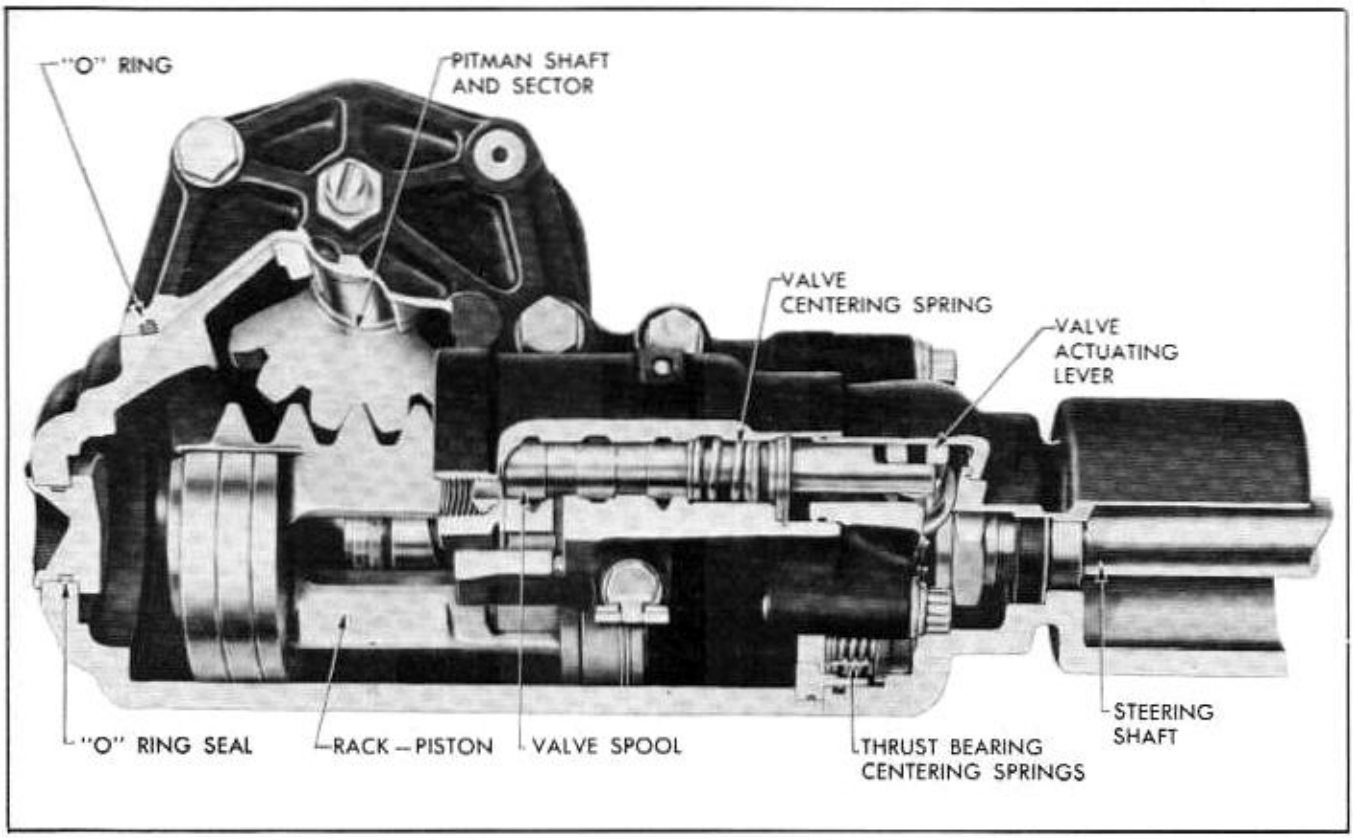


Fig. 9-21 Power Steering Sectional View

GENERAL DESCRIPTION OF IN-LINE POWER STEERING

Pontiac's power steering gear for 1956 is a completely new unit, operating on hydraulic principle similar to that used heretofore. The gear is now of in-line type and incorporates innovations which importantly improve its performance, durability and serviceability. Drivers will particularly appreciate the fact that maximum parking effort has been reduced 34 per cent while desirable road feel has been retained.

The steering shaft, worm, and ball nut, power rack-piston and power cylinder are all in-line (Fig. 9-21). The valve assembly is mounted on top of gear housing, which has eliminated external lines and hoses with exception of pressure and return hoses between the pump and valve.

Housing of the in-line gear is treated with lubrite to provide an extremely durable bearing surface between the piston and housing.

Over-all steering ratio of the new power steering unit is approximately 22.5:1 as compared to the 24:1 ratio used in 1955. This reduces the amount of steering wheel turns necessary to obtain a desired amount of front wheel turn.

This unit is so designed that it requires only approximately five pounds effort on the steering wheel for parking, the most difficult of turning conditions, a 34 per cent decrease over that formerly required.

The mechanical element of this steering gear is similar to that used in the standard gear, and consists of recirculating ball nut in which a number of steel balls act as a highly efficient rolling thread between the steering worm and ball nut. The ball nut is assembled as a rigid part of the rack piston assembly that is geared to the sector on the pitman shaft.

DESCRIPTION OF OPERATION OF POWER STEERING

Function of the entire system in the straight-ahead and right turn positions, respectively, is shown schematically in Figs. 9-22 and 9-23. The

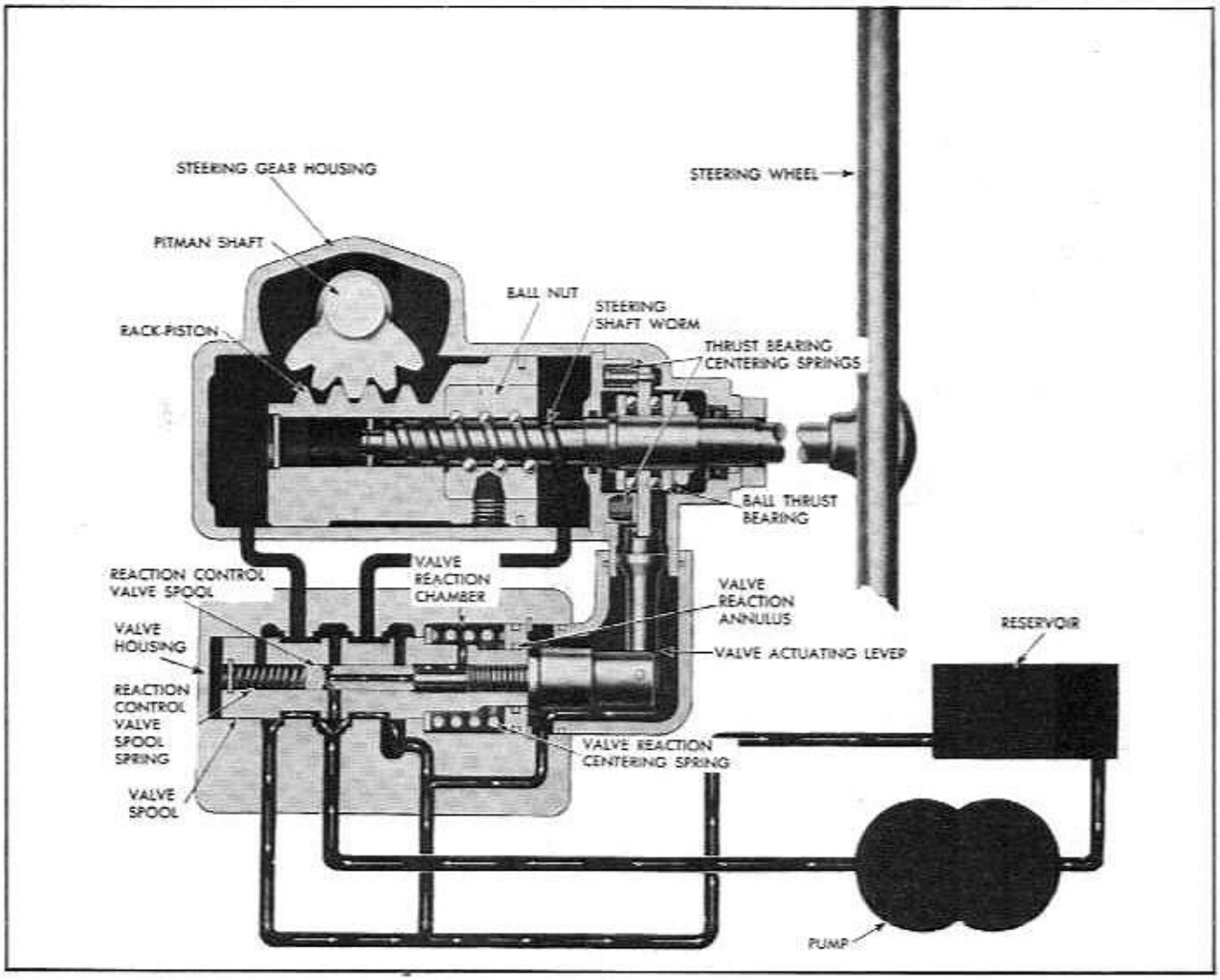


Fig. 9-22 Oil Flow—Straight Ahead Position

valve assembly is purposely enlarged to facilitate the explanation of its function. This valve is an open center three way type. The valve spool is held in the neutral position by means of a valve reaction centering spring located in the valve reaction chamber, plus the thrust bearing centering springs and hydraulic pressure.

A second spool called the reaction control valve spool, is located in the center of the valve spool. The reaction spool establishes the maximum pressure that may build up in the reaction chamber to hydraulically center the valve spool. Limiting the pressure in this manner limits the maximum steering wheel effort when parking to 5 lbs.

OIL FLOW IN STRAIGHT-AHEAD POSITION

In neutral or straight-ahead position (Fig. 9-22) the oil flows from the pump, through the open-center valve spool and back to the pump reservoir without circulating in the power cylinder in which the rack-piston is located. Since all passages are open, flow resistance is low in the neutral position, and since the valve remains in this position at all times except when steering in turns, the power required to operate the pump is at the minimum.

The power cylinder is full of oil at all times, although in the straight-ahead position the pressure on both sides of the rack-piston is equal and very low. This oil acts as a cushion that absorbs road shocks so that they are not transferred to the steering wheel, thus giving safer and more effortless driving. In addition, this oil lubricates all internal components of the gear, making it unnecessary to lubricate the gear at any time.

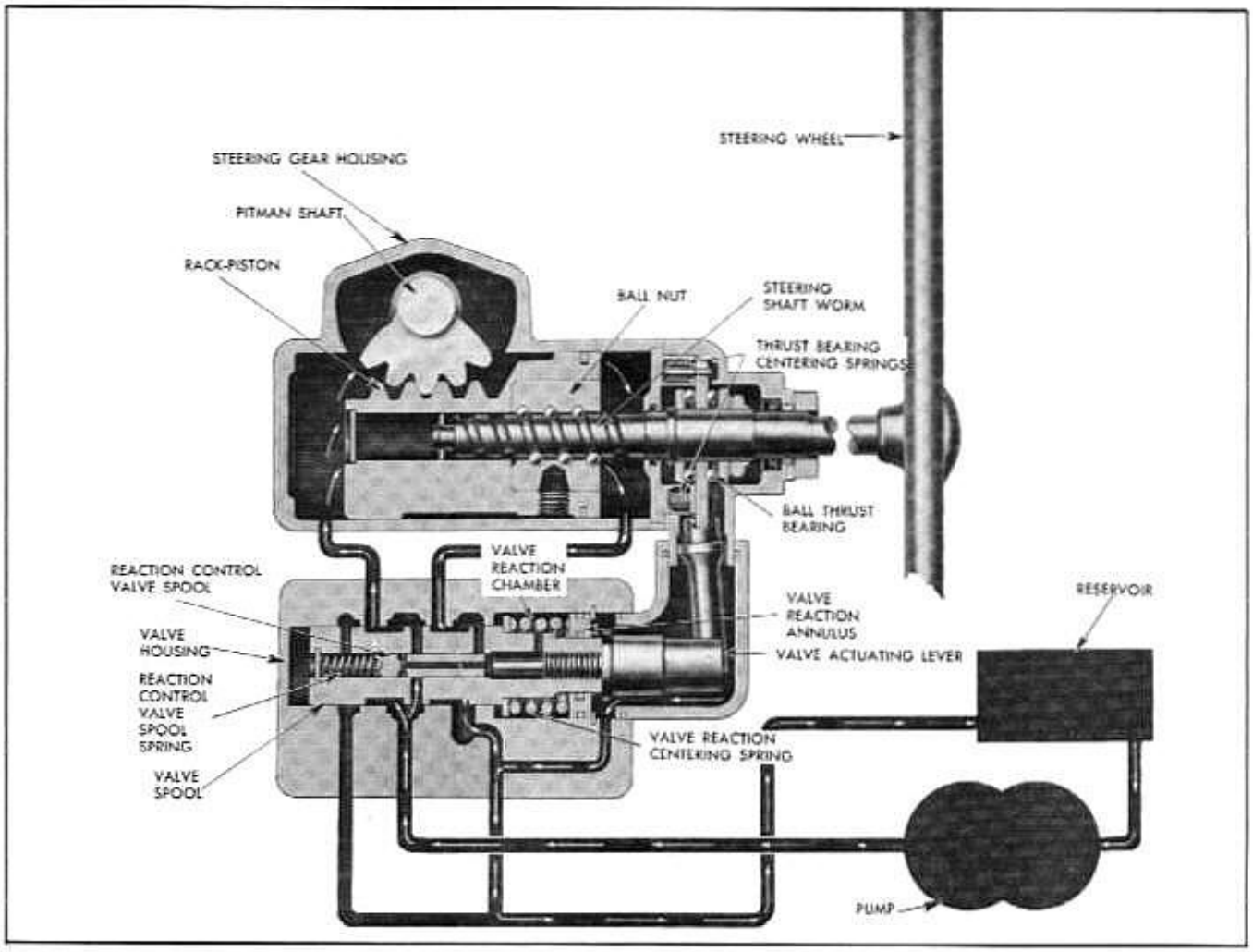


Fig. 9-23 Oil Flow—Right Turn Position

OIL FLOW DURING TURNS

For the purpose of explanation, only right turn will be described (Fig. 9-23). Oil flow and reactions are similar during a left turn except that oil and mechanical movements are in the opposite direction. When the steering wheel is turned to the right, the steering shaft worm tends to screw into the ball nut since the resistance of the wheels on the road tends to prevent the ball nut from moving. Therefore, as the driver applies right turn effort to the steering wheel, the worm is allowed to move downward an imperceptible amount. As the worm moves downward, it also moves the ball thrust bearing downward, which in turn causes the valve actuating lever to move the valve spool upward.

As the spool moves, the relationship between the grooves in the spool and the grooves in the valve housing are changed with respect to each other. As a consequence, the lower spool groove is no longer as fully open to return, but is opened wider to the pressure side of the pump. The upper spool groove is opened more fully to return, but less fully to the pressure side of the pump. This causes the oil to flow into the lower half of pressure cylinder and forces the rack-piston upward, which in turn applies turning effort to the pitman shaft.

Oil in the upper end of the cylinder is simultaneously forced out through the valve and back to the pump reservoir. The higher the resistance to turning between the road and the front wheels, the more the valve spool is displaced and the higher the oil pressure will be on the lower end of the rack-piston. Fig. 9-23 shows the displacement that would occur when the maximum power is required.

Since the amount of valve action and, consequently, the amount of hydraulic pressure built in the cylinder

is dependent upon the resistance to turning, the driver is assured of the proper amount of smooth, hydraulic assistance at all times.

OPERATION OF REACTION CONTROL VALVE

Oil is directed through a passage in the spool valve to the reaction control valve. The reaction control valve spring holds the reaction control valve to the right allowing pump oil to enter the reaction control valve. The oil then passes through the center of the reaction control valve to the reaction chamber (Fig. 9-22). The effect of pressure in the reaction chamber is to aid the reaction centering spring in trying to center the spool valve. The higher the pressure the greater the tendency to center the valve and the more effort the driver must apply to the steering wheel to turn the car.

In order to limit the pressure in the reaction chamber, the reaction valve spool spring is calibrated so that when the pressure in the reaction chamber reaches 250 lbs., the reaction spool moves to the left cutting off the entrance of additional oil (Fig. 9-23). If pressure in the reaction chamber exceeds 250 lbs., due to effort on the steering wheel forcing the spool valve farther off center after the reaction spool has closed, the reaction spool moves farther to the left allowing the excess pressure to exhaust through a passage in the spool valve to the pump return passage.

By limiting the pressure in the reaction chamber to a maximum of 250 lbs., the maximum effort required at the steering wheel is limited to 5 lbs.

PERIODIC SERVICE RECOMMENDATIONS

Since the steering gear is lubricated by Type "A" automatic transmission fluid used to operate the unit, it is only necessary to periodically check the fluid level in the pump.

ADJUSTMENT ON CAR

Before making adjustments to the power steering gear to correct conditions such as, shimmy, hard or loose steering, road shock, wander or weave, a check should be made of front end alignment, shock absorbers, wheel balance, or for tight front wheel bearings, loose steering rod ends or loose pitman arm.

There is only one adjustment of the power steering gear that can be made on the car.

PITMAN SHAFT END PLAY ADJUSTMENT

1. Disconnect steering connecting rod from pitman arm ball by removing rod end cotter key and plug.

2. Loosen pitman shaft lash adjusting screw locking nut using Tool J-6354 and adjust screw so that the pull on the steering wheel rim, using spring scale J-5178, has a total load between 1¼ to 1¾ lbs. through center high point. Readings are to be taken on rim of steering wheel as the wheel is rotated through an arc not exceeding 3" at rim with gear on center.

3. While holding screw with offset screw driver tighten lock nut to 25 to 30 lb ft. torque. Recheck by pulling through center after lock nut has been tightened.

4. Reassemble connecting rod to pitman arm, by screwing in end plug until tight, and backing off to nearest cotter pin alignment hole and insert cotter pin.

REMOVAL OF POWER STEERING GEAR FROM CAR

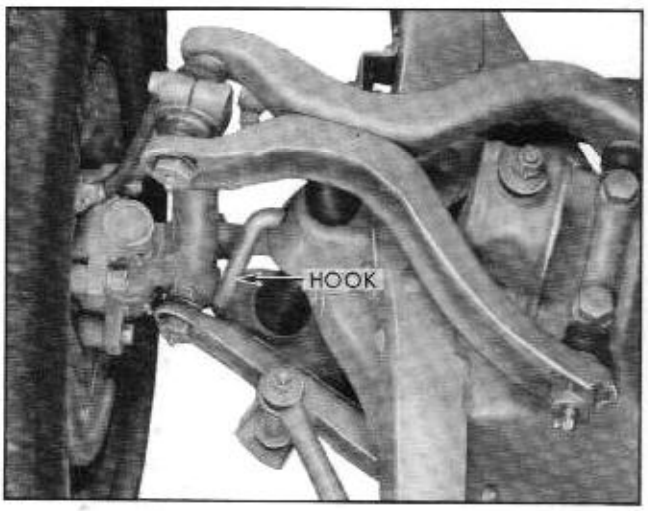
NOTE: If car is equipped with power brakes, refer to page 5–19 for removal of power brake unit.

