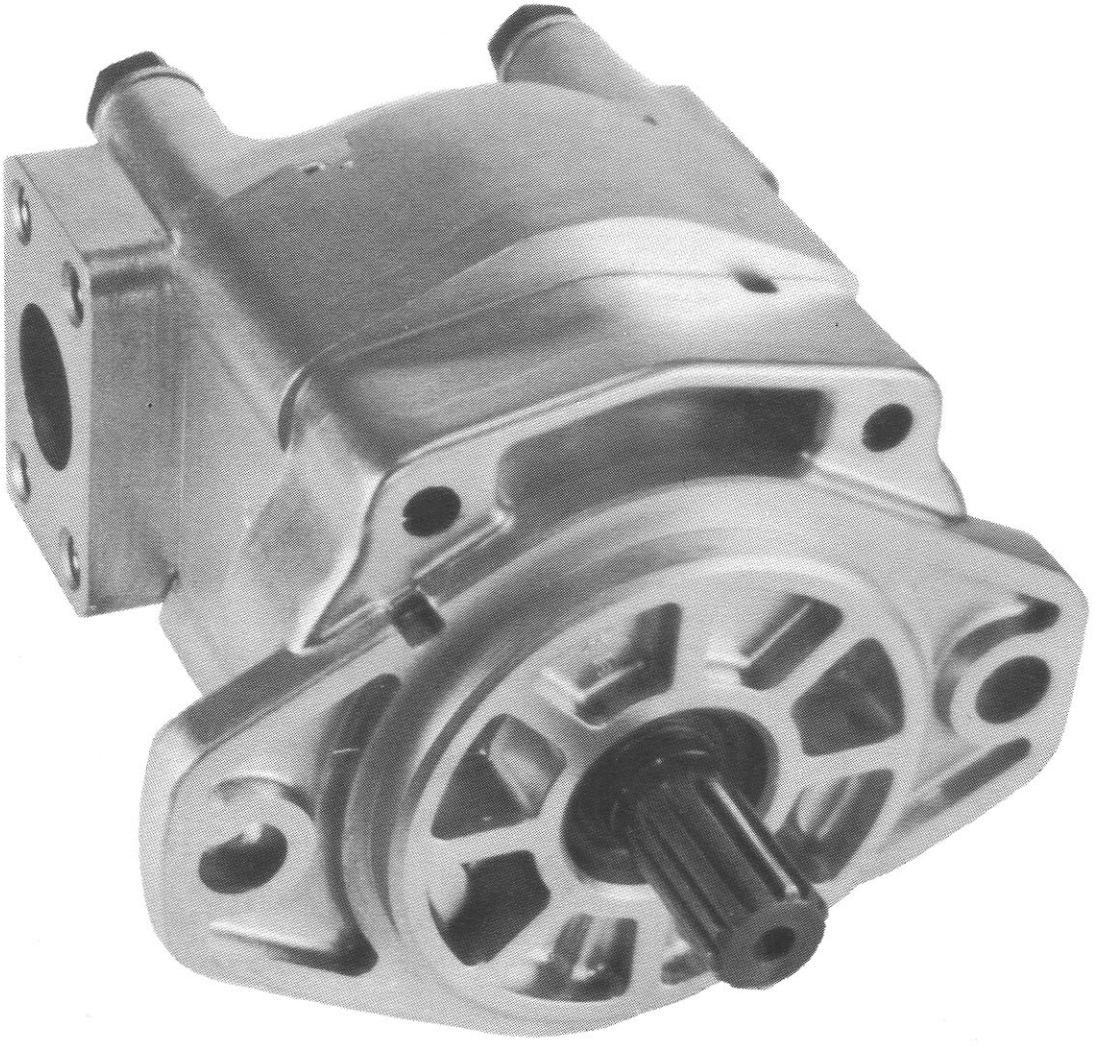
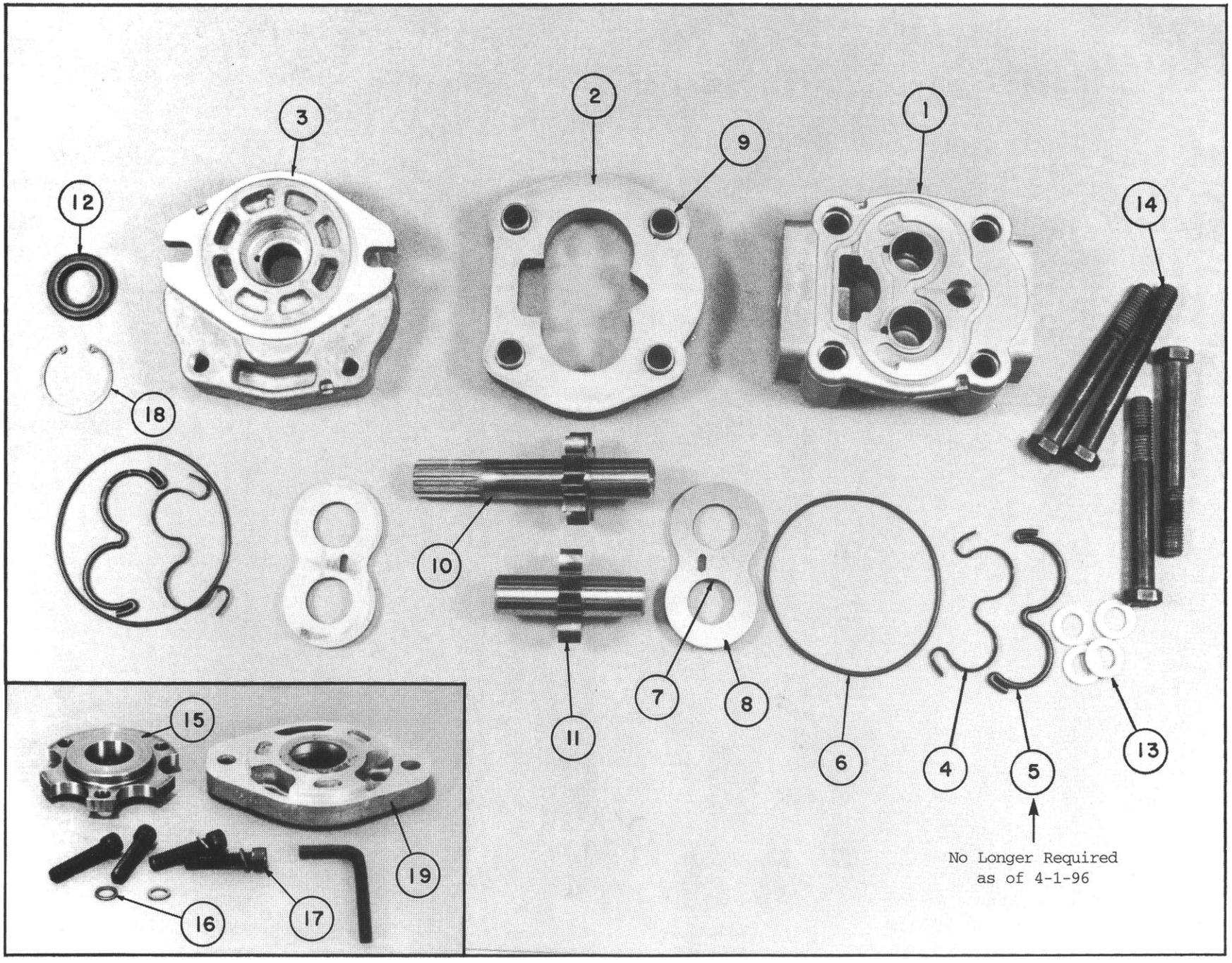
GRESEN®

