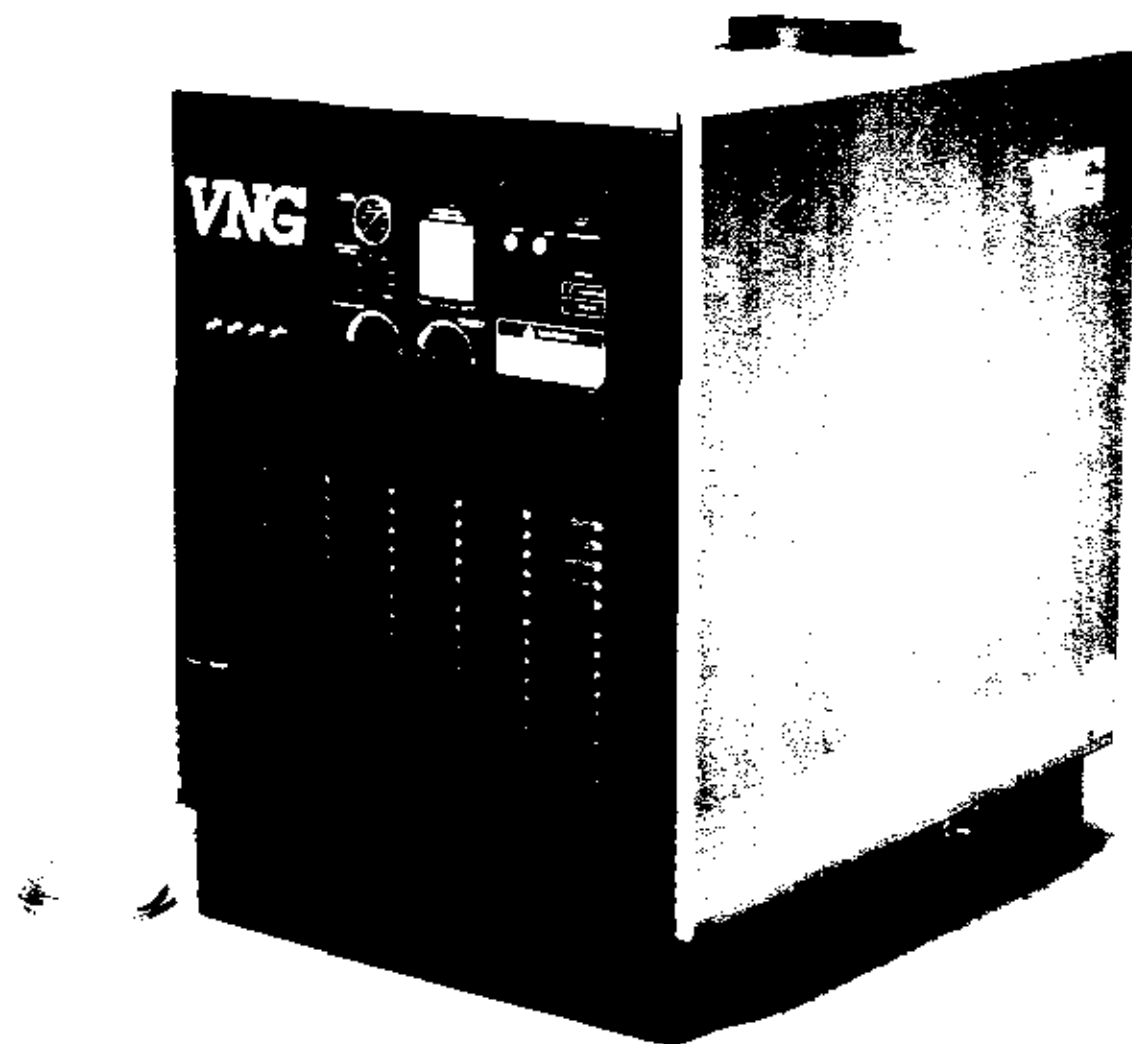


LANDA

THE LEADER IN PRESSURE WASHERS

OPERATOR'S MANUAL ■ VERTICAL NATURAL GAS/PROPANE HOT WATER PRESSURE WASHERS

- **VNG3-1100** (CSA Approved)
 - **VNG4-2000** (CSA Approved)
 - **VNG4-3000** (CSA Approved)
 - **VNG6-3000** (CGA Approved)
 - **VNG8-2500** (CGA Approved)
 - **VNG3-300** (Steamer) (CSA Approved)
-



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NOTE:

7-7015 Flame Switch

- **CSA** does not apply to **VNG6-3000, VNG8-2500, VLP6-3000, VLP8-2500**
 - **CGA** does not apply to **VLP6-3000, VLP8-2500**

 - The **VNG-S** machines are: **VNG3-300, VNG3-1100, VNG4-2000, VNG4-3000**

 - The **VNG-L** machines are: **VNG6-3000, VNG8-2500**

 - **VLP** units are made up of the same components as the **VNG** except for the following:

7-7LVLPKIT	Conversion Kit (VLP6-3000, VLP8-2500)
7-7SVLPKIT	Conversion Kit (VNG3-300, VNG3-1100 VNG4-2000, VNG4-3000)
- (For Burner Orifices, see Burner Specifications Chart in this manual)

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INTRODUCTION

Your owner's manual has been prepared to provide you with a simple and understandable guide for machine operations and maintenance. To keep your unit in top running condition, follow the specific maintenance and troubleshooting procedures given in this manual. When ordering parts please specify model and serial number.

Note any damage to machine or components for claims against the freight lines.

SAFETY INSTRUCTIONS

1. Read the owner's manual thoroughly. Failure to follow instructions could cause a malfunction of the unit and result in death, serious bodily injury and/or property damage.

2. The installations of the unit must comply with local codes.

3. Avoid installing units in small areas or near exhaust fans. Adequate oxygen is needed for combustion or dangerous carbon monoxide will result.

4. The machine must be electrically grounded. Do not spray water near electrical components.

La machine doit être mise à la terre.

5. Grip cleaning wand securely before starting the cleaner. Failure to do this could result in injury from a whipping wand.

6. Do not use near combustible material as open flame may start a fire.

7. **WARNING:** risk of injection or severe injury. Keep clear of nozzle. Do not direct discharge stream at persons. This equipment is to be used only by trained operators.

AVERTISSEMENT: Risque d'injection et de blessures graves. Se tenir à l'écart du jet. Ne pas diriger le jet de sortie vers d'autres personnes. Confier l'utilisation de ce matériel à un opérateur qualifié.

8. Never make adjustments on machine while in operation.

9. Eye safety devices must be worn when using this equipment.

10. Units with shut-off gun should not be operated with the gun in the off position for extensive periods of time as this may cause damage to the pump. (See Maintenance and Service section under Temperature and Pressure Valve.) Check to make sure burner shuts off with gun closed.

11. Protect from freezing.

12. Protect discharge hose from vehicle traffic and sharp objects.

13. Be certain quick coupler on discharge hose has locked before using pressure washer.

14. Before disconnecting discharge hose from water outlet, turn off unit and water supply and open to relieve pressure.

15. Do not allow acids or abrasive fluids to pass through the pump.

16. Inlet water temperature must not exceed 160°.

17. When making repairs disconnect from electrical source and shut off gas valve.

18. The best insurance against an accident is precaution, and knowledge of the machine.

19. Landa is not liable for any modifications or the use of components not purchased from Landa.

20. Turn burner off and cool heating coil to 100° before turning machine off.

21. This machine is not to be connected to a Type B gas vent if the stack temperature exceeds 243° C (470°F).

Ne pas raccorder cet appareil à un tuyau d'évacuation de gaz du type B.

22. **WARNING:** If you smell gas, shut off the gas supply to the appliance, extinguish any open flame, and test all joints with a soap solution. If the odor persists, call your gas supplier immediately.

AVERTISSEMENT: Si une odeur de gaz est décelée, couper l'alimentation en gaz de l'appareil, éteindre toutes les flammes et vérifier tous les raccords à l'aide d'une solution savonneuse. Si l'odeur persiste, avertir immédiatement le fournisseur de gaz.

23. This machine must be attended during operation.

Ne pas faire fonctionner cette machine sans surveillance.

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24. Not suitable for connection to Type B gas vent

Ne convient pas à un tuyau d'évacuation de gaz du Type B.

25. A draft hood shall be installed.
Installer une hotte de tirage.

26. For use with natural gas and propane. A conversion kit, as supplied by the manufacturer, shall be used to convert this appliance to the alternate fuel.

GENERAL OPERATING TECHNIQUES

If dirt comes off relatively easy and no grease and oil are present, cleaning with cold water will normally suffice. However, when grease and oil are present, hot water will greatly speed up the process.

Clean with the spray nozzle a foot or so from the surface being cleaned. For more difficult cleaning, move the nozzle in closer.

If the unit is equipped with a shut-off gun and various nozzle patterns, use the wide patterns for easy soil removal jobs and the narrow patterns on the more difficult jobs or for tight areas such as cracks and holes.

In most cases, faster results and better chemical economy will be obtained by applying the chemical and letting it "set" for a few minutes, prior to rinsing. This enables the chemical to do its soil penetrating and loosening work.

Most cleaning work terminates with a high pressure rinse as part of the normal cleaning procedure. In some cases, however, the last operation may be application of a chemical or detergent (sanitizing, for example). After such work, run the unit for 20-30 seconds to clear pump and lines.

INSTALLATION

Step 1: LOCATION

Find a location that will protect the machine from damaging environment, such as wind, rain, and freezing.

Avoid small areas or near exhaust fans.

Step 2: GAS CODES

Confer with local gas company, and with proper municipal officials regarding any specific code or regulations governing the installation. The installation must conform with local codes.

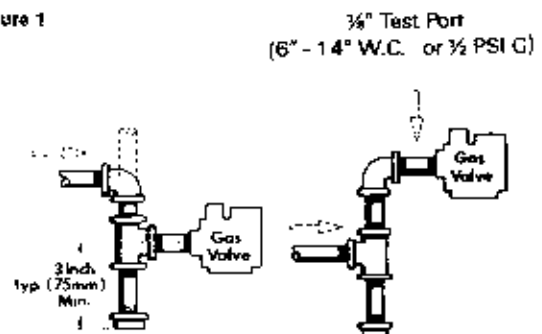
Step 3: ELECTRICAL

The unit, when installed, must be electrically grounded in accordance to local codes. Check for proper power supply using a volt meter.

Step 4: GAS PIPING

All piping must comply with local codes and ordinances of the National Fuel Gas Code: A sediment trap or drip leg must be installed in the supply line to the burner.

Figure 1



DRIP LEG
A sediment trap (drip leg) must be installed in the supply line.

A union shall be installed in the gas line adjacent to and upstream from the control manifold and downstream from the manual main shut-off valve.

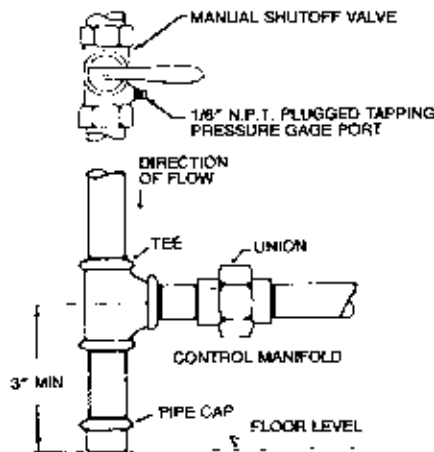
An 1/8" N.P.T. plugged tapping accessible for test gauge connection shall be installed immediately upstream of the gas supply connection for the purpose of determining the gas supply pressure to the burner, and to prevent damage to gas valve.

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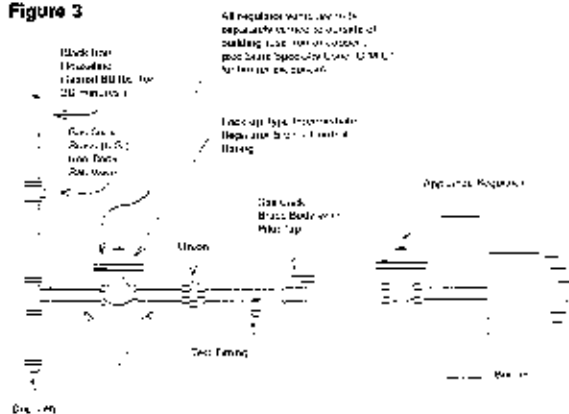
Figure 2



Location of Union and Drip Leg for Connecting Conversion Burner to House Piping.

A manual shut-off valve shall be installed in the gas supply line external to the appliance. See Figure 2. The gas line should be a separate supply direct from the meter to the burner. It is recommended that new pipe be used and located so that a minimum amount of work will be required in future servicing. The piping should be so installed as to be durable, substantial and gas tight. It should be clear and free from cutting burrs and defects in structure of threading. Cast iron fittings or aluminum tubing should not be used for the main gas circuit. Joint compounds (pipe dope) should be used sparingly on male threads only and be approved for all gases.

Figure 3



Length of pipes - 2' pipe sections
and 1/2" air regulator
NOTE: Full instructions are also
attached for commercial installers.

Propane Gas

The following pipe sizes should be used between the regulator and the gas valve on the burner.

Distance From Regulator

0 - 50'
50' - 100'
100' - 200'

Pipe Size

1" 1 PS
1-1/2" 1 PS
1-3/4" 1 PS

Natural Gas

The following pipe sizes should be used between the meter and the cleaner.

Distance From Meter

0 - 50'
50' - 100'
100' - 200'

Pipe Size

1-1/2" 1 PS
2" 1 PS
2-1/2" 1 PS

Step 5: VENTING

If the unit is used indoors, regulations or ventilation concerns may call for a chimney or furnace pipe. Not more than 6,500 BTU per square inch of flue area:

Input - BTU Per Hour Draft Hood and Flue Pipe Size

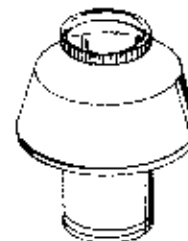
Input - BTU Per Hour	Draft Hood and Flue Pipe Size
Up to - 120,000	5 inch
120,000 - 180,000	6 inch
180,000 - 250,000	7 inch
250,000 - 320,000	8 inch
320,000 - 410,000	9 inch
410,000 - 600,000	10 inch
600,000 - 750,000	12 inch

NOTE: If the flue pipe exceeds 10 ft. in length, or contains more than two elbows, use next size larger pipe and draft hood, or burner will not ignite. No movable flue pipe damper should be used on any installation.

DRAFT DIVERTER should be installed above the heating coil. The diverter serves to sever the chimney effect created in all sections of furnace pipe positioned below to enhance the draft through the burner. It also helps prevent freezing of the coil due to wind chill factors.

When the heating appliance is installed in a tightly

Figure 4



Standard on all machines
(see inside front cover)

closed room without ventilation openings to the outdoors or other rooms, provisions shall be made for supplying air for combustion through special openings, one near the floor line and the other near the ceiling, each to be sized on the basis of one square inch or more of free area for each 1,000 BTU input per hour. See Figure 5.

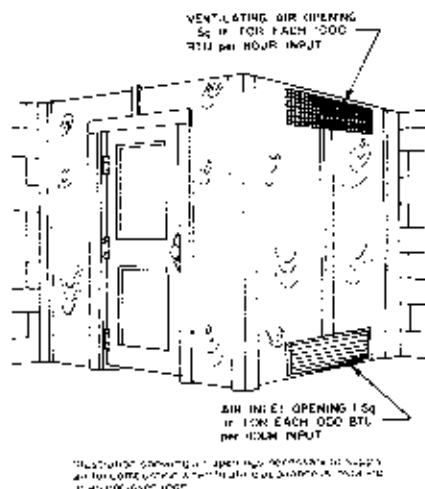
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When a house is of unusually tight construction and has a kitchen and/or bathroom ventilating fan, which may be used for exhausting air to outdoors - or has a vented fireplace - it is recommended that combustion air be supplied to the furnace room through intakes extending to the outside of the building and terminating in downturned fittings, suitably arranged to prevent obstruction from snow or rain, and including a protecting screen not smaller than 1/4 inch mesh.

Figure 5



Step 6: PLACEMENT

Do not locate near any combustible material. Keep all flammable material at least 20 feet away. Allow enough space for servicing the unit. Local code will require certain distances from floor and walls. (Two feet away should be adequate.)

Step 7: WATER SOURCE

Water source for unit should be supplied by a 5/8" I.D. garden hose with a city water pressure of not less than 30 psi. If the water supply is inadequate, or if the garden hose is kinked, the unit will run very rough and the burner will not fire.

Step 8: CONNECTION

Connect the wand, nozzle, hose and gun (where applicable). On pipe thread connections, use teflon tape to avoid water leaks.

Place chemical dip tube into liquid soap or chemical solution. Avoid letting tube suck air.

Step 9: INSPECTING AND TESTING

The building structure should not be weakened by installing of the gas piping. The piping should not be supported by other piping, but should be firmly supported with gas hooks, straps, bands or

hangers. Butt or lap welded pipe should not be run through or in an air duct or clothes chute.

Before turning gas under pressure into piping, all openings from which gas can escape should be closed. Immediately after turning on gas, the system should be checked for leaks. This can be done by watching the 1/2 cubic foot test dial and allowing 5 minutes to show any movement, or by soaping each pipe connection and watching for bubbles. If a leak is found, make the necessary repairs and repeat the above test.

Defective pipes or fittings should be replaced and not repaired. Never use a flame or fire in any form to locate gas leaks, use a soap solution.

After the piping and meter have been checked completely, purge the system of air. **DO NOT** bleed the air inside an enclosed room.

The appliance and its individual shut-off valve must be disconnected from the gas supply piping system during the pressure testing of that system at test pressure in excess of 1/2 psig, or damage to the gas valve will occur.

SHUT-OFF VALVE

A gas shut-off valve should be installed between the gas supply line and the washer. The plumbing should also include a union between the shut-off valve and the burner.

MEASURING GAS PRESSURE

A column manometer can be made by taking a clear tube and filling it about halfway with water. With both ends of the tube open to the atmosphere the water levels in both legs of the "U" will equalize; this is the zero point which should be marked on both legs, to measure gas pressure connect one end of U-tube (either directly if it is long enough, or otherwise with a connecting tube) to the pressure tap port on the main gas valve. Now, with the burner lit and operating normally, the gas pressure will force the water column down below zero point on one leg and up above the zero point on the other leg. These new water levels should be carefully marked on the tube. **NOTE:** If a commercial manometer is used it will have its own scale, and marking the tube will not be necessary. Also, careful use of a yardstick or ruler could be substituted for marking the tubing. Your gas pressure (in column inches) will be equal to the number of inches the water level was lowered below the zero point added to the number of inches the water was raised above the zero point on the other leg of the tube. For

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example, the water moved 2" down on one side and 2" up on the other side; the measured pressure was a total of 4" water column.

The ideal incoming gas pressure is 11wc". The correct operating manifold pressure for natural gas is 2.0" w.c. minimum and 4.0" maximum. By adjusting the pressure regulator between 2.0" and 4.0" w.c. aside range can be achieved.

If the desired input rating cannot be obtained within the above manifold pressure adjusting range, the next size larger or smaller burner orifice should be used.

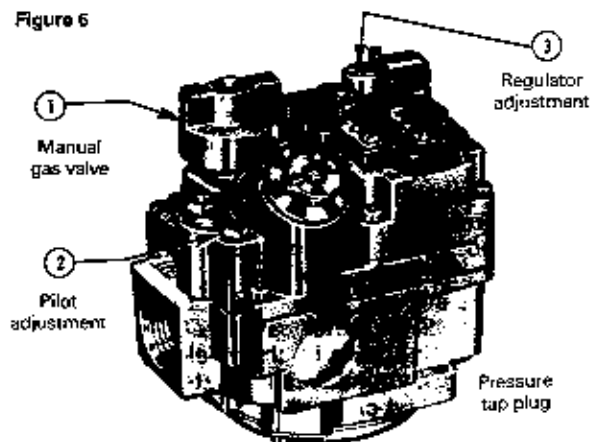
CONDENSATION FROM COILS

When cold water is being pumped into the water heater coils, and the burners are on, condensation will form on the coils and drip down into the burner compartment, giving the appearance of a leaking coil, particularly on cold humid days.

TO CHECK WATER HEATER COILS FOR LEAKS

With the main burners "OFF" start the pumping unit and allow to run for a few minutes. Check into the burner compartment with a drop light or flashlight. If no leaks are visible, then water dripping from coils is from condensation in the flue gases, when the burners are on.

Figure 6



PRESSURE REGULATOR ADJUSTMENT

Adjustment of the built-in regulator (Natural Gas only) isn't normally necessary, since it is preset at the factory. However, field adjustment may be accomplished as follows:

1. Attach manometer at pressure tap port.
2. Remove regulator adjustment screw cap.
3. With small screwdriver, rotate adjustment screw clockwise to increase or counterclockwise to decrease gas pressure.

4. Replace regulator adjustment screw cap. (see Figure 6, item 3)

Step 10: WARNING & CHECK LIST

WARNING

1. Installation or servicing of gas appliances and controls must only be performed by qualified personnel. After installation or servicing, test manual valve, operating valves, pressure regulation, and automatic shut-off valve for proper operation.
2. Install in a suitable dry location. The unit must be located in an area properly protected from the weather.
3. Shut off gas and electricity before starting installation or service. Turn back on to test or operate.
4. **DO NOT** connect appliances before pressure testing gas piping. Damage to gas valve may result. (6" - 14" W.C.P. or 1/2 PSIG)
5. **DO NOT** insert any object other than suitable pipe or tubing in the inlet or outlet of the gas valve. Internal damage may occur and result in a hazardous condition.
6. **DO NOT** trip gas valve body with a pipe wrench or vise. Damage may result causing gas leakage. Use inlet or outlet bosses or a special body wrench.
7. **DO NOT** short the gas valve terminals.
8. **DO NOT** allow any flame to impinge on the regulator vent tubing if supplied. It may clog and cause gas valve malfunction.
9. **DO NOT** use the gas cock to adjust gas flow.
10. In case of failure of main burner to shut off, turn off gas supply.
11. Keep all combustible materials away from gas appliances. **DO NOT** allow lint or dust to collect in burner area.
12. Dials must only be operated by hand. Never use pliers, wrenches or other tools to turn dials.
13. Leak test with a soap solution after installation or service with the main burner on. Coat pipe and tubing joints, gaskets, etc. Bubbles indicate leaks.
14. If the unit is installed in an enclosed room, care should be taken to ensure that an adequate supply of air is available for combustion and ventilation. (1 sq. inch per 1000 BTU)

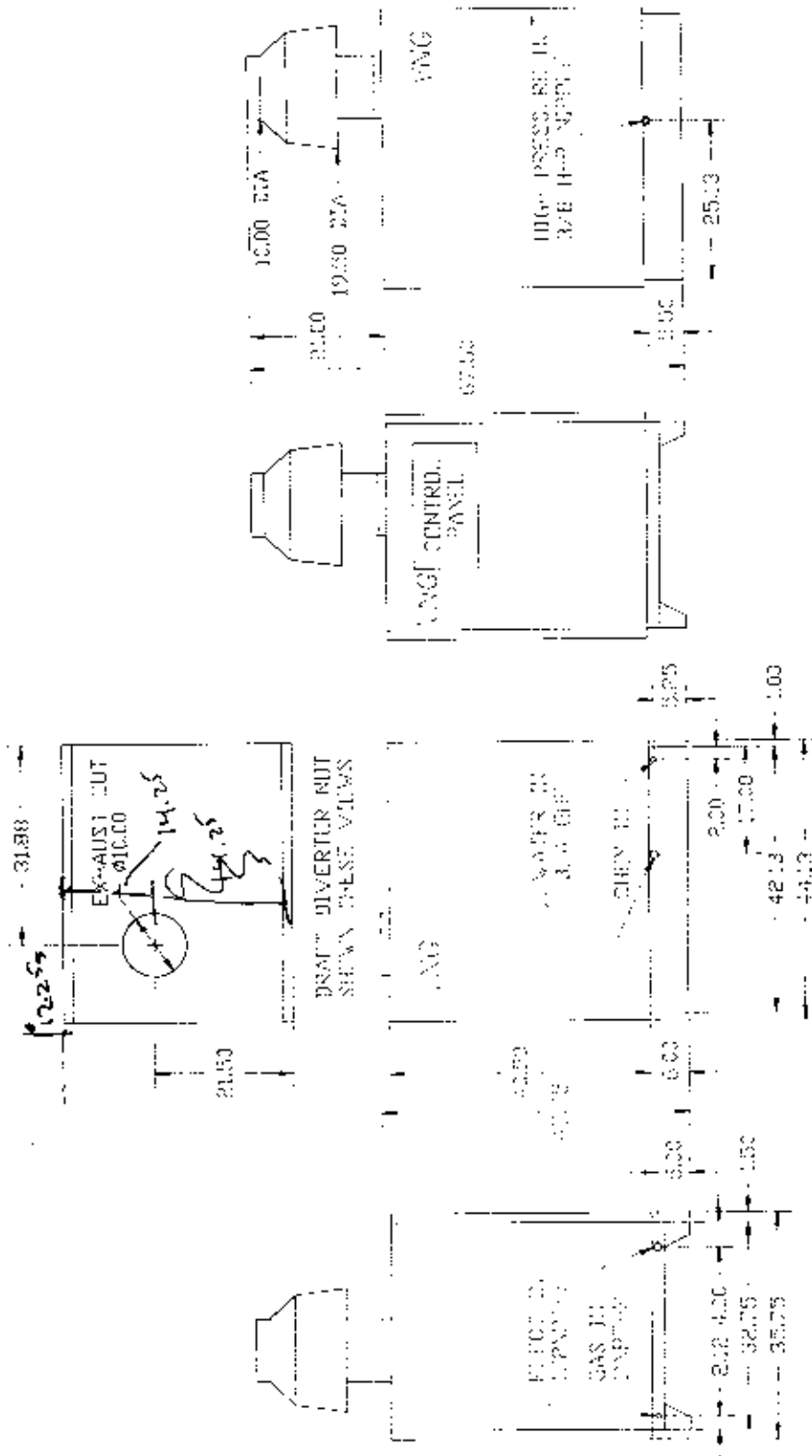
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INSTALLATION GUIDE

VNG-S



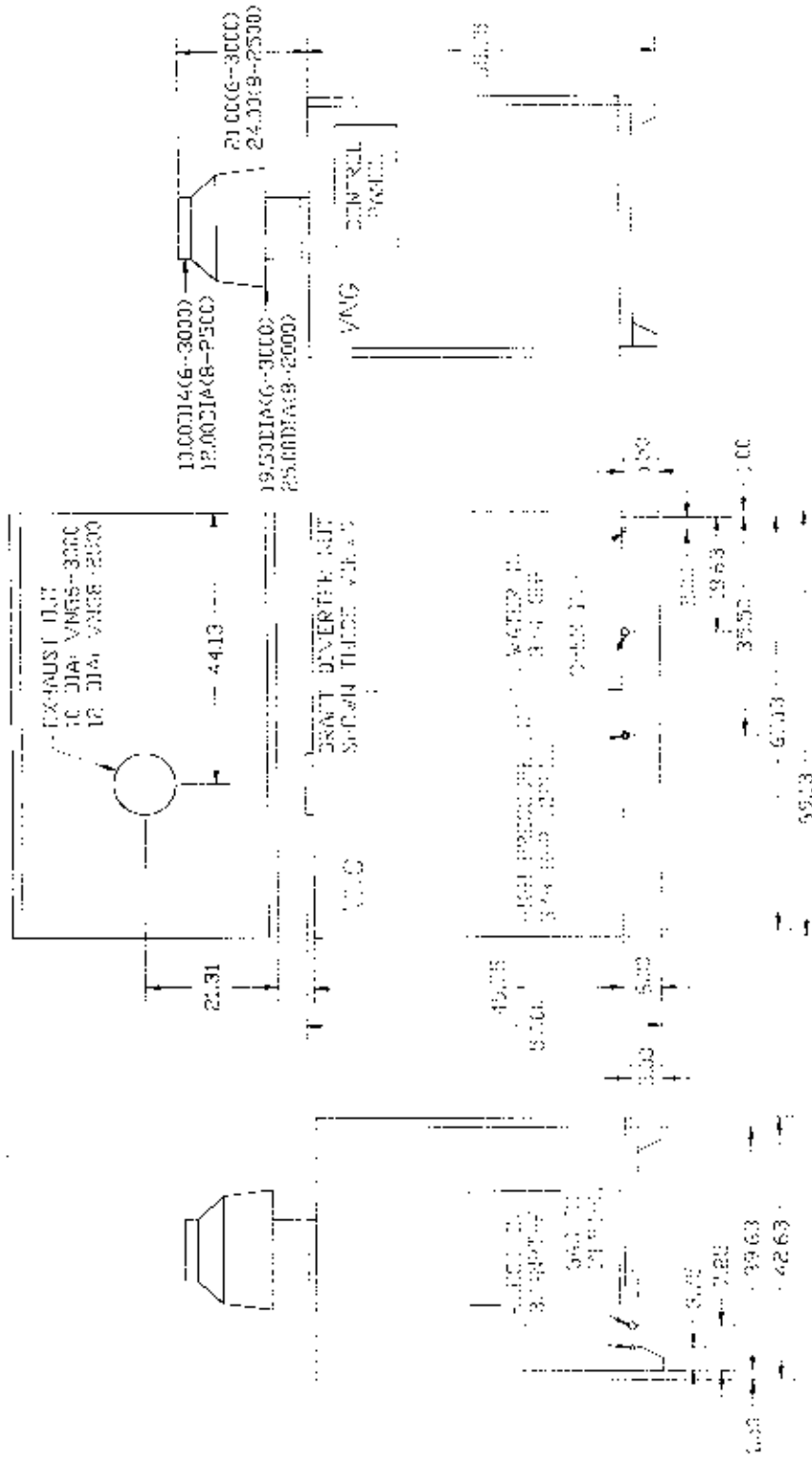
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INSTALLATION GUIDE

VNG-L



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CHECK LIST BEFORE STARTING

- | | YES | NO |
|---|-------|-------|
| 1. Has gas supply been inspected by an authorized contractor to meet local codes? | _____ | _____ |
| 2. Is unit protected from downdraft and excessive wind? | _____ | _____ |
| 3. Is unit shielded from moisture of water spray? | _____ | _____ |
| 4. Is the voltage correct and circuit breaker and supply cord adequate according to specifications and serial plate notation? | _____ | _____ |
| 5. Is the unit electrically grounded? | _____ | _____ |
| 6. Is there ample water supply? | _____ | _____ |
| 7. Have all flammable liquids or gases been removed from installation location? | _____ | _____ |
| 8. Is there adequate gas supply for the BTU rating of the burner? | _____ | _____ |
| 9. Is incoming gas supply pressure to unit between 6" - 14" water column inches or 1/2 PSIG? | _____ | _____ |
| 10. Has the proper gas regulator been installed for pressure and volume? | _____ | _____ |
| 11. Is the unit properly vented to allow adequate air flow? | _____ | _____ |
| 12. Are the propane tanks large enough, according to rating of the unit, to prevent freezing? | _____ | _____ |
| 13. Have gas lines been checked for gas leaks? | _____ | _____ |
| 14. Have all operators using this unit been instructed properly & have they read the manual? | _____ | _____ |
| 15. Has the Unit been installed according to operator's manual instructions? | _____ | _____ |
| 13. Have gas lines been checked for gas leaks? | _____ | _____ |
| 14. Have all operators using this unit been instructed properly & have they read the manual? | _____ | _____ |
| 15. Has the Unit been installed according to operator's manual instructions? | _____ | _____ |

CAUTION!

If "NO" has been checked on any of the above fifteen questions, do not operate this unit.

FOR YOUR SAFETY READ BEFORE LIGHTING

WARNING

If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

A. This appliance has a pilot which must be lighted by hand. When lighting the pilot, follow these instructions exactly.

Follow the gas supplier's instructions.

• If you cannot reach your gas supplier, call the fire department.

B. BEFORE LIGHTING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

FOR YOUR SAFETY "WHAT TO DO IF YOU SMELL GAS"

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

STARTING AND OPERATING INSTRUCTIONS

To Start:

1. Review installation instructions.
2. Turn on water to unit.
3. Grip wand or shut-off gun securely.
4. Turn burner switch to "OFF".
5. Depress and turn Gas Cock Dial ⓐ to "OFF" position. (Figure 6)
6. Wait sufficient length of time to allow gas which may have accumulated in burner compartment to escape (at least 15 minutes).
7. Turn Gas Cock Dial ⓐ to "PILOT" position.
8. Depress and hold the Gas Cock Dial while lighting pilot burner. Allow pilot to burn approximately 1-1/2 minutes before releasing Gas Cock Dial. If pilot does not remain lighted, repeat operation allowing longer period before releasing Gas Cock Dial (adjust pilot if necessary).
9. Turn Gas Cock Dial ⓐ to "ON" position.
10. Push control switch to start position, when steady stream of high pressure water flows from the gun, turn the burner switch on. Burner will light automatically.
11. Turn burner switch to the "ON" position. **IMPORTANT:** Do not adjust gas input between "PILOT" and "ON" positions on the Gas Cock Dial.
12. Adjust soap metering valve as needed.
13. Should pilot outage occur turn automatic gas valve to "OFF". Wait 5 minutes before lighting, to clear combustion chamber of accumulated gas.

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14. For cold water washing or rinsing, turn knob on combination gas valve to "PILOT" position. Do not turn to "OFF" position as the pilot light will have to be re-lit before heater can be put into operation.
15. For complete shutdown of the water heater, turn knob on combination gas valve to "OFF" position.

To Stop:

1. Turn soap valve off allowing chemical to be flushed from system. Use clear water to flush entire system.
2. Turn burner switch to "OFF" position and wait for water to cool or coil damage will result.
3. After water has cooled, push pump switch to stop position.
4. Turn water off.

PREVENTATIVE MAINTENANCE

1. Check to see that water pump is properly lubricated.
2. Follow winterizing instructions to prevent freeze damage to pump and coils.
3. Always neutralize and flush chemical from system after use.
4. If water is known to be high in mineral content, use a water softener on your water system, or de-scale as needed.
5. Do not allow acidic, caustic or abrasive fluids to be pumped through system.
6. Always use high grade quality Landa cleaning products.
7. Never run pump dry for extended periods of time.
8. Periodically delime coils as per instructions.

