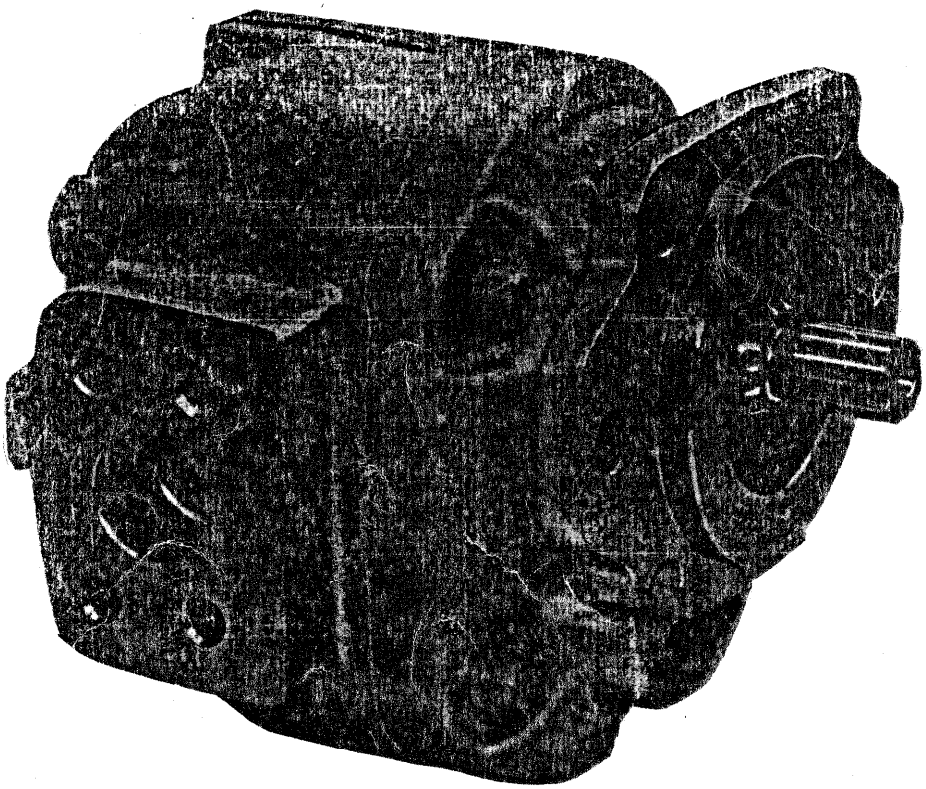
HYDRECO®

# 190-220-290 and "A" Series ROLLER BEARING PUMPS SERVICE INSTRUCTIONS



80-286 (8-85)

