OWNER'S MANUAL

MODEL

_____308 EC_____

PART NUMBER

____836701____

SERIAL NUMBER

_____

PURCHASED

_____

Record Model Number and Serial Number Here
Always include them in Service Correspondence

MACHINE RECORD

SERIAL NUMBER	DATE OF PURCHASE	PLACE OF PURCHASE

MONTH/ DAY/ YEAR	OPERATING HOURS	MAINTENANCE PERFORMED

NOTES

P/N - 836701

MODEL 308EC

SPECIFICATIONS

PERFORMANCE

DISCHARGE VOLUME.....3.0 GPM / 11.4 LPM

PUMP HEAD PRESSURE..... 800 PSI / 55 BAR

GENERAL

MINIMUM INLET WATER PRESSURE.....10 PSI / 0.68 BAR

BELT ..... P/N R03-00232

WEIGHT (DRY) .....190 LBS / 86 KG

HOSE - 3/8" X 27" ..... P/N Y01-00027

SPRAY TIP.....(#6-0DEG) P/N J00-00060-1

SPRAY TIP.....(#6-25DEG) P/N J00-25060-1

WAND & GUN ..... P/N J06-00106

DISCHARGE HOSE W/COUPLER ..... P/N 2102-00701

DISCHARGE HOSE ..... P/N W04-31231-B

COUPLER ..... P/N W04-31231-B

CHEMICAL LINE ..... P/N 4120-00903P

CHEMICAL HOSE ..... P/N Z01-04813-2

SCREEN ..... P/N C04-00131

PUMP & UNLOADER

PUMP - GENERAL ..... P/N N07-00179

PUMP PULLEY ..... P/N R03-00664

PUMP PULLEY BUSHING ..... P/N R04-00001

PUMP MOTOR

MOTOR HORSEPOWER..... 2.3 HP / 1.7 KW

MOTOR SPEED……..... 3450 RPM

MOTOR VOLTAGE.....115V / 230V 60HZ 1PH

MOTOR RATING..... ODP

MOTOR PART NUMBER..... F02-000138-U

MOTOR PULLEY..... P/N R03-00128

ELECTRICAL

MACHINE VOLTAGE 115V 1PH 60HZ

CORDSET.....P/N F04-00176

SWITCH, CAM .....P/N F04-00735A

OPERATION TABLE OF CONTENTS
ELECTRIC DRIVEN COLD WATER CLEANER

SAFETY, INSTALLATION, AND OPERATION
ELECTRIC DRIVEN COLD WATER CLEANER

MACHINE UNPACKING

ALL CLEANERS ARE CAREFULLY INSPECTED AND CARTONED TO PROTECT AGAINST SHIPPING DAMAGE. IF THERE IS DAMAGE OR MISSING PARTS, THE TRANSPORTATION COMPANY AGENT SHOULD MAKE A NOTATION TO THAT EFFECT ON THE BILL. REFER TO THE PARTS LIST IN THIS MANUAL AND ADVISE WHAT PARTS ARE MISSING OR DAMAGED. IF AVAILABLE, GIVE THE INVOICE NUMBER ON ALL ORDER BILLS. THIS PROCEDURE WILL ENABLE NEEDED PARTS TO BE SHIPPED QUICKLY.

READ ALL Installation, Operation, and Maintenance instructions before operating the machine.

NOTE: Refer to CLEANER MODEL for **SERIAL NUMBER** location.

NOTE: Dimensions are in inches unless otherwise note.

IMPORTANT SAFETY INSTRUCTIONS

The safety alert symbol. ⚠ This symbol is used to identify safety information about hazards that can result in personal injury.
A signal word (DANGER, WARNING, or CAUTION) is used with the alert symbol to indicate the likelihood and the potential severity of injury. In addition, a hazard symbol may be used to represent the type of hazard

⚠ **DANGER** indicates a hazard which, if not avoided, **will result in death or serious injury.**

⚠ **WARNING** indicates a hazard which, if not avoided, **could result in death or serious injury.**

⚠ **CAUTION** indicates a hazard which, if not avoided, **might result in minor or moderate injury.**

CAUTION, when used **without** the alert symbol, indicates a situation that **could result in damage to the equipment.**

Read and understand this "OPERATOR'S MANUAL" and "LABELS ON THE MACHINE" before starting.

