Installation Operation and Maintenance

LaBour Horizontal Pumps
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DZT
DL-DS
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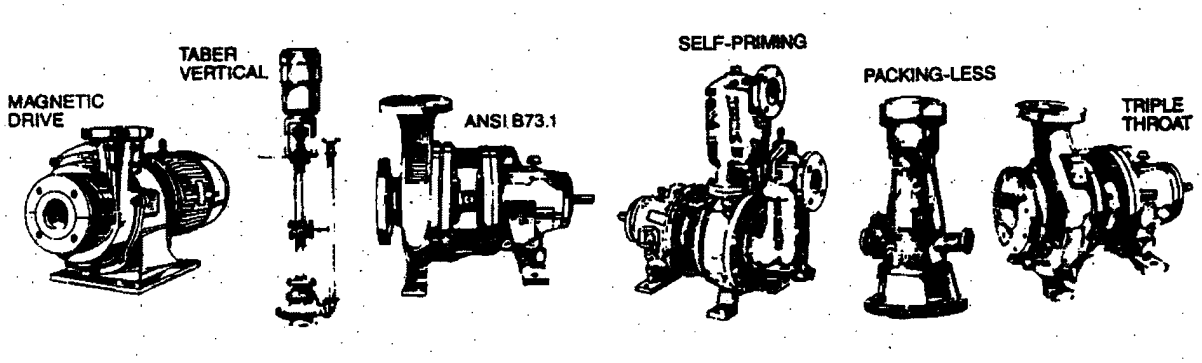

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Instructions for the Care and Operation of LaBour Horizontal Centrifugal Pumps

This bulletin is intended to give information on the proper installation and maintenance of LaBour centrifugal pumps of the horizontal types. The description of the operating characteristics and the mechanical construction will acquaint the operator with the general construction of this equipment. The hints as to where to look for trouble in case of improper operation, as found in the last few pages of this bulletin, should be of help to the pump operator and maintenance department.

The following drawings apply to this pump Serial No.....

Drawing Numbers

INSTALLATION OF PUMP

The pump should be so located that it is readily accessible in order that proper attention may be given, and should be placed a foot or more above floor level, thus making maintenance more convenient. The suction and discharge pipes must properly match the companion flanges on the pump and no strain must occur in connecting the pipes. The pumps are not designed to carry any appreciable mechanical load on either the suction or discharge openings and if the piping must be strained to make the final connection at the pump, trouble will result.

CAPACITY OF THE PUMP

Pumping capacities are ordinarily expressed in terms of volume of liquid handled per unit time; together with the total head against which the pump is to operate. The capacity of the pump is generally given in gallons per minute (GPM), and the head is expressed in feet. LaBour pumps are all carefully tested at the factory before being shipped, and although the pumps are tested with water, the performance will generally be the same regardless of the specific gravity of the liquid being handled. Wide variations in the viscosity will change somewhat the pumping characteristics, but as long as the head is expressed in feet and not in pounds pressure, the capacity-head characteristics are the same, regardless of the specific gravity. The power required to drive the unit will vary in direct proportion to the specific gravity of the liquid.

MATERIALS OF CONSTRUCTION

LaBour pumps are furnished in a wide variety of construction materials, these being especially selected for the liquids to be handled and the duty to be performed. When the pump leaves the factory it is tagged, indicating the metal used in the pump casing and also indicating the metal of which the impeller is made. Care should be taken to see that pumps constructed of given metals are applied only for handling liquids for which they are suitable.

STARTING THE PUMP

If the installation has been properly made, the pump is ready for starting. A careful check should be made to see that no foreign material has become lodged in the pump. When the pump leaves the factory, the suction and discharge openings have been closed in order to protect the pump. The operator can remove the cover from the suction trap, in case this is a self-priming pump, and make a partial examination of the pump. Also the pump can be turned over by hand to be certain that no solid obstacle is blocking the impeller.

The bearing bracket is supplied with the proper amount of lubricant suitable for indoor operation at ordinary temperatures. The housing completely encloses the bearings and nothing could ordinarily get

the trap and liner head are replaced by a suction head. The removal of these parts will expose the impeller.

