



Operation and Maintenance Manual

**MXP, MXPC, LF
LFM, and MXP-2213C
SERIES PUMPS**

Magnatex Pumps, Inc.
3575 West 12th Street * Houston, TX 77008
Phone (713) 972-8666 Fax (713) 972-8665
www.magnatexpumps.com

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OPERATING INSTRUCTIONS

This instruction manual is intended to assist those responsible for the installation, operation and maintenance of **MAGNATEX** Magnetic Drive Sealless Pumps. We recommend thoroughly reading this manual and reviewing the Hydraulic Institute Standards regarding installation before installing and operating your pump.

RECEIPT OF EQUIPMENT

- A. Check nameplate on the pump against receiving and purchase order documents to be sure that the correct size pump and materials of construction have been supplied. If a motor has been supplied, check that horsepower, speed, and voltage are correct.
- B. Prior to uncrating, check for physical damage to the pumping system and notify the common carrier **IMMEDIATELY** if any damage is found.
- C. Check that flange protectors are intact. If not, check for foreign objects that may have found their way into the pump casing through the flange openings.

As shipped, the pumps are suitable for short term storage only. If long term storage is necessary before the pump will be put into operation, we suggest that you contact your local representative or **MAGNATEX PUMPS** for long term storage recommendations.

- D. Check for free rotation of the pump. If the pump is close coupled to the motor, this can be accomplished by removing the fan cover from the motor and rotating the fan by hand. Only slight resistance should be felt. If the pump will not rotate, heavy resistance is felt, or any noise is heard, call your **MAGNATEX** representative or **MAGNATEX PUMPS**. To check flexible coupled pumps for free rotation, remove the coupling guard and rotate both pump and motor shafts at the flexible coupling.

PUMP AND MOTOR ALIGNMENT

- A. Close coupled pumps have been aligned prior to shipment and if they turn freely by hand as outlined above, no further adjustments are necessary.
- B. Flexible coupled pumps have been pre-aligned with the customer's motor (where applicable) prior to shipment. Because pumps frequently receive rough treatment during shipment, they can become misaligned. To prevent inadvertent operation of a misaligned pump, the elastomeric spacer sleeve has been removed and packed separately with your shipment. The sleeve will need to be reinstalled and the coupling realigned prior to starting the pump. The elastomeric spacer sleeve is not designed to compensate for misalignment. Improper alignment will cause vibration and premature bearing failure.

FOUNDATION

The foundation should be substantial in order to reduce vibration and rigid enough to prevent flexing which can result in misalignment. Foundation bolts of the correct size should be located by reference to certified drawings if the baseplate is supplied by **MAGNATEX**. A final alignment check should be made after the baseplate has been grouted and set, and the foundation bolts have been tightened.

LOCATION & PIPING

- A. Locate the pump as close as practical to the source of the liquid supply.
- B. The suction line should be as short and straight as possible and contain a minimum number of elbows. Any elbows should be the large radius type. Elbows and fittings should be no closer than 20 pipe diameters to the pump suction to allow undisturbed flow to the pump impeller.

- C. Generally, suction piping should be one or two sizes larger than the pump suction to keep friction losses to a minimum. This becomes more important as the distance between the pump and the liquid supply increases.
- D. The suction piping should slope gradually upward to the pump and high spots where air pockets can collect must be avoided. All joints in the suction line should be tight to prevent air from entering into the system and creating the possibility of the pump vapor locking. A pressure gauge should be installed in the suction line as close as possible to the suction flange.
- E. The discharge line should be as short and direct as possible to minimize friction losses. An air vent should be installed at the initial high point in the pump discharge. A check valve and gate valve should be installed as close as possible to the pump discharge nozzle. The check valve is installed to protect the pump from excessive back pressure, reverse flow / rotation, and to prevent back flow into the pump during shut down or driver failure. The discharge (gate) valve is used to regulate flow. The check valve should be installed between the pump and the discharge valve to allow the pump to be removed from service without emptying the discharge line. A pressure gauge should be installed on the discharge side of the pump as close as possible to the discharge nozzle between the pump and the discharge (gate) valve.
- F. Prior to starting the pump it is important to flush the piping to insure that the system is free of foreign matter and particles such as pipe scale, welding beads, and dirt. If possible a temporary startup strainer with a 40 X 40 mesh screen should be installed in the suction line. **BE VERY CAREFUL** not to allow the temporary strainer to be plugged to the point of lowering the NPSHA below the NPSHR, resulting in cavitation or the possibility of the pump running dry and destroying the pump bearings. A pressure gauge should be installed on either side of the temporary strainer to measure the pressure drop across the strainer.

- G. **MAGNATEX** pumps are very rugged but they are not designed to handle pipe stress. The resulting forces and moments on the pump can result in misalignment and possible damage to the pump. Piping must be anchored and supported as close as possible to, but independent from the pump. Pump and pipe flanges must be positioned together before attempting to tighten flange bolts.
- H. The pump **MUST NOT RUN DRY**. To be sure that adequate liquid is available to the pump suction, a pressure or flow sensor should be installed to shut the pump down in the event of loss of prime.

ROTATION CHECK AND STARTUP

WARNING! NEVER RUN THE PUMP DRY

Prior to starting the pump the bearing housing should be filled with:

Texaco - Regal Oil R & O 32
Shell - Turbo T32 Turbine Oil

or equivalent. Fill to the middle of the sight gauge.

To confirm the direction of rotation against the rotation arrow on the pump casing use the following procedure:

- A. Open both the suction and discharge valve allowing the pump to be filled with liquid.
- B. Remove the coupling guard in the case of a flex coupled pump, or the motor fan cover in the case of a close coupled pump.
- C. Bump the motor by quickly pushing the motor start/stop buttons. If the direction of rotation is incorrect, reverse 2 of the three-phase power leads to the motor.
- D. After confirming proper rotation, replace the coupling guard or motor fan cover.

