SERVICE INSTRUCTIONS

OILGEAR TYPE "PFWH", "PFWW" AND "PFW" OPEN-LOOP FIXED DISPLACEMENT PUMPS

PURPOSE OF INSTRUCTIONS

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

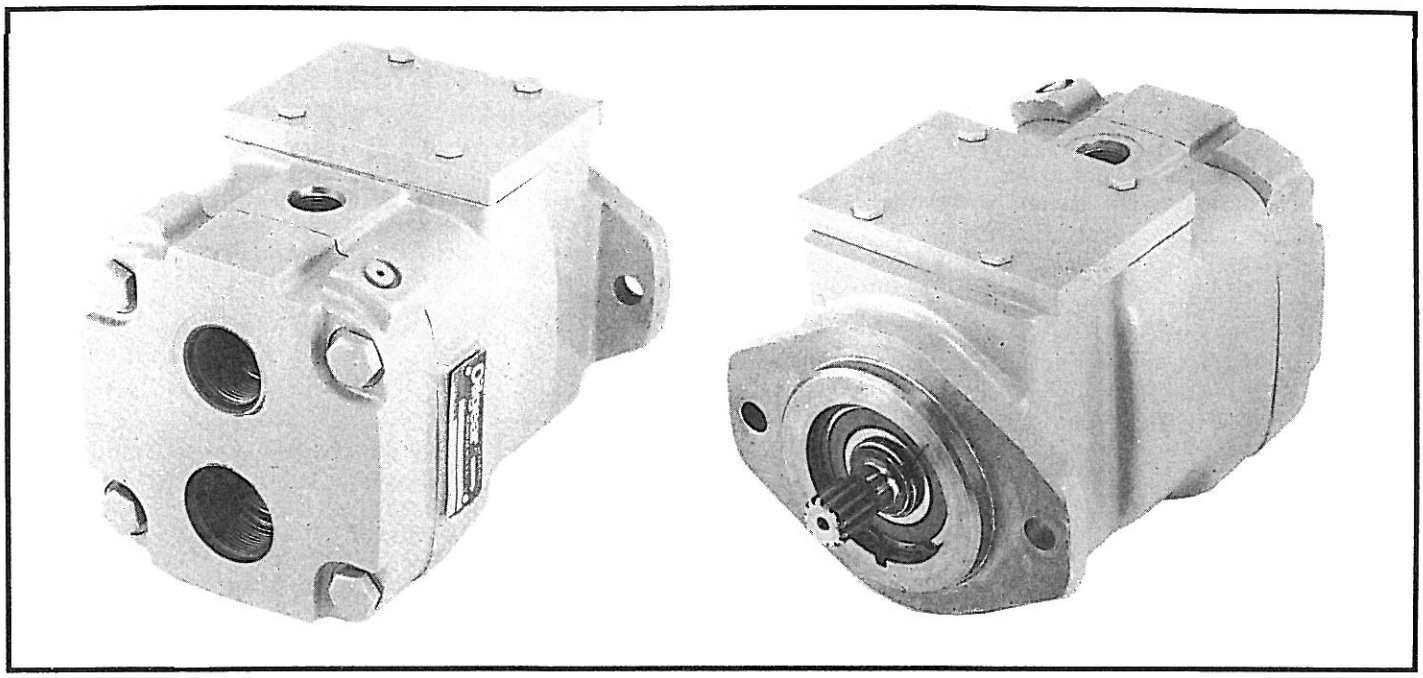

Figure 1. Typical Oilgear "PFWH" Open Loop Pumps (95040 and 95041) .

REFERENCE MATERIAL

Specifications, PFWW Pumps	Bulletin 47013
Specifications, PFW Pumps	Bulletin 47014
Specifications, PFWH Pumps	Bulletin 47015
Fluid Recommendations	Bulletin 90000
Contamination Evaluation Guide	Bulletin 90004
Filtration Recommendations	Bulletin 90007
Piping Information	Bulletin 90011

I. PREPARATION AND INSTALLATION

NOTE:- Parts drawings and lists are located on pages 10 and 11. To aid in location of parts, numerals parenthesised (##) in text correspond to parts list Item Numbers.

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" on the top side. Secure the unit to a rigid mounting surface. See section "B" on "Piping and Fittings".

PUMP WITH RESERVOIR. These 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 least six inches above floor level to facilitate fluid changes.

B. PIPING AND FITTINGS

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

For "PFWH" and "PFW" Pumps using 150-300 SSU VISCOSITY FLUIDS, an inlet strainer is not required. Inlet should be unrestricted and have a minimum of fittings. See reference "Specification Bulletin" for minimum inlet "psia" requirements at selected input rpm. If suction line is used, it should reach 1 or 2 times its diameter from bottom of reservoir - do not "bottom - out" tubes in reservoir.

For "PFWW" Pump using 27-30 SSU VISCOSITY FLUIDS, pump should have a flooded inlet and an inlet filter should not be used. Inlet should not be restricted and should have a minimum of fittings. Inlet velocity should not exceed 5 fps (1,5 m/s).

Arrange case drain line so pump case remains full of fluid (non-siphoning) at less than 25 psi (1,7 bar) and case pressure must not be 10 psi (0,7 bar) greater than inlet pressure. Each drain line must be separate, unrestricted, full sized and connect directly to the reservoir below the lowest fluid level. Drain tubing should not incorporate a "suction break". Provisions for opening this line without draining (siphoning) reservoir should be made.

System and pump must be protected against over-loads by separate high pressure relief valves. Install bleed valves (use of Oilgear automatic bleed valves is recommended) at highest points in system. Consult The Oilgear Company for other recommendations.

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 direction plate on units housing. Units are available for left hand (CCW) or right hand (CW) rotation but are **not** reversible. Use direct drive. Size and install coupling per manufactures 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 drive shaft should **not** exceed 0.005" (0,13 mm) Total Indicator Readout (TIR) in any plane.