GENERAL SAEFTY

1. Before operating this machine, read and observe all safety, unpacking, and operating instructions. Failure to comply with these instructions could create a hazardous situation.
2. The operator of this equipment should not operate this equipment when fatigued or under influence of alcohol or drugs.
3. The operator of this equipment should be thoroughly familiar with its operation and trained in the job to be accomplished.
4. The operator of this equipment should wear protective face shields and other protective clothing as required for safe operation.
5. Keep all protective covers and shields in place. Operating this machine with moving parts could allow operator or bystander serious injury or even death.
6. Do not operate the machine if any mechanical failure is noted or suspected. Keep all shields in place.
7. Always point the gun assembly in a safe direction and do not direct spray on the cleaner.

⚠ ***WARNING:*** RISK OF INJECTION OR SEVERE INJURY. KEEP CLEAR OF NOZZLE. DO NOT DIRECT DISCHARGE STREAM AT PERSONS. THIS EQUIPMENT IS TO BE USED ONLY BY TRAINED OPERATORS.

AVERTISSEMENT:RISQUE D'INJECTION ET DE BLESSURES GRAVES. SE TENIR À L'ÉCART DU JET. NE PAS DIRIGER LE JET DE SOTIE VERS D'AUTRES PERSONNES CONFIER L'UTILISATION LE JET DE SOTIE VERS D'AUTRES PERSONNES. CONFIER L'UTILISATION DE CE MATÉRIEL À UN OPÉRATEUR QUALIFIÉ.

ADVERTENCIA:RIESGO DE LA INYECCIÓN O SEVERO LESIÓN. CLARO DE LA SUBSISTENCIA DEL INYECTOR. NO DIRIJA LA CORRIENTE DE LA DESCARGA EN LAS PERSONAS. ESTO EL EQUIPO DEBE SER UTILIZADO SOLAMENTE POR LOS OPERADORESENTRENADOS.

8. Do not leave this machine unattended when it is operating
9. All installations must conform to all applicable Local codes. Contact your electrician, plumber, utility company or seller for details.
10. If a water leak is found, ***DO NOT OPERATE THE MACHINE.*** Shut off the motor and repair.
11. Follow instructions on how to stop the machine and bleed pressures quickly. Be thoroughly familiar with the controls.
12. When starting a job, survey the area for possible hazards and correct before proceeding.
13. If chemicals are used in conjunction with this equipment, read and follow the product label directions.
14. Do not start the machine unless the gun assembly is firmly gripped by the machine operator. Failure to do this could result in injury from flying hose and gun assembly.

MECHANICAL SAFETY

1. All guards, shields, and covers must be replaced after adjustments are made to prevent accidental contact with hazardous parts.
2. Drive belts must be inspected and tightened periodically to operate at optimum levels.
3. Inspect machine for damaged or worn components and repair or replace to avoid potential hazards. Do not operate the machine if any mechanical failure is noted or suspected.
4. Always use the correct size spray tip specified in the GENERAL section of the **MODEL SPECIFICATIONS** or **MODEL EXPLODED VIEW**.
5. Do not start the machine until you have observed all safety instructions and operating found in the operating manual.

ELECTRICAL SAFETY

1. **This machine must be electrically ground Failure to have the machine grounded may result in the operator being electrically shocked and even death.**
2. **Do not plug-in or un-plug machine with wet hands.**
3. **Keep power cords and connections (connectors) out of water.**
4. **If an extension cord must be used to operate this machine, it should be as short as possible. The extension cord must be properly sized and fitted with a grounding type plug and receptacle.**
5. All wiring and electrical connections should comply with the National Electrical Code (NEC) and with local codes and practices.
6. Fuses or circuit breakers should be compatible with machine requirements. (See ELECTRICAL section of **MODELSPECIFICATIONS** for power requirements.)
7. High voltage may be present within this machine. Servicing should only be performed by properly trained personnel.

