

INSPECTION OF PARTS

All parts should be thoroughly cleaned and examined. After examining, cover all parts with a lint-free cloth while waiting for assembly. Oil all moving parts with 10W30 premium engine oil when assembling.

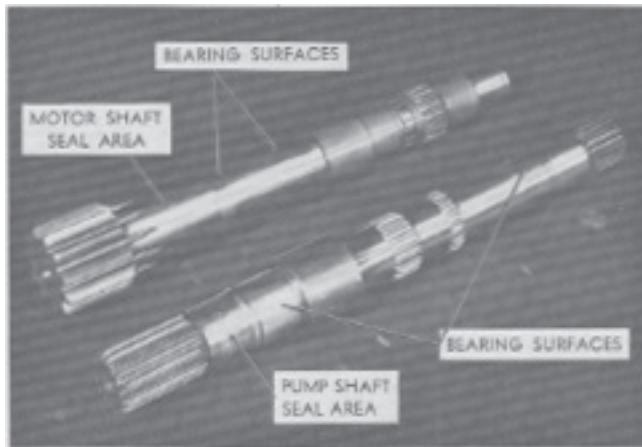


FIG. 40.

Pump and Motor Shafts

Examine the bearing and seal surfaces of the shafts. Scored or worn shafts must be replaced. Pay particular attention to the pump shaft seal area. A scratched seal area will cause an oil leak.

Cylinder Block Assemblies — General

Although the pump and motor cylinder block and piston assemblies look similar, they differ. Two cylinder block kits, one for the pump and one for the motor, are available, and should be used for replacement when the following conditions are found:

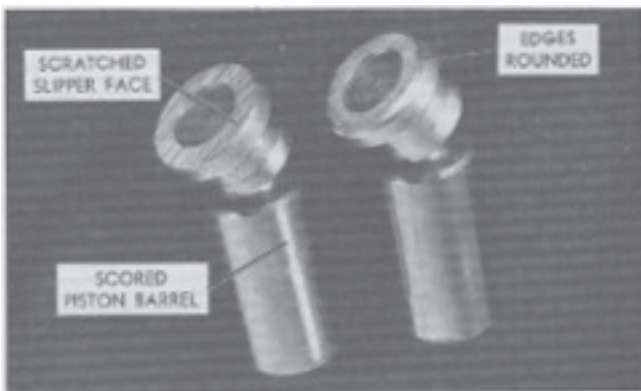


FIG. 41.

1. Cylinder bores out of round or scored.
2. Cylinder block face (valving surface) worn, scratched or scored.
3. Scored piston barrels.
4. Slipper edges rounded more than $\frac{1}{32}$ inch.

When inspecting cylinder block assemblies always return pistons to their original cylinder bores.

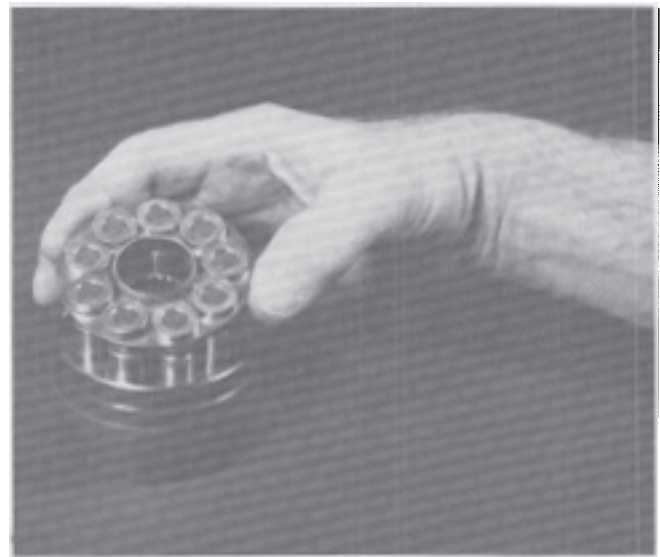


FIG. 42. Check Free Movement of Pistons

Check to make sure the pistons move freely in their bores. Carefully remove each piston and check for scores on the piston barrels and on the cylinder bore walls. Replace with cylinder block kit if bores or barrels are scored.

Cylinder Block Face

Inspect the polished valving surface of the cylinder blocks. If the surface is scored replace with a cylinder block kit.

Pistons and Slippers

Scored piston barrels and slippers with edges rounded more than $\frac{1}{32}$ inch must not be used. Replace with a new cylinder block kit. Slight scratches on slippers or slightly rounded edges may be removed by lapping. Use crocus cloth for finishing. Do not remove more than .005". Make sure that all slippers are within .002" thickness of each other.

Make sure the lubrication hole is open in the center of the slipper face. Use compressed air to open.

