4405EB - OPERATION TABLE OF CONTENTS

OIL FIRED ENGINE DRIVEN CLEANER

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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 noted

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.**

GENERAL SAFETY

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. Do not leave this machine unattended when it is operating.
8. All installations must conform to all applicable local codes. Contact your electrician, plumber, utility company or seller for details.
9. If a water leak is found, **DO NOT OPERATE THE MACHINE**. Shut off the engine and repair.
10. Follow instructions on how to stop the machine and bleed pressures quickly. Be thoroughly familiar with the controls.
11. When starting a job, survey the area for possible hazards and correct before proceeding.
12. If chemicals are used in conjunction with this equipment, read and follow the product label directions.
13. During normal operation of this machine, hot discharges and surfaces may be produced. Avoid burns by being aware of these areas and staying clear of them during and immediatly following equipment operation.
14. Do not start the burner unless a full flow of water is coming from the gun. Air leaks or insufficient water to the machine, or an open chemical valve means less than full flow of water through the coil. This could cause hose failure and burns to the operator.

15. 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 a flying hose and gun assembly.

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

16. Always point the gun assembly in a safe direction and do not direct spray on the cleaner or personnel in the area.

WARNING: OPEN FLAME. Do not operate this machine in an area with combustible materials. A suitable fire extinguisher should be available in operating area.

17. Always shut down machine before refueling.

18. Do not overfill the fuel tank. If any spillage occurs, clean up immediately and/or neutralize the spill before attempting to operate the machine.

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 found in the GENERAL section of the **MODEL SPECIFICATIONS** or **MODEL EXPLODED VIEW**.

5. **DO NOT** start the engine until you have observed all safety and operating instructions found in the engine manual..

FUEL SAFETY

1. Use only #1 or #2 diesel fuel for the water heater burner. The use of incorrect fuel may result in fire or explosion and severe injury to the operator.

2. Do not refuel machine while it is running or hot. Allow it to cool sufficiently to prevent ignition of any spilled fuel. Clean up any spilled fuel before resuming operation.

3. Fuel burning equipment must have proper ventilation for cooling, combustion air, and exhausting of combustion products.

WARNING: DO NOT USE GASOLINE, CRANKCASE DRAININGS, OR OIL CONTAINING GASOLINE OR SOLVENTS.

AVERTISSEMENT: NE PAS UTILISER D'ESSENCE DE PRODUITS DE VIDANGE NI D'HUILE CONTENANT DE L'ESSENCE OU DES SOLVANTS

4. Stacking, where required, must be installed in accordance with all local codes. A draft diverter must be installed on a machine connected to an exhaust stack to prevent improper operation. (See GENERAL section of **MODEL SPECIFICATIONS** for stack size).

5. Where stacking is not required, provide adequate ventilations to prevent any possible accumulation of hazardous fumes.

6. Personnel trained in and familiar with the type of equipment being serviced should only perform adjustments to fuel burning equipment.

SAVE THESE SAFETY INSTRUCTIONS

INSTALLATION

This machine emits **CARBON MONOXIDE**, a **DEADLY GAS**, and must be vented if used in an enclosed area. Improper venting can cause poor combustion, delayed ignition, down drafts, and the possibility of freezing the coil. Contact your distributor or local heating and air conditioning dealer for proper materials. Local codes must be observed.

1. **VENTILATION:** Oil fired machines that must be vented. See the VENTING section of this manual. Where stacking is not required, provide adequate ventilations to prevent any possible accumulation of hazardous fumes.

2. **FIRE HAZARD:** Keep combustible materials away from oil machines. **DO NOT** allow lint or dust to collect in the burner area.

3. **BARRIER**: We recommend a barrier be installed between the machine and wash area to prevent moisture from coming in direct contact with electrical controls and engine. 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 machine specifications, and a minimum water inlet pressure of 40PSI / 12.1KGM.

7. **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.

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

9. **COLD WEATHER**: As the weather becomes colder, fuel becomes thicker and may become so viscous that the fuel will not flow properly. As viscosity increases, the thicker oil can cause delayed ignition, poor spray patterns, and rumbling fires. As moisture will quickly destroy fuel pumps, make certain that tank openings are secure and moisture cannot enter. In cold weather areas, frost build up will occur in fuel tanks. As the weather warms it turns to condensate, and the water will be in the tank. Keep the tank clear of water, as moisture reaching the fuel pump will cause rust, and the pump will bind. A full fuel tank will lessen condensation build up.

10. **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

VENTING

DANGER: This machine emits carbon monoxide, and deadly gas, and **MUST NOT** be used in an enclosed or confined area.

DANGER: Engine exhaust gases contain poisonous carbon monoxide. Carbon monoxide is oderless, colorless, and can cause death if inhaled. Avoid inhaling gas fumes. Engine **MUST NOT** be used in an enclosed or confined area.

DANGER: CARBON MONOXIDE HAZARD

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 pressure wash hose with your machine.

¨ **DO NOT** substitute any 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".

START-UP

♦ Refer to the **MAINTENANCE SCHEDULE** for any maintenance to be performed before operation.

♦ This machine emits carbon monoxide, a deadly gas, and must be vented if used in an enclosed area.

⚠ **DANGER:** CARBON MONOXIDE HAZARD

♦ **OIL LEVEL**: Check the oil level in the water pump, the gear case (if so equipped), and the engine.

♦ **BELT** (if so equipped): Make sure the 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.

♦ **FUEL FILTER**: Inspect the fuel filter for any evidence of water contaminants.

♦ **FUEL**: Make sure the fuel lines are open (**CAUTION**: Closed fuel valves will DAMAGE the fuel pump and void warranty) and fuel is the type specified in the BURNER section of **MODEL SPECIFICATIONS**

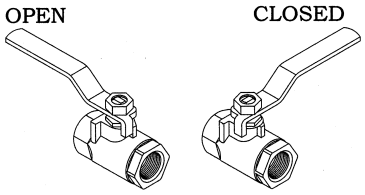
♦ **FUEL QUANTITY**: Make sure the fuel supply is sufficient to complete the job. See the GENERAL section of the **MODEL SPECIFICATIONS** for the fuel tank capacity.

♦ **WATER SUPPLY**: This machine must have a water supply meeting or exceeding the maximum discharge volume specified in the machine specifications, and a minimum water inlet pressure of 40PSI / 12.1KGM.

♦ **LIME:** Water containing large amounts of lime, calcium or other similar materials can produce a coating on the inside of the impact nozzle or spray tip and coil pipe.

♦ **FLOAT TANK**: Check the float tank to assure it is full and the float tank valve shuts off securely.

¨ **BALL VALVE**: Check the position of the ball valve (if so equipped) on outlet line of the float tank assuring that it is in the open 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.

A V E R T I S S E M E N T : R I S Q U E 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.

1. Select temperature (if so equipped).
2. 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 start the engine per engine owner's manual.

   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.
4. Turn the burner switch on.

   CAUTION: Do not run the machine with the burner switch in the on position when the fuel tank is empty or with tank valves closed. This will cause damage to the fuel pump and void warranty.

   CAUTION: Do not operate with the trigger gun valve closed for more than 3 minutes or water pump damage may occur.
5. 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 is not present. However if grease and/or oil are present, hot water and chemical will accelerate in the cleaning process.
6. **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.

   Mix chemicals per label instructions. Use necessary safety precautions.

   A. Insert chemical screen into chemical container

   B. Adjust metering valve (if so equipped).

   C. If the gun assembly is equipped with variable or multiple nozzle assembly, adjust as desire.

7. **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 burner switch to the off position. (If not already done so in the cold water rinse.)
2. After cool, clear water is coming from the end of the wand, turn off the engine.
3. Turn off the water supply.
4. If freezing conditions may exist, refer to STORAGE in **MACHINE MAINTENANCE**.
5. Replace stack cover (if so equipped).

COMBINATION OPTION

INSTRUCTION

WARNING: This machine should be operated only by personnel instructed in and familiar with its operation. The discharge produced is 300°F / 150°C and can cause **SERIOUS BODILY INJURY** to you and anyone coming in contact with it.

NOTE: In process of making steam, the water flow through the coil has to be decreased. The amount of water is determined by the pressure and water temperature of your location.

If the incoming water temperature is as high as 70°F, the amount of water going through the coil has to decrease very little.

If the incoming water temperature is as low as 40°F, the amount of water going through the coil has to be decreased quite a bit.

The water temperature is relative to the season variation and should be taken in consideration when operating steam.

1. Install the open gun assembly.
2. Open the ball valve on coil inlet assembly.
3. Set the temperature control to 300°F MAXIMUM.
4. For startup see "START UP" section of this manual

5. Turn the burner switch on.

CAUTION: Do not run the machine with the burner switch in the on position when the fuel tank is empty. This will cause damage to the fuel pump and void warranty.

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

6. To **CLEAN**:

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

B. Regulate the temperature indicated on the thermometer to 300°F by turning the regulating valve on the coil inlet assembly clockwise to DECREASE the temperature and counter clockwise to INCREASE the temperature.

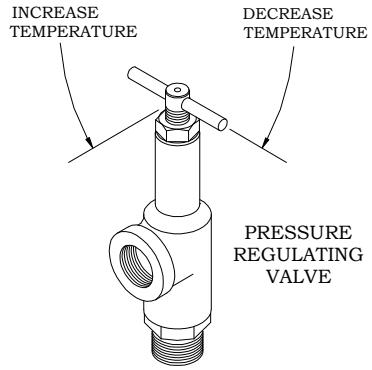
C. To RINSE:

D. Turn off the burner.

E. 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 burner switch off. (If not already done so in the cold water rinse.)
2. After cool, clear water is coming from the end of the wand, turn off the engine.
3. Turn off the water supply
4. Close the ball valve on the coil inlet assembly.
5. Replace the stack cover (if so equipped)
6. If freezing conditions may exist, refer to STORAGE in **MACHINE MAINTENANCE**.
7. Replace stack cover (if so equipped).



MACHINE MAINTENANCE

GAS ENGINE DRIVEN OIL FIRED CLEANERS

FLUSHING

1. Connect machine to a pressurized water supply meeting the requirements specified in the GENERAL section of the **MODEL SPECIFICATIONS**.
2. Turn on the water supply.
3. Check the float tank (if so equipped) to assure it is full and the float valve shuts off securely.
4. Check the position of the ball valve (if so equipped) on outlet line of the float tank assuring it is in the open position.
5. Remove spray tip from gun assembly.
6. With gun assembly in hand, start the engine. On trigger gun models hold the trigger gun valve in open position.
   CAUTION: DO NOT RUN PUMP WITHOUT WATER, AS THIS WILL CAUSE DAMAGE TO THE PUMP AND VOID WARRANTY.
7. When clean water flows from gun, turn off the switch.
8. Reinstall spray tip.
9. With gun assembly in hand, start the engine. On trigger gun models hold the trigger gun valve in open position.
10. When clean water flows from gun, turn off the engine.
11. If freezing conditions may exist, refer to "STORAGE" section.
12. Turn off and disconnect the water supply.

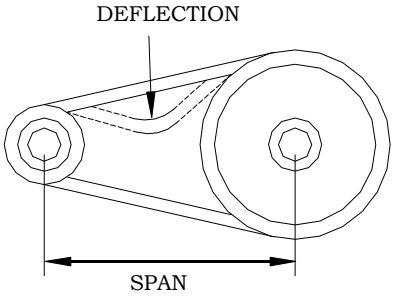
STORAGE

1. To prevent the fuel tank rusting from condensation, drain and flush with clean fuel. Do not use gasoline or water. Refill with proper fuel.
2. Rinse the Soap 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 chemical metering valve is closed when finished.
3. Disconnect the water supply.
4. Remove the spray tip nozzle from gun assembly and wire to machine.
5. Check the position of the ball valve (if so equipped) on the outlet of the float tank assuring it is in the closed position.
6. 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 Then turn on the burner and depress the vacuum switch. Run it for 45 seconds allowing any remaining water to turn to steam. Do not remove air until after the burner is off.
7. 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 each use.
8. Install a 2-ft. Garden hose to the water inlet. Insert the other end into a container of antifreeze solution.
9. With the discharge gun assembly in hand, start the engine. On trigger gun models hold the trigger gun valve in open position.
10. Turn off the switch just prior to running out of antifreeze mixture.
11. Disconnect electrical supply.
12. Disconnect gun and hose.
13. Place machine in a dry place protected from weather conditions.

SPRAY TIP MAINTENANCE

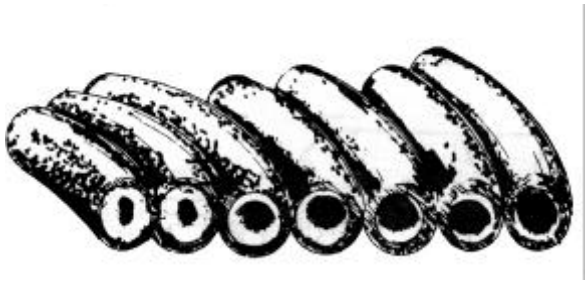
1. Remove the spray tip from the gun assembly.
2. Blow out debris with compressed air from the outside in. Any debris remaining in the inlet side of the nozzle should be cleaned out. If lime or chemical scale is present in the inlet side, the nozzle may be soaked in descaling solution or replaced. If 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" section.
4. Reinstall Spray tip to gun assembly.

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.

COIL BACK PRESSURE CHECK



Above is a cross section view showing the progressive liming of coils.

A regular maintenance schedule for descaling your heating coil is essential to insure its longevity.

The frequency of descaling depends upon the amount of use and the condition of the water.

1. Check the condition of your water pump and unloader valve.
2. Install a pressure gauge between the water pump and coil inlet as specified below.

COIL BACK PRESSURE CHECK INSTRUCTIONS

DISCHARGE VOLUME GPM	BACK PRESSURE REQUIRING DESCALING
2-3 GPM	50 PSI
3-4 GPM	75 PSI
4-5 GPM	100 PSI
6 GPM	150 PSI
8-10 GPM	175 PSI

USE A 1000 PSI GAUGE

4. Remove the hose and gun assembly from the coil outlet.
5. Turn on the water supply. Check the float valve (if so equipped) to assure float tank is full and the float valve shuts off securely.
6. Check the position of the ball valve (if so equipped) on outlet line of the float tank assuring it is in the open position.
7. Start the engine. If the coil back pressure reading is above that found in the GENERAL section of the **MODEL SPECIFICATIONS** then your machine needs to be descaled.

A separate descaling pump is recommended so scale and other chemicals will not come in contact with your water pump and causes premature wear.

NOTE: Contact your local dealer for descaling of your unit.

7. Disconnect the water supply.
8. Disconnect the electrical supply.
9. Reinstall the hose and gun assembly.
10. Remove the pressure gauge.

