

# Disassembly and Repair Instructions



## CENTRIFUGAL DRY PIT PUMPS

**6000 Series Pumps  
Bearing Frame: 1Y  
Vertical and Horizontal**

### **IMPORTANT**

READ THIS ENTIRE INSTRUCTION MANUAL THOROUGHLY BEFORE SERVICING PUMP.



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# Table of Contents

	Page
<b>GENERAL</b>	
Tooling, Solvent, Lubricants	3
Spare Parts Ordering, Nameplate Identification	3
Spare Parts Recommendations	4
<b>DISASSEMBLY PROCEDURES</b>	
Motor	4
Bearing Frame	4
Packing, Shaft Sleeve, Radial Bearing, Thrust Bearing	5
<b>REASSEMBLY PROCEDURES</b>	
Bearing Housing	6
Stuffing Box	7
Impeller	7
Impeller Clearance Adjustment	7
Mechanical Seal	7
<b>Table 1:</b> Recommended Torque Values of Fasteners	8
Cross section drawing and parts list – Drawing No. 96461-C	9

## TOOLING

Use only the proper tools when dismantling or repairing any YEOMANS CHICAGO CORPORATION equipment. Tools required for disassembly and assembly of dry pit pumps are as follows:

Screwdrivers	Wooden Mallet	Bearing Heater
Standard Wrenches	Bearing Puller	Emery Cloth
Retaining Ring Pliers	Wheel Puller/Bars	Allen Wrenches
Lifting Sling	Several Good Blocks of	
Torch	Wood or a Bench	

### Recommended Cleaning Solvent:

Safety-Kleen, or any equal grade of non-flammable industrial cleaner.

### Recommended Lubricants:

#### Grease

Citgo Lithium EP-2

#### Oil

Citgo Citgard 10W

Petro Canada 10W

In cases where abnormal conditions exist, such as very high temperatures, it is advisable to consult a lubrication engineer to determine the proper lubricant to use. If this is not practical, contact your YEOMANS CHICAGO CORPORATION representative stating your conditions and alternative recommendations will be provided.

### Procedure for Ordering Spare Parts

Parts and service for YEOMANS CHICAGO CORPORATION Products are available exclusively through the designated sales representative located in your geographical area. When ordering repair parts, please give the full nameplate data from the pump nameplate as described below, including S.O. Number. Complete nameplate data will insure most rapid handling of your order with the minimum chance of mistake. List each part required using the item number and name of part as shown on the following pages. Be sure to state the quantity of parts required.

### NAMEPLATE IDENTIFICATION

<b>S.O.</b>	This number corresponds to records which will enable your YEOMANS CHICAGO CORPORATION representative to determine the component parts of your unit so that exact duplicate parts or specific technical assistance can be provided. The S.O. number must be provided when ordering spare parts or requesting any technical assistance.
<b>DATE</b>	Indicates the month and year of manufacture of the unit.
<b>GPM and HEAD/FT</b>	These ratings indicate the design flow and capacity operating rating of the unit. The unit should be operated within 10% of these ratings.
<b>MODEL</b>	Indicates the pump model and bearing frame configuration (when applicable) for the unit. This information is desirable but not necessary when contacting the factory or our representative.
<b>UNIT</b>	This number indicates the number of units provided on the order and the unit designation (1 of 3. etc.).

Make record of the nameplate information from your pumps) in this manual for easy reference.

### Spare Parts Recommendations

The parts list accompanying the cross-section drawing included with this manual denotes items recommended to be carried as spare parts. It is impossible for YEOMANS CHICAGO CORPORATION to accurately determine the predicted life of any parts subject to wear because of the varying severity of duty exerted on each individual unit manufactured. The list includes parts recommended for one to five years of operation. It is recommended that the following parts not be reused at reassembly, even if showing no apparent wear:

Grease Seals	Radial Bearing	Thrust Bearing
O-rings	Gaskets	Mechanical Seals
Packing	Bearing Holder	Wear Rings & Screws
Impeller Locknut or Cap Screw	Shaft Sleeve (for Packed Pump)	(When Furnished)

## Drawing Legend – Refer to Cross Section Drawing 96461-C

Horizontal pumps differ from vertical pumps only in that these units are provided with a pump base to which the pump and motor are mounted, and they have a mounted support leg and a bearing frame leg to support the units and provide a means for securing the pump to the base. The attached drawing 96461-C is representative of both vertical and horizontal pumps with the exception of the horizontal pump support legs shown.

