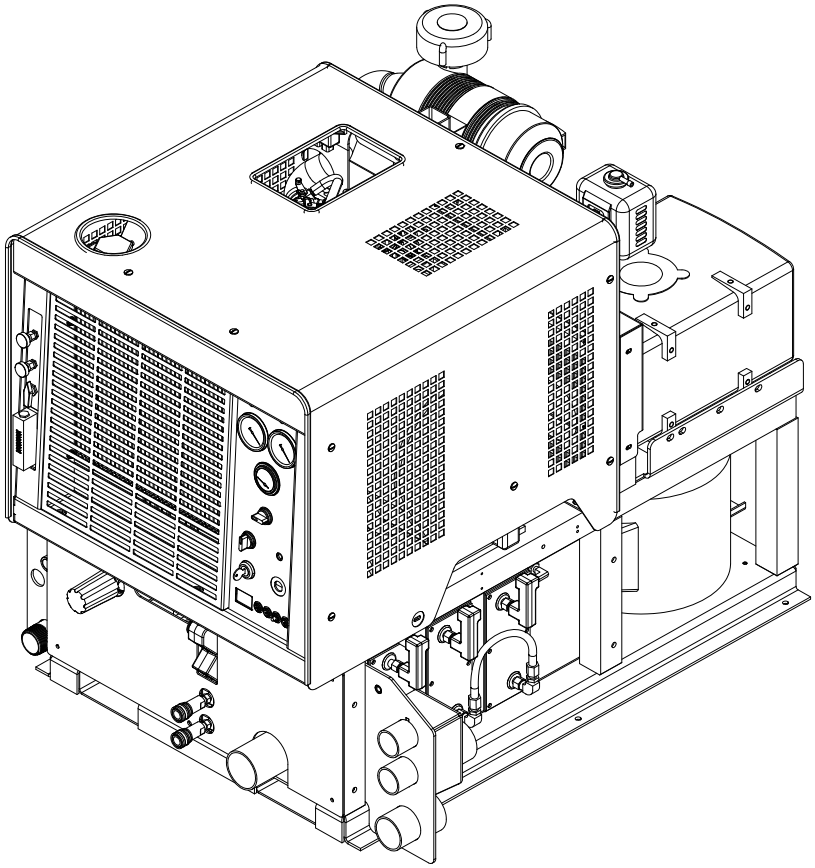
APEX PROCHEM

Operating Instructions (ENG)



MODELS:

APEX GAS	***1.001-069.0***
APEX DIESEL	***1.001-072.0***

Read instructions before operating the machine.

BL 86037630 09-09-10
PRV NO. 980217

MODEL _____

DATE OF PURCHASE _____

SERIAL NUMBER _____

SALES REPRESENTATIVE # _____

YOUR DEALER

NAME: _____

ADDRESS: _____

PHONE NUMBER: _____

Welcome…and congratulations on the purchase of your Mobile Cleaning Unit. This instruction manual is a guide for operating and servicing your unit. **Read this manual completely before installing or operating this unit.** This unit offers you personal convenience. All of your instrumentation and controls have been positioned to give you easy access for operation and daily maintenance.

Proper operation and service are essential to the efficient functioning of this unit. When maintained correctly, this unit will have a long, trouble-free life.

The service methods described in this manual are explained in such a manner that servicing may be performed accurately and safely. Proper service varies with the choice of procedure, the skill of the mechanic, and the tools or parts available. Before attempting any repair, make certain that you are thoroughly familiar with this equipment and are equipped with the proper tools. Any questions pertaining to operating or servicing this unit should be directed to your nearest dealer.

THIS UNIT MUST BE INSTALLED BY THE DEALER FROM WHOM YOU PURCHASED IT IN ACCORDANCE WITH THE PRESCRIBED INSTALLATION PROCEDURES.

MAKE CERTAIN THAT THE WARRANTY CARD IS FILLED OUT AT THE TIME OF INSTALLATION AND IS RETURNED TO YOUR DEALER.

PROFESSIONAL CHEMICALS CORPORATION
325 SOUTH PRICE ROAD
CHANDLER, ARIZONA 85224

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PARTS LIST – GAS AND DIESEL

ACCEPTANCE OF SHIPMENT

Every part of your cleaning unit was carefully checked, tested, and inspected before it left our manufacturing plant. **Upon receiving the unit, make the following acceptance check:**

1. The unit should not show any outward signs of damage. If damaged, notify the delivering carrier immediately.

2. Check your equipment and packing list. The cleaning unit should arrive equipped with the following items (unless otherwise specified).

NOTE: Your distributor from whom you purchased this mobile cleaning unit is responsible for the correct installation of this machine. The dealer is also responsible for initial training of your operators and maintenance personnel in the proper operation and maintenance of this unit.

EQUIPMENT LIST:

1. Console.
2. Waste tank
3. Hose clamps for vacuum hoses.
4. 150 ft. of 2” vacuum hose.
5. 2 vacuum hose connectors.
6. 150 ft. of 1/4" high pressure hose with quick connects.
7. 50 ft. water supply hose with quick connect.
8. Installation bolting kit.
9. Installation mounting plates.
10. Operation and service manual for engine, water pump, and vacuum pump manuals.

NOTES:

This manual contains the following sections:

- HOW TO USE THIS MANUAL
- SAFETY
- INSTALLATION REQUIREMENTS
- SYSTEMS
- OPERATIONS
- MAINTENANCE & SERVICE
- PARTS LIST

The HOW TO USE THIS MANUAL section will tell you how to find important information for ordering correct repair parts.

Parts may be ordered from authorized dealers. When placing an order for parts, the machine model and machine serial number are important. Refer to the MACHINE DATA box which is filled out during the installation of your machine. The MACHINE DATA box is located on the inside of the front cover of this manual.

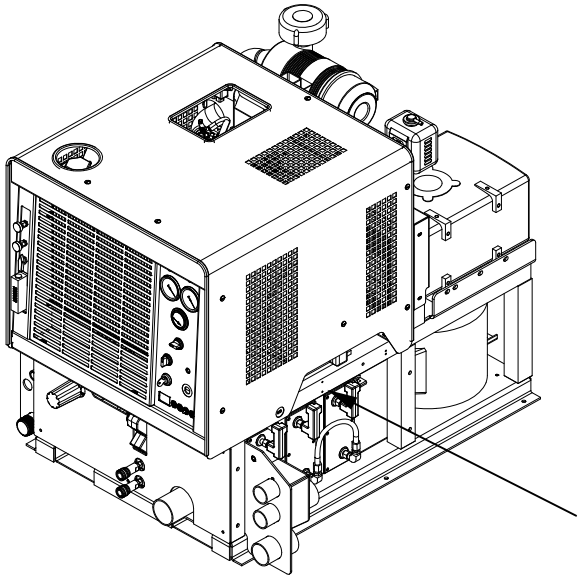
MODEL _____

DATE OF PURCHASE _____

SERIAL NUMBER _____

SALES REPRESENTATIVE # _____

The model and serial number of your machine is on the side approximately where shown.



The SAFETY section contains important information regarding hazard or unsafe practices of the machine. Levels of hazards is identified that could result in product or personal injury, or severe injury resulting in death.

The OPERATIONS section is to familiarize the operator with the operation and function of the machine.

The MAINTENANCE section contains preventive maintenance to keep the machine and its components in good working condition. They are listed in this general order:

- Engine
- Vacuum Pump
- Water Pump
- Drive Belts, Pulleys & Hubs
- Chemical Pumps
- Hoses
- Vac/Exhaust Heat Exchanger
- General Service Adjustments
- Troubleshooting

The PARTS LIST section contains assembled parts illustrations and corresponding parts list. The parts lists include a number of columns of information:

- **REF –** column refers to the reference number on the parts illustration.
- **PART NO.** – column lists the part number for the part.
- **PRV NO. -** reference number.
- **DESCRIPTION** – column is a brief description of the part.
- **SERIAL NO. FROM** – If this column has an (*) and a Reference number, see the SERIAL NUMBERS page in the back of your manual. If column has two asterisk (**), call manufacturer for serial number. The serial number indicates the first machine the part number is applicable to. The main illustration shows the most current design of the machine. When a boxed illustration is shown, it displays the older design.
- **NOTES** – column for information not noted by the other columns.

NOTE: If a service or option kit is installed on your machine, be sure to keep the KIT INSTRUCTIONS which came with the kit. It contains replacement parts numbers needed for ordering future parts.

NOTE: The number on the lower left corner of the front cover is the part number for this manual.

IMPORTANT SAFETY INSTRUCTIONS

When using this machine, basic precautions must always be followed, including the following:

READ ALL INSTRUCTIONS BEFORE USING THIS MACHINE.

⚠ WARNING:
⚠ CAUTION:

These symbols mean WARNING or CAUTION. Failure to follow warnings and cautions could result in fatality, personal injury to yourself and/or others, or property damage. Follow these instructions carefully!

Read the operator's manual before installing or starting this unit. Failure to adhere to instructions could result in severe personal injury or could be fatal.

Operate this unit and equipment only in a well-ventilated area. Exhaust fumes contain carbon monoxide which is an odorless and deadly poison that can cause severe injury or fatality. **DO NOT** run this unit in an enclosed area. **DO NOT** operate this unit where the exhaust may enter any building doorway, window, vent, or opening of any type.

Gasoline is extremely flammable and its vapors can explode if ignited. Store gasoline only in approved containers, in well-ventilated, unoccupied buildings away from sparks or flames. Never carry any gasoline or flammable material in the vehicle. Fumes may accumulate inside the vehicle and ignite, causing an explosion. **DO NOT** store any type of flammable material in the vehicle.

This unit must be operated with the vehicle or trailer doors open in order to ensure adequate engine ventilation.

DO NOT operate engine if gasoline is spilled. Avoid creating any ignition until the gasoline has been cleaned up. Never use gasoline as a cleaning agent.

DO NOT place hands, feet, hair, or clothing near rotating or moving parts. Avoid any contact with moving parts! Rotating machinery can cause injury or fatality.

Never operate this unit without belt guards. The high speed moving parts, such as belts and pulleys, should be avoided while this unit is running. Severe injury, damage, or fatality may result.

DO NOT service this unit while it is running. The high-speed mechanical parts as well as high temperature components may result in severe injury or severed limbs.

Never touch electrical wires or components while the engine is running. They can be sources of electrical shock.

Engine components can get extremely hot from operation. To prevent severe burns, **DO NOT** touch these areas while the engine is running - or immediately after the engine is turned off.

DO NOT touch the exhaust system while this unit is running. Severe burns may result.

Before servicing this unit, allow it to "cool down." This will prevent burns from occurring.

Water under high pressure at high temperature can cause burns, severe personal injury, or fatality. Shut down machine, allow to cool down, and relieve system of all pressure before removing valves, caps, plugs, fittings, filters, and bolts.

DO NOT leave the vehicle engine running while operating this unit.

Dangerous Acid, Explosive Gases! Batteries contain sulfuric acid. To prevent acid burns, avoid contact with skin, eyes and clothing. Batteries produce explosive hydrogen gas while being charged. To prevent a fire or explosion, charge batteries only in well ventilated areas. Keep sparks, open flames, and other sources of ignition away from the battery at all times. Keep batteries out of the reach of children. Remove all jewelry when servicing batteries.

Before disconnecting the negative (-) ground cable, make sure all switches are OFF. If ON, a spark will occur at the ground cable terminal which could cause an explosion if hydrogen gas or gasoline vapors are present. When disconnecting the battery, **ALWAYS** disconnect the negative (-) terminal FIRST.

DO NOT smoke around the unit. Gas fumes may accumulate and be ignited. The battery is also extremely flammable. This will prevent possible explosions.

DO NOT damage the vehicle in any manner during installation. When routing fuel lines **DO NOT** place the hose in any location where damage may occur to the hose or vehicle. Avoid any contact with moving parts, areas of high temperature, brake lines, fuel lines, muffler, catalytic converter, or sharp objects.

DO NOT cut or splice any of the vehicle fuel lines during fuel line installation. This may result in fuel leaks and potentially dangerous conditions. There is no fuel solenoid shut off on this unit. Use only the provided abrasion resistant fuel hose for fuel lines. When traversing the vehicle floor with fuel lines, always use a bulkhead adapter. This will prevent leakage and ensure that the hose is not punctured by vehicle vibration abrasion.

DO NOT exceed your vehicle's weight limit. The console with waste tank and accessories weighs approximately 1160 lbs. Make certain to account for any additional accessories in your weight and balance calculations. Make certain that the vehicle has the correct axle rating. This will prevent unsafe vehicle driving conditions.

We require high-back seats on all vehicles in which units are to be installed for head and neck protection. We recommend using a metal partition between the seats and equipment.

DO NOT operate this unit without the water supply attached and turned on. The water pump and other vital components may be seriously damaged if this unit is permitted to operate dry without water.

DO NOT operate this unit without the filter installed in the waste tank.

Keep your vehicle work area clean. Wands, stair tools, and other accessories must be securely fastened before driving the vehicle.

All high pressure hoses must be rated for 3000 PSI at 250°F. Thermoplastic hoses do not meet these specifications and should not be used. Severe burns and injury may result if the hoses do not meet these requirements.

The winterizing loop hose assembly, Part #86260700 – PRV NO. 10-805380, is for winterizing use only. If used improperly, live steam may escape from this hose, causing it to whip around. Burns or injury may result.

Make certain that you receive complete training by the distributor from whom you purchased this unit.

This unit uses high pressure and temperature. Improper or irresponsible use may result in serious injury.

Do not modify this unit in any manner. Improper modification can cause severe personal injury or fatality.

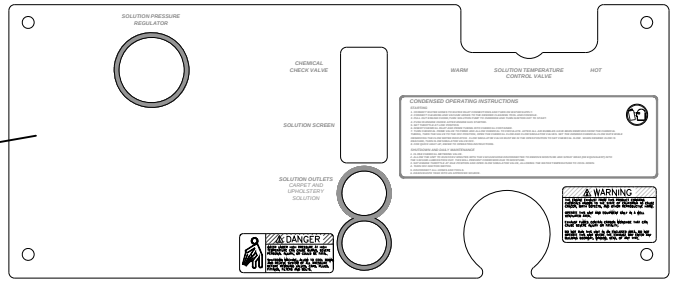
CALIFORNIA PROPOSITION 65 WARNING: Engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

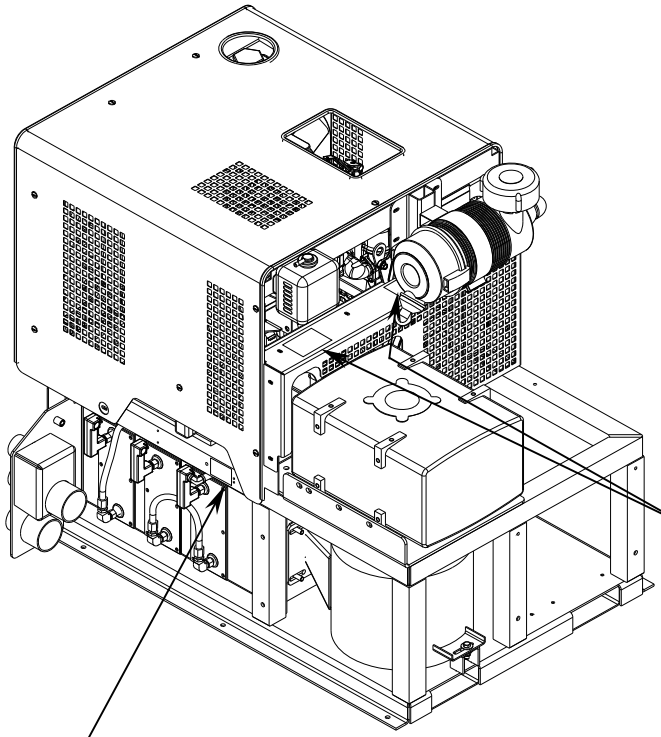
HAZARD INTENSITY LEVEL - GAS

*The following **WARNING LABELS** are found on your cleaning unit . These labels point out important **Warnings** and **Cautions** which should be followed at **all** times. Failure to follow warnings and cautions could result in fatality, personal injury to yourself and/or others, or property damage. Follow these instructions carefully! **DO NOT** remove these labels.*

NOTE: If at any time the labels become illegible, promptly replace them.

Front panel decal
Part # 86179320
PRV NO. 790958





(2) Warning labels
Part # 86186520
PRV NO. 500769

Caution label
Part # 86186530
PRV NO. 500770

TECHNICAL SPECIFICATIONS – GAS ENGINES

ITEM	DIMENSION/CAPACITY
Engine speed	2740 rpm (high speed) Water Pump ON 1500 rpm (idle speed) Water Pump OFF.
Water pump rpm	965 -1000 rpm
Vacuum pump rpm	3100 rpm
Water flow rate	4.15 GPM (maximum)
Water pump pressure	1000 PSI (maximum)
Vacuum relief valve	13” Hg
Waste tank capacity	80 gallons
Console weight	910 lbs.
Console weight (with waste tank & waste tank accessories)	1160 lbs. (1830 lbs. If waste tank is full)
TORQUE VALUES	
Engine front pulley	300 inch lbs 25 foot/lbs
Vacuum pump hub	192 inch/lbs 16 foot/lbs
Engine rear pulley	480 in//lbs 40 foot/lbs

JET SIZING:
Recommended floor tool tip sizing not exceed a total of “.06”. Using larger jet sizes on your cleaning unit may reduce cleaning temperatures.

Example: Tri-jet wand uses three 9502 jets (95° spray angle w/ 02 orifice).
02 x 3 = 06

When using two floor tools while cleaning with this unit, it is recommended that each tool tip size does not exceed a total of “.045”.

Example: Tri-jet wand uses three 95015 jets (95° spray angle w/ 015 orifice).
015 x 3 = 045…….045 x 2 tools = 09

Upholstery tool jet size: 80015
Stair tool jet size: 9502

OPERATION - GAS

INSTALLATION REQUIREMENTS DEALER RESPONSIBILITY

NOTE: Your distributor from whom you purchased this mobile cleaning unit is responsible for the correct installation of this machine. The dealer is also responsible for initial training of your operators and maintenance personnel in the proper operation and maintenance of this unit.

1. The unit should **NOT** be mounted in any motor vehicle of less than **3/4 ton capacity**.

⚠ CAUTION:

The console with waste tank and accessories must NOT exceed the vehicle's axle weight limit.

2. If mounting in a trailer, make certain that the trailer is rated for the total weight of the **UNIT AND TRAILER**. Electric or hydraulic brakes should be provided, and a strict compliance with any State and Federal vehicle laws must be maintained.

3. The vehicle tires should have a load rating above the combined vehicle and unit weight.

4. We do not recommend using flooring materials that absorb water. This could result in rust and corrosion of the vehicle floor.

5. Padding under rubber floor mats should be removed before installing this unit.

6. We highly recommend using a drip tray under the console (Part #86055040 – PRV NO. 790552).

7. If using a trailer, the console should be positioned so that it balances properly with respect to the axle. Ten percent (10%) of the overall unit weight should be on the tongue.

   Example: If loaded trailer weight is 2,000 lbs., tongue weight needs to be a minimum of 200 lbs. to tow properly.

FUEL REQUIREMENTS

Use unleaded gasoline ONLY. DO NOT use any gasoline additives. We recommend the use of clean, fresh, unleaded gasoline intended for automotive use. High octane gasoline should **NOT** be used with the engine on this unit.

ENGINE OIL REQUIREMENTS

Use high quality detergent oil of at least API (American Petroleum Institute) service class SF or SG. Select the viscosity based on the air temperature at the time of operation as shown in the following table. **NOTE:** Using less than service class SF or SG oil or extending oil change intervals longer than recommended can cause engine damage. The recommended SAE viscosity grade is **10W-30**.

CHEMICAL REQUIREMENTS

This cleaning unit, due to its chemical injection pump design, can be used with a variety of water-diluted chemical compounds (either acidic or alkaline), depending on the job to be done. However, to obtain optimum results with this unit, we recommend using the PROCHEM line of chemicals. For information on using the cleaning compounds, refer to the PROCHEM chemical manual.

WATER REQUIREMENTS

Hard water deposits will adversely affect the plumbing and heat exchange systems on this unit. The map below will give you an idea of where areas of high water hardness may occur. However, any water supply obtained from a well is almost always hard water and a water softener will be needed to protect your equipment.

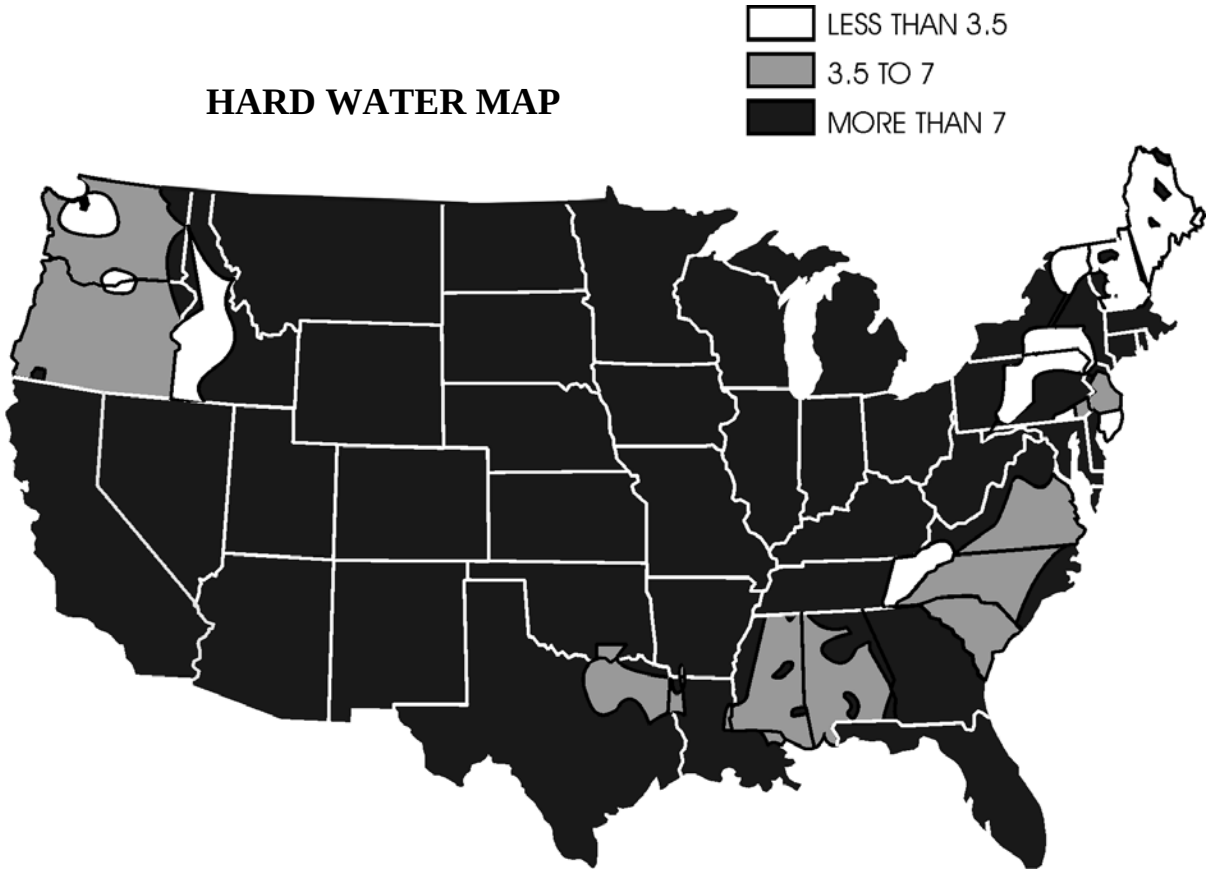
NOTE: Equipment malfunction or component failure caused by hard water scaling is NOT covered under the warranty.

If you are operating this unit in an area where the unit will be using water in which the harness exceeds 3-1/2 grains, we highly recommend a suitable water softener be installed. If using a water softener, it must have a five (5) GPM (or greater) flow capacity without any hose constrictions.

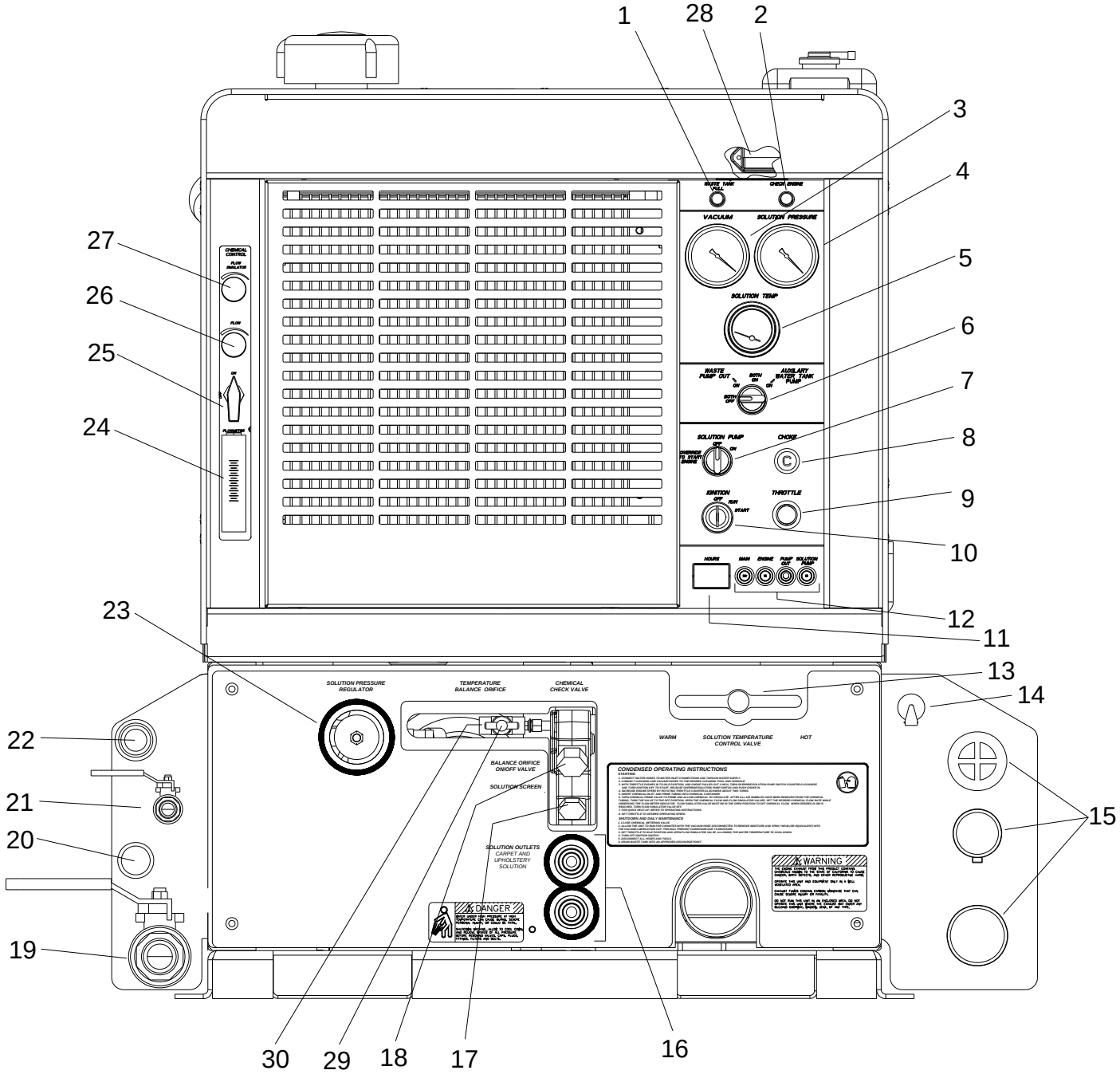
Using a water softener will reduce maintenance and decrease down time caused by hard water scaling. It will also allow cleaning chemicals to be more effective in lower concentrations

If you require a water softener, PROCHEM has a model to meet your needs. Please contact your nearest distributor for information, price, and abailability.

HARD WATER MAP



COMPONENTS - GAS



1. WASTE TANK FULL INDICATOR LIGHT

This indicator light is activated when the waste tank is full. When lit the unit will shutdown protecting the equipment from damage. This also indicates that the waste tank must be emptied before the unit can be brought back in service.
NOTE: Never dispose of waste water in storm drains, water ways or on ground areas. Always dispose of waste in accordance with local, state and federal laws.

2. ENGINE HIGH TEMPERATURE SHUTDOWN INDICATOR

This light when activated signals an over heat condition with the engine. When this occurs, troubleshooting is required.

3. VACUUM GAUGE

This gauge indicates in inches of mercury how much vacuum the system is producing at any given time.

4. SOLUTION PRESSURE GAUGE

This gauge registers the amount of pressure in the system.

5. SOLUTION TEMPERATURE GAUGE

This gauge measures the temperature of the cleaning solution as it exits the machine.

6. WASTE PUMPOUT AND AUXILIARY WATER PUMP SWITCH

This four-position switch is for activating the waste pumpout device. It also serves to activate the fresh water transfer pump. For turning on pumps, rotate clockwise. For turning off pumps, rotate counter clockwise.

7. SOLUTION PUMP SWITCH

This switch serves to energize the magnetic clutch to turn the water pump on or off. Turn clockwise for activating the pump and counter clockwise for deactivating the pump.

8. CHOKE

The choke cable is for restricting air to the carburetor, this enriches the fuel mixture. The primary purpose is for starting in cold temperatures. When the cable is pulled out air is restricted, when pushed in the engine is in run position.

9. THROTTLE

This serves to set the speed of the engine by pulling the throttle lever out. It serves to increase the speed and pushing it in has the effect of slowing down the engine. The lever has a collar lock, which serves to lock in given speeds.

10. KEY SWITCH

The key switch controls the power for the machine. To turn the machine on, rotate the key clockwise until the starter engages the engine. When machine is running let off the switch and engine will continue to run. To turn power off, rotate key counter clockwise to stop position, engine will then stop.

11. HOUR METER

The hour meter records the number of hours the unit has run. This serves as a time recorder for servicing the machine.

12. CIRCUIT BREAKERS

These serve to protect the circuits from electrical spike and over loads and protects wires from damage and fire.

13. SOLUTION TEMPERATURE CONTROL VALVE

This valve enables additional heat exchangers to contribute more heat to the system if necessary. By rotating the lever to the right it adds more heat, by rotating to the left it removes heat.

14. OIL CUP

The oil cup allows lubricant spray to reach the vacuum blower.

COMPONENTS - GAS

15. VACUUM INLETS

The vacuum inlets serve as connecting point for vacuum hoses.

16. SOLUTION OUTLETS

The solution outlets are the connecting point for the high pressure cleaning hoses. These outlets are quick disconnects that allow hoses to be plugged into the unit.

17. SOLUTION SCREEN

The solution screen is located on the front of the machine. The function of this screen is to trap foreign particles from exiting the machine and plugging the orifices of the cleaning tools. This screen is part of the machine maintenance cleaning.

18. CHEMICAL CHECK VALVE

The chemical check valve allows chemicals to enter the system and travel in a singular direction to the wand. The chemical check valve prevents chemicals from traveling up-stream into the solution system of the unit.

19. WASTE OUTLET

This valve allows the waste tank to be emptied. Turning clockwise opens the valve.

20. WASTE PUMPOUT

This auxiliary pump serves to empty the waste collection tank automatically. A float located inside the tank automatically turns off and on when the solution level reaches certain points.

21. WARM WATER OUTLET

The warm water outlet allows the cleaning technician to drain hot water from the water box for mixing chemical.

⚠ CAUTION:

Water from this valve is hot.

22. WATER INLET

This quick connect allows the water supply hose to be connected to the unit.

23. PRESSURE REGULATOR

This pressure regulating valve allows the water pressure circuit to be adjusted by turning the handle clockwise the pressure will increase, by turning counter clockwise the pressure will decrease.

24. FLOW METER

The flow meter is a gauge to indicate how much liquid chemical is being introduced in the water system. The quantity can be increased by turning the chemical flow knob counter clockwise.

25. CHEMICAL PRIME CONTROL VALVE

This valve allows the chemical to circulate through the chemical system with little or no restriction. It also purges out air that may be trapped in the lines and cavities of the chemical pump. By turning the valve clockwise the injection system is enabled.

26. CHEMICAL METERING VALVE

The chemical metering valve regulates the amount of chemical that is injected into the system. Clockwise rotation of the knob closes the valve. Counter clockwise rotation opens the valve, allowing more chemical to enter the system.

27. FLOW SIMULATOR VALVE

This valve allows solution to move through the machine and chemical to be injected simulating the cleaning process. This allows the operator to set the chemical flow level without connecting tools to the machine. It is also useful in troubleshooting. The valve is turned off by rotating the knob clockwise and opened by turning the knob counter clockwise.

28. PANEL LIGHT

This light is useful if the machine is used in a poorly lit area or night use. It is helpful in reading the instruments and gauges.

29. TEMPERTURE BALANCE ORIFICE SHUTOFF VAVLE

The temperature balance orifice shutoff valve allows the operator to increase solution temperature during two wand operation. This should only be closed during two wand operation.

30. TEMPERATURE BALANCE ORIFICE

The temperature balance orifice helps to balance and stabilize the solution temperature within the system.

OPERATION - GAS

WATER PUMPING AND HEAT TRANSFER SYSTEM

Cold water enters the console through the water inlet. When the water box is full the valve will automatically shut off.

Water then flows from the water box, through a strainer, into the water pump where it is pumped to the pressure regulator manifold where the pressure regulator provides and maintains the desired pressure setting.

The pressure regulator manifold includes a nitrogen charged accumulator which helps reduce pressure spikes from the pump.

A certain amount of water is by-passed from the pressure regulator due to over pumping capacity of the water pump. Water that is not called for in the cleaning process is channeled through a heat exchanger box into the first heater core from the front of the unit. This bypass water may circulate several times through the bypass heat exchanger allowing the water to be pre-warmed.

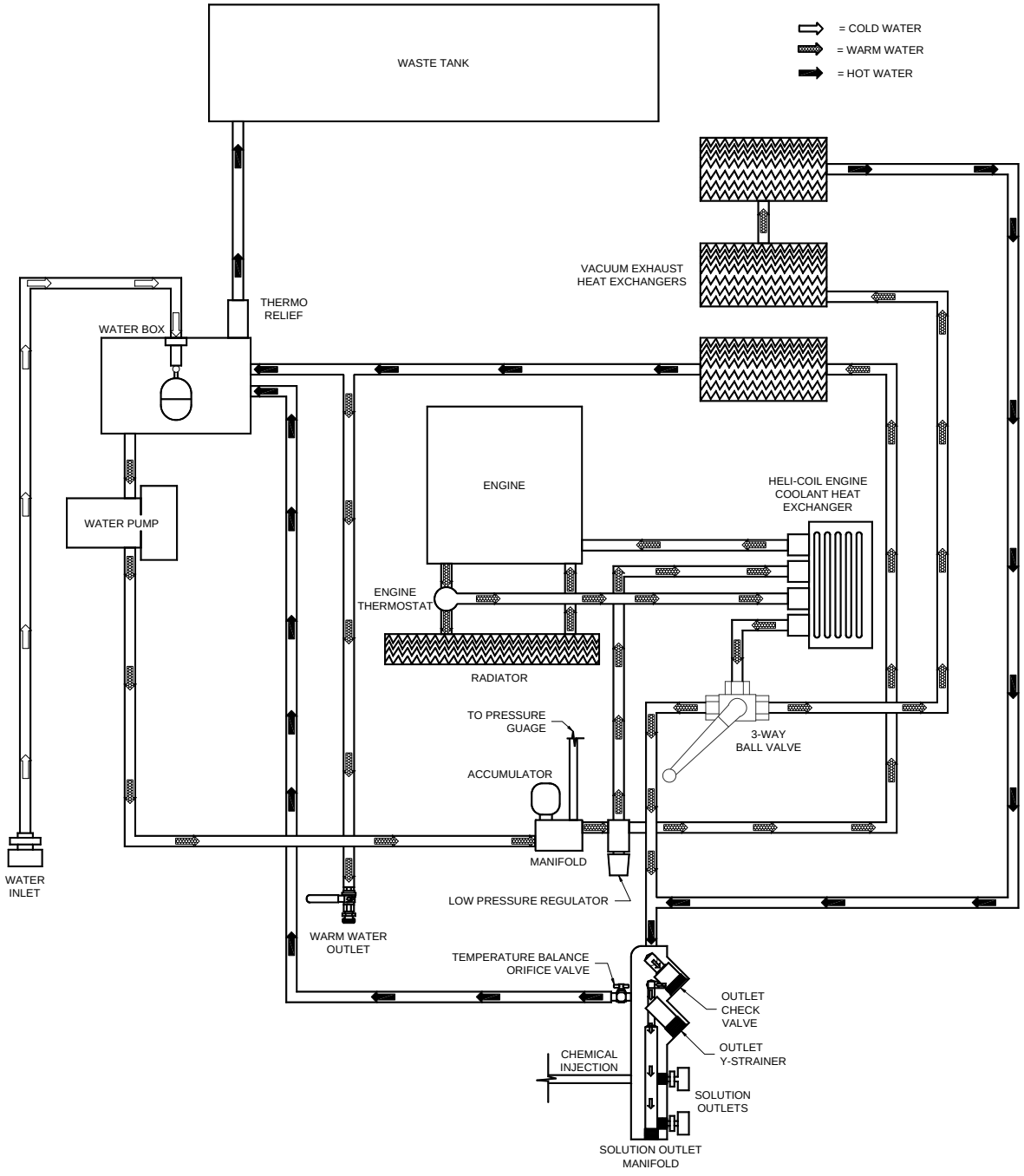
The next stage of heating and water flow is to the helicoil, when water is called for in the cleaning process it flows to the helicoil under pressure. Heat from the engine coolant is exchanged to the cleaning solution through a series of spiraled copper tubing. This allows the engine coolant to travel in a counter rotating direction to the cleaning water during the exchange process creating a very efficient transfer of heat out of the engine and into the cleaning solution.

The third stage of plumbing and heat exchange takes place in the 2nd heater core located in the heater box. This is the hottest point of the gases coming from the vac pump and the engine. These hot gases are forced through heater core #2 creating the third stage of heat transfer to the cleaning solution.

Finally, the hot solution passes to the outlet manifold where cleaning chemicals are injected from the chemical pulse pump. This manifold serves as a temperature sensing point and a connecting point for the high-pressure hoses. Also a check valve is located in this outlet manifold prohibiting chemicals from backing up into the system.

The cleaning solution then passes through high-pressure hoses and is distributed by the cleaning tool to a surface that is being cleaned, completing the water pumping and heating cycle of the cleaning unit.

SINGLE SYSTEM WATER FLOW DIAGRAM
LOW PRESSURE



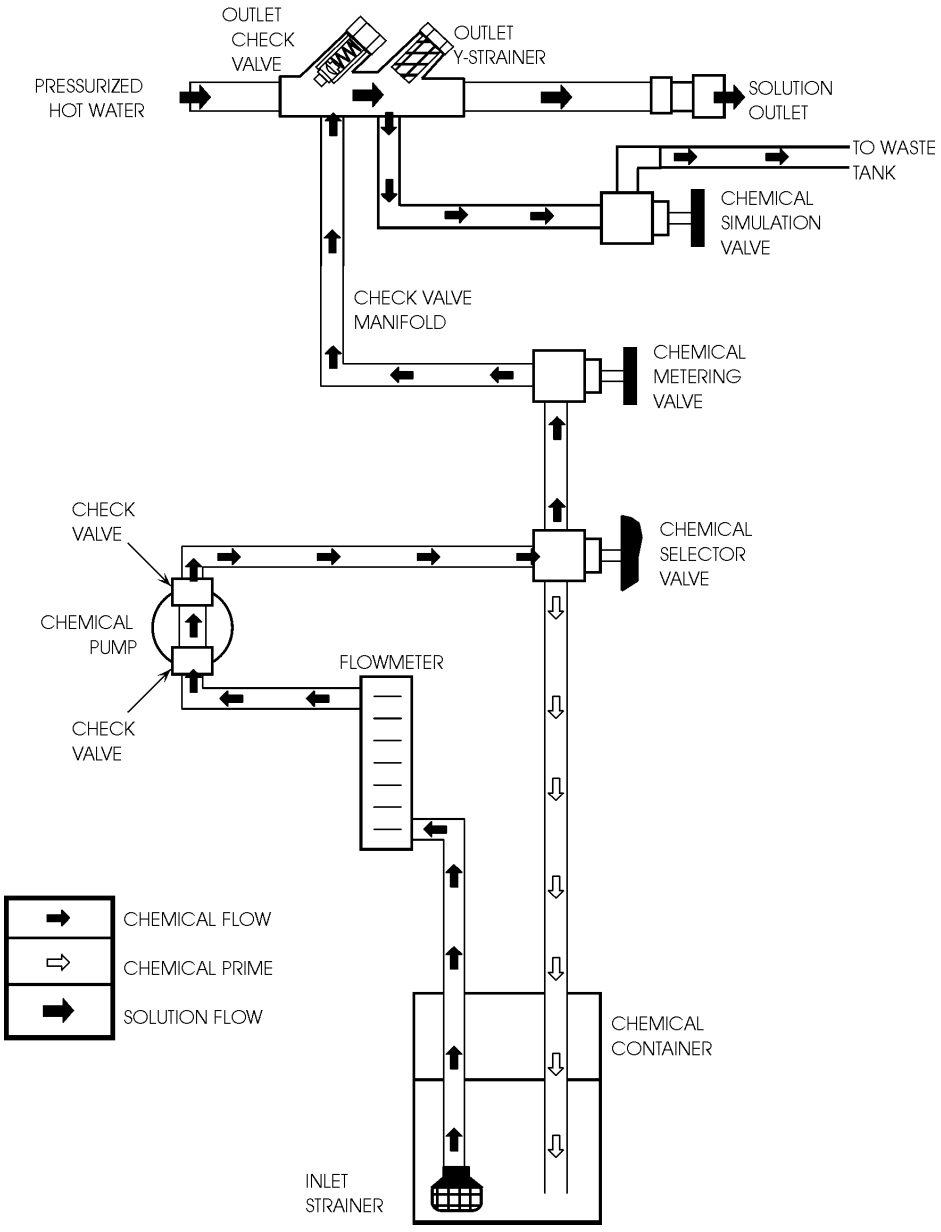
CHEMICAL INJECTION SYSTEM

The chemical injection system is unique in that it utilizes the pressure spikes generated by the high-pressure water pump to move chemical into the main pressure stream. The high pressure spikes move the diaphragm in the chemical pulse pump forcing small amounts of liquid chemical to be moved in a single direction of flow with the aid of two check valves.

The chemical is picked up from the container and fed through the flow meter to the chemical pulse pump where it is pressurized.

After reaching the chemical pulse pump the chemicals can either go into a bypass loop to purge air from the system. The chemical can then be directed by the chemical selector valve to the metering valve. The metering valve creates an orifice allowing the correct amount of chemical to enter the outlet manifold. The outlet manifold assembly is complete with a check valve that will not allow the chemicals to travel upstream into the plumbing system of the unit.

The chemicals are then mixed with hot pressurized water that make up a solution for cleaning application.

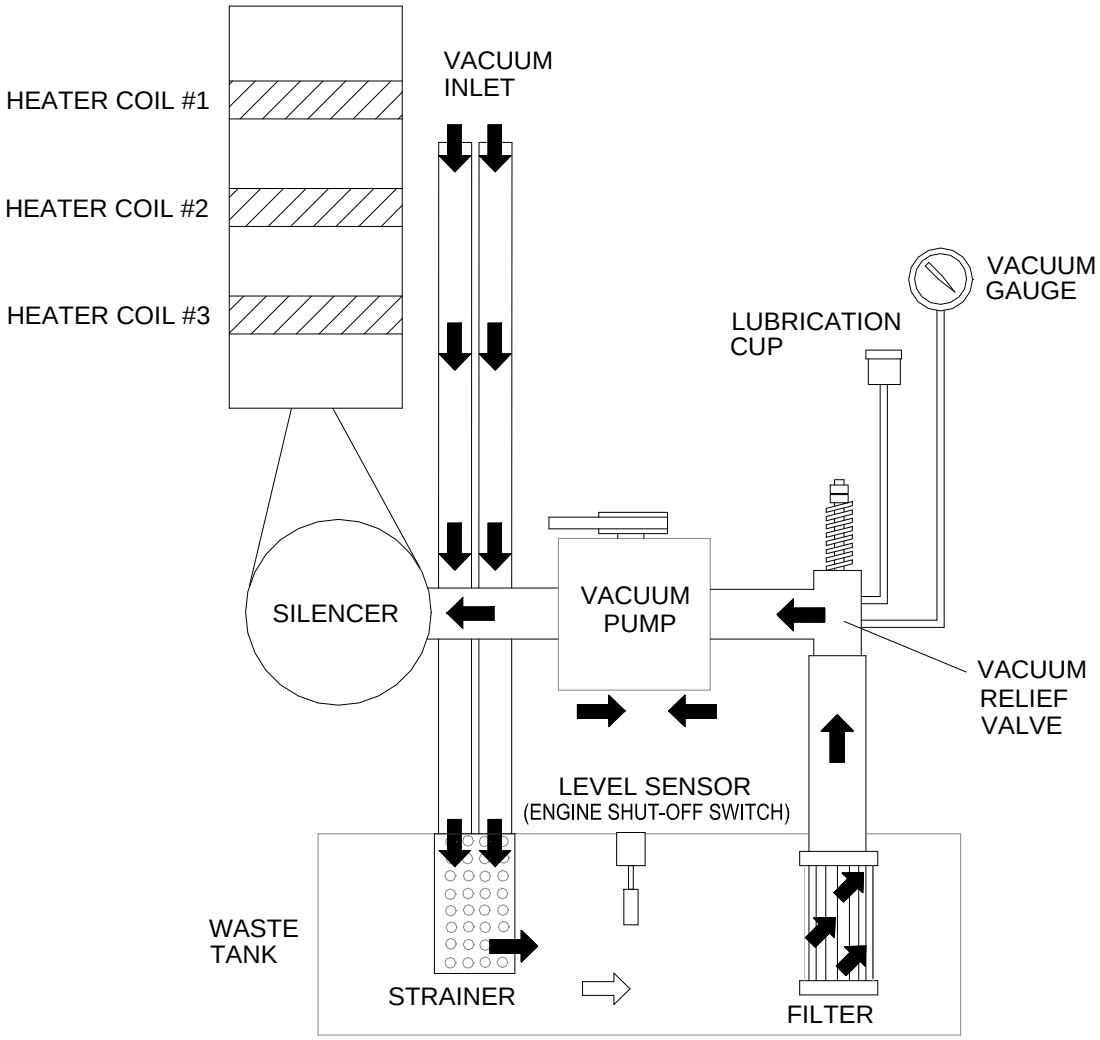


VACUUM SYSTEM

The engine turning an air pump generates vacuum. The air is channeled in one side of the vacuum pump, compressed and discharged on the opposite side, creating airflow.

The movement of air is used to do the work necessary for the extraction process. A vacuum nozzle applied to the carpet surface removes moisture, dirt and spent chemicals. These elements are conveyed back to a separating tank utilizing hoses and the force of air. Particles of moisture and dirt are separated in the vacuum tank using a series of changes in direction and velocity. The air is then filtered and rushes into the vacuum pump.

The vacuum pump compresses and heats the incoming air. The hot discharged air is forced down stream into a silencer for noise abatement. After exiting the silencer, this hot air is mixed with hot air and gases from the engine. This mixture of hot air and gases are then forced through 3 radiators serving as heat collectors. Heat from the engine and vacuum pump is then transferred into the plumbing system raising the water temperature for better cleaning.



OPERATION - GAS

PRE-RUN INSPECTION

NOTE: Operation of this unit is simple. However, only trained personnel should proceed.

⚠ WARNING:

Operate this unit and equipment only in a well-ventilated area. Exhaust fumes contain carbon monoxide which is an odorless and deadly poison that can cause severe injury or fatality. DO NOT operate this unit where the exhaust may enter any building doorway, window, vent, or opening of any type.

CHECK FOR ADEQUATE FUEL

Check the fuel tank to be certain there is adequate fuel to complete the job. This unit uses approximately .95 to 1.18 gallons of fuel per hour, depending on the speed setting.

REMOVE TOOLS FROM VEHICLE

Remove any **tools** or **hoses** from the van which you will require.

WATER SUPPLY CONNECTION

NOTE: Before connecting your water hose to the supply faucet, flush out the faucet until the water is free of any debris. Flush out any debris which may be in your water inlet hose.

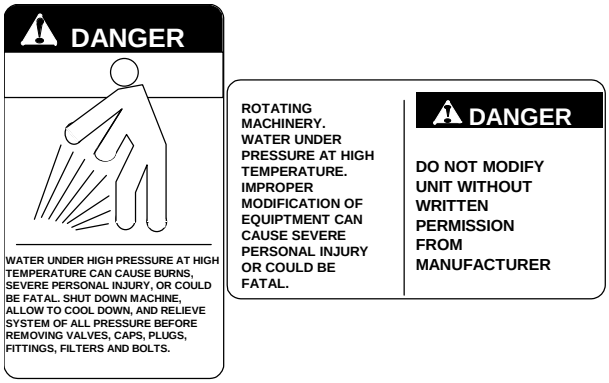
1. Connect the **water supply hose** to the **water inlet** quick-connect at the left front of the console. Connect the hose to the water supply faucet.

NOTE: Never use your waste pump outlet hose as a water inlet hose. Use only clean hoses for water inlet.

2. Turn the **water supply faucet** on. The water will fill the **water box**.

HIGH PRESSURE HOSE

Before starting the unit, connect the **pressure hose(s)** to the **outlet connection(s)** at the front of the unit. Connect the **cleaning tool(s)** to the **pressure hose(s)**.



VACUUM HOSE

Connect the **vacuum hose(s)** to the **vacuum inlet** connection(s) at the front of the unit. Connect the other end of the **vacuum hose(s)** to the **cleaning tool(s)**.

PRIMING THE CHEMICAL PUMP

1. Connect water hose to water inlet connection and turn on water supply.

2. Connect cleaning and vacuum hoses to the desired cleaning tool and console.

3. Insert chemical inlet and prime tubing into chemical container.

4. Pull out engine choke, turn solution pump switch to override, and turn ignition key to start.

5. Push in engine choke after engine has started.

6. Set throttle to low speed.

7. Fill chemical container and inspect chemical filter.

8. Turn chemical prime valve to prime and allow chemical to circulate. After all air bubbles have been removed from chemical tubing, turn the valve to the horizontal (off) position and open the chemical metering valve, and the simulation valve. Set the desired chemical flow rate while observing the flow meter indicator. Simulator valve must be in the open position to set chemical flow. When desired flow is reached turn simulator valve off.

9. Set throttle to maximum position with vacuum ports blocked off for quick unit heat up.

WASTE PUMP (OPTIONAL)

1. If your unit is equipped with an automatic waste pump, connect one end of a garden hose to the pump-out connection on the console and the other end to an appropriate waste disposal.

2. Turn the pump-out switch on the control panel to the ON position. The waste pump will operate automatically throughout the cleaning operation.

We recommend that you use a 3/4" I.D. water hose as a waste pump outlet hose. DO NOT use a hose smaller than 5/8" I.D.

NEVER use your automatic waste pump outlet hose as a water inlet hose.

⚠ WARNING:

NEVER dispose of waste in storm drains, water ways, or on ground areas. Always dispose of waste in accordance with Local, State, and Federal laws.

Once you have completed steps 1 through 8, proceed with the cleaning operation. Your unit should be in the correct throttle position for your cleaning operation or extracting. A float switch located inside the waste tank will automatically shut down the unit when it reaches its full capacity. When this occurs, empty the waste tank before continuing.

CLEANING

Observe the following guidelines, while cleaning:

1. Before proceeding make sure the nozzles are functioning properly.

a. To check , hold the wand about one foot above the surface to be cleaned and open the wand valve. A full spray should be observed from the cleaning nozzles.

b. If the nozzles are not showing a full spray pattern, adjust nozzles for proper pattern, clean, or replace nozzles, if required.

2. Normally chemical is applied on the push stoke of the wand when cleaning and vacuuming is done on the pull stroke. For heavily soiled carpets the wand may be used in a scrubbing manner, apply chemical in both push and pull strokes. Always finish up an area with a vacuum stroke.

3. When cleaning, keep the working opening (mouth) flat on the surface being cleaned. Keep the wand moving when the valve is open.

4. The unit will automatically shut-down when the waste tank is full. This will prevent water being drawn into the vacuum pump. If shut-down occurs, empty the waste tank before proceeding.

UPHOLSTERY CLEANING

Upholstery tool, part #86285260 – PRV NO. 78513

1. Set temperature as desired and slow down the engine speed to minimize excess heat.

2. Use one (1) “80015” spray tip in tool.

SHUTDOWN AND DAILY MAINTENANCE

1. Close chemical metering valve.

2. Allow the unit to run for 2 minutes with the vacuum hose disconnected to remove moisture. Spray WD40 (or equivalent) into the vacuum lubrication cup. This will prevent corrosion due to moisture.

3. Set engine throttle at idle position and allow the water temperature to cool down, unitizing the simulator valve in the open position to bleed off residual hot water left in the system.

4. Turn off ignition switch.

5. Disconnect all hoses and tools.

6. Drain waste tank.

PERSONAL PROTECTIVE EQUIPMENT

⚠ CAUTION:

Ensure that proper Personal Protective Equipment (PPE) is used during the operation of this equipment. Failure to use proper PPE could result in injury. Ensure required ventilation and/or breathing apparatuses are used with a chemical injection system. Check with your chemical vendor for proper safety requirements.

DE-FLOODING OPERATIONS

De-flooding operations involve removal of water from carpet and flooring. This differs from normal cleaning operations in that no water or solution is required. An automatic waste pump-out is highly recommended for all de-flooding operations due to the large amount of water removal often required.

