

3.17 WATER INJECTION HYDRAULIC PUMP (Vickers "V-100")

DIRECT MOUNTING: A pilot on the pump mounting flange (Figure 5) assures correct mounting and shaft alignment, provided the pilot is firmly seated in the accessory pad of the power source. Care should be exercised in tightening all flange mounting screws to prevent misalignment.

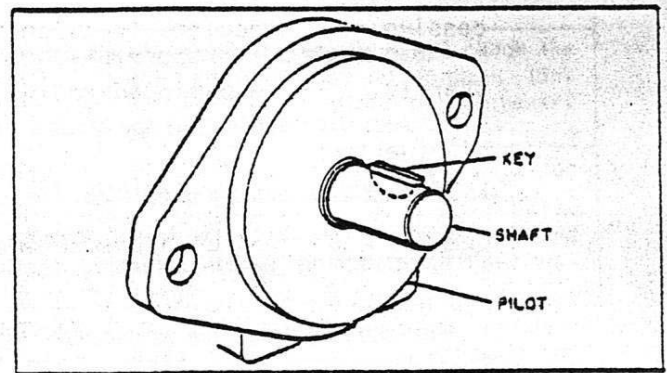


Figure 5

If gaskets are used between flanges, they should be installed carefully so as to lay flat. Shaft keys and couplings must be properly seated to avoid slipping and possible shearing.

SHAFT ROTATION: Vickers pumps are normally assembled for right-hand (clockwise) rotation as viewed from the shaft ends. A pump made for left-hand rotation is identified by an "L" in the model code. These pumps must be driven in the direction of the arrows cast on the pump ring. If it is desired to change the direction of drive rotation, it is necessary to reverse the ring. (See Section VI-B-D and Figure 9.)

CAUTION: Never drive a pump in the wrong direction of rotation. Seizure may result, necessitating expensive repairs.

PIPING AND TUBING:

1. All pipes and tubing must be thoroughly cleaned before installation. Recommended methods of cleaning are sand blasting, wire brushing and pickling.
2. To minimize flow resistance and the possibility of leakage, only as many fittings and connections as are necessary for proper installation should be used.

3. The number of bends in tubing should be kept to a minimum to prevent excessive turbulence and friction of oil flow. Tubing must not be bent too sharply. The recommended radius for bends is three times the inside diameter of the tube.

CLEANLINESS: Thorough precautions should always be observed to insure that the hydraulic system is clean:

1. Clean (flush) entire system to remove paint, metal chips, welding shot, etc.
2. Filter each change of oil to prevent introduction of contaminant into the system.
3. Provide continuous protection of system from entry of airborne contamination.
4. During usage, proper oil filling and servicing of filters, breathers, reservoirs, etc., cannot be overemphasized.

SERVICE, INSPECTION & MAINTENANCE

SERVICE TOOLS: No special tools are required to service these pumps.

INSPECTION: Periodic inspection of the fluid condition and tube or piping connections can save time-consuming breakdowns and unnecessary parts replacement. The following should be checked regularly.

1. All hydraulic connections must be kept tight. A loose connection in a pressure line will permit the fluid to leak out. If the fluid level becomes so low as to uncover the inlet pipe opening in the reservoir, extensive damage to the pump can result. In suction or return lines, loose connections permit air to be drawn into the systems, resulting in noisy and/or erratic operations.
2. Clean fluid is the best insurance for long service life. Therefore, the best reservoir should be checked periodically for dirt or other contaminants. If the fluid becomes contaminated, the system should be thoroughly drained and

