End suction frame mounted pumps

Series F

Repair Instructions
before attempting to repair this pump. For installation and operation refer to instruction bulletin 2880549. Properly installed, your Peerless pump will give you satisfactory, dependable service. We urge that you read carefully these step-by-step instructions to simplify any problems of installation, operation or repair.

Failure to read and comply with installation and operating instructions will void the responsibility of the manufacturer and may also result in bodily injury as well as property damage.

This bulletin is intended to be a permanent part of your pump installation and should be preserved in a convenient location for ready reference. If these instructions should become soiled obtain a new copy from Peerless Pump. Include pump model and/or serial number with your request.

WARRANTY

New equipment manufactured by Seller is warranted to be free from defects in material and workmanship under normal use and service for a period of one year from date of shipment; Seller’s obligation under this warranty being limited to repairing or replacing at its option any part found to its satisfaction to be so defective provided that such part is, upon request, returned to Seller’s factory from which it was shipped, transportation prepaid. This warranty does not cover parts damaged by decomposition from chemical action or wear caused by abrasive materials, nor does it cover damage resulting from misuse, accident, neglect, or from improper operation, maintenance, installation, modification or adjustment. This warranty does not cover parts repaired outside Seller’s factory without prior written approval. Seller makes no warranty as to starting equipment, electrical apparatus or other material not of its manufacture, since the same are usually covered by warranties of the respective manufacturers thereof.

In the event, notwithstanding the terms of this agreement, it is determined by a court of competent jurisdiction that an express warranty has been given by Seller to Purchaser with respect to the head, capacity or other like performance characteristics of said equipment, Seller’s liability for breach of the same shall be limited to accepting return of such equipment F.O.B. plant of manufacture, refunding any amount paid thereon by Purchaser (less depreciation at the rate of 15% per year if Purchaser has used equipment for more than thirty (30) days) and cancelling any balance still owing on the equipment.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, AND SELLER SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

WARNING

Do not operate this pump at any pressure, flow rate, or liquid temperature other than those for which the pump was originally purchased. Do not pump any other liquid than the one for which the pump was originally purchased without the consent of Peerless Pump or its authorized representatives. Disregard of this warning can result in pump failure and serious personal injury or death.
PUMP REMOVAL

Before starting disassembly of the pump, it is recommended that a set of spare parts be obtained. Peerless Pump does not recommend reuse of gaskets, O-rings, packing rings, or ball bearings.

Shut down pump. Disconnect power to the pump driver before starting any repairs. Refer to Bulletin No. 2880549 for the procedure to follow.

PUMP DISASSEMBLY

Disassembly pump in the following manner:

NOTE: The pump may be either packed or with a mechanical seal. Procedures for the two types of sealing differ slightly.

1. Remove any seal piping (tubing) that may be present between pump discharge and stuffing box of adapter (71, Figure 1).
2. Take out all screws and remove casing (1) and casing gasket (73A). If necessary, lightly tap with plastic hammer at several places to loosen casing from adapter.
3. Insert a rod of suitable diameter into a passage of impeller (2) and hold while loosening impeller lock screw (26). Remove lock screw and impeller washer (24A).
4. Slide impeller from end of shaft (6) and remove impeller key (32). If impeller is hard to remove, use a small wood block against adapter and pry carefully at several points around impeller to loosen.
5. For the mechanical seal pump, very carefully remove seal parts (80A thru 80D). Be particularly careful not to scratch or damage lapped surface of sealing washer (80D). Store seal parts in suitable container; lapped surface of sealing washer must be up and covered.
6. For the packed pump, loosen both gland bolts (17B) and pull gland (17) out slightly to relax packing (13).
7. Remove screws and slide adapter (71) off from shaft. Use care not to scratch shaft sleeve (14).
8. Carefully push floating seat (65A) from adapter, avoiding scratching or other damage to lapped surface. Use narrow, flat screwdriver to lift and work O-ring (65B) from seat. Store seat with remaining mechanical seal parts with lapped surface up and covered.
9. Remove gland (17), packing (13) and lantern ring (29) (if furnished) from adapter (for packed pump).
10. Slide shaft sleeve (14) and deflector (40) from shaft. Remove O-ring (130) from shaft sleeve or gasket (38) from shaft.
11. Remove screws and slide outboard bearing cover (37) from shaft. Push outboard bearing cover seal (49) from cover.
13. Carefully push inboard grease retainer (51) from frame (19).
14. If bearings (16, 18) are to be removed from shaft, temporarily install impeller key (32) and impeller (2) on shaft. With rod inserted into impeller passage, restrain shaft while loosening bearing lock nut (22). Remove lock nut, impeller and key from shaft. Support bearings on inner races and press shaft out. The bearing retaining ring (18A, Figure 3) on the shaft of the F3 frame in the outboard bearing journal need not be removed unless damaged, loose or worn.

