CAT PUMPS
TUFF CAT®

High Pressure Cleaning System

High Temp and Pulsating

Owner's Manual

Hi-Temp Models

2X1000HT, 2X1500HT, 2X2000HT, 3X1000HT, 3X1500HT

Pulsating Models

2X1000HTP, 2X1500HTP, 3X1000HTP

SAVE THESE INSTRUCTIONS

High Pressure Cleaning System
ONE YEAR LIMITED WARRANTY

For one year from date of purchase, when the High Pressure Cleaning System is maintained and operated according to the instructions in the owner's manual, we will repair, free of charge, any defects in material or workmanship.

This warranty does not cover repairs necessary as a result of operator neglect or abuse or normal wear. This cleaning system may be returned to any CAT PUMP distributor or directly to CAT PUMPS.

SEND PREPAID to CAT PUMPS, 1681 - 94th Lane N.E., Minneapolis, MN 55449 or call 763-780-5440 for assistance.

Replacement of parts or accessories with non-original items or servicing of unit other than that specifically outlined in owner's manual will VOID THE WARRANTY.

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⚠ CAUTION ⚠

READ AND FOLLOW ALL SAFETY RULES AND INSTRUCTIONS BEFORE OPERATING THIS UNIT.

INSTRUCTIONS GIVEN THIS SYMBOL ARE FOR PERSONAL SAFETY. BE SURE TO FOLLOW THEM.

FEATURES

1. Dual Pressure switches with mechanical relay assures automatic shut off of unit when gun trigger is released.

2. The proven dependability of the SF ceramic plunger pump offering unequaled performance life in its horsepower range.

3. A custom designed, industrial electric motor featuring Thermal Overload Protection with reset button and low amp draw performance.

4. 35 foot electrical cord with Ground-Fault Circuit-Interrupter (GFCI) protection for maximum safety during operation.

5. A convenient pop-up cord wrap making carrying and storing easy and neat.

6. Impact resistant, lightweight molded plastic case free of excess weight and bulk.

7. Easy to read, flat-mount, glycerine-filled pressure gauge to monitor system operation and meet exact cleaning needs.

8. Adjustable pressure regulating unloader to set and maintain system pressure for various cleaning applications.

9. Adjustable downstream chemical injector with inlet hose and chemical strainer.

10. Shut-off spray gun with molded extension and quick coupling allows easy assembly and quick changes to many optional accessories.

11. Vari-Nozzle with extension, featuring adjustable spray angle and high/low pressure settings for chemical application and pressure cleaning flexibility.

12. 30 foot, 3/8 inch, wire braid, non-marking high pressure hose with swivel and quick disconnect for convenience in assembly and operation.

SPECIFICATIONS

MODEL 2X1000HT AND 2X1000HTP

	U.S. Measure	Metric Measure
Maximum Pressure*	1000 PSI	(70 Bar)
Maximum Flow	2.0 GPM	(7.6 LM)
Horsepower	1.5	(1.5)
Voltage	110 to 115V, 60 Hz	(110 to 115V, 60 Hz)
Maximum Amperage	15	(15)
Weight	60 lbs.	(27.1 Kg)
PUMP MODEL	2LIDX20EHT	

MODEL 2X1500HT AND 2X1500HTP

	U.S. Measure	Metric Measure
Maximum Pressure*	1500 PSI	(105 Bar)
Maximum Flow	2.0 GPM	(7.6 LM)
Horsepower	2.0	(2.0)
Voltage	110 to 115V, 60 Hz	(110 to 115V, 60 Hz)
Maximum Amperage	20	(20)
Weight	73 lbs.	(33.2 Kg)
PUMP MODEL	2LIDX20EHT	

MODEL 2X2000HT

	U.S. Measure	Metric Measure
Maximum Pressure*	2000 PSI	(140 Bar)
Maximum Flow	2.2 GPM	(8.3 LM)
Horsepower	3.0	(3.0)
Voltage	208 to 230V, 60 Hz	(208 to 230V, 60 Hz)
Maximum Amperage	14	(14)
Weight	79 lbs.	(35.9 Kg)
PUMP MODEL	2LIDX22ESHT	

MODEL 3X1000HT AND 3X1000HTP

	U.S. Measure	Metric Measure
Maximum Pressure*	1000 PSI	(70 Bar)
Maximum Flow	3.0 GPM	(11.3 LM)
Horsepower	2.0	(2.0)
Voltage	110 to 115V, 60 Hz	(110 to 115V, 60 Hz)
Maximum Amperage	20	(20)
Weight	73 lbs.	(33.2 Kg)
PUMP MODEL	2LIDX30EHT	

MODEL 3X1500HT

	U.S. Measure	Metric Measure
Maximum Pressure*	1500 PSI	(105 Bar)
Maximum Flow	3.0 GPM	(11.3 LM)
Horsepower	3.0	(3.0)
Voltage	208 to 230V, 60 Hz	(208 to 230V 60 Hz)
Maximum Amperage	14	(14)
Weight	79 lbs.	(35.9 Kg)
PUMP MODEL	2LIDX30ESHT	

COMMON SPECIFICATIONS

	U.S. Measure	Metric Measure
Inlet Pressure*	**30-75 PSI**	**(2.1-5.25 BAR)**
Max. Liquid Temperature	190°F	(88°C)
Pump Oil Capacity	11 oz.	(0.35 L)
Hose Length	30 ft.	(9.1M)
Cord Length	(w/GFCI) 35 ft.	(10.7M)
Wand Length	36 In.	(914 mm)
Dimensions	21.75 x 17.0 x 9.62"	(553 x 432 x 244 mm)

*On Hi-Temp units, a minimum of 500 PSI discharge pressure is required to shut down the system when the trigger is released.

Note: 50HZ available upon request.

IMPORTANT SAFEGUARDS

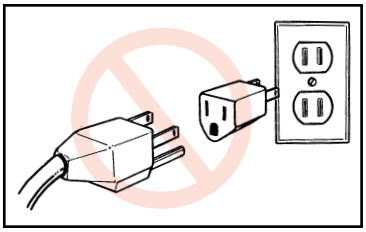
WARNING - When using this product basic precautions should always be followed, including the following:

IMPORTANT: This manual should be read and understood thoroughly before assembly and operation of this High Pressure Cleaning System. Keep this manual available for future reference in servicing or ordering parts or accessories.

Failure to follow basic safety rules and precautions could result in serious injury, shock or fire.

RULES FOR SAFE OPERATION

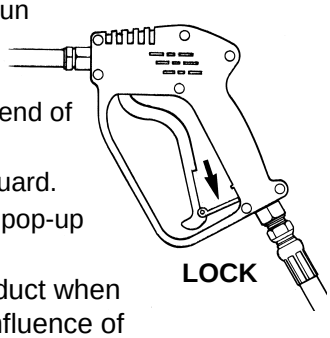
⚠ WARNING ⚠
Risk of shock or electrocution.

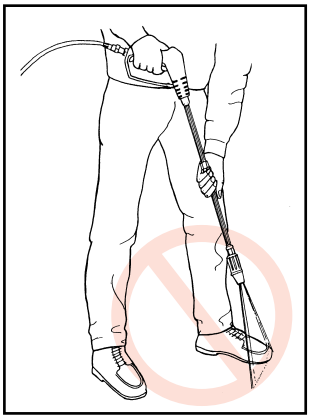


- Connect only to properly grounded outlet.
- Do not remove ground pin or use cheater.
- Know how to stop the product and bleed pressures quickly. Be thoroughly familiar with the controls.
- Do not overreach or stand on unstable support.
- Keep good footing and balance at all times.
- Do not use extension cords unless plugged into a GFCI protected outlet and cord meets specifications shown under “Extension Cords” in this manual.
- Keep all connections dry and off ground.
- Inspect electric cord before using and do not use if damaged.
- Do not spray at electrical areas.
- Do not touch plug with wet hands.
- This product is provided with a Ground-Fault Circuit-Interrupter built into the power cord plug. If replacement of the plug or cord is needed, use only identical replacement parts.
- Do not modify electric outlet. Have a qualified electrician install the properly grounded outlet.
- Unplug cord from receptacle before disconnecting cleaning system from extension cord.
- Keep operating area clear of all persons.
- Never leave unit unattended while running.
- To reduce the risk of injury, close supervision is necessary when a product is used near children.
- Stay alert - watch what you are doing.

CAUTION
Although the Pressure Switch and Relay shut “off” the unit when the trigger is released and “on” when trigger is squeezed, it is recommended the master power switch be turned “off” when unattended to avoid unintentional operation of unit.

- Engage safety lock on gun trigger when not spraying.
- Do not place hand over end of nozzle, injury will result.
- Do not remove nozzle guard.
- Do not lift or pull unit by pop-up cord wrap.
- Do not operate the product when fatigued or under the influence of alcohol or drugs.





- Do not spray at people or animals.
- WARNING - Risk of injection or injury - Do not direct discharge stream at persons.
- Follow the maintenance instructions specified in the manual.

SAVE THESE INSTRUCTIONS

In case of accidental injection with water, contact physician.

GROUNDING INSTRUCTIONS

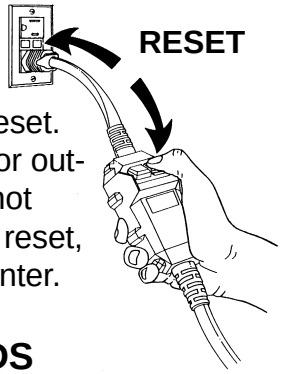
This product must be grounded. If it should malfunction or break down, grounding provides a path of least resistance for electrical current to reduce the risk of electric shock. This product is equipped with a cord having an equipment-grounding conductor and a grounding plug. The plug must be plugged into an appropriate outlet that is properly installed and grounded in accordance with all local codes and ordinances.
DANGER: Improper connection of the equipment-grounding conductor can result in a risk of electrocution. Check with a qualified

electrician or service person if you are in doubt as to whether the outlet is properly grounded. Do not modify the plug provided with the product—if it will not fit the outlet, have a proper outlet installed by a qualified electrician. Do not use any type of adapter with this product.

GROUND-FAULT CIRCUIT-INTERRUPTER PROTECTION

This pressure washer is provided with a GROUND-FAULT CIRCUIT-INTERRUPTER (GFCI) built into the plug of the power supply cord. This device provides additional protection from the risk of electric shock. Should replacement of the plug or cord become necessary, use only identical replacement parts that include GFCI protection.

If the GFCI is not the AUTOMATIC RESET TYPE, it must be manually TESTED and RESET each time the cleaning system is plugged in. Press firmly to assure internal spring activates switch. Push “test” then push “reset”. Motor will not start if GFCI does not reset. Check circuit breakers or outlet. If circuit breaker is not tripped and unit will not reset, contact local service center.



EXTENSION CORDS

Use only 3-wire extension cords that have

⚠ WARNING ⚠

To reduce the risk of electrocution, keep all connections dry and off the ground. Do not touch plug with wet hands.

3-prong grounding-type plugs and 3-pole cord connectors that accept the plug from the product. Use only extension cords that are intended for outdoor use. The extension cords are identified by a marking “Acceptable for use with outdoor appliances; store indoors while not in use". Use only extension cords having an electrical rating not less than the rating of the product. Do not use damaged extension cords. Examine extension cord before using and replace if damaged. Do not abuse extension cord and do not yank on any cord to disconnect. Keep cord away from heat and sharp edges. Always disconnect the extension cord from the receptacle before disconnecting the product from the extension cord.