1. Move the temperature selection valve from the “hot” position to the “warm” position.

2. Adjust pressure regulator to set pressure at 100 psi.

3. Allow solution temperature to cool below 160 deg F.

4. Begin de-flooding operation.

⚠ CAUTION:

FREEZING PROTECTON

If the unit is exposed to freezing weather the water in the unit may freeze, causing SERIOUS DAMAGE to the unit. To avoid this, the following is recommended during the cold weather season.

When the unit is not in use, always park it in a heated building.

While in operation, avoid long shutdowns as the unit provides heat while running. Shut it down just prior to leaving for the next job.

If a heated building is not available, we recommend that you winterize the unit with anti-freeze. At present, it is only possible to winterize units, which do not have an auxiliary water tank. Units with auxiliary water tanks must be stored in a heated building when not in use.

WINTERIZING YOUR UNIT

1. Shut off the water supply. Disconnect the **water inlet hose** from the front of your console.

2. Connect all **high pressure hoses and tools** that may have water in them.

3. Start the unit and turn water pump on. Open the tool valve until water pressure drops and water stops flowing.

4. Fill the water box with approximately two gallons of 100% glycol base anti-freeze.

5. Turn the **solution pump override switch** to the override position and start the unit. Turn the **solution pump switch** ON.

6. Open the tool valve until anti-freeze begins to come out of the tool. Recover **ALL** anti-freeze that comes out of the tools into an approved container. We strongly recommend that you re-cycle and re-use the anti-freeze.

Repeat this procedure with all the remaining tools. After all tools and pressure hoses have been filled with anti-freeze, disconnect and store them.

7. Turn the **solution pump switch** OFF. Attach the **winterizing loop hose** with attachment, Part # 86260700 – PRV NO. 10-805380, to the solution outlet connection and the water inlet connection. Turn the **solution pump switch** ON.

Allow the unit to run for approximately 3 minutes with the winterizing loop hose attached.

8. Prime the chemical system with 50/50 anti-freeze/water mix. Insert the chemical inlet and prime discharge tubes into the anti-freeze container. Turn the chemical valve to PRIME until anti-freeze begins to flow out of the prime hose.

9. Now turn the chemical valve and flow simulator valves to the open position, making certain that the flow meter indicates flow and that all anti-freeze drains out of the chemical hose into an approved container, after 30 seconds, turn off both valves.

After completing these procedures, shut the unit down. The unit is now winterized.

REMOVING ANTI-FREEZE FROM THE UNIT

1. Connect one end of the **winterizing loop hose** to the solution outlet connection. Place the other end of the loop hose, without the attachment, into an approved container.

2. Start the unit. Allow the anti-freeze to flow into the container until flow stops.

3. Fill the water box with fresh water and repeat step #2.

4. Connect the **water inlet hose** to the water inlet connection on the console. Turn the water supply on.

5. Connect all **solution hoses and any tools** which require purging of anti-freeze to the solution outlet connection(s).

6. Open the tool valves and drain the anti-freeze into an approved container until the flow is clear and all anti-freeze is purged from the tools and hoses.

7. Place the chemical prime hose into the approved container. Submerge the chemical inlet hose in water. Turn the **chemical valve** to the PRIME position until clear water comes through the prime hose, and then remove the prime hose from the container.

Turn the **chemical valve** to the ON (CHEMICAL) position. This will allow water to flow into the other side of the system.

Once all of the anti-freeze is removed, the unit is ready to use.

Eventually, the anti-freeze in your storage container will become diluted with water. If the anti-freeze level drops below 50% of the total, dispose of it and start with fresh 100% anti-freeze.

⚠ WARNING:

When disposing of used anti-freeze, observe local laws and regulations. Do not drain onto the ground or into storm drainage systems

SERVICE SCHEDULE

Engine	Daily	Check engine oil level. *** Fill to proper level
Engine	Daily	Check coolant level in overflow bottle
Vacuum Pump	Daily	Spray WD-40 in lubrication cup at front of console for 5 sec.
Water Pump	Daily	Check oil level.** Fill to proper level
Solution Inlet Tube Strainer	Daily	Check strainer for blockage, remove any debris
Vacuum Inlet Filter (In Waste Tank)	Daily	Clean filter, inspect, replace if damaged
Vacuum Hoses	Daily	Wash out with clean water
Automatic Waste Pump	Daily	Inspect and remove any debris or sediment
Chemical Filter	Daily	Inspect daily
Vacuum Pump	Weekly*	Check oil level. Fill to proper level
Water Box Float Valve	Weekly	Check for proper seating and shut-off
Water Pump Inlet Filter	Weekly*	Check for debris and clean
Battery	Weekly*	Check for proper fluid level. Fill with distilled water only
Solution Outlet Y-Strainer	Weekly*	Inspect and remove any debris or blockage
Temperature Balance Orifice	Weekly	Remove, check, and clean
High Pressure Hoses	100 hrs	Inspect for damage or impending damage
Pressure Regulators	100 hrs	Lubricate o-rings
Engine	100 hrs	Change engine oil***
Engine	100 hrs	Change oil filter***
Engine	100 hrs	Check fan belt tightness
Battery	100 hrs*	Clean battery terminals
Float Valve Seal	200 hrs.	Replace seal
Engine	200 hrs	Service air cleaner elements*
Engine	200 hrs	Check radiator hoses and clamp tightness
Fuel Pump	200 hrs	Check hose connections
Engine	200 hrs	Check spark plugs for carbon deposits and proper gap
Flow Simulator And Chemical Valves	200 hrs	Inspect and/or adjust packing nuts

* Or as often as required
** Change water pump crankcase oil after the first 50 hours
***Change engine crankcase oil and filter after the first 50 hours
****Perform drive belt, pulley and hub maintenance after the first 25 hours of operation, and then again at 100 hours
*****If using AEON PD synthetic lubricant, 4500 hours or every 2 years, whichever comes first

SERVICE SCHEDULE

Vacuum Exhaust Heat Exchanger	500 hrs	Inspect cores and remove debris.
Water Pump	500 hrs	Change oil**
Pulley Set Screws & Hub Cap Screws, Water Pump Clutch Shaft Bolts	500 hrs	Check for proper torque valves. Re-torque, if required****
Drive Pulley	500 hrs	Inspect, clean and check for pulley groove wear****
Drive Pulley	500 hrs	Check pulley alignment****
Drive Belts	500 hrs	Inspect and clean****
Drive Belts	500 hrs	Check belt tension****
Chemical Pump & Check Valves	500 hrs	Replace diaphragm and check valves.
Heater Core	500 hrs	Clean and inspect.
Engine	1000 hrs	Replace spark plugs.
Check Valve (Solution Outlet)	1000 hrs	Inspect, clean, and repair, if needed.
Vacuum Pump	1500 hrs	Drain, flush, and replace oil *****
Engine	Yearly	Flush radiator and change engine coolant.
Engine	Yearly*	Replace in-line fuel filter on engine.
Engine	Yearly*	Replace air cleaner element.
Nitrogen Accumulator	Yearly*	Replace Accumulator.
Waste Tank Filters/Strainers	Yearly	Check for damage and blockage. Replace if needed.
Engine	2 years	Replace radiator hoses and hose clamps.
Battery	2 years	Replace.
Engine	3 years	Replace ignition wires.

* Or as often as required
** Change water pump crankcase oil after the first 50 hours
***Change engine crankcase oil and filter after the first 50 hours
****Perform drive belt, pulley and hub maintenance after the first 25 hours of operation, and then again at 100 hours
*****If using AEON PD synthetic lubricant, 4500 hours or every 2 years, whichever comes first

KEY CHECKPOINTS

NOTE: Initiation of a planned preventative maintenance program will assure that your unit has optimum performance, a long operating life, and a minimal amount of "down" time.

ENGINE COOLANT SYSTEM (RADIATOR) MAINTENANCE

Your engine radiator coolant system is an important part of the power plant operation. In addition, this heat exchange system is used to provide heat for cleaning operations is also highly dependent on the engine coolant system. Follow the recommended coolant system maintenance in the Maintenance Schedule in this manual and your engine owner's manual. Refer any additional questions to your dealer.

EXTERNAL FUEL PUMP MAINTENANCE

The power plant for unit receives fuel from the main gas tank of your van/truck. An external fuel pump that provides this fuel is located on the underside of the van/truck. Loose fittings and hose connections will cause your unit to perform poorly. Follow the recommended fuel pump maintenance in the Maintenance Schedule in this manual. Refer any additional questions to your dealer.

SOLUTION SUPPLY SYSTEM MAINTENANCE

The chemical supply system pulls chemicals from your chemical bottle utilizing a pump that works off the water pump pulsing. Any clogged filters or loose connections will result in a chemical supply system malfunction or a malfunction at the cleaning tool. Maintenance of the solution outlet check valve and strainer are vital to effective cleaning operation and minimal unit downtime. Additionally, the hoses related to supplying water and chemical to the outlet manifold are under high pressures and experience thermal expansion and contraction. Periodic inspections of these hoses for tears, cracks, and failing connectors are necessary to avoid unwanted leaks. To keep your solution supply system functioning properly, follow the chemical pump and solution outlet maintenance in the Maintenance Schedule in this manual. Refer any additional questions to your dealer.

HEAT EXCHANGER SYSTEM MAINTENANCE

The heat exchange system in your unit transfers energy between the unwanted heat of the power plant and the solution supply system of the unit. The heat transfer of this system is highly dependent on the surface area contact in the heat exchanger cores located in the heat exchanger box. This surface area amount is adversely minimized when the supplied water is not softened to recommended levels. Hard water will result in scaling on the inside walls of the heat exchanger tubes. It is recommended that you use a dealer approved water softener to avoid premature heat exchanger core failure. Contact your local dealer for advice on the water hardness levels in your area.

Additionally, the heat exchanger tubes are very sensitive to freezing conditions. As the water freezes during cold conditions, it expands in the heat exchanger tubes and causes damage. Often the tubes are cracked and require the replacement of the heat exchanger core. Refer to the Freeze Protection instructions section in this manual. Refer any additional questions to your dealer.

VACUUM PUMP MAINTENANCE

The total function of the unit is based around the performance of the vacuum pump. Heat transfer used to raise the temperature of the solution is gained from the air drawn by the vacuum pump and solution is removed from the carpet with the vacuum suction of the vacuum pump. General maintenance actions for the vacuum pump as listed in this manual are vital to prolonged vacuum pump operations. Daily lubrication of the pump is required to avoid seizure of the system. Also, waste tank filters and strainers must be maintained to prevent unwanted debris from entering the vacuum pump.

⚠ WARNING:

DO NOT service this unit while it is running. The high-speed mechanical parts as well as high temperature components may result in severe injury, severed limbs, or fatality.

NOTE: Use the hour meter as a guide for coordinating the maintenance schedule.

ENGINE

1. Check the engine oil level **daily**, when in use. Make certain that proper oil level is maintained. **NEVER** overfill.

2. Change the break-in oil after the first **50 hours** of operation. Thereafter, change oil every **100 hours** of operation. USE ONLY KUBOTA BRAND OIL FILTERS. USING ANY OTHER TYPE OIL FILTER WILL VOID YOUR ENGINE WARRANTY.

Oil Recommendation. Use high-quality detergent oil of at least API (American Petroleum Institute) service class SF or SG. The recommended SAE viscosity grade for summer is **10W-30**, and **10W-30** winter.

NOTE: Using less than service class SF or SG oil or extending oil change intervals longer than recommended can cause engine damage.

3. Re-torque the manifold and exhaust tube nuts, cylinder head bolts, and carburetor attaching nuts after the **first 200 hours** of use.

4. Check the spark plugs every **200 hours**. Clean if necessary. Replace the spark plugs every **1000 hours**. **NOTE:** Never sandblast spark plugs. Spark plugs should be cleaned by scraping or wire brushing.

Clean the air cleaner element every **200 hours**. Replace the element yearly.

5. Check the engine idle RPM every **200 hours** and adjust, if necessary. **NEVER** adjust engine RPM without a tachometer. Refer to Kubota Engine Operation and Service Manual.

6. Check the coolant level in the radiator overflow container **daily**. If no coolant is seen, remove the cap and add coolant. Change the coolant with a 70:30 coolant to water ratio every **1000 hours**.

7. Replace the in-line gas filter **yearly**.

NOTE: For additional engine service information, obtain a "Kubota Service and Repair Manual" from any authorized Kubota Service Center. If service or repair is required, contact an authorized Kubota Service Center. You will need to provide the serial number of the engine.

VACUUM PUMP

Refer to the Vacuum Pump Operation and Service Manual for specific instructions.

Lubrication: We recommend that you use AEON PD Synthetic Blower Lubricant in the gear end of the vacuum pump for all operating temperatures. AEON PD is formulated especially for positive displacement blower service to provide maximum blower protection at any temperature. One filling of AEON PD will last a minimum of 2 times longer than a premium mineral oil.

NOTE: AEON PD (Part# 86189090 – PRV NO. 05-008039) is the oil which PROCHEM puts in the vacuum pump at the factory. Topping off or adding petroleum oil to synthetic oil is NOT recommended.

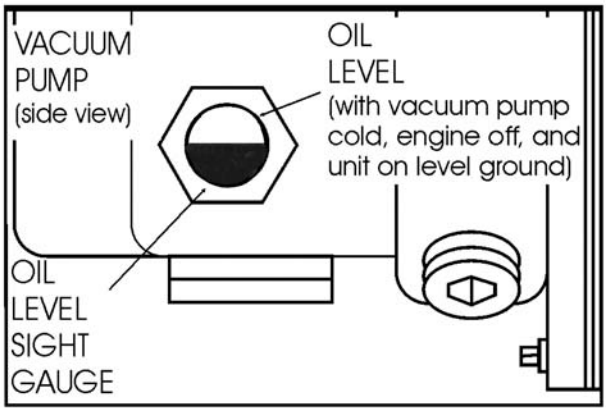
If not using AEON PD synthetic blower lubricant, use oils with rust and oxidation inhibitors, anti-foam additives and the viscosity's listed on the chart on the next page.

1. Check the oil level **daily** to assure the proper level. **PROPER LEVEL** cannot be overemphasized. Too little oil will ruin bearings and gears. Too much oil will cause overheating. Use the illustration as a guide when adding oil.

2. To prevent rust from building up inside the vacuum pump (if moisture exists) we have provided a lubrication cup on the front of the unit.

   First run the unit at least **1 minute** to remove any moisture from the vacuum pump. Next, fill the lubrication cup with WD-40, or a similar lubricant, for **5 seconds** while the unit is running and the vacuum inlets are sealed. Do this at the end of **each working day**.

3. Drain, flush and replace oil **every 1500 hours or yearly, whichever comes first.** Change oil more frequently if inspection so indicates. With AEON PD synthetic lubricant, perform the oil change maintenance **every 4500 hours or every 2 years, whichever comes first.**

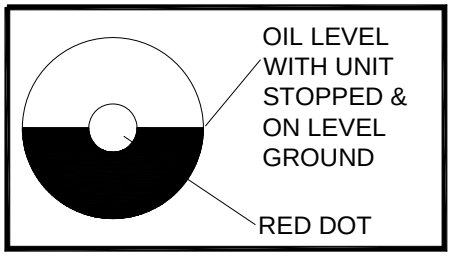


WATER PUMP

Refer to the Water Pump Operation and Service Manual for specific instructions.

1. Check the crankcase oil level **daily** to assure the proper level. Use the illustration as a guide when checking the oil level. If the level has dropped, check for the source of leakage and repair.

2. Use the provided dipstick. Remove black cap with attached dipstick. Oil level should be between marks on the dipstick. You may also use the site glass located on the non-shaft side of the pump.



3. Change the crankcase oil with Interpump oil (P/N 791106) after the **first 50 hours** of operation. Drain and refill the crankcase oil **every 500** hours thereafter.

4. Other approved oil SAE 15W-40 equivalents are: Mobil and Shell Super, Castrol CWX, and Helix Super.

VACUUM INLET FILTER (IN WASTE TANK)

1. The vacuum filter in the waste tank should be removed and cleaned **daily**. If this is done, the filter will last for a long period of time.

VACUUM RELIEF VALVE

While the unit is running at full RPM, block the air flow at the vacuum inlet connection and read the vacuum gauge. If adjustment is required, shut the unit down and adjust the vacuum relief valve locking nut tension. Start your unit and read the vacuum gauge. Repeat this process until the relief valve opens at 13" Hg.

VACUUM PUMP DRIVE BELTS

To tighten the vacuum pump belts:

1. Loosen the four screws which hold the vacuum pump mount in place.

2. Loosen the 6 nuts at the vacuum muffler outlet to heat exchanger box and loosen the bolt at the back of the machine connecting the muffler bracket to the frame.

3. Turn the adjusting bolts until the proper belt tension is achieved (1/2” deflection in the center of the belt, halfway between the pulleys).

4. Retighten all bolts previously loosened at the vacuum muffler.

N*OTE: When adjusting belt tension, make certain that the engine shaft and vacuum pump shaft remain parallel, and the belt tension is equal throughout the belt width.*

5. After adjusting, re-tighten the four screws which hold the vacuum pump mount in position. Check belt alignment with straight-edge.

⚠ CAUTION:

Make certain that when you re-torque these screws, that you use a clockwise pattern and continue until proper torque is achieved.

Torque values		
Component	Inch/lbs	Foot/lbs
Rear Engine Pulley	480	40
Front Engine Pulley	300	25

6. Check for pulley groove wear, clean belts and pulley grooves, check for worn belts, proper belt tension, and pulley alignment after the **first 25 hours** and then again at **100 hours**.
Check for belt ride in the groove.

WATER PUMP DRIVE BELT

To tighten the water pump belt:

1. Loosen the nuts which hold the water pump mount to base.

2. Adjust the position of the belt tension adjusting bolt until the proper belt tension is achieved. (1/2" deflection in the center of the belt, halfway between the pulleys).

3. While checking the alignment, tighten the nuts which hold the water pump mount to base.

FLOAT VALVE (WATER BOX)

The float valve should only be adjusted if the water box is overflowing or the water level in the box is lower than 5-1/2".

1. If the box is overflowing, remove, and check the float valve for debris or damage.

NOTE: If the float ball has any water inside it must be replaced.

⚠ CAUTION:

When replacing float ball, DO NOT over- tighten, as the rod can puncture the ball. Make sure to tighten the nuts on the rod.

2. Disassemble the valve and check the piston and seat for damage, replace if needed. See the “Illustrated Parts Listing” for a parts break-down.

WASTE TANK STRAINER BASKET

The strainer basket located inside the waste tank should be removed and cleaned whenever it is full of debris. This should be done on at the end of each job.

Y-STRAINER (OUTLET)

Inspect the Y-strainer **after the first week** of running the unit by unscrewing the screen and remove any accumulated debris. Inspect the strainer again at **2** and **4 weeks.**

The Y-strainer should then be inspected **every month.** However, if the Y-strainer has a frequent build-up of debris it should be inspected and cleaned more often.

CHECK VALVE (OUTLET)

Inspect the check valve when rebuilding the chemical pump or as needed. Remove and disassemble the check valve. Check the Teflon seat for debris or abnormal wear. Clean or replace seat if needed.

NOTE: Improper seating of the check valve poppet, damaged spring, or o-rings will cause poor operation of the chemical system.

For the procedure, see the "General Service Adjustments” section in this manual for details.

CHEMICAL PUMP

Rebuild the chemical pump **every 500 hours**. This involves changing the diaphragm and check valves.

For the procedure, see the "Chemical Pump” section in this manual for details.

NOTE: Inspect chemical filter daily.

CHEMICAL AND SIMULATOR VALVE

Examine the packing nut on the chemical selector valve, heat bypass valve, and chemical metering valve **every 200 hours.** Keeping these valve packings properly adjusted will eliminate possible leakage from the valve stems and add to overall valve life.

For the procedure, see the "General Service Adjustments” section in this manual for details.

NITROGEN ACCUMULATOR

The nitrogen accumulator is pressurized to 250 PSI and must be replaced periodically. The accumulator cannot be repaired or recharged. We recommend replacement every 1000 hours of use.

PRESSURE REGULATOR

Lubricate the o-rings **every 50 hours.** Use o-ring lubricant Part #86265430 – PV NO. 05-008035.

For the procedure, see the "General Service Adjustments" section in this manual for details.

VACUUM HOSES

To assure maximum hose life, we recommend that the hoses be washed out with clean water at the end of each **working day**.

HIGH PRESSURE HOSES

Inspect your high pressure hoses for wear after the **first 100 hours** of use. Inspect **every 25 hours thereafter**. If hoses show any signs of damage or impending rupture, **replace the hose**.

⚠ WARNING:

DO NOT attempt to repair high pressure hoses! Repairing high pressure hoses may result in severe burns and serious injury!

All high pressure hoses must be rated for 3000 PSI at 250°F. Thermoplastic hoses do not meet these specifications and should not be used. Severe burns and injury may result if the hoses do not meet these requirements.

OPTIONAL WASTE PUMP-OUT

At the end of each work day, make certain that you remove any debris or sediment which may be inside the waste pump by pumping fresh water through the pump.

TEMPERATURE BALANCE ORIFICE

Weekly maintenance of the temperature balance orifice is required for proper machine operation.

1. Unscrew nozzle cap from the connector body.
2. Remove the adapter, orifice plate, and strainer.
3. Clean any debris from the strainer and orifice plate.
4. Reassemble as shown in Parts Section - Solution Outlet.

ENGINE COOLANT REPLACEMENT

Annually the coolant in the Prochem machine should be replaced. This coolant is an integral part of the heating system and needs to be maintained as any other working part of the system. We recommend that this procedure be accomplished by the following steps.

DRAINING COOLANT:

1. Add 7/16" hose or a 1/4" plastic hose into the radiator drain petcock. Turn counter clockwise to open and drain coolant. After draining approximately 1/2 gallon, open bleed petcock in heli-coil to assure that heli-coil drains also. Allow the coolant to completely drain.

NOTE: Be sure that used coolant is collected in a proper container and disposed of in accordance with local laws.

2. After draining is complete, close both the radiator and heli-coil petcocks. Draining is complete.

REPLACING COOLANT:

1. Fill radiator with 70/30 anti-freeze water mix.
2. Start unit and run on first notch.
3. As the unit warms up, maintain a full radiator with a 70/30 mix.
4. Open petcock slightly on heli-coil to allow any trapped air to escape. When coolant runs out of heli-coil, close petcock.
5. Fill radiator with 70/30 coolant mix.
6. Re-install radiator cap.
7. Shutdown unit.

Check radiator overflow bottle. Add coolant to proper "cold" level.

GENERAL SERVICE ADJUSTMENTS

⚠ WARNING:

USE EXTREME CAUTION while servicing while machine is running. The high-speed mechanical parts as well as high temperature components may result in severe injury, severed limbs, or fatality.

ENGINE SPEED

1. This unit uses a governor to set and maintain engine speed. The engine speed is adjusted by shifting the throttle adjustment controller located on the front panel.

2. The throttle adjustment lever is attached to an internal governor. The governor has internal weights that apply pressure to a shaft with an extending arm. Attached to the arm is the carburetor linkage, adjusting engine speed. **NOTE:** Units are pre-set at the factory.

3. Engine RPM should drop approximately 50 RPM on high and low speed when the vacuum inlets are covered.

⚠ CAUTION:

DO NOT attempt to adjust without a tachometer and NEVER adjust the engine above 2700 RPM (Full Load). Permanent damage may occur.

HIGH ALTITUDE OPERATIONS

Altitude compensation kit is applied for EPA and CARB certified engines only. EPA and CARB emission regulations require the ultimate users of non-road SI engines, as their obligation, to adjust the emissions by installing the appropriate genuine altitude compensation kit. The engine manufacturer must provide such kit when the engine is operated at an altitude that exceeds the standard level, as guaranteed by the engine manufacturer. For this purpose, KUBOTA prepared an engine altitude compensation kit described below. The ultimate users of the SI engines must comply with the regulations through the installation of the appropriate altitude compensation kit for the altitude range where the engine will be operated.

Altitude Compensation Kit	Applicable Altitude Ranges
Original carburetor (with 0m Kit)	0 m ⟷ 700 m 0 ft ⟷ 2300 ft
1000 m compensation kit	300 m ⟷ 1700 m 1000 ft ⟷ 5600 ft
2000 m compensation kit	1300 m ⟷ 1700 m 4300 ft ⟷ 8900 ft

Prepare for the users who have lost original carburetor's jet.

Altitude compensation kit part number: Contact your local KUBOTA dealer and specify your engine type and engine Serial No.

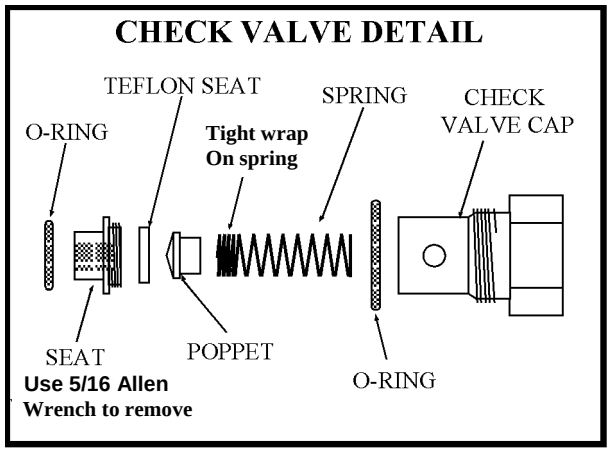
Consult your local KUBOTA dealer for further information on the altitude compensation kit.

CONSULT YOUR LOCAL KUBOTA DEALER FOR FURTHER INFORMATION ON THIS PROCEDURE.

CHECK VALVE (SOLUTION OUTLET)

Inspect the check valve whenever doing service on the chemical pump or if flow problems occur in the chemical system:

1. Remove the check valve. Be sure the small o-ring for the seat comes out with the check valve.
2. Remove the seat, using a 5/16" Allen wrench.
3. Check the Teflon seat for debris or wear. Clean or replace Teflon seat if needed.
4. Clean the poppet and spring, inspect for wear or damage, and replace as needed.
5. Re-assemble the check valve. Start the seat by hand, tighten using a 5/16" Allen wrench. **DO NOT** over-tighten seat.



NOTE: Improper seating of the check valve poppet, damaged spring or o-rings will cause poor operation of the chemical system.

6. Lubricate the o-rings with o-ring lubricant Part #86265430 – PRV NO. 05-008035 and reinstall.

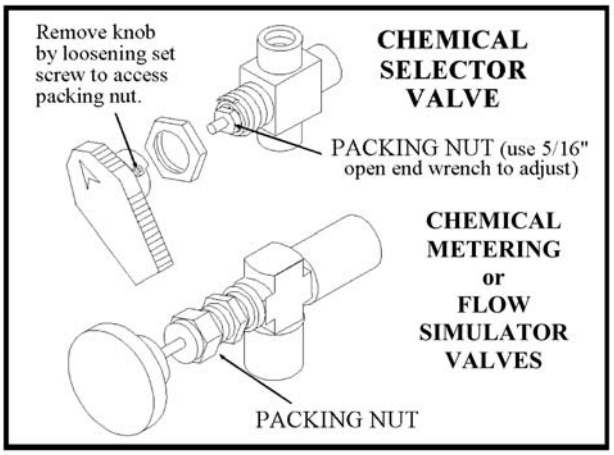
CHEMICAL PUMP

The only repairs which the chemical pump may require is the replacement of the diaphragm or check valves. To replace the diaphragm, unscrew the cover from the body. When replacing the diaphragm, lubricate the outer edges of the diaphragm with o-ring lubricant Part # 86265430 – PRV NO. 05-008035 and reassemble. To replace the check valves, unscrew the check valve caps. Replace the check valves and reassemble, using new o-rings.

DO NOT attempt to re-use o-rings once the check valves have been removed. See the “Illustrated Parts Listing” for a parts break-down on the chemical pump.

PACKING NUT ADJUSTMENT FOR CHEMICAL METERING AND CHEMICAL SELECTOR VALVES

Examine the packing nut on the chemical metering, flow simulator, and chemical selector valves for proper tension every **200 hours**. When turning the knob, there should be a small amount of resistance. If not, slightly tighten the packing nut. **DO NOT** over-tighten. Keeping the valve packings properly adjusted will eliminate possible leakage from the valve stems and add to overall valve life.



PRESSURE REGULATORS

The pressure regulators serve only to hold locked up water pressure at a preset point and to bypass this water back to the water box.

PRESSURE REGULATOR

To adjust:

1. With your unit running, close the cleaning tool. Check the pressure gauge. Open the tool valve. We recommend setting the pressure regulator so that the pressure gauge reads 350 PSI with the tool valve **open**.

When the tool valve is opened, there is an approximate drop of 100 PSI in pressure. **If there is a pressure drop greater than 100 PSI, it may be necessary to lubricate the o-rings in the pressure regulator.**

2. If the pressure regulator requires adjustment, turn the adjusting knob (while observing the pressure gauge on the control panel) until the desired pressure is obtained.

ADDING/DRAINING ENGINE COOLANT

Use a 70:30 coolant to water ratio in this unit's cooling system. **NOTE:** See the "Maintenance Chart" for specific details.

1. To drain the coolant, remove the radiator cap and turn the lower engine radiator draincock counter-clockwise.

TROUBLESHOOTING - GAS

PROBLEM	CAUSE	SOLUTION
Loss of water pump pressure. With the cleaning tool open, the water pressure gauge reads below the normal operating pressure.	Water supply is turned off or the float valve is stuck or improperly adjusted. NOTE: This may also cause the water pressure switch to disengage pump.	Turn the water supply on or up. Check for kinks in the water supply hose. Examine the float valve and adjust or replace.
	Water pump inlet supply line is plugged or drawing air. NOTE: This may also cause the water pressure disengage pump.	Examine the water inlet filter inside the water box. Remove accumulated debris and replace if required. Check for suction leaks and loose clamps or fittings. Tighten any loose fittings or clamps. Replace any ruptured hose(s).
	Improper engine speed	Using a tachometer, check the engine speed. Full throttle engine speed is 2400 RPM. Idle engine speed is 900 RPM. Refer to the "engine Speed" section for instructions on how to re-adjust.
	Pressure regulator o-rings are dry.	Lubricate o-rings, using o-ring lubricant Part #86265430 – PRV NO. 05-008035.
	Pressure regulator has worn o-rings	Check o-rings. If necessary, replace.
	Pressure regulator is dirty, stuck open, or improperly adjusted.	Clean or repair regulator. Adjust to working pressure. Lubricate o-rings, using o-ring lubricant Part # 86265430 – PRV NO. 05-008035.
	Low pump volume. (Measure the amount of water being returned to the water box from the pressure regulator. It should fill a gallon container about every 17 seconds).	Examine the check valves, plunger cups, and cylinder head on the water pump. Repair, whenever required (refer to the water pump service manual).
	Defective water pressure gauge.	Replace gauge
	Orifice (spray nozzle) in the cleaning tool is worn, defective, or wrong size.	Replace Nozzle or change nozzle size.
	Debris clogging water lines or water inlet disconnect.	Clean or replace as needed.
	Belts loose or broken	Re-tension or replace as needed.
Loss of solution volume at cleaning tool orifice. Water gauge reads normal.	Plugged orifice and/or screen in the cleaning tool.	Unplug or replace orifice and/or screen
	Internal block between the pressure regulator manifold and the outlet Y-strainer, or the Y-strainer screen is clogged	Inspect all lines, remove accumulated debris which is blocking proper flow. Replace any defective hoses. Remove, inspect, and clean the Y-strainer screen. De-scale unit and install a water softener, if necessary.
	Outlet check valve is plugged	Examine the check valve, remove any debris
	Defective quick-connect on one or more of the high pressure hoses.	Replace defective quick-connects(s) on high pressure hoses(s).
	Cleaning tool valve is malfunctioning.	Repair or replace valve.
	Hose inner lining is constricted.	Remove restriction or replace hose.

PROBLEM	CAUSE	SOLUTION
Loss of vacuum While cleaning, the vacuum is not up to specification. Engine RPM is normal.	Vacuum gauge is giving an improper reading.	Examine the tubing between the vacuum relief valve and the vacuum gauge and remove any blockage.
	Vacuum hose(s) is damaged, causing a suction leak.	Inspect hose(s), repair or replace.
	Waste tank gaskets not sealing properly, not positioned properly	Inspect the gasket. Repair seal or replace Re-position lid(s).
	Plugged vacuum hose or vacuum plumbing between vacuum inlet and strainer basket.	Unplug vacuum hose or inlet plumbing.
	Waste tank filter or strainer basket is plugged.	Clean or replace filter. Clean strainer basket.
	Loose vacuum pump drive belts.	Tighten the drive belts
	Waste tank drain valve is damaged or left open, causing a vacuum leak.	Drain the waste tank. Close drain valve, if open. Remove the dump valve and, after inspecting, replace the defective components.
	Vacuum relief valve requires adjustment or has a vacuum leak due to damaged diaphragm.	Re-adjust the vacuum relief valve. If the vacuum does not increase, remove and inspect the relief valve diaphragm. If damaged, replace
	Vacuum exhaust heat exchangers are plugged with lint.	Remove and clean.
	Vacuum pump is worn out.	Replace the vacuum pump.
Loss of chemical With the cleaning tool valve open, no chemical	Chemical pump is improperly primed.	Refer to chemical pump priming instructions.
	The strainer at the inlet end of the chemical inlet line is clogged	Unclog the strainer. If damaged, replace.
	Suction leak in the inlet line leading into the chemical pump.	Inspect inlet lines and flow meter for damage and replace, if required.
	Chemical pump check valve(s) is clogged	Remove any debris from the chemical check valve(s). Replace chemical check valve(s) or seals, if necessary.
	Chemical prime/on-off valve or chemical metering valve is defective.	Replace valve(s).
	Chemical pump diaphragm is ruptured.	Disassemble the chemical pump and replace the damaged diaphragm.
	Defective cylinder in the water pump.	Measure the pump volume. If the pump volume is less than normal, refer to “Loss of Pump Volume” in the Troubleshooting section in this manual.
Chemical flow meter indicates flow with the tool valve closed	External leak in chemical piping	Tighten fittings. Re-apply thread sealant where required. If any fittings are damaged, replace.
	Outlet check valve is full of debris or damaged, not allowing it to close properly	Close the chemical valve on the instrument panel. If the flow meter does not indicate flow, remove debris or replace check valve, if necessary.
	Chemical pump diaphragm is ruptured	Close the chemical valve on the instrument panel. If the flow meter still indicates flow, replace the chemical pump diaphragm.
	Internal leak in chemical valve causing continual flow through prime tube returning to container.	Tighten valve packing nut (see “General Service Adjustments” section in this manual). Replace valve, if necessary.

TROUBLESHOOTING - GAS

PROBLEM	CAUSE	SOLUTION
Water pump does not engage	Solution pump circuit breaker has been tripped	Check the solution pump circuit breaker on the control panel. Press the ciruit breaker reset button.
	Defective electrical connection in the console wiring or defective switch.	Examine switch, electrical connections, and wiring. Repair any defective connections. If there is power going to the switch but not going out, replace the defective switch.
	Water pump has not been activated	Turn solution pump switch to on.
	Defective water pump clutch.	If there is power in the switch, but not power at the clutch, replace the defective wire. If there is power at the clutch, replace the defective switch.
	Loose or broken water pump belts.	Tighten or replace belts.
Engine will not start The engine does not turn over	Main circuit breaker on the control panel has been tripped.	After inspecting the unit to determine the cause of the tripped circuit breaker, press the reset button.
	Loose or corroded battery.	Clean, tighten, or replace the battery terminals.
	Dead battery.	Recharge or replace battery.
	Defective ignition switch.	Test ignition switch for power going into the switch. If there is power going in but NO power going out, replace the switch.
	Defective starter motor.	Test the starter motor. If necessary replace.
	Vacuum pump seized.	Refer to Sutorbilt Service & Repair Manual.
Starter turns over engine, but will not start	Waste tank is full.	Empty the waste tank.
	Engine temperature has exceeded 240°F, triggering the high temperature switch to shut the unit down.	Determine the cause of overheating before restarting the unit. See “Excessive Heating” in the “Troubleshooting” section of this manual.
	Defective fuel pump.	Replace the fuel pump.
	Loose or broken wires leading to waste tank float switch.	Repair or replace any broken electrical connections.
	Defective float switch in the waste tank.	Check switch for proper operation, replace as necessary.
	Oil pressure switch (located on engine), anti-diesel solenoid (located on engine), high temperature switch (located on engine).	Test these components. If any are defective, replace. Consult the Kubota Engine Operation and Maintenance Manual.

PROBLEM	CAUSE	SOLUTION
Starter turns over engine, but will not start	Engine is malfunctioning	Refer to Kubota Engine Operation and Maintenance Manual.
Engine stops running While doing normal cleaning, the engine stops running	Engine is out of gasoline	Add gasoline to the fuel tank.
	Waste tank is full	Empty waste tank.
	Main or engine circuit breaker on the control panel has been tripped.	After inspecting the unit to determine the cause of the tripped circuit breaker, press the reset button.
	Engine coolant temperture has exceeded 240°F, triggering the high temperature switch to shut the unit down.	Determine the cause of the overheating before restarting the unit. Refer to the Kubota Engine Operation and Maintenance Manual.
	Defective fuel pump.	Replace fuel pump.
	Defective float switch inside the waste tank.	Check switch for proper operaton. Replace as necessary.
	Defective 240°F engine coolant high-temperature shudown switch.	Test switch. If necessary, replace.
	Oil pressure gauge on engine has shut down, due to insufficient oil pressure.	Refer to the Kubota Engine Operation and Maintenance Manual. **DO NOT** restart the engine until the cause is determined and corrected.
	No ignition in the engine or engine is malfunctioning.	Refer to the Kubota Engine Operation and Maintenance Manual.
Excessive heating	Flow restriction caused by hard water scaling.	Descale unit, repair or replace damaged plumbing components as necessary. Install water softener.
	Not enough water flow.	Check jet size of tool.
Heat exchanger leaks ***NOTE: The exhaust heat exchanger will produce water condensation discharge at times during normal operation. DO NOT confuse this with a leak.***	Engine/vacuum exhaust heat exchangers are damaged from frozen water.	Inspect heat exchangers for leaks. Visually inspect for damage. Pressure check after removing from the unit. (Maximum test pressure 1200 PSI).
Loss of temperature The heat output of the unit is LESS than normal.	Temperature relief valve on water box is stuck open.	Clean temperature relief valve and test. Replace, if necessary.
	Engine RPM is low.	Reset engine RPM.
	Defective temperature gauge.	Test gauge and sensor. Replace failed component.
Automatic waste pump is malfunctioning or not operating normally ***NOTE: When replacing either the pump or float switch, use new electrical connectors and heat shrink. Inspect connection for watertight seal.***	Defective waste pump float switch.	Replace float switch.
	Broken diaphragm.	Replace diaphragm.
	Weak battery.	Charge or replace battery if needed. Check charging station.
	Pump-out circuit breaker on control panel has been tripped.	After inspecting waste pump to determine the cause of the tripped circuit breaker, press the reset button.

NOTES:

APEX DIESEL

IMPORTANT SAFETY INSTRUCTIONS

When using this machine, basic precautions must always be followed, including the following:

READ ALL INSTRUCTIONS BEFORE USING THIS MACHINE.

⚠ WARNING:
⚠ CAUTION:

These symbols mean WARNING or CAUTION. Failure to follow warnings and cautions could result in fatality, personal injury to yourself and/or others, or property damage. Follow these instructions carefully!

Read the operator's manual before installing or starting this unit. Failure to adhere to instructions could result in severe personal injury or could be fatal.

Operate this unit and equipment only in a well-ventilated area. Exhaust fumes can cause severe injury or fatality. **DO NOT** run this unit in an enclosed area. **DO NOT** operate this unit where the exhaust may enter any building doorway, window, vent, or opening of any type.

Diesel fuel is flammable and requires special storage. Ensure all diesel fuel use and storage meets local, state, and federal requirements. Never utilize an ether spray to assist starting. Severe engine damage will result.

This unit must be operated with the vehicle or trailer doors open in order to ensure adequate engine ventilation.

DO NOT operate engine if diesel fuel is spilled. Avoid creating any ignition until the diesel has been cleaned up.

DO NOT place hands, feet, hair, or clothing near rotating or moving parts. Avoid any contact with moving parts! Rotating machinery can cause injury or fatality.

Never operate this unit without belt guards. The high speed moving parts, such as belts and pulleys, should be avoided while this unit is running. Severe injury, damage, or fatality may result.

DO NOT service this unit while it is running. The high-speed mechanical parts as well as high temperature components may result in severe injury or severed limbs.

Never touch electrical wires or components while the engine is running. They can be sources of electrical shock.

Engine components can get extremely hot from operation. To prevent severe burns, **DO NOT** touch these areas while the engine is running - or immediately after the engine is turned off.

DO NOT touch the exhaust system while this unit is running. Severe burns may result.

Before servicing this unit, allow it to "cool down." This will prevent burns from occurring.

Water under high pressure at high temperature can cause burns, severe personal injury, or fatality. Shut down machine, allow to cool down, and relieve system of all pressure before removing valves, caps, plugs, fittings, filters, and bolts.

DO NOT leave the vehicle engine running while operating this unit.

Dangerous Acid, Explosive Gases! Batteries contain sulfuric acid. To prevent acid burns, avoid contact with skin, eyes and clothing. Batteries produce explosive hydrogen gas while being charged. To prevent a fire or explosion, charge batteries only in well ventilated areas. Keep sparks, open flames, and other sources of ignition away from the battery at all times. Keep batteries out of the reach of children. Remove all jewelry when servicing batteries.

Before disconnecting the negative (-) ground cable, make sure all switches are OFF. If ON, a spark will occur at the ground cable terminal which could cause an explosion if hydrogen gas or fuel vapors are present. When disconnecting the battery, **ALWAYS** disconnect the negative (-) terminal FIRST.

DO NOT smoke around the unit. Fumes may accumulate and be ignited. The battery is also extremely flammable. This will prevent possible explosions.

DO NOT damage the vehicle in any manner during installation. When routing fuel lines **DO NOT** place the hose in any location where damage may occur to the hose or vehicle. Avoid any contact with moving parts, areas of high temperature, brake lines, fuel lines, muffler, catalytic converter, or sharp objects.

DO NOT cut or splice any of the vehicle fuel lines during fuel line installation. This may result in fuel leaks and potentially dangerous conditions. There is no fuel solenoid shut off on this unit. Use only the provided fuel hose for fuel lines. When traversing the vehicle floor with fuel lines, always use a bulkhead adapter. This will prevent leakage and ensure that the hose is not punctured by vehicle vibration abrasion.

DO NOT exceed your vehicle's weight limit. The console with waste tank and accessories weighs approximately 1160 lbs. Make certain to account for any additional accessories in your weight and balance calculations. Make certain that the vehicle has the correct axle rating. This will prevent unsafe vehicle driving conditions.

We require high-back seats on all vehicles in which units are to be installed for head and neck protection. We recommend using a metal partition between the seats and equipment.

DO NOT operate this unit without the water supply attached and turned on. The water pump and other vital components may be seriously damaged if this unit is permitted to operate dry without water.

DO NOT operate this unit without the filter installed in the waste tank.

Keep your vehicle work area clean. Wands, stair tools, and other accessories must be securely fastened before driving the vehicle.

All high pressure hoses must be rated for 3000 PSI at 250°F. Thermoplastic hoses do not meet these specifications and should not be used. Severe burns and injury may result if the hoses do not meet these requirements.

The winterizing loop hose assembly, Part #86260700 – PRV NO. 10-805380, is for winterizing use only. If used improperly, live steam may escape from this hose, causing it to whip around. Burns or injury may result.

Make certain that you receive complete training by the distributor from whom you purchased this unit.

This unit uses high pressure and temperature. Improper or irresponsible use may result in serious injury.

Do not modify this unit in any manner. Improper modification can cause severe personal injury or fatality.

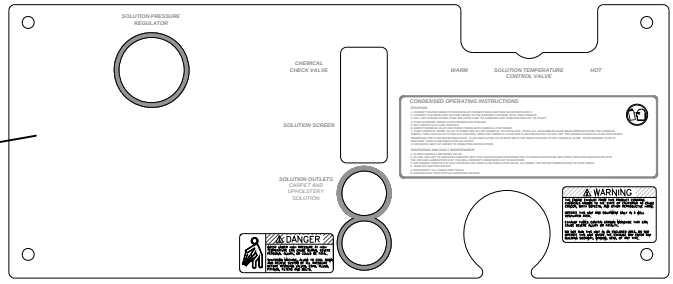
CALIFORNIA PROPOSITION 65 WARNING: Engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

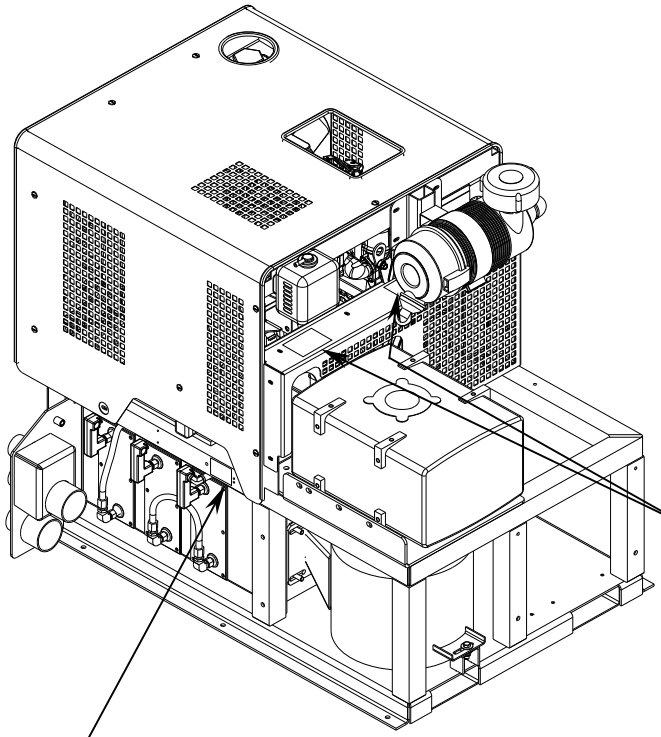
HAZARD INTENSITY LEVEL - DIESEL

*The following **WARNING LABELS** are found on your cleaning unit . These labels point out important **Warnings** and **Cautions** which should be followed at **all** times. Failure to follow warnings and cautions could result in fatality, personal injury to yourself and/or others, or property damage. Follow these instructions carefully! **DO NOT** remove these labels.*

NOTE: If at any time the labels become illegible, promptly replace them.

Front panel decal
Part # 86179340
PRV NO. 791103





(2) Warning labels
Part # 86186520
PRV NO. 500769

Caution label
Part # 86186530
PRV NO. 500770

TECHNICAL SPECIFICATIONS – DIESEL ENGINES

ITEM	DIMENSION/CAPACITY
Engine speed	2850 rpm (high speed) Water Pump ON 1300 rpm (idle speed) Water Pump OFF.
Water pump rpm	1000 rpm
Vacuum pump rpm	2600 rpm
Water flow rate	4.15 GPM (maximum)
Water pump pressure	1000 PSI (maximum)
Vacuum relief valve	13” Hg
Waste tank capacity	80 gallons
Console weight	910 lbs.
Console weight (with waste tank & waste tank accessories)	1160 lbs. (1830 lbs. If waste tank is full)
TORQUE VALUES	
Engine front pulley	300 inch lbs 25 foot/lbs
Vacuum pump hub	300 inch/lbs 25 foot/lbs
Engine rear pulley	480 in//lbs 40 foot/lbs

JET SIZING:
Recommended floor tool tip sizing not exceed a total of “.06”. Using larger jet sizes on your cleaning unit may reduce cleaning temperatures.

Example: Tri-jet wand uses three 9502 jets (95° spray angle w/ 02 orifice).
02 x 3 = 06

When using two floor tools while cleaning with this unit, it is recommended that each tool tip size does not exceed a total of “.045”.

Example: Tri-jet wand uses three 95015 jets (95° spray angle w/ 015 orifice).
015 x 3 = 045…….045 x 2 tools = 09

Upholstery tool jet size: 80015
Stair tool jet size: 9502

INSTALLATION REQUIREMENTS DEALER RESPONSIBILITY

NOTE: Your distributor from whom you purchased this mobile cleaning unit is responsible for the correct installation of this machine. The dealer is also responsible for initial training of your operators and maintenance personnel in the proper operation and maintenance of this unit.

1. The unit should **NOT** be mounted in any motor vehicle of less than **3/4 ton capacity**.

⚠ CAUTION:

The console with waste tank and accessories must NOT exceed the vehicle's axle weight limit.

2. If mounting in a trailer, make certain that the trailer is rated for the total weight of the **UNIT AND TRAILER**. Electric or hydraulic brakes should be provided, and a strict compliance with any State and Federal vehicle laws must be maintained.

3. The vehicle tires should have a load rating above the combined vehicle and unit weight.

4. We do not recommend using flooring materials that absorb water. This could result in rust and corrosion of the vehicle floor.

5. Padding under rubber floor mats should be removed before installing this unit.

6. We highly recommend using a drip tray under the console (Part #8605504 – PRV NO. 790552).

7. If using a trailer, the console should be positioned so that it balances properly with respect to the axle. Ten percent (10%) of the overall unit weight should be on the tongue.

   Example: If loaded trailer weight is 2,000 lbs., tongue weight needs to be a minimum of 200 lbs. to tow properly.

FUEL REQUIREMENTS

Use diesel fuel ONLY.

⚠ WARNING:

NEVER use a starting fluid (i.e. ether) to assist in starting engine. Severe engine damage will result.

ENGINE OIL REQUIREMENTS

1. **LUBRICATING OIL**
   With the emission control now in effect, the CF-4 and CG-4 lubricating oils have been developed for use of a low sulfur fuel on on-road vehicle engines. When an off-road vehicle engine runs on a high-sulfur fuel, it is advisable to employ the CF, CD or CE lubricating oil with a high total base number. If the CF-4 or CG-4 lubricating oil is used with a high-sulfur fuel, change the lubricating oil at shorter intervals.

   API service classification: above CD grade.
   Ambient temperature: below 35°C (95°F).

   Lubricating oil recommended when a low-sulfur or high-sulfur fuel is employed.

O: Recommendable X: Not recommendable

Lubricating Oil Class	Fuel		Remarks
	Low-Sulfur	High-Sulfur	
CF	O	O	TBN ≥ 10
CF-4	O	X	
CG-4	O	X	

2. **CHANGING INTERVAL OF ENGINE OIL AND OIL FILTER CARTRIDGE.**

Engine D902-E	Engine oil	50 Hrs (Initial)
		100 Hrs
	Oil filter cartridge	200 Hrs

CHEMICAL REQUIREMENTS

This cleaning unit, due to its chemical injection pump design, can be used with a variety of water-diluted chemical compounds (either acidic or alkaline), depending on the job to be done. However, to obtain optimum results with this unit, we recommend using the PROCHEM line of chemicals. For information on using the cleaning compounds, refer to the PROCHEM chemical manual.

WATER REQUIREMENTS

Hard water deposits will adversely affect the plumbing and heat exchange systems on this unit. The map below will give you an idea of where areas of high water hardness may occur. However, any water supply obtained from a well is almost always hard water and a water softener will be needed to protect your equipment.

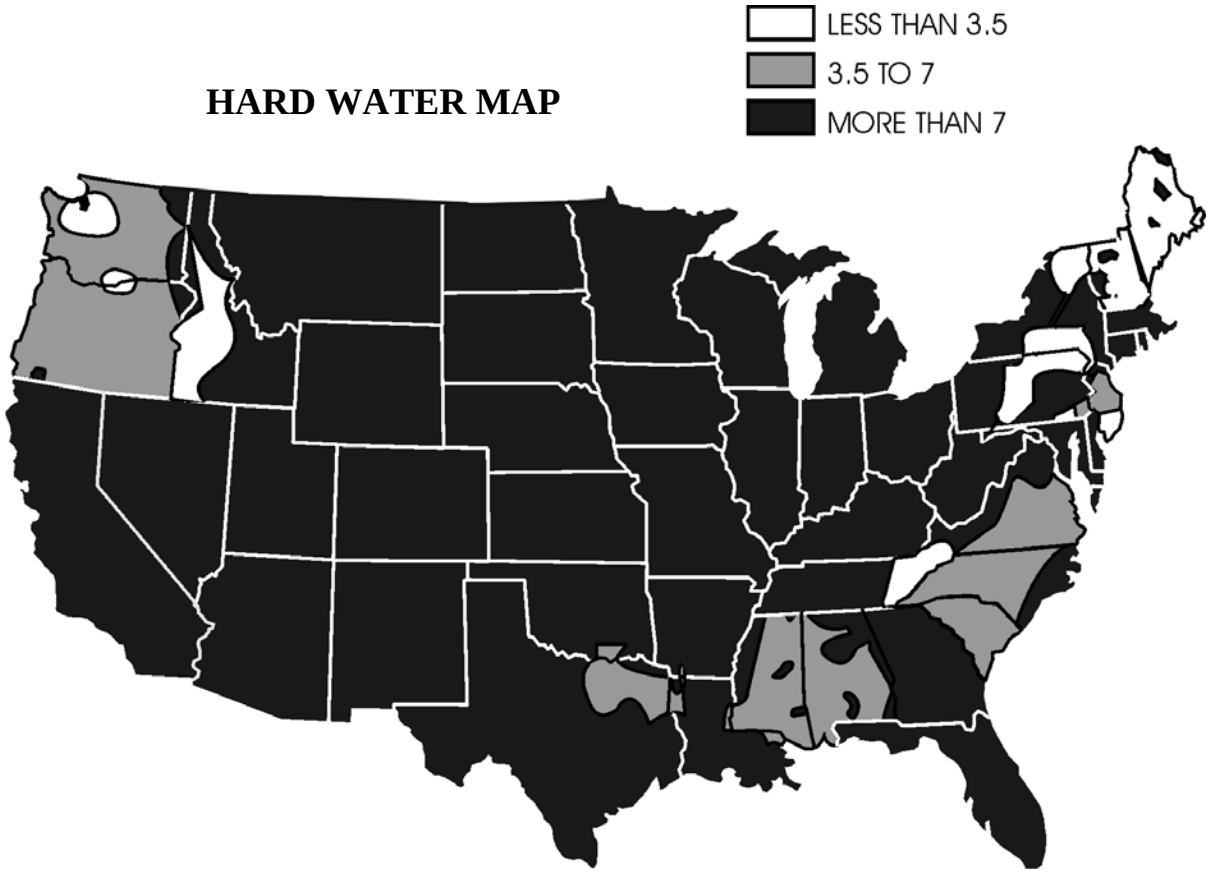
NOTE: Equipment malfunction or component failure caused by hard water scaling is NOT covered under the warranty.

