# 2100i Operator's Manual

Units starting with serial number 22-05V-XXXXX Initial Units

### **Release history**

0 Initial release (AC 5-23-2022)

VACTC

Vactor Training Academy

- 1 Maintenance release (DE 06-08-2022)
- 2 Updated LS compensator setting. (AC 7-21-2022)
- 3 Added page on HXX option and added fan gearbox lube. (AC 9-1-2022)
- 4 Added master disconnect switch misc updates. (AC 2-2-2023)
- 5 Mid Model Updates work modes, winterization mode, service intervals. (DE 5-26-2023)
- 6 Updating wireless to Hetronic (DE 1-12-2024)
- 7 Airbag suspension content update (DE 4-3-2024)
- 8 Added Dumping Best Practices, Swivel Bearing Rebuild, and Footage Counter Adjustment (DE 8-19-2024)
- 9 Addresed Service Interval Content (AJK 10-9-2024)
- 10 Added Boom and Body Out of Position content (DE 1-15-2025)

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Operation, maintenance, troubleshooting, parts pages, and supporting files for this unit are located in the Service Cloud and Vactor's Electronic Parts Catalog at: Vactor.com  $\rightarrow$  Parts and Service  $\rightarrow$  scroll down to Service Cloud

Replacement operation manuals require the unit serial number. Order part No.: 512459A-30

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## NOTICE



Consult OEM chassis and engine □ operation and maintenance manuals for complete details on operation.

## NOTICE

- Due to available options, the control panel illustrations and decals reflected in this manual may not appear the same on all units.
- Prior to operation, perform daily maintenance on the Vactor unit according to the Daily Maintenance Check List in the Maintenance Section of this manual.
- Read the safety and operation manuals before operating Vactor equipment.
- Set the parking brake and select neutral before operating the Vactor.
- Turn on any safety lighting according to procedures and local, state and federal law requirements.
- Everyone associated in any way with a Vactor® Mfg. product must thoroughly understand and apply the contents of this manual. It is the responsibility of the owner to train his employees in the operation and safety procedures while operating or repairing this equipment.

# NOTICE

- Do not overload the vehicle. Due to weight restrictions, it may be better to fill the water tanks near the work site. Know the Gross Vehicle Weight Rating (G.V.W.R.). Know the vehicle axle capacities. Do not exceed the Gross Vehicle Weight (G.V.W.).
- Always follow procedures established by the water supplier.
- When connecting the fill hose, inspect the area around the fire hydrant and place hose in a position that will not impede traffic or cause vehicles to strike the hose.





#### **Custom Machine Parameters**

Reprogramming the chassis or engine controls will result in problems ranging from improper operation to complete loss of service. Follow chassis manufacturer's procedures when reprogramming to avoid the loss of the custom machine parameters.



#### **Overriding Controls**

To avoid injury or death never override any operator controls, fail-safe or deadman features of a control; or hydraulic, mechanical, or electrical safety devices during use.

Follow service instructions for overrides during maintenance.

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**Cancer and Reproductive Harm** 

Required for compliance with California Prop 65. Refer to: <u>www.P65Warnings.ca.gov</u>

# NOTICE



Follow recommended safety practices while performing all work. Refer to the FS Solutions/Guzzler/Vactor/TRUVAC/Westech Safety Manual for additional information.

This manual is available at: www.vactor.com

# NOTICE



Jump Starting Or Welding Can Damage Electrical System

To avoid damage:

- Disconnect ECU, control modules and batteries before welding on unit.
- Disconnect control modules before jump starting. Consult chassis service manual for details on jump starting.
- Never use a test light when troubleshooting. Only use digital multimeter on all circuits. Test lights and older analog meters can damage the electronic systems.
- Set all ignition switches to OFF before testing CANbus system.

#### SAFETY INSTRUCTIONS

Unit operator must hold the pendant/remote during vacuum operations and stay within line of sight of the hose end operation. In an emergency, use the E-stop or pendant/remote to disable the vacuum. Maintain clear access to all E-stops and place an operator near one.



#### Safe Work Zone

Bystanders must be kept a minimum of 15 feet from the work area. NEVER stand directly behind the truck when raising or lowering the body.



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Trip, fall and other hazards

To avoid serious injury or death always use the ladders, walkways, grab handles and safety tie off

points provided on the unit. Follow all required site, local, state, federal requirements for service work. This may require that the unit be moved to location that can provide the required safe access equipment.



Scan the QR Code with your mobile device or visit:



507048

http://www.fsesgsafety.com for the latest FSESG product and application safety information.

# NOTICE

Preparing for Transport

Prior to transport secure all tools, hoses and all miscellaneous items in their storage locations.

- All items in tool trays and racks need to be secured or tied down.
- If equipped, secure boom in transport mode.
- If equipped, lower debris body, close rear door.
- If equipped, secure all hose ends on hose reels.
- Close and secure all cabinet, tool box and control panel doors and covers.
- Remove and stow all hoses, suction tube, extension pipes and accessories.
- Disengage the hydraulic, vacuum and water systems.
- Check and clear the area around the unit before moving.

# **Guzzler/TRUVAC/Westech/Vactor Manual**

This manual package contains safety and operation, maintenance, basic troubleshooting for your unit.

Electronic versions of the operation, maintenance, troubleshooting, parts pages, options, videos, and supporting files for this unit are located in the Service Cloud and Vactor's Electronic Parts Catalog at: **Vactor.com**  $\rightarrow$  **Parts and Service**  $\rightarrow$  scroll down to **Service Cloud** 

Replacement operation manuals require the unit serial number.

Order part No.: 512459A-30





**Note:** Preferred browsers are Microsoft Edge or Google Chrome. Other browsers may not work correctly.



Selecting the Service Cloud will take you to the login page. Registration is required.

Once in you will find parts manuals for over 7000 Vactor products. Each manual contains relevant drawings and parts lists for the assemblies that make up the machine as a whole. The purpose of the EPC is to provide you with the parts information that is relevant to your machine.

If you have any issues with obtaining a Vactor manual through this website to please e-mail <u>crmadmin@federalsignal.com</u>.

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WARRANTY & TECHNICAL SERVICE TEAM



The Vactor Service Team provides assistance to all Guzzler/TRUVAC/Vactor dealers and customers via remote (telephone, e-mail, fax, etc.) and on-site (dealer/customer visits, field training, etc.) support operations.

# **Toll-Free Telephone**



## (877) 342-5374

Fax (815) 673-1621 • Website www.vactor.com

Technical Support • 24 hours/Day, 7 Days/Week!



# Pride in partnership ... *training* from Vactor

At Vactor, our partnership with you includes our commitment to insure that you're getting the maximum performance from your Vactor, Guzzler or TRUVAC unit.

That's why we offer a full range of training giving you the know-how to safely and efficiently operate, troubleshoot, repair, and maintain your equipment. Training to help you:

- \* Operate safely and efficiently at all times
- \* Select the right tools for every application and environment
- \* Save time and money on troubleshooting and repairs
- Protect your investment by using proper maintenance techniques

Whether you're an operator, dealer, mechanic, or contractor, Vactor training will help you boost performance and your bottom line!

Make the most of your partnership with Vactor. Call us today for complete information on upcoming training opportunities.

Training at Vactor takes advantage of our multimedia classroom and hands-on lab where you'll enjoy working with our expert instructors. Small class size and an informal atmosphere mean you will have ample opportunity to ask questions and get answers for your specific needs.

In-the-field demonstrations provide additional hands-on learning showcasing the right tools and techniques for safe, efficient operations; the key to getting the maximum performance out of your Vactor equipment!

Learn about our entire range of custom-crafted options and tools designed to boost your system's performance in every application. We've refined our products during thirty years of partnering with our customers to develop the world's leading vacuum loader technologies!

Take a tour of our facility to see how we build in quality at every step of the design and production process. Meet with our experts in engineering, manufacturing, and customer service to get connected with your entire Vactor support team!







Training workshops held at our facility are typically two or three days in length, depending on the topic and the audience. Sessions focus on the specific needs of operators, mechanics, and dealers. On-site training at your location may also be arranged. Call our Customer Service Coordinator, at 847-468-2371 or visit our web site at www.vactor.com for complete information on training from Vactor!

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## **GENERAL SECTION**

Vactor® Manufacturing, LLC is happy to welcome you to our growing family of Vactor, Guzzler and TRUVAC customers. The current series of Vactors, Guzzlers, TRUVACs and accessory equipment are the latest developments in the continuous research program carried out by the Vactor's engineering staff. This program is formulated to bring you the latest and most efficient pneumatic cleaning and jetrodding equipment available in the world today.

Good operation and a planned maintenance program, as outlined in this manual, are of vital importance in obtaining maximum performance and long life. Instructions on the operation and preventive maintenance of the current series Vactors and Jet-Rodders, as well as applicable parts lists are contained herein. The operator should familiarize himself thoroughly with the contents of this manual before operating the equipment or carrying out maintenance procedures.

The information, specifications, illustrations and parts numbers in this publication are based on the information in effect at the time of approval for publication. We are constantly improving our products and, therefore, reserve the right to make changes at any time without notice.

If a question arises concerning your Vactor product or this publication, please contact your Vactor® Manufacturing, LLC distributor.

#### SALES POLICY

**Prices:** All merchandise will be billed at prices at the time of shipment, unless otherwise stated.

**Terms:** Standard terms are NET cash within 30 days from date of invoice to customers with approved credit.

**Shipments:** All shipments, unless otherwise quoted, are F.O.B. ex--factory. Claims for shortages or damages in transit shall be made by the Consignee against the Carrier. If shipping instructions are not given, we will decide how to ship. We are not responsible for products after delivery to the transportation company. We are not responsible for delays resulting from causes beyond our control.

**Returned Material:** Goods will not be accepted for return or credit unless pre-authorized by us. Credit or allowance for authorized return of new parts will be based on condition of part, price originally paid and current parts prices. A restocking charge may be made, if required. We will not allow credit for return of used parts unless specifically authorized.

#### INFORMATION FOR ORDERING PARTS

#### Parts

When ordering parts or accessory equipment, refer to the Vactor® Manufacturing, LLC name plate. The name plate (one located on Vactor equipment, one located in cab of truck) lists the model and serial number of your Vactor. The model number and serial number of your Vactor are also listed in the front of the parts book. It is important that the model number and serial number be included with ALL parts orders to insure prompt service and necessary replacement parts. Parts should be ordered from Vactor® Manufacturing, LLC through your Vactor distributor.

#### Trucks

Refer truck parts orders to your local chassis distributor following the instructions in the truck manual.

### INTRODUCTION PROPER USE OF THE PART'S MANUAL

This manual provides the general information that will enable operation and maintenance personnel to understand the unit and it's accessories. Each Vactor Parts Manual is customized for the individual unit shown on the binder cover. Each Vactor unit is unique unto itself. The individual specifications and option package make this unit different from any other unit. This manual shows those unique differences and should only be used to order parts for the serial numbered unit shown on the binder cover. Use of this manual for any other unit may cause incorrect parts to be ordered.

Each manual has tabs A through L. An index of these tabs is at the beginning of the manual. All of the tabs may not be used on a particular unit. If a section, or tab, is not used a sheet is installed in that section explaining that the particular section is not used. If the section is used, the particular information shown on the index is illustrated in that section.

EXAMPLE: Section F is the BOOM section of the manual If the particular unit does not have a boom on it, this section is empty. If the unit does have a boom on it, all of the information pertaining to that particular boom is shown in that section.

Many times the information in a section will show the word (REF) in place of a part number. This is generally the case with items not normally supplied by Vactor such as engine components. It is also the case for electrical and hydraulic components. When an electrical or hydraulic component is referenced (REF) it is normally shown in the electrical or hydraulic schematics supplied for that unit. In some cases the particular part number for a item shown in the breakdown is left blank. These items are usually electrical or hydraulic and are therefore shown in the individual schematic for that unit.

EXAMPLE: The hydraulic cylinders do not have part numbers listed. If you look at the hydraulic schematic for the boom you will find all of the individual cylinders listed.

This is done specifically because the same base drawing can be used on many different units. Some units may require a special spacer in the cylinder to restrict its movement. Again, this would be reflected in the part number shown in the schematic not in the parts page.

If after going through the manual, you still cannot find the particular part you are after, feel free to contact the Vactor parts and service department. Please have the model and serial number of the unit that you are working on, available to give to the parts and service representative at Vactor. He or she must have the correct model and serial number of the unit in order to look up and get the correct information. This manual is for use only with units meeting Vactor Mfg., standards. If your unit does not meet these standards, contact your Vactor representative to have your unit retrofit to meet these standards.

Vactor





1621 S. Illinois St. Streator, IL 61364 Ph: 815-672-3171 Fax: 815-672-2779 Subsidiary of Federal Signal Corporation OWNERS MANUAL COVERING OPERATION, SAFETY, UNIT IDENTIFICATION AND REGISTRATION FOR VACTORS, GUZZLERS, TRUVACS, VAXJETS AND JET RODDERS.

#### IMPORTANT NOTICE

It is essential that everyone associated in any way with a Vactor® Mfg. product thoroughly understand and apply the contents of this manual. It is the responsibility of the owner to train his employees in the operation and safety procedures while operating or repairing this equipment.

PLEASE KEEP VACTOR MFG. INFORMED OF ANY CHANGE OF VEHICLE OWNERSHIP OR ADDRESS.

THIS OPERATOR'S MANUAL SHOULD BE CONSIDERED A PERMANENT PART OF THE YOUR UNIT AND SHOULD BE WITH THE VEHICLE AT ALL TIMES FOR READY REFERENCE.

# Vactor (ESG) Technical Service Hotline

24 Hour

Vactor now has in place a 24 hour a day service hotline In the USA or Canada Call:

### 877-342-5374 • Outside the USA or Canada call 847-741-4330

You will be asked for specific information pertaining to the type of unit you are calling about, Vactor, Elgin, Guzzler, TRUVAC, etc. You will be asked for the zip code you are calling from. Your call will then automatically be transferred to the Vactor dealer closest to you. If it is after normal business hours and the closest dealer to you does not have a 24-hour line, your call will be transferred to a factory service technician.

When the dealer or the technician answers, you will be asked for the model and serial number of the Vactor unit you are working on. Please have that number available. It will definitely help to expedite our being able to help you with any questions or problems you have. Our plan is to service our customers to the best of our ability 24 hours a day, seven days a week, no matter where you are in the world!

## Vactor

## MODEL IDENTIFICATION - SERIAL NUMBERS

These reference charts cover most Vactor/Guzzler /TRUVAC models.

Serial Numbers					
		Exar	nple: 03-02GL-4125		
Year made	Month made	Product Code	Manufacturing Location	Sequential build number	
03	02	G	L	4125	
		<b>G</b> - Guzzler	No letter - Streator IL		
		E - Elgin	E - Elgin IL		
		V - Vactor	C - Long Beach CA		
		R - TRUVAC	L - Leeds AL		
		T - Jetter/Ramjet	H - La Porte TX		
		X - Vaxjet	N - New Brunswick NJ		
		S - Gylcol	W - Williston ND		



Pre 2011 serial plate. Location varied by model. Refer to the serial number location page in the maintenance section.



2011 and newer units all have the serial plate in the same general location on the driver side on the front part of the subframe. Options may obscure direct viewing.

Note: Unit serial number can also be found on the chassis door tag.

P	FEDERAL	SIGNAL
	Environmenta	l Solutions

## DELIVERY, INSTALLATION AND WARRANTY REGISTRATION FORM

Serial Number:	Dealer Name	e:			
Hours: Miles:	Delivery Date:	In-Service Date:**			
	** Form must be acco	ompanied by a letter of request/explanation if different from Delivery date.			
Comments:					
Dealer Representative		ESG Representative			
Print Name	Signature	Print Name Signature			
To assure warranty protect retail customer agent at the	tion, this form must be f e time of delivery to the	illed out completely and signed by an authorized end user / customer.			
Failure to complete, sign and return form to the factory will void the limited warranty.					
We have reviewed the ESG product installation and start up procedures, and understand the warranty, operation, service, and maintenance responsibilities for the above ESG product dated this day of,					
End/Retail Customer Name:					
Address 1:					
Address 2:					
City: State / Province:					
Zip Code:	Country:				
Customer Contact Name:					
Phone: ()	Fax: ()	E-mail:			
Whom should we contact after 6 months to inquire about machine reliability and level of satisfaction with product?					
Name: Phone # ()					
Customer Representatives Present at Delivery					
Print Name	Print Name	Print Name			
Signature	Signature	Signature			
For information regarding this form or filing instructions call (815) 673-3841 • Attn warranty administrator. Mail completed form to:					
VACTOR MFG., INC., 16 Original to Manufacturer	21 S Illinois St., Stre Copy	to Dealer Copy to Customer			

# Operation

Operation

## OVERVIEW

## OPERATION



The Vactor 2100i uses high pressure water and vacuum to clear and clean sewer lines and remove blockages. The unit is self-contained with its own water supply tanks, debris body, vacuum system, rodder pump, hose reel, high pressure water hose, and hydraulic pump.

The operational systems on the Vactor are dependent upon the options and capacities of the vehicle as ordered. The vehicle is custom designed to provide a combination of high-pressure water and suction to perform in a designated area and application. The water, hydraulic and vacuum systems work together to provide a powerful cleaning machine. The system is designed for wet debris.

The units feature a host of advanced systems that not only offer better performance, but also operate more efficiently. The multi-flow system allows a set flow at a lower rpm, which results in better fuel efficiency without sacrificing performance. Optimized air-routing and filtration system make getting the job done faster, safer and more efficient.



## OVERVIEW

## OPERATION



The IntuiTouch electronic control system makes operation and troubleshooting easier.

Some available options include:

- Cold weather recirculation system
- Liquid debris pump-off system
- Debris flush-out system

- Pump delivery system up to 120 gpm
- Hose reel capacity up to 1,000 ft (305 m)
- Accumulator
- Dual-stage centrifugal compressor

The units can be used for hydro excavation work with suitable options, attachments and operator training.





## **OVERVIEW - MODES**

## OPERATION

The system operating modes are:

#### Standard

- Road Mode
- Jet Mode
- Combo Mode
- Wash Mode
- Dig Mode

#### Optional

- Recirc mode
- Vac on the Go mode
- Flusher mode

All modes are mutually exclusive, the unit can not be in more than one mode at a time. Modes can be selected with either the press of a button or screen touch.

Most normal vacuum, rodding and offloading operations are done in jet or combo mode. The hydraulic PTO's are activated automatically as needed. To operate in this mode the following minimum conditions to begin operating are required:

- a. Park brake ON
- b. Transmission in Neutral
- c. No system E-stops
- d. Service brake applied (Combo mode)

#### Recirculator mode (Optional)

Recirculator mode uses low water flow to circulate water from the water tanks, through the pump, and back to the tanks while stationary or being driven to keep the water from freezing in cold climates.

Vac on the Go (Optional - fan units only)

Vac on the Go allows the truck to be driven with the vacuum fan running, low pressure water and boom functions. This allows vacuuming debris along a road for example. An optional water ring may be needed if the debris is dry.

Flusher mode (Optional)

The unit is equipped with spray nozzles for flushing streets with fresh water.







## **OVERVIEW - BASIC OPERATION**

It is important to remember that the vacuum tube uses air flow and not vacuum to pick up material. Keep the suction end of the nozzle in the upright position to receive air and material. Submerging the nozzle in material stops airflow, prevents material movement and creates a loading and unloading effect on the blower. The catch basin nozzle is designed to pull air into the pipe to move material. The end is serrated with small holes; if the end is submerged no air is pulled in through the holes.

The weather and operating conditions cannot be controlled, but the air speed, water volume and water pressure can be controlled. Blower/fan speed controls the volume of air and the speed of air movement through the pipe and into the debris body. Adjust the air speed to move maximum amount of material without carry over into the blower exhaust.

Air speed is important when working in freezing temperatures. High air speeds cause wind chill conditions because of the air velocity created. The wind chill conditions cause ice build up in the vacuum tube or boom which blocks material movement.

Proper air speed will vary depending on the material moved. Air velocity should be set so that material does not hang in the pipe. Adjust speed to the lowest setting to move the material efficiently. Increase the speed as needed to pick-up large rocks or heavy sludge. Watch the air exhaust for carry over of material.

The further the distance from the work site to the debris body the higher the air speed that is needed. The shorter the distance, the lower the air speed needed. Material moving through a pipe or tube creates a friction factor. The longer the tube or pipe, the higher the friction factor called friction loss. Pipe and tube diameter is a major factor when moving material. Lower engine/air speed translates to lower fuel costs and reduced noise.

## NOTICE

- Due to available options, the control panel illustrations and decals reflected in this manual may not appear the same on all units.
- Prior to operation, perform daily maintenance on the Vactor unit according to the Daily Maintenance Check List in the Maintenance Section of this manual.
- Read the safety and operation manuals before operating Vactor equipment.
- Set the parking brake and select neutral before operating the Vactor.
- Turn on any safety lighting according to procedures and local, state and federal law requirements.
- Everyone associated in any way with a Vactor® Mfg. product must thoroughly understand and apply the contents of this manual. It is the responsibility of the owner to train his employees in the operation and safety procedures while operating or repairing this equipment.

# NOTICE

Machine Can Be Damaged

- Beware of carry over material from debris body through the blower or fan.
- Running the blower/fan too fast with light material can carry the material over into the blower or fan. This can cause premature wear.
- Over filling the debris body can cause carry over and damage to the fan/blower.
- If ice builds up in the boom, shut down the vacuum system. Use hot water to heat the boom tubes or move the vehicle to a warm place. Slowly retract the boom when the tubes have warmed up. Do not retract the boom with ice build up in the vacuum tube. Damage to the boom and/or seal can occur. If hot water is available, start the vacuum system and spray hot water into the vacuum tube/nozzle. As the ice breaks away it will be carried to the debris body.
- To prevent rodder pump damage, always open at least one ball valve before engaging the pump.

## **OVERVIEW - AIR FLOW**

## OPERATION



The Vactor is a completely self-contained mobile cleaning and vacuum collection unit It is designed to serve two functions. First, it cleans by using high pressure water and jet rodding action. Second, it collects the waste and material that results from the cleaning.

#### Vacuum System

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- Debris is vacuumed through the vacuum hose and boom
- 2 Debris first enters the Vactor through the inlet on top of the debris body.
- Obbis bits the deflector shield and drops out of the air stream and is collected in the debris body.
- The air stream leaves the debris body through outlet pipes and if equipped flows into a two sets of cyclones filter chambers. In the filter chamber, centrifugal force hurls the denser particles toward the cyclone walls where they spiral downward into the collection hopper. The lighter and by now relatively particle-free air which has travelled to the bottom of the cyclone, returns to the top.
- From there, the air stream leaves the cyclone chambers and flows into the microstrainer or the fan. On PD blower machines the microstrainer is the safety dropout point for any objects which may accidentally enter the filtration system during servicing.
  - The air stream leaves the microstrainer and flows through the blower or the discharge pipe on a fan machine.



PD blower system

Finally, on a PD blower machine the air stream leaves the system through the silencer. The silencer reduces the noise level of the air being discharged.

#### Water System

The water system begins on the passenger side of the unit with the high pressure water pump. Water is brought into the pump from the water tanks. The water is filtered and pressurized by the water pump and sent to the front of the unit. The water enters the water hose which is stored on the hose reel. The hose reel is used for jet rodding. Jet rodding is the cleaning of sewer lines with high pressure water. Additionally, the hose reel is the platform for many of the control panels used in the jet rodding function. With a turn of a valve on the hose reel water is sent out of the water nozzle on the end of the water hose.

The major components of the water system as illustrated in this section, are as follows:

- Water Pump
- Water Hose and Hose Reel
- Water Tank
- Water Filter
- Hose reel Auto-wind
- Hydraulic Pumps

## **OVERVIEW - SYSTEMS**

## OPERATION



Fan and PD machines share many common features and system locations. The rodder pump system is normally on the passenger side in front of the rear wheels on all units. The blower and fan systems are behind the cab. The hose reel, boom system, water tanks, debris body and filtration systems are very similar.


## **OVERVIEW - ELECTRICAL**

Units are equipped with an electrical equipment disconnect switch which can be found on the driver side behind the cab. This switch is used in the event of servicing the machine or jump starting the chassis. Switching to OFF separates the chassis electrical systems from the Vactor systems.

When the switch is in the OFF position, the cab and chassis electronics will still remain active.

#### Notes

- **1.)** The master switch light is powered by the ignition and will still illuminate with the disconnect switch enabled.
- **2.)** Wait at least 2 minutes after shutting the truck down before turning off the chassis batteries.



## NOTICE

Electrical Equipment Disconnect

To prevent electrical systems damage, turn switch to OFF position before servicing chassis or before jump starting.



Note: Chassis/Cab electronics still active when switch is off.

Effective Date April 2, 2025

#### 514295\_2100i\_Operation\_Overview\_r1

#### OPERATION



SYMBOLS

#### Symbols



#### Symbols



## INDICATORS & SWITCH BEHAVIOR



## INTUITOUCH DISPLAY - OVERVIEW

### OPERATION



The IntuiTouch touch display provides controls and displays most of the functionality of the unit. Among the things displayed are: chassis engine, fan and blower, hydraulics and the electrical controls systems. A variety of settings can be changed through the controls of the display. The display controls work very much like many other devices we encounter in everyday life. The function buttons along the right side of the display can be used to select the tabs that are along that side of the display. This makes it easier when wearing gloves. The chassis cab display has buttons on both sides of the display.

An additional display is used in the chassis cab. It has an additional set of function buttons on the left side that are used to select the tabs along the left side of the screen.

**Note:** Display is designed to operate at an internal temperature range of -22° (F) to 158° (F). Outside that range the display may shut down.

- 1 Alarm silence silences an active alarm. Also can be used to clear an active message. Wireless remotes need to be cleared at the remote.
- 2 F2 button selects option tab to the left of the button
- **3 F3 button -** selects option tab to the left of the button
- 4 **F4 button -** selects option tab to the left of the button
- 5 F5 button selects option tab to the left of the button
- 6 Counter reset resets the hose reel footage counter. One second hold resets the counter to new start point. Three second hold resets to zero feet off the reel.
- **Note:** Keys 2-5 are soft keys. Their functions change as required.



## INTUITOUCH DISPLAY - HOSE REEL SCREENS

## OPERATION

#### Home - main hose reel screen - Fan

**Home Page – PD** - Same as FAN but with the addition of the vacuum gauge.

Home Page – Ramjet - Same but without vacuum.

- 1. Hose Reel section
  - Hose reel speed in feet per minute (or metric)
- Hose reel speed reading in percentage
- Hose reel footage counter (relative footage)
- 2. Water Section
  - Water flow Will read "low water" when water level is low
  - Water pressure (measured at rodder pump, may be adjusted to show front hose reel pressure)
- Water level (optional) shows percentage of water volume left in the tank as a bar graph. Grey water may also be shown on a separate graph here on a recycler
- 4. Chassis section
- Chassis RPM
- 5. Vacuum section
  - Fan/PD RPM
- 6. Debris body level (optional) shows range
- 7. Top Bar Content Active controls
  - Panel White , Wireless blue, Pendant – green
  - PTO status/issue
  - Alarm/Alarm Silenced
  - Sensor error
  - High Blower Temp
  - High Oil Temp

#### Alternate Main/Home Screen

To get to this page press HOME tab/ button. Press again to go back to main home page

Home - main hose reel screen - PD







## INTUITOUCH DISPLAY - HOSE REEL SCREENS

#### Chassis

- 1. To get here press chassis tab, to leave press a different tab.
- 2. Content
  - Fuel Level
  - Engine Oil Pressure
  - Coolant Temp
  - Voltage
  - Engine RPM
  - Engine Hours
  - Engine Load
  - Fuel Rate

#### System Info

- To get to this page hit the system tab/ button. To leave press the back arrow tab/button
- 2. This is the landing screen to access system info and diagnostics. From this page go to the Manuals, modules, or functions pages.
- 3. Page content
  - How the truck is set up
  - Activated options

#### Modules page

To get to this page from the system info page press the modules tab, to get back press the back arrow.

- 1. Navigation Each of the module lcons is a touch screen icon. Navigate with the arrows and check box or navigate with gloves via the keypad.
- The box will turn red if there is no connection to that module via J1939/ CAN
- These go to module specific diagnostics (like I/O). To get back to this page use the back arrow.



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## INTUITOUCH DISPLAY - HOSE REEL SCREENS

#### **Functions Page**

Access this from the system info page via the functions tab

- Navigation Each of the Icons is a touch screen icon. Navigate with the arrows and check box so that you can navigate with gloves on via the keypad
- 2. Each icon takes you to a page specific to diagnosing that function or system. Get back to this page from the other pages by pressing the back arrow.

**Functions** Modes/ Interlocks Work Lights Accu Counter A In: ا<sub>∱</sub>ل vacuum 007 Δ Strobe Lights Water 沿 Alarms .... Arrow Board O Hose Reel Throttle <--> Boom à <sup>D</sup> Hydraulics Recycler Tool Package Debris Body Hours/ Cycles  $\bigcirc$ 

#### **Manuals Page**

When available Engine Config and Trans Config tell how to program the truck if, for example, a dealer updates the transmission and erases Vactor's configuration. I/O is additional reference information on the system.

Manuals	+
Engine Config	
Trans Config	7
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#### INTUITOUCH DISPLAY - HOSE REEL SCREENS - FOOTAGE COUNTER

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Reset

OPERATION

Access this from the main page via the Menu tab.

The Footage Counter screen is used to configure the hose size and length for accurate measurements.

- Note: some screens like the Measure screen must be scrolled with your finger to view the entire listing.
  - Relative vs Absolute Only relative footage is ٠ displayed on the 2100i.
  - Resetting both the relative and absolute ٠ footage can be reset, even though absolute isn't displayed.
  - Wireless and panel on both the panel • and TD3100 an Accucount reset button is provided on the bottom right corner of the display.
  - Relative vs absolute To reset the • relative footage you press the footage counter button for 1 second. To reset the absolute, hold the button for 5 seconds and a message will pop up to let you know that the absolute footage has been reset. This should be done in the pay out direction without allowing hose to come off of the reel. (Absolute footage cannot go negative so paying in past zero will not require a reset). Both the absolute and relative footage will reset anytime the truck is put into drive mode.

The hose reel footage and hose reel speed are available on both the wireless displays as well as on the front panel display. The panel and the TD3100 belly pack have buttons to reset the footage counter.







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Rear Work Lt

#### INTUITOUCH DISPLAY - CAB DISPLAY

#### Cab display - PD

#### OPERATION



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Reports

Strobe

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Home



#### Worklights Cab Page

- 1. To get to this page hold the Worklight button
- Left Tabs using these tabs/buttons individually selects worklight outputs.
  - Side Worklights
  - Boom Worklights
  - Manhole worklights
  - Rear Worklights
- 3. Right Tabs
  - All on all worklight outputs on
  - All off all worklight outputs off
  - Home takes you back to the home page
- 4. System indicator shows that the system has accepted the input and all interlocks are met to turn on the output. If the option for the lights wasn't turned on, this could be a reason that the system indicator doesn't turn on.
- 5. Relay and Fuse columns are grey for off, green for on/powered, and red for fault.



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Rear:

Boom:

All On:

All Off:

## INTUITOUCH DISPLAY - CAB DISPLAY

## OPERATION

#### **Reports Pages**

There re three views here. Job, Trip, and Lifetime Reports.

- To get to this page you touch the "Vactortrack" or "Job ID" on the main page
- 2. Left Tabs
  - Reset should only be visible when on the trip reports screen. This will reset the trip reports section to zero.
- 3. Right Tabs
  - Back arrow back to home page
  - Job view job reports
  - Trip view trip reports
  - Lifetime view lifetime reports
- 4. Lifetime Reports
  - # of Jobs
  - Time
  - Work Duration
  - Cleaning Time
  - Sum of Max Feet
  - Water Used
    - Fresh
    - Grey
  - Average Pressure
  - Vacuum Enabled Time
  - Fuel Used

Work mode vs Truck Lifetime

- Average Water Flow
- 5. Job Reports
  - Job #
  - Start Time
  - Work Duration
  - Cleaning Time
  - Max Feet
  - Water Used
    - Fresh

Grey

- Average Pressure
- Vacuum Enabled Time





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## INTUITOUCH DISPLAY - CAB DISPLAY

## OPERATION

- Fuel Used
- Average Water Flow
- 6. Trip Reports this info is the sum of all the jobs since last resetting the trip reports to zero.
  - # of Jobs
  - Time
  - Work Duration
  - Cleaning Time
  - Sum of Max Feet
  - Water used
    - Fresh

Grey

- Average Pressure
- Vacuum Enabled Time
- Fuel Used inWork Mode
- Average Water Flow
- Last Reset Timestamp

Reset	Trip Reports			
Ĵ	Start Time: 09:24:38 Start Date: 2018 june 01 Number Of Jobs: 4	Duration: 00:12:06 Clean Time: 00:00:00		
	Water Used: 0 GAL Average Water Pressure: 0 PSI Average GPM: 0 GPM Max Hose Jetting: 0 FT Accumulated Max Hose Jetting: 0 FT	Vacuum Time: 00:00:00 Fuel Used: 0.00 GAL		

## INTUITOUCH - CAB MENU > MAIN > SYSTEM > WINTERIZATION

#### OPERATION

A specific winterization schedule can be set up. A message will display in the cab when activated.

For example: the reminder can be set to turn on close to shift change at a selected time during a selected month.

🖍 Settings.Winte	erization Dates	
End Hour	14	
Start Month	12	
Start Day	1	
End Month	10	
End Day	13	



#### INTUITOUCH - CAB MENU > MAIN > HXX MODE

#### OPERATION

HXX Mode is used for hydroexcavation. It can be selected with either the press of a button or screen touch.

Depending on the transmission these is one or two PTO's. If you have two PTO's the Wash and Dig mode will turn PTO B off. If you have one PTO then valve will disable the compensator on one of the pumps to reduce heat build up in the hydraulic oil.

Disabled

Active

Mid-Model Update (Wash and Dig)







## INTUITOUCH DISPLAY - CAB DISPLAY SETTINGS

## OPERATION

#### **Settings Page**

- 1. This is the page you go to if you press the settings gear icon from the main page.
- 2. Touching each of the different selections takes you to each of the different settings pages. Some of those pages also have sub-pages.
- 3. Right tabs are used as an alternate method of navigating this page. The back arrow takes you back to the main page. The up down and select tabs highlight and then select the next setting screen you want to go to.

Settings		ł
Modes	]	
Lights/Strobes	]	
Camera	]	
Display Brightness	]	
Time/Date	]	$\left  \right\rangle$
User Preferences		

#### INTUITOUCH DISPLAY - CAB DISPLAY SETTINGS

#### Mode Settings Page

- 1. You get to this page from the settings page
- The back arrow/tab takes you back to the settings page
- The rest of the tabs are for navigation as before.
- 2. Each of the buttons takes you to a page that allows you to set which items turn on/off when you enter that mode.
  - Road Mode
  - Jet Mode
  - Combo Mode
  - Recirc Mode
- The available options are the same for each mode so this description will apply to the next 4 images as well.
- 4. Each box allows you 3 options
  - Auto On turns on the related light/function when you enter that mode
  - Auto Off turns off the related light/function when you enter that mode
  - Do Nothing does not change the status of the related light/function when you enter that mode
- 5. Arrow board has 6 Options but works the same as the above with 3 options.
  - Do Nothing
  - Auto Off
  - Left Arrow
  - Right Arrow
  - Center Out/Both
  - WigWag









**INTUITOUCH - FUNCTION - BODY CONTROLS SETTINGS** 

#### OPERATION

#### **Recirc Mode Settings**



#### Light/Strobe Settings Page

- 1. You get to this page from the settings page
  - The back arrow/tab takes you back to the settings page
  - The rest of the tabs are for navigation as before.
- 2. Each of the buttons takes you to a page that allows you to set which items turn on/off when have a single button press on the tab/button on the main page.
  - Work Lights
  - Strobe Lights
  - Arrow Board









## INTUITOUCH - FUNCTION - BODY CONTROLS DATE/TIME

## OPERATION

#### **Date/Time Settings Page**

- This is one of the IQAN menus but this shortcut from the settings page also exists. Here you can set the date and time of the real time clock in the cab display.
- 2. The date and time are synchronized between modules, so setting it on one display will change the other.
- 3. The date and time effects things like logs and reports.
- Date and time shown in cab.



## TOOLBOX SIDE KEYPAD

Button combinations vary with the unit configuration.

There are four indicator lights at the top of each button. Typically red indicates the button is locked out, blue or green indicate the function is active.

- 1 **Open/close rear door -** to open press and hold until all four lights are on, then door will start opening. The open function will remain active for five seconds (green light on) from the last press to permit jogging the door open to drain liquids. The close function closes the rear door as long as the button is activated.
- 2 Body Up/Down raise and lower the debris body
- **3 Offload -** activates the debris body pump system (optional)
- 4 Rear work lights activates rear worklights (optional)
- **5 Tool package -** activate the optional hydraulic tool package.
- 6 Tool +/- increase or decrease flow
- 7 **Cont Fill -** activates the continuous fill option
- 8 **Recycler -** Activates the recycle system option.
- **9 Gray / Fresh -** Select drawing water from the gray water or fresh tanks for the recycle option. Both can be selected at the same time to draw water from both tanks.







## INTUITOUCH - HR MENU TAB

#### OPERATION



**Note:** some screens like the Measure screen must be scrolled with your finger to view the entire listing.



$\bigcirc$	Measure	$\mathbf{x}$
	Validation	]
	Rodder Pump Simulation	]
	Combo Mode Validation	]
	O3-5 2nd Allison	]
	Combo Mode	]
		I

$\bigcirc$		Adjust	X
	ô		J
	FO	OTAGE COUNTER	)
	Ô	OPT1 FL Alarm Pkg	]
	Ô	OPT2 Tool Pkg	)
	Ô	OPT3 Pump Off	]
	A		1



## INTUITOUCH - HR MENU > MAIN > SYSTEM

$\bigcirc$	(i) System	$\mathbf{x}$
	Info	
	Modules	
	Logs	



$\bigcirc$	(i) Modules		$\mathbf{x}$
	Hose Reel Display	ОК	
	Junction/Rodder Controller	ОК	
	Cab Display	ок	
	Hose Reel Controller	ок	

$\bigcirc$	(i) Logs		$\mathbf{x}$
	Hose Reel Display log	122 records	
	Junction/Rodder Controller log	58 records	
	Cab Display log	89 records	
	Hose Reel Controller log	88 records	
	E-Stop Log	0 records	

#### INTUITOUCH - CAB MENU > MAIN > SYSTEM > SERVICE INTERVALS

#### OPERATION



The service intervals (depending on unit configuration) accumulate run time for chassis oil, transfer case oil, blower/fan oil, hydraulic oil, and an inspection date reminder. The intervals can be turned on and off independently of each other.

Reset Screen for service intervals:



User Preferences Screen continued:









## DEBRIS BODY

#### OPERATION

The debris body normally serves as the receptacle for material collected during vacuuming operations. If so equipped, it may also serve as an additional water body with the tanks joined option. The debris body can be raised or lowered hydraulically to dump material collected during operations. The body is sealed at the rear with a rear door. To prevent leakage, the rear door has a gasket around the perimeter to seal the debris body.

The arrows in the photo are pointing to the rear door safety props and their stops. The red props should be deployed whenever anyone needs to be under the door/access the body (cleanout or service work).

The standard debris body is equipped with a liquid load-level indicator, a decant port, stainless steel float ball shut-offs and full dump controls.

Note: The rear door seal gasket and corresponding surface of the debris body must be kept clean to ensure adequate sealing. Always clean the rear door sealing areas before closing to prevent accidental damage from

foreign material sticking to the body or the gasket.



NOTICE

Never overfill the debris body. Do not exceed the GVWR (gross vehicle weight rating.)

### DEBRIS BODY OUT-OF-POSITION

## OPERATION

Located on the subframe is a body out-of-position sensor. This provides a way to notify the operator if the debris body is not all the way down. The debris body must be fully down before transit.

#### Functionality

#### Park Brake Set

- 1. "OK" light on 6-button keypad in cab flashes yellow.
- 2. Message pops up on in-cab screen indicating that the body is out of position.





#### Park Brake Released

- 1. "OK" light on 6-button keypad in cab flashes yellow.
- 2. Message pops up on in-cab screen indicating that the body is out of position.
- 3. Alarm sounds



#### **DEBRIS BODY - FLOAT BALL & SCREEN**

The debris body is equipped with two float ball shut-offs. If the body fills with water the float balls block the air inlets to stop suction and prevent flooding the fan/blower. This reduces the risk of liquid entering and damaging the blower/fan system.

The float balls are protected by screens to prevent damage. The screens filter larger debris from the air before it exits the body to the fan/ blower.

Screens should be cleaned with the handgun **EVERY TIME** the debris body is dumped. It is important to keep the screens clean. Debris clogged screens will result in a loss of airflow and productivity.

Deflector plates should be checked daily and replaced if worn.

Screens Screens Deflector Plates **Debris Body** Interior **Body Washout** 





#### DEBRIS BODY LIQUID LEVEL INDICATOR

The liquid load-level indicator is a float type gauge to indicate the level of liquids only inside the debris body. When arrow is horizontal the debris body is full and should be decanted and dumped. If permissible decant before dumping. The float ball starts raising when the debris body is about half full. The indicator marks for the level gauge are actually showing the level starting when the debris body is about half full.

Some units are equipped with an optional load limit alarm system. See the Options Section for operating instructions.

- **Note:** Over filling the debris body can cause carry over and damage to the fan/blower.
- **Note:** a optional on screen debris level indicator is available.







Depending on configuration the liquid level indicator float ball may be located behind the decant screens as shown here.

#### DEBRIS BODY - REAR DOOR & LOCKS

The rear door is hydraulically opened and closed using the control panel in the toolbox on the passenger side. The rear door is opened with the aid of a sequence valve. When opening, the door locks release allowing the rear door to then hydraulically open. Similarly, when closing, the door is hydraulically lowered into position tight against the debris body and the locks lock the door.

# <image>



Body and Rear Door Controls (PD machine shown)



#### VACUUM SYSTEM - INLET/OUTLET SEALS

The inlet and outlet seals permit the debris body to easily be raised without having to disconnect hoses to the boom and air system.

When the blower/fan is engaged for vacuuming, it is important the debris body and the inlet seals be in good shape and not leaking. If they are torn, dirty or not adjusted properly, loss of airflow at the end of the debris hose will result. Both the inlet and outlet seal can be adjusted in order to compensate for wear.

A similar procedure is followed for the inlet seal. See the maintenance section for the procedures to follow in making adjustments.

#### Operation



#### DECANTING

Decanting is the draining of excess liquids from the debris body, typically while at the job site. Fewer trips to the disposal site will be needed if the excess liquid is drained from the debris body at the job site. This also lightens the weight of the truck.

Decanting should be done at job site for several reasons.

Excessive weight can:

- Lead to fines.
- Cause material to carry over into blower or fan.

Various configurations are available. Decanting can be done from gravity or a pump off system.

Always check local government laws, regulations and rules for decanting into sewers or catch basins.

The decant port allows liquid to be drained from the debris body. Besides placing the decant port on the rear door, it can also be positioned on the side of the debris body.

First position the unit over a manhole or near the catch basin. If not equipped with an optional valve turn on the vacuum system and operate in mid-range. Unfold the nylon flat-hose and let it hang down into the manhole opening. Turn off the vacuum to allow the liquids to flow out. If equipped with an optional valve open the valve and drain until complete and close the valve. If the drain port plugs with debris the vacuum system can be used to pull the debris clear of the port.

Be sure to check for overhead obstructions. If none, the hydraulic controls can be used to raise the debris body up to the height of the first stage of the hoist cylinder when the rear door is closed.

After the excessive liquid has drained, lower the debris body, refold the hose and place it back into its bracket.

**Note:** The vacuum system must be shut down to drain. Do not raise the debris body fully when decanting water. Material in the debris body can slide against the rear door and thereby shutting off the decanting process.



## FOLD DOWN PIPE RACK (OPTIONAL)

Optional fold down pipe racks are used to store extension pipes. Each pipe rack can hold three pipes in a variety of sizes.

The pipe racks are normally mounted on the side of the vehicle. The racks are designed to fold down for safe ground-level retrieval of the pipes.

When stowing the pipes in the rack, placing the most used pipe in the upper position will aide in retrieving the pipes in the order needed. Secure the pipes to the rack with the locking handle.

#### OPERATION





To release or secure pipe pull and twist the locking handle.





## VACUUM PIPE

#### OPERATION

If the vacuum hose needs to be extended, additional vacuum pipes can be attached to the vacuum hose. Vacuum pipe extensions are stored on pipe racks located on the side and/or rear of the unit.

When working with deeper basins, preassemble pipes in horizontal position and slide into basin.



#### BOOM SAFETY FOR ALL MODELS



#### Electrocution nazard

# Serious injury or death can result from electrocution.

Check for overhead wires and obstructions before raising or moving boom. Do not leave boom raised while vehicle is unattended. Do not move vehicle unless boom is in travel mode. Do not allow boom to contact the vehicle or any obstruction.

Be aware of the vehicle's surroundings before operating any of the boom functions to prevent death, injury or equipment damage.

Refer to SAFETY section in manual.

boom.



# NOTICE

#### **Boom Can Be Damaged**

This lift eye should only be used to lift and move manhole grates to 700 lbs max. weight. Break grates loose before lifting. Other use can damage the

Refer to manual for details.



Boom Can Injure or Kill

Always park the boom in travel mode before raising the debris body.

Misuse of boom, including contact with wires or other objects can cause serious injury or death.

Always be aware of the boom position in relation to over head wires, any obstruction (including the unit body) that may prevent proper movement of the boom.

#### SAFETY INSTRUCTIONS

Unit operator must hold the pendant/remote during vacuum operations and stay within line of sight of the hose end operation. In an emergency, use the E-stop or pendant/remote to disable the vacuum. Maintain clear access to all E-stops and place an operator near one.

# NOTICE

Machine can be damaged

The boom operator must maintain a clear view of the boom during all movements to avoid striking the parts of the unit and surrounding structures.

# NOTICE

#### Machine Can Be Damaged

If ice builds up in the boom, shut down the vacuum system. Use hot water to heat the boom tubes or move the vehicle to a warm place. Slowly retract the boom when the tubes have warmed up. Do not retract the boom with ice build up in the vacuum tube. Damage to the boom and/or seal can occur. If hot water is available, start the vacuum system and spray hot water into the vacuum tube/nozzle. As the ice breaks away it will be carried to the debris body.