Directions for removing the *lockscrew type* of impeller are given on Form E-8085-6 shown on a following sheet. If it is necessary to remove the *drawbolt type* impeller, the driving motor must be moved in order that access may be had to the end of the pump drive shaft drawbolt. The impeller and impeller shaft are an integral unit carried by the hollow drive shaft which runs in the bearing bracket. The end of the impeller shaft is keyed into this hollow drive shaft and is held in place against end movement by a drawbolt which runs through the entire length of the hollow drive shaft and is secured by a nut and lock washer at the drive end. Removing this nut allows the impeller to be pulled out. In case the impeller shaft sticks in the drive shaft, it is necessary to tap the end of the drawbolt and in some instances it is necessary to pry the impeller forward as well as tap the drawbolt.

When reassembling a pump, care must be taken that when the impeller is firmly seated in position there is a clearance of approximately $\frac{1}{32}$" between the impeller blades and the pump back. When the liner head is in position, the entire assembly is so designed that there will not be less than $\frac{1}{32}$" between the impeller blades and the liner head. These clearances are all obtained through the use of a $\frac{1}{16}$" thick casing gasket. The use of a thinner gasket will reduce the clearance and the use of a thicker gasket will mean excessive clearance between the impeller and the pump head. Because of the high co-efficient of expansion of chrome alloys, impellers made of such metals are set closer to the pump back than to the head.

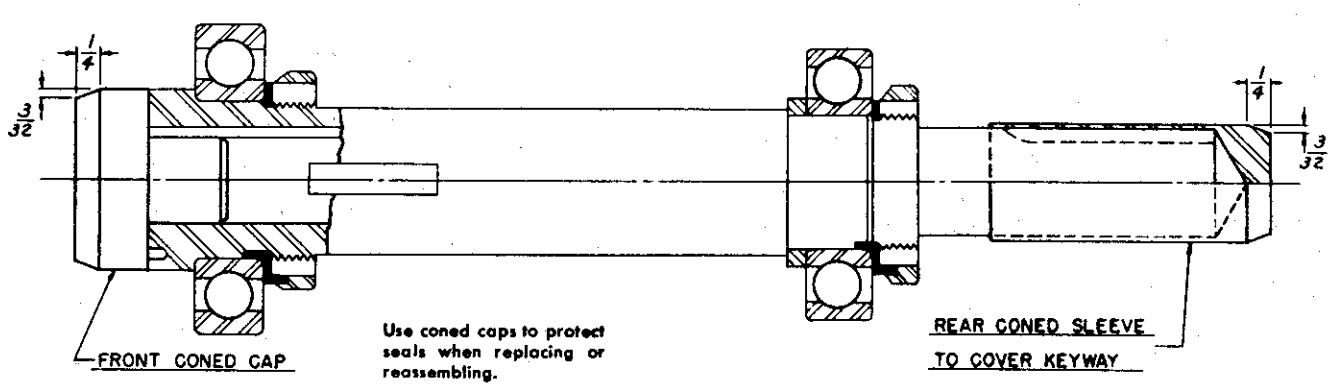
The bearing bracket is provided with two ball bearings which carry the drive shaft. When these bearings are grease lubricated, the bearing housing should be supplied with the proper amount of grease such as #00 Lubriko Special to level off at a height which reaches and covers the lowest ball in both bearings. Too much grease will result in over heating of the bearings. If the unit is used in a location where the temperature becomes low, a special grease may be required. The grease should be at all times sufficiently fluid so that it will not remain in a mound or ridge but will spread out to reach both bearings. A grease which will operate at temperatures up to 250° is preferred.

If it should become necessary to replace a ball bearing, the present bearing should be pressed off the shaft. The new bearing should be heated in oil to a temperature of 300° F., at which temperature it can be slipped over the shaft and drawn snugly into place by the locknut which is secured by the lock washer.

If it becomes necessary to replace the oil seals or reassemble the end covers in the QC bracket assembly, care must be used not to cut or notch the lip of the seal when pushing it on the shaft as this may cause leakage. The best method is to use a coned assembly cap on the ends of the drive shaft. This will protect the seal from possible damage from prying tools, sharp edges, or keyways. (See drawing below.)

The flexible coupling generally used on LaBour pumps is of the pin and disc type. The two halves of the coupling each have projecting pins which enter holes in a rubber and fabric composition disc placed between the two halves of the coupling. These couplings are designed with ample strength and protect both the pump and the motor from any slight misalignment.

A coupling connected bearing bracket assembly is not designed for belt drive with overhung pulley. In a belt driven unit, the bearing housing is provided with a suitable drive shaft to mount the pulley and has ample bearing capacity to handle normal overhung belt loads.