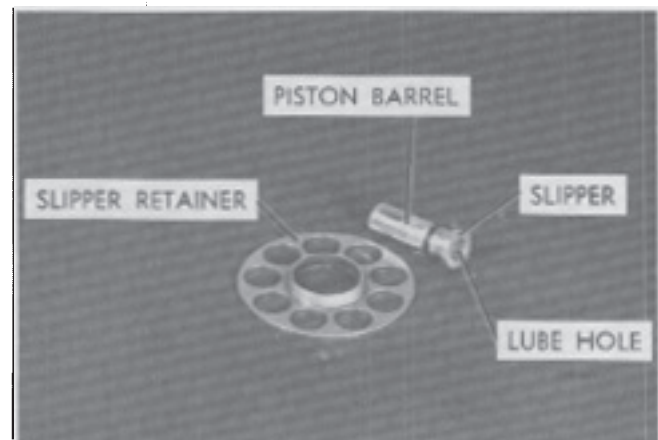


FIG. 43.

Slipper Retainers

Slipper retainers must be flat. Examine them carefully. If bent or worn, replace them.

Valve Plates

Clean valve plates and check both sides of the plates. Remove any burrs or foreign matter from the steel side of the plate. Check the bronze side of the plate for scratches and wear. This surface must be smooth and free from scratches. To check the surface, run your fingernail across the plate. If wear is felt, replace the plate.

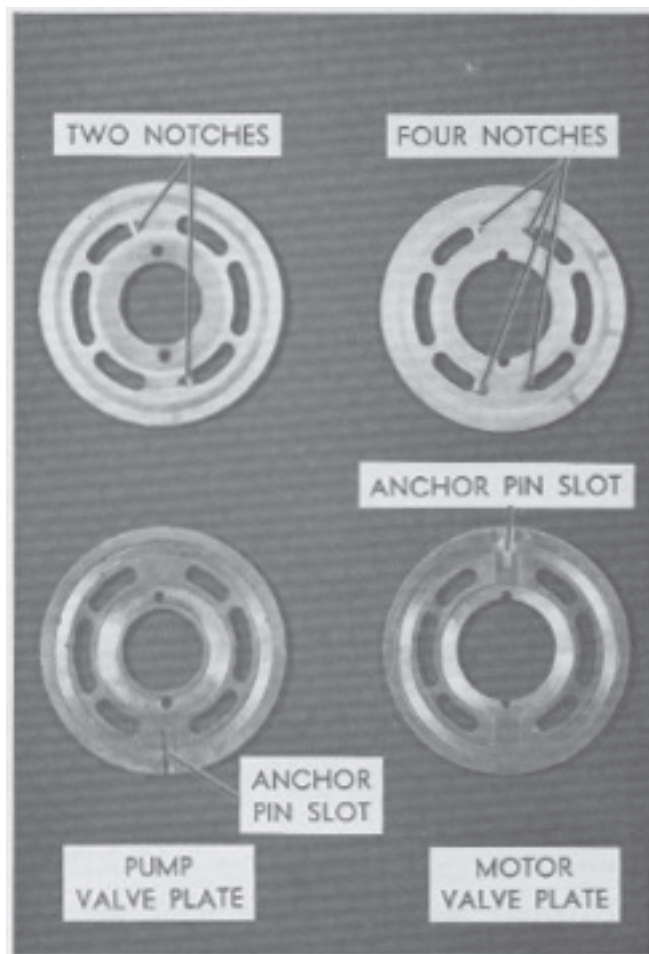


FIG. 44.

Thrust Plates

Inspect both thrust plates (for the pump and motor swash plates) for flatness, scoring and imbedded material. Replace as required.

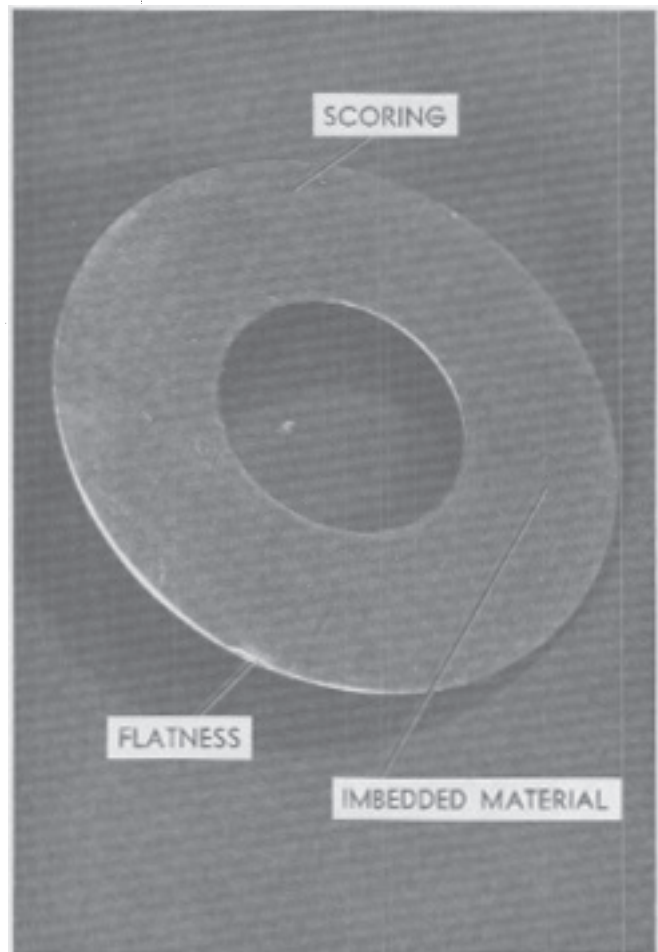


FIG. 45. Inspect Thrust Plates

Charge Pump Assembly

Inspect the gerotor set (internal and external rotors), and the housing, for wear and scoring. Replace as required. **Note:** The gerotor set is a matched unit. Always replace as an assembly. If the charge pump housing is worn or scored, it must be replaced.