E. FILTRATION

To insure long life from your hydraulic system, keep to an ISO contamination code of 19/16 or less 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. A minimum of 1/3 of all pump volumes must be filtered. Replace filter element(s) when filter condition indicator reaches "change" area at normal fluid temperature. Drain and thoroughly clean filter case.

FOR 150-300 SSU VISCOSITY FLUIDS, ("PFWH" and "PFW" pumps) use of ten micron filtration (Beta 10 of four or better) in pressure or return line is recommended.

FOR 27-30 SSU VISCOSITY FLUIDS, ("PFWW" pumps) use of ten micron filtration (Beta 10 of fifteen or better) in pressure or return line is recommended. **Continuous filtration is required.**

F. FLUID COOLING

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

G. AIR BREATHER

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

H. FLUID, FILLING AND STARTING RECOMMENDATIONS

"PFWH" and "PFW" Pumps use 150-300 SSU VISCOSITY FLUIDS, meeting or exceeding lubricating specifications of SAE10W API Engine Service Classifications - SC, CC or SE (or ISOVG32 thru 68) is recommended, viscosity range 150-300SSU at 100°F (37,7°C). **For fire resistant fluids,** phosphate ester hydraulic fluids can be used in accordance with manufactures recommendations.

"PFWW" Pumps, use 27-30 SSU VISCOSITY FLUIDS, it is suggested you confirm your selection with your Oilgear representative before you specify the type of hydraulic fluid. High Water Content Fluids (HWCF) 95 - 5, water glycol and oil emulsion fluid can be used in accordance with fluid manufactures recommendations.

Refer to instructions plate on unit, reservoir, machine and/or reference "Fluid Recommendations" bulletin. Pump all fluid into the reservoir through a clean (see "Section E" for Beta ratings) filter. Fill reservoir with hydraulic fluid to, but not above, "high level" mark on sight gage. **Remove case drain line at the pump and fill the pump case with hydraulic fluid.**

Turn driveshaft a few times with a spanner wrench to be sure parts are free:

Table 1. Torque to Turn Shaft.

SIZE UNIT	Approx. Torque to Turn Shaft	
	foot pounds	Nm
04, 06, 10	1.7 - 2.1	2,3 - 2,8
11, 15, 20	2.9 - 3.3	4,0 - 4,5
25, 34, 45, 60	7.9 - 8.3	10,8 - 11,3

With pump under "no load", turn drive unit on and off several times before allowing pump to attain full speed. The system

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can usually be filled by running the pump and operating the system components. Watch the fluid level in the reservoir and stop pump if the level reaches "low level" 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.

Use automatic bleed valves or bleed air from system by cautiously opening air bleed petcocks at highest point in the system. Close connections or petcocks tightly when solid stream of fluid appears.

CAUTION:

Fluid may be under high pressure and caution is advised to prevent stream from hitting personnel or machinery. Use of an Oilgear automatic air bleed valve is recommended.

II. CONSTRUCTION

Refer to Figures 7 and 8. A driveshaft (1) runs through the centerline of the pump housing (5), swashblock (11) and valve plate (22). Pump cylinder barrel (18) is splined to driveshaft. A bearing (3) supports the outboard end of the driveshaft and a bushing, integral with the valve plate, supports the inboard end. The pump cylinder barrel is carried in a journal type hydrodynamic cylinder bearing (12). The valve plate (22) has two crescent shaped ports. Pumping piston/shoe assemblies (15) in the cylinder barrel are held against a swashblock (11) and the wedge shaped swashblock limits the piston stroke.

III. PRINCIPLE OF OPERATION

A FIXED DELIVERY PUMP DRIVEN COUNTERCLOCKWISE (LEFT HAND) IS DESCRIBED

See Figure 2. Turning the driveshaft rotates the splined cylinder barrel (18) which contains pumping pistons with swivel shoes (15). A shoe retainer (14), backed up by a spring (17) loaded fulcrum ball (16), holds piston shoe against a swashblock (11).

See Figure 3. When the cylinder is rotated, the pistons move in and out of their bores as the shoes "ride" against the angled swashblock and the individual piston bores are connected alternately to the lower (Port B) and upper (Port A) crescent shaped ports in the valve plate.

While connected to the lower (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 port to the upper crescent port.

While rotating across the upper crescent, each piston is forced inward by the angled swashblock face. Thus, each piston displaces fluid from the bore and thru the upper crescent port to pump Port A until it's innermost stroke is reached. At that point, the piston bore passes from the upper to the lower crescent again and the operating cycle is repeated.

