

# LANDA®

Kärcher Group

# HOT

# OPERATOR'S MANUAL

■ HOT 2-1100

■ HOT2-1500

■ HOT 4-2000

■ HOT 3-1100

■ HOT 3-300



89172080-1

For technical assistance or the Landa Dealer nearest you,  
consult our web page at [www.landa.com](http://www.landa.com)

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Model Number \_\_\_\_\_

Serial Number \_\_\_\_\_

Date of Purchase \_\_\_\_\_

The model and serial numbers will be found on a decal attached to the pressure washer. You should record both serial number and date of purchase and keep in a safe place for future reference.

# INTRODUCTION & IMPORTANT SAFETY INFORMATION

Thank you for purchasing this Pressure Washer. We reserve the right to make changes at any time without incurring any obligation.

## Owner/User Responsibility:

The owner and/or user must have an understanding of the manufacturer's operating instructions and warnings before using this pressure washer. Warning information should be emphasized and understood. If the operator is not fluent in English, the manufacturer's instructions and warnings shall be read to and discussed with the operator in the operator's native language by the purchaser/owner, making sure that the operator comprehends its contents.

Owner and/or user must study and maintain for future reference the manufacturers' instructions.

The operator must know how to stop the machine quickly and understand the operation of all controls. Never permit anyone to operate the engine without proper instructions.

## SAVE THESE INSTRUCTIONS

This manual should be considered a permanent part of the machine and should remain with it if machine is resold.

When ordering parts, please specify model and serial number. Use only identical replacement parts.

This machine is to be used only by trained operators.

## IMPORTANT SAFETY INFORMATION

**! WARNING**



**READ OPERATOR'S MANUAL THOROUGHLY PRIOR TO USE.**

**WARNING: To reduce the risk of injury, read operating instructions carefully before using.**

1. Read the owner's manual thoroughly. Failure to follow instructions could cause malfunction of the machine and result in death, serious bodily injury and/or property damage.
2. Know how to stop the machine and bleed pressure quickly. Be thoroughly familiar with the controls.
3. Stay alert — watch what you are doing.
4. All installations must comply with local codes. Contact your electrician, plumber, utility company or the selling distributor for specific details. If your machine is rated 250 volts or less, single phase will be provided with a ground fault circuit interrupter (GFCI). If rated more than 250 volts, or more than single phase this product should only be connected to a power supply receptacle protected by a GFCI.

**DANGER: Improper connection of the equipment-grounding conductor can result in a risk of electrocution. Check with a qualified electrician or service personnel if you are in doubt as to whether the outlet is properly grounded. Do not modify the plug provided with the product - if it will not fit the outlet, have a proper outlet installed by a qualified electrician. Do not use any type of adaptor with this product**

**! WARNING**



**KEEP WATER SPRAY AWAY FROM ELECTRICAL WIRING.**

**WARNING: Keep wand, hose, and water spray away from electric wiring or fatal electric shock may result.**

5. To protect the operator from electrical shock, the machine must be electrically grounded. It is the responsibility of the owner to connect this machine

to a UL grounded receptacle of proper voltage and amperage ratings. Do not spray water on or near electrical components. Do not touch machine with wet hands or while standing in water. Always disconnect power before servicing.

**! WARNING**




**RISK OF EXPLOSION: OPERATE ONLY WHERE OPEN FLAME OR TORCH IS PERMITTED.**

**WARNING: Flammable liquids can create fumes which can ignite, causing property damage or severe injury.**

**WARNING: Risk of explosion — Operate only where open flame or torch is permitted.**

6. In oil burning models, use only kerosene, No. 1 home heating fuel, or diesel. If diesel is used, add a soot remover to every tankful.

**! WARNING**



**RISK OF FIRE. DO NOT ADD FUEL WHEN OPERATING MACHINE.**

**WARNING: Risk of fire — Do not add fuel when the product is operating or still hot.**

**WARNING: Do not use gasoline crankcase draining or oil containing gasoline, solvents or alcohol. Doing so will result in fire and/or explosion.**

7. This pressure washer shall be installed only in locations where combustible dusts and flammable gases or vapors are not present. Do not store or use gasoline near this machine.
8. Do not allow acids, caustic or abrasive fluids to pass through the pump.
9. Never run pump dry or leave spray gun closed longer than 1-2 minutes.
10. Keep operating area clear of all persons.

# IMPORTANT SAFETY INFORMATION



**WARNING:** High pressure spray can cause paint chips or other particles to become airborne and fly at high speeds. To avoid personal injury, eye, hand and foot safety devices must be worn.

11. Eye, hand, and foot protection must be worn when using this equipment.



**WARNING:** High pressure developed by these machines will cause personal injury or equipment damage. Keep clear of nozzle. Use caution when operating. Do not direct discharge stream at people, or severe injury or death will result.



**WARNING:** This machine exceeds 85 db appropriate ear protection must be worn.



**WARNING:** Protect machine from freezing.

15. To keep machine in best operating conditions, it is important you protect machine from freezing. Failure to protect machine from freezing could cause malfunction of the machine and result in death,

serious bodily injury, and/or property damage. Follow storage instructions specified in this manual.



**WARNING:** Hot discharge fluid. Do not touch or direct discharge stream at persons.

**WARNING:** This machine produces hot water and must have insulated components attached to protect the operator.



**WARNING:** Risk of asphyxiation. Use this product only in a well ventilated area.

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



**WARNING:** Risk of injury. Hot surfaces can cause burns. Use only designated gripping areas of spray gun and wand. Do not place hands or feet on non-insulated areas of the pressure washer.

18. Manufacturer will not be liable for any changes made to our standard machines or any components not purchased from us.

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

12. To reduce the risk of injury, close supervision is necessary when a machine is used near children. Do not allow children to operate the pressure washer. This machine must be attended during operation.



**WARNING:** Grip cleaning wand securely with both hands before starting. Failure to do this could result in injury from a whipping wand.