Extension cords are not recommended

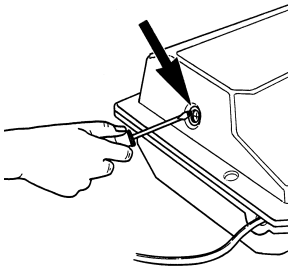
Extension Cord Length		
Model	up to 50 feet	50 to 100 feet
2X1000HT	14 AWG	12 AWG
2X1500HT	12 AWG	10 AWG
2X2000HT	N/A	N/A
3X1000HT	12 AWG	10 AWG
3X1500HT	N/A	NA

unless they are plugged into a ground-fault circuit-interrupter found in circuit boxes or protected outlet receptacles.

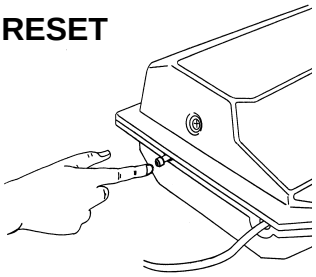
MOTOR RESET

This cleaning system has a motor reset button in the event the motor overheats or overloads. If the motor stalls turn the power switch to OFF and unplug. Follow the guidelines under **“TROUBLESHOOTING”** to determine the cause of the motor shutdown. A plastic extension inserted into the reset hole on the side of the case will initiate motor operation. TEST AND RESET THE GFCI BEFORE TURNING THE UNIT “ON”.

Note: 3.0 Hp, 220V units have reset button located at case parting line. Press with finger to reset.



1.5, 2.0 H.P.



3.0 H.P.

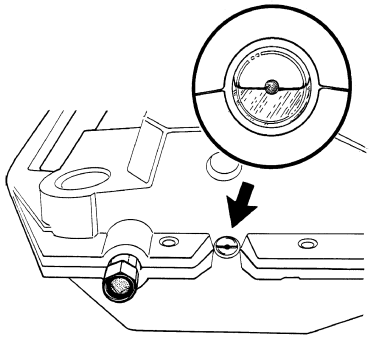
ACCIDENTAL SUBMERSION

The molded case of this cleaning system is not watertight. In case of accidental submersion, case must be opened and all internal components thoroughly dried. Pump crankcase should be drained and fresh oil added. See **“LUBRICATION”** for additional information.

INITIAL ASSEMBLY AND START-UP

Remove the cleaning system from the carton and inspect for damage or missing components. Keep box for storage or shipping unit if service is required.

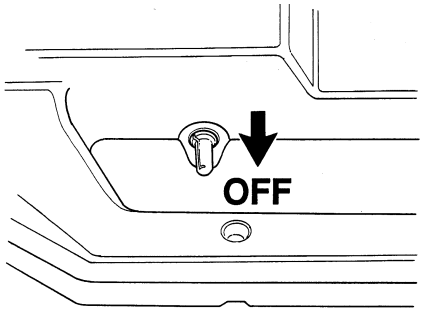
Place unit on a hard level surface and visually verify that the oil level is at the dot in center of gauge. The unit is shipped slightly overfilled. Tip case to see air bubble before operation.



CAUTION

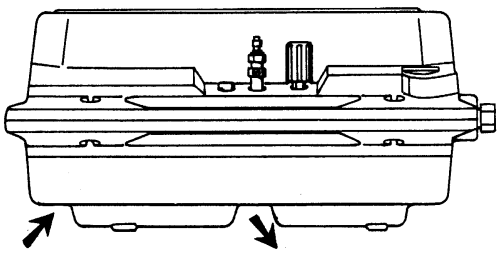
Lack of proper lubrication will result in severe damage to pump. Visually check oil before each use.

Be sure the power switch is in the “OFF” position.



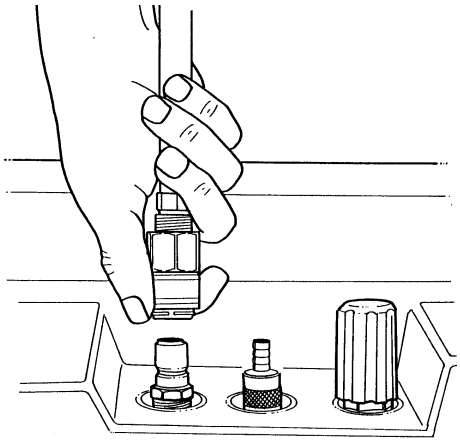
CAUTION

Set unit on a hard level surface. Do not operate unit in tall grass or on other soft surface that would restrict air flow to and from the bottom of the case.



AIR FLOW

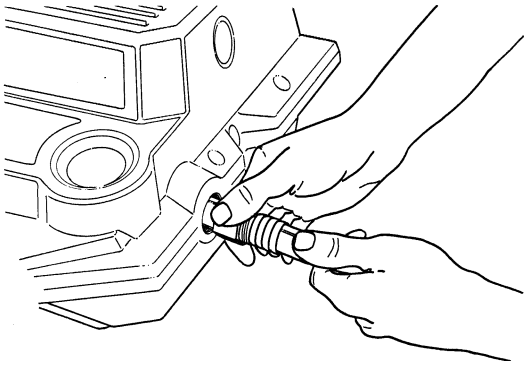
Attach the high pressure hose quick-disconnect to the discharge nipple on the top of the case by pulling back the collar and pressing over the nipple. Push down until it snaps into position.



NOTE

When attaching accessories to the inlet connection or chemical injector, some movement may be noticeable. Each connection is o-ring sealed and the movement is normal.

Attach a garden hose to the inlet fitting on the side of the case. Check for the gasket and screen in the fitting. The gasket assures a good seal and the screen keeps debris from entering the pump. CLEAN THIS SCREEN periodically to avoid restricting liquid to the inlet of the pump.



CAUTION

Inlet line must be a minimum of 1/2". Inlet water pressure must be minimum 30 PSI.

Uncoil the power cord and connect to a properly grounded receptacle. Voltage should be between 110 and 115 to avoid stalling or overloading motor on 1.5 and 2.0 H.P. units (15 amp for 1.5 H.P., 20 amp for 2.0 H.P.). and between 208 and 230 for 3.0 H.P. (14 amp for 3.0 H.P.).

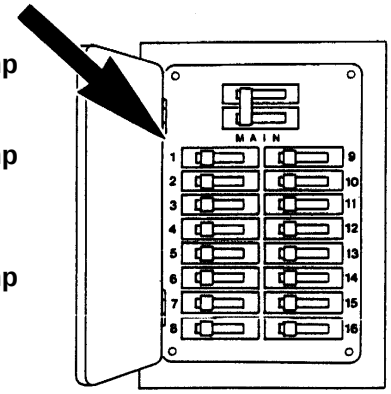
CAUTION

2 H.P. Model must be plugged into an outlet that is rated for 20 amps or greater or the circuit breaker will trip.

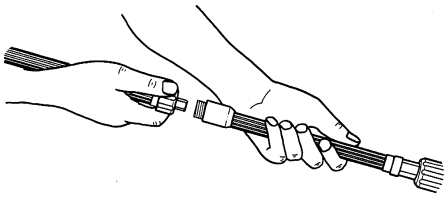
110V-115V, 15 amp
2X1000HT

110V-115V, 20 amp
2X1500HT
3X1000HT

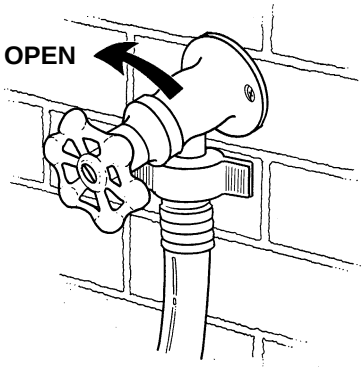
208V-230V, 15 amp
2X2000HT
3X1500HT



Attach Vari-Nozzle with extension to gun with extension. Snap Vari-Nozzle fitting into extended hex collar on gun extension and thread on hand tight.



Turn inlet water supply to the unit to full open. Inlet water temperature should not exceed the maximum listed in specifications.



Bleed air from system by triggering gun. With adequate water pressure, unit should prime within one minute. Trigger the gun with the Vari-Nozzle in the (forward) low pressure position to speed the priming.

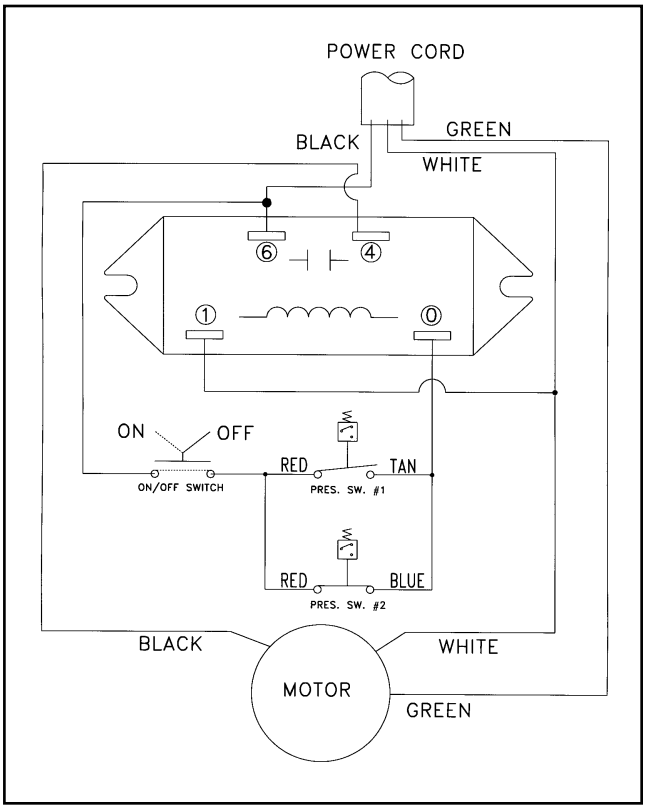
The Pressure Switches and Relay will automatically shut the unit off when the gun trigger is released (shut off).

Flip power switch from “OFF” to “ON”. Then squeeze the trigger gun to assure all air is bled from system before setting operating pressure.

CAUTION

When not in use for prolonged period, turn the master Power Switch to “OFF”.

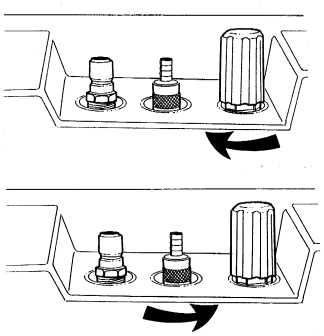
Cleaning System Circuit Diagram



OPERATION

PRESSURE ADJUSTMENT AND GAUGE READING

Before using the cleaning system, the operating pressure must be set. The cleaning system is equipped with a pressure gauge for setting and monitoring system pressure. To set or adjust pressure, rotate the unloader adjustment knob, marked “PSI” on the top of the case clockwise to increase pressure and counterclockwise to decrease pressure. **Make all adjustments with the gun off** (trigger released). Adjust unloader 1/2 turn, squeeze trigger and read pressure. If operating pressure has not been reached, repeat until desired pressure is reached. Do not exceed the maximum operating pressure listed in specifications. Be certain to use only the Vari-Nozzle provided with cleaning system or replacement nozzle sized for the flow and pressure of unit.



