

REPAIR INSTRUCTIONS

TYPE AD PUMPS FIGURE 5100

Read this entire book

before attempting to install, operate or repair this pump. 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 book 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.



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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.

SECTION I DISASSEMBLY

WARNING

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

1-1. REMOVE COUPLING GUARD. Disengage the drive coupling halves. Refer to the coupling manufacturer's instructions.

1-2. PUMP DISASSEMBLY. (See Figure 1 or 2.) Disassemble pump to the extent required as follows:

NOTE

AD Figure 5100 pumps can be furnished with either grease or oil lubricated bearings. All instructions apply to either pump unless otherwise stated. Disregard instructions which do not apply to the specific pump being repaired.

- a. Disconnect seal piping (127) for cleaning.
- b. Remove the cap screws from each adapter (71).
- c. Take off all cap screws from upper casing (1B). Remove taper dowel pins. Turn pump jack screw clockwise to separate upper casing from lower casing. After the casings have separated, turn jack screw back so that it will not interfere with the pump reassembly. Using (customer furnished) eye bolt and hoist, lift off upper casing. Do not use eye bolts to lift pump!
- d. Place suitable slings around each shaft (6) near the impeller, and lift rotating element from lower casing. Place in a convenient work area.
- e. Loosen drive 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).

1-3. ROTATING ELEMENT. Disassemble to the extent required as follows:

FOR OIL LUBRICATED PUMPS (See Figure 1).

- a. On the oil-lubricated pump, remove plugs to drain oil from bearing housings (31, 33). Take off oil cups (125) and related pipe nipples. Take out cap screws at heat exchangers (128), and pull heat exchangers from bearing housings.
- b. Remove bearing end cover (123) by prying outward on flange.

FOR GREASE LUBRICATED PUMPS (See Figure 2).

- c. Remove grease deflector (40B) from shaft.
- d. Remove all cap screws or nuts that retain bearing cover (35) to inboard bearing housing (31) and outboard bearing housing (33).

- e. Remove bearing housings (31, 33) from shaft. If pump has oil-lubricated bearing housing, be careful not to damage oil seal (107A) when removing inboard housing.
- f. Remove adapters (71) from shaft.
- g. On outboard end of pump, loosen bearing locknut (22) and remove. Slide bearing lockwasher (69A) from shaft. Outboard bearing must be removed with a bearing puller. See Figure 3. The inboard bearing (16) is a press fit and must be removed with a bearing puller. Remove snap ring from shaft, outboard bearing and inboard bearing.
- h. Remove bearing covers (35) from shaft.
- i. Loosen set screw in shaft sleeve nuts (20). Turn nuts in same direction shaft rotates to remove from shaft.
- j. Remove stuffing box groups (13, 17, 17B, 29, 83), as an assembly, from each end of shaft.
- k. Remove "O" ring from OD of each stuffing box.
- l. Remove gland (17), gland bolts (17B), packing (13) and lantern ring (29) from stuffing box (83).
- m. Remove case rings (7) from impeller.
- n. Remove shaft sleeves (14) from shaft. Remove one "O" ring from each sleeve.
- o. Pull impeller (2) from shaft.
- p. Remove impeller key (32).

1-4. CLEANING. Clean all metal parts (except 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. Blow dry with clean dry compressed air. Clean bearings as described below:

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

1-5. Bearings not removed from the housing may be cleaned in the following manner:

- a. Remove grease fittings and drain plug, or bearing cover.
- b. 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.
- c. Replace grease fitting or bearing cover.

d. Relubricate. (Refer to Section III and Bulletin 2880549 for grease type recommendation.)

e. Replace drain plug (run out excess grease).

MECHANICAL SEAL NOTE

Disassembly and reassembly of Figure 5100 AD pumps with mechanical seals requires attention to the following:

- (1) Axial location of mechanical seal set collars must be maintained. Scribe location of set collars on sleeves, scribe location of impeller on shaft, and do not reverse inboard and outboard sleeves.
- (2) If sleeves are being replaced, transfer set collar location from old to new shaft sleeves.

**TABLE I
BEARING DEFECTS
(Failures – Replace if found)**

DEFECT (Failure)	APPEARANCE	PROBABLE CAUSE
Flaking and cracking	In the early stages, the surface of the inner and outer races develop small cracks, which flake. The cracks and flaking ultimately spread over the entire race surface.	<ol style="list-style-type: none"> 1. Normal fatigue failure. 2. Bearing loads in excess of bearing capacity caused by misalignment.
Indentations	Indentations or cavities in the inner and outer races.	<ol style="list-style-type: none"> 1. Dirt in the bearings. 2. Excessive impact loading of the bearings such as improper mounting or removal.
Broken separator (cage)	Cracked separator or separator in pieces.	<ol style="list-style-type: none"> 1. Poor lubrication. 2. Misalignment of shaft. 3. Excessive shaft deflection.
Wear	Bore and OD of outer ring of bearing galled or braided.	<ol style="list-style-type: none"> 1. Fit on shaft or in housing too loose. 2. Bearing locked by dirt and turning on shaft or in housing.
Fractured ring	Hairline cracks or complete ring fracture.	<ol style="list-style-type: none"> 1. Forcing a cocked bearing on or off shaft. 2. Too heavy a press fit.
Discoloration	Rolling elements and races darker than normal appearance of bearing metal. (Moderate discoloration of rolling elements and races not a reason for discard.)	<ol style="list-style-type: none"> 1. Inadequate lubrication.
Corrosion	Rolling elements and raceways rusted.	<ol style="list-style-type: none"> 1. Water entering the housing. 2. Condensation inside the housing. 3. Lubricant breaks down into acid. (Wrong lubricant.)