ACCESSORIES

PART NO.	DESCRIPTION
Y02-00001	0-1000 PSI (69 BAR) Pressure Gauge
Z01-00070-1.....	3/8" x 100 Yards Thread Tape

NOTE: All Gauges are Glycerin Filled—¼ NPT

MACHINE MAINTENANCE

ENGINE DRIVEN OIL FIRED CLEANERS	DAILY	EACH HR FIRST 8 HRS	AFTER FIRST 50 HRS	EVERY 50 HRS	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 environment 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 belt tension, see MACHINE MAINTENANCE insert.	● ●						
FILTER – WATER: **Check water inlet** hose screen for debris **Check float tank** screen for debris	 ●	●		●			
SPRAY TIP: **Check Tip** for debris.	●						
FUEL: Adequate fuel supply.	●						
FILTER—FUEL: **If contaminants** are present see FUEL FILTER insert. **Remove and Replace** fuel filter per FUEL FILTER insert.	● ●						
SCREEN—FUEL: **Check fuel pump screen** for debris see OIL BURNER MAINTENANCE insert.					●		
BURNER NOZZLE: **Replace Nozzle** as specified in BURNER section of MODEL SPECIFICATIONS or BURNER ASSEMBLY insert.							●
GUARDS AND SHIELDS: Check that all guards and shields are in place and secure.							●
ENGINE: Check oil level per engine manual. Fill fuel tank. Check air cleaner for dirty, loose or damaged parts. Service pre-cleaner element Service air cleaner	● ● ●		● 	 ●			

CLEANER TROUBLESHOOTING

GAS ENGINE DRIVEN HOT WATER CLEANERS

TROUBLE	POSSIBLE CAUSE	REMEDY
1. Poor Cleaning Action.	A. Hard water.	A. Connect machine to water softener.
	B. Low Pressure.	B. See "Low operating pressure"
	C. Little or no chemical being drawn.	C. See "Machine will not draw chemical".
	D. Improper chemical.	D. Obtain proper chemical.
	E. Improper chemical mixture	E. Mix chemicals per the label. Follow all mixing, handling, application, and disposal instructions.
	F. Low discharge pressure.	F. See "Low operating pressure"
2. Machine will not draw chemical.	A. No chemical solution.	A. Replenish supply.
	B. Metering valve not open.	B. Turn metering valve knob to open.
	C. Chemical line strainer clogged.	C. Remove screen and clean.
	D. Air leak in chemical line.	D. Tighten all fittings and hoses for the chemical line.
	E. Metering valve clogged.	E. Disassemble and clean.
	F. Restrictor orifice too large or missing.	F. Install proper size orifice.
3. Low operating pressure	A. Insufficient water supply.	A. The water supply must meet or exceed the maximum discharge volume specified in the PERFORMANCE section, and minimum water inlet pressure specified in the GENERAL section of the **MODEL SPECIFCATIONS** section.
	B. Incoming water hose too small.	B. Use larger water supply hose.
	C. Water supply hose too long.	C. Use shorter water supply hose.
	D. Belt slippage.	D. Tighten belt per instructions in **MACHINE MAINTENANCE** insert.
	E. Worn Belt.	E. Replace belt per **CLEANER EXPLODED VIEW**.
	F. Spray tip worn or wrong size.	F. Replace with spray tip specified in the GENERAL section of **MODEL SPECIFICATIONS**.
	G. Dirty or worn check valves in water pump.	G. See **PUMP TROUBLESHOOTING**.
	H. Water supply hose kinked.	H. Straighten hose.
	I. Inlet filter screen clogged.	I. Clean water filter screen or hose inlet screen.
	J. Engine runs slow.	J. See "Pump engine starts slow or overheats and stops".
	K. Air leak in inlet plumbing.	K. Tighten all fittings.
	L. Defective water pump.	L. See **PUMP TROUBLESHOOTING**.
	M. Leaking discharge hose.	M. If a water leak is found, **DO NOT OPERATE THE MACHINE**. Disconnect the power and replace hose.
	N. Chemical metering valve open and sucking air.	N. Resupply chemical, place soap screen in water, or shut off metering valve.
	O. Defective unloader valve	O. Repair or replace unloader valve.
	P. Inlet ball valve not fully open (if so equipped)	P. Open inlet ball valve completely. (Handle parallel w/valve body).
	Q. Restricted coil	Q. See COIL BACK PRESSURE CHECK on **MACHINE MAINTENANCE**.

CLEANER TROUBLESHOOTING (CONT.)

ELECTRIC DRIVEN HOT WATER CLEANERS

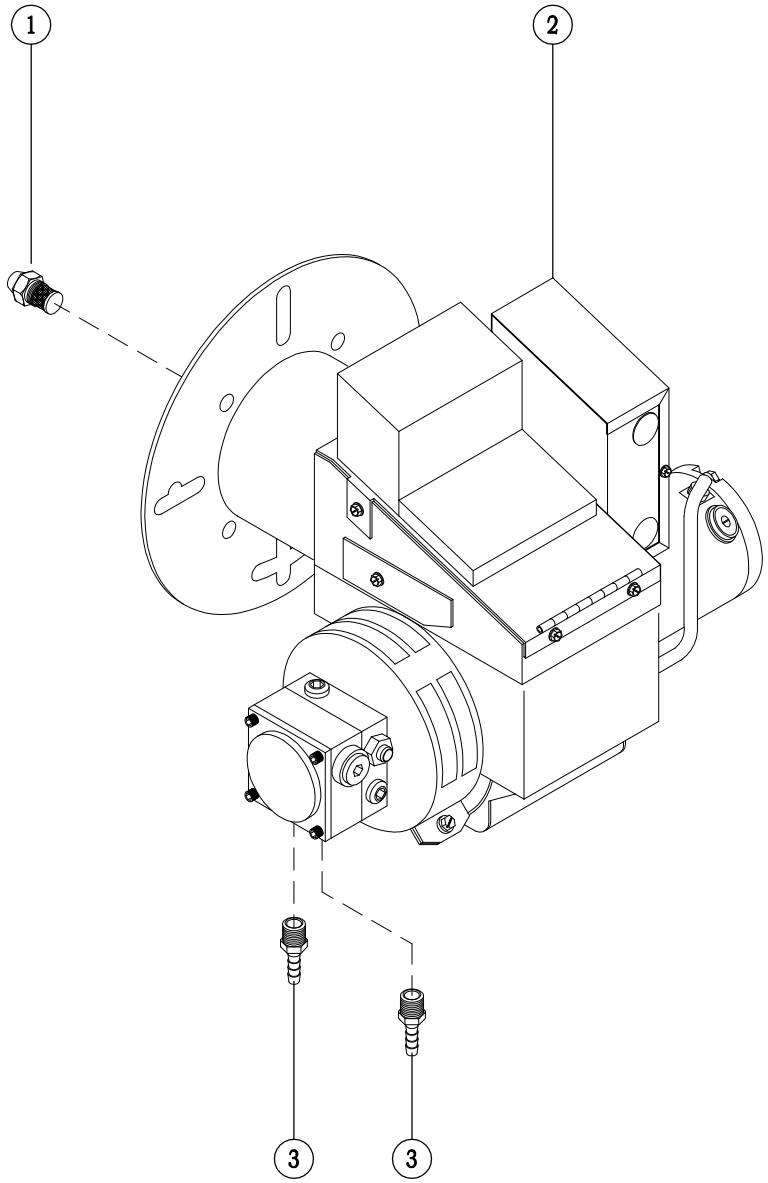
TROUBLE	POSSIBLE CAUSE	REMEDY
4. Excessive, unusual noise.	A. Pump	A. See **PUMP TROUBLESHOOTING**.
	B. Defective engine.	B. Call service technician or take engine to Repair/Warranty station.
	C. Pulleys rubbing.	C. Adjust shields or pulley(s).
	D. Misalignment of pump & engine	D. Realign pump and engine.
5. Belts slipping.	A. Belts too loose.	A. Tighten belt per instructions on **MACHINE MAINTENANCE**.
	B. Excessive Back Pressure.	B. See "Excessive Back Pressure"
	C. Defective Water Pump.	C. See **PUMP SERVICE**.
6. Excessive Back Pressure	A. Spray tip built up with lime.	A. Remove and clean, or replace spray tip with tip specified in the GENERAL section of **MODEL SPECIFICATIONS**. Flush machine per FLUSHING in **MACHINE MAINTENANCE**.
	B. Water pump turning too fast.	B. See **MODEL SPECIFICATIONS**.
	C. Coil built up with lime.	C. Delime coil.
	D. Relief valve defective.	D. Remove and replace.
7. Excessive vibration.	A. Defective Belt.	A. Remove and replace using belt specified in CLEANER EXPLODED VIEW or the GENERAL section of **MODEL SPECIFICATIONS**.
	B. Defective Pump.	B. See **PUMP TROUBLESHOOTING**.
	C. Defective accumulator	C. Recharge/Replace.
8. Engine will not start	A. No Fuel	A. Replenish fuel per owners manual.
	B. Plugged fuel filter.	B. Change fuel filter.
	C. Water in fuel	C. Drain and replenish fuel.
	D. Defective or corroded battery cable.	D. Clean cables and cable ends.
	E. Defective engine	E. Call service technician.
9. Engine will not turn over.	A. Pump frozen	A. Machine must be thoroughly warmed to above freezing.
	B. Defective engine.	B. Call service technician or take engine to Repair/Warranty station.
	C. Defective water pump	C. See **PUMP SERVICE**.
	D. Excessive back pressure	D. See "Excessive Back Pressure"
10. Engine starts slow or overheats and stops.	A. Improper fuel.	A. See "Low voltage".
	B. Excessive back pressure.	B. See "Excessive Back Pressure".
	C. Defective engine.	C. Call service technician.
	D. Dirt in fuel line or filters.	D. Clean and replace fuel filters.
	E. Incorrect oil level.	E. Check oil level per engine owners manual.
	F. Dirty air cleaner.	F. Change air filters per engine owners manual.
	G. Faulty spark plug.	G. Change spark plug and set gap per engine owners manual.
	H. Engine overloaded.	H. See "Excessive Back Pressure".
11. Engine operates erratically knocks or pings.	A. Improper fuel.	A. Replenish fuel as specified in engine owners manual.
	B. Dirt in fuel line or filter.	B. Clean and replace fuel filters.
	C. Dirty air cleaner.	C. Change air filters per engine owners manual.
	D. Faulty spark plug.	D. Change spark plug and set gap per engine owners manual.
	E. Engine overloaded.	E. See "Excessive Back Pressure".

OIL FIRED WATER HEATER TROUBLESHOOTING

TROUBLE	*POSSIBLE CAUSE*	*REMEDY*
1. Machine will not rise to operating temperature	A. Low fuel pressure. B. Water in fuel piping. C. Fuel filter clogged. D. Poor combustion. E. Improper fuel supply. F. Temperature control inoperative (if equipped).	A. See BURNER on **MODEL SPECIFICATIONS** for specified pressure. B. Drain fuel tank and remove and replace filter per **FUEL FILTER INSERT**. C. Remove and replace fuel filter element per **FUEL FILTER INSERT**. D. See "Poor combustion". E. Use fuel specified in "BURNER" section of the **MODEL SPECIFICATIONS**. F. See **TEMPERATURE CONTROL INSERT**.
2. Machine overheats	A. Insufficient water. B. Temperature control inoperative. C. Improper fuel supply	A. See Low Operating Pressure on **MACHINE TROUBLESHOOTING INSERT**. B. See **TEMPERATURE CONTROL INSERT**. C. Use fuel specified in "BURNER" section of the **MODEL SPECIFICATIONS**.
3. Dry steam (very little moisture, very hot steam)	A. Insufficient water. B. Improper fuel supply. C. Improper fuel pressure.	A. See Low Operating Pressure on **MACHINE TROUBLESHOOTING INSERT**. B. Use fuel specified **in BURNER section of the MACHINE SPECIFICATIONS.** C. See BURNER on MODEL **SPECIFICATIONS** for specified pressure.
4. Machine smokes (sweet smelling exhaust)	A. Improper fuel supply. B. Insufficient combustion air. C. Leaking fuel system. D. Clogged or improper burner nozzle. E. Loose burner nozzle.	A. Use fuel specified in BURNER section of **MODEL SPECIFICATIONS**. B. See AIR BAND ADJUSTMENT on **OIL BURNER MAINTENANCE INSERT**. C. Correct leakage problem. D. Remove (DO NOT CLEAN) and replace nozzle per **BURNER ASSEMBLY INSERT**. E. See **BURNER MAINTENANCE INSERT**.
5. Machine fumes (exhaust burns eyes)	A. Too much combustion air. B. Improper fuel pressure.	A. See **BURNER TROUBLESHOOTING INSERT.** B. See FUEL on **MODEL SPECIFICATIONS** for specified pressure.
6. Excessive oil dripping from laydown coil condensate.	A. Loose nozzle. B. Fuel pressure too high. C. Burner nozzle defective. D. Incorrect burner nozzle.	A. See **BURNER TROUBLESHOOTING INSERT.** B. See FUEL PRESSURE ADJUSTMENT section on **BURNER MAINTENANCE INSERT.** C. Remove and replace with appropriate nozzle found on the **BURNER ASSEMBLY OR BREAKDOWN INSERT**. D. Remove and replace with appropriate nozzle found on the **BURNER ASSEMBLY OR BREAKDOWN INSERT.**
7. Poor combustion.	A. Low fuel pressure. B. Improper fuel supply. C. Insufficient combustion air.	A. See Low Fuel Pressure on **BURNER TROUBLESHOOTING INSERT.** B. See Low Fuel Pressure on **BURNER TROUBLESHOOTING INSERT.** C. See AIR BAND ADJUSTMENT section on **OIL BURNER MAINTENANCE**.

ASSEMBLY, BURNER - P/N 5305EA-00401

EXPLODED VIEW



PARTS LIST

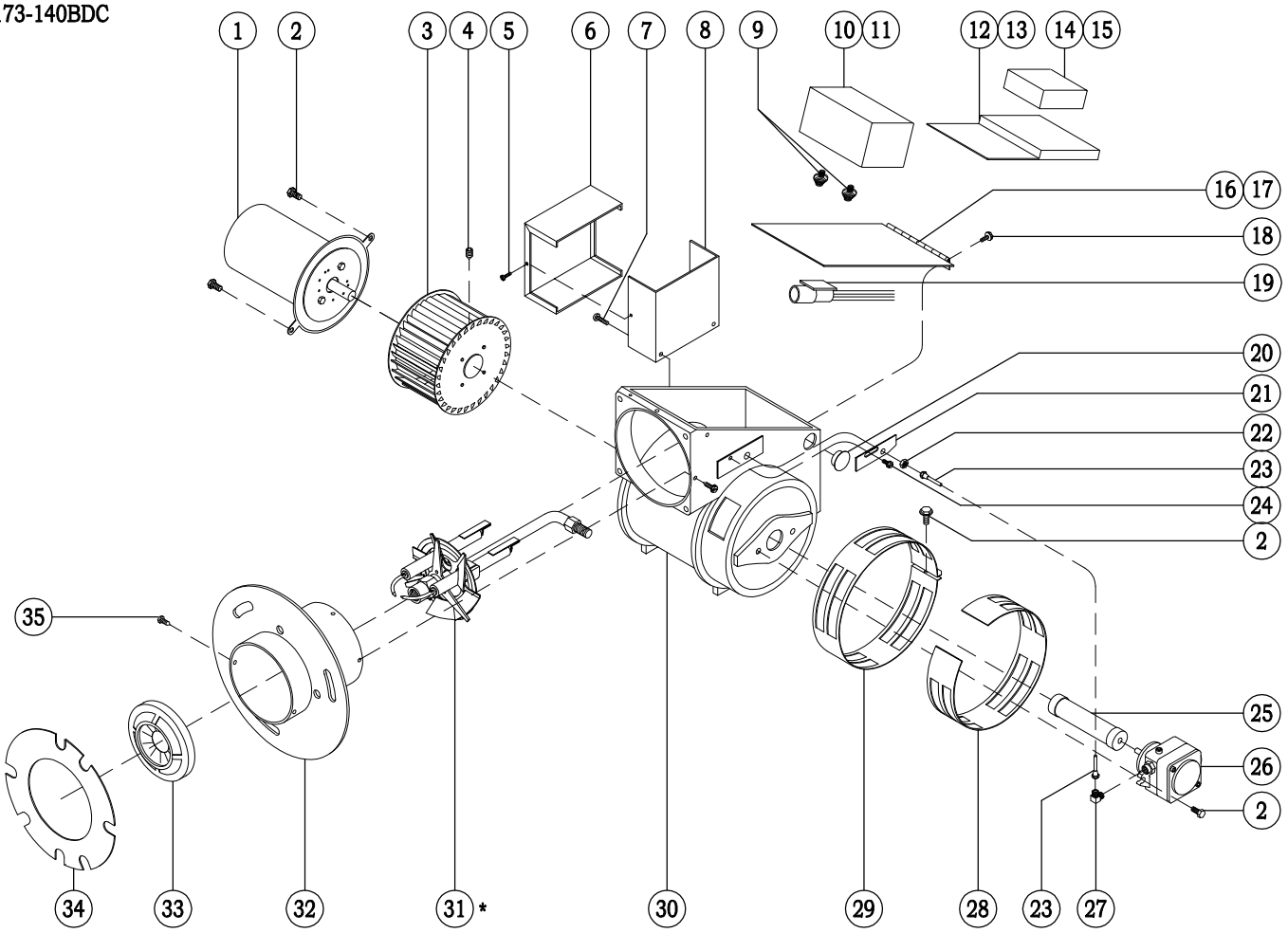
ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION
*1	V2.25 80DB	NOZZLE, BURNER	3	W02-10019-8	BARB, HOSE
2	V00-173140	BURNER, OIL			

