

MAINTENANCE INSTRUCTION

FUEL AND SOAK BACK PUMPS

INTRODUCTION

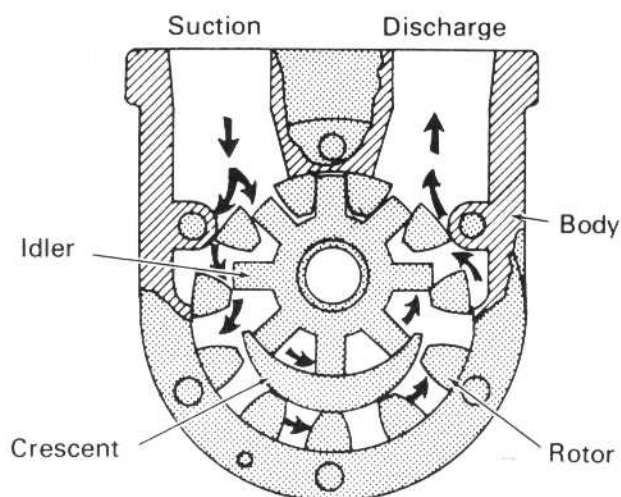
The fuel oil pump supplies the diesel engine with adequate fuel for operation. This task is accomplished by positive displacement, rotating internal gear type pumps with mechanical seals. These same type pumps are also used on turbocharged engines to pump lubricating oil to the turbocharger bearings prior to engine start and for a timed period to remove residual heat after engine shutdown. Two different manufacturers supply these pumps – Tuthill and Viking. The quantity of oil needed in a particular application determines which pump will be used.

In locomotive applications the fuel pump is driven by a small electric motor, however, in other cases (marine, industrial) it is driven directly by the diesel engine. In the latter instance, a separate priming pump is required to provide the engine with sufficient fuel for starting purposes. When the pump is used as a soak back pump it is always driven by an electric motor.

Since the Tuthill and Viking pumps differ somewhat in construction, specific instructions pertaining to each of them are provided. In instances where no particular pump is identified, the information will pertain to both pumps.

OPERATION

The operation of both the Viking and Tuthill pumps is based on the “internal gear” pumping principle. This principle relies on the use of a rotor, idler gear, and a crescent-shaped partition that is cast integral with the cover, Fig. 1. Thus only two moving parts are responsible for the actual pumping. Power is applied to the rotor and transmitted to the idler gear with which it meshes. The space between the outside diameter of the idler gear and the inside diameter of



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Fig.1 – Gear Pump Operation

the rotor is sealed by the crescent. When the pump is started, there is an increase in volume as the teeth of the idler and rotor come out of mesh. This creates a partial vacuum, drawing oil into the pump through the suction port. The oil then fills all the spaces between the gear teeth. As the pump shaft rotates, the oil is entrapped between the teeth of the rotor and idler and is carried past the crescent partition to the pressure or discharge side of the pump. When the teeth once again mesh on the pressure side, the oil is forced from the spaces and out through the discharge port.

CAUTION

It is very important that the old model Tuthill pumps be driven in the direction of the arrow stamped on the pump body. The Viking and new model Tuthill pumps are not sensitive to direction of rotation.

- a. On all pumps manufactured prior to 1974, there is a passage from the suction part of

*This bulletin is revised and supersedes previous issues of this number.

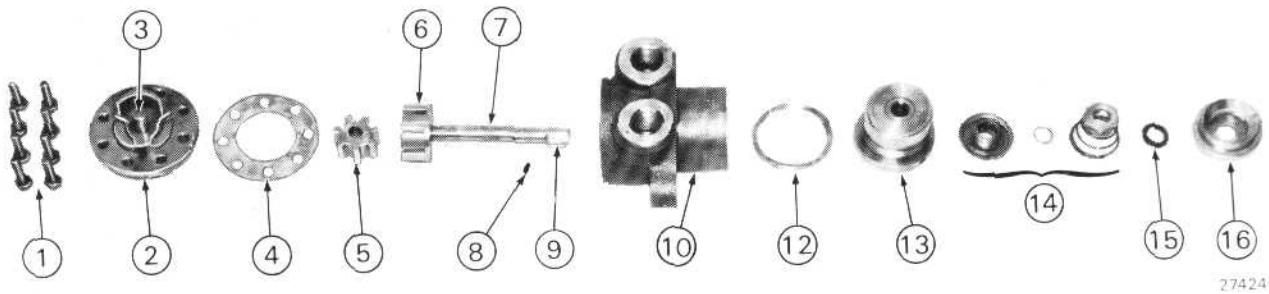
the pump to the seal assembly so a partial vacuum is created in the seal which tends to hold the seal faces together. Should the pump rotation be reversed on the old style Tuthill pumps, there will be a pressure on the seal which will force the seal out of its seat as the pump pressure increases.

- b. On pumps manufactured since 1974, there is a passage from the pressure part of the pump to the seal assembly. This construction enables easy detection of a faulty seal by visible leakage of oil.