## **BOOM OPERATION**

OPERATION

The boom connects the debris body to the vacuum tube and is also used to move and position the vacuum tube. The boom is used to lift and position the vacuum tube into the manhole. Hydraulic cylinders lift and turn the boom which pivots on a central column.

#### **Boom Operation**

The joystick can be used when operating from the front of the vehicle. The pendant is used in front or in other locations around the vehicle. Wireless remote is also an option.

When being used the boom should always remain pointed above horizontal so that debris will always run back into the debris body.







#### **Boom Can Be Damaged**

The lift eye should only be used to lift and move manhole grates to 700 lbs max. weight. Grate must be loose and free prior to lifting with boom. The rest of the boom is only rated for vacuum hoses, tubes and debris during normal operation.

- Rope or other supports should be provided to support the run. Hose and tube assemblies are not intended to support their weight on vertical drops or runs up.
- Long hose/tube runs should be supported at multiple locations to prevent tip overs and connection failures.
- Hose and tubes can pull connections and hoses apart In operation from the added weight of the material being vacuumed.
- Inspect all connections prior to operation and periodically during operation.

## **BOOM OPERATION**

The standard boom is a simple up/down/left/right boom. The unit may also be equipped with our other optional booms. These are the telescopic, extendable, 5x5 and 10x15RDB booms. Refer to the options section for these.

#### **Telescopic boom**

The telescopic boom extends outward, pushing the vacuum tube outward. This allows the operator to position the vacuum tube over a manhole or into a hard to reach job site.

The telescopic boom can be maneuvered using the BOOM button located on the control panel or with buttons located on the pendant control.

#### Extendable boom

The extendable boom extends outward, pushing the vacuum tube outward, however as the boom extends the end of the vacuum hose is pulled up. Additional pipe must be added as the boom is extended. This allows the operator to position the vacuum tube over a manhole or into a hard to reach job site. A guide located on the end of the boom keeps the vacuum hose aligned and provides a contoured surface for the tube to ride on.

The extendable boom can be maneuvered using the BOOM button located on the control panel or with buttons located on the pendant control.

#### Maintenance

Fully extend and retract both boom styles and flush with water daily. Wash down the telescoping tube while fully extended on the telescopic boom.

The flexible hosing connected to the extendable boom should be rotated end to end as well as turned on its axis 90 degrees. This should occur on a regular basis and at least no longer than 150 hours of operation. This will assure longer life of the hose so that material being vacuumed will not unduly wear on any one side of the vacuum hose.







## **BOOM OUT-OF-POSITION**

## OPERATION

Located on the boom cradle is a boom out-ofposition sensor. This provides a way to notify the operator if the boom is not in its stowed position. The boom must be stowed before transit.

#### Functionality

#### Park Brake Set

- 1. "OK" light on 6-button keypad in cab flashes yellow.
- 2. Message pops up on in-cab screen indicating that the boom is out of position.



#### Park Brake Released

- 1. "OK" light on 6-button keypad in cab flashes yellow.
- 2. Message pops up on in-cab screen indicating that the boom is out of position.
- 3. Alarm sounds.






## **BOOM CONTROLS**

#### Jet, Combo, VOG modes allow boom operation.

The boom is controlled using either the pendant or joystick on the control panel. The joystick can be used when operating from the front of the vehicle. The pendant is used in front or other locations around the vehicle. Wireless remote is also available.

#### Joystick

The joystick boom control is located on the front reel control panel. Move the joystick, in the directions shown on the control panel for raising, lowering and moving left to right. Rotation of the joystick controls the controls the EXTEND and RETRACT movements of the boom.

**Note:** Other boom options are available. Refer to the Options Section for additional details.



# NOTICE

#### Boom Can Be Damaged

The lift eye should only be used to lift and move manhole grates to 700 lbs max. weight. Grate must be loose and free prior to lifting with boom. The rest of the boom is only rated for vacuum hoses, tubes and debris during normal operation.

- Rope or other supports should be provided to support the run. Hose and tube assemblies are not intended to support their weight on vertical drops or runs up.
- Long hose/tube runs should be supported at multiple locations to prevent tip overs and connection failures.
- Hose and tubes can pull connections and hoses apart In operation from the added weight of the material being vacuumed.
- Inspect all connections prior to operation and periodically during operation.

## **BOOM - PENDANT CONTROL**

The pendant is an extension of the control box used by the operator to direct the operation of the boom. Pendant controls will vary from unit to unit depending on the options ordered. The pendant control is used to operate the boom from any location within the cable's length. The pendant plug cable plugs in below the main control box on the front of the hose reel.

Plugging in the pendant and turning it on automatically disables the control panel boom functions. When an optional wireless control is being used the pendant is disabled.

Up to eight buttons on the pendant are used for boom movement. The normal six functions of the buttons are:

Up - the boom will raise

Down - the boom will lower

Left - the boom will rotate left

Right - the boom will rotate right

Extend - the boom will extend

Retract - the boom will retract

The buttons are momentary switches and upon releasing the button, the boom will cease moving.

The power on/off button controls power to the pendant control. The E-stop will drop the engine to idle, , disengages the hydraulics and opens the vacuum relief. The vacuum enable/disable button relieves the air flow at the boom inlet to clear blockages.





## VACUUM TUBE

The vacuum tube is maneuvered and controlled using the pendant control. Plug in the pendant control. The vacuum must be off when attaching or removing vacuum tubes.

- 1. Remove the boom from its stored position and swing boom from its stowed position into position over basin.
- 2. Stand the long catch basin nozzle in the catch basin.
- 3. Lower the boom until the vacuum tube and catch basin nozzle are joined.
- 4. Install the quick clamp to fasten the nozzle to the vacuum tube.

To remove the vacuum tube lower the end of the tube to the ground to relieve tension in the joint.

Boom hose shown in stowed position on post style storage.





# 

#### Vacuum Hazard

Cutting, crushing, suffocation or body rupture from the forces of vacuum could result in serious injury or death.

Stay clear of the suction hose inlet end.

Turn vacuum off before attaching hose, pipe or accessories.

Keep suction hose inlet end near ground level when vacuum is operating.

Refer to SAFETY manual for details.

# 

#### **Riesgo Por Altovacío**

Trituración, asfixia, amputación o desgarre corporal por las fuerzas altovacío pudieran resultar en lesiones serias o mortales.

Manténgase lejos de la boquilla de la manguera de succión.

Apague el compresor de altovacío antes de conectar la manguera, tubos o accesorios.

Mantenga el extremo de la manguera de succión cerca del nivel del suelo cuando esté funcionando el compresor de altovacío.

Refiérase a la sección de SEGURIDAD en el manual para detalles.

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## BOOM WORK LIGHTS (OPTIONAL)

The boom work lights are mounted on the boom and can be adjusted for best illumination. A BOOM LIGHTS switch on the hose reel control panel activates the lights. They can also be activated from in the cab. The cab controls provide additional settings.

The lights are mounted on the 70° degree elbow.

**Note:** The work light switch is a momentary switch that is controlled by the system along with the light switch in the cab. Activating the switch changes modes from on to off, or off to on.

#### Operation



Front hose reel controls

## RDB (RAPID DEPLOYMENT BOOM) (OPTIONAL)

## OPERATION



Tips:

- 5' rule This means that the boom should always be telescoped or the hose should be extended out 5' before rotating it to the side of the unit or lifting vertically. This rule is in place to make sure that the boom hose is not inside the intermediate boom tube before rotating then extending. The boom hose has the potential of being caught inside the intermediate boom hose and if the boom is telescoped out, it can cause a failure in the RDB Hose.
- Operating over truck exhaust Do not operate the boom directly over the exhaust. The exhaust can melt airlines causing a failure in the RDB. Additional heat guards have been added to the boom to help prevent this issue.
- 3. Boom Hose Storage When storing the unit overnight, do not store it with the catch basin nozzle attached. This causes memory in the hose which will add an unwanted curve to the boom hose. Also, when storing the boom hose, ensure that the hose is not resting on the bottom of the boom post. The boom hose should be free floating while on the boom post. The boom post is meant to prevent the hose from swinging, it is not a support.
- 4. Avoid the Cab Guard The aluminum trays on the boom can be damaged. To avoid damage work the boom above horizontal. Let gravity help with the job by having the boom above the horizontal position. This will also help with the end of the day cleaning. Working above horizontal should be a standard practice with any boom. (See SB-0313 for upgrade)
- 5. **Mind the red lines** If the boom hose is extended too far out the bullet will come in contact with the air bladder housing. The bullet is meant to be a safety stop not an operational stop. If the boom hose is retracted too far in it will go into the debris body and can cause





damage to the hose if the body is raised. Always operate in-between the red lines.

- 6. **Daily Cleaning** At the end of each job, extend the boom hose and inner boom tube out past normal operating position and flush water through the boom. This will allow any debris that has been collected inside the inner boom tube to be flushed out.
- 7. **Hose Longevity** When vacuuming up dry material with the RDB, adding water to the air stream will reduce the wear on the RDB hose liner.
- 8. **Boom Hose Elbow Wear** To improve hose life work the hose in a different position to avoid pre-mature wear on hose if the *elbow* position is not changed. Simply work at different boom elevations to change the wear point on the hose.

#### WIRELESS REMOTE CONTROLS - BELLY PACK - HETRONIC NOVA L

OPERATION

The optional belly pack is a portable control used by the operator to direct the operation of the boom among other operations. Actual configuration may vary with model and options. The function of the buttons normally mimic the master control panel unless otherwise noted here.

The buttons and joysticks are momentary switches. Upon releasing the joysitck, the boom will cease moving.

The vacuum relief enable/disable button relieves the air flow in an emergency.

# L

Jettina

To use, power up the belly pack first then select the Remote button on the front hose reel controls.

The common controls include:

- Hose reel speed
- Pump water pump on/off
- Water pressure variable
- Throttle up/down
- Vacuum enable/disable
- Hose reel pay in/pay out
- Boom up/down, left/right and in/out

**Display Interface** – The hose reel footage and hose reel speed are available on both the wireless displays as well as on the front panel display.

SAFETY INSTRUCTIONS

Unit operator must hold the pendant/remote during vacuum operations and stay within line of sight of the hose end operation. In an emergency, use the E-stop or pendant/remote to disable the vacuum. Maintain clear access to all E-stops and place an operator near one.



Alarm silence - clears any alarm messages and silences the alarm.

## **BELLY PACK - CONNECTING WIRELESS**

OPERATION

Step 1: Turn START switch to the ON position.



Step 3: The following screen will display:



Step 2: Engage Wireless Mode by pressing the REMOTE button on the Setup keypad (located on the front hose reel).



Step 4: Momentarily turn the START switch 1/4 turn to the START position and hold briefly to connect.



## BELLY PACK - E-STOP

OPERATION

The E-stop output from the Hetronic module (wireless receiver) is the source for the E-stop circuit. This simplifies the E-stop circuit and makes it easier to engage the wireless or pendant without accidently creating an E-stop.

The following will trigger an E-stop:

- The pendant off/E-stop button is pressed
- The E-stop on the control panel is pressed
- The battery dies
- The wireless goes out of range

#### E-Stop

- 1. Press the red E-Stop button located in the center of the remote.
- 2. After pressing the E-Stop on the wireless remote, the following screen will display.
- 3. To return to work condition, rotate the E-Stop button clockwise then press the RESET button on the front control panel.
- 4. Momentarily turn the START switch 1/4 turn to the START position and hold briefly to connect.









# Jet Mode



# **Combo Mode**

## BELLY PACK FUNCTIONS - WATER AND HOSE REEL

#### Water

- 1. Double tap the WATER PUMP button to engage the rodder pump (pump indicator light on top of remote will illuminate).
- Note: A "press and hold" command is also available. Whicever setting is chosen will match the setting for the main controls.
- 2. Use WATER PRESSURE turn dial to adjust water pressure.
- 3. Press WATER PUMP button again to disengage rodder pump.



#### Hose Reel

- 1. To pay-in/pay-out, use HOSE REEL joystick.
- 2. To adjust hose reel speed, use HR SPEED turn dial.



## **BELLY PACK FUNCTIONS - BOOM**

## OPERATION

#### Boom

1. Use BOOM joystick to move the boom up, down, left, right, extend, and retract.



- Hose
- 1. If equipped with RDB or 5x5 boom, use the HOSE UP and HOSE DOWN buttons.



Belly Pack Functions - Vacuum and Throttle

## OPERATION

#### Blower

1. Turn on the BLOWER on the front control panel.

#### Throttle

- 1. To increase/decrease throttle, use THROTTLE buttons.
- 2. Double tap throttle-down to return to idle.





#### Vacuum

- 1. Press the VAC button (VAC light will illuminate).
- 2. To disengage vacuum, press the VAC button again.



## BELLY PACK FUNCTIONS - BODY AND REAR DOOR

#### **Debris Body Functions**

**Note:** The green button on the left joystick is an interlock for body functions. It must be pressed and held for body/door operation.



- 1. Press and hold the MODE button.
- 2. The following screen will appear.
- 3. Use the BOOM joystick to lift/lower body and open/close rear door.
- **Note:** Only one function can be active at a time. It is not possible to open/close door while raising/lowering debris body.
- 4. To go back to regular boom/hose reel functions, press and hold the MODE button.



## BELLY PACK - BATTERY REPLACEMENT AND STORAGE

#### OPERATION

#### **Battery Pack**

Note: Battery pack does fit into compartment backwards so if remote does not turn on, check the orientation of how it's installed.



Press in and lift out battery.





#### WATERTANKS

The watertanks hold water for use during operations. There are normally two tanks located on each side of the debris body and one optional tank under the debris body. They are interconnected through gravity feeds. The watertank capacity is unique with each unit configuration.

A visual gauge is standard. An low water sensor is located on the front near the bottom of the lowest watertank. When the water level drops below the sensor, the low water alarm on the operator control panel will activate. There is also an optional audible alarm that notifies the operator of low water. The audible alarm can be turned on or off from the front control panel.

The sight gauges have red float balls inside the clear tube to indicate the level of the water in the tank. This gauge is used when the tanks are being filled with water.

The watertanks should be filled prior to operating the water pump, but always flushed and stored empty when done.

**Note:** a optional on screen debris level indicator is available.



## NOTICE

The fill mechanism installed on the Vactor water system has an air gap as required by OSHA to prevent siphoning water out of the tank and back into the fire hydrant and water supply. Never modify or otherwise obstruct this passageway. Obstructions will cause water to be spilled and sprayed onto the operator and/ or equipment or possibly contaminate the water supply.



## WATERTANKS - FILLING

#### **Filling the Watertank**

Prior to connecting the fill hose to the water hydrant always flush the hydrant to clear it of contaminants that may enter the vehicle water system.

- Park the truck centered with the hydrant on the passengers side of the unit.
- Check and clean y-strainers daily prior to filling tanks. Make sure y-strainer gaskets are in place.
- Remove the cap on the hydrant and flush the hydrant, or water supply, until water runs clear.
- Turn off the hydrant and remove the water fill hose from its compartment and attach it securely to the hydrant, or water source.
- Make sure the water filter screen in the y-strainer is clean and in place. Be sure both gaskets are on the filter housing cap.
- Attach the other end of the water fill hose to the watertank hose connection.

## NOTICE

- Do not overload the vehicle. Due to weight restrictions, it may be better to fill the water tanks near the work site. Know the Gross Vehicle Weight Rating (G.V.W.R.). Know the vehicle axle capacities. Do not exceed the Gross Vehicle Weight (G.V.W.).
- Always follow procedures established by the water supplier.
- When connecting the fill hose, inspect the area around the fire hydrant and place hose in a position that will not impede traffic or cause vehicles to strike the hose.





## WATERTANKS - FILLING



- Allow the tank to fill. The operator should monitor the sight gauges located on the side of the tank. Red balls inside a clear hose float upward as the water level rises. Turn the water supply off when the gauge indicates full and disconnect the hose from the water source.
- Remove any excess water by lifting the hose at the watertank and walking toward the end of the hose
- Roll the fill hose securely and place in storage compartment.
- Replace any cap previously removed.





## WATERTANKS - DRAINING

All lower watertanks are equipped with water drains. Additionally water drains for other system components are also located under the watertanks. A variety of plugs and valves are used. All drains should be opened and flushed weekly. When not in use, typically overnight, the watertanks should be drained and empty.

All drains must be left open to avoid freezing during cold weather when unit is not being used.







Water System Can Be Damaged By Freezing

Ice in the water system can severely damage components. To avoid ice damage:

- Verify that water flows when valves or plugs are opened. Insure that ice has not plugged drain lines, valves or drain plugs.
- Leave all drain plugs open to keep residual tank water from the tanks from migrating to the system during transport.
- Leave all valves open, Y-strainers out and drain plugs out when the unit will sit overnight or longer. This will allow residual water to drain.
- If the unit cannot be properly drained, move the unit to a warm area and allow the water system to warm completely to drain.
- Never operate water pump(s) if system is frozen.

## VACUUM HOSE - TUBE & FITTINGS

Inspect all vacuum hoses, tubes and connectors before each use. Leaks reduce vacuum efficiency and may result in spills.

- 1. Dents or kinks in the hose reduce air flow.
- 2. Do not pile hose as the weight of the piled hose can crush or kink it.
- 3. Always use the correct hose clamp for the hose. Vactor recommends common cream type hand cleaner as a lubricant to assemble hose to the fittings. Do not use grease as it may allow the hose to pull off the fitting much easier.
- 4. Route hose away from traffic other work to avoid damage.
- 5. Verify the hose is suitable for the material and temperatures being vacuumed.
- 6. Store hose in a cool, dry, dark and clean place.
- 7. Verify all electrical connections are good for proper static protection.

#### Vacuum line routing

Generally the shorter the run the better. Large easy curves reduce wear on the hose. Eliminate unnecessary bends or turns. Eliminate as much corrugated hose as possible as it lessens vacuum efficiency. Use as short and direct a route as possible. Rotating the hose regularly will also increase the usable life. The hose run should be well supported without any large sags when crossing open areas.

Hose and tube assemblies are not intended to support their weight on vertical drops or runs up. Rope or other supports should be provided to support the run. The assembly should be supported at multiple locations so it can not tip over if a connection should become disconnected. In operation the added weight of the material being vacuumed along with the hose and tubes can pull connections and hoses apart. Generally, the hose diameter should be larger than the maximum lump size handled. For heavy materials, the larger hose diameters provide more efficient pneumatic conveying and also can handle higher blower speeds for additional carrier air volume.

Use as large a tubing as possible. Light weight, smooth, bore flexible hose is recommended at the working end. Use rigid, aluminum tubes for longer runs, this reduces losses due to friction and have a longer life.

Do not reduce the diameter of hose in the middle of a run. For example 8" from the unit for 100 feet then reduced to 4" for 20 feet then back up to 6" for 50 feet. The change in air flow and velocity can result in debris plugging the hose closest to the unit.



If a smaller hose is needed, install a reducer at the truck and run the smaller hose all the way through. Use the largest size that can be handled safely and easily.

Always use a vacuum nozzle at the working end of the tube.

Before connecting the last section of hosing, install the in-line vacuum relief valve. Leave the in-line vacuum relief valve open until vacuum operations are ready to begin.

## Vactor

## VACUUM HOSE - TUBE & FITTINGS



Shown is an example of a good vacuum hose run. The hose is the same size from the truck to the hose end. The Safety tee is located for good operator access and a hose end is being used.

Multip	le Hose	Runs

Multiple lines should all be the same length.

Three 2" hoses = 4" hose run

Nine 2" hoses = 6" hose run

Four 3" hoses equals 6" hose run

Two 4" hoses equals 6" hose run

Sixteen 2" hoses = 8" hose run

Seven 3" hoses = 8" hose run

Four 4" hoses equals 8" hose run

Hose Restriction								
Hose Dia. Inches	Hose Area square/inches	Orifice Area	Orifice Area	Orifice Area				
8	50.3	100.0%						
7	38.5	76.6%						
6	28.3	56.3%	100.0%					
5	19.6	39.1%	69.4%					
4	12.6	25.0%	44.4%	100.0%				
3	7.1	14.1%	25.0%	56.3%				
2	3.1	6.3%	11.1%	25.0%				
1	0.8	1.6%	2.8%	6.3%				



#### Overview

Vacuum relief valves are installed on vacuum trucks that use positive displacement vacuum pumps. The blowers require free air for start up to prevent overloading the drive engine, and for shutdown to prevent reversal damage to the blower and drive engine. Hand operated and operator triggered (air actuator, etc.) automatically operated valves are the two styles typically used. Lower vacuum units are also equipped with spring loaded automatic relief valves to protect the blower by limiting the vacuum level.

Vacuum reliefs are normally labeled enable/disable.

Enable CALL Disable

#### Application on PD blower vacuum trucks

Vacuum relief valves are not meant to be a substitute for the safety tee during most vacuum operations. Operators of PD blower vacuum trucks are typically working close to the hose ends and can become entrapped. In most situations a safety tee is required and the operator and/or their observer would release the safety tee to relieve the system vacuum in an emergency.

In applications where the hose is supported vertically from a boom and the operator does NOT manually manipulate the hose, a safety tee is not practical nor necessary.

High vacuum PD blower trucks are typically equipped with a hand operated vacuum relief valve so that the valve can be throttled to control the amount of fresh air allowed into the system. This feature is usually used to control the air temperature while vacuuming hot materials to prevent overheating the vacuum pump.

Most PD blower trucks are equipped with an operator triggered vacuum relief valve. This is usually a large valve located near the vacuum pump inlet. All units require that this valve be open during startup to prevent the drive engine from stalling. It is also opened before shutdown so that the system vacuum does not attempt to reverse the airflow through the vacuum pump. Reversed flow can damage the vacuum pump, drive engine and drivelines. They are also used to quickly relieve system vacuum to correct hose blockage or other emergency situations.

#### Application on sewer cleaner vacuum systems

Sewer cleaner vacuum systems that use positive displacement vacuum pumps are equipped with an operator triggered vacuum relief valve. The main purpose in these applications is to quickly relieve system vacuum to correct hose blockage or other emergency situations. Typical sewer cleaner operations do not expose the operator to the vacuum hose inlet end as the hose end is normally in a confined space such as a manhole or catch basin. A safety tee is required when vacuuming any time the operator is exposed to the hose inlet end. Hand operated valves are not normally found on sewer cleaner vacuum systems as hot materials are usually not vacuumed. High vacuum sewer cleaners normally have an operator triggered vacuum relief system standard.

#### PD versus Fan vacuum relief operation

The method for disabling the vacuum is different on Fan and PD units.

On a FAN unit the inlet to the fan will be blocked off. This stops the flow of air from the debris body into the fan and therefore stops the flow of air from the hose into the debris body. A smaller valve opens at the same time to relieve the debris body vacuum.

On a PD unit the inlet to the blower is opened to external air, providing a path of least resistance for air into the blower. This stops the flow of air from the debris body into the blower and therefore stops the flow of air from the hose into the debris body.

## Vactor

## VACUUM RELIEF VALVES

The air operated vacuum valve is used to relieve the system if the vacuum hose, debris body or inlet filter become plugged or restricted. These valves are on all blower units. The valves are normally operated by a switch or E-stop button located on the master control panel, pendant, or wireless remote (if equipped). Proper operation should be verified daily while under vacuum. Actual location size and configuration of the valve varies by the model and options. Typical location is in the inlet piping of the blower.

Vacuum valves require regular inspection and periodic cleaning. Develop a regular program of visual inspection, looking for clogged drains and discharge pipe, dirt buildup in and around the valve seat, and broken or missing parts. Keep the valve and the area around the valve clean and free of any foreign material or substance.



Use proper hearing protection when in the vicinity of this device which emits a loud, sharp sound. Follow safety precautions to prevent injury from high velocity flow of materials.

- **Note:** Keep foreign material from entering the valve. Never paint, oil, or otherwise cover any interior or working parts of any safety valve; safety valves do not require any lubrication or protective coating to work properly.
- **Note:** Test all vacuum valves to ensure proper valve operation.

The switch controls an air valve which sends air pressure to the valve either opening or closing, whichever is selected. The vacuum valve needs to be closed for normal vacuuming using the boom and debris hose. When the vacuum valve is opened, air flow to the boom and debris hose is stopped.

The vacuum valve normally defaults to the disabled (valve open) position when the master switch is off, E-stop is activated or the unit is shut down. Verify how the vacuum valves operate on the unit before use.





## Vactor 2100i WATER SYSTEM - RODDER (WATER) PUMP

OPERATION

The Vactor dual-action, singlepiston jet rodder water pump is designed exclusively for sewer cleaning and provides "jackhammer" obstructionbreaking action and continuousflow cleaning.

It is designed to be driven hydraulically and normally has a one-to-one hydraulic-towater ratio. For every gallon of hydraulic oil pumped, one gallon of water is pumped. There is a hydraulic cylinder on one side of a sealed center block and a water cylinder on the other side. The pump is loading constantly and expelling hydraulic oil while also constantly loading and expelling an equal amount of water. The hydraulic pump

is driven off the truck engine via a power takeoff (PTO) from the chassis engine. Front control engagement/disengagement is standard.

A combination of water flow - GPM (gallons-perminute) and water pressure - creates thrust. Thrust is used to propel the rodder nozzle through sewer lines. The debris loosened by the nozzle movement and water pressure is pushed to the rear of the nozzle and picked up by the vacuum system.

#### **Jackhammer Action**

The pulsations of the pump piston create a jackhammer effect that further helps to break up debris caked on pipe walls and provides additional cleaning power to burst through obstructions in the line. It delivers maximum continuous flow and up to 2500 PSI (3000 PSI is optional) with minimal wear. At the nozzle, this creates an additional forward thrust. If there is an obstruction in the line, the pump cycle literally causes the nozzle to jackhammer against the obstruction until it is cleared. The jackhammer action can be regulated by an optional accumulator.



## WATER SYSTEM - RODDER (WATER) PUMP - SYSTEM



- 1. Water from the water tank enters the pump through a water supply line.
- 2. A valve controls the supply of water to the pump.
- 3. Water then passes through the heat exchangers. The heat exchangers allows the water to be used to cool the hydraulic oil and engine coolant. The heat exchangers are inboard behind the rodder pump. One or two heat exchangers may be installed depending on configuration.
- 4. When opened the flow of water passes through a Y-strainer which filters material from the water so as to keep the pump from being damaged by the material. A metal basket traps contaminants as the water passes through.
- 5. The water enters the water end of the pump in two locations and is pressurized in the pump chamber. The hydraulic side of the pump supplies the hydraulic pressure needed to pressurize the water.
- 6. High pressure water leaves the pump on the water end in two locations through a hose that connects the pump to the hose reel.



Remove all Y-strainers at fill, water pump & other options

Remove hand gun outlet(s), recirc & HXX drain plugs

Remove optional debris body washout system plug

Remove plug to water pump manifold (2100Plus)

PD units - Open microstrainer housing drains

Fan units - Open the fan housing(s) drain

Leave all drains open until next use

Remove plug from under the front hose reel

Open optional water valve to rodder pump

Open heat exchanger(s) drain(s)

PD units - Open silencer drain

Open all cyclones and allow to drain

Remove accumulator valve drain plug

Empty all water tanks

Drain water guns

2.

3.

4.

5.

6.

7.

8.

10.

11.

12.

13.

## WATER SYSTEM - DRAINING

#### OPERATION

This decal is standard on all units and describes the general procedures for draining the system. More detailed information follows.

In addition to these specific drain points, the accumulator (optional) ball valve should be opened to allow any water trapped in the accumulator to drain. The handgun ports should be drained as well. Open the handgun water ball valve and remove all the quick-connect handgun connections.

All drains must be left open to avoid freezing during cold weather when unit is not being used.

#### 2100 Series • Freezing Weather Drain Procedure Drain Checklist

- Purge System
- Open handgun and rodder ball valves REMOVE rodder nozzle and SECURE hose end to an
- adjacent hose loop so reel can rotate. Point the hose end towards the ground as ice and water may be ejected while running rodder pump.
- 3 Start engine and engage water pump for two minutes at slow speed to expel any water.
- Turn OFF water pump.
- Remove drain plugs from water pump or open optional drain 5. valves and engage water pump for one minute at slow speed to expel any water 6
  - Turn OFF water pump.
  - Rotate hose reel in the PAYIN direction to expel any water in hose

# **A** WARNING

#### High pressure water.

Serious injury or death can result from sudden release of high pressure water. Remove the rodder hose nozzle and secure the hose end to an adjacent hose loop so reel can rotate. Point the hose end towards the ground as ice may be ejected while running rodder pump.

Both pressure side water valves must be open prior to operating rodder pump.

> Refer to manual for details. 53695A rl





## HOSE REEL

The rodder hose reel is located on the front of the unit and holds the water hose that is fed into sewer lines. The length of hose varies with the size and type. The same basic hose reel configuration is used on both fan and blower machines.

The operator control box for the boom, jetting and the reel controls are located on the hose reel. The hose reel can normally be rotated 270 degrees, and can extend. Some options like the auto wind guide may limit rotation.

There may be other features on the front of the hose reel depending on the options ordered. Refer to the Options Section for instruction on these features.



## HOSE REEL - TELESCOPING

The hose reel can be hydraulically extended outward from the truck chassis using the HOSE REEL switch. The extendable hose reel is useful when lining up the hose with a manhole for rodding operations. A keypad switch on the control panel moves the reel in and out. The hose reel will extend up to about 15 inches.

Rotate the reel parallel to the bumper before retracting to avoid damaging the hose reel.





## HOSE REEL - ROTATING

The hose reel can rotate up to 270 degrees when fully extended. The HOSE REEL LOCK-UNLOCK switch in the unlocked position allows the operator to physically rotate the hose reel. This feature allows the operator to position the rodder hose for optimum performance. It turns on a bearing located on the underside of the hose reel carriage. The hose reel is locked in place with two air-activated cylinders. The cylinders mesh with the gear to hold it in place.

Activate the reel lock to unlock and rotate the reel, unlock it by activating the unlock switch.

Once the reel is unlocked, it can be turned manually in either direction – toward the driver side or the passenger side.

After it has been rotated into position, the reel can be locked in place with the switch.

## NOTICE

Hose reel can be damaged

- Never use the lock as a stop. To avoid damage to the lock, allow the hose reel to completely stop before locking the hose reel.
- Rotate and lock the hose reel parallel to the bumper before retracting.
- Never drive the vehicle with the hose reel in the extended or unlocked position (if equipped).





## HOSE REEL CONTROLS

#### **Display cover**

The control panel display is equipped with a cover for use during transport and as a sunshade.

#### **Control panel**

The hose reel control panel can be adjusted for easy use. Release the lock and swing out the panel. While out the panel can be raised/lowered and rotated for easier use. During transport the control panel must fully latched back into the front of the hose reel as shown. Lower and secure the display cover.







HOSE REEL - MAIN CONTROL PANEL



## HOSE REEL - MAIN CONTROLS

## OPERATION



Only one switch for a function can operate at a time. Example: when pay-in/pay-out joystick is in use on the front panel the one on the wireless is deactivated.

See following pages for the Setup and Vacuum switch panels.

1 **E-Stop -** turns off rodder pump, turns off PTO A and PTO B, sets chassis throttle back to idle and sets chassis to neutral on automatic transmissions. Disables vacuum (opens vacuum disable on PD units). Hydraulic fan pump will de-stroke shutting down the fan drive.

Cab ignition key must be used to shut down chassis engine.

Activate the E-Stop daily to verify it functions correctly and that no error message appear on the display.

- 2 Jetting Pump Enable Activates the rodder pump. Double click up to activate. Double tap is the default setting. Press and hold option can be changed in the setup screen.
- 3 Accumulator Defaults to the ON position when Jet Mode is activated. Pushing this button would disable the accumulator and enable the jackhammer action of the rodder pump.

- 4 Jetting Multiflow system is designed to vary the flow by prioritizing pressure of the jet-rodder system. The flow rate of nozzles used for jet-rodding operations varies according to the orifice size. For optimum performance the flow rate (GPM) and pressure (PSI) supplied by the rodder pump should match the requirements of the nozzle.
- 5 **Throttle Control UP/DOWN -** controls the engine speed from the master control panel. Operation dependant on chassis/engine configuration. May be overridden by a higher priority message to the engine such as derate, high coolant temp, or other priority message.

Holding switch will ramp the RPM up or down.

Toggling the switch will bump the RPM up or down.

# NOTICE

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High Water Pressure Can Increase Wear

Always adjust multi-flow water pressure at or below the water system rating. Exceeding system rating may result in excessively high hydraulic oil temperature and premature component wear.

#### HOSE REEL - REEL & BOOM CONTROLS

## OPERATION



Only one switch for a function can operate at a time. Example: when pay-in/pay-out joystick is in use on the front panel the one on the wireless is deactivated.

- 1 Hose reel PAYOUT/PAYIN joystick control - PAYIN retracts the hose on to the reel. When rodding PAYOUT controls the hose speed as it is pulled along into the sewer.
- 2 Hose reel rotation speed control controls the maximum speed to the hose reel pay in/out motor.

Turn clockwise to increase, counter clockwise to decrease.

3 Boom joystick control - proportionally controls the movement of the boom, extend/retract, hose up/hose down, up/down or left/right. Greater movement the faster the movement.



Rotating the knob extends or retracts the boom.

Boom left - clockwise rotation of boom as viewed from above the truck.

Boom right - counter clockwise rotation of boom as viewed from above the truck.



# Hose raise (5x5 and 10x15 boom options) -

switches are in the upper rim of the joystick handle to raise or lower the hose.

#### HOSE REEL SWITCH PANELS - SETUP

Switch combinations vary with the unit configuration.

There are four indicator lights above each switch. Typically red indicates the switch is locked out, blue or green indicate the function is active.

- 1 Remote On/Off activates the wireless remote system or pendant. Pendant activates the blue light and wireless activates the green light.
- 2 Hose reel lock locks the hose reel in place to stop rotation
- 3 **Pinch roller -** Optional applies pressure to the hose during rotation to assist in coiling the hose back on to the reel.
- 4 Index Up/Down Optional raises/lowers the optional auto wind guide pinch roller.
- 5 Extend/retract move the hose reel away from or towards the truck to position the hose for use.
- 6 Free wheel Optional allows the hose reel to free wheel.



Setup keypad - standard on all units.

Fan module

## HOSE REEL SWITCH PANELS - VACUUM

Switch combinations vary with the unit configuration. The three common ones are:

- PD W/front blower control
- PD w/o front blower control
- Fan

There are four indicator lights above each switch. Typically red indicates the switch is locked out, blue or green indicate the function is active.

- 1
- 2 Blower On/Off activates the fan or blower On a fan - The low/mid/high indicator light will be blue for the current setting and green for the desired setting

when in transition.

- 3 Vacuum Enhance Optional Momentary - the momentary vacuum enhance is more common. Holding this button will close the vacuum enhance and releasing it will open it. The controllers will power the hydraulics long enough to fully open the vacuum enhance and then it will shut off power to that hydraulic valve.
- 4 Vacuum Enables/disables the vacuum.

The method for disabling the vacuum is different on Fan and PD units.

On a FAN unit the inlet to the fan will be blocked off. This stops the flow of air from the debris body into the fan and therefore stops the flow of air from the hose into the debris body. A smaller valve opens at the same time to relieve the debris body. Disabling the vacuum forces the fan to LOW.

On a PD unit the inlet to the blower is opened to external air, providing a path of least resistance for air into the blower. This stops the flow of air from the debris body into the blower and therefore stops the flow of air from the hose into the debris body.

The system defaults to the Disable position.

	Throttle	LOW	MID 6	нідн 6
PD module with water recycler	Throttle	Blower On/Off	Vacuum Enhance + 5 Vacuum Enhance	•••• J介L
PD module	Throttle	Blower On/Off	Vacuum Enhance	•••• J介L
5 Va	cuum Enhan - the varia normally of at this tim there are enhance - will slowly while you slowly ope	ce +/ C ble vacuu only used e. On the "vac enha "vac enha close the hold it, th en the val	Optional - im enhand on the red recycler k ince +" an . The plus e enhance e minus b ve. This is	Variable ce is cycler keypad d "vac button valve outton will s used to

Blower

On/Off

2

OPERATION

Vacuum

Enhance

3

6 LOW - low vacuum

MID - primarily used for combo mode

work and backflush properly.

**HIGH -** primarily used for hydroexcavation or catch basin. Load management is active.

maintain vacuum levels in the debris

body to allow the recycler system to

#### HOSE REEL - MANUAL WIND GUIDE

A hose guide mounted on the hose reel is designed to aid the operator in guiding the hose on and off the reel. To use the guide, move the handle from side to side during the unwinding or winding process. Proper unit positioning will make hose rewinding easier.

Aligning the hose as it rewinds on the reel is a simple matter when the hose comes straight up out of the manhole. The optional auto wind guide should be centered on the hole to reduce side loading, which increases wear on the mechanism. The manual wind guide becomes much harder to manipulate with side loading. If there is a pulling force on either side, aligning the hose as it returns can be difficult.



#### STEP 1

Unlock the assembly by lifting the locking latch on the side of the roller guide. Swing the top half of the roller guide upward and allow it to rest in the open position.

#### **STEP 2**

Place the hose in the bottom half of the roller guide.

#### STEP 3

Lower the top half of the roller guide. The hose should fit snug between the two halves of the roller guide. Lower the locking latch.







When not in use, secure the guide handle using the chain



## OPERATION

provided.

## Spotlight

The spotlight connects to a receptacle on the right side of the hose reel and can be used for manhole work and work at night. The spotlight is stored in the tool box.

Note: there is also an optional wireless spotlight.

# Wireless Remote and Participant


### CATCH BASIN ONLY UNITS

OPERATION

Catch Basin units operate the same as normal units except they are not equipped with the front hose reel for jetting. The on board water pump is used for all high pressure hose reel functions.





### WATER SYSTEM - STANDARD RODDER NOZZLES

#### OPERATIONS

#### When do my nozzles need servicing?

#### Signs of orifice wear:

- Orifices are as large or larger than the next drill size.
- System pressure cannot be achieved.

#### Signs of nozzle wear:

- Wear rings (where applicable) are worn down.
- Orifice, retainer, or chamber area has been breached.
- There is noticeable leakage from area other than the orifice.
- All of these conditions require immediate attention and/or replacement.

Size *
0.050
0.055
0.060
0.065
0.070
0.075
0.080
0.086
0.090
0.095
0.100
0.103
0.105
0.110
0.116
0.122
0.130
0.135
0.140

Also Available

48964A Stainless Steel Retainer (each)

41848A Stainless Steel Penetrator Plug

(used in all Vactor OEM nozzles)

\* All sizes are in inches of diameter

#### Nozzle labeling and Sizing

This chart is to be used for ordering a nozzle. It will match your system specifications for the nozzle style you request.

Extensive testing allows Vactor nozzles to be accurately sized to your system specifications. Hose size, desired flow, and pump pressure are easily converted into the lettering system described at right.

Reorders and parts orders can be quickly placed and processed when providing part numbers and lettering.

Note: Nozzles are sized approximately 3-5 GPM below the specified flow rate to allow for wear.



Example: If you want a nozzle on 1" hose at 80 GPM and 2500 PSI, the product chart above indicates part number 48980BJC would be the part to order.

48902

### **Vactor** Water System - Standard Rodder Nozzles

#### OPERATIONS



The Power Cleaner is an 8-jet nozzle with great coverage and cleaning ability. The rugged cone shape assists with forward travel while its power-maximizing internal cup diverts the jet spray backwards to flush out unwanted dirt and debris.



When your job requires high thrust and effective cleaning, this 10-jet nozzle gets the job done. The Super Flusher's rugged cone shape assists forward travel while its powermaximizing internal cup diverts the jet spray backwards to flush out loose obstructions and debris.



The P-15 Penetrator's long, narrow body easily navigates small diameter pipes and traverses many treacherous conditions, such as broken or settled pipe. With the front nozzle port open, the P-15 Penetrator can bust through blockages with ease. When blockages are cleared, simply insert the front plug to convert the P-15 Penetrator to a flusher nozzle to finish the job.

Part #	NPT Port Diameter	Part Description	1st Rear Angle	2nd Rear Angle	Front Angle	Nozzle Diameter	Nozzle Length	Nozzle Weight	Pipe Diameter
48999-30	) 1"	P-15 PENETRATOR	6 @15°	none	1 @0°	2-1/2"	11"	11.3 lb	6"-16"
49054 - 30	D 1"	POWER CLEANER	4 <b>@1</b> 5° 4	@25°	none	3"	5-1/2"	6.9 lb	6"-20"
49006-30	) 1"	SUPER FLUSHER	5 @10°	5 @25°	none	3-3/8"	6-1/8"	9.4 lb	6"-20"

This calculated information is presented for reference only to help users better understand how a properly functioning system works.

#### Thrust

Thrust as it is utilized in a sewer cleaning operation is a measure of the forward force produced by the rearward discharge of water.

Theoretical maximum assuming a single orifice	Thrust (forward force)
30 gpm @ 2500 psi	78.0 lbf
30 gpm @ 3000 psi	85.4 lbf
35 gpm @ 2500 psi	93.6 lbf
60 gpm @ 2000 psi	139.5 lbf
60 gpm @ 2500 psi	156.0 lbf
80 gpm @ 2000 psi	186.0 lbf
80 gpm @ 2500 psi	208.0 lbf
100 gpm @ 2000 psi	232.5 lbf
140 gpm @ 2000 psi	325.6 lbf
30 gpm @ 2000 psi 60 gpm @ 2000 psi	69.8 lbf 139.5 lbf
the volume	rust by doubling
60 gpm @ 1000 psi 60 gpm @ 2000 psi	98.7 lbf 139.5 lbf
Note: 41% increase in threase the pressure	ust by doubling

#### Pressure drop

Friction generates heat, pressure drop is energy lost to heat.

In any fluid system, friction, and therefore heat, is generated because of the liquid flowing through the hose. The faster a liquid travels, the more heat is generated.

Pressure drop is simply the difference in pressure between any two points in a system. This data indicates the pressure at the opposite end of a sewer hose. This difference in pressure is a measure of the working energy being transformed to heat energy because of friction. This is energy that is no longer available to do work. Pressure drop is system inefficiency.

Pressure drop (PSI) per 100 ft of 1.0" ID sewer cleaning hose				
Flow (gpm)	PD (psi)			
30	25			
35	35			
40	45			
45	57			
50	70			
55	84			
60	99			
65	115			
70	134			
75	153			
80	174			
Pressure drop (F 3/4" ID sewer	SI) per 100 ft of cleaning hose			
Flow (gpm)	PD (psi)			
20	41			
30	100			
40	166			
50	233			
60	318			

### WATER SYSTEM - DECIMAL CHART

Use the closest drill size that fits into the orifice to determine the orifice size.

INCH	DECIMAL	MM	INCH	DECIMAL	ММ	INCH	DECIMAL	MM
1/64"	.0156"	.396	#28	.1405"	3.569	F	.257"	6.528
1/32"	.0312"	.795	9/64"	.1406"	3.571	G	.261"	6.629
#60	.040"	1.016	#27	.144"	3.658	17/64"	.2656"	6.746
#59	.041"	1.041	#26	.147"	3.734	Н	.266"	6.756
#58	.042"	1.067	#25	.1495"	3.797	1	.272"	6.909
#57	.043"	1.092	#24	.152"	3.861	J	.277"	7.036
#56	.043"	1.092	#23	.154"	3.912	К	.281"	7.137
#55	.0465"	1.181	5/32"	.1563"	3.970	9/32"	.2813"	7.145
3/64"	.0468"	1.191	#22	.157"	3.988	L	.290"	7.366
#55	.052"	1.321	#21	.159"	4.039	М	.295"	7.493
#54	.055"	1.397	#20	.161"	4.089	19/64"	.2969"	7.541
#53	.0595"	1.511	#19	.166"	4.216	N	.302"	7.671
1/16"	.0625"	1.588	#18	.1659"	4.214	5/16"	.3125"	7.938
#52	.0635"	1.613	11/64"	.1718"	4.366	0	.316"	8.026
#51	.067"	1.701	#17	.173"	4.394	Р	.323"	8.204
#50	.070"	1.778	#16	.177"	4.496	21/64"	.3281"	8.334
#49	.073"	1.854	#15	.180"	4.572	Q	.332"	8.433
#48	.076"	1.930	#14	.182"	4.623	R	.339"	8.611
5/64"	.0781"	1.984	#13	.185"	4.699	11/32"	.3438"	8.733
#47	.0785"	1.994	3/16"	.1875"	4.763	S	.348"	8.839
#46	.081"	2.06	#12	.189"	4.801	Т	.358"	9.093
#45	.082"	2.083	#11	.191"	4.851	23/64"	.3594"	9.129
#44	.086"	2.184	#10	.1935"	4.915	U	.368"	9.347
#43	.089"	2.26	#9	.196"	4.978	3/8"	.375"	9.525
#42	.0935"	2.375	#8	.199"	5.055	V	.377"	9.576
3/32"	.0937"	2.383	#7	.201"	5.105	W	.386"	9.804
#41	.096"	2.438	13/64"	.2031"	5.159	25/64"	.3906"	9.921
#40	.098"	2.489	#6	.204"	5.182	Х	.397"	10.084
#39	.0995"	2.527	#5	.2055"	5.22	Y	.404"	10.262
#38	.1015"	2.578	#4	.209"	5.309	13/32"	.4063"	10.320
#37	.104"	2.642	#3	.213"	5.41	Z	.413"	10.49
#36	.1065	2.705	7/32"	.2188"	5.558	27/64"	.4219"	10.716
7/64"	.1094"	2.779	#2	.221"	5.613	7/16"	.4375"	11.113
#35	.110"	2.794	#1	.228"	5.791	29/64"	.4531"	11.509
#34	.111"	2.819	A	.234"	5.943	15/32"	.4688"	11.908
#33	.113"	2.87	15/64"	.2344"	5.954	31/64"	.4844"	12.304
#32	.116"	2.946	В	.238"	6.045	1/2"	.500"	12.700
#31	.120"	3.048	С	.242"	6.147	There are	four different	types of drill
1/8"	.125"	3.175	D	.246"	6.248	bits - fracti	on, number, l	etter and
#30	.1285"	3.195	1/4"	.250"	6.35	metric. Use	e the one that	t is closest
#29	.136"	3.454	E	.250"	6.35			

# Hose Reel Main Water Valve Switch

Vactor 2100i

The hose reel main water valve switch, normally located on the passenger side water controls plate, controls the rodder pump water valve. The switch has three positions:

- 1. Up valve open for full flow. The switch can also be bumped up for partially opening the valve.
- 2. Center neutral
- Down valve closed for full flow. The switch can also be bumped down for partially closing the valve.