GIVE PART NUMBER AND PUMP SERIAL NUMBER WHEN ORDERING REPAIRS

into the bearings. A check should, however, be made to be certain that the drain and filling plugs are in place and that the lubricant is up to the proper level.

When starting a self-priming pump, the suction trap must be filled with liquid. This may ordinarily be done by removing the cover on the trap, but some types of pumps are provided with a special filler plug in the separator. The direction of rotation of the pump should be checked by referring to the arrow on the pump back. LaBour pumps rotate clockwise when looking at the coupling end of the pump; with the exception of the food products pumps, which rotate in the opposite direction.

To meet specified pumping conditions, each pump must operate at a definite speed, and any appreciable change from this speed will materially change the pumping characteristics of the unit.

PACKING USED AND GLAND CONSTRUCTION

Several types of glands are used on LaBour pumps, together with several kinds of packing, depending upon the liquid to be handled. The gland on a pump which handles corrosive liquid must be intelligently operated and maintained in order that satisfactory results may be obtained.

When handling acids a braided packing is generally used. This packing is thoroughly impregnated with special grease and graphite. Pumps handling caustic have a special packing for this service, while pumps on hydraulic duty are packed with a good grade of hydraulic packing. When repacking a pump, care must be taken to use the correct size and kind of packing for the particular service.

The most common gland used with LaBour pumps is of the floating type with a double packing seal. In this construction, the main packing is within a projection on the pump back and is compressed through an external auxiliary gland which also carries packing. The entire assembly is compressed through a gland follower by means of some compression device such as gland bolts, or a gland lever working in conjunction with a compression spring.

An extra deep stuffing box is provided for certain services. This type generally has a lantern ring located in the center of the single packing chamber. This ring communicates with a passage in the projection on the pump back which in turn allows grease to be forced to this lantern ring, or allows a liquid seal to be used.

REPACKING GLAND

When it becomes necessary to repack the gland, the pressure on the gland follower should be entirely released. The gland and gland follower can then be slid back along the shaft and the packing removed from both the main and the auxiliary chambers. New packing should be cut to such length that when the ends are butted together a ring will be formed which is of slightly larger diameter than the packing chamber. When this ring is forced into place the ends will be held tightly together. Care must be taken to stagger the joints. After a gland has been packed, it should be carefully watched and in some cases an extra ring of packing may be inserted after a short period of operation.

In repacking a deep stuffing box, care must be taken that the lantern ring is in the center of the packing chamber when the gland is compressed. The lantern ring communicates with a grease or liquid passage in the packing chamber, and if the lantern ring is not in the approximate center of this chamber, the grease or liquid cannot flow to this ring.

WATER COOLED HUBS AND WATER SEALED GLANDS

When pumping hot liquids it is desirable to keep the gland temperature as low as possible, thus preserving the life of the packing. For this service, a pump with a water-cooled gland should be used. In this design, an annular water chamber is cored in the casting which surrounds the packing. LaBour pumps having the type "B" hubs provide optional water cooling. It is only necessary to insert a drain plug and add pipe connections to make use of this feature.

Pumps operating with vacuum on the suction may be provided with liquid sealed glands, which design prevents an excessive amount of air being drawn past the gland. Water-sealing cannot be used with concentrated sulphuric acid and with some other liquids under certain conditions.

REPAIRING THE PUMP

In case it becomes necessary to dismantle the pump or to replace parts, the following procedure and suggestions will be found helpful. If the pump is of the self-priming type, a separator is bolted to the discharge flange of the casing and is readily removed. A gravity feed pump, if of the type which can be converted into a self-priming pump, has an adapter in place of the separator.

The trap of the self-priming pump, together with the liner head which is inside the trap, can be detached from the pump back by removing the casing clamps or bolts. In the case of a non-priming unit,

OPERATING INFORMATION

The following suggestions, when used as guides to the proper installation and operation of self-priming centrifugal pumps and to the location of troubles, must be based on the assumption that the pump was originally designed and constructed to suit the specified conditions.

PUMP FAILS TO PRIME

A. Pump has not received its initial prime.

B. Direction of rotation is wrong. See arrow on pump back showing rotation.

C. There are air leaks on the suction side of the pump in excess of the pump's air capacity under existing conditions of vacuum. This may be detected:
   1. By submerging the end of the discharge line in water. The presence of bubbles indicates the pumping of air.
   2. Remove the suction line from the pump and install a blind flange on the pump inlet. Connect a vacuum gauge and note if the dry vacuum pulled is sufficient for the suction lift required. If this is not sufficient and air continues to be discharged, there is an air leak in the pump. If the vacuum is satisfactory and little or no air is discharged after the vacuum reading reaches a maximum, the suction line is probably not tight.

