



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 the factory.

SEND PREPAID to Cat Pumps, 1681 - 94th Lane N.E., Minneapolis, MN 55449 or call 612-780-5440 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. Fluid 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:

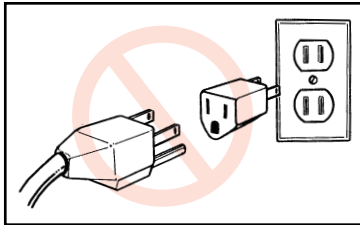
IMPORTANT: This manual should be read and understood thoroughly before assembly and operation of this High Pressure Cleaning System. Keep this manual available for future reference in servicing or ordering parts or accessories.

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

RULES FOR SAFE OPERATION

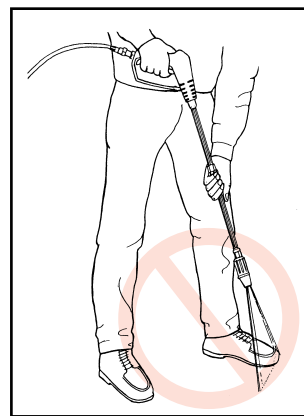
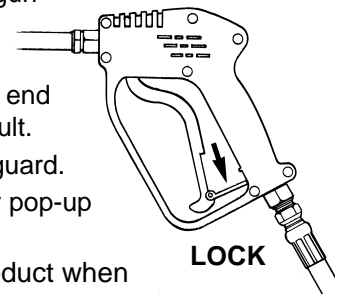
▲ WARNING ▲
Risk of shock or electrocution.

- 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 immediately or call:

EMERGENCY MEDICAL HOTLINE
1-800-228-5635.

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

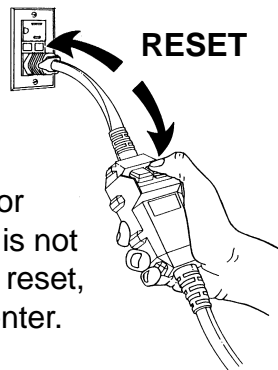
electrician or service person if you are in doubt as to whether the outlet is properly grounded. Do not modify the plug provided with the product—if it will not fit the outlet, have a proper outlet installed by a qualified electrician. Do not use any type of adapter with this product.

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

▲ WARNING ▲

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

Use only 3-wire extension cords that have 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.

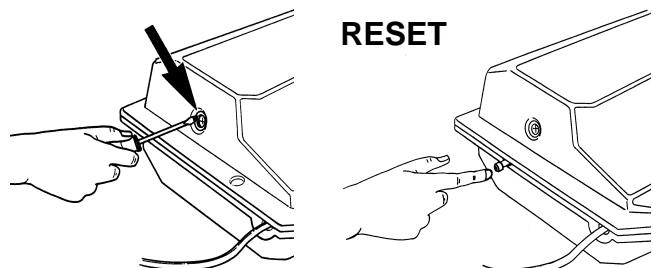
Model	Extension Cord Length	
	up to 50 feet	50 to 100 feet
2X1000HT	14 AWG	12 AWG
2X1500HT	12 AWG	10 AWG
2X2000HT	N/A	N/A
3X1000HT	12 AWG	10 AWG
3X1500HT	N/A	NA

Extension cords are not recommended 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

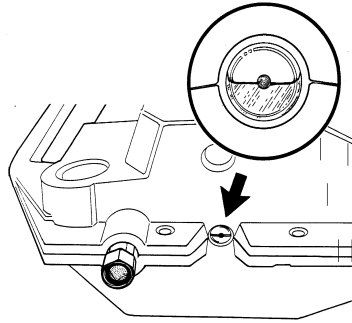
The molded case of this cleaning system is not watertight. In case of accidental submersion, case must be opened and all internal components thoroughly dried. Pump crankcase should be drained and fresh oil added. See “LUBRICATION” for additional information.

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.

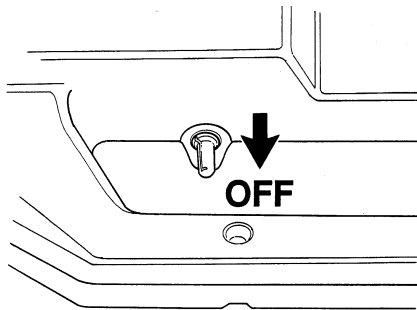
The unit is shipped slightly overfilled. Tip case to see air bubble before operation.



CAUTION

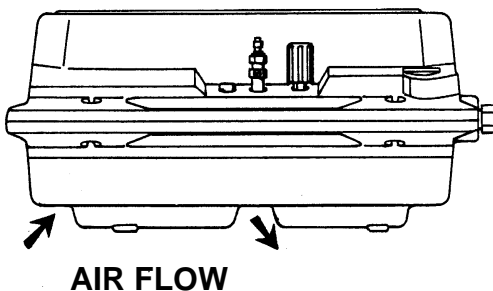
Lack of proper lubrication will result in severe damage to pump. Visually check oil before each use.

Be sure the power switch is in the "OFF" position.

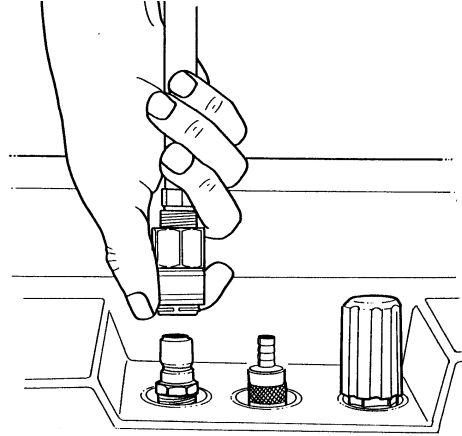


CAUTION

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.



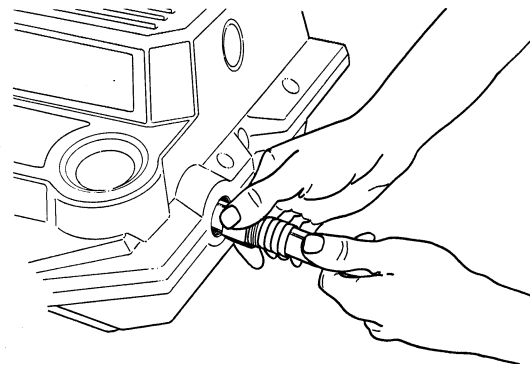
Attach the high pressure hose quick-disconnect to the discharge nipple on the top of the case by pulling back the collar and pressing over the nipple. Push down until it snaps into position.



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 fluid to 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.).

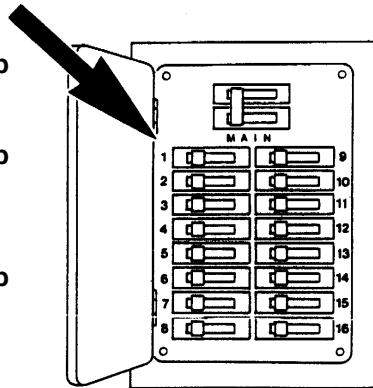
CAUTION

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

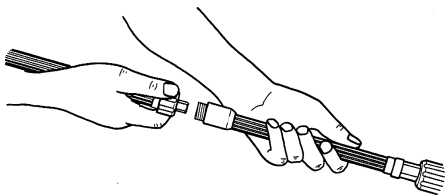
110V-115V, 15 amp
2X1000HT

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

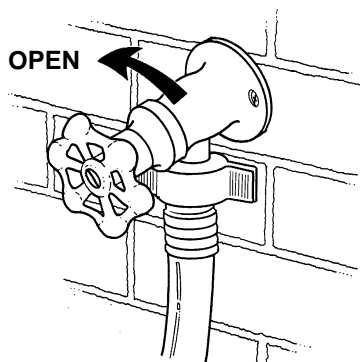
208V-230V, 15 amp
2X2000HT
3X1500HT



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.

