SPARTAN TOOL

FOR TOUGH CUSTOMERS. SINCE 1943.

Ultimate & High Flow Warrior

Standard Warrior

PRODUCT MANUAL

Standard, Hi-Flow & Ultimate Warrior

Trailer Jetter

Spartan Tool LLC | 1618 Terminal Road | Niles, MI 49120

order by phone **800.435.3866** order online **SpartanTool.com**

Part #7992G000, 7993G000, 7994D000

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Warnings

- Read the safety and operating instructions before using any Spartan Tool product. Drain and sewer cleaning can be dangerous if proper procedures are not followed and appropriate safety gear is not utilized. Read the engine owners' manual for instructions and safety precautions on engine operation.
- Gasoline is extremely flammable and is explosive under certain conditions.
  - Refuel in a well ventilated area with the engine stopped. Do not smoke or allow flames or sparks in the area where the engine is refueled or where gasoline is stored.
  - Do not overfill the fuel tank (there should be no fuel in the filler neck). After refueling, make sure the tank cap is closed properly and securely.
- Before starting unit, be sure to wear personal protective equipment such as safety goggles or face shield and protective clothing such as gloves, coveralls or raincoat, rubber boots with metatarsal guards, and hearing protection.
- Carbon monoxide exhaust and/or gasoline fumes from this equipment can create a hazardous atmosphere in confined spaces (which may include, but are not limited to, manholes and septic tanks), closed garages or other areas which may not be properly ventilated. In particular, excess gasoline fumes can create an explosion hazard. Such hazardous atmospheres can cause death or severe injury. Do not operate this equipment with its cart (used to house the engine and gasoline tank) located in any confined space or area with inadequate ventilation. Operate this equipment only when the cart is located outdoors or in an open, well-ventilated area.
- Ensure the jet hose has been placed in the pipe a minimum of 6 feet before engaging the water pressure to prevent the hose from coming out of the pipe prematurely and causing injury.
- Always shut off the water pressure before pulling the hose out of the pipe. Mark the hose a minimum of 6 feet from the end to help ensure the hose is not accidentally pulled out of the pipe while still under pressure. Shut off the water pressure when the hose mark is encountered.
- Never point the wash gun at anyone while operating the unit. Injury may result.
- Drains and sewer can carry bacteria and other infectious micro-organisms or materials which can cause death or severe illness. Avoid exposing eyes, nose, mouth, ears, hands, and cuts and abrasions to waste water or other potentially infectious materials during drain and sewer cleaning operations. To further help protect against exposure to infectious materials, wash hands, arms and other areas of the body, as needed, with hot, soapy water and, if necessary, flush mucous membranes with water. Also, disinfect potentially contaminated equipment by washing such surfaces with a hot soapy wash using a strong detergent.
- For any questions, contact Spartan Tool at the address shown below.

CAUTION: Portions of the system can still be under pressure even if the unit is not operating.

CONTACT US

Spartan Tool LLC
1618 Terminal Rod
Niles, MI 49120
800.435.3866
SpartanTool.com

CALIFORNIA PROP. 65
This product may contain an extremely small amount of lead in the coating. Lead is a material known to the State of California to cause cancer or reproductive toxicity.

Technical Information

STANDARD WARRIOR WATER JET SPECS

GENERAL

- Pipe Sizes: 3” to 24" diameter
- Max Water Pressure: 4,000 psi
- Max Water Flow: 18 GPM
- Water Capacity: 300 gallons
- Trailer L x W x H: 160” x 73” x 74”

TRAILER

- Gross Vehicle Weight Rating (GVWR): 7060 lbs (3202 kg)
- Gross Axle Weight Rating (GAWR): 6460 lbs (2930 kg)
- Hitch: 2" Ball Type (Class IV)
- Tires: ST 235-80-R16BE-I (Max Load: 3520 lbs each)
- Cold Inflation Pressure: 80 PSI / 552 kPa (each)
- Rim (diameter x width x capacity): 16" x 6" x 3750 lbs (each)
- Maximum Recommended Towing Speed: 55 mph

ENGINE

- Model: KDI 2504 TCR Kohler Gas WG3800 Engine
- Cylinders: 4
- Bore & Stroke: 3.5” x 4”
- Displacement: 151.5 cu. in.
- Fuel: Diesel Fuel Oil No. 2-D (ASTM D975-09 B-Grade 2-D S15)/ Unleaded Gas
- Fuel Tank Capacity: 20 gal
- Cooling: Water Cooled
- Oil Capacity: 3.25 gal
- Electric: 12 Volt/Negative Ground
- Powered Engagement Clutch: Hayes bearing supported stub shaft

REWIND

- Hydraulic pump & motor with 8 gal reservoir

FEATURES

- Smart pressure engine setting
- Clutchless engine and pump configuration
- Adjustable pressure unloader allows easy adjustment of pressure while maximizing flow when all you need is additional flow in the pipe
- 300-gallon water tank with integrated baffles allows unit to be towed while full of water

SAFETY

- 12" nozzle anti-turn device
- Center, raised stop light
- Top-mounted amber strobe safety light
- Emergency stop button to manually shut down machine
- Automatic engine shutdown protection for low water, low engine oil pressure, and high engine temperature

Technical Information

ULTIMATE WARRIOR WATER JET SPECS

GENERAL

- Pipe Sizes: 3" to 24" diameter
- Max Water Pressure: 4,000 psi
- Max Water Flow: 18 GPM
- Water Capacity: 600 gallons
- Trailer L x W x H: 191" x 73" x 74"

TRAILER

- Gross Vehicle Weight Rating (GVWR): 9900 lbs (4495 kg)
- Gross Axle Weight Rating (GAWR): 4700 lbs (2134 kg)
- Hitch: 2-5/16" Ball Type (Class IV)
- Tires: ST 225-75-R15BD (Max Load: 2540 lbs each)
- Cold Inflation Pressure: 65 PSI / 448 kPa (each)
- Rim (diameter x width x capacity): 15" x 6" x 2600 lbs (each)
- Maximum Recommended Towing Speed: 55 mph

ENGINE

- Model: KDI 2504 TCR Kohler Gas WG3800 Engine
- Cylinders: 4
- Bore & Stroke: 3.5" x 4"
- Displacement: 151.5 cu. in.
- Fuel: Diesel Fuel Oil No. 2-D (ASTM D975-09 B Grade 2-D S15)/ Regular Unleaded
- Fuel Tank Capacity: 20 gal
- Cooling: Water Cooled
- Oil Capacity: 3.25 gal
- Electric: 12 Volt/Negative Ground
- Powered Engagement Clutch: Hayes bearing supported stub shaft

REWIND

- Hydraulic pump & motor with 8 gal reservoir

FEATURES

- 600-gallon water tank with integrated baffles allows unit to be towed while full of water

SAFETY

- 12" nozzle anti-turn device
- Center, raised stop light
- Top-mounted amber strobe safety light
- Emergency stop button to manually shut down machine
- Automatic engine shutdown protection for low water, low engine oil pressure, and high engine temperature

HI-FLOW WARRIOR WATER JET SPECS

GENERAL

- Pipe Sizes: 4" to 36" diameter
- Max Water Pressure: 3,000 psi
- Max Water Flow: 35 GPM
- Water Capacity: 600 gallons
- Trailer L x W x H: 191" x 73" x 74"

TRAILER

- Gross Vehicle Weight Rating (GVWR): 9900 lbs (4495 kg)
- Gross Axle Weight Rating (GAWR): 4700 lbs (2134 kg)
- Hitch: 2-5/16" Ball Type (Class IV)
- Tires: ST 225-75-R15BD (Max Load: 2540 lbs each)
- Cold Inflation Pressure: 65 PSI / 448 kPa (each)
- Rim (diameter x width x capacity): 15" x 6" x 2600 lbs (each)
- Maximum Recommended Towing Speed: 55 mph

ENGINE

- Model: KDI 2504 TCR Kohler Gas WG3800 Engine
- Cylinders: 4
- Bore & Stroke: 3.5" x 4"
- Displacement: 151.5 cu. in.
- Fuel: Diesel Fuel Oil No. 2-D (ASTM D975-09 B Grade 2-D S15)/ Unleaded Gas
- Fuel Tank Capacity: 20 gal
- Cooling: Water Cooled
- Oil Capacity: 3.25 gal
- Electric: 12 Volt/Negative Ground
- Powered Engagement Clutch: Hayes bearing supported stub shaft

REWIND

- Hydraulic pump & motor with 8 gal reservoir

FEATURES

- Smart pressure engine setting
- 600-gallon water tank with integrated baffles allows unit to be towed while full of water

SAFETY

- 12" nozzle anti-turn device
- Center, raised stop light
- Top-mounted amber strobe safety light
- Emergency stop button to manually shut down machine
- Automatic engine shutdown protection for low water, low engine oil pressure, and high engine temperature