# DISASSEMBLY PROCEDURES

## CAUTION

PRIOR TO DISASSEMBLING UNIT, LOCK OUT MOTOR AND DISCONNECT MOTOR LEADS.

### TO REMOVE MOTOR:

#### Pedestal Mounted Pumps

- 1A. Remove cap screws, nuts and washers. Lift motor with motor support off of bearing housing (10). Coupling halves will separate and coupling insert can be removed. Motor half of coupling can be taken off of motor shaft by removing coupling set screw(s), not shown. To separate motor from motor support remove cap screws and washers.

#### Horizontal Pumps

- 1 B. Disconnect flexible coupling and motor leads, remove bolts from motor feet, and remove motor from baseplate. NOTE: It may be necessary to use a sling and hoist to aid in disassembling a horizontal unit. Be careful to keep unit balanced when removing bearing housing/impeller from volute.

#### Line Shaft Driven Pumps

- 1C. Removal of motor is not necessary. Disconnect shafting flange at pump and swing shafting out of the way. NOTE: Additional protection must be provided in order to eliminate the possibility of drive shaft coming apart at the spline connection (slip joint). Using a rope to tie both sections of the shafting together can support the slip joint.

### BEARING FRAME DISASSEMBLY

2. Remove nuts and washers (19 & 19A) from studs. Using a pry bar, break the joint between inboard side plate (23) and volute (28) at gasket (24). Lift complete upper assembly including impeller (27) from volute (28). Place entire assembly with shaft horizontal on blocks, with impeller and pump half of coupling overhanging. Remove coupling half from shaft (1) by removing set screw(s), not shown.
3. Inspect suction wear ring (35) if provided, by viewing through volute (28). If replacement is necessary, remove screws (34) to extract wear ring (35). Impeller wear ring (35) can be visually inspected while bearing frame assembly is on blocks. Impeller wear ring (35) can be removed by taking out screws (34). It may be necessary to apply heat to screws (34) to facilitate removal.

4. Remove impeller locknut and washer (26) off shaft. Impeller (27) can be easily removed by placing a wedge between the impeller (27) and inboard side plate (23) and "popping" impeller off of shaft (1). Remove key (25).

### **WARNING**

**IMPELLER MUST BE INDEPENDENTLY SUPPORTED PRIOR TO ITS REMOVAL.**

#### **PACKING DISASSEMBLY**

5. Remove gland nuts (17), remove retaining clip (15) and remove stuffing box gland halves (16). Inboard side plate with integral stuffing box (23) can then be pulled off shaft (1). Packing rings (31) and seal ring (32) may then be removed from stuffing box. If the shaft area surrounding the water slinger (13) is corroded, polish with a fine emery cloth before sliding water slinger (13) off shaft. To remove slinger (13) extract set screw (29) and slide slinger (13) off shaft. Polish and oil remainder of shaft in this area to prevent damage to components.

#### **IF UNIT IS EQUIPPED WITH MECHANICAL SEAL:**

- 5A. Remove cap screws and washers (123). Remove seal box (23) from shaft (1). If the shaft area surrounding the water slinger (13) is corroded, polish with a fine emery cloth before sliding water slinger (13) off shaft. To remove slinger (13) extract set screw (29) and slide slinger (13) off shaft. Polish and oil remainder of shaft in this area to prevent damage to components.
- 5B. Push the mechanical seal seat out of the seal box cover (121), using care not to scratch seal face. Lift the rotating assembly out of the seal box (23). Push the mechanical seal seat out of the seal box (23), again being careful not to scratch the seal face.

#### **SHAFT SLEEVE DISASSEMBLY**

6. Due to an interference fit, it will be necessary to apply heat to shaft sleeve (30) to facilitate its removal. (Caution: use heat resistant gloves or suitable protection when pulling heated shaft sleeve off shaft.)

#### **REMOVAL OF THRUST BEARING**

7. Remove cap screws (6). Clean, polish and oil end of shaft around grease seal (21) and pull end cap (2) off of bearing/shaft.
8. Remove thrust bearing locknut (3) and washer (4). With a spanner wrench unscrew and remove thrust bearing assembly consisting of bearing collar (5), thrust bearing (8), and retaining ring (9) from shaft (1). Remove retaining ring (9) from thrust bearing assembly. Using a bearing puller or similar device, remove thrust bearing (8) from bearing collar (5).