PRIMING

WARNING! NEVER RUN THE PUMP DRY

- A. Open both the suction and discharge valves and allow the pump to fill with liquid. **NOTE:** If the direction of rotation has not been checked, this must be done as detailed above under Rotation Check and Startup, before proceeding.
- B. Open the discharge valve to 1/4 open.
- C. Start the motor and immediately check the discharge pressure gauge. The pressure should rise quickly and hold steady. If the pressure rises and then falls back, there is air or vapor in the system. **STOP THE PUMP IMMEDIATELY.** Wait 15 to 20 seconds before restarting the pump.
- D. If the pressure gauge does not hold steady after repeating Step C above several times, shut the pump down and open the discharge vent (if permissible) and check that all vapors or air are purged from the system.
- E. Once the pump is fully primed and a steady discharge pressure is established, slowly open the discharge valve until the desired operating point is reached.

OPERATIONS AND MAINTENANCE

- A. Operators should make frequent visual inspections to insure that the pump is running smoothly without noise or vibration, and that the discharge pressure is holding steady without fluctuation. Any heating of the pump or motor bearings is cause for alarm. The unit should be shut down immediately, an investigation made to determine the cause, and corrective action taken.

- B. Particularly when using carbon bushings care must be exercised to insure that the bearings in the pump are replaced in sufficient time to prevent mechanical rubbing between the inner magnet and the rear casing of the pump. This condition can be detected by an increase in power consumption and loss of pump performance. In addition the pump may vibrate or operate noisily. **IF LEFT UNATTENDED, THE MECHANICAL RUBBING COULD EVENTUALLY BREACH THE REAR CASING CAUSING THE PUMPAGE TO BE RELEASED INTO THE ATMOSPHERE.** Be sure to properly maintain the ball bearings (Part No. 18) supporting the outer magnet in the frame adapter (motor bearings in the case of close coupled pumps). **FAILURE TO DO SO WILL RESULT IN THE OUTER MAGNET MECHANICALLY RUBBING ON THE OUTSIDE OF THE REAR CASING, WHICH IF LEFT UNATTENDED MAY CAUSE THE REAR CASING TO BE BREACHED, RELEASING PUMPAGE TO THE ATMOSPHERE.**
- C. Follow the motor manufacturer's recommendations and keep the motor bearings lubricated properly.

WARNING! Never throttle the pump by closing the valve on the suction side of the pump. Throttling the suction side can cause serious damage to the pump.

WARNING! Never operate the pump against a closed discharge valve. Low flow operation can cause rapid heating of the pumpage which can vaporize causing the bearings to run dry, resulting in serious damage to the pump.

MAINTENANCE SCHEDULE

Part to be Inspected

Frequency

Bearing Housing	Fill with appropriate oil to the middle of the sight gauge as needed.	Weekly
Inner Magnet Sub-Assembly	Check Thrust Ring, Sleeve, and Bushing for wear. Use new gaskets and O-rings upon reassembly.	Carbon - Annually Silicon Carbide - Every 2 Years
Motor	As directed in the motor operations manual.	As directed in the motor operations manual.

STORAGE PROCEDURES

For maximum protection cover only the pump with plastic or some other protective material. Motors should be greased and rotated by hand every three (3) months.

Before start-up, refer to the section titled "Rotation Check and Start-Up" on page 4.

RECOMMENDED TIGHTENING FORCE FOR NUTS AND BOLTS

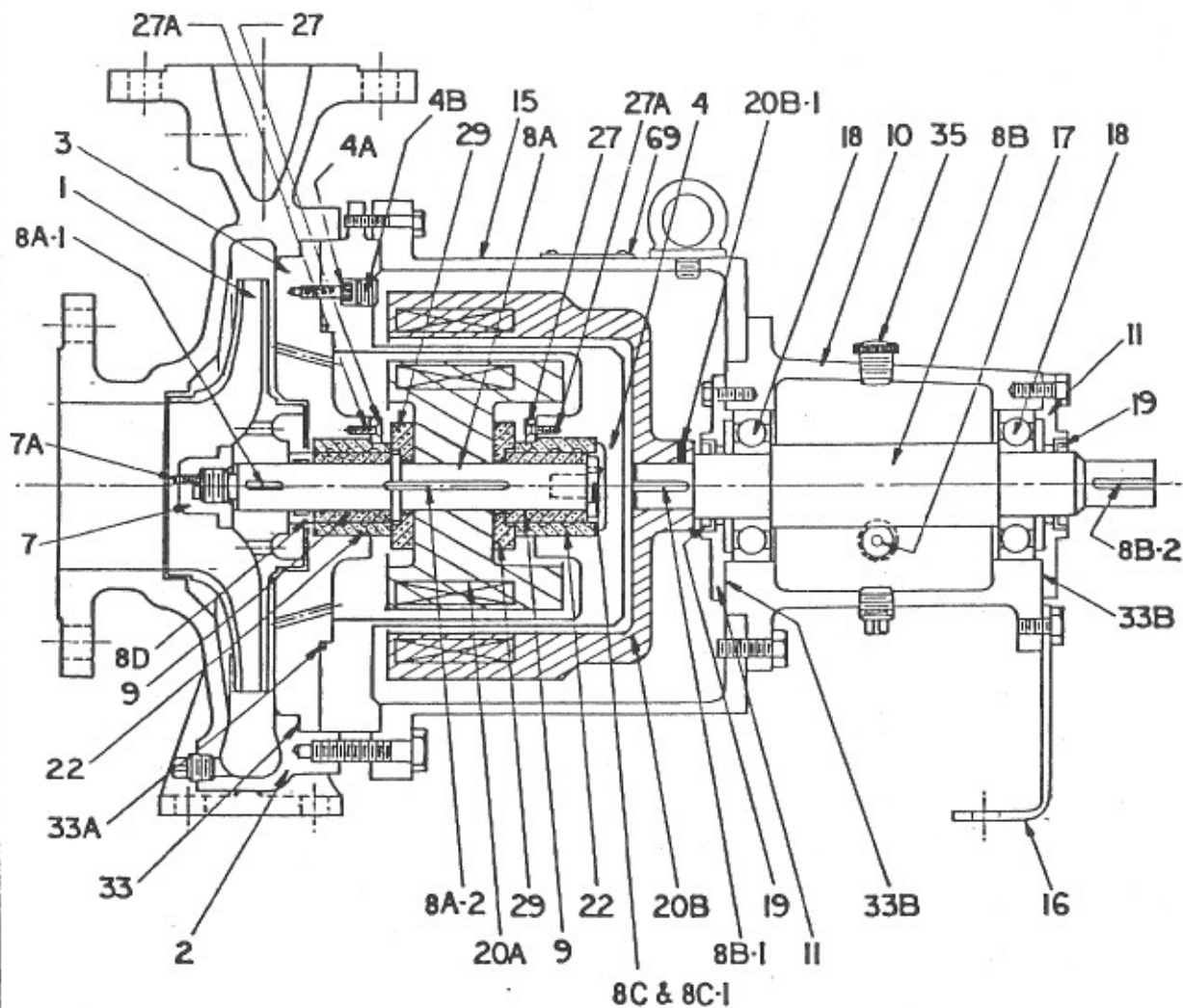
Normal Tightening Force for 316 SS or Mild Steel Bolts and Nuts

