



REPAIR INSTRUCTIONS

AQUALINE PUMPS

Packed and Sealed Types



PEERLESS PUMP

Indianapolis 8, Ind.

SECTION I

DISASSEMBLY

WARNING

Shut down the pump. Temporarily disable the pump drive before starting any repairs. Refer to Bulletin No. 2880549 for the procedure to follow.

1-1. Disengage the coupling halves. If a pin and rubber bushing type, remove the pins; if other type, refer to the coupling manufacturer's instructions.

1-2. Shut off the suction and discharge valves. Then drain pump casing by removing the drain plug at the pump suction nozzle; the drain plug at the discharge nozzle; and two plugs straddling centerline of pump on the lower casing (on some pumps only).

1-3. Remove the rotating element in the following manner (see figure 1 or 2):

NOTE

Sealed-Type pumps are supplied in two constructions differing slightly in the method of retaining the seals. To avoid repetition these instructions have been combined and treat the Packed and both Sealed-Types as if they were one pump. Disregard instructions which do not apply to the specific pump being repaired.

a. Remove nuts from gland bolts (17B) and detach gland halves (17) (separable) from shaft (6). Gland flanges (17D) are not separable.

b. Loosen set screws in water deflectors (40A, figure 2), and slide deflectors into the casing to compress mechanical seal approximately 1/8 inch. Tighten set screws.

c. Take off all nuts and cap screws from upper casing (1B) and from both bearing caps (41). Turn pump jack screws clockwise alternately and evenly to separate upper casing from lower casing. After the casings have separated, turn jack screws back so that they will not interfere with the pump reassembly.

d. Match mark each bearing cap (41) so that it can be reinstalled in the same position and location. Then take off both bearing caps.

e. Using eye bolts and hoist, lift off upper casing (1B).

f. Place suitable slings around each end of shaft (6) near the bearing housings. While tapping lightly on underside of bearing housings, lift rotating element from lower casing. Place in a convenient work area.

g. Loosen coupling set screw and tap coupling at back of its hub to remove from shaft. If coupling does not come off easily, use a suitable puller to pull from shaft. Extract coupling key (46).

1-4. To disassemble rotating element, proceed as follows:

a. Remove outboard bearing cover (37) by hitting on its protruding edge with a blunt end chisel in such a manner as to impart an outward motion.

b. Slide cover (37) away from outboard bearing housing (33) to provide access to bearing retaining ring in housing bore. Remove retaining ring from housing with suitable internal retaining ring pliers.