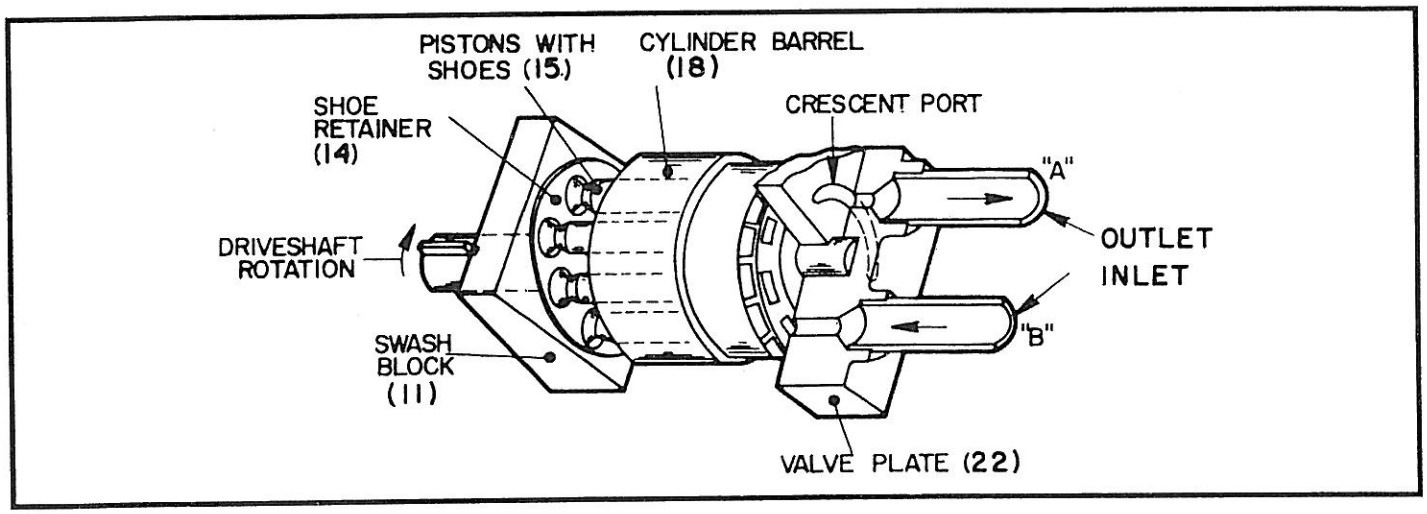

Figure 2. Type "PFWH" Pumping Mechanism shown from right side of pump (517474).

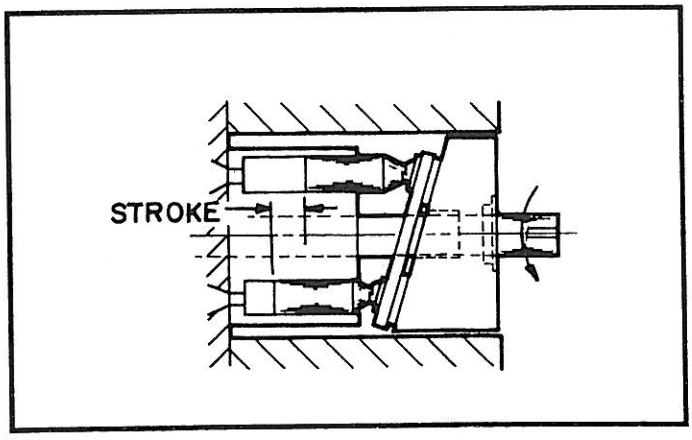

Figure 3. A Plan (top) View of Swashblock and Cylinder Barrel (517474).

IV. SPECIFICATIONS

See reference material and individual application circuits for exceptions.

Table 2. Nominal Performance Data for "PFWH" and "PFW" Pumps with 150-300 SSU Viscosity Fluids.

FRAME SIZE	UNIT SIZE	THEORETICAL MAXIMUM DISPLACEMENT		RATED CONTINUOUS PRESSURE		MAXIMUM PRESSURE		FLOW RATE at 1800 rpm, rated continuous pressure & 14.7 psia (1 bar_{abs}) inlet condition		MINIMUM INLET PRESSURE* psia (bar_{abs})			MAXIMUM SPEED†	POWER INPUT at rated continuous pressure and 1800 rpm	
		in^3/rev	ml/rev	psi	bar	psi	bar	gpm	l/min	1200 rpm	1500 rpm	1800 rpm	rpm	hp	kw
A	04	0.66	10,8	5000	344,8	5800	400,0	4.2	15,9	5.4 (,37)	5.7 (,39)	6.1 (,42)	3000	16.3	12,2
	06	0.86	14,1	4000	275,9	4500	310,3	5.9	22,4	5.5 (,38)	5.9 (,41)	6.4 (,44)	3000	17.7	13,2
	10	1.35	22,1	3000	206,9	3500	241,4	9.5	36,0	5.5 (,38)	6.0 (,41)	7.0 (,48)	3000	20.2	15,1
B	11	1.55	25,4	5000	344,8	5800	400,0	10.9	41,3	7.0 (,48)	7.3 (,50)	8.2 (,57)	3000	36.5	27,2
	15	2.06	33,8	3500	241,4	4000	275,9	14.7	55,7	7.0 (,48)	7.6 (,52)	8.4 (,58)	3000	35.5	26,5
	20	2.83	46,4	2500	172,4	3000	206,9	20.6	78,1	7.2 (,50)	7.9 (,54)	9.0 (,62)	2400	35.0	26,1
C	25	3.88	63,6	5000	344,8	5800	400,0	27.4	103,8	7.6 (,52)	8.5 (,59)	9.5 (,66)	2400	95.1	70,9
	34	4.67	76,5	3500	241,4	4000	275,9	33.7	127,7	8.0 (,55)	8.6 (,59)	9.6 (,66)	2400	80.4	60,0
	45	6.00	98,3	2500	172,4	3000	206,9	43.3	164,1	7.6 (,52)	8.6 (,59)	9.8 (,68)	2400	74.1	55,3
	60	7.94	130,2	1500	103,4	2000	137,9	58.2	220,3	8.0 (,55)	9.3 (,64)	14.5 (1,00)	1800	80.0	59,7

*For higher speeds see suction curves on Page 15. †Higher speeds available—consult factory. Note: Minimum speed 600 rpm.

Table 3. Nominal Performance Data for "PFWW" Pumps with 27-30 SSU Viscosity Fluids.

