

# MODEL 10

## OPERATING INSTRUCTIONS

MODEL	FLOW	PRESSURE	SHAFT
10.002,	2 GPM	500 PSI	Hollow
10.003	3 GPM	500 PSI	Hollow
10.005	3 GPM	500 PSI	Solid
10.006	1.3 GPM	500 PSI	Hollow
10.007	1.6 GPM	500 PSI	Hollow
10.010	2 GPM w/injector	500 PSI	Hollow
10.015	3 GPM w/injector	500 PSI	Hollow

**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

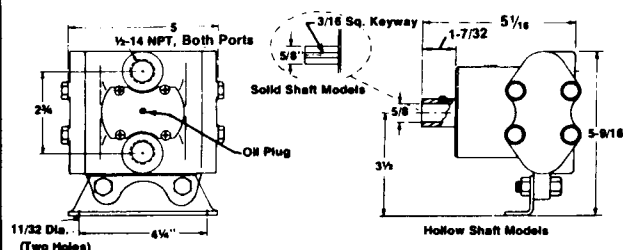
	2 GPM	3 GPM
Inlet Pressure	- 2 to 60	- 2 to 60
R.P.M.	1800 RPM	1800 RPM
Bore	1"	1"
Stroke	.20"	.26"
Max. Temperature	160°F	160°F
Inlet Port	1/2"	1/2"
Discharge Port	1/2"	1/2"
Weight (carton of 4)	48 lbs.	48 lbs.

### WARRANTY

**WARRANTY:** CAT PUMPS CORPORATION (hereafter called the Corporation) warrants that the goods sold hereunder will be free from defects in materials and workmanship for 90 days from the date of original shipment to the buyer. It is expressly agreed that the Corporation's liability hereunder shall in no event exceed the purchase price paid for any defective goods, and the Corporation's sole obligation, and the buyer's exclusive remedy, shall be limited, at the Corporation's election, to the Corporation's repairing, replacing, or refunding the purchase price paid for the defective goods. In no event shall the Corporation be liable for any damages, including but not limited to loss of use and loss of profits, caused by any defects in the goods sold hereunder, whether such damages occur, or are discovered, before or after repair or replacement. Moreover, all warranty claims are subject to inspection at CAT Pumps facilities in Minneapolis, Minnesota. If goods returned for inspection have been disassembled or otherwise tampered with, all warranty commitments by the Corporation shall be null and void.

No agent, employees, or representative of CAT Pumps has any authority to bind the Corporation to any affirmation, representation, or warranty concerning the goods sold hereunder, and unless an affirmation, representation, or warranty made by an agent, employee, or representative is specifically included in writing within these Conditions of Purchase, it shall not be enforceable by the buyer. In addition, IT IS EXPRESSLY AGREED THAT THE WARRANTY CONTAINED HEREIN SHALL BE THE EXCLUSIVE AND ONLY WARRANTY TO PASS WITH THE GOODS SOLD HEREUNDER AND SAID WARRANTY SHALL BE IN LIEU OF ALL WARRANTIES OF MERCHANTABILITY AND FITNESS.

