# SERVICE INSTRUCTIONS

## OILGEAR TYPE "PVV-200 & 250" OPEN LOOP PUMPS

### PURPOSE OF INSTRUCTIONS

These instructions are written to simplify your work when installing, operating and maintaining Oilgear type "PVV" pumps. Your acquaintance with the construction, principle of operation and characteristics of these units will help you attain satisfactory performance, reduce downtime and increase the unit's life. Some units have been modified from those described in this bulletin and other changes may be made without notice.

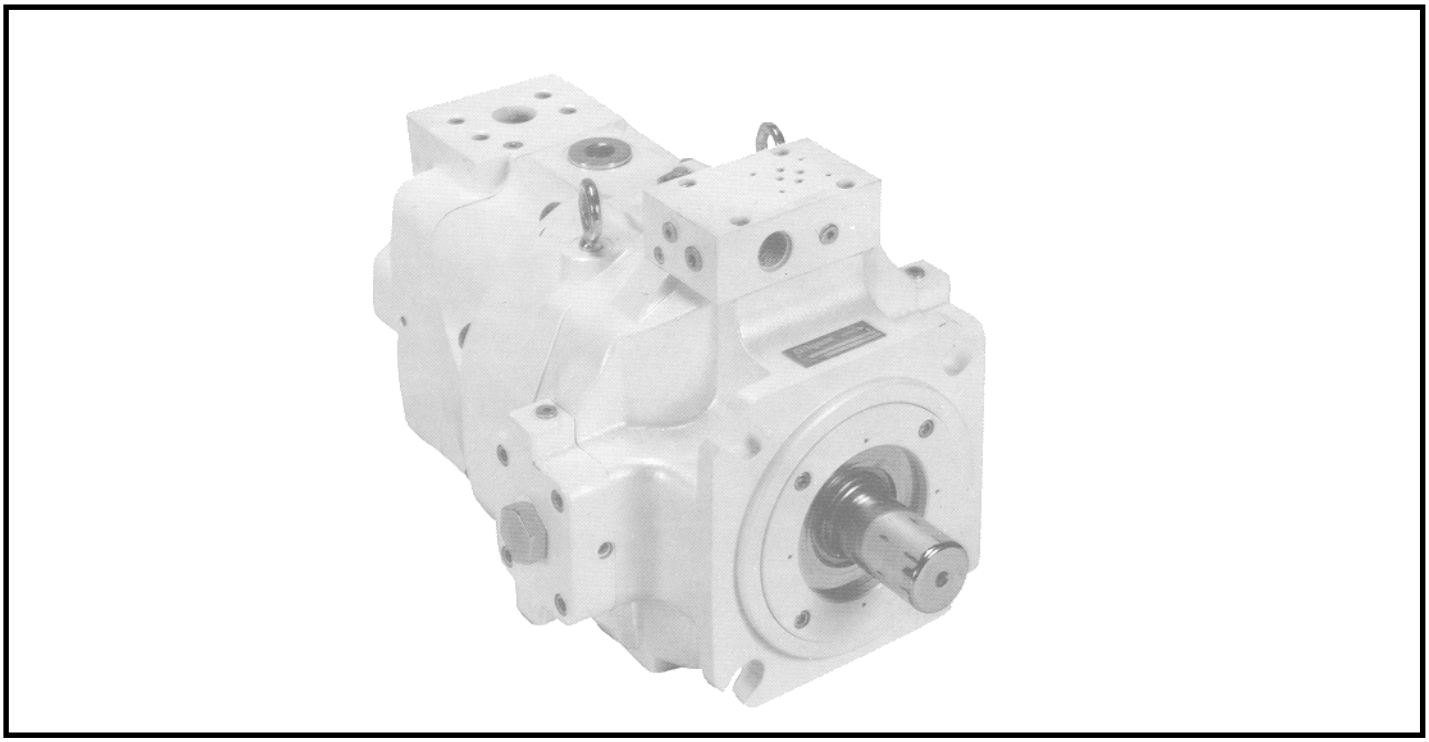

Figure 1. Typical Oilgear "PVV-200" Open Loop Pump (55988B)

### REFERENCE MATERIAL:

| | | |
|---|---|---|
| Fluid Recommendations | Bulletin | 90000 |
| Contamination Evaluation Guide | Bulletin | 90004 |
| Filtration Recommendations | Bulletin | 90007 |
| Piping Information | Bulletin | 90011 |

| PUMP CONTROL INSTRUCTIONS | | |
|---|---|---|
| "F" Fixed Volume | Data Sheet | 947129 |
| "P" Pressure Compensator & Options | Data Sheet | 947529 |
| "RU" Solenoid Operated Two Volume | Data Sheet | 947859 |
| "V-R" Electro Hydraulic Remote Servo Valve | Data Sheet | 947738 |
| "V-S" Electro Hydraulic Servo Valve | Data Sheet | 947739 |

## I. PREPARATION AND INSTALLATION

### A. MOUNTING

PUMP WITHOUT RESERVOIR. The pump may be mounted in any position. But, for convenience the recommended mounting position is with the driveshaft axis on a horizontal plane and with case drain "Port 1" to the top side. Secure the unit to a rigid mounting surface. See section "B" on "Piping Information".

PUMP WITH RESERVOIR. The units are usually fully piped and equipped, although it may be necessary to connect to supercharge circuit when used. Mount reservoir on level foundation with reservoir bottom at lease six inches above floor level to facilitate fluid changes.

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## B. PIPING AND FITTINGS

See reference "Piping Information" bulletin and individual circuit diagram before connecting pump to system.

If "suction" inlet line is used, it should reach within 1 to 2 times its' diameter from the bottom of reservoir – do not "bottom-out" tubes in reservoir. Inlet velocity must not exceed 7 fps (2,13 mps). Suction inlet should be unrestricted and have a minimum of fittings. An inlet strainer is not recommended. Consult The Oilgear Company for recommendations.

Arrange line from "case drain" so case remains full of fluid (non-siphoning). Case pressure must **not** be greater than 25 psi (1,7 bar). Each drain line must be separate, unrestricted, full sized and connect directly to the reservoir below the lowest fluid level. Provisions for opening this line without draining (siphoning) reservoir should be made.

### WARNING:

**Running pump in "Neutral" position (zero delivery) for long periods of time without supercharge (or a case bleed thru circuit) can damage the pump.**

System and pump must be protected against overloads by separate high-pressure relief valves. Install bleed valve(s) at highest point(s) in system.

## C. POWER

Power is required in proportion to volume and pressure used. Motor size recommendations for specific applications can be obtained from The Oilgear Company. Standard low starting torque motors are suitable for most applications.

### CAUTION:

**Never start or stop unit under load unless system is approved by The Oilgear Company. It may be necessary to provide delivery bypass in some circuits.**

## D. DRIVE

See rotation plate on unit's housing. Clockwise units should not be driven counter-clockwise nor counter-clockwise units driven clockwise. Use direct drive. Size and install coupling per manufacturer's instructions.

### CAUTION:

**Do not drive coupling onto pump driveshaft. If fit is too tight, it may be necessary to heat coupling (see manufacturer's instructions).**

Misalignment of pump shaft to driveshaft should not exceed 0.005" (0,13 mm). Total Indicator Readout (TIR) in any plane.

## E. FILTRATION

To assure long life from your hydraulic system, keep fluid clean at all times. See reference bulletins on "Filtration Recommendations" and "Contamination Evaluation". Oilgear recommends the use of a filter in an auxiliary (pilot) pump circuit. Replace filter element(s) when filter condition indicator reaches "change" area at normal fluid temperature. Drain and thoroughly clean filter case. Use replacement element(s) of same Beta 10 ratio (normally a ratio of 4 or more).

## F. FLUID COOLING

When pump is operating continuously at rated pressure or frequently at peak load, auxiliary cooling of fluids may be necessary. Fluid temperature should not exceed limits specified in referenced bulletin on "Fluid Recommendations".

## G. AIR BREATHER

On most installations, an air breather is mounted on top of fluid reservoir. It is important the breather be of adequate size to allow air flow in an out of reservoir as fluid level changes. Keep oil filled breather cases filled to the "fluid level" mark. About once every six months, remove cover, wash screens in solvent, clean and refill case to "level" mark and install dry screen. For paper or other type filters, see manufactures' recommendations.

