

# ECOS 7000 Series

Hot Water - Gasoline Powered - Diesel/Oil Heated

# LANDA®

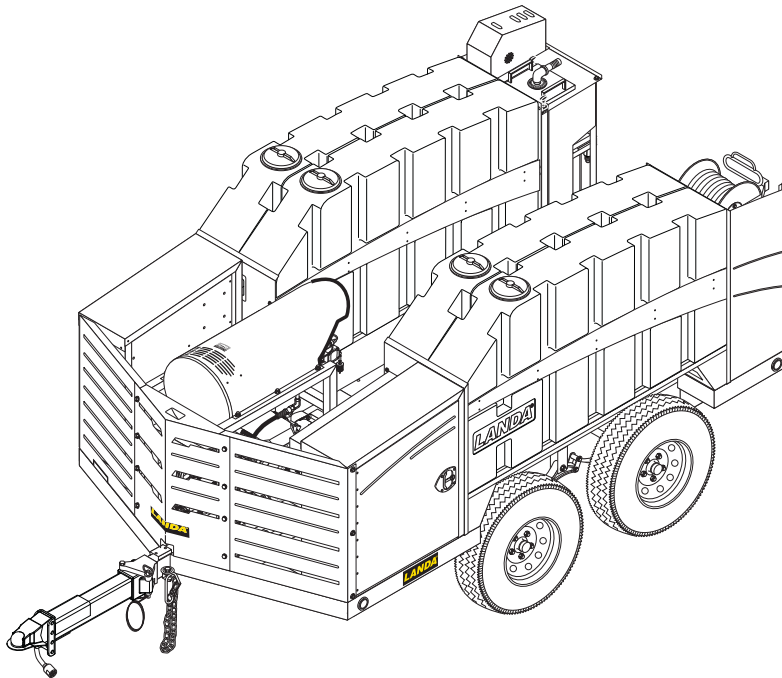
## Operator's Manual

## Pressure Washer Trailer

**MODELS:**            **ECOS-7000**  
                              **1.103-825.0**

**ECOS-7000**  
                              **1.103-838.0**

**ECOS-7000**  
                              **1.103-839.0**



U.S. DESIGN PATENT NO. 701,357 OR PAT. NO. D701,357  
U.S. UTILITY PATENT NO. 8,597,434 OR PAT. NO. 8,597,434

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



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9.801-316.0-F 12/13/19

## **Machine Data Label**

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Model:	_____
Date of Purchase:	_____
Serial Number:	_____
Dealer:	_____
Address:	_____
Phone Number:	_____
Sales Representative:	_____

### **Introduction**

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.

### **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.**

### **Notice**

This trailer is equipped to meet applicable U.S. Federal safety standards. Check local and state requirements regarding brakes and any additional equipment that may be required. Any modifications or additions including load equalizing hitches, without written factory consent: usage in an abnormal manner including overloading voids all manufacturers' warranties and liability.

***WARNING: This Owner's Manual contains safety information and instructions for your trailer.***

***You must read this manual before loading or towing your trailer.***

***You must follow all safety precautions and instructions.***

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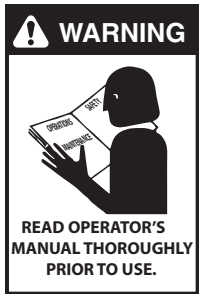
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## Important Safety Information



**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.



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

4. Follow engine fuel recommendation in the engine manual provided.



**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.

5. Use only kerosene, No. 1 home heating fuel, or diesel for the hot water burner. If diesel is used, add a soot remover to every tankful.

**WARNING:** Gasoline is highly flammable and explosive. You can be seriously injured when refueling.

- Stop engine and keep heat sparks and flame away.
- Refuel only outdoors.
- Wipe up spills immediately.



**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.

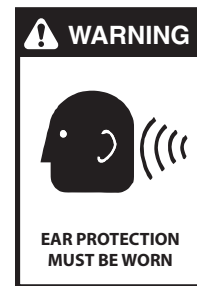
6. Operate only in locations where combustible dusts and flammable gases or vapors are not present. Do not store or use gasoline near this machine.
7. Do not allow acids, caustic or abrasive fluids to pass through the pump.
8. Never run pump dry or leave spray gun closed longer than 1-2 minutes.
9. Keep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



**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.

10. Always wear properly rated eye protection such as safety goggles or face shield while spraying.

(Safety glasses do not provide full protection)



**WARNING:** This machine exceeds 85 dB. Appropriate ear protection must be worn.



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

Use only designated insulated gripping areas of the lance and spray gun.



**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.

- 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.

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



**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 animals, or severe injury or death will result.



**WARNING:** Protect machine from freezing.

- 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.

- Inlet water must be clean fresh water and no hotter than 90°F.



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

- Running this product indoors can result in death due to carbon monoxide, a poison gas you cannot see or smell. Never operate indoors, even if windows and doors are open. Only use outdoor and far away from windows, doors, and openings or vents.
- Manufacturer will not be liable for any changes made to our standard machines or any components not purchased from us.



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

**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.

- Do not overreach or stand on unstable support. Keep good footing and balance at all times.



- Do not operate this machine when fatigued or under the influence of alcohol, prescription medications, or drugs.

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

## Safety

### Batteries

Charge batteries in an open, well-ventilated area, away from sparks. Unplug battery charger before connecting or disconnecting from battery. Wear protective clothing and use insulated tools.

### Type of Fuel

Use only clean, fresh, unleaded regular grade gasoline to run engine.

**CAUTION: DO NOT MIX OIL WITH GASOLINE. USE ONLY NO. 1 OR NO. 2 HEATING OIL (ASTM D306) FOR BURNER.**

### Type and Quality of Oil

Engine oils with API Service Classifications: SF, SG, SH or SJ are recommended.

*NOTE: Using multi-grade oils (5W-20, 10W-30 and 10W-40) will increase oil consumption. Check oil level more frequently when using them.*

### Handling Waste Products and Chemicals

Waste products, such as, used oil, fuel, coolant, brake fluid, batteries, can harm the environment and people.

Do not use beverage containers for waste fluids someone may drink from them.

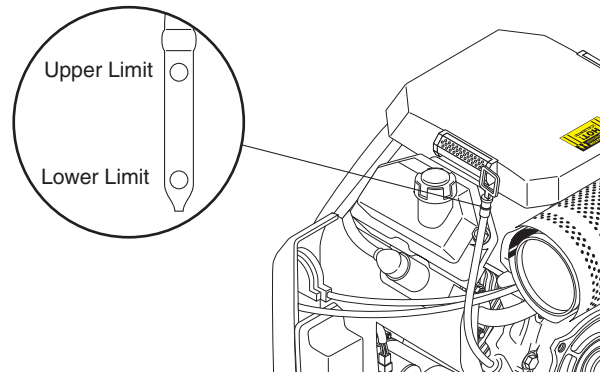
### Using a Spark Arrestor

The engine in this machine is not equipped with a spark arrestor muffler. It is a violation of California Public Resource Code Section 4442 to use or operate this engine on or near any forest-covered, brush-covered or grass-covered land unless the exhaust system is equipped with a spark arrestor meeting applicable local or state laws. Other states or federal areas may have similar laws.

A spark arrestor for your machine maybe available from your authorized dealer. An installed spark arrestor must be maintained and in good working order.

### Pre-operation Check

- Pump oil (SAE 10W-40 non-foaming oil)
- Cold clean fresh water supply (6 GPM • 3/4" (15.875 mm) • 20 PSI).
- Hose, nozzle
- Fuel (unleaded 86 or higher octane)
- Check engine oil (oil level full)

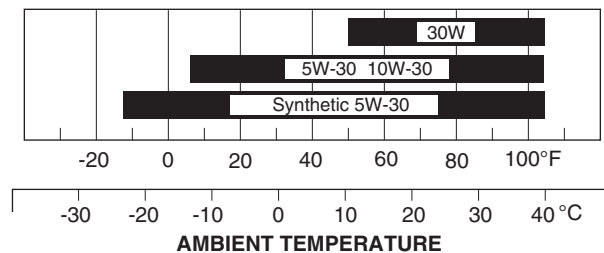


### Engine Oil

Oil is a major factor affecting performance and service life. Use 4-stroke automotive detergent oil.

### Recommended Oil

Use 4-stroke motor oil that meets or exceeds the requirements for API service category SJ or later (or equivalent). Always check the API service on the oil container to be sure it includes the letters SJ or later (or equivalent).



SAE 10W-30 or 5W-30 is recommended for general use. Use a full synthetic 5W-30 for starting/operating temperatures 5°F (-15°C) and -13°F (-25°C). Other viscosities shown in the chart may be used when average temperature in your area is within indicated range.

## Setup Procedures

These machines are meant to be used at or near the working area and under operator supervision. If machine must be located out of sight of the operator, special controls may be required for proper machine operation and operator safety.

Always locate the trailer in the driest and safest place possible. Avoid high traffic areas and use flashers and safety cones. Position the trailer so that the hose can be pulled directly off of the reel for use.

Avoid areas where water can be sprayed at machine.

Locate the equipment on a solid level area with slopes for drainage. When operating upon unlevel ground, position trailer with hitch end at the downhill side.

***WARNING: Do not unhitch or operate trailer unhitched on unlevel ground.***

Before using the trailer, make sure there are no impurities in the incoming water supply. Turn the water source on for at least 15 seconds, to remove any possible debris in the water before connecting hose to water supply.

The inlet screen located inside the filter should be cleaned before each use. Filter is located behind valve panel and can be accessed from underneath or by removing small access panel in control cabinet. To clean the inlet screen, unscrew cap beneath the filter, remove the screen and rinse thoroughly with water. Then replace screen.

## ***Important Trailer Safety Information***

### **Referencing The Utility Trailer In This Manual**

All references to the trailer or component parts to either left or right are made with the assumption that you are standing behind the trailer facing forward. Your left hand or right hand is the equivalent on the trailer.

### **Tire Safety**

The most common cause of trailer tire failure is under-inflation. Therefore, it is important that you always maintain the specified air pressure as indicated by the tire manufacturer on the tire's side-walls. This information can also be found on the tire label or the air pressure molded on the tire side-wall.

The most important things you can do to maintaining proper tire pressure are observe all tire and trailer maximum carrying capacities, avoid road hazards, and inspect the tires for cuts, slashes and other irregularities. These practices, along with other care and maintenance, can improve handling, help protect you and others from avoidable breakdowns and accidents, improve fuel economy, and increase the life of your tires.

Make tire safety a regular part of your trailer maintenance routine. The time you spend is minimal compared to the amount of time, inconvenience, and potential safety hazards that can occur from a flat tire or failure.

### **Basic Tire Maintenance**

Properly maintained tires improve the load-carrying capability of your trailer. You can help avoid flat tires and tire failures by maintaining proper tire pressure, observing tire and trailer capacity limits, avoiding road hazards, and inspecting your tires regularly.

### **Identifying Your Recommended Tire Pressure And Maximum Load Carrying Capacity For Your Trailer**

Both the tire placard and the VIN label are permanently attached on top of the frame of your trailer and have the required information printed on them. They also list the maximum load that can be placed on the trailer without exceeding the load limits of the tires or the trailers other components. These labels indicate the manufacturer's information including:

- Recommended tire size.
- Recommended tire inflation pressure.
- The maximum weight the trailer is designed to carry.
- Gross vehicle weight rating of the trailer.
- Gross axle weight rating of the trailer.

### **Understanding Tire Pressure and Load Limits**

Tire inflation pressure is the level of air in the tire that provides it with the load-carrying capacity and affects the overall performance of the trailer. The tire inflation pressure is a number that indicates the amount of air pressure that is inside the tire. It is measured in pounds per square inch (PSI). The tire must be inflated to the air pressure as designated on the labels. Also listed on the labels is the air pressure in kilo Pascals (kPa), which is a metric measurement. Tire manufacturers determine the air pressure to maximize the amount of weight the tires can safely carry. The proper tire pressure for your trailer tires is referred to as the "recommended cold inflation pressure." It is difficult to obtain the recommended tire pressure if your tires are not cold when the reading is taken because the air will expand when it is warmed by towing down the road, thus increasing the air pressure inside. If air is added to a tire that is low the air pressure should never exceed the recommended pressure.

It is important to check your trailer's tire pressure at least once a month for the following reasons:

Most tires will naturally lose air over time.

Tires can lose air suddenly if driven over an object that punctures or cuts the tire. Sometimes a sharp blow from a pothole or curb can knock the tire loose from the rim causing immediate deflation.

### **Maintaining Proper Tire Pressure**

Locate the recommended tire pressure on the trailer's tire information placard or owner's manual.

Record the tire pressure of all tires. If the tire pressure is too high in any of the tires, slowly release air by gently pressing on the tire valve stem with the edge of your tire gauge until you get the correct pressure.