Technical Information

ALL WARRIORS INCLUDE

REWIND

- Hydraulic pump & motor with 8 gal reservoir

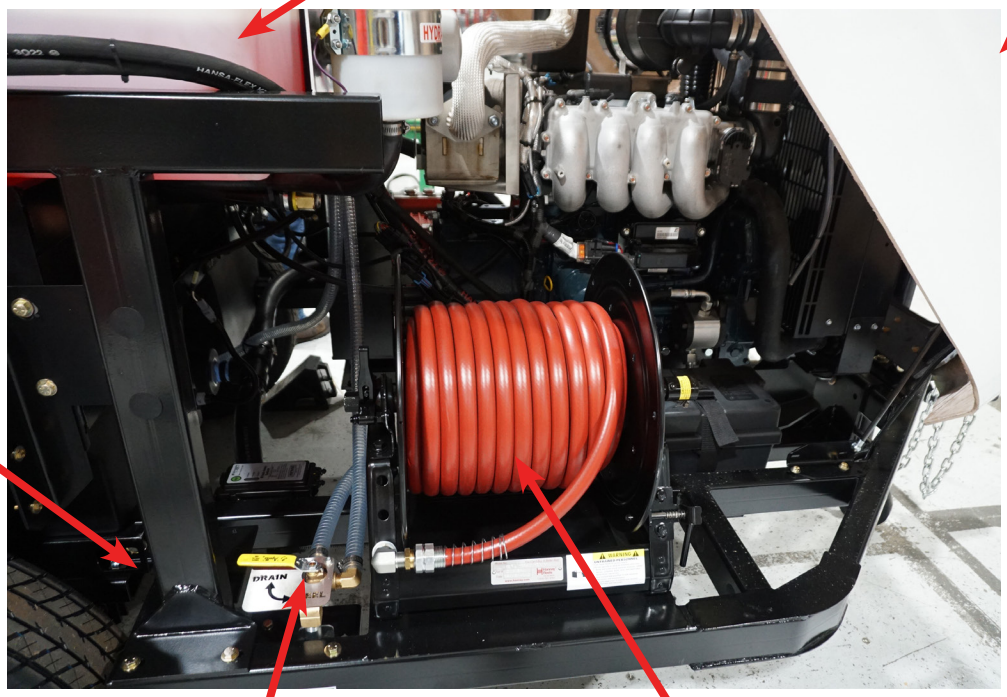
FEATURES

- 1/2" x 500' Thermal Plastic High Pressure Hose (5/8" Hose for High Flow)
- 1/2" x 15' Colored Leader Hose
- 5/8" x 100' Supply Hose, Mounted on Reel
- 75' of 1/4" trap-cleaning hose
- Torsion axle suspension with electric brakes (dual axles for ultimate & high flow)
- Tier IV Diesel Engine Meets Standards
- Easy Access Pump Inlet Filter
- Unit equip with Three Way Ball Valve (enables engine to warm up without building water pressure)
- Hydraulic Hose Rewind and Hose Rewind Guide
- Rear Operator Control and Instrument Gauge
- Negative Ground Wiring
- 6' Break Away Wiring Harness
- Hitch Jack with Swivel Caster Wheel
- Class IV 2" (Standard) 2-5/16" (Ultimate & High Flow) Hitch with Safety Tether Brake
- Automatic Pressure Regulator
- Patented 180° pivoting hose reel and controls with variable speed hydraulic rewind
- Fully enclosed (and lockable) for the quietest large trailer jetter in the world
- Lift-up rear door provides sun and weather protection for operator
- Manhole hose protection
- Marine-grade gauges and battery enclosure
- Nozzle storage
- Wash down gun and lance
- 4 preassigned engine speed settings
- Bearing buddies
- Open and closed nozzles
- Hose and hydrant fill valves
- Hose rewind guide pivots with reel
- Full-system winterization with antifreeze recirculation
- Electronic controlled pump pulsation for maximum cleaning distance
- National Association of Trailer Manufacturers Certified

SAFETY

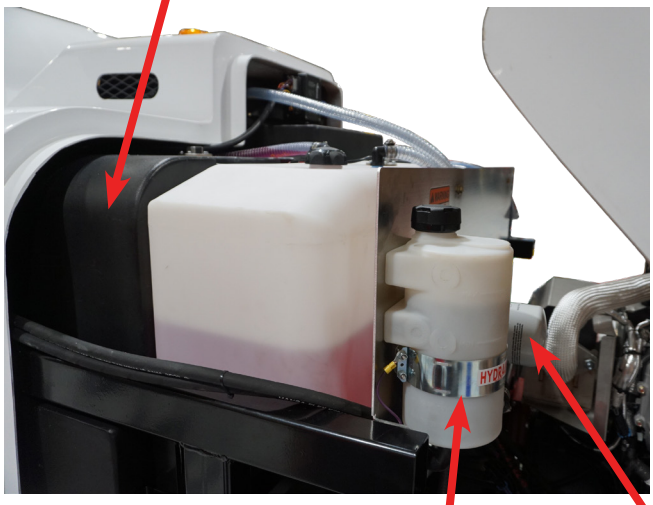
- 12" nozzle anti-turn device
- Center, raised stop light
- Top-Mounted and Rear Door Facing Amber Strobe Light
- Emergency stop button to manually shut down machine
- Automatic engine shutdown protection for low water, low engine oil pressure, and high engine temperature

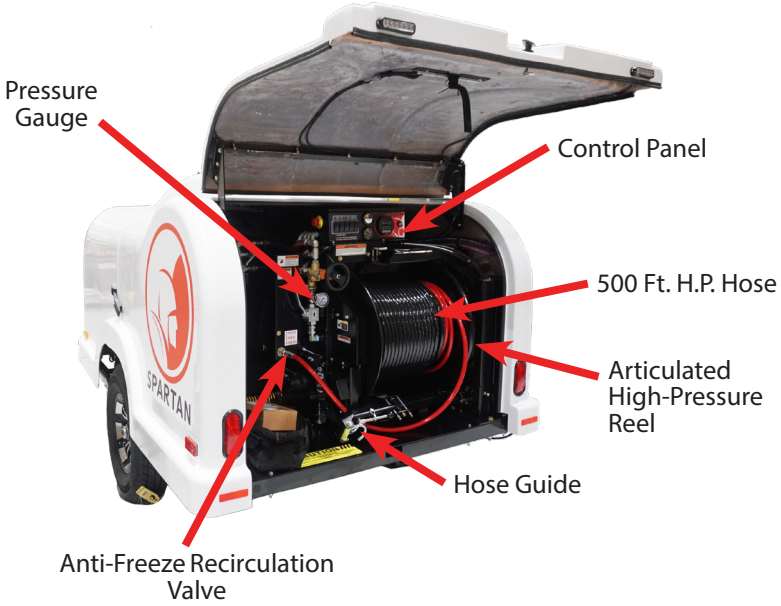
Machine Overview



300 Gallon Baffled Water Tank(s)

Ultimate & High Flow have 2 Water Tanks connected together





Towing Instructions

Before hitching and towing on public roads, check that the tow vehicle uses a 2-5/16" ball on a hitch rated class IV (2" diameter for Standard Warrior), make sure keeper engages ball to secure hitch. Adjust if necessary.

The 300-gallon water tank(s) are equipped with internal baffles which minimizes water sloshing when towed. However, the following 2 rules may limit your vehicles towing capacity and the tank fill level when towed. Determine towing capacity as described below and follow guidelines in using the lowest value from the 2 rules.

TRAILER HITCH

Check rating of vehicle's trailer hitch

- Standard Warrior: Class IV - 10,000 lbs. towing capacity
- Ultimate & High Flow Warrior: Class IV - 12,000 lbs. towing capacity

VEHICLE GCWR (GROSS COMBINED WEIGHT RATING)

Towing capacity = GCWR minus vehicle weight minus cargo weight minus passenger weight.

- **Note:** GCWR is provided on your vehicle or in vehicle manual.

VEHICLE TOWING CAPACITY

- Refer to the Vehicle Owners Manual for listed trailer towing capacity.
- Trailer towing capacity should equal GCWR minus vehicle weight, cargo weight, people weight, and (vehicle) fluids weight.
- Check axle load rotatings.

Wire the plug receptacle to your vehicle as show below.

- **Note**: The wire colors used on the jet running lights are also indicated in Fig. 7-1 for re-wiring to a different plug design.

- Always use trailer lights.

View Looking Toward Receptacle

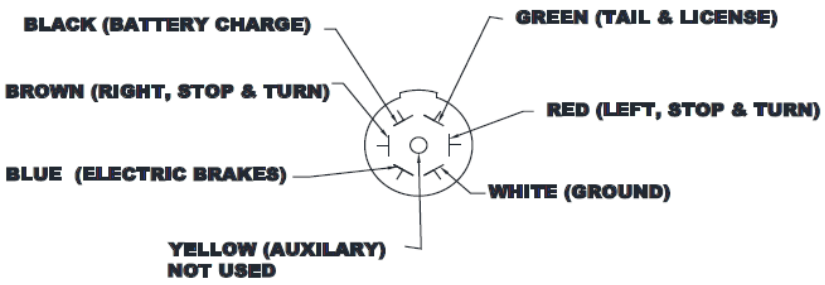
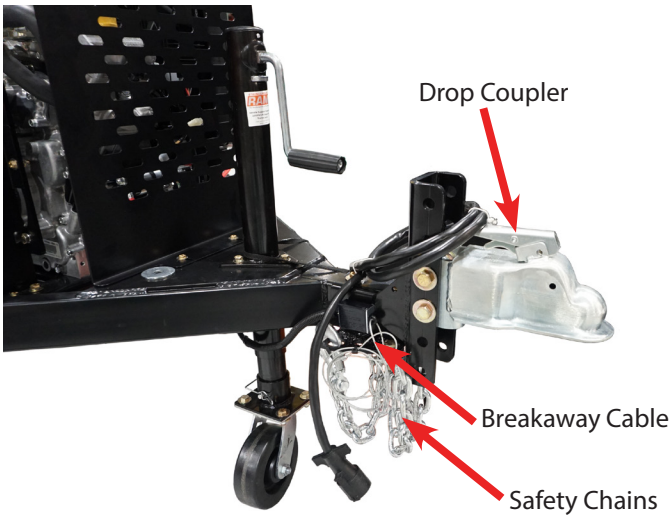
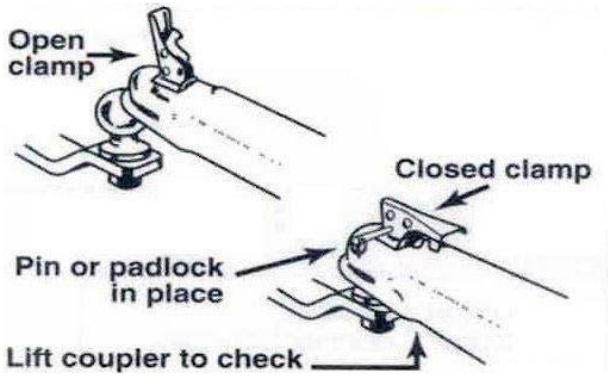


FIG. 7-1





The coupler will need to be adjusted up or down depending on vehicle hitch height to ensure the jetter is towed level.

TOWING

1. Check that ball size is same as coupler.
2. Check that Ball Load Rating is the same or greater than Coupler Load Rating
3. Open clamp on hitch coupler.
4. Position hitch coupler above trailer hitch ball.
5. Lower trailer tongue until ball rests in ball socket.
6. Close hitch coupler clamp and secure with a pin or padlock.
7. Connect breakaway cable solidly to bumper or frame of tow vehicle as near to center as possible. The cable must hang clear of trailer tongue and be long enough to permit short radius without pulling breakaway cable forward.
8. Make sure breakaway cable is in the released position.

CAUTION: Do not use breakaway cable as a parking brake.