BOLT SIZE (MM)	FORCE (FT. LB.)
3	0.4
5	2.1
6	3.5
8	8.8
10	17.7
12	31.0
14	49.8
16	79.4
18	108.3
20	155.2
22	213.0
24	267.1
27	390.0
30	541.5
33	758.1
36	938.6

Normal Tightening Force for Mild Steel Bolts vs. Cast Iron Threads

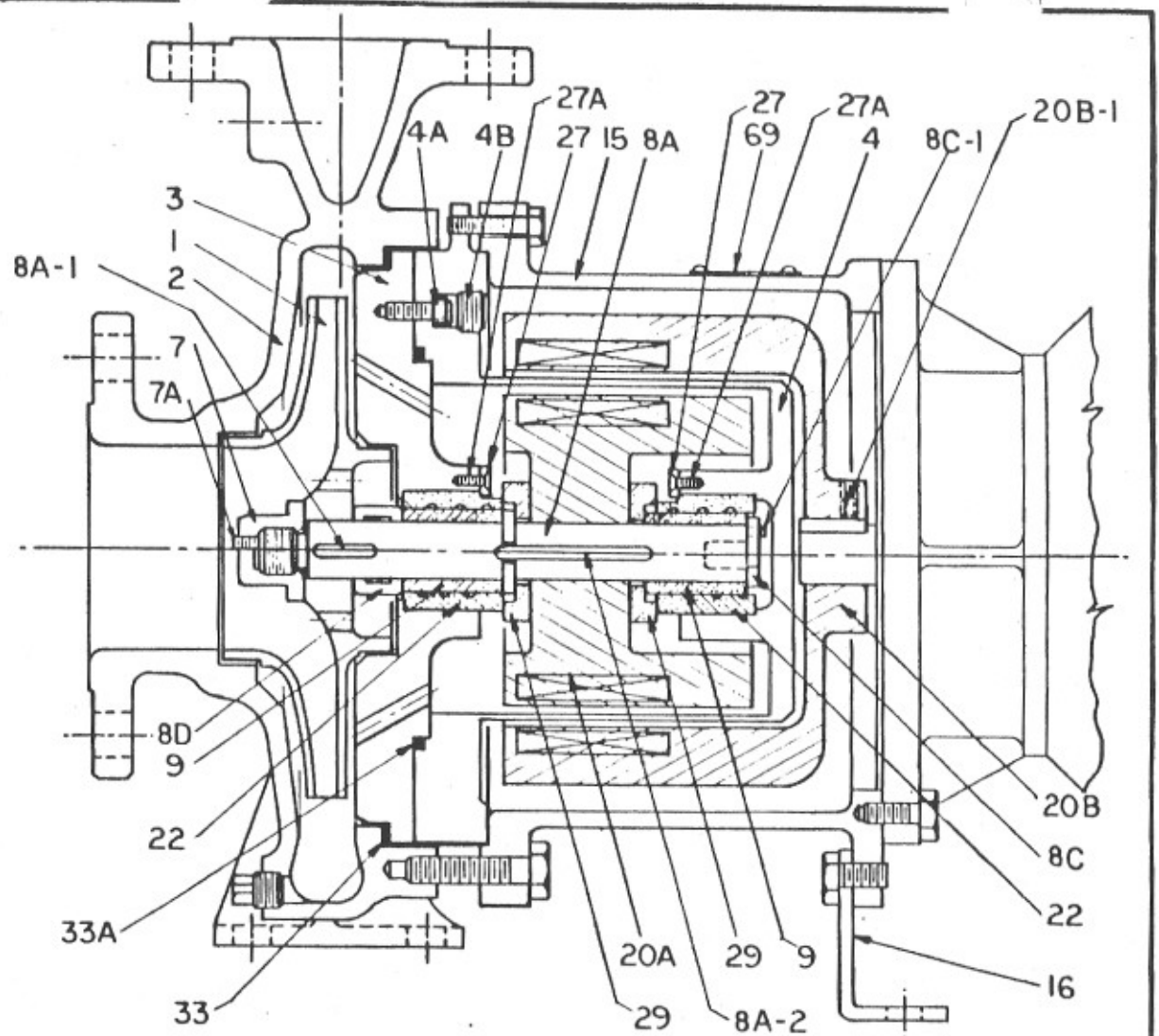
BOLT SIZE (MM)	FORCE (FT. LB.)
3	0.3
5	1.4
6	2.3
8	5.8
10	11.5
12	20.2
14	33.2
16	52.7
18	72.2
20	101.1
22	137.2
24	173.3
27	260.0
30	361.0
33	505.4
36	613.7