If the tire pressure is too low, note the difference between the measured tire pressure and the correct tire pressure. These "missing" pounds of pressure are what you will need to add.



## **Important Trailer Safety Information**

Add the missing pounds of air pressure to each tire that is under inflated.

Check all tires to make sure they have the same air pressure.

If you have been towing your trailer and think that a tire is under inflated, fill it to the recommended cold inflation pressure indicated on your trailer's tire label placard or the VIN label. You can also check the sidewall of the tire for a correct tire inflation pressure. Your tire will have a slightly lower air pressure because the tire is warm when you are inflating it, but it will be much better than to continue to tow it with the under inflation it may have had. Once the trailer has been parked long enough to allow the tires to cool down, recheck the tire pressure and add additional air to return the tire pressure to the recommended level.

### **Tire Size**

To maintain the trailer's carrying capacity and safety, purchase only the same size tires as what were originally supplied on the trailer.

### **Safety Tips**

Slow down if you have to go over a pothole or other object in road.

Do not run over curbs and try not to strike the curb when parking.

For a free brochure visit:

[www.nhtsa.dot.gov](http://www.nhtsa.dot.gov)

***IMPORTANT: Before towing this trailer be sure to read the instructions and warnings supplied in this manual. Also read the information supplied with your tow vehicle so you know and understand it's limitations.***

### **Never Tow the Trailer Before Checking:**

- Coupler and latch assembly show no signs of wear or damage.
- Coupler hitch and hitch ball are of the same size.
- Coupler and safety chains are safely secured to the hitch.
- Check all fasteners for proper tightness.
- Load is securely tied down to the trailer.
- Wheel lug nuts are properly tightened to the right torque.
- Wheel bearings are properly adjusted and maintained.

- Load is within the maximum load carrying capacity of trailer.
- Tires are properly inflated and are road worthy.
- All trailer lighting is working properly.
- Tire pressure and tire condition
- Wheel lugs\*
- Bearing lube and tightness
- Hitch
- Safety chains
- 12V running lights
- Distribution and security
- Caster up in travel position

\* Check lug nuts for tightness before initial trip, at 10 miles, 25 miles and 50 miles. Recheck every 3 months or 3000 miles.

*NOTE: Checking all of the above steps before every trip is key for safety.*

***IMPORTANT: The load must be distributed equally on the bed of the trailer if possible. Heavy, concentrated loads may cause damage or possible failure of the trailer.***

***WARNING: Loads place on the trailer must be securely tied to the trailer. Always use appropriate tie downs designed to restrict loads from moving when properly attached. Failure to do so will allow shifting of the load causing potential trailer failure and/or loss of the load and personal injury.***

This trailer is equipped to meet all applicable federal safety standards in effect the day of manufacture. Check local and state requirements regarding any additional equipment that may be required.

The addition of optional equipment to your trailer may increase the total weight of your trailer package to where it now exceeds the maximum load carrying capacity of the trailer.

## Important Trailer Safety Information

### Tow Vehicles

**WARNING: Serious injury or property damage can result if the total weight of your loaded trailer exceeds the capacity of the hitch and/or your tow vehicle.**

It is very important that you know and understand the towing capabilities of your tow vehicle. This is especially true with the braking abilities of the tow vehicle. You should check with your authorized dealer to see what the capabilities are for the total towing load and the maximum allowable tongue weight for the vehicle you plan on using for towing.

It is also important that the lighting system in the tow vehicle has sufficient capacity support the additional load the trailer lighting will add to the system. A heavy duty flasher may be required to make your turn signals function properly.

### Trailer Ball & Couplers

**WARNING: Failure to properly engage the hitch ball in the coupler ball socket and securely lock the coupler latch mechanism can cause the trailer to become detached from the tow vehicle while traveling, which may cause serious injury or property damage.**

Ball diameter for which rating (GVWR) shall not exceed the gross trailer weight marked on the trailer coupler. The hitch balls have the rated load they are capable of towing stamped into the top of the ball. Make sure the ball that you use to tow your trailer has the same capacity rating as the coupler. Do not use a different size ball than the size the coupler is designed to use.

Class	Coupler	Ball Diameter
II	3,500# GVWR	2"
III	5,000# GVWR	2"
IV	8,000# GVWR	2 5/16"

### Before Towing

Check mounting bracket hardware for wear and proper tightness. Replace bent, broken, or worn hardware. Tighten hardware to 75-94 ft. lbs. Use only the hardware provided with the Trailer. If replacement hardware is needed, order replacement kit 8.924-356.0.

Make sure that the trailer safety chains are properly connected to the towing vehicle and trailer according to SAE J684. See Safety Chain information in your manual.

Make sure that all trailer lighting is hooked up and working properly.

**Warning: Failure to follow all installation instructions could result in coupler failure.**

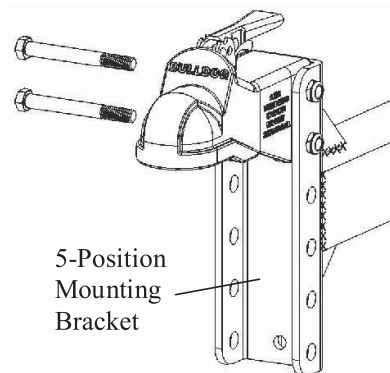
### Variable Height Bracket

Coupler operation must not be impaired in any way. Do not use if coupler operation is impaired.

### Bolting Instructions

Align holes in coupler and mounting bracket.

*NOTE: Coupler must be secured to mounting bracket using two sets of holes in the mounting bracket. Insert two (2) 5/8"x4.5", grade 5 bolts through desired mounting bracket holes and coupler. For each bolt, Place one (1) washer at the bolt head side and another at the bolt thread side before assembling the nuts. Tighten lock nuts to 90-96 ft. lbs. After installation, ensure coupler operation is not impaired in any way. Do not use if coupler operation is impaired. The hardware provided with the trailer has a self-lubricating coating which is taken into account for the tightening torque above, and is lower than standard hardware and also is more consistent with re-torque specifications to first-torque than standard hardware. Order replacements with the 8.924-356.0 replacement kit, or consult your hardware vendor for applicable, higher, torques for the application.*



### Maintenance

Keep ball pocket and mechanism clean. The following procedures should be performed at least annually:

- Check set screw torque Grease ball pocket
- Oil pivot points with SAE 30 wt. motor oil
- Inspect retaining pin and replace if necessary

### Operation

To Couple

1. Block trailer wheels.
2. Align hitch ball beneath coupler.
3. Open coupler locking lever. While holding locking lever open, lower the coupler over the hitch ball until ball is fully seated into the ball pocket.
4. If locking lever is pinned open, remove pin. Move locking lever to the closed position. Check that the latch is engaged by lifting up on back of locking lever. Also, check that the hitch ball is fully seated and ball clamp is below the ball. If the ball is not seated with lever in the closed position and latch engaged, DO NOT TOW.

Repeat the above steps.

5. OPTIONAL: Place a 5/16" pin or lock in hole shown

To Uncouple:

1. Block trailer wheels.
2. Open locking lever. While holding locking lever fully open, raise trailer off of hitch ball.

*NOTE: A 5/16" diameter pin can be used to hold the locking lever open.*

### Hitch Coupler Troubleshooting

If the coupler becomes damaged it must be repaired or replaced before towing. When the coupler is placed on the ball, the latch should close firmly. Keep the latch mechanism lightly oiled and clean. Items to check for are as follows:

1. Latch does not grasp ball securely:
  - Check the ball size. Make sure the ball and coupler are the same size.
2. Latch does not snap into full latch position:
  - Check adjustment. Latch mechanism may be too tight.

- Check to see that the coupler housing has not been damaged, keeping the ball hitch from fitting completely into the housing as designed.
3. Keep the tongue blocked up when not in use so the coupler and mechanism are not in the ground being exposed to dirt and moisture.
  4. Apply a small amount of an automotive grease to the ball before hitching coupler to prevent wear of the two parts during towing.
  5. Make sure the latch safety pin is in position before towing.

### Coupler & Ball Engagement

If the coupler and towing ball resist attempts to make engagement, do not force latch assembly. Instead, check the ball diameter to verify that it conforms to Society of Automotive Engineers (SAE) specifications. Standard two-inch diameter ball should be within the limits of 2.000-inches to 1.970-inches. Balls larger than 2.000- inches will not readily fit the coupler. A two-piece coupler ball is not recommended.

If the coupler becomes damaged it must be repaired or replaced before towing. When the coupler is placed on the ball, the latch should close firmly. Keep the latch mechanism lightly oiled and clean.

Improper engagement of the coupler and ball can cause damage if the vehicles separate in transit, thus, caution must be exercised to insure a secure hook-up. Lower the coupler onto the ball with the coupler latch in the vertical position. Continue to lower the trailer tongue until the jack clears the ground, then flip the coupler latch to its locked (horizontal) position. At this point visually observe that the ball is fully engaged in the ball hitch. An even better check to make sure the two are fully engaged is to raise the tongue of the trailer again using the jack. Raise until the ball hitch connection starts to raise the rear of the tow vehicle. If the connection was not properly made, the ball and socket will separate as the tongue of the trailer is raised.

## Important Trailer Safety Information

### Safety Chains

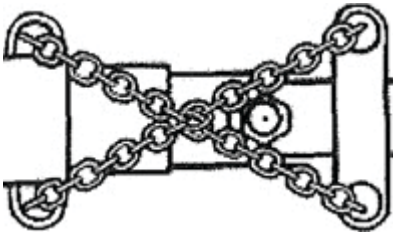
Listed in the chart below are the different class sizes of safety chains and the rated load each chain must be capable of withstanding. Your trailer is equipped with safety chains that meet the requirements of D.O.T Regulation 393.70.

TRAILER CLASS	TRAILER WEIGHT GVWR IN LBS.	MINIMUM BRAKING STRENGTH IN LBS.
I	to 2,000	2,000
II	2,000 to 3,500	3,500
III	3,500 to 5,000	5,000
IV	5,000 to 7,000	7,600

**WARNING: Failure to properly attach safety chains between the trailer and tow vehicle can result in a runaway trailer.**

**WARNING: To avoid accidents, before trailering:**

- Hitch only to ball size marked on coupling.
- Ball clamp must capture ball and lever or hand wheel is fully clamped.
- Cross safety chains under coupling.
- Allow only enough slack for turns.

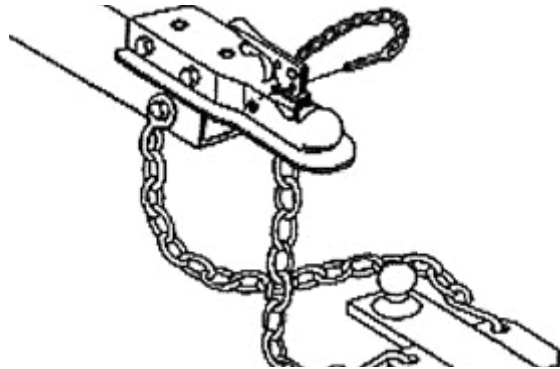


Bottom View

The safety chains on your trailer are an added insurance that it will not become detached from the tow vehicle. All safety chains are provided with an added clasp to keep them from becoming accidentally detached from the tow vehicle. Your trailer hitch on the tow vehicle should have two attaching holes or rings for attaching the safety chains, preferably one on each side of the ball hitch. Crisscross the chains under the tongue, the chain on the left side of the trailer tongue attached to the right side of the ball hitch, the chain on the right side of the trailer tongue attached to the left side of the ball hitch.

This prevents the trailer tongue from dropping to the road should the coupler or ball hitch fail. The chains should be rigged as tight as possible with just enough slack to allow tight turns to be made. This can be accomplished by twisting the chain hook in a clockwise or counterclockwise direction thus twisting the link

spacing and making the chain shorter. Also by keeping your chains as short as possible you prevent them from dragging on the road and wearing the chain links. If for any reason you find it necessary to replace a safety chain, use only original equipment.



### Load-Carrying Capacity

Located on the front left-hand side of the frame, (either the inside or the outside) is the VIN (Vehicle Identification Number) tag. It will show the GVWR (Gross Vehicle Weight Rating) which is the maximum load that can be applied to the tires on the trailer. The GVWR and the carrying capacity of the trailer are based on the tire size installed on the trailer.

The GVWR is the maximum carrying capacity of the trailer with its respective tires. It may not necessarily equal the total GVWR of the trailer less the empty weight of the trailer because there may be another controlling factor such as frame strength that reduces the carrying capacity to what is listed on the VIN tag.


The tire label will list the tire size that was installed on the trailer as original equipment when it was sold to you, the consumer. It also lists the maximum carrying capacity of the trailer.