SAVE THESE SAFETY INSTRUCTIONS

INSTALLATION

1. **BARRIER**: We recommend a barrier be installed between the machine and wash area to prevent moisture from coming in direct contact with electrical controls, motors and transformers. This will increase the machine's life and lessen electrical problems.

2. **WATER SUPPLY**: This machine must have a water supply meeting or exceeding the maximum discharge volume specified in the PERFORMANCE section, and a minimum water inlet pressure specified in the GENERAL section of the **MODEL SPECIFICATIONS**.

3. **WATER CONDITIONS**: Local water conditions affect the coil adversely more than any other element. In areas where troublesome conditions may exist with like equipment (such as water heaters), we recommend the use of a water softener.

4. **FREEZING:** This machine must be protected from freezing according to STORAGE section of **MACHINE MAINTENANCE**.

5. **CHEMICALS:** Mix chemicals per the chemical manufacturers printed directions. Follow all mixing, handling, application, and disposal instructions. Wear gloves, boots, goggles, and protective clothing appropriate for the chemical being used.

ELECTRICAL INSTALLATION

1. **ELECTRICAL**: Connect the machine to an electrically grounded circuit that is fused or circuit breaker protected. The circuit must match that specified in the ELECTRICAL section under **MODEL SPECIFICATIONS.**

WARNING: ELECTRICAL SHOCK HAZARD

AVERTISSEMENT: LE DANGER ELECTRIQUE DE CHOC

ADVERTENCIA: CHOQUE ELÉCTRICO PELIGRO

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

COPPER WIRE SIZE MINIMUM AWG	MACHINE AMP DRAW 3 CONDUCTOR WIRES	MACHINE AMP DRAW 2 CONDUCTOR WIRES
16	10	13
15	--	--
14	15	18
12	20	25
10	30	30
8	35	40
6	40	55
4	55	70
2	70	95

CHART FIGURES ARE BASED ON NOT MORE THAN 100 FOOT

(Based on Ambient Temperature of 86°F (30°C)).

*Use Amp Draw indicated the same or higher than your machine output.

EXAMPLE: Machine Amp Draw 51, use 55 (2 Conductor). The thermostat type of cord shall be C, PD, E, EO, EN, S, SO, SRD, SJ, SJO, SV, SVO, SP.

The thermo set plastic types shall be ET, ETT, ETLB, ETP, ST, STO, SRDT, SJT, SJTO, SVT, SVTO, and SPT.

2. **EXTENSION CORD:** The use of an extension cord that has undersize wire compared to the amp draw of your machine will adversely limit the starting load carrying abilities of the motor and machines performance. Use only 3-wire extension cords that have 3-prong plugs and 3-pole cord connectors that accept the plug from the product. Use only extension cords that are intended for outdoor use. These 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. Use an extension cord in good repair free of frays or cracks in the outer covering. 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.

OPERATING INSTRUCTIONS

PRE START-UP

1. The first time the machine is operated, after repairs have been made, or if the machine has set for a period of time (30 days or more) follow the following procedures.
   A. Check the tension of the belt (if so equipped) per instructions in **MACHINE MAINTENANCE**.
   B. Flush the machine per instructions in **MACHINE MAINTENANCE**.
   C. Install float tank drain plug (if so equipped).
   D. Open float tank ball valve (if so equipped).

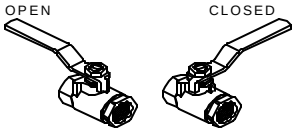
   CAUTION: Always use the factory supplied wash hose with your machine. **Do not** substitute other hoses as a potential safety problem may develop.