MECHANICAL SEAL

*80A Spring Retainer
80B Spring
80C Seal Bellows Assy
80D Sealing Washer
65A Floating Seat
65B Seat Ring

*Some pumps have a step turned on the impeller hub to accept the spring and therefore do not have or use a spring retainer.
Thread depth for suction flanges:
2 1/4" dia. suction  5/8" dia. thread  0.75" deep
5" dia. suction         3/4" dia. thread  0.88" deep

1  Casing
2  Impeller
6  Shaft
7  Casing Ring
13  Packing
14  Shaft Sleeve
16  Bearing, Inboard
17  Gland
17B  Gland Bolt
18  Bearing, Outboard
19  Frame
22  Bearing Lock Nut
24A  Impeller Washer
26  Impeller Lock Screw
27  Adapter Ring
29  Lantern Ring (optional)
32  Impeller Key
37  Bearing Cover, Outboard
38  Shaft Sleeve Gasket
40  Deflector
46  Coupling Key
49  Bearing Cover Seal, Outboard
51  Grease Retainer, Inboard
53  Case Support
65  Mechanical Seal, Stationary Element
71  Adapter
73A  Casing Gasket
80  Mechanical Seal, Rotating Element
130  Shaft Sleeve O-Ring

DETAIL OF SLEEVE WITH O-RING INSTEAD OF GASKET.
FIGURE 1A.

See Fig. 3 for typical construction of F3 and F4 frames.

FIGURE 1. TYPE F1 AND F2 END SUCTION PUMPS
FO FRAME DISASSEMBLY ONLY
Remove snap ring (16A) from groove in bearing bore on pump end of frame (19). Push shaft (6) with bearings from frame. Push in direction of pump end. If bearings (16, 18) are to be removed, support inner races and press shaft out.
NOTE: Bearings are sealed type. There is no need for cleaning or lubrication. (See Figure 2.)
15. Remove casing ring (7) from casing only if damaged or worn to excess (refer to Repair).

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<table>
<thead>
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<tbody>
<tr>
<td>6</td>
<td>Shaft</td>
</tr>
<tr>
<td>16</td>
<td>Bearing, Inboard</td>
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<tr>
<td>16A</td>
<td>Bearing, Retaining Ring</td>
</tr>
<tr>
<td>18</td>
<td>Bearing, Outboard</td>
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<tr>
<td>19</td>
<td>Frame</td>
</tr>
<tr>
<td>40</td>
<td>Deflector, Inboard</td>
</tr>
<tr>
<td>40A</td>
<td>Deflector, Outboard</td>
</tr>
<tr>
<td>46</td>
<td>Coupling Key</td>
</tr>
<tr>
<td>131</td>
<td>Coupling Guard</td>
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</tbody>
</table>

**FIGURE 2. TYPE FO END SUCTION FRAME**

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**CLEANING**

**WARNING**
Petroleum-base cleaning solvents are flammable. Smoking or open flames in the vicinity of these solvents are extremely hazardous and must not be permitted. Disregard of this warning could result in grave personal injury.

1. Clean all metal parts 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. Blow dry with clean dry compressed air.

**CAUTION**
Never use hydrocarbon liquids (oil or solvent) to clean mechanical seal parts. Use of oil or solvent will deteriorate material used for manufacture of the seal.

2. Clean seal parts using a mild soap solution. Rub only with finger to remove dirt. Rinse with clear water and dry with mild air stream. Use care not to damage or scratch lapped surfaces.