**IMPORTANT:** The total weight of the load must never exceed the weight of cargo listed on the tire label and/or the maximum load carrying capacity listed on the VIN tag on your trailer. The GVWR (Gross Vehicle Weight Rating) listed is the maximum total weight of the trailer with accessories and all cargo allowable to be carried on the tires that are installed on the trailer.

**WARNING:** Fishtailing caused from improper tongue weight on the tow vehicle hitch ball can cause loss of control of the tow vehicle and resulting serious injury or property damage.

**CAUTION:** The maximum load applied to the trailer must never exceed the carrying capacity of the trailer as stated on the VIN label and/or the tire placard. Doing so may cause failure of one or more component parts of the trailer causing potential damage to the trailer and/ or a potential accident. All concentrated loads must be spread over as large an area as possible to eliminate potential damage to the decking.

Shown below is an example of the tire label that is placed on your trailer showing the items just discussed above. Once you have familiarized yourself with the information supplied on the example tire label and VIN tag, check the tire size and capacity of your trailer as shown on the VIN tag on your trailer.



**TIRE AND LOADING INFORMATION**  
RENSEIGNEMENTS SUR LES PNEUS ET LE CHARGEMENT

The weight of cargo should never exceed  
1,565 kg or 3,450 lbs

TL9FD0819GC041628

TIRE	SIZE	COLD TIRE PRESS.
FRONT	ST205 75 R15 D	345 KPA (50 MAX PSI)
INTER	NONE/AUCUN	
REAR	ST205 75 R15 D	345 KPA (50 MAX PSI)
SPARE	ST205 75 R15 D	345 KPA (50 MAX PSI)

SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION. VOIR LE MANUEL DE L'USAGER POUR PLUS DE RENSEIGNEMENTS.

MANUFACTURED BY: KARCHER NORTH AMERICA INC. DATE OF MFG.: 01/2015

GAWR (EACH AXLE)	WITH TIRES	RIMS AT	COLD
676 KG (1490 LB)	4.80-8 C/P R	8 X 3.75 A	621 KPA (90 PSI) SINGLE

THIS VEHICLE CONFORMS TO ALL APPLICABLE U.S. FEDERAL MOTOR VEHICLE SAFETY STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.

V.I.N.: 1L9FD0819GC041628 TYPE: TRAILER SMT-350437E

### Proper Weight Distribution & Tongue Weight

Ensuring that your trailer has the proper GVWR is very important. Once that has been established and you have the load on the trailer it is equally important that you have proper weight distribution.

### Tongue Weight

The tongue weight on your trailer is 10%-15% of the total weight of the trailer and all the cargo that it is carrying. This is the amount of weight that is then transferred to the tow vehicle through the ball hitch.

Example: The total weight of the trailer with load is 6500 pounds. The tongue weight should not be less than 650 pounds (10%).

Too light of tongue weight can cause the trailer to “fish-tail” (sway Weight Rating) as you travel down the highway. This creates excessive strains on the tow vehicle, hitch and on the trailer itself. It can very easily lead to an accident.

To adjust for too light of a tongue weight the load must be shifted forward with respect to the axle. This will increase the weight that is transferred to the tongue. Adjustments should be made until the tongue weight falls within 10% -15% recommended range. Likewise, if you have too much tongue weight adjust the weight backwards with respect to the axle until the tongue weight falls in the recommended range

Tow vehicles vary on how much tongue weight they can support for proper towing.

### Tire Pressure

Proper air pressure for your tires is printed on the sidewall. Check pressure while tires are cold. Do not raise or lower pressure to meet load. Pressure other than recommended pressure will lead to excessive tire wear or tire failure. Balancing recommended.

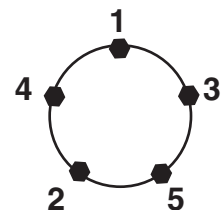
### Wheels

Check wheels for hole elongation or “out of round”. This condition can be caused by lug nuts not being tight or being too tight. Trailer wheels can be damaged by chuck holes or curb jumping. You may not be aware of the road shock to the wheels without periodic checks. Replace any wheel that is bent. Replace any wheel if you see elongation of the bolt holes.

### Wheel Lugs

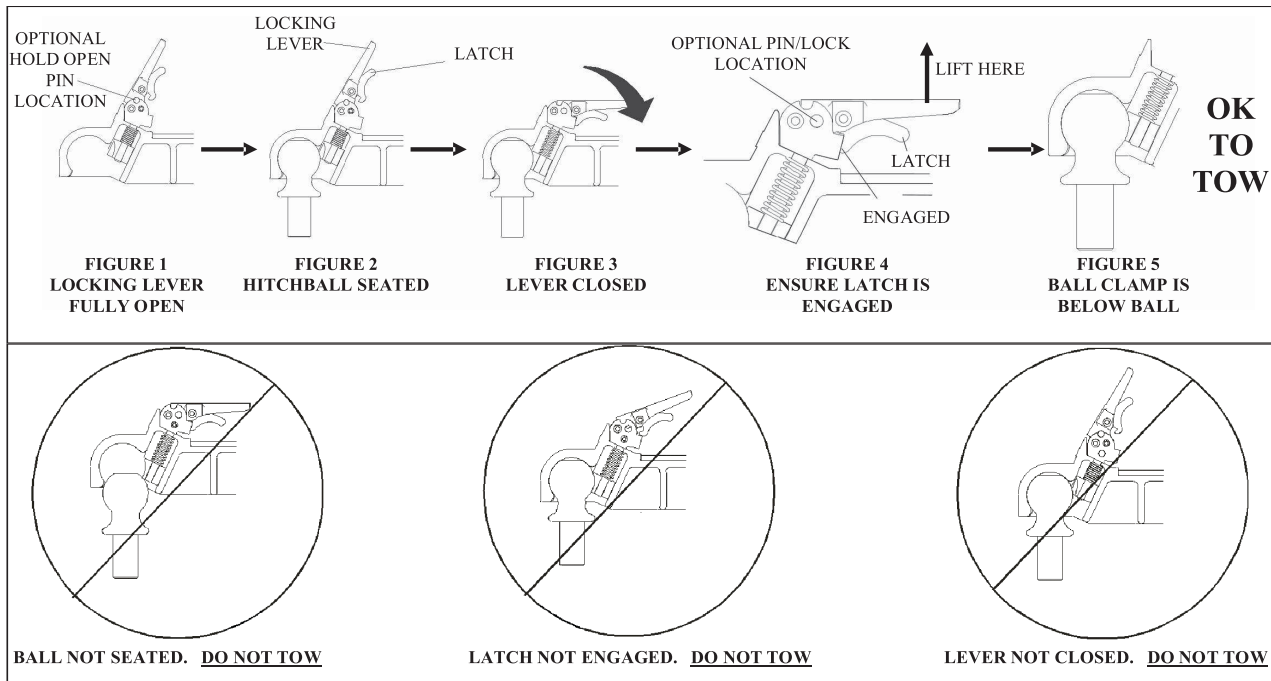
Wheel lug nuts must be tightened with a torque wrench. Refer to the chart below for proper torque.

1. Start all bolts or nuts by hand to prevent cross threading.



2. Tighten bolts or nuts following sequence at right.
3. The tightening of the fasteners should be done in stages. Following the recommended sequence, tighten fasteners per wheel torque chart below.
4. Wheel nuts/bolts should be torqued before first road use and after each wheel removal. Check and re-torque after the first 10 miles, 25 miles and again at 50 miles. Check periodically thereafter.

## What to Check And How To Check



### Wheel Torque Requirements

WHEEL SIZE	TORQUE SEQUENCE		
	1st Stage	2nd Stage	3rd Stage
15"	20 - 25	50 - 60	80-90

### Ball Coupler Hitches

Coupler assembly includes a latch lever and latch lever safety pin or hitch pin. Be sure the latch lever is locked and the pin properly secured before moving your trailer. The pin can be engaged fully only if ball is properly seated in the coupler.

### Tires




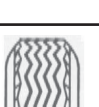


Before mounting tires onto wheels make certain that the rim size and contour is approved for the tire as shown in the Tire and Rim Association Yearbook or the tire manufacturer's catalog. Also make sure the tire will carry the rated load. If the load is not equal on all tires due to trailer weight distribution, use the tire rated for the heaviest wheel position.

*NOTE: The capacity rating molded into the sidewall of the tire is not always the proper rating for the tire if used in a trailer application. Use the following guideline:*

1. LT and ST tires: use the capacity rating molded into the tire.
2. Passenger Car Tires: Use the capacity rating molded into the tire sidewall divided by 1.10.

Use tire mounting procedures as outlined by the Rubber Manufacturer's Association or the tire manufacturers.

*NOTE: Tire wear should be checked frequently because once a wear pattern becomes firmly established in a tire it is difficult to stop, even if the underlying cause is corrected.*

WEAR PATTERN	CAUSE	ACTION	
	<b>Center Wear</b>	Over Inflation	Adjust pressure to particular load per tire catalog.
	<b>Edge Wear</b>	Under Inflation	Adjust pressure to particular load per tire catalog.
	<b>Side Wear</b>	Loss of camber or overloading	Make sure load doesn't exceed axle rating. Align at alignment shop.
	<b>Toe Wear</b>	Incorrect toe-in	Align at alignment shop.
	<b>Cupping</b>	Out of balance	Check bearing adjustment and balance tires.
	<b>Flat Spots</b>	Wheel lockup & tire skidding	Avoid sudden stops when possible and adjust brakes.

## **Breakaway Switch & D.O.T. Wet Cell Battery**

After hitching to the tow vehicle, pull the safety pin on the breakaway switch. Check to see if system is operational. Push safety pin back in to its original position.

Check battery fluid level every 60-90 days. Remove cover. There are two fill caps. Refill with distilled water only.

## **Breakaway Switch Mounted on an A-Frame**

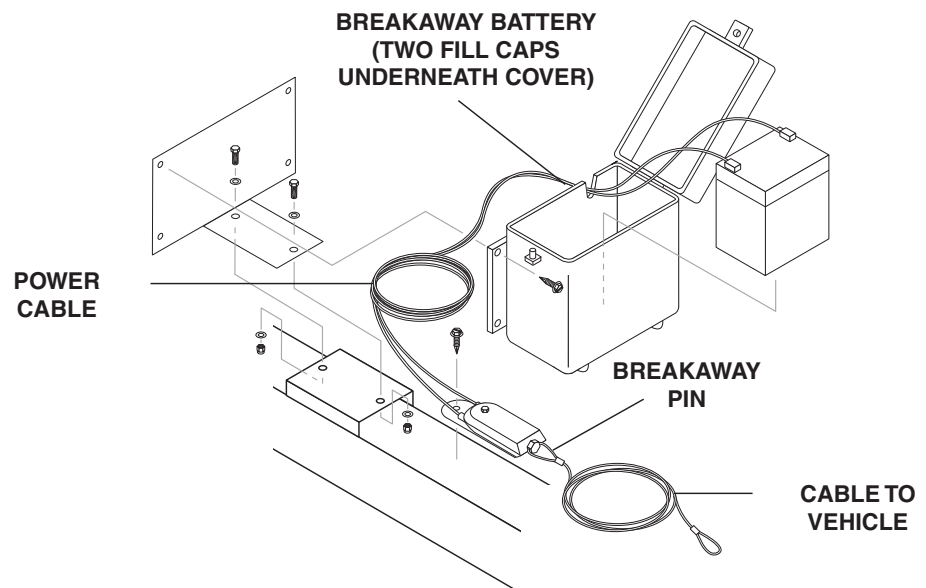
Attach breakaway switch cable securely in a straight line to the tow vehicle. Locate attachments so little "slack" is left in the cable, but enough slack to allow for turning without disengaging the pin. The cable will activate brakes the instant a trailer becomes disengaged. Brake adjustment is critical to stopping a disengaged trailer.

## **Check Breakaway System & Brakes Before Each Trip**

1. Disconnect 12V plug from tow vehicle.
2. Pull breakaway pin.
3. While pin is pulled, move tow vehicle forward. Brake should be on and wheels locked.
4. Replace pin and secure to tow vehicle. Do not loop over hitch ball.
5. Plug 12V connector into tow vehicle receptacle.
6. Test brakes with brake controller.

*NOTE: When disconnecting trailer from tow vehicle, make sure to replace safety pin.*

## **Breakaway Battery on A-Frame**



## What to Check And How To Check

### Brakes

Your trailer is equipped with one of several brake type options.

Complete service and repair information for each available type brake is found in the Axle Break Service Manual that is furnished with your trailer,

*NOTE: It is important to strictly adhere to the axle break instructions for brake service and repair. In this way, you are protecting the validity of all applicable warranties.*

### Burnishing the Brakes

Brakes on a new trailer may tend to “grab” or pulsate. This is normal. To correct the situation, pull the trailer with the trailer brake control slightly engaged a short distance (about 1000 ft or until trailer does not grab or pull to one side anymore). This action smooths down the brake bands.