D. A plugged suction line. Install vacuum gauge at the pump suction and note if the dry vacuum developed is sufficient for the suction lift required.

E. Suction lift too high for the handling of the desired liquid. The principal factors affecting this are:
   1. Specific gravity of liquid too high. The possible height of suction lift varies inversely as the specific gravity of the liquid. The only remedy is to place the pump nearer the liquid level.
   2. Vaporization of liquid under vacuum or liberation of absorbed gas under vacuum. These troubles are the most difficult to detect. The gas or vapor will exist as such on the suction side of the pump and in all parts of the pump under suction conditions, but may not be evident at all on the pressure side of the pump, due to recondensation or reabsorption of the vapors or gases under the relatively high pressure conditions existing on the discharge side. The only sure check on this trouble is to test the operation of the pump with cold water under similar conditions of suction.

F. Discharge line plugged or under pressure, preventing free release of air. LaBour self-priming centrifugal pumps remove air by entraining it with liquid. This mixture is discharged into a separator which does not function properly under pressure. It is necessary to arrange for the free release of air without back pressure.

G. Liquid foams readily and does not release air, thus preventing the separator from functioning. This will be found when attempting to handle materials like liquid soap.

H. Loss of priming liquid.

I. Speed too low. Always operate at the speed recommended by the manufacturer.

J. Mechanical damage, wear or corrosion.

PUMP PRIMES, BUT CAPACITY LOW

A. Speed too low.

B. Direction of rotation wrong.

C. Gas or vapor enters pump with liquid. A small amount of gas at atmospheric pressure may attain a considerable volume under the vacuum existing in the pump. This lowers the pressure head which the pump will develop due to the reduction in the weight of the fluid mixture actually within the pump, and the consequent loss of centrifugal force. Furthermore, any actual space occupied by the gas displaces an equal volume of liquid. This gas or vapor may not be evident after passing to the pressure side of the pump, as it may be reabsorbed or condensed under the higher pressure conditions.

PUMP REQUIRES TOO MUCH POWER

A. Dynamic head materially lower than that specified. This will usually increase the capacity and power required.

B. Specific gravity of liquid higher than that for which the pump was powered. The power varies directly as the specific gravity.

C. Viscosity of the liquid too high.

D. Mechanical damage, such as impeller rubbing.

E. Scale deposits or other obstructions inside of pump casing and in contact with rotating parts.

F. Mechanical or adjustment defects in the prime mover or power supply, resulting in a lower output and an apparatus over-load.

TYPE "QC" BEARING BRACKET ASSEMBLY

BRACKET	ASSEMBLY
101-S-6	E-8076-6
101-Q-6	E-8078-6
201-Q-6	E-8079-6
501-Q-6	E-8080-6
501-Q-6	E-11079
501-Q-6	E-11089
501-Q-6-E	E-8081-6