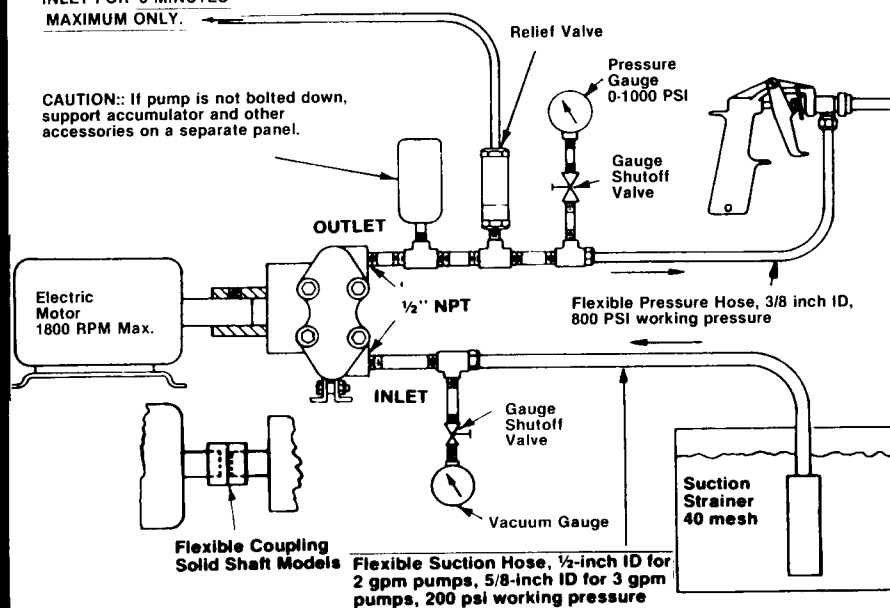
### DIMENSIONAL DRAWING



### TYPICAL INSTALLATION

Note: Fluid may be returned to reservoir, drain, OR PUMP INLET FOR 3 MINUTES MAXIMUM ONLY.

CAUTION: If pump is not bolted down, support accumulator and other accessories on a separate panel.



### HORSEPOWER

### REQUIREMENTS

#### MODEL 10

PSI	100	200	300	400	500
GPM					
3.0	.29	.58	.87	1.17	1.46
2.5	.24	.49	.73	.97	1.22
2.0	.19	.39	.58	.78	.97
1.5	.15	.29	.44	.58	.73
1.0	.11	.19	.29	.39	.49

## Before Installation

1. Leave plastic port plugs in place until ready to connect lines.
2. Check lube level to make sure it is even with the lube inspection plug when the pump is horizontal. Add lubricant if needed.
3. Carefully review the Typical Installation Drawing for recommended hookup and specifications of other components in the system.
4. For hollow shaft models make sure the motor has a 5/8" straight shaft.
5. If pump will not be bolted down, use a torque arm to keep it from rotating. Free end of torque must bear against a rigid surface.
6. Support accumulator and other heavy accessories on a separate panel to avoid damaging motor bearings.
7. Suction strainer should be 40 mesh.
8. Be certain the nozzle is properly sized for the system to meet the requirements.
9. If vacuum and pressure gauges are not used provide a fitting so they can be installed for troubleshooting.
10. Mount an accumulator in the discharge line close to the pump to dampen pulsations in the system.
11. A relief valve, regulating valve or unloader valve must be in the discharge line of the system to relieve excessive pressure should clogging occur.
12. By-pass flow can be returned:

To The Reservoir: This should be done only when a single liquid is pumped. If detergents are added by means of an injector, for example, this would contaminate the reservoir.

To The Floor Drain: This is used when the valve functions only as a safety device to relieve the outlet line should clogging occur.

To The Pump Inlet: This procedure is not recommended and should be limited to a maximum THREE MINUTE CONTINUOUS BY-PASS. Returning to the inlet permits using a gun without contaminating the reservoir or wasting liquid. The liquid recirculates when the gun is closed and this small amount of liquid will increase in temperature.

## Operation

1. Before operating, always check the lubricant level of the pump. Any rapid rise in lubricant level above the inspection plug indicates leakage at the piston cups. Replace piston cups immediately.
2. Before starting, open all valves in the piping system. Then start pump. If the pump does not prime, remove the nozzle until the pump delivers full outlet flow. Filling inlet line before starting will avoid any priming problems.
3. Do not exceed a vacuum (negative inlet head) of 5 inches of mercury (approximately 5-1/2 feet lift of water). This means keeping the vertical lift distance (from the pump to water level) less than 5-1/2 feet. The inlet can be pressurized to 60 pounds maximum.
4. Do not operate pumps with a liquid temperature above 180°.
5. Limit pressure to 500 PSI measured at the pump and limit operating speed to 1800 RPM.

## Maintenance

1. Clean strainer often enough to prevent starving pump inlet. Restricted inlet flow will result in cavitation damage to pump.
2. Check lube level of pump before operation and every 100 hours of operation. Change lubricant when warm.
3. After operation with chemicals, thoroughly rinse pump with clear water.