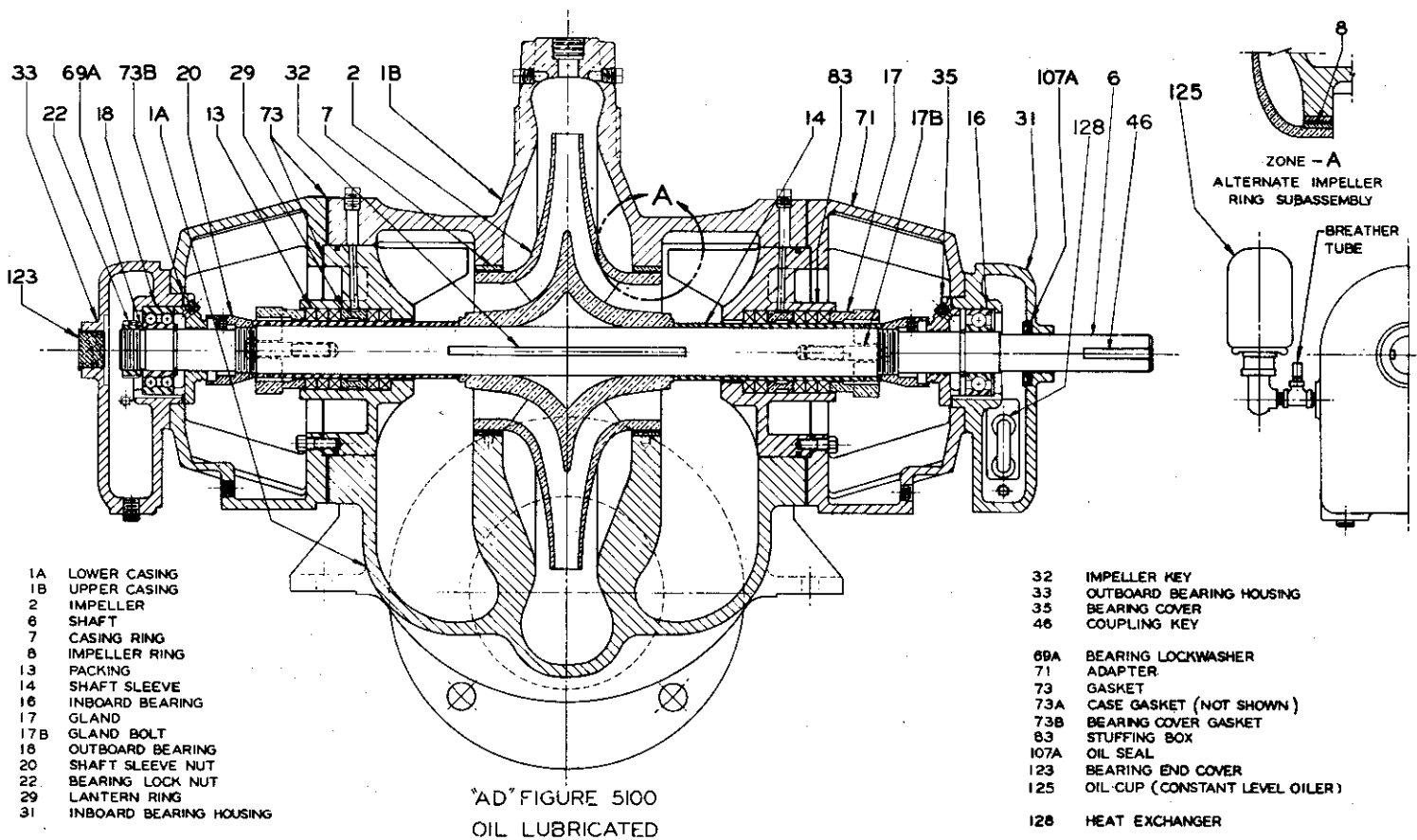


FIGURE 1

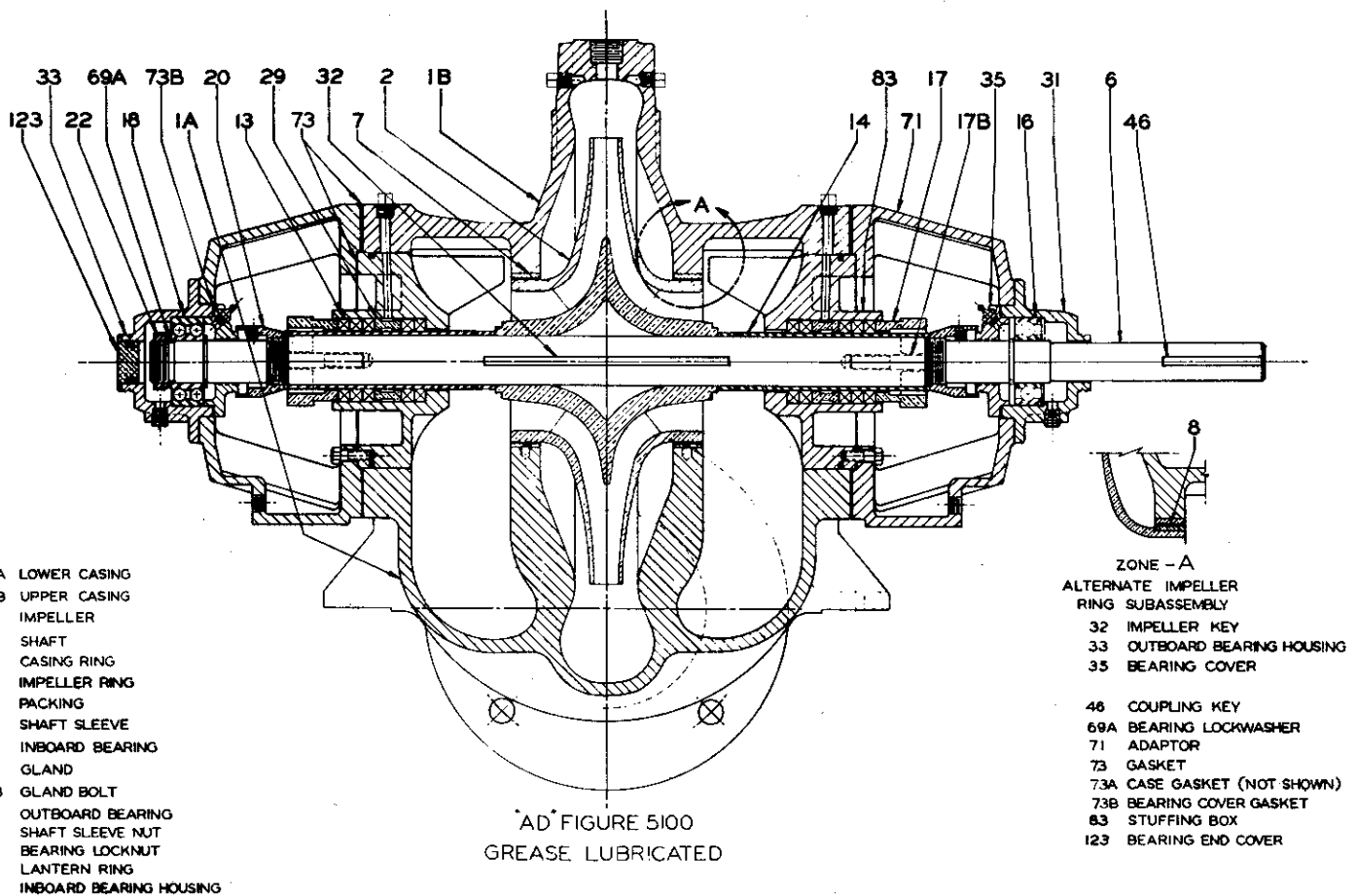


FIGURE 2



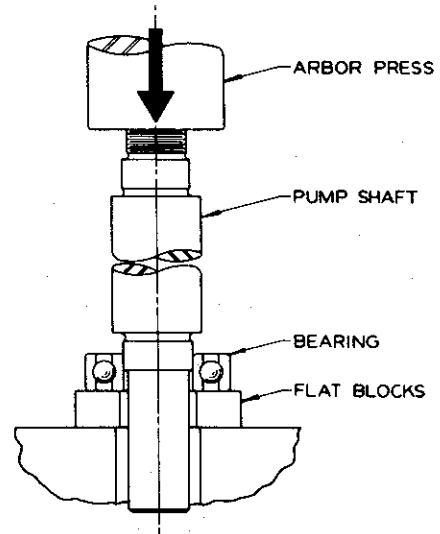
DF
MOUNTING



DB
MOUNTING

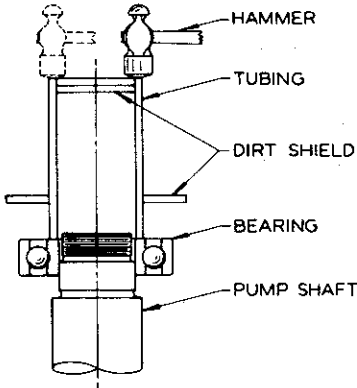
USING AN ARBOR PRESS

1. PLACE THE BEARING ON TWO FLAT BLOCKS SO THAT THEY CONTACT THE INNER RING OR BOTH RINGS OF THE BEARING.
2. HOLD SHAFT STRAIGHT - FORCE THE SHAFT BY A STEADY PRESSURE, UNTIL THE BEARING IS SEATED AGAINST THE SHAFT SHOULDER.



USING TUBING

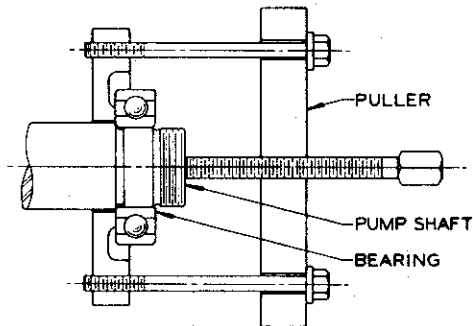
1. PLACE THE BEARING ON SHAFT.
2. PLACE TUBING OVER SHAFT IN CONTACT WITH THE INNER RING OF THE BEARING.
3. APPLY HAMMER ALTERNATELY AT OPPOSITE POINTS - AVOID COCKING.



