

GROUP 19

STEERING GEAR (PUMPS, STEERING GEAR ARM, IDLER ARM)

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DATA AND 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

POWER STEERING

Ratio.....	16 to 1
Fluid Capacity of Hydraulic System.....	2 Qts.
Type of Fluid.....	Use only Part Number 2084329 Power Steering Fluid

POWER STEERING PUMP

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

TIGHTENING REFERENCE

MANUAL STEERING

	Foot-Pounds
Intermediate Steering Arm Pit Nut.....	50
Steering Gear to Frame Bolt.....	50
Steering Gear Pitman Arm Nut.....	125
Steering Wheel Nut.....	40
Steering Knuckle Tie Rod Clamp Bolt.....	15
Steering Knuckle Tie Rod End Ball Nut.....	40
Steering Idler Arm Bolt Nut.....	60

POWER STEERING

	Foot-Pounds
Pressure Control Valve Body Screws.....	10
Pump Inlet Fitting.....	30
Reservoir to Pump Body Bolts.....	10-15
Steering Wheel Nut.....	40
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.....	20
Steering Gear Shaft Adjusting Screw Lock Nut.....	50

POWER STEERING PUMP

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

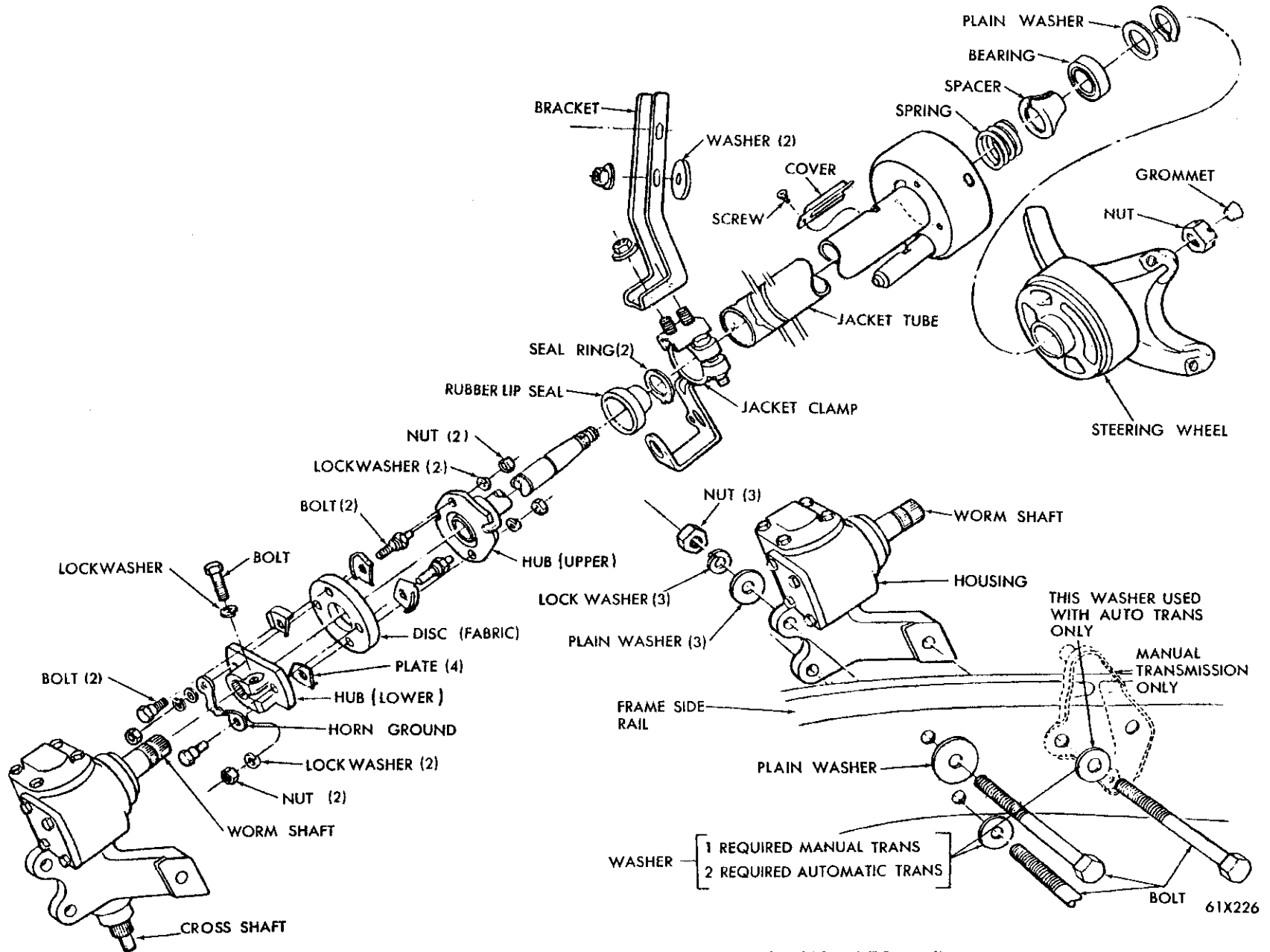
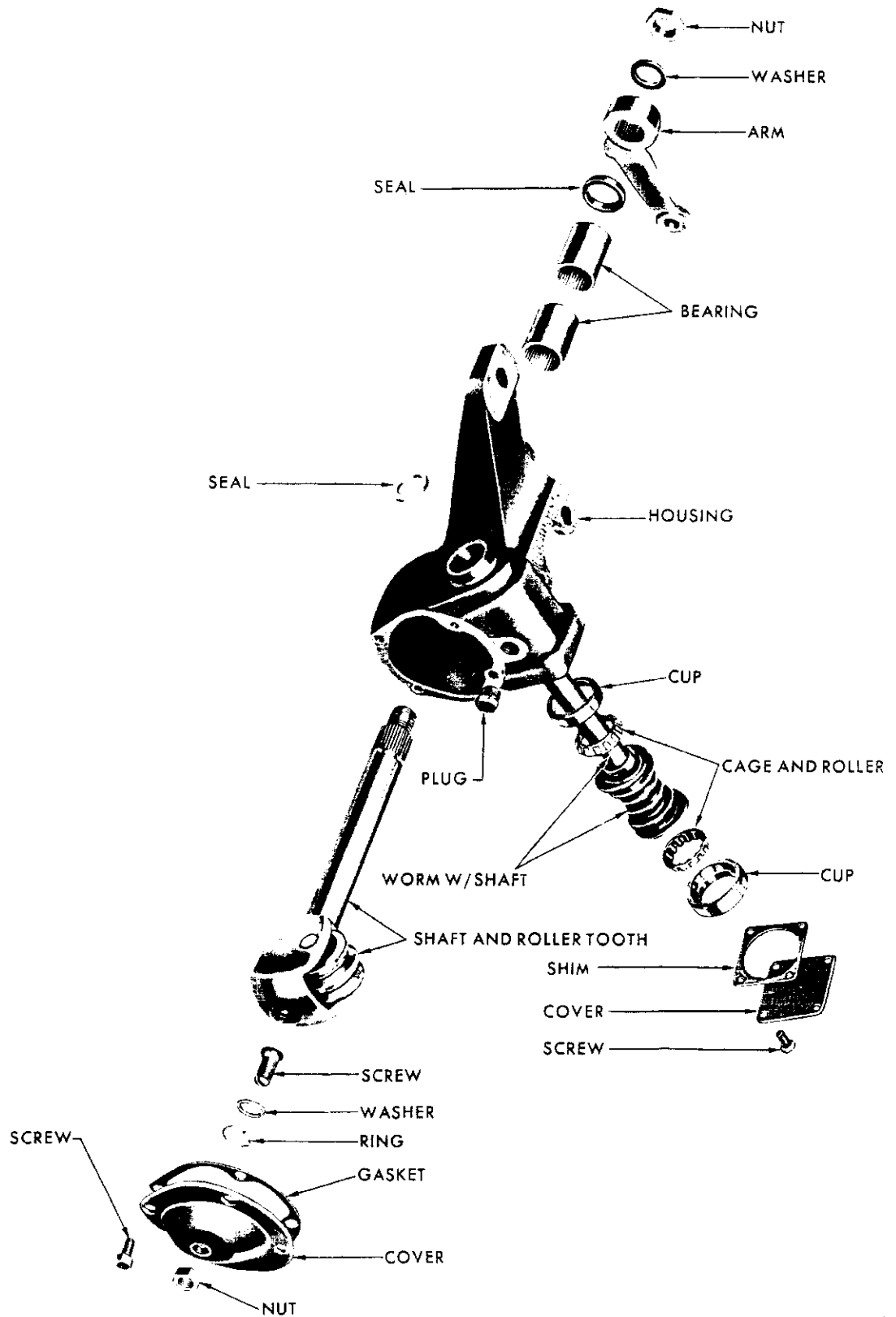


Fig. 1—Steering Gear and Jacket Tube (Disassembled View) (Manual)



62x548

Fig. 2—Steering Gear (Disassembled View)

GROUP 19

STEERING GEAR (PUMPS, STEERING GEAR ARM, IDLER ARM)

MANUAL STEERING

The manual steering (Figs. 1 and 2) incorporates a flexible coupling (Fig. 3) 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: With an automatic transmission, a $1\frac{1}{4}$ " x $\frac{7}{16}$ " x $\frac{1}{8}$ " 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

STEERING JACKET TUBE BEARING REPLACEMENT

a. Steering Column Removal

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

(2) Remove the two screws from the underside of the steering wheel and remove the horn ring, retainer and attaching screws.

(3) Disconnect the horn wire at the horn switch; remove the horn switch screws and bushings and the horn switch.

(4) Loosen the steering wheel nut several turns, install puller Tool C-3428 and remove the steering wheel nut, wheel, and puller tool.

(5) Disconnect the directional signal wires at the connectors.

(6) Remove the directional indicator switch (held to the jacket tube by two screws) (Fig. 4).

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

(8) Move the trim cap up on the steering jacket

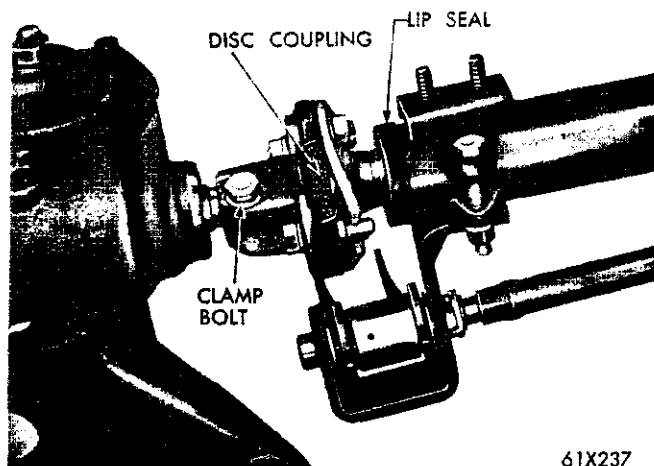


Fig. 3—Steering Gear and Flexible Coupling

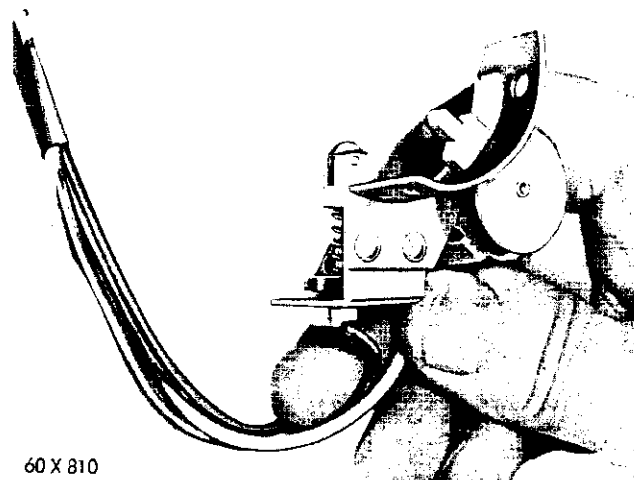


Fig. 4—Removing the Turn Signal Switch

tube and raise the floor carpet to expose the floor panel.

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

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

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

(12) 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.

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

b. Disassembly

(1) Remove the screw and directional wires cover at the jacket tube directional switch housing.

(2) Remove the snap ring and washer from the upper end of the steering column shaft, then withdraw the steering column shaft from the jacket tube.

(3) Remove the tapered spacer, spring and snap ring from the upper end of the steering column shaft, and the turn indicator cancelling dog, and slide the jacket rubber seal and nylon rings off the column shaft.

(4) Remove the jacket tube housing by carefully straightening the three retaining tabs and tapping the bearing out of the jacket tube.

c. Assembly

(1) Inspect all the parts for wear and check the rubber seal for deterioration. Replace the bearing if

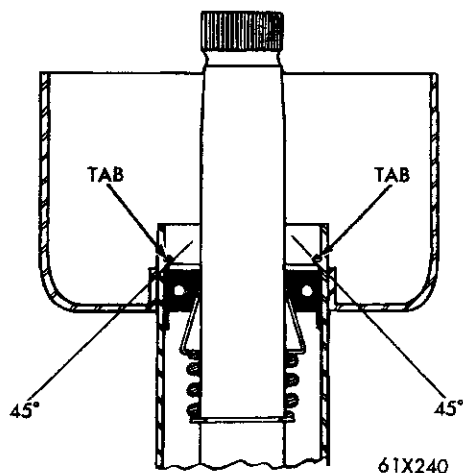


Fig. 5—Steering Jacket Tube Bearing Installation

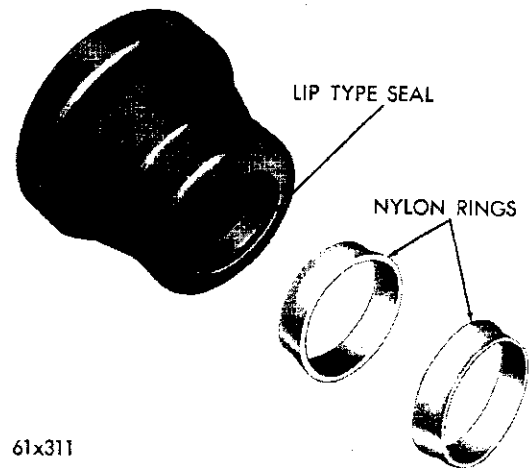


Fig. 6—Nylon Rings and Lip Type Seal (Disassembled View)

there has been any indication of binding before removal of the column tube.

