



HX30

Kubota® D1105

Operator's Manual



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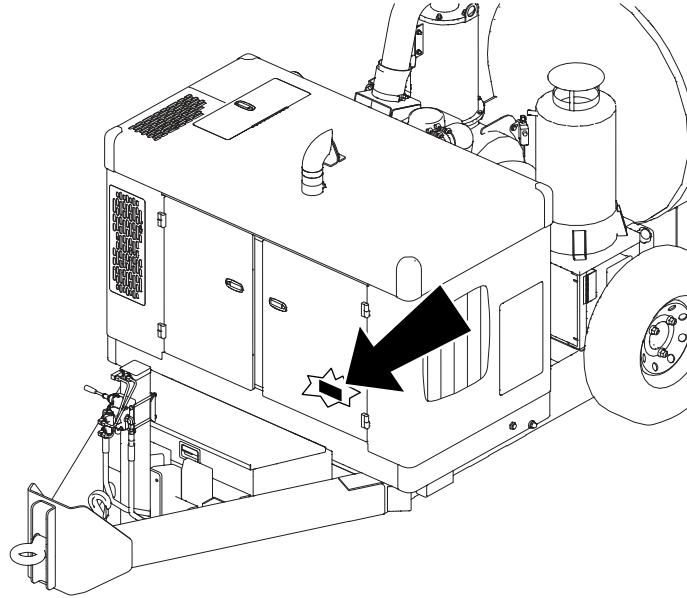
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California Proposition 65

 **WARNING** Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm. www.P65warnings.ca.gov.

Serial Number Location

Record serial numbers and date of purchase in spaces provided. Serial number is located as shown.



j70om005w.eps

Item	
Date of manufacture	
Date of purchase	
Machine serial number	

Intended Use

The HX30 is a self-contained vacuum excavation machine capable of vacuuming a wide variety of non-hazardous, non-flammable liquid and solid debris. The HXT30 is a truck-mounted version of the HX50 vacuum excavation machine.

The machine is designed to perform efficient soft excavation, including exposing utilities for visual verification and potholing. The optional reverse flow system allows for spoils transfer to another tank. The optional air system on the HXT30 can operate auxiliary pneumatic tools on a low (100psi/689kPa) setting.

This machine is intended for operation only according to the instructions in this manual. Operate machine in ambient temperatures from 10° to 115°F (-12° to 46°C). Contact your Ditch Witch® dealer for provisions required for operating in extreme temperatures. Use in any other way is considered contrary to the intended use.

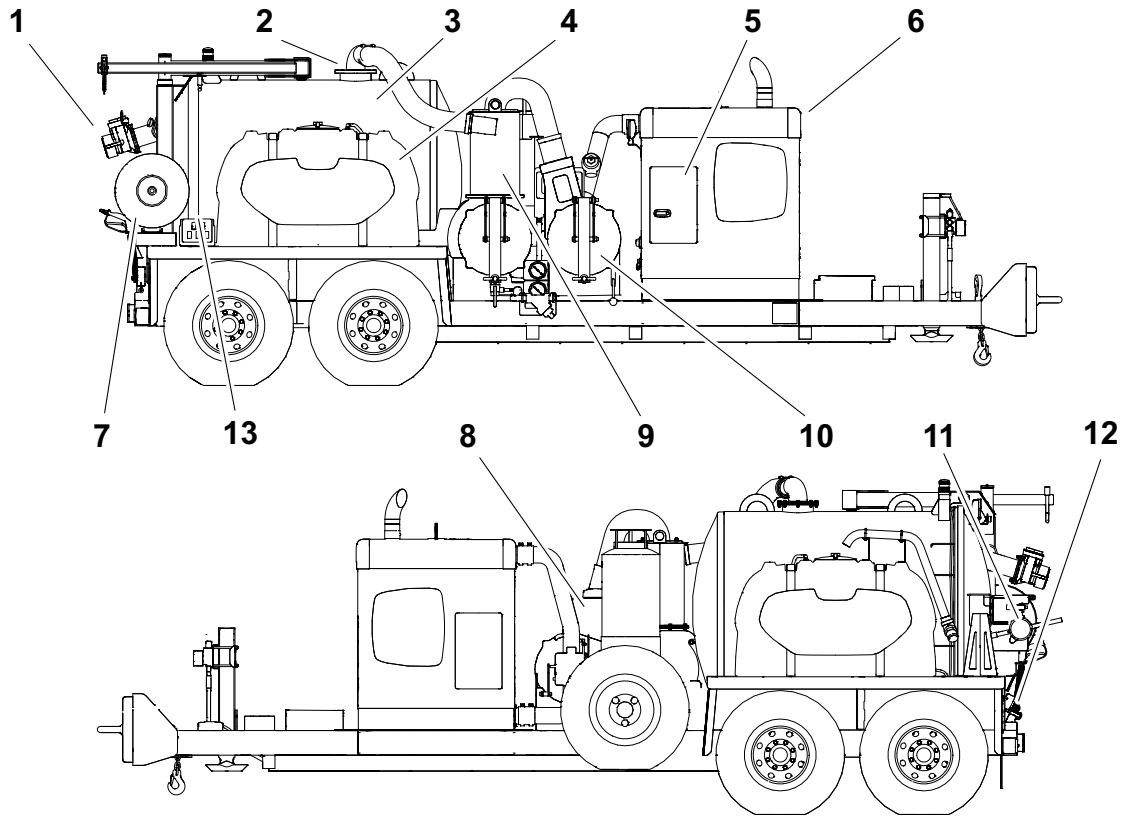
This machine should be operated, serviced, and repaired only by professionals familiar with its particular characteristics and acquainted with the relevant safety procedures.

Equipment Modification

This equipment was designed and built in accordance with applicable standards and regulations. Modification of equipment could mean that it will no longer meet regulations and may not function properly or in accordance with the operating instructions. Modification of equipment should only be made by competent personnel possessing knowledge of applicable standards, regulations, equipment design functionality/requirements and any required specialized training.

Machine Components

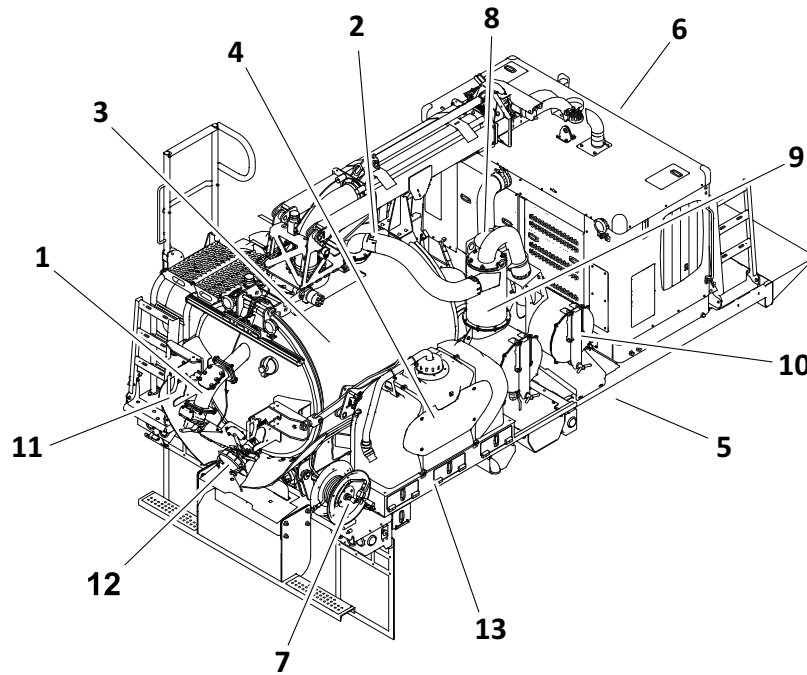
Trailer-Mounted Machines



j70om001w.eps

- | | |
|--------------------------|------------------------|
| 1. Inlet valve | 8. Antifreeze tank |
| 2. Primary shutoff valve | 9. Cyclone filter |
| 3. Debris tank | 10. Vacuum filter |
| 4. Water tank | 11. Potholing tools |
| 5. Operator station | 12. Drain/Outlet valve |
| 6. Power pack | 13. Wash wand |
| 7. Hose reel | |

Truck-Mounted Machines



j90om002w21.eps

- | | |
|--------------------------|------------------------|
| 1. Inlet valve | 8. Antifreeze tank |
| 2. Primary shutoff valve | 9. Cyclonic filter |
| 3. Debris tank | 10. Vacuum filter |
| 4. Water tank | 11. Potholing tools |
| 5. Operator station | 12. Drain/Outlet valve |
| 6. Power pack | 13. Wash wand |
| 7. Hose reel | |

Regulatory Notices

United States

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Changes or modifications not expressly approved by **The Charles Machine Works, Inc.** could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Contains **FCC ID:** LW9-ERGOF-2G4 & LW9-MFS-RX-2G4.

Canada

CAN ICES-2/NMB-2

This device complies with Industry Canada *license-exempt* RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Contains **IC:** 2119B-ERGOF & 2119B-MFSRX.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Contient **IC:** 2119B-ERGOF & 2119B-MFSRX.

RF Exposure Statement

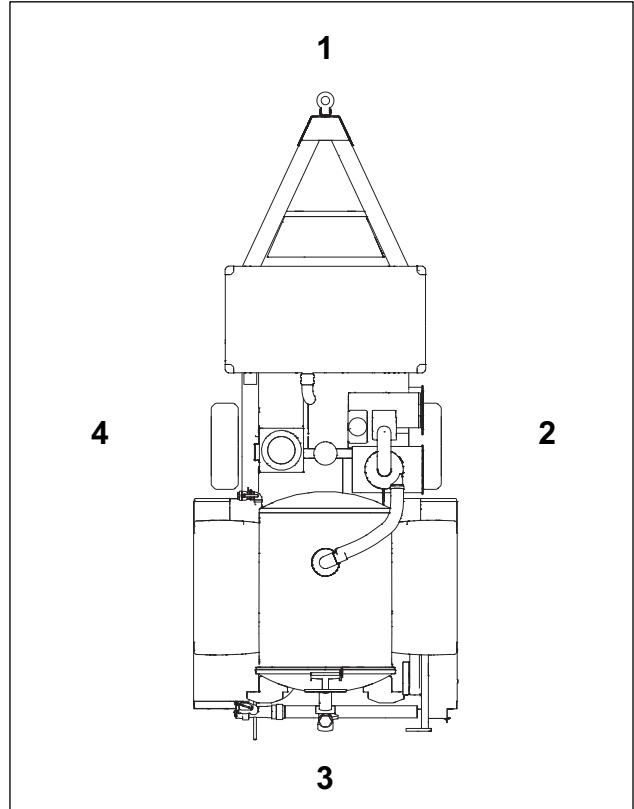
In order to comply with RF exposure requirements during normal operation, this device must be held in front of the body horizontally. The antenna must be vertical in line with the body with at least 4" (100mm) separation distance from the body.

This device complies with Health Canada's Safety Code Section 6.

Operator Orientation

IMPORTANT: Top view of machine is shown.

1. Front
2. Right side
3. Rear
4. Left side



j70om006w.eps

Operating Area

Operate within easy access of controls and/or remote control.

About This Manual

This manual contains information for the proper use of this machine. Cross references such as “See page 50” will direct you to detailed procedures.

Bulleted Lists

Bulleted lists provide helpful or important information or contain procedures that do not have to be performed in a specific order.

Numbered Lists

Numbered lists contain illustration callouts or list steps that must be performed in order.

Foreword

This manual is an important part of your equipment. It provides safety information and operation instructions to help maintain your Ditch Witch equipment.

Read this manual before using your equipment. Keep it with the equipment at all times for future reference. If you sell your equipment, be sure to give this manual to the new owner.

If you need a replacement copy, contact your Ditch Witch dealer. If you need assistance in locating a dealer, visit our website at www.ditchwitch.com or write to the following address:

The Charles Machine Works, Inc.
ATTN: Marketing Department
PO Box 66
Perry, OK 73077-0066
USA

The descriptions and specifications in this manual are subject to change without notice. The Charles Machine Works, Inc. reserves the right to improve equipment. Some product improvements may have taken place after this manual was published. For the latest information on Ditch Witch equipment, see your Ditch Witch dealer.

Thank you for buying and using Ditch Witch equipment.

Reporting Safety Defects

If you believe that your vehicle 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 the Product Safety Coordinator at The Charles Machine Works, Inc.

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 any individual problems between you, your Ditch Witch dealer, or The Charles Machine Works, Inc.

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

Administrator
NHTSA
400 Seventh Street, SW.
Washington, DC 20590

You can also obtain other information about motor vehicle safety from <http://www.safercar.gov>.

**HX30/HXT30
Operator's Manual**

Kubota® D1105

Issue number 6.1/OM-08/2023

Part number 053-3102

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and Ditch Witch are registered trademarks of The Charles Machine Works, Inc.

This product and its use may be covered by one or more patents at <http://patents.charlesmachine.works>.

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Safety

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Safety Alert Classifications

These classifications and the icons defined on the following pages work together to alert you to situations which could be harmful to you, jobsite bystanders or your equipment. When you see these words and icons in the book or on the machine, carefully read and follow all instructions. YOUR SAFETY IS AT STAKE.

Watch for the three safety alert levels: **DANGER**, **WARNING** and **CAUTION**. Learn what each level means.

 **DANGER** indicates a hazardous situation that, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.

 **WARNING** indicates a hazardous situation that, if not avoided, could result in death or serious injury.

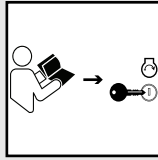
 **CAUTION** indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

Watch for two other words: **NOTICE** and **IMPORTANT**.

NOTICE indicates information considered important, but not hazard-related (e.g., messages relating to property damage).

IMPORTANT can help you do a better job or make your job easier in some way.

Guidelines

**⚠ WARNING**

Misuse of machine can cause death or serious injury. Read and understand operator's manual and all other safety instructions before use. Know how to use all controls.

Follow these guidelines before operating any jobsite equipment:

- Complete proper training.
- Read and understand operator's manual before using equipment.
- Wear personal protective equipment including long pants, hard hat, eye protection, hearing protection, and protective footwear.
- Do not wear jewelry or loose clothing.
- Mark proposed path with white paint and have underground utilities located before working. In the US or Canada, call 811 (US) or 888-258-0808 (US and Canada). Also contact any local utilities that do not participate in the One-Call service. In countries that do not have a One-Call service, contact all local utility companies to have underground utilities located.
- Classify jobsite based on its hazards and use correct tools and machinery, safety equipment, and work methods for jobsite.
- Mark jobsite clearly and keep spectators away.
- Review jobsite hazards, safety and emergency procedures, and individual responsibilities with all personnel before work begins. Safety videos are available from your Ditch Witch dealer or at www.ditchwitch.com/safety. Safety Data Sheets (SDS) are available at www.ditchwitch.com/support.
- Ensure jobsite is adequately lit. Arrange for secondary light sources as needed.
- Complete the equipment checklist located at www.ditchwitch.com/safety.
- Fully inspect equipment before operating. Repair or replace any worn or damaged parts. Replace missing or damaged safety shields and safety alert signs. Contact your Ditch Witch dealer for assistance.
- Follow instructions on all safety alert signs on machine.
- Keep access steps and platforms clean and free of obstacles and debris.
- Use equipment carefully per the instructions in this manual. Stop operation and investigate anything that does not look or feel right.
- Do not operate machine where flammable gas may be present.
- Only operate equipment in well ventilated areas.
- Always tie down equipment and properly stow accessories, even if traveling short distances.
- Contact your Ditch Witch dealer if you have any questions about operation, maintenance, or equipment use.

Emergency Procedures



⚠ WARNING

Underground utilities. Contact can cause death or serious injury. Locate and verify underground utilities before digging or drilling.

Before operating any equipment, review emergency procedures and check that all safety precautions have been taken.

EMERGENCY SHUTDOWN: Shut off machine or press remote engine stop button or emergency stop button (if equipped).

Electric Strike Description

When working near electric cables, remember the following:

- Electricity follows all paths to ground, not just path of least resistance.
- Pipes, hoses, and cables will conduct electricity back to all equipment.
- Low voltage current can injure or kill. Many work-related electrocutions result from contact with less than 440 volts.

Most electric strikes are not noticeable, but indications of a strike include:

- power outage
- smoke
- explosion
- popping noises
- arcing electricity

If any of these occur, assume an electric strike has occurred.

If an Electric Line is Damaged

If you suspect an electric line has been damaged, DO NOT MOVE and DO NOT TOUCH ANY EQUIPMENT. Take the following actions. The order and degree of action will depend on the situation.

- If you are **operating machine**, immediately RELEASE CONTROLS.
- If you must leave the area, take small steps with feet close together to reduce the hazard of being shocked from one foot to another.
- Warn people nearby that an electric strike has occurred. Instruct them to leave the area.
- Have someone contact electric company to shut off power.
- If you leave the area, do not return to jobsite or allow anyone into area until given permission by utility company.

If a Gas Line is Damaged

If you suspect a gas line has been damaged, take the following actions. The order and degree of action will depend on the situation.

- Immediately shut off engine(s), if this can be done safely and quickly.
- Remove any ignition source(s), if this can be done safely and quickly.
- Warn others that a gas line has been cut and that they should leave the area.
- After warning others to leave the area, leave jobsite as quickly as possible.
- Immediately call your local emergency phone number and utility company.
- If jobsite is along street, stop traffic from driving near jobsite.
- Do not return to jobsite until given permission by emergency personnel and utility company.

If a Fiber Optic Cable is Damaged

Do not look into cut ends of fiber optic or unidentified cable. Vision damage can occur. Contact utility company.

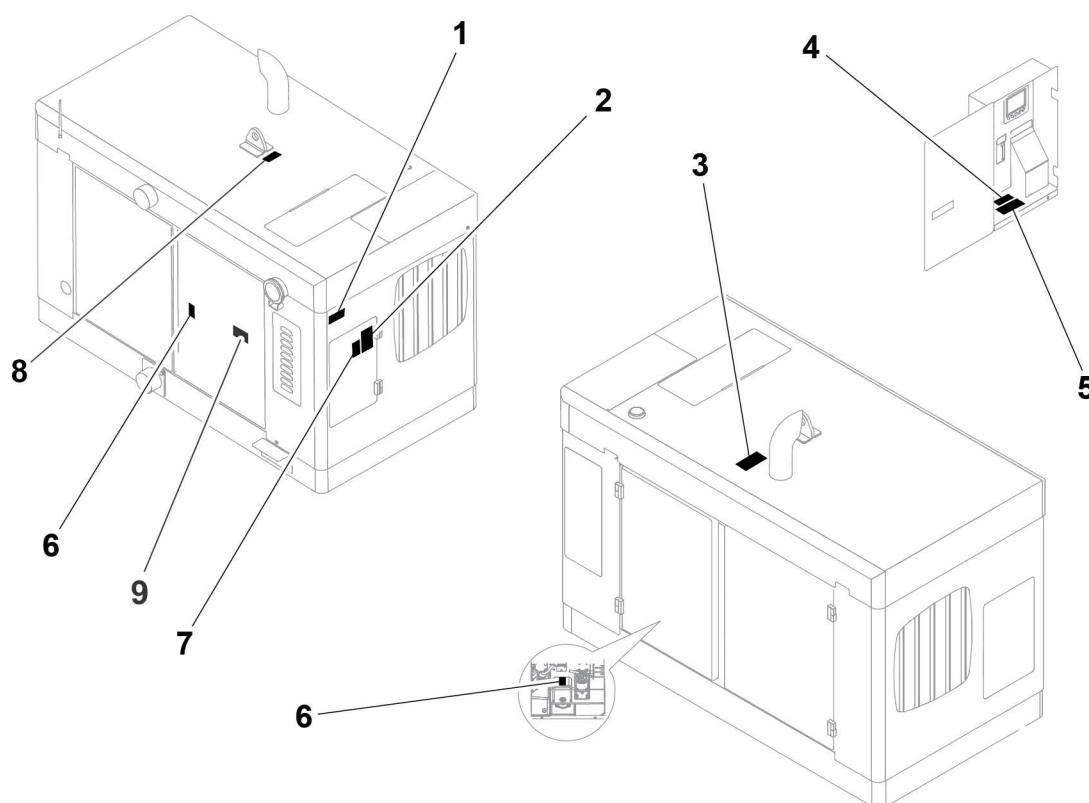
If Machine Catches on Fire

Perform emergency shutdown procedure and then take the following actions. The order and degree of action will depend on the situation.

- Immediately move battery disconnect switch (if equipped and accessible) to disconnect position.
- If fire is small and fire extinguisher is available, attempt to extinguish fire.
- If fire cannot be extinguished, leave area as quickly as possible and contact emergency personnel.

Machine Safety Alerts

Power Unit



Decal_HX30_Powerpack.png



⚠ WARNING High pressure. Impact can cause death or serious injury. Exercise and clean relief valve before each use.



⚠ CAUTION Thrown objects. Impact can cause injury. Wear hard hat and safety glasses.



⚠ CAUTION Hot parts. Contact can cause burns. Only touch when cool or wear gloves.

4



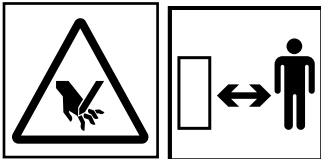
⚠ WARNING Underground utilities. Contact can cause death or serious injury. Locate and verify underground utilities before digging or drilling.

5



⚠ WARNING Misuse of machine can cause death or serious injury. Read and understand operator's manual and all other safety instructions before use. Know how to use all controls.

6



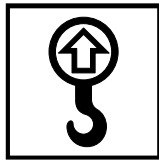
⚠ WARNING Moving parts. Contact can cause serious injury. Stay away.

7



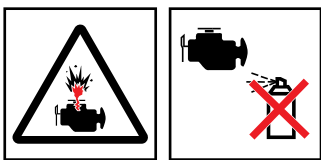
⚠ CAUTION High noise levels. Exposure can cause hearing loss. Wear hearing protection.

8



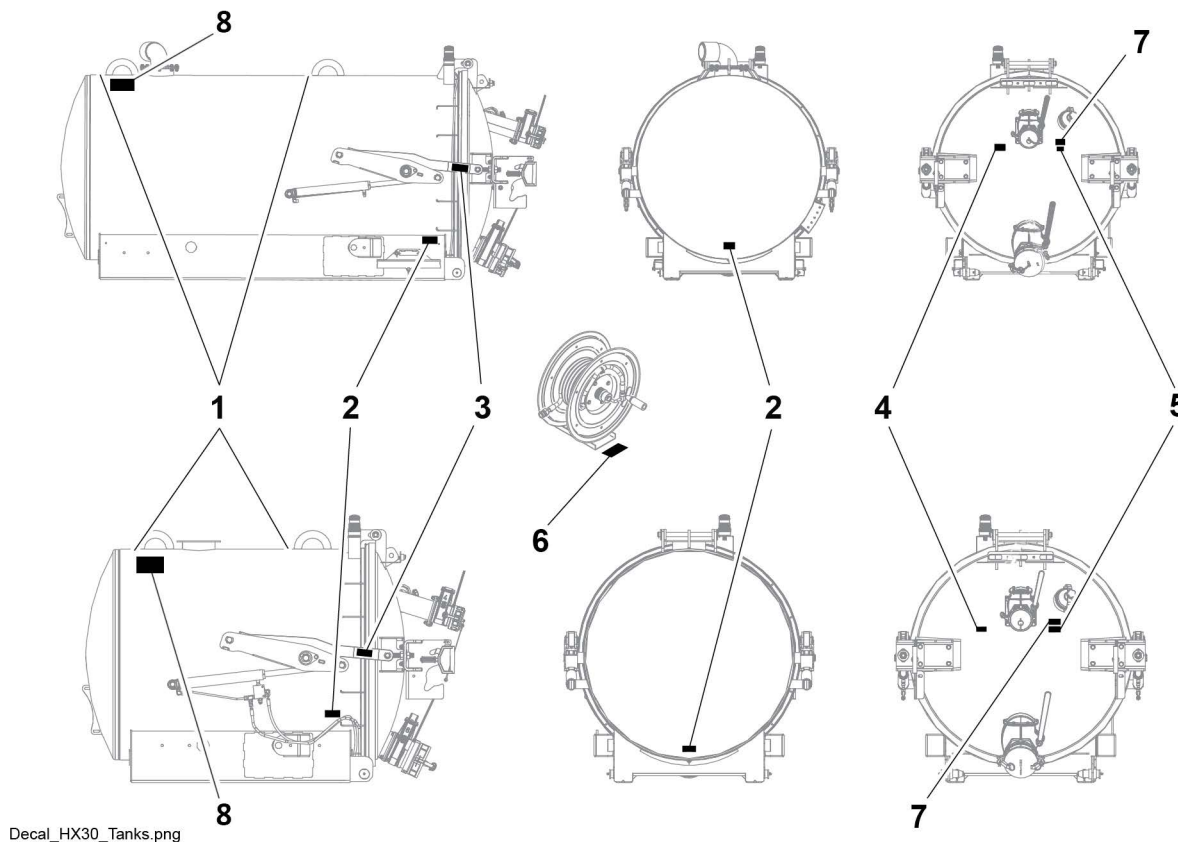
Lift point. See Transport chapter for more information.

9

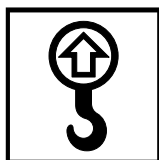


⚠ WARNING Pre-heater. Fire or explosion can cause death or serious injury. Never use starter fluid.

Tanks

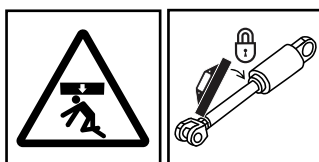


1



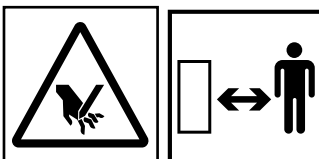
Lift point. See Transport chapter for more information.

2



! WARNING Raised component. Crushing can cause death or serious injury. Stay away or secure raised component with locking device. Use correct equipment and procedures.

3



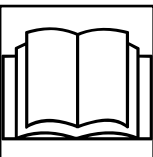
! WARNING Moving parts. Contact can cause serious injury. Stay away.

4



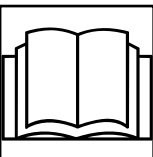
⚠ WARNING Static charge. Fire or explosion can cause death or serious injury. Never vacuum flammable or combustible substances.

5



⚠ WARNING Contents under pressure. Impact can cause death or serious injury. Refer to operator's manual for correct use.

6



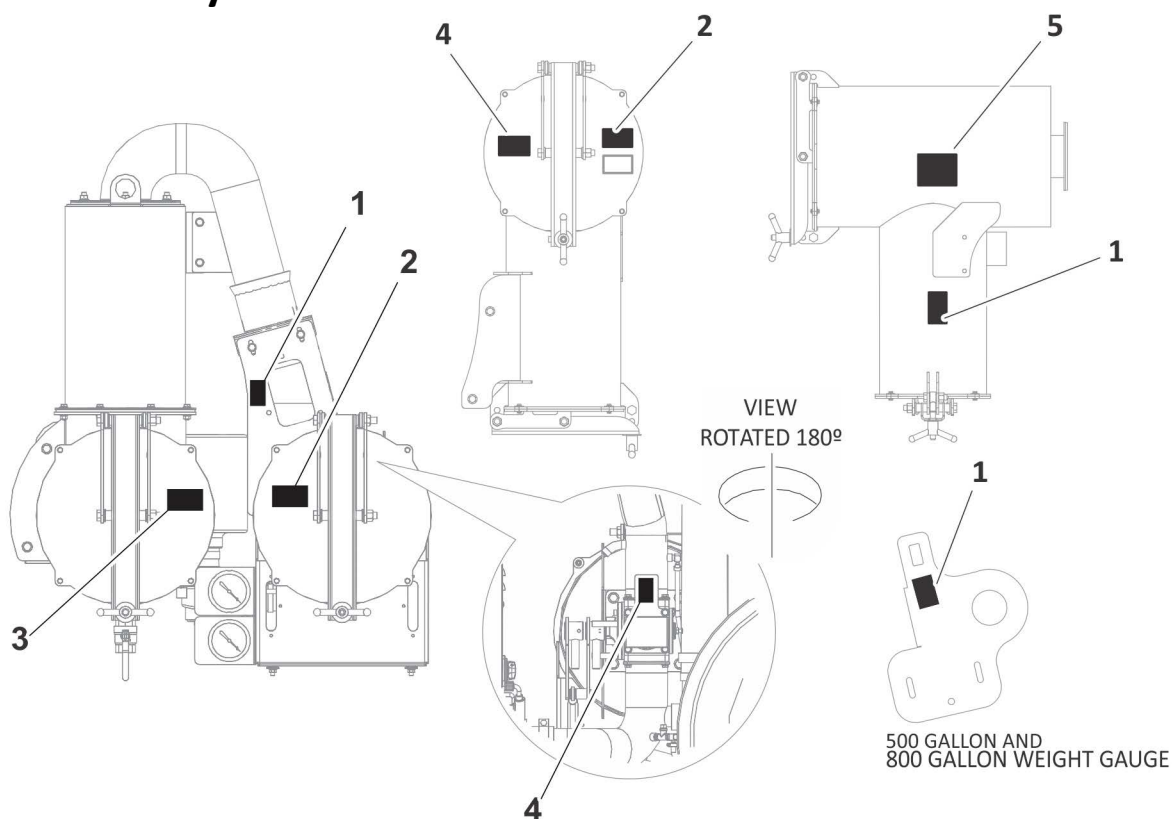
⚠ WARNING Pressurized fluid or air. Contact can cause death or serious injury. Refer to operator's manual for correct use.

7



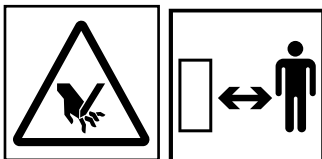
⚠ DANGER Confined space. Suffocation will cause death. Stay away or follow procedures for entering.

Filters and Cyclones



Decal_HX30_Cyclone.png

1



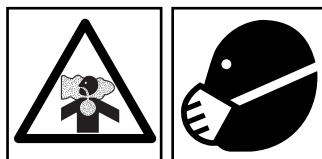
WARNING Moving parts. Contact can cause serious injury. Stay away.

2



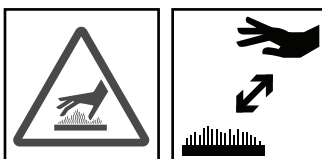
WARNING Contents under pressure. Impact can cause death or serious injury. Refer to operator's manual for correct use.

3



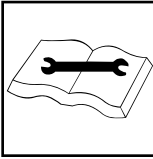
WARNING Silica dust. Exposure can cause lung disease. Use breathing protection.

4



CAUTION Hot parts. Contact can cause burns. Only touch when cool or wear gloves.

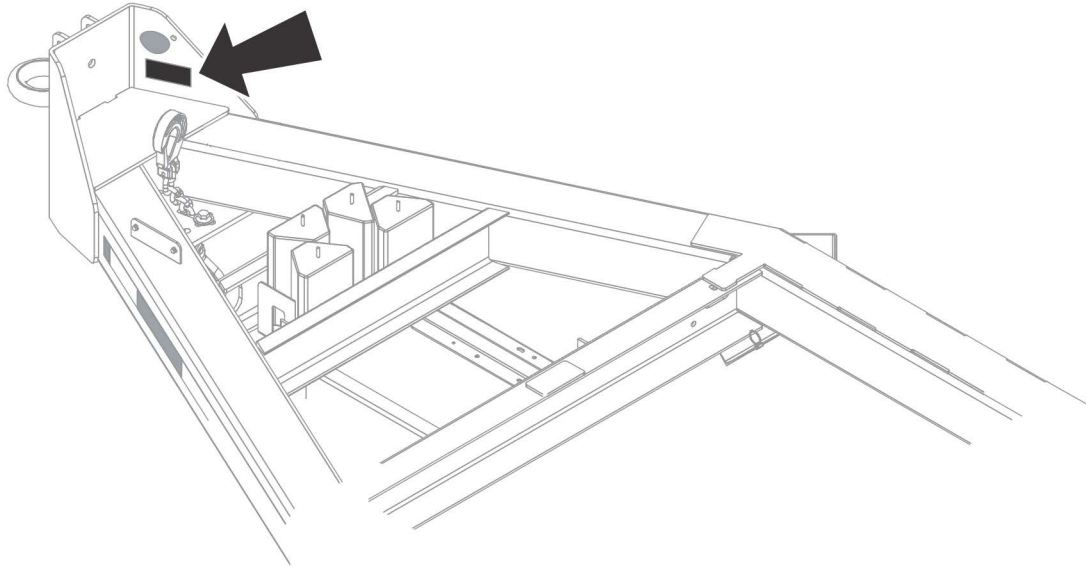
5



! WARNING High pressure. Impact can cause death or serious injury. Exercise and clean relief valve before each use.

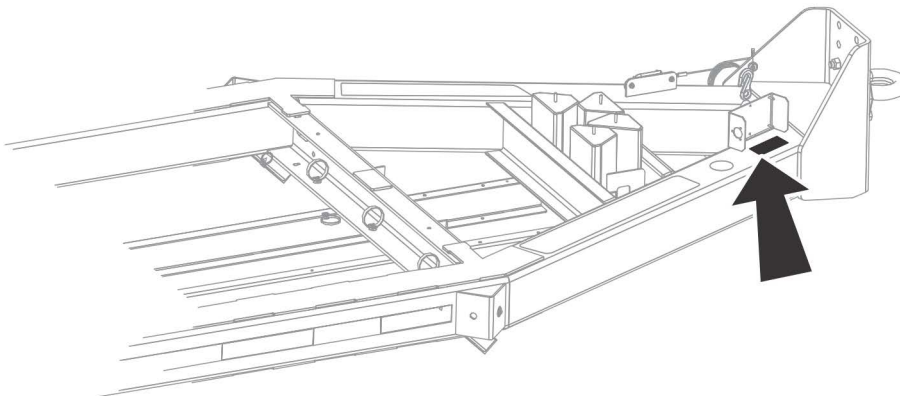
Trailer

VT9/VT9H/VT12/VT14/VT17

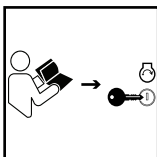


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VT20/VT24

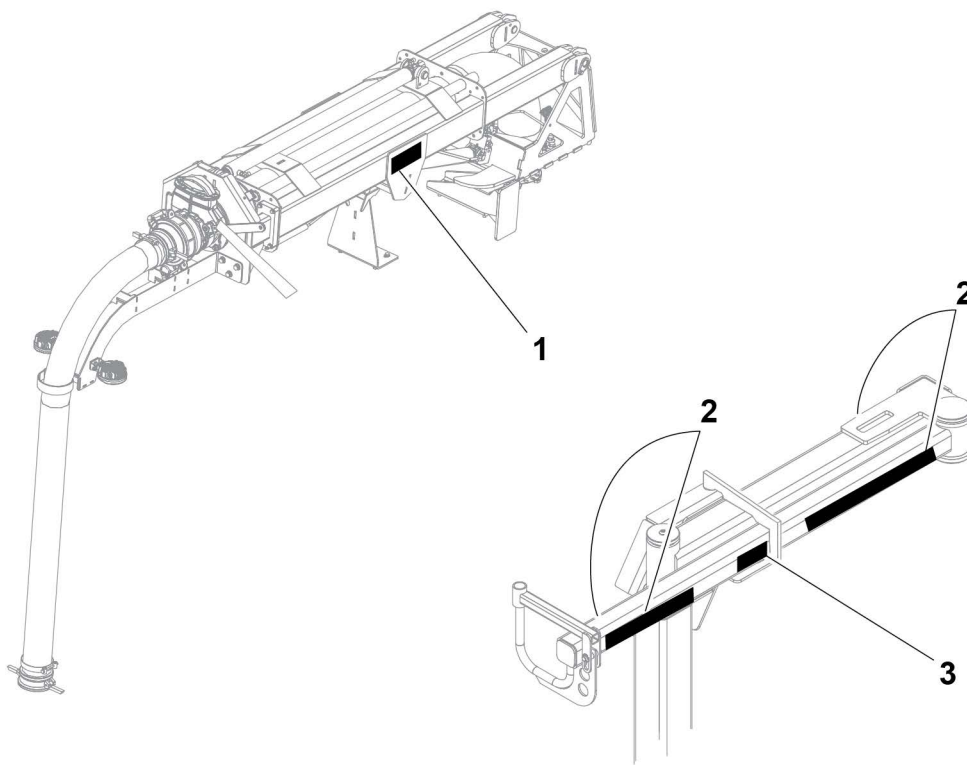


Decal_VT20.png



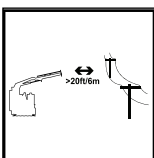
! WARNING Misuse of machine can cause death or serious injury. Read and understand operator's manual and all other safety instructions before use. Know how to use all controls.

Boom



Decal_HXVacBooms.png

1



⚠ DANGER Overhead electrical lines. Exposure will cause death or serious injury. Keep raised components away from electrical lines. Use a spotter.

2



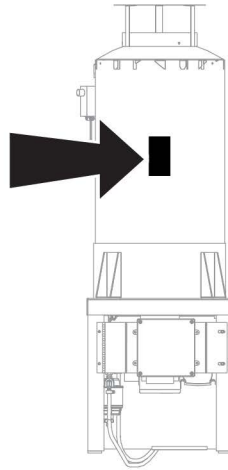
DANGER stripe decal. See Parts Manual for replacement part numbers.

3

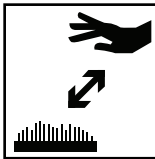


⚠ WARNING Swinging overhead boom. Impact can cause death or serious injury. Lock boom before transporting or tilting tank. Use correct boom procedures.

Water Heater




Decal_Vac_Heater.png



⚠ CAUTION Hot parts. Contact can cause burns. Only touch when cool or wear gloves.

Prepare

Chapter Contents



See “Safety” for additional precautions.

Wear proper personal protective equipment.

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Prepare Jobsite



⚠ WARNING

Underground utilities. Contact can cause death or serious injury. Locate and verify underground utilities before digging or drilling.

To help avoid injury:

- Use appropriate equipment and procedures for exposing utility lines.
- Classify jobsite and follow precautions based on classification.
- Follow local regulations for digging near utilities.

A successful job begins before working. The first step in planning is reviewing information already available about the job and jobsite.

Review Job Plan

Review blueprints or other plans. Check for information about existing or planned structures, elevations, or proposed work that may be taking place at the same time.

Select Start and End Points

Select one end to use as a starting point. Consider the following when selecting a starting point:

Slope

Equipment should be parked on a level site. Consider how slope will affect setup and operation. Assess the risks on each slope to determine if factors affecting risks create an unsafe condition for working.

Space

Check that starting and ending points allow enough space for working.

Comfort

Consider shade, wind, fumes, and other site features.