   CAUTION: If machine has been exposed to sub-freezing temperatures, it must be thoroughly warmed to above freezing before operating. Failure to warm machine can cause damage to the pump packings and other components.

2. Read and observe all items in "CLEANER INSTALLATION".

- Refer to the **MAINTENANCE SCHEDULE** for any maintenance to be performed before operation.
- **ELECTRICAL**: Connect the machine to an electrically grounded circuit that is fuse or circuit breaker protected. Do not use any type of adapter. If the correct type of receptacle is not available, have one installed by a qualified electrician.
- **OIL LEVEL**: Check the oil level in the water pump.
- **BELT**: Make sure belt tension and condition is as specified in MACHINE MAINTENANCE.
- **METERING VALVE (** if so equipped): Make sure the metering valve is closed before operation. If air enters the system through this valve, poor performance and machine damage will occur. Refer to the metering valve insert for proper operation.
- **WATER SUPPLY**: This machine must have a water supply meeting or exceeding the maximum discharge volume specified in the PERFORMANCE section, and a minimum water inlet pressure of 40 PSI /12.1KGM.
- **LIME:** Water containing large amounts of lime, calcium or other similar materials can produce a coating on the inside of the spray tip, impact nozzle and coil pipe.

- **FLOAT TANK:** Check the float tank (if so equipped) to assure it is full and the float valve shuts off securely.
- **BALL VALVE:** Check the position of the ball valve on the outlet side of the float tank (if so equipped) that it is in the open position.
- **SPRAY TIP:** Choose the correct spray tip for the job to be performed.



BALL VALVE POSITION

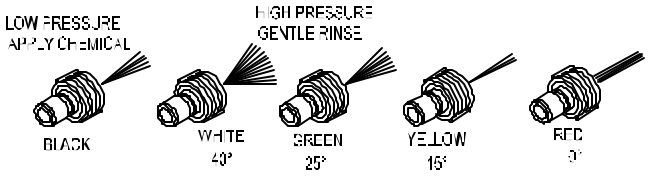
Quick-Connect spray tips have fixed spray patterns that are more consistent than those produced by an adjustable nozzle. Each tip is color-coded for easy identification.

White (40°): produces a wide-fan spray for general cleaning and rinsing.

Green (25°): provides a narrower-fan spray for tough stains in cleaning applications.

Yellow (15°): maintains a tight-fan spray with intense cleaning power for heavy-duty cleaning and paint preparation.

Red (0°): creates a concentrated pinpoint water jet for stubborn stains on concrete, masonry, or steel, and for stripping paint.



START-UP

1. With the gun assembly in hand (on trigger gun models hold the trigger gun valve in open position) and with a good flow of water turn the switch to the "pump" position.

WARNING: RISK OF INJECTION OR SEVERE INJURY. KEEP CLEAR OF NOZZLE. DO NOT DIRECT DISCHARGE STREAM AT PERSONS. THIS EQUIPMENT IS TO BE USED ONLY BY TRAINED OPERATORS.

AVERTISSEMENT: RISQUE D'INJECTION ET DE BLESSURES GRAVES. SE TENIR À L'ÉCART DU JET. NE PAS DIRIGER LE JET DE SOTIE VERS D'AUTRES PERSONNES CONFIER L'UTILISATION LE JET DE SOTIE VERS D'AUTRES PERSONNES. CONFIER L'UTILISATION DE CE MATÉRIEL À UN OPÉRATEUR QUALIFIÉ.

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WARNING: Use of pressure washer can create puddles and slippery surfaces.
High pressure spray could cause you to fall if you are too close to the cleaning surface.

- Keep spray nozzle between 8 to 24 inches away from cleaning surface.
- Operate this unit on a stable surface.
- The cleaning area should have adequate slopes and drainage to reduce the possibility of a fall due to slippery surfaces.
- Be extremely careful if you must use the pressure washer from a ladder, scaffolding or any other relatively unstable location.
- Firmly grasp spray gun with both hands when using high pressure spray to avoid injury when gun kicks back.