Bearings (for replacement see Disassembly and Assembly section)

Examine the needle bearings in the pump and motor end caps and replace as required. Examine the ball bearings in the pump and motor housings and replace as required.

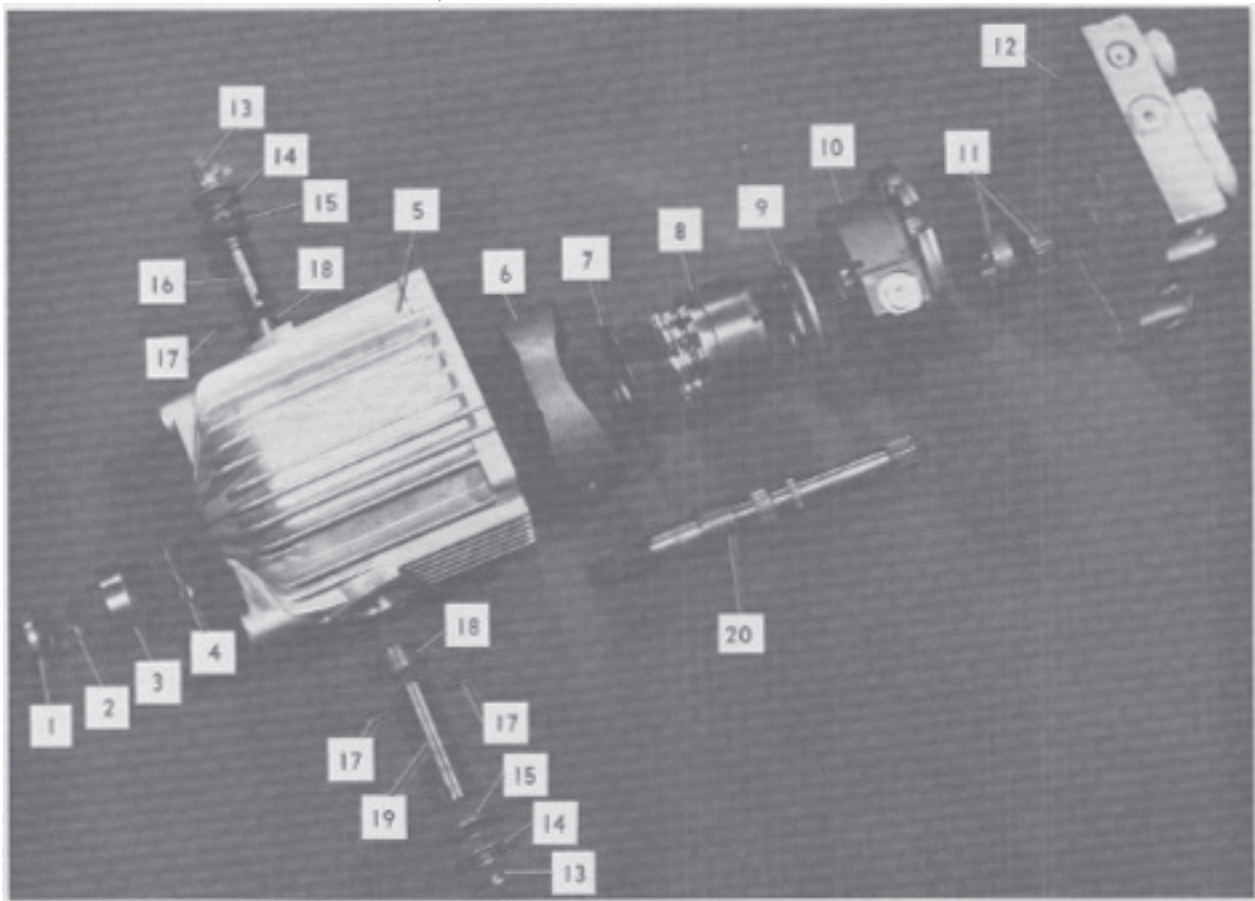


FIG. 46. Hydrostatic Pump — Exploded View

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Pump Shaft Seal 2. Shaft Retaining Ring 3. Bearing 4. Bearing Retaining Ring 5. Pump Housing 6. Swash Plate 7. Thrust Plate 8. Cylinder Block & Piston Assembly 9. Valve Plate 10. Charge Pump Assembly | <ol style="list-style-type: none"> 11. Gerotor Set 12. Pump End Cap Housing 13. Retaining Ring 14. Retaining Washer 15. Trunnion Shaft Seal 16. Trunnion Shaft 17. Roll Pin 18. Trunnion Shaft Needle Bearing 19. Control Shaft 20. Pump Shaft |
|---|--|

