LUBE OIL SERVICE PUMP

SUN SHIPBUILDING & DRY DOCK CO.

Hull 670 Gould

P.O. J-43851-2
P.S. 670-904-1

DELAVAL Serial No. 320037

Instructions IM-142A

DELAVAL-IMO PUMP DIVISION

Trenton, N.J.

March 1974

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ORDERING INSTRUCTIONS

All correspondence pertaining to renewal parts for the equipment must refer to the instruction book number and should be addressed to the nearest DELAVAL representative. See addresses of sales offices listed above.

The handling of renewal orders will be greatly facilitated if the following directions are carefully observed.

1. Give the number of the instruction book.

2. Give the serial number of the machine for which part is desired. This number appears on the nameplate.

3. Designate the desired part by the number and name as listed in this instruction book.

4. Give the drawing number or figure number in which the part is shown. (In the event the part is called out on an unnumbered sketch — the page number on which the sketch appears should be used in lieu of the drawing number as the reference.)

For Example:

Instruction Book No.	A3D–6
Serial Number	505629
Part Number and Name	063, Power Rotor
Drawing Number (see item 4 above)	SF–5377

GENERAL INFORMATION

The Lube Oil Service Pump is a DELAVAL-IMO Series TKC422BS-337 positive displacement rotary screw type pump driven by a Reliance 40 H. P. motor through a flexible gridmember type coupling.

Installation dimensions, piping connections and operating data will be found on the outline drawing.

DRAWINGS

Outline Drawing and Spare Parts List SDD-12928
List of Material SDD-10957
Pump Assembly SD-5447

COUPLING

Manufacturer..... Falk
Type 60T10

INSTALLATION

DELAVAL IMO pumps are usually shipped with pump and driving unit mounted and properly aligned. Ordinarily no disassembly of the unit is necessary to make the installation. Installation dimensions and connections are shown on the outline drawing.

FOUNDATION

The foundation should preset a level surface for mounting the unit. If the foundation is not level, shims may be used. When installing a unit with shims, locate the shims near the mounting bolts and adjust the shims so that the mounting flange on the pump casing or bedplate, as the case may be, will not be sprung when the bolts are tightened.

After the unit is bolted down, check the alignment of the pump and driving unit.

CONNECTIONS

Suction, discharge, and drain connections are made to the pump and electrical connections to the driving unit after the unit is installed on the foundation. Be sure the motor is connected to rotate in the direction indicated on the pump casing.

PIPING

In installing the piping, it is essential that all lines be kept free of dirt, scale, waste, tools, and all other foreign matter. Damage to the rotors and other elements of the pump are frequently caused by dirty lines. Support all piping independently so that the weight of the piping will not impose a strain on the pump casing. Avoid pockets or loops in the lines. Piping plans usually designate the sizes of the piping, the fittings, and the run of the piping. However, some general installation requirements for the proper operation of the pump are given in the following paragraphs.

Suction lines must be airtight and should be as short and direct as possible. Wherever possible suction fittings should be larger than the suction opening of the pump. If it is not possible to have the liquid flow to the pump, install a foot valve at the far end of the suction piping or a check valve as far from the pump as possible and a priming connection to the suction side of the pump.

Return lines to the supply tank should be installed so that the returned oil will enter below the normal liquid level to avoid foaming or picking up air. These connections should be placed as far as possible from the pump suction connection. A vent connection should be made to the discharge side of the pump.

After all the piping has been installed, check the alignment of the pump and driving unit. All piping should then be tested in accordance with the applicable specifications.

SUCTION STRAINER

A suction strainer is to be installed immediately ahead of the inlet for the protection of the pumping element. The strainer size and configuration should be selected based on the general system design and operation. The pressure drop across the strainer should be limited to prevent starvation of the pump inlet and cavitation. A low pressure switch, between the strainer and the pump inlet, is recommended. The function of this switch is to either shut down the unit when the inlet pressure falls below a set minimum, or activate an alarm to warn of loading the strainer.

RELIEF VALVE

A relief valve should be connected to the pump discharge line as close to the outlet as possible. The relief valve setting should be approximately 5% above maximum system operating pressure, but in no event shall it be set higher than 105% of the maximum pressure rating of the pump. The relief valve return line should not be piped to the pump inlet line. Where it is necessary to return from the relief valve to the inlet line, the connection should be made as remote from the pump as possible.

OPERATION

SAFETY PRECAUTIONS

a. Beware of the high voltages connected to the motor and controller equipment. Observe all safety precautions set forth for electrical equipment in the manufacturer's manual.

b. Do not wipe or clean in the vicinity of rotating parts.

c. Never operate the pump with suction or discharge lines closed.

d. If the pump or motor should develop excessive or unusual noise or vibration, shut down the unit, determine the cause and correct the trouble before restarting.