1. Hook front suspension in five passenger load position using tool J-5571 front suspension hold down hook (Fig. 9-24).

2. Remove steering wheel using puller J-3044.

3. Remove direction signal switch handle and gearshift lever.

4. Remove steering column to instrument panel bracket cap.



. Fig. 9-24 Hold Down Hook J-5571 Installed

5. Slide rubber grommet up steering column jacket. Roll back floor mat and remove pedal plates from floor.

6. Remove neutralizer and back-up light switch on Hydra-Matic equipped cars.

7. Disconnect gearshift and selector rods.

8. Disconnect direction signal and horn wires.

9. Disconnect power steering oil lines at gear and secure lines so ends are higher than reservoir to prevent fluid leaking. Install plastic plugs or tape to cover gear and line openings and prevent entry of dirt.

10. Protect all finished surfaces on steering column with masking tape.

11. Raise car on hoist.

12. Remove starter motor.

13. Remove pitman arm.

14. Remove left side tie rod end and drop steering linkage.

15. Remove engine left side apron.

16. Remove brake pedal hairpin spring retainer and slide pedal to right as far as it will go.

17. If car is on a twin post hoist it will be necessary to place stands under both front frame ends and lower front post approximately three feet to allow steering assembly to clear hoist.

18. Push steering connecting linkage down and toward rear of car, remove steering assembly to frame attaching bolts, removing front upper bolt last, and lower assembly between lower control arm and steering connecting linkage. NOTE: Check amount of shims and do not lose shims that are between steering gear housing and frame.

19. Thoroughly clean exterior of steering gear.

20. Steering gear oil can be drained into a container by turning control valve down and turning the worm through steering range several times.

POWER STEERING GEAR—OVERHAUL AND ADJUST

GENERAL INFORMATION ON SERVICING THE POWER STEERING GEAR

Disassembly and reassembly of the unit and the subassemblies must be made on a clean work bench preferably while the assembly is in a holding fixture.

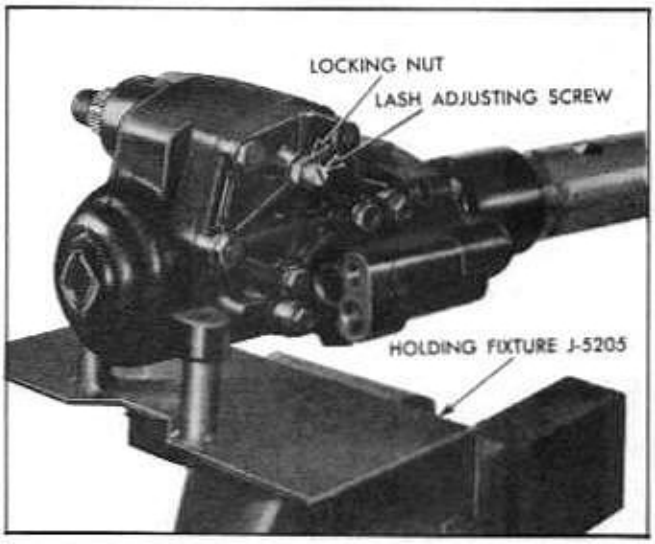


Fig. 9-25 Steering Gear Mounted on Tool J-5205

As in repairing any hydraulically operated unit, cleanliness is of the utmost importance. Therefore, the bench, tools, and parts must be kept clean at all times.

Before disassembly of the unit, thoroughly clean the exterior of the unit with a suitable solvent and drain as much of the hydraulic oil as possible.

Assist the draining by placing the unit with the control valve down and turning the worm through its entire range two or three turns.

DISASSEMBLY OF POWER STEERING GEAR

REMOVAL OF CONTROL VALVE FROM STEERING GEAR

1. Mount unit on holding fixture J-5205 (Fig. 9-25).

2. Remove control valve retaining screws and lift control valve and linkage cover off gear housing (Fig. 9-26).

3. Remove linkage cover to end cover "O" ring seals.

4. Remove control valve to gear housing "O" ring seals.

5. Pull the linkage cover out of the valve body. Remove the linkage cover to control valve "O" ring seal.

6. Remove actuator lever from end cover (Fig. 9-27).

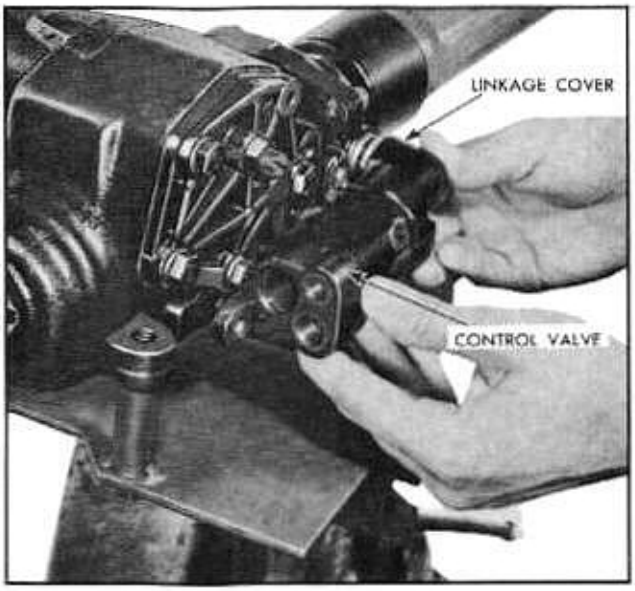


Fig. 9-26 Removing Control Valve and Linkage Cover

DISASSEMBLY OF CONTROL VALVE

1. Remove annulus retaining ring and annulus retaining washer using snap ring pliers J-4245 (Fig. 9-28). NOTE: Pliers can be used more effectively if spool assembly is turned to a position so that pivot of pliers can be moved into slot of link.

2. Slide spool assembly out of valve body (Fig. 9-29). Care should be taken to see that neither spool assembly or valve body are scratched or dropped. NOTE: Spool valve should not be disassembled since it may be distorted when loosening link.

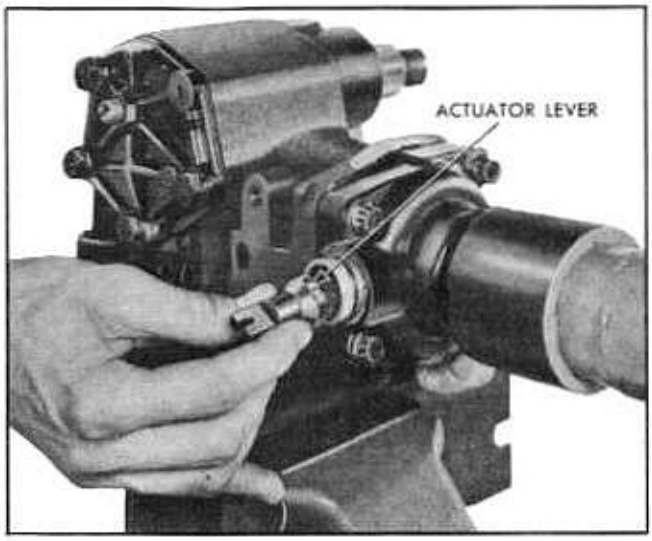


Fig. 9-27 Removing Actuator Lever

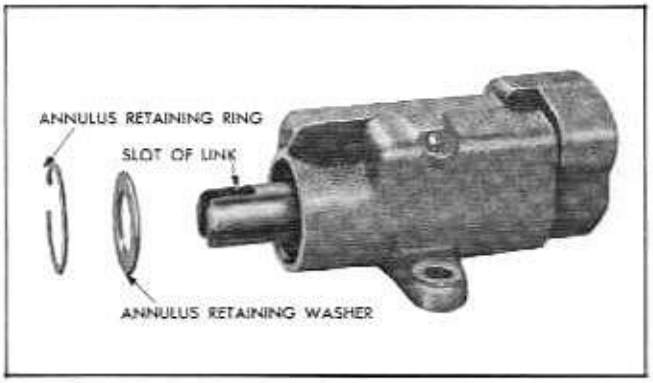


Fig. 9-28 Exploded View—Annulus Retaining Ring and Washer

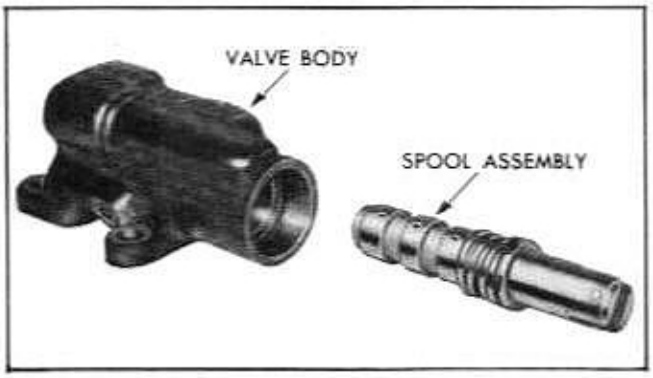


Fig. 9-29 Spool Assembly Removed

3. Remove retaining ring, end plug and seal from valve body using #1 Truarc pliers J-5403 (Fig. 9-30). Remove end plug seal.

REMOVAL OF PITMAN SHAFT AND RELATED PARTS

1. Remove side cover retaining screws and rotate cover one half turn.

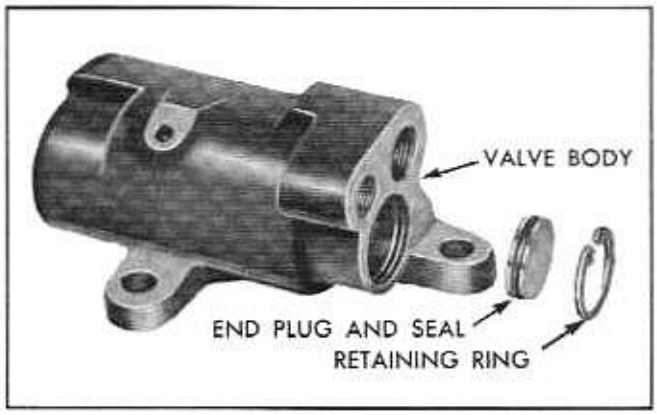


Fig. 9-30 Valve Body Plug and Retaining Ring

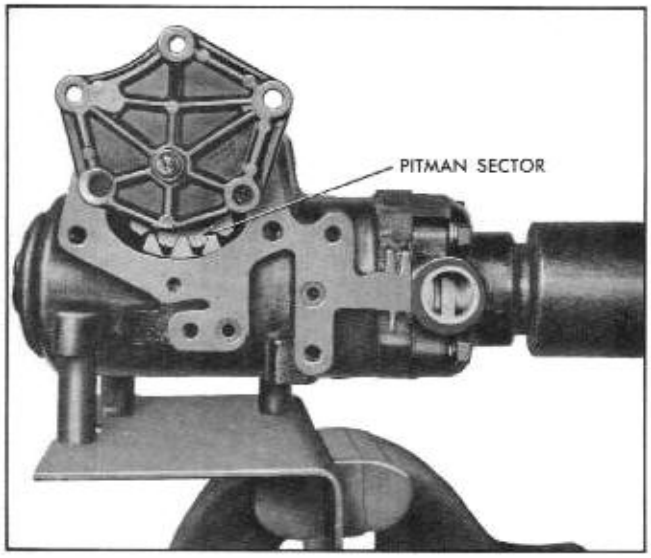


Fig. 9-31 Pitman Sector Alignment

2. Align pitman sector with opening in gear housing (Fig. 9-31). Tap end of pitman shaft with a soft hammer and slide shaft out of housing.

DISASSEMBLY OF PITMAN SHAFT AND RELATED PARTS

1. Remove "O" ring from side cover and discard if swelled or damaged.

2. Hold pitman shaft adjusting screw with a screw driver and remove adjusting screw locknut. Turn screw out of cover and remove cover. Slip adjusting screw and shim out of pitman shaft.

REMOVAL OF END COVER AND MAST JACKET ASSEMBLY

1. Remove end cover retaining screws and pull cover and housing assembly off gear housing (Fig. 9-32).

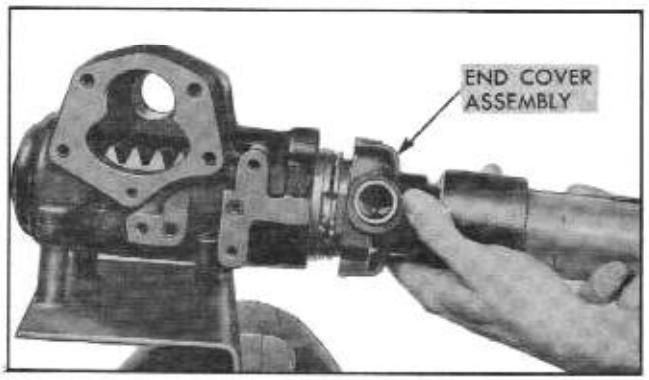


Fig. 9-32 Removing End Cover from Gear Housing

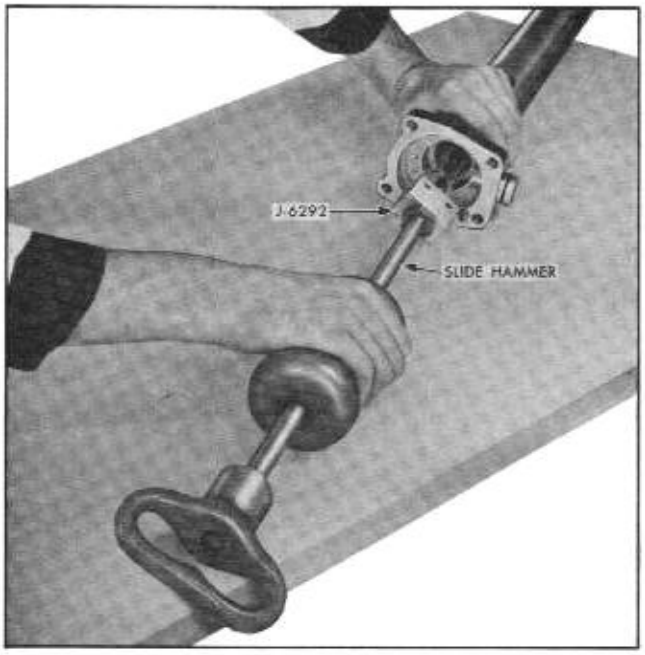


Fig. 9-33 Removing Bearing and Seal from End Cover

DISASSEMBLY OF END COVER

1. Remove end cover oil seal, back-up washer, and bearing, using tool J-6292 with slide hammer J-2619-A (Fig. 9-33).

REMOVAL OF RACK-PISTON AND WORM ASSEMBLY FROM HOUSING

1. Pull rack-piston and worm assembly out of housing (Fig. 9-34).

DISASSEMBLY OF RACK-PISTON AND WORM ASSEMBLY

1. Remove piston rings from piston.

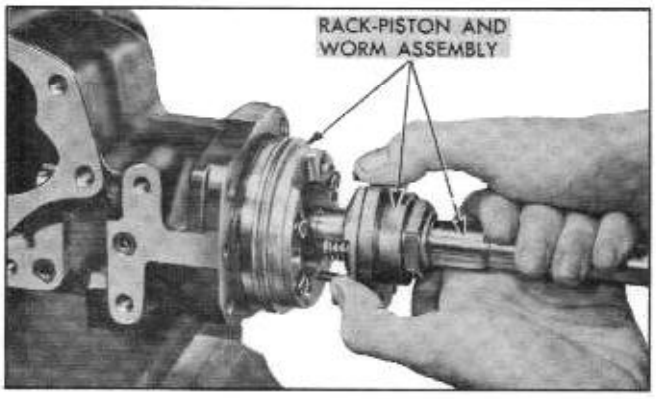


Fig. 9-34 Removing Rack-Piston and Worm Assembly

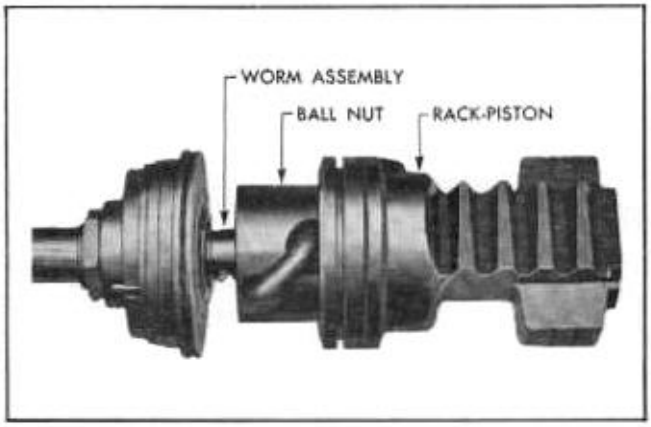


Fig. 9-35 Ball Nut and Worm Assembly Removed from Rack-Piston

2. Remove ball nut retaining screw and slide ball nut and worm assembly out of rack-piston with ball nut retaining screw hole down to prevent ball return guides and balls from falling out and losing balls (Fig. 9-35).

3. Remove ball return guide caps and ball return guides. Turn nut with ball return guide holes down. Rotate worm back and forth until all balls have dropped out of nut. Catch balls in a clean pan or in a clean cloth. Remove the ball nut and adapter from worm.

4. Remove adapter seal spiral retaining ring, adapter seal washer, and adapter seal (Fig. 9-36). Remove adapter "O" ring seal and thrust bearing centering springs from adapter.

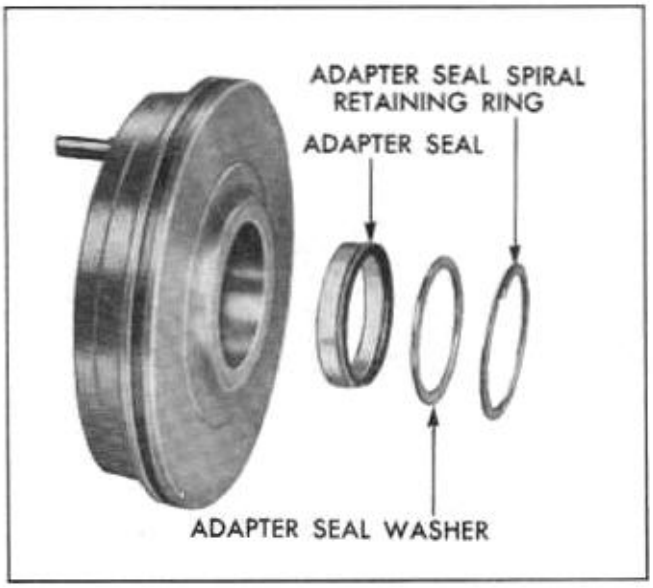


Fig. 9-36 Adapter Assembly—Exploded View

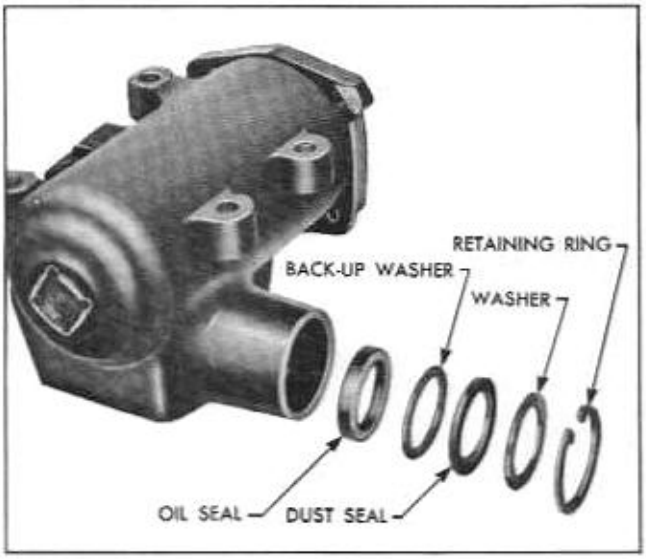


Fig. 9-37 Pitman Shaft Oil Seal—Exploded View

5. Push the retaining ring washer and worm seal toward worm groove and remove worm seal retaining ring. Remove shaft retaining ring washer, worm seal retaining washer, shaft worm seal assembly, and seal retaining washer.