## H. FLUID, FILLING AND STARTING RECOMMENDATIONS

Refer to instruction plate on unit, reservoir, machine and/or reference "Fluid Recommendations" bulletin. Pump all fluid into reservoir through a clean (Beta 10 ratio of 10 or more) filter. Fill reservoir to, but not above, "high level" mark on sight gage. Remove case drain line and prefill pump case with hydraulic fluid.

Turn driveshaft a few times by hand with a spanner wrench to be sure parts are free.

Table 1. TORQUE to TURN SHAFT

| Size Unit | 200 & 250 |
|---|---|
| Approx. Torque to turn Driveshaft — foot lbs. | 14.08 |
| -N.m. | 19,1 |

With pump under "no load" or with pump control at "neutral", turn drive unit on and off several times before allowing pump to attain full speed. The system can usually be filled by running the pump and operating the control. Watch fluid level mark in the reservoir and stop pump if level reaches "low" mark. Add fluid and start again. With differential (cylinder) systems, fluid must not be above "high level" when ram is retracted or below "low level" when extended. Bleed air from the system by loosening connections or opening petcocks at the highest point in the system. Close connection or petcocks tightly when solid stream of fluid appears.

# II. CONSTRUCTION

Refer to Figure 6 & 7. A driveshaft (301) runs through the centerline of the front (001) and middle (002) pump housing as well as the valve plate (401). The front driveshaft bearing (302) supports one end of the shaft and the rear shaft bearing (403) supports the other end of the shaft. A cylinder barrel (101) is splined to the driveshaft. Pumping piston/shoe assemblies (102) in the cylinder are held against the swashblock wearplate (202) by a shoe retainer (104) and a shoe hold down retainer (203). A cylinder spring (105), bearing against an inner cylinder spring guide (106) and driveshaft (301) acts against the outer cylinder spring guide (107) secured by screws (110) to the cylinder barrel (101), forcing the cylinder and wearplate (103) against the port plate (1) and valve plate (401). The semi-cylindrical swashblock (201) can be swiveled in the saddle bearings (204) by operator pistons (501) which are operated by a control (covered in reference material). A stroke indicator assembly (800) stem (812) gives a visual indication of swashblock position.

The port plate (1) has two crescent shaped ports one crescent connects the pumping pistons (102) during the upper half revolution to the valve plate and port "A". The other crescent port connects the pistons during the lower half revolution to the valve plate and port "B".

(See Pages 4 and 5 for "III. PRINCIPLE OF OPERATION").

## IV. SPECIFICATIONS

See reference material, pump control material and individual application circuit for exceptions.

Table 2. NOMINAL PERFORMANCE DATA with 85-550-SSU viscosity fluids.

### 80-550 SSU VISCOSITY FLUID

| UNIT SIZE | THEORETICAL MAXIMUM DISPLACEMENT | | RATED CONTINUOUS PRESSURE | | MAXIMUM PRESSURE | | RATED FLOW AT CONTINUOUS RATED PRESSURE | | | | | | | | | | | | MAX-IMUM SPEED |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | NON-SUPERCHARGED | | | | | | | | SUPERCHARGED | | | | |
| | | | | | | | 1000 rpm | | 1200 rpm | | 1500 rpm | | 1800 rpm | | 1800 rpm | | 2200 rpm | | |
| | $in^3$/rev | ml/rev | psi | bar | psi | bar | gpm | lpm | gpm | lpm | gpm | lpm | gpm | lpm | gpm | lpm | gpm | lpm | rpm |
| 200 | 12.2 | 200 | 6000 | 414 | 6500 | 450 | 46.5 | 177 | 56 | 212 | 70 | 266 | 83 | 315 | 83 | 315 | 101 | 384 | 2200 |
| 250 | 15.26 | 250 | 5000 | 345 | 5800 | 400 | 58 | 221 | 69 | 262 | 86 | 327 | 103* | 393* | 103 | 393 | 125 | 480 | 2200 |

***Must have 1.0 psi (0.34 bar) at inlet flange.**

| UNIT SIZE | POWER INPUT AT RATED CONTINUOUS PRESSURE | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1000 rpm | | 1200 rpm | | 1500 rpm | | 1800 rpm | | 2200 rpm | |
| | hp | kw | hp | kw | hp | kw | hp | kw | hp | kw |
| 200 | 185 | 138 | 223 | 166 | 278 | 208 | 330 | 246 | 406 | 303 |
| 250 | 203 | 152 | 242 | 180 | 302 | 225 | 362 | 270 | 435 | 325 |

Table 3. NOMINAL DIMENSIONS and WEIGHTS without controls.

### DIMENSIONS AND WEIGHTS W/O CONTROLS

| UNIT | WIDTH | | LENGTH | | HEIGHT | | WEIGHT | | FACE MTG. FLANGE |
|---|---|---|---|---|---|---|---|---|---|
| | in. | mm. | in. | mm. | in. | mm. | lbs. | kg | |
| PVV200 & 250 | 16.31 | 414,3 | 20.78 | 527,7 | 11.82 | 300,2 | 355 | 161 | ISO 200 4-Bolt |

("See Page 6 for "V. MALFUNCTIONS and CAUSES")

## III. PRINCIPLE OF OPERATION

A ONE-WAY PUMP DRIVEN CLOCKWISE (RIGHT HAND) IS DESCRIBED. DIAGRAMS ARE SHOWN FROM TOP (PLAN) VIEW.

SEE FIGURE 2. POSITION A. Rotating driveshaft (301) clockwise turns the splined pump cylinder barrel (101) which contains the pumping pistons (102). A piston shoe retainer (104) and a shoe hold down retainer (206) holds the piston shoes against the swashblock wear plate (202). When the cylinder barrel is rotated, the pistons moves in and out of their bores as the shoes "ride" against the angled swashblock wear plate.

As the cylinder rotates, the individual piston bores are connected alternately to the upper (Port "A") and lower (Port "B") crescent shaped ports in port plate (1) and valve plate (401). While connected to the lower side (suction) Port "B", each piston moves outward, drawing fluid from Port "B" into the piston bore until it's outermost stroke is reached. At that point, the piston bore passes from the lower crescent to the upper crescent port.

While rotating across the upper crescent, each piston is forced inward by the swashblock wear plate face. Each piston displaces fluid thru the upper crescent to Port "A" until its innermost stroke is reached. At that point, the piston bore passes from the upper crescent to the lower crescent again and the operating cycle is repeated.

SEE FIGURE 3. POSITION A/2. A study of the diagram will show the linear stroke of the control pistons and shoe assembly (501) sets the angular position of the swashblock (201) and swashblock wear plate which determines the length of piston stroke (difference between outermost and innermost position) thereby determining the amount of delivery from the high pressure piston pump. In this example, the linear stroke of the control piston and the angle of theswashblock is one half former (Position A) and pump delivery is one one half the former delivery.

SEE FIGURE 4. POSITION N. Neutral position results when the control pistons and/shoe assembly centers the swashblock. The swashblock wear plate face is now parallel to the cylinder face and the angle is now zero. Therefore, no inward or outward motion of the pump pistons exits as piston shoes rotate around the swashblock wear plate face. The lack of inward and outward motion results in no fluid being displaced from the piston bores to the crescents in port plate to the valve plate and subsequently no delivery from pump ports.