In normal use the valve is either fully open or fully closed. Partially open is typically needed in cold weather operation when the optional recirculator system is used along with the handgun and when hydroexcavating. Bump the switch as needed to get the needed flow. The rodder pump valve has a position indicator on it as shown. Observe the indicator while bumping the switch to achieve the needed flow.







### Washdown Hand Gun

The hand gun controls are normally located on the passenger side of the truck, while other locations are optional for convenience of operation.

Water is supplied to the hand gun by a manual ball valve when the front hose reel air valve is closed. When not using the handgun, the valve should be closed.

The unit is equipped with a high pressure handgun system. This consists of a handgun assembly with a variable spray pattern, a water hose and a quick-connect / disconnect system. Depending on configuration there may one or two optional hose reels.

The standard handgun connection is mounted on the side of the truck. Other locations are optional. The handgun is used to clean the unit and inside the debris body, screens, floats, rear door seal; and can be used for cleaning catch basins, removing materials from basin walls, adding water to the material for easier pick-up, flushing street area around the work site and cleaning ledges and ladders inside the basins. The standard handgun and hose are normally stored in the vehicle tool box.

#### **Rodder Pump Inlet Valve**

Shuts off water to the rodder pump. This allows the rodder pump to be pumped out. Operates an air valve in the rodder pump plumbing.

#### Hose Reel Main Water Valve

Replaces the hose reel mounted ball valve. Operates an air valve on the rodder pump.

#### To Engage Water for Handgun Operation

Check the water tanks for adequate water supply. With the pump disengaged, connect the highpressure handgun hose to the quick-coupler socket behind the passenger side of the chassis cab, making sure the coupler is fastened securely. Turn the ball valve for the handgun ON and close the hose reel main water valve switch.

Multi-flow and the throttle should be set to the lowest setting to start up. Turn the Rodder pump OFF if the hand gun water system is not going to be

# NOTICE

High Water Pressure Can Increase Wear

Always adjust multi-flow water pressure at or below the water system rating. Exceeding system rating may result in excessively high hydraulic oil temperature and premature component wear.

# 

Handguns Use High Pressure Water



High pressure water can cause serious injury or death.

- Wear appropriate safety equipment including: Waterproof apparel, protective boots, insulated gloves, safety glasses or goggles, hearing protection (ear plugs and/ or ear muffs) and a hard hat with a face shield.
- Never point the handgun at or near a person or animal.
- Bleed pressure from handgun by shutting off water pump pressure and pressing the trigger before disconnecting from high pressure connection.
- Use handgun and connection supplied with the unit; never use common low pressure handguns or connectors with the high pressure system.



The handgun can be used to clean up work site and the rear door area after dumping.

### Washdown Hand Gun

### OPERATION

#### utilized.

When not using the handgun, the handgun ball valve should be closed.

The following instructions are applicable to the standard hand gun:

- 1. Ensure the main water supply is available to the water pump by placing the activating the rodder pump water.
- 2. Ensure the HAND GUN ball valve is in the OFF position.

#### Set the Multi-flow and throttle to lowest setting.

- 3. Ensure the PUMP is OFF.
- 4. Set the hose reel valve switch in the OFF position
- 5. Remove the quick coupler socket from the coupler plug.
- 6. Connect the hand gun hose to the quick coupler and ensure the coupler is securely coupled.
- 7. Place the HAND GUN ball valve in the ON position.
- 8. With the truck engine running and in Jetting mode enable the rodder pump.
- 9. Adjust the Multiflow s needed
- 10. Depress the hand gun trigger to begin pressure washing.

The handgun has a variable spray pattern which is controlled by pivoting the forward handle forward or backward.

#### After Cleaning

After the cleaning is finished, reduce the speed of the truck engine. Turn off the high pressure water pump.

Activate the handgun before disconnecting to allow the water to run out to relieve the water system and empty the accumulators.

Idle the truck engine a few minutes before shutting it off.

# 

High pressure water

High pressure water can cause serious injury or death. The handgun operates under high pressure. Never point the handgun at another individual. Severe injury can result from the high-pressure water.

Special safety equipment is required when operating the high-pressure handgun. Always wear safety toe shoes or boots (waterproof shoes or boots preferred), coveralls, face shield and safety goggles and gloves (waterproof gloves preferred).







### PD BLOWER

# OPERATION

The Vactor vacuum system is designed to perform in combination with the rodder pump to remove debris from storm drains and sewer pipes and to place the waste material into the debris body. The movement of air by the blower picks up debris and water from the work site and moves the material through a vacuum tube into the debris body. A positive displacement (PD) blower is used to produce the movement of air needed to transport debris from the job site into the debris body. Due to the change in air volume in the debris body, the debris and water are deposited into the body, while air is drawn through ports in the body to the blower where it is exhausted.

#### Blower

The blower is the heart of the vacuum system. Large volumes of air are displaced from the intake side to the discharge side. This creates air flow and allows material to be conveyed through the vacuum hose.

The vacuum pump is driven by the chassis engine through a heavy duty transfer case. Its fuel-efficient, positive-displacement design enables the unit to vacuum solids from beneath water surfaces and to convey material for distances more than 600 feet. Airflow created by the vacuum pump is controlled by the engine speed. Maximum vacuum is limited by the relief valves and airflow. The level of vacuum can be monitored on the vacuum gauge located on the hose reel.

**Notes:** The blower is operational when the truck is started and the power of the truck is diverted from "Road Mode" to "Blower Mode."

#### **Blower Operation**

The operator should monitor the exhaust of the blower consistently. If there is a visible discharge, the operator should take immediate steps to correct the problem. NO DISCHARGE IS ACCEPTABLE. The material is probably too dry and will have to be "wetted" with the handgun prior to entering the end of the vacuum hose or reduce the engine rpm to eliminate the material being discharged through the blower exhaust.

#### **Freezing Weather**

Any time the blower/unit will sit after use during freezing weather the blower should be run 3-5 minutes with the vacuum relief open to dry out the blower. This will reduce the risk of the blower freezing up. Depending on weather conditions it may even be necessary before the operators go to lunch and at the end of the daily operation.



# NOTICE

Blower And Transfer Case Can Be Damaged

To avoid damaging the blower and transfer case:

- When engaging or disengaging the blower, make sure the blower has stopped turning completely before attempting to shift in or out of gear.
- Never attempt to disengage blower while it is still turning.
- Never operate blower at less than 1,000 RPM or more than its rated RPM. Never operate blower when vacuum exceeds its allowable rating.



### PD - TRANSFER CASE

The transfer case enables the truck chassis engine to drive the truck on the road, or to transfer the power to drive the blower. The blower is run only when the truck is stationary and parking brake is applied. In the Road position the drive is connected to the rear drive axles and disconnected from the blower. In the Blower position, the engine drive after the transmission, is diverted to the blower and away from the rear axles.

This transmission of the drive is done by engaging or disengaging gears in the transfer case nose cones, similar to those in a transmission.

A drive line guard is provided to cover the upper drive line from the transfer case to the blower. This is to remain in place unless the drive line has to be worked on.

Vactor installs transfer cases from a variety of suppliers. Consult the supplier's manual for additional details.

# NOTICE

#### Machine Can Be Damaged

NEVER turn the chassis ignition off, disengage the clutch (if equipped) or change modes (if equipped) while operating the blower/fan, hydraulic system, or drive train.

- Always allow the engine to return to idle before engaging/disengaging the blower/ fan.
- NEVER operate the blower/fan more than its rated rpm or vacuum rating.
- Always open the vacuum relief before shutting down. Stored energy from vacuum can back-drive the system.
- Always disengage PTO(s) before shutting down.
- Always allow the driveline to stop before switching to driving mode.
- NEVER engage/disengage PTO(s) while driving. PTO should only be engaged while moving if equipped with a recirculation system.



### PD - HYDRAULIC PUMP

Many of the main functions on the Vactor are activated by hydraulic power. Hydraulic power is provided by the hydraulic pumps. The hydraulic tank, containing the hydraulic oil is located in the boom support. The hydraulic pump provides hydraulic oil to power the water pump, hose reel, boom, debris body, rear door, hydraulic locks and any other hydraulic accessories.

**Notes:** There are many combinations of shifters available with the Vactor. Always follow the instructions posted in the cab for engaging the hydraulic pump.

# DANGER

**Entanglement Hazard** 

**Contacting moving parts** with clothes or body can cause injury or death:

- Never go underneath the vehicle with the Ð engine running.
- Never work near a rotating drive shaft.
- Never attempt to engage or disengage the pump or other driven equipment from underneath the vehicle with the engine running.
- Never attempt to engage or disengage any driven equipment from any position that could result in getting entangled in the drive shaft or moving parts.
- Never attempt to work on any installed driven equipment with the engine running.
- Remove the ignition keys and post a lockout/tagout sign on the chassis steering wheel and engine control panels as required.

Effective Date April 2, 2025







### PD - VACUUM SYSTEM - MICROSTRAINER

From the debris body, air enters the microstrainer housing. The three microstrainer are stainless steel mesh filters located on the intake side of the blower. It's purpose is to prevent any objects or foreign matter which has entered the system from reaching the blower. If it becomes plugged, it will result in a high vacuum and a reduction of air flow. The microstrainer should be cleaned if necessary and any foreign matter contained in the microstrainer should be removed.

The microstrainer should be checked daily. Raise the latch and rotate it clockwise 90° to unlock the door.

Leave the drain plug out until the next use and when in storage.





### PD - VACUUM SYSTEM - SILENCER

Air leaving the blower enters the silencer where it passes through a series of baffles and is discharged into the atmosphere. The baffles are tuned to reduce pump noise by combining similar sound frequencies that are out of phase so as to cancel each other. Discharging air vertically further reduces objectionable ground-level sound.

The silencer should be drained daily. The drain plug is normally on the passenger side of the unit.

Leave the drain plug out until the next use and when in storage. Verify the rain cap works correctly.



### HYDRAULIC FAN SYSTEM

The Vactor vacuum system, consisting of a large dynamically balanced aluminum fan, produces a smooth, safe and powerful airflow. This unique system is capable of vacuuming debris from great depths and significantly increases debris volume and velocity. There is a single stage and an optional two stage system available. Both versions are hydraulically driven.







The hydraulic fan system uses two hydraulic pumps mounted on opposite sides of a split shaft transfer case. The smaller pump operates the fan hydraulics cooling fan and the larger one powers the fan.

### Hydraulic Fan - Controls

The chassis engine drives the hydraulics that run the fan, which develops the airflow needed for suction pick-up. The controls are located on a front reel control panel. Start the fan as follows:

- 1. Set the Fan switch to On
- 2. Select Fan Mode of Low/mid/high

Low (left) - Low vacuum

Mid (center) - allows full water pressure and normal working vacuum.

High (right) - full vacuum - Increase engine RPM's to at least 1200rpm.

The fan on function has a ramp feature and takes approximately 10 seconds to fully activate. Starting the fan at higher engine rpms will not damage the system.

- If the fan is engaged with the speed control in the high setting position the engine rpm should be increased to approximately 1200 rpms to keep from loading the engine at idle.
- These settings control the target current thus controlling hydrostat pump displacement and fan operating rpm.
- The best efficiency for combination work is in the medium setting.

Perform daily maintenance as outlined on the Daily Maintenance Check List located in the Maintenance Section.

#### **Operating tips**

**Combination operation in Fan High** - Fan High mode may have limitations on waterflow and/ or pressure. Fan High vacuum mode is primarily assigned for increased vacuum when cleaning wet wells of catch basins. High vacuum mode should normally be limited to operation of the water pump at a lower volume/pressure.

#### Fan operation

For maximum fan RPM use full chassis RPM when using the fan in High mode. Use the fan in Low or Mid mode for best speed control.

#### Fan only

- 1. Low mode and Mid mode can be operated at any engine speed.
- 2. High mode operation chassis engine speeds must be above 1200 rpm's.



#### Water pump only

1. There are no restrictions while operating the water pump only.

#### Combo mode (water & fan)

- A. With Fan in Low mode or Mid mode can be operated but may require an increase in engine speed above 1200rpm.
- B. With Fan in High mode should be avoided unless the chassis is at full RPM's. Note: this is specific to Lower horse powered units.

All two-stage fan units incorporate a load management system.

	Water
Fan Low	Chassis Throttle can be set to any value.
Fan Mid	Limited to Low Fan until RPM is greater than 1500.
Fon Linh	LOAD MANAGEMENT comes into play.
Fan High	Limited to Low Fan until RPM is greater than 1500.

### IN CAB - CONTROLS

### OPERATION



The in-cab touch screen display controls are located between the seats. The display works in conjunction with the chassis supplied switches on the dash.

Buttons to the left or right of the screen activate the on screen tabs. This allows the use of gloves.



- **Strobe** Activates the strobes. Press and hold for diagnostic menu.
- **Arrow** Activates the arrow board. Pressing quickly toggles through the various modes. Press and hold for selection menu.
- **Work lights** Activates the work lights. Press and hold for selection menu.
- Camera Activates the camera.
- Settings User can set arrow board, strobes, and work lights to come on based on what mode you are in (can set auto off too), to speed up setup time once on site.

#### IN CAB - CONTROLS

### OPERATION

This system automates the Jet, Combo, Recirc, Dig, and Wash modes. The following are the general instructions. On screen guidance is provided as needed.

There is a general operation decal typically installed under the driver side visor to guide the operator.

Set to Neutral and apply parking brake to start all jetting and combo mode operations.





### SAFETY LIGHTS

### Operation

Safety lights are needed at the work site. The standard Vactor comes with hazard lights. Additional lights can be mounted at various places around the truck. They include a directional arrow light mounted on the rear door, and strobe lights.



### SEWER CLEANING

Common to municipalities around the world is the need to maintain a clean and sanitary environment suitable for humans to live. This responsibility includes providing a system for efficiently moving both wastewater (sewage) and storm water.

A wastewater collection system is typically a network of pipes, manholes, cleanouts, traps, siphons, lift stations and other required structures to collect all the wastewater from an area and transport it to an environmentally safe place such as an treatment plant or disposal system.

Sewer systems can be located above or underground, typically running parallel to streets, housing, commercial and residential structures. This series of pipes and culverts are engineered as gravity flow systems, built on a slight grade to assist material flow. Most sewers are designed to convey material at a velocity of 2 feet (61 cm) per second. When

The objectives of a Sewer Cleaning and Maintenance Program is to operate and maintain the wastewater collection system so it will function and strive toward the following:

Minimize the number of stoppages per mile of sewer pipe

Minimize the number of odor complaints

Minimize the number of lift station failures

Maintain intended flow in the system

Systems around the world vary in many details. Type of material for the pipe, shape, size and location all differ. Regardless of these variables these systems must be routinely cleaned to ensure safe, consistent movement of the material.



designed to flow greater than 10 feet (300 cm) per second, solids could separate from the flow during low usage. At high velocities splashing occurs when the water changes directions, releasing odors and accelerating corrosion of concrete structures.

Partial or complete interruption of the flow may result from an obstruction in a sewer.

a stoppage. If the velocity is



When a stoppage occurs, material will backup and eventually overflow the system up to the point of the blockage. Streets, homes, and businesses can be damaged from the debris. Human health is threatened with unsanitary conditions and the spread of germs and disease.

For reference, the book Jetter Code of Practices is available from:

National Association of Sewer Companies 11521 Cronridge Drive, Suite J Owings Mills, MD 21117

Phone: 410.486.3500



### SEWER CLEANING

The following pages cover basic cleaning of catch basins, jet rodding operations and simultaneous vacuum and jet rodding operation.

Be aware of traffic and pedestrians on the job site. Use extreme caution while moving around the vehicle to avoid contact with moving vehicles. When moving the boom or vehicle make sure pedestrians are clear of the area. Use orange safety cones to mark the work area.

Germs and other biological hazards are common in sewers. All operators must wear safety apparel: hard hat, visor and / or goggles, ear protection, rain suit, safetytoe shoes or boots with non skid soles and water proof gloves are recommended to avoid injury and contamination. Additional equipment may be required as determined by an on site safety assessment.

#### Before Jetting A Line, The Operator Should Consider The Following Points

- If the manhole is surcharged, relocate to a manhole downstream. A surcharged manhole is one that water has risen above the top of the outlet pipe. This makes it impossible to see the line you are trying to clean.
- The size of pipe should be determined in order to use the proper size nozzle and nozzle support guide.



 Determine the direction the line is supposed to flow. Always jet against the flow or upstream!

#### When Jetting a line

 When starting to jet a line or anytime the rodder nozzle cleaning the line is near the manhole, spray or mist can be forced out. If equipped, use the unit's vacuum system to reduce the spray or mist by lowering the vacuum tube into the manhole about one foot or more and allowing the vacuum airflow to capture it.

#### Starting nozzle in line

- Place nozzle in the line before turning water pump on.
- Use low water flow to minimize water jetting out of the line.
- Allow slack in line to enable the nozzle to move quickly up the line.
- Once insured nozzle is in the line, distance yourself from manhole and mist.
- If equipped, use a remote control to enable distance from manhole.

#### Retracting nozzle in line

- As nozzle comes close to manhole, lower water flow and retract slowly.
- Turn off pump before retracting nozzle out of the line.

### SEWER CLEANING

### OPERATION

# Observe environmental protection regulations

Be mindful of the environment and ecology.



Observe the relevant environmental protection regulations when disposing of oil, fuel, coolant, brake fluid, filters, and batteries.

### **A**WARNING

#### Sewer gas hazard.



Sewer lines often contain poisonous or explosive gas

such as methane. NEVER enter or bend over a sewer without proper ventilation and personal protective equipment. If another person needs help in a sewer, immediately call for emergency assistance. NEVER enter the sewer to help unless you have been trained to do so and have proper personal protective equipment.

NEVER smoke in or around sewer lines, drains, or catch basins.

Failure to follow these instructions may result in death or serious injury.



Chemical waste hazard

Many chemicals are illegally dumped in storm drains, catch basins and

sewers. To prevent contamination and injury wear chemical resistant gloves, long sleeves, trousers and safety glasses or face shields. Seek immediate medical attention if exposure or contamination is suspected.

## 





Germs and other biological hazards are common in sewers. All operators must wear safety apparel: hard hat, visor and / or goggles, ear protection, rain suit, safety-toe shoes or boots with non skid soles and water proof gloves are recommended to avoid injury and contamination. Additional equipment may be required as determined by an on site safety assessment.

Immediately treat all abrasions, cuts and nicks for contamination. Get medical attention for injuries associated with cleaning sewers, drains and catch basins if biological contamination is suspected. Serious illness may result if this procedure is not followed.

### **A**WARNING



Trip, fall and other hazards

Open manholes and other access openings create risks of trips and falls. Be aware of such locations and do not step in or over them. Ensure that manhole cover and other covers are in place when job is completed. Failing to follow these precautions may cause serious injury or death.

Be aware of traffic and pedestrians on the job site. Use extreme caution while moving around the vehicle to avoid contact with moving vehicles. When moving the boom or vehicle make sure pedestrians are clear of the area. Use orange safety cones to mark the work area.

### HIGH PRESSURE WATER

OPERATION

When setting up for rodding operations use the appropriate guide fin and hose guard (tiger tail) to prevent the nozzle from turning in the pipe and returning toward the operator. The length cewer pip of the assembled nozzle and guide fin

must be greater than the diameter of the pipe to be cleaned.

Correct

Inspect the minimum rodder hose length often for indications of damage or wear. Check the hose before each

use for movement in hose fittings, exposed hose reinforcement, kinking or collapsing, blisters or bubbles and fittings that are improperly installed or cutting into the hose.



When splicing hoses read the maintenance section of the manual for instructions on hose repair. All hose manufacturers have instituted a color code system for identification of the hose, fittings and tools. When repairing a rodder hose the

inside color of the hose, the color of the fitting and the die colors must match. Fittings

from one manufacturer will not properly crimp onto hose from another manufacturer. The outside color



of rodder hose indicates the pressure rating of the hose and must match during splicing operations. Be aware of the operating pressures associated with the vehicle and the proper hose specifications for safe operation. National Association of Sewer Service Companies publishes a variety of industry related recommended practice guides.

#### NASSCO, Inc.

2470 Longstone Lane, Suite M Marriottsville, MD 21104 (410) 442-7473 • Fax (410) 442-7788 http://nassco.org/

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High pressure water

High pressure water can cause serious injury or death.

The handgun operates under high pressure. Never point the handgun at another individual. Severe injury can result from the high-pressure water.

Special safety equipment is required when operating the high-pressure handgun. Always wear safety toe shoes or boots (waterproof shoes or boots preferred), coveralls, face shield and safety goggles and gloves (waterproof gloves preferred).





Out of control hose can cause severe injury or death.

The rodder hose creates

tremendous pressure and must not be fitted with a reducer or hand held nozzle, or operated outside of the sewer pipe. The back pressure created by such action will cause loss of control and violent movement of the hose and fittings, and the release of high pressure water.

Never use improper fittings or use out of sewer pipe. Refer to manual for details.

#### **OPERATING PROCEDURES - HAZARDS**

### OPERATION



#### Additional information is available here:

The AEM is a leading provider of training and safety material.



Association of Equipment Manufacturers 6737 West Washington Street Suite 2400 Milwaukee, WI 53214-5647

414.272.0943 Fax: 414.272.1170 Email aem@aem.org website: www.aem.org



#### **OPERATING PROCEDURES - VISUAL INSPECTION**

#### Before taking the Vactor to the job site, be sure to follow the checklist for maintenance and lubrication in the Maintenance Section of this manual.

#### **Visual Inspection**

The operator should make a visual inspection of the Vactor unit before use. A properly conducted pre-trip inspection will prevent safety hazards and extend the life of the Vactor unit.

- To access the engine compartment, the hose reel must be moved. Make a visual inspection of the engine compartment for oil or water leaks and loose or worn belts. Check and adjust fluid levels as needed. When finished under the hood, securely fasten the hood straps.
- 2. Begin at the hose reel and inspect the condition of the rodder hose. Look for wear on the exterior of the hose and damage such as blisters, bubbles or knots. Check that the fittings are neither too loose, have no excessive play nor are too tight, cutting into the rodder hose. Do not use, but immediately repair or replace, that part of the rodder hose that exhibits any of these characteristics.
- 3. Check the control panel for damage or water and oil leaks or both.
- 4. Listen around the hose reel for air leaks. Small leaks will get larger; repair immediately.
- 5. Check the tires for pressure and wear.
- 6. In the hydraulic fluid site gauges, the hydraulic oil should be at the proper level..
- 7. Look in the toolboxes to ensure all correct accessories for the day's assignments are present. Keep tools well organized to save time finding needed items. Greasy tools are slippery, hard to control and unsafe. Keep them clean.
- 8. Carefully inspect the ground or floor under the chassis for oil and water leaks. Listen for air leaks.
- 9. Visually inspect the rear door seal for leakage or damage.
- 10. Clean the windows and adjust the side mirrors, as necessary for safe driving.
- 11. Report all concerns found during inspection to a mechanic or supervisor, or both, so needed repairs can be evaluated and scheduled. If necessary, personally point out the exact location of each problem area.

Before starting any new job, meet with your supervisor to discuss details such as hoses and accessories needed to perform the job properly; any special considerations related to the work site or any anticipated hazards; and any safety precautions an operator should take to ensure correct setup and operations.

Be especially aware of underground utilities.

All aspects of safety need to be considered, no matter how routine using the equipment has become.

#### When Arriving at Work Site

When arriving at the work site, turn on the hazard and strobe lights. If equipped, the optional arrow board should also be turned on. When parking at the work site, position the truck between the manhole and oncoming traffic, if possible. This procedure uses the weight of the Vactor as a device to protect the operator from any driver who doesn't see or obey the safety cones set up around the work area.

All diesel engines should be allowed to warm up. This provides an opportunity to perform other vital checks over the entire truck.

The operators must wear a florescent-colored vest while working at the work site. Because the applications for which Vactor trucks are used expose the operator to dirt and germs, gloves and a long-sleeved shirt must be worn at all times while the truck is in operation. Ear plugs guard against hearing loss from engine noise. Protective eye wear can save the operators sight from flying debris. Some operating tools are quite heavy. Steel-toed boots will provide not only protection, but also support and comfort during a long day of standing.

After moving into position, set the transmission into neutral and then set the parking brake. Before leaving the cab, engage the hydraulic system by following the engagement procedure posted in the cab.

### **OPERATING PROCEDURES - GETTING STARTED**

### OPERATION



#### **Positioning the Truck**

If possible, position the truck with the rodder hose reel to one side and the end of the hose directly over the manhole. If the rodder hose can be inserted into the center of the manhole, retrieving the hose is simplified.

Aligning the hose as it rewinds on the reel is a simple matter when the hose comes straight up out of the manhole. The optional auto wind guide should be centered on the hole to reduce side loading, which increases wear on the mechanism. The manual wind guide becomes much harder to manipulate with side loading. If there is a pulling force on either side, aligning the hose as it returns can be difficult.

The hose reel on the Vactor rotates 135 degrees either way from center to aid in aligning the rodder hose with the manhole. To rotate, unlock the hose reel and rotate to the desired position.

When the hose cannot be inserted directly into the manhole, use additional hose guards (tiger tails) to prevent damage to the hose.



#### Setting up Water Hose

When setting up for rodding operations, always use a rigid hose guard (tiger tail) and guide fin of proper length. The length of the guide fin and nozzle should be greater than the diameter of the sewer pipe. Hose support guards and guide fins are used to protect the hose and to prevent nozzles from reversing in the line and causing uncontrolled acceleration and operator injuries. They help center the nozzle in the pipe for better cleaning. They help reduce nozzle body and leader hose wear. They also prevent the nozzle from turning laterally if the nozzle size is incorrect for the pipe diameter. Hose guards should be used at each turning point to protect the hose.

**Note:** If the handgun or body washout valves are left open during rodding, it will result in a loss of pressure in the rodder hose.

#### **Air Flow**

The action of rodding creates air flow through the pipe system back towards the hose entry point creating a vacuum up stream on the system. To work efficiently there must be an adequate amount of in coming air flow from up-stream. On a typical sewer system it is usually necessary to remove the next up-stream manhole cover. Open man holes must be guarded and marked.

### STARTING OPERATION - SETTING UP (RODDING)

#### OPERATION

The jet rodding operation is used to clean and remove blockage from sewer lines. The rodder hose and nozzle is inserted into the sewer line and the thrust from the nozzle propels the rodder hose and nozzle through the sewer line.

The nozzle breaks down material that may stick to the sides of sewer lines and removes blockages. Also, it adds water to the material for easier pickup and moves the material to the vacuum nozzle. The vacuum hose is used to remove the debris from the basin.

Open the RODDER ball valve. Unwind enough rodder hose to install a hose guard (tiger tail), leader hose and guide fin and nozzle, approximately ten feet. Using the nozzle selection guide located in the Description Section of this manual, select the appropriate nozzle for the application.

- 1. Push the rodder hose through the hose guard (tiger tail) and attach a guide rope to the ring.
- 2. Install the leader hose to the end of the rodder hose. Tighten the leader hose hand-tight, plus one-half turn.
- Install the appropriate guide fin on the end of the rodder hose or the leader hose if used. Tighten guide fin hand-tight, plus one-half turn.
  - Screw the appropriate nozzle onto the end of the guide fin. Tighten the nozzle handtight, plus one-half turn.

4.

5. Using the reel controls attached rope, insert the nozzle into the

sewer pipe. Tie the rope in a position on the truck bumper to prevent loss of the tiger tail.

**Notes:** The tiger tail can be installed on the rodder hose with the rope ring on the top or the bottom, whichever is most convenient.

Use additional tiger tails if necessary to protect the rodder hose from sharp edges and rough areas.

A leader hose is used for easier pipe insertion and to absorb the excessive wear and damage to the first few feet of the rodder hose. A standard leader hose is 30 inches long. However, a leader hose of 10 to 20 feet is optional. When retracting the rodder hose from the sewer line, the operator knows the nozzle is approaching the opening when the leader hose is visible.

Rope

Guide fin

Nozzle





Adapter

Hose guard

Leader hose

### STARTING OPERATION - SETTING UP

### OPERATION



- 6. Set the Hose Reel Main Water Valve switch to open.
- 7. While the engine is at idle activate the rodder pump switch.
- 8. Adjust the throttle until the appropriate flow and pressure are indicated.
- Slowly unwind the hose reel; the available water pressure will propel the nozzle into the sewer line.
- **Notes:** To turn the water pump on from the panel, double tab the water pump switch in the up/on position. To turn it off press the switch down/ off once. The throttle speed controls both the water pressure and vacuum pressure. If the vacuum pressure is increased, the water pressure will also increase. With multi-flow, one can be increased without increasing the other. This can be double tap on the button or press and hold for starting the pump. Setting choice in user preferences page in cab. Default is double tap.

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Out of control hose can cause severe injury or death.

The rodder hose creates

tremendous pressure and must not be fitted with a reducer or hand held nozzle, or operated outside of the sewer pipe. The back pressure created by such action will cause loss of control and violent movement of the hose and fittings, and the release of high pressure water.

Never use improper fittings or use out of sewer pipe. Refer to manual for details.

# 

#### High pressure water.

Serious injury or death can result from sudden release of high pressure water. The hose end and water discharge direction may become uncontrolled.

One pressure side water valve must be open prior to operating rodder pump.

The rodder hose must be properly in place before running rodder pump.

Refer to manual for details.

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### STARTING OPERATION - RODDING

The operator must know how to quickly shut down the system in the event of problems of safety issues. The E-stop is the primary method for safely bringing the systems to a standby condition.

The operator must become thoroughly familiar with the different features and controls on the hose reel control panel. From truck to truck, the control panels may not have the same controls or location based on available options.

A water pressure gauge on the upper hose reel monitors the water pressure. An optional low-water level alert warns the operator when the fresh water supply is down to 100 gallons or less. When this happens the operator should begin returning the rodder hose to the reel. The rodder pump is not damaged by running it dry. However, the rodder hose nozzle will plug if it is dragged through sewer pipe debris without water pressure.

Allow the hose to feed itself through the line at a moderate pace. **NEVER** allow the hose to coil up in the bottom of the manhole.

If the sewer is tightly plugged, it may be best to feed the hose in 25-foot lengths and return. Repeat this, in 25-foot increments, until the hose has gone the complete distance. This prevents the line from blocking up with material behind the nozzle. It also helps allow debris to flow to the manhole. The actual cleaning of the line takes place as the hose is retrieved.

Hose travel, both forward and reverse, is controlled by the hose reel hydraulic power. The hose reel hydraulic power acts as a brake limiting the speed of hose movement and to drag the hose back. Adjust the speed control knob for the job at hand. The basic rule is the dirtier the pipe, the slower the pay-out of the hose.

To achieve full system water pressure, increase the RPMs. Watch the pressure gauge until it reaches the rated maximum pressure.



#### **Nozzle Guide**

- 1. Prevents reversal of nozzle in line and an unrestrained nozzle to accelerate uncontrolled. Length of guide should be greater than the diameter of sewer pipe being cleaned.
- 2. Helps center the nozzle in the pipe for more complete cleaning.
- 3. Helps reduce wear of nozzle body and leader hose.
- 4. Enables the nozzle to travel over rough or broken sections of pipe and minimizes the possibility of the nozzle traveling up a lateral sewer line.

#### ALWAYS USE A NOZZLE SUPPORT GUIDE OR GUIDE FIN

### JET-RODDING OPERATION

The travel speed of the nozzle into and out of the sewer is controlled with the speed control adjustment on the hose reel directional control. The speed will also be affected by variables in engine rpm and nozzle selection as these variables affect hydraulic flow, water thrust and water pressure. The unit should not be operated above maximum system pressure. Note that the flow rate of the nozzle will determine how high the engine rpm will be to achieve maximum working pressure. Typically as the flow rate of the nozzle is reduced the required engine rpm to achieve maximum working pressure will also be reduced.

Multi-flow can be used to reduce flow and pressure that will also decrease the forward thrust created by the nozzle.

In general sewer cleaning applications there are a substantial number of variables that the operator must review to have the unit perform to its maximum capabilities. The size and type of the line, the amount of material in the line and the grade of the line are a few. These variables will determine the proper nozzle selection. For example a line that has been cleaned on a regular maintenance schedule would require a lower flow nozzle and lower pressures to clean. The operator in this situation could clean longer lines with out utilization of incremental cleaning. He would also utilize less water and fuel while cleaning more lines.

The same diameter line that had not been cleaned in years would be heavily laden with material. In this example the operator would chose a larger flow nozzle with a lower degree of angle and would employ incremental cleaning. The lower degree nozzle creates more forward thrust to better break through blockages. It also does a better job of moving large amounts of material. The additional flow is required to more efficiently move the additional material down the line. Incremental cleaning would be utilized. Incremental cleaning is inserting the nozzle down the line in short intervals and then returning it to the man hole with that material. Trying to move too much material at one time can create additional blockages in the line or potentially getting the nozzle and hose stuck in the line. The operator can determine how long each increment should be based on the amount of material he is removing from the line. Units can be equipped with optional footage counters or hoses can be marked to assist in incremental cleaning.



Proper nozzle selection is the key to maximize the performance and utilization of the sewer cleaning equipment. Note that larger lines may utilize multiple nozzles on different passes to maximize cleaning. Operators with proper nozzle training will be more productive.

#### JET-RODDING OPERATION - STOP RODDING

When the hose has reached the end of the run or the line is clean, pull the hose back. This should be done with the rodder pump on. If the line is clean, a minimum of water pressure is needed. When the nozzle gets close to the manhole, lower the pressure completely by reducing the pressure control and setting the pump enable switch to off. Remove nozzle from the pipe and wind rodder hose onto the hose reel using the manual wind guide.



#### High pressure water.

Serious injury or death can result from sudden release of high pressure water. The hose end and water discharge direction may become uncontrolled.

One pressure side water valve must be open prior to operating rodder pump.

The rodder hose must be properly in place before running rodder pump.

Refer to manual for details.



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### VACUUMING - POSITIONING THE TRUCK

The ideal position of the truck for cleaning catch basins, manholes and wet wells is with the vacuum nozzle to one side of the front reel and the front bumper approximately even with the opening. Once the suction tube is released and nozzle attached, the nozzle should be in a vertical position directly over the basin or manhole opening. With the truck in this position, the boom can be used to move the suction tube and nozzle up and down for most efficient cleaning.

Set the parking brake and chock the tires. Engage the emergency lights to flash. If possible, activate the rotating flasher and warning lights. The truck engine should be running to power the hydraulic pump and water pump.

#### OPERATION



# NOTICE



Follow recommended safety practices while performing all work. Refer to the FS Solutions/Guzzler/Vactor/TRUVAC/Westech Safety Manual for additional information.

This manual is available at: www.vactor.com

### VACUUMING - SET UP

- 1. Release tension on the vacuum tube by lowering the boom slightly.
- Remove the tube from the flange which 2. secures the tube while not in use, and swing boom into position over the basin.
- 3. Stand the long catch basin nozzle in the manhole.
- 4. Lower the boom until the vacuum tube and catch basin nozzle are joined.
- 5. Install the quick clamp to fasten the nozzle to the vacuum tube.



Electrocution hazard Serious injury or death can result from electrocution.

Check for overhead wires and obstructions before raising or moving boom. Do not leave boom raised while vehicle is unattended. Do not move vehicle unless boom is in travel mode. Do not allow boom to contact the vehicle or any obstruction.

Be aware of the vehicle's surroundings before operating any of the boom functions to prevent death, injury or equipment damage. Refer to SAFETY 

1800149 rev A

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#### Vacuum Hazard

Cutting, crushing, suffocation or body rupture from the forces of vacuum could result in serious injury or death.

Stay clear of the suction hose inlet end.

Turn vacuum off before attaching hose, pipe or accessories.

Keep suction hose inlet end near ground level when vacuum is operating.

Refer to SAFETY manual for details.

### 

section in manual.

#### **Riesgo Por Altovacío**

Trituración, asfixia, amputación o desgarre corporal por las fuerzas altovacío pudieran resultar en lesiones serias o mortales.

Manténgase lejos de la boquilla de la manguera de succión.

Apague el compresor de altovacío antes de conectar la manguera, tubos o accesorios.

Mantenga el extremo de la manguera de succión cerca del nivel del suelo cuando esté funcionando el compresor de altovacío.

Refiérase a la sección de SEGURIDAD en el manual para detalles.

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### OPERATION

### VACUUMING - OPERATION

For most operations, (including cleaning catch basins, wet wells, sludge filter beds or digesters) the best performance will be obtained from using the nozzle in a vertical position.

All vacuum trucks move material through air conveyance. They rely on air movement to entrap and carry away the debris. For proper operation the end of the vacuum tube must be just above the debris so that an air stream is maintained. Various optional vacuum tubes like the Higbee nozzle are available to permit vacuuming under water by providing, in effect a snorkel to get air to the vacuum tube nozzle end.

Use the boom to lower the nozzle into the material to be removed. With most material, it helps to move the nozzle up and down using the boom controls. Lower the nozzle into the material and raise the nozzle enough for the bottom of the nozzle to clear the material, and then back down into the material. Using this up and down motion will help loosen the debris, especially compacted material.

When picking up water or slurries, allow the tip of the nozzle to just clear the top of the water or slurry. As material is removed, the nozzle can be tipped, or the pipe and boom moved horizontally to reach other material. Continually working the nozzle this way enables the operator to observe the work area. If the material to be picked up is not in a pile, use a shovel, rake or hoe to work the material into the nozzle. The handgun stream can be used to move material toward the tip of the nozzle.

The catch basin nozzle has holes just above the jagged or serrated edge at its base to allow air to flow into the tube.

During operation, observe the debris body level gauge. When the indicator is horizontal the body is full and must be drained and/or dumped.

#### **Disconnect and Store Nozzle**

Loosen the clamp holding the suction nozzle and tube and return it to its storage compartment. Return the suction nozzle and tube extensions to their traveling locations. Attach the end of the vacuum tube to the flange on the side of the bumper. Lower the boom fully to its resting spot on the cab guard.





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#### Vacuum Hazard

Cutting, crushing, suffocation or body rupture from the forces of vacuum could result in serious injury or death.

Stay clear of the suction hose inlet end.

Turn vacuum off before attaching hose, pipe or accessories.

Keep suction hose inlet end near ground level when vacuum is operating.

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Refer to SAFETY manual for details.

### **ADVERTENCIA**

#### **Riesgo Por Altovacío**

Trituración, asfixia, amputación o desgarre corporal por las fuerzas altovacío pudieran resultar en lesiones serias o mortales.

Manténgase lejos de la boquilla de la manguera de succión.

Apague el compresor de altovacío antes de conectar la manguera, tubos o accesorios.

Mantenga el extremo de la manguera de succión cerca del nivel del suelo cuando esté funcionando el compresor de altovacío.

Refiérase a la sección de SEGURIDAD en el manual para detalles. 1800174

### VACUUMING OPERATION

#### **Operating Instructions**

- 1. It is important to remember that the vacuum tube uses air flow and not vacuum to pick up material. Keep the suction end of the nozzle in the right position to receive air and material
- 2. Submerging the nozzle in material stops air flow and prevents material movement. The catch basin nozzle is designed to pull air into the pipe to move material. The end is serrated with small holes; if the end is submerged, air is pulled in through the holes.
- 3. The weather and operating conditions cannot be controlled, but the air speed, water volume and water pressure can be. The blower/ fan speed controls the volume of air and the speed of air movement through the pipe and into the debris body.
- 4. If the soil or material breaks up easily, the blower/fan can run at higher speeds and allow faster material pickup. The air speed must be adjusted to move maximum amounts of material without carry-over into the blower/fan.
- Air speed is important when working in freezing temperatures. High Air speeds cause wind chill conditions because of the air velocity. The wind chill conditions cause ice build-up in the vacuum tube or boom, which blocks material movement.
- 6. Proper air speed will vary depending on the material moved. Air velocity should be set so material does not hang in the pipe. Adjust RPM to the lowest setting to move the material efficiently. Increase the speed as needed to pick up large rocks or heavy sludge. Watch the air exhaust for carry-over material. Any type of carry-over should be avoided.
- 7. The further the distance from the work site to the debris body, the higher the air speed should be. The shorter the distance, the lower the air speed. Material moving through a pipe or tube creates a friction factor. The longer the tube or pipe, the higher the friction factor called friction loss. Pipe and tube diameter is a major factor when moving material. The standard unit comes with a eight-inch diameter hose.

# NOTICE

Machine Can Be Damaged

- Beware of carry over material from debris body through the blower or fan.
- Running the blower/fan too fast with light material can carry the material over into the blower or fan. This can cause premature wear.
- Over filling the debris body can cause carry over and damage to the fan/blower.
- If ice builds up in the boom, shut down the vacuum system. Use hot water to heat the boom tubes or move the vehicle to a warm place. Slowly retract the boom when the tubes have warmed up. Do not retract the boom with ice build up in the vacuum tube. Damage to the boom and/or seal can occur. If hot water is available, start the vacuum system and spray hot water into the vacuum tube/nozzle. As the ice breaks away it will be carried to the debris body.
- To prevent rodder pump damage, always open at least one ball valve before engaging the pump.

**Note:** When doing extended vacuuming only, fill the water tanks at least half full and run the recirculator system. The heat exchangers in the water system help cool the chassis engine and hydraulic oil.

### VACUUMING TIPS

- 1. Always use a vacuum nozzle at the working end of the tube.
- 2. Never hold the open end of the hose with your hand while vacuum system is on.
- 3. Never guide debris to the nozzle end or open end with your foot or hand.
- 4. Never remove obstructions from the nozzle while the system is operating.
- 5. Always disable vacuum relief valves and reduce RPM before attempting to dislodge any obstruction in the vacuum tube.
- 6. For best performance, run the vacuum pump at a lower RPM. Do not bury the nozzle in the material. Air flow is required to convey the material through the tube.
- 7. If air flow is not sufficient enough to convey the material, increase the RPM in moderation.
- 8. Do not wear loose clothing or untied hair when working on or near the unit or the open end of the tube.
- 9. Eliminate unnecessary bends or turns in the tube.
- 10. Always check the working condition of all safety devices before starting the Vactor unit.
- 11. Observe all safety instructions and markings on the unit. Use ear plugs, safety glasses and gloves.
- 12. Be aware that the air system becomes hot during vacuum operations.

#### SAFETY INSTRUCTIONS

# In an EMERGENCY the VACUUM and WATER must be stopped Activate the E-Stop

#### To shut down the system:

- Stop vacuuming.
- Enable vacuum relief valves.
- Reduce engine/blower/fan RPM.
- If required, shut down the engine.

# 

#### Vacuum Hazard

Cutting, crushing, suffocation or body rupture from the forces of vacuum could result in serious injury or death.

Stay clear of the suction hose inlet end.

Turn vacuum off before attaching hose, pipe or accessories.

Keep suction hose inlet end near ground level when vacuum is operating.

Refer to SAFETY manual for details.

# 

#### **Riesgo Por Altovacío**

Trituración, asfixia, amputación o desgarre corporal por las fuerzas altovacio pudieran resultar en lesiones serias o mortales.

Manténgase lejos de la boquilla de la manguera de succión.

Apague el compresor de altovacío antes de conectar la manguera, tubos o accesorios.

Mantenga el extremo de la manguera de succión cerca del nivel del suelo cuando esté funcionando el compresor de altovacío.



#### SIMULTANEOUS RODDING/VACUUMING

The ability to remove material as rodding takes place is a major advantage with this unit. By placing the vacuum tube and suction nozzle into the manhole while rodding, the sewer line is cleaned and back washed debris is removed at the same time.

- Using the instructions for rodding, position the rodding hose, guide fin and nozzle into the sewer line.
- Using the instructions for vacuum suction operation, position the vacuum tube and nozzle into the manhole.
- By operating the suction tube and rodder at the same time, the cleaning operation can occur.

When ready to begin operations, the truck must be running and the following procedures should be followed.

- 1. Open all vacuum relief valves.
- 2. Plug in the remote control pendant and carry the pendant to the work area if desired.
- 3. Communicate with the rodder hose handler. When the operator is ready, increase the RPM to the desired level.

When vacuuming, never attempt to guide or push debris to the open end of the hose with your foot or hand. Vacuum suction is powerful enough to suck a limb into the hose. Never reach into a vacuum hose to free clogs. Always open the vacuum relief valves and reduce the RPM before attempting to dislodge any obstructions.

If the air flow is not large enough to carry the material, increase the RPM to just a little more than required to have a free flow of the material. Do not overload the air stream as that will pull debris into the blower or fan. This will result in a drop in efficiency. It will also make the engine work harder than it has to, decreasing the overall life of the unit.

The appropriate level of RPM is the lowest RPM that will readily convey the material into the tube and carry it to the debris body. This will depend on the density of the material, and the distance it has to travel to the tank.



The rodder hose is positioned inside the tiger tail and in the manhole. The operator has begun simultaneous rodding and vacuuming by also placing the catch basin (suction) nozzle into the manhole.
## SHUTTING DOWN

## Operation

When the clean out job is completed:

- 1. Raise the boom above horizontal position and allow the vacuum system to clear the tube of debris. Keep end of hose or vacuum tube near or below ground level.
- 2. Using the handgun clean vacuum hose and tube. Spray water into the boom hose to flush and clean out the boom system.
- 3. Set vacuum switch to DISABLE..
- 4. Reduce chassis engine speed to idle.
- 5. Set RODDER PUMP switch to OFF.



## SHUTTING DOWN - DECANT

Vacuuming can continue until the debris body capacity is reached. Then vacuum operations must cease. Vacuum system must be off prior to draining excess liquid from the debris body. Make sure the auxiliary engine is shut off before decanting.

In liquid vacuuming, the level indicator or the change of the sound of the blower/fan (the float ball will get sucked up) will indicate a full tank. As the tank becomes full, the float in the debris body rises automatically with the load level to stop the flow of air through the filtration system. When this happens, the vacuum relief valve whistles. Shut the system down at this point and prepare for dumping.

### Decant or Draining Water from Debris body

Draining the debris body before dumping will result in fewer trips to the disposal site, less weight for transportation and safer vehicle operation.