FRAME SIZE	UNIT SIZE	THEORETICAL MAXIMUM DISPLACEMENT		RATED CONTINUOUS PRESSURE		MAXIMUM PRESSURE *		FLOW RATE at 1800 rpm, rated continuous pressure & 14.7 psia (1 bar_{abs}) inlet condition		MAXIMUM SPEED at 1800 rpm and 14.7 psia inlet condition	POWER INPUT at rated continuous pressure and 1800 rpm	
		in^3/rev	ml/rev	psi	bar	psi	bar	gpm	l/min	rpm	hp	kw
A	06	0.86	14,1	3000	206,9	3500	241,4	5.5	20,8	1800	12.9	9,6
	10	1.35	22,1	2000	137,9	2500	172,5	9.0	34,1	1800	13.3	9,9
B	15	2.06	33,8	3000	206,9	3500	241,4	12.7	48,1	1800	30.4	22,7
	20	2.83	46,4	2000	137,9	2500	172,5	20.3	76,9	1800	27.8	20,7
C	34	4.67	76,5	3000	206,9	3500	241,4	32.6	123,6	1800	68.4	51,0
	45	6.00	98,3	2000	137,9	2500	172,5	42.8	162,2	1800	59.7	44,5
	60	7.94	130,2	1200	82.8	1500	103,4	56.6	214,2	1800	62.7	46,8

*Higher pressure available—consult factory. Note: Minimum speed 600 rpm.

Table 4. Nominal Dimensions and Weights.

UNIT SIZE	LENGTH		WIDTH		HEIGHT		WEIGHT	
	in	mm.	in.	mm.	in.	mm.	lbs.	kg.
04, 06, & 10	7.20	18,29	4.32	109,7	5.00	127,0	32	14,5
11, 15 & 20	8.50	215,9	4.80	147,3	6.61	167,9	68	30,9
25, 34, 45 & 60	10.44	265,2	6.76	171,7	7.68	195,1	103	46,8

V. MALFUNCTIONS AND CAUSES

A. INSUFFICIENT PUMP VOLUME

1. Obstructed suction circuit or insufficient supercharge volume.
2. Insufficient drive motor speed.
3. Worn or grooved cylinder barrel (18) and/or valve plate (22) matching surfaces.
4. Worn piston/shoe assemblies (15) or piston bores in cylinder (18).
5. Worn or damaged piston shoe or swashblock (11).

B. IRREGULAR OR UNSTEADY OPERATION

1. Fluid level in reservoir is low or supercharge is insufficient.
2. Air entering the system.
3. Worn axial piston pump.
4. Faulty output circuit components (cylinders, motors, valves, etc.).

C. LOSS OF PRESSURE

1. Worn piston pump.
2. Worn or grooved cylinder barrel (18) and/or valve plate (22) matching surfaces.
3. Worn piston/shoe assemblies (15) or piston bores in cylinder.
4. Faulty output devices.

D. EXCESSIVE or HIGH PEAK PRESSURE

1. Faulty output circuit components (pay particular attention to relief valves). The use of a "spike" relief valve (fast acting) is recommended.

E. EXCESSIVE NOISE

1. Pump being incorrectly 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., obstruction in line, line too long, line diameter too small, too many bends and/or loops in line.
6. Broken or worn piston/shoe assembly.
7. Pump rotating in wrong direction.

F. 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. Worn or grooved cylinder barrel (18) and/or valve plate (22) matching surface.
6. Faulty output circuit components (continuous blowing relief valve or "slip" through valves, cylinders, etc.).
7. 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 prior to (up-stream from) pump relief valve or system high pressure relief valve will result in damage and could result in personal injury.

A. PISTON PUMP

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.

CAUTION:

Do not run a pump on stroke against a blocked output unless it 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.

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 into a known size container and calculate the flow rate in terms of gallons per minute (gpm). The leakage should conform with Table 5, 6 or 7. Additional leakage indicates wear, but does not become critical until it impairs performance.

Table 5. "PFWH" Pump NOMINAL CASE SLIP vs. High Pressure at 1800 rpm (viscosity of 160 SSU).

PUMP SIZE	Case Slip at Indicated Pressures			
	Pressure		Slip	
	PSI	bar	GPM	lpm
04	5000	345	0.87	3,3
06	4000	275	0.87	3,3
10	3000	205	0.87	3,3
11	5000	345	1.30	4,9
15	3500	240	1.30	4,9
20	2500	170	1.30	4,9
25	5000	345	2.00	7,6
34	3500	275	2.00	7,6
45	2500	170	2.00	7,6
60	1500	100	2.30	8,7

Table 6. "PFW" Pump NOMINAL CASE SLIP vs. High Pressure at 1800 rpm (viscosity of 160 SSU)

PUMP SIZE	Case Slip at Indicated Pressures			
	Pressure		Slip	
	PSI	bar	GPM	lpm
06	4000	275	0.65	2,5
10	3000	205	0.65	2,5
15	3500	240	1.0	3,8
20	2500	170	1.0	3,8
34	3500	240	1.5	5,7
45	2500	170	1.5	5,7
60	1500	100	1.7	6,4

Table 7. "PFWW Pump NOMINAL CASE SLIP vs. High Pressure at 1800 rpm (viscosity 27-30SSU).

PUMP SIZE	Case Slip at Indicated Pressures			
	Pressure		Slip	
	PSI	bar	GPM	lpm
06	3000	205	0.66	2,5
10	2000	135	0.66	2,5
15	3000	205	1.00	3,8
20	2000	135	1.00	3,8
34	3000	205	1.50	5,7
45	2000	135	1.50	5,7
60	1200	100	1.70	6,4

VII. DISASSEMBLY

A. GENERAL

Refer to Figures 7 and 8. 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 crane and/or sling capable of handling 200 lb. loads will be useful (particularly when working on larger size units).

When disassembling or assembling unit, we recommend choosing an area where no traces of dust, sand or other abrasive particles, which could 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 and lint free rags used to handle and dry parts.

WARNING: NEVER attempt to remove or install any components or assemblies 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 unit without causing the line to drain (siphon) the reservoir.

Disconnect pump from drive motor and piping. Usually, it is necessary to remove pump from it's mounting before the case can be drained.