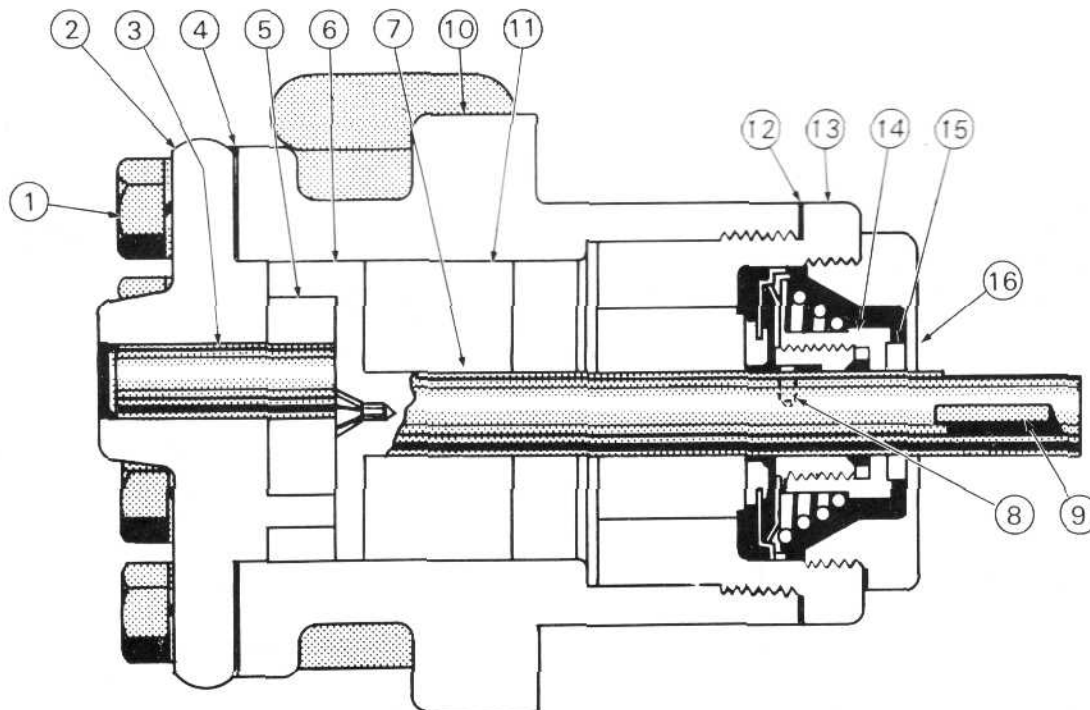
SEAL

The seal is a device which prevents leakage between the pump body and rotating shaft. This is accomplished by providing a perfectly smooth surface on both the shaft and pump body. The clearance is so small that resistance to oil flow is great enough to prevent oil from leaking out or air from entering the pump body.

The old style Tuthill pump, Fig. 2, employs a rotary seal which turns with the shaft. This assembly is attached to the shaft by a copper washer which when



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|-------------------|------------------------|-------------------------|
| 1. Cover Bolts | 7. Rotor Gear Shaft | 12. Housing Plug Gasket |
| 2. Pump Cover | 8. Drive Pin | 13. Housing Plug |
| 3. Idler Gear Pin | 9. Woodruff Key | 14. Seal Assembly |
| 4. Cover Gasket | 10. Pump Body | 15. Felt Washer |
| 5. Idler Gear | 11. Rotor Gear Bushing | 16. Housing Plug Cap |
| 6. Rotor Gear | | |

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Fig.2 – Typical Old Style Tuthill Pump – Exploded And Cross-Sectional Views

compressed by the hex seal nut prevents oil and air from leaking down the shaft past the seal. A flexible diaphragm incorporated in the seal is spring loaded to control the tension on the seal face.

Leakage is prevented in the Viking pump, Fig. 4, and in the new model Tuthill pump, Fig. 3, by a seal which rotates with the shaft and rides against the gland assembly. The carbon seal is secured to the shaft by means of two notches on the carbon seal which mate with two corresponding tangs on the bronze cup of the seal assembly. The shaft is sealed by and secured to the seal assembly by a neoprene seal which is internal to the assembly and is press fitted on the shaft. Tension is provided by a load spring and washer which push the seal against the gland assembly. The entire sealing assembly is contained within the pump by the packing nut.

Both the carbon seal and neoprene seal within the sealing assembly prevent oil from leaking around the shaft while the gasket on the gland assembly is compressed by the packing nut and prevents oil from leaking between the gland and pump body.

MAINTENANCE

Pumps should be removed from service and reconditioned at intervals prescribed in the applicable Scheduled Maintenance Program. Procedures for the disassembly, inspection, replacement of worn parts, assembly, and testing are covered below.

DISASSEMBLY

TUTHILL PUMPS (OLD MODELS WITH SHAFT SEAL), Fig. 2, Part Numbers 8020257, 8102911, 8411540, 8432896, 8434917, 8436302, and 8452409

1. Place pump in a vise, shaft facing up, so that one jaw grips across the two ports. Do not over tighten, which will distort pump housing.
2. Inspect rotor gear shaft at flat and keyway. Any burrs on the shaft will cause interference with the removal of the housing plug cap and seal assembly. If necessary use a fine file to remove any burrs.
3. Remove housing plug cap with face-type spanner wrench 8017824.
4. Slide felt washer off rotor shaft.
5. Place one wrench on hex seal nut, and another wrench across flat of pump shaft to keep shaft

from turning while loosening hex seal nut. Loosen seal nut five or six turns.

6. Remove pump from vise. Carefully grip hex seal nut in vise and pull oil seal off shaft as one assembly.
7. Remove drive pin from shaft using a small pair of tweezers.
8. Inspect rotor gear shaft at drive pin hole. Any burrs in this area will cause interference with the removal of the housing plug. If necessary use a fine file to remove any burrs.
9. Place pump in vise and remove housing plug with spanner wrench 8017825.

