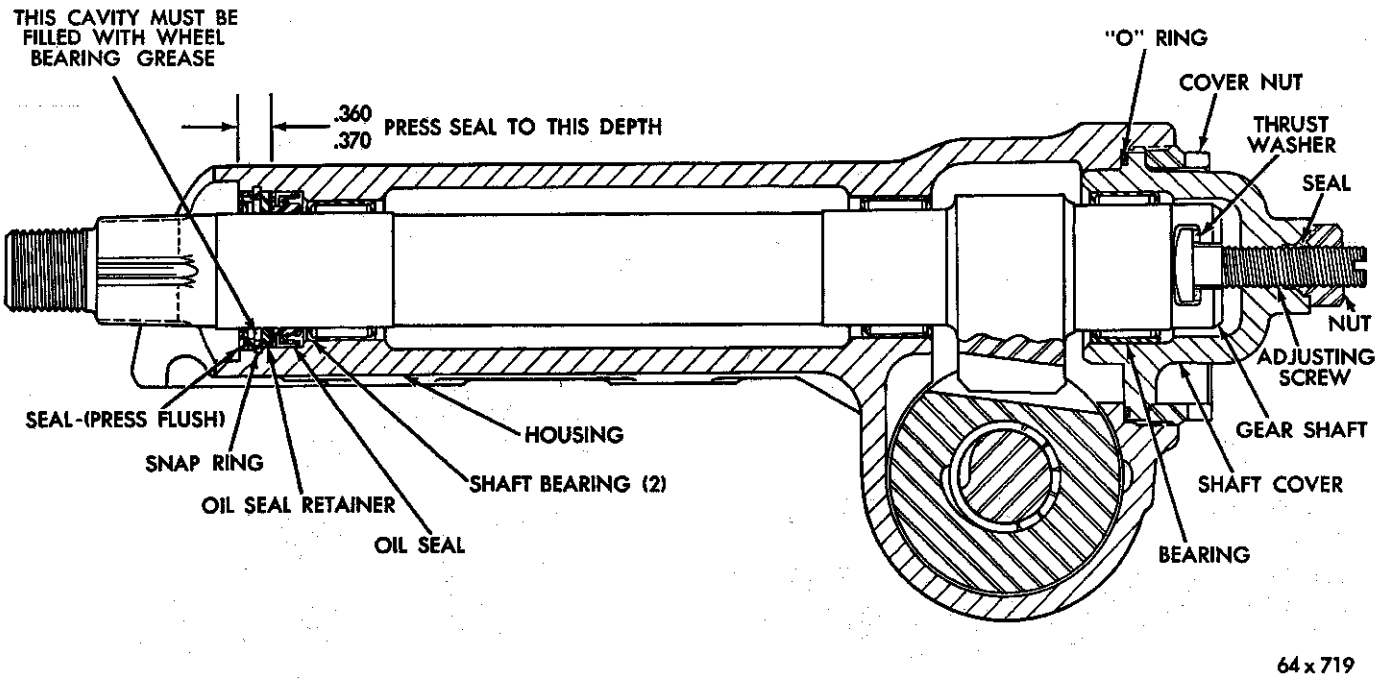

Fig. 5—Steering Gear Housing (Sectional View)

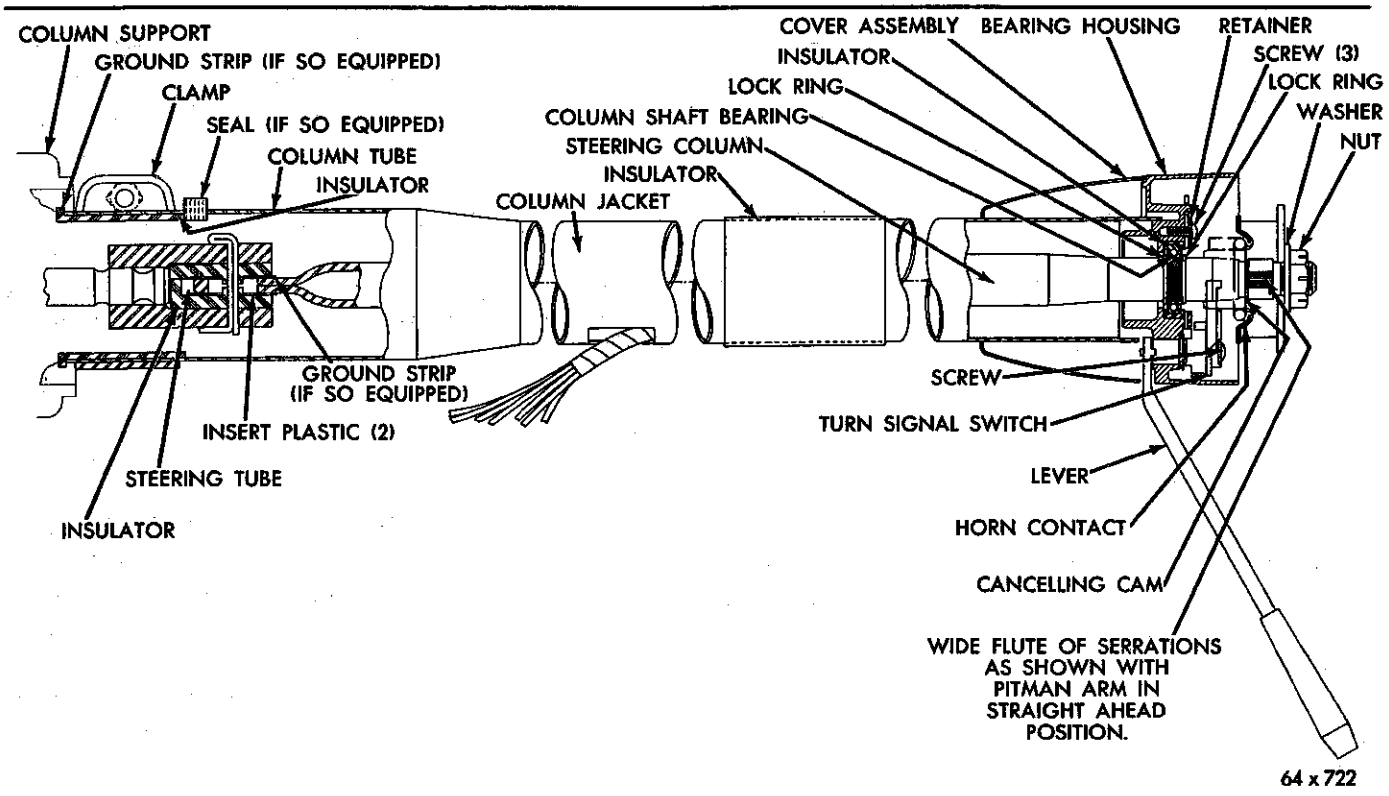

Fig. 6—Jacket Tube and Column Tube—Cross Section (Chrysler)

(e) Fill the cavity of the housing base to within 3/16 inch of the end of the bore with wheel bearing grease. Any surplus grease will squeeze out around inner edge of seal when the seal is installed.

(f) Position the gear shaft grease retainer with lip of seal towards the needle bearings and with the hub of the adapter SP-3052 against the seal, install the seal.

3. POWER STEERING GEAR UNIT

Removal

(1) Disconnect the negative (ground) cable from the battery.

(2) On models VC-1, VC-2 and VC-3 compress and turn the horn button ¼ turn counter-clockwise to release the horn button from the retainer.

(3) Disconnect the horn wire at the horn blowing switch.

(4) Remove the three (3) screws and insulators attaching the horn ring and horn blowing switch to the steering column. Remove the horn ring and switch.

(5) Refer to Figure 6 and loosen the steering wheel nut several turns and install the steering wheel puller Tool C-3428A and remove the steering wheel nut and steering wheel.

(6) Remove the two bolts attaching the steering jacket tube clamp at the instrument panel and remove the clamp.

(7) Disconnect the directional switch wiring at the multiple connector below the instrument panel.

(8) Remove the screws attaching the dust pad to the floor panel and slide the dust pad up on the jacket tube.

(9) Loosen the jacket tube clamp at the steering gear housing.

(10) Remove the retainer snap ring from the groove in the steering tube at the top of the bearing using Pliers Tool C-3128 (Fig. 7).

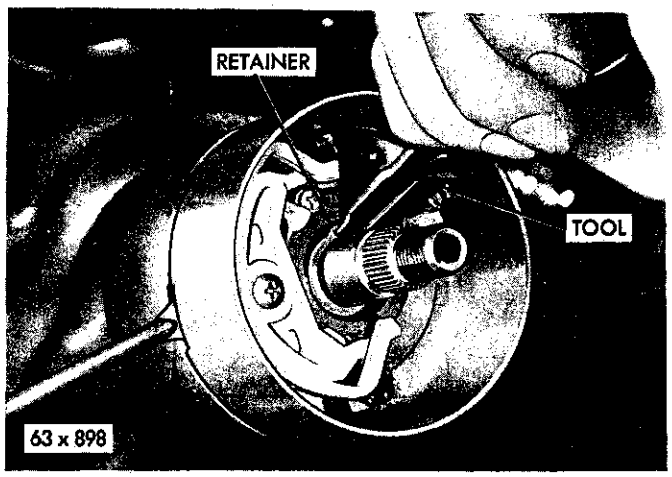

Fig. 7—Removing Bearing Retainer Ring

(11) Reinstall the steering wheel nut on the upper steering tube to protect the threads. Pull up on the jacket tube and tap the steering wheel nut with a fibre hammer. This action will force the bearing from the splines on the steering tube.

(12) On Imperial models, remove the two screws from the underside of the steering wheel and remove the horn blowing actuator and the steering wheel cover.

(13) Disconnect the horn wire.

(14) Refer to Figure 8 and loosen the steering wheel nut several turns and install the steering wheel puller Tool C-3428-A, and remove the steering wheel nut and the steering wheel.

(15) Remove the directional switch lever.

(16) Remove the steering column lower cover.

(17) Remove the two screws and disconnect the switch wires at the connection and remove the directional switch and wires.

(18) Remove the retainer snap ring from the groove in the steering tube at the top of the bearing using pliers Tool C-3229.

(19) Remove the jacket tube shield to allow access to the column tube clamp and remove the screws attaching the steering jacket tube clamp at the instrument panel and remove the clamp.

(20) Raise the carpet to expose the floor panel. Move the rubber grommet up on the jacket column.

(21) Remove the screws attaching the rubber dust boot at the firewall and remove the floor inspection panel.

(22) Loosen the jacket tube clamp at the steering gear housing.

(23) On Chrysler and Imperial Models, remove the cotter key and nut at the center link and disconnect the link from the arm.

(24) Remove the arm nut and washer at the steering gear shaft.

(25) Slide Tool C-3646 up on the arm and place the shoe of the puller behind the steering arm (Fig. 2). Tightening the tool center screw against the gear shaft, will pull the steering arm from the gear shaft.

CAUTION: Do not remove the steering arm by prying with a lever or striking with a hammer as serious steering gear internal damage will result.

(26) Remove the four nuts and washers connecting the master cylinder to the brake booster and move the master cylinder towards the engine.

NOTE: Use a wire to attach the cylinder so that the brake tube will not be damaged.

(27) Disconnect the pressure and return hoses at the steering gear. Fasten the ends of the hoses above

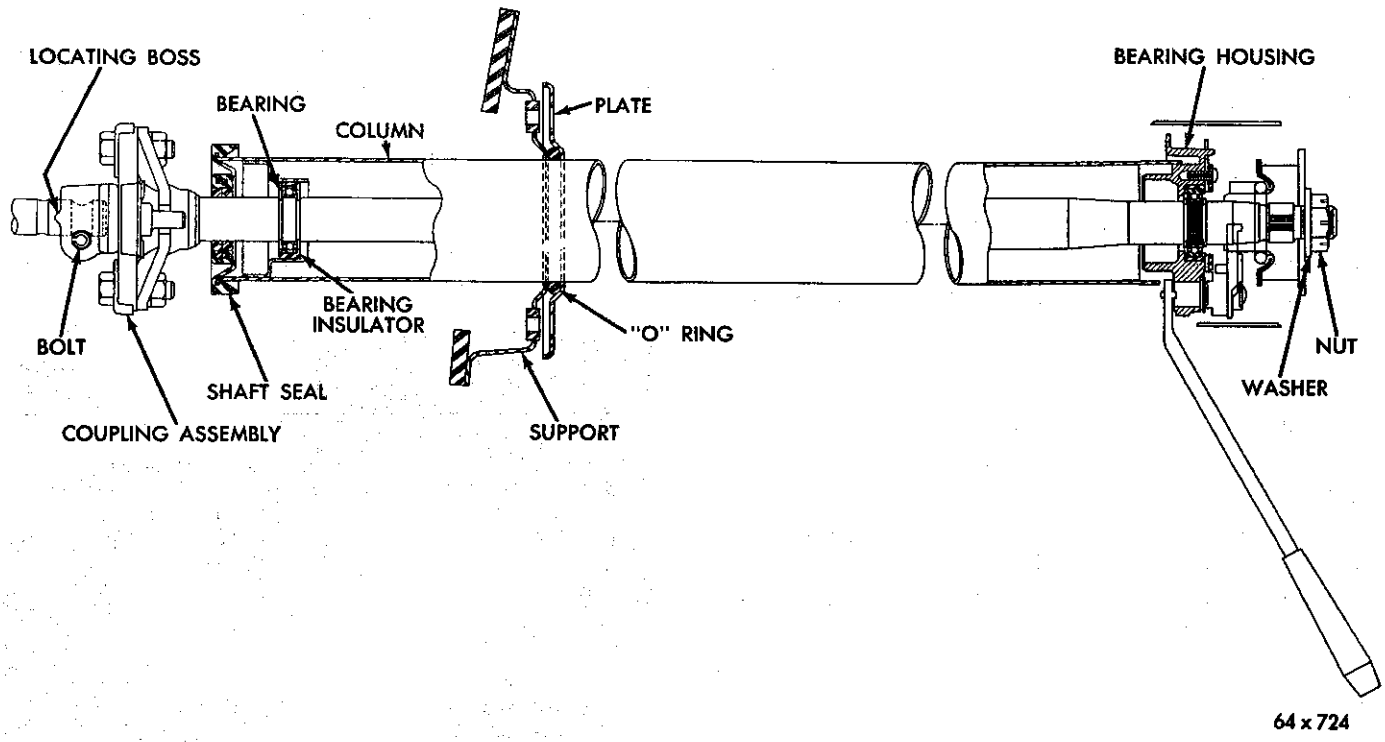

Fig. 8—Jacket Tube and Column Tube—Cross Section (Imperial)

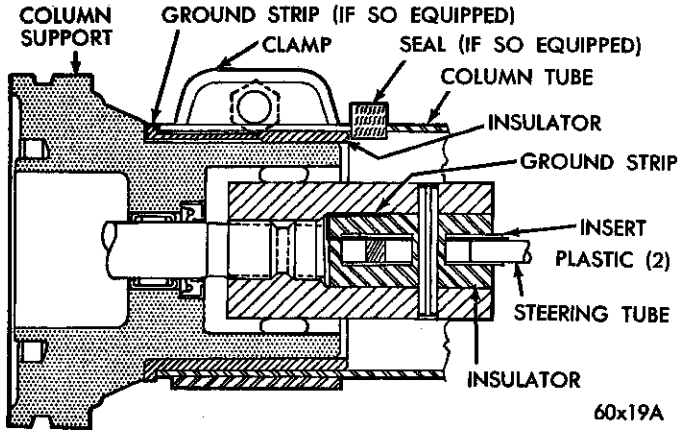

Fig. 9—Jacket Tube Installed on Jacket Support—Cross Section

the oil level in the reservoir. Cap the ends of the hoses. Cap the fittings on the steering gear.

(28) On Chrysler Models, pry between the jacket tube clamp (Fig. 9) and the steering gear housing to loosen the jacket tube from the column jacket support insulator boot.

(29) Slide the jacket tube up and off the steering gear through the driver's compartment.

(30) Remove the rubber insulator boot horn ground strap, the steering tube coupling pin, two plastic inserts, horn ground strap, rubber insulator and the upper steering tube.

(31) On Chrysler and Imperial Models, remove the gear housing to frame bolts, washers and alignment wedge.