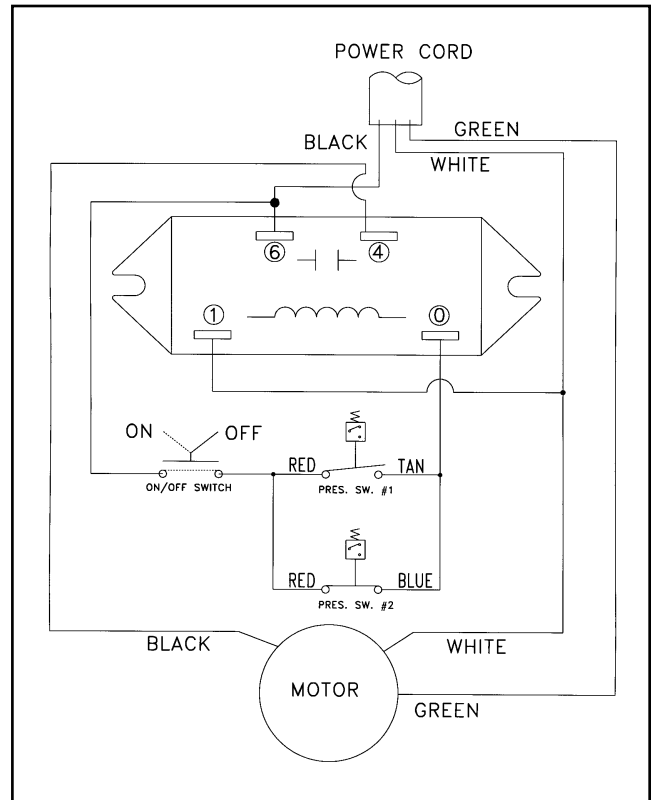
The Pressure Switches and Relay will automatically shut the unit off when the gun trigger is released (shut off).

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



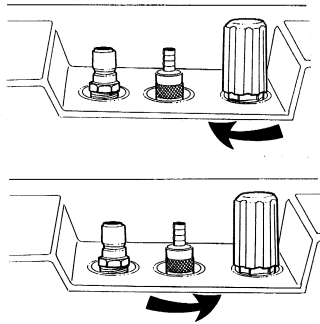
OPERATION

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.

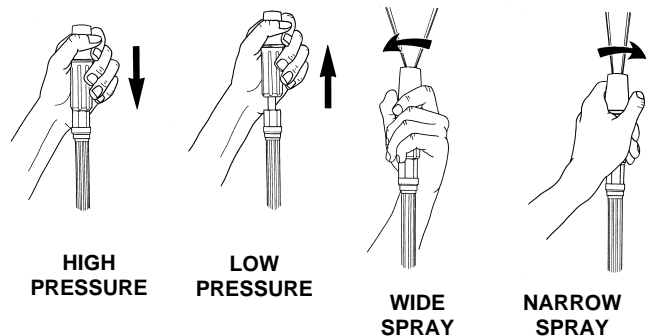
To set or adjust pressure, rotate the unloader adjustment knob, marked "PSI" on the top of the case clockwise to increase pressure and counterclockwise to decrease pressure. **Make all**

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.



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.

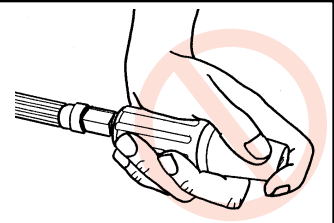
Make high to low pressure adjustments with gun off or trigger released.

CAUTION

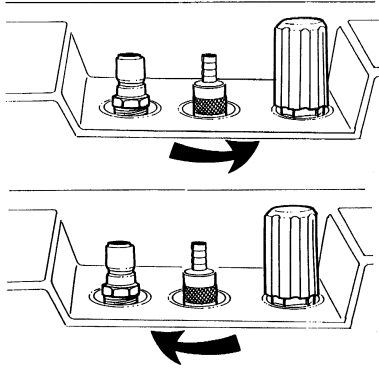
The maximum operating pressure of your cleaning system has been secured at the factory with a Locking Collar. Tampering or removal of the Locking Collar on the unloader valve will VOID THE WARRANTY.

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.

▲ **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

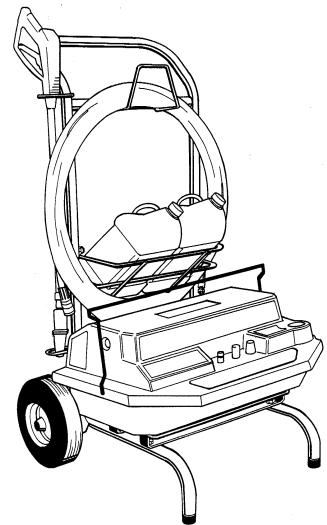
Follow these safety steps when you are done using your Cleaning System:

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

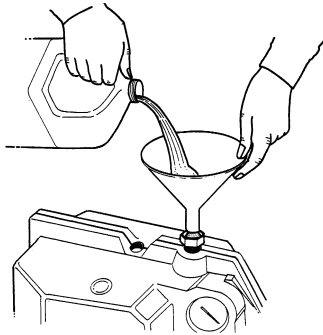
Do not store unit in unheated areas during cold weather. Severe damage can occur if water freezes in unit. If near or below freezing conditions cannot be avoided, unit must be protected from freezing.

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

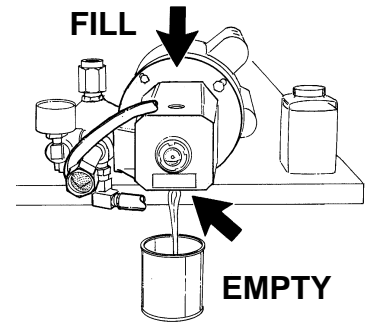
Keep crankcase filled to proper level (11 oz. capacity) with Cat Pumps special formula Premium 10W30 Grade Non-Detergent **Hydraulic** oil. Cat Pumps oil contains anti-wear and anti-rust inhibiting additives for maximum protection and cool running. **Do not use motor oil.** Annual oil changes are recommended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

CAUTION

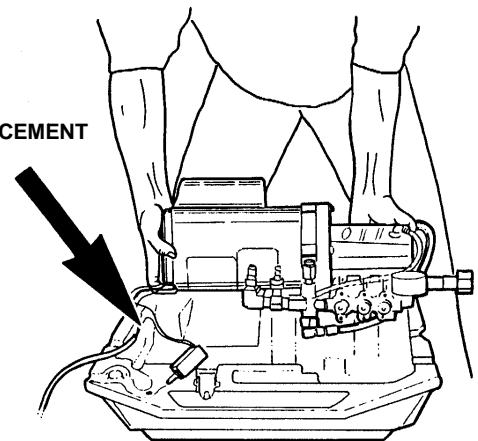
The top half of the case must be removed to add oil and the pump must be completely removed from case to drain oil. See Tech Bulletin 001 for additional instructions.

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

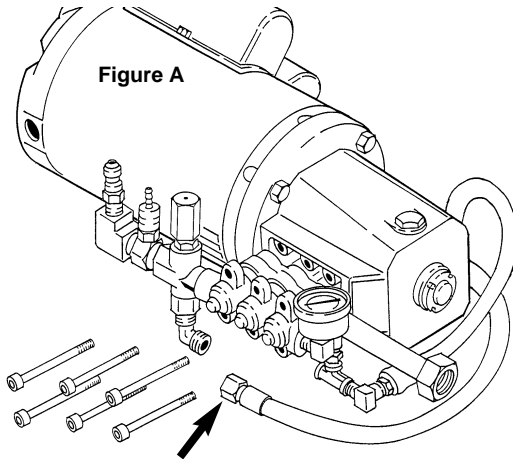


10. Ensure that the foam seals on the unloader, injector and discharge ports are in place.
11. Replace upper case half.
12. Replace all cover screws, using the two shortest in the handle area.
13. Push on injector knob and suction tube.
14. Place spring in unloader with metal insert down. Screw on unloader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