After removing pump from mounting, but before disassembly, cap or plug all ports and clean the outside of the unit thoroughly to prevent entry of dust into the system.

Refer to Figures 7 and 8. Depending upon what part or parts are to be inspected, it may not be necessary to completely take apart all assemblies. **NOTE: disassembly of pump not required if only shaft seal needs replacing - see section "E. Driveshaft Group" instructions.**

C. VALVE PLATE GROUP

If another unit is coupled to thru-shaft units, it will be necessary to remove coupling half (180 or 191) before removing valve plate (22). Block unit on bench with driveshaft facing down. Remove valve plate (22) by alternately turning out the four hex. head screws (25) until "free" and then lifting the valve plate straight up. Remove valve plate gasket (21) and o'ring (28).

D. ROTATING GROUP

WARNING: Extreme care must be taken to not damage cylinder wear surface (that matches against the valve plate), bearing diameters or piston shoes. The use of a sling, and/or assistance from others and use of proper lifting techniques are strongly recommended to prevent personal injury (particularly when working on larger units).

Place the pump in a horizontal position and remove the rotating group by turning shaft (1) slowly while pulling the cylinder barrel (18) from housing. Place assembly on a clean soft surface (to prevent damage to cylinder barrel/wear plate face) as shown in Figure 4.

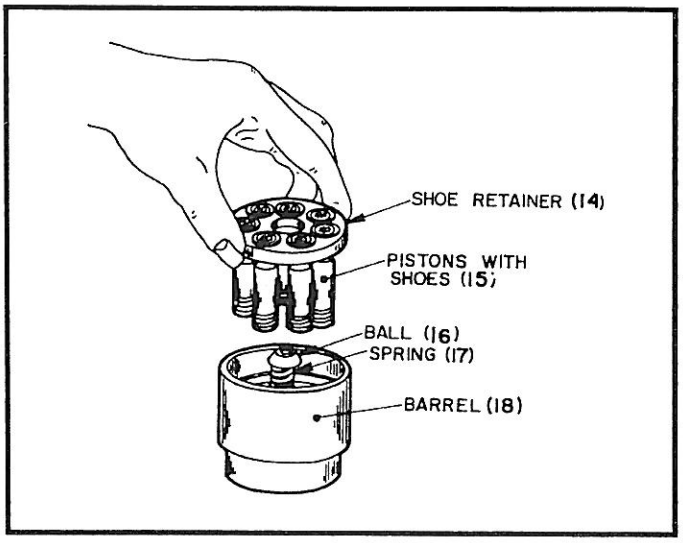

Figure 4. Rotating Group Disassembly (517474).

See Figure 4. Lift off shoe retainer (14) with piston/shoe assemblies (15), remove fulcrum ball (16) and shoe retainer spring (17).

Remove retainer ring (13) and noting the position of bearing locating pin, pull hydrodynamic cylinder bearing (12) from pump housing.

E. DRIVESHAFT GROUP

Remove drive key (2) if used and driveshaft bearing retainer ring (29). Grasp outboard end of driveshaft (1) and pull out from pump housing. Remove shaft retainer ring (4) and front driveshaft bearing (3). Remove seal retainer (6) and shaft seal (7) from housing only if necessary.

F. SWASHBLOCK GROUP

If necessary the swashblock (11) can be pulled out. The swashblock is located by pin (20) and can be pulled from the housing.

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 safety goggles could result in serious personal injury.

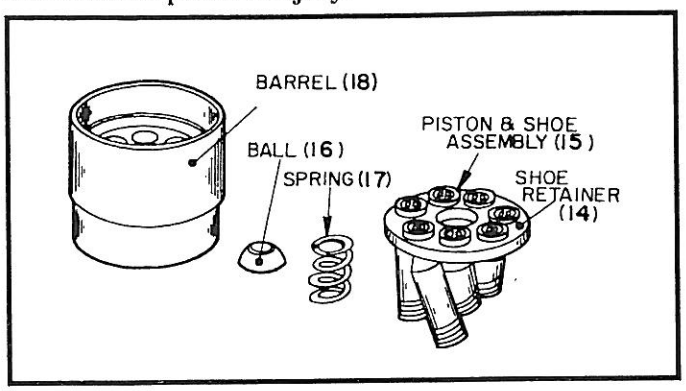

Figure 5. Rotating Group Inspection (5`7474).

A. VALVE PLATE GROUP

Inspect the valve plate (22) surface, that mates with the cylinder barrel (18), for excessive wear or scoring. Remove minor defects by lightly stoning the surface with a hard stone that is flat to within 0.001" (0.03mm). Be sure to stone lightly. Any excessive stoning will remove the hardened surface. If wear or damage is extensive, replace the valve plate (as part of Valve Plate Assembly Kit 79L or 79R) and cylinder barrel (18).

B. ROTATING GROUP

Inspect cylinder barrel (18) piston bores and the face that mates with valve plate for wear or scoring. Remove minor defects by lightly stoning the surface with a hard stone that is flat to within 0.001" (0,03mm). Be sure to stone lightly. Any excessive stoning will remove the hardened surface. If defects can not be removed by this method, replace the cylinder barrel as part of Rotating Group Kit No. 73. Inspect hydrodynamic cylinder bearing (12) and matching cylinder barrel surface for galling, pitting, roughness, damage and replace if necessary. Check all piston/shoe assemblies (15) to be sure they ride properly on the swashblock.

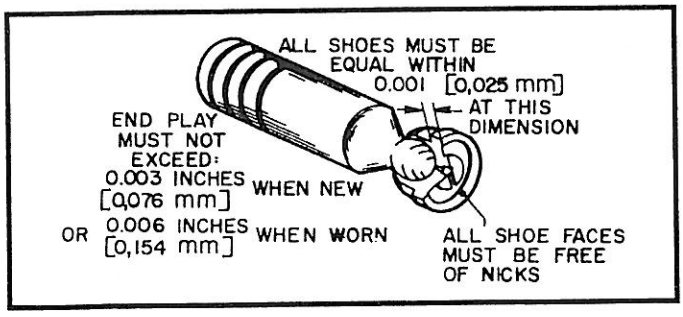

Figure 6. Piston and Shoe Inspection (517474).