(32) Slide the steering gear towards the rear of the

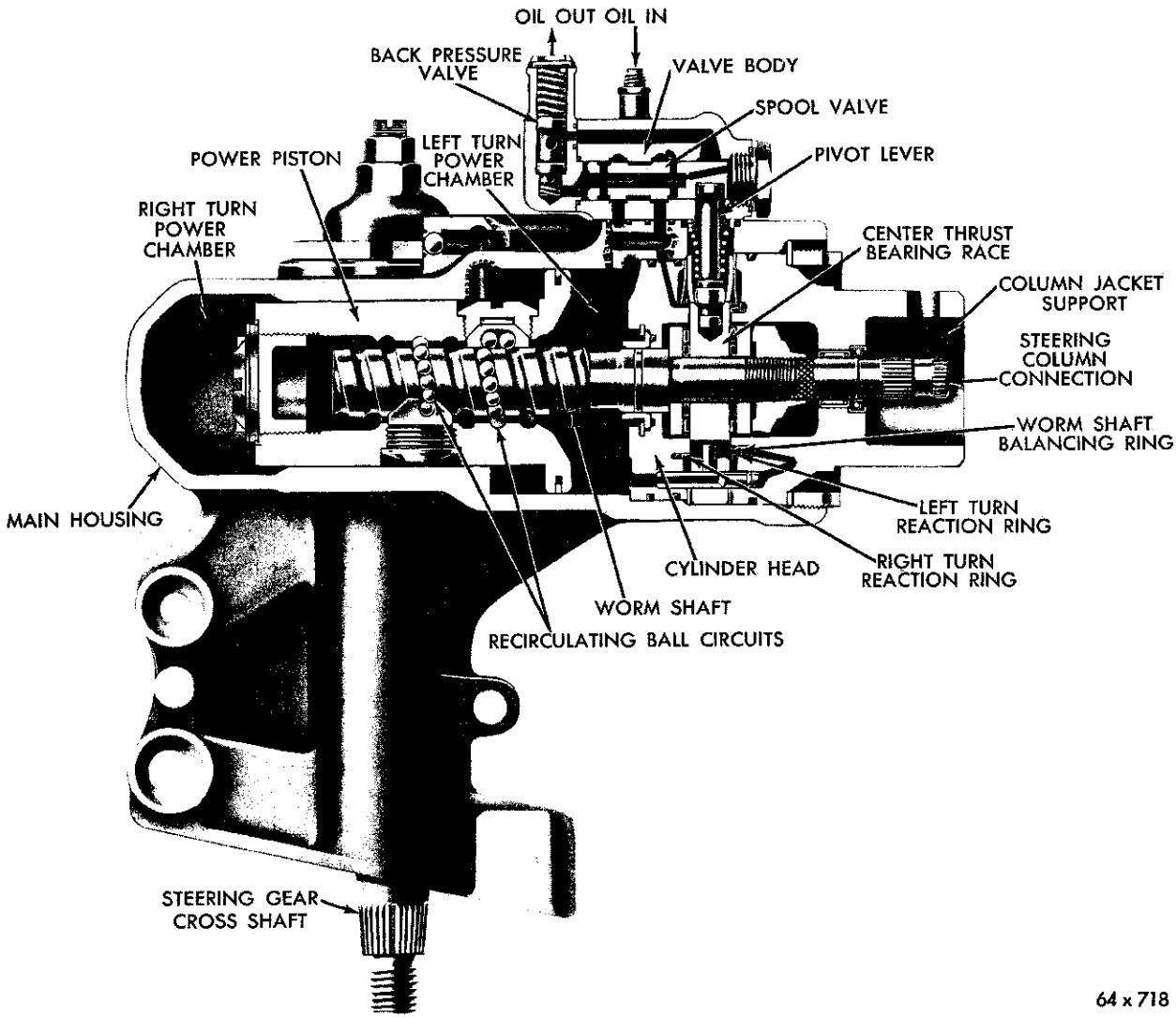

Fig. 10—Steering Gear (Sectional View)

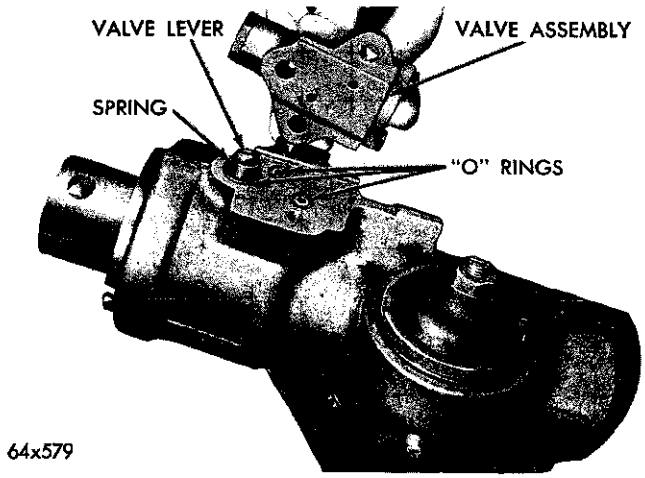

Fig. 11—Removing the Valve Body Assembly

vehicle and at the same time, raise the lower end of the gear to remove the gear at the engine compartment.

Disassembly (Fig. 10)

NOTE: Prior to disassembly, clean the gear assembly thoroughly in a suitable solvent and install the unit in the holding fixture Tool C-3323.

When disassembling, each part should be placed in a suitable solvent, washed, then dried by dry compressed air. Careful handling of the parts must be exercised to avoid the occurrence of nicks and burrs. Crocus cloth may be used to remove small nicks or burrs provided it is used carefully. When used on the steering gear valve, use extreme care not to round off the sharp edge portions of the two lands located between the valve drilled holes. The sharp edge portion of these two lands is vitally important to this type of valve.

Remove and discard all "O" seal rings and seals. Use new ones lubricated with petrolatum when reassembling.

(1) Drain the steering gear through the pressure and return connections by turning the worm shaft from one extreme of travel to the other.

(2) Remove the coupling pin on Chrysler Models.

CAUTION: Support the coupling when driving the pin in or out to avoid damaging the worm shaft and bearings.

(3) Remove the valve body housing attaching screws and remove the valve body and the three "O" rings (Fig. 11).

(4) Remove the spring and valve lever. Pry under the spherical head with a screwdriver.

NOTE: Use care not to collapse the slotted end of the valve lever as this will destroy the bearing tolerances of the spherical head.

(5) Remove the gear shaft oil seal inner and outer as outlined under Paragraph 2 "Gear Shaft Oil Seal Replacement".

(6) Loosen the gear shaft adjusting screw locknut to facilitate removal and remove the gear shaft cover nut with Tool C-3633 (Fig. 12).

CAUTION: Oil will be expelled when the gear shaft and cover are withdrawn from the housing.

(7) Rotate the worm shaft to the full right turn position, then return the worm shaft to the center of travel. This will place the piston in the center position (Fig. 1). Withdraw the gear shaft until the sector teeth clear the housing. Rotate the shaft 180 degrees and allow the ends of the teeth to rest on the housing.

(8) Turn the worm shaft to the full right turn position to compress the power train parts and remove the steering jacket support nut with Tool C-3634 (Fig. 13).

(9) On Chrysler models firmly install a suitable drift through the hole in the jacket support to engage the groove in the worm shaft, thereby locking these two parts together (Fig. 14).

NOTE: By this procedure, the worm will be all

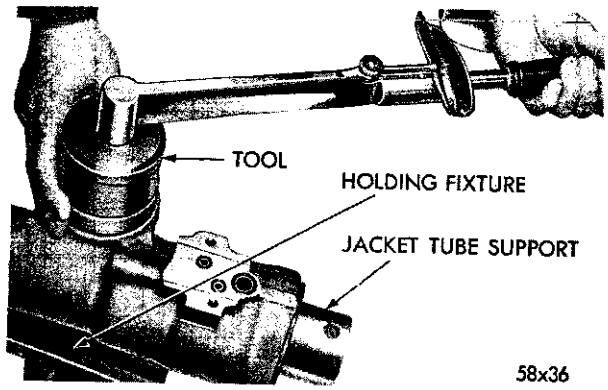

Fig. 12—Removing the Gear Shaft Cover Nut

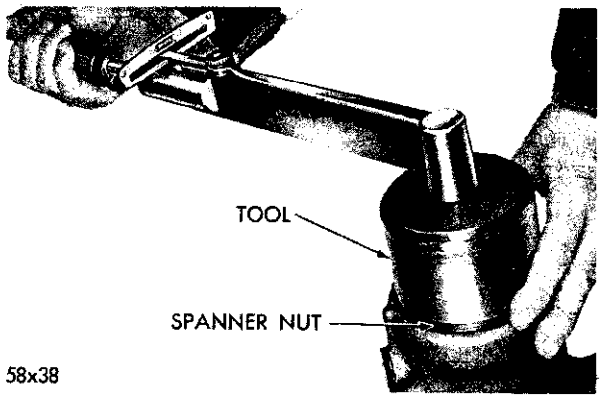

Fig. 13—Removing the Steering Column Support Nut

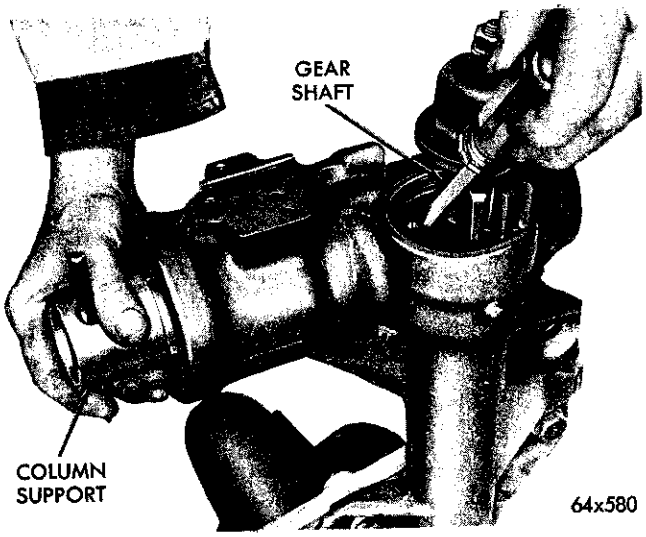

Fig. 14—Removing the Power Train

the way into the position and the power train parts will be resting against the piston flange. It is imperative that the cylinder head, center race and spacer assembly and the jacket support be maintained in close contact with each other. This will prohibit the teflon sealing ring on the worm shaft from becoming disengaged from its mating sleeve retained in the cylinder head. It will also eliminate the possibility of the reaction rings becoming disengaged from their grooves in both the cylinder head and the column jacket support.

(10) While holding the drift, pry up on the piston teeth with a screwdriver using the gear shaft as a fulcrum and remove the complete power train.

NOTE: On Imperial models hold the power train compressed manually, while the power train is being pried out of the housing.

(11) Remove the gear shaft and cover assembly from the housing and remove the steering gear housing from the vise.

4. POWER TRAIN DISASSEMBLY

(1) Place the power train in a vise equipped with soft jaws to avoid damaging the piston assembly.

CAUTION: Do not turn the worm shaft more than one-half turn during disassembly.

(2) Remove the column jacket support tang washer.

NOTE: The needle bearing in the support consists of 33 needles originally retained in the support by heavy lubricant to facilitate assembly. This lubricant, however, will have become dissolved in the hot hydraulic fluid with the unit in operation.

(3) To make sure the bearing needles do not drop

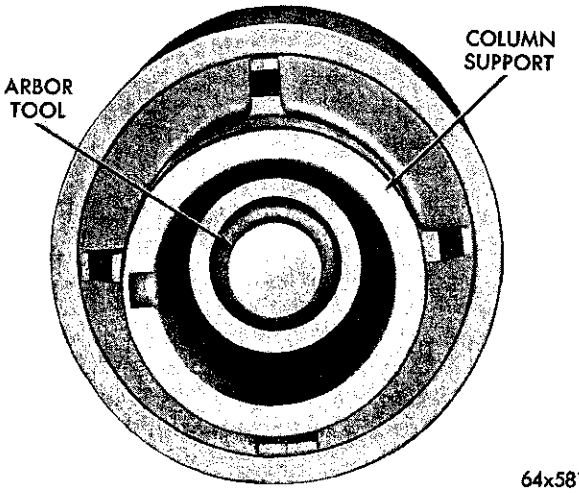

Fig. 15—Retaining the Bearing Rollers with Arbor Tool

out when removing the support, place the arbor, Tool C-3929 on the wormshaft and slide the support and bearing up on the arbor tool (Fig. 15).

(4) Hold the worm shaft from turning, then turn the thrust bearing nut with sufficient force to release the staked portions from the knurled section and remove the nut.

NOTE: Wire brush the knurled section to remove the chips, then blow out the nut and worm shaft to remove any metal particles.

(5) Remove the upper thrust bearing race (thin) and the upper thrust bearing.

(6) Remove the center bearing race.

(7) Remove the lower thrust bearing and the lower thrust bearing race (thick).

(8) Remove the lower reaction ring and the reaction spring.

(9) Remove the cylinder head assembly.

(10) Test the operation of the worm shaft. The

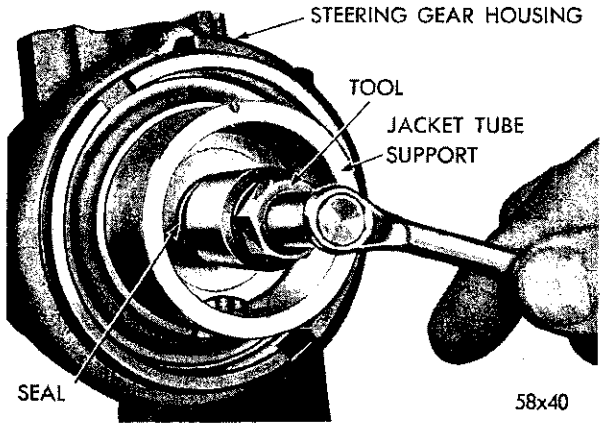

Fig. 16—Removing the Worm Shaft Upper Seal

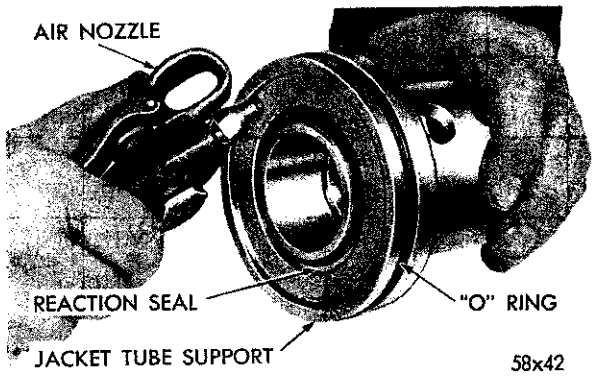

Fig. 17—Removing the Reaction Seal from the Jacket Support

torque required to rotate the wormshaft throughout its travel in or out the piston must not exceed 2 inch pounds.

NOTE: The worm and piston assembly is serviced as a complete assembly only and should not be disassembled.

Column Jacket Support Disassembly

(1) Remove the worm shaft upper seal with puller Tool C-3638 (Fig. 16).

CAUTION: Do not interchange the Imperial worm shaft support, reaction rings and seals with that of any other models. The machining on the Imperial support is different, resulting in a difference of reaction feel.

(2) Remove the large "O" ring from the groove in the jacket support.

(3) Remove the reaction seal from the groove in the face of the jacket support with air pressure directed into the ferrule chamber (Fig. 17).

(4) Inspect all the grooves for burrs. Make sure the passage from the ferrule chamber to the upper reaction chamber is unobstructed.

Assembly

(1) Install the worm shaft upper oil seal using Tool

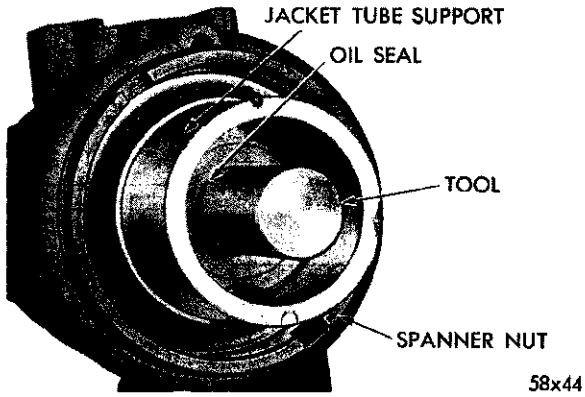

Fig. 18—Installing the Worm Shaft Upper Seal

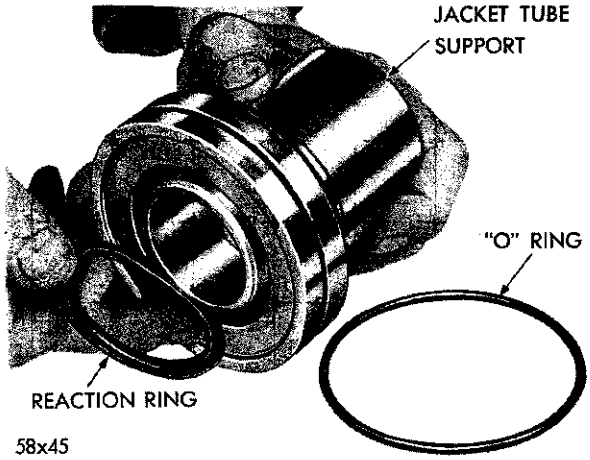

Fig. 19—Installing the Reaction Seal into the Jacket Support

C-3650 (Fig. 18) (with the lip of the seal toward the bearing).