DANA

P16 SERIES



Service Instructions


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
No Longer Required
as of 4-1-96

P16

PARTS IDENTIFICATION — P16

ITEM NO.	NAME OF PART	ITEM NO.	NAME OF PART
1	COVER PLATE	28	
2	GEAR PLATE	29	
3	FLANGE PLATE	30	
4	BACK-UP RING	31	
5	O-RING, PRESSURE BALANCE No Longer Required as of 4-1-96	32	
6	O-RING, FLANGE & COVER	33	
7	O-RING, PRESSURE PLATE	34	
8	PRESSURE PLATE	35	
9	DOWEL	36	
10	DRIVE GEAR	37	
11	IDLER GEAR	38	
12	SEAL, SHAFT	39	
13	WASHER	40	
14	CAPSCREW	41	
15	ADAPTER, MOUNTING	42	
16	WASHER	43	
17	CAPSCREW		
18	SNAP RING		
19	ADAPTER, FLANGE		
20			
21			
22			
23			
24			
25			
26			
27			

DISASSEMBLY AND ASSEMBLY INSTRUCTIONS FOR P16 PUMP

DISASSEMBLY INSTRUCTIONS

1. Using solvent and brush, clean outside of pump thoroughly. (Fig. 1)

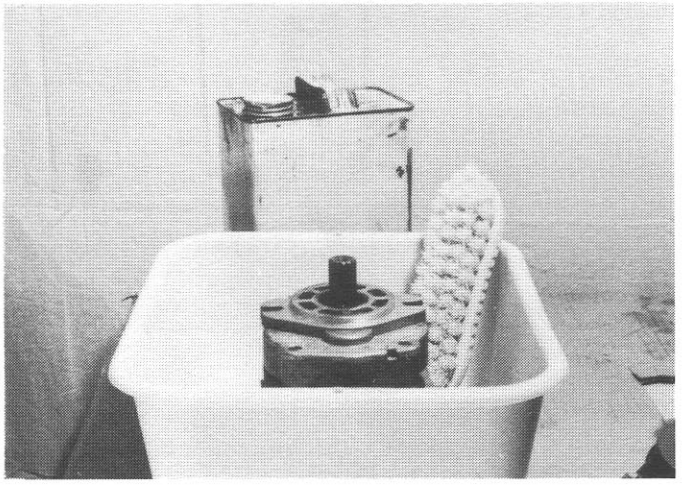


Fig. 1

2. Mark the pump plates nearest to drive shaft extension side. These marks can be used for matching in reassembling pump. (Fig. 2)

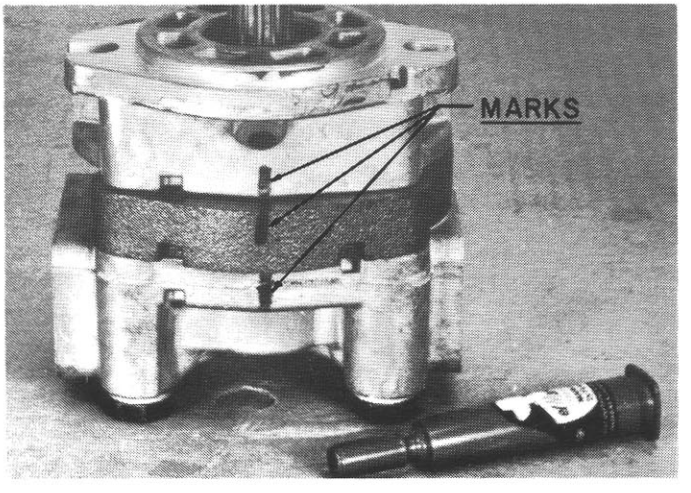


Fig. 2

3. Place pump in machinist vise. Use blocks of wood or cardboard between pump and vise jaws. (Fig. 3)

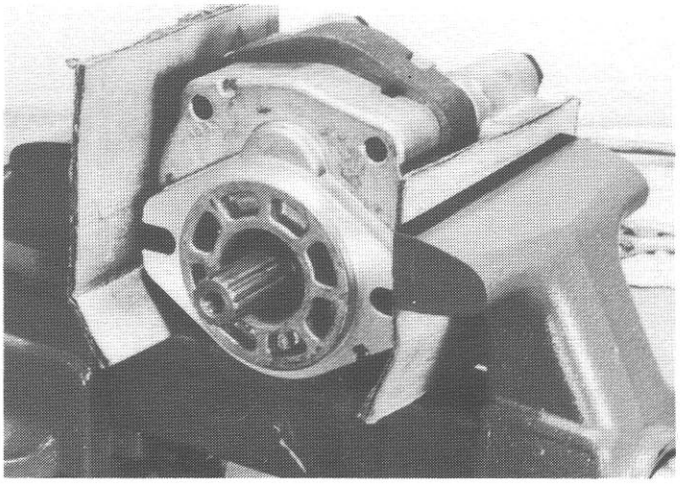


Fig. 3

4. If your pump has a mounting adapter (15), remove allen-head capscrews (17), washers (16) and flange adapter (19). (Fig. 4)

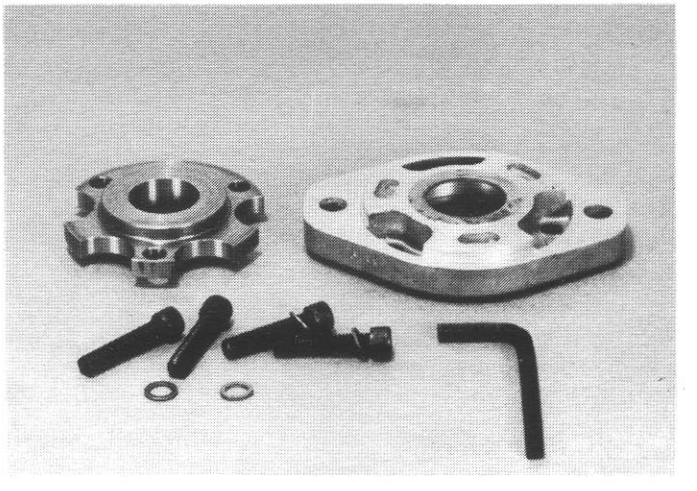


Fig. 4

5. Using 3/4 wrench, loosen and remove capscrews (14) and washers (13). (Fig. 5)

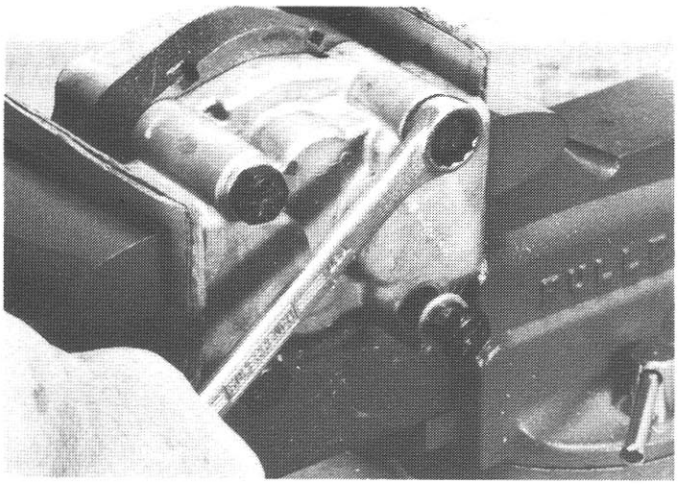


Fig.5

6. Remove pump from vise. Using wood mallet or plastic hammer, tap connector bosses to loosen cover plate (1). Lift plate straight up off gear journals. (Fig. 6)