NOTE

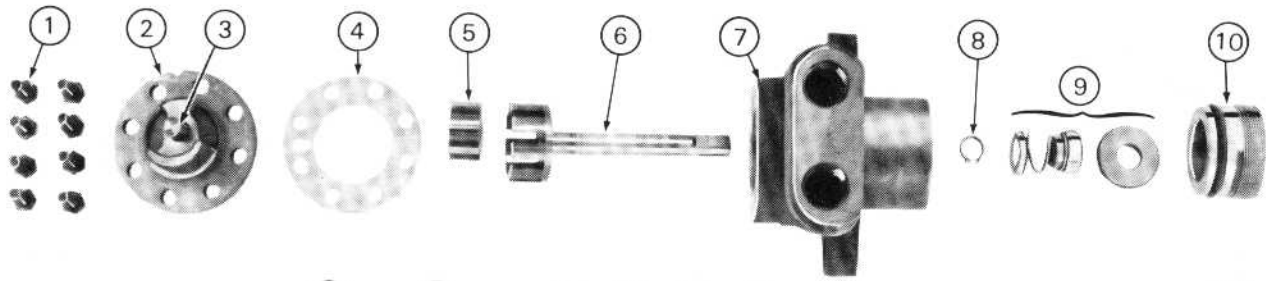
Place seal assembly in housing plug and screw on the housing plug cap to keep all pieces of the seal intact and to prevent damage.

Steps 10 through 13 below need not be performed unless complete pump disassembly is necessary.

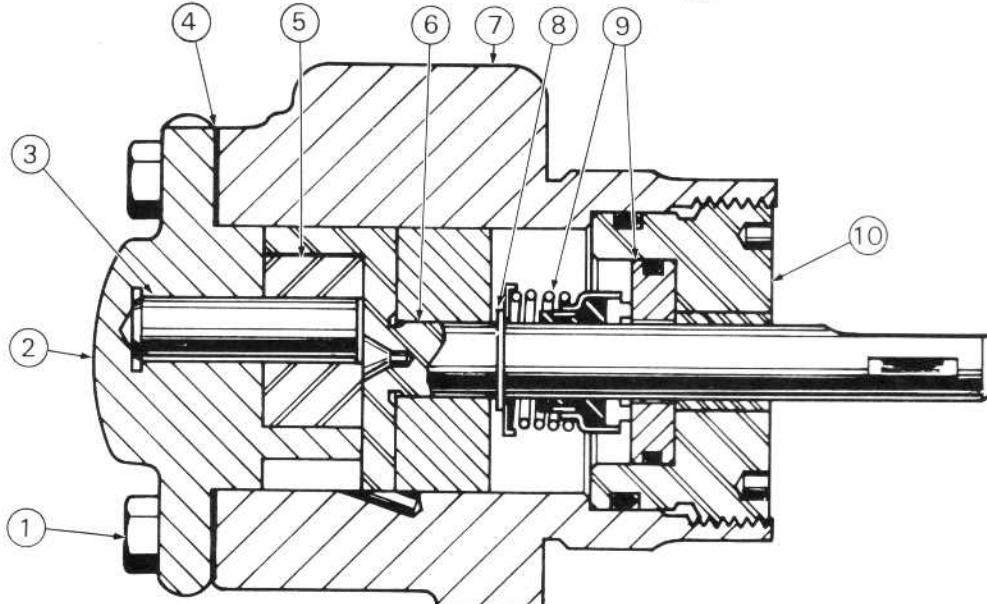
10. Placing matching marks on cover and body of pump to ensure proper reassembly.
11. Remove pump cover bolts, and remove pump cover.
12. Remove rotor gear with shaft and idler gear.
13. Inspect pump components. Refer to Inspection section.

TUTHILL PUMPS (NEW MODELS), Fig. 3, Part Numbers 8498099, 8498154, 8498155, and 8498156

1. Place pump in a vise, shaft facing up, so that one jaw grips across the two ports. Do not overtighten, which will distort pump housing.
2. Inspect rotor gear shaft for any burrs. Any burrs on the shaft will cause interference with the removal of the housing plug/bearing assembly.
3. Remove housing plug/bearing assembly with face-type spanner wrench 8017824. The stationary portion of the seal assembly may be removed from housing plug by pressing out from opposite side.



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|------------------|------------------------|-----------------------------|----------------------------------|
| 1 Cover Bolts | 4 Cover Gasket | 7 Pump Body | 9 Seal Assembly |
| 2 Pump Cover | 5 Idler Gear | *8 Seal Retaining Snap Ring | 10 Housing Plug/Bearing Assembly |
| 3 Idler Gear Pin | 6 Rotor Gear And Shaft | | |

*Not on all models.

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Fig.3 - New Model Tuthill Pump - Exploded And Cross-Sectional Views

4. Remove the seal assembly from rotor gear shaft. The rubber boot will be bonded to the rotor shaft, so it is necessary to push down on the seal to break the bond. Grasp the metal outer shell with any suitable device and pull the seal assembly off the shaft. Also remove the spring and washer parts of the seal.

NOTE

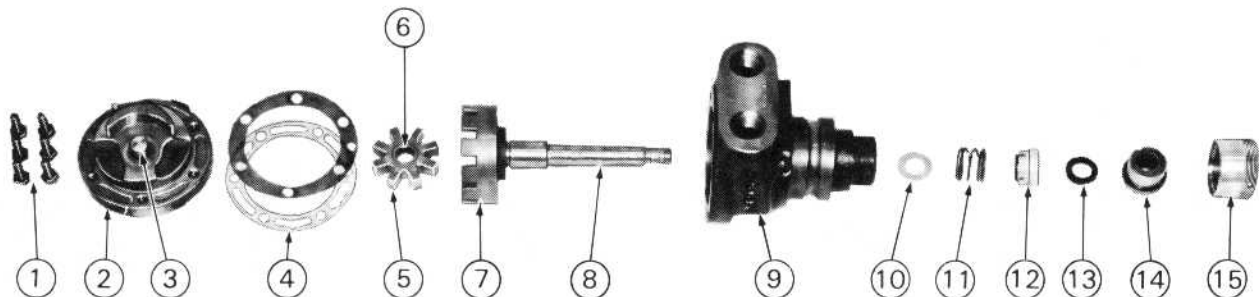
Steps 5 through 9 below need not be performed unless complete pump disassembly is necessary.