CAUTION: A good flow of water must be flowing from the end of a gun for 30 seconds, before proceeding. Lack of water can cause damage to the water pump and like components.

CAUTION: On a machine equipped with a trigger gun valve, if the trigger gun valve remains in the closed position for more than 3 minutes, water pump damage may occur.

CAUTION: Do not operate with the trigger gun valve closed for more than 3 minutes or water pump damage may occur.

2. **TO CLEAN**:

   A. Start on the lower portion of the area to be cleaned and work up using long, even, overlapping strokes.

   B. Dirt is generally removed easily if grease and/or oil are not present. However if grease and/or oil are present, hot water and chemical will accelerate in the cleaning process.

3. **TO APPLY CHEMICAL**:

CHEMICAL: Use factory recommended chemicals for best cleaning action and for extended pump life. Contact your dealer for chemicals available. Follow instructions on chemical container.

Note : If the valve is **open without** the chemical line in a source the water pump will **draw air** causing the system **not to** pressure up.

Mix chemicals per label instructions. Use necessary safety percautions.

When chemical is desired, the system must be switched over to the low pressure nozzle to draw chemical.

A. Insert chemical screen into chemical container.

B. Adjust metering valve or injector. Install your injector tip.

C. If the gun assembly is equipped with variable or multiple nozzle assembly, adjust to low pressure, multiple nozzle assembly, adjust as desired.

UPSTREAM CHEMICAL INJECTION:
When injecting chemicals "upstream" what you are doing is introducing chemicals to the water flow as it enters the actual pump inlet and requires a float tank. The popularity of this type of chemical injection is due to the fact that this allows chemicals to be applied at **full pressure** a major advantage for productivity.

CAUTION: You cannot draw an abrasive product such as an aluminum brightner. It will cause an non-warrantable premature pump failure.

DOWNSTREAM CHEMICAL INJECTION:
Mounted to the outlet of the pump or the coil a downstream injector introduces chemicals to the water flow AFTER it leaves the pump or the coil. This effectively eliminates the major risks of exposing the inner workings of a pump to harsh chemicals. When chemical is desired, the system must be switched over to the low pressure nozzle to draw chemical.

A. Engage the trigger safety latch on the spray wand. Pull back the Quick-Connect collar on the end of the wand and remove the tip. Now insert "black" tip into the fitting, and release the collar. You can draw chemical only with the "black" low pressure nozzle.Tug on spray tip to make sure the connection is secure. Rotate to desired spray angle. For most effective cleaning, keep spray tip from 8 to 24 inches away from the cleaningsurface.
B. Insert chemical screen into chemical container.
C. Turn the **burner switch to the "off"** postion. There will be air in the chemical line. Air heats very quickly and needs to be eliminated before the burner can be turned on.Open the metering valve counter clockwise with the trigger gun open allowing the chemical to come up the chemical line. Chemical should begin moving up the chemical line. Once t he chemical line is completely full, trigger the gun on and off numerous times to break any possible air locks. Turn burner system switch to "on" position.
D. If the gun assembly is equipped with variable or multiple nozzle assembly, adjust to low pressure.
E. If the gun assembly is equipped with a dual lance wand open the valve.
Do not allow the detergent to dry on the surface (prevents streaking).

TO RINSE:

A. If the machine is equipped with a panel mounted metering valve, close the chemical metering valve (if so equipped). NOTE: It is advisable to dip the chemical screen in a container of clean water and open the valve 1 minute to clean the valve of any remaining residue.

B. If the gun assembly is equipped with variable or multiple nozzle assembly, open and close to clean nozzle of any remaining residue.

C. After a clear flow of water is noted from the end of the wand, start from the top, working downward using long, overlapping strokes.