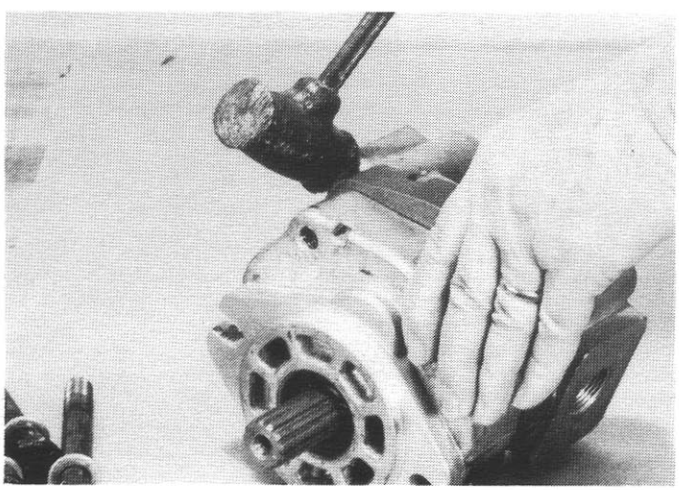


Fig. 6

7. Remove body o-ring (6), pressure balance o-ring (5), and back-up ring (4). (Fig. 7)

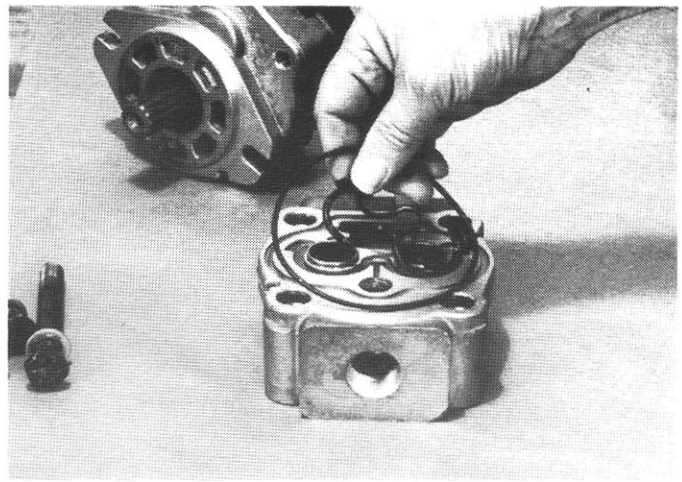


Fig. 7

8. Remove pressure plate (8). Remove o-rings (7) from journal bores of pressure plate. (Fig. 8)

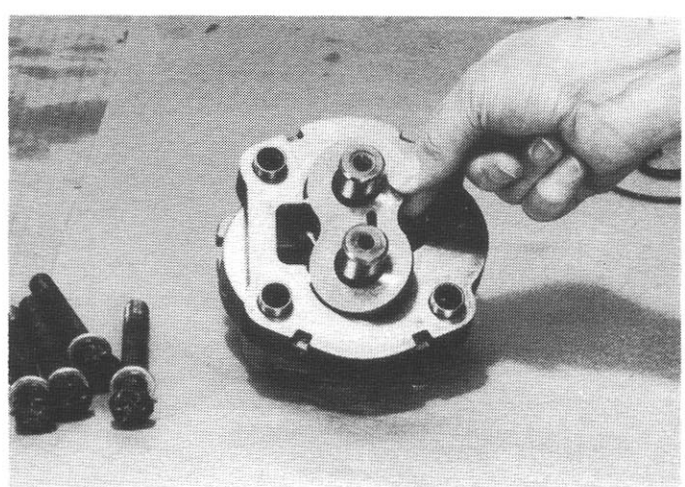


Fig. 8

9. Lift drive gear (10) and idler gear (11) straight up out of gear plate. (Fig. 9)

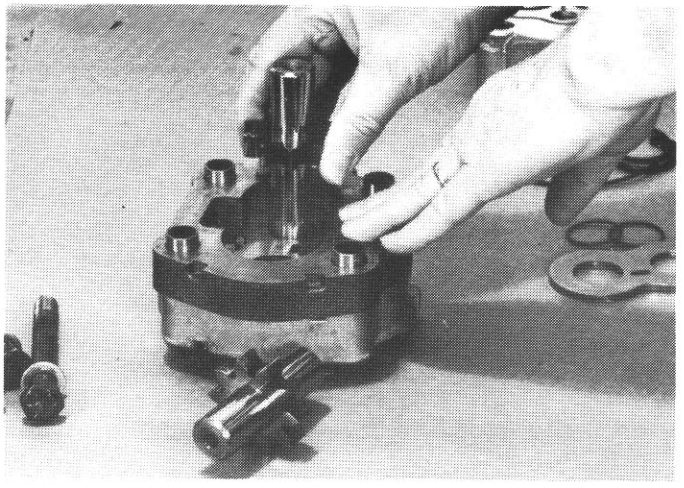


Fig. 9

10. Tap edges of gear plate (2) with wood mallet or plastic hammer to loosen. If gear plate does not move by this method, lift the plates up off work bench slightly and tap the ears of flange plate lightly. (Fig. 10)

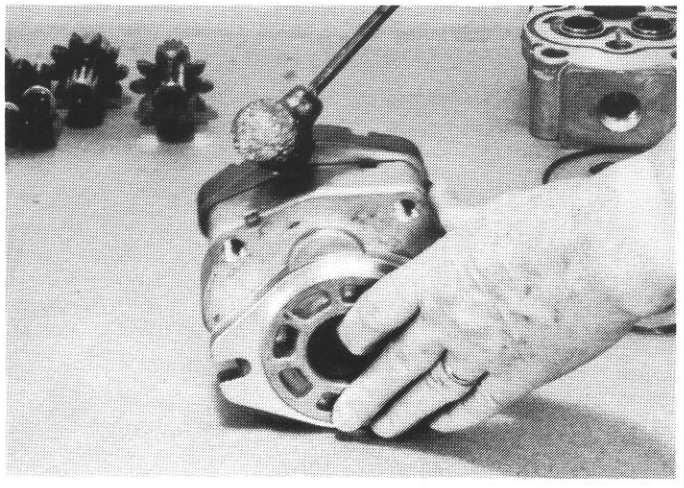


Fig. 10

11. Dowels (9) are pressed into gear plate. There are four dowels on each side and unless gear plate is replaced it is not necessary to remove them. To remove the dowels use a rod or punch and hammer to drive them out. Place driver inside of dowel and against end of dowel on opposite side and tap it out. (Fig. 11)