PART No.	NAME OF PART	No. REQ'D	
		USE	SPARE
1	IMPELLER	1	
2	CASING	1	
3	CASING COVER	1	
4	REAR CASING	1	
4A	SOC. HD. CAPSCREW, M-6	2	*
4B	SOC. HD. PIPE PLUG, 1/4"	2	
7	IMPELLER NUT	1	*
7A	SET SCREW, M-8	1	*
8A	SHAFT, A	1	*
8A-1	IMPELLER KEY	1	*
8A-2	INNER MAGNET KEY	1	
8B	SHAFT, B	1	
8B-1	OUTER MAGNET KEY	1	
8B-2	COUPLING KEY	1	
8C	SLEEVE BOLT	1	*
8C-1	SET SCREW, M-6	1	*
8D	COLLAR	1	*
9	SLEEVE	2	*
10	BEARING HOUSING	1	
11	BEARING COVER	2	
15	FRAME ADAPTER	1	
16	SUPPORT	1	
17	OIL GUAGE	1	
18	BALL BEARINGS	2	*
19	DUST SEAL	2	*
20A	INNER MAGNET	1	
20B	OUTER MAGNET	1	
20B-1	SET SCREW, M-6	1	
22	BUSHING	2	*
27	DETENT WASHER	2	*
27A	FLAT HD. CAPSCREW, M-4	2	*
29	THRUST RING	2	*
33	GASKET	1	*
33A	O-RING	1	*
33B	GASKET	2	*
35	AIR VENT	1	



REVISIONS		MAGNATEX Pumps Inc. SECTIONAL DRAWING MOTOR SEPARATED - OIL LUBE				
NO.	DATE					
1		DRAWN BY S. BROWN			DATE JULY 7 '68	REV. 0
2						
3		DRAWING NO. SD-1982				
4						
5						

PART No.	NAME OF PART	No. REQ'D	
		USE	SPARE
1	IMPELLER	1	
2	CASING	1	
3	CASING COVER	1	
4	REAR CASING	1	
4A	SOC. HD. CAPSCREW, M-6	2	*
4B	SOC. HD. PIPE PLUG, 1/4"	2	
7	IMPELLER NUT	1	*
7A	SET SCREW, M-8	1	*
8A	SHAFT	1	*
8A-1	IMPELLER KEY	1	*
8A-2	INNER MAGNET KEY	1	
8C	SLEEVE BOLT	1	*
8C-1	SET SCREW, M-6	1	*
8D	COLLAR	1	*
9	SLEEVE	2	*
15	FRAME ADAPTER	1	
16	SUPPORT	1	
20A	INNER MAGNET	1	
20B	OUTER MAGNET	1	
20B-1	SET SCREW, M-6	1	
22	BUSHING	2	*
27	DETENT WASHER	2	*
27A	FLAT HD. CAPSCREW, M-4	2	*
29	THRUST RING	2	*
33	GASKET	1	*
33A	O-RING	1	*
69	NAME PLATE	1	



REVISIONS		MAGNATEX Pumps Inc.		
NO.	DATE	SECTIONAL DRAWING		REV.
1		CLOSE - COUPLED PUMP ASSY.		
2				
3		DRAWN BY	DATE	REV.
4		S. BROWN	NOV. 5 '86	0
5				
		DRAWING NO.		
		SD-1951		

DISASSEMBLY of MXP and MXPC SERIES [Fig. 1]

- A. Remove the casing drain plug and empty the pump of any remaining liquid. [Fig. 2]
- B. Remove the casing bolts [Fig. 3] and the bolts from the support (Part No. 16). The pump may now be removed leaving the casing attached to the baseplate and piping [Fig. 4].

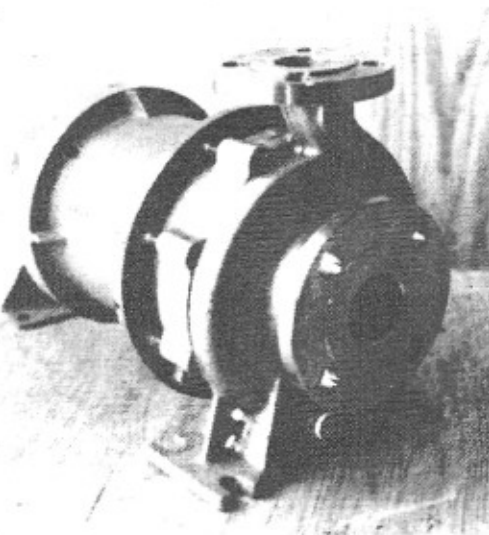


Figure 1

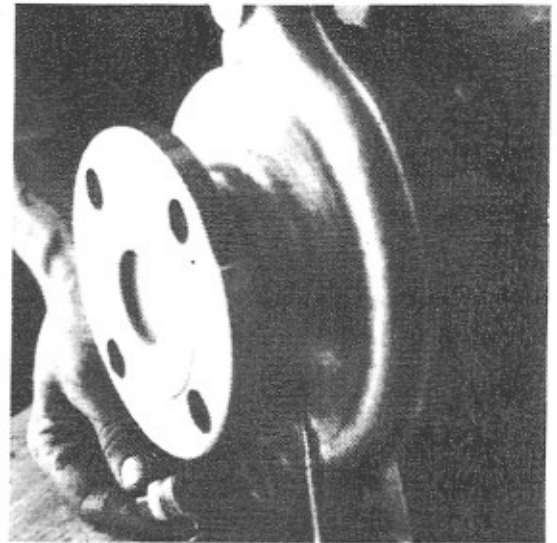


Figure 2



Figure 3

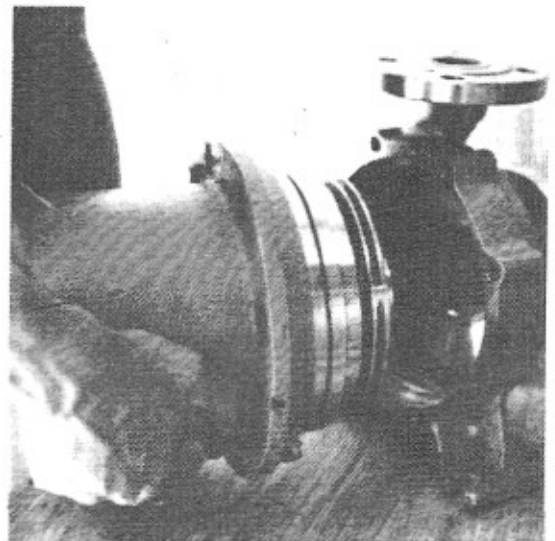


Figure 4

- C. Disconnect the rear casing bolts [Fig. 5] and pull out the rear casing (Part No. 4) with all the internal parts [Fig. 6]. During this procedure remember that strong magnetic forces are working to keep the inner and outer magnets together. A fair amount of force will be required to disconnect larger horsepower pumps. **CAUTION - BE CAREFUL TO AVOID TRAPPING YOUR FINGERS BETWEEN THE REAR CASING AND THE FRAME ADAPTOR (Part No. 15)**