wagner
a division of allied systems company

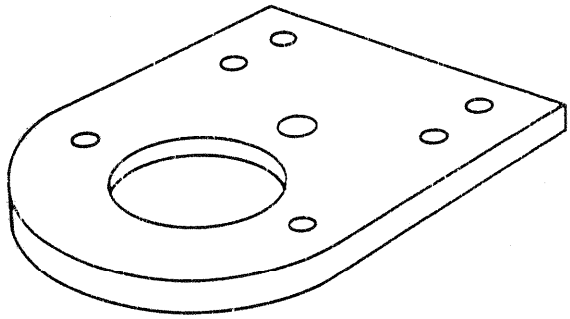
# Index

# Preparation for disassembly

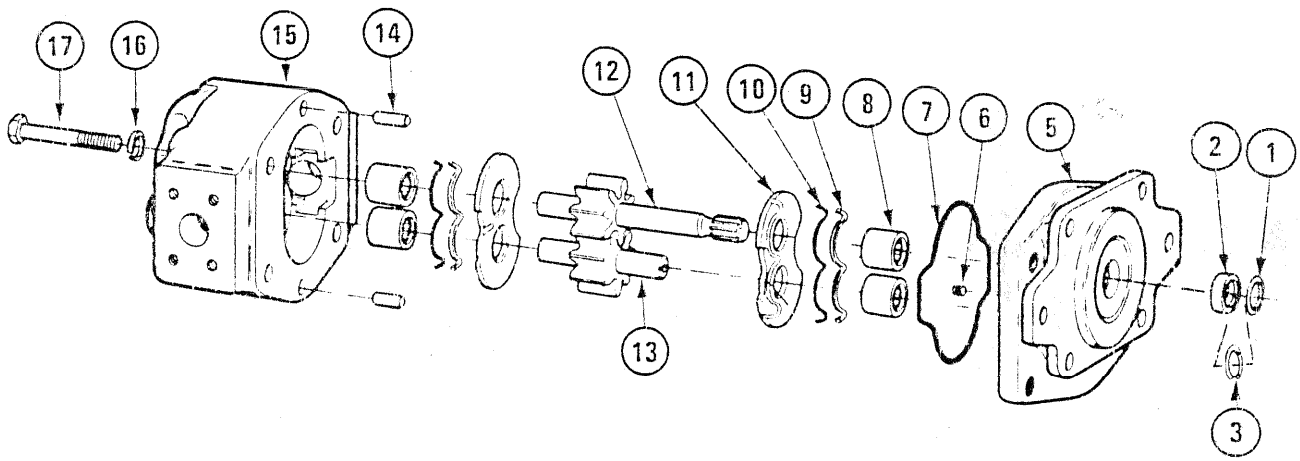
1. Be sure the work is done in a clean area.
2. Clean the unit thoroughly with a solvent. Remove all sharp edges from splines, drill points, keyways and end of shaft. Mark the adapter and cover/housing sections to ensure correct reassembly.
3. To aid you in disassembly and reassembly, the pump should be retained in some manner.

   We recommend the use of a steel plate bolted to and extending over the edge of a work bench. The plate should have a hole large enough for the adapter flange pilot to drop through, and two holes matching the location of the mounting holes in the adapter flange. The pump can now be firmly fixed to the plate by bolts.

   This is especially helpful in removal and torquing of capscrews.



BENCH MOUNTED ASSEMBLY PLATE




TYPICAL SINGLE PUMP ASSEMBLY

1. Dust Seal
2. Shaft Seal
3. Spacer
5. Mounting Adapter
6. Plug (does not apply on 290)
7. Seal Ring
8. Bearing
9. Back-up Ring
10. Seal
11. Seal Plate
12. Drive Shaft Gear
13. Driven Shaft Gear
14. Dowel
15. Cover/Housing
16. Lock Washer
17. Cap Screw

**Note:** Spacer "item 3" required with Tell-Tale Drain Construction.

# Disassembly

1. Remove capscrews (17) and lockwashers (16)

2. Cover/housing (15) and adapter (5) can now be separated. There are two methods of separation:
   A. As illustrated in fig. 1
   B. Remove two capscrews 180° apart leaving two engaged approx. three or four threads into adapter section. Lay pump on its side and tap capscrews with soft head hammer until cover/housing and adapter separate. Remove capscrews, lay pump, cover/housing down and remove adapter.

CAUTION:
DO NOT ATTEMPT TO PRY SECTIONS APART WITH A SCREWDRIVER OR SIMILAR TOOL, AS SUCH ACTION CAN DAMAGE MACHINED SEALING SURFACES.

3. Remove adapter seal plate (11) drive (12) and driven (13) gear assemblies. Note: If gears are to be reused, they should be marked before removal to ensure replacement in the same position. See fig. 2.

4. Remove section seal (7)

5. Remove cover/housing seal plate (11)

6. Remove back-up ring (9) and seal (10) from both seal plates. Note position of seal and back-up ring for correct installation upon reassembly.

7. Remove roller bearings (8) with bearing puller as illustrated in fig. 3.

8. Remove dust seal (1) shaft seal (2) spacer (3) and oil deflector (4). Use extreme caution in the removal of these parts to avoid damaging seal bore area.

9. If pump is to be rebuilt and operated in original direction of rotation, it is not necessary to remove plug (6) in adapter.

This completes disassembly.