BEARING MOUNTING

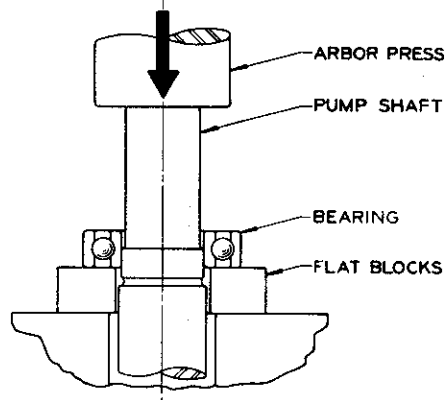
USING A BEARING PULLER

1. PLACE BEARING PULLER BEHIND BEARING INNER RING. SET PULLER JAWS SO THAT THEY WILL NOT SLIP OVER THE INNER RING AND DAMAGE SEPARATOR OR SHIELD WHEN PRESSURE IS APPLIED.
2. FORCE BEARING OFF SHAFT BY A STRAIGHT PULL. DO NOT COCK BEARINGS.



USING AN ARBOR PRESS

1. REST THE BEARING INNER RING OR BOTH RINGS (NEVER THE OUTER RING ONLY) AGAINST A PAIR OF FLAT BLOCKS.
2. FORCE THE SHAFT OUT BY A STEADY PRESSURE-KEEP SHAFT STRAIGHT-DO NOT ALLOW SHAFT TO COCK OR DROP.



BEARING REMOVAL

- COURTESY OF NEW DEPARTURE -

FIGURE 3. BEARING REMOVAL AND MOUNTING

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 detailed inspection as follows:

- a. Check "O" rings, gaskets, and seals for shrinkage, cracks, nicks or tears. The gasket in the case split must be flush with bores. When case split is open for any length of time, gasket will shrink.
- b. Check packing rings for excessive compression, fraying, or shredding, embedded particles (dirt or metal). Replace if defective in any way.
- c. 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 microinches and the shoulders square and free from nicks.
- d. Measure the OD of the impeller wearing surface or ring (8), and the ID of the casing ring (7). Compute the diametrical clearance (ID minus OD) and compare the difference with the limits given in Figure 5. ID surface of casing rings and OD of impeller rings must be smooth and concentric.
- e. Examine impeller passages for cracks, dents, gouges or embedded material.
- f. Check upper and lower casing machined surfaces to be free of burrs or nicks.

g. Inspect bearings according to Table I.

h. Inspect shaft sleeves (14) for excessive wear. Replace sleeves that are worn. Replace packing.

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

- a. If ID of casing ring (7) is grooved, scored, or eccentric, replace case ring. Check Figure 5 for diametrical clearance between impeller and case rings. For worn case ring maximum allowable clearance add 0.030 to values shown in Figure 5.

- b. If diametrical clearance is not within limits, the clearance can be restored by installing impeller wear rings (8) on OD of impeller wearing surface.

NOTE

If impeller 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 ring skirt OD. If no rings were installed on impeller skirt, turn OD to diameter shown for Model (see Figure 4).

(1) 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.

(2) After installation, machine the wear rings OD to provide the nominal diametrical clearance shown in Figure 5.

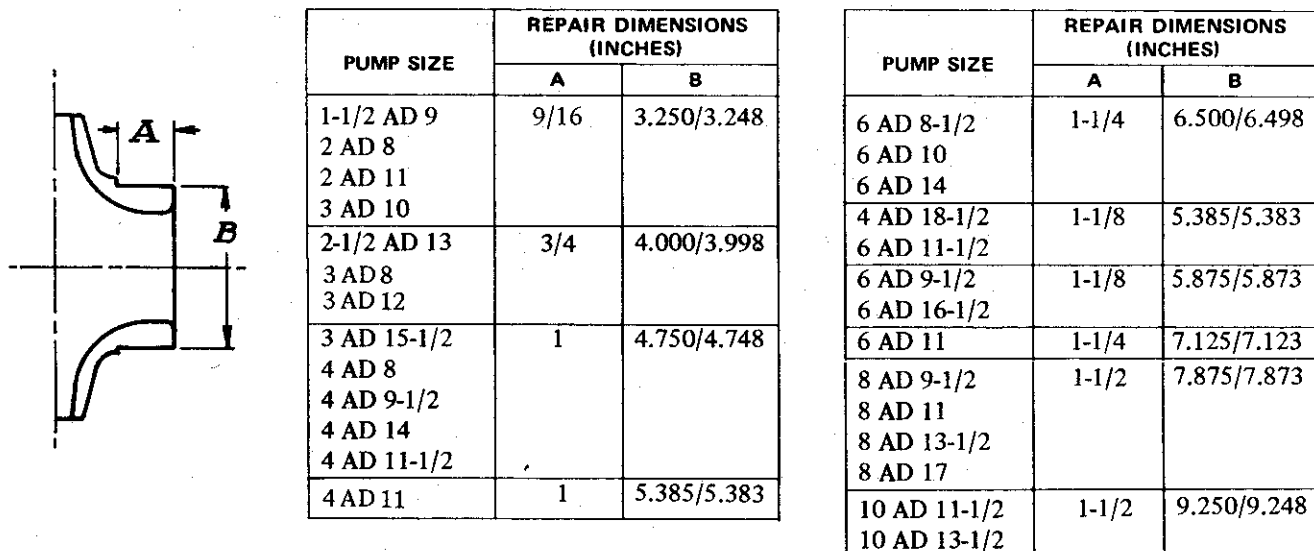


FIGURE 4. IMPELLER DIMENSIONS FOR WEAR RING INSTALLATION

IMPELLER/CASE WEAR RING DIAMETRICAL CLEARANCE

.015 .021	.016 .022	.017 .023	.018 .024	.019 .025	.020 .026	.020 .027
3AD15½ 4AD8 4AD9½ 4AD11½ 4AD14	1½AD9 2AD8 2AD11 2½AD13 3AD8 3AD10 3AD12	4AD11 4AD18½ 6AD11½	6AD9½ 6AD16½	6AD8½ 6AD10 6AD11 6AD14	8AD9½ 8AD11 8AD13½ 8AD17	10AD11½ 10AD13½

FIGURE 5

NOTE

Clearances are for standard bronze or cast iron fitted pumps. For materials with a tendency to gall, such as stainless steel, increase clearance approximately .010 inch.