5. Some pump models are equipped with a snap ring on the rotor gear shaft to retain the seal assembly. Other models have a step in the rotor gear shaft and do not require a snap ring to position the seal assembly. It is not necessary to remove the seal retaining snap ring unless complete pump disassembly is necessary.
6. Place matching marks on cover and body of pump to ensure proper reassembly.

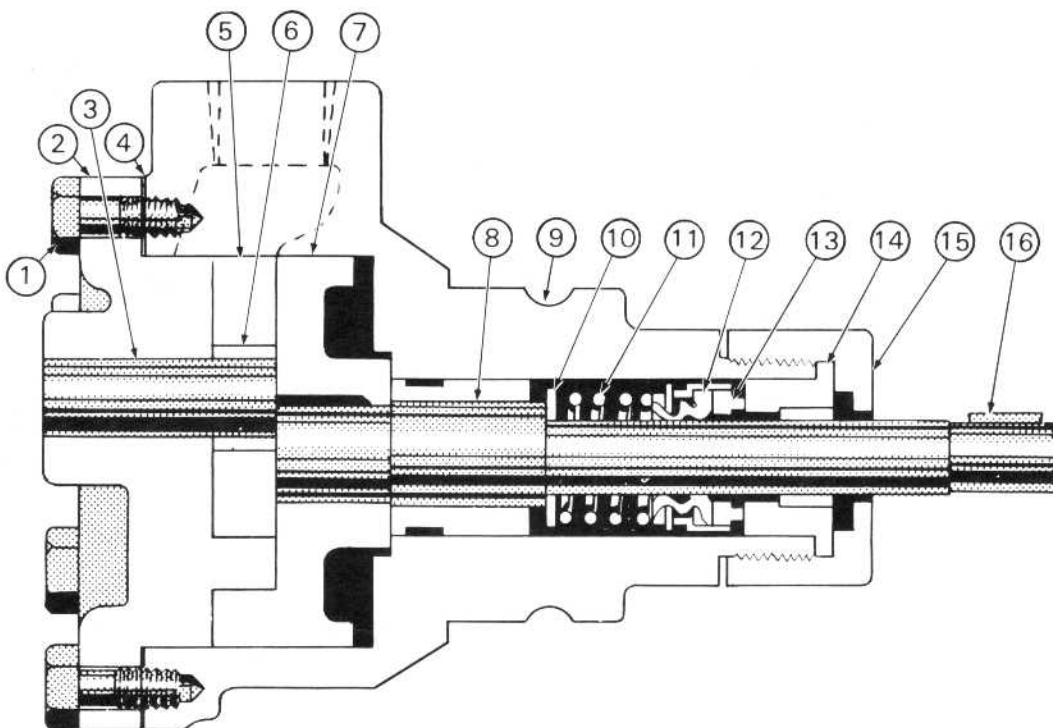
7. Remove pump cover bolts, and remove pump cover.
8. Remove rotor gear with shaft and idler gear.
9. Inspect pump components. Refer to Inspection section.

VIKING PUMPS (NON-BALL BEARING MODELS), Fig. 4, 8080284, 8386440, 8410219, 8422951, 8460815

1. Place pump in a vise, shaft horizontal, so that one jaw grips across the two ports. Do not overtighten, which will distort pump housing.
2. Remove packing nut using a hook spanner wrench.
3. Carefully remove gland assembly with carbon seal.



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| 1. Cover Bolts | 6. Idler Gear Bushing (Graphite) | 11. Load Spring |
| 2. Pump Cover | 7. Rotor Gear | 12. Sealing Assembly |
| 3. Idler Gear Shaft | 8. Rotor Gear Shaft | 13. Carbon Seal |
| 4. Cover Gaskets | 9. Pump Body | 14. Gland Assembly |
| 5. Idler Gear | 10. Thrust Washer | 15. Packing Nut |
| | | 16. Woodruff Key |