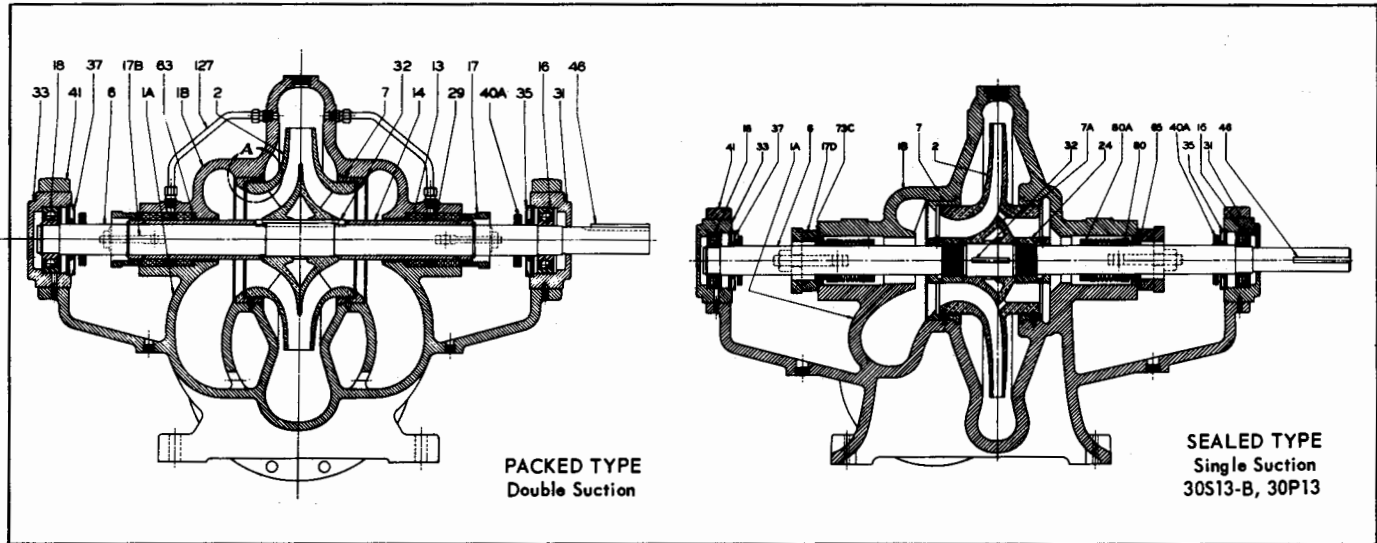


FIGURE 1. PACKED OR SEALED TYPE PUMP CROSS SECTION

- | | | | |
|------|------------------|-----|------------------------------------|
| 1A | LOWER CASING | 31 | INBOARD BEARING HOUSING |
| 1B | UPPER CASING | 32 | IMPELLER KEY |
| 2 | IMPELLER | 33 | OUTBOARD BEARING HOUSING |
| 6 | SHAFT | 35 | INBOARD BEARING COVER |
| 7-7A | CASING RING | 37 | OUTBOARD BEARING COVER |
| 13 | PACKING | 40A | WATER DEFLECTOR |
| 14 | SHAFT SLEEVE | 41 | BEARING CAP |
| 16 | INBOARD BEARING | 46 | COUPLING KEY |
| 17 | GLAND | 63 | STUFFING BOX BUSHING |
| 17B | GLAND BOLT | 65 | MECHANICAL SEAL STATIONARY ELEMENT |
| 17D | GLAND FLANGE | 73A | CASE GASKET (NOT SHOWN) |
| 18 | OUTBOARD BEARING | 73C | SEAL GLAND GASKET |
| 24 | IMPELLER NUT | 80 | MECHANICAL SEAL ROTATING ELEMENT |
| 29 | LANTERN RING | 80A | SET COLLAR (MECHANICAL SEAL) |