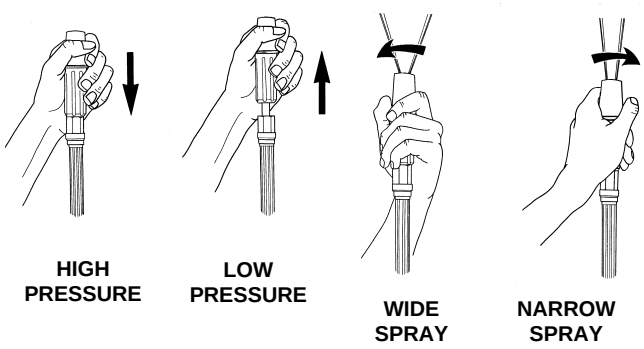
CAUTION

The maximum operating pressure of your cleaning system has been secured at CAT PUMPS with a Locking Collar on the unloader valve. Tampering or removal of the Locking Collar will VOID THE WARRANTY.

Check your gauge while setting pressure and periodically during operation. Changes in pressure will warn you of wear or improper operating conditions. If maximum pressure cannot be reached it is most likely due to insufficient inlet water to the unit. If the pressure drops after prolonged use, it is most likely due to a worn nozzle or seals within the pump. Consult **“TROUBLESHOOTING”** or call your local service center.

VARI-NOZZLE

This unit is equipped with a multi-function nozzle. The Vari-Nozzle changes from high pressure (back position) to low pressure (forward position) with an easy push-pull motion. Changing from high to low pressure permits the the low pressure chemical injector to begin drawing chemical into the system. When chemical is no longer needed,return to high pressure (back position).

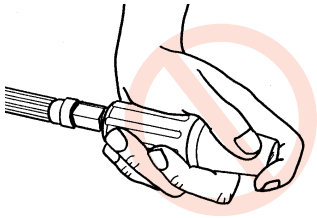


The Vari-Nozzle will also rotate right to left to adjust from a 0° to 60° spray angle for desired cleaning needs.

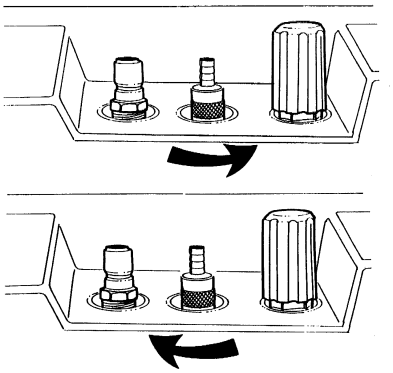
Make high to low pressure adjustments with gun off or trigger released.

⚠ WARNING ⚠

Do not place hand over end of nozzle while spraying or adjusting nozzle.



CHEMICAL INJECTION



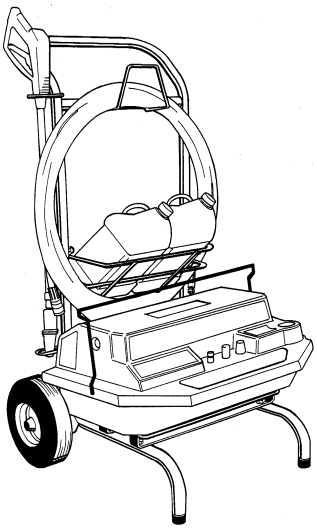
To use the injector, insert the injector hose into the bottom of the chemical bottle and connect the other end to the exposed barb on the unit. Open the injector by turning the adjustment collar counterclockwise. The Chemical Injector will only draw chemical when pressure is below 150 PSI. Push the Vari-Nozzle (forward) to the low pressure position and chemical will begin to flow. When chemical appears at the nozzle, adjust injector to desired rate. Reduce chemical flow by rotating injector collar clockwise to desired amount. Stop chemical flow by pulling Vari-Nozzle (back) to the high pressure position. Periodically clean the filter at the end of the chemical hose to assure smooth flow.

UNIT SHUT-DOWN AND STORAGE INSTRUCTIONS

Follow these safety steps when you are done using your Cleaning System:

1. Flush chemical injector with clean water. With injector knob fully open draw clean water through injector for one minute.
2. Switch cleaning system to “OFF”.
3. Shut off inlet water supply and disconnect garden hose.
4. Trigger the gun to relieve pressure locked in high pressure hose.
5. Turn unloader to low pressure setting.
6. Disconnect the high pressure hose and completely drain water. Squeeze trigger and hold Vari-Nozzle up in the air. Lift hose and follow length until all water drains from hose. This procedure is acceptable for short term storage or warm climates. For prolonged storage or unheated storage in cold weather see **“FREEZE PROTECTION”**. Straighten hose and coil up for storage.
7. Unplug the electric power cord. Wind up on pop-up cord wrap. Attach GFCI to cord wrap with velcro strap.

8. Cleaning system may be stored in original carton, on the special cleaning system cart or on the wall mount.



WARNING

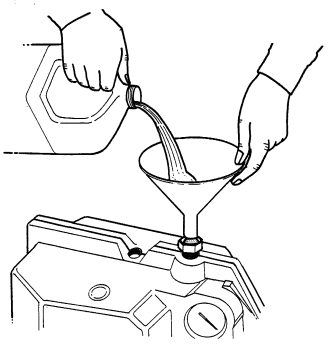
Do not store unit in unheated areas during cold weather. Severe damage can occur if water freezes in unit. If near or below freezing conditions cannot be avoided, unit must be protected from freezing. See FREEZE PROTECTION.

FREEZE PROTECTION

Follow all the steps for normal shut-down and storage. Flush the cleaning system with a 50% antifreeze and 50% water solution using one of two methods:

Method One

Tip the unit on end exposing inlet garden hose fitting. Remove screen filter from fitting and pour in approximately 1/2 cup of antifreeze and water mixture. Turn on unit while pouring the mixture in to allow circulation of antifreeze. Turn unit off as soon as all solution has been poured into the system.



Method Two

Attach a short garden hose (not to exceed four feet) to inlet fitting on pump and put other end into the antifreeze and water mixture. Turn the unit on until mixture flows out of the discharge fitting. Then shut unit off.

LUBRICATION

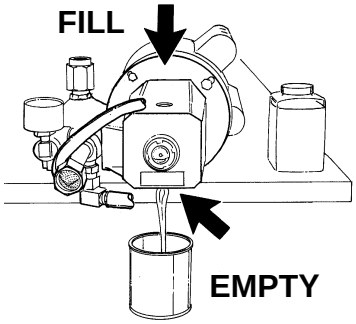
Keep crankcase filled to proper level (11 oz. capacity) with Cat Pumps special formula Premium 10W30 Grade Non-Detergent **Hydraulic** oil. Cat Pumps oil contains anti-wear and anti-rust inhibiting additives for maximum protection and cool running. **Do not use motor oil.** Annual oil changes are recommended in heavy use applications. With normal use change oil when service to pump seals or valves becomes necessary. (See Cleaning System Parts List.)

CAUTION

The top half of the case must be removed to add oil and the pump must be completely removed from case to drain oil.

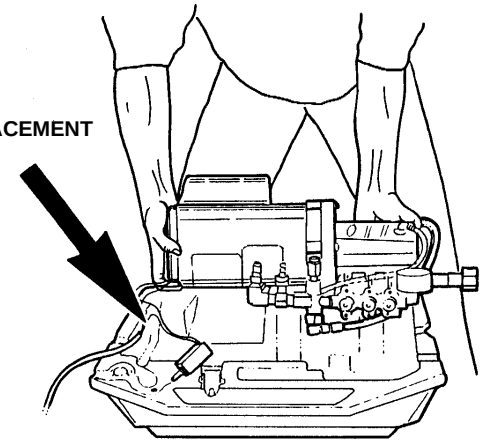
DRAINING AND ADDING OIL

1. Remove chemical injector knob and suction tube by pulling upward.
2. Unscrew unloader knob counterclockwise and remove spring.
3. Remove the eleven case screws, lift off top half of case and remove pump motor assembly.
4. Place pump and motor on work table with pump extended over edge. Secure pump to work surface.



5. Remove oil drain plug and drain oil from crankcase. Replace drain plug when empty.
6. Ensure motor shims and air seal gasket are in place.
7. Position the pump and motor into lower case.
8. Fill pump with new oil to dot on oil gauge. Oil can be added to the pump through the oil filler cap on the top of the pump.
9. Place switch box and wires into proper slots. Use tape to retain wires if they will not lie flat in grooves.

NOTE
WIRE REPLACEMENT



10. Ensure that the foam seals on the unloader, injector and discharge ports are in place.
11. Replace upper case half.
12. Replace all cover screws, using the two shortest in the handle area.
13. Push on injector knob and suction tube.
14. Place spring in unloader with metal insert down. Screw on unloader knob.

MAINTENANCE OF THE PUMP

DISASSEMBLY OF THE DISCHARGE VALVE ASSEMBLY

1. Remove pump and motor assembly from case and drain oil from crankcase of pump.

2. Disconnect by-pass hose from the bottom unloader by-pass fitting. (Figure A)

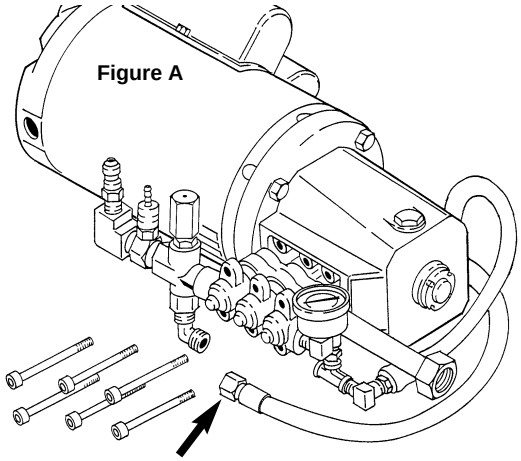


Figure A

3. With a standard M6 allen wrench remove the six (6) socket head screws from the manifold. (Figure A)

4. Remove discharge manifold by tapping backside of manifold on opposite sides with a soft mallet. Support manifold and unloader assembly from underside and pull away from crankcase. (Figure B)

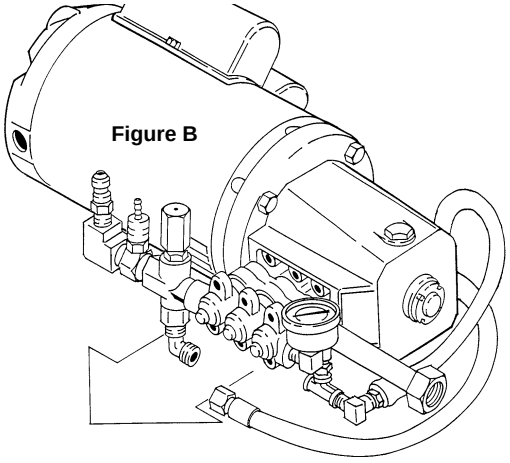


Figure B

5. The discharge adapter-seats may stay with either the discharge or inlet manifold. By inserting two opposing screwdrivers between adapter-seats and manifold you can easily pry them out of the discharge manifold. (Figure C)

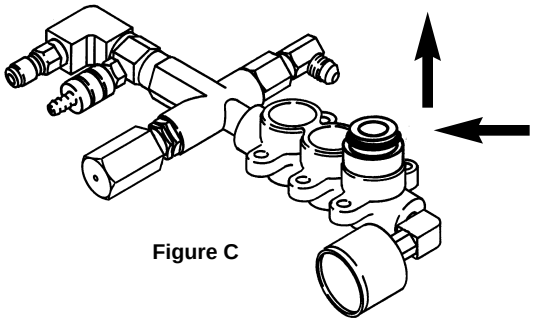


Figure C

If the discharge adapter-seats stay in the inlet manifold, gently work them up and down as you pull away from crankcase. (Figure D)

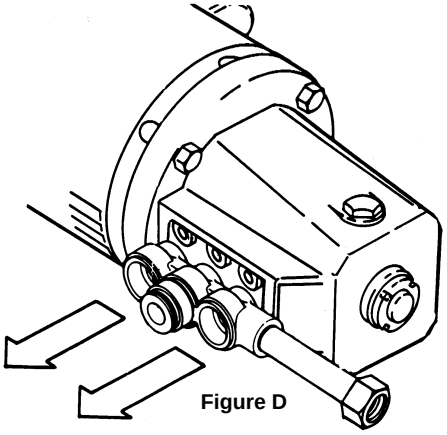


Figure D

6. The valve assemblies are in the discharge manifold ports and will fall out when manifold is turned over. A complete valve assembly includes: (★) retainer, spring, valve, and o-ring (Figure E). A complete valve kit includes three valve assemblies.