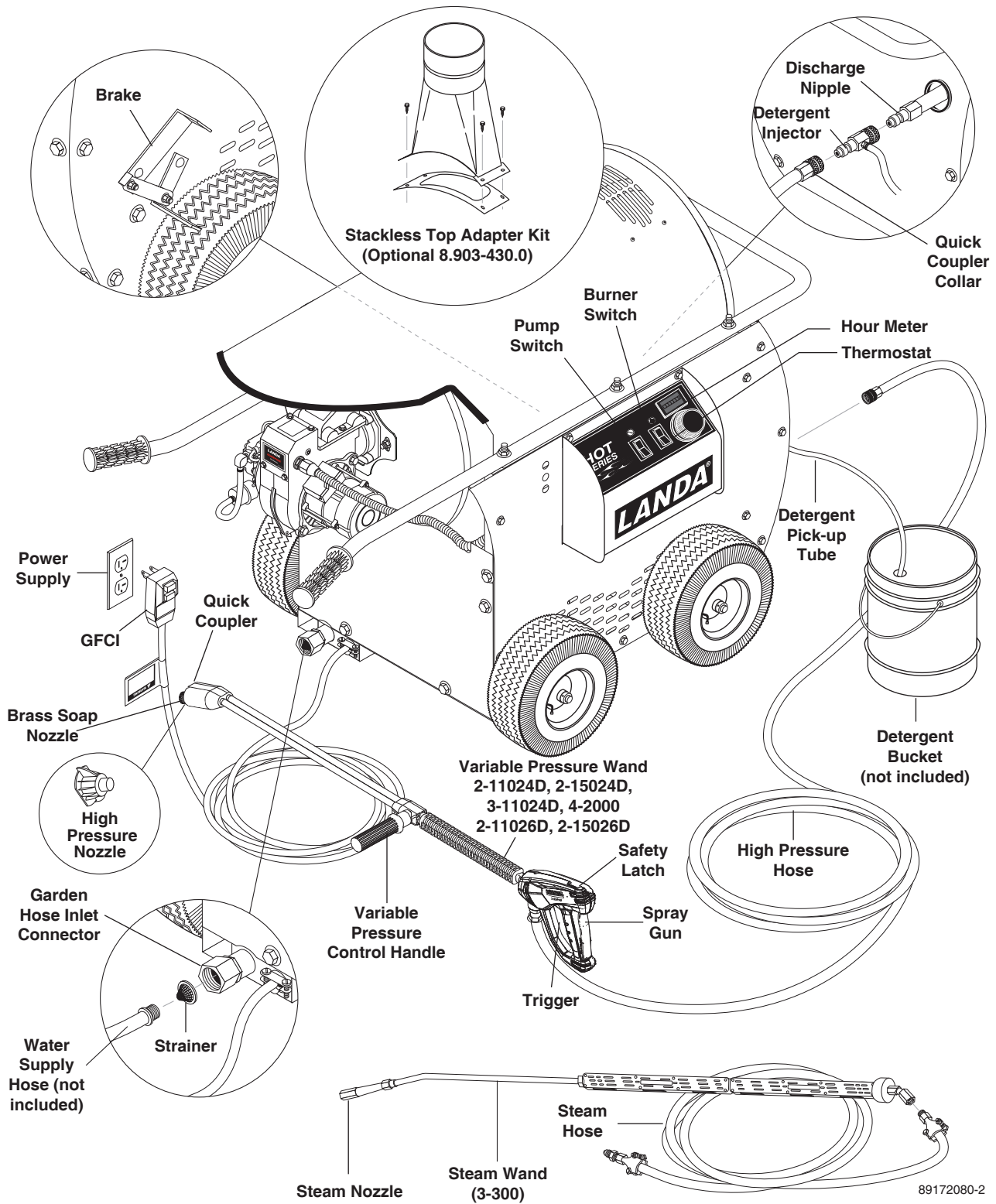
13. Never make adjustments on machine while in operation.
14. Be certain all quick coupler fittings are secured before using pressure washer.



**WARNING:** Be extremely careful when using a ladder, scaffolding or any other relatively unstable location. The cleaning area should have adequate slopes and drainage to reduce the possibility of a fall due to slippery surfaces.

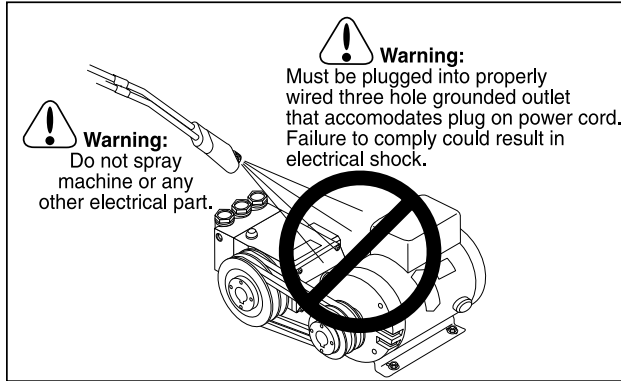
20. Do not overreach or stand on unstable support. Keep good footing and balance at all times.
21. Do not operate this machine when fatigued or under the influence of alcohol, prescription medications, or drugs.

# COMPONENT IDENTIFICATION



89172080-2

## IMPORTANT SAFETY INFORMATION



**Follow the maintenance instructions specified in the manual.**

## INSTALLATION

Place machine in a convenient location providing ample support, drainage and room for maintenance.

**These machines are designed for indoor use. They must be stored indoors when not in use.**

### Location:

The location should protect the machine from damaging environmental conditions, such as wind, rain, and freezing temperatures.

The machine should be run on a level surface where it is not readily influenced by outside sources such as strong winds, freezing temperatures, rain, etc. The machine should be located to allow accessibility for refilling of fuel, adjustments and maintenance. Normal precautions should be taken by the operator of the machine to prevent excess moisture from reaching the power unit or electrical controls.

It is recommended that a partition be made between the wash area and the machine to prevent direct water spray from coming in contact with the machine. Excess moisture reaching any electrical components or controls will reduce machine life and may cause electrical shorts.

During installation of the machine, beware of poorly ventilated locations or areas where exhaust fans may cause an insufficient supply of oxygen. Sufficient combustion can only be obtained when there is a sufficient supply of oxygen available for the amount of fuel being burned. If it is necessary to install a machine in a poorly ventilated area, outside fresh air may have to be piped to the burner and a fan installed bringing the air into the machine.

**WARNING: Avoid small areas or areas near exhaust fans.**

### Electrical

The machine, when installed, must be electrically grounded in accordance to local codes. Check for proper power supply using a volt meter. The HOT 2-1100, HOT 2-1500, and HOT 3-1100 each require a 120V-20 amp receptacle to comply to the UL 1776 Standard.

### Placement

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

### Water Source

Water source for machine 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 machine will run very rough and the burner will not fire.