See Figure 6. Piston shoes must pivot smoothly, but end play should not exceed 0.003" (0,076mm). 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 the shoe must rotate and pivot on the piston ball. Inspect each shoe face for nicks and scratches. Measure each shoe thickness [the part held between shoe retainer (14) and swashblock (11)]. All shoes must be equal within 0.001" (0,025mm). If a single piston/shoe assembly needs to be replaced, all piston/shoe assemblies must be replaced. Replace as part of Piston/Shoe Kit 87. When installing a new rotating group kit, make sure pistons are free in their bores.

C. SWASHBLOCK GROUP

Inspect the swashblock (11) for wear or scoring. If damage is extensive, replace swashblock as part of Swashblock Kit No. 82.

D. DRIVESHAFT GROUP

Check shaft seal (7) for deterioration or cracks. Replace if necessary. Examine the sealing area of the driveshaft (1) for scoring or wear. Inspect the front shaft bearing (3) for roughness, galling, pitting or binding. Check shaft and splines for wear. If driveshaft is bent, scored or worn excessively or if bearing is bad, replace as part of Shaft and Bearing Kit 74. Inspect bushing in valve plate (22). If replacement is necessary, the bushing is not available as a loose item, it is included when ordering Valve Plate Kit No. 79.

IX. ASSEMBLY

Refer to Figures 7 and 8. The procedure for assembling the pump is basically the reverse order of disassembly. During assembly install new gaskets and o'rings (Kit No. 77). Apply a thin film of CLEAN grease or hydraulic fluid to sealing components to ease assembly. If a new rotating group (Kit No. 73) is used, lubricate thoroughly with CLEAN hydraulic fluid. Apply fluid generously to all wear surfaces.

A. SWASHBLOCK GROUP

If removed, press shaft seal (7) into front of pump housing (5) and then place housing on bench with mounting flange side down. Place swashblock (11) into housing - center properly [a locating hole in the swashblock and a pin (20) in housing must match].

Position the hydrodynamic bearing (12) into the case so the pin (in the bearing) will fit (per Table 8) into corresponding slot in the housing. The bearing should fit into place with little difficulty and be square to the axis of the pump. Tap bearing into place if necessary, using extreme care to not damage the bearing. Insert retaining ring (13) to hold bearing in place.

Table 8. Hydrodynamic Bearing Locating Pin Position.

Left Hand (CCW) Pumps =	Pin at 8:00 o'clock position between swashblock and pump housing.
Right Hand (CW) Pumps =	Pin at 4:00 position between swashblock and pump housing.

B. DRIVESHAFT GROUP

Place housing on it's side with axis horizontal and then install seal retainer (6). Place front driveshaft bearing (3) onto driveshaft (1) and lock in place with shaft retaining ring (4). Lubricate shaft seal (7) and shaft, then insert driveshaft and bearing assembly into pump housing (5) and lock in place with driveshaft bearing retainer ring (29).

C. ROTATING GROUP

See previous Figure 4. Place the cylinder barrel (18), wear surface down, on a clean cloth. Place the shoe retainer spring (17)

in the center of the barrel with fulcrum ball (16) on top of it. Insert the piston/shoe assemblies (15) into the shoe retainer (14).

As a unit, fit the pistons into bores of the cylinder barrel. DO NOT FORCE. If aligned properly, the pistons will fit smoothly.

WARNING: Assistance from others and proper lifting technique is strongly recommended to prevent personal injury while assembling large size pump rotating groups into the pump.

The rotating group can now be carefully installed over the tail of the driveshaft (1) and into the pump housing (5). When installing the rotating group, support the weight of the cylinder barrel (18), as cylinder spline is passed over the tail shaft to avoid scratching or damage. Push cylinder forward until the cylinder spline reaches the driveshaft spline and rotate the cylinder or driveshaft slightly to engage shaft splines. Continue to slide cylinder forward until it encounters the hydrodynamic cylinder bearing (12). Lifting the tail shaft slightly helps cylinder barrel (18) and cylinder bearing (12) engagement. Continue pushing cylinder forward until the piston shoes contact the swashblock. At this point, the back of the cylinder should be located slightly outside the back of the pump housing.

D. VALVE and TOP PLATE GROUP

Block pump housing on bench with open end facing up. Install new o'ring (28) and gasket (21) on housing. Make sure the tail end of shaft engages bushing while positioning the valve plate (22) on pins (19) and housing. Finger tighten hex head cap screw (25) closest to o'ring (28) first and then alternately tighten other cap screws per Table 9. On thru shaft units connected to another pump or device, install coupling half.

Place top plate gasket (36) and o'ring (38) in place and fasten top plate (38) to pump case using hex. head screws (37) torqued per table 9.

Table 9. Torques.

Unit Size	Valve Plate		Control	
	Ft. lbs.	N.m	Ft. lbs.	N.m.
4, 6, 10	15	20,4	8.3	11,3
11, 15, 20	37	50,3	8.3	11,3
25, 34, 45, 60	56	76,2	16.6	22,6

SEE SECTION "I. PREPARATION and INSTALLATION".

PARTS DRAWINGS and LISTS ARE ON PAGES 10 and 11.

NOTES:

IT IS RECOMMENDED THAT SPARE OR REPLACEMENT PARTS BE ORDERED AS PART OF THE FOLLOWING KITS.