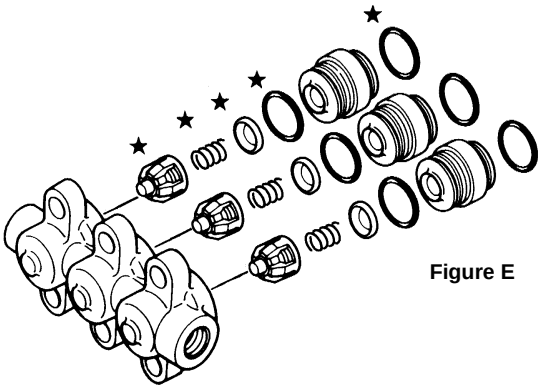
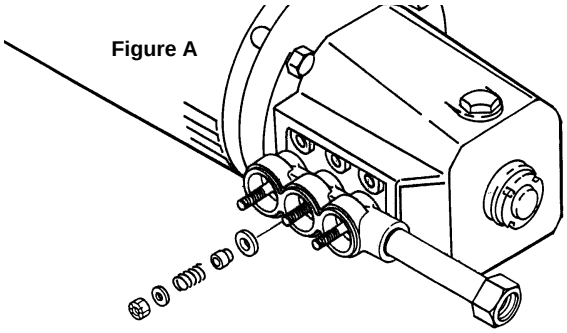


Figure E

DISASSEMBLY OF THE SEAL ASSEMBLY

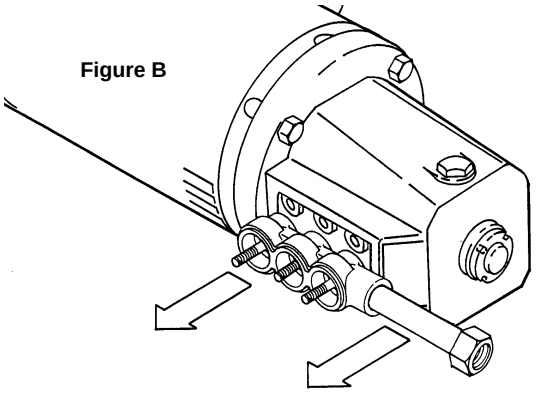
1. Next remove the inlet valve assembly from the exposed plunger rod ends, including nut, washer, spring, spacer and inlet valve (Figure A). A complete inlet valve kit contains three inlet valve assemblies.

Figure A



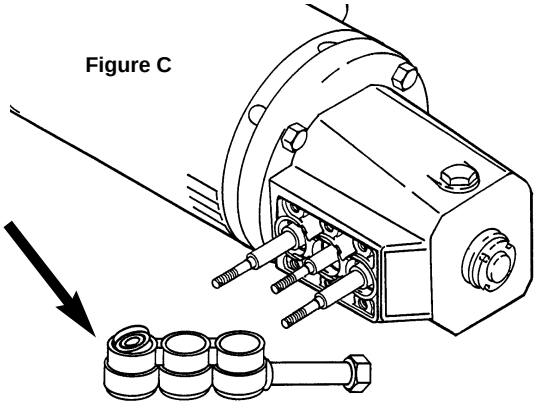
2. Grasp the inlet manifold from the front and underside and with a gentle up and down motion, pull away from crankcase.(Figure B)

Figure B



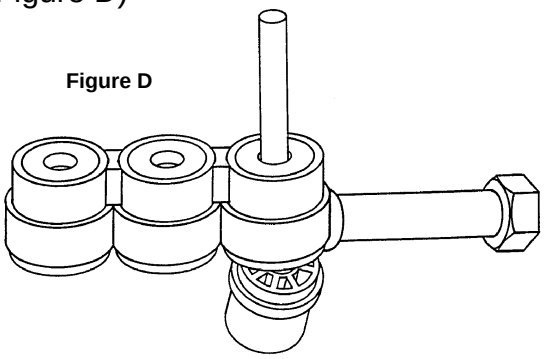
3. Carefully examine back side of low pressure seal before removing from manifold as it will be damaged during removal. If worn, insert screwdriver into inside diameter (I.D.) of seal and pry out. Exercise caution to avoid damage to the inlet manifold. (Figure C)

Figure C



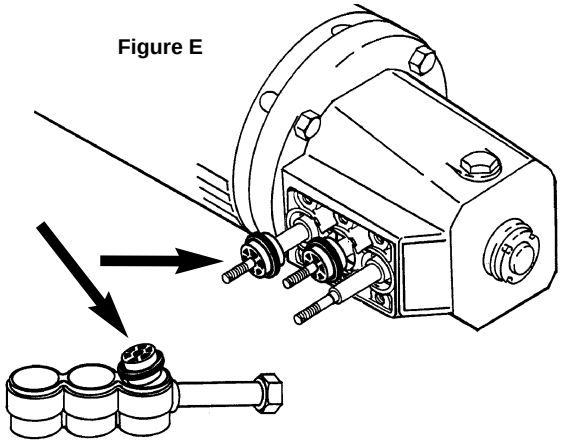
4. Next remove ceramic plunger with thumb or soft tool from backside of inlet manifold. (Figure D)

Figure D



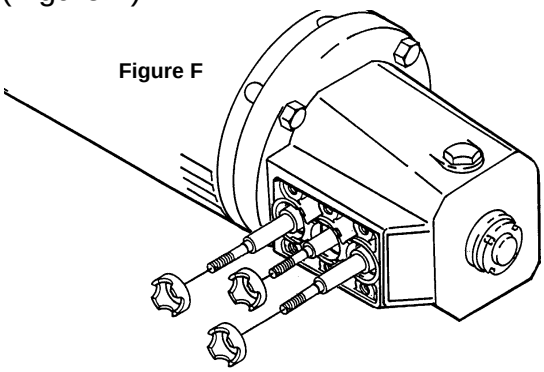
5. The high pressure seal may stay with the plunger or remain in inlet manifold. If on the plungers, rotate and pull off by hand. If in the manifold, use a reverse pliers to remove. (Figure E)

Figure E



6. Remove seal retainers from crankcase by grasping tab with pliers and pulling out. Examine crankcase oil seal to determine if crankcase servicing is needed. Consult local distributor or CAT PUMPS if drive end servicing is needed. Also see **"MAINTENANCE OF THE CRANKCASE"** section. (Figure F)

Figure F



REASSEMBY OF THE SEAL ASSEMBLY

1. Examine seal retainers and replace if worn or damaged. Install on plunger rod and press into crankcase with tabs out. (Figure A)

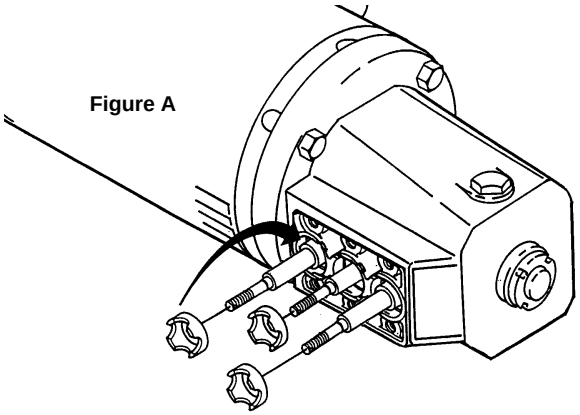


Figure A

2. Place inlet manifold on work surface with **small I.D. ports up**. (Figure B)
3. A complete seal kit contains three LPS and HPS assemblies. Lubricate new low pressure seal and press into position in the manifold chambers with **garter spring down**. (Figure B)

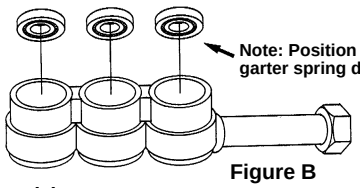


Figure B

4. Carefully examine plungers for scoring or cracks and replace if worn. Next lubricate ceramic plungers and new high pressure seals. **Place the deeper recessed hole of the plunger into the metal back side of the seal** and slide seal to the middle of the plunger. (Figure C)

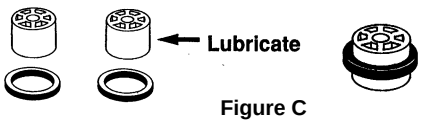


Figure C

5. Place inlet manifold on work surface with **larger I.D. ports up.** Install plungers with seals into ports **with metal seal side into manifold.** Press into position using the larger I.D. end of discharge adapter-seat. (Fig. D)

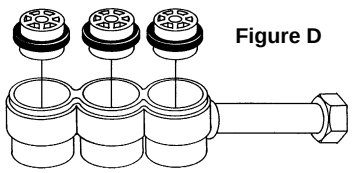


Figure D

6. Carefully install manifold over plunger rod ends and slowly press into crankcase. (Figure E)

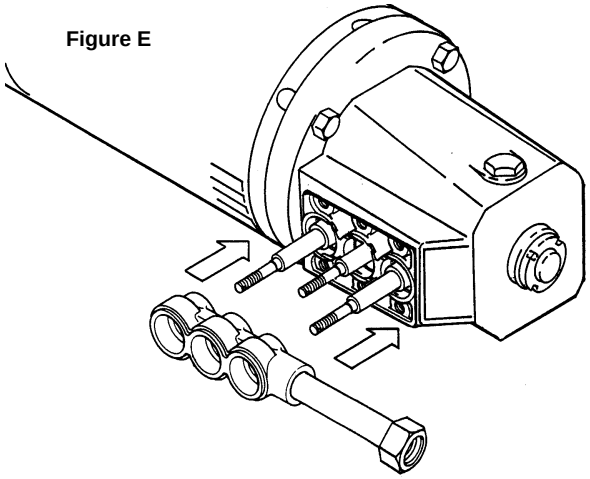


Figure E

7. Examine inlet valve and replace if worn. Inlet valve cannot be lapped or reversed if worn. Install new inlet valve with **ridged side facing away from the crankcase,** toward the discharge. (Figure F)

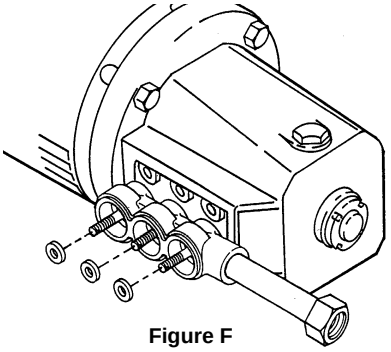


Figure F

8. Examine spacers for wear and replace as needed. Install spacer on each plunger with **smaller outside diameter (O.D.) into inlet valve.**
9. Examine springs for damage or fatigue and replace as needed. Place on plunger rods. (Figure G)