*NOTE: Do not lock up the wheels.*

### Brake Adjustment

Brakes should be adjusted (1) after the first 200 miles of operation after the brake shoes and drums have “seated”, (2) at 3000 mile intervals and (3) as use and performance require. The brakes should be adjusted in the following manner:

1. Jack up trailer and secure on adequate capacity jack stands. Check that wheel and drum rotate freely.
2. Remove adjusting hole cover from adjusting slot on bottom of brake backing plate.
3. With screwdriver or standard adjusting tool, rotate the starwheel of the adjuster assembly to expand the brake shoes. Adjust the brake shoes out until the pressure of the linings against the drum makes the wheel very difficult to turn.

*NOTE: With drop spindle axles, a modified adjusting tool with about an 80 degree angle should be used.*

4. Then rotate starwheel in opposite direction until wheel turns freely with slight lining drag.
5. Replace the adjusting hole cover and lower wheel to ground.
6. Repeat above procedure on all brakes.



**CAUTION: Never crawl under your trailer unless it is resting on properly placed jack stands.**

Do not lift or place supports on any part of the suspension system.

### Brake Cleaning & Inspection

Your trailer brakes must be inspected and serviced at yearly intervals or more often as use and performance require. Magnets and shoes must be changed when they become worn or scored thereby preventing inadequate vehicle braking.

Clean the backing plate, magnet arm, magnet and brake shoes. Make certain that all the parts removed are replaced in the same brake and drum assembly. Inspect the magnet arm for any loose or worn parts. Check shoe return springs, hold down springs and adjuster springs for stretch or deformation and replace if required.



**CAUTION: Asbestos Dust Hazard. Since some brake shoe friction materials contain asbestos, certain precautions need to be taken when servicing brakes:**

1. Avoid creating or breathing dust.
2. Avoid machining, filing or grinding the brake linings.
3. Do not use compressed air or dry brushing for cleaning. (Dust can be removed with a damp brush).

### Reporting Safety Defects

If you believe that your trailer has a defect which could cause a crash or could cause injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying Landa.

If NHTSA receives similar complaints, it may open an investigation, and if it finds that a safety defect exists in a group of trailers, it may order a recall and remedy campaign. However, NHTSA cannot become involved in individual problems between you, your dealer or Landa.

To contact NHTSA, you may either call the Auto Safety Hotline toll-free at 1-888-327-4236 (or 202-366-4000 in Washington, DC area) (TTY: 1-800-424-9153) or write to:

NHTSA

1200 New Jersey Avenue, SE

West building

Washington, DC 20590

<http://www.safercar.gov>

[http://www.nhtsa.gov/nhtsa-spmexntnljsp/email\\_nhtsa.jsp](http://www.nhtsa.gov/nhtsa-spmexntnljsp/email_nhtsa.jsp)

You can also obtain other information about motor vehicle safety from the Hotline



### **Trailer Storage Preparation**

If your trailer is to be stored for an extended period of time or over the winter, it is important that the trailer be prepared properly.

1. Remove the emergency breakaway battery and store inside, out of the weather. Charge the battery at least every 90 days.
2. Jack up the trailer and place jack stands under trailer frame so that the weight will be off the tires. Never jack up or place jack stands on the axle tube or on the equalizers.
3. Lubricate mechanical moving parts that are exposed to weather, such as the hitch and suspension parts.

*NOTE: On oil lubricated hubs the upper part of the roller bearings are not immersed in oil and are subject to potential corrosion. For maximum bearing life it is recommended that you revolve your wheels periodically (every 2-3 weeks) during periods of prolonged storage.*

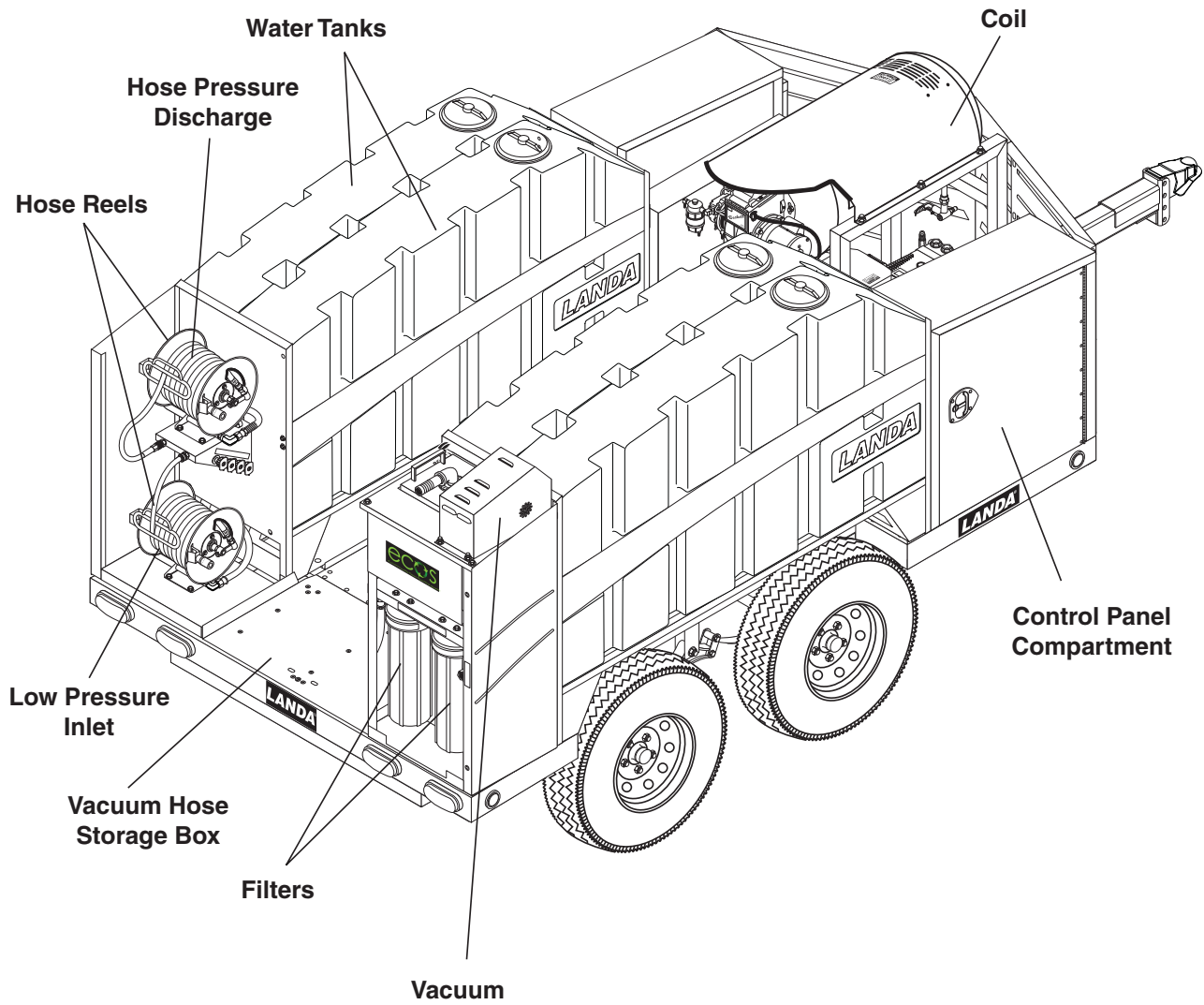
### **After Prolonged Storage — Inspection Procedures Before removing trailer from jack stands:**

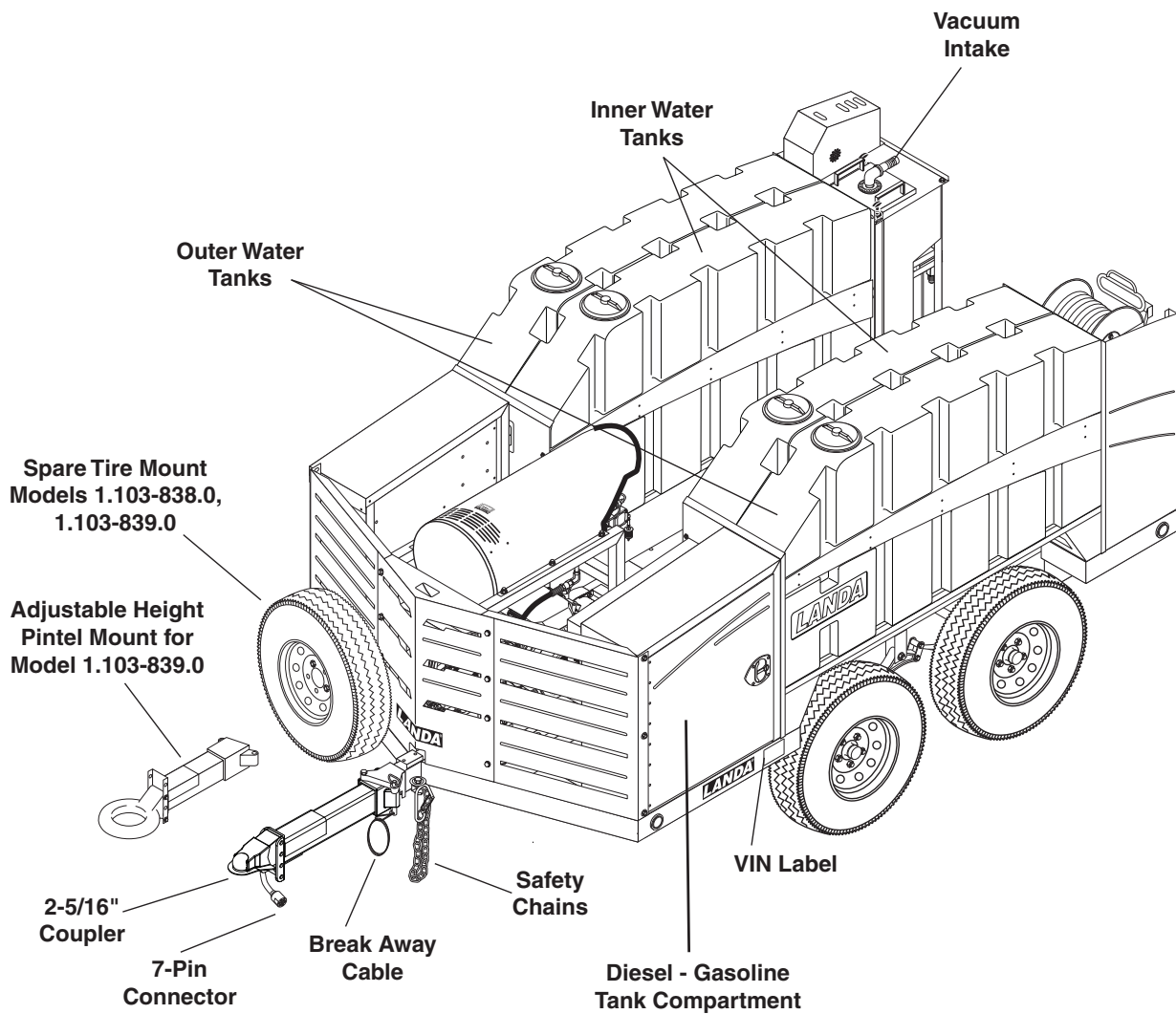
1. Remove all wheels and hubs or brake drums. Note which spindle and brake that the drum was removed from so that it can be reinstalled in the same location.
2. Inspect suspension for wear.
3. Check tightness of hanger bolt, shackle bolt and U-bolt nuts per recommended torque values.
4. Check brake linings, brake drums and armature faces for excessive wear or scoring.
5. Check brake magnets with an ohmmeter. The magnets should check 3.2 ohms. If shorted or worn excessively, replace.
6. Lubricate all brake moving parts using a high temperature brake lubricant. (Lubriplate or equivalent).

### **CAUTION: Do not get grease or oil on brake linings or magnet face.**

7. Remove any rust from braking surface and armature surface of drums with fine emery paper or crocus cloth. Protect bearings from contamination while so doing.
8. Inspect oil or grease seals for wear or nicks. Replace if necessary.
9. Lubricate hub bearings. Refer to procedure in manual.
10. Reinstall hubs and adjust bearing per instructions in manual.