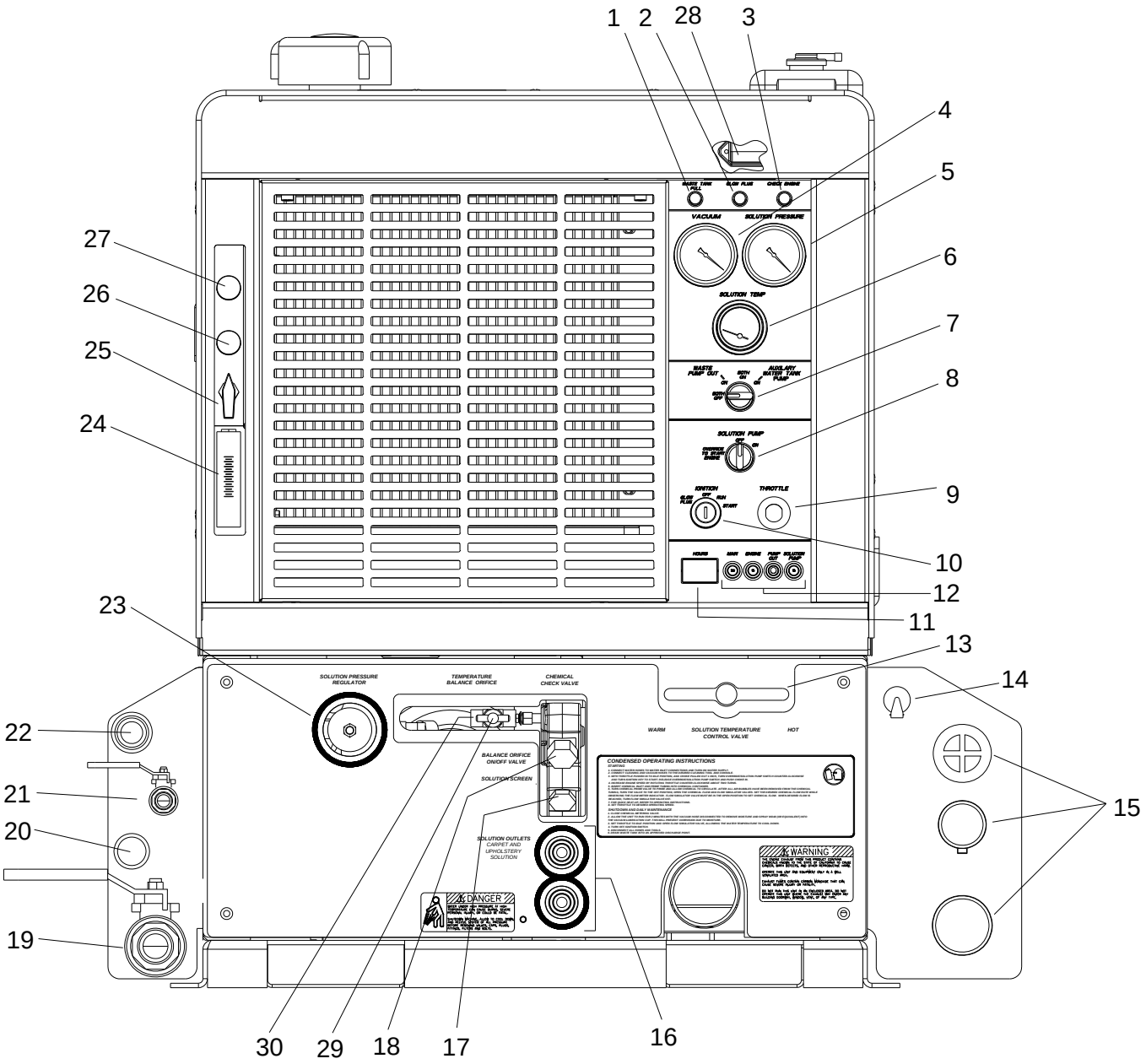
If you are operating this unit in an area where the unit will be using water in which the hardness exceeds 3-1/2 grains, we highly recommend a suitable water softener be installed. If using a water softener, it must have a five (5) GPM (or greater) flow capacity without any hose constrictions.

Using a water softener will reduce maintenance and decrease down time caused by hard water scaling. It will also allow cleaning chemicals to be more effective in lower concentrations

If you require a water softener, PROCHEM has a model to meet your needs. Please contact your nearest distributor for information, price, and abailability.

HARD WATER MAP

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VACUUM
SOLUTION PRESSURE
SOLUTION TEMP
SOLUTION PUMP
IGNITION
THROTTLE
HOURS
SOLUTION PRESSURE REGULATOR
TEMPERATURE BALANCE ORIFICE
CHEMICAL CHECK VALVE
WARM
SOLUTION TEMPERATURE CONTROL VALVE
HOT
BALANCE ORIFICE ON/OFF VALVE
SOLUTION SCREEN
SOLUTION OUTLETS CARPET AND UPHOLSTERY SOLUTION
CONDENSED OPERATING INSTRUCTIONS
DANGER
WARNING

1. WASTE TANK FULL INDICATOR LIGHT

This indicator light is activated when the waste tank is full. When lit the unit will shutdown protecting the equipment from damage. This also indicates that the waste tank must be emptied before the unit can be brought back in service.
NOTE: Never dispose of waste water in storm drains, water ways or on ground areas. Always dispose of waste in accordance with local, state and federal laws.

2. GLOW PLUG INDICATOR

After turning the ignition switch counterclockwise this indicator lamp illuminates during glow plug warm up. When light goes out, engine is ready for start.

3. ENGINE HIGH TEMPERATURE SHUTDOWN INDICATOR

This light when activated signals an over heat condition with the engine. When this occurs, troubleshooting is required.

4. VACUUM GAUGE

This gauge indicates in inches of mercury how much vacuum the system is producing at any given time.

5. SOLUTION PRESSURE GAUGE

This gauge registers the amount of pressure in the system.

6. SOLUTION TEMPERATURE GAUGE

This gauge measures the temperature of the cleaning solution as it exits the machine.

7. WASTE PUMPOUT AND AUXILIARY WATER PUMP SWITCH

This four-position switch is for activating the waste pumpout device. It also serves to activate the fresh water transfer pump. For turning on pumps, rotate clockwise. For turning off pumps, rotate counter clockwise.

8. SOLUTION PUMP SWITCH

This switch serves to energize the magnetic clutch to turn the water pump on or off. Turn clockwise for activating the pump and counter clockwise for deactivating the pump.

9. THROTTLE

This serves to set the speed of the engine by rotating the throttle knob counterclockwise to increase, clockwise to decrease. The cable has a collar lock, which serves to lock in a given speed.

10. KEY SWITCH

The key switch controls the power for the machine. To turn the machine on, rotate the key counterclockwise to energize the glow plugs and hold. This will illuminate the green glow plug lamp. When the glow plug lamp goes out the engine is ready to start. Turn solution pump switch counterclockwise to override and hold. Turn key switch clockwise until engine starts and release. Wait 5 seconds then release override switch. To stop engine rotate key to OFF position.

11. HOUR METER

The hour meter records the number of hours the unit has run. This serves as a time recorder for servicing the machine.

12. CIRCUIT BREAKERS

These serve to protect the circuits from electrical spike and over loads and protects wires from damage and fire.

13. SOLUTION TEMPERATURE CONTROL VALVE

This valve enables additional heat exchangers to contribute more heat to the system if necessary. By rotating the lever to the right it adds more heat, by rotating to the left it removes heat.

14. OIL CUP

The oil cup allows lubricant spray to reach the vacuum blower.

15. VACUUM INLETS

The vacuum inlets serve as connecting point for vacuum hoses.

16. SOLUTION OUTLETS

The solution outlets are the connecting point for the high pressure cleaning hoses. These outlets are quick disconnects that allow hoses to be plugged into the unit.

17. SOLUTION SCREEN

The solution screen is located on the front of the machine. The function of this screen is to trap foreign particles from exiting the machine and plugging the orifices of the cleaning tools. This screen is part of the machine maintenance cleaning.

18. CHEMICAL CHECK VALVE

The chemical check valve allows chemicals to enter the system and travel in a singular direction to the wand. The chemical check valve prevents chemicals from traveling up-stream into the solution system of the unit.

19. WASTE OUTLET

This valve allows the waste tank to be emptied. Turning clockwise opens the valve.

20. WASTE PUMPOUT

This auxiliary pump serves to empty the waste collection tank automatically. A float located inside the tank automatically turns off and on when the solution level reaches certain points.

21. WARM WATER OUTLET

The warm water outlet allows the cleaning technician to drain hot water from the water box for mixing chemical.

⚠ CAUTION:

Water from this valve is hot.

22. WATER INLET

This quick connect allows the water supply hose to be connected to the unit.

23. PRESSURE REGULATOR

This pressure regulating valve allows the water pressure circuit to be adjusted by turning the handle clockwise the pressure will increase, by turning counter clockwise the pressure will decrease.

24. FLOW METER

The flow meter is a gauge to indicate how much liquid chemical is being introduced in the water system. The quantity can be increased by turning the chemical flow knob counter clockwise.

25. CHEMICAL PRIME CONTROL VALVE

This valve allows the chemical to circulate through the chemical system with little or no restriction. It also purges out air that may be trapped in the lines and cavities of the chemical pump. By turning the valve clockwise the injection system is enabled.

26. CHEMICAL METERING VALVE

The chemical metering valve regulates the amount of chemical that is injected into the system. Clockwise rotation of the knob closes the valve. Counter clockwise rotation opens the valve, allowing more chemical to enter the system.

27. FLOW SIMULATOR VALVE

This valve allows solution to move through the machine and chemical to be injected simulating the cleaning process. This allows the operator to set the chemical flow level without connecting tools to the machine. It is also useful in troubleshooting. The valve is turned off by rotating the knob clockwise and opened by turning the knob counter clockwise.

28. PANEL LIGHT

This light is useful if the machine is used in a poorly lit area or night use. It is helpful in reading the instruments and gauges.

29. TEMPERTURE BALANCE ORIFICE SHUTOFF VALVE

The temperature balance orifice shutoff valve allows the operator to increase solution temperature during two wand operation. This should only be closed during two wand operation.

30. TEMPERATURE BALANCE ORIFICE

The temperature balance orifice helps to balance and stabilize the solution temperature within the system.

WATER PUMPING AND HEAT TRANSFER SYSTEM

Cold water enters the console through the water inlet. When the water box is full the valve will automatically shut off.

Water then flows from the water box, through a strainer, into the water pump where it is pumped to the pressure regulator manifold where the pressure regulator provides and maintains the desired pressure setting.

The pressure regulator manifold includes a nitrogen charged accumulator which helps reduce pressure spikes from the pump.

A certain amount of water is by-passed from the pressure regulator due to over pumping capacity of the water pump. Water that is not called for in the cleaning process is channeled through a heat exchanger box into the first heater core from the front of the unit. This bypass water may circulate several times through the bypass heat exchanger allowing the water to be pre-warmed.

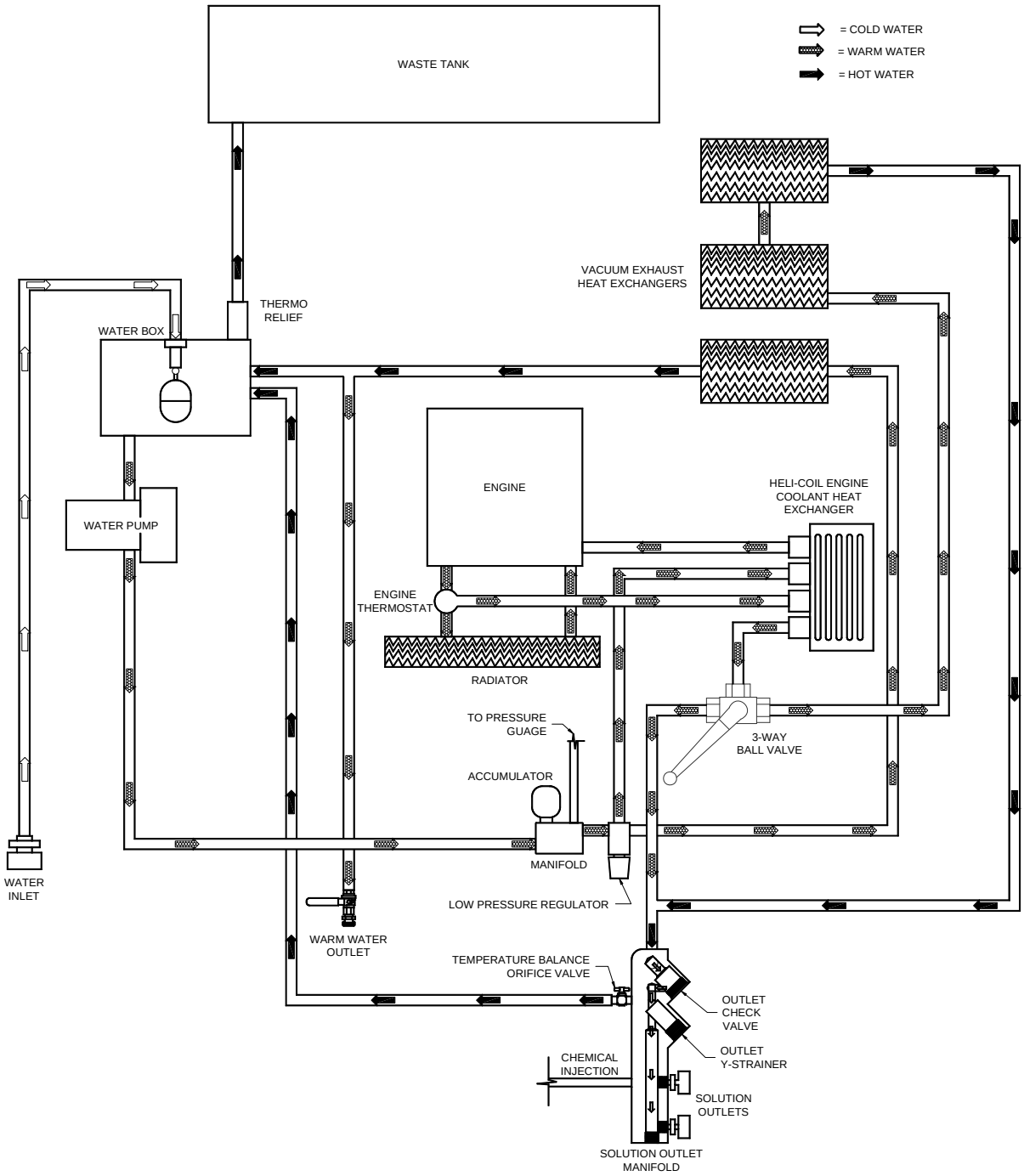
The next stage of heating and water flow is to the helicoil, when water is called for in the cleaning process it flows to the helicoil under pressure. Heat from the engine coolant is exchanged to the cleaning solution through a series of spiraled copper tubing. This allows the engine coolant to travel in a counter rotating direction to the cleaning water during the exchange process creating a very efficient transfer of heat out of the engine and into the cleaning solution.

The third stage of plumbing and heat exchange takes place in the 2nd heater core located in the heater box. This is the hottest point of the gases coming from the vac pump and the engine. These hot gases are forced through heater core #2 creating the third stage of heat transfer to the cleaning solution.

Finally, the hot solution passes to the outlet manifold where cleaning chemicals are injected from the chemical pulse pump. This manifold serves as a temperature sensing point and a connecting point for the high-pressure hoses. Also a check valve is located in this outlet manifold prohibiting chemicals from backing up into the system.

The cleaning solution then passes through high-pressure hoses and is distributed by the cleaning tool to a surface that is being cleaned, completing the water pumping and heating cycle of the cleaning unit.

SINGLE SYSTEM WATER FLOW DIAGRAM
LOW PRESSURE



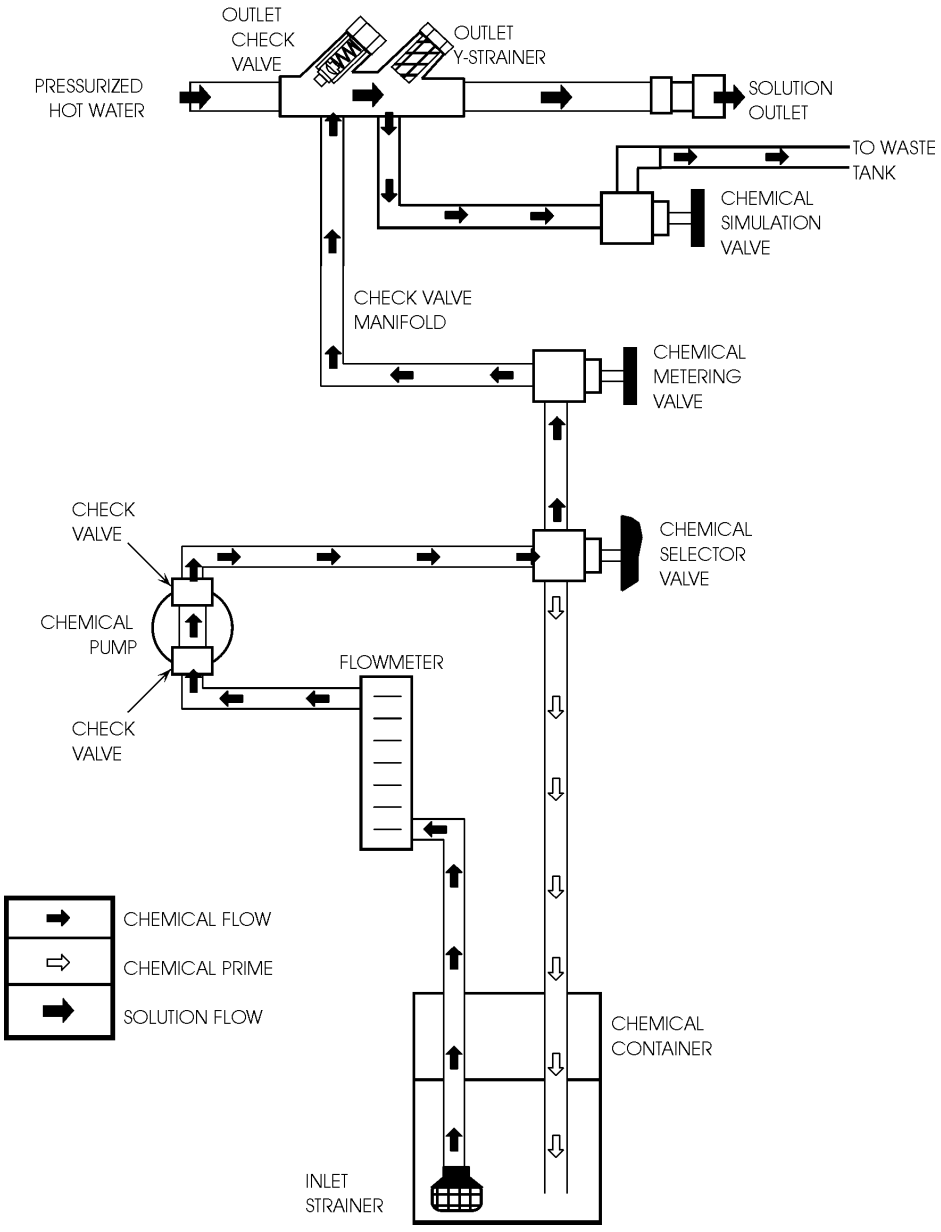
CHEMICAL INJECTION SYSTEM

The chemical injection system is unique in that it utilizes the pressure spikes generated by the high-pressure water pump to move chemical into the main pressure stream. The high pressure spikes move the diaphragm in the chemical pulse pump forcing small amounts of liquid chemical to be moved in a single direction of flow with the aid of two check valves.

The chemical is picked up from the container and fed through the flow meter to the chemical pulse pump where it is pressurized.

After reaching the chemical pulse pump the chemicals can either go into a bypass loop to purge air from the system or the chemicals can be directed by the chemical selector valve to the metering valve. The metering valve creates an orifice allowing the correct amount of chemical to enter the outlet manifold. The outlet manifold assembly is complete with a check valve that will not allow the chemicals to travel upstream into the plumbing system of the unit.

The chemicals are then mixed with hot pressurized water that make up a solution for cleaning application.

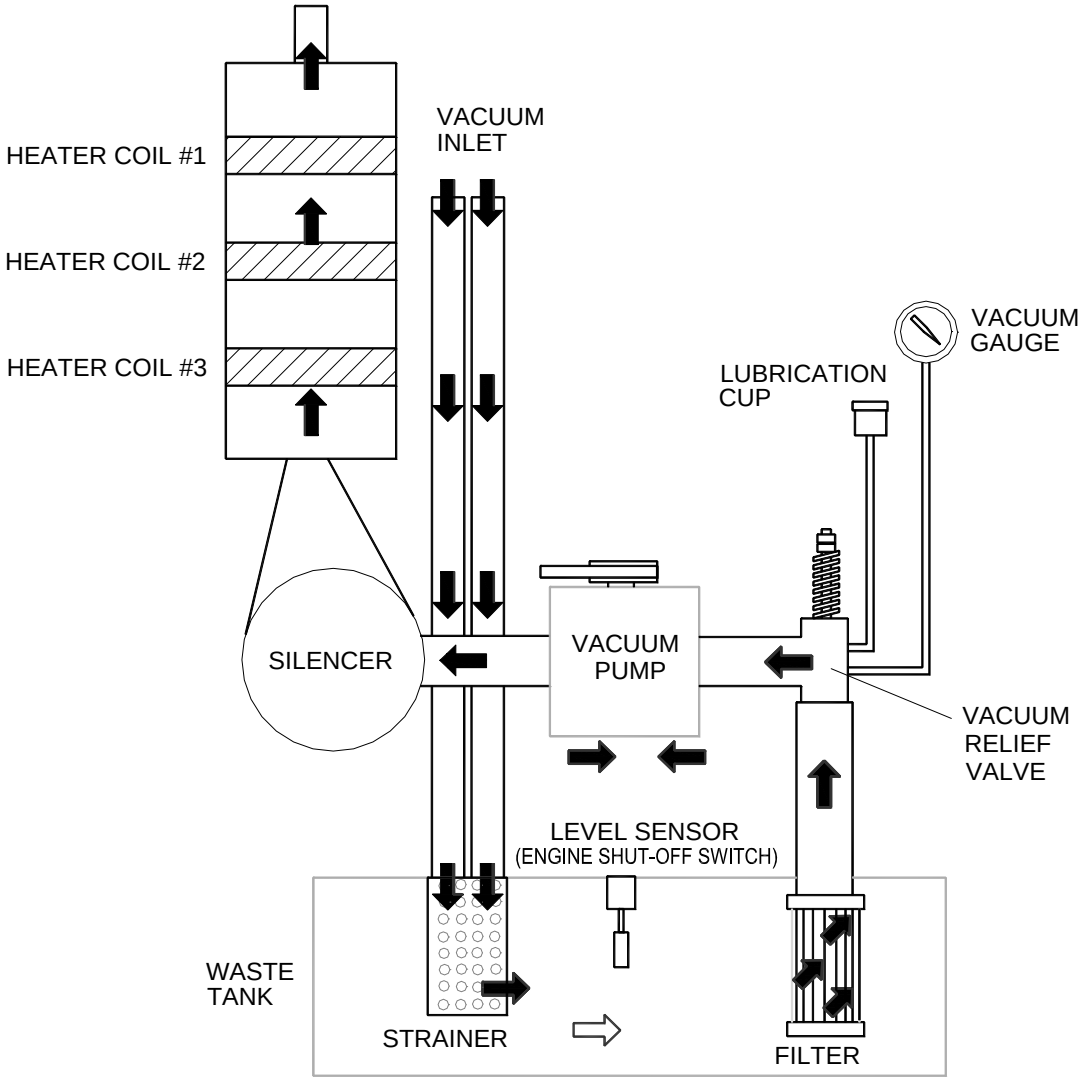


VACUUM SYSTEM

The engine turning an air pump generates vacuum. The air is channeled in one side of the vacuum pump, compressed and discharged on the opposite side, creating airflow.

The movement of air is used to do the work necessary for the extraction process. A vacuum nozzle applied to the carpet surface removes moisture, dirt and spent chemicals. These elements are conveyed back to a separating tank utilizing hoses and the force of air. Particles of moisture and dirt are separated in the vacuum tank using a series of changes in direction and velocity. The air is then filtered and rushes into the vacuum pump.

The vacuum pump compresses and heats the incoming air. The hot discharged air is forced down stream into a silencer for noise abatement. After exiting the silencer, this hot air is mixed with hot air and gases from the engine. This mixture of hot air and gases are then forced through 3 radiators serving as heat collectors. Heat from the engine and vacuum pump is then transferred into the plumbing system raising the water temperature for better cleaning.



OPERATION - DIESEL

PRE-RUN INSPECTION

NOTE: Operation of this unit is simple. However, only trained personnel should proceed.

⚠ WARNING:

Operate this unit and equipment only in a well-ventilated area. Exhaust fumes contain carbon monoxide which is an odorless and deadly poison that can cause severe injury or fatality. DO NOT operate this unit where the exhaust may enter any building doorway, window, vent, or opening of any type.

CHECK FOR ADEQUATE FUEL

Check the fuel tank to be certain there is adequate fuel to complete the job. This unit uses approximately .95 to 1.18 gallons of fuel per hour, depending on the speed setting.

REMOVE TOOLS FROM VEHICLE

Remove any **tools** or **hoses** from the van which you will require.

WATER SUPPLY CONNECTION

NOTE: Before connecting your water hose to the supply faucet, flush out the faucet until the water is free of any debris. Flush out any debris which may be in your water inlet hose.

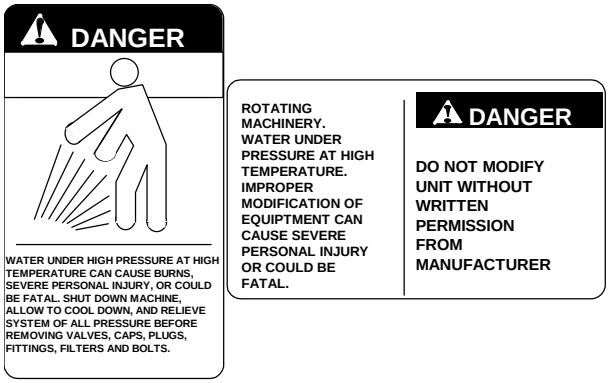
1. Connect the **water supply hose** to the **water inlet** quick-connect at the left front of the console. Connect the hose to the water supply faucet.

NOTE: Never use your waste pump outlet hose as a water inlet hose. Use only clean hoses for water inlet.

2. Turn the **water supply faucet** on. The water will fill the **water box**.

HIGH PRESSURE HOSE

Before starting the unit, connect the **pressure hose(s)** to the **outlet connection(s)** at the front of the unit. Connect the **cleaning tool(s)** to the **pressure hose(s)**.



VACUUM HOSE

Connect the **vacuum hose(s)** to the **vacuum inlet** connection(s) at the front of the unit. Connect the other end of the **vacuum hose(s)** to the **cleaning tool(s)**.

PRIMING THE CHEMICAL PUMP

1. Connect water hose to water inlet connection and turn on water supply.

2. Connect cleaning and vacuum hoses to the desired cleaning tool and console.

3. Insert chemical inlet and prime tubing into chemical container.

4. Turn ignition switch counterclockwise until glow plug light goes off. Turn solution pump switch to override, and turn ignition key clockwise to start.

5. Set throttle to low speed.

6. Fill chemical container and inspect chemical filter.

7. Turn chemical prime valve to prime and allow chemical to circulate. After all air bubbles have been removed from chemical tubing, turn the valve to the horizontal (off) position and open the chemical metering valve, and the simulation valve. Set the desired chemical flow rate while observing the flow meter indicator. Simulator valve must be in the open position to set chemical flow. When desired flow is reached turn simulator valve off.

8. Set throttle to maximum position with vacuum ports blocked off for improved unit heat up.

WASTE PUMP (OPTIONAL)

1. If your unit is equipped with an automatic waste pump, connect one end of a garden hose to the pump-out connection on the console and the other end to an appropriate waste disposal.

2. Turn the pump-out switch on the control panel to the ON position. The waste pump will operate automatically throughout the cleaning operation.

We recommend that you use a 3/4" I.D. water hose as a waste pump outlet hose. DO NOT use a hose smaller than 5/8" I.D.

NEVER use your automatic waste pump outlet hose as a water inlet hose.

⚠ WARNING:

NEVER dispose of waste in storm drains, water ways, or on ground areas. Always dispose of waste in accordance with Local, State, and Federal laws.

Once you have completed steps 1 through 8, proceed with the cleaning operation. Your unit should be in the correct throttle position for your cleaning operation or extracting. A float switch located inside the waste tank will automatically shut down the unit when it reaches its full capacity. When this occurs, empty the waste tank before continuing.

CLEANING

Observe the following guidelines, while cleaning:

1. Before proceeding make sure the nozzles are functioning properly.

a. To check , hold the wand about one foot above the surface to be cleaned and open the wand valve. A full spray should be observed from the cleaning nozzles.

b. If the nozzles are not showing a full spray pattern, adjust nozzles for proper pattern, clean, or replace nozzles, if required.

2. Normally chemical is applied on the push stoke of the wand when cleaning and vacuuming is done on the pull stroke. For heavily soiled carpets the wand may be used in a scrubbing manner, apply chemical in both push and pull strokes. Always finish up an area with a vacuum stroke.

3. When cleaning, keep the working opening (mouth) flat on the surface being cleaned. Keep the wand moving when the valve is open.

4. The unit will automatically shut-down when the waste tank is full. This will prevent water being drawn into the vacuum pump. If shut-down occurs, empty the waste tank before proceeding.

UPHOLSTERY CLEANING

Upholstery tool, part #86285260 – PRV NO.78513

1. Set temperature as desired and slow down the engine speed to minimize excess heat.

2. Use one (1) “80015” spray tip in tool.

SHUTDOWN AND DAILY MAINTENANCE

1. Close chemical metering valve.

2. Allow the unit to run for 2 minutes with the vacuum hose disconnected to remove moisture. Spray WD40 (or equivalent) into the vacuum lubrication cup for 5 seconds. This will prevent corrosion due to moisture.

3. Set engine throttle at idle position and allow the water temperature to cool down, unitizing the simulator valve in the open position to bleed off residual hot water left in the system.

4. Turn off ignition switch.

5. Disconnect all hoses and tools.

6. Drain waste tank.

PERSONAL PROTECTIVE EQUIPMENT

Ensure that proper Personal Protective Equipment (PPE) is used during the operation of

⚠ CAUTION:

this equipment. Failure to use proper PPE could result in injury. Ensure required ventilation and/or breathing apparatuses are used with a chemical injection system. Check with your chemical vendor for proper safety requirements.

DE-FLOODING OPERATIONS

De-flooding operations involve removal of water from carpet and flooring. This differs from normal cleaning operations in that no water or solution is required. An automatic waste pump-out is highly recommended for all de-flooding operations due to the large amount of water removal often required.

1. Move the temperature selection valve from the “hot” position to the “warm” position.

2. Adjust pressure regulator to set pressure at 100 psi.

3. Turn temperature balance orifice valve to open.

4. Allow solution temperature to cool below 160 deg F.

5. Begin de-flooding operation.

FREEZING PROTECTON

⚠ CAUTION:

If the unit is exposed to freezing weather the water in the unit may freeze, causing SERIOUS DAMAGE to the unit. To avoid this, the following is recommended during the cold weather season.

When the unit is not in use, always park it in a heated building.

While in operation, avoid long shutdowns as the unit provides heat while running. Shut it down just prior to leaving for the next job.

If a heated building is not available, we recommend that you winterize the unit with anti-freeze. At present, it is only possible to winterize units, which do not have an auxiliary water tank. Units with auxiliary water tanks must be stored in a heated building when not in use.

WINTERIZING YOUR UNIT

1. Shut off the water supply. Disconnect the **water inlet hose** from the front of your console.

2. Connect all **high pressure hoses and tools** that may have water in them.

3. Start the unit and turn water pump on. Open the tool valve until water pressure drops and water stops flowing.

4. Fill the water box with approximately two gallons of 100% glycol base anti-freeze.

5. Turn the **solution pump override switch** to the override position and start the unit. Turn the **solution pump switch** ON.

6. Open the tool valve until anti-freeze begins to come out of the tool. Recover **ALL** anti-freeze that comes out of the tools into an approved container. We strongly recommend that you re-cycle and re-use the anti-freeze.

Repeat this procedure with all the remaining tools. After all tools and pressure hoses have been filled with anti-freeze, disconnect and store them.

7. Turn the **solution pump switch** OFF. Attach the **winterizing loop hose** with attachment, Part #86260700 – PRV NO. 10-805380, to the solution outlet connection and the water inlet connection. Turn the **solution pump switch** ON.

Allow the unit to run for approximately 3 minutes with the winterizing loop hose attached.

8. Prime the chemical system with 50/50 anti-freeze/water mix. Insert the chemical inlet and prime discharge tubes into the anti-freeze container. Turn the chemical valve to PRIME until anti-freeze begins to flow out of the prime hose.

9. Now turn the chemical valve and flow simulator valves to the open position, making certain that the flow meter indicates flow and that all anti-freeze drains out of the chemical hose into an approved container, after 30 seconds, turn off both valves.

After completing these procedures, shut the unit down. The unit is now winterized.

REMOVING ANTI-FREEZE FROM THE UNIT

1. Connect one end of the **winterizing loop hose** to the solution outlet connection. Place the other end of the loop hose, without the attachment, into an approved container.

2. Start the unit. Allow the anti-freeze to flow into the container until flow stops.

3. Fill the water box with fresh water and repeat step #2.

4. Connect the **water inlet hose** to the water inlet connection on the console. Turn the water supply on.

5. Connect all **solution hoses and any tools** which require purging of anti-freeze to the solution outlet connection(s).

6. Open the tool valves and drain the anti-freeze into an approved container until the flow is clear and all anti-freeze is purged from the tools and hoses.

7. Place the chemical prime hose into the approved container. Submerge the chemical inlet hose in water. Turn the **chemical valve** to the PRIME position until clear water comes through the prime hose, and then remove the prime hose from the container.

   Turn the **chemical valve** to the ON (CHEMICAL) position. This will allow water to flow into the other side of the system.

   Once all of the anti-freeze is removed, the unit is ready to use.

   Eventually, the anti-freeze in your storage container will become diluted with water. If the anti-freeze level drops below 50% of the total, dispose of it and start with fresh 100% anti-freeze.

⚠ WARNING:

When disposing of used anti-freeze, observe local laws and regulations. Do not drain onto the ground or into storm drainage systems

SERVICE SCHEDULE

Engine	Daily	Check engine oil level. *** Fill to proper level
Engine	Daily	Check coolant level in overflow bottle
Vacuum Pump	Daily	Spray WD-40 in lubrication cup at front of console for 5 sec.
Water Pump	Daily	Check oil level.** Fill to proper level
Solution Inlet Tube Strainer	Daily	Check strainer for blockage, remove any debris
Vacuum Inlet Filter (In Waste Tank)	Daily	Clean filter, inspect, replace if damaged
Vacuum Hoses	Daily	Wash out with clean water
Automatic Waste Pump	Daily	Inspect and remove any debris or sediment
Chemical Filter	Daily	Inspect daily
Vacuum Pump	Daily	Check oil level. Fill to proper level
Water Box Float Valve	Weekly	Check for proper seating and shut-off
Water Pump Inlet Filter	Weekly*	Check for debris and clean
Battery	Weekly*	Check for proper fluid level. Fill with distilled water only
Solution Outlet Y-Strainer	Weekly*	Inspect and remove any debris or blockage
Temperature Balance Orifice	Weekly	Remove, check, and clean
Heater Cores	100 hrs	Check and clean
High Pressure Hoses	100 hrs	Inspect for damage or impending damage
Pressure Regulators	100 hrs	Lubricate o-rings
Engine	100 hrs	Change engine oil***
Engine	100 hrs	Check fan belt tightness
Battery	100 hrs*	Clean battery terminals
Engine	200 hrs	Change oil filter***
Float Valve Seal	200 hrs	Replace seal
Engine	200 hrs	Service air cleaner elements*
Engine	200 hrs	Check radiator hoses and clamp tightness
Fuel Pump	200 hrs	Check hose connections
Flow Simulator And Chemical Valves	200 hrs	Inspect and/or adjust packing nuts

* Or as often as required
** Change water pump crankcase oil after the first 50 hours
***Change engine crankcase oil and filter after the first 50 hours
****Perform drive belt, pulley and hub maintenance after the first 25 hours of operation, and then again at 100 hours
*****If using AEON PD synthetic lubricant, 4500 hours or every 2 years, whichever comes first

SERVICE SCHEDULE

Water Pump	500 hrs	Change oil**
Pulley Set Screws & Hub Cap Screws	500 hrs	Check for proper torque valves. Re-torque, if required****
Drive Pulley	500 hrs	Inspect, clean and check for pulley groove wear****
Drive Pulley	500 hrs	Check pulley alignment****
Drive Belts	500 hrs	Inspect and clean****
Drive Belts	500 hrs	Check belt tension****
Chemical Pump & Check Valves	500 hrs	Replace diaphragm and check valves.
Check Valve (Solution Outlet)	1000 hrs	Inspect, clean, and repair, if needed.
Vacuum Pump	1500 hrs	Drain, flush, and replace oil *****
Engine	Yearly	Flush radiator and change engine coolant.
Engine	Yearly*	Replace air cleaner element.
Nitrogen Accumulator	Yearly*	Replace Accumulator.
Waste Tank Filters/Strainers	Yearly	Check for damage and blockage. Replace if needed.
Engine	2 years	Replace radiator hoses and hose clamps.
Battery	2 years	Replace.

* Or as often as required
** Change water pump crankcase oil after the first 50 hours
***Change engine crankcase oil and filter after the first 50 hours
****Perform drive belt, pulley and hub maintenance after the first 25 hours of operation, and then again at 100 hours
*****If using AEON PD synthetic lubricant, 4500 hours or every 2 years, whichever comes first

KEY CHECKPOINTS

NOTE: Initiation of a planned preventative maintenance program will assure that your unit has optimum performance, a long operating life, and a minimal amount of "down" time.

ENGINE COOLANT SYSTEM (RADIATOR) MAINTENANCE

Your engine radiator coolant system is an important part of the power plant operation. In addition, this heat exchange system is used to provide heat for cleaning operations is also highly dependent on the engine coolant system. Follow the recommended coolant system maintenance in the Maintenance Schedule in this manual and your engine owner's manual. Refer any additional questions to your dealer.

EXTERNAL FUEL PUMP MAINTENANCE

The power plant for unit receives fuel from the main fuel tank of your van/truck. An external fuel pump that provides this fuel is located on the underside of the van/truck. Loose fittings and hose connections will cause your unit to perform poorly. Follow the recommended fuel pump maintenance in the Maintenance Schedule in this manual. Refer any additional questions to your dealer.

SOLUTION SUPPLY SYSTEM MAINTENANCE

The chemical supply system pulls chemicals from your chemical bottle utilizing a pump that works off the water pump pulsing. Any clogged filters or loose connections will result in a chemical supply system malfunction or a malfunction at the cleaning tool. Maintenance of the solution outlet check valve and strainer are vital to effective cleaning operation and minimal unit downtime. Additionally, the hoses related to supplying water and chemical to the outlet manifold are under high pressures and experience thermal expansion and contraction. Periodic inspections of these hoses for tears, cracks, and failing connectors are necessary to avoid unwanted leaks. To keep your solution supply system functioning properly, follow the chemical pump and solution outlet maintenance in the Maintenance Schedule in this manual. Refer any additional questions to your dealer.

HEAT EXCHANGER SYSTEM MAINTENANCE

The heat exchange system in your unit transfers energy between the unwanted heat of the power plant and the solution supply system of the unit. The heat transfer of this system is highly dependent on the surface area contact in the heat exchanger cores located in the heat exchanger box. This surface area amount is adversely minimized when the supplied water is not softened to recommended levels. Hard water will result in scaling on the inside walls of the heat exchanger tubes. It is recommended that you use a dealer approved water softener to avoid premature heat exchanger core failure. Contact your local dealer for advice on the water hardness levels in your area.

Additionally, the heat exchanger tubes are very sensitive to freezing conditions. As the water freezes during cold conditions, it expands in the heat exchanger tubes and causes damage. Often the tubes are cracked and require the replacement of the heat exchanger core. Refer to the Freeze Protection instructions section in this manual. Refer any additional questions to your dealer.

Proper heat exchanger core cleaning is vital to maintaining high performance operation. Diesel exhaust residue can quickly build up on the exterior of heat exchanger cores. Ensure you follow the service schedule requirements for cleaning.

VACUUM PUMP MAINTENANCE

The total function of the unit is based around the performance of the vacuum pump. Heat transfer used to raise the temperature of the solution is gained from the air drawn by the vacuum pump and solution is removed from the carpet with the vacuum suction of the vacuum pump. General maintenance actions for the vacuum pump as listed in this manual are vital to prolonged vacuum pump operations. Daily lubrication of the pump is required to avoid seizure of the system. Also, waste tank filters and strainers must be maintained to prevent unwanted debris from entering the vacuum pump.

MAINTENANCE - DIESEL

⚠ WARNING:

DO NOT service this unit while it is running. The high-speed mechanical parts as well as high temperature components may result in severe injury, severed limbs, or fatality.

NOTE: Use the hour meter as a guide for coordinating the maintenance schedule.

ENGINE

1. Check the engine oil level **daily**, when in use. Make certain that proper oil level is maintained. **NEVER** overfill.

2. Change the break-in oil after the first **50 hours** of operation. Thereafter, change oil every **100 hours** of operation. USE ONLY KUBOTA BRAND OIL FILTERS. USING ANY OTHER TYPE OIL FILTER WILL VOID YOUR ENGINE WARRANTY.

Oil Recommendation. Use high-quality 15-40 detergent oil of at least API (American Petroleum Institute) service class CD or higher.

Changing interval of engine oil and oil filter cartridge.

D902-E	Engine Oil	50 Hrs (Initial)
		100 Hrs
	Oil Filter Cartridge	200 Hrs

Lubricating Oil
With the emission control now in effect, the CR-4 and CG-4 lubricating oils have been developed for the use of a low-sulfur fuel. If the CF-4 or CG-4 lubricating oil is used with a high-sulfur fuel, change the lubricating oil at shorter intervals.

API service classification: above CD grade.
Ambient temperature: below 35°C (95°F).

3. Re-torque the manifold and exhaust tube nuts, cylinder head bolts after the **first 200 hours** of use.

4. Clean the air cleaner element every **200 hours**. Replace the element yearly.

5. Check the engine idle RPM every **200 hours** and adjust, if necessary. **NEVER** adjust engine RPM without a tachometer. Refer to Kubota Engine Operation and Service Manual.

6. Check the coolant level in the radiator overflow container **daily**. If no coolant is seen, remove the cap and add coolant. Change the coolant with a 50/50 coolant to water ratio every **1000 hours**.

7. Replace the in-line fuel filter **yearly**.

NOTE: For additional engine service information, obtain a "Kubota Service and Repair Manual" from any authorized Kubota Service Center. If service or repair is required, contact an authorized Kubota Service Center. You will need to provide the serial number of the engine.

VACUUM PUMP

Refer to the Vacuum Pump Operation and Service Manual for specific instructions.

Lubrication: We recommend that you use AEON PD Synthetic Blower Lubricant in the vacuum pump for all operating temperatures. AEON PD is formulated especially for positive displacement blower service to provide maximum blower protection at any temperature. One filling of AEON PD will last a minimum of 3 times longer than a premium mineral oil.

NOTE: AEON PD (Part #86189090 PRV NO. 05-008039) is the oil which PROCHEM puts in the vacuum pump at the factory. Topping off or adding petroleum oil to synthetic oil is NOT recommended.

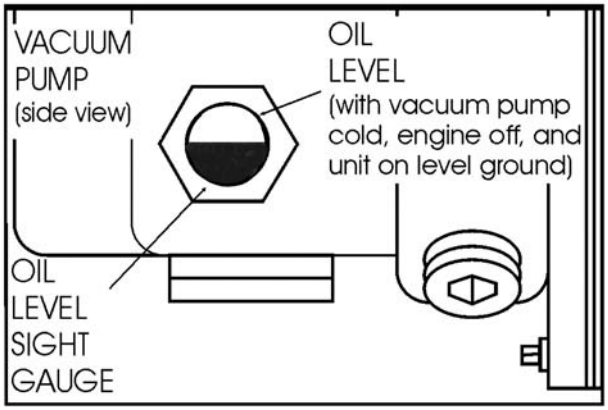
If not using AEON PD synthetic blower lubricant, use oils with rust and oxidation inhibitors, anti-foam additives and the viscosity's listed on the chart on the next page.

1. Check the oil level **daily** to assure the proper level. **PROPER LEVEL** cannot be overemphasized. Too little oil will ruin bearings and gears. Too much oil will cause overheating. Use the illustration as a guide when adding oil.

2. To prevent rust from building up inside the vacuum pump (if moisture exists) we have provided a lubrication cup on the front of the unit.

   First run the unit at least **1 minute** to remove any moisture from the vacuum pump. Next, fill the lubrication cup with WD-40, or a similar lubricant, for **5 seconds** while the unit is running and the vacuum inlets are sealed. Do this at the end of **each working day**.

3. Drain, flush and replace oil **every 1500 hours or yearly, whichever comes first.** Change oil more frequently if inspection so indicates. With AEON PD synthetic lubricant, perform the oil change maintenance **every 4500 hours or every 2 years, whichever comes first.**

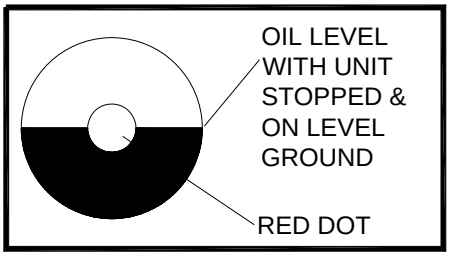


WATER PUMP

Refer to the Water Pump Operation and Service Manual for specific instructions.

1. Check the crankcase oil level **daily** to assure the proper level. Use the illustration as a guide when checking the oil level. If the level has dropped, check for the source of leakage and repair.

2. Use the dipstick or sightglass to check oil level daily. Oil level should be between marks on the dipstick or centered in sightglass.



3. Change the crankcase oil after the **first 50 hours** of operation. Drain and refill the crankcase oil **every 500** hours thereafter.

4. Other approved oil SAE 15W-40 equivalents are: Mobil and Shell Super, Castrol CWX, Helix Super, and Tellus 100.

VACUUM INLET FILTER (IN WASTE TANK)

1. The vacuum filter in the waste tank should be removed and cleaned **daily**. If this is done, the filter will last for a long period of time.

VACUUM RELIEF VALVE

While the unit is running at full RPM, block the air flow at the vacuum inlet connection and read the vacuum gauge. If adjustment is required, shut the unit down and adjust the vacuum relief valve locking nut tension. Start your unit and read the vacuum gauge. Repeat this process until the relief valve opens at 13" Hg.

VACUUM PUMP DRIVE BELTS

To tighten the vacuum pump belts:

1. Loosen the four screws which hold the vacuum pump mount in place.

2. Loosen the 6 nuts at the vacuum muffler outlet to heat exchanger box and loosen the bolt at the back of the machine connecting the muffler bracket to the frame.

3. Turn the adjusting bolts until the proper belt tension is achieved (1/2” deflection in the center of the belt, halfway between the pulleys).

4. Retighten all bolts previously loosened at the vacuum muffler.

N*OTE: When adjusting belt tension, make certain that the engine shaft and vacuum pump shaft remain parallel, and the belt tension is equal throughout the belt width.*

5. After adjusting, re-tighten the four screws which hold the vacuum pump mount in position. Check belt alignment with straight-edge.

⚠ CAUTION:

Make certain that when you re-torque these screws, that you use a clockwise pattern and continue until proper torque is achieved.

Torque values		
Component	Inch/lbs	Foot/lbs
Rear Engine Pulley	480	40
Front Engine Pulley	300	25

6. Check for pulley groove wear, clean belts and pulley grooves, check for worn belts, proper belt tension, and pulley alignment after the **first 25 hours** and then again at **100 hours**.
Check for belt ride in the groove.

WATER PUMP DRIVE BELT

To tighten the water pump belt:

1. Loosen the nuts which hold the water pump mount to base.

2. Adjust the position of the belt tension adjusting bolt until the proper belt tension is achieved. (1/2" deflection in the center of the belt, halfway between the pulleys).

3. While checking the alignment, tighten the nuts which hold the water pump mount to base.

FLOAT VALVE (WATER BOX)

The float valve should only be adjusted if the water box is overflowing or the water level in the box is lower than 5-1/2".

1. If the box is overflowing, remove, and check the float valve for debris or damage.

NOTE: If the float ball has any water inside it must be replaced.

⚠ CAUTION:

When replacing float ball, DO NOT over- tighten, as the rod can puncture the ball. Make sure to tighten the nuts on the rod.

2. Disassemble the valve and check the piston and seat for damage, replace if needed. See the “Illustrated Parts Listing” for a parts break-down.

WASTE TANK STRAINER BASKET

The strainer basket located inside the waste tank should be removed and cleaned whenever it is full of debris. This should be done on at the end of each job.

Y-STRAINER (OUTLET)

Inspect the Y-strainer **after the first week** of running the unit by unscrewing the screen and remove any accumulated debris. Inspect the strainer again at **2** and **4 weeks.**

The Y-strainer should then be inspected **every month.** However, if the Y-strainer has a frequent build-up of debris it should be inspected and cleaned more often.

CHECK VALVE (OUTLET)

Inspect the check valve when rebuilding the chemical pump or as needed. Remove and disassemble the check valve. Check the Teflon seat for debris or abnormal wear. Clean or replace seat if needed.

NOTE: Improper seating of the check valve poppet, damaged spring, or o-rings will cause poor operation of the chemical system.

For the procedure, see the "General Service Adjustments” section in this manual for details.

CHEMICAL PUMP

Rebuild the chemical pump **every 500 hours**. This involves changing the diaphragm and check valves.

For the procedure, see the "Chemical Pump” section in this manual for details.

NOTE: Inspect chemical filter daily.

CHEMICAL AND SIMULATOR VALVE

Examine the packing nut on the chemical selector valve, heat bypass valve, and chemical metering valve **every 200 hours.** Keeping these valve packings properly adjusted will eliminate possible leakage from the valve stems and add to overall valve life.

For the procedure, see the "General Service Adjustments” section in this manual for details.

NITROGEN ACCUMULATOR

The nitrogen accumulator is pressurized to 250 PSI and must be replaced periodically. The accumulator cannot be repaired or recharged. We recommend replacement every 1000 hours of use.

PRESSURE REGULATOR

Lubricate the o-rings **every 50 hours.** Use o-ring lubricant Part #86265430 – PRV NO. 05-008035.

For the procedure, see the "General Service Adjustments" section in this manual for details.

VACUUM HOSES

To assure maximum hose life, we recommend that the hoses be washed out with clean water at the end of each **working day**.

HIGH PRESSURE HOSES

Inspect your high pressure hoses for wear after the **first 100 hours** of use. Inspect **every 25 hours thereafter**. If hoses show any signs of damage or impending rupture, **replace the hose**.

⚠ WARNING:

DO NOT attempt to repair high pressure hoses! Repairing high pressure hoses may result in severe burns and serious injury!

All high pressure hoses must be rated for 3000 PSI at 250°F. Thermoplastic hoses do not meet these specifications and should not be used. Severe burns and injury may result if the hoses do not meet these requirements.

OPTIONAL WASTE PUMP-OUT

At the end of each work day, make certain that you remove any debris or sediment which may be inside the waste pump by pumping fresh water through the pump.

TEMPERATURE BALANCE ORIFICE

Weekly maintenance of the temperature balance orifice is required for proper machine operation.

1. Unscrew nozzle cap from the connector body.
2. Remove the adapter, orifice plate, and strainer.
3. Clean any debris from the strainer and orifice plate.
4. Reassemble as shown in Parts Section - Solution Outlet.

ENGINE COOLANT REPLACEMENT

Annually the coolant in the Prochem machine should be replaced. This coolant is an integral part of the heating system and needs to be maintained as any other working part of the system. We recommend that this procedure be accomplished by the following steps. Be sure unit is off and engine is cool.

DRAINING COOLANT:

1. Insert a 1/4" plastic hose into the radiator drain petcock. Turn counterclockwise to open and drain coolant. After draining approximately 1/2 gallon, open bleed petcock in heli-coil to assure that heli-coil drains also. Allow the coolant to completely drain. Also drain engine block from under the governor.

NOTE: Be sure that used coolant is collected in a proper container and disposed of in accordance with local laws.

2. After draining is complete, close all the engine, radiator and heli-coil petcocks. Draining is complete.

REPLACING COOLANT:

1. Fill radiator with 50/50 anti-freeze/water mix.
2. Start unit and run at idle.
3. As the unit warms up, maintain a full radiator with a 50/50 mix.
4. Open petcock slightly on heli-coil to allow any trapped air to escape. When coolant runs out of heli-coil, close petcock.
5. Fill radiator with 50/50 coolant mix.
6. Re-install radiator cap.
7. Shutdown unit.

Check radiator overflow bottle. Add coolant to proper "cold" level.