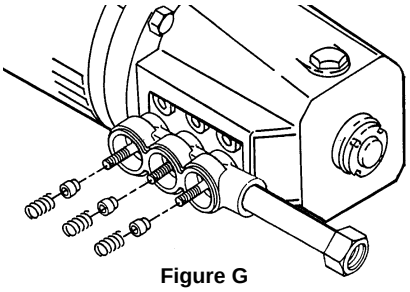


Figure G

10. Install washers next with **concave side toward manifold.**
11. Next install nuts and torque to specifications in **TORQUE CHART.** (Figure H)

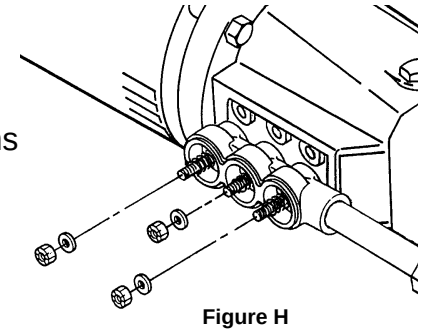


Figure H

REASSEMBY OF THE DISCHARGE VALVE ASSEMBLY

1. Examine discharge adapter-seat o-rings and replace if worn. Lubricate and install o-rings on both front and rear of adapter-seat. (Figure A)

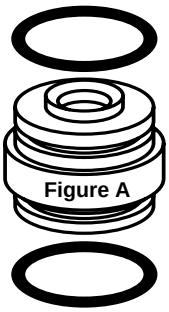


Figure A

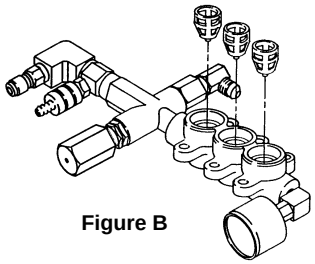


Figure B

2. Place discharge manifold on work surface and install valve retainers in each port with top tab down and completely seat into the chamber. (Figure B)

3. Replace worn or damaged springs and place into retainers.

4. Examine valves and seats for pitting, grooves or wear and replace as needed.

5. Place valves over springs with **concave side down.** (Figure C)

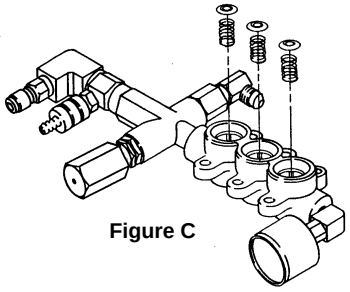


Figure C

6. Lubricate O.D. of discharge adapter-seat and insert **smaller I.D. into discharge mani-fold ports.** Snap into position. Exercise caution not to cut or pinch o-rings. (Figure D)

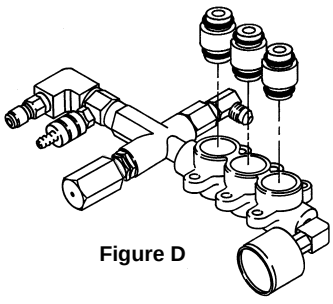


Figure D

7. Carefully guide manifold with adapters over plunger rod ends and press into inlet manifold. (Figure E)

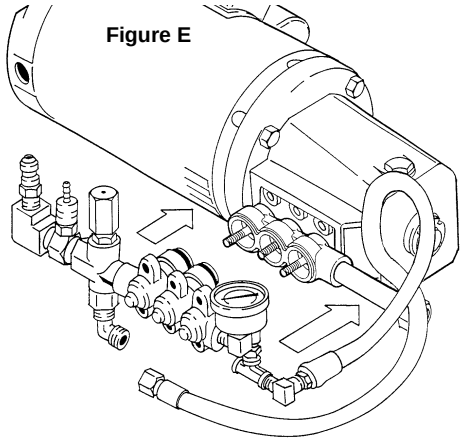


Figure E

8. Apply anti-seize to six (6) socket head screw threads and thread in hand tight per torque sequence. Torque in sequence to specifications in torque chart. (Figure F)

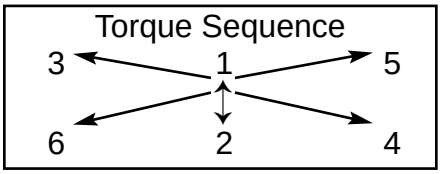


Figure F

9. Reattach by-pass hose to bottom of unloader fitting.

10. Remember to fill crankcase with oil before replacing top cover to unit. See **"LUBRICATION"** for more information. (Figure G)

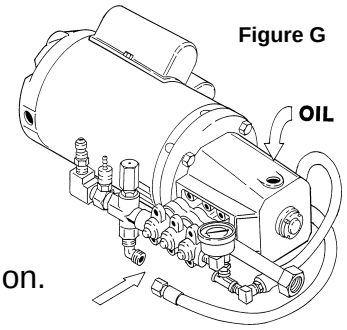


Figure G

Torque Chart

Pump Item	Thread	Tool Size	Torque in.lbs.	Torque ft.lbs.	Torque Nm
Outer Bearing Case (Prior to Mfg. date 1/90)	M6x16	M10/Phillips	50	4.0	6
Inner Bearing Case	M6x16	M10/Phillips	50	4.0	6
Manifold Socket Head Screws	M8x75	M6 Allen	115	9.4	13
Plunger Rod Nuts	M6	M10 Hex	55	4.4	6
Oil Gauge	M28	Oil Gauge Tool	45	3.6	5

Maintenance of the Crankcase, Unloader, Chemical Injector, Pressure Switches and Pulsator

CRANKCASE

1) While inlet manifold, plungers and seal retainers are removed, examine crankcase seals for wear.
2) Check oil level and for evidence of water in oil.
3) Rotate crankshaft by hand to feel for smooth bearing movements.
4) Examine crankshaft oil seal externally for drying, cracking or leaking.
5) Consult CAT PUMPS or your local distributor if crankcase service is needed.

UNLOADER

Unloader o-rings should be examined for wear and replaced at the same frequency as servicing the valves and seals of the pump.

If after reasonable use, your system cycles (repeatedly goes on and off by-pass) or will not come up to pressure, you should examine the unloader for worn o-rings, flow balancer or ball and valve assembly. Refer to the **"TROUBLESHOOTING"** guide for more information.

CHEMICAL INJECTOR

The chemical injector should be inspected when chemical draw will not occur or at the same frequency as servicing the valves and seals of the pump. After prolonged use, the chemical injector orifice may wear or a build up of soap or other chemical on the ball may cause the ball to stick in the seat. Flushing with clear water after chemical application will generally prevent this. However, after prolonged use, ball and o-rings may fatigue and need replacement.

HI-TEMP FEATURES

Pressure Switches

The dual Pressure Switches and mechanical relay work together to shut the cleaning system off when the trigger is released.

If the unit does not shut off when the trigger is released, it could be a result of air in the discharge line, a failed relay or faulty pressure switches. Consult CAT PUMPS or a qualified technician for assistance.

If the unit does not start when the trigger is squeezed, there is not adequate liquid being delivered to the inlet. This may be caused by a kinked hose, clogged filter or failure to turn on the inlet water supply. Periodically check and clean the inlet filter and screen on the inlet fitting. Purging the system of air before turning the unit on will help prevent accidental operation without turning the water supply on. **Always maintain 30 PSI inlet pressure. Always operate the TUFF CAT between 500 PSI and maximum rated pressure.**

Specially formulated Hi-Temp, Hi-Pressure Seals are standard on all "HT" models and offer exceptional performance and service life at water temperatures **up to 190°F.** It is recommended the water temperature be carefully monitored to avoid exceeding this temperature limit.

PULSATOR

Special "P" models use a modified Discharge Valve Adapter in the pump to work with the **Jetter Hose** and **Tri-Jet Nozzle** to create a pulsating action for added agitation while cleaning.