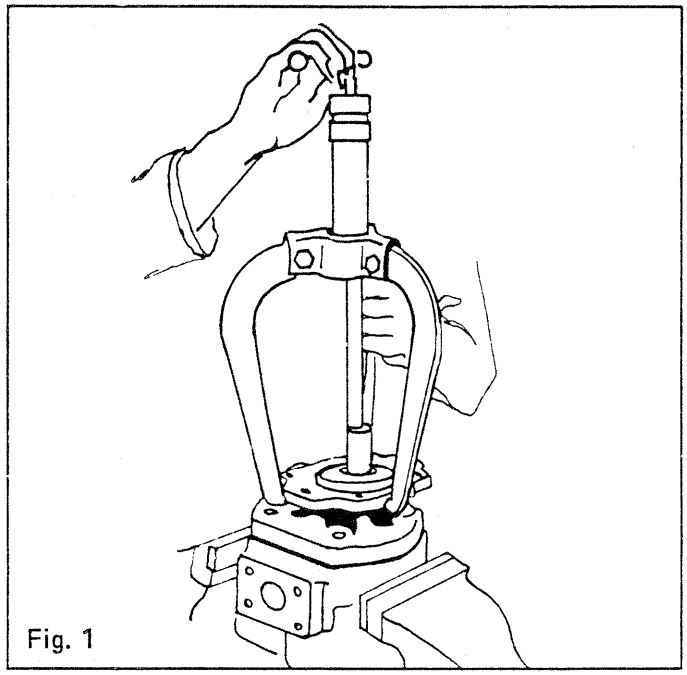


Fig. 1

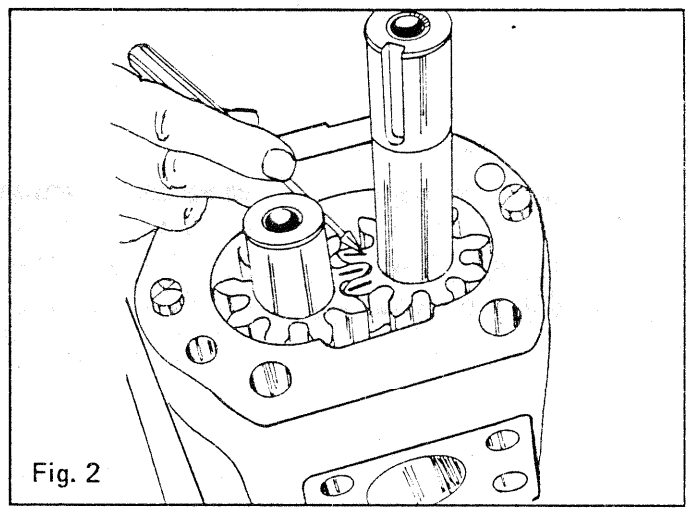


Fig. 2

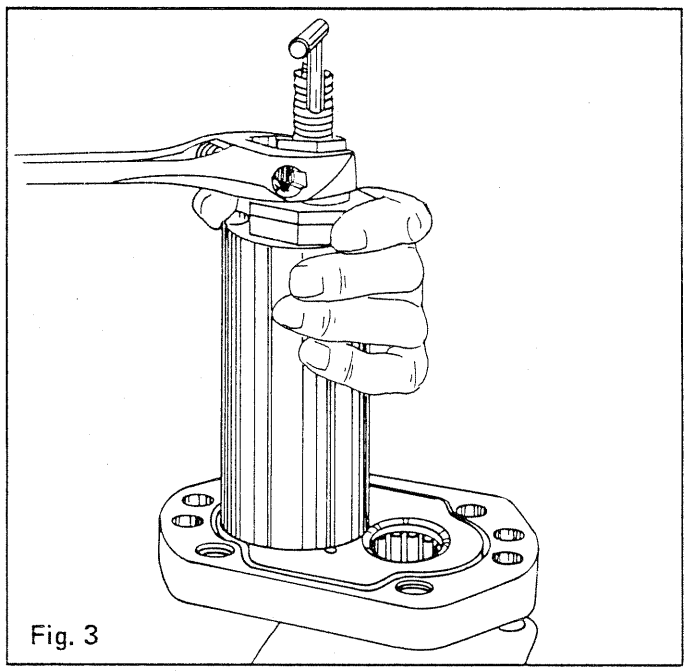


Fig. 3

# Service inspection

This is decision making time. Is a part reusable? In all cases, O-rings and seal components should be replaced. The following factors should be considered in determining the re-usability of a component.

1. Discard seal plates that have score marks, heavy wear pattern or show erosion marks indicating cavitation or aerated oil condition. See fig. 1.

2. Gear assemblies should be discarded if:
   A. Shaft journals show excessive wear or pitting.
   B. Gear teeth show excessive wear.
   C. Gear face scored or cracked.
   D. Drive shaft splines or keyways distorted or badly worn. See fig. 2. Note: Gear assemblies should be replaced in pairs.

3. Check clearance between the gear housing and gear teeth. To measure this clearance, place a .005 inch thick shim at point 'A', measure clearance at point 'B' while holding the gear against the shim at point 'A'. The cover/housing and/or gears should be replaced if the clearance exceeds .010 inch at point 'B'. See fig. 3.

4. Bearings should be examined visually for evidence of spalling of rollers and fracture of stamped cages. Check roughness of outer race by sliding rollers around periphery of cage.
   Any of these defects would be reason for replacement. Note: Bearings should be replaced in sets of four.