*For Breakdown See Z08-02609

BREAKDOWN, BURNER - OIL 12VDC

P/N V00-173140 - EXPLODED VIEW

173-140BDC



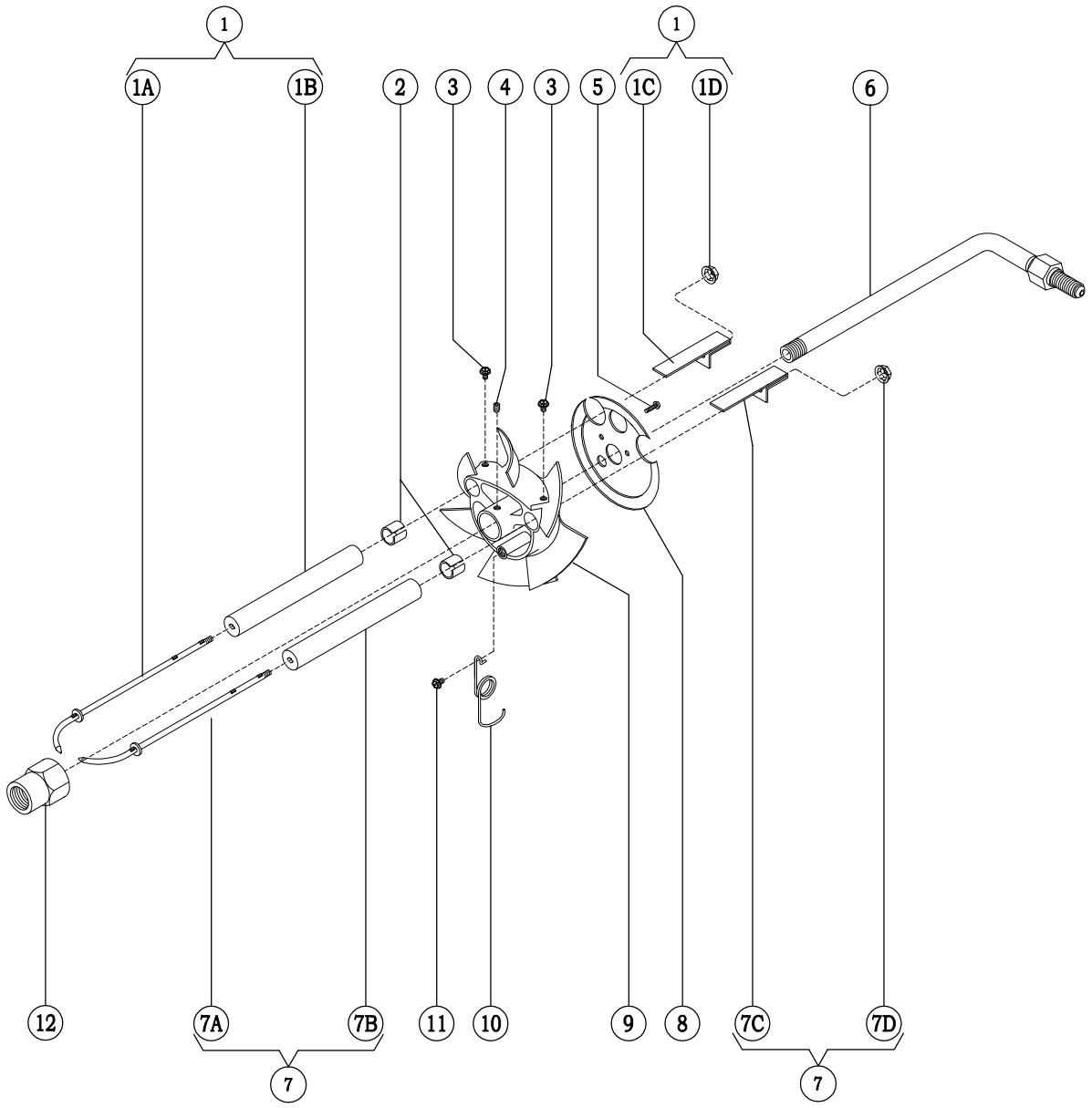
PARTS LIST

ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION
1	V-101126-002	KIT, MOTOR/ADAPTER	17	V-101256-001	GASKET, COVER - REAR HINGE
1A	V-21993-006	MOTOR, ELEC - 12VDC 3900RPM	18	H04-31301	SCREW, SELF TAP
1B	----------	ADAPTER, MOTOR	19	V04-00401	DETECTOR, CAD CELL
1C	----------	BUSHING	20	V-12689	PLUG
1D	V00-13424	COUPLING, SHAFT	21	V00-13392	COVER, SLOT
2	H04-19000	SCREW, SELF TAP	22	V00-14296	NUT, LOCK - OIL LINE
3	V00-21427003	FAN, BURNER w/SET SCREW	23	V00-14452-1	LINE, OIL
4	H04-31302	SCREW, SET	24	H04-31313	SCREW, CAP
5	V-100603-001	SCREW	25	V00-13424	COUPLING, SHAFT
6	V-62899-001	COVER, CONTROL BOX	26	V-100714-001	PUMP, FUEL - DAN FOSS
7	H04-19010	SCREW, MACHINE	27	V00-13494-1	ELBOW, FLARE
8	V-63355-001	BOX, CONTROL - SIDE MOUNT	28	V-20602-002	BAND, AIR - OUTER
9	V-100732-001	SPRING, COMPRESSION	29	V-20601-002	BAND, AIR - INNER
10	V-100764-001	IGNITOR, 12V	30	V-21866-002	ASSEMBLY, HOUSING
11	V-100603-016	SCREW, SELF TAP	*31	V-30537-011	ASSEMBLY, GUN
12	V-100730-003	MOUNT, IGNITOR	32	V-21864-011	AIR TUBE
13	V-100603-015	SCREW, SELF TAP	33	V00-14160	CONE, AIR - #4A
14	V-100889-002	TIMER, IGNITOR - 12V	34	V00-12484	GASKET
15	V00-12694	SCREW, MACHINE	35	V00-12699	SCREW, AIR CONE
16	V-21723-004	COVER, HOUSING - REAR HINGE	*For Breakdown See Z08-03362		

BREAKDOWN, BURNER GUN - P/N V-30537-011

EXPLODED VIEW

30537-011



PARTS LIST

ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION
1	V-100597-002	ASSEMBLY, ELECTRODE - RH	7	V-100598-002	ASSEMBLY, ELECTRODE - LH
*1A	----------	STEM, ELECTRODE - RH	*7A	----------	STEM, ELECTRODE - LH
1B	V00-12574	INSULATOR, ELECTRODE	7B	V00-12574	INSULATOR, ELECTRODE
1C	V-13499-002	BAR, BUSS - "T"	7C	V-13499-002	BAR, BUSS - "T"
1D	V00-13110	NUT, PAL	7D	V00-13110	NUT, PAL
2	V00-12408	BUSHING, INSULATOR	8	V00-13409	PLATE, BAFFLE - 2 1/2"
3	V00-12694	SCREW, MACHINE	9	V00-14310	SUPPORT, ELECTRODE
4	H04-19002	SCREW, SET	10	V00-14442	SPRING, ELECTRODE SUPPORT
5	V00-12695	SCREW, MACHINE	11	H04-16400	SCREW, THREAD CUTTING
6	V-21410-006	ASSEMBLY, OIL PIPE - 7"	12	V00-12362	ADAPTER, NOZZLE
*ELECTRODE STEMS AVAILABLE IN ELECTRODE ASSEMBLIES ONLY					

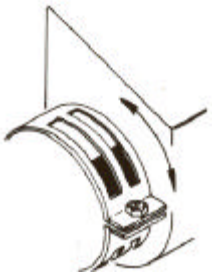
OIL BURNER MAINTENANCE

OIL FIRED CLEANERS

AIR BAND ADJUSTMENT

NOTE: The air band adjustment on this burner has been preset at the factory (elevation approximately 1400 feet). On equipment installed where elevation is substantially different, the air band(s) must be readjusted.

1. Loosen the cap screw retaining the air bands.
2. Move the air bands as indicated below with the machine in operation. NOTE: The air band should be set so the exhaust gives the smoke spot specified in the GENERAL section of the **MACHINE SPECIFICATIONS** on a Shell-Bacharach scale. If a smoke tester is not available, a smoky exhaust, oily odor, or sweet smell indicates insufficient air while eye-burning fumes indicate too much air.

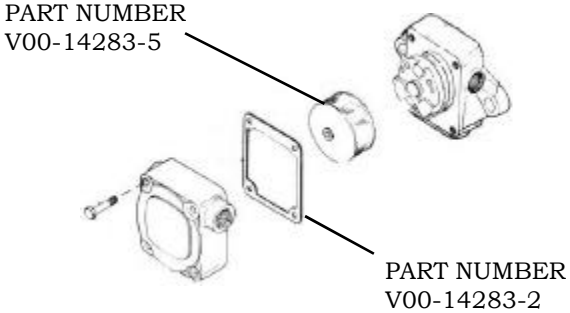


3. Tighten the cap screw retaining the air bands.

FUEL PUMP FILTER

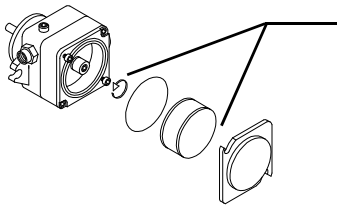
SUNDSTRAND PUMP

1. Shut off fuel supply.
2. Loosen the 4 screws holding the cover to the fuel pump housing.
3. Take cover and cover gasket off and pull strainer off of pump housing.
4. Clean out any dirt remaining in the bottom of strainer cover. If there is evidence of rust inside of the unit, be sure to remove water in supply tank and fuel filter.
5. Turn on fuel supply. Failure to do so will result in fuel pump damage.



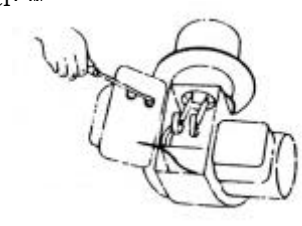
DANFOSS PUMP

1. Shut off fuel supply.
2. Loosen the 2 screws with 7/64 allen wrench one turn.
3. Turn cover counter clockwise and pull strainer and cover off of pump housing.
4. Clean out any dirt remaining in the bottom of strainer cover. If there is evidence of rust inside of the unit, be sure to remove water in supply tank and fuel filter.
5. Reinstall reverse of removal.
6. Turn on fuel supply.



TRANSFORMER TEST

1. Remove burner junction box cover.
2. Turn on burner and make sure ignition transformer is receiving rated voltage.
3. Turn off burner.
4. Loosen screw and swing transformer away from burner gun assembly.
5. Turn on burner.
6. Short the high voltage terminals. **CAUTION**: Use screwdriver with a well insulated handle to avoid shock.
7. Open gap by drawing screwdriver away from one electrode while touching the other.
8. The spark should jump between 5/8 inches and 3/4 inches, if it doesn't jump, replace the transformer.
9. Turn burner off.
10. Partially close transformer. Check if buss bars align and contact transformer electrodes. If buss bars do not contact, see Buss Bar Alignment.
11. Close transformer, reposition retainer clip and tighten screw.



BUSS BAR ALIGNMENT

1. With burner off, loosen screw and swing the transformer away from burner gun assembly.
2. Inspect the buss bars and transformer electrodes for pitting or corrosion.
3. Partially close the transformer. Check if the buss bars contact and are in alignment with transformer electrodes.
4. Proper adjustment is obtained by gently bending the buss bars until they spring against, parallel, and are in full contact with the transformer electrodes.
5. With buss bars aligned, carefully close and fasten the transformer.

BURNER GUN REMOVAL & INSTALLATION

1. Disconnect the fuel line from the burner gun assembly oil line fitting. Loosen the other end of the line and swing line out of the way.
2. Remove the retaining nut.
3. Loosen screw and swing transformer away from burner gun assembly.
4. Carefully remove the burner gun assembly.
   A. Check and replace electrode insulators if cracked.
   B. Clean burnt buss bars.
   C. Clean carbon off electrodes.
   D. Clean carbon off oil nozzle. (Use caution not to scratch face of nozzle or orifice.)
   E. Check for a loose oil nozzle. NOTE: Check with dealer and/or replace nozzle with proper nozzle.
5. Gently replace burner gun assembly in air tube. **CAUTION:** Do not force. Forcing will cause electrode misalignment
6. Reinstall the retaining nut.

   Reinstall the oil line making sure both ends are tight.
7. Partially close transformer. Check if buss bars align and contact the transformer electrodes. If buss bars do not contact, see Buss Bar Alignment.
8. Close transformer, reposition retainer and tighten screw.

ACCESSORIES

Z01-00095 – Fuel Nozzle Changing Wrench
Z01-00092 – Fuel Pump Wrench (Sundstrand)
Z01-00093 – Solenoid Wrench (ASCO)

ELECTRODE ASSEMBLY ADJUSTMENT

1. Loosen screws holding electrode assemblies.
2. Raise electrode tips 5/32 inches above surface plane or end of oil nozzle.
3. Place each electrode tip 5/16 inches from center of spray nozzle hole, maintaining previous measurement.
4. Spread electrode tips to 1/8-inch gap maintaining previous measurements.
5. When the proper measurements are obtained, gently tighten screws that hold electrode assembly in place. **CAUTION:** Do not over tighten, as this will cause the electrode insulator to fail.

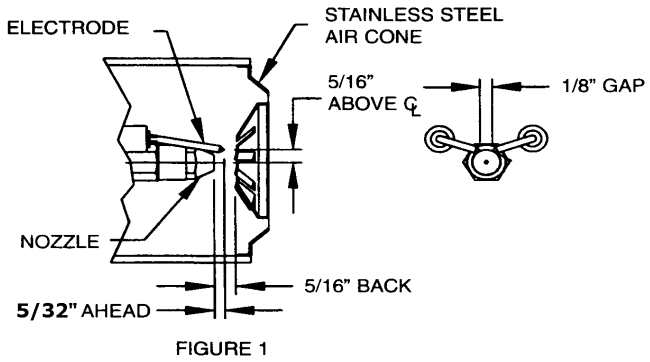


FIGURE 1

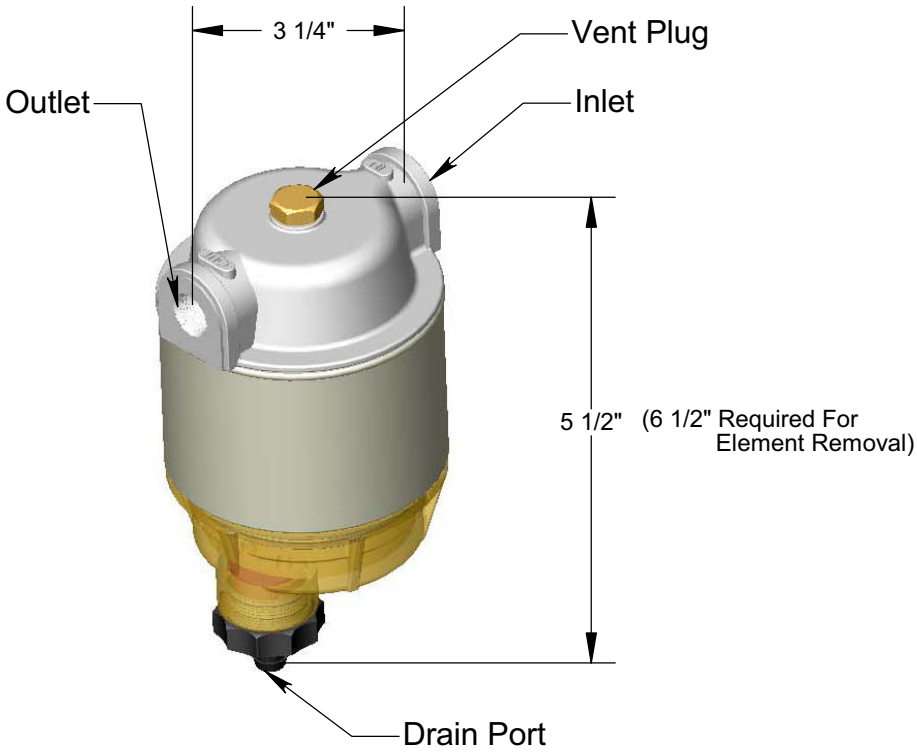
OIL FIRED BURNER TROUBLESHOOTING

TROUBLE	*POSSIBLE CAUSE*	*REMEDY*
1. Burner will not ignite.	A. Electrodes out of alignment.	A. See "ADJUSTING ELECTRODE ASSEMBLY" in **BURNER MAINTENANCE SECTION**.
	B. Electrode insulator failure.	B. Remove and replace if there are breaks, cracks, or spark trails.
	C. Water flow switch not closing.	C. Adjust, repair, or replace switch.
	D. Vacuum switch not closing.	D. Adjust, repair or replace switch.
	E. Temperature control switch not closing.	E. Adjust or replace the TEMPERATURE CONTROL.
	F. Fuel solenoid valve not opening.	F. Clean, repair, or replace solenoid.
	G. Weak transformer.	G. Clean and check transformer terminals. Check transformer for spark per "TRANSFORMER TEST" in **BURNER MAINTENANCE SECTION.**
	H. Faulty cad cell (if equipped).	H. Clean and test cad cell, replace if required.
	I. Faulty primary control (if equipped).	I. Replace primary control.
	J. Burner motor thermal protector locked out.	J. See "Burner motor thermal protector locked out.
	K. Wiring.	K. All wire contacts are to be clean and tight. Wire should not be cracked or frayed.
	L. Burner switch.	L. Test switch operation. Remove and replace as necessary.
	M. Pump pressure.	M. See "Low fuel pressure".
	N. Venting.	N. A downdraft will cause delayed ignition. Soot deposits on the coil and burner can interrupt air flow, and cause shorting of the electrodes. Clean as required.
	0. Sooting.	O. Soot deposits on the coil and burner can interrupt air flow, and cause shorting of the electrodes. Clean as required.
	P. No fuel	P. See "No fuel."
2. No fuel	A.Clogged fuel filter.	A. Remove and replace filter per **FUEL FILTER SECTION.**
	B. Fuel leak.	B. Repair as necessary.
	C. Kinked or collapsed fuel line.	C. Remove and replace fuel line.
	D. Low fuel pressure.	D. See "Low fuel pressure".
	E. Faulty burner oil pump.	E. Adjust pressure or replace.
	F. Air leak in intake lines.	F. Tighten all fittings.
	G. Clogged burner nozzle	G. Remove and replace (Do not clean).
3. Low fuel pressure	A. Clogged fuel filter.	A. Remove and replace filter per FUEL FILTER page.
	B. Clogged fuel pump filter screen.	B. Remove pump cover and clean strainer using a brush and clean fuel oil, diesel oil or kerosene.
	C. Fuel oil too viscous.	C. Operate a lighter oil or in warmer area.
	D. Air leaks in intake lines.	D. Tighten all fittings.
	E. Kinked or collapsed fuel line.	E. Remove and replace.
	F. Burner shaft coupling slipping.	F. Remove and replace.
	G. Fuel Nozzle worn.	G. Remove and replace with specified nozzle on BURNER ASSEMBLY.
	H. Faulty oil pump	H. Remove and replace.