(2) Pack the new upper bearing with short fiber grease and with the radius end of the bearing (inside diameter) facing downward, press the bearing squarely into the jacket tube until it stops against the bearing supporting lugs in the jacket tube, using a socket of the proper size, or a similar tool that will exert pressure on the outer race only.

(3) Place the large washer against the top side of the bearing outer race. Bend the three bearing retaining tabs down to an angle of 45 degrees (Fig. 5). Do not exceed the 45 degrees since this may cause internal damage to the bearing.

(4) Slide the jacket tube rubber seal and nylon rings on the steering column shaft.

(5) Install the direction indicator cancelling sleeve on the column tube.

(6) Install the jacket bearing snap ring in the steering column shaft lower groove; install a new snap ring if the old ring will not fully seat in the groove.

(7) Install the spring and tapered spacer (tapered end up).

(8) Carefully install the steering column shaft assembly into the column jacket tube.

(9) Support the column tube lower hub on a block of wood, place the upper snap ring on the steering column shaft, pull down on the jacket tube to compress the bearing spacer spring sufficiently to expose the upper groove in the steering gear shaft and install the upper snap ring. **Make sure** the snap ring seats fully in the shaft groove.

(10) 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 (Fig. 6).

(11) Position the directional switch and install the switch attaching screws. **Be sure** the column jacket does not restrict the switch movement.

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

d. Installation

(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.

(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) Install the steering wheel.

(9) Install the steering wheel nut. Tighten to 40 foot-pounds torque.

(10) Install the horn switch bushings and screws. Attach the horn wire at the horn switch terminal.

(11) Install the horn ring, retainer and attaching screws.

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

(13) 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.

STEERING GEAR

a. 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) Remove the three nuts, washers and bolts attaching the steering gear to the frame side rail and slide the steering gear assembly toward the front of the vehicle to disengage the column tube flexible coupling from the steering gear worm shaft.

(5) Remove the gear through the engine compartment.

b. Disassembly (Fig. 2)

(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, cover gasket and the steering gear shaft assembly.

(3) Remove the cover and shim from the bottom of the housing.

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

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

c. 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

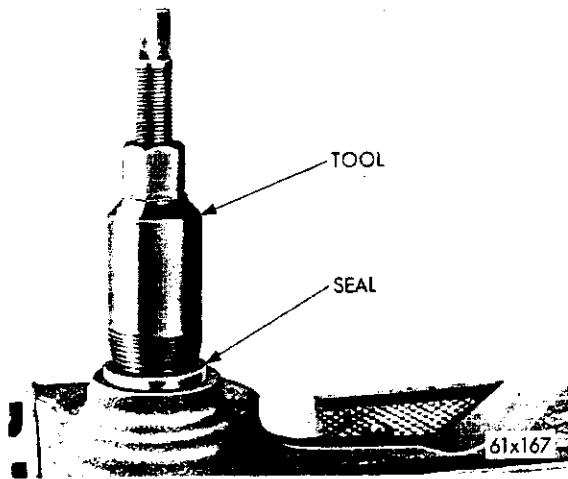


Fig. 7—Removing the Worm Shaft Oil Seal

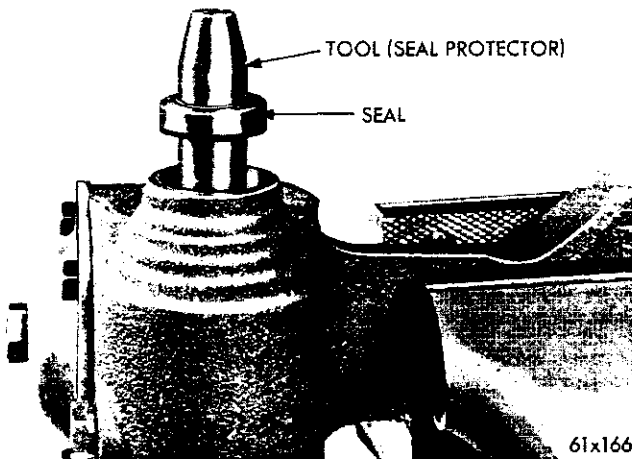


Fig. 8—Installing the Oil Seal Protector

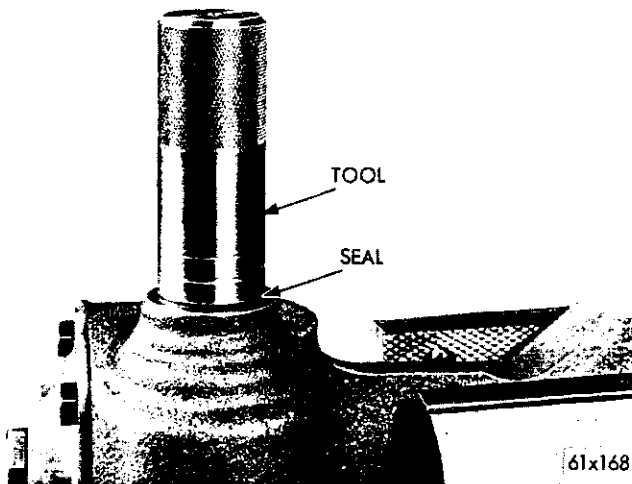


Fig. 9—Installing the Worm Shaft Oil Seal

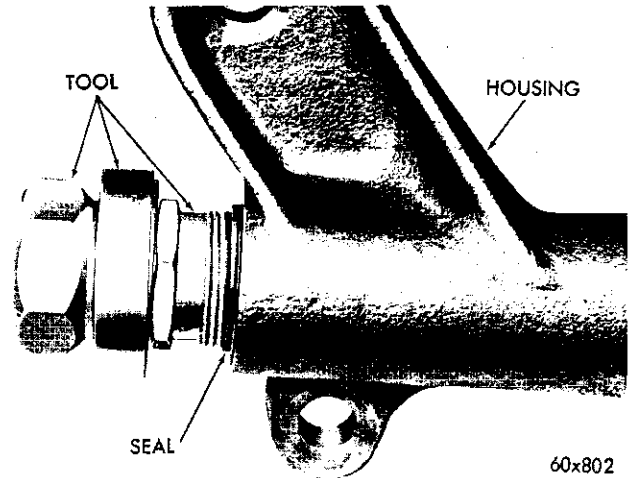


Fig. 10—Removing the Gear Shaft Oil Seal

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

a. Removal (Fig. 10)

(1) Remove 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.

(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.

b. 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 pro-

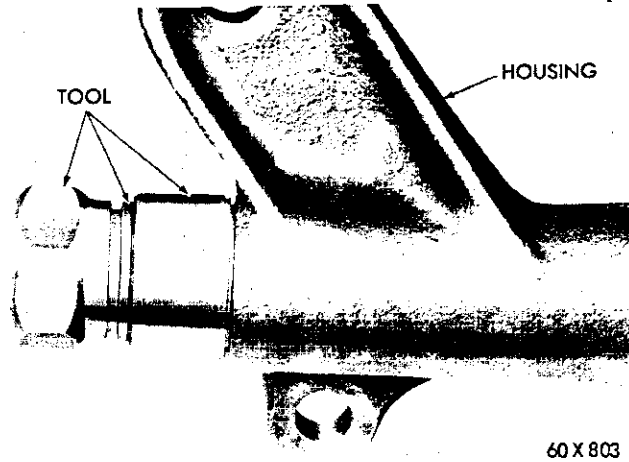


Fig. 11—Installing the Gear Shaft Oil Seal

tector 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.

(4) Install the steering gear arm and nut. Tighten the nuts to 125 foot-pounds torque.

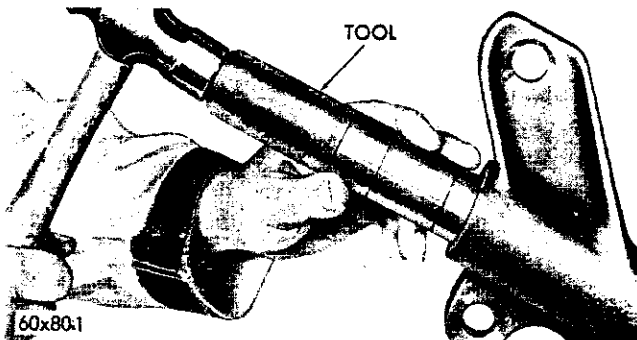


Fig. 12—Installing the Gear Shaft Housing Outer Bearing

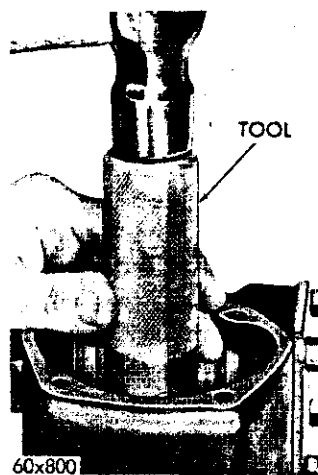


Fig. 13—Installing the Gear Shaft Housing Inner Bearing

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.

STEERING GEAR

a. Assembly

(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 $\frac{3}{8}$ to $\frac{1}{4}$ 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) Place the steering wheel on the tube and rotate the steering wheel in one direction to the end of its travel. Rotate the wheel in the other direction to the end of its travel, counting the turns. Rotate the wheel back $\frac{1}{2}$ of the full number of turns. This is the exact center of travel (high point).

(7) Turn the adjusting screw (clockwise) until all the end play in the gear shaft is gone. Rotate the wheel to one end of its travel and apply a spring scale. With pull applied at rim of the steering wheel, tension should measure from 1 to 2 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 check for leaks.

b. Installation

(1) Inspect the steering gear for 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.

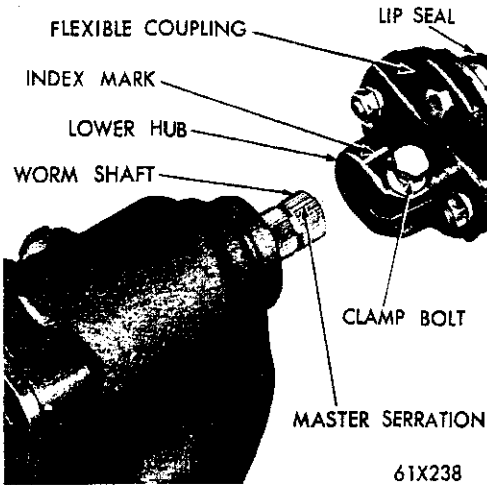


Fig. 14—Aligning the Steering Gear with Flexible Coupling

(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. 14).

(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

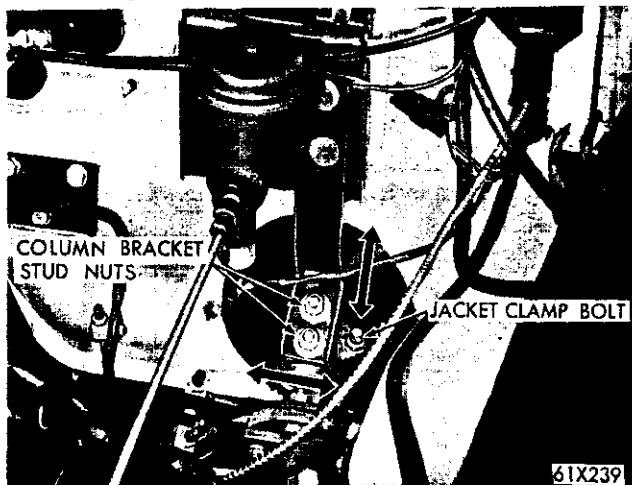


Fig. 15—Steering Gear Alignment

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.

STEERING GEAR ALIGNMENT (Fig. 15)

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.

(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. 6) 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 $\frac{1}{8}$ inch on the tube while aligning the column support bracket to the dash panel and lower column clamp.

(4) When column is properly located, tighten the support bracket stud nuts at the dash panel and at the column clamp to 100 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 125 foot-pounds torque.

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) Install the steering gear arm.

STEERING KNUCKLES

a. 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.

b. 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 on Models SC-1 and SC-2 and 135 foot-pounds torque on Models SC-3 and SY-1. Tighten the lower ball joint stud nut to 115 foot-pounds SC-1 and SC-2, 135 foot-pounds (SC-3 and SY-1) and install the cotter pin.

(2) Slide the brake dust shield, support and shoe assembly 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.

STEERING LINKAGE (Figure 16)

a. 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 are the permanently lubricated type. If the tie rod or steering arm seals are damaged, replace the assembly.

The tie rod, seals and covers should be inspected at all oil change periods. Damaged seals necessitate replacement of the tie rod end assembly. The tie rod end seal covers are serviced separately.

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.