6. If thrust bearing is to be replaced, clean up staking on thrust bearing preload nut, remove nut and remove thrust bearing assembly.

DISASSEMBLY OF HOUSING

1. Remove pitman shaft seal retaining ring using snap ring pliers J-4245 (Fig. 9-37).

2. Remove washers and leather dust seal.

3. Remove oil seal. NOTE: To remove seal tap an offset screw driver in between seal and shoulder in gear housing. Then pry seal out of housing being careful not to damage seal bore.

CLEANING AND INSPECTION OF POWER STEERING GEAR PARTS

1. Wash all parts in a suitable cleaning solvent before following inspection procedure shown below.

2. Inspect "O" ring seals; if cut, damaged or distorted, seals should be replaced.

INSPECTION OF VALVE BODY AND SPOOL

1. Inspect valve body and spool for scores,, nicks, or burred edges. If either the valve body or spool is

damaged, a complete control valve assembly must be replaced. Valve body and spool are a selective fit and, therefore, are available only as a complete assembly.

2. Inspect connectors. If badly brinelled or scored, replacement will be necessary.

INSPECTION OF PITMAN SHAFT AND RELATED PARTS

1. Inspect pitman shaft bearing surface inside cover for excessive wear or scoring. If worn or scored, replace side cover.

2. Check pitman shaft sector teeth and bearing surfaces. If worn, pitted, or scored, replace shaft.

3. Check pitman shaft bushing in housing for wear, if worn replace bushing.

4. Inspect lash adjustment screw.

INSPECTION OF END COVER

1. Inspect end cover for wear in actuator lever bore. If badly worn, replace bushing.

2. Inspect end cover needle bearing. If needles are pitted or worn, replace bearing.

INSPECTION OF RACK-PISTON, WORM AND NUT

1. Inspect worm and ball nut grooves and all balls for wear or scoring. If either worm or ball nut needs replacing, both must be replaced as a matched assembly.

2. Inspect ball return guides, making sure that the ends where balls enter and leave guides are not damaged.

3. Inspect rack-piston teeth for pitting, wear and scoring. Inspect all bearing surfaces on rack-piston for scoring. Do not remove rack-piston end plug unless loose.

4. Inspect thrust bearing for roughness by holding worm stationary and rotating the bearing.

5. Inspect thrust bearing centering springs. If any of the springs riveted to the thrust bearing are broken, the thrust bearing assembly must be replaced. If any of the four loose springs are broken or require replacement, replace all four.

6. Test thrust bearing preload. Preload should be between ¾ to 3 lbs. for used thrust bearing, and 1¾ to 3 lbs. for new thrust bearing. Measure at outer edge of center bearing through an angle of 90°. Measure bearing preload, as follows:

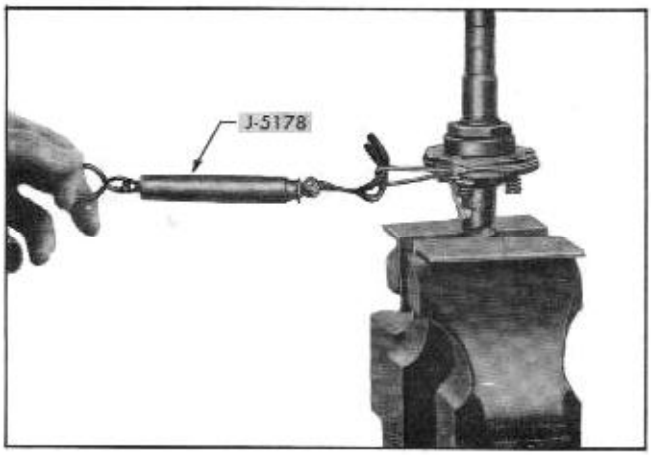


Fig. 9-38 Testing Thrust Bearing Preload

a. Clamp worm in a vise using soft jaws.

b. Fasten a cord to one of the rivets and wind it around the center race.

c. Attach other end of cord to spring scale J-5178, then slowly pull the other end of the scale and check reading (Fig. 9-38).

d. If preload is not within limits, push staked portion of thrust bearing nut up out of thread groove, being careful not to damage threads, remove nut and discard.

e. Use a new nut and readjust as necessary to obtain proper preload.

f. After proper preload has been obtained, stake nut being careful not to move when staking (Fig. 9-39).

INSPECTION OF HOUSING

1. Inspect housing bore. If scored or worn, replace housing. Inspect housing end plug for leakage. Unless there is visual evidence of leakage, do not remove end plug.

2. Inspect pitman shaft bushing and if badly worn replace.

REPAIRS

REPLACEMENT OF VALVE BODY CONNECTORS

1. Tap threads in holes of large and small connectors using $\frac{5}{16}$-18 tap in the large connector and a 12-24 tap in the small connector.

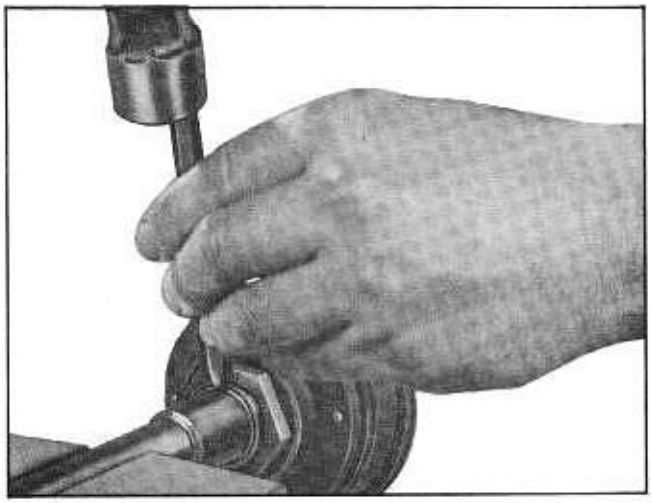


Fig. 9-39 Staking Nut After Preload Adjustment

2. Remove connectors by using bolt threaded into tapped holes with washer and nut as an extractor and discard (Fig. 9-40).

3. Blow out valve body thoroughly to remove any tapping chips.

4. Replace connectors by driving into place with tool J-6217 (Fig. 9-41).

REPLACEMENT OF PITMAN SHAFT BUSHINGS

1. With steering gear housing supported in Holding Fixture J-5205, drive pitman shaft bushing from housing using Tool J-6278 (Fig. 9-42).

2. Drive new pitman shaft bushing into position using tool J-6278. NOTE: Bushing is diamond bored and requires no further reaming.

REPLACEMENT OF RACK-PISTON END PLUG

1. Remove end plug by driving out from inside of

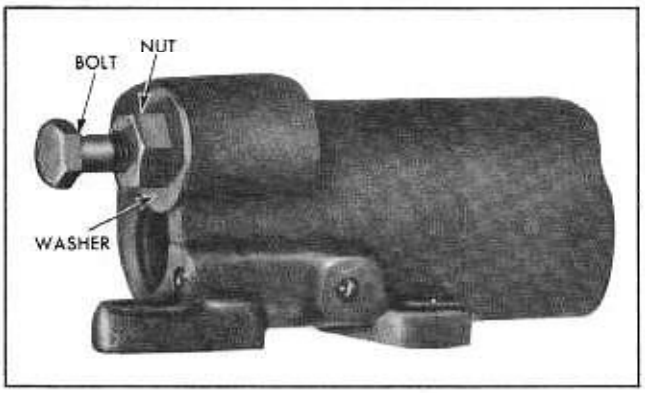


Fig. 9-40 Removing Connector

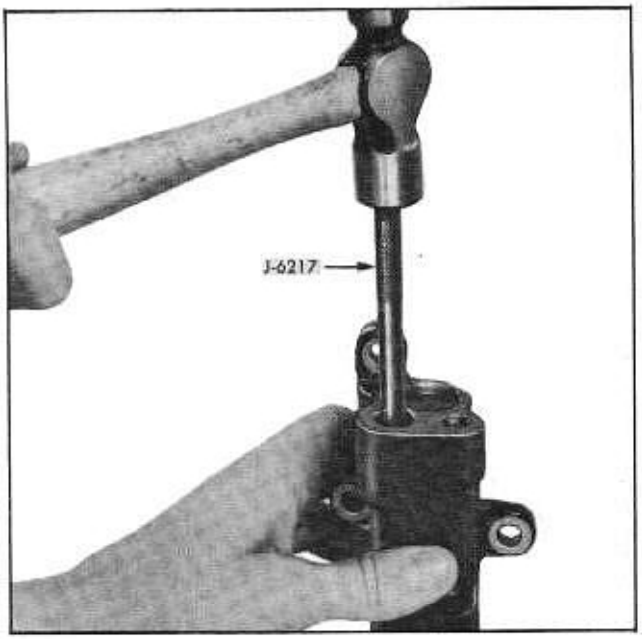


Fig. 9-41 Replacing Connector

rack-piston using a drift of soft material. NOTE: Care must be taken not to damage inside diameter of rack-piston bore.

2. To replace rack-piston end plug, press plug in flush with end of rack-piston and stake four places evenly (Fig. 9-43).

REPLACEMENT OF HOUSING END PLUG

1. To remove end plug, push up or cut off the staked portions and drive out of housing, using a

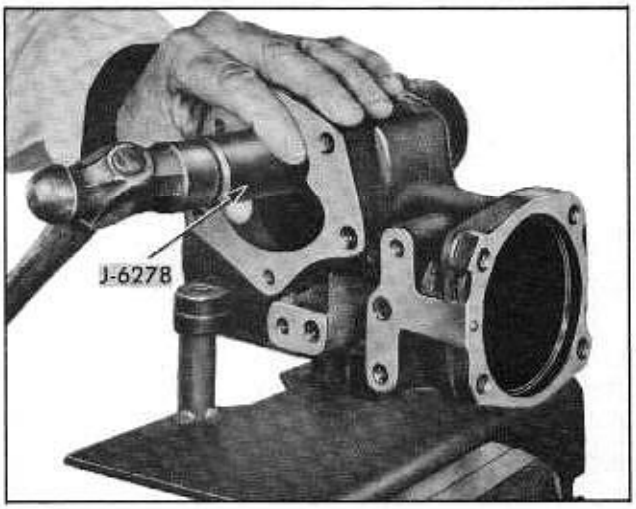


Fig. 9-42 Removing or Replacing Pitman Shaft Bushing

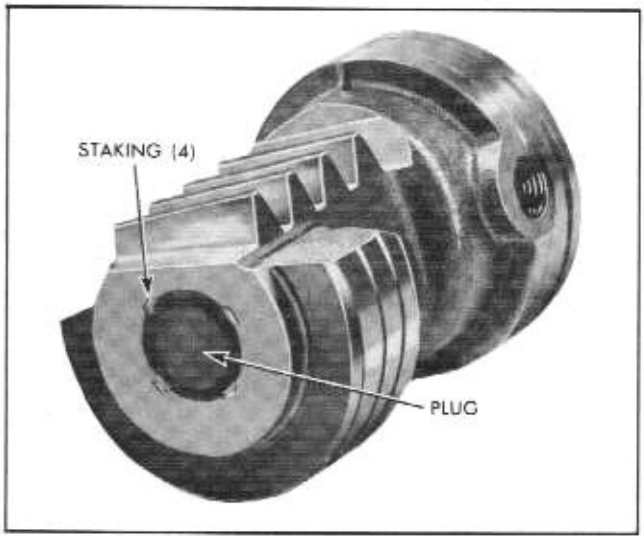


Fig. 9-43 Rack Piston End Plug Staked

drift of soft material (Fig. 9-44). NOTE: Care should be taken to prevent scoring the sealing diameter in the housing.

2. Lubricate seal and install on new end plug. Install end plug in housing from inside and drive so that shoulder on plug seats in housing, using drift of soft material.

Fig. 9-44 Removing Housing End Plug Staked Portions

Fig. 9-45 Housing End Plug Staked

3. Stake plug lip in four equal spaces, so that plug shoulder is held tightly against housing (Fig. 9-45).

ASSEMBLY OF POWER STEERING GEAR

NOTE: Lubricate all parts as they are assembled. See Fig. 9-46—Exploded View.

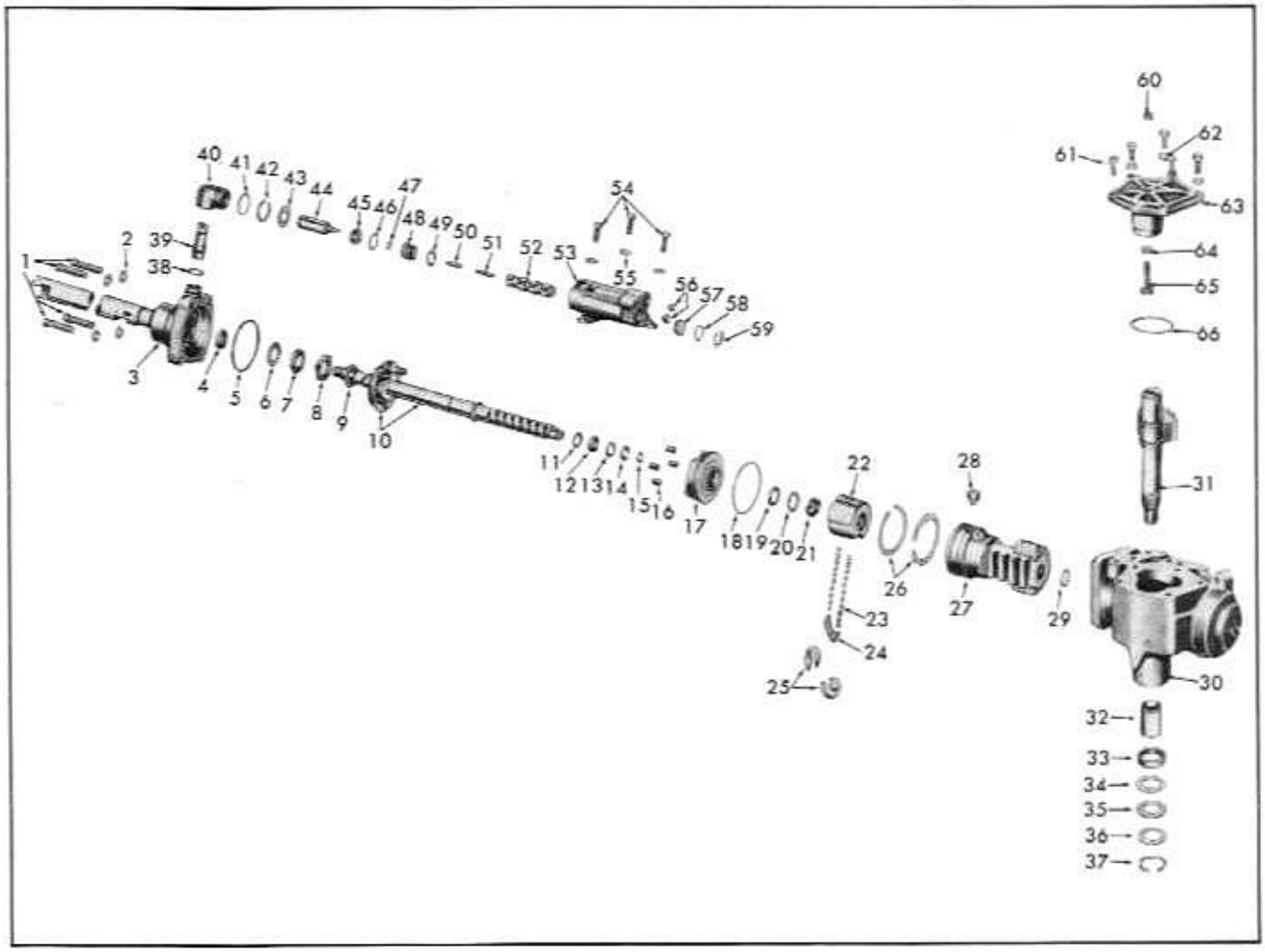
ASSEMBLY OF HOUSING

1. Install pitman shaft oil seal using tool J-6219 (Fig. 9-47).

2. Install seal back-up washer, leather dust seal, washer and retainer ring, using snap ring pliers J-4245. Make certain that retaining ring is properly seated.

ASSEMBLY OF RACK-PISTON, WORM AND NUT

1. Install thrust bearing assembly with centering springs toward worm. Install thrust bearing washer



1. End Cover Screws
2. End Cover Screw Washers
3. End Cover
4. End Cover Bearing
5. End Cover "O" Ring Seal
6. Seal Back-Up Washer
7. End Cover Oil Seal
8. Thrust Bearing Nut
9. Thrust Bearing Lockwasher
10. Worm and Thrust Bearing
11. Seal Retaining Washer
12. Seal Assembly
13. Worm Seal Retaining Washer
14. Retaining Washer
15. Retaining Ring
16. Thrust Bearing Centering Springs
17. Adapter
18. Adapter "O" Ring Seal
19. Adapter Seal
20. Seal Back-Up Washer
21. Spiral Retaining Ring
22. Ball Nut
23. Balls
24. Ball Return Guides
25. Ball Return Guide Caps
26. Rack-Piston Rings
27. Rack-Piston
28. Ball Nut Retaining Screw
29. Rack-Piston End Plug
30. Housing Steering Gear
31. Pitman Shaft
32. Bushing
33. Oil Seal
34. Washer Back-Up
35. Dust Seal
36. Washer
37. Retaining Ring
38. Linkage Cover Inner "O" Ring Seal
39. Actuator Lever
40. Linkage Cover
41. Linkage Cover Outer "O" Ring Seal
42. Retaining Ring
43. Washer
44. Link Adapter to Control Valve
45. Annulus
46. Annulus Outer "O" Ring Seal
47. Annulus Inner "O" Ring Seal
48. Valve Centering Spring
49. Valve Centering Spring Thrust Washer
50. Reaction Control Valve Spool
51. Reaction Control Spring
52. Spool Control Valve
53. Valve Body
54. Valve Body Retaining Screws
55. Valve Body Retaining Screw Washers
56. Valve Body Connectors
57. Valve Body End Plug
58. Valve Body End Plug "O" Ring Seal
59. Retaining Ring
60. Lash Adjustment Screw Nut
61. Side Cover Retaining Screws
62. Side Cover Retaining Screw Washers
63. Side Cover
64. Lash Adjustment Screw Shim
65. Lash Adjustment Screw
66. Side Cover "O" Ring Seal

Fig. 9-46 Power Steering—Exploded View

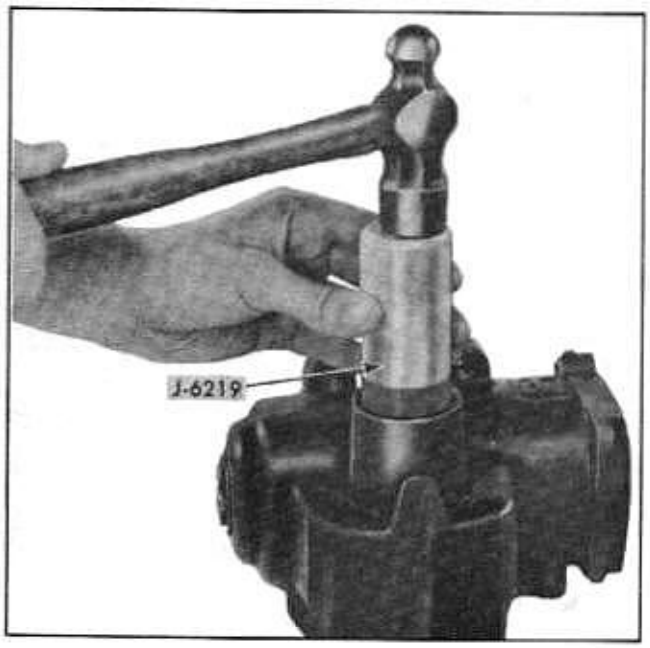


Fig. 9-47 Replacing Pitman Shaft Seal

and nut and tighten to obtain proper preload as outlined in step 6 (page 9–18).