OIL BURNER TROUBLESHOOTING

TROUBLE	*POSSIBLE CAUSE*	*REMEDY*
4. Pulsating pressure	A. Partially clogged fuel pump strainer or filter. B. Air leaking around fuel pump cover.	A. Remove and replace strainer per FUEL PUMP FILTER in **OIL BURNER MAINTNANCE** Section. B. Check fuel pump cover screws for tightness and damaged gasket.
5. Unit smokes	A. Improper fuel. B. Air to burner insufficient. C. Fuel nozzle interior loose. D. Water in fuel. E. Gun out of alignment.	A. Refuel with FUEL specified on **MACHINE SPECIFICATIONS**. B. See AIR BAND ADJUSTMENT in **OIL BURNER MAINTENANCE** section. C. Replace nozzle. D. Inspect fuel filter for water presence. E. Bend oil pipe to center burner nozzle.
6. Burner motor thermal protector kicked out.	A. Low voltage. B. Fuel too viscous. C. Fuel pump defective. D. Motor defective.	A. Voltage must match those specified in the BURNER section of **MACHINE SPECIFICATIONS** section. B. Operate in warmer conditions or with fuel adapted to cold weather conditions. C. Check that fuel pump turns freely. D. Call service technician or take motor to repair/warranty station.
7. Delayed ignition (rumbling, noisy starts)	A. Dirty or damaged electrodes. B. Air adjustment open too far. C. Poor fuel spray pattern. D. Incorrect electrode setting. E. Weak transformer	A. Clean or replace. B. Readjust per AIR BAND ADJUSTMENT in **OIL BURNER MAINTENANCE** section. C. Remove and replace with fuel nozzle specified in **BURNER ASSEMBLY**. D. Readjust per ADJUSTING ELECTRODE ASSEMBLY in **OIL BURNER MAINTENANCE** section. E. See TRANSFORMER CHECK on **OIL BURNER MAINTENANCE** section
8. Burner does not electrically come on	A. Burner motor reset button tripped. B. High limit temp control reset tripped if so equipped.	A. Reset if necessary. CAUTION: Do not keep hitting the "reset button" if you have oil pressure you are just filling the burner combustion chamber with oil and if ignited will cause an explosion. B. Reset if necessary.

FILTER, FUEL
P/N V04-00308



ALL DIMENTIONS ARE
IN INCHES UNLESS OTHERWISE
NOTED. 25.4 MM = 1 INCH

SPECIFICATIONS

• MAXIMUM FLOW	15 GPH / 57 LPM
• MAXIMUM FILTRATION	2 MICRONS
• MAXIMUM TEMPERATURE	212°F / 100°C
• WEIGHT	1.0 LBS. / 340 GM
• INLET	1/4 NPT
• OUTLET	1/4 NPT

TROUBLE SHOOTING

TROUBLE	POSSIBLE CAUSE	REMEDY
1. Fuel bowl leaking.	A. Deteriorated gasket. B. Housing Cracked. C. Bowl rim cracked, nicked, or scratched. D. Gasket missing. E. Loose Fuel Bowl.	A. Remove and Replace Gasket. B. Remove and Replace Housing. C. Remove and Replace Bowl. D. Replace Gasket. E. Tighten Fuel Bowl Onto Filter.
2. Air leaking into system (indicated by air bubbles in bowl during operation).	A.Loose Valve Assembly. B. craked Component. C. loose Filter bowl.	A.Tighten Valve Assembly. B. Inspect Filter Bowl, Filter Housing, and Gasket. C. Tighten Fuel Bowl Onto Fuel Filter.

FILTER, FUEL
BREAKDOWN - P/N V04-00308

MAINTENACE PROCEDURES

1. ***PRIMING THE MACHINE***

Shut off the fuel tank valves. Spin off the element, fill with clean fuel and coat the square gasket (3) with fuel. Reinstall the element and tighten 1/4 to 1/3 turns after the gasket contacts the upper housing. Turn on the fuel tank valves. Start the machine and check that there are no leaks.

2. ***DRAINING WATER***

Check the collection bowl daily. Drain off water contaminants by opening the head vent and then the drain. If more than 1/8 cup of fluid is drained, follow the priming instructions, otherwise, close the vent and drain. Start the machine and allow air to purge from the fuel system prior to operating the equipment.

3. ***ELEMENT REPLACEMENT FREQUENCY***

Frequency of element replacement is determined by contamination level in the fuel. Replace the element upon power loss of the engine (if so equipped) or every 500 hours whichever comes first.

NOTE: Foul smelling diesel fuel is an indication of microbiological contamination. A change in fuel source is recommended. Always carry a spare element as one tank full of contaminated fuel will plug the fuel filter element prematurely.

4. ***ELEMENT REPLACEMENT PROCEDURE:***

1. Shut off the fuel tank valves.
2. Unscrew the amber bowl from the fuel filter.
3. Unscrew and discard the filter from the upper housing.
4. Follow listed procedures under “PRIMING”.

MAINTENANCE SCHEDULE

	WEEKLY	100 HRS
GASKETS: 1. Inspect for deterioration or tearing. 2. Remove and Replace.	*	*
BOWLS: Inspect rim of bowl to insure it is free of nicks, cracks, or scratches.	*	
FILTER ELEMENT: 1. Inspect for damage or deterioration. 2. Remove and Replace. (500 hours)	* *	
FUEL BOWL: If contaminants are found, check more frequently.	*	

NOTE:

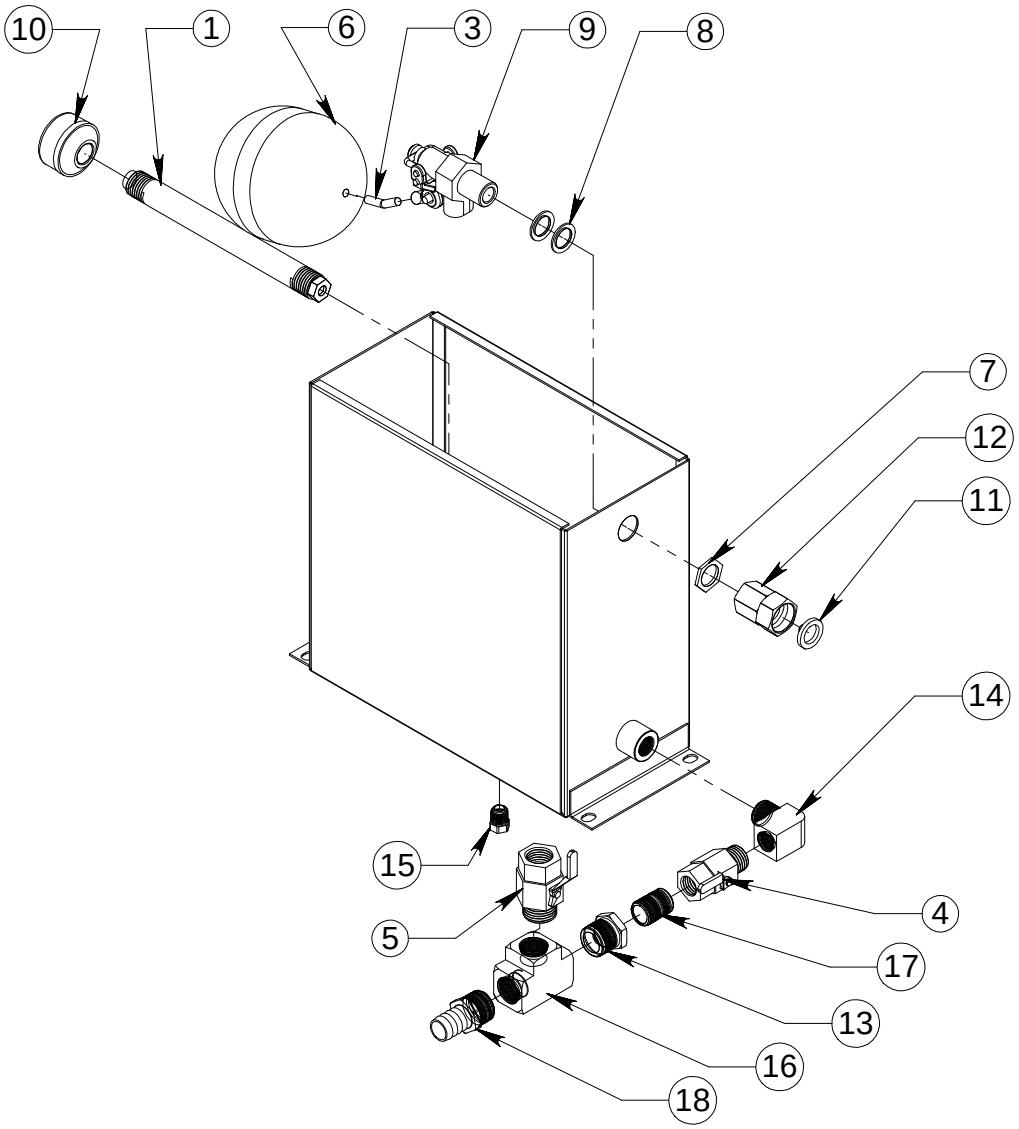
intervals stated are for normal operating conditions. the intervals suggested may be shiortened or lengthened as determined by existing conditions.

EXPLODED VIEW

PARTS LIST			
ITEM	PART NUMBER	PART DESCRIPTION	QTY.
1	V04-00308-02	HOUSING, UPPER	1
2	V04-00308-07	ASSEMBLY, DRAIN	1
3	V04-00308-06	BOWL, AMBER - 3"	1
4	V04-00308-01	ELEMENT, FILTER	1
5	V04-00308-05	O-RING - 3/32CS X 2 1/2ID	1
6	C07-01300-08	O-RING - 1/16CS X 5/16ID	1
7	V04-00308-08	PLUG, PIPE	1
8	V04-00308-03	RING, FLAT	1
9	V04-00308-K	KIT, REPLACEMENT BOWL	1
10	V04-00308-04	ASSEMBLY, VENT	1

ASSEMBLY, FLOAT TANK

EXPLODED VIEW - P/N 4355EB-01121



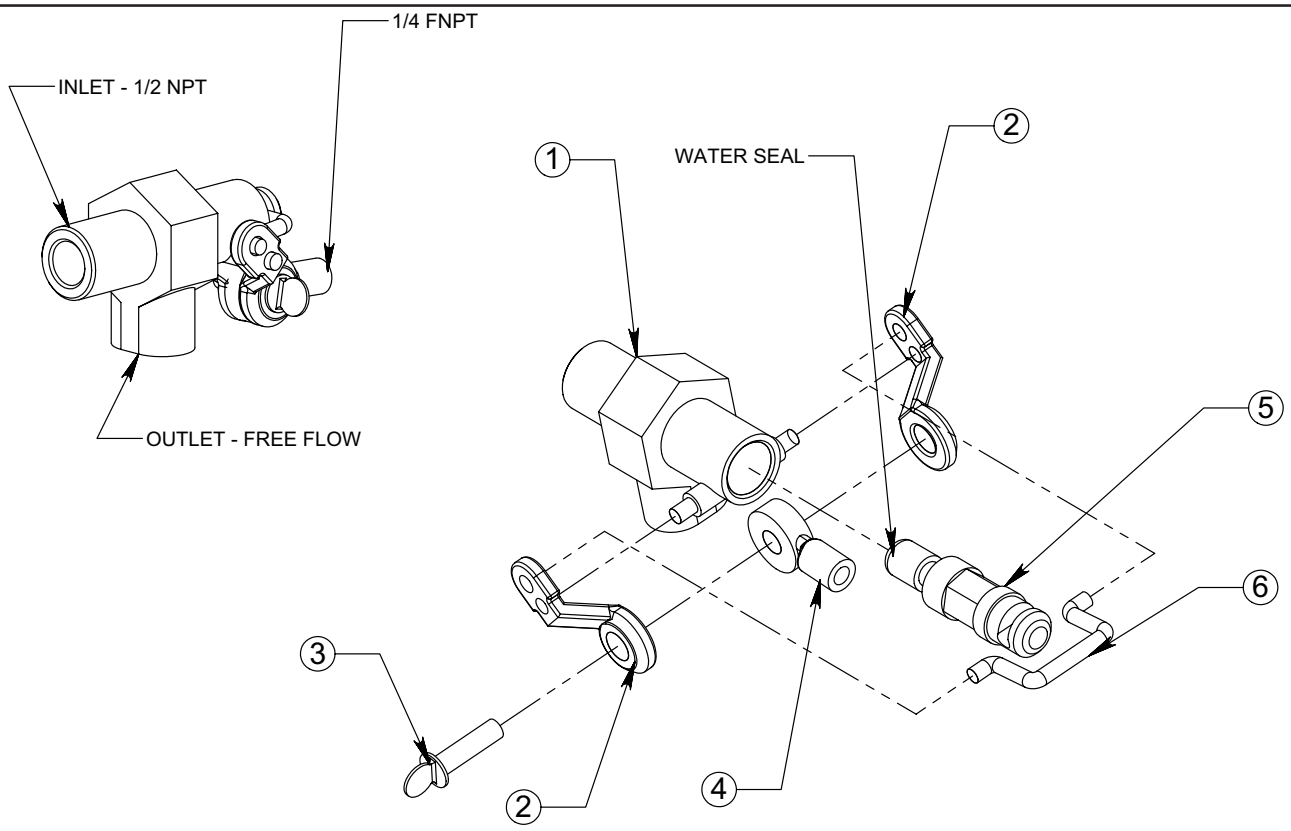
PART LISTS

ITEM	*PART NUMBER*	*PART DESCRIPTION*	*QTY.*
1	4120-10540P	ASSEMBLY, RESTRICTOR	1
2	5305A-04120	WELDMENT, TANK - FLOAT	1
3	AR14-00100-B	ROD, FLOAT	1
4	C03-00152-4	VALVE, BALL - 1/2	1
5	C03-00153-4	VALVE, BALL - 3/4	1
6	C03-00622-B	BALL,FLOAT-PLASTIC	1
7	C03-00629-01	NUT, HEX	1
8	C03-00629-02	WASHER, FIBER	2
9	C03-00636	VALVE, FLOAT	1
10	C04-00120	FILTER, SOAP SCREEN	1
11	C05-00271	WASHER, GARDEN HOSE	1
12	C05-00273	ADAPTER, GARDEN HOSE	1
13	E04-00009-48	BUSHING, PIPE	1
14	E08-00017-48	ELBOW, STREET	1
15	E09-00002-P	PLUG, PIPE - NYLON	1
16	E10-00008-4	TEE, PIPE	1
17	E15-00010-48	NIPPLE, BRASS 1/2"	1
18	W02-10029-8	BARB, HOSE	1

VALVE, FLOAT
P/N C03-00636

SPECIFICATIONS

• MAXIMUM FLOW	14 GPM / 53 LPM / 35 PSI
• MATERIAL - HOUSING	BRASS
• MATERIAL - WATER SEAL	BUNA - N
• MATERIAL - PLUNGER	FLUTED CELCON
• WEIGHT	0.82 LBS. / 0.37 GM
• INLET	1/2 MIP



