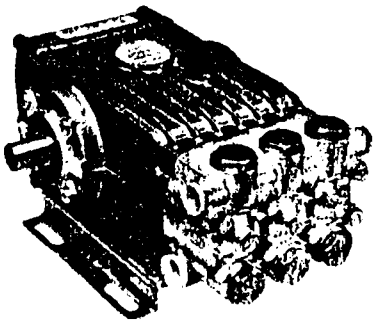
(Obsolete)



CAT PUMPS CORPORATION

Models 600 and 630
OPERATING INSTRUCTIONS

CAUTION: CAT PUMPS are positive displacement pumps. Therefore, a properly designed pressure relief mechanism MUST be installed in the discharge piping. Failure to install such relief mechanism could result in personal injury or damage to the pump or system. Cat Pumps Corporation does not assume any liability or responsibility for the operation of a customer's high pressure system.

SPECIFICATIONS

	MODEL 600		MODEL 630	
	U.S. Measure	Metric	U.S. Measure	Metric
VOLUME	Up to 6 GPM	(22.7 L/Min)	Up to 5 GPM	(19.0 L/Min)
DISCHARGE PRESSURE	Up to 1500 PSI	(100 BAR)	Up to 2400 PSI	(168 BAR)
INLET PRESSURE	Flooded to 110 PSI	(7 BAR)	Flooded to 110 PSI	(7 BAR)
RPM	Max. 1090 RPM	(1090 RPM)	Max. 1050 RPM	(1050 RPM)
CRANKCASE CAPACITY	40 OZ.	(1.2 L)	42 OZ.	(1.25 L)
MAXIMUM FLUID TEMPERATURE	160°F	(71°C)	160°F	(71°C)
INLET PORTS	1/2 In. NPT	(1/2 In. NPT)	1/2 In. NPT	(1/2 In. NPT)
DISCHARGE PORTS	3/8 In. NPT	(3/8 In. NPT)	3/8 In. NPT	(3/8 In. NPT)
PULLEY MOUNTING	Either Side	Either Side	Either Side	Either Side
SHAFT DIAMETER	0.94 In.	(24 mm)	0.94 In.	(24 mm)
WEIGHT: Without Pulley & Mounting Rails	31 LBS.	(14 kg)	32 LBS.	(14.5 kg)

CAT PUMP WARRANTY

This Cat Pump ("product") is warranted by the manufacturer to be free from defects in workmanship and material for one year from date of manufacturer's shipment. This warranty is limited to repairing or replacing products which manufacturer's investigation shows were defective at the time of shipment by the manufacturer. All products subject to this warranty shall be returned F.O.B. Cat Pumps Corp., Minneapolis, Minnesota 55430, U.S.A. for examination, repair or replacement.

The express warranty set forth herein is in lieu of all other warranties, express or implied, including without limitation any warranties of merchantability or fitness for a particular purpose and all such warranties are hereby disclaimed and excluded by the manufacturer. Repair or replacement of defective products as provided above is the sole and exclusive remedy provided hereunder and the manufacturer shall not be liable for any further loss, damages or expenses, including incidental or consequential damages, directly or indirectly arising from the sale or use of this product.

This warranty is subject to the following warranty conditions:

IMPORTANT CONDITIONS

LUBRICATION — Fill crankcase to dot on oil gauge window with (40 oz. — 1.2 L) (42 oz. — 1.25 L) of Cat Pump Crankcase Oil or equivalent SAE 40 weight hydraulic oil with antiwear and rust inhibitor additives. Change initial fill after 50 hour run-in period. Change oil every 3 months or at 500 hour intervals.

GOOD LUBRICATION IS THE EASIEST, MOST EFFICIENT AND LEAST EXPENSIVE OF PREVENTATIVE MAINTENANCE.

RPM and PRESSURE — Pump operation must be within RPM and pressure specifications. Pressure relief valve must be installed.

DO NOT PUMP ACIDS OR ABRASIVE FLUIDS with this unit! Contact Cat Pumps for additional information on questionable fluids.

FREEZING CONDITIONS — Pump must be protected from freezing conditions.

USE OF OTHER THAN CAT PUMP PARTS OR THEIR EQUIVALENT VOIDS THE WARRANTY

CAT PUMPS CORPORATION
1600 FREEWAY BOULEVARD N. MINNEAPOLIS, MN 55430
Phone (612) 566-1212 • Telex 29-0276

N.V. CAT PUMPS INTERNATIONAL S.A.
Harmoniestraat 29
B 2000 Antwerp Belgium

CAT PUMPS — A.G.
Loretonohe 5
CH-6300 ZUG Switzerland

CAT PUMPS DEUTCHLAND GmbH
Rostocker Strasse 9
6200 Wiesbaden Bierstadt
West Germany

CAT PUMPS (U.K.) LTD
17A Kings Road, Fleet
Hampshire GU13 9AA
England

Distributed By:

PARTS LIST

Models 600 and 630

MARCH 1980

ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	33290	Hex Cap Bolt	8
2	33010	Manifold Head	1
3	33401	O-ring, Valve Assembly	6
8	33400	O-ring, Valve Cover	6
9	33240	Hex Valve Cover	6
10	33300	Valve Assembly	6
11	33330	Screw (M8x16)	8
12	33050	Bearing Case	2
13	33390	O-ring, Bearing Case	2
14	33100	Oil Seal, Crankshaft	2
15	33080	Bearing, Crankshaft	2
16	33001	Crankcase	1
17	33231	Filler Plug	1
18	33380	Gasket, Crankcase Cover	1
19	33030	Crankshaft (600)	1
	33031	Crankshaft (630)	1
20	33450	Piston Pin Retainer	3
21	33320	Key	1
22	33310	Piston Pin	3
23	33060	Piston Rod (600)	3
	33061	Piston Rod (630)	3
24	33070	Connecting Rod Assembly	3
26	33340	Screw (M6x20) (600)	4
	33341	Screw (M6x40) (630)	4
27	33040	Crankcase Cover (600)	1
	33041	Crankcase Cover (630)	1
28	33220	Oil Gauge	1
30	33440	Barrier Slinger	3

ITEM NO.	PART NO.	DESCRIPTION	QTY.
31	33113	Ceramic Plunger (630)	3
	33114	Ceramic Plunger (600)	3
32	33455	Back-up-ring	3
33	33410	O-ring, Piston Rod	3
34	33281	Plunger Bolt, S.S.	3
35	33370	Shaft Protector	3
36	33081	Bearing Shim	2
37	33270	Drain Plug	1
38	33090	Sleeve	3
39	33020	Mounting Rail	2
40	33210	Oil Seal, Crankcase	3
41	33420	Washer	4
42	33350	Screw (M10x18)	4
43	33411	O-ring, Main Seal Retainer	3
44	33140	Main Seal Retainer (630)	3
	33141	Main Seal Retainer (600)	3
45	33171	V-packing (600)	6
	33172	V-packing (630)	6
46	33160	Intermediate Seal Retainer (600)	3
	33161	Intermediate Seal Retainer (630)	3
47	33133	Mail Adapter (630)	6
	33134	Male Adapter (600)	6
48	33250	Drain Plug	1
49	33200	Washer	1
50	33260	Drain Plug	1
51	33201	Washer	1
52	33430	Washer	8
—	33000	Hub (M24)	1

IMPORTANT INLET INFORMATION

The Model 600 and 630 are designed to have an adequate supply of water to it. The pump will operate with a flooded suction, i.e. a positive "head" of fluid at the inlet port. If the pump is fed from a gravity tank, the top level of the fluid must be above the level of the inlet port. The inlet port of the pump is 1/2". We recommended 3/4" piping from the tank to the inlet port.

If the pump is being fed from a city water supply or some other pressure source, **be certain pressures will not exceed 110 PSI to the pump.** Inlet pressures in excess of 110 PSI can cause stress to the rear v-packing, this could result in short v-packing life and/or leaking from the pump.

Priming the Pump

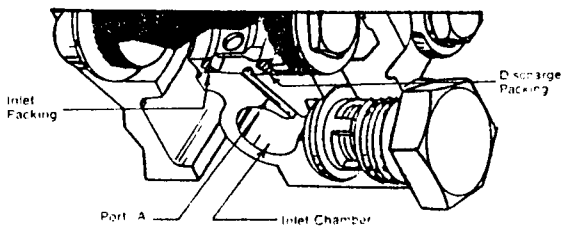
The design of the pump is such that with flooded suction or pressure feeding, the pump will purge itself of air. No further priming is necessary.

HOW CAT PUMPS "WET V-PACKING" DESIGN HELPS ELIMINATE LEAKAGE AND EXTENDS PACKING LIFE.

Note Port "A" leading from inlet chamber to cavity between discharge and inlet V-Packings:

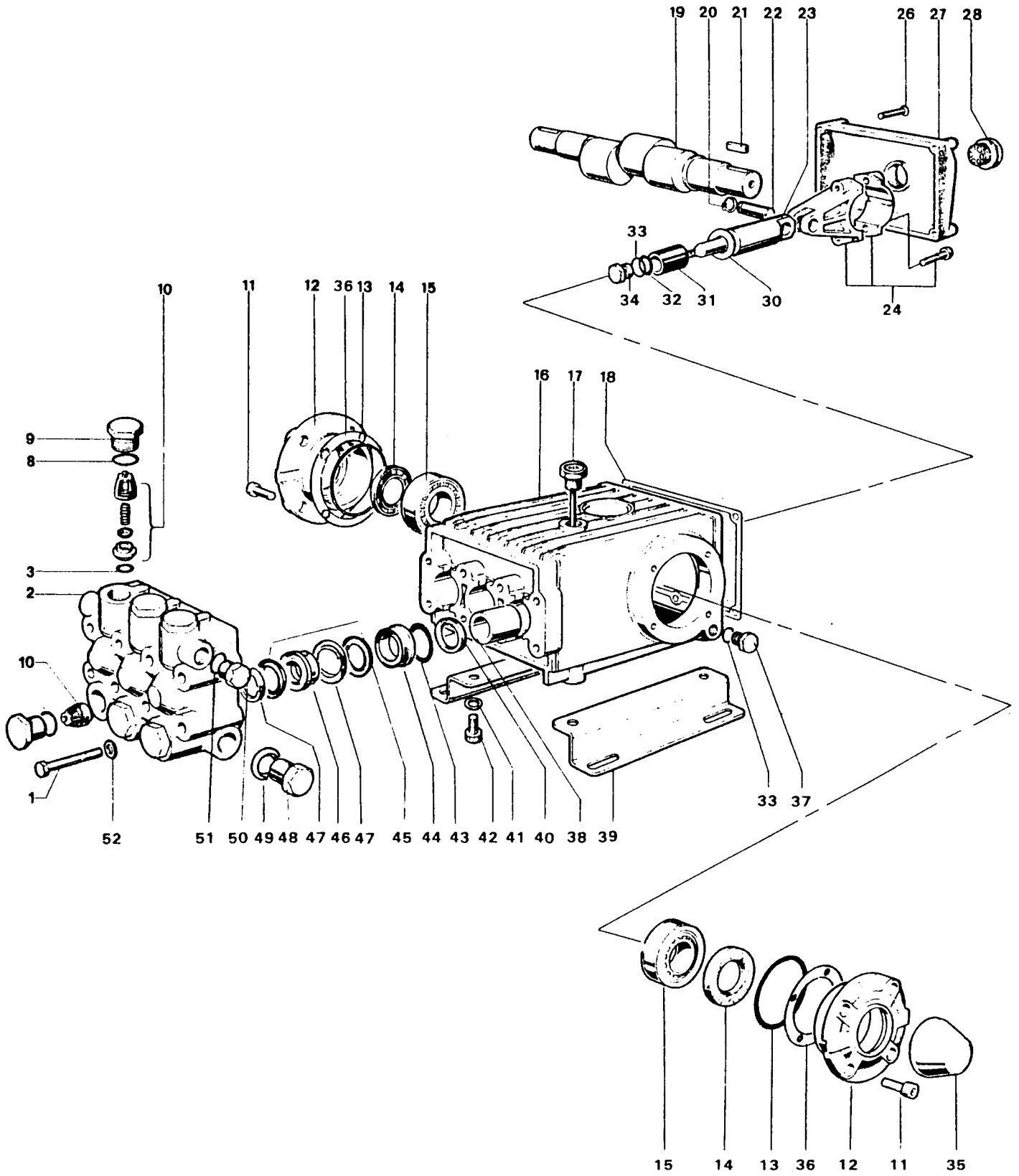
When pump is operating, fluid from the inlet chamber passes *up* port (A) to lubricate and cool both inlet and discharge V-Packings. . . giving better packing life.

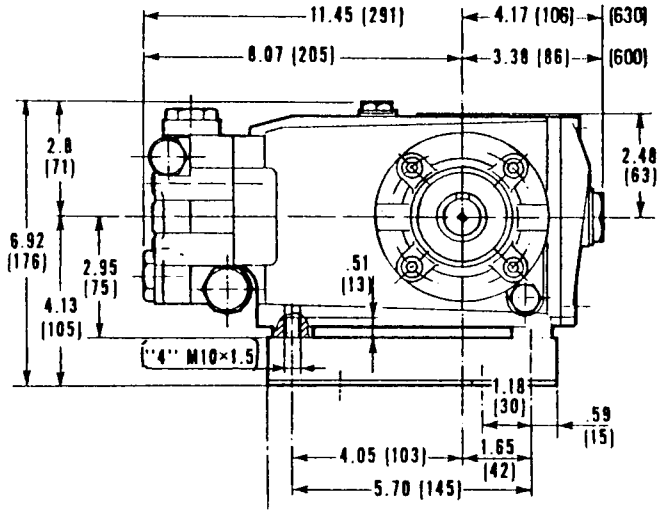
As the discharge packing wears and allows some fluid to leak, this fluid will flow *down* port (A) and back into the inlet chamber. . . minimizing external leakage.