Identify Hazards

Inspect jobsite before transporting equipment. Check for the following:

- overall grade or slope
- changes in elevation such as hills or open trenches
- obstacles such as buildings, railroad crossings, or streams
- signs of utilities
 - “buried utility” notices
 - gas or water meters
 - drop boxes
 - manhole covers
 - utility facilities without overhead lines
 - junction boxes
 - light poles
 - sunken ground
- traffic
- access
- soil type and condition
- water supply

Locate Utilities

Notify One-Call Services

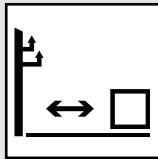
Mark proposed path with white paint and have underground utilities located before working.

- In the US or Canada, call 811 (US) or 888-258-0808 (US and Canada). Also contact any local utilities that do not participate in the One-Call service.
- In countries that do not have a One-Call service, contact all local utility companies to have underground utilities located.

Verify Underground Utilities

Have an experienced locating equipment operator sweep area within 20' (6m) to each side of proposed excavation to verify previously marked line and cable locations. Mark locations of all buried utilities and obstructions.

Locate Overhead Lines



DANGER Overhead electrical lines. Contact will cause death or serious injury. Know location of lines. Stay away.

Note location and height of all overhead lines in jobsite and ensure that equipment maintains proper distance from live lines.

Classify Jobsite

Select a Classification

Jobsites are classified according to underground hazards present, not by line being installed. Jobsite may have more than one classification.

If working . . .	then classify jobsite as . . .
within 10' (3m) of a buried electric line	electric
within 10' (3m) of a natural gas line	natural gas
in concrete, sand, or granite which is capable of producing crystalline silica dust	crystalline silica dust
within 10' (3m) of any other hazard	other

Classify jobsite as electric if jobsite is in question or if the possibility of unmarked electric utilities exists.

Apply Precautions

**! WARNING**

Underground utilities. Contact can cause death or serious injury. Locate and verify underground utilities before digging or drilling.

Once classified, precautions appropriate for jobsite must be taken. Follow US Department of Labor regulations on excavating and trenching (Part 1926, Subpart P) and other similar regulations.

Electric Jobsite Precautions

Use one or both of these methods:

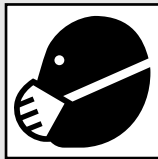
- Use appropriate equipment and procedures for exposing utility lines.
- Have service shut down while work is in progress. Have electric company test lines before returning them to service.

Natural Gas Jobsite Precautions

Position equipment upwind from gas lines and use one or both of these methods:

- Use appropriate equipment and procedures for exposing utility lines.
- Have service shut down while work is in progress. Have gas company test lines before returning them to service.

Crystalline Dust Jobsite Precautions

**! WARNING**

Silica dust. Exposure can cause lung disease or cancer. Use breathing protection.

Crystalline silica dust is a naturally occurring substance found in soil, sand, concrete, granite, and quartz.

To reduce exposure when cutting, drilling, or working these materials:

- Use water spray or other means to control dust.
- Refer to US Occupational Safety and Health Administration (OSHA) guidelines or other applicable regulating guidelines for appropriate breathing protection or dust control methods.

Other Jobsite Precautions

You may need to use different methods to safely avoid other underground hazards. Talk with those knowledgeable about hazards present at each site to determine which precautions should be taken or if job should be attempted.

Clear objects such as landscaping fabric, cable, and wire from the work area. These objects may be underground or partially buried.

Arrange for Traffic Control

Vehicle and pedestrian traffic must be a safe distance from equipment. Evaluate jobsite and allow an appropriate buffer zone around equipment. If working near a road or other traffic area, contact local authorities about safety procedures and regulations.

Prepare Excavation Point

Clear the area to be excavated. Remove rocks or branches too large for vacuum hose.

Select a solid area to stand on while excavating.

Prepare Operator

**⚠ WARNING**

Jobsite hazards. Exposure can cause death or serious injury. Use correct equipment and work methods. Use and maintain appropriate safety equipment.

To help avoid injury:

- Wear personal protective equipment including hard hat, safety eye wear, foot protection, hearing protection, and gloves (except when near rotating equipment).
- Remove jewelry.
- Wear close-fitting, high visibility clothing.
- Have other personal protective equipment, such as insulated boots and gloves, breathing protection, and face shield, etc. available for use depending on jobsite hazards or requirements.

Follow these guidelines before operating any jobsite equipment:

- Complete proper training and read operator's manual before using equipment.
- Plan for emergency services. Have the telephone numbers for local emergency and medical facilities on hand. Check that you will have access to a telephone.
- Review jobsite hazards, safety and emergency procedures, and individual responsibilities with all personnel before work begins. Safety videos are available from your Ditch Witch dealer or at www.ditchwitch.com/safe. Safety Data Sheets (SDS) are available at www.ditchwitch.com/support.
- Use equipment carefully. Stop operation and investigate anything that does not look or feel right.

Any time jobsite is classified as electric, operator must wear boots and gloves meeting the following standards:

- Boots must have high tops and meet the electric hazard protection requirements of ASTM F2413 or ASTM F1117 when tested at 18,000 volts. Tuck legs of pants completely inside boots.
- Gloves must have 17,000 AC maximum use voltage, according to ASTM specification D120.
- If working around higher voltage, use gloves and boots with appropriately higher ratings.

Prepare Equipment

Check Supplies

- fuel
- keys
- marking flags or paint
- notepad and pencil
- spare fuses
- lubricants
- extra batteries for accessories and equipment

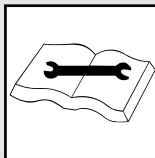
Check Equipment

Fluid Levels

- fuel
- engine oil
- diesel exhaust fluid (DEF), if needed
- hydraulic fluid
- engine coolant

Condition and Function

- all controls



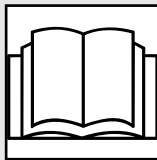
⚠ WARNING Improper control function. Use can cause death or serious injury. If control does not work as described in instructions, stop machine and have it serviced.

- ramps
- trailer bed and decking
- lights and reflectors
- hitch
- pins and retainer clips
- tire pressure
- lug nut torque
- jack
- safety chain/hooks

- tiedowns
- battery
- hoses and valves
- pumps and motors
- tires or tracks
- signs, guards, and shields
- couplers and fittings
- water tank(s)
- filters (air, oil, hydraulic)
- belts

Lay Out Equipment

1. Determine what equipment and other items will be carried on trailer.
2. Lay out equipment positions to balance load and obtain correct tongue load.

**⚠ WARNING**

Misuse of machine can cause death or serious injury. Read and understand operator's manual and all other safety instructions before use. Know how to use all controls.

To help avoid injury:

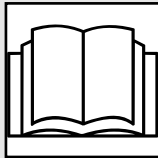
- At least ten to fifteen percent of total trailer weight (equipment plus trailer) must be on tongue to help prevent trailer sway.
 - Do not exceed tow vehicle capacities. See tow vehicle manual.
 - Do not exceed maximum trailer tongue load specifications or hitch capabilities.
3. Consider the following:
 - factory-approved tiedown standard weight
 - equipment weight
 - weight of any other equipment/supplies that will be hauled
 4. Ensure load will remain balanced with and without consumables such as sod or water.
 5. Check loading on each side of trailer by weighing.

Position Load

IMPORTANT: Access to truck scales is required for this procedure.

Position trailer load for proper tongue weight by following procedure below to enhance towing stability and safety.

1. Select appropriate size tow vehicle based on trailer gross vehicle weight rating (GVWR).
2. Adjust hitch on trailer so that hitch is about 2" (51mm) higher than level when coupled to tow vehicle.
3. Load trailer.
4. Pull trailer onto scale. Ensure tow vehicle wheels are off scale.
5. Unhitch trailer from tow vehicle and lower jack to remove all tongue weight from vehicle.
6. Record total unhitched weight of trailer and load. This is gross trailer weight (GTW) and must not exceed trailer GVWR or tow vehicle GTW.
7. Multiply GTW by 0.9 and record this number as 90% GTW.
8. Hitch trailer to tow vehicle. Raise and stow jack.
9. Watch scale readout while helper positions load. When scale displays 90% GTW value, the load is positioned properly with at least 10% of GTW on hitch.



⚠ WARNING

Misuse of machine can cause death or serious injury. Read and understand operator's manual and all other safety instructions before use. Know how to use all controls.

To help avoid injury:

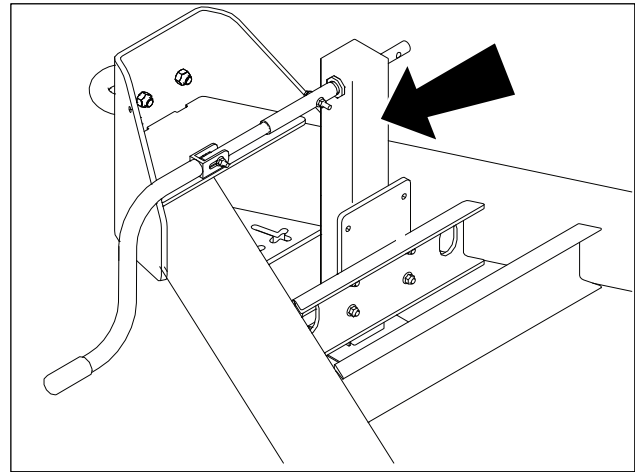
- At least ten to fifteen percent of total trailer weight (equipment plus trailer) must be on tongue to help prevent trailer sway.
- Do not exceed tow vehicle capacities. See tow vehicle manual.
- Do not exceed maximum trailer tongue load specifications or hitch capabilities.

10. Tie down load. See equipment manual.
11. Mark positions of all equipment that will be unloaded at jobsite to allow correct loading when work is finished.

Assemble Accessories

Fire Extinguisher

Mount a fire extinguisher near the power unit but away from possible points of ignition where shown. The fire extinguisher should always be classified for both oil and electric fires. It should meet legal and regulatory requirements.



j70om080w.eps

Lighting Kit

If additional lighting is needed, plug lighting kit into provided outlet. Contact your local Ditch Witch dealer for further information.

Controls

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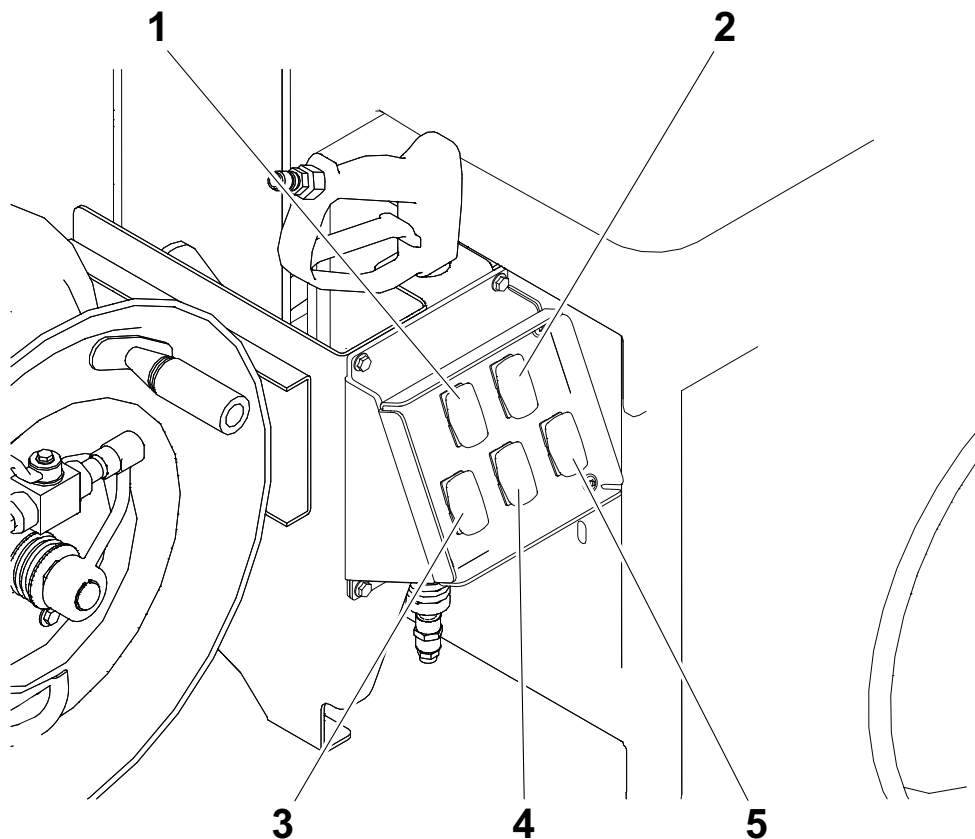
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Console, Rear

500/800 Trailer



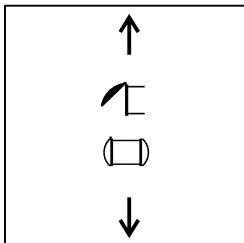
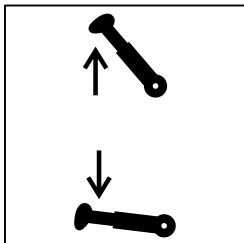
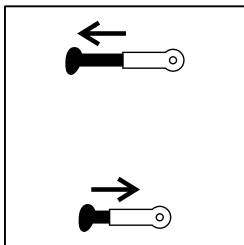
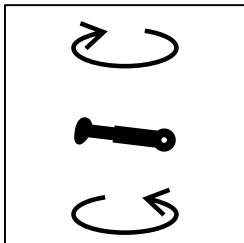
j70om012w.eps

1. Boom/Door/Tank selection switch
2. Hydraulic lift switch
3. Boom tilt switch*

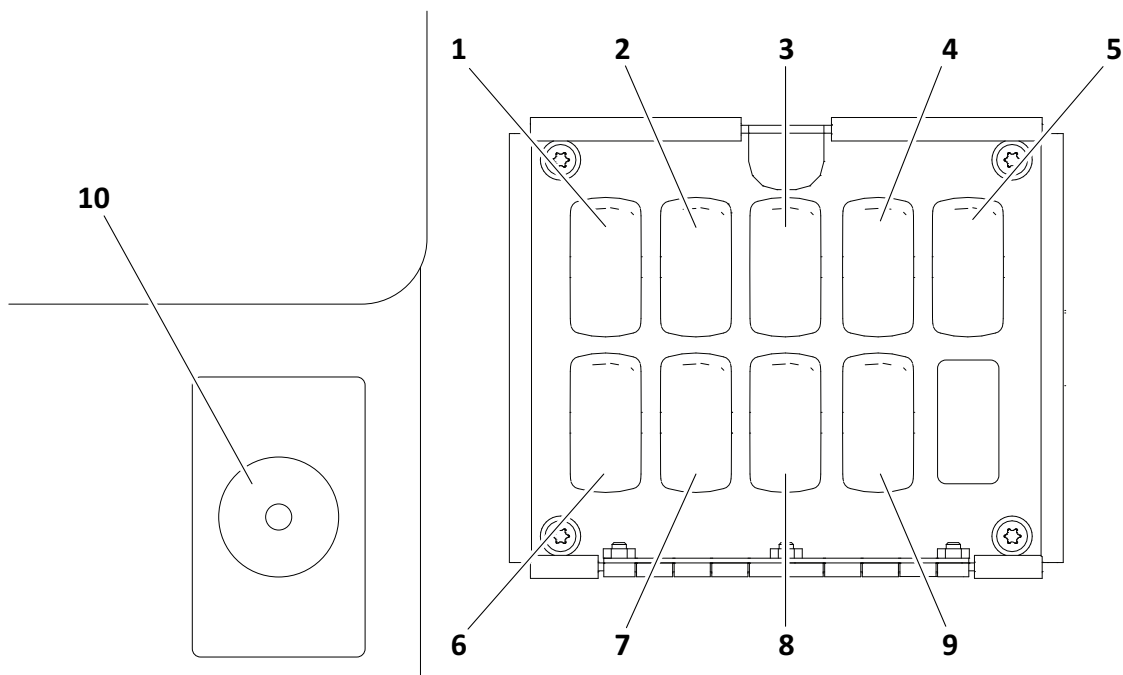
4. Boom extension switch*
5. Boom rotation switch*

* If equipped

Item	Description	IMPORTANT
1. Boom/Door/Tank selection switch <small>c00ic277w.eps</small>	<p>To enable boom control, press top.</p> <p>To enable door control, move to middle.</p> <p>To enable debris tank control, press bottom.</p>	See "Hydraulic lift switch" on page 41.

Item	Description	IMPORTANT
2. Hydraulic lift switch  <small>c00ic276w.eps</small>	<p>To raise debris tank/door, press and hold top.</p> <p>To lower debris tank/door, press and hold bottom.</p>	<p>Ensure correct function is selected. See "Boom/Door/Tank selection switch" on page 40.</p>
3. Boom tilt switch  <small>c00ic278w.eps</small>	<p>To raise boom, press and hold top.</p> <p>To lower, press and hold bottom.</p>	<p>Ensure correct function is selected. See "Boom/Door/Tank selection switch" on page 40.</p>
4. Boom extension switch  <small>c00ic279w.eps</small>	<p>To extend boom, press and hold top.</p> <p>To retract, press and hold bottom.</p>	<p>Ensure correct function is selected. See "Boom/Door/Tank selection switch" on page 40.</p>
5. Boom rotation switch  <small>c00ic280w.eps</small>	<p>To rotate boom right, press and hold top.</p> <p>To rotate boom left, press and hold bottom.</p>	<p>Ensure correct function is selected. See "Boom/Door/Tank selection switch" on page 40.</p>

Truck

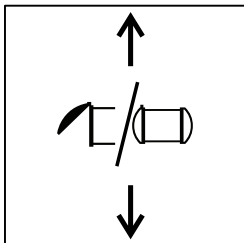
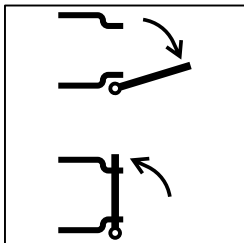
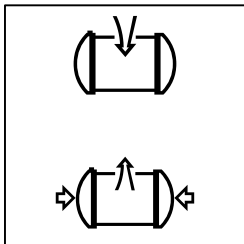
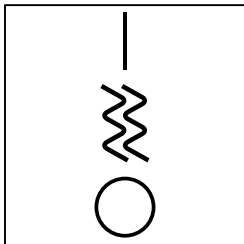
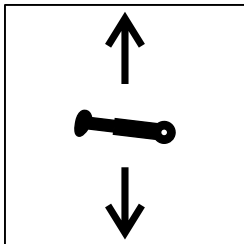


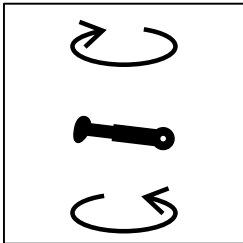
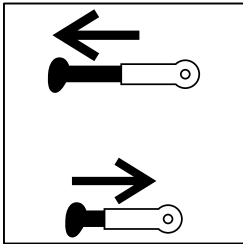
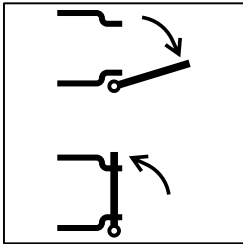
j90om004w21.eps

- | | |
|---|---------------------------|
| 1. Boom/Door/Debris tank selection switch | 6. Boom tilt switch* |
| 2. Hydraulic lift switch | 7. Boom rotation switch* |
| 3. Drain valve switch | 8. Boom extension switch* |
| 4. Flow mode switch | 9. Boom valve switch* |
| 5. Tank shaker switch* | 10. Engine stop switch |

* If equipped

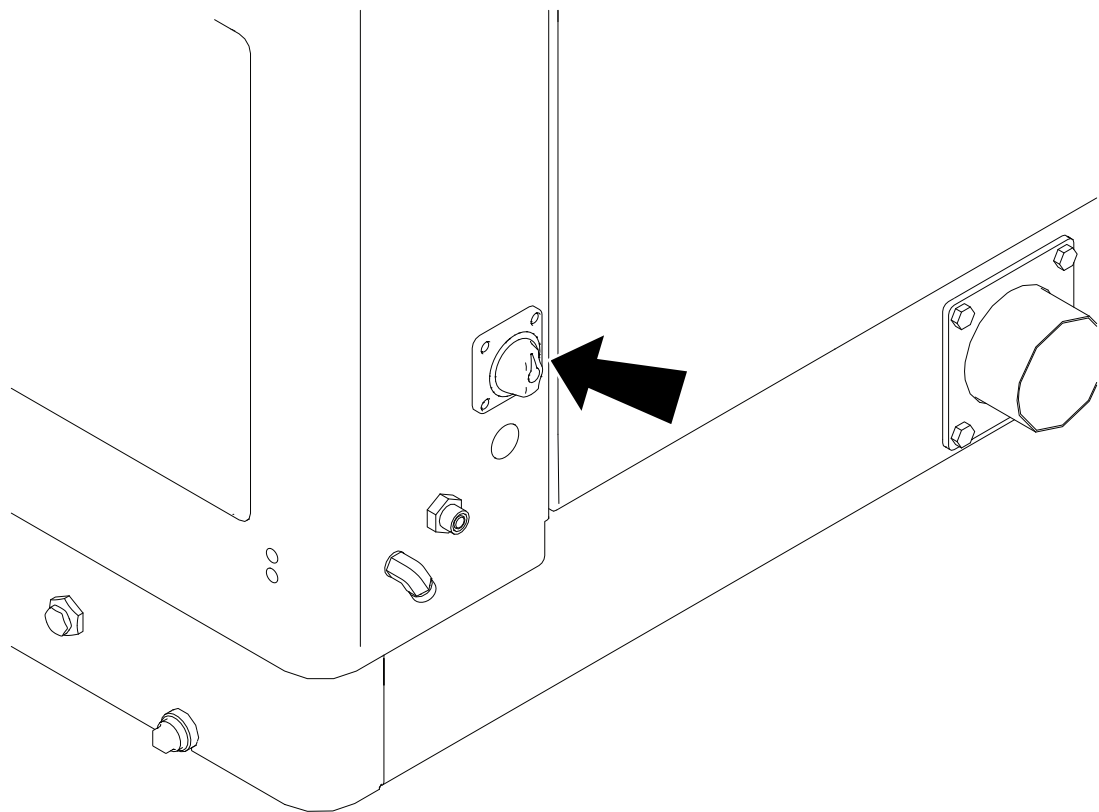
Item	Description	IMPORTANT
1. Boom/Door/Debris tank selection switch c00ic277w.eps	<p>To enable boom control, press top.</p> <p>To enable door control, move to middle.</p> <p>To enable debris tank control, press bottom.</p>	

Item	Description	IMPORTANT
2. Hydraulic lift switch  <small>c00ic426w.eps</small>	<p>To raise debris tank/door, press and hold top.</p> <p>To lower debris tank/door, press and hold bottom.</p>	<p>Ensure correct function is selected. See "Boom/Door/Debris tank selection switch" on page 42.</p> <p>When closing door, ensure door closes fully.</p>
3. Drain valve switch  <small>c00ic427w.eps</small>	<p>To open drain valve, press top.</p> <p>To close, press bottom.</p>	
4. Flow mode switch  <small>c00ic428w.eps</small>	<p>To use suction mode, press top.</p> <p>To use reverse flow mode, press bottom.</p>	
5. Tank shaker switch  <small>c00ic429w.eps</small>	<p>To turn on tank shaker, press top.</p> <p>To turn off, press bottom.</p>	
6. Boom tilt switch  <small>c00ic430w.eps</small>	<p>To raise boom, press and hold top.</p> <p>To lower, press and hold bottom.</p>	<p>Ensure correct function is selected. See "Boom/Door/Debris tank selection switch" on page 42.</p>

Item	Description	IMPORTANT
7. Boom rotation switch  <p>c00ic280w.eps</p>	<p>To rotate boom right, press top.</p> <p>To rotate boom left, press bottom.</p>	<p>Ensure correct function is selected. See "Boom/Door/Debris tank selection switch" on page 42.</p>
8. Boom extension switch  <p>c00ic431w.eps</p>	<p>To extend boom, press and hold top.</p> <p>To retract, press and hold bottom.</p>	<p>Ensure correct function is selected. See "Boom/Door/Debris tank selection switch" on page 42.</p>
9. Boom valve switch  <p>c00ic427w.eps</p>	<p>To open boom valve, press top.</p> <p>To close, press bottom.</p>	
10. Engine stop switch	<p>To stop engine, press button.</p> <p>To allow engine to start, pull.</p>	<p>Turn ignition to off position and then restart engine.</p>

Power Pack

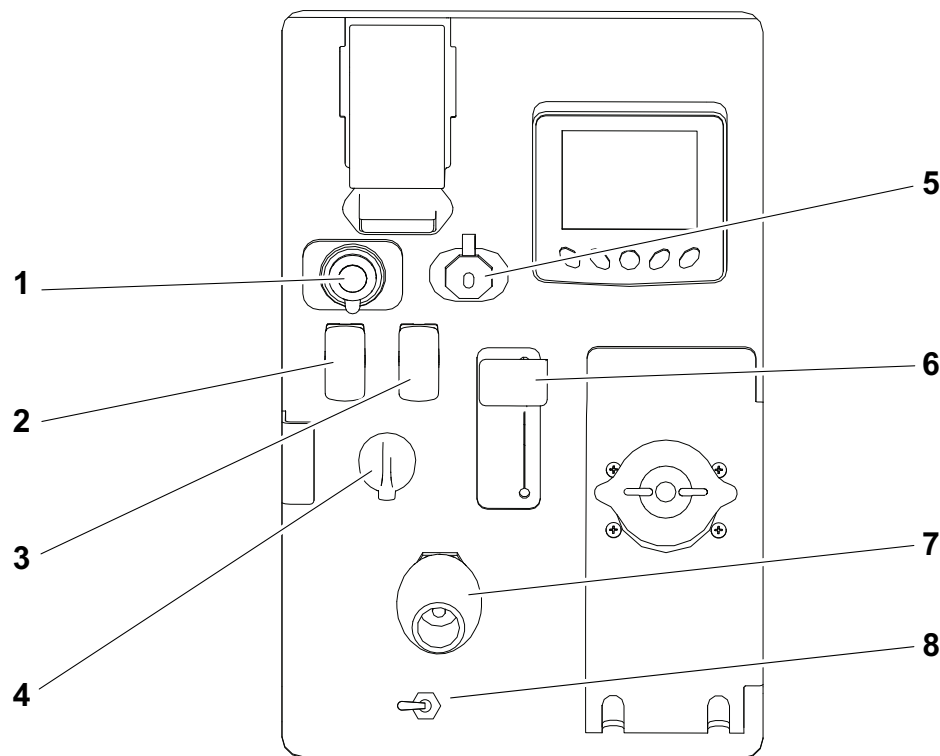
Battery Disconnect



j70om009w.eps

Item	Description	IMPORTANT
<div>Battery disconnect switch</div> <div></div> <div>c00ic272w.eps</div>	<div>To connect, move right.</div> <div>To disconnect, move left.</div>	<div>NOTICE:</div> <div><ul style="list-style-type: none">Do not disconnect with engine running.To avoid equipment damage, wait two minutes after turning engine off before disconnecting battery.</div>

Controls



j700m007w.eps

1. USB port

2. Work light switch

3. Cold start switch

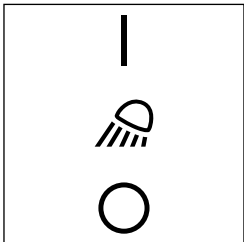
4. Ignition switch
5. Auxiliary outlet

6. Throttle

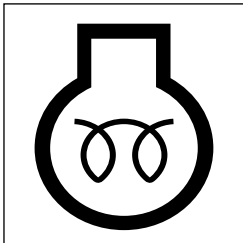
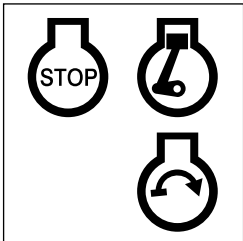
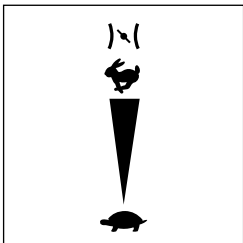
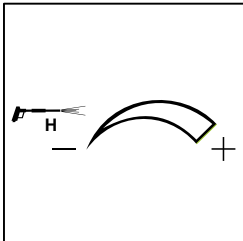
7. Water pressure control

8. Air pressure switch

Item	Description	IMPORTANT
1. USB port	Provides power for mobile devices.	Dual USB 12VDC 2.1A
2. Work light switch	To turn on, press top. To turn off, press bottom.	All lights will turn on.

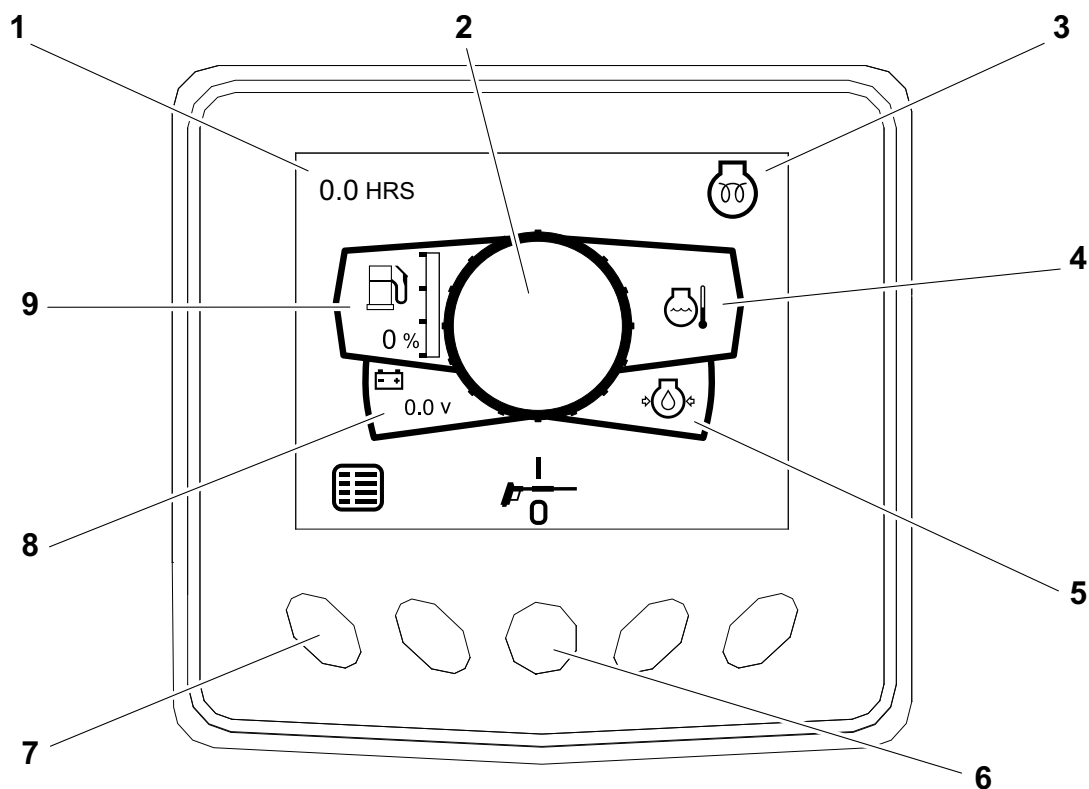


c00ic274w.eps

Item	Description	IMPORTANT
3. Cold start switch  <small>c00ic275w.eps</small>	<p>To turn on, press and hold.</p>	<p>See "Wireless Remote Control (Trailer)" on page 83.</p>
4. Ignition switch  <small>c00ic065h.eps</small>	<p>To activate accessories, turn right.</p> <p>To start engine, turn right and hold.</p> <p>To shut off machine, turn left.</p>	<p>NOTICE:</p> <ul style="list-style-type: none"> Only start unit when flow direction control is in vacuum mode. When engine is on, blower operates and vacuum is present at tank inlet valve. <p>See "Wireless Remote Control (Trailer)" on page 83.</p>
5. Auxiliary outlet	Provides power for other equipment.	DC12V, 10A
6. Throttle control  <small>c00ic116h.eps</small>	<p>To increase engine speed, move up.</p> <p>To decrease, move down.</p>	Run engine at full throttle during operation.
7. Water pressure control  <small>c00ic060t.eps</small>	<p>To increase, move right.</p> <p>To decrease, move left.</p>	



Item	Description	IMPORTANT
8. Air pressure switch	To select low-pressure air, move to left. To select high-pressure air, move to right.	Operate auxiliary pneumatic tools at low air setting.







Display



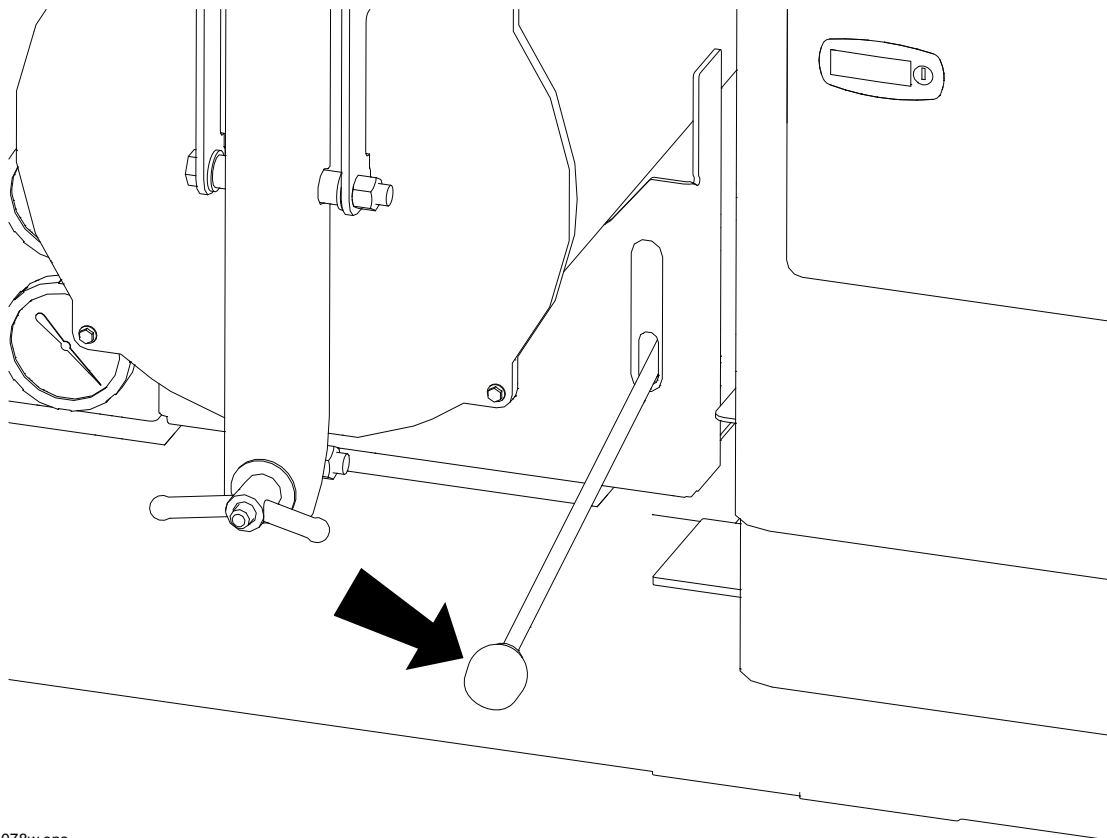
j67om064w.eps

- | | |
|---|---------------------------|
| 1. Hourmeter | 6. Water pump key |
| 2. Water pump indicator | 7. User settings menu key |
| 3. Cold start wait indicator | 8. Voltmeter |
| 4. Engine coolant temperature indicator | 9. Fuel gauge |
| 5. Engine oil pressure indicator | |

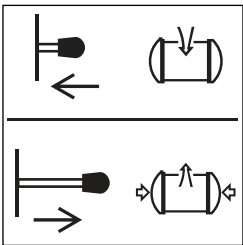
Item	Description	IMPORTANT
1. Hourmeter	Displays engine operating time.	Use these times to schedule service.
2. Water pump indicator	 Water pump off PSI Water pump on (pressure is shown)	
3. Cold start wait indicator	 Lights when cold start switch is on.	