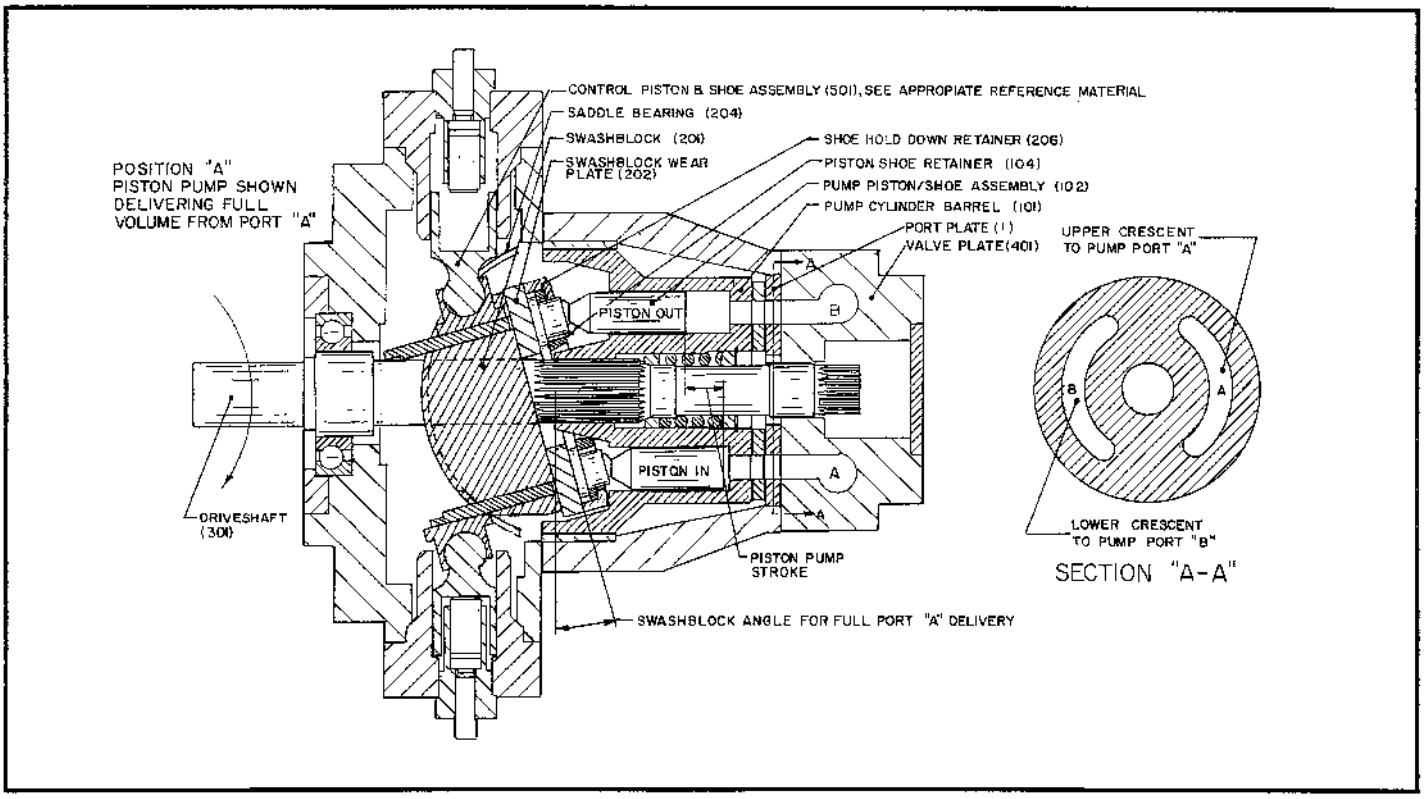



Figure 2. Position "A" (5V-12110-L)

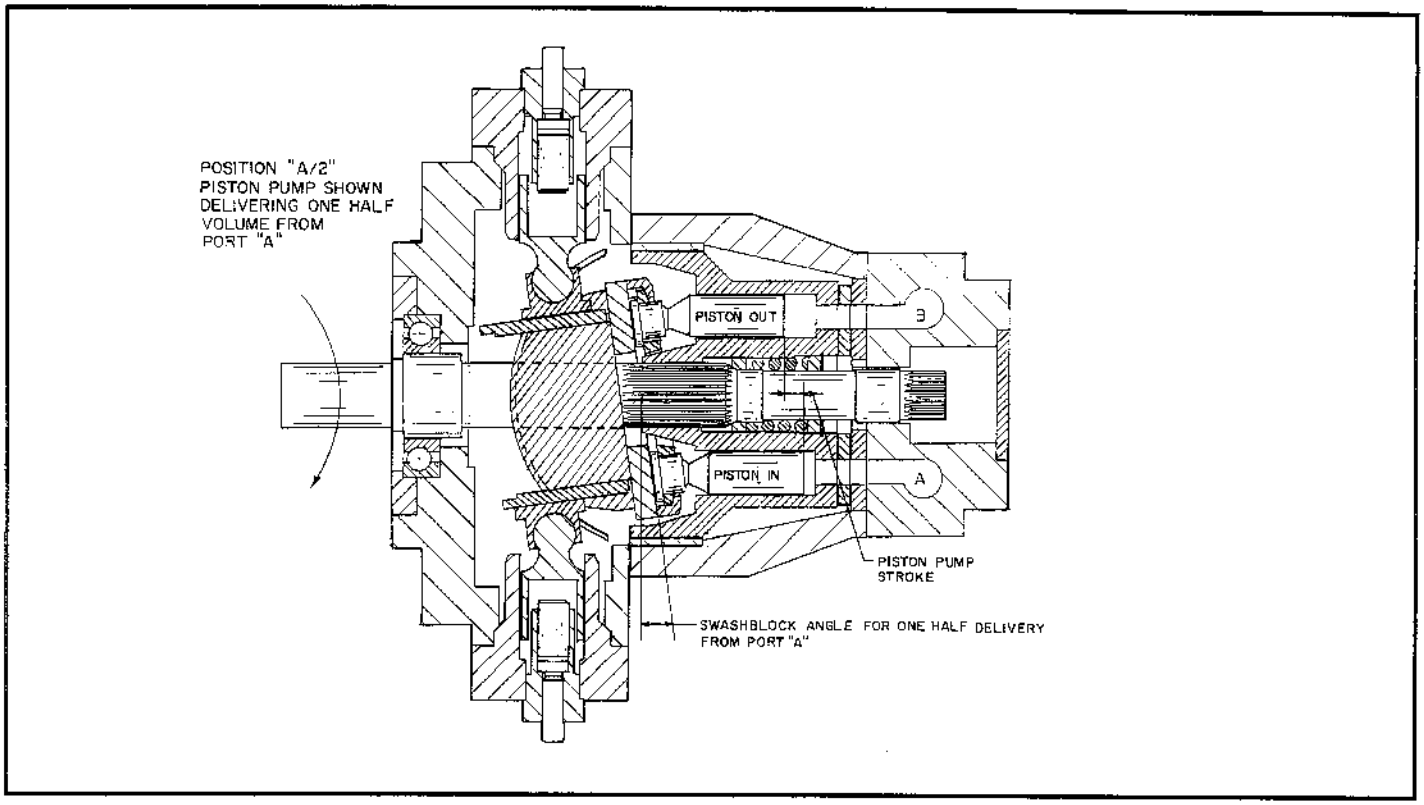



Figure 3. Position "A/2" (5V-12110-L)