On firm level ground only raise the debris body no more than three feet when decanting water. Material in the debris body can slide against the rear door and thereby shutting off the decanting process.

A water drain located in the rear door or right side of the debris body allows draining excess water.

- 1. Position the truck with the rear door over a manhole at the work site.
- 2 Attach and unroll the drain hose and place it in the manhole.
- 3. Open the decant (optional) valve.
- 4. If the debris body is less than half full, raise the debris body slightly to help drain.
- 5. After excess water is drained, lower debris body, fold and replace hose.









Unit can tip over when the body

is raised while loaded. During decanting or offloading liquids only raise the body no more than three feet, enough to allow the liquid out and not plug the ports.

NEVER attempt to raise body when vehicle is on unlevel ground or in motion.

After decanting or offloading liquids, rear door MUST BE opened before the front of the body is 3 feet above the chassis frame.

Operator must remain at controls during all operations.

# NOTICE

Before draining water into a storm drain, sewer or other location, ensure that local laws and regulations do not prohibit offload.

# NOTICE

Never overfill the debris body. Do not exceed the GVWR (gross vehicle weight rating.)

# OPERATION

## MOVING & STOWING EQUIPMENT

## OPERATION

### Moving To a New Location

To move the truck to a new job site, proceed as follows:

- 1. Set chassis engine speed to idle.
- 2. Reel hose completely in.
- 3. Set hose reel SPEED CONTROL to lowest position.
- 4. Set the VACUUM switch to DISABLE.
- 5. Position boom in the stowed position.
- 6. Disengage the blower or fan
- 7. Activate Road mode
- 8. Remove and stow the suction tube nozzle and extension pipes.
- 9. Secure vacuum tube.
- 10. Stow suction nozzle and extension pipes.
- 11. Move truck to new location.

# NOTICE

### **Preparing for Transport**

Prior to transport secure all tools, hoses and all miscellaneous items in their storage locations.

- All items in tool trays and racks need to be secured or tied down.
- If equipped, secure boom in transport mode.
- If equipped, lower debris body, close rear door.
- If equipped, secure all hose ends on hose reels.
- Close and secure all cabinet, tool box and control panel doors and covers.
- Remove and stow all hoses, suction tube, extension pipes and accessories.
- Disengage the hydraulic, vacuum and water systems.
- Check and clear the area around the unit before moving.





Electrocution hazard Serious injury or death can

result from electrocution. Check for overhead wires and obstructions before raising or moving boom. Do not leave boom raised while vehicle is unattended. Do not move vehicle unless boom is in travel mode. Do not allow boom to contact the vehicle or any obstruction.

Be aware of the vehicle's surroundings before operating any of the boom functions to prevent death, injury or equipment damage. Refer to SAFETY

1800149 rev A

section in manual.

## **Stowing Equipment**

It is important to check the area around the vehicle and stow the equipment used on a job site.

1. Set the VACUUM switch to DISABLE.

2. Let idle for 3 - 5 minutes before shut down.

3. Using the boom controls, lift the vacuum tube and remove the suction nozzle and extension pipes. Stow the nozzle and extension pipes with the most used attachment on the bottom of the rack.

4. Attach lower end of vacuum tube to its flange on the front bumper. Secure with the quick clamp.

5. Reel rodder hose in completely and remove nozzle, guide fin, tiger tail and guide rope.

6. Set hose reel SPEED CONTROL to lowest position.

- 7. Set HAND GUN ball valve to OFF.
- 8. Release water pressure from hand gun by depressing trigger.
- 9. Remove the hand gun from the quick coupler and replace with quick coupler socket.
- 10. Stow the hand gun and hose in the toolbox.
- 11. Using the guide located in the cab, disengage the PTO.

# Vactor/Guzzler/TRUVAC

## **DUMPING BEST PRACTICES**

- Maneuver the unit to the dump site and park on firm/level ground. Make sure the ground in that area is compact enough to prevent the truck from getting stuck.
- Ensure there are no overhead obstacles that will interfere with raising the debris body.
- Engage the parking brake.

## **Dumping Safely & Effectively**

**NOTE:** If equipped with a boom, stow the boom so that the hose clears the unit's components when raising the debris body.

- Read the in-cab or manual instructions on how to properly engage the hydraulic system.
- Keep one operator on the hydraulic controls for safety, and to cease operations if an emergency arises. Ensure the operator is proficient with the controls.
- Monitor the dump site area for anyone or anything that may interfere with the safe operation of the unit.
- Check behind the unit for people or obstacles before opening the rear door to avoid harming anyone or causing damage.
- The rear door MUST be opened before the front of the debris body is 3 feet above the chassis frame.
- During decanting or off-loading liquids, only raise the body no more than 3 feet, enough to allow the liquid out and not plug the ports.
- Observe the material as the debris body raises to make sure it is coming out. Do not continue raising the body if the material is not moving. High pressure water or mechanical removal may be necessary.
- **NOTE:** If equipped with dump tubes, as the debris body is being raised the dump tube doors located on each side of the debris body will automatically open.



#### WARNING WARNING

- NEVER raise the debris body while on unlevel ground or in motion.
- NEVER leave body raised or partly raised while vehicle is unattended.
- NEVER move the unit with the debris body in a raised position.
- ALWAYS open rear door before fully raising debris body and/or dumping.
- When using vibrator, raise body 3 feet and pulse to dislodge debris before fully raising. Repeat as needed.
- If equipped with chassis air ride suspension, ALWAYS dump air suspension so that the rear of the unit is at its lowest point (not applicable on TRXX).
- **NOTE:** If equipped with the optional vibrator, it can be used to dislodge any material that is attached to the sides of the debris body. Make sure to raise debris body 3 feet and pulse vibrator to dislodge debris. Activate the vibrator mechanism intermittently with the switch on the master control panel until debris starts to move. Only use short vibrating blasts. DO NOT use long or continuous blasts. DO NOT raise body fully and then activate vibrator as extreme weight shift could cause unit to tip/roll.
- Deploy the rear door safety props to secure the door from accidentally falling during cleaning operations. Never enter the debris body without thoroughly cleaning it first. Be aware of the dangers of confined spaces and request a confined space permit if required.
- Using the hand gun, wash out the debris body, paying particular attention to the door seal, lock bolts, level indicator, float balls, screens, etc. and the inside of the rear door.

### **Transportation Precautions**

- NEVER leave the debris body raised or partly raised while the unit is unattended, nor when in motion.
- NEVER move the unit with the debris body in the up or raised position.
- ALWAYS disengage the PTO when hoist is not in use or when moving the unit.

DUMPING & DRAINING DEBRIS BODY - SAFETY

## OPERATION



#### SAFETY INSTRUCTIONS

**Best Practices for Dumping** 

- Position unit on level, stable ground.
- Check for overhead wires and obstructions
- Operator must remain at controls during all operations.
- During decanting or offloading liquids, only raise the body no more than three feet, enough to allow the liquid out and not plug the ports.
- Open rear door before dumping.
- Observe the material as the debris raises to make sure it is coming out. If equipped use the vibrator. Do not continue raising if the material is not moving. High pressure water or mechanical removal may be necessary.
- NEVER move the unit with the debris body in the up or raised position.

#### Vibrator (if equipped)

• The vibrator can be used to dislodge any material that is attached to the sides of the debris body while raising. Only use short vibrating blasts.



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## **Crushing Hazard**

NEVER leave body raised or partly raised while vehicle is unattended

or while performing maintenance or service under body unless body is propped to prevent accidental lowering. [Always disengage PTO when hoist is not in use or when moving vehicle.] The debris body MUST BE empty for service work.

NEVER attempt to raise body when vehicle is on unlevel ground.

Rear door MUST BE opened before the front of the body is 3 feet above the chassis frame. Operator must remain at controls during all operations.

## DUMPING THE BODY

The chassis engine must be started to dump the debris body containing the material collected. The engine provides the power to the hydraulic system which lifts the front of the body and opens the rear door.

- 1. Back the unit up to the dump site and park on firm level ground. Pick a level area with enough compaction to prevent the truck from getting stuck.
- 2. When in position, set the parking brake.
- 3. If truck is equipped with air ride suspension, dump air suspension so that the rear of the truck is at its lowest point.
- 4. Ensure there is adequate clearance overhead for the debris body to rise.
- 5. Inspect the rear of the unit and the area that the material will be dumped.
- Using the instructions located in the cab, activate Jet mode to engage the hydraulic power.

## Controls

The control station for dumping the material is usually located on the passenger side of the unit inside the tool box. The controls for fan and PD machines are similar.

**Note:** the dump functions will not work when vacuum is enabled. Fan/Blower can be active.

- 1 **Open/close rear door -** open and close the rear door. When using the vacuum relief is disabled, boom and hose reel extend/retract functions are halted. High flow mode to use rodder pump for body washout remains available.
- 2 Body UP/DOWN raise and lower the debris body. When using the vacuum relief is disabled, boom and hose reel extend/retract functions are halted. High flow mode to use rodder pump for body washout remains available.
- 3 Offload activates the debris body pump system (optional)



# **WARNING**

**Crushing / Tipping Hazard** 

To avoid injury or death:



OPFRATION

- Position unit on level stable ground.
- Open rear door before dumping.
- NEVER move the unit with the debris body in the up or raised position.

# **A**WARNING

**Crushing Hazard** 

Unit can tip over when the body is raised while loaded. During decanting or offloading liquids only raise the body no more than three feet, enough to allow the liquid out and not plug the ports.

NEVER attempt to raise body when vehicle is on unlevel ground or in motion.

After decanting or offloading liquids, rear door MUST BE opened before the front of the body is 3 feet above the chassis frame.

Operator must remain at controls during all operations.



## DEBRIS BODY PROP

#### At any time the debris body is raised in order to obtain easier access to the underside of the debris body, all safety precautions must be followed. The debris body should be stabilized and secured before entering any space below it. The body prop is normally located on the driver side towards the front of the debris body. The unit should be parked on a flat level surface.

- 1. Raise the debris body so that the front of the body is approximately 5 feet in the air.
- **Note:** The debris body must be sufficiently high enough in the air to allow the safety prop to clear the body and swing into position with the prop rest under the body.
- Tilt the safety props towards the prop rest.
  Depending on the configuration of the unit there may not be a handle to operate the body prop.
  In those cases use the supplied reach pole.
- 3. After the top of the prop is in position, lower the body until the prop is resting around the prop rest. This will secure the body from falling.

## **Disengaging Safety Prop**

- 1. Raise the debris body to a sufficient height to clear the safety prop socket and pull the prop back to the stored position.
- 2. The debris body can now be lowered.









## OPERATION

## DEBRIS BODY - REAR DOOR PROP

## Operation





Rear Door Can Be Damaged

To avoid twisting damage to rear door always use the rear door prop(s). Lower rear door until it just touches both prop(s). Never power door down onto prop(s).

Any time access is required inside the debris body all safety precautions must be followed for confined space. The inside debris body must be fully cleaned prior to entry.

- 1. Unlock and open the rear door enough to put the props in place.
- 2. Using the reach pole pull out both body props. Both props must always be used.
- 3. Lower the door so it just touches both props.
- 4. Verify the prop is properly seated in to the socket as shown. If not raise the door enough for the prop to clear and lower again.

## **Disengaging Safety Prop**

- A. Raise the door to a sufficient height for the prop to clear the door.
- B. Push the prop to the stored position.
- C. The door can now be lowered and locked.

### Rear Door Can Be Damaged

NOTICE Remove safety support(s) before closing door to avoid damage. Open rear door before raising the debris body. Make sure rear door attachments clear the bumper and ground when raising the debris body.











## DUMPING THE BODY - CLEAN UP

Using the hand gun, wash out the debris body, paying particular attention to the door seal, lock bolts, level indicator, float balls, screens, etc. and the inside of the rear door.

Deploy the rear door safety props to secure the door from accidentally falling during cleaning operations.

Visually inspect door seal. The door gasket and mating surface on the debris body should be completely cleaned so that it may form a complete seal when it is closed.

#### Lowering Debris Body/Closing Door

The rear door must close with an air and watertight seal. Make sure all debris is removed from the seal before closing the door.

After the debris body has been emptied and the seal cleaned, tilt the rear door props back to the stored position and lower the tank to its original operating position. Disengage the hydraulics.

The body should always be lowered first and then the door closed. Never raise a loaded body unless the rear door is open and you intend to empty the body.







## OPERATION

## DEBRIS BODY WASHOUT

## OPERATION

If equipped, the debris body washout system is used to wash out the debris body and aid in dumping. The washout system has nozzles installed inside the debris body, which can be activated by a debris body washout valve. Operate only long enough to clean out the debris body and to avoid unnecessary abrasive wear to the debris body. To fully clean the debris body finish the job with the handgun system. The body washout valve is normally located on the passenger side near the handgun water valve controls.

The debris body can be washed out as follows:

- 1. Fully open the rear door and raise the debris body about one quarter of the way up so it will drain.
- 2. Make sure water is available in the water tank.
- 3. Place the HAND GUN valve and the Hose Reel valve in the OFF position.
- 4. Place the BODY WASHOUT ball valve in the ON position.
- 5. Set to Jet mode in the cab.
- 6. Set the Pump Enable switch to ON.
- 7. Adjust to maximum water pressure setting. Run until washout or dumping is complete.
- 8. When debris body washout is complete, reduce the chassis engine RPM.
- 9. Set the Jetting switch to OFF.
- 10. Place the BODY WASHOUT ball valve in the OFF position and the Hose Reel or HAND GUN valve in the ON position.
- 11. Lower the debris body after it has fully drained and close the rear door.
  - **Notes:** The washout system is optimized for an 80GPM at 2500PSI system. Pressure during operation should be 800-1000PSI. Higher pressure may indicate plugged nozzles and lower pressure may indicate worn nozzles.





All replacement nozzles need to be the fan-style as originally supplied.

**Note:** Some units may be equipped with a check valve at the body washout nozzle. This prevents liquids from



back flowing into the system and causing problems in freezing weather. The body washout must always be air purged after use in freezing weather.

## **CROSS CONTAMINATION HAZARDS**

**Before and after** all work serious issues need to be addressed which include:

- 1. Has the unit been thoroughly cleaned?
- 2. Will any of the debris react with any of the components of the unit?
- 3. Has the debris been positively identified?
- 4. In the case of a spill, there may be cross contamination issues with material soaked into the surrounding area.

#### Cleaning

The owner, operator and user are responsible for determining what level of cleaning is required for the specific job due to the possibility of cross contamination of chemicals. Two common resources for information are shown here for reference.

Things to consider when cleaning:

- Visually inspect the debris body, cyclone(s), baghouse(s) and all material flow paths. They should be clean and clear of all visible debris and should be dry.
- 2. Replace all filter media in the debris path.
- 3. Disassemble and clean all filter screens and hoses.
- 4. Dispose of all waste in accordance with federal, state, and local laws and regulations.
- 5. Maintain an MSDS/SDS for all materials the units is used for.
- 6. A procedure should be developed and strictly followed to track the last material the unit was used for and cleaning. A sample form is included here.

# **A**WARNING



**Cross Contamination Hazards** 

Serious hazards from poison gasses, fire and explosions are possible when the wrong chemicals or materials come in contact with each other.

Serious injury or death may result if cleaning procedures are not followed.

Safe Operation of Vacuum Trucks in Petroleum Service

API RECOMMENDED PRACTICE 2219

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Available from the WJTA: Recommended Practices for the Use of Industrial Vacuum Equipment.



RECOMMENDED PRACTICES FOR THE USE OF INDUSTRIAL VACUUM EQUIPMENT

Published by the Water Jet Technology Association

LAST USE CLEANING/SAFETY FORM

**OPERATION** 

Unit						
Work performed by			Date			
Note	Notes					
Area	s NOT decontamina	ated				
1						
2						
3						
4						
5						
Last	material in unit					
M	SDS/SDS attached		Yes - No			
Cleaning agents used		Yes - No				
MSDS/SDS attached			Yes - No			
Othe	Other					
1	Unit fully winterize	ed?	Yes - No			
2	Water tanks draine	ed and flushed?	Yes - No			
3	All filters, strainers, filter bags cleaned or replaced?		Yes - No			
4	Exterior of unit cleaned?		Yes - No			
5	Debris body, cyclone(s), bag house(s), dump tube(s) cleaned?		ned? Yes - No			
6	All other areas ma	terial passes or accumulates cleaned?	Yes - No			

# **BIOLOGICAL HAZARDS**

Units used around or for sewer work present some special handling issues due to biological hazards. This also includes all of the unit's exterior that may have come in contact with waste material. The unit's water tanks, debris body, pumps, filters and plumbing can all become contaminated in use. Recycling units will require additional cleaning before servicing.

Thoroughly flushing with fresh water is the first step to cleaning a unit. A wide variety of chemicals and procedures are available for decontamination. Machine components and seals can be damaged by some chemicals. Consult Vactor Service before use. The owner, operator and user are responsible for determining what level of cleaning is required.

# **WARNING**



Germs and other biological hazards are common in sewers. All operators must wear safety apparel: hard hat, visor and / or goggles, ear protection, rain suit, safety-toe shoes or boots with non skid soles and water proof gloves are recommended to avoid injury and contamination. Additional equipment may be required as determined by an on site safety assessment.

Immediately treat all abrasions, cuts and nicks for contamination. Get medical attention for injuries associated with cleaning sewers, drains and catch basins if biological contamination is suspected. Serious illness may result if this procedure is not followed.

# DAILY CHECKS - CHASSIS

## OPERATION

# NOTICE



Consult OEM chassis and engine <sup>U</sup> operation and maintenance manuals for complete details on operation.

For reliable operation these items should be reviewed daily for proper operation. Perform a walk around to verify all items are properly secured for travel.

**Note:** A printable checklist is in the Maintenance section.

Under the hood: check all fluids, belts and hoses. Fill fuel tanks.



Check all lights including brake and running.



Check tire pressure and condition.



Check brakes, driving and parking.



Fill diesel exhaust fluid tank if equipped.



Wheel chocks should be available on the unit.



Drain air tank(s) and check air dryer system.



# DAILY CHECKS - UNIT

For reliable operation these items should be reviewed daily for proper operation.

- Verify all safety decals are in place and legible
- All safety equipment should be with the unit including a safety tee if required
  - **Note:** All drain plugs should be left open to keep residual water from the tanks from migrating to the system during transport. Leave all valves open, Y-strainers out and drain plugs out when the unit will sit overnight or longer. This will allow any residual water to drain.

Perform a walk around to verify all items are properly secured for travel.

**Note:** A printable checklist is in the Maintenance section.

Check all hydraulic and electrical functions for proper operation.

Verify the correct operation of all manual and automatic vacuum relief valves.



Activate the E-Stop to verify it functions correctly and that no error message appear on the display (if equipped).



Verify all drains have been drained and all drain caps are with the unit.

Check filters if

Replace any

excessive build

equipped.

that have

up.



Verify all that all blower, transfer case, pump and gearbox fluid levels are correct.



Check all microstrainers and strainer baskets as equipped.



Verify ground bonding cable.





## OPERATION

## **CHASSIS - REGENERATION**

## OPERATION



Changes to the emissions systems may require the operator to perform additional procedures while operating the equipment not required on prior years trucks. The EPA requires a 50% reduction in Nitrogen Oxides (NOx) which are created by the high temperatures and speed of combustion. NOx creates ground level ozone formation and smog.

To comply changes in engines have been made that include:

- Exhaust systems with a Diesel Particulate Filter (DPF) and Diesel Oxidation Catalyst (DOC) unit.
- Larger cooling packages to remove the added heat.
- Require Ultra Low Sulfur Diesel fuel
- Require low ash oils to extend service intervals

A Diesel Particulate Filter (DPF) is a porous ceramic filter to capture the soot particles. It is larger than normal exhaust mufflers and provides maximum ash storage capability between periodic cleanings. The smaller DOC unit is after the DPF to complete the processing of the exhaust.



# NOTICE



Consult OEM chassis and engine operation and maintenance manuals for complete details on operation.

A process called regeneration oxidizes the soot naturally at high exhaust temperatures to eliminate it. The truck is equipped with a regeneration system that operates automatically under proper conditions or manually when conditions require.

Prolonged operations at low engine rpm may not permit the automatic regeneration cycle. This may require parking the unit for regeneration. Some longer operations like vacuuming fly ash at low rpm are more likely to require parked regeneration. It may be more efficient for an operator to perform a manual regeneration as part of the pre-job preparations to reduce the need for regeneration any time during that day.

**Note:** The regen process will not function if the check engine light has been activated. The unit must be serviced to allow the regen process to function.



#### Typical cab instruction decal (IH shown)

## CHASSIS - REGEN WARNING SYSTEM

Installed on this truck is a supplemental engine and diesel particulate filter warning system, consisting of a horn and flashing external lights, which is designed to augment, not replace, the standard warning system in the cab.

This system will sound a horn and flash the external mirror lights in conjunction with the engine and diesel particulate filter warning lamps located in the instrument cluster.

No liability or warranty is assumed by or provided on this secondary external warning system, as the primary in cab warning and derate system remains in place. Observance of the warning lamps must be adhered to and acted upon as directed in the chassis owner's manual.

## **External Alert**

#### System This unit is equipped with an external alert system. Park brake must be applied to enable system. External mirror lights will flash and horn will sound when DPF and /or check engine indicators are illuminated in dash panel.

Consult chassis operator's manual for service details.

## CHASSIS - CALIFORNIA 5-MINUTE SHUTDOWN

Newer chassis are often equipped to accommodate the California Air Resources Board (CARB) requirement to shut down the engine after five minutes of non-use idle time. Operators need to be aware of this feature as it may interfere with operations. Refer to the chassis manufacture manuals for details and to verify if the chassis is equipped. Typically on Vactor units the throttle switch must be set to ON and the unit in work or blower mode to override the five minute shutdown feature.

#### Note

There are many misconceptions — mainly that turning the engine off and restarting it several times a day will increase wear. "Starting and stopping the engine is actually easier on the engine than prolonged idling," says Brian Lindgren, vocational sales director, Kenworth Truck Co. "It is a good idea to have a good set of batteries and a high-quality starter and alternator to ensure sufficient power to start the engine numerous times if it is not run long enough to recharge the batteries."

Mike Powers, product development manager for Caterpillar Global On-Highway, agrees, noting, "There is no additional wear when shutting the truck on/off several times a day. There are benefits in fuel economy and wear/durability when shutting the truck down rather than idling."

According to Christy Nycz, Cummins Inc., an idling engine in a Class 8 truck will consume roughly 1 gal./hour of fuel at 1,000 rpm and .5 gal./hour at 650 rpm.

"The fuel consumption depends on the application, load factor on the engine, etc.," Powers adds. "It is very difficult to quantify exact savings. But if you decrease your idle time from 50% to 25%, it could improve your fuel economy by up to 4%."

http://articles.directorym.net/Crack Down on Idle Time-a878668.html

# NOTICE



Jump Starting Or Welding Can Damage Electrical System

To avoid damage:

- Disconnect ECU, control modules and batteries before welding on unit.
- Disconnect control modules before jump starting. Consult chassis service manual for details on jump starting.
- Never use a test light when troubleshooting. Only use digital multimeter on all circuits. Test lights and older analog meters can damage the electronic systems.
- Set all ignition switches to OFF before testing CANbus system.





Follow recommended safety practices while performing all work. Refer to the FS Solutions/Guzzler/Vactor/TRUVAC/Westech Safety Manual for additional information.

This manual is available at: <u>www.vactor.com</u>

## STATIC ELECTRICITY

The owner, operator and user are responsible for determining if static grounding is required and what level of protection is required for the specific job. Due to the possibility of static electricity build up in the system we recommend grounding the unit in all applications.



Additional copies available from API Publications and Distribution: (202) 682-8375

Information about API Publications, Programs and Services is available on the World Wide Wob at: http://www.api.org

American Petroleum Institute 1220 L Street, Northwest Washington, D.C. 20005-4070 202-682-8000



Typical static cable and clamp

The American Petroleum Institute provides additional resources and programs to industry which are based on API Standards. For more information, contact:

Training	/Workshops	Ph: Fax:	202-682-8490 202-682-8222
Inspector	Certification Programs	Ph: Fax:	202-682-8161 202-962-4739
Americar	n Petroleum Institute	Ph:	202-682-8130
Quality F	Registrar	Fax:	202-682-8070
Monogra	m Program	Ph: Fax:	202-962-4791 202-682-8070
Engine C	Dil Licensing and	Ph:	202-682-8233
Certificat	tion System	Fax:	202-962-4739
Petroleur	m Test Laboratory	Ph:	202-682-8129
	tion Program	Fax:	202-682-8070

In addition, petroleum industry technical, patent, and business information is available online through API EnCompass<sup>34</sup>. Call 1-888-604-1880 (toll-free) or 212-366-4040, or fax 212-366-4298 to discover more.

To obtain a free copy of the API Publications, Programs, and Services Catalog, call 202-682-8375 or fax your request to 202-962-4776. Or see the online interactive version of the catalog on our web site at www.api.org/cat.



Get The Job Done Right.

## Available from the WJTA-IMCA:

Recommended Practices for the Use of Industrial Vacuum Equipment. Familiarize yourself with the Recommended Practices, particularly Section 2.0 Accidents & Section 5.5 Grounding/Bonding.



In addition, NFPA 77 Recommended Practice on Static Electricity provides more detailed grounding methods. This can be obtained from the National Fire Protection Association at www.NFPA.org (800-344-3555).

These three references are recommended to help in making good decisions in the proper use of vacuum truck technology. Other references are also available.

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## **DUST - HANDLING SAFETY**

If use of Vactor equipment results in exposure to potentially hazardous dust, employers and users should consult any applicable SDS as well as OSHA regulations, guidelines, and information to ensure safety of operators. Under these circumstances, users should pay particular attention to possible increased exposure when dumping debris hoppers and changing bag filters. Wearing appropriate respirator during dumping operations and wetting down filter bags before service or removal may reduce exposure to certain dusts such as silica dust. To reduce exposure in presence of potentially hazardous dusts, employers should consider use of upgraded filters, broken bag detectors, and ensure that any leaking gaskets and seals are promptly serviced. Employers should monitor exposure of operators and ensure compliance with applicable OSHA regulations and standards.

Some common practices to reduce exposure include:

- 1. Upgrading filters
- 2. Servicing gaskets and seals if leaking
- 3. Wetting down filter bags, if appropriate before servicing or removal.
- 4. Operators wearing appropriate respirators when servicing, dumping or during air excavation.

### **Combustible dusts**

Materials that are, or could produce, combustible dusts must be handled in such a way as to prevent combustible dust explosions and deflagrations (fires).

Combustible dusts consist of the following dust types as per NFPA 70: National Electrical Code 2014 Edition

- Group E Metallic Dusts
- Group F Carbonaceous Dusts
- Group G Organic Dusts

It is the responsibility of the owner to insure that all of the following steps are taken before using any air mover unit on combustible dust materials.

- All employees involved in handling combustible dusts must be trained as to the combustible dust hazards as part of their HAZCOM training. See: OSHA 3371-08 2009 - Hazard Communication Guidance for Combustible Dusts
- 6. Consult the SDS(s) of the material(s) for the recommended Safe Handling Procedures and Fire and Explosion potentials.
- 7. Dry materials and low relative humidity increase the dangers of handling combustible dusts.
- 8. Never dry sweep or *Blow Down* the dusts with compressed air to form piles for easier vacuum removal. Both of these methods can create conditions for a dust explosion to occur.
- 9. Position the air mover so that the top baghouse doors, which are the emergency relief vent in the event of an explosion, do not create a greater hazard should an explosion occur within the unit. Keep all personnel clear of the baghouse and cyclone clean out doors which may also vent should an explosion occur.
- The air mover itself contains many possible exterior ignition sources (electrical and heat). Never operate the unit in an area containing airborne combustible dust.
- 11. Insure the grounding cable on the unit is properly mounted, bare metal bottom of the grounding reel to bare metal mounting surface on either the frame or bed of the unit, and that the grounding cable and clamp are in good condition.

## DUST - HANDLING SAFETY

- 12. Ground the unit to an approved grounding point or grounding rod. If using a grounding rod(s), it must be designed for grounding and driven firmly into the soil per the site requirements. The grounding point should be wire brushed to remove oxidation or other materials that might prevent the free flow of electricity.
- 13. For rear loading air movers, a rubber baffle placed over the diverter plate is strongly recommended to prevent any potential metal to metal contact during vacuuming. This is essential when vacuuming metal combustible dusts.
- 14. All components of the vacuum line must be bondable. This includes: nozzle, hoses, pipes, fittings, safety tee, trunk hose.
- 15. Never use any non-conductive materials in any part of the vacuum line (PVC Pipe or Plastic Hose).
- 16. Never use bare copper wire inside or outside of the vacuum line as a jumper across non-conductive components.
- Rubber hoses must include a continuous wire helical stiffener. The wire should be stripped 4-6" on each end of the hose, the bared wire pushed into the hose opening and then the metal hose shanks pressed in to the hoses and clamped together.

- All bonds and grounds must be tested with a suitable Ohm meter to verify the bonding and grounding meet the site requirements.
- 19. Do not restrict the air flow to the unit to prevent overheating of the blower. Restricting the air flow could cause the blower to become an ignition source for dusts. Use multiple smaller hoses if a larger hose is not practical.
- 20. Run the unit at the lowest RPM that moves the material. Excess RPM's create excess heat in the blower.
- 21. If the unit begins to blow dust from the discharge silencer, immediately shut the unit down, disconnect the vacuum line, repair any broken or unseated bags in the bag house, rinse any dust out of the silencer, clean or purge any dust remaining in the unit between the top of the bag house and the blower and finally reconnect the vacuum line and resume work. Failure to do so could result in a dust explosion.
- 22. Upon completion of the job, insure the air mover has been cleaned of any combustible dust residue.

## DUST - RESOURCES

Vactor can not possibly, know, evaluate, and advise the service trade of all conceivable ways in which operation or service might be done or the possible hazardous consequences of each way. Anyone who uses operational procedures, service procedures, or tools, whether recommended by Vactor or not, must first satisfy himself thoroughly that neither his safety nor the product safety will be jeopardized by the methods he shall select.

Vactor vacuum systems are designed to user specifications. The owner/ operator/user is responsible for the safe use and application of this equipment and proper waste disposal. Transportation and disposal of waste may be subject to local, state or federal laws.

There is an increased risk of fire and/or explosion from combustible dust. The following section provides resources will assist in solving those issues.

### **General Information**

- FM Global, "Prevention and Mitigation of Combustible Dust Explosions and Fire", Data Sheet No. 7-76, January 2005.
- Eckhoff, Rolf K. "Dust Explosions in the Process Industries," 3rd Edition, Gulf Professional Publishing, 2003.
- Bartknecht, W. "Dust Explosions: Course, Prevention, and Protection," Springer- Verlag, 1989.



OPERATION



An online refresher course, OSHA's Combustible Dust National Compliance Directive, is available through Federal Signal. The course can be accessed at the following web address:

www.fssolutionsgroup.com/Training/OnlineCourses/ tabid/115/Default.aspx

- Hatwig, M., and Steen, H. (eds.), "Handbook of Explosion Prevention and Protection," Wiley-VCH, 2004.
- Frank, Walter. "Dust Explosion Prevention and the Critical Importance of Housekeeping," Process Safety Progress, vol. 23, no. 3, September 2004, pp. 175-184.
- Amyotte, P., Kahn, F., and Dastidar, A. "Reduce Dust Explosions the Inherently Safer Way," Chemical Engineering Progress, vol. 99, no. 10, October 2003, pp. 36-43.
- Ebidat, Vahid. "Is Your Dust Collection System an Explosion Hazard?" Chemical Engineering Progress, vol. 99, no. 10, October 2003, pp. 44-49.
- Center for Chemical Process Safety (CCPS). "Guidelines for Safe Handling of Powders and Bulk Solids." CCPS, American Institute for Chemical Process Safety, New York, New York, January 2005.

### Code of Federal Regulations (CFR) [Standards]

U.S. Government Printing Office 732 N. Capitol Street, NW Washington, DC 20401 Telephone: 1-866-512-1800 (toll-free) OSHA Standards, Interpretations, and Publications U.S. Department of Labor/OSHA OSHA Publications Office 200 Constitution Ave., NW, N-3101 Washington, DC 20210 Telephone: (202) 693-1888 or by Fax: (202) 693-2498

### Related OSHA standards found in 29 CFR:

1910.22 - General Requirements: Housekeeping

1910.94 - Ventilation

1910.107 - Spray Finishing Using Flammable and Combustible Materials

## DUST - RESOURCES

## OPERATION

National Fi	re Protection	Association	(NFPA)
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1 Batterymarch Park Quincy, MA 02169-7471 Telephone: (800) 344-3555

Related NFPA Standards:

- NFPA 61, Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities
- NFPA 68, Guide for Venting of Deflagrations
- NFPA 69, Standard on Explosion Prevention Systems
- NFPA 70, National Electrical Code 2014 Edition
- NFPA 91, Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids
- NFPA 120, Standard for Fire Prevention and Control in Metal/Nonmetal Mining and Metal Mineral Processing Facilities
- NFPA 432, Code for the Storage of Organic Peroxide Formulations
- NFPA 480, Standard for the Storage, Handling, and Processing of Magnesium Solids and Powders
- NFPA 481, Standard for the Production, Processing, Handling, and Storage of Titanium
- NFPA 482, Standard for the Production, Processing, Handling, and Storage of Zirconium
- NFPA 484, Standard for Combustible Metals, Metal Powders, and Metal Dusts
- NFPA 485, Standard for the Storage, Handling, Processing, and Use of Lithium Metal
- NFPA 495, Explosive Materials Code
- NFPA 499, Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas
- NFPA 505, Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operation
- NFPA 560, Standard for the Storage, Handling, and Use of Ethylene Oxide for Sterilization and Fumigat
- NFPA 654, Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids
- NFPA 655, Standard for Prevention of Sulfur Fires and Explosions
- NFPA 664, Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities
- NFPA 1124, Code for the Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles
- NFPA 1125, Code for the Manufacture of Model Rocket and High Power Rocket Motors







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## **DUST - RESOURCES**

# **OSHA® Fact**Sheet

# **Hazard Alert: Combustible Dust Explosions**

Combustible dusts are fine particles that present an explosion hazard when suspended in air in certain conditions. A dust explosion can be catastrophic and cause employee deaths, injuries, and destruction of entire buildings. In many combustible dust incidents, employers and employees were unaware that a hazard even existed. It is important to determine if your company has this hazard, and if you do, you must take action now to prevent tragic consequences.

#### **How Dust Explosions Occur**

In addition to the familiar fire triangle of oxygen, heat, and fuel (the dust), dispersion of dust particles in sufficient quantity and concentration can cause rapid combustion known as a deflagration. If the event is confined by an enclosure such as a building, room, vessel, or process equipment, the resulting pressure rise may cause an explosion. These five factors (oxygen, heat, fuel, dispersion, and confinement) are known as the "Dust Explosion Pentagon". If one element of the pentagon is missing, an explosion cannot occur.

### **Catastrophic Secondary Explosions**

An initial (primary) explosion in processing equipment or in an area where fugitive dust has accumulated may dislodge more accumulated dust into the air, or damage a containment system (such as a duct, vessel, or collector). As a result, if ignited, the additional dust dispersed into the air may cause one or more secondary explosions. These can be far more destructive than a primary explosion due to the increased quantity and concentration of dispersed combustible dust. Many deaths in past incidents, as well as other damage, have been caused by secondary explosions.

Initial Explosion

#### Secondary Explosion





A pharmaceutical plant after a dust explosion.

### **Industries at Risk**

Combustible dust explosion hazards exist in a variety of industries, including: agriculture, chemicals, food (e.g., candy, sugar, spice, starch, flour, feed), grain, fertilizer, tobacco, plastics, wood, forest, paper, pulp, rubber, furniture, textiles, pesticides, pharmaceuticals, tire and rubber manufacturing, dyes, coal, metal processing (e.g., aluminum, chromium, iron, magnesium, and zinc), recycling operations, fossil fuel power generation (coal), and additive manufacturing and 3D printing.

#### **Prevention of Dust Explosions**

To identify factors that may contribute to a explosion, OSHA recommends a thorough hazard assessment of:

- All materials handled;
- · All operations conducted, including by-products;
- · All spaces (including hidden ones); and
- · All potential ignition sources.

#### **Dust Control Recommendations**

- Implement a hazardous dust inspection, testing, housekeeping, and control program;
- · Use proper dust collection systems and filters;
- Minimize the escape of dust from process equipment or ventilation systems;
- Use surfaces that minimize dust accumulation and facilitate cleaning;
- Provide access to all hidden areas to permit inspection;
- Inspect for dust residues in open and hidden areas at regular intervals;
- If ignition sources are present, use cleaning methods that do not generate dust clouds;
- Use only vacuum cleaners approved for dust collection; and
- · Locate relief valves away from dust deposits.

#### **Ignition Control Recommendations**

- Use appropriate electrical equipment and wiring methods;
- Control static electricity, including bonding of equipment to ground;
- · Control smoking, open flames, and sparks;
- Control mechanical sparks and friction;
- Use separator devices to remove foreign materials capable of igniting combustibles from process materials;
- · Separate heated surfaces from dusts;
- · Separate heating systems from dusts;
- Select and use industrial trucks properly;
- Use cartridge-activated tools properly; and
- · Use an equipment preventive maintenance program.

#### **Injury and Damage Control Methods**

- Separation of the hazard (isolate with distance);
- · Segregation of the hazard (isolate with a barrier);
- Deflagration isolation/venting;
- · Pressure relief venting for equipment;
- Direct vents away from work areas;
- · Specialized fire suppression systems;
- Explosion protection systems;

- Spark/ember detection for suppression activation;
- Develop an emergency action plan; and
- Maintain emergency exit routes.

#### **Applicable OSHA Requirements Include:**

- §1910.22 Housekeeping
- §1910.307 Hazardous Locations
- §1910.1200 Hazard Communication
- §1910.269 Electric Power Generation, Transmission and Distribution (coal handling)
- §1910.272 Grain Handling Facilities
- General Duty Clause, Section 5(a)(1) of the Occupational Safety and Health Act (Employers must keep workplaces free from recognized hazards likely to cause death or serious physical harm).

#### Resources

Readily available from www.osha.gov are:

- Combustible Dust National Emphasis Program
- Safety and Health Information Bulletin (SHIB) (07-31-2005) Combustible Dust in Industry: Preventing and Mitigating the Effects of Fires and Explosions

See the SHIB or www.osha.gov for other applicable standards.

The primary National Fire Protection Association (NFPA) consensus standards related to this hazard are:

- NFPA 654, Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids
- NFPA 61, Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities
- NFPA 484, Standard for Combustible Metals
- NFPA 664, Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities
- NFPA 655, Standard for the Prevention of Sulfur Fires and Explosions
- · See www.nfpa.org to view NFPA standards.

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory-impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.



www.osha.gov (800) 321-OSHA (6742)

DSG FS-3791 05/2015



U.S. Department of Labo

## OPERATION

# **OSHA Fact**Sheet



# **OSHA's Respirable Crystalline Silica** Standard for Construction

Workers who are exposed to respirable crystalline silica dust are at increased risk of developing serious silica-related diseases. OSHA's standard requires employers to take steps to protect workers from exposure to respirable crystalline silica.

#### What is Respirable Crystalline Silica?

Crystalline silica is a common mineral that is found in construction materials such as sand, stone, concrete, brick, and mortar. When workers cut, grind, drill, or crush materials that contain crystalline silica, very small dust particles are created. These tiny particles (known as "respirable" particles) can travel deep into workers' lungs and cause silicosis, an incurable and sometimes deadly lung disease. Respirable crystalline silica also causes lung cancer, other potentially debilitating respiratory diseases such as chronic obstructive pulmonary disease, and kidney disease. In most cases, these diseases occur after years of exposure to respirable crystalline silica.

# How are Construction Workers Exposed to Respirable Crystalline Silica?

Exposure to respirable crystalline silica can occur during common construction tasks, such as using masonry saws, grinders, drills, jackhammers and handheld powered chipping tools; operating vehiclemounted drilling rigs; milling; operating crushing machines; using heavy equipment for demolition or certain other tasks; and during abrasive blasting and tunneling operations. About two million construction workers are exposed to respirable crystalline silica in over 600,000 workplaces.

#### What Does the Standard Require?

The standard (29 CFR 1926.1153) requires employers to limit worker exposures to respirable crystalline silica and to take other steps to protect workers. Employers can either use a control method laid out in Table 1 of the construction standard, or they can measure workers' exposure to silica and independently decide which dust controls work best to limit exposures in their workplaces to the permissible exposure limit (PEL).

#### What is Table 1?

Table 1 matches 18 common construction taskswith effective dust control methods, such as usingwater to keep dust from getting into the air or usinga vacuum dust collection system to capture dust. In

some operations, respirators may also be needed. Employers who follow Table 1 correctly are not required to measure workers' exposure to silica from those tasks and are not subject to the PEL.

#### **Table 1 Example: Handheld Power Saws**

If workers are sawing silica-containing materials, they can use a saw with a built-in system that applies water to the saw blade. The water limits the amount of respirable crystalline silica that gets into the air.

Table 1: Specified Exposure Control MethodsWhen Working With Materials ContainingCrystalline Silica

	Continuous and	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)		
Equipment/ Task	Work Practice Control Methods	≤ 4 hrs/ shift	> 4 hrs/ shift	
Handheld power saws (any blade diameter)	Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. • When used outdoors. • When used indoors or in an enclosed area.	None APF 10	APF 10 APF 10	

Excerpt from Table 1 in 29 CFR 1926.1153

In this example, if a worker uses the saw outdoors for four hours or less per day, no respirator would be needed. If a worker uses the saw for more than four

## Operation

hours per day or any time indoors, he or she would need to use a respirator with an assigned protection factor (APF) of at least 10, such as a NIOSH-certified filtering facepiece respirator that covers the nose and mouth (sometimes referred to as a dust mask). See the respiratory protection standard (29 CFR 1910.134) for information on APFs.

#### **Alternative Exposure Control Methods**

Employers who do not fully implement the control methods on Table 1 must:

- Determine the amount of silica that workers are exposed to if it is, or may reasonably be expected to be, at or above the action level of 25 µg/m<sup>3</sup> (micrograms of silica per cubic meter of air), averaged over an 8-hour day;
- Protect workers from respirable crystalline silica exposures above the PEL of 50 µg/m<sup>3</sup>, averaged over an 8-hour day;
- Use dust controls and safer work methods to protect workers from silica exposures above the PEL; and
- Provide respirators to workers when dust controls and safer work methods cannot limit exposures to the PEL.

#### What Else Does the Standard Require?

Regardless of which exposure control method is used, all construction employers covered by the standard are required to:

- Establish and implement a written exposure control plan that identifies tasks that involve exposure and methods used to protect workers, including procedures to restrict access to work areas where high exposures may occur;
- Designate a competent person to implement the written exposure control plan;
- Restrict housekeeping practices that expose workers to silica, such as use of compressed air without a ventilation system to capture the dust and dry sweeping, where effective, safe alternatives are available;
- Offer medical exams—including chest X-rays and lung function tests—every three years for workers who are required by the standard to

wear a respirator for 30 or more days per year;

- Train workers on the health effects of silica exposure, workplace tasks that can expose them to silica, and ways to limit exposure; and
- Keep records of workers' silica exposure and medical exams.

#### Additional Information

Additional information on OSHA's silica standard can be found at www.osha.gov/silica.



Applying water to the blade of a handheld power saw reduces the amount of dust created when cutting.

OSHA can provide compliance

assistance through a variety of programs, including technical assistance about effective safety and health programs, workplace consultations, and training and education.

OSHA's On-Site Consultation Program offers free, confidential occupational safety and health services to small and medium-sized businesses in all states and several territories across the country, with priority given to high-hazard worksites. On-Site consultation services are separate from enforcement and do not result in penalties or citations. Consultants from state agencies or universities work with employers to identify workplace hazards, provide advice on compliance with OSHA standards, and assist in establishing and improving safety and health management systems. To locate the OSHA On-Site Consultation Program nearest you, call 1-800-321-OSHA or visit www.osha.gov/consultation.

#### **How to Contact OSHA**

Under the Occupational Safety and Health Act of 1970, employers are responsible for providing safe and healthful workplaces for their employees. OSHA's role is to ensure these conditions for America's working men and women by setting and enforcing standards, and providing training, education and assistance. For more information, visit www.osha.gov or call OSHA at 1-800-321-OSHA (6742), TTY 1-877-889-5627.

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory-impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.



# **Options**

# **See Options Book**

Options

# **Maintenance**

Maintenance

## MODEL & SERIAL NUMBER LOCATION

## MAINTENANCE

## NEW UNIT SERVICE CHECKLIST

Perform these items in addition to all other service and lubrication requirements.

New Unit First Time Service & Lubrication Checklist					
	ITEM	When	Performed By	Date	
	Fill out and send in all warranty/registration cards				
1	Service chassis (consult manufacturer's manual)				
2	Inspect all door seals	1st week			
3	Inspect all vacuum hoses	1st week			
4	Wash and clean entire truck	1st week			
5	Inspect all safety equipment, guards, etc.	1st week			
6	Drain air tanks	1st week			
7	All grease zerks (unless otherwise noted)	1st week			
8	Grease lift cylinder	1st week			
9	Grease box hinges	1st week			
10	Grease rear door hinges	1st week			
11	Grease all clamp and lid screws	1st week			
12	Change transfer case oil if equipped	100 hours			
13	Change hydraulic oil filter	100 hours			
14	Change hydraulic oil and filter	1000 hours			
15	Driveline joints	1st week			
16	Grease boom	1st week			
17	Inspect / repair leaks	1st week			
18	Change auxiliary engine transmission oil if equipped	100 hours			
19	Retorque the hose reel rotary bearing bolts	100 hours			
20	Retorque all hose reel base to chassis mounting bolts	100 hours			

# 

**Confined Space Hazard** 

Entering a confined space without proper precautions can lead to death or serious injury. Before entering the debris body, watertank or filter housing comply with all work rules and applicable federal, state, and local regulations.

## SERVICE CHECKLIST

## MAINTENANCE

All units are equipped with this general purpose decal, normally located on the passenger side, to assist operators.

# **A** DANGER

**Confined Space Hazard** 

Entering a confined space without proper precautions can lead to death or serious injury. Before entering the debris body, watertank or filter housing comply with all work rules and applicable federal, state, and local regulations.