TROUBLE SHOOTING CHART

TROUBLE	PROBABLE CAUSE	REMEDY
PUMP NOT DELIVERING FLUID	DRIVEN IN THE WRONG DIRECTION OF ROTATION	The drive direction must be changed immediately to prevent seizure. Figure 9 shows the correct ring position for each direction of rotation.
	COUPLING OR SHAFT SHEARED OR DISENGAGED	Disassemble the pump and check the shaft and cartridge for damage. (See Section VI.) Replace the necessary parts.
	FLUID INTAKE PIPE IN RESERVOIR RESTRICTED	Check all strainers and filters for dirt and sludge. Clean if necessary.
	FLUID VISCOSITY TOO HEAVY TO PICK UP PRIME	Completely drain the system. Add new filtered fluid of the proper viscosity.
	AIR LEAKS AT THE INTAKE. PUMP NOT PRIMING	Check the inlet connections to determine where air is being drawn in. Tighten any loose connections. See that the fluid in the reservoir is above the intake pipe opening. Check the minimum drive speed which may be too slow to prime the pump.
	RELIEF VALVE STUCK OPEN. (MODELS WITH INTEGRAL RELIEF VALVE ONLY)	Disassemble the pump and wash the valve in clean solvent. Return the valve to its bore and check for any stickiness. A gritty feeling on the valve periphery can be polished with crocus cloth. Do not remove excess material, round off the edges of the lands or attempt to polish the bore. Wash all parts and reassemble the pump.
INSUFFICIENT PRESSURE BUILD-UP	VANE(S) STUCK IN THE ROTOR SLOT(S)	Disassemble the pump. Check for dirt or metal chips. Clean the parts thoroughly and replace any damaged pieces. If necessary flush the system and refill it with clean fluid.
	SYSTEM RELIEF VALVE SET TOO LOW	Use a pressure gauge to correctly adjust the relief valve.
PUMP MAKING NOISE	WORN PARTS CAUSING INTERNAL LEAKAGE OF PUMP DELIVERY	Replace pump cartridge.
	PUMP INTAKE PARTIALLY BLOCKED	Service the intake strainers. Check the fluid condition and, if necessary, drain and flush the system. Refill with clean fluid.
	AIR LEAKS AT THE INTAKE OR SHAFT SEAL. (OIL IN RESERVOIR WOULD PROBABLY BE FOAMY)	Check the inlet connections and seal to determine where air is being drawn in. Tighten any loose connections and replace the seal if necessary. See that the fluid in the reservoir is above the intake pipe opening.
	PUMP DRIVE SPEED TOO SLOW OR TOO FAST	Operate the pump at the recommended speed.
	COUPLING MISALIGNMENT	Check if the shaft seal bearing or other parts have been damaged. Replace any damaged parts. Realign the coupled shafts.

V-100 HYDRAULIC PUMP
SERVICE, INSPECTION & MAINTENANCE (CONT'D)

the reservoir cleaned before new fluid is added.

3. A pump which is running excessively hot or noisy is a potential failure. Should a pump become noisy or overheated, the machine should be shut down immediately and the cause of improper operation corrected.

ADDING FLUID TO THE SYSTEM: When hydraulic fluid is added to replenish the system, it should always be poured through a fine wire screen - 200 mesh or finer.

It is important that the fluid be clean and free of any substance which could cause improper operation or wear of the pump or other hydraulic units. Therefore, the use of cloth to strain the fluid should be avoided to prevent lint getting into the system.

ADJUSTMENTS: No periodic adjustments are required, other than to maintain proper shaft alignment with the driving medium.

LUBRICATION: Internal lubrication is provided by the fluid in the system.

REPLACEMENT PARTS: Only genuine replacement parts manufactured or sold by Vickers should be used. These are identified in the parts catalog.

TROUBLE-SHOOTING: Table IV lists the common difficulties experienced with vane pumps and hydraulic systems. It also indicates the probable causes and remedies for each of the troubles listed.

It should always be remembered that many apparent pump failures are actually the failures of other parts of the systems. The cause of improper operation is best diagnosed with adequate testing equipment and a thorough understanding of the complete hydraulic system.

OVERHAUL

GENERAL: Plug all removed units and cap all lines to prevent the entry of dirt into the system. During disassembly, pay particular attention to identification of the parts, especially the cartridges, for correct assembly.

Pump bearings are pressed in the bodies or on the shafts and should not be removed unless defective. Figure 7 is an exploded view which shows the proper relationship of the parts for disassembly and assembly.

DISASSEMBLY OF BASIC PUMP: See Figure 7. If a mounting flange or foot bracket is used, remove it before dismantling the pump. Clamp the pump body in a vise (not too tightly), cover end up, and remove the four cover screws. Note the position of the cover port with respect to the body port before lifting off the cover and "O" ring.