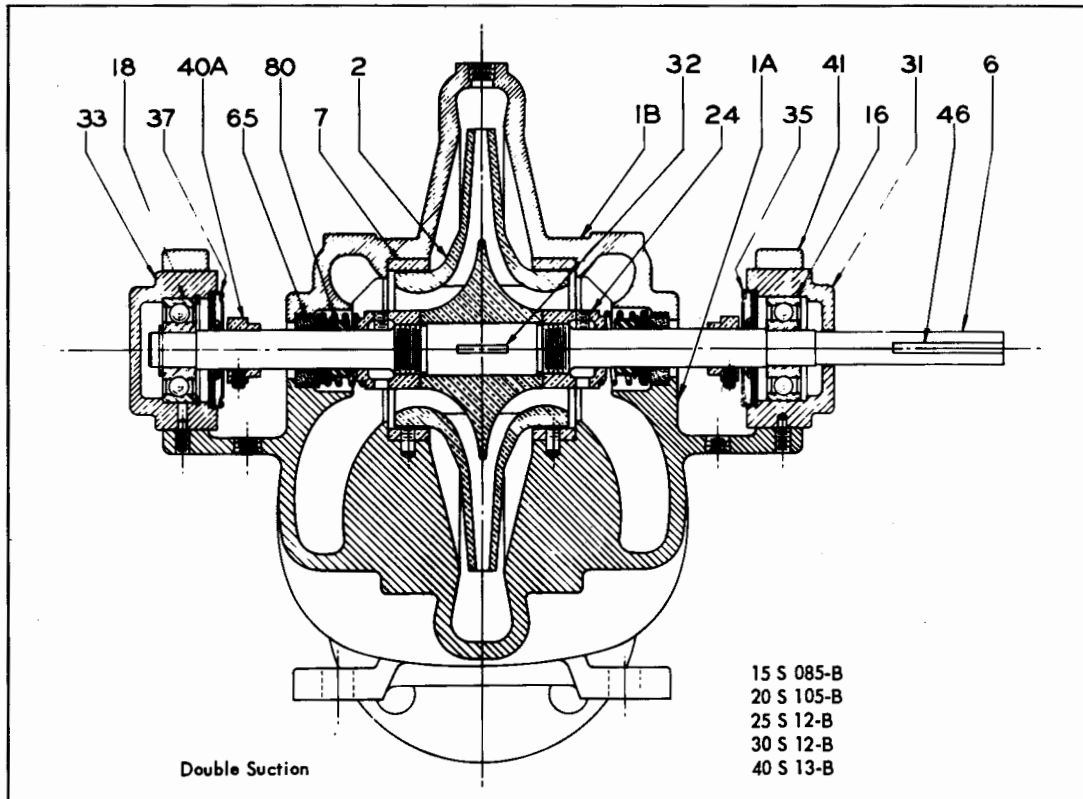


FIGURE 2. SEALED TYPE PUMP CROSS SECTION

- c. Pull housing (33) off of outboard bearing (18). Now extract bearing retaining ring from end of shaft (6) with suitable external retaining ring pliers. To remove bearing from shaft, refer to Bulletin No. 2880549.
- d. Remove inboard bearing cover (35), inboard bearing housing (31) and inboard bearing (16) in the same manner as above steps (a), (b) and (c), and remove rubber deflectors (40A).
- e. Pull packings (13), lantern ring (29) and stuffing box bushing (63) from each end of shaft.
- f. Loosen set screws and remove water deflectors (40A).
- g. Remove gland flanges (17D) together with gland gaskets (73C).
- h. Carefully remove the mechanical seals stationary elements (65) and the rotating elements (80). Do not nick or scratch faces of the stationary seat or rotating washer. Keep elements of same seal assembly together. Loosen set screw and withdraw set collars (80A).
- i. Remove casing rings (7).

NOTE

On most pumps the casing rings can be removed before pump coupling half is removed.

- j. Extract the shaft sleeve retaining ring from each end of shaft with suitable external retaining ring pliers. Pull shaft sleeve (14) straight off shaft. Loosen the set screws and remove impeller nuts (24). They have right-hand threads.
- k. Using a suitable arbor press, slowly and carefully press shaft through impeller (2). If a press is not available use a suitable tubular sleeve and mallet to carefully drive impeller from shaft. Extract impeller key (32).

NOTE

Seals must not come in contact with or be exposed to hydrocarbon materials such as: gasoline, grease, oil, propane; cleaning agents such as: kerosene, lacquer thinners, alcohol, etc.

- 1-5. CLEANING. Clean all metal parts (except seals & bearings) with a solvent. Use a bristle brush (NOT metal or wire) to remove tightly adhering deposits. A fiber scraper may be used to remove the gasket and shellac from casing flanges.
 - a. Blow dry with clean dry compressed air.
 - b. Check bearings as described in Bulletin No. 2880549. These are "Lifetime" lubricated bearings.