#### **REMOVAL OF RADIAL BEARING**

9. Shaft (1) may now be removed through impeller end from radial bearing housing (10). Using a bearing puller or similar device, remove radial bearing (11) from shaft (1).

# REASSEMBLY PROCEDURES

When disassembling and reassembling pumps, YEOMANS CHICAGO CORPORATION strongly urges replacing all parts subject to wear, as listed on page 4. The procedure for ordering spare parts is outlined on page 3.

Prior to reassembling the pump:

Clean, polish and oil shaft, inspecting for unusual wear or scoring. Scrape and clean all gasketed mating faces to insure proper sealing.

Make sure that stuffing/seal box, shaft sleeve and seal ring are thoroughly cleaned.

Clear all lubricant paths and replace any defective fittings.

Unless indicated otherwise, all fasteners should be tightened to the applicable torque as shown on Table 1.

If any part not listed as a recommended spare part shows excessive wear, it too should be replaced.

Contact your YEOMANS CHICAGO CORPORATION representative for ordering replacement parts.

## CAUTION

WHEN INSTALLING BALL OR ROLLER BEARINGS, PRESS ONLY AGAINST INNER RACES OF BEARINGS. PRESSING ON OUTER RACES WILL DAMAGE BALLS OR ROLLERS AND RUIN THE BEARING. PRESS EVENLY ON BEARING INNER RACE, USING EXTREME CARE NOT TO SCORE SHAFT.

It may be necessary to heat bearings to facilitate installation because of close tolerance fits. Bearings may be heated by either of the following methods:

*OIL BATH:* Accomplished by submerging bearing in a tank of oil having a high flash point. The bearing should be suspended so as not to be in contact with the heat source, for 20 to 30 minutes at a temperature of approximately 200°F. Oil temperature must not exceed 250°F.

*INDUCTION HEATING:* Accomplished by applying heat directly to the bearing (i.e., commercially available induction bearing heater). Extreme caution must be exercised to insure that bearing temperature does not exceed 200°F.

The bearings should be quickly installed and positioned squarely against mating face while it is still hot, and secured with appropriate locknut or retaining ring.

## WARNING

SUITABLE PROTECTIVE CLOTHING (I.E. GLOVES) MUST BE WORN  
WHEN HANDLING HEATED COMPONENTS.

## BEARING HOUSING REASSEMBLY

1. Install grease seal (21) into thrust bearing cap (2). Primary lip should be oriented to restrict the entrance of dirt, water, and contaminants on grease lubricated thrust bearing (8).
2. Shaft sleeve (30) must be press fitted onto shaft (1) using care that shaft sleeve is not distorted in the process. Once installed, shaft sleeve concentricity should be less than .002" TIR, when dial indicated.
3. Thrust and radial bearings are single seal bearings which are designed to provide protection against the entrance of contaminants as well as allowing relubrication through grease fittings (18). When installing thrust bearing (8) onto collar (5), sealed end of bearing will face (mate) thrust bearing retaining ring (9).

Install thrust bearing (8) onto bearing collar (5), making certain that the seal is properly oriented.

4. Using a spanner wrench or similar tool, thread assembled bearing collar onto shaft (1). Loosely install thrust bearing lockwasher (4) and thrust bearing locknut (3) onto shaft but do not tighten.

5. Slide assembled shaft through motor end of radial bearing housing (10).
6. Install radial bearing (11), making sure that sealed side is properly oriented, towards motor end of shaft. Install grease seal (12) into radial bearing housing (10). Primary lip should be positioned to restrict the entrance of dirt, water, and contaminants on radial bearing (11).
7. Slide water slinger (13) onto shaft, butting firmly against radial bearing (11). Secure to shaft with set screw (29).

### **STUFFING BOX REASSEMBLY – PACKING**

8. Place packing rings (31) and seal ring (32) into integral inboard side plate/stuffing box, being certain to maintain the correct number of rings above and below seal ring. Install packing gland halves (16) and loosely secure with gland nuts (17). Normally two rings of packing are placed at the bottom of the stuffing box before the seal ring is installed, then the remaining three rings of packing are installed.
9. Install assembled inboard side plate/stuffing box onto assembled radial bearing housing, lining up mounting holes.