Item	Description	IMPORTANT
4. Engine coolant temperature indicator	 Flashes when engine coolant temperature is high.	
5. Engine oil pressure indicator	 Flashes when engine oil pressure is low.	
6. Water pump key	 To turn on, press. To turn off, press again.	
7. User settings menu key	 To access user settings menu, press.	Brightness, contrast, language, and units of measurement can be adjusted in this screen.
8. Voltmeter	 Displays battery voltage.	
9. Fuel gauge	 Displays fuel level.	Icon flashes when fuel level reaches 10%. See "Approved Fuel" on page 114

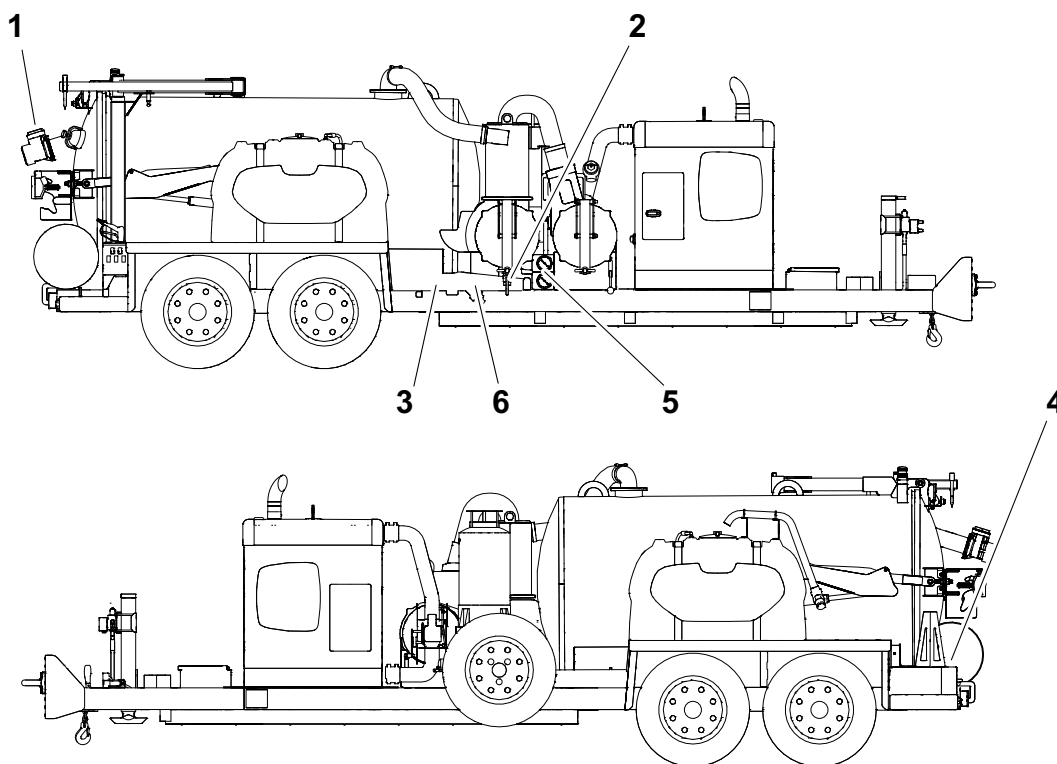
Reverse Flow



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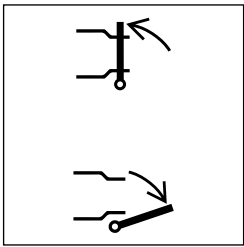
Item	Description	IMPORTANT
Flow direction control  c00ic292w.eps	<p>To select vacuum mode, push in fully.</p> <p>To select reverse flow mode, lift and pull out fully.</p>	<p>Use reverse flow, if equipped, to unload debris tank contents to another tank.</p> <p>Operate reverse flow mode only when outlet valve is open.</p>

Tank

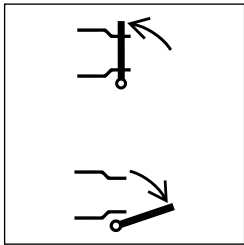


j70om011w.eps

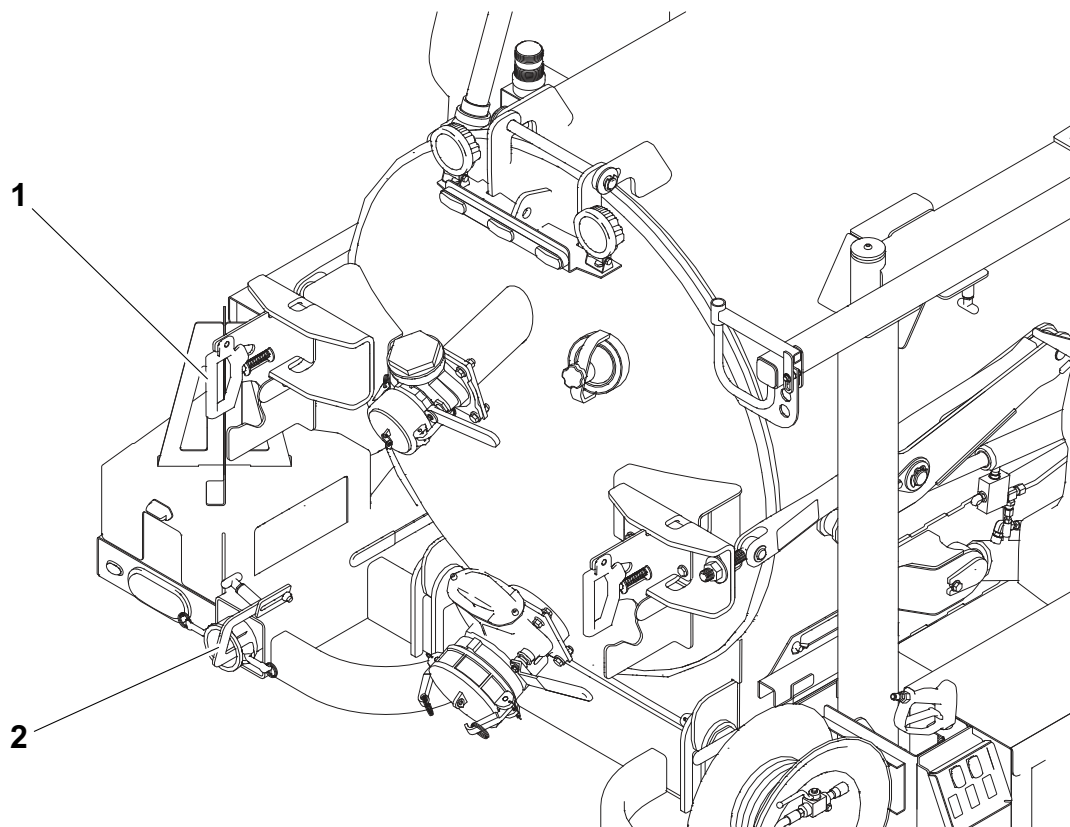
- | | |
|----------------------------|-------------------------------|
| 1. Inlet valve | 4. Outlet valve |
| 2. Water tank supply valve | 5. Vacuum/Reverse flow gauges |
| 3. Water tank drain | 6. Antifreeze tank valve |

Item	Description	IMPORTANT
1. Inlet valve 	To start suction, move down. To stop suction, move up.	NOTICE: <ul style="list-style-type: none"> Only run engine with tank inlet valve open. If hose or tool gets stuck on the ground or material being vacuumed, use tank inlet valve to break suction.

c00ic794h.eps

Item	Description	IMPORTANT
2. Water tank supply valve	<p>To send water from tank to wash wand, move left.</p> <p>To stop water flow, move right.</p>	NOTICE: Ensure water tank supply valve or antifreeze tank valve is open when pump is on.
3. Water tank drain	<p>To open, move left.</p> <p>To close, move right.</p>	
4. Outlet valve	 <p>To open and drain tank, move down.</p> <p>To close, move up.</p>	
5. Vacuum/Reverse flow gauges	<p>Bottom gauge displays vacuum reading.</p> <p>Top gauge displays reverse flow pressure, if equipped.</p>	Vacuum relief valve opens when vacuum reaches 15inHG (381mm).
6. Antifreeze tank valve	<p>To open, move left.</p> <p>To close, move right.</p>	NOTICE: Ensure water tank supply valve or antifreeze tank valve is open when pump is on.

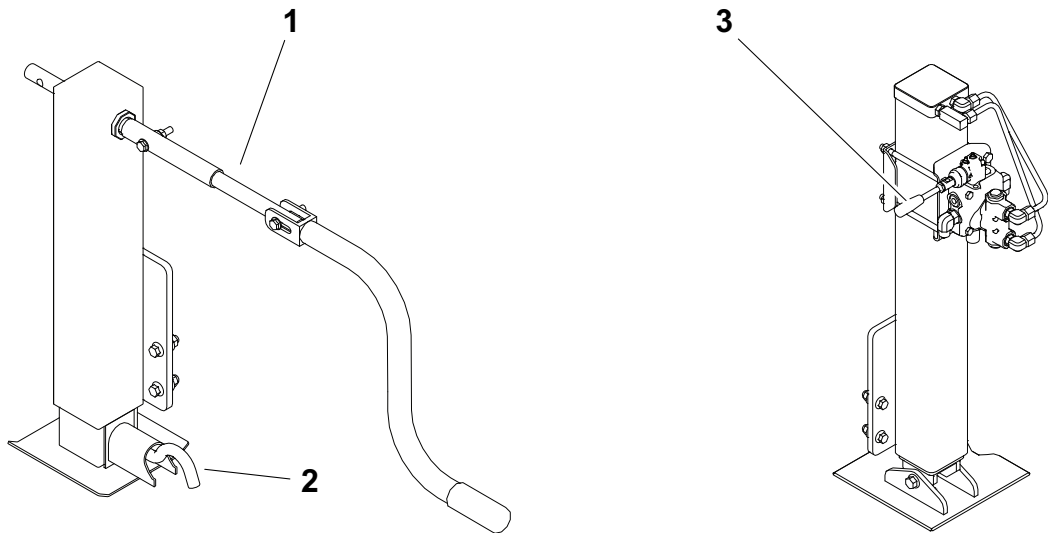
Tool Controls



j70om083w.eps

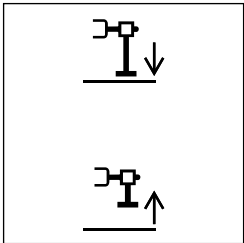
Item	Description	IMPORTANT
1. Tool rack handle	Pull handle and turn 90° to access tool.	Lock or other security device can be attached to handle.
2. Hose storage handle	Pull handle to release restraining arm and access hose.	

Trailer Jack



j70om074w.eps

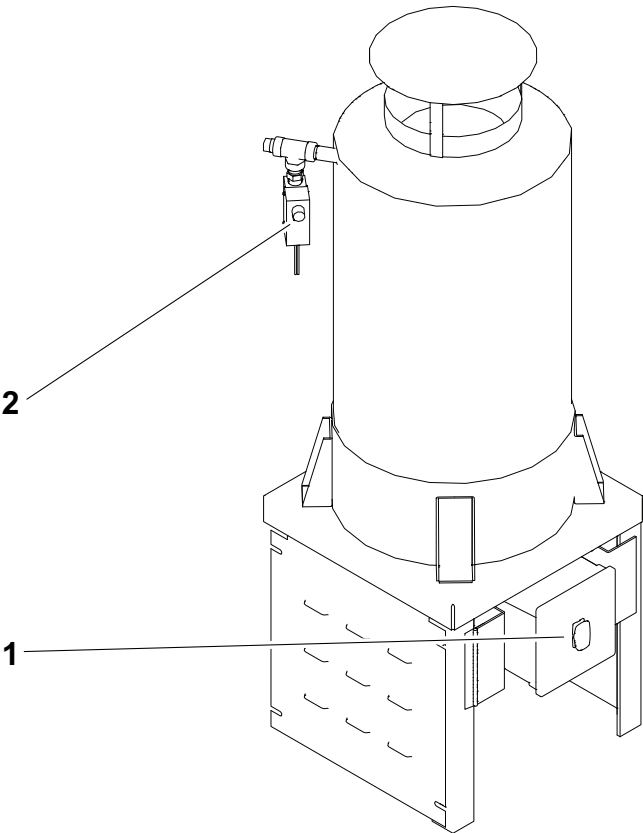
Item	Description	IMPORTANT
1. Manual trailer jack handle	To raise front of trailer, turn handle clockwise. To lower front of trailer, turn handle counterclockwise.	Fold handle down when not in use.
2. Jack base latch	To raise and lower jack base, pull.	Trailer jack automatically raises when latch is pulled.
3. Hydraulic trailer jack control	To raise front of trailer, move up. To lower front of trailer, move down.	



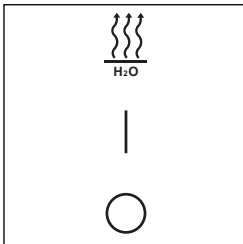
c00ic701h.eps

Water Heater

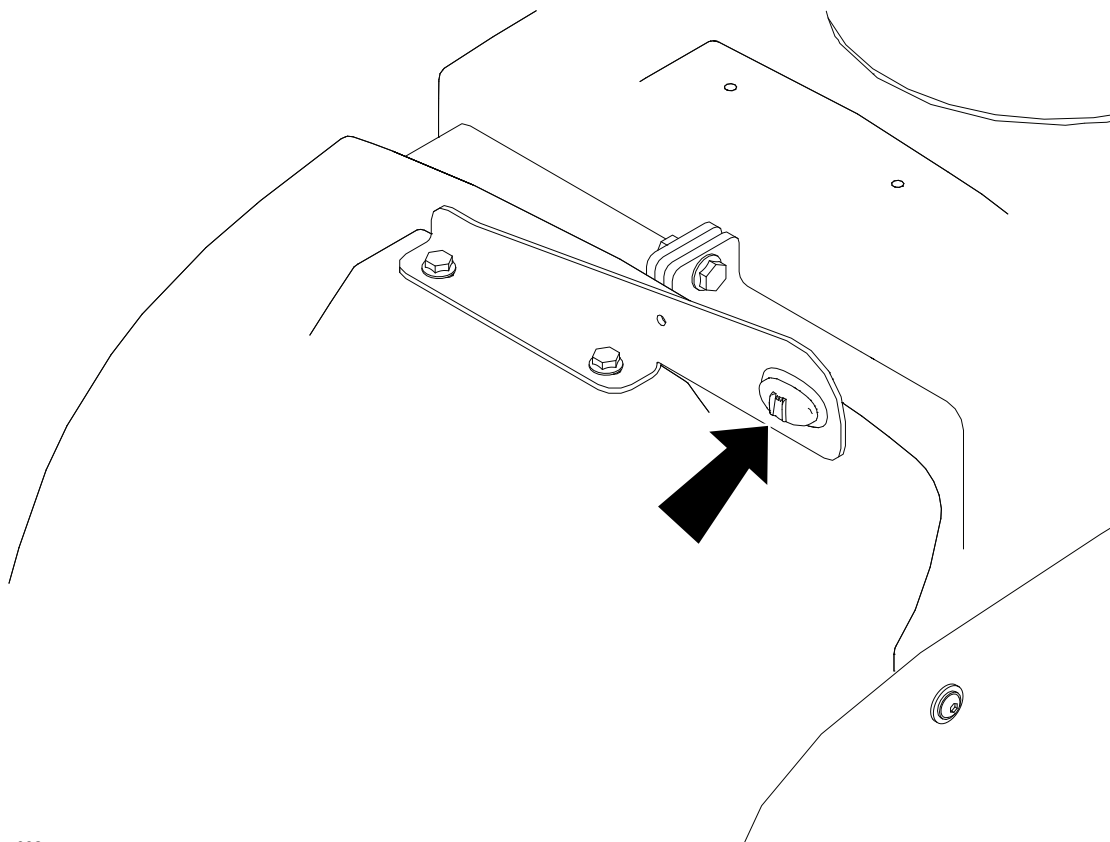
Controls



j70om014w.eps

Item	Description	IMPORTANT
<div>1. Power switch</div> <div></div> <div>c00ic293w.eps</div>	<div>To turn on, press top.</div> <div>To turn off, press bottom.</div>	<div>NOTICE:</div> <div><ul style="list-style-type: none">• Turn off when not in use.• Heater will shut off any time water flow stops or power pack is off.</div>
<div>2. Thermostat</div>	<div>To adjust temperature, turn dial.</div>	<div>NOTICE: Do not adjust temperature above 130°F (54°C).</div>

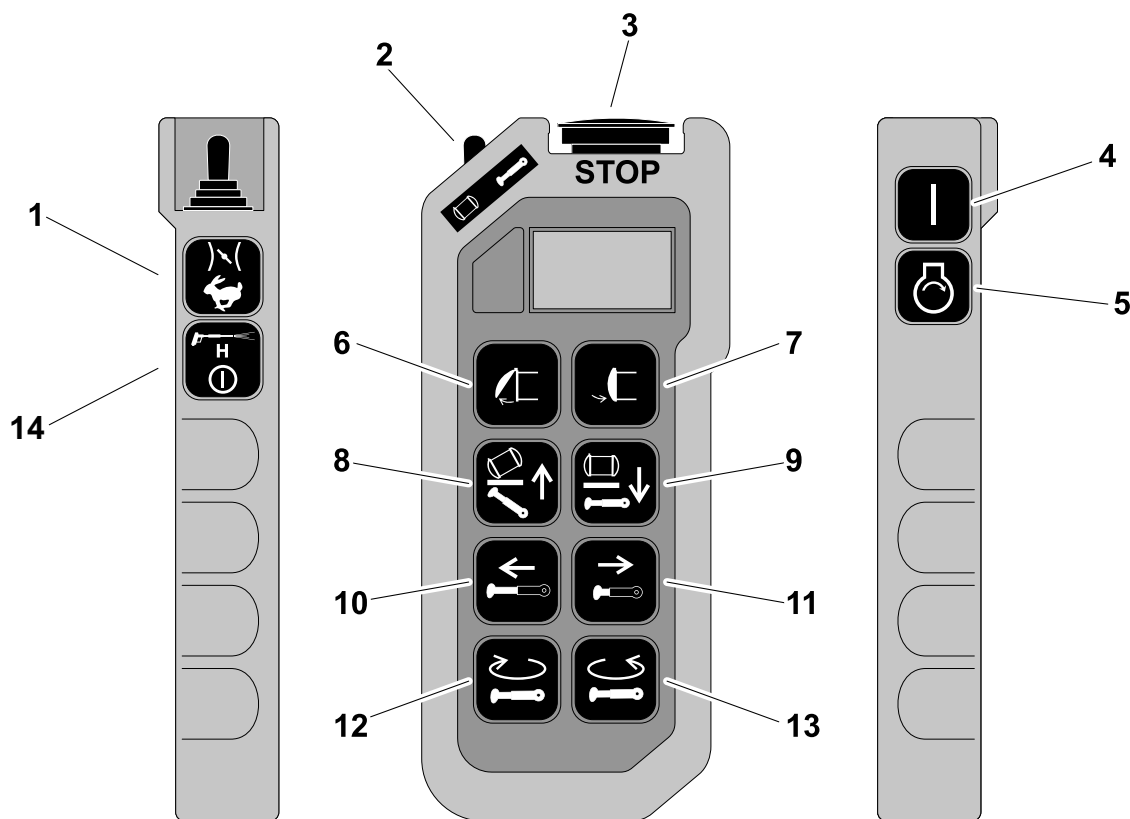
Heater Flame Indicator



j70om082w.eps

Item	Description	IMPORTANT
Heater flame indicator	Flashes when heater flame is out.	<p>Indicator should be visible in towing vehicle's left side rearview mirror.</p> <p>If indicator is flashing, turn off water heater power switch and check heater fuel tank.</p> <ul style="list-style-type: none">• If tank has fuel, turn heater power switch on to restart flame.• If flame does not restart, contact your Ditch Witch dealer.

Wireless Remote Control (Trailer)



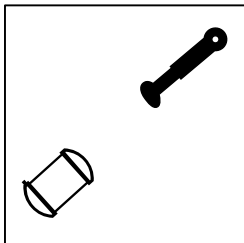
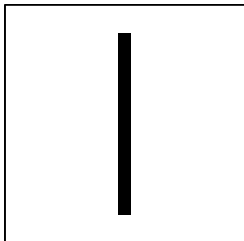
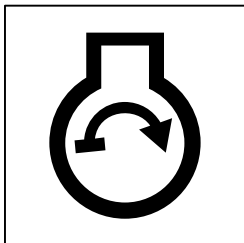
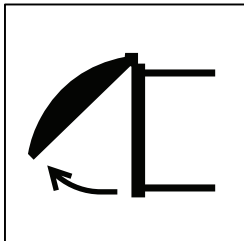
j70om013w.eps

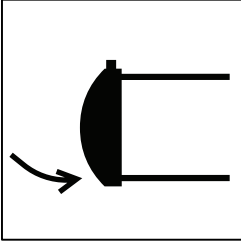
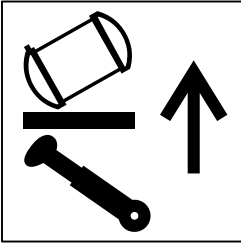
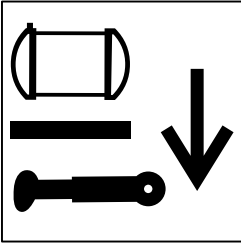
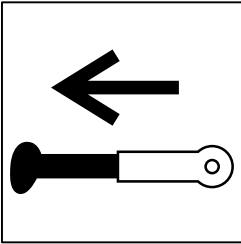
IMPORTANT: Wireless remote control should be paired to receiver at factory. See “Wireless Remote Control (Trailer)” on page 83.

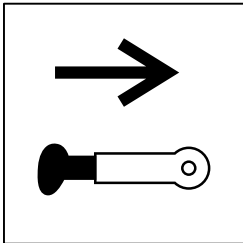
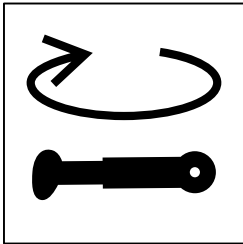
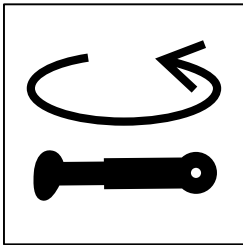
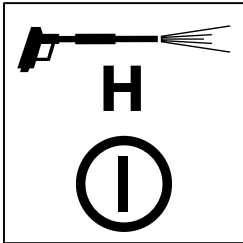
- | | |
|-------------------------------|-------------------------------|
| 1. Throttle button | 8. Tank/Boom* raise button |
| 2. Boom/Tank selection switch | 9. Tank/Boom* lower button |
| 3. Engine stop button | 10. Boom extend button* |
| 4. Power button | 11. Boom retract button* |
| 5. Remote start button | 12. Boom rotate right button* |
| 6. Door open button | 13. Boom rotate left button* |
| 7. Door close button | 14. Water pump button |

* If equipped

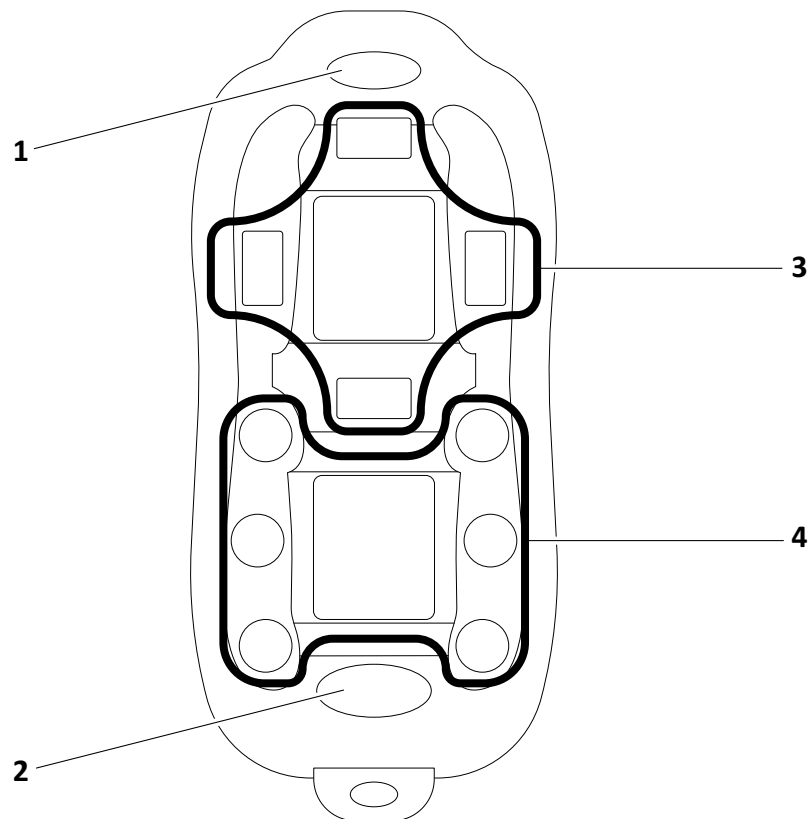
Item	Description	IMPORTANT
1. Throttle button	Not used.	Use throttle control on power pack.

Item	Description	IMPORTANT
2. Boom/Tank selection switch  c00ic282w.eps	<p>To enable boom control, move right.</p> <p>To enable debris tank and door control, move left.</p>	
3. Engine stop button	To stop engine, press.	<p>Pressing button also turns off wireless remote control.</p> <p>To restart engine, turn ignition switch off and back on.</p> <p>To restart wireless remote control, press power button.</p>
4. Power button  c00ic284w.eps	To turn on wireless remote control, press.	Wireless remote control turns off after 20 minutes of inactivity.
5. Remote start button  c00ic056t.eps	To start machine, press and hold until engine starts.	NOTICE: If cold start procedures are needed, do not start engine with wireless remote control. For remote start to function, accessories must be activated, and wireless remote control must be on.
6. Door open button  c00ic368w.eps	To open debris tank door, press and hold.	

Item	Description	IMPORTANT
7. Door close button  <small>c00ic369w.eps</small>	To close debris tank door, press and hold.	
8. Tank/Boom raise button  <small>c00ic285w.eps</small>	To raise debris tank or boom, press and hold.	NOTICE: <ul style="list-style-type: none"> Do not use boom to raise or lower objects. Do not operate tank while trailer is unhitched. Select tank or boom functions using function switch.
9. Tank/Boom lower button  <small>c00ic286w.eps</small>	To lower debris tank or boom, press and hold.	NOTICE: <ul style="list-style-type: none"> Do not use boom to raise or lower objects. Do not operate tank while trailer is unhitched. Select tank or boom functions using function switch.
10. Boom extend button  <small>c00ic287w.eps</small>	To extend power boom, press and hold.	

Item	Description	IMPORTANT
11. Boom retract button  <small>c00ic288w.eps</small>	To retract power boom, press and hold.	
12. Boom rotate right button  <small>c00ic289w.eps</small>	To rotate power boom right, press and hold.	
13. Boom rotate left button  <small>c00ic290w.eps</small>	To rotate power boom left, press and hold.	
14. Water pump button  <small>c00ic291w.eps</small>	To start water pump, press. To stop, press again.	Check and adjust pressure at power pack controls.

Wireless Remote Control (Truck)



j90om001w21.eps

1. Green button








2. Red button
3. Upper variable function buttons

4. Lower variable function buttons





Item	Description	IMPORTANT
1. Green button	<div>To turn on wireless control, press in sequence with red button.</div> <div>To move through control screens, press.</div>	To turn on wireless control, press and hold red button and then press and hold green button. Release red button and then green button.
2. Red button	<div>To turn on wireless control, press in sequence with red button.</div> <div>To turn off wireless remote control and vac engine, press.</div>	To turn on wireless control, press and hold red button and then press and hold green button. Release red button and then green button.
3. Upper variable function buttons	Button functions vary based on icons in display screen.	












Item	Description	IMPORTANT
4. Lower variable function buttons	Button functions vary based on icons in display screen.	

Upper Variable Function Icons

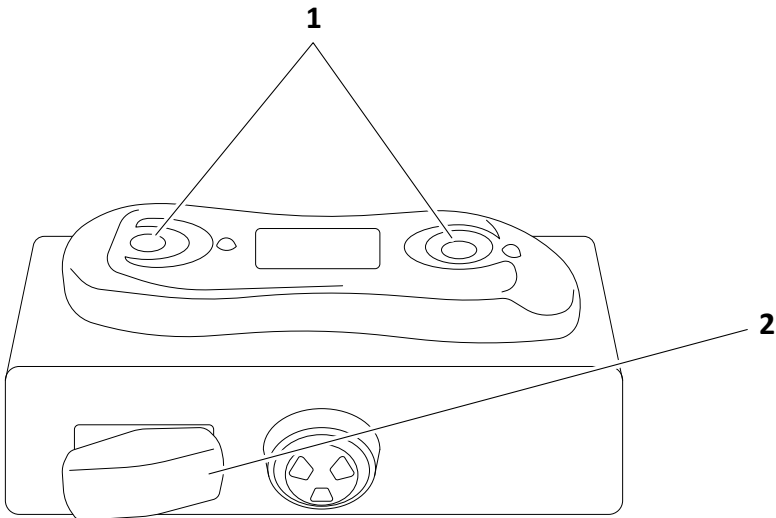
Item	Description	IMPORTANT
1. Engine screen	 To start engine, press.	
2. Door screen	 To open door, press.  To close door, press.	
3. Boom screen	 To raise boom, press.  To lower boom, press.  To rotate boom counterclockwise, press.  To rotate boom clockwise, press.	"No Link" indicates the connection between the remote and the machine is not active or that there is an issue with the onboard scales.

Lower Variable Function Icons

Item	Description	IMPORTANT
1. Suction/Worklight screen	 To enable suction mode.  To enable reverse flow mode.  To toggle work lights on and off, press.  To lift tank a few inches to break suction/flow, press.	

Item	Description	IMPORTANT
2. Tank screen	 To toggle tank shaker on and off, press.	
	 To open tank dump valve, press.	
	 To close tank dump valve, press.	
	 To raise tank, press.	
	 To lower tank, press.	
3. Boom screen	 To retract boom, press.	
	 To extend boom, press.	
	 To open boom valve, press.	
	 To close boom valve, press.	
	 To lift tank a few inches to break suction/flow, press.	
	 To toggle water pump on and off, press.	

Wireless Remote Charging Cradle



j90om006w21.eps


1. Charging contacts

2. Alarm switch

Item	Description	IMPORTANT
1. Charging contacts	To charge battery, place magnets on remote on charging contacts.	The remote will only fit on the charger one way.
2. Alarm switch	To turn on audible alert when truck is started if remote is not on the charger, press left. To turn off alert, press right.	Remote can be left on the charger when not in use.

Transport

Chapter Contents



For additional precautions, see “Safety” and “Prepare” chapters.

IMPORTANT: For more information on how to operate controls, see “Controls” chapter.

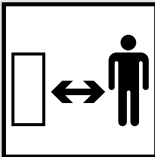
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- Points 68
- Procedure 68

Haul 69

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- Operate Jack 70
- Hitch Trailer 71
- Unhitch Trailer 72
- Adjust Trailer Lunette 72
- Haul in Cold Weather 73

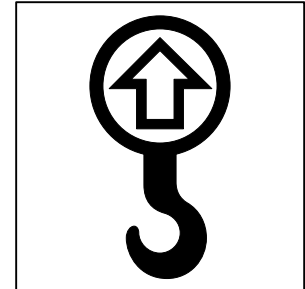
Lift

**WARNING**

Lifted load. Crushing weight can cause death or serious injury. Stay away from lifted load and its range of movement.

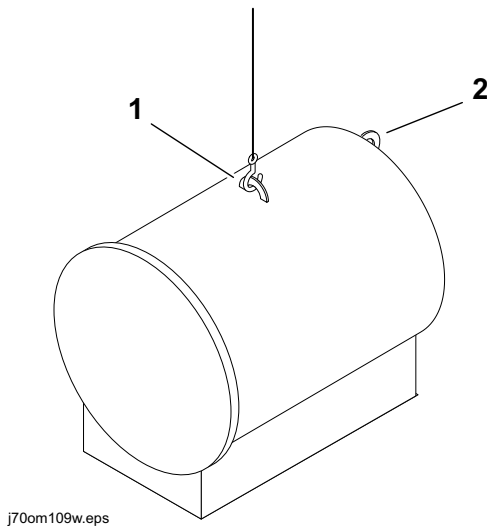
Points

Lifting points are identified by lifting decals. Lifting at other points is unsafe and can damage machine.

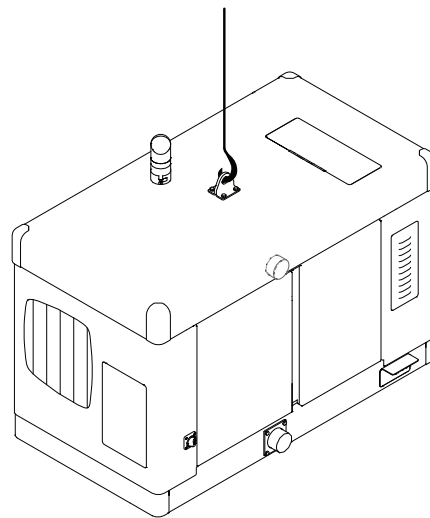


ic1319a.eps

Procedure



j70om109w.eps



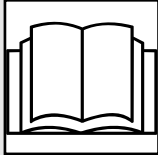
Use equipment capable of supporting machine's size and weight. See "Specifications" on page 149 or measure and weigh equipment before lifting.

For debris tank, use top lift point (1) to lift tank. Use end lift point (2) to drain tank if machine is disabled.

NOTICE:

- Ensure power pack or tank is detached from trailer before lifting.
- Relieve pressure in tank before lifting.
- Only lift empty water or debris tanks.
- Do not lift tank using boom, if equipped.

Haul

**⚠ WARNING**

Misuse of machine can cause death or serious injury.
Read and understand operator's manual and all other safety instructions before use. Know how to use all controls.

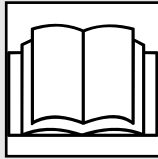
To help avoid injury:

- Only haul if tank is fully lowered and horizontal.
- Only haul if optional vacuum boom is secured. See "Stow Boom" on page 104.

Inspect Trailer

- Check hitch for wear and cracks.
- Check battery for 12V charge.
- Inspect lights for cleanliness and correct operation.
- Inspect reflectors and replace if needed.
- Check tire pressure.
- Check lug nut torque.
- Ensure trailer brakes are adjusted to come on with tow vehicle brakes.
- Check trailer for cracks.

Operate Jack



⚠ WARNING

Misuse of machine can cause death or serious injury. Read and understand operator's manual and all other safety instructions before use. Know how to use all controls.

To help avoid injury:

- Do not use manual crank to force jack operation. See your Ditch Witch dealer if jack binds.
- Use manual crank only when hydraulic power is unavailable.
- Operate the hydraulic motor only when engine is set to medium or low throttle.
- Do not overextend jack. Use telescoping leg to gain additional height.

1. Support trailer tongue.
2. Raise or lower jack base.

IMPORTANT: Ensure trailer jack latch engages.

3. Remove tongue support.

Hitch Trailer

1. Back tow vehicle to trailer.
2. Put manual transmission into first or reverse gear or automatic transmission into park.
3. Shut off tow vehicle.
4. Block wheels.
5. Connect trailer lunette to tow vehicle hitch and lock in place with lock pin.

IMPORTANT: Trailer must be level. If needed, adjust lunette bolts to move lunette and level trailer. See "Adjust Trailer Lunette" on page 72.

6. Connect safety chains to tow vehicle, crossing chains under lunette.

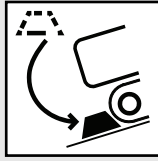
NOTICE: Do not connect chains to pintle hook or hitch ball.

7. Connect breakaway switch cable to tow vehicle.

NOTICE: Do not connect cable to pintle hook or hitch ball.

8. Plug trailer electrical connector into tow vehicle connector.
9. Raise jack base.
10. Remove and stow wheel blocks.

Unhitch Trailer



⚠ WARNING Runaway machine. Impact can cause death or serious injury. Chock or block machine when parking on slopes.

1. Stop tow vehicle and trailer on level ground.
2. Put manual transmission into first or reverse gear or automatic transmission into park.
3. Shut off machine.
4. Block trailer wheels.
5. Unhitch trailer.

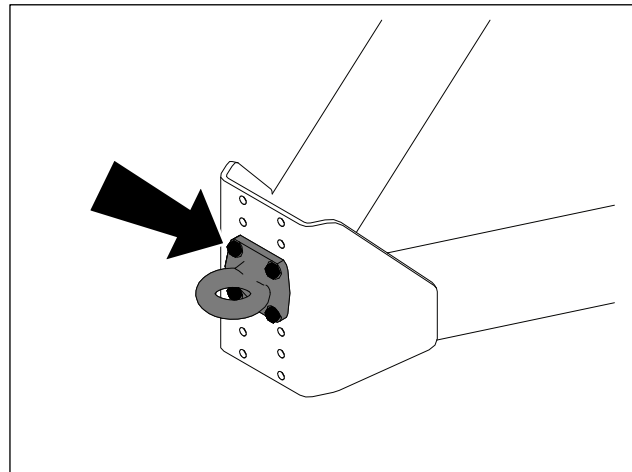
Adjust Trailer Lunette

To ensure level trailer, adjust lunette.

1. Lower jack base.
2. Remove lunette bolts (shown).
3. Move lunette to new position.

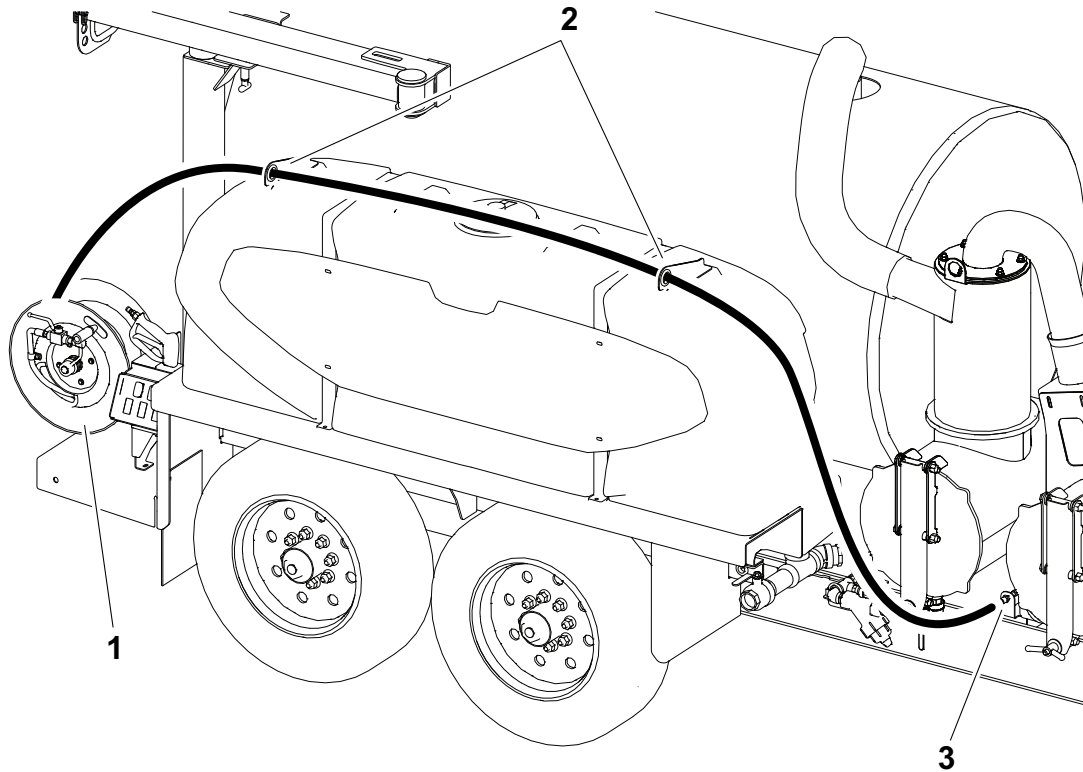
IMPORTANT: On VT20 or VT24 trailer, remove paint from lunette destination location. Retouch paint after installation.

4. Reattach lunette, ensuring bolts are properly tightened. See "Specifications" on page 149.



TrailerHitchAdjust_VT20.eps

Haul in Cold Weather




j71om024w.eps

To transport in cold weather, connect and run optional water heater.

1. Extend hose from hose reel (1).
2. Route hose through retainers (2).
3. Connect hose to QDC adapter (3).
4. Start engine and set to low throttle.
5. Turn on water pump and set to 3000psi (206bar).
6. Turn on water heater and adjust temperature according to conditions.

Vacuum and Pothole

Chapter Contents



For additional precautions, see “Safety” and “Prepare” chapters.

IMPORTANT: For more information on how to operate controls, see “Controls” chapter.

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- Connect Hoses 76
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- Wireless Remote Control 76

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Pothole 89

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- With Water 93

Drain Tank 95

Unload to Another Tank 97

Open/Close Tank Door 98

- Open 98
- Close 99

Shut Down 99

Set Up

Connect Hoses

1. Remove vacuum hoses from storage.
2. Connect hoses. Secure all locking clamps.
3. Ensure debris tank outlet valve is closed.

Monitor Working Trailer Weight

Working trailer weight can be determined by using weight gauge or determining tank fill level.