5. Check roller bearing for internal clearance by use of a feeler gauge. Bearings and gear assemblies should be replaced if clearance exceeds .003 inch. See fig. 4. Note: Always replace the bearings if a gear assembly is replaced or vice versa.

We have pointed out specific areas to check for your inspection, however, common sense and knowledge of the product can be a very important part of your inspection. A pump having many hours of operation under ideal conditions would not necessarily reveal extreme wear features. Shafts and bearings can and do fail as a result of fatigue. Therefore, consideration must be given to length of time in service as well as the application.

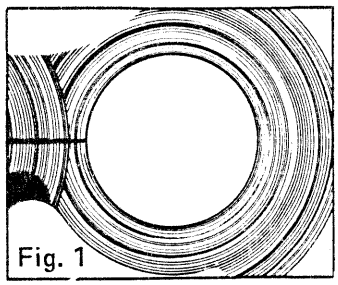
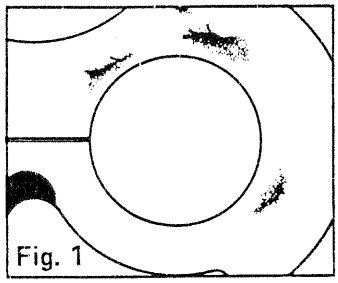


Fig. 1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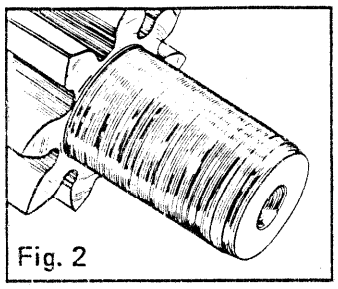
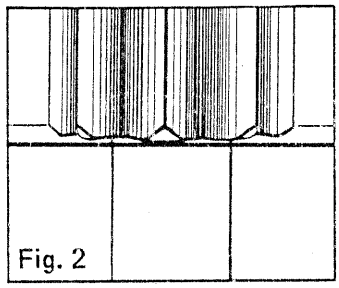


Fig. 2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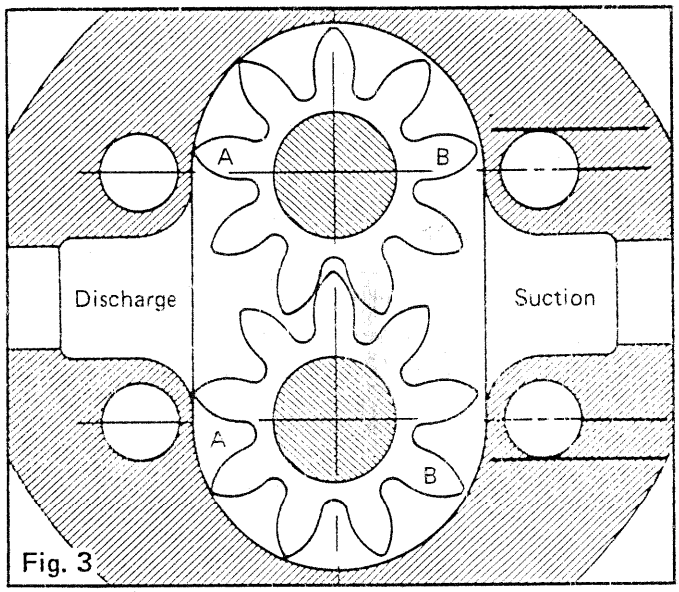