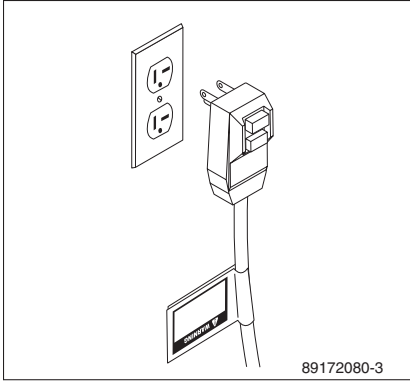
### Connection

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

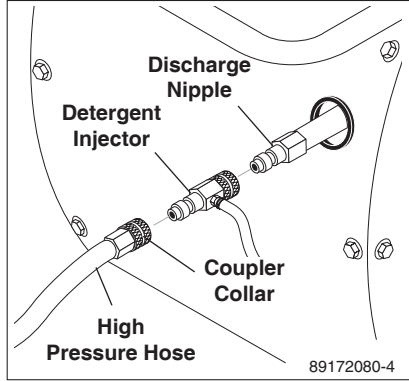
### Venting

Adding exhaust vent pipe to your oil fired burner is not recommended. The pipe restricts air flow which causes carbon buildup, which affects the operation, and increases maintenance on the coil. If a stack must be used, refrain from using 90° bends. If the pipe cannot go straight up then use only 45° bends and go to the next larger size pipe. The overall pipe length must not exceed 6 feet. The addition of a vent pipe will require an air adjustment and smoke test.

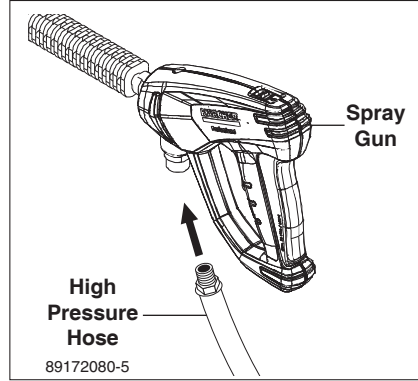
# ASSEMBLY INSTRUCTIONS



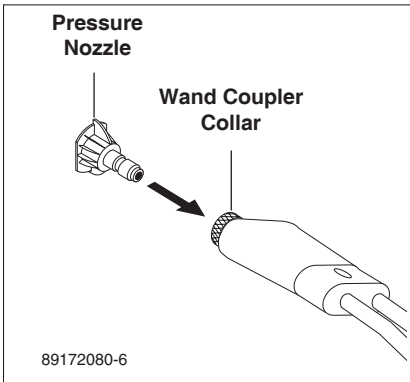
**STEP 1:** Connect the power cord into the proper electrical outlet, then push in the GFCI reset button. (Refer to serial plate for information.)



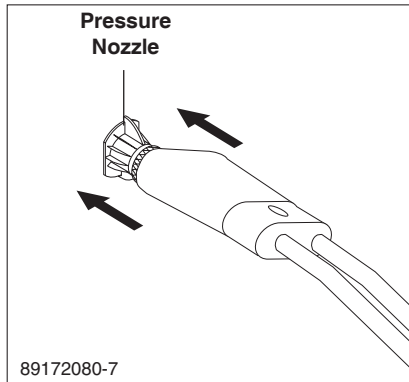
**STEP 2:** Connect high pressure hose to discharge nipple by sliding quick coupler collar back. (If detergent is to be applied, insert a detergent injector.) Insert quick coupler onto discharge nipple and secure by pushing quick coupler collar forward.



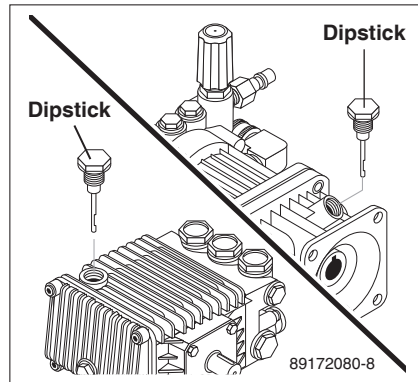
**STEP 3:** Attach the high pressure hose to the spray gun using teflon tape on hose threads. Move safety latch into locked position.



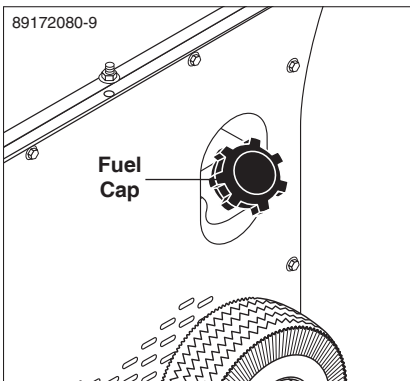
**STEP 4:** Pull the spring-loaded coupler collar of the wand coupler collar back to insert your choice of pressure nozzle. **Caution: Never replace nozzles without engaging the safety latch on the spray gun trigger.**



**STEP 5:** Release the coupler collar and push the nozzle until the collar clicks. Pull the nozzle to make sure it is seated properly.



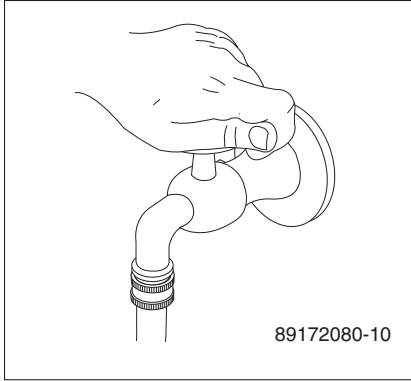
**STEP 6:** Check oil level by using supplied dip-stick. Use SAE 30W non-detergent only.



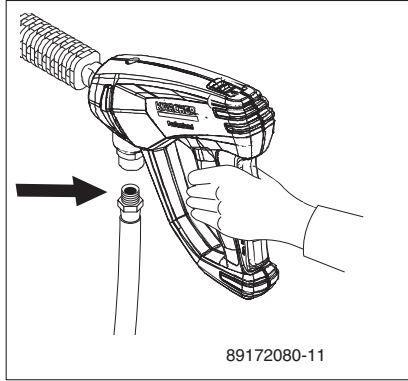
**STEP 7:** Fill fuel tank with proper fuel.