NOTE: Check location of breakaway cable periodically during each trip. Accidental application will cause brakes to drag and heat up, causing failure.

9. Cross safety chains underneath coupler. Allow slack for trailer to turn. Attach chain hooks securely to tow vehicle frame.

CAUTION: Avoid sharp turns. This could bend, create extreme stress or fracture either the actuator or trailer tongue.

10. Fully retract hitch jack and remove caster wheel. This will provide adequate ground clearance for transport.
11. Return high pressure reel to towing position, engage the transit lock, and confirm reel lock is engaged.
12. You are now ready to tow your trailer. The maximum recommended towing speed is 55 mph.

CAUTION: Always use safety chains. Chains hold trailer if connection fails.

Pump and Pressure System

The pump and relief valve are the heart of your jet. They have been specifically designed for use with cold water (140°F max) for pipe jetting but can provide useful water flow for many other cleaning jobs using the optional wash down gun and special attachments. The positive displacement pump (each crankshaft revolution has to move a certain amount of water) uses 3 plungers (similar to pistons in an engine) to create water flow. Pressure is not created until the pump outlet is restricted with a valve or nozzle. The Standard and Ultimate Warrior pump, valving, and hoses can support 4,000 psi working pressures. The High Flow Warrior supports up to 3,000 psi.

- The regulator valve acts to direct the water flow to the water tank when the hose reel and gun valves are off or if nozzles provide too much restriction for total flow.
- Always use clean water to keep the regulator valve operating properly.
- The hose and nozzle are designed to allow full flow at 4,000 psi (3,000 psi for High Flow Warrior), and the wash down gun operates at lowest engine speed.
- If leaks develop in the system between the relief valve and hose reel valve (or gun valve) you will hear intermittent engine surges in by-pass as the by-pass pressure gradually drops and is built up again by the pump. Tighten or otherwise repair the leaks for smooth running.
- Always stop engine and release pressure before any plumbing changes or repairs.

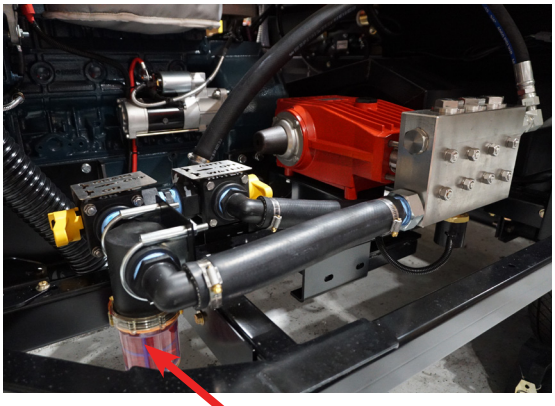
Fig. 10-1

CAUTION: Because of the inherent hazards with high pressure, use only Spartan high pressure hoses and components when repairing your machine.

If the nozzles become worn or if the gun is used with the jet hose, the regulator valve allows the same total flow but at a lower pressure because the restriction is lower. Replace the nozzles in order to maintain the desired pressure.

If nozzles become plugged, the regulator valve will direct some of the flow back to the water tank while providing pressures over maximum regulator setting. If these pressures are seen with normal engine speed check and clean the nozzles. When using optional lengths of 1/4" hose (>75'), the operating pressure can also exceed maximum setting at full gpm. Reducing engines RPM will produce lower pressures to prevent regulator valve from by-passing off and on.

Clean the water filter daily. A clogged filter will cause the pump to run dry and can cause expensive damage to the pump.



High Pressure Water Jetting

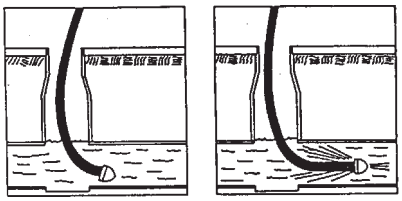
High pressure water jetting is the utilization of high pressure water combined with sufficient water flow to remove debris in drain/sewer pipes. High pressure water jetting can also be used to remove debris on surfaces.

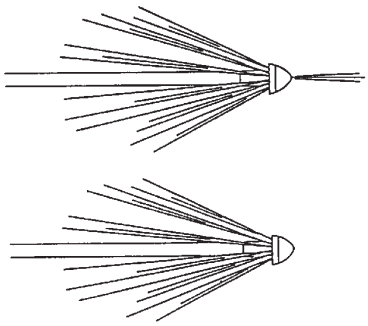
A high pressure water jet consists of a pump, a motor or engine, a hose reel, a given length of hose, and a various assortment of nozzles.

A pipe is cleaned with a high pressure water jet by directing water pressure and flow through a nozzle. Controlled water pressure and flow propels a water jet through the sewer pipe allowing it to remove and wash away the obstruction (See Fig. 11-1).

Ideally, a sewer pipe is cleaned from the lower end of the pipe and the hose propels itself to the higher end of the pipe. By slowly withdrawing the jet hose, the water pressure and flow cleans the line most effectively. When it is impossible to clean from the lower end of the pipe, the pipe must be water jetted several times to remove all the debris. A skilled operator can effectively clean a drain/sewer regardless of the obstacles in his or her way.

How A Jet Works





(Penetrating Nozzle) 79824700

Nozzle to be used for initial penetration of sewer pipe.

(Closed Nozzle) 79824600

Nozzle to be used for thorough cleaning of sewer pipe.

Fig. 11-1

Included Nozzles

	Penetrating Nozzle	Closed Nozzle
Standard Warrior	**79824700**	**79824600**
Ultimate Warrior	**79824700**	**79824600**
High Flow Warrior	**79966100**	**79966000**

Engine Operation Procedure

Engine speeds are preset at the factory and should require no adjustment in the field. The Warrior is also equipped with a low water safety switch, which indicates critical water levels in the supply tanks. When tripped, the low water safety switch will automatically shut down the engine.

START UP

1. Check water tank level. This water jet is equipped with a low water shut-off switch that will automatically shut down the engine at low water levels.
2. Check fuel level.
   - **Note:** Also check engine and pump oil levels per manufacturer specifications (attached).
3. Turn key switch to crank position and start engine.
4. Allow engine to warm up on lowest engine speed for several minutes.
   - **Note:** If the low water switch is tripped, the engine will automatically shut down and will not continue to run. Operate low water override if desired to run despite low water.

ENGINE SHUT-DOWN

1. Reduce engine speed to idle by pressing down arrow button.
2. Idle engine for at least 5 minutes to allow systems to cool.
3. Move all panel rocker switches to OFF.
4. Turn OFF key switch.

Water Tank Filling

Fill the water tank from a clean water source. Always flush rust out of hydrants before connecting fill hose. Trailer jet unit can be filled using 5/8" garden hose on fill reel or using fire hydrant fill. Fire hydrant fill requires fire hose with 2" cam lock female quick coupler.

- Standard Warrior: Class IV - 10,000 lbs. towing capacity
- Ultimate & High Flow Warrior: Class IV - 12,000 lbs. towing capacity

NOTE: If the next 4 items are not followed, cavitation of the pump could occur and reduce operating efficiency and severely damage the pump.

- Use water temperatures under 140°F.
- Ensure that water strainer is clean (check daily as needed).
- Make sure the strainer valve (between the tank and the pump) is fully open during operations. This valve stops tank flow to allow strainer service.
- The pump drain valve must be closed. It must not drip when engine is off and strainer valve is open.

Operation Set Up

Always locate the jet in the driest and safest place possible. Avoid high traffic areas and use flashers and safety cones. Position the jet so that the hose can be pulled directly off of the reel for use. Remember that jetting is most effective when you jet against the water flow. See Fig. 13-1 for the recommended positioning of the jet for best visibility during manhole work.

NOTE: Loosening the hose and damaging corners are minimized when the jet is parked as shown.

When operating upon unlevel ground, position the trailer with the hitch (tank suction) end pointed downhill.

For non-manhole use, allow extra space for handling the hose before it is wound back on the reel or run the hose directly to the pipe inlet using extra hose guards to protect the hose from cutting when going around corners.

WARNING: Do not unhitch or operate trailer jet unhitched upon unlevel ground.

When unhitching the machine from towing vehicle, always follow these steps:

1. Disconnect ball hitch by loosening ball clamp and jacking hitch up.

2. Disconnect safety chains and light cord before driving away.

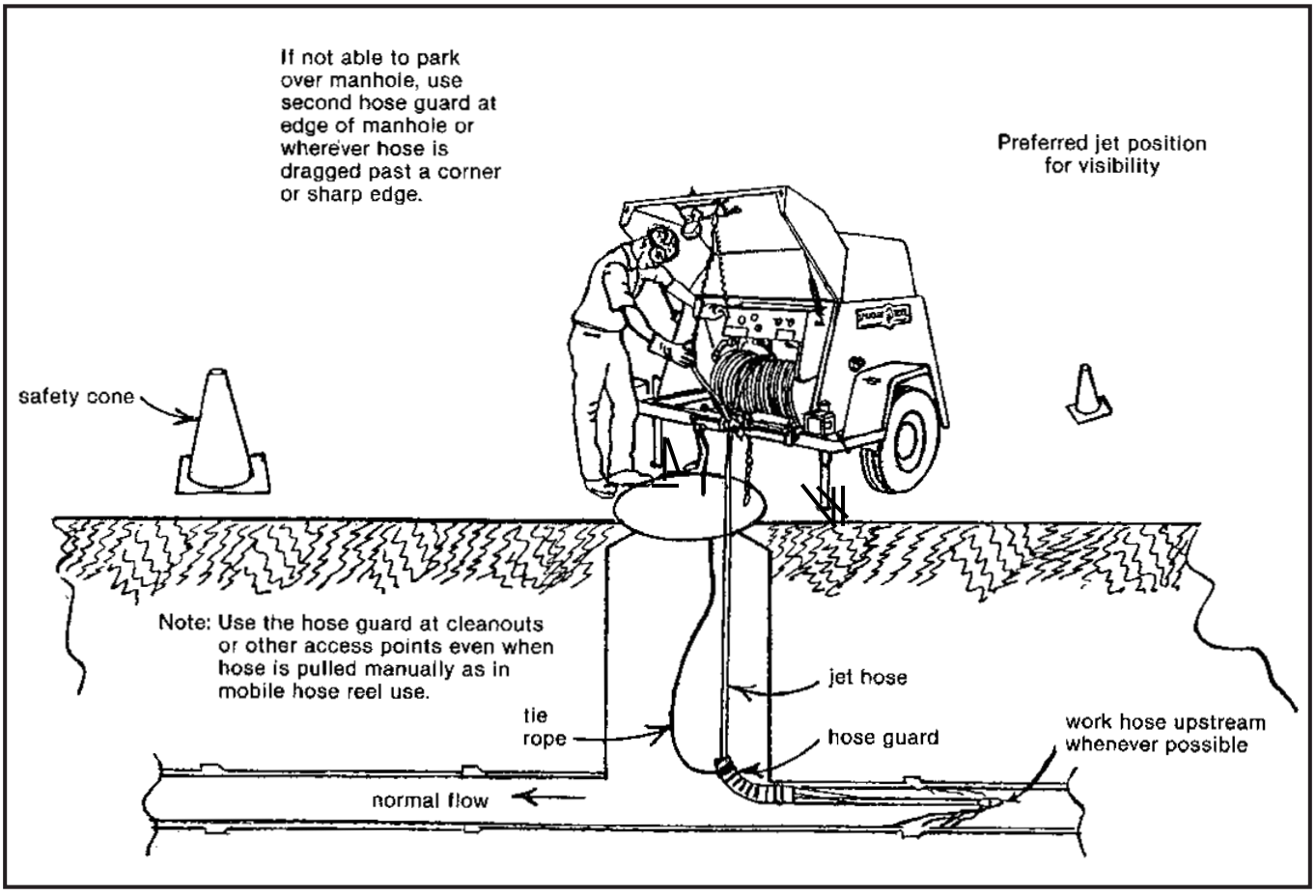


Fig. 13-1

Hydraulic Rewind Instructions

The hydraulic rewind control valve can be used to feed out high pressure hose and rewind hose back to the reel. The control lever should be left in its neutral position while transporting trailer jet unit.

The high pressure hose reel is hydraulically locked from rotating when in neutral (position between hose in and out). Move hydraulic control back to rewind hose on reel and forward to power feed hose off reel. Move hydraulic control completely forward until spool goes into descent; the reel will now free spin.

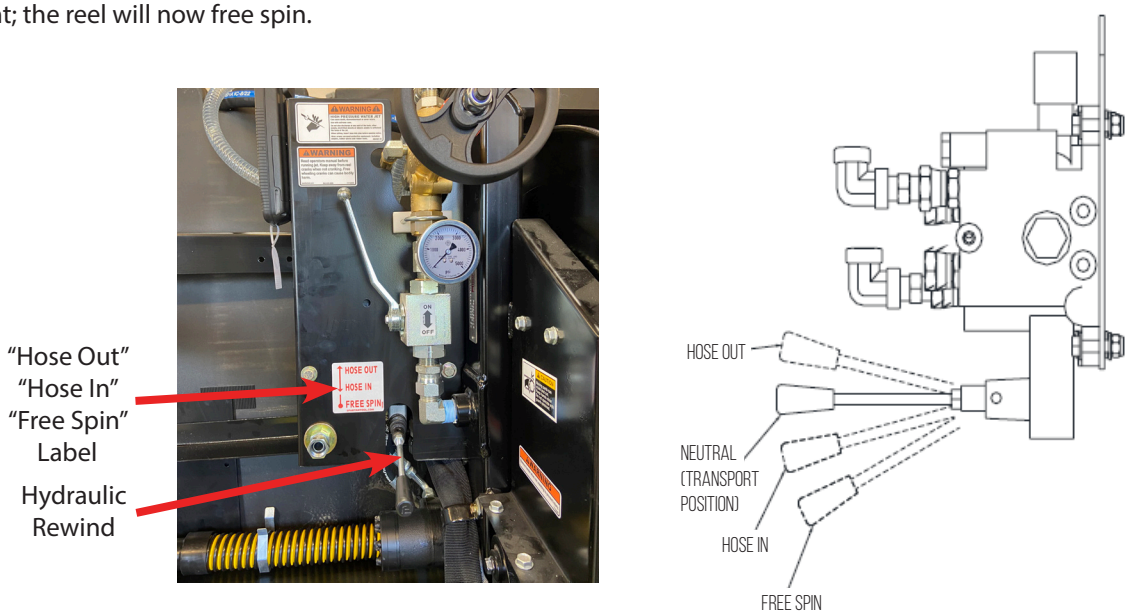


Fig. 14-1

Operating Instructions

- Move hydraulic control lever completely forward into "Free Spin" position. Select and install nozzle, hose guard(s), and roller guides.
- Always insert sewer hose several feet into pipe opening before actuating the water control switch. Never stand in front of the pipe opening when a nozzle is near the opening. As described in the setup section, work upstream whenever possible.
- You are ready to start pipe cleaning operations after tank filling and engine starting procedures are followed.

NOTE: At this time, put on safety goggles to prevent eye injury from flying water and debris.

- Turn H.P. water control switch to ON and choose operating pressure desired. As the nozzle pulls the hose into the pipe, the hose reel can free spin or hydraulically feed the hose out. Untwist hose kinks as necessary before they enter the pipe. Proceed slowly and cautiously.
- Pull back 1-2 feet for every 4-5 feet of progress to make sure that the hose is not burying itself or tying itself up in an open cavity or larger pipe.

WARNING: Do not let the engine run at full throttle without load (hose reel valve OFF) for longer than 1-2 minutes.

- Continue working up the line while watching and feeling for speed changes as the nozzle makes its way into a blockage.

HINT: Use 15' leader hose as indicator of how close the nozzle is to the pipe opening.

- When working over a manhole, you often will see dirty water, chunks of grease or debris flow past as the nozzle penetrates a blockage. When backed up water flows, the line is probably open. Continue working up the line to open restrictions as desired.
- Now, pull the "working" nozzle back slowly to reclean and scour the pipe walls. When working through heavy and long blockages

REMINDER: All rocker switches, including the Engine key switch must be off to prevent battery drain while engine is shut down.

you may have to flush debris back to machine every few feet. Repeat until water runs clean from the pipe.

- When finished, turn H.P. water control switch to OFF, idle down engine, and disengage clutch before removing nozzle from pipe.
- Wind hose back onto reel, remove hose guard and nozzle from hose. Secure hose end to recirculation valve located on the right side of the H.P. reel. Store all parts in the tool box compartment.
- Follow engine shut down procedure.
- Reverse setup instructions, drain tank and disconnect fill hose. Replace manhole cover or pipe caps and clean up machine and job site before leaving.

OPERATING HINTS:

The following techniques can be tried if the going gets slow.

- Grab the hose into an "S" shape and twist the hose to help it get around corners and off of pipe edges (See Fig. 16-1 & 16-2).
- Turn water valve off and pull hose back out of line. Look for traces of clay or other material to determine if nozzle is burying itself outside of pipe.
- Try different nozzle or different pipe openings.
- Walk to nearby buildings and manholes and listen for a water sound to determine if hose is going where it should. The hose may tie itself up in a manhole and need help going into the next pipe. Use a pole or pipe to guide the hose so entering the manhole can be avoided.

PIPE JETTING PROCEDURE

- Although all Warriors are capable of various high pressure cleaning operations, jetting pipes of 4" - 36" is typically the major work required of the jet. The hose reel is designed for outdoor applications. An optional portable hose reel and 1/4" drain hose can be purchased for indoor applications, remote applications, and for lines smaller than 6".
- For ***safety*** reasons, always operate with 2 people when the pipe entrance is away from the jet location; one person should stay near the jet to control the machine operation while the other person works the hose and nozzle.
- The sewer hose should always be replaced when the reinforcement cord can be seen due to a worn cover.
- The Warrior nozzles are designed to match the pressure and flow performance of your jet. They are key to efficient operation because they convert all of the engine and pump power to water speed for hose pull and for cleaning impact.
- Nozzles "Closed" (79966000) and "Open" (79966100) are standard equipment for the High Flow model. See page 13 additional nozzles. Nozzle holes will wear after several months of continuous use. If the system operating pressure drops, try a new nozzle to check for wear. Check for nozzle plugging occasionally by removing the nozzle from the hose and holding up to the light. Clean by inserting small diameter wire if necessary. Plugged nozzles will cause poor hose pull even though the gauge pressure will show higher.

ENCOUNTERING OBSTRUCTIONS

- When obstruction or corners are encountered it may be necessary to manually rotate the hose (See Fig. 16-1) to enable feed through that area. The rotation will cause the jetting nozzle to jump over or around those areas. When it becomes necessary to manually rotate the hose to clear obstructions, any rotations in one direction must be followed by an equal number in the opposite direction to prevent kinks from building in the hose.
- At times, it will be necessary to move the hose slightly in and out of the drain line to assist the jetting nozzle in clearing stubborn clogs, obstructions, or tight corners (See Fig. 16-2).

Fig. 16-1

Fig. 16-2

Pulsation

To activate the pulsation feature, turn rocker switch labeled PULSE to the ON position. To deactivate pulsation, turn rocker switch to OFF position.

Fig. 17-1

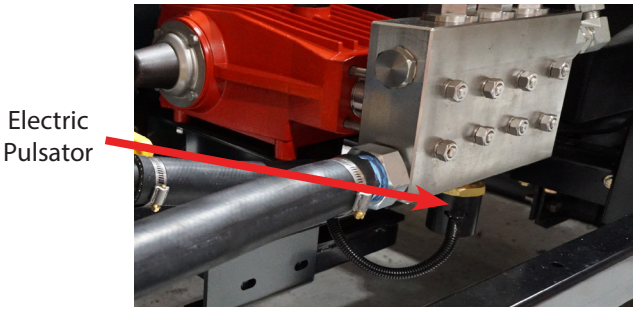


Fig. 17-2

Note: Operating pressure will decrease and fluctuate when pulsation is activated. See below (Fig. 17-3) for approximate pressures.

PRESSURE SETTING	PULSATION PRESSURE (PSI)
1000 psi	200 - 700
2000 psi	800 - 1600
3000 psi	1100 - 1700

Fig. 17-3

Wash Down Gun

To use the wash-down gun, do the following:

1. Turn water control switch OFF, if equipped with optional remote control.
2. Connect wash-down gun to the end of 500' HP hose.
3. Select lowest engine speed setting. Turn water control switch ON (remote control units).