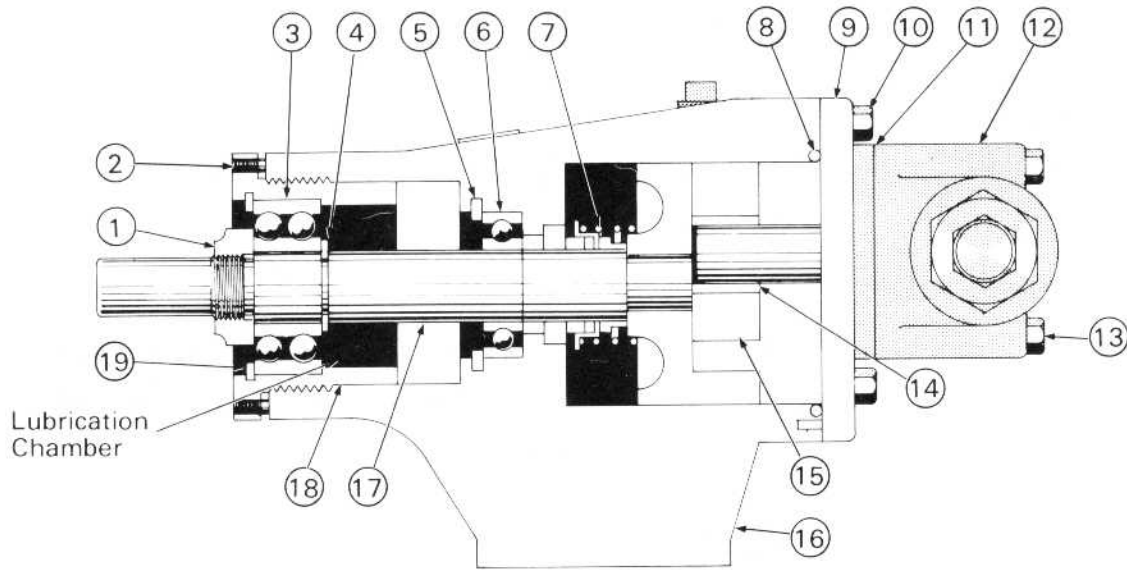
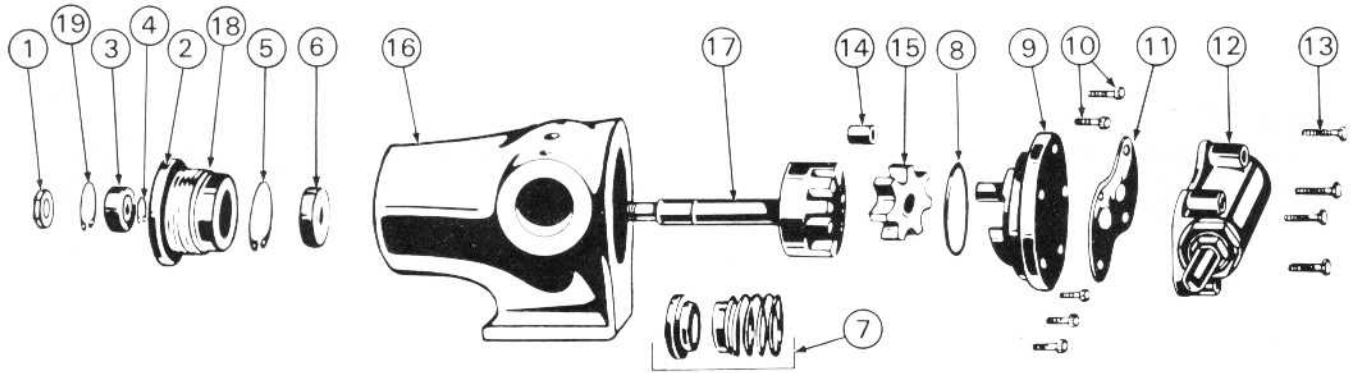
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Fig.4 – Viking Pump – Exploded And Cross-Sectional Views (Non-Ball Bearing Models)

4. Place matching marks on pump cover and pump body to ensure proper reassembly.
5. Remove pump cover bolts, then remove pump cover.
6. Remove idler gear and bushing.
7. Carefully push in on end of rotor gear shaft until rotor gear extends past the pump body. Grip rotor gear and carefully pull rotor gear and shaft out of pump body.
8. Remove the sealing assembly, load spring, and thrust washer from pump body.
9. Inspect pump components. Refer to Inspection section.

VIKING PUMPS (BALL BEARING MODELS), Fig. 5, 8274509, 8304343

1. Place matching marks on pump cover and pump body to ensure proper reassembly. Remove cover mounting bolts. Remove cover



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| 1. Bearing Locknut | 7. Seal Assembly | 14. Idler Gear Bushing |
| 2. Setscrew | 8. O-Ring Seal | 15. Idler Gear And Bushing |
| 3. Double Row Ball Bearing | 9. Pump Cover | 16. Pump Body |
| 4. Snap Ring | 10. Cover Mounting Bolts | 17. Rotor Gear And Shaft |
| 5. Snap Ring | 11. Relief Valve Gasket | 18. Bearing Housing |
| 6. Single Row Ball Bearing | 12. Internal Relief Valve | 19. Snap Ring |
| | 13. Relief Valve Mounting Bolts | |

27408

Fig.5 - Viking Pump - Exploded And Cross-Sectional Views (Ball Bearing Models)

1. and O-ring gasket. It is not necessary to remove internal relief valve from pump cover.
2. Slide idler gear off pin in cover.
3. Remove bearing locknut from rotor gear shaft. A piece of brass rod or hardwood may be inserted in the port opening between the rotor gear teeth to hold the shaft from turning.
4. Loosen the two setscrews located in the outer ring of the bearing housing. Turn the bearing housing counterclockwise and remove it from pump body. The double row ball bearing may be removed from the bearing housing after removing the large snap ring.
5. Remove double row bearing retainer snap ring from rotor gear shaft.

6. Carefully push in on end of rotor gear shaft until rotor gear extends past the pump body. Grip rotor gear and carefully pull rotor gear and shaft out of pump body. The spring and rotating parts of the mechanical seal will come out with the shaft.
7. Remove snap ring which retains single row ball bearing. Remove single row ball bearing from pump body.
8. Remove remaining parts of seal assembly from pump body.

GENERAL INSPECTION OF PUMPS (ALL MODELS)

The individual parts of both types of pumps should be inspected for damage. The keyway in the end of the rotor shaft must be in good condition. There must not be any grooves or deep scratches on the following surfaces.

1. The I.D. surface in the housing (the seating surface for the rotor gear).
2. The O.D. of the rotor gear.
3. The end face of the rotor gear
4. The O.D. of the idler gear.
5. Both faces on the idler.
6. The tooth surfaces on the idler and rotor gears.
7. The inside surface of the pump cover including the surfaces of the crescent.
8. Check all O-rings for deterioration.

On non-ball bearing pumps the rotor gear and shaft assembly should be positioned in the housing and checked for clearance in the bearing. The shaft must turn freely without any detectable side play. Any side play will require replacement of the housing, the shaft, or both. The condemning limit for the clearance between the rotor and the housing is .05 mm (0.002") for Tuthill pumps and .13 mm (0.005") for Viking pumps.

The bushing 8017806 in the old model Tuthill pumps must be positioned with the 2.4 mm (3/32") R oil groove on the suction side of the pump.

The bushing in the new model Tuthill pumps must be positioned with the oil groove away from the pump ports.