GENERAL SERVICE ADJUSTMENTS

⚠ WARNING:

USE EXTREME CAUTION while servicing while machine is running. The high-speed mechanical parts as well as high temperature components may result in severe injury, severed limbs, or fatality.

ENGINE SPEED

1. This unit uses a governor to set and maintain engine speed. The engine speed is adjusted by pulling the throttle cable out to maximum travel for high speed operation. For lower temperature or vacuum setting, rotate knob clockwise two turns or as needed to obtain desired temperature and vacuum settings.

⚠ CAUTION:

DO NOT attempt to adjust without a tachometer and NEVER adjust the engine above 2850 RPM (No Load). Permanent damage may occur.

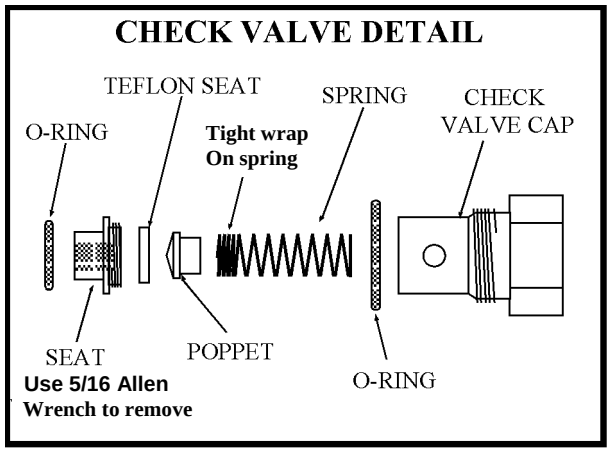
HIGH ALTITUDE OPERATIONS

CONSULT YOUR LOCAL KUBOTA DEALER FOR FURTHER INFORMATION ON THIS PROCEDURE.

CHECK VALVE (SOLUTION OUTLET)

Inspect the check valve whenever doing service on the chemical pump or if flow problems occur in the chemical system:

1. Remove the check valve. Be sure the small o-ring for the seat comes out with the check valve.
2. Remove the seat, using a 5/16" Allen wrench.
3. Check the Teflon seat for debris or wear. Clean or replace Teflon seat if needed.
4. Clean the poppet and spring, inspect for wear or damage, and replace as needed.
5. Re-assemble the check valve. Start the seat by hand, tighten using a 5/16" Allen wrench. **DO NOT** over-tighten seat.



NOTE: Improper seating of the check valve poppet, damaged spring or o-rings will cause poor operation of the chemical system.

6. Lubricate the o-rings with o-ring lubricant Part #86265430 – PRV NO. 05-008035 and reinstall.

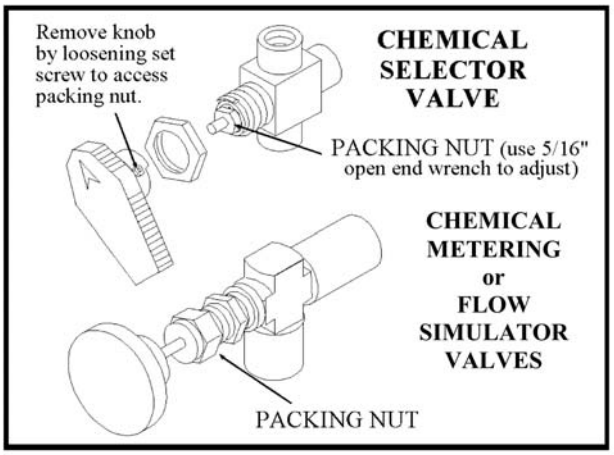
CHEMICAL PUMP

The only repairs which the chemical pump may require is the replacement of the diaphragm or check valves. To replace the diaphragm, unscrew the cover from the body. When replacing the diaphragm, lubricate the outer edges of the diaphragm with o-ring lubricant Part #86265430 – PRV NO. 05-008035 and reassemble. To replace the check valves, unscrew the check valve caps. Replace the check valves and reassemble, using new o-rings.

DO NOT attempt to re-use o-rings once the check valves have been removed. See the “Illustrated Parts Listing” for a parts break-down on the chemical pump.

PACKING NUT ADJUSTMENT FOR CHEMICAL METERING AND CHEMICAL SELECTOR VALVES

Examine the packing nut on the chemical metering, flow simulator, and chemical selector valves for proper tension every **200 hours**. When turning the knob, there should be a small amount of resistance. If not, slightly tighten the packing nut. **DO NOT** over-tighten. Keeping the valve packings properly adjusted will eliminate possible leakage from the valve stems and add to overall valve life.



PRESSURE REGULATOR

The pressure regulator serves only to hold locked up water pressure at a preset point and to bypass this water back to the water box.

PRESSURE REGULATOR

To adjust:

1. With your unit running, close the cleaning tool. Check the pressure gauge. Open the tool valve. We recommend setting the pressure regulator so that the pressure gauge reads 350 PSI with the tool valve **open**.

When the tool valve is opened, there is an approximate drop of 100 PSI in pressure. **If there is a pressure drop greater than 100 PSI, it may be necessary to lubricate the o-rings in the pressure regulator.**

2. If the pressure regulator requires adjustment, turn the adjusting knob (while observing the pressure gauge on the control panel) until the desired pressure is obtained.

ADDING/DRAINING ENGINE COOLANT

Use a 50/50 coolant to water ratio in this unit's cooling system. **NOTE:** See the "Maintenance Chart" for specific details.

1. To drain the coolant, remove the radiator cap and turn the lower engine radiator draincock counter-clockwise.

TROUBLESHOOTING - DIESEL

PROBLEM	CAUSE	SOLUTION
Loss of water pump pressure. With the cleaning tool open, the water pressure gauge reads below the normal operating pressure.	Water supply is turned off or the float valve is stuck or improperly adjusted.	Turn the water supply on or up. Check for kinks in the water supply hose. Examine the float valve and adjust or replace.
	Water pump inlet supply line is plugged or drawing air.	Examine the water inlet filter inside the water box. Remove accumulated debris and replace if required. Check for suction leaks and loose clamps or fittings. Tighten any loose fittings or clamps. Replace any ruptured hose(s).
	Improper engine speed	Using a tachometer, check the engine speed. Full throttle engine speed is 2850 RPM. Refer to the “engine Speed” section for instructions on how to re-adjust.
	Pressure regulator o-rings are dry.	Lubricate o-rings, using o-ring lubricant Part #86265430 – PRV NO. 05-008035.
	Pressure regulator has worn o-rings	Check o-rings. If necessary, replace.
	Pressure regulator is dirty, stuck open, or improperly adjusted.	Clean or repair regulator. Adjust to working pressure. Lubricate o-rings, using o-ring lubricant Part #86265430 – PRV NO. 05-008035.
	Low pump volume. (Measure the amount of water being returned to the water box from the pressure regulator. It should fill a gallon container about every 17 seconds).	Examine the check valves, plunger cups, and cylinder head on the water pump. Repair, whenever required (refer to the water pump service manual).
	Defective water pressure gauge.	Replace gauge
	Orifice (spray nozzle) in the cleaning tool is worn, defective, or wrong size.	Replace Nozzle or change nozzle size.
	Debris clogging water lines or water inlet disconnect.	Clean or replace as needed.
	Belts loose or broken	Re-tension or replace as needed.
Loss of solution volume at cleaning tool orifice. Water gauge reads normal.	Plugged orifice and/or screen in the cleaning tool.	Unplug or replace orifice and/or screen
	Internal block between the pressure regulator manifold and the outlet Y-strainer, or the Y-strainer screen is clogged	Inspect all lines, remove accumulated debris which is blocking proper flow. Replace any defective hoses. Remove, inspect, and clean the Y-strainer screen. De-scale unit and install a water softener, if necessary.
	Outlet check valve is plugged	Examine the check valve, remove any debris
	Defective quick-connect on one or more of the high pressure hoses.	Replace defective quick-connects(s) on high pressure hoses(s).
	Cleaning tool valve is malfunctioning.	Repair or replace valve.
	Hose inner lining is constricted.	Remove restriction or replace hose.

PROBLEM	CAUSE	SOLUTION
Loss of vacuum While cleaning, the vacuum is not up to specification. Engine RPM is normal.	Vacuum gauge is giving an improper reading.	Examine the tubing between the vacuum relief valve and the vacuum gauge and remove any blockage. Ensure vent hole is present in black plug.
	Vacuum hose(s) is damaged, causing a suction leak.	Inspect hose(s), repair or replace.
	Waste tank gaskets not sealing properly, not positioned properly	Inspect the gasket. Repair seal or replace Re-position lid(s).
	Plugged vacuum hose or vacuum plumbing between vacuum inlet and strainer basket.	Unplug vacuum hose or inlet plumbing.
	Waste tank filter or strainer basket is plugged.	Clean or replace filter. Clean strainer basket.
	Loose vacuum pump drive belts.	Tighten the drive belts
	Waste tank drain valve is damaged or left open, causing a vacuum leak.	Drain the waste tank. Close drain valve, if open. Remove the dump valve and, after inspecting, replace the defective components.
	Vacuum relief valve requires adjustment or has a vacuum leak due to damaged diaphragm.	Re-adjust the vacuum relief valve. If the vacuum does not increase, remove and inspect the relief valve diaphragm. If damaged, replace
	Vacuum exhaust heat exchangers are plugged with lint.	Remove and clean.
	Vacuum pump is worn out.	Replace the vacuum pump.
Loss of chemical With the cleaning tool valve open, no chemical	Chemical pump is improperly primed.	Refer to chemical pump priming instructions.
	The strainer at the inlet end of the chemical inlet line is clogged	Unclog the strainer. If damaged, replace.
	Suction leak in the inlet line leading into the chemical pump.	Inspect inlet lines and flow meter for damage and replace, if required.
	Chemical pump check valve(s) is clogged	Remove any debris from the chemical check valve(s). Replace chemical check valve(s) or seals, if necessary.
	Chemical prime/on-off valve or chemical metering valve is defective.	Replace valve(s).
	Chemical pump diaphragm is ruptured.	Disassemble the chemical pump and replace the damaged diaphragm.
	Defective cylinder in the water pump.	Measure the pump volume. If the pump volume is less than normal, refer to “Loss of Pump Volume” in the Troubleshooting section in this manual.
Chemical flow meter indicates flow with the tool valve closed	External leak in chemical piping	Tighten fittings. Re-apply thread sealant where required. If any fittings are damaged, replace.
	Outlet check valve is full of debris or damaged, not allowing it to close properly	Close the chemical valve on the chemical panel. If the flow meter does not indicate flow, remove debris or replace check valve, if necessary.
	Chemical pump diaphragm is ruptured	Close the chemical valve on the chemical panel. If the flow meter still indicates flow, replace the chemical pump diaphragm.
	Internal leak in chemical valve causing continual flow through prime tube returning to container.	Tighten valve packing nut (see “General Service Adjustments” section in this manual). Replace valve, if necessary.

TROUBLESHOOTING - DIESEL

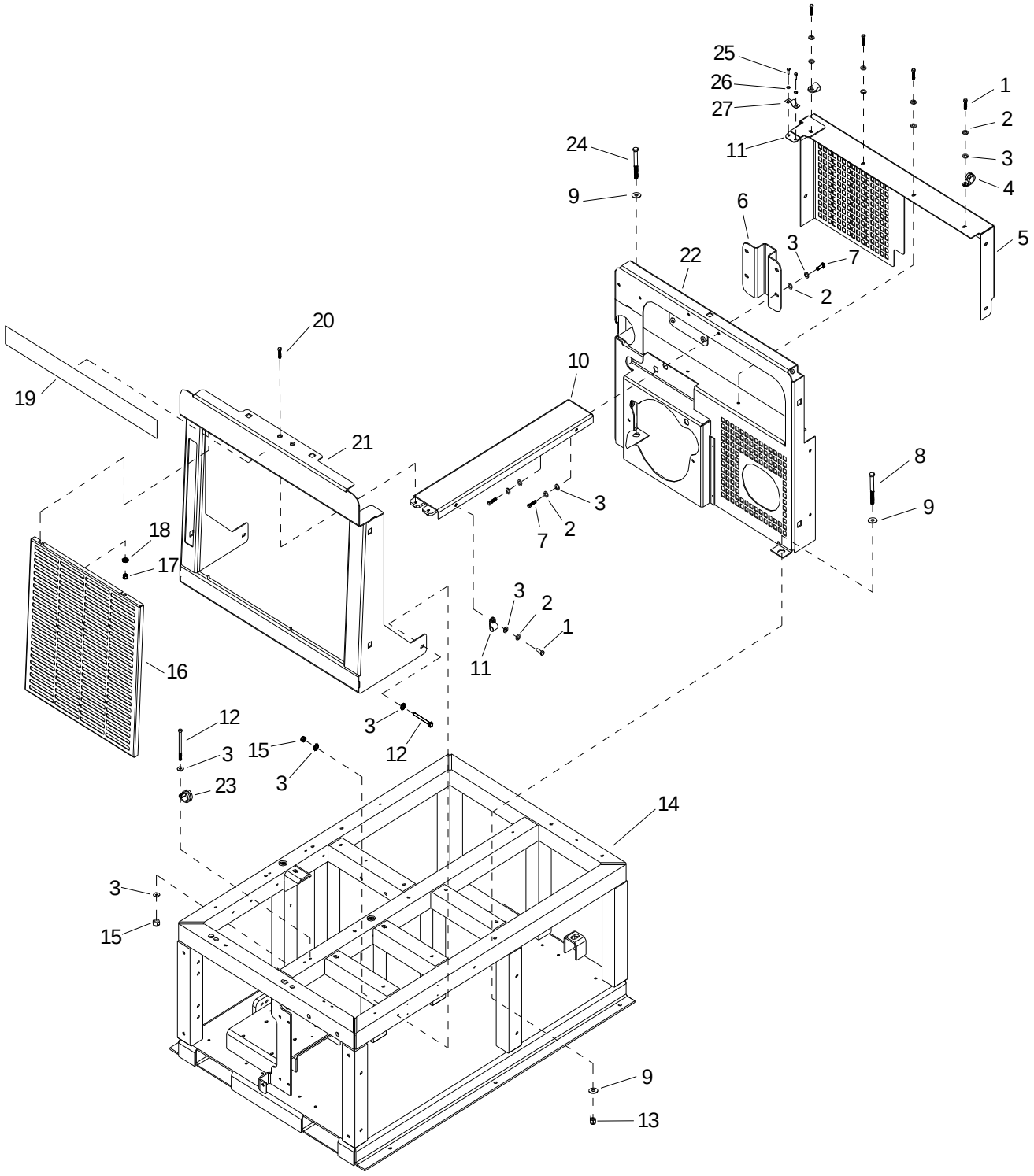
PROBLEM	CAUSE	SOLUTION
Water pump does not engage	Solution pump circuit breaker has been tripped	Check the solution pump circuit breaker on the control panel. Press the circuit breaker reset button.
	Defective electrical connection in the console wiring or defective switch.	Examine switch, electrical connections, and wiring. Repair any defective connections. If there is power going to the switch but not going out, replace the defective switch.
	Water pump has not been activated	Turn solution pump switch to on.
	Defective water pump clutch.	If there is power in the switch, but not power at the clutch, replace the defective wire. If there is power at the clutch, replace the defective switch.
	Loose or broken water pump belts.	Tighten or replace belts.
Engine will not start The engine does not turn over	Main circuit breaker on the control panel has been tripped.	After inspecting the unit to determine the cause of the tripped circuit breaker, press the reset button.
	Loose or corroded battery.	Clean, tighten, or replace the battery terminals.
	Dead battery.	Recharge or replace battery.
	Defective ignition switch.	Test ignition switch for power going into the switch. If there is power going in but NO power going out, replace the switch.
	Defective starter motor.	Test the starter motor. If necessary replace.
	Vacuum pump seized.	Refer to Sutorbilt Service & Repair Manual.
Starter turns over engine, but will not start	Waste tank is full.	Empty the waste tank.
	Engine temperature has exceeded 240°F, triggering the high temperature switch to shut the unit down.	Determine the cause of overheating before restarting the unit. See “Excessive Heating” in the “Troubleshooting” section of this manual.
	Defective fuel pump.	Replace the fuel pump.
	Loose or broken wires leading to waste tank float switch.	Repair or replace any broken electrical connections.
	Defective float switch in the waste tank.	Check switch for proper operation, replace as necessary.
	Oil pressure switch (located on engine), high temperature switch (located on engine).	Test these components. If any are defective, replace. Consult the Kubota Engine Operation and Maintenance Manual.
	Defective fuel shut down solenoid	Test. Replace.

PROBLEM	CAUSE	SOLUTION
Starter turns over engine, but will not start	Engine is malfunctioning	Refer to Kubota Engine Operation and Maintenance Manual.
Engine stops running while doing normal cleaning, the engine stops running	Engine is out of fuel	Add fuel to the fuel tank.
	Waste tank is full	Empty waste tank.
	Main or engine circuit breaker on the control panel has been tripped.	After inspecting the unit to determine the cause of the tripped circuit breaker, press the reset button.
	Engine coolant temperture has exceeded 240°F, triggering the high temperature switch to shut the unit down.	Determine the cause of the overheating before restarting the unit. Refer to the Kubota Engine Operation and Maintenance Manual.
	Defective fuel pump.	Replace fuel pump.
	Defective float switch inside the waste tank.	Check switch for proper operaton. Replace as necessary.
	Defective 240°F engine coolant high-temperature shudown switch.	Test switch. If necessary, replace.
	Oil pressure switch on engine has shut down, due to insufficient oil pressure.	Refer to the Kubota Engine Operation and Maintenance Manual. **DO NOT** restart the engine until the cause is determined and corrected.
	Engine is malfunctioning.	Refer to the Kubota Engine Operation and Maintenance Manual.
Excessive heating	Flow restriction caused by hard water scaling.	Descale unit, repair or replace damaged plumbing components as necessary. Install water softener.
	Not enough water flow.	Check jet size of tool.
Heat exchanger leaks ***NOTE: The exhaust heat exchanger will produce water condensation discharge at times during normal operation. DO NOT confuse this with a leak.***	Engine/vacuum exhaust heat exchangers are damaged from frozen water.	Inspect heat exchangers for leaks. Visually inspect for damage. Pressure check after removing from the unit. (Maximum test pressure 1200 PSI for stainless steel heat exchanger) (Maximum test pressure 100 psi for copper heat exchanger)
Loss of temperature The heat output of the unit is LESS than normal.	Heat Exchangers are plugged with carbon.	Clean and replace.
	Temperature relief valve on water box is stuck open.	Clean temperature relief valve and test. Replace, if necessary.
	Engine RPM is low.	Reset engine RPM.
	Defective temperature gauge.	Test gauge and sensor. Replace failed component.
Automatic waste pump is malfunctioning or not operating normally ***NOTE: When replacing either the pump or float switch, use new electrical connectors and heat shrink. Inspect connection for watertight seal.***	Defective waste pump float switch.	Replace float switch.
	Broken diaphragm.	Replace diaphragm.
	Weak battery.	Charge or replace battery if needed. Check charging station.
	Pump-out circuit breaker on control panel has been tripped.	After inspecting waste pump to determine the cause of the tripped circuit breaker, press the reset button.

NOTES:

PARTS

FRAME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REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86273180	00-000078	10	SCR, 1/4-20 X 1” HXHD GRD8		
2	86010780	87162	16	WASHER, 1/4 SPLIT LOCK PLTD		
3	86270330	02-000066	22	FLATWASHER, 1/4		
4	86177090	03-000261	1	CLAMP, CABLE 1/2 I.D. 1/4 BLT		
5	86054600	790010	1	PNL, BELT GUARD, REAR		
6	86051620	790950	1	PLT, AIR FILTER		
7	86274750	70270	6	SCR, 1/4-20 X 3/4 HHCS PLTD		
8	86274000	70069	2	SCR, 3/8-16 X 3 HHCS GR5		
9	86279510	87171	4	WASHER, 3/8 FLAT		
10	86046160	790952	1	BRKT, CENTER HOOD		
11	86046190	791100	1	BRKT, THROTTLE MTG		DIESEL ONLY
12	86273330	00-000286	3	SCR, CAP 1/4-20 X 2.75 HXHD		
13	86005770	57119	2	NUT, 3/8-16 HEX NYLOCK		
14	86043840	790793	1	ASSY, FRAME		
15	86005680	57047	3	NUT, 1/4-20 HEX NYLOCK		
16	86055730	790927	1	PNL, GRILLE		
17	86270990	57090	4	NUT, 10-32 HEX NYLOCK SS		
18	86279340	87139	4	WASHER, 3/16 FLAT		
19	86186730	500886	1	LABEL, MAIN, APEX-D		
20	86273260	00-000216	2	SCR, CAP 1/4-20 X 1/2 FLTSO		
21	86043860	790947	1	ASSY, FRONT HOOD		
22	86043850	790907	1	ASSY, REAR EN/HOOD MTG		
23	86233410	81270	1	CLAMP, 3/4 DIA CUSHION .406DIA		
24	86275430	70461	1	SCR, 3/8-16 X 3.5 HHTB GR5 PLTD		
25	86192120	791119	2	SCR, 10-24 X 3/8 SHCS PLATED		DIESEL ONLY
26	86279470	87165	2	WASHER, #10 SPLIT LOCK PLTD		DIESEL ONLY
27	86177140	791118	1	CLAMP, THROTTLE CABLE		DIESEL ONLY

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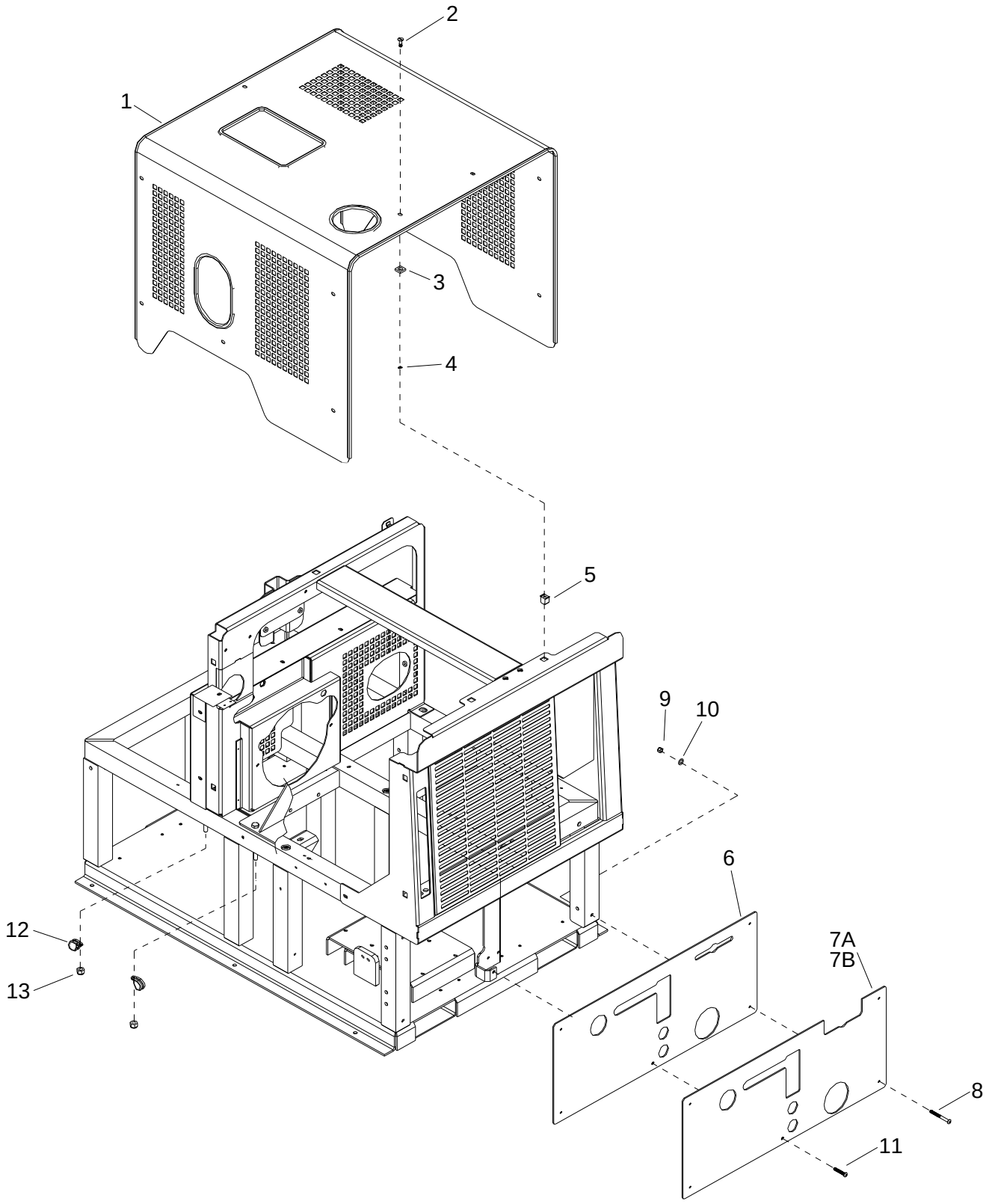
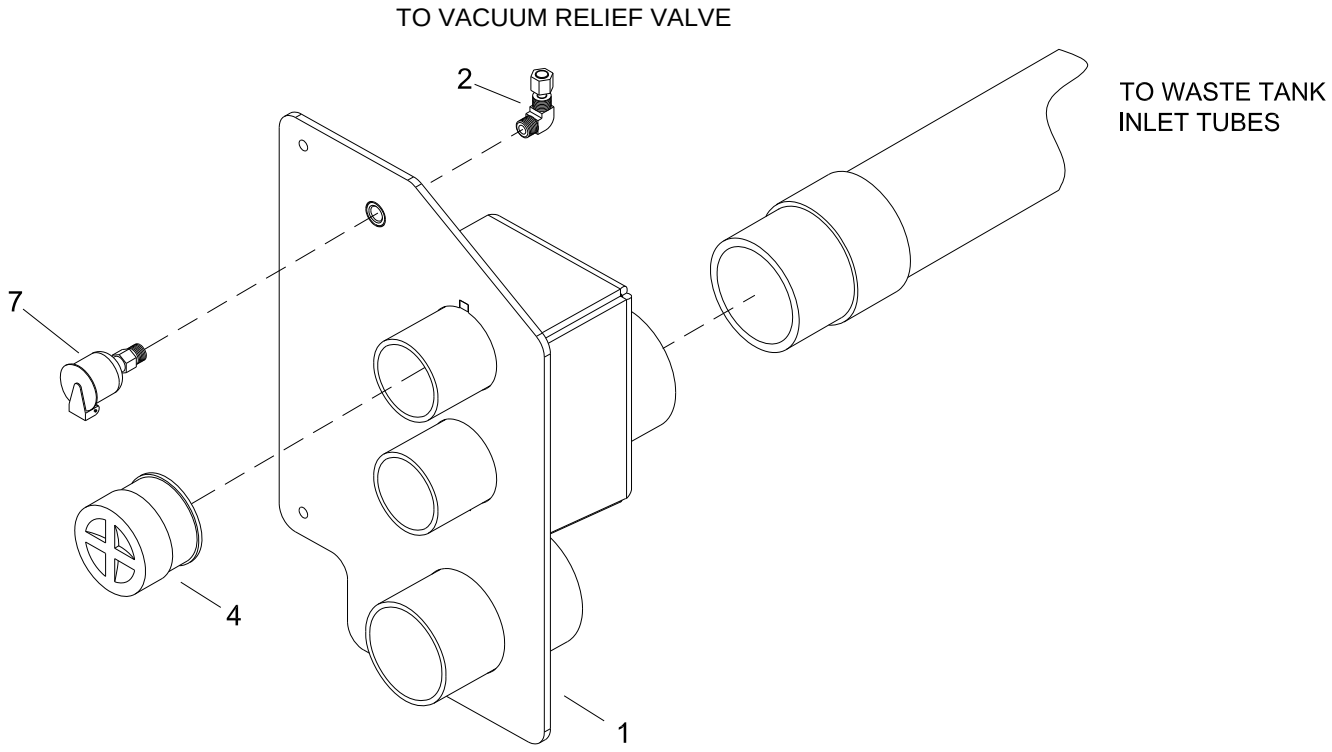
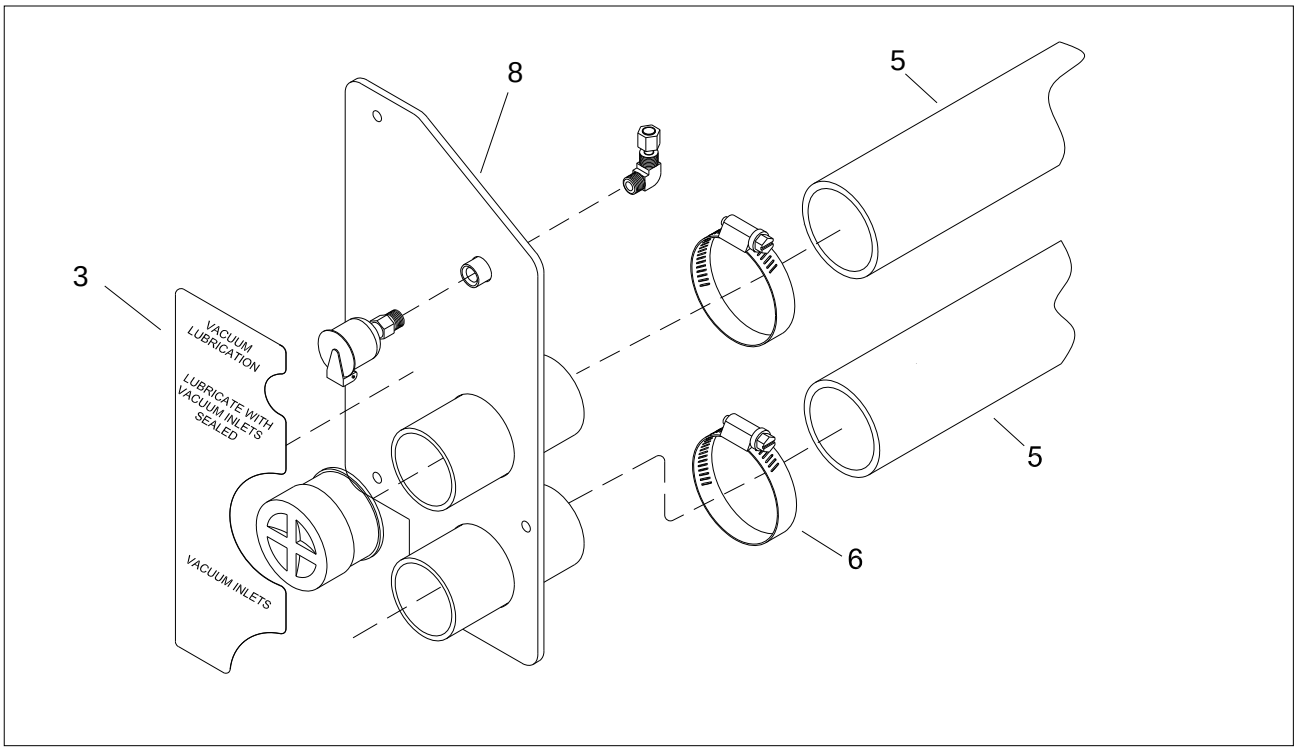


REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86030290	790970	1	ASSY, HOOD, APEX		
2	86193550	00-000272	13	STUD, 1/4 TURN FAST #85 OV		
3	86189660	58-700023	13	PAD, 1/4 TURN VIBR		
4	86193220	02-000268	13	SPLITRING, RETAIN, 1/4 TURN		
5	86191570	01-000259	13	RECEPT, SNAPIN 1/4 TURNFAST		
6	86055840	790957	1	PNL, LOWER FRONT		
7A	86179340	791103	1	DEC, LWR FR PNL, APEX D		
7B	86179320	790958	1	DEC, LWR FR PNL, APEX		
8	86277730	790465	4	SCR, 1/4-20 X 2.75 BHCS BLK		
9	86005680	57047	4	NUT, 1/4-20 HEX NYLOCK		
10	86270330	02-000066	4	FLATWASHER, 1/4		
11	86275460	70481	1	SCR, 1/4-20 X 3/4 BHCS BLK		
12	86233410	81270	2	CLAMP, 3/4 DIA CUSHION .460DIA		
13	86005770	57119	2	NUT, 3/8-16 HEX NYLOCK		

SIDE PANEL, RIGHT

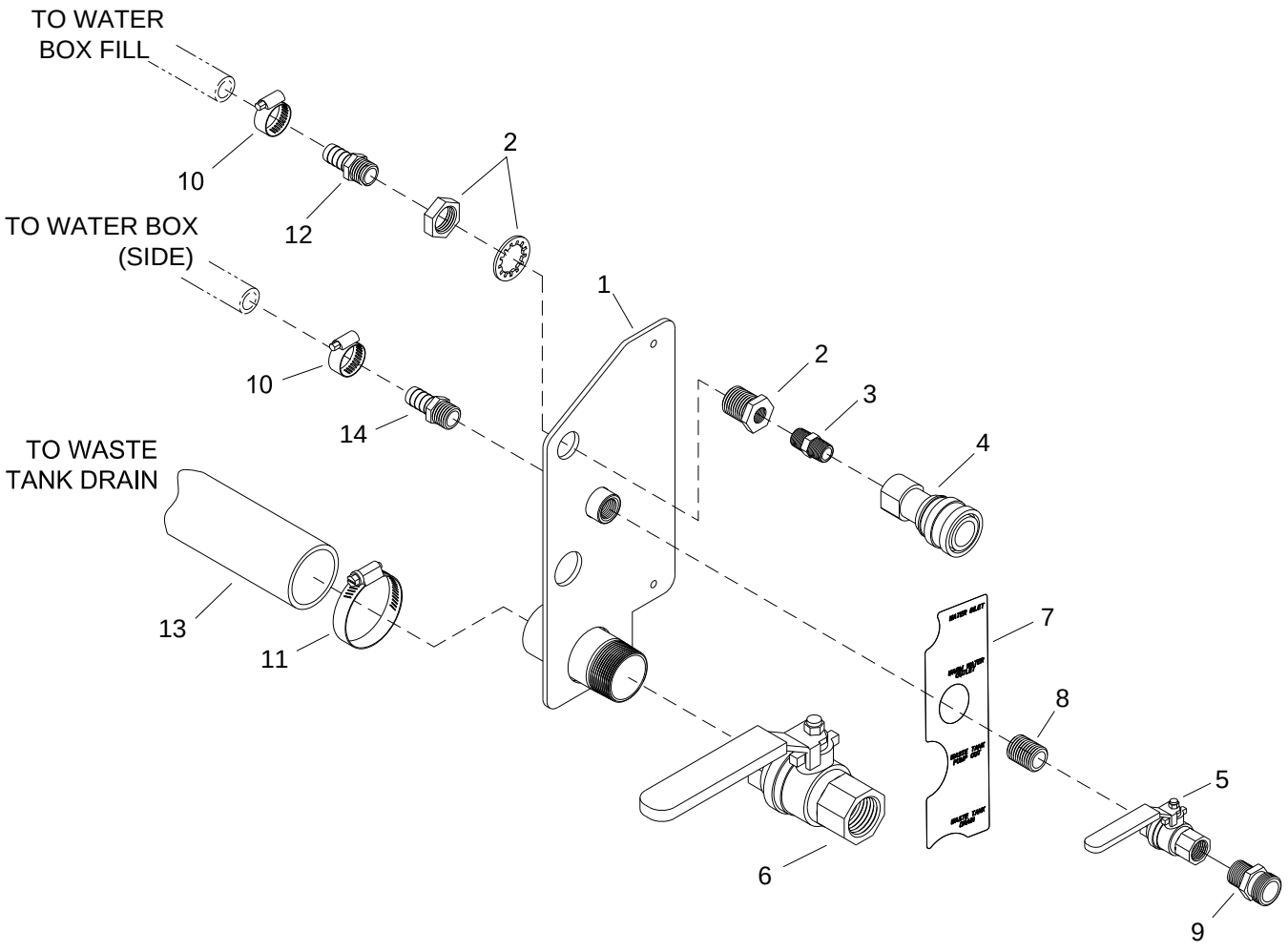




REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86330040	-	1	BRKT, VAC INLET, APEX	**	
2	86180370	12-800099	1	ELL, 1/8P X 1/4 POLY BR		
3	86186470	500694	1	LABEL, VAC/WTR INLET		
4	86180700	32064	2	END CAP, VAC INLET, 1 1/2	*(1)	
5	86049000	09-805380	2	HOSE, INT VAC 2.0 X 60.0 BLK		
6	86177220	03-000054	2	CLMP, HOSE #32 1.5625/2.5 SST		
7	86178700	19-800075	1	CUP, OIL FILL 1/8P		
8	86046030	790430	1	BRKT, VAC INLET		

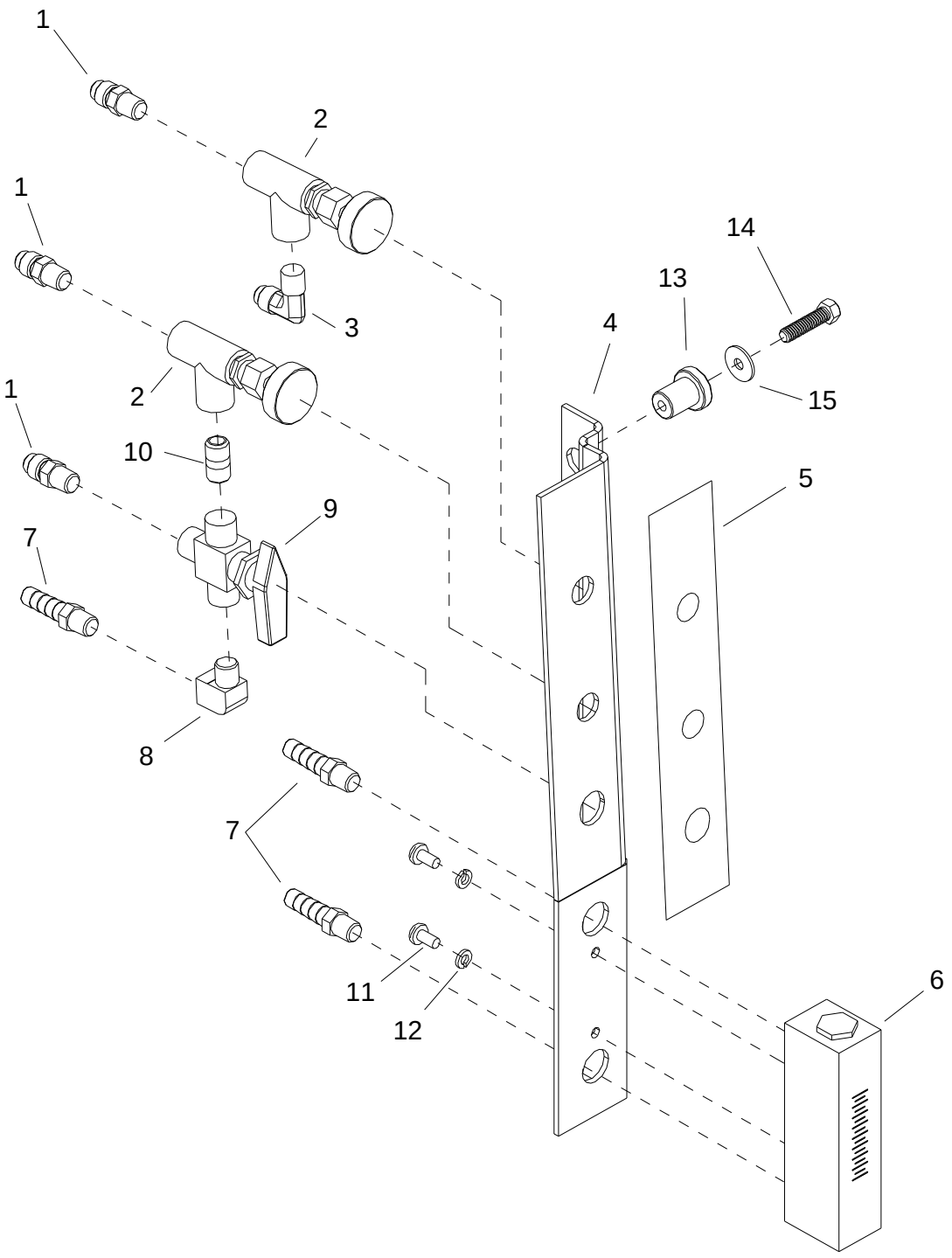
***SEE SERIAL NUMBER PAGE.**
****CALL MANUFACTURER FOR SERIAL NUMBER.**

SIDE PANEL, LEFT



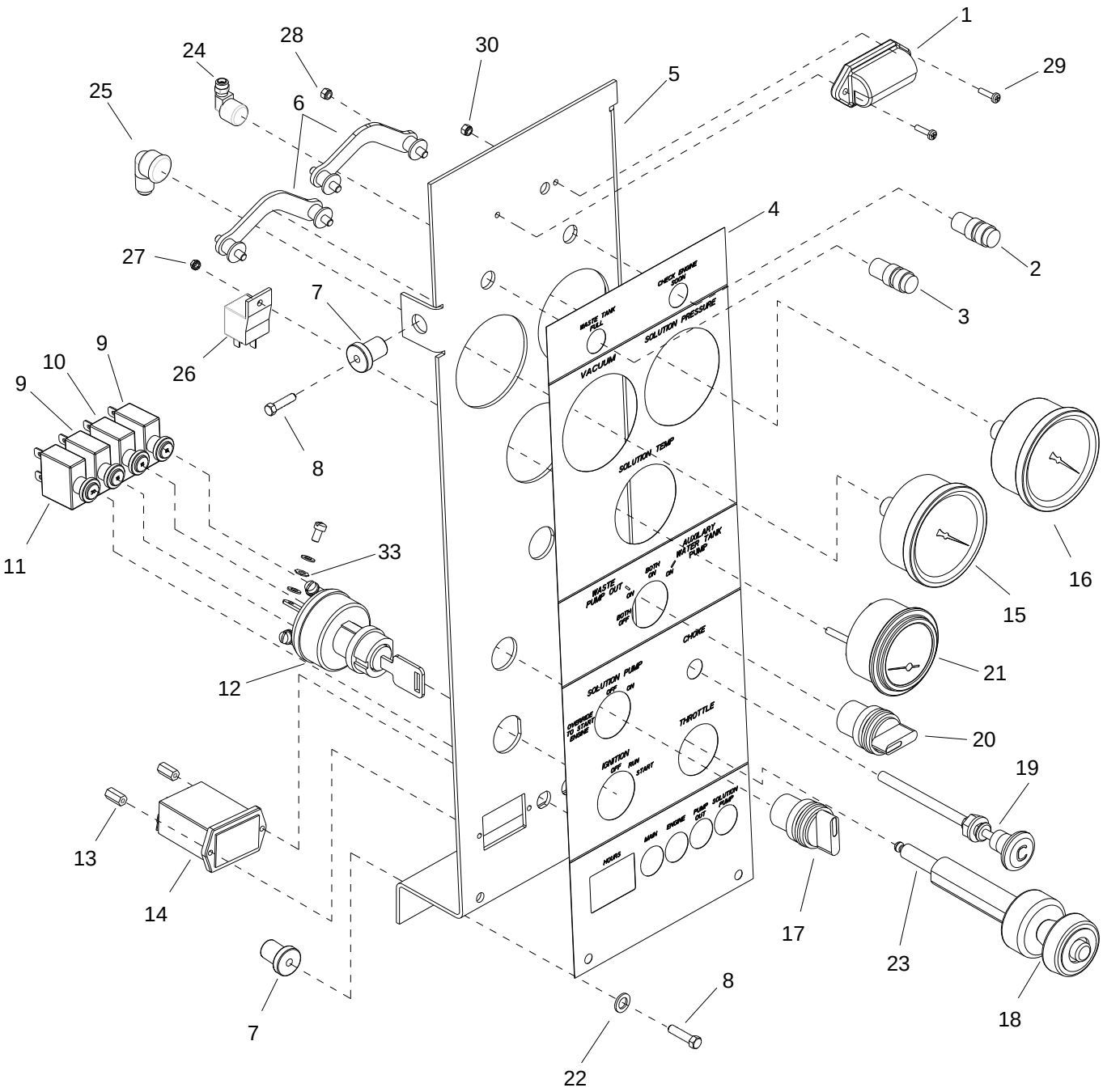
REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86046040	790431	1	BRKT, WTR INLET		
2	86173640	11-800437	1	ADPT, 3/8 BLKHD		
3	86188080	11-800102	1	NIP, 3/8 HX BR		
4	86179710	13-806008	1	DSC, 3/8F X 3/8FP		
5	86195230	15-808008	1	VLV, BALL 1/2FP BS		
6	86195180	84196	1	VALVE, BALL		
7	86186470	500694	1	LABEL, VAC/WTR INLET		
8	86188180	11-800300	1	NIP, 1/2 X CL		
9	86173530	790506	1	ADAPTER, HOSE 1/2M X MGT		
10	86177050	03-000176	2	CLAMP, HOSE #8		
11	86177220	03-000054	1	CLMP, HOSE #32 1.5625/2.5, SST		
12	86181400	12-800345	1	FTTG, BRB 3/8P X 5/8H BR		
13	86048880	09-805090	1	HOSE, INT VAC 2.0 X 49.0 BLK		
14	86181360	12-800269	1	FTTG, BRB 1/2P X 5/8H BR		

CHEMICAL CONTROL PANEL



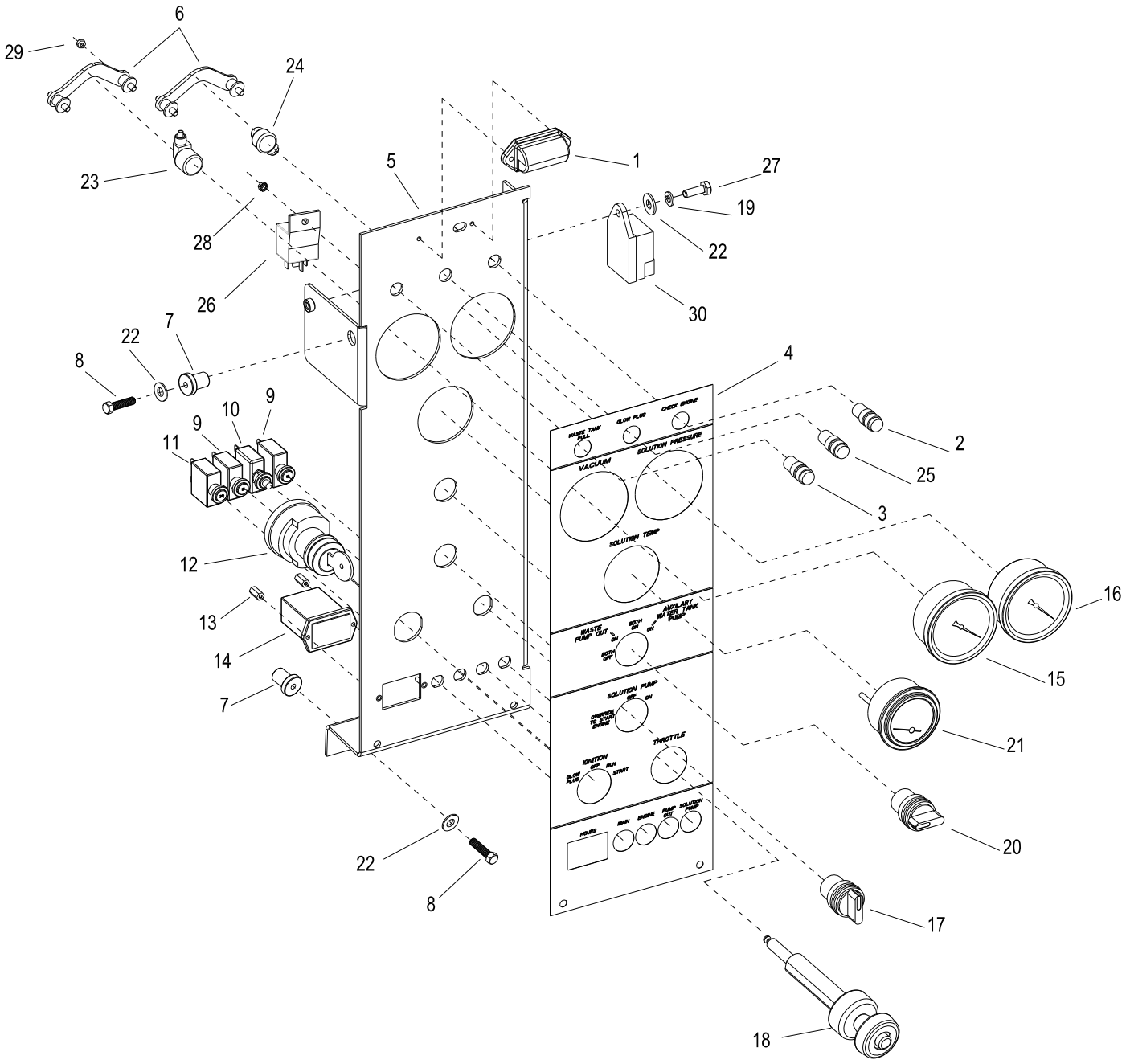
REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86177660	12-800065	3	CONN, 1/8P X 1/4T		
2	86195050	15-808106	2	VALVE, METER 1/8FP		
3	86180360	12-800040	1	ELL, 1/8P X 1/4T BR		
4	86055700	790910	1	PNL, CHEMICAL CONTROL		
5	86186890	500692	1	LABEL, CHEM CNTRL PN		
6	86181170	18-808513	1	FLOWMETER 1/8 FP		
7	86181300	12-800093	3	FTG, BRB 1/8P X 5/16H		
8	86180140	11-800014	1	ELL, STREET 1/8 BR		
9	86297070	-	1	VALVE, 3-WAY BALL 1/8P		
10	86247720	56032	1	NIPPLE, 1/8 CLOSE		
11	86274290	70162	2	SCR, 10-32 X 3/8 PPHMS SS		
12	86279470	87165	2	WASHER, #10 SPLIT LOCK		
13	86189050	790464	2	NUT, WELL 1/4-20 HD		
14	86273180	00-000078	2	SCR, 1/4-20 X 1” HXHD GRD8		
15	86270330	02-000066	2	FLATWASHER, 1/4		

CONTROL PANEL - GAS

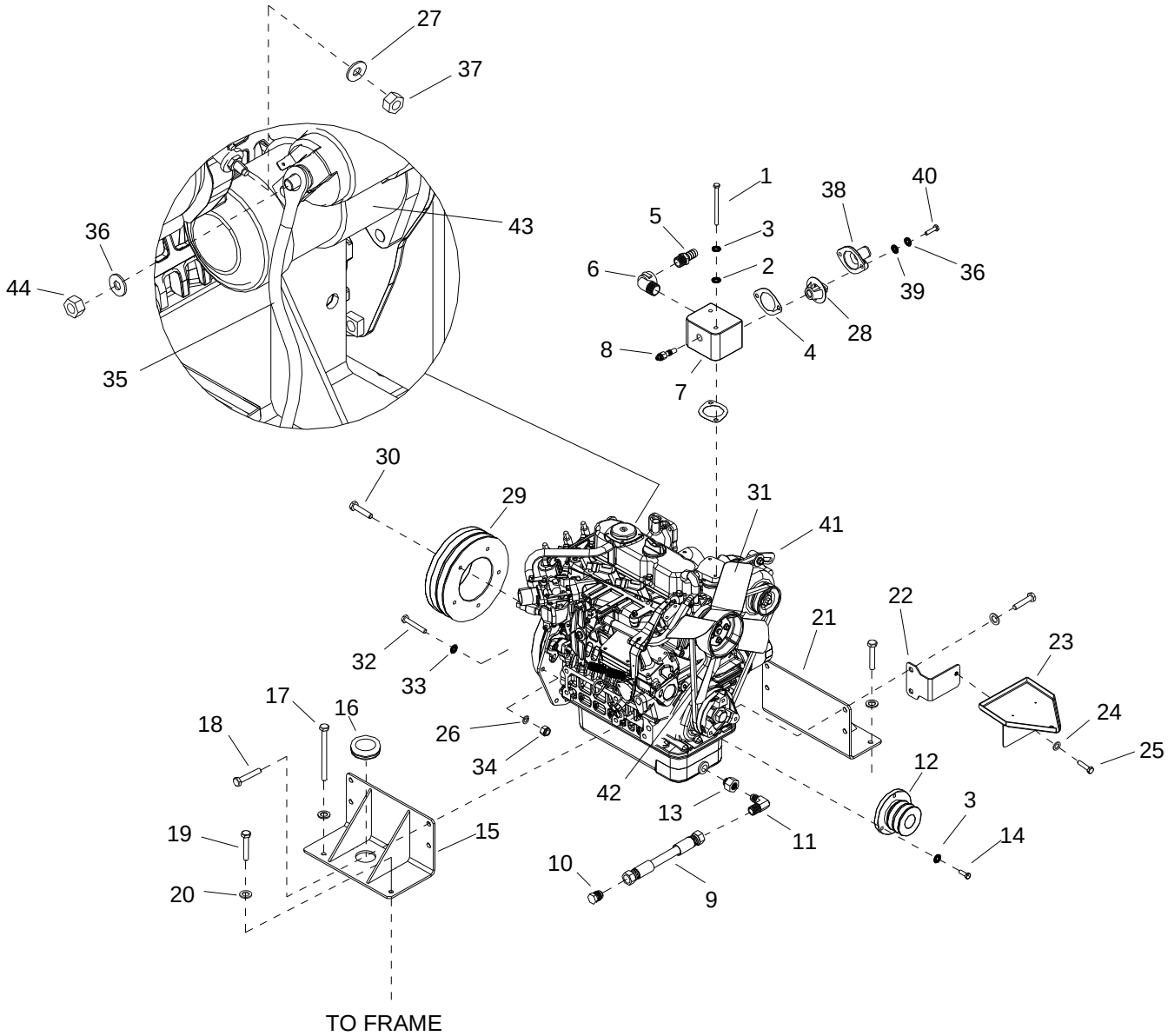


REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86187070	34-903026	1	LT, INST		
2	86186940	790787	1	LIGHT, WARNING, AMBER, IDEC		
3	86186930	51387	1	LIGHT, WARNING, IDEC AP2M		
4	86186830	790942	1	LABEL, CNTRL PNL, APEX		
5	86055760	790941	1	PNL, INSTRUMENT AP		
6	86175680	140702	2	BRKT, WIKA MOUNTING		
7	86189050	790464	3	NUT, WELL 1/4-20 HD		
8	86273180	00-000078	3	SCR, 1/4-20 X 1” HXHD GRD8		
9	86175600	140624	1	BRKR, CIRCUIT, 15A		
10	86298280	-	1	BRKR, CIRCUIT, 20A		
11	86175610	140625	1	BRKR, CIRCUIT, 30A		
12	86193770	32-900201	1	SW, START W/KEY 3 POS TM		
13	86255920	73811	2	STANDOFF, 6-32 X 1/2 HEX NYL		
14	86246890	54092	1	METER, 0-60VDC HOUR		
15	86181950	36227	1	GAUGE, VACUUM 30” HG		
16	86181930	36225	1	GAUGE, 0-1500 PSI		
17	86193760	32-900206	1	SW, RTRY W/BYPASS NON-ILL		
18	86178170	790966	1	CONTROL, THROTTLE, P31		
19	86176120	49-802518	1	CABLE, CHOKE		
20	86193850	730202	1	SWITCH, 4-WAY		
21	86181860	36229	1	GAUGE, TEMP, DATCON		
22	86270330	02-000066	3	FLATWASHER, 1/4		
23	86282620	81130	1	HOSE, 1/4ID FUEL BLK X 38”		
24	86180350	12-800035	1	ELL, 1/4FP X 1/4T BR		
25	86180380	12-800101	1	ELL, 1/4FP X 1/4POLY BR		
26	86191740	35-900188	1	RELAY, ENG SHTDWN		
27	86005720	57106	1	NUT, 8-32 W/STAR WASHER PLTD		
28	86136310	57086	4	NUT, M5 HEX		
29	86273790	70016	2	SCR, 6-32 X 3/4 PPHMS		
30	86270920	57049	2	NUT, 6-32 HEX NYLOCK SS		
31	86177090	03-000261	1	CLAMP, CABLE 1/4ID 1/4BLT		(FOR CHOKE CABLE) NOT SHOWN
32	86183030	790979	1	HARNESS, WIRING, APEX		NOT SHOWN
33	86278930	87007	4	WASHER, #8 LOCK EXT. STAR PLT		