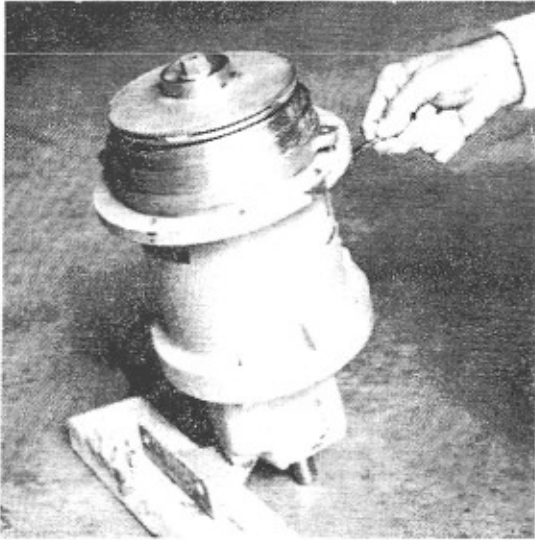


Figure 5

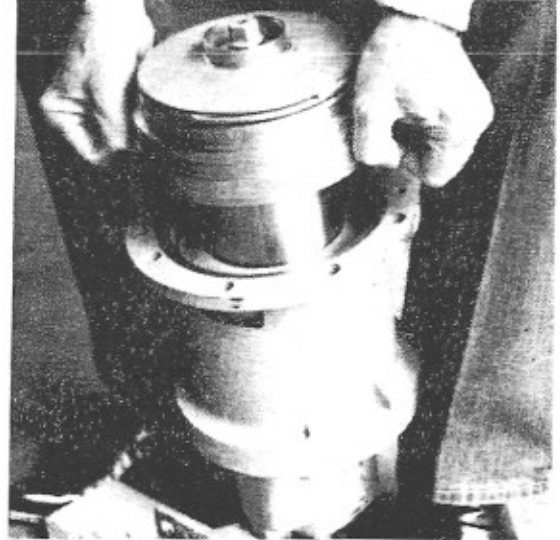


Figure 6

- D. Loosen the set screw (Part No. 7A), then remove the impeller nut (Part No. 7) and the impeller (Part No. 1 [Fig. 7]).



Figure 7

- E. Remove the socket head pipe plug (Part No. 4B) and the socket head capscrew (Part No. 4A) [Fig. 8]. Next, lift the casing cover off. Avoid dropping the loose collar (Part No. 8D) and the sleeve (Part No. 9) [Fig. 9].



Figure 8

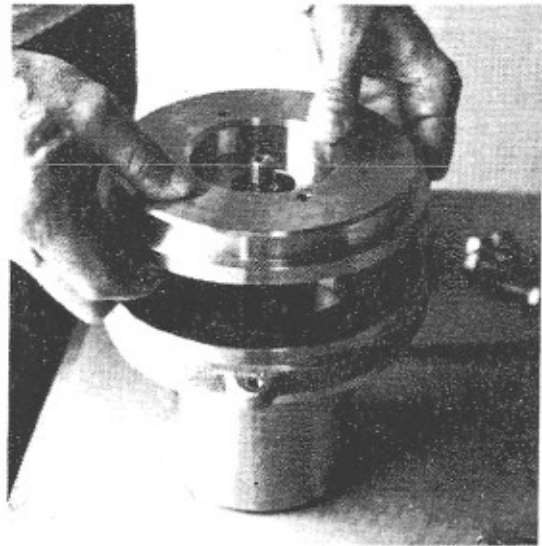


Figure 9

- F. Lift the inner magnet assembly straight up out of the rear casing (Part No. 4), so that the sleeve (Part No. 9) and the bushing (Part No. 22) do not bind [Fig. 10].



Figure 10

- G. Remove the O-ring (Part No. 33A).

- H. Remove the bushings (Part No. 22) from the rear casing (Part No. 4) and the casing cover (Part No. 3) by removing the flat head capscrew (Part No. 27A) and the detent washer (Part No. 27) [Fig. 11].

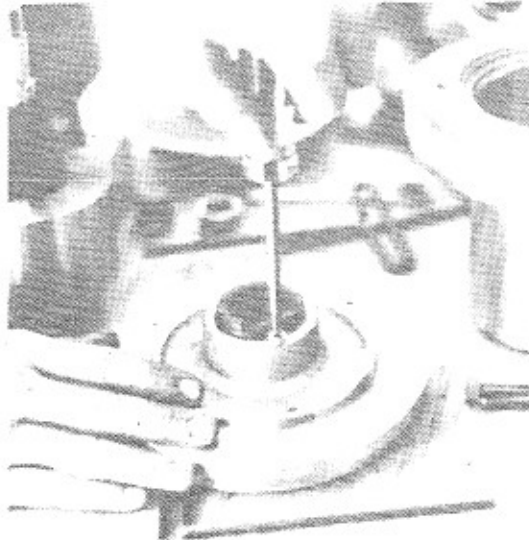


Figure 11

- I. By loosening the set screw (Part No. 8C-1) and removing the sleeve bolt (Part No. 8C) from the shaft (Part No. 8A), the sleeve (Part No. 9), the thrust rings (Part No. 29), and inner magnet (Part No. 20A) may now be easily removed [Fig. 12].