SECTION II

INSPECTION AND REPAIR

2-1. INSPECTION. Visually inspect parts for damage affecting serviceability or sealing. Emphasize inspection of mating parts having relative motion — wear rings, for example. Perform detail inspection as follows:

- a. Check O-rings and bearing cover gaskets for cracks, nicks or tears; packing rings for excessive compression, fraying or shredding, embedded particles (dirt or metal). Replace if defective in any way.
- b. Mount the shaft between lathe centers. Check the eccentricity throughout entire length with a dial indicator to be not more than 0.002 inch total indicator reading. Check that the threads are clean and sharp. Surfaces on which bearings mount must be smooth, have a finish not less than 32 microinches and the shoulders square and free from nicks.
- c. Measure the OD of the impeller (2) wearing surface, and the ID of the casing ring (7). Compute the diametrical clearance (ID minus OD) and compare with the limits given in Bulletin No. 2880549. ID surface of casing rings must be smooth and concentric.
- d. examine impeller passages for cracks, dents, gouges or embedded material.
- e. Check upper and lower casing machined surfaces to be free of burrs or nicks.
- f. For Packed-Type pumps, inspect shaft sleeves (14) for excessive wear. Replace sleeves that are worn. Replace packing.

g. For Sealed-Type pumps, examine mechanical seal for wear at the seal faces and for damage to the rubber bellows. Replace the complete seal if scoring or hardening of the rubber is evident, or if the seal lapped faces are cracked, nicked or scored.

2-2. REPAIR. Make needed repairs in the following manner:

- a. If ID of casing ring (7) is grooved, scored or eccentric, bore to produce a smooth, concentric surface. Measure and record new ID. Compute new diametrical clearance (impeller in ring) and compare with limits in Bulletin No. 2880549.
- b. If diametrical clearance is not within limits, the clearance can be restored by installing impeller wear rings on OD of impeller wearing surface.

NOTE

If wear rings were previously installed, remove old rings by turning in a lathe. Be sure machining is concentric with impeller ID. Use care NOT to reduce impeller skirt OD.

- (1) Before installing wear ring, machine the OD of the impeller skirts to the dimensions in figure 3.
- (2) Heat wear rings to a temperature that will enable the ring to drop onto the machined impeller skirts.

The ID is factory-machined for proper fit. Allow the assembly to cool to room temperature.

(3) After installation, machine the wear rings OD to provide the nominal diametrical clearance in Bulletin No. 2880549.

(4) Impellers Part No. 35-3LH-1 and 2657946/47 used on pump sizes 30P08, 30S08-B and 20P12, 20S12B respectively, do not have replaceable wear rings. To restore the diametrical clearance, a repair casing ring is

available. Check impeller skirt OD to see that its surface is smooth and concentric throughout its circumference; if the surface is grooved or scored, machine OD to obtain a smooth concentric surface. Measure and record OD of impeller skirt. Machine ID of repair casing ring to provide the nominal diametrical clearance in Bulletin No. 2880549.

c. Straighten or replace any shaft having excessive run-out (eccentricity).