## PUMP DISASSEMBLY

### A. Servicing The Valves

1. Remove the name plate (6) and gasket (7) by unscrewing the four screws (4).
2. Remove both cylinder heads (9) and cylinder head o-rings (10) from both sides of the pump by unscrewing the four capscrews (8).
3. **NOTE:** Two valve assemblies (11) are on each side of the pump: an inlet valve (bottom) and an outlet valve (top). ALTHOUGH THE PARTS ARE THE SAME IN EACH, THE ORDER IS REVERSED.
4. The valve seat of the OUTLET ASSEMBLY can be lifted out with a screwdriver or a puller (P.N.923073). The o-ring (12), valve (14), spring (15) and retainer (16) should be removed next.
5. For the INLET ASSEMBLY lift out the spring retainer (16), spring (15) and valve (14). If the valve seat (13) is tight, apply a few drops of penetrating oil around edge of seat. Let oil soak a few minutes. Then using a screwdriver or puller, tap out valve seat (13) from opposite side of pump. Tap gently, moving rod or screwdriver from side to side of seat to force valve seat out. Remove o-ring (12) from valve seat (13).

### B. Servicing the Piston Cup

1. Unscrew capscrow (17) and remove using a 3/16" allen wrench.
2. Push out sleeve (18) containing piston seal (20), cup support (21), piston cup (22), cup spreader (23), o-ring (24) and washer (25). If sleeve is tight, remove by tapping against inner end with wood dowel and hammer. Remove o-ring (26) from sleeve (18), Lift seal support (19) from connecting rod end.
3. Repeat same procedure for opposite side of pump.
4. Then lift out connecting rod (27).
5. With snap ring pliers, remove retaining ring (28).
6. Push drive assembly (29) from pump. This can best be done with an arbor press.
7. Use an arbor press and yoke support to remove outer main bearing (30) from shaft. Remove both snap rings (31) and press inner bearing (30) from shaft.
8. Cam follower bearing and shaft assembly (34) should now be examined for wear and replaced if necessary.

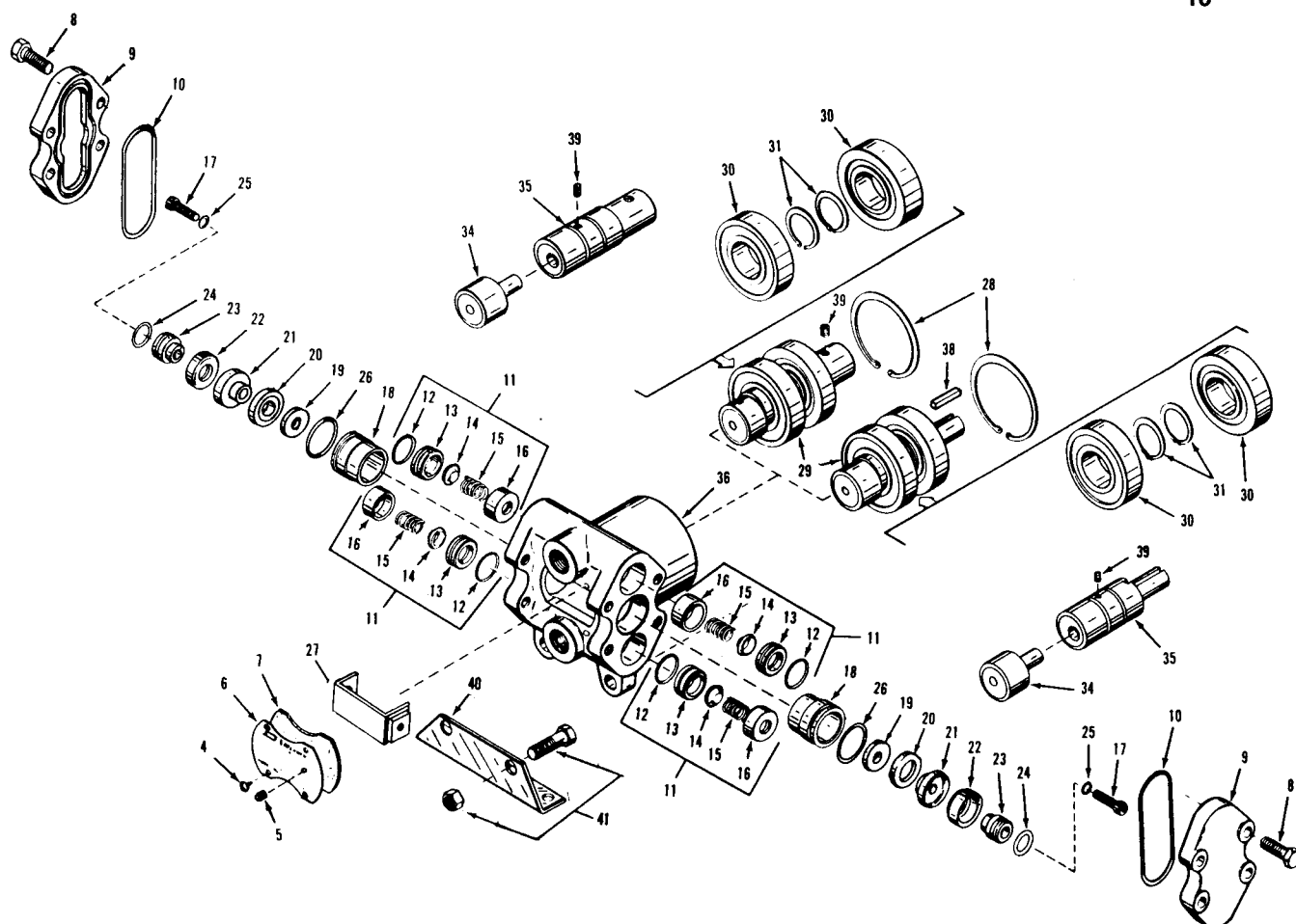
**NOTE:** The numbers in parentheses ( ) used throughout this text refer to items in the exploded view of the pump and in the parts list.