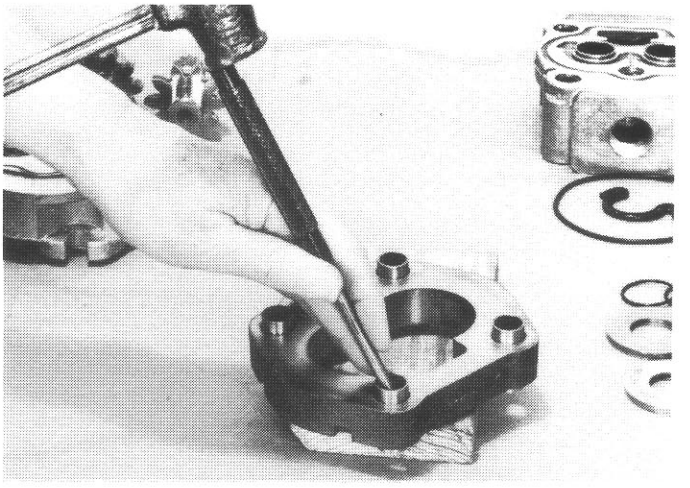


Fig. 11

12. To complete the disassembly, follow steps 7 and 8. (Fig. 12)

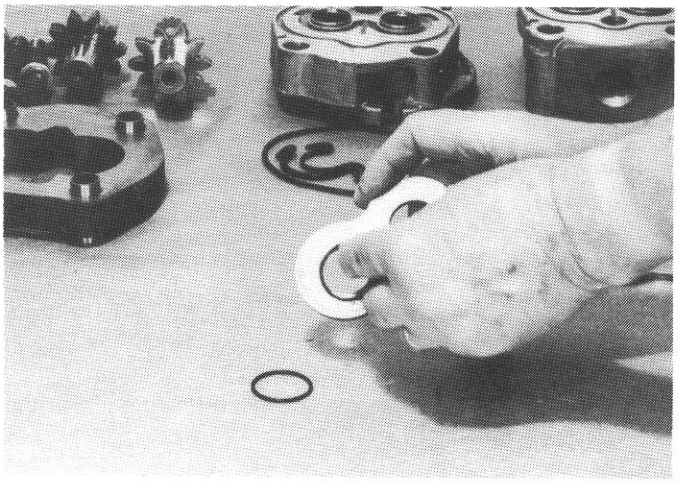


Fig. 12

13. For shaft seal removal and replacement, see seal replacement section.

14. Wash all pump parts in clean solvent and wipe dry with clean shop towel or blow dry with shop air.

15. Visually inspect all parts. For detailed instructions, see parts inspection section.

ASSEMBLY INSTRUCTIONS

16. Each pump is assembled and tested for a specific direction of rotation. Direction of rotation can not be changed without changing flange (3).

17. Install o-ring (6) in cover plate (1). After o-ring has been placed in groove, spread a light coat of clean heavy grease on the o-ring to hold it in place. (Fig. 13)

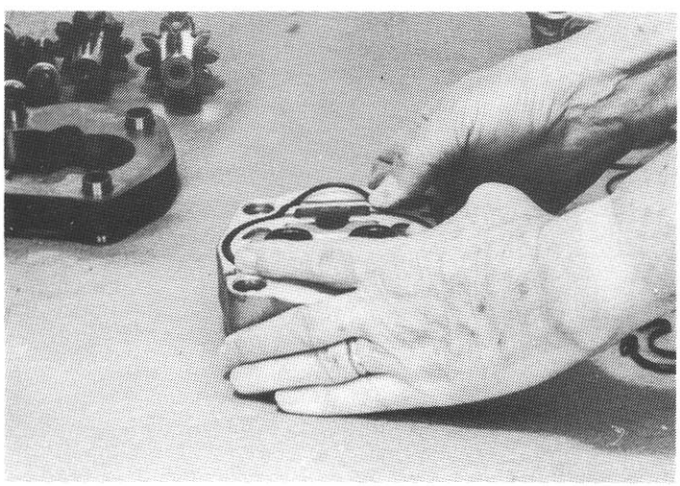


Fig. 13

18. If for any reason gear plate (2) had to be replaced, dowels (9) must be pressed into both sides of replacement gear plate before assembling it to cover plate (1). Dowels can be tapped in with hammer, but it is best to use dowel guide and press. Whichever method is used, make sure they are straight in dowel bores. If press is used, do not apply rapid force on dowels. If hammer is used, do not drive the dowels in aggressively. Tap them lightly until they are against shoulder. (Fig. 14)

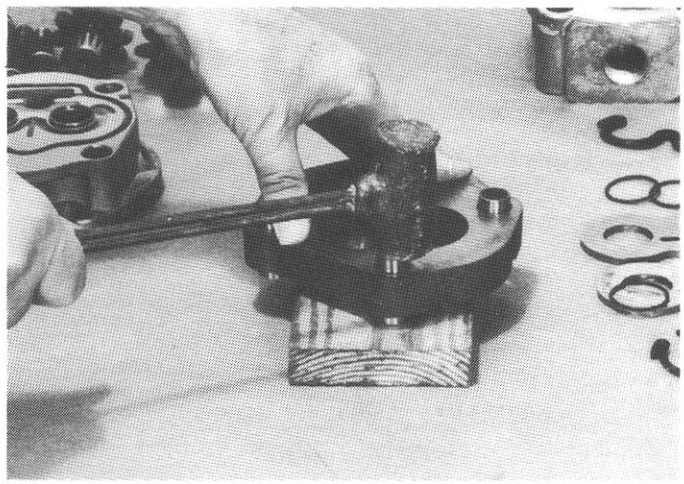


Fig. 14

19. With matching marks made in step 2 toward you, and the four cast recesses in the outer edge of gear plate toward cover plate, line up dowels. Tap gear plate lightly until it is against O-ring in cover plate. (Fig. 15)