# NOTICE



Service Access Never use access ladders or platforms with the unit running. Shut down and lock out the unit before all service to avoid injury. Refer to the unit manual and safety manual for details.

507592 r0



## Technical Service Hotline - 877-342-5374

### **General Operation**

 Consult the OPERATOR'S manual for complete details on SAFETY and proper OPERATION of this unit.

- Cold weather operation drain as required. Consult the OPERATOR'S manual for complete details.
- Do not operate without manual, automatic and safety vacuum reliefs installed and properly operating.

## **Daily Service Check List**

- Inspect all safety equipment, guards, etc.
- Check blower or fan engine oil level
- Check hydraulic oil level
- Check transfer case oil level (if equipped)
- Service chassis (consult manufacturer's manual)
- Inspect all vacuum hoses
- Drain, inspect and clean micro strainer (if equipped)
- Drain, inspect and clean all air/water filters and
- Y-strainers
- Inspect for proper functioning of vacuum relief valves
- Inspect inlet head and inlet boot seals
- Inspect the rodder hose for excessive wear, damage or improper assembly of fittings
- Inspect hoses and gaskets
- Inspect and clean all door seals before closing doors
- Drain air tanks and silencers (if equipped)
- Inspect cyclones for excess material (if equipped)
- Consult the OPERATOR'S manual for complete details



\* HOSE REEL PIVOT BEARING & LOCKS While applying grease to the hose reel pivot bearing grease zerks rotate the hose reel back and forth. The hose reel locks are lubricated through the right hand zerk. Use two pumps per zerk.

#### WEEKLY (25HRS) GREASE POINTS

1	HOSE REEL PIVOT, HOSE GUIDE, EXTENSIONS & SHAFT			
2	ALL DRIVELINE JOINTS			
3	HOIST CYLINDER PINS - UPPER & LOWER - MONTHLY			
4	DEBRIS BODY MOUNTING HINGE			
5	REAR DOOR - ALL LOCKS AND PIVOT POINTS			
6	REAR DOOR HINGES			
7	VACUUM ENHANCER (OPTION)			
8	LEVEL INDICATOR			
9	TRASH PUMP OPTION (location will vary)			
10	BOOM HINGES & SLEEVES - MONTHLY			
11	VACUUM RELIEF (FAN units only)			
-	ALL SMALL DOOR HINGES			
	BLOWER UNITS			
12	GREASEABLE BLOWERS ONLY - MONTHLY (100HRS)			
	Refer to manual for details.			

FOR REPLACEMENT ORDER LABEL No. 1800165A rev F

## SERVICE CHECKLIST - COMMON

The system should be serviced according to the following schedule. Proper service of the system includes proper lubrication. Consult the lubrication checklist in conjunction with the service checklist. The following time intervals are based upon a normal eight hour working day. Frequency of maintenance may have to be increased if the system is placed into operation for longer periods of time.

Service Checklist						
	ITEM	8 Hrs. or each shift	25 Hrs. or Weekly	100 Hrs. or Monthly	500 Hrs. or Every 6 Months	1000 Hrs. or Every 12 Months
1	Check hydraulic oil level	х				
2	Service chassis (consult manufacturer's manual)	х	х	х	х	х
3	Inspect all door seals		х			
4	Inspect all vacuum hoses	х				
5	Wash and clean entire truck		х			
6	Inspect all safety equipment, guards, etc.	х	х			
7	Inspect all warning labels		х			
8	Inspect proper functioning of vacuum relief valves	х				
9	Inspect and clean debris body screens	х				
10	Inspect and clean float balls and screens	х				
11	Inspect deflector plates and replace if worn	х				
12	Inspect body and make/break seals	х				
13	Drain air tank(s)	х				
14	Inspect and clean cyclone & dust box if equipped	х				
15	Check water Y-strainer Filter Screens	х				
16	Check boom seals for leakage & condition		х			
17	Check all chassis fluid levels	х				
18	Drain and flush high pressure water pump		х			
19	Inspect and rotate vacuum suction hose			х		
20	Inspect and clean water tank sensor probes				х	
21	Inspect high pressure wand and hand gun for damage	х				
22	Check water pump oil level if equipped	х				
23	Inspect water & hydraulic hoses for wear or damage	х				
24	Inspect hoses and gaskets for leaks and wear	х				
25	Check pressure limiting devices (hydraulic and water reliefs)		х			
26	Check battery (s)	х	х			
27	Inspect hose reel drive chain tension			х		
28	Retorque the hose reel rotary bearing bolts					х
29	Verify E-Stop functions (at idle)	х				
30	Verify vacuum relief(s) function	х				
31	Check chassis air dryer	х				
32	Verify all silencer and engine rain caps are working	Х				
33	Retorque all hose reel base to chassis mounting bolts				х	
34	Check and clean hose reel bearing gear teeth			Х		
## SERVICE CHECKLIST - PD & FAN SPECIFIC

The system should be serviced according to the following schedule. Proper service of the system includes proper lubrication. Consult the lubrication checklist in conjunction with the service checklist. The following time intervals are based upon a normal eight hour working day. Frequency of maintenance may have to be increased if the system is placed into operation for longer periods of time.

	Service Checkl	list				
	ITEM	8 Hrs. or each shift	25 Hrs. or Weekly	100 Hrs. or Monthly	500 Hrs. or Every 6 Months	1000 Hrs. or Every 12 Months
	PD Units					
1	Check blower oil level	x				
2	Inspect and clean blower micro strainer	x				
3	Check transfer case oil level	x				
4	Check blower driveline	x				
5	OMSI transfer case air shift - drain air filter if equipped	x				
6	OMSI transfer case air shift - check air dryer if equipped	x				
	Fan Units					
1	Check fan transmission oil level	x				
2	Inspect & clean fan impeller(s)		x			

## LUBRICATION

# MAINTENANCE

	Lubrication Chec	klist				
	ITEM	8 Hrs. or each shift	25 Hrs. or Weekly	100 Hrs. or Monthly	500 Hrs. or Every 6 Months	1000 Hrs. or Every 12 Months
1	All grease zerks (unless otherwise noted)		x			
2	All small door hinges		х			
3	Driveline joints - PTO and chassis		х			
4	Change hydraulic oil and filter(s)		1000 h	ours or or	ne year	_
5	Grease boom swivel bearing		х			
6	Grease boom sleeve			х		
7	Grease boom lift cylinder			х		
8	Grease boom hinge pin			х		
9	Grease debris body hoist cylinder pins			х		
10	Grease debris body hinge		х			
11	Grease debris body rear door hinges		х			
12	Grease debris body rear door locks & pivot points		х			
13	Grease debris body fill indicator		х			
14	Grease vacuum enhancer if equipped		х			
15	Grease trash pump if equipped		х			
16	Grease pinch roller if equipped	х				
17	All clamp and lid screws		х			
18	Hose reel swivel joints				х	
19	Hose reel center shaft bearing		х			
20	Hose reel bearing lubrication manifolds		х			
21	Hose reel hose guide		х			
22	Hose reel extensions and shaft		х			
23	Hose reel auto wind guide		х			
	PD Units					
1	Change OMSI transfer case oil if equipped			First	х	
2	Change COTTA transfer case oil if equipped		6 mont	hs or 250	0 hours	
3	Change blower oil (see Mfg. manual)			First	х	
	Fan Units					
1	Change fan transmission oil			First	х	
2	Vacuum relief		х			
3	Change OMSI transfer case oil if equipped			First	х	

1. And if equipped, the Vac on the Go option hydraulic oil filter

## SERVICE INTERVALS & REMINDERS

Service reminders can be set to appear on the in-cab display. They are set by selecting the wrench icon.



Service interval lengths can be set from the front
hose reel display Menu button then Adjust.

Inspection Interval	90	
Service Intervals.Vactor	On	
Service Intervals.Inspection	On	
Service Intervals.Chassis	On	



PRE-JOB / DAILY CHECKLIST - PD UNITS

MAINTENANCE

Pre-Job/Daily Checklist					
	Engine Off, Engine Cool			Engine ON	
Check	Item	Date	Check	Item	Date
	Radiator Coolant			Engine Sound & Exhaust	
	Battery Water			Foot Brakes	
	Hydrometer			Emergency Brake	
	Drive Belts			Power Steering	
	Fan			Cab Lights	
	Alternator			Headlights	
	Crankcase Oil			Tail lights	
	Fuel Tank			Turn Signals, Rear	
	Transmission Fluid			Turn Signals, Front	
	Brake Function			Clearance Lamps, Front	1
	Brake Fluid		1	Clearance Lamps, Rear	
	Instrument Gages		1	Marker Lamps, Front	1
	Windshield Wipers		1	Marker Lamps, Rear	
	Windshield Washers	1	1	Instrument Panel Lamps	
	Mirrors		1	Instrument Panel Gages	
	Tire Wear		1	Horn	1
	Tire Damage			Heating and Ventilating	
	Tire Inflation	1	1	Air Conditioning	1
	Hoses			Mirrors	
	Frame			Seating	
				Test Drive	
	·				
	Engine Off			Engine On, Park Brake Set	
Check	Item	Date	Check	Item	Date
	Hydraulic oil level			Open rear door	
	Blower oil level			Install rear door safety prop	
	Vacuum valves			Inspect vacuum float balls	
	Transfer case oil level			Inspect, clean rear door seal	
	Access door secured			Store rear door safety props	
	Hoses, tubing, loose items secured			Close rear door	
				Hydraulic pump ON when PTO is engaged	
				Verify blower operation	
				Activate E-Stop - check for messages	
Notes:					

Copy and use this check list prior to each job. Failure to monitor the items included in the check list prior to each job will increase the risk of accidental injury to personnel and/or damage to the equipment.

PRE-JOB / DAILY CHECKLIST - FAN UNITS

MAINTENANCE

Pre-Job/Daily Checklist					
	Engine Off, Engine Cool			Engine ON	
Check	Item	Date	Check	Item	Date
	Radiator Coolant			Engine Sound & Exhaust	
	Battery Water			Foot Brakes	
	Hydrometer			Emergency Brake	
	Drive Belts			Power Steering	
	Fan			Cab Lights	
	Alternator			Headlights	
	Crankcase Oil			Tail lights	
	Fuel Tank			Turn Signals, Rear	
	Transmission Fluid		1	Turn Signals, Front	
	Brake Function		1	Clearance Lamps, Front	
	Brake Fluid			Clearance Lamps, Rear	
	Instrument Gages		1	Marker Lamps, Front	
	Windshield Wipers			Marker Lamps, Rear	
	Windshield Washers			Instrument Panel Lamps	
	Mirrors			Instrument Panel Gages	
	Tire Wear			Horn	
	Tire Damage		1	Heating and Ventilating	
	Tire Inflation			Air Conditioning	
	Hoses		1	Mirrors	
	Frame			Seating	
				Test Drive	
			1		
	Engine Off			Engine On, Park Brake Set	
Check	Item	Date	Check	Item	Date
	Hydraulic oil level			Open rear door	
	Fan transmission oil level			Install rear door safety prop	
	Vacuum valves			Inspect vacuum float balls	
	Access door secured			Inspect, clean rear door seal	
	Hoses, tubing, loose items secured			Store rear door safety props	
				Close rear door	
				Hydraulic pump ON when PTO is engaged	
				Verify fan operation	
				Activate E-Stop - check for messages	
Notes:					

Copy and use this check list prior to each job. Failure to monitor the items included in the check list prior to each job will increase the risk of accidental injury to personnel and/or damage to the equipment.

## LUBRICATION - GREASE

## MAINTENANCE

**Grease** - Unless otherwise noted grease all zerks and required surfaces with Castrol Pyroplex Protection ES Synthetic EP Grease NLGI #2 (purple) or equivalent. Special operating conditions (excessive temperature or speed) may require a different type of grease (consult the factory). Do not over grease.

**Hose reel swivel joint** - Use Vactor No. 508541-30 green grease or equivalent high performance synthetic waterproof grease.

**Note:** Keep grease fittings clean, accessible, and free from damage. Grease fittings should be checked every week. Examine for broken fittings and replace broken fittings.

All clamp and lid screws should be lubed with an anti-sieze compound.

Chassis service - refer to the chassis manual.

# 

Entanglement Hazard

Contacting moving parts with clothes or body can cause injury or death:



- Never go underneath the vehicle with the engine running.
- Never work near a rotating drive shaft.
- Never attempt to engage or disengage the pump or other driven equipment from underneath the vehicle with the engine running.
- Never attempt to engage or disengage any driven equipment from any position that could result in getting entangled in the drive shaft or moving parts.
- Never attempt to work on any installed driven equipment with the engine running.
- Remove the ignition keys and post a lockout/tagout sign on the chassis steering wheel and engine control panels as required.

# NOTICE

Keep grease fittings clean, accessible, and free from damage. Grease fittings should be checked every week. Examine and replace broken fittings.

## LUBRICANTS

## MAINTENANCE

-	PD units - Transfer Cases					
	OMSI	NOTES				
1	BP Autran SYN 295	Standard Fill				
	PD units - Roots Blower Lubricant					
	Fluid	NOTES				
1	Castrol Alpha HC/Isolube 220	Standard Fill - refer to Root's manual for additional recommendations based on ambient conditions.				

Fan units - OMSI Transfer Case for Hydraulic Fan System						
1	1 CASTROL SYNGEAR 75W90 (75W-90 API MT-1/GL5 EP) Standard Fill					
Fan units - COTTA Fan Engine Step-Up Transmissions						
1 Castrol Aircol SR 46		Standard Fill				



Machine Can Be Damaged

To avoid damage:

- Never overfill or under fill lubricant or fluid levels.
- Maintain proper fill levels.
- Always use the correct lubricant or fluid.
- Overfilling can cause overheating in gear lubrication systems.
- NEVER operate with either a malfunctioning lubrication system or indicator light ON (if equipped).

## LUBRICATION - GREASE MANIFOLDS - OPTIONAL

Optional grease manifolds provide grease to inaccessible or difficult to reach points. Units may have three grease manifolds: 1) Hose Reel Grease Manifold, 2) Boom Grease Manifold, and 3) Rear Door Grease Manifold.

The hose reel grease manifold is standard and there are two sets of them near the bottom and front of the hose reel. Rotate the reel through its full sweep while greasing.





**Hose Reel Grease Manifolds** 



# HYDRAULIC OIL

## MAINTENANCE

The hydraulic system leaves the factory filled with Castrol Hydraulic Dual Range 32 oil. This purple fluid is recommended for all normal operation conditions from -20° to 95° (F) ambient. For continuous operation above 95° (F) ambient Castrol Hydraulic Plus Blue 68 is recommended. For continuous operation below -20° (F) ambient grade 22 oil is recommended.

Other hydraulic oils, if used, should be a quality product carefully selected with assistance from a credible supplier. The oil should include thermal stability, sheer stability, low-temperature fluidity, anti-wear, anti-corrosion, anti-foaming and seal conditioning characteristics. Consult the factory for oil other than the recommended products.

**Dual range** - Viscosity is similar to a grade 46 oil at temperatures of 155° F and above. Viscosity is similar to a grade 32 oil at temperatures of 60° to 155° F. Viscosity superior to a grade 32 oil at temperatures of -20° to +60° F.



The first change is for the filter at 100 hours and oil every 1000 hours or one year after that. Filters should be changed whenever indicated by the filter gauge. Contaminants allowed to remain in the circuit not removed by the filters will cause excessive wear and malfunctions.

The oil tank will normally feel hot to the touch.

Two sight eyes are installed to determine the oil level are mounted on the side of the oil reservoir tank Proper oil level should not be less than 1/2 as viewed in the lower sight eye and not above 1/2 in the upper sight eye. The debris body should be down, rear door closed, boom stored, hose reel retracted and system off when checking level. Check the oil level every eight hours. If the oil level is low, add proper grade hydraulic oil.



Anti-Wear Hydraulic Oils						
	GRADE	32	46	68		
1	Gravity, API D 1298	32.2	29.3	28.5		
2	Flash, COC, °F D 92.	410	440	460		
3	Viscosity cSt at 40° C D 445	32	46	68		
4	Viscosity cSt at 100° C	5.4	6.8	8.7		
5	Viscosity SUS at 100° F	165	237	352		
6	Viscosity SUS at 210° F	44.4	49	55.5		
7	Viscosity Index D 2270	102	102	99		
8	Emulsion at 130° F D-1401	Pass	Pass	Pass		
9	Turbine Oil Stability Test D 943 Hours	5000+	5000+	5000+		
10	Rust Test, SSW D 665B	Pass	Pass	Pass		

Note: The control system must be configured for the hydraulic oil being used. Different oils have different high temperature alerts.

# Hydraulic Oil Filter

The filtering system used on the Vactor is considered absolute filtering. Many filters only give approximately thirty percent filtration of the particles in the hydraulic oil. These filters are referred to as nominal filters. Absolute filtering can give as much as ninety eight percent filtration of the particles in the hydraulic oil. Vactor uses and recommends only the use of absolute filters.

Filters should be changed whenever indicated by the filter gauge and any time the hydraulic oil is changed. More frequent replacement could be advisable, depending on operating conditions or oil changes at more frequent intervals may be necessary if oil condition becomes poor. Contaminants allowed to remain in the circuit not removed by the filters will cause excessive wear and malfunctions.

The filter uses a disposable element.

The Indicator on the filter automatically resets after maintenance and is color-coded as follows:

Green - Normal

Yellow - Warning

1/2 Yellow & 1/2 Red - Service

The indicator signals the following conditions:

- Clogged filter element
- Fluid temperature below normal
- Impending filter by-pass valve open condition

Hydraulic oil filters should not be cleaned. They should be replaced and the old filter properly discarded in compliance with all federal, state and local laws.

Hydraulic fan systems typically have two filters. Change both at the same time.

To change the filter, follow these steps.

- 1. Shut down the system and relieve pressure in the filter line.
- 2. Unthread canister or housing and remove. This may require a strap wrench.
- 3. Apply a thin film of oil to the new canister or housing seal.
- 4. Pre-fill the canister with oil until full. Prefill the new style housing to the top of the filter element. This reduces the amount of air introduced into the system This is very important on the closed loop system used on the hydraulic fan system.

# NOTICE

Machine Can Be Damaged

To avoid damage:

- Never overfill or under fill lubricant or fluid levels.
- Maintain proper fill levels.
- Always use the correct lubricant or fluid.
- Overfilling can cause overheating in gear lubrication systems.
- NEVER operate with either a malfunctioning lubrication system or indicator light ON (if equipped).
- 5. Install the new canister/element and/or housing. Hand tighten only.
- Start the hydraulic pumping system and check for leaks. If oil seepage is noted, apply additional hand torque to the canister until seepage stops.

#### Filter Element: 514335-30



## HYDRAULIC SYSTEM - RESERVOIR

The hydraulic reservoir should be drained, flushed and filled every 1000 hours or six months whichever comes first. The oil strainers should be removed and cleaned each time the hydraulic oil is changed.

The hydraulic system contains approximately 70 gallons of oil (50 gallons in the reservoir and 20 gallons in the various components). When draining the reservoir a suitable container must be used to hold the oil and prevent spills. It may be necessary to drain the reservoir a small amount at a time.

Change the hydraulic oil and clean the strainer as follows:

- 1. Place a suitable container below the hydraulic reservoir and remove the drain plug from the drain hose on the drivers side.
- 2. Allow all the oil to drain from the reservoir.
- 3. Remove the reservoir cover bolt and cover
- 4. Reach inside the reservoir and remove the oil strainers by unscrewing them.
- 5. Inspect the strainers for wear or damage. Replace the strainers if worn or damaged.



Drain hose is normally located on the driver side in front of the rear wheels inside under the frame.



## HYDRAULIC SYSTEM - RESERVOIR

- 6. Using compressed air thoroughly clean the strainers.
- 7. Install the strainers in the hydraulic reservoir and tighten hand tight plus one-half turn.
- 8. Inspect the diffuser and replace if any damage is present. Orient the diffuser towards the front of the unit.
- 9. Inspect the reservoir cover and seal for wear or damage. If worn or damaged replace the cover and seal.
- 10. Install the cover on the reservoir and secure with the cover bolt. Tighten to general torque specifications.
- 11. Fill the hydraulic reservoir using the specified oil.

# 

#### **High Pressure Air**

When using compressed air, always use eye and face protection, protective clothing and adjust air pressure to 30 PSI or less. Never point the air nozzle at a person. Compressed air can penetrate the skin and cause serious injury or death.





#### Hydraulic oil tank valve

Hydraulic oil tanks have a valve on the bottom of the tank to isolate the tank for service.



Operating the hydraulic system with the valve closed will damage the hydraulic system.



## BOOM LUBRICATION (TELESCOPIC OR EXTENDABLE)

## MAINTENANCE



Lubricate post swivel joints, cylinder ends and hinge pins monthly. Weekly - Extend and retract boom while using hand gun to wash inner and outer tube and sealing area. Photo shows unit with optional remote grease system. Standard units are equipped with grease zerks at each pivot point.

## OUTLET SEAL ADJUSTMENT

The outlet seal can be adjusted for wear. The band clamp around the outlet cone can be either loosen or tighten as dictated by the circumstances. If it is loosened, the outlet pipe will seat deeper into the cone. The adjustment procedure is:

- 1. Install the outlet seal, but leave loose and pushed down away from the outlet cone.
- 2. Fully lower the debris body and raise back up 1/2 inch.
- 3. Slide the outlet seal up to the outlet cone and position so it evenly contacts the cone all the way around.
- 4. Tighten up the seal band clamp.
- Raise and lower the debris body to verify correct alignment and sealing. The outlet cone must not catch on the leading edge of the seal. Readjust as needed for a good seal.



## MAKE/BREAK SEAL ADJUSTMENT

#### MAINTENANCE

The seals going into and out of the debris body must be tight so there can be proper vacuum pressure. The inlet seal is between the vacuum hose and the debris body.

#### Inlet Seal

The inlet seal is adjusted by four bolts under the vacuum hose. Each of the bolts are in a slot which allows the vacuum hose to be slid in either direction. After the bolts are loosened, the seal can be made tighter by sliding the vacuum hose assembly closer to the debris tank.

Four more bolts, two on each side, allow the seal to be tripped to match up to the debris body inlet.

The general adjustment procedure is:

- 1. Position the boom straight ahead, centered over the cab and raised about one foot over the cab guard. This allows the boom hose to push the inlet seal bracket rearward.
- 2. Raise and prop the debris body.
- 3. Loosen the seal bolts just enough so there is some friction to allow the assembly to move when the debris body is lowered.
- 4. Coat the seal with grease.
- 5. Unprop and lower the debris body down. This will push the inlet seal and bracket into proper position.
- 6. Tighten the inlet seal bracket bolts.
- 7. Raise the debris body high enough to verify by the grease print on the debris body that the seal is correctly positioned. Repeat as needed for getting a good seal.





## DEFLECTOR PLATES

The deflector plates redirect the solid debris down to control how the debris body loads and reduce debris entrapment in the air stream. They reduce wear on all the down stream components and increase the working life of them.

Deflector plates should be checked daily and replaced if worn.

# 

**Confined Space Hazard** 

Entering a confined space without proper precautions can lead to death or serious injury. Before entering the debris body, watertank or filter housing comply with all work rules and applicable federal, state, and local regulations.



## MATERIAL FLOW

All areas where material flows are subject to wear. The rate of wear varies greatly with the material and operating conditions. All models are equipped with a replaceable deflector to receive the highest wear and to reduce the materials wear on other parts of the system.

The deflector, cyclones, hoses, tubes, elbows, boom turret and all areas in contact with the moving material should be inspected monthly and repaired or replaced as required. Highly abrasive and/ or corrosive materials will require more frequent inspections.

# 

#### **Confined Space Hazard**

Entering a confined space without proper precautions can lead to death or serious injury. Before entering the debris body, watertank or filter housing comply with all work rules and applicable federal, state, and local regulations.



## PRESSURE WASHING/CLEANING

Units may be equipped with a low or high pressure handgun system. The handgun system can be used to clean the unit, the inside of the debris body, screens, floats, the rear door seal; it can also be used to clean catch basins, to add water to material for easier pick-up, to flush streets around work sites, and to clean ladders and ledges. The system consists of a handgun assembly, a hose, and a quick-connect/disconnect system.

The low pressure handgun is typically mounted on the passenger side of the truck, although other locations are optional. The low pressure handgun and hose are typically stored in the vehicle tool box.

High pressure handguns have long barrels to reduce the risk of operators spraying themselves. High pressure handguns are typically used with systems intended for hydro excavating and industrial applications.

Handgun pressure is controlled with the engine throttle and limited by a pressure relief valve. The handgun must not exceed 600 psi or a maximum volume of 20 gpm when cleaning the unit. Use caution when washing around decals and labels, gear box or blower vents, all air vents or exhausts, painted surfaces, bearings, seals and other soft components to avoid damage. Never spray on or around electrical components. Keep the end of the nozzle at least two feet from the wash area and only work closer after verifying that no damage is occurring.

NEVER use sewer cleaning hose or lateral cleaning hose for any purpose outside of a sewer. Refer to the Safety Manual and Operation section for additional instructions.



# 

Handguns Use High Pressure Water



High pressure water can cause serious injury or death.

- Wear appropriate safety equipment including: Waterproof apparel, protective boots, insulated gloves, safety glasses or goggles, hearing protection (ear plugs and/ or ear muffs) and a hard hat with a face shield.
- Never point the handgun at or near a person or animal.
- Bleed pressure from handgun by shutting off water pump pressure and pressing the trigger before disconnecting from high pressure connection.
- Use handgun and connection supplied with the unit; never use common low pressure handguns or connectors with the high pressure system.

# NOTICE

Machine Can Be Damaged During Cleaning

High pressure water can damage or remove safety decals, vents, paint, wash lubricants out of bearings, and damage seals or other soft components. Avoid spraying on or around electrical boxes and components.

Never increase speed of engine above that which is necessary to obtain a maximum of 600psi water pressure while hand gun is being used to prevent damage to the hose and hand gun.

To prevent rodder pump damage, if equipped, always open at least one ball valve before engaging the pump.

## PD - MICROSTRAINER

From the debris body, air enters the microstrainer housing. The microstrainer is a steel mesh filter located on the intake side of the blower. Its purpose is to prevent any objects or foreign matter from reaching the blower. If it becomes plugged, it will result in a high vacuum, reduction of air flow and loss of efficiency. The microstrainer should be cleaned if necessary and all foreign matter contained in the microstrainer housing should be removed.

The blower lobes can be clearly seen for inspection with the microstrainers removed.

#### **Draining - Service Daily**

Two drain plugs are provided at the bottom of the microstrainer to drain any excess moisture that has collected in the microstrainer during operations. They are plugged during normal operations. At the end of each day, the drain plugs should be removed to drain the water and left open until the next use.

The microstrainers should be checked daily. Follow these steps:

#### Inlet Filter Screen - Service Daily

- 1. Open the cover.
- 2. Inspect the filter screens for dust, dirt or debris.
- If the filters are dirty loosen the wing nut from the center and rotate clamp to clear the strainers.
- 4. Remove the strainers.
- 5. Directing high-pressure water inward from the outside, thoroughly clean all material from grooves in filter screen.







## **PD** - MICROSTRAINER

- 6. Reinstall the cleaned strainers fully into the housing. The strainer bottom should align to a guide pin in the housing.
- 7. Clean the housing cover seal.
- 8. Liberally coat the clamp threads with an antiseize compound.
- 9. Rotate the clamp so each leg is centered on each of the strainers. Rotate each strainer so that the leg of the clamp is properly seated as shown in the cross bracing cutouts. Tighten the wingnut.
- 10. Close the housing cover. Note the orientation of the clamp. Rotate the clamp and secure.
- 11. Check around the cover to verify that the cover is fully seated on the seal. Loosen and retighten as needed.







## PD - OMSI TRANSFER CASE - OIL

The oil level should be checked before beginning any operation. A sight glass for determining the oil level is mounted on the side of the back of the transfer case under the truck chassis. The sight glass can be viewed from the passenger side. Oil level should be in the center of sight glass.

#### **Oil Level**

A sight glass for determining the oil level is mounted on the side of the back of the transfer case which is under the chassis of the truck. The sight glass can be viewed from the passenger side. Oil level should be one-third to one-half as viewed in the sight gauge.

**Note:** The oil level should not be full as viewed in the sight gauge. Oil level should be checked only after unit has been shut down for a minimum of one-half hour. Checking the oil level too soon may give an incorrect reading. See manufacturer's manual for correct oil type. Fill the transfer case slowly with oil. Allow time for the oil to flow down into the transfer case.

Check oil level daily and service as needed. Fill to center of sight glass. Every 500 hours or six months, whichever comes first, drain, flush and refill with BP Autran SYN 295 or equivalent. Verify with the case ID tag. Hydraulic fan unit requires a different lube. Verify with the TC tag.

Note: Rail units with creep drive use a different lube. Always verify with the transfer case ID tag.

#### **Oil Filling**

Clean away all dirt around the filler plug before removing the plug. Refill with new oil of grade recommended for the existing season and prevailing service. Fill until the oil level is halfway as viewed in the sight glass. Typical fill is about 11 guarts.

Note: Do not overfill the transfer case. Overfilling usually results in oil breakdown due to excessive heat and aeration from the churning action of the gears. Early breakdown of the oil will result in heavy varnish and sludge deposits that plug up oil ports and build up on splines and bearings.



# NOTICE

Machine Can Be Damaged

Drain Plug

To avoid damage:

Never overfill or under fill lubricant or fluid levels.

**OMSI Transfer Case** 

- Maintain proper fill levels.
- Always use the correct lubricant or fluid.
- Overfilling can cause overheating in gear lubrication systems.
- NEVER operate with either a malfunctioning lubrication system or indicator light ON (if equipped).



## PD - BLOWER

## MAINTENANCE

For blower description, maintenance, lubrication and operation, see the blower manuals supplied with the vehicle.

#### **Freezing Weather**

Any time the blower/unit will sit after use during freezing weather the blower should be run 3-5 minutes with the vacuum relief open to dry out the blower. This will reduce the risk of the blower freezing up. Depending on weather conditions it may even be necessary before the operators go to lunch and at the end of the daily operation.

#### **Oil Level**

There are normally three sight glasses on the blower. Locations will vary with the blower model and manufacturer. The unit should be on level ground and off. The oil should be filled to the center of these sight glasses. **Do not overfill.** 

#### **Blower Oil Service**



# Check blower oil daily or the start of each shift.

All vacuum blowers are equipped with at least one sight glass at each end of the blower. Depending on blower configuration the sight glasses may be located on either side or the end of the blower at each end, and there may also be upper and lower sight glasses. The oil level must be checked at both ends of the blower while the unit is off and on level ground.

Refer to the maintenance section in the manual and the blower <u>manufacturer's manual.</u> 18







Note opening(s) in frame rails to view sight eye. (Varies with configuration)



## PD - BLOWER - STORAGE

## MAINTENANCE

When the blower will not be used for any time beyond a few days there is risk the close fitting surfaces inside the blower will rust and increase blower lobe wear on startup. Refer to the blower manufacturer's manual for details on long term storage.

Units in extended storage or not being used should have the blowers operated at a minimum bi-weekly to ensure gear and bearing lubrication, and protects against failures due to condensation and moisture.

Short term in high humidity conditions allow the blower to run for 3-5 minutes with the vacuum relief open to dry out the system. Then with the blower at idle speed and the vacuum relief open spray up to 8 ounces of Liquid Wrench® NON-FLAMMABLE Penetrant and Lubricant L312 or L-412 or equivalent rust preventative in to the vacuum relief or in the vacuum gauge port (remove hose to gauge first).

Leave all drain plugs out when not in use. This prevents rain water from building up in the microstrainer housing and silencers.





# PD - BLOWER - SOUND SYSTEM

A drain plug is provided at the bottom of the silencer housing which is used to drain any excess moisture that has collected in the silencer during operations. It must be plugged during normal operations. The plug must be removed at the end of each day and the water drained out.

Leave the drain plugs out when not in use. This prevents rain water from building up in the silencer.

Verify the rain cap works correctly to assure rain and water cannot enter.



## FAN SYSTEM - VACUUM VALVE SYSTEM

#### Vacuum Valve System

The vacuum valve is an air actuated butterfly valve which shuts off the air flow to the vacuum hose while venting the debris body.

The valve is activated at either the pendant control, the hose reel control panel or E-stop.

The vacuum valve system on a fan unit functions differently then in a PD blower unit. The valve on a fan machine closes off the air path to the fan to reduce power consumption and at the same time the small tear drop shaped opening allows the debris body and vacuum lines to relieve vacuum. The valve on a PD blower system opens to atmosphere between the debris body and blower. This creates an alternate air path for the blower to draw cool air, and the debris body and vacuum lines to relief of vacuum.

#### Valve operation

The valve should not slam open or slam close, but should have a noticeably smooth operation.

The valve can be thrown out of alignment and fail to operate properly if it is allowed to open or close too abruptly.

The valve is equipped with a screw on either side for speed adjustment. These are needle valves.

#### Valve Adjustment

The butterfly valve is held in place by a compression bushing.

- 1. To relocate, loosen the compression bushing and relocate the valve.
- 2. Tighten the compression bushing.

Vacuum valve system is controlled by the system.

When on MID or HIGH range and the vacuum valve is engaged, then the throttle drops to idle.

When the vacuum valve is opened, then the throttle will go back to where it was previously.





# Maintenance

# FAN CI FANING

Each impeller needs to be inspected and cleaned at least once a week even if the unit is equipped with an optional impeller washout system. Dirty impellers will cause vibrations and reduce vacuum levels. They must be shut down and cleaned. There is one washout plug on top of each housing. Housing drains are normally routed down lower, usually under a tool box.



#### The fan drive must be off WARNING during cleaning.

- 1. Dump the debris body.
- 2. Shut down the fan drive.
- 3. Remove the housing wash out plug or plugs. If equipped with the optional washout system note/mark the orientation of the plugs before removing.
- 4. Remove the housing drain plug or plugs.
- 5. Insert the hand gun nozzle into the washout ports. Using the hand gun thoroughly clean the impeller and inside housing.





# NOTICE

Machine Can Be Damaged

- Beware of carry over material from debris body through the blower or fan.
- Running the blower/fan too fast with light material can carry the material over into the blower or fan. This can cause premature wear.
- Over filling the debris body can cause carry over and damage to the fan/blower.
- A build-up of material on the fan will cause an out-of-balance condition. Operating an out-of-balance fan can cause damage to the fan, fluid drive, spindle box or auxiliary engine. If necessary, remove the intake elbow for proper cleaning.

# FAN CLEANING

#### 6. After washing out the impeller and housing, use a flashlight to inspect the impeller blades for wear and tear. If the impeller tips show signs of excessive wear inspect the unit for excessive carry over during operation. There should not be any regular visible debris in the fan exhaust stream.

7. If necessary, replace the impeller.

#### Optional fan housing washout system

Shut down the fan drive during cleaning.



#### The fan drive must be off WARNING during cleaning.

Note: Depending on configuration some units will require opening/closing either the Handgun or High Pressure Hose Reel valve in addition to the Fan Housing Washout valve.

To use:

- 1. Open drain to each housing.
- 2. Turn ON Fan Housing Washout valve.
- 3. Turn ON the rodder pump.
- 4. Continue running water until the housing drains run clear.
- 5. Turn OFF the rodder pump.
- 6. Turn OFF Fan Housing Washout valve.
- 7. OPEN hose reel valves.
- 8. Reinstall drain plugs to each housing.
- **Note:** Starting late 2021 the orientation and size of the nozzle was changed to improve cleaning. Contact your dealer for additional information.

impeller(s) realign nozzles to face forward when reinstalling hole plugs. Verify that nozzles are not plugged.

After

inspecting









Worn Impeller



Effective Date April 2, 2025

## IMPELLER REPLACEMENT

## MAINTENANCE

A damaged or worn impeller will cause vibration and possible damage to the drive system. The procedures for replacing the impeller are similar for single and two stage units. The expandable shaft coupling procedure must be followed when locating and attaching the impeller(s) to the shaft.

The two stage units require the additional removal of the first stage impeller and housing.

#### Special tools

- 81006A Expandable bushing remover plate
- 500370 Expandable bushing remover bar
- 500371 Expandable bushing remover plate



# **A** DANGER

#### **Entanglement Hazard**

Contacting moving parts with clothes or body can cause injury or death:

- Never go underneath the vehicle with the engine running.
- Never work near a rotating drive shaft.
- Never attempt to engage or disengage the pump or other driven equipment from underneath the vehicle with the engine running.
- Never attempt to engage or disengage any driven equipment from any position that could result in getting entangled in the drive shaft or moving parts.
- Never attempt to work on any installed driven equipment with the engine running.
- Remove the ignition keys and post a lockout/tagout sign on the chassis steering wheel and engine control panels as required.

## IMPELLER REPLACEMENT - EXPLODED VIEWS



# Vactor 2100i Impeller Replacement - Shaft Coupling 47801F-30

Vactor uses a variety of fan couplings. Verify which coupling is being used in the assembly before proceeding to avoid damage to the fan assembly.

#### Assembly procedure

- 1. Remove coupling from wrapper; retain instructions included with wrapper.
- 2. Remove all visible oil, grease, debris, etc from surface of shaft and coupling .
- Slowly slide coupling into impeller hub. Coupling should protrude slightly from back face of impeller hub.
- 4. Slide impeller and coupling onto impeller shaft
- 5. Align back of coupling flush with back edge of hub.
- 6. Remove the two, red painted, hex head shipping bolts from the coupling.
- 7. Align expansion slot (mark in white) with index mark on hub (mark in white).
- 8. Tighten the 10 retaining bolts, in sequence, per following diagram.

**Note:** The impeller will move as the coupling is tightened. Several attempts may be required to end up at the correct gap adjustment.

The coupling may be loosened and retightened as often as needed to adjust the impeller assembly. However, once the bolts have been torqued to 30 ft-lbs they cannot be reused. If they are loosened, they MUST be discarded and replaced with new bolts! It is critical that any adjustments needed for proper assembly be done prior to final torquing in the assembly process.

507417-30 - REPLACEMENT BOLTS

- 9. Increase torque in increments of 15 ft-lbs.
- 10. When assembling the coupling into the final impeller / shaft assembly, torque bolts to 30 ft-lbs.





**Note:** Coupling is rebuildable. Brass bushing must not be reused if damaged. Contact Vactor Parts and Service for assistance.



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# Vactor 2100i

# IMPELLER REPLACEMENT PROCEDURE

#### Replace the impeller(s) as follows:

- 1. Shut down the chassis and auxiliary engine. Remove the ignition key and post notice of maintenance on the steering wheel and front control panel.
- 2. Remove the elbow and hose assembly.
- 3. Using an overhead support and lift, remove the fan housing nuts.
- 4. Remove the inlet cover.
- 5. Clean all corrosion and debris from the end of the shaft.
- 6. Using a marker, match mark the hub and shaft for positioning during installation.
- 7. Remove the bolts from the flange and install in threaded holes.
- 8. Tighten the bolts evenly until the impeller can be moved back from the hub.
- 9. Slide the coupling off the shaft.

**Note:** If the coupling does not readily move on the shaft, then the special removal tools will be needed to pull it off.

10. Remove impeller from housing.

#### For two stage fans continue to remove the first stage housing and install the inner impeller. For single stage fan skip ahead as noted.

- 11. Using an overhead lift and support, remove the spacer and outer fan housing to continue on for the inner impeller.
- 12. Clean the drive shaft by removing any rust or rough spots.
- 13. Using a marker, match mark the hub and shaft for positioning during installation.
- 14. Remove the bolts from the flange and install in threaded holes
- 15. Tighten the bolts evenly until the impeller can be moved back from the hub.
- 16. Slide the coupling off the shaft.

**Note:** If the coupling does not readily move on the shaft then the special removal tools will be needed to pull it off.

- 17. Remove impeller from housing.
- 18. Place the new impeller with new bushing in the housing.

Effective Date April 2, 2025

19. Using the match mark, position the hub on the drive shaft.





- 20. Position the impeller on the hub with the mounting bolt holes aligned.
- 21. Install the hub mounting bolts loosely.
- 22. Install new gasket material and the spacer assembly on the fan housing and secure with mounting nuts. Torque nuts to general torque specifications.
- 23. Position the impeller/hub for a 3/16" gap (all around) between the impeller and spacer assembly as shown. A washer of the correct thickness is being shown used as a thickness gauge. Do not allow gauge to fall into housing or run with gauge lost in housing or impeller.

## IMPELLER REPLACEMENT PROCEDURE

**Note:** The impeller will move as the coupling is tightened. Several attempts may be required to end up at the correct gap adjustment.

- 24. Verify which coupling is being used and follow the shaft coupling assembly procedures to lock the impeller in place. While doing so verify that the correct gap is maintained. Adjust as needed.
- 25. Check inner impeller for vibration and proper clearance by operating impeller with inner impeller installed. The impeller can be operated with only the inner impeller installed. Operate at normal operating speed to check for vibration and proper clearance. Adjust as necessary without having to remove the outer impeller.
- 26. Install new gasket material, outer housing and spacer assembly on the inner fan housing and secure with mounting nuts. Torque nuts to general torque specifications.

# Continue here for single stage fan and to finish two stage fan assembly

- 27. Place the new impeller with new bushing in the housing.
- 28. Using the match mark, position the hub on the drive shaft.
- 29. Position the impeller on the hub with the mounting bolt holes aligned.
- 30. Install the hub mounting bolts loosely.
- 31. Install new gasket material and the cover on the fan housing and secure with mounting nuts. Torque nuts to general torque specifications.
- 32. Position the impeller/hub for a 3/16" gap (all around) between the impeller and cover as shown.
- 33. Verify which coupling is being used and follow the shaft coupling assembly procedures to lock the impeller in place. While doing so verify that the correct gap is maintained. Adjust as needed.
- 34. Check inner impeller for vibration and proper clearance by operating fan with inner impeller installed.
- 35. Install remaining air inlet parts. Torque to general torque specifications.
- 36. Run system to verify correct operation.







## FAN TRANSMISSION

## MAINTENANCE

The fan transmission is located between the hydraulic drive motor and the fan housing. Normal oil change interval is every 500 hours or 6 months in normal use. Refer to the lubricant page for the recommended oil.

Fill until oil is at the fill level plug if not equipped with a dipstick.

A drain hose for the transmission is located under the frame and is normally bundled up with local hoses on the driver side near the transfer case. Look for a hose that is capped.



# Vactor

## **BLOWER - AUTOMATIC RELIEF VALVE**

The automatic relief valves protect the blower if the vacuum hose, debris body or inlet filter become plugged or restricted. These valves are on all units with 15-18 in-hg systems. The valves open at a preset vacuum level and allow the blower to draw air through the valve openings. Proper operation should be verified daily by temporarily blocking off the vacuum hose and observing that the valve whistles at the unit's rated vacuum level.

The relief valve, when operating, will emit a loud, sharp whistle. This will occur when the vacuum hose is plugged or when the floatball shutoff stops the airflow, indicating the debris body is full.

The blower is cooled internally by the air moving through it. As the vacuum levels increase, the airflow decreases; therefore less cooling air is available which causes the blower to heat up.

The relief valve opens at a preset level to admit extra air into the blower. The valve will whistle when this happens. Steps should be taken to reduce the vacuum.

The valves are not user adjustable and must be replaced.

**Note:** The valves have a set pressure tolerance of -0/+2 IN-HG. Always install a second known good vacuum pressure gauge to verify correct operation when troubleshooting.





# A CAUTION

Noise outside cab can cause permanent hearing loss. Always wear approved hearing protection when operating equipment.



Se puede perder el poder de audición

Protección de orejas se requiere cuendo este equipo esta en uso para evitar pérdida de audición.

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# **Vactor** BLOWER - AUTOMATIC RELIEF VALVE - REPLACING

#### Replace the Relief Valve

A safety-relief valve should begin opening 1-1/2 to 2-inches hg below maximum hg and be fully open at maximum hg. To check relief valve operation, leave vacuum tube attached to bumper mount and watch vacuum gauge, located on control panel. Briefly increase truck RPM to normal operating pressure. If relief valve does not open, increase RPM until it opens or vacuum gauge shows 15 hg. Replace the relief valve if it opens before system pressure reaches normal level or after 15-inches hg on the vacuum gauge.

To replace the relief valve, do the following:

- 1. Remove screen from bottom of relief valve. Then remove the relief valve.
- 2. Before installing a new safety-relief valve, use a pipe tap to ensure clean-cut uniform threads are in the opening for normal hand-tight installation.
- **Note:** Use pipe compound sparingly to prevent excess from entering valve and causing leakage.
- 3. Thoroughly clean and flush system of all dirt and debris, which can scratch seals and cause erosion and leaking.
- 4. On relief valve, leave female pipe threads and the first thread of the male pipe free of pipe compound; apply a moderate amount to remaining male pipe threads.
- 5. Install relief valve hand-tight followed by one half to one full turn.
- **Note:** Avoid over-tightening which will distort safetyrelief valve seals. As the vessel and valve are heated, the heat causes an explosion, which grasps the valve more firmly.
- 6. Apply a moderate amount of pipe compound to the male pipe threads on the relief valve.
- 7. Install the screen (hand-tight) followed by onehalf to one full turn.

# NOTICE

Safety / relief valves should be operated only to assure that they are in good working condition. Opening can cause leakage of trapped foreign material.

Never break lead and wire seals or tamper with safety / relief valve. Never reset relief valves to higher vacuum settings. Damage to the blower can occur.



# PD UNITS - AIR OPERATED VACUUM VALVE

Vactor

The air operated vacuum valve is used to relieve the system if the vacuum hose, debris body or inlet filter become plugged or restricted. These valves are on all blower units. The valves are normally operated from the master control panel, pendant, E-Stop or optional wireless remote. Proper operation should be verified daily while under vacuum. Actual location size and configuration of the valve varies by the model and options. Typical location is in the inlet piping of the blower.

Vacuum valves require regular inspection and periodic cleaning. Develop a regular program of visual inspection, looking for clogged drains and discharge pipe, dirt buildup in and around the valve seat, and broken or missing parts. Keep the valve and the area around the valve clean and free of any foreign material or substance.



- **Note:** Keep foreign material from entering the valve. Never paint, oil, or otherwise cover any interior or working parts of any safety valve; safety valves do not require any lubrication or protective coating to work properly.
- **Note:** Test all vacuum valves to ensure proper valve operation.