The wash down gun is used to control the spray lance. The lance is attached by pulling back on the ring of the guns quick connect fitting. Insert adapter nipple of lance (or 1/4" hose) until ring can slide back to original position. The lance is equipped with an adjustable spray nozzle for general use. The wash down gun can also be used with the optional portable hose reel with 1/4" drain hose.

CAUTION: HOLD HAND GUN/WASH WAND WITH TWO HANDS AT ALL TIMES. Back pressure buildup on the wash wand/hand gun requires two hands firmly gripping the wand when the trigger is initially pulled.

CAUTION: Under no circumstances should you ever operate the wash down gun in the direction of any other person(s). To do so may cause serious damage to eyes or other bodily tissue and may even cause death.

Lubrication and Maintenance

Note: Use a #2 consistency lithium base grease formulated from a high quality mineral oil with rust and oxidation inhibitors.

Engine PTO.

Grease every 100 hours (a).

Apply about one grease gun shot of an NLGI No. 2 Lithium Grease.

Clean, repack, and set main bearing endplay every 2 years or 4000 hours of operation. Inspect sealed for life pilot bearing for wear.

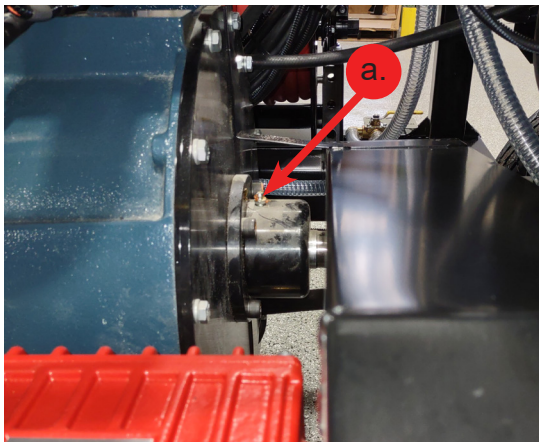


Fig. 20-1

High pressure reel

Oil chain every 200 hours (SAE 30 or heavier oil)

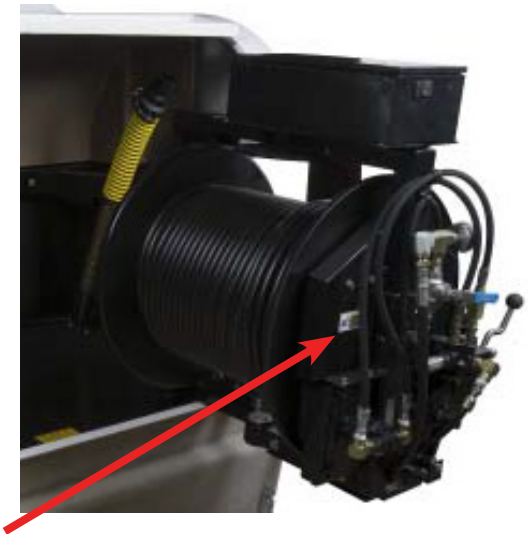


Fig. 20-2

Change hydraulic oil and filter every 500 hours.

Use Amoco - Rykon AW Oil 46.

Hydraulic Oil Filter: 79807100

Fig. 20-3

Change pump oil after first 50 hours and every 500 hours thereafter. Use SAE 80 gear oil.

High Flow Pump Not Shown

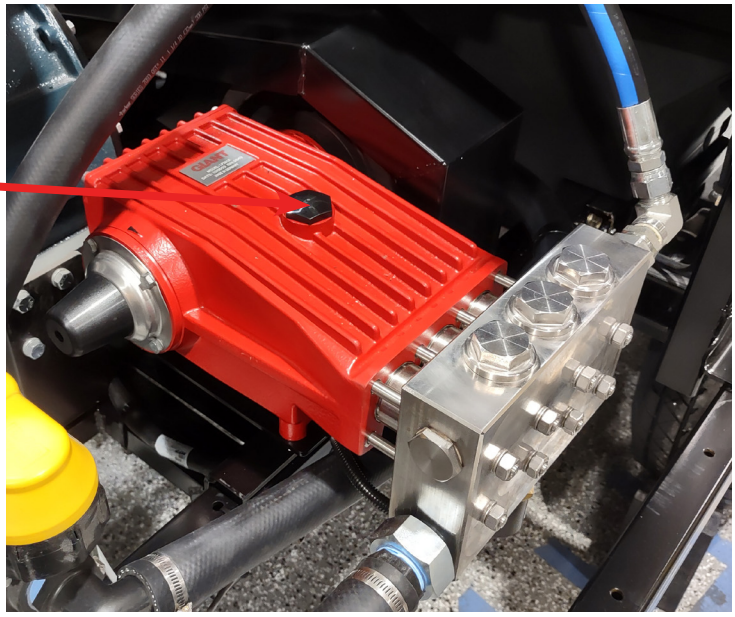


Fig. 21-1

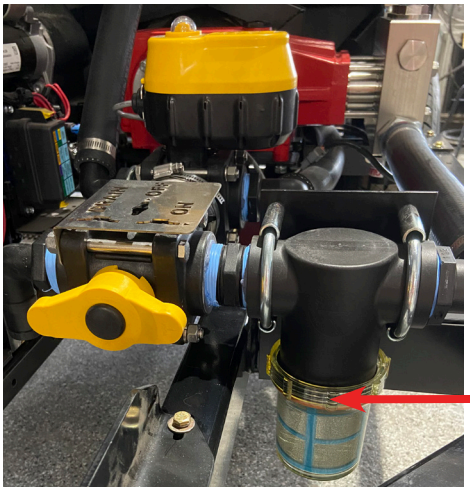


Fig. 21-2

Inlet Filter. Clean daily.

Adjust brakes after the first 200 miles and at 3000 mile intervals thereafter, or as use and performance requires. For brake adjustment procedure refer to the Dexter Axle Service Manual

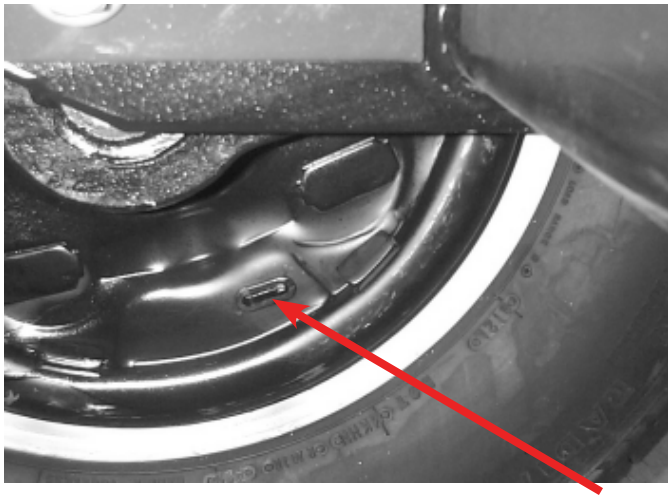


Fig. 21-3

GAS

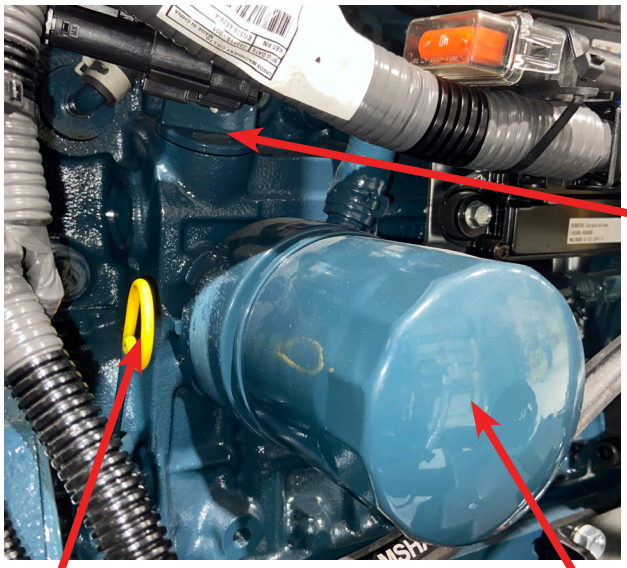


Fig. 22-1

DIESEL

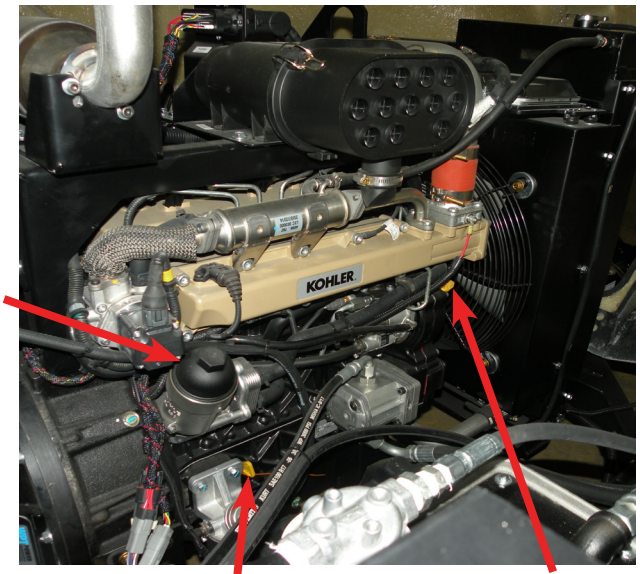


Fig. 22-2

Follow maintenance instructions in Kohler Diesel Engine Operator's Manual.

Note: Use the same type of diesel fuel as used in cars. (ASTM D975 reg. S 15) Keep fuel system clean.

- Use only Kohler approved filters, available at local Kohler diesel dealers.

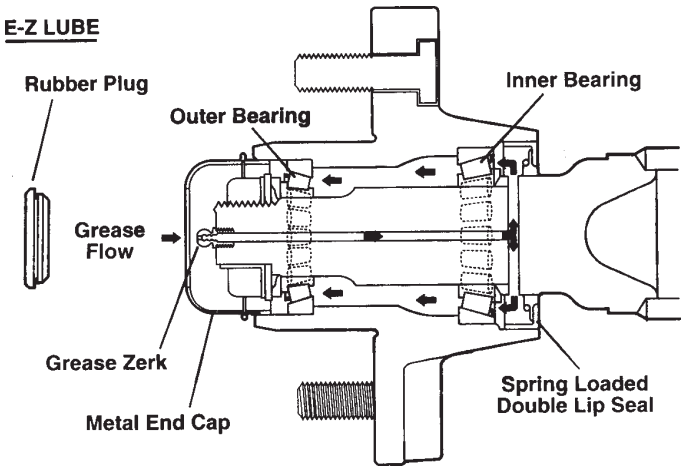


Fig. 22-3

Grease wheel bearings every 12000 miles or 12 months. Follow greasing procedure in the Dexter Axle Service Manual.