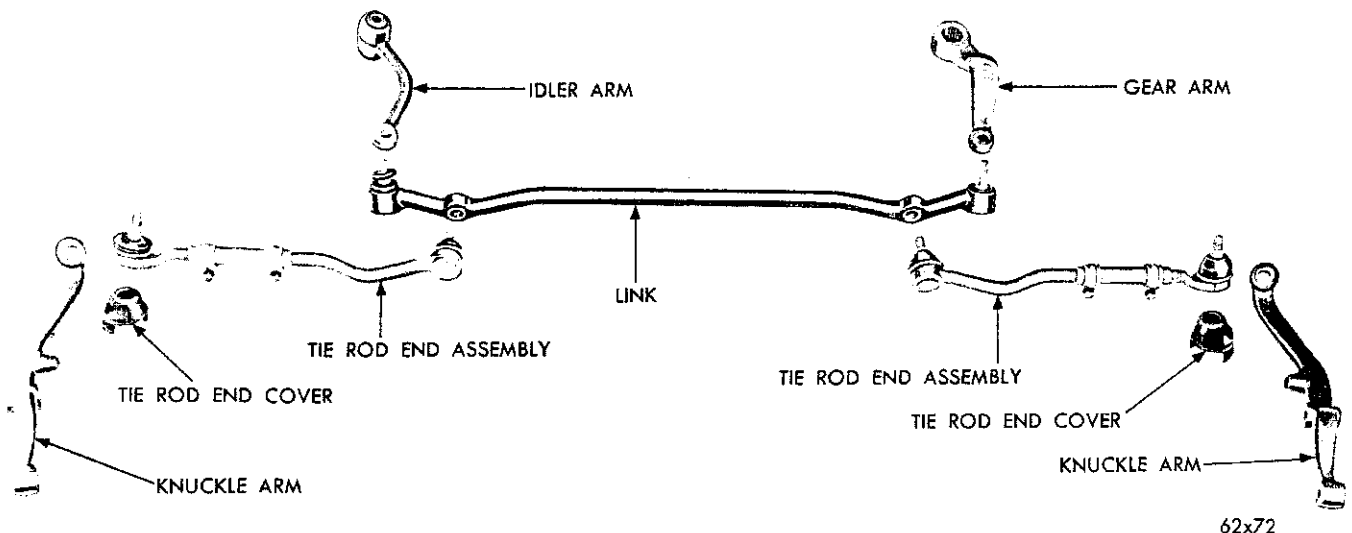


Fig. 16—Steering Linkage (Disassembled View)

(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 cross-member.

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

b. 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 85 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.

(3) Connect the tie rod ends to the steering knuckle arms. Tighten the nuts to 40 foot-pounds. 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.

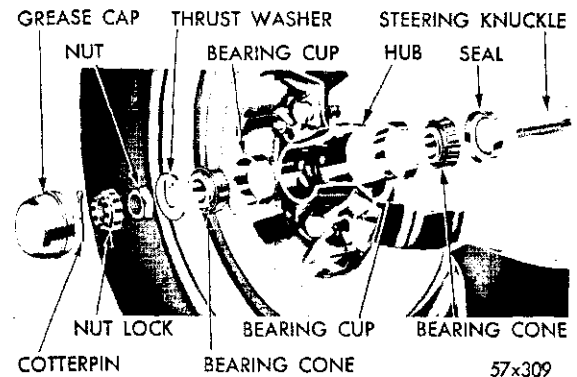


Fig. 17—Front Wheel Bearing Adjustment

FRONT WHEEL BEARING ADJUSTMENT (Fig. 17)

(1) Tighten the wheel bearing and adjusting nut to 90 inch-pounds while rotating the wheel.

(2) Position the nut lock on the nut with one pair of slots in line with the cotter pin hole.

(3) Back off the lock and adjusting nut to the next slot.

(4) Install the cotter pin.

NOTE: The resulting adjustment should be zero to .003 inch end play.

(5) Clean the grease cap, coat the inside with wheel bearing lubricant (do not fill) and install.

POWER STEERING

The power steering gear consists of a gear housing 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 (Fig. 18) 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.

In this explanation of operation, the left end of the steering gear means the lower end and the right end means the upper end of the steering gear. Direction of oil flow will also be described as flowing to left or right.

When the vehicle is in the straight-ahead direction, the steering valve is in the neutral (center) position and the oil flow through both of the grooves in the steering valve body is equal, hence, in the neutral position (Fig. 19), the two lands of the steering valve are centered in the grooves of the valve body. The left oil passage directs its oil where it contacts the

right (upper) end of the power piston and across into the right reaction chamber. Part of this oil is forced around the grooves of the worm shaft, inside the piston and around the recirculating balls, to the hollow area between the left (lower) end of the

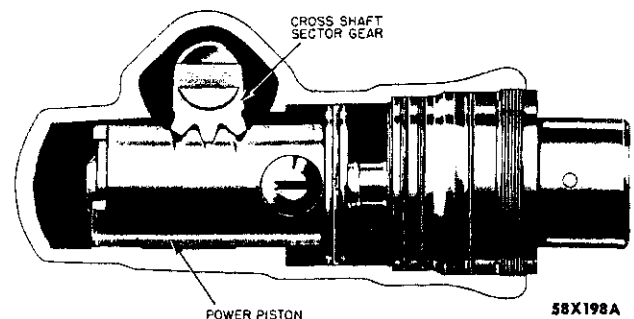


Fig. 18—Steering Gear Housing (Sectional View)

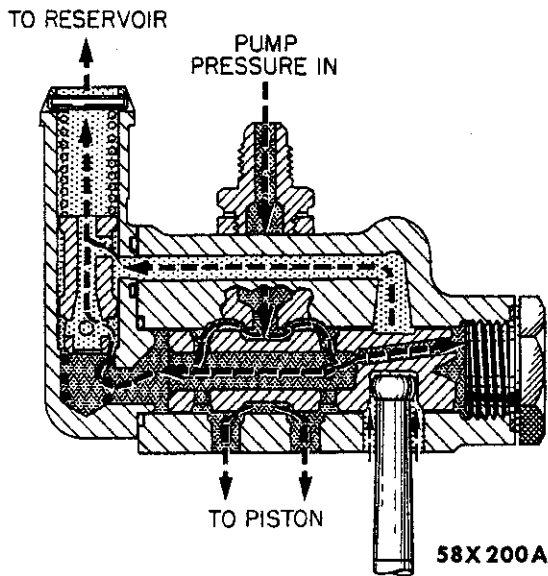


Fig. 19—Steering Gear Valve (Neutral Position)

worm shaft and the left (lower) end of the power piston. Pressure on the end of the worm shaft is balanced by the pressure against the area of the worm shaft balancing ring.

At the same time, oil from the right groove in the steering valve is directed to the left, through a gallery, parallel to the worm shaft. This oil flows to the area below the power piston flange. Part of this oil is then directed through the cylinder head into the left reaction chamber.

Forces exerted on the piston through oil pressure on its faces are completely balanced by the two reaction rings shown in the cross section in Figure 20. The reaction ring shown to the left of the center bearing race is fed oil from the right turn power chamber oil gallery through a drilled hole.

When the driver makes a left turn, power is immediately provided by the unit to effect the turn. As the wormshaft rotates inside the power piston, the piston is prevented from instantly "climbing

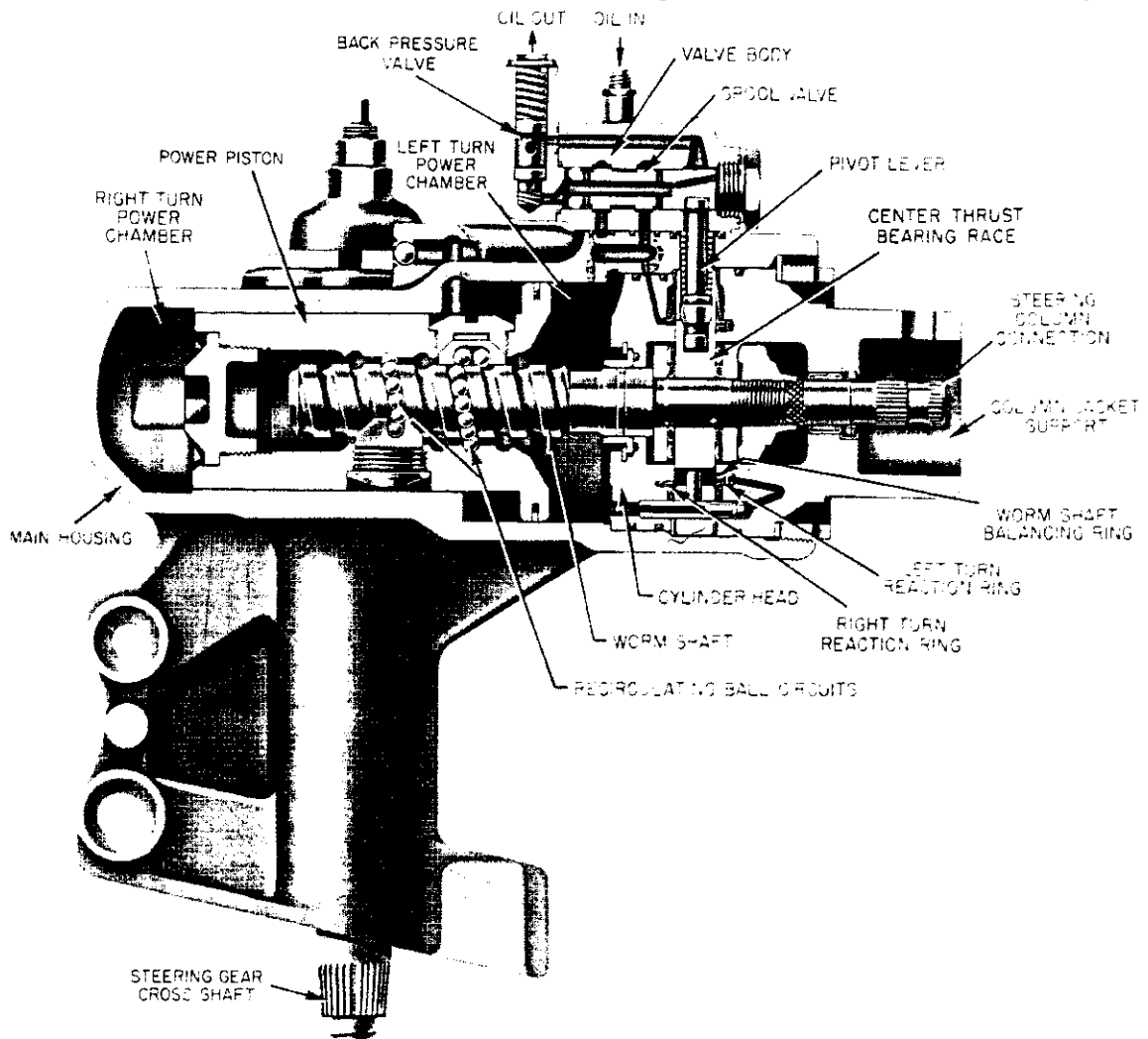


Fig. 20—Steering Gear (Sectional View)

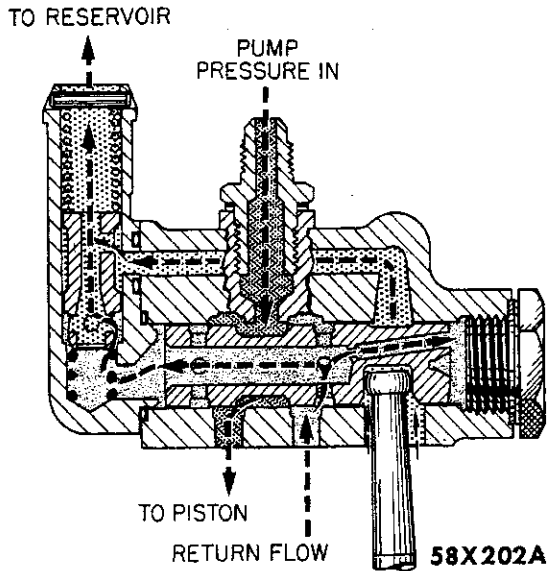


Fig. 21—Steering Gear Valve (Left Turn Position)

down" the wormshaft by the resisting forces which the steering linkage and wheels transmit to the steering gear cross shaft. Instead, the worm shaft is "drawn out" of the piston a very small amount (a few thousandths of an inch). The center thrust bearing race, which in effect is clamped axially to

the wormshaft, moves the same distance. The race thus tips the pivot lever and moves the steering valve to the left (down).

The oil flow diagram for a left turn is shown in Figure 21. Here it can be seen that as the left edges of the two lands on the valve approach the groove edges of the valve body, two things happen: oil flow to the right groove in the valve body is reduced and the flow of oil to the left groove is increased because the opening is larger. Oil then flows from the power steering pump through the enlarged orifice and through the oil gallery to the left turn power chamber of the piston (Fig. 22). Since the supply of oil to the left (lower side) (right turn chamber) of the piston has been cut off by movement of the steering valve, a force of unbalance on the piston exists and it is pushed to the left. Its linear movement is translated into rotation of the cross shaft sector gear and subsequently through the steering linkage to the front wheels.

In the reaction area of the steering unit another action takes place simultaneously as the wheel is turned to the left. The restraining force of the reaction spring must be overcome before the center race can move to the right. The force of the reaction spring provides positive returnability to the unit. At the instant when power assistance is no longer de-

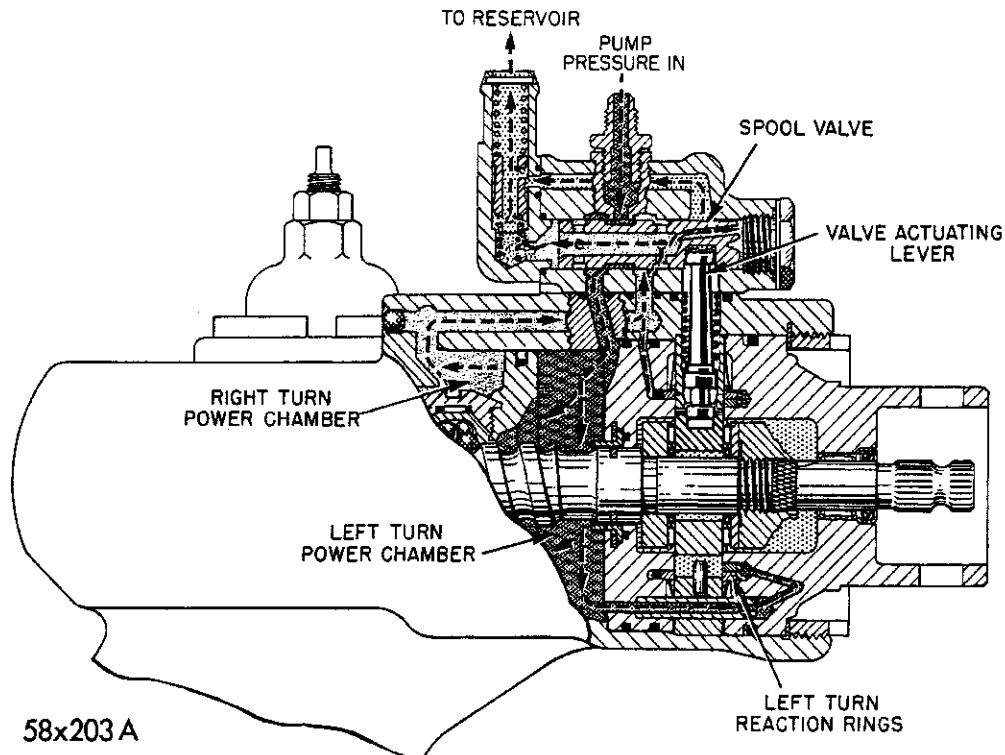


Fig. 22—Oil Flow (Left Turn Position) (Typical)

sired by the driver, the reaction spring and the operating oil pressure move the center thrust bearing race and the steering spool valve back to their neutral (center) positions. Equal oil pressures then are directed to both sides of the power piston and power assist ceases immediately. The natural effect of the front wheel caster and the steering axis inclination then returns the wheels to their straight-ahead position.