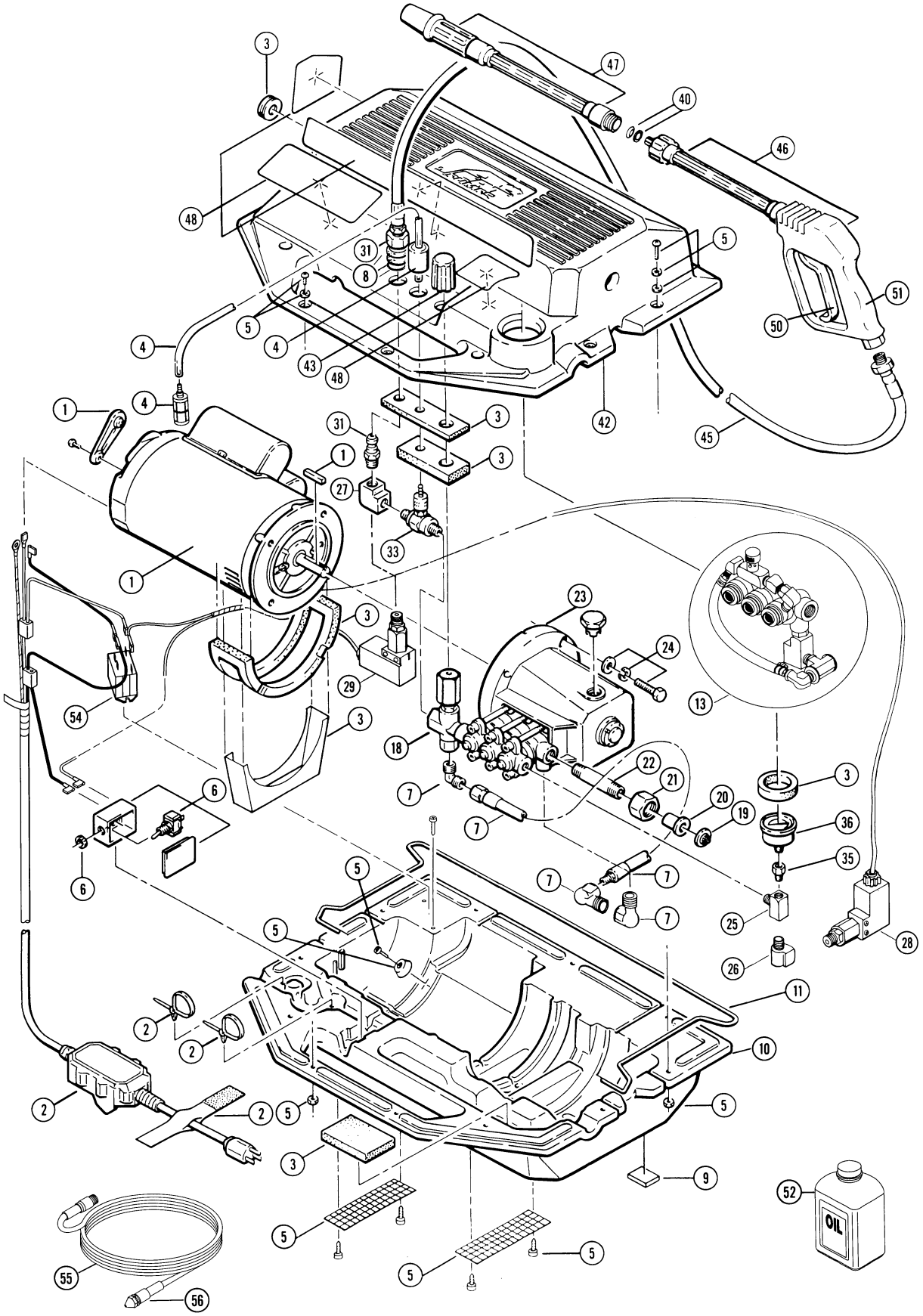
CLEANING SYSTEM PARTS LIST

ITEM	PART NO.					DESCRIPTION	QTY.
	2X1000HT	**2X1500HT**	**2X2000HT**	**3X1000HT**	**3X1500HT**		
1	34691	34690	34791	34690	34791	Motor Kit	1
2	34520	34521	34277	34521	34277	GFCI/Power Cord Assembly	1
3	34666	34666	34666	34666	34666	Gasket Set	1
4	34669	34669	34669	34669	34669	Injector Inlet Hose Kit	1
5	34670	34670	34670	34670	34670	Hardware Kit	1
6	34524	34524	34524	34524	34524	Wire Switch Assembly	1
7	34183	34183	34183	34183	34183	By-Pass Hose Assembly	1
8	23170	23170	23170	23170	23170	O-Ring, Socket	1
9	34560	34560	34560	34560	34560	Rubber Foot	4
10	34777	34777	34777	34777	34777	Case, Bottom	1
11	34249	34249	34249	34249	34249	Pop-Up Power Cord Wrap	1
13	34455	34455	34455	34455	34455	Pulsator Assembly	1
18	**7500S**	**7500S**	**7500S**	**7500S**	**7500S**	Unloader (See pg 19)	1
19	34402	34402	34402	34402	34402	Gasket and Screen Kit	1
20	34401	34401	34401	34401	34401	Adapter Fitting, Garden Hose	1
21	46488	46488	46488	46488	46488	Hex Knurled Garden Hose Fitting	1
22	34400	34400	34400	34400	34400	Nipple - 3/8" x 3/8" x 3", Garden Hose	1
23	**2LIDX20EHT**	**2LIDX20EHT**	**2LIDX22ESHT**	**2LIDX30EHT**	**2LIDX30ESHT**	Pump with Unloader (See pg 18)	1
24	30517	30517	30517	30517	30517	Bolt Mount Kit	1
25	34688	34688	34688	34688	34688	Tee - 1/8" M. Branch	1
26	34658	34658	34658	34658	34658	Elbow - 1/8" x 1/4"	1
27	34659	34659	34659	34659	34659	Tee - 3/8" x 3/8" x 1/4"	1
★ 28	31615	31615	31615	31615	31615	Pressure Switch, 215 PSI	1
★ 29	31625	31625	31625	31625	31625	Pressure Switch, 360 PSI	1
31	34667	34667	34667	34667	34667	Quick Disconnect Assembly (Hose-to-Unit)	1
★ 33	**7193**	**7193**	**7193**	**7194**	**7194**	Adjustable Chemical Injector (See pg 19)	1
34	34450	34450	34450	34450	34450	Elbow - 90° 1/8", Gauge	1
35	34501	34501	34501	34501	34501	Hex Adapter Fitting - 1/8F x 1/8M, Gauge	1
★ 36	6096	6096	6096	6096	6096	Pressure Gauge	1
40	34335	34335	34335	34335	34335	Lance O-Ring Kit	1
42	34778	34778	34778	34778	34778	Case, Top	1
43	32088	32088	32088	32088	32088	Unloader Adjust. Handle-Black	1
★ 45	34374	34374	34374	34374	34374	Discharge Hose Assembly - 30 ft.-3/8"	1
★ 46	36130.220	36130.220	36130.220	36130.220	36130.220	Custom I Gun w/Extension	1
★ 47	7935.521	7930.521	7930.521	7950.521	36666.521	Extension w/Vari-Nozzle	1
50	33316	33316	33316	33316	33316	Trigger Assembly	1
51	32400	32400	32400	32400	32400	Handle Assembly	1
52	6107	6107	6107	6107	6107	Crankcase Oil (21 oz.) 10w30 Prem. Gr. Hyd.	1
★ 54	34542	34542	—	34542	—	Mechanical Relay Switch - 120V	1
	—	—	34543	—	34543	Mechanical Relay Switch - 220V	1
★ 55	34643	34643	34643	34643	34643	Jetter Hose with Tri-Jet Nozzle - 30 ft.	1
	34644	34644	34644	34644	34644	Jetter Hose with Tri-Jet Nozzle - 50 ft.	1
★ 56	36634	36634	36634	36634	36634	Tri-Jet Nozzle	1

★ See individual **data sheets** for additional information on **Accessories.**

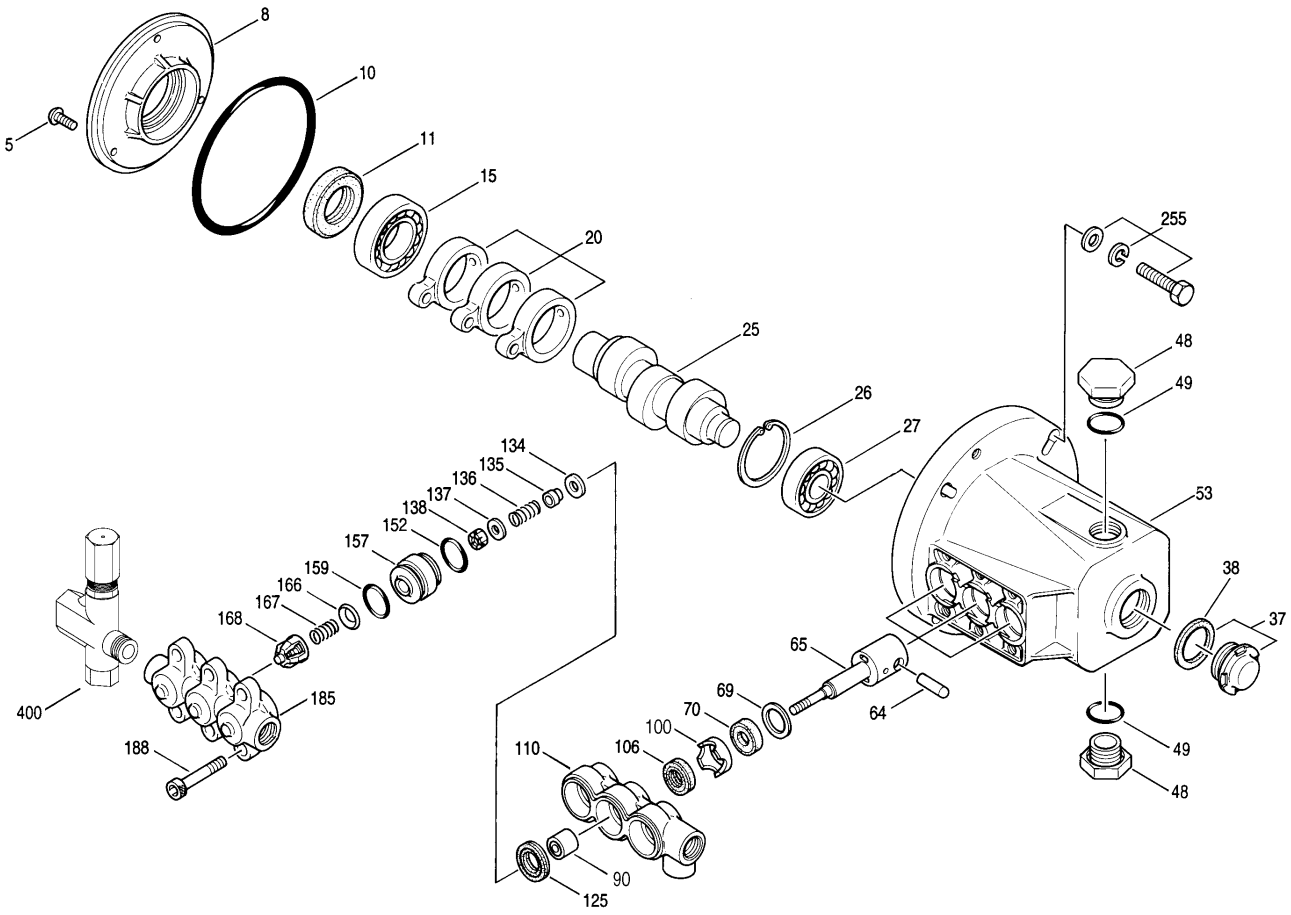
CLEANING SYSTEM EXPLODED VIEW

MODELS 2X1000HT, 2X1500HT, 2X2000HT, 3X1000HT, 3X1500HT



EXPLODED VIEW

Models 2LIDX20EHT, 2LIDX22ESHT, 2LIDX30EHT, 2LIDX30ESHT

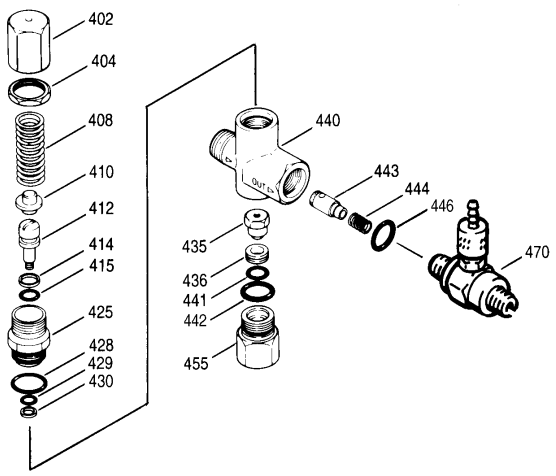


PARTS LIST

ITEM	P/N	MATL	DESCRIPTION	MODEL USED	QTY
5	547161	STCP	Screw, HHC (M6x14) [3/03]	All Models	3
8	547153	AL	Cover, Bearing, Inner [3/03]	All Models	1
10	14041	NBR	O-Ring, Bearing Cover - 70D [3/03]	All Models	1
11	55337	NBR	Seal, Oil [3/03]	All Models	1
15	14488	STL	Bearing, Ball, Inner	All Models	1
20	547046	TNM	Rod, Connecting [3/03]	All Models	3
25	46109	FCM	Crankshaft, 3450 RPM, 5/8", 3.1mm	2LIDX20EHT	1
	44929	FCM	Crankshaft, 3450 RPM, 5/8", 3.35mm	2LIDX22ESHT	1
	44931	FCM	Crankshaft, 3450 RPM, 5/8", 4.5mm	2LIDX30EHT, 2LIDX30ESHT	1
26	12385	STL	Ring, Retaining	All Models	1
27	15710	STL	Bearing, Ball, Outer	All Models	1
37	92241	—	Gauge, Oil, Bubble w/Gasket	All Models	1
38	44428	NBR	Gasket, Oil Gauge - 80D	All Models	1
48	44842	NY	Plug, Drain (1/2" NPT)	All Models	2
49	14179	NBR	O-Ring, Drain Plug - 70D	All Models	2
53	547285	AL	Crankcase [3/03]	All Models	1
64	16948	CM	Pin, Crosshead	All Models	3
65	540073	SZZ	Rod, Plunger, Unchromed	All Models	3
69	20017	STZP	Washer (M24)	All Models	3
70	25461	NBR	Seal, Oil	All Models	3
90	45847	CC	Plunger (M18x14)	All Models	3
100	44869	PVDF	Retainer, Seal	All Models	3
106	44876	NBR	Seal, LPS w/S-Spg	All Models	3
110	44874	BB	Manifold, Inlet	All Models	1
125	46652	HT	Seal, HPS, Hi-Temp	All Models	3
134	33873	NY	Valve, Inlet, Hi-Temp	All Models	3
135	44871	S	Spacer	All Models	3
136	44872	S	Spring, Inlet	All Models	3
137	88575	S	Washer, Conical M6)	All Models	3
138	81240	SS	Nut, Hex (M6)	All Models	3
152	23172	NBR	O-Ring, Adapter	All Models	3
157	45859	BB	Discharge Adapter-Seat	Standard HT Models	3
	45923	*BB*	*Discharge Adapter-Seat*	*Pulsator Models*	*2*
	45923T	*BB*	*Discharge Adapter-Seat*	*Pulsator Models*	*1*
159	23172	NBR	O-Ring, Adapter	All Models	3
166	43723	S	Valve	All Models	3
167	541062	S	Spring	All Models	3
168	44565	PVDF	Retainer, Spring	All Models	3
185	45724	BB	Manifold, Discharge	All Models	1
188	87859	STZP	Screw, HSH (M8x75)	All Models	6
255	30517	STZP	Kit, Bolt Mount	All Models	1
	30980	STZP	Washer, Flat (3/8")		4
	30921	STZP	Lockwasher, Split (3/8")		4
	34100	STZP	Screw, HH (3/8"-16x1-3/8")		4
	6106	—	Lubricant, Antiseize		1
	30050	STL	Key (3/16x3/16x1-1/4" HD)		1
300	*33953*	*HT*	*Kit, Seal, Hi-Temp (Inclds: 106,125,134,152,159)*	*All Models*	*1*
310	*34056*	*NBR*	*Kit, Valve (Inclds: 157,159,166,167,168)*	*Standard HT Models*	*1*
311	*34668*	*NBR*	*Kit, Inlet Valve (Inclds: 134-137,152,159)*	*All Models*	*1*
400	7500S		Unloader	All Models	1