The idler and bushing assembly must turn freely on the idler pin in the pump cover without any detectable side play.

A decrease in pump output is generally caused by the abrasive action of foreign materials in the oil resulting in end play of the rotor gear and shaft assembly.

Obtain the correct end clearance of the rotor on the Viking pump (.03 mm to .05 mm [0.001" 0.002"]) by adjusting the thickness of the cover gaskets that will result in the rotor shaft turning freely without any detectable end play. This is done without installing the seal assembly. Gaskets are added or removed until when the rotor is pushed back and forth no end play is detected. The remainder of the pump may then be assembled and must meet the torque requirement listed under Testing Instructions.

Obtain the correct end clearance of the rotor on the Tuthill pumps (.03 mm [0.001"]) by adding a .03 mm (0.001") spacer between the rotor and bushing 8017806, installing the pump cover and gasket, and tapping the bushing until the rotor is tight. Disassemble the pump to remove the .03 mm (0.001") spacer and reassemble. As an alternate, the spacer could be omitted and the cover gasket replaced with a .03 mm (0.001") thicker gasket using the same procedure outlined above.

A new seal is then installed. The spring in the old model Tuthill pumps should be compressed 1.02 mm (0.040") and the seal in the Viking and new model Tuthill pumps should be compressed approximately 4.8 mm (3/16"). The bronze bushing in the seal nut of the Tuthill pump should be either refaced or replaced.

ADDITIONAL INSPECTIONS FOR VIKING BALL BEARING MODEL PUMPS

The following inspections pertain to the Viking ball bearing model pumps. These inspections are in addition to the above inspection criteria.

1. Check idler gear pin located on the pump cover. If pin is worn, the pump cover, idler gear pin, and idler gear bushing should be renewed.
2. Check idler gear bushing for wear. If worn it is strongly recommended that the carbon graphite bushing and idler gear be renewed as an assembly.

Replacement of the bushing is possible but difficult due to the brittleness of the carbon

graphite bushing. The bushing will quickly disintegrate, if cracked.

If necessary, use a hydraulic press to install bushing. Be sure the bushing is started straight. Do NOT STOP the pressing operation until the bushing is in the proper position.

3. Wash the bearings thoroughly and examine. Check bearings for wear or damage. Renew bearings, if necessary.

ASSEMBLY

TUTHILL PUMPS (OLD MODELS WITH SHAFT SEAL), Fig. 2

NOTE

Clean all pump parts thoroughly before reassembling pump.

1. Install rotor gear and shaft into pump body.
2. Install idler gear on idler gear pin located in pump cover. Also install gasket on cover.

NOTE

Gasket thickness is selected based on the amount of rotor gear shaft end play. Refer to General Inspection Of Pumps Section for procedure to determine gasket thickness.

Pump capacity may be restored by using a thinner cover gasket to reduce excessive end play.

3. Align matching marks placed on pump cover and body during disassembly, and install cover on body. Install cover mounting bolts and tighten them evenly and gradually. Rotate rotor gear shaft while the cover bolts are being tightened. Tighten all bolts a small amount until all become secure and the rotor gear shaft turns freely without any detectable end play.

NOTE

If rotor shaft binds before cover bolts are fully tightened, remove cover and gasket, reinstall cover (without gasket) and tighten. This will fully seat the rotor gear and shaft. Again remove cover, install gasket, and reapply cover to pump. Tighten cover bolts as described above.

4. Place pump in a vise, shaft facing up, so that one jaw grips across the two ports. Do not overtighten, which will distort pump housing.

5. Place lead gasket over housing plug and install housing plug in pump housing. Use spanner wrench 8017825 to tighten housing plug.

6. Assemble parts of rotating seal before placing on pump shaft. If any part of the seal needs replacement, an entire new seal assembly should be installed. Do not tighten hex seal nut at this time. The copper washer will be distorted if hex nut is tightened before seal is located on shaft.

7. Place entire seal assembly on rotor gear shaft. Slide seal up and down on shaft a few times to make certain that no binding occurs and that seal faces make contact.

8. Install seal assembly drive pin in rotor gear shaft.

9. Clean seal faces using care to eliminate all dirt.

10. Install seal assembly onto rotor gear shaft, over drive pin, until sealing faces are in contact.

11. Compress spring in seal assembly. This is done by pressing on hex seal nut.

The amount of movement should be 1.02 mm (.040"). This will produce approximately 3.2 kg (7 lbs) of spring pressure. If no means are available to measure the 1.02 mm (.040") compression, press in on the hex seal nut until it bottoms, then release a few thousandths for clearance.

Hold spring compressed and tighten hex seal nut which locks the seal assembly to the shaft. Use a wrench on the shaft so that the hex seal nut is tightened securely.

12. Install felt washer and housing plug cap with gasket. Tighten with face-type spanner wrench 8017824.

13. Place a small quantity of light lube oil in the pump body for initial lubrication.

14. Refer to Testing Instructions for pump testing.

TUTHILL PUMPS (NEW MODELS), Fig. 3

NOTE

Clean all pump parts thoroughly before reassembling pump.

1. Install rotor gear and shaft into pump body.

2. Install idler gear on idler gear pin located in pump cover. Also install gasket on cover.

NOTE

Gasket thickness is selected based on the amount of rotor gear shaft end play. Refer to General Inspection Of Pumps Section for procedure to determine gasket thickness.

Pump capacity may be restored by using a thinner cover gasket to reduce excessive end play.

3. Align matching marks placed on pump cover and body during disassembly and install cover on body. Install cover mounting bolts and tighten them evenly and gradually. Rotate rotor gear shaft while the cover bolts are being tightened. Tighten all bolts a small amount until all become secure and the rotor gear shaft turns freely without any detectable end play.