# EXPLODED VIEW

October 1989

# PISTON MODEL

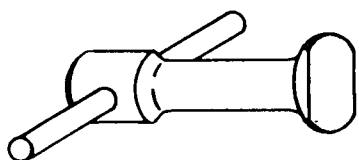
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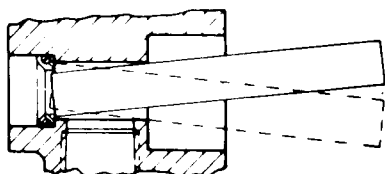
## PARTS LIST

ITEM	PART NO.	DESCRIPTION	QTY.	ITEM	PART NO.	DESCRIPTION	QTY.
4	935562	Screw	4	29	923302	Drive Assy. (10.002)(2GPM Hollow)	1
5	925785	Pipe Plug	1		923304	Drive Assy. (10.003)(3GPM Hollow)	1
6	930111.002	Nameplate	1		923305	Drive Assy. (10.005)(3GPM Solid)	1
7	923217	Gasket	1		927304	Drive Assy. (10.006)(3.5 GPM Hollow)	1
8	918235	Cap Screw 5/16"	8		927306	Drive Assy. (10.007)(1.6GPM Hollow)	1
	937735	Cap Screw (3/8" x 1-1/8")	8	30	920217	Bearing	2
9	927578	Cylinder Head	2	31	920219	Snap Ring	2
10	926615	O-Ring, Cylinder Head	2	34	920200	Cam Follower, Bearing Assembly	1
12	931350.019	•O-Ring, Valve Seat	4	35	919936	Drive Shaft (10.002)(2GPM Hollow)	1
13	919450	•Valve Seat	4		917732	Drive Shaft (10.003)(3GPM Hollow)	1
14	937677	•Valve	4		919943	Drive Shaft (10.005)(3GPM Solid)	1
15	920969	•Valve Spring	4		927064	Drive Shaft (10.006)(1.3GPM Hollow)	1
16	926606	•Spring Retainer	4		927065	Drive Shaft (10.007)(1.6GPM Hollow)	1
17	924828.002	■Socket Head Capscrew	2	36	923250	Pump Body	1
18	918236	Sleeve	2	38	920036	Key	1
19	923895	Piston Seal Support	2	39	937731	Set Screw - 1/4 x 20	1
20	923896	■Piston Seal	2	40	919972.004	Mounting Bracket	1
21	923894	Cup Support	2	41	926794	Hex Nut & Bolt Assy. 3/8" unc	1
22	923745	■Piston Cup	2		931688.002	Piston Kit (Incls. 17, 20, 22, 24, 25)	1
23	922525	Cup Spreader	2		921061	Valve Assembly (Incls. 12, 13, 14, 15, 16)	1
24	931350.113	■O-Ring, Cup Spreader	2		923474	Lub Kit	1
25	918242	■Washer	2		920373	Valve Puller Tool	1
26	931350.024	O-Ring, Sleeve	2				
27	934265	Connecting Rod	1				
28	918249	Retaining Ring	1				