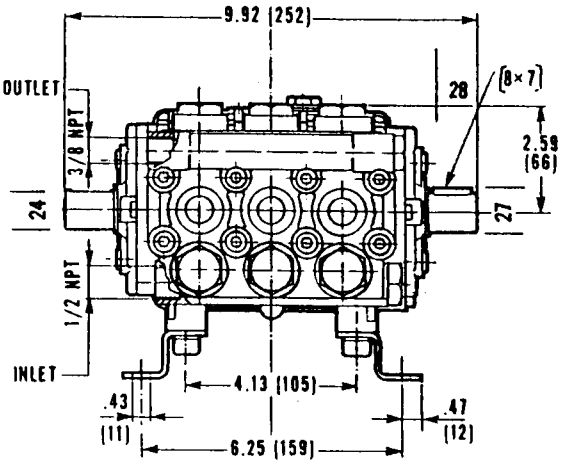


EXPLODED VIEW
Models 600 and 630

MARCH 1980







HORSEPOWER REQUIREMENTS									PULLEY SELECTION USING 9.75" PUMP PULLEY	
FLOW		PRESSURE								
		400 PSI	600 PSI	800 PSI	1000 PSI	1200 PSI	1400 PSI	1500 PSI	RPM	MOTOR PULLEY O.D.
GPM	L/M	30 BAR	40 BAR	55 BAR	70 BAR	80 BAR	95 BAR	100 BAR	600	600
6	24	1.6	2.5	3.3	4.1	4.9	N/A	N/A	1090	6.2
5	20	1.4	2.1	2.7	3.4	4.1	4.8	N/A	908	5.1
4	14	1.1	1.6	2.2	2.7	3.3	3.8	4.1	725	4.1
3	12	.8	1.2	1.6	2.1	2.5	2.9	3.1	543	3.1
2	8	.6	.8	1.1	1.4	1.5	1.9	2.1	362	2.0
1	4	.3	.4	.5	.7	.8	1.0	1.2	181	1.0

HORSEPOWER REQUIREMENTS									PULLEY SELECTION USING 9.75" PUMP PULLEY	
FLOW		PRESSURE								
		400 PSI	600 PSI	800 PSI	1000 PSI	1200 PSI	1400 PSI	1500 PSI	RPM	MOTOR PULLEY O.D.
GPM	L/M	30 BAR	40 BAR	55 BAR	70 BAR	80 BAR	95 BAR	100 BAR	600	600
5	20	1.4	2.7	4.1	5.5	6.9	N/A	N/A	1050	5.9
4	14	1.1	2.2	3.3	4.4	5.5	6.0	N/A	840	4.7
3	12	.8	1.6	2.5	3.3	4.1	4.5	4.9	630	3.6
2	8	.6	1.1	1.6	2.2	2.7	3.0	3.3	420	2.4
1	4	.3	.5	.8	1.1	1.4	1.5	1.6	210	1.2

Pump speed and pump output in gallons per minute as tabulated is based upon a 1725 RPM drive motor. Select motor pulley size to provide GPM of the approximate pump output desired.

Pump RPM and GPM output are approximate values due to variations in pulleys, belts and motors between manufacturers and a ±5% pump output tolerance.

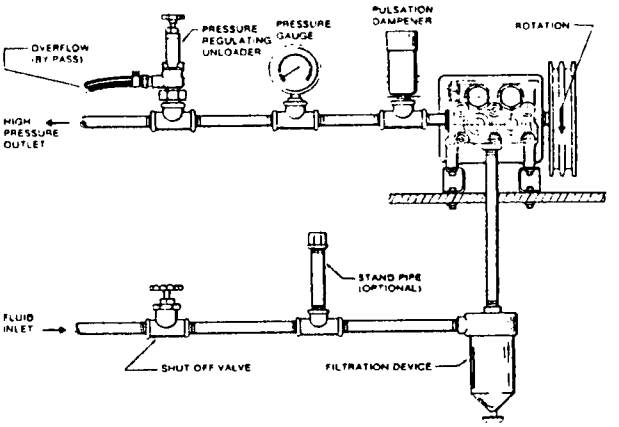
Horsepower figures shown are for electric motor only. For gas engine requirements, follow engine manufacturer's recommendations. In general, use a gas engine with approximately double the electric motor horsepower.

"TYPICAL" INSTALLATION

The illustration at the right shows the basic elements for the proper installation of a high-pressure pump. Each component offers potential problems that too often are ascribed to a perfectly functioning pump. A clogged strainer, a partially closed shut-off valve or a faulty pressure gauge or pressure regulating unloader may be the source of trouble.

Proper system installation, routine lubrication and monitoring of components are your best guarantees of optimum pump performance. These precautions will eliminate most problems, minimize corrective maintenance, and give many, many added hours of trouble free operation.

Cat Pumps Corporation in no way assumes responsibility/liability for the operation of a customer's high pressure system.



GENERAL INFORMATION

INTERPRETING PRESSURE READINGS: Pressure readings that differ from the rated PSI or those normal for a particular set-up indicate a problem, *but not necessarily a pump problem!*

Before any servicing of the pump, carefully check the following: inlet plumbing for size, restriction and/or air leaks, restricted or worn orifice and condition of the by-pass valve and pressure gauge. Check any shut-off valves in the inlet or discharge plumbing to be sure they are fully open. Seven out of ten problems are other than pump problems!