ITEM NO.	DESCRIPTION

HOUSING & PINS
Kit. No. 72

25	Housing, Pump
7	Seal, Shaft
19	Pin, Roll
20	Pin, Swashblock Locating

ROTATING GROUP
Kit No. 73

14	Retainer, Shoe
15	Assembly, Piston/Shoe
16	Ball, Fulcrum
17	Spring, Shoe Retainer
18	Barrel, Cylinder

SHAFT & BEARING
Kit No. 74

1	Driveshaft
2	Key, Driveshaft
3	Bearing, Front Driveshaft
4	Ring, Shaft Retainer
6	Retainer, Seal
29	Ring, Driveshaft Bearing Retainer

GASKET & SEAL
Kit No. 77

7	Seal, Shaft
21	Gasket, Valve Plate
23	Seal, O'ring
28	Seal, O'ring

ITEM NO.	DESCRIPTION

VALVE PLATE
Kit No. 79

21	Gasket, Valve Plate
22	Valve Plate
23	Seal, O'ring
24	Plug, S.A.E.
25	Screw, Hex Hd.
28	Seal, O'ring

SCREWS, KEY & TAG
Kit No. 80

2	Key, Driveshaft
25	Screw, Hex. Hd. Cap
26	Plate Name
27	Screw, Drive

ROTATING GROUP BEARING
Kit No. 81

12	Bearing, Cylinder Hydrodynamic

SWASHBLOCK
Kit. No. 82

11	Swashblock

O'RING SIZES
Cross Section x O.D. Duro ±5

ITEM NO.	PUMP SIZE		
	04, 06, 10	11, 15, 20	25, 34, 45, 60
11C			60 Only 0.062 x .250 - 70
23	ARP 902	ARP 902	ARP 902
28	.062 x .375 - 90	.062 x .375 - 90	* 0.062 x.375 - 90 .062 x .500 - 90
185	**	**	**

* Use on early units
** Consult factory

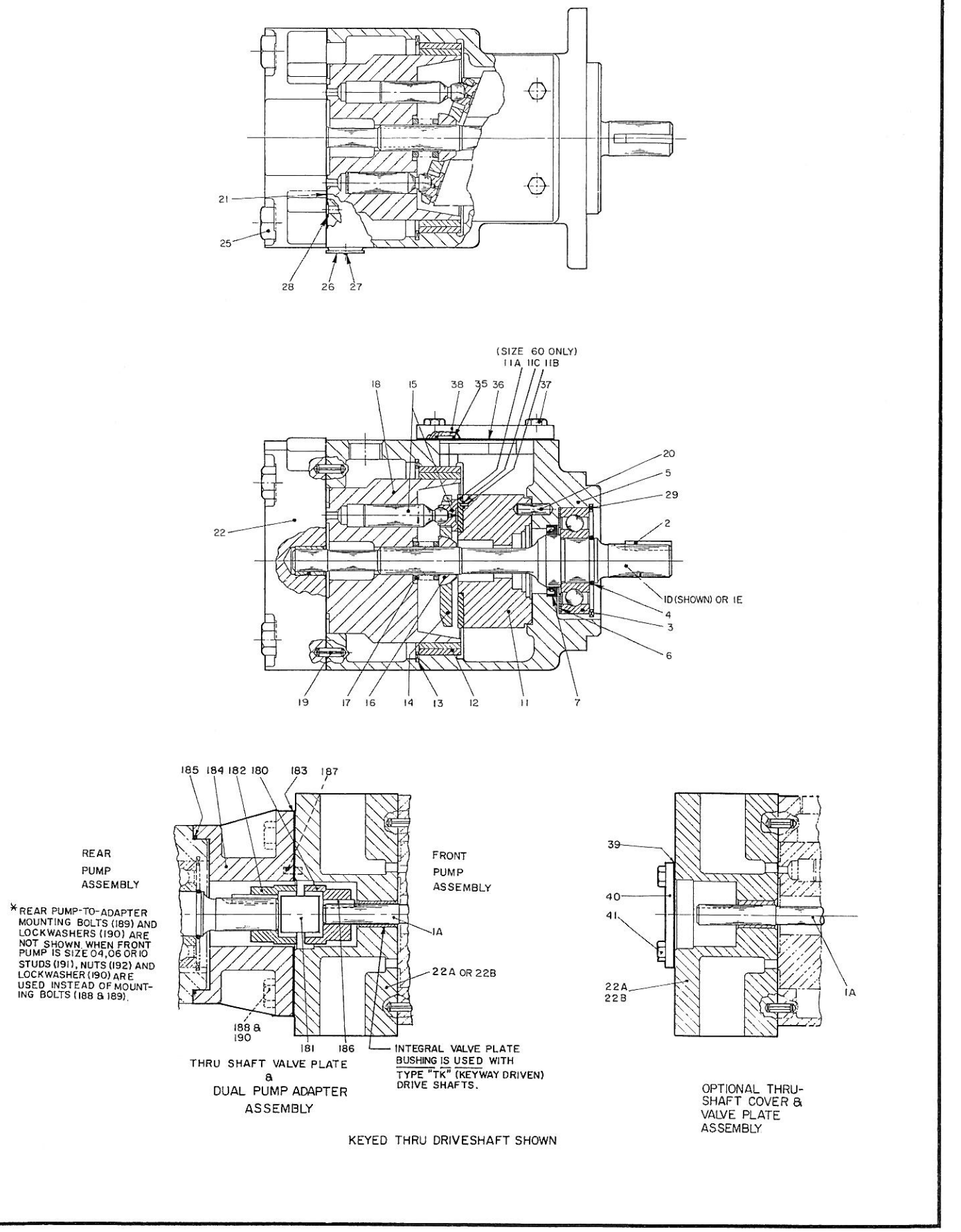

Figure 7. Parts Drawing, "PFWH", "PFWW" and "PFW" Pumps w/keyed Shafts (517474).