(2) Lubricate and install the reaction seal in the groove in the face of the column jacket support with the flat side of the seal out (Fig. 19.)

Cylinder Head Disassembly

(1) Remove the two "O" rings in the two outer grooves in the cylinder head.

(2) Remove the lower reaction "O" ring in the groove in the face of the cylinder head. Apply air pressure into the oil hole located in the groove between the two "O" ring grooves (Fig. 20).

(3) Inspect the worm shaft seal in the cylinder head counterbore for possible damage; replace the cylinder head seal if necessary (Fig. 21).

Assembly

(1) Inspect the oil passage in the ferrule for obstruction and cylinder head lands for burrs, then lubricate the two large "O" rings and install in the grooves on the cylinder head.

(2) Install the cylinder head oil seal, back-up ring

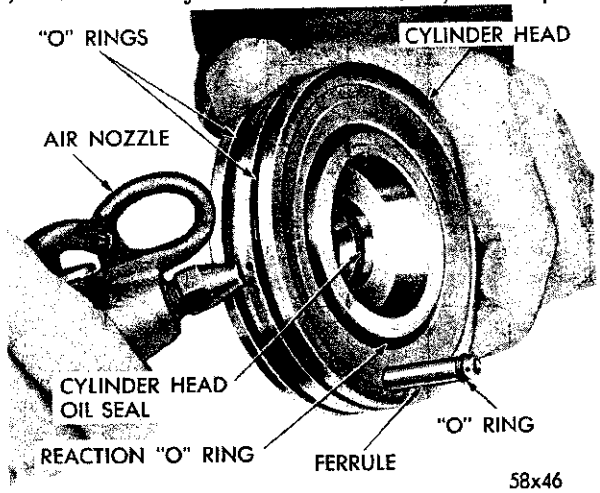

Fig. 20—Removing the Reaction Ring Seal From The Cylinder Head

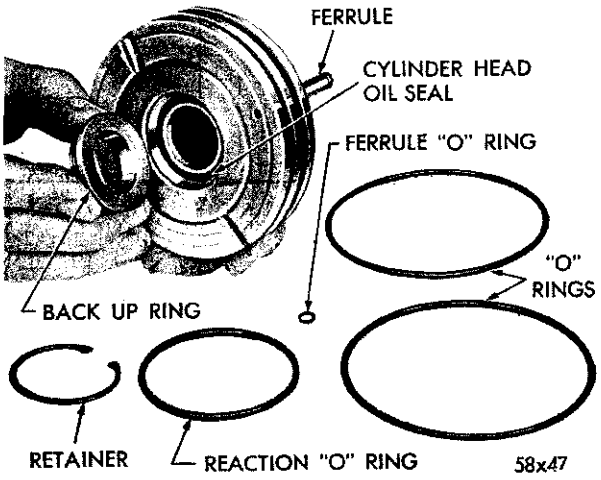

Fig. 21—Removing the Cylinder Head Seal

and retainer (if removed). Make sure the retainer is seated in the groove.

(3) Install the lower reaction seal in the cylinder head groove.

NOTE: The small "O" ring for the ferrule groove should be installed after the worm shaft bearing preload has been established; otherwise, the small "O" ring will be damaged by the reaction springs and the center bearing spacer.

Steering Valve Assembly Disassembly (Fig. 22)

(1) Remove the two screws attaching the pressure control valve body to the steering valve body and remove the back pressure control valve assembly.

(2) Compress the pressure control valve spring and remove the retainer pin, spring, pressure control valve piston and back pressure valve cushion spring.

(3) Carefully shake out the steering valve piston. Inspect the valve for nicks, burrs and scores.

NOTE: If the steering valve or valve housing is damaged, replace the valve and housing assembly.

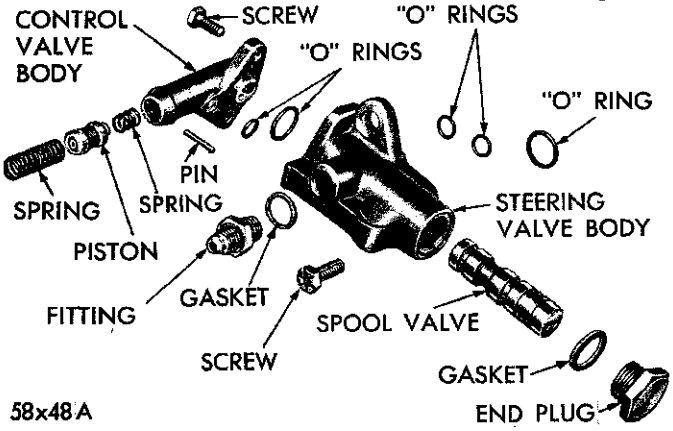

Fig. 22—Steering Valve (Disassembled View)

Do not remove the valve end plug unless inspection indicates a leak at the seal.

Small burrs and nicks may be removed with crocus cloth, if extreme care is used not to round off the sharp edge portion of the valve. The sharp edge portion is vitally important to the operation of this valve.

Clean the valve bodies and valve pistons thoroughly in clean solvent. Blow out all passages and blow parts dry with dry compressed air. Lubricate the pistons and bores with Power Steering Fluid MoPar Part No. 2084329.

Assembly

(1) Install the steering spool valve into the valve housing so that the valve lever hole is aligned with the lever opening in the valve body. The valve must be perfectly free in the valve body without sticking or binding.

(2) Install a new seal and end plug (if removed). Tighten the plug to 25 foot-pounds torque.

(3) Install the back pressure valve cushion spring in the back pressure valve body. Lubricate the back pressure valve piston and insert the nose end of the piston into the body bore. Test for smooth operation. Be sure the lower spring is not cocked.

(4) Install the pressure control valve spring on top of the valve piston. Compress the spring and install the retaining pin.

(5) Install the two "O" rings and assemble the back pressure valve assembly to the control valve body. Tighten the two attaching screws to 10 foot-pounds torque.

(6) If the pressure inlet fitting has been removed, replace the copper gasket and retighten the fitting to 30 foot-pounds torque.

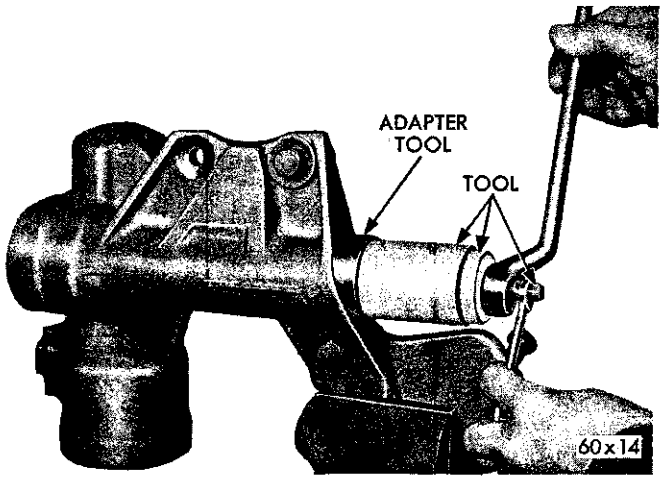

Fig. 23—Removing the Housing Lower Bearing

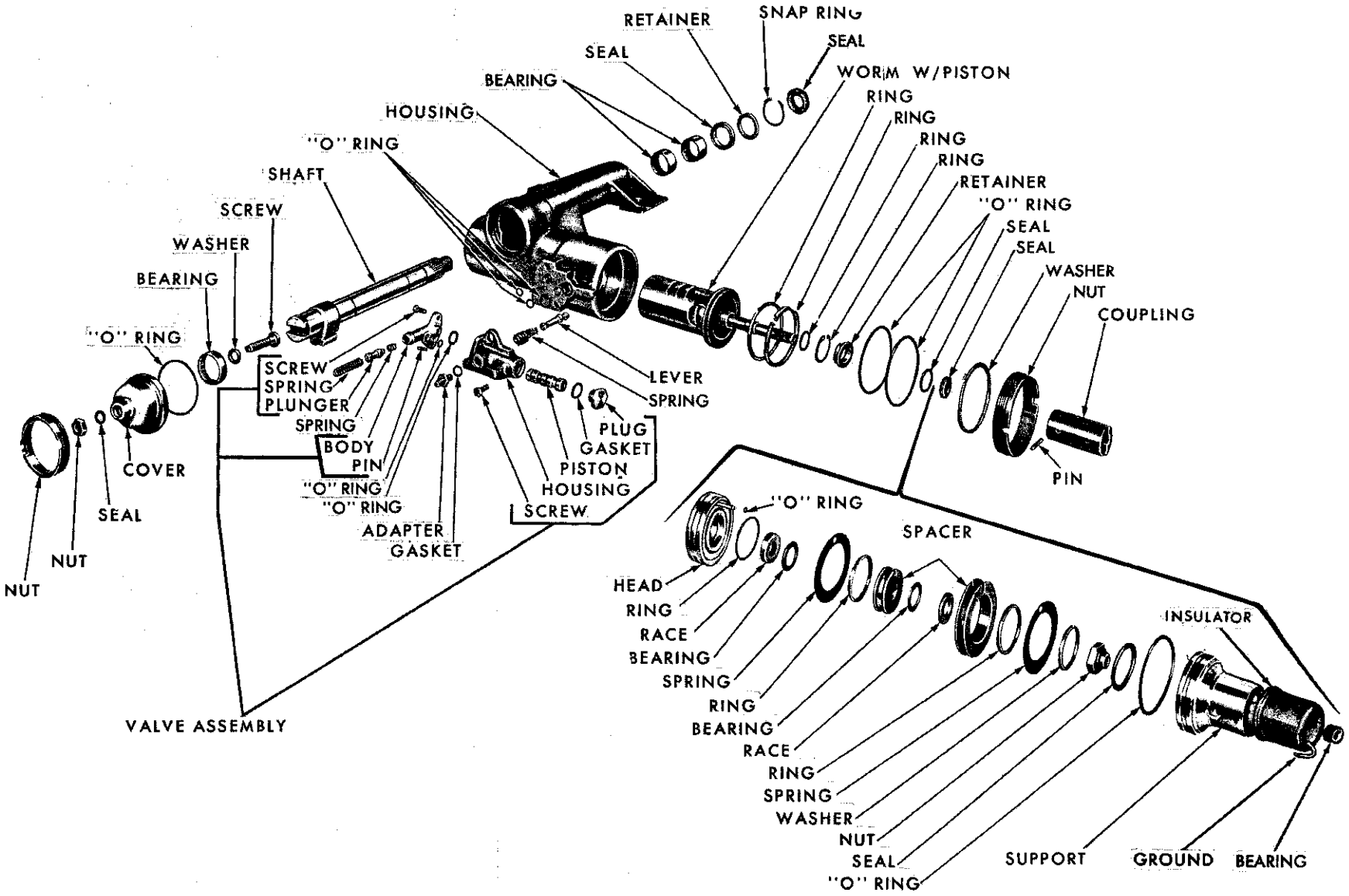

Fig. 24—Steering Gear (Disassembled View)—Chrysler

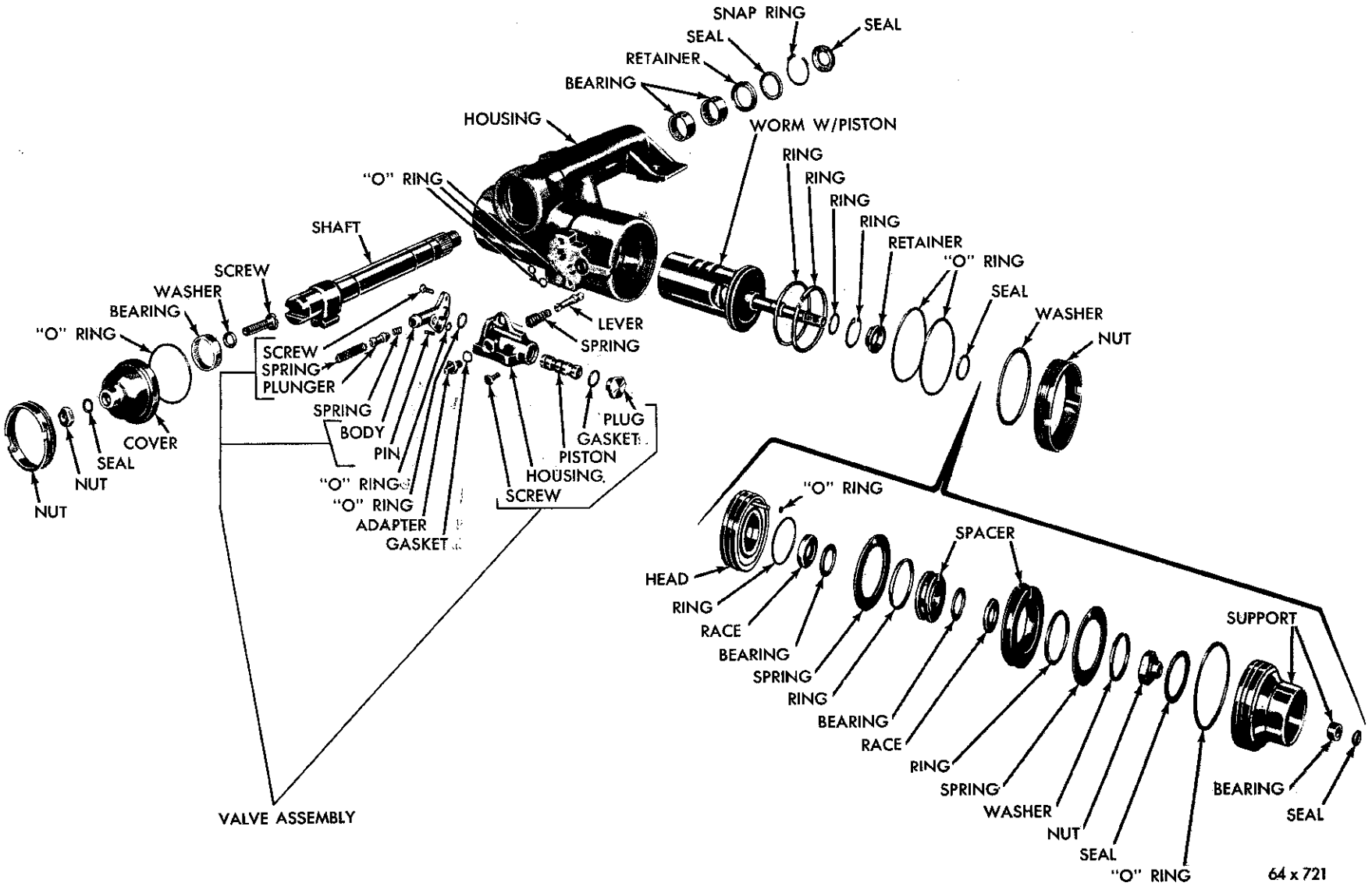

Fig. 25—Steering Gear (Disassembled View)— Imperial

Gear Shaft Disassembly

(1) Remove the gear shaft adjusting screw lock nut and remove the small "O" ring from the top of the cover and large "O" ring from the base of the cover (Fig. 5).

NOTE: The needle bearing in the cover consists of 51 needles originally retained in the cover by heavy lubricant to facilitate assembly. This lubricant, however, will have become dissolved in the hot hydraulic fluid with the unit in operation.

CAUTION: If for some reason, the cover assembly must be removed from the gear shaft, the 51 needles will fall out of the cover. If any needles (51) become lost, it will be necessary to replace the cover and bearing as an assembly. Use wheel bearing lubricant to retain the needle rollers in the cover when reassembling.

Assembly

(1) Lubricate a new small "O" ring and install it over the adjusting screw into position at the top of the gear shaft cover.

(2) Lubricate an "O" ring and gear shaft cover with petrolatum and install the "O" ring in the cover groove.

(3) Install the adjusting screw lock nut, but do not tighten.

Steering Gear Housing Gear Shaft Bearings

Removal

(1) Attach the steering gear housing in the holding fixture Tool C-3323 and place the holding fixture in a vise.