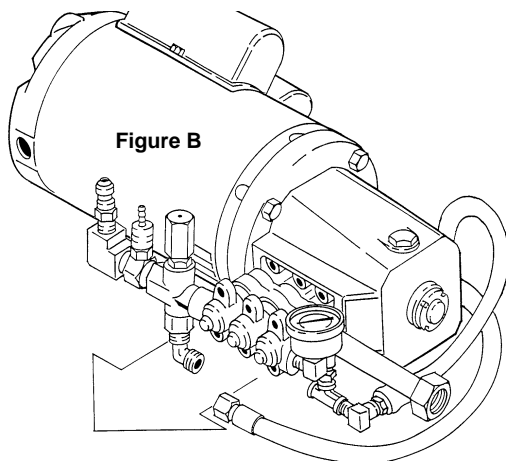
MAINTENANCE OF THE PUMP

DISASSEMBLY OF THE DISCHARGE VALVE ASSEMBLY

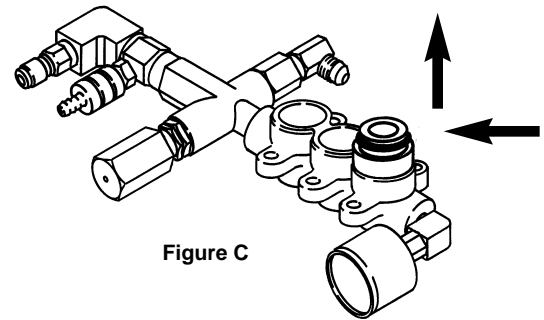
1. Remove pump and motor assembly from case and drain oil from crankcase of pump.
2. Disconnect by-pass hose from the bottom unloader by-pass fitting. (Figure A)



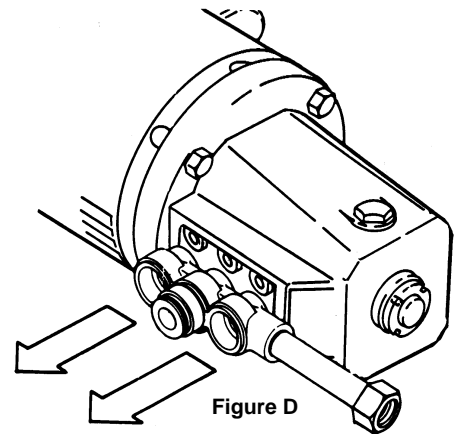
3. With a standard M6 allen wrench remove the six (6) socket head screws from the manifold. (Figure A)
4. Remove discharge manifold by tapping backside of manifold on opposite sides with a soft mallet. Support manifold and unloader assembly from underside and pull away from crankcase. (Figure B)



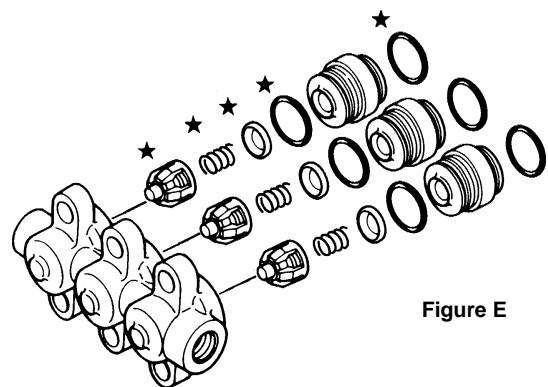
5. The discharge adapter-seats may stay with either the discharge or inlet manifold. By inserting two opposing screwdrivers between adapter-seats and manifold you can easily pry them out of the discharge manifold. (Figure C)



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

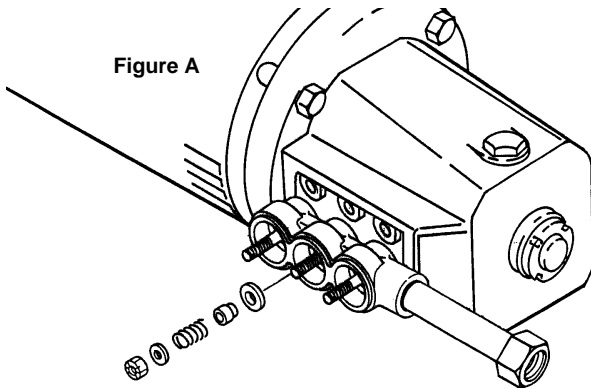


6. The valve assemblies are in the discharge manifold ports and will fall out when manifold is turned over. A complete valve assembly includes: (★) retainer, spring, valve, and o-ring. (Figure E)

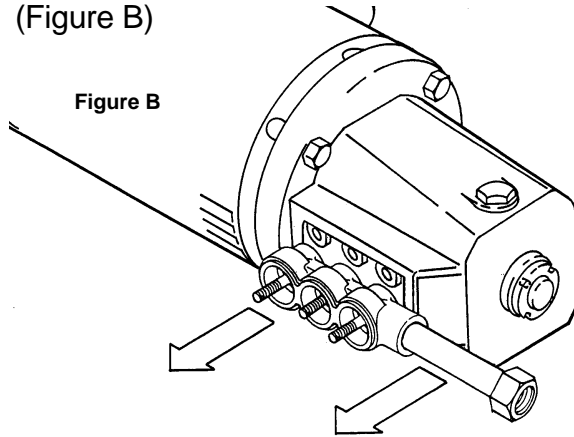


DISASSEMBLY OF THE SEAL ASSEMBLY

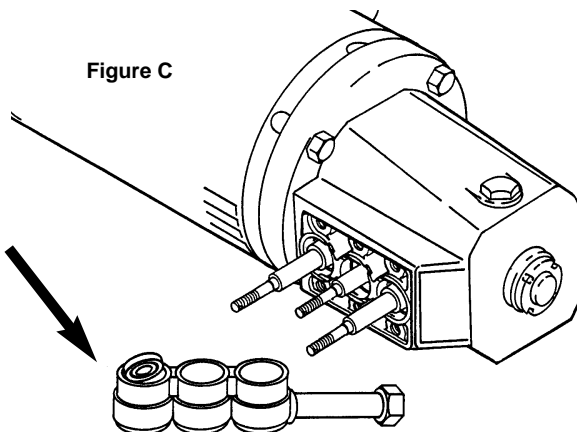
1. Next remove the inlet valve assembly from the exposed plunger rod ends, including nut, washer, spring, spacer and inlet valve. (Figure A)



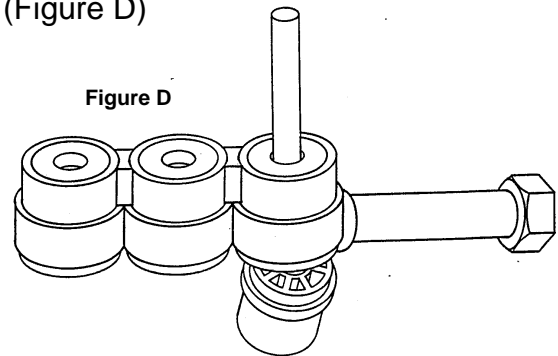
2. Grasp the inlet manifold from the front and underside and with a gentle up and down motion, pull away from crankcase. (Figure B)



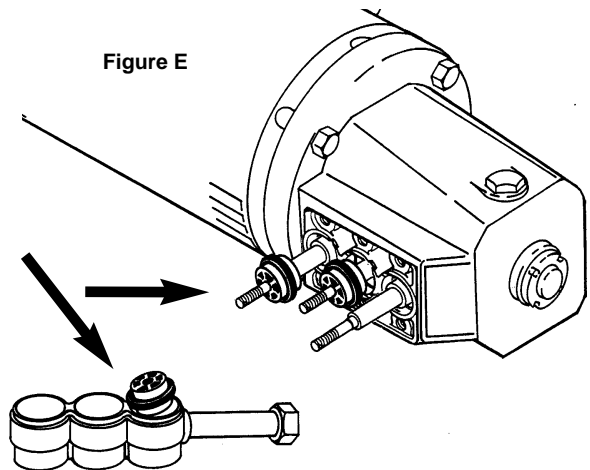
3. Carefully examine back side of low pressure seal before removing from manifold as it will be damaged during removal. If worn, insert screwdriver into inside diameter (I.D.) of seal and pry out. Exercise caution to avoid damage to the inlet manifold. (Figure C)