It is advisable, periodically, to visually inspect the burner. Check air inlet to make sure it is not clogged or blocked. Wipe off any oil spills and keep this equipment clean and dry.

The areas around the Landa washer should be kept clean and free of combustible materials, gasoline and other flammable vapors and liquids.

The flow of combustion and ventilating air to the burner must not be blocked or obstructed in any manner.

MAINTENANCE AND SERVICE

Spray nozzles

Each unit is equipped with one or more spray nozzles, depending on model. Different spray nozzles are calibrated for each machine depending on the flow and pressure of that particular model.

Spray nozzles vary in bore size and angle of spray. Popular spray angles are 0°, 15°, 25°, 40°. When ordering, please specify size and angle of nozzle. Nozzle size for each machine is located on the serial plate.

Unloader Valves

Units utilizing unloader valves relieve pressure in the line when a shut-off gun is closed. Machines with unloader valves are preset and tested at the factory before shipping. Occasional adjustment of the unloader may be necessary to maintain correct pressure. (See section in manual on unloaders for correct procedure in adjusting valve.)

Winterizing Procedure

Damage due to freezing is not covered by warranty. Adhere to the following cold weather procedures whenever the washer must be stored or operated outdoors under freezing conditions.

During winter months, when temperatures drop below 32° F, protecting your machine against freezing is necessary. Siphoning a small amount of anti freeze into the system is recommended. This is done by pouring a 50:50 mix of antifreeze and water into the float tank and then siphoning 100% antifreeze through the chemical line with the pump on. If compressed air is available, an air fitting can be screwed into the float tank strainer fitting and by injecting compressed air, all water will be blown out of the system. The use of a draft diverter will prevent the wind chill factor from freezing the coil.

Low Pressure Diagnosis (Units with shut-off gun)

Refer to Trouble Shooting Chart for low pressure. If by referring to the chart, the trouble is found to be either the unloader or pump, your next step is to determine whether, in fact, the unloader or the pump is the problem. This can be done by eliminating the unloader from the system and attaching a 50' charge hose directly to the pump. If high pressure is developed in this manner the pump is good, and the unloader needs to be repaired or replaced. If low pressure is still present the pump needs repairing. **CAUTION:** When using this procedure to test components keep shut-off gun open at all times.

High Limit Hot Water Thermostat

For safety, each unit is equipped with a high limit control switch. In the event the temperature of the water should exceed its operating temperature the high limit control will turn the burner off until the water cools.

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Pumps

Use only SAE 30 weight non-detergent oil. Change oil after first 50 hours of use. Thereafter, change oil every three months or at 500 hour intervals. Oil level should be checked through use of dipstick found on top of pump, or red dot visible through oil gauge window. Oil should be maintained at that level.

Cleaning of Coils

In alkaline water areas, lime deposits can accumulate rapidly inside the coil pipes. This growth is increased by the extreme heat build up in the coil. The best preventative for liming conditions is to use high quality cleaning chemicals. In areas where alkaline water is an extreme problem, periodic use of Landa Deliming Powder will remove lime and other deposits before coil becomes plugged. (See Deliming Instructions for use of Landa Deliming Powder.)

Deliming Coils

Periodic flushing of coils is recommended.

- Step 1 Fill a container with 4 gallons of water, then add 1 lb. of deliming powder. Mix thoroughly.
- Step 2 Remove nozzle from gun assembly and put gun into container.
- Step 3 Attach a short section (3-5 ft.) of garden hose to machine to siphon solution from container or add mixture to float tank. Turn pump switch on, allowing solution to be pumped through coils back into the container. Solution should be allowed to circulate 2-4 hours.
- Step 4 After circulating solution flush entire system with fresh water. Reinstall nozzle in gun.

Pressure Relief Valve

Each unit is equipped with a relief valve to relieve pressure in the system when higher than normal operating pressures are encountered. Unusually high pressures come from an object plugging the spray nozzle. This problem can easily be remedied by removing the obstruction. If operating pressure of unit is found to be normal and relief valve continues to leak, repair or replace valve.

Temperature and Pressure Relief Valve

(Pump protector for units with gun control only)
Units having gun control offer the operator the convenience of stopping and starting the flow of water at the end of the discharge hose. When the gun stops the flow of water, the unloader valve back at the machine opens and recycles the cold water back to the inlet side of the pump. Recycling for

longer than five minutes causes the cold water within the pump to heat up. To avoid damage to the pump, a temperature and pressure relief valve is installed next to the inlet side of the pump that will open in the event the temperature of the water should exceed 145° F. Therefore, while operating the machine, do not leave the shut-off gun closed for an extended period of time.

Propane Gas

General Safety Precautions

Have a qualified gas service person assist in any gas burner installation or service. Few maintenance people or mechanics are knowledgeable in gas controls or related safety practices. Propane Gas is heavier than air; unburned Propane Gas will gravitate to the floor rather than rise out of the stack. Hence, adequate floor space and good ventilation are especially important with propane systems.

Gas Pressure Requirements

All propane fired units operate on gas phase only. They are designed to operate at a pressure of 11" water column (between 1/3 and 1/2 of one PSI), and are often operated at even higher pressures when extra heat is needed.

Exterior regulators are needed to control the system. propane bottles are not included with unit. A high pressure regulator should be installed on propane bottle and a low pressure regulator attached to the pressure washer.

Propane Cylinder Capacity

An important consideration with propane systems is the capacity of the supply cylinder relative to the needs of the burner. The burner operates on propane as a gas; as gas is used from the propane cylinder, the liquid in the cylinder boils to maintain gas pressure. This boiling process cools the liquid, and in a heavy, continuous-demand situation, the liquid temperature can fall to the point at which it cannot provide gas as rapidly as is needed. In this case, it may be necessary to warm the PROPANE CYLINDER by directing a warm spray, not over 120°, on the cold cylinder, or by manifolding two propane bottles together to increase total vaporization capacity. It is recommended that a minimum 100 lb. propane bottle be used on the unit.

BURNER FEATURES

Millivolt Operated Automatic Valve

The automatic valve is operated by a millivolt operated relay operator. The automatic pilot valve

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and automatic valve are both operated in parallel from a thermopile.

Field Replaceable Electro-Magnet in Gas Atmosphere

The thermo-electric magnetic operator is located in the gas stream to provide a gas atmosphere for corrosion protection. The magnetic operator for the automatic pilot is field replaceable. The automatic pilot valve is first in the control operation sequences. It is entirely independent of either the manual valve or the diaphragm valve in its closure operation.

Built-In Self Protection

Inlet and outlet screens on these controls provide protection from valve contamination on "in plant" appliance assembly and in the field. Bleed gas and pilot filters protect against bleed orifice and pilot orifice clogging.

Care of Main Burners

Due to condensation from heater coils dripping down on the burners, a scale build-up may occur in the burner jet orifices.

1. TO REMOVE BURNERS FROM WATER HEATER:

Turn off the gas to the main burners with the combination gas valve by turning the knob to "OFF" position.

Disconnect the pilot line and thermopile from the combination gas valve. Disconnect union in main burner line below thermostat. Slide burner out through shell opening.

2. TO CLEAN BURNER JETS:

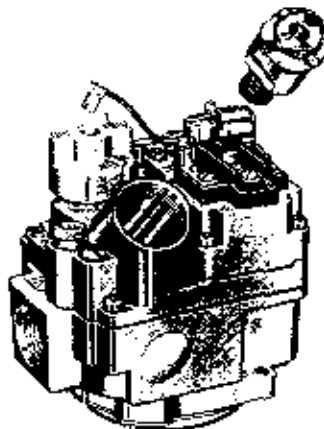
Select proper size drill for type gas involved. Use pin vise to hold drill and ream out each jet orifice. CAUTION: Do not ream out orifices to a larger size.

If the water heater will be exposed to freezing weather, an anti-freeze solution should be circulated through the coils by whatever means are available for the particular system the water heater is used on.

Automatic Pilot Magnet Replacement

1. Shut off gas line valve or meter.
2. Remove jumper wire from magnet.
3. Remove MAGNET ASSEMBLY by unscrewing hexagon magnet base with 5/8" socket wrench.

4. When replacing MAGNET ASSEMBLY, apply thread lube and tighten sufficiently to prevent gas leakage.
5. Reinstall jumper wire on new magnet.
6. Reestablish gas supply and leak test with soap and water.



To Adjust Pressure Regulator

Adjustment of the Pressure Regulator is not normally necessary since it is preset at the factory. However, field adjustment may be accomplished as follows:

1. Manometer attachment may be accomplished at pressure tap plug.
2. Remove regulator adjustment screw cap (see ③ Figure 6).
3. With small screwdriver, rotate adjustment screw "clockwise" to increase, or "counterclockwise" to decrease pressure.
4. Replace regulator adjustment screw.

Regulator Replacement

1. Depress and turn Gas Cock Dial to "OFF".
2. Remove two screws, regulator cartridge and gasket.
3. Install new gasket and regulator (this assembly must be positioned properly).
4. Install and tighten screws securely.
5. Relight appliance by following steps 4 and 5 of procedure for lighting and relighting.
6. Test for leaks around the regulator using soap solution with main burner "ON".

To Clean Main Valve

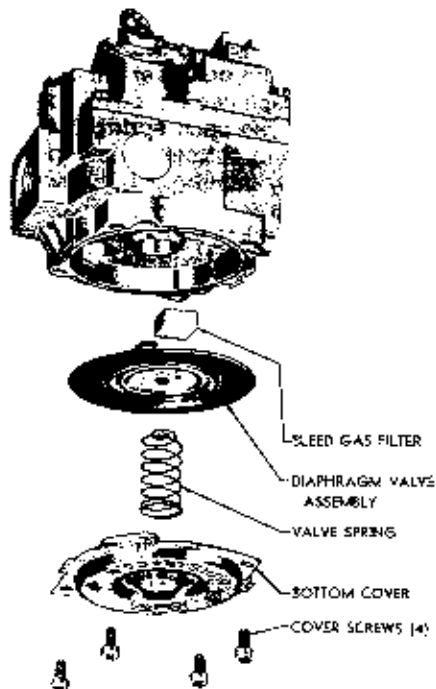
1. Depress and turn Gas Cock Dial to "OFF" position.
2. Remove four screws from bottom of control and remove bottom cover.

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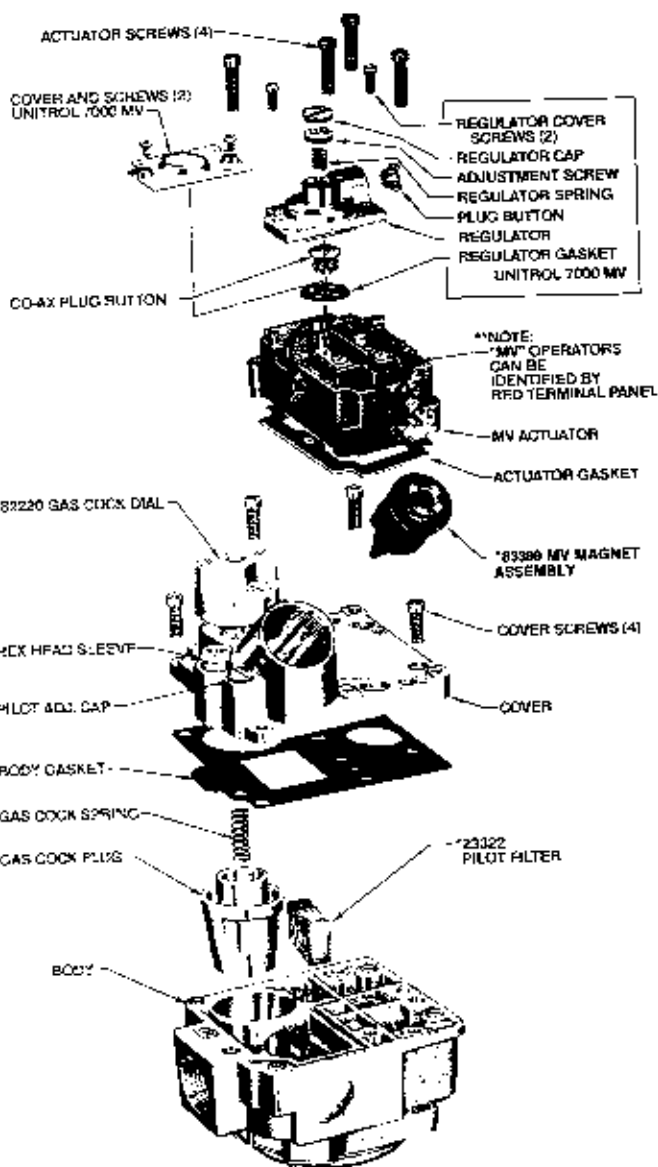
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- Remove diaphragm spring and valve assembly by carefully lifting edge all around.
- Clean valve and valve face with clean, soft, lint-free cloth or chamois.



- Replace body gasket and spring; be sure holes in gasket are over raised boss around screw holes.
- Depress gas cock dial on cover assembly with dial in pilot position and replace top cover assembly on control body. Be sure gas cock spring enters hub of gas cock dial shaft, and rubber safety pilot valve face clears edge of body casting. Hold down on top cover while tightening screws.



To Lubricate Gas Cock Plug

(See Exploded View)

- Close gas supply at line valve or meter.
- Disconnect thermopile, pilot tubing, actuator wiring and regulator vent tubing (if so equipped).
- Turn gas cock dial to "PILOT" position.
- Remove four screws at corners of actuator and remove actuator and gasket.
- Remove four screws through top cover.
- Carefully separate top cover assembly from body of control, being careful not to damage body gasket, then remove gasket and gas cock spring.
- Note position of key-way in top of gas cock plug, then pull gas cock straight out of body. If necessary, rotate slightly while removing.
- Remove old grease from plug only. Do not attempt to clean cavity as old grease or foreign matter may be pushed into cavity.
- Lubricate gas cock plug only, with good quality gas cock grease suitable for use on aluminum gas cocks (do not over lubricate).
- Replace gas cock; rotate gas cock until key-way is in the same position as when removed.

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13. Replace actuator gasket and actuator; position actuator so that indicator mark is near the gas cock dial; tighten four corner screws securely.
14. Replace thermopile, pilot tubing, actuator wiring and regulator vent tubing (if so equipped).
15. Reestablish gas supply to appliance.
16. Check for gas leaks using soap solution with main burner "ON".

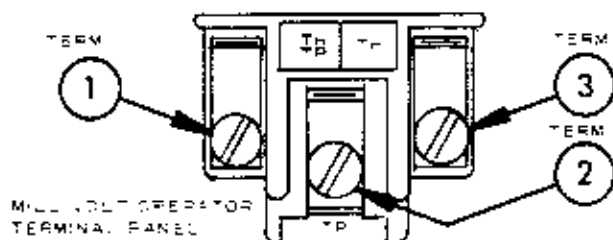
BURNER TROUBLESHOOTING

Millivolt Check

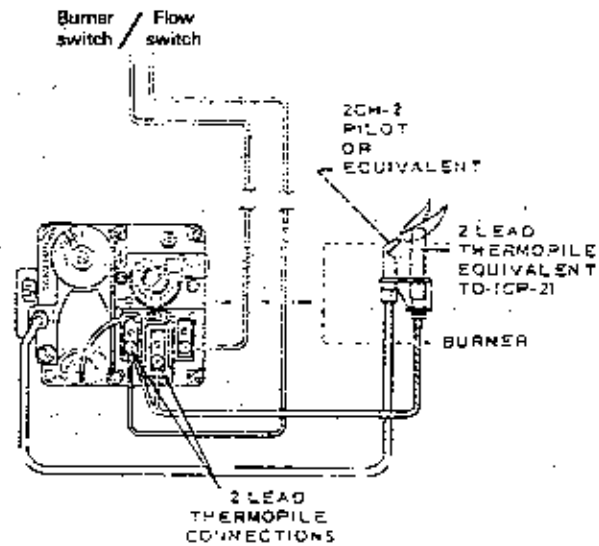
The Unitrol 7000MV or 7000MVR is a thermopile self-powered combination gas control. Before checking the millivolt system, the following operations should be performed and observations made:

1. Inspect system for proper wiring.
2. The switch leads and all wire connections should be cleaned and tightened to eliminate all unnecessary resistance.
3. Clean and/or adjust pilot for maximum flame impingement on the thermopile.
4. If pilot will not remain lit when gas cock dial is released, check automatic pilot (Step D).

The millivolt system and individual components may be checked with a millivolt meter having a 0-1000MV range. Conduct each check shown in chart below by connecting meter leads to terminals as indicated. All readings are closed circuit.



Check Test	To Test	Connect Meter Leads To Terminals	Switch Flow & Burner Contacts	Meter Reading Should Be
A	Complete System	2 & 3	Closed	100 MV or More
B	Thermopile Output	1 & 2	Open	Greater than 250 - (CP-1)
C	System Resistance	1 & 3	Closed	Less than 35 (CP-1)
D	Auto/Pilot Dropout	1 & 2	Open	Between 120 - 30 MV



A. Complete Millivolt System Check

("A" Reading - Switch contacts CLOSED - Gas Cock Dial "ON" - Main burner should come ON).

1. If the reading is more than 100 millivolts and the automatic valve still does not come on, replace the automatic valve operator.
2. If the closed circuit reading ("A" Reading) is less than 100 millivolts, determine cause for low reading - proceed as follows:

B. Thermopile Output Reading Check

("B" Reading - Switch contacts OPEN - Main burner OFF)

CP - 1 system - 250 millivolts minimum.

If the minimum millivolt reading is not obtainable, readjust pilot for maximum millivolt output. If millivolt reading is still below minimum specified, replace thermopile.

C. System Resistance Check

("C" Reading = Switch contacts CLOSED - Gas Cock "ON" - Main burner should be ON)

1. CP - 1 system - less than 35MV.
2. If the "C" Reading is more than that specified for the system being checked, this indicates the resistance in the system is excessive and must be reduced. To correct:

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- a. Clean and tighten switch leads and connections.
- b. Shorten switch lead wires and/or replace with heavier gage wire.
- c. Cycle switch rapidly to clean contacts.

D. Automatic Pilot Dropout Check

1. Hold Gas Cock Dial depressed in pilot position until maximum output is observed. Then extinguish pilot and observe meter.
2. Dropout of automatic pilot magnet (sound should be audible) should occur between 120 millivolts and 30 millivolts. If dropout occurs outside these limits, change the automatic pilot magnet assembly.

No Spark - No Pilot Gas	Spark - But No Pilot Gas	Pilot Gas - But No Spark	Fluct. Lit. - But Main Burner Won't Come On	Pilot Dyes Off and On by itself	Main Burner Shuts Down	POSS. CAUSES	POSS. CURE
•						No Main Power	Restore Power
•						Faulty Limit Switch	Test/Replace
	•					No Gas supplied to Pilot Valve	Check for Availability of Gas
	•					Manual Valves in "OFF" Positions	Turn Man. Valve and Gas Cock to full "ON." Check Pilot Key Adj.
	•			•		Faulty Pilot Valve	Test Gas Valve
•	•		•	•		Faulty Wiring	Test Wiring
	•					Restricted Pilot Line or Clogged Pilot Orifice	Clean Pilot Tubing and Orifices
		•				Broken or Shorted Electrode Assembly	Test Replace
				•	•	Low Pilot Flame	Check Inlet Press. Pilot Orifice Poss. Adjust w/ Pilot Key
				•	•	Improper Alignment of Sensor in Pilot Flame	Adjust Alignment-see Sketch page
					•	Faulty Main Gas Operator in Gas Control	Test Gas Valve Repair/Replace
					•	Faulty Flame Sensor	Test Sensor, Wiring Repair/Replace
					•	Pilot flame being drawn away from sensor	Check Inlet Press. Manual Valve must be full "on"
					•	Faulty Limit	Test/Replace

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PROBLEM	POSSIBLE CAUSE(S)	SOLUTION
LOW OPERATING PRESSURE	Faulty pressure gauge	Install new gauge
	Insufficient water supply	Use larger garden hose; clean filter washer at water inlet
	Old, worn or incorrect spray nozzle	Match nozzle number to machine and/or replace with new nozzle
	Belt slippage	Tighten or replace; use correct belt
	Plumbing or hose leak	Check plumbing system for leaks. Retape leaks with teflon tape
	Faulty or misadjusted unloader valve (Where applicable)	Adjust unloader for proper pressure. Install repair kit when needed
	Worn packing in pump	Install new packing kit
	Fouled or dirty inlet or discharge valves in pump	Clean inlet and discharge valves
	Worn inlet or discharge valves	Replace with valve kit
	Obstruction in spray nozzle	Remove obstruction
LOW WATER TEMPERATURE	Leaking pressure control valve (where applicable)	Rebuild or replace as needed
	Chemical metering valve left open sucking air, or faulty metering valve	Close and/or replace metering valve
	Slow engine RPM	Set engine speed at proper specifications
	Improper size of gas lines	See Page 3 for sizing of gas lines
	Low gas pressure	Increase gas pressure to machine
	Improper pressure regulator	Specify BTU, building gas pressure and 11wc" to machine for correct sizing of regulator
	Low gas valve pressure	Increase gas pressure as described on Page 10
Soot buildup on coils not allowing heat transfer	Clean coils	
Improper burner nozzle	See specifications on Page 58	

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PROBLEM	POSSIBLE CAUSE(s)	SOLUTION
WATER TEMPERATURE TOO HOT	Incoming water to unit warm or hot	Lower incoming water temperature
	Gas pressure too high	See specifications for proper gas pressure
	Chemical line sucking air	Tighten all clamps. Check chemical lines for holes
	Defective high limit switch	Replace
	Incorrect burner nozzle size	See specifications on page 62 for proper size
	Insufficient water supplied	Check water G.P.M. to machine
	Restricted water flow	Check nozzle for obstruction, proper size
CHEMICAL NOT DRAWING	Air leak	Tighten all clamps. Check chemical lines for holes
	Chemical metering valve packing not tight or packing worn	Tighten nut. Replace valve or packing
	Filter screen on chemical suction hose plugged	Clean or replace
	Dried up chemical plugging metering valve	Disassemble and clean thoroughly
	High viscosity of chemical	Dilute chemical to specifications
	Restriction behind float tank screen removed	Install restriction
	Hole in chemical line(s)	Repair hole
	Strainer basket plugged	Remove and clean
	Connections on selector valve loose	Put teflon tape on all pipe connections
	Chemical solenoid not opening (where applicable)	Check flow switch, replace chemical solenoid

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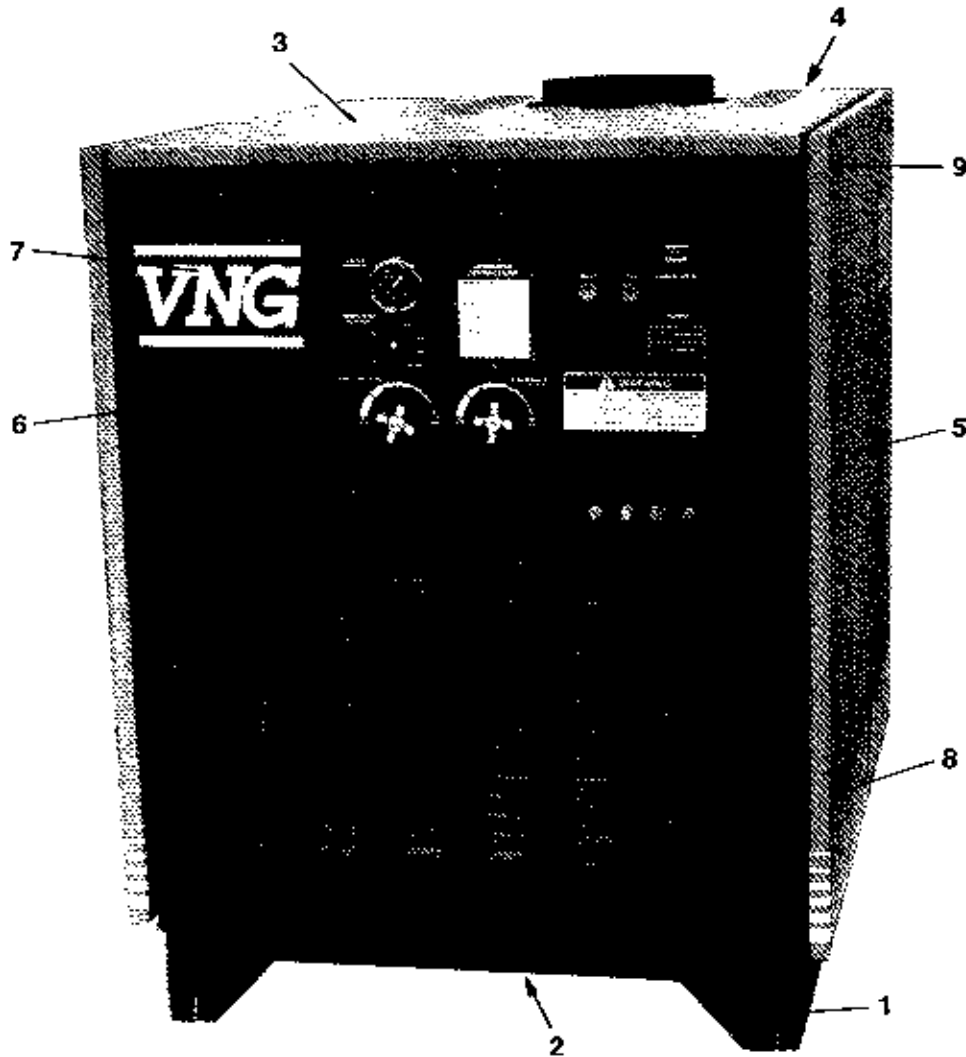
PROBLEM	POSSIBLE CAUSE(s)	SOLUTION
PUMP RUNNING NORMALLY BUT PRESSURE LOW ON INSTALLATION	Pump sucking air Valves sticking Unloader valve seat faulty Nozzle incorrectly sized Worn piston packing	Check water supply and possibility of air seepage Check and clean or replace if necessary Check and replace if necessary Check and replace if necessary (See serial plate for proper size) Check and replace if necessary
FLUCTUATING PRESSURE	Valves worn Blockage in valve Pump sucking air Worn piston packing	Check and replace if necessary Check and replace if necessary Check water supply and air seepage at joints in suction line Check and replace if necessary
PUMP NOISY	Air in suction line Broken or weak inlet or discharge valve springs Excessive matter in valves Worn bearings	Check water supply and connections on suction line Check and replace if necessary Check and clean if necessary Check and replace if necessary
PRESENCE OF WATER IN OIL	Oil seal worn High humidity in air	Check and replace if necessary Check and change oil twice as often
WATER DRIPPING FROM UNDER PUMP	Piston packing worn O-Ring plunger retainer worn	Check and replace if necessary Check and replace if necessary
OIL DRIPPING	Oil seal worn	Check and replace if necessary
EXCESSIVE VIBRATION IN DELIVERY LINE	Irregular functioning of the valves	Check and replace if necessary
RELIEF VALVE LEAKS WATER	Relief valve defective	Replace or repair

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EXTERIOR VIEW



ITEM	PART NO.	DESCRIPTION	QTY
1	95-07163052	Base, VNG-S	1
	95-07163000	*Base, VNG-L	1
2	95-07163054	*Cap, Base End, VNG-S (Discontinued)	2
	95-07163005	*Cap, Base End, VNG-L (Discontinued)	2
3	95-07163056	Panel, Top, VNG-S	1
	95-07163010	*Panel, Top, VNG-L	1
4	95-07163060	*Panel, Burner End, VNG-S	1
	95-07163014	*Panel, Burner End, VNG-L	1
5	95-07163062	Panel, Side, VNG-S	2
	95-07163018	*Panel, Side, Large, VNG-L	2
	95-07163020	*Panel, Side, Small, VNG-L	2
6	10-99015	Label, VNG Control Panel, Lexan	1
	10-99031	Label, VNG Control Panel w/ Remote	1
7	10-99016	Label, VNG Logo	3
8	10-99017	Label, VNG Stripe	2
9	90-50033	Latch, Vise Action	4

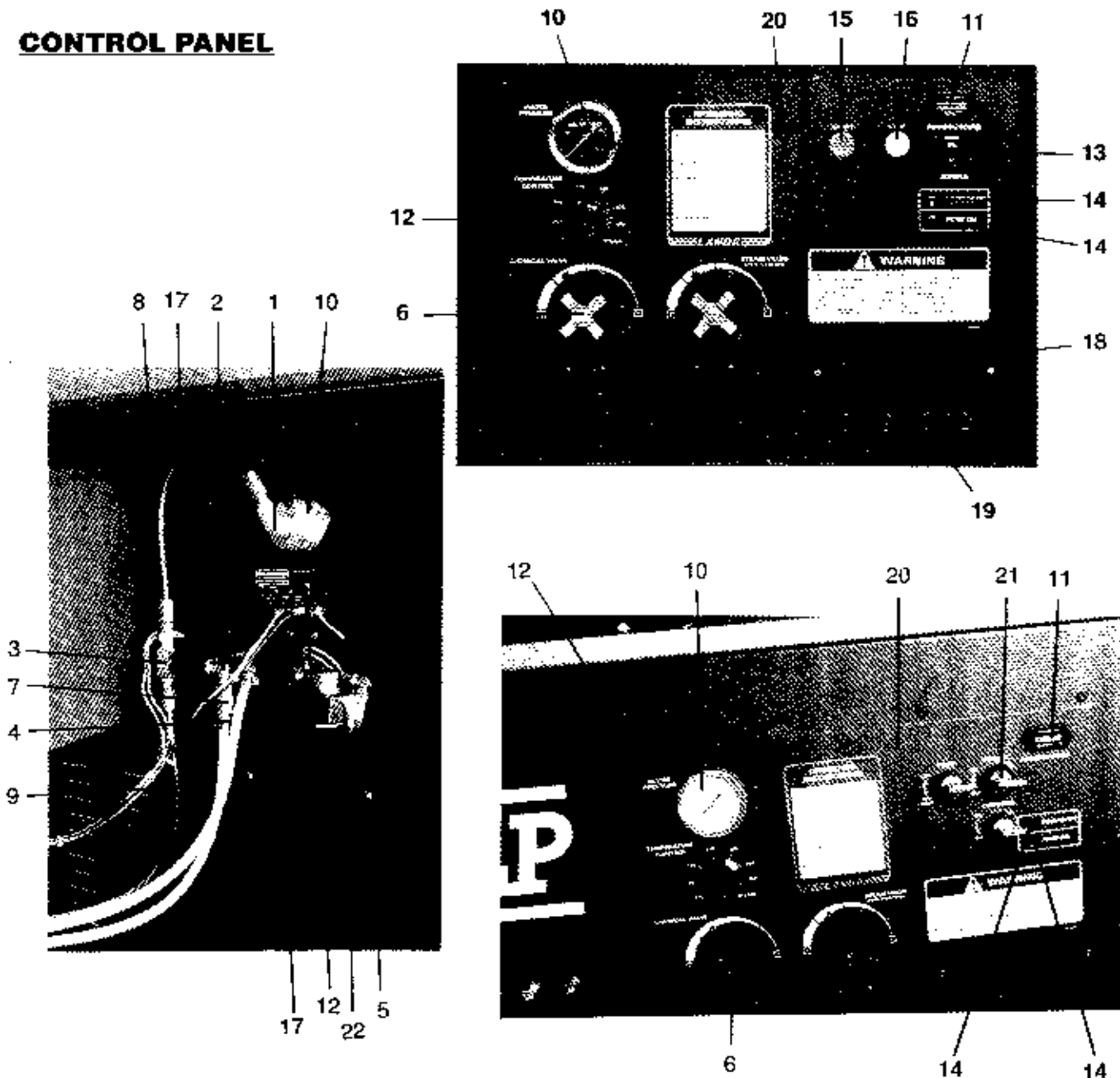
* not shown in photo

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CONTROL PANEL



ITEM	PART NO.	DESCRIPTION	QTY
1	2-0026	Elbow, Female, 1/4" Pipe	1
2	2-00260	Elbow, Male, 1/4" Pipe	1
3	2-1037	Lee, Branch, 1/4" Male	1
4	2-1065	Hose Barb, 1/4" x 1/4"	2
5	2-1089	Hose, 90 Dgr., 1/4" x 1/4"	1
6	2-3015	Valve/Control, Metering, 1/4"	2
	2-30153	Kit, MVK-4 Mount	2
7	2-3028	Valve, Inline Metering, MV-250	1
8	4-02021216	Hose, Press Loop, 100R2, 1/4" x 16"	1
9	4-02021228	Hose, Press Loop, 100R2, 1/4" x 28"	1
	4-02021242	Hose, Gauge line 100R2 42" x 1/4"	1
10	4-05031	Gauge, 0-2000 (3-300, 3-1100)	1
	4-05035	Gauge, 0-5000 PSI, VNG & Skid	1
11	4-050879	Hour Meter, Hobbs, 110V, 20001	1

ITEM	PART NO.	DESCRIPTION	QTY
12	4-05085	Control, Temp, Solid State 275DR	1
13	6-020251	Switch, Curvette 120V & 220V	1
14	6-02053	Light, Indicator, Red, 125V	2
15	6-0920	Push Button, GE, Green, VNG	1
16	6-0921	Push Button, GE, Red, VNG	1
17	95-07163038	Support, Metering Valve, VNG	2
18	95-07-63058	Panel, Control, VNG-S	1
	95-07-63012	Panel, Control, VNG-L	1
19	2-01031	Grommet, Rubber 2282	4
20	10-99015	Label, VNG Control Panel	1
	10-99031	Label, w/Remote, Control Panel	1
21	6-0391	Pilot Switch, Red	3
22	6-140160	Solenoid, Chemical, 120V	1
	6-140162	Solenoid, Chemical, 24V	1