### **IMPELLER INSTALLATION**

10. Insert key (25) into shaft keyway and slide impeller (27) onto shaft (1) until hub of impeller is firmly seated against shaft sleeve (30). Impeller must not ride on key. Key must slide in keyway. Final impeller adjustment will be made by turning bearing collar (5). When installing impeller, make certain that hub is butting against shaft sleeve and not against inboard side plate (23) – Impeller should turn freely. Adjust bearing collar (5) as necessary. Secure impeller (27) with impeller locknut and washer (26). Once impeller is installed, turn bearing collar (5) to draw impeller/shaft assembly towards motor, so that surface of impeller eye will not contact suction eye (wear ring) surface when assembled bearing housing is mounted to volute (28).
11. Place gasket (24) over studs (19) and install assembled bearing housing to volute (28). Secure with nuts and washers (19).

### **IMPELLER CLEARANCE ADJUSTMENT**

12. Using a spanner wrench, turn bearing retainer (5) to lower impeller until impeller eye (impeller wear ring surface) just touches suction (suction wear ring surface). The recommended 0.015" impeller clearance can be achieved by backing collar (5) off 1/2 turn. Thrust bearing lockwasher (4) and locknut (3) can then be tightened down.
13. Install thrust bearing cap (2) and secure with cap screws (6).

### **MECHANICAL SEAL BOX REASSEMBLY**

The mechanical seal assembly is a precision product. Treat it with care. In handling, do not let the carbon sealing ring fall, and take particular care not to scratch the lapped faces on the rotating and floating seat. If the seal has been used before, do not put it back in service until the sealing faces of the carbon washer have either been relapped or replaced.

- 8A. Oil the outer surface of the stationary seat rings (use light oil, not grease) and push the assembly into the seal cover and into the seal box, seating them firmly and squarely. If it is not possible to insert seats with clean fingers, place a cardboard protecting ring over face of seats and press into bore with a piece of brass tubing having a square cut smooth end. Tubing should be slightly larger than diameter of shaft. Remove cardboard after seat is firmly seated. Before completing the shaft seal installation, wipe the lapped sealing faces of the seat and sealing washer perfectly clean.

- 9A. Place washer and bellows inboard assembly on shaft (not spring) and slide into position against inboard (seal box) seat. When sliding seal assembly on shaft, be sure to press ONLY on tail sections of bellows and driving band. Use a smooth sleeve of about 1/32" over shaft diameter with a wall thickness sufficient to butt against the driving band.
- 10A. Install spring into position making sure it is properly seated over retainer.
- 11A. Place washer and bellows outboard (seal cover) assembly on shaft and slide into a position so that spring is not compressed more than 1/16". Make sure spring is properly seated.
- 12A. Before putting seal cover (121) on shaft, thoroughly clean and oil lapped faces of both seal washer and seat. Then slide seal cover (121) and press it in as far as it will go. Do not allow it to spring out or move backward.
- 13A. **Immediately** install impeller as described above.
- 14A. Set impeller clearance as described above

**CAUTION**

SEAL MUST NOT BE ALLOWED TO REST ON SHAFT TOO LONG BEFORE SEAL BOX COVER IS PLACED IN POSITION AS SEAL BELLOWS HAS TENDENCY TO ADHERE TO SHAFT CAUSING TAIL BELLOWS TO BE IMPROPERLY SEATED.

- 15A. Tighten cap screws (123) uniformly to keep faces of the seat at right angles to shaft. Tightening of seal box cover (121) automatically sets seal in proper position.

**IMPELLER CLEARANCE ADJUSTMENT (MECHANICAL SEAL)**

- 16A. Impeller clearance must be set with seal box cover (121) loose. To adjust axial impeller or wear ring clearance, withdraw adjusting screws (57) and tighten cap screws (6) down evenly until impeller (27) touches suction plate (62), or impeller wear ring (54) touches suction wear ring (80). Measure gap for shims (133) and add 1/32". Loosen cap screws (6), and evenly tighten adjusting screws (57) until desired shimming gap be obtained. Install appropriate amount of shims (133), and tighten screws (6) Check that shaft turns freely. After initial installation, impeller may be lowered an additional 1/16" before complete seal box disassembly and reassembly is required.