When a right turn is made, all of the earlier described actions necessary to make a left turn in the steering unit are repeated, except that all of the motions are reversed. Consequently, in a right turn, the lower side of the power piston and the right turn reaction ring are pressurized (Fig. 22).

The force of this reaction spring also contributes to increased on-center "feel." The "feel" is further provided by the operating oil pressure which tends to return the center thrust bearing race to its neutral position. The driver feels this force on the reaction rings (shown in Figures 21 and 22) as a force proportional to operating oil pressure. It causes the driver to exert a steering effort proportional to the total force required to turn the front wheels of the vehicle. The force he actually exerts is only a small percentage of the total force that would be required to steer the vehicle with a manual gear. If the oil pressure is interrupted in the steering gear, it would operate with increased effort and there would be more steering wheel free play. However, complete steering control is retained by the driver if a "lack of power assist" condition should ever arise.

GEAR SHAFT ADJUSTMENT

(1) With the gear shaft on center, loosen the gear shaft adjusting screw lock nut $\frac{1}{2}$ turn and tighten the adjusting screw until backlash just disappears. Tighten the screw $1\frac{1}{4}$ 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.

(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 $\frac{3}{8}$ to

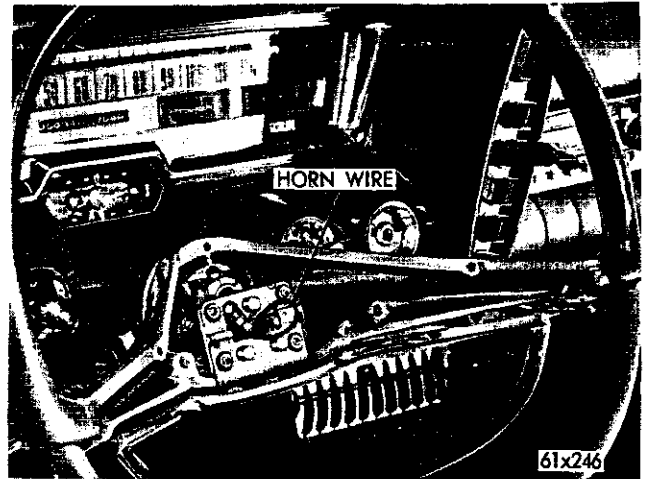


Fig. 23—Horn Switch and Horn Wire

$\frac{1}{2}$ turn from this position and tighten the lock nut 50 foot-pounds torque to maintain this setting.

REMOVING POWER STEERING GEAR UNIT

- (1) Disconnect the battery cable at the battery negative post.
- (2) On Chrysler Models (if so equipped) remove the steering wheel ornament by pressing down on the center ornament and turning $\frac{1}{4}$ inch to remove.
- (3) Disconnect the horn wire and remove three screws, bushings, horn blowing ring, rubber insulator and the horn terminal plate.
- (4) Disconnect the directional signal wires and the horn wire at the connectors.
- (5) Loosen the steering wheel nut three turns. Use puller, Tool C-3428, to loosen the steering wheel.
- (6) Remove the tool, steering wheel nut and the steering wheel.

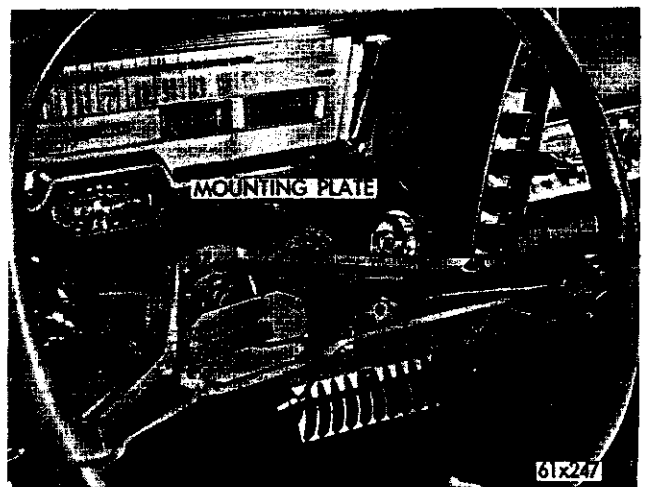


Fig. 24—Horn Blowing Ring Mounting Plate

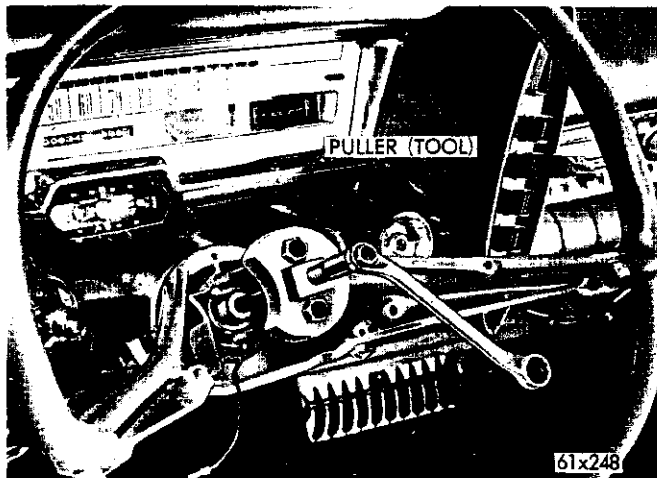


Fig. 25—Removing the Steering Wheel

(7) 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.

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

(9) Remove the four screws and insulators and remove the horn blowing switch (Fig. 23).

(10) Remove the four screws and remove the horn blowing ring mounting plate (Fig. 24).

(11) Loosen the steering wheel nut several turns and install the steering wheel puller Tool C-3428 (Fig. 25) and remove the steering wheel nut and the steering wheel.

(12) Remove the directional switch lever (Fig. 26).

(13) Remove the steering column lower cover.

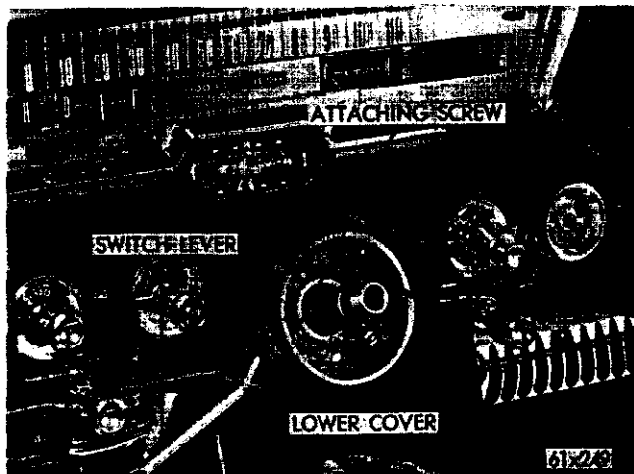


Fig. 26—Directional Switch and Lever—
Steering Wheel Removed

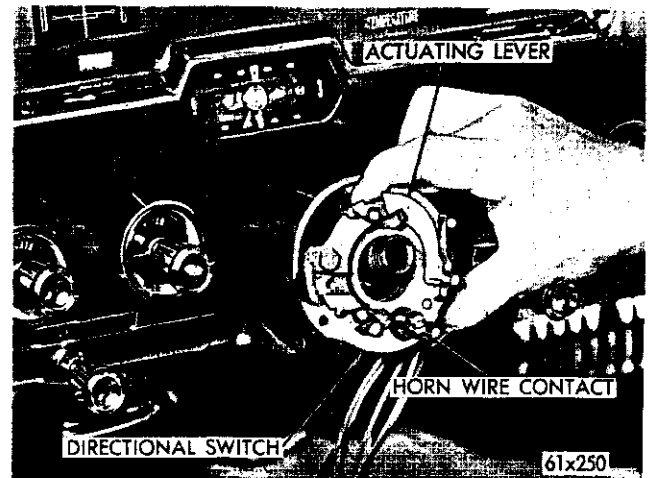


Fig. 27—Removing the Directional Switch

(14) Remove the two screws and disconnect the switch wires at the connection and remove the directional switch and wires (Fig. 27).

(15) Remove the retainer snap ring (Fig. 28) from the groove in the steering tube at the top of the bearing using pliers Tool C-3229.

(16) 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.

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

(18) Remove the screws attaching the rubber dust boot at the firewall. (On Imperial cars, remove the floor inspection panel.)

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

(20) Remove the cotter key and nut at the drag

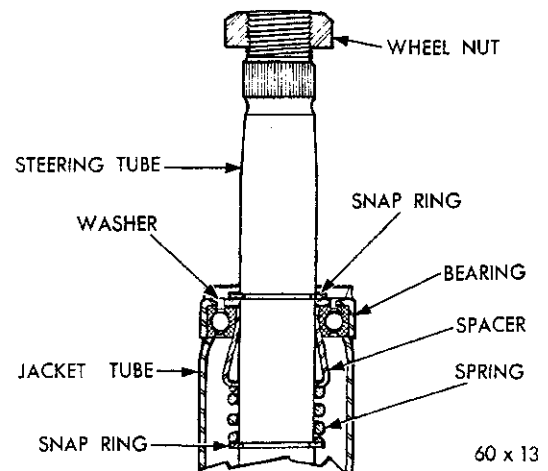


Fig. 28—Jacket Tube Installation SC-1, SC-2, SC-3, SY-1

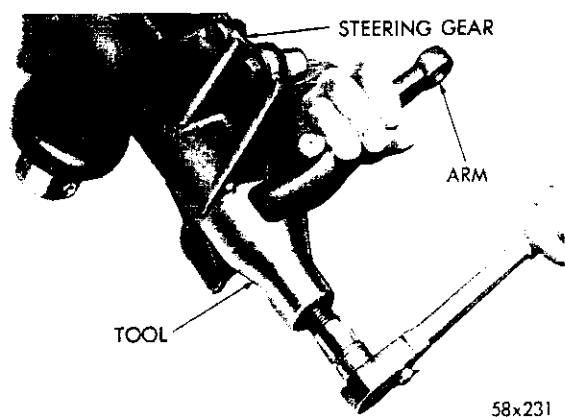


Fig. 29—Removing the Steering Gear Arm

link and disconnect the link from the steering arm.

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

(22) Slide Tool C-3646 up on the steering arm and place the shoe of the puller behind the steering arm (Fig. 29). 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.

(23) Disconnect the hydraulic brake line at the master cylinder and the brake tee and remove the line (not necessary on Imperial cars).

(24) Disconnect the pressure and return hoses at the steering gear. Fasten the ends of the hoses above the oil level in the reservoir. Cap the ends of the hoses. Cap the fittings on the steering gear.

(25) Slide the jacket tube up and off the steering gear through the driver's compartment. Remove the jacket tube upper spring and retainer. Remove the rubber insulator boot and horn ground strap.

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

(27) Remove the gear housing to frame bolts, washers and alignment wedge. Slide the steering gear towards the rear of the vehicle and at the same time, raise the lower end of the gear to remove the gear at the engine compartment. (Remove the gear through the driver's compartment on Imperial cars.)

DISASSEMBLY OF STEERING GEAR (Fig. 20)

NOTE: Prior to disassembly, clean the gear assembly

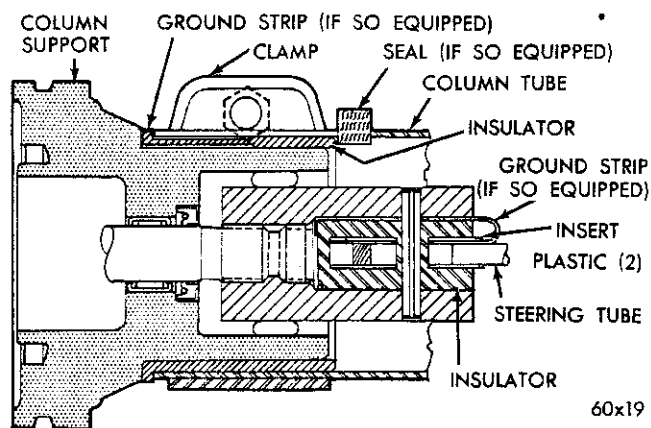


Fig. 30—Jacket Tube and Column Tube (Cross Section)

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 re-assembling.

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

(2) Remove the coupling pin.

CAUTION

Support the coupling when driving the pin in or out

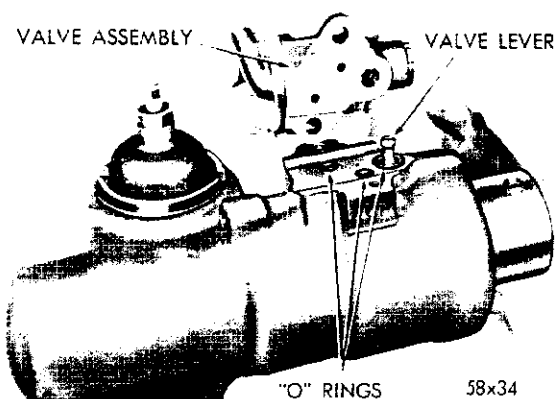


Fig. 31—Removing the Valve Body Assembly (Typical)

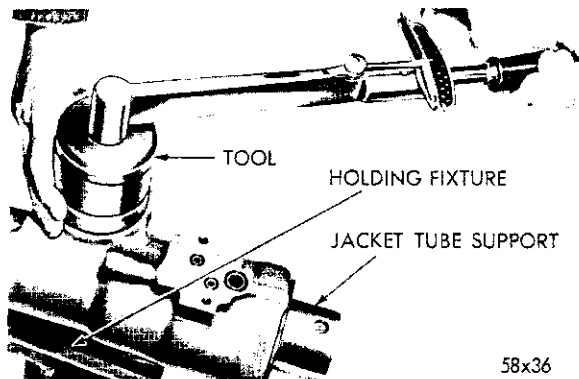


Fig. 32—Removing the Gear Shaft Cover Nut (Typical)

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. 31).