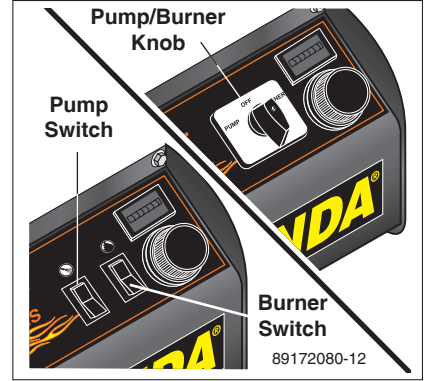
## OPERATION INSTRUCTIONS



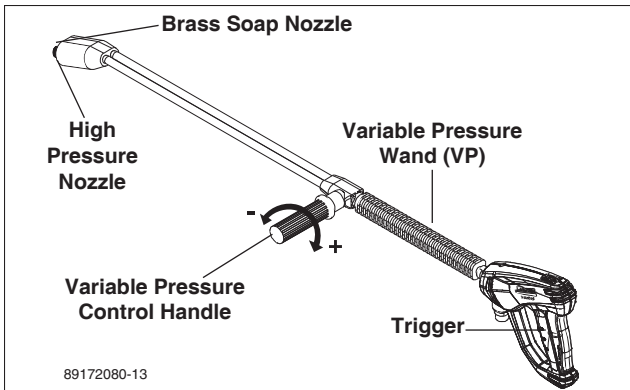
**STEP 1: STOP!** Read operator's manual before operating this machine. Failure to read operation and warning instructions may result in personal injury or property damage. Connect water supply hose to inlet connector and turn water on.



**STEP 2:** On machines with variable pressure wands, grip spray gun securely. Then turn the variable pressure control handle counterclockwise to reduce pressure.

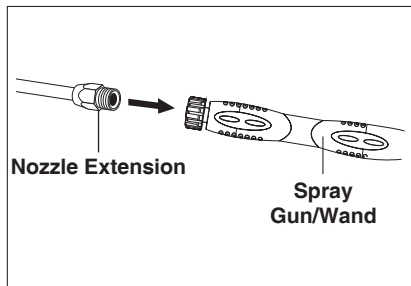


**STEP 3:** Before installing nozzle, turn on water supply and run machine, allowing water to flush through the system until clear. Turn pump switch ON or turn knob to pump position. When a steady stream of water flows from the spray gun and wand, the machine is ready for the nozzle to be installed. Turn the variable pressure control handle clockwise to raise the pressure. For hot water washing, turn the burner switch ON or turn knob to the burner position. (The burner will light automatically.)

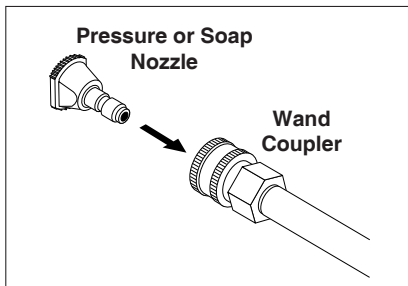


Selection of high or low pressure is accompanied by turning the handle. **Note:** High pressure nozzle must be inserted at end of wand to obtain high pressure. To apply soap, read detergent instructions.

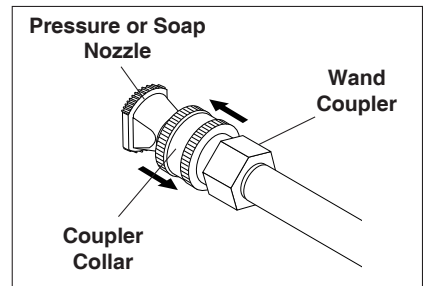
## INSULATED STRAIGHT WAND ASSEMBLY



Attach the high pressure hose to the spray gun using teflon tape on hose threads. Attach nozzle extension to spray gun/wand. Tighten both by hand.



Before installing nozzle, turn on water supply and run machine allowing water to flush through the system until clear.

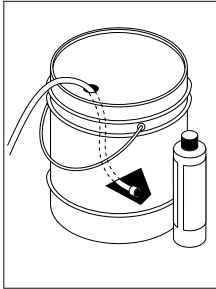


Pull spring-loaded collar of the wand coupler back to insert your choice of pressure nozzle or soap nozzle. Release the coupler collar and push the nozzle until the collar clicks. Pull the nozzle to make sure it is seated properly.

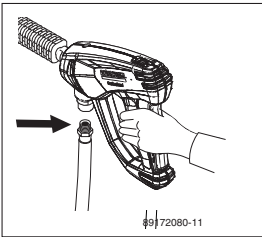
## DETERGENTS & GENERAL CLEANING TECHNIQUES



**WARNING:** Some detergents may be harmful if inhaled or ingested, causing severe nausea, fainting or poisoning. The harmful elements may cause property damage or severe injury.



**STEP 1:** Use detergent designed specifically for pressure washers. Household detergents could damage the pump. Prepare detergent solution as required by the manufacturer. Fill a container with pressure washer detergent. Place the filter end of detergent suction tube into the detergent container.



**STEP 2:** Apply safety latch to spray gun trigger. Secure black detergent nozzle into quick coupler. **NOTE:** Detergent cannot be applied using the Yellow nozzle.

**STEP 3:** With the motor running, pull trigger to operate

machine. Liquid detergent is drawn into the machine and mixed with water. Apply detergent to work area. Do not allow detergent to dry on surface.

**IMPORTANT:** You must flush the detergent injection system after each use by placing the suction tube into a bucket of clean water, then run the pressure washer in low pressure for 1-2 minutes.

### THERMAL PUMP PROTECTION

If you run your pressure washer for 3-5 minutes without pressing the trigger on the spray gun, circulating water in the pump can reach high temperatures. When the water reaches this temperature, the pump protector engages and cools the pump by discharging the warm water onto the ground. This thermal device prevents internal damage to the pump.

### CLEANING TIPS

Pre-rinse cleaning surface with fresh water. Place detergent suction tube directly into cleaning solution and apply to surface at low pressure (for best results, limit your work area to sections approximately 6 feet square and always apply detergent from bottom to top). Allow detergent to remain on surface 1-3 minutes. Do not allow detergent to dry on surface. If surface appears to be drying, simply wet down surface with fresh water. If needed, use brush to remove stubborn dirt. Rinse at high pressure from

top to bottom in an even sweeping motion keeping the spray nozzle approximately 1 foot from cleaning surface. Use overlapping strokes as you clean and rinse any surface. For best surface cleaning action, spray at a slight angle.

### Recommendations:

- Before cleaning any surface, an inconspicuous area should be cleaned to test spray pattern and distance for maximum cleaning results.
- If painted surfaces are peeling or chipping, use extreme caution as pressure washer may remove the loose paint from the surface.
- Keep the spray nozzle a safe distance from the surface you plan to clean. High pressure wash a small area, then check the surface for damage. If no damage is found, continue to pressure washing.