SECTION III REASSEMBLY

3-1. ROTATING ELEMENT. (See Figure 1 or 2)

- a. Coat shaft (6) lightly with oil. Place impeller key (32) in shaft slot. Install impeller (2) on shaft. Center impeller hub on key (32) as closely as possible. Check impeller to make sure that vanes will rotate in proper direction (see Figure 6). Install casing rings (7).
- b. Install one "O" ring in each shaft sleeve (14) in groove provided. Slide slot end of shaft sleeve over shaft first and locate around key ends which extend beyond impeller.
- c. Slide stuffing boxes (83) on shaft, insert two rings of packing (13), lantern ring halves (29), three rings of packing (13) and gland (17) in each packing box. Insert each packing ring separately and stagger joints of successive packings 90°. Tighten attaching bolts (17B) finger tight. DO NOT USE A WRENCH. See Figure 7 for stuffing box dimensions.
- d. Slide shaft sleeve nuts (20) on shaft and thread in direction opposite to rotation of shaft. DO NOT tighten set screws in shaft sleeve nuts, as it may be necessary to adjust location of impeller on shaft to center in volute.
- e. Install "O" ring in groove OD of each stuffing box.
- f. Slide bearing covers (35) and gasket on shaft.
- g. Install snap-ring in groove on outboard end of shaft, press outboard bearing (18) (thrust bearing) on shaft. Install bearing lockwasher (69A) and bearing locknut (22). Tighten locknut securely and bend tab on lockwasher into groove provided in nut (oil thrower) (22).
- h. Drive or press inboard bearing (16) onto shaft. (See Figure 3.)
- i. Install gaskets (73) between adapter and case and adapter and stuffing box.
- j. Slide adapters (71) on shaft over bearings, and attach adapters to stuffing boxes with cap screws.
- k. Slide bearing housings (31, 33) on shaft over bearings and register into adapter (71). Before bolting bearing housings to adapter make sure that drain hole in bearing housing is in line with drain hole in adapter.
- l. On oil lubricated pump, install oil seal (107A) in bearing housing (31). The oil lubricated bearing housing is attached to adapter (71) with studs and nuts, whereas the grease lubricated housing is attached to adapter with cap screws.
- m. Slide bearing covers (35) into bearing housings (31,33). Be sure that cored slot is located at bottom of bearing cover.

This is a critical location on oil lubricated bearings, as it is part of the oil return. Secure bearing covers to housings with Allen head cap screws.

- n. Insert coupling key (46) on shaft. Assemble coupling half on shaft and tighten set screw.
- o. Some couplings require grease or oil lubrication prior to assembly. Refer to coupling instructions. See Table II for general instructions of coupling lubrication and recommended types of grease or oil.

3-2. PUMP. (See Figure 1 or 2)

- a. Install rotating element in case as assembled thus far. Locate stuffing box (83) in lower case (1A). Splitter, or gusset, which extends into suction chamber must be at top center, facing toward impeller eye.
 - b. Attach adapter (71) to lower case (1A) by use of two cap screws. Tighten cap screws, moving adapter face to within 1/16 inch of lower case.
 - c. Center impeller in volute by adjusting the impeller nuts (24). After impeller is centered, tighten set screws in impeller nuts.
 - d. To locate case rings, rotate until pin in ring matches hole in lower case.
 - e. Use upper case as template to cut a casing gasket (73A) from 1/64 inch vellumoid or equal. Shellac the new case gasket to lower case (1A). (Be sure gasket is flush with bore where stuffing box (83) locates; if gasket is not flush, "O" rings will not seal at these points.) Coat the top of gasket with a mixture of graphite and oil.
 - f. Install upper casing (1B) on lower casing. Be sure case splits are flush. Insert dowel pins for positive location of bores. Secure upper and lower casings with cap screws; tighten alternately and diagonally at opposite locations. See Torque Chart, Table III. Tighten cap screws that attach adapter to case. Rotate shaft by hand. Packing will cause shaft to be somewhat tight when it is turned.
 - g. Replace any drain plugs that were removed during disassembly.
 - h. Re-lubricate grease bearings. Refer to Bulletin 2880459 for grease type recommendation.
- It is most important to provide proper lubrication and keep bearings clean. Frequency of lubrication must be deter-

mined by experience as it depends upon bearing size, speed, operating conditions and location (environment). Table IV should be used as a guide for grease re-lubrication.

i. Oil. (Pumps are shipped without oil in the bearing housings.) Be sure to fill and adjust constant level oilers before initial start of pump.

(1) Adjust dust cap to lowest possible position on base fittings.

(2) The pipe nipple and base fitting must be level; check with spirit level. If the pipe nipple is bent, replace it. A constant level oiler that is not level will not provide proper lubrication to the bearings.