(4) Remove the valve lever and spring. Pry under the spherical head with a screwdriver. Use care not to collapse the slotted end of the valve lever as this will destroy the bearing tolerances of the spherical head.

(5) Loosen the gear shaft adjusting screw locknut to facilitate removal and remove the gear shaft cover nut with Tool C-3633 (Fig. 32).

CAUTION

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

(6) 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. 18). 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.

(7) Turn the worm shaft to full right turn posi-

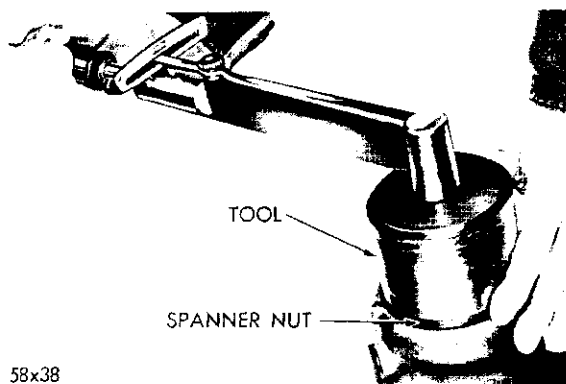


Fig. 33—Removing the Steering Column Support Nut

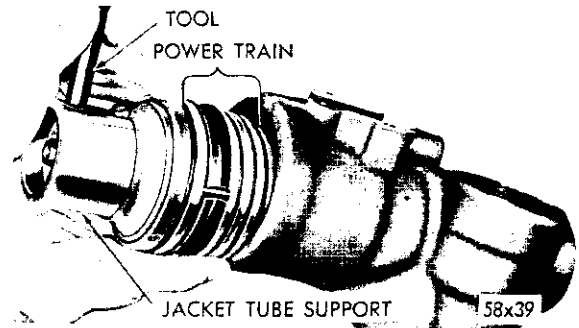


Fig. 34—Removing the Power Train (Typical)

tion to compress the power train parts and then remove the coupling.

(8) Remove the steering jacket support nut with Tool C-3634 (Fig. 33).

(9) 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. 34).

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

NOTE: By this procedure, the worm will be all the way into the piston 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.

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

DISASSEMBLY OF POWER TRAIN

(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 and jacket support.

(3) Remove the reaction spring, reaction ring and spacer, ferrule "O" ring and the center bearing spacer.

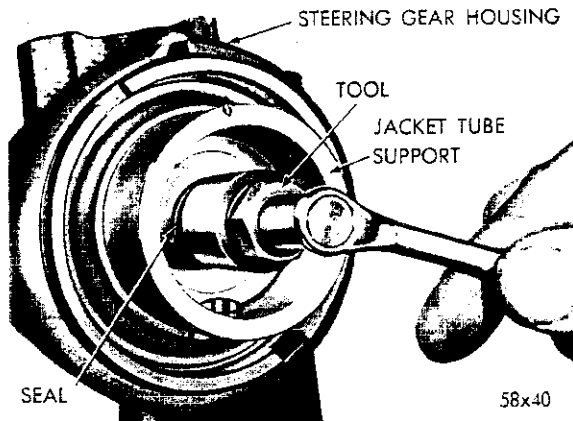


Fig. 35—Removing the Worm Shaft Upper Seal

(4) Hold the worm shaft from turning, then turn the 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 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.

NOTE: The worm and piston assembly is furnished as a complete assembly only.

COLUMN JACKET SUPPORT

a. Disassembly

(1) Remove the worm shaft upper seal with puller Tool C-3638 (Fig. 35).

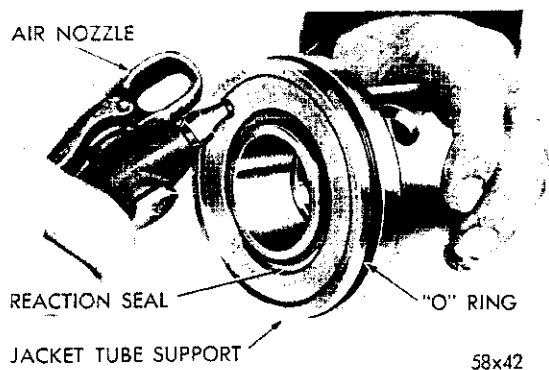


Fig. 36—Removing the Reaction Seal from the Jacket Support

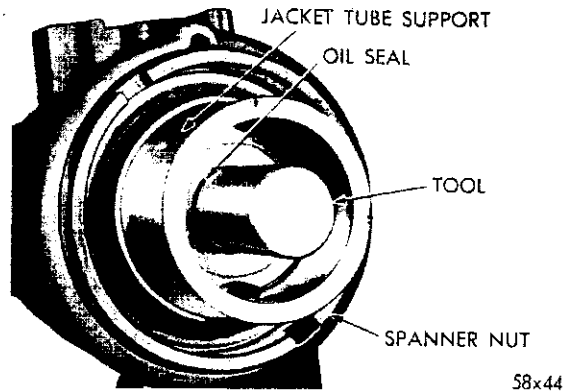


Fig. 37—Installing the Worm Shaft Upper Seal

NOTE: The column jacket support and worm shaft upper bearing are serviced as an assembly.

(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. 36).

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

b. Assembly

(1) Install the worm shaft upper oil seal using Tool C-3650 (Fig. 37) (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. 38).

CYLINDER HEAD

a. Disassembly

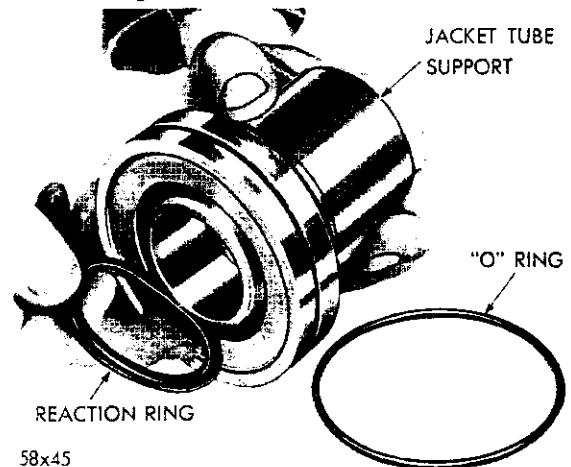


Fig. 38—Installing the Reaction Seal into the Jacket Support

(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. 39).

(3) Inspect the worm shaft seal in the cylinder head counterbore for possible damage; replace the cylinder head seal if necessary (Fig. 40).

b. Assembly

(1) Check 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 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 (Fig. 41)

a. Disassembly

(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.

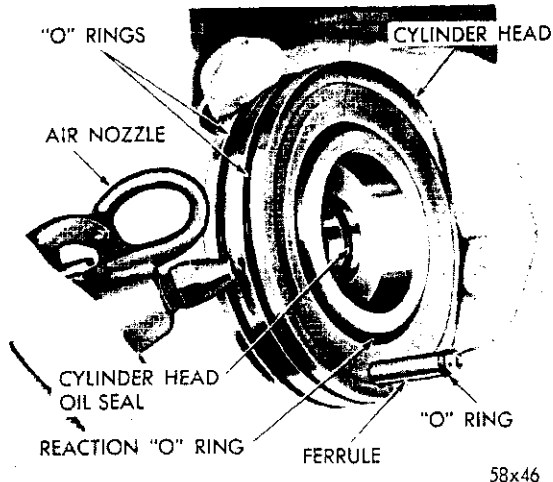


Fig. 39—Removing the Reaction Ring Seal from the Cylinder Head

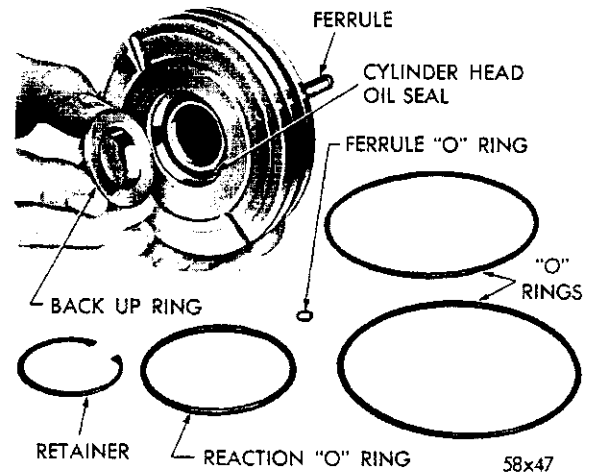


Fig. 40—Removing the Cylinder Head Seal

(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.

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 pistons and bores with MoPar No. 2084329 Power Steering Fluid.

b. Assembly

(1) Install the steering spool valve into the valve housing so that the valve lever hole is aligned with

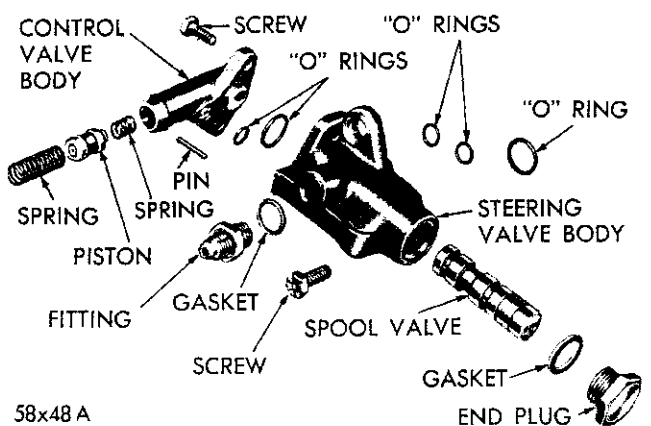


Fig. 41—Control Valve (Disassembled View)

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. Check 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.

GEAR SHAFT

a. 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. 42).

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

CAUTION

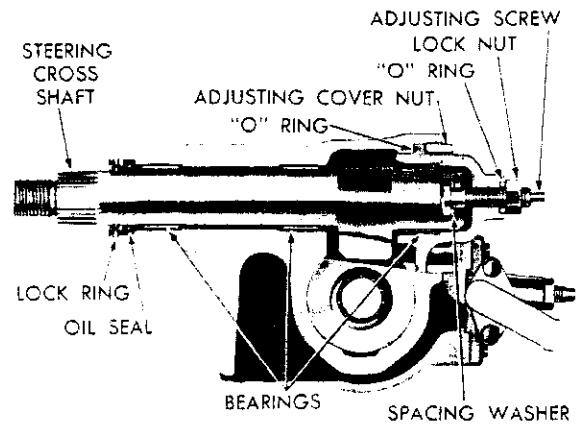
If for some reason, the cover assembly must be removed from the gear shaft, the 51 needles will fall out of the cover. If any needles (51) become lost, it will be necessary to replace the cover and bearing as an assembly. Use wheel bearing grease to retain the needle rollers in the cover when reassembling.

b. 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.



58x283

Fig. 42—Steering Gear Housing (Sectional View)

STEERING GEAR HOUSING

a. Disassembly

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

(2) Remove the oil seal snap ring with pliers Tool C-3229 and remove the seal back-up washer.

NOTE: The gear shaft oil seal should be removed with the gear shaft installed in the housing.

(3) Remove the gear shaft oil seal with adapter SP-3056 and Tool C-3350 (Fig. 43) as follows:

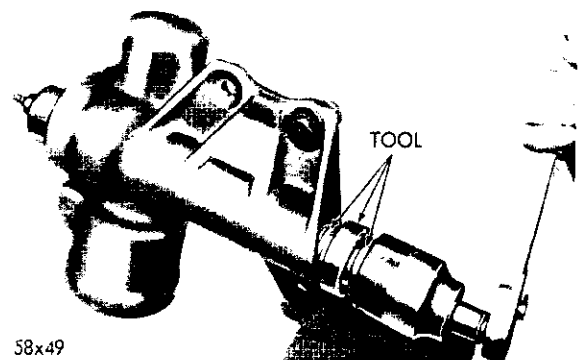
a. Slide the threaded position of adapter SP-3056 over the end of the gear shaft.

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

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

d. Install the two half-rings and retainer over both portions of the tool.

e. Turn the nut counter-clockwise; as the hexagon



58x49

Fig. 43—Removing the Gear Shaft Oil Seal

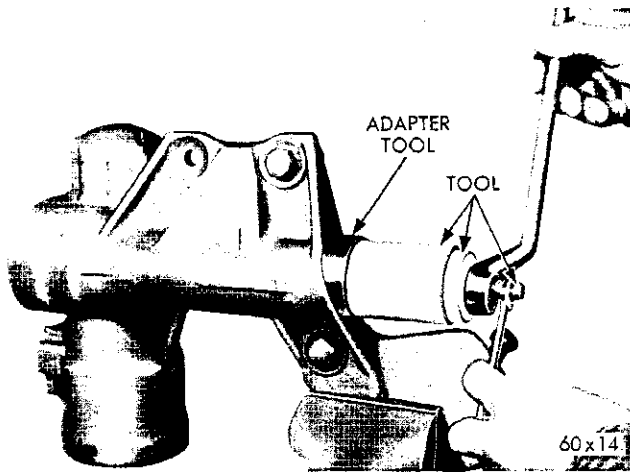


Fig. 44—Removing the Housing Lower Bushing

nut is removed from the shaft, the seal will be pulled from the housing.