DISASSEMBLY & ASSEMBLY OF HYDROSTATIC PUMP

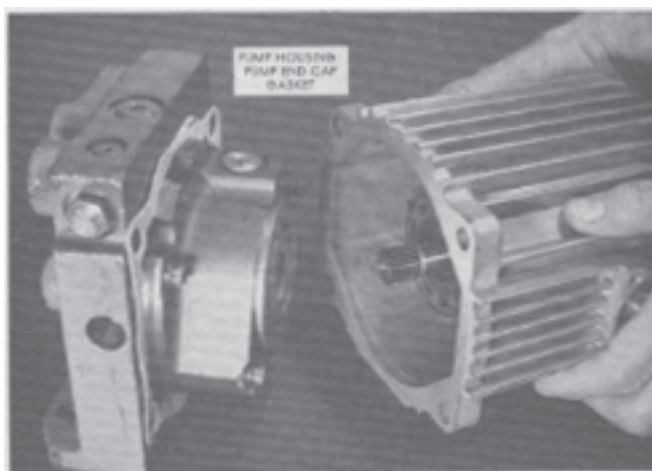


FIG. 47. Pump Housing Removal

1. Remove the four $\frac{3}{8}$ -16 socket-head cap screws that hold the finned aluminum pump housing to the pump end cap.

2. With the pump assembly held horizontally, carefully remove the finned aluminum pump housing, together with the input shaft, swashplate and cylinder block assembly. **Note:** Make sure the cylinder block and piston assembly does not drop off the input shaft. The valve plate may stick to the cylinder block and come out with it, or it may stick on the charge pump housing.

3. Remove the pump housing/pump end cap gasket.

4. Carefully slide off the cylinder block and piston assembly from the pump shaft. **Important:** If any of the pistons slip out, return them to their **original** cylinder bores. Place the cylinder block and pistons on a lint free towel so the valving surface and slippers will not be damaged. If the pump housing is to be disassembled to remove the shaft, trunnion or swash

plate, refer to the **Pump Housing Disassembly and Assembly** section.