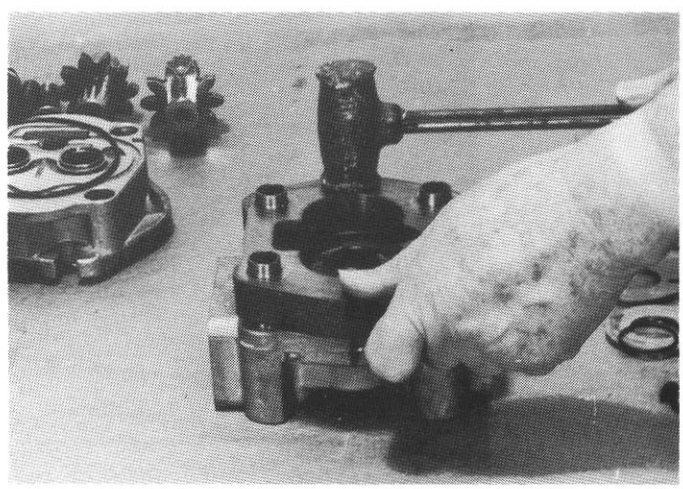


Fig. 15

20. Install back-up ring (4) and o-ring (5) as shown in figure 16.

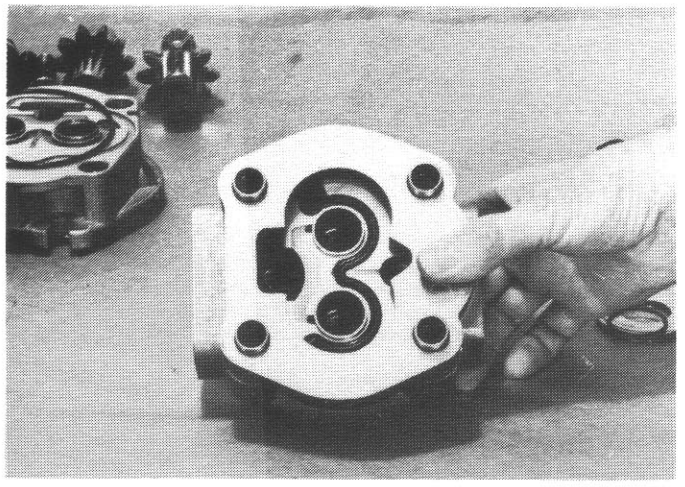


Fig. 16

21. Install o-ring (7) in pressure plate (8). With trap (small oblong hole) in pressure plate toward discharge side of gear plate and bronze side up, slide pressure plate down gear bores. (Fig. 17)

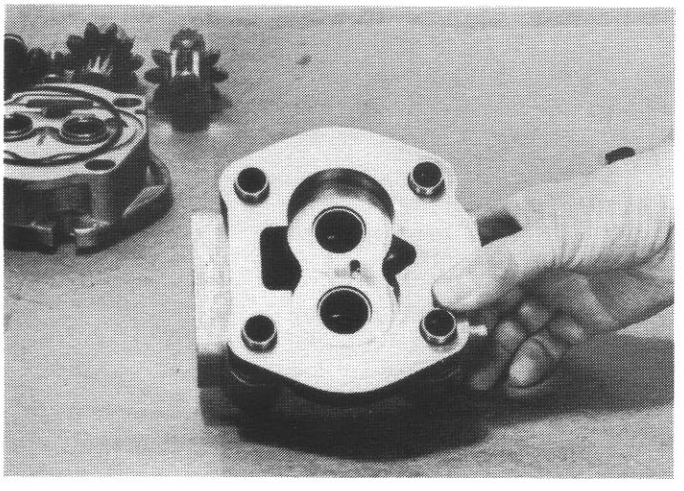


Fig. 17

22. Install drive gear (10) in gear bore nearest to matching mark and idler gear (11) in opposite bore. (Fig. 18)

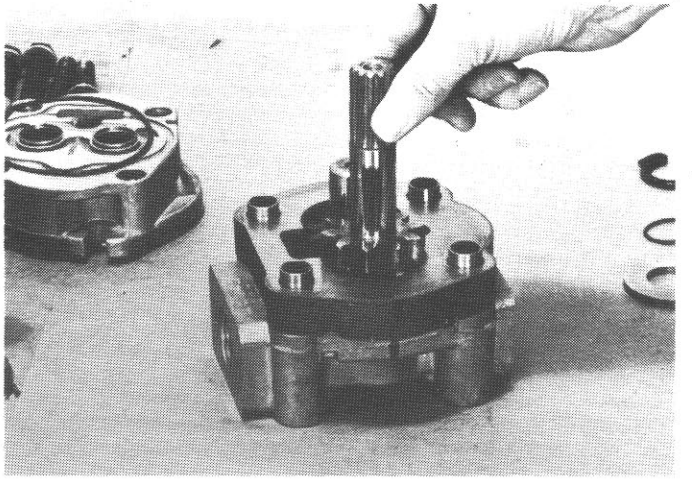


Fig. 18

23. Install o-ring (7) in pressure plate (8). With trap toward discharge side and bronze side down, place pressure plate down against gear faces. (Fig. 19)

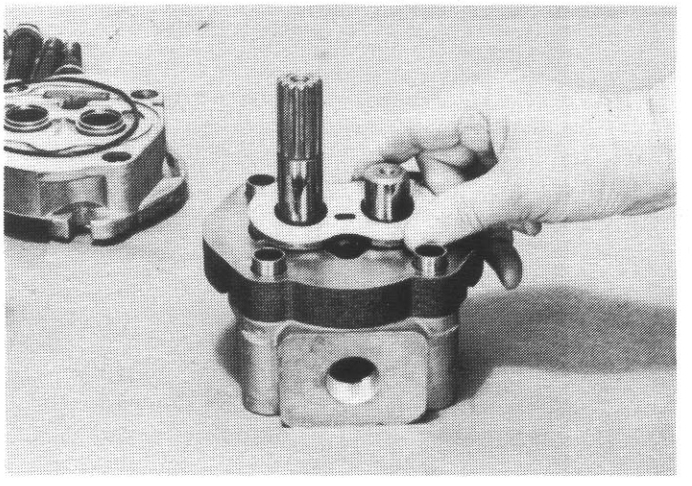


Fig. 19

24. Install back-up ring (4), and o-ring (6) in flange plate (3). Use clean heavy grease to hold o-rings in grooves. (Fig. 20)

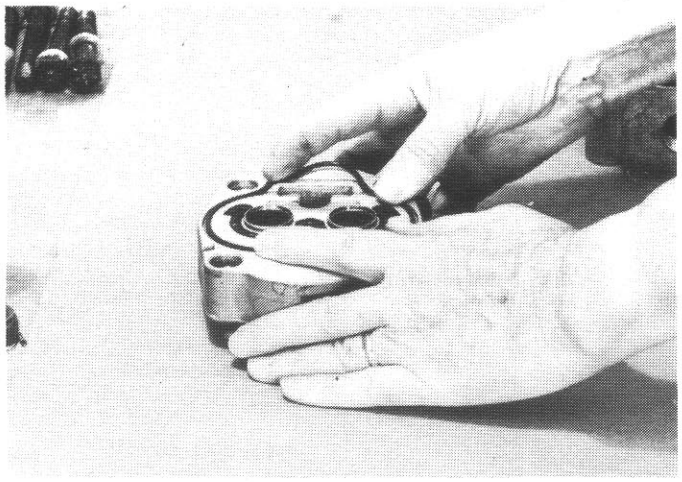
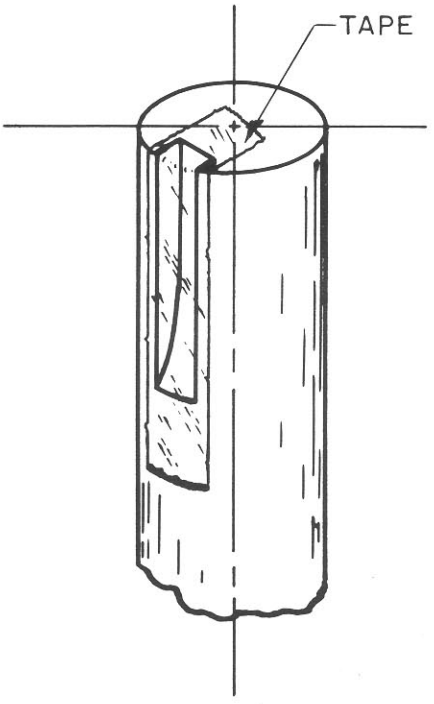


Fig. 20

NOTE: Use tape to cover keyway before installing flange to avoid nicking seal lip.