FOR SERVICE contact your local representative or look in the Yellow Pages under **PUMPS.**

ORDERING OF PARTS: When ordering parts, be sure to give the "model number" and "serial number" of the pump in addition to the "part number", "description", and "quantity" of the items desired.

MATERIAL RETURNS: If necessary to return a Cat Pump, please secure an approved "RETURN GOODS AUTHORIZATION" form from Cat Pumps Corporation and complete a "PRODUCT REPORT" form detailing the application and the conditions of operation. Any material AUTHORIZED for return must be shipped FREIGHT PREPAID.

FILTER INSPECTION: A frequent source of low pressure is due to foreign matter in the fluid being pumped. It takes but one small particle to partially hold open a valve – several to plug an inlet screen or filter, or if the particles are abrasive, to damage cups, valves, valve seats, or cylinder walls.

Inspect filters and screens on a schedule commensurate with the material being pumped and whenever a low pressure problem develops.

NOZZLES: A worn nozzle will result in loss of pressure.

LEAKAGE: The *Quiet Cat's* unique design eliminates most leakage problems associated with plunger-type pumps. However, slight leakage may occur and does not indicate a malfunction or component failure.

INSTALLATION

Optimum performance of the pump is dependent upon the entire fluid system and will be obtained only with the proper selection and installation of plumbing and accessories.

Lubrication: Fill the crankcase with oil as described under warranty conditions.

Pulley Selection: Select size of motor pulley required to deliver the desired volume from Horse Power Requirement and Motor Pulley Chart.

Motor Selection: The motor or engine driving the pump must be of adequate horsepower to maintain full RPM when the pump is under load. Select a motor size from the Horse Power Requirement Chart according to required pump discharge volume and maximum pressure *at the pump!*

Mount the pump on a rigid, horizontal surface in a manner to permit drainage of crankcase oil. An uneven mounting surface will cause extensive damage to the pump base. Use the correct belt; make sure pulleys are aligned. Excessive belt tension is harmful to the main bearings of the pump crankshaft.

Inlet Plumbing must be at least 1/2" (preferably 3/4"), to the manifold. Restrictions in the inlet plumbing will cause cavitation in the pump, drastically reducing packing life. All joints must be air tight.

Inlet Pressure: Optimum performance is obtained with + 20 PSI inlet pressure. With adequate size inlet plumbing, the pump will perform very satisfactorily with flooded suction. The pump can operate with inlet pressures up to 110 PSI. Use of excessive pressure will void the warranty.

Note: Operating the pump with "negative" suction conditions will cause the pump to cavitate, reducing the life of packings significantly.

Inlet Accessories: Install an inlet strainer of twice the rated capacity of the pump.

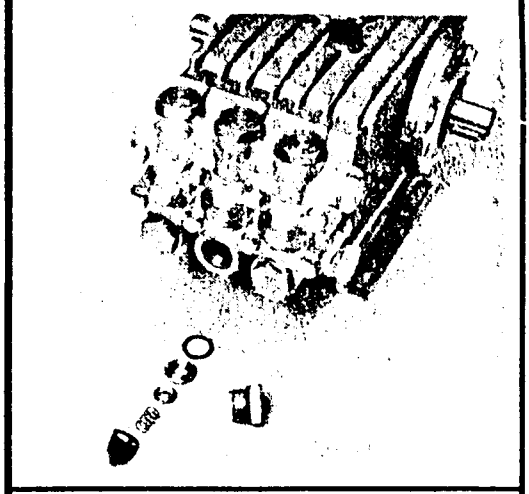
A stand pipe to help maintain a positive pressure head in the inlet line is desirable.

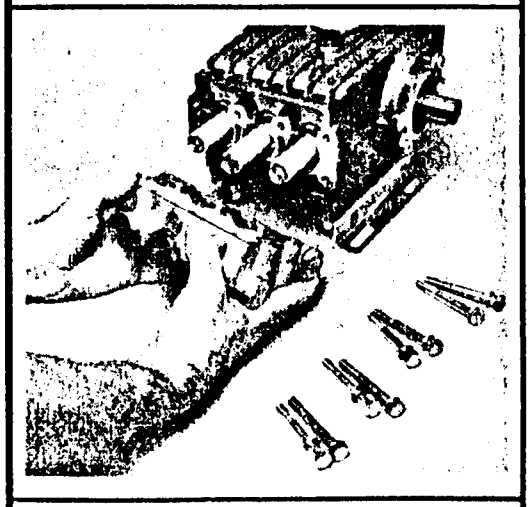
A shut-off valve is recommended to facilitate maintenance.