PART LISTS

ITEM	PART NUMBER	PART DESCRIPTION	QTY.
1	BODY	HOUSING, VALVE	1
2	ANGLE	ARM, PLUNGER	2
3	BOLT	SCREW, WING	1
4	Part14	ARM, BALL	1
5	PLUNGER	PLUNGER	1
6	U PEICE	LINK,PLUNGER	1

PUMP, WATER - P/N N09-00053

DIMENSIONS

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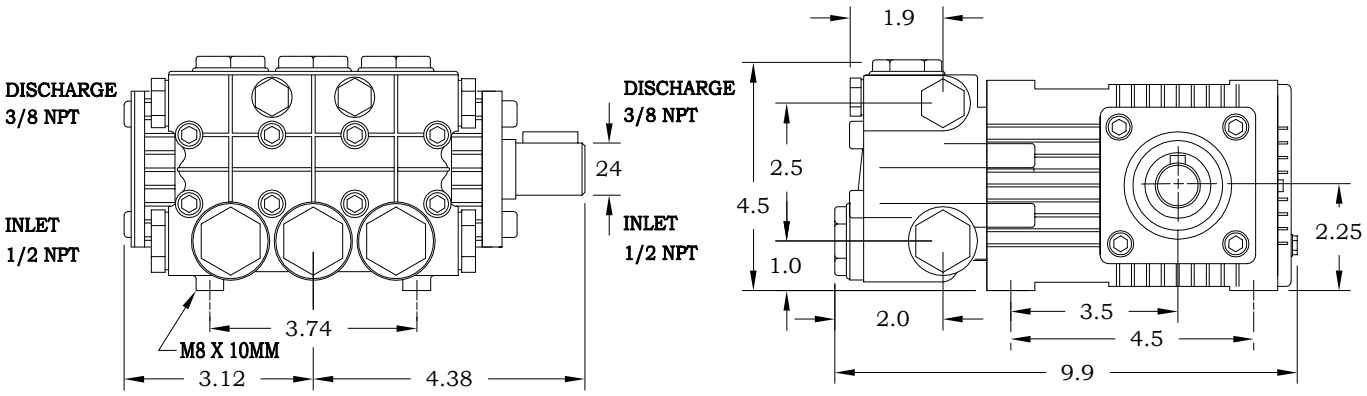

ALL DIMENSIONS ARE IN
INCHES UNLESS OTHERWISE
NOTED. 25.4 MM = 1 INCH

PERFORMANCE

DISCHARGE VOLUME.....4.0 GPM / 15.1 LPM
PUMP HEAD PRESSURE.....4000 PSI / 275.0 BAR

GENERAL

CRANKSHAFT ROTATION.....CLOCKWISE AND COUNTER CLOCKWISE
MAXIMUM SPEED.....1450 RPM
MAXIMUM PUMPED FLUID TEMPERATURE.....165°F / 74°C
INLET PRESSURE.....-9 IN HG @ 75°F TO 116 PSI / -0.3 BAR @ 24°C TO 8 BAR
WEIGHT (WET).....20.0 LBS / 8.8 KG

LUBRICATION

OIL CHANGE INTERVAL .....AFTER FIRST 50 HOURS THEN AFTER 500 HOURS
OIL TYPE.....SAE 30 (NON-DERTERGENT)
CRANKCASE CAPACITY.....15.0 FL OZ / 0.44 LT

TORQUE

VALVE PLUG.....40 FT LBS / 5.5 KG M
MOUNT TO CRANKCASE.....32 FT LBS / 4.4 KG M
* PLUNGER NUT TO CROSSHEAD.....8.8 FT LBS / 1.2 KG M
REAR COVER TO CRANKCASE.....18 FT LBS / 2.4 KG M
RETAINER TO CRANKCASE.....18 FT LBS / 2.4 KG M
HEAD TO CRANKCASE.....18.0 FT LBS / 2.5 KG M

*__NOTE:__ When plunger nut is removed, install a new copper washer and flinger washer to ensure proper fit and seal of ceramic plunger. If same copper washers are reused cracking or a poor seal may result.

REPAIR PARTS PACKAGES

PART NO.	DESCRIPTION	ITEM	QTY
N09-992864	VALVE ASSEMBLIES		
	ASS'Y, CHECK VALVE	36	6
	O-RING	35	6
N09-991855	OIL SEALS & O-RINGS		
	O-RING, RETAINER	4	2
	O-RING, COVER	11	1
	SEAL, OIL	45	3
	SEAL, OIL - CRANKSHAFT	17	1

PART NO.	DESCRIPTION	ITEM	QTY
N09-991857	V-PACKING, SEAL, & O-RING		
	SEAL, WATER	21	3
	O-RING	22	3
	PACKING, V - 18MM	24	3

PART NO.	DESCRIPTION	ITEM	QTY
N09-992757	PLUNGERS - 18MM		
	PLUNGERS	41	3
N09-991829	ADAPTER, MALE - 18MM		
	ADAPTER, MALE	25	3

BREAKDOWN, PUMP - N09-00053

EXPLODED VIEW

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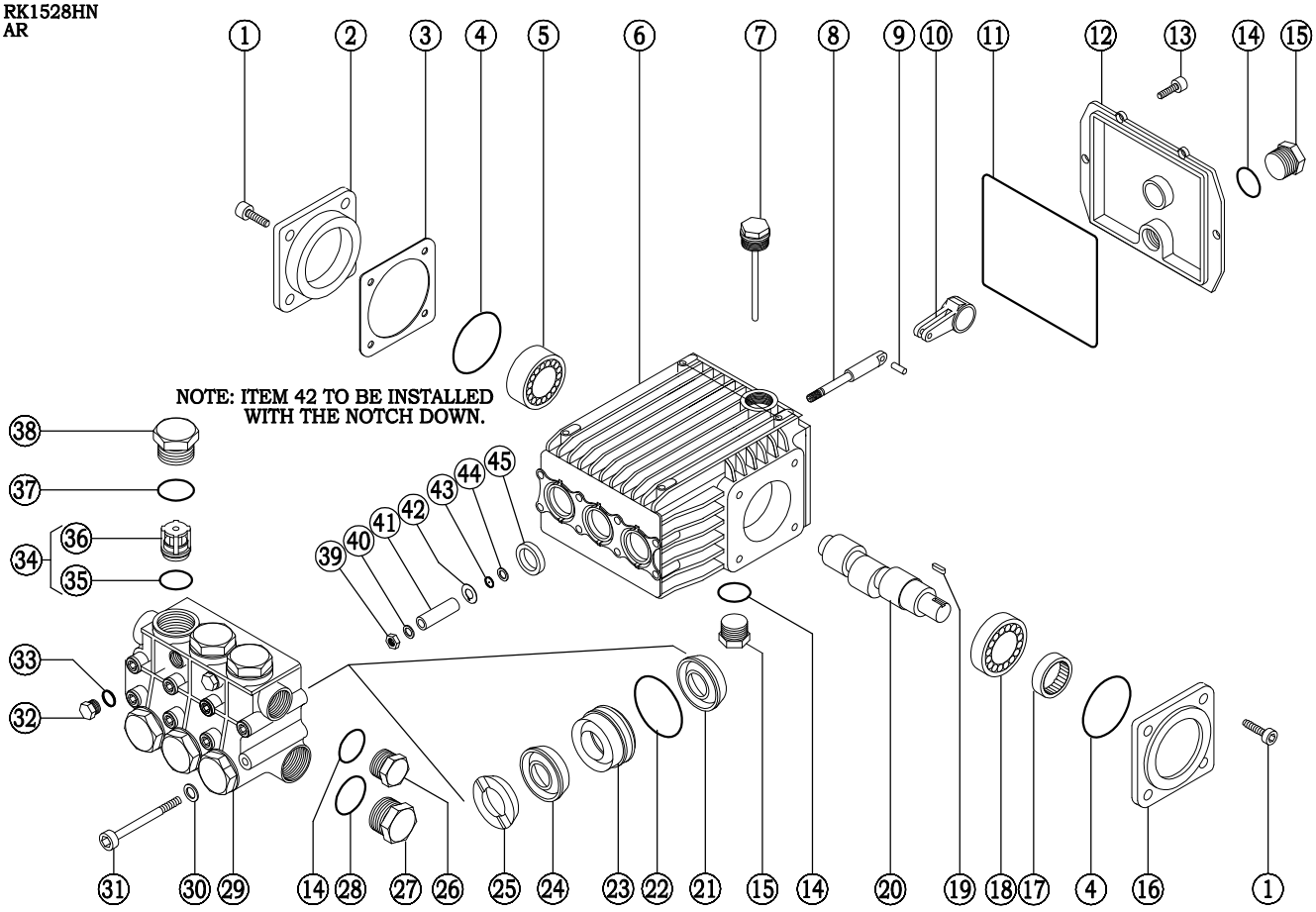


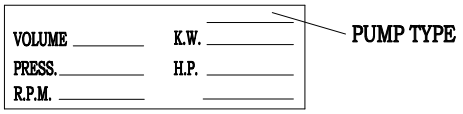
PARTS LIST

ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION
1	N09-850370	SCREW, CAP	24	N09-880320	V-PACKING - 18MM
2	N09-1380050	RETAINER, BEARING - CLOSED	25	N09-960110	ADAPTER, MALE - 18MM
3	N09-1380120	SHIM - 0.1 MM	26	N09-1981180	PLUG - 3/8" NICKEL PLATED
4	N09-640030	O-RING	27	N09-960870	PLUG - 1/2" NICKEL PLATED
5	N09-2280240	BEARING	28	N09-180101	O-RING
6	N09-1382770	CRANKCASE	29	N09-1381070	HEAD, PUMP - NICKEL PLATED
7	N09-0880130	DIPSTICK, OIL	30	N09-1381850	WASHER, FLAT
8	N09-1380920	CROSSHEAD	31	N09-820150	SCREW, CAP
9	N09-1380060	PIN, CROSSHEAD	32	N09-1380690	PLUG - 1/4" NICKEL PLATED
10	N09-1383050	ROD, CONNECTING	33	N07-20028	O-RING
11	N09-1780510	O-RING	34	N09-992864	KIT, VALVE ASSEMBLY
12	N09-1789010	COVER, PUMP HOUSING - REAR	35	P04-00212	O-RING
13	N09-1343510	SCREW, CAP	36	----------	ASSEMBLY, VALVE
14	C03-00503-01	O-RING	37	N09-0960160	0-RING
15	N09-880530	PLUG - 3/8"	38	N09-960850	PLUG - S.S.
16	N09-1380040	RETAINER, BEARING - OPEN	39	N09-962010	NUT, HEX
17	N09-880520	SEAL, OIL	40	N09-962000	WASHER, FLAT - COPPER
18	N09-840370	BEARING	41	N09-1380940	PLUNGER - 18MM
19	N09-1380520	KEY	42	N09-1380950	WASHER, FLINGER - COPPER
20	N09-2280060	CRANKSHAFT	43	N09-600180	O-RING
21	N09-880330	SEAL, WATER - 18MM	44	N09-1080401	RING, ANTI-EXTRUSION
22	N07-20016	O-RING	45	N09-880520	SEAL, OIL
23	N09-1380090	ADAPTER, FEMALE - 18MM			

AR PUMP SERVICE

PUMP IDENTIFICATION

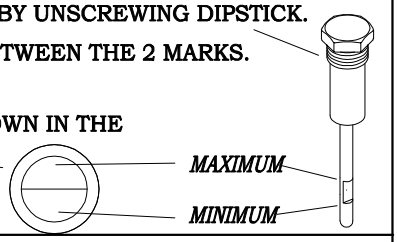
PUMP I.D. PLATE FOUND BEHIND PUMP HEAD.
NOTE LOCATION OF INFORMATION ON THE PLATE BELOW



OIL LEVEL

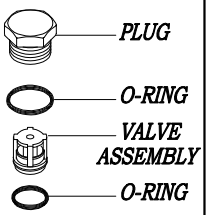
CHECK THE OIL LEVEL BY UNSCREWING DIPSTICK.
THE LEVEL SHOULD BETWEEN THE 2 MARKS.

OIL LEVEL IS ALSO SHOWN IN THE
ROUND INDICATOR.

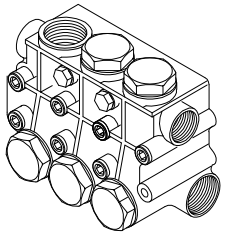


VALVE SERVICE

1. REMOVE THE PLUGS HOLDING THE VALVE ASSEMBLIES.
2. REMOVE AND DISCARD O-RINGS FROM PLUGS. CLEAN PLUGS WITH SOLVENT OR SOAP AND WATER AND ALLOW TO DRY.
3. USING FINGERS, NEEDLE NOSE PLIERS, OR HOOK SHAPED TOOL, REMOVE VALVE ASSEMBLIES FROM HEAD. REMOVE AND DISCARD THE O-RINGS FROM THE VALVE ASSEMBLIES AND/OR HEAD. EXAMINE EACH VALVE ASSEMBLY AND DISCARD DAMAGED ASSEMBLIES USING INSERT SHEET FOR PART NUMBERS OF REPLACEMENT.
4. CLEAN ANY ACCUMULATED DEBRIS FROM THE VALVE CAVITIES AND FLUSH WITH CLEAN WATER.
5. WASH THE VALVE ASSEMBLIES IN CLEAN WATER AND RINSE. WHILE STILL WET, TEST EACH VALVE ASSEMBLY BY HOLDING THE GUIDE AND SUCKING ON THE VALVE SEAT. A PROPERLY SEATING VALVE WILL ALLOW A GOOD VACUUM TO BE DEVELOPED AND MAINTAINED, WHILE A MALFUNCTIONING VALVE WILL NOT. GOOD VALVES SHOULD BE SET ASIDE FOR INSTALLATION IN STEP 6.
6. TO REINSTALL VALVE:
   LUBRICATE A NEW O-RING WITH PUMP CRANKCASE OIL AND INSTALL INTO THE VALVE CAVITY IN THE HEAD. INSTALL A GOOD VALVE ASSEMBLY INTO THE CAVITY AS ILLUSTRATED.



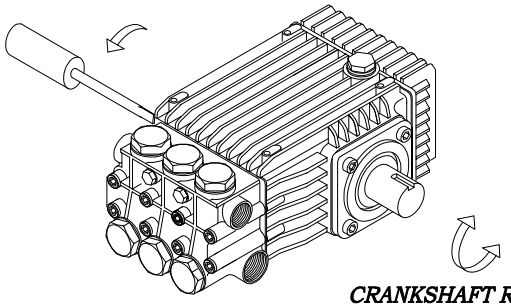
7. LUBRICATE A NEW O-RING AND PLACE ON CLEANED PLUG REMOVED IN STEP 2. INSTALL THE PLUG INTO THE HEAD TIGHTENING BY HAND THEN TORQUE TO VALUE INDICTED ON THE PUMP INSERT.



HEAD REMOVAL / INSTALLATION

PUMP HEAD REMOVAL

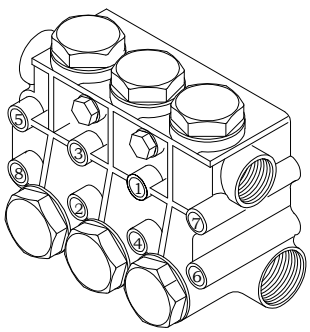
1. REMOVE THE CAP SCREWS HOLDING THE PUMP HEAD TO THE CRANKCASE. A METRIC TOOL IS REQUIRED FOR THIS STEP. BE CAREFUL NOT TO LOSE THE WASHER ON EACH CAPS SCREW.
2. REMOVE THE HEAD BY ROTATING THE CRANKSHAFT AND LEVERING BETWEEN HEAD AND CRANKCASE. KEEP HEAD PARALLEL TO THE FRONT SURFACE OF CRANKCASE TO PREVENT BINDING ON PLUNGERS.
   ONCE HEAD IS REMOVED PROTECT EXPOSED PLUNGERS FROM DAMAGE.
3. FOR PLUNGER, SEALS, AND PACKING MAINTENANCE SEE SEPARATE SECTIONS LATER IN THIS INSERT.