INITIAL STARTING

When the pump is started for the first time or after a long period of idleness, the following procedures should be followed:

CAUTION

Running the pump without oil will cause rapid wear of housings, rotors and other internal parts.

a. Ensure that the motor is ready to operate.

b. Vent air from pump and suction line.

c. Open suction and discharge valves; start the motor. Check that motor rotates in the direction indicated on the pump case.

d. Check all gages to see that proper pressure are being developed.

e. If the pump is operating satisfactorily, close vent line as soon as a steady stream of oil without air bubbles is observed.

If the pump fails to operate satisfactorily after restarting, refer to the Trouble Shooting Chart, for probable cause and remedy.

NORMAL OPERATION

Starting. If the pump has been in use recently, perform the operating procedures listed below and in subsequent paragraphs.

a. Check to see that the suction and discharge valves open.

b. Start motor.

c. Check suction and discharge pressures to be sure that the pump is operating normally before leaving it unattended.

d. If pump is noisy or not operating normally, refer to the Trouble Shooting Chart, for probable cause and remedy.

Running. After the pump is in service, it will continue to operate satisfactorily with practically no attention. The suction and discharge pressure should be checked at the beginning of each watch to verify the performance of the pump. Any unusual conditions should be noted and investigated.

Shaft Seals. When the packing box is fitted with packing rings, adjust the packing gland to allow for slight seepage of fluid when the pump is running. If a mechanical seal is installed, check the seal chamber periodically for leakage. Replace the seal if leakage occurs.

SHUTTING DOWN

Whenever the unit is shut down, both suction and discharge valves should be closed. This is particularly important if the shutdown is to be for an extended period. Leakage in the foot valve, if the main supply is below the pump elevation, could drain the oil from the unit and necessitate repriming as though it was the initial starting of the system.

OPERATIONAL TROUBLE SHOOTING

Some of the conditions which might lead to unsatisfactory pump operation are shown below.

TROUBLE SHOOTING CHART

TROUBLE	PROBABLE CAUSE	REMEDY
No Delivery	Pump not primed or vented	Fill pump and suction line; vent air from pump.
	Low pump speed	Check that motor is across-the-line and receiving full voltage.
	Wrong direction of rotation	Compare direction with arrow on pump case. Ensure field for motor is not reversed.
	Leaks in suction piping	Inspect piping, repair leaks.
	Obstruction in piping	Inspect piping, remove obstruction
Low Capacity	Low pump speed	Check that motor is across-the-line and receiving full voltage.
	Obstruction in piping	Inspect piping, remove obstruction
	Seal Leakage (If fitted)	Replace seal.
Loss of Suction	Leaks in suction line	Inspect piping, repair leaks

TROUBLE SHOOTING CHART (Cont'd)

TROUBLE	PROBABLE CAUSE	REMEDY
Low Discharge Pressure	Low oil level	Check oil level. Add oil as required.
	Air in system	Inspect suction line for leaks, repair leaks as required.
Excessive Friction	Low oil level	Check oil level. Add oil as required.
	Misalignment	Realign pump and motor.
Excessive or Unusual Noise Vibration	Dirty strainer (if fitted)	Clean strainers.
	Misalignment	Realign pump and motor.
	Internal rubbing of parts	Check alignment, disassemble and inspect rotors and pump case for wear.
	Air in oil	Inspect suction line for leaks.
	Vaporization of oil	Reduce suction lift.
	Tight shaft packing (if fitted)	Adjust packing gland.
	Low oil temperature	Adjust temperature control.

MAINTENANCE

DELAVAL-IMO pumps require very little attention in normal usage. Unless they are run without oil or pump oil containing abrasive particles, they may run indefinitely without major overhaul.

The exterior of the pump should be kept clean. An inspection made while the pump is running will then disclose any leakage between the end covers and the casing, or in the piping connections. If there is leakage, tighten the cover or flange bolts or replace the gaskets as required.

LUBRICATION

The fluid being pumped lubricates all the internal rotating elements of the pump.

DISASSEMBLY OF PUMP

To disassemble the pump, it is necessary to remove it from the mounting. Close suction and discharge piping. Disconnect the driver and the coupling. Remove the pump drain plug to drain the pump casing. Remove the pump to a convenient working area.

The procedure for disassembly of the pump is as follows:

STEP 1 - Remove tubing (034) taking care not to bend or flatten it. Loosen set screw (013) and remove check nut (012) and coupling hub from shaft.