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**CONTROL PANEL
STEAMER**



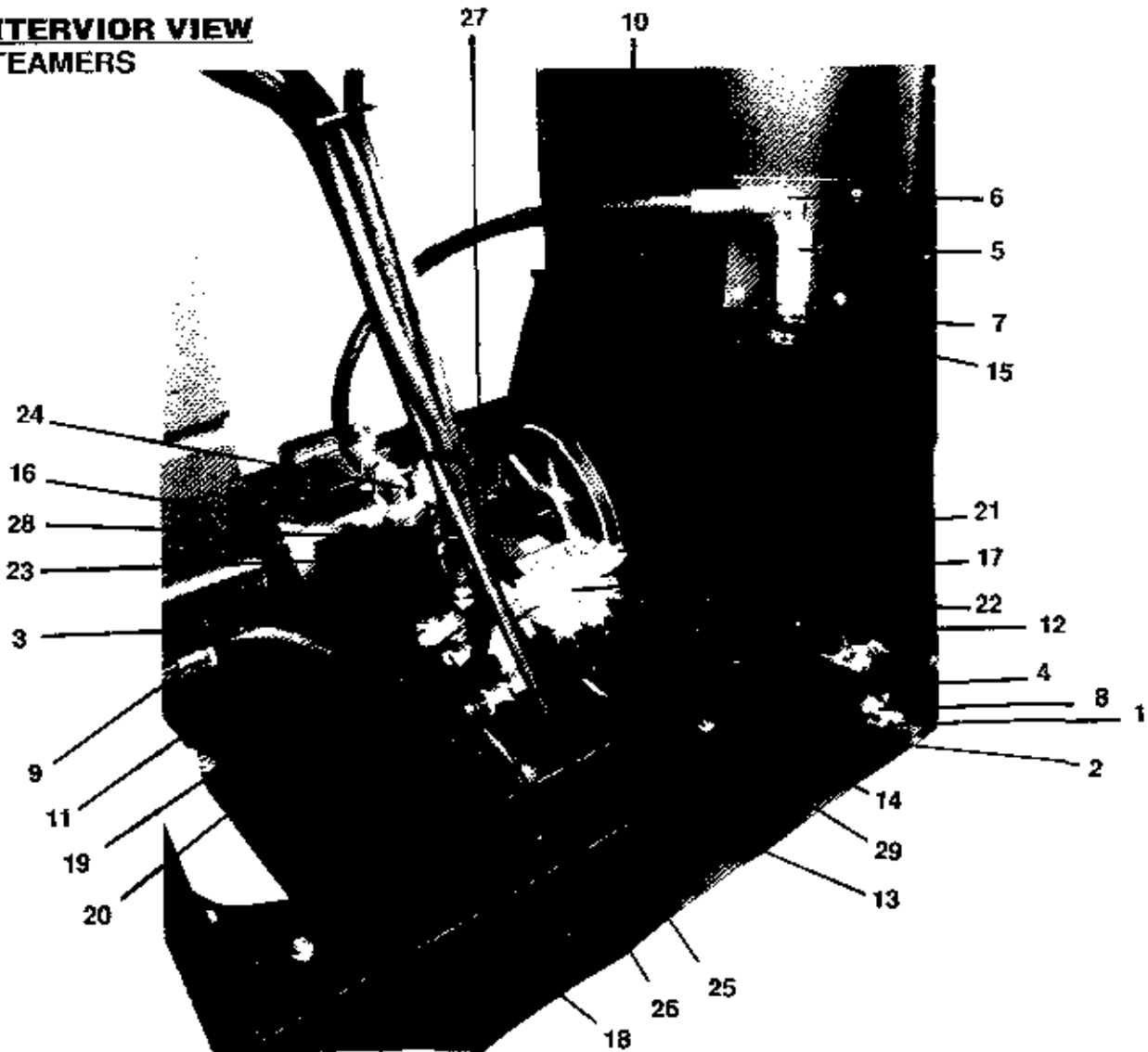
ITEM	PART NO.	DESCRIPTION	QTY
1	17-22282	Nut, 10/32" Keps	10
2	4-05031	Gauge, 0-2000 PSI, Black, GTO	1
3	4-050822	Hour Meter, Hobbs, 110V, 20001	1
4	8-020251	Switch, Curvette, 120V & 220V	1
5	6-02051	Light, Indicator, Red, 125V	2
6	6-0920	Push Button, GE, Green	1
7	6-0921	Push Button, GE, Red	1
8	95-07163058	Panel, Control, VNG-S	1
	95-07163012	Panel Control, VNG-L	1
9	10-990151	Label, VNG Control Panel, Steam	1
10	10-99016	Label, VNG Logo	1

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**INTERIOR VIEW
STEAMERS**



ITEM	PART NO.	DESCRIPTION	QTY
1	2-0079	Swivel, 1/2" JIC FEM, 3/8" MAT	1
2	2-0101	Isolator, Vibration, 5/16"	6
3	2-10062*	Modified Close Nipple, 2-1100	1
	2-1906*	Strainer, Basket, 1/2"	1
4	2-1023	Elbow, Street, 3/8"	1
5	2-1032	Tee, Female, 1/2" Pipe	2
6	2-1062	Elbow, 90 DGR, 1/2" JIC x 1/2"	2
7	2-1076	Bushing, 1/2" x 1/4" Pipe	1
8	2-11039	Connector, Anchor, 3/8"	1
9	2-1105	Swivel, Push On, 1/2" JIC FEM	4
10	4-02037725	Hose, Pres Loop, 100R1, 25' x 3/8"	1
11	4-02110000	Hose, Push-On, 1/2" JFT	4.5
12	4-02228636	Hose, Press Loop, P809 SHO x 36"	1
	4-0510*	Switch, Snap, 340 DR Hi-Limit	1
13	6-0100	Cord, Service, SFO, 16/2, /F-I	3
14	6-0104	Cord, Service, SEO, 12/3, /A-1	6
	6-04103*	Junction Box, 4 Hole	1
	6-0411*	Cover Plate, Junction Box	1

ITEM	PART NO.	DESCRIPTION	QTY
15	81-22550	Valve, Pop-Off, 1200 PSI	1
16	5-1001	Motor, .75 HP 1 PH 3450 RPM L1906A	1
17	5-2216	Pump, Hypro, 2230BX (8630 BX)	1
18	95-07163050	Power Platform, VNG-S	1
	95-07121013	Platform, Motor, PHW	1
19	2-1023	Elbow, Street, 3/8"	1
20	2-1041	Tee, Street, 3/8"	1
21	2-1047	Plug, Hex, 3/8" Head	1
22	2-1048	Plug, Hex, 1/2" Head	1
23	2-1050	Plug, Flare, 1/2" JIC, 639F-8	1
	2-1052*	Nipple, 1/2" JIC x 3/8" Pipe	1
24	2-1060	Elbow, 90 DGR, 1/2" JIC x 3/8"	1
25	2-1062	Elbow, 90 DGR, 1/2" JIC x 1/2"	2
26	2-1088	Hose Barb, 90 DGR, 1/4" x 1/8"	1
27	4-02157724	Hose, Pulsation	1
28	6-02173	Switch, Flow, STS	1
29	95-0712112HD	Pump Rail, 1 Hypro, Duplex	1

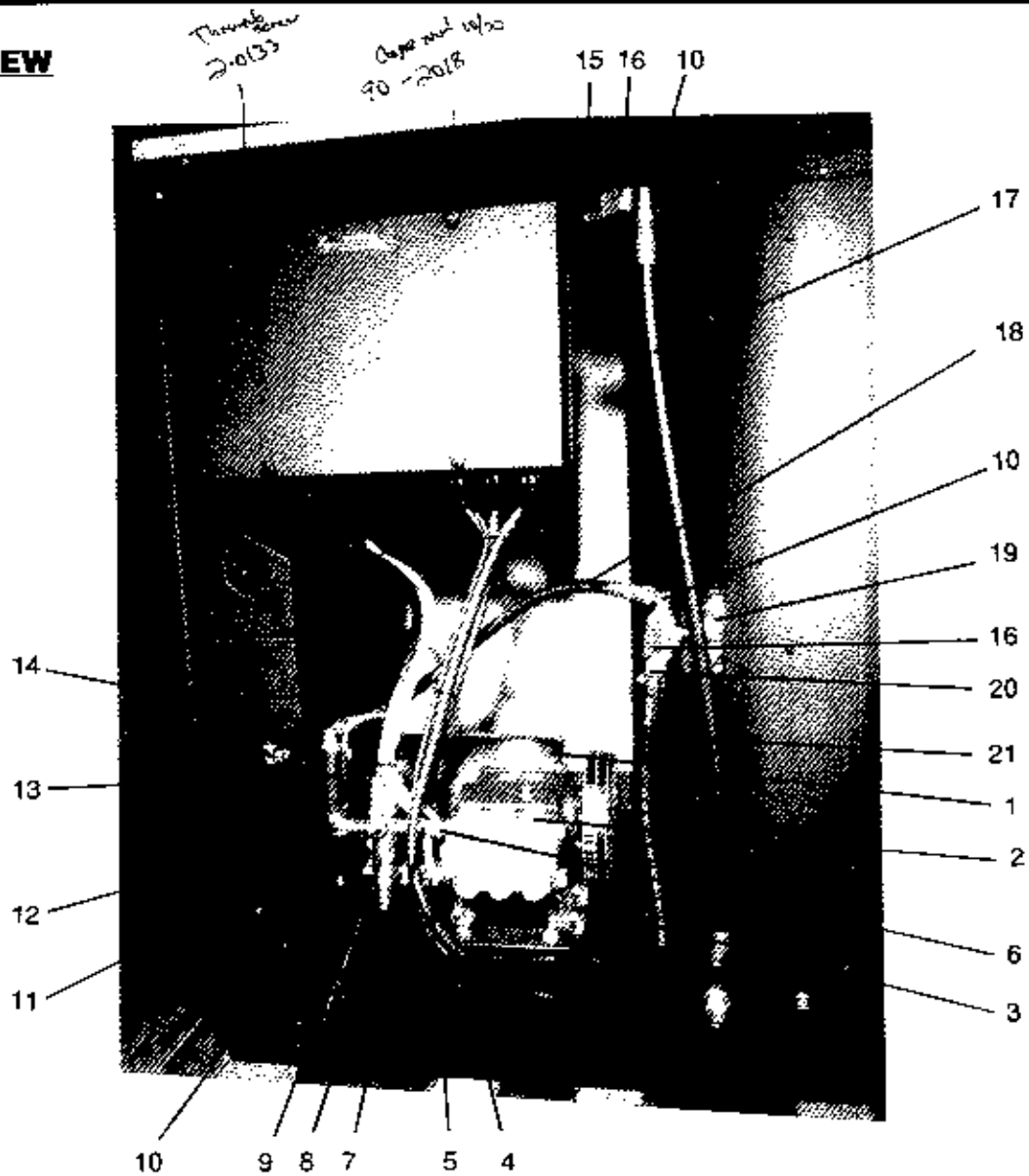
*not shown

OPERATOR'S MANUAL • VERTICAL NATURAL GAS/PROPANE PRESSURE WASHER

■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■

■ VNG6-3000 ■ VNG8-2500 ■ VNG3-300 ■

**INTERIOR VIEW
VNG-S**



ITEM	PART NO.	DESCRIPTION	QTY
1	5-1043	Motor, 2 HP, 1 PH, 3450, 35K263Y685 (3-1100)	1
	5-1040	Motor, 6 HP, 1 PH, 1725 (4-2000, 230 1 PH)	1
	5-1011	Motor, 5 HP, 3 PH, 1725, M32181, (4-2000, 230V & 460V, PH)	1
	5-1013	Motor, 7.5 HP, 1 PH, 1725, L1510T (4-3000, 230V, 1 PH)	1
	5-10145	Motor, 7.5 HP, 3 PH, 1725, M311T (4-3000, 230V, 3 PH)	1
2	5-2302	Pump, General T-991, (3-1100)	1
	5-2304	Pump, General T-1011 (4-2000)	1
	5-2307	Pump, General TS-2021 (4-3000)	1
3	95-07121112	Rail, Pump, PHW Large, Combo	1
4	2-10421	Tee, Street 1/2" x 1/8" Hole	1
5	2-1088	Hose Barb, 90°, 1/4" x 1/8"	1
	2-1076	* Bushing, 1/2" x 1/4" Pipe2	1
	2-1089	* Hose Barb, 90°, 1/4" x 1/4"	1
6	2-0079	Swivel, 1/2" JIC Fem 3/8 Male	1
7	2-0051	Nipple, 1/2" JIC, 3/8" Pipe	1
8	2-1042	Tec, Street, 1/2"	1

* Not Shown

ITEM	PART NO.	DESCRIPTION	QTY
9	5-3201	Unloader, SMC, 0031790 (3-1100)	1
	5-30011	Unloader, Valve, K-5.1 (4-2000, 4-3000)	1
10	2-1062	Elbow, 90°, 1/2" JIC x 1/2"	4
11	2-1022	Elbow, Street, 1/4"	1
12	2-01023	Elbow, Street, 3/8"	1
13	6-02173	Switch, Flow, ST5	1
14	2-1060	Elbow, 90°, 1/2" JIC x 3/8"	3
	95-07163050	* Power Platform	1
15	4-05086	Thermistor	1
16	2-1032	Tee, Female, 1/2" Pipe	2
	2-1007	Nipple, Hex, 1/2"	1
17	4-02047736	Hose, Pres Loop, 100R2, 3/8" x 3/8"	1
18	4-02037725	Hose, Pres Loop, 100R1, 25" x 3/8" (3-1100)	1
	4-02047725	Hose, Pres Loop, 100R2, 25" x 3/8" (4-2000/4-3000)	1
19	95-071211131	VNG Insulation Retainer Plate	1
20	81-22550	Valve, Pop-Off, 200 PSI (3-1100)	1
	81-22560	Valve, Pop-Off, 2400 PSI (4-2000)	1
	81-22565	Valve, Pop-Off, 3600 PSI (4-3000)	1
21	4-02129000	Hose Push-On, 3/4" /ft.	2

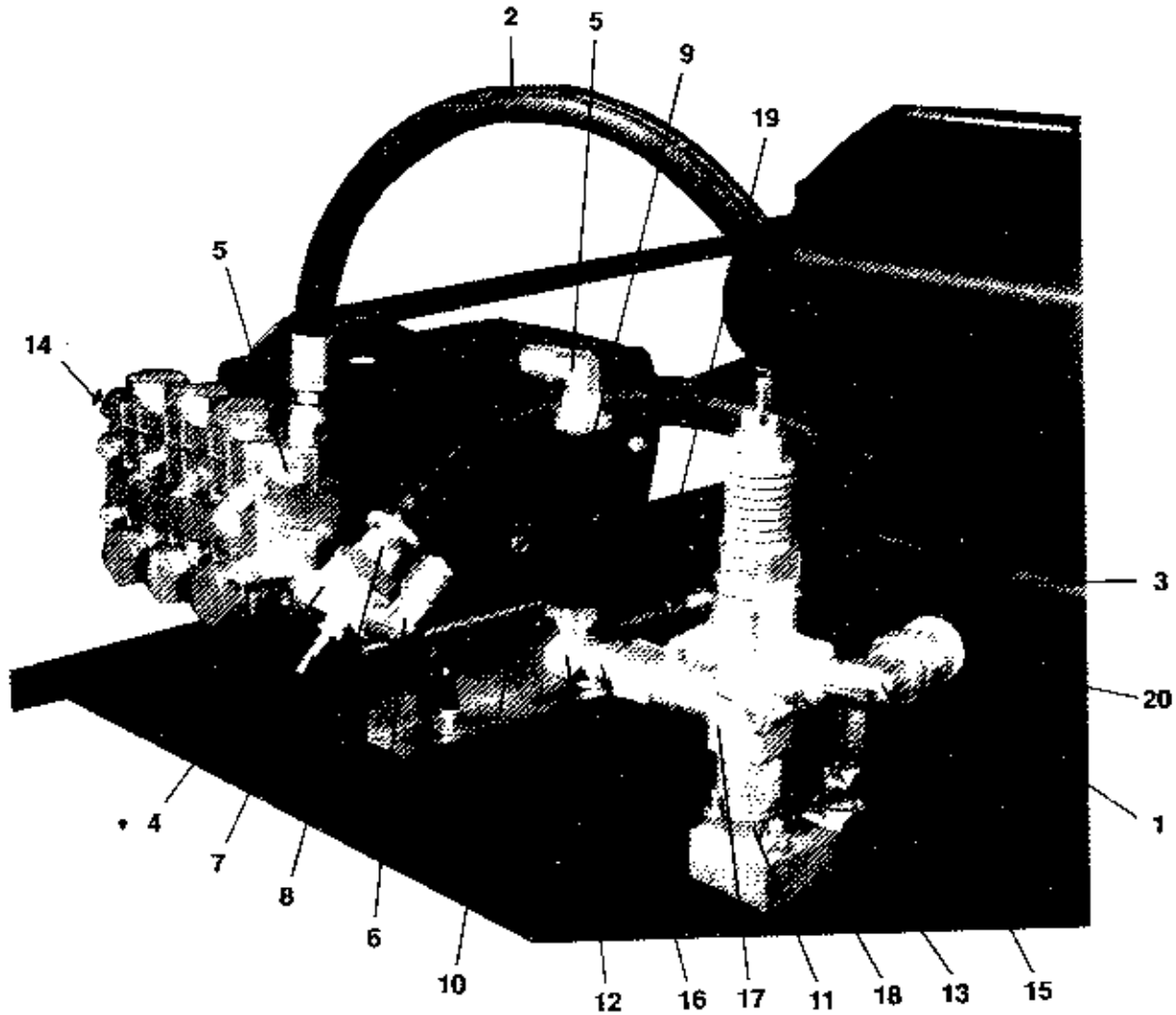
OPERATOR'S MANUAL • VERTICAL NATURAL GAS/PROPANE PRESSURE WASHER

■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■

■ VNG6-3000 ■ VNG8-2500 ■ VNG3-300 ■

PUMP ASSEMBLY

VNG-L 6-3000



2-60370 Elbow, Max 3/8" pipe

ITEM	PART NO.	DESCRIPTION	QTY
1	2-11050	Swivel, Push-On, 3/4" JIC Fern	2
2	4-02047729	Hose, Pres Loop, 100R2, 29" x 3/8"	1
3	4-02120000	Hose, Push-On, 3/4"	2
4	2-10421	Tee, Street 1/2" w/ 1/8" Hole	1
5	2-1060	Elbow, 90°, 1/2" JIC x 3/8"	1
6	2-10630	Elbow, 90°, 3/4" JIC x 1/2"	2
7	2-1084	Hose Barb, 1/4" x 1/8"	1
8	2-11080	Push-On, 3/4" x 1/2" Male (Discontinued 11/92)	1
9	6-02173	Switch Flow, ST's	1
10	95-07121112	Rail, Pump, PIRW Large, Combo	1

ITEM	PART NO.	DESCRIPTION	QTY
11	2-0008	Nipple, Hex, 1/2" Steel	1
12	2-00459	Tee, Male x Fem Pipe, 6803-8-6	1
13	2-0054	Elbow, 90°, 1/2" JIC, 1/2"	1
14	2-1022	Elbow, 90°, Street, 1/4"	1
15	2-10630	Elbow, 90° 3/4" JIC x 1/2"	1
16	2-1077	Bushing, 1/2" x 3/8" Pipe	1
17	5-31034	Unloader, Giant Adj, 22913 Orange	1
18	95-07101215	Bracket, Unloader, 1/2"	1
19	95-07141110	Retainer, Pump Take-Up, Plated	1
20	95-071830420	Power Platform, VNG6-3000 & 8-2500	1

* not shown

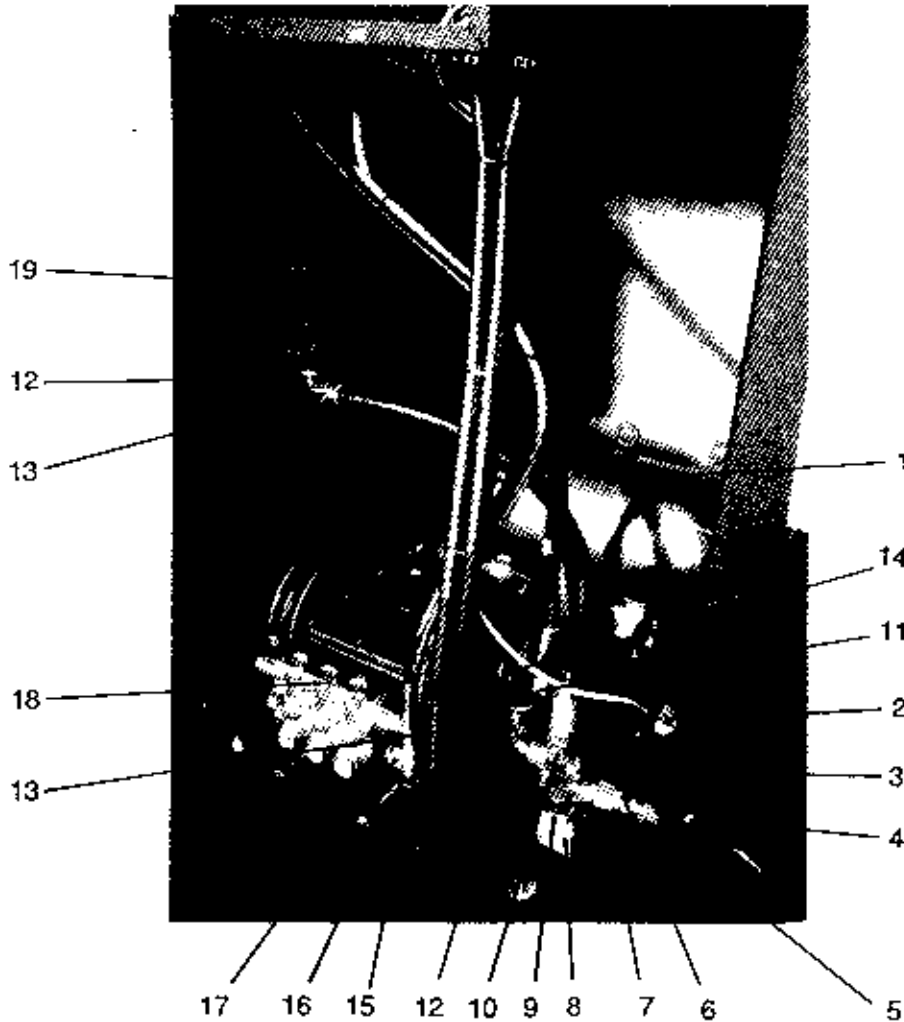
OPERATOR'S MANUAL • VERTICAL NATURAL GAS/PROPANE PRESSURE WASHER

■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■

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PUMP ASSEMBLY

VNG-L



ITEM	PART NO.	DESCRIPTION	QTY
1	5-1025	Motor, 15 HP 3 PH, 1725, M2513T (6-3000, 8-2500)	1
2	2-1060	Elbow, 90°, 1/2" JIC x 3/8"	1
3	6-02173	Switch, Flow, ST-5	1
4	81-22565	Valve, Pop-Off, 3600 PSI	1
4	2-1074	Bushing, 3/8" x 1/4" Pipe	1
5	2-00450	Tee, Male x Fem Pipe, 5603-6 6	1
6	2-00681	Bushing, 1/2" x 3/8" Steel	1
7	95-07163040	Power Platform (6-3000, 8-2500)	1
8	95-07101215	Bracket, Unloader 1/2" x 1/2"	1
8	2-0054	* Elbow, 90°, 1/2" JIC x 1/2"	1
9	2-0008	Nipple, Hex, 1/2" Steel	1
10	5-81034	Unloader, Giant Adj, 22913 Org.	1

ITEM	PART NO.	DESCRIPTION	QTY
11	2-1033	Tee, Female, 3/4" Pipe	1
	2-10620	* Elbow, 90°, 3/4" JIC x 3/4"	2
12	2-10630	Elbow, 90°, 3/4" JIC x 1/2"	1
13	2-11050	Swivel, Push-on, 3/4" JIC Fem	2
14	2-1006	Nipple, Close, 3/4"	1
15	95-07163040	Power Platform (6-3000, 8-2500)	1
16	2-1089	Hose Barb, 90°, 1/4" x 1/4"	2
16	2-1037	Tee, Branch, 1/4" Male	1
17	2-1079	Bushing, 3/4" x 1/4" Pipe	1
18	5-2309	Pump, General T-1631	1
19	2-01164	Float Tank, Universal, Plastic	1
	30-532	Float Tank, Assembly, VNG-L	1
		* Not Shown	

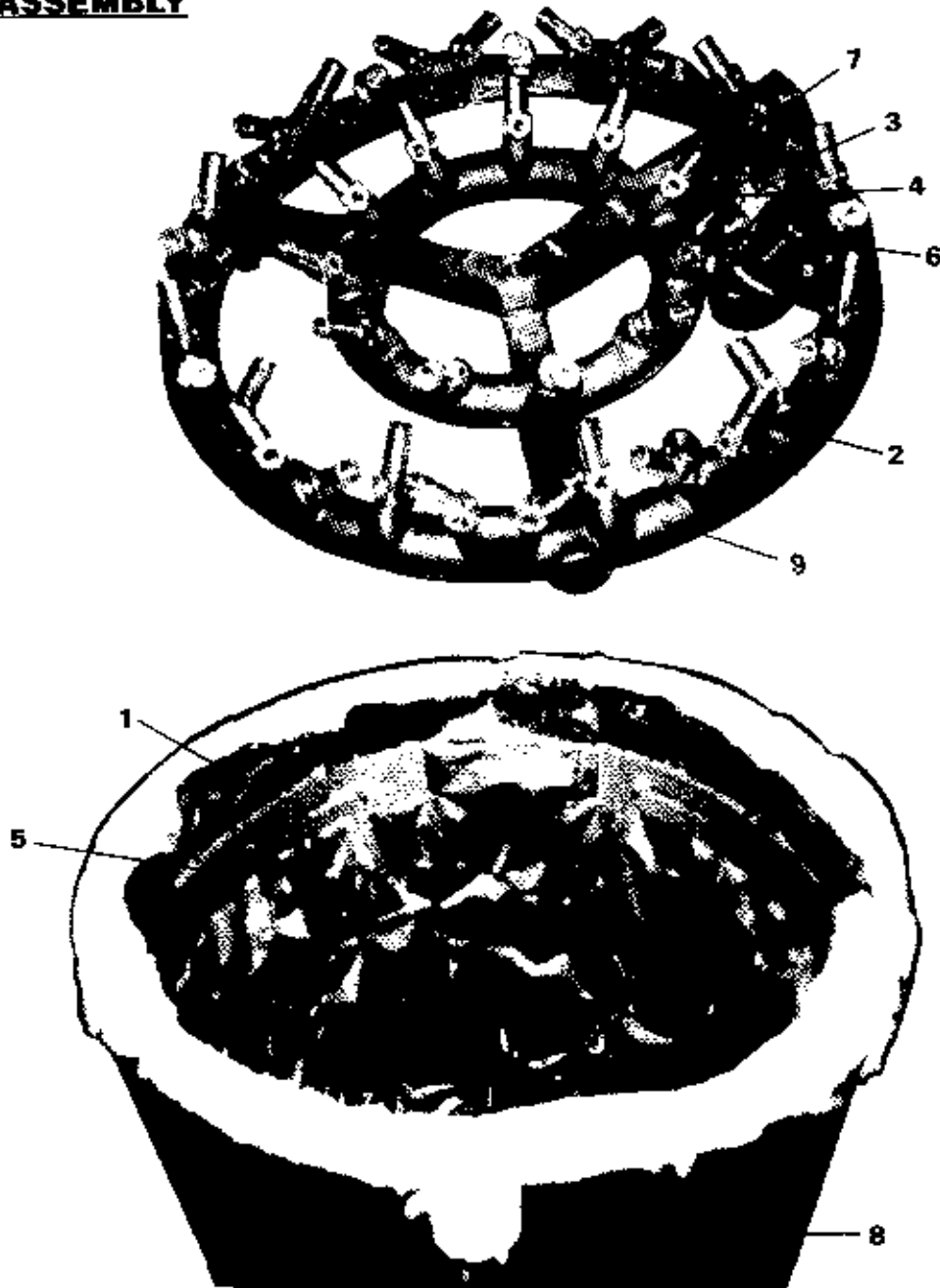
OPERATOR'S MANUAL • VERTICAL NATURAL GAS/PROPANE PRESSURE WASHER

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■ VNG6-3000 ■ VNG8-2500 ■ VNG3-300 ■

BURNER ASSEMBLY

VNG-S



ITEM	PART NO.	DESCRIPTION	QTY
1	7-0142	Insulation Blanket /Sq. Ft.	10
2		* Burner, Nat. Gas, (See page 58)	1
3	7-7CH	Pilots, VNG	1
4	7-7036	Thermopile, 44", VNG	1
5	95-07101241V	Insulation Retainer Band, VNG	2
6	95-07162025	Bracket, Pilot Light, VNG-S	1
7	95-07162026	Splash Guard, Pilot, VNG-S	1
8	95-07163072	Coil Wrap, VNG-S	1
9	7-7011	Burner-Ring only	1

* see Burner Specification Chart

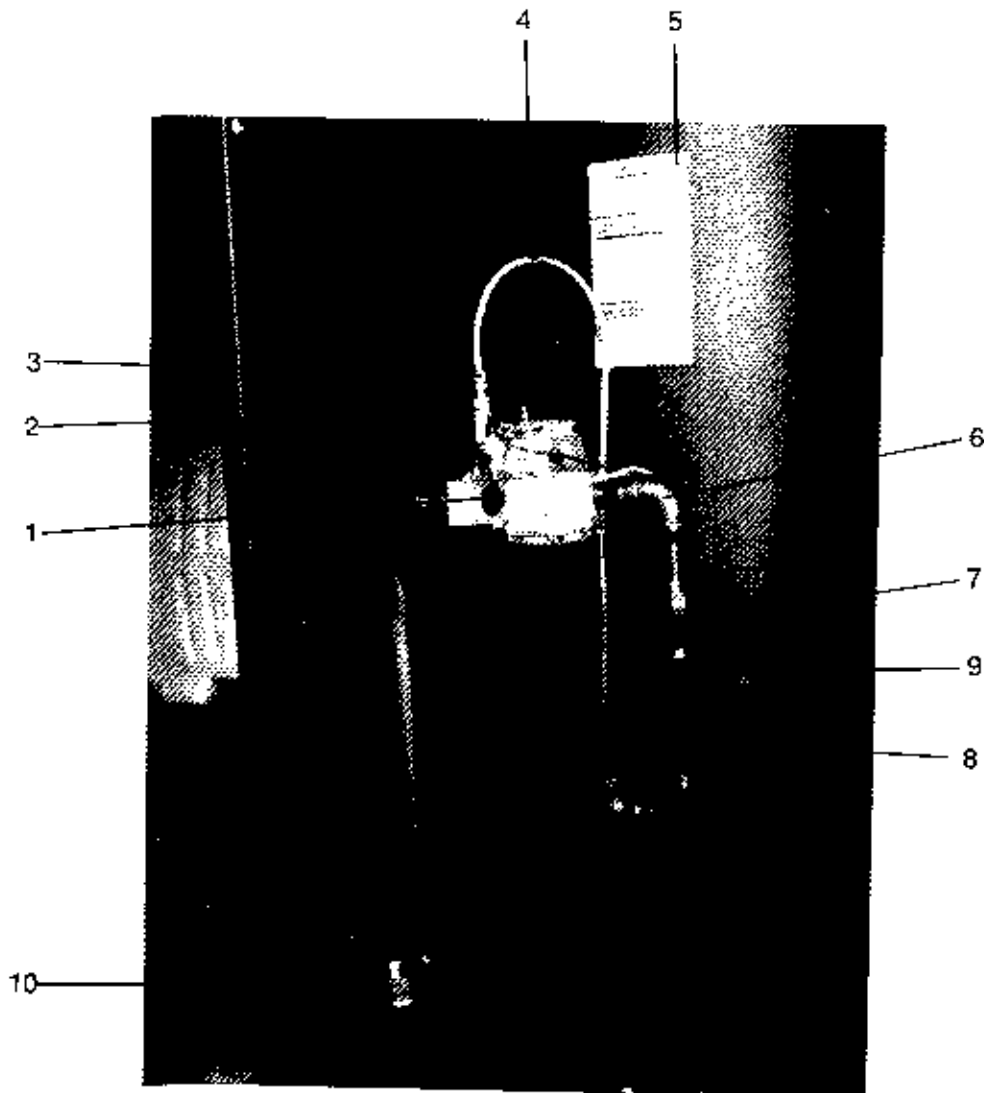
OPERATOR'S MANUAL • VERTICAL NATURAL GAS/PROPANE PRESSURE WASHER

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BURNER ASSEMBLY

VNG-S



ITEM	PART NO.	DESCRIPTION	QTY
1	7-7000HC	Gas Valve, Millivolt, 7000 MVR/IC 3/4" x 3/4"	1
2	2-3006	Valve Ball, 1/4" Jomar T91LLP	1
3	2-1118	Connector, 1/4", Tube x 1/4" MPT	1
4	7-0150	Tubing, Aluminum, 1/4" Dead Soft 1/2 in.	36"
5	10-02020	Decal, VNG Burner Instructions	1
6	2-00293	Elbow 3/4" Fern Pipe Black	5
7	2-0087	Union, 3/4" Pipe, Black	1
8	7-7022	* Jet Orifice #69-VLP	44
		(See page 55 for drill out size) 62	
	7-7024	* Jet Orifice #57-VNG	44
		(See page 55 for drill out size) 62	
	95-07121213V	VNG-S Coil (as of 5/89)	1
	95-07121212V	VNG-S Coil (before 5/89)	1
9	95-07163076	Door, Burner, VNG-S	1
10	7-7012	Valve, Gas Shut-Off *	1