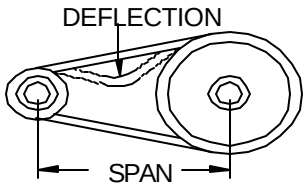
SHUT-DOWN

1. Turn the switch to the pump off position.
2. Turn off the water supply.
3. If freezing conditions may exist, refer to STORAGE in **MACHINE MAINTENANCE**.

MACHINE MAINTENANCE

Electric Driven Cold Water Cleaners

BELT TENSION



1. Correct belt tension will allow a 1/64- inch deflection for each inch of span between pulley centers with a 6-pound force applied in the middle of the span.

   EXAMPLE: A 6-pound force applied at the middle of an 8 inch span should produce a deflection of 8/64 inch or 1/8 inch.

2. Belts can be tightened or loosened by loosening the nuts holding the pump assembly to the motor mount. Then tighten or loosen the j-bolt on the motor mount. Retighten the pump assembly after the desired tension is reached.

SPRAY TIP MAINTENANCE

1. Remove the spray tip from the gun assembly.
2. Blow out debris with compressed air from the outside in. Any debris remaining in the inlet side of the nozzle should be cleaned out. If lime or chemical scale is present in the inlet side, the nozzle may be soaked in descaling solution or replaced. If the tip is worn, replace with one specified in the GENERAL section of **MODEL SPECIFICATIONS** or **MODEL EXPLODED VIEW**.
3. Before replacing spray tip flush the machine per "FLUSHING".
4. Reinstall Spray tip to gun assembly.

FLUSHING

1. Connect machine to an electrically grounded circuit that is fuse or circuit breaker protected.
2. Connect machine to a pressurized water supply meeting the requirements specified in the GENERAL section of the **MODEL SPECIFICATIONS**.
3. Turn on the water supply.
4. Check the float tank (if so equipped) to assure it is full and the float valve shuts off securely.
5. Check the position of the ball valve (if so equipped) on outlet line of the float tank assuring it is in the open position.
6. Remove spray tip from gun assembly.
7. With the gun assembly in hand (on trigger gun models hold the trigger gun valve in open position) and with a good flow of water turn switch to the PUMP position

   CAUTION: DO NOT RUN PUMP WITHOUT WATER, AS THIS WILL CAUSE DAMAGE TO THE PUMP AND VOID WARRANTY.

8. When clean water flows from the gun, turn switch to the "OFF" position. Reinstall spray tip.
10. With the gun assembly in hand turn on the switch. On trigger gun models hold the trigger gun valve in open position.)
11. When clean water flows from gun, turn switch off the PUMP position
11. If freezing conditions may exist, refer to "STORAGE" section.
13. Turn off and disconnect the water supply. Disconnect elctrical supply.

STORAGE

1. Rinse the chemical line by inserting the screen into a container of clear water and open the metering valve 1 minute to clean it of any remaining residue. Be sure the chemical metering valve is closed when finished.
2. Disconnect the water supply. Remove the spray tip nozzle from gun assembly and wire to machine.
3. Check the position of the ball valve (if so equipped) on the outlet of the float tank assuring it is in the closed position.
4. Attach an air chuck to the air valve stem on the pump assembly. With the trigger gun in the open position, apply air until a mixture of air and very little water is coming from the gun wand . Allow air to blow for 60 seconds. Turn switch to the "OFF" position. Remove the air chuck.
5. Fill a 1-gallon container with Ethylene Glycol type antifreeze. Minimum should be a mixture of ½ antifreeze and ½ water strength before each use, as the antifreeze will dilute with use.
6. Install a 2-ft garden hose to the water inlet. Insert the other end into a container of antifreeze solution.
7. With the gun assembly in hand turn on the switch. On trigger gun models hold the trigger gun valve in open position.)
8. Turn off the switch just prior to running out of antifreeze mixture.
9. Disconnect electrical supply, and the gun and hose.
10. Place machine in a dry place protected from weather conditions.