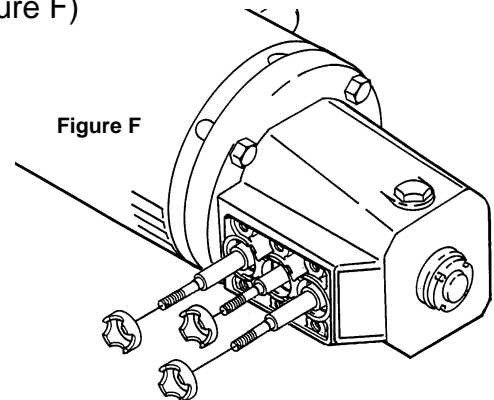
4. Next remove ceramic plunger with thumb or soft tool from backside of inlet manifold. (Figure D)



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)

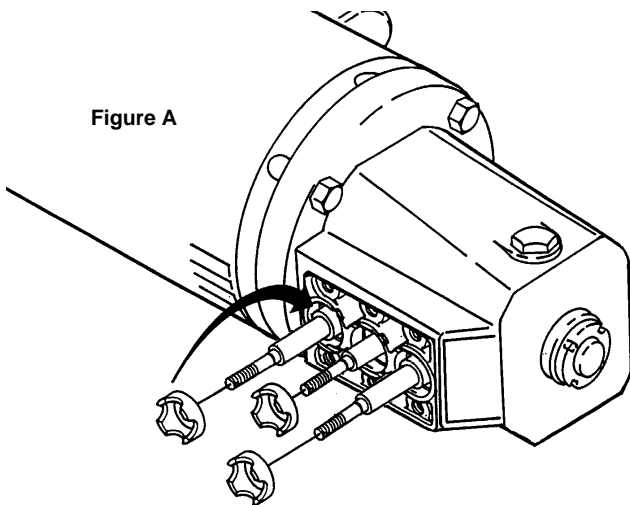


6. Remove seal retainers from crankcase by grasping tab with pliers and pulling out. Examine crankcase oil seal to determine if crankcase servicing is needed. Consult local distributor or factory if drive end servicing is needed. Also see "**MAINTENANCE OF THE CRANKCASE**" section. (Figure F)



REASSEMBLY 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)



2. Place inlet manifold on work surface with **small I.D. ports up**. (Figure B)

3. Lubricate new low pressure seal and press into position in the manifold chambers with **garter spring down**. (Figure B)

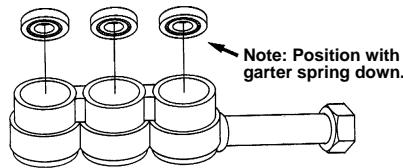


Figure B

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**

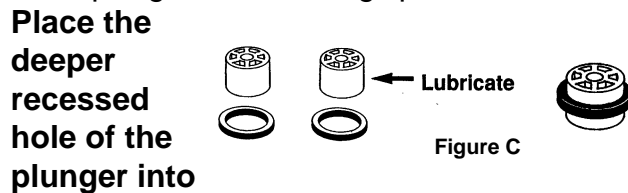


Figure C

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)

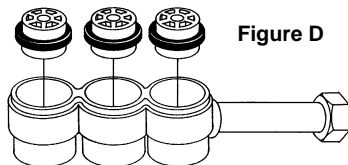


Figure D

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

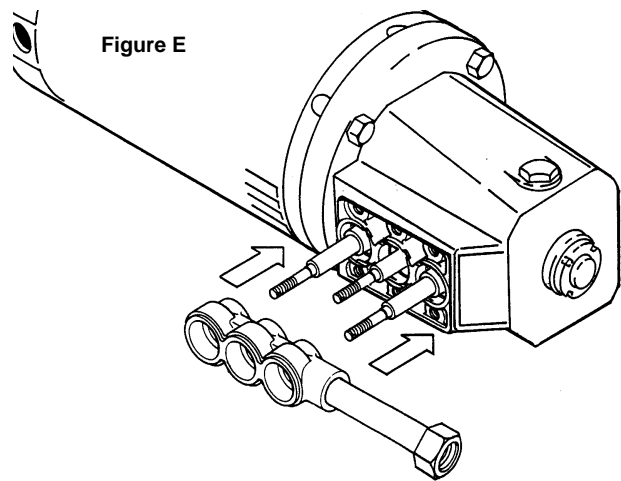


Figure E

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)

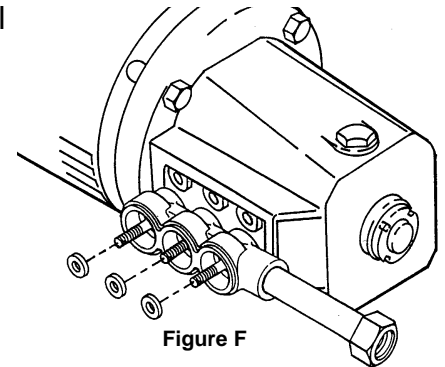


Figure F

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)

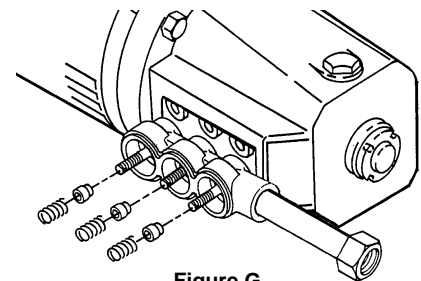


Figure G

10. Install washers next with **concave side toward manifold**.

11. Next install nuts and torque to specifications in **TORQUE CHART**. (Figure H)

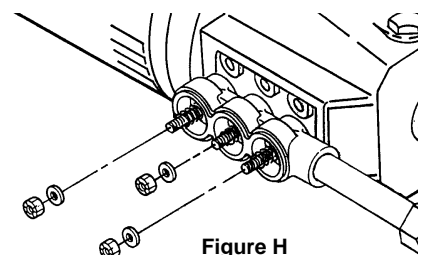
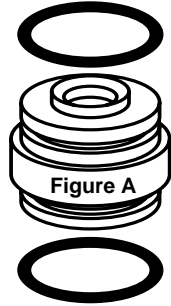


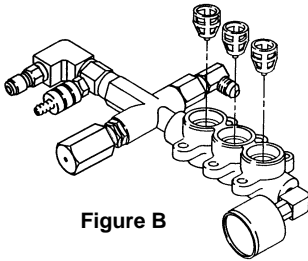
Figure H

REASSEMBLY 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)

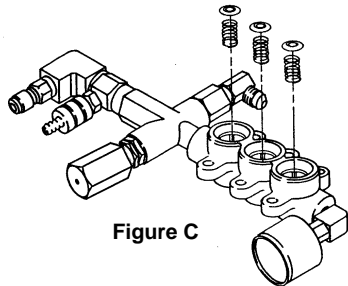


2. Place discharge manifold on work surface and install valve retainers in each port with top tab down and completely seat into the chamber. (Figure B)

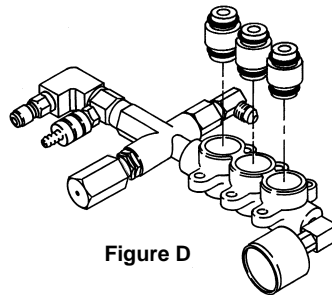


3. Replace worn or damaged springs and place into retainers.
4. Examine valves and seats for pitting, grooves or wear and replace as needed.