3. Clean ball bearings in the following manner:

   a. Place bearings in wire basket — so there is space for cleaner to reach all parts.
   b. Immerse in Stoddard solvent. Agitate basket until grease is thoroughly loosened and can be flushed out.
   c. Place bearing on a screened surface.
   d. Using a spray gun with air filter and clean Stoddard solvent, flush each bearing until all grease and sludge is removed.
   e. Blow solvent out of bearings with dry, filtered air.
   f. Lubricate bearings immediately after cleaning with light spindle oil and place them in a covered container.
   g. Do not spin bearings any time during cleaning.

4. Bearings not removed from the shaft may be cleaned in the following manner:

   a. Flush with Stoddard solvent until all old grease is removed. Rotate bearing slowly (by hand) while flushing. DO NOT use kerosene or fuel oil for flushing.
   b. Relubricate (refer to paragraph 3, step f, above).

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**INSPECTION**

Visually inspect and replace parts that are damaged and affecting the serviceability or sealing. Emphasize inspection of mating parts having relative motion — casing rings for example. Perform detailed inspections as follows:

1. Check O-rings, gaskets and seals for shrinkage, cracks, nicks or tears.
2. Check packing rings for excessive compression, fraying or shredding, embedded particles (dirt or metal). Replace if defective in any way.
3. Examine impeller passages for cracks, dents, gouges or embedded material.

4. Inspect shaft sleeves (14) for excessive wear. Replace sleeves that are worn. Replace gasket, if used.
5. Inspect lapped surfaces of sealing washer and floating seat for chipping, gouges, nicks, scratches or other damage. These surfaces must be free from any defect. If lapped surfaces are damaged, replace the entire seal.
6. Mount the shaft between lathe centers. Check the eccentricity throughout the entire length with a dial indicator to be not more than 0.003 inch total indicator reading. Surfaces on which bearings mount must be smooth, have a finish not less than 32 micro-inches, and the shoulders square and free from nicks.
When ordering repair parts, give the complete pump nameplate data (nameplate on the pump casing) plus the name and item number of the part shown on sectional view.

Remove burrs, nicks and scratches from non-critical areas with a fine stone or crocus cloth.

1. Impeller and Casing Wear. If the pump capacity falls off due to wear on the impeller and casing ring, repair is made by replacing the casing ring. The inside diameter of the casing ring should be 0.008” to 0.012” larger than the impeller skirt diameter.

2. Normally, when the pump is completely disassembled, all gaskets, O-rings and seals (grease retainer) should be replaced at reassembly. If the O-rings for the floating seat of the mechanical seal or shaft sleeve are not damaged, they may be reused with the other satisfactory seal parts.

## Reassembly

Reassemble pump in the following manner:

1. If bearings (16, 18) were removed from shaft (6), support shaft and press bearing on, applying force only against the inner race. Be sure that inner races bottom on shaft shoulders. If bearing retaining ring (18A, Fig. 3) was replaced or removed from shaft of the F3 frame, reinstall in proper groove in outboard bearing journal before installing bearing. Press bearing until inner race bottoms on retaining ring.

2. Temporarily install impeller key (32) and impeller (2) on shaft. Use rod inserted in impeller passage to restrain shaft while tightening bearing locknut (22). Remove impeller and key.

3. Install new inboard grease retainer (51) in frame (19). Lip of retainer, which contacts shaft, must face away from inboard bearing (16) cavity.

4. Lightly pack each bearing with a recommended grease from the instruction “Lubrication” in this manual. Maintain absolute cleanliness at all times while packing and handling bearings. No further lubrication is necessary until normal maintenance interval is reached.

5. Coat shaft at inboard bearing (where grease retainer will contact) with light oil or grease. Carefully insert shaft through outboard end of frame, impeller end first. Carefully guide through inboard end and through grease retainer (51) so that lip remains facing away from bearing cavity. Push shaft so that retaining ring in outer race of outboard bearing (18) contacts frame.

6. Install new outboard bearing cover seal (49) in outboard bearing cover (37). Be sure that seal lip will face bearing when cover is installed.

7. Coat outboard end of shaft with light oil or grease up to bearing locknut. Carefully slide cover and seal on shaft, so that lip remains facing bearing; position so that grease fitting is at top and bottom against outer race of bearing. Install screws to hold cover, tightening uniformly (do not tighten so that cover is bowed).

### FO Frame Reassembly Only

If bearings (16, 18) were removed from shaft (6), support shaft and press bearings on, applying force only against the inner race. Be sure inner races bottom on shaft shoulders. Carefully insert shaft, coupling end first, through pump end of frame (19). Push shaft so that shoulder of pump end bearing contacts shoulder in frame bore. Install snap ring (16A) in proper groove in frame bore.