* Not Shown

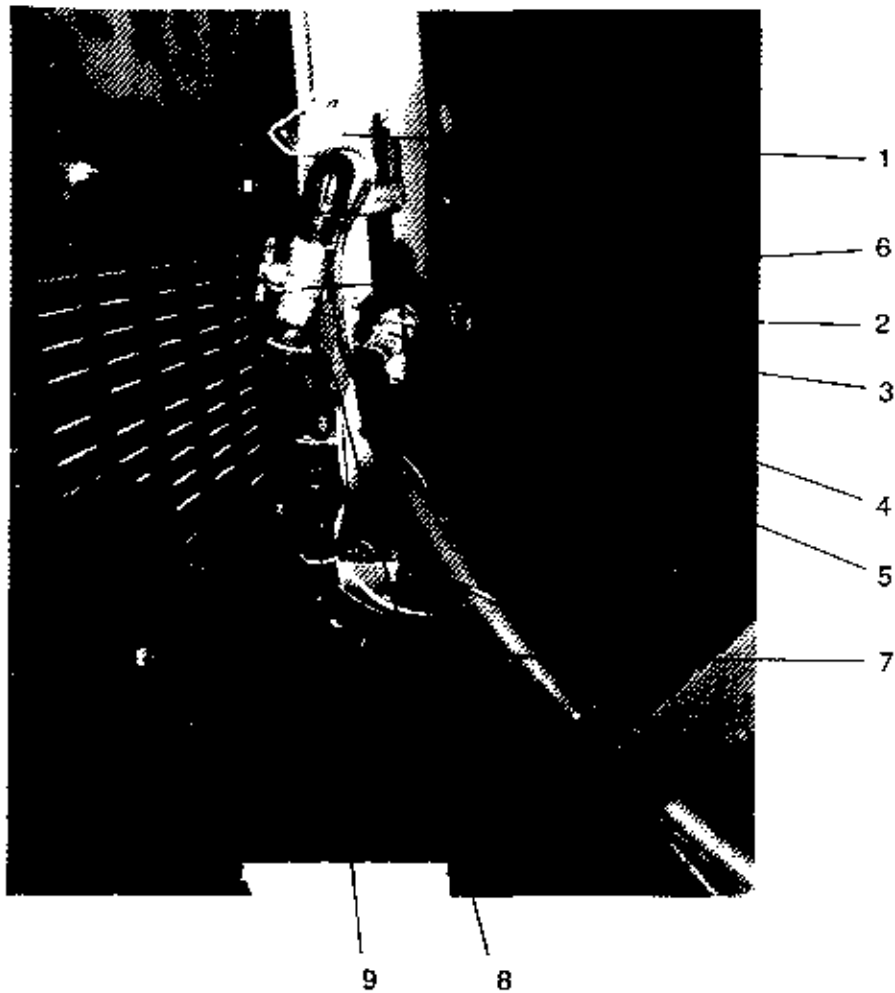
OPERATOR'S MANUAL • VERTICAL NATURAL GAS/PROPANE PRESSURE WASHER

■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■

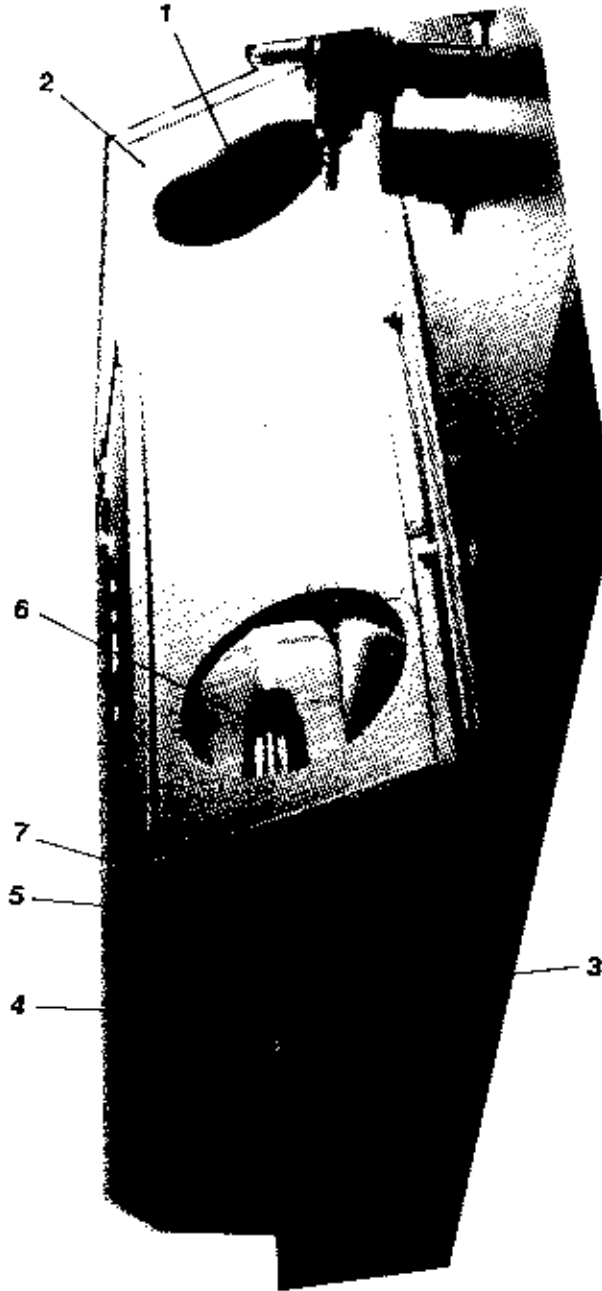
■ VNG6-3000 ■ VNG8-2500 ■ VNG3-300 ■

BURNER ASSEMBLY

VNG-L



ITEM	PART NO.	DESCRIPTION	QTY
1	7-7028	Gas Valve, Millivolt, HWG-75, 1"	1
2	2-10811	Bushing, 1" X 1/2" Pipe	1
3	2-1042	Tee, Street, 1/2"	1
4	2-1053	Nipple, 1/2" JIC X 1/2" Pipe	1
5	4-05086	Thermistor	1
6	7-7012	Valve, Gas Shut Off, 1"	1
7	4-02067796	Hose, Pres Loop, 100R2, 1/2" X 36"	1
8	7-7026	Thermostat, Modulating, Kimray	1
9	2-0086	Union, 1" Pipe (Black)	1

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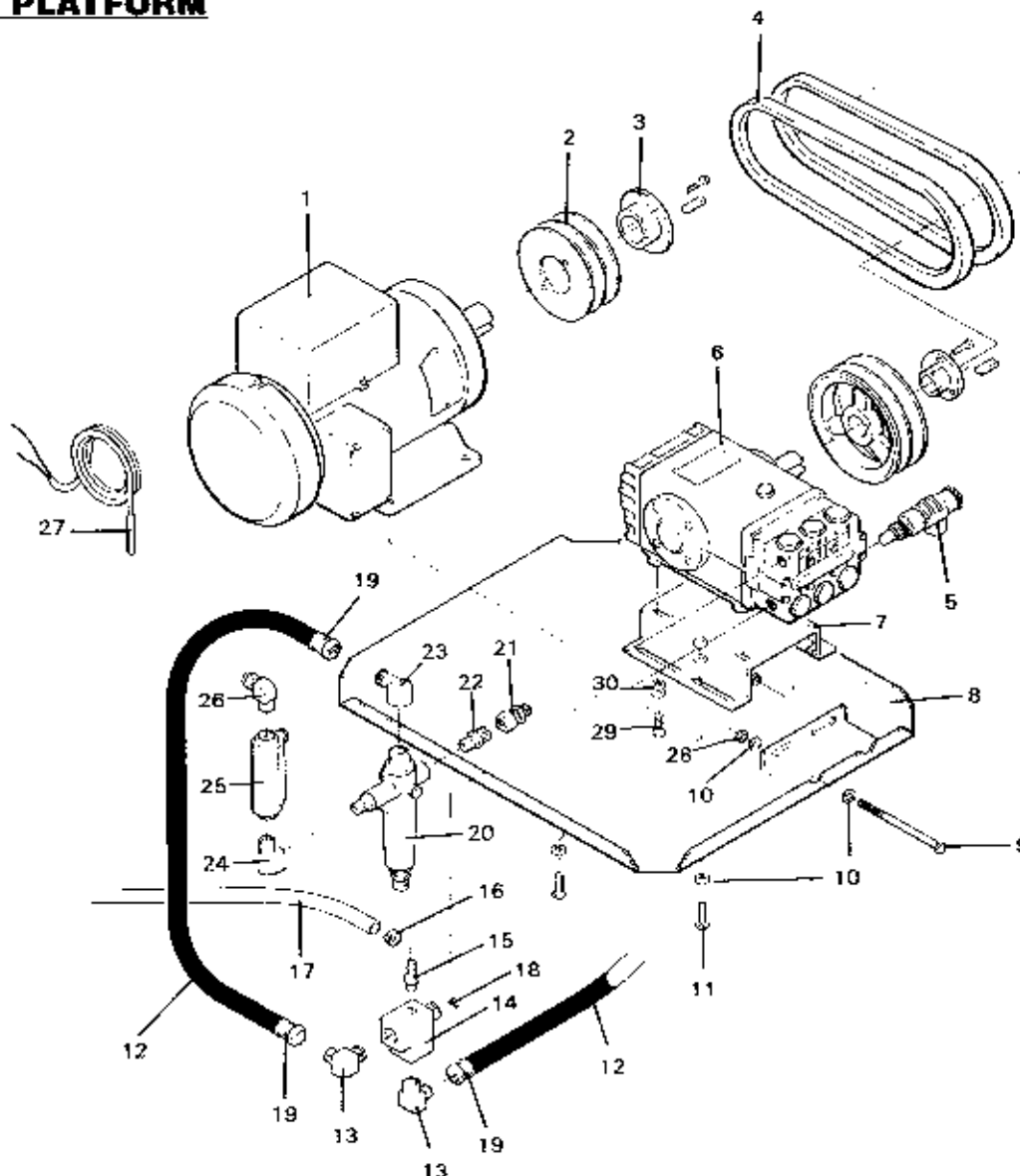
ITEM	PART NO.	DESCRIPTION	QTY
1	2-01162	Cap, Float Tank, GTD (Discontinued)	2
2	2-01164	Tank, Float, Universal, Plastic	1
3	2-0147	Plug, Overflow, Float Tank (Discontinued)	2
4	2-1062	Elbow, 90°, 1/2" JIC x 1/2"	2
5	2-11041	Connector, Anchor, 1/2"	2
6	2-30*21	Valve Float Assembly, VNG-S	1
	2-30*110	Valve, Float, Water Tank, R400 3/4 VNG-S	1
7	90-4017	Washer, 1-3/16" x 2 1/4" S11 9br	2

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■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■

■ VNG6-3000 ■ VNG8-2500 ■ VNG3-300 ■

POWER PLATFORM



ITEM	PART NO.	DESCRIPTION	QTY
1		Motor (specify model, voltage and phase)	1
2		Pulley (refer to Pulley & Belt Chart)	1
3		Bushing (refer to Pulley & Belt Chart)	1
4		Belts (refer to Pulley & Belt Chart)	2
5	2-30081	1/2" Pump Protector	1
6	5-2300	T731 General Pump (3-300 Steamer)	1
	5-2302	T991 General Pump (2-1100/3-710/ 4-1200/4-400 Steamer) (3-1100)	1
	5-2304	T1011 General Pump (4-2000/5-1500)	1
	5-2309	T1631 General Pump (8-2500)	1
	5-2306	TS2021 General Pump (4-3000/6-3000)	1
7	95-0/121112	PHW Pump Rail (Large, General Pump)	1
8	95-0/121013	PHW Motor Platform	1
9	90-10220	Bolt, 3/8" x 3-1/2" Tap	2
10	90-4002	3/8" SAE flatwasher	20
11	90-1017	3/8" x 1-1/4" NC HH Bolt (Discontinued 1991)	4
12	4-02110000	1/2" Push-On Hose /ft.	2
13	2-1062	1/2" JIC x 1/2" Pipe Elbow	2

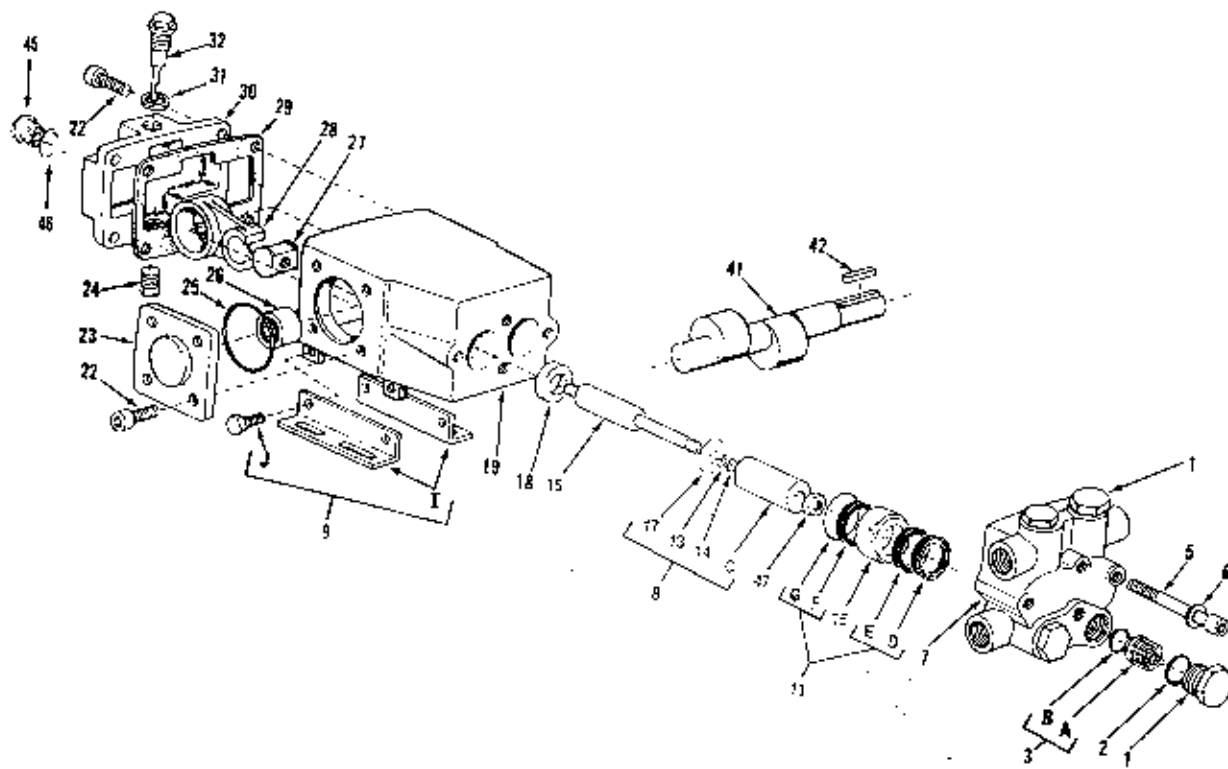
ITEM	PART NO.	DESCRIPTION	QTY
14	2-10421	1/2" Street Tee (Modified)	1
15	2-1084	1/4" x 1/8" Hose Barb	1
16	2-9000	#4 Screw Clamp	5
17	4-02090000	1/4" x 1/2" Braided Vinyl Tube /ft.	2
18	2-1042	1/2" Street Tee (used with 1991 Pump only)	1
19	2-1105	Swivel, Push-On, 1/2" JIC Female	4
20	5-30011	Valve, Unloader, K5-1 (4-1200, 4-2000, 4-3000)	1
	5-3201	Valve, Unloader, SMC (3-1100)	1
21	2-0079	Swivel, 1/2" JIC Female, 3/8" Mat	1
22	2-0051	1/2" JIC x 3/8" Pipe Nipple	1
23	2-1067	1/2" JIC x 3/4" Female 90° Elbow	1
24	2-1023	3/8" Street Elbow	1
25	6-02173	Flow Switch ST5	1
26	2-1060	3/8" JIC x 3/8" Pipe Elbow	1
27	6-02174	ST5 Replacement Reed	1
28	90-2007	3/8" NC Hex Nut	2
29	90-10343	10mm x 20mm HH Bolt	4
30	90-40101	10mm Split Ring Lock Washer	4

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PUMP 2230B #5-2216 VNG3-300, Steamer



ITEM	PART NO.	DESCRIPTION	QTY	ITEM	PART NO.	DESCRIPTION	QTY
1	8-24040154	Valve Cap (Bronze)	4	18	8-21020023	Oil Seal	2
2	8-17200039	O-ring	4	19	8-01002200A	Crankcase	1
3	8-34300235	Valve Kit (Stainless Steel) Consists of: 4 Valve Assemblies (Ref. A), 4 O-rings (Ref. B)	1 Set	22	8-22200041	Socket Head Capcrew	12
5	8-22200051	Socket Head Cap Screw	4	23	8-07012200A	End Plate	1
6	8-22700053	Washers (Aluminum only)	4	24	8-24060019	Drain Plug	1
7	8-02022200B	Head (Bronze)	1	25	8-17200131	O-ring	2
8	8-34300319	Plunger Kit Consists of: 1 O-ring, 1 Plunger (Ref. C), 1 Backup Seal, 1 Slinger Ring	2 Sets	26	8-20070046	Roller Bearing	2
9	8-34300243	Solid Shaft Base Kit Consists of: 2 Bases (Ref. I), 4 Hex Head Capscrews (Ref. J)	1 Set	27	8-24040186	Wrist Pin	2
11	8-34300236	Plunger Seal Kit (Buna-N Standard) Consists of: 2 Cups (Ref. ID), 2 Cup Supports (Ref. E), 2 O-rings (Ref. G), 2 Low Pressure Seals (Ref. F)	1 Set	28	8-05008600A	Connecting Rod	2
13	8-17600006	Backup Seal	2	29	8-17000077	Gasket	1
14	8-17200033	O-ring	2	30	8-07112200A	Cover	1
15	8-1830011A	Cup Retainer (Bronze)	2	31	8-17000078	Gasket	1
16	8-25000045	Lower Plunger	2	32	8-26300008	Clipstick	1
17	8-22700058	Slinger Ring	2	33	8-05008530F	Crankshaft (Model 2230)	1
				38	8-07002200A	End Cover (Solid Shaft)	1
				40	8-21020014	Seal (Solid Shaft)	1
				41	8-05008630F	Crankshaft (Model 2230)	1
				42	8-16100007	Key (Solid Shaft)	1
				45	8-26300011	Sight Glass	1
				48	8-17000094	Gasket	1
				47	8-22500054	Retaining Nut	2

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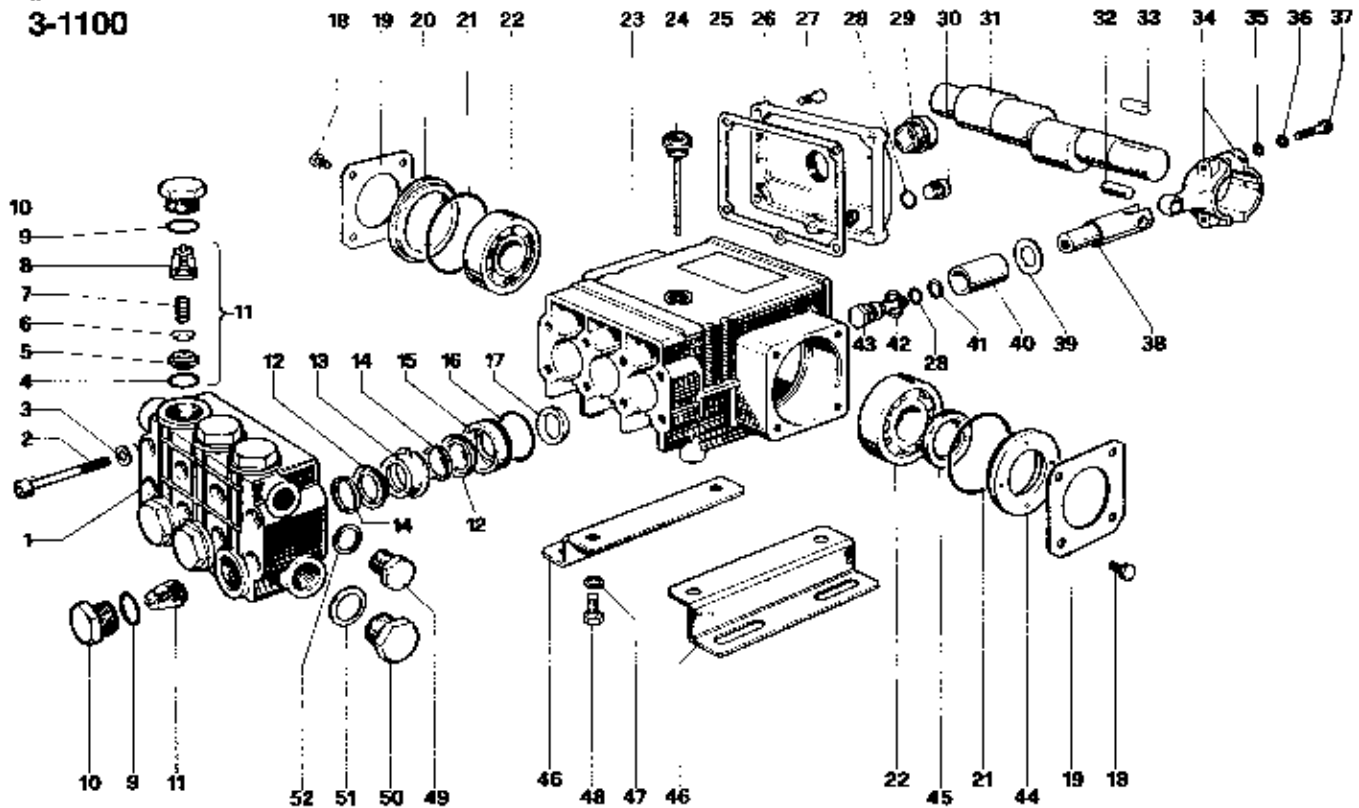
■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■

■ VNG6-3000 ■ VNG8-2500 ■ VNG3-300 ■

PUMP T991

#5-2302

3-1100



ITEM	PART NO.	DESCRIPTION	QTY
1	1-50120741	Pump Head	1
2	1-99317500	Screws	8
3	1-96701400	Washers	8
4	1-90384100	O-Rings (Kit 1-0001)	6
5	1-96200366	Valve Seats (Available only in Kit 1-0001)	6
6	1-96200176	Valve Plates (Available only in Kit 1-0001)	6
7	1-04737600	Springs (Available only in Kit 1-0001)	6
8	1-96200251	Valve Guides (Available only in Kit 1-0001)	6
9	1-90384700	O-Rings (Available only in Kit 1-0004)	6
10	1-96222000	Caps (Available only in Kit 1-0004)	6
11	1-96703201	Valve Assembly (Available only in Kit 1-0001)	6
12	1-90270900	Packing (Available only in Kit 1-0013, 1-0027)	6
13	1-50219670	Intermediate Ring (Available only in Kit 1-0020, 1-0027)	3
14	1-50100051	Head Ring (Available only in Kit 1-0021, 1-0027)	3
15	1-50080570	Packing Retainer (Available only in Kit 1-0022, 1-0027)	3
16	1-90081200	O-Rings (Available only in Kit 1-0032, 1-0027)	3
17	1-90181400	Oil Seal (Available only in Kit 1-0022)	3
18	1-99180700	Screw	8
19	1-50150074	Crankcase Cover	2
20	1-50211651	Spacer	1
21	1-90409700	O-Rings	2
22	1-91832900	Ball Bearing 5305	2
23	1-50010422	Crankcase	1
24	1-96210300	Oil Drip Stick	1
25	1-50211984	Cover Gasket	1
26	1-50180322	Crankcase Cover	1
27	1-99183700	Screw	5
28	1-90268500	O-Rings (Kit 1-0006)	4
29	1-97596900	Oil Level Indicator	1

ITEM	PART NO.	DESCRIPTION	QTY
30	1-98204100	Cap	1
31	1-50021835	Crankshaft	1
32	1-97738000	Wrist Pin	3
33	1-91487801	Key	1
34	1-50039001	Connection Rod	3
35	1-96684000	Washer	6
36	1-96683800	Washer	6
37	1-99192700	Screw	6
38	1-50050746	Piston Guide	3
39	1-96729600	Washer	3
40	1-50040408	Piston	3
41	1-90508700	Anti-extrusion Ring (Kit 1-0009)	3
42	1-96728000	Washer (Kit 1-0009)	3
43	1-47219566	Piston Screw (Kit 1-0009)	3
44	1-50211551	Spacer	1
45	1-90163400	Oil Seal	1
46	1-50200074	Pump Fast	2
47	1-96701520	Washer	4
48	1-99303700	Screw	4
49	1-96210000	Cap	1
50	1-96217600	Cap	1
51	1-96750400	Washer	1
52	1-96738000	Washer	3

For proper pump repair and ease of packing insertion/extraction, the following tools are recommended:

- 4-44785 Packing Insertion Tool (T-2, PA) Top 1
- 1-26019400 Packing Extractor, Slip Hammer
- 1-26093400 Packing Extractor, Socket T-991

REPAIR KIT	1-0001	1-0004	1-0005	1-0010	1-0020	1-0021	1-0022	1-0023	1-0027
ASSEMBLY (POS. #)	4, 5, 6, 7, 8, 11	9, 10	28, 41, 42, 43	12	13	14	15, 16	17	12, 13, 14, 15, 16
# OF ASSEMBLIES	6	6	3	6	3	6	3	3	1

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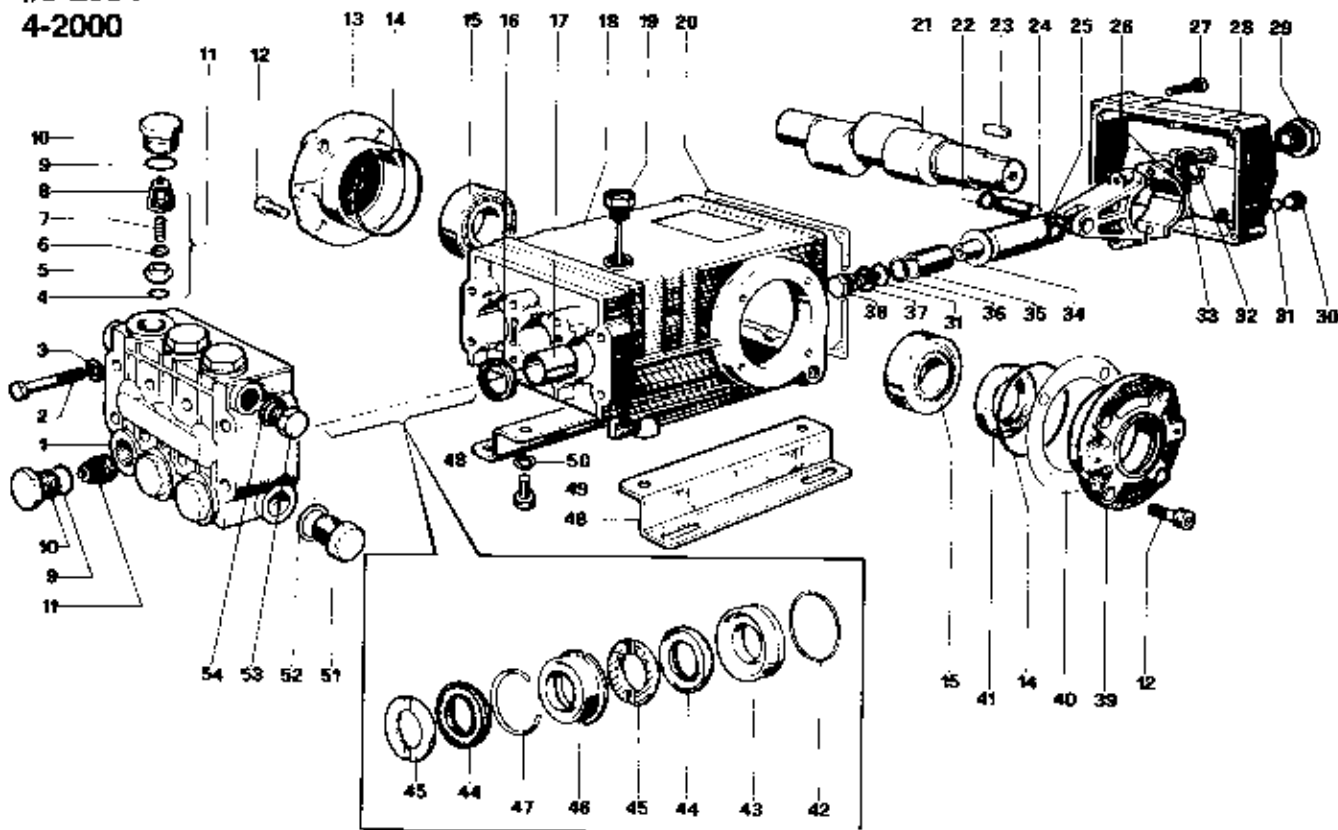
■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■

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PUMP T1011

#5-2304

4-2000



ITEM	PART NO.	DESCRIPTION	QTY
1	1-47120891	Pump Head	1
2	1-96320600	Screws	8
3	1-96702000	Washers	8
4	1-90384100	O-Rings (Kit 1-0001)	6
5	1-96200366	Valve Seats (Available only in Kit 1-0001)	6
6	1-96200176	Valve Plates (Available only in Kit 1-0001)	6
7	1-94737600	Springs (Available only in Kit 1-0001)	6
8	1-96200251	Valve Guides (Available only in Kit 1-0001)	6
9	1-90384700	O-Rings (Available only in Kit 1-0004)	6
10	1-96222000	Caps (Available only in Kit 1-0004)	6
11	1-96703201	Valve Assembly (Available only in Kit 1-0001)	6
12	1-99303900	Screws	8
13	1-47150522	Side Crankcase Cover (Closed)	1
14	1-90391300	O-Rings	2
15	1-91897500	Tapered Rolling Bearings	2
16	1-90182500	Oil Seals (Available only in Kit 1-0002)	3
17	1-90912600	Bushings	3
18	1-47010422	Crankcase	1
19	1-99210600	Oil Dip Stick	1
20	1-47211904	Cover Gasket	1
21	1-47021795	Crankshaft	1
22	1-90055700	Snap Rings	6
23	1-91487800	Key	1
24	1-97738000	Wrist Pins	3
25	1-47050454	Piston Guides	3
26	1-47030001	Connecting Rods	3
27	1-99183700	Screws	5
28	1-47165322	Rear Crankcase Cover	1
29	1-97596800	Oil Level Indicator	1
30	1-96204100	Cap	1

ITEM	PART NO.	DESCRIPTION	QTY
31	1-90358500	O-Rings (Kit 1-0005)	4
32	1-90309900	Screws	6
33	1-96701400	Washers	6
34	1-96729600	Washers	3
35	1-47020409	Pistons	3
36	1-90508700	Anti-extrusion Rings (Kit 1-0006)	3
37	1-96728000	Washers (Kit 1-0006)	3
38	1-47219566	Piston Screws (Kit 1-0006)	3
39	1-47150122	Side Crankcase Cover (Open)	1
40	1-97567900	Shims	2
41	1-90164800	Oil Seals (Available only in Kit 1-0003)	2
42	1-90361600	O-Rings (Kit 1-0003)	3
43	1-47080570	Packing Retainers (Available only in Kit 1-0008)	3
44	1-90706500	Packings (Available only in Kit 1-0008, 1-0028)	6
45	1-47100051	Head Rings (Available only in Kit 1-0007, 1-0028)	6
46	1-47216670	Intermediate Rings (Available only in Kit 1-0028)	3
47	1-90518200	"Long Life" Rings (Kit 0028)	3
48	1-47200074	Pump Feet	2
49	1-90364400	Screws	4
50	1-96710600	Washers	4
51	1-98217600	Cap	1
52	1-98751400	Washer	1
53	1-98210000	Cap	1
54	1-96738000	Washers	1

For proper pump repair and ease of packing insertion/extraction, the following tools are recommended:

4-KIT999	Packing Insertion Tool (7/8" Dia)
1-26019400	Packing Extractor, Slap Hammer
1-26093400	Packing Extractor, Socket T-991

REPAIR KIT#	1-0001	1-0002	1-0003	1-0004	1-0006	1-0007	1-0008	1-0028
ASSEMBLY (PCS: 3)	4, 5, 6, 7, 8, 11	16	47	9, 10	31, 36, 37, 38	45	44	42, 43, 44, 45, 46, 47
# OF ASSEMBLIES	6	3	2	6	3	6	6	1

OPERATOR'S MANUAL • VERTICAL NATURAL GAS/PROPANE PRESSURE WASHER

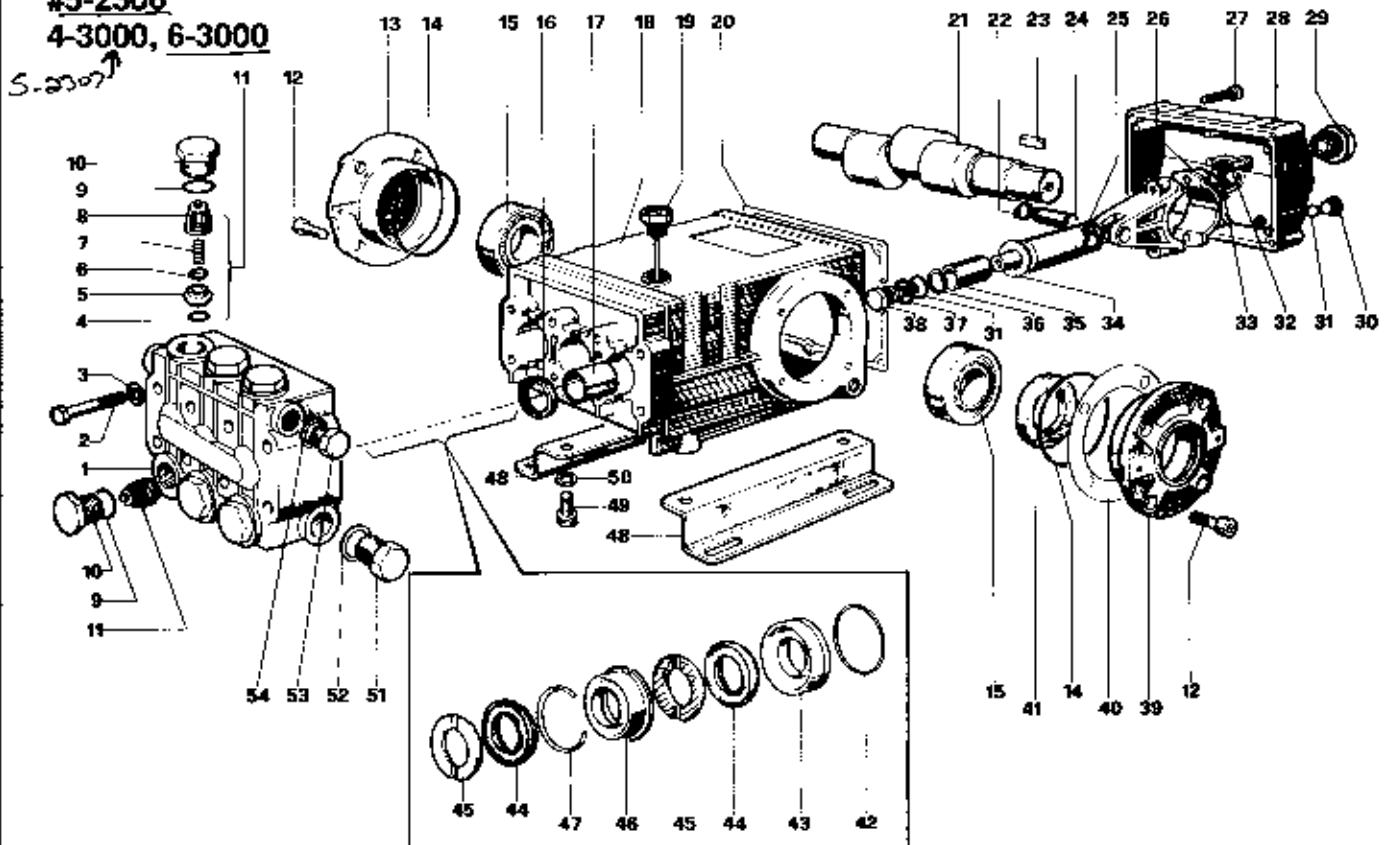
■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■