2. Lubricate adapter seal and "O" ring and install on adapter. Install seal, retaining washer and spiral retaining ring. Assemble adapter to worm being careful not to damage seal when passing over worm grooves. Slide ball nut over worm up to adapter with chamfered edge away from adapter (Fig. 9-48).

3. Align ball return guides with worm groove. Load 17 balls into ball nut. Drop balls into return guide hole farthest from adapter while slowly rotating worm counterclockwise to feed balls through circuit (Fig. 9-49).

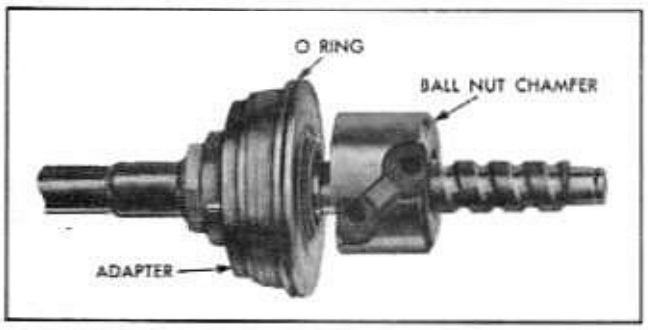


Fig. 9-48 Shaft, Ball Nut and Adapter Assembly

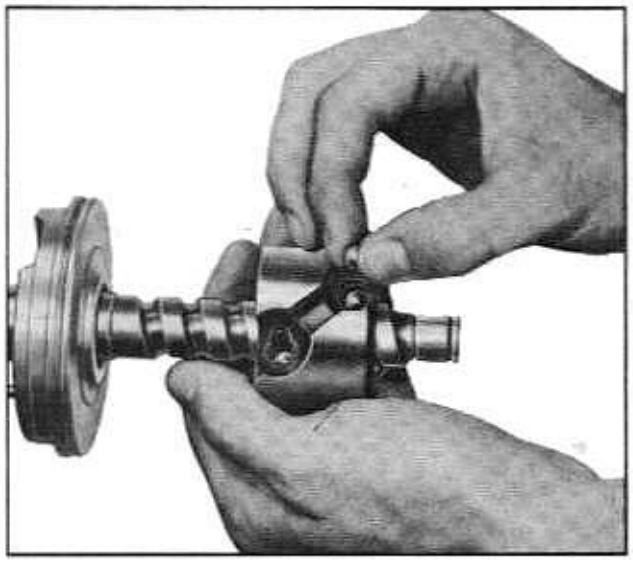


Fig. 9-49 Loading Balls Into Ball Nut

4. Fill one-half of ball return guide with remaining 6 balls. Place other half of guide over balls and plug each end with heavy grease to prevent balls from falling out when installing guide into ball nut (Fig. 9-50). Push guide into guide holes in ball nut (Fig. 9-51). If the guide does not push down easily, tap guide lightly with a soft hammer to seat it. Wrap a strip of tape around ball nut and guide to prevent the guide from falling out.

5. The worm groove is ground to provide a "High Point" through center. To measure preload, clamp worm in a vise using soft jaws, fasten a cord to ball nut and wind it around two or three times. Using spring scale J-5178 (Fig. 9-52) slowly pull, unwind-

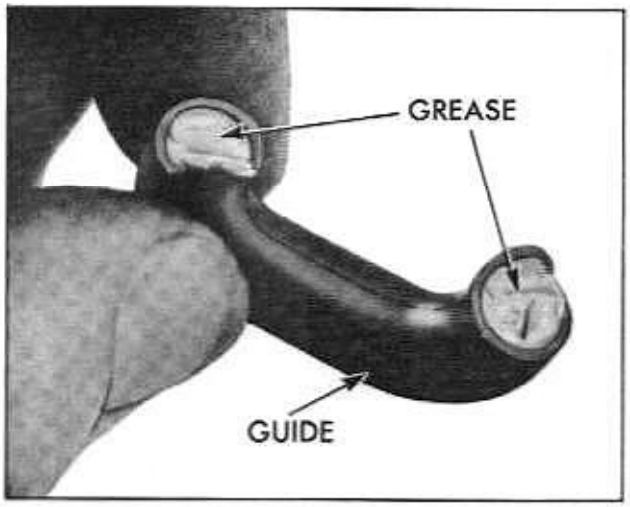


Fig. 9-50 Ball Return Guide

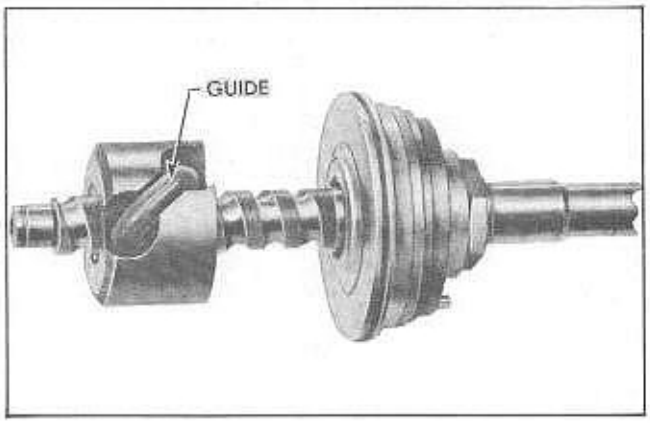


Fig. 9-51 Ball Guide in Place in Ball Nut

ing the cord and rotating ball nut over "High Point". Reading after nut has started to rotate should be between two and six lbs. If preload is below two lbs., install set of next larger balls and recheck (see table). If preload is over six lbs., install next smaller size balls and recheck. NOTE: Ball size used in original assembly is marked on outer diameter of ball nut. Due to wear or use of new parts, it is sometimes necessary to use a size different than indicated.

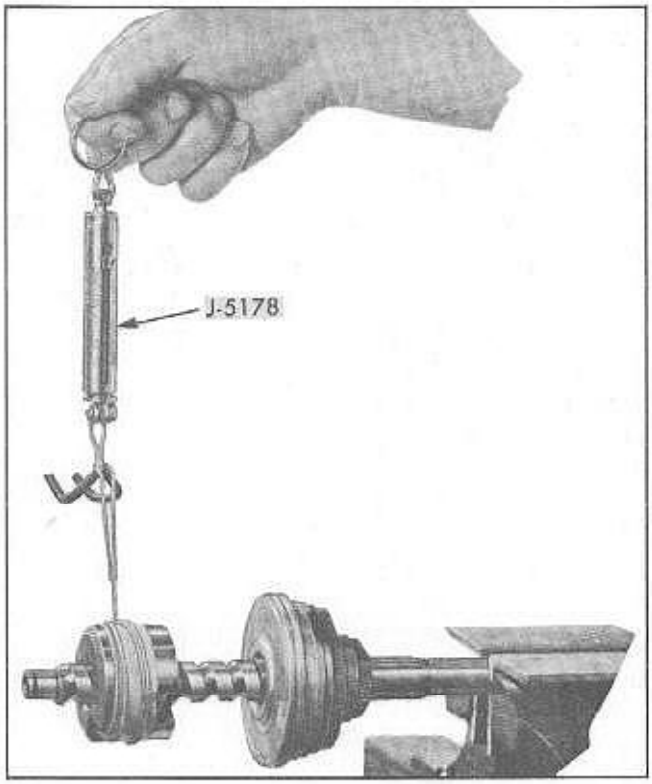


Fig. 9-52 Measuring Preload of Ball Nut Using Tool J-5178

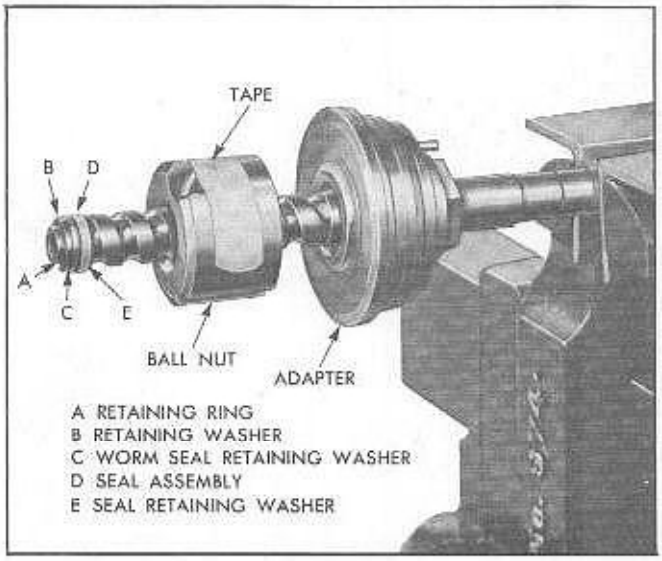


Fig. 9-53 Worm Shaft, Seal and Washers Installed

SELECTIVE SIZES OF STEERING NUT BALLS

Code	Diameter	Part
1	.28077"	5684001
2	.28085"	5684002
3	.28093"	5684003
4	.28101"	5684004
5	.28109"	5684005
6	.28117"	5684006
7	.28125"	5684007
8	.28133"	5684008
9	.28141"	5684009
10	.28149"	5684010
11	.28157"	5684011
12	.28165"	5684012
13	.28173"	5684013

6. Install seal retaining washer, seal assembly, worm seal retaining washer, retaining washer, and retaining ring (Fig. 9-53).

7. Lubricate worm seal, remove tape from ball nut, install ball nut guide caps, and install in rack-piston, being careful not to damage worm seal.

8. Install ball nut retaining screw and tighten to 30 to 35 lb. ft. torque using Tool J-6223. Stake screw securely in two places using Tool J-6285 (Fig. 9-54). Lubricate piston rings and install on rack-piston.

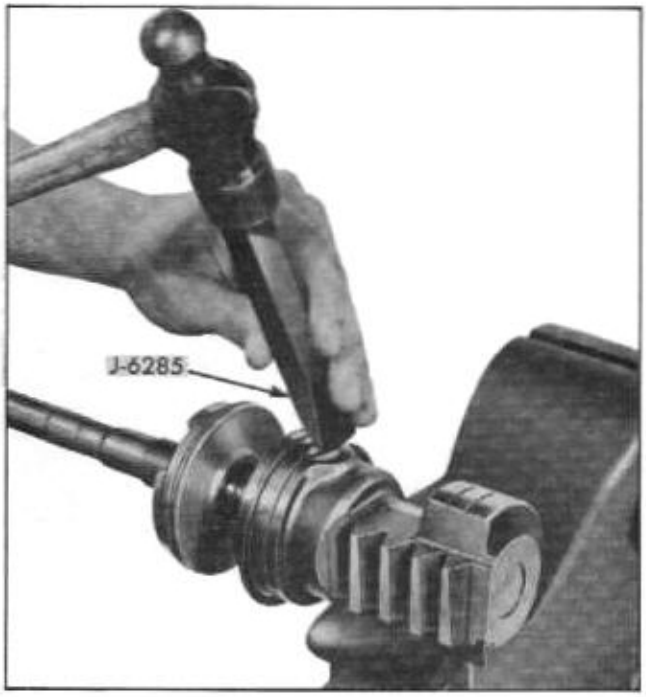


Fig. 9-54 Staking Ball Nut Retainer Screw

ASSEMBLY OF END COVER AND MAST JACKET

1. Lubricate needle bearing with wheel bearing lubricant and install in end cover using Tool J-5188 (Fig. 9-55). NOTE: The bearing identification marks must be against shoulder of tool.

2. Install back-up washer.

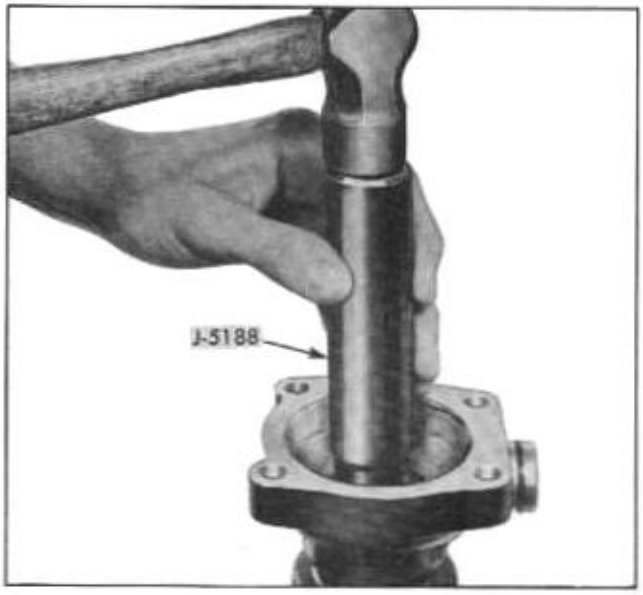


Fig. 9-55 Replacing End Cover Bearing or Seal

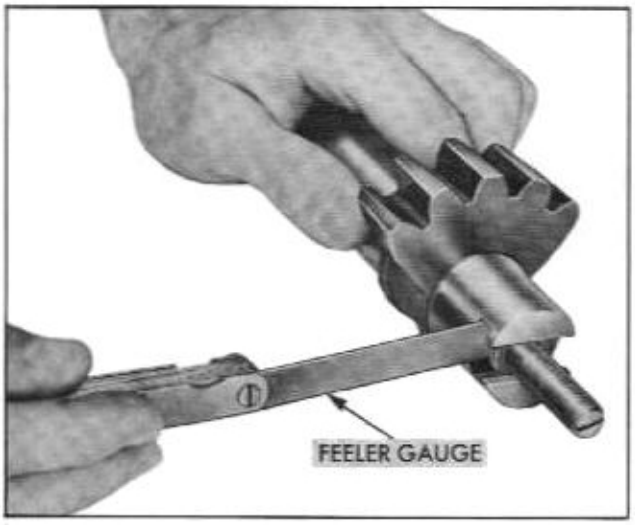


Fig. 9-56 Checking End Play of Lash Adjuster Screw

3. Lubricate oil seal and install. NOTE: Tool J-5188 is used to install bearing and oil seal in end cover.

ASSEMBLY OF PITMAN SHAFT AND RELATED PARTS

1. Check end play of lash adjuster screw in slot of pitman shaft by inserting a feeler gauge between head of screw and bottom of slot (Fig. 9-56). If end play exceeds .002", select proper shim to give less end play. The shims are available in four different thicknesses: .063", .065", .067" and .069".

2. Assemble side cover on pitman shaft. Screw lash adjuster screw through side cover until side cover bottoms on pitman shaft. Lubricate side cover "O" ring seal and install in groove in face of side cover.

3. Install lash adjuster screw lock nut.

ASSEMBLY OF CONTROL VALVE

1. Carefully insert spool valve assembly into valve body. The spool and valve body are selective fits and have very little clearance. Only if properly started can spool be assembled (Fig. 9-57). NOTE: Do not attempt to force spool assembly into valve body.

2. Install annulus retaining washer and retaining ring making certain that retaining ring is properly seated.

3. Lubricate end plug "O" ring seal. Install end plug and end plug retaining ring in valve body, making certain that retaining ring is properly seated.

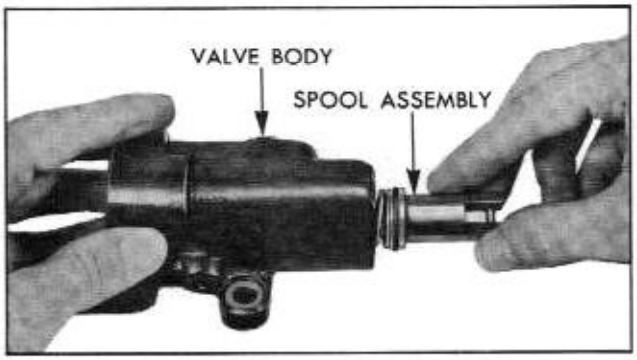


Fig. 9-57 Spool Assembly Started in Valve Body

REPLACEMENT OF RACK-PISTON, WORM, AND NUT IN HOUSING

1. Install ring compressor Tool J-6216 to compress piston rings and hold tightly against shoulder of housing and push rack-piston assembly into housing until piston rings are into cylinder bore (Fig. 9-58).

2. Remove ring compressor. Turn worm counterclockwise to give clearance. If more clearance is needed, push rack-piston assembly into housing until adapter is seated in housing counterbore.

3. Align actuator lever relief on adapter with control valve mounting face on housing (Fig. 9-59).

REPLACEMENT OF END COVER ASSEMBLY ON HOUSING

1. Install tool J-5210 over serrations at steering wheel end of shaft (Fig. 9-60).

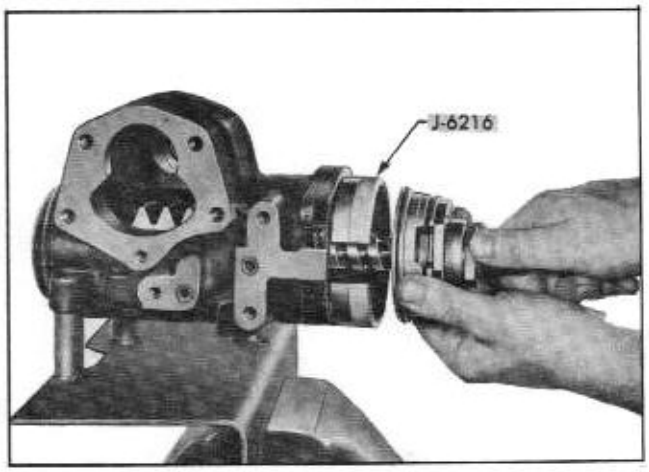


Fig. 9-58 Replacing Rack-Piston

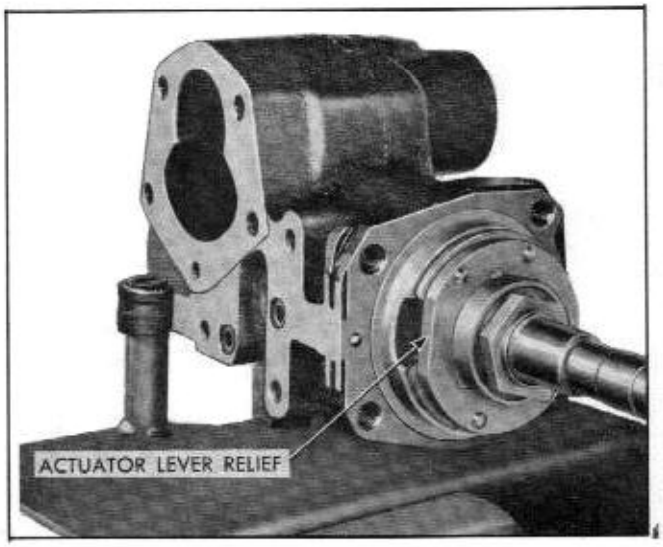


Fig. 9-59 Actuator Lever Relief Aligned on Adapter

2. Assemble end cover over worm and adapter making certain that adapter pin enters pilot hole in end cover. Align end cover holes with housing holes and install retaining screws and lockwashers. Tighten to 25-30 lb. ft. torque.