Fig. 3

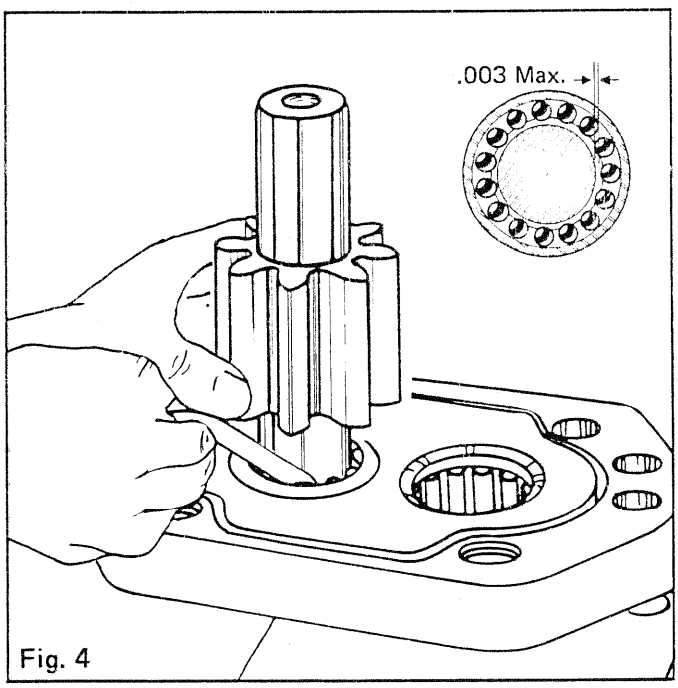


Fig. 4

# Reassembly

*keep it clean*

Prior to reassembly, all parts should be deburred by sanding or stoning; washed in a solvent, wiped with a clean lint free cloth and, if available, dried with compressed air.

1. Install bearings (8) using arbor press or bearing driver. Install flush to a maximum of .005 inch below adapter and cover/housing face.
2. Assemble cover/housing section in following steps:
   - 2.1 Install seal (10) and back-up ring (9) in seal plates (11). Seal and back-up rings can be assembled before installation.

   Note: Sharp edge of back-up ring into groove of seal plate . . . radius edge exposed.
   Apply a film of grease on seal and back-up ring to ensure retention in seal plate groove.
   - 2.2 Place seal plate in cover/housing, bronze side up; again making sure seal and back-up ring remain in place. High pressure pocket in seal plate must be towards outlet (high pressure) side of cover/housing.
   - 2.3 Install drive gear (12) and driven gear (13) in cover/housing section.

   Note: When original gears are reused, align the marks made during disassembly.
   "Reference for proper gear installation": C.W. rotation - with inlet on right side - install drive gear towards you; C.C.W. rotation - install driven gear towards you.
   - 2.4 Install adapter seal plate, bronze side on gears and high pressure pocket in same position as cover/housing wear plate.
3. Install O-ring (7) in adapter. Apply light film of grease to retain ring in adapter groove.
4. Install adapter (5).
5. Install oil deflector (4), spacer (3), shaft seal (2), "metal casing outside" and dust seal (1).

Note: Extreme care should be taken to prevent cutting of seals during installation. Lubrication of seal lip and protective thimble or plastic type of material placed over shaft lightly coated with grease is recommended procedure.
Correct seal driver should be used in the installation of shaft and dust seal.

6. For 190 & 220 install capscrew (17) and lockwashers (16). Torque evenly to 120 ft. lbs. For 290 Torque to 250 ft. lbs.

This completes assembly. Oil the pump generously and rotate shaft by using coupling or wrench. Effort to rotate shaft should not exceed 15 ft. lbs. torque.

## START-UP PROCEDURE

Before the pump is put into service, the following break-in procedure should be followed:

A. Maintain inlet oil temperature between 80°-120° F.

B. Run pump at 1800 R.P.M. or with available engine/electric motor speed between 1000-2500 R.P.M.

C. Load pump in 500 P.S.I. increments to maximum pressure of 250 P.S.I. over application pressure and cycle three seconds on load, and two seconds off, a minimum of five times at each pressure level.

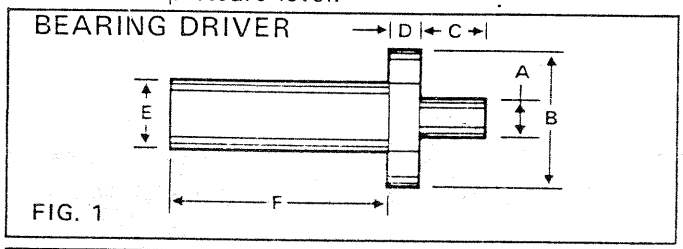


FIG. 1

| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| Series 190 | 1.125<br>1.120 | 1.797<br>1.792 | 1.40 | .37 | 1.50 | 3.50 |
| Series 220 | 1.250<br>1.249 | 1.992<br>1.917 | 1.40 | .37 | 1.50 | 3.50 |
| Series 290 | 1.740 | 3.00 | 1.85 | .50 | 1.50 | 4.50 |