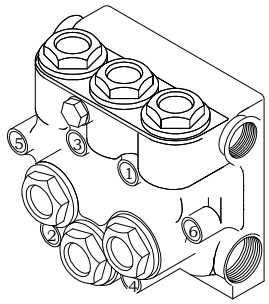


CRANKSHAFT ROTATION

PUMP HEAD REINSTALLATION

1. ROTATE CRANKSHAFT SO TWO OUTER PLUNGERS ARE PROJECTING THE SAME DISTANCE FROM CRANKCASE.
2. LUBRICATE EXPOSED PLUNGERS WITH CRANKCASE OIL.
3. START HEAD ONTO PLUNGERS AND USING SOFT MALLET, TAP HEAD EVENLY UNTIL IT CONTACTS THE CRANKCASE.
4. START THE CAP SCREWS THROUGH THE HEAD AND INTO THE CRANKCASE. DO NOT FORGET THE WASHERS.
5. TIGHTEN ALL SCREWS BY HAND, THEN TIGHTEN CAP SCREWS TO THE VALUE LISTED IN THE "TORQUE SPECIFICATIONS" FOUND ON THE PUMP INSERT. TORQUE CAP SCREWS IN THE ORDER LISTED BELOW.





AR PUMP SERVICE

PACKING SERVICING

PACKING REMOVAL

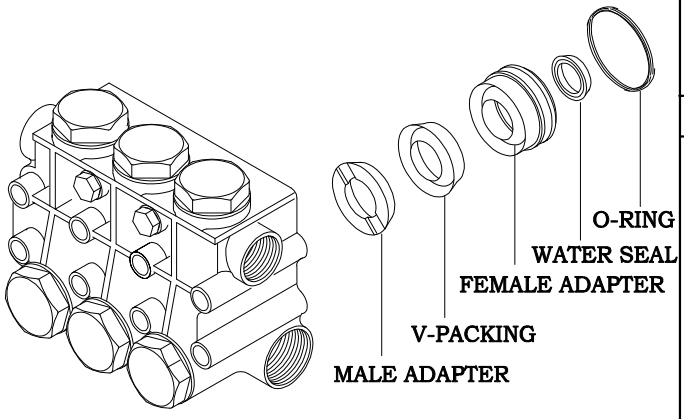
1. REMOVE PUMP HEAD AS INSTRUCTED ON Z08-02614-1.
2. USING SEAL EXTRACTOR TOOL REMOVE THE FEMALE ADAPTER BEING CAREFUL NOT TO DEFORM THEM.
3. REMOVE V-PACKING AND MALE ADAPTER IF THEY REMAINED IN THE PUMP HEAD.
4. REMOVE WATER SEAL FROM INSIDE ADAPTER AND O-RING OFF OUTSIDE OF FEMALE ADAPTER & DISCARD.

PACKING & HEAD INSPECTION

1. CLEAN PACKING CAVITIES IN HEAD AND RINSE WITH CLEAN WATER. CLEAN EXPOSED PLUNGERS.
2. CLEAN MALE AND FEMALE ADAPTERS WITH SOAP AND WATER AND ALLOW TO DRY.
3. INSPECT MALE AND FEMALE ADAPTERS AND DISCARD WORN ITEMS.

PACKING INSTALLATION

1. LUBRICATE PACKING CAVITIES IN HEAD AND ALL PACKINGS AND ADAPTERS WITH PUMP CRANKCASE OIL.
2. LAY HEAD ON BENCH WITH PACKING CAVITIES UP.
3. INSTALL ONE MALE ADPATER INTO EACH CAVITY WITH THE FLAT SIDE DOWN.
4. INSTALL ONE V-PACKING INTO EACH CAVITY WITH THE LIPS POINTING DOWN.
5. INSTALL NEW WATER SEAL INTO FEMALE ADAPTER AS ILLUSTRATED BELOW WITH THE LIPS POINTING TOWARDS "V" GROOVE IN FEMALE ADAPTER.
5. INSTALL O-RING ONTO FEMALE ADAPTER.
7. INSTALL THE FEMALE ADAPTER ASSEMBLY INTO THE CAVITY WITH THE "V" GROOVE FACING DOWN. ONLY HAND PRESSURE SHOULD BE REQUIRED TO PERFORM THIS OPERATION.
8. REINSTALL HEAD AS INSTRUCTED ON ZO8-02614-1.



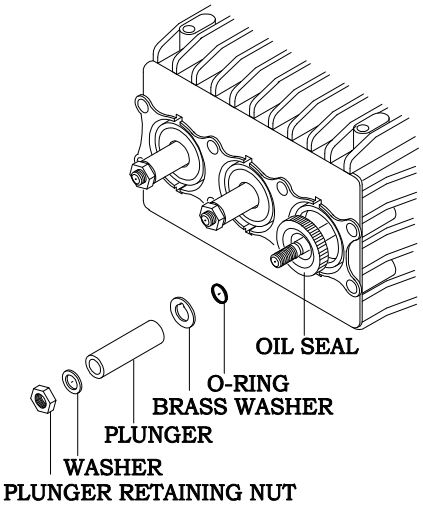
PLUNGER SERVICING

PLUNGER INSPECTION

1. REMOVE PUMP HEAD AS INSTRUCTED ON Z08-02614-1.
2. EXAMINE EACH PLUNGER, LOOKING FOR A SMOOTH SURFACE FREE FROM CRACKS, SCORING, OR PITTING. ANY DEFECTIVE PLUNGERS SHOULD BE REMOVED PER INSTRUCTIONS BELOW.
3. DISCARD ANY DEFECTIVE PLUNGERS. REFER TO PUMP INSERT SHEET FOR REPLACEMENT PART NUMBERS.
4. REINSTALL PLUNGER AS INSTRUCTED BELOW.
5. REINSTALL HEAD AS INSTRUCTED ON ZO8-02614-1.

PLUNGER REMOVAL

1. REMOVE THE PLUNGER RETAINING NUT BY TURNING COUNTER CLOCKWISE. REMOVE PLUNGER WASHER AND SLIDE PLUNGER OFF CROSS HEAD. INSPECT PLUNGERS AS INSTRUCTED IN "PLUNGER INSPECTION".



PLUNGER INSTALLATION

1. INSTALL O-RING ONTO CROSS HEAD FOLLOWED BY THE BRASS WASHER.
2. SLIDE PLUNGER ONTO CROSS HEAD.
3. INSTALL FLAT WASHER ONTO CROSS HEAD.
4. THREAD NUT ONTO CROSSHEAD AND TORQUE PER PUMP INSERT.

OIL SEAL SERVICING

1. REMOVE PUMP HEAD AS INSTRUCTED ON Z08-02614-1.
2. REMOVE PLUNGER AS INSTRUCTED ABOVE.
3. SET PUMP ON COVER END CAREFUL NOT TO DAMAGE OIL LEVEL GAUGE. REMOVE OIL SEAL.
4. REINSTALL SEAL WITH LIPS TOWARD CRANKSHAFT.
5. REINSTALL PLUNGER AS INSTRUCTED ABOVE.
6. REINSTALL HEAD AS INSTRUCTED ON ZO8-02614-1.

PUMP MAINTENANCE RECORD

OIL CHANGE

MONTH / DAY / YEAR	OPERATING HOURS	OIL BRAND & TYPE

PUMP SERVICE

MONTH / DAY / YEAR	OPERATING HOURS	TYPE OF MAINTENANCE

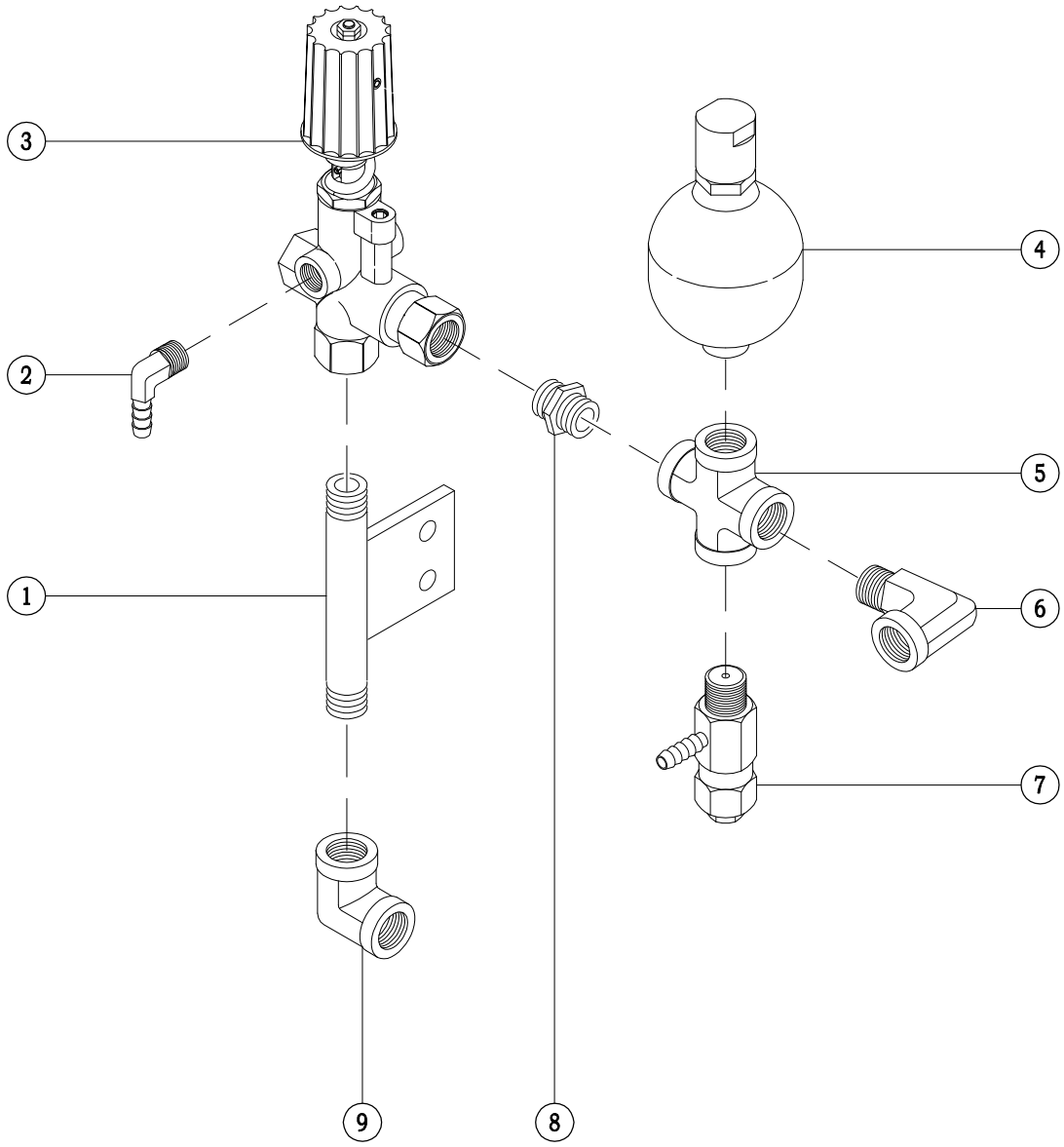
PUMP TROUBLESHOOTING

TROUBLE	*POSSIBLE CAUSE*	*REMEDY*
1. Oil leaking in the area of water pump crankshaft.	A. Worn crankshaft seal. B. Bad bearing. C. Grooved shaft. D. Failure of retainer o-ring	A. Remove and replace. B. Remove and replace. C. Remove and replace. D. Remove and replace.
2. Excessive play on crankshaft.	A. Defective bearings. B. Excess shims.	A. See "Worn bearing". B. Set up crankshaft.
3. Loud knocking in pump.	A. Loose conecting rod screws. B. Worn connecting rod. C. Worn bearings. D. Loose plunger bushing screw.	A. Tighten connecting rod screws per **PUMP SPECIFICATIONS**. B. Replace connecting rod per **PUMP MAINTENANCE.** C. Replace bearings per **PUMP MAINTENANCE**. D. Tighten plunger screw per **PUMP SPECIFICATOINS.**
4. Oil leaking at the rear portion of the pump.	A. Damaged or improperly installed oil gauge window gasket. B. Damaged or improperly installed rear cover. C. Oil gauge loosed. D. Rear cover screws loose. E. Pump overfilled with oil, displaced through crankcase breather hole in oil cap/dipstick.	A. Replace gasket or o-ring. B. Replace gasket or o-ring. C. Tighten oil gauge. D. Tighten rear screws. to torque values in **PUMP SPECIFCATIONS. S** E. Drain oil: refill to recommended oil level as stated in OIL LEVEL in **PUMP MAINTENANCE**.
5. Water in crankcase	A. May be caused by humid air condensing into water inside the crankcase. B. Worn or damaged plunger screw o-ring.	A. Maintain or step up lubrication schedule. B. Remove and replace. See PLUNGER SERVICE in **PUMP MAINTENANCE.**
6. Worn bearing	A. Excessive belt tension. B. Oil contamination.	A. See BELT TENSION in **MACHINE MAINTENANCE**. B. Check oil type and change intervals per **PUMP SPECIFICATIONS.**
7. Short bearing life	A. Excessive belt tension. B. Misalignment between pump and motor. C. Oil has not been changed on regular basis.	A. See BELT TENSION in **MACHINE MAINTENANCE**. B. Re-align pump and motor. C. Check oil type and change intervals per **PUMP SPECIFICATIONS.**
8. Short seal life	A. Damaged plunger bushing. B. Worn connecting rod. C. Excess pressure beyond the pump's maximum rating. D. High water temperature.	A. Replace punger bushing. B. Peplace connecting rod. C. Match pressure stated in **PUMP SPECIFICATIONS**. D. Lower water tempersture stated in **PUMP SPECIFCATIONS**.

PUMP TROUBLESHOOTING		
TROUBLE	***POSSIBLE CAUSE***	***REMEDY***
9. Dirty or worn check valves.	A. Normal wear. B. Debris	A. Remove and replace. B. Check for lack of water inlet screens.
10. Presence of metal particles during oil change.	A. Failure of internal component. B. New pump.	A. Remove and disassemble to find probable cause. B. New pumps have machine fillings and debris and should be drained and refilled per **PUMP SPECIFICATIONS**.
11. Water leakage from under head.	A. Worn packing. B. Cracked/scored plunger. C. Failure of plunger retainer o-ring.	A. Install new packing. B. Remove and replace plunger. C. Remove and replace plunger retainer o-ring.
12. Loud knocking noise in pump	A. Pulley loose on crankshaft. B. Defective bearing. C. Worn connecting rod. D. Worn crankshaft. E. Worn crosshead.	A. Check key and tighten set screw. B. Remove and replace bearing. C. Remove and replace connecting rod. D. Remove and replace crankshaft. E. Remove and replace crosshead.
13. Frequent or premature failure of the packing	A. Scored, damaged, or worn plunger. B. Overpressure to inlet manifold. C. Abrasive material in the fluid being pumped. D. Excessive pressure and or temperature of fluid being pumped. E. Over pressure of pumps. F. Running pump dry.	A. Remove and replace plungers. B. Reduce inlet pressure. C. Install proper filtration on pump inlet pumping. D. Check pressures and fluid inlet temperature; be sure they are within specified range. E. Reduce pressure. F. Do not run pump without water.
14. Low Pressure	A. Dirty or worn check valves. B. Worn packing. C. Belt slipping. D. Improperly sized spray tip or nozzle. E. Inlet filter screen is clogged. F. Pitted valves.	A. Clean/Replace check valves. B. Remove and replace packing. C. See BELT TENSION in **MACHINE MAINTENANCE.** D. See **MACHINE SPECIFICATIONS** for specified spray tip or nozzle. E. Clean inlet filter screen. F. See VALVE SERVICE in **PUMP MAINTENANCE.**
15. Erratic pressure: pump runs rough	A. Dirty or worn check valves. B. Foreign particles in valve assemblies. C. High inlet water temperature	A. Clean/Replace check valves. A. Clean/Replace check valves. C. See temperature in **PUMP SPECIFICATIONS**.
16. Excessive vibration	A. Dirty or worn check valves	A. See "Dirty or worn check valves"
17. Scored plungers	A. Abrasive material in fluid being pumped.	A. Install proper filtration on pump inlet plumbing
18. Pitted plungers	A. Cavitation	A. Decrease inlet water temperature and/or increase inlet water pressure.
19. Cavitation	A. High inlet fluid temperatureLow inlet pressure.	A. Lower inlet fluid temperature.Raise inlet fluid pressure.