### CAUTION - Never use:

- Bleach, chlorine products and other corrosive chemicals
- Liquids containing solvents (i.e., paint thinner, gasoline, oils)
- Tri-sodium phosphate products
- Ammonia products
- Acid-based products

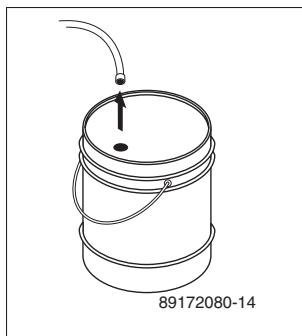
These chemicals will harm the machine and will damage the surface being cleaned.

### RINSING

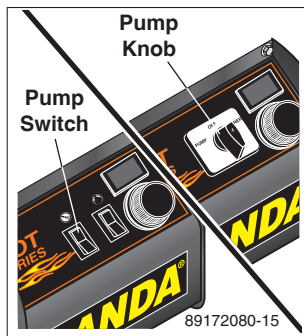
It will take a few seconds for the detergent to clear. Apply safety latch to spray gun. Remove black soap nozzle from the quick coupler. Select and install the desired high pressure nozzle.

**NOTE:** You can also stop detergent from flowing by simply removing detergent siphon tube from bottle.

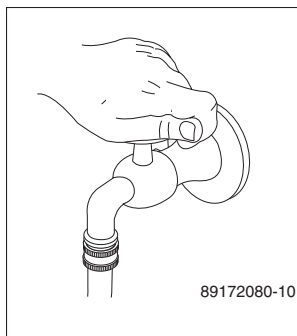
## SHUTTING DOWN AND CLEAN-UP



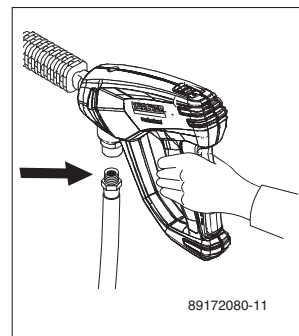
**STEP 1:** Remove detergent suction tube from container and insert into one (1) gallon of fresh water. Pull trigger on spray gun and siphon water for one minute.



**STEP 2:** Turn pump switch ON or turn knob to pump position then open spray gun to allow water to cool.



**STEP 3:** After water has cooled to less than 100°, turn switch or knob to OFF and turn off water.



**STEP 4:** Squeeze trigger on spray gun to relieve remaining pressure. Move shut-off gun safety latch into its locked position.

## STORAGE

**CAUTION:** Always store your pressure washer in a location where the temperature will not fall below 32°F (0°C). The pump in this machine is susceptible to permanent damage if frozen. **FREEZE DAMAGE IS NOT COVERED BY WARRANTY.**

1. Stop the pressure washer, squeeze spray gun trigger to release pressure.
2. Detach water supply hose and high pressure hose.
3. Turn on the machine for a few seconds, until remaining water exits. Turn engine off immediately.
4. Drain the gas and oil from the engine.
5. Do not allow high pressure hose to become kinked.
6. Store the machine and accessories in a room which does not reach freezing temperatures.

**CAUTION:** Failure to follow the above directions will result in damage to your pressure washer.

When the pressure washer is not being operated or is being stored for more than one month, follow these instructions:

1. Replenish engine oil to upper level.
2. Drain gasoline from fuel tank, fuel line, fuel valve and carburetor.
3. Pour about one teaspoon of engine oil through the spark plug hole, pull the starter grip several times and replace the plug. Then pull the starter grip slowly

until you feel increased pressure which indicates the piston is on its compression stroke and leave it in that position. This closes both the intake and exhaust valves to prevent rusting of cylinder.

4. Cover the pressure washer and store in a clean, dry place that is well ventilated away from open flame or sparks. **NOTE:** The use of a fuel additive, such as STA-BIL®, or an equivalent, will minimize the formulation of fuel deposits during shortage. Such additives may be added to the gasoline in the fuel tank of the engine, or to the gasoline in a storage container.

### After Extended Storage

**CAUTION:** Prior to restarting, thaw out any possible ice from pressure washer hoses, spray gun or wand.



### Engine Maintenance

During the winter months, rare atmospheric conditions may develop which will cause an icing condition in the carburetor. If this develops, the engine may run rough, lose power and may stall. This temporary condition can be overcome by deflecting some of the Hot air from the engine over the carburetor area.

**NOTE:** Refer to the engine manufacturer's manual for service and maintenance of the engine.

## MAINTENANCE & SERVICE

### PREVENTATIVE MAINTENANCE

1. Check to see that water pump is properly lubricated.
2. Follow Winterizing Procedures to prevent freeze damage to pump and coils.
3. Always neutralize and flush detergent 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. Use clean fuel-kerosene, No. 1 fuel oil, or diesel. Replace fuel filter every 100 hours of operation. Avoid water contaminated fuel as it will seize up the fuel pump. Desoot coils monthly or use an additive if diesel is being used.
9. If machine is operated with smoky or eye burning exhaust, coils will soot up, not letting water reach maximum operating temperature (see Burner Adjustments).
10. Never allow water to be sprayed on or near the motor, the burner assembly or any electrical component.
11. Periodically delime coils per instructions.
12. Check to see that the motor is properly lubricated.

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

#### Unloader Valves

Unloader valves trap pressure in the line when a spray gun is closed. Unloader valves are preset and tested at the factory before shipping. Tampering with the factory setting may cause personal injury and/or property damage, and will void the manufacturer's warranty.

#### 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. Store the machine in a heated room. If this is not possible then mix a 50/50 solution of antifreeze and water into a 5 gallon bucket. Place a short section of garden hose into the bucket and connect it to the machine. Elevate the bucket and turn the pump on to siphon the antifreeze through the machine. If compressed air is available, screw an air fitting into the inlet connector. By injecting compressed air, all water will be blown out of the system.

#### High Limit Hot Water Thermostat

For safety, each machine 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.

#### 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. 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 detergents. In areas where alkaline water is an extreme problem, periodic use of Landa Deliming Powder (Landa Part #9-028008) 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 or optional float tank is recommended.

**Step 1** Fill a container or float tank with 4 gallons of water, then add 1 lb. of deliming powder. Mix thoroughly.

**Step 2** Remove wand assembly from spray gun and put spray gun into container or optional float tank. Secure trigger on spray gun into the open position.