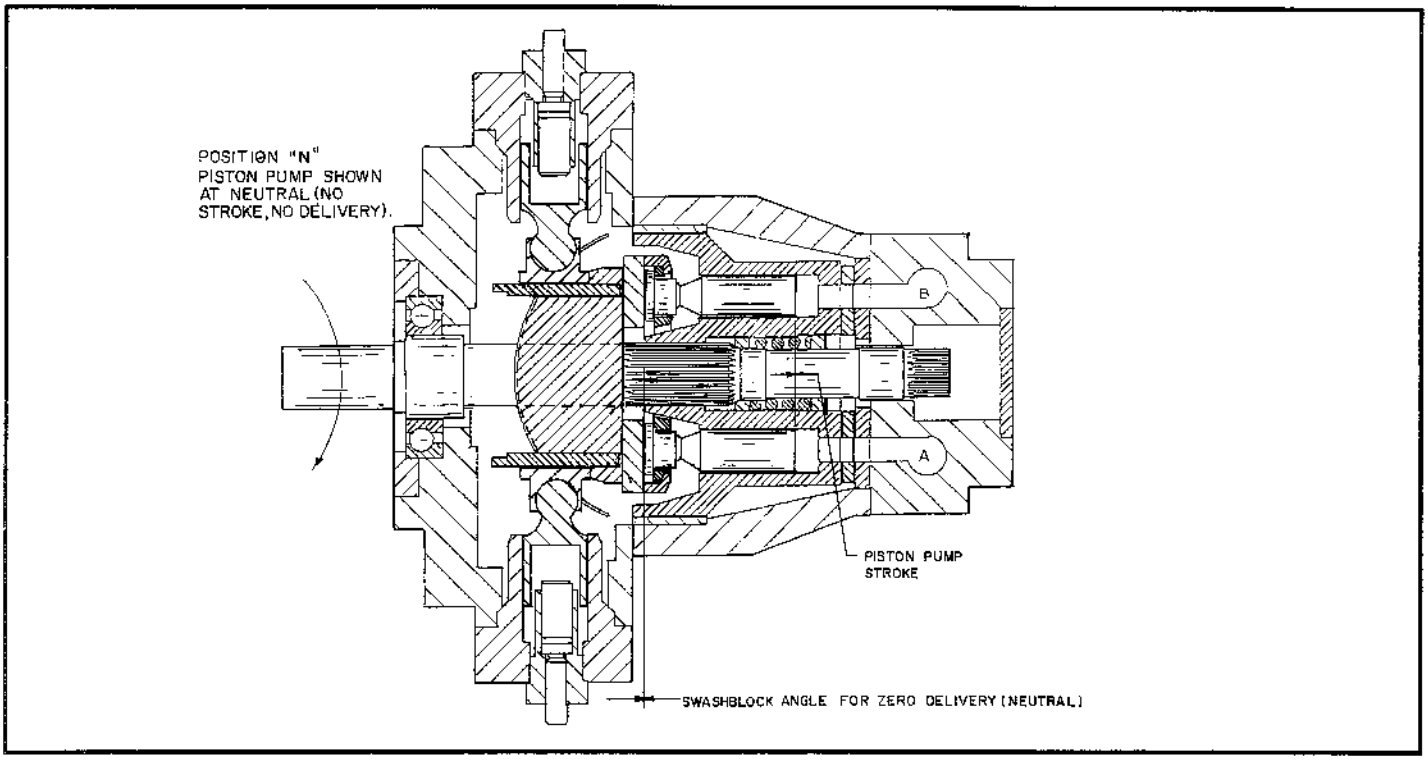



Figure 4. Position "N" (5V-12110-L)

## V. MALFUNCTIONS and CAUSES

### A. UNRESPONSIVE OR SLUGGISH CONTROL

1. Faulty or binding control pistons (501) – see reference control instruction bulletin.
2. Insufficient control circuit pressure and/or volume (other auxiliary devices in circuit may "rob" volume from the pump control).
3. Swashblock (201) binding in worn or damaged saddle bearings (204).

### B. INSUFFICIENT PUMP VOLUME

1. Delivery limited by faulty control (see appropriate control instruction bulletin).
2. Maximum volume stops (701) limiting pump stroke.
3. Obstructed suction circuit or insufficient supercharge volume.
4. Insufficient drive motor speed.
5. Worn or grooved cylinder wearplate (103) and/or port plate (1).
6. Worn piston/shoe assemblies (102) or bores in pump cylinder barrel (101).
7. Worn or damaged piston/shoe assemblies (102), swashblock (201) or swashblock wear plate (202).

### C. IRREGULAR OR UNSTEADY OPERATION

1. Faulty control – an oscillating stroke indicator (812) is indicative of an unstable control.
2. Fluid level in reservoir is low or supercharge is insufficient.
3. Air entering hydraulic system.
4. Worn axial piston pump.
5. Faulty output circuit components (cylinders, motors, valves, etc.).

### D. LOSS OF PRESSURE

1. Worn piston pump.
2. Worn or grooved cylinder wearplate (103) and/or port plate (1); wear plate and/or port plate separation from cylinder, each other or valve plate (401).
3. Worn piston/shoes not seated on swashblock wear plate (202).
4. Faulty output circuit components (cylinders, motors, valves, etc).

### E. EXCESSIVE OR HIGH PEAK PRESSURE

1. Faulty output circuit components (pay particular attention to relief valves).

### F. EXCESSIVE NOISE

1. Pump, incorrectly, being stopped or started under load.
2. Low fluid level in reservoir or insufficient supercharge resulting in cavitation.
3. Air entering hydraulic system.
4. Fluid too cold or viscosity too high.
5. Suction line problem i.e. obstructions in the line, line too long, line diameter too small or too many bends or loops in line.
6. Broken or worn piston/shoe assembly (102).
7. Worn or pitted bearings.
8. Pump rotating in wrong direction.
9. Pump being driven faster than rated speed.

### G. EXCESSIVE HEATING

1. Operating pump above rated or peak pressure.
2. Low fluid level in reservoir or insufficient supercharge.
3. Air entering hydraulic system.
4. Worn piston pump.
5. Faulty output circuit components (continuous blowing of relief valves or "slip" through valves, cylinders, etc.).
6. Insufficient cooling provision or clogged coolers.

## VI. TESTING AND ADJUSTING

**WARNING – Shut pump off and release pressure from the system before disassembling components. Failure to comply with these instructions could result in personal injury or death. Blocking pressure line between pump and system (or pump) high-pressure relief valve will result in damage and could result in serious personal injury.**

### A. AXIAL PISTON PUMP

**CAUTION:**

**Do not run pump on stroke against a blocked output unless the pump is protected by a high pressure relief valve and then run no longer than necessary to check slip. Limit discharge to prevent dropping reservoir fluid below "low" level.**

To check for worn piston pump, measurement of the leakage can be made from the case drain while the pump is under pressure. After the unit is warm, either install a flow meter in the drain line or have the flow from the drain line directed into a large container or reservoir. The pump case must remain full of fluid during this test. With an accurate high-pressure gage in the pressure line, start pump and stall (or block) output device to raise system pressure to maximum (as set by system relief valve). Read the flow meter, or time the case drain flow to fill a known size container and calculate the flow rate in terms of cubic inches per minute (cipm). The leakage should conform with Table 4. Additional leakage indicates wear, but does not become critical until it impars performance.

Table 4. NOMINAL CASE SLIP vs High Pressure at 1800 rpm (and viscosity of 90SSU).

| Pump Size | Units | Case Slip at Full Stroke and Indicated Pressure | | | | |
|---|---|---|---|---|---|---|
| | | 1000 psi | 2000 psi | 3000 psi | 4000 psi | 5000 psi |
| 200 | cipm<br>lpm | 780<br>12,8 | 1110<br>18,2 | 1440<br>23,6 | 1860<br>20,5 | 2250<br>36,9 |
| 250 | cipm<br>lpm | 1010<br>16,6 | 1425<br>23,4 | 1875<br>30,3 | 2525<br>41,9 | 3100<br>50,8 |
| | | Case Slip at Quarter Stroke at Indicated Pressure | | | | |
| | | 1000 psi | 2000 psi | 3000 psi | 4000 psi | 5000 psi |
| 200 | cipm<br>lpm | 840<br>13,8 | 1170<br>19,2 | 1500<br>24,6 | 1890<br>31,0 | 2280<br>37,4 |
| 250 | cipm<br>lpm | 1450<br>25,8 | 1775<br>29,1 | 2250<br>36,9 | 2700<br>44,3 | 3325<br>54,5 |

## VII. DISASSEMBLY

### A. GENERAL

Refer to figures 6 and 7. It will be advantageous to tag similar parts (particularly screws, plugs and o'rings) during disassembly to be certain they don't become confused with similar parts and to assure they will be returned to original location. Do not remove (locator) roll pins unless they are deformed or otherwise in need of replacement.

### B. PREPARATION

For disassembly and assembly, a large crane capable of handling a 1000 lb. load will be necessary.

While disassembling or assembling unit, we recommended choosing an area where no traces of dust, sand or other abrasive particles, (which would damage the unit), are in the air. We also recommend not working near welding, sand blasting, grinding benches and the like. Place all parts on a CLEAN surface. To clean parts, which have been disassembled, it is important to use CLEAN solvents. All tools and gages should be CLEAN prior to working with these units and CLEAN threadless rags used to handle and dry parts.

**WARNING: NEVER attempt to remove or install any components or assembly while unit and system is running. Always stop the pump, shut-off power and release pressure from the system before servicing or testing. Be sure provisions have been made so case drain line can be disconnected from the unit without causing the line to drain (siphon) the reservoir.**

Disconnect case drain line from Port "1" or "1A" and drain pump case through the remaining port (1 or 1A) on the bottom of the case. If plugs are inaccessible, it may be necessary to remove pump from mounting before draining it.

After removing pump from mounting, or before disassembling the middle pump housing (002) from the front pump housing (001), cap or plug all ports and clean the outside of the unit thoroughly to prevent entry of dirt and dust into the system.

Refer to figures 6 and 7. Depending upon what part or parts are to be inspected, it may not be necessary to completely take apart all assemblies. If only the port plate (J) is to be inspected, it is possible to remove valve plate group (J) only. The driveshaft group (E) can be removed, without disassembling the rest of the pump, to access front driveshaft bearing (302) and/or shaft seal (007).

### C. & D. CONTROL & STROKE INDICATOR GROUP

See reference material for applicable information on the control your unit is equipped with. To disassemble the rotating group and/or swashblock group, remove the stroke indicator gland (811) and the stroke indicator assembly (811 thru 816). It is also recommended that screws (508) be removed along with control cap assemblies (503). Remove control piston shoe assemblies (501). Note which bore (right or left side facing shaft) each piston (501) and each control cap assembly (503) is removed from.