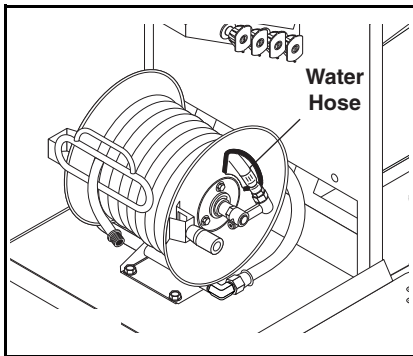
**Trailer Component Identification**



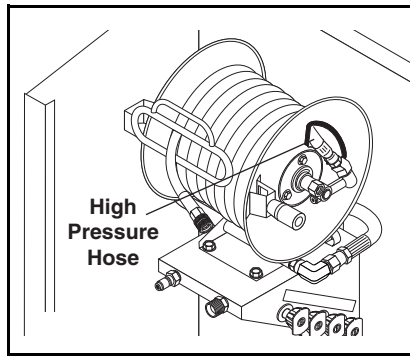


# Operations

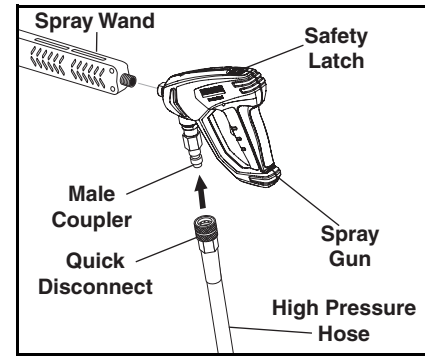
## Assembly Instructions



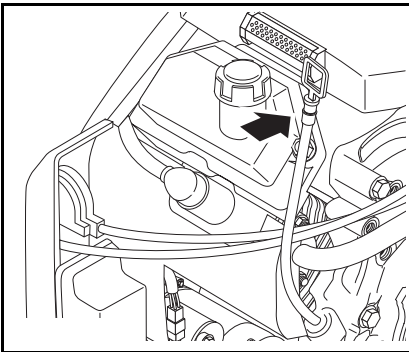
**STEP 1:** Install water hose (5/8" minimum) to lower hose reel. Connect loose end of water hose to water supply. Minimum flow should be 5 gpm.



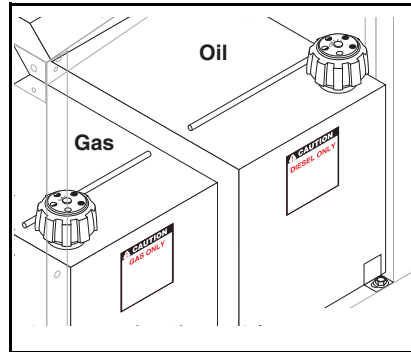
**STEP 2:** Install high-pressure hose to upper high-pressure hose reel.



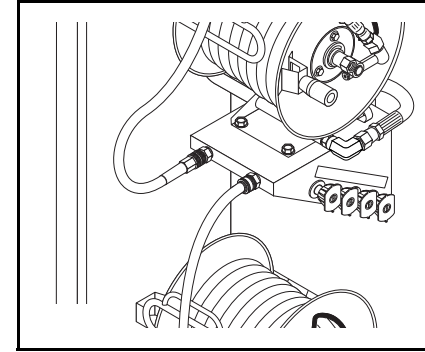
**STEP 3:** Attach variable wand to spray gun, use teflon tape on threads to prevent leakage. Attach male coupler to the inlet on gun using teflon tape on threads. Attach spray gun assembly to quick disconnect of high pressure hose.



**STEP 4:** Check engine and pump oil level by removing oil dipstick, making sure oil is on proper indicator marking on pump. Oil should be visible one half way up sight glass.



**STEP 5:** Fuel tanks are located on the driver side cabinet. Fill red tank with gasoline. Fill the black tank with fuel oil (diesel). DO NOT confuse gasoline and oil tanks. Keep proper fuel in proper tank.



To prevent injury or damage when transporting trailer, attach the loose ends of both hoses to the fittings located on the base of the upper reel. Wind reels to remove any excess hose and lock reels in place.

## Battery Installation

Due to Federal Regulations concerning shipment of corrosive chemicals, batteries are not shipped with this machine.

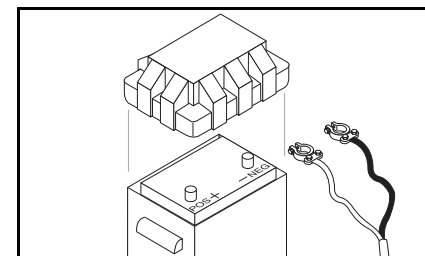


Local purchase of battery will be the responsibility of the owner. Automotive type 12 Volt Group 24

battery is recommended for placement within the weather resistant box. Follow safety and installation instructions furnished with the battery.

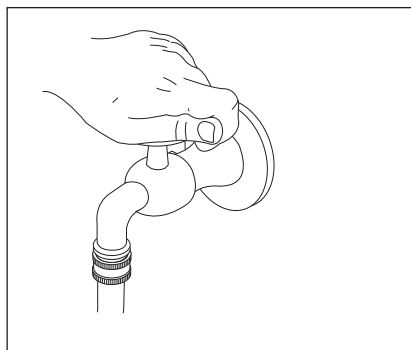
Red Cable is attached to battery (+) positive terminal, black cable is connected to battery (-) negative terminal.

**Important: Remove the battery when trailer is not in use to prevent the battery from draining.**



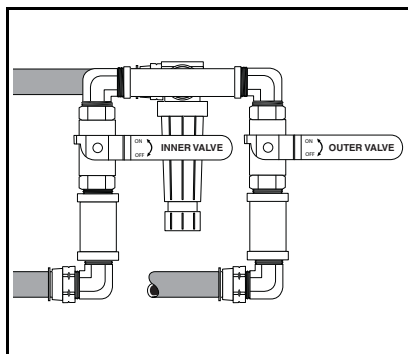
**Install proper battery making sure that the red cable is attached to the positive terminal Use a 12v Group 24 battery.**

**Pressure Washer Instructions**

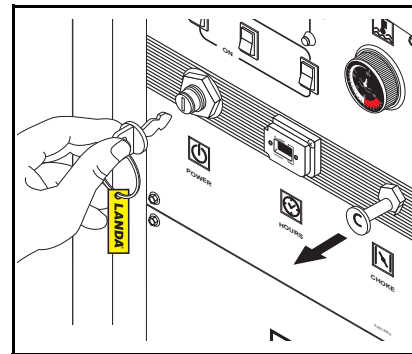


**STEP 1:** Read safety, installation and preventative maintenance instructions before starting machine. Fill the water tanks from a clean water source. If filling from a hydrant, flush out any rust before connecting water supply. The water supply may remain connected for further filling. Tanks can also be filled by removing lid and feeding water directly into tanks.

**CAUTION:** To prevent damage to the pump, incoming water temperature must not exceed 140° F.

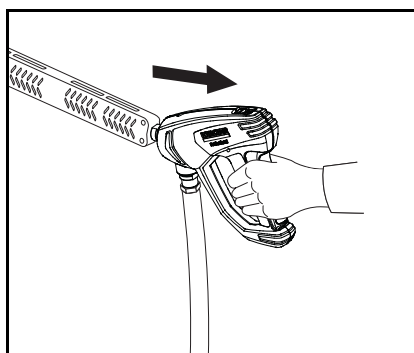


**STEP 2:** To fill the two outer tanks, turn the inner tank valve to the "OFF" position and the outer tank valve to the "ON" position. To fill all four tanks turn the two bottom valves to the "ON" position. The two outer tanks are linked together with a 1" line to distribute the weight of the water. The two inner tanks are also linked together

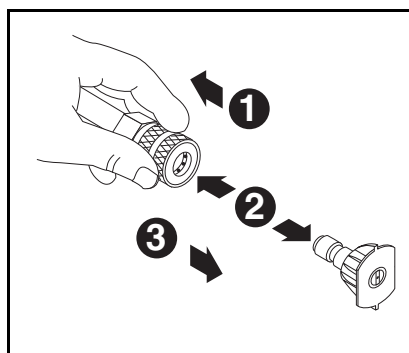


**STEP 3:** Read engine manual provided and pull choke. Pull spray gun trigger to relieve pressure. Turn the engine switch to the START position and hold until the engine starts.

**NOTE:** Do not engage the electric starter for more than five seconds at a time. If the engine fails to start, release the switch, pull spray gun trigger and wait ten seconds before operating the starter again. Once the engine starts, push the choke in.

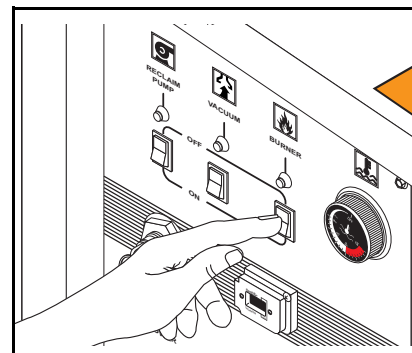


**STEP 4:** With the spray nozzle pointed away from you or anybody else, press the trigger on the spray gun to obtain pressurized cold water spray.



**STEP 5:** Pull wand coupler collar back and insert desired pressure nozzle into wand coupler. Then secure by pushing coupler collar forward.

**CAUTION:** Never replace nozzles without engaging the safety latch on the spray gun trigger.

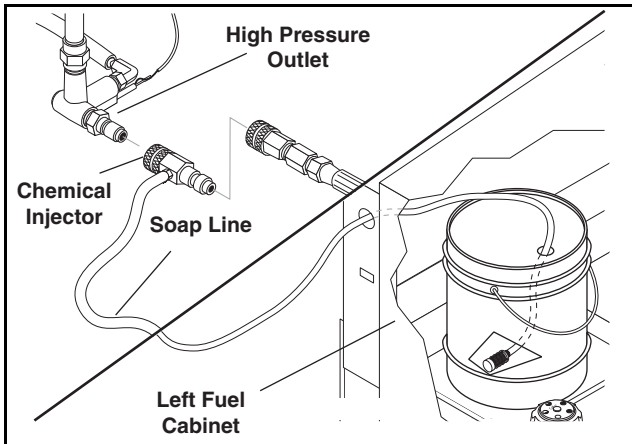


**STEP 6:** For hot water, turn the burner switch to ON and set the thermostat knob to the desired temperature. When a steady stream of water flows out of the spray gun the burner will light automatically.

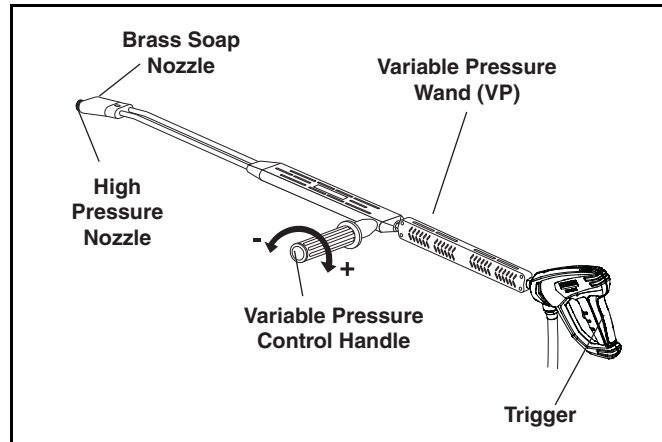
**NOTE:** Do not start machine with burner switch on. The green light will be illuminated when the burner switch is in the on position.

## Operations

### Detergent Instructions



**STEP 1:** Connect the downstream chemical injector to the high pressure outlet. Route the soap line into the left fuel cabinet and into detergent bucket. (buckets not provided).



**STEP 2:** Selection of high or low pressure is accompanied by turning the handle.

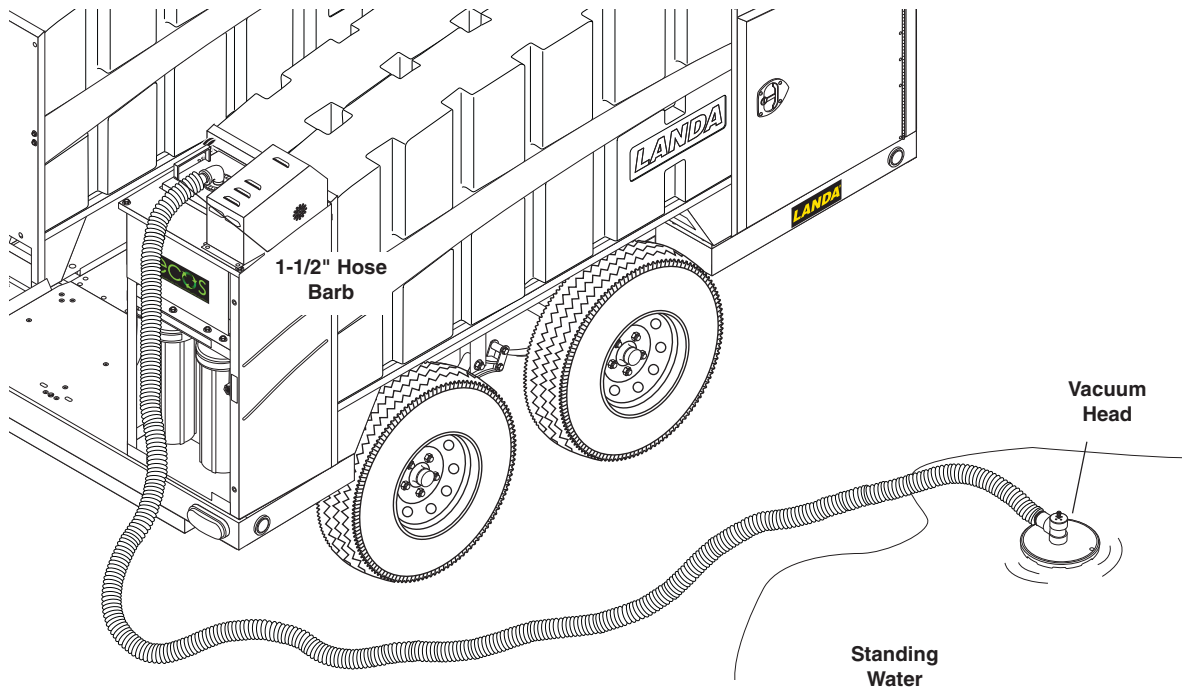
*NOTE: High pressure nozzle must be inserted at the wand to obtain high pressure. Variable pressure control wand handle must be turned clockwise to enable water to flow out of the high pressure nozzle.*

To apply detergent, place detergent pick-up tube into a container of detergent and turn the detergent valve handle on the wand counterclockwise.