\*Optional Liquid Injector Model 937678 available.  
See individual specification sheet.



#20373 Valve Puller Tool



Removing valve seat  
with small diameter  
rod

## TROUBLE SHOOTING GUIDE

Early problems or failures often can be traced to improper installation, operation beyond recommended limits or to inadequate maintenance. If trouble does occur, the following guide suggests possible causes and remedies.

**HELPFUL HINT:** The pump can be run for short periods of time with the nameplate off. This can help during troubleshooting, particularly in looking for leaks.

### PROBLEM

1. **LOW PRESSURE**
  - a. Starved inlet. Check for clogged strainer or collapsed inlet hose. Is inlet hose I.D. proper size? Is pump primed?
  - b. Check pump valves to make sure that the wear mark caused by valve hitting on valve seat forms a complete circle on the seat. Replace if in doubt. Also check condition of O-rings on valve seat.
2. **LOW OR ERRATIC PRESSURE, PLUS NOISE**
  - a. Leaking valves
  - b. Bad bearings. Either the cam follower bearing or drive shaft bearings.
3. **EXCESSIVE VIBRATION OF PUMP BODY**
  - a. Bad bearings
  - b. Check alignment of pump shaft and motor shaft coupling.
4. **WATER COMING OUT VENT**
  - a. Worn cups or sleeves. Cups should be very snug in sleeves.
  - b. Damaged O-rings on sleeves.
5. **ELECTRICAL OVERLOAD**
  - a. If electrical supply to motor or motor overload keeps opening up when pump is started, it could be a blocked outlet, or nozzle size is too small.
  - b. Or check to make sure motor is large enough to handle your specific horsepower requirements as determined by the flow and operating pressure.

## PRIOR TO ASSEMBLY

1. Clean all parts in cleaning solvent. Be particularly careful to keep dirt and grit from entering bearings.
2. Replace cups (22) and piston seals (20). Use repair parts kit shown in parts list. A kit includes 2 each of washer (25), piston seal (20), O-ring (24), piston cup (22), and cap screw (17).
3. Inspect sleeve (18). Replace if scored or worn. Always install a new O-ring (26) before installing sleeve in pump.
4. Examine seating surfaces of valves and valve seats for nicks, wear, or other damage. If damage affects operation—low pressure, for example—replace bad parts. Replacing valves in sets is recommended. If one set (11) is replaced, all FOUR sets should be replaced.
5. Examine shaft and follower for wear or damage. Cam follower (34) can be replaced, or both shaft and follower.
6. **CAUTION: MAKE SURE PUMP PARTS ARE FREE OF ALL FOREIGN MATERIAL, PARTICULARLY GRIT AND METAL CHIPS. THE ASSEMBLY AREA MUST BE CLEAN. FOREIGN PARTICLES CAN CAUSE PUMP FAILURE.**