### E. DRIVESHAFT GROUP

Position pump vertically, with driveshaft (301) pointed up, and block securely in place. Alternately back out screws (307) partially [which will relax cylinder spring (105)] until they are finger loose and then remove. Lift out shaft retaining plate (303). Driveshaft (301) can be pulled upward from the front pump housing. Remove key (306) if used. If necessary, shaft bearing retaining ring (305) can be removed and front driveshaft bearing (302) pulled from shaft. Seal retainer (304) and shaft seal (007) can be removed if necessary.

## F. FRONT HOUSING GROUP

### CAUTION:

**Use eye bolts and hoist to support the weight of front housing assembiy (001).**

Screw out swashblock pins (005) with o'ring (012) from bottom and top of front pump housing (001). Remove screws (014) and lift off front pump housing (001). The swashblock (201) will remain with the rotating group. Remove saddle bearings (204) from pins (016) and from front housing (mark which saddle bearing is top and which is bottom so they can be put back in same position). Pin (017) may stay in front (001) or middle (002) housing. Lift out o'ring (011) and remove pump housing gasket (003).

## G. SWASHBLOCK GROUP

Remove screws (210) which hold the swashblock (201) to swashblock wear plate (202). Pry swashblock (201) from swashblock wear plate (202). Using eyebolts and a hoist to support it, lift swashblock (201) from the swashblock wear plate (202) and the rotating group assembly. If necessary, stroke indicator roll pin (215) and roll pin (211) can be removed. Screws (214) and control piston wear plate (213) can also be removed if necessary.

## H. ROTATING GROUP

Thread eyebolts into swashblock wear plate (202) and use a hoist to lift wear plate/piston assembly from the cylinder. Remove screws (209) and pull swashblock wear plate (202) from assembly. Now, lift out and number each piston/shoe assembly (102), number its' corresponding hole in the shoe retainer (104) as well as cylinder bore. Remove shoe retainer (104) and , the shoe hold down retainer (203). Using threaded lifting holes provided, lift the pump cylinder barrel (101) from the middle pump housing (002). If necessary, the cylinder wear plate (103) can be removed as well as screws (110) and cylinder spring outer guide (107) along with cylinder spring (105) and inner cylinder spring guide (106). If necessary locating pins (109) can be removed. The pump cylinder bearing (004) is a pressed fit, but can be tapped out from inside the middle, housing (002) after the next step. Note the location of cylinder bearing locating pin (025) so it can be returned to that same location when unit is reassembled.

## I. MIDDLE HOUSING GROUP

Back out screws (405). Separate valve plate (401) from pump middle housing (002). Use a hoist to lift the middle housing (002) from the valve plate.

## J. VALVE PLATE GROUP

**If only valve plate is being removed,** remember the cylinder spring (105) holds pump cylinder (101) and it's wear plate (103) against port plate (1). To avoid damage to these parts, partially back out screws (405) on alternate corners, until they can be unscrewed by finger pressure and remove valve plate (401).

**If middle housing group is removed,** lift port plate (1) from locating pin (408) and valve plate (401). Do not remove rear shaft bearing (403) unless replacement is necessary. If removed, note the direction the slot faces. Remove o'rings (019) and (407) from housing and valve plate.

# VIII. INSPECTION

Clean all parts thoroughly. Inspect all seals and o'rings for hardening, cracking or deterioration and replace if necessary. Check all locating pins for damage and springs for cracking or signs of fatigue.

**WARNING – Always wear safety goggles when using solvents or compressed air. Failure to wear goggles could result in serious personal injury.**

## A. CONTROL GROUP

See applicable reference material on pump controls.

## B. VALVE PLATE GROUP

Closely examine mating faces of port plate (1) and cylinder wear plate (103) for flatness, scratches or grooves. If faces are not flat and smooth, the cylinder will "lift off" from the port plate resulting in delivery loss and damage to the pump. If necessary, the port plate (1) and cylinder wear plate (103) can be re-lapped. Check rear shaft bearing (403). Replace any parts necessary.

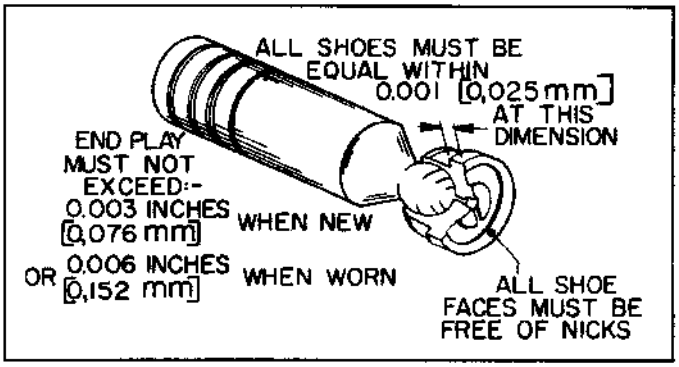
## C. STROKE INDICATOR GROUP

Check to be sure the stroke indicator stem (812) slides smoothly in its gland (811) and that spring (813) is not cracked, binding or broken.

## D. ROTATING GROUP

Check all piston/shoe assemblies (102) for smooth action in their respective bores. Check piston walls or bores for scratches, scouring or other signs of excessive wear. Replace if necessary. Piston shoes must pivot smoothly, but end play should not exceed 0.003" (0,076 mm). Check end play as follows: Place square end of piston on bench and hold down firmly. Pull on end of shoe with other hand and note end play. A good piston/shoe fit will have no end play, but shoe must rotate and pivot on the piston ball. Inspect each shoe face for nicks or scratches. Measures shoe thickness [the part held between shoe retainer (104) and swashblock wear plate (202)]. All shoes must be equal within 0.001" (0,025 mm). If a single piston/shoe assembly (102) needs to be replaced, all piston/shoe assemblies must be replaced. Inspect cylinder bearing (004) and matching pump cylinder barrel (101) surface for galling, pitting or roughness. Replace if necessary.

Figure 5. PISTON and SHOE INSPECTION (5V-12021-L)




## E. SWASHBLOCK GROUP

Inspect swashblock wear plate (202) for scratches, grooves, cracks or uneven surface. Replace (the swashblock wear plate can not be re-lapped) if defective. Inspect saddle bearings (204) for signs of tearing, wear-thru or deterioration of bearing material. Check mating surface of swashblock for cracks or excessive wear. Replace if necessary. Swashblock movement in saddle bearings must be smooth.

## F. DRIVESHAFT GROUP

Check shaft seal (007) for deterioration or cracks. Replace if necessary. Check front driveshaft bearing (302) for galling, pitting, binding or roughness. Check shaft and its' splines for wear. Replace if necessary.

## IX. ASSEMBLY

Refer to figures 6 and 7. The procedure for assembling the pump in basically the reverse order of disassembly. During assembly, install new gaskets, seals and o'rings. Apply a thin film of CLEAN grease or hydraulic fluid to sealing components to ease assembly. If a new rotating group is used, lubricate thoroughly with CLEAN hydraulic fluid. Apply fluid generously to all wear surfaces.

### A. VALVE PLATE GROUP

If used, place gasket (903) on cover plate (901) and secure cover to valve plate (401) with screws (902).

Lay valve plate (401) on bench with machine surface facing up. Press tailshaft bearing (403) into valve plate bore. When properly installed, bearing (403) should protrude upward 0.60" (15,2 mm) from the machined face with slot facing same direction as original bearing. Slide port plate (1) over tailshaft bearing to engage locating dowel pin (408) which is pressed into valve plate. Place o'ring (019) in groove on back side of pump middle housing (002), locate o'ring (407) in housing, and place lubricated screws (014) in their respective bores before mounting valve plate. Using screws (405), torque to 240 ft. lbs., secure valve plate (401) to middle pump housing (002).

### B. ROTATING GROUP

If removed, press locating pin (025) into cylinder bearing (004) and slide or tap bearing into pump housing (002). Align the slots with screw holes in barrel and place the inner cylinder spring guide (106) with chambered edge facing in, into the center bore of the pump cylinder (101). Follow the guide with the cylinder spring (105), outer cylinder spring guide (107) and secure the assembly in the bore of pump cylinder (101) with screws (110). If removed, press locating pins (109) into the rear end of the cylinder. Spread a coat of grease on the rear of the cylinder and locate cylinder wear plate (103) on the pins (109). Lubricate port plate (1) and cylinder bearing (004) generously, with hydraulic fluid. With middle pump housing (002) and valve plate (401) assembly on bench with open end up and securely blocked place, use eyebolts and a hoist to carefully lift cylinder (101) assembly up and carefully lower into bearing (004) and housing (002).