■ VNG6-3000 ■ VNG8-2500 ■ VNG3-300 ■

PUMP TS2021-L

#5-2306

4-3000, 6-3000



ITEM	PART NO.	DESCRIPTION	QTY
1	1-47120941	Pump Head	1
2	1-99320600	Screws	6
3	1-96702000	Washers	8
4	1-90384100	O-Rings (Kit 1-0001)	6
5	1-36200368	Valve Seals (Available only in Kit 1-0001)	6
6	1-36200126	Valve Plates (Available only in Kit 1-0001)	6
7	1-94737600	Springs (Available only in Kit 1-0001)	6
8	1-96700251	Valve Guides (Available only in Kit 1-0001)	6
9	1-90384700	O-Rings (Available only in Kit 1-0004)	6
10	1-98222200	Cap (Available only in Kit 1-0004)	5
11	1-36703201	Valve Assembly (Available only in Kit 1-0001)	6
12	1-99303300	Screws	8
13	1-47150522	Side Crankcase Cover (Closed)	1
14	1-90391300	O-Rings	2
15	1-91837500	Tapered Rolling Bearings	2
16	1-90162500	Oil Seals (Available only in Kit 1-0002)	2
17	1-90912600	Bushings	3
18	1-47010522	Crankcase	1
19	1-98210600	Oil Dip Stick	1
20	1-47211984	Cover Gasket	1
21	1-47021735	Crankshaft	1
22	1-90056700	Snap Rings	6
23	1-91487800	Key	1
24	1-97738000	Wrist Pins	3
25	1-47050358	Piston Guides	3
26	1-47030001	Connecting Rods	3
27	1-99191200	Screws	5
28	1-47160422	Rear Crankcase Cover	1
29	1-97596800	Oil Level Indicator	1
30	1-98204100	Cap	1

ITEM	PART NO.	DESCRIPTION	QTY
31	1-90358500	O-Rings (Kit 1-0005)	4
32	1-98309900	Screws	6
33	1-96701400	Washers	6
34	1-98728600	Washers	3
35	1-47040409	Pistons	3
36	1-90508700	Anti-extrusion Rings (Kit 1-0006)	3
37	1-96728000	Washers (Available only in Kit 1-0005)	3
38	1-47219566	Piston Screws (Available only in Kit 1-0006)	3
39	1-47150322	Side Crankcase Cover (Open)	2
40	1-97567800	Shims	2
41	1-90164800	Oil Seals (Available only in Kit 1-0003)	2
42	1-90361600	O-Rings (Kit 1-0008)	3
43	1-47080570	Packing Retainers (Available only in Kit 1-0002)	3
44	1-90270500	Packings (Available only in Kit 1-0008, 1-0008)	6
45	1-47100051	Head Rings (Available only in Kit 1-0007, 1-0008)	6
46	1-47216670	Intermediate Rings (Available only in Kit 1-0008)	3
47	1-90516200	"Long Life" Rings (Kit 1-0008)	3
48	1-47200024	Pump Feet	2
49	1-98364400	Screws	4
50	1-96710600	Washers	4
51	1-98217600	Cap	1
52	1-98751400	Washer	1
53	1-98219000	Cap	1
54	1-96798000	Washers	1

For proper pump repair and ease of packing insertion/extraction, the following tools are recommended:

HRH88	Packing Insertion Tool	1-2m/Tool
1-28019400	Packing Extractor, Slap Hammer	
1-25093400	Packing Extractor, Socket T-991	

REPAIR KIT#	1-0001	1-0002	1-0003	1-0004	1-0006	1-0007	1-0008	1-0008
	Valve Assembly	Piston Oil Seal	Crankshaft Oil Seal	Valve Cap Assembly	Piston Retainer	Head Ring	Packing	Packing Assembly
ASSEMBLY (POS. #)	4, 5, 6, 7, 8, 11	16	41	9, 10	31, 36, 37, 38	45	40	42, 43, 44, 45, 46, 47
# OF ASSEMBLIES	6	3	2	6	3	6	6	1

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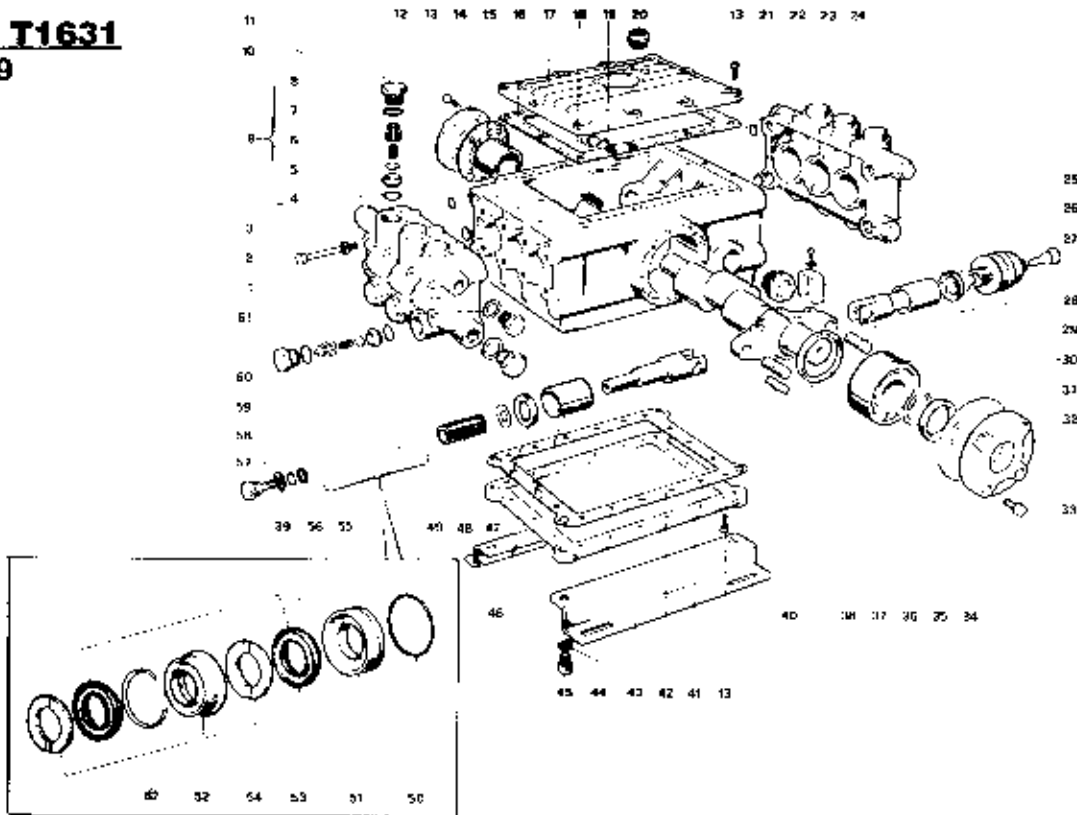
■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■

■ VNG6-3000 ■ VNG8-2500 ■ VNG3-300 ■

PUMP T1631

#5-2309

8-2500



ITEM	PART NO.	DESCRIPTION	QTY
1	1-48120241	Pump Head	2
2	1-982201600	Screws	18
3	1-98702000	Washers	18
4	1-90384100	O-Rings (Kit 1-0001)	12
5	1-98200968	Valve Seals (Available only in Kit 1-0001)	12
6	1-98200176	Valve Plates (Available only in Kit 1-0001)	12
7	1-947512800	Springs (Available only in Kit 1-0001)	12
8	1-98200251	Valve Guides (Available only in Kit 1-0001)	12
9	1-96703201	Valve Assembly (Available only in Kit 1-0001)	12
10	1-90384700	O-Rings (Available only in Kit 1-0004)	12
11	1-98222200	Caps (Available only in Kit 1-0001)	12
12	1-48160222	Crankcase Cover	1
13	1-99183700	Screws	32
14	1-48211984	Cover Gasket	1
15	1-91897000	Tapered Rolling Bearing	1
16	1-48211884	Cover Gasket	1
17	1-48211322	Crankcase Cover	1
18	1-98204100	Caps	1
19	1-90385600	O-Ring	1
20	1-98209700	Cap	1
21	1-48010522	Crankcase	1
22	1-90382700	O-Rings	4
23	1-90382900	O-Rings	4
24	1-97598300	Oil Level Indicator	1
25	1-99183700	Screws	6
26	1-98691080	Washers	8
27	1-48217074	Yokes	6
28	1-48030122	Connecting Rods	3
29	1-97737400	Wrist Pins	1
30	1-91847500	Bearing	1
31	1-90089500	Snap Ring	4
32	1-48150122	Crankcase Cover	6
33	1-98307900	Screws	6

ITEM	PART NO.	DESCRIPTION	QTY
34	1-48212284	Cover Gasket	3
35	1-90187000	Oil Seal	3
36	1-48020155	Crankshaft	3
37	1-48212389	Connecting Rod Ring	3
38	1-91197500	Key	3
39	1-96728000	Washers	2
40	1-48050154	Piston Guides	2
41	1-48212022	Crankcase Cover	2
42	1-88211794	Cover Gasket	3
43	1-48700074	Pump Front	3
44	1-96710600	Washers	6
45	1-98389900	Screws	8
46	1-90915000	Bushings	3
47	1-90762700	Oil Seals	3
48	1-96729600	Washers	2
49	1-47040500	Pistons	4
50	1-90361600	O-Rings	4
51	1-47080670	Packing Retainers (Available only in Kit 1-0029)	1
52	1-47216770	Intermediate Rings (Available only in Kit 1-0029)	1
53	1-90272500	Packing (Available only in Kit 1-0012, 1-0029)	1
54	1-48100051	Head Rings (Available only in Kit 1-0011)	6
55	1-90506700	Anti-Extrusion Rings (Kit 1-0006)	6
56	1-90385600	O-Rings (Available only in Kit 1-0006)	6
57	1-47219568	Piston Screws (Kit 1-0006)	6
58	1-98217600	Caps	4
59	1-98751400	Washers	4
60	1-98210000	Caps	4
61	1-98738000	Washers	4
62	1-90518200	"Long Life" Rings	6

For proper pump repair and ease of packing insertion/extraction, the following tools are recommended:

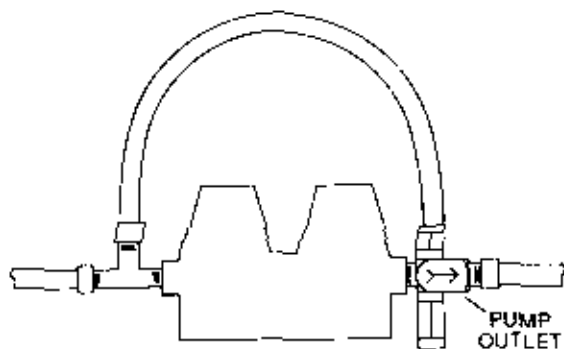
1-26019400	Packing Extractor, Slip Hammer
1-26039400	Packing Extractor, Socket 1-991

REPAIR KIT#	1-0001	1-0004	1-0006	1-0011	1-0012	1-0015	1-0024	1-0029
	Valve Assembly	Valve Assembly	Piston Retainer	Head Ring	Packing	Intermediate Ring	Piston Oil Seal	Packing Assembly
ASSEMBLY (POS. #)	4, 5, 6, 7, 8, 9	10, 11	39, 55, 56, 57	54	53	52, 62	47	50, 51, 52, 53, 54, 62
# OF ASSEMBLIES	6	6	3	6	6	3	3	1

UNLOADER

#5-3201 (1500 psi max.)

3-1100



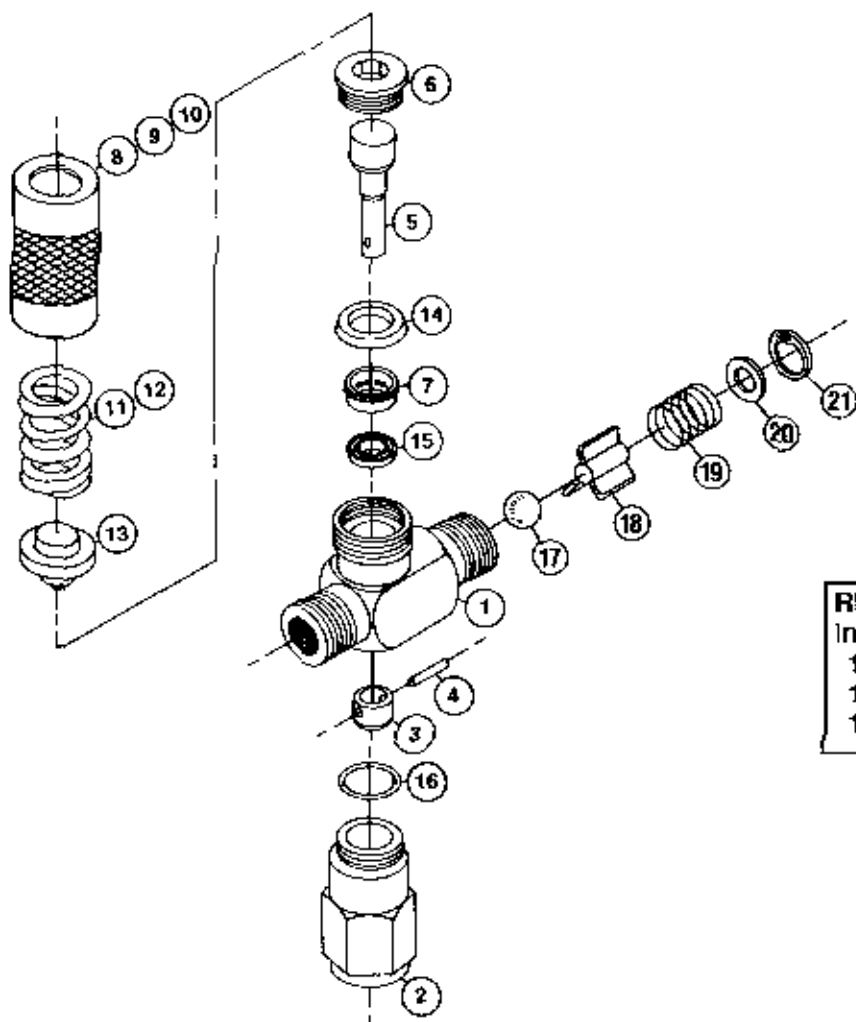
ADJUSTING

All unloaders are tested for performance. They are not preset for pressure.

Start with the valve set at its lowest spring tension. Raise pressure by turning adjusting cap clockwise until pressure is at the desired position. Do not overtighten.

Open and close spray gun to be sure pressure is correct. Raise or lower pressure by adjusting the cap.

Do not by-pass more than 10 minutes when by-passing to the suction side of the pump.



REPAIR KIT #8-0032090

Includes Items

- 14 Cup
- 15 Cup
- 16 O-Ring

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■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■

■ VNG6-3000 ■ VNG8-2500 ■ VNG3-300 ■

UNLOADER

#5-3102 (2000 psi max.) 22636

#5-31029 (3000 psi max.) 22650

#5-31010 (1100 psi) 22613

ITEM	PART NO.	DESCRIPTION
1	81-22601	Nut
2	81-22602	Valve Cone
3	81-22661	Rod, Piston sold only w/22662 Snap Ring
4	81-22604	Seat
5	81-22640	*O-Ring, Seal (1)
6	81-22605	Piston
7	81-22606	Spring (1200 psi)
	81-22631	Spring (2200 psi)
	81-22643	Spring (3000 psi)
7A	81-22630	Helper Spring
8	81-22607	Washer, Cone
9	81-22641	Shim 0-2
10	81-22608	*O-Ring
11	81-22610	Plug 1/4" (1)
12	81-22611	Valve Body
13	81-22612	Adjusting Screw
14	81-22627	Lock Nut
15	81-22615	Orifice
16	81-22618	O-Ring, Orifice
17	81-22619	Nipple (4-2000, 6-3000)
	81-22664	Nipple (4-2500)
18	81-22622	*O-Ring, Orifice
19	81-22623	Piston Sleeves
21	81-22609	Teflon Rings (2)
23	81-22662	*Snap Rings
24	81-22642	Restrictor

Orifice and Nipple must be ordered as set for model unloader.

SERVICE KIT: O-Ring Kit 81-22666 Marked with * in parts listed above.

Complete Rebuild Kits Easy exchange - just unscrew complete piston assembly and replace with complete kit already assembled

Part #81-22687 (22636)

Part #81-22688 (22650, 22651)

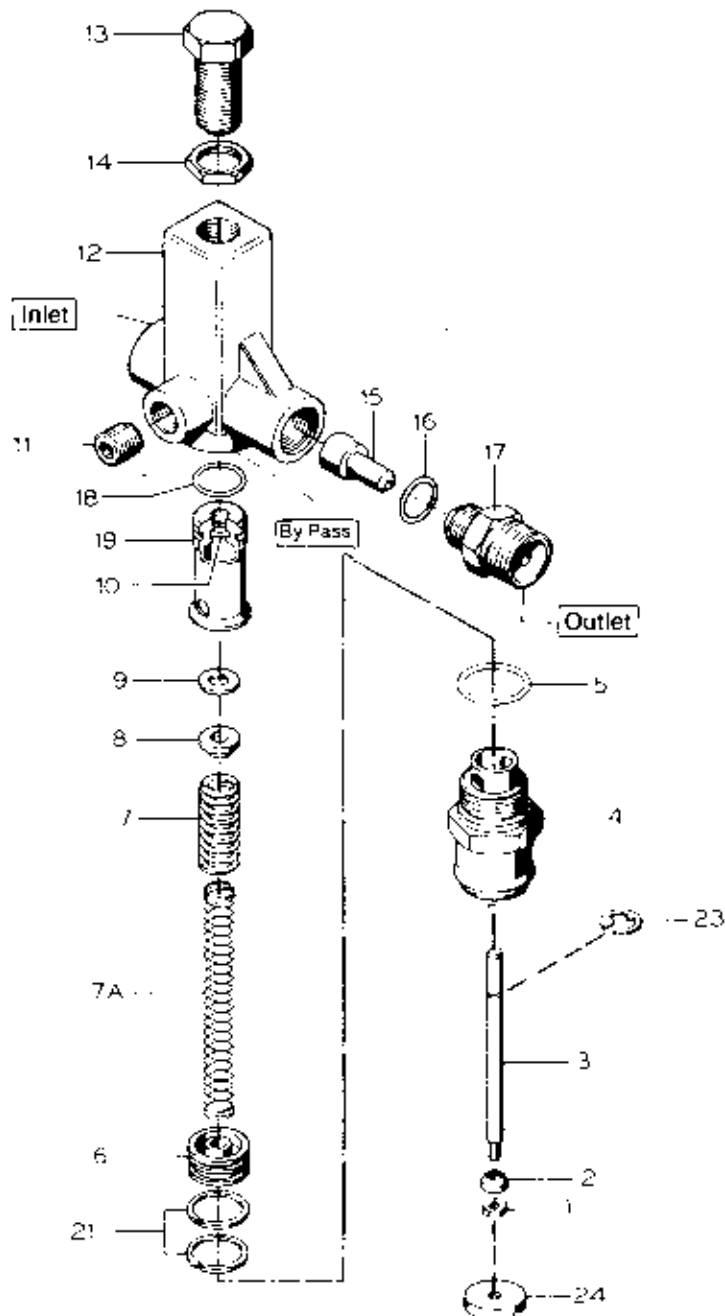
Items included in complete rebuild kit are:

1, 2, 3, 4, 5, 6, 7, 7A, 8, 9, 10, 18, 21, & 23

PRESSURE ADJUSTMENT: This regulating unloader develops the lowest operating pressure when the adjusting bolt is screwed completely into the valve body.

NOTE: Before starting unit make certain the adjusting bolt is in this maximum/minimum pressure position. Start the pump with the gun shut off and back off the adjusting bolt one turn. Open the gun handle and allow the system to reach stable pressure. Note pressure reading on gauge at the pump. If more pressure is desired, close the gun, back off the adjusting bolt one more turn, open the gun and check the pressure. Continue this procedure until the desired pressure is attained. Once the proper adjustment is made, tighten the lock nut.

CAUTION: Any adjustment of this unloader must be made with the gun handle shut off (i.e. no flow through the valve). When making adjustment open the gun frequently to check pressure (i.e. to determine your normal operating pressure).



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■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■

■ VNG6-3000 ■ VNG8-2500 ■ VNG3-300 ■

UNLOADER 2000 - 3000 psi

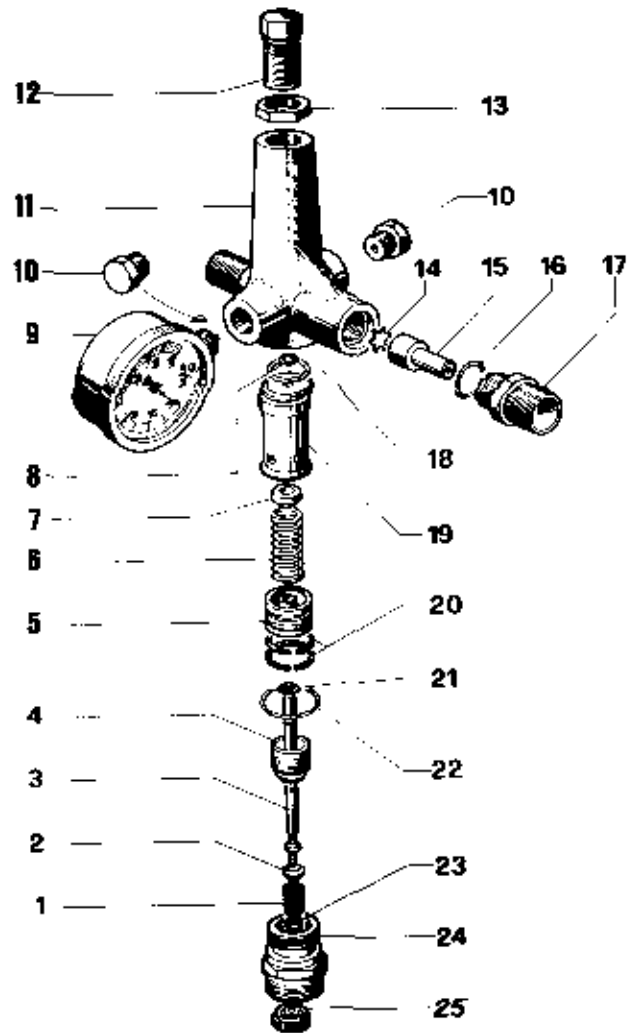
#5-3001 - K5.2 (5-6 GPM)(6-3000)

#5-30011 - K5.1 (2-4 GPM)(4-2000, 4-3000)

ITEM	PART NO.	DESCRIPTION	QTY
1	1-94737400	Spring * ‡	1
2	1-36300886	Valve * ‡	1
3	1-36303086	Control Rod ‡	1
4	1-36303486	Seat Insert * ‡	1
5	1-36303270	Piston * ‡	1
6	1-94743000	Spring * ‡	1
7	1-36303170	Spring Plate ‡	1
8	1-90357200	O-Ring *	1
9		Pressure Gauge	1
10	1-98204100	Cap	2
11	1-36302841	Unloader Body	1
12	1-36300164	Pressure Adjusting Screw	1
13	1-92256000	Nut	1
14	1-90382300	O-Ring	1
15	1-10007766	Nozzle (K5.1)	1
	1-10018266	Nozzle (K5.2)	1
	1-10016366	Nozzle (K5.3)	1
16	1-90383300	O-Ring *	1
17	1-10007870	Nipple (K-5.1)	1
	1-10016070	Nipple (K-5.2)	1
	1-10016170	Nipple (K5.3)	1
18	1-90384500	O-Ring *	1
19	1-36302970	Rod Guide	1
20	1-92772200	Compression Rings * ‡	4
21	1-90050900	Retaining Ring * ‡	1
22	1-90385900	O-Ring * ‡	1
23	1-90192500	Nut * ‡	1
24	1-36305070	Valve Seat ‡	1
25	1-36303570	Ring Nut * ‡	1
	81-22642	Resistor	1

* Repair Kits #1-0058 - K-5 (includes Nos. 1, 2, 4, 5, 6, 8, 16, 18, 20, 21, 22, 23, 25)

‡ Rebuild Kits #1-0060 - K-5 (includes Nos. 1, 2, 3, 4, 5, 6, 7, 20, 21, 22, 23, 24, 25)



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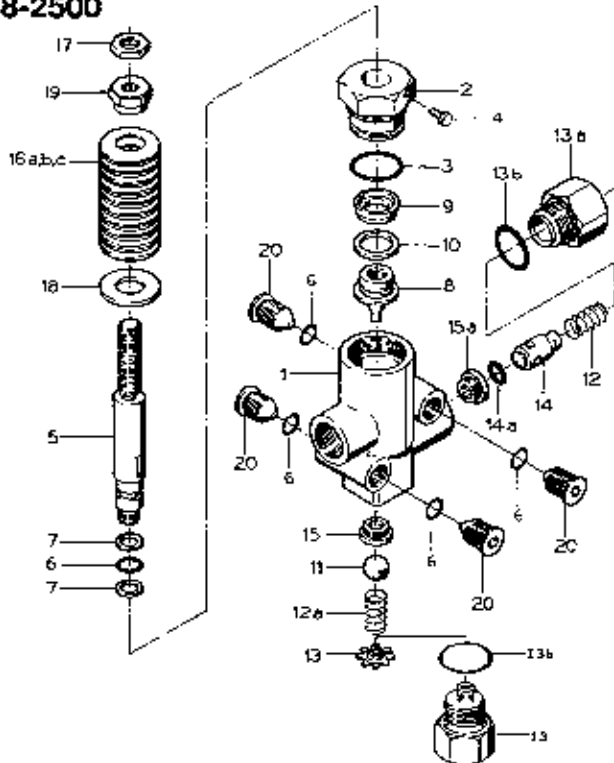
■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■

■ VNG6-3000 ■ VNG8-2500 ■ VNG3-300 ■

UNLOADER

#5-31034 (2500 - 3000 psi)

8-2500



ITEM	PART NO.	DESCRIPTION	QTY
1	81-12087	Valve Body	1
	81-12112	Valve Body	1
2	81-12003	Valve Cap	1
3	81-12004	O-Ring, Valve Cap	1
4	81-12005	Set Screw, Valve Cap	1
5	81-12018	Valve Stem	1
6	81-12017	O-Ring, Valve Stem	5
7	81-12019	*Back-up Ring, Valve Stem	2
8	81-12015	Piston	1
9	81-04006	*Cup (23mm)	1
10	81-04018	*Back-up Ring, Piston	1
11	81-12089	Ball, Inlet	1
12	81-12090	Spring, Outlet Valve	1
12A	81-12011	Spring, Inlet	1
13	81-12012	Spring Retainer, Inlet	1
	81-12111	Inlet Adapter	1
13A	81-12091	Spring Retainer, Outlet Valve	1
13B	81-1209230	*O-Ring, Spring Retainer	2
14	81-12093	Outlet Valve	1
14A	81-12094	O-Ring, Outlet Valve	1
15	81-12096	Seat, Inlet (S.S.)	1
15A	81-12096	Seat, Outlet Valve (Brass)	1
16	81-22829	Spring, Silver (800 PSI)	19
16A	81-22830	Spring, Yellow (1400 PSI)	17
16B	81-22831	Spring, Red (2400 PSI)	17
16C	81-22835	Spring, Orange (3000 PSI)	15
17	81-12021	Nut	1
18	81-12023	Washer, Spring	1
19	81-12022	Adjusting Nut	1
20	81-12098	Plug, 1/4"	4

*not shown in photo

*81-12098 Kit includes items 3, 6, 7, 9, 10, 13B and 14A

UNLOADER TROUBLESHOOTING PROCEDURES

(Except #5-31034)

PROBLEM	POSSIBLE CAUSE(S)	SOLUTION
UNLOADER STAYS IN BYPASS, WILL NOT COME UP TO PRESSURE	Insufficient flow	Increase flow
	Outlet orifice and nipple parts sized too large	Change outlet parts to smaller size
	Gun nozzle tip too small	Change tip to a larger size
	Outlet orifice and nipple parts worn	Replace outlet parts
	Worn piston ring	Replace piston ring
	Compressed main spring	Install a shim just below snap ring
	Broken main spring	Replace main spring
	Snap ring out of groove	Replace or re-install snap ring with flat side up
	Foreign debris internally	Clean and re-assemble loader
	Failed bypass fitting O-Ring	Replace O-Ring
Deformed valve body	Replace valve body	
UNLOADER WILL NOT ATTAIN FULL PRESSURE	Gun nozzle tip worn	Replace nozzle tip
	Insufficient flow	Increase flow
	Failed sleeve O-Ring(s)	Replace O-Ring(s)
	Worn piston ring(s)	Replace ring(s)
	Deformed valve body	Replace valve body
	Sleeve not seating against adjusting screw	Disassemble and carefully push sleeve against adjusting screw
Foreign debris internally	Clean and re-assemble unloader	

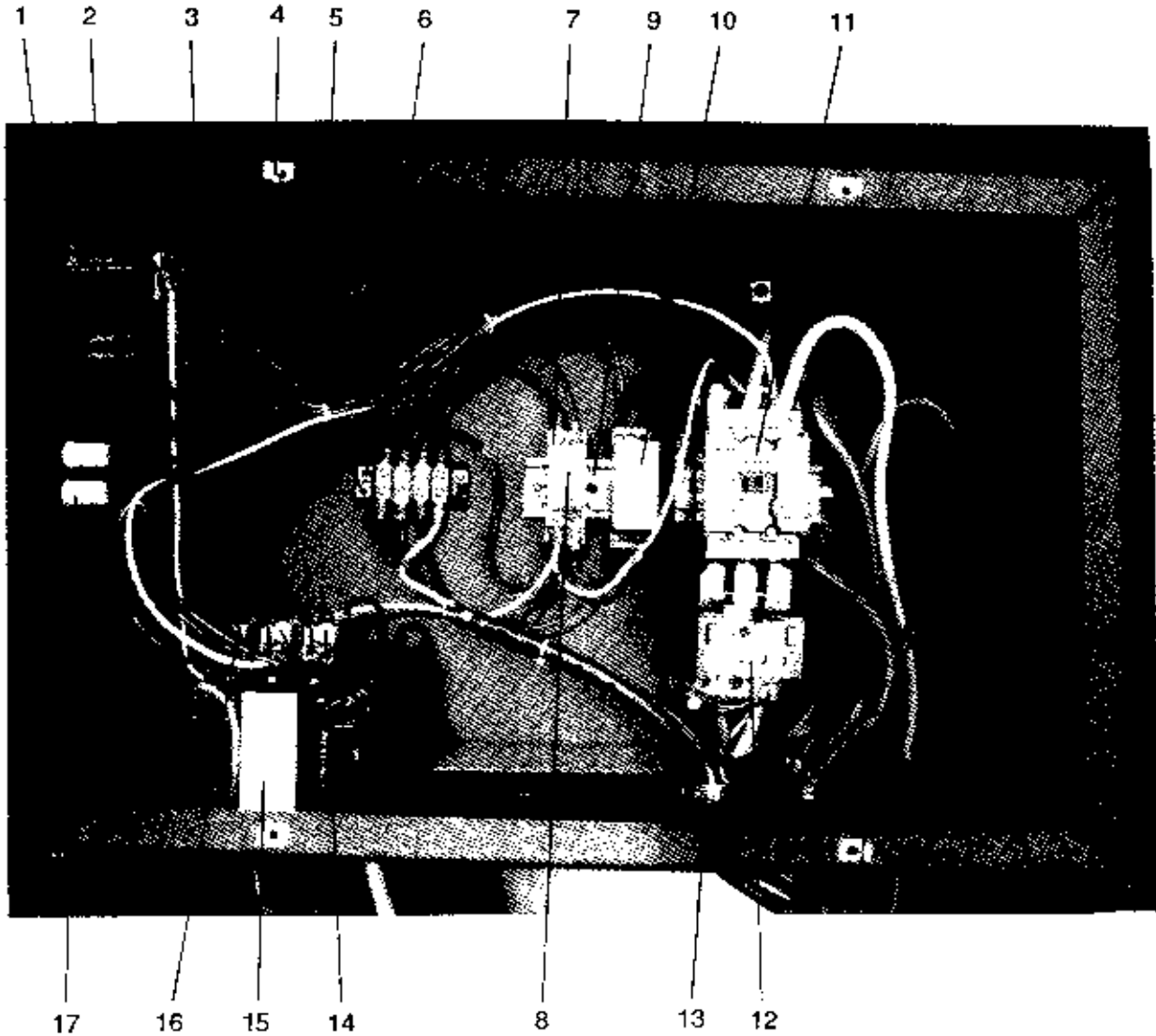
PROBLEM	POSSIBLE CAUSE(S)	SOLUTION
UNLOADER CYCLES UNDER PRESSURE	Outlet orifice and nipple parts worn	Replace outer parts
	Insufficient flow	Increase flow
	Outlet orifice and nipple parts sized too large	Change outlet parts too smaller size
	Foreign debris internally unloader	Clean and re-assemble unloader
	Worn piston ring(s)	Replace piston ring(s)
UNLOADER CYCLES IN BYPASS	Worn weep nozzle at gun	Replace weep nozzle
	Excessive downstream leakage	Stop leakage
	Stand pipe positioned downstream	Position stand pipe upstream from unloader
UNLOADER BYPASS AT EXCESSIVE PRESSURE	Excessive pump inlet pressure (closed system)	Install an inlet pressure regulator
	Excessive tension on main spring when relaxed	Remove shim to increase spring clearance
	Restricted bypass line	Remove restriction
	Excessive pump inlet regulator pressure (closed system)	Install an inlet pressure regulator
Foreign debris internally	Clean and re-assemble unloader	