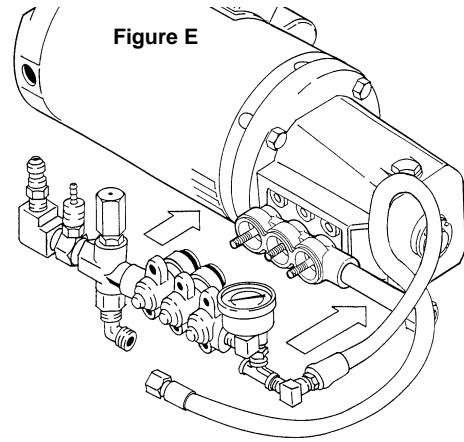
5. Place valves over springs with **concave side down**. (Figure C)



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



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



8. Replace six (6) socket head screws and torque to specifications. See **TORQUE CHART** below. Torque diagonally in order shown. The outer four (4) screws, then center two (2), hand tight. Then repeat series to specifications. (Figure F)

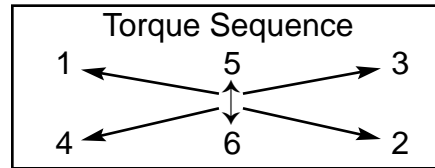


Figure F

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)

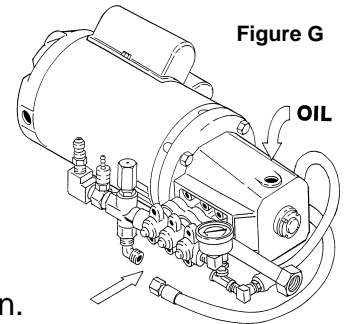


Figure G

Torque Chart

Pump Item	Thread	Tool Size	Torque		
			in.lbs.	ft.lbs.	Nm
Outer Bearing Case (Prior to Mfg. date 1/90)	M6x16	M10	55	4.4	6.2
Inner Bearing Case	M6x16	Phillips	55	4.4	6.2
Manifold Socket Head Screws	M8x75	M6	115	9.4	13
Plunger Rod Nuts	M6	M10	55	4.4	6.2
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 factory 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 the factory or a qualified technician for assistance.

If the unit does not start when the trigger is squeezed, there is not adequate fluid 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.

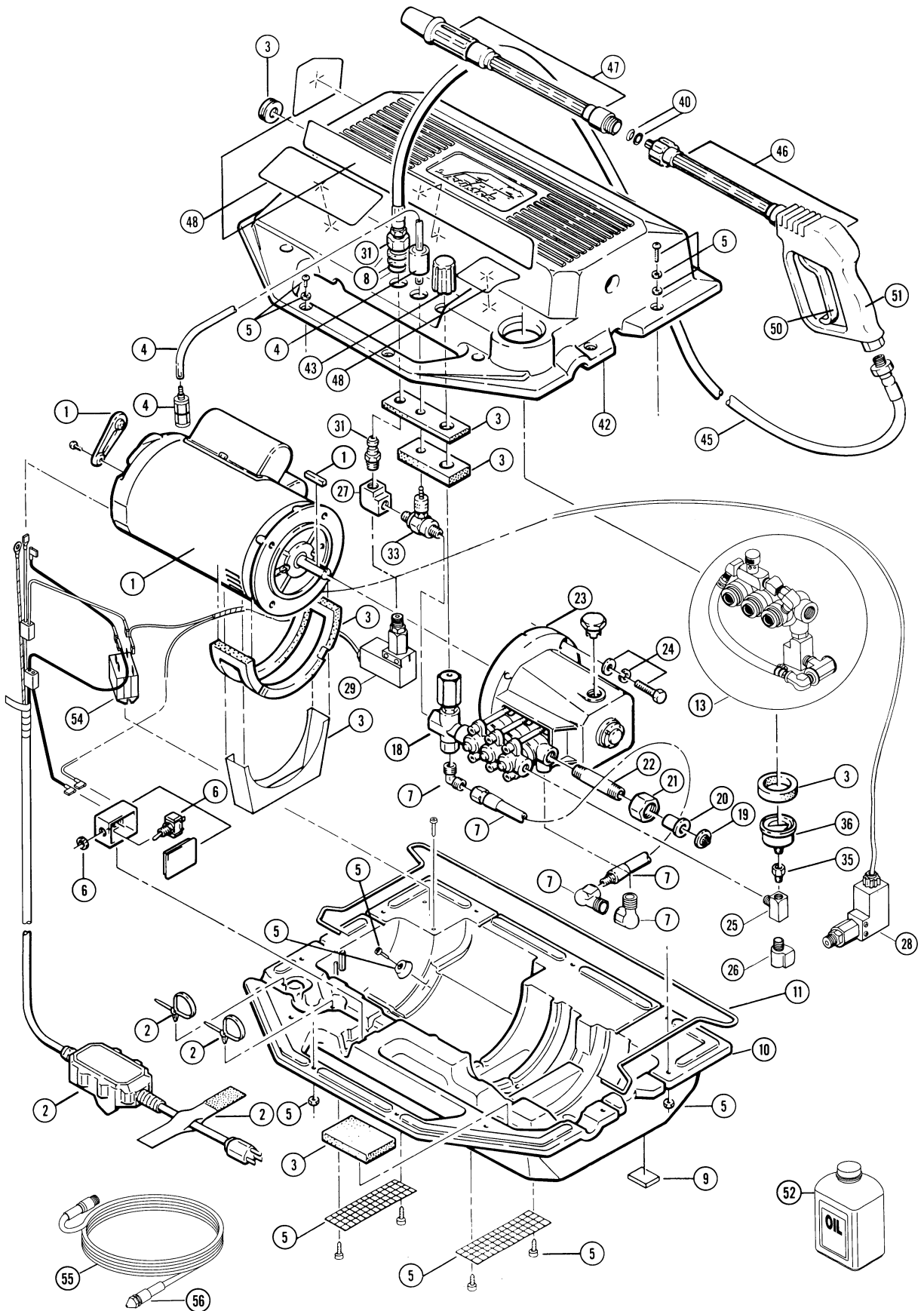
CLEANING SYSTEM PARTS LIST

ITEM	PART NO.					DESCRIPTION	QTY.
	2X1000HT	2X1500HT	2X2000HT	3X1000HT	3X1500HT		
1	34691	34690	34791	34690	34791	Motor Kit	1
2	33521	33522	33523	33522	33523	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	33659	33659	33659	33659	33659	Pressure Switch, 170 PSI	1
★ 29	32660	32660	32660	32660	32660	Pressure Switch, 350 PSI	1
31	34667	34667	34667	34667	34667	Quick Disconnect Assembly (Hose-to-Unit)	1
★ 33	7123	7123	7123	7124	7124	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	32120.220	32120.220	32120.220	32120.220	32120.220	Custom I Gun w/Extension	1
★ 47	36665.521	36664.521	36664.521	36668.521	36666.521	Extension w/Vari-Nozzle	1
50	32401	32401	32401	32401	32401	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 - 110V	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	35634	35634	35634	35634	35634	Tri-Jet Nozzle	1