3. Install actuator lever in end cover making certain that it is seated over thrust bearing center race. The actuator lever should enter freely into the end cover bushing.

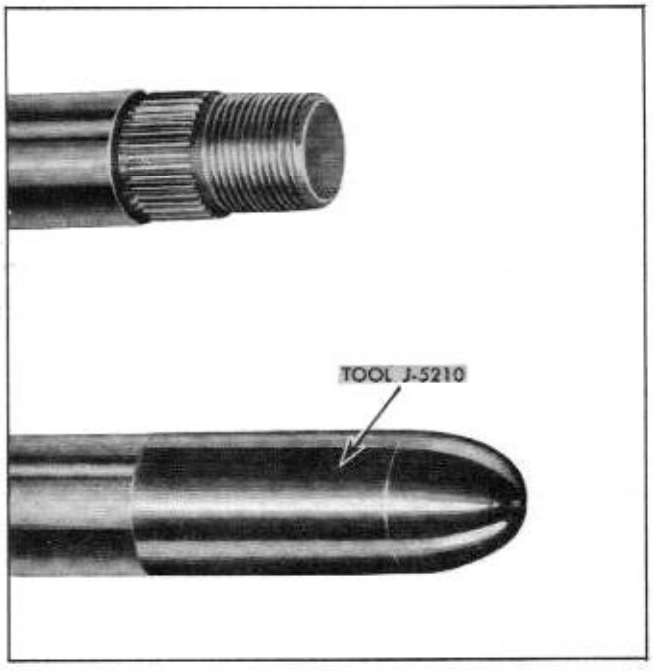


Fig. 9-60 Tool J-5210 Installed on Steering Shaft

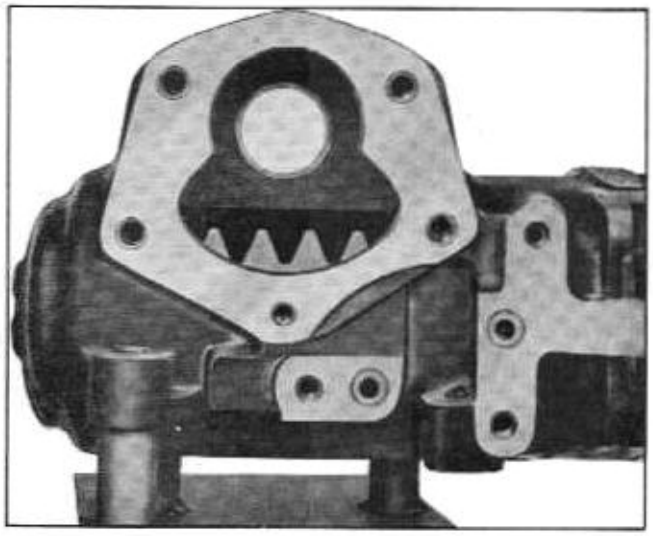


Fig. 9-61 Centering Rack-Piston

REPLACEMENT OF PITMAN SHAFT AND RELATED PARTS

1. Turn worm shaft until center groove of rack-piston is aligned with center of pitman shaft bushing (Fig. 9-61). Tape serrations of pitman shaft before installing to protect oil seal.

2. Install pitman shaft so that the center tooth in the sector meshes with the center groove of rack-piston. Make sure that side cover "O" ring is in place before pushing side cover down on gear housing.

3. Install four $\frac{3}{8}$" and one $\frac{5}{16}$" side cover screws finger tight. Tighten flat head screw first. Tighten all screws to 25-30 lb. ft. torque.

REPLACEMENT OF CONTROL VALVE ASSEMBLY ON HOUSING

1. Lubricate linkage cover "O" ring seal and install on linkage cover and assemble to control valve. Position valve link so that slot is perpendicular with bottom of valve (Fig. 9-62).

2. Lubricate housing valve port "O" ring seals and assemble to housing.

3. Position control valve and linkage cover over gear housing and end cover. Start the actuator lever into link slot and then push down on linkage cover until valve is seated on housing.

4. Install control valve retaining screws. Starting with screw on lower end of control valve, tighten screws to 15 to 20 lb. ft. torque (Fig. 9-63). NOTE: Be sure not to force valve in either direction while

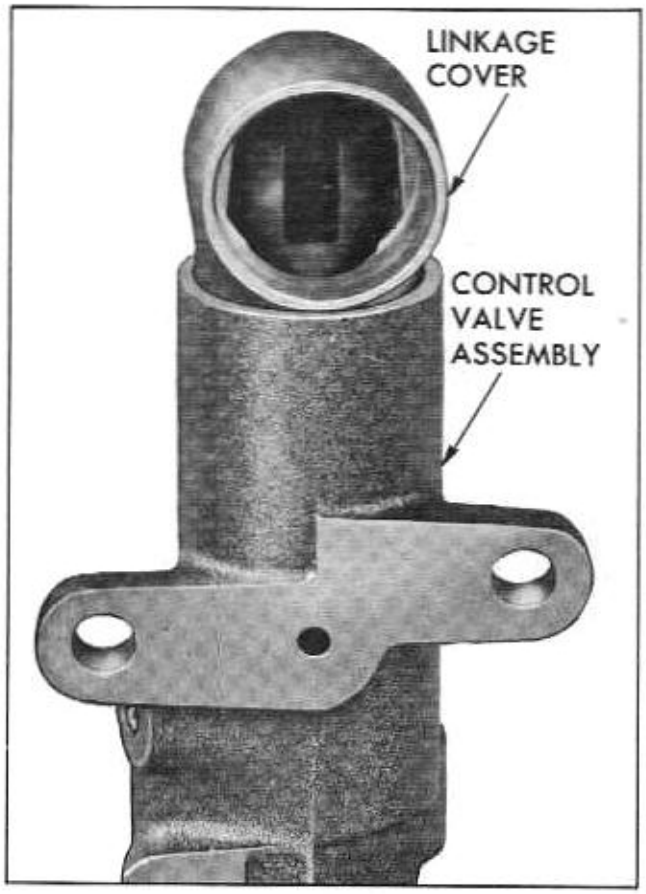


Fig. 9-62 Control Valve and Linkage Cover

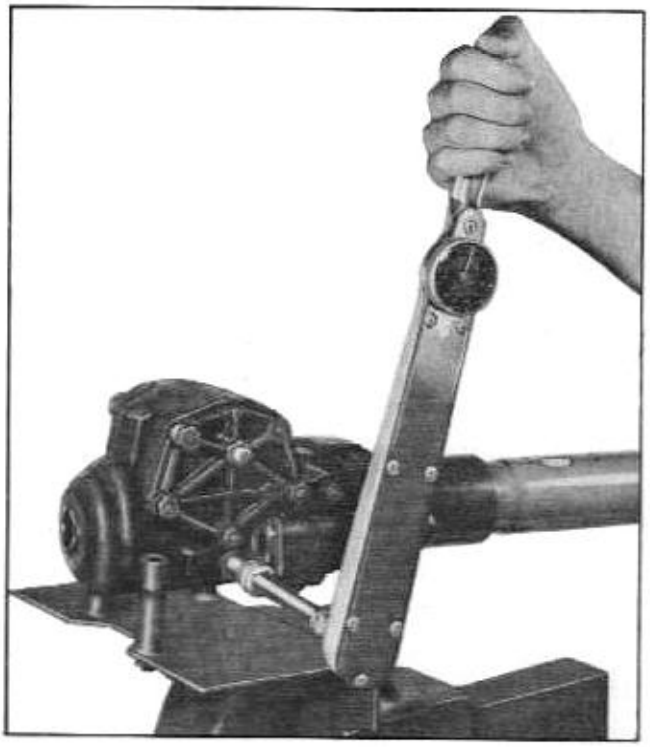


Fig. 9-63 Tightening Control Valve Retaining Screws

tightening retaining screws as this will cause malfunctioning of the valve.

INSTALLATION OF POWER STEERING GEAR IN CAR

1. With hairpin spring retainer removed, move brake pedal as far to right as it will go.

2. Push steering connecting linkage down and toward rear and install steering gear assembly by guiding between lower control arm and steering connecting linkage. Remove tool J-5571 hold down hook.

3. Install top front steering gear housing to frame bolt with lockwasher finger tight. CAUTION: Be sure to install shims which were between steering gear housing and frame when unit was removed.

4. Install steering column lower bracket with lockwashers and bolts to upper bracket on instrument panel.

5. Install two remaining steering gear housing to frame bolts with plain washers and lockwashers and tighten all three bolts.

6. Check for correct shimming of steering gear housing to frame by seeing if steering column aligns with upper bracket when bracket bolts are loosened. If alignment is correct, tighten steering column bracket bolts. NOTE: If misalignment exists, it will be necessary to change steering gear housing to frame shims to correct alignment.

7. Position brake pedal and install hairpin retaining spring.

8. Connect direction signal wires.

9. Connect power steering oil lines to gear.

10. Connect gear shift and selector rods.

11. Install engine left side pan.

12. Install pitman arm and secure with lockwasher and nut. Tighten nut to 100 to 125 lb. ft. torque.

13. Install starter motor.

14. Install neutralizer and back-up light switch on Hydra-Matic equipped cars.

15. Install pedal plates, floor mat and position steering column jacket rubber grommet on floor.

16. Install direction signal switch handle and gear shift lever.

17. Install steering wheel.

18. Check fluid level in pump reservoir. Fluid should be up to oil level mark in reservoir. If not, add Hydra-Matic fluid or Automatic Transmission fluid Type A identified by an AQ-ATF qualification number. With front wheels off floor start engine and bleed hydraulic system by manually steering through cycles several times until there is no evidence of air bubbles in reservoir. Recheck fluid level.

IN-LINE POWER STEERING VANE TYPE PUMP GENERAL DESCRIPTION

The power steering gear pump is mounted on the engine in position to be driven by a belt from the crankshaft pulley. The pump components are explained in the following paragraphs.

The pump body is the intake or low pressure side of the pump and houses two bearings, drive shaft and seal. The pump body is directly connected to the pump reservoir through an opening at the top. The face of the pump body has two kidney shaped slots which function as intake ports.

The pump ring is a flat plate with a cam surface opening. The ring is located next to face of pump body by two dowel pins (Figs. 9-64 and 9-75).

The pressure plate contains four kidney shaped openings, two for intake and two for discharge. It is located next to pump ring by the same dowel pins which locate the pump ring.

The pump cover also is located next to the pump ring and encircles the pressure plate. It is located by four bolts which hold the pump together. The cover also houses the flow control valve and spring and is provided with the pressure fitting for the external circuit (Fig. 9-65).

The reservoir provides oil storage space and a means of directing return oil back to intake side of the pump.

The drive shaft is belt-driven by the crankshaft at a 1.31 ratio to engine r.p.m.

The pump rotor is loosely splined to the end of the drive shaft and is located next to face of pump body and encircled by the pump ring. It contains ten vanes freely mounted in radial positions (Fig. 9-67).

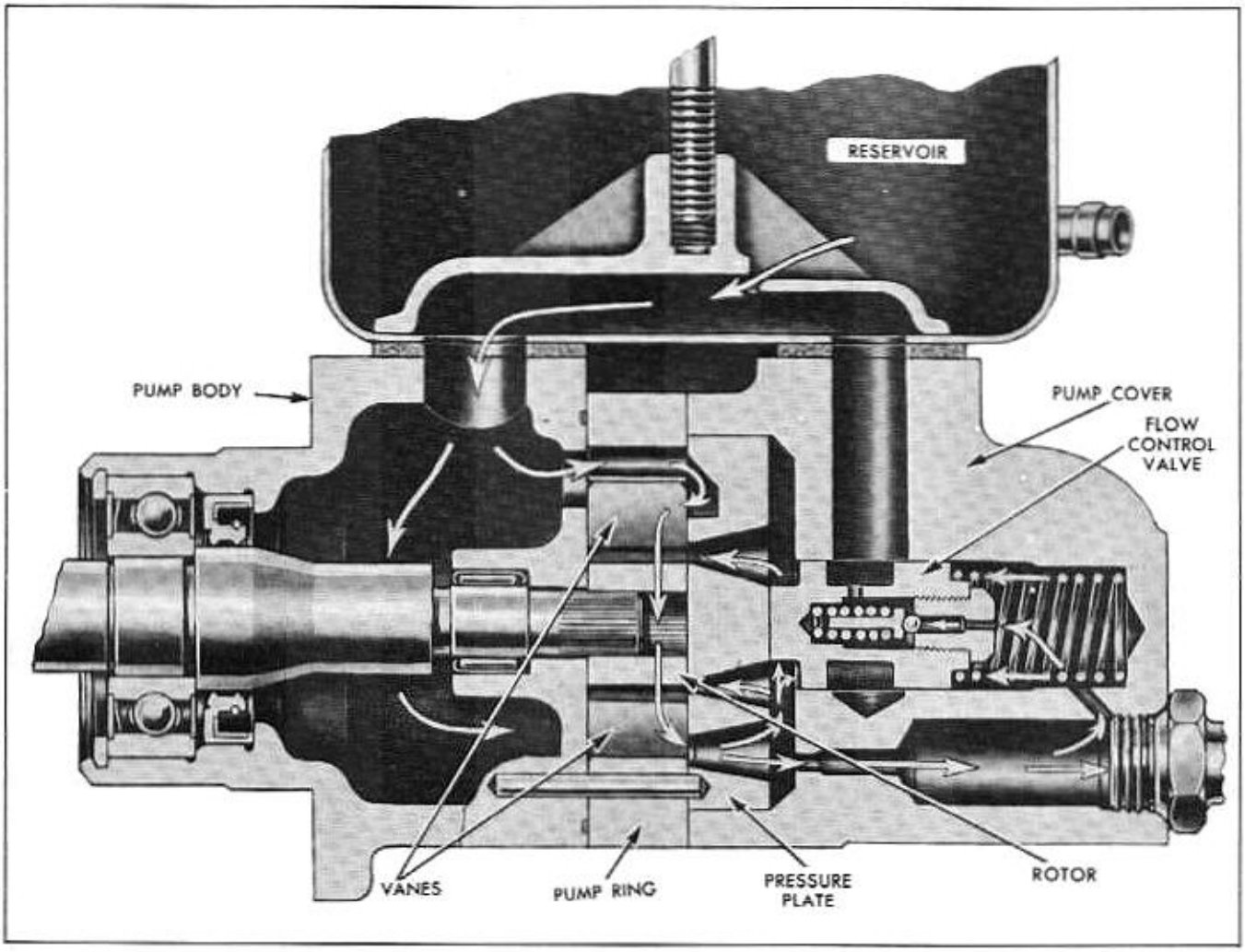


Fig. 9-64 Low Speed During a Partial Turn

DESCRIPTION OF OPERATION OF VANE TYPE OIL PUMP

As the drive shaft rotates the rotor, the vanes follow the cam surface machined in the pump ring. This cam consists of two rising and two falling areas, and, therefore, a complete pumping cycle occurs every 180°

The spaces between vanes pick up oil on rising portions of cam from two kidney shaped slots in pump body and two in pressure plate. Feeding of kidney shaped slots in pressure plate is accomplished by cross-over holes in pump ring. This oil is then discharged on falling portion of cam through two other kidney shaped openings in pressure plate only. The oil passes through pressure plate into the cavity behind it. A portion of this oil is directed back through other passages in pressure plate so that it may enter behind the vanes forcing them to follow cam surface of pump ring (Fig. 9-67).

The remainder of discharged oil up to 2.2 gallons per minute passes through an orifice in pump cover and circulates through the control valve on steering gear and back to reservoir. This orifice is so calibrated that any flow in excess of 2.2 gallons per minute will cause a pressure rise large enough to force the flow control valve back against the spring pressure of flow control spring. This causes excess oil flow to pass into return passage where it joins oil returning

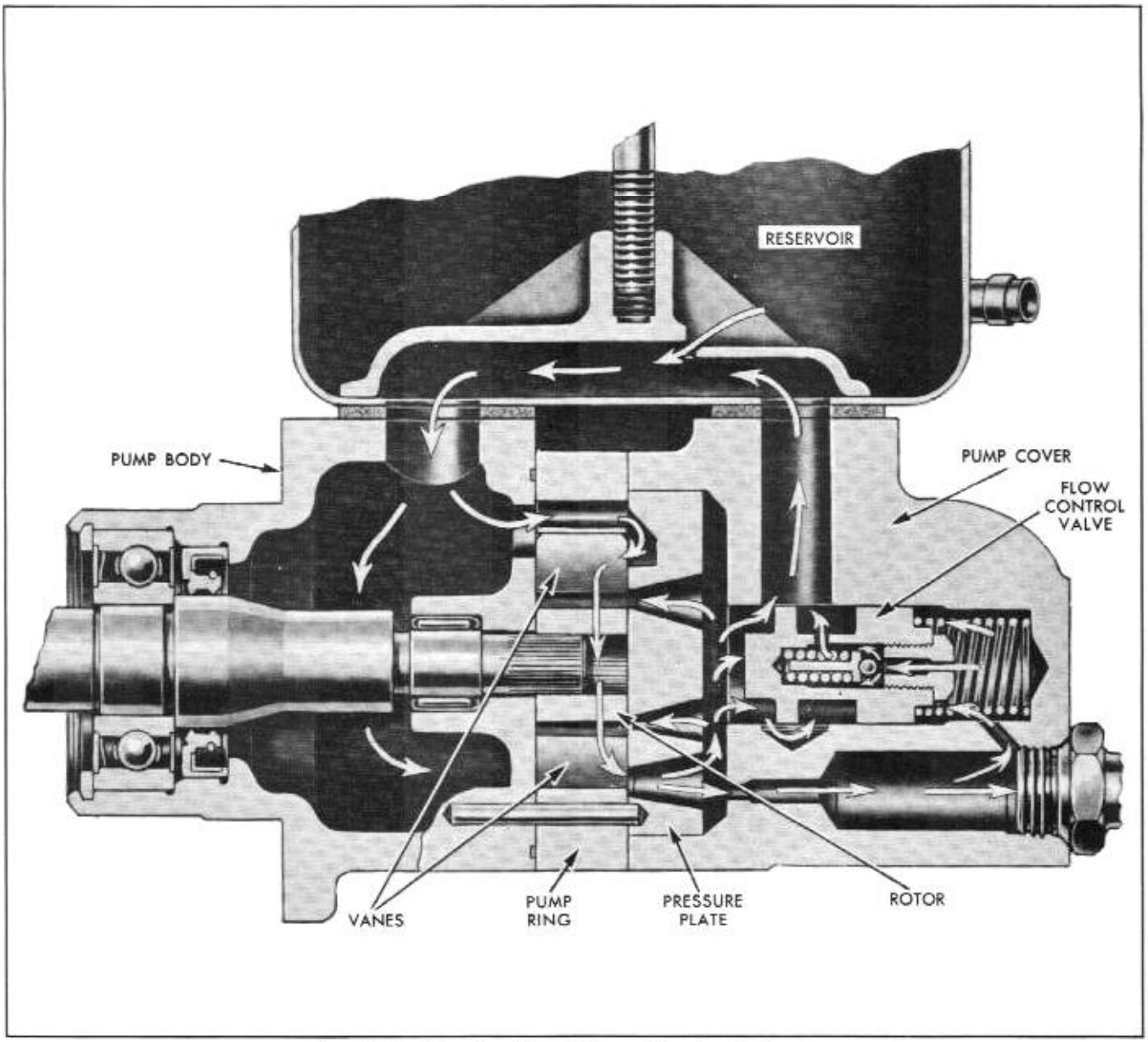


Fig. 9-65 Steering Wheel Turned Against Resistance

from external circuit and passes through reservoir plate into intake side of the pump.