CONTROL PANEL - DIESEL



REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86187070	34-903026	1	LT, INST		
2	86186940	790787	1	LIGHT, WARNING, AMBER, IDEC		
3	86186930	51387	1	LIGHT, WARNING, IDEC AP2M		
4	86179330	791069	1	DEC, INSTR PNL, APEX D		
5	86056000	791068	1	PNL, INST APEX DIESEL		
6	86175680	140702	2	BRKT, WIKA MOUNTING		
7	86189050	790464	3	NUT, WELL 1/4-20 HD		
8	86273180	00-000078	3	SCR, 1/4-20 X 1” HXHD GRD8		
9	86175600	140624	2	BRKR, CIRCUIT, 15A		
10	86230070	140634	1	BREAKER, 20AMP THERMAL CIRCUIT		
11	86175610	140625	1	BRKR, CIRCUIT, 30A		
12	86193880	791086	1	SWITCH, IN, KUBOTA DIESEL		
13	86255920	73811	2	STANDOFF, 6-32 X 1/2 HEX NYL		
14	86246890	54092	1	METER, 0-60VDC HOUR		
15	86181950	36227	1	GAUGE, VACUUM 30” HG		
16	86181930	36225	1	GAUGE, 0-1500 PSI		
17	86193760	32-900206	1	SW, RTRY W/BYPASS NON-ILL		
18	86177550	791102	1	CNTRL, THROTTLE APEX DIESEL		
19	86010780	87162	1	WASHER, 1/4 SPLIT LOCK PLTD		
20	86193850	730202	1	SWITCH, 4-WAY		
21	86181960	36229	1	GAUGE, TEMP, DATCON		
22	86270330	02-000066	4	FLATWASHER, 1/4		
23	86180380	12-800101	1	ELL, 1/4FPx1/4 POLY BR		
24	86180350	12-800035	1	ELL, 1/4FPx1/4T BR		
25	86186950	791070	1	LIGHT, GLOW PLUG GRN, IDEC		
26	86191740	35-900188	1	RELAY, ENG SHTDWN		
27	86274750	70270	1	SCR, 1/4-20 X 3/4 HHCS PLTD		
28	86005720	57106	1	NUT, 8-32 W/STAR WASHER PLTD		
29	86136310	57086	4	NUT, M5 HEX		
30	86308810	-	1	TIMER, GLOW PLUG		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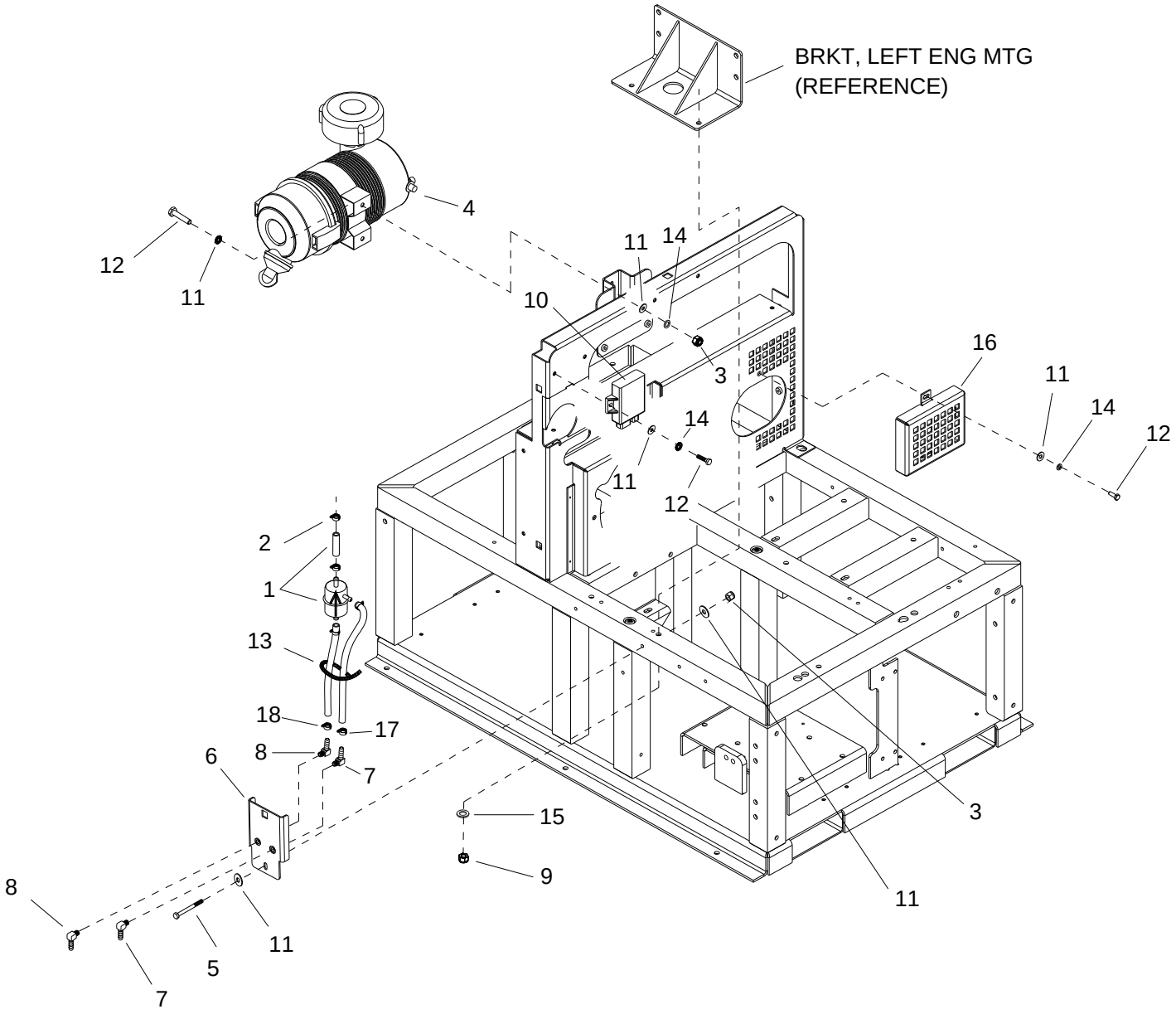
REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86274830	70307	2	SCR, M8 X 80HHCS PLTD		
2	86278830	02-000143	2	WASHER, 5/16 FLAT PLTD		
3	86279130	87083	5	WASHER,5/16 SPLIT LOCK PLTD		
4	86182750	790980	1	GSKT, THERM OUT, KU.WG972		
5	86181420	12-800361	1	FTTG, BRB 3/4PX1H BR		
6	86180260	11-800401	1	ELL, 3/4 ST BR		
7	86187780	790909	1	MNFLD, THERM ADAPTER		
8	86192510	35-900050	1	SENS. TEMP 240 DEG		
9	86183640	10-805315	1	HOSE, HP 3/8X13” (1/2FT BS)		
10	86190550	12-800062	1	PLUG, 1/2T		
11	86179910	31097	1	EL, BR, 1/4MNPT X 1/2 MJIC		
12	86191300	790928	1	PULLEY FRONT, KUBOTA WG972		
13	86173630	04103	1	ADPT, M12 – 1.25 X 1/4FNPT		
14	86273700	140644	3	SCR, M8 X 25MM SHCS SS		
15	86046130	790917	1	BRKT, LEFT ENG MTG		
16	86176050	790439	2	BUSH, HEYCO, 1” ID		
17	86275860	70554	1	SCR, 3/8-16 X 3.5 HHCS GR5 PLT		
18	86175450	790987	8	SCR, M10-1.25 X 20MM		
19	86274000	70069	3	SCR, 3/8-16 X 3 HHCS GR5		
20	86279510	87171	4	WASHER, 3/8 FLAT		
21	86046140	790922	1	BRKT, RIGHT ENG MTG		
22	86051630	790962	1	PLT, OIL DRAIN MTNG		
23	86046000	790115	1	BRKT, OIL DRAIN		
24	86010780	87162	1	WASHER, 1/4 SPLIT LOCK		
25	86274750	70270	1	SCR, 1/4-20 X 3/4 HHCS PLTD		
26	86270330	02-000066	2	FLATWASHER, 1/4		
27	86279140	87085	1	WASHER, M6 SPLIT LOCK DIN127B		
28	86194340	790969	1	THERM, 180 DEG, KUBOTA		
29	86191310	790929	1	PULLEY, REAR KUBOTA WG972		
30	86277310	70827	5	SCR, M8-1.25 X 6MM SHCS PLTD		
31	86180880	790992	1	FAN, ENGINE KUBOTA WG972		
32	86274910	70325	2	SCR, 5/16-18 X 1.25 HHCS GR5PLTD		
33	86278830	02-000143	2	WASHER, 5/16 FLAT PLTD		
34	86005750	57113	2	NUT, 5/16-18 HEX NYLOCK		
35	86176230	64-950519	1	CABLE, BAT X 71” RED		
36	86137310	87098	3	WASHER, M8 SPLIT LOCK		
37	86136270	57053	1	NUT, M6 HEX ZINC PLATED		
38	86178830	790988	1	COVER, THERMOSTAT		
39	86137280	87054	2	WASHER, M8 FLAT DIN125A PLT		
40	86288730	70184	2	SCR, 10-24 X 1/2 PHTC		
41	86180790	790904	1	ENG, KUBOTA, WG972		
42	86175210	790993	1	BELT, ENGINE KUBOTA WG972		
43	86193330	790990	1	STARTER, ENGINE KUBOTA WG972		
44	86136280	57054	1	NUT, M8		
-	86190780	790989	-	PUMP, WATER KUBOTA WG972		NOT SHOWN
-	8619290	790991	-	SPARK PLUG, KUBOTA WG972		NOT SHOWN
-	86265440	05-008005	-	OIL, 10W30WT DET (QT)		NOT SHOWN
-	86193860	790994	-	SENSOR, OIL PRESS, KUBOTA WG972		NOT SHOWN
-	86187790	790995	-	MANUAL, OPERATION KUBOTA WG972		NOT SHOWN
-	86185770	42-902309	-	FILTER, OIL, KUBOTA WG972		NOT SHOWN
-	86276730	70719	-	SCR, M4 X 8MM LG PPHMS		NOT SHOWN
-	86277350	70831	-	SCR, M6 X 6, HHC, 8.8 TCN, ZN		NOT SHOWN
-	86193270	790983	-	SPRING, THROTTLE RETURN		NOT SHOWN
-	86191790	790981	-	RETAINER, THROTTLE CABLE		NOT SHOWN
-	86192070	00-000408	-	SCR, SET 8-32 X 1/4 SS		NOT SHOWN
-	86193390	790982	-	STOP, THROTTLER SPRING		NOT SHOWN


BRKT, LEFT ENG MTG
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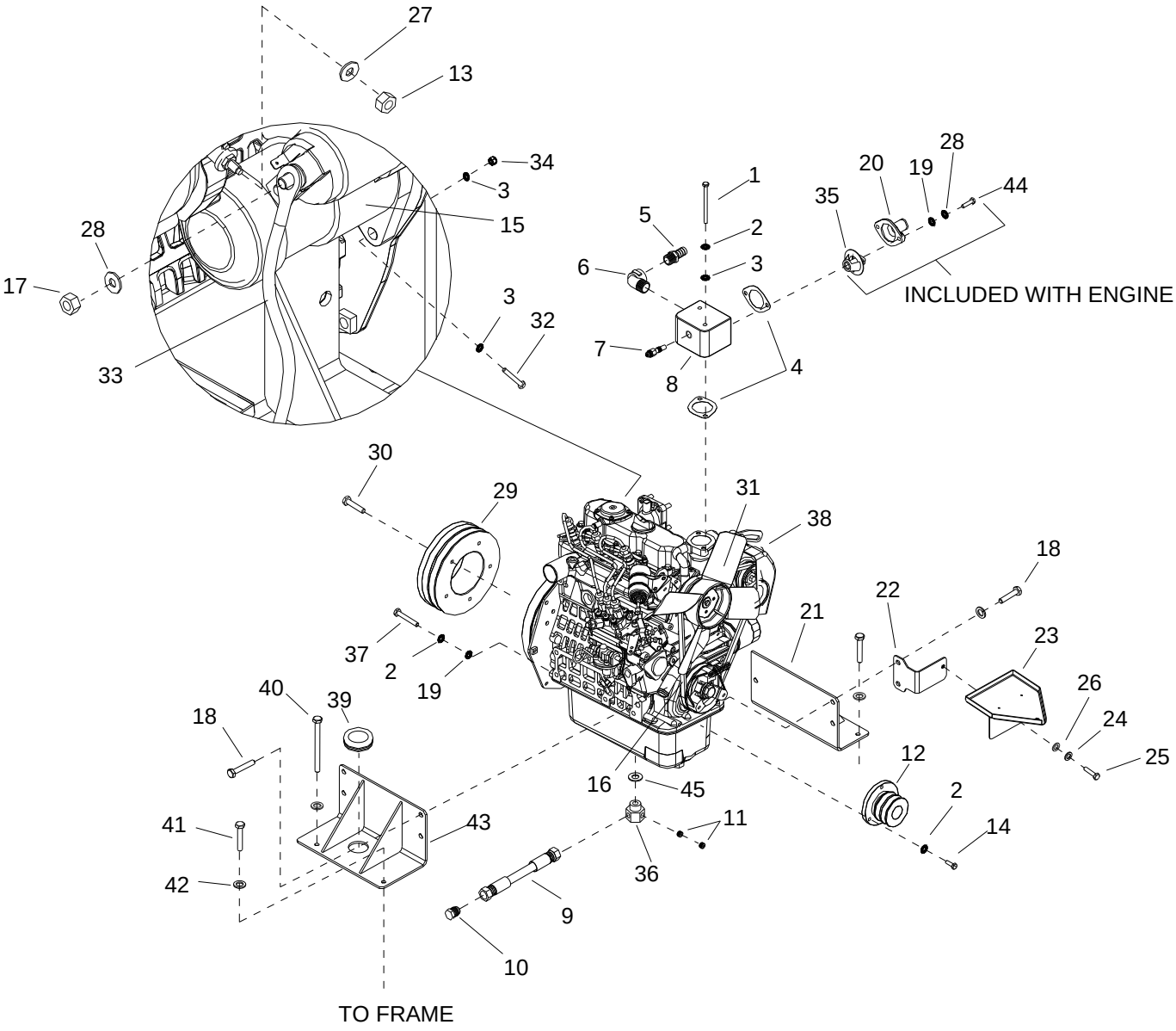
REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86181620	14-806574	1	FUEL FILTER		
2	86176990	03-000065	6	CLAMP, HOSE #4 SST		
3	86005680	57047	2	NUT, 1/4-20 HEX NYLOCK		
4	86173910	790780	1	ASMBLY, FLTR, AIR, ZEEMS		
5	86273330	00-000286	1	SCR, CAP 1/4-20 X 2.75 HXHD		
6	86046170	790961	1	BRKT, FUEL/LEFT HOOD MTG		
7	86179920	790605	2	EL, 90DEG 1/8 X 5/16HB		
8	86179930	790606	2	EL, 90DEG 1/8NPT X 1/4HB		
9	86005770	57119	4	NUT, 3/8-19 HEX NYLOCK		
10	86185600	790986	1	IGNITION, KUBOTA WG972		
11	86270330	02-000066	11	FLATWASHER, 1/4		
12	86274750	70270	8	SCR, 1/4-20 X 3/4 HHCS PLTD		
13	86265730	04-000053	3	TIE, CABL 8” WHT		
14	86010780	87162	8	WASHER, 1/4 SPLIT LOCK		
15	86279510	87171	4	WASHER, 3/8 FLAT		
16	86046210	791131	1	BRKT, HUB GUARD		
17	86177390	791166	1	CLMP, F.I., SAE12, 1/4” HOSE		
18	86323830	-	1	CLMP, #10SAE, 5/16-13/32 MINI		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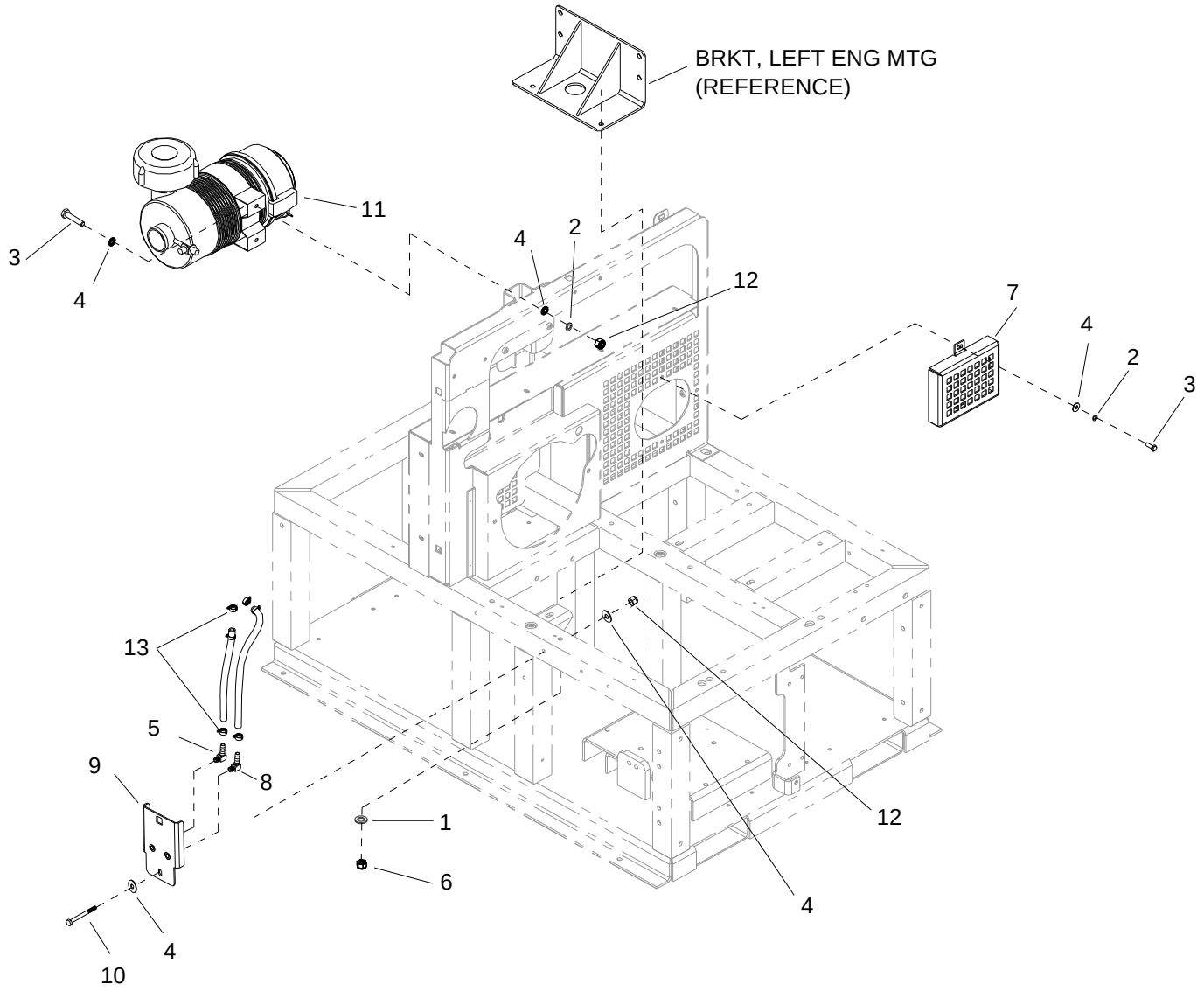
REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86274830	70307	2	SCR, M8 X 80HHCS PLTD		
2	86279130	87083	5	WASHER, 5/16 SPLIT LOCK PLTD		
3	86278830	02-000143	5	WASHER,5/16 FLAT PLTD		
4	86182750	790980	2	GSKT, THERM OUT, KU.WG972		
5	86181420	12-800361	1	FTTG, BRB 3/4PX1H BR		
6	86180260	11-800401	1	ELL, 3/4 ST BR		
7	86192510	35-900050	1	SENS. TEMP 240 DEG		
8	86187780	790909	1	MNFLD, THERM ADAPTER		
9	86184020	10-805409	1	HOSE, HP 1/4 X 12 (1/4P X 1/4P)		
10	86176610	791110	1	CAP, 1/4" FPT BRASS		
11	86272720	11-800345	2	PLG, 1/4 SOCHD BRASS		
12	86191300	790928	1	PULLEY FRONT, KUBOTA WG972		
13	86136270	57053	1	NUT, M6 HEX ZINC PLATED		
14	86273700	140644	3	SCR, M8 X 25MM SHCS SS		
15	86193340	791137	1	START, ENG, D902 KUB		
16	86175210	790993	1	BELT, ENGINE KUBOTA D902		
17	86136280	57054	1	NUT, M8		
18	86175450	790987	8	SCR, M10-1.25 X 20MM		
19	86137280	87054	1	WASHER, M8 FLAT DIN125A PLT		
20	86178830	790988	1	COVER, THERMOSTAT		
21	86046140	790922	1	BRKT, RIGHT ENG MTG		
22	86051630	790962	1	PLT, OIL DRAIN MTNG		
23	86046000	790115	1	BRKT, OIL DRAIN		
24	86010780	87162	7	WASHER, 1/4 SPLIT LOCK		
25	86274750	70270	4	SCR, 1/4-20 X 3/4 HHCS PLTD		
26	86270330	02-000066	8	FLATWASHER, 1/4		
27	86279140	87085	1	WASHER, M6 SPLIT LOCK DIN127B		
28	86137310	87098	3	WASHER, M8 SPLIT LOCK		
29	86191310	790929	1	PULLEY, REAR KUBOTA WG972		
30	86277310	70827	5	SCR, M8-1.25 X 60MM SHCS PLTD		
31	86180880	790992	1	FAN, ENGINE KUBOTA WG972		
32	86274910	70325	1	SCR, 5/16-18 X 1.25 HHCS GR5PLTD		
33	86176230	64-950519	1	CABLE, BAT X 71" RED		
34	86005750	57113	1	NUT, 5/16-18 HEX NYLOCK		
35	86194340	790969	1	THERM, CLNT, 180 DEG KUB WG972		
36	86190590	791074	1	PLUG, OIL DRAIN DIESEL		
37	86136640	70262	1	SCR, M8 X 20 HHMS PLTD		
38	86180800	790914	1	ENG, KUBOTA, D902		
39	86176050	790439	2	BUSH, HEYCO, 1" ID		
40	86275860	70554	1	SCR, 3/8-16 X 3.5 HHCS GR5 PLT		
41	86274000	70069	3	SCR, 3/8-16 X 3 HHCS GR5		
42	86279510	87171	4	WASHER, 3/8 FLAT		
43	86046130	790917	1	BRKT, LEFT ENG MTG		
44	86288730	70184	1	SCR, 10-24 X 1/2 PHTC		
45	86343490	-	1	GSKT, .882ID X 1.095OD X .06THK, COPPER		
-	86190780	790989	-	PUMP, WATER, KUBOTA		NOT SHOWN
-	86182020	791138	-	GLOW PLUG, D902 KUB		NOT SHOWN
-	86189120	791129	-	OIL, CRANKCASE DIESEL		NOT SHOWN
-	86193290	790991	-	SPARK PLUG, ENGINE, WG972 KUB		NOT SHOWN
-	86187290	791139	-	MANUAL, OPERATION KUBOTA D902		NOT SHOWN
-	86185770	42-902309	-	FILTER, OIL KUBOTA		NOT SHOWN
-	86192910	791140	-	SOLENOID, ENG D902 KUB		NOT SHOWN
-	86174430	791117	-	ATTACH, THROTTLE CABLE TO ARM		NOT SHOWN
-	86272200	66073	-	PIN, COTTER 1/16" X 3/4" L PLTD		NOT SHOWN
-	86270330	02-000066	-	FLATWASHER, 1/4		NOT SHOWN
-	86192950	791120	-	SPACER, THROTTLE LINKAGE		NOT SHOWN
-	86193210	791130	-	SPG, THROTTLE RETURN, DIESEL		NOT SHOWN


BRKT, LEFT ENG MTG
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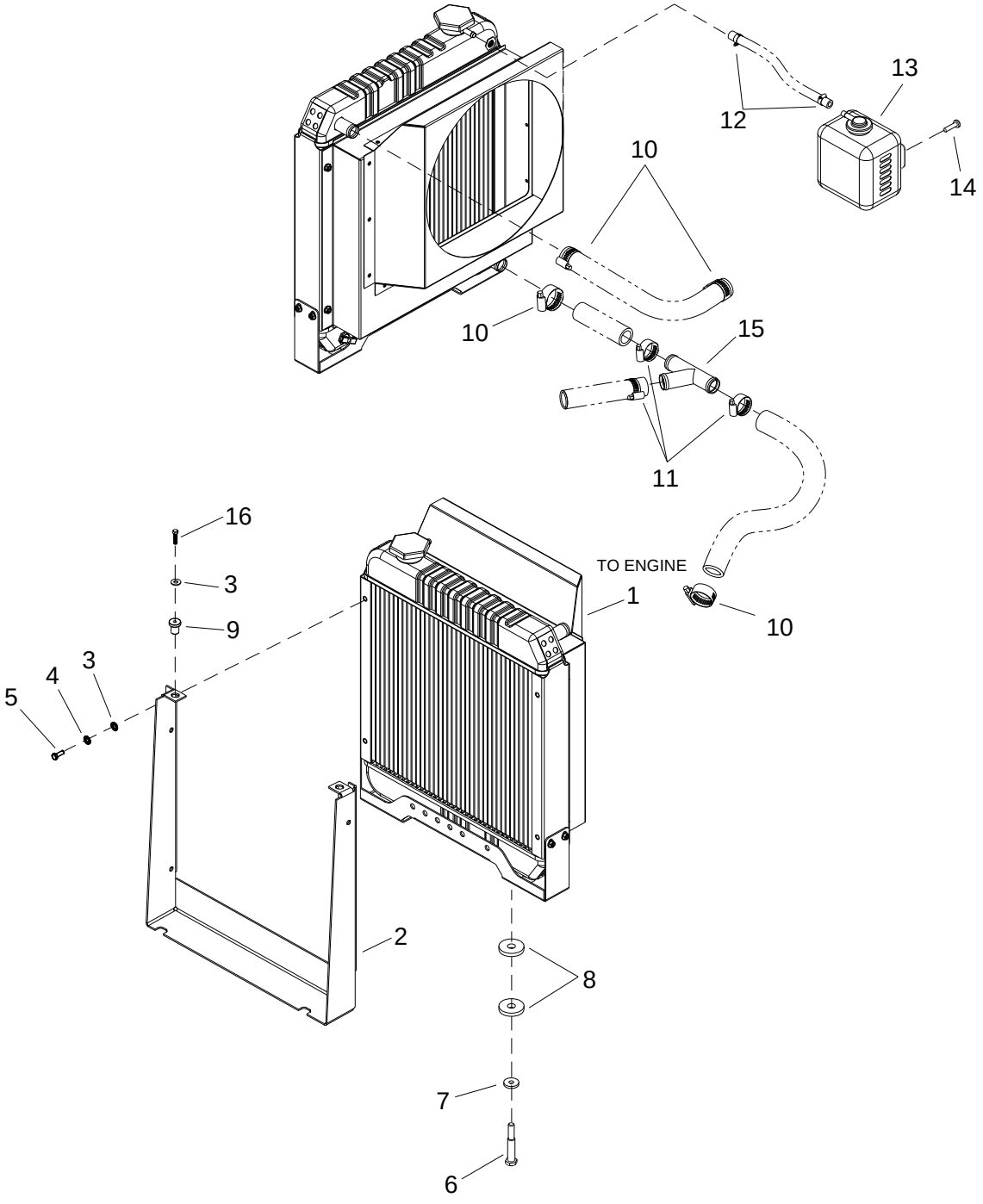
REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86279510	87171	4	WASHER, 3/8 FLAT		
2	86010780	87162	7	WASHER, 1/4 SPLIT LOCK		
3	89274750	70270	4	SCR, 1/4-20 X 3/4 HHCS PLTD		
4	86270330	02-000066	8	FLATWASHER, 1/4		
5	86185080	791114	1	HOSEBARB, 1/8M X 5/16H 90 DEG		
6	86005770	57119	4	NUT, 3/8-16 HEX NYLOCK		
7	86046210	791131	1	BRKT, HUB GUARD		
8	86179920	790605	1	EL, 90DEG 1/8 X 5/16HB		
9	86046170	790961	1	BRKT, FUEL/LEFT HOOD MTG		
10	86273330	00-000286	1	SCR, CAP 1/4-20 X 2.75 HXHD		
11	86173910	790780	1	ASMBLY, FLTR, AIR, ZEEMS		
12	86005680	57047	3	NUT, 1/4-20 HEX NYLOCK		
13	86176990	03-000065	4	CLAMP, HOSE #4 SST		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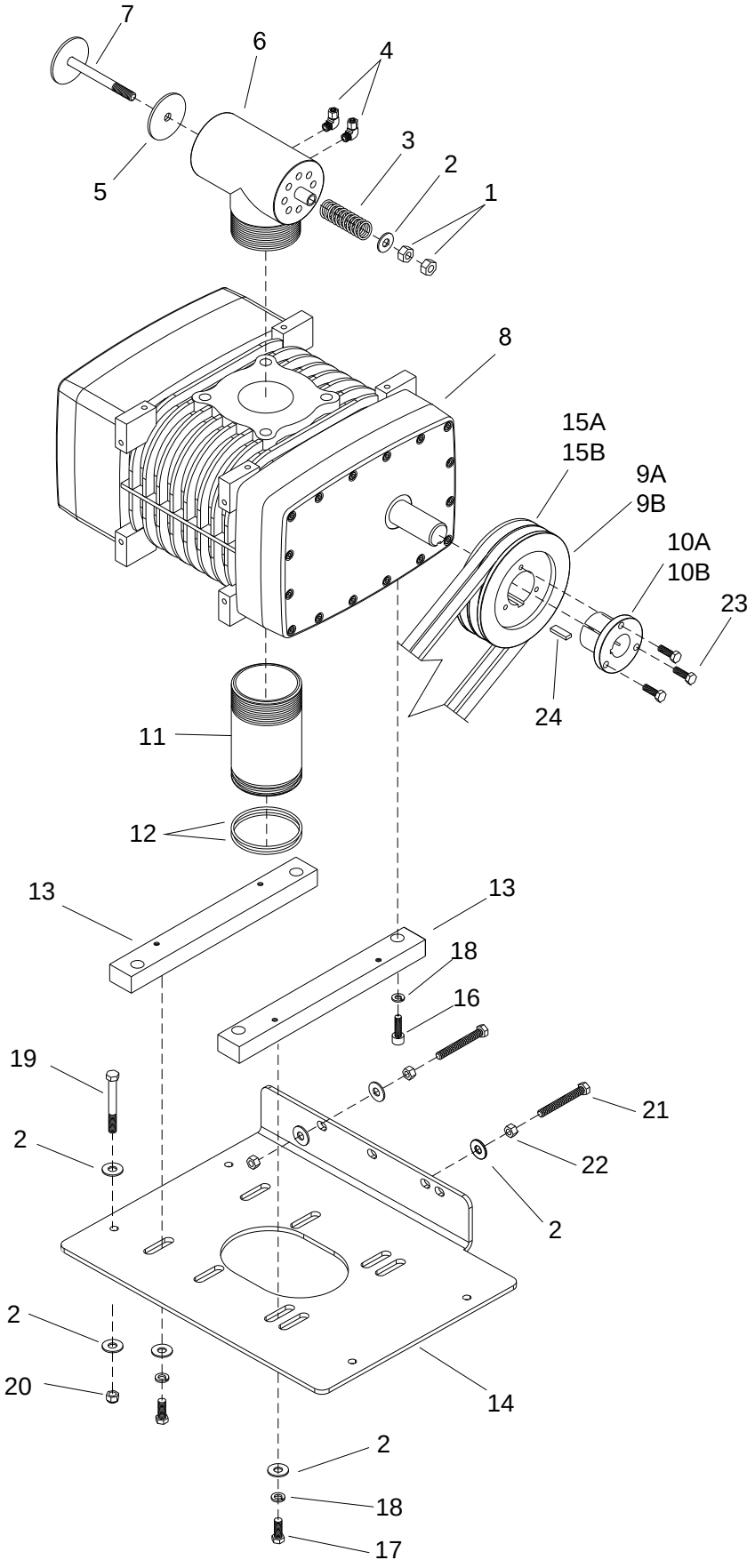
REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86191530	790918	1	RADIATOR,KUBUTA W/SHROUD		
2	86055820	790953	1	PNL, FRONT RAD CLOSEOUT		
3	86270330	02-000066	6	FLATWASHER, 1/4		
4	86010780	87162	4	WASHER, 1/4 SPLIT LOCK		
5	86274750	70270	4	SCR, 1/4-20 X 3/4 HHCS PLTD		
6	86278380	70825	2	SHOULDER BOLT, 5/8 OD X 2.25L		
7	86010730	87088	2	WASHER, 5/8 ID X 1.18 X .06 SS		
8	86195590	790930	4	WASH, .612IDX1.31OD, RAD, APEX		
9	86189050	790464	2	NUT, WELL 1/4-20 HD		
10	86177020	03-000113	4	CLAMP, HOSE #12 SST		
11	86177310	03-000248	3	CLMP, HOSE #16 1-1/2 MIN 1-3/4		
12	86176990	03-000065	2	CLAMP, HOSE #4 SST		
13	86175820	140642	1	BTL, CLNT RECIV, PIN, 1 LTR		
14	86273260	00-000216	2	SCR, CAP 1/4-20 X 1/2 FLTSO		
15	86173590	790936	1	ADAPTER, Y COOLANT		
16	86273180	00-000078	2	SCR, 1/4-20 X 1” HXHD GRD8		

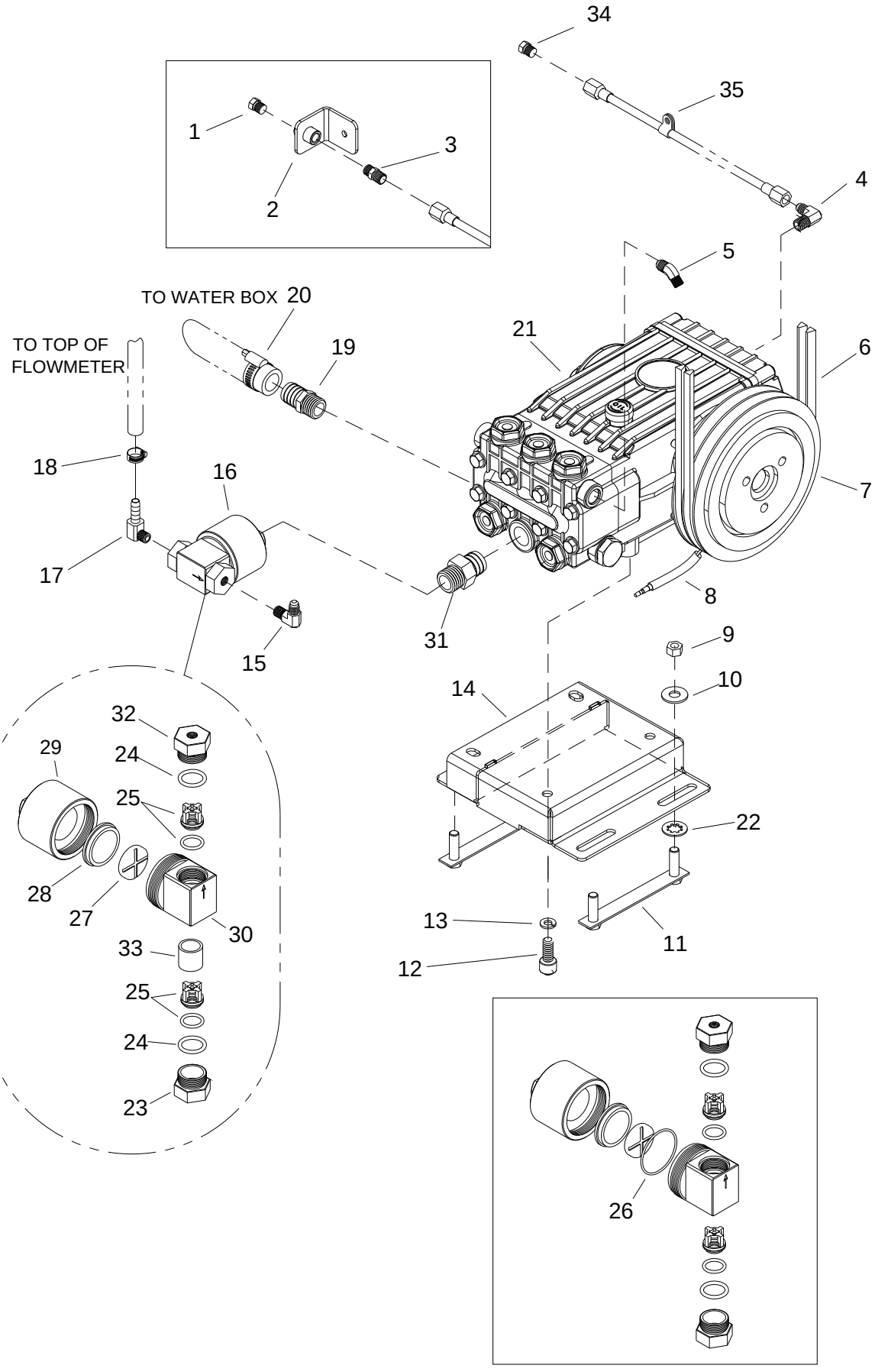
VACUUM BLOWER



REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86271070	57114	2	NUT, 7/16-14 HEX		
2	86279510	87171	16	WASHER, 3/8 FLAT		
3	86193230	04-000091	1	SPRING, VAC REL VLV		
4	86180370	12-800099	2	ELL, 1/8P X 1/4 POLY BR		
5	86179590	43-807106	1	DIAPH, VAC REL VLV		
6	86180610	52-501684	1	ELL, VAC REL VLV		
7	86057090	56-501994	1	STM-VAC REL VLV		
8	86175390	140611	1	BLWR, TRI-FLOW		
9A	86191320	790954		PULLEY, 2TB64		GAS ONLY
9B	86191110	44-802335	1	PULL, 2TB74 PERF 805		DIESEL ONLY
10A	86185390	790944	1	HUB, P1 X 1-1/4		GAS ONLY
10B	86185410	791115	1	HUB, Q1 X 1-1/4		DIESEL ONLY
11	86188540	52-502071	1	NIPPLE, VAC OUTL TRI-FLOW		
12	86189610	43-810104	2	O-RING, 3-1/4 X 3-1/2 OD		
13	86056810	790443	2	SPACER, BLOWER		
14	86051520	790442	1	PLT, BLOWER ADJUST		
15A	86174790	141039	2	BELT, GATES, BP46 PREDATOR	*(2)	GAS ONLY
15B	86174800	141040	2	BELT, GATES, BP48 PREDATOR	*(2)	DIESEL ONLY
16	86277740	790467	4	SCR, 3/8-16 X 1.25 SHCS PLTD		
17	86275190	70377	4	SCR, 3/8-16 X 1.25 HHCS SS		
18	86010790	87163	8	WASHER, 3/8 SPLIT LOCK		
19	86274000	70069	4	SCR, 3-8-16 X 3 HHCS GR5		
20	86005770	57119	4	NUT, 3/8-16 HEX NYLOCK		
21	86273420	00-000336	2	SCR, CAP 3/8-16 X 3 ALL THD		
22	86005730	57111	3	NUT, 3/8-16 HEX		
23	86277750	791116	3	SCR, 3/8-16 X 1.25 HHMS GR8 PL		
24	86049230	54-500412	1	KEY, 1/4 SQ X 1.88		

***SEE SERIAL NUMBER PAGE.**
****CALL MANUFACTURER FOR SERIAL NUMBER.**

WATER PUMP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TO WATER BOX
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TO TOP OF
FLOWMETER
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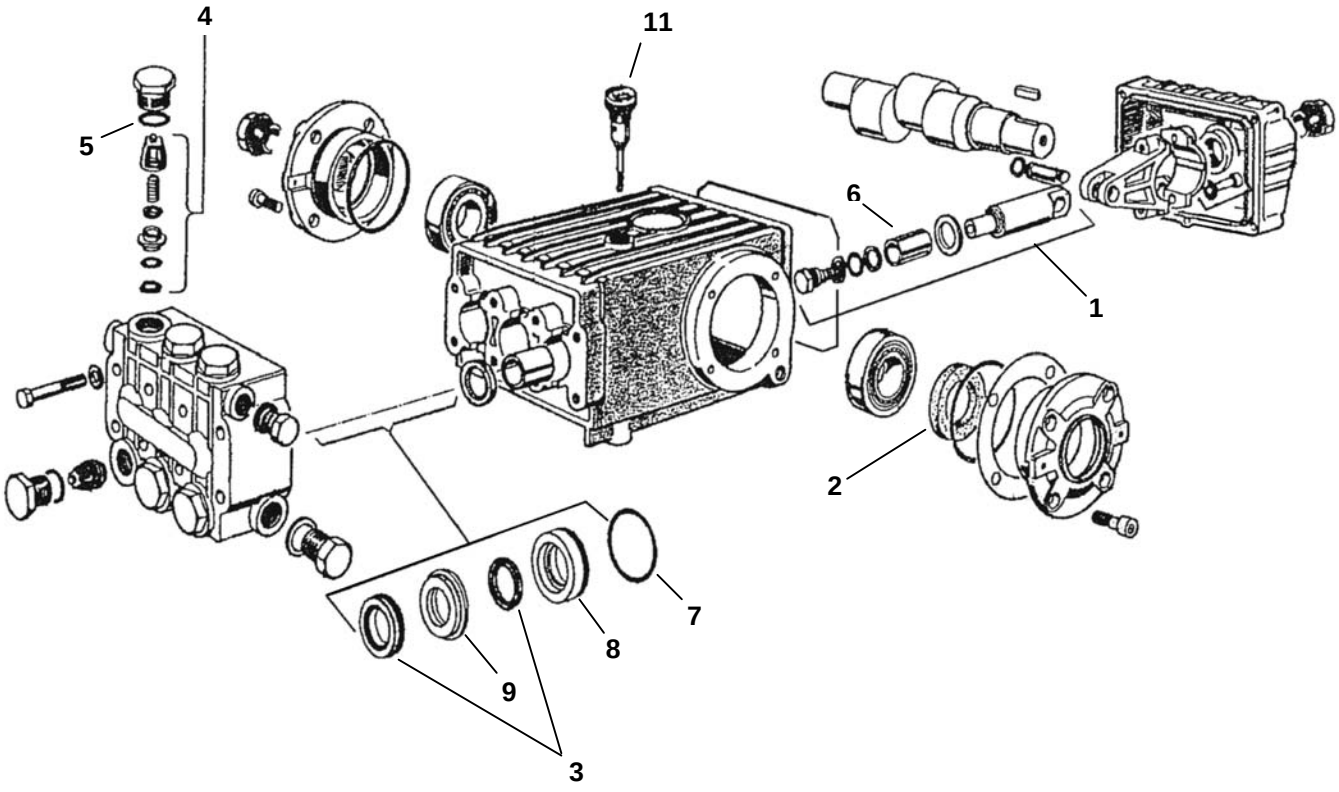
REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86190490	11-800101	1	PLUG, 1/8P		
2	86046050	790434	1	BRKT, 1/8 ALUM COUPLER		
3	86177660	12-800065	1	CONN, 1/8P X 1/4T		
4	86179900	31095	1	EL, 1/4 MJIC X 1/4 MBSPP		
5	86180450	12-800347	1	ELL, 3/8P X 1/2T 45 DEG. BR		
6	86175030	44-802250	2	BELT, AX38 GOODYEAR MATCH		
7	86177520	790976	1	CLUTH, 2X BELT, P31		
8	86282770	51372	1	LOOM, 1/4 HE TMP X 10”		
9	86005770	57119	4	NUT, 3/8-16 HEX NYLOCK		
10	86279510	87171	4	WASHER, 3/8 FLAT		
11	86057150	790436	2	STRAP, WTR PMP HOLDDOWN		
12	86277300	70826	4	SCR, M10-1.5 X 20MM SHCS PLTD		
13	86279500	87168	4	WASHER, M10 SPLIT		
14	86046150	790935	1	BRKT, WTR PMP MTG		
15	86180360	12-800040	1	ELL, 1/8P X 1/4T BR		
16	86191440	791173	1	PUMP, CHEM, PULSE, GP	*(3)	WAS 41-809158
17	86179920	790605	1	EL, 90 DEG 1/8 X 5/16 HB		
18	86176990	03-000065	2	CLAMP, HOSE #4 SST		
19	86181370	12-800278	1	FTTG, BRB 1/2P X 3/4H BR		
20	86177020	03-000113	1	CLAMP, HOSE #12 SST		
21	86191400	65241	1	PUMP, ASSY, GEN 4.5GPM, P31		
22	86271970	57302	4	NUT, 3/8 PUSH PLATE		
23	86195100	65245	1	VALVE CAP, 303 SST, INLET	*(3)	WAS 16-808237
24	86189290	65249	2	O-RING, DURO,.862ID X .103CS	*(3)	WAS 43-810079
25	86195110	65247	2	VALVE KIT, ASM, CHEM, PULSE PUMP	*(3)	WAS 42-809265
26	86173440	43-810105	1	O-RING, 1-5/8OD X 1-3/4 OD/40D VITON	*(3)	
27	86249220	65252	1	PLASTIC DISC	*(3)	WAS 42-809264
28	86179500	42-809047	1	DIAPHRAGM, CHEM PUMP		
29	86194630	65250	1	PULSE PUMP, TOP COVER INLET	*(3)	WAS 52-502053
30	86191340	65253	1	PULSE PUMP, BODY	*(3)	WAS 52-502052
31	86173620	04102	1	ADAPTR, PULSE PMP, GEN PUMP		
32	86195120	65248	1	VALVE CAP, 303 SST, OUTPUT	*(3)	WAS 16-808237
33	86192920	65246	1	SPACER CAP, 303 SST, OUTPUT	*(3)	
34	86190540	12-800029	1	PLUG, 1/4T BR	*(4)	
35	86177210	03-000051	1	CLMP, CABL 7/16 ID 1/4 BLT	*(4)	

***SEE SERIAL NUMBER PAGE.**
****CALL MANUFACTURER FOR SERIAL NUMBER.**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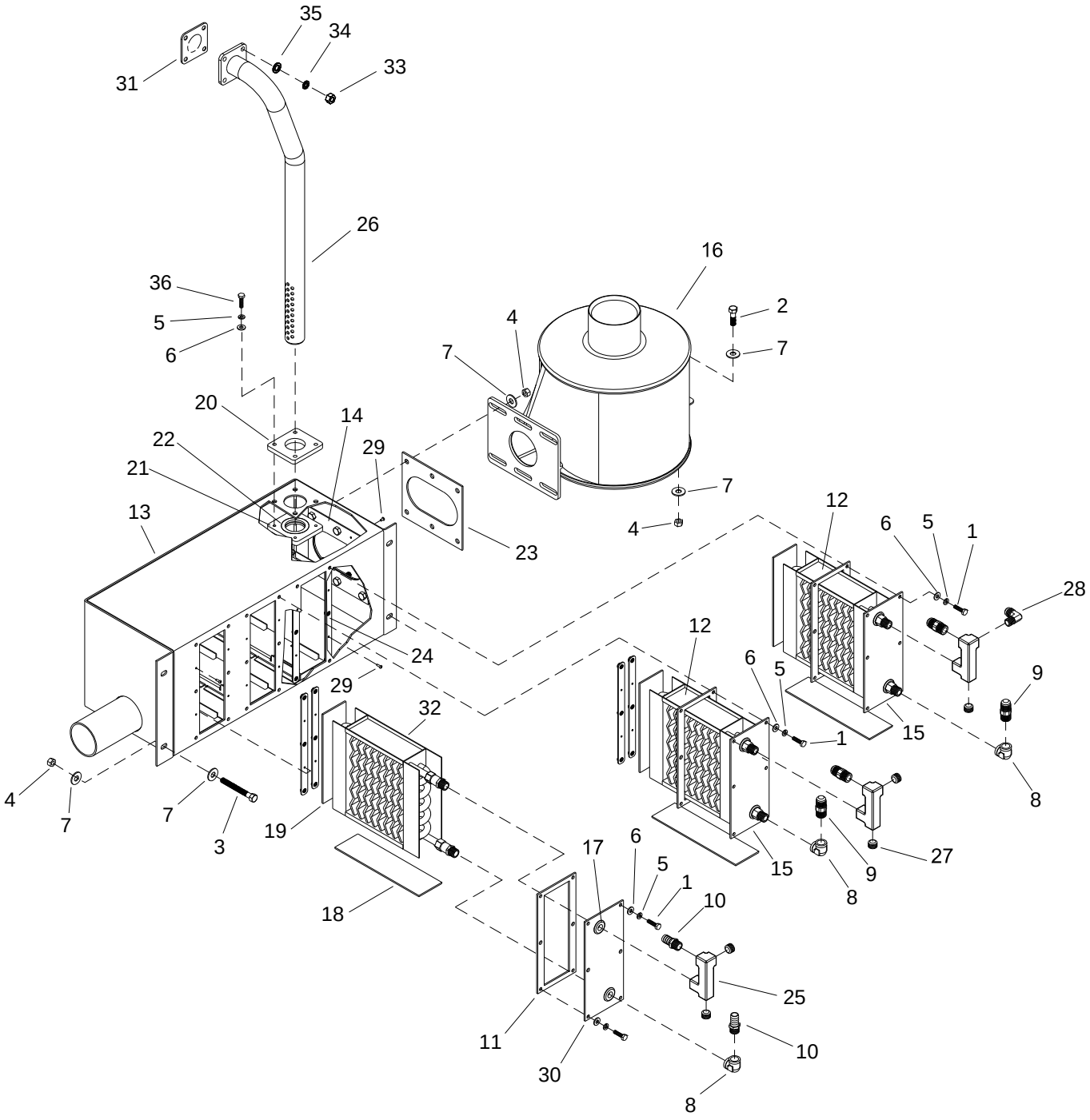
REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86186230	791031	1	KIT, MAINT, PLUNGER		
2	86186220	791030	1	KIT, SEALS CRANKCASE		
3	86014870	-	1	KIT, PLUNGER SEALS, 20MM GP		
4	86186250	791035	6	KIT, CHK VALVE, GEN PMP, 6PC		
5	86189320	791036	6	O-RING, CAP, GEN PMP		
6	86014880	-	3	PLUNGER, 20MM GP		
7	86014890	-	3	O-RING, PLUNGER SEAL GP		
8	86014900	-	3	SEAL RETAINER, 20MM GP		
9	86014910	-	3	RING, INTERMEDIATE, 20MM GP		
10	86189110	791106	1	OIL, GEN PUMP, SERIES 100		NOT SHOWN
11	86300440	-	1	DIPSTICK, VENTED GP		