For additional maintenance information review the following section in the Dexter Axle Service Manual:

- Braking System - Electric
- Hubs/Drums/Bearings
- Wheels and Tires

Fig. 22-4

Warrior Control Panel

Fig. 26-1

Fig. 27-2

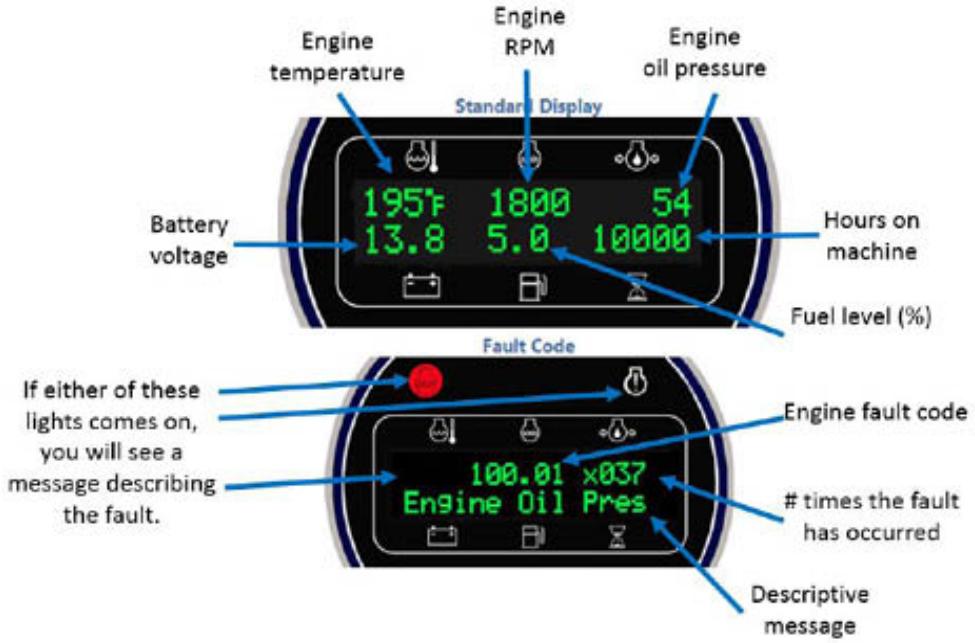


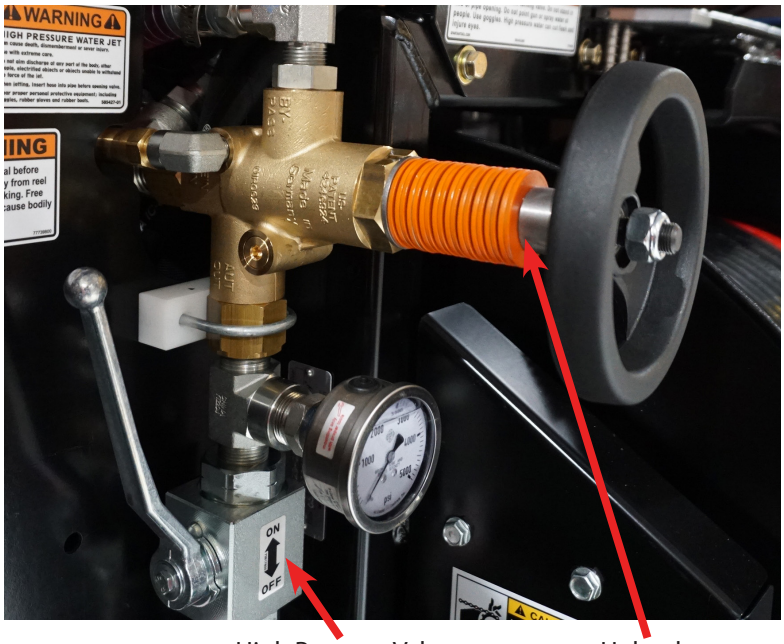
Fig. 27-1

Optional: Wireless Remote Control

If the Warrior is equipped with Wireless Remote Control Activation

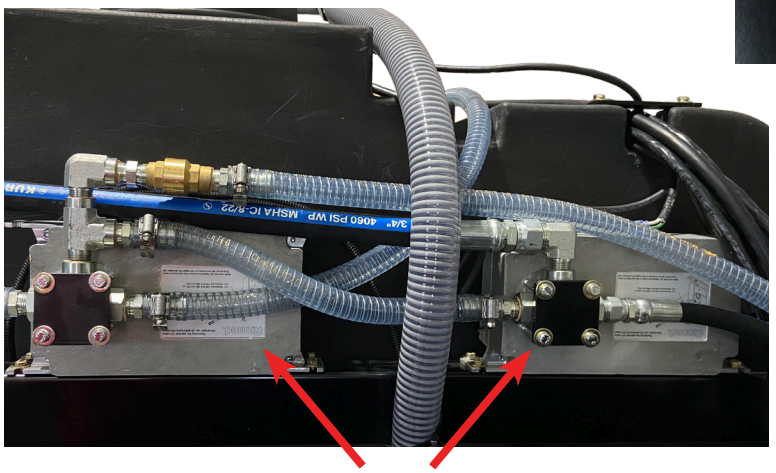
Note: If this switch is in the ON position, all on-board controls are disabled (except ignition switch and beacon)

Behind HP Reel



High Pressure Valve

Unloader



Actuators

(if so equipped)

Long Term Storage

If stored for longer than a week, this machine needs to be run once a week for at least 10 minutes or have a trickle charger connected to maintain the battery. If using a charger, disconnect the battery and do not start the jetter with charger connected to reduce the chance of electrical overload to the system.

Winterize the machine if temperatures will drop to freezing during the time the machine is in storage.

Cold Weather Protection

The warrior comes equipped with a versatile antifreeze system that allows the user to choose between different levels of protection.

Antifreeze Recirculation: Full Winterization

The pump and all hoses charged with antifreeze solution. Antifreeze is conserved by recirculating back to the antifreeze tank.

Water Recirculation: Temporary Freeze Resistance

Water is recirculated through hoses and returned to main water tank.

FULL WINTERIZATION PROCEDURE

1. Fill antifreeze tank with Propylene Glycol Antifreeze and water mixture (Follow manufacturer's recommendation regarding ratio of water to antifreeze).
2. Close water supply valve at pump and open antifreeze supply valve.
3. Remove nozzle or handgun from H.P. (high pressure) hose.
4. Move the selector valve to "Antifreeze Re-circulate"
5. Confirm the H.P. hose is secured and pointed in a safe direction before turning the water on.
6. Follow engine start up procedures. Select the lowest (1000 psi) speed setting. Turn water control switch to ON if unit is equipped with optional remote control system.

> **CAUTION:** Running the engine faster than the lowest setting during recirculation will result in excessive pressure which could cause serious damage and personal injury.

7. Allow water to discharge from H.P. hose. Once the water has visibly changed to antifreeze, turn the water control switch to OFF.
8. Connect the handgun to the 500 ft. H.P. hose. Maintain speed selection at its lowest setting (1000 psi), turn the water control switch to ON and leave on for 10 seconds. Turn water OFF. With a firm grasp of the handgun. Press handgun trigger to release pressure.

> **CAUTION:** Hold the handgun with two hands and always point the handgun away from any other person(s).

9. Disconnect handgun from H.P. hose.
10. Connect the 500 ft. H.P. hose to the recirculation connection fitting located on the baseplate. Connect the 100 ft. fill hose to the recirculation fitting located on the fill reel mounting bracket. Open fill hose valve.
11. Keeping the engine speed set to its lowest speed setting. Turn water control switch to ON if equipped with remote control.
12. Monitor the antifreeze tank. When antifreeze begins flowing into the antifreeze tank, turn the water control to OFF and shut down engine.
13. Close the antifreeze supply valve.
14. Open drain valve and water supply valve at pump to empty the tank completely. Open the hydrant fill valve to confirm that no water is trapped

Cold Weather Instructions

ANTIFREEZE RECOVERY PROCEDURE

1. Close the drain valve and antifreeze valve.
2. Open water supply valve at the front of the unit. Open the fill hose valve at the rear of the unit.
3. Fill the water tank at least 1/4 full of water.
4. Connect the fill hose and H.P. hose to their recirculation connections.
5. Move selector valve to "Antifreeze Re-circulate"
6. Follow engine start up procedures. Select lowest engine speed (1000 psi) setting. Turn water control switch to ON if unit is equipped with optional remote control system.

> **CAUTION:** Running the engine faster than the lowest setting during recirculation will result in excessive pressure which could cause serious damage and personal injury.

7. Monitor the antifreeze tank.
8. Turn the water control switch to OFF when either the antifreeze tank is full of antifreeze or when water is present in the stream.
9. Shut down engine.

WATER RECIRCULATION PROCEDURE

To provide temporary freezing resistance, plain water can be set to recirculate continuously. The moving water will resist freezing, but only provided the pump continues to run. This condition can only be maintained for a limited time. It must be noted that water recirculation will not prevent freezing in very low temperature conditions. When operating in below freezing weather, monitor the water condition closely to avoid costly damage to the system. It also must be noted that the recirculation plumbing itself needs to be protected from freezing by draining or antifreeze treatment.

1. Remove nozzle or handgun from H.P. hose reel.
2. Connect the 500 ft. H.P. hose to the recirculation connection fitting located on the baseplate.
3. Connect fill hose to recirculation fitting located on the fill reel mounting bracket.
4. Set selector valve to "Water Recirculate".
5. Follow engine start up procedures. Select engine lowest speed (1000 psi) setting. Turn water control switch to ON if unit is equipped with the optional remote control system.
6. Recirculate water for as long as desired. Turn water control switch to OFF, and stop engine.