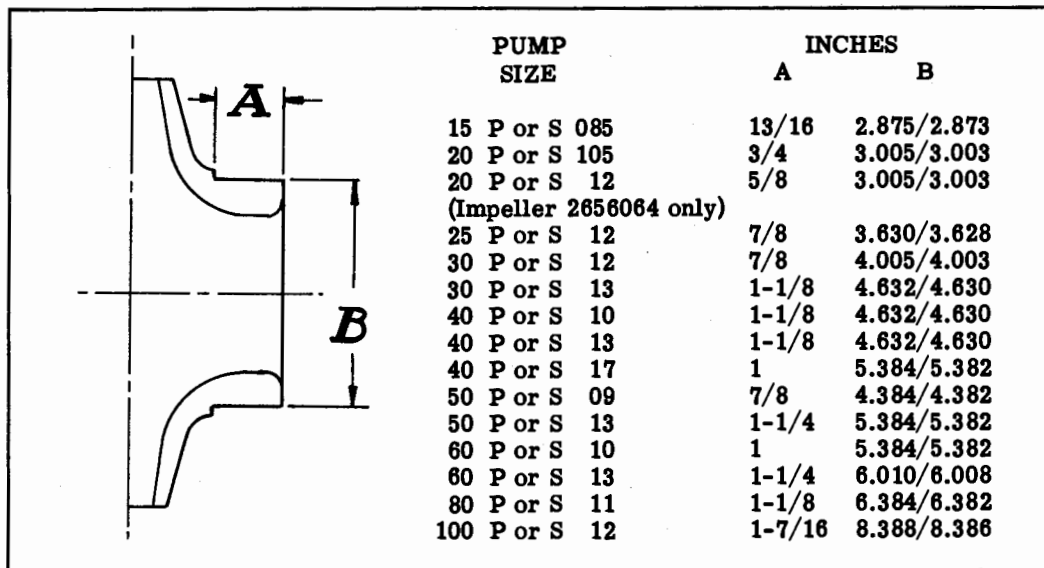


FIGURE 3. IMPELLER DIMENSIONS FOR WEAR RING INSTALLATION

SECTION III REASSEMBLY

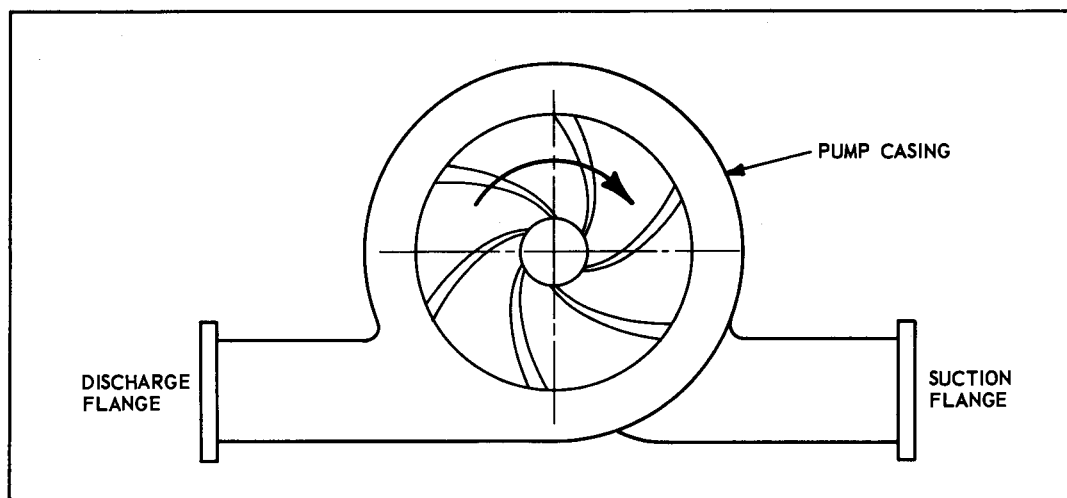


FIGURE 4. VANE POSITION FOR PROPER ROTATION

- 3-1. Install the impeller on the shaft as follows:
- Coat shaft (6, figure 1 or 2) lightly with oil.
 - Replace impeller key (32) in shaft slot.
 - Align impeller (2) on shaft and install with an arbor press or with a tubular sleeve and mallet. Guard against bending shaft.
 - When assembled, the impeller vanes must rotate in the direction shown in figure 4.
- 3-2. Reassemble rotating element as follows:

NOTES

These instructions have been combined and treat the Packed and both Sealed-Types as one pump. Disregard instructions which do not apply to the specific pump being repaired.

No oil may be used in the installation of these seals. It is recommended that a 3% detergent solution be substituted or other types of mild soap solutions in place of oil for installation purposes.

- Install O-rings in shaft sleeves (14, figure 1) and push shaft sleeves on shaft (6). The notch on the sleeve must engage impeller key (32). Install shaft sleeve retaining rings in their grooves on shaft.
- Place stuffing box bushings (63) and lantern rings (29) on shaft.
- Assemble impeller nuts (24) on shaft (6), but do not tighten the set screws yet.