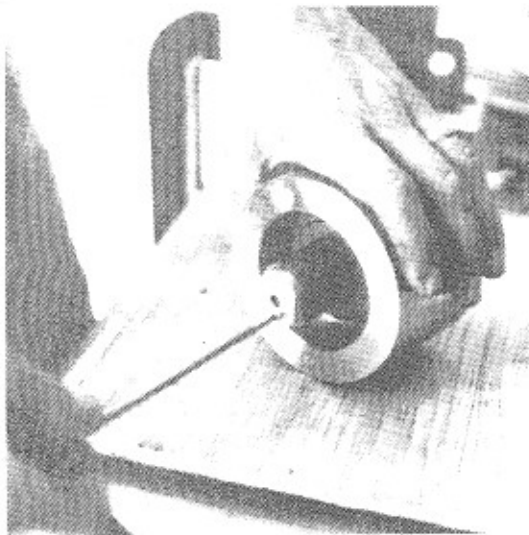


Figure 12

REASSEMBLY of MXP and MXPC SERIES

- A. Be sure that all gaskets, O-Rings, and gasket surfaces are clean and free of dirt or damage. **DO NOT REUSE TEFLON® GASKETS.** Use only new Teflon® gaskets when reassembling the pump.
- B. Be sure to remove any magnetic particles that may have accumulated on the inner or outer magnets.
- C. Remove any accumulated particles of dirt from the internal lubrication passages.
- D. Reassemble the pump reversing the disassembly procedure outlined above. **CAUTION - WHEN REASSEMBLING THE REAR CASING TO THE FRAME ADAPTOR, BE CAREFUL TO AVOID TRAPPING YOUR FINGERS BETWEEN THE REAR CASING (Part No. 4) AND THE FRAME ADAPTER (Part No. 15).**

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DISASSEMBLY of LF, and MXP-2213C SERIES [Fig. 13]

- A. Remove the casing drain plug and empty the pump of any remaining liquid [Fig. 14].

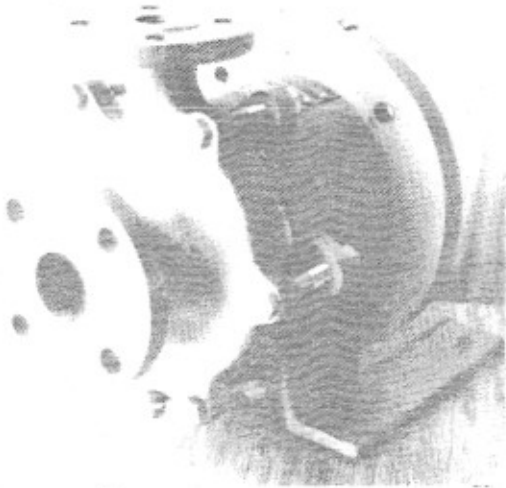


Figure 13

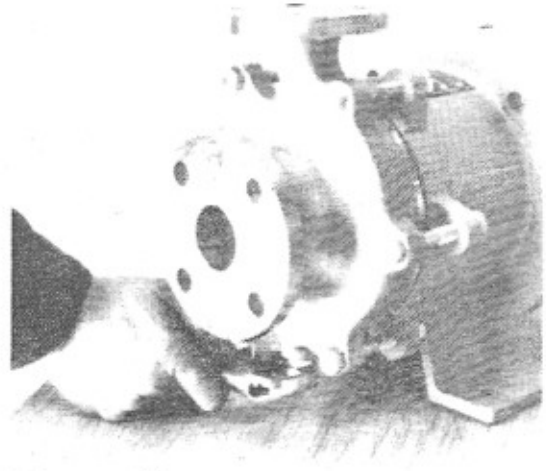


Figure 14

- B. Remove the casing bolts and the bolts from the frame adapter (Part No. 15) [Fig. 15]. The pump may now be removed, leaving the casing attached to the suction and discharge piping.



Figure 15

- C. Remove impeller nut and impeller (Part No. 7 and Part No. 1) [Fig. 16].



Figure 16

- D. Remove gasket (Part No. 33A) or O-ring (Part No. 33).
- E. Pull out the rear casing (Part No. 4) [Fig. 17]. During this procedure remember that strong magnetic forces are working to keep the inner and outer magnets together. A fair amount of force will be required to disconnect pump. **CAUTION - BE CAREFUL TO AVOID TRAPPING YOUR FINGERS BETWEEN THE REAR CASING AND THE FRAME ADAPTOR.**

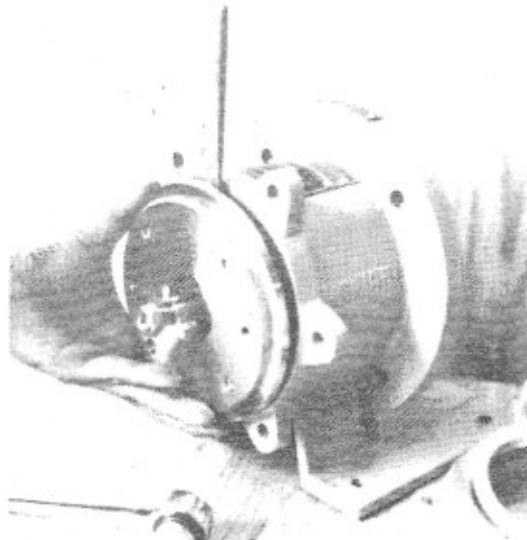


Figure 17

- F. Disconnect the hexagonal bolts (Part No. 4A) and remove the rear casing (Part No. 4) [Fig. 18].

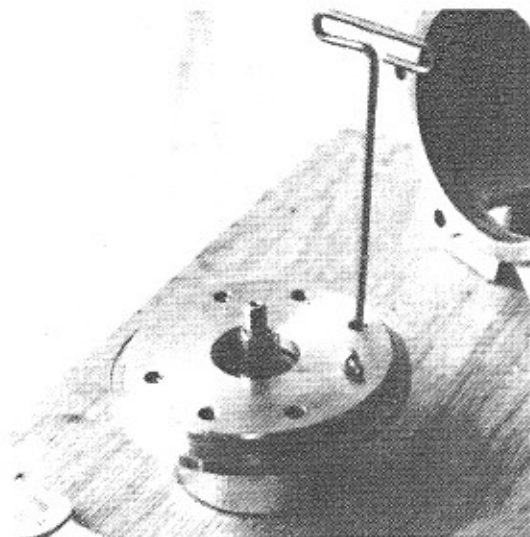


Figure 18

- G. Separate the inner magnet (Part No. 20A) from the casing cover (Part No. 3) being careful of the loose thrust ring (Part No. 29) and the sleeve bearing (Part No. 9) [Fig. 19].