ASSEMBLY, UNLOADER VALVE - P/N 4355EB-00515

EXPLODED VIEW



PARTS LIST

ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION
1	4355EB-00514	BRACKET, UNLOADER	6	E08-00011-58	ELBOW, STREET
2	W02-10040-8	BARB, HOSE	7	C03-00518	VALVE, RELIEF
* 3	C07-03800	VALVE, UNLOADER	8	E14-00010-68	NIPPLE, PIPE
4	Y01-00123	ACCUMULATOR	9	E08-00010-5	ELBOW, PIPE
5	E07-00006-5	CROSS, PIPE	*For Breakdown See Z08-02765 (3)		

VALVE, UNLOADER - C07-03700

SPECIFICATIONS

MAX FLOW.....7.8 GPM / 30 LPM

MAXIMUM UNLOADING PRESSURE.....3650 PSI / 251 BAR

MAXIMUM TEMPERATURE.....190 F / 88 C

WEIGHT.....2.1 LBS / 0.91 KG

BYPASS.....1/4 NPT

INLET & DISCHARGE.....3/8 NPT

REPAIR PARTS PACKAGE

* P/N C07-03700KA - INCLUDES 1 EACH OF ITEMS:

6, 13, 21, 24, TWO OF 9 & THREE OF ITEM 5

ACCESSORIES

Y02-00009.....0 TO 1500 PSI / 103 BAR GAUGE

Y02-00002.....0 TO 2000 PSI / 138 BAR GAUGE

Y02-00010.....0 TO 5000 PSI / 345 BAR GAUGE

UNLOADING ADJUSTMENT

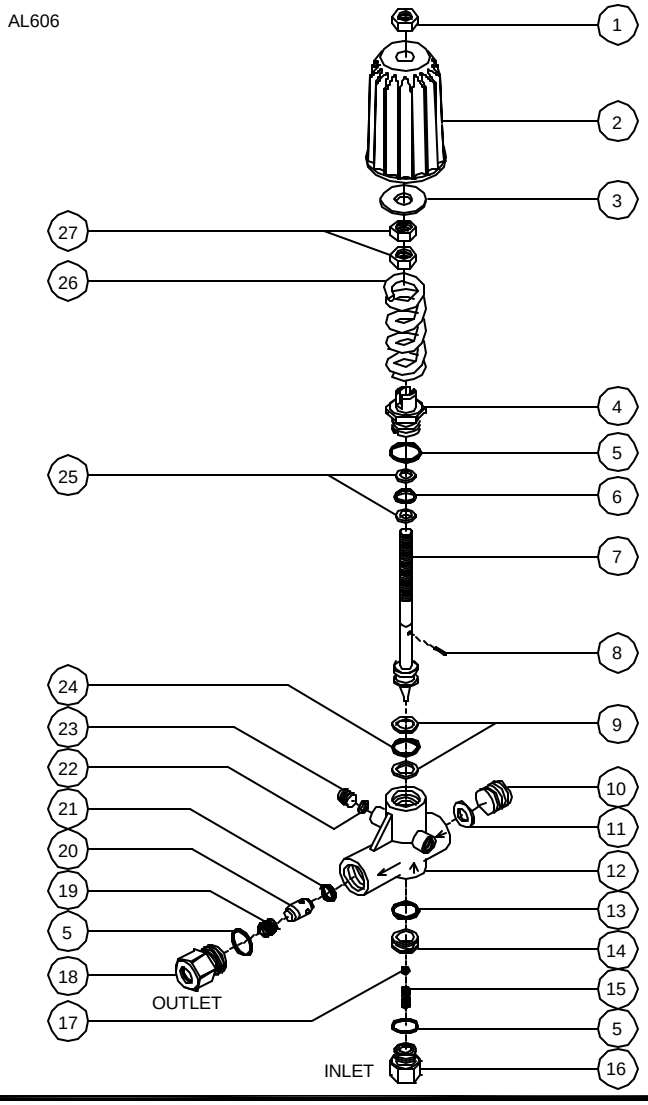
1. INSTALL APPROPRIATE PRESSURE GAUGE IN PUMP HEAD OUTLET. THE GAUGE SHOULD HAVE A PRESSURE RANGE OF TWICE THE OPERATING PRESSURE.
2. LOOSEN NUT (1) AND TURN KNOB COUNTER CLOCKWISE UNTIL MINIMUM SPRING TENSION.
3. OPEN TRIGGER GUN, START PUMP, AND OBSERVE PRESSURE GAUGE READING. SLOWLY TIGHTEN KNOB CLOCKWISE UNTIL DESIRED OPERATING PRESSURE.
4. CLOSE AND OPEN TRIGGER GUN TO CHECK UNLOADING PRESSURE AND BYPASS FUNCTION OF UNLOADER VALVE. UNLOADING PRESSURE SHOULD NOT EXCEED OPERATING PRESSURE BY MORE THAN 400 PSI.
5. LOCK SETTING BY TIGHTENING LOCK NUT (1).

NOTE: ONCE OPERATING PRESSURE IS REACHED, TURNING CLOCKWISE INCREASES UNLOADING PRESSURE ONLY.

PARTS LIST

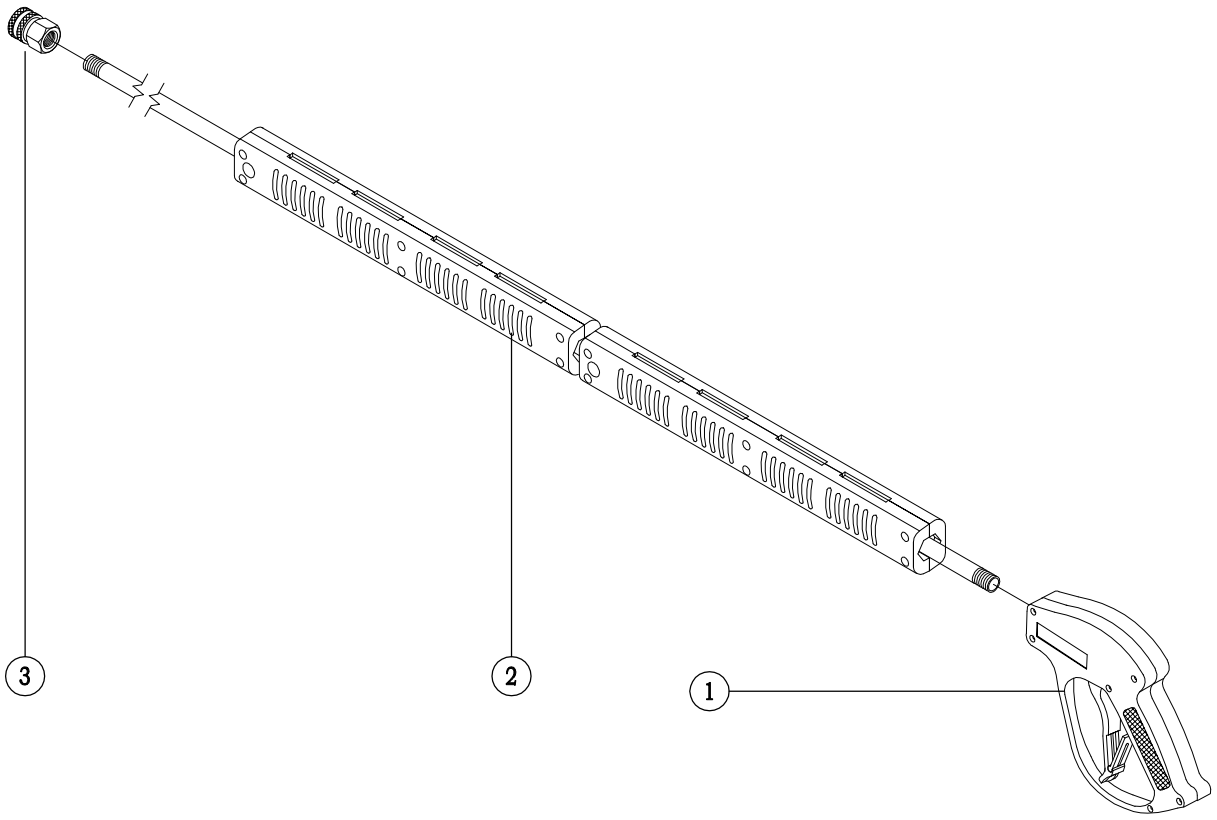
ITEM	PART NO.	DESCRIPTION
1	C07-03700-7	NUT, LOCK - M8
2	C07-03700-8	KNOB, ADJUSTMENT
3	C07-03700-9	FOLLOWER, SPRING
4	C07-03700-11	GUIDE, PISTON
* 5	C07-02300-08	O-RING
* 6	8RS6-000SV01	O-RING
7	C07-03700-26	PISTON
8	C07-03700-15	PIN, SPRING
* 9	C07-03700-28	RING, ANTI-EXTRUSION
10	C07-0370019A	PLUG - 3/8
11	C07-0370019B	GASKET, WASHER
12	C07-0370018B	HOUSING - 3/8
* 13	N07-20028	O-RING
14	C07-03700-21	SEAT
15	C07-03700-23	SPRING, COMPRESSION
16	C07-03700-24	GUIDE, BALL
17	C07-02000-18	BALL
18	C07-03700-1	GUIDE, ORIFICE
19	C07-03700-3	SPRING, COMPRESSION
20	C07-03700-4	ORIFICE, SHUTTER
* 21	C07-02000-20	O-RING
22	C07-03700-6B	GASKET, WASHER
23	C07-03700-6A	PLUG - 1/4
* 24	C07-03700-29	O-RING
25	C07-03700-12	RING, ANTI-EXTRUSION
26	C07-0370010C	SPRING, COMPRESSION - BLUE
27	C07-03700-25	NUT, HEX - M8

EXPLODED VIEW



ASS'Y, TRIGGER GUN & WAND

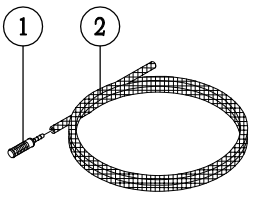
EV - P/N J06-00158-B



PARTS LIST			PARTS LIST		
ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION
1	J06-00158	VALVE, TRIGGER GUN	3	W04-24225-A	COUPLING, FEMALE
2	J06-00104E	ASSEMBLY, WAND - 42"			

ASSEMBLY, CHEMICAL LINE

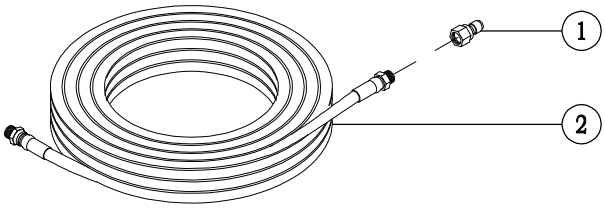
EV - P/N 4120-00902P



PARTS LIST		
ITEM	PART NO.	DESCRIPTION
1	C04-00130	SCREEN, CHEMICAL
2	Z01-08413-2	HOSE, POLY BRAID - 84"

ASSEMBLY, HOSE & COUPLER

EV - P/N 3401-00710



PARTS LIST		
ITEM	PART NO.	DESCRIPTION
1	W04-33233-B	NIPPLE, COUPLER
2	K02-03150-5	ASSEMBLY, HOSE

BREAKDOWN, TRIGGER GUN - P/N J06-00158

SPECIFICATIONS

MAXIMUM VOLUME.....10.0 GPM / 37.9 LPM
MAXIMUM PRESSURE.....5000 PSI / 344.7 BAR
TEMPERATURE RISE.....300˚F / 150˚C
WEIGHT.....1.8 LBS / 0.8 KG
INLET.....3/8" NPT FEMALE
OUTLET.....1/4" NPT FEMALE
DISCHARGE FITTING..... S.S.

REPAIR INSTRUCTIONS

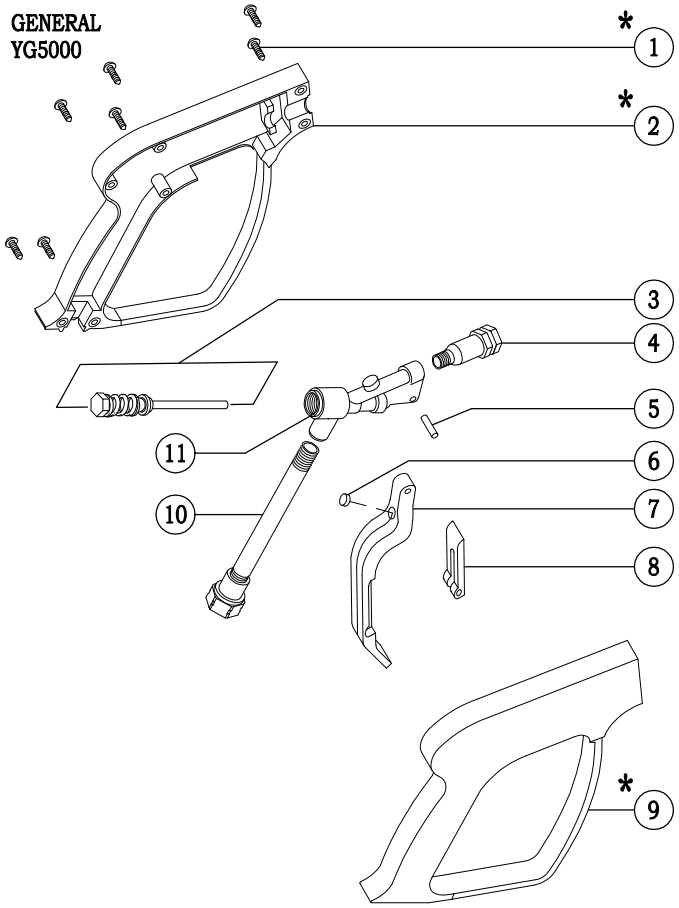
1. Remove screws (Item 1).
2. Remove handle housings.
3. Drive out pin (Item 5).
4. With a small dowel, remove the cam (Item 6) through the backside of the trigger. Replace with new cam.
5. Remove valve retainer (Item 11), springs (Items 13), and ball (Item 14).
6. With a dowel drive out pin (Item 17) and ball seat (Item 15).
7. Assemble in reverse order.

WARNING: DO NOT USE ACID CONCENTRATES THROUGH GUN

WARNING: NEVER SECURE TRIGGER GUN IN AN OPEN POSITION (TRIGGER PULLED BACK) BY MEANS OTHER THAN THE OPERATOR'S HAND, ETC. BODILY HARM MAY OCCUR IF THE OPERATOR LOSES CONTROL OF THE TRIGGER GUN.

CAUTION: ALWAYS ENGAGE TRIGGER SAFETY LATCH (ITEM 8) WHEN NOT IN USE.