NOTE

If rotor shaft binds before cover bolts are fully tightened, remove cover and gasket, reinstall cover (without gasket) and tighten. This will fully seat the rotor gear and shaft. Again remove cover, install gasket, and reapply cover to pump. Tighten cover bolts as described above.

4. Place pump in a vise, shaft facing up, so that one jaw grips across the two ports. Do not overtighten, which will distort pump housing.
5. Install seal retaining snap ring, if equipped, on rotor gear shaft.
6. Oil rotor gear shaft with a light lubricating oil. Place rotary portion of seal assembly on rotor gear shaft. Push seal down with your fingers to a position approximately half-way down on shaft.

NOTE

The stationary portion of the seal assembly (large bushing with O-ring), has one lapped and one plain surface. The lapped surface faces the seal assembly during installation as described in Step 7 below. It is important that this part be installed correctly because the carbon-graphite portion of the rotary seal assembly rides on the lapped surface.

7. Press stationary portion of seal assembly with O-ring into housing plug/bearing assembly, lapped side up. Use a piece of paper to cover lapped surface during this operation.

8. Install O-ring seal on O.D. of housing plug/bearing assembly. Lubricate O-ring with light oil.

9. Lubricate carbon-graphite face of rotary seal liberally with light oil.

10. Thread housing plug into pump body. Use care when placing housing plug/bearing assembly into position over rotor gear shaft. Do not nick stationary seal face or bushing type bearing. Tighten housing plug/bearing assembly using face-type spanner wrench 8017824. Rotary portion of the seal assembly will automatically be seated during this operation.

11. Refer to Testing Instructions for pump testing.

VIKING PUMPS (NON-BALL BEARING MODELS), Fig. 4**NOTE**

Clean all pump parts thoroughly before reassembling pump.

1. Place pump in vise, shaft horizontal, so that one jaw grips across the two ports. Do not overtighten, which will distort pump housing.
2. Carefully push rotor gear and shaft assembly into pump body until seated.
3. Install idler gear and bushing on idler gear shaft located in pump cover. Also install gasket(s) on cover.

NOTE

Gasket thickness is selected based on the amount of rotor gear shaft end play. Refer to General Inspection Of Pumps Section for procedure to determine gasket thickness.

Pump capacity may be restored by using a thinner cover gasket to reduce excessive end play.

4. Align matching marks placed on pump cover and body during disassembly and install cover on body. Install cover mounting bolts and tighten them evenly and gradually. Rotate rotor gear shaft while the cover bolts are being tightened. Tighten all bolts a small amount until all become secure and the rotor gear shaft turns freely without any detectable end play.

NOTE

If rotor shaft binds before cover bolts are fully tightened, remove cover and gasket, reinstall

cover (without gasket) and tighten. This will fully seat the rotor gear and shaft. Again remove cover, install gasket, and reapply cover to pump. Tighten cover bolts as described above.

5. Install spring thrust washer and load spring on the rotor gear shaft.

CAUTION

Care must be taken not to forget to install the bronze thrust washer in combination with the load spring. The washer, because it rotates with the spring, rubs against the bronze bushing insert in the pump body and serves as a wear plate. If the washer is left out, the sharp end of the spring will rub against the bronze bushing, scoring it severely.

6. Coat the shaft and the inside of the rubber bellows of the sealing assembly with light oil. Carefully slip the carbon seal over the shaft making sure the two notches fit the tangs on the sealing assembly.
7. Place a small amount of light oil on the carbon seal face and corresponding sealing face of the gland assembly.
8. Slip gland assembly and gaskets over shaft and seat sealing faces.

NOTE

Two gaskets are required for the working length of the seal.

9. Place packing nut over shaft and tighten to compress gland gasket using a hook spanner wrench.
10. Refer to Testing Instructions for pump testing.

VIKING PUMPS (BALL BEARING MODELS), Fig. 5

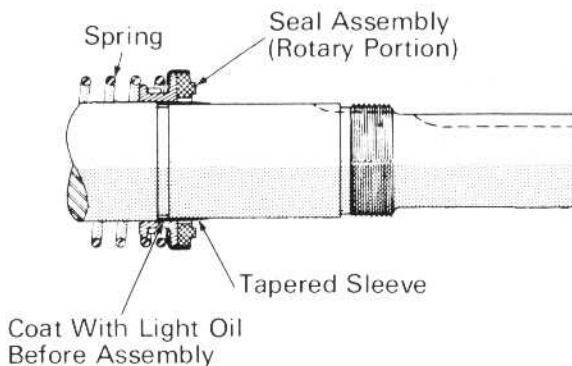
NOTE

Clean all pump parts thoroughly before reassembling pump.

1. Coat the outside diameter of the stationary seal seat portion of the seal assembly and the inside diameter of the seal seat bore located in the pump body with light oil.

Using thumb and forefinger, push seal seat into position in the pump body.

2. Slide tapered sleeve (furnished with replacement seal assembly) on rotor gear shaft as far as it will go. Thin end must be toward end of rotor gear shaft as shown in Fig. 6.



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Fig.6 – Seal Assembly, Viking Ball Bearing Model Pumps

3. Lubricate the inside diameter of the rotary portion of the seal assembly and the outside of the tapered sleeve using light oil.

Make certain the rotary gear shaft is free of nicks and burrs. Slide the spring and rotary portions of the seal assembly, spring first, onto the shaft and over the tapered sleeve until the spring contacts the rotary gear.

Remove the tapered sleeve.

4. Coat the sealing faces of both the stationary and rotary portions of the seal assembly with light oil.
5. Push the rotary gear and shaft into the pump body slowly and carefully until the rotor gear enters the pump body.
6. Install idler gear and bushing on idler gear pin located in pump cover. Install O-ring seal on pump cover.