Remove the pressure plate and spring and note the position of the ring for correct reassembly. Lift off the ring and remove the locating pin. Separate the vanes from the rotor and remove the rotor from the shaft.

Turn the pump body over and remove the shaft key and the snap ring which retains the outer bearing. Tap with a soft hammer on the splined end of the shaft to force the shaft out of the body. Support the bearing inner race and press the shaft out of the bearing. Pull the shaft seal out of the body with a suitable hooked tool and press out the inner bearing.

INSPECTION AND REPAIR:

1. Discard the used shaft seal and all "O" rings. Wash the metal parts in mineral oil solvent, blow them dry with filtered compressed air and place them on a clean surface for inspection.
2. Check the wearing surfaces of the body, pressure plate, ring and rotor for scoring and excessive wear. Remove light score marks by lapping. Replace any

heavily scored or badly worn parts.

3. Inspect the vanes for burrs, wear and excessive play in the rotor slots. Replace the rotor if the slots are worn.
4. Check the bearings for wear and looseness. Rotate the bearings while applying pressure to check for pitted or cracked races.
5. Inspect the oil seal mating surface on the shaft for scoring or wear.

ASSEMBLY: Coat all parts with hydraulic fluid to facilitate assembly and provide initial lubrication. Use small amounts of petroleum jelly to hold "O" rings in place during assembly.

IMPORTANT: During handling and shipping of the precision machined cartridge parts, it is possible to raise burrs on the sharp edges. All sharp edges on the parts of a new cartridge kit should be stoned prior to installation.

Assembly of pump: See Figure 7. Begin assembly by pressing the shaft into the front bearing while supporting the bearing inner race. Next, press the inner bearing into the body, using a driver which contacts the outer race only. Be certain both bearings are firmly seated.

NOTE: Before assembling the shaft seal, determine the correct position of the sealing lip. (See Figure 8) Double lip seals are assembled with the spring toward the pumping cartridge. Single lip seals have two pressure holes, which are assembled toward the shaft end of the pump.

Press the seal firmly in place and lubricate the lip with petroleum jelly or other grease compatible with the system fluid. Slide the drive shaft into the body until the bearing is seated. Tap lightly on the end of the shaft if