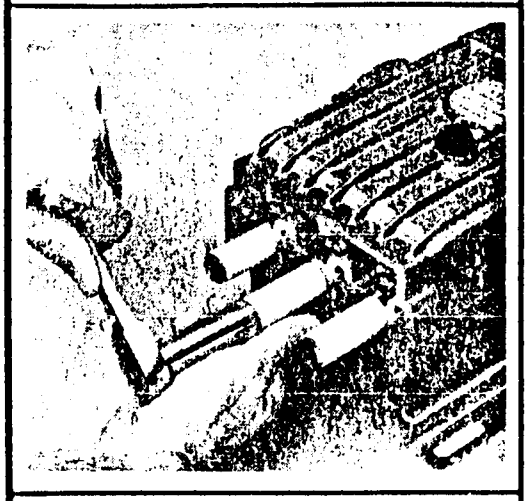
Discharge Plumbing: *Install a pulsation dampening device* mounted directly to the discharge line precharged to a pressure calibrated for operating conditions.

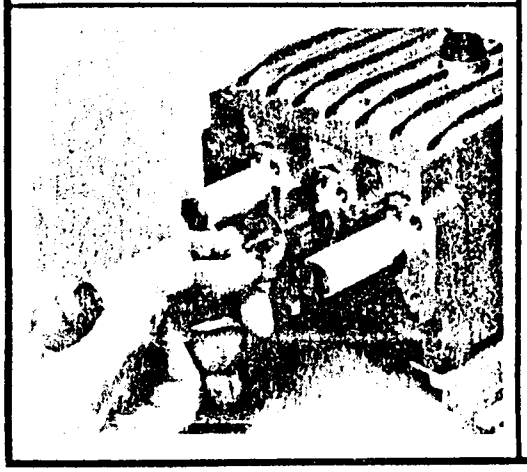
A reliable pressure gauge should be installed near the discharge outlet of the high pressure manifold. This is extremely important for adjusting pressure regulating devices and also for proper sizing of the nozzle or restricting orifice. The pump is rated for a maximum pressure; this is the pressure which would be read at the discharge manifold of the pump, not at the gun or nozzle end of a long hose.

A pressure regulating relief valve or unloader must be installed to prevent over-pressure in the event the discharge or downstream plumbing becomes plugged or is turned off. Severe damage to the pump will result if this condition occurs without a relief valve in the line. CAUTION: *Failure to install such a valve will void the warranty on the pump.*









SERVICING MODELS 600 AND 630

PHOTO 1
THE VALVE ASSEMBLIES

1) All inlet and discharge valves can be serviced without disrupting any inlet or discharge piping. The parts for inlet and discharge valves are the same.
2) To service any valve, remove the hex plug using a M27 wrench.
3) Examine o-ring gasket and replace if any evidence of cuts or distortion.
4) Remove valve assembly (retainer, spring, valve, valve seat) from valve cavity.
5) Remove o-ring from valve cavity.
6) A valve repair kit is used to repair each valve. Kit includes new o-ring, valve seat, valve, spring and retainer.
7) Install new o-ring in valve cavity.
8) Assemble valve seat, valve, valve spring and retainer.
9) Insert assembly into valve cavity.
10) Replace valve cover and torque to 75 to 80 foot pounds.

PHOTO 2
REMOVING MANIFOLD HEAD

1) Remove the eight M13 cap bolts from the head.
2) Separate head from crankcase.
   NOTE: It may be necessary to tap head lightly with rawhide mallet to loosen.
   CAUTION: When sliding head from crankcase, use caution not to damage plungers.
3) V-packings, Retainers and adapters will come off with the head. At this point, examine plungers. Plunger surfaces should be smooth and free from scoring or pitting; if not, replace.
4) Reinstall manifold head and torque per sequence described below.

TORQUE SEQUENCE FOR TIGHTENING HEAD

Install all eight 13 mm cap bolts fingertight. Torque all cap bolts to 10 foot pounds in sequence as shown, then torque to 20 foot pounds, again in sequence shown. Follow this procedure when reinstalling the Manifold Head.

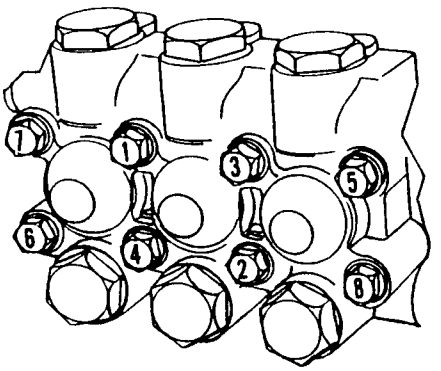
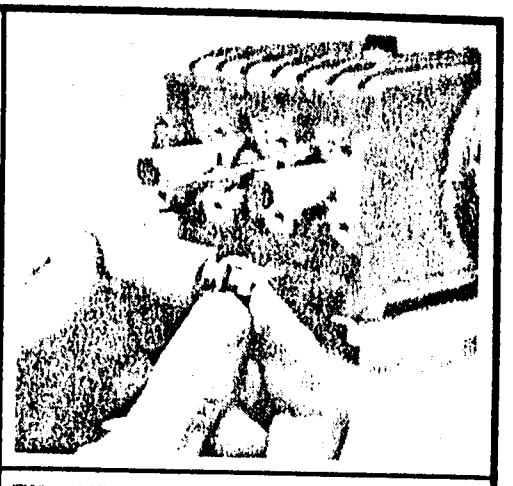


PHOTO 3, 4 and 5
REPLACING PLUNGERS

1) Using a M17 wrench, remove bronze plunger retainer and plunger from piston rod.
2) Remove o-ring from groove in piston rod.
3) If barrier slinger comes off with plunger, be certain this is replaced before new plunger is installed.
4) Separate plunger retainer from plunger.
5) Install new o-ring and re-install teflon backup-ring on plunger retainer.
6) Install new o-ring in groove on piston rod.