Weight Gauge

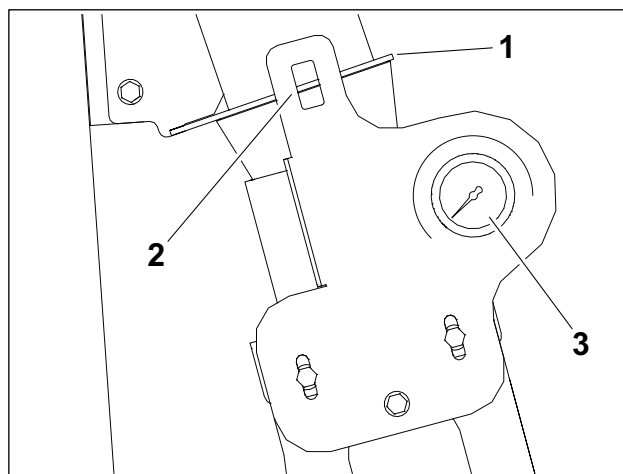
Use weight gauge (3) to see approximate weight of trailer and working load.

To use gauge after calibration:

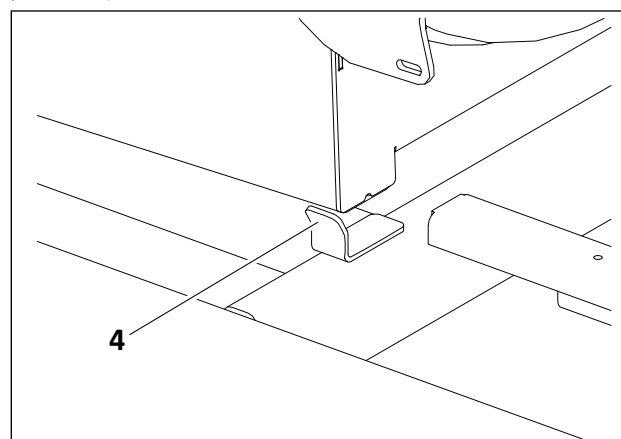
1. Lower tank into position.

NOTICE: Tank must be lowered into position for weight reading to be accurate. If tank is not lowered into position, tank tilt cylinders will not be bearing full weight of tank.

- **VT9/VT9H:** Lower until bottom of tank is near upper edge of lowering guide (4), as shown.
 - **All other trailers:** Lower until back lip of make/break seal tube (1) is visible inside gauge window (2).
2. Read value on gauge.
 3. **Truck:** Weight is displayed on gauge in truck cab and messages appear on the wireless remote control when weight nears maximum allowable weight. Once that weight is reached, machine automatically breaks suction and displays a message.



j700m090w.eps



j70in004w19.eps

NOTICE: Follow manufacturer's instructions to calibrate onboard scales.

Tank Fill Level

NOTICE: Exceeding the maximum fill level will overload the trailer. Never exceed trailer capacity.

IMPORTANT: For all materials, vacuum tank should be no more than half full when lifting the tank.

Use the reference charts below to help determine how full of various materials the vacuum tank can be without overloading trailer.

To use these charts, first select the appropriate table based on trailer and vacuum tank size. Next find the material being excavated. If material being excavated is not listed, find a material with similar density. Finally, determine the maximum fill level based on the amount of water in water tank.

500 Gallon Debris Tank on VT9/VT9H Trailer

Values shown are for machine with no options. Values will vary for other configurations.

Material	Maximum Debris Tank Fill Level	
	Water Tank Full (200gal/757L)	Water Tank Empty
Wood chips, dry	100%	100%
Snow, dry	100%	100%
Water	75%	91%
Lightweight mud, 8-10lb/gal (1-1.2kg/L)	69%	84%
Earth, dry loose	64%	78%
Caliche	60%	72%
Earth, loam	60%	72%
Mid-weight mud, 10-12lb/gal (1.2-1.44kg/L)	56%	68%
Limestone, crushed	48%	59%
Asphalt	46%	56%
Sand, dry	46%	56%
Earth, wet excavated	46%	56%
Heavy-weight mud, 12-15lb/gal (1.44-1.8kg/L)	46%	56%
Gravel, dry	45%	55%
Shale, riprap	44%	54%
Sand, wet	36%	43%

Set Up

500 Gallon Debris Tank on VT12 Trailer

Values shown are for machine with optional jib boom, reverse flow, spare tire and carrier, and trailer tongue toolbox. Values will vary for other configurations.

Material	Maximum Debris Tank Fill Level	
	Water Tank Full (200gal/757L)	Water Tank Empty
Wood chips, dry	100%	100%
Snow, dry	100%	100%
Water	74%	100%
Lightweight mud, 8-10lb/gal (1-1.2kg/L)	69%	100%
Earth, dry loose	64%	99%
Caliche	59%	91%
Earth, loam	59%	91%
Mid-weight mud, 10-12lb/gal (1.2-1.44kg/L)	56%	86%
Limestone, crushed	48%	74%
Asphalt	46%	71%
Sand, dry	46%	71%
Earth, wet excavated	46%	71%
Heavy-weight mud, 12-15lb/gal (1.44-1.8kg/L)	46%	70%
Gravel, dry	45%	69%
Shale, riprap	44%	68%
Sand, wet	36%	55%

500 Gallon Debris Tank on VT14 Trailer

Values shown are for machine with optional jib boom, reverse flow, spare tire and carrier, and trailer tongue toolbox. Values will vary for other configurations.

Material	Maximum Debris Tank Fill Level	
	Water Tank Full (200gal/757L)	Water Tank Empty
Wood chips, dry	100%	100%
Snow, dry	100%	100%
Water	100%	100%
Lightweight mud, 8-10lb/gal (1-1.2kg/L)	100%	100%
Earth, dry loose	100%	100%
Caliche	98%	100%
Earth, loam	98%	100%
Mid-weight mud, 10-12lb/gal (1.2-1.44kg/L)	93%	100%
Limestone, crushed	80%	93%
Asphalt	76%	89%
Sand, dry	76%	89%
Earth, wet excavated	76%	89%
Heavy-weight mud, 12-15lb/gal (1.44-1.8kg/L)	75%	88%
Gravel, dry	74%	87%
Shale, riprap	73%	85%
Sand, wet	59%	69%

500 Gallon Debris Tank on VT17 Trailer

Values shown are for machine with optional hydraulic jack, power boom, spare tire and carrier, and trailer tongue tool box. Values will vary for other configurations.

Material	Maximum Debris Tank Fill Level	
	Water Tank Full (200gal/757L)	Water Tank Empty
Wood chips, dry	100%	100%
Snow, dry	100%	100%
Water	100%	100%
Lightweight mud, 8-10lb/gal (1-1.2kg/L)	100%	100%
Earth, dry loose	100%	100%
Caliche	100%	100%
Earth, loam	100%	100%
Mid-weight mud, 10-12lb/gal (1.2-1.44kg/L)	100%	100%
Limestone, crushed	97%	100%
Asphalt	92%	100%
Sand, dry	92%	100%
Earth, wet excavated	92%	100%
Heavy-weight mud, 12-15lb/gal (1.44-1.8kg/L)	91%	100%
Gravel, dry	89%	100%
Shale, riprap	88%	100%
Sand, wet	71%	90%

800 Gallon Debris Tank on VT20 Trailer

Values shown are for machine with optional jib boom, reverse flow, spare tire and carrier, trailer tongue toolbox, and water heater. Values will vary for other configurations.

Material	Maximum Debris Tank Fill Level	
	Water Tank Full (200gal/757L)	Water Tank Empty
Wood chips, dry	100%	100%
Snow, dry	100%	100%
Water	100%	100%
Lightweight mud, 8-10lb/gal (1-1.2kg/L)	100%	100%
Earth, dry loose	100%	100%
Caliche	100%	100%
Earth, loam	100%	100%
Mid-weight mud, 10-12lb/gal (1.2-1.44kg/L)	100%	100%
Limestone, crushed	88%	100%
Asphalt	84%	100%
Sand, dry	84%	100%
Earth, wet excavated	84%	100%
Heavy-weight mud, 12-15lb/gal (1.44-1.8kg/L)	83%	99%
Gravel, dry	82%	97%
Shale, riprap	80%	95%
Sand, wet	65%	77%

Set Up**800 Gallon Debris Tank on VT24 Trailer**

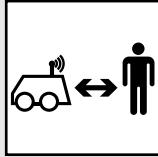
Values shown are for machine with optional power boom and reverse flow. Values will vary for other configurations.

Material	Maximum Debris Tank Fill Level	
	Water Tank Full (200gal/757L)	Water Tank Empty
Wood chips, dry	100%	100%
Snow, dry	100%	100%
Water	100%	100%
Lightweight mud, 8-10lb/gal (1-1.2kg/L)	100%	100%
Earth, dry loose	100%	100%
Caliche	100%	100%
Earth, loam	100%	100%
Mid-weight mud, 10-12lb/gal (1.2-1.44kg/L)	100%	100%
Limestone, crushed	100%	100%
Asphalt	100%	100%
Sand, dry	100%	100%
Earth, wet excavated	100%	100%
Heavy-weight mud, 12-15lb/gal (1.44-1.8kg/L)	100%	100%
Gravel, dry	98%	100%
Shale, riprap	96%	100%
Sand, wet	78%	100%

Wireless Remote Control (Trailer)

Check batteries. Replace if needed. See "Battery, Wireless Remote Control" on page 121.

EMERGENCY STOP: Press engine stop on wireless remote control.



WARNING Remote-controlled equipment. Impact can cause death or serious injury. Stay away.

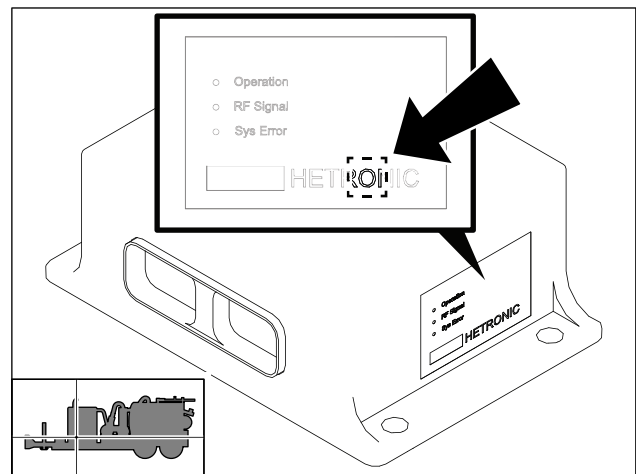
To help avoid injury:

- Keep machine in sight at all times when using wireless remote control.
- Keep a safe distance away from machine when operating wireless remote control.
- Remove strap from around neck when using wireless remote control near moving parts.

NOTICE: Place wireless remote control in storage box after use. Take care not to store with neck strap on top of switches.

Wireless remote control should be paired to receiver at factory. If paired connection is lost, re-pair control to receiver.

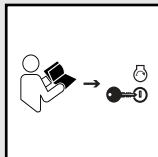
1. Activate accessories using ignition switch.
2. Locate wireless receiver box inside power pack.
3. Press and hold "O" (shown) in the word "HETRONIC" to engage pairing button.
4. While holding down pairing button, turn on remote control.
5. Release pairing button.
6. Turn off remote control.
7. Shut off machine.
8. Activate accessories using ignition switch.
9. Turn remote control on and test for function.



j70om081w.eps

Start

EMERGENCY SHUTDOWN: Turn ignition switch off.



⚠ WARNING

Misuse of machine can cause death or serious injury. Read and understand operator's manual and all other safety instructions before use. Know how to use all controls.

To help avoid injury:

- Allow hydraulic fluid time to warm before operating in cold weather. Cold hydraulic fluid can lengthen ground drive stopping time.
- For starting in extreme temperatures, contact your Ditch Witch® dealer.



⚠ WARNING

Pre-heater. Fire or explosion can cause death or serious injury. Never use starter fluid.

NOTICE: If engine turns but does not start within 10 seconds, allow starter to cool. Wait at least 30 seconds and try again.

1. Open tank inlet valve.
2. Ensure machine is in vacuum mode.
3. Ensure all controls are in neutral.
4. Insert key and activate accessories using ignition switch.
5. **If starting machine in normal conditions**, start engine and run at medium throttle under light load for at least one minute before applying heavier load.

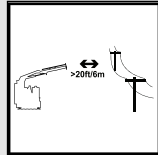
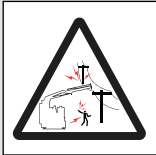
If starting machine in cold weather:

- 5.1 Press and hold cold start switch for 8-10 seconds. Cold start wait indicator will light.
- 5.2 When cold start wait indicator turns off, start engine.
- 5.3 Warm engine and hydraulic fluid by gradually increasing engine speed for up to 30 minutes.
- 5.4 After warmup, carefully operate all hydraulic controls at low throttle until controls operate as described in controls chapter.

Position Vacuum Boom

The vacuum boom is optional equipment. Contact your Ditch Witch dealer to add this option. Always secure boom when not in use.

Precautions near Electrical Power Lines



⚠ WARNING Overhead electric lines. Exposure will cause death or serious injury. Keep boom away from electric lines. Use a spotter.

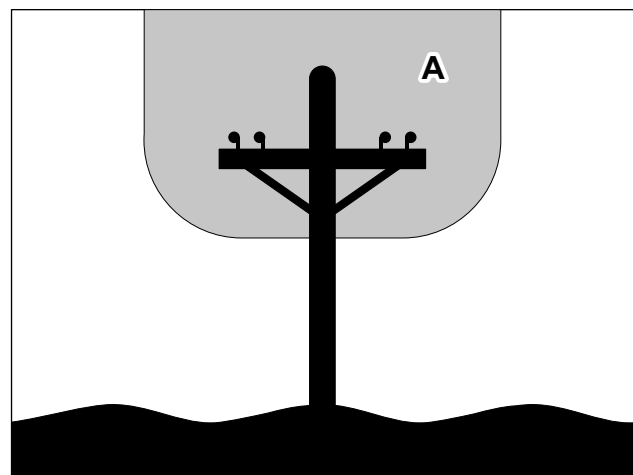
To help avoid injury:

- Follow US Occupational Safety and Health Administration (OSHA) or other applicable regulating guidelines for working around power lines.
- Observe minimum clearance requirements.

Normal Voltage (Phase to Phase)	Minimum Operating Clearance Required	Normal Voltage (Phase to Phase)	Minimum Transporting Clearance Required
up to 50kV	10' (3m)	up to 0.75kV	4' (1.2m)
51-200kV	15' (4.6m)	0.76-200kV	6' (1.8m)
201-350kV	20' (6m)	201-345kV	10' (3.8m)
351-500kV	25' (7.6m)	346-750kV	16' (4.9m)
501-750kV	35' (10.7m)	751-1000kV	20' (6.1m)
751-1000kV	45' (13.7m)	unknown	20' (6.1m)

Never enter the danger zone (A), unless one of the following conditions is met:

- An appointed person has confirmed that electrical distribution and transmission lines have been de-energized and visibly grounded at the point of work.
- Insulating barriers (not a part of the boom) have been erected to prevent physical contact with electrical lines.



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Procedure

**⚠ WARNING**

Raised component. Crushing can cause death or serious injury. Stay away or secure raised component with locking device. Use correct equipment and procedures.

To help avoid injury:

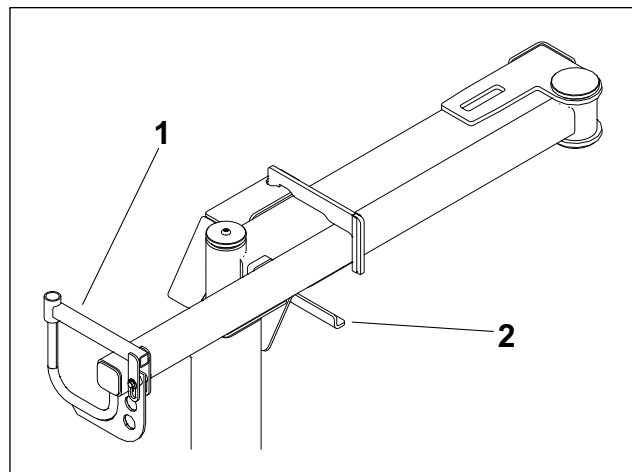
- Secure boom before lifting tank.
- Never move boom when tank is tilted up.
- Always check boom path before moving boom.
- If machine is parked on a slope, control boom so it does not swing freely when released.
- Never use boom to lift or move objects.

NOTICE: Do not use boom to break vacuum.

Jib Boom

1. Remove vacuum hoses from storage.
2. Run hoses along boom, and secure with tube latch (1).
3. Lift pin (2) to release boom arms.

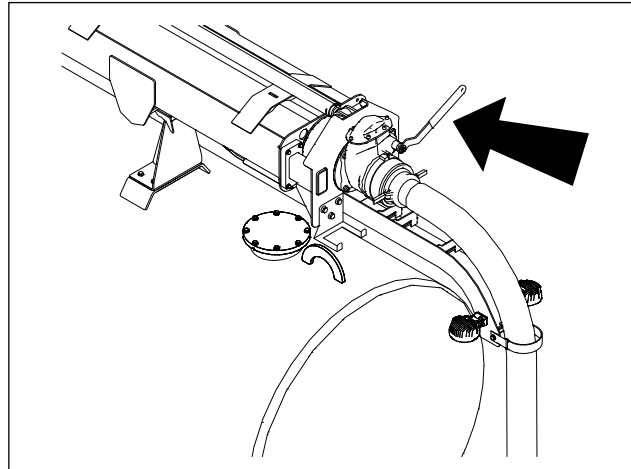
NOTICE: Ensure pin is fully engaged when stowing jib boom.



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Power Boom

1. Remove vacuum hoses from storage.
2. Use lever (shown) to ensure inlet valve on boom is closed.
3. Attach hoses at tank inlet valve.
4. Operate boom from rear console or wireless remote control.
5. Open tank inlet valve to start vacuum flow.

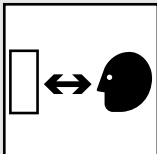


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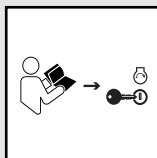
Remove Debris

EMERGENCY SHUTDOWN:

- Close tank inlet valve to shut off suction.
- Turn ignition switch off or press engine stop button on wireless control module.



⚠ DANGER Suction. Suffocation will cause death. Keep hose end away from face.



⚠ WARNING Misuse of machine can cause death or serious injury. Read and understand operator's manual and all other safety instructions before use. Know how to use all controls.

To help avoid injury:

- Never excavate hazardous or toxic materials. Machine is designed to excavate only soil cuttings, drilling fluids, and other non-toxic waste.
- Never lift an object using vacuum hose.



⚠ WARNING Static charge. Fire or explosion can cause death or serious injury. Never vacuum flammable or combustible substances.

To help avoid injury:

- Use proper equipment to monitor inlet air to ensure it is outside of flammability limits.
- Use proper grounding equipment.
- See "Set Up" on page 76.

NOTICE: Close tank inlet valve or shut off machine to break suction if hose or tool gets stuck on the ground or to what is being vacuumed.

1. Position vacuum hose in area to be excavated.
2. Start engine.
3. Open tank inlet valve if needed to begin excavation.

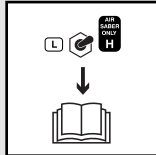
4. Use sight glass to monitor debris level in tank. Vacuum will shut off automatically when tank is full, but engine will remain running.

NOTICE: Exceeding maximum fill level will overload trailer. See “Monitor Working Trailer Weight” on page 76.

Pothole

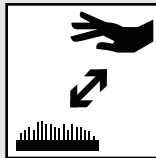
EMERGENCY SHUTDOWN:

- Close tank inlet valve to shut off suction
- Turn ignition switch off or press engine stop button on wireless control module.



WARNING

High pressure. Impact can cause death or serious injury. Refer to air tool manual to ensure proper pressures are used.



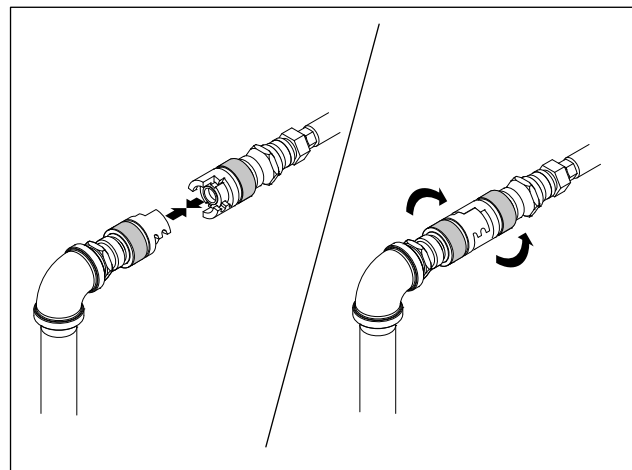
CAUTION

Hot parts. Contact can cause burns. Only touch when cool or wear gloves.

With Air

Set Up

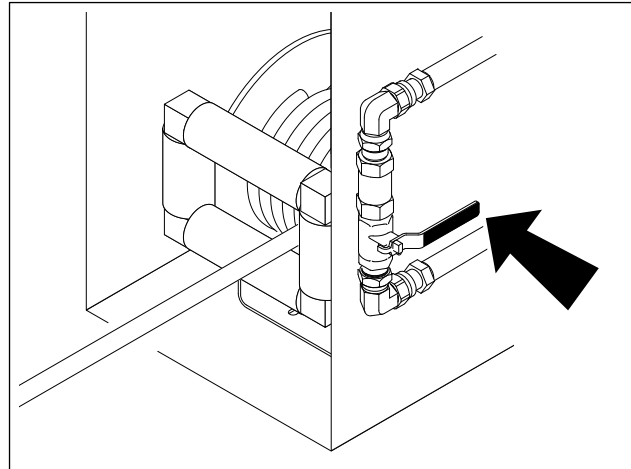
1. Remove air lance from storage.
2. Connect air lance to hose.
 - 2.1 Align ends and move together.
 - 2.2 Twist to engage latch.



j56om071h.eps

3. Slowly open service valve (shown).

IMPORTANT: Open service valve slowly to prevent velocity fuse from activating. If fuse activates, air pressure at the lance tip will be very low. If air pressure is very low, close service valve and slowly open it.



j56om069h.eps

Operate



⚠ WARNING Pressurized fluid or air. contact can cause death or serious injury. Refer to operator's manual for correct use.

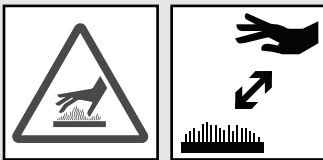
To help avoid injury:

- Wear protective eyewear, face shield, and gloves when operating air lance.
- Never point or aim nozzle at yourself or anyone else.
- Keep nozzle low to the ground but never allow tip to touch ground or utility.
- Check all connections and lines for leakage before using and check nozzle for damage.



⚠ WARNING High pressure. Impact can cause death or serious injury. Refer to air tool manual to ensure proper pressures are used.

To help avoid injury: High pressure setting is for air lance only.



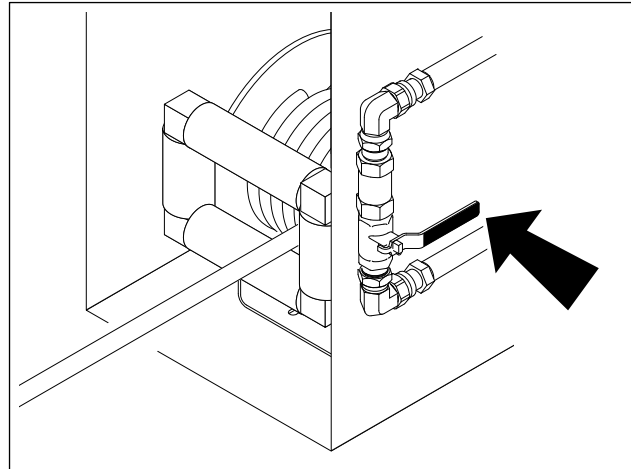
⚠ CAUTION Hot parts. Contact can cause burns. Only touch when cool or wear gloves.

To help avoid injury: Remember that air generates heat. Connections could be hot during and after operation.

1. Locate utility with a locating receiver.
2. Set up air system. See air system operator's manual for information.
3. Connect hoses.
4. Start breaking the soil at the location of the utility. Do not touch the tip of the air lance to anything.
5. Once the hole has been started, vacuum loose soil and begin to work on exposing sides of the utility next.
6. Vacuum loose soil as needed to expose utility.

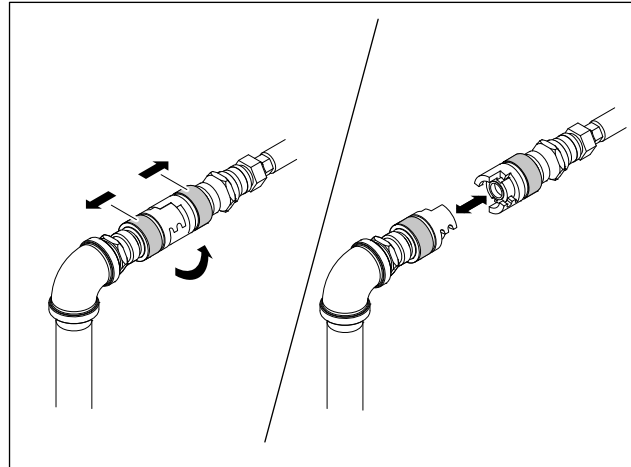
Disconnect

1. Close service valve (shown).



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2. Disconnect air lance from air hose.
 - 2.1 Pull back collar on air lance and on air hose.
 - 2.2 Twist.
 - 2.3 Pull ends away from each other.



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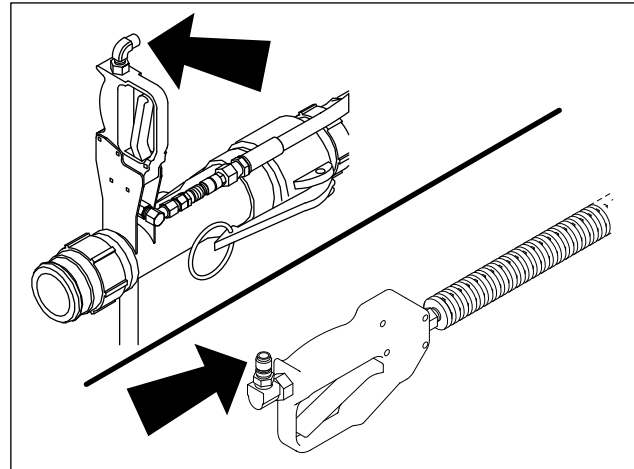
With Water

Set Up

1. Remove 2-in-1 potholing tool or digging lance from storage.

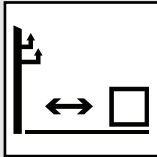
IMPORTANT: Do not use wash wand for digging tasks.

2. Connect water pressure hose to 2-in-1 potholing tool or digging lance where shown.



J70m089w.eps

Operate



⚠ DANGER Overhead electrical lines. Contact will cause death or serious injury. Know location of lines. Stay away.

To help avoid injury: Never direct water at overhead lines.



⚠ WARNING Pressurized fluid or air. Contact can cause death or serious injury. Refer to operator's manual for correct use.

To help avoid injury:

- Never use high pressure when using wash wand.
- When exposing utilities, only use rotating nozzle.
- Never point or aim nozzle at yourself or anyone else.
- Keep nozzle low to the ground but never allow tip to touch ground or utility.
- Keep tool moving over area to be potholed. Never point nozzle at utility continuously.
- Test water pressure on a sample of utility line material to be exposed. Adjust pressure until no damage occurs to the material. High pressure water can cut utility lines.

1. Open water tank supply valve.
2. Open tank inlet valve.
3. Start engine.
4. Turn on water pump.

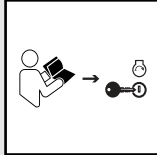
5. Position tool over area to be excavated.

2-in-1 Tool	Digging Lance
5.1 Squeeze water pressure lever to start water pressure.	5.1 Use digging lance to loosen soil.
5.2 Work pressurized water in side-to-side or circular motion to loosen and excavate soil until hole is at desired diameter and depth.	5.2 Work lance in side-to-side or circular motion to excavate soil.
	5.3 Use digging lance and vacuum alternately until hole is at desired diameter and depth.

6. Adjust water pressure as needed to match soil conditions and/or material of utility being exposed.
7. Ensure water sprays from nozzle. If it does not, nozzle may be clogged and pump will not function properly. Clean or replace nozzle as needed.
8. When freshwater tank is empty, stop operation and turn off water pump.

NOTICE: Never operate with freshwater tank empty.

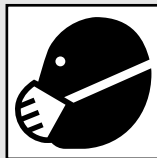
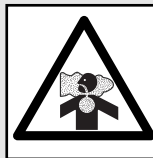
Drain Tank

**WARNING**

Misuse of machine can cause death or serious injury. Read and understand operator's manual and all other safety instructions before use. Know how to use all controls.

To help avoid injury:

- Never unhitch from tow vehicle before or during dumping. A freestanding machine can become unstable when tilting tank.
- Only unlatch door with tank fully lowered.

**WARNING**

Silica dust. Exposure can cause lung disease. Use breathing protection.

To help avoid injury:

- Use water spray or other means to control dust.
- Follow US Occupational Safety and Health Administration (OSHA) or other applicable regulating guidelines for appropriate breathing protection or dust control methods.

IMPORTANT: Truck mounted machines are equipped with a tank shaker which can be used to help remove material when emptying tank.

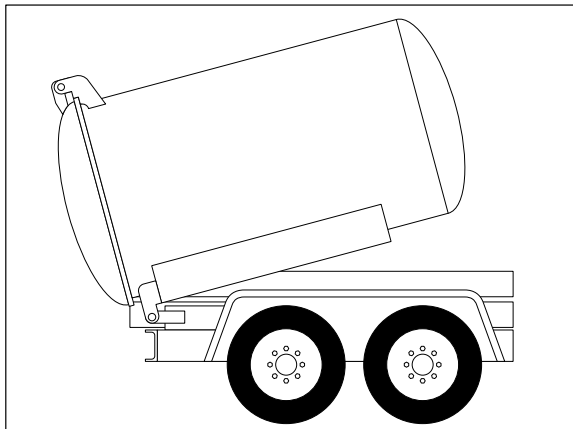
1. Ensure machine is hitched to vehicle. See "Hitch Trailer" on page 71.
2. Haul to approved dumping area.

NOTICE: Never drive with tank door raised.

3. Open tank outlet valve.
4. Open tank inlet valve.
5. Allow tank to drain in the horizontal position until tank is approximately half drained.
6. Start engine and run at low throttle.
7. Stow jib or power boom, if equipped. See "Stow Boom" on page 104.


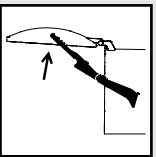
Drain Tank

8. Tilt tank up to flush solids from tank.
9. Lower tank to full horizontal position.
10. Close tank outlet valve.
11. Close tank inlet valve.



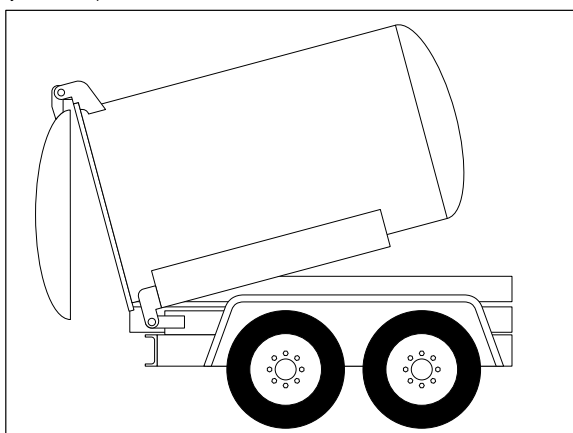
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12. If further draining is needed, open tank door.


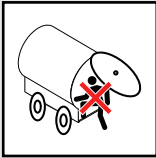
⚠ WARNING

Raised component. Crushing can cause death or serious injury. Ensure door has opened fully and locked into place before working beneath open door.



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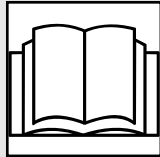
13. Tilt tank up. Allow tank to drain completely.
14. Connect water pressure hose to wash wand.
15. Turn water pump switch on. Adjust water pressure.
16. Use wash wand to thoroughly rinse inside of tank and around door seal.

⚠ DANGER Confined space. Suffocation will cause death. Stay away or follow procedures for entering.

17. Return tank to full horizontal position.
18. Close tank door.

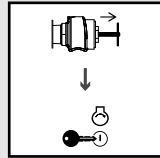
Unload to Another Tank

**⚠ WARNING**

Contents under pressure. Impact can cause death or serious injury. Refer to operator's manual for correct use.

To help avoid injury:

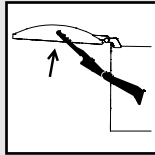
- Restrain hose prior to pressurization.
- Only open valves and tank door when tank is not pressurized.
- Never use pressure to clear clogs in vacuum hose.

**⚠ WARNING**

High pressure. Impact can cause death or serious injury. Exercise and clean relief valve before each use.

1. Close debris tank outlet valve.
2. Connect transfer hose to debris tank outlet valve.
3. Ensure inlet valve on offboard tank is closed and tank is vented.
4. Connect other end of transfer hose to offboard tank inlet valve.
5. Close debris tank inlet valve and open debris tank outlet valve. Material may flow into transfer hose.
6. Open offboard tank inlet valve.
7. Select reverse flow mode.
8. Start engine. Material will flow into offboard tank.
9. When transfer is complete, close debris tank outlet valve.
10. Close offboard tank inlet valve
11. Disconnect hose only from offboard tank inlet valve.
12. Select vacuum mode.
13. Open debris tank outlet valve. Material will empty from transfer hose.
14. Close debris tank outlet valve.
15. Disconnect transfer hose from debris tank.

Open/Close Tank Door

**⚠ WARNING**

Raised component. Crushing can cause death or serious injury. Ensure door has opened fully and locked into place before working beneath open door.

Open

NOTICE: Only drive with tank in full horizontal position and door lowered.

IMPORTANT: Relieve pressure in tank before opening door.

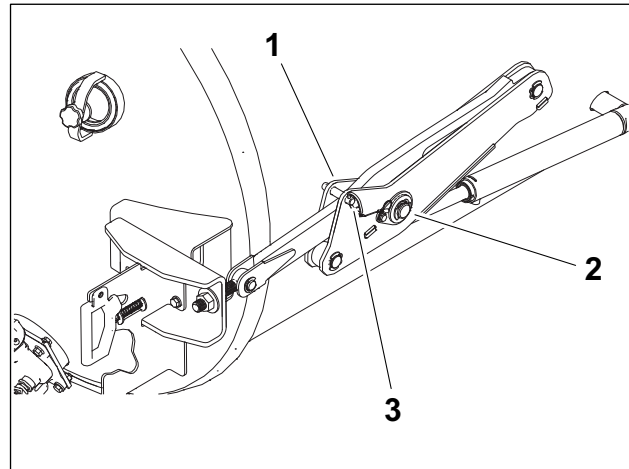
1. If optional reverse flow is installed, select vacuum mode.
2. Start engine.
3. Lower tank to full horizontal position.
4. Open tank inlet valve.
5. Remove locking pins from door arms.
6. Enable door function.
7. Open door fully. See 99 for more information.

Close

1. Ensure seal mating surfaces are clean and free of debris.
2. Close door until linkages on both sides of tank are fully collapsed.

IMPORTANT:

- Door is closed when arms are fully below round pin hole (1) and in contact with brass roller (2).
- Hold switch (or key) for two seconds after door appears closed to fully seat seals.
- Once door is fully closed, insert retaining pin (3).
- On trailers with 500 gallon (1893L) debris tanks, pin hole sits behind water tanks. Tilt tank slightly to expose pin hole.




Shut Down

1. When job is complete, move machine to level ground.
2. Return all controls to neutral.
3. Run engine at low throttle with no load for at least five minutes to cool.
4. Shut off machine.
5. If leaving machine unattended, remove key.
6. For maintenance or long-term storage, disconnect battery using battery disconnect switch.

NOTICE: Wait two minutes after shutting off machine before disconnecting battery.

Complete the Job

Chapter Contents



For additional precautions, see “Safety” and “Prepare” chapters.

Antifreeze Machine 102

- Add Antifreeze 102
- Reclaim Antifreeze 102

Rinse Equipment 103

Disconnect 104

Stow Tools 104

Stow Boom 104

- Jib Boom 104
- Power Boom 104

Store Long Term 105

Decommission Machine 105

Antifreeze Machine

IMPORTANT: Antifreeze can be removed from antifreeze tank and disposed of properly or it can be reused until it is too diluted to protect against freezing.

This machine can be left overnight in freezing conditions by filling fluid lines with a polypropylene-based, RV antifreeze with optional antifreeze system before shutdown.

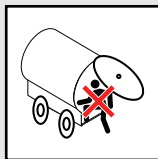
Add Antifreeze

1. Fill antifreeze tank.
2. Close water tank supply valve.
3. Open antifreeze tank valve.
4. Connect water pressure hose to wash wand.
5. Start engine.
6. Turn on water pump.
7. Squeeze wash wand handle and run until antifreeze comes out of nozzle.
8. Turn off water pump.
9. Close antifreeze tank supply valve.
10. Shut off machine.
11. Drain water tank completely.

Reclaim Antifreeze

1. Turn water pressure down.
2. Turn on water pump.
3. Put end of wash wand in antifreeze tank.
4. Squeeze wash wand handle and run until water comes out of nozzle.
5. Turn off water pump.

Rinse Equipment

**⚠ DANGER**

Confined space. Suffocation will cause death. Stay away or follow procedures for entering.

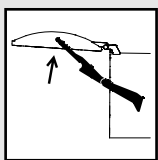
To help avoid injury: Enter tank only if necessary. Follow US Department of Labor guidelines for entering confined spaces.

**⚠ WARNING**

Pressurized fluid or air. Contact can cause death or serious injury. Refer to operator's manual for correct use.

To help avoid injury:

- Never use high flow when using wash wand.
- Never point or aim wand at yourself or anyone else. Keep nozzle low to the ground.

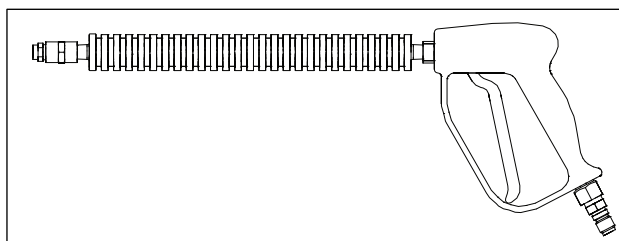
**⚠ WARNING**

Raised component. Crushing can cause death or serious injury. Ensure door has opened fully and locked into place before working beneath open door.

NOTICE:

- Do not spray water onto operator console or electrical center in engine compartment. Water can damage electrical components. Wipe down instead.
- Do not spray water directly onto trailer axle hub caps. Water can enter hubs and cause premature wear or failure.

Use wash wand (shown) to spray water onto equipment to remove dirt and mud. Thoroughly rinse inside of tank and around door seal mating surfaces.



washWand.eps

Disconnect

Disconnect and store all hoses.