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■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■

■ VNG6-3000 ■ VNG8-2500 ■ VNG3-300 ■

ELECTRICAL BOX



ITEM	PART NO.	DESCRIPTION	QTY
1	6-020251	Switch, Curvette, 120V & 220V	1
2	4-050822	Hour Meter, Hobbs, 110V, 20001	1
3	6-0920	Push Button, GF, Green	1
	6-0921	Push Button, GF, Red	1
4	17-22282	Nut, 10/32", KFPS	4
	2-0133	Screw, Thumb, 10/32" x 1/2" Blk	4
5	95-07163028	Electrical Box, VNG-L	1
	95-07163030	Panel, Electrical Box, Side, VNG-L	2
6	6-0504	Block, Strip, Terminal, 4-Pole/2r	1
7	6-03641	Base, Relay, SH2B-05, IDEC	1
8	6-03621	Relay, 120V, RI (2B-UL, AC120	1
9	6-021595	Din Rail Track, 1/2 in.	6 in.
10	6-0371	Timer, 120V Syalec	1
11	6-1100	Contactor CR7CAA (4-2000, 460V 3 PH)	1
	6-1103	Contactor CR7CBA (4-3000, 460V 3 PH)	1
	6-1105	Contactor CR7CCA (3-300, 120V 1 PH)	1
		(4-2000, 230V 3 PH)	
	6-1108	Contactor CR7CEA (3-1100, 120V 1 PH)	1
		(4-3000, 230V 3 PH)(6-3000, 460V 3 PH)	

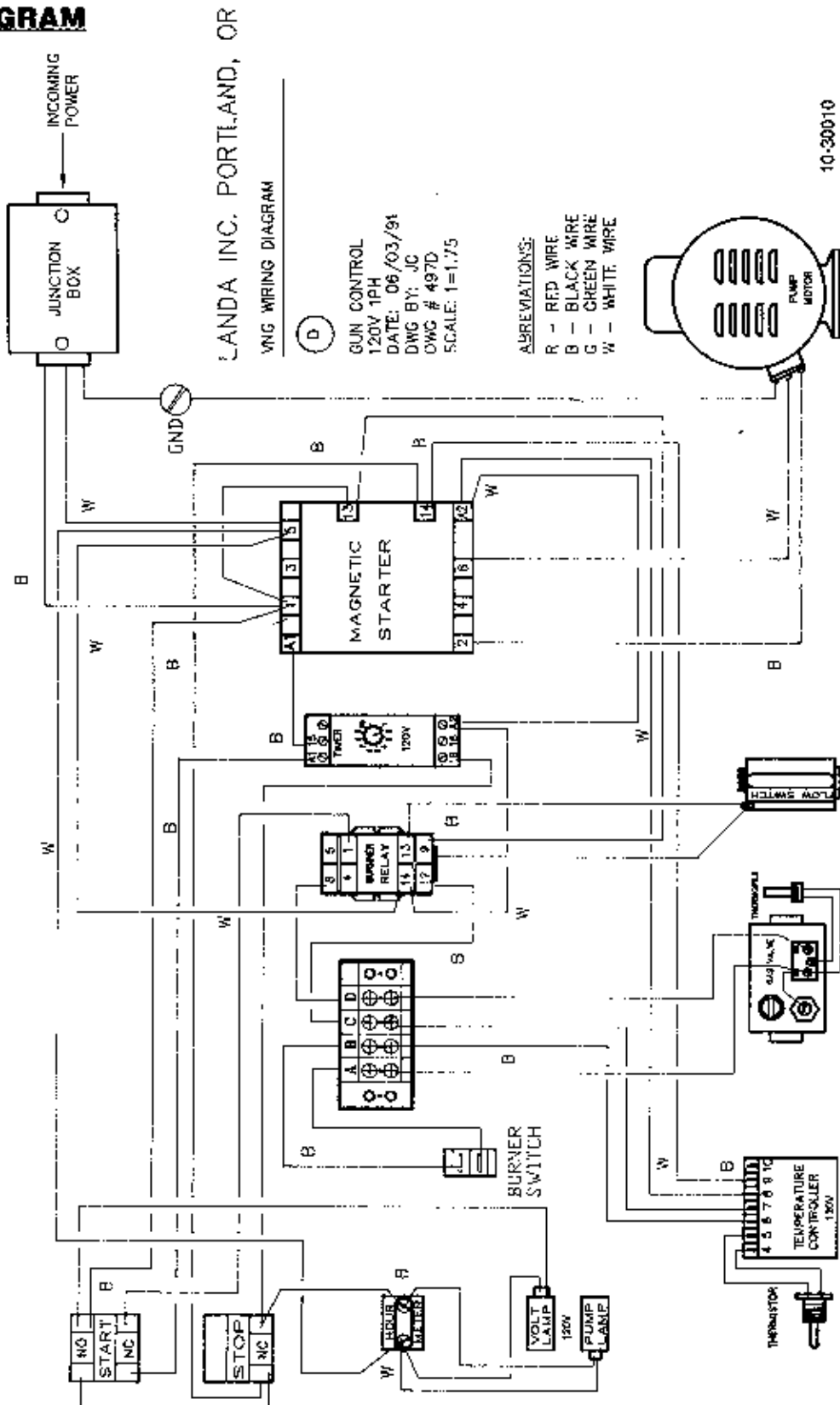
ITEM	PART NO.	DESCRIPTION	QTY
11	6-1110	Contactor CR7CFA (4-2000, 230V 1 PH)	1
	6-1112	Contactor CR7CHA (4-3000, 230V 1 PH)	1
		(6-3000, 4-2500, 230V 3 PH)	
12	6-1114	Overload Relay CR7G1WM (4-2000, 460V 3 PH)	1
	6-1115	Overload Relay CR7G1WN (4-3000, 460V 3 PH)	1
	6-1117	Overload Relay CR7G1WR (4-2000, 230V 3 PH)	1
	6-1118	Overload Relay CR7G1WS (6-3000, 4-2500,	1
		460V 3 PH)	
	6-1119	Overload Relay CR7G1WT (4-3000, 230V 3 PH)	1
	6-1125	Overload Relay CR7G1TF (6-3000, 4-2500,	1
		230V 3 PH)	
13	6-0517	Strain Relief, 3/4	3
14	6-02294	240V ATMR 1 Class CC (Primary	2
		Voltage Fuse)	
	6-02295	460V ATMR 1/2 Class CC (Primary	2
		Voltage Fuse)	
15	6-05235	Transformer, Control, 060 KVA	1
16	6-02297	120V GDL 1/2 (Secondary Voltage Fuse)	1
17	6-02053	Light, Indicator, Red, 125V	2

OPERATOR'S MANUAL • VERTICAL NATURAL GAS/PROPANE PRESSURE WASHER

■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■
 ■ VNG6-3000 ■ VNG8-2500 ■ VNG3-300 ■

WIRING DIAGRAM

120V 1PH
 Time Delay



LANDA INC. PORTLAND, OR
 VNG WIRING DIAGRAM

(D)
 GUN CONTROL
 120V 1PH
 DATE: 06/03/91
 DWG BY: JC
 DWC # 497D
 SCALE: 1=1.75

ABBREVIATIONS:
 R - RED WIRE
 B - BLACK WIRE
 G - GREEN WIRE
 W - WHITE WIRE

10-30010

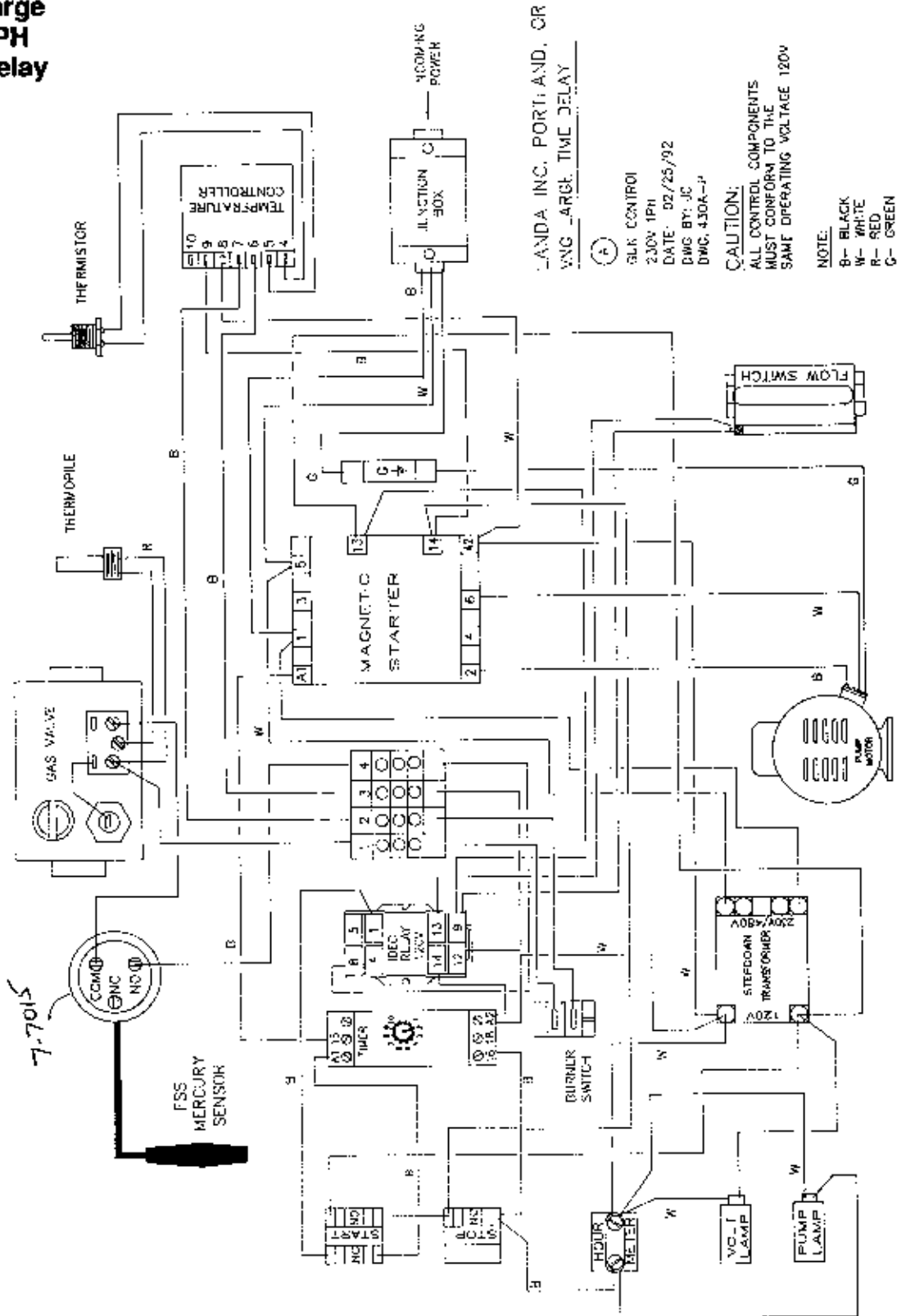
OPERATOR'S MANUAL • VERTICAL NATURAL GAS/PROPANE PRESSURE WASHER

■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■

■ VNG6-3000 ■ VNG8-2500 ■ VNG3-300 ■

WIRING DIAGRAM

VNG Large
230V 1PH
Time Delay



LANDA INC. PORTLAND, OR
VNG_LARGE.TIME DELAY

Ⓢ
BLK CONTROL
230V 1PH
DATE 02/25/92
DWG BY: JC
DWG. 430A-1P

CAUTION:
ALL CONTROL COMPONENTS
MUST CONFORM TO THE
SAME OPERATING VOLTAGE 120V

NOTE:
B- BLACK
W- WHITE
R- RED
G- GREEN

OPERATOR'S MANUAL • VERTICAL NATURAL GAS/PROPANE PRESSURE WASHER

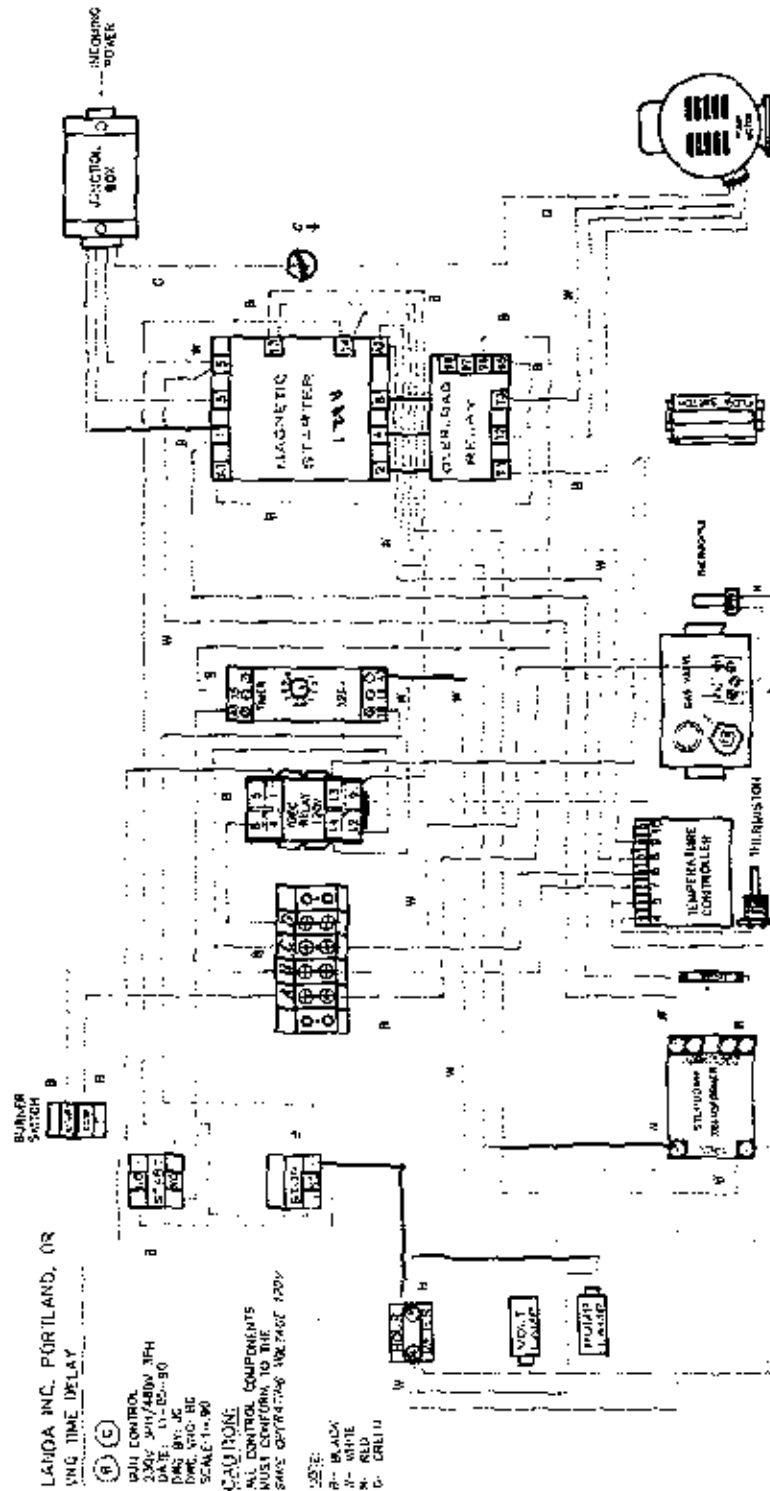
■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■

■ VNG6-3000 ■ VNG8-2500 ■ VNG3-300 ■

WIRING DIAGRAM

230V 3PH/460V 3PH

Time Delay



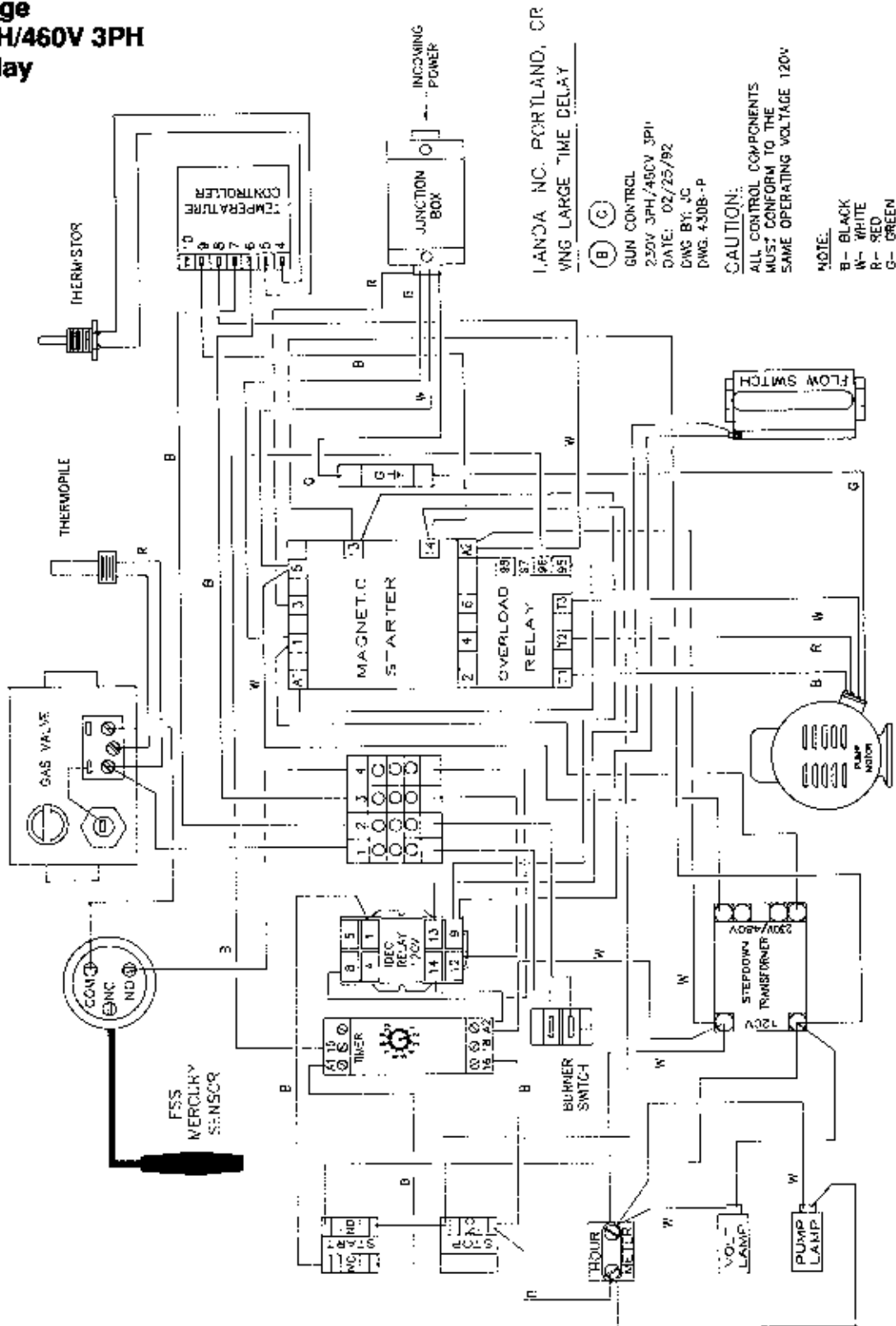
OPERATOR'S MANUAL • VERTICAL NATURAL GAS/PROPANE PRESSURE WASHER

■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■

■ VNG6-3000 ■ VNG8-2500 ■ VNG3-300 ■

WIRING DIAGRAM

VNG Large
230V 3PH/460V 3PH
Time Delay



LANCA, INC. PORTLAND, OR
 VNG LARGE TIME DELAY

(B) (C)

GUN CONTROL
 230V 3PH/460V 3PH
 DATE: 02/25/92
 DWG BY: JC
 DWG. 430B-P

CAUTION:
 ALL CONTROL COMPONENTS
 MUST CONFORM TO THE
 SAME OPERATING VOLTAGE 120V

NOTE:
 B- BLACK
 W- WHITE
 R- RED
 G- GREEN

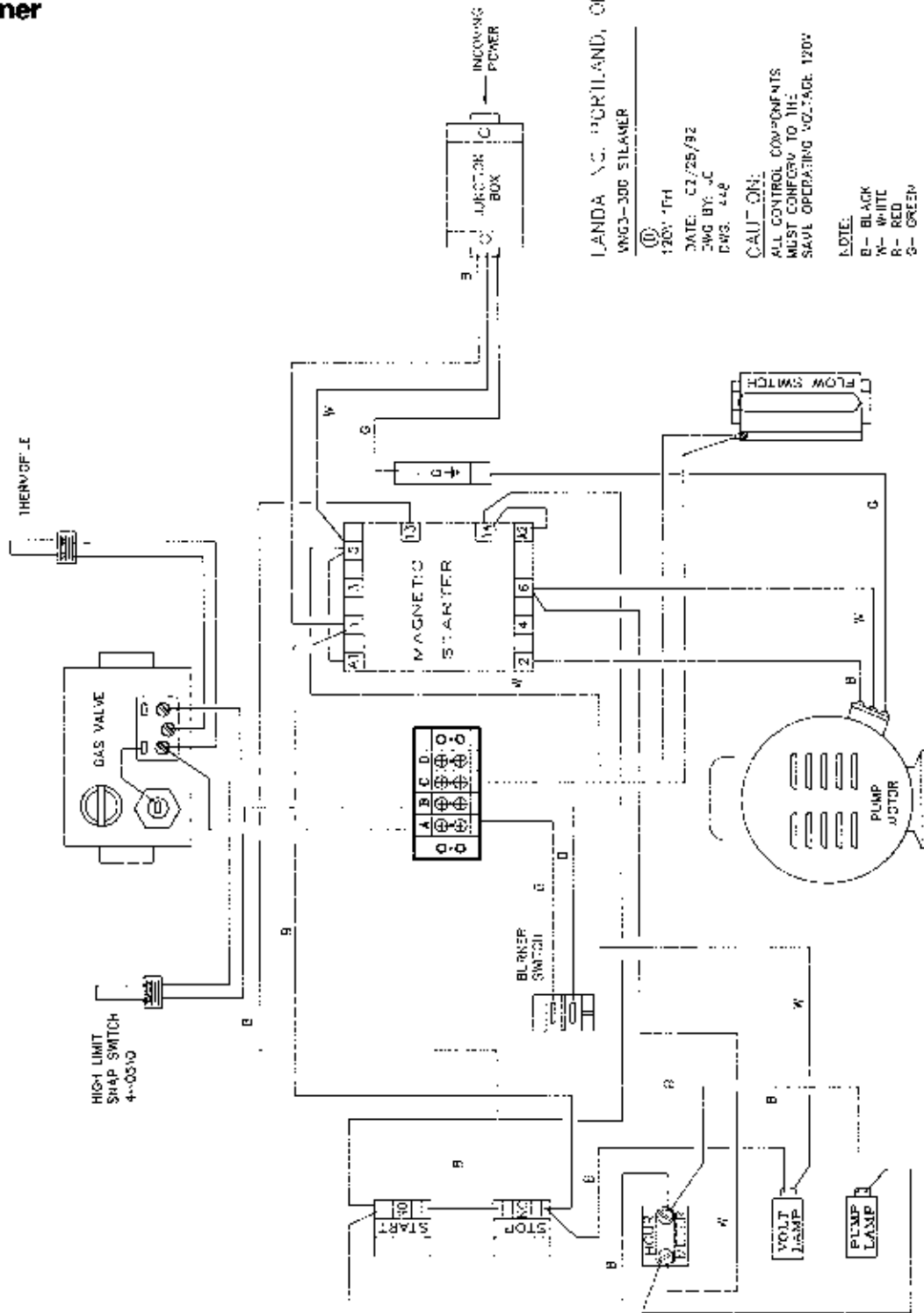
OPERATOR'S MANUAL • VERTICAL NATURAL GAS/PROPANE PRESSURE WASHER

■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■

■ VNG6-3000 ■ VNG8-2500 ■ VNG3-300 ■

WIRING DIAGRAM

Steamer



LANDA INC. PORTLAND, OR
VNG3-300 STEAMER

①

120V 1PH
DATE: 03/25/92
DWG BY: JC
DWG. 449

CAUTION:

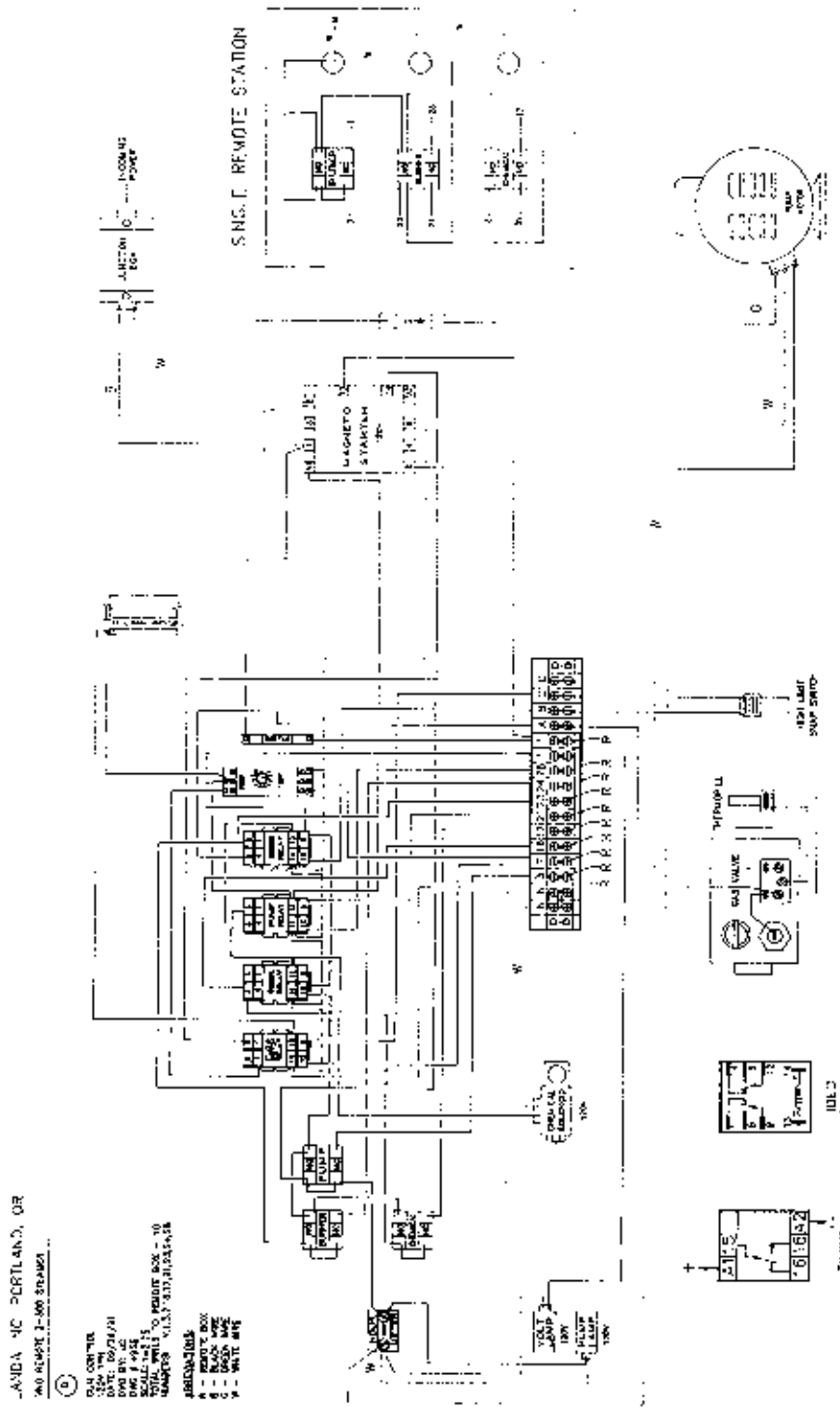
ALL CONTROL COMPONENTS
MUST CONFORM TO THE
SAFE OPERATING VOLTAGE 120V

NOTE:

B - BLACK
W - WHITE
R - RED
G - GREEN

WIRING DIAGRAM

Remote Steamer



OPERATOR'S MANUAL • VERTICAL NATURAL GAS/PROPANE PRESSURE WASHER

■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■

■ VNG6-3000 ■ VNG8-2500 ■ VNG3-300 ■

ROS

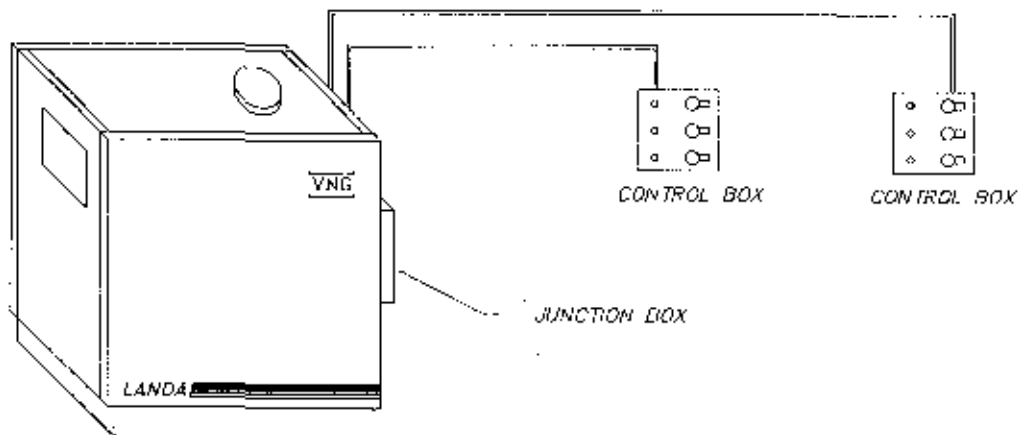
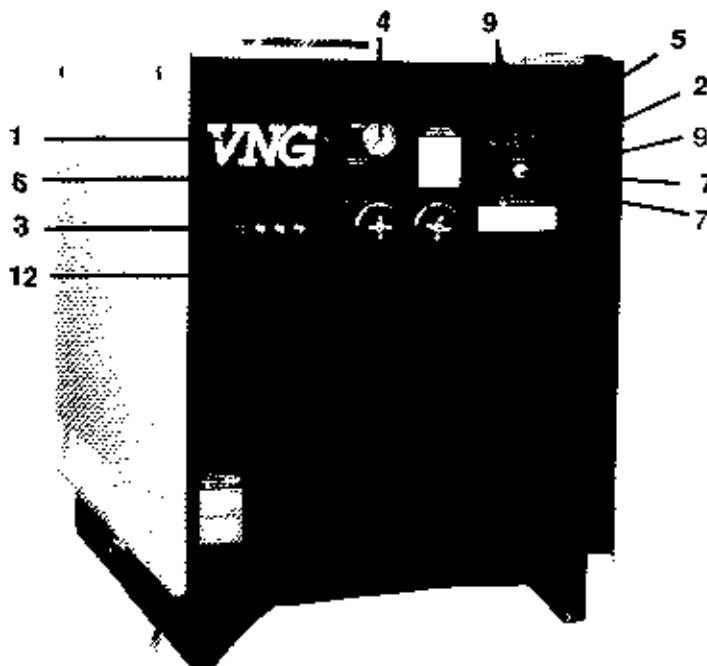


FIGURE 2. Two station parallel wiring, machine to box, machine to box.