(3) Fill bottle, screw it into the dust cap as far as it will go — do not force. Allow the oil to flow into the bearing housing. Repeat this procedure until there remains a supply of oil in the bottle. Never fill bearing housing through base fitting.

(4) Check the breather tube for cleanliness. The breather tube must be used with the oil lubrication system.

(5) The bottle on the constant level oilers is made of plastic — the oil temperature must never exceed 170°F, or solvents such as alcohol be put in it. For such applications, use a glass bottle.

j. Consult the driver manufacturer's Maintenance instructions for lubricants and relubrication procedures for the driver bearings.

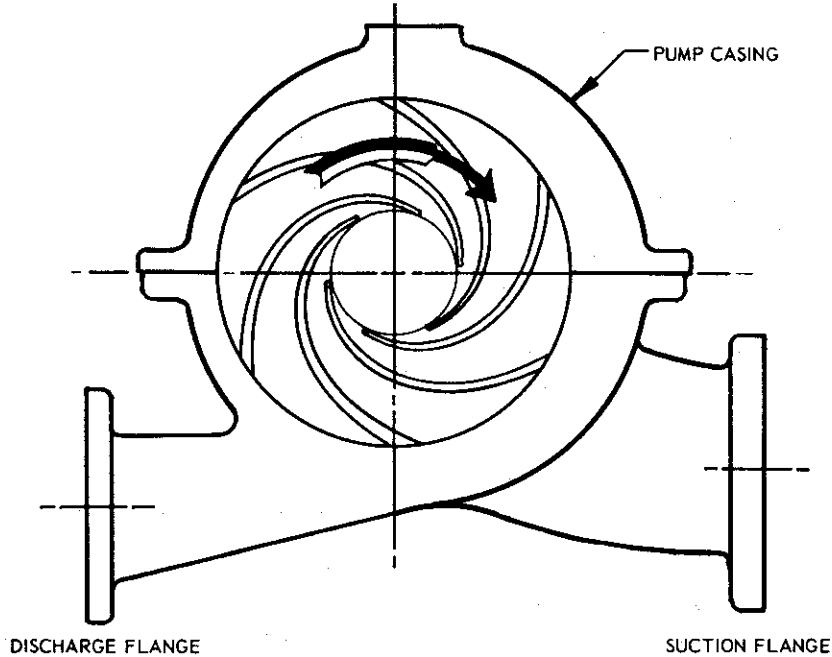
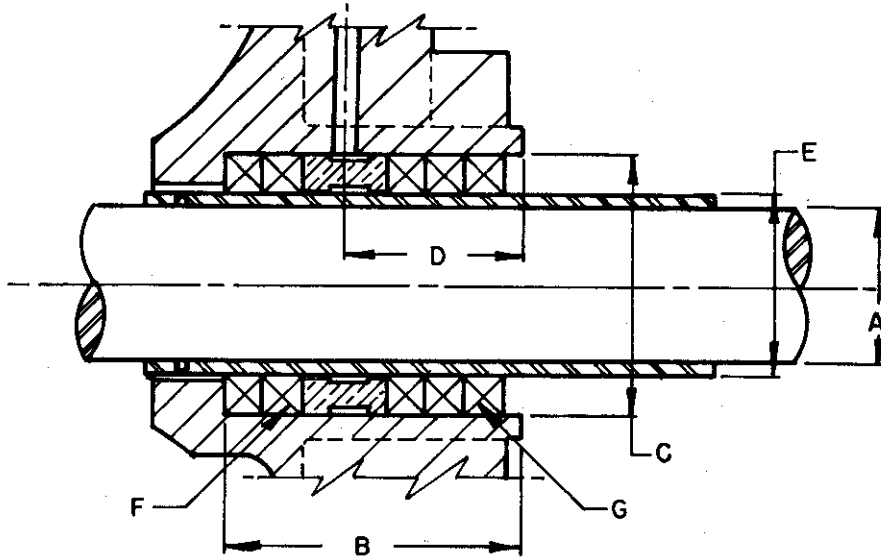


FIGURE 6. VANE POSITION FOR PROPER ROTATION

TABLE II

GREASE LUBRICATED COUPLING	
Temperature Range	Recommended Grease
-20° to 150°F	Sodium or Lithium soap Type NLGI No. 2 or ASTM worked penetration 250-300
+150° to 250°F	Lithium soap Type grease NLGI No. 3 or ASTM worked penetration 200 to 250
OIL LUBRICATED COUPLING	
Temperature Range	Recommended Oil
-20° to 300°F	Mineral base oil with viscosity minimum of 150 SSU maximum 1000 SSU at 210°F

COUPLING LUBRICATION		
Type Coupling	Type Lubrication	Frequency of Lubrication
Falk	Grease	6 Months
Fast	Grease-Oil	6 Months
Sier-Bath	Grease	6 Months
Waldron	Oil	6 Months
T. B. Wood's	No Lubrication Required	



PUMP SIZE	A	B	C	D	E	PACKING RINGS		
						Quantity		Size
						F	G	
1-1/2AD9 2AD8 2AD11 2-1/2AD13 3AD8 3AD10	1-3/16	2-3/16	2-1/16	1-5/16	1-7/16	2	3	5/16
3AD12 3AD15½ 4AD8 4AD9½ 4AD11 4AD14 6AD8½ 6AD10 6AD11	1-1/2	2-13/16	2-1/2	1-11/16	1-3/4	2	3	3/8
4AD11½ 4AD18½ 6AD9½ 6AD11½ 6AD14 6AD16½ 8AD9½ 8AD11	1-15/16	2-13/16	2-15/16	1-21/32	2-3/16	2	3	3/8
8AD13½ 8AD17 10AD11½ 10AD13½	2-1/4	3-1/2	3-1/2	2-1/16	2-1/2	2	3	1/2

FIGURE 7. PACKING DATA FOR FIGURE 5100 TYPE PUMPS

Oil, high quality, non-detergent, straight High Viscosity Index mineral oil. It must not contain free acid, sulphur, or chlorine and not more than a trace of alkali. See Figure 8.

k. Replace coupling guard.