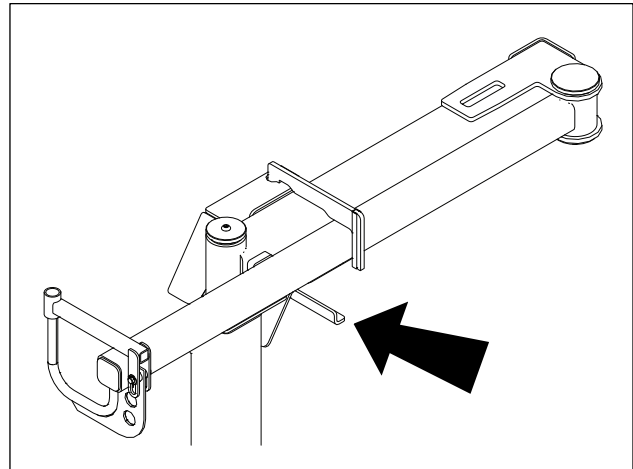
Stow Tools

Ensure hoses and tools are properly stowed.

Stow Boom

Jib Boom

1. Ensure hoses are removed and in frame rail.
2. Ensure retaining pin (shown) is engaged.



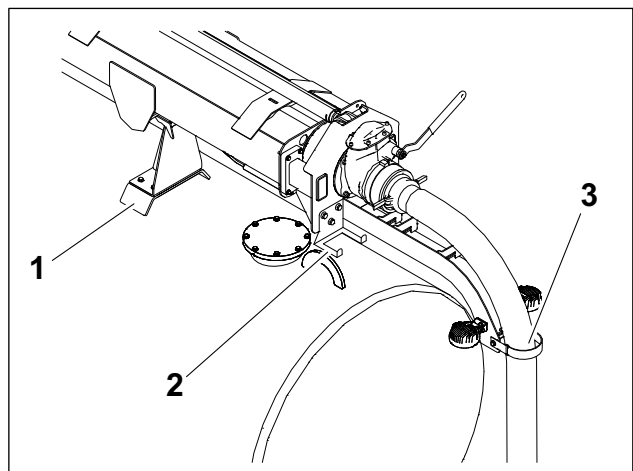
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Power Boom

1. Settle boom in place on cradle (1).

NOTICE: On 500 gallon tanks, extend boom for stowing and transport. Leaving boom retracted will cause hose to interfere with power pack.

2. Stow hose end on retaining plate (2).
3. Secure hose with retaining strap (3).



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Store Long Term

To store machine for periods of time exceeding two months:


- Ensure exposed parts are treated with anti-rust agent.
- Touch up paint as needed to prevent rusting.
- Lubricate machine and apply grease to unpainted surfaces.
- Cover exhaust pipe.
- Inflate tires to recommended tire pressure. See "Specifications" on page 149.

Decommission Machine

Before decommissioning machine, follow local regulations for disposing of hazardous substances. For more information on draining fluids, see Maintenance chapter or contact your Ditch Witch dealer.

Maintenance

Chapter Contents



For additional precautions, see “Safety” and “Prepare” chapters.

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- Welding Precaution 109
- Working from Maintenance Platform 109
- Working under Raised Debris Tank 110
- Working under Raised Tank Door 111
- Removing/Replacing Power Pack Doors 111

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- Approved Coolant 113
- Approved Fuel 114

Machine Maintenance Interval Chart 115

Machine Procedures 117

Trailer Maintenance Interval Chart 141

Trailer Procedures 142

Maintenance Precautions

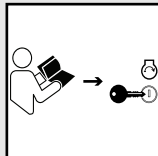


⚠ WARNING

Jobsite hazards. Exposure can cause death or serious injury. Use correct equipment and work methods. Use and maintain appropriate safety equipment.

To help avoid injury:

- Wear personal protective equipment including hard hat, safety eye wear, foot protection, hearing protection, and gloves (except when near rotating equipment).
- Remove jewelry.
- Wear close-fitting, high visibility clothing.
- Have other personal protective equipment, such as insulated boots and gloves, breathing protection, and face shield, etc. available for use depending on jobsite hazards or requirements.



⚠ WARNING

Misuse of machine can cause death or serious injury. Read and understand operator's manual and all other safety instructions before use. Know how to use all controls.

To help avoid injury:

- Unless otherwise instructed, all maintenance should be performed with the engine off and cool.
- Lower unsecured, raised components before servicing equipment.
- Unless otherwise instructed, all maintenance should be performed with machine parked on level surface.
- Refer to US Occupational Safety and Health Administration (OSHA) guidelines for appropriate lockout-tagout procedures.

Washing Precaution

NOTICE: Water can damage electronics. When cleaning equipment, do not spray electrical components with water.

Welding Precaution

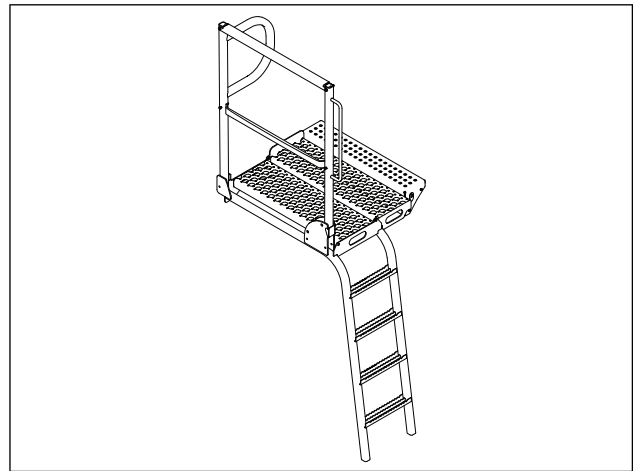
NOTICE: Welding can damage electronics.

- Welding currents can damage electronic components. Always disconnect the ECU ground connection from the frame, harness connections to the ECU, and other electronic components prior to welding on machine or attachments.
- Connect welder ground close to welding point and make sure no electronic components are in the ground path.
- Disconnect battery at battery disconnect switch before welding to prevent damage to battery. See "Battery" on page 118.
- Never turn off battery disconnect switch with engine running, or alternator and other electronic equipment devices may be damaged.

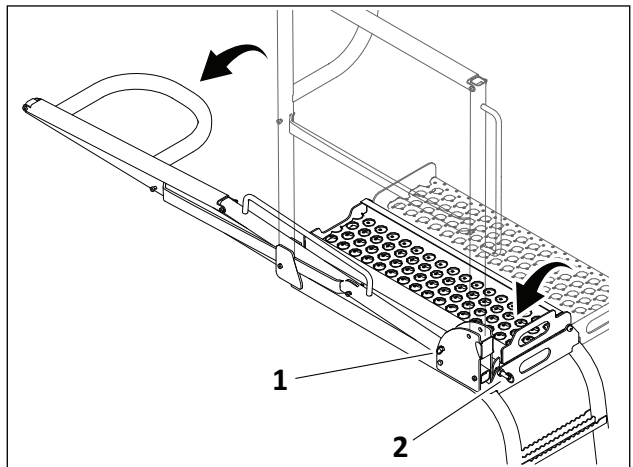
Working from Maintenance Platform

A maintenance platform is available for access to tank inlet hose when machine is equipped with powered boom. Do not use maintenance platform while machine is being operated or towed.

1. Tilt boom up fully and install cylinder lock.
2. Shut off machine before using platform.
3. Attach fall restraint to anchor point when using maintenance platform.
4. Ensure fold-out deck section is in stow and lock position before opening debris tank door or tilting tank.
5. Secure with locking pins (1,2).



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j90om002w22.eps

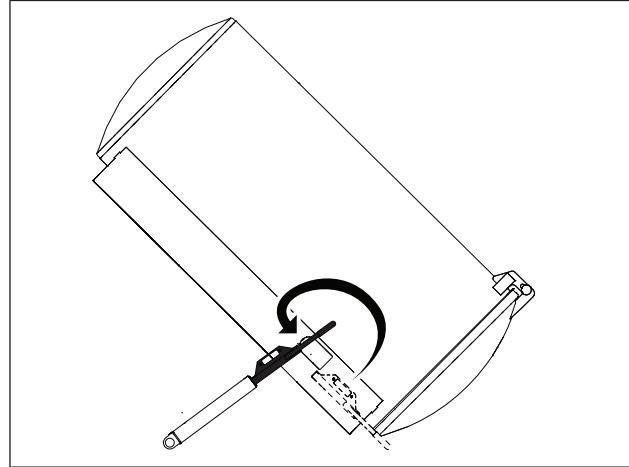
Working under Raised Debris Tank



⚠ WARNING

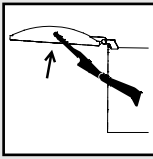
Raised component. Crushing can cause death or serious injury. Stay away or secure raised component with locking device. Use correct equipment and procedures.

1. Stow and secure boom, if equipped.
2. Raise vacuum tank.
3. Remove cylinder lockout tool (shown) and place over extended cylinder rod.
4. Lower vacuum tank until load is supported by cylinder lockout tool.



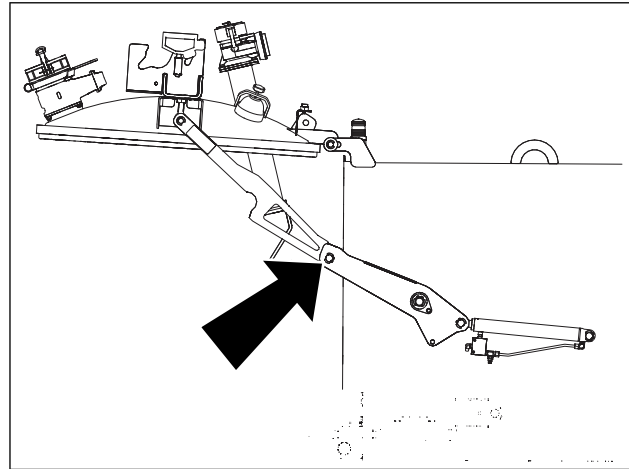
j70om091w.eps

Working under Raised Tank Door



⚠ WARNING Raised component. Crushing can cause death or serious injury. Ensure door has opened fully and locked into place before working beneath open door.

Open door fully. Door linkage is fully open when both arms stop moving and are in contact with pivoting joint (shown).



j70om092w.eps

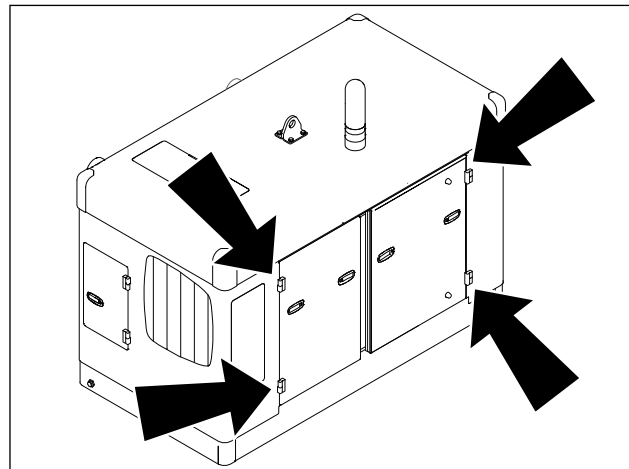
Removing/Replacing Power Pack Doors

Remove

1. Unlatch and swing door open.
2. Lift door up and off. Hinges (shown) will separate.









Replace

1. Fit hinges together to line up doors.
2. Close and latch doors.



j70om093w.eps

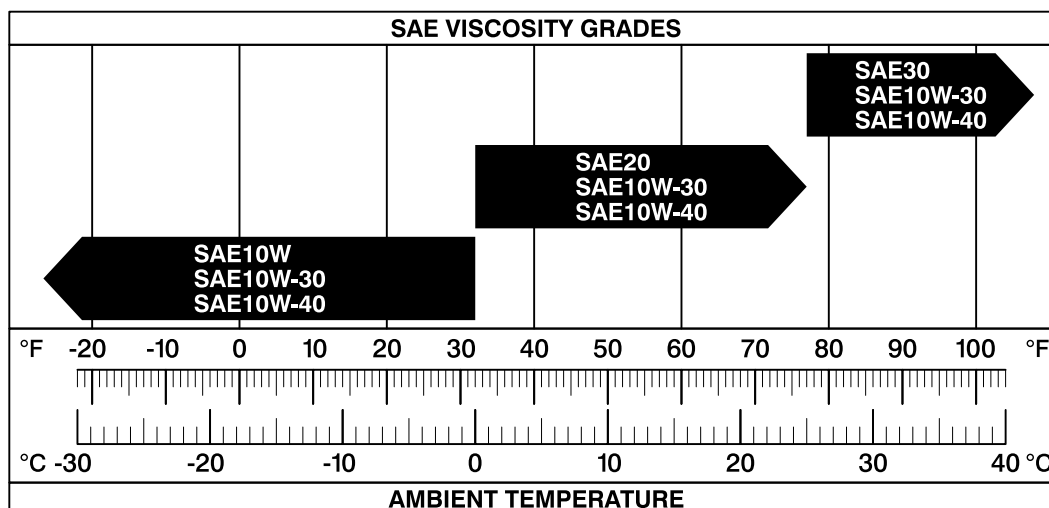
Recommended Lubricants

Item	Description
 DEAC	Low silicate, fully formulated diesel engine antifreeze/coolant meeting ASTM D6210 See "Approved Coolant" on page 113.
 DEO	HRC: Diesel engine oil meeting or exceeding API service classification CH-4 (CH-4, CI-4, or CJ-4) or ACEA E7 (E6, E7, or E9). <ul style="list-style-type: none">• API American Petroleum Institute, ACEA European Automobile Manufacturer's Association• See "Engine Oil Temperature Chart" on page 113. LRC: Diesel engine oil compatible with the sulfur content of the fuel used. <ul style="list-style-type: none">• If fuel sulfur content exceeds 500ppm (500mg/kg), DEO base number (TBN) should exceed 10.• If fuel sulfur content exceeds 5000ppm (5000mg/kg), service interval is reduced to every 50 hours.• See "Engine Oil Temperature Chart" on page 113.
DOT	DOT 3 or 4 brake fluid.
 HTG	High temperature, NLGI #2 premium grade, petroleum-based grease
 MPG	Multipurpose grease, polyurea based NLGI GC-LB Grade 1.5 or lithium based NLGI GC-LB Grade 2
 MPS	Multipurpose aerosol spray lubricant, silicone based
 NDO	30W non-detergent oil
 SGL	Synthetic gear oil (ISO 100), Ditch Witch p/n 256-044. See blower manual for more information.
 THF	Tractor hydraulic fluid, Phillips 66® PowerTran, Mobilfluid® 423, Chevron® Tractor Hydraulic Fluid, Texaco® TDH Oil, or equivalent

Proper lubrication and maintenance protects Ditch Witch equipment from damage and failure. Maintenance intervals listed are for minimum requirements. In extreme conditions, service machine more frequently. Use only genuine Ditch Witch parts, filters, approved lubricants, TJC, and approved coolants to maintain warranty. Fill to capacities listed in "Specifications" on page 149.

For more information on engine lubrication and maintenance, see your engine manual.

Engine Oil Temperature Chart



t180m049a.eps

Temperature range anticipated before next oil change

Approved Coolant

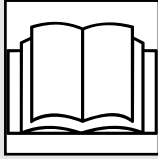
NOTICE:

- Use only pre-diluted coolant or concentrated coolant mixed with distilled water. Do not use tap water.
- Using water or high-silica automotive-type coolant will lead to engine damage or premature engine failure.
- Mixing heavy-duty diesel engine coolant and automotive-type coolants will lead to coolant breakdown and engine damage.

This machine was filled with Fleetguard® ES Compleat™ coolant (blue in color) before shipment from factory. This coolant is available, pre-diluted, from your Ditch Witch dealer as part number 255-1055. Add or replace only with coolant meeting ASTM D6210.

Approved Fuel

HRC (Highly Regulated Countries)



⚠ WARNING

Ultra Low Sulfur Diesel (ULSD) poses a greater static ignition hazard than earlier diesel formulations with higher sulfur content. Avoid death or serious injury from fire or explosion; consult with your fuel or fuel system supplier to ensure the delivery system is in compliance with fueling standards for proper grounding and bonding practices.

This engine is designed to run on diesel fuel. Use only high quality fuel meeting ASTM D975 No. 2D, EN590, or equivalent. At temperatures below 32°F (0°C) winter fuel blends are acceptable. See the engine operation manual for more information.

NOTICE: Use only Ultra Low Sulfur Diesel (less than 15ppm sulfur content in the US and Canada or 10mg/kg in EU and Japan) in this machine. Operating with higher sulfur content will damage the engine and aftertreatment device.

Biodiesel blends up to 5% (B5) are approved for use in this machine. The fuel must meet the specifications for diesel fuel shown above. In certain markets, higher blends may be used if certain steps are taken. Extra attention is needed when using biodiesel, especially when operating in cold weather or storing fuel. Contact your Ditch Witch dealer or the engine manufacturer for more information.

LRC (Less Regulated Countries)

This engine is designed to run on diesel fuel. Use only high quality fuel meeting ASTM D975 No. 2D, EN590, or equivalent. At temperatures below 32°F (0°C) winter fuel blends are acceptable. See the engine operation manual for more information.

NOTICE: Worldwide, fuel sulfur regulations vary widely. Fuel used should always comply with local regulations. Prior to shipping, LRC machines were filled with API CJ-4 DEO. If using fuel with sulfur content above 15ppm (15mg/kg), change oil initially at 250 hours.

Biodiesel blends up to 5% (B5) are approved for use in this machine. The fuel must meet the specifications for diesel fuel shown above. In certain markets, higher blends may be used if certain steps are taken. Extra attention is needed when using biodiesel, especially when operating in cold weather or storing fuel. Contact your Ditch Witch dealer or the engine manufacturer for more information.

Vac Service Interval Chart

IMPORTANT: Chart indicates first instance of repeated service procedures. See detailed information below.

▽	Adjust, service, or test	□	Change, initial	○	Lube, initial
▲	Check	■	Change	●	Lube

Service	Startup	10 Hours	25 Hours	50 Hours	100 Hours	150 Hours	1000 Hours	2000 Hours	As Needed
Accessory mounting bolts					▲				▽
Air intake system		▲							▽
Battery		▲							▽
Battery, wireless remote control									■
Belt, blower		▲				▲			■
Belt, fan				▲					■
Belt, water pump		▲							■
Blower									●
Blower bearings				●					
Boom, extension shaft				●					
Boom, mounting bolts					▲				▽
Boom, pivot			●						
Boom, structure					▲				▽
Coolant		▲						■	
Cyclonic separator canister	▽	▽							
Debris tank deflector		▲							▽
Debris tank door rollers					▲				■

Vac Service Interval Chart

Service	Startup	10 Hours	25 Hours	50 Hours	100 Hours	150 Hours	1000 Hours	2000 Hours	As Needed
Debris tank door seals/fittings		▲							■
Debris tank pivot pins				●					
Debris tank primary shutoff valve									▽
Dust ejector valve	▲	▲							
Filter, blower relief air									■
Filter, engine air		▲							■
Filter, engine oil (see Oil, engine)									
Filter, fuel				□	■				
Filter, vacuum air		▲							▽
Filter, water pump		▲							■
Fluid, hydraulic		▲			□		■		
Hoses, hydraulic	▲	▲							
Hoses, water				▲					■
Lance spray nozzle		▲							▽
Oil, blower		▲			□		■		
Oil, engine		▲		□		■			
Oil, water pump		▲	□		■				
Power pack base									▽
Radiator				▲					▽
Reverse flow 4-way valve									●
Reverse flow relief valve	▽								
Strobe light		▲							■
Weight gauge	▲								▽

Vac Procedures

Accessory Mounting Bolts

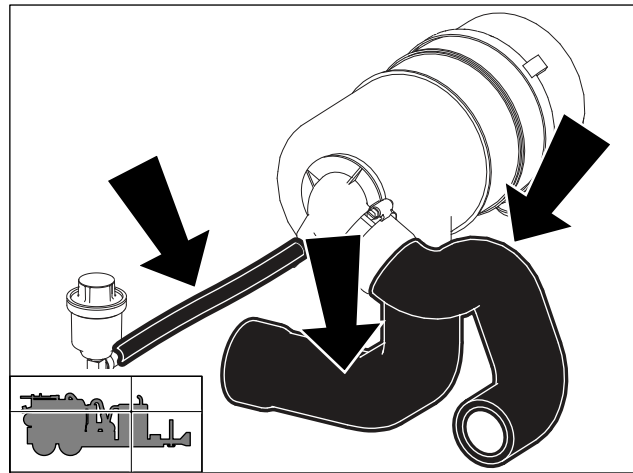
Check accessory (fender, hitch, water heater, bumper, skid extension, front tool rack) mounting bolts every 100 hours for tightness and damage. Tighten or replace as needed.

Air Intake System

Check air intake system (shown) for dirt and debris every 10 hours.

If clamp is loose, apply oil to threads and retighten.

If hose is cracked or worn, replace.



j70om001w20.eps

Battery



⚠ WARNING Corrosive fluid. Contact can cause death or serious injury. Avoid contact. Wear appropriate gloves. See Safety Data Sheet (SDS) for more information.

To help avoid injury:

- Never attempt to charge a battery that is leaking, bulging, heavily corroded, frozen, or otherwise damaged.
- Refer to Safety Data Sheet (SDS) for additional information regarding battery.



⚠ WARNING Explosive hydrogen gas. Fire or explosion can cause death or serious injury. Keep heat flames, sparks, and other sources of ignition away.

To help avoid injury:

- Use a single 12V maximum source for charging. Never connect to rapid chargers or dual batteries.
- Never lean over battery when making connections.
- Never allow vehicles to touch when charging.
- Never short-circuit battery terminals for any reason or strike battery posts or cable terminals.
- Refer to Safety Data Sheet (SDS) for additional information regarding battery.

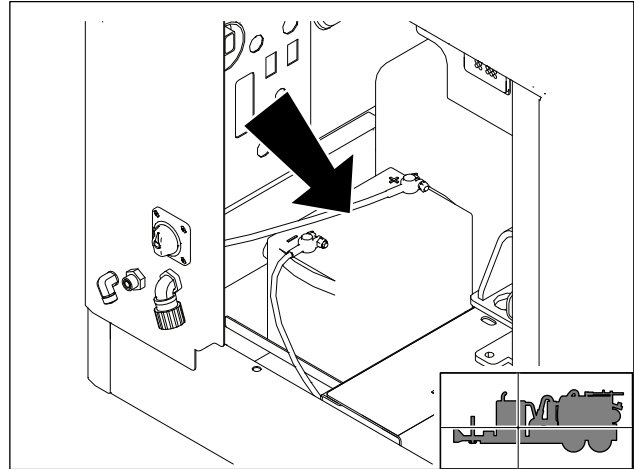
NOTICE:

- Electronic components can be easily damaged by electrical surges. Jump starting can damage electronics and electrical systems, and is not recommended. Try to charge the battery instead. Use quality large diameter jumper cables capable of carrying high currents (400 amps or more). Low quality cables may not allow enough current flow to charge a dead/discharged battery.
- Read all steps thoroughly and review illustration before performing procedure.

Check every 10 hours. Charge as needed.

Check

1. Disconnect battery at battery disconnect switch, if equipped.
2. Ensure no ignition sources are near battery.
3. Loosen and remove battery cable clamps carefully, negative (-) cable first.
4. Clean cable clamps and terminals to remove dull glaze.
5. Check for signs of internal corrosion in cables.
6. Connect battery cable clamps, positive (+) cable first.
7. Tighten any loose connections.
8. Ensure that battery tiedowns are secure.
9. Turn battery disconnect, if equipped, on.



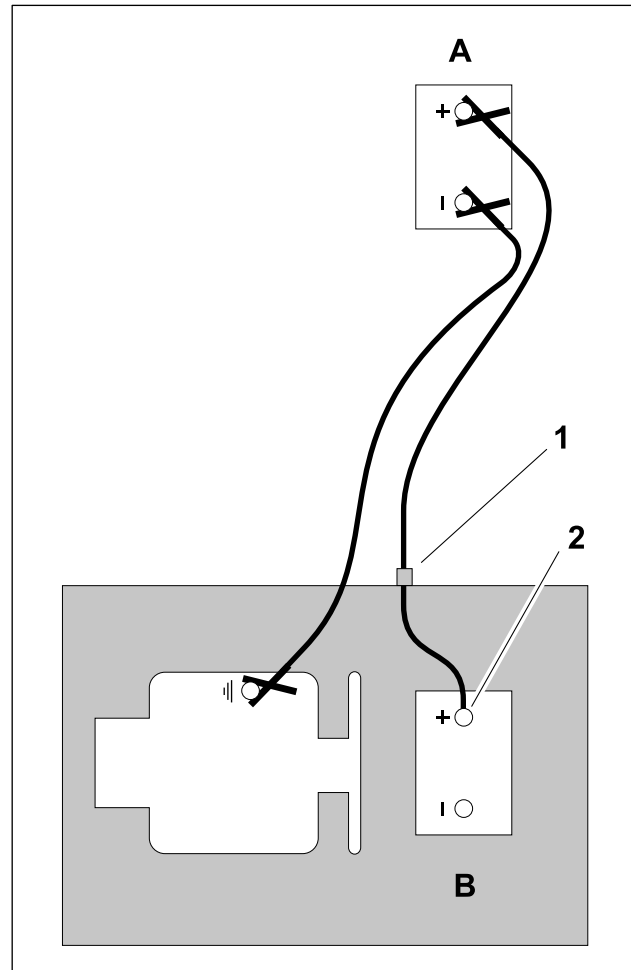
j700m044w.eps

Charge

1. Park service vehicle close to disabled equipment but do not allow vehicles to touch.
2. Engage parking brake in both vehicles.
3. Turn ignition switch off in both vehicles and turn off all electrical loads.
4. Disconnect machine controller, if equipped.
5. Inspect battery in disabled machine (B) for signs of cracking, bulging, leaking, or other damage.
6. Connect red positive (+) jumper cable clamp to positive (+) post of battery (2) in disabled machine.

IMPORTANT: Some equipment may have a positive jumper cable terminal (1) located externally. If so equipped, connect red positive (+) jumper cable clamp to terminal.

7. Connect the other red positive (+) jumper cable clamp to positive (+) post of battery in service vehicle (A).
8. Connect black negative (-) cable clamp to negative (-) post of battery in service vehicle.
9. Connect the other black negative (-) cable clamp to engine or frame ground on disabled machine, at least 12" (305 mm) from failed battery, as shown.
10. Operate service vehicle engine at 1500-2000 rpm for a few minutes to build an electrical charge in failed battery.
11. Stop engine in service vehicle.
12. Remove jumper cables from service vehicle, black negative (-) clamp first. Do not allow clamps to touch.
13. Remove black negative (-) cable clamp from disabled engine or frame ground.
14. Remove red positive (+) cable clamp from disabled machine.
15. Reconnect machine controller, if equipped.
16. Start disabled machine.

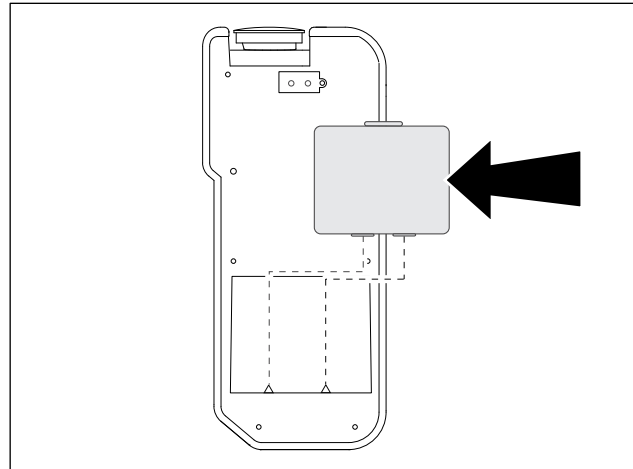


Battery, Wireless Remote Control

Trailer

Change batteries as needed.

1. Remove back cover.
2. Remove battery adapter (shown).
3. Remove old batteries from battery adapter.
4. Insert 3 AA batteries into slots as indicated on case.
5. Slide battery adapter into battery compartment.
6. Replace back cover.



VacWirelessControlBattery.eps

Truck

Charge when red LED flashes.

Place wireless control in charging cradle located in truck cab. LCD screen shows charging status after a few minutes.

IMPORTANT: A completely discharged battery requires 3 hours to charge but the battery can be charged even if it is not fully depleted.

Belt, Blower

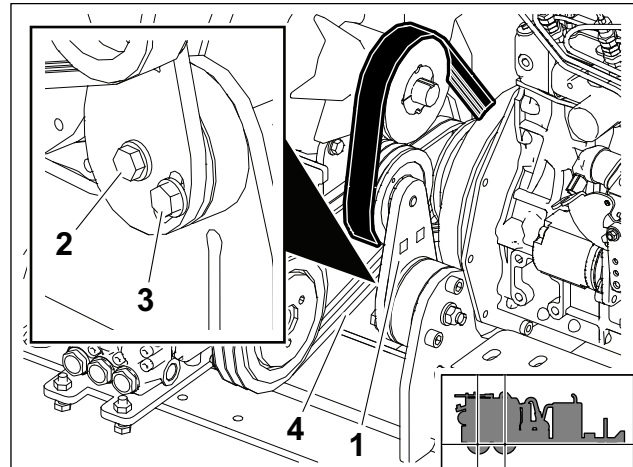
Check at 10 hours and every 150 hours thereafter.
Change as needed.

Check

Check belt (shown) for excessive slack, damage, or wear.

Adjust

1. Apply 30ft-lb (41N•m) of torque to tensioner arm (1).
2. Tighten slot bolt (3) to 80ft-lb (108N•m).
3. Tighten cross bolt (2) to 80ft-lb (108N•m).



j70om104w.eps

Change

IMPORTANT: Water pump belt (4) must be removed before changing blower belt.

1. Loosen slot bolt.
2. Loosen cross bolt.
3. Replace belt.
4. Reassemble.
5. Adjust tension.

Belt, Fan

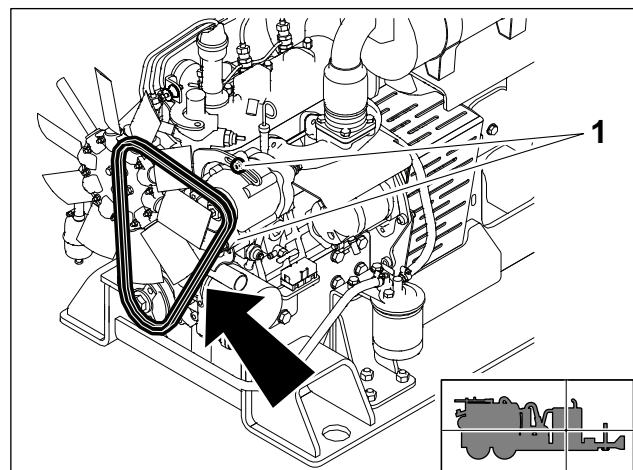
Check every 50 hours. Change as needed.

Check

Check for excessive slack, damage, or wear. Belt is properly tensioned when it moves about 1/4-3/8" (7-9mm) when pushed at the long span (shown).

Change

1. Loosen two alternator bolts (1).
2. Replace belt.
3. Adjust position as needed.
4. Tighten bolts.
5. Check tension.



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Belt, Water Pump

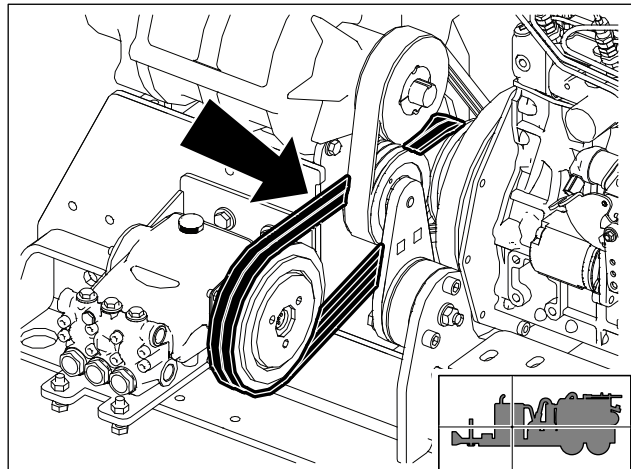
Check every 10 hours. Change as needed.

Check

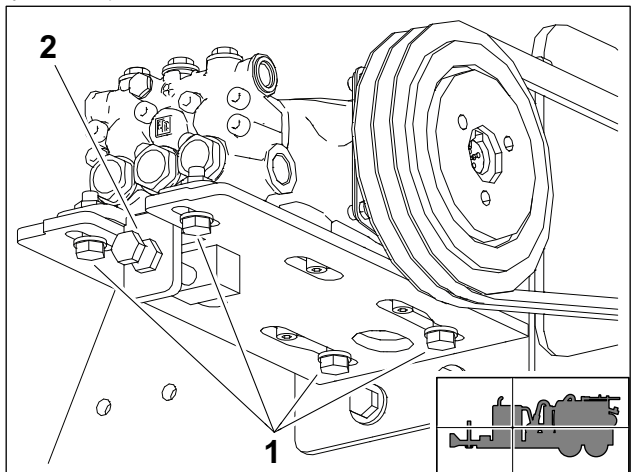
Check for excessive slack, damage, or wear. Belt is properly tensioned when it moves about 1/8-1/4" (3-6mm) when pushed where shown.

Change

1. Loosen four bolts (1) on underside of pump mount.
2. Loosen jam nut on tension screw (2) and adjust screw to relieve tension on belt.
3. Replace belt.
4. Adjust tension screw to properly tension belt.
5. Tighten jam nut on tension screw.
6. Tighten bolts to secure pump on mount.



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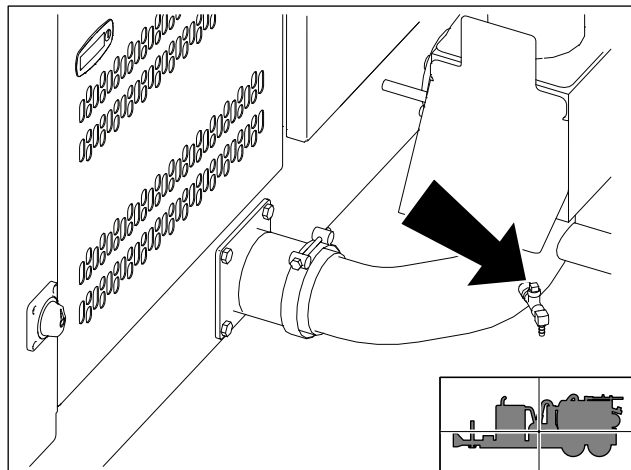


j70om108w.eps

Blower

Lube as needed to help prevent rust and seizing during long-term storage.

1. Remove plug (shown).
2. Start engine.
3. Spray light oil (WD-40® or equivalent) into port.
4. Run engine for 1-2 minutes.
5. Shut off machine.
6. Install plug.

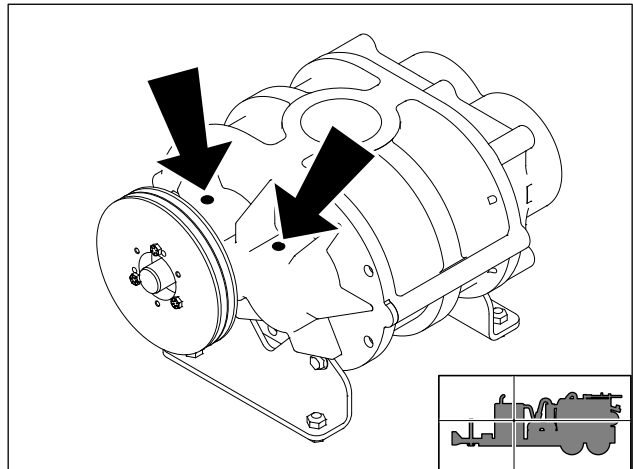


j70om071w.eps

Blower Bearings

NOTICE: Do not inject grease too quickly. Drive shaft seal damage could occur.

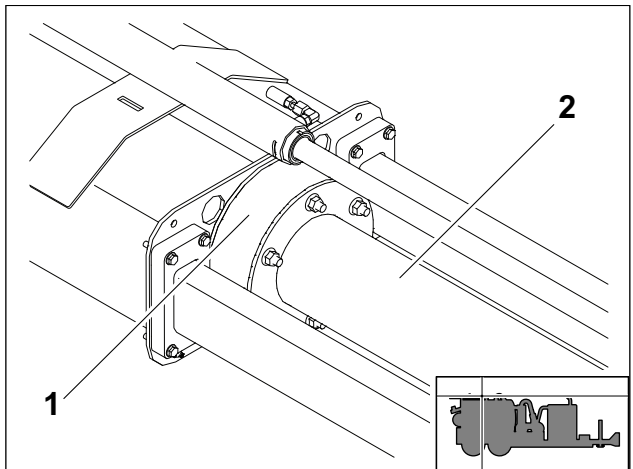
Wipe two zerks (shown) clean and lube with HTG every 50 hours. Inject grease into zerk until clean grease comes out of relief fittings.



j70om046w.eps

Boom, Extension Shaft

Lube with MPS every 50 hours. Extend boom shaft (2) fully from housing (1) to lube.



j73om017w.eps

Boom, Mounting Bolts

Check top (shown) and bottom bolts every 100 hours. Adjust as needed.

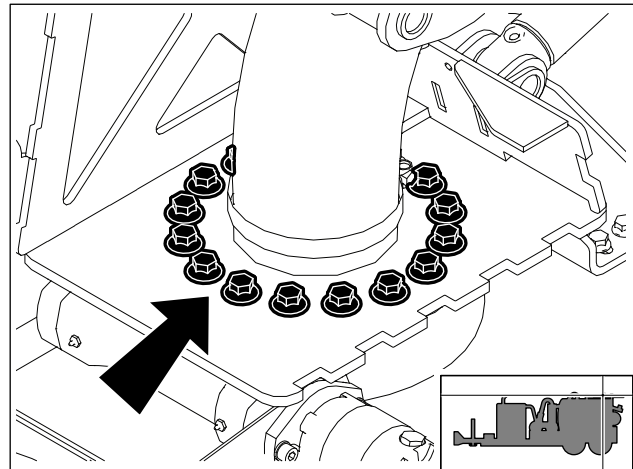
NOTICE: Bottom bolts are accessed from inside tank.