When circulation of oil is restricted by movement of the control valve on the steering gear, pressure becomes equal on both sides of the orifice and the flow control valve closes allowing pressure to build up as required.

The pressure relief valve is contained inside flow control valve. If pump pressure exceeds a certain predetermined pressure (975-1075), pressure relief ball will open allowing oil to flow through flow control valve and into reservoir.

Fig. 9-64 is typical of pump operating when car is being driven at low speed during a partial turn. The oil pressure cannot build up high enough to cause the pressure relief valve to open as external circuit still allows some oil to flow through the system. Also the flow of oil is less than 2.2 gallons per minute, therefore, flow control valve is completely closed.

Fig. 9-65 is typical of pump operating with medium to high engine speeds when turning steering wheel against resistance and control valve in steering gear is closed. In this case maximum pump pressure is developed and pressure relief occurs as described above.

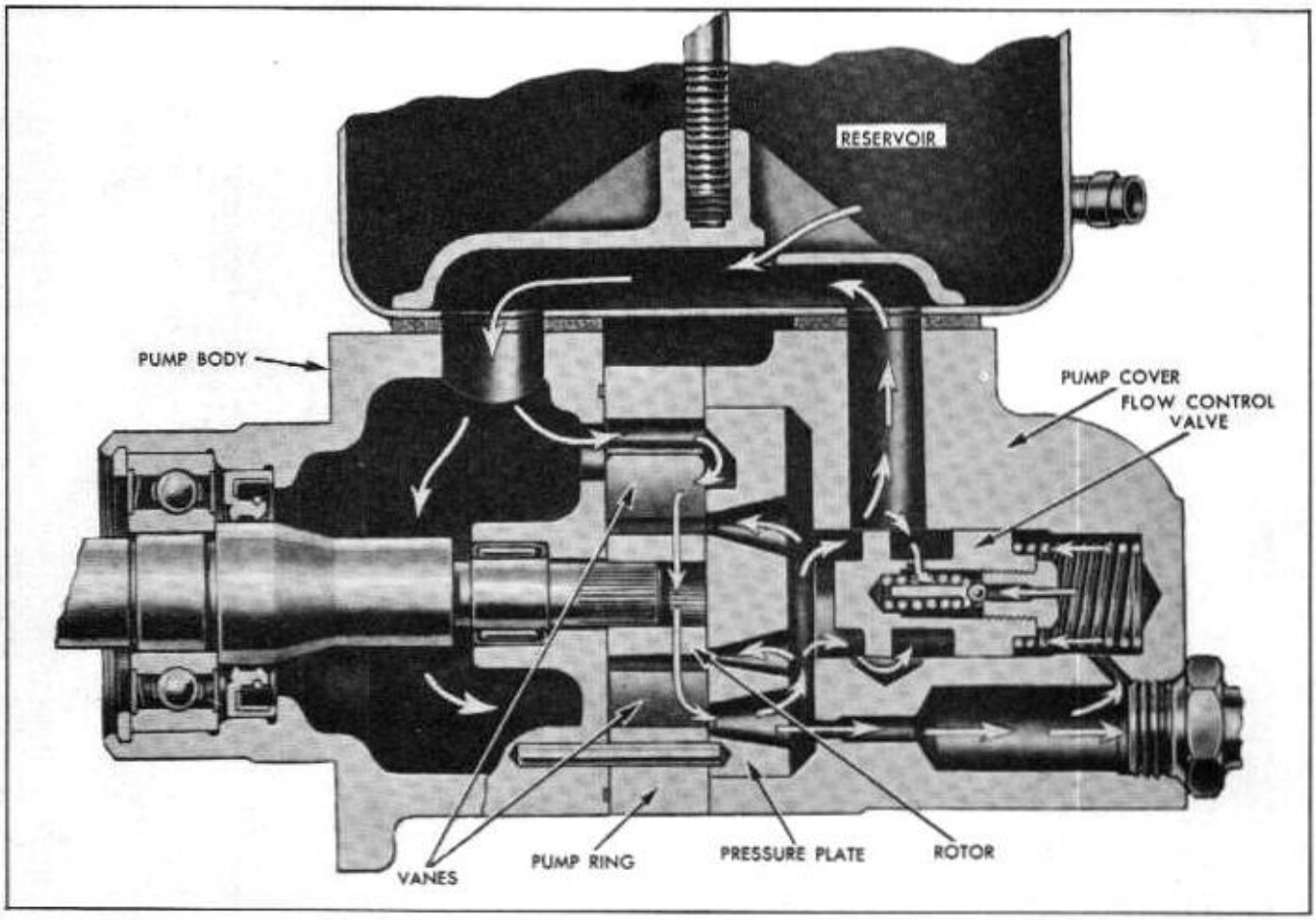


Fig. 9-66 Straight Ahead Position

Fig. 9-66 is typical of pump operating medium to high engine speeds in a straight-ahead position. In this case, the flow control valve has opened to allow all oil flow in excess of 2.2 gallons per minute to by-pass into the reservoir.

PERIODIC SERVICE RECOMMENDATIONS

No periodic service of the pump is required except checking oil level in reservoir as outlined in general lubrication section.

PUMP BELT TENSION ADJUSTMENT

Loosen pump to bracket bolts two full turns so pump falls of its own weight. Place pump belt tightener J-5574, over head of hinge bolt as shown in Fig. 9-68. Using torque wrench perpendicular to tool,

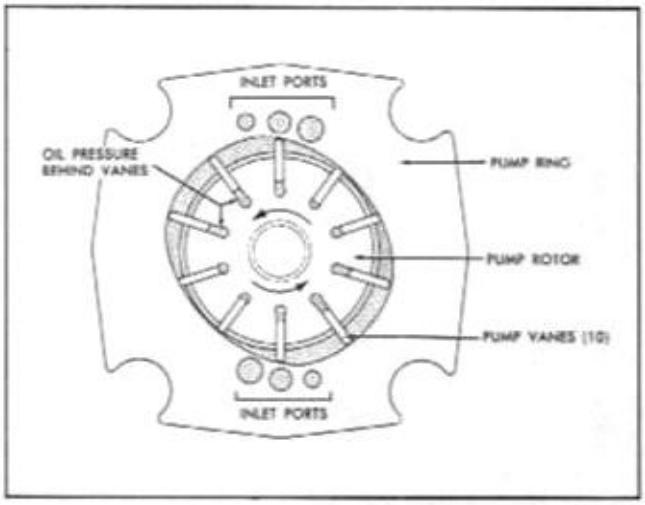


Fig. 9-67 Oil Flow in Rotor and Vanes in Pump Ring

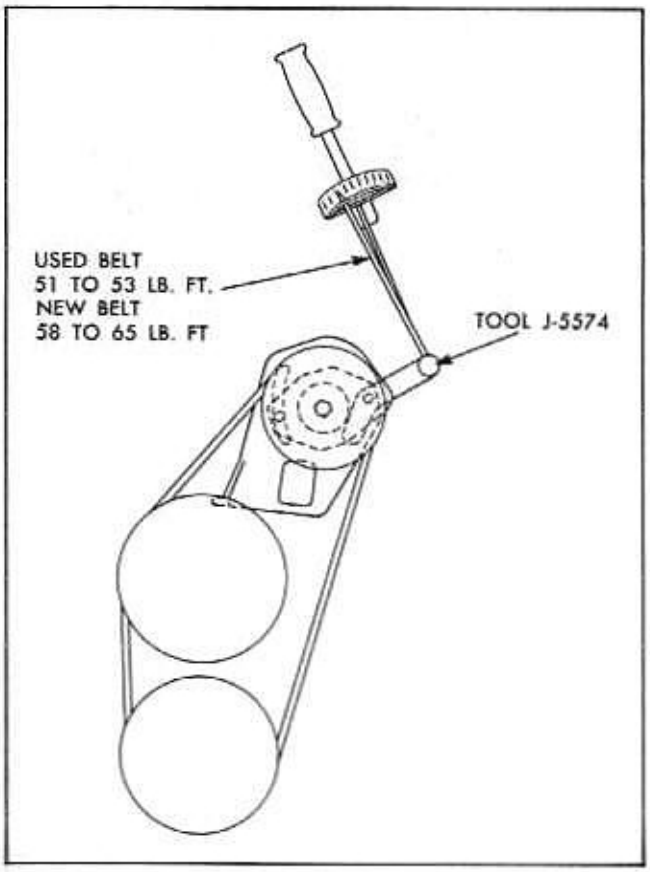


Fig. 9-68 Adjusting Pump Belt Tension

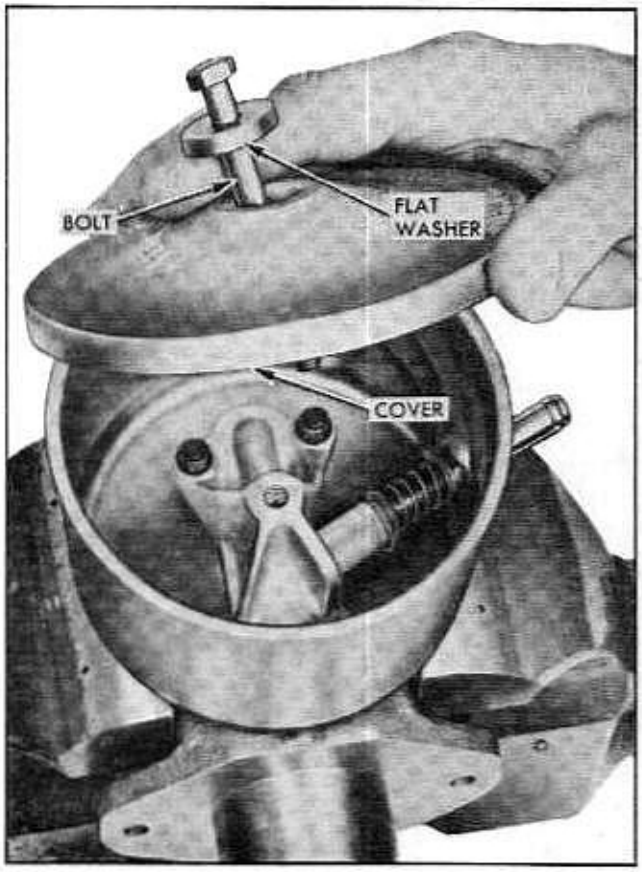


Fig. 9-69 Removing Reservoir Cover

tighten a new belt 58-65 lb. ft. or a used belt 51-53 lb. ft.

Tighten clamp bolt. Remove tool and tighten mounting bolt.

REMOVAL OF PUMP FROM CAR

1. Disconect hoses at unions on pump. When hoses are disconnected, secure ends in a raised position to prevent drainage of oil.

2. Install two caps at pump fittings to prevent drainage of oil from pump.

3. Remove drive pulley attaching nut.

4. Loosen bracket-to-pump mounting bolts.

5. Remove pump belt.

6. Slide pulley from shaft. NOTE: Do not hammer pulley off shaft as this can damage the pump bearings.

7. Remove bracket-to-pump bolts.

8. Remove pump.

DISASSEMBLY OF PUMP

1. Remove reservoir cover bolt, flat washer, and reservoir cover with gasket (Fig. 9-69).

2. Remove gasket from reservoir cover.

3. Remove filter screen, filter retainer and filter spring by pushing the retainer back against the spring as shown in Fig. 9-70.

4. Remove four reservoir-to-pump bolts (Fig. 9-71).

5. Remove reservoir and cork gaskets under the reservoir.

6. Remove four pump cover to pump body attaching screws (Fig. 9-72). NOTE: Do not clamp on front hub of pump as this may damage the bearing housed therein.

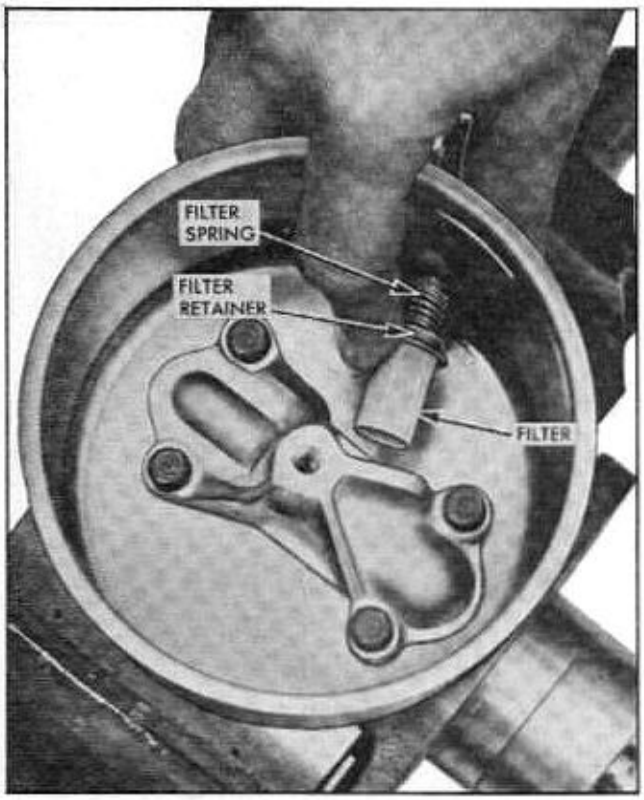


Fig. 9-70 Removing Filter Screen

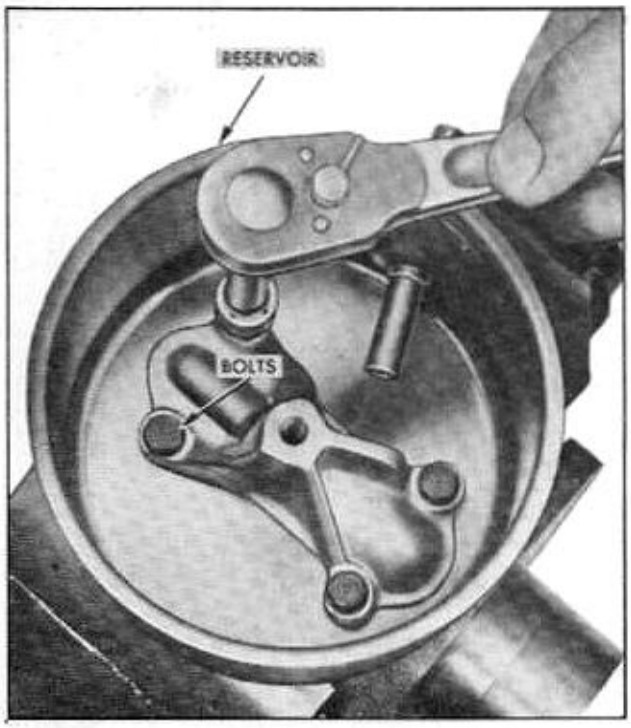


Fig. 9-71 Removing Pump Reservoir

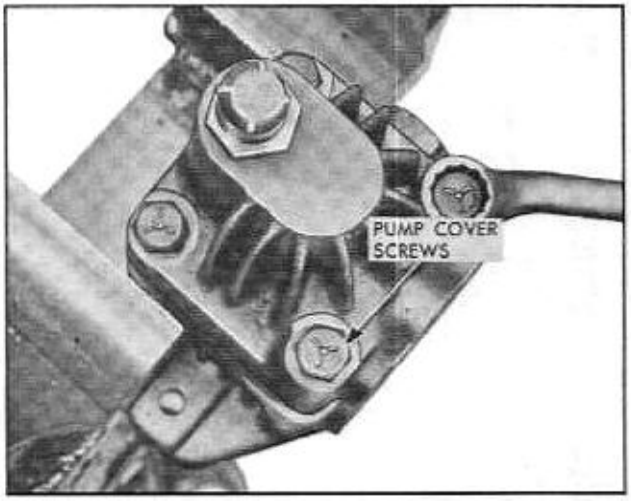


Fig. 9-72 Removing Pump Cover Screws

7. Lift pump cover with flow control valve assembly and spring from assembly. Be especially careful to insure that flow control assembly does not drop out (Fig. 9-73).

8. Mark position of pressure plate and remove plate from dowel pins (Fig. 9-74).

9. Mark position of pump ring in relation to pump body, and remove ring from dowel pins (Fig. 9-75). NOTE: Arrows on outer edge of pump ring point in direction of pump rotation.

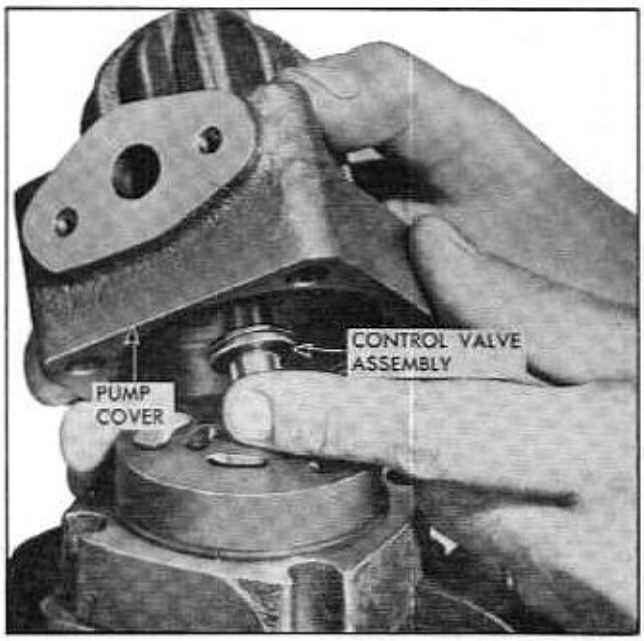


Fig. 9-73 Removing Pump Cover and Valve Assembly

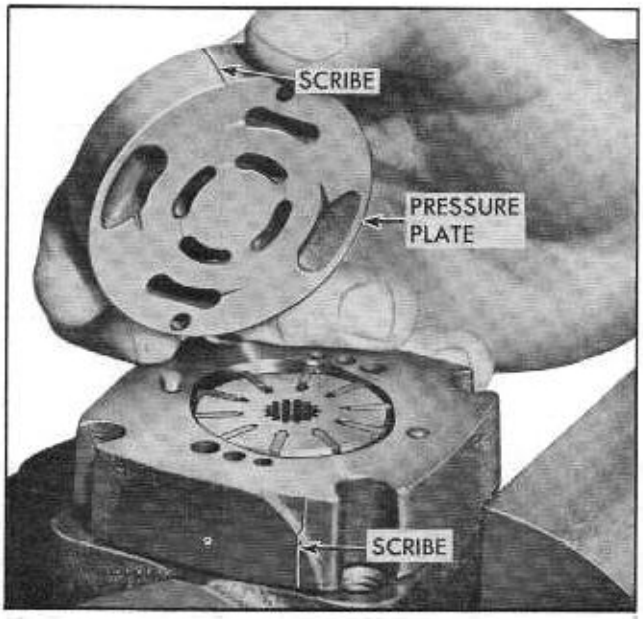


Fig. 9-74 Removing Pressure Plate

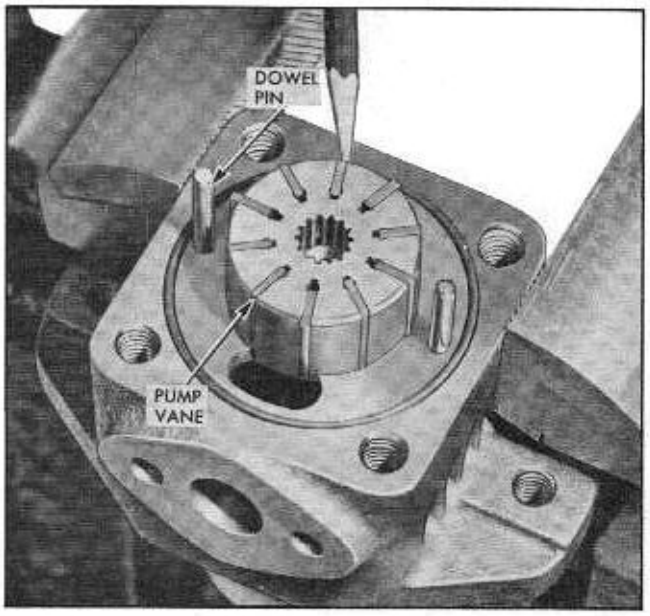


Fig. 9-76 Removing Pump Vanes

10. Remove ten pump vanes (Fig. 9-76).

11. Remove pump rotor (Fig. 9-77).

12. Remove dowel pins from pump body. Any further disassembly should be avoided unless parts are dirty or repair operations are necessary on any of the remaining parts.