## MAINTENANCE & SERVICE

**Step 3** Attach a short section (3-5 ft.) of garden hose to machine to siphon solution from an elevated container. Turn machine 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 high pressure nozzle into wand.

### Rupture Disk

If pressure from pump or thermal expansion should exceed safe limits, the rupture disk will burst, allowing high pressure to be discharged through hose to ground. When the disk ruptures it will need to be replaced. Torque the replacement rupture disk to 35 foot pounds.

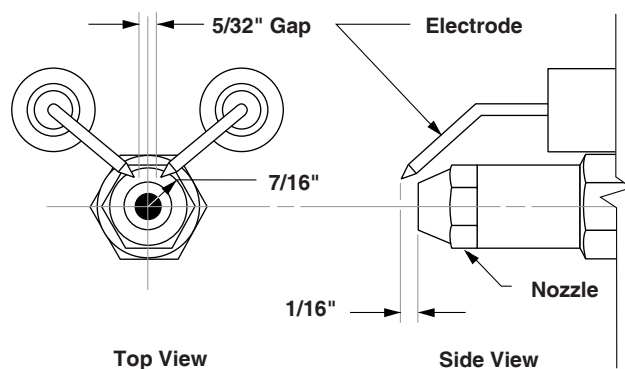
### Fuel

Use clean fuel oil that is not contaminated with water and debris. Replace fuel filter and drain tank every 100 hours of operation. Use No. 1 or No. 2 Heating Oil (ASTM D306) only. **NEVER** use gasoline in your burner tank. Gasoline is more combustible than fuel oil and could result in a serious explosion. **NEVER** use crankcase or waste oil in your burner. Fuel unit malfunction could result from contamination.

Biodiesel fuels are becoming more popular as alternative fuels under the Green Initiative. Landa endorses the use of fuels that are blended with biodiesels meeting ASTM D6751 and petroleum fuels meeting ASTM D396. Landa offers no opinion regarding the combustion characteristics of B5 blends. B5 biodiesel fuels are 5% ASTM D6751 biodiesel and 95% ASTM D396 fuel oil blend.

### Electrode Setting

(See illustration below.)

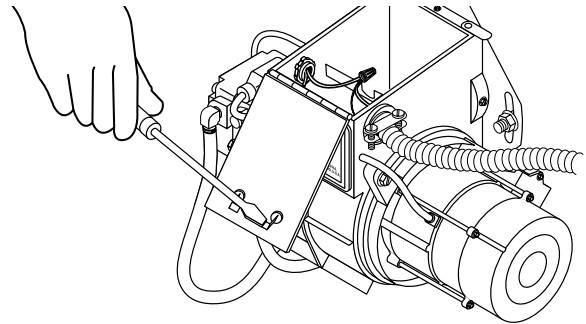


### Ignition Circuit

Periodically inspect wires, spring contact and electrodes for condition, security and proper spacing. Transformer test: **(CAUTION 10,000 VOLTS)** use defect free insulated screwdriver and keep fingers

off blade! Lay blade across one contact: OK if arc will span 1/2" between end of blade and other contact (see illustration below).

### Transformer Check



### Burner Nozzle

Keep the tip free of surface deposits by wiping it with a clean, solvent-saturated cloth, being careful not to plug or enlarge the nozzle. For maximum efficiency, replace the nozzle each season.

### Fuel Control System

These machines utilize a fuel solenoid valve located on the fuel pump to control the flow of fuel to the combustion chamber. This solenoid, which is normally closed, is activated by the unloader's pressure switch. When an operator releases the trigger on the spray gun, the unloader goes into a by-pass mode, thus stopping electrical current to the fuel solenoid coil. With the solenoid closed, the fuel supply to the combustion chamber ceases. Periodic inspection to insure that the fuel solenoid valve functions properly is recommended. This can be done by operating the machine and checking to see that when the spray gun is in the OFF position the burner is not firing.

### Fuel Pressure Adjustment:

To adjust fuel pressure, turn the adjusting screw (located at the regulator port) clockwise to increase, counterclockwise to decrease. Do not exceed 200 psi.

**NOTE:** When changing fuel pump, a by-pass plug must be installed in return line port or fuel pump will not prime.

To adjust fuel pressure, First install a pressure gage into the port just after the pump fuel exit. Turn the adjusting screw (located at the regulator port) clockwise to increase, and counterclockwise to decrease. Do not exceed 200 psi or lower the pressure below 130 PSI, when checked at the post-pump pressure port.

The fuel pressure may need to be adjusted due to altitude. For every 500 ft altitude above sea level, the boiling point of water goes down 1 °F. At high altitude environments, this boiling point change may require the heat input to be lowered so the water input does not turn to steam earlier than at the factory settings

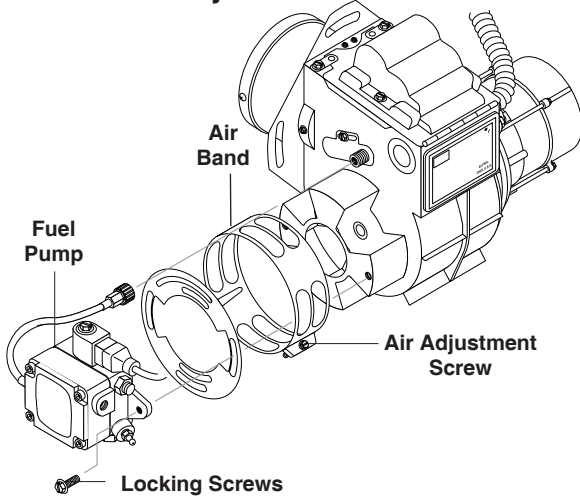
## MAINTENANCE & SERVICE

and activate the pressure sensors and pressure relief equipment when the unit is operated and much higher altitudes from factory settings or local dealer site settings. Check with your dealer before making local site fuel pressure adjustments.

Also, as ambient temperature changes seasonally, the fuel temperature in the feed tank and air temperature inlet can impact fuel flow. In more extreme temperatures, this local-site adjustment may also require different fuel nozzles for fuel inlet temperatures that are at seasonal extremes (higher or lower) in locations where the temperature changes are beyond moderate temperatures of between 40°F and 90°F. Colder temperatures will make for a thicker flow and less fine a fuel spray while hotter temperatures will make for a thinner flow a more fine spray with the same nozzle. Consider alternate nozzle configurations from the baseline factory-supplied nozzle for operating in such temperature extremes if performance is not meeting needs with air band and fuel pressure settings alone.