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

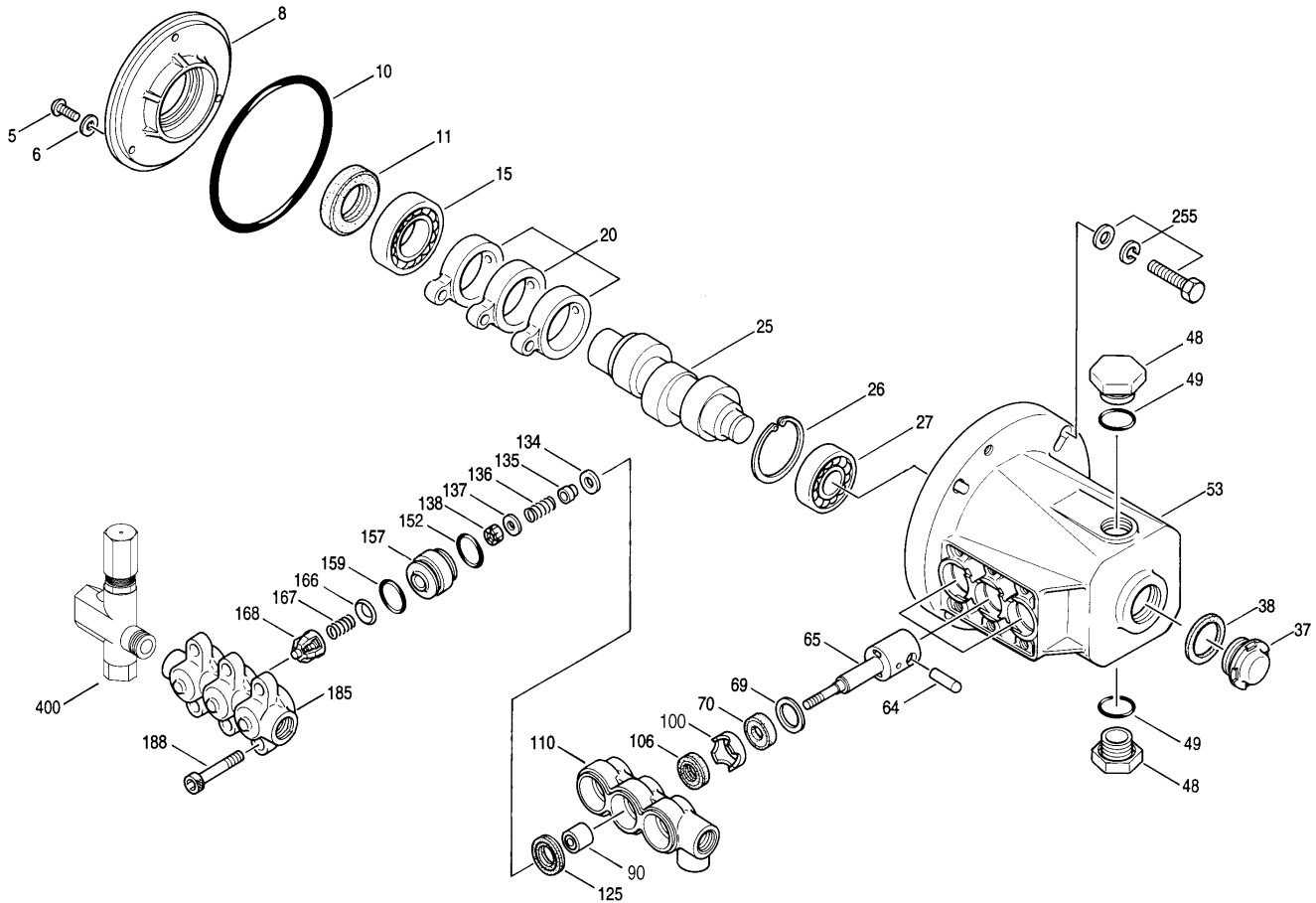
CLEANING SYSTEM EXPLODED VIEW

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



EXPLODED VIEW

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



PARTS LIST

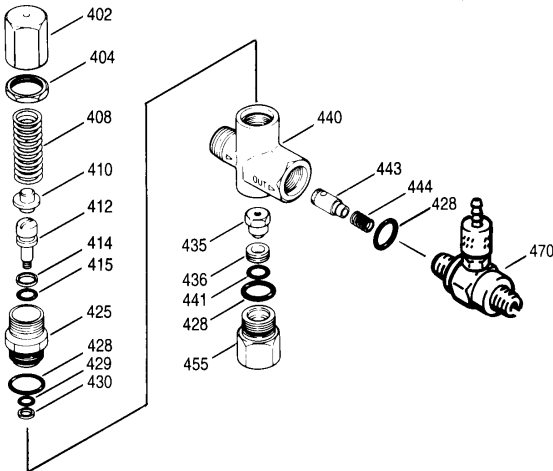
Item	Part No.	Description	Model Used	Qty.	Item	Part No.	Description	Model Used	Qty.
5	89551 Z	Phil. Head Screw (M6 x 16)	All Models	3	135	44871 S	Spacer	All Models	3
6	150810 B	Seal Washer (M6)	All Models	3	136	44872 S	Inlet Valve Spring	All Models	3
8	44857 A	Bearing Case, Inner	All Models	1	137	88575 S	Conical Washer (M6)	All Models	3
10	14044 B	O-Ring, Bearing Case	All Models	1	138	81240 S	Nut (M6)	All Models	3
11	44859 B	Oil Seal	All Models	1	152	23172 B	O-Ring, Adapter	All Models	3
15	14488	Bearing, Inner	All Models	1	157	45859 BB	Discharge Adapter-Seat	Standard HT Models	3
20	44863	Connecting Rod	All Models	3	45923 BB	Discharge Adapter-Seat	Pulsator Models	2	
25	45092	Crankshaft - 3450 RPM	2LIDX20EHT	1	45923T BB	Discharge Adapter-Seat	Pulsator Models	1	
	44929	Crankshaft - 3450 RPM	2LIDX22ESHT	1	159	23172 B	O-ring, Adapter	All Models	3
	44931	Crankshaft - 3450 RPM, Tapped End (M8 x 1.25mm)	2LIDX30EHT, 2LIDX30ESHT	1	166	43723 S	Valve	All Models	3
26	12385	Retaining Ring	All Models	1	167	43360 S	Valve Spring	All Models	3
27	15710	Bearing, Outer	All Models	1	168	44565 P	Valve Spring Retainer	All Models	3
37	43987	Bubble Oil Gauge	All Models	1	185	45724 BB	Discharge Manifold (1/8" NPT and 3/8" NPT Ports)	All Models	1
38	44428 B	Flat Flex. Gasket, Oil Gauge	All Models	1	188	87859 Z	Hex Socket Head Screw (M8x75)	All Models	6
48	44842	Drain Plug - 1/2" NPT	All Models	2	255	30517	Bolt Mount Kit	All Models	1
49	14179 B	O-Ring, Drain Plug	All Models	2		30980	Flat Washer - 3/8"		4
53	541018 A	Crankcase	All Models	1		30921	Split Lock Washer - 3/8"		4
64	16948 S	Piston Rod Pin	All Models	3		34100	Hex Bolt (3/8"-16 x 1-3/8")		4
65	540073	Piston Rod	All Models	3		6106	Antiseize Lubricant		1
69	20017 S	Washer	All Models	3		30050	Key (3/16 x 3/16 x 1-1/4")		1
70	25461 B	Oil Seal	All Models	3	306	33953	Seal Kit (Incls: 106,125,152)	All Models	1
83	44869 P	Seal Retainer	All Models	3	307	34668	Inlet Valve Kit	All Models	1
106	44876 B	Lo-Pressure Seal	All Models	3			(Incls: 134,135,136,137,152,159)		
110	44874 BB	Inlet Manifold	All Models	1	310	34056	Valve Kit	Standard HT Models	1
124	44870 C	Plunger	All Models	3			(Incls: 157,159,166,167,168)		
125	46652 S	Hi-Pressure Seal, Hi-Temp	All Models	3	400	7500S	Unloader	All Models	1
134	33873 P	Inlet Valve	All Models	3					

Material Codes (Not Part of Part Number) A=Aluminum B=Buna-N BB=Brass C=Ceramic P=PVDF S=304SS Z=Zinc Plated

• Effective with 1/90 mfg. date PN 45853, 14036, 44861, 92519 have been replaced with new one piece crankcase.

•• Effective with 6/92 mfg. date Cotterpin was eliminated.

PRESSURE REGULATING UNLOADER MODEL 7500S



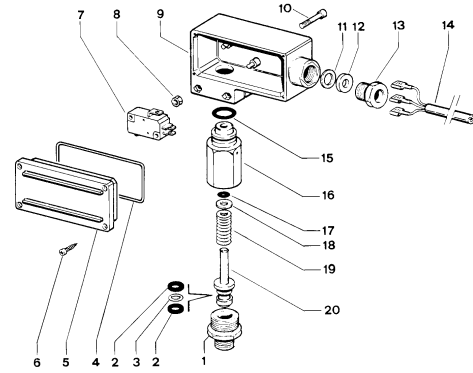
PARTS LIST

Item	Part No.	Description	Qty.
402	540081	BB Hex Adjusting Cap	1
404	31047	Locking Nut	1
408	32094	Coil Spring	1
410	107672	BB Spring Retainer	1
412	45694	B Piston Stem (M5)	1
414	20184	T Back-up Ring	1
415	14190	B O-Ring, Piston Stem	1
425	107673	BB Piston Retainer	1
428	13969	B O-Ring, Piston Guide	3
429	14759	B O-Ring, Piston Body	1
430	107675	T Back-up Ring	1
435	45696	S Valve and Ball Assembly (M5)	1
436	107680	S Valve Seat	1
440	—	BB Body	1
441	13963	B O-Ring, Valve Seat	1
443	541060	Flow Balancer w/O-Ring	1
444	45924	Spring - 85 G	1
455	45695	BB By-Pass Fitting - 3/8" F	1
—	32097	B O-Ring Kit (Incls: 414,415,428,429,430,441)	1
470	7123/7124	Chemical Injector	1