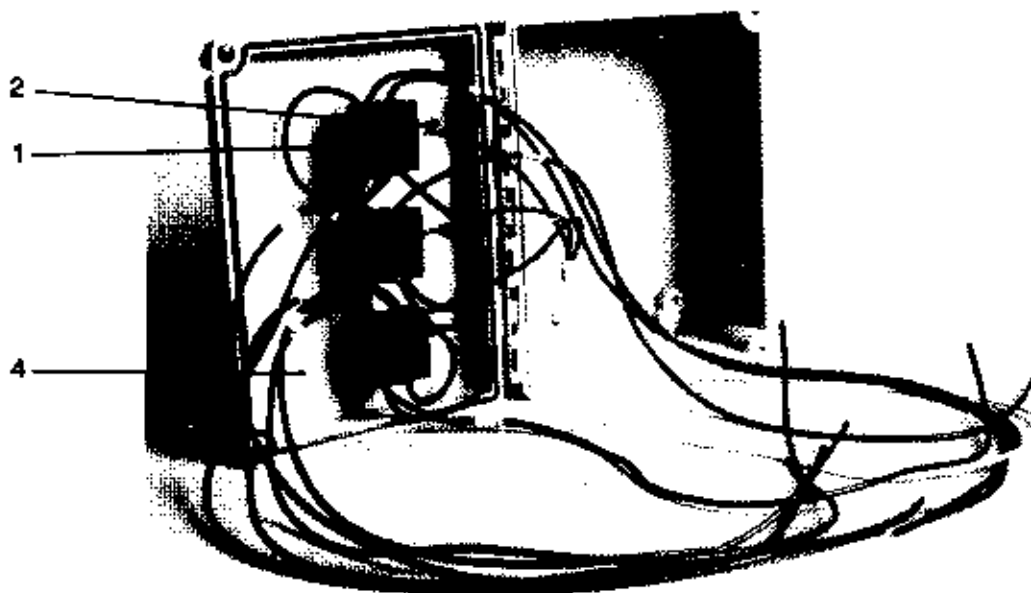
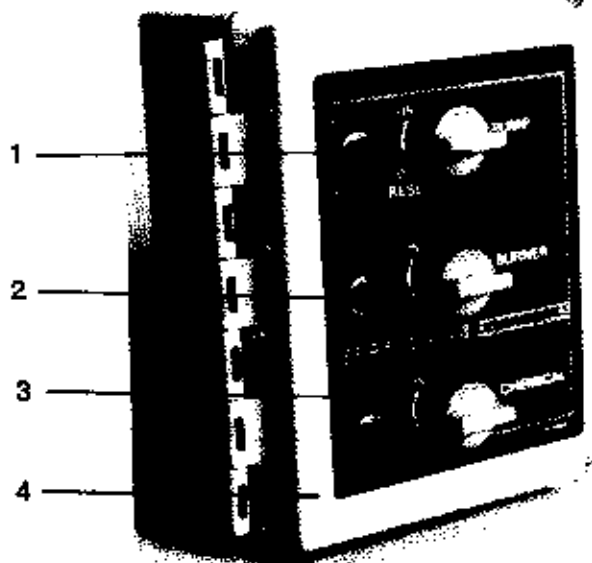
ITEM	PART NO.	DESCRIPTION	QTY
1	10-99016	Label, VNG Logo	1
2	10-99031	Label, VNG Cont. Panel, w/remote	2
3	2-01031	Grommet, Rubber 2282	4
4	4-05035	Gauge, 0-5000 PSI, VNG & Skid	1
5	4-050822	Hour Meter, Hobbs, 110V., 20001	1
6	4-05085	Control, Temp, Solid State 275 DR	1
7	6-02053	Light, Indicator, Red, 110V	2
9	6-0391	Button, Red, Pilot Switch	3
12	95-07163058	Panel, Control, VNG-S	1
	95-07163012	Panel, Control, VNG-L	1

OPERATOR'S MANUAL • VERTICAL NATURAL GAS/PROPANE PRESSURE WASHER

■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■

■ VNG6-3000 ■ VNG8-2500 ■ VNG3-300 ■

ROS CONTROL BOX



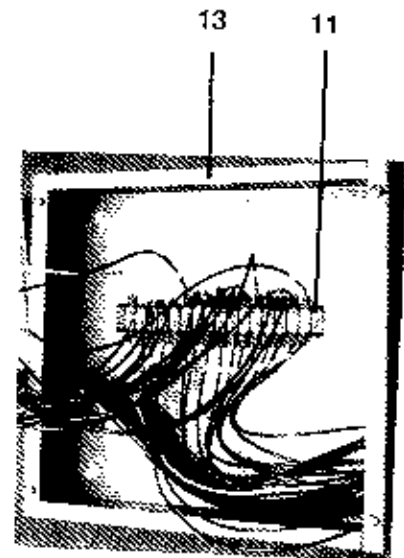
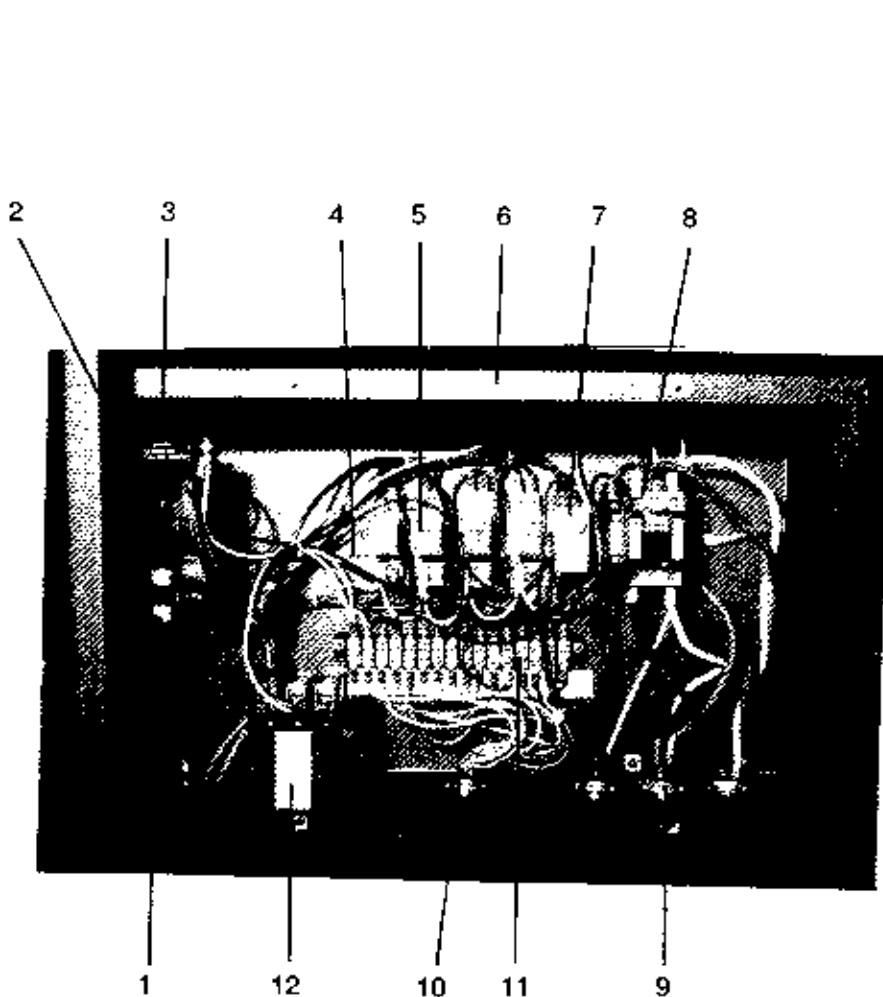
ITEM	PART NO.	DESCRIPTION	QTY
1	8-0391	Button, Red, Pilot Switch	3
2	8-02053	Light, Indicator, Red, 125V	3
3	10-02021	Decal, ROS Control Box	1
4	8-0390	Box, Plastic, Remote Station	1

OPERATOR'S MANUAL • VERTICAL NATURAL GAS/PROPANE PRESSURE WASHER

■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■

■ VNG6-3000 ■ VNG8-2500 ■ VNG3-300 ■

ROS ELECTRICAL BOX



ITEM	PART NO.	DESCRIPTION	QTY
1	6-02053	Light Indicator, Red, 125V	2
2	6-0391	Button, Red, Pilot Switch	3
3	4-050822	Hour Meter, Hobbs, 110V, 20001	1
4	6-021595	Din Rail track, 1/2 in.	12 in.
5	6-03621	Relay, 120V RH2B-LIL-AC120	4
5	6-3541	Base, Relay SH2B-05-1DEC	4
6	95-07163028	Electrical Box, VNG-L	1
6	95-07163030	Panel, Electrical Box, Side, VNG-L	2
7	6-0371	Timer, 120V Syrelec	1
8		Contactors/Overload (See page 40)	1
9	6-0517	Strain Relief, 3/4, 3303	3

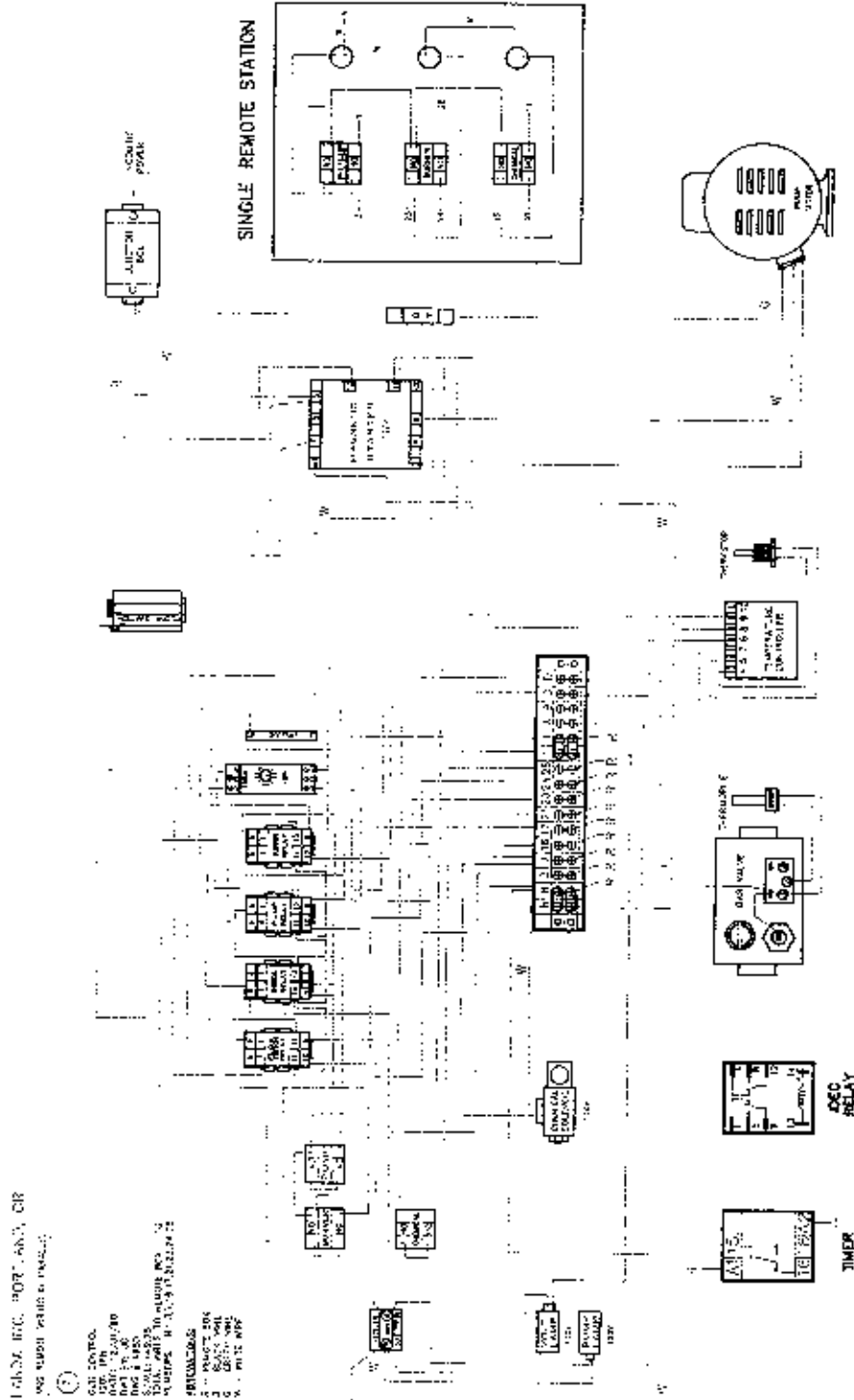
ITEM	PART NO.	DESCRIPTION	QTY
10	6-0516	Strain Relief, 1/2	1
11	6-05041	Block, Strip, Terminal, 16-Pole	2
	6-0505	Bar, Jumper	2
12	6-05235	Transformer, Control, .060 KVA	1
	6-02294	240V ATMR 1/2 Class CC (Primary Voltage Fuse)	2
	6-02295	460V ATMR 1/2 Class CC (Primary Voltage Fuse)	2
	6-02297	120V KCGL 1/2 (Secondary Voltage Fuse)	1
13	6-03901	Box, Metal, Junction, 12" x 12" x 4"	1

OPERATOR'S MANUAL • VERTICAL NATURAL GAS/PROPANE PRESSURE WASHER

■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■

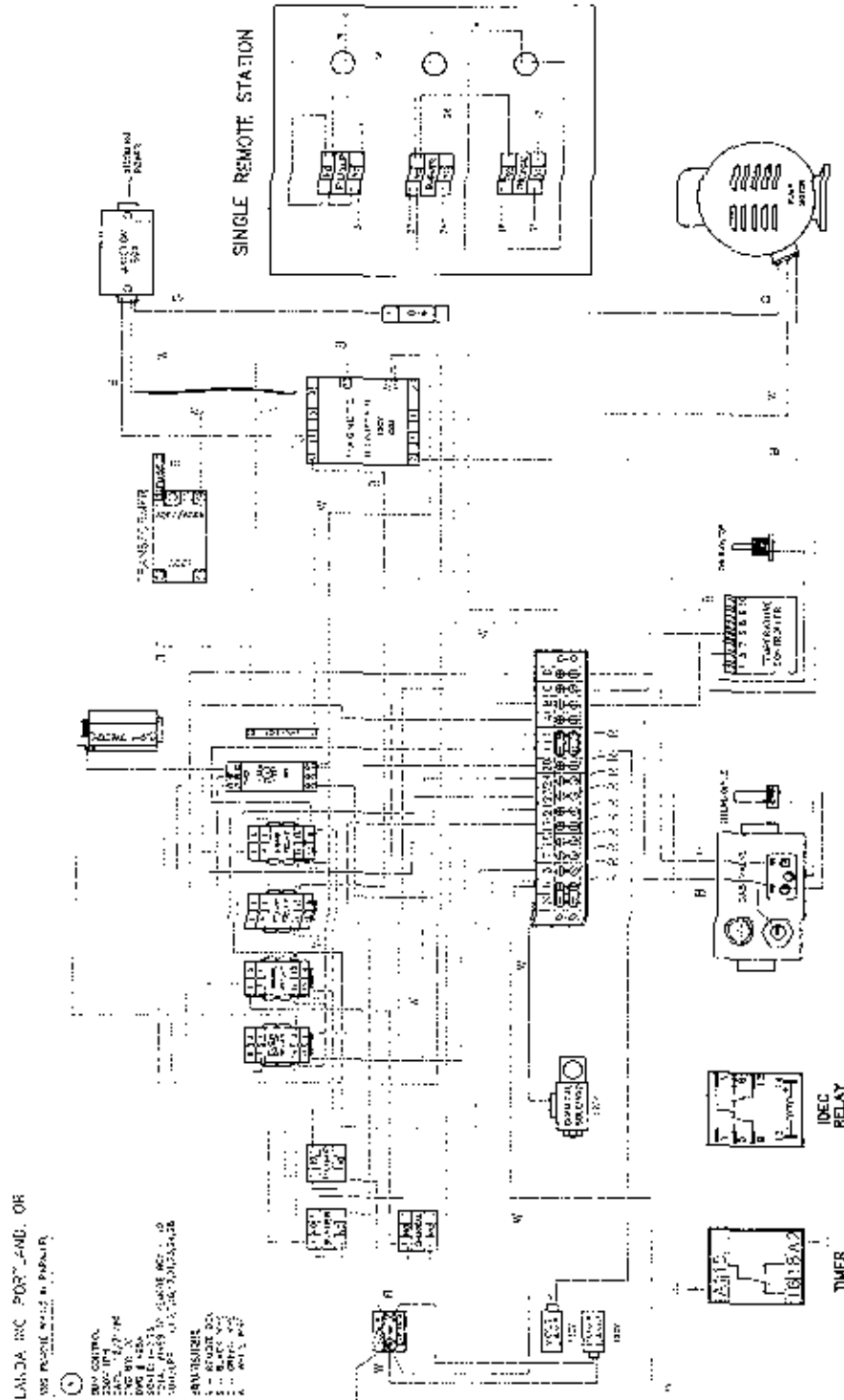
■ VNG6-3000 ■ VNG8-2500 ■ VNG3-300 ■

ROS WIRING DIAGRAM
 (Remote Wiring in Parallel)
 120V 1PH



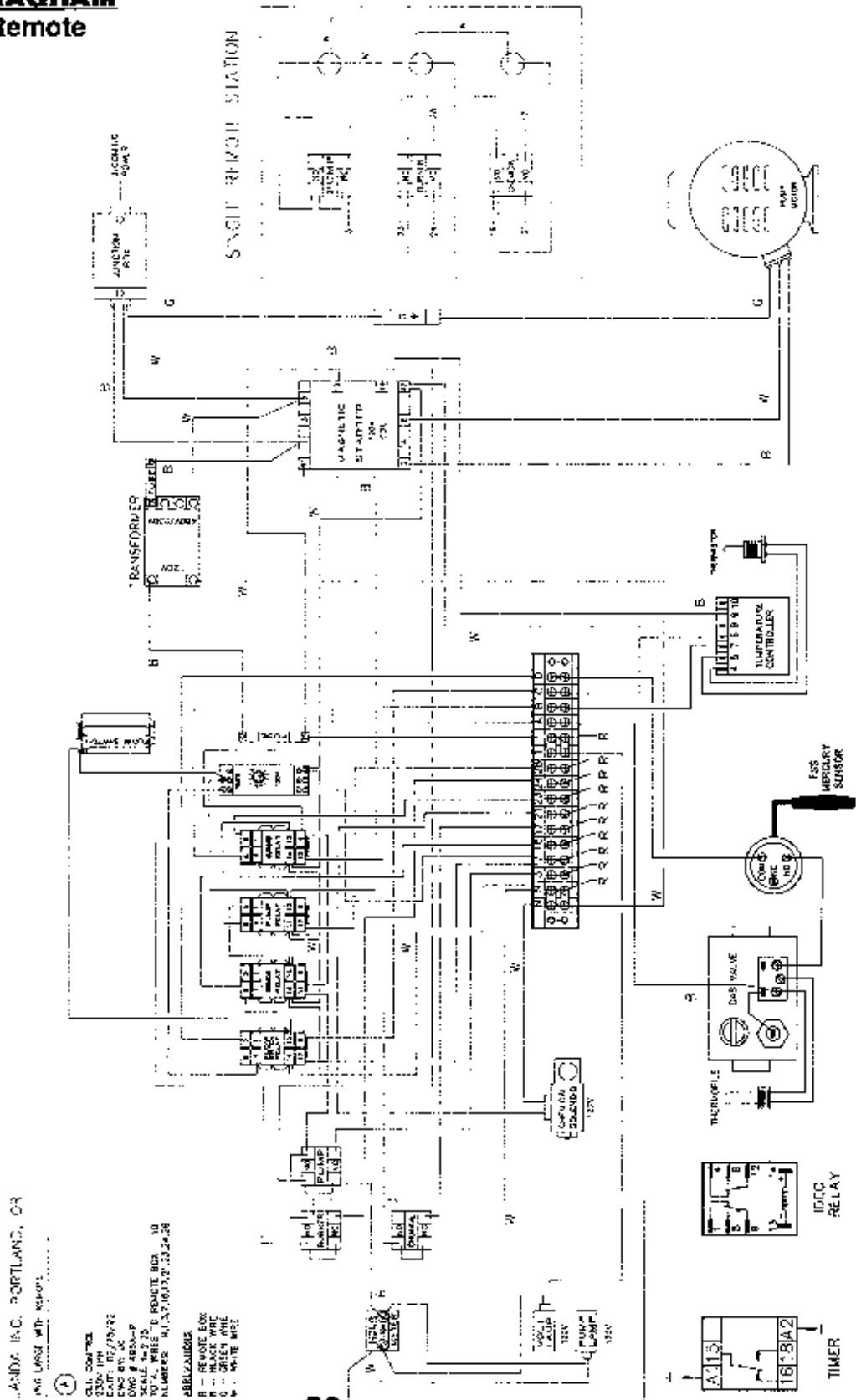
120V, 1PH, 60HZ, 100% DUTY, 1/2 HP
 MOTOR PARTS & FINISHES
 (1)
 CIR. CONTROL
 CIR. 1PH
 MOTOR
 TRIGGER GUN
 SPRAY LANCE
 THERMOSTAT
 PRESSURE RELIEF VALVE
 TIMER
 OVC RELAY
 WATER INLET
 WATER OUTLET
 WATER INLET
 WATER OUTLET
 WATER INLET
 WATER OUTLET

ROS WIRING DIAGRAM
 (Remote Wiring in Parallel)
 230V 1PH



ROS WIRING DIAGRAM

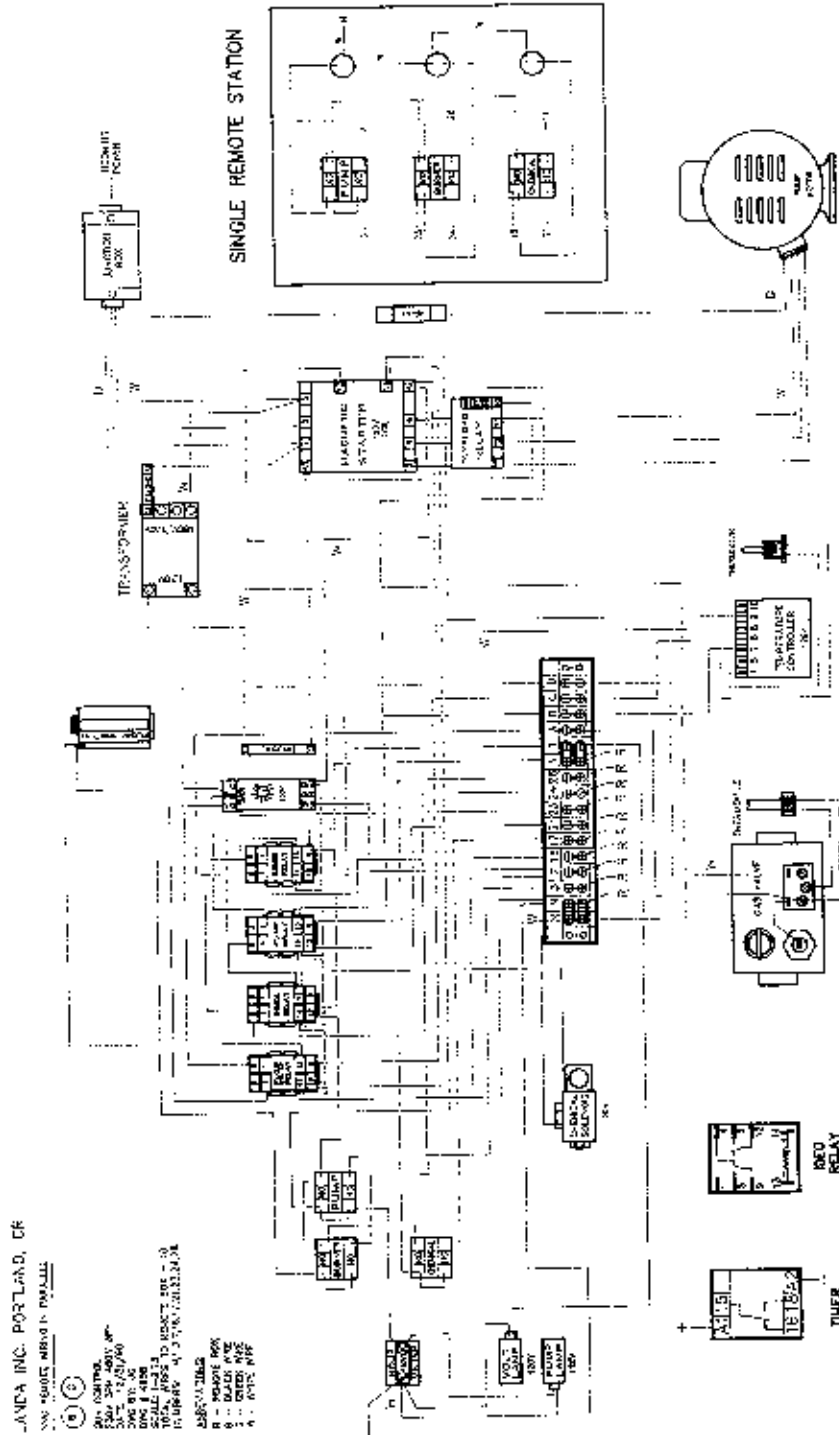
VNG Large with Remote
230V 1PH



ANDA INC. PORTLAND, OR
 ENG USER WITH REPORT
 ①
 DATE: 04/27/92
 ENG BY: AC
 DWG # 485A-P
 SCALE: 1/8" = 1"
 TITLE: WIRING TO REMOTE BOX
 NUMBER: 81, A7, 00, 17, 03, 24, 28

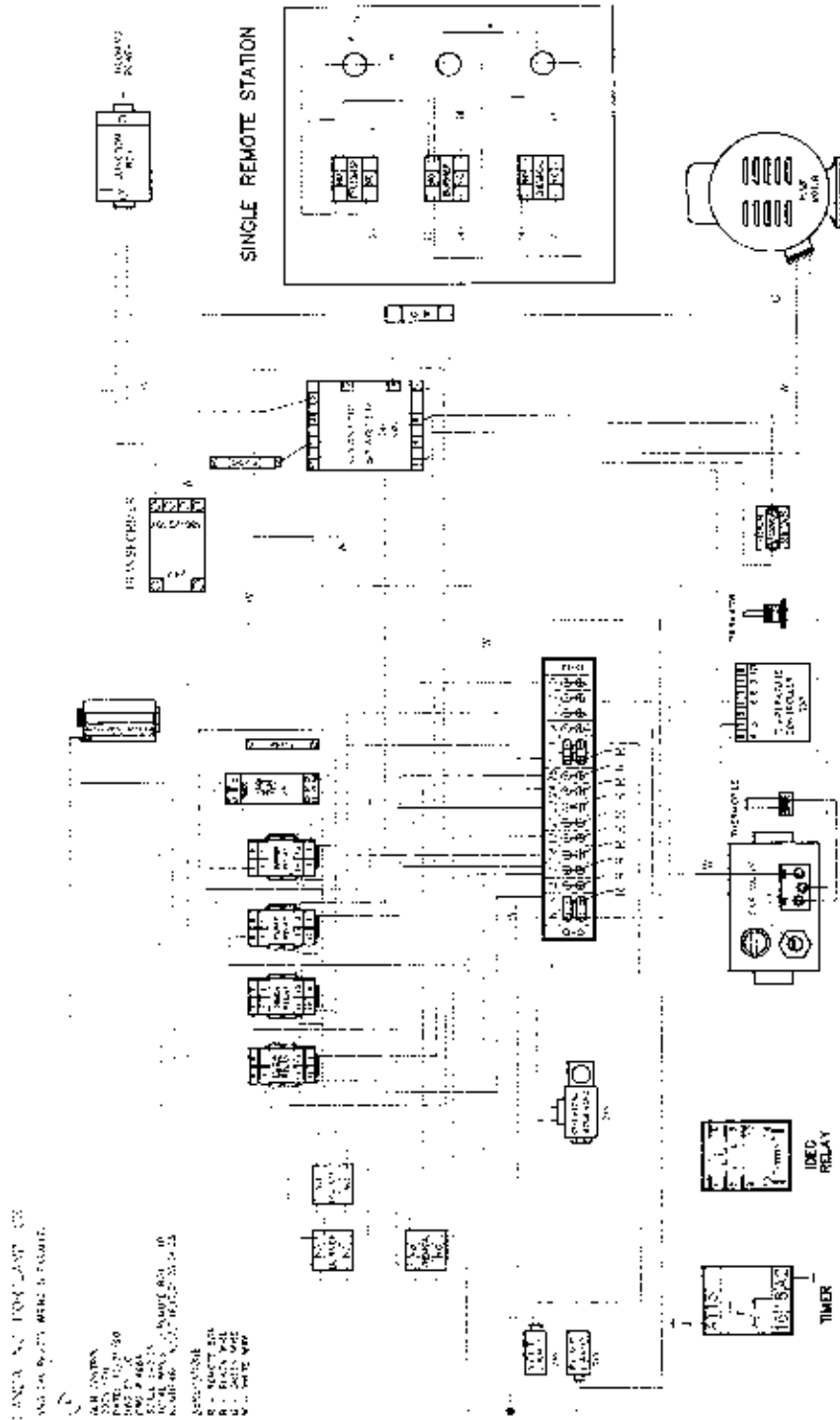
ABBREVIATIONS
 R - REMOTE BOX
 B - BLACK WIRE
 G - GREEN WIRE
 W - WHITE WIRE

ROS WIRING DIAGRAM
 (Remote Wiring in Parallel)
 230V 3PH/460V 3PH



ROS WIRING DIAGRAM

(24V Remote Wiring in Parallel)
230V 1PH



WIRING DIAGRAM FOR
VERTICAL NATURAL GAS/PROPANE PRESSURE WASHER

ALL DIMENSIONS
IN INCHES
UNLESS OTHERWISE SPECIFIED

WIRING DIAGRAM FOR
VERTICAL NATURAL GAS/PROPANE PRESSURE WASHER

WIRING DIAGRAM FOR
VERTICAL NATURAL GAS/PROPANE PRESSURE WASHER

ROS WIRING DIAGRAM

(2 Station Remote Wiring in Parallel)
Junction Box

**2 STATION PARALLEL
WIRING INSTRUCTIONS**

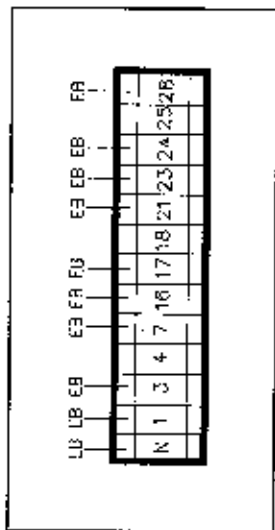
JOIN NUMBERED WIRES FROM REMOTE STATIONS TO CORRESPONDING TERMINAL BLOCKS IN JUNCTION BOX LOCATED AT REAR OF MACHINE.

DWG # 467A
DATE: 7/20/90
DWG BY: J. CLARK

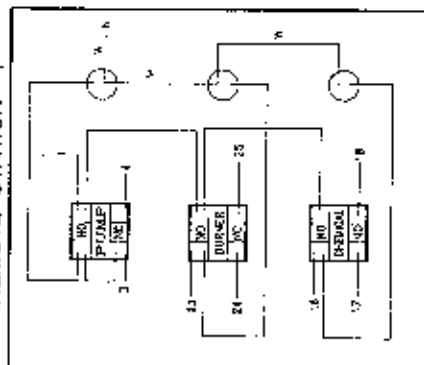
LEGEND:

- CB = ELECTRICAL BOX
- N = NEUTRAL
- T = TOP TERMINAL
- B = BOTTOM TERMINAL
- W = WHITE WIRE

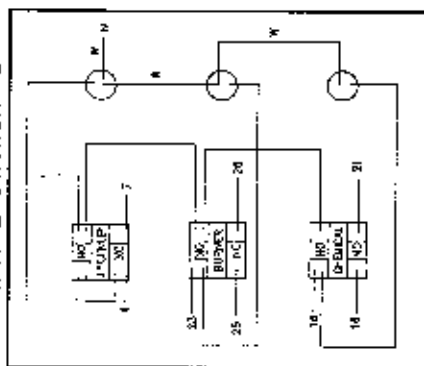
TERMINATION JUNCTION BOX



REMOTE STATION 1



REMOTE STATION 2



OPERATOR'S MANUAL • VERTICAL NATURAL GAS/PROPANE PRESSURE WASHER

■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■

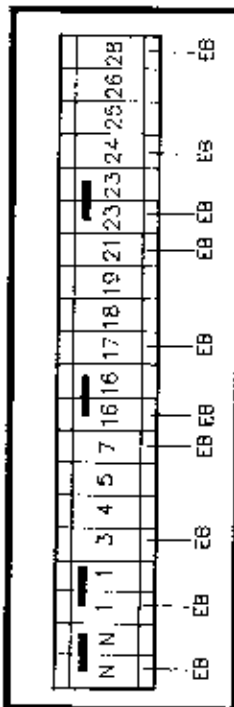
■ VNG6-3000 ■ VNG8-2500 ■ VNG3-300 ■

ROS WIRING DIAGRAM

(3 Station Remote Wiring in Parallel)

Junction Box

TERMINATION JUNCTION BOX



LEGEND:

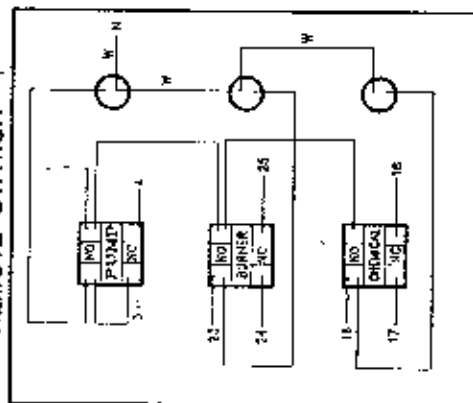
EB = ELECTRICAL BOX
 N = NEUTRAL
 W = WHITE WIRE

3 STATION PARALLEL WIRING INSTRUCTIONS

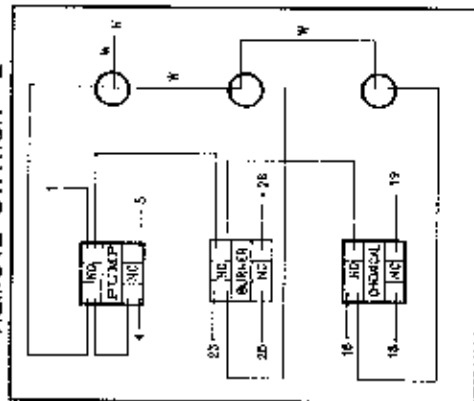
JOIN NUMBERED WIRES FROM REMOTE STATIONS TO CORRESPONDING TERMINATION BLOCKS IN JUNCTION BOX LOCATED AT REAR OF MACHINE.