Italics are optional items. [ ] Date of latest production change. See Tech Bulletins 002, 024, 036, 043, 055, 064, 065, 070, 073, 074, 083 and 092 for additional information.
Effective with 1/90 Mfg. date 45853, 14036, 44861, 92519 have been replaced with new one piece crankcase.
Note: Discard Key which may come standard with most motors and engines and **use only the key included in this kit.**
MATERIAL CODES (Not Part of Part Number): AL=Aluminum BB=Brass BZ=Bronze CC=Ceramic CM=Chrome-moly FCM=Forged Chrome-moly
FPM=Fluorocarbon HT=Hi-Temp (EPDM Alternative) NBR=Medium Nitrile (Buna-N) NY=Nylon PVDF=Polyvinylidene Fluoride
RTP=Reinforced Composite S=304SS SHS=304SS/High Strength SNG=Special Blend (Buna) SS=316SS STL=Steel
STZP=Steel/Zinc Plated SZZ=304SS/Zamak TNM=Special High Strength

PRESSURE REGULATING UNLOADER MODEL 7500S



PARTS LIST

ITEM	P/N	MATL	DESCRIPTION	QTY
402	540081	BB	Cap, Hex Adjusting	1
404	31047	BB	Nut, Locking	1
408	32094	STZP	Spring, Coil	1
410	107672	BB	Retainer, Spring	1
412	45694	S	Stem, Piston (M5)	1
414	20184	PTFE	Back-up Ring	1
415	14190	NBR	O-Ring, Piston Stem - 70D	1
425	107673	BB	Retainer, Piston	1
428	13969	NBR	O-Ring, Piston Guide	1
429	14759	NBR	O-Ring, Piston Body	1
430	107675	PTFE	Back-up Ring	1
435	45696	BB	Valve and Ball Assembly (M5)	1
436	107680	S	Seat	1
440	—	BB	Body	1
441	13963	NBR	O-Ring, Valve	1
442	13969	NBR	O-Ring	1
443	541060	BB	Flow Balancer w/O-Ring	1
444	45924	S	Spring - 85 G	1
446	13969	NBR	O-Ring	1
455	45695	BB	By-Pass Fitting - 3/8" F	1
—	32097	NBR	Kit, O-Ring (Incld: 414,415,428,429,430,441)	1
470	7193/7194		Chemical Injector	1

MATERIAL CODES (Not Part of Part Number): BB=Brass NBR=Medium Nitrile (Buna-N) PTFE=Pure Polytetrafluoroethylene S=304SS STZP=Steel/Zinc Plated

SPECIFICATIONS

	U.S. Measure	Metric Measure
Inlet Port - Rear	3/8" NPTM	(3/8" NPTM)
Discharge Port - Front	M18x1.0	(M18x1.0)
By-Pass Port - Bottom	3/8" NPTF	(3/8" NPTF)
Weight	14 oz.	(0.40L)
Dimensions	3.0x1.0x4.25"	(76x25x108mm)

ADJUSTABLE CHEMICAL INJECTOR

PARTS LIST

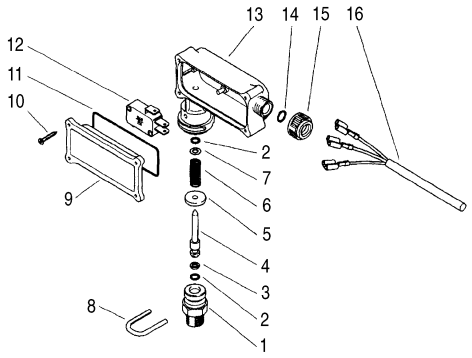
ITEM	P/N	MATL	DESCRIPTION	MODEL USED	QTY.
471	—	BB	Collar, Adjustment	All Models	1
472	—	BB	Barb, Hose	All Models	1
473	—	NBR	O-Ring	All models	1
474	33500	S	Spring	All Models	1
475	—	BB	Ball Seat Retainer	All Models	1
476	33504	FPM	O-Ring	All Models	1
477	34620	SS	Ball	All Models	1
478	33501	SS	Spring	All Models	1
479	32373	S	Injector Orifice (2.1mm)	7193	1
	32374	S	Injector Orifice (2.3mm)	7194	1
480	—	BB	Body-Unloader Mount	All Models	1

MATERIAL CODES (Not Part of Part Number): BB=Brass FPM=Fluorocarbon NBR=Medium Nitrile (Buna-N) S=304SS SS=316SS

SPECIFICATIONS

	7193	7194
TUFF CAT Model	2X1000, 2X1500	3X1000, 3X1500
Nozzle Orifice	2.1 mm	2.3 mm
Hose Barb	1/4"	1/4"
Inlet port	M18x1.0	M18x1.0
Discharge port	3/8" NPTM	3/8" NPTM
Weight	6.3 oz.	6.3 oz.
Dimensions	2x1x3"	2x1x3"

PRESSURE SWITCH MODELS 31615, 31625



PARTS LIST

ITEM	P/N	MATL	DESCRIPTION	QTY
1	—	SS	Fitting, Inlet (1/4") (3/8")	1
	—	*BB*	*Fitting, Inlet (3/8")*	*1*
2	—	PTFE	Back-up-Ring, Piston	2
3	—	NBR	O-Ring, Piston	1
4	—	BB	Piston	1
5	—	BB	Washer, Piston	1
6	31515	SS	Spring (215 PSI, 15 BAR)	1
	31525	SS	Spring (360 PSI, 25 BAR)	1
	31540	SS	Spring (580 PSI, 40 BAR)	1
7	—	BB	Washer, Spring	1
8	31505	S	U-Clip, Fitting	1
9	—	NY	Cover	1
10	31506	STZP	Screw (M2.6 x 11.5)	4
11	—	NBR	O-Ring, Square Cover	1
12	32861	—	Switch, Micro	1
13	—	NY	Case	1
14	—	NBR	O-Ring, Nut	1
15	31508	NY	Nut, Red (360 PSI, 25 BAR)	1
	31509	NY	Nut, Black (580 PSI, 40 BAR)	1
	31510	NY	Nut, Blue (215 PSI, 15 BAR)	1
16	—	—	Cable*, 3-wire, M1200	1
—	*31530*	*NBR*	*Kit, O-Ring (Incld: 2, 3, 11, 14)*	*1*

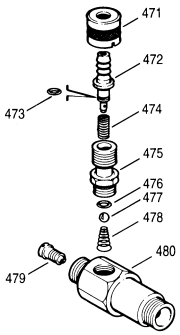
*Normally Closed – Red and Blue Normally Open – Red and Tan

Italics are optional items.

MATERIAL CODES (Not Part of Part Number):
BB=Brass NBR=Medium Nitrile (Buna-N) NY=Nylon PTFE=Pure Polytetrafluoroethylene S=304SS SS=316SS STZP=Steel/Zinc Plated

SPECIFICATIONS

		U.S. Measure	Metric Measure
Pressure		3625 PSI	(250 BAR)
Switch Engine Pressure	Model 31625	360 PSI	(25 BAR)
	Model 31615	215 PSI	(15 BAR)
Voltage		12-250 Volts	(12-250 Volts)
Max. Amperage		6 Amps	(6 Amps)
Max. Temperature		194°F	(90°C)
Inlet Fitting		1/4" NPTM	(1/4" NPTM)
Weight		6.4 oz.	(0.181 Kg)
Dimensions		3.0x3.0x1.00"	(76x76x25 mm)



CHEMICAL INJECTOR PERFORMANCE CHART
Optional Special Ported Chemical Injector for Unloader Mounting

Model	Injector Orifice Size	SF Injector	Lo-Pressure Nozzle (Max. Injecting Press. Less Hose Friction Loss)	Max. Chemical Draw (0 PSI) (Downstream)	Hi-Pressure Nozzle "Deduction" (Pressure drop across injector)
2X1000	2.1 mm std.	7193	100 PSI	50 oz. / min	75 PSI
2X1500	2.1 mm std.	7193	100 PSI	50 oz. / min	75 PSI
3X1000	2.1 mm opt.	7193	225 PSI	50 oz. / min	150 PSI
3X1250	2.3 mm std.	7194	150 PSI	50 oz. / min	125 PSI