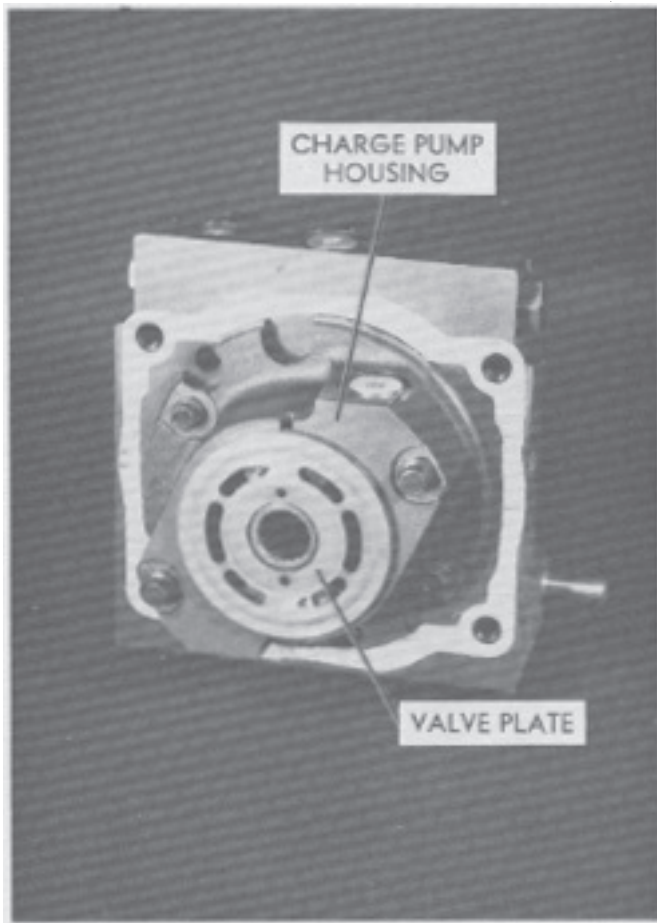


FIG. 48. Charge Pump Housing – With Valve Plate

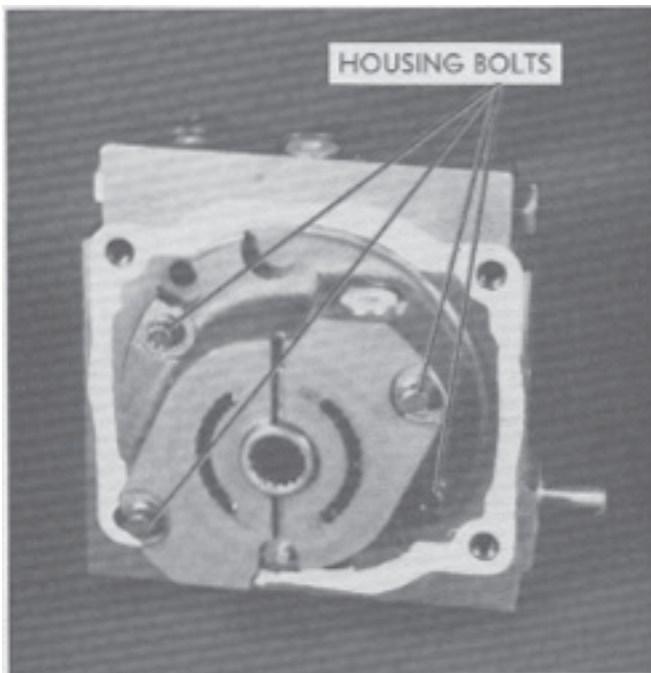


FIG. 49.

Charge Pump Housing – Valve Plate Removed

5. Remove the valve plate from the charge pump housing, noting that the steel surface fits against the

charge pump housing and over a dowel pin to keep it from rotating.

6. Using a $\frac{5}{16}$ " 12-point socket, remove the two short and two long $\frac{5}{16}$ -24 charge-pump-housing-to-end-cap bolts.

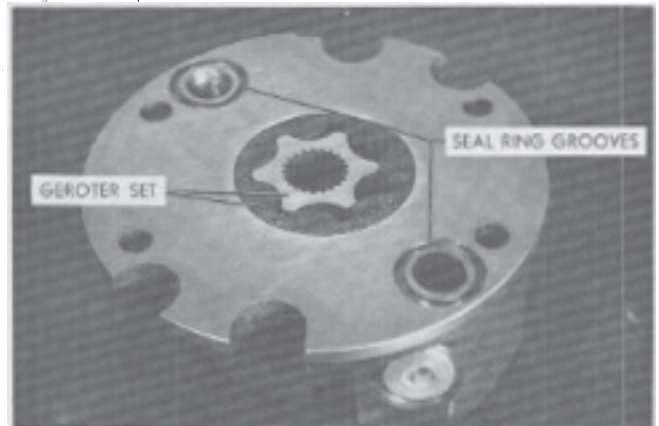


FIG. 50. Charge Pump Assembly

7. Remove the charge pump assembly from the pump end cap, being careful to keep the gerotor set together. Carefully note the position (dowel pin down) of the charge pump assembly in relation to the end cap.

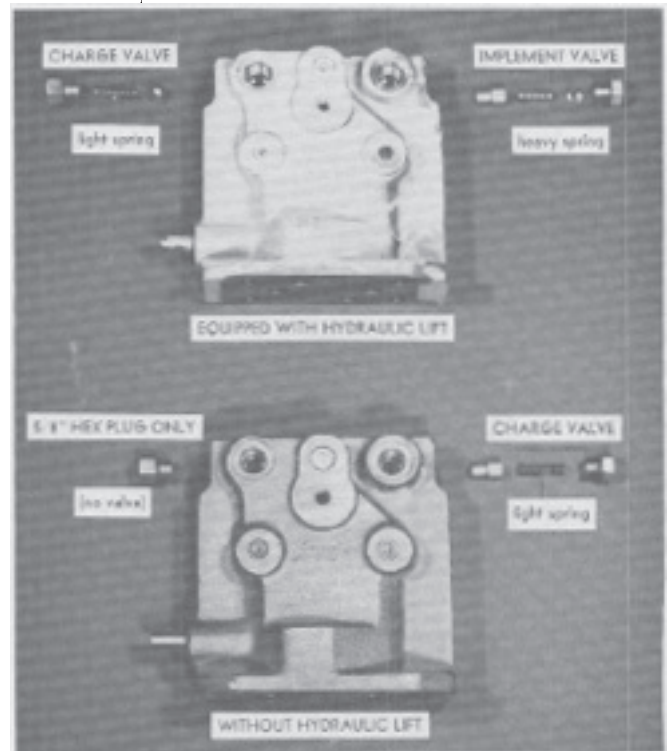


FIG. 51. Pump End Caps

8. Remove the $\frac{5}{8}$ " hex plug from the top left corner of the pump end cap. (Top left means viewed from the motor side of the end cap. See Fig. 51). If the unit is equipped for hydraulic lift operation, remove the charge ball valve and spring from the pump end cap (top view). If the unit is **not** equipped for hydraulic lift operation, there will be no spring and ball valve in this area (bottom view).