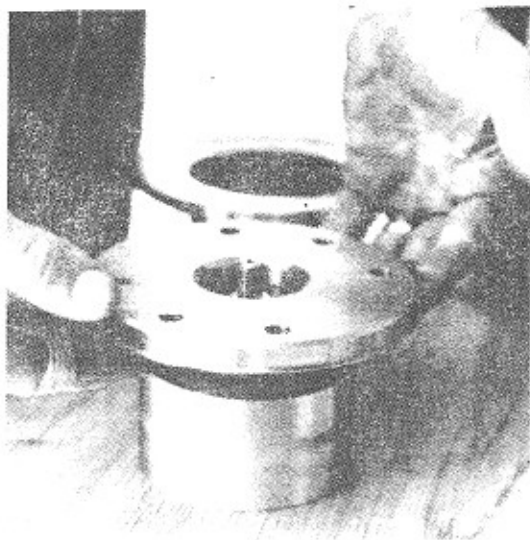


Figure 19

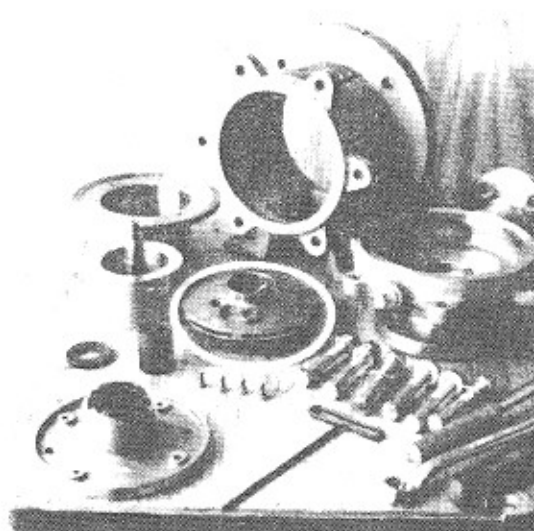


Figure 20

REASSEMBLY of LF, MXP-2213 SERIES

- A. Be sure that all gaskets, O-Rings, and gasket surfaces are clean and free of dirt or damage. **DO NOT REUSE TEFLON[®] GASKETS.** Use only new Teflon[®] gaskets when reassembling the pump.
- B. Be sure to remove any magnetic particles that may have accumulated on the inner or outer magnets.
- C. Remove any accumulated particles of dirt from the internal lubrication passages.
- D. Reassemble the pump reversing the disassembly procedure outlined above. **CAUTION - WHEN REASSEMBLING THE REAR CASING TO THE FRAME ADAPTOR, BE CAREFUL TO AVOID TRAPPING YOUR FINGERS BETWEEN THE REAR CASING (Part No. 4) AND THE FRAME ADAPTER (Part No. 15).**

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DISASSEMBLY of LFM SERIES [Fig. 21]

- A. Remove the casing drain plug (Part. No. 67) [Fig. 22] and empty the pump of any remaining liquid.

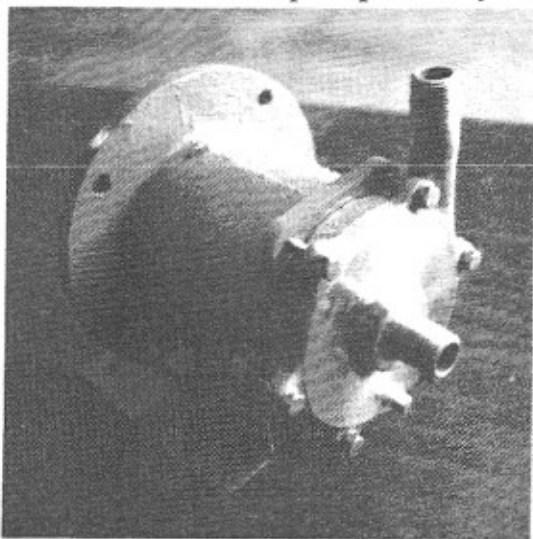


Figure 21

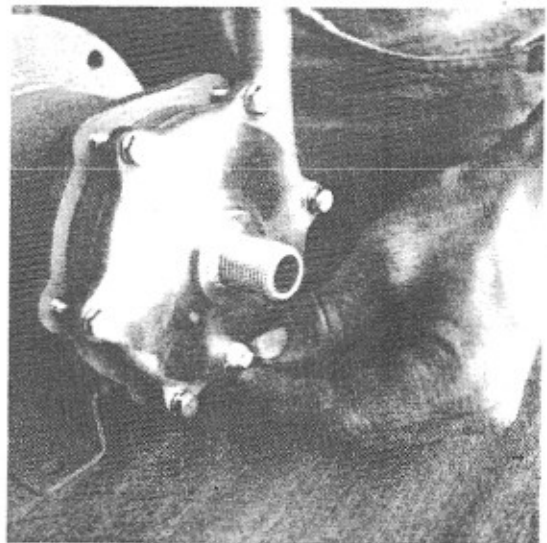


Figure 22

- B. Loosen in an alternating pattern in stages and remove the casing bolts (Part No. 63) from the frame adapter (Part No. 15) [Fig. 23].