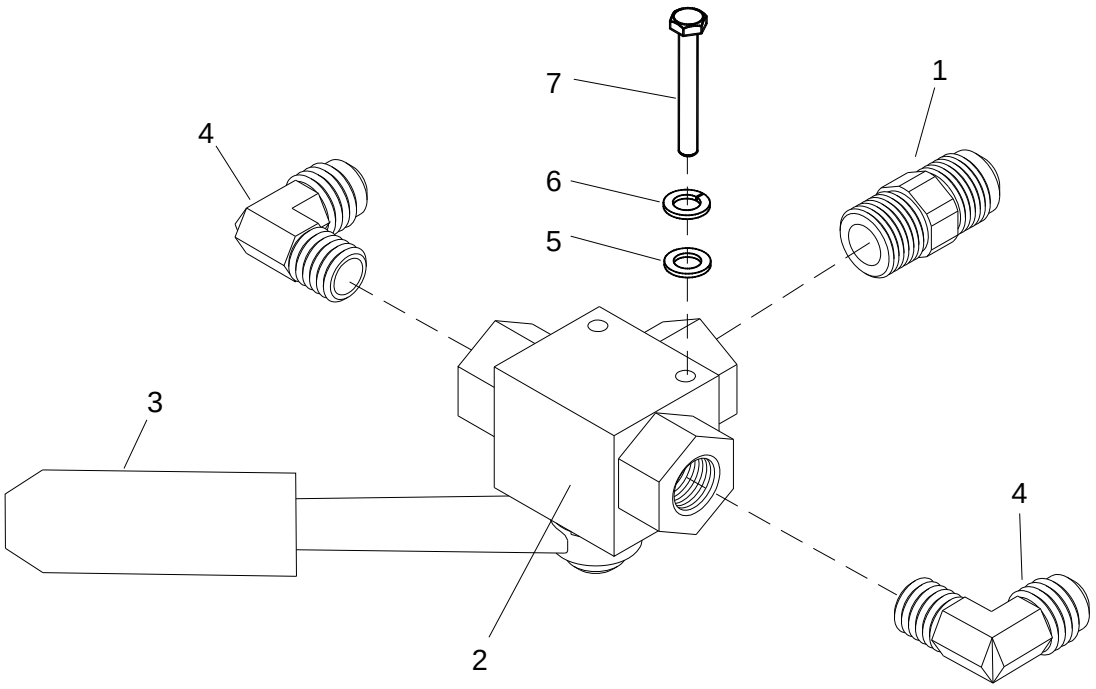
VAC/EXHAUST HEAT EXCHANGER/SILENCER



REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86273180	00-000078	18	SCR, 1/4-20 X 1” HXHD GRD8		
2	86275190	70377	1	SCR, 3/8-16 X 1.25 HHCS GR5PLT		
3	86274000	70069	4	SCR, 3/8-16 x 3 HHCS GR5		
4	86005770	57119	11	NUT, 3/8-16 HEX NYLOCK		
5	86010780	87162	22	WASHER, 1/4-20 SPLIT LOCK PLTD		
6	86270330	02-000066	22	FLTWSR, 1/4		
7	86279510	87171	16	WASHER, 3/8 FLAT		
8	86180220	11-800276	3	ELL, 3/8 BR		
9	86177700	12-800282	4	CONN, 3/8P x 1/2T BR		
10	86181400	12-800345	2	FTTG, BRB 3/8P x 5/8H BR		
11	86181850	790050	3	GASKET, VAC HE CVR		
12	86043150	790388	2	ASSEMBLY, HEATER CORE		
13	86049180	790064	1	HSG, VAC HE		
14	86051460	790121	1	PLT, VAC MUFFLER MTG		
15	86051220	620023	2	PLT, HEATER CORE CVR, STL		
16	86059260	790341	1	VAC MUFFLER		
17	86182190	36238	6	GROM, 1/2IDX1-1/4OD 1/8G 5/16W		
18	86189720	790343	3	PAD, BTM VAC HTR CORE		
19	86189730	790423	3	PAD, REAR VAC HTR CORE		
20	86051470	790328	1	PLT, UPPER EXHAUST		
21	86051490	790329	1	PLT, LOWER EXHAUST		
22	86192360	730420	1	SEAL, 5.813 DIA., GRAPH, BRAID SQ	*(5)	WAS 790330
23	86181840	790039	1	GASKET, VAC HE BOX TO MUFFLER		
24	86051410	790051	6	PLT, NUT-VAC HE HSG		
25	86187210	790038	3	FORGING, HEATER CORE MANIFOLD		
26	86054680	790926	1	TUBE EXHAUST ASSY		
27	86190520	11-800224	5	PLG, 3/8 SOCHD BR		
28	86180410	12-800225	1	ELL, ST 3/8 P X 1/2T BR		
29	86272970	00-000064	14	RIV, 1/8 x 3/8 ALUM		
30	86051230	620024	1	PLT, HEATER CORE CVR FRONT, STL		
31	86182290	35275	1	GSK, EXH, KUB D902/WG972		
32	86029780	790505	1	ASSEMBLY, HEATER CORE (COPPER)		INCLUDES 17 & 30
33	86136280	57054	4	NUT, M8 HEX		
34	86137310	87098	4	WASHER, M8 SPLIT LOCK		
35	86137280	87054	4	WASHER, M8 FLAT DIN125A PLT		
36	86277680	70937	4	SCR, 1/4-20 X 1 1/4 HXHD GR8		

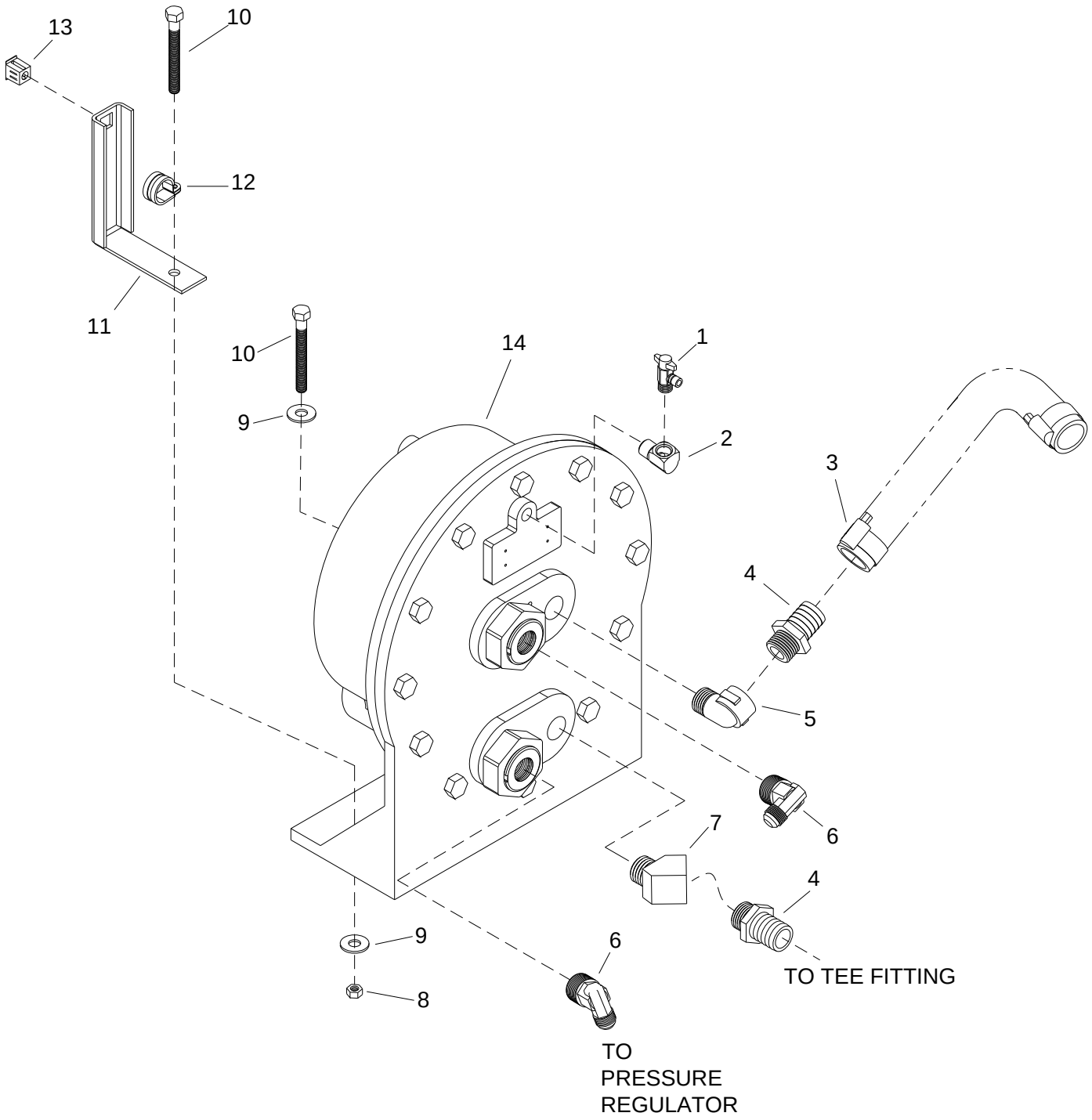
***SEE SERIAL NUMBER PAGE.**
****CALL MANUFACTURER FOR SERIAL NUMBER.**

SOLUTION TEMPERATURE CONTOL VALVE



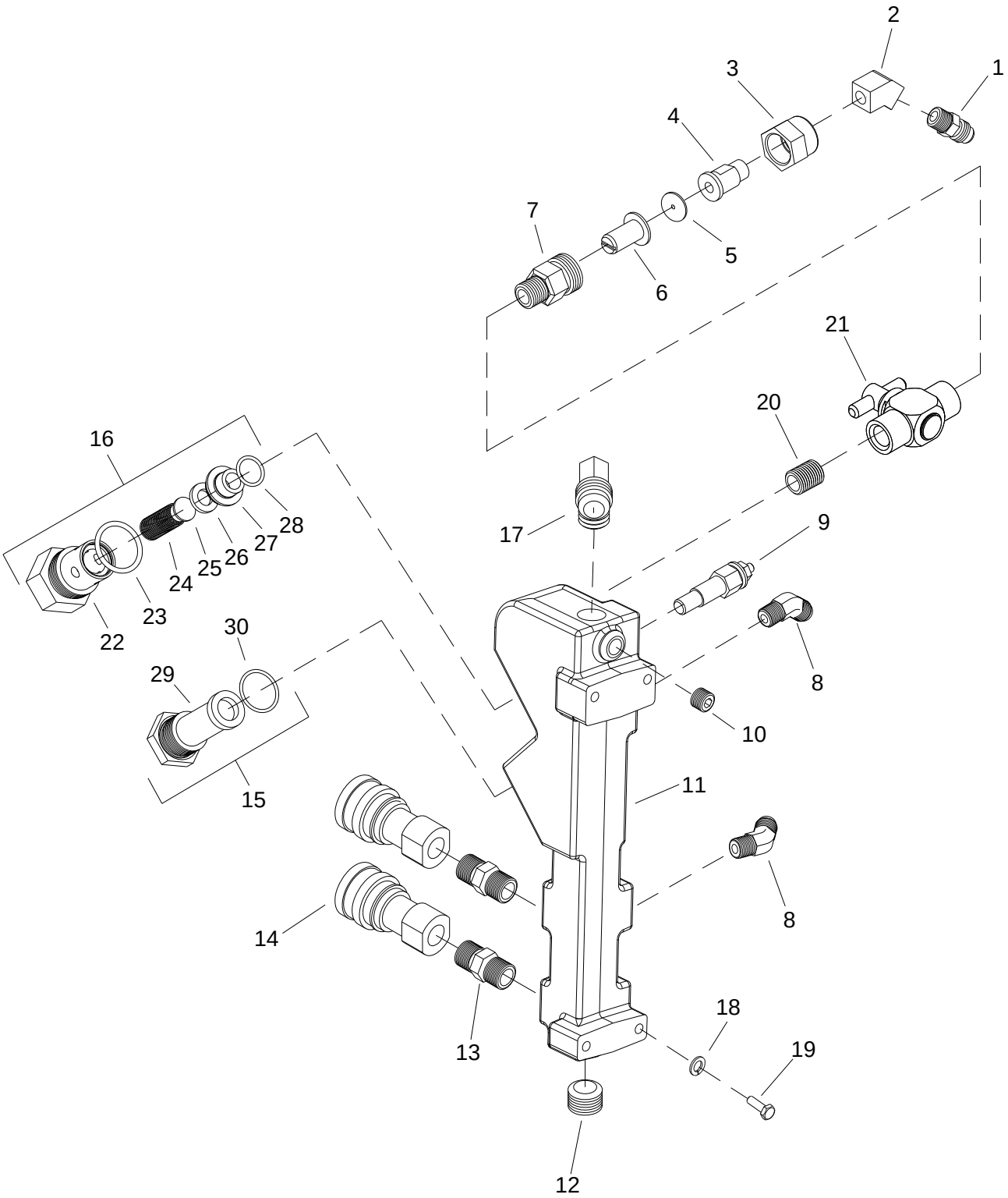
REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86177700	12-800282	1	CONN, 3/8P X 1/2T BR		
2	86195540	84192	1	VLV, BALL, 3-WAY, HI-TEMP/PRES		INCLUDES REF# 3
3	86183230	38317	1	HNDL, VALVE, 3-WAY, HI P/T		
4	86180410	12-800225	2	ELL, 3/8P X 1/2T BR		
5	86270330	02-000066	2	FLATWASHER, 1/4		
6	86010780	87162	2	WASHER, 1/4 SPLIT LOCK		
7	86273800	70017	2	SCR, CAP 1/4-20 X 2.50 HHCS		

HELI-COIL HEAT EXCHANGER



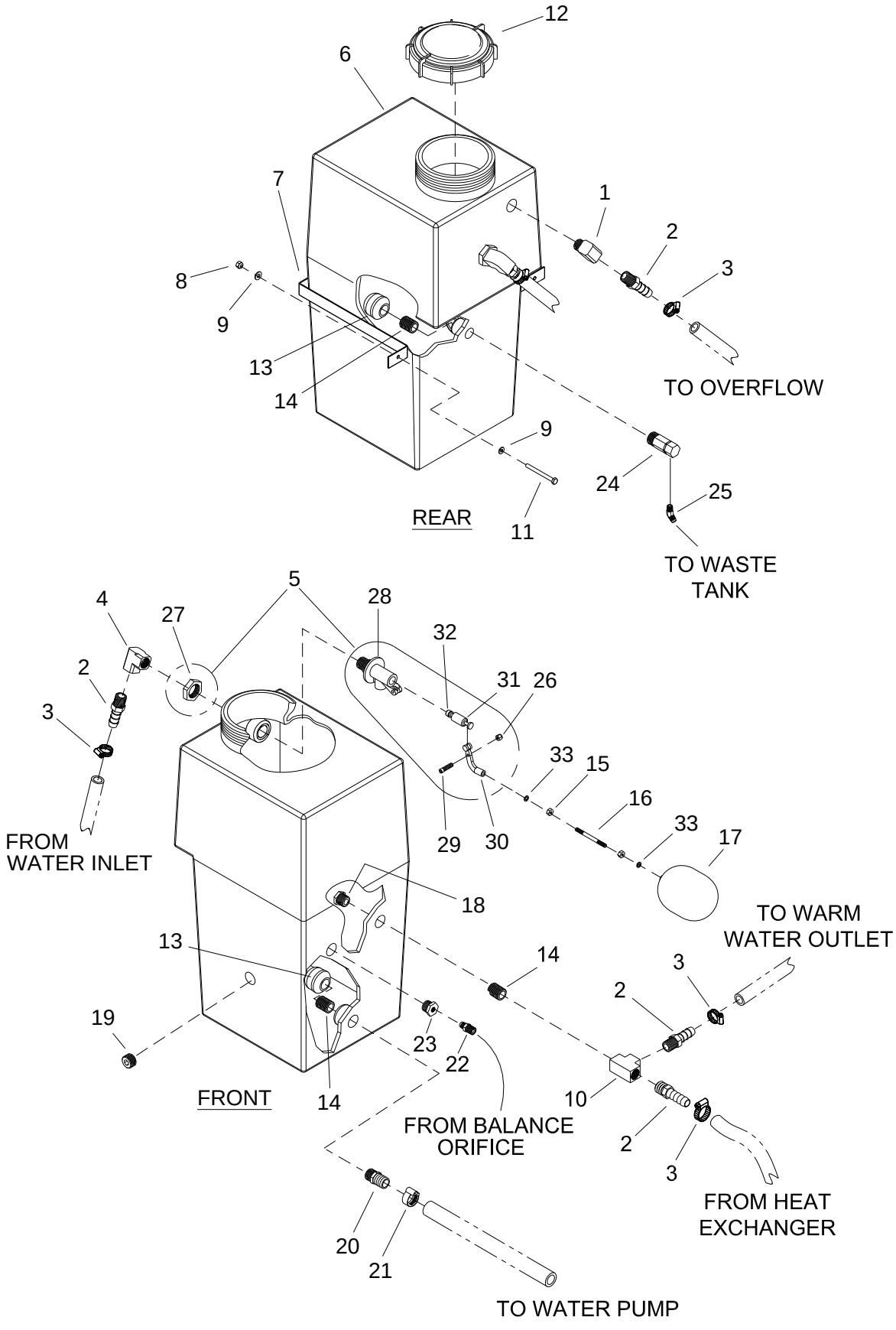
REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86177560	15-808073	1	COCK, DRN 1/4P X 1/4 HOSE ELL		
2	86197360	31016	1	ELBOW, 1/4NPT STREET		
3	86177310	03-000248	2	CLMP, HOSE #16 1-1/2 MIN 1-3/4		
4	86181420	12-800361	2	FTTG, BRB 3/4PX1H BR		
5	86180260	11-800401	1	ELL, 3/4 ST BR		
6	86180430	12-800326	2	ELL, 3/4PX1/2T BR		
7	86180000	31093	1	ELBOW, 3/4” 45 DEG BRASS ST		
8	86005770	57119	2	NUT, 3/8-16 HEX NYLOCK		
9	86279510	87171	2	WASHER, 3/8 FLAT		
10	86275860	70554	2	SCR, 3/8-16 X 3.5 HHCS GR5PLTD		
11	86046060	790445	1	BRKT, RIGHT HOOD MTG		
12	86233410	81270	1	CALMP, 3/4 DIA CUSHION .406 DIA		
13	86191570	01-000259	1	RECPT, SNAPIN 1/4 TURNFA		
14	86048290	57-520073	1	HE, HELI-COIL		

SOLUTION OUTLET



REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86177660	12-800065	1	CONN, 1/8P X 1/4T		
2	86179990	31092	1	ELBOW, 1/8” 45 DEG BRASS		
3	86002820	27074	1	CAP, NOZZLE		
4	86173580	790839	1	ADAPTER, HOSE BYPASS		
5	86189190	790836	1	ORIFICE PLATE, BYPASS		
6	86193490	14-806512	1	STRNR, JET 50MESH		
7	86177860	17-803010	1	CONN, 1/4P X 11/16-16M		
8	86180420	12-800261	2	ELL, 1/8P X 1/4T 45 DEG		
9	86192490	34-903019	1	SENDER, TEMP 140-320DEG		
10	86190180	11-800206	1	PLG, 1/8 SOCHD BR		
11	86055610	790844	1	MANIFOLD, SOLUTION		
12	86190520	11-800224	1	PLUG, 3/8 SOCHD BR		
13	86247680	56015	2	NIPPLE, 1/4 HEX		
14	86002450	22015	2	COUPLER, 1/4 QD		
15	86192240	730224	1	SCRN, MESH W/O-RNG, SOL MNFLD		
16	86195030	15-808094	1	VALVE, CHECK		
17	86180410	12-800225	1	ELL,S 3/8PX1/2T BR		
18	86010780	87162	4	WASHER, 1/4 SPLIT LOCK		
19	86274750	70270	4	SCR, 1/4-20 X 3/4 HHCS PLTD		
20	86005590	56014	1	NIPPLE, 1/4 CLOSE		
21	86195170	84195	1	VALVE, 1/4FP BALL W/HANDLE CAPS		
22	86176350	16-808222	1	CAP		
23	86189270	43-810079	1	O-RING, 7/8 ID 1-1/16 OD		
24	86193260	16-808224	1	SPRING		
25	86190910	16-808226	1	POPPET, CHK VLV ASSY		
26	86194250	16-808225	1	TEFLON SEAT		
27	86192390	16-808223	1	SEAT, CHK VLV ASSY		
28	86189230	43-810008	1	O-RING		
29	86192210	14-806549	1	SCREEN, CHECK VALVE		
30	86189260	43-810053	1	O-RING		

WATER BOX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REAR
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TO WASTE TANK
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FROM WATER INLET
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TO WARM WATER OUTLET
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22
FRONT
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FROM BALANCE ORIFICE
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FROM HEAT EXCHANGER
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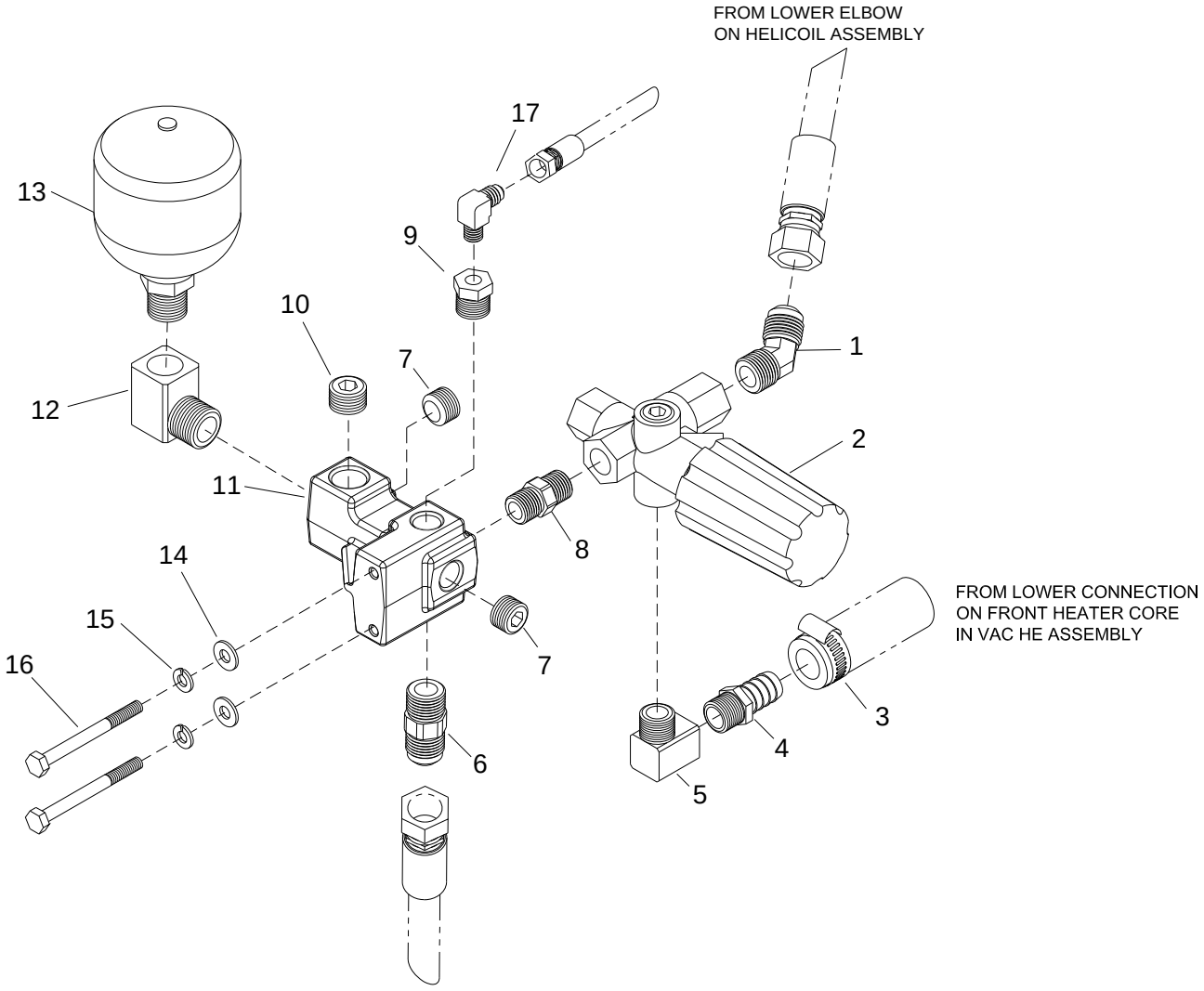
21
TO WATER PUMP

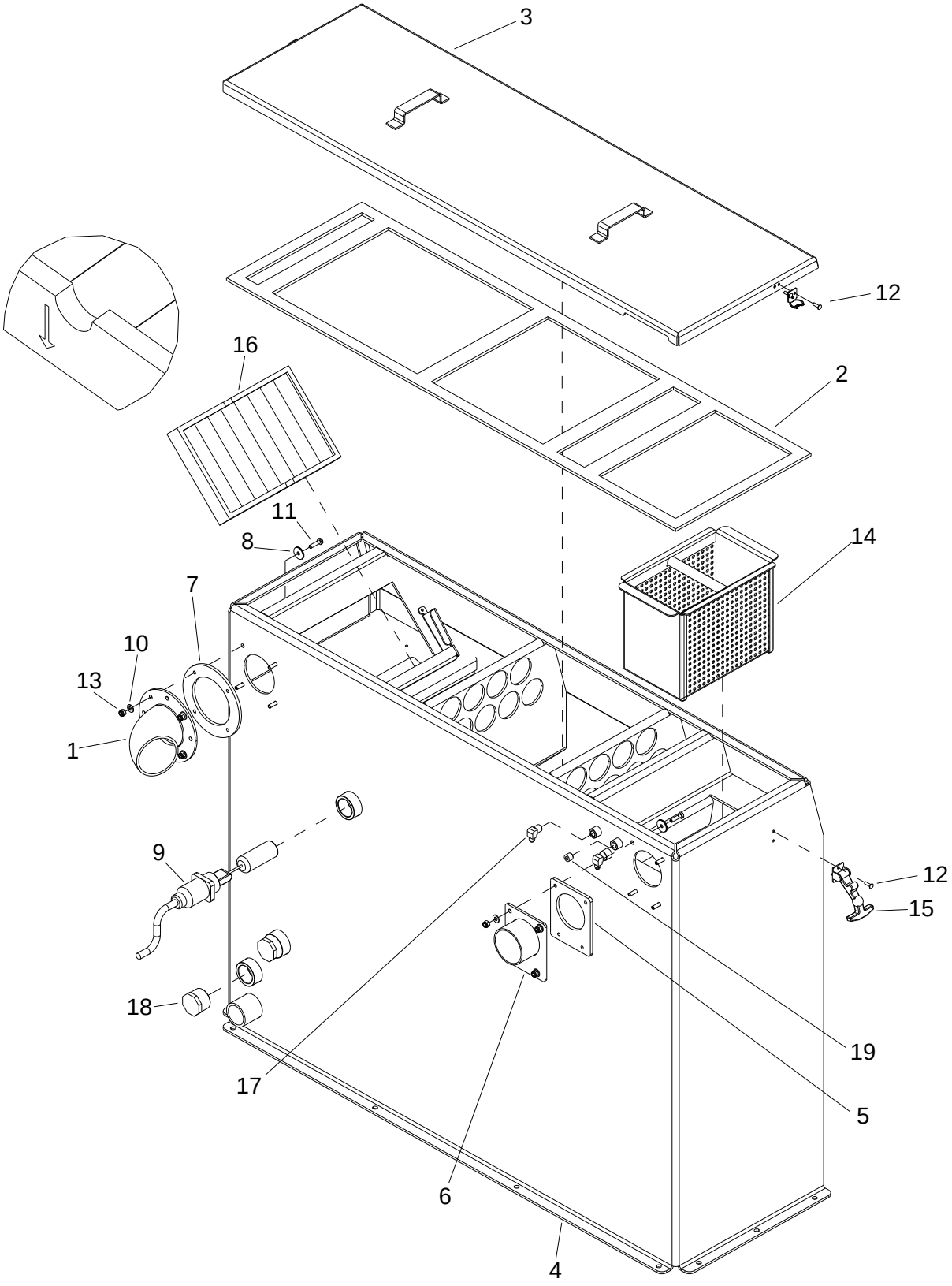
REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86180170	11-800041	1	ELL, STREET 1/2 BR MACH		
2	86181360	12-800269	3	FTTG, BRB 1/2P X 5/8H BR		
3	86177060	03-000246	6	CLAMP, HOSE, #8 SST		
4	86180250	11-800361	1	ELL, 1/2 BR		
5	86195060	15-808110	1	VALVE, FLOAT		
6	86187460	790132	1	MLDG, WATER BOX		
7	86057160	790437	1	STRAP, WTR BOX HOLDDOWN		
8	86005680	57047	2	NUT, 1/4-20 HEX NYLOCK		
9	86270330	02-000066	4	FLATWASHER, 1/4		
10	86194120	11-800085	1	TEE, 1/2 BRASS		
11	86273330	00-000286	2	SCR, CAP 1/4-20 X 2.75 HXHD		
12	86176400	11-800432	1	CAP, WATER BOX		
13	86193440	14-806540	2	STAINER, SUC END 1/2FP		
14	86188180	11-800300	3	NIP, 1/2 X CL		
15	86270770	57006	2	NUT, 1/4-20 HEX		
16	86056660	790411	1	ROD, FLOAT (1/4-20 X 4") SS		
17	86348200	-	1	BALL, 4" DIA X 5" L, WHITE FLOAT		
18	86175870	11-800021	1	BUSH, 1/2X1/8 BR		
19	86190480	11-800069	1	PLUG, 1/2 SOCHD BR		
20	86181370	12-800278	1	FTTG, BRB 1/2P X 3/4H BR		
21	86177020	03-000113	1	CLAMP, HOSE #12 SST		
22	86177660	12-800065	2	CONN, 1/8P X 1/4T		
23	86175860	11-800020	2	BUSH, 1/2X 1/4 BR		
24	86195340	15-808075	1	VLV, TEMP REL 145DEG		
25	86180420	12-800261	1	ELL, 1/8P X 1/4T 45 DEG		
26	86024750	94028	1	NUT, M5 HEX NYLOCK SS		WAS 57090
27	86189010	52-501706	1	NUT, FLOAT VALVE		
28	86309160	-	1	BDY, FLOAT VALVE		WAS 16-808217
29	86308950	-	1	SCR, HHSS, M5 X 20MM, SS		WAS 00-000337
30	86309140	-	1	ARM, PIVOT-FH VALVE		WAS 16-808216
31	86189870	16-808219	1	PISTON, FH VLV		
32	86192380	16-808164	1	SEAT, FLOAT VLV		
33	86010660	87025	2	WASHER 1/4 LOCK EXT STAR SS		

PRESSURE REGULATOR



REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86180450	12-800347	1	ELL, 3/8P X 1/2T 45 DEG BR		
2	86191660	790067	1	REGULATOR, LOW PRESSURE SOLUTION		
3	86177060	03-000246	1	CLAMP, HOSE #8 SST		
4	86181400	12-800345	1	FTTG, BRB 3/8P X 5/8H BR		
5	86180210	11-800275	1	ELL, ST 3/8 BR		
6	86177700	12-800282	1	CONN, 3/8P X 1/2T BR		
7	86190520	11-800224	1	PLUG, 3/8 SOCHD BR		
8	86188390	11-800429	1	NIP, HEX 3/8 SST		
9	86175920	11-800118	1	BUSH, 3/8X1/8 BR		
10	86190480	11-800069	1	PLUG, 1/2 SOCHD BR		
11	86187770	790901	1	MNFLD, PRESS		
12	86180570	31098	1	ELL, STREET 1/2 BR FORGED		
13	86173460	790106	1	ACCUMULATOR, 250PSI CAT 6026		
14	86270330	02-000066	2	FLATWASHER, 1/4		
15	86010780	87162	2	WASHER, 1/4 SPLIT LOCK		
16	86273330	00-000286	2	SCR, CAP 1/4-20 X 2.75 HXHD		
17	86180360	12-800040	1	EL, 1/8P X 1/4T BR		

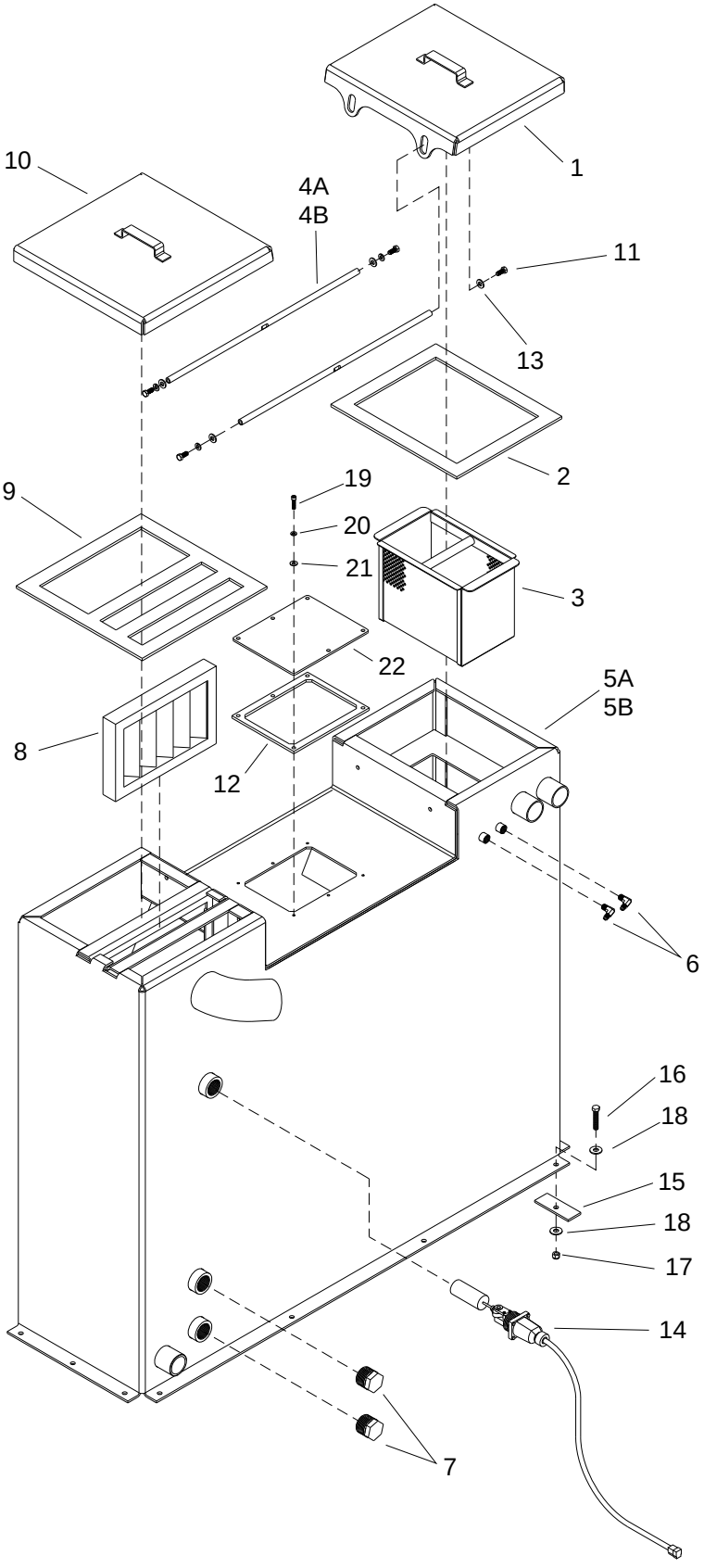
AFTER SERIAL NUMBER **
WASTE TANK – 100 GALLON



REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86328460	-	1	OUTLET, VACUUM, 3-1/2", PC		
2	86325770	-	1	GASKET, LID, 100G WST TNK		
3	86325720	-	1	LID, 100G WST TNK, PC		
4	86325650	-	1	TANK, WASTE, 100G PC		
5	86323700	-	1	GASKET, VAC INLET		
6	86323580	-	1	INLET, 3" VACUUM, PC		
7	86318560	-	1	GASKET, VAC OUTLET		
8	86202240	-	8	WASHER, SEAL 1/4 X 1 OD SS		
9	86193870	791066	1	SWITCH, FLOAT, N.C. HARWIL		
10	86010630	87013	8	WASHER, 1/4 X 5/8 FLAT SS		
11	86273810	70018	8	SCR, 1/4-20 X 1.00 HHCS SS		
12	86273020	67006	8	RIVET, 3/16 OD X 5/8 AL		
13	86005810	57245	8	NUT, 1/4-20 HEX NYLOCK SS		
14	86043190	56-501793	1	ASSY, BSKT, STRNR WST TNK		
15	86186860	46-802510	2	LATCH, DRAW 2-7/8 SST		
16	86193540	14-806569	1	STRNR, WST TNK, RECT, 1.5"		
17	86180340	12-800031	2	ELL, 1/4P X 1/4T BR		
18	86190530	11-800402	2	PLUG, 1-1/4 HXHD PVC		
19	86272720	11-800345	1	PLG, 1/4 SOCHD BRASS		

***SEE SERIAL NUMBER PAGE.**
****CALL MANUFACTURER FOR SERIAL NUMBER.**

BEFORE SERIAL NUMBER **
WASTE TANK – 80 GALLON

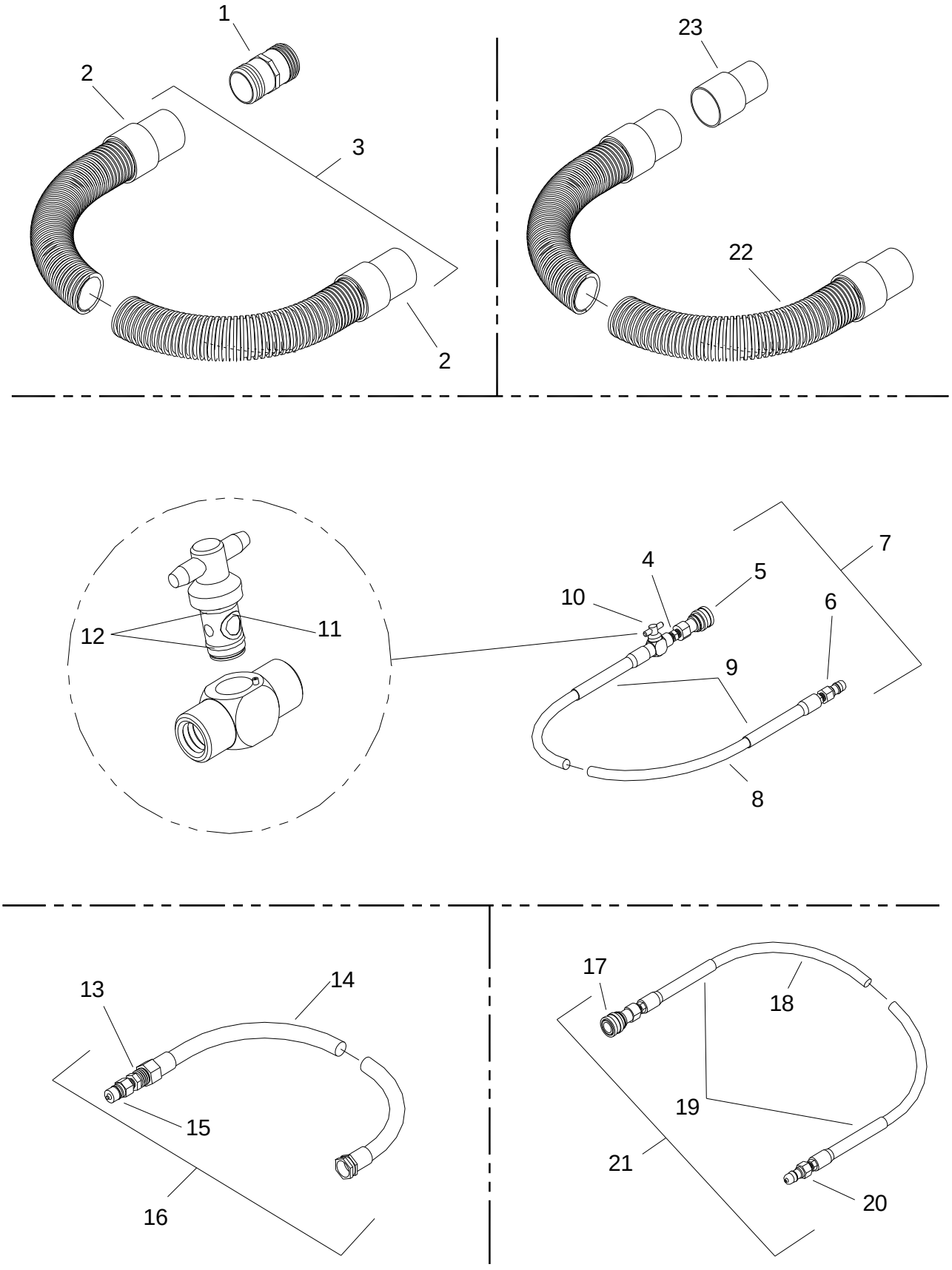


*BEFORE SERIAL NUMBER ***
WASTE TANK – 80 GALLON

REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86049640	790125	1	LID, STRAINER, WST TNK		
2	86182700	790448	1	GASKET, WASTE TANK		
3	86043190	56-501793	1	STRAINER BOWL		
4A	86191920	790475	2	ROD, WST TNK LID SST, 100 GAL		
4B	86191930	790514	2	RD, LID, ST TNK SST, 80 GAL		
5A	86058480	790470*	1	TNK, WASTE, 100 GAL		
5B	86058510	790509*	1	TNK, WST, 80 GAL		
6	86180340	12-800031	2	ELL, 1/4P X 1/4T BR		
7	86190530	11-800402	2	PLUG, 1-1/4 HXHD PVC		
8	86193540	14-806569	1	STRNR, WST TNK RECT. 1.5”		
9	86182690	790351	1	GASKET, WASTE TANK		
10	86049590	790124	1	LID, FILTER, WST TANK		
11	86275320	70432	4	SCR, 5/16-24 X 3/4 HHCS SS		
12	86182660	43-807574	1	GSKT, ACCESS PNL-WST TNK		
13	86010670	87029	4	WASHER, 5/16 FLAT SS		
14	86193870	791066	1	SWITCH, FLOAT, N.C. HARWIL		
15	86249550	62986	4	PLATE TRUCKMOUNT		
16	86277830	00-000072	10	SCR, 3/8-16 X 2” HXHD		
17	86005770	57119	10	NUT, 3/8-16 HEX NYLOCK		
18	86279510	87171	21	WASHER, 3/8 FLAT		
19	86273810	70018	6	SCR, CAP 1/4-20 X 1 HHCS SS		
20	86010780	87162	6	WASHER, 1/4 SPLIT LOCK		
21	86270330	02-000066	6	FLATWASHER, 1/4		
22	86051860	50-502085	1	PNL, ACCESS-WST TNK		
-	86264850	05-008002	1	ADH, GSKT (ADHESIVE)		NOT SHOWN

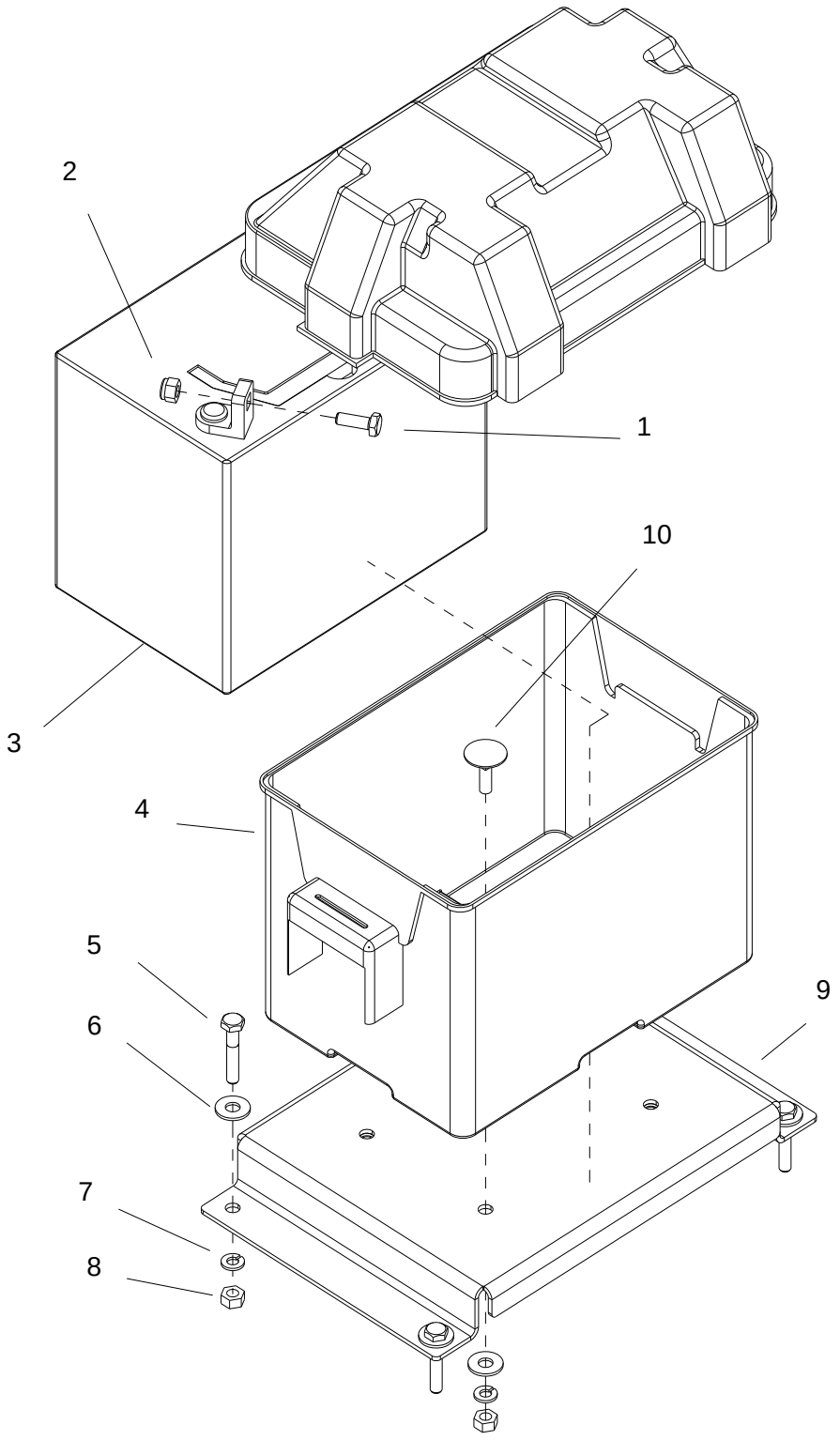
***SEE SERIAL NUMBER PAGE.**
****CALL MANUFACTURER FOR SERIAL NUMBER.**

HOSE ACCESSORIES

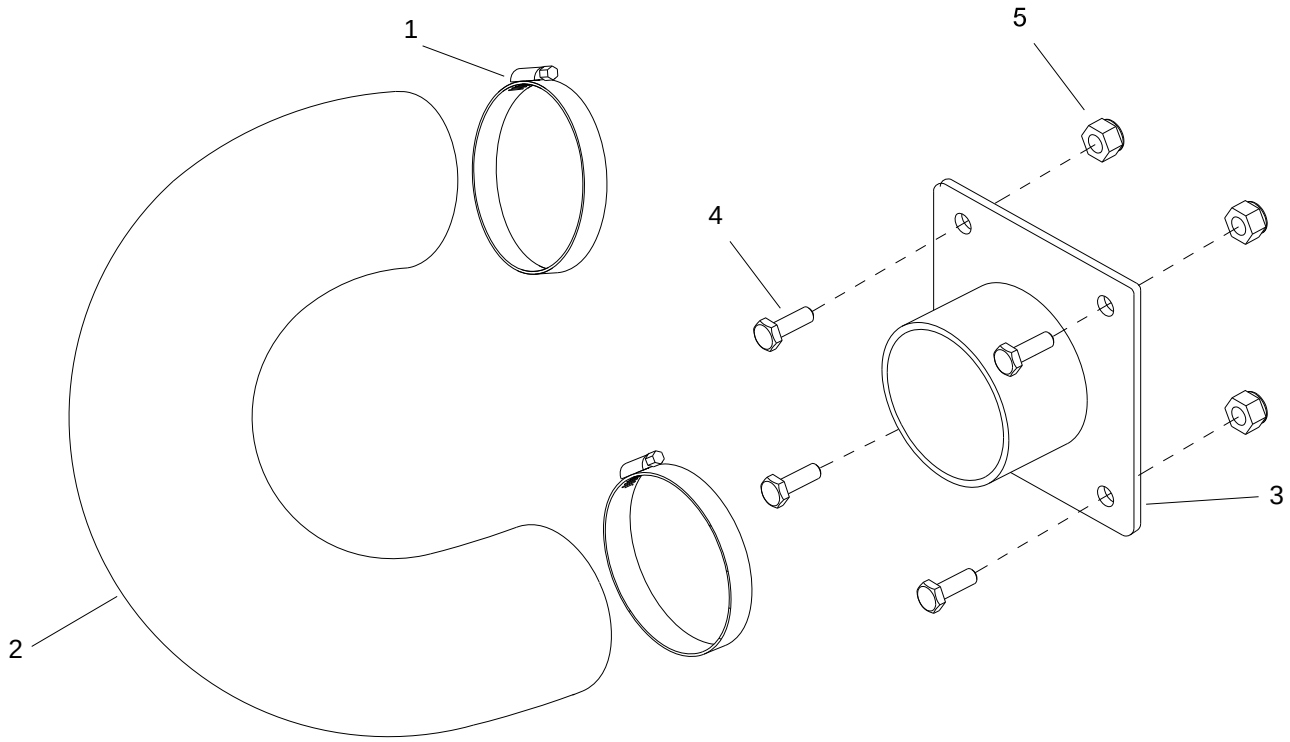


REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86180980	12-800078	1	FITTING, BRB 2H BS PVC		
2	86178640	08-805147	2	CUFF, 2”		
3	86184510	10-805060	1	HOSE, VAC 2”X50’ W/ CUFFS & HOSE		
4	86247680	56015	1	NIPPLE, 1/4 HEX		
5	86002450	22015	1	COUPLER, 1/4 QD		
6	86005580	56012	1	NIPPLE, 1/4 FPT QD		
7	86184530	10-805108	1	HOSE, HP 1/4 X 50FT W/QD & VLVE		
8	86184520	10-805077	1	HOSE, HP 1/4 X 50’		
9	86182800	08-805155	2	GUARD, HOSE VINYL		
10	86194990	15-808012	1	VALVE, BALL 1/4FP		
11	86189240	43-810014	2	O-RING, 7/32ID X 11/32OD		
12	86189250	43-810019	2	O-RING, 3/8 ID X 1/2 OD		
13	86188210	11-800354	1	NIP, 1/2 X 3/8 HEX BR		
14	86184570	10-805157	1	HOSE, WATER 1/2 X 50’		
15	86179630	13-806009	1	DISCONNECT 3/8M X 3/8FP		
16	86184620	10-805295	1	HOSE, WATER 1/2 X 50’		
17	86002450	22015	1	COUPLER, 1/4 QD		
18	86184520	10-805077	1	HOSE, HP 1/4 X 50’		
19	86182800	08-805155	2	GUARD, HOSE VINYL		
20	86005580	56012	1	NIPPLE, 1/4 FPT QD		
21	86184540	10-805122	1	HOSE, HP 1/4 X 50FT W/QD		
22	86328140	-	1	HOS, VAC 2-1/2" X 50' W/CUFFS & HOSE		
23	86328150	-	1	COUPLER, HOS 2-1/2" TO 2" REDUCER		

BATTERY-FLOOR MOUNT

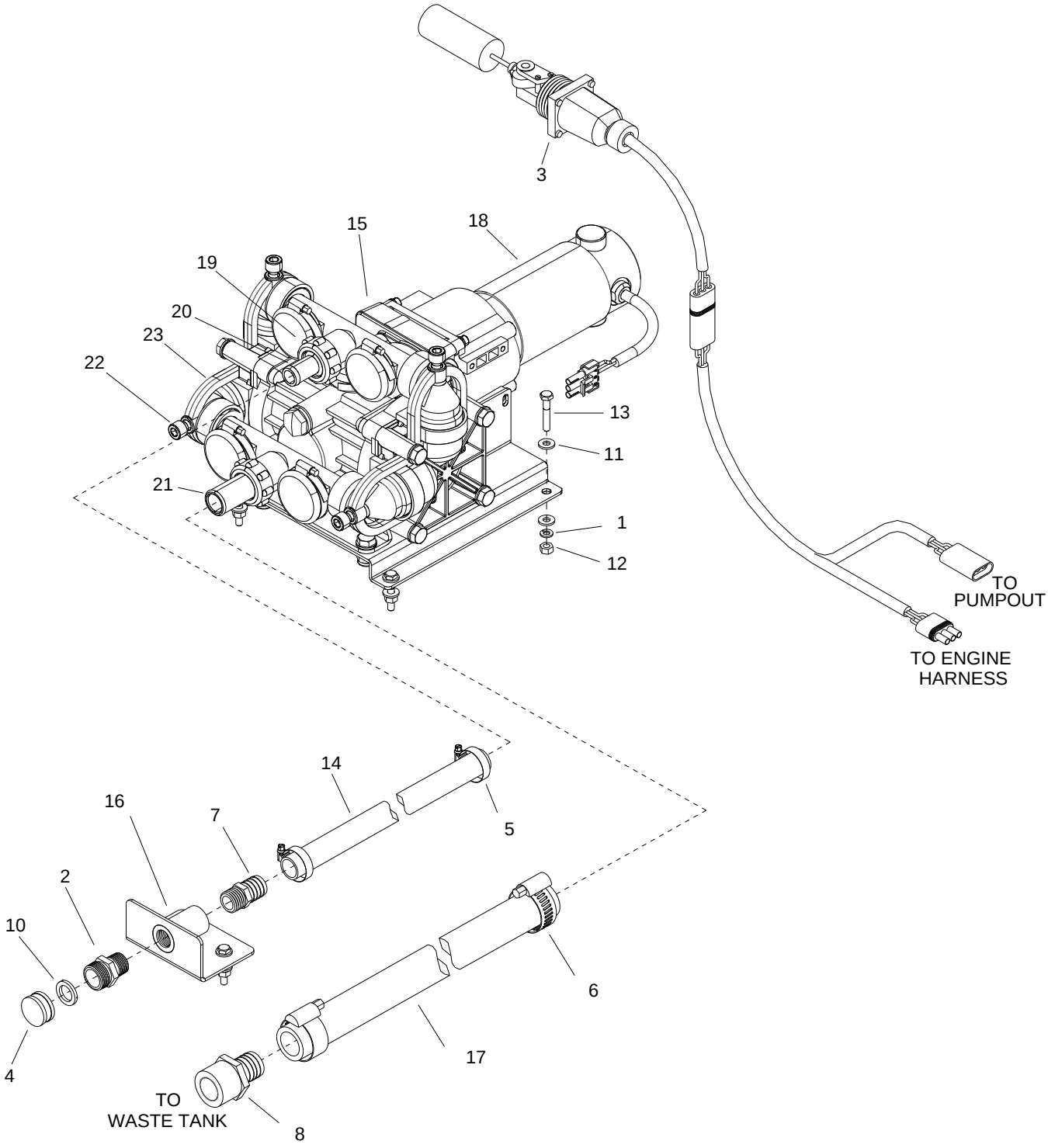


REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86273780	70015	2	SCR, 1/4-20 X 3/4 HHCS SS NP		
2	86005680	57047	2	NUT, 1/4-20 HEX NYLOCK		
3	86174580	36-900056	1	BATTERY		
4	86012060	-	1	BOX, BATTERY, MODIFIED		
5	86273190	00-000132	4	SCR, 1/4-20 X 1-1/2 HXHD		
6	86270330	02-000066	8	FLATWASHER, 1/4		
7	86010780	87162	8	WASHER, 1/4 SPLIT LOCK PLTD		
8	86270770	57006	8	NUT, 1/4-20 HEX		
9	86309890	-	1	BRKT, BATTERY BOX MTG		
10	86011470	-	4	BOLT, ELEVATOR, 1/4-20 X 1		