SPECIFICATIONS

	U.S. Measure	Metric Measure
GPM	5-6.0 GPM	(2-23 L/M)
PSI	100-2000 PSI	(7-140 BAR)
Inlet port - Rear	3/8" NPT	(3/8" NPT)
Discharge port - Front	M18 x 1.0	(M18 x 1.0)
By-Pass port - Bottom	3/8" NPT	(3/8" NPT)
Weight	14 oz.	(0.43L)
Dimensions	3.0" x 1.0" x 4.25"	(76 x 25 x 108mm)

PRESSURE SWITCH MODELS 33659, 32660



PARTS LIST

Item	Part No.	Description	Qty.
1	—	SS Inlet Fitting 1/4"	1
2	33586	T Back-up Ring, Stem	2
3	33557	V O-Ring, Stem	1
4	—	B Square O-Ring, Cover	1
5	—	P Cover	1
6	—	S Screw (M2.2 x 9.5)	4
7	32861	Micro Switch (350 PSI)	1
—	—	Micro Switch (700 PSI)	1
8	—	Z Nut (M4)	2
9	—	P Case	1
10	—	Z Screw (M4 x 22)	2
11	—	S Washer	1
12	—	B Seal	1
13	—	BB Nut	1
14	—	★ Cable, 3-wire	1
15	33576	B O-Ring, Housing	1
16	—	BB Housing	1
17	33556	B O-Ring, Stem	1
18	—	Z Washer, Stem	1
19	32361	SS Spring (350 PSI)	1
—	32360	SS Spring (700 PSI)	1
—	34657	SS Spring (170 PSI)	1
20	—	SS Stem	1
—	32862	O-Ring Kit (Incls: 2, 3, 15, 17)	1

★ Normally Closed - Red and Blue Normally Open - Red and Tan

SPECIFICATIONS

	U.S. Measure	Metric Measure
Max. System Pressure	3550 PSI	(250 BAR)
Switch Engine Pressure	Model 32660.....350 PSI Model 33659.....170 PSI	(25 BAR) (12 BAR)
Voltage	12-250 Volts	(12-250 Volts)
Max. Amperage	6 Amps	(6 Amps)
Max. Temperature	194°F	(90°C)
Inlet Fitting	1/4" NPT	(1/4" NPT)
Weight	10.0 oz.	(0.280 kg)
Dimensions	3.5" x 3.5" x 1.38"	(89 x 89 x 35 mm)

ADJUSTABLE CHEMICAL INJECTOR

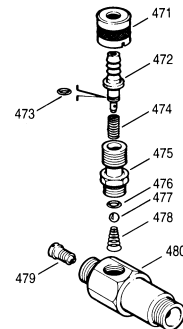
PARTS LIST

Item	Part No.	Description	Qty.
471	—	BB Adjustment Collar	All Models 1
472	—	BB Hose Barb	All Models 1
473	33503	B O-Ring	All models 1
474	33500	S Spring	All Models 1
475	33506	BB Ball Seat Retainer	All Models 1
476	33504	V 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)	7123 1
—	32374	S Injector Orifice (2.3mm)	7124 1
480	—	BB Body-Unloader Mount	All Models 1

B=Buna-N BB=Brass P=Nylon S=304SS SS=316SS V=Viton T=Teflon

SPECIFICATIONS

	7123	7124
GPM	2 GPM	3 GPM
Nozzle Orifice	2.1 mm	2.3 mm
Hose Barb	1/4"	1/4"
Inlet port	M18 x 1.0	M18 x 1.0
Discharge port	3/8" NPTM	3/8" NPTM
Weight	6.3 oz.	6.3 oz.
Dimensions	2 x 1 x 3"	2 x 1 x 3"



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 Friction Loss)		Hi-Pressure Nozzle "Deduction" (Pressure drop across injector)	
			Max. Hose Draw (0 PSI Downstream)	Max. Chemical Draw (0 PSI)	Max. Chemical Draw (0 PSI)	"Deduction" (Pressure drop across injector)
2X1000	2.1 mm std.	7123	100 PSI	50 oz. / min	75 PSI	75 PSI
2X1500	2.1 mm std.	7123	100 PSI	50 oz. / min	75 PSI	75 PSI
3X1000	2.1 mm opt.	7123	225 PSI	50 oz. / min	150 PSI	150 PSI
3X1250	2.3 mm std.	7124	150 PSI	50 oz. / min	125 PSI	125 PSI

TROUBLESHOOTING

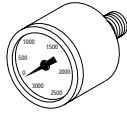
Condition	Probable Cause	Solution
<ul style="list-style-type: none"> Unit will not start when gun is triggered. 	<ul style="list-style-type: none"> GFCI tripped. Unit is turned off. Unit unplugged. Relay for Flow switch malfunction. Insufficient flow to unit. Circuit breaker or fuse tripped. Motor hums but does not run. Incorrect extension cord. 	<ul style="list-style-type: none"> Reset GFCI-See “GROUND-FAULT CIRCUIT-INTERRUPTER PROTECTION”. Check on/off switch. Be certain to use 20 amp circuit. Check voltage at relay with voltmeter or circuit tester. (Qualified Technician only.) DO NOT STARVE UNIT. Minimum 30 PSI inlet water pressure. Disconnect other appliances on this circuit. Insufficient voltage, check for 15/20 Amp. See “EXTENSION CORDS”.
<ul style="list-style-type: none"> Motor stopped while spraying. 	<ul style="list-style-type: none"> Interruption in power (volts to unit). 	<ul style="list-style-type: none"> Totally release trigger for 5 seconds and squeeze again.
<ul style="list-style-type: none"> Pump runs but pressure does not achieve rated values. 	<ul style="list-style-type: none"> Air leak in inlet plumbing or pump sucking air. Pressure gauge inoperative. Valves worn or dirty. Unloader valve seat faulty or worn. Nozzle setting incorrect or worn. Worn seals in pump. Unloader not at maximum setting. Insufficient time to fill supply line. 	<ul style="list-style-type: none"> Check that hoses and fittings are air tight. Check and replace gauge. Clean or replace-See “MAINT. OF THE PUMP”. Clean or replace-See “MAINT. OF THE PUMP”. Check nozzle adjustment or replace orifice in Vari-Nozzle, see parts list for correct size. Replace-See “MAINT. OF THE PUMP”. Turn adjustment knob to maximum setting. Allow 20-30 seconds to fill supply line. Continue to run without setting pressure for 60 seconds to purge air from line.
<ul style="list-style-type: none"> Fluctuating or pulsing pressure. 	<ul style="list-style-type: none"> Valves worn, dirty or stuck. Pump sucking air. Worn seals. 	<ul style="list-style-type: none"> Clean or replace-See “MAINT. OF THE PUMP”-VALVES. Check that hoses and fittings are air tight. Replace-See “MAINT. OF THE PUMP”-SEALS.
<ul style="list-style-type: none"> Pressure drops after period of normal use. 	<ul style="list-style-type: none"> Nozzle worn. Valves worn, dirty or stuck. Unloader valve seat worn or dirty. Worn seals. 	<ul style="list-style-type: none"> Replace. Clean or replace-See “MAINT. OF THE PUMP”-VALVES. Clean or replace-See “MAINT. OF THE PUMP”-UNLOADER. Replace-See “MAINT. OF THE PUMP”-SEALS.
<ul style="list-style-type: none"> Pump noise. 	<ul style="list-style-type: none"> Pump sucking air. Valves worn or dirty. Worn bearings. Water too hot. 	<ul style="list-style-type: none"> Check that hoses and fittings are air tight. Clean or replace-See “MAINT. OF THE PUMP”-SEALS. Consult factory. Reduce temperature-check seals and o-rings for wear. See “MAINT. OF THE PUMP”-SEALS.
<ul style="list-style-type: none"> Presence of water in oil. 	<ul style="list-style-type: none"> High humidity in air. Seals and oil seals worn. 	<ul style="list-style-type: none"> Change oil as needed. Replace-See “MAINT. OF THE PUMP”-SEALS.
<ul style="list-style-type: none"> Water dripping from under pump or case. 	<ul style="list-style-type: none"> Seals worn. O-rings worn. Loose connection. 	<ul style="list-style-type: none"> Replace-See “MAINT. OF THE PUMP”-SEALS. Excessive temperatures. DO NOT EXCEED 190°F (85°C). Replace-See “MAINT. OF THE PUMP”-SEALS. Check all connections.
<ul style="list-style-type: none"> Oil dripping. 	<ul style="list-style-type: none"> Oil seal worn. 	<ul style="list-style-type: none"> Consult factory.