TROUBLESHOOTING

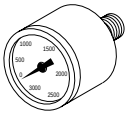
Condition	Probable Cause	Solution
• Unit will not start when gun is triggered.	• GFCI tripped.	• Reset GFCI-See **"GROUND-FAULT CIRCUIT-INTERRUPTER PROTECTION"**.
	• Unit is turned off.	• Check on/off switch.
	• Unit unplugged.	• Be certain to use 20 amp circuit.
	• Relay for Flow switch malfunction.	• Check voltage at relay with voltmeter or circuit tester. (Qualified Technician only.)
	• Insufficient flow to unit.	• DO NOT STARVE UNIT. Minimum 30 PSI inlet water pressure.
	• Circuit breaker or fuse tripped.	• Disconnect other appliances on this circuit.
	• Motor hums but does not run.	• Insufficient voltage, check for 15/20 Amp.
	• Incorrect extension cord.	• See **"EXTENSION CORDS"**.
• Motor stopped while spraying.	• Interruption in power (volts to unit).	• Totally release trigger for 5 seconds and squeeze again.
• Pump runs but pressure does not achieve rated values.	• Air leak in inlet plumbing or pump sucking air.	• Check that hoses and fittings are air tight.
	• Pressure gauge inoperative.	• Check and replace gauge.
	• Valves worn or dirty.	• Clean or replace-See **"MAINT. OF THE PUMP"**.
	• Unloader valve seat faulty or worn.	• Clean or replace-See **"MAINT. OF THE PUMP"**.
	• Nozzle setting incorrect or worn.	• Check nozzle adjustment or replace orifice in Vari-Nozzle, see parts list for correct size.
	• Worn seals in pump.	• Replace-See **"MAINT. OF THE PUMP"**.
	• Unloader not at maximum setting.	• Turn adjustment knob to maximum setting.
	• Insufficient time to fill supply line.	• Allow 20-30 seconds to fill supply line. Continue to run without setting pressure for 60 seconds to purge air from line.
• Fluctuating or pulsing pressure.	• Valves worn, dirty or stuck.	• Clean or replace-See **"MAINT. OF THE PUMP"-VALVES**.
	• Pump sucking air.	• Check that hoses and fittings are air tight.
	• Worn seals.	• Replace-See **"MAINT. OF THE PUMP"-SEALS**.
• Pressure drops after period of normal use.	• Nozzle worn.	• Replace.
	• Valves worn, dirty or stuck.	• Clean or replace-See **"MAINT. OF THE PUMP"-VALVES**.
	• Unloader valve seat worn or dirty.	• Clean or replace-See **"MAINT. OF THE PUMP"-UNLOADER**.
	• Worn seals.	• Replace-See **"MAINT. OF THE PUMP"-SEALS**.
• Pump noise.	• Pump sucking air.	• Check that hoses and fittings are air tight.
	• Valves worn or dirty.	• Clean or replace-See **"MAINT. OF THE PUMP"-SEALS**.
	• Worn bearings.	• Consult CAT PUMPS.
	• Water too hot.	• Reduce temperature-check seals and o-rings for wear. See **"MAINT. OF THE PUMP"-SEALS**.
• Presence of water in oil.	• High humidity in air.	• Change oil as needed.
	• Seals and oil seals worn.	• Replace-See **"MAINT. OF THE PUMP"-SEALS**.
• Water dripping from under pump or case.	• Seals worn.	• Replace-See **"MAINT. OF THE PUMP"-SEALS**. Excessive temperatures. DO NOT EXCEED 190°F (85°C).
	• O-rings worn.	• Replace-See **"MAINT. OF THE PUMP"-SEALS**.
	• Loose connection.	• Check all connections.
• Oil dripping.	• Oil seal worn.	• Consult CAT PUMPS.

TROUBLESHOOTING

Condition	Probable Cause	Solution
• Motor does not start when switched on.	• Plug not well connected or lack of power supply. • GFCI tripped. • Circuit breaker or fuse in house tripped. • Motor stopped while spraying.	• Check plug, cable and switch for snug connection. • Reset GFCI-See **"GROUND-FAULT CIRCUIT-INTERRUPTER"** • Disconnect other appliances on same circuit and reset circuit breaker. • Totally release trigger for 5 seconds and squeeze again.
• Motor stalls.	• Overheated. • Overloaded. • Motor failure. • Lack of cooling air flow.	• Allow motor to cool 10 minutes and use Reset located on side of unit. • Check facility for power overload or low voltage service. • Motor capacitor failure-replace. • Consult CAT PUMPS. • Remove blockages from bottom of case.
• Trigger will not move.	• Safety lock engaged.	• Release safety.
• Irregular water pressure or low water pressure.	• Injector drawing air. • Inadequate water supply. • Nozzle partially blocked or wrong size or worn. • Extension cord too small. • Seals worn.	• Adjust injector sleeve clockwise to increase flow. • Use proper inside diameter and length of garden hose. • Check water supply to assure sufficient delivery. • Remove nozzle and clean or select new nozzle to match desired flow and pressure. • Use 12 Gauge extension cord-See **"EXTENSION CORDS"** • Replace-See **"MAINT. OF THE PUMP"-SEALS**. Excessive temperatures. DO NOT EXCEED 190°F (85°C).
• Injector does not prime.	• Vari-Nozzle not set to low pressure. • Adjustment collar on chemical injector incorrectly adjusted. • Dried soap or other chemical buildup in injector. • Check-ball stuck. • Strainer blocked.	• Push forward on nozzle sleeve. • Turn knob fully counterclockwise then slowly clockwise to proper soap flow. • Blow compressed air into injector barb to free ball. • Clean or replace. • Clean strainer.
• Unloader cycles.	• Worn ball or valve.	• Clean or replace ball and valve assembly.
• Liquid leaking from bottom fitting.	• O-ring on by-pass fitting cut or worn.	• Replace with o-ring from kit.
• Liquid leaking from under case.	• O-ring for unloader piston retainer worn or cut. • O-ring for unloader piston stem worn or cut.	• Replace with o-ring from kit. • Replace with o-ring from kit.
• Unloader will not come up to pressure.	• Foreign material in unloader. • Piston stem o-rings worn. • Nozzle worn.	• Clean unloader and reassemble. • Replace with o-ring stem kit. • Replace with nozzle sized to system flow.
• Extreme pressure spikes.	• Adjusting cap turned completely into unloader. • Restricted by-pass.	• Back off and gradually turn in to set system pressure. • Replace by-pass hose with identical length and inside diameter.

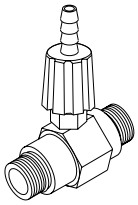
ACCESSORIES

Standard Accessories



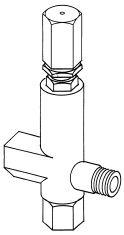
PRESSURE GAUGE

Easy-to-read glycerine filled pressure gauge to permit pressure adjustments to meet exact spraying or cleaning needs and to monitor system performance. **6096**



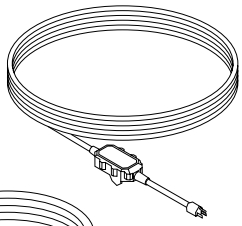
ADJUSTABLE CHEMICAL INJECTOR

Adjustment collar over barb permits chemical and cleaning solution application at operator selected intensity. Optional stainless steel construction for extended life.
2X1000, 2X1500 .....**7193**
3X1000 .....**7194**



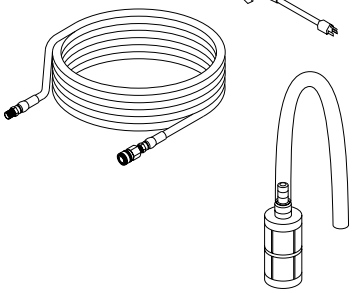
UNLOADER

Adjustable pressure regulating Unloader permits the setting and maintaining of system pressure from 100 to 2000 for optimum performance. 100-2000 PSI **7500S**



ELECTRICAL CORD

35 foot electrical cord featuring a Ground-Fault Circuit-Interrupter for protection and maximum safety during operation.
2X1000HT (15 Amp, 110-115V) **34520**
2X1500HT, 3X1000HT (20 Amp, 110-115V) **34521**
3X1500HT, 2X2000HT (15 Amp, 208-230V) **34277**

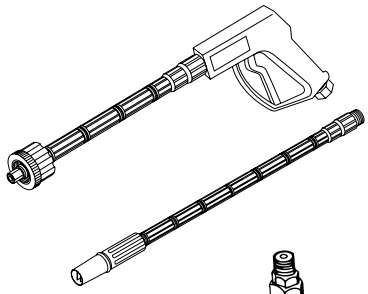


HIGH PRESSURE HOSE

30 foot high pressure hose with swivel and quick disconnect for ease in operation and assembly. Common to all models.
Standard.....**34374**
Optional.....**34385**
Hose-to-Hose Q.D.....**34380**

CHEMICAL HOSE

3 foot clear plastic chemical hose easily slips over the chemical injector barb to visually monitor chemical draw. With weighted filter (32631) to hold chemical tube at bottom of supply container and prevent debris from being drawn into injector. **34669**

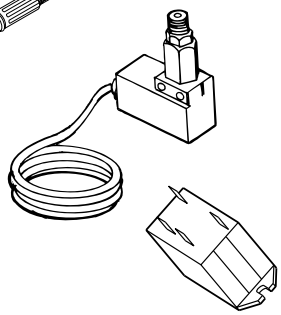


SHUT-OFF GUN

Lightweight Shut-Off Gun with molded extension and quick coupling allows easy assembly and quick changes to many optional accessories. Common to all models. **36130.220**

VARI-NOZZLE

Adjustable Vari-Nozzle with extension features low to high pressure, as well as 0° to 60° spray angle for chemical and cleaning flexibility with extension for quick assembly.
2X1500HT **7930.521**
2X1000HT **7935.521**
3X1000HT **7950.521**
2X2000HT **7930.521**
3X1500HT.....**36666.521**



PRESSURE SWITCH

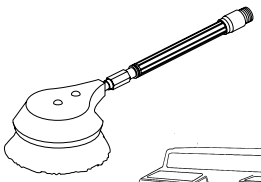
Dual Pressure Switches work with Mechanical Relay to automatically shut unit off when trigger is released [shut-off].
215 PSI.....**31615**
360 PSI.....**31625**

MECHANICAL RELAY

Mechanical relay shuts motor down when trigger is released or no flow is delivered to unit.
120V.....**34542**
220V.....**34543**

ACCESSORIES

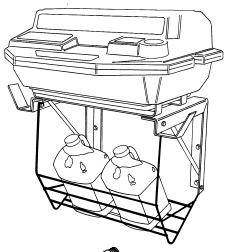
Optional Ambient Temperature Accessories



ROTATING BRUSH

Low pressure rotating brush with extension to agitate stubborn stains and dirt before blasting with high pressure. 32156 uses #3 Nozzle for 3X1000HT. 34456 uses #2 Nozzle for 2X1000HT, 2X2000HT, 2X1500HT, 3X1500HT. MAXIMUM 285 PSI.

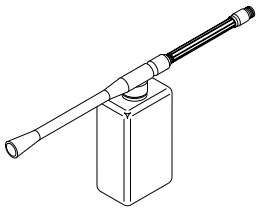
Nylon **32156.521, 34456.521**



WALL MOUNT

Wall mount kit for stationary, out-of-the-way operation or convenient storage. Common to all models.

Wall Mount **34115**
Chemical Rack **34807**



FOAM LANCE KIT

Lance extension with chemical dispenser and unique agitator sprays thick foam, adhering to surface for added cleaning action.....**34595.521**

JETTER HOSE WITH TRI-JET NOZZLE

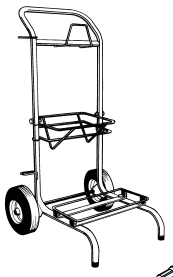
Blasts dirt from pipe walls and flushes pipe clean with three-way power spray action. Optional 30 or 50 foot hose.

30 ft. Hose **34643**
50 ft. Hose **34644**

SANDBLASTER

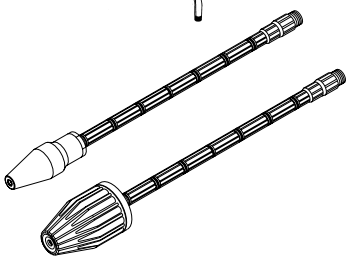
Extension, sand probe and 15 foot hose provides discharge line induction of sand, fertilizer, grass seed and other granular substances for special surface treatment.

2X1000HT **34660**
2X1500HT, 2X2000HT.....**34661**
3X1000HT, 3X1500HT **34663**



INDUSTRIAL CART

Offers convenient transporting and storing. Two-wheel heavy duty construction with chemical rack, gun holder and cleaning system case basket. Common to all models. **34700**



TURBO NOZZLE

Turbo Nozzle with extension converts 0° blasting penetration to a 25° spinning action to cut through the toughest grime.

4.5 nozzle.....**7265.45.521**
5.5 nozzle.....**7270.55.521**

1681 - 94th Lane N.E., Minneapolis, MN 55449
Phone: 763-780-5440 Fax: 763-780-2958 www.catpumps.com

PN 34912
Rev. F 4/03