MACHINE MAINTENANCE SCHEDULE

ELECTRIC DRIVEN OIL FIRED CLEANERS	DAILY	EACH HR 8 HRS	AFTER FIRST 50 HRS	EVERY 50HRS	EVERY 100 HRS	EVERY 500 HRS	YEARLY
OIL BATH WATER PUMP: **Oil Level** - check and add as needed per PUMP SERVICE insert.	●						
Oil Change - drain and refill per PUMP SERVICE insert. **CAUTION**: Used oil must be disposed into an enviromental safe container and brought to an oil recycling center.			●			●	
Oil contamination- Milky color indicates water.	●						
HOSES:							
Blistering, Loose Covering	●						
Abrasion of cover exposing reinforcement.	●						
Cuts exposing reinforcement.	●						
BELTS:							
Cracks or fraying	●						
Belt Tension- For correct tension, see MACHINE MAINTENANCE insert.		●		●			
LEAKS:							
Check for water and buildup of scale at pipe connections.	●						
SCREEN-WATER:							
Check Inlet Hose Screen for debris.	●						
Check float Tank Hose Screen (if so equipped) for debris.	●						
Check Water Filter (if so equipped) for debris see breakdown elsewhere in this manual.	●						
SPRAY TIP:							
Check tip for debris.	●						
GUARDS AND SHIELDS:							
Check that all guards and sheilds are in place and secure.	●						
PUMP MOTOR WITH GREASE FITTINGS:							
Remove drain plug. Use 1 or 2 full strokes of shell "DOBLIUM RB", Cheveron"SR1 No.2" or Texaco "PREMIUM RB". Operate for 20 minutes and replace drain plug.							●
FREEZING TEMPERATURES:							
Freezing temperatures break coils and water pumps. See STORAGE in the **MACHINE MAINTENANCE** section for cold weather instructions.	●						

CLEANER TROUBLESHOOTING
ELECTRIC MOTOR DRIVEN COLD WATER CLEANERS

TROUBLE	POSSIBLE CAUSE	REMEDY
1. Poor cleaning action.	A. Hard water. B. Low pressure. C. Little or no chemical being drawn. D. Improper chemical. E. Improper chemical mixture. F. Low discharge pressure.	A. Connect the machine to a water softner. B. See "Low operating pressure." C. See "machine will not draw chemical." D. Obtain proper chemical. E. Mix chemical per the label. Follow all the mixing, handling, application,and disposal instructions. F. See "Low operating pressure."
2. Machine will not draw chemical.	A. No chemical solution. B. Metering valve not open. C. Chemical line strainer clogged. D. Air leak in Chemical line. E. Metering valve clogged. F. Restrictor orifice too large or missing.	A. Replenish supply. B. Turn metering valve knob to open. C. Remove screen and cleaan. D. Tighten all fittings and hoses for the chemical line. E. Disassemble and clean. F. Install proper size orifice.
3. Low operating pressure.	A. Insufficeint water supply. B. Incoming water hose too small. C. Water supply hose too long. D. Belt slippage. E. Worn belt. F. Spray tip worn or wrong size. G. Dirty or worn check valves in water pump. H. Water supply hose kinked. I. Inlet filter screen clogged. J. Motor runs slow. K. Air leak in inlet plumbing. L. Defective water pump. M. Leaking discharge hose. N. Chemical metering valve open and sucking air. O. Defective unloader. P. Inlet ball valve not fully open (if so equipped).	A. The water supply must meet or exceed the maximum discharge volume specified in the PERFORMANCE sectionof the **MODEL SPECIFICATIONS** section , and minimum water inlet pressure of 10 PSI/0.68 BAR. B. Use larger water supply hose. C. Use shorter water supply hose. D. Tighten belt per instructions in **MACHINE MAINTENANCE** insert. E. Replace bely per **CLEANER EXPLODED VIEW.** F. Replace with spray tip specified in the GENERAL section of **MODEL SPECIFICATIONS.** G. See **PUMP TROUBLE SHOOTING.** H. Straighten hose. I. Clean water filter screen or hose inlet screen. J. See "Pump motor starts slow or overheats and stops." K. Tighten all fittings. L . See **PUMP TROUBLESHOOTING.** M. If a water leak is found, **DO NOT OPERATE THE MACHINE.** Disconnect the power andreplace hose. N. Resupply chemical, place soap screen in water, or shut off metering valve. O. Repair or replace unloader valve. P. Open inlet ball valve completely. (Handle parallel w/ valve boody).
4. Excessive, unusual noise.	A. Pump. B. Defective motor. C. Pulleys rubbing. D. Misalignment of pump &motor	A. See **PUMP TROUBLESHOOTING.** B. Call service technician or take engine to Reapir/ Warranty station. C. Adjust shields or pulley(s). D. Realign pump and engine.
5. Belts slipping.	A. Belts too losse. B. Excessive back pressure. C. Defective water pump.	A. Tighten per instruction on **MACHINE MAINTENANCE.** B. See "Excessive Back Pressure." C. See **PUMP SERVICE.**