The vacuum valve is actuated by a switch located on the main control panel, E-Stop or a switch located on the pendant control. The switch and system control an air valve which sends air pressure to the valve either opening or closing, whichever is needed. The vacuum valve needs to be open for normal vacuuming using the boom and debris hose. When the vacuum valve is enabled (closed), air flow is blocked to the boom and debris hose.

The vacuum valve defaults to the disabled (valve open) position when the master switch is off (legacy units), E-stop is activated or the unit is shut down.

#### OPERATIONS





Solenoid valve for vacuum valve (Normally located on driver side)
# PD UNITS - AIR OPERATED VACUUM VALVE

Whether it is manually or automatically operated, a switch triggers the system to energize an electric over air solenoid valve with a spring return. This allows pressurized air to fill a chamber on the actuator for the butterfly valve which closes or opens.

As with any other electrical system in Vactor products, the master switch (legacy units) or E-Stop in the main control panel has to be in the ON position. If the valve fails to function, the problem could lie in the electrical or the pneumatic system. To trouble-shoot, first ascertain whether the problem is mechanical, electrical or pneumatic. To do this, start the engine, build up air pressure to the maximum and follow the procedure to obtain power to the control panel and turn on the master switch (legacy units) or E-Stop. Trace back the two air lines at the valve actuator to the double air solenoid. This may be located very close to the valve itself or may be somewhere at the underbelly of the debris body. Remove one air line at a time on the "out" side of the solenoid. If there is pressure at one of the ports, the problem is not pneumatic.

Now, operate the switch. If the air pressure switches to the other port, there is no electrical malfunction either. Now that the problem has been categorized, we can proceed to rectify the defect.

#### Pneumatic

If there is no air pressure at the "out" side of the air solenoid, remove the incoming air line to the solenoid. Does that have air pressure? If yes, you have a faulty solenoid. Open, clean and reassemble or replace the solenoid assembly. If there is no pressure in the incoming line, trace the incoming line to its origin, checking for kinks or blockages. Pull out the air line coming out of the air dryer/ tank at the air protection valve. Check for air in the reservoir. Check if air protection valve functions



properly, if not, replace.

#### Electrical

Vactor

Is the master switch (legacy units) or E-Stop on? Check for loose connections at the mating plugs. Open the junction box door and check for tripped breakers, loose connections or damaged wiring. Repair as required. Unplug the wiring harness at the solenoid and check for voltage at the harness connectors with the switches in both, the open and closed positions. If no power, go back to the pendant switch and open it. Check incoming voltage to the switch, corroded, worn or otherwise damaged contacts or loose or damaged wiring. Repair as required.

If there is voltage at the wiring harness connectors at the solenoid valve, press the solenoid over ride rubber buttons, one on each of the solenoid assembly. If that operates the valve, the solenoids are faulty. Replace the faulty solenoids).

#### Mechanical

If air is being supplied to the valve actuators and the valve still does not work, the valve could be binding. Remove the strainer basket and try to free the valve by squirting some penetrating oil at the shaft bushings. Remove the air lines going to the actuators and lubricate the ports with air tool oil or penetrating oil. It may be that the screws of the valve to shaft or the actuator coupling have come loose or the shaft is broken. Rectify as necessary.

## REAR DOOR PROP BREAK-AWAY

Starting in late 2009 the standard rear door safety prop configuration has a break-away feature. The center bolt will shear off with a loud popping sound in the event an operator inadvertently tries to power the door closed with the prop(s) in place. This reduces the risk of damaging the rear door.

If the bolt is sheared, tap the arm back in place, remove the damaged bolt and replace with Vactor part number 16342D-30, 43762-30, and two of 16365B-30. Reinstall all washers as shown.

Remove the pivot and slot bolts and replace if damaged with standard grade 5 bolts. Reinstall all washers as shown.

The pivot bolt and slot bolt are installed with belleville washers. Tighten the fibre locknuts down until the belleville washer just becomes flat and no more. Do not overtighten.

# NOTICE

Rear Door Can Be Damaged

To avoid twisting damage to rear door always use the rear door prop(s). Lower rear door until it just touches both prop(s). Never power door down onto prop(s).



# REAR DOOR - SEAL

### MAINTENANCE

Regularly clean the door, especially the door seal, and lubricate the hinges. The door seal should be cleaned each time the debris body is dumped.

The rear door seal provides an airtight seal for the debris body. It is important to keep the seal clean and in good condition. Inspect the seal after each dump and replace if damaged or worn. The seal can be replaced on the vehicle or the door may be removed and placed on supports with the seal channel facing up.

Changing the Door Seal Materials needed:

- Replacement seal
- 3M Industrial Adhesive P/N 4799 (2 tubes 1002)

body before using machine.

Refer to manual for details.

- Cyanoacrylate adhesive (super glue)
- Duckbill vise grip pliers
- Hacksaw
- Mallet

#### Seal Replaced with Door Removed

If removing the door for installation of the seal off the vehicle, use an overhead crane support and lift to remove the door. Place it on supports with the seal channel facing up.



Use an overhead crane support and lift to secure the door before disassembling the door hinges. Use the crane to remove the door and position it for seal replacement. Never work underneath the door without proper support or safety props.

#### Seal Replaced with Door on Unit

When installing the seal with the door on the vehicle, do the following:



body before using machine.

the hydraulic functions to prevent death, injury or equipment damage.

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- Use the instructions posted in the cab to a. engage the hydraulic pump.
- Raise the debris body. Install the debris b. tank and rear door safety prop.
- Shut down the engine and remove the C. ignition key.
- d. Post a notice on the steering wheel that maintenance is being performed.

# Rear Door – Seal

## MAINTENANCE

#### Procedure When Replacing the Door Seal

- 1. Completely remove the seal and clean the seal channel of all glue and dirt.
- 2. Apply a generous amount of adhesive to all sides of the seal channel.



3. Make sure the end of the seal is cut squarely for a proper seal at the end of the procedure. A hacksaw works well.



4. Starting at the top of the door, place the flat surface of the new seal into the seal channel.



- 5. If installing the seal with the door on the vehicle, do the following:
  - Squeeze the seal with the duckbill pliers while feeding the seal into the channel.



## Rear Door – Seal



- 6. If installing the seal with the door removed do the following:
  - Using a mallet, pull on the seal while pounding the seal into the channel.



- 7. Use the hacksaw to cut off excess seal to form a flush, airtight mating surface between seal ends. Coat one end of seal with the cyanoacrylate adhesive before installing.
- 8. If installing the seal with the door off of the vehicle, use an overhead crane support and lift to install the door on the debris body.



## BUTTERFLY VALVE ADJUSTMENT

A variety of air and hydraulic actuated butterfly style valves from a number of different manufacturers are used. A butterfly valve, shown at right, rotates a disc in the material flow to open and closed positions (shown in closed position). The valves are normally actuated by switches or automatically by the system controls. During servicing or use an inadvertent actuation could result in an injury from the moving parts. The valves can still remain active when not installed unless the air or hydraulic lines are disconnected and all safety precautions followed.

Do not allow tools, arm, hands etc. in the butterfly areas as serious injury may occur. Shut down all systems and de-energize or disconnect the air or hydraulic system to the valve before servicing.

Improperly adjusted valves can cause actuator damage or disc bolt fatigue and failure. *Valve should open and close smoothly.* 

Butterfly pneumatic actuators are designed to allow adjustment without the removal of the actuator end caps. Typically there is a jam nut located on each end of the actuator in the center of the end cap. Newer style butterfly valves have the adjuster bolt on the side of the actuator. One adjuster controls the closed position and the other the open position.

With the valve in the CLOSED position:

- 1. Determine which adjuster screw is for the closed position. It will be the one that moves the disc.
- Adjust the screw all the way in (for side adjusters - out for end cap adjusters). This should give you about 5 deg. adjustment.
- 3. The disc should start to unseat in this position and still provide shut-off.
- 4. Tighten the jam nut and check your system to see if the valve is providing shut-off.
- 5. If the valve is not providing shut-off loosen the jam nut and readjust to where the disc just seals.
- 6. Observe the valve operating:

# CLOSED Valve angle seat should be between 3 and 5 degrees.

Valve should open and close smoothly.



**Butterfly Valve** 







# AIR SYSTEM

All units use compressed air to operate various valves and cylinders. The air is normally supplied by the chassis air system. Depending on options, unit or chassis configuration there will normally be one or more air tanks, filters or dryers located on the unit in varying locations.

#### Maintenance

If equipped all air tank filters should be checked daily and cleaned if necessary. If upon a visual inspection, the filter is dirty or clogged, it should be replaced.

Note: the chassis air tank should be drained daily and the unit air filter

checked and cleaned if necessary every 48 hours. Cold or very humid weather may require more frequent draining of the chassis air tanks.

When air is compressed the water vapor in the air is put into the vehicle's air system. The liquid accumulates and affects system performance by washing away lubricants, accelerating corrosion and blocking air system components by freezing. High humidity, high air consumption and cold temperatures increase the water vapor collected in the air system. Two common methods are used to address this issue are automatic drains and desiccant-type air dryers. Manual drains may also be found.

**Note:** Alcohol injection systems are sometimes used by others. They are very specialized and should not be used as the alcohol can damage seals and plastic parts in an air system.

Freezing conditions can create situations where the frozen water can slow down or stop the proper operation of the various components in an air system. This can include chassis brakes, air valves and air cylinders that operate safety systems such as vacuum reliefs. When operating under these conditions proper operation of the air systems should be routinely verified. The frequency will vary with the conditions.

When the conditions exist for air system water problems Vactor Manufacturing and most chassis manufacturers recommend draining all system air reservoirs every 2-3 hours of operation.

Desiccant-type air dryers require routine replacement of the desiccant element. Refer to the chassis service manual.

Consult the Vactor Manufacturing Service Group for recommendations and systems suited to your applications.







In-line dryers and filters are normally used on units with blowers and transfer cases for the air shift.



Typical desiccant style air dryer with replaceable filter element.



## HOSE REEL ASSEMBLY - DRIVE CHAIN

#### Drive Chain Lubrication

Lubricate the chain using a good quality spray foam chain lubricant.

#### Drive Chain Adjustment

With the chassis engine off, check the slack in the hose reel drive chain. The chain should have no slack. If there is slack, adjust the chain as follows:

- 1. Loosen the four drive motor bracket bolts.
- 2. Loosen adjusting bolt lock nut.
- 3. Tighten adjusting bolt until there is no slack in the chain.
- 4. Retighten lock nut on the adjusting bolt securely.
- 5. Retighten drive motor bracket bolts to general torque specifications.

**Notes:** Over time it may become necessary to remove a half link or a link from the drive chain.

#### Bypass valve

Motors are equipped with a bypass valve. Opening the valve allows the hose reel to be free wheeled or rotate freely for manual retraction.



## HOSE REEL SWIVEL JOINT

### MAINTENANCE

There are two swivel joints on the water hose reel and both have grease zerks. One swivel joint is located near the front center of the hose reel. The other is positioned below the hose reel near the middle.

Use Vactor No. 508541-30 green grease or equivalent high performance synthetic waterproof grease.

On units equipped with remote grease zerks the lefthand zerk is normally the swivel joint.

At the first indication of fluid leak from the swivel joint, take remediation action as follows:

- 1. De-pressurize system.
- Remove Lock Bar and rotate Nut 30 degrees clockwise (Lock Bar slots in Body are 30 degrees apart, slots in Nut are 60 degrees apart), reinstall Lock Bar in appropriate slot.
- Pressurize system and inspect for leaks. If no leak observed, remediation is complete; if leak observed, repeat Steps 1-3.
- 4. If 25 ft-lb or more torque is required to tighten Nut in Step 2, the packing inside the swivel joint is too worn to control leakage and the packing should be replaced as soon as practical. If packing is not replaced in a timely manner, fluid will migrate into the pressure cavity and bearing cavity, corroding components and rendering the swivel joint unusable and unrepairable.





#### Swivel Joint Packing Adjustment

If swivel leaks, remove the locking tab and loosen the packing gland adjustment two notches. Use a hand grease gun and give two pumps of grease. Tighten the packing gland adjustment two notches and recheck for leaks. Continue until leaking stops. When all adjustment has been taken up, remove packing gland and replace packing. Fill with grease after repacking.

## HOSE REEL - CENTER SHAFT BEARINGS

Greasing of the bearings on the center shaft should be performed on a weekly basis. There is a grease zerk for the center shaft on each end – one remote zerk on the front of the hose reel and the other on the backside of the hose reel. Do not over grease as these are of a sealed bearing type, and over greasing will push the seals out and allow dirt to enter the bearing. Two pumps of the grease gun is sufficient.





## HOSE REEL - TELESCOPIC/ROTATING BEARING

#### The bearing used on the telescopic/rotating hose reel bears the weight of the hose reel, rodder hose and attachments. The bearing and locks must be lubricated properly to prevent bearing wear and damage.

Grease once a week or every 25 operating hours, whichever comes first.

The bearing is lubricated through the left hand grease zerks located underneath the hose reel. When greasing the bearing, grease cannot flow throughout the bearing without rotating the hose reel. While applying grease to the grease zerks, rotate the hose reel back and forth. Bearing failure is usually caused by lack of lubrication.

The hose reel locks are lubricated through the right hand zerks. They should be lubricated monthly. Do not over grease, use two pumps per zerk.

The bearing teeth should be checked monthly to ensure there is not a buildup of debris. Debris buildup may prevent the hose reel locks from properly meshing with the bearing, and will reduce the effectiveness of the locks.





## **Vactor** INTUITOUCH DISPLAY - FOOTAGE COUNTER ADJUSTMENT

## OPERATION

# Hose Reel Footage Counter - Program Adjustment

If the hose reel footage counter (encoder) needs to be replaced or is not reading correctly, the following adjustments should be verified. The hose reel footage counter will not display correctly until properly adjusted. This can be due to two variables:

Issue		Solution
Incorrect Accu- Count Adjustment Setting	1.	Calibration setting should be set to 4

2. Incorrect instalation 2. of encoder

1.

Encoder needs to have the adjustment notch facing downwards as well as be backed out a quarter turn when correctly installed

#### **Program Adjustment Procedure:**

- Shut down the truck on level ground while keeping the ignition active (in the ON position), set the brake, and follow lockout/ tagout procedures.
- 2. From the main hose reel page:
  - > Click the System Tab
  - > Then the Functions Tab
  - > Then the Accu Counter Button

Settings Hose Diameter: 1.5 Inch te Diameter Calibration: 1.1 Hose Length: 9720.0 Inch se Reel Inner Diameter: 23.0 Step Size Calibration: 1 Hose Reel Width: 20.9 Inch	Status Accu Count Pulse Count: Layer Status: Default sta Wraps Per Layer: Total Layers:	0 10 7
Adjust Settings	- · · · ·	e es
Settings.Accu Count Hose Diamet	cu Count er Calibration 1	-10
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- 3. Select the Adjust Settings Button.
- 4. Scroll down to the end of the settings.
- 5. Set Accu Counter calibration to value: 4.

#### Hose Speed Encoder Location



The encoder is located on the body of the hose reel motor



## SPEED ENCODER INSTALLATION

## OPERATION

# Accu Counter Speed Encoder Installation Procedure:

- 1. Shut down the unit on level ground, set the brake, and follow lockout/tagout procedures.
- 2. Rotate the motor's shaft until a (gear/target) tooth is centered in the speed encoder port.
- **Note:** If a gear tooth is not centered in the speed encoder port, the encoder may be damaged during motor operation.
- 3. Make sure the lock nut and its threads are clean, dry, and free of debris so the speed encoder can be properly torqued.
- 4. Position the lock nut against the alignment nut during installation. This will prevent the lock nut from interfering with the alignment nut and producing an inaccurate torque reading.
- 5. Move the washer and the o-ring up against the speed encoder body threads. This will prevent the washer and o-ring from interfering with the speed encoder installation and producing an inaccurate torque reading.
- By hand, lightly thread the speed encoder body into the housing until the encoder touches against the motor (gear/target) tooth. Back off the speed encoder body to make sure the o-ring or the washer are not touching the housing.
- Note: Do not force the encoder against the (gear/ target) tooth, encoder damage may occur.



- 6. Turn the speed encoder body out one-quarter (1/4) turn counter-clockwise (CCW) plus the additional amount (CCW) needed to make the alignment notch face downwards.
- 7. Maintain the speed encoder body alignment, and tighten the lock nut to 8.5-14 Nm [75-125lb-in.] (torque values are for clean, dry threads).
- Check the speed encoder body to ensure the alignment notch is still facing downwards. If not, reinstall the encoder by following the aforementioned steps.

## RODDER HOSE REPLACEMENT

## MAINTENANCE

Vactor uses only high quality jet rodder hose, but even the best hose can wear out or become damaged beyond repair. What constitutes damaged hose and how to properly repair Vactor jet rodder hose is discussed elsewhere in this manual. If the hose needs to be replaced, follow these procedures:

- 1. Start the unit and engage the hydraulic pump using the procedure listed in the cab for your unit. This may vary from one unit to the next.
- 2. Go to the front hose reel and rotate the hose reel so that the damaged or old hose runs off the reel. The old hose can be run out on the floor or wound up on an old reel to be disposed of at a later date.
- 3. Go back in the cab and shut the hydraulics OFF once all the hose is off the reel.
- 4. Remove the rear cover from the hose reel.
- 5. Disconnect hose at connection on the rear side of the hose reel and discard the hose.



# **A** WARNING

Entanglement Hazard



To avoid severe injury or death: L

- Never attempt to engage or disengage hose reel from any position that could result in getting entangled in the reel or moving parts.
- Never attempt to work on hose reel with the engine running.
- Remove the ignition keys and post a lockout/tagout sign on the chassis steering wheel and engine control panels as required.

## RODDER HOSE REPLACEMENT

- 6. Feed the new hose through the hose reel opening and connect the hose to the water connection as shown. Leave the connection loose so it move with the hose during the wrapping.
- 7. Orient the hose towards the outer side of the hose reel. It may be necessary to loosen and rotate the elbow fitting.
- 8. Go back in the cab and re-engage the hydraulics.
- 9. Lubricate the hose with soapy water. Repeat as need as the hose is unwrapped of the shipping spool.







## RODDER HOSE REPLACEMENT

- 10. Wind the new hose onto the hose reel keeping the wraps tightly aligned. Rotate the reel slowly so the hose can be guided to a tight wrap.
- 11. Install and wrap the leader hose.
- 12. If the unit is not going right back into service, tie-wrap the hose end to prevent if from unraveling.
- 13. Tighten the hose connection inside the hose reel and reinstall the cover.
- 14. Reposition the hose guide for the starting point of the new hose. Ensure that the hose guide is will run in the correct direction.
- **Note:** A heavy welding coat worn by the operator winding the hose works well to reduce the friction rubbing of the hose while guiding it.

Do not allow the hose end to pass under the pinch roller. The hose fitting can catch on the roller and loosen up the hose wind on the reel.









## SWIVEL BEARING REBUILD

#### **Swivel Bearing Rebuild Instructions**

Hose reel swivel bearings can wear out over time from normal (and/or excessive) wear and tear. As previously mentioned, adjustments can reduce or halt leakage and therefore lengthen the time until the unit must be replaced or a repair must be made. However, the hose reel swivel bearings are rebuildable. Disassemble the swivel bearing to find any worn out parts to be replaced to get the unit back operational.

#### Swivel Bearing Disassembly Instructions:

1. Remove the lock bar.

2. Rotate the halves counterclockwise to seperate the nipple body.

**3.** Remove packing (2 chevrons and 1 male adapter) from body.

- 4. Gently remove back-up ring from nipple, followed by the o-ring.
- **Note:** Take extra care during this step not to damage parts. Only use non-marring tools.









## SWIVEL BEARING REBUILD

- Remove the two ball retaining plugs. Next, rotate the nipple body to enable all ball bearings to drop out.
- Note: Do not use excess force to remove ball plugs, especially in stainless steel joints. Remove stake with small grinder or another suitable tool.

6. Remove the nut from the nipple, followed by removing the o-ring from the nut.

7. Clean all components in preparation for re-assembly. Re-assemble in reverse order.

**Note:** To properly install the ball retaining plugs, turn the plug clockwise until it contacts a ball below it. Turn the plug 1/4 to 1/3 counterclockwise. Lock the plug in place using a center punch or another suitable tool. Ensure the plugs are locked in place to avoid the plugs and ball bearings from falling out.

#### Packing Adjustment Procedure

- 1. Turn nut clockwise into body.
- 2. When nut approaches body an increase in torque will be noted.
- 3. Stop and rotate nut counter-clockwise 15 plus the amount required to line up the lock bar slots in the nut & body.
- 4. Install lock bar and retaining screw.

Effective Date April 2, 2025









# WATER SYSTEM

The water system must be maintained in summer and winter. Accumulations of dirt and debris in the water tanks and pump can cause excessive wear and premature failures. Water freezing in the rodder pump, lines or other components can cause severe damage to the water system with water in the tanks. The tanks should normally be left empty when the unit will not be used. The tanks can be filled in 10-15 minutes.

Never use any cleaners, degreasers or chemicals in the water. The use of cleaners, degreasers or chemicals in

the tanks can cause premature failure of the tanks, hoses and pump components.

**Note:** Leave all drain plugs out and drain valves open until the unit is used. This avoids freezing damage from stray amounts of water that did not fully drain.

#### Draining and Flushing the Water Tank(s)

Vactor manufactures a variety of products with a variety of styles and sizes of water tanks. Regardless of style or size, draining and flushing the water tanks is important for several reasons:

- If the water tank inlet filter is damaged or the gaskets are missing from the filter cap, foreign material can enter the water tank and spread through the entire water system. If this happens, it could damage the rodder pump seals and damage or clog the oil cooler.
- Foreign material can enter the water tank through the air vents and filler point air gaps, which are open and vulnerable to weather conditions such as dust storms, high winds, rain and snow. Contaminants form sludge that when carried through the system, can damage the water tanks or other components.
- Filling the water tanks from an unfiltered source, such as a hose or city water tower rather than using the hydrant fill system, may allow direct access to chemical contamination. This can create damage-causing sludge.
- Some city water systems contain high concentrations of chemicals such as chlorine, copper, calcium and iron. Certain chemicals

in the right concentrations and combinations can damage the water system. A chemical analysis of some damaged Vactor water tanks has shown pitting caused by localized galvanic action due to copper plating onto the aluminum surface. For this chemical reaction (nucleation of the pit) to occur, the copper residue must be present in a concentration of at least 5 - 6 PPM and the water stagnant in the tank for a long period of time. Even the slightest movement of the water across the aluminum surface would prevent the formation of a residue and the pit would not form.

MAINTENANCE

It is not always possible to determine if contaminates such as foreign material and chemicals have entered the system. Draining and flushing the water tanks and rodder pump as recommended removes all doubt and extends the life of the water system.



# Vactor 2100i DRAINING THE WATER SYSTEM (COLD WEATHER)

### MAINTENANCE

#### 2100 Series • Freezing Weather Drain Procedure Purae System

4

8

(11)

**Drain Checklist** 

1.	Empty all water tanks
2.	Remove all Y-strainers at fill, water pump & other options
3.	Remove hand gun outlet(s), recirc & HXX drain plugs
4.	Remove accumulator valve drain plug
5.	Drain water guns
6.	Remove optional debris body washout system plug
7.	Remove plug from under the front hose reel
8.	Open optional water valve to rodder pump
9.	Open heat exchanger(s) drain(s)
10.	Remove plug to water pump manifold (2100Plus)
11.	Open all cyclones and allow to drain
_	

- 12. PD units Open microstrainer housing drains
- 13. PD units Open silencer drain
- 14. Fan units Open the fan housing(s) drain Leave all drains open until next use

slow speed to expel any water. Turn OFF water pump.

3. Start engine and engage water pump for two minutes at

2. REMOVE rodder nozzle and SECURE hose end to an adjacent hose loop so reel can rotate. Point the hose end towards the ground as ice and water may be ejected while

5. Remove drain plugs from water pump or open optional drain valves and engage water pump for one minute at slow speed to expel any water.

Turn OFF water pump. 6.

running rodder pump.

Rotate hose reel in the PAYIN direction to expel any water in hose.

# 

#### High pressure water.

1. Open handgun and rodder ball valves.

Serious injury or death can result from sudden release of high pressure water. Remove the rodder hose nozzle and secure the hose end to an adjacent hose loop so reel can rotate. Point the hose end towards the ground as ice may be ejected while running rodder pump.

Both pressure side water valves must be open prior to operating rodder pump.

> Refer to manual for details. 53695A rE

This decal is standard on all units and describes the general procedures for draining the system. More detailed information follows.

In addition to these specific drain points, the accumulator (optional) ball valve should be opened to allow any water trapped in the accumulator to drain. The handgun ports should be drained as well. Open the handgun water ball valve and remove all the quick-connect handgun connections. Drain the body washout if equipped.

# NOTICE

#### Water System Can Be Damaged By Freezing

Ice in the water system can severely damage components. To avoid ice damage:

- Verify that water flows when valves or plugs are opened. Insure that ice has not plugged drain lines, valves or drain plugs.
- Leave all drain plugs open to keep residual tank water from the tanks from migrating to the system during transport.
- Leave all valves open, Y-strainers out and drain plugs out when the unit will sit overnight or longer. This will allow residual water to drain.
- If the unit cannot be properly drained, move the unit to a warm area and allow the water system to warm completely to drain.
- Never operate water pump(s) if system is frozen.

## DRAINING THE WATER SYSTEM (COLD WEATHER)

## MAINTENANCE

Winterize reminders can be set from the front hose reel display Menu button. The reminder message will appear on the in-cab display.

The following procedure will tell you how to set the Winterization Reminder:

- 1. On the screen inside the cab, go to Settings, Winterization Dates.
- 2. Choose your start hour and end hour in 24 hour format.
- 3. Pick the start month and start day.
- 4. Pick the end month and end day.
- **Note:** When the calender date falls between the two chosen dates, the Winterization Reminder will actively display. The reminder is inactive except for when the clock time on the display is between the start hour and end hour.

Settings.Winte	erization Dates
End Hour	14
Start Month	12
Start Day	1
End Month	10
End Day	13



DRAINING THE WATER SYSTEM (COLD WEATHER)

#### MAINTENANCE

# NOTICE

#### Pump Can Be Damaged By Freezing

An accumulation of frozen water in the rodder pump can severely damage the pump. To avoid damage from ice in the pump, move the vehicle to a warm area and allow the water system to warm completely before use.

The water system must be drained in cold weather to prevent freezing and accumulations of ice in the rodder pump. The following procedure will help prevent ice forming in the system:

- 1. Move the vehicle to a suitable drain location and shut unit down.
- 2. Remove the clamp, cap, gasket and screen from the y-strainer. Some units may have multiple y-strainers.
  - **Note:** when draining is completed open all ball valves, put Y-strainers, cap, clamp and drain plugs in a tool box if the unit will sit overnight or longer. This will allow any residual water to drain.

The heat exchanger is normally located on passenger side inboard of the rodder pump paralleling the drive line. Note the water drain line going out to the rodder pump base. Dual heat exchangers are normally only on PD units.

The heat exchangers are drained through the one on the fans or two on the PD units, ¼ turn valves under the water pump.

The heat exchanger is normally located on passenger side along the drive line. Note the water drain line going out to the driver side of the unit. Dual heat exchangers are normally only on PD units.







The water pump and heat exchangers are drained through the two valves under the water pump.

# Vactor 2100i Draining the Water System (Cold Weather)

# 3. Open the water tank drains located on the bottom of the water tanks and heat exchanger drain.

- 4. Remove the HXX gun, lateral clean out and hand gun quick couplers/quick disconnects from hand gun hose reel (if equipped) and hand gun outlet at rear of truck.
- 5. Start truck engine and leave engine at idle.

If allowed to freeze the water barrel can be damaged. If you suspect there is frozen or even partially frozen water, the pump must be placed indoors or the pump must be heated until ALL the ice is melted before the pump can be stroked. Leave all drain ball valves open to ensure the melting ice thaws and drains.

- 6. Using the instructions posted in the truck cab, engage the hydraulic pump.
- 7. REMOVE nozzle from rodder hose. Remove the rodder pump drain plugs or open the drain ball valves (if equipped) and drain all the water from the pump.
- 8. Stand clear of all outlets and activate the rodder pump valve switch.
- 9. Set the RODDER PUMP switch to ON.
- 10. Run until all water is expelled from the rodder pump.
- 11. Set the RODDER PUMP switch to OFF.
- 12. Using plastic ties, secure end of rodder hose to adjacent wrap of hose on hose reel. Rodder hose must be wound tightly and orderly on the hose reel.
  - **Note:** when draining is completed leave all valves open, Y-strainers out and drain plugs out when the unit will sit overnight or longer. This will allow any residual water to drain.
- 13. Once the end of the hose is secured rotate the hose reel backwards to expel residual water that will collect in the lower coils of the hose, rotate until no more water runs out.
- 14. Set the RODDER PUMP switch to OFF.
- 15. Close the RODDER switch located on the passenger side pane; and open the HAND GUN, HXX and LATERAL ball valves one at a time with the clamp, cap and y-strainer removed.







## Vactor 2100i Draining the Water System (Cold Weather)

#### 16. Set the RODDER PUMP switch to ON. The Rodder Pump will act like an air compressor. Run until all water is expelled from the HAND GUN, HXX and LATERAL systems. Drain the hoses before storage by walking the water out of the hose while holding the valve open.

- 17. Set the RODDER PUMP switch to OFF.
- 18. Set the HAND GUN valve in the ON position.
- 19. Set the RODDER PUMP switch to ON.
- 20. Operate rodder pump until all water and debris is clear from drain plugs or remote drains.
- 21. Set the RODDER PUMP switch to OFF.
- 22. Using instructions posted in cab, disengage hydraulic pump.
- 23. Remove debris body washout drain plug and open ball valves, if equipped.
- 24. Store strainer cap, gasket, clamp, rodder pump plugs and quick disconnects in toolbox.
- 25. Open accumulator ball valve and remove drain plug.
- 26. Open the optional remote drain ball valves if so equipped, if there are no ball valves you will have to remove the hex head plugs from the water side of the pump. Remove (6) the manifold plug.
  - **Note:** when draining is completed leave all valves open, Y-strainers out and drain plugs out when the unit will sit overnight or longer. This will allow any residual water to drain.

The unit is now ready for storage. On START-UP, close rodder pump remote drain ball valves, place either HAND GUN or RODDER ball valve in the ON position, replace hand gun quick couplers/quick disconnects and install screen, cap and clamp on Y-strainer, close water tank drains before filling water tanks.







# Y-Strainer

The Y strainer water filter is an important part of the maintenance program to protect the water pump from damage. The Y strainer comes in different sizes. Y strainers are normally either 2" or 3" and may be an option depending on where it is located. Each filter is inspected the same way and needs to be inspected daily or more often if poor quality water is being used. All versions work the same. Smaller Y strainers may be made from composite materials.

3" Y-strainer on water pump - Assembled



2" Y-strainer at water fill - Assembled





3" Y-strainer on water pump - Disassembled



2" Y-strainer at water fill - Disassembled



# Y-Strainer

Remove the cap and the retainer from the filter housing. Then remove the filter. Inspect the filter for any damage. Replace any damaged filter. Inspect the inside of the filter for any dirt, stones, grime, etc. Be sure to clean any filter screen before reinstalling the filter. NEVER reinstall a dirty or damaged filter.

Always inspect the filter cap prior to installation. There are two gaskets on the filter cap. Both gaskets **must** be intact and in place before installing the filter cap. The outer gasket seals the cap to the housing. Water will leak out if this gasket is not in place.

The second gasket seals the cover to the filter screen. If this gasket is missing, debris can bypass the filter screen and get into the water tank and eventually into the water pump causing damage to the pump. Both gaskets must be intact and in place. Replace any damaged or missing gasket.

# Circle Ci



Typical composite Y Strainer. Cap unscrews to remove filter.







## SEWER CLEANING HOSE REPAIR INSTRUCTIONS

### MAINTENANCE



#### NOTICE OF LIABILITY DISCLAIMER

Vactor Mfg., Inc. neither manufactures nor assumes liability for the High Pressure Rodding Hose. Vactor Mfg., Inc does not guarantee this hose beyond the manufacturer's warranties, which are printed on the hose. All hose liability claims will be referred to the hose manufacturer.

The customer assumes any risk when using this hose. All hose must be used in accordance with standard accepted practices and replaced or repaired when damaged or worn.

#### Excerpts from WASTEC 2003 Guidelines for Sewer Cleaning Hose Repair

High-pressure water is used in sewer cleaning operations. The cleaning nozzle is connected to the pump on the vehicle with a length of sewer cleaning hose. Occasionally this hose may be damaged in service. When damage occurs, the hose may be repaired (mended). **Hose, fittings, and assembly equipment from various manufacturers differ greatly and must NEVER be interchanged.** Consequently, each manufacturer color codes the hose outer cover for operating pressure, and hose inner tube, inspection gauges, fittings, and assembly tooling for easy identification. The repairer shall

identify that all these items match the hose to be repaired.

WARNING: Failure to properly inspect, repair, or test the hose assembly before being returned to service can cause a failure of the hose. Because of the high pressure generated, a hose failure can occur, which may result in damage to property, personal injury, or death. The following instructions must be followed explicitly.

#### Inspection after damage has occurred

Unreel the hose and disconnect the hose from both the storage reel and the nozzle. Very carefully inspect the hose for any of the following:

- Hose burst;
- Cover damage exposing the fabric reinforcing braid;
- Any areas containing a blister or bubble in the outer cover;
- Kinking or severe collapse of the hose (These areas shall be repaired.); and,
- Fittings cutting into hose at the edge of connections (These areas also shall be repaired.)

Determine the total number of areas requiring repair, plus the number of mender fittings all ready in the hose. No mender shall be located within 50 feet of the hose end or another mender.

Locate each area to be mended in a clear work area to complete the repair.

Cut out the damaged areas of hose a distance of at least 12 inches on each side of the damaged area. Use the cutting tool recommended by the hose manufacturer. The hose must be cut cleanly and squarely. Discard the damaged section of hose.

Inspect both of the hose ends very carefully as follows:

**CAUTION:** Proper inspection of the hose is critical.

- Determine the color of the hose inner liner. Verify that the color is the same as the inspection gauges, fittings, and assembly tooling. If all these items are not the same color, the hose end(s) shall not be mended until the correct color-coded fittings, and assembly tooling are obtained;
- Check for any signs of entrapped water in the fabric reinforcement layer. If any water is present within the reinforcing layer, the hose ends shall not be mended;
- Check for any indication of separation of the hose inner liner from the fabric reinforcement or the fabric reinforcement from the outer layer. The entire circumference shall be inspected. If any separation of layers exist, the hose ends shall not be mended; and,
- With the manufacturer's color-coded inspection gauge provided, measure the wall thickness around the entire circumference in accordance with the manufacturer's instructions. If any portion of the wall thickness shows excessive wear (as defined in the manufacturer's instructions), the hose ends shall not be mended.

If the hose end(s) fail to meet any of the conditions contained in sections a - d (above) the hose end(s) shall not be mended. On any failed end, cut off an additional four (4) to five (5) feet of hose. The failed section of hose is to be discarded and the inspection noted in sections a - d (above), is to be repeated on the new end(s). If the hose fails to pass this second inspection, the entire hose length shall be discarded.

Proceed with the assembly only if both ends of the hose have been inspected and successfully met the criteria of the section above.

#### Assembly instructions

Sewer cleaning hose manufacturers color code the hose inner liner, inspection gauges, fittings, and assembly tooling for easy identification.

- WARNING: Failure to identify and match the color coding of hose, inspection gauges, fittings, and assembly tooling to the specific manufacturer may result in hose burst or fitting separation, and could result in damage to property, personal injury, or death. Follow the assembly instruction provided by the specific manufacturer. Do not use repair methods or equipment from any other manufacturer.
- **TESTING:** After completing the assembly operation, the entire length of hose shall be pressure tested as follows:
  - Position the hose so that the one end is higher than the other. Completely remove any entrapped air from the assembly by filling with water and bleeding off all air from the higher of the two end fittings;
  - Install a valve on one end which will permit the slow relief of pressure. The valve is to be compatible with the field test pressure, as specified by WASTEC standards
  - Connect the other end to a test pump capable of pumping water at the field test pressure as specified in WASTEC standards
- WARNING: A failure of the hose or fittings may occur during pressure testing. The high pressures involved pose a hazard that could cause property damage, injury, or death. Locate the hose in an area away from persons and property, and stand clear of the hose when pressure is applied;
  - Pressurize the hose at the field test pressure for five (5) minutes;
  - Slowly bleed off pressure;
- CAUTION: Make sure pressure is completely bled off before proceeding

Inspect the hose assembly carefully for any of the following:

- Any signs of water leakage;
- Any movement of the hose in the mender fitting; and,
- Any blisters or bulges in the cover.

If any of these conditions exist, additional damage

is present. The hose is unsafe for operation. Immediately terminate the test. Isolate the damaged area(s) and repeat the instructions for repairing of the hose.

**RETURN TO SERVICE:** After successful completion of the pressure test procedure, reconnect the hose to the storage reel and return the mended hose to service.

- **IN-SERVICE INSPECTIONS:** Hoses in service should be frequently inspected and monitored during use for the following conditions:
- Coupling movement at the hose fitting;
- Damaged cover exposing the fabric reinforcement;
- Cover blisters or bubbles;
- Hose kinking or severe flattening; and,
- Mender fittings cutting into hose at the edge of connections.

Replace the hose if any of these conditions are present.

**RODDER HOSE INSPECTION & MENDING INSTRUCTIONS** 

#### MAINTENANCE

# NOTICE

Always use matching color coded hose and tools when swaging rodder hose.

Each manufacturer of hose, liners, fittings, gauges, tooling and assembly equipment has its own coloring coding system, which is not compatible or interchangeable with other systems.

- a. The color of the inner liner, inspection gauges, fittings and assembly tooling must be the same. If any item color does not match, do not repair the hose.
- b. If there is any water present in the reinforcement layer, do not repair the hose using that hose end.
- c. If there is any sign of separation of the tube from the fabric reinforcement or the reinforcement from the outer cover, do not repair the hose using that hose end.
- d. Using the inspection gauge, measure the entire circumference of the hose end. If any portion of the hose has excessive wear or incorrect wall thickness, do not repair the hose using the hose end.

# 

**Hose And Fitting Failures** 



Failure to properly inspect, test, and repair the rodder hose assembly may result in rupture or leaks of hoses or fittings, causing serious personal injury, death, or damage to unit.

To avoid dangerous leaks or ruptures,

- Properly inspect hose for wear or damage. Repair or replace damaged areas or replace the entire hose assembly. Do not mend damaged hose ends.
- Always use fittings, gauges, hoses and tools with matching color codes, and fittings with pressure ratings equal to or higher than the hose requirements.
- Complete all inspection, repair, and testing procedures before operating unit.
- Place hose in an area clear of all personnel and equipment and completely bleed off hose pressure before pressure testing.

Hose crimping information provided by: Aeroquip Corporation. This document can be found at: http://hydraulics.eaton.com/products/pdfs/fc/ja67.pdf



**Warning** Aeroquip fitting tolerances are engineered to match Aeroquip hose tolerances. The use of Aeroquip fittings on hose supplied by other manufacturers and/or the use of Aeroquip hose with fittings

supplied by other manufacturers may result in the production of unreliable and unsafe hose assemblies and is neither recommended nor authorized by Aeroquip.

Failure to follow Aeroquip process and product instructions and limitations could lead to premature hose assembly failures resulting in property damage, serious injury or death.

The user must exercise extreme care when operating any Aeroquip assembly equipment with powered moving components. Safety

glasses must be worn at all times when using any Aeroquip assembly equipment.

Read and understand the owners and operators manual before attempting to operate any equipment.

Aeroquip hereby disclaims any obligation or liability (including incidental and consequential damages) arising from breach of contract, warranty, or tort (under negligence or strict liability theories) should Aeroquip hose, fittings or assembly equipment be used with the hose, fittings or assembly equipment supplied by another manufacturer or in the event that product instructions for each specified hose assembly are not followed.

# **RODDER HOSE INSPECTION & MENDING INSTRUCTIONS**

#### MAINTENANCE

Hose crimping information provided by: Aeroquip Corporation. This document can be found at: http://hydraulics.eaton.com/products/pdfs/fc/ja67.pdf

Assembly Instructions for Swage Male Pipe Fitting Using the FT1284 Swage Assembly Tool



#### Step 1

Lubricate the die cavity with Aeroquip 222070 hose assembly lube.



#### Step 3

Place the bottom half of the die in assembly tool. Place pusher in assembly tool as shown.

CAUTION: Use of hose, inspection gauges, fittings and swage dies from different manufacturers will result in a hose of reduced performance. Hose burst or fitting separation may occur and could result in damage to the equipment or personal injury.



Step 2 Lubricate the inside of the die.



#### Step 4

Cut hose square using FT1258 bench-mounted cut off tool. Using the bottom edge of the fitting part number as a reference for the length of hose to be inserted into the socket, mark the hose with a china marker to indicate the insertion length.



#### Step 5

Insert hose until the back edge of the socket aligns with the mark on the hose. Place the preassembled hose assembly through the top slot into the assembly tool. 6



Step 6 Place the top half of the die in the assembly tool.

## **Vactor** Rodder Hose Inspection & Mending Instructions

#### MAINTENANCE

Hose crimping information provided by: Aeroquip Corporation. This document can be found at: http://hydraulics.eaton.com/products/pdfs/fc/ja67.pdf



Step 7 Insert 2 retaining bolts to firmly secure the dies.





Begin the swaging process by tightening the draw bolts uniformly in an alternating fashion.



#### Step 9

Swaging process is completed when the dies and pusher faces meet. Open the draw bolts until the dies are free. Pry the die halves off the fittings.



#### Step 10

Inspect the hose assembly to ensure:

- · that there is no hose movement in the fitting.
- the insertion mark on the hose (from step 4) is still located at the bottom of the socket.

The hose assembly is now complete and ready for service (see In Service Inspection below).

## In Service Inspection

Hose assemblies in service should be frequently inspected for the following conditions:

- 1. Hose movement in the fitting.
- 2. Damaged cover exposing the fabric reinforcement.
- 3. Cover blisters or bubbles.
- 4. Hose kinking or collapse.
- 5. Fittings cutting into hose at edge of connection.

Repair or replace the hose if any of these conditions are present.

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# **RODDER HOSE INSPECTION & MENDING INSTRUCTIONS**

# Hose crimping information provided by: Aeroquip Corporation. This document can be found at: http://hydraulics.eaton.com/products/pdfs/fc/ja67.pdf

#### Sewer Cleaning Hose and Swage Mender Inspection WARNING: Hose, fittings and assembly equipment differ High pressure water is utilized in sewer cleaning applications. The cleaning nozzle is connected to the pump on the from manufacturer to manufacturer and are not interchangevehicle with a length of sewer cleaning hose. From time to able. Consequently, each manufacturer color codes the hose time, this hose may be damaged in service. When damage tube\*, inspection gauges, fittings and assembly tooling for occurs, the hose may be repaired (mended) utilizing the ease of identification and use with their product. instructions on pages 9 through 10. Failure to properly inspect, repair or test the hose assembly before returning it to service may cause hose assembly failure which may result in damage to equipment or personal injury. The following instructions must be followed. "WEMI refers to the "inner liner," Aeroquip refers to the liner as "the tube". Inspection 2. Determine the total number of areas requiring repair plus 1. Unreel the hose assembly and disconnect the hose from the number of mender fittings already in the hose. A both the storage reel and the nozzle. Carefully inspect the mender should not be located within 50 feet of the hose hose for evidence of damage. The following hose conditions will require repair: end or another mender. 3. Cut out the damaged areas of the hose a distance of at least 12 inches on each side of the damaged area. Utilize a. Hose burst. a sharp knife or bench mounted cut off tool. The hose Sit must be cut squarely. 4. Discard the damaged section of hose. 5. Inspect both of the hose ends very carefully for any of the following conditions: a. Any signs of water in the fabric reinforcement layer. If any water is present within the reinforcing layer, the hose end(s) should not be mended. b. Any indication of incomplete bonding of the tube\* to the b. Cover damage exposing the fabric reinforcing braid. fabric reinforcement or the fabric reinforcement to the outer cover. The entire circumference should be inspected. If any lack of bonding is present, the hose end(s) should not be mended. c. Check the color of the hose inner liner. The color must be the same as the inspection gauges, fittings, and assembly tooling. If all these items are not the same color, the hose end(s) should not be mended until the correct color-coded fittings and tooling are obtained. c. Any areas containing a blister or bubble in the d. With the manufacturer's color coded inspection gauge, outer cover. measure the wall thickness around the entire circumference". If any portion of the hose circumference exhibits excessive wear as determined by this inspection, the hose end(s) should not be mended. 6. As noted, if any of the conditions contained in item 5 are not satisfactory, hose end(s) shall not be mended. On any unsatisfactory end, cut off an additional four to five feet of hose. This section of hose is to be discarded and the inspection noted in item 5 is to be repeated on the d. Hose kinking or collapse. new end(s). If the hose fails to meet this second inspection, the entire length should be discarded. 7. Proceed only to the assembly instructions in the next section if both ends of the hose have been inspected and successfully met the criteria of this section. "WEMI refers to the "inner liner", Aeroquip refers to the liner as "the tube". "See page 4 for more information on kit FF10257

## **Vactor** Rodder Hose Inspection & Mending Instructions

#### MAINTENANCE

Hose crimping information provided by: Aeroquip Corporation. This document can be found at: http://hydraulics.eaton.com/products/pdfs/fc/ja67.pdf

## 

Assembly Instructions for Swage Mender Fitting Using the FT1284 Swage Assemble Tool



#### Step 1

Lubricate die cavities with Aeroquip 222070 hose assembly lube.



#### Step 3 Place the bottom halves of the dies in the assembly tool.

CAUTION: Use of hose, inspection gauges, fittings and swage dies from different manufacturers will result in a hose of reduced performance. Hose burst or fitting separation may occur and could result in damage to the equipment or personal injury.



Step 2 Lubricate the inside of each die.



#### Step 4

Cut hose square using the Aeroquip FT1258 bench-mounted cut off tool. Using the bottom edge of the fitting part number as a reference for the length of hose to be inserted into the socket, mark the hose with a china marker to indicate the insertion length.



#### Step 5

Insert hose until the back edge of the socket aligns with the mark on the hose. Place the preassembled hose assembly through the top slot into the assembly tool.



Step 6 Place the top half of the dies in the assembly tool.