NOTE: When changing fuel pump, a by-pass plug must be installed in return line port or fuel pump will not prime.

### Burner Air Adjustment



The oil burner on this machine is preset for operation altitudes near 1700 feet. If operated at higher or lower altitudes, it may be necessary to adjust the air band setting. Adjust air band for a #1 or #2 smoke spot on the Bacharach scale. If a smoky or eye-burning exhaust is being emitted from the stack, two things should be checked. First, check the fuel to be certain that kerosene or No. 1 home heating fuel or No. 2 Diesel being used. Next, check the air adjustment on the burner. An oily, black, smoky fire indicates a lack of air and the air band should be moved to allow the air to flow through the burner. Sharp

eye-burning white fumes indicate too much air flowing through the combustion chamber. The air band should be moved to allow less air to flow through the burner.

To adjust, Loosen locking screw found on the air band. Start machine and turn burner ON and close air band until black smoke appears from burner exhaust vent. Note air band position. Next, slowly open the air band until white smoke just starts to appear and note air band position, again. Rotate the air band halfway between to the previously noted positions. Tighten locking screws. Typical distance from the 'black smoke' position is roughly 3/8"-1/2" more open from the point of visible black smoke, but may vary based upon local operating conditions.

- For higher altitudes, the air band opening may need to be increased; for lower altitude, the air band may need to be decreased.
- For higher humidity, the air band opening may need to be increased; for lower relative humidity, the air band may need to be decreased.
- For higher ambient temperatures the air band opening may need to be increased; for lower ambient temperatures, the air band opening may need to be decreased.

Adjust the burner to your operating location's environment as-needed for best smoke spot and performance compliant with local, state, and federal regulations.

Example: a unit preset at a factory at 1700 feet altitude with an air band of 1.1" and fuel pressure of 190 PSI with Ambient temperature of 72 °F and a relative humidity of 84% using #2 Diesel fuel oil. The unit is shipped to a location at 5300 feet altitude with ambient air temperature of 59 °F and a relative humidity of 25%. The air band required adjustment to 1.8" opening and fuel pressure lowered to 150 PSI for a high altitude adjustment for both heat input adjustments and combustion air intake with the same fuel type.

**To Adjust:** Start machine and turn burner ON. Loosen two locking screws found in the air shutter openings (refer to illustration) and close air shutter until black smoke appears from burner exhaust vent. Note air band position. Next, slowly open the air shutter until white smoke just starts to appear. Turn air shutter halfway back to the black smoke position previously noted. Tighten locking screws.

If the desired position cannot be obtained using only the air shutter, lock the air shutter in as close a position as can be obtained, then repeat the above procedure on the air band setting.

**Initial Air Adjustments:** Allow sufficient air to obtain a clean burning flame by loosening the lock screws and moving the air shutter and if necessary the bulk air band. Reduce the air supply until the flame tips appear slightly smoky, then increase the air just enough to cause the flame tips to appear absolutely clean.

### Removal of Soot and Heating Coil

In the heating process, fuel residue in the form of soot deposits may develop between the heating coil pipe and block air flow which will affect burner combustion. When soot has been detected on visual observation, the soot on the coil must be washed off. Follow these steps to remove the coil.

1. Disconnect hose from pump to inlet side of the coil.
2. Disconnect electrical connection to the thermostat.
3. Remove quick coupler from inlet and discharge side of coil.
4. Remove burner assembly from combustion chamber.
5. Remove the 3-3/8" bolts from each side of coil and tank assembly (these bolts are used to fasten tank and handles to chassis).
6. Disconnect 1/2" pipe nipples from inlet and discharge side of coil.
7. Remove top tank wrap exposing insulation and coil and fold back insulation.
8. Remove bolts that hold down coil to bottom wrap.
9. Remove coil.
10. Replace or repair any insulation found to be torn or broken.

### Coil Reinstallation

Reinstall new or cleaned coil by reversing Steps 9 through 1 above.

## PREVENTATIVE MAINTENANCE

This pressure washer was produced with the best available materials and quality craftsmanship. However, you as the owner have certain responsibilities for the correct care of the equipment. Attention to regular preventative maintenance procedures will assist in preserving the performance of your equipment. Contact your LANDA dealer for maintenance. Regular preventative maintenance will add many hours to the life of your pressure washer. Perform maintenance more often under severe conditions.

| <b>MAINTENANCE SCHEDULE</b>             |         |  |
|---|---------|--|
| Pump Oil                                | Inspect | Daily inspect the oil level                            |
|   | Change  | After first 50 hours, then every 500 hours or annually |
| Clean Burner Filter                     |         | Annually   |
| Remove Burner Soot From Heating Coil    |         | Annually   |
| Check Belt Tension                      |         | Monthly  |
| Descale Coil                            |         | Annually - (more often if required)                    |
| Replace High Pressure Nozzle            |         | Every 6 months   |
| Replace Quick Connects                  |         | Annually   |
| Clean Water and Detergent Screen/Filter |         | Weekly   |
| Replace HP Hose                         |         | If there is any sign of wear                           |
| Grease Motor                            |         | Every 10,000 hours                                     |
| Check Burner Nozzles                    |         | Annually   |
| Unloader Valve                          |         | Annually   |

## OIL CHANGE RECORD

| Date Oil Changed<br>Month/Day/Year | Estimated Operating<br>Hours Since Last<br>Oil Change |
|------------------------------------|---|
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| Date Oil Changed<br>Month/Day/Year | Estimated Operating<br>Hours Since Last<br>Oil Change |
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## TROUBLESHOOTING