25. If extension end of drive shaft is splined, coat splines with clean heavy grease to protect seal as flange plate (3) slides down shaft. If extension end is keyed, use a piece of tape to cover keyway to protect seal. (Fig. 21)

26. With o-rings in flange plate (3) facing down and keeping plate true with shafts, slide it down until it contacts dowels in gear plate. Bump flange very lightly with hands or plastic hammer to force the plate down on dowels, at the same time making sure grease is holding o-rings in grooves. Once plate is in position if keyway protection was used, remove from shaft. (Fig. 22)

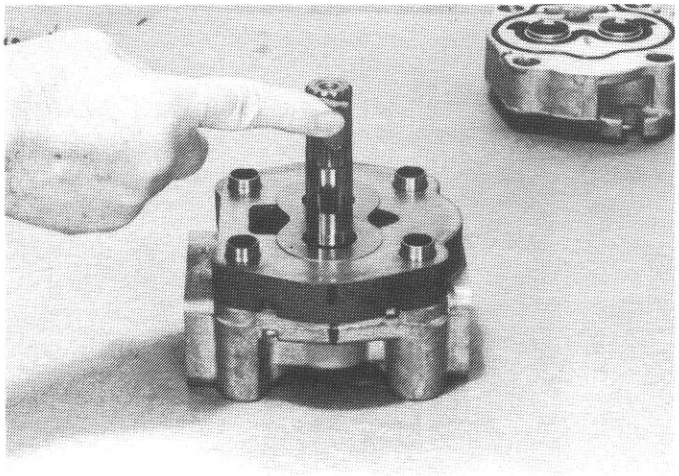


Fig. 21

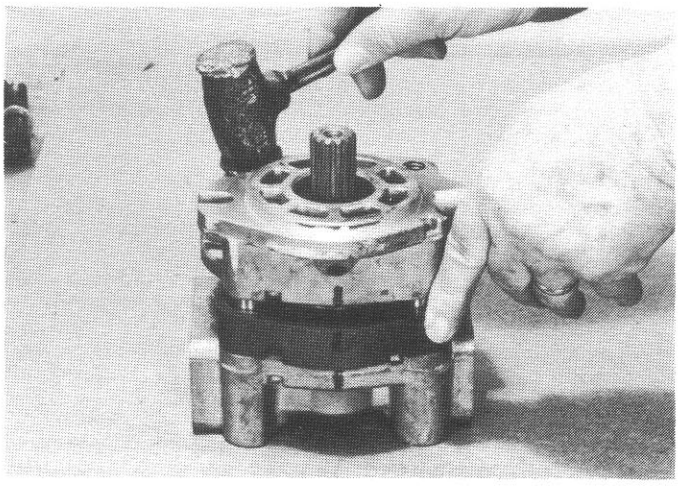


Fig. 22

27. Coat capscrew (14) threads with clean hydraulic oil. Install washers (13) on capscrews and screw them in and torque to 80 ft. lbs. (Fig. 23)

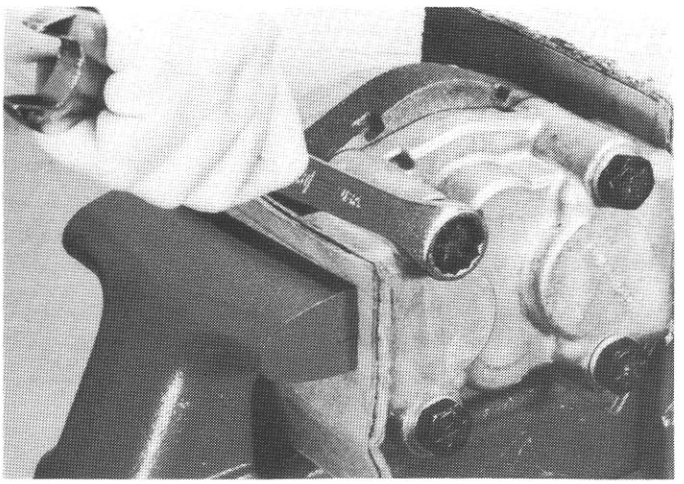


Fig. 23

28. Using twelve inch wrench, check to see if shaft will turn. It will be tight but should turn free with a 15 lbs maximum of force on wrench. (Fig. 24)

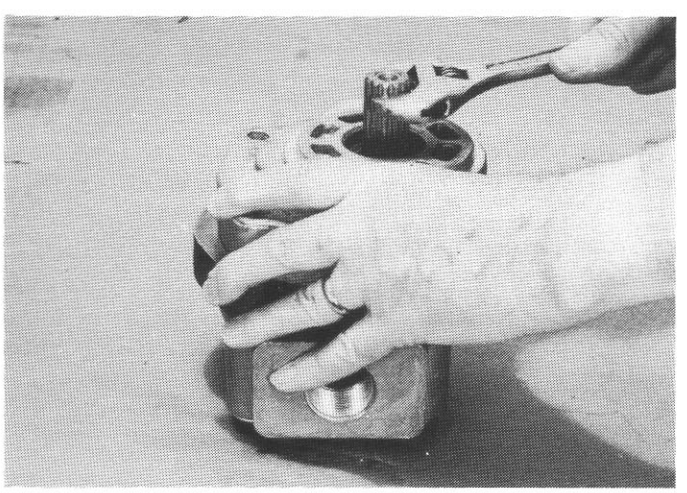


Fig. 24

SHAFT SEAL REPLACEMENT INSTRUCTIONS

FOR P16 SERIES

1. Remove pump from machine. Plug the suction and discharge ports and wash the pump thoroughly. If shop air is available, blow all contaminants from shaft seal area.

2. If only shaft seal replacement is to be made, it is not necessary to completely disassemble the pump.

3. For adaptor equipped models, loosen and remove capscrews and washers. Tap the mounting adaptor loose with a soft hammer and slide it off the shaft. Remove the flange adaptor also, if one is used.

4. Loosen and remove the four capscrews from the rear of the pump. Hold the gear plate and valve body together and tap the flange plate with a soft hammer to loosen (Fig. 1)

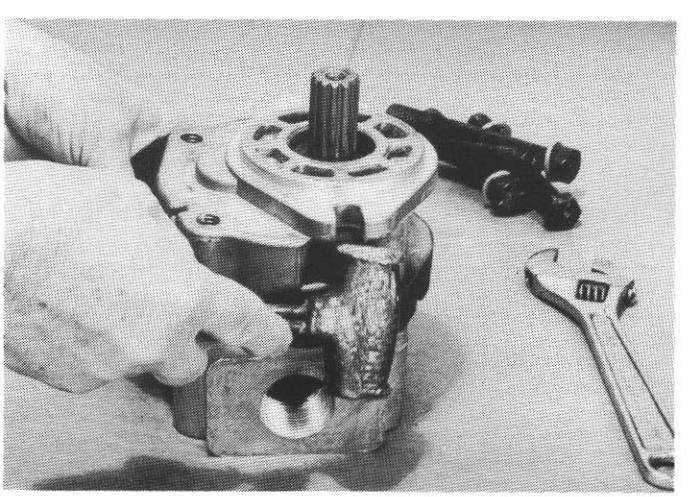


Fig. 1

5. Slide flange plate off the shafts and remove the plate o-ring, "E" shaped o-ring, and back-up strip. Also remove the shaft seal snap ring from seal bore. Pumps with mounting adaptors do not get shaft seal snap ring. (Fig. 2)