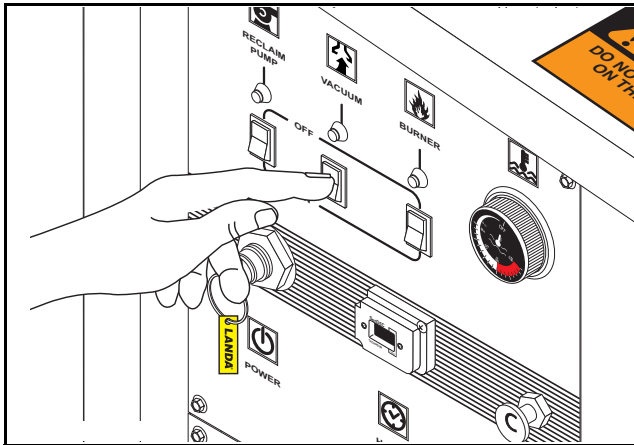


## Operations

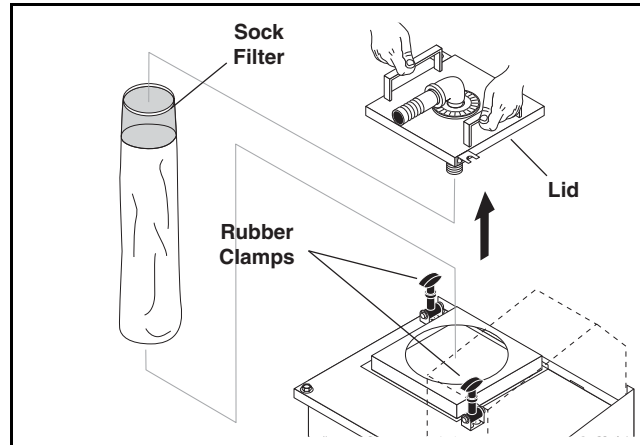
### Vacuum Operating Instructions



**STEP 1:** Keep the working area free of rubbish. Attach the vacuum hose to the 1-1/2" hose barb located in the rear of the trailer. Attach the vacuum head to the other end of the vacuum hose. Locate the vacuum head at the lowest area of standing water. If washing, set up a damming or a containment system. Start engine as outlined in "Pressure Washing Instructions".

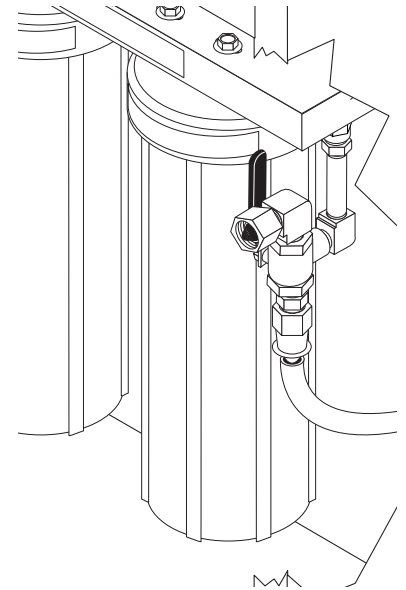
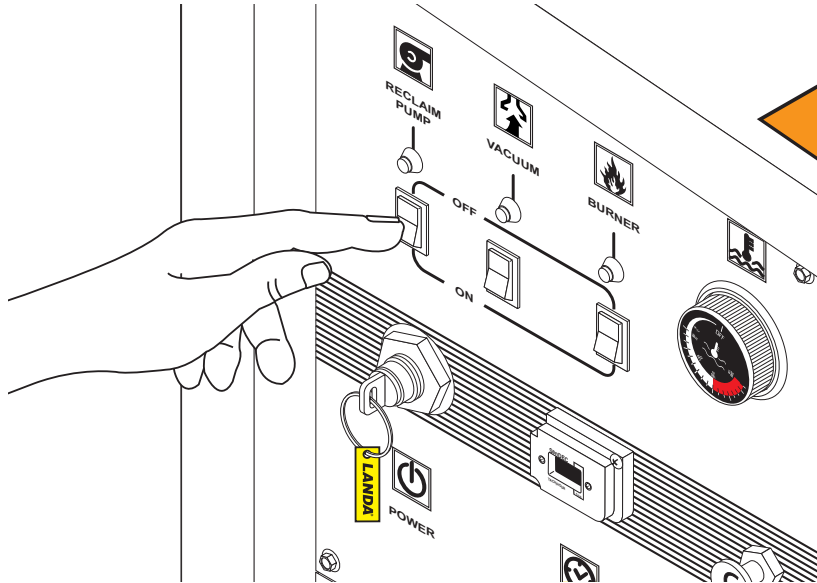


**STEP 2:** To reclaim water, press the Vacuum Motor switch located in the control cabinet to the "ON" position. The vacuum system will draw water into the 40 gallon holding tank and will automatically stop when the tank is full.



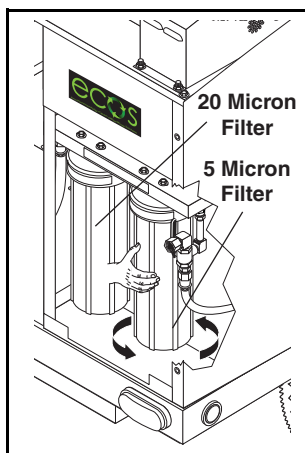
**STEP 3:** Located in the vacuum tank is the large debris sock filter. To clean the sock filter turn off vacuum motor and then remove the vacuum hose and the two rubber clamps located on the top of vacuum inlet. Grasp the two handles and lift the lid vertically until the sock filter clears the opening. Remove the filter and dispose of the contents per local regulations. Replace and secure the bag filter, lid and vacuum hose.





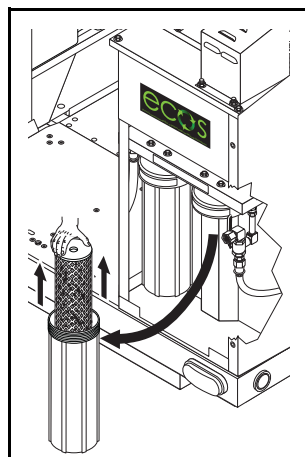
**STEP 4:** To filter the finer particulates, push the reclaim pump switch to the "ON" position. The reclaim pump will push the water through the two filter housing. On the outlet end of the filters is the filtered water valve. In the vertical position the filtered water is routed back to the inner holding tanks. In the horizontal position the filter water can be discharged as needed.

**WARNING:** When disposing of reclaimed water, check with local state and federal laws before disposal.

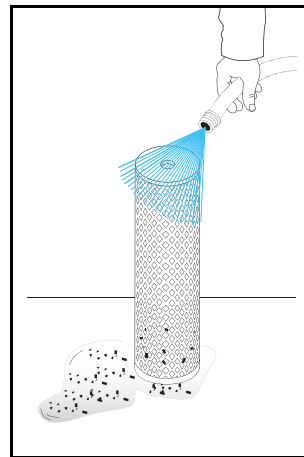


**Filter Replacement**

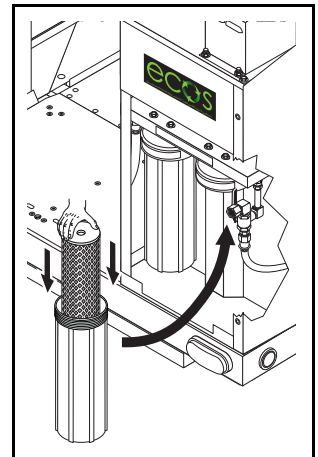
**STEP 1:** To remove filters, turn filter housing counterclockwise.



**STEP 2:** Remove the used filter from the filter housing, be sure not to lose the black o-ring.



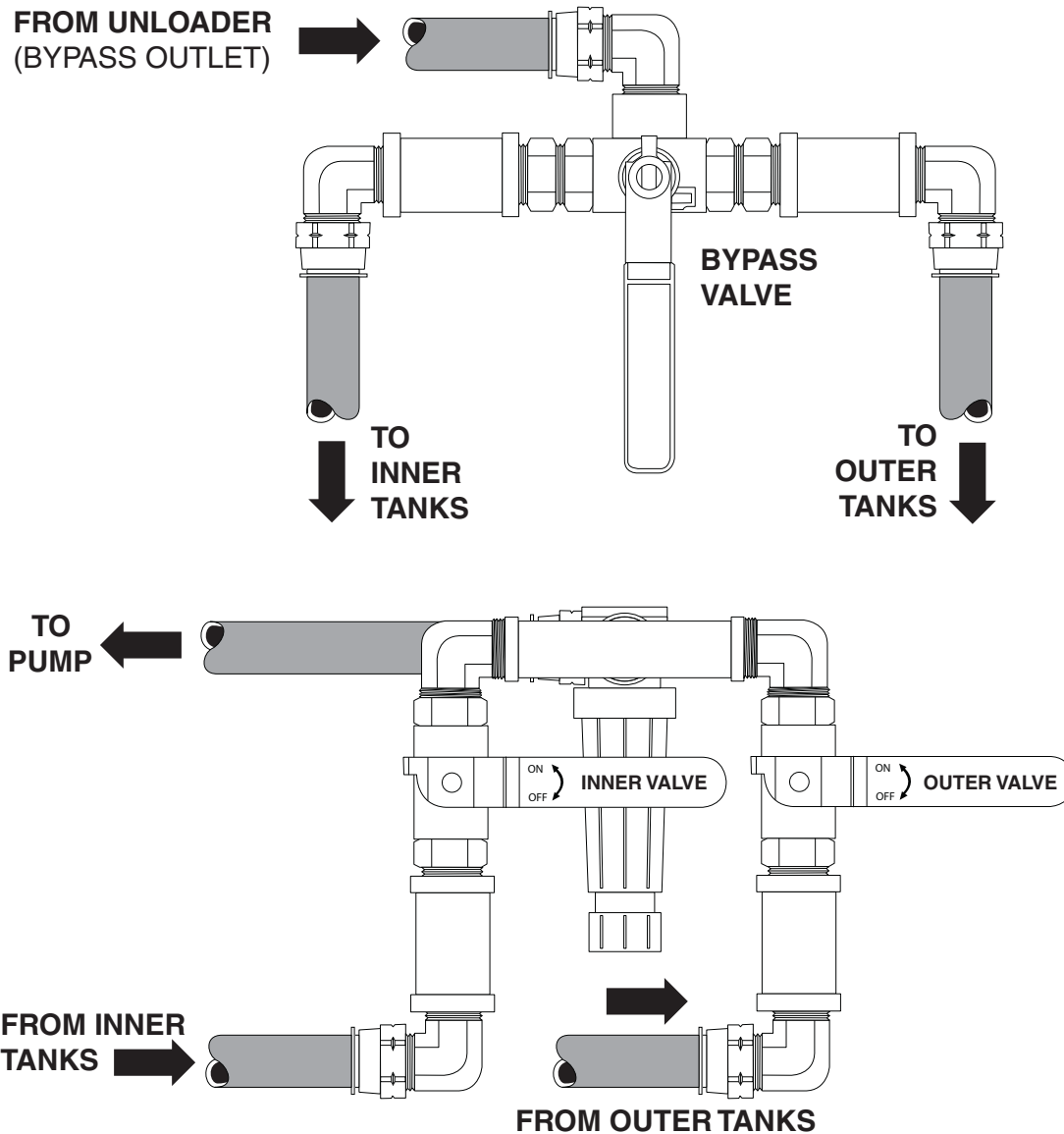
**STEP 3:** Spray gently with clean running water. Do not use soap or other additives which may cause damage on the filter.