Water on-off

Used only on units with optional remote control

Fig. 19-1

Hydrant Fill

Fig. 19-2

Auto Antifreeze - Optional Accessory

The autoantifreeze box is located next to the control panel

Footage Counter - Optional Accessory

Troubleshooting

PROBLEM	POSSIBLE CAUSES	CORRECTIVE ACTION
Low pressure or flow.	Clogged inlet filter or improper size.	Clean. Use adequate size. Check more frequently.
	Worn or damaged nozzle.	Replace nozzle of proper size.
	Worn or damaged hose.	Repair or replace.
	Restricted discharge plumbing.	Re-size discharge plumbing to flow rate of pump.
	Broken Valve Spring.	Replace spring.
	Worn packing seals.	Replace packing seals.
	Fouled discharge valves.	Clean discharge valve assemblies.
	Worn or plugged relief valve on pump.	Clean, reset, and replace.
	Cavitation.	Check suction lines on inlet of pump for restrictions.
	Unloader.	Check for proper operation.
	Belt Slippage.	Tighten or replace belt.
Rough/pulsating operation with pressure drop.	Accumulator pressure.	Recharge/replace accumulator.
	Worn packing.	Replace packing.
	Inlet restriction.	Check system for stoppage, air leaks, and correctly sized inlet plumbing.
	Unloader	Check for proper operation.
	Cavitation.	Check inlet lines for restrictions and/or proper size.
Water in crankcase.	High humidity.	Reduce oil change interval.
	Worn seals.	Replace seals.
Noisy pump.	Low oil level.	Add or replace oil.
	Worn or dirty valves.	Clean valve assemblies or replace.
	Bad bearings.	Inspect and replace as required.
Excessive leakage.	Worn or cracked plungers.	Replace plungers.
	Worn packing/seals.	Adjust or replace packing seals.
	Excessive vacuum.	Reduce suction vacuum.
	Inlet pressure too high.	Reduce inlet pressure.
High crankcase temperature.	Wrong grade of oil.	Giant oil is recommended.
	Improper amount of oil in crankcase.	Adjust oil level to proper amount.

Electric Braking System

PROBLEM	POSSIBLE CAUSES	CORRECTIVE ACTION
No Brakes.	Open circuits.	Find and correct.
	Severe under-adjustments.	Adjust brakes.
	Faulty controller.	Test and correct.
	Short circuits.	Find and correct.
Weak Brakes.	Grease or oil in magnets or linings.	Clean or replace.
	Corroded connections.	Clean and correct cause of corrosion.
	Worn linings or magnets.	Replace.
	Scored or grooved brake drums.	Machine or replace.
	Improper synchronization.	Correct.
	Under-adjustment.	Adjust brakes.
	Glazed Linings.	Re-burnish or replace.
	Overloaded trailer.	Correct.
Locking Brakes.	Under-adjustment.	Adjust brakes.
	Improper synchronization.	Correct.
	Faulty controller.	Test and correct.
	Loose, bent, or broken brake components.	Replace components.
	Out-of-round brake drums.	Machine or replace. Adjust system.
	Insufficient wheel load.	Resistor and synchronize.
	Breakaway protection activated.	Reset breakaway protection.
Intermittent Brakes.	Faulty controller.	Test and correct.
	Broken wires.	Repair or replace.
	Loose connections.	Find and repair.
	Faulty ground.	Find and repair.
Brakes Pull to One Side.	Wrong magnet led wire color.	Find and correct.
	Incorrect adjustment.	Adjust brakes.
	Grease or oil on magnets or linings.	Clean or replace.
	Broken wires.	Find and repair.
Harsh Brakes.	Under-adjustment.	Adjust brakes.
	Improper controller.	Change.
	Faulty controller.	Test and correct.
	Improper synchronization.	Correct.

PROBLEM	POSSIBLE CAUSES	CORRECTIVE ACTION
Noisy Brakes.	Under-adjustment.	Test and correct.
	Lack of lubrication.	Lubricate.
	Incorrect brake components.	Correct.
	Broken brake components.	Replace components.
Surging Brakes.	Out-of-round or cracked brake drums.	Machine or replace.
	Faulty controller.	Test and correct.
	Grease or oil on magnets or linings.	Clean or replace.
Dragging Brakes.	Over-adjustments.	Re-adjust.
	Out-of-round or cracked brake drums.	Machine or replace.
	Incorrect brake components.	Replace.
	Loose, bent, or broken brake components.	Replace components.
	Faulty breakaway switch.	Repair or replace.
	Loose wheel bearing adjustment.	Adjust.
	Bent spindle.	Replace axle.

Standard Warrior Tire Information

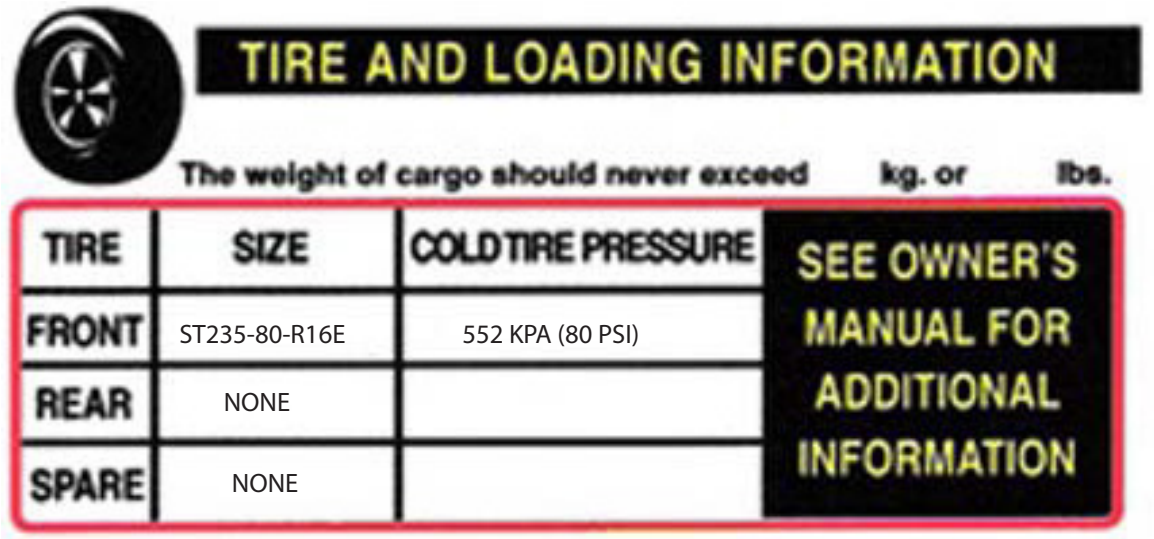


Fig. 34-1

Tire Safety Information

This portion of the User's Manual contains tire safety information as required by 49 CFR 575.6.

The National Traffic Safety Administration (NHTSA) has published a brochure (DOT HS 809 361) that discusses all aspects of Tire Safety, as required by CFR 575.6. It can be obtained and downloaded, free of charge, from the NHTSA website.

Tire Safety Terminology Glossary

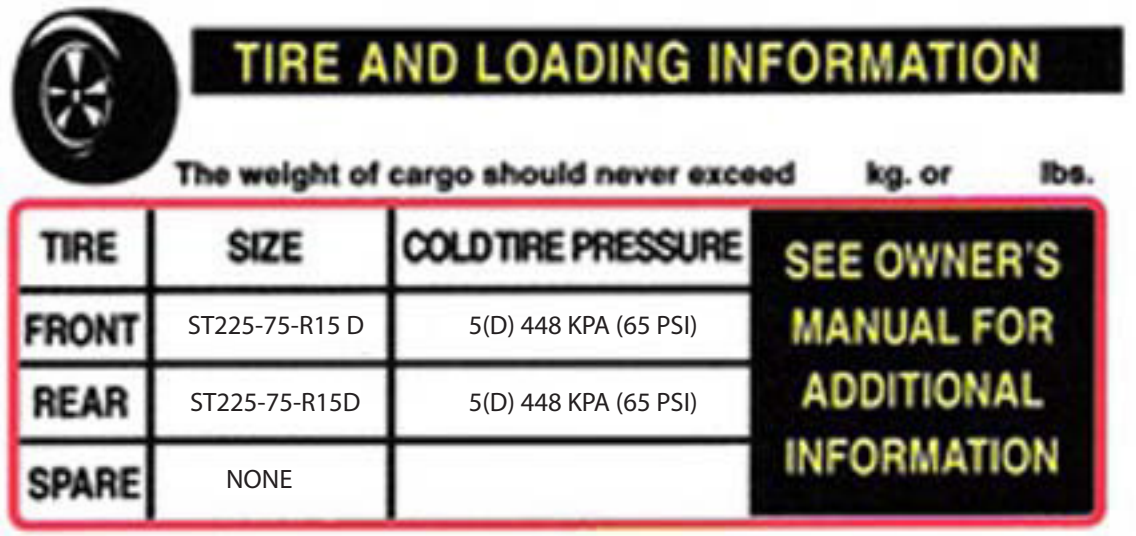
- **Cold tire inflation pressure** - the pressure in the tire before you drive
- **Gross Axle Weight Rating (GAWR)** - The maximum weight that any axle can support, as published on the Certification / VIN label on the front left side of the trailer. Actual weight determined by weighing each axle on a public scale, with the trailer attached to the towing vehicle.
- **Gross Vehicle Weight Rating (GVWR)** - The maximum weight of the fully loaded trailer, as published on the Certification / VIN label. Actual weight determined by weighing trailer on a public scale, without being attached to the towing vehicle.
- **Load rating** - The maximum load that a tire is rated to carry for a given inflation pressure.
- **Maximum load rating** - The load rating for a tire at the maximum permissible inflation pressure for that tire.
- **Maximum permissible inflation pressure** - The maximum cold inflation pressure to which a tire may be inflated.
- **Outer diameter** - The overall diameter of an inflated new tire.
- **Recommended inflation pressure** - The inflation pressure provided by the vehicle manufacturer on the Tire Information label and the Certification/VIN tag.
- **Rim** - a metal support for a tire or a tire and tube assembly upon which the tire beads are seated.
- **Vehicle maximum load on the tire** - The load on an individual tire that is determined by distributing to each axle its share of the maximum loaded vehicle weight and dividing by two.

Tire Information Placard

The Spartan Warrior's Federal Certification/VIN label is located on the forward half of the left (road) side of the unit. The VIN label will identify the units GVWR and GAWR.