13. Remove shaft bearing retainer snap ring from front hub of pump body using tool J-4245 (Fig. 9-78).

14. Remove drive shaft with large sealed bearing by lightly tapping on splined end (Fig. 9-79).

15. Remove oil seal from body with a long punch inserted through large holes in machined face of the pump body (Fig. 9-80).

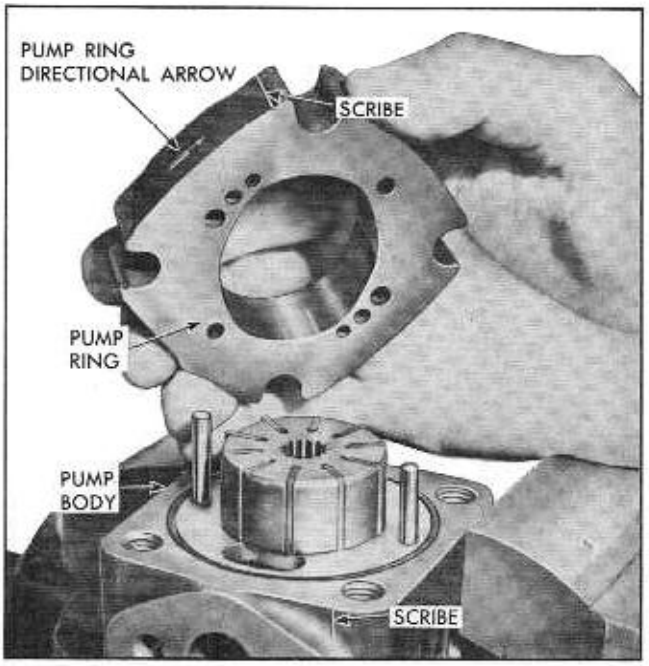


Fig. 9-75 Removing Pump Ring from Pump Body

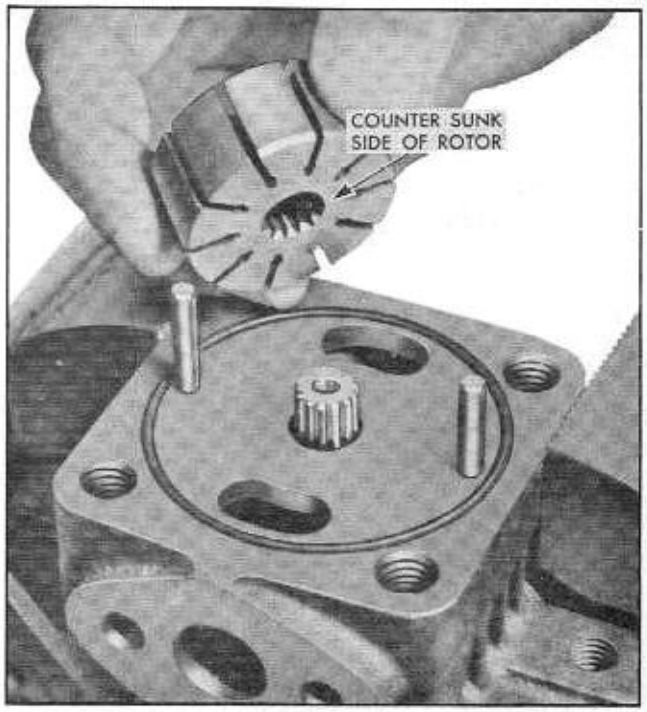


Fig. 9-77 Removing Pump Rotor

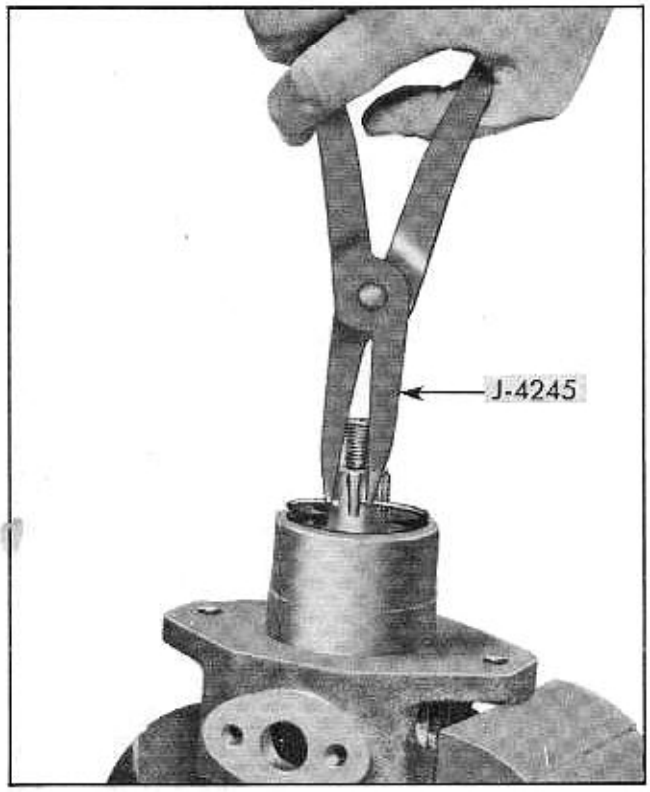


Fig. 9-78 Removing Bearing Retaining Rings

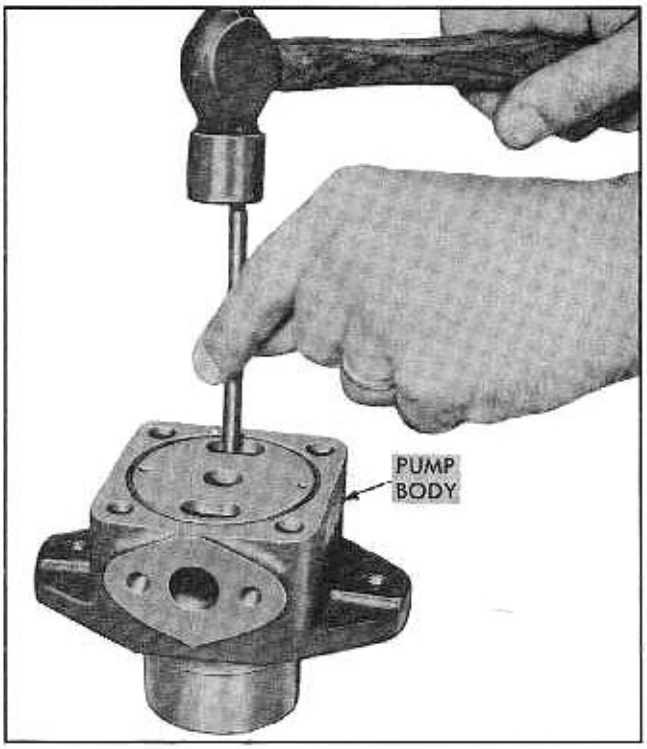


Fig. 9-80 Removing Oil Seal from Pump Body

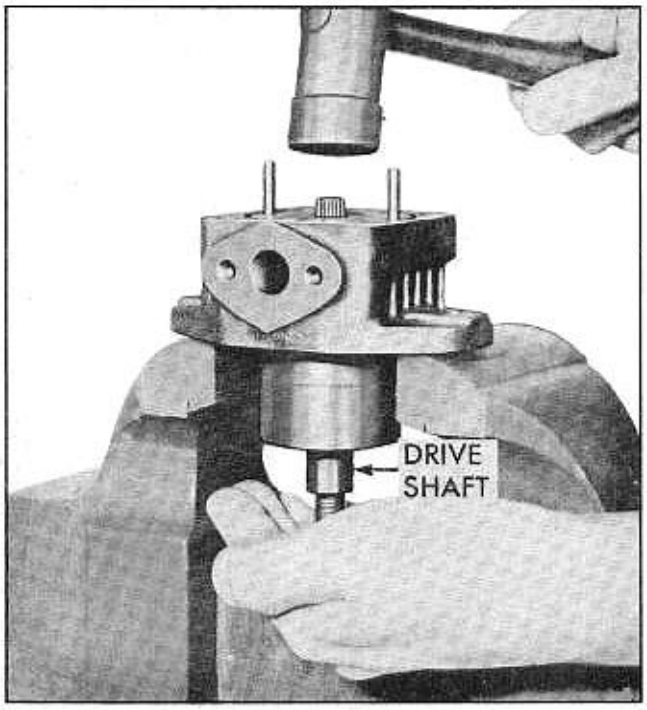


Fig. 9-79 Removing Pump Drive Shaft and Bearing from Pump Body

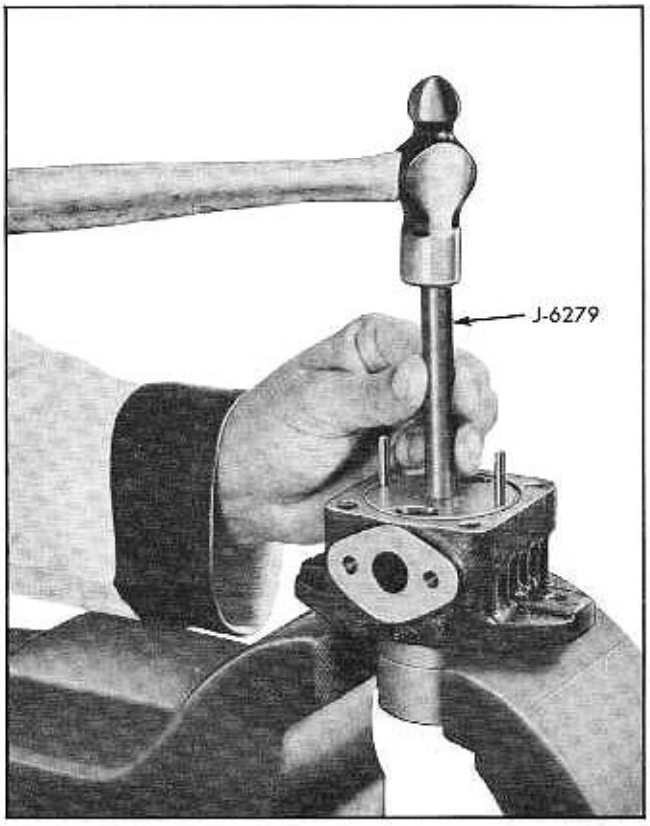


Fig. 9-81 Removing Inner Needle Bearing from Pump Body

16. If it is to be replaced, remove inner needle bearing from pump body using tool J-6279 (Fig. 9-81).

17. Remove key from shaft.

18. If it is to be replaced, remove outer bearing by pressing from the pump shaft.

CLEANING AND INSPECTION OF PUMP PARTS

1. Carefully wash all parts in a suitable cleaning solvent except the drive shaft bearing, as the lubricant sealed into the bearing may be diluted by the solvent.

2. Inspect "O" ring seals and gaskets; if cut damaged, or distorted, seals and gaskets should be replaced.

3. Inspect pump cover flow control valve bore for scores and wear.

4. Inspect flow control valve for free movement in its bore. Inspect all passages in cover and body for obstructions or dirt.

5. Inspect pressure plate for scoring.

6. Inspect contour surface of pump ring for scoring.

7. Inspect rotor faces for metal pick up or scoring.

8. Check vanes for bind in slots of rotor.

9. Inspect face of pump body for scoring or wear.

10. Inspect drive shaft seal surface for scratches and wear.

11. Inspect drive shaft inner and outer bearings for roughness or noisy operation.

REPAIRS

FLOW CONTROL VALVE

If flow control valve is stuck, dislodge by jarring front of pump cover. If pump cover control valve bore is worn or scored, replace pump cover. If necessary to clean or repair pressure relief valve, grip flow control valve by small hub on end of valve and remove orifice screw, shims, ball, plunger and spring. If internal parts are found to be worn or scored, replace assembly. NOTE: The control valve assembly is calibrated at the factory and components of assembly cannot be serviced.

INTERNAL GROUND SURFACES OF PUMP

If pressure plate, pump body, rotor, or pump ring is scored, the following corrections can be made. On a flat surface lap the scored surfaces with a lapping compound until the surfaces are smooth. NOTE: Thoroughly clean in a suitable solvent when lapping operation is completed.

ASSEMBLY OF PUMP

Before assembling make sure all parts are absolutely clean. Lubricate "O" rings and all moving parts as assembled (Fig. 9-83—Exploded View).

1. Press large sealed bearing over threaded end of drive shaft with stamped face of inner race toward front of pump.

2. Install key into shaft keyway. NOTE: Shaft should be supported on opposite side when installing key.

3. Install needle bearing into pump body with the stamped face toward the front of pump using tool J-6280 (Fig. 9-82). NOTE: Be sure needles are free to roll after installation.

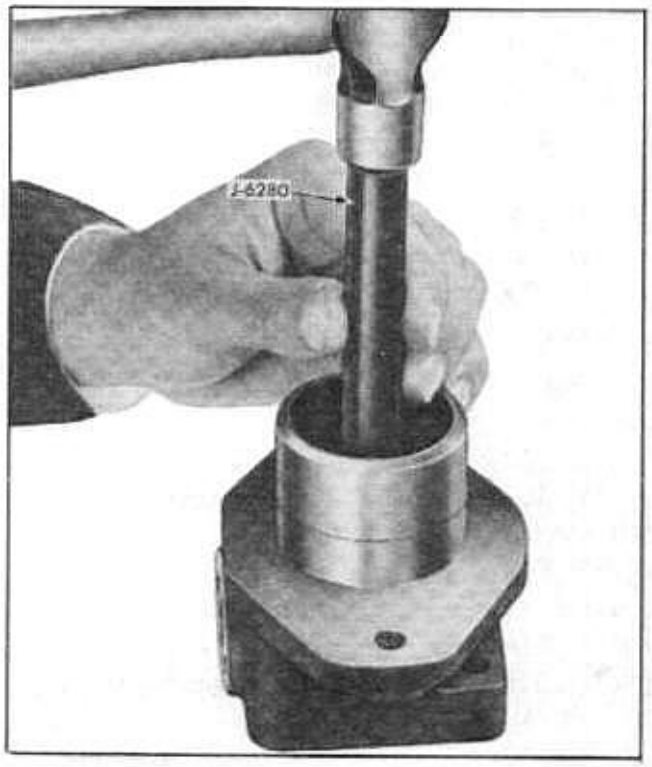


Fig. 9-82 Driving Needle Bearing Into Pump Body

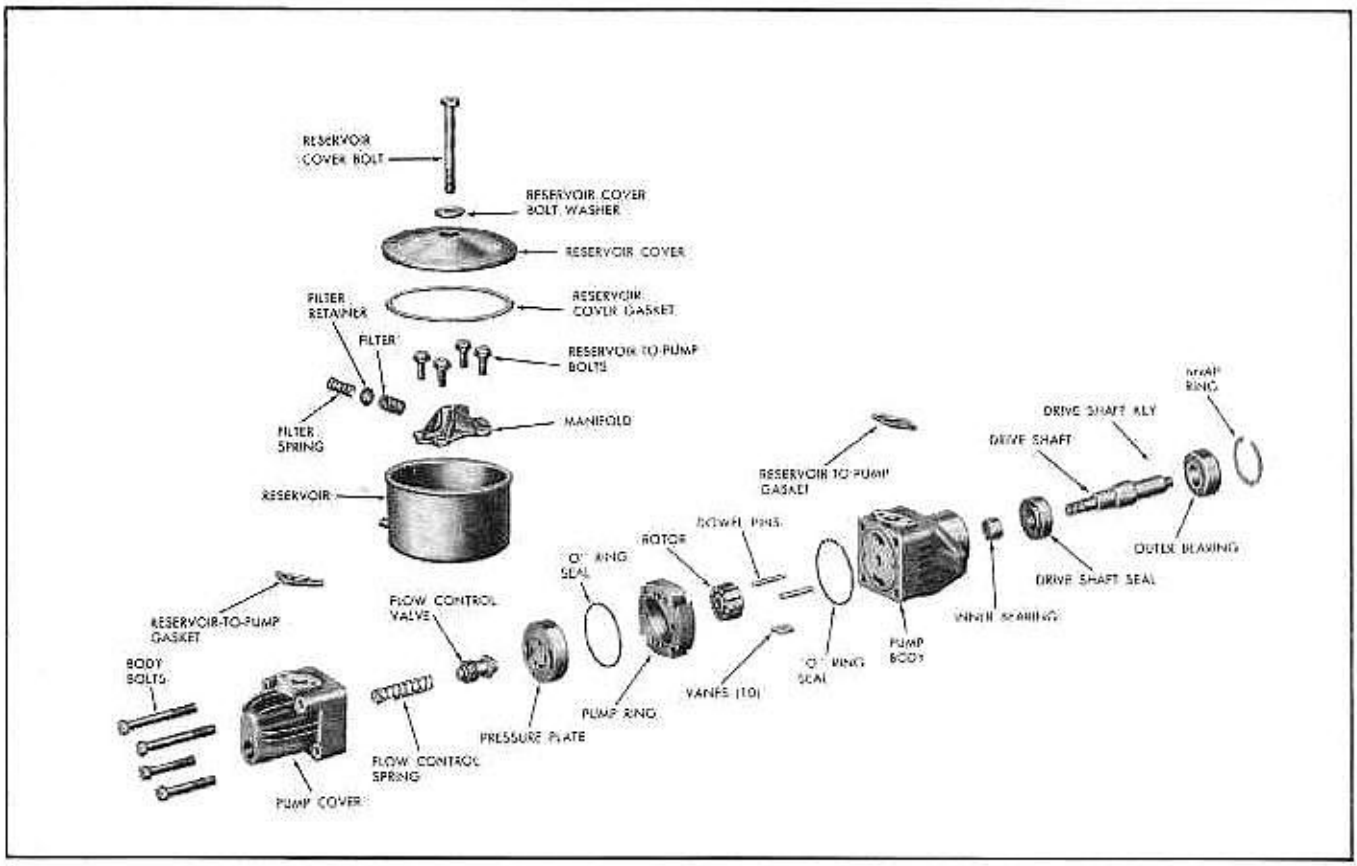


Fig. 9-83 Exploded View of Pump

4. Install shaft seal in body using tool J-6348 (Fig. 9-84). Install seal with the word "outside" toward front of pump.

5. With pump body in vise drive shaft and bearing assembly into pump body using pitman shaft oil seal tool J-6219 (Fig. 9-85).