Align matching marks placed on pump cover and body during disassembly and install cover on body. Install cover mounting bolts and tighten them evenly and gradually. Tighten all bolts a small amount until they become secure.

NOTE

During this operation the seal assembly will automatically compress to its proper working length.

7. Pack the single row ball bearing with lithium base ball bearing grease. Slide the bearing over the rotor gear shaft and into position in the pump body.

Install single row bearing retainer snap ring.

8. Install small double row bearing retainer snap ring on rotor gear shaft.
9. Pack lubrication chamber in pump body approximately half full with lithium base ball bearing grease.
10. Pack the double row ball bearing with lithium ball bearing grease, and press into bearing housing.

Install large double row ball bearing retainer snap ring into bearing housing.

11. Thread the bearing housing into pump body. Turn by hand until tight. This forces the rotor gear against the cover.
12. Thread bearing locknut onto rotor gear shaft and tighten. A piece of brass rod or hardwood may be inserted in the port opening between the rotor gear teeth to hold the shaft from turning.

THRUST BEARING ADJUSTMENT

Loosen the two setscrews located in the outer ring of the bearing housing. Turn setscrews counterclockwise until 12.7 mm (1/2") of the screw extends from the bearing housing. This represents approximately 0.08 mm (.003") end clearance.

Make certain that rotor gear shaft can be rotated freely. If not, turn bearing housing counterclockwise until shaft can be turned. Retighten setscrews after adjustment setting is complete.

NOTE

High viscosity liquids require additional end clearance. The amount of end clearance depends on the viscosity of the liquid being pumped.

TESTING INSTRUCTIONS

PUMP SHAFT ROTATION

The pump shaft on all pumps should be capable of being rotated by hand in either direction.

TEST PARAMETERS

The pump test speed, inlet suction, and outlet pressure all affect the pump flow. To reduce the number of variables the following recommendations are made: Pump outlet pressure and inlet suction should be read as close to the pump as possible. Fuel oil at room temperature should be used. Use a one inch pipe on the suction side of the pump. The device used for restricting the suction line to the pump should be located as far from the pump as possible. There should be a sight glass before and after the pump for visual inspection for air bubbles. The pump should be run at full RPM, in the direction marked on the pump, for 15 minutes with full oil flow and no restrictions on the pump, suction or discharge.

This running serves to seat the new seal against the mating seat.

On application of a new seal some leakage may occur when the pump is first started. The seal, if properly installed, will adjust itself in a minute or two and the leaking should stop.

When the 15 minute run is completed the pump should be tested for output.

PUMP OUTPUT

The pump output should be checked with a suction head of 254 mm (10") of mercury on the inlet of the pump and a 552 kPa (80 psi) pressure on the outlet of the pump. Fuel oil temperature should be 21° C to 27° C (70° F to 80° F). The flow can be checked by any of the following ways: weight of fuel oil per time interval, with a flow meter, or with an orifice. Whichever means is used must be calibrated with fuel oil. The following chart gives the pump part number, nominal flow, vendor, and minimum output.

PART NUMBER	REPLACES	VENDOR	NOMINAL FLOW PER MINUTE		MINIMUM FLOW PER MINUTE		TEST RPM
			Liters	Gallons	Liters	Gallons	
8080284		Viking	15.1	4	14.4	3.8	1200
8274509		Viking	18.9	5	18.2	4.8	1150
8304343		Viking	75.7	20	71.9	19	1800
8386440		Viking	15.1	4	14.4	3.8	1200
8410219		Viking	15.1	4	14.4	3.8	1200
8422951		Viking	22.7	6	21.6	5.7	1200
8434917		Tuthill	18.9	5	18.2	4.8	1200
8460815		Viking	11.4	3	10.6	2.8	1800
8498099	8432896 8452409	Tuthill	7.6	2	6.4	1.7	1200
8498154	8020257 8102911	Tuthill	7.6	2	6.4	1.7	1200
8498155	8411540	Tuthill	7.6	2	6.4	1.7	1200
8498156	8436302	Tuthill	11.4	3	10.6	2.8	1200

Old style Tuthill pumps should have same rating as their replacement. Reduced pump flow is probably caused by excessive clearances in the pump.

PUMP SUCTION TEST

With no restriction on the pump outlet, restrict the pump inlet until the inlet suction becomes 635 mm (25") of mercury. The pump should still flow a limited amount of oil. The duration of this test should not exceed 15 seconds. Failure to develop the 635 mm (25") of mercury suction indicates a suction leak exists (seal leaks on pumps built prior to 1974).

STORAGE

Upon completion of the testing, if the pump will not be used immediately, the pump ports should be filled with SAE No. 10 or No. 20 oil and plugged with pipe plugs or stoppers.

INSTALLATION OF PUMP TO MOTOR

Install pump to motor and check coupling end clearance.

It is very important that proper clearance is provided in the coupling between the two coupling halves and the center piece to prevent end thrust on

the pump shaft, which in turn, can damage the pump cover.

Both single and double pump units are equipped with a coupling, which should have a distance of 122 mm (1/2") between the two coupling halves with the end play of the motor armature taken into consideration.

There should be 0.79 mm (1/32") clearance between the composition center piece and the two die cast coupling halves with the pump bolted in place and the motor armature pulled toward the pump shaft to its farthest position. The two pump bracket bolts should be torqued to 7 to 11 N·m (5 to 8 ft-lbs).

It is a very common error in assembling not to take into consideration the end play of a motor armature which may cause end thrust on the pump shaft. These pumps are not designed to take end thrust toward the pump cover, and extreme care must be taken to prevent thrust in this direction.

INSTALLATION OF PUMP TO ENGINE

On units where the fuel pump is driven by the diesel engine, instructions for removal and installation will be found in the applicable Engine Maintenance Manual.