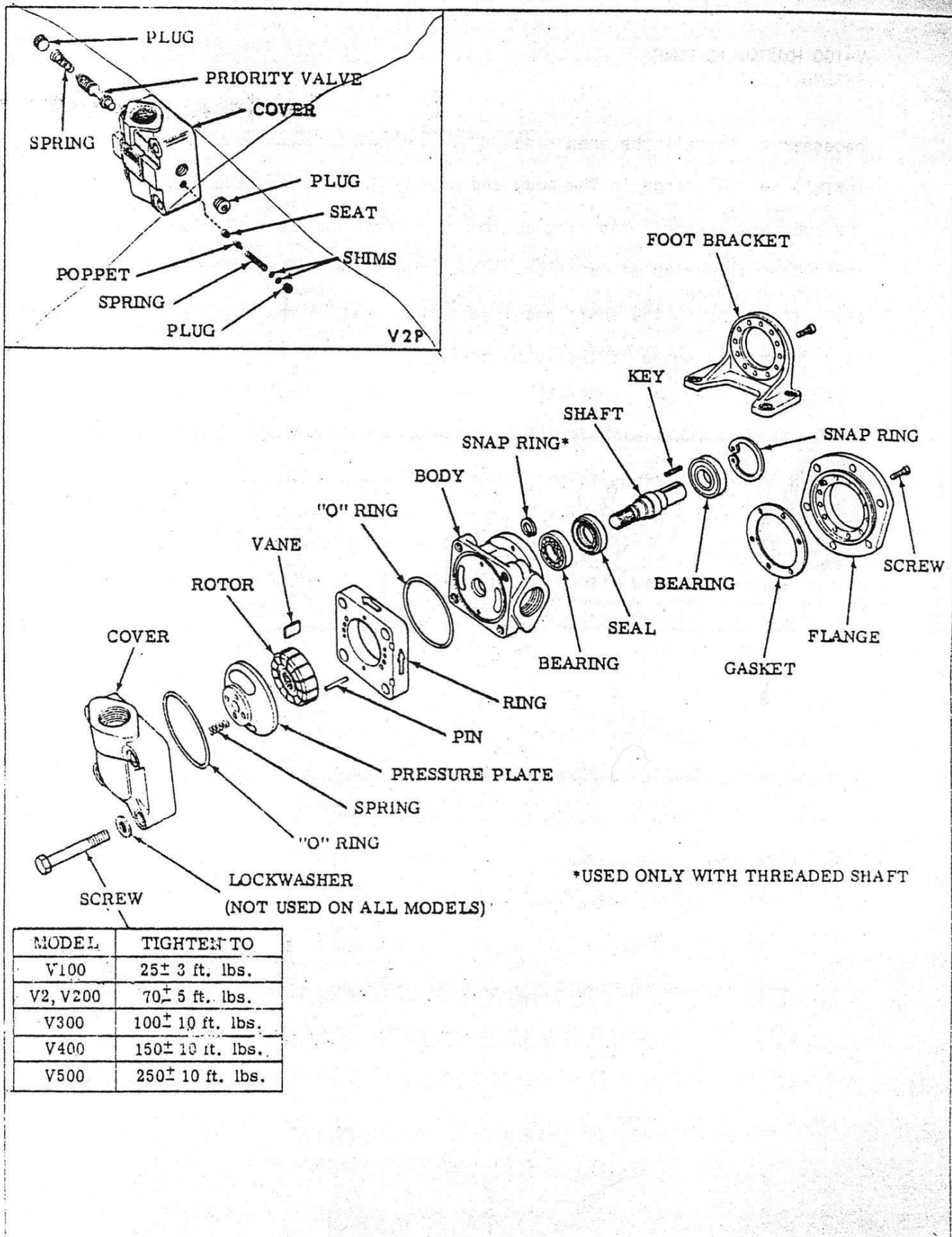


Figure 7

necessary. Install the snap ring.

Install new "O" rings in the body and cover. Insert the ring locating pins in the body and assemble the ring so that the arrow on the perimeter points in the proper direction of rotation. Check the assembly against Figure 9. Install the rotor on the shaft and insert the vanes in the rotor slots. Be certain the radius edges of the vanes are toward the cam ring.

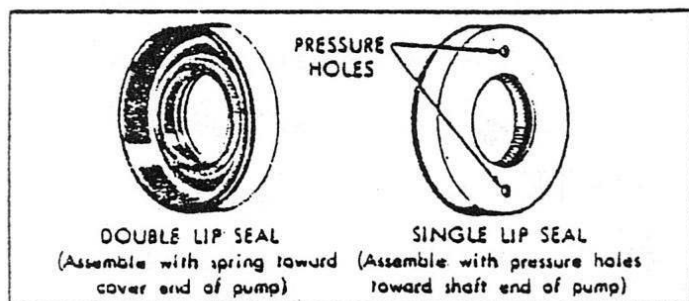


Figure 8

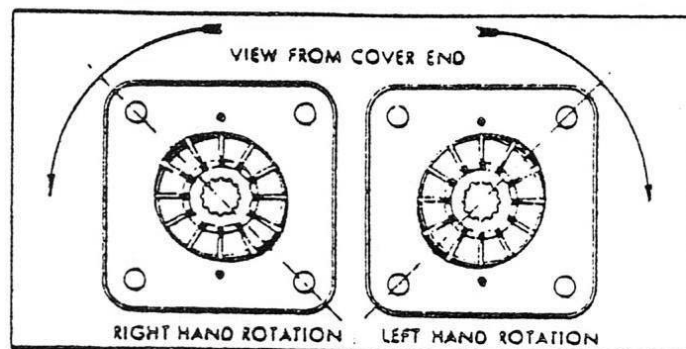


Figure 9

Place the pressure plate on the locating pins and flat against the ring. Use a small amount of petroleum jelly or grease to stick the spring in the recess in the pressure plate. Carefully install the cover with the outlet port in the correct position. Tighten the cover screws to the torque shown in Figure 8. Turn the shaft through by hand to insure that there is no internal binding. Install the shaft key.

Assemble the pump to its mounting flange or foot mounting. If a gasket is used, be certain it is flat to avoid misalignment of the shaft.