(2) If necessary to remove the housing bearings, use puller, Tool C-3332 with adapter SP-3062 (Fig. 23) as follows:

a. Engage the jaws behind the bearing, hold the center screw while turning the puller nut to pull the lower (outer) needle bearing out of the housing.

b. Use puller, Tool C-3332, to remove the upper (inner) needle bearing.

Installation

Install the gear shaft bearings into the housing with installer, Tool C-3333 (lettered end of the bearings against the installer tool). Press the bearings to ⅛ inch below the edge of the counterbore.

5. POWER TRAIN

Assembly (Figs. 24 and 25)

If the power piston ring was removed at disassembly, inspect the condition of the rubber sealing ring and install a new cast iron ring with Tool C-3676,

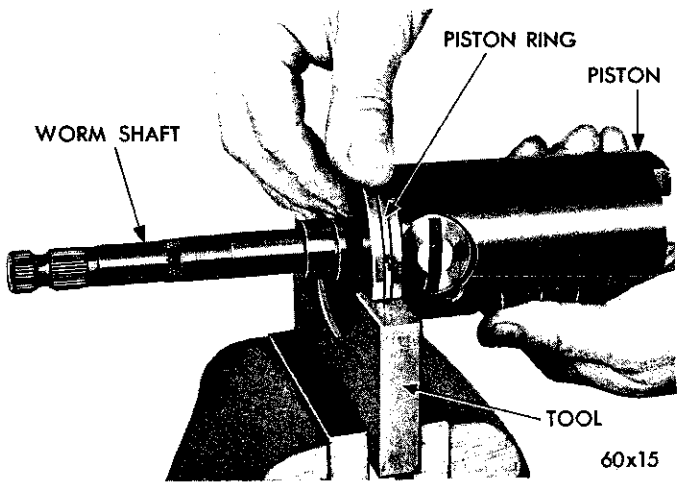

Fig. 26—Removing the Piston Ring

Piston Ring Remover and Installer, as follows:

(a) Position Tool C-3676 in the vise (Fig. 26).

(b) Slide a new piston ring into place in the piston groove.

(c) Place the piston and ring assembly in Tool C-3676 with the lower part of the piston and the ring resting on the land of tool.

(d) Press down on the piston to bottom the piston ring in the piston groove, forcing the open ends of the ring out for ease of locking the ring. The ring should be positioned with ring hooks in line with the ball guide plug.

(1) Place the piston assembly in a vertical position (worm shaft up) in a vise equipped with soft jaws.

(2) Slide the cylinder head assembly (ferrule up) on the worm shaft, inspect the worm shaft seal ring making sure the gap is closed to avoid damaging the ring as the cylinder head moves against the piston flange.

(3) Lubricate with Power Steering Fluid MoPar Part No. 2084329 and install the following parts in order:

a. Lower thrust bearing race (thick).

b. Lower thrust bearing.

c. Lower reaction spring (with small hole over the ferrule).

d. Lower reaction ring (flange up so the ring protrudes through the reaction spring and contacts the reaction "O" ring in the cylinder head).

e. Center bearing race.

f. Upper thrust bearing.

g. Upper thrust bearing race (thin).

h. Start the worm shaft thrust bearing nut (do not tighten).

(4) Turn the worm shaft counter-clockwise one-half turn. Hold the worm shaft in this position while tightening the unit to 50 foot-pounds torque to pre-stretch the worm shaft threads.

CAUTION: If the worm shaft is turned more than one-half turn, the cylinder head sleeve will clear the oil seal ring on the worm shaft. Always position the worm shaft oil seal ring before bottoming the cylinder head against the piston top flange to avoid damaging the oil seal ring.

(5) Loosen the adjusting nut. Place several rounds of cord around the center bearing race (Fig. 27). Make a loop in one end of the cord and hook the loop of a distributor breaker arm spring scale Tool MTU-36 in the cord loop. Pulling the cord will cause the bearing race to rotate. Retighten the worm bearing adjusting nut while pulling on the cord with the scale. If the adjusting nut is tightened properly, reading on the scale should be 16 to 24 ounces (20 ounces preferred) while the bearing race is turning.

CAUTION: Place a support under the adjusting nut during the staking operation to avoid brinelling the piston and the worm bearings.

(6) Stake the upper part of the worm shaft adjusting nut into the knurled area of the shaft as follows:

a. Hold a ¼ inch flat end punch on the center line of the worm shaft and perpendicular to the worm shaft and at a slight angle to the nut flange (Fig. 28).

b. Strike the punch a sharp blow with a hammer and recheck the pre-load.

NOTE: If the adjusting nut moved during the staking operation, it can be corrected by striking the nut a glancing blow in the direction required to regain proper pre-load.

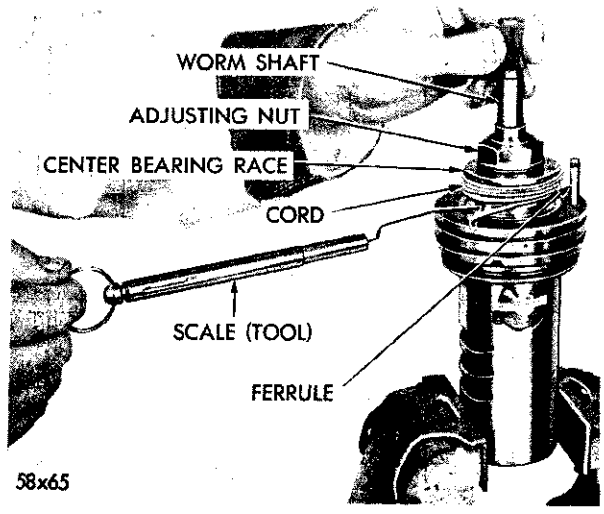

Fig. 27—Adjusting the Center Bearing Race Pre-Load

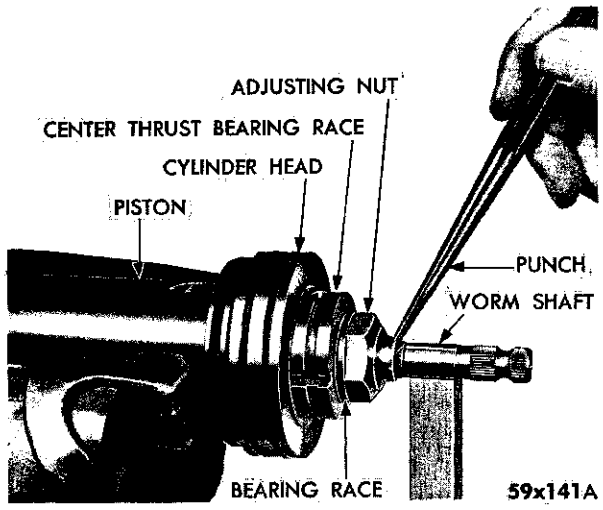

Fig. 28—Staking the Worm Shaft Bearing Adjusting Nut

c. After the proper pre-load, stake the nut at three more locations 90 degrees apart around the upper part of the nut.

d. To test the total staking, tighten the nut to 28 foot-pounds torque in either direction. If the nut does not move, the staking operation is satisfactory.

IMPORTANT: Retest the pre-load adjustment, the torque of 16 to 24 inch ounces must remain after the adjusting nut is securely locked.

(7) Install the center bearing spacer assembly over the center bearing race and engage the dowel pin of the spacer in the slot of the race and the slot of the spacer entered over the cylinder head ferrule.

NOTE: This will align the valve lever hole in the center bearing race with the valve lever hole in the center bearing spacer assembly.

(8) Install the upper reaction ring on the center bearing spacer with the flange down against the spacer.

(9) Install the upper reaction pressure spring over the reaction ring with the cylinder head ferrule through the hole in the reaction spring.

(10) Install the reaction ring (without flange) inside the upper reaction ring.

(11) Lubricate the ferrule "O" ring with petrolatum and install it in the groove on the cylinder ferrule.

(12) Carefully install the jacket support over the worm shaft, engaging the cylinder head ferrule and the "O" ring and making sure the reaction rings enter the circular groove in the jacket or worm shaft support.

CAUTION: Form a .0015 inch feeler gauge into a coil and insert with the jacket support to protect

the lip of the seal when installing over the worm shaft serrations.

(13) Align the parts on the power train so that the valve lever hole in the center bearing spacer assembly is 90 degrees counter-clockwise from the piston rack teeth and hold all the parts together.

6. STEERING GEAR

Assembly

(1) With the steering gear housing in the holding fixture Tool C-3323 in approximate vehicle installed position; lubricate the bore of the housing with petrolatum and carefully install the power train assembly with the center bearing spacer valve lever hole in "UP" position (Fig. 10) to line up with the control valve lever clearance hole in the steering gear housing.

NOTE: Place a feeler stock, .0015 inch, to cover the aligning notch in the steering gear housing to protect the "O" ring seals when installing the gear train.

CAUTION: Make sure the cylinder head is bottomed on the housing shoulder (Fig. 10). Do not release pressure on the power train (Fig. 14) until all the parts are positioned in the steering gear housing.

(2) Align the valve lever hole in the center bearing spacer exactly with the clearance hole in the housing, with aligning Tool C-3649.

NOTE: Aligning tool should not be removed until the spanner nut is securely tightened.

(3) Install the column support spanner nut and tighten the nut 110 to 200 foot-pounds torque with Tool C-3634 (Fig 13).

(4) Set the piston at the center of travel and install the gear shaft and cover assembly so that the sector teeth index with the piston rack teeth. Make sure the "O" ring is properly positioned in the face of the cover (Fig. 5).

(5) Install the cover spanner nut and tighten the nut 110 to 200 foot-pounds torque with Tool C-3633 (Fig. 12).

(6) Install the valve lever (double bearing end first) into the center bearing spacer through the hole in the steering housing so that the slots in the valve lever are parallel to the worm shaft in order to engage the anti-rotation pin in the center bearing race.

NOTE: Turn the worm until the piston bottoms in both directions and observe the action of the lever. It must return easily to its center position when the worm torque is relieved.

(7) Install the valve body on the housing making sure that the valve lever enters the hole in the piston (Fig. 10). Be sure that the "O" ring seals are in place. Tighten the steering valve mounting screws to 30 inch-pounds torque.

(8) Install a new inner oil seal, back-up washer, retainer, and new outer seal as outlined in Paragraph 2 "Gear Shaft Oil Seal Replacement".

7. FINAL TEST, ADJUSTMENTS AND SPECIFICATIONS

(1) Remove the oil reservoir cover and fill the reservoir to the bottom of the filler neck opening.

(2) Connect the test hoses, Tool C-3211 and Tool C-3318, with the proper adapters to the hydraulic pump on the vehicle with pressure gauge Tool C-3309B installed between the pump and the steering gear to register the pressures.

(3) Start the engine and operate at idle to bring the steering gear to normal operating temperature.

(4) Expel all the air from the unit by turning the worm shaft several times to the right and then to the left.

(5) Refill the reservoir before proceeding with the following test and adjustments on the bench:

a. Tighten the steering valve body attaching screws to 7 foot-pounds torque.

b. Install a steering gear shaft arm on the steering gear shaft.

c. With the gear shaft on center, tighten the gear shaft adjusting screw until the backlash just disappears. Tighten 1¼ turns from this position and while holding the adjusting screw in this position, tighten the lock nut (Fig. 29).

NOTE: This will bring the piston rack and the sector teeth in full alignment.

d. Turn off the hydraulic power to the unit. Oper-

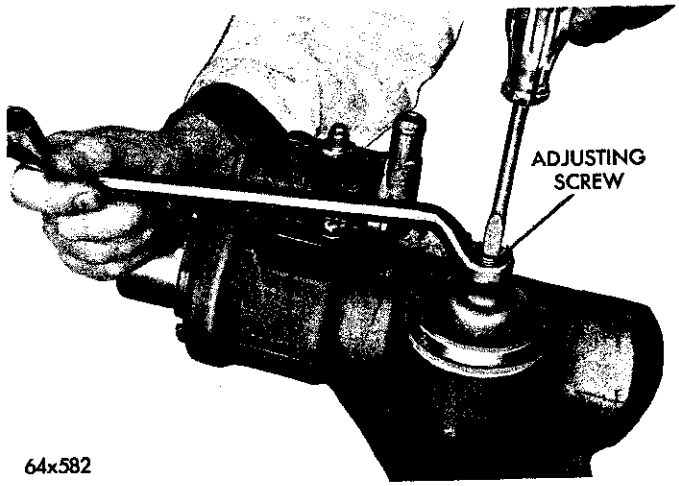

Fig. 29—Steering Gear Shaft Adjustment

ate the unit manually from a minimum of 180 degrees from center in each direction, measured at the worm shaft.

e. With the hydraulic power applied to the unit and with the gear shaft on center plus or minus 2 degrees, readjust the gear shaft backlash. This will require loosening the adjusting screw until the backlash is evident. Retighten the adjusting screw until the backlash just disappears. Continue to tighten ⅜ to ½ turn from this position and tighten the lock nut to 50 foot-pounds torque to maintain this setting.

f. Starting from a point at least one full turn of the worm shaft either side of center, the torque at the gear shaft required to turn the unit through center at 2 rpm in each direction shall not exceed 25 foot-pounds from left to right. Perform this operation carefully to prevent a lockup in the steering gear.

g. Adjust the torque evenly by moving the steering valve assembly by tapping gently on the back pressure valve body attaching screws to move the valve body up on the steering housing and tap on the end plug to move the valve body down on the housing.

NOTE: If the torque is greater to the right, move the control valve body "Down." If the torque is greater to the left, move the valve body "Up." After positioning the valve to obtain equal torque, tighten the valve body attaching screws to 15 foot-pounds torque to maintain this setting.

h. With the unit at or near the full turn in either direction, attempt to return the unit to the center by applying a torque wrench at the steering gear cross shaft. Hold the worm shaft until the cross shaft torque builds up to 50 foot-pounds torque. Release the worm shaft and maintain a constant steady pull on the cross shaft (turning cross shaft slowly). If the cross shaft torque does not drop to 25 foot-pounds torque maximum as the piston passes through the center, check for too much interior drag; binding valve lever, binding valve spool, or cross shaft adjustment is too tight.

i. With the unit under power, but without any load, the torque required to rotate the worm shaft through an included angle of 180 degrees (90 degrees either side of center) shall be 6 to 9 inch-pounds.

j. If the steering gear tests are satisfactory, disconnect the test equipment and install the coupling and coupling pin on units so equipped.

CAUTION: Support the coupling when installing the pin to avoid damaging the worm shaft and bearings.

8. STEERING GEAR INSTALLATION IN VEHICLE (Chrysler Models)

(1) Install the steering tube rubber insulator, plastic insert, the upper steering tube, coupling pin and the horn ground strip (Fig. 9).

(2) Enter the steering gear assembly into the engine compartment and through the floor panel opening. Install the housing attaching bolts, flat washers, swivel washers and nuts, but do not tighten.

(3) Assemble the horn ground strap (copper) to the jacket tube support rubber insulator boot and install this assembly into the lower end of the jacket tube.

(4) Lubricate (powder lubricant) the end of the steering column jacket support and insulator boot to facilitate installation and slide the jacket tube and insulator boot assembly down against the shoulder on the jacket tube support. Tighten the clamp bolt securely.

NOTE: There must be at least $\frac{1}{16}$ inch clearance between the bottom face of the jacket tube clamp and the column support spanner nut to avoid metal to metal contact.

(5) Install the jacket tube support bracket clamp at the instrument panel. Tighten the clamp bolts to 50 inch-pounds torque.

(6) Position the snap ring against the top of the bearing and place the installing tool sleeve C-3879, then a flat washer and the steering wheel nut on the top end of the steering shaft in that order. (Fig. 30).

(7) Turn the steering wheel retaining nut to exert pressure on the installing sleeve and upper snap ring and bearing, this action will press the bearing down onto the serrated section of the steering shaft and against the lower snap ring and will flatten the upper snap ring so that it can enter the groove in the steering shaft. Be sure the snap ring is firmly seated in the steering shaft groove (Fig. 6).

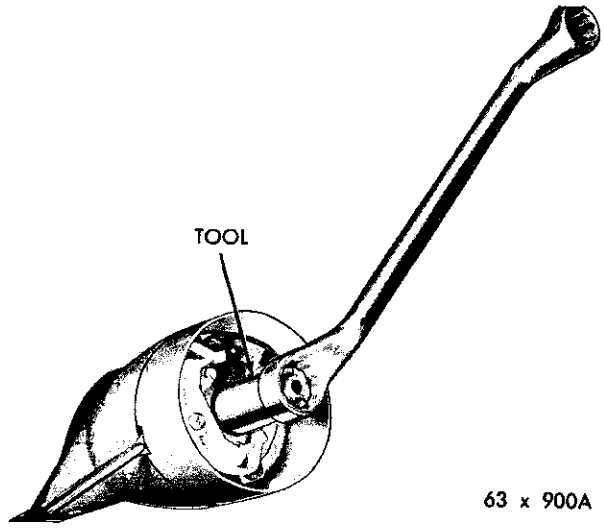

Fig. 30—Installing Jacket Tube Bearing

NOTE: This lock ring places the upper steering shaft in the proper relation with the worm shaft coupling pin.