STEP 2 - Remove bolts (016) from seal retainer (017) and seal housing (014). Remove seal retainer, stationary seal member and seal housing. Gasket (015) between seal housing and inboard end cover (002), is also removed at this time. Slide rotating seal member from shaft. Remove retaining ring (023).

STEP 3 - Remove bolts (006) from outboard end cover (003) and remove cover and gasket (007).

STEP 4 - Complete rotor set, power rotor (019) and idler rotors (020), may now be removed through outboard end. The thrust collars (021) are assembled onto power rotor and normally will remain in place.

Rotors and housing bores may now be inspected. If it is necessary to remove housing proceed to Steps 5 and 6.

STEP 5 - Remove the two plugs (009) and "O" rings (010) from on top of housing stop pins (008). Housing stop pins may be removed by screwing 3/8" -16 bolt into tapped hole in the pin and pulling out of pump case (001).

NOTE: Housing stop pins should have one or two punch marks on top with a corresponding mark by hole. If these marks are not present be sure to put them on before removing pins and observe carefully when reassembling.

STEP 6 - Rotor housings (030) can now be removed from their respective ends of the pump case. Housings should be marked so they can be replaced in same location unless it is necessary to replace them with new housings. Spacer ring (031) may be removed from either end if necessary.

REASSEMBLY OF PUMP

Inspect and clean all parts before starting reassembly. New gaskets, new mechanical seal and new "O" rings should be installed whenever the pump is rebuilt. SAE-30 oil or equal should be used to assist pump reassembly. DO NOT USE GREASE.

The procedure for reassembly of the pump is as follows.

STEP 1 - If spacer (031) was removed, slide into position in pump case (001). Openings in spacer must be in line with inlet and outlet openings in case.

STEP 2 - Install rotor housings (030). When replacing rotor housings insert inboard housing first with stop pin slot properly positioned. Replace housing stop pin (008) taking care to use proper marked pin. Insert plug (009) and "O" ring (010) on top of pin. Install outboard housing using idler rotors as aligning bars. Slide idler rotors back and forth to detect any misalignment of the two housings. Replace other stop pin, plug, and "O" ring. Withdraw idler rotors from pump.

NOTE: If new housings are used, stop pins must be checked carefully. These pins are fitted at assembly and it will probably be necessary to fit new pins to insure snug fit with new housings.

STEP 3 - Place the idler rotors (020) in mesh with power rotor (019). Install complete rotor set into pump using rope slings to support. Use care while installing to protect rotors and housing bores from damage.

STEP 4 - Install new gasket (007) on inboard end of case. Bolt inboard end cover (002) to case with bolts (006). Bushing (011) is bolted to cover at assembly.

STEP 5 - The end play, or clearance, of the power rotor is controlled by the laminated shim (024) which is behind the thrust collar (021) on outboard end of power rotor. If original power rotor is replaced end play should be correct, but if new rotor is installed some adjustment may be necessary. For the seal type pump this end play should be .030".

If new rotor is installed measure distance from mounting face of outboard end cover (003) to thrust block (004) which is located in counterbore of cover with spring pin (005). Add to this figure .009", which is 60% of the thickness of gasket (007).

With power rotor pushed tight against inboard end, measure distance from outer face of outboard thrust collar to face of pump case. This figure should be .030" less than previous figure. If adjustment is required simply add to or remove the necessary amount of laminated shim to obtain the correct measurement.

STEP 6 - Install new gasket (007) on outboard end of case. Bolt outboard end cover (003) to case with bolts (006).

STEP 7 - Check the power rotor (019) end play by using a dial indicator from a fixed position to the end of the power rotor. Make necessary adjustment to shim (024) to obtain .030" end play.

STEP 8 - Install retaining ring (023) into its groove on shaft. Install the mechanical seal spring and spring holder against the retaining ring. Oil the I. D. of the seal bellows and the O. D. of the shaft with a light oil. Slide the rotating assembly along the shaft until it contacts the spring. Do not compress the spring at this time.

STEP 9 - Install new gasket (015) and bolt seal housing (014) to inboard end cover (002) with bolts (016).

STEP 10 - Install gasket provided with new mechanical seal into counterbore of seal housing (014) and insert the seal stationary seat. Bolt the seal retainer (017) to the seal housing with bolts (016). Tighten the bolts evenly to compress the seal spring and to position the seal.

STEP 11 - Replace coupling hub onto shaft. Screw on check nut (012) and lock into position with set screw (013). Install tubing (034). Check that rotors turn freely before connecting to driver.

Replace pump and align with driver before connecting main piping. See section dealing with "INSTALLATION". Alignment should be rechecked. Check "OPERATION" section when placing pump back into operation.