(4) If necessary to remove the housing bearings, use puller Tool C-3332 with adapter SP-3062 (Fig. 44) 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.

b. Assembly

(1) Install the gear shaft bearings into the housing with driver, Tool C-3333 (lettered end of the bearings against the driver tool). Drive the bearings to $\frac{1}{8}$ inch below the edge of the counterbore.

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

- a. Place the adapter against the seal and thread the tool nut on the threaded end of the gear shaft (Fig. 45).
- b. Turn the tool nut on the gear shaft until the shoulder of the adapter tool contacts the housing.
- c. Remove the tools and install the oil seal back-up washer and snap ring.

CAUTION

Make sure the snap ring is properly seated in the groove in the housing (Fig. 42).

ASSEMBLY OF POWER TRAIN (Figs. 18 and 46.)

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, Piston Ring Remover and Installer, as follows:

- a. Position Tool C-3676 in the vise (Fig. 47).
- 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 No. 2084329 Power Steering Fluid 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-

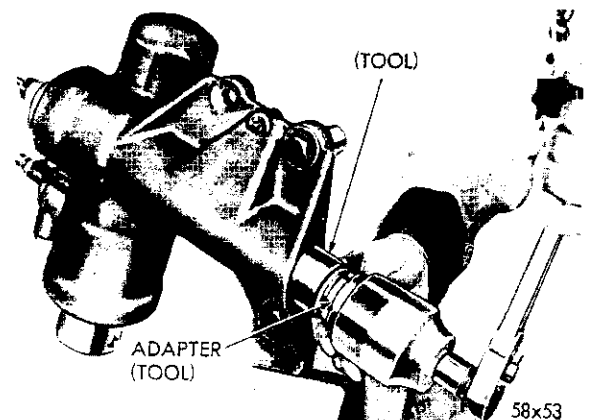


Fig. 45—Installing the Gear Shaft Oil Seal

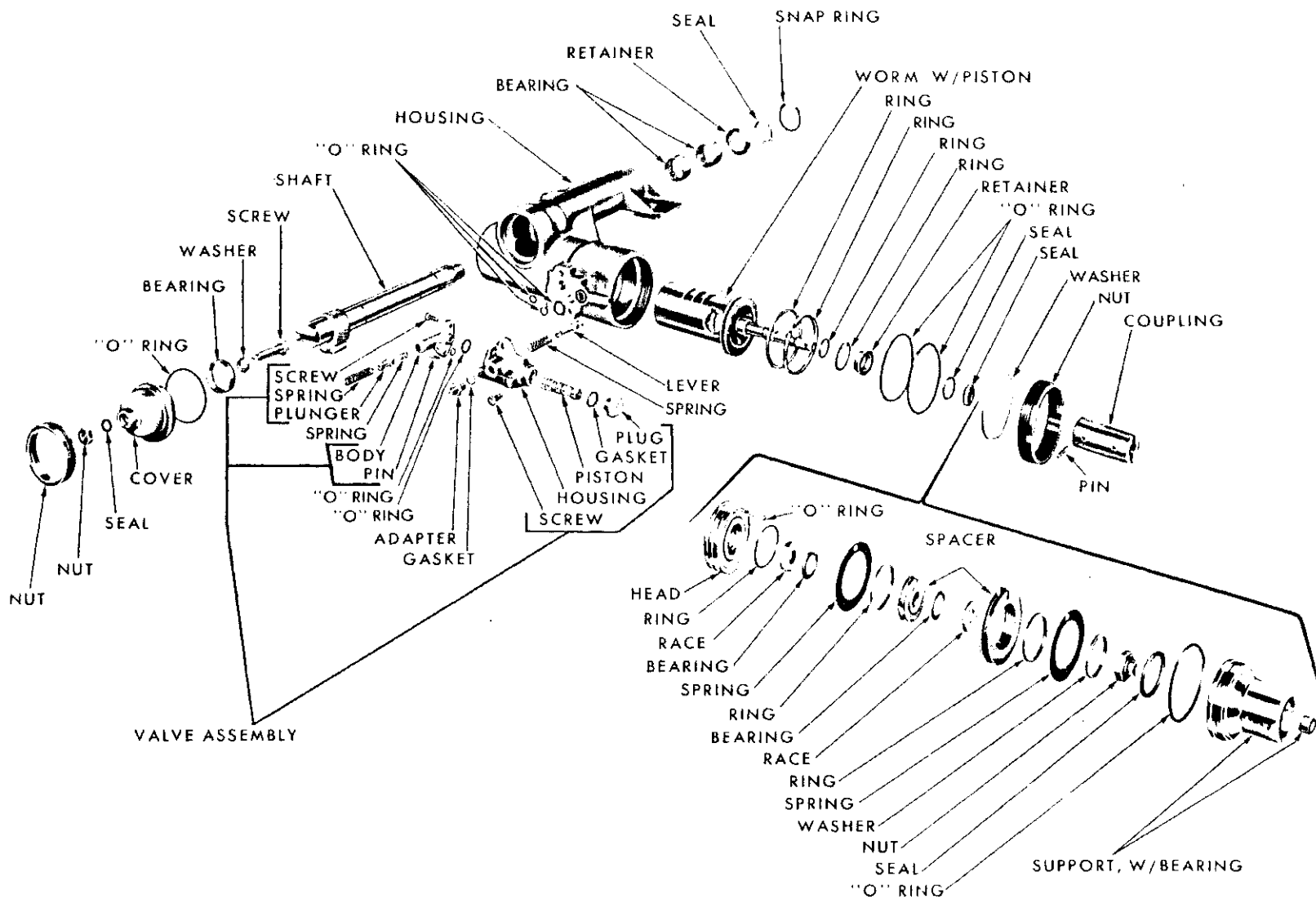


Fig. 46—Steering Gear (Disassembled View)

60x18

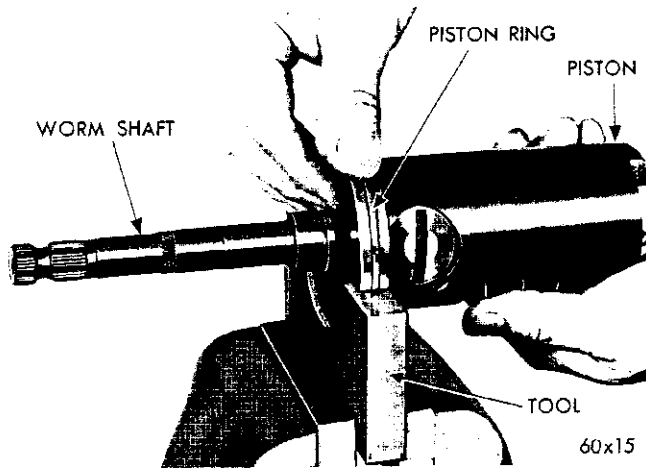


Fig. 47—Removing the Piston Ring

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. 48). 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,

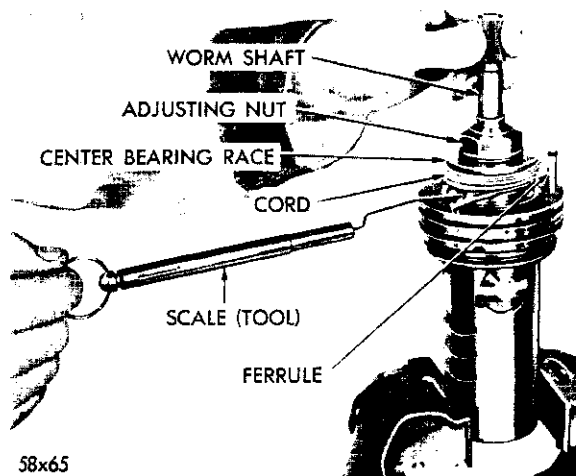


Fig. 48—Adjusting the Center Bearing Pack Preload

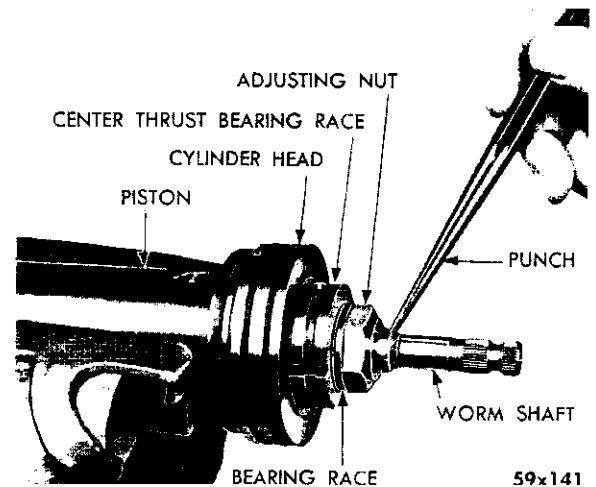


Fig. 49—Staking the Worm Shaft Bearing Adjusting Nut

reading on the scale should be 8 to 16 ounces (12 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 $\frac{1}{4}$ 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. 49).
- 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.

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 20 foot-pounds torque in either direction. If the nut does not move, the staking operation is satisfactory.

IMPORTANT

Recheck the pre-load adjustment, the torque of 8-16 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 spring.

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

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

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

REASSEMBLY OF THE STEERING GEAR

(1) With the steering gear housing in the holding fixture Tool C-3323 in approximate car installed position; lubricate the bore of the housing with petroleum and carefully install the power train assembly (Fig. 20) with the center bearing spacer valve lever hole in "UP" position 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. 20). Do not release pressure on the power train (Fig. 34) 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, using a suitable drift as an aligning tool. Tool should not be removed until the spanner nut is securely tightened.

(3) Install the column support spanner nut and

tighten nut 110 to 200 foot-pounds torque with Tool C-3634 (Fig. 32).

(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. 42).

(5) Install the cover spanner nut and tighten the nut 110 to 200 foot-pounds torque with Tool C-3633 (Fig. 32).

(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 (Fig. 16).

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. 20). Be sure that "O" ring seals are in place. Tighten the valve mounting screws to 30 inch-pounds torque.

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

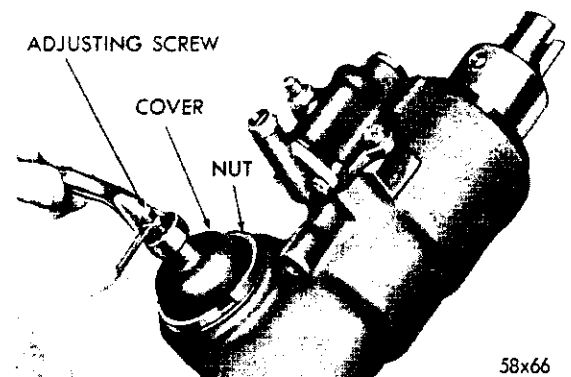


Fig. 50—Steering Gear Shaft Adjustment

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. With the gear shaft on center, tighten the gear shaft adjusting screw until the backlash just disappears. Tighten $1\frac{1}{4}$ turns from this position and while holding the adjusting screw in this position, tighten the lock nut (Fig. 50).

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

c. Turn off the hydraulic power to the unit. Operate the unit manually for a minimum of 180 degrees from center in each direction, measured at the worm shaft.

d. 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 $\frac{3}{8}$ to $\frac{1}{2}$ turn from this position and tighten the lock nut to 50 foot-pounds torque to maintain this setting.

e. 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 or vary more than 5 foot-pounds from left to right. Perform this operation carefully to prevent a lockup in the steering gear.

f. 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 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.

g. 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

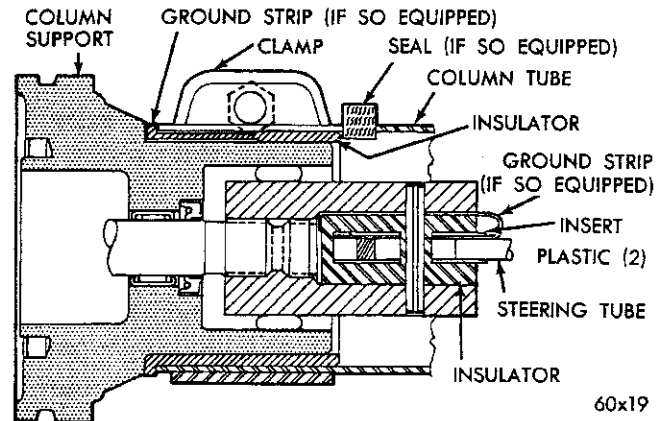


Fig. 51—Jacket Tube Installation

center, check for too much interior drag; binding valve lever, binding valve spool, or cross shaft adjustment is too tight.

(6) 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. Disconnect the test equipment and the mounting fixture and install the unit in the car.

INSTALLATION (Steering Gear)

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

(2) Enter the steering gear assembly into the engine compartment and through the opening in the floor panel. Install the housing attaching bolts, flat washers, swivel washers and nuts, but do not tighten. The swivel washer permits alignment of the housing to the dash.

(3) Inspect the jacket bearing snap ring in the steering tube lower groove. Install a new ring if the old ring will not fully seat in the groove. Install the spacer washer, spring and tapered spacer on top of the snap ring.

(4) 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 (Fig. 51).

(5) Lubricate (powder lubricant) the end of the steering gear column 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 bolts securely.

NOTE: There must be at least $\frac{1}{16}$ inch clearance be-

tween the bottom face of the jacket tube clamp and the column support spanner nut to avoid metal to metal contact.

(6) Install the jacket tube support bracket clamp at the instrument panel. Tighten the clamp bolts to 15 foot-pounds torque.

(7) Connect the directional signal wires and the horn wire at the connectors.

(8) Pry the steering column tube up with a wedge shaped tool or screwdriver far enough to install the truarc ring in the column tube upper groove next to the bearing. Make sure the lock ring seats in the groove (Fig. 28).

IMPORTANT

This lock ring places the upper column tube in the proper relation with the worm shaft coupling pin.

(9) On Chrysler Models, install the steering wheel and the steering wheel nut. Tighten the nut to 40 foot-pounds torque.

(10) Install the turn signal cancelling mechanism on the jacket tube. Make sure the column jacket does not restrict the lever movement (Chrysler models only).