(8) Remove the steering wheel nut, washer and sleeve tool.

(9) Install the directional switch and wires and the horn wire at the connectors.

(10) Install the directional switch lever (Fig. 6).

(11) Install the steering wheel and steering wheel nut. Tighten nut to 40 foot-pounds torque. Test operation of cancelling lever.

(12) Install the horn blowing switch, horn ring, insulators and attaching screws. Connect the horn wire.

(13) Position floor panel opening toe cover.

(14) Tighten the front upper and the lower gear housing to the frame attaching bolts to 50 foot-pounds torque.

(15) Install the serrated wedge over the rear mounting bolt (Fig. 31) between the housing and the frame parallel to the axis of the steering gear worm shaft so that the tapered surfaces match; tap lightly but firmly into place and tighten the rear mounting bolt to 50 foot-pounds torque.

(16) With the steering gear centered in its travel and the steering wheel and front wheels in the straight ahead position, install the steering gear arm, washer and nut. Tighten to 120 foot-pounds torque.

(17) Install the steering center link, nut. Tighten to 30 foot-pounds torque and install cotter pin.

(18) Install the hydraulic brake master cylinder on the brake booster unit and install the lockwashers and attaching nuts. Tighten nuts securely.

(19) Connect the pressure and the return hoses.

(20) Refill the reservoir. Expel all the air from the system by turning the steering wheel several times to the right and left.

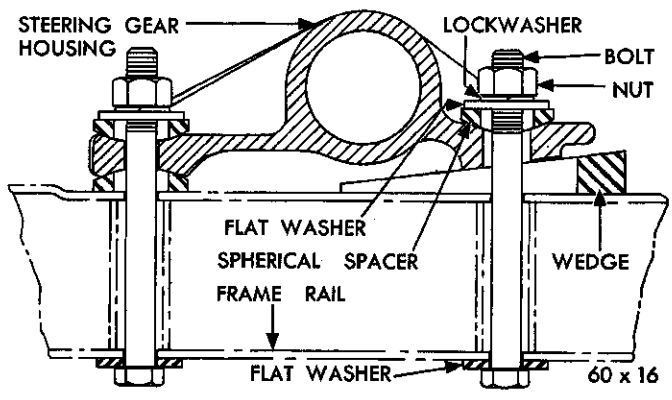

Fig. 31—Steering Gear Mounting

(21) Connect the battery cable at the battery negative post.

9. STEERING GEAR AND COLUMN—IMPERIAL

Steering Column Shaft End Jacket Assembly

NOTE: The steering column and jacket is completely assembled including the panel clamp insulator, lower jacket seal and jacket column floor support before installation into the vehicle. Refer to Figure 8 and proceed as follows:

a. Place the two bearing housing retaining bolts into position in the bearing housing and start the nuts but do not tighten.

b. Stand the jacket column assembly upright and lower the bearing housing into position, engaging the bolt heads in the slots with column jacket. Tighten the two retainer bolt nuts alternately and evenly in steps to prevent unseating the bolt heads from the slots. Tighten nuts to 50 inch-pounds torque.

c. Install the upper shaft bearing and insulator into the jacket tube bearing housing.

d. Install the turn signal switch, switch retaining plate and attaching screws. Tighten the plate screws to 24 inch-pounds torque.

e. Install the "O" ring seal support, the "O" ring seal and the jacket column floor support in that order on the column jacket.

NOTE: The sealing cavity of the steering shaft to jacket tube seal plastic bushing must be filled with short fiber wheel bearing lubricant before installation.

f. Slide the column jacket to steering shaft seal on the steering shaft past the lower bearing serrations.

g. Install the lower shaft bearing and insulator on the lower knurled portion of the steering shaft.

CAUTION: The bearing must be pressed on the shaft by the inner race only or damage to the bearing will result.

NOTE: The lower bearing is color coded and can be identified by a red ball separator. The upper bearing has either a white separator or no separator.

h. Install the upper bearing lower snap ring on the steering shaft and engage it in the upper bearing lower groove.

i. Slide the steering shaft assembly into the column jacket tube assembly and position the upper bearing upper snap ring against the bearing.

j. Place the bearing installing sleeve Tool C-3879

and the steering wheel retaining washer and nut on the steering shaft in that order (Fig. 30).

CAUTION: The bearing must be pressed on the shaft by the inner race only or damage to the bearing will result.

k. Turn the steering wheel retaining nut to exert pressure on the installing sleeve, upper snap ring, and bearing, pressing the bearing down onto the knurled section of the steering tube and against the lower snap ring.

NOTE: The steering shaft upper bearing has approximately .001 inch interference fit at the knurled section of the upper steering shaft.

1. Exert sufficient pressure against the upper retaining ring to flatten it against the bearing so it can enter the upper groove in the steering tube. Be sure the retaining ring seats firmly in the groove.

m. Slip the steering column jacket to steering shaft seal into position evenly on the jacket tube.

Steering Gear and Column Installation

(1) Enter the steering gear assembly through the engine compartment and install the spherical, flat and lockwashers and nuts, but do not tighten.

(2) Install the Steering Gear Housing Aligning Tool C-3949 in place of the vehicle steering column and jacket tube and align the steering gear as follows:

a. Slide the lower end of the aligning tool into position on the steering gear worm shaft support and the upper end at the instrument panel clamp.

b. Install the jacket tube support bracket clamp at the instrument panel. Tighten the instrument support bracket clamp bolts to 95 inch-pounds torque.

c. Tighten the two forward steering gear mounting bolts to 50 foot-pounds torque (Fig. 31).

d. Install the serrated wedge over the rear mounting bolt between the steering housing and the frame parallel to the axis of the steering gear worm shaft so that the tapered surfaces match, then tap the wedge gently but firmly into the space.

e. Tighten the rear mounting bolt to 50 foot-pounds torque. This locks the gear in place and maintains steering gear alignment.

f. Remove the jacket tube support bracket clamp at the instrument panel and remove the Steering Gear Housing Aligning Tool C-3949.

(3) Install the steering column and jacket assembly through the floor panel from the driver's side and start the coupling on the steering gear wormshaft, making certain the master serration on the coupling indexes with the missing serration on the worm shaft.

NOTE: The steering column assembly should be moved down onto the wormshaft until the wormshaft lightly bottoms on the locating pin pre-assembled into the coupling.

(4) Install the coupling clamp bolt and tighten to 33 foot-pounds torque.

(5) Align the jacket tube at the instrument panel and install the jacket tube clamp and attaching screws. Tighten the screws finger tight.

CAUTION: While the steering column is not rigidly attached to the instrument panel use extreme care to prevent any misalignment of the column from the true column position which would result in damage to the flexible coupling disc and horn ground.

(6) After positioning the steering column assembly so that the flexible coupling disc assumes an unstressed axial position, and the top of the steering column is correctly aligned with the instrument panel bracket clamp, tighten the clamp bolts to 95 inch-pounds torque.

(7) Slide the toe board support plate into position, centering it around the column jacket, install the attaching bolts. Tighten bolts to 95 inch-pounds torque.

(8) Move the jacket "O" ring down the jacket into position and bolt the "O" ring retaining plate to the toe board support plate. Tighten bolts to 95 inch-pounds torque.

(9) Install the lower column plate to the instrument panel.

(10) Install the directional switch lever and test operation of the directional switch.

(11) Install the steering wheel aligning the master serrations on the steering wheel and steering shaft, the plain washer and nut. Tighten nut to 24 foot-pounds torque. Test operation of the directional cancelling lever.

(12) Install the horn blowing contact. Connect the horn wire.

(13) Position the master cylinder on the brake booster unit and install the lockwashers and attaching nuts.

(14) Connect the pressure and return hoses at the steering gear.

(15) With the steering gear centered in its travel and the steering wheel and front wheels in the straight ahead position, connect the steering gear arm to the steering gear cross shaft. Install the washer and nut. Tighten nut to 120 foot-pounds torque.

(16) Install the steering center link, tighten to 30 foot-pounds and install cotter pin.

(17) Refill the reservoir. Expel all the air from the system by turning the steering wheel several times to the right and left.

(18) Connect the battery cable at the battery negative post.

PART 4- POWER STEERING PUMP

The power steering pump is a belt-driven constant displacement pump.

In operation (Fig. 1) the spring loaded slippers in the pump rotor are in contact with the eccentric, inside diameter of the housing. As a rotor revolves, the slippers force the oil from the inlet side of the pump to the flow control valve. Orifices in the valve permit a flow of approximately two gallons per minute to the gear before the valve moves to the right to allow the excess to flow back to the inlet side of the pump. Maximum pressure in the system is limited by the pressure relief valve. The valve opens into the reservoir when the pressure exceeds the maximum pressure specified.

SERVICE PROCEDURES

1. FLUID LEVEL

(1) Start the engine, turn the steering wheel back and forth several times to expel the air from the system, then shut off the engine.

(2) Remove the filler cap and visually inspect the oil level in the reservoir:

Engine Cold—Oil level should be at the bottom of filler neck.

Engine Hot—Oil level should be one-half way up in fill neck.

If necessary, add only MoPar Power Steering Fluid Part No. 2084329 to the required level. Do not overfill.

2. PRESSURE TEST

(1) Measure the pump belt tension. See "Cooling System", Group 7.

(2) Disconnect the pump to the steering gear pressure hose at the power steering pump. Connect the test hose Tool C-3388 with the proper adapter between the power steering pump and pressure gauge Tool C-3309B with a shut-off valve between the pressure gauge and the pressure hose that you disconnected from the pump (Fig. 2). **Make sure all connections are tight and that the shut-off valve is fully opened.**

NOTE: The pressure gauge must be installed between the pump and the shut-off valve, all connections must be tight and the shut-off valve fully open.

(3) Remove the oil reservoir filler cap.

(4) Connect one lead of the tachometer to the distributor terminal of coil and the other to a good ground, start the engine and operate at 500 rpm and fill the pump reservoir to the proper level.

(5) Expel all the air from the unit by turning the

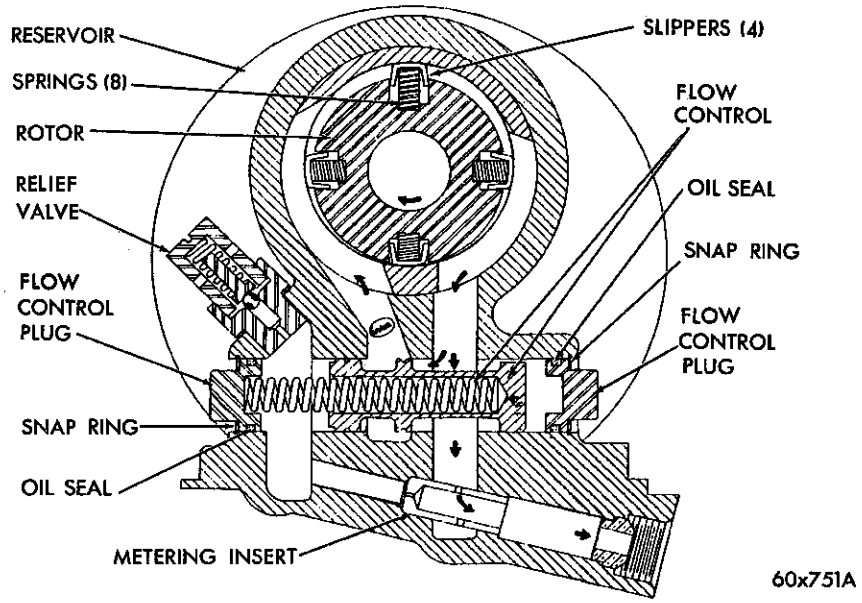

Fig. 1—Power Steering Pump—Oil Flow

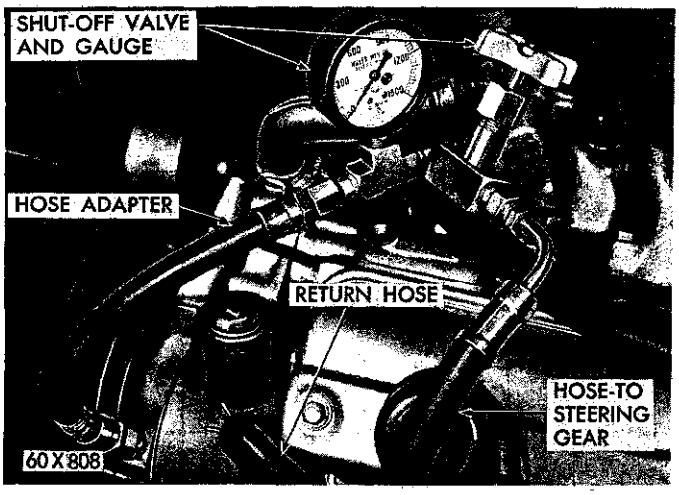

Fig. 2—Pressure Test Typical

steering wheel to the full right turn and back to the full left turn several times and recheck oil level.

NOTE: To assist in heating the pump oil; slowly turn the pressure gauge valve towards the closed position until the gauge reads 400 psi and open the valve fully when the oil temperature reaches 150 degrees F.

(6) With the engine operating at 500 rpm and no steering effort applied, the oil temperature should be between 150 and 170 degrees F. (measure with a thermometer in the reservoir); the pressure gauge should show a pressure of less than 100 psi. If the pressure is higher, inspect the hoses and connections for kinks and obstructions, or restrictions in the steering gear.

(7) Increase the engine speed to 1000 rpm, then slowly close the gauge shut-off valve. With the gauge shut-off valve fully closed the pump pressure should be as follows:

1000 to 1100 psi for Models VC-1, VC-2, VC-3; 1150 to 1300 psi for Models, VY-1.

CAUTION: Do not close the valve for more than a few seconds, as this would abnormally increase the oil temperature and cause undue oil pump wear.

a. If the pressure increases to mor then 1100 psi for the Chrysler Models and 1300 psi for the Imperial Models, the relief valve is faulty or the pump is equipped with the wrong relief valve.

b. If the pressure is less than 1000 psi for the Chrysler Models and 1150 psi for the Imperial Models, the relief valve is faulty. Replace the relief valve with the correct relief valve known to be in working order and repeat the test in step (7). If the pressures are still below specifications, disassemble the pump and inspect the flow control valve for evidence of fouling or slipper spring breakage.

c. With the gauge shut-off valve fully open, operate the steering unit through another cycle, this time holding the unit at the extreme travel in each direction while watching the oil pressure gauge. The gauge reading should be equal in each direction. If not, it indicates excessive internal leakage in the steering gear unit. **Do not hold the worm shaft at either extreme position for more than a few seconds.**

d. If the pressures are within the ranges specified; make a flow test as outlined in "Pump Flow Test"

3. PUMP FLOW TEST

(1) Inspect the pump belt tension. See "Cooling System" Group 7.

(2) Disconnect the pump pressure hose at the power steering pump and connect the test hose adapter tube and pressure gauge Tool C-3309B with the proper adapters between the power steering pump and the hose disconnected from the pump (Fig. 3).

NOTE: The pressure gauge must be installed between the pump and the shut-off valve; all connections must be tight and the shut-off valve fully open.

(3) Disconnect the return hose at the power steering pump.

NOTE: Remove the return hose screen; be sure screen is cleaned and reinstalled after the tests.