3-3. TEST. Follow instructions in Bulletin No. 2880549 to check out the pump after repair.

3-4. TROUBLES. To reliably establish the malfunctioning of either the pump or driver, instruments such as tachometers, pressure gauges and electric meters, must be in proper working condition and preferably of recent calibration. In many cases, much time and expense have been expended with faulty instruments. Table III lists a number of troubles commonly occurring. If unable to determine the cause, and remedy the trouble from this list, refer the problem to the Peerless representative.

3-5. SPARE PARTS. To keep delays to a minimum when pump repairs are required, we suggest that the following spare parts be stocked. The number of each part required depends upon the application. For a minimum, we recommend:

- (A) One set of inboard bearings.
- (B) One set of outboard bearings.
- (C) One set of shaft sleeves.
- (D) One set of case wear rings.
- (E) One set of impeller wear rings.
- (F) In some instances, an entire rotating element should be stocked.

3-6. To obtain quick and accurate service when ordering spare parts, provide the following information:

- (A) Pump size and type as noted on nameplate.
- (B) Pump serial number as noted on nameplate.
- (C) The name and number of the parts as shown on the sectional drawings.
- (D) Quantity required of each item.

Aid may be obtained from the Peerless representative, or an authorized distributor, for planning an adequate supply of spare parts.

TABLE III

TORQUE VALUE CHART	
TORQUE VALUE (FT-LB)	
SIZE INCH	MEDIUM CARBON STEEL, SAE 5 105-120,000 PSI
3/8	23-25
1/2	59-62
5/8	120-125
3/4	210-225
7/8	305-325
1	450-475

TORQUE VALUES SHOWN ARE FOR CLEAN & LUBRICATED THREADS; GASKETED JOINTS. INSTALL UPPER CASE, TIGHTEN CENTER CAP SCREWS, THEN WORK OUT FROM CENTER TO EACH SIDE, TIGHTENING WITH TORQUE WRENCH TO VALUES SHOWN ON CHART.

TABLE IV
GREASING FREQUENCY

SERVICE	GREASE EACH
Normal, 8-hour day operation. Room free of dust and damaging atmosphere.	6 Months
Severe, 24-hour day operation. Room with moderate dust and/or damaging atmosphere, or outdoor service.	1 Month
Light, approximately 10-hour week. Room relatively free of dust and damaging atmosphere.	1 Year

LUBRICATING INSTRUCTIONS

Lubricating Instructions	Lubricating Oils
1. The pump is shipped without oil in the bearing housings.	Type: High quality non-detergent straight H.V.I. mineral oil.
2. Change first oil after operating 1000 hrs. or 60 days, whichever occurs sooner.	Weight: Brg. Operating Range (°F)
3. Frequency of oil change thereafter is dictated by service conditions. It is suggested, however, that oil changes occur at least every 3000 hr. of operation.	0-150 150-200* 200-250*
4. In order to keep the bearing housings vented, the breather tubes and filters must be kept clean.	Weight 150 SSU at 100°F 300 SSU at 100°F 500 SSU at 100°F
	*Maximum oil temperature in plastic oiler bottle 170°F

FIGURE 8

RECOMMENDED STUFFING BOX PACKING ARRANGEMENTS

SUCTION PRESSURE RANGE	PACKING	SHAFT SLEEVE	LEAKAGE RATE
60. PSIA - 60 PSIG	1) Square Braid Asbestos 2) Lattice Braid Asbestos 3) Plastic with end rings of Asbestos	SAE 40 Bronze or stainless steel	50 drops/min.
60 - 100 PSIG	Plastic with metallic or Asbestos end rings	Hardened stainless steel*	1/3 pint/min.
100 - 250 PSIG	Combination plastic and metallic packing, or Teflon impregnated packing	Hardened stainless steel*	1 pint/min.

*Metallic packing has an affinity for bronze, therefore, do not use brass or bronze shaft sleeves. †Packing must be equal to John Crane 810 (Square Braid), 5811 (Lattice Braid), Super Seal No. 1, 111-M or 101M Metallic, or CO-6 or C-12 white asbestos with Teflon suspensoid coating.