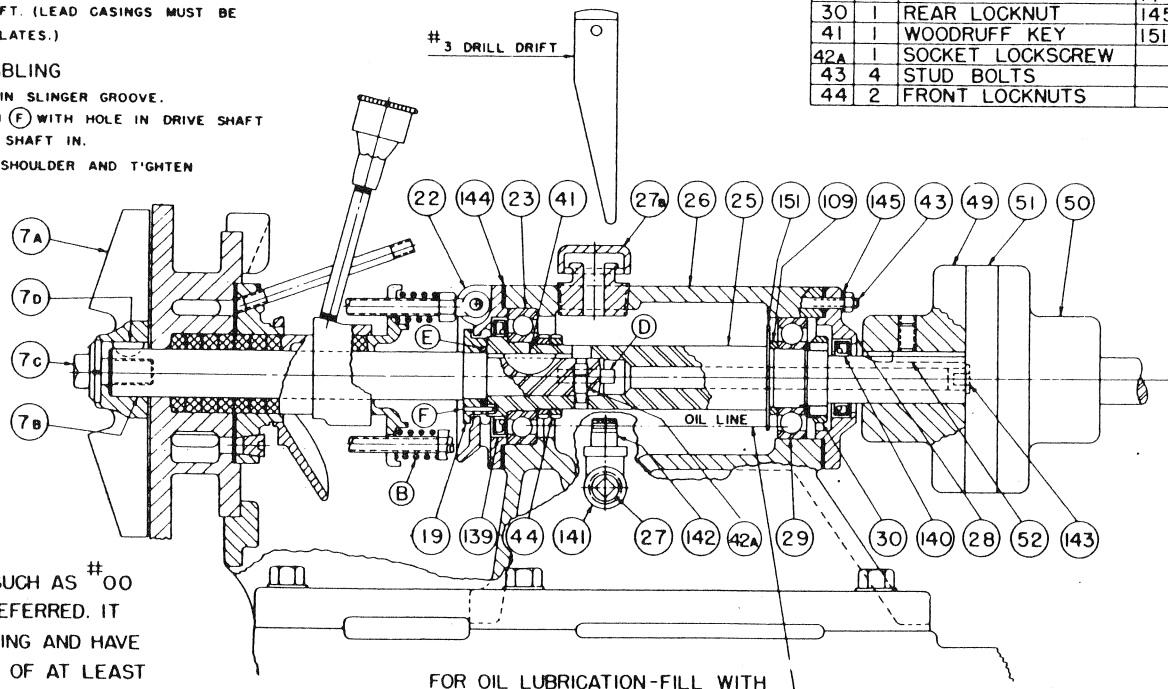
TO REMOVE IMPELLER SHAFT FROM BEARING BRACKET

1. REMOVE PLUG (27B) RELEASE PRESSURE (B) ON PACKING.
2. TURN SHAFT TO EXPOSE SOCKET IN LOCKSCREW (42A).
3. LOOSEN SOCKET LOCKSCREW ABOUT 4 OR 5 TURNS UNTIL IT STRIKES THE SHOULDER.
4. ROTATE SHAFT 90° TO EXPOSE DRIFT SLOTS (D).
5. DRIVE DRIFT DOWN TO FORCE OUT IMPELLER SHAFT.
6. PRY BARS MAY NOW BE INSERTED UNDER THE BLADES TO REMOVE IMPELLER SHAFT. (LEAD CASINGS MUST BE PROTECTED WITH STEEL PLATES.)

CAUTION WHEN REASSEMBLING

1. PUSH "O" RING (E) FIRMLY IN SLINGER GROOVE.
2. LINE UP SLINGER DRIVE PIN (F) WITH HOLE IN DRIVE SHAFT BEFORE FORCING IMPELLER SHAFT IN.
3. FORCE SHAFT IN AGAINST SHOULDER AND TIGHTEN LOCKSCREW (42A) SECURELY.

PC. NO.	NO. REQ'D	PART NAME	PC. NO.	NO. REQ'D	PART NAME
7A	1	IMPELLER	49	1	FLEXIBLE COUPLING (PUMP HALF)
7B	1	IMPELLER SHAFT	50	1	FLEXIBLE COUPLING (MOTOR HALF)
7C	1	SHAFT SCREW	51	1	FLEXIBLE COUPLING DISC
7D	1	WOODRUFF KEY	52	1	FLEXIBLE COUPLING KEY
19	1	SLINGER "O" RING & PIN	109	▲ 1	SHAFT SHOULDER RING
22	1	FRONT BEARING COVER			(SEE NOTE BELOW)
23	1	FRONT BEARING			
25	1	DRIVE SHAFT	139	1	FRONT OIL SEAL
26	1	BEARING BRACKET	140	1	REAR OIL SEAL
27	1	PIPE PLUG 3/8-18	141	1	3/8 PIPE TEE
27B	1	BREATHER PLUG	142	1	OIL LEVEL ASSEMBLY
28	1	REAR BEARING COVER	143	1	CA PLUG
29	1	REAR BEARING	144	2	GASKETS
30	1	REAR LOCKNUT	145	4	COPPER GASKETS
41	1	WOODRUFF KEY	151	1	REAR SLINGER
42A	1	SOCKET LOCKSCREW			
43	4	STUD BOLTS			
44	2	FRONT LOCKNUTS			



NOTE:
GLAND BOLTS ARE ACTUALLY 90° FROM POSITION SHOWN.

▲ SHOULDER RING (PC. NO. 109) NOT REQ'D. FOR SIZE NO. 17-22-30 DZT 15WH-20WH-35-45-55 Q 25-35 DPL

NOTE:
WHEN USING BEARINGS WITH BALL LOADING SLOTS ASSEMBLE WITH LOADING SLOTS FACING EACH OTHER.