   NOTE: A small dab of grease on the outside diameter of the o-rings insures a better installation.

7) Carefully press plunger retainer into new plunger.
8) Slide new plunger over the piston rod and torque to 30 to 35 foot pounds.



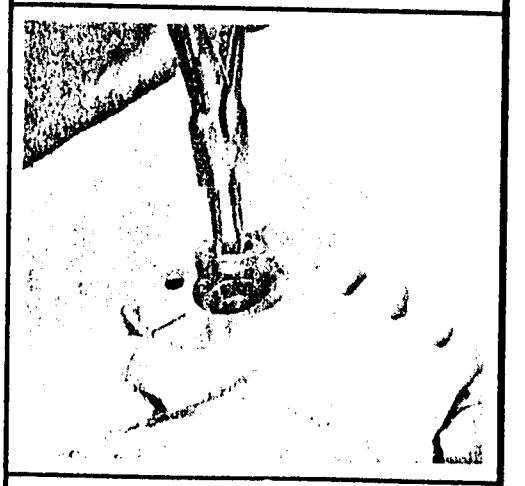
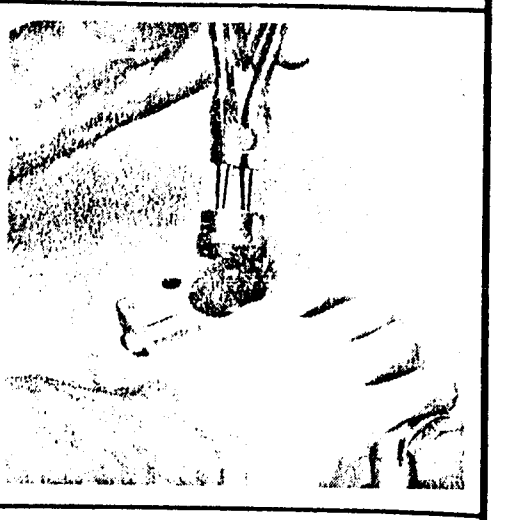
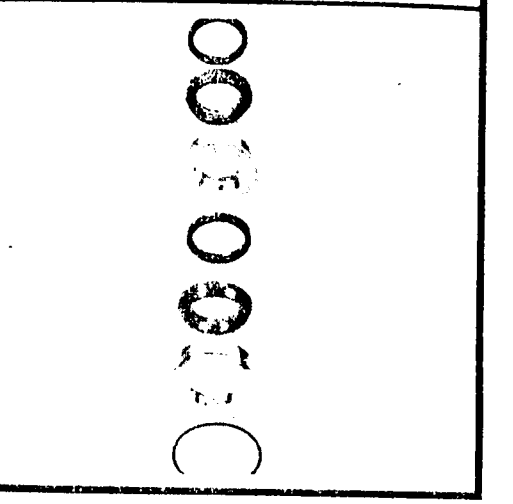


PHOTO 6, 7, and 8
REPLACING V-PACKINGS

1) From crankcase side of manifold head, remove main seal retainer and rear v-packing. This is best done with a hook-shaped tool. Gently hook the edge of the v-packing or adapter and lift out.
2) Using same tool lift out male adapter and intermediate retainer.
3) Front male adapter and v-packing should be removed next.
4) Examine adapters and v-packings for wear and replace as needed.
5) Install new parts: First front male adapter.
6) Coat front v-packing with thin film of grease and insert into cavity.
7) Firmly press intermediate seal retainer into v-packing.
8) Next press rear male adapter and rear v-packing into cavity.
9) Replace main seal retainer.
10) Coat each plunger with thin film of grease and carefully slide manifold head onto crankcase.
11) Reinstall eight cap bolts and torque to ten foot pounds. Then torque to 20 foot pounds as described in torque sequence drawing.