- Place casing rings (7) on impeller. (2).
- Slide the mechanical seal set collars (80A) in position on the shaft. Snug (do not tighten) set screw to retain.
- Before completing the seal installation, wipe the lapped sealing faces of the seat and washer perfectly clean with a soft cloth. Then oil only seat and washer faces with clean oil. Do not wipe off excess oil with fingers or cloth. Do not use oil on shaft. Install mechanical seal rotating elements (80) and stationary elements (65) on shaft. Be careful not to cut the rubber bellows on shaft edges or to break the seal elements.
- Slide water deflectors (40A) with the thin end first on shaft, completely compressing the seal springs against impeller nuts (24), then tighten the deflector set screws.
- Install gland gaskets (73C) and gland flanges (17D).
- Grease the rubber lip of bearing covers (35 and 37) and place them on shaft.
- Place the bearing-to-housing retaining ring on outboard side of shaft.
- Install bearings (16) and (18) on shaft as shown in Bulletin No. 2880549. Install the bearing-to-shaft retaining ring.
- Push outboard bearing housing (33) over outboard bearing (18) and install retaining ring in groove of housing. Drive outboard bearing cover (37) in place by lightly tapping with a mallet.
- Push inboard bearing housing (31) over inboard bearing (16). Drive inboard bearing cover (35) in place by lightly tapping with a mallet.

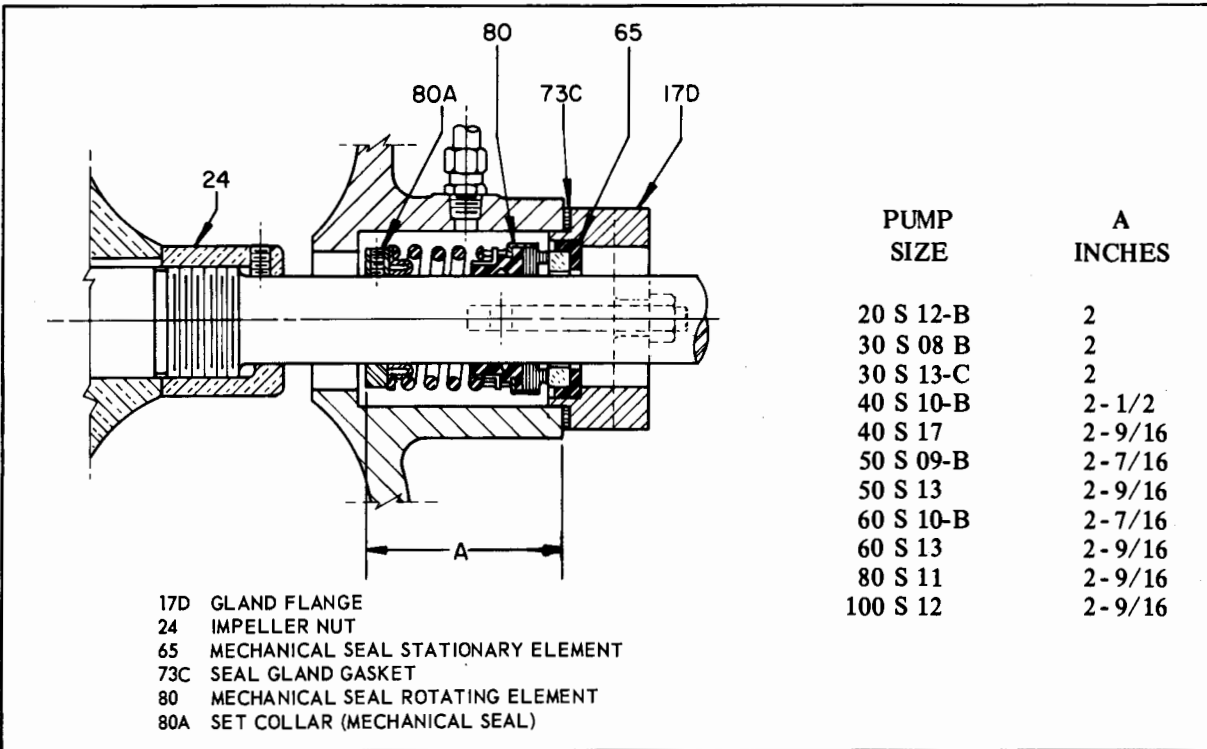


FIGURE 5. MECHANICAL SEAL SET COLLAR ADJUSTMENT

3-3. Install the rotating element in the following manner (See figure 1 or 2):