(4) Install the flow checking gauge set Tool C-

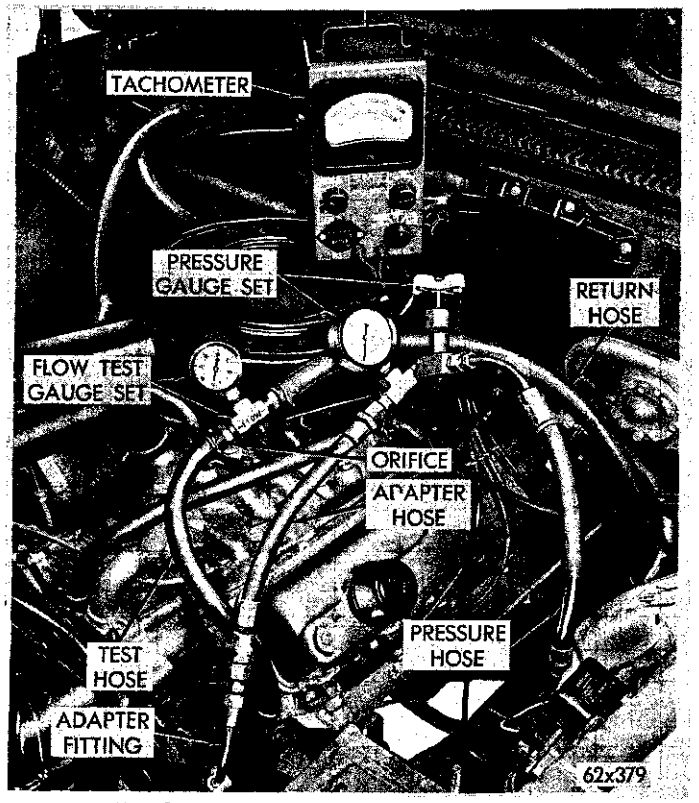

Fig. 3—Flow Test Connections (Typical)

3885 with the special hose between the power steering pump and the return hose disconnected from the pump (Fig. 3).

CAUTION: The fitting that has the restriction, and the arrow on the "tee" connector must be towards the power steering pump. Use orifice SP-3825.

(5) Remove the oil reservoir cover and fill the reservoir to the proper level.

(6) Start the engine and operate at 500 engine rpm.

(7) Expel all the air from the unit by turning the steering wheel to the full right turn and back to the full left turn several times and recheck oil level.

(8) Increase the engine speed 1000 to 1200 rpm and no steering effort applied, oil temperature between 150 and 170 degrees F. (Check the thermometer in the reservoir); the flow pressure gauge in the pump return line should read between 14 and 25 psi. If correct measuring orifice is used for test, and flow pressure gauge registers less than 14 psi inspect to see if the restrictor is installed properly, if O.K., dirt may be restricting control valve movement or blocking the orifice or flow valve spring may be weak. If the return pressure is greater than 25 psi, the flow valve may be stuck in the closed position.

(9) Decrease the engine speed to 500 rpm, then slowly turn the pressure gauge shut-off valve towards the closed position to obtain 850 psi on the pressure gauge at the pump discharge without fully closing the shut-off valve.

CAUTION: Do not close the valve completely.

With 850 psi registered on the pressure gauge, the flow measuring gauge should show a minimum pressure of 10 psi.

If the flow pressure reading is less than 10 psi; inspect the flow valve operation for sticking: if the valve is operating satisfactorily the pump is worn and should be replaced.

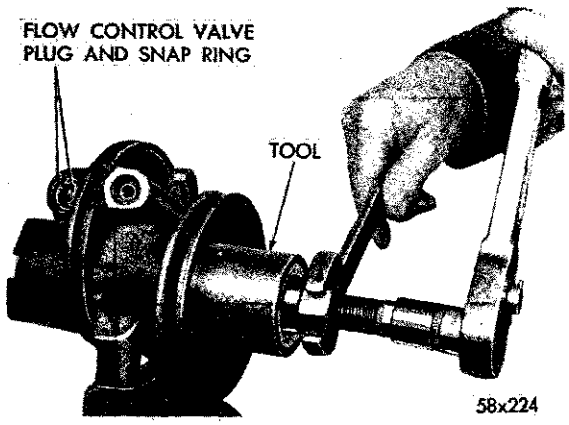

Fig. 4—Removing Pump Pulley (Typical)

If the flow pressure reading is 10 psi or greater, and the relief valve is operating properly; the pump is good.

When removing the test equipment, make sure the pressure and return hoses are reinstalled properly. There should be no interference of the hoses with the components attached to the fender shield or the dash panel.

NOTE: The return hose screen should be clean and reinstalled in the end of the return hose before reinstalling the return hose.

4. POWER STEERING PUMP

Removal from the Vehicle

(1) Loosen the pump lower mounting bolt and remove the belt from the pulley.

(2) Place a container under the pump and disconnect both hoses at the pump. Cap ends of the hoses and secure the hoses high enough to prevent loss of fluid.

(3) Remove the bolts attaching the pump bracket to the engine and remove the pump and bracket assembly.

Oil Seal Replacement

(1) Clean the exterior of the pump before disassembly.

(2) Remove the filler cap and drain the reservoir.

(3) Remove the brackets, reservoir screws, gasket and "O" ring.

(4) Using spacer washers between the front bracket and the pump, reinstall the front bracket for use as a holding fixture. Clamp the bracket in a vise (Fig. 4).

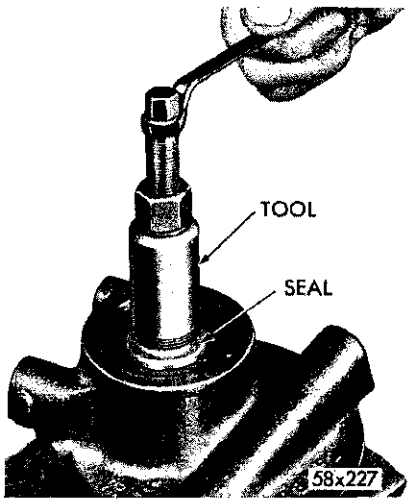

Fig. 5—Removing Pump Oil Seal (Typical)

(5) Remove the pulley with Tool C-3615 or C-3934 as follows:

a. Engage one half-collar under the flange of the pulley hub.

b. Position the screw shaft and nut with the flange section inside the half-collar.

c. Engage the other half-collar under the pulley hub and over the flange of the screw shaft nut and install the retainer sleeve over both half-collars.

d. Hold the nut from turning and turn the screw inward to remove the pulley.

(6) If there has been evidence of a leak, remove pump shaft oil seal by threading Tool C-3783 far enough into seal to engage the metal portion of the seal (Fig. 5).

Turning the puller center screw while holding the tool body will force the seal assembly from the pump.

CAUTION: The pulley end of the shaft should be examined for sharp burrs or corners and smoothed with a stone or fine emery cloth. This will prevent seal damage when the new seal is installed. Do Not stone or emery the area on the shaft that the seal lip contacts.

(7) Install the new seal with the lip of the seal toward the pump. Use Tool C-3782 to drive the seal flush with the insert (Fig. 6).

(8) Support the pump body on the holding fixture, Tool C-3643, with the tool dowel pins in the pump bolt holes so that the pressure will be absorbed by the lower end of the pump shaft (Fig. 7).

CAUTION: The pump must be supported in a manner in which all pressing force will be applied to the shaft only: otherwise, the pump body and rotor will be damaged.

(9) Install the pulley with a heavy duty arbor press.

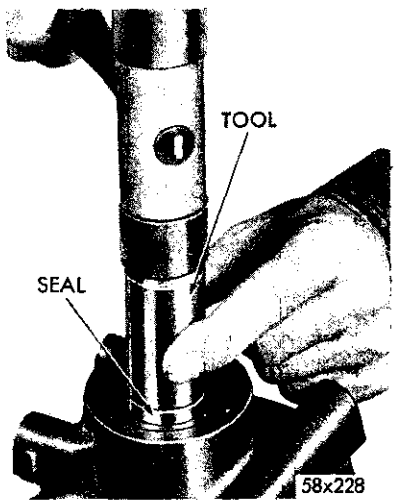

Fig. 6—Installing Pump Oil Seal (Typical)

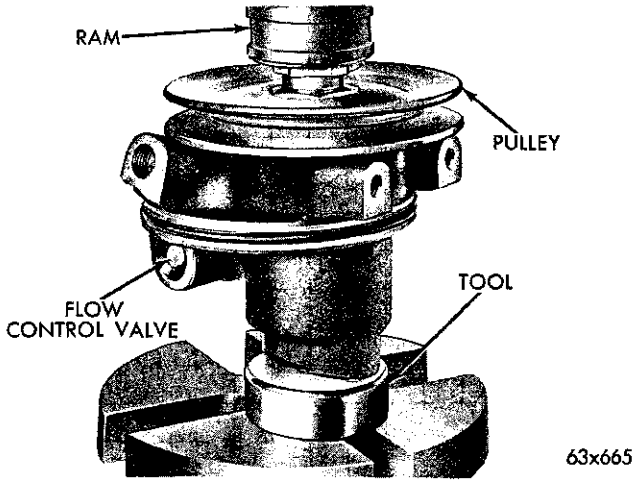

Fig. 7—Installing the Pump Pulley

Press on the pulley hub only until the hub is flush with the end of the pump shaft.

(10) Lubricate the large "O" ring and the reservoir cap screw gasket and install both on the pump body.

(11) Tighten the reservoir and the pump brackets. Tighten the screws to 16 foot-pounds torque.

(12) Install the steering pump and test belt adjustment as outlined under "Cooling System" Group 7.

Power Steering Pump Discharge Fitting Ferrule Replacement

(1) Wipe away all dirt around the discharge fitting and tighten the high pressure hose tube nut to 24 foot-pounds torque.

(2) Restart the engine and steer car from stop to stop to build-up pressure.

If the discharge fitting is leaking, disconnect the high pressure hose at the pump and examine the tubing flare for nicks, scratches, or other damage. If the tubing flare or nut is damaged, replace the high pressure hose.

(3) Examine the pump housing in the discharge area to be sure that the housing has not been damaged by cross-threading or over-tightening the flare nut. If the housing is cracked or if the threads are damaged; the pump must be replaced.

(4) Examine the brass ferrule in the pump discharge fitting for nicks and scratches. The hose tubing flare should make an indentation in the ferrule which is concentric with the center hole and of approximate uniform depth all the way around. If the ferrule is damaged or nut improperly seated, replace the ferrule.

(5) Remove the pump from the vehicle.

(6) Clamp the pump in a vise with the discharge

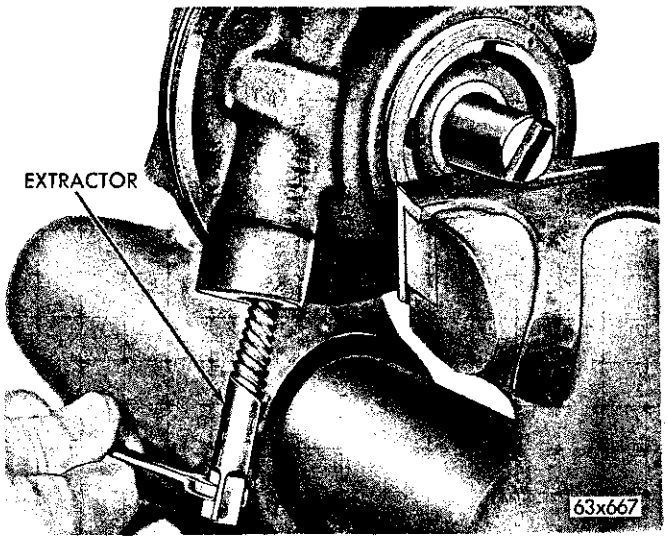

Fig. 8—Removing the Brass Ferrule

opening in the down position, this will prevent any chips from falling into the pump.

(7) Use a No. 4 screw-extractor (E-Z Out). Turn the extractor into the ferrule (Fig. 8), then rock the extractor slightly to remove the ferrule. Perform this operation carefully so as not to damage the threads on the housing.

(8) Clean out the discharge bore of any foreign material (brass chips, dirt, etc.).

(9) Center the new ferrule with the tapered end up in the housing bore. The ferrule is pressed into place by reinstalling the high pressure hose and tightening the flare nut to 24 foot-pounds torque. Figure 9 is a cutaway view to show the ferrule properly seated in the housing.

CAUTION: Be sure that the ferrule is centered in the housing bore before installing the high pressure hose flare nut.

Flow Control Valve Removal

(1) With the pump reservoir removed, remove one of the flow control valve end plug retaining rings and end plug (Fig. 10).

(2) Depress the control valve against spring pressure and allow it to spring back. The valve should pop out of the bore to a point where it can be removed. If the valve should stick, **do not force it,** but repeat the spring back procedure several times.

NOTE: Gum deposits will cause the control valve to stick in one position and it will be necessary to break the valve free by light tapping and repeat Step 2.

If the control valve and bore were fouled by gumming, foreign material, or burrs, the valve and valve bore should be thoroughly cleaned and flushed and reassembled.

NOTE: Inspect the flow control valve and valve bore. If the valve or valve bore in pump body are badly scored, replace the pump assembly less pulley and reservoir.

Installation

(1) Install the control valve spring, seating the spring in the spring socket.

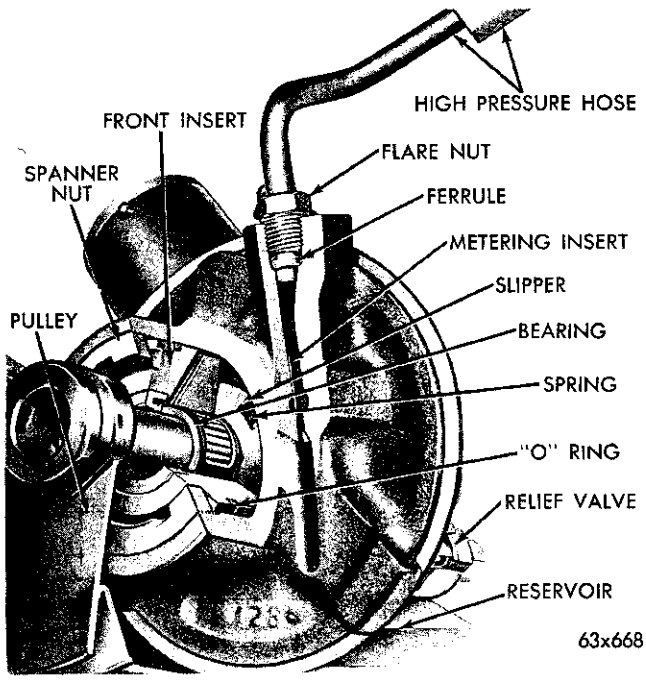

Fig. 9—Pump Cross Section Showing Ferrule Installed

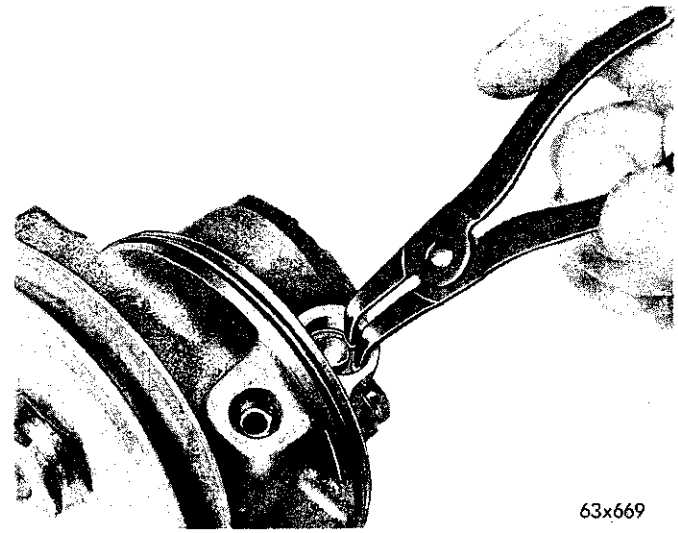

Fig. 10—Removing the Flow Control Valve Retaining Ring

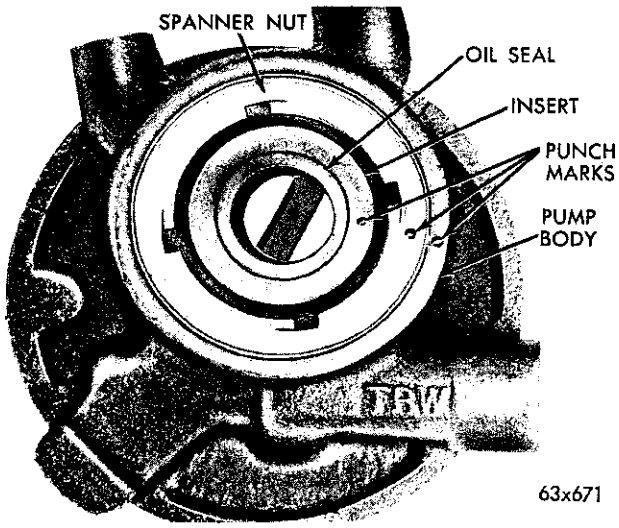

Fig. 11—Center Punch Marks on Pump Body Spanner Nut and Front Insert

(2) Remove any burrs with a fine hone or crocus cloth but **Do Not** round the valve land corners.

(3) Lubricate with 2084329 power steering fluid and install the control valve over the control valve spring and into the bore. When all valve lands have cleared the retaining ring groove area, work the control valve back and forth against spring pressure until the valve operates smooth and freely.