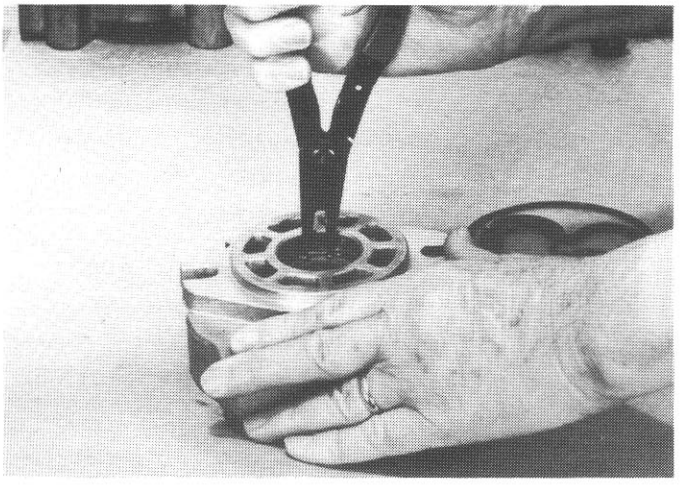


Fig. 2

6. Place flange plate in machinist vise. Use cardboard between jaws of vise and flange plate. (Fig. 3)

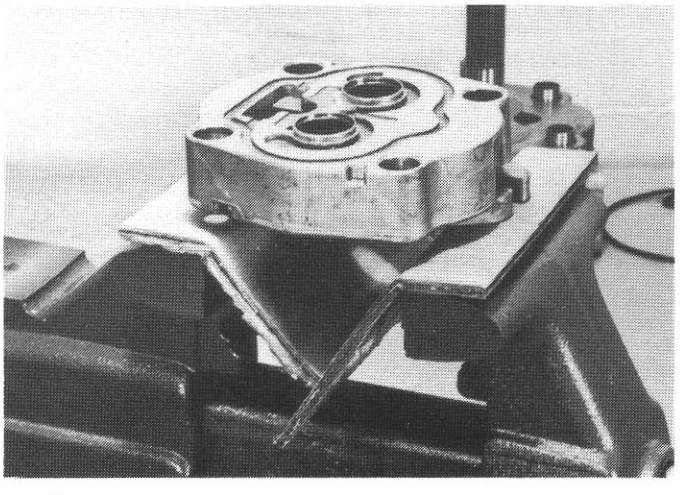


Fig. 3

7. Slide a punch of appropriate size through the bearing and against the seals metal casing. Hold the punch away from the bearings and drive the seal out without damaging seal bore or bearing. Move the punch around the seal as it is driven out. Do not allow the punch to rest against the seal bore or bearing while driving the seal out. (Fig.4)

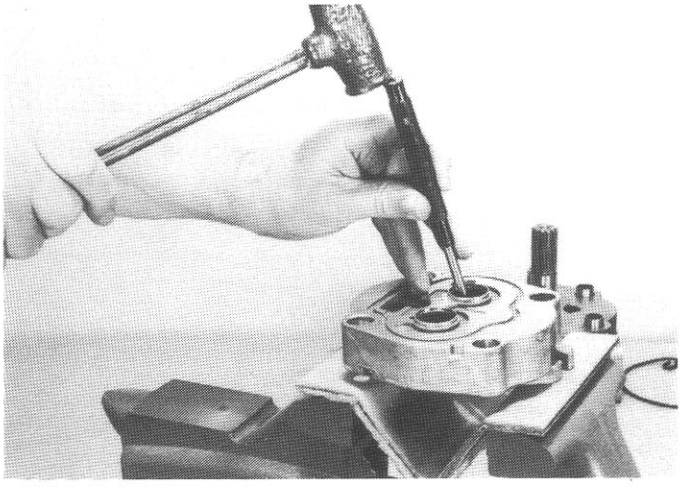


Fig. 4

8. Check the seal bore for scratches. If scratches are apparent, us a four hundred grit sandpaper to clean up the bore. Do not use coarse grit sandpaper. It will cut heavy grooves in the bore and will allow the seal to leak around the O.D.

9. Wash the flange plate in clean solvent and wipe it dry with clean shop towels or blow it dry with shop air.

10. If an arbor press is available, use it to press the new seal into flange bore. If the press is not available, place the flange in a machinist vise with the seal bore facing the movable jaw. Arrange blocks of wood on each side of the protruding ends of the bearings at the side next to fixed jaw to prevent pressing on the bearings while the seal is being pressed in. (Fig. 5)

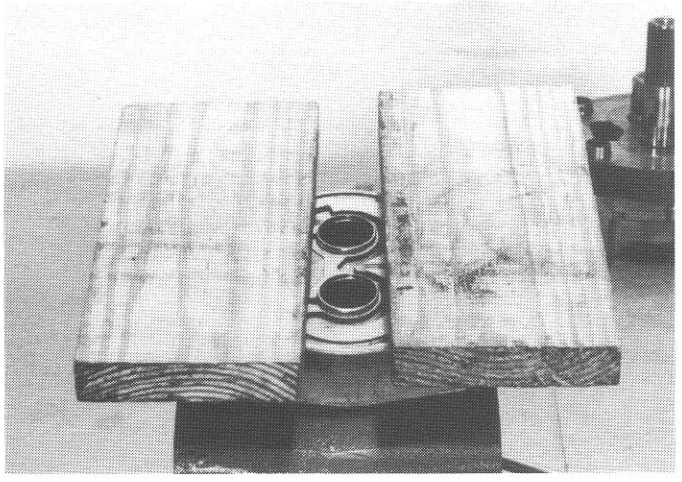


Fig. 5

11. Center the seal over the seal bore with metal face of the seal facing movable jaw. Place clean block of wood against seal and tighten the vise slowly until wood block is against the flange. Make sure the seal is started and pressed straight into the bore. (Fig. 6)

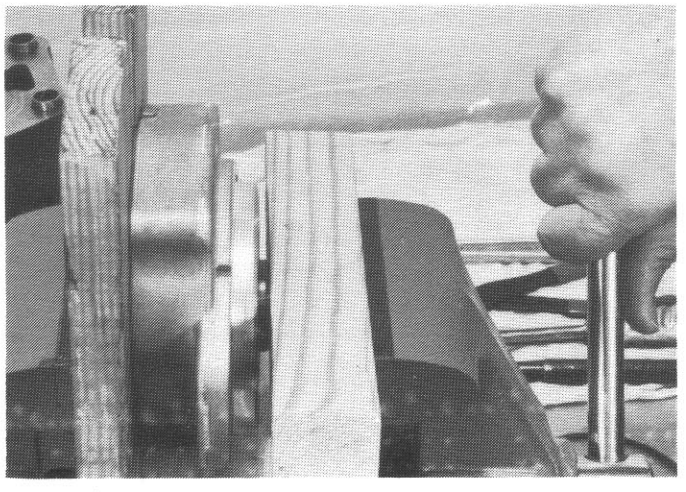


Fig. 6

12. Loosen the vise and remove the block of wood. Place a socket wrench (having an O.D. just slightly smaller than seal bore) against seal. Tighten vise against socket and press seal in until seal has just cleared snap ring groove in seal bore. Apply two or three drops of #290 Loctite against seal bore and O.D. of seal. Hold the flange at a 45 degree angle and rotate it slowly to allow the loctite to flow all the way around the O.D. of the seal. If your flange gets snap ring in seal bore, install the snap ring and wipe the excess loctite out of seal bore and any that might have gotten on seal lip. (Fig. 7)