8. Install deflector (40), shaft sleeve gasket (38) and shaft sleeve (14) on shaft. Be sure gasket is completely contained by sleeve and that sleeve bottoms on shaft shoulder (see Fig. 1). Install O-ring (130) in sleeve (14). Install deflector and shaft sleeve over shaft, making sure sleeve bottoms on shoulder. (See Fig. 1A). Position deflector midway between end of sleeve and grease retainer. Align sleeve slot with key slot of shaft.

9. For the packed pump, slide the gland (17) and lantern ring (29) over the shaft sleeve to abut the deflector.

### CAUTION

Use care not to mar or scratch the lapped surfaces of floating seat and sealing washer when installing mechanical seal. Damage to these surfaces will result in leakage and will require replacement of the entire seal.

10. For the mechanical seal pump, lubricate the O-ring (65B), groove in floating seat (65A) and seat cavity in adapter (71) with any of MOLYKOTE® DC No. 55 silicone grease, 3% detergent solution, glycerine or ethylene glycol.

11. Install floating seat in the adapter with lapped surface facing away from adapter shoulder. Apply lubricant (step 10 above) to entire surface of shaft sleeve and carefully install adapter. Use care not to cock or scrape floating seat on sleeve. Seat adapter against frame, tapping very lightly with plastic hammer, then install screws and tighten uniformly. Rotate shaft by hand to check that there is no binding or hang-up.

12. In the same manner as in step 11, lubricate the entire surface of shaft sleeve and the bores of sealing washer (80D) and spring bellows assembly (80C). Carefully install sealing washer, lapped surface toward floating seat, and spring bellows assembly on shaft sleeve and slide along to contact floating seat. Install spring (80B) and spring retainer (80A), if used.

13. For the packed pump, install the adapter (71) in the same manner as in step 11 except shaft sleeve need not be lubricated.

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14. In order, install 3 rings of packing (13), the lantern ring (29) if furnished and 2 rings of packing in adapter cavity. When lantern ring is not furnished, install 6 rings of packing. Stagger the joint of each packing ring approximately 180° from adjacent rings. Be sure each ring is square with the shaft. Use a split bushing and the gland (17) to move rings to the bottom of the cavity. When all packing rings are in place, position the gland (17) and loosely seat on packing, using gland bolts (17B). Tighten as required to limit leakage after pump is running.

15. Install impeller key (32) in shaft keyway. Make sure that key enters slot in shaft sleeve. Align impeller (2) with key and install on shaft. Tap impeller hub lightly with plastic hammer to seat against shaft sleeve. For the mechanical seal pump, guide spring to seat on the shoulder as impeller is installed. Be sure spring is correctly seated against bellows assembly.

16. Install impeller washer (24A) and impeller lock screw (26). Restrain impeller with rod inserted in one passage and securely tighten screw. Rotate shaft by hand to check for free movement.

17. Lightly coat both sides of casing gasket (73A) with a non-hardening sealing compound, such as grease and graphite. Position on adapter making sure that holes are aligned. Install casing (1), tapping lightly with plastic hammer to seat on adapter. Install screws and tighten uniformly in a star pattern. The cap screws are SAE Grade 5 and are to be tightened to the following minimum torque values for dry threads.

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<thead>
<tr>
<th>Size</th>
<th>Torque</th>
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<tbody>
<tr>
<td>3/8</td>
<td>30 ft-lbs</td>
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<tr>
<td>7/16</td>
<td>50 ft-lbs</td>
</tr>
<tr>
<td>1/2</td>
<td>75 ft-lbs</td>
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<td>5/8</td>
<td>155 ft-lbs</td>
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<tr>
<td>3/4</td>
<td>265 ft-lbs</td>
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</table>

18. Install seal piping (tubing) if used between pump discharge and stuffing box of adapter.

See Fig. 1 for typical construction of F1 and F2 frames.

FIGURE 3. TYPE F3 AND F4 END SUCTION FRAMES

NOTICE: Materials of construction, specifications, dimensions, design features, and application information, where shown in this bulletin, are subject to change and/or modification without notice by Peerless Pump at their option.
End suction frame mounted pumps

Series F

Repair Instructions