**STEP 4:** Place the filter back in the filter housing, make sure o-ring is in place, put it back in position and turn clockwise.

## Operations

### Valve Operations



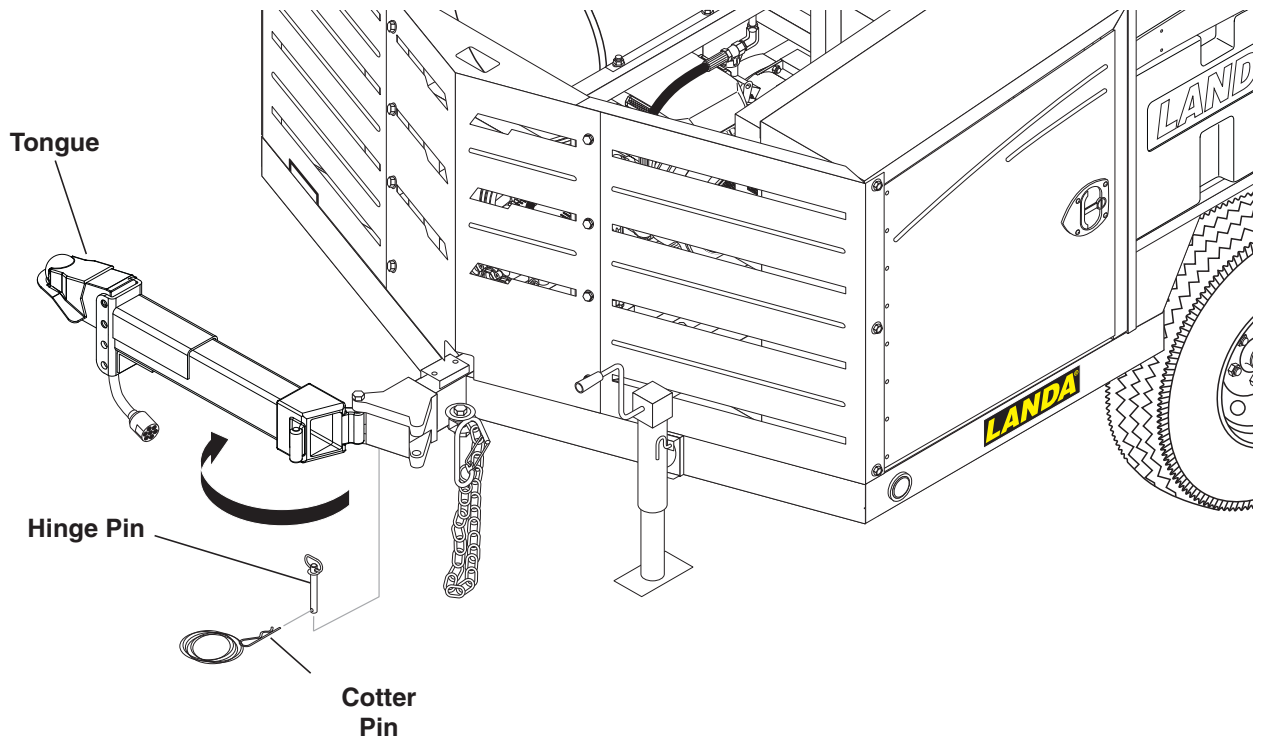
With all tanks full, you have the option of drawing water from the two outer tanks, the two inner tanks or all four tanks.

**OPTION 1:** To draw water from the outer tanks set the outer tank valve to the "ON" position and the inner tank valve to the "Off" position. Set the bypass valve to the outer tank position.

**OPTION 2:** To draw water from the inner tanks set the outer tank valve to the "OFF" position and the inner tank valve to the "ON" position. Set the Bypass valve to the inner tank position.

**OPTION 3:** To draw water from all the tanks set the outer and inner tank valves to the "ON" position. The bypass valve can be in the inner or outer tank position.

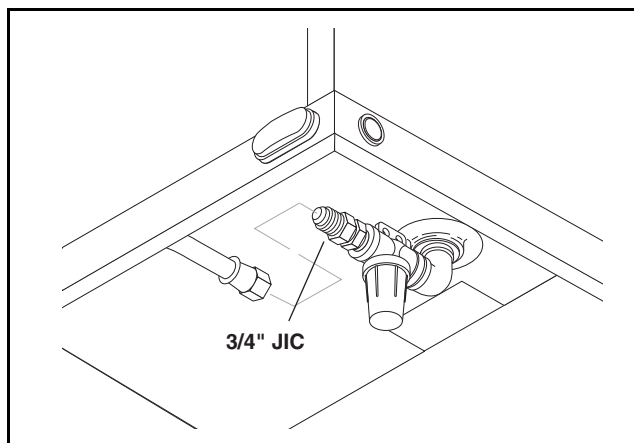
## Fold Away Tongue



To swing the tongue away for storage pull the cotter pin and remove the hinge pin. Rotate the hinge to the side. Store the hinge pin and cotter pin in the hinge.

**WARNING:** Before towing trailer make sure that the fold-away hinge is locked into position with the hinge pin and cotter pin.

## Vacuum Tank Drain Instructions



To drain vacuum tank disconnect the 3/4" JIC on bottom of tank. Re-connect hose when tank is empty.

## Maintenance

### Preventative Maintenance

Check to see that water pump is properly lubricated.

- Follow winterizing instructions to prevent freeze damage to pump and coils.
- Always neutralize and flush detergent from system after use.
- If water is known to be high in mineral content, use a water softener on your water system, or de-scale as needed.
- Do not allow acidic, caustic or abrasive fluids to be pumped through system.
- Always use high grade quality cleaning products.
- Never run pump dry for extended periods of time.
- Use clean diesel fuel. Clean or replace fuel filter every 100 hours of operation. Avoid water contaminated fuel as it will damage the fuel pump.
- If machine is operated with smoky or eye burning exhaust, coils soot up and prevent water from reaching maximum operating temperature. (See section on Burner Adjustments.)
- Never allow water to be sprayed on or near the engine or burner assembly or any electrical component.
- Periodically descale coils per instructions.
- Check to see that engine 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 flow of combustion and ventilating air to the burner must not be blocked or obstructed in any manner.

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

### Unloader Valves

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.

### Trailer Winterization

***To protect your machine from severe damage caused by water freezing inside the components, it is important to winterize it whenever it is subjected to freezing temperatures.***

***The best way to protect the system is to keep it out of the cold. Barring that, the next best way is to flush the system with antifreeze. To do so, follow these steps to properly operate the anti-freeze protection system. This system is designed to protect your equipment during cold weather conditions of 32°F or below. Your ECOS trailer comes with a factory installed winterization system.***

***Be sure to wear safety glasses and gloves when winterizing system.***

#### Inner And Outer Water Tanks

- After operation, turn engine off, drain all yellow tanks by removing debris filter cap located behind control panel and turn both tank valves to the open position. If there is still water in the tank, lower the front end of the trailer with the jack to completely drain the tanks. Use a wet-dry vacuum to suck the remaining water from the drain ports at the bottom of the tanks.
- Once tanks are drained, replace debris filter cap and turn both tank valves to the off position.

#### Coil and High Pressure Hose

- Relieve any pressure in wand and hose. Close both tank valves located in the control cabinet. Keep gun and wand attached to high pressure hose and remove high pressure nozzle.
- Pour a minimum of a 5 gallons of environmentally safe antifreeze mixture into two 5 gallon buckets. (Determine what is the best mix ratio for your environment).
- Remove the plug on the antifreeze inlet line located in the control panel cabinet. Place open line into antifreeze mixture. Have a second 5 gallon bucket ready to collect antifreeze recycling through system.
- While holding open the gun trigger, start the engine to draw the antifreeze solution into the system. Keep the gun open. Once antifreeze can be seen coming out of the wand, release the gun trigger and allow the system to run in bypass for 15 seconds. While in bypass, switch the bypass valve on the control panel to the other tank and continue to run in bypass for another 15 seconds. Turn the key to the OFF position.

- Remove the inlet feed line from the antifreeze mixture and replace the plug.
- Keep the gun and wand attached to the hose to prevent antifreeze mixture from draining from the unit.

### **Vacuum Tank Assembly**

- Start by turning on the filter pump until the float at the bottom of the vacuum tank turns off the pump. Manually pull the normally open float (lower float located inside vacuum tank) to the up position so the pump starts and removes any remaining water from the system.
- Pour 1 gallon of environmentally safe antifreeze mix into vacuum tank and disconnect  $\frac{3}{4}$ " JIC below the pressure gauge on the inlet side of the filter assembly. Manually pull the lower float to the up position so the pump starts and fills the pump assembly and hoses with antifreeze mix. Once you see antifreeze start to flow from the  $\frac{3}{4}$ " hose, drop the float to the off position and reconnect  $\frac{3}{4}$ " JIC.
- Remove the two filter canisters and drain any water. (Take care not to lose O-rings) Remove the filters and air dry for storage. Disconnect the  $\frac{3}{4}$ " JIC on the right hand side of the filter assembly and use air to purge the water out of the return line to the inner water tank. Reconnect when you are finished.

### **Use the following steps to return to normal operation after winterizing your equipment.**

- Open the tanks valves and remove high pressure nozzle from wand.
- Place the wand end into a 5 gallon bucket and pull gun trigger, be careful of backslash.
- With the gun in hand and the trigger pulled, turn the start key to the auxiliary position.
- Run the pump until there is clear water running out of wand end.
- Turn feed pump off and release wand. Replace high pressure nozzle in wand.
- Comply with local state and federal laws when using and disposing of antifreeze.

**The machine is now ready for normal use.**

### **High Limit Hot Water Thermostat**

For safety, each machine is equipped with a temperature sensitive high limit control switch. In the event that the water should exceed its operating temperature, the high limit control will turn the burner off until the water cools then automatically reset itself. The thermostat sensor is located on the discharge side of the heating coil. The thermostat control dial is located on the control panel.

### **Pumps**

Use only SAE 10W-40 weight non-foaming oil. Change oil after first 50 hours of use. Thereafter, change oil every year or at 500 hour intervals. Oil level should be checked through use of dipstick found on top of pump, or the red dot visible through the oil gauge window. Oil should be maintained at that level.

### **Cleaning of Coils**

In alkaline water areas, lime deposits can accumulate rapidly inside the heating coil. This growth is increased by the extreme heat build up in the coil. The best prevention for liming conditions is to use high quality cleaning chemicals. In areas where alkaline water is an extreme problem, periodic use of Landa Coil Descaler (part #8.914-296.0) will remove lime and other deposits before coil becomes plugged.

### **Descaling Coils**

Periodic flushing of coils is recommended.

1. Fill a container with 5 gallons of water, then add 1 lb. of descaling powder. Mix thoroughly.
2. Remove wand assembly from spray gun and put spray gun into container. Secure the trigger on the spray gun into the open position.
3. Remove front middle and right side (passenger side) panels. Detach  $\frac{3}{4}$ " hose from top of heat exchanger, the other end of the hose is attached to the high pressure pump inlet. Place the loose end of the hose in the descaling solution.
4. Turn pump switch on, allowing solution to be pumped through coils back into the container. The solution should be allowed to circulate 2-4 hours or until the color changes.
5. After circulating solution flush entire system with fresh water. Reinstall wand assembly to spray gun, a  $\frac{3}{4}$ " hose and front panels.

## Maintenance

### Removal of Soot and Heating Coil

In the heating process, fuel residue in the form of soot deposits may develop on 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 after following the coil removal steps (See Coil Removal).

### Pressure Relief Valve

Each machine is equipped with a relief valve to relieve pressure in the system when higher than normal operating pressures are encountered or if the unloader valve should fail. Unusually high pressures come from an object plugging the spray nozzle. If operating pressure is found to be normal and the relief valve continues to leak, repair or replace valve. **CAUTION: This valve must be opened each year to check operation.**

### 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. The ruptured disk needs to be inspected once or twice a year for any obstructions.

### Fuel

Use clean fuel oil/diesel 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 gas or line in your burner fuel tank. Gasoline is more combustible than fuel oil and could result in a serious explosion. **NEVER** use crank case or waste oil in your burner. Fuel unit malfunction could result from contamination.

### Fuel Control System

This machine utilizes a fuel solenoid valve located on the fuel pump to control the flow of fuel to the combustion chamber. The solenoid, which is normally closed, is activated by a flow switch when water flows through it. When the operator releases the trigger on the spray gun, the flow of water through the flow switch stops, turning off the electrical current to the fuel solenoid. The solenoid then closes, shutting off the supply of fuel to the combustion chamber. Controlling the flow of fuel in this way gives an instantaneous burn-or-no-burn situation, thereby eliminating high and low water temperatures, and combustion smoke normally associated with machines incorporating a spray gun.

**CAUTION:** 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 the burner is not firing when the spray gun is in the off position.