(11) Install the stationary plate, bushings, horn ring and attaching screws. Connect the horn wire at the stationary plate and install the steering wheel ornament.

(12) Tighten the jacket tube to the instrument panel clamp screws. Tighten the screws to 50 inch-pounds torque. Install the jacket tube cover.

(13) On Imperial models position the directional switch, install the attaching screws and the wire connections.

(14) Install the directional switch lever.

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

(16) Install the horn blowing switch mounting plate and the four attaching screws (Fig. 24).

(17) Install the horn blowing switch, insulators and attaching screws (Fig. 23). Connect the horn wire.

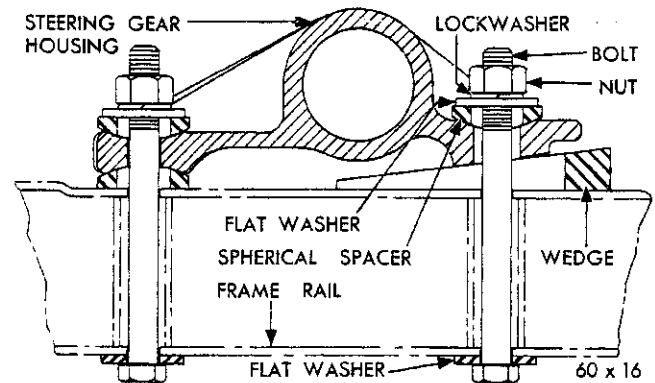


Fig. 52—Steering Gear Mounting

(18) Install the horn blowing actuator, the steering wheel cover and attaching screws.

(19) Tighten the jacket tube to the instrument panel bracket screws. Tighten screws to 50 inch-pounds torque.

(20) Install the steering column lower cover.

(21) Tighten the front upper and the lower gear housing to the frame attaching bolts to 20 foot-pounds torque.

(22) Install a wedge over the rear bolt (Fig. 52) between the housing and the frame so that the tapered surfaces match, wedge lightly into place and tighten the three attaching bolts to 50 foot-pounds torque.

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

(24) Install the steering center link, nut and cotter pin.

(25) Connect the pressure and the return hoses.

(26) Install the hydraulic brake line at the master cylinder and brake tee. Bleed the brakes as necessary.

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

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

POWER STEERING PUMP

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

In operation (Fig. 53) 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 min-

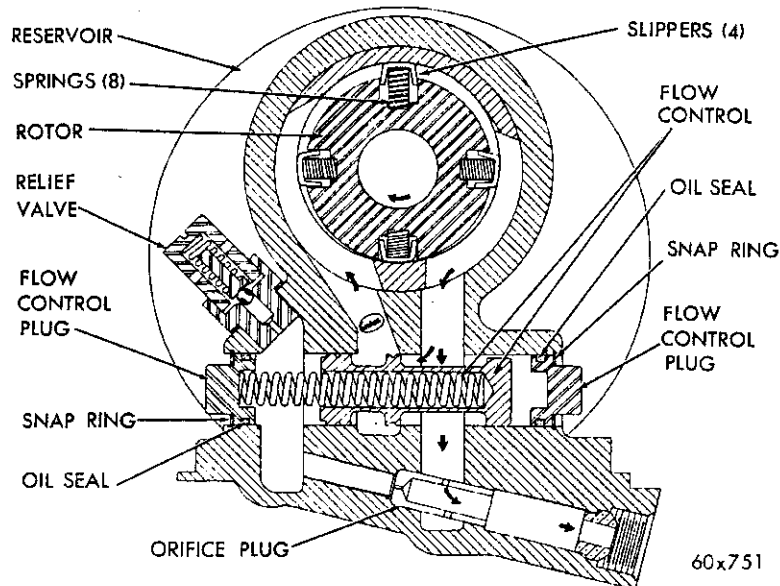


Fig. 53—Power Steering Pump (Schematic)

ute through the valve 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. In doing so it unbalances the flow valve, causing it to move to the left and allows nearly all oil flow to flow back into the inlet.

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 No. 2084329 to the required level. Do not over-fill.

PRESSURE TEST

(1) Measure the pump belt tension. See Paragraph "Belt Adjustment."

(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. 54). **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 cover.

(4) Connect one lead of the tachometer (Fig. 54) to the distributor terminal of coil and the other to a good ground, start the engine and operate at 500

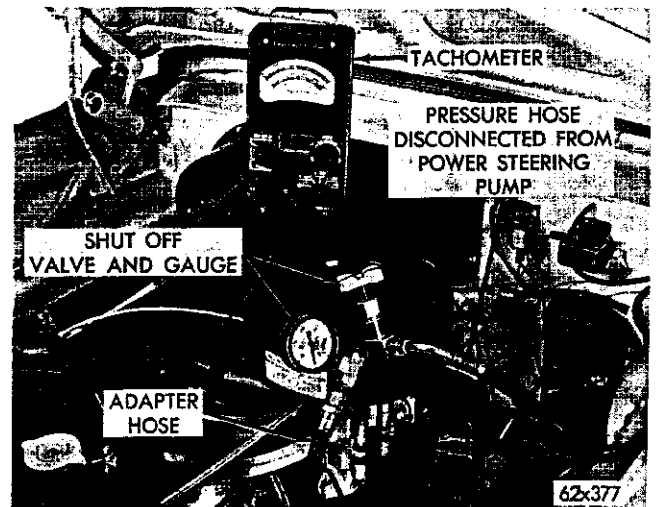


Fig. 54—Pressure Test (Typical)

rpm and fill the pump reservoir to the proper level.

(5) 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.

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, oil temperature should be between 150 and 170 degrees F. (measure with a thermometer in the reservoir (Fig. 55); 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 Chrysler Models; 1150 to 1300 psi for Imperial models.

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 more than 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

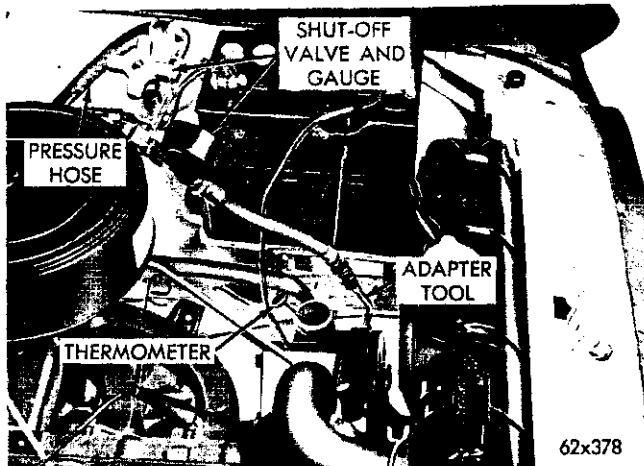


Fig. 55—Testing Oil Temperature in Pump Reservoir

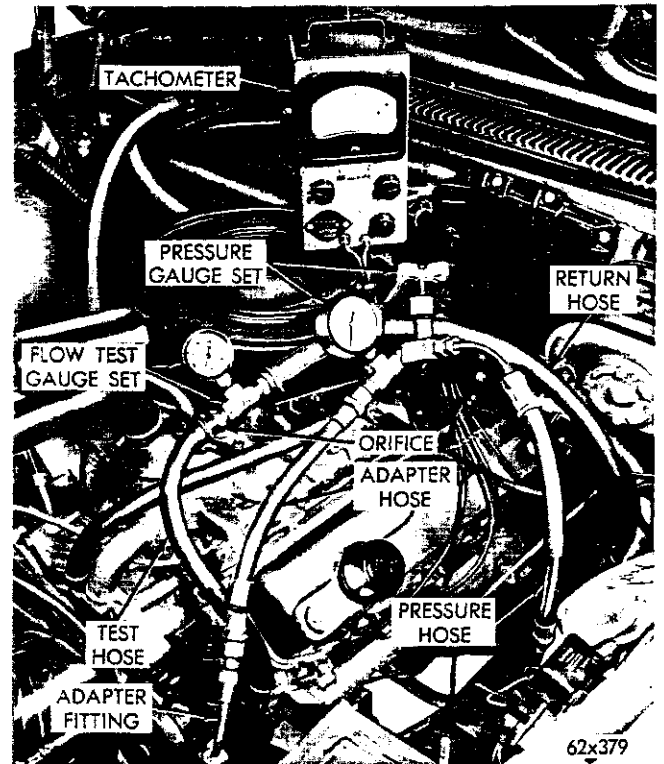


Fig. 56—Flow Test Gauge Connections

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, replace the pump.

c. With the gauge shut-off valve fully open, operate 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 check as outlined in "Pump Flow Test".

PUMP FLOW TEST

(1) Inspect the pump belt tension. See Paragraph "Belt Adjustment."

(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. 54).

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-3885 with the special hose between the power steering pump and the return hose disconnected from the pump (Fig. 56).

CAUTION

The fitting that has the restriction; and the arrow on the "tee" connector (Fig. 56) must be towards the power steering pump. Use passenger car orifice only.

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

(6) Start the engine and operate at 500 engine r.p.m.

(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.

(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 16 and 25 psi. If correct measuring orifice is used for test, and flow pressure gauge registers less than 16 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 the following pressure reading on the pressure gauge at the pump discharge without fully closing the shut-off valve.

CAUTION

Do not close the valve completely.

Chrysler and Imperial 850 psi
With the above value 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.

If the flow pressure reading is 10 psi or greater, and the relief valve is operating properly; inspect the steering gear for malfunction.

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. The return hose screen should be clean and reinstalled in the end of the return hose before re-installing the return hose.

POWER STEERING PUMP

a. Disassembly

NOTE: Disassembly of the pump is not recommended as the internal parts of the pump are not serviced separately. The only parts that are serviced are the pump assembly, filler cap, reservoir, "O" ring and gasket, pump shaft oil seal, flow control plug, snap ring and relief valve.

(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. 57).

(5) Remove the pulley with Tool C-3615 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

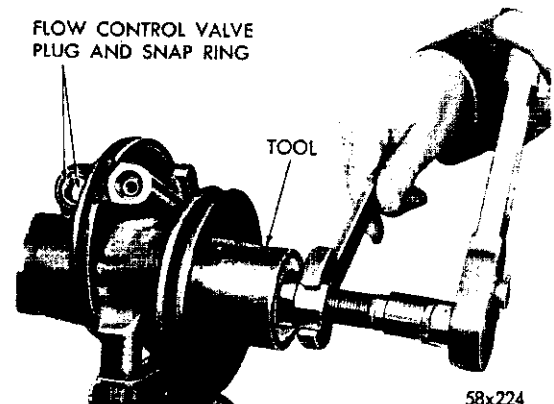


Fig. 57—Removing the Pump Pulley

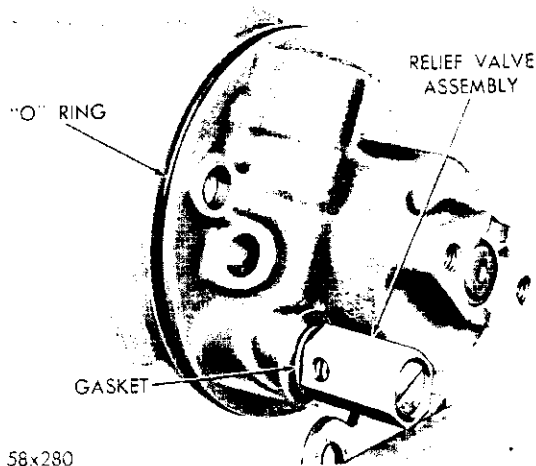


Fig. 58—Removing the Relief Valve

inward to remove the pulley (Fig. 57).

(6) Remove the relief valve assembly and the gasket (Fig. 58). The relief valve is serviced only as an assembly.

(7) Remove the flow control valve plug snap ring with pliers, Tool C-3229.

(8) Remove the flow control valve plug with Tool C-3655 (Fig. 59) by threading the tap securely into the plug. Place the spacer and nut over the tap. Hold the tap and tighten the nut to remove the plug.

CAUTION

The valve is spring loaded.

(9) Remove the oil seal by threading Tool C-3783 far enough to engage the metal portion of the seal (Fig. 60). Turning the puller center screw while holding the tool body will force the seal assembly from the pump.

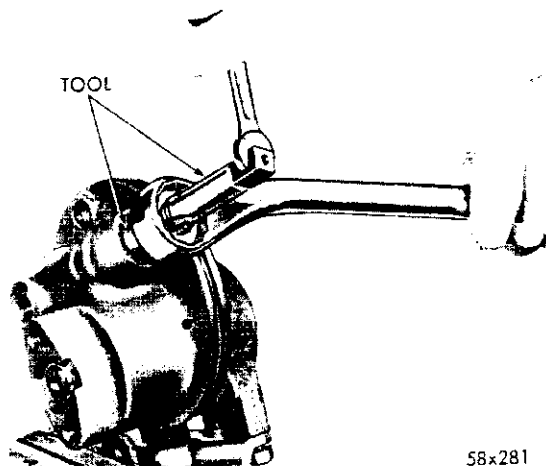


Fig. 59—Removing the Flow Control Valve Plug

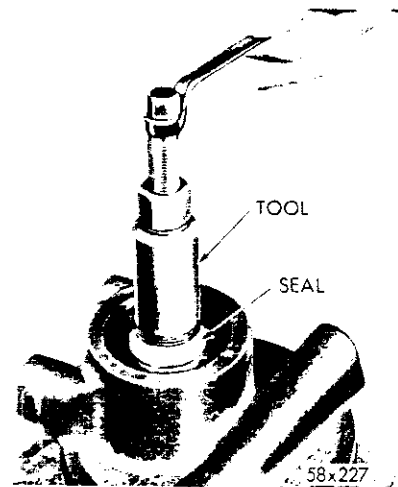


Fig. 60—Removing the Pump Oil Seal (Typical)

b. Cleaning and Inspection

Clean all parts in mineral spirits or other suitable solvent, discard the body to reservoir "O" ring. The pump shaft should turn freely and should be smooth at the seal contact area. The flow control valve bore and the valve should be smooth, free of scores or scratches. The valve must operate freely in the bore.