TROUBLESHOOTING

Condition	Probable Cause	Solution
<ul style="list-style-type: none"> Motor does not start when switched on. 	<ul style="list-style-type: none"> Plug not well connected or lack of power supply. GFCI tripped. Circuit breaker or fuse in house tripped. Motor stopped while spraying. 	<ul style="list-style-type: none"> 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.
<ul style="list-style-type: none"> Motor stalls. 	<ul style="list-style-type: none"> Overheated. Overloaded. Motor failure. Lack of cooling air flow. 	<ul style="list-style-type: none"> 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 factory. Remove blockages from bottom of case.
<ul style="list-style-type: none"> Trigger will not move. 	<ul style="list-style-type: none"> Safety lock engaged. 	<ul style="list-style-type: none"> Release safety.
<ul style="list-style-type: none"> Irregular water pressure or low water pressure. 	<ul style="list-style-type: none"> Injector drawing air. Inadequate water supply. Nozzle partially blocked or wrong size or worn. Extension cord too small. Seals worn. 	<ul style="list-style-type: none"> 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).
<ul style="list-style-type: none"> Injector does not prime. 	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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.
<ul style="list-style-type: none"> Unloader cycles. 	<ul style="list-style-type: none"> Worn ball or valve. 	<ul style="list-style-type: none"> Clean or replace ball and valve assembly.
<ul style="list-style-type: none"> Fluid leaking from bottom fitting. 	<ul style="list-style-type: none"> O-ring on by-pass fitting cut or worn. 	<ul style="list-style-type: none"> Replace with o-ring from kit.
<ul style="list-style-type: none"> Fluid leaking from under case. 	<ul style="list-style-type: none"> O-ring for unloader piston retainer worn or cut. O-ring for unloader piston stem worn or cut. 	<ul style="list-style-type: none"> Replace with o-ring from kit. Replace with o-ring from kit.
<ul style="list-style-type: none"> Unloader will not come up to pressure. 	<ul style="list-style-type: none"> Foreign material in unloader. Piston stem o-rings worn. Nozzle worn. 	<ul style="list-style-type: none"> Clean unloader and reassemble. Replace with o-ring stem kit. Replace with nozzle sized to system flow.
<ul style="list-style-type: none"> Extreme pressure spikes. 	<ul style="list-style-type: none"> Adjusting cap turned completely into unloader. Restricted by-pass. 	<ul style="list-style-type: none"> Back off and gradually turn in to set system pressure. Replace by-pass hose with identical length and inside diameter.

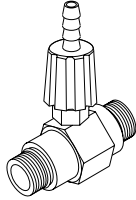
ACCESSORIES

Standard Accessories



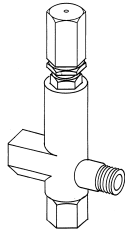
PRESSURE GAUGE

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



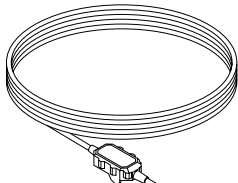
ADJUSTABLE CHEMICAL INJECTOR

Adjustment collar over barb permits chemical and cleaning solution application at operator selected intensity. Optional stainless steel construction for extended life. 2X1000, 2X1500 **7123**
3X1000 **7124**



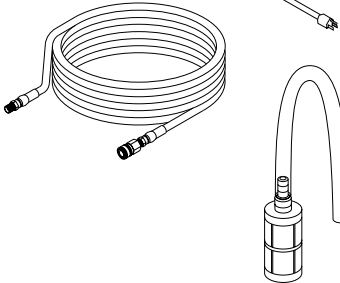
UNLOADER

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) **33521**
2X1500HT, 3X1000HT (20 Amp, 110-115V) **33522**
3X1500HT, 2X2000HT (15 Amp, 208-230V) **33523**

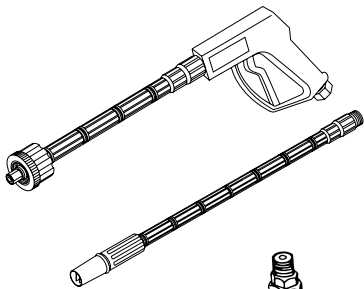


HIGH PRESSURE HOSE

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**

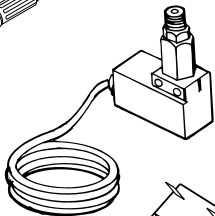


SHUT-OFF GUN

Lightweight Shut-Off Gun with molded extension and quick coupling allows easy assembly and quick changes to many optional accessories. Common to all models. **32120.220**

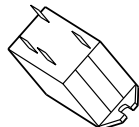
VARI-NOZZLE

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 **36664.521**
2X1000HT **36665.521**
3X1000HT **36668.521**
2X2000HT **36664.521**
3X1500HT **36666.521**



PRESSURE SWITCH

Dual Pressure Switches work with Mechanical Relay to automatically shut unit off when trigger is released [shut-off]. 170 PSI **33659**
350 PSI **32660**

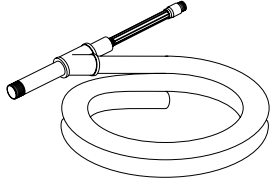


MECHANICAL RELAY

Mechanical relay shuts motor down when trigger is released or no flow is delivered to unit. 110V **34542**
220V **34543**

ACCESSORIES

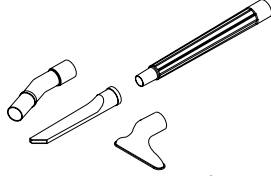
Optional Ambient Temperature Accessories



TRANSFER VAC

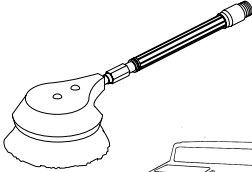
Wet or dry vacuum used with attachments draws up spills or moisture accumulation in recessed areas and transfers debris for convenient disposal. 2x1000 transfers up to 25 GPM.

2X1000HT, 2X2000HT**7245.521**
 2X1500HT, 3X1000HT, 3X1500HT**7250.521**



ATTACHMENT KIT

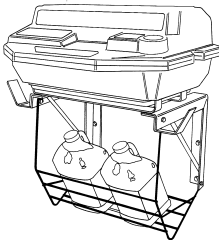
Attachment kit for Transfer-Vac provides extension arms and vacuum head options for maximum pickup for each application need.**34692**



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.

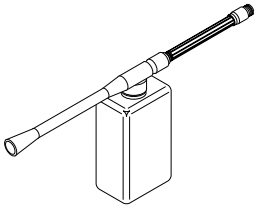
Nylon**32156.521, 34456.521**



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.

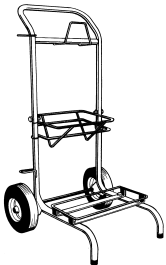
30 ft. Hose**34643**
 50 ft. Hose**34644**



SANDBLASTER

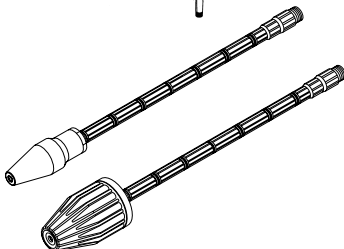
Extension, sand probe and 15 foot hose provides discharge line induction of sand, fertilizer, grass seed and other granular substances for special surface treatment.

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**



TORNADO NOZZLE

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

4.5 nozzle.....**36402.521**
 5.5 nozzle.....**36502.521**



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