### Fuel Pressure Adjustment

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 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.

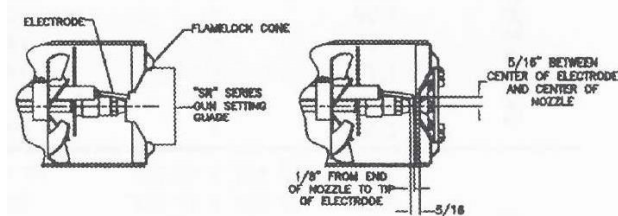
*NOTE: When changing fuel pump, a by-pass plug must be installed in return line port or fuel pump will not prime.*

### Burner 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.

## Electrodes Setting

Gun Setting for EHASR Only



SR-Series Gage

Order Number: 8.717-379.0

## Oil Burner

**Burner Air Adjustment:** The oil burner on this machine is preset for operation at altitudes below 500 feet. If operated at higher altitudes, it may be necessary to adjust the air band for a #1 or #2 smoke spot on the Bacharach scale.

To adjust, start machine and turn burner ON. Loosen two locking screws found on the air band 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. Turn air band halfway back to the previously noted position. Tighten locking screws.

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

**CAUTION: If white smoke appears from burner exhaust vent during start-up or operation, discontinue use and readjust air bands.**

**ATTENTION: Si de la fumée blanche s'échappe de l'évacuation du brûleur pendant le démarrage ou le fonctionnement, cesser d'utiliser et réajuster les bandes d'air.**

*NOTE: If a flue is installed, have a professional serviceman adjust your burner for a #1 or #2 smoke spot on the Bacharach scale.*

## Coil Removal

Coil removal, because of freeze breakage or to clean soot from it, can be done quickly and easily.

1. Disconnect hose from pump to inlet side of coil.
2. Carefully disconnect the thermostat sensor making sure you do not crimp the capillary tube.
3. Remove burner assembly from combustion chamber.
4. Remove the 3-3/8" bolts from each side of coil and tank assembly (these bolts are used to fasten tank to chassis).
5. Remove fittings connected to the 1/2" pipe nipples from inlet and discharge sides of coil.
6. Remove top tank wrap, bend back insulation tabs and fold back blanket.
7. Remove bolts that hold down coil to bottom wrap.
8. Remove coil.
9. Replace or repair the coil and any insulation found to be broken or torn.
10. Remove insulation retainer plates.

## Coil Reinstallation

Reinstall new or cleaned coil reversing Steps 9 through 1.

## Maintenance

### Troubleshooting

These troubleshooting procedures cover pump malfunctions, delivery problems and charge system malfunction.

**Warning: Before attempting any repairs or maintenance, make sure machine is shut off.**

PROBLEM	POSSIBLE CAUSE	REPAIR
<b>ENGINE WILL NOT START</b>	Low oil level	Fill to proper levels.
	Low water level in 200 gallon tank	Fill to 1/2 full minimum.
	No fuel	Fill fuel tank.
<b>LOW PRESSURE</b>	Worn or oversized nozzle	Replace worn nozzle. Check nozzle size.
	Clogged water supply hose, inlet strainer, or kinked hose	Clean or replace strainers.
	Worn or damaged piston cups	Replace piston cups.
	Worn or damaged inlet or discharge valve	Replace worn valve poppets or valve springs.
	Dirt or foreign particles in valve assembly	Remove any dirt particles.
	Air leak in inlet plumbing or inaccurate gauge	Locate air leak. Re-seal connection or replace damaged gauge.
	Cavitation	Check suction lines on inlet of pump for restrictions.
	Unloader	Check for proper operation
	Worn or plugged relief valve on pump	Clean, reset and replace worn parts.
	Worn or damaged hose	Repair/replace hose.
	Broken valve spring	Replace spring.
	Pulse valve on	Turn off pulse valve.
Improper adjustment of unloader	Adjust as necessary.	
<b>ROUGH OPERATION WITH LOSS OF PRESSURE</b>	Restricted inlet plumbing or air leak in inlet plumbing	Replace clogged inlet fittings. Check supply hose and ensure adequate water supply.
	Damaged piston, cup or pump valve	Replace any damaged pump parts and clean out any foreign particles.
	Clogged nozzles	Clean or replace nozzles.
<b>WATER LEAKAGE AT INTAKE MANIFOLD OR CRANKCASE</b>	Worn manifold seals, pistons or O-rings. Or, condensation inside crankcase	Replace seals, sleeves or O-rings. Change oil at regular intervals.
	Inadequate water supply to pump creating a vacuum lock	Ensure adequate tap water supply. Clear inlet filter.
<b>SHORT PISTON CUP LIFE</b>	Scored cylinders from pumping acids	Replace cylinders. DO NOT PUMP ACID SOLUTIONS. For acid application, ask your dealer for a pump saver injector.
	Abrasive particles in fluid being pumped	Replace water and detergent strainers if damaged or missing. Install additional filter if fine abrasives are still evident.
	Operator(s) running pump without water supply	DO NOT ALLOW WASHER TO RUN WITHOUT PROPER WATER SUPPLY.
	Hot water in pump	Do not run in bypass for more than 5 minutes. Do not let water supply exceed 140°F (60°C).



<b>PROBLEM</b>	<b>POSSIBLE CAUSE</b>	<b>REPAIR</b>
<b>WASHER FAILS TO DRAW DETERGENT</b>	Detergent metering valve closed or valve clogged or defective	Open detergent metering valve, following procedure in operating instructions.
	Back pressure in hose (when using additional lengths of pressure hose)	Contact dealer for proper injector size when adding lengths of hose.
	Back pressure in pressure hose (when using dual lance wand)	Use proper size flood nozzle in dual lance wand (refer to parts breakdown).
	Suction tube not below liquid surface	Completely submerge suction tube and strainer in detergent solution.
	Clogged or damaged suction strainer	Clean or replace strainer.
<b>DETERGENT SOLUTION TOO WEAK</b>	Clogged detergent strainer	Clean or replace strainer.
	Air leak in detergent suction tube or inlet plumbing	Find air leak and clean or replace parts as necessary.
<b>DETERGENT SOLUTION TOO CONCENTRATED</b>	Original detergent too concentrated	Dilute product as necessary to achieve proper concentration.
<b>DETERGENT IN RINSE CYCLE</b>	Dual lance wand or adjustable nozzle holder in open position or chemical metering valve open	Close dual lance wand adjustable lance holder to achieve high pressure. Close detergent metering valve.
<b>DILUTION OF DETERGENT CONCENTRATE DURING CYCLE</b>	Worn or defective internal check valve	Repair or replace check valve or injector parts as necessary.
	Defective check valve in detergent tank	Replace parts as necessary.
<b>NOISY OPERATION</b>	Worn bearings	Replace bearings, refill crankcase oil with recommended lubricant.
	Cavitation	Check inlet lines for restrictions and/or proper sizing.
<b>PUMP NOISY</b>	Low oil level	Add oil
	Worn or dirty valves	Replace or clean.
	Bad bearings	Inspect bearings; replace as required
<b>IRREGULAR SPRAY PATTERN</b>	Worn or partially clogged nozzle	Clean or replace nozzles.
<b>EXCESSIVE WEAR</b>	Worn or loose bearings	Replace bearings. Check bearing seals, spacers and retainers. Replace any worn parts.
<b>HIGH CRANKCASE TEMPERATURE</b>	Wrong grade of oil	USE SAE 90 Gear Oil.
	Improper amount of oil in crankcase	Adjust oil level to proper amount.
<b>OIL LEAKS</b>	Worn pistons and/or leaking crank seals, crankcase cover seal or drain plugs	Replace seals, sleeves or O-Rings.

## Maintenance

### Unloader Valve Malfunction

PROBLEM	POSSIBLE CAUSE	REPAIR
<b>UNLOADER CYCLES</b>	Fitting leaking downstream	Tighten/replace fitting.
	Piston or valve spring broken or worn	Replace parts as necessary.
	Clogged nozzle	Clean or replace.
<b>FLUID LEAKING FROM BODY</b>	O-ring worn or cut	Replace part as necessary
<b>UNLOADER WILL NOT COME TO PRESSURE</b>	Foreign particle in valve	Replace or clean.
	Nozzle worn or wrong size	Replace part as necessary.
	Piston or valve worn	Replace part as necessary.
<b>EXTREME PRESSURE SPIKES</b>	Adjusting nut turned completely into unloader	Back off adjusting nut.
	Clogged nozzle	Clean or replace.
<b>MACHINE SMOKES WHILE BURNER UNIT IS RUNNING OR UNIT SMOKES AT COLD-START ONLY WHEN BURNER IS OFF</b>	Improper fuel or water in fuel	Drain tank and replace contaminated fuel
	Improper air adjustment	Readjust air bands on burner assembly
	Fuel pressure is low <140 psi for burner	Adjust fuel pump pressure to specifications
	Burner nozzle is plugged or dirty	Replace nozzle. Check parts breakdown for nozzle size
	Burner nozzle spray pattern is faulty	Replace nozzle. Check parts breakdown for nozzle size
	Heavy accumulation of soot on coils and burner assembly	Remove coils and burner assembly, clean thoroughly Call local dealer
	Misaligned electrode setting	Realign electrodes to specifications
	Obstruction in smoke stack	Check for insulation blockage or other foreign objects
	Low engine RPM	Increase RPM to correct specs. See serial plate
	Fuel Pressure is too high for clean burn (fuel PSI above 140 and below 200) and smokes when burner is off	Reduce fuel pressure PSI/Increase air band set for cleaner without max water heat loss

**Pressure Washer Preventive 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 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>		
Engine Oil	Inspect	Daily
	Change	Every 25 hours
	Filter	Every 50 hours
Air Cleaner	Inspect	Every 50 hours or monthly
	Clean	Every 3 months
Battery Level		Check monthly
Engine Fuel Filter		500 hours or 6 months
Spark Plug Maintenance		500 hours or 6 months
Clean Fuel Tank(s)		Annually
Replace Fuel Lines		Annually
Pump Oil (SAE 10W-40 Non-foaming)	Inspect	Oil level daily
	Change	After first 50 hours, then every 500 hours or annually
Clean Burner Filter		Monthly (More often if fuel quality is poor)
Remove Burner Soot		Annually
Burner Adjustment/Cleaning		Annually
Replace Burner Nozzle		Annually
Descale Coil		Annually (More often if required)
Replace High Pressure Nozzle		Every 6 months
Replace Quick Connects		Annually
Clean Water Screen/Filter		Weekly
Replace HP Hose		Annually or as needed
Diverter Valve Cable		Lube Cable Weekly

## Maintenance

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### Oil Change Record

**Pump Oil:** Check pump oil level before first use of your new Power Washer. **Change** pump oil after first 50 hours and every year or 500 hours thereafter. Use SAE 10W-40 weight oil, non-foaming.

**Engine Oil** - Use 4-stroke motor oil that meets or exceeds the requirements for API service category SJ or later (or equivalent).

Date Oil Changed Month/Day/Year	No. Of Operating Hours Since Last Oil Change	Brand Name and Type of Oil (See above)

## Trailer Preventive Maintenance

This trailer 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.

<b>MAINTENANCE SCHEDULE</b>		
<b>Tire Air Pressure</b>	Inflate to proper pressure indicated on sidewall	Every Trip
<b>Wheel Lugs, Bolts, Nuts and Wheel Mount</b>	Tighten to proper torque specifications	Every 3000 mi or 3 mos.*
<b>Wheel</b>	Check for damage and or out-of-round	Every 6000 mi or 6 mos.
<b>Coupler Ball</b>	Check for sufficient lube. Check lock mechanism. Check for unusual wear.	Every trip
<b>Safety Chains at Hitch Ball</b>	Check for abrasion, distortion and general integrity of links.	Every trip
<b>Coupler</b>	Check for proper fastening & hitch pin in position and secure.	Every trip
<b>Brakes</b>	Check for proper adjustment & operation	Every trip
<b>Breakaway Switch</b>	Test switch operation and connections	Every trip
<b>Breakaway Battery</b>	Pull switch pin, check charge indicator light	Every trip
<b>Load Distribution</b>	Check load distribution & security	Every trip
<b>Welds</b>	Check all weld beads for cracks or separations	Every 6000 mi. or 6 mos.
<b>Electrical: Lights &amp; Signals</b>	Check to make sure all are working properly. Replace burned out bulbs.	Every trip
* Check lug nuts for tightness before initial trip, at 10 miles, 25 miles and 50 miles. Recheck at least every 3 months or 3000 miles		

## Axles, Hubs and Brakes

Maintenance for axles, hubs and brakes is extremely important for protecting the longevity of your trailer. It is extremely important for your personal safety and the protection of others.

***Please, never shortcut axle, hub and brake service and maintenance.***

**LANDA<sup>®</sup>**

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