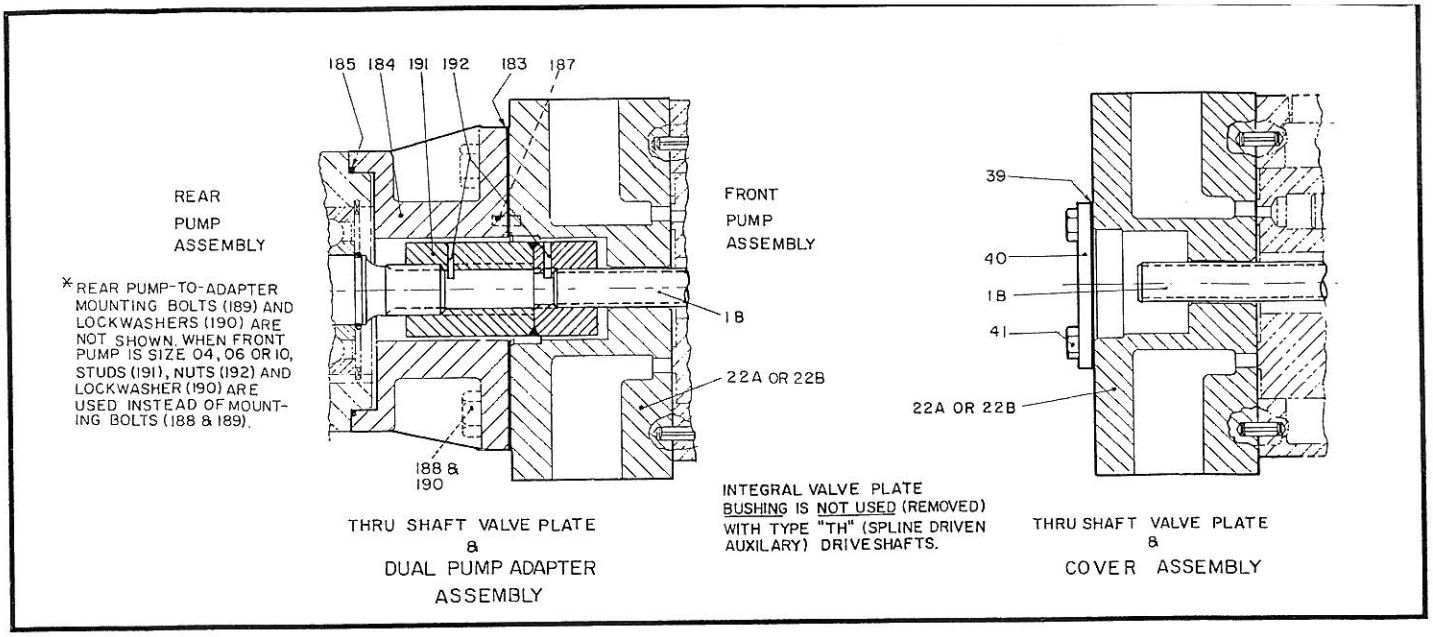

Figure 8. Parts Drawing, Driveshaft w/SAE Spline Shaft. (517474).

X. PARTS LISTS

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 and serial number. To assure seal and packing compatibility, specify type of hydraulic fluid used:

ITEM NO.	DESCRIPTION
1A	Driveshaft w/Keyway (side port)
1B	Driveshaft w/SAE Spline (side port)
1D	Driveshaft w/Keyway (rear port)
1E	Driveshaft w/SAE Spline (rear port)
2	Key, Driveshaft
3	Bearing, Front Driveshaft
4	Ring, Shaft Retainer
5	Housing, Pump
6	Retainer, Seal
7	Seal, Shaft
11	Swashblock
11A	Wearplate, Swashblock (size 60 only)
11B	Pin, Roll (size 60 PFWH only)
11C	Seal, O'ring (size 60 PFWH only)
12	Bearing, Cylinder Hydrodynamic
13	Ring, Retainer
14	Retainer, Shoe
15	Assembly, Piston/Shoe
16	Ball, Fulcrum
17	Spring, Shoe Retainer
18	Barrel, Cylinder

ITEM NO.	DESCRIPTION
19	Pin, Roll
20	Pin, Swashblock Locating
21	Gasket, Valve Plate
22A	Valve Plate, Side Port/Rear Shaft LH
22B	Valve Plate, Side Port/Rear Shaft RH
22C	Valve Plate, Rear Port/LH
22D	Valve Plate, Rear Port/RH
23	Seal, O'ring
24	Plug, SAE
25	Screw, Hex Head Cap
26	Plate, Name
27	Screw, Drive
28	Seal, O'ring
29	Ring, Driveshaft Bearing Retainer
35	Seal, O'ring
36	Gasket, Top Plate
37	Screw, Hex. Head
38	Plate, Top
39	Gasket, Rear Cover
40	Cover, Rear
41	Screw, Hex. Head. Cap

DUAL PUMP ADAPTER AND COUPLING KITS

SIZE 04, 06 & 10

ITEM NO.	DESCRIPTION
185	Seal, O'ring
*190	Lockwasher
*191	Stud
*192	Nut

*Use when 04, 06 or 10 is front pump in dual arrangement instead of bolts 188 and 189.

SIZE 11 THRU 60

ITEM NO.	DESCRIPTION
180	Coupling, Front
181	Key, Coupling
182	Coupling, Rear
183	Gasket, Adapter
184	Adapter
185	Seal, O'ring
186	Key, Coupling
187	Pin, Roll
188	Screw, Hex. Hd. Cap
189	Screw, Hex. Hd. Cap (not shown)
190	Lockwasher (not shown)
191	Coupling, Spline
192	Pin, Roll

XI. AFTER SALES SERVICES

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 personal. 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
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BULLETIN 946015

Litho in USA