| PROBLEM   | POSSIBLE CAUSE  | SOLUTION   |
|---|---|--|
| <b>LOW OPERATING PRESSURE</b>                                 | 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.                         |
|   | Plumbing or hose leak                                       | Check plumbing system for leaks. Re-tape leaks with teflon tape.                       |
|   | Faulty or mis-adjusted 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.  |
| <b>LOW WATER TEMPERATURE</b>                                  | Soot buildup on coils not allowing heat transfer            | Clean coils.   |
|   | Lime deposits on inside of coil                             | Delime coil.   |
| <b>WATER TEMPERATURE TOO HOT</b>                              | Defective high limit switch                                 | Replace.   |
|   | Insufficient water supplied                                 | Check water G.P.M. to machine.   |
|   | Restricted water flow                                       | Check nozzle for proper size or obstruction.   |
| <b>DETERGENT NOT DRAWING</b>                                  | Air leak  | Tighten all clamps. Check detergent lines for holes.                                   |
|   | Valve in the injector head may be blocked, dirty or damaged | Clean or replace valve in injector.  |
|   | Filter screen on detergent suction hose plugged             | Clean or replace.  |
|   | Dried up detergent plugging metering valve                  | Disassemble and clean thoroughly.  |
|   | High viscosity of detergent                                 | Dilute detergent to specifications.  |
|   | Hole in detergent line(s)                                   | Repair hole.   |
|   | Low detergent level   | Add detergent, if needed.  |
|   | Variable pressure control handle set for high pressure      | Turn variable pressure control handle to allow water to flow out of brass soap nozzle. |
| <b>PUMP RUNNING NORMALLY BUT PRESSURE LOW ON INSTALLATION</b> | Pump sucking air  | Check water supply and possibility of air seepage.                                     |
|   | Valves sticking   | Check and clean or replace if necessary.   |
|   | Unloader valve seat faulty                                  | Check and replace if necessary.  |
|   | Nozzle incorrectly sized                                    | Check and replace if necessary (See serial plate for proper size).                     |
|   | Worn piston packing   | Check and replace if necessary.  |

## TROUBLESHOOTING

| PROBLEM                               | POSSIBLE CAUSE                                  | SOLUTION  |
|---------------------------------------|---|---|
| <b>FLUCTUATING PRESSURE</b>           | Valves worn                                     | Check and replace if necessary.   |
|                                       | Blockage in valve                               | Check and replace if necessary.   |
|                                       | Pump sucking air                                | Check water supply and air see page at joints in suction line.                              |
|                                       | Worn piston packing                             | Check and replace if necessary.   |
| <b>PUMP NOISY</b>                     | Air in suction line                             | Check water supply and connections on suction line.   |
|                                       | Broken or weak inlet or discharge valve springs | Check and clean if necessary.   |
|                                       | Excessive matter in valves                      | Check and clean if necessary.   |
|                                       | Worn bearings                                   | Check and clean if necessary.   |
| <b>PRESENCES OF WATER IN OIL</b>      | Oil seal worn                                   | Check and replace if necessary.   |
|                                       | High humidity in air                            | Check and change oil twice as often.  |
| <b>WATER DRIPPING FROM UNDER PUMP</b> | Piston packing worn                             | Check and replace if necessary.   |
|                                       | O-Ring plunger retainer worn                    | Check and replace if necessary.   |
|                                       | Pump protector                                  | Reduce inlet water pressure. Do not close trigger on spray gun for longer than 1-2 minutes. |
| <b>OIL DRIPPINGS</b>                  | Oil seal worn                                   | Check and replace if necessary.   |
| <b>MACHINE SMOKES</b>                 | Improper fuel or water in fuel                  | Drain tank and replace contaminated fuel.   |
|                                       | Improper air adjustment                         | Readjust air bands on burner assembly.  |
|                                       | Low fuel pressure                               | Adjust fuel pump pressure to specifications.  |
|                                       | Weak fuel pump                                  | Check fuel pump pressure. Replace pump if needed.   |
|                                       | Fuel filter partially clogged                   | Replace as needed.  |
|                                       | Soot build up on coils                          | Clean coils with soot remover.  |
|                                       | Lime build up in coils                          | Clean inside of coils using Landa's coil cleaner.   |
|                                       | Improper burner nozzle                          | See combustion assembly breakdown   |
| <b>WATER TEMPERATURE TOO HOT</b>      | Incoming water to machine warm or hot           | Lower incoming water temperature.   |
|                                       | Fuel pump pressure too high                     | Lower fuel pressure.  |
|                                       | Fuel pump defective                             | Replace fuel pump.  |
|                                       | Detergent line sucking air                      | Tighten all clamps. Check detergent line for holes.   |
|                                       | Defective high limit switch                     | Replace.  |
|                                       | Incorrect fuel nozzle size                      | See exploded view parts list for proper size.   |
|                                       | Insufficient water supplied                     | Check G.P.M. to machine.  |
|                                       | Restricted water flow                           | Check nozzle for obstruction, proper size.  |

## TROUBLESHOOTING

| PROBLEM   | POSSIBLE CAUSE  | SOLUTION   |
|---|---|--|
| <b>BURNER LIGHT WILL NOT LIGHT</b>                                      | Disconnected or short in electrical wiring  | All wire contacts should be clean and tight. No breaks in wire.  |
|   | Burner motor thermal protector tripped  | If tripped, check voltage, connections, and extensions for cause. Check fuel pump shaft rotation for binding causing motor to over-heat. |
|   | Flex-coupling slipping on fuel pump shaft or burner motor shaft                                 | Replace if needed.   |
|   | ON-OFF Switch defective   | Check continuity through burner switch.  |
|   | Heavy sooting on coil and burner, can cause interruption of air flow and shorting of electrodes | Clean as required.   |
|   | Improper electrode setting  | Clean and test according to diagram in Operators Manual.   |
|   | Fuel not reaching combustion chamber  | Check fuel pump for proper flow. Check solenoid flow switch on machines with spray gun control, for proper on-off fuel flow control.     |
|   | Clogged burner nozzle   | Replace.   |
|   | Water not turned on   | Turn on water to activate burner flow switch.  |
|   | Fuel solenoid malfunction   | Remove, test for continuity and replace as needed.   |
|   | Fuel solenoid malfunction   | Replace if needed.   |
| Pressure switch malfunction   | Test for proper operation. Replace if needed.   |  |
| <b>PUMP MOTOR STOPS AFTER A FEW MINUTES OF OPERATION OR STARTS SLOW</b> | Insufficient voltage  | Use heavier drop cord and check voltage at receptacle. Check name plate for amperage draw.   |
|   | Plugged nozzle  | Remove and clean nozzle. Turn on water pump, flush lines, and replace nozzle.  |
|   | Wrong spray nozzle  | See serial plate for minimum nozzle size.  |
|   | Automatic overload switch tripped   | Allow motor to cool - then push Red reset button.  |
|   | Motor wet   | Allow to dry.  |
|   | Short in electrical wiring  | Wire contacts should be clean and tight. No breaks in wires.   |
|   | Coil liming up causing excessive pressure   | See section on Preventative Maintenance.   |
| Water pump low or out of oil causing the pump to bind up                | Fill to correct level.  |  |

**LANDA<sup>®</sup>**

Kärcher Group

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