EXPLODED VIEW

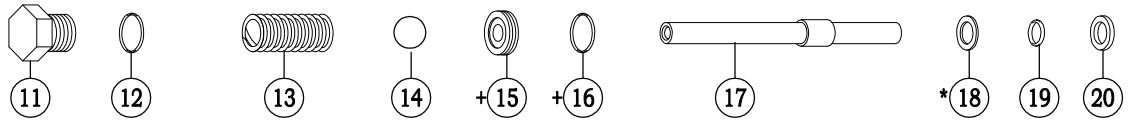


PARTS LIST

ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION
*1	J06-00132-19	SCREW, SELF TAP	7	J06-00158-04	TRIGGER
*2	----------	HOUSING, HANDLE - LEFT	8	J06-00158-05	LATCH, SAFETY
3	J06-99158	KIT, REPAIR	*9	----------	HOUSING, HANDLE - RIGHT
4	J06-00158-01	FITTING, DISCHARGE	10	J06-00158-06	FITTING, INTAKE - 3/8 FNPT
5	J06-00158-02	PIN - 5 X 27.5MM	11	J06-00158-11	HOUSING, VALVE - BRASS
6	J06-00158-03	CAM		*J06-99158A	KIT, HANDLES - HOUSING

KIT, BREAKDOWN - P/N J06-99158

NOTE: POSITION PIN WITH CUPPED END TOWARDS BALL.
* ITEM 18 NOT IN KIT - SHOWN FOR POSITION ONLY



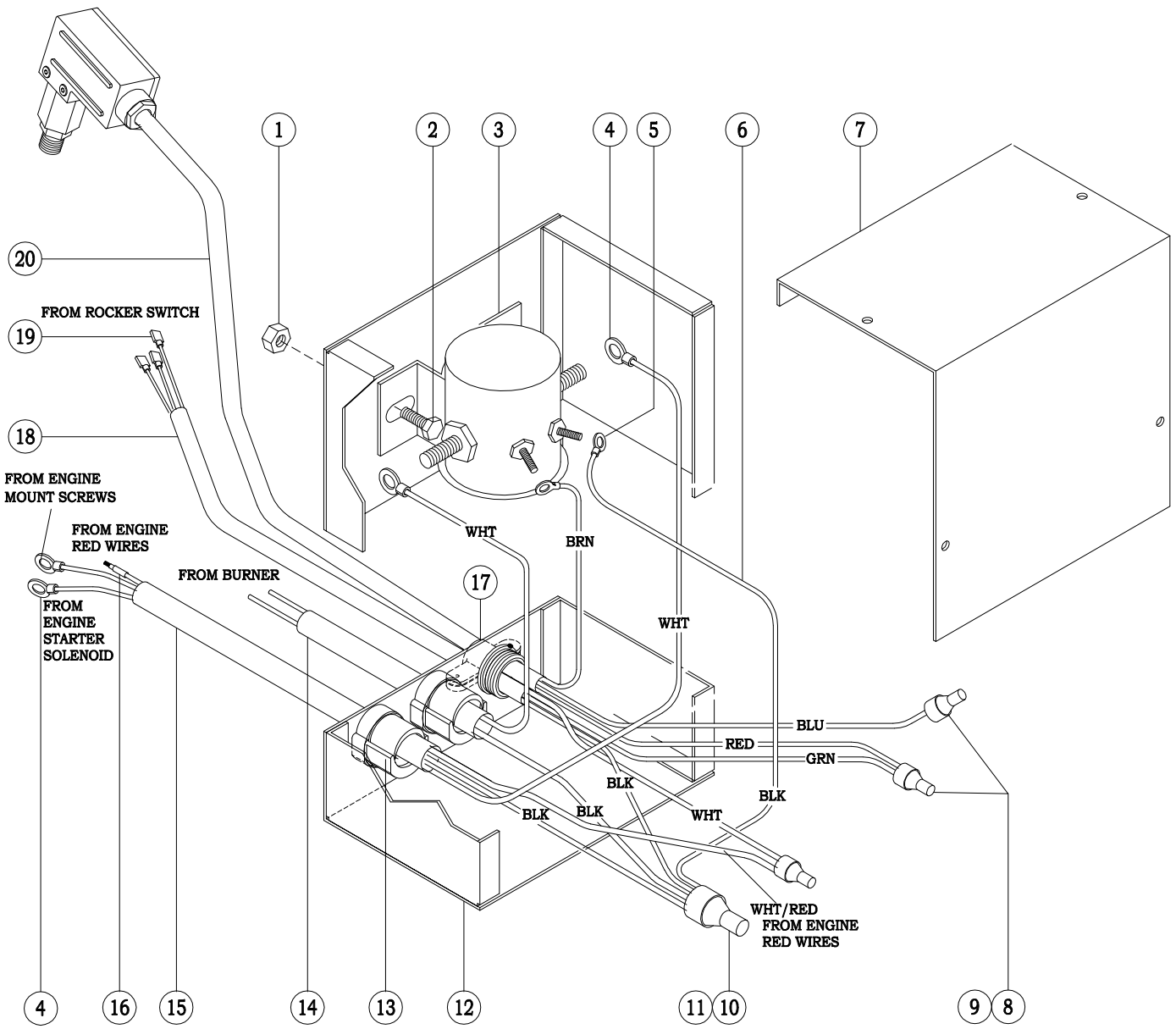
PARTS LIST

ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION
11	----------	RETAINER, VALVE	17	----------	PIN, VALVE
12	J06-00158-07	O-RING	18	*J06-00158-09	WASHER, FLAT - 3.2 X 7 X 0.5MM
13	----------	SPRING, COMPRESSION	19	J06-00121-07	O-RING - VITON
14	J06-00121-11	BALL, SS - 5/16"	20	J06-00158-10	WASHER, FLAT - 3.2 X 7.5 X 1.2MM
15	J06-00158-08	SEAT, VALVE			
16	C07-01300-08	O-RING - VITON		+J06-99158B	KIT, O-RING AND SEAT

ASSEMBLY, WIRING - J-BOX

EXPLODED VIEW - P/N 5305EA-00304

SERIAL NUMBER 219794 & UP



PARTS LIST

ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION
1	H06-25003	NUT, LOCK	11	F04-00616-2	INSULATOR, TERMINAL
2	H04-25000	SCREW, CAP	12	4355E-00310	WELDMENT, JUNCTION BOX
3	F04-00992	SWITCH, SOLENOID	13	F04-00413	BUSHING, STRAIN RELIEF
4	F04-00608	TERMINAL, RING	14	F04-04659	CORD, ELECT - 14/2SO X 46"
5	F04-00602	TERMINAL, RING	15	F04-04331	CORD, ELECT - 14/3SOOW X 43"
6	F14-00610	WIRE, BLACK - 6"	16	Z06-01100	TAPE, RED
7	AS16-01017PB	COVER, JUNCTION BOX	17	F04-00310	CONNECTOR, CONDUIT
8	F04-00615	TERMINAL, SPLICE	18	F04-07541	CORD, ELEC - 16/3SO X 75"
9	F04-00616	INSULATOR, TERMINAL	19	F04-00618	TERMINAL, QUICK DISCONNECT
10	F04-00616-1	TERMINAL, SPLICE	20	F04-00790	SWITCH, PRESSURE

VALVE, METERING - P/N C03-00307

OPERATION

HANDLE

Turning Chemical flow handle clockwise will shut off chemical flow.

FLOW ADJUSTING SCREW

Turning the flow adjusting screw clockwise lowers the chemical flow. Turning the screw counterclockwise lowers the flow.

SPECIFICATIONS

Maximum Pressure.....4000 PSI / 276 BAR
Maximum Flow .....12 GPM / 45 LPM
Minimum Flow .....1.0 GPM / 3.8 LPM
MAXIMUM TEMPERATURE .....200F° / 93°C
WEIGHT.....0.75 LBS. / 0.33 KG
INLET.....1/4 FNPT
OUTLET .....1/4 FNPT
O-RINGS.....VITON
VALVE HOUSING MATERIAL.....BRASS

MAINTENANCE

VALVE STEM REMOVAL -

1. Using screw driver remove cap (item 1A).
2. Holding handle and using socket remove nut (item 1B) and lock washer (item 1C) found inside handle.
3. Remove mounting nut (item 1E).
4. Holding valve housing (item 7), turn the valve retainer (item 2) counter clockwise be careful not to lose o-ring off bottom of retainer.
5. Holding the valve retainer (item 2) turn stem (item 4) counterclockwise until it comes out of the bottom of the retainer.

VALVE STEM INSTALLATION -

Reinstall in reverse order lubing o-rings before reinstallation.
Torque retainer (item 2) to 13 ft/lbs.

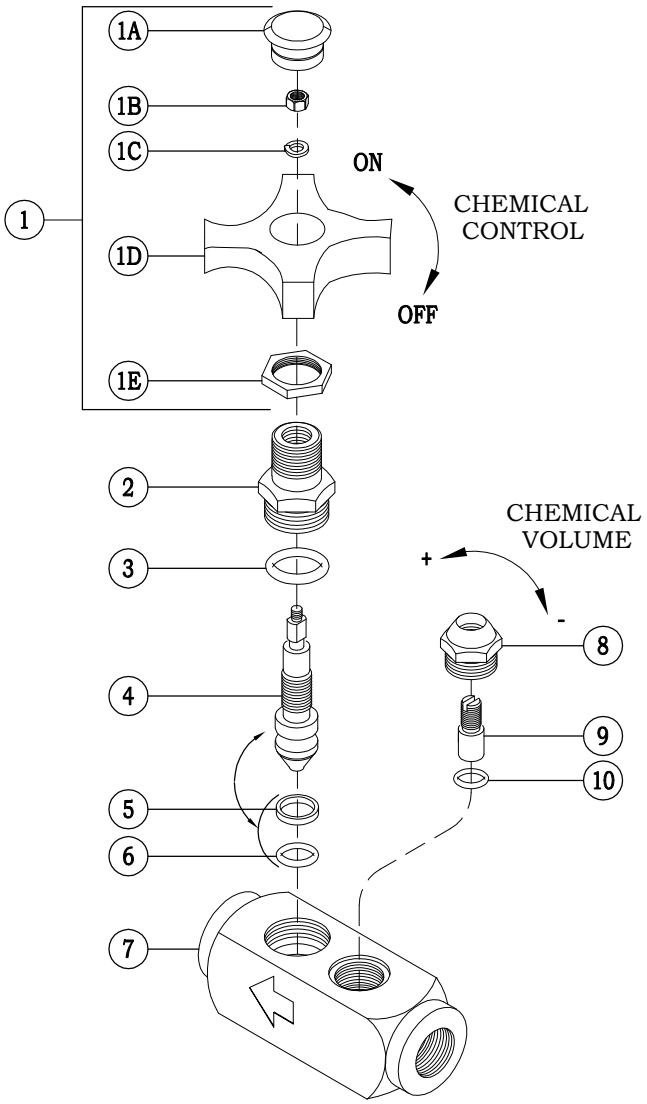
REMOVE FLOW ADJUSTING SCREW -

1. Remove the adjusting screw retainer (item 8) turning couter-clockwise.
2. Hold the retainer (item 8), using a screw driver turn the adjusting screw (item 9) clockwise until it comes out of the bottom.
3. Inspect screw for any nicks or scratches and replace as necessary.
4. Remove and replace o-ring (item 10).

REINSTALL FLOW ADJUSTING SCREW -

Reinstall in reverse order lubing o-rings before reinstallation.
Torque retainer (item 2) to 30 ft/lbs

EXPLODED VIEW



PARTS LIST

ITEM	PART NO.	DESCRIPTION
1	C07-00307-01	KIT, HANDLE
1A	----------	CAP, PLASTIC
1B	----------	NUT, HEX
1C	----------	WASHER, LOCK
1D	----------	HANDLE, ADJUSTMENT
1E	----------	NUT, HEX
2	----------	RETAINER, VALVE STEM
3	----------	O-RING - VITON 1/16CS X 3/16ID
4	----------	STEM, VALVE - SHUT-OFF
5	----------	RING, ANTI-EXTRUSOIN
6	----------	O-RING - VITON 3/32CS X 1/4ID
7	----------	HOUSING, VALVE
8	----------	RETAINER, ADJUSTING SCREW
9	----------	SCREW, ADJUSTING - FLOW
10	----------	O-RING - VITON 1/16CS X 1/8ID
	D01-00060	DECAL, METERING VALVE

MAINTENANCE METER

P/N Y02-00035

INTRODUCTION

Use the Tach/Hour Meter to perform regular preventive maintenance. You will benefit with increased fuel economy, less down time and engine life.

FUNCTIONS

- **HOUR METER—**Records actual running time of the engine. Records can not be erased.
- **TACHOMETER—**Tells you what R.P.M. your engine is running at for maximum power and efficiency. Reads up to 6,000 R.P.M.s.
- **SERVICE ALARM—**Display flashes at 25 hour intervals. Helps perform preventive maintenance (oil & filter changes, lubrication and cleaning etc.) within the manufacturers recommendations.

OPERATION

Operation is fully automatic.

- **FLASH ALERT—**Flash alert alarms will flash automatically for a 2 hour period (2 hours of engine running time) at 25 hour intervals.
- **TACHOMETER—**When the engine is started the meter will show the engine RPM's.
- **HOUR METER—**The total accumulated hours of run time will appear after the engine is shut down.

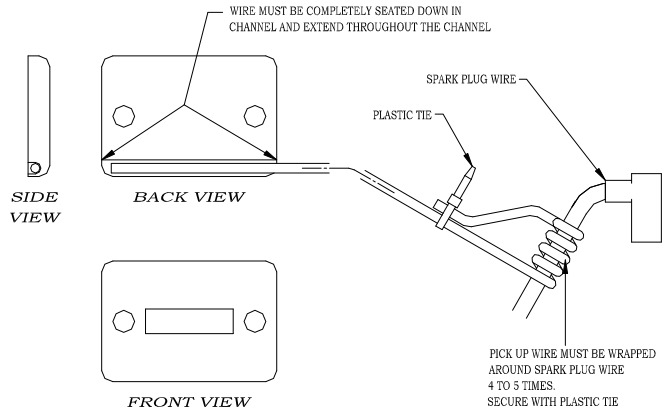
WARRANTY

We will replace, free of charge, any parts, which prove to be defective from faulty material or workmanship for a period of one year from the date of purchase. Warranty is void if caused from any high heat, physical damage or any other condition of misuse or abuse beyond normal operating conditions of the product. For repair or replacement (at manufacturer's option) return the product postage pre-paid.

Warranty Service Co.
Box 288
Alcester, South Dakota 57001

REPLACEMENT INSTALLATION INSTRUCTIONS

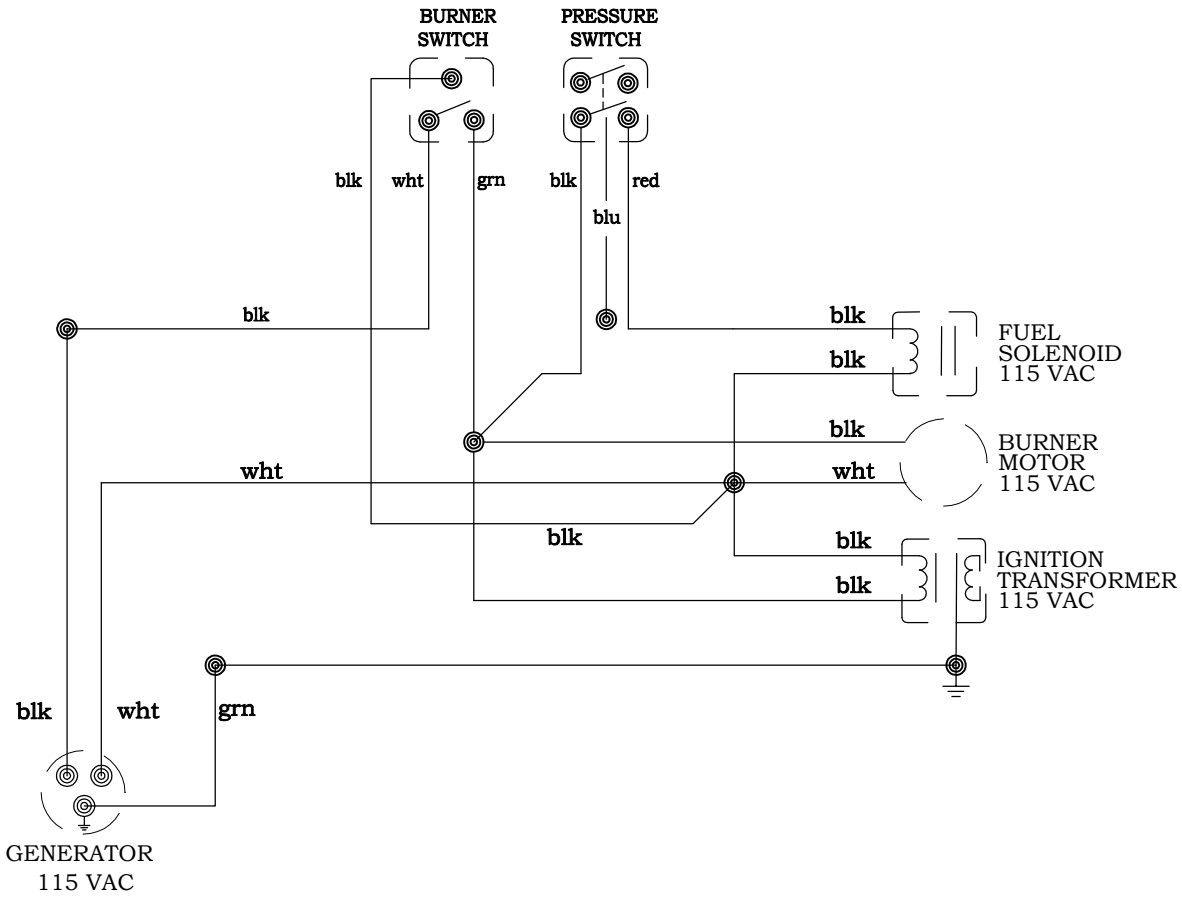
1. Remove the existing meter by removing the screws and nuts.
2. Remove the pick up wire from the rear of the meter.
3. Take the new pick up wire from the package and follow the route to the spark plug wire.
4. Carefully remove the plastic tie without nicking or cutting the spark plug wire.
5. Wrap the new pick up wire onto the spark plug wire 4 to 5 times and secure the loose end with a cable tie.
6. Take the new meter and place the pick up wire into the slot on the back of meter. Make sure the wire is completely pushed down in the slot and runs the complete length of the slot.
7. Re-install the screws into the meter and onto the securing with nuts previously removed.



SCHEMATICS, ELECTRICAL - OIL FIRED

12 VDC WITH:115V 1 PHASE 60 HERTZ BURNER AND CONTROLS

ES-00427



OIL FIRED CLEANER
12 VDC
WITH: 115VAC 1 PHASE 60 HERTZ
BURNER AND CONTROLS
ROCKER SWITCH
PRESSURE SWITCH
FUEL SOLENOID