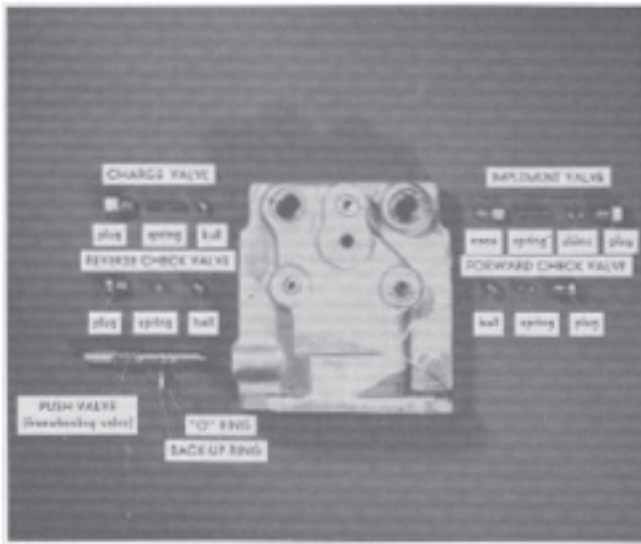


FIG. 52. Pump End Cap Valves

9. Remove the $\frac{5}{8}$ " hex plug from the top right corner of the pump end cap. (Viewed from the motor side of the pump end cap, see Fig. 52). If the unit is equipped for hydraulic lift operation, there will be shims located in the spring cavity of the plug. Do not lose these shims as they determine the amount of implement pressure. Remove the spring and cone valve. Do not mix up this implement valve spring with the charge valve spring removed from the top left corner.

10. Remove the two slotted pump check valve plugs together with their respective check valve balls

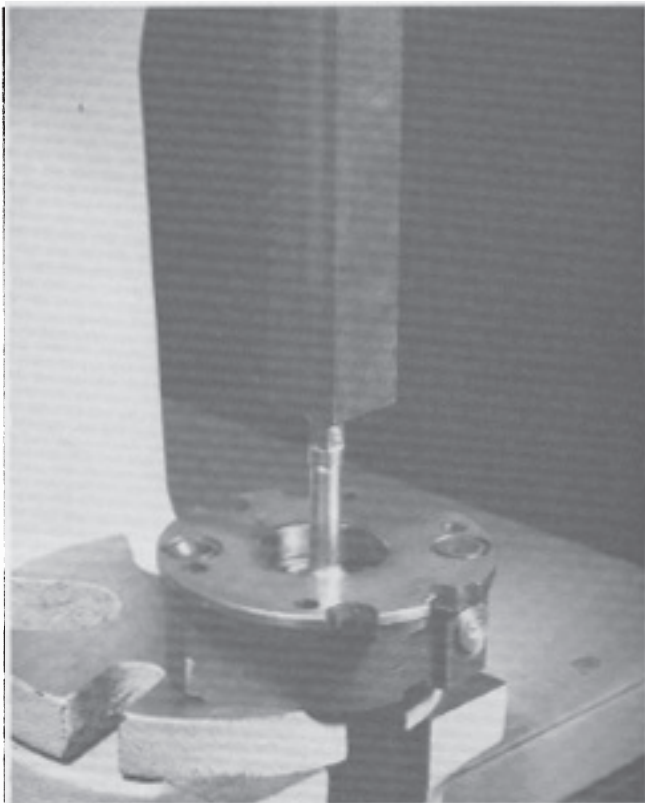


FIG. 53. Needle Bearing Removal

and springs. (These valves are located in the passage just below the charge and implement valve passage.)

11. Remove the push or free-wheeling valve by unscrewing it from the housing.

12. Remove the split back-up ring and the "O" ring seal from the valve.

13. If the needle bearing in the charge pump housing is damaged, replace as follows:

- a: Using a $\frac{1}{16}$ O.D. flat washer with two opposite edges ground to a width of $\frac{1}{16}$ " as a tool, insert it from the gerotor side against the inside of the needle bearing. Then, pressing against the washer with an arbor, remove the needle bearing.

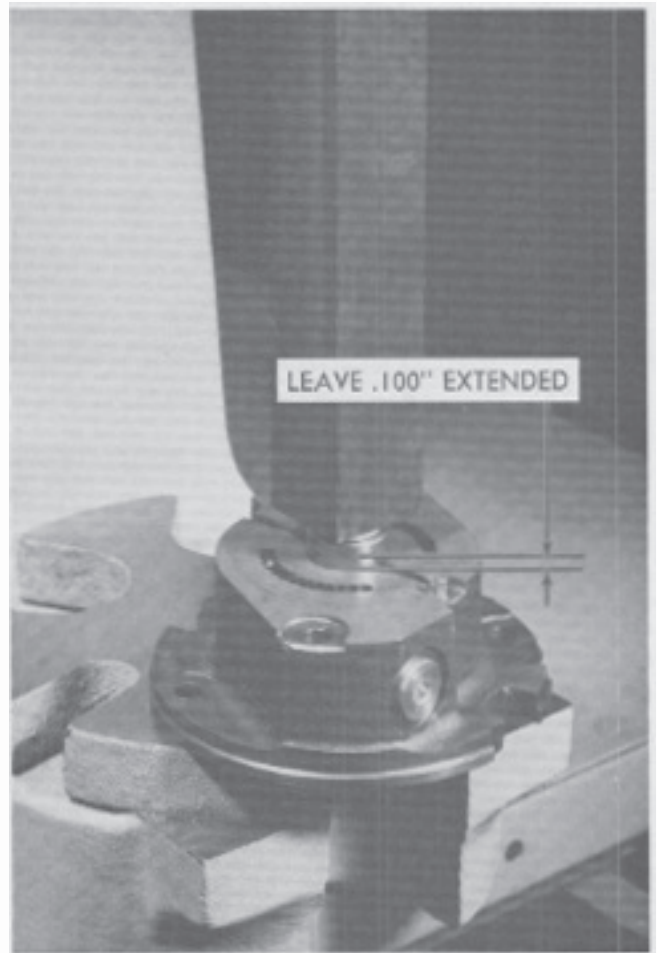


FIG. 54. Needle Bearing Installation

- b: To install the needle bearing, press it in place from the front side. **Note:** Always install needle bearings pressing on the heavy end, which may be easily identified. It is the end where the identification numbers are found. Press bearing to the correct depth — .100" should be left out of the bore.