If pistons and corresponding holes in retainer (104) were marked upon disassembly, note which piston goes in which hole. Place shoe hold down retainer (203) on bench blocks, insert the shoe retainer (104) with chamfered side down and lower each piston/shoe assembly (102) into its' corresponding hole. Lubricate this assembly liberally with hydraulic fluid. Place swashblock wear plate (202), with locating pin (211) in it, on top of assembly and secure with Nylock threaded screws (209). Make sure the shoe hold down retainer (203) and swashblock wear plate (202) are pull together tightly. The shoes should be loose (0.001" clearance) between the retainer and the wear plate. Place eyebolts in swashblock wear plate (202) and using a hoist, lift the assembly from the blocks. Check to be sure none of the pistons are binding in their shoes (swivel freely) and that retainer (203) is free (can be revolved) within the shoe hold down retainer (203) and swashblock wear plate (202) assembly. Lubricate bores in cylinder as well as cylinder splines. Lower assembly slowly into pump case. Again, if pistons and corresponding bores in cylinder were marked upon disassembly, be sure pistons are returned to their original bores by working piston/shoe assemblies (102) into the cylinder while continuously lowering the wearplate assembly until the weight is no longer supported by the hoist. Remove the eyebolts. Pin (211) located in the swashblock, will be used to position swashblock (201) on wear plate (202). Using screws (209), secure swashblock wear plate (202) to shoe hold down retainer (203).

### C. SWASHBLOCK GROUP

If removed, re-install roll pin (215), and use screws (214) to secure control piston wear plates (213). Lower swashblock assembly onto swashblock wear plate (202) so swashblock locating pin (211), engages matching hole in swashblock wear plate (202). Use screws (210) to secure swashblock (201) to swashblock wear plate (202). Rotate the swashblock/rotating group assembly so roll pin (215) is in line with upper case drain port on the middle housing. This is necessary to position the swashblock assembly to receive the front housing assembly.

### D. FRONT HOUSING GROUP

Place saddle bearings (204) on saddle bearing locating pins (016). Be sure locating pins (016) do not protrude above the saddle bearing (204). If re-installing original saddle bearings be sure to put the one you marked "top" in the upper location, and tap into place. Spread grease on housing surface and place pump housing gasket (003) and o'ring (011) on pump front housing (001). Using eyebolt and hoist, carefully lower pump front housing (001) onto the middle housing (002) being sure that locating pin (017) engages both housing and that swashblock surfaces mate with saddle bearings (204). Place o'rings (012) on the two swashblock locating pins (005). Again, be sure the swashblock is properly seated in the saddle bearing before screwing in the top and bottom swashblock locating pins (005) with o'ring (012) in place. Use screws (014) to secure pump front housing (001) to middle pump housing (002). Torque screws up to 140 ft. lbs.

### E. DRIVESHAFT GROUP

If removed, press seal (007) into pump front housing (001) with "U" opening of the seal towards inside of housing. Place seal retainer (304) over seal. Press shaft bearing (302) onto driveshaft (301) and secure with retainer ring (305). Lubricate driveshaft (301) and lower the driveshaft so it passes through the front housing, cradle, cylinder barrel, clinder wear plate, port plate and into the rear shaft bearing (403). It may be necessary to gently rotate the driveshaft back and forth to help the splines on the driveshaft (301) engage the splines of the pump cylinder barrel (101). The resistance of the cylinder spring (105) will keep the front driveshaft bearing (302) from seating in it's bore. Place shaft retainer plate (303) over front driveshaft bearing (302). Using screws (307) alternately to, "jack" the retainer into it's bore [and thus compress pump cylinder spring (105)] until it is firmly seated.

### F. STROKE INDICATOR

Slide o'ring (815) and back-up ring (816) onto stroke indicator stem (812). Slip stroke indicator spring (813) onto thinner end of stroke indicator stem. Insert this assembly in bore until stem (212) contacts pin (215). Slip stroke indicator gland (811), with o'ring (814) in place, onto stroke indicator stem and secure (screw-in) gland to case. Reaching in through the control bores swivel swashblock assembly to be sure the stroke indicator follows repositioning of swashblock.

### G. CONTROL GROUP

Return control piston shoe assemblies (501) to the bores they were taken from. Use screws (508) to put control cap assemblies (503) back to the sides they were removed from.

See reference material for applicable information on the control your unit is equipped with. See appropriate control reference for control group mounting.