1. Ensure both sets of bolts are tightened to 160ft-lb (217N•m).

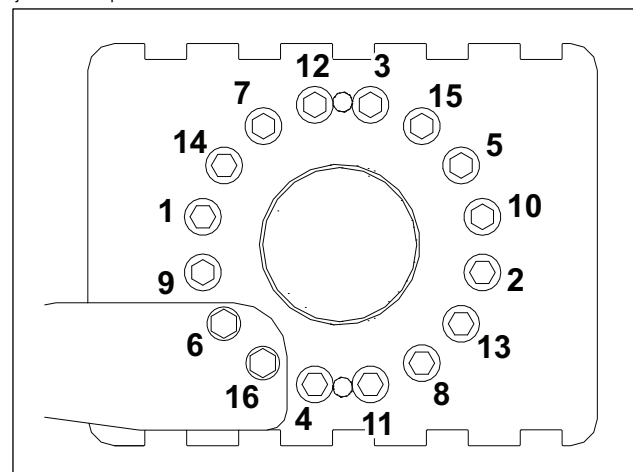
NOTICE:

- Tighten bolts in star pattern (1-16).
- Tighten one set of bolts (top or bottom) entirely before starting the other set.
- Use Loctite® 242 on threads.

2. If any bolt is excessively loose, change bolt and washer.



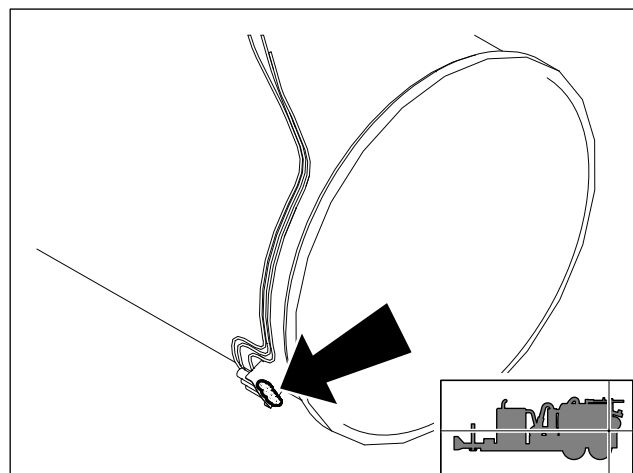
j70om088w.eps



j70om101w.eps

Boom, Pivot

Lube three zerks (shown) with MPG every 25 hours.



j70om048w.eps

Boom, Structure

If equipped, check boom structure for damage every 100 hours. Change or repair if needed.

Coolant

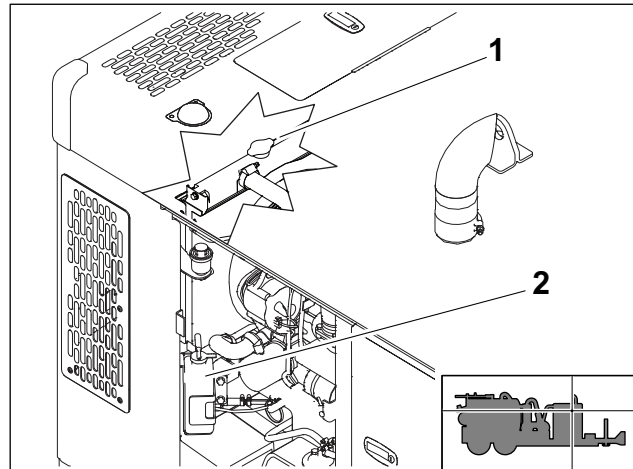
Check every 10 hours. Change every 2000 hours.

Check

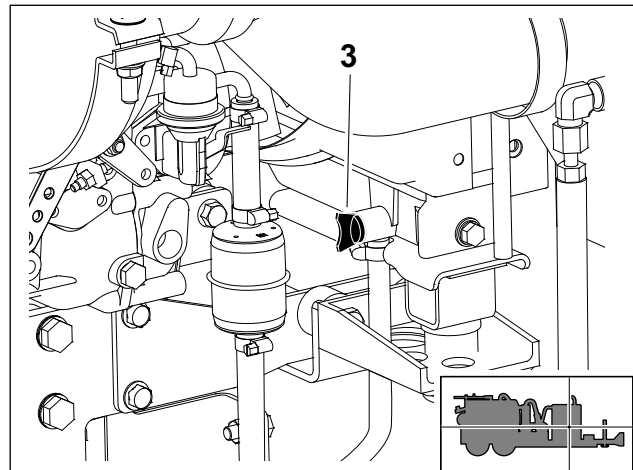
1. Check level at overflow bottle (2).
2. Add DEAC at fill (1) as needed to keep level between LOW and FULL marks on overflow bottle.

Change

1. Uncoil drain hose.
2. Open valve (3) to drain.
3. Close valve.
4. Coil and secure hose.
5. Add DEAC at fill to keep level between LOW and FULL marks on overflow bottle.



j70om073w.eps

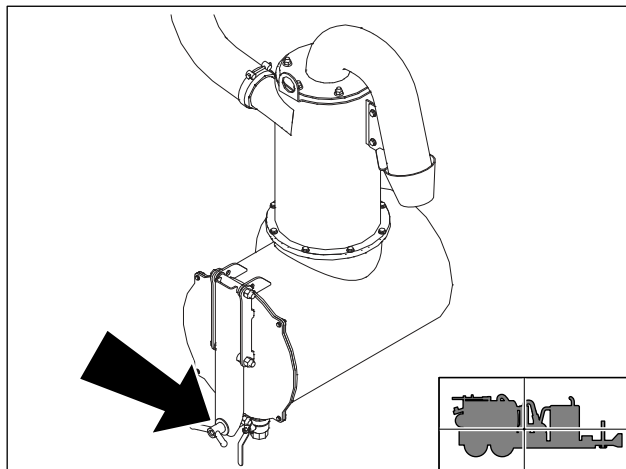


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Cyclonic Separator Canister

IMPORTANT: Relieve pressure in debris tank before emptying canister.

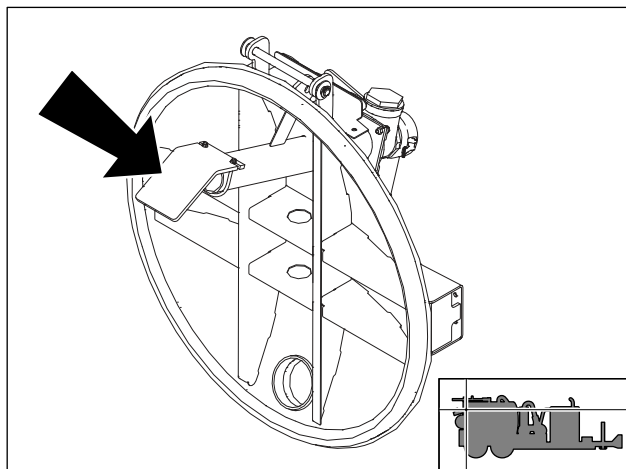
Remove wing nut (shown) to drain before startup and every 10 hours.



j70om034w.eps

Debris Tank Deflector

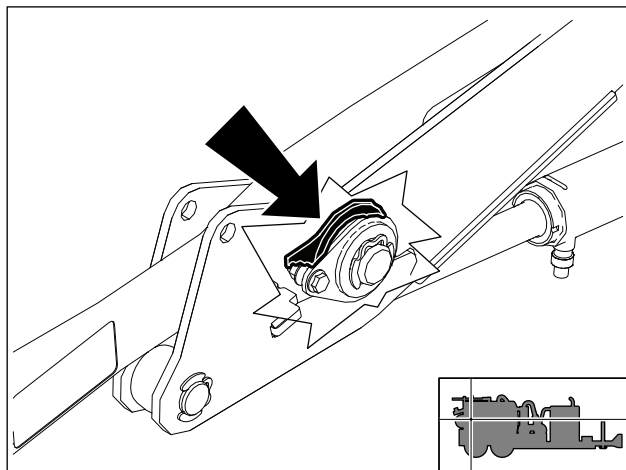
Check deflector (shown) every 10 hours for buildup, wear, or damage. Clean or change as needed.



j70om037w.eps

Debris Tank Door Rollers

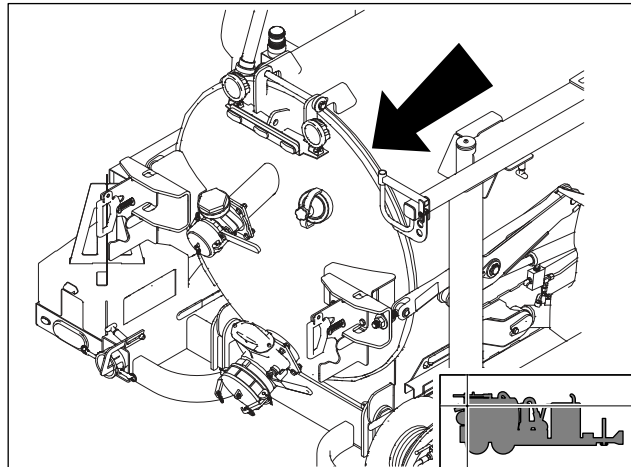
Check rollers (shown) every 100 hours for excessive wear or flat spots. Change as needed.



j70om079w.eps

Debris Tank Door Seals/ Fittings

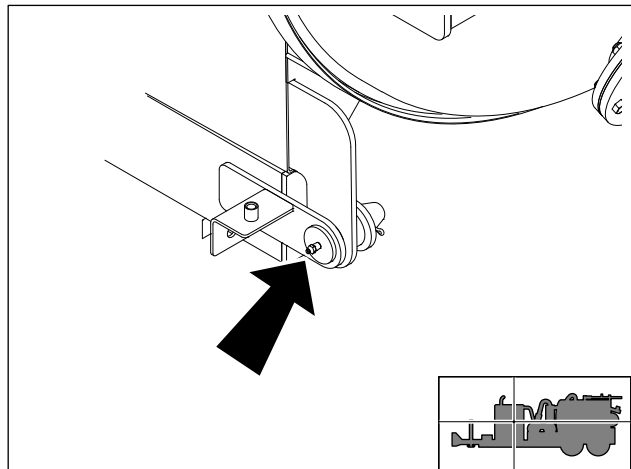
Check seal (shown) and fittings every 10 hours for wear, damage, or leaks. Change as needed.



j70om036w.eps

Debris Tank Pivot Pins

Lube two pins (shown) with MPG every 50 hours.

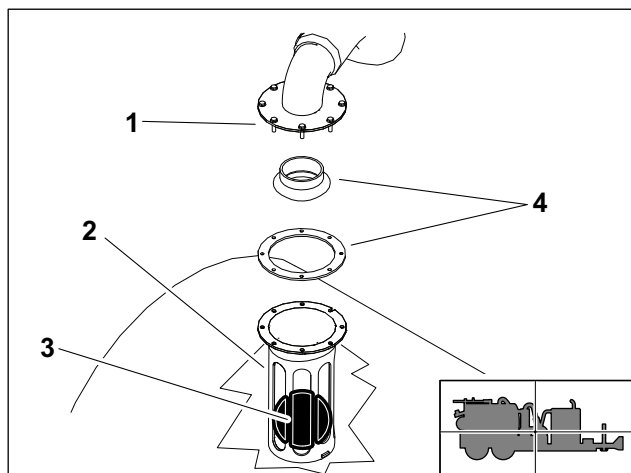


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Debris Tank Primary Shutoff Valve

Clean as needed.

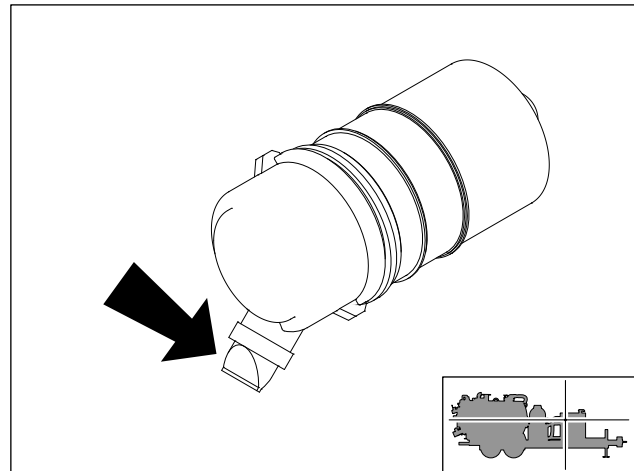
1. Loosen eight bolts (1) to remove elbow weldment.
2. Remove ball (3).
3. Clean ball, housing (2), and seals (4) with high-pressure water.
4. Inspect seals. Change as needed.
5. Reassemble.



j70om058w.eps

Dust Ejector Valve

Check valve (shown) before startup and every 10 hours. Ensure valve is not inverted, damaged, plugged, or cracked.



j330m089h.eps

Filter, Blower Relief Air

NOTICE: Operating system above 15inHG may result in blower damage.

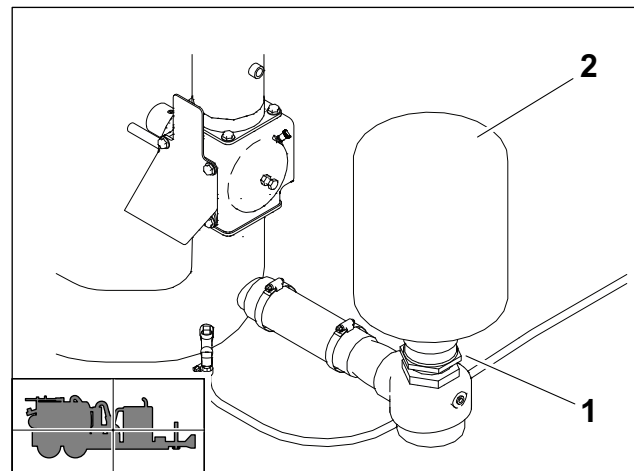
Check whenever vacuum gauge goes over 15inHG. Change as needed.

Check

Check filter (2) for dirt or debris.

Change

1. Remove clamp (1).
2. Replace filter.
3. Install clamp.



j700m072w.eps

Filter, Engine Air

NOTICE:

- Only open air filter canister when air restriction is indicated.
- Change the elements. Do not attempt to clean them.
- Compressed air or water may damage filter element.
- Tapping to loosen dirt may damage element.

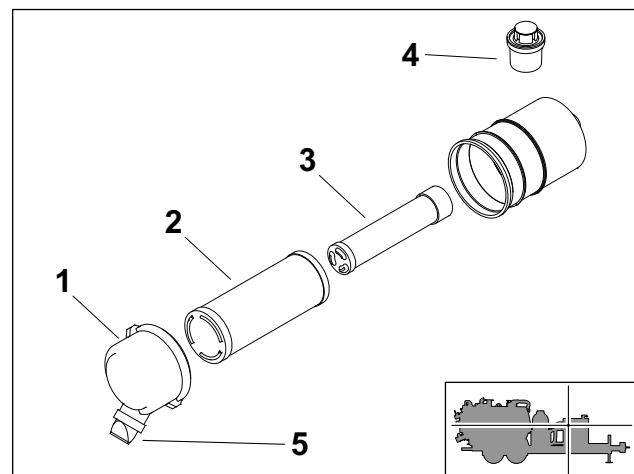
Check every 10 hours. Change as needed.

Check

Check air filter restriction indicator (4). Change filter when red band on indicator is visible.

Change

1. Remove cover (1).
2. Remove primary element (2) and secondary element (3).
3. Wipe inside of housing and wash cover.
4. Insert new secondary element and ensure it is seated correctly.
5. Insert new primary element.
6. Install cover with dust ejector (5) facing down.
7. Reset air filter restriction indicator.



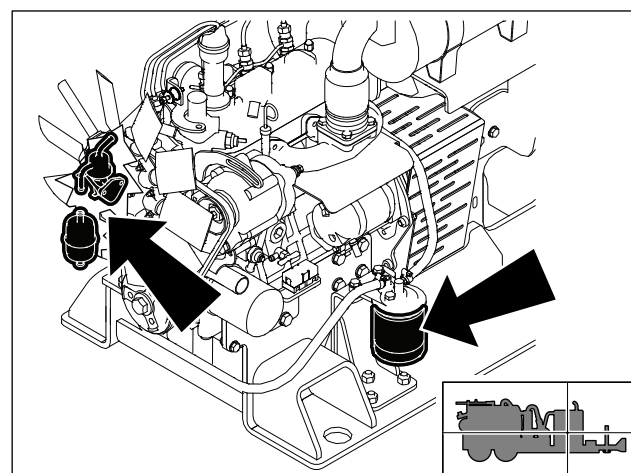
j33om074h.eps

Filter, Fuel

IMPORTANT: Do not pre-fill filters with diesel. Use hand pumps to prime.

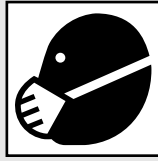
Change filters (shown) at 50 hours and every 100 hours thereafter.

1. Remove filters.
2. Thinly apply fuel over filter gaskets.
3. Install new filters.
4. Bleed air from injection pump. See engine manual for more information.



j70om041w.eps

Filter, Vacuum Air



⚠ WARNING Silica dust. Exposure can cause lung disease. Use breathing protection.

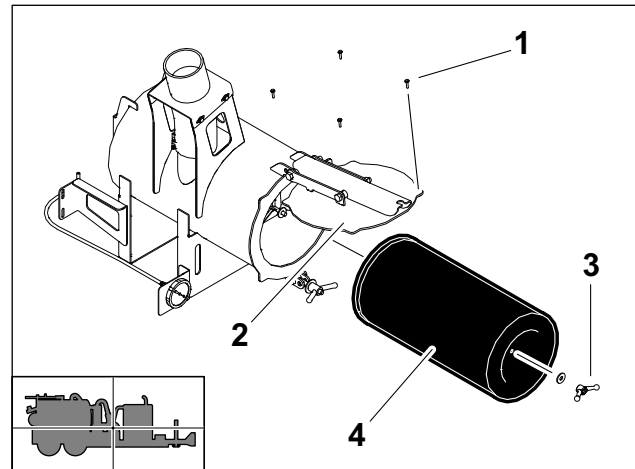
To help avoid injury:

- Use water spray or other means to control dust.
- Follow US Occupational Safety and Health Administration (OSHA) or other applicable regulating guidelines for appropriate breathing protection or dust control methods.

Check every 10 hours. Clean as needed.

1. Remove bolts (1) to open cover (2).
2. Remove wing nut (3) to remove filter element (4).
3. Wipe inside of housing and wash cover.
4. Clean element with low pressure water, as needed.

NOTICE: Do not use high pressure water or air to clean filter.



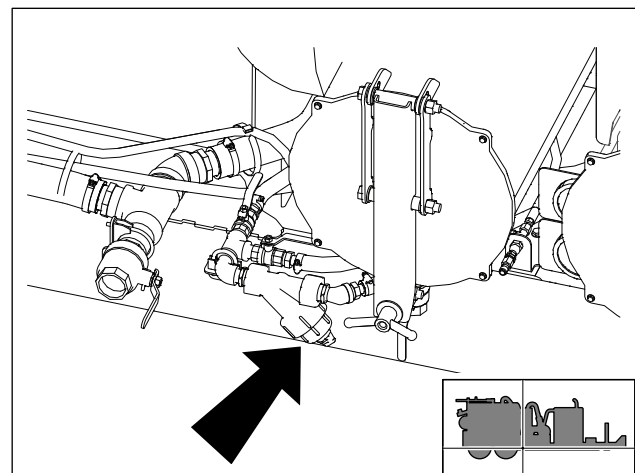
j70om032w.eps

5. Allow element to dry completely.
6. Reassemble.

Filter, Water Pump

Check every 10 hours. Change as needed.

1. Open filter housing (shown).
2. Remove element.
3. Wipe inside of housing.
4. Inspect element for damage or wear. Change as needed.
5. Reassemble.



j70om068w.eps

Fluid, Hydraulic

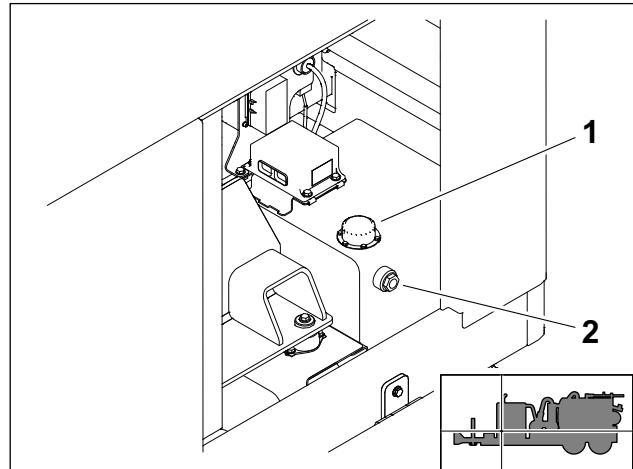
Check every 10 hours. Change at 100 hours and every 1000 hours thereafter.

Check

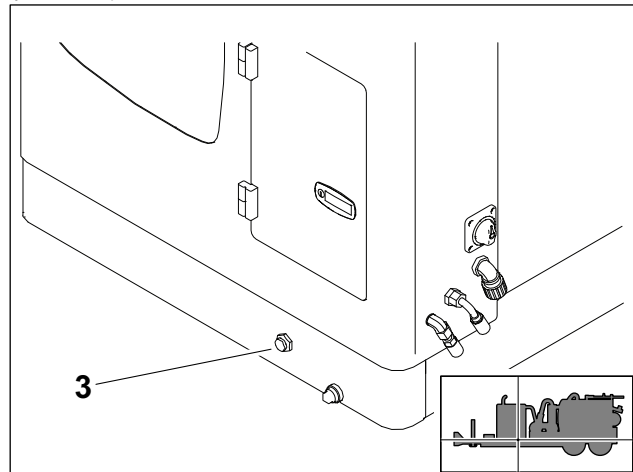
1. Check level at sight glass (2).
2. Add THF at fill (1) as needed to keep level at halfway point on sight glass.

Change

1. Remove plug (3) to drain.
2. Install plug.
3. Add THF at fill to keep level at halfway point on sight glass.

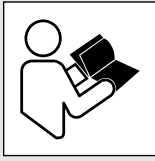


j70om027w.eps



j70om051w.eps

Hoses, Hydraulic

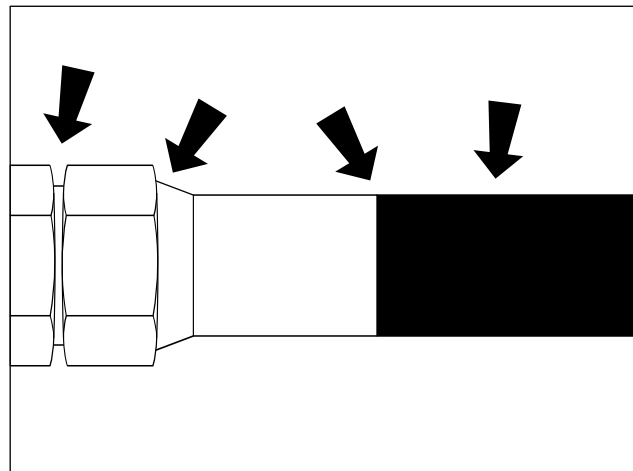


⚠ WARNING Pressurized fluid or air. Injection can cause death or serious injury. Refer to operator's manual for correct use.

To help avoid injury:

- Use a piece of cardboard or wood, rather than hands, to check for leaks.
- Before disconnecting a hydraulic line, turn engine off and operate all controls to relieve pressure.
- Lower, block, or support any raised component with a hoist.
- Cover connection with heavy cloth and loosen connector nut slightly to relieve residual pressure. Catch all fluid in a container.
- Before using system, check that all connections are tight and all lines are undamaged.
- If you are injured, seek immediate medical attention from a doctor familiar with this type of injury.

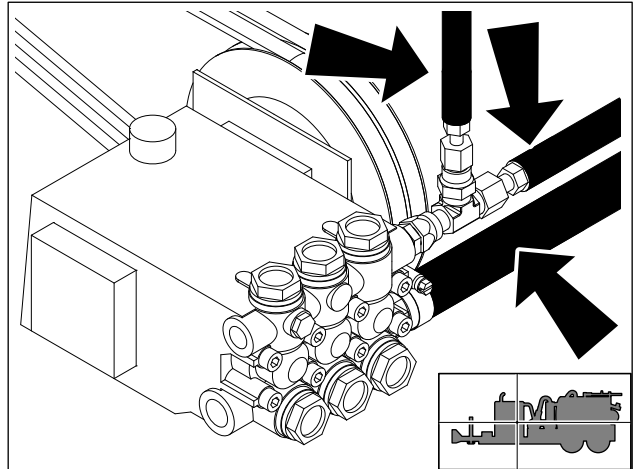
Check for leaks where shown before startup and every 10 hours.



CheckHoses.eps

Hoses, Water

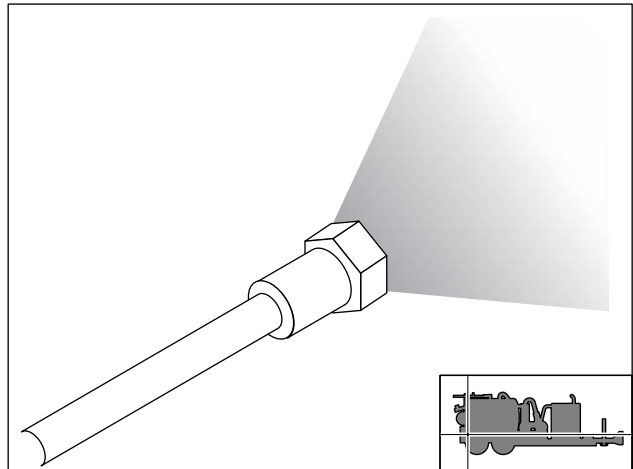
Check hoses (shown) for damage or wear every 50 hours. Change as needed.



j70om045w.eps

Lance Spray Nozzle

Check every 10 hours. Ensure water sprays in a rotary pattern. Clean or change as needed.

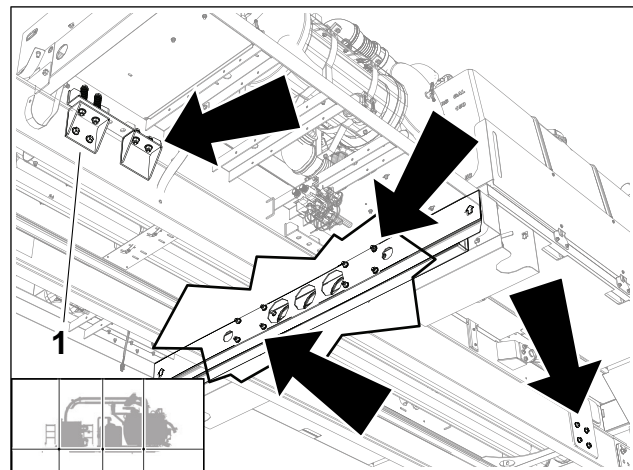


j70om033w.eps

Mounting Bolts and Springs

Check mounting bolts and springs (shown, underneath and both sides) every 100 hours for looseness and damage.

- Springs (1) should be 3in (76mm). Loosen or tighten bolt to adjust spring length.
- Tighten skid-to-skid hardware to 225ft-lb (305N•m).
- Tighten skid-to-truck frame hardware to 240ft-lb (325N•m).



j39om013w.eps

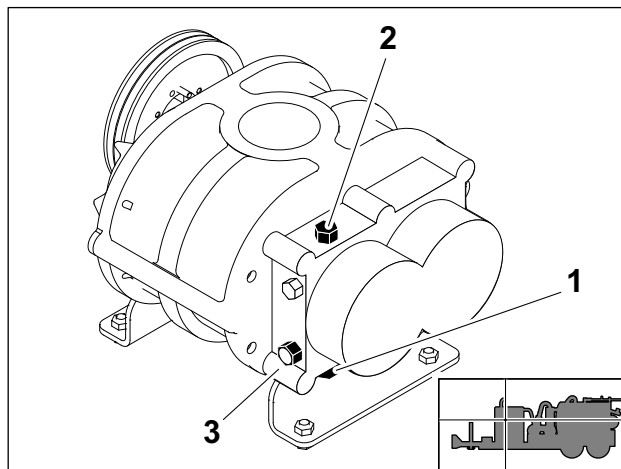
Oil, Blower

IMPORTANT: Change oil more often if working in dusty conditions.

Check every 10 hours. Change at 100 hours and every 1000 hours thereafter.

Check

1. Check level at sight glass (3).
2. Add SGL at fill (2) as needed to keep level at halfway point on sight glass.



j70om049w.eps

Change

1. While oil is warm, remove plug (1) to drain.
2. Install plug.
3. Add SGL at fill as needed to keep level at halfway point on sight glass.

Oil, Engine

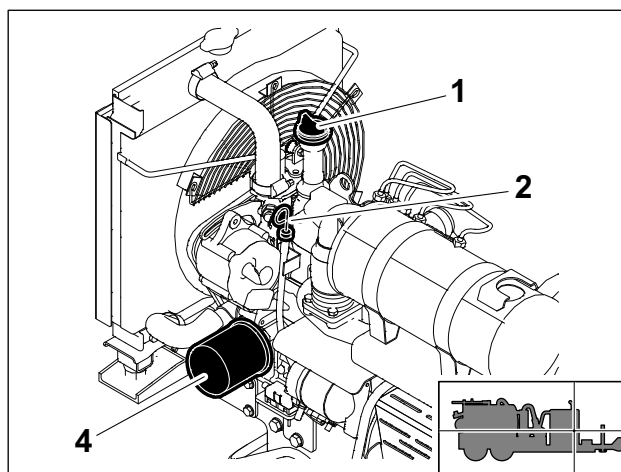
Check every 10 hours. Change at 50 hours and every 150 hours thereafter.

Check

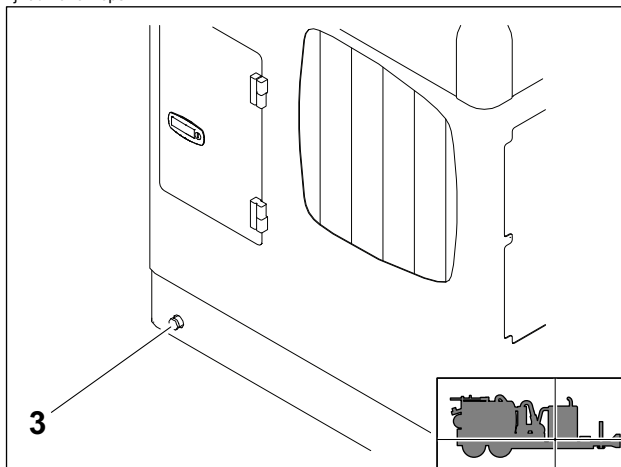
1. While oil is warm, check level at dipstick (2).
2. Add DEO at fill (1) as needed to keep level at highest line on dipstick.

Change

1. Remove plug (3) to drain.
2. Install plug.
3. Remove filter (4) and replace with new filter.
4. Add DEO at fill to keep level at highest line on dipstick.



j70om026w.eps



Oil, Water Pump

IMPORTANT: Change oil more often if working in dusty conditions.

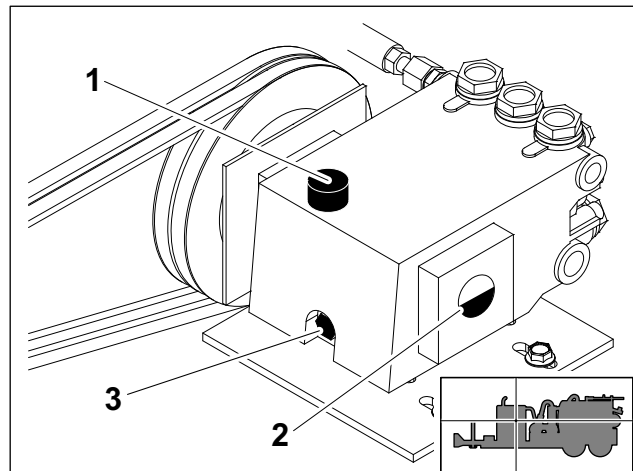
Check every 10 hours. Change at 25 hours and every 100 hours thereafter.

Check

1. Check level at sight glass (2).
2. Add NDO at fill (1) as needed to keep level at halfway point on sight glass.

Change

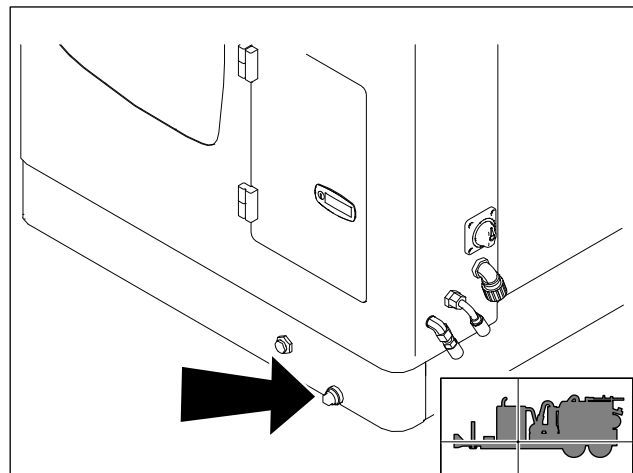
1. While oil is warm, remove plug (3) to drain.
2. Install plug.
3. Add NDO at fill to keep oil level at halfway point on sight glass.



j70om038w.eps

Power Pack Base

Drain fluids from base where shown as needed.



j70om087w.eps

Radiator

NOTICE: Radiator may need to be cleaned more often in dusty or grassy conditions.

Check every 50 hours. Clean as needed.

Check

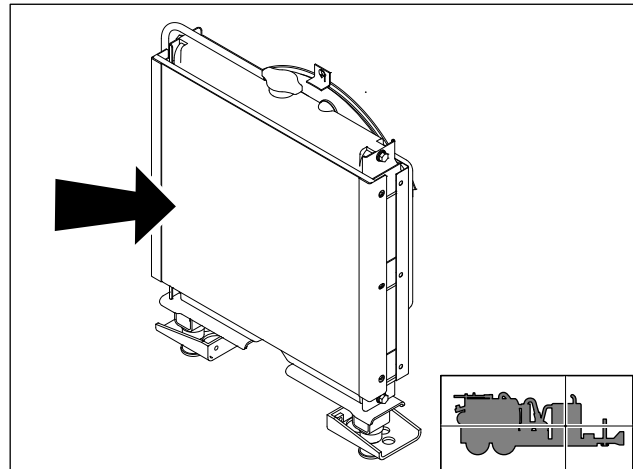
Check radiator (shown) for dirt, grass, and other debris. Check radiator hoses for wear. Check hose clamps for proper tightness.

Clean

1. Clean fins with compressed air or spray wash.

NOTICE: Cleaning with high pressure air or water can damage fins.

2. Open rear hood and spray through radiator toward engine.
3. If grease and oil are present on radiator, spray with solvent and allow to soak overnight.



j70om043w.eps

Reverse Flow 4-Way Valve

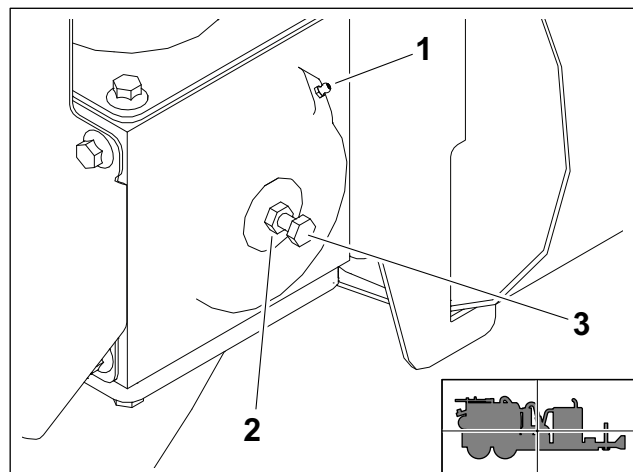
Lube or adjust as needed.

Lube

If reverse flow becomes difficult or impossible to engage, lube zerks (1) on each side of valve with two pumps of MPG at each zerk.

Adjust

If reverse flow is difficult or impossible to engage after lube, adjust valve.



j70om069w.eps

1. Loosen nut (2).
2. Adjust bolt (3) until desired operation is achieved.

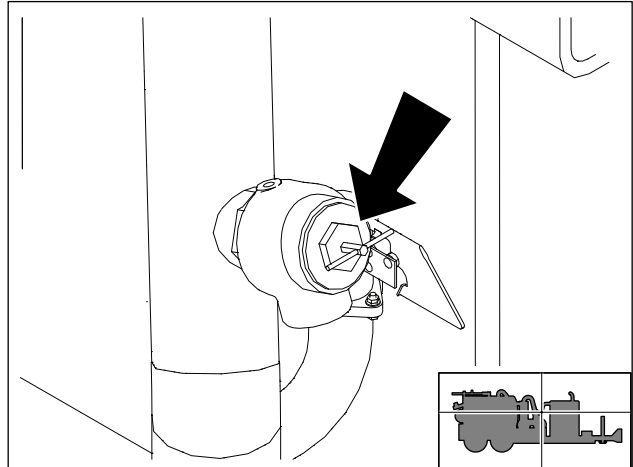
IMPORTANT: Tightening bolt loosens valve.

3. Hold bolt and tighten nut to prevent further adjustment.

Reverse Flow Relief Valve

Exercise valve before startup.

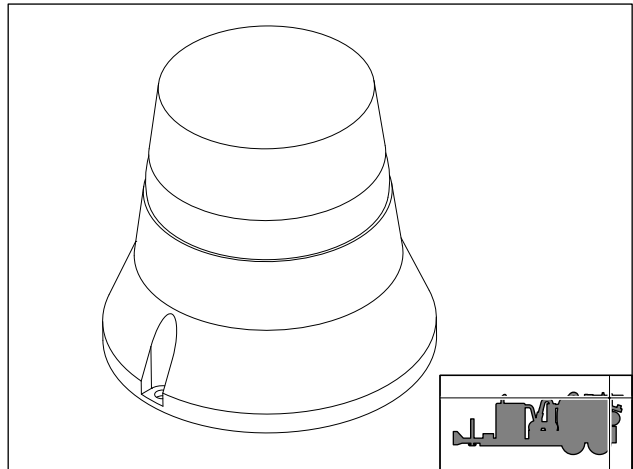
1. Pull handle (shown), rotate back and forth, and release.
2. Ensure vents on valve are free of mud and other restrictions.



j70om018w.eps

Strobe Light

Check every 10 hours. Strobe light should flash.
Change as needed.



j70om035w.eps

Weight Gauge

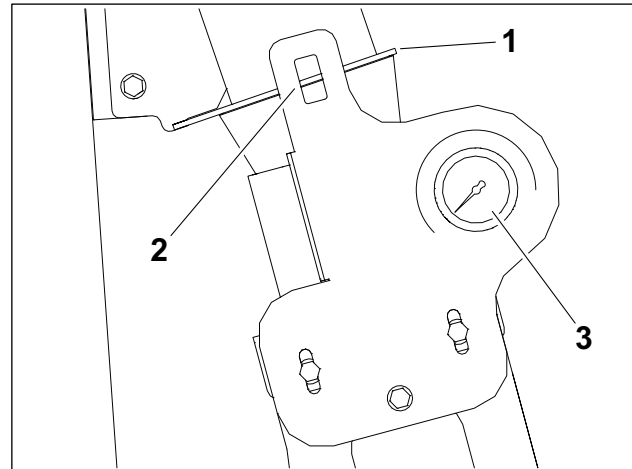
Check before startup. Adjust as needed.