PUMP HOUSING DISASSEMBLY & ASSEMBLY

Disassembly

1. Remove the thrust plate from the swash plate assembly.



FIG. 55. Seal Removal

2. Remove the pump shaft seal.

- a. Use a sharp awl and puncture the seal retainer.
- b. Pry out the seal, being careful not to scratch or damage the shaft seal surface or the aluminum housing.

3. Using snap ring pliers remove the retaining ring from the shaft.

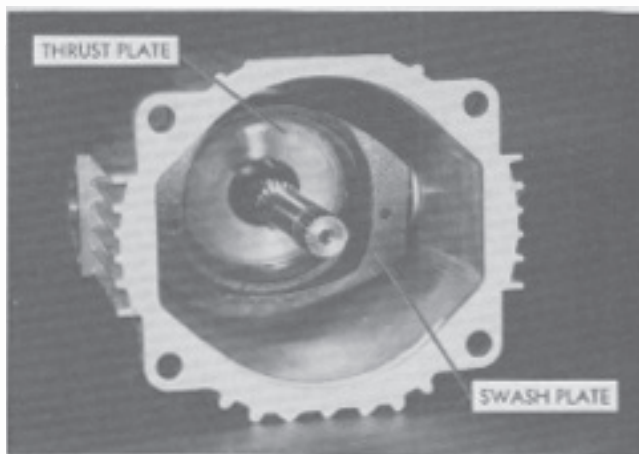


FIG. 56.

4. Remove the shaft by tapping on the input (both ends are splined) end and pushing it through the bearing.

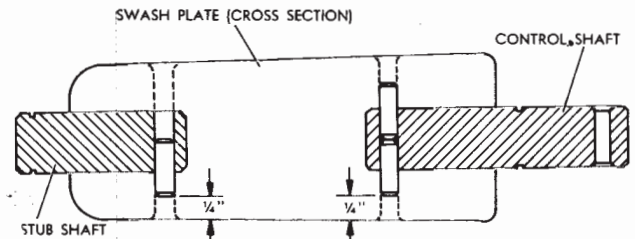


FIG. 57.

5. Using a $\frac{3}{16}$ " punch, drive the swash-plate-to-trunnion-shaft roll pins out toward the closed end of the case. **Note:** One roll pin is used at the short stub shaft and two roll pins are used at the control shaft.

6. Remove the trunnion shaft retaining rings and washers. Drive the stub trunnion shaft in from the outside and remove. Drive the control shaft out from the inside using a long punch inserted through the removed trunnion shaft hole.

7. Remove the swash plate housing.

8. Pry out the trunnion seals, being careful not to damage the housing. **Note:** If examination of the trunnion shaft needle bearings and the pump shaft ball bearing shows them to be in good condition, steps 9 and 10 should not be performed.