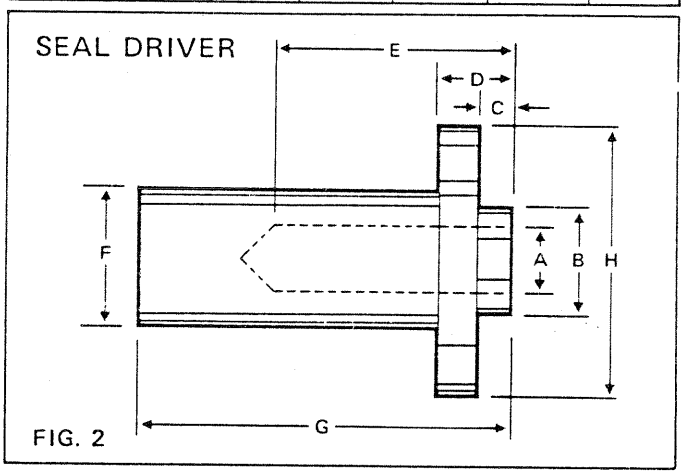


FIG. 2

| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| Series 190 | 1.003<br>1.005 | 1.550<br>1.545 | .658<br>.648 | .90 | 3.00 | 1.50 | 6.00 | 4.00 |
| Series 220 | 1.255<br>1.253 | 1.738<br>1.728 | .777<br>.767 | 1.00 | 3.00 | 2.00 | 6.00 | 4.00 |
| Series 290 | 1.760 | 2.232 | .886 | 1.25 | 3.88 | 2.00 | 6.00 | 6.00 |

Figs. 1 and 2 give you the dimensions needed to have drivers made by any nearby shop. (Not available from Hydreco.)

# Dual and Multiple pumps

Disassembly, service inspection, and reassembly procedures should be followed per instructions just the same as single pumps, with the following exceptions:

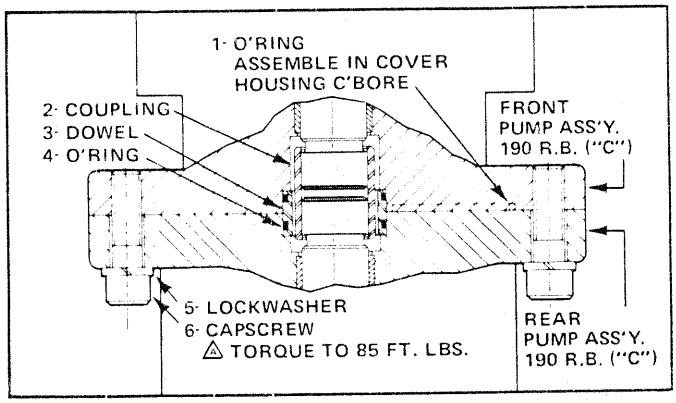
1. Separate the pumps by removing capscrews (6) from the joining plates of the front and rear sections.

Note: Do not attempt to pry apart with screwdriver, separate by tapping with a soft faced hammer.

2. Remove coupling (2) and examine for damage to splines or excessive wear on both coupling and spline shaft ends.

3. Remove dowel (3), replace O-rings (4).

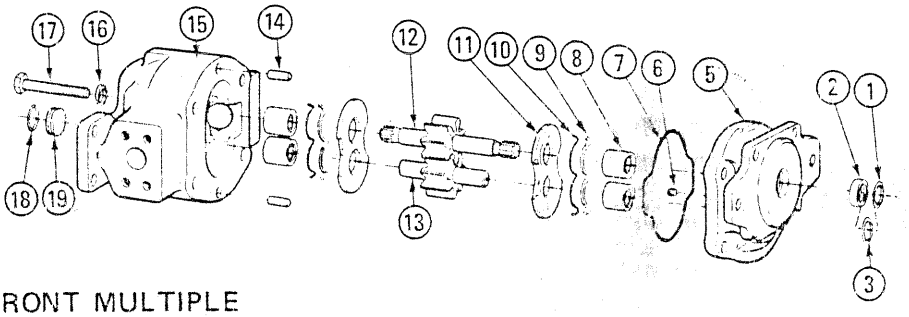
4. Remove O-ring (1) from cover/housing C' bore and replace.



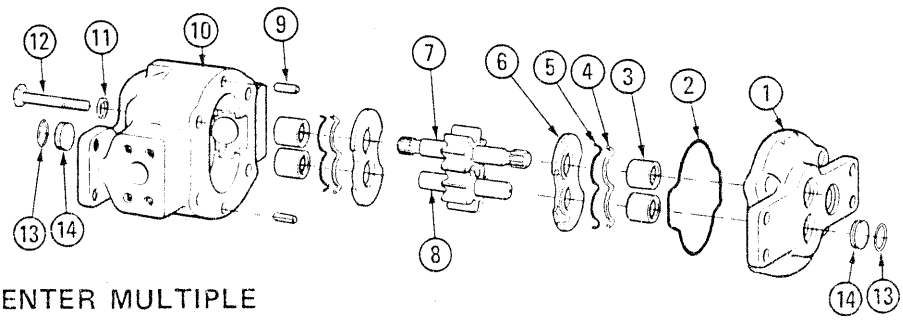

Note: Center multiple pump - word 'adapt' on drive shaft end is to be installed in the adapter section of the pump.