**SEE SECTION "I. PREPARATION and INSTALLATION".**

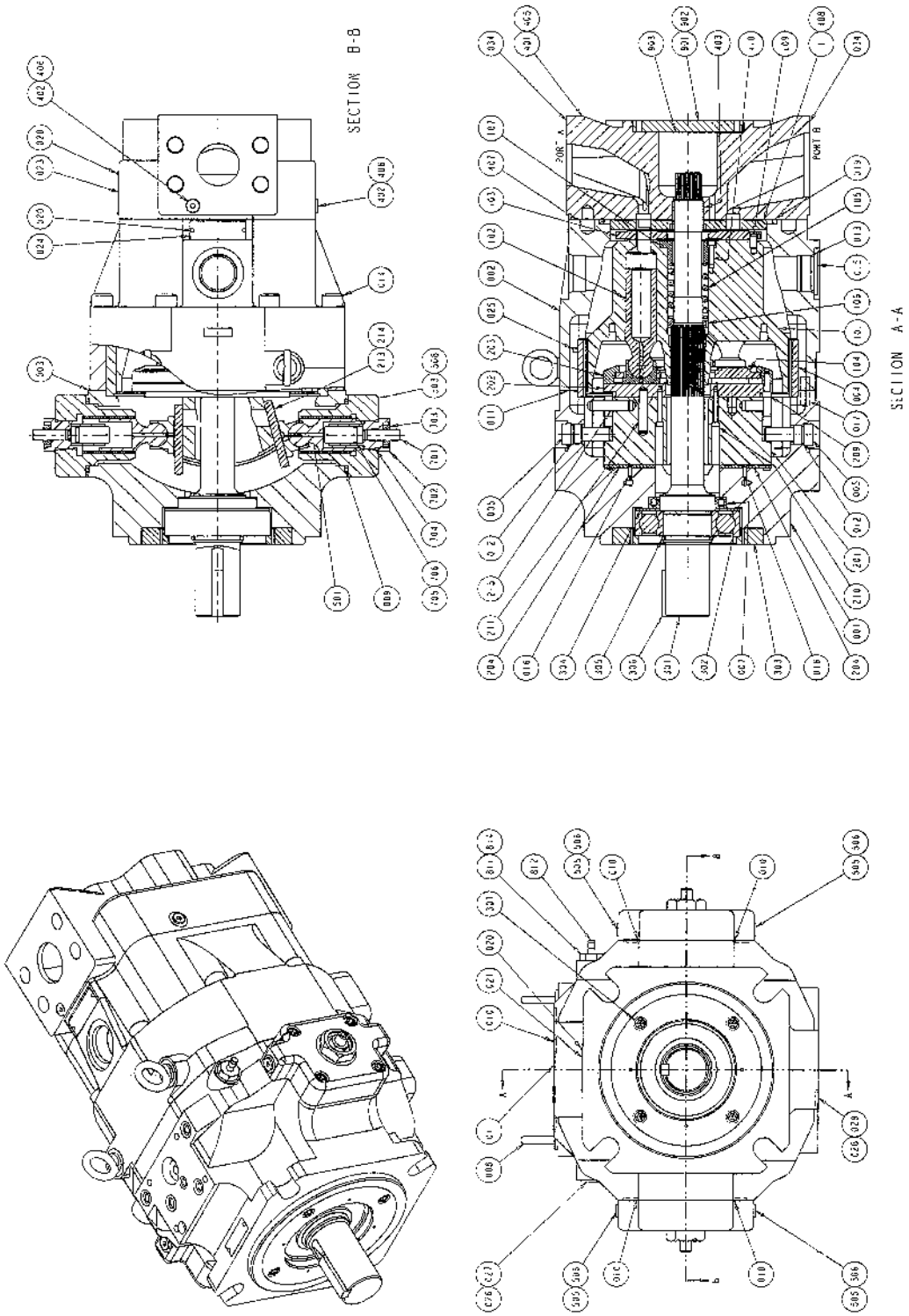



**Figure 6. Cross-Section Drawing (517925) sheet 1.**

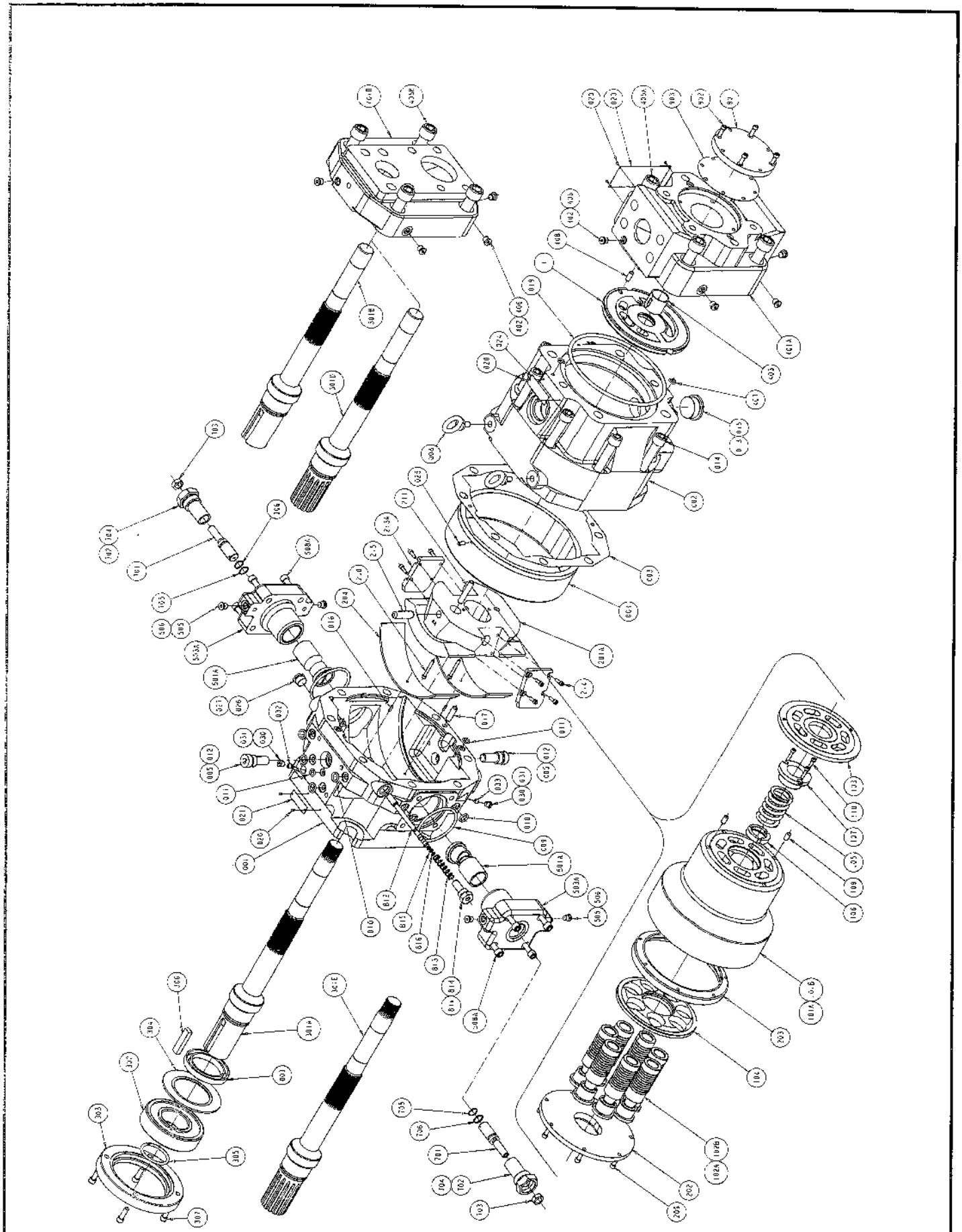


**Figure 7. Exploded Parts Drawing (517925) sheet 2.**

## X. PARTS LIST

Parts used in this assembly are per Oilgear specifications. Use Oilgear parts to ensure compatibility with assembly requirements. When ordering replacement parts, be sure to include pump type designation, serial number, Data Sheet (DS-) number and item number. To assure seal and packing compatibility specify type of hydraulic fluid used.

| ITEM NO. | DESCRIPTION |
|---|---|
| 1 | Plate, Port |
| 000 | COMMON ASSEMBLY GROUP |
| 001 | Housing, Pump Front |
| 002 | Housing, Pump Middle |
| 003 | Gasket, Pump Housing |
| 004 | Bearing, Pump Cylinder |
| 005 | Pin, Swashblock Locating |
| 007 | Seal, Shaft |
| 008 | Eyebolt, Lifting |
| 009 | Seal, O'ring |
| 010 | Seal, O'ring |
| 011 | Seal, O'ring |
| 012 | Seal, O'ring |
| 013 | Seal, O'ring |
| 014 | Screw, Sock. Hd. Cap |
| 015 | Plug, SAE |
| 016 | Pin, Saddle Bearing Locating |
| 017 | Pin, Housing Locating |
| 019 | Seal, O'ring |
| 020 | Screw, Drive |
| 021 | Plate, Rotation |
| 023 | Plate, Name |
| 024 | Plate, Caution |
| 025 | Pin, Cylinder Bearing Locating |
| 026 | Plug, SAE |
| 027 | Seal, O'ring |
| 028 | Plug, SAE |
| 029 | Seal, O'ring |
| 030 | Plug, SAE |
| 031 | Seal, O'ring |
| 032 | Plug, Orifice |
| 033 | Plug, Pipe |
| 034 | Cover, Port |

| ITEM NO. | DESCRIPTION |
|---|---|
| 100 | ROTARY ASSEMBLY GROUP |
| 101 | Barrel, Pump Cylinder |
| 102 | Assembly, Piston/Shoe |
| 103 | Wear Plate, Cylinder |
| 104 | Retainer, Shoe |
| 105 | Spring, Cylinder |
| 106 | Guide, Inner Cylinder Spring |
| 107 | Guide, Outer Cylinder Spring |
| 109 | Pin, Cylinder Wear Plate Locating |
| 110 | Screw, Sock. Hd. Cap |
| 200 | SWASHBLOCK ASSEMBLY GROUP |
| 201 | Swashblock |
| 202 | Wear Plate, Swashblock |
| 203 | Retainer, Shoe Hold Down |
| 204 | Bearing, Saddle |
| 209 | Screw, Sock. Hd. Cap |
| 210 | Screw, Sock. Hd. Cap |
| 213 | Pin, Swashblock Locating |
| 213 | Wear Plate, Control Piston |
| 214 | Screw, Sock. Hd. Cap |
| 215 | Pin, Roll |
| 216 | Pin, Dowel |
| 300 | DRIVESHAFT ASSEMBLY GROUP |
| 301A | Driveshaft, w/Keyway (Side Ported Pump) |
| 301B | Driveshaft, w/Keyway (Rear Ported Pump) |
| 301D | Driveshaft, Frt. Spline (Side Ported Pump) |
| 301E | Driveshaft, Front Spline (Rear Ported Pump) |
| 302 | Bearing, Front Driveshaft |
| 303 | Retainer, Plate (Shaft) |
| 304 | Retainer, Seal |
| 305 | Ring, Shaft Bearing Retainer |
| 306 | Key, Driveshaft |
| 307 | Screw, Sock. Hd. Cap |

| ITEM NO. | DESCRIPTION |
|---|---|
| 400 | VALVE PLATE ASSEMBLY GROUP |
| 401A | Valve Plate, Side Ported |
| 401B | Valve Plate, Rear Ported |
| 402 | Plug, SAE |
| 403 | Bearing, Rear Shaft |
| 405(A/B) | Screw, Sock. Hd. Cap |
| 406 | Seal, O'ring |
| 407 | Seal, O'ring |
| 408 | Pin Dowel |
| 500 | CONTROL CAP ASSEMBLY |
| 501A | Assembly, Control Piston/Shoe |
| 503A | Assembly, Control Cap/Sleeve |
| 505 | Plug, Hollow Hex. |
| 506 | Seal, O'ring |
| 508 | Screw, Sock. Ad. Cap |
| 700 | VOLUME STOP ASSEMBLY |
| 701 | Stop, Min./Max. Volume |
| 702 | Gland, Volume Stop |
| 703 | Nut, Lock |
| 704 | Seal, O'ring |
| 705 | Seal, O'ring |
| 706 | Ring, Back-up |
| 810 | STOKE INDICATOR ASSEMBLY |
| 811 | Gland, Stroke Indicator |
| 812 | Stem, Stroke Indicator |
| 813 | Spring, Stroke Indicator |
| 814 | Seal, O'ring |
| 815 | Seal, O'ring |
| 816 | Ring, Back-up |

| ITEM NO. | DESCRIPTION |
|---|---|
| 920 | ADAPTER ASSEMBLIES |
| | AA Suffix = for SAE A-A Mountings |
| | A = for SAE A Mountings |
| | BB Suffix = for SAE B-B Mountings |
| | B = for SAE B Mountings |
| | C Suffix = for SAE C Mountings |
| 921 | Coupling |
| 922 | Pin, Roll |
| 923 | Seal, O'ring (gasket for "AA" suffix) |
| 924 | Seal, O'ring |
| 925 | Adapter |
| 926 | Screw, Sock. Hd. Cap |