6. Install shaft bearing retainer snap ring, using tool J-4245 (Fig. 9-78).

7. Install "O" ring in groove of pump body.

8. Install dowel pins in pump body. Tap lightly if necessary.

9. Install rotor over splined end of drive shaft. NOTE: Assemble rotor with countersunk side toward front of pump and be sure rotor is free on splines.

10. Install vanes in rotor slots with radius edge toward outside.

11. Install pump ring on dowel pins and position correctly according to scribed marks. NOTE: Arrow on outer edge of pump ring points to rotation of pump.

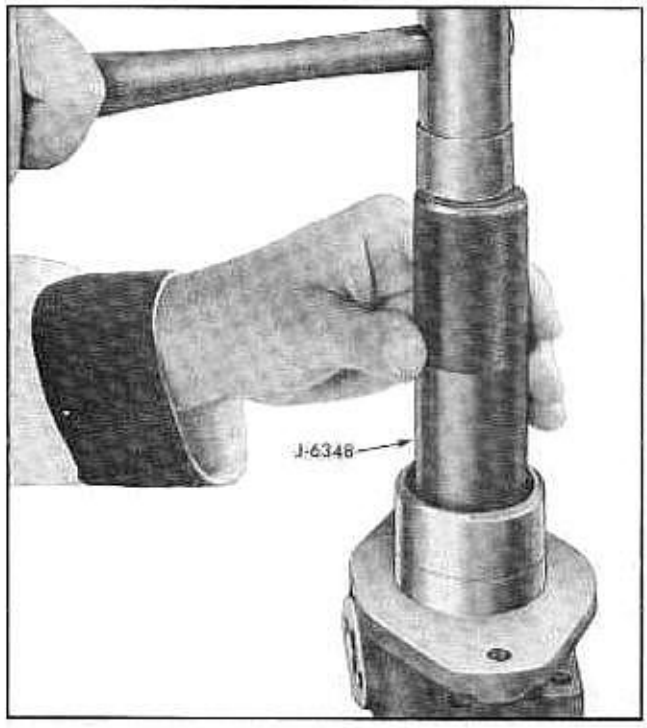


Fig. 9-84 Driving Shaft Seal Into Pump Body

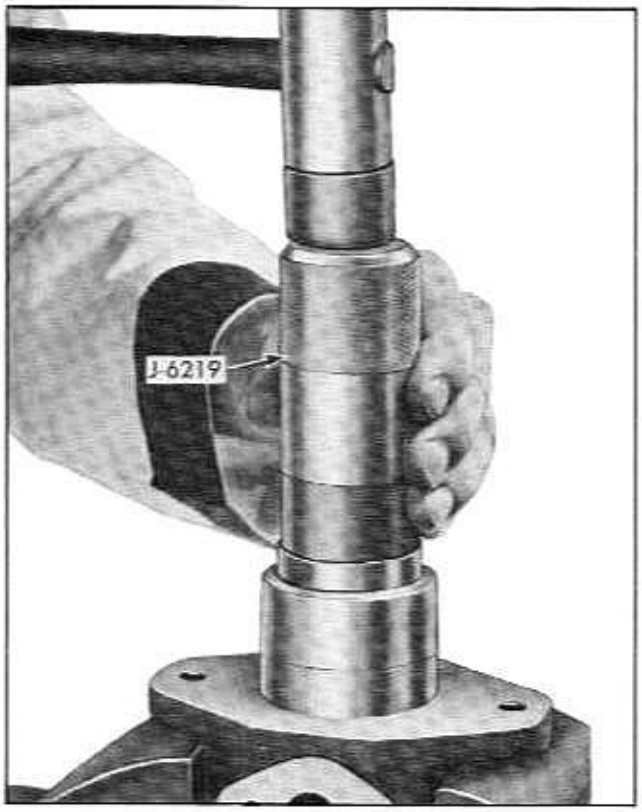


Fig. 9-85 Driving Shaft and Bearing Into Pump Body

12. Install pressure plate on dowel pins. NOTE: Pressure plate must be free with no binding on dowel pins.

13. Install "O" ring around pressure plate.

14. Install flow control valve and spring in pump cover. Be sure that end with screw goes into the bore first.

15. Position pump cover assembly over pressure plate being careful not to pinch "O" ring.

16. Install four cover-to-body attaching bolts. Tighten alternately to 25-30 lb. ft. torque.

17. Install gaskets on pump body and cover.

18. Position reservoir on pump assembly with extrusions in reservoir bottom inside the smaller gasket holes and install four bolts. Tighten to 8-10 lb. ft. torque.

19. Install filter spring, filter retainer, and filter. Be sure flared end of filter retainer is toward filter.

20. Install reservoir cover with gasket bolt and washer. Tighten cover bolt to 7-9 lb. ft. torque.

INSTALLATION OF PUMP ON CAR

1. Position pump assembly on mounting bracket with holes lined up and install bolts loosely.

2. Slide pulley on shaft. NOTE: Do not hammer on pulley.

3. Install pulley nut finger tight against pulley.

4. Connect and tighten hose fittings.

5. Fill reservoir. Bleed pump by turning pulley backward (counterclockwise as viewed from front) until air bubbles cease to appear.

6. Install pump belt over pulley.

7. Move pump outward until belt is properly adjusted. See Pump Belt Tension Adjustment (page 9-30).

8. Tighten pulley nut to 35-45 lb. ft. torque.

TROUBLE DIAGNOSIS AND TESTING

The power steering pump is not completely noiseless. Some noise will be present at standstill parking, particularly when wheels are against the wheel stops.

Power steering pump noise can be confused with many other noises, such as transmission, rear axle, generator, etc. If it is determined that excessive noise is present, remove the pump drive belt, to determine if the pump is at fault. If it is determined that excessive pump noise is present, see Noisy Pump After Refilling Reservoir.

STEERING KNOCKS WHILE TURNING WITH ENGINE RUNNING

Improper pitman shaft adjustment.

STEERING WHEEL SURGES OR JERKS WHEN TURNING WITH ENGINE RUNNING

Loose pump belt.

NOISY PUMP AFTER REFILLING RESERVOIR

1. Check oil level, fill reservoir to level mark if necessary.

2. Check belt adjustment and all fittings and bolts to insure tightness.

3. Check to make sure hoses are not touching any other parts of car, particularly sheet metal.

4. Be sure there is no air present in oil. Air will show up as bubbles or the oil will appear milky. Very small amounts of air will cause extremely noisy operation. If it is impossible to expell all air, either air is leaking into the system or air is trapped in steering gear cylinder.

5. Air trapped in cylinder should be bled as described for the steering gear. (See page 9-27). Air can leak into the system at any place. Air leaks usually occur at joints in the system where oil passes through at high velocity, such as hose connections. Air can leak into system where no external oil leakage appears.

6. If after Step 4 there in no air present, install pressure gauge in the pressure line between the pump and gear. If, when racing engine to about 1000 RPM and without turning the steering wheel, the pressure exceeds 125 lbs., hoses and/or steering gear are restricting oil flow and these parts should be examined to determine cause of restriction.

7. If the pressure in Step 6 is normal (less than 125 lbs.) and the pump is noisy it will be necessary to remove pump from car and disassemble or partially disassemble following the steps outlined under DISASSEMBLY OF PUMP (page 9-31).

WATER IN FLUID

Should the fluid be cloudy i.e., have the appearance of a mixture of coffee with cream, it is due to water being in the system. Once water is in the system there is no way to clarify the fluid so it is necessary that the fluid be replaced. This can best be done by removing the pump return pipe or flexible hose and catching the discarded fluid in a container. Pump the system as clear as possible, then fill with new fluid and cycle the steering from extreme right to extreme left and in this way force out all the contaminated fluids. When the fluid being pumped through the return hose shows clean of this clouded mixture, connect the hose to the pump, fill the reservoir and again cycle the unit while the pump is operating until there is no evidence of air bubbles in the reservoir. Again fill the reservoir to level and install cover.

HARD STEERING WHEN PARKING

When engine is idling, car stopped, and steering wheel is turned in an effort to park, normal effort required at steering wheel rim is approximately 5 pounds with oil at normal operating temperature between 150°F. and 170°F. measured with a thermometer in the reservoir.

Temperature will build up if steering wheel is turned from side to side with car standing. Therefore, if a complaint of hard steering when parking is encountered, carefully follow procedure below:

Simulate parking by applying hand brake and turning wheels on a clean dry service floor. If effort exceeds 5 pounds when checked with spring scale J-5178, make the following checks:

1. Check pump drive belt tension and adjust. (See page 9-30).

2. Check for lack of lubrication in steering gear, linkage and front suspension.

3. Test tires for proper inflation and inflate to recommended pressures.

4. Check tie rod and connecting rod ball seats for being too tight.

5. Check steering pitman shaft adjustment. See Adjustments on Car (page 9-13).

6. Check lines and gear for signs of oil leakage.

7. If the above mentioned checks and their corrections do not eliminate the difficulty, perform pressure test.

PRESSURE CHECK

TEST NO. 1—OIL CIRCUIT OPEN

1. Install pressure gauge in pressure line between pump and gear and turn valve to open position. NOTE: Use pressure gauge J-5176 (Fig. 9-86) for 1200 lb. pressure reading. Mark gauge face below 1000 lb. reading with a line using same distance between 800 and 1000 pound reading. Divide this distance with a line showing 1100 first line and 1200 second line.

2. Turn steering wheel from one stop to other stop and note pressure on gauge while turning wheel. Especially note maximum pressure that can be built up with steering wheel held in either extreme right or extreme left position. This maximum pressure reading should not be less than 850 lbs., with engine idling at 460 RPM and oil temperature in reservoir between 150° and 170° as measured with a thermometer. NOTE: To obtain temperatures of 150° to 170° desired for testing, turn wheels through normal operating range several times. CAUTION: Do not hold steering wheel against stop for any extended period of time.

3. If maximum pressure is below 850 lbs., it indicates there is some trouble in hydraulic circuit; how-

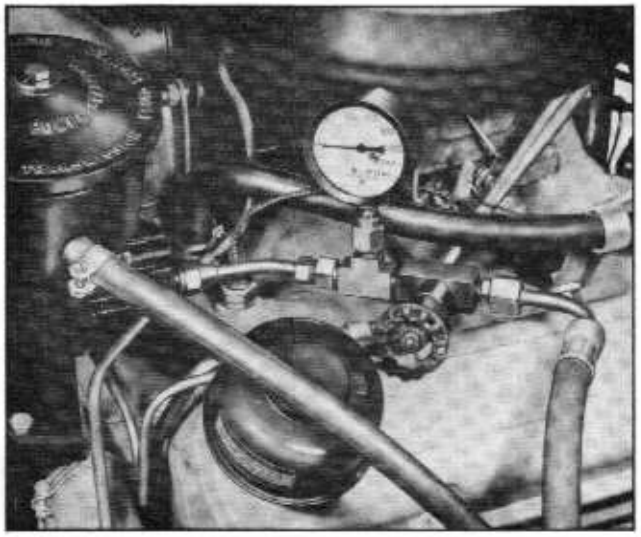


Fig. 9-86 Pressure Gauge Installed Between Pump and Gear

ever, it does not indicate whether pump or gear is at fault. To determine if pump alone or if both are at fault, proceed with Test No. 2.

TEST NO. 2—OIL CIRCUIT CLOSED

1. With engine idling at 460 RPM, turn shut-off valve of gauge to closed position.

2. Observe and compare maximum pump pressure at idle. It should not be less than 850 lbs. NOTE: By comparing this reading with Test No. 1 (testing complete circuit), it is possible to determine whether fault is with the pump or steering gear, or both.

TEST RESULTS	DIAGNOSIS
1. First Test below 850 lbs.—Second Test normal 850 lbs. minimum	Defective steering gear
EXAMPLE: First test 600 lbs., Second test 850 lbs.	
2. First Test below 850 lbs.—Second Test not more than 50 lbs greater	Defective pump
EXAMPLE: First test 400 lbs., Second test 450 lbs.	

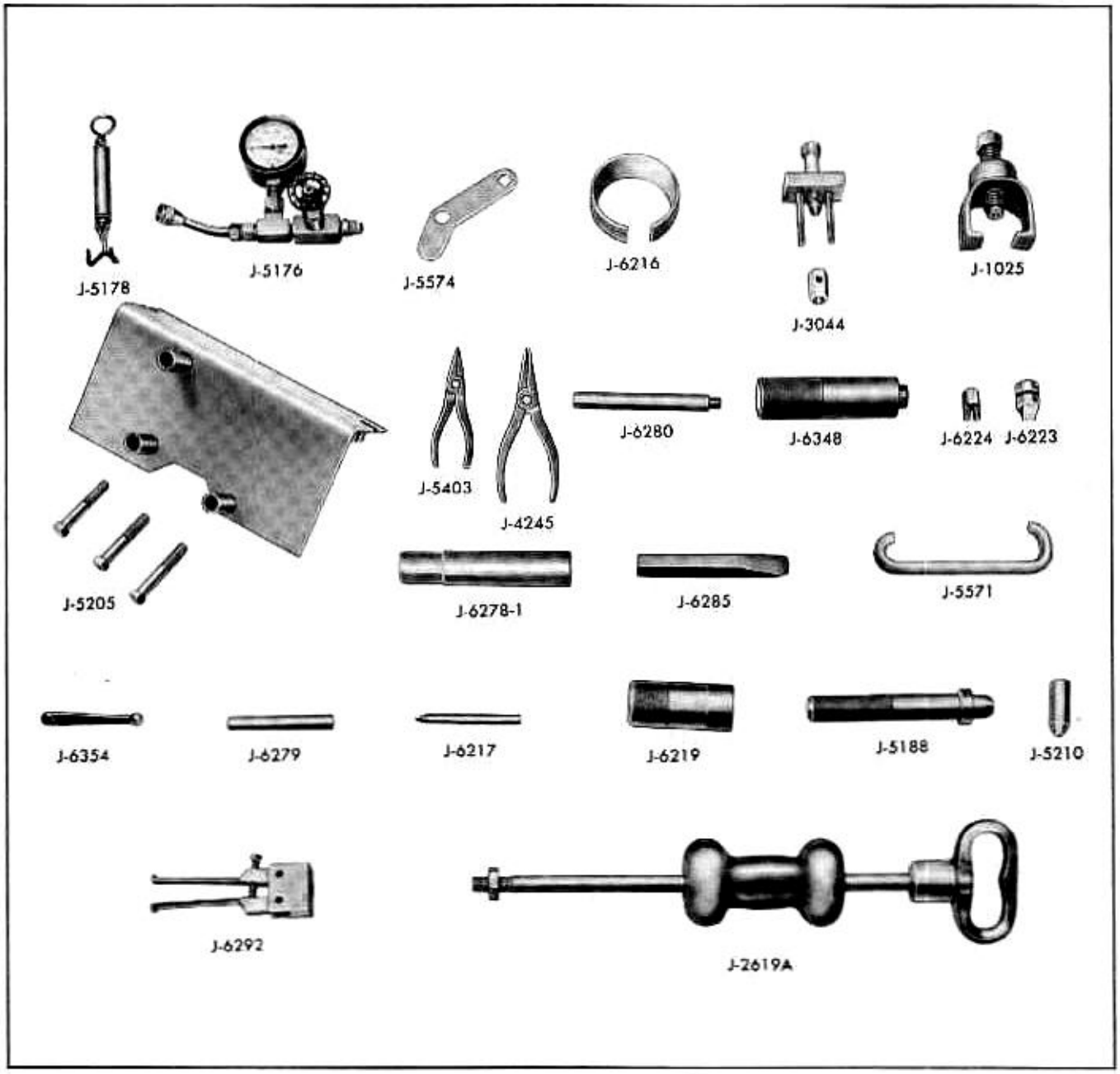
If pressure test under Test No. 1 and Test No. 2 shows pressure above 1150 lbs., remove pressure line fitting from back of pump. Check to determine if small hole inside pump cover drilled at an angle toward flow control valve assembly is plugged. This hole must be through to communicate between downstream side of orifice to the cavity behind flow control valve assembly. If this hole is not plugged, install a new flow control valve assembly, making sure it is free in its bore. Recheck pump pressure after installation of new flow control valve assembly.

TORQUE SPECIFICATIONS

	LB. FT. TORQUE
Tie Rod Clamp Nuts	18 to 20
End Cover to Housing Screws	25 to 30
Steering Gear Pitman Arm Nut	100 to 125
Pitman Shaft Lash Adjusting Screw Nut	25 to 30
Side Cover to Housing Screws (3/8)	25 to 30
Side Cover to Housing Screws (5/16)	15 to 20
Steering Wheel to Shaft Nut	25 to 30
Gear Housing to Frame Bolts	23 to 28
Pump Reservoir Cover Bolts	7 to 9
Reservoir to Pump Bolts	8 to 10
Cover to Pump Body Bolts	25 to 30
Pump Belt Tension New Belt	58 to 65
Pump Belt Tension Used Belt	51 to 53
Pulley Hub to Pump Shaft Nut	50 to 55

SPECIFICATIONS (POWER STEERING)

Type	In-Line Saginaw Recirculating Ball Nut
Pump	Vane Type
Pull at Steering Wheel	5 lbs. Maximum
Steering Jacket Diameter	2 3/8"
Over-All Steering Ratio	22.5:1
Fluid Level	Fill to Filler Line on Reservoir
Fluid Capacity Steering Gear	1 qt.
Engine to Pump Ratio	1.31



SPECIAL TOOLS—STEERING

J-1025	Pitman Arm Puller
J-2619-A	Slide Hammer Assembly
J-3044	Steering Wheel Puller
J-4245	Snap Ring Pliers (Truarc No. 3—Internal)
J-5176	Pressure Gauge
J-5178	Wheel Tension Gauge (15 lb. scale)
J-5188	End Cover Seal Installer
J-5205	Steering Gear Holding Fixture
J-5210	Steering Shaft Inserter
J-5403	Snap Ring Pliers (Truarc No. 1—Internal)
J-5571	Front Suspension Hold Down Hook
J-5574	Pump Belt Tightener
J-6216	Piston Ring Compressor
J-6217	Valve Connector Installer
J-6219	Pitman Shaft Seal Installer
J-6223	Ball Nut Retaining Screw Adapter
J-6224	Valve Link Adapter (5/8" Hex Head)
J-6278-1	Pitman Shaft Bushing Remover and Replacer
J-6279	Pump Body Inner Needle Bearing Remover
J-6280	Pump Body Inner Needle Bearing Replacer
J-6285	Ball Nut Retainer Staking Tool
J-6292	Upper Housing Bearing Puller
J-6348	Pump Shaft Seal Installer
J-6354	Pitman Shaft End Play Adjuster