**TABLE 1**  
Recommended Torque Values of Fasteners\*

		<b>MATERIAL</b>			
		LOW CARBON STEEL	304 ST'N ST'L	SILICON BRONZE	316 ST'N ST'L
<b>Bolt/Size</b>	1/4-20	5.4	6.3	5.7	6.6
	5/16 - 18	10.8	11.0	10.3	11.5
	3/8 - 16	17.7	19.7	18.3	20.6
	7/16" - 14	28.2	31.3	29.1	32.8
	1/2 - 13	38.8	43.1	40.0	45.2
	9/16 - 12	51.1	56.8	52.7	59.4
	5/8 - 11	83.3	92.5	85.8	96.7
	3/4-10	104.9	127.5	118.0	131.8
	7/8 - 9	159.9	194	178.3	202.5
	1" - 8	236.0	286.7	265.4	299.6

\*ALL VALUES LISTED IN FOOT-POUNDS

**NOTE:** Impeller locknut (26) for bearing frames 1Y should be tightened to 75-100 ft-lbs.

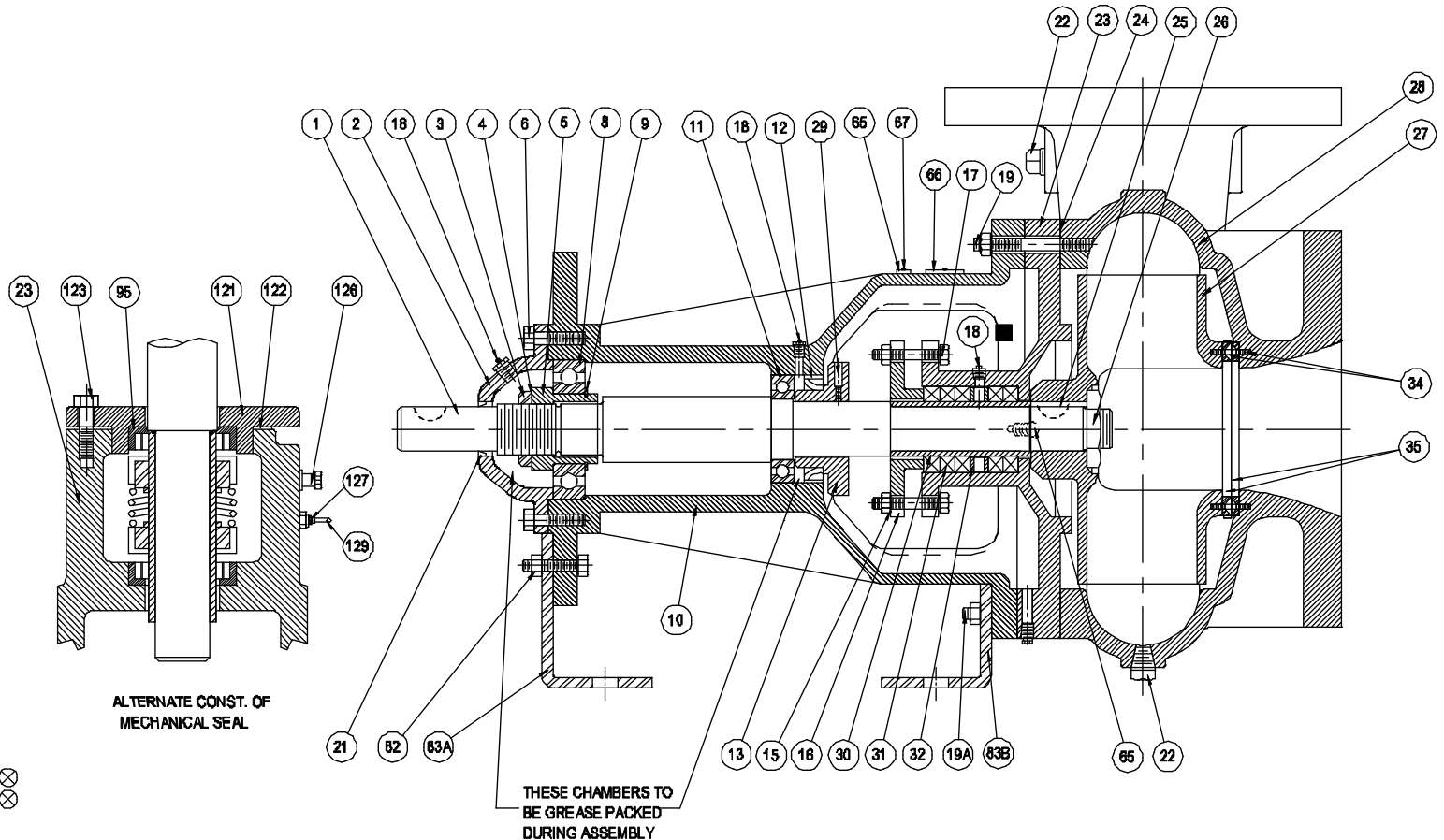
If any question with regard to pump installation, operation, assembly or repair ever arises, please do not hesitate to contact your YEOMANS CHICAGO CORPORATION representative, or the factory.