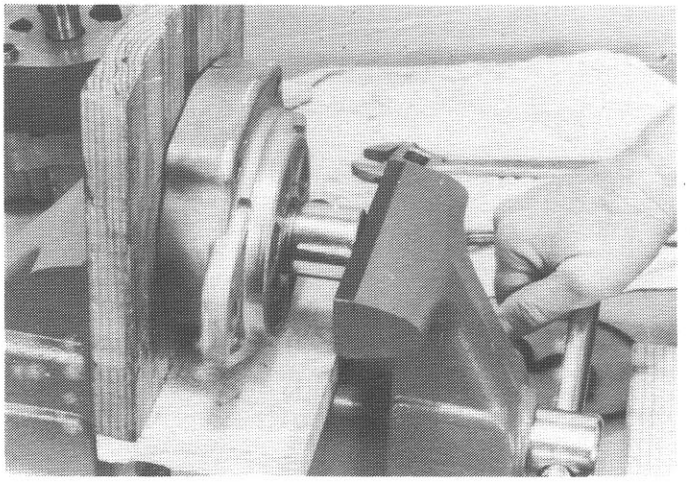


Fig. 7

13. Install flange o-ring, and "E" shaped back-up strip. Use clean heavy grease to hold the o-rings and back-up strip in position. (Fig. 8)

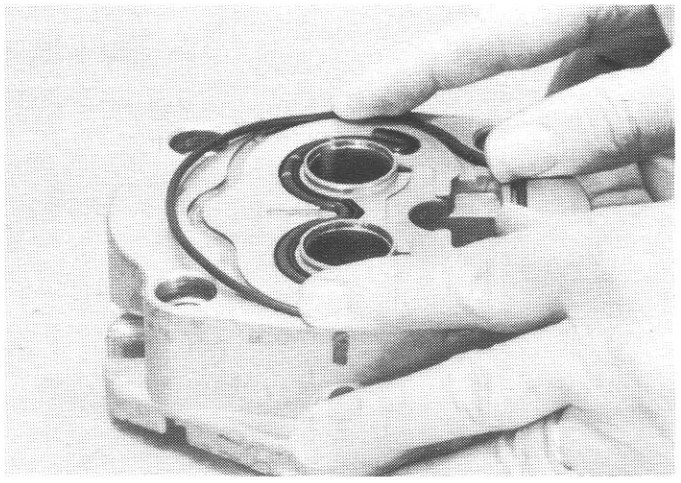


Fig. 8

14. If extension end of the drive shaft is splined, coat the spline with clean grease. If is has keyway, cover the keyway with transparent tape. This will protect the rubber sealing lip as it slides down the shaft. If tape is used, make sure all of the tape is removed from the shaft.

15. After flange plate has been installed, screw the cap-screws in and torque them to 70 to 75 lb. ft.

16. If your pump uses the adaptor and flange mount arrangement, reinstall the adaptors, cap-screws, and washers. Torque the capscrews to 35 lb. ft.

INSPECTION OF PARTS

1. Visually inspect all parts. It is not necessary to set up gauges to check the amount of wear on the pump parts. After a visual inspection those parts which are in questionable condition should be replaced with new ones.

2. Note the bores in the gear plate. On the discharge side you will see a milled groove in the center of the plate. During the initial break-in at the factory, the gears cut into the suction side. Nominal depth of this cut is .008" and should not exceed .015". Small bits of metal are sometimes pulled out of the surface during break-in. This is not detrimental. If the cut is deeper than .015" or the plate is cracked or damaged in some other way, it should be rejected.

3. Examine the gears. If excessive wear is visible on the journals, sides, or faces of the gears, or at the point where the drive gear shaft rotates in the lip seal, reject them. If splines or keyways are excessively worn, replace the drive gear.

4. Examine the pressure plates. They should not show excessive wear on the bronze side. If deep curved wear markes are visible, replace the plate with new ones.

5. Shaft seals should be replaced. All o-ring seals and back-up rings or strips should be replaced with new.

6. Bearing i.d.'s should have a gray coating. If bronze can be seen shining through the teflon on the suction side, the bearings and plate they are in, should be replaced.

TROUBLESHOOTING GUIDE FOR GEAR TYPE HYDRAULIC PUMPS

IDENTIFICATION	CAUSE	CORRECTIVE CHECKS
1. Sandblasted band around pressure plate bores 2. Angle groove on face of pressure plate 3. Lube groove enlarged and edges rounded 4. Dull area on shaft at root of tooth 5. Dull finish on shaft in bearing area 6. Sandblasted gear bore in housing	I. Abrasive wear caused by fine particles. 1. Dirt (fine contaminants, not visible to the eye)	1. Was clean oil used? 2. Was filter element change period correct? 3. Were correct filter elements used? 4. Cylinder rod wiper seals in good condition? 5. Cylinder rods dented or scored? 6. Was system flushed properly after previous failure?
1. Scored pressure plates 2. Scored shafts 3. Scored gear bore	II. Abrasive wear caused by metal particles. 1. Metal (coarse) contaminants, visible to the eye	1. Was system flushed properly after previous failure? 2. Contaminants generated elsewhere in hydraulic system? 3. Contaminants generated by wearing pump components?
1. Any external damage to pump 2. Damage on rear of drive gear and rear pressure plate only	III. Incorrect Installation	1. Did shaft bottom in mating part? 2. Any interference between pump and machine?
1. Eroded gear plate 2. Eroded pressure plates	IV. Aeration — Cavitation 1. Restricted oil flow to pump inlet 2. Aerated oil	1. Tank oil level correct? 2. Oil viscosity as recommended? 3. Restriction in pump inlet line? 4. Air leak in pump inlet line? 5. Loose hose or tube connection near or above oil level in tank? 6. Excessive operation of relief valve?
1. Heavy wear on pressure plate 2. Heavy wear on end of gear	V. Lack of Oil	1. Was oil level correct? 2. Any leaks in piping inside tank? 3. Any oil returning above oil level?
1. Gear plate scored heavily 2. Inlet peened and battered 3. Foreign object caught in gear teeth	VI. Damage caused by metal object	1. Metal object left in system during initial assembly or previous repair? 2. Metal object generated by another failure in system?
1. Pressure plate black 2. O-rings and seals brittle 3. Gear and journals black	VII. Excessive Heat	1. Was a valve stuck? 2. Was relief valve too low? 3. Was oil viscosity correct? 4. Was oil level correct?
1. Broken shaft 2. Broken gear plate or flange	VIII. Over Pressure	1. Relief valve setting correct? 2. Did relief valve function?

GRESEN®

DANA

GRESEN HYDRAULICS DIVISION • DANA CORPORATION
PO BOX 25000, GREENVILLE, SC 29616 • PHONE 864-234-0444 • FAX 864-234-4615

People Finding A Better Way™

RECYCLED PAPERS

CATALOG NO. GSP-185
Rev. 10/96 Printed in U.S.A.