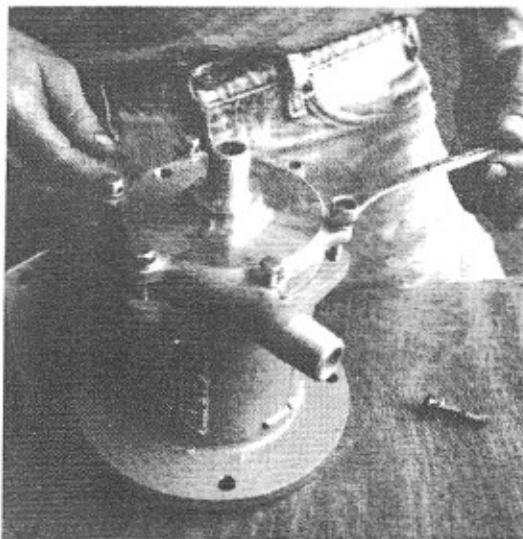


Figure 23

- C. Lift off the casing (Part No. 2) [Fig. 24]. CAUTION: LIFT STRAIGHT UP TO AVOID BENDING AND BREAKING THE SHAFT (Part No. 8).

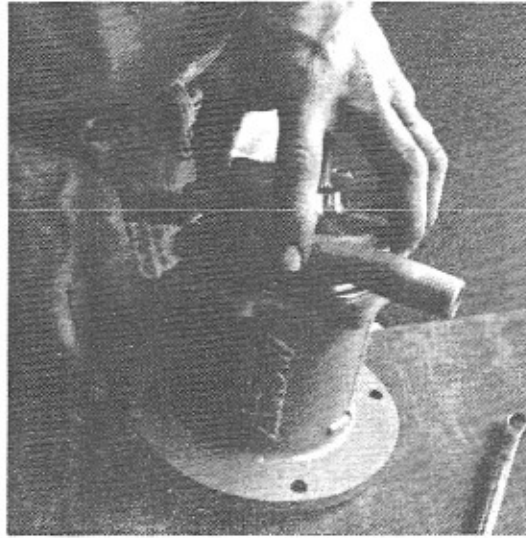


Figure 24

- D. Remove O-ring (Part No. 33).

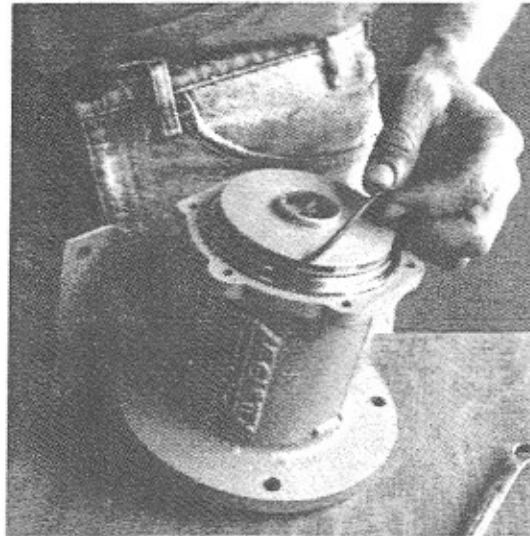


Figure 25

- E. Lift out inner magnet assembly (Part No. 65) which includes the impeller. (Part No. 11), inner magnet (Part No. 20B0, pin (Part No. 1A), bushing (Part No. 45), and the shaft (Part No. 8) [Fig. 26].



Figure 26

- F. Remove the silicon carbide shaft (Part No. 8) being careful not to drop the shaft as it can shatter.



Figure 27

- G. Examine and replace parts as required.

REASSEMBLY of LFM SERIES

- A. Slowly center the inner magnet assembly (Part No. 65) into the rear casing (Part No. 4) [Fig. 28].

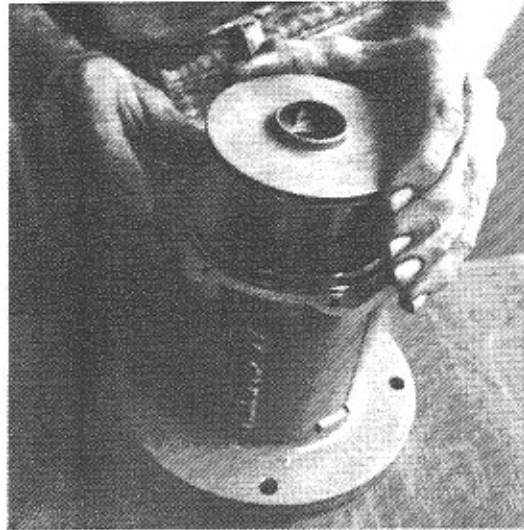


Figure 28

- B. Be sure that the O-ring and O-ring surfaces are clean and free of dirt or damage. **DO NOT REUSE O-RINGS.** Use only new O-rings when reassembling the pump [Fig. 29].



Figure 29

- C. Carefully guide the shaft (Part No. 8) [Fig. 30] into the inner magnet assembly with the short, flat end up.

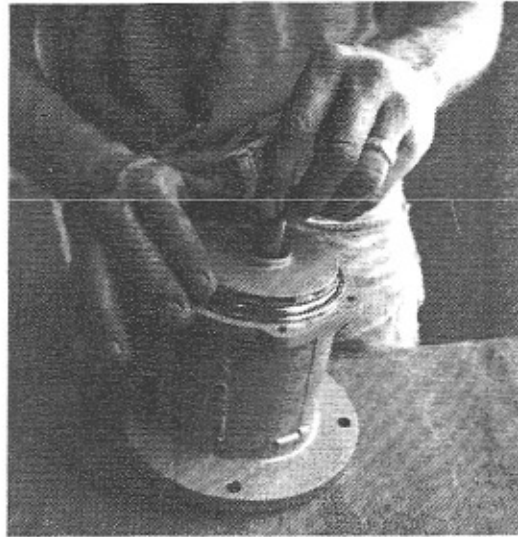


Figure 30

- D. Replace the casing (Part No. 2) while looking down the suction port to confirm that the flat slot on the shaft support aligns with the flat slot on the shaft [Fig. 31].



Figure 31

- E. Replace the casing bolts (Part No. 32) being sure to tighten the bolts in an alternating pattern in stages to the recommended bolt tightening force of 2.3 ft. lbs. This is very important because any lateral force could put undue strain on the shaft and cause breakage.