1
5
4
3
2

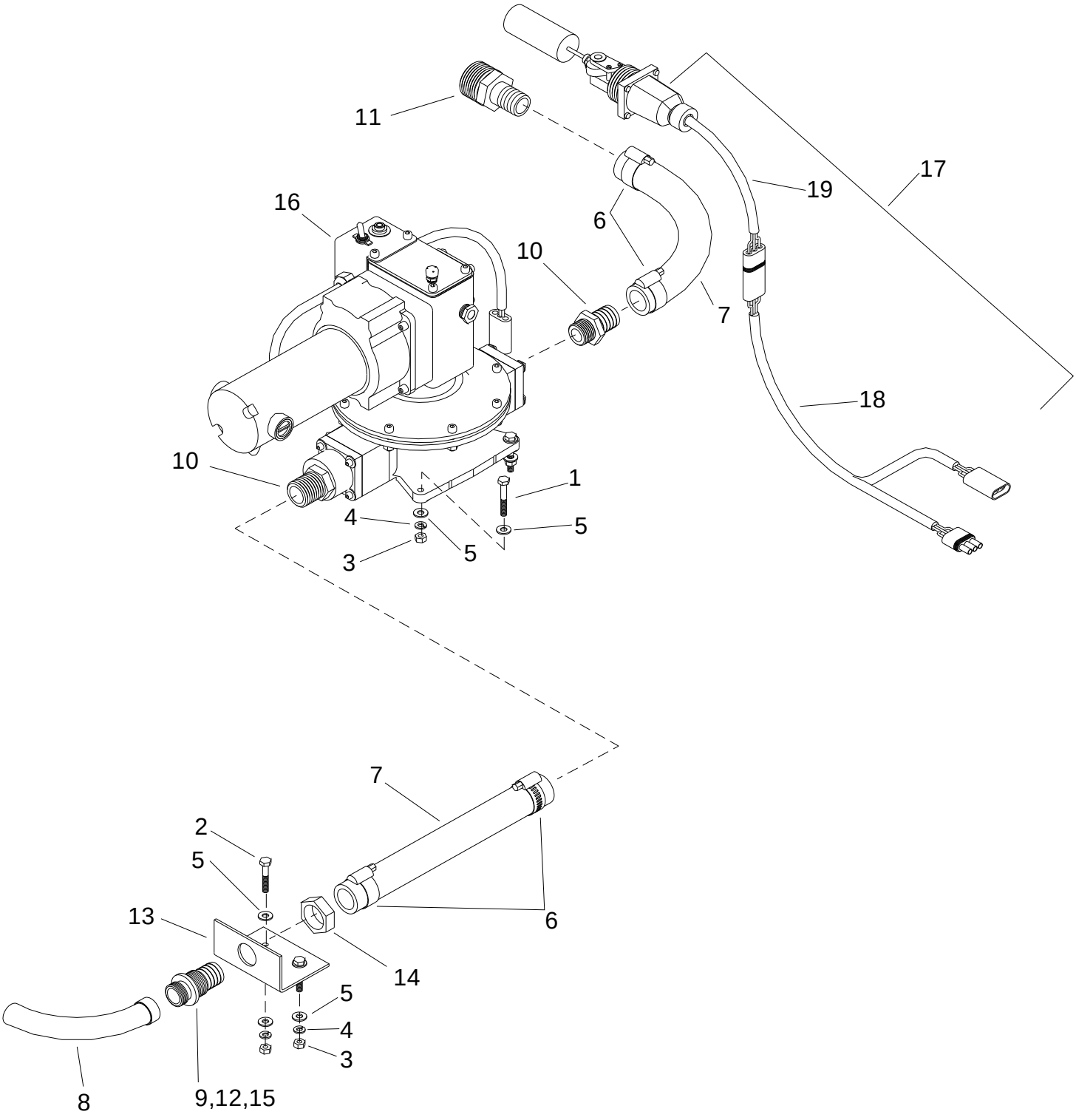
REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86177010	03-000112	2	CLAMP, #48 HOSE		
2	86280600	09-805487	1	HOSE, 3" X 17" FLEXABLE		
3	86181110	56-502131	1	FLANGE, VAC EXH DUCT KIT LG		
4	86192060	00-000376	4	SCREW, 1/4-20 X 1-1/4" SST		
5	86005810	57245	4	NUT, 1/4-20 HEX NYLOCK SS		
-	86030440	47447	1	KIT, EXHAUST 3” ID, SINGLE		KIT COMPLETE

AUTOMATIC PUMPOUT - DUAL DIAPHRAGM - OPTIONAL



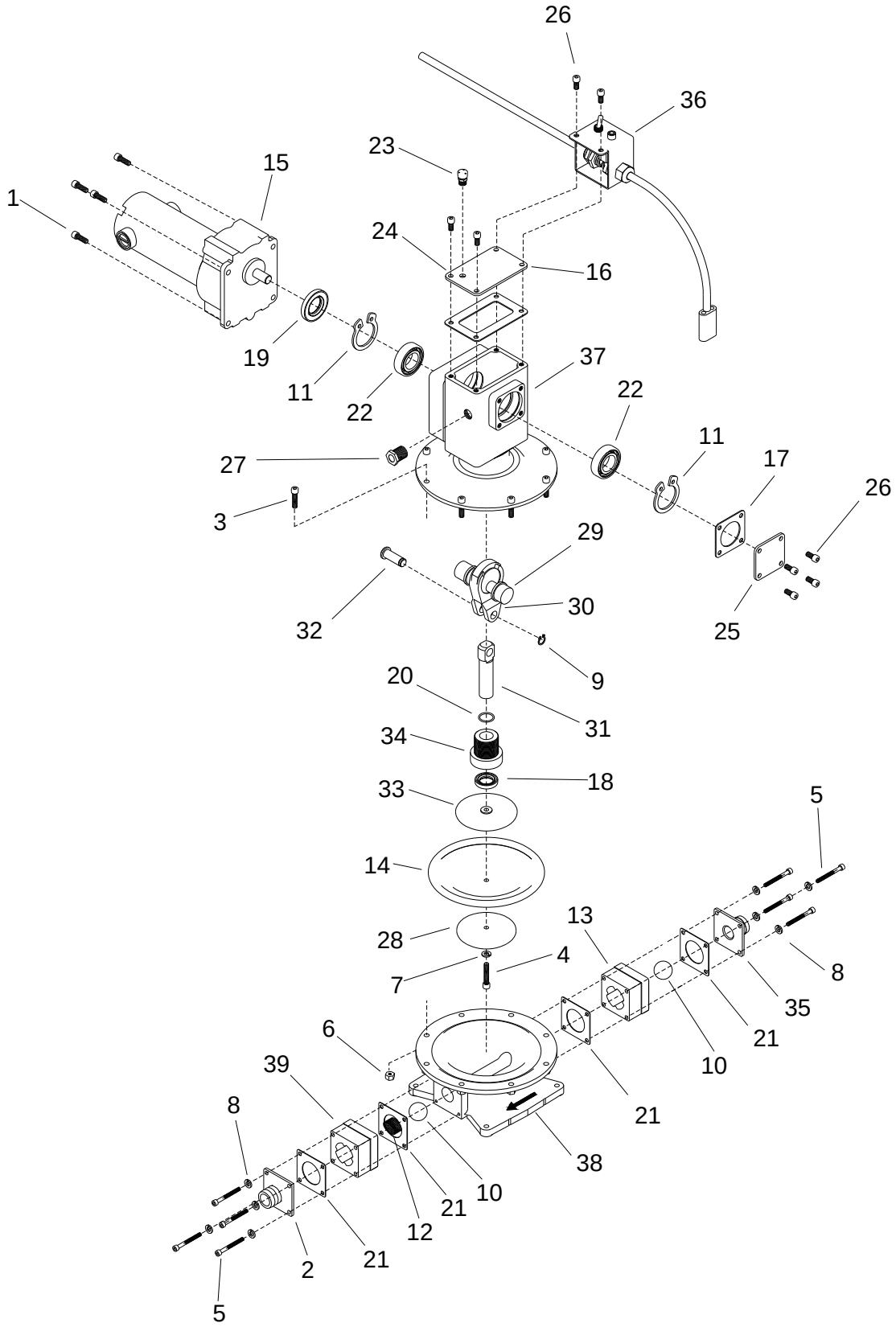
REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
-	86335970	-	1	ASSY, PUMPOUT, DUAL DIAPHRAGM		COMPLETE ASSEMBLY
1	86010780	87162	1	WASHER, 1/4 SPLIT LOCK, PLTD		
2	86173530	790506	1	ADAPTER, HOSE 1/2M X 3/4 MGT		
3	86174260	61-951319	1	ASSY, LVL SW WASTE PUMPOUT		
4	86176420	12-800052	1	CAP, HOS 3/4 BR		
5	86177020	03-000113	2	CLAMP, HOSE #12 SST		
6	86177050	03-000176	2	CLAMP, HOSE #20		
7	86181370	12-800278	1	FTTG, BRB 1/2P X 3/4H BR		
8	86181440	12-800444	1	FTTG, 1-1/4P X 1"H BR		
9	86184780	10-805484	1	HOSE, GARDEN 3/4 X 75'		
10	86195820	43-807008	1	WSR, HOS 5/8 ID 1"OD		
11	86270330	02-000066	12	FLATWASHER, 1/4		
12	86270770	57006	6	NUT, 1/4-20 HEX		
13	86273190	00-000132	6	SCR, 1/4-20 X 1-1/2 HXHD		
14	86280590	09-805456	1	HOSE, 3/4ID WTR X 96"		
15	86333880	-	1	PUMPOUT, WASTE, DUAL DIAPHRAGM		
16	86335950	-	1	BRKT, HOSE CONNECTING		
17	86335960	-	1	HOSE, WTR, 1" X 48"		
18	86336370	-	1	MOTOR, BISON PUMP 12V		
19	86336350	-	1	NUT, 3/4"DIA OUTLET, DUAL PUMPOUT		
20	86336360	-	1	FTTG, BARB, 3/4"DIA, DUAL PUMPOUT		
21	86336380	-	1	FTTG, BARB, OUTLET, DUAL PUMPOUT		
22	86336410	-	4	SCR, CLAMP SHCS, DUAL PUMPOUT		
23	86336420	-	4	CLAMP, DUAL PUMPOUT		
-	86336300	-	2	DIAPHRAGM, PUMP OUT, DUAL		NOT SHOWN
-	86336310	-	2	BOLT, DIAPH RETAINING		NOT SHOWN
-	86336320	-	2	WASHER, DIAPH RETAINING		NOT SHOWN
-	86336340	-	4	VALVE, DUAL PUMPOUT, CHECK		NOT SHOWN
-	86336390	-	4	O-RING, DUAL PUMPOUT, MANIFOLD		NOT SHOWN
-	86336400	-	4	O-RING, BARB FTTG, DUAL PUMPOUT		NOT SHOWN
-	86336430	-	4	O-RING, DUAL PUMPOUT, ELBOW		NOT SHOWN
-	86336440	-	1	KIT, DUAL PUMPOUT, REBUILD		NOT SHOWN

AUTOMATIC PUMPOUT - OPTIONAL



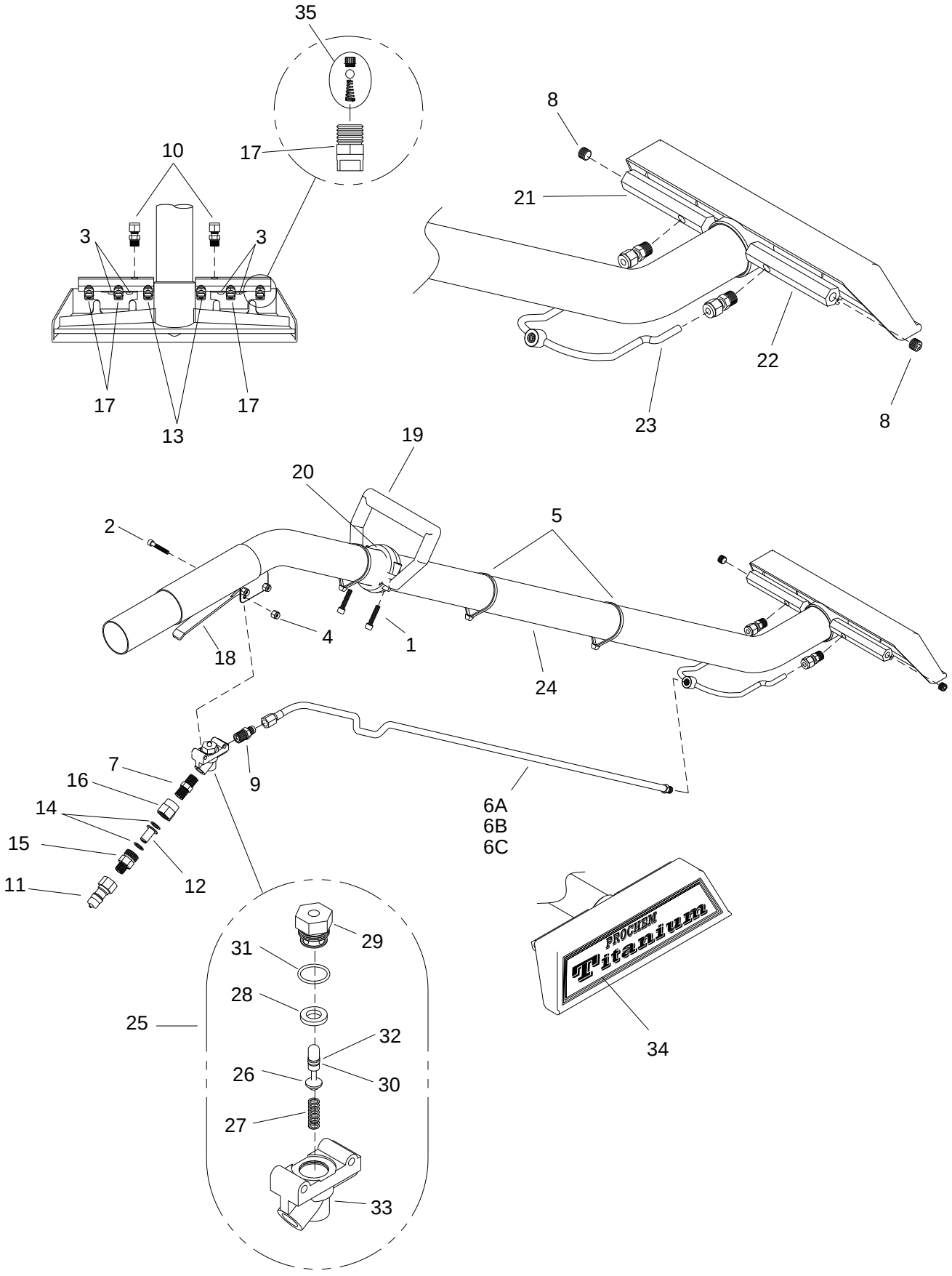
REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86274150	70105	4	SCR, M4 X 60 PH		
2	86273190	00-000132	2	SCR, 1/4-20 X 1/ 1/2 HXHD		
3	86270770	57006	4	NUT, 1/4-20 HEX		
4	86010780	87162	4	WASHER, 1/4 SPLIT LOCK PLTD		
5	86270330	02-000066	4	FLATWASHER, 1/4		
6	86177050	03-000176	4	CLAMP, HOSE #16		
7	86280680	09-805591	1	HOSE, WASTE PUMP 1” X 8’		
8	86184780	10-805484	1	HOSE, GARDEN 3/4 X 75’		
9	86176420	12-800052	1	CAP, HOSE 3/4 BR		
10	86181430	12-800367	1	FTTG, BRB 1PX1H BR		
11	86181440	12-800444	1	FTTG, 1-1/4P X 1” H BR		
12	86195820	43-807008	1	WASHER, HOSE 5/8 ID 1” OD		
13	86175720	50-502055	1	BRKT, CTR HOOD FR		
14	86188970	52-000123	1	NUT, 1-3/16-12 UN HXHD		
15	86162270	52-501993	1	CONN, HOSE WATER OUTL		
16	86191380	61-951306	1	PUMP, HD AUTO		
17	86174260	61-951319	1	ASSY, LVL SENS SHUT OFF SW		
18	86195860	23719	1	CORD ASM, CNCTN SIDE		
19	86195910	72185	1	SWITCH ASSEMBLY		

AUTOMATIC PUMPOUT - OPTIONAL



REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86273250	00-000210	4	SCR, 1/4-20 X 3/4 SOCHD		
2	86178820	52-502064	1	CVR, OUTLET WST PMP-OUT		
3	86192020	00-000312	8	SCR, CAP 1/4 X 1 SOCHD		
4	86273550	00-000399	1	SCR, CAP 1/4 X 1 3/8 SOC		
5	86273280	00-000241	8	SCR, CAP 10-32 X 2 SOCHD SS		
6	86005810	57245	8	NUT, 1/4-20 HEX NYLOCK SS		
7	86010780	87162	1	WASHER, 1/4 SPLIT LOCK		
8	86279470	87165	8	WASHER, #10 SPLIT LOCK		
9	86024840	04-000312	1	RING, RETAIN EXT 1/2		
10	86174520	04-000334	2	BALL, NYL ID		
11	86024850	04-000335	2	RING, SNAP 1-7/8D		
12	86193250	04-000342	1	SPRING, PUMP-OUT BALL PRESS		
13	86174700	52-502061	1	BDY, INLET WST PMP-OUT		
14	86179530	16-808241	1	DIAPH, WST TNK PMP-OUT		
15	86187870	40-902151	1	MOTOR, 1/8HP 12V		
16	86182540	43-807117	1	GSKT, CVR TOP PMPOUT		
17	86182550	43-807118	1	GSKT, CVR SD PMPOUT		
18	86192300	43-810091	1	SEAL, PUMPOUT SHFT		
19	86192350	43-810100	1	SEAL PUMPOUT CAM		
20	86189600	43-810101	1	O-RING, 800/1000 .072		
21	86189280	43-810106	4	O-RING, 1-13/16 ID X 2 OD HDWP		
22	86175530	45-801927	4	BRG, SHFT PUMP-OUT		
23	86195190	49-876301	1	VENT, UPR SHFT BRNG HSG		
24	86050890	50-502025	1	PL, CVR TOP PUMP-OUT		
25	86024860	50-502026	1	PL, CVR SD PUMP-OUT		
26	86274110	70094	8	SCR, 1/4-20 X 1/2 SHCS SS		
27	86181680	11-800504	1	GA, FLOW SIGHT 3/8 NPT		
28	86175830	52-501828	1	BTM, PLNGR WST TNK PMP-OUT		
29	86192690	52-501829	1	SHT, 3/4” STROKE WST TNK		
30	86191550	52-501914	1	RD, CONNECT WST PMP-OUT		PART OF 31
31	86182810	52-501915	1	GUIDE, PLNGR WST PUMP-OUT		INCL. 32, 18, 30
32	86024870	52-501921	1	PIN, WRIST PUMP-OUT		
33	86194640	52-501934	1	TOP, PLNGR PUMP-OUT		
34	86176020	52-501950	1	BUSH, THREADED		
35	86178810	52-502062	1	CVR, INLET WST PMP-OUT		
36	86045790	56-502428	1	BRKT, PMP-OUT SW/CCT BRKR		
37	86024880	52-501821	1	TOP, WST TNK PUMP-OUT		
38	86174550	52-501820	1	BASE, WST TANK PMP-OUT		
39	86174710	52-502063	1	BDY, INLET WST PMP-OUT		

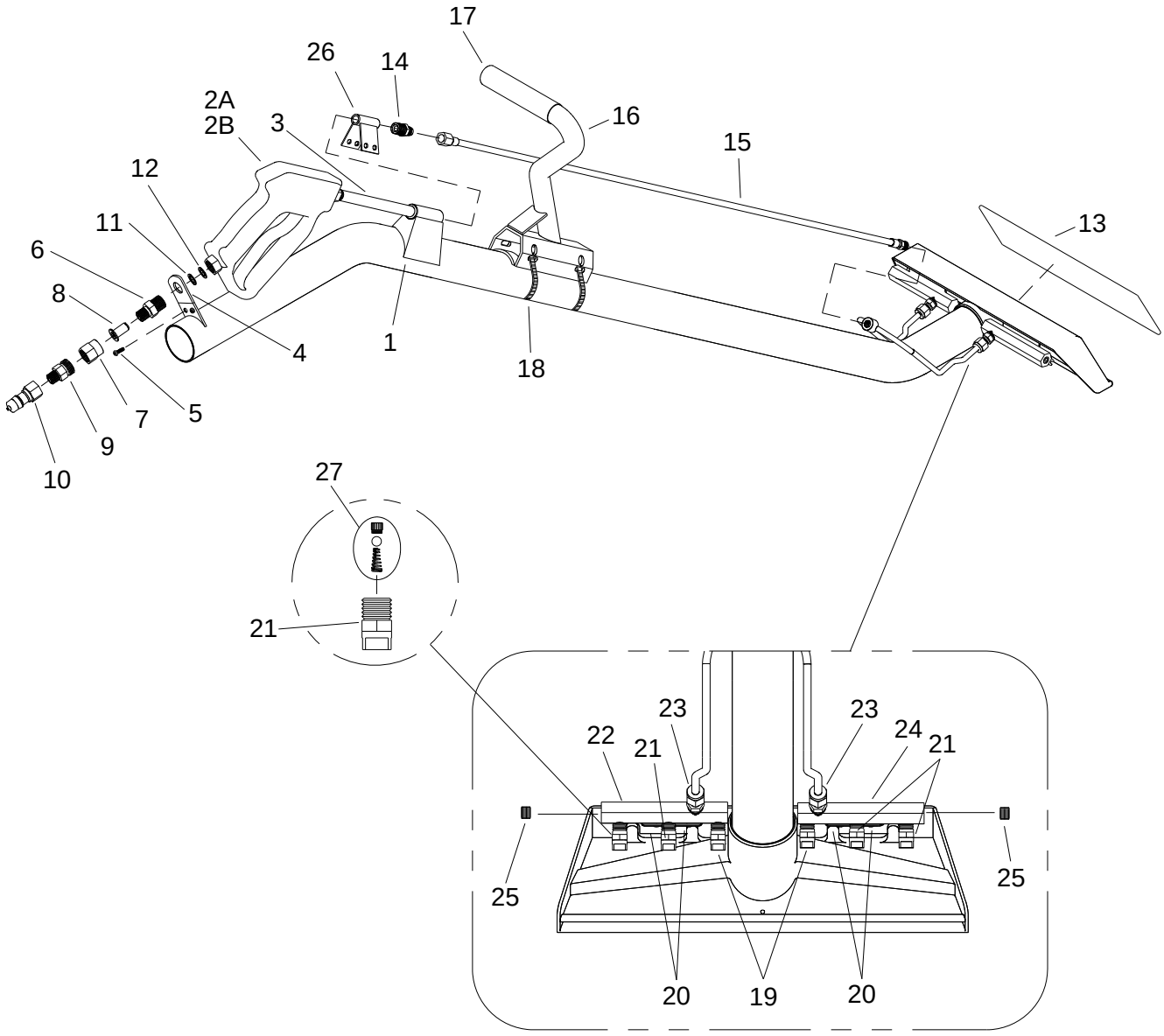
WAND-TITANIUM SIX JET-OPTIONAL



REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
-	86288350	89248	1	WD, TM, 6 JET, TITANIUM (8001) PC		COMPLETE
1	86273310	00-000282	2	SCR, CAP 1/4-20 X 1 1/4 SOC		
2	86192030	00-000317	2	SCR, CAP 10-32 X 1 1/4 SOCH		
3	86006680	70228	4	SCR, 10-32 X 1/4 PPHMS SS		
4	86270990	57090	2	NUT, 10-32 HEX NYLOCK SS		
5	86264910	04-000093	2	TIE, CABLE 13”		
6A	86184270	10-805504	1	HOSE, 3/16 X 46 (1/8P X 1/4FT) MET		▲
6B	86337360	-	1	HOSE, 3/16 X 47 (1/8P X 1/4FT) MET		▲
6C	86183720	-	1	HOSE, 3/16 X 47 5/8 (1/8P X 1/4FT) MET		▲
7	86247680	56015	1	NIPPLE, 1/4 HEX		
8	86190180	11-800206	2	PLUG, 1/8 SOCHD BR		
9	86177650	12-800060	1	CONN, 1/4P X 1/4T BR		
10	86177710	12-800322	2	CONN, 1/8P X 1/4T COMP BR		
11	86005580	56012	1	NIPPLE, 1/4 FPT QD		
12	86193490	14-806512	1	STRAINER, JET 50 MESH		
13	86194450	17-803018	2	TIP, SPRAY 9501 X 1/8P SST		
14	86195570	17-803006	2	WASHER, NYLON		
15	86177860	17-803010	1	CONN, 1/4P X 11/16-16M		
16	86177870	17-803036	1	CONN, 1/4FP X 11/16-16F BR		
17	86194580	17-803078	4	TIP, SPRAY 8001 SST \1/8 VJET		
18	86340720	-	1	TRIGGER, WD VLV, 9 DEG		
19	86174680	52-502008BK	1	BODY, WD HDL, 2” TB, BK		
20	86198180	52-502009	1	HOLD DN-WD HDL 2” TUBE		
21	86187610	52-502057	1	MANIFOLD, LEFT		
22	86187620	52-502058	1	MANIFOLD, RIGHT		
23	86174060	56-502548	1	ASSY, MNFLD S-BEND		
24	86285440	56-502534	1	WD & HD, TITANIUM		
25	86174120	61-950496	1	ASSY, EXTRACTOR VALVE		
26	86193360	16-808189	1	STEM, EXTRACTOR VALVE		
27	86193200	16-808190	1	SPRING, EXTRACTOR VALVE		
28	86192410	16-808228	1	SEAT, EXTRACTOR VALVE		
29	86183160	16-808229	1	HLDR, VLV STEM-EXTRACTOR VL		
30	86189510	43-810062	1	O-RING, .114 ID .254OD		
31	86189520	43-810063	1	O-RING, .551ID .691OD		
32	86174500	43-810064	1	BACK-UP, .250DIA		
33	86174630	52-501590	1	BDY, EXTRACTOR VLV		
34	86179250	48-941462	1	DEC, WD HD TITANIUM		
35	86341590	-	6	CHECK VALVE, NOZZLE WD		

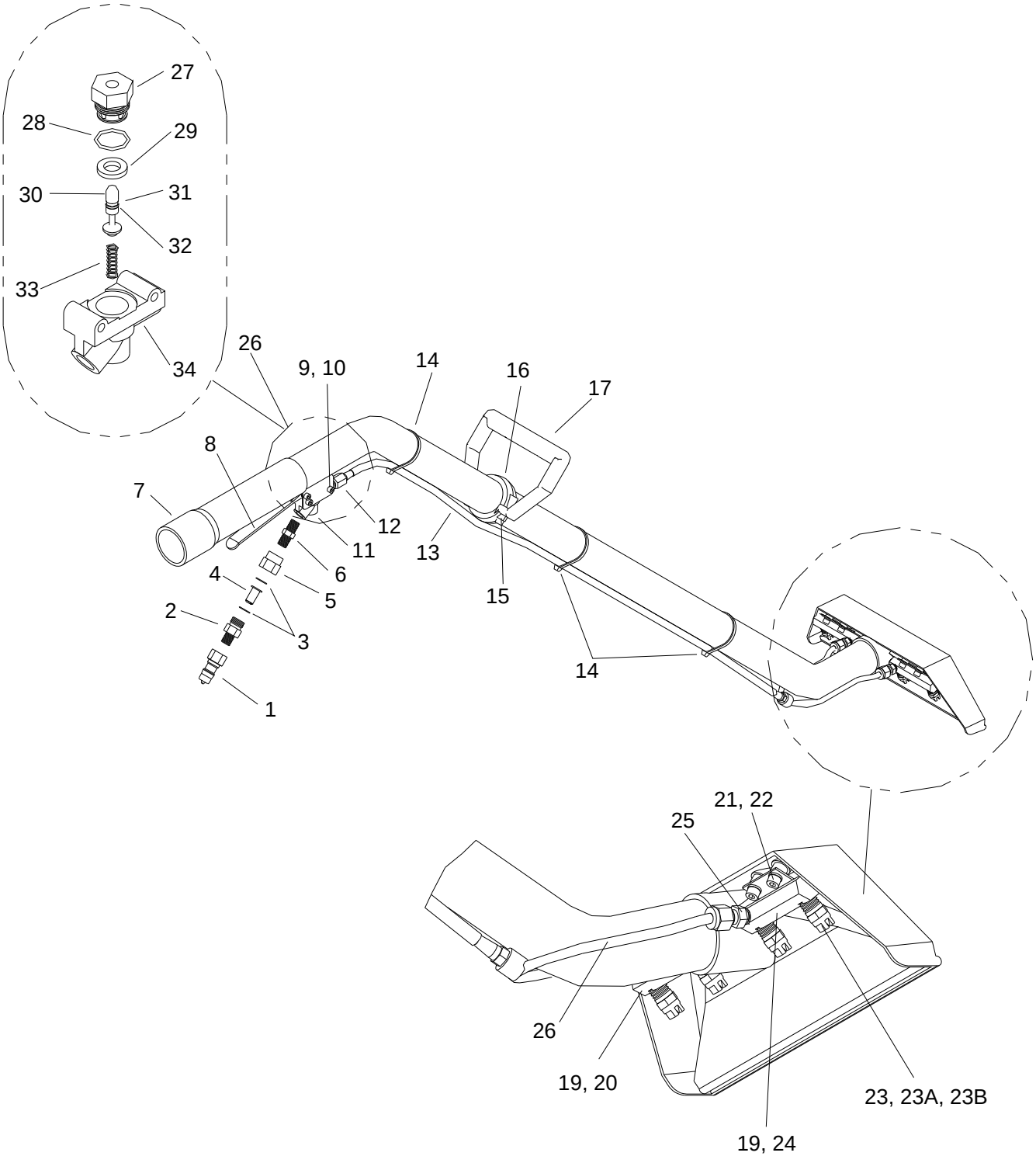
▲ MEASURE AND MATCH EXISTING HOSE LENGTH.

WAND-ERGONOMIC SIX JET-OPTIONAL



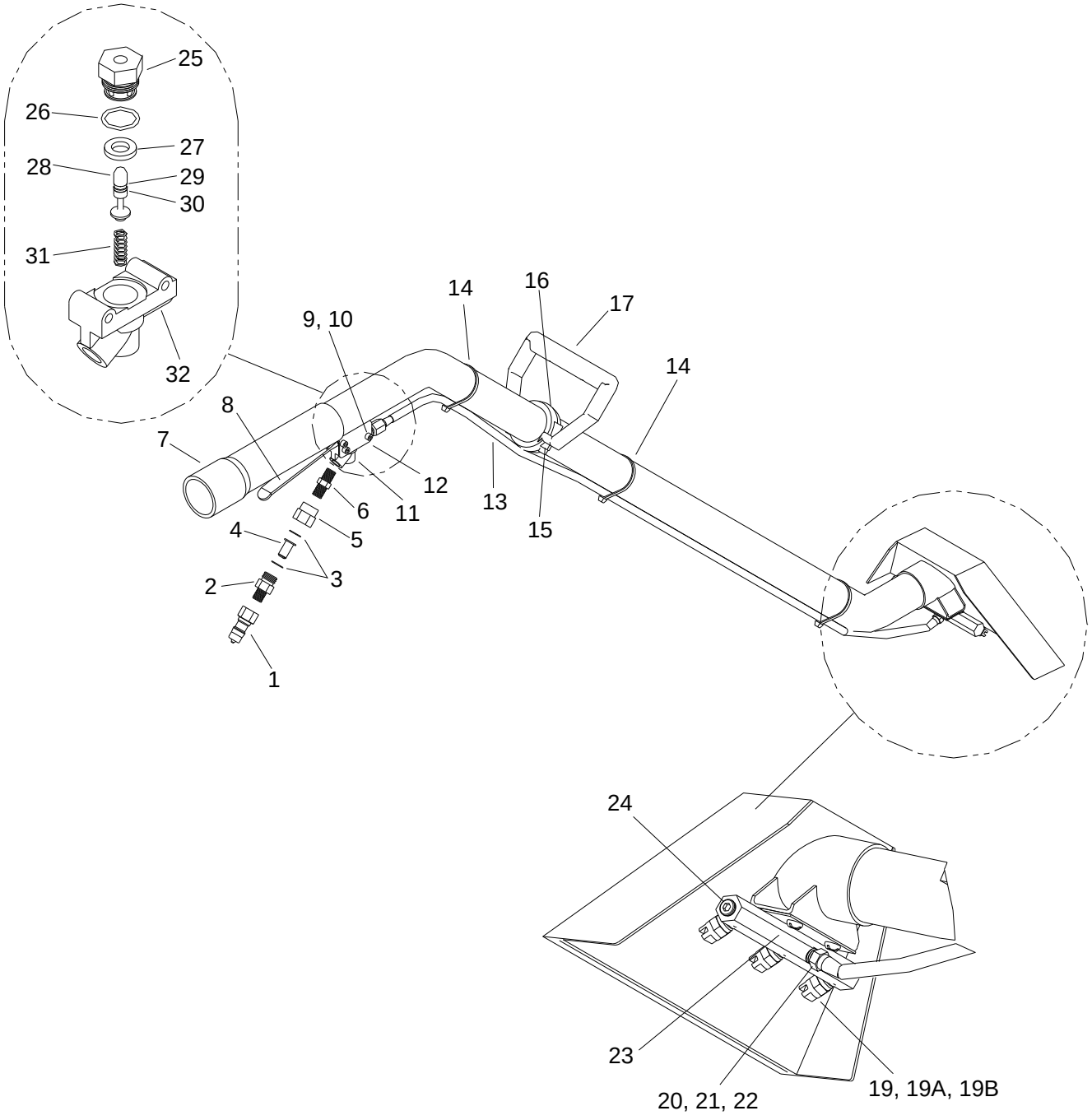
REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
-	86326900	-	1	WAND, ERGO TI		COMPLETE
1	86195560	791121	1	WAND/HEAD WELDMENT		
2A	86182820	17-803025	1	GUN, PRESS WASH TM		
2B	86011740	-	1	YG5000 SPRAY GUN ASM		
3	86188590	791122	1	NIPPLE, 1/4 X 5 SS		
4	86175760	791123	1	BRKT, HNDL, CLMP		
5	86277760	791124	2	SCR, 8-32 X 1/4 SHCS SS		
6	86188280	11-800381	1	NIP, 3/8 X 1/4 HX SST		
7	86177870	17-803036	1	CONN, 1/4FP X 11/16-16F BR		
8	86193490	14-806512	1	STRNR, JET 50 MESH		
9	86177860	17-803010	1	CONN, 1/4 X 11/16-16M		
10	86005580	56012	1	NIP, 1/4 FPT QD		
11	86195600	791127	1	WASHER, BLK WD		
12	86195610	791128	1	WASHER, FLAT SS WD		
13	86179020	48-941186	1	DEC, WD HD (CAST SST) TM		
14	86177650	12-800060	1	CONN, 1/4P X 1/4T BR		
15	86031580	10-805245	1	HOSE, 3/16 X 40-1/2		
16	86183110	46-802553	1	HDL, TITANIUM WND W/SPYR		
17	86182120	791125	1	GRIP, BLU HANDLE		
18	86177150	791126	2	CLAMP, #38 HOSE SS		
19	86194450	17-803018	2	TIP, SPRY 9501 X 1/8P SST		
20	86270990	57090	4	NUT, 10-32 HEX SS NYLOCK		
21	86194580	17-803078	4	TIP, SPRAY 8001 SST 1/8 VJE		
22	86187620	52-502058	1	MNFLD, LT TITAN		
23	86177710	12-800322	2	CONN, 1/8P X 1/4T COMP BR		
24	86187610	52-502057	1	MNFLD, RT TITAN		
25	86190180	11-800206	2	PLG, 1/8 SOCHD BR		
26	86175660	140160	1	BRKT, MANIFOLD, WAND		
27	86341590	-	6	CHECK VALVE, NOZZLE WD		
-	86186100	47453	1	KIT, REPAIR 17-803025		NOT SHOWN

WAND-QUAD-JET-OPTIONAL



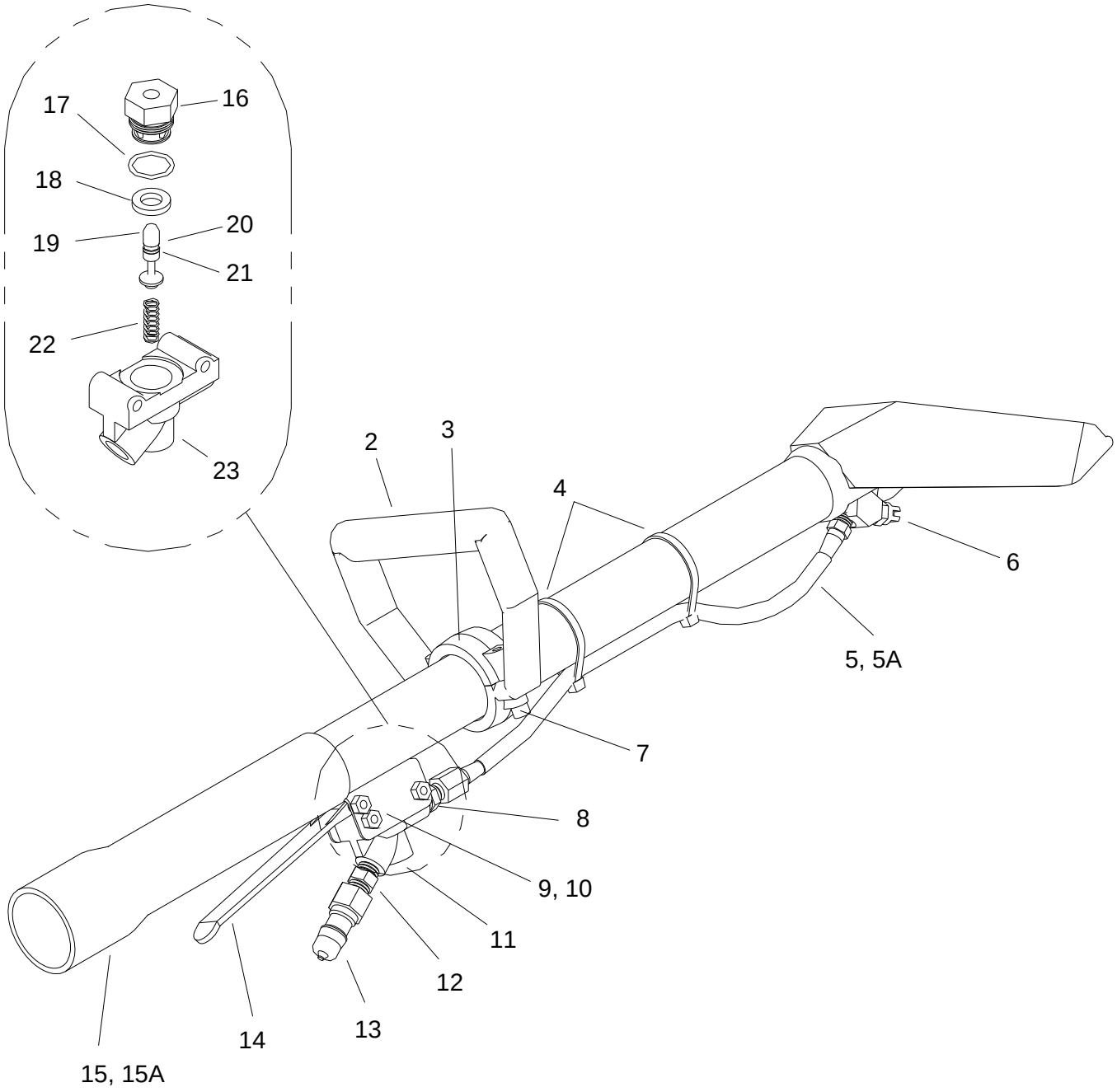
REF	PART NO.	PRV NO.	DESCRIPTION	SERIAL NO. FROM	NOTES:
-	86285570	89238	WAND, TM, QJW (95015) PC		COMPLETE
-	86285580	89239	WAND, TM, QJW (9502) PC		COMPLETE
-	86285560	89237	WAND, TM QJW (9501) PC		COMPLETE
-	86285540	89235	WAND, TM, QJW, (9501) NO DECAL		COMPLETE
1	86005580	56012	NIPPLE, 1/4 FPT QD		
2	86177860	17-803010	CONN, 1/4P X 11/16-16M		
3	86195570	17-803006	WASHER, NYLON		
4	86193490	14-806512	STRAINER, JET 50 MESH		
5	86177870	17-803036	CONN, 1/4FP,11/16-16R BR		
6	86247680	56015	NIPPLE, 1/4 HEX		
7	86280020	09-805359	SLEEVE, WD HDL 9.5		
8	86194650	52-501619	TRIGGER, WD VLV		
9	86192030	00-000317	SCR, CAP 10-32X 1-1/4 SOCH		
10	86270990	57090	NUT, 10-32 HEX NYLOCK SS		
11	86174120	61-950496	ASSY, EXTRCTR VLV		
12	86177650	12-800060	CONN, 1/4P X 1/4T BR		
13	86183970	10-805387	HOSE, 3/16 X 43-1/2 (1/8P X 1/4)		
14	86265730	04-000053	TIE, CABLE 8” WHT		
15	86273310	00-000282	SCR, CAP 1/4-20 X 1-1/4 SOC		
16	86198160	52-501569	HOLD DOWN, WD HDL		
17	86182840	791150	HANDLE GRIP ASM 1.75		
18	OPEN	-	-		
19	86190180	11-800206	PLUG, 1/8 SOCHD BR		
20	86043300	56-501966	ASSY, L S-BEND MNFLD		
21	86273450	00-000347	SCR, CAP 10-24 X1/4 SOCHD		
22	86279470	87165	WASHER, #10 SPLIT LOCK		
23	86194400	17-803001	TIP, SPRY 95015X1/8P SST		89238
23A	86194410	17-803002	TIP, SPRY 9502X1/8P SST		89239
23B	86194450	17-803018	TIP, SPRY 9501X1/8P SST		89237 89235 (NO DECAL)
24	86043310	56-501986	ASSY, RT S-BEND MNFLD		
25	86177710	12-800322	CONN, 1/8PX1/4T COMP BR		
26	86174030	56-501967	ASSY, S-BEND MNFLD		
27	86183160	16-808229	HOLDER, VLV STEM-EXTRCTR VL		
28	86189520	43-810063	O-RING, .551 ID .691 OD		
29	86192410	16-808228	SEAT, EXTRCTR VLV		
30	86193360	16-808189	STEM, EXTRCTR VLV		
31	86174500	43-810064	BACK-UP, .250 DIA		
32	86189510	43-810062	O-RING, .144 ID .254 OD		
33	86193200	16-808190	SPRING, EXTRCTR VLV		
34	86174630	52-501590	BODY, EXTRCTR VLV		
-	86179020	48-941186	DECAL, WD HD (CAST SS)		NOT SHOWN
-	86186160	66-808169	KIT, REP-WD VLV		NOT SHOWN INCLUDES PARTS 27-29 & 31-33

WAND-TRI-JET-OPTIONAL



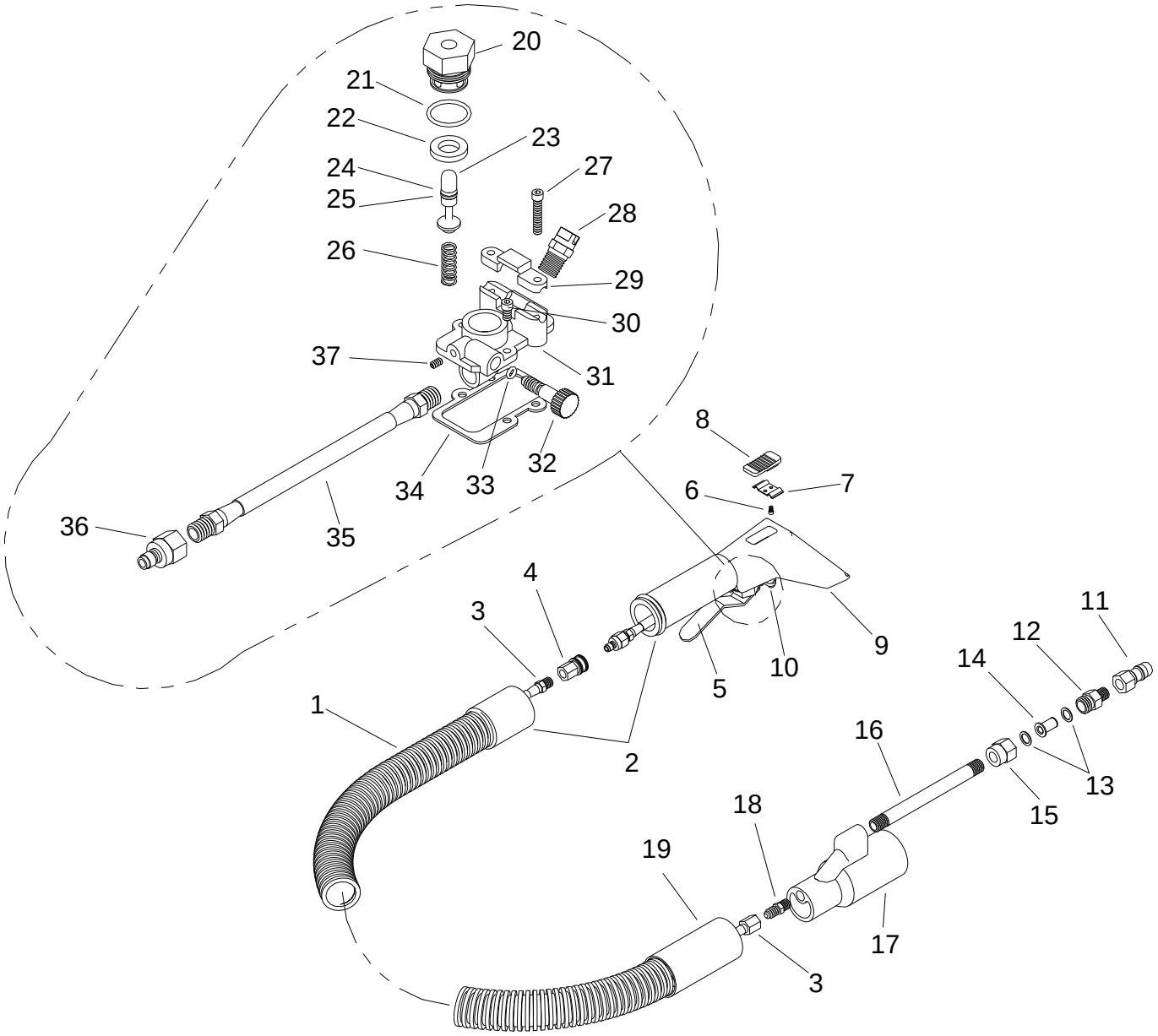
REF	PART NO.	PRV NO.	DESCRIPTION	SERIAL NO. FROM	NOTES:
-	86285520	89233	WAND, TJW (9502) PC		COMPLETE
-	86285510	89232	WAND, TJW, (95015) CUBXL		COMPLETE
-	86285530	89234	WAND, TJW, (9503) PC		COMPLETE
1	86005580	56012	NIPPLE, 1/4 FPT QD		
2	86177860	17-803010	CONN, 1/4P X 11/16-16M		
3	86195570	17-803006	WASHER, NYLON		
4	86193490	14-806512	STRAINER, JET 50MESH		
5	86177870	17-803036	CONN, 1/4FP,11/16-16R BR		
6	86247680	56015	NIPPLE, 1/4 HEX		
7	86280020	09-805359	SLEEVE, WD HDL 9.5		
8	86194650	52-501619	TRIGGER, WD VLV		
9	86192030	00-000317	SCR, CAP 10-32X 1-1/4 SOCH		
10	86270990	57090	NUT, 10-32 HEX NYLOCK SS		
11	86174120	61-950496	ASSY, EXTRCTR VLV		
12	86177650	12-800060	CONN, 1/4P X 1/4T BR		
13	86183510	10-805253	HOSE, 3/16X49 (1/8P X 1/4FT)		
14	86265730	04-000053	TIE, CABLE 8” WHT		
15	86273310	00-000282	SCR, CAP 1/4-20 X 1-1/4 SOC		
16	86198160	52-501569	HOLD DOWN, WD HDL		
17	86182840	791150	HANDLE GRIP ASM 1.75”		
18	OPEN	-	-		
19	86194410	17-803002	TIP, SPRY 9502X1/8P SST		89233
19A	86194400	17-803001	TIP, SPRY 9501X1/8P SST		89232
19B	86194520	17-803046	TIP, SPRY 9503X1/8P SST		89234
20	86274290	70162	SCR, 10-32 X 3/8 PPHMS SS		
21	86279470	87165	WASHER, #10 SPLIT LOCK		
22	86270800	57014	NUT, 10-32 HEX SS		
23	86197700	56-501739	MANIFOLD, WD TRI-JET		
24	86190180	11-800206	PLUG, 1/8 SOCHD BR		
25	86183160	16-808229	HOLDER, VLV STEM-EXTRCTR VL		
26	86189520	43-810063	O-RING, .551 ID .691 OD		
27	86192410	16-808228	SEAT, EXTRCTR VLV		
28	86193360	16-808189	STEM, EXTRCT VLV		
29	86174500	43-810064	BACK-UP, .250DIA		
30	86189510	43-810062	O-RING, .114ID .254OD		
31	86183200	16-808190	SPRING, EXTRCTR VLV		
32	86174630	52-501590	BODY, EXTRCTR VLV		
-	86178990	48-941166	DECAL, WD HD		NOT SHOWN
-	86186160	66-808169	KIT, REP-WD VLV		NOT SHOWN INCLUDES PARTS 25-27 & 29-31