CLEANER TROUBLESHOOTING (CONT.)
ELECTRIC MOTOR DRIVEN COLD WATER CLEANERS

TROUBLE	POSSIBLE CAUSE	REMEDY
6. Excessive back pressure.	A. Spray tip built up with lime. B. Water pump turning too fast. C. Releif valve defective.	A. Remove and clean, or replace spray tip with tip specified in GENERAL section of **MODEL SPECIFCATIONS.** B. See **MODEL SPECIFICATIONS.** C. Remove and replace.
7. Excessive vibration.	A. Defective belt. B. Defective Pump. C. Defective accumulator.	A. Remove and replace using belt specified in CLEANER EXPLODED VIEW or the GENERAL section of **MODEL SPECIFICATIONS.** B. See **PUMP TROUBLESHOOTING.** C. Recharge/replace.
8. Pump motor will not start (motor does not hum).	A. No power. B. Defective motor starter or ON/OFF switch. C. Defective motor.	A. Use a different outlet, check fuses in main disconnect switch. Replace fuse if blown. B. Call service technician. C. Call service technichian, or take motor to repair/ Warranty station.
9. Pump motor will not start (motor hums).	A. Pump frozen B. Defective Motor. C. Defective water pump D. Excessive back pressure.	A. Machine must be thoroughly warmed to above freezing. B. Call service technican or take motor to Repair/ Warranty station. C. See **PUMP SERVICE.** D. See "Excessive Back Pressure."
10. Pump motor starts slow or overheats and stops.	A. Low voltage. B. Excessive back pressure. C. Defective motor.	A. See "Low voltage." B. See "Excessive Back Pressure." C. Call service technichian, or take motor to Repair/ Warranty station.
11. Pump motor stops and will not start.	A. Motor starter "kicked out" (if so equipped) or thermal overload tripped. B. Excessive back pressure. C. Defective motor.	A. Turn motor starter off to reset, then turn on, or push thermal overload reset button on motor. B. See "Excessive Back Pressure." C. Call service technichian, or take motor to Repair/ Warranty station.
12. Low voltage.	A. Incoming voltage incorrect. B. Not large enough extension cord. C. Too long extension cord.	A. Have a qualified technician check motor terminal voltage. Correct voltage is in **MODEL SPECIFICATIONS.** B. Use an extension cord with amperes or watts rating as high or higher than that of the **MODEL SPECIFICATIONS.** C. Shorten extension cord.
13. Machine shocks operator.	A. Machine improperly grounded. B. Outlet not grounded. C. "Adapter" used. D. Defective extension cord.	A. STOP! Operating machine. call service technichian. B. Have properly wired outlet installed. C. Discard "Adapter" and use grounded outlet. D. Replace extension cord with grounded type connectors and amperes or watts rating as high or higher in MODEL SPECIFICATIONS.