5. Install capscrews (6) and lockwashers (5). Torque to 85 ft. lbs. upon reassembly.

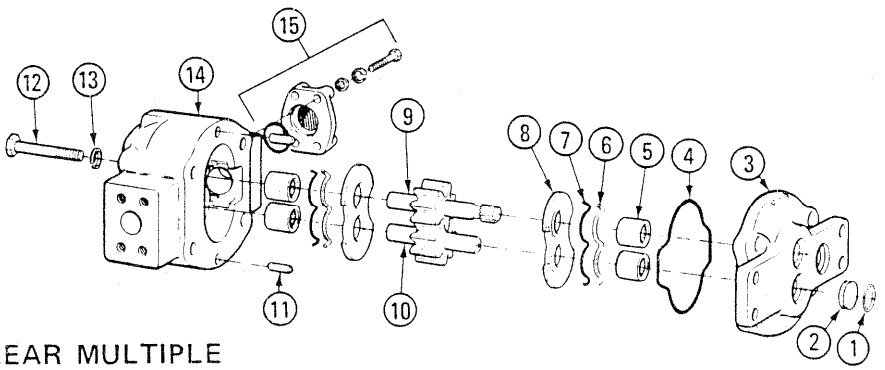
| FRONT | CENTER | REAR |
|---|---|---|
| 1. Dust Seal | Adapter | O-Ring |
| 2. Shaft Seal | O-Ring | Plug |
| 3. Spacer | Bearing | Adapter |
| | Back-Up Ring | O-Ring |
| 5. Adapter | Seal | Bearing |
| (does 6. Plug not apply on 290) | Seal Plate | Back-Up Ring |
| 7. O-Ring | Drive Shaft | Seal |
| 8. Bearing | Driven Shaft | Seal Plate |
| 9. Back-Up Ring | Dowel | Drive Shaft |
| 10. Seal | Cover/ Housing | Driven Shaft |
| 11. Seal Plate | Lock-washer | Dowel |
| 12. Drive Shaft | Capscrew | Capscrew |
| 13. Driven Shaft | O-Ring | Lock-washer |
| 14. Dowel | Plug | Cover/ Housing |
| 15. Cover/ Housing | | Port Cover Kit |
| 16. Lock-washer | | |
| 17. Capscrew | | |
| 18. O-Ring | | |
| 19. Plug | | |




FRONT MULTIPLE

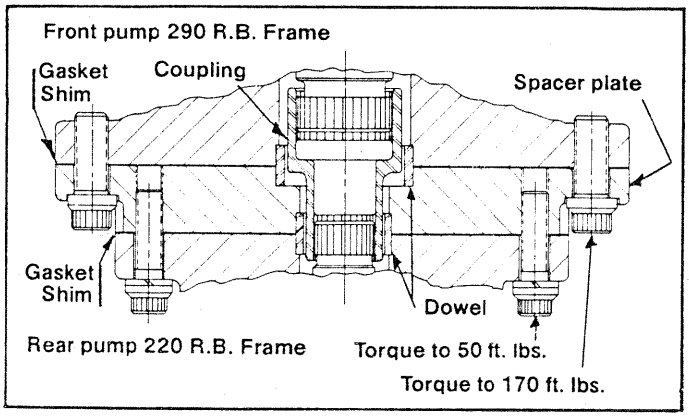



CENTER MULTIPLE




REAR MULTIPLE

## For all "A" Series Pumps




# Change of rotation Single pump

1. Reference disassembly instructions page 4 step two, paragraph B.

   Care must be exercised to prevent damaging shaft and wiper seal when removing adapter.

Note: Since there is always some doubt as to whether the seal components have been damaged, we recommend the installation of new seals.

2. Cover seal plate will remain in cover/housing. The next step is to remove drive and driven gear assemblies and re-install in cover/housing in opposite position; i.e. install drive shaft where driven shaft was, and driven shaft where drive shaft was originally. But, before you do this, **make sure** cover/housing seal plate has retained its position. If it appears as if seal plate has pulled out, remove and make sure seal and back-up ring are properly retained in seal plate groove, and re-install in original position.