STAIR TOOL-OPTIONAL



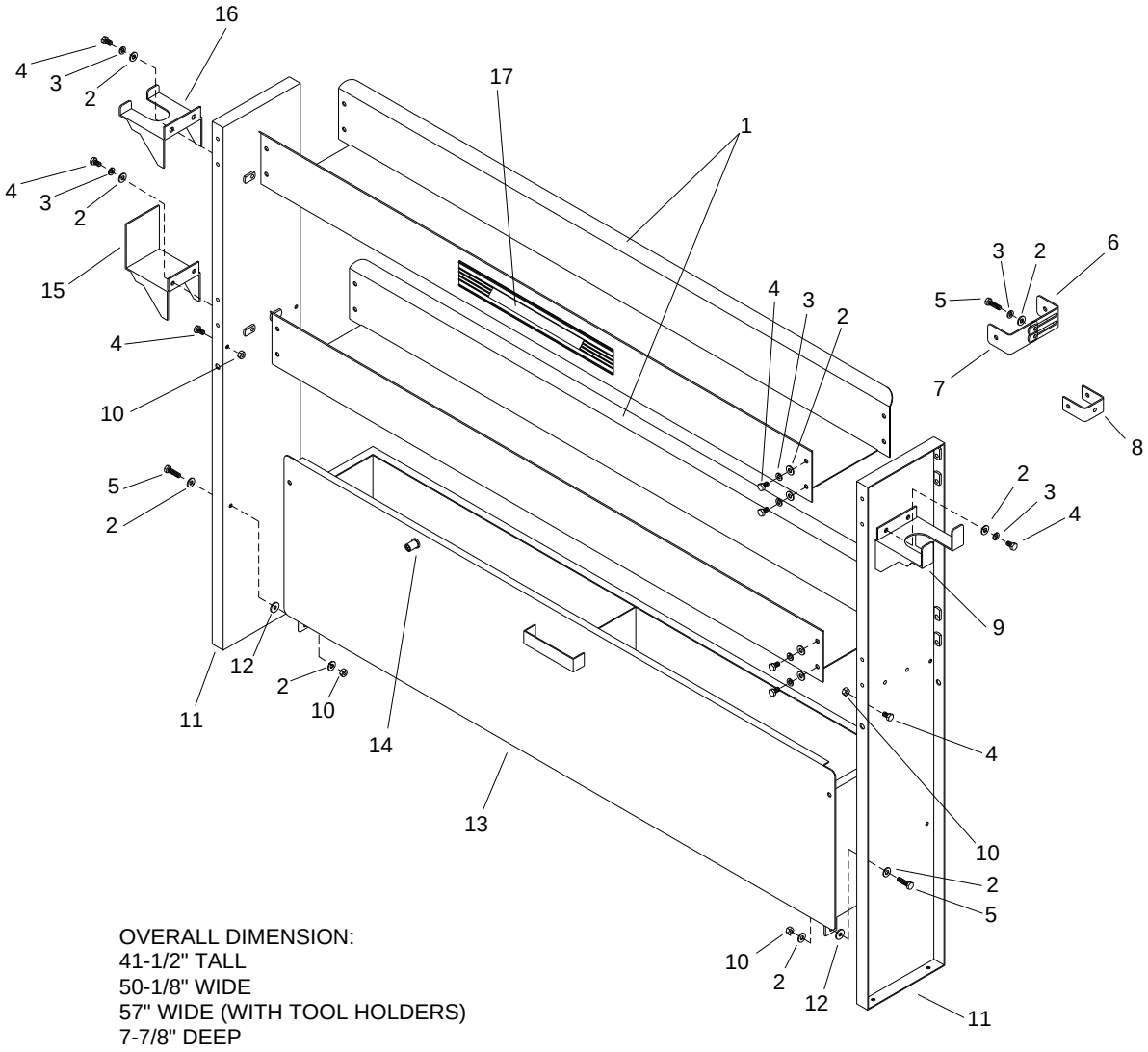
REF	PART NO.	PRV NO.	DESCRIPTION	SERIAL NO. FROM	NOTES:
-	86285350	78519	TL, STAIR, LNG, TM DJ (80015)		COMPLETE
-	86285290	78521	TL, STAIR, SHT, TM (80015)		COMPLETE
1	OPEN	-	-		
1A	OPEN	-	-		
2	86198080	52-501576	BODY, WD HDL PORT		
3	86198170	52-501577	HOLD DOWN, WD HDL PORT		
4	86265730	04-000053	TIE, CABLE 8” WHT		
5	86183710	10-805330	HOSE, 3/16X13-3/4 (1/8PX1/4)		
5A	86184000	10-805397	HOSE, 3/16X7-1/2 (1/8P X 1/4F)		
6	86194410	17-803002	TIP, SPRY 9502X1/8P SST		
7	86273310	00-000282	SCR, CAP 1/4-20 X 1-1/4 SOC		
8	86177650	12-800060	CONN, 1/4P X 1/4T BR		
9	86192030	00-000317	SCR, CAP 10-32X1-1/4 SOCH		
10	86270990	57090	NUT, 10-32 HEX NYLOCK SS		
11	86174120	61-950496	ASSY, EXTRCTR VLV		
12	86247680	56015	NIPPLE, 1/4 HEX		
13	86005580	56012	NIPPLE, 1/4 FPT QD		
14	86194650	52-501619	TRIGGER, WD VLV		
15	86280020	09-805359	SLEEVE, WD HDL 9.5		
15A	86040950	09-805504	SLEEVE, STAIR TL HDL 7-1/8		
16	86183160	16-808229	HOLDER, VLV STEM-EXTRCTR VL		
17	86189520	43-810063	O-RING, .551 ID .691 OD		
18	86192410	16-808228	SEAT, EXTRCTR VLV		
19	86193360	16-808189	STEM, EXTRCTR VLV		
20	86174500	43-810064	BACK-UP, .250DIA		
21	86189510	43-810062	O-RING, .114 ID .254 OD		
22	86193200	16-808190	SPRING, EXTRCTR VLV		
23	86174630	52-501590	BODY, EXTRCTR VLV		
-	86178970	48-941163	DECAL, STAIR TL		NOT SHOWN
-	86186160	66-808169	KIT, REP-WD VLV		NOT SHOWN INCLUDES PARTS 16-19 & 20-22

UPHOLSTERY TOOL-OPTIONAL



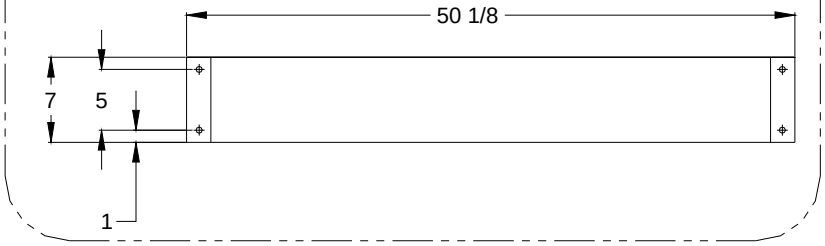
REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
-	86186160	78513	1	TL, UPHOLST, PC (80015)		COMPLETE
1	86280240	09-805131	2	HOSE, VAC 1-1/4X10' BLU		
2	86178660	08-805243	1	CUFF, SWIV 1-1/4HX1-1/4T		
3	86184670	10-805347	1	HOSE, 3/16X119-1/2 (1/8PX1/4FT)		
4	86179720	13-806023	1	DSC, 1/8FC1/8FP SST		
5	86178550	58-500639	1	UPHOLSTERY TL TRIGGER		
6	86273370	00-000310	1	SCR, CAP 4-40 X7/32 SHCS SS		
7	86193050	04-000282	1	SPRING, VAC ADJ BUTT		
8	86176080	52-501624	1	BUTTON, VAC ADJ		
9	86194590	52-501842	1	TOOL, UPHOLSTERY		
10	86174140	61-950570	1	ASSY, UPHLST TL VLV		INCLUDES PARTS 20-26, 28, & 31- 37
11	86005580	56012	1	NIPPLE, 1/4 NPT QD		
12	86177860	17-803010	1	CONN, 1/4P X 11/16-16M		
13	86195570	17-803006	1	WASHER, NYLON		
14	86193490	14-806512	1	STRAIRNER, JET 50MESH		
15	86177870	17-803036	1	CONN, 1/4FPX11/16-16F BR		
16	86188320	11-800404	1	NIP, 1/4X5 SST		
17	86178520	52-501585	1	COUPLER, UPHLST TL		
18	86177660	12-800065	1	CONN, 1/8P X 1/4T		
19	86178630	08-805138	1	CUFF, 1 1/4H X 1 1/2T GRY		
20	86183160	16-808229	1	HOLDER, VLV STEM-EXTRCTR VL		
21	86189520	43-810063	1	O-RING, .551 ID .691 OD		
22	86192410	16-808228	1	SEAT, EXTRCTR VLV		
23	86193360	16-808189	1	STEM, EXTRCTR VLV		
24	86174500	43-810064	1	BACK-UP, 250DIA		
25	86189510	43-810062	1	O-RING, .144 ID .254 OD		
26	86193200	16-808190	1	SPRING, EXTRCTR VLV		
27	86273350	00-000306	2	SCR, 6-32 X 1 SCHD SS		
28	86194500	17-803033	1	TIP, SPRY 80015X1/8P SST		
29	86178540	58-500638	1	CSTG, TRIGGER CLMP		
30	86273360	00-000307	2	SCR, CAP 6-32X3/8 SOCHD		
31	86195210	52-501623	1	VALVE, UPHLST TL		
32	86195530	52-501626	1	VALVE, ADJ-UPHLST TL VLV		
33	86189460	43-810016	1	O-RING, 5/32IDX9/32OD VIT		
34	86182570	43-807513	1	GASKET, UPHLST TL VLV		
35	86183770	10-805348	1	HOSE, 3/16X6-1/2 (1/8P BS)		
36	86179740	13-806030	1	DSC, 1/8MX1/8FP SST		
37	86192070	00-000408	1	SCR, SET 3-32 X 1/4 SOCHD		
-	86178980	48-941164	1	DECAL, UPHLST TL		NOT SHOWN
-	86186160	66-808169	1	KIT, REPAIR-WAND VLV		NOT SHOWN INCLUDES PARTS 20-22 & 24-26

SHELF ASSEMBLY-OPTIONAL



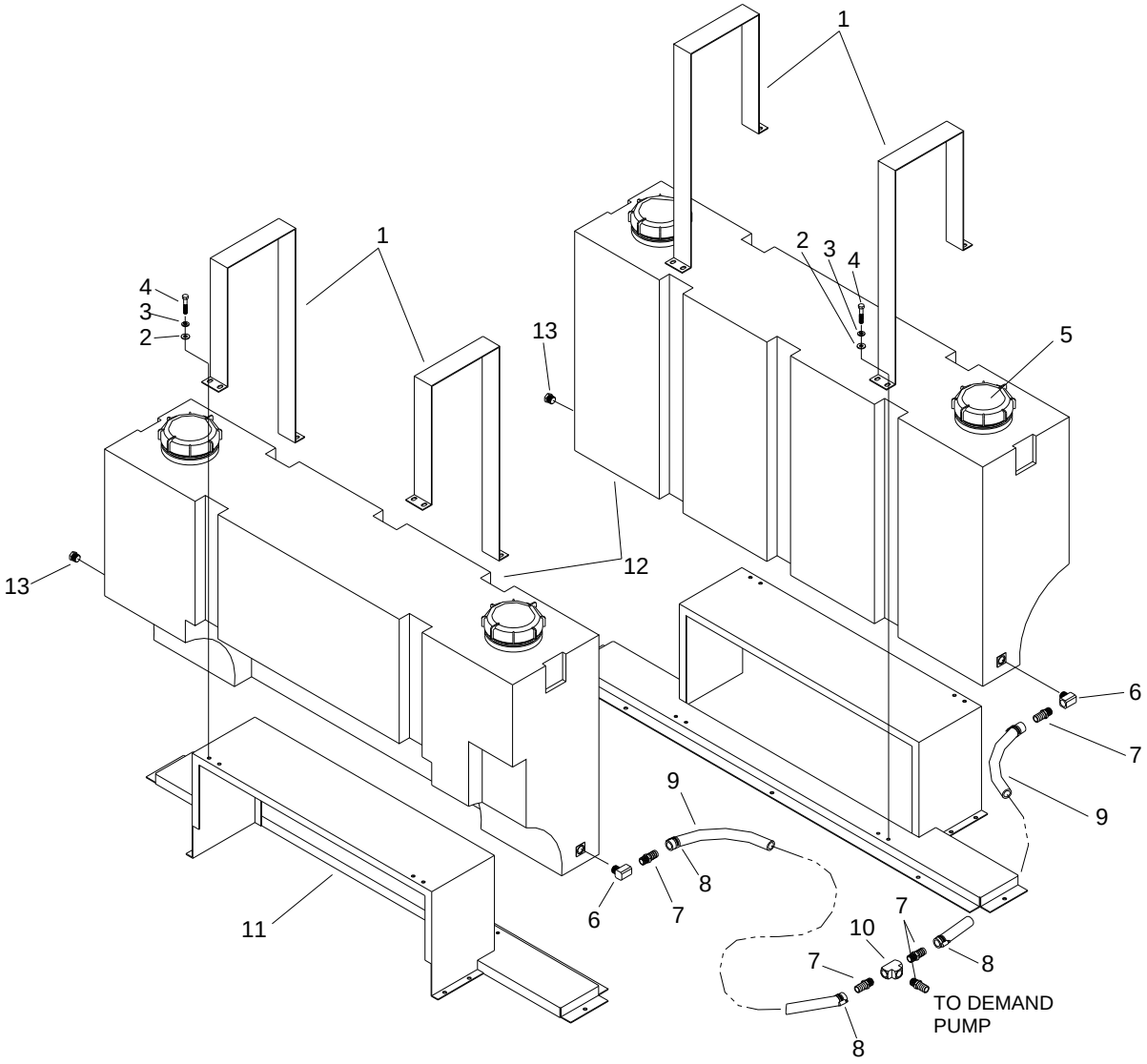
OVERALL DIMENSION:
41-1/2" TALL
50-1/8" WIDE
57" WIDE (WITH TOOL HOLDERS)
7-7/8" DEEP

DIMENSIONAL DATA

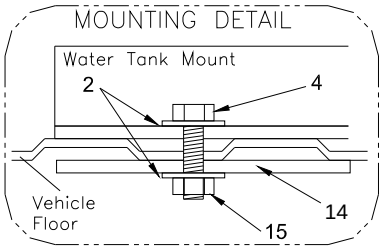


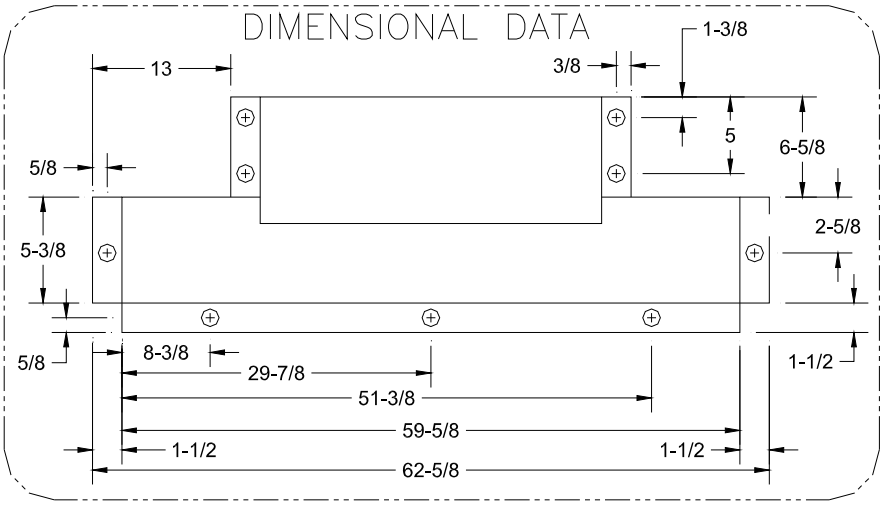
REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
-	86285410	65-950392	1	VAN STORAGE UNIT		COMPLETE
1	86192680	56-501921	1	SHELF, LWR		
2	86270330	02-000066	20	FLATWASHER, 1/4		
3	86010780	87162	20	WASHER, 1/4 SPLIT LOCK		
4	86274760	70271	20	SCR, 1/4-20 X 1/2 HHCS PLTD		
5	86274750	70270	4	SCR, 1/4-20 X 3/4 HHCS PLTD		
6	86175710	50-501840	1	BRKT, ADJUST MTG SLOT		
7	86175730	56-502067	1	BRKT, ADJUST MTF HLDR		
8	86198090	56-501942	1	BRKT, SHELF MOUNTING		
9	86285120	41460	1	HOLDER, STAIR TOOL		
10	86270620	01-000105	4	LOCK NUT, 1/4-20 HXHD		
11	86024890	56-501922	2	PANEL, SHLF END		
12	86278840	50-501749	2	WASHER, NYLON		
13	86021920	56-501920	1	DRAWER, SHELF GRAY		
14	86186850	46-802506	1	LATCH, ADJ GRIP		
15	86183180	50-501755	1	HOLDER, UP TO HOSE		
16	86183170	50-501754	1	HOLDER, UPHST TL		
17	86179350	48-941152	1	DECAL, PROCHEM		
-	86162440	66-945424	1	KIT, ADJ BRKT.		INCLUDES PARTS 6,7 & MOUNTING HARDWARE

WATER TANK, DUAL WITH DEMAND PUMP-OPTIONAL



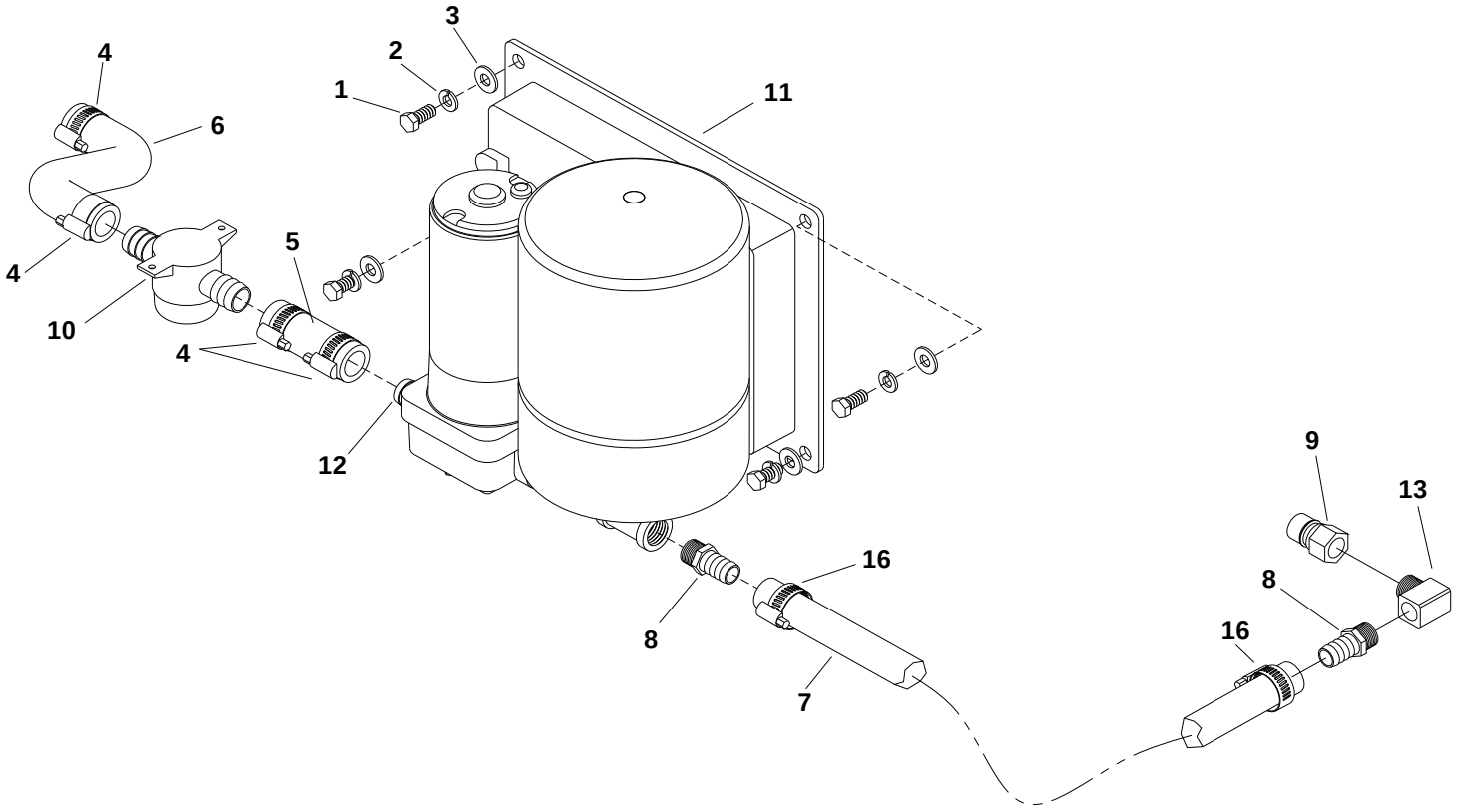
OVERALL DIMENSION:
32-1/2" TALL
62-5/8" WIDE
15-1/2" DEEP





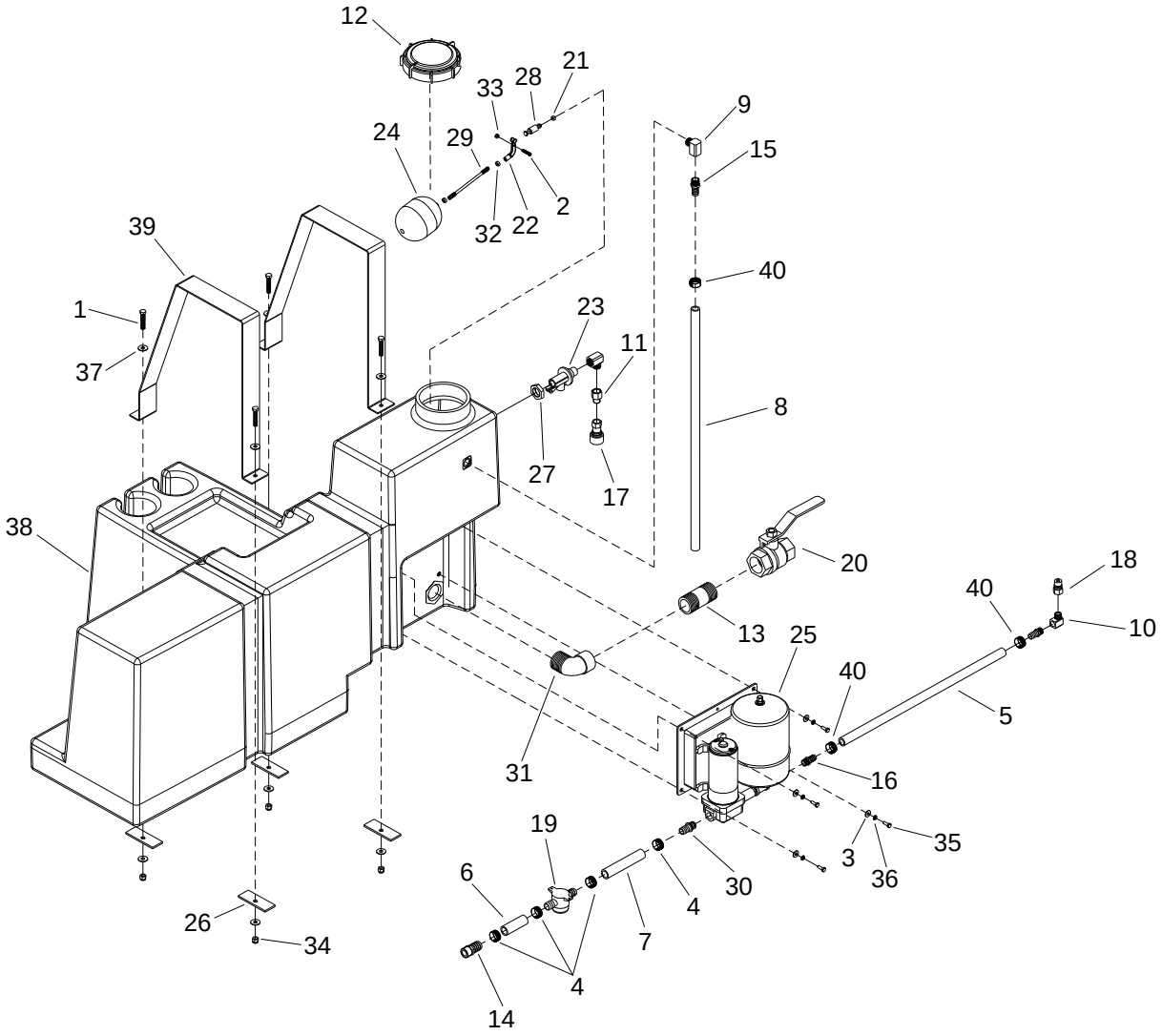
REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
-	86041730	66-945260	-	TANK, DUAL SADDLE W/DMD PUMP		COMPLETE
-	86041710	66-945265	-	SINGLE SADDLE TANK W/DMND PMP		COMPLETE
1	86048310	50-501774	4	HOLD DOWN, SADDLE TANK GRAY		
2	86279510	87171	16	WASHER, 3/8 FLAT		
3	86010790	87163	16	WASHER 3/8 SPLIT LOCK		
4	86277830	00-000072	16	SCR, 3/8-16 X 2' HXHD		
5	86176400	11-800432	4	CAP, WATER BOX		
6	86180170	11-800041	2	ELL, STREET 1/2 BR		
7	86181370	12-800278	4	FTTG, BRB 1/2P X 3/4H BR		
8	86177020	03-000113	4	CLAMP, HOSE #12 SST		
9	86280590	09-805456	1	HOSE, WTR 3/4 X 96"		
10	86194120	11-800085	1	TEE, 1/2 BRASS		
11	86043320	56-502000	2	ASSY, BASE SADDLE TANK GRAY		
12	86030090	58-500661	2	MOLDING, WATER TANK		
13	86190500	11-800168	2	PLUG, 1/2 BRASS HXHD		
14	86190170	50-500511	1	PLATE, INSTALL MT		
15	86005770	57119	9	NUT, 3/8-16 HEX NYLOCK		
-	86285190	41458	1	SHLR, CHEM, 10-GAL JUG		NOT SHOWN

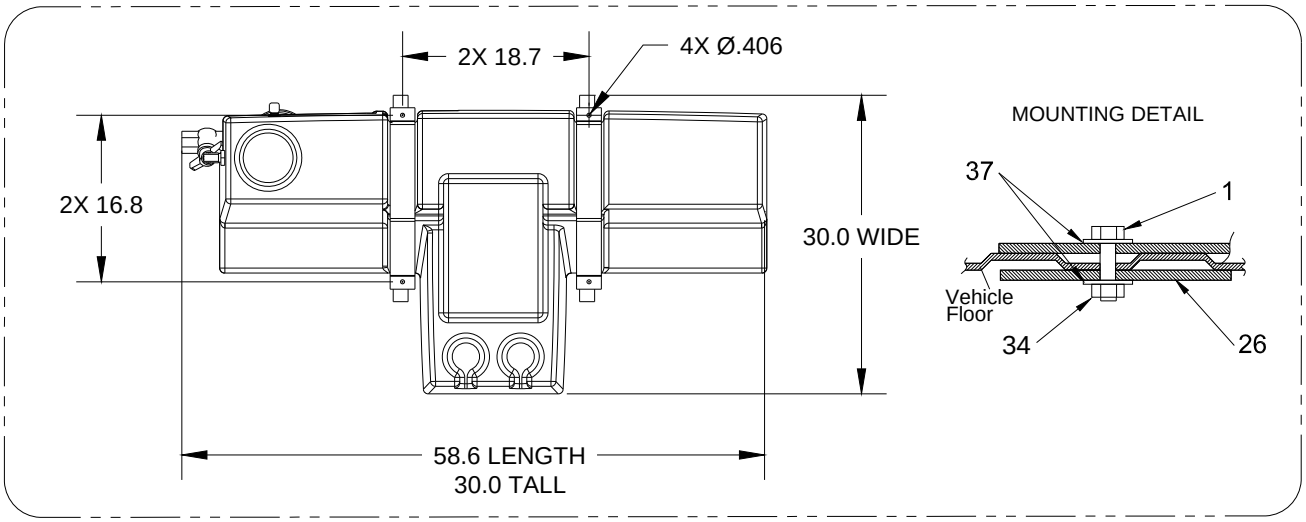
WATER TANK- DEMAND PUMP-OPTIONAL



REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86006760	70305	4	SCR, 5/16-18 X 3/4 HHCS GR5 PL TDL		
2	86279130	87083	4	WASHER, 5/16 SPLIT LOCK PLTD		
3	86278830	02-000143	4	WASHER, 5/16 FLAT		
4	86177020	03-000113	4	CLAMP, HOSE #12 SST		
5	86280290	09-805278	1	HOSE, WATER 3/4 X 3”		
6	86280420	09-805357	1	HOSE, WATER .75 X 5.5		
7	86280550	09-805446	1	HOSE, WATER 5/8 X 55		
8	86181400	12-800345	1	FTTG, BRB 3/8P X 5/8H BR		
9	86179630	13-806009	1	DISCONNECT, 3/8M X 3/8FP		
10	86180900	14-806553	1	FILTER, DEMAND PUMP		
11	86190740	41-905049	1	PUMP, WATER BOOSTER FLOJET 2		
12	86186120	48-809423	1	KIT, PORT		
13	86180210	11-800275	1	ELBOW, ST 3/8 BR		
14	86191390	65240	1	PUMP ONLY, TM DEMAND		NOT SHOWN
15	86186030	47449	1	KIT SERVICE DEMAND PMP FJ		NOT SHOWN
16	86177060	03-000246	2	CLAMP, HOSE #8 SST		

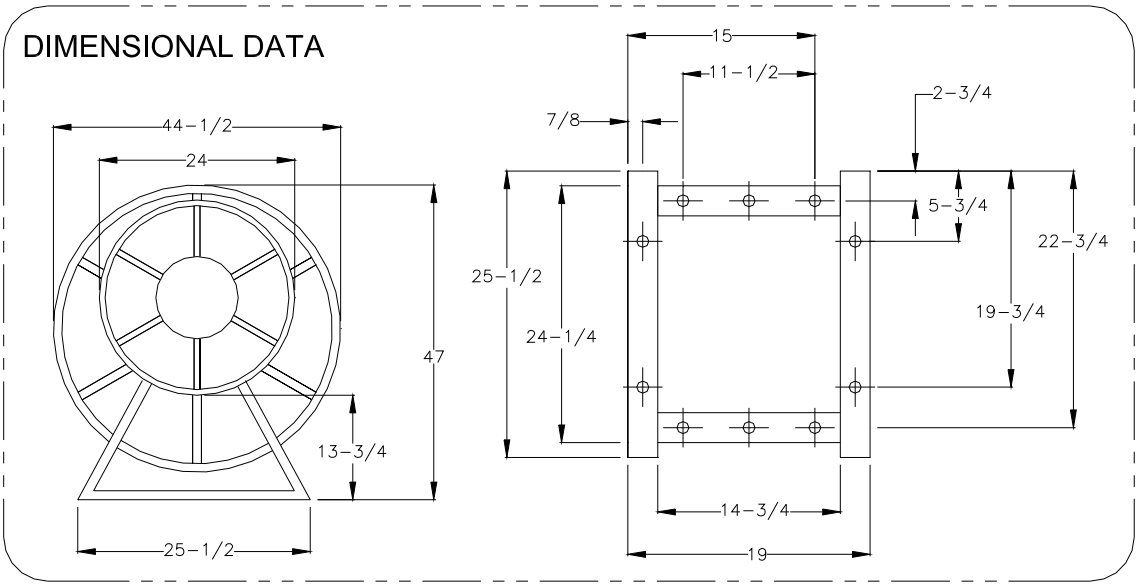
AUXILIARY WATER TANK WITH PUMP

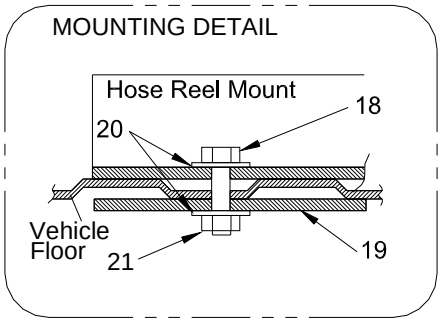




REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86277830	00-000072	4	SCR, 3/8-16 X 2” HXHD		
2	86277850	00-000337	1	SCR, 10-32 X 1” SOCHD SST		
3	86270330	02-000066	4	FLATWASHER, 1/4		
4	86177020	03-000113	4	CLAMP, HOSE #12 SST		
5	86280550	09-805446	1	HOSE, 5/8ID BLU X 55”		
6	86280290	09-805278	1	HOSE, 3/4 ID WTR X 3”		
7	86280420	09-805357	1	HOSE, 3/4 ID WTR X5.5”		
8	86280140	09-805406	1	HOSE, 5/8 ID BLU X 30 1/2		
9	86180170	11-800041	2	ELL, STREET 1/2 BR MACH		
10	86180210	11-800275	1	ELL, ST 3/8 BR		
11	86191600	11-800283	1	RED, 1/2FP X 3/8P BR		
12	86176400	11-800432	1	CAP, WATER BOX		
13	86188480	11-800525	1	NIP, 3/4 X 2 1/2 BR	*(6)	WAS 11-800524
14	86181320	12-800095	1	FTTG, BRB 3/4PX3/4H BR		
15	86181360	12-800269	1	FTTG, BRB 1/2 X 5/8H BR		
16	86181400	12-800345	2	FTTG, BRB 3/8P X 5/8 BR		
17	86179710	13-806008	1	DISCONNECT 3/8F X 3/8FP		
18	86179630	13-806009	1	DISCONNECT 3/8M X 3/8FP		
19	86180900	14-806553	1	FILTER, DEMAND PUMP		
20	86195330	15-808072	1	VLV, BALL 3/4 FP BS	*(6)	WAS 15-808080
21	86192380	16-808164	1	SEAT, FLOAT VLV TM		
22	86173820	16-808216	1	ARM, PIVOT-FH VLV		
23	86174610	16-808217	1	BDY, FLOAT VLV		
24	86174540	19-807014	1	BALL, FLOAT		
25	86190740	41-905049	1	PMP, WTR BOOSTER FLOJET 2		
26	86190170	50-500511	4	PLATE, INSTALL MT		
27	86189010	52-501706	1	NUT, FLOAT VALVE		
28	86028860	52-800314	1	PISTON, FLOAT VLV PISTON		
29	86181150	54-501715	1	FLOAT ROD, TM		
30	86184120	48-809423	1	KIT, PORT DEMAND PUMP		
31	86180260	11-800401	1	ELL, 3/4 ST BR	*(6)	WAS 31100
32	86270770	57006	2	NUT, 1/4-20 HEX		
33	86270990	57090	1	NUT, 10-32 HEX NYLOCK SS		
34	86005770	57119	4	NUT, 3/8-16 HEX NYLOCK		
35	86274750	70270	4	SCR, 1/4-20 X 3/4 HHCS PLTD		
36	86010780	87162	4	WASHER, 1/4 SPLIT LOCK PLTD		
37	86279510	87171	8	WASHER, 3/8 FLAT		
38	86031000	790617	1	TANK, FRESH WATER 70GAL		
39	86057170	790666	2	STRAP, WTR TNK HOLD DOWN		
40	86177060	03-000246	3	CLAMP, HOSE #8 SST		

HOSE REEL - OPTIONAL

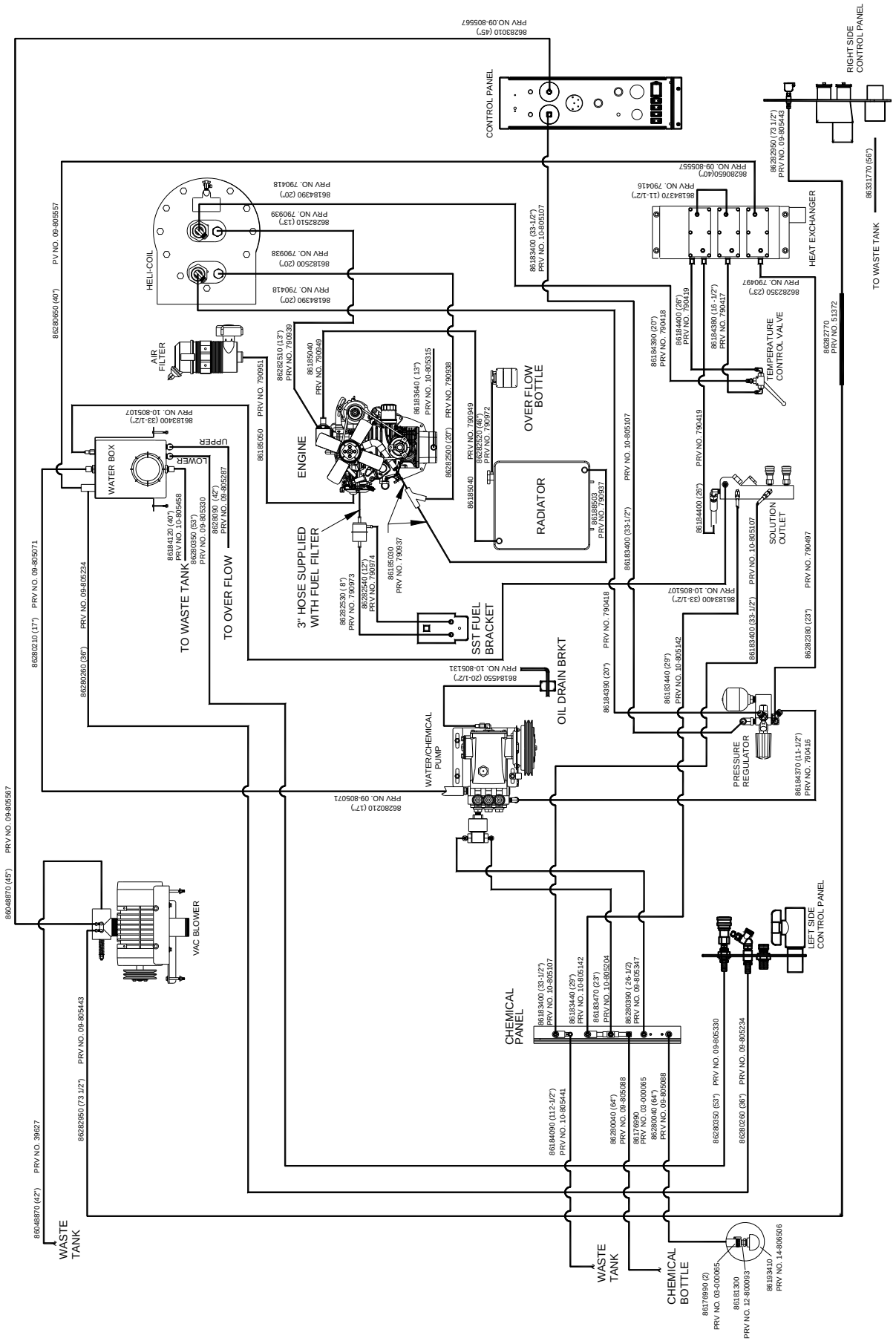


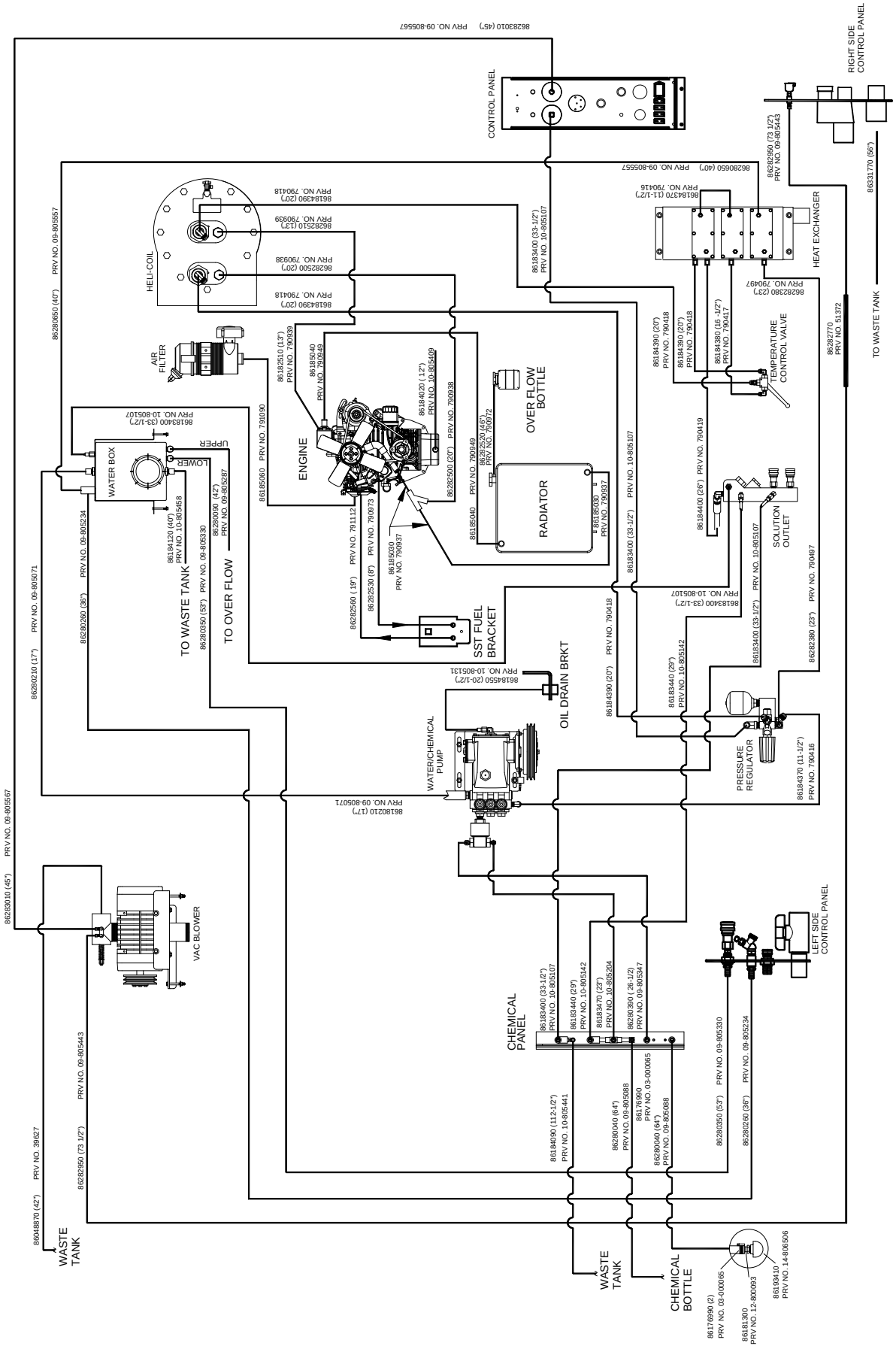


OVERALL DIMENSIONS: 47" TALL
29" WIDE
44-1/2" DEEP

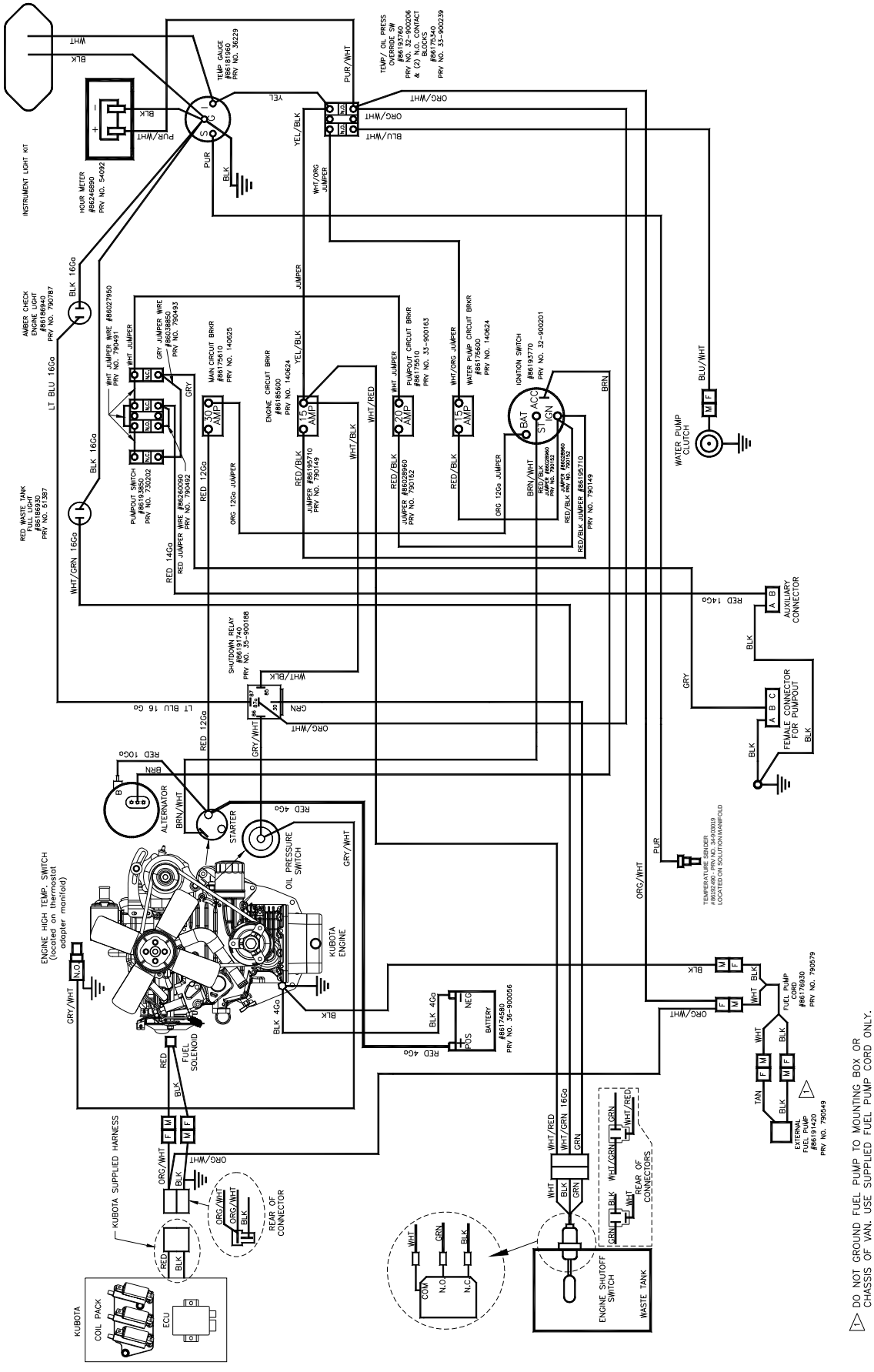
REF	PART NO.	PRV NO.	QTY	DESCRIPTION	SERIAL NO. FROM	NOTES:
1	86191620	56-501962	1	REEL, VACUUM HOSE GRAY		
2	86177270	03-000124	2	CLAMP, MFLR 1-3/4		
3	86175990	52-501685	2	BUSHING, HOSE REEL		
4	86174560	56-501960	1	BASE, HOSE RL (250')		
5	86175740	56-502207	1	BRKT, LOCKOUT HOSE REEL		
6	86186870	61-950854	1	LATCH ASSEMBLY		
7	86270330	02-000066	2	FLATWASHER, 1/4		
8	86010780	87162	2	WASHER, 1/4 SLPIT LOCK		
9	86274750	70270	2	SCR, 1/4-20 X 3/4 HHCS PLTD		
10	86005650	57031	2	NUT, 5/16-18 HEX		
11	86191820	56-501968	1	REEL, HP HOSE GRAY		
12	86174740	45-802138	2	BEARING HOSE REEL		
13	86278830	02-000143	4	FLATWASHER, 5/16		
14	86279130	87083	4	WASHER, 5/16 SPLIT LOCK PLTD		
15	86006750	70302	4	SCR, 5/16-18 X 1" HHCSGR5PLT		
16	86181030	44-802122	4	FLANGE, 47MST		
17	86174730	56-501961	1	BODY, HP HOSE GRAY		
18	86277830	00-000072	10	SCR, 3/8-16 X 2" HXHD		
19	86190170	50-500511	1	PLATE, INSTALL MT		
20	86279510	87171	10	WASHER, 3/8 FLAT		
21	86005770	57119	10	NUT, 3/8-16 HEX NYLOCK		
22	86189850	55-501789	1	PIN, LOCK HOSE REEL		
23	86175700	50-501812	1	BRKT, HOSE REEL LOCK		
24	86193240	04-000302	1	SPRING, LOCK-LOCK PIN ASSY		
25	86177190	04-000303	1	CLIP, RETAINER-LOCK PIN ASSY		

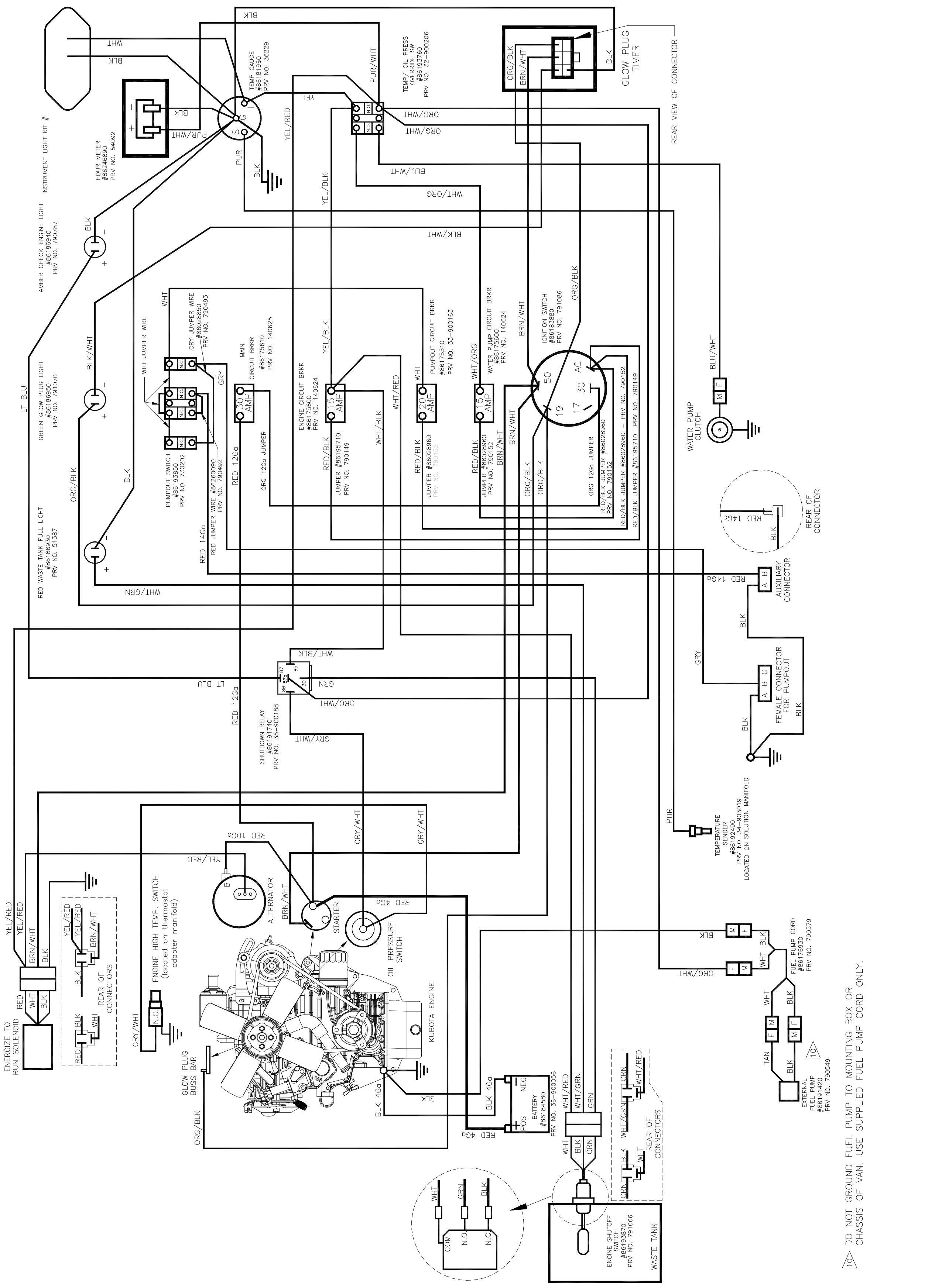
HOSE DIAGRAM - GAS




CONTROL PANEL
RIGHT SIDE CONTROL PANEL
HEAT EXCHANGER
HELI-COIL
AIR FILTER
ENGINE
OVER FLOW BOTTLE
RADIATOR
TEMPERATURE CONTROL VALVE
WATER BOX
UPPER
LOWER
TO WASTE TANK
TO OVER FLOW
SST FUEL BRACKET
OIL DRAIN BRKT
WATER/CHEMICAL PUMP
SOLUTION OUTLET
PRESSURE REGULATOR
VAC BLOWER
CHEMICAL PANEL
LEFT SIDE CONTROL PANEL
WASTE TANK
CHEMICAL BOTTLE
TO WASTE TANK

WIRING DIAGRAM - GAS





GLOW PLUG TIMER
REAR VIEW OF CONNECTOR
TEMP GAUGE #86181860 PRV NO. 36229
TEMP/ OIL PRESS OVERRIDE SW #86193760 PRV NO. 32-900206
HOUR METER #86246890 PRV NO. 54092
INSTRUMENT LIGHT KIT #
AMBER CHECK ENGINE LIGHT #86186940 PRV NO. 790787
GREEN GLOW PLUG LIGHT #86186950 PRV NO. 791070
RED WASTE TANK FULL LIGHT #86186930 PRV NO. 51387
PUMPOUT SWITCH #86193850 PRV NO. 730202
GRY JUMPER WIRE #86028850 PRV NO. 790493
WHT JUMPER WIRE
MAIN CIRCUIT BRKR #86175610 PRV NO. 140625
ENGINE CIRCUIT BRKR #86175600 PRV NO. 140624
PUMPOUT CIRCUIT BRKR #86175510 PRV NO. 33-900163
WATER PUMP CIRCUIT BRKR #86175600 PRV NO. 140624
IGNITION SWITCH #86183880 PRV NO. 791086
WATER PUMP CLUTCH
AUXILIARY CONNECTOR
FEMALE CONNECTOR FOR PUMPOUT
SHUTDOWN RELAY #86191740 PRV NO. 35-900188
TEMPERATURE SENDER #86192490 PRV NO. 34-903019 LOCATED ON SOLUTION MANIFOLD
ENERGIZE TO RUN SOLENOID
REAR OF CONNECTORS
ENGINE HIGH TEMP. SWITCH (located on thermostat adapter manifold)
ALTERNATOR
STARTER
OIL PRESSURE SWITCH
KUBOTA ENGINE
GLOW PLUG BUSS BAR
BATTERY #86184580 PRV NO. 36-900056
FUEL PUMP CORD #86176930 PRV NO. 790579
EXTERNAL FUEL PUMP #86191420 PRV NO. 790549
ENGINE SHUTOFF SWITCH #86193370 PRV NO. 791066
WASTE TANK
DO NOT GROUND FUEL PUMP TO MOUNTING BOX OR CHASSIS OF VAN. USE SUPPLIED FUEL PUMP CORD ONLY.

SERIAL NUMBERS

REF. NO.	MODEL: SERIAL #:
1	1.001-069.0, 1.001-072.0: 1000158501
2	1.001-069.0, 1.001-072.0: 1000165558
3	1.001-069.0, 1.001-072.0: 1000151479
4	1.001-069.0, 1.001-072.0: 10010770000119
5	1.001-069.0, 1.001-072.0: 1000161005
6	1.001-069.0, 1.001-072.0: 1000166634