## PUMP ASSEMBLY

1. Install both snap rings (31) in grooves of drive shaft. Press bearings (30) on shaft. Press against inner race only.
2. Press cam follower bearing assembly (34) into drive shaft (35) until roller retainer washer of cam follower is against drive shaft. **DO NOT APPLY EXCESSIVE PRESSURE:** It will damage bearing. Make certain outer race turns freely after pressing operation.
3. Press drive assembly (29) into pump body (36) **MAINTAIN GOOD ALIGNMENT BETWEEN OUTSIDE DIAMETER OF BEARINGS AND CASTING BORE.** Inner bearing touches shoulder in casting. Install retaining ring (28) with snap ring pliers.  
(If excessive clearance is found between the bore and the bearings it may be necessary to use a bearing retaining compound such as Lockite.\* But be sure mating parts are free of grease or oil before using.)
4. **PISTON AND SLEEVE ASSEMBLY**
  - a. Insert O-ring (26) in groove of sleeve (18).
  - b. Apply grease generously to bearing surfaces of connecting rod (27). Insert over cam follower bearing.
  - c. Make sure cylinder cavity of body casting is clean, apply grease to side wall, then insert sleeves (18). Make certain sleeve O-ring (26) is not damaged.
  - d. Place piston seal (20) on cup support (21) with flat side of seal against the flat side of cup support. Apply grease on lip side of seal. Place piston seal support (19) against seal (20) and cup support (21) then align center holes. Grease will hold parts together while installing in pump.
  - e. Turn pump drive shaft until connecting rod is in full forward position.
  - f. Slide piston seal (20), cup support (21) and piston seal support (19) into sleeve (18) until piston seal support is against connecting rod (27).
  - g. Install O-ring (24) on cup spreader (23), making sure it is not twisted.
5. **CUP INSTALLATION**
  - a. Nest cup (22) in open end of sleeve (18). **DO NOT PRESS INTO SLEEVE.**
  - b. Place washer (25) on cap screw (17). Insert cap-screw into cup spreader (23).
  - c. Nest cup spreader (23) in cup (22). Pull parts into sleeve with cap screw and Allen wrench. **DO NOT TIGHTEN FULLY.**
  - d. Repeat these steps for opposite side of pump, then tighten both cap screws. Loosen cap screws one half turn, then tighten to 150 lb-in. torque.
6. **VALVE INSTALLATION**
  - a. Remember that the bottom valve is the inlet and has the seat at the bottom of the cavity; beveled edge toward you. The inlet cavity is the one nearest to the 1/2-inch NPT port marked "IN."
  - b. Make certain there are no burrs or sharp edges on outer ends of the four valve ports in body casting. Apply grease or similar lubricant to sidewalls at outer ends.
  - c. Install O-ring (24) in groove of valve seat (13).
  - d. Place pump in a position where one flat face of body casting is up. Insert valve seat (13) with O-ring (12) part way into the inlet cavity with cone side up. Do this by hand, avoiding excessive force which may damage O-ring.
  - e. Lay valve (14) on seat, beveled side down. Place spring (15) on valve.
  - f. Place plastic spring retainer (16) over spring. Push down by hand until valve seat bottoms in casting. Make certain spring end is centered in retainer.
  - g. The outlet valve is installed in reverse order. Insert plastic spring retainer (16) into outlet valve recess. Retainer end with smaller bore must be down.
  - h. Place spring (15) inside retainer (16). Make certain spring is centered. Lay valve (14) over end of spring with beveled side up.
  - i. Insert valve seat (13) with O-ring (12) installed into recess by hand with cone side down. Press down until spring retainer bottoms in cavity.
  - j. Place O-ring (10) in groove of cylinder head (9).
  - k. Place cylinder head, with O-ring, on pump face in which valve parts have been installed.
  - l. Insert four cap screws (8) and tighten evenly until cylinder head is against body.
7. Repeat steps 6-b through 6-l on opposite pump end.
8. Fill crank housing with lubricant. Only one ounce is required. A small quantity of lubricant should be injected through the center hole of the cam follower bearing.
9. Place gasket (7) and nameplate (6) on pump. Tighten four screws (4) evenly.
10. Rotate pump drive shaft two or three revolutions by hand, making certain that no binding occurs.

Specifications subject to change without notice.

10-O-1089-59 5M



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