* A SEMI-FLUID GREASE SUCH AS #00 LUBRIKO SPECIAL IS PREFERRED. IT MUST BE NON-SEPERATING AND HAVE A TEMPERATURE RANGE OF AT LEAST -10° TO 250°

FOR OIL LUBRICATION-FILL WITH #10 OIL TO GAGE LEVEL.

FOR GREASE LUBRICATION-FILL WITH APPROVED GREASE* TO A HEIGHT WHICH WILL COVER THE LOWEST BALL IN BOTH BEARINGS.

TYPE "QC" BEARING BRACKET ASSEMBLY

(WITH ONE PIECE SHAFT)

BRACKET	ASSEMBLY
101-S-6	E-8076-6
101-Q-6	E-8078-6
101-Q-6	E-11714
201-Q-6	E-8079-6
501-Q-6	E-8080-6
501-Q-6	E-11083
501-Q-6	E-11096
501-Q-6	E-11325
501-Q-6-E	E-8081-6

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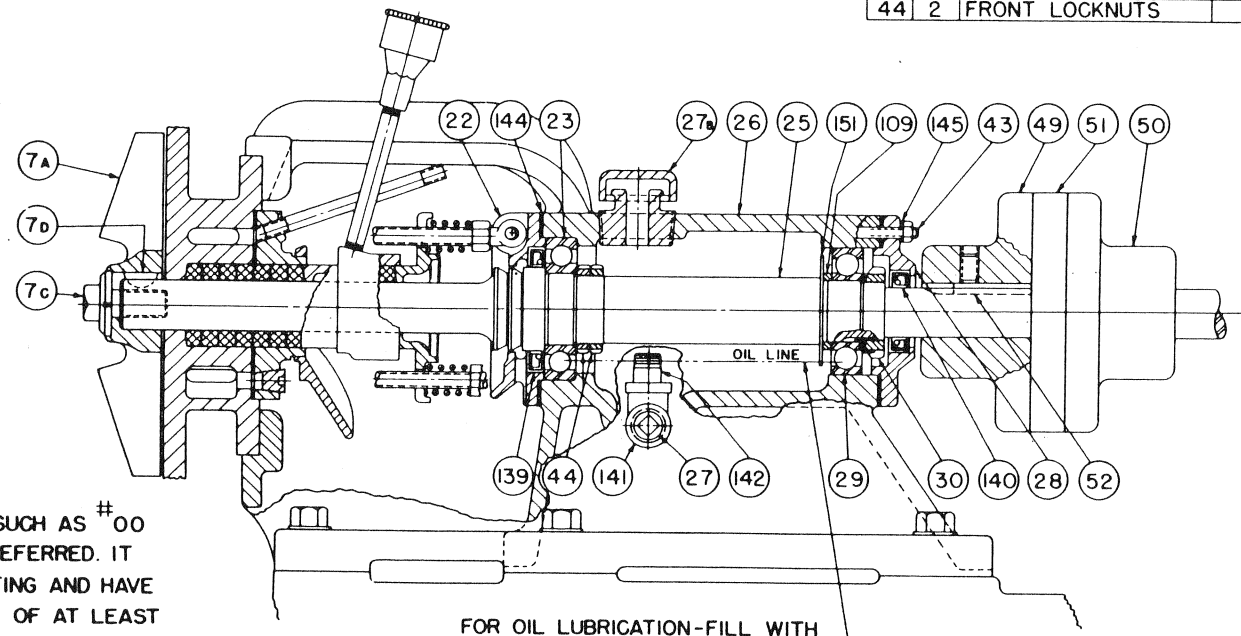
			50	1	FLEXIBLE COUPLING (MOTOR HALF)
7C	1	SHAFT SCREW	51	1	FLEXIBLE COUPLING DISC
7D	1	WOODRUFF KEY	52	1	FLEXIBLE COUPLING KEY
			109	▲ 1	SHAFT SHOULDER RING
22	1	FRONT BEARING COVER			(SEE NOTE BELOW)
23	1	FRONT BEARING			
25	1	SHAFT	139	1	FRONT OIL SEAL
26	1	BEARING BRACKET	140	1	REAR OIL SEAL
27	1	PIPE PLUG 3/8-18	141	1	3/8 PIPE TEE
27B	1	BREATHER PLUG	142	1	OIL LEVEL ASSEMBLY
28	1	REAR BEARING COVER			
29	1	REAR BEARING	144	2	GASKETS
30	1	REAR LOCKNUT	145	4	COPPER GASKETS
			151	1	REAR SLINGER
43	4	STUD BOLTS			
44	2	FRONT LOCKNUTS			



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