DIAGNOSIS AND MAINTENANCE

PROBLEM	PROBABLE CAUSE	SOLUTION
Pulsation	Faulty Pulsation Dampner	Check precharge; if low, recharge it or install a new one
Low Pressure	Worn nozzle	Replace nozzle, of proper size
	Belt slippage	Tighten or replace; use correct belt
	Air leak in inlet plumbing	Disassemble, reseal, and reassemble
	Pressure gauge inoperative or not registering accurately	Check with new gauge; replace worn or damaged gauge. P.N. 06090
	Relief valve stuck, partially plugged or improperly adjusted; valve seat worn	Clean, and adjust relief valve; check for worn and dirty valve seats. Kit available.
	Inlet suction strainer clogged or improper size.	Clean. Use adequate size. Check more frequently.
	Worn packing. Abrasives in pumped fluid or severe cavitation. Inadequate water supply.	Install proper filter. Check flow available to pump.
	Fouled or dirty inlet or dishcarge valves	Clean inlet and discharge valve assemblies.
	Worn inlet or discharge valves	Replace worn valves, valve seats and/or dishcarge hose.
	Leaky discharge hose	
Pump runs extremely rough, pressure low	Restricted inlet or air entering the inlet plumbing	Proper size inlet plumbing; check for air tight seal
	Inlet restrictions and/or air leaks. Stuck inlet or discharge valve.	Clean out foreign material, replace worn valves
	Leaking H.P. seals	Replace seals
Water leakage from under the manifold *Slight leakage	Worn packing	Install new packing
Oil leak between crankcase and pumping section	Worn crankcase piston rod seals	Replace crankcase piston rod seals
Oil leaking in the area of crankshaft	Worn crankshaft seal or improperly installed oil seal retainer O-ring	Remove oil seal retainer and replace damaged O-ring and/or seals
	Bad bearing	Replace bearing

PROBLEM	PROBABLE CAUSE	SOLUTION
Excessive play in the end of the crankshaft pulley	Worn main bearing from excessive tension on drive belt.	Replace bearing. Properly tension belt.
Water in crankcase	May be caused by humid air condensing into water inside the crankcase	Change oil at 3 month or 500 hour intervals using Cat Pump Crankcase Oil (other approved oil every month or 200 hours) P.N. 06100.
	Leakage of packing seals	Replace packing
Oil leaking from underside of crankcase	Worn crankcase seals	Replace seal
Oil leaking at the rear portion of the crankcase	Damaged or improperly installed oil gauge or crankcase rear cover O-ring, and drain plug O-ring	Replace oil gauge or cover O-ring, and drain plug O-ring
Oil leakage from drain plug	Loose drain plug or worn drain plug O-ring	Tighten drain plug or replace O-ring
Loud knocking noise in pump	Pulley loose on crankshaft	Check key and tighten set screw.
	Broken or worn bearing	Replace bearings
Frequent or premature failure of the packing	Scored plungers	Replace plungers.
	Over pressure to inlet manifold	Reduce inlet pressure per instructions
	Damaged or worn plungers	Replace plungers
	Abrasive material in the fluid being pumped	Install proper filtration on pump inlet plumbing
	Excessive pressure and/or temperature of fluid being pumped	Check pressures and fluid inlet temperature; be sure they are within specified range.
	Over pressure of pumps	Reduce pressure
	Running pump dry	Do not run pump without water
Strong surging at the inlet and low pressure on the discharge side	Foreign particles in the inlet or discharge valve or worn inlet and/or discharge valves	Check for smooth lap surfaces on inlet and discharge valve seats. Discharge valve seats and inlet valve seats may be lapped on a very fine oil stone

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019 - - 06/80

SUBJECT: MODEL 600 & 630 MANIFOLD CHANGES

The Model 600 and Model 630 have been produced with two versions of manifolds. While all the wear parts on the pumps are interchangeable for the two versions, there are three parts, including the manifolds, that are not. The following is a list of the part numbers for each version.

Part Name	Catalog Item #		VERSION "A" Mod. 600 Part No.	VERSION "A" Mod. 630 Part No.	VERSION "B" Mod. 600 Part No.	VERSION "B" Mod. 630 Part No.
Manifold	2**	2*	33010	33010	33011	33011
V-Packing Spacer	42	46	33151	33152	33161	33160
Main Seal Retainer	43	44	33191	33192	33141	33140

*Refers to March 1980 drawing
**Refers to November 1978 drawing

Version "A" manifold can be identified by a 1-1/2 inch diameter counterbore 1/16 inch deep. The Version "B" manifold has a 1-9/16 inch counterbore 5/8 inch deep. All Version "A" manifolds have P.N. 47.1200.41 forged in center area of discharge valve. Most Version "B" manifolds have a 47.1201.41 although a few of the earlier units of Version "B" had the 47.1200.41 forged in.

If it is necessary to replace a manifold on the "A" version models, we recommend that the pump be converted to a "B" version. To do this, order P.N. 33011 manifold plus the following:

Quantity	Part Name	Model 600	Model 630
3	V-Packing Spacer	33161	33160
3	Main Seal Retainer	33141	33140
3	O-Ring	33411	33411

Parts for both versions will be available. However, when ordering replacement parts, be sure that part numbers match your particular package version. This will avoid delays in matching components.

Claude Myers
Claude B. Myers

CBM/rh