DWG# 451A
 DATE: 12-21-80
 DWG BY: J. CLARK

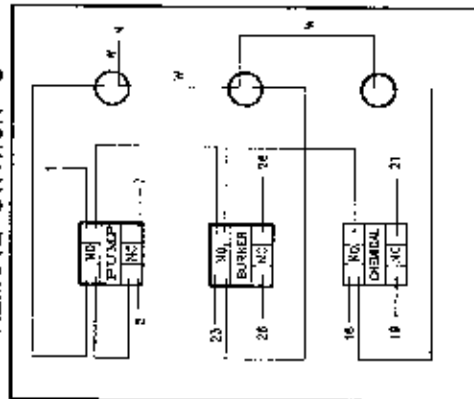
REMOTE STATION 1



REMOTE STATION 2



REMOTE STATION 3



ROS WIRING DIAGRAM
(4 Station Remote Wiring in Parallel)
Junction Box

LEGEND:

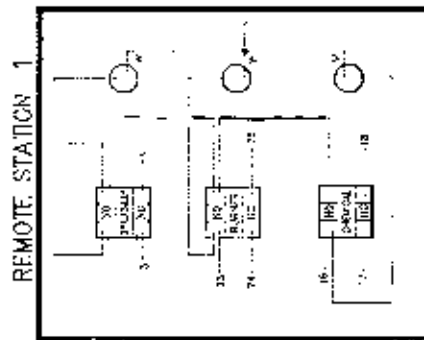
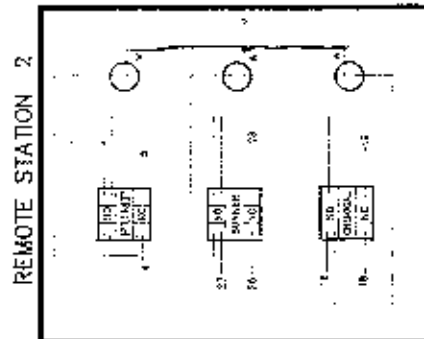
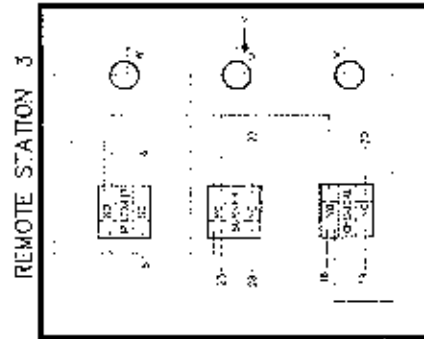
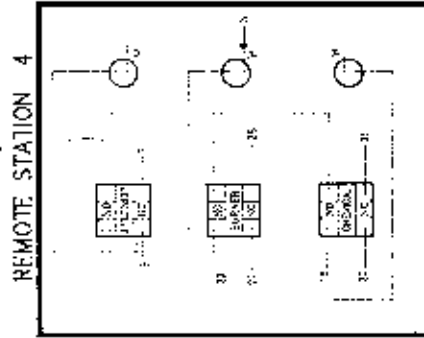
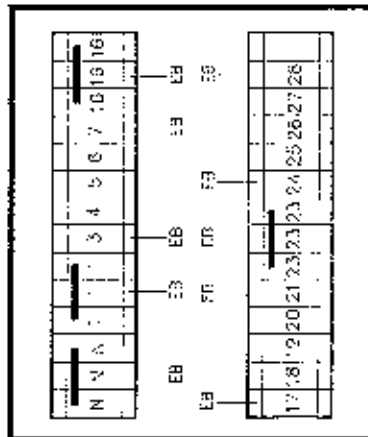
- EB = ELECTRICAL BOX
- L = LINE
- N = NEUTRAL
- W = WHITE WIRE

**4 STATION PARALLEL
WIRING INSTRUCTIONS**

JOIN NUMBERED WIRES FROM REMOTE
STATIONS TO CORRESPONDING TERMINAL
BLOCKS IN JUNCTION BOX LOCATED
AT REAR OF MACHINE.

DWG # 4154
DATE 12/27/93
DWG BY: C. CLARK

TERMINATION JUNCTION BOX

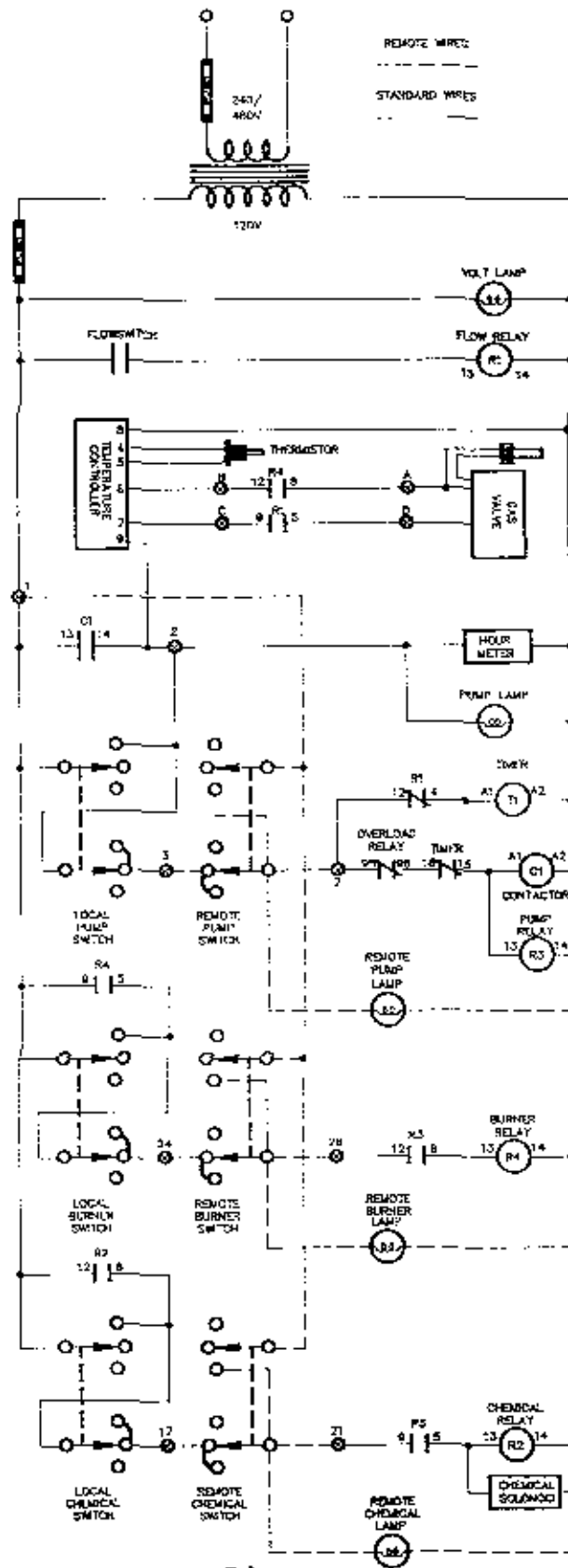


OPERATOR'S MANUAL • VERTICAL NATURAL GAS/PROPANE PRESSURE WASHER

■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■

■ VNG6-3000 ■ VNG8-2500 ■ VNG3-300 ■

LADDER FLOW CHART



OPERATOR'S MANUAL • VERTICAL NATURAL GAS/PROPANE PRESSURE WASHER

■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■

■ VNG6-3000 ■ VNG8-2500 ■ VNG3-300 ■

BURNER SPECIFICATIONS

MODEL	BURNER ASSEMBLY	JET SIZE	GAS VALVE	PILOT ORIFICE CONVERSION
VNG3-1000	X-44	57	3/4" 7000MVRHC	No
VNG4-2000	X-44	54	3/4" 7000MVRHC	No
VNG4-3000	X-44	54	3/4" 7000MVRHC	No
VNG6-3000	EW-100	54	1" 7000MVRHC	No
VNG8-2500	EW-70	54	1" 7000MVRHC	No
VNG3-300 (Steamer)	X-44	54	3/4" 7000MVRHC	No
VLP3-1000	X-44	69	3/4" 7000MVRHC Kit	Yes
VLP4-2000	X-44	5165	3/4" 7000MVRHC-LP Kit	Yes
VLP4-3000	X-44	5465	3/4" 7000MVRHC-LP Kit	Yes
VLP6-3000	EW-98	66	1" 7000MVRHC-LP Kit	Yes
VLP8-2500	EW-66	66	1" 7000MVRHC-LP Kit	Yes
VLP3-300 (Steamer)	X-44	5365	3/4" 7000MVRHC-LP Kit	Yes

PULLEY and BELT CHART

	PUMP	PUMP PULLEY	PULLEY BUSHING/BORE	PUMP RPM	MOTOR	MOTOR PULLEY	PULLEY BUSHING/BORE	MOTOR RPM	BELT SIZE
VNG3-1000	T991	AK 84 H	24 mm	1125	2 HP	AK 28	5/8" Bore	3450	AX 36
VNG4-2000	T1011	2 AK 84 H	24 mm	1100	6 HP	2 AK 54 H	1-3/8" Bushing	1725	(2) AX 36
VNG4-3000	TS2021-L	2 BK 80 H	24 mm	1050	7-1/2 HP	2 BK 45 H	1-3/8" Bushing	1725	(2) BX 36
VNG6-3000	TS2021-L	2 BK 55 H	24 mm	1400	15 HP	2 TB 40	1-1/8" Bushing	1725	(2) BX 46
VNG8-2500	T1631	2 BK 80 H	32 mm	800	15 HP	2 TB 40	1-5/8" Bushing	1725	(2) BX 51
VNG3-300 (Steamer)	2230B	AK 84 H	24 mm	1450	3/4 HP	AK 25	5/8" Bore	3450	AX 33

OPERATOR'S MANUAL • VERTICAL NATURAL GAS/PROPANE PRESSURE WASHER

■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■

■ VNG6-3000 ■ VNG8-2500 ■ VNG3-300 ■

VNG MODEL SPECIFICATIONS

MODEL	VNG3-1000+	VNG4-2000+	VNG4-3000+	VNG6-3000†	VNG8-2500†	VNG3-300+ Steamer
Discharge Capacity G.P.M.	2.8	4.2 3.9	5.4 5.5	5.2 5.2	5.9 7.9	2.5
Operating Pressure P.S.I.	1000	2000	3000	3000	2500	300
Operating Temperature**	200°F	200°F	200°F	200°F	200°F	310°
B.T.U. Per Hour	280,000	400,000	400,000	500,000	750,000	440,000
Burner Type	Natural Draft					
Fuel Type	Natural Gas or Liquid Propane (please specify)					
Burner Assembly	Ring Type with Aspirating Spud					
Volts	Millivolt Control					
Controls	AGA Approved					
Stack Size	10	10	10	10	12	10
Coil	1/2" Sch. 80, ASTM A53 Close Coiling Pipe			3/4" Sch 80 Pipe		1/2" Sch 80
Pump	Tri-Plunger					2 Plunger
Pump Motor H.P.	2	5 (3 Ph) 5 (3 Ph)	7-1/2	15	15	3/4
Volts	D	A, B, C*	A, B, C*	B, C*	B, C*	120 D
Amps	18	A-28 B-15 C-7	A-36 B-25 C-15	B-39 C-19	B-39 C-19	10
Paint	Textured Polyester Powder Coating					
Hose 50' Wire Braid	3/8" I.D.				1/2" I.D.	1/2" Steam
Shut Off Gun Control	Standard					Opt.
Variable Pressure Wand	Standard					N/A
Nozzles	Four (4) 0°, 15°, 25°, 40°					Steam
Chemical Control	Precision Meter Valve					
Control Switch	Magnetic					
Length/Width/Height	44"/35"/46"	44"/35"/46"	44"/35"/46"	69"/43"/57"	69"/43"/57"	44"/35"/46"
Net Weight lbs.	720 660	690 720	665 750	1040 960	1090 1210	660 550

* A=: 230V, 1 Ph B=: 230V, 3 Ph C=: 480V, 3 Ph D=: 120V, 1Ph

** Varies with incoming water temperature

† CSA Approved ‡ CGA Approved Note: CGA does not approve Liquid Propane

LP units do not include propane tank

Discharge water temperature is dependent on ambient water temperature. (50°F ambient temp. + 150°F rise will produce 200°F discharge temperature.)

Note: There may be slight variances in gallonage and pressures due to variances allowed by manufacturers of our machine components.

We attempt to keep our machine performance ± 5% of listed specifications.

OPERATOR'S MANUAL • VERTICAL NATURAL GAS/PROPANE PRESSURE WASHER**■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■****■ VNG6-3000 ■ VNG8-2500 ■ VNG3-300 ■****BASIC FACTS**

BASED ON 60° F	PROPANE	BUTANE
Formula	C ₃ H ₈	C ₄ H ₁₀
Vaporization Point (°F)	-43.7	31.1
Specific Gravity (Vapor)	1.522	2.006
Specific Gravity (Liquid)	0.508	0.584
Lbs. Per Gallon (Liquid)	4.23	4.87
B.T.U. Per Cubic Foot (Vapor)	2.563	3.390
B.T.U. Per Lb. (Vapor)	21.663	21.308
B.T.U. Per Gallon (Liquid)	91.740	103.830
Cubic Feet Per Lb. (Liquid)	8.607	6.53
Cubic Feet Per Gallon (Liquid)	36.45	31.8
Octane Number	125	91
Molecular Weight	44.09	58.12

To calculate running cost:

1 cubic ft./1,000 BTU

100 cubic ft./Therm

Therm/hour

50¢/Therm

Example: Using natural gas
 400,000 BTU Machine
 400 cubic feet
 4 Therms/hour
 4 x .50 = \$2.00/hour to run

PRESSURE EQUIVALENTS

Simply stated, pressure is the force exerted by a gas or liquid attempted to escape from a container. It is useful to know how strong this "attempt to escape" is. Pressure can be measured with a manometer or with a pressure gauge. At the lower levels, it is expressed in "inches of water column", i.e., 11" W.C. Higher pressures are expressed in terms of the force exerted against a square inch of area. For example, 125 lbs. per square inch (125 PSI).

1" Water Column	=	50 oz./sq. in.	11" Water Column	=	6.35 oz./sq. in.
11" Water Column	=	4 lb./sq. in.	1 lb./sq. in.	=	27.71" Water Column
1 lb./sq. in.	=	2.04" Mercury	1" Mercury	=	39 lb./sq. in.
1 Std. Atmosphere	=	14.73 lbs./sq. in.			

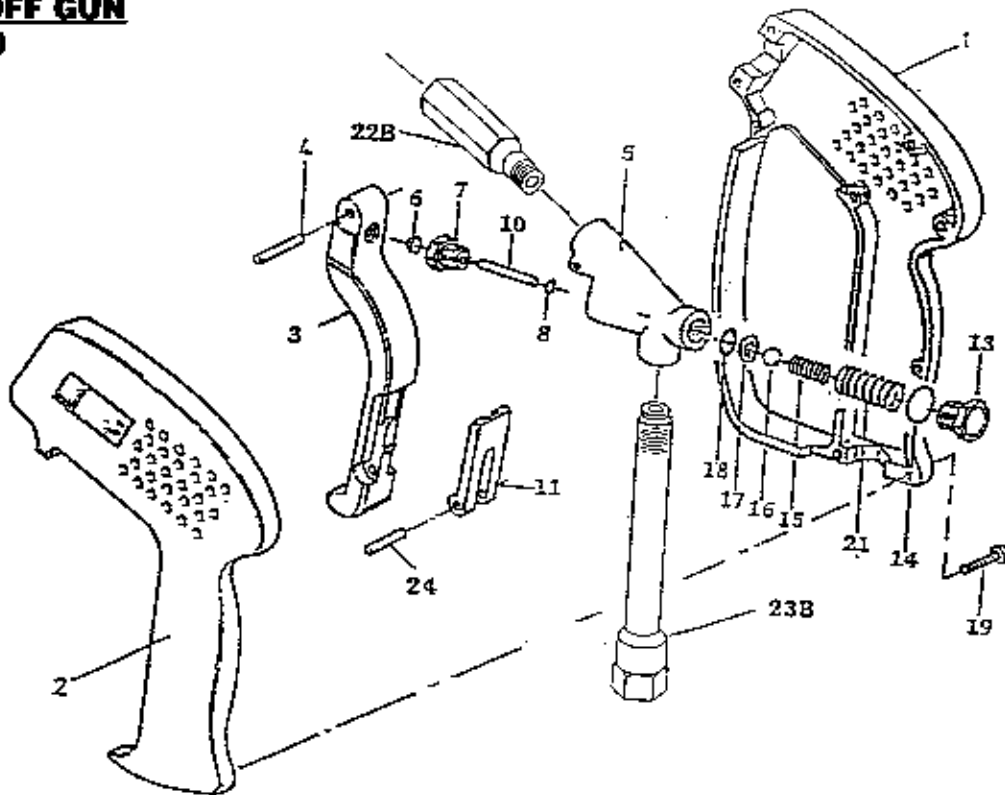
OPERATOR'S MANUAL • VERTICAL NATURAL GAS/PROPANE PRESSURE WASHER

■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■

■ VNG6-3000 ■ VNG8-2500 ■ VNG3-300 ■

SHUT-OFF GUN

81-21250



ITEM	PART NO.	DESCRIPTION	QTY
1	81-21271	Housing, Right Half 21250B/21260/21290B	1
2	21272	Housing, Left Half 21250B	1
3	21273	Trigger	1
4	21214	Pin	1
5	21405+	Valve Body 21250B/21290B (2 piece discharge design)	1
*6	21213	Cam, Trigger	1
7	21211	Guide Sleeve	1
*8	21210	O-Ring	1
*10	21209	Control Bolt	1
11	21274	Lock	1
13	21208	Cap	1
*14	21207	O-Ring	1
*15	21206	Valve Spring	1
*16	21205	Valve Ball	1
*17	21218	Valve Seat	1
*18	21217	O-Ring	1
19	21254	Self Tapping Screw	7
*21	21251	Spring	1
22B	21256+	Discharge Tube/Fitting Assy. S. S. 21250B	1
23B	21257	Inlet Tube/Fitting Assy.	1
24	21236	Lock Pin	1
-	21227	*Kit includes items #6, 8, 10, 14, 15, 16, 17, 18 & 21	

+The design of the discharge tube/fitting assembly varies depending on the manufacturing date of your shut-off gun. Replacement of these parts must be with the same design as your shut-off gun was originally equipped.

DISASSEMBLY OF THE GIANT SHUT-OFF GUN METRIC WRENCHES OR SOCKETS REQUIRED

- 1) Remove the seven cheese head screws (item #19) that secure the two halves of the housing together. Remove housing (items #1 and #2).
- 2) Drive out hinge pin (item #4) and remove trigger (item #3).
- 3) Remove the cap (item #13), springs (items #21 and #15), and ball (item #16). Inspect parts for wear and replace if necessary.
- 4) Next, remove the guide sleeve (item #7), control bolt (item #10), and o-ring (item #8). Inspect parts for wear and replace if necessary.
- 5) Insert a small dowel rod through the guide sleeve port in front of the valve body (item #5) and drive out the valve seat (item #17) and o-ring (item #18). Inspect parts for wear and replace if necessary.
- 6) If necessary, the inlet and discharge tube/fitting assemblies (item #22) may be removed.
- 7) Assemble in reverse order

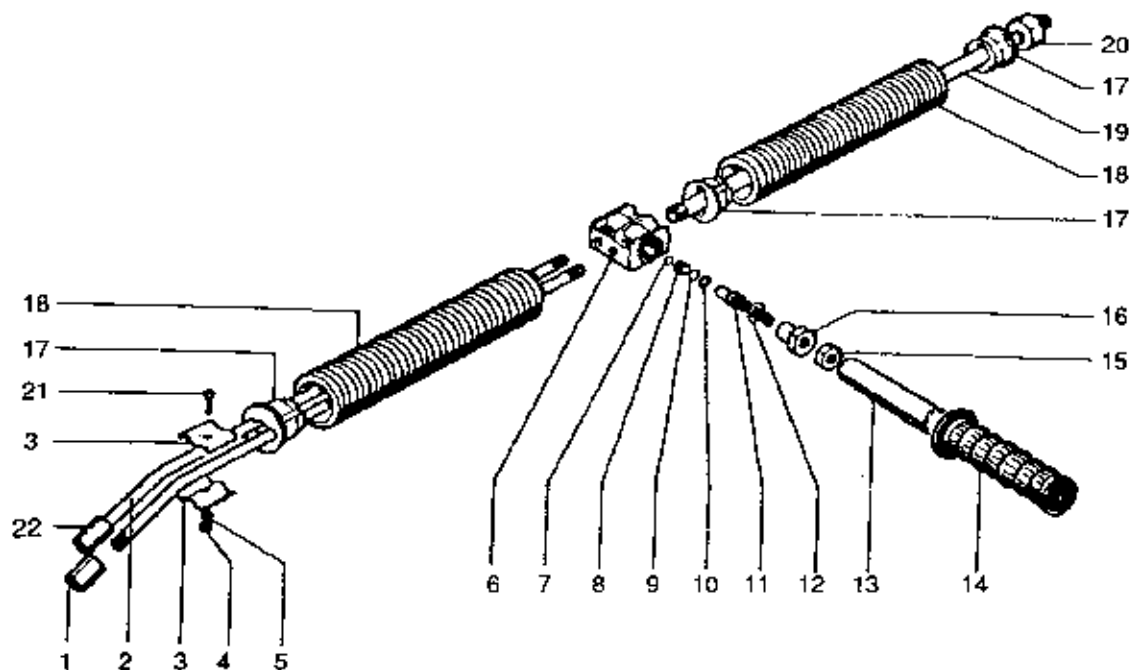
NOTE: Be sure to apply a small amount of thread sealant (Lockite #271 or equivalent) to the threads on (item #13) before reassembly.

DO NOT USE ACID CONCENTRATES THRU GUN.

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

VARIABLE PRESSURE WAND

4-011142



ITEM	PART NO.	DESCRIPTION	QTY
1	1-94513000	Nipple	1
2	1-18007289	Tube	2
3	1-19009134	Separator	2
4	1-92197500	Nut	1
5	1-96688000	Washer	1
6	1-10007141	Faucet	1
7	1-90357500	O Ring	1
8	1-10008566	Valve Seal	1
9	1-90357700	O Ring	1
10	1-90503300	Anti-extrusion Ring	1
11	1-10007366	Shutter	1
12	1-90383500	O Ring	1
13	1-10007961	Handle Core	1
14	1-94557000	Handle	1
15	1-92237500	Nut	1
16	1-10007270	Nipple	1
17	1-18008251	Tube Spacer	4
18	1-18007951	Guard	2
19	1-18203389	Tube	1
20	1-94483200	Nipple	1
21	1-99158700	Screw	1
22	2-1013	Coupling, Hex, 1/8"	1
	1-VPKIT	Repair Kit	

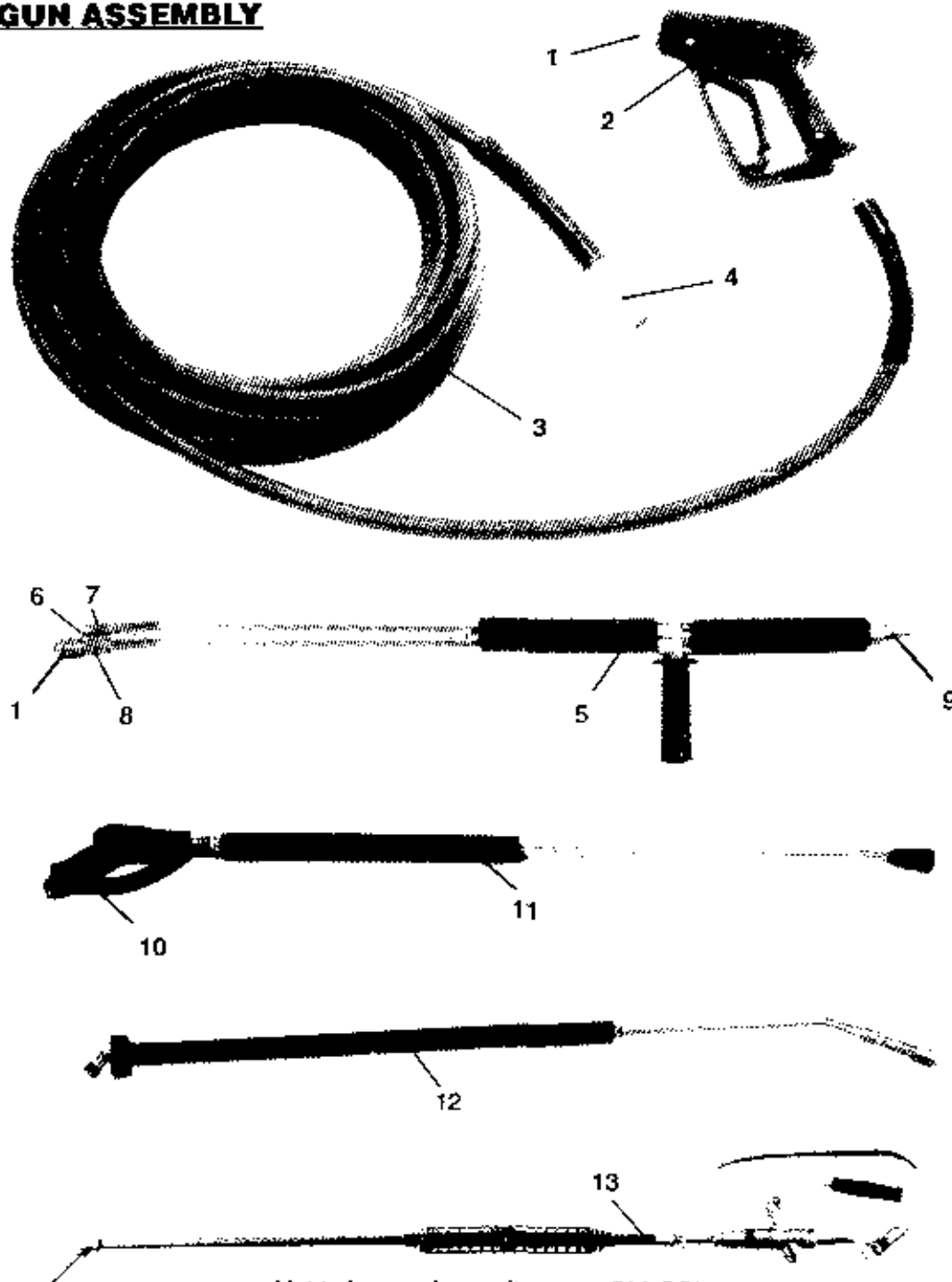
All kits include items 7, 8, 9, 10, 11, 12

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■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■

■ VNG6-3000 ■ VNG8-2500 ■ VNG3-300 ■

HOSE & GUN ASSEMBLY



Not to be used on units over 1500 PSI

ITEM	PART NO.	DESCRIPTION
1	2-2001	1/4" Male Coupler
2	81-21250	Shut-off Gun
3	4-02033450	50' x 3/8" 2000 PSI Hose (2-1100, 3-710, 4-1200, 5-1500)
	4-02043450	50' x 3/8" 3000 PSI Hose (4-2000, 4-3000, 5-3000)
	4-02063450	50' x 1/2" 1000 PSI Hose (8-2500)
4	2-2002	3/8" Female Quick Coupler
	2-2006	3/8" Female Nipple
5	4-011142	Variable Pressure Wand

ITEM	PART NO.	DESCRIPTION
6	4-06540	Nozzle only, 1/8" 6540 Brass
7	2-1013	Coupling, Hex, 1/8"
8	1-94481200	Nipple 1/8" x 1/8"
9	2-2004	1/4" Female Nipple
10	4-01202	Open Spray Grip
11	4-011059	Straight Wand
12	4-01111	Steam Open Spray Wand w/ Nozzle
13	4-012141	Steam Shut-Off Gun & Wand w/ Nozzle

COUPLERS and NIPPLES



FEMALE COUPLER

1/4" Female Coupler - *Part No. 2-2000*
3/8" Female Coupler - *Part No. 2-2002*



FEMALE NIPPLE

1/4" x 1/8" NPT Female Nipple - *Part No. 2-20040*
1/4" x 1/4" NPT Female Nipple - *Part No. 2-2004*
3/8" x 3/8" NPT Female Nipple - *Part No. 2-2006*



MALE COUPLER

1/4" Male Coupler - *Part No. 2-2001*
3/8" Male Coupler - *Part No. 2-2003*



MALE NIPPLE

1/4" x 1/4" NPT Male Nipple - *Part No. 2-2005*
3/8" x 3/8" NPT Male Nipple - *Part No. 2-2007*

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ACCESSORIES

4-011211 SAND BLASTER WITH PROBE 4-011201 SAND BLASTER WITH POT

The Landa Sand Blast system is designed to inject sand into the stream of water being created by a high pressure washer.

The pressure washer acts as a compressor to draw sand into a moving chamber and propel it at a velocity sufficient to become abrasive to the surface being cleaned.

Many types of abrasive materials can be used with a Landa Sand Blaster such as sand, glass beads, walnut chips, lead shot, etc., making your sand blaster versatile to clean and etch most types of surfaces.

The Optional Sand Probe is used where portability of the sand is not a factor. The sand probe will draw sand directly from a sack or existing barrel.

4-0601 TEMP & PSI TEST GAUGE ASSEMBLY

This Gauge System enables you to test pressure and temperature in one step.

90-8005 LANDA PUMP OIL

Specially formulated with anti-wear agents, rust-inhibiting agents, anti-foaming agents, anti-oxidation agents, and anti-moisture agents.

4-01118 (4-6PM) DOWN STREAM CHEMICAL INJECTOR

The Chemical Injector adds to the versatility of your pressure washer. It allows the use of chemicals with a Down Stream System, thus eliminating caustic agents going through the pump.

9-40083 RED DEVIL

Red Devil liquid soot remover added to the diesel tank will attack the soot, save fuel and clean burner nozzle.

9-028008 COIL CLEAN

Coil Clean is a granular powder that works to dissolve lime and scale buildup. Used as directed it is safe for personnel and equipment. Coil Clean has built-in inhibitors.

9-4007 SOOT-O-MAGIC

Soot-O-Magic is used to keep burner chambers clean and free from soot. Periodic use will help reduce maintenance and extend the life of your machine.

31-20075 2000 PSI TWO-STEP CHEMICAL SYSTEM 31-30075 3000 PSI TWO-STEP CHEMICAL SYSTEM

The Landa Two-Chemical Injector System utilizes a new concept in pressure washing. The chemical injector allows you to feed two separate chemicals through your system by simply flipping a switch.

1-20 CAR WASH BRUSH

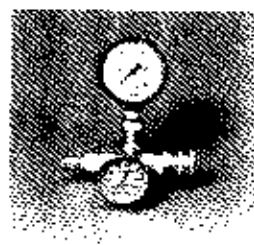
Landa's rotating car wash brush, when attached to a wand, makes cleaning rough ribbed and extremely dirty cars, trucks and trailers a snap!



4-011211



4-011201



4-0601



90-8005



4-01118



9-40083, 9-028008, 9-4007



1-20

OPERATOR'S MANUAL • VERTICAL NATURAL GAS/PROPANE PRESSURE WASHER

■ VNG3-1100 ■ VNG4-2000 ■ VNG4-3000 ■

■ VNG6-3000 ■ VNG8-2500 ■ VNG3-300 ■

SUGGESTED MAINTENANCE SCHEDULE

x = Change • = Inspect	8 Hrs.	25 Hrs.	50 Hrs.	100 Hrs.	500 Hrs.	Yearly
PUMP						
Oil			x			
BURNER						
Pilot						•
Burner Jets						•
MISCELLANEOUS						
Spray Nozzles				•		
Hose (Kinks, Leaks)		•				
Belt Tension			•			
Float Tank Strainer				•		
Chemical Strainer				•		
Coil (Scale Build Up)				•		
ELECTRIC MOTOR						
Grease Bearing						Regrease

OPERATOR'S MANUAL • VERTICAL NATURAL GAS/PROPANE PRESSURE WASHER

■ **VNG3-1100** ■ **VNG4-2000** ■ **VNG4-3000** ■

■ **VNG6-3000** ■ **VNG8-2500** ■ **VNG3-300** ■

LIMITED NEW PRODUCT WARRANTY

We warrant to you, the original purchaser, that each new Landa Inc. product (except those referred to below) will be free from defects in materials and/or workmanship for a period of one year from date of manufacture.

1. Components such as electric motors, generators, engines, which are supplied by other manufacturers are warranted, by their respective authorized service representatives. Service on these items, both in and out of warranty can be expedited through their local authorized service centers.
2. Coils, frames, chassis and burner wraps will have a two year warranty from date of manufacture.
3. Items such as unloaders, hoses, guns, valves, injectors and accessories will have a ninety day warranty from date of purchase.

WHAT WE WILL DO:

During the term of this warranty, we will at our option, repair or replace any part covered by this warranty if the part is defective, malfunctions or otherwise fails under normal use.

WHAT YOU MUST DO TO OBTAIN WARRANTY:

Upon purchase, the end user must complete and return the Warranty Card which was shipped with machine.

In order to obtain warranty, alleged defects must be reported to the manufacturer within the 90 day warranty period, and must subsequently be verified by the manufacturer. All items under warranty must be returned to Landa, Inc., accompanied by a completed RGA form, with freight or postage pre-paid.

WHAT THIS WARRANTY DOES NOT COVER:

1. Used products and demonstration equipment used extensively prior to end user purchase.
2. Damage or malfunctions resulting from: accidents, abuse, modifications, alterations, installation, or improper servicing.
3. Freezing or chemical deterioration.
4. Unit altered to operate at higher than rated PSI or GPM.
5. Pump has been run without water supplied.
6. Normal maintenance services such as: adjustments, fuel system cleaning, and obstruction (due to chemical, dirt, carbon or lime, etc.).
7. Replacement of normal maintenance items such as: o-rings, couplers, filters, nozzles, belts, and wear parts in the wet end of the pump.
8. Field labor charges in connection with adjustments, disassembly, or reassembly.
9. Transportation charges in connection with the replacement or repair of defective parts.
10. Thermo expansion, caused by not cooling the coil after use or scale deposits

THIS IS THE ONLY EXPRESS WARRANTY ON OUR PRODUCT

Landa, Inc., does not authorize any other party to make representation or promise on behalf of Landa, Inc., or to modify the terms, conditions, or limitations in any way.

LIMITATION OF OUR RESPONSIBILITY WITH REPAIR TO PRODUCTS PURCHASED

Our responsibility is to repair or replace defective parts only and does not include replacement of complete products as stated above. We will not be responsible for any other expenses, losses or inconvenience which you may sustain as a result of the purchase, use, malfunction or defective condition of our products. This warranty is in lieu of all other warranties, expressed or implied, and of any other obligations or liability on our part. Warranted parts must be returned to manufacturer for their inspection. After inspection, a credit will be issued, if warranted. We accept only prepaid shipments.

Attn: Warranty Service Department
Landa, Inc., 13705 N.E. Airport Way,
Portland, Oregon 97230-1048
Telephone: (503) 255-5980 Ext. 223