9

## **Vactor** Rodder Hose Inspection & Mending Instructions

# Hose crimping information provided by: Aeroquip Corporation. This document can be found at: http://hydraulics.eaton.com/products/pdfs/fc/ja67.pdf



Step 7 Insert 2 retaining bolts to firmly secure the dies.



#### Step 8

Begin the swaging process by inserting the yoke into the center groove of the mender and then tighten the draw bolts uniformly, in an alternating fashion, while keeping the fitting centered between the jaws.



#### Step 9

Swaging process is complete when the die faces meet the yoke.



#### Step 11

Remove the retaining bolts from the die plates and remove the completed hose assembly.

Inspect the hose assembly to ensure:

- · that there is no hose movement in the fitting
- the insertion mark on the hose (from step 4) is still located at the bottom of the socket.

The hose assembly is now complete and ready for service (see **In Service Inspection** at the right). 10



#### Step 10

Open the draw bolts until the dies are free. Remove the yoke, then pry the die halves off the fitting.

# In Service Inspection

Hose assemblies in service should be frequently inspected for the following conditions:

- 1. Hose movement in the fitting.
- 2. Damaged cover exposing the fabric reinforcement.
- 3. Cover blisters or bubbles.
- 4. Hose kinking or collapse.

5. Fittings cutting into hose at edge of connection.

Repair or replace the hose if any of these conditions are present.

## SWAGER APPLICATION SPECIFICATIONS

### MAINTENANCE

When the swaging assembly is complete, use the following chart to check the coupling for proper Length X and Diameter.

#### Testing

After completing the assembly, pressure test the entire hose.

- 1. On one end, install a block and bleed valve compatible with the pressure rating of the hose.
- 2. Remove all air from the hose as follows:
  - Raise open end of hose and fill with water
  - Operate bleed valve until all air has escaped and only water is being released
  - Ensure hose is completely full of water
- 3. Connect open end of hose to a test pump capable of supplying water pressure at the maximum pressure rating of the hose.
- 4. Apply maximum pressure to the hose for at least five minutes
- 5. Bleed off pressure on hose.
- 6. Inspect hose carefully for any of the following conditions:
  - Water leakage
  - Loose hose fittings
  - Blisters or bulges under cover

When hose has successfully completed the pressure test, it is safe to use. Connect and wind hose on hose reel.

# 

**Hose And Fitting Failures** 



Failure to properly inspect, test, and repair the rodder hose assembly may result in rupture or leaks of hoses or fittings, causing serious personal injury, death, or damage to unit.

To avoid dangerous leaks or ruptures,

- Properly inspect hose for wear or damage. Repair or replace damaged areas or replace the entire hose assembly. Do not mend damaged hose ends.
- Always use fittings, gauges, hoses and tools with matching color codes, and fittings with pressure ratings equal to or higher than the hose requirements.
- Complete all inspection, repair, and testing procedures before operating unit.
- Place hose in an area clear of all personnel and equipment and completely bleed off hose pressure before pressure testing.



Length and Diameter

HOSE TYPE	MALE PIPE	MENDER	DIES*	PUSHER	LENGTH X- MIN.	DIAMETER+/015
3⁄4"	45268A	45267A	45269	45270	1.109"	1.172"
1"	43605	46142	44172	44174	1.156"	1.445"
1 1⁄4"	44107	44153	44173	44175		

#### Rodder hose field test pressure

Field Test Pressure = (Rated Max. Operating Pressure) + (25% (.25) Rate Max. Operating Pressure)

Rated Max. Operating Pressure

Field Test Pressure

2500	
3125	
3750	
6250	


# FIELD REPAIR PROCEDURE FOR PIRANHA® ARMOR®-BEACON® SEWER CLEANING HOSE

5	PERLY REPAIR OR REPLACE T LAYER CAN CAUSE DEATH, DAMAGE.	KE STRANDS IN A BRIDGE CABLE, EACH EINFORCEMENT FIBER PLAYS AN <u>XACT</u> ROLE IN THE ULTIMATE BURST TRENGTH OF THE HOSE. A <mark>MINOR</mark> LICE OR NICK IN THE REINFORCEMENT AN RESULT IN TOTAL HOSE FAILURE.	HE AGE OF THE HOSE DOES NOT ATTER! IT IS UNFORTUNATE, BUT EVEN OSE USED (1) TIME CAN BE DAMAGED I SEVERE APPLICATIONS. THESE OSES MUST BE IMMEDIATELY EMOVED FROM SERVICE.	5. A KINKED, CRUSHED, OR BLISTERED HOSE WILL EVENTUALLY FAIL -	DO NOT KISK INJUKY. IMMEDIATELY REPAIR OR REMOVE HOSE FROM SERVICE	<ul> <li>Cadillac, MI 49601</li> <li>Phone: (231) 779-4390 Fax: (231) 779-4399</li> <li>Host Products piranhahose.com email: sales @piranhahose.com</li> <li>(See reverse side for excerpts from the 2003 WASTEC guidelines)</li> </ul>
<b>WARNIN</b>	STOP "IT": FAILURE TO PROF WHITE BRAID REINFORCEMEN SONAL INJURY AND PROPERTY			4. HIGH PRESSURE HOSES ARE DESIGNED TO USE SPECIFIC FITTINGS AND	DIFFERENT BRAND OF FITTINGS OR TOOLING. FAILURE TO DO SO CAN	CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.
	IF YOU SEE "IT" - HOSE AFTER EXPOSING PER		DANGER READ AND UNDERSTAND THE FOLLOWING:	HOSE BASICS 1. NEVER EXCEED THE MAXIMUM WORKING PRESSURE	2. NEVER EXCEED THE MAXIMUM WORKING TEMPERATURE	3. NEVER APPLY PRESSUF TO A DAMAGED HOSE

## **PIRANHA HOSE**

# Vactor

## MAINTENANCE

## FIELD REPAIR PROCEDURE FOR PIRANHA® ARMOR®-BEACON® SEWER CLEANING HOSE



**STEP 1** CUT END OF HOSE SQUARELY.

**STEP 2** LOCATE FLAT BRAIDED WIRE BETWEEN ORANGE OUTERJ ACKET AND WHITE BRAID



## STEP 3

MARK A ¼" WIDE BY .875" LONG RECTANGULAR AREA DIRECTLY OVER THE FLAT BRAIDED WIRE.

#### STEP 4

CAREFULLY CUT THE HORIZONTAL LINES OF RECTANGULAR AREA MARKED ON THE OUTER JACKET.



REV C 7/23/07

#### STEP 5

CAREFULLY PEEL BACK THE OUTER JACKET.

#### STEP 6

CUT ON THE REMAINING VERTICAL LINE TO REMOVE THE OUTER JACKET.

## **PIRANHA HOSE**

## FIELD REPAIR PROCEDURE FOR PIRANHA® ARMOR®-BEACON® SEWER CLEANING HOSE



#### STEP 7

REMOVE LOOSE FIBERS FROM CUT AREA TO ALLOW ACCESS TO FLAT BRAID WIRE.

#### STEP 8

CAREFULLY FOLD BACK FLAT BRAIDED WIRE ONTO HOSE JACKET. THE DISTANCE FROM THE END OF THE HOSE TO THE END OF THE WIRE SHOULD BE APPROXIMETALY 1.750".

#### STEP 9

CAREFULLY SLIDE PROPER FITTING ONTO HOSE TO THE PROPER INSERTION DEPTH. **DO NOT TWIST FITTING DURING INSTALLATION.** 

#### STEP 10

USING APPROVED PIRANHA ARMOR BELT® SWAGE DIE AND PUSHER, SWAGE THE FITTING.

#### STEP 11

WITH A MULTIMETER, CHECK RESISTANCE BETWEEN HOSE END FITTINGS. VALUE MUST BE LOWER THAN .8 MULTIPLIED BY THE LENGTH OF HOSE IN FEET. (ex .8 x 600ft = 480 Ohms)

# PIRANHA SEWER ASSEMBLY INSTRUCTIONS

## HORIZONTAL SWAGE-ARMOR



**ARMOR PIRANHA SEWER HOSE** END FITTINGS MENDER Inspect the fitting or mender. The swage should be uniform. The bulge LENGTH (y) HOSE SIZE LENGTH (x) DIAMETER DIAMETER appearing on the fitting after the 0.938 0.965 1.050 0.965 -8 swaging operation should be minimum distance from the edge of NA -10 NA NA NA the fitting or mender. The chart to -12 1.300 1.125 1.300 1.188 the right gives this distance per hose size. -16 1.500 1.560 1.770 1.560 1.950 1.880 NA -20 NΔ

End fittings and menders for thermoplastic hose are not interchangeable. It is essential that hose, end fittings, menders, and tooling be properly matched. Identification of Piranha Hose Products is simple. The inner tube of all Piranha Sewer Cleaning Hose is yellow, as assigned by WASTEC (Waste Equipment Technology Association) for the manufacture identification code. To assure proper matching of all components, the hose tube material, end fittings, menders, and tooling must be color coded yellow. While there may be several sources of end fittings and assembly tooling that bear the yellow color coding, for safety and reliability-end fittings and assembly tooling should be purchased directly from Piranha Hose Products.

A Piranha supplied swaging machine is required for the installation of end fittings and menders. All assembly tooling is designed and produced to be compatible with the Piranha Hose Products supplied swaging machines.



2500 WEIGEL STREET CADILLAC, MI 49601 800-250-5132 SALES@PIRANHAHOSE.COM





The information contained in this booklet is intended to be a guide. It is the responsibility of the user to apply this information in the appropriate manner to insure safe operating procedures.



Shark Hose I.D.	34"	1"	11/4"
Bend Radius	4"	5¼"	6"
Bend Radius with Repair Coupling	8"	9"	11"

This information should be used in conjunction with other industry standards related to proper hose care and maintenance (i.e. RMA IP-2 Hose Handbook, NSWMA Standard).

Should you have any questions on any topic covered in this Technical Paper, contact Goodall Rubber Company at (800) 331-3349, or call (800) GOODALL to obtain the phone number and address of a local Goodall service center.













3. Mount ferrule onto the outside of the hose by screwing the ferrule on to the hose. Leave a <sup>1</sup>/<sub>4</sub>" gap between the hose end and the ferrule end (this space **must be left** for expansion of rubber when crimping).

4. Insert the male or female stem completely into the hose. If difficulty in inserting is encountered, use a plastic hammer to avoid damaging threads.

5. Set your crimping equipment at an O.D. slightly larger than your target finished crimp diameter (we recommend +.050" larger than the target finished crimp diameter). Crimp\* the assembly and measure the first crimp with dial or digital calipers. Determine the difference between your first crimp and the target finished crimp and reset your crimping equipment. Reposition your hose assembly to ensure the raised portions of the ferrule will be under your dies and recrimp. Using calipers, measure the crimp diameter again. The desired crimp dimension range is your target finished crimp diameter ±.008". If your finished crimp dimension is smaller than the target finished crimp diameter minus .008", cut the fitting off and begin again.







\*Note: Only personnel who have been trained and have working experience with the crimping equipment should recouple Shark hose.



	rumg.#1
•	To calculate Average Wall Thickness           (Measurement #1
]	Measurement #3+ Measurement #4) ÷ 4 = "(average wall thickness)
,	To calculate Target Finished Crimp Diameter
]	Hose O.D 2(.3 x average wall thickness) + 2(ferrule thickness measured over the inside ferrule serrations)
1	Sample:
]	Hose O.D. is 1.6"
]	Ferrule Thickness (FT) is .115"
	1.6 - [2(.3 x .26)] = 1.444 + [2(.115)] = 1.674" Target Finished Crimp Diameter
٦	When finished crimping, measure your actual finished crimp
C H	diameter". If that diameter falls between your Target Finished Crimp Diameter of $\pm .008$ ", your finished
(	crimp will be correct.
1	<b>2</b>
1	2

	<u>Fitting #2</u>
To calculate Average         (Measurement #1         Measurement #3        " (average was	ge Wall Thickness         + Measurement #2+         + Measurement #4) ÷ 4 =         all thickness)
To calculate Target Hose O.D 2(.3 x av measured over the in:	Finished Crimp Diameter verage wall thickness) + 2(ferrule thickness side ferrule serrations)
Sample: Hose O.D. is 1.6" Average Wall Thickn Ferrule Thickness (F	ness (AWT) is .26" T) is .115"
1.6 - [2(.3 x .26)] = 1 Crimp Diameter	.444 + [2(.115)] = 1.674" Target Finished
When finished crimpi diameter 1 Finished Crimp Diam crimp will be correct.	ing, measure your actual finished crimp If that diameter falls between your Target eter of" ±.008", your finished



## MAINTENANCE

#### Step 5:

Mender Application: Lubricate the inside of the four (4) die halves with anti-seizing grease. Male Pipe Fitting: Lubricate the inside of the two (2)

die halves with anti-seizing grease. The one-piece pusher does not require grease.

#### Step 6:

Mender Application: Place a die half into each die holder as shown.

Male Pipe Fitting:

Place a die half into <u>one</u> holder and place the pusher into the remaining die holder.





#### Step 7: <u>Mender Application & Male</u> <u>Pipe Fitting</u>

Using a grease pencil or pen, mark a line approx. 2" from each prepared hose end. This line will serve as a reference to the length of hose that must be inserted into the coupling.

#### Step 8:

#### Mender Application & Male Pipe Fitting:

Lubricate the outside and the inside of the hose, and the inside of the mender ferrule (use Dixon DCL Hose Lubricant or soapy water). <u>Do not use grease or any</u> petroleum based lubricant or oil.



## MAINTENANCE

Step 9:

#### Mender Application:

Insert the hose ends into the mender to the reference lines applied in Step 7. The hose should now be bottomed in the shell. Place the assembly through the top slots and into the swager. Male Pipe Fitting:

Insert the hose end into the coupling to the reference line applied in Step 7. The hose should be bottomed in the shell. Place the assembly into the swager with the male pipe end in the pusher.

#### Step 10:

Mender Application: Place the two (2) remaining die halves over the hose and into the holders. Male Pipe Fitting: Place the remaining die half over the hose and into the holder.





Step 11: <u>Mender Application & Male</u> <u>Pipe Fitting</u>: Insert and tighten the fwo (2) cross bolts to secure the dies.

Step 12: <u>Mender Application only</u>: Insert the yoke between the two (2) mender halves.





## MAINTENANCE

#### Step 13:

Mender Application:

Start the swaging process by alternately tightening the ACME draw bolts. Continue this process until the die faces are flush against the yoke.\* Male Pipe Fitting:

Start the swaging process by alternately tightening the ACME draw bolts. Continue this process until the die face and the pusher face meet.\* \* Note: To extend the life of the ACME draw bolts and nuts, lubricate the threads with a light lube oil.



## Step 14:

#### Mender Application:

When contact is made between the two (2) die faces, the swaging process is complete.

#### Male Pipe Fitting:

When contact is made between the pusher and the die face, the swaging process is complete.

#### Step 15: Mender Applie

#### Mender Application & Male Pipe Fitting:

Remove the cross bolts. Loosen the ACME draw bolts and pry the die holders apart until the dies are free. When the Mending or Coupling Procedure is finished, remove the dies from the hose.













The assembled hose shall be reeled on to the drum on the truck without any twisting and such a tension so there will be no deformation on the hose body. We recommend that the hose is filled with pressurized water, not more than 15 PSI, before reeling the hose on to the truck. With this precautionary method, you will avoid unnecessary expansion of the hose which can result in drum deformation.

# LONG TERM STORAGE - GENERAL

Machines can often sit at a work site for months while work creeps along. For long term storage beyond one year consult Vactor-Guzzler Service. Refer to the unit's manual for specific details. Storage protection plans should look like the following for a northern, dry climate:

- Rotation Rotate all compressors, pumps, fans and blowers every two weeks.
- Visual Inspection When rotating exposed machined surfaces, check shafts and couplings to see that a protective coating has been applied and has not been removed. Reapply if needed.
- **Miscellaneous -** Lubricate miscellaneous equipment as applicable per normal maintenance schedule.
- **Drains** Leave all drain plugs out to prevent the buildup of moisture.

#### **Other Considerations**

In a warm, high-precipitation climate it is wise to look for alternate solutions to the problem of field storage during construction and prior to start-up.

For engines refer to the manufacturer's manual for procedures.

#### Vacuum System

Any time the unit will sit after use, the blower should be run 3-5 minutes with the vacuum relief open to dry out the vacuum system.

If the unit is not in operation, or will be parked for an extended period of time, the rear door can be opened slightly to drain and vent the debris body. This allows airflow into the body which reduces rusting and allows the rear door seal to relax, preventing it from training to a flat state. To ensure no entry to the debris body, or operation of the unit while the door is open, the door must only be cracked enough to relax the seal and a lockout/ tagout procedure must be performed.

#### **Air Systems**

Drain all moisture traps and tanks. Replace all filters and all desiccant.

#### **Freezing Weather**

Any time the unit will sit after use during freezing weather the blower should be run 3-5 minutes with the vacuum relief open to dry out the vacuum system.

#### Oil & Grease

The unit should be on level ground and off. Before

storage all oil should be changed and filled to the center of the sight glass(s) or fill mark. **DO NOT OVERFILL.** When the blower will not be used for any time beyond a few days there is risk the close fitting surfaces inside the blower will rust and increase blower lobe wear on startup. Refer to the blower manufacturer's manual for details on long term storage. Grease the unit per the manual's schedule.

#### Sound Suppression Systems

Leave the drain plugs out when not in use to prevent rain water from building up in the silencers. Verify the rain cap works correctly to assure rain and water cannot enter.

#### Water Systems

Drain and purge all the water components. When completed open all ball valves, put Y-strainers, cap, clamp and drain plugs in a tool box if the unit will sit overnight or longer. This will allow any residual water to drain.

- Verify that water flows when valves or plugs are opened. Insure that ice has not plugged drain lines, valves or drain plugs.
- Leave all drain plugs open to keep residual tank water from the tanks from migrating to the system during transport.
- Leave all valves open, Y-strainers out and drain plugs out when the unit will sit overnight or longer. This will allow residual water to drain.
- If the unit cannot be properly drained, move the unit to a warm area and allow the water system to warm completely to drain.
- Never operate water pump(s) if system is frozen.

#### Putting the unit back in service

- Close the rear door if left open.
- Verify all fluids are at correct levels.
- Install all drain plugs and Y-strainers and close all drain valves.
- Operate engine(s) at low RPM's until warm.
- Engage and cycle all functions to verify operation.

# NOTICE



Consult OEM chassis and engine operation and maintenance manuals for complete details on operation.

# DRIVELINE SERVICE

Driveline components installed by Vactor all require these bolt, nut and torque specifications.

Chassis manufacturers may use other bolt, nut and torque configurations in the chassis drivelines. Some transfer cases are installed by the chassis manufacturer. Follow chassis manufacturer specifications for bolt, nut and torque when provided.

Vactor standard practice is to replace any yoke strap that is removed with a new strap and bolts. All Vactor installed driveline bolts are marked with *TORQUE SEAL* (508727-30) to verify the bolts were properly torqued and to detect vibration loosening.

Use only recommended and approved components and torque specified here or by the chassis manufacturer for service work. Alterations, substitutions, or use of additional components must have Vactor engineering approval.





Ser	ies	Strap & Bolt Kit P/N	Bolt Torque (Ft-Lbs)
1710		48332D-30	115-135
1760		48332D-30	115-135
1810		48332D-30	115-135
SPL2	:50	48332F-30	115-135



**Note:** Use Loctite 242 or equivalent on all bolt threads. If the seal on the bolts is broken at any point reapply the thread locker.

Driveline Bolt and Torque Specifications								
Driveline Series	Diameter, Thread, Length	Grade	Vactor Bolt	Vactor Nylock Nut	Torque (Ft-Lbs) ±5% Lubed w/Loctite 242 or Equiv.			
1280-1310	3/8"-24 X 1"	8	1210648-30	43042A-30	35			
1610	3/8"-24 X 1-3/16"	8	1210008-30	43042A-30	35			
1710	3/8"-24 X 1-1/4"	8	16337N-30	43042A-30	35			
1610*	3/8"-24 X 1-9/16"	8	48400B-30	43042A-30	35			
1710*	3/8"-24 X 1-11/16"	8	1210701-30	43042A-30	35			
1350/1410	7/16"-20 x 1-3/16"	8	1210650-30	49751-30	60			
1760	7/16"-20 x 1-3/4"	8	47635C-30	49751-30	60			
1810	7/16"-20 x 1-3/8"	8	1210010-30	49751-30	60			
1350/1410*	7/16"-20 x 1-5/8"	8	1210913-30	49751-30	60			
1810*	7/16"-20 x 1-3/4"	8	47635C-30	49751-30	60			
SPL140	3/8"-24 x 1-11/16"	8	1210701-30	43042A-30	35			
SPL170	7/16"-20 x 1-3/4"	8	47635C-30	49751-30	60			
SPL250	7/16"-20 x 1-3/4"	8	47635C-30	49751-30	60			
* Tru Stop Brake A	Tru Stop Brake Applications							

## MAINTENANCE

# HOSE REEL BOLTS - CHECK & TORQUE

## MAINTENANCE

Tighten all hose reel rotary bearing bolts every 1000 hours or 12 months.

Tighten all hose reel base to chassis mounting bolts every 500 hours or six months to the required torque.

Refer to the reference page on bolt torque for each bolt size used. Actual bolts used vary by location and size depending on chassis and options.











PURPOSE: THE PURPOSE OF THIS STANDARD IS TO PROVIDE A RECOMMENDED TORQUE FOR THREADED FASTENERS SUCH AS BOLTS, NUTS, CAP SCREWS, USED IN STEEL AND CAST IRON PARTS.

APPLICATION: THIS STANDARD IS INTENDED FOR FASTENERS OF GASKETED OR NON-GASKETED JOINTS, WITH OR WITHOUT STEEL WASHERS, AND WITH COARSE OR FINE THREADS. ALL SPECIAL CONDITIONS WHICH WILL SERIOUSLY AFFECT THE RELATIONSHIP BETWEEN TOROUE AND TENSION OF THE FASTENER, SUCH AS SPECIAL SURFACE FINISHES, LEAD WASHERS, AND FASTENERS SCREWED INTO MATERIAL OTHER THAN STEEL OR CAST IRON, WILL REQUIRE SEPARATE TORQUE VALUES TO BE INCLUDED IN THE APPLICABLE SPECIFICATION. THIS SPECIFICATION DOES NOT APPLY TO TORQUING OF HYDRAULIC CONNECTIONS.

MEAN OR BASIC RECOMMENDED TIGHTENING TORQUE FOR INCH FASTENER REQUIRING ±20% ACCURACY+. TORQUE VALUES ARE BASED ON NON-LUBRICATED THREADS.

	TORQUE IN POUND FOOT (LB-FT)		
NOM. DIA. INCH	GRADE 5	GRADE 8	
1/4250	9	12	
5/16312	18	25	
3/8375	30	45	
7/16438	50	70	
1/2500	75	110	
9/16562	110	155	
5/8625	155	215	
3/4750	270	385	
7/8875	435	620	
1 - 1.000	660	930	

	TORQUE IN NEWTON METER (Nm)		
NOM. DIA. INCH	GRADE 5	GRADE 8	
1/4250	12.2	16.3	
5/16312	24.4	33.9	
3/8375	40.7	61.0	
7/16438	68	95	
1/2500	101	149	
9/16562	150	210	
5/8625	210	290	
3/4750	365	520	
7/8875	590	840	
1 - 1.000	895	1260	

BOLT HEAD MARKING



#### \*WRENCH TYPES WITH ±20% ACCURACY:

TORQUE CONTROLLED IMPACTS WITH TORSION BARS HAND TORQUE WRENCHES NUTRUNNERS - STALL AND SHUTOFF NUTRUNNERS - ELECTRONIC SHUTOFF AIR CYLINDER - STALL TYPE

NOTE: THIS DOES NOT INCLUDE AIR AND ELECTRIC IMPACT WRENCHES WHICH TYPICALLY ARE ±50% ACCURATE. NOTE: NYLON LOCKING NUTS WILL BE TORQUED TO GRADE 5 STANDARDS

PURPOSE: THE PURPOSE OF THIS STANDARD IS TO PROVIDE A RECOMMENDED TORQUE FOR FASTENERS SUCH AS BOLTS, NUTS, CAP SCREWS, USED IN STEEL AND CAST IRON PARTS. FOR THREADED

APPLICATION: THIS STANDARD IS INTENDED FOR FASTENERS OF GASKETED OR NON-GASKETED JOINTS, WITH OR WITHOUT STEEL WASHERS, AND WITH COARSE OR FINE THREADS. ALL SPECIAL CONDITIONS WHICH WILL SERIOUSLY AFFECT THE RELATIONSHIP BETWEEN TORQUE AND TENSION OF THE FASTENER, SUCH AS SPECIAL SURFACE FINISHES, LEAD WASHERS, AND FASTENERS SCREWED INTO MATERIAL OTHER THAN STEEL OR CAST IRON, WILL REQUIRE SEPARATE TORQUE VALUES TO BE INCLUDED IN THE APPLICABLE SPECIFICATION. THIS SPECIFICATION DOES NOT APPLY TO TORQUING OF HYDRAULIC APPLICABLE S CONNECTIONS.

MEAN OR BASIC RECOMMENDED TIGHTENING TORQUE FOR METRIC FASTENER REQUIRING ±20% ACCURACY\*. TORQUE VALUES ARE BASED ON NON-LUBRICATED THREADS.

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		TORQUE IN POUND FOOT (LB-FT)					
	SIZE	GRADE 8.8	GRADE 10.9	GRADE 12.9			
I	EМ	0.4	1.3	1.5			
I	M4	2.2	3.3	3.7			
M5		4.5	6.5	7.5			
	M6	7.5	11.0	13.0			
	MB	18	30	33			
	M1O	35	50	63			
M12 65 M14 105 M16 160		65	95	110			
		105	150	177			
		160	235	277			
	M20	320	460	542			
	M24	550	700	037			

	NEWTON METER (Nm)				
SIZE	GRADE 8.8	GRADE 10.9	GRADE 12.9		
EМ	0.5	1.8	2.0		
M4	Э.О	4.5	5.0		
M5	6	9	10		
M6	10	15	18		
MB	25	35	45		
M1O	50	70	85		
M12	90	125	150		
M14	140	200	240		
M16	225	310	375		
M20	435	610	735		
M24	750	1050	1270		

TODOUE IN

BOLT HEAD MARKING







\*WRENCH TYPES WITH ±20% ACCURACY:

TORQUE CONTROLLED IMPACTS WITH TORSION BARS HAND TORQUE WRENCHES NUTRUNNERS - STALL AND SHUTOFF NUTRUNNERS - ELECTRONIC SHUTOFF AIR CYLINDER - STALL TYPE

NOTE: THIS DOES NOT INCLUDE AIR AND ELECTRIC IMPACT WRENCHES WHICH TYPICALLY ARE ±50% ACCURATE. NOTE: NYLON LOCKING NUTS WILL BE TORQUED TO GRADE 8.8 STANDARDS

# **REFERENCE - HYDRAULIC SYMBOLS**

Lines		Hydraulic F	Pumps	■ Miscellane	ous Units
	Line, Working (Main)		Fixed Displacement		Cooler
	Line, Pilot or Drain				
	Flow Direction Hydraulic	$\square$	Variable Displacement		Temperature Controller
	Pneumatic				Filter, Strainer
	Lines Crossing	Motors and	l Cylinders		
		Ну	/draulic		Pressure Switch
	Lines Joining	$\bigcirc$	Fixed Displacement		Pressure Indicator
	Lines With Fixed		Variable Displacement		Temperature Indicator
	Line, Flexible		Cylinder, Single-Acting		Component Enclosure
	Station Testing	Cylinder,	Double-Acting		Direction of Shaft Rotation (assume arrow
	Measurement or Power Take-Off		Single End Rod		on near side of shaft)
	Variable Component (run arrow through symbol at 45°)		Double End Rod	Methods o	f Operation
	Pressure Compensated		Adjustable Cushion Advance Only		Spring
	Units (Arrow parallel to short side of symbol)		Differential Piston		Manual
	Temperature Cause or Effect		Telescopic		Push Button
Re	eservoir				Push-Pull Lever
	Vented	Miscellane	ous Units		Pedal or Treadle
	Pressurized		Electric Motor		Mechanical
Line, To Reservoir Above Fluid Level			Accumulator,		
			Accumulator		Detent
	Below Fluid Level		Gas Charged		Pressure Compensated
$  \rightarrow$	Vented Manifold		Heater		1

# **REFERENCE - HYDRAULIC SYMBOLS**

■Methods of Operation		Valves		Color Code for Fluid Power Schematic Drawings		
	Solenoid, Single Winding		Check	Black	Intensified Pressure	
				Red	Supply	
	Servo Control		On-Off (manual shut-off)	Intermittent Red	Charging Pressure	
Pilot	L Pressure			Intermittent Red	Reduced Pressure	
	Domete Supply		Pressure Relief	Intermittent Red	Pilot Pressure	
	Remote Supply			Yellow	Metered Flow	
	Internal Supply		Pressure Reducing	Blue	Exhaust	
			Flow Control, Adjustable	Green	Intake	
			Flow Control Adjustable	Green	Drain	
			(Temperature and pressure compensated)	Blank	Inactive	
			Two-Position Two Connection			
			Two-Position Three Connection			
			Two-Position Four Connection			
			Three-Position Four Connection			
			Two-Position In Transition			

# **Troubleshooting**

Troubleshooting

# Vactor 2100i

## SUCTION

## TROUBLESHOOTING

Trouble	Probable Cause	Remedy	
Air volume (suction) at hose pickup point drops.	Plugged hose, elbow, horizontal connection hose.	Material has plugged tubing at some point. Most likely blockage is at the truck elbow or the horizontal hose connection location. Remove hose and inspect for blockage. Use the vacuum enhancer if equipped.	
	Hose has flattened or collapsed.	Check hose for flattening or collapse. Blockage will be immediately ahead of such an area.	
	Leaking seals.	Check rear door, cyclone and microstrainer housing for proper sealing. Clean and/or repair, as required.	
	Blower is faulty (blower lobe wear or timing problems).	Normal vacuum is inadequate; the blower is not functioning properly. Refer to the Blower manual for repair information or contact factor service for repair assistance.	
	Debris body is full.	Empty debris body at the dump site.	
	Microstrainer is plugged.	Remove and clean microstrainer.	
	Inner liner of hose has collapsed.	Remove and discard hose. Replace with a new hose section.	
	Inlet seal is damaged or missing.	Repair or replace the faulty inlet seal.	
	Plugged hose from heavy material being vacuumed.	Mix air and heavy material evenly to avoid sluggish in-hose transport.	
	Frozen water and debris in hose	Spray warm water into boom or bring unit inside to warm up.	
	Float ball screens plugged	Clean ball seals and screens	
Hoses soften or melt.	Motorial is too bot for plastic	Switch to rubber hose or steel pipe.	
	hoses.	Reduce feed rate so that material is cooled as it flows through the hose.	



Machine can be damaged

The boom operator must maintain a clear view of the boom during all movements to avoid striking the parts of the unit and surrounding structures.

# NOTICE

#### Machine Can Be Damaged

If ice builds up in the boom, shut down the vacuum system. Use hot water to heat the boom tubes or move the vehicle to a warm place. Slowly retract the boom when the tubes have warmed up. Do not retract the boom with ice build up in the vacuum tube. Damage to the boom and/or seal can occur. If hot water is available, start the vacuum system and spray hot water into the vacuum tube/nozzle. As the ice breaks away it will be carried to the debris body.

# Vactor 2100i

# SUCTION

# TROUBLESHOOTING

Trouble	Probable Cause	Remedy	
	Worn hose or pipe.	Repair or replace. Keep bends and turns to a minimum.	
Air volume (suction) at hose pickup point drops.	Damp material clogging hose or pipe.	Material must be very wet to be effectively vacuumed.	
	Hose has split or come apart at a joint.	Replace damaged hose section.	
Air volume (suction) at hose pickup point drops and/or hose shortens suddenly (the anaconda effect).	Hose blockage.	Examine hose for blockage; clear blockage, repair, or replace hose.	
Lump material enters hose but does not flow to debris body	Material too heavy or lumpy.	Material too heavy to be conveyed on existing air volume or the lumps are too large for hose diameter in use. Use larger hose if possible.	
Low air volume (suction) in multiple hose hookups.	Blockage at porthole connection or "Y" adapters.	Generally, the hose diameter should be larger than the maximum lump size handled. For heavy materials, the larger hose diameters provide more efficient pneumatic conveying and also can handle higher blower speeds for additional carrier air volume.	
		Find and remove blockage.	

Multiple Hose Runs				
Multiple lines should all be the same length.				
Three 2" hoses = 4" hose run				
Nine 2" hoses = 6" hose run				
Four 3" hoses equals 6" hose run				
Two 4" hoses equals 6" hose run				
Sixteen 2" hoses = 8" hose run				
Seven 3" hoses = 8" hose run				
Four 4" hoses equals 8" hose run				

Hose Restriction						
Hose Dia. Inches	Hose Area square/inches	Orifice Area	Orifice Area	Orifice Area		
8	50.3	100.0%				
7	38.5	76.6%				
6	28.3	56.3%	100.0%			
5	19.6	39.1%	69.4%			
4	12.6	25.0%	44.4%	100.0%		
3	7.1	14.1%	25.0%	56.3%		
2	3.1	6.3%	11.1%	25.0%		
1	0.8	1.6%	2.8%	6.3%		




# What should I look for when there is little or no suction at the end of the vacuum hose.

There are several reasons that could singly or in combination cause loss of suction at the end of a vacuum hose. By following these logical steps you can identify and easily rectify the problem by the process of elimination.

• Are all vacuum enable valves closed?

If not, close them, never tape any relief, pressure or safety valves shut. To do so will jeopardize safety and serious bodily harm or even death might occur. Faulty valves need to be repaired, not bypassed or forcibly shut.

• Did you reduce the size of the hose/tube or tube somewhere down the run?

Reduction of the hose/tube size midway down the run can cause material to build up in the hose/tube around the area where the hose/tube size changes. As the hose/tube size changes, the speed of air flowing through the hose/tube drops and some material falls off the airstream and begins to collect in that area. Over a short period, the accumulation grows into an obstruction which clogs the hose, resulting in loss of suction at the hose/tube inlet. The idea is to keep a constant air velocity from the point of material pick up to the entrance to the debris body. A velocity just high enough to transport the material to the body.

#### What Do I do to remedy the situation?

Uncouple the hose/tube at the point of the size change and operate the blower. If the clog is not very bad, it will clear itself otherwise manual cleaning of the hose/tube or removal of the clogged section of the hose/tube may be required. To avoid the situation, if a smaller hose/tube is all that will work, run that size hose/tube right from the truck but remember a 50% diameter reduction reduces the effective area to 1/4th the original size. Therefore the job will take much longer and also blower cooling will be reduced. To get the job done more efficiently always use the recommended hose/ tube size.

Is the debris body full?

In a liquid filled debris body, the float ball will get sucked closed resulting in a drop of suction at the hose/tube inlet.

In case of solids, an over full body, debris might partially block the passageway, translating to a loss of suction at the hose/tube end. If continued, debris will get carried over to the cyclone (if equipped) chamber, choking the filter. Any blockage of the air path or a considerable reduction of airflow will not supply enough cooling to the blower and it will over heat. The blower is a positive displacement pump and has to have a certain amount of air flowing through it to work efficiently. It is similar to failure of the water pump in an engine cooling system, if cooler water is not allowed to flow through the engine block, it will overheat rapidly and damage.

#### How to correct

Stop vacuuming, empty the debris body and clean it thoroughly.

 Leaky gaskets, damaged or blocked hoses, damaged debris body. Leaky or damaged gaskets will cause air to be sucked in through the leaky area which will translate into loss of suction at the hose/tube inlet. Same will be the result of a leaky hose/tube or connections.

Repair or replace the damaged hose. Replace a leaky gasket as soon as possible and repair any other sources of leaks.

Regulating the vacuuming speed. It is a misconception that higher the blower RPM the faster the job will be completed, especially where light weight material is vacuumed.

**Note:** The vacuum system on the 2100 series units are not suitable for vacuuming dry material. The material must be wet. When needed an optional water ring can be used to cool and wet the incoming material.

A faster blower speed generates a high velocity airflow and increases the production of flying dust. As it is, light weight dust is difficult to separate from the airstream and a high velocity airstream makes it even harder. As a result, with higher RPM than required, more dust carries over into the cyclone chamber and the microstrainer housing. All the dust that enters the housing tries to pass through the filter, exposing it to faster choking. This ingress can be reduced by reducing the operating blower speed. As a rule of thumb, keep the blower speed just high enough to easily convey the debris to the debris body and no faster. This will depend on the type of material handled and the distance through which it has to travel to the body. Start with a low RPM and if it does not do the job, increase it gradually until material starts flowing easily into the suction hose. A lower RPM will reduce the carryover into the cyclone and microstrainer housing.

Is the silencer blocked?

Any dust that is small enough to pass through the system also passes through the blower and through

### PD UNITS - NO SUCTION AT HOSE END

the silencer. Although most of this is emitted in the atmosphere, some of the minute particles cling to the insides of the silencer. Over a period of time, the silencer will get choked. This will not allow all the air from the blower to readily exhaust out of the blower, effectively creating a back pressure in the blower. This reduces its efficiency as it has to use some of its power to overcome this back-pressure, resulting in loss of airflow through it.

The remedy is to clean or replace the silencer.

• Is the blower worn out?

Any dust particle that passes through the system, however small it may be, at the high speed it is traveling sand blasts the internals of the blower and eventually wear it out. The tolerances between the moving and stationary parts in a blower are very minute and they get even smaller as the metals expand when the blower achieves its working temperature. This helps in creating a seal to trap air and pump it out. As the blower wears, the clearances get larger and the sealing gets weaker, the pumping performance reduces, creating less and less airflow. Eventually it needs to be taken out of service and rebuilt.

The blower's condition can be checked by the following method:

- 1. Find and repair all vacuum system leaks. This includes all door seals, debris body inlet seal, etc.
- 2. Cap the boom hose end to close it off.
- 3. Set the vacuum to disable.
- 4. Start the engine, engage the blower.
- 5. Increase the blower speed to about 1500rpm.
- 6. Set the vacuum to enable.
- 7. Note the rise in the vacuum gauge reading.
- Observe the blower as vacuum builds and the automatic vacuum relief valves (Kunkle valves) open up at the specified vacuum for the blower, or in case of a high vacuum blower, the gauge climbs up without an appreciable loss in blower speed.

The blower should raise the vacuum to at least 75% of the blower's rated vacuum or the automatic vacuum relief valves should open. If the blower achieves the required vacuum, the blower is in good shape. Refer to competent repair facilities (factory service can assist), or refer to blower manufacturer's maintenance manual. If it fails to achieve the rated vacuum, the blower may need attention. If the engine bogs down and begins to stall, the engine is not building enough power to run the blower to full load. It could also translate to a choked silencer and excessive back pressure.

## PD UNITS - NO SUCTION AT HOSE END



## FILTRATION SYSTEM - CYCLONES (OPTIONAL)

Trouble	Probable Cause	Remedy	
	Debris	Overfilled debris body.	
	Float ball problem	Float ball not sealing in debris body. Clean float ball and seal.	
Excessive carry-over into cyclones.	Excessive blower/fan RPM	Lower blower/fan RPM for lighter materials.	
	Dry material	Water rings are available to wet and cool material.	

### BLOWER

Trouble	Probable Cause	Remedy
	Low oil.	Check sight gauge and add oil.
	Bearings bad.	Disassemble and replace.
Noisy.	Timing out	Place transfer case in neutral and with engine OFF manually rotate the blower. If interference is felt call service.
	Low RPM	Operate blower at 1000rpm or higher
	Too much or too little oil.	Check sight gauge and service as needed.
Runs hot.	Operating at too low RPM or too high vacuum.	Never operate below 1,200 RPM or above the blowers rated vacuum level.
	Submerged or blocked vacuum hose/tube limiting air flow	Clear hose/tube and verify air flow
Locked up.	Material or rust build up in blower.	Disassemble and clean. Inspect filtration system
	Ice in blower (Never operate)	Bring inside and warm up.
	Too much or too little oil.	Check sight gauge and service as needed.
Bearing cover paint discolored.	Bearings bad.	Disassemble and replace.
	Submerged or blocked vacuum hose/tube limiting air flow	Clear hose/tube and verify air flow
	Hose/tube plugged.	Disengage and clean or replace.
	Hose/tube damaged.	Repair or replace.
	Hose/tube leaks (can be heard).	Replace.
	Final filter screen plugged.	Disassemble and clean or replace.
Low vacuum at pick up nozzle.	Relief valve plugged or stuck open.	Clean or replace.
	Blower worn.	Repair or replace.
	Microstrainer plugged	Remove and clean
	Doors not sealed.	Secure locks, check for debris; replace seals if worn.
	Clamps on joints not sealed	Check for proper attachment.
	Doors not sealed.	Secure locks, check for debris; replace seals if worn.
	Clamps on joints not sealed	Check for proper attachment.
No vacuum	Blockage in pipe / tube.	Clean or check to see if inner liner has collapsed and replace.
	Debris body full.	Dump.
	Suction nozzle immersed	Operate properly by raising and lowering nozzle in material.
	Microstrainer plugged	Clean microstrainer

### BLOWER

### TROUBLESHOOTING

Trouble	Probable Cause	Remedy	
Protective strainer plugged	Screen assemblies plugged	Dump debris, open body, lower safety props, clean screens.	
(float ball cages)	Float balls stuck.	Remove and flush with water or air.	
	Engine speed too low.	Verify engine operation	
No air flow.	Wrong direction of rotation.	Compare actual rotation with vacuum pump illustration and arrow on blower. Compare driver if wrong.	
	Obstruction in piping.	Check piping, screen, valves, silencer, to assure an open flow path.	
	Engine speed too low.	Verify engine operation	
	Excessive discharge pressure.	Check inlet vacuum and discharge pressure, and compare these figures wit specified operating conditions on order.	
	Obstruction in piping.	Check piping, screen, valves, silencer, to assure an open flow path.	
	Excessive slip.	Check inside of casing for worn or eroded surfaces causing excessive clearances.	
	Hose leaks.	Check hose for tears or splits.	
Low capacity.	Connection leaks.	Check connections for air leaks.	
	Rear door leak.	Check for leaking seal at rear door.	
	Expansion joint leak.	Check for air leaks at rubber seal connection at the make/break.	
	Blower lobe wear or timing problem.	Refer to competent repair facilities (factory service can assist), or refer to blower manufacturer's maintenance manual.	
	Vacuum relief valves	Check for leaks and proper operation.	



#### Machine Can Be Damaged

To avoid damage to the blower/fan and drive train immediately shut down the unit when any vibrations or material discharge at the exhaust is noticed. Immediately stop operations and correct problem.

## BLOWER

Trouble	Probable Cause	Remedy
	Dry material	Water rings are available to wet and cool material.
	Excessive blower speed for job requirement creates dust carry-over through the microstrainer.	Reduce engine speed to optimize vacuum operations.
Dust plume through blower	Over loaded cyclone section resulting in excessive carry over. Microstrainer overloaded.	Dump the vacuum system and thoroughly inspect for material buildup. Clean vacuum system, as required.
(silencer) exhaust.	Overloaded microstrainer.	Open the microstrainer door and clean out the housing area. <b>NOTE:</b> This section should be cleaned every time that the vacuum system is dumped.
	Faulty or improperly installed microstrainer.	Open the microstrainer access door, remove the microstrainer and inspect for dust buildup. If a general buildup or leak is evident, replace the microstrainer. Material behind the microstrainer is an indication of a leaking or damaged microstrainer.
A plume appears for several minutes after microstrainer change over.	Dust from previous vacuuming activities is being blown into the atmosphere.	Clean equipment between microstrainer service intervals.
	Speed too high.	Never operate above rated RPM of blower.
	Pressure too high.	See item "Low capacity."
Excessive power (chassis)	Impellers rubbing.	Inspect outside of cylinder and head plates for high temperature areas, then check for impeller contacts at these points. Correct blower mounting, drive alignment.
	Vacuum too high	Never exceed blower system rating. Repair or replace the vacuum relief (Kunkle) valve.
	Inadequate lubrication	Restore correct oil levels in main oil sumps.
	Excessive lubrication	Check oil level. If incorrect, drain and refill with clean oil of recommended grade.
Overneating of bearings of gears.	Excessive pressure	See item "Low capacity."
	Not enough air flow	Do not submerge the end of the hose or vacuum tube. There must be adequate airflow to cool the blower.

# NOTICE

Machine Can Be Damaged

To avoid damage to the blower/fan and drive train immediately shut down the unit when any vibrations or material discharge at the exhaust is noticed. Immediately stop operations and correct problem.

Trouble	Probable Cause	Remedy	
	Driver of blower loose.	Tighten mounting bolts securely.	
	Driveline bearings Check and replace as needed both UPPER and LOWER driveline bear		
	Misalignment.	See item "Overheating of bearings or gears."	
	Impellers rubbing.	See item "Excessive power."	
Vibration	Worn bearings/gears.	Check gear backlash and condition of bearings. Refer to blower manual for specifications. Replace gears and bearings.	
	Unbalanced or rubbing.	Scale or process material may build up on casing and impellers, or inside impellers. Remove buildup to restore original clearances and impeller balance.	
Engine overheats and blower gets hot to the touch.	Hose sized incorrectly.	Allow more air to flow into vacuum hoses.	
High blower temperatures, high vacuum, low air flow.	Hoses are plugged.	Allow more air to flow into vacuum hoses.	
High blower temperatures, high material temperatures.	Insufficient air flow in vacuum hose.	Allow more air to enter the vacuum hose. If possible, cool the hot material with water.	
High blower temperature with normal air flow.	Improper amount, type, or weight of oil in blower.	Drain blower lubricant and refill with proper type and weight of oil. Refer to the OEM manual for further information.	
		Check for holes and/or leaks.	
Noisy blower.	Silencer or muffler defects.	Replace silencer if sound deadening material has hardened or has disintegrated.	
Engine loads up and relief valve pops open.	Debris body is full.	System is overloaded. Shutdown and dump. Debris body is full and float has closed off air passage. After dumping, clean rear door seal and inspect gasket for cuts. Check and clean float balls.	