Product Manual 6101-YP covers Installation, Operation and Maintenance of YEOMANS CHICAGO CORPORATION and should be used in conjunction with this instruction manual.

**PARTS LIST**

NO.	DESCRIPTION	MATERIAL
1	SHAFT	C1141 STL
2	END CAP (SPLIT)	A48 C.I.
3	BEARING LOCKNUT	STL
4	BEARING LOCKWASHER	STL
5	BEARING COLLAR	LEDLOY
6	CAP SCREW & WASHER	STL
7		
8	SINGLE ROW BALL BEARING	STL
9	RETAINING RING	STL
10	BEARING HOUSING	A48 C.I.
11	SINGLE ROW BALL BEARING	STL
12	GREASE SEAL	
13	SLINGER	A48 C.I.
14		
15	CLIP	STL
16	SPLIT PACKING GLAND	A48 C.I.
17	GLAND BOLT & LOCKNUT	STL
18	ALEMITE GREASE FITTING	
19	STUD & NUT	STL
20		
21	GREASE SEAL	
22	PIPE PLUG	STL
23	INBOARD SIDE PLATE	A48 C.I.
24	GASKET	NEOPRENE
25	IMPELLER KEY	STL
26	IMPELLER LOCKNUT	STN.ZN.PLT.
27	IMPELLER	A48 C.I.
28	VOLUTE	A48 C.I.
29	SET SCREW	STL
30	SHAFT SLEEVE	416 S.S.
31	PACKING RING	GRPH. FIBER
32	SEAL RING	SAE 40 BRZ
33		
34	FLAT HEAD MACHINE SCREW	STNL STL
35	WEARING RING	
59	PIPE PLUG	STL
19A	STUD,NUT & WASHER	STL
65	UNIT NAMEPLATE	316 S.S.
66	ROTATION PLATE	316 S.S.
67	DRIVE SCREWS	STL
82	CAP SCREW & HEX NUT	STL
83A	SUPPORT LEG	STL
83B	SUPPORT LEG	STL
95	MECHANICAL SEAL	
121	SEAL BOX COVER	A48 C.I.
122	GASKET	NEOPRENE
123	CAP SCREW	STL
126	VENT FITTING	STL
127	TUBING FITTING STRAIGHT	STL
129	TUBING	STL



ALTERNATE CONST. OF MECHANICAL SEAL

THESE CHAMBERS TO BE GREASE PACKED DURING ASSEMBLY

■ ITEM 18 SHALL BE OMITTED AND 1/8 NPT PORT SHALL BE USED FOR FLOW THRU WATER LUBRICATION WHEN SPECIFIED.

⊗ FURNISH ONLY WHEN SPECIFIED AT EXTRA COST.

<b>REVISIONS</b> *B* ADDED LIST OF MATERIAL 4-22-82 MSR *C* GREASE FITTING ADDED ON BEARING HOUSING 9-2-82 MSR *D* UPDATE DRAWING AND CHANGE TO "A" SIZE FOR INSTRUCTION MANUAL MDT 5/30/01	<b>TOLERANCES FRACTIONAL ±.015</b>	<b>MATERIAL</b>		YEOMAN'S CHICAGO CORPORATION AURORA, IL 60598	
		DRAWN BY JFN    SCALE NONE CHECKED BY        DATE 08/14/86    DRAWER 45-AA		<b>CROSS SECTION &amp; PARTS LIST OF 4207 &amp; 4307/6150 SERIES PUMP</b> DWG. SIZE <b>A</b> PART & DWG. NO. <b>96461-C</b>	