The Spartan Warrior's Tire Information Placard can be located adjacent to the trailer's VIN (Certification) label at the left front of the trailer. The placard includes the Warrior's tire size, cold tire inflation pressure, and load limitations. The load limitation statement will give an indication of the maximum cargo capacity. Any items (cargo) added to the Warrior must not cause the total weight of the Warrior to exceed the stated GVWR.

Ultimate and High Flow Warrior Tire Informantion



TIRE AND LOADING INFORMATION

The weight of cargo should never exceed kg. or lbs.

TIRE	SIZE	COLD TIRE PRESSURE	SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION
FRONT	ST225-75-R15 D	5(D) 448 KPA (65 PSI)	
REAR	ST225-75-R15D	5(D) 448 KPA (65 PSI)	
SPARE	NONE		

Fig. 34-1

Tire Safety Information

Steps for Determining Correct Load Limit

1. Locate the statement "The weight of cargo should never exceed 1157 kg or 2550 lbs" on your tire information placard.
2. This figure equals the available amount of cargo and luggage load capacity.
3. Determine the combined weight of luggage and cargo being loaded on the vehicle. That weight may not safely exceed the available cargo and luggage load capacity.

General Tire Information

- Tire inflation pressure is the level of air in the tire that provides the load-carrying capacity and affects the overall performance of the vehicle. The tire inflation pressure is a number that indicates the amount of air pressure a tire requires to be properly inflated. Since tires are designed to be used on more than one type of vehicle, tire manufacturers list the "maximum permissible inflation pressure" on the tire sidewall. This number is the greatest amount of air pressure that should ever be put in the tire under normal driving conditions.
- Improper inflation is the main cause of tire failure. Excessive loads and/or under inflation cause tire overloading, which leads to abnormal tire flexing. Check the cold tire inflation pressures at least once a week for proper inflation levels.
- The proper air pressure may be found on the Certification/VIN label and/or the Tire Information placard.

  High speed towing in hot conditions degrades the life of the Warrior's tires. The internal heat generated form high speeds breaks down the tire's internal structure. It is recommended to drive at moderate speeds.
- If the trailer is stored for an extended period of time, the tires should be fully inflated to the maximum rated pressure. The Warrior should be stored in a cool, dry place. Use tire covers to protect the trailer tires from the harsh effects of the sun.

Tire Maintenance

Checking Tire Pressure

- The recommended tire inflation pressure that vehicle manufacturers provide reflects the proper PSI when a tire is cold. A cold tire is one that has not been driven on for at least three hours. Since driving raises the tires temperature, the internal air pressure also increases. To prevent inflated tire readings, the tire must be measured when cold.

Maintaining Proper Tire Pressure

a. Locate the recommended tire pressure on the vehicle's tire information placard, certification label, or in the Owner's Manual.
b. Record the tire pressure of all tires.
c. If the tire pressure is too high in any tires, slowly release air by gently pressing on the tire valve stem with the edge of your tire gauge until the correct pressure is reached.
d. If the tire pressure is too low, note the difference between the measured tire pressure and the correct tire pressure. Add the missing pounds of air pressure to each tire that is under inflated.
e. Check all the tires to make sure they have the same air pressure.

NOTE: If the tires are warm due to driving, but testing confirms under inflation, fill the tire to the recommended cold inflation pressure. While the tire may be slightly under inflated due to extra pressure in the warm tire, it is safer to drive a slightly under inflated tire then to drive a significantly under inflated tire. Since this is a temporary fix, the tire must be re-checked and adjusted once a cold reading can be obtained.

Tire Size and Tread

- Tires should be replaced when the tread is worn down 1/16 of an inch.
- Treadwear indicators on the bottom of the tire can be used as a guide. The indicators are raised sections spaced intermittently in the bottom of the tread groves. If they appear even with the outside of the tread, the tire should be replaced.
- Replacement tires should be the same size as the Warrior's original tires. To prevent error and maintain safety, it is recommended that all replacement parts be purchased through Spartan Tool LLC.

Tire Balance and Wheel Alignment

- Tires must be properly balanced to avoid vibrations and shaking of the trailer. A wheel alignment adjusts the angles of the wheels to position them correctly relative to the trailer's frame. Such adjustments can maximize the life of the tires, but should be performed by a qualified technician.

Tire Repair

- A punctured tire can be repaired by plugging the hole and patching the area that surrounds the puncture hole. A small puncture in the tire tread can be repaired, but punctures to the sidewall should not. Tires should be removed from the rim to be properly inspected before plugging.

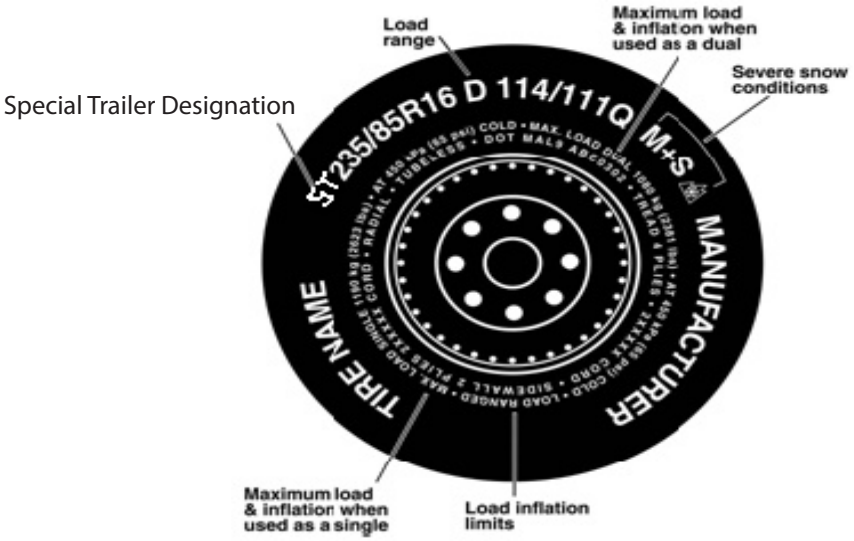


Fig. 36-1

Tire Fundamentals

- Federal law requires tire manufacturers to place standardized information on the sidewall of all tires. This information identifies and describes the fundamental characteristics of the tire. It also provides a tire identification number for safety standard certification and in case of a recall.

Tire Safety Tips

Preventing Tire Damage

- Slow down before driving over a pothole or other object in the road.
- Do not run over curbs or other foreign objects in the roadway.

Tire Safety Checklist

- Check tire pressure regularly (at least once a month).
- Inspect tires for uneven wear patterns on the tread, cracks, foreign objects, or other signs of wear or trauma.
- Remove bits of glass and foreign objects wedged in the tread.
- Make sure tire valves have valve caps.
- Check tire pressure before any long trips.
- Do not overload trailer. Check the Tire Information Placard for the maximum recommended trailer load.

Safety Information

Confirm that:

- The coupler is secured to the hitch and is locked.
- Electrical connections are made.
- There is appropriate slack in the safety chains.
- There is appropriate slack in the breakaway switch pull-pin cable.
- The tires are not visibly low on pressure, and the cargo is secure and in good condition.

Reporting Safety Defects

If you believe that your vehicle has a defect that 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 Spartan Tool LLC.

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

To contact NHTSA, you may either call the Vehicle Safety Hotline toll-free at 1-888-327-4236 (TTY: 1-800-424-9153), go to http://www.safecar.gov; or write to

Administrator

NHTSA

1200 New Jersey Avenue S.E.

Washington, DC 20590

You can also obtain other information about motor vehicle safety from

http://www.safecar.gov.

Spartan Tool LLC

1618 Terminal Road

Niles, MI 49120

Diesel & Gas Engine Emissions

All Kohler Diesel engines are tested to meet emissions standards.

See below for the emissions authentication label.

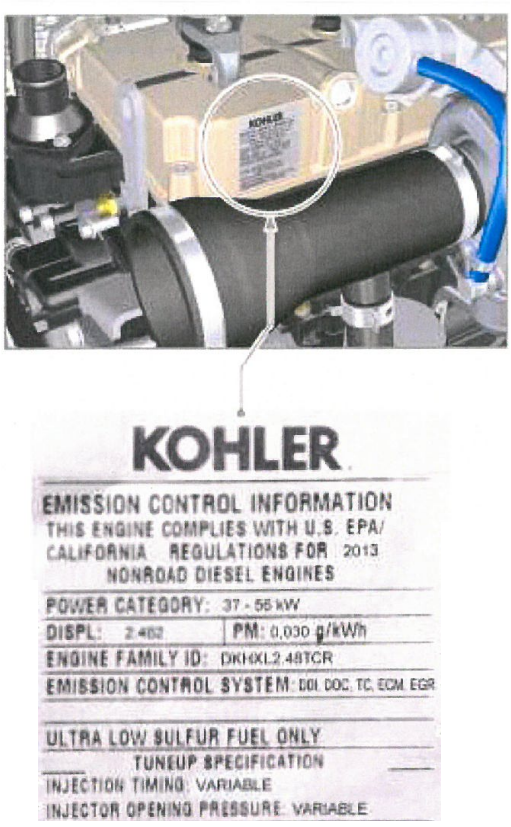


Fig. 83-2

All Kubota Gas engines are tested to meet emissions standards.

See below for the emissions authentication label.

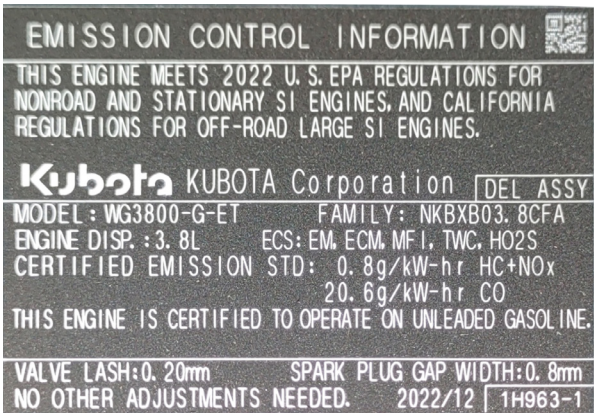


Fig. 83-3

SAMPLE EMISSIONS LABELS

Warranty Information

For our terms and conditions, including warranty, please visit https://spartantool.com/pages/terms-and-conditions. For warranty assistance, please contact us at (800) 435-3866 or customerservice@spartantool.com.

CONTACT US

Spartan Tool LLC
1618 Terminal Road
Niles, MI 49120
800.435.3866
SpartanTool.com

Notes

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7992G000