(4) Install a new "O" ring on the end plug.

(5) Lubricate the end plug and "O" ring and install the end plug with the machined projection **out.**

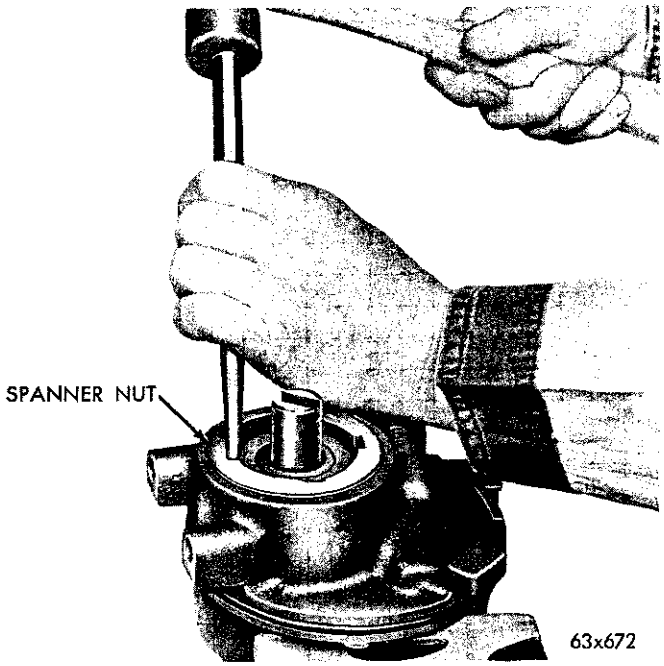

Fig. 12—Removing the Spanner Nut

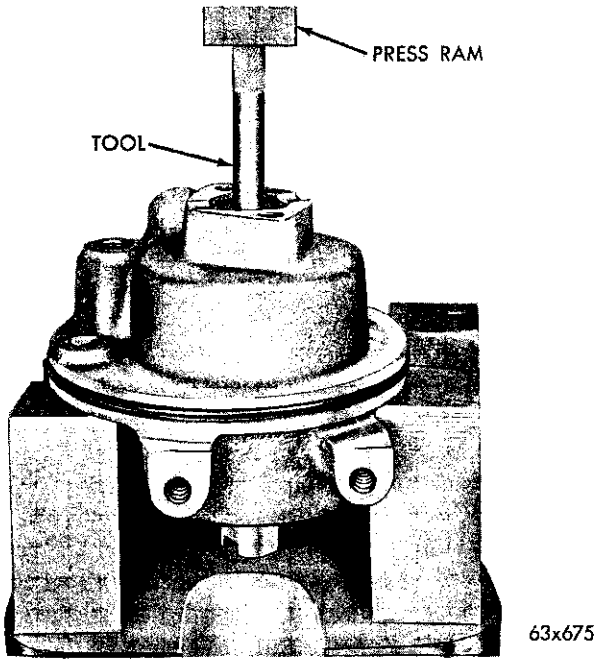

Fig. 13—Removing the Shaft Rotor and Front Insert

(6) Install the plug retainer ring with the sharp edge of ring **up.**

(7) Install the relief valve.

(8) Install pulley (Fig. 7).

(9) Install a new pump body "O" ring, new reservoir gasket and reservoir and brackets.

Slipper Ring Replacement

(1) Remove the pump and bracket from the vehicle.

(2) Remove the bracket and reservoir from the pump.

(3) Remove the pump pulley (Fig. 4).

(4) Use a center punch to mark the position of the spanner nut and front insert in the pump housing (Fig. 11,) to insure that the front insert and spanner nut are returned to the exact same position at reassembly.

(5) Use a ¼ inch drift to loosen and remove the spanner nut (Fig. 12).

(6) Support the pump housing so that the front insert is clear and use a smooth ½ inch diameter bar (Fig. 13), press the shaft, rotor and front insert out of the pump housing.

CAUTION: Be careful not to damage the pump rear bearing.

(7) Examine the parts for broken edges or deep scoring, especially on the rotor and slippers. If either of these conditions are present, then the pump as-

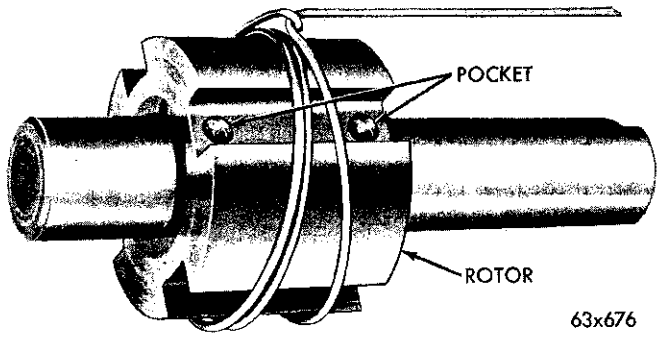

Fig. 14—Slipper Retainer Wire Retainer Tool Installed on Rotor

sembly less relief valve, pulley, and reservoir must be replaced. Small nicks or burrs may be smoothed with a fine hone.

NOTE: The cam insert has two machined notches (one large and one small) on the inside surface; these are not to be interpreted as deep scoring.

(8) Smooth off burrs or corners on the pulley end of the pump shaft, this will prevent shaft oil seal damage when a new seal is installed.

CAUTION: Do not stone or emery the area on the shaft the seal lip contacts.

(9) If all parts are in a serviceable condition, discard all eight slipper springs even if they appear to be in good condition.

(10) Thoroughly flush and clean all parts with **clean** solvent.

NOTE: It is essential that cleanliness be observed throughout the pump assembly.

(11) Using a piece of soft steel wire 25 inches long, make three turns around the center of the rotor and fasten the wire as shown in Figure 14. Bend the ends of the wire towards the pulley end of shaft. Do not make the wire coils too tight or the wire will be difficult to remove.

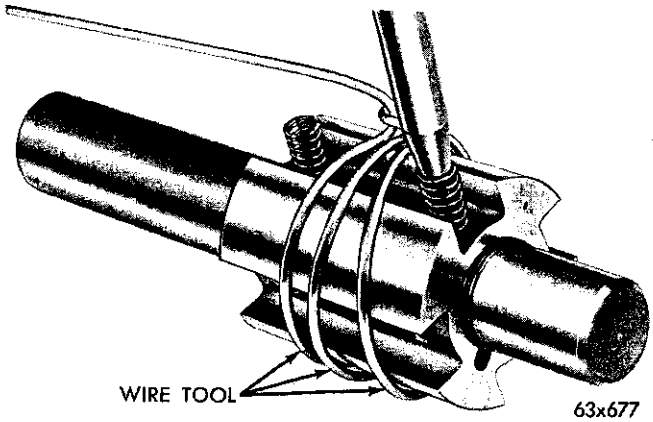

Fig. 15—Installing the Slipper Springs (Typical)

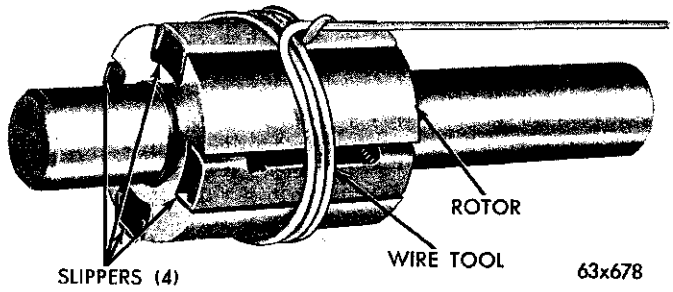

Fig. 16—Slippers Properly Installed in the Pump Rotor

CAUTION: Use care when handling the rotor and shaft since the corners of the rotor are extremely sharp and must remain sharp for good pump operation. The oil seal and bearing surfaces of the shaft must remain free of any nicks or burrs.

(12) Use an ordinary wood pencil with the point broken to install the new springs. Enter the blunt tapered end of the pencil in the spring and snap the springs into the pockets in the rotor by turning the pencil clockwise (Fig. 15). Install the springs and slippers in one rotor slot at a time. Remove the pencil from the spring with a counter-clockwise rotation. Either end of the spring may be inserted into the rotor pocket.

NOTE: Make sure the proper springs are installed. The springs for the .96 pump (small) are not interchangeable with the springs for the 1.2 pump (large).

(13) Install each slipper by sliding the slipper between the two springs and the wire tool so that the

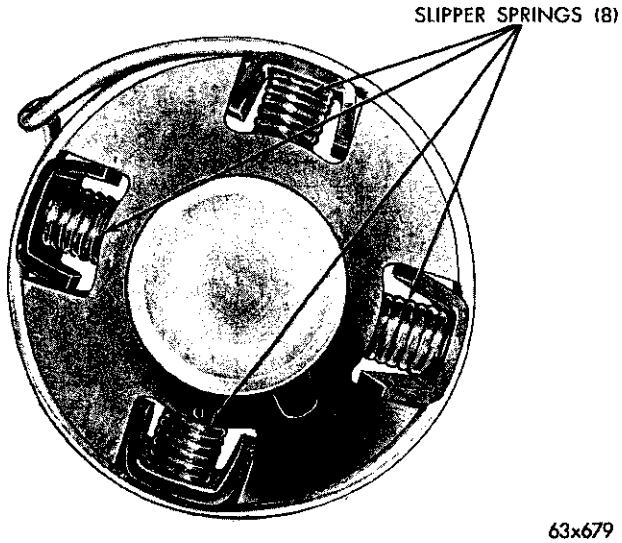

Fig. 17—Slippers and Springs Properly Installed

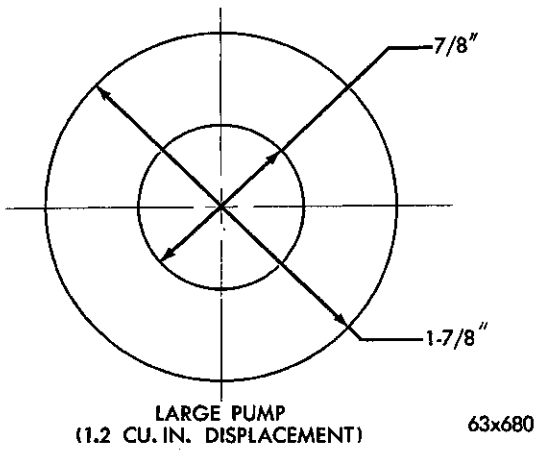

Fig. 18—Slipper Retaining Washer Tool Dimensions

ends are flush with the rotor. The notched portion of the slipper must be installed, as shown in Figure 16.

NOTE: Inspect the springs to make sure they are in the pockets and in an upright position under the slipper (Fig. 17).

(14) Using a washer of the dimensions shown in Figure 18 drop it over the pulley end of the shaft. This washer is used to keep the slippers flush with the end of the rotor.

NOTE: It is important that the slippers remain flush with the end of the rotor throughout the assembly operation.

(15) Insert the shaft and rotor assembly with the flat washer tool and slipper retaining wire tool into the pump cam insert so that the slippers and rotor are inside the cam with the end of the shaft resting against the back face in the housing (Fig. 19).

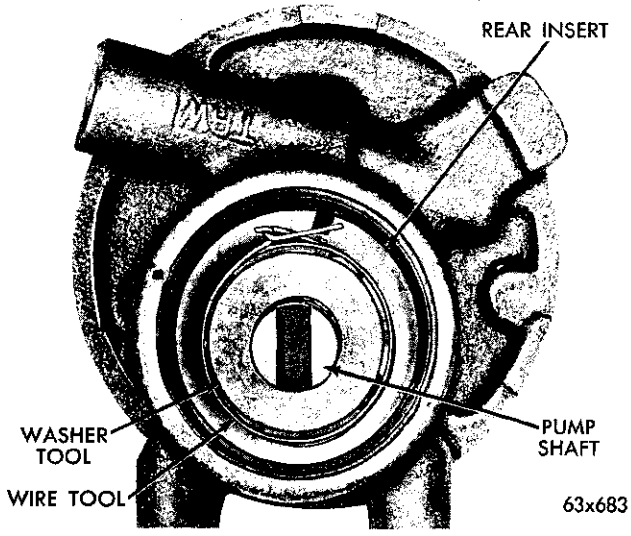

Fig. 19—Installing the Rotor, Shaft and Slippers Assembly

CAUTION: Do Not attempt to insert the pump shaft into the bearing at this time.

(16) Hold the washer against the rotor with a screw driver while removing the wire retaining tool, making sure that the slippers remain flush with the end of the rotor.

(17) Line the pump shaft with the lower bearing and push the shaft, rotor and slippers all the way into the housing until the rotor is flush with the end of the cam insert.

NOTE: The slipper ends may hang up on the center openings in the cam insert. If this should occur, rotate the shaft while installing will overcome this condition.

(18) Remove the special flat washer tool. Make sure that the springs are in place by rotating the pump shaft and looking through the notch in each slipper.

(19) Lubricate the rotor and slippers with clean power steering fluid and rotate the shaft to make sure the slippers do not bind.

(20) Replace the shaft seal and "O" ring seal on the front insert. Lubricate the shaft seal, "O" ring and shaft with power steering fluid.

(21) After making sure the inner face on the front insert is smooth and free of burrs, place the insert assembly on the shaft with care so that the shaft seal is not damaged by the end of the shaft.

(22) Support the pump housing in an arbor press, align the center punch marks on the front insert and the pump body, and using a 1¼ inch socket with ½ inch drive, press the insert into the pump housing (Fig. 20).

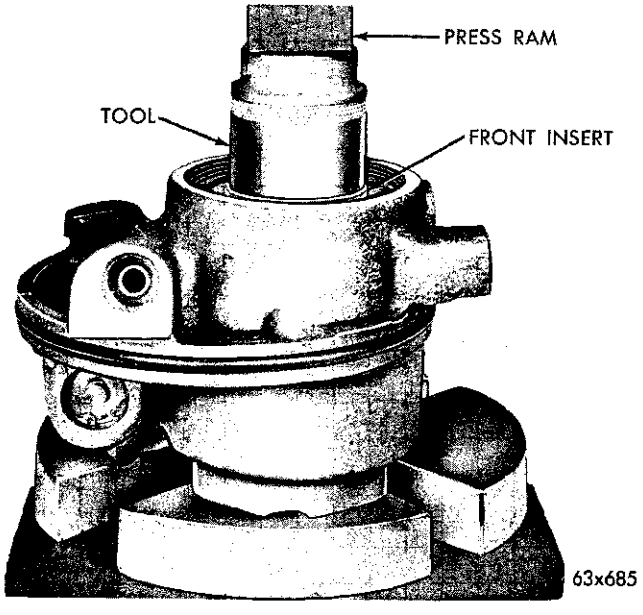

Fig. 20—Installing the Front Insert into the Pump Housing

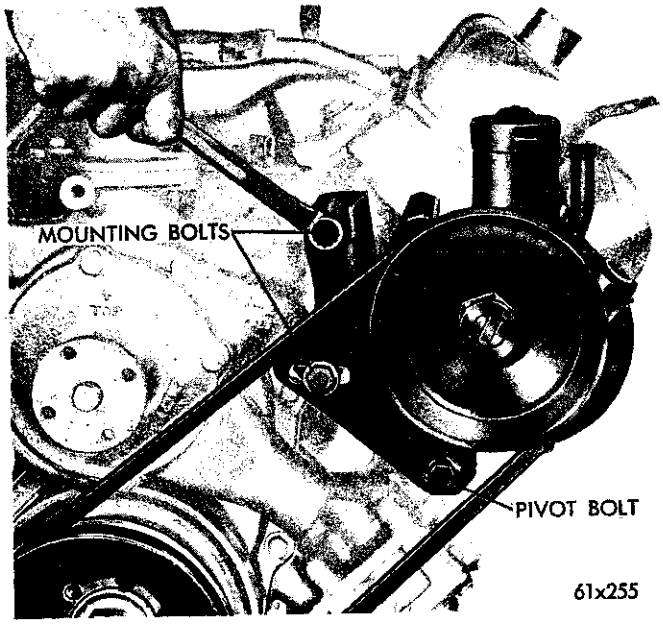

Fig. 21—Loosening the Pump Bracket Mounting Screws

(23) Install the spanner nut and tighten to the exact original position in the housing as indicated by the pin punch marks placed on the pump body and spanner nut at disassembly.

(24) Install the flow control valve as outlined under "Flow Control Valve Installation".

(25) Install the pump pulley (Fig. 7).

(26) Install a new "O" ring on the pump body and install the reservoir and pump brackets.