Check

Check set screws on gauge face (3) for tightness.

Adjust

Adjust gauge any time gauge face is loose, new options are installed on machine, or base trailer load otherwise changes.

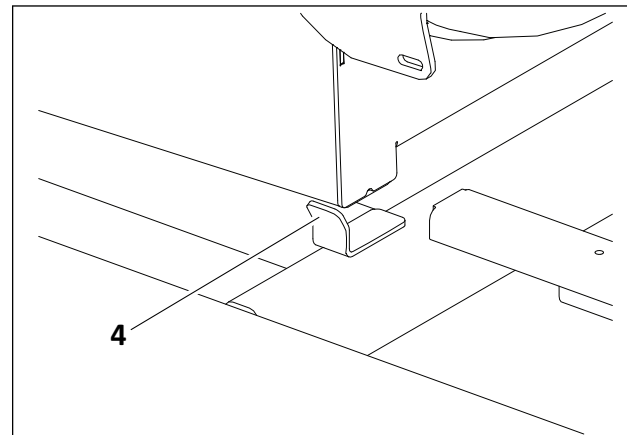


j70om090w.eps

1. Empty water and debris tanks.
2. Weigh trailer.
3. Note empty trailer weight.
4. Raise tank until back lip of make/break seal tube (1) is above gauge plate.
5. Lower tank into position.

NOTICE: Tank must be lowered into position for weight reading to be accurate. If tank is not lowered into position, tank tilt cylinders will not be bearing full weight of tank.

- **VT9/VT9H:** Lower until bottom of tank is near upper edge of lowering guide (4), as shown.
- **All other trailers:** Lower until back lip of make/break seal tube is visible inside gauge window (2).



j70in004w19.eps

6. Loosen set screws on gauge face, and rotate gauge until arrow points at empty trailer weight. For example, if empty trailer weighs 10,000lb, rotate gauge until arrow indicates "10".
7. With gauge arrow properly oriented, tighten gauge set screws to fix gauge in place.

IMPORTANT: Apply blue Loctite 24221 to set screws.

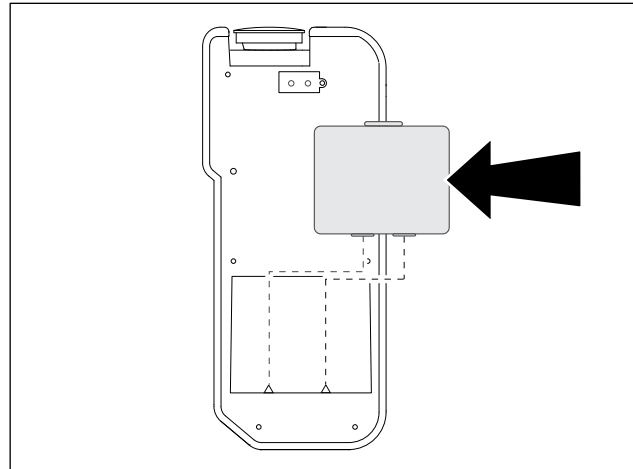
8. Fully lower tank.

Wireless Remote Control

Trailer

Change batteries as needed.

1. Remove back cover.
2. Remove battery adapter (shown).
3. Remove old batteries from battery adapter.
4. Insert 3 AA batteries into battery adapter as indicated on case.
5. Slide battery adapter into battery compartment.
6. Replace back cover.



VacWirelessControlBattery.eps

Truck

Charge when red LED flashes.

Place wireless control in charging cradle located in truck cab. LCD screen shows charging status after a few minutes.

IMPORTANT: A completely discharged battery requires 3 hours to charge but the battery can be charged even if it is not fully depleted.

Trailer Service Interval Chart

IMPORTANT: Chart indicates first instance of repeated service procedures. See detailed information below.

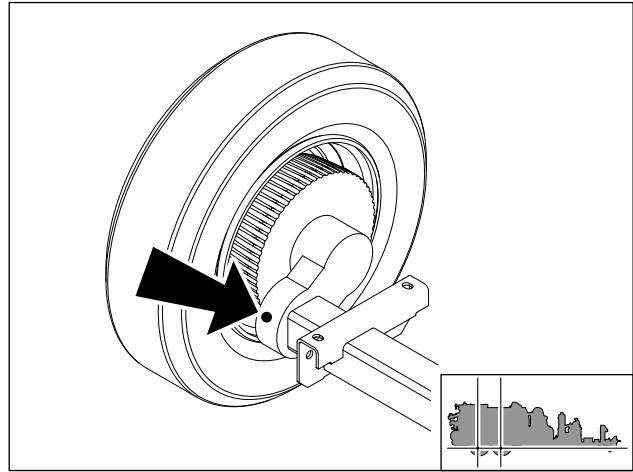
▽	Adjust, service, or test	□	Change, initial	○	Lube, initial
▲	Check	■	Change	●	Lube

Service	Startup	100 Hours	200 Miles (320km)	3000 Miles (5000km)	12000 Miles (20 000km)	As Needed
Axle bushings, VT24 only				●		
Bearings					●	
Brakes, electric			▽	▽		
Brakes, shoes and linings					▲	
Hitch bolts, Trailer	▲					
Hitch bolts, Truck	▲					
Hydraulic jack						▽
Lights and reflectors	▲					
Tires	▲				▽	
Mounting hardware, Trailer		▲			▽	
Mounting hardware, Truck		▲			▽	

Trailer Procedures

Axle Bushings

Lube VT24 axle bushing zerks (two per axle) with MPG every 3000 miles (5000km).

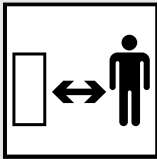


j810m051h19.eps

Bearings

Lube and adjust bearings every 12,000 miles (20 000km). See Dexter® trailer manual for more information. Visit www.dexteraxle.com.

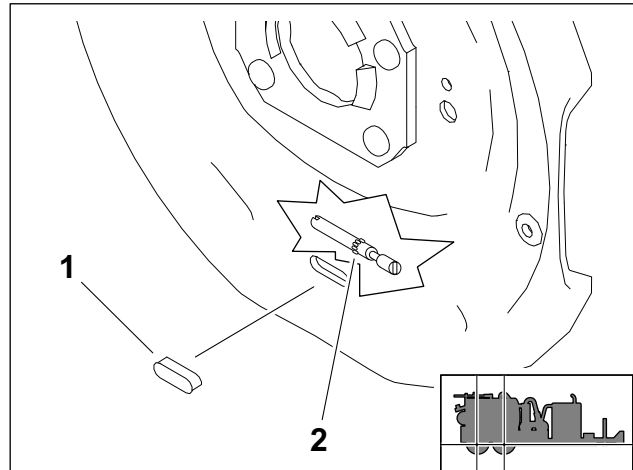
Brakes, Electric


⚠ WARNING

Raised component. Crushing can cause death or serious injury. Stay away. Use correct equipment and procedures.

Adjust at 200 miles (320km), and every 3000 miles (5000km) thereafter.

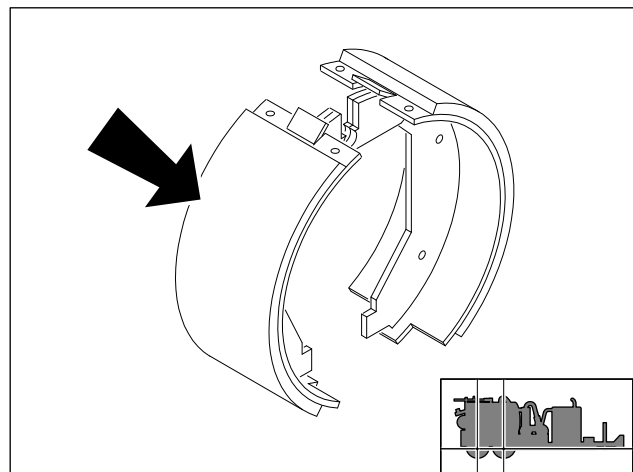
1. Place jack stands under frame rails and remove wheels.
2. Remove cover (1) from adjusting slot on bottom of backing plate.
3. Rotate adjuster starwheel (2) with screwdriver or brake spoon to expand brake shoes. Adjust until drum is very difficult to turn by hand.
4. Rotate starwheel the other direction until drum turns with slight drag.
5. Install adjusting slot cover and install wheel.
6. Repeat procedure for all remaining brakes.
7. Remove jack stands and lower wheels to ground.



j70om106w.eps

Brakes, Shoes and Linings

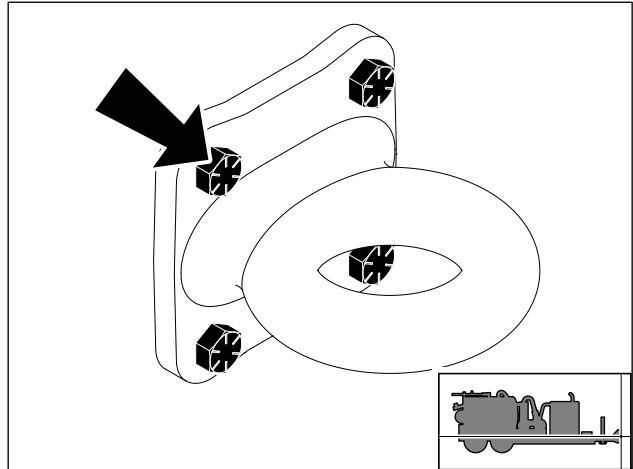
Check every 12 months or 12,000 miles (20 000km) for wear. When lining is worn to 1/16" (2mm) or less, change. Change shoe (shown) and lining if contaminated by oil.



j70om062w.eps

Hitch Bolts, Trailer

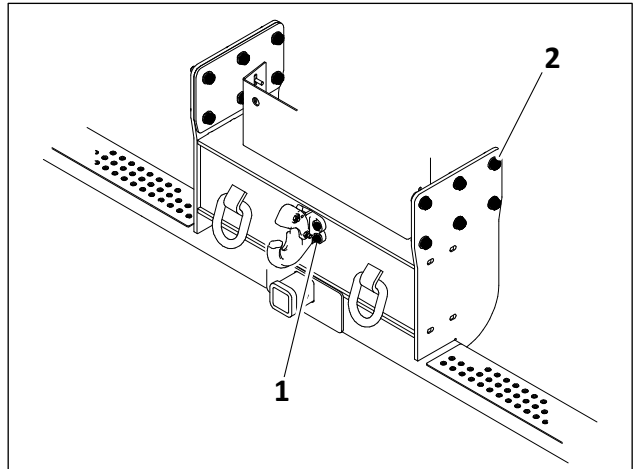
Check before startup. Torque varies by trailer model. See "Specifications" on page 149.



j70om019w.eps

Hitch Bolts, Truck

Check truck hitch bolts (1) and weldment bolts (2) before startup. See "Specifications" on page 149.



TruckHitchBolts.eps

Hydraulic Jack

Bleed jack every time jack is repaired or replaced. Also bleed jack every time air is introduced into the hydraulic system.

1. Retract jack completely.
2. Fill reservoir.

NOTICE: Only add fluid when jack is retracted.

3. Extend 1/4 stroke.
4. Retract jack completely.
5. Check fluid and fill with THF as needed.
6. Repeat steps 3-5 for 1/2 stroke and 3/4 stroke.
7. Extend completely.
8. Retract to standard resting height.
9. Extend and retract completely two more times to ensure all air is bled from the system.

Lights and Reflectors

Check all lights and reflectors for correct operation and cleanliness before startup.

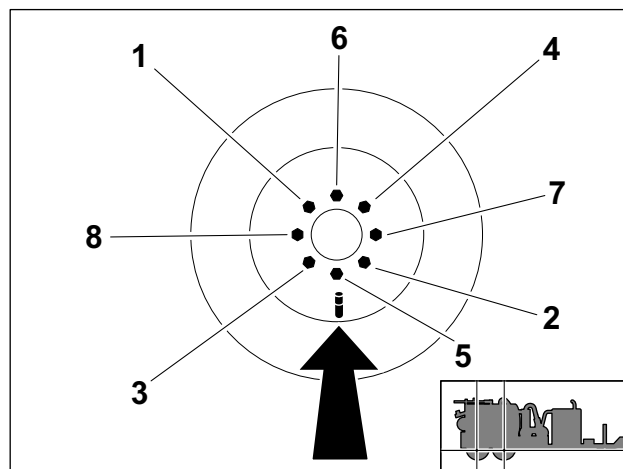
Tire

Check tire pressure and lug nut torque before startup.

Check Pressure

Check pressure at valve stem (shown). Adjust as needed.

Trailer	Tire Pressure
VT9/VT9H	80psi (551kPa)
VT12	80psi (551kPa)
VT14	80psi (551kPa)
VT17	110psi (758kPa)
VT20	125psi (861kPa)
VT24	125psi (861kPa)



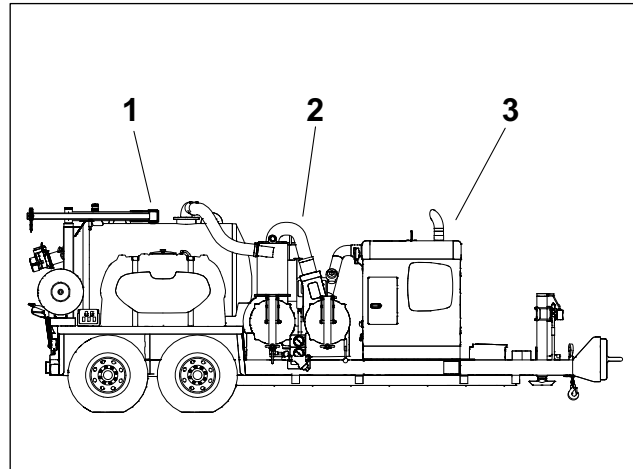
j700m023w.eps

Check Lug Nut Torque

Check torque on lug nuts (1-8) in sequence shown. See "Specifications" on page 149 for correct torque values by trailer model.

Mounting Hardware, Trailer

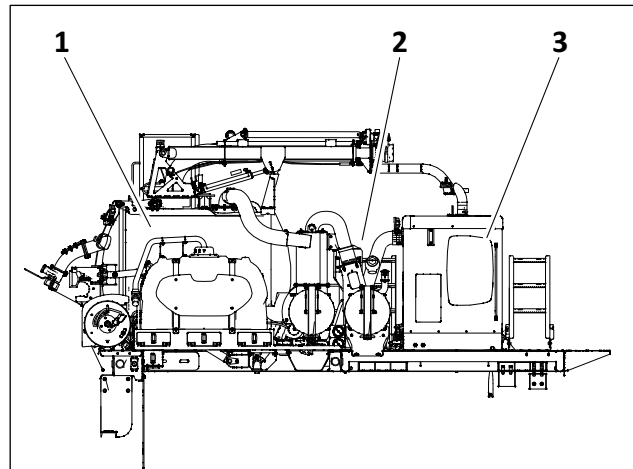
Check mounting hardware on trailer mounted components every 100 hours. Check debris tank (1), vacuum system (2), power pack (3), and any optional equipment or systems installed on trailer. Tighten or change hardware as needed.



j700m067w.eps

Mounting Hardware, Truck

Check mounting hardware on trailer mounted components every 100 hours. Check debris tank (1), vacuum system (2), power pack (3), and any optional equipment or systems installed on trailer. Tighten or change hardware as needed.



J900m001h23.eps

Specifications

Specifications are called out according to SAE recommended practices. Specifications are general and subject to change without notice. If exact measurements are required, equipment should be weighed and measured. Due to selected options, delivered equipment may not match that shown.

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HX30-500 VT9 150

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HX30-800 VT20 159

HX30-800 VT24 161

HXT30-500 163

HXT30-800 165

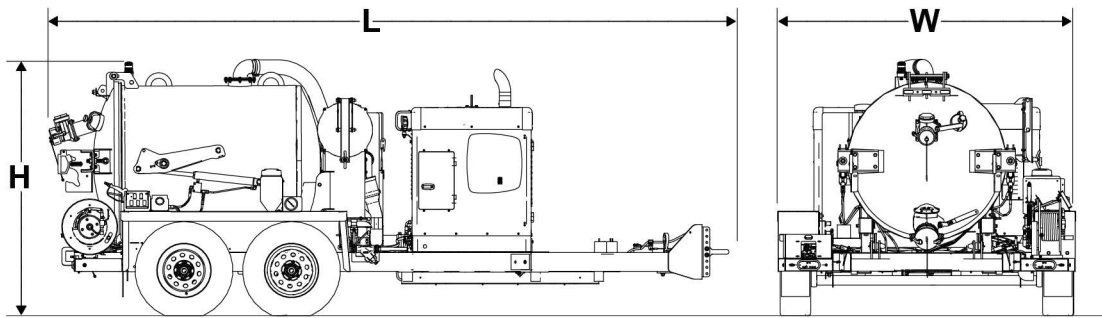
HXT Air System 167

HXT Centers of Gravity 168

- Power Pack Skid 168
- Tank Skids 169

Power Pack 170

HX30-500 VT9



hx30vt9.eps

Dimensions		US	Metric
H	Height	84.4in	2.14m
L	Length	218in	5.54m
W	Width	96in	2.44m

Debris Tank		US	Metric
Capacity		500gal	1893L
Diameter		48in	1219mm
Drain valve size		6in	152mm
Dump angle		45°	45°
Inlet valve size		4in	102mm

Operation		US	Metric
Weight*		6240lb	2830kg
Weight, with debris tank full*		10,410lb	4722kg
Weight, with all tanks full*		11,075lb	5024kg

*Options included in weight calculation: reverse flow

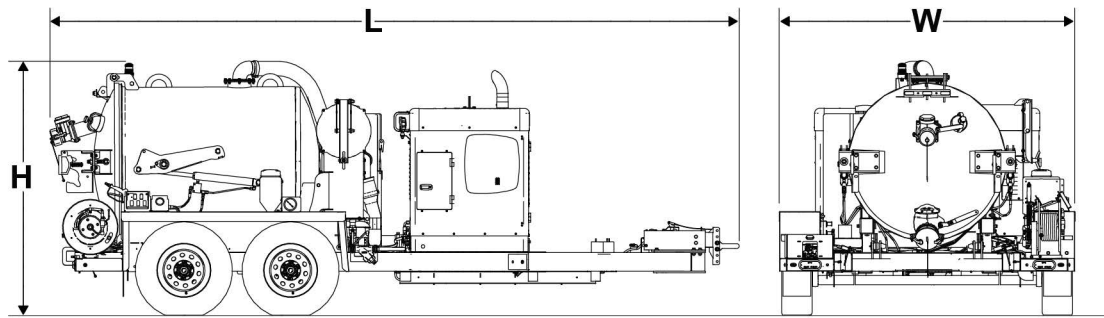
Water System		US	Metric
Tank capacity		200gal	757L
Hose reel capacity, locking		50ft	15.2m

VT9 Trailer		US	Metric
Dimension			
	Adjustable coupler height, 7 positions	16.9-28.9in	424-729mm
	Clearance, at jack foot pad	12.7in	323mm
	Width, outside fenders	96in	2.4m
General			
	Number of axles	2	2
	Coupler, square mount drawbar	3in	76.2mm
	Type of brakes	Electric	
	Lug nut torque	100-120ft-lb	136-162N•m
	Hitch bolt torque	110ft-lb	149N•m
	Electrical system	12V	
Tire			
	T/W (ST235/80R16)		
Load rating			
	Tongue weight, empty**	1225lb	556kg
	Tongue weight, full, approximate**	1195lb	542kg
	Max tongue load	2600lb	1179kg
	GVWR (gross vehicle weight rating)*	9999lb	4535kg
	GAWR (gross axle weight rating, each)*	6000lb	2722kg

* Load ratings for speeds up to 65mph (104 km/h).

**Weights are with no options installed.

HX30-500 VT9H



hx30vt9h.eps

Dimensions		US	Metric
H	Height	84.2in	2.14m
L	Length	232in	5.66m
W	Width	96in	2.44m

Debris Tank		US	Metric
Capacity		500gal	1893L
Diameter		48in	1219mm
Drain valve size		6in	152mm
Dump angle		45°	45°
Inlet valve size		4in	102mm

Operation		US	Metric
Weight*		6290lb	2853kg
Weight, with debris tank full*		10,460lb	4745kg
Weight, with all tanks full*		11,125lb	5046kg

*Options included in weight calculation: reverse flow

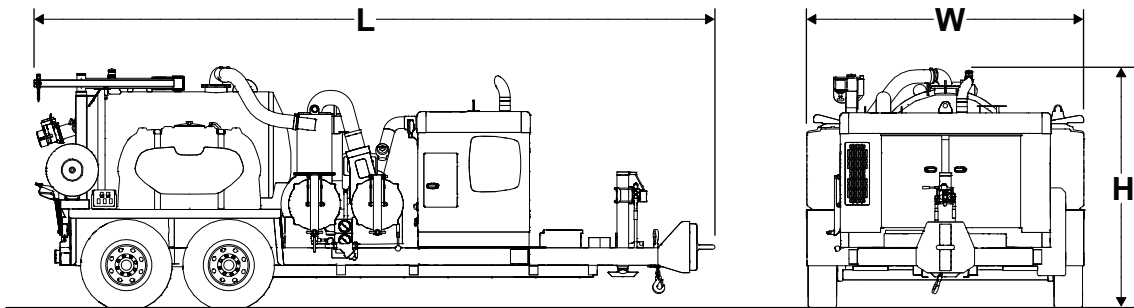
Water System		US	Metric
Tank capacity		200gal	757L
Hose reel capacity, locking		50ft	15.2m

VT9H Trailer		US	Metric
Dimension			
	Adjustable coupler height, 7 positions	19.8-28.8in	503-732mm
	Clearance, at jack foot pad	12.7in	323mm
	Width, outside fenders	96in	2.4m
General			
	Number of axles	2	2
	Coupler, square mount drawbar	3in	76.2mm
	Type of brakes	Hydraulic	
	Lug nut torque	100-120ft-lb	136-162N•m
	Hitch bolt torque	110ft-lb	149N•m
	Electrical system	12V	
Tire			
	T/W (ST235/80R16)		
Load rating			
	Tongue weight, empty**	1125lb	510kg
	Tongue weight, full, approximate**	1095lb	497kg
	Max tongue load	2000lb	907kg
	GVWR (gross vehicle weight rating)*	9999lb	4535kg
	GAWR (gross axle weight rating, each)*	6000lb	2722kg

* Load ratings for speeds up to 65mph (104 km/h).

**Weights are with no options installed.

HX30-500 VT12



j70om003w.eps

Dimensions		US	Metric
H	Height	84.2in	2.14m
L	Length	232.1in	5.9m
W	Width	96in	2.44m

Debris Tank		US	Metric
Capacity		500gal	1893L
Diameter		48in	1219mm
Drain valve size		6in	152mm
Dump angle		45°	45°
Inlet valve size		4in	102mm

Operation		US	Metric
Weight*		6910lb	3134kg
Weight, with debris tank full*		10,985lb	4983kg
Weight, with all tanks full*		12,495lb	5668kg

*Options included in weight calculation: reverse flow

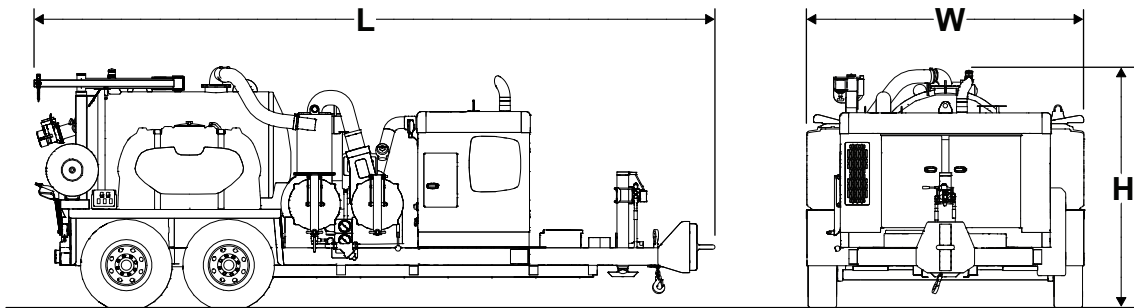
Water System		US	Metric
Tank capacity		200gal	757L
Hose reel capacity, locking		50ft	15.2m

VT12 Trailer		US	Metric
Dimension			
	Adjustable coupler height, 7 positions	16.7-28.7in	424-729mm
	Clearance, at jack foot pad	12.5in	318mm
	Width, outside fenders	96in	2.4m
General			
	Number of axles	2	2
	Coupler, square mount drawbar	3in	76.2mm
	Type of brakes	Electric	
	Lug nut torque	100-120ft-lb	136-162N•m
	Hitch bolt torque	110ft-lb	149N•m
	Electrical system	12V	
Tire			
	T/W (ST235/80R16)		
Load rating			
	Tongue weight, empty**	1515lb	687kg
	Tongue weight, full, approximate**	1600lb	726kg
	Max tongue load	2600lb	1179kg
	GVWR (gross vehicle weight rating)*	12,000lb	5443kg
	GAWR (gross axle weight rating, each)*	6840lb	3102kg

* Load ratings for speeds up to 65mph (104 km/h).

**Weights are with hydraulic jack, toolbox, reverse flow, and jib boom.

HX30-500 VT14



j70om003w.eps

Dimensions		US	Metric
H	Height	84.2in	2.14m
L	Length	232.1in	5.9m
W	Width	96in	2.44m

Debris Tank		US	Metric
Capacity		500gal	1893L
Diameter		48in	1219mm
Drain valve size		6in	152mm
Dump angle		45°	45°
Inlet valve size		4in	102mm

Operation		US	Metric
Weight*		6910lb	3134kg
Weight, with debris tank full*		10,955lb	4983kg
Weight, with all tanks full*		12,495lb	5668kg

*Options included in weight calculation: reverse flow

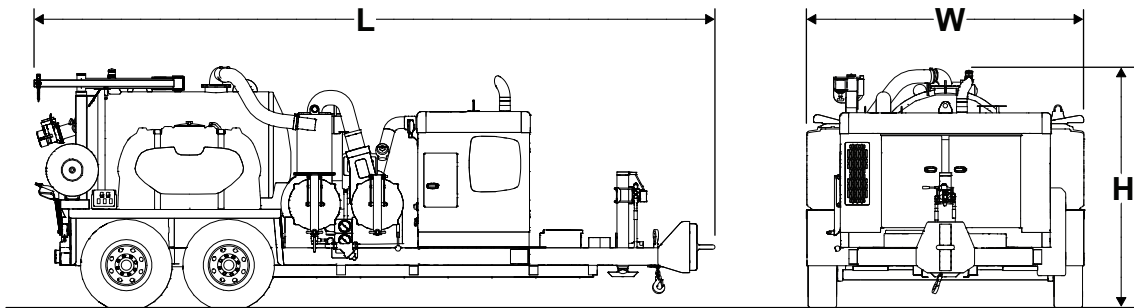
Water System		US	Metric
Tank capacity		200gal	757L
Hose reel capacity, locking		50ft	15.2m

VT14 Trailer		US	Metric
Dimension			
	Adjustable coupler height, 7 positions	16.7-28.7in	424-729mm
	Clearance, at jack foot pad	12.5in	318mm
	Width, outside fenders	96in	2.4m
General			
	Number of axles	2	2
	Coupler, square mount drawbar	3in	76.2mm
	Type of brakes	Electric	
	Lug nut torque	100-120ft-lb	136-162N•m
	Hitch bolt torque	110ft-lb	149N•m
	Electrical system	12V	
Tire			
	T/W (ST235/80R16)		
Load rating			
	Tongue weight, empty**	1515lb	687kg
	Tongue weight, full, approximate**	1600lb	726kg
	Max tongue load	2600lb	1179kg
	GVWR (gross vehicle weight rating)*	14,000lb	6350kg
	GAWR (gross axle weight rating, each)*	6840lb	3102kg

* Load ratings for speeds up to 65mph (104 km/h).

**Weights are with hydraulic jack, toolbox, reverse flow, and jib boom.

HX30-500 VT17



j70om003w.eps

Dimensions		US	Metric
H	Height	84.8in	2.15m
L	Length	232.1in	5.9m
W	Width	96in	2.44m

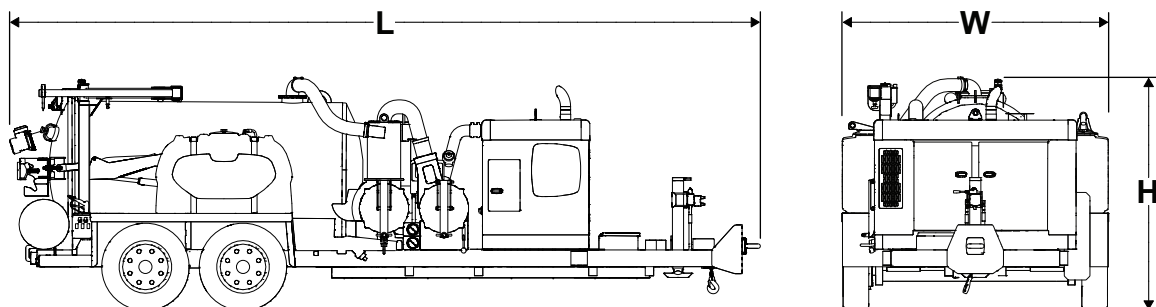
Debris Tank		US	Metric
Capacity		500gal	1893L
Diameter		48in	1219mm
Drain valve size		6in	152mm
Dump angle		45°	45°
Inlet valve size		4in	102mm

Operation		US	Metric
Weight*		7755lb	3518kg
Weight, with debris tank full*		11,925lb	5409kg
Weight, with all tanks full*		13,593lb	6166kg

*Options included in weight calculation: reverse flow

Water System		US	Metric
Tank capacity		200gal	757L
Hose reel capacity, locking		50ft	15.2m

HX30-800 VT20



j70om004w.eps

Dimensions		US	Metric
H	Height	85in	2.16m
L	Length	269.4in	6.84m
W	Width	96in	2.44m

Debris Tank		US	Metric
Capacity		800gal	3028L
Diameter		48in	1219mm
Drain valve size		6in	152mm
Dump angle		45°	45°
Inlet valve size		4in	102mm

Operation		US	Metric
Weight*		8595lb	3899kg
Weight, with debris tank full*		15,065lb	6833kg
Weight, with all tanks full*		16,660lb	7557kg

*Options included in weight calculation: reverse flow

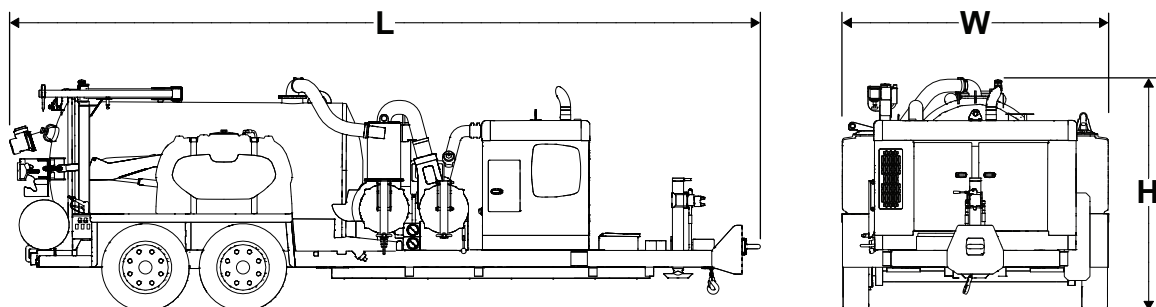
Water System		US	Metric
Tank capacity		200gal	757L
Hose reel capacity, locking		50ft	15.2m

VT20 Trailer		US	Metric
Dimension			
	Adjustable coupler height, 6 positions	18.3-29.55in	465-750mm
	Clearance, at jack foot pad	13.9in	353mm
	Width, outside fenders	96in	2.4m
General			
	Number of axles	2	2
	Coupler, square mount drawbar	3in	76.2mm
	Type of brakes	Electric	
	Lug nut torque - Fixed flange	275-325ft-lb	373-441N•m
	Lug nut torque - Swivel flange	150-175ft-lb	203-237N•m
	Hitch bolt torque	320ft-lb	433N•m
	Electrical system	12V	
Tire			
	235/75R-17.5, H16TL		
Load rating			
	Tongue weight, empty**	2025lb	919kg
	Tongue weight, full, approximate**	2290lb	1039kg
	Max tongue load	3000lb	1361kg
	GVWR (gross vehicle weight rating)*	20,000lb	9072kg
	GAWR (gross axle weight rating, each)*	10,000lb	4536kg

* Load ratings for speeds up to 65mph (104 km/h).

**Weights are with hydraulic jack, toolbox, reverse flow, jib boom, heater, spare tire and carrier.

HX30-800 VT24



i70om004w.eps

Dimensions		US	Metric
H1	Height, with boom	110.2in	2.8m
H2	Height, without boom	85.5in	2.17m
L	Length	269.4in	6.84m
W	Width	96in	2.44m

Debris Tank		US	Metric
Capacity		800gal	3028L
Diameter		48in	1219mm
Drain valve size		6in	152mm
Dump angle		45°	45°
Inlet valve size		4in	102mm

Operation		US	Metric
Weight*		9008lb	4086kg
Weight, with debris tank full*		15,930lb	7226kg
Weight, with all tanks full*		18,985lb	8611kg

*Options included in weight calculation: reverse flow

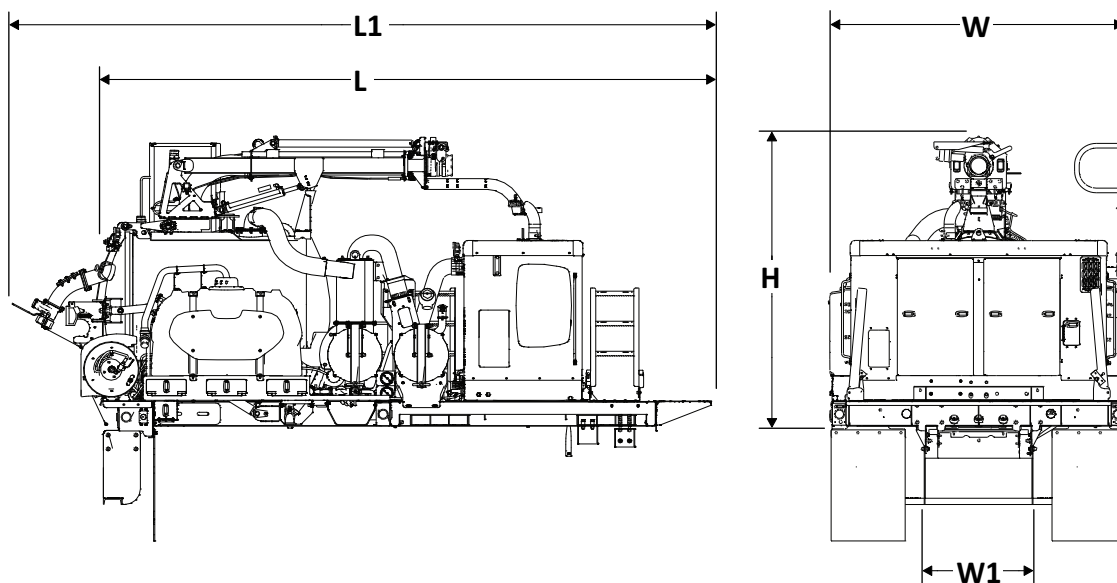
Water System		US	Metric
Tank capacity		370gal	1401L
Hose reel capacity, locking		50ft	15.2m

VT24 Trailer		US	Metric
Dimension			
	Adjustable coupler height, 6 positions	18.3-29.55in	465-750mm
	Clearance, at jack foot pad	13.9in	353mm
	Width, outside fenders	96in	2.4m
General			
	Number of axles	2	2
	Coupler, square mount drawbar	3in	76.2mm
	Type of brakes	Electric	
	Lug nut torque - Fixed flange	275-325ft-lb	373-441N•m
	Lug nut torque - Swivel flange	150-175ft-lb	203-237N•m
	Hitch bolt torque	320ft-lb	433N•m
	Electrical system	12V	
Tire			
	235/75R-17.5, H16TL		
Load rating			
	Tongue weight, empty**	1675lb	760kg
	Tongue weight, full, approximate**	1895lb	860kg
	Max tongue load	3600lb	1633kg
	GVWR (gross vehicle weight rating)*	24,000lb	10 886kg
	GAWR (gross axle weight rating, each)*	12,000lb	5443kg

* Load ratings for speeds up to 65mph (104 km/h).