## O'RING and BACK-UP SIZES
### Cross Section x O.D. Duro ±5

| ITEM NO. | PUMP SIZE 200 & 250 | | ITEM NO. | PUMP SIZE 200 & 250 | |
|---|---|---|---|---|---|
| 009 | 3/16 x 3-3/8 | 70 | 814 | 908 ARP | 90 |
| 010 | 1/8 x 3/4 | 90 | 815 | 1/16 x 5/16 | 90 |
| 011 | 3/32 x 9/16 | 90 | 816 | 1/16 x 5/16 | 90 |
| 012 | 910 ARP | 70 | 923A | 1/16 x 3-3/8 | 70 |
| 013 | 920 ARP | 70 | 923B, BB | 3/32 x 4-3/16 | 70 |
| 019 | 1/4 x 8 | 70 | 923C | 1/16 x 5-1/8 | 70 |
| 027 | 908 ARP | 90 | 924A | 3/32 x 3-11/16 | 70 |
| 029 | 906 ARP | 90 | 924AA | 3/32 x 2-7/8 | 70 |
| 031 | 903 ARP | 90 | 924B, BB | 3/32 x 4-15/16 | 70 |
| 406 | 904 ARP | 90 | | | |
| 407 | 3/32 x9/16 | 90 | | | |
| 704 | 916 ARP | 90 | | | |
| 705 | 1/16 x3/4 | 90 | | | |

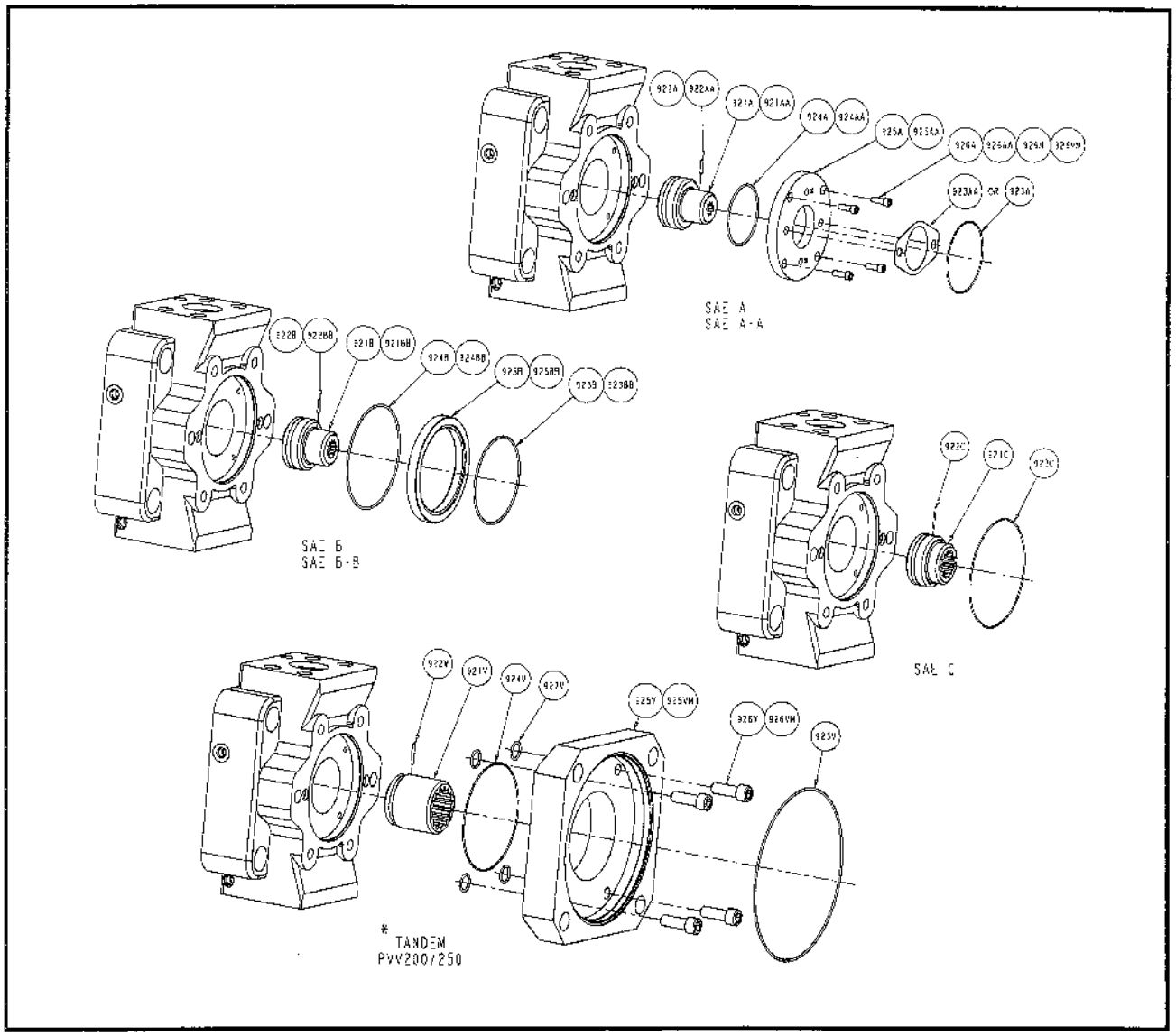



**Figure 8. Exploded Parts Drawing (517925) sheet 6.**

## FOLD OUT FOR PARTS LIST

## XI. AFTER SALES SERVICE

Oilgear builds products that last. However, it is the nature of this type of machinery to require proper maintenance regardless of the care that goes into its manufacture. Oilgear has several service programs to help you.

### "STAY-ON-STREAM" SERVICE:

By signing up for Oilgear's "Stay-On-Stream" program you can prepare for problems before they happen. Certain field tests such as fluid testing, slip testing and electronic profile recording comparisons can be performed by our field service people or your own trained personnel. These tests can indicate problems before they become "down-time" difficulties.

### SERVICE SCHOOLS:

Oilgear holds schools to train your maintenance personnel. A "general" hydraulic or electronic school is conducted in our Milwaukee plant on a regular basis. "Custom" schools, specifically addressing your particular hydraulic and electrohydraulic equipment can be conducted in your plant.

### SPARE PARTS AVAILABILITY:

Prepare for future needs by stocking Oilgear original factory parts. Having the correct parts and necessary skills "in-plant" enables you to minimize down-time. Oilgear has developed parts kits to cover likely future needs. Oilgear field service technicians also stand ready to assist your maintenance people in trouble-shooting and repairing equipment.

## OILGEAR EXCHANGE SERVICE

Standard replacement pumps and motors are available to users of Oilgear equipment where comparable units will be returned in exchange. When standard replacements must be modified to replace units which are special, shipment will depend on availability of parts, assembly and test time necessary.

To obtain this service, place an order for an exchange unit and provide the serial number and type designation. The replacement unit will be shipped F.O.B. our factory, Milwaukee, Wisconsin. User retains the replacement and returns the worn unit prepaid to The Oilgear Company for reconditioning and test. When the unit is reconditioned and stocked, the user is billed the cost of reconditioning or a flat rate exchange price if one has been applied to that particular type of unit.

Oilgear
PERFORMANCE
ASSURANCE

**THE OILGEAR COMPANY**
2300 So. 51st. Street
Milwaukee, WI 53219

BULLETIN 947029

Litho in USA