Note: To double check for correct installation of gear assemblies, refer to reassembly instructions page 6 Paragraph 2.3

3. Place adapter seal plate on gears, bronze side facing gears and in the same position as cover/housing seal plate. Again, be sure seal and back-up ring are securely retained in seal plate groove.

4. Remove the 1/8 N.P.T. pipe plug from adapter section and re-install in opposite (H.P.) side of adapter.

CAUTION: Pipe plug must be relocated, HIGH PRESSURE SIDE PLUGGED ONLY. (does not apply on 290)

5. To help retain its position in adapter, apply light film of grease on adapter O-ring and install adapter over drive and driven shafts. If shaft and dust seals are being re-used, extreme caution must be taken to prevent damaging of these components. If new seals are to be installed, reference reassembly instructions page 6 paragraph 5.

6. Install capscrews and lockwashers, torque evenly to 120 ft. lbs.

7. Restamp name tag to identify either left (PL) or right (PR) hand rotation, and change last 3 numbers in model number to proper designation.

Follow instructions as outlined on page 6, START UP PROCEDURE.

# Change of rotation: Front, Center, Rear

1. Front pump same as single except plug (19) and O-ring (18) will now be installed in plug bore over driven shaft.

2. Center pump same as above except both plugs (14) and O-rings (13) in cover/housing and adapter sections will now be installed in plug bore over driven shaft.

3. Rear section same as above except plug (2) and O-ring (1) will now be installed in plug bore over driven shaft.

*keep it clean*

# Hydraulic system maintenance

Hydraulic mechanisms are precision units, and their continued smooth operation is dependent on proper care. Foreign matter can cause considerable trouble, and every precaution should be taken to keep the system CLEAN. Change the oil and filter at regular intervals.

Best results are obtained by using a good grade of hydraulic oil having a viscosity index of not less than 173 to 185 SUS at 100° F. Operating oil temperature should not exceed 200° F. as the viscosity and lubricating qualities are reduced at a higher temperature.

ALWAYS use a good grade of oil that has satisfactory characteristics for the elimination of FOAMING, OXIDATION and the PREVENTION of CORROSION.

DO NOT use the following fluids in the hydraulic systems:

a) Hydraulic brake fluid
b) Low viscosity naptha base engine oils

Consult our engineering department when considering the use of the following fluids:

a) Aircraft hydraulic fluids
b) Non-flammable hydraulic fluids

ALWAYS drain dirty oil, remove and replace filters, flush and refill the system with clean oil.

Check the oil level frequently and add oil if necessary. Add only clean oil to the system.

# Trouble shooting

| POSSIBLE PUMP TROUBLES | CAUSES | REMEDIES |
|---|---|---|
| I. Pump unusually noisy. | a—Low supply of oil<br>b—Heavy oil<br>c—Dirty oil filter<br>d—Suction line too small<br>e—Restriction in suction line<br>f—Air leak in suction line<br>g—Oil temperature extremely high causing vapor to form in the oil<br>h—Pump sucking air through the shaft oil seal when pump is idling | a—Fill to proper level<br>b—Change to proper oil<br>c—Clean and replace filter<br>d—Increase size of suction line<br>e—Remove<br>f—Check for loose connection<br>g—Check entire circuit<br>h—Check by squirting oil around the seal —Replace if faulty |
| II. Pump takes too long to respond or fails to respond | a—Low oil supply<br>b—Insufficient relief valve pressure<br>c—Pump worn or damaged | a—Fill to proper level<br>b—Reset to correct pressure setting using gauge<br>c—Inspect, repair or replace |
| III. Oil heating up | a—Foreign matter lodged between the relief valve plunger and relief valve seat<br>b—Using very light oil in a hot climate<br>c—Dirty oil<br>d—Oil level too low<br>e—Insufficient relief valve pressure<br>f—Relief valve pressure too high<br>g—Pump worn (slippage) | a—Inspect and remove foreign matter<br>b—Drain and refill with proper oil<br>c—Drain, flush and refill with clean oil<br>d—Fill to proper level<br>e—Set to correct pressure<br>f—Same as "e"<br>g—Replace or repair |
| IV. Oil foaming | a—Air leaking into suction line from tank to pump<br>b—Wrong kind of oil<br>c—Oil level too low<br>d—Improper tank or reservoir baffling<br>e—Discharge lines not below oil level | a—Tighten all connections<br>b—Drain and refill with non-foaming type of hydraulic oil<br>c—Fill to proper level<br>d—Baffle correctly<br>e—Extend lines below oil level |