**Weights are with hydraulic jack, reverse flow.

HXT30-500



j90om005w21.eps

Dimensions		US	Metric
H	Height, with boom	95in	2.4m
L	Length, on frame rail	221in	5.6m
L1	Length, overall	197in	5.0m
W	Width, overall	96.5in	2.44m
W1	Width, sitting on truck frame	34in	864mm

Debris Tank		US	Metric
Capacity		500gal	1893L
Diameter		48in	1219mm
Drain valve size		6in	152mm
Dump angle		45°	45°
Inlet valve size		4in	102mm

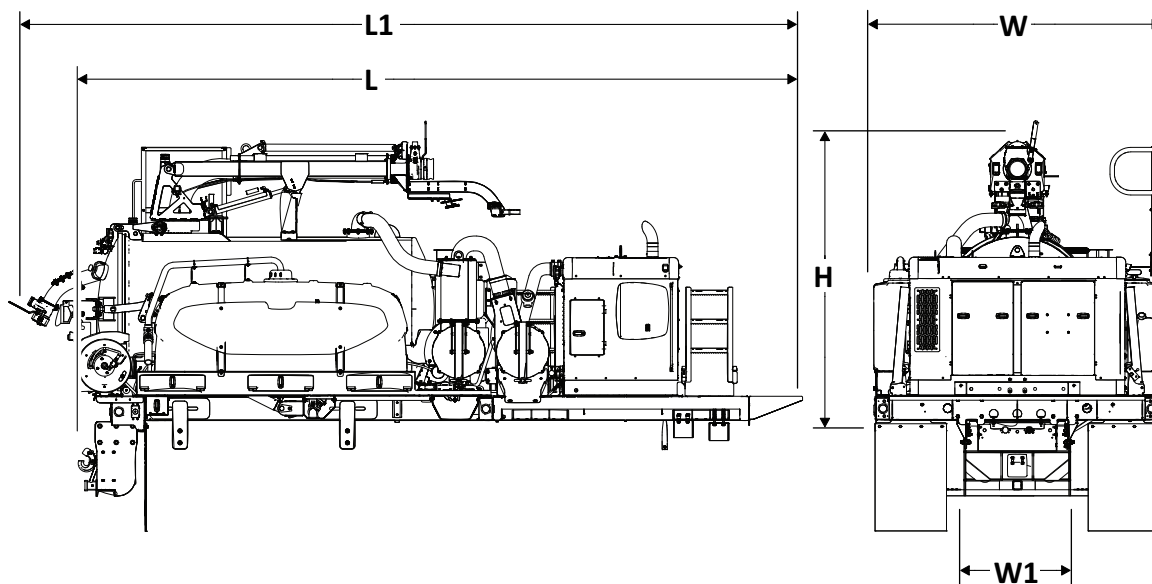
Operation	US	Metric
Weight, dry*	7750lb	3515kg
Weight, with debris tank fill (water)*	11,753lb	5331kg
Weight, with all tanks full (water)*	13,421lb	6088kg

*Options included in weight calculation: powered boom and hitch

Truck Information	US	Metric
Axle requirement: single		
Truck Hitch		
Maximum trailer GVWR (gross vehicle weight rating)	40,000lb	18144kg
Maximum tongue load	8,000lb	3629kg
Hitch bolt torque	130ft-lb	176N•m
Hitch weldment torque	280ft-lb	380N•m

Water System	US	Metric
Tank capacity	100gal	379L
Tank capacity	200gal	757L
Hose reel capacity, locking	50ft	15.2m

HXT30-800



j90om003w22.eps

Dimensions		US	Metric
H	Height, with boom	95in	2.4m
L	Length, overall	261in	6.6m
L1	Length, sitting on truck frame to hitch/bumper	237in	6.02m
W	Width, overall	96.5in	2.44m
W1	Width, sitting on truck frame	34in	864mm

Debris Tank		US	Metric
Capacity		800gal	3028L
Diameter		48in	1219mm
Drain valve size		6in	152mm
Dump angle		45°	45°
Inlet valve size		4in	102mm

Operation	US	Metric
Weight, dry*	10,150lb	4990kg
Weight, with debris tank fill (water)*	16,545lb	7505kg
Weight, with all tanks full (water)*	18,213lb	8261kg

*Options included in weight calculation: powered boom and hitch

Truck Information	US	Metric
Axle requirement: tandem rear		
Truck Hitch		
Maximum trailer GVWR (gross vehicle weight rating)	40,000lb	18144kg
Maximum tongue load	8,000lb	3629kg
Hitch bolt torque	130ft-lb	176N•m
Hitch weldment torque	280ft-lb	380N•m

Water System	US	Metric
Tank capacity	370gal	140L
Hose reel capacity, locking	50ft	15.2m

HXT Air System

10 Series

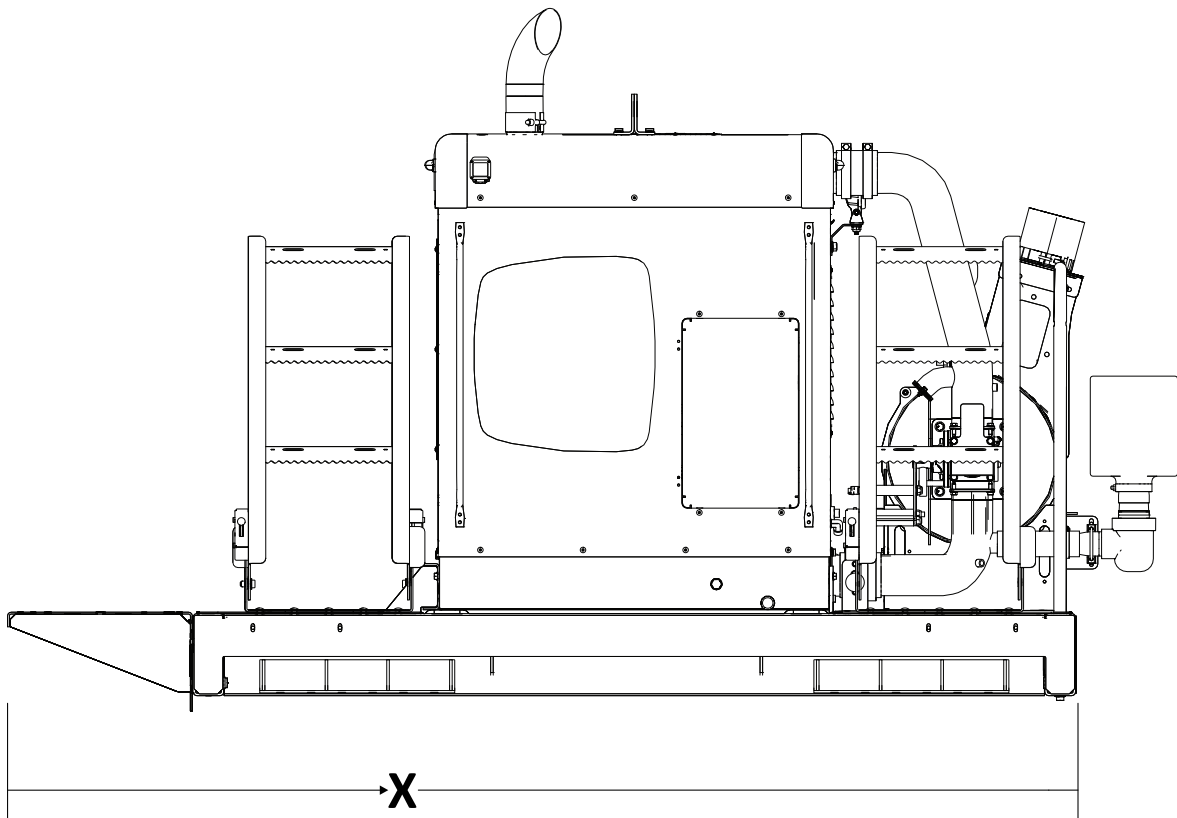
- Truck PTO driven
- 200CFM (5.6m³/min)
- Selectable operating pressure - 100 or 200psi (689 or 1379kPa)
- Air hose: 3/4in (19mm), 50ft (15m) long
- Approximate weight: 650lb (295kg)

12 Series

- Truck PTO driven
- 300CFM (8.5m³/min)
- Selectable operating pressure - 100 or 200psi (689 or 1379kPa)
- Air hose: 1in (25mm), 50ft (15m) long
- Approximate weight: 1200lb (544kg)

HXT Centers of Gravity

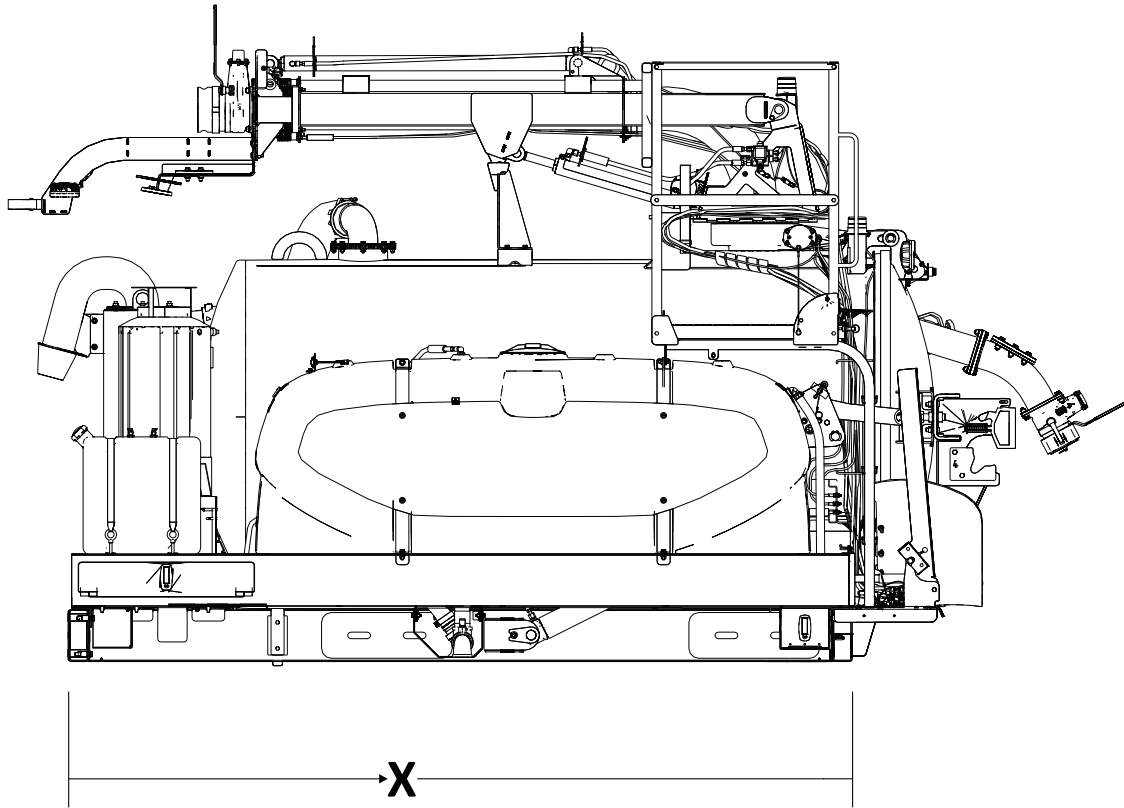
Power Pack Skid



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Component	Skid Length		Weight/Mass		CG from Front of Skid	
Power pack skid	104.2in	2.65m	3800lb	1304kg	64.5in	1.64m

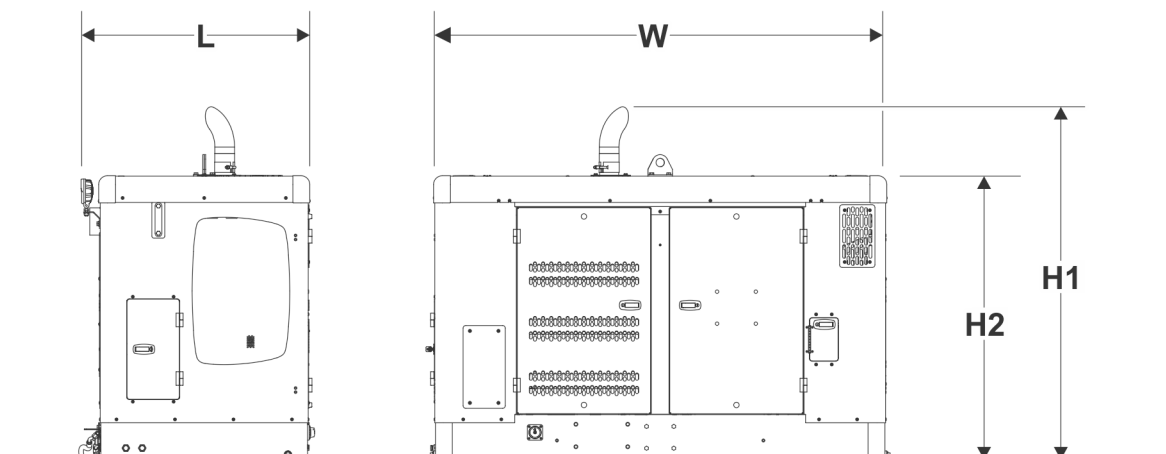
Tank Skids



j710m002w22.eps

Component	Skid Length		Weight/Mass		CG from Front of Skid	
500 gal (1893-L) debris tank skid	80in	2.03m	4700lb	2132kg	64.5in	1.64m
500-gal (1893-L) debris volume					55.1in	1.40m
100-gal (379-L) water volume			830lb	376kg	53in	1.35m
200-gal (757-L) water volume			1660lb	753kg	53in	1.35m
800 gal (3028-L) debris tank skid	120in	3.05m	5975lb	2710kg	72in	1.83m
800-gal (3028-L) debris volume					75.1in	1.91m
370-gal (1401-L) water volume			3085lb	1399kg	70.1in	1.78m

Power Pack



J710m003h.png

Dimensions		US	Metric
H1	Height	58.6in	1.49m
H2	Height, basic enclosure	46.3in	1.18m
L	Length	38.8in	0.99m
W	Width	72.8in	1.85m

Operation		US	Metric
Weight*		1700lb	771kg

Vacuum System		US	Metric
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Positive displacement rotary lobe

	Drive type	Belt	
	Displacement	515cfm	14.5m ³ /min
	Max vacuum	15inHg	381mmHg
	Flow @ 15inHg (3816mmHg)	350cfm	9.9m ³ /min
	Suction hose size	3in	76mm
	Speed	3200rpm	3200rpm

Water System		US	Metric
Triplex plunger			
	Max pressure	3000psig	207bar
	Max flow	4.2gpm	15.9L/min
Engine		US	Metric
Kubota D1105 EPA Tier 4 EU Stage V			
	Fuel	Diesel	
	Cooling medium	Liquid	
	Injection	Indirect	
	Aspiration	Natural	
	Number of cylinders	3	
	Displacement	68.53in ³	1.1L
	Bore	3.07in	78mm
	Stroke	3.09in	78.5mm
Engine manufacturer's gross power rating (per SAE J1995)		24.8hp	18kW
Estimated net power rating (per SAE 1349)		23.8hp	18kW
Rated engine speed		3000rpm	3000rpm
Max engine tilt angles		20°	20°
Hydraulic System		US	Metric
Drive type		Gear	
Flow rate		3.6gpm	14L/min
Pressure		2500psig	172bar

Fluid Capacities	US	Metric
Blower gear oil	0.3qt	0.3L
Cooling system	1.25gal	4.7L
Engine oil	5.2qt	4.9L
Fuel tank	25gal	94.6L
Hydraulic reservoir	6.3gal	23.8L
Hydraulic system	7.75gal	29.3L
Water pump oil	0.47qt	0.4L

Battery	US	Metric
SAE reserve capacity 110 minutes, cold crank (0°F/-18°C) 800A, 12V electrical system		

Noise Level

This machine can generate sound levels exceeding 80dBA. Always wear appropriate hearing protection when operating machine. Find sound power and pressure information at www.ditchwitch.com, or contact customersupport@ditchwitch.com.

Support

Registration

If your equipment was purchased through a Ditch Witch dealer, it is already registered. If you purchased from any other source, please email productsupportwarrantyadmin@ditchwitch.com or fill out the registration card located in the back of the parts manual. Registration enables you to receive updates on this equipment as well as information on new products of interest.

Procedure

Notify your dealer immediately of any malfunction or failure of Ditch Witch equipment.

Always give model, serial number, and approximate date of your equipment purchase. This information should be recorded and placed on file by the owner at the time of purchase.

Return damaged parts to dealer for inspection and warranty consideration if in warranty time frame.

Order genuine Ditch Witch replacement or repair parts from your authorized Ditch Witch dealer. Use of another manufacturer's parts may void warranty consideration.

Resources

Publications

Contact your Ditch Witch dealer for publications and videos covering safety, operation, maintenance, and repair of your equipment.

Ditch Witch Training

For information about on-site individualized training, contact your Ditch Witch dealer.

Warranty

Ditch Witch Equipment and Replacement Parts Limited Warranty Policy

Subject to the limitation and exclusions herein, free replacement parts will be provided at any authorized Ditch Witch dealership for any Ditch Witch equipment or parts manufactured by the Ditch Witch factory that fail due to a defect in material or workmanship within one (1) year of first commercial use. Free labor will be provided at any authorized Ditch Witch dealership for installation of parts under this warranty during the first year following "initial commercial" use of the serial-numbered Ditch Witch equipment on which it is installed. The customer is responsible for transporting their equipment to an authorized Ditch Witch dealership for all warranty work.

Exclusions from Product Warranty

- All incidental or consequential damages.
- All defects, damages, or injuries caused by misuse (including, but not limited to, rollover), abuse, improper installation, alteration, neglect, or uses other than those for which products were intended.
- All defects, damages, or injuries caused by improper training, operation, or servicing of products in a manner inconsistent with manufacturer's recommendations.
- All engines and engine accessories (these are covered by original manufacturer's warranty).
- Tires, belts, and other parts which may be subject to another manufacturer's warranty (such warranty will be available to purchaser).
- ALL IMPLIED WARRANTIES NOT EXPRESSLY STATED HEREIN, INCLUDING ANY WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE AND MERCHANTABILITY.

IF THE PRODUCTS ARE PURCHASED FOR COMMERCIAL PURPOSES, AS DEFINED BY THE UNIFORM COMMERCIAL CODE, THEN THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE FACE HEREOF AND THERE ARE NO IMPLIED WARRANTIES OF ANY KIND WHICH EXTEND TO A COMMERCIAL BUYER. ALL OTHER PROVISIONS OF THIS LIMITED WARRANTY APPLY INCLUDING THE DUTIES IMPOSED.

Ditch Witch products have been tested to deliver acceptable performance in most conditions. This does not imply they will deliver acceptable performance in all conditions. Therefore, to assure suitability, products should be operated under anticipated working conditions prior to purchase.

Defects will be determined by an inspection within thirty (30) days of the date of failure of the product or part by Ditch Witch Product Support (DWPS) or its authorized dealer. DWPS will provide the location of its inspection facilities or its nearest authorized dealer upon inquiry. DWPS reserves the right to supply remanufactured replacement parts under this warranty as it deems appropriate.

Extended warranties are available upon request from your local Ditch Witch dealer or the Ditch Witch factory.

Some states do not allow exclusion or limitation of incidental or consequential damages, so above limitation of exclusion may not apply. Further, some states do not allow exclusion of or limitation of how long an implied warranty lasts, so the above limitation may not apply. This limited warranty gives product owner specific legal rights and the product owner may also have other rights which vary from state to state.

For information regarding this limited warranty, contact the DWPS department, P.O. Box 66, Perry, OK 73077-0066, or contact your local dealer.

Emissions Warranty Statement

Federal Emissions Control Warranty Statement
Your Warranty Rights and Obligations

Introduction

Emissions related parts and components of the engine are covered by the Emissions Warranty. Non-emissions related parts and components of the engine are covered by the terms and conditions of the equipment warranty. New equipment that use compression ignition engines must be designed, built, and equipped to meet stringent anti-smog standards. The Charles Machine Works, Inc. must warrant the emissions control system on your equipment for the period listed below provided there has been no abuse, neglect, or improper maintenance of your equipment leading to the failure of the emissions control system.

Your emissions control system may include parts such as: aftertreatment equipment, aftertreatment equipment mounting, DEF lines, DEF tanks, DEF pump, air induction system and other associated emission-related components.

Manufacturer's Warranty Coverage

This emissions control system is warranted for a number of years depending on the power class and speed rating, see table below. If any emission-related part on your equipment is defective, the part will be repaired or replaced by The Charles Machine Works, Inc.

Owner's Warranty Responsibilities

As the equipment owner, you are responsible for performance of the required maintenance listed in your operator's manual. The Charles Machine Works, Inc. recommends that you retain all receipts covering maintenance on your equipment, but The Charles Machine Works, Inc. cannot deny warranty solely for the lack of receipts.

As the equipment owner, you should be aware that The Charles Machine Works, Inc. may deny you warranty coverage if your equipment or a part has failed due to abuse, neglect, improper maintenance, or unapproved modifications.

You are responsible for presenting your equipment to a Ditch Witch® service center as soon as the problem exists. The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days. If you have a question regarding your warranty coverage, you should contact your local Ditch Witch Dealer or The Charles Machine Works, Inc. at 1-800-433-6652.

General Emissions Warranty Coverage

The Charles Machine Works, Inc. warrants to the ultimate purchaser and each subsequent purchaser that the equipment is:

- Designed, built, and certified to conform with all applicable emissions regulations, and
- Identical in all material respects to the parts as describe in the application for certification, and
- Free from defects in materials and workmanship that could cause the failure of a warranted part.

The warranty period begins on the date the equipment is delivered to an ultimate purchaser. The warranted period is a number of years depending on power and speed rating.

If engine is certified as	And its maximum power is	And its rated speed is	Then it's warranty period is
Variable speed or constant speed	kW < 19 hp < 25	Any speed	1500 hours or two years, whichever comes first
Constant speed	19 ≤ kW < 37 25 ≤ hp < 49	3000 rpm or higher	1500 hours or two years, whichever comes first
Constant speed	19 ≤ kW < 37 25 ≤ hp < 49	Less than 3000 rpm	3000 hours or five years, whichever comes first
Variable speed	19 ≤ kW < 37 25 ≤ hp < 499	Any speed	3000 hours or five years, whichever comes first
Variable speed or constant speed	kW ≥ 37 hp ≥ 49	Any speed	3000 hours or five years, whichever comes first

Subject to certain conditions and exclusions as stated below, the warranty on emission-related parts is as follows:

- Any warranted part that is not scheduled for replacement as required maintenance in the written instructions supplied, is warranted for the warranty period stated above. If the part fails during the period of warranty coverage, the part will be repaired or replaced by The Charles Machine Works, Inc. Any such part repaired or replaced under warranty will be warranted for the remainder of the warranty period.
- Any warranted part that is scheduled only for regular inspection in the written instructions supplied is warranted for the warranty period stated above. Any such part repaired or replaced under the warranty will not reduce the period of warranty coverage and will be warranted for the remainder of the warranty period.
- Any warranted part that is scheduled for replacement as required maintenance in the written instructions supplied is warranted for the period of time prior to the first scheduled replacement date for that part. If the part fails before the first scheduled replacement, the part must be repaired or replaced by The Charles Machine Works, Inc. Any such part repaired or replaced under warranty will be warranted for the remainder of the period up to the first scheduled replacement point for the part.
- Repair or replacement of any warranted part under the warranty provisions herein must be performed at an Authorized Service Dealer at no charge to the owner.
- Warranty services or repairs will be provided at all Service Dealers authorized to service the subject equipment.
- The equipment owner will not be charged for diagnostic labor that is directly associated with diagnosis of a defective, emission-related warranted part, provided that such diagnostic work is performed by an Authorized Service Dealer.
- The Charles Machine Works, Inc. is liable for damages to other engine or equipment components proximately caused by a failure under warranty of any warranted part.
- Throughout the emissions control system's warranty period stated above, The Charles Machine Works, Inc. will maintain a supply of warranted parts sufficient to meet the expected demand for such parts.
- Manufacturer approved replacement parts may be used in the performance of any warranty maintenance or repairs and must be provided without charge to the owner. Such use will not reduce the warranty obligations of The Charles Machine Works, Inc.
- Add-on or modified parts that are not approved by The Charles Machine Works, Inc. will not be liable to warrant failures of warranted parts caused by the use of non-approved, add-on, or modified parts.

Warranted Parts

The repair or replacement of any warranted part otherwise eligible for warranty coverage may be excluded from such coverage if The Charles Machine Works, Inc. demonstrates that the equipment has been abused, neglected, or improperly maintained, and that such abuse, neglect, or improper maintenance was the direct cause of the need for repair or replacement of the part. That notwithstanding, any adjustment of a component that has a factory installed, and properly operating, adjust limiting device is still eligible for warranty coverage. The following emissions warranty parts list are covered.

- aftertreatment equipment
- DEF tank
- DEF pump
- electronic controls
- fuel lines when connected to exhaust aftertreatment equipment
- fuel line clamps when connected to exhaust aftertreatment equipment
- air filter
- aftertreatment equipment mounting brackets
- DEF hoses
- DEF filter
- air filter hoses and connections

Appendix

Chapter Contents

Tire Safety Information

TIRE SAFETY INFORMATION

1.1. STEPS FOR DETERMINING CORRECT LOAD LIMIT – TRAILER

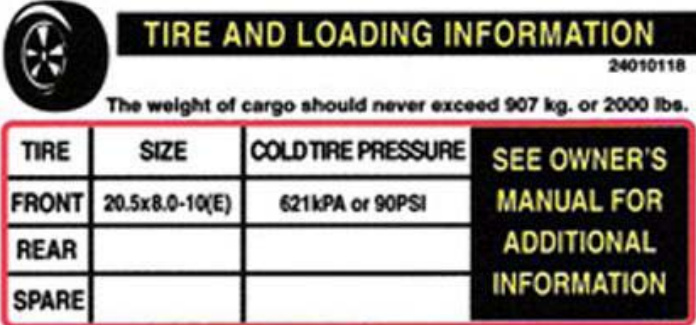
Determining the load limits of a trailer includes more than understanding the load limits of the tires alone. On all trailers there is a Federal certification/VIN label that is located on the forward half of the left (road) side of the unit. This certification/VIN label will indicate the trailer's Gross Vehicle Weight Rating (GVWR). This is the most the fully loaded trailer can weigh. It will also provide the Gross Axle Weight Rating (GAWR). This is the most a particular axle can weigh. If there are multiple axles, the GAWR of each axle will be provided.

If your trailer has a GVWR of 10,000 pounds or less, there is a vehicle placard located in the same location as the certification label described above. This placard provides tire and loading information. In addition, this placard will show a statement regarding maximum cargo capacity. Cargo can be added to the trailer, up to the maximum weight specified on the placard. The combined weight of the cargo is provided as a single number. In any case, remember: the total weight of a fully loaded trailer can not exceed the stated GVWR.

When loading your cargo, be sure it is distributed evenly to prevent overloading front to back and side to side. Heavy items should be placed low and as close to the axle positions as reasonable. Too many items on one side may overload a tire. The best way to know the actual weight of the trailer is to weigh it at a public scale. Talk to your dealer to discuss the weighing methods needed to capture the various weights related to the trailer. This would include the weight empty or unloaded, weights per axle, wheel, hitch or king-pin, and total weight.

Excessive loads and/or underinflation cause tire overloading and, as a result, abnormal tire flexing occurs. This situation can generate an excessive amount of heat within the tire. Excessive heat may lead to tire failure. It is the air pressure that enables a tire to support the load, so proper inflation is critical. The proper air pressure may be found on the certification/VIN label and/or on the Tire Placard. This value should never exceed the maximum cold inflation pressure stamped on the tire.

1.1.1. TRAILERS 10,000 POUNDS GVWR OR LESS



The placard features a tire icon on the left. The title 'TIRE AND LOADING INFORMATION' is in yellow on a black background. Below the title is the number '24010118' and a warning statement: 'The weight of cargo should never exceed 907 kg. or 2000 lbs.'. A table with three columns (TIRE, SIZE, COLD TIRE PRESSURE) and three rows (FRONT, REAR, SPARE) is shown. The FRONT row is filled with '20.5x8.0-10(E)' and '621kPA or 90PSI'. The REAR and SPARE rows are empty. To the right of the table, the text 'SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION' is displayed in yellow on a black background.

TIRE	SIZE	COLD TIRE PRESSURE
FRONT	20.5x8.0-10(E)	621kPA or 90PSI
REAR		
SPARE		

Tire and Loading Information Placard – Figure 1-1

1. Locate the statement, "The weight of cargo should never exceed XXX kg or XXX lbs.," on your trailer's placard. See figure 1-1.
2. This figure equals the available amount of cargo load capacity.
3. Determine the combined weight of cargo being loaded on the trailer. That weight may not safely exceed the available cargo load capacity.

The Tire Information Placard is attached adjacent to or near the trailer's VIN (Certification) label at the left front of the trailer.

1.1.2. TRAILERS OVER 10,000 POUNDS GVWR (NOTE: These trailers are not required to have a tire information placard on the trailer.)

1. Determine the empty weight of your trailer by weighing the trailer using a public scale or other means. This step does not have to be repeated.
2. Locate the GVWR (Gross Vehicle Weight Rating) of the trailer on your trailer's VIN (Certification) label.
3. Subtract the empty weight of your trailer from the GVWR stated on the VIN label. That weight is the maximum available cargo capacity of the trailer and must not be exceeded.

1.2. STEPS FOR DETERMINING CORRECT LOAD LIMIT – TOW VEHICLE

1. Locate the statement, "The combined weight of occupants and cargo should never exceed XXX lbs.," on your vehicle's placard.
2. Determine the combined weight of the driver and passengers who will be riding in your vehicle.
3. Subtract the combined weight of the driver and passengers from XXX kilograms or XXX pounds.
4. The resulting figure equals the available amount of cargo capacity. For example, if the "XXX" amount equals 1400 lbs. and there will be five 150 lb. passengers in your vehicle, the amount of available cargo and luggage capacity is 650 lbs. ($1400 - 750 (5 \times 150) = 650$ lbs.).
5. Determine the combined weight of cargo being loaded on the vehicle. That weight must not exceed the available cargo capacity calculated in Step # 4.
6. If your vehicle will be towing a trailer, load from your trailer will be transferred to your vehicle. Consult the tow vehicle's manual to determine how this weight transfer reduces the available cargo and luggage capacity of your vehicle.

1.3. GLOSSARY OF TIRE TERMINOLOGY

Bead - the part of the tire that is made of steel wires, wrapped or reinforced by ply cords and that is shaped to fit the rim.

Bead separation - the breakdown of the bond between components in the bead.

Bias ply tire - a pneumatic tire in which the ply cords that extend to the beads are laid at alternate angles substantially less than 90 degrees to the centerline of the tread.

Carcass - the tire structure, except tread and sidewall rubber which, when inflated, bears the load.

Chunking - the breaking away of pieces of the tread or sidewall.

Cold inflation pressure - the pressure in the tire before you drive.

Cord - the strands forming the plies in the tire.

Cord separation - the parting of cords from adjacent rubber compounds.

Cracking - any parting within the tread, sidewall, or inner liner of the tire extending to cord material.

Curb weight - the weight of a vehicle with standard equipment.

Groove - the space between two adjacent tread ribs.

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.

Tongue Weight - the downward force exerted on the hitch ball or lunette by the trailer coupler.

Innerliner - the layer(s) forming the inside surface of a tubeless tire that contains the inflating medium within the tire.

Innerliner separation - the parting of the innerliner from cord material in the carcass.

Light truck (LT) tire - a tire designated by its manufacturer as primarily intended for use on lightweight trucks or multipurpose passenger vehicles.

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.

Maximum loaded vehicle weight - the sum of curb weight, accessory weight, vehicle capacity weight, and production options weight.

Outer diameter - the overall diameter of an inflated new tire.

Overall width - the linear distance between the exteriors of the sidewalls of an inflated tire, including elevations due to labeling, decorations, or protective bands or ribs.

Ply - a layer of rubber-coated parallel cords.

Ply separation - a parting of rubber compound between adjacent plies.

Pneumatic tire - a mechanical device made of rubber, chemicals, fabric and steel or other materials, that, when mounted on an automotive wheel, provides the traction and contains the gas or fluid that sustains the load.

Radial ply tire - a pneumatic tire in which the ply cords that extend to the beads are laid at substantially 90 degrees to the centerline of the tread.

Recommended inflation pressure - the inflation pressure provided by the vehicle manufacturer on the Tire Information label and on the Certification / VIN tag.

Rim - a metal support for a tire or a tire and tube assembly upon which the tire beads are seated.

Rim diameter - the nominal diameter of the bead seat.

Rim size designation - the rim diameter and width.

Rim type designation - the industry of manufacturer's designation for a rim by style or code.

Rim width - the nominal distance between rim flanges.

Sidewall - that portion of a tire between the tread and bead.

Sidewall separation - the parting of the rubber compound from the cord material in the sidewall.

Special Trailer (ST) tire - the "ST" is an indication the tire is for trailer use only.

Tread - that portion of a tire that comes into contact with the road.

Tread rib - a tread section running circumferentially around a tire.

Tread separation - pulling away of the tread from the tire carcass.

Treadwear indicators (TWI) - the projections within the principal grooves designed to give a visual indication of the degrees of wear of the tread.

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.

Vehicle normal load on the tire - the load on an individual tire that is determined by distributing to each axle its share of the curb weight and dividing by 2.

1.4. TIRE SAFETY - EVERYTHING RIDES ON IT

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. This brochure is reproduced in part below. It can be obtained and downloaded from NHTSA, free of charge, from the following web site: http://www.nhtsa.dot.gov/cars/rules/TireSafety/ridesonit/tires_index.html

Studies of tire safety show that maintaining proper tire pressure, observing tire and trailer load limits (not carrying more weight in your trailer than your tires or trailer can safely handle), avoiding road hazards, and inspecting tires for cuts, slashes, and other irregularities are the most important things you can do to avoid tire failure, such as tread separation or blowout and flat tires. These actions, along with other care and maintenance activities, can also:

- ◇ Improve vehicle handling
- ◇ Help protect you and others from avoidable breakdowns and accidents
- ◇ Improve fuel economy
- ◇ Increase the life of your tires.

This booklet presents a comprehensive overview of tire safety, including information on the following topics:

- ◇ Basic tire maintenance
- ◇ Uniform Tire Quality Grading System
- ◇ Fundamental characteristics of tires
- ◇ Tire safety tips.

Use this information to make tire safety a regular part of your trailer maintenance routine. Recognize that the time you spend is minimal compared with the inconvenience and safety consequences of a flat tire or other tire failure.

1.5. SAFETY FIRST—BASIC TIRE MAINTENANCE

Properly maintained tires improve the steering, stopping, traction, and load-carrying capability of your trailer. Underinflated tires and overloaded vehicles are a major cause of tire failure. Therefore, as mentioned above, to avoid flat tires and other types of tire failure, you should maintain proper tire pressure, observe tire and trailer load limits, avoid road hazards, and regularly inspect your tires.

1.5.1. FINDING YOUR TRAILER'S RECOMMENDED TIRE PRESSURE AND LOAD LIMITS

Tire information placards and vehicle certification labels contain information on tires and load limits. These labels indicate the vehicle manufacturer's information including:

- ◇ Recommended tire size
- ◇ Recommended tire inflation pressure
- ◇ Vehicle capacity weight
- ◇ Front and rear gross axle weight ratings

Both placards and certification labels are permanently attached to the trailer near the left front.

1.5.2. UNDERSTANDING TIRE PRESSURE AND LOAD LIMITS

Tire inflation pressure is the level of air in the tire that provides it with 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—measured in pounds per square inch (psi) or kilopascals (kpa)—a tire requires to be properly inflated.

This number based on the trailer's design load limit, that is, the greatest amount of weight a trailer can safely carry and the tire size. The proper tire pressure for your trailer is referred to as the "recommended cold inflation pressure." (As you will read below, it is difficult to obtain the recommended tire pressure if your tires are not cold.)

Because 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.

1.5.3. CHECKING TIRE PRESSURE

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

- ◇ Most tires may naturally lose air over time.
- ◇ Tires can lose air suddenly if you drive over a pothole or other object or if you strike the curb when parking.
- ◇ With radial tires, it is usually not possible to determine underinflation by visual inspection.

For convenience, purchase a tire pressure gauge to keep with your trailer. Gauges can be purchased at tire dealerships, auto supply stores, and other retail outlets.

The recommended tire inflation pressure that manufacturers provide reflects the proper psi when a tire is cold. The term cold does not relate to the outside temperature. Rather, a cold tire is one that has not been driven on for at least three hours. When you drive, your tires get warmer, causing the air pressure within them to increase. Therefore, to get an accurate tire pressure reading, you must measure tire pressure when the tires are cold or compensate for the extra pressure in warm tires.

1.5.4. STEPS FOR MAINTAINING PROPER TIRE PRESSURE

Step 1: Locate the recommended tire pressure on the trailer's tire information placard, certification label, or in the owner's manual.

Step 2: Record the tire pressure of all tires.

Step 3: 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 to the correct pressure.

Step 4: 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.

Step 5: Add the missing pounds of air pressure to each tire that is underinflated.

Step 6: Check all the tires to make sure they have the same air pressure (except in cases in which the front and rear tires are supposed to have different amounts of pressure).

If you have been towing your trailer and think that a tire is underinflated, fill it to the recommended cold inflation pressure indicated on your trailer's tire information placard or certification label.

While your tire may still be slightly underinflated due to the extra pounds of pressure in the warm tire, it is safer to drive with air pressure that is slightly lower than the recommended cold inflation pressure than to drive with a significantly underinflated tire. Since this is a temporary fix, don't forget to recheck and adjust the tire's pressure when you can obtain a cold reading.

1.5.5. TIRE SIZE

To maintain tire safety, purchase new tires that are the same size as the trailer's original tires or another size recommended by the manufacturer. Look at the tire information placard, the owner's manual, or the sidewall of the tire you are replacing to find this information. If you have any doubt about the correct size to choose, consult with your dealer.

1.5.6. TIRE TREAD

The tire tread provides the gripping action and traction that prevent your trailer from slipping or sliding, especially when the road is wet or icy. In general, tires are not safe and should be replaced when the tread is worn down to 1/16 of an inch. Tires have built-in treadwear indicators that let you know when it is time to replace your tires. These indicators are raised sections spaced intermittently in the bottom of the tread grooves. When they appear "even" with the outside of the tread, it is time to replace your tires. Another method for checking tread depth is to place a penny in the tread with Lincoln's head upside down and facing you. If you can see the top of Lincoln's head, you are ready for new tires.

1.5.7. TIRE BALANCE AND WHEEL ALIGNMENT

To avoid vibration or shaking of the trailer when a tire rotates, the tire must be properly balanced. This balance is achieved by positioning weights on the wheel to counterbalance heavy spots on the wheel-and-tire assembly. A wheel alignment adjusts the angles of the wheels so that they are positioned correctly relative to the trailer's frame. This adjustment maximizes the life of your tires. These adjustments require special equipment and should be performed by a qualified technician.

1.5.8. TIRE REPAIR

The proper repair of a punctured tire requires a plug for the hole and a patch for the area inside the tire that surrounds the puncture hole. Punctures through the tread can be repaired if they are not too large, but punctures to the sidewall should not be repaired. Tires must be removed from the rim to be properly inspected before being plugged and patched.

1.5.9. 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 and also provides a tire identification number for safety standard certification and in case of a recall.

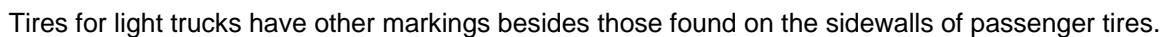
1.5.9.1. UTQGS Information

Treadwear Number - indicates the tire's wear rate. The higher the treadwear number is, the longer it should take for the tread to wear down. For example, a tire graded 400 should last twice as long as a tire graded 200.

Traction Letter - indicates a tire's ability to stop on wet pavement. A higher graded tire should allow you to stop your car on wet roads in a shorter distance than a tire with a lower grade. Traction is graded from highest to lowest as "AA", "A", "B", and "C".

Temperature Letter - indicates a tire's resistance to heat. The temperature grade is for a tire that is inflated properly and not overloaded. Excessive speed, underinflation or excessive loading, either separately or in combination, can cause heat build-up and possible tire failure. From highest to lowest, a tire's resistance to heat is graded as "A", "B", or "C".

Please refer to the diagram below.



ST - indicates the tire is for trailer use only.

Max. Load Single kg (lbs) at kPa (psi) Cold - indicates the maximum load and tire pressure when the tire is used as a single.

Load Range - identifies the tire's load-carrying capabilities and its inflation limits.

Preventing Tire Damage

- ## Tire Safety Checklist

- ◇ Check tire pressure regularly (at least once a month), including the spare (if equipped).
- ◇ 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 your tire valves have valve caps.
- ◇ Check tire pressure before going on a long trip.
- ◇ Do not overload your trailer. Check the Tire Information and Loading Placard or Owner's Manual for the maximum recommended load for the trailer.