- a. Insert coupling key (46) on shaft. Assemble coupling half on shaft and tighten its set screw.
- b. Use the upper casing as a template and cut a casing gasket (73A). The casing gasket should be 1/64-inch vellumoid. Shellac the new casing gasket (73A) to the lower casing (1A) and cover the top of the gasket with a mixture of graphite and oil.
- c. Place assembled rotating element into lower casing. The casing rings (7) must be oriented to engage dowels into holes of lower casing (1A). Check for interference between lower casing and water deflectors (40A) or set collars (80A); reposition if necessary. Engage outboard bearing housing (33) with dowel pin on lower casing. Install outboard bearing cap (41). Adjust inboard bearing housing to engage with dowel pin. Install inboard bearing cap (41). Tighten cap screws on bearing caps.
- d. Adjust impeller nuts (24) so impeller runs centrally in casing. Tighten the set screws.
- e. Adjust the mechanical seal set collars (80A) in accordance with figure 5. Tighten the set screws.

f. Gently place upper casing on lower casing. Insert the dowel pins. Install all case bolts and gland bolts (17B). Tighten case bolts alternately and diagonally at opposite locations.

g. Loosen set screws in water deflector (40A) and slide water deflectors into position at bearing housings. Then tighten the set screws.

h. Insert the mechanical seal stationary element (65) in the gland counterbore. Position the gland gasket (73C) on gland flange (17D), insert flange in counterbore and tighten evenly with gland bolt (17B) nuts.

i. Withdraw lantern ring (29) and push bushing (63) to rear of stuffing box. Insert the same number of packing rings (13) as were found during disassembly, on each side of lantern ring. Insert each ring separately and stagger the joints of successive rings 90°. Install glands (17) and set nuts of gland bolts (17B) finger tight – DO NOT USE A WRENCH.

3-4. Rotate shaft by hand to check that it runs free. Replace all drain plugs removed during disassembly.

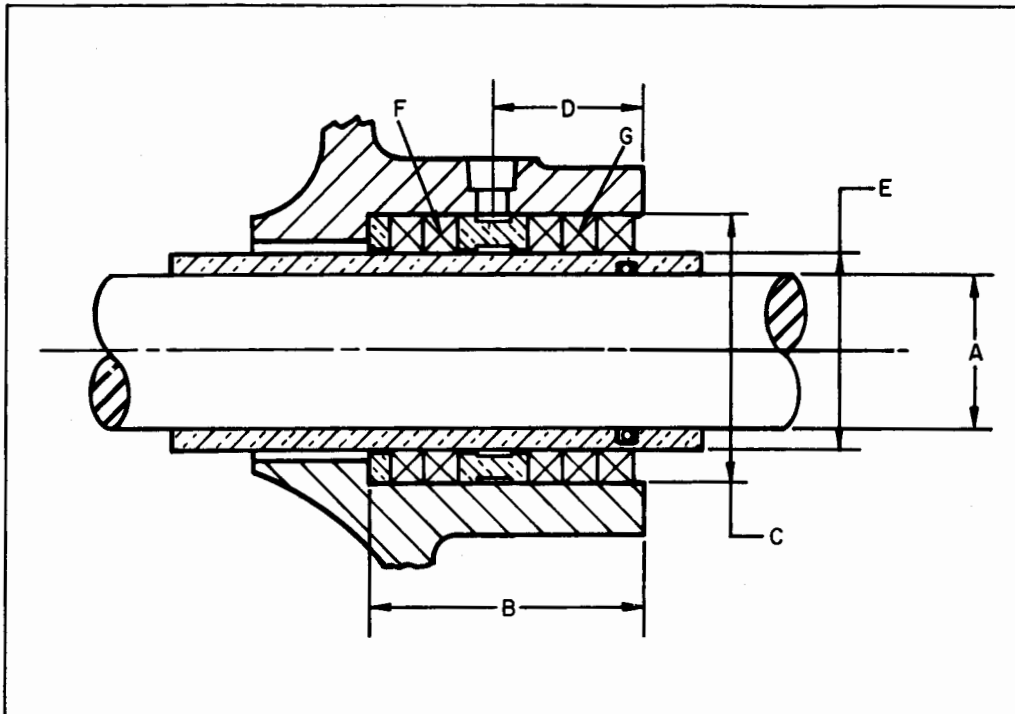
3-5. Follow instructions in Bulletin No. 2880549 to check out the pump after repair, and place in service.