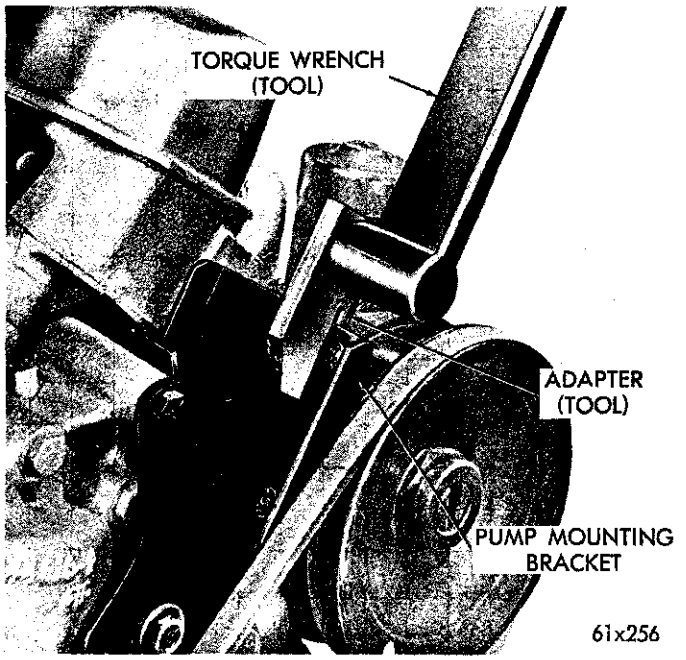

Fig. 22—Pump Belt Adjustment

Power Steering Pump (Installation in the Vehicle)

(1) Position the pump on the engine and install the attaching bolts.

(2) Install the drive belts and adjust. See Paragraph 5 "Belt Adjustment".

(3) Connect the pressure and return hoses.

(4) Fill the pump reservoir with power steering fluid MoPar Part No. 2084329.

(5) Start the engine, turn the steering wheel all the way to the left and back all the way to the right several times to expel the air from the system, then turn off the ignition switch to stop the engine and recheck the fluid in the reservoir.

5. BELT ADJUSTMENT

(1) Loosen the adjustment bracket to engine mounting bolts (Fig. 21).

(2) Install Tool C-3832 over the edge of the mounting bracket as close as possible to the outer edge of bracket and insert torque wrench drive in square hole of tool (Fig. 22).

(3) Tighten the pump belt until you get a reading of 45 foot-pounds on the torque wrench.

(4) While holding the tension with a torque wrench, tighten the bracket mounting bolt nuts enough to hold the adjustment, then use torque wrench to tighten the mounting bolts to 30 foot-pounds torque.

When the belt is properly adjusted and normal pump pressures are developed, the pump mounting bracket will be resting against the rubber stop in the adjustment bracket (Fig. 23).

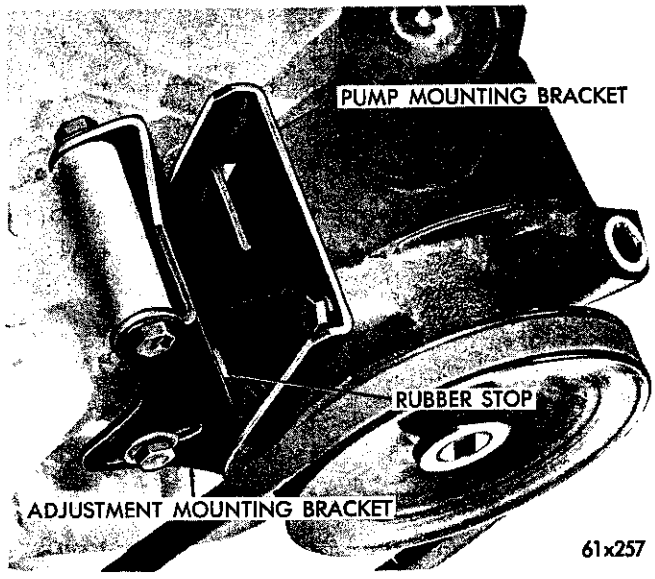

Fig. 23—Pump Bracket and Rubber Stop

PART 5—SERVICE DIAGNOSIS

MANUAL STEERING

Condition	Possible Cause	Correction
Hard Steering	(a) Low or uneven tire pressure.	(a) Inflate the tires to recommended pressures.
	(b) Insufficient lubricant in the steering gear housing or in steering linkage.	(b) Lubricate as necessary.
	(c) Steering gear shaft adjusted too tight.	(c) Adjust according to instructions.
	(d) Front wheels out of line.	(d) Align the wheels. See "Front Suspension" Group 2.
	(e) Steering column misaligned.	(e) See "Steering Gear Alignment", Paragraph 3.
Pull to One Side (Tendency of the Vehicle to veer in one direction only)	(a) Incorrect tire pressure.	(a) Inflate the tires to recommended pressures.
	(b) Wheel bearings improperly adjusted.	(b) See "Front Wheel Bearing Adjustment" Group 22.
	(c) Dragging brakes.	(c) Inspect for weak, or broken brake shoe spring, binding pedal.
	(d) Improper caster and camber.	(d) See "Front Wheel Alignment" Group 2.
	(e) Incorrect toe-in.	(e) See "Front Wheel Alignment" Group 2.
	(f) Grease, dirt oil or brake fluid on brake linings.	(f) Inspect, replace and adjust as necessary.
	(g) Front and rear wheels out of alignment.	(g) Align the front wheels. See "Front Suspension" Group 2.
	(h) Broken or sagging rear springs.	(h) Replace the rear springs.
	(i) Bent suspension parts.	(i) Replace the parts necessary.
Wheel Tramp (Excessive Vertical Motion of Wheels)	(a) Incorrect tire pressure.	(a) Inflate the tires to recommended pressures.
	(b) Improper balance of wheels, tires and brake drums.	(b) Balance as necessary. See "Wheels and Tires" Group 22.
	(c) Loose tie rod ends or steering connections.	(c) Inspect and repair as necessary.
	(d) Worn or inoperative shock absorbers.	(d) Replace the shock absorbers as necessary.
Excessive Play or Looseness in the Steering Wheel	(a) Steering gear shaft adjusted too loose or badly worn.	(a) Replace worn parts and adjust according to instructions.
	(b) Steering linkage loose or worn.	(b) Replace worn parts. See "Front Wheel Alignment" Group 2.
	(c) Front wheel bearings improperly adjusted.	(c) Adjust according to instructions.
	(d) Steering arm loose on steering gear shaft.	(d) Inspect for damage to the gear shaft and steering arm, replace parts as necessary.
	(e) Steering gear housing attaching bolts loose.	(e) Tighten the attaching bolts to 50 foot-pounds.
	(f) Steering arms loose at steering knuckles.	(f) Tighten according to torque specifications.
	(g) Worn ball joints.	(g) Replace the ball joints as necessary. See "Front Suspension" Group 2.

SERVICE DIAGNOSIS—(Continued)

POWER STEERING

Condition	Possible Cause	Correction
Hard Steering	(a) Tires not properly inflated.	(a) Inflate the tires to recommended pressures.
	(b) Low oil level in pump reservoir (usually accompanied by pump noise).	(b) See "Fluid Level", Power Steering Pump, Paragraph 1.
	(c) Loose pump belt.	(c) See "Belt Adjustment", Power Steering Pump, Paragraph 6.
	(d) Improper caster and camber.	(d) See "Front Wheel Alignment". Front Suspension, Group 2.
	(e) Power steering output low.	(e) Perform the "Pump Pressure and Flow Tests". NOTE: When the power steering pump fails to give proper steering, assist, the trouble is usually caused by fouling of the flow control valve causing it to stick in the open or "by pass" position. This fouling can be caused by gum deposits, pieces of broken slipper springs, burrs, or foreign material (pieces of rubber, dirt or machine chips). If no fouling of the flow control valve is evident, or if the flow control valve contains pieces of coiled wire (broken slipper spring), the pump should be disassembled for possible slipper spring replacement.
	(f) Steering linkage binding.	(f) Repair and lubricate as necessary.
	(g) Steering gear malfunctions.	(g) Adjust or repair as follows:
	1. Gear shaft adjustment too tight.	1. See "Gear Shaft Adjustment", Paragraph 1.
	2. Damaged valve lever.	2. Remove steering gear, repair as necessary.
	3. External leakage.	3. Inspect for leakage at the lower sector shaft oil seal; the sector shaft cover "O".
	4. Excessive internal leakage.	4. Remove the steering gear and repair as necessary.
Poor Recovery from Turns	(a) Tires not properly inflated.	(a) Inflate the tires to recommended pressures.
	(b) Steering linkage binding.	(b) Repair and lubricate as necessary.
	(c) Improper wheel alignment.	(c) See "Front Wheel Alignment", Front Suspension, Group 2.
	(d) Damaged or worn steering tube bearing.	(d) Remove jacket tube and replace bearings.
	(e) Steering wheel column jacket and steering nut improperly aligned.	(e) See "Installation of Steering Gear", Paragraph 8.
	(f) Steering gear malfunctions.	(f) Adjust or repair as follows:

SERVICE DIAGNOSIS—(Continued)

POWER STEERING

Condition	Possible Cause	Correction
Poor Recovery from Turns, Continued	1. Improper gear shaft adjustment.	1. See "Gear Shaft Adjustment", Paragraph 1.
	2. Column support spanner nut loose.	2. Remove the steering gear, disassemble, inspect and reassemble as outlined in this section.
	3. Damaged valve lever.	3. Remove the steering gear and repair as necessary.
	4. Improper worm thrust bearing adjustment.	4. Remove the steering gear, disassemble, inspect and reassemble. See "Center Bearing Preload", Assembly of Power Train, Paragraph 5.
	5. Damaged cylinder head worm seal ring or faulty worm piston ring.	5. See "Steering Gear Removal, Disassembly and Inspection", replace parts as necessary. See "Disassembly and Assembly of Power Train", Paragraph 5.
	6. Burrs or nicks in the reaction ring grooves in the cylinder head or column support.	6. Remove the steering gear and repair as necessary.
	7. Dirt or chips in the steering gear unit.	7. Remove the steering gear, disassemble completely, clean in a clean solvent, inspect and make repairs as necessary.
	8. Rough or catchy worm in the piston assembly.	8. Replace the worm and piston assembly. See "Steering Gear Removal, Disassembly, Inspection and Reassembly Paragraph 3.
Leads to Either Side	(a) Tires not properly inflated.	(a) Inflate the tires to recommended pressures; See "Wheels and Tires, Group 22.
	(b) Improper wheel alignment.	(b) See "Front Suspension, Front Wheel Alignment", Group 2.
	(c) Valve body out of adjustment.	(c) If vehicle leads to the left, move the steering valve housing **down** on the steering housing. If vehicle leads to the right, move the steering valve housing **up** on the steering housing.
	(d) Valve lever damaged.	(d) Remove the steering gear and replace or repair as necessary.
	(e) Column support spanner nut loose.	(e) Remove the steering gear and repair as necessary.
Excessive Steering Wheel Free-Play	(a) Improper gear shaft adjustment.	(a) See "Gear Shaft Adjustment", Paragraph 1.
	(b) Column support spanner nut loose.	(b) Remove the steering gear, disassemble, inspect, and reassemble.

SERVICE DIAGNOSIS—(Continued)
POWER STEERING

Condition	Possible Cause	Correction
Excessive Steering Wheel Free-Play Continued	(c) Improper worm thrust bearing adjustment.	(c) Remove the steering gear, disassemble, inspect and reassemble, see "Center Bearing Preload Assembly of Power Train".
	(d) Coupling loose on the worm shaft.	(d) Inspect the wormshaft splines for wear.
Lack of Assist 1. (One Direction)	(a) Oil leaking past worm shaft oil seal ring.	(a) Remove the steering gear, disassemble, inspect and replace the parts as necessary.
	(b) Broken or worn ring on worm piston.	(b) See "Assembly of the Power Train" Paragraph 5.
	(c) Piston end plug loose.	(c) Replace the worm and piston assembly.
	(d) Reaction seal missing.	(d) Remove the steering gear and repair as necessary.
Lack of Assist (Both Directions)	(a) Pump belt slipping.	(a) See "Belt Adjustment", Power Steering Pump, Paragraph 6.
	(b) Pump output low.	(b) Perform the "Pump Pressure and Flow Tests", also refer to correction (e) in Diagnosis under "Hard Steering".
	(c) Broken or worn ring on worm piston.	(c) See "Assembly of Power Train".
	(d) Piston end plug loose.	(d) Replace the worm and piston assembly.
	(e) Internal leakage in the steering gear valve body.	(e) Replace the steering gear valve body assembly.
Temporary Increases in Effort When Turning Steering Wheel to the Right or Left	(a) Oil level low in pump reservoir.	(a) See "Fluid Level", Power Steering Pump, Paragraph 1.
	(b) Loose pump belts.	(b) See "Belt Adjustment" Power Steering Pump, Paragraph 6.
	(c) Oil on pump belt.	(c) Replace the belt and adjust.
	(d) Binding steering linkage.	(d) Lubricate and repair as necessary.
	(e) Engine idle too slow.	(e) See "Fuel Specifications".
	(f) Air in the system.	(f) Work the steering wheel from right to left until the air is expelled.
	(g) Power steering pump output low.	(g) See Diagnosis "Hard Steering" correction (e).
	(h) Gear malfunction.	(h) Adjust and repair as outlined under "Hard Steering"—condition and correction (g).
Noises	(a) Buzzing noise in neutral and stops when the steering wheel is turned.	(a) Noisy pump, make pressure test and repair as necessary. Damaged hydraulic lines or interference of the hoses with components attached to the fender shield. Air in system; work steering wheel from right to left until the air is expelled.

SERVICE DIAGNOSIS—(Continued)

POWER STEERING

Condition	Possible Cause	Correction
Noises Continued	(b) Chuckling noise. Causes as follows: 1. Improper gear shaft adjustment.	(b) Correct as follows: 1. See "Gear Shaft Adjustment", Paragraph 1.
	2. Improper worm shaft thrust bearing adjustment.	2. Remove steering gear, disassemble, inspect and reassemble. See "Center Bearing Preload".
	3. Coupling loose on the worm shaft.	3. Inspect worm shaft splines for wear. Also inspect retaining pin for tightness.
	4. Worn worm and piston assembly.	4. Replace worm and piston assembly.
	(c) Metallic clatter or tapping noise.	(c) Replace the back pressure valve cushion.
	(d) Knocking condition at the bracket stop when the engine is running.	(d) Rubber stop worn or missing from pump bracket.
	(e) Loose pump belt.	(e) Belt not properly adjusted or worn to the extent that belt tension cannot be properly adjusted.

POWER STEERING PUMP

Low Oil Pump Pressure	(a) Pump belt loose.	(a) See "Belt Adjustment", Paragraph 6.
	(b) Pump pulley loose.	(b) Replace the pulley, measure the pump diameters as follows: Shaft diameter .8120-.8125 Pulley inside diameter .8095-.8105. If shaft is damaged, replace pump.
	(c) Oil level low in pump reservoir.	(c) See "Fluid Level", Paragraph 1.
	(d) Pressure relief valve spring weak, or relief valve stuck in open position.	(d) Replace the relief valve and perform "Pump Pressure Test", Paragraph 2.
	(e) Flow control valve stuck.	(e) Repair as necessary. Refer to "Flow Control Valve Removal and Installation" and Correction under Diagnosis "Hard Steering".
	(f) Worn pump rotor, slippers, or broken and distorted springs.	(f) Repair as necessary. See Diagnosis "Hard Steering" Correction (e).
High Pump Pressure	(a) Wrong relief valve.	(a) Replace relief valve and perform "Pump Pressure Test". Paragraph 2.
	(b) Relief valve clogged with foreign matter (dirt, metal chips, etc.).	(b) Replace relief valve and perform "Pump Pressure Test", Paragraph 2.

SERVICE DIAGNOSIS—(Continued)

POWER STEERING PUMP

Condition	Possible Cause	Correction
Leaks	(a) Reservoir over-filled. NOTE: Operating the steering gear manually when the engine is not running will cause the steering gear to displace the fluid from the steering gear housing which will then be forced out of the pump filler cap vent, giving a false indication of fluid leakage.	(a) See "Fluid Level". Paragraph 1.
	(b) Pressure and return hose connections and fittings.	(b) Tighten all fittings, check hose for deterioration: replace any faulty hoses. If the discharge fitting is leaking; See "Power Steering Pump Discharge Fitting Ferrule Replacement".
	(c) Reservoir to-pump-body "O" ring or mounting screws.	(c) Replace the reservoir "O" ring and tighten reservoir mounting screws.
	(d) Pump shaft oil seal.	(d) Replace oil seal.