FIGURE 9

TABLE V
AMOUNT OF GREASE FOR BALL BEARINGS

OUNCES	GRAMS	MODEL
1.0	28	1½AD9, 2AD8, 2AD11, 2½AD13, 3AD8, 3AD10
1.4	39.2	3AD15½, 3AD12, 4AD8, 4AD9½, 4AD11, 4AD14, 6AD8½, 6AD10 6AD11
3.0	84	4AD11½, 4AD18½, 6AD9½, 6AD11½, 6AD14, 6AD16½, 8AD9½, 8AD11
4.0	112	8AD13½, 8AD17, 10AD11½, 10AD13½

**TABLE VI
TROUBLES**

TROUBLE	PROBABLE CAUSE	REMEDY
Failure to deliver liquid or sufficient pressure.	Pump not primed. Pump not up to speed. Discharge head too high. Insufficient available NPSH. Incorrect direction of rotation. Air leaks in suction line or through stuffing boxes. Impeller passages restricted. Worn wearing rings. Damaged impeller. Foot valve too small or restricted by dirt.	Reprime. Check for low motor voltage or motor overload. Other drives, increase driver speed when possible. Check to see that all discharge valves are opened and the discharge line is free from obstructions. In some cases, the installation has to be altered or a pump of suitable rating must be provided. Check NPSH requirements of pump and increase system NPSH accordingly. Check impeller assembly for correct rotation either by removing upper case or through priming connection. Check rotation of driver. Tighten packing. Check for air leaks between sleeve and shaft and replace O-ring if there is an air leak. Check all suction line joints for bad gaskets and loose joints. Disassemble the pump and clean impeller. Replace worn parts. Replace or repair impeller. Replace with adequate size foot valve or clean foot valve.
Pump loses prime after starting.	Air leaks in suction line. Insufficient available NPSH.	Tighten packing. Check for air leaks between sleeve and shaft and replace O-ring if there is an air leak. Check all suction line joints for bad gaskets and loose joints. Check NPSH requirements of the pump and increase the system available NPSH accordingly.
Overload on driver.	Pump speed high. Total head lower than rating. Tight packing. Liquid is of higher specific gravity or viscosity than rating. Mechanical trouble of pump or driver.	Motor voltage higher than nameplate rating will cause the motor to run faster. Either reduce motor voltage or trim impeller diameter. On other drives, reduce speed if possible. If speed reduction not realized, trim impeller diameter.** Check suction and discharge pressures and determine the total dynamic head. If TDH lower than ratings, throttle discharge to rated TDH or if this is not possible, reduce impeller diameter. Stop pump — follow proper repacking procedure. Check for scored sleeve; and for sleeve run-out if packing wears rapidly. Replace sleeve and packing as required. Check with Peerless distributor to determine if a larger motor is required. See if pump and motor turn freely. Check impeller fit, shaft straightness and ball bearings.
Pump vibrates or is noisy.	Driver unbalanced. Misalignment. Cracked foundation. Worn ball bearings.	Disconnect driver and operate it alone. Check pump for large pieces of debris, such as wood, rags, etc. Realign pumping unit. Replace foundation. Replace bearings. Check lubricants for proper grade. Check pump alignment. Check for condensation on water cooled bearings.

**Always obtain new trim diameter from Peerless representative.



SECTION IV REPAIR PARTS

4-1. Refer to the following list for commercial repair parts available from local outlets.

PUMP SIZE	RETAINING RING FOR FIG. 5100	SHAFT SLEEVE O-RINGS FIG. 5100	STUFFING BOX O-RINGS	BALL BEARING	
				THRUST DOUBLE ROW	RADIAL SINGLE ROW
1-1/2 AD 9 2 AD 8 2 AD 11 2-1/2 AD 13 3 AD 8 3 AD 10	TRUARC External Series 5100-98 Peerless Part No. 2617554	Precision Rubber No. 123 or Equal Material-Buna "N" Peerless Part No. 2669968	Parker Seal Co. No. 2-158 or Equal Material-Buna "N" Peerless Part No. 2631869	ND-5205 or Equal Peerless Part No. 2669996	ND-3205 or Equal Peerless Part No. 2629847
3 AD 12 3 AD 15½ 4 AD 8 4 AD 9-1/2 4 AD 11 4 AD 14	TRUARC External Series 5100-137	Precision Rubber No. 128 or Equal Material-Buna "N"	Parker Seal Co. No. 2-164 or Equal Material-Buna "N" Peerless Part No. 2631870	ND-5207 or Equal	ND 3207 or Equal
6 AD 8-1/2 6 AD 10 6 AD 11	Peerless Part No. 2617556	Peerless Part No. 2669896	Parker Seal Co. No. 2-265 or Equal Material-Buna "N"	Peerless Part No. 1104509	Peerless Part No. 1104448
4 AD 11-1/2 4 AD 18-1/2 6 AD 9-1/2 6 AD 11-1/2 6 AD 14 6 AD 16-1/2	TRUARC External Series 5100-177	Precision Rubber No. 135 or Equal Material-Buna "N"	Peerless Part No. 2611908	ND-5209 or Equal	ND 3209 or Equal
8 AD 9-1/2 8 AD 11	Peerless Part No. 2612155	Peerless Part No. 2669940	Precision Rubber No. 377 or Equal Material-Buna "N"	Peerless Part No. 2669989	Peerless Part No. 1104454
8 AD 13-1/2 8 AD 17 10 AD 11-1/2 10 AD 13-1/2	TRUARC External Series 5100-187 Peerless Part No. 2612157	Precision Rubber No. 140 or Equal Material-Buna "N" Peerless Part No. 2671944	Peerless Part No. 2671943	ND-5210 or Equal Peerless Part No. 2671923	ND 3210 or Equal Peerless Part No. 1104457

4-2. Figure 7 gives pertinent dimensions for packing used in Type AD Figure 5100 Pumps. Refer to Figure 9 for specifications of suitable packings which may be installed.

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.