9. Using a suitable arbor such as a socket, press or drive needle bearings out of the housing from the inside.

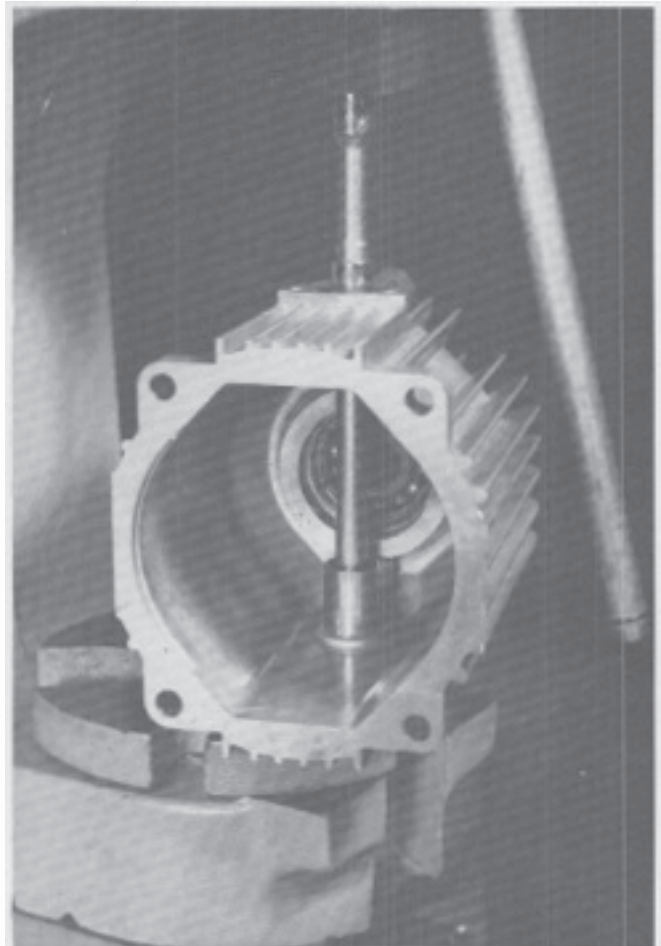


FIG. 58. Needle Bearing Removal

10. With snap ring pliers, remove the internal retaining ring that retains the pump shaft ball bearing in the pump housing, then remove the bearing by pressing it toward the inside of the housing.

Assembly of Pump Housing

1. Install pump shaft ball bearing in the front of the pump housing and retain with the internal tru-arc retaining ring.

2. **Note:** Only if needle bearings have been removed, install the two trunnion shaft needle bearings from the outside, pushing on the lettered end of the bearing. The bearings should be pressed in flush with the bottom of the seal bore so they will not interfere with the seal installation.



FIG. 59. Needle Bearing Installation

3. Install new trunnion shaft seals, pressing them in until they touch bottom. Oil the seal lips with 10W30 engine oil.

4. Insert the swash plate assembly into the case. Slide the trunnion shafts into each side, and into the swash plate housing. Line up the roll pin holes and install the roll pins. One roll pin is used at the short trunnion shaft and two roll pins are used at the control shaft. Drive the first pin in so it enters into the far side of the swash plate. Then drive the second roll pin down against the first pin until it is $\frac{1}{4}$ " below the surface of the swash plate. Drive the single roll pin at the short trunnion side so that it is $\frac{1}{4}$ " below the surface. See Fig. 57.

5. Install the trunnion seal washers and the retaining rings.

6. Install the pump shaft by tapping it through the bearing from the inside and retain it with the external snap ring.

7. Lubricate the pump shaft seal and install over the pump shaft with the lip side toward the pump. Press it in place so that it is flush with the outside of the housing.

Assembly of Pump Section

1. Install a new "O" ring seal and new back-up ring on the free wheeling valve, making sure the seal is toward the pump housing and the split back-up ring is toward the outside. Install the valve assembly.

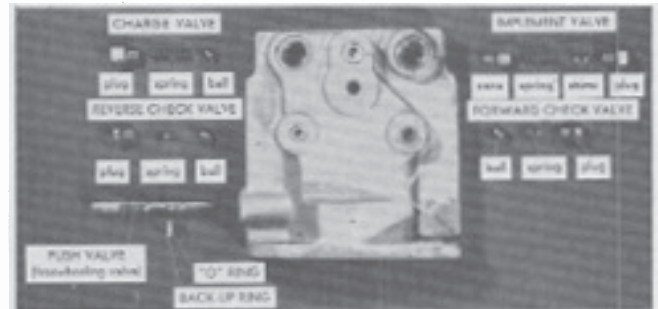


FIG. 60. Pump End Cap Valves

2. Install both pump check valve balls and springs, together with their slotted plugs and "O" ring seals.

3. Viewed from the motor side of the pump end cap, install charge relief valve and implement valve parts.

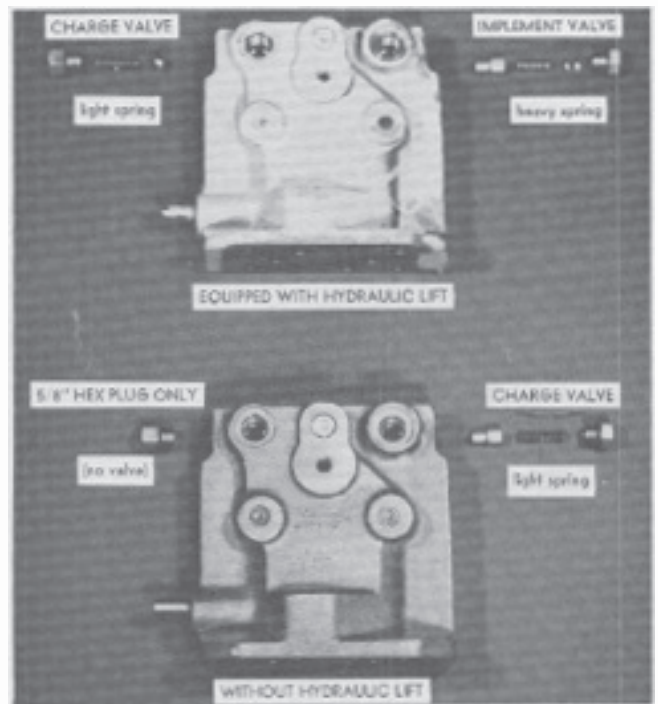


FIG. 61. Pump End Caps

a. Models not equipped for hydraulic lift:

1. Install the hex head plug and new "O" ring seal in the top left corner of the pump end cap.