SECTION IV
REPAIR PARTS

4-1. The following list gives commercial parts for Packed or Sealed Type Aqualine Pumps available from local outlets.

Pump	O-Ring - Used on Packed Pumps Only	Bearing Cover	Bearing Size (New Departure)
15S085-B 15P085 20S105-B 20P105	AN6227-17	Garlock Klozure Model 63 x 267	99504
20S12-B 20P12 25S12-B 25P12	AN6227-23 AN6227-21	National Bud Oil Seal No. 450336	99505
30S08-B 30P08	AN6227-17	Garlock Klozure Model 63 x 267	99504
30S12-C 30P12-B 30S13-C 30P13-B	AN6227-23	Garlock Klozure. No. 63 x 505	99506
40S10-B 40P10-B 40S13-C 40P13-B	AN6227-27	Chicago - Rawhide Stock No. 15781	99507
40S17 40P17	AN6230-2	National Bud Oil Seal No. 450090	99508
50S09-B 50P09-B	AN6227-23	Garlock Klozure No. 63 x 505	99506
50S13 50P13	AN6230-2	National Bud Oil Seal No. 450090	99508
60S10-B 60P10-B	AN6227-23	Garlock Klozure Model 63 x 505	99506
60S13 60P13 80S11 80P11 100S12 100P12	AN6230-2	National Bud Oil Seal No. 450090	99508

4-2. The following chart gives pertinent dimensions for packing used in Packed Type Aqualine Pumps. Refer to Bulletin No. 2880549 for specifications of suitable packings which may be used.



PUMP SIZE	A	B	C	D	E	PACKING RINGS		
						NUMBER		SIZE
						F	G	
15P085		2-1/16		1-1/8		2		
20P105	7/8	2-1/8	1-11/16	1-3/8	1-1/8	2	3	1/4
30P08		2-3/16		1-3/16		3		
25P12	1-1/8	3-1/16	2-3/16	1-3/4	1-3/8	2	3	3/8
20P12	1-1/4	2-3/4	2-5/16	1-5/8	1-1/2	2	3	3/8
30P12-B		3-1/16		1-3/4				
30P13-B	1-1/4	3-1/8	2-7/16	1-7/8	1-5/8	2	3	3/8
50P09-B	1-1/4	2-7/8	2-5/16	1-3/4	1-1/2	2	3	3/8
60P10-B								
40P10-B	1-1/2	3-1/8	2-9/16	1-3/4	1-3/4	2	3	3/8
40P13-B								
40P17	1-3/4	3	3-1/16	1-5/8	2-1/4	2	3	3/8
50P13		3-1/8		1-3/4		2		
60P13		3-1/2		1-7/8		3		
80P11		3-1/8		1-3/4		2		
100P12		3-1/2		1-3/4		3		