NOTE: Small scratches can be removed with crocus cloth. DO NOT round off the square edges on the valve as they are vitally important to this type of valve. The housing bore should not be honed. If the bore is scratched or worn, the pump should be replaced.

c. Assembly

(1) Install the flow control valve spring and the valve.

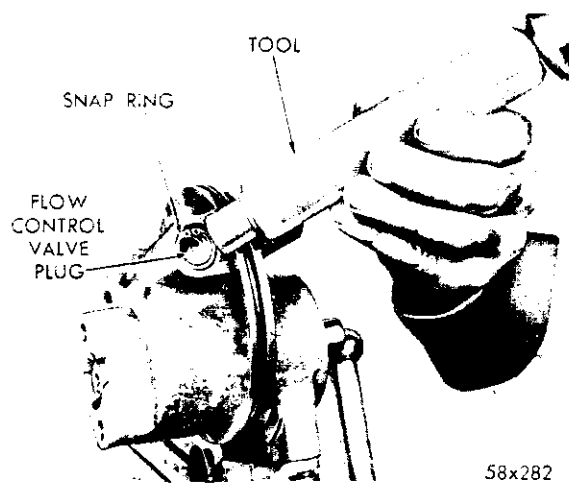


Fig. 61—Installing the Flow Control Valve Plug

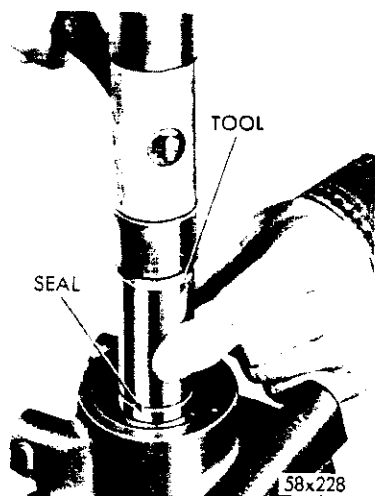


Fig. 62—Installing the Pump Oil Seal (Typical)

(2) Drive a new plug into the base with Tool C-3233 only far enough to place the snap ring in the bore (Fig. 61) then drive the snap ring and plug with Tool C-3233 until the snap ring seats in its groove in the housing bore.

(3) Install the new oil seal with the lip of the seal toward the pump. Use Tool C-3782 to drive the seal flush with the insert (Fig. 62).

(4) Install the pressure relief valve and gasket assembly.

(5) Remove the front bracket. 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. 63).

CAUTION

The pump must be supported in a manner in which

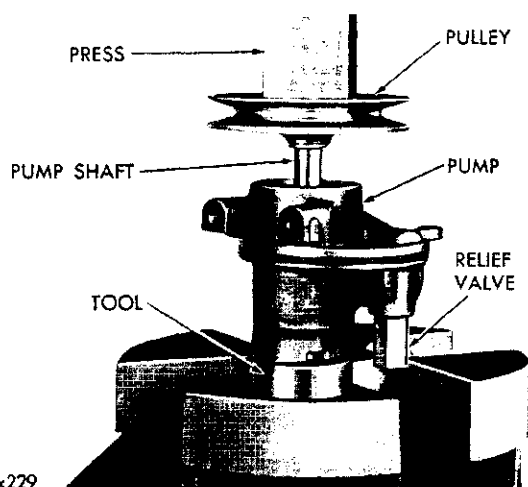


Fig. 63—Installing the Pump Pulley (Typical)

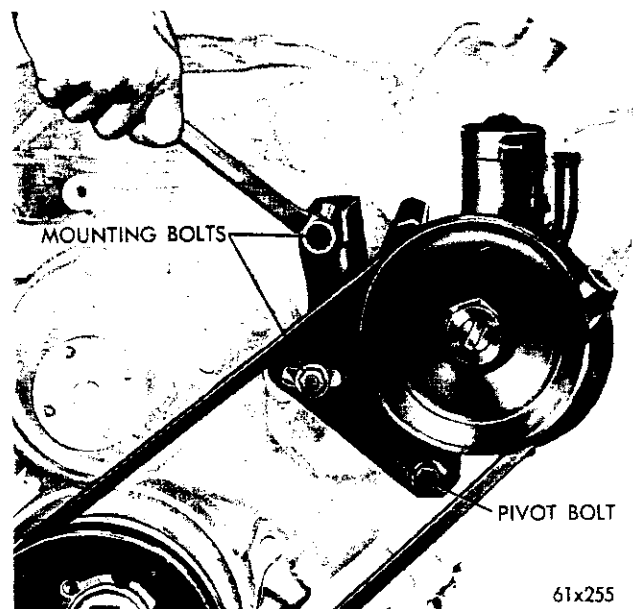


Fig. 64—Loosening the Pump Bracket Mounting Screws

all pressing force will be applied to the shaft only; otherwise, the pump body and rotor will be damaged.

(6) Install the pulley with a heavy duty arbor press. Press on the pulley hub only until the hub is flush with the end of the pump shaft.

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

(8) Install the reservoir and the pump brackets. Tighten the screws to 10 foot-pounds torque.

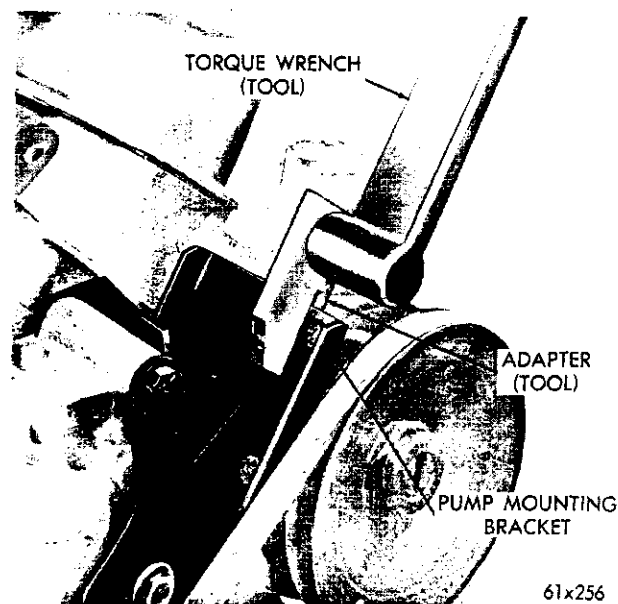


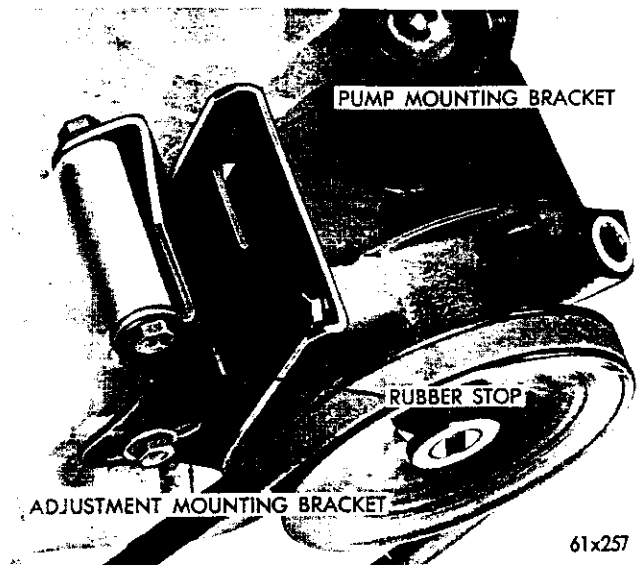
Fig. 65—Pump Belt Adjustment

d. 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 "Belt Adjustment".
- (3) Connect the pressure and return hoses.
- (4) Fill the pump reservoir with No. 2084329 Mo-Par Power Steering Fluid.
- (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.

BELT ADJUSTMENT

- (1) Loosen the adjustment bracket to engine mounting bolts (Fig. 64).
- (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. 65).
- (3) Tighten the pump belt until you get a reading of 45 foot-pounds on the torque wrench.
- (4) While holding the tension with torque wrench, tighten the bracket mounting bolt nuts enough to

**Fig. 66—Pump Bracket and Rubber Stop**

hold the adjustment, then use torque wrench 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. 66).

SERVICE DIAGNOSIS**MANUAL STEERING**

Condition	Possible Cause	Correction
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".
	(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 torque.
	(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".

SERVICE DIAGNOSIS—CONT'D.

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".
	(e) Steering column misaligned.	(e) See "Steering Gear Alignment".
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".
	(c) Dragging brakes.	(c) Inspect for weak, or broken brake shoe spring, binding pedal.
	(d) Improper caster and camber.	(d) See "Front Wheel Alignment".
	(e) Incorrect toe-in.	(e) See "Front Wheel Alignment".
	(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".
	(h) Broken or sagging rear springs.	(h) Replace the rear springs.
	(i) Bent suspension parts.	(i) Replace the parts as 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".
	(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.

POWER STEERING

Hard Steering	(a) Tires not properly inflated.	(a) Inflate the tires to recommended pressures.
	(b) Low oil level (usually accompanied by pump noise).	(b) See "Fluid Level", Power Steering Pump.
	(c) Loose pump belt.	(c) See "Belt Adjustment".
	(d) Improper caster and camber.	(d) See "Front Wheel Alignment", Front Suspension Section.
	(e) Power steering pump output low.	(e) See "Pressure Test", Power Steering.
	(f) Steering linkage binding.	(f) Repair and lubricate as necessary.
	(g) Steering gear malfunctions.	(g) Adjust or repair as follows: 1. See "Gear Shaft Adjustment".

SERVICE DIAGNOSIS—CONT'D.

POWER STEERING

Condition	Possible Cause	Correction
Hard Steering Cont'd	2. Faulty or 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" ring seal or the valve housing-to-gear housing "O" ring.
	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 Section.
	(d) Damaged or faulty steering tube bearing.	(d) Remove the jacket tube and replace bearing.
	(e) Steering wheel column jacket and steering not properly aligned.	(e) See "Installation of Steering Gear".
	(f) Steering gear malfunctions.	(f) Adjust or repair as follows:
	1. Improper gear shift mesh adjustment.	1. See "Gear Shaft Adjustment."
	2. Column support spanner nut loose.	2. Remove the steering gear, disassemble, inspect and reassemble as outlined in this section.
	3. Faulty or 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.
5. Faulty or 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".	
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".	

SERVICE DIAGNOSIS—CONT'D.

POWER STEERING

Condition	Possible Cause	Correction
Leads to Either Side	(a) Tires not properly inflated.	(a) Inflate the tires to recommended pressures; See "Wheels and Tires".
	(b) Improper wheel alignment.	(b) See "Front Suspension, Front Wheel Alignment".
	(c) Valve body out of adjustment.	(c) If vehicle steers to the left, move the steering valve housing down on the steering housing. If vehicle steers 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".
	(b) Column support spanner nut loose.	(b) Remove the steering gear, disassemble, inspect, and reassemble as outlined in Group 19.
	(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 Assistance		
	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".
	(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.
2. (Both Directions)		
	(a) Pump belt slipping.	(a) See "Pump Belt Adjustment".
	(b) Pump output low.	(b) See "Pump Pressure and Flow Tests".
	(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 valve body.	(e) Replace the 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".
	(b) Loose pump belts.	(b) See "Pump Belt Adjustment".
	(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 "Electrical Specifications", Group 8.

SERVICE DIAGNOSIS—CONT'D.**POWER STEERING**

Condition	Possible Cause	Correction
	(f) Faulty power steering pump.	(f) Make the "Pressure and Flow Test" and repair as necessary.
	(g) Air in system.	(g) Working the steering wheel from right to left until the air is expelled.
	(h) Gear malfunctions. 1. Gear shaft adjustment too tight. 2. Faulty or damaged valve lever. 3. External leakage.	(h) Adjust or repair as follows: 1. See "Gear Shaft Adjustment". 2. Remove the steering gear, repair as necessary. 3. Inspect for leakage at the lower sector shaft oil seal; the sector shaft cover "O" ring seal or the valve housing-to-gear housing "O" ring.
	4. Excessive internal leakage.	4. Remove the steering gear and repair as necessary.
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.
	(b) Chuckling noise. Causes as follows: 1. Improper gear shaft adjustment. 2. Improper worm shaft thrust bearing adjustment. 3. Coupling loose on the worm shaft.	(b) Correct as follows: 1. See "Gear Shaft Adjustment". 2. Remove steering gear, disassemble, inspect and reassemble; See "Center Bearing Preload". 3. Inspect worm shaft splines for wear. Also inspect retaining pin for tightness.
	(c) Metallic clatter or tapping noise.	(c) Replace the back pressure valve cushion.

POWER STEERING PUMP**SERVICE DIAGNOSIS**

Low Oil Pump Pressure	(a) Pump belt loose.	(a) See "Pump Belt Adjustment".
	(b) Pump pulley loose.	(b) Replace the pulley, measure the pump shaft diameter. If shaft is damaged, replace pump.
	(c) Oil level low in pump press.	(c) See "Fluid Level".
	(d) Pressure relief valve spring weak, or relief valve stuck in open position.	(d) Replace the relief valve and perform "Pump Pressure Test".
	(e) Flow control valve stuck or a broken flow control valve spring.	(e) Repair as necessary.

SERVICE DIAGNOSIS—CONT'D.**POWER STEERING PUMP**

Condition	Possible Cause	Correction
Low Oil Pump Pressure Cont'd	(f) Worn pump rotor, slippers, or broken and distorted springs.	(f) Replace the pump.
Leaks	(a) Pressure and return hose connections and fittings. (b) Reservoir to-pump-body "O" ring or mounting screws.	(a) Tighten all fittings, check hose for deterioration; replace any faulty hoses. (b) Replace the reservoir "O" ring and tighten reservoir mounting screws.
Knocking Condition at the Bracket Stop when the Engine is Running	(a) Rubber stop worn or missing from pump bracket. (b) Belt not properly adjusted or worn to the extent that belt tension cannot be properly adjusted.	(a) Replace the rubber stop. (b) Replace and adjust the belt tension.