## TRANSFER CASE

Trouble	Probable Cause	Remedy
Transfer case runs hot.	Too much or too little oil in the transfer case.	Drain and refill the transfer case with the proper type and amount of oil.
Transfer case is noisy.	Vehicle has been idling with blower engaged.	Never allow vehicle to idle with blower engaged. <b>Note:</b> The blower should not be operated at idle rpm's. Maintain at least 875rpm to reduce wear on the transfer case. The system does this automatically on auto transmissions.
Transfer case is hard to engage. (MANUAL transmission)	Transfer case gears are not meshing properly.	Feather the clutch pedal to allow the transmission to roll. This will allow the transfer case gears to mesh.
Transfer case does not operate blower when engaged. No power is available at the remote control panel. (MANUAL transmission)	Faulty transmission shift prior to engaging the transfer case.	Return transfer case shift knob to ROAD MODE and restart the gear shifting process until the amber TRANSMISSION CAUTION light extinguishes. Then place the transfer case shift lever in the BLOWER MODE.
Transfer case does not engage.	Proper transfer case engagement procedure not followed.	Procedures are normally decalled on the driver side visor.
	Low air pressure.	Check compressor air pressure gauge. There must be a minimum air pressure of 80 PSI for the air shifter to operate.
Blower does not engage.	Air leak at air shifter.	Tighten or replace leaking air shifter components.
	Transfer case nose cone not shifting.	Refer to the transfer case manual for repair instructions.
	Proper engagement procedure not followed.	Attempt engagement procedure.

## Fan - Cotta Gear Box

### TROUBLESHOOTING

#### **Excessive Heat**

Excess oil actually leads to oil loss by causing excessive heat, which hardens the seals and results in oil leaks.

Normal operating temperature ranges from 140° (F) to 225°. If temperature exceeds 225°, proceed as follows:

- 1. Check oil level and if it is high, low or dirty:
  - a. Drain oil thru a filter.
  - b. Check the filter for debris from failing bearings or gears.
  - c. If there is debris, rebuild or contact Vactor Manufacturing.
- 2. Check seals for leaks and replace if necessary as follows:
  - a. Lubricate seal lip with oil.
  - b. Avoid cutting seal lip on shaft during installation.
- **Note:** Hydraulic fan system gear box temperature normally will not go above 160° (F).

#### **Debris In Oil**

Debris in oil drained from gear box indicates gear and/or bearing failure. Rebuild the gear box or contact Vactor Manufacturing.

#### **Discolored Paint At Bearing Housing**

Paint discoloration at the bearing housing indicates bearing failure.

#### Silvery Paste On Drain Plug

Normal use causes minute particles that are attracted to and collect on the magnetic drain plug and form a silvery paste.

#### **Increased Noise Level**

If the noise level suddenly increases check the following:

- 1. Check gear box mounting, drive lines and shift control linkages for loose connections, which vibrate and cause noise.
- Check condition of fan, which can transmit vibration thru drive line to gear box if unbalanced.
- 3. Drain, filter and check oil for debris, which indicates gear and/or bearing failure.





## PUMP - DIRECTIONAL VALVE IS NOT SHIFTING

## TROUBLESHOOTING

#### **Correct Pressure On Only One Stroke**

The rodder pump system includes two check valves located between the water intake manifold and the pump. A piece of dirt or scale can cause a check valve to stick open.

- 1. Clean the intake screen. If the screen has a build-up of rust or is damaged replace it. Open the ball valve and check for water flow from the water tanks.
- Remove the intake elbow and inspect the intake valves. One of the valves may be stuck or has a slipped spring. Replace the valve assembly if worn or damaged.



WATER

Intake
High Pressure

Legend

OIL Exhaust

High Pressure

### WATER SYSTEM - RODDER PUMP

#### Pump fails during full stroke

Pressure drops off and pump fails to pump water during the full stroke. This restriction prevents water from being drawn into the pump on the fill cycle.

If water pressure drops and the pump fails during full stroke, remove the intake screen. Clean the screen or replace if the screen is rusted, damaged or worn.

#### Pump works during one stroke, but not both

Pump fails to deliver water on both cycles; however it does deliver water on one stroke.

- 1. Remove the intake screen and clean if dirty or replace if rusted.
- 2. If still not working properly, open valve to check water flow from tank:
  - a. Remove the intake manifold which supplies water to the pump.
- View of the series of the seri

b. Examine both intake check valves for broken springs or debris causing valves to stick in open position. Clean, repair or replace.

#### Pump cycles but no water at nozzle.

The pump is cycling; however, it is failing to deliver water to the nozzle. The intake screen is clean and everything else is functioning properly

- 1. Examine the exhaust check valves. This would suggest a damaged or broken exhaust check valve located under the exhaust manifold.
- 2. Examine intake check valves for damage or sticking. Replace if damaged.
- 3. Check for worn seals on the water piston or even a broken piston.



#### **Pump Performance Reference Test**

An easy check of both the rodder pump water and oil side hydraulics can be made by verifying the number of pump strokes to water measured by a flow gauge on the rodder hose. If the pump speed (strokes per minute) comes up lower than expected there is a hydraulic flow problem.

Flow Rate GPM	Pump Speed Strokes/Min	Pressure PSI
60-61*	21	2000
71-73*	25	2000
82-85*	28	2000
85-87**	29	2000
91-93**	30	2000
93-96**	31	2000
101-104**	35	2000

\* 500" x 1" hose plus 50" leader hose

\*\* 500" x 1-1/4" hose plus 50, leader hose

End block side = 3 gallons

Center block side- 2.8 gallons

## WATER SYSTEM - RODDER PUMP - DO8 VALVE

### TROUBLESHOOTING

# Pump won't shift when manually operating solenoid valve.

- If the pump does not shift when the rodder pump solenoid is manually operated, check the spool inside the main control valve:
- 1. Shut down the hydraulics and electrical power.
- 2. Remove the four Allen-head bolts holding the end cap on the main control valve directly below the solenoid valve checked above.
- 3. Check to make sure spool moves freely inside valve.
- 4. If the spool does not move freely, remove and polish with a fine emery cloth.
- Reinstall spool, end cap and Allen bolts. Torque per Vickers specification: Bolts should be torqued to 5–7 N.m (44–62 lbf. in.) with threads lubricated.
- **Note** If the solenoids and pilot valve assembly was removed ensure that both the face of the valve and the face on which it is being mounted (i.e subplate, manifold, SystemStak valve or plate) is as clean as possible. Do not over tighten hold-down bolts beyond recommended values. If these are overtorqued, it could bind the pilot spool causing it to fail to shift.

# Main directional valve is shifting, but rodder pump won't function.

The problem is internally in the rodder pump, broken shaft, bad seals, etc., when the main directional valve is shifting but the rodder pump still will not function. Remove the rodder pump and disassemble.

#### Correct pressure on only one stroke.

The rodder pump pressure is correct on one stroke, but there is no or very little pressure on the other stroke. One of the two intake check valves is stuck open.

- Clean the intake screen. If the screen has a build- up of rust or is damaged, replace it. Open the ball valve and check for water flow from the water tanks.
- 2. Remove the intake manifold and inspect the intake valves. One of the valves may be stuck or has a slipped spring. Replace the valve assembly if worn or damaged.



#### Engine stalls when pump is turned on.

Several things can cause the engine to stall out when the rodder pump toggle switch is turned on.

- 1. All ball valves are closed (OFF) causing the rodder pump to "deadhead." Turn one ball valve ON.
- The sensor may be defective or the sensor wiring is bad. The rodder pump is at the end of the stroke and is not being shifted. (See "Pump Fails to Cycle" for proper trouble shooting of the sensor.)
- 3. The solenoid valve may be defective. The rodder pump is at the end of the stroke and is not being shifted. (See "Pump Fails to Cycle" for proper trouble shooting of the solenoid valve.)

## WATER SYSTEM - HEAT EXCHANGERS

Depending on the unit configuration a second heat exchanger may be installed to supplement the chassis engine cooling. This heat exchanger can be identified by the smaller water lines and solenoid valve mounted on it. The solenoid valve is activated by the chassis engine controller. The valve connects to the CANBUS through VMM 3.



### CONTROLS - HOSE REEL - DISPLAY

The display is actually a control system that is uniquely programmed for the unit. It will not work on another unit. Replacement requires the unit serial number so that it can be programmed correctly.

Note: Display is designed to operate at an internal temperature range of -22° (F) to 158° (F). Outside that range the display may shut down.

Following is a list of cause and effect relationships that may be non-intuitive. By being non-intuitive they may make troubleshooting difficult.

- If chassis dash does strange things and/ or truck will not operate, this could be an indication that the extended chassis CANbus is faulty. Put a 120 ohm resister in place of the chassis CANbus extension (located in the driver side firewall) (may be behind trim panel).
- Reverse power and ground polarity to a controller will cause a short circuit

Refer to the Diagnostics manual for more detailed information.



## ELECTRICAL EQUIPMENT DISCONNECT SWITCH

#### Units are equipped with an electrical equipment disconnect switch which can be found on the driver side behind the cab. This switch is used in the event of servicing the machine or jump starting the chassis. Switching to OFF separates the chassis electrical systems from the Vactor systems.

When the switch is in the OFF position, the cab and chassis electronics will still remain active.

#### Notes

- **1.)** The master switch light is powered by the ignition and will still illuminate with the disconnect switch enabled.
- **2.)** Wait at least 2 minutes after shutting the truck down before turning off the chassis batteries.
- **3.)** Switch to OFF when jump starting to prevent a surge through the Vactor system.



## NOTICE

Electrical Equipment Disconnect

To prevent electrical systems damage, turn switch to OFF position before servicing chassis or before jump starting.



Note: Chassis/Cab electronics still active when switch is off.

614678 rB

## **CONTROLS - TOOL BOX - JUNCTION BOX**







### **CONTROLS - BEHIND CAB - JUNCTION BOX BREAKERS**

### TROUBLESHOOTING



Consult the schematic's specific to the unit for breaker and relay applications.

Replacement relays and breakers:

44594F-30	COOPER BUSSMANN SPDT RELAY
44596F-30	5 AMP RESETTABLE BREAKER
44596G-30	10 AMP RESETTABLE BREAKER
44596K-30	20 AMP RESETTABLE BREAKER
44596N-30	30 AMP RESETTABLE BREAKER

### Breaker - Relav Panel

CB#	Description	CB Size	Source	
1	Not Used (Relay 1)	20A	Stud 1/Batt	
2	Manifold Power	20A	Stud 2/Ign	
3	Subframe Power	20A	Stud 2/Ign	
4	Side Worklights Relay	10A	Stud 2/Ign	
5	MD4 RTC	10A	Stud 1/Batt	
6	Not Used	15A	Stud 2/Ign	
7	Not Used (Relay 2)	15A	Stud 1/Batt	
8	Electric Recirculator Relay	25A	Stud 2/Ign	
9	Rear Worklights Relav	10A	Stud 2/lan	
10	Strobe Lights Relay	20A	Stud 1/Batt	
11	Cab Power	10A	Stud 2/Ian	
12	Side Battery Power	15A	Stud 1/Batt	
13	Expansion Power	20A	Stud 2/Ian	
14	Sensor Power	10A	Stud 2/Ian	
15	Front Power	20A	Stud 2/lan	
16	Oil Cooler Relay	30A	Stud 1/Batt	
17	Not Used (Relay 8)	20A	Stud 2/Ian	
18	Boom Worklights Relay	10A	Stud 2/Ign	
19	Arrow 1 (Relay)	10A	Stud 1/Batt	
20	Side Switched Power	15A	Stud 2/Ian	
21	Not Used	15A	Stud 1/Batt	
22	Handlight Power	15A	Stud 2/Ian	
23	Mirror Strobes Relay	154	Stud 1/Batt	
20	Front Worklights Relay	104	Stud 2/lan	
25	Tool Box Heaters Relay	204	Stud 1/Batt	
26	Rodder Blocking Valves Relay	ν 10Δ	Stud 2/lan	
20	Not Used	201	Stud 1/Ratt	
21	Not Used	207	Stud 2/lan	
20		207		
Relay	Description	СВ	Source	
1	Not Used		Stud 1/Batt	
2	Not Used		Stud 1/Batt	
3	Side Worklights	4	Stud 2/Ign	
4	Electric Recirculator	8	Stud 2/Ign	
5	Strobe Lights	10	Stud 1/Batt	
6	Rear Worklights	9	Stud 2/Ign	
7	Oil Cooler	16	Stud 1/Batt	
8	Not Used		Stud 2/Ign	
9	Arrow 1	19	Stud 1/Batt	
10	Boom Worklights	18	Stud 2/Ign	
11	Mirror Strobe	23	Stud 1/Batt	
12	Front Worklights	24	Stud 2/Ign	
13	Tool Box Heaters	25	Stud 1/Batt	
14	Rodder Blocking Valves	26	Stud 2/Ign	
Source Power (supply studs on rear of panel)				
Stud 1 Battery power				
Stud	2 Ignition Power		<u>(</u> <u>−</u> <u>+</u> )	



## **CONTROLS - TOOL BOX - JUNCTION BOX**

### TROUBLESHOOTING





#### No power

Before attempting to check for power failure at the control panel, check all connections for tightness at the battery. This includes all auxiliary wires connected to the battery terminals.

Verify that there is power to the relay and that the relay is functioning. Replace relay as required.

**Note** - Diode on main power relay is flyback protection (surge protection).

## SINGLE PTO - PTO A - DRIVER SIDE PUMPS

## TROUBLESHOOTING



**Note:** Allison 4000 series transmissions only use one PTO. All others use the same pumps spread over two PTO's.

	Port	Function	Setting
1	-	Load sense pump - outlet hose	NA
2	-	Load sense pump - powers debris body, rear door, boom and hose reel	NA
3	-	Load sense pump - suction hose	NA
4	-	Multi-flow pump - suction hose	NA
5	-	Multi-flow pump - compensator	NA
6	-	Multi-flow pump - outlet check valve	NA
7	-	Multi-flow pump - outlet hose	NA
8	-	Case drains	NA
9	-	Rodder system pump	NA
10	-	Load sense pump - compensator	NA

## DUAL PTO'S - PTO A - DRIVER SIDE PUMPS



	Deat	<b>F</b> and the	0
	Port	Function	Setting
1	-	Load sense pump - outlet hose	NA
2	-	Load sense pump - powers debris body, rear door, boom and hose reel	NA
3	-	Load sense pump - suction hose	NA
4	-	Multi-flow pump - suction hose	NA
5	-	Multi-flow pump - compensator	NA
6	-	Multi-flow pump - outlet check valve	NA
7	-	Multi-flow pump - outlet hose	NA
8	-	Case drains	NA
9	-	Rodder system pump	NA
10	-	Load sense pump - compensator	NA

DUAL PTO'S - PTO B - PASSENGER SIDE PUMP



	Port	Function	Setting
1	-	Multi-flow pump - suction hose	NA
2	-	Multi-flow pump - compensator	NA
3	-	Multi-flow pump - outlet check valve	NA
4	-	Multi-flow pump - outlet hose	NA
5	-	Case drains	NA
6	-	Rodder system pump	

## HYDRAULIC SYSTEMS ID



Hydraulic Systems - 506156 - Manifold - Photo



Hydraulic Systems - 506156 - Manifold - Face



	Port	Function	Setting
1	NA	Pilot valve - body down. Manual - push.	NA
2	NA	Pilot valve - body up. Manual - push.	NA
3	NA	Hose reel pay out. Manual - push.	NA
4	NA	Load sense over ride valve. Manual - pull	NA
5	NA	Rear door valve. Manual - pull to open/push to close.	NA
6	NA	Hose reel pay in. Manual - push	NA



	Port	Function	Setting
1	G4	Pilot pressure - body down	NA
2	BDUP	Body up - hose connection	NA
3	BDDW	Body down - hose connection	NA
4	T1	Tank port - hose connection	NA
5	BOOM	Oil OUT - hose connection for options	NA
6	G3	Pilot pressure - body up	NA
7	HRIN	Hose reel pay in - hose connection	NA
8	HROUT	Hose reel pay out - hose connection	NA
9	T2	Drain port - hose connection	NA
10	Р	Pressure port IN to manifold - hose connection	NA
11	GP	Gauge port	NA
12	PV2	Hose reel speed control. Manual - CW to increase, CCW to decrease. Rotate fully CCW when done.	NA

HYDRAULIC SYSTEMS - 506156 - MANIFOLD - REAR SIDE TROUBLESHOOTING



	Port	Function	Setting
1	NA	Option valve - can be used for vacuum enhance, lateral hose reels and hydraulic pipe racks. Manual - rotate fully clockwise. Rotate back fully CCW when done.	NA
2	NA	Body counter balance valve	3000psi
3	NA	Body counter balance valve	3000psi
4	NA	Load sense check valve for auxiliary circuit	NA
5	NA	Cavity plug for optional content	NA

### TROUBLESHOOTING

## HYDRAULIC SYSTEMS - 506156 - MANIFOLD - TOP



	Port	Function	Setting
1	RV1	Relief valve - main	2800psi
2	PD1	Body raise/lower piloted element	NA
3	PR1	Pressure reducing valve	400psi

TROUBLESHOOTING



	Port	Function	Setting
1	LS	Load sense - hose connection	NA
2	NA	Aux relief plug	NA
3	RDDN	Rear door down - hose connection	NA
4	RDUP	Rear door up - hose connection	NA
5	NA	Construction plug (2)	NA
6	NA	Load sense - check valve for boom circuit	NA
7	NA	Load sense - check valve for hose reel circuit	NA

Vactor 2100i Hydraulic Systems - 506156 - Manifold - Schematic



HYDRAULIC SYSTEMS - 513917 - BOOM VALVE

### TROUBLESHOOTING



#### Manual Hydraulic Operation.

In the event of an electrical failure or other system failure, the manually operated hydraulic pump is provided to lower the boom and retract the hose reel. Activate the required manual override and pump the hand pump to operate.

**Note:** The handle for the manual override pump, as well as the valve override wrench, are located and secured above the boom hydraulic valve.





#### **Crushing hazard**

NEVER go under a raised boom. To avoid injury or death:



- NEVER loosen or disconnect any hydraulic components while the hydraulic pump is running.
- Always vent residual pressure from the hydraulic system before disconnecting any hydraulic components. High pressure hydraulic oil will injure by injection into the skin and by cutting.
- The unit must be off and hydraulics disengaged when performing electrical or hydraulic service. Before operating any of the manual overrides, ensure that the solenoid override buttons move freely.
- To avoid unexpected boom movement turn OFF pendant and remote controls.
- Remove the ignition keys and post a lockout/tagout sign on the chassis steering wheel and engine control panels as required.



## HYDRAULIC SYSTEMS ID - HYD OIL TEMP SENSOR

#### One temperature sensor monitors the system for high hydraulic oil temperature. A warning on the display appears, also an optional indicator light on the panel and an alarm sounds when the temperature reaches 180" (F). The system triggers an E-Stop at about 200° (F). Troubleshoot the unit for problem.



## Vactor 2100i Hydraulic Systems ID - 513905 - Door Manifold

### TROUBLESHOOTING

### Normally located above the rear door.









## **Rear Door**

Trouble	Probable Cause	Remedy
	Hydraulic pump is not engaged.	Engage hydraulic pump.
		Check hydraulic oil level in sight gauge. Ensure main supply valve is open.
Rear door will not operate.	Leaks and blockages.	Check hydraulic pump and hoses for leaks.
		Check hydraulic system for dirt or blockage.
		Check hydraulic return oil spin-on filter.
		Check suction line strainer.
Rear door leaks on way to dump		Seal is not holding. After dumping, clean off seal and inspect gasket for cuts.
site.	Leaking rear door seals.	Replace door seal.
		Adjust door locks
## Hydraulics

## TROUBLESHOOTING

Trouble	Probable Cause	Remedy	
		An insufficient oil flow to the hydraulic pump will cause what is called "Starving the Pump". First check the reservoir.	
Noisy hydraulic pump.	Insufficient flow of hydraulic fluid.	<b>NOTE:</b> Insufficient oil supply in the reservoir with lift cylinders in extreme raised position will cause the pump to deliver charges of air instead of oil into hydraulic unit.	
Slow lift (body, rear door.)	Extreme temperature.	In cold weather, oil becomes thick. This can cause hoist cylinder to be slow in raising a load. Pump efficiency is retarded by the oil being unable to flow readily enough to supply the pump in extreme hot or cold temperatures.	
	Hydraulic leakage.	Check for leaks in hydraulic lines.	
Insufficient lifting of debris body.	Bad check valve.	Check for leakage in hoist cylinder packing.	
Hoist cylinder will not operate in up or down position.	Improperly functioning check valve.	The pilot in the check valve holds hydraulic fluid to operate cylinder. If this does not happen, replace check valve when body is in fully lowered position.	
	Center of gravity of body and debris misaligned.	Never attempt any repair. Consult factory.	
Body is up and will not come down	Bad check valve.	The debris body MUST be held securely by means of the safety stand. If it will not, place blocking between body and chassis or other means before removing and replacing new check valve.	

## **A** WARNING



#### Crushing hazard

NEVER go under a raised loaded debris body. To avoid injury or death:

- Empty debris body before service work.
- Always use the body prop when the debris body is raised for service.
- NEVER disconnect check valve with the debris body in raised position. Debris body will fall.
- NEVER remove the bleeder screw (if equipped) from cylinder with pressure on the cylinder. Debris body will fall. Only loosen bleeder screw to bleed air from cylinder.
- NEVER loosen or disconnect any hydraulic components while the hydraulic pump is running.

### HYDRAULIC SYSTEM - HOIST CYLINDER

## TROUBLESHOOTING

#### Hoist

The hoist includes the hydraulic pump, hoist control valve and debris body / boom lift cylinders.

#### Noisy hydraulic pump.

**Note:** Insufficient oil supply in the reservoir will "starve the pump" and cause it to deliver charges of air instead of oil when hoist is in the extreme raised position.

The primary causes of pump noise are a lack of hydraulic oil known as cavitation or operating in extremely cold temperatures. Check the hydraulic oil level daily before operating. In extremely cold weather, allow the unit to warm up completely and slowly operate the hydraulic controls until the hydraulic oil has warmed. See the Maintenance Section for information on hydraulic oil level and specifications.

- 1. Check hydraulic oil reservoir level and service as needed.
- **Note:** Raising the hoist at a higher speed than necessary may also "starve the pump," which will reduce hoisting speed and result in damage to the unit.
- 2. Keep the truck engine speed at a moderate level when using the hydraulic controls.

#### Extreme temperatures effects pump efficiency.

- 1. During hot weather, the oil may become thin and cause the hoist to be slow in raising because the pump efficiency is reduced by the thin oil.
- 2. During cold weather, the oil may become thick and cause the hoist to be slow in raising. Thick oil will also retard the descent. Pump efficiency is reduced because the oil is unable to flow readily enough to supply the pump. This is another case of "starving the pump."
- 3. Be sure to have the right viscosity oil for your operating conditions. (See suggested oils in the Maintenance section.)

## 

Entanglement Hazard

Contacting moving parts with clothes or body can cause injury or death:



- Never go underneath the vehicle with the engine running.
- Never work near a rotating drive shaft.
- Never attempt to engage or disengage the pump or other driven equipment from underneath the vehicle with the engine running.
- Never attempt to engage or disengage any driven equipment from any position that could result in getting entangled in the drive shaft or moving parts.
- Never attempt to work on any installed driven equipment with the engine running.
- Remove the ignition keys and post a lockout/tagout sign on the chassis steering wheel and engine control panels as required.

## **A**WARNING

#### **Crushing hazard**

NEVER go under a raised loaded debris body. To avoid injury or death:



- Empty debris body before service work.
- Always use the body prop when the debris body is raised for service.
- NEVER disconnect check valve with the debris body in raised position. Debris body will fall.
- NEVER remove the bleeder screw (if equipped) from cylinder with pressure on the cylinder. Debris body will fall. Only loosen bleeder screw to bleed air from cylinder.
- NEVER loosen or disconnect any hydraulic components while the hydraulic pump is running.

## HYDRAULIC SYSTEM - HOIST CYLINDER

#### Lift cylinder creeping down or drifting.

The terms "creeping down" and "drifting" refer to the hydraulic cylinder dropping slowly during operation. The primary cause of this is a loss of hydraulic pressure, either internally or due to leaks in the system.

- 1. Visually check for oil leaks at the following points:
  - Cylinder sleeve packing
  - Hoses and connections
  - Tubing and connections
  - Pipe fittings
  - Pump mounting base
- **Note:** A small particle of dirt between the ball and seat of check valves and control spools can result in pressure loss and damage to internal parts. See the Maintenance Section for information on hydraulic system service.
- 2. Examine for debris in the check valves by operating the hoist several times to dislodge and pass the debris to the filter.

Drifting can also be caused by hydraulic oil bypassing internally and causing a lack of pressure at the cylinder. Wear and damage can cause bypassing around cylinder packing, control valve seals / spools and actuating solenoid. If drifting continues after checking for leaks and debris in the system, check the system for bypassing.

#### Poor hoist performance.

Air in the lift cylinder can cause many problems including:

- Failure to lift
- Jerky hoist operation
- Lift cylinder won't raise to full extension
- Lift cylinder drops several inches when lowered
- **Note:** Bleeding air from the lift cylinder can result in a discharge of hydraulic oil from the cylinder. Make sure the vehicle is in an appropriate area for cleanup. Make sure surrounding personnel are aware of the procedure.

Check the hydraulic reservoir oil level daily before use. If air enters the hydraulic system, add oil to the reservoir if needed and operate the hoist several times. If necessary, raise the lift cylinder a few inches and loosen the manual bleeder valve on top of the debris body lift cylinder. This will allow air to escape. When the air is displaced, close the bleeder and lower the cylinder. Check the hydraulic reservoir level.

#### **Other Notes**

A small particle of dirt between the ball and seat of check valves and control spools can result in pressure loss and damage to internal parts. See the Maintenance Section for information on hydraulic system service.

Insufficient oil supply in the reservoir will "starve the pump" and cause it to deliver charges of air instead of oil when hoist is in the extreme raised position.

Raising the hoist at a higher speed than necessary may also "starve the pump," which will actually reduce hoisting speed and will result in damage to the unit.

## RODDER PUMP VALVE

## TROUBLESHOOTING



	Port	Function	Setting
1	-	Relief valve - see build ticket for setting	NA

## MULTI-FLOW REMOTE COMPENSATOR

## TROUBLESHOOTING



	Port	Function	Setting
1	-	Multi-flow remote proportional compensator (preset to 3600psi)	NA

## HYDRAULIC & PTO SYSTEM SAFETY

## TROUBLESHOOTING

## **A** DANGER

Entanglement Hazard



Contacting moving parts with clothes or body can cause injury or death:

- Never go underneath the vehicle with the engine running.
- Never work near a rotating drive shaft.
- Never attempt to engage or disengage the pump or other driven equipment from underneath the vehicle with the engine running.
- Never attempt to engage or disengage any driven equipment from any position that could result in getting entangled in the drive shaft or moving parts.
- Never attempt to work on any installed driven equipment with the engine running.
- Remove the ignition keys and post a lockout/tagout sign on the chassis steering wheel and engine control panels as required.

## NOTICE



Follow recommended safety practices while performing all work. Refer to the FS Solutions/Guzzler/Vactor/TRUVAC/Westech Safety Manual for additional information.

This manual is available at: <u>www.vactor.com</u>

## **WARNING**

#### Crushing hazard





- NEVER go under a raised boom, debris body, rear door or other powered system.
- Relieve all residual pressure in pneumatic and hydraulic circuits.
- NEVER loosen or disconnect any hydraulic components while the hydraulic pump is running.
- The unit must be off and hydraulics disengaged when performing electrical or hydraulic service. Before operating any of the manual overrides, ensure that the solenoid override buttons move freely.
- Verify all areas are clear and safe before manually overriding any pneumatic, electrical or hydraulic circuit.
- To stop unexpected movements turn off all pendants and remote controls.
- Remove the ignition keys and post a lockout/tagout sign on the chassis steering wheel and engine control panels as required.

## HYDRAULIC SYSTEM OVERVIEW - AUTO TRANSMISSIONS

## TROUBLESHOOTING

What follows is a description for the 3000 and 4000 series Allison transmissions ONLY.

The hydraulic system is really composed of two separate sub-systems which are for all practical purposes completely independent of one another. What they share is a common power source (the chassis engine) and a common oil source (the hydraulic tank). One hydraulic system drives the water (rodder) pump. The second system drives all of the other hydraulic functions on the truck.

#### Water System Hydraulics

The water (rodder) pump is powered by a hydraulic system which consists of one or two transmissionmounted PTOs, two hydraulic pumps, a rodder valve, the actual water (rodder) pump itself, and a water-cooled heat exchanger. The first PTO drives one or two variable displacement electronically pressure-controlled hydraulic pumps. The second PTO drives a variable displacement electronically pressure-controlled hydraulic pump if equipped. Both pump flows combine at the rodder valve subplate. Check valves at each pump outlet prevent backflow and ensure that all of the flow from both pumps is delivered to the rodder.

A variable displacement pump is capable of changing its displacement per revolution anywhere from zero up to its maximum. Actual flow delivered from the pump can thus vary in two ways: changing the input speed to the pump or the pump itself altering the amount of oil discharged per revolution.

The 3000 series transmissions requires two PTOs.

#### Accessory Hydraulic System

This system is powered by a load sense (LS) pump. Custom Hydraulic Integrated Circuit (HIC) valve blocks which contain electo-hydraulic valving control such truck functions as: rear door open/ close, debris body up/down, hose reel pay-in/payout, hose reel extend/retract, all boom functions, hydraulic tool package (optional), and pump off (optional).

Manual overrides are included on all valve functions. This allows for reliable and rapid troubleshooting as well as manual operation in the case of minor system faults. A hand pump built into the system facilitates emergency positioning of boom functions and extension/retraction of the hose reel in cases of a complete system failure. PTO driven hydraulic pumps are located behind the cab and under/ between the chassis frame rails.

- A Water system variable displacement hydraulic pump
- B Water system variable displacement hydraulic pump
- C Accessory hydraulic system pump



## HYDRAULIC SYSTEM CHECK/SET ITEMS

#### Set or check hydraulic pressures (\*1)

#### Water system

Set Main relief

Set Multiflow pump compensator(S)

#### Auxiliary hydraulics

Check main relief

Set LS compensator differential

Set LS maximum pressure

Check AUX relief

Check boom multiple-function overpressure relief (RV2)

Check boom multiple-function overpressure relief (RV1)

#### Test function manual overrides:

body/door valve

Rear door open/close

Debris body up/down

Hose reel pay-in/pay-out

#### Boom valve

Hose reel extend/retract

Boom extend/retract

Boom rotate left/right

Boom raise/lower

D08 rodder valve

#### Test operation/function of:

Water system

Boom

Up/down

Extend/retract

Rotate left/right

Hose reel extend/retract

Rear door open/close & lock/unlock, proper

sequencing Debris body up/down

Hose reel pay-in/pay-out

Aux valve (if option exists)

#### (\*1) Regarding pressure settings for pumps/ valves:

**SET -** Indicates items which must be adjusted to the proper value on every unit.

TROUBLESHOOTING

**CHECK** - Indicates items which are the same most (or all) configurations and therefore are purchased preset. Except in rare circumstances, these values do not need to be adjusted. They simply need to be verified.

### SETTING HYD. PRESSURES - WATER SYSTEM - MAIN RELIEF TROUBLESHOOTING

## Set the Main Relief (located in subplate under the D08 directional valve)

(5/32 Allen wrench needed for adjusting relief, 9/16 wrench for lock nut)

- A. Install 5000 psi pressure gauge on D08 directional valve "PG" port
- B. Remove electrical connector from the remote pump compensator (the pumps default to maximum pressure unless driven to a lower value by an electrical control signal. Removing this connector ensures no electrical signal is driving the pumps to a lower pressure than maximum.)
- C. Raise multiflow pump compensator setting to near its maximum. 4mm wrench loosens side locking screw and 6mm wrench adjusts from the top.
- D. Lower D08 relief setting to near its minimum
- E. Ensure parking brake is set
- F. Start truck
- G. Engage all PTOs from in the cab. Hydraulic system is now at maximum flow. D08 relief valve setting determines maximum system pressure and engine speed determines flow.
- H. Set rodder pump ON (switch at front hose reel)
- I. Raise engine speed to 1000 RPM
- J. Close ball valve at the rodder pump to deadhead the water system (hydraulic oil is now forced to flow over D08 relief)
- K. Slowly raise engine speed to certified value (refer to build ticket for proper RPM)
- L. Slowly increase relief adjustment on D08 valve to proper value (3500 psi for 2500 psi water: 3100 psi for 2000 psi water)
- M. Open ball valve at the rodder pump
- N. Lower engine speed to IDLE
- O. Shut off rodder pump, shut off system from in cab, and shut truck OFF
- P. Reconnect electrical connector on the remote pump compensator
- Q. Remove pressure gauge







## SETTING HYDRAULIC PRESSURES - MULTI-FLOW

## TROUBLESHOOTING

## Set the compensator on the first multi-flow pump (set main relief first)

- A. Install 5000 psi pressure gauge on D08 directional valve "PG" port
- B. Remove electrical connector from the remote pump compensator (the pumps default to maximum pressure unless driven to a lower value by an electrical control signal. Removing this connector ensures no electrical signal is driving the pumps to a lower pressure than maximum.)
- C. Lower compensator setting on multiflow hydraulic pump to minimum
- D. Ensure parking brake is set
- E. Start truck
- F. Engage all PTO's from in the cab.

**Note:** If unit is equipped with the Allison 4000 series transmission a hose will need to be added to route the second rodder pump system ¼" remote pressure hose directly to tank. If unit is equipped with the Allison 3000 series transmission or manual transmission disconnect the second pump PTO by removing the PTO clutch electrical connector at the PTO. To set the passenger side pump, plug the 1/4" compensator line at the pump being set.

- G. Leave truck at idle rpm
- H. Set rodder pump ON (switch at front hose reel)
- I. Close ball valve at the rodder pump to deadhead the water system (hydraulic oil also now deadheaded, pump is at compensator max setting, and is destroked completely)
- J. Slowly raise multiflow pump compensator setting to proper value (3200 psi for 2500 psi water system: 2700 psi for 2000 psi water system)
- K. Open ball valve at the rodder pump
- L. Shut rodder pump OFF, shut off system in the cab, and shut truck OFF
- M. Reconnect electrical connector on pump compensator
- N. Remove pressure gauge

Repeat steps A through N for second multiflow pump (if equipped) and add ~50psi to the target setting for the second pump.







Hydraulic system pressures are now set for the water system.

### SETTING HYDRAULIC PRESSURES - CHECK MAIN RELIEF

#### TROUBLESHOOTING

#### Check Main Relief (2800 psi)

- A. Install 5000 psi pressure gauge in "GP" port on body/door valve
- B. Adjust maximum pressure compensator to near minimum
- C. Ensure parking brake is set
- D. Start truck
- E. Engage only PTO "A" by turning MASTER switch ON in the cab and by selecting LOW mode at front of hose reel
- F. Slowly raise engine speed to certified value (refer to build ticket for proper RPM)
- G. Slowly raise aux pump maximum pressure compensator to near maximum
- H. Close rear door and hold energized closed (aka deadhead function). Aux pump flow is now flowing over main relief valve.
- I. Pressure on the gauge should read between 2700-2850 psi. If not, the relief valve will have to be adjusted to within this range. Proceed to steps J, K, L & M below and then refer to "SET main relief" procedure below.
- J. Release rear door function
- K. Lower engine speed to IDLE
- L. Shut off MASTER switch in cab, and shut truck OFF
- M. Remove pressure gauge
- N. Since the compensator is no longer properly set (even if it was at the beginning of this process), proceed to the section detailing how to set the LS maximum compensator.





## **Vactor 2100i** Setting Hydraulic Pressures - Set Main Relief

## TROUBLESHOOTING

# SET Main Relief (2800 psi) (only required in RARE circumstances when preset pressure is wrong)

(5/16 allen wrench to remove cap, 3/16 allen wrench for adjustments)

The adjustment screw for the main relief valve is "hidden" below a hex plug cover. Without this cover plug in place, the adjustment screw is NOT sealed and hydraulic oil will flow out at the adjustment. Therefore, setting this relief will require an iterative trial and error process.

- A. Install 5000 psi pressure gauge in "GP" port on body/door valve.
- B. Adjust maximum pressure compensator to near minimum.
- C. Install vacuum venturi on hydraulic tank.
- D. Remove cover cap from Main relief valve.
- E. Adjust pressure setting upward or downward towards desired pressure (as appropriate).
- F. Replace cover cap on main relief valve.
- G. Remove vacuum venturi from hydraulic tank.
- H. Ensure parking brake is set.
- I. Start truck.
- J. Engage only PTO "A" by turning MASTER switch ON in the cab and by selecting LOW mode at front of hose reel.
- K. Slowly raise engine speed to certified value (refer to build ticket for proper RPM).
- L. Slowly raise aux pump maximum pressure compensator to near maximum.
- M. Close rear door and hold energized closed (aka deadhead function). Aux pump flow is now flowing over main relief valve.
- N. Pressure on the gauge should read between 2700-2850 psi. If pressure is inside that range, proceed to step S. If pressure is outside of that range, proceed to step O.
- O. Release rear door actuation.
- P. Lower engine speed to IDLE.
- Q. Shut off MASTER switch in cab, and shut truck OFF.
- R. If pressure was not within the required range in step "N", loop back to step "B".
- S. Remove pressure gauge.
- T. Since the compensator is no longer properly set (even if it was at the beginning of this



## SETTING HYDRAULIC PRESSURES - SET LS COMPENSATOR

TROUBLESHOOTING

#### Set LS compensator differential (425 psi)

(4mm allen wrench to loosen, 6mm allen wrench for adjustment)

- A. Install 1000 psi pressure gauge in "LS" line as near to pump as possible
- B. Ensure parking brake is set
- C. Start truck
- D. Engage only PTO "A" by turning MASTER switch ON in the cab and by selecting LOW mode at front of hose reel
- E. Leave engine speed at IDLE and do NOT actuate any functions (pressure gauge(s) may be damaged if anything is actuated)
- F. Verify pressure on LS is 0 psi. If not, jump to step "I"
- G. Install 1000 psi pressure gauge in "GP" port on body/door valve
- H. Adjust compensator differential until pressure on GP is between 400-450 psi. Lower 4mm screw is a locking screw.
- I. Shut off MASTER switch in cab, and shut truck OFF
- J. Remove pressure gauges
- K. If LS pressure was not 0 psi in step "F", consult Trouble Shooting Guide to correct "Load Sense does not bleed off to zero with no functions activated". Once that problem is corrected, restart this procedure from step "A".





## SETTING HYD. PRESSURES - SET LS MAX COMPENSATOR

#### TROUBLESHOOTING

#### Set LS maximum compensator (2600 psi)

- A. Install 5000 psi pressure gauge in "GP" port on body/door valve
- B. Adjust compensator setting on Aux hydraulic pump to minimum
- C. Ensure parking brake is set
- D. Start truck
- E. Engage only PTO "A" by turning MASTER switch ON in the cab and by selecting LOW mode at front of hose reel
- F. Leave engine speed at IDLE
- G. Close rear door and hold energized closed (aka deadhead function). Aux pump is now operating at compensator max setting and is destroked completely.
- H. Slowly raise Aux pump compensator setting to proper value (2500-2650 psi)
- I. Release rear door function
- J. Shut off MASTER switch in cab, and shut truck OFF
- K. Remove pressure gauge





### SETTING HYDRAULIC PRESSURES - OPTIONAL AUX SUPPLY

#### TROUBLESHOOTING

Typically used for tool package and/or pump off.

#### Check AUX Relief (2000 psi)

- A. Install 5000 psi pressure gauge in "AUX" port on body/door valve
- B. Ensure parking brake is set
- C. Start truck
- D. Engage only PTO "A" by turning MASTER switch ON in the cab and by selecting LOW mode at front of hose reel
- E. Slowly raise engine speed to certified value (refer to build ticket for proper RPM)
- F. Engage AUX function. (If AUX function does not work electronically, use manual overrides procedure to engage the AUX function.)
- G. Pressure on the gauge should read between 1900-2050 psi (if not, relief valve will have to be adjusted to within this range). Because the adjustment screw is "hidden" and without this hiding cover plug the adjustment screw is NOT sealed and will leak oil, this setting process will require back and forth/trial and error possibly several times before the proper setting is achieved.
- H. Release AUX door function
- I. Shut off MASTER switch in cab, and shut truck OFF
- J. Remove pressure gauge





## MANUAL OVERRIDES

## TROUBLESHOOTING

Every hydraulically actuated function is equipped with a means to manually override the function. These manual overrides can be used for such purposes as: returning devices to their HOME position in order to tow the vehicle, to position devices in order to perform maintenance, or as an aid in troubleshooting a malfunction in the truck performance.

#### Always return all manual overrides to their default position for proper operation.

To utilize the manual overrides, only PTO "A" needs to be ON. Therefore, perform the following "generic" procedure to prepare the truck for override use and then proceed to the relevant manual override section which follows:

- A. Ensure parking brake is set
- B. Start truck
- C. Engage only PTO "A" by turning MASTER switch ON in the cab and by selecting LOW mode at front of hose reel
- D. Leave engine at IDLE

Following is a list of available manual overrides and how to operate them:

- Rear door open/close Simultaneously pull the LS OVERRIDE valve and operate the REAR DOOR valve (pull to open the door, push to close the door)
- Debris body up/down Simultaneously pull the LS OVERRIDE valve and push the relevant DEBRIS BODY UP or DEBRIS BODY DOWN valve
- 3.

When finished using these overrides, return the BOOM SPEED SELECT valve fully counterclockwise (to the ZERO position). Failure to do so will prevent normal function of the boom and can cause excessively fast boom motions because this override speed (if set higher than the normal boom speed)

the programming.

negates all speed selections integral to

## **A**WARNING

#### **Crushing hazard**

To avoid serious injury or death while servicing powered systems:



- NEVER go under a raised boom, debris body, rear door or other powered system.
- Relieve all residual pressure in pneumatic and hydraulic circuits.
- NEVER loosen or disconnect any hydraulic components while the hydraulic pump is running.
- The unit must be off and hydraulics disengaged when performing electrical or hydraulic service. Before operating any of the manual overrides, ensure that the solenoid override buttons move freely.
- Verify all areas are clear and safe before manually overriding any pneumatic, electrical or hydraulic circuit.
- To stop unexpected movements turn off all pendants and remote controls.
- Remove the ignition keys and post a lockout/tagout sign on the chassis steering wheel and engine control panels as required.



### MANUAL OVERRIDES

## TROUBLESHOOTING

8. In addition to the manual valve override actuators, the unit is equipped with a hand pump which can power the following functions: hose reel extend/retract, boom left/ right, boom extend/retract, and boom up/ down. This hand pump allows for returning the boom to its HOME position or to extend the hose reel to gain access to the chassis engine in the event of a total system power failure.

To test this system, simultaneously actuate one of the relevant valve manual overrides and stroke the hand pump using the handle extension rod (provided in the tool storage box).

**Note:** The handle for the hand pump, as well as the tool for the HAAVE valve are located above the hydraulic block.







### TROUBLESHOOTING

## Воом

The boom is hydraulically operated and controlled by the operator using a wired, hand held remote controlled pendant switch panel. These switches control electric over hydraulic, which direct hydraulic oil or air through different circuits to accomplish various functions.

Hydraulic operation of the boom is achieved by means of a hydraulic cylinders to turn or raise. The boom lowers by gravity.

The boom may or may not be a part of the day to day operation of the unit and as such one might tend to ignore its periodic maintenance thinking it unnecessary. An infrequently used boom is prone to problems due to rust, corrosion or hardening of rubber components.

When a boom is not used very often part of maintenance should be to run it through its paces a few times each week, performing all operations to ensure that all systems are "go", that there is no binding due to weather, wiring is intact and that there are no leaks or other small problems that might escalate later. Any defects noted, should be taken care of as soon as possible. Check for leaky hoses, loose connections, loose or broken wiring and hardened vacuum hoses.

Never use the boom as a crane to lift loads, as it could bend the frame or strain and weaken the hinge points. The boom is only rated to 700 lbs, enough for vacuum hoses, tubes and debris during normal operation.

#### Troubleshooting

Before starting to troubleshoot malfunctions of the boom, ensure that:

- a. The hydraulic reservoir has the correct grade and quantity of hydraulic oil in it. Repair any leaks in the system.
- b. The unit's engine is running and that the PTO to operate the hydraulic pump has been engaged using the proper procedure and other hydraulic systems such as the tail gate and hoist work. This will eliminate the speculation of faulty hydraulic pump, relief valve setting at the pump or the hydraulic control valve.
- c. Plugs and connectors are securely fastened.
- **Note:** Always check the easiest and most logical cause first, before tackling a cause that might involve excessive disassembly or disturbing any settings.

## **BOOM - GENERAL USE**

## TROUBLESHOOTING

Trouble	Probable Cause	Remedy
Debris leaks from the seal between the inner and outer boom tube when unit is shut down.	Operator is shutting the vacuum system down with debris in tube. Debris runs between tubes and leaks out the seal.	Prior to shutdown of the vacuum system, raise the boom and allow the vacuum system to clear the tube of any debris.
Debris leaks from the seal between the inner and outer boom tube while vacuuming.	Excessive build up of debris between the inner and outer boom tubes.	Engage the vacuum system. Extend and retract the boom. At the same time, use the handgun to wash the seal area. If this does not stop the leak, disassemble the boom and clean the area between the inner and outer boom tube. Prior to shutdown of the vacuum system, raise the boom and allow the vacuum system to clear the tube of any debris.
Bottom of inner tube has holes in it causing leaks.	Excessive build up of material between the inner and outer boom tubes causing tube to rust and corrode as well as physical wear of the tube.	Replace the inner tube. Prior to shutdown of the vacuum system, raise the boom and allow the vacuum system to clear the tube of any debris.
Debris hose and / or tube wear out quickly.	Material being vacuumed is highly abrasive.	Add more water to the material being vacuumed. Increase flow from handgun/ water wand. Reduce the engine rpm. Reducing the air flow and / or adding more water reduces the abrasion factor of the material.
	Rotate hoses and tubes	Rotating the hoses and tubes evenly distributes the wear for longer life.
	Straighten hose runs	Avoid bends, turns and keep hose runs as straight as possible to reduce wear.
Debris leaks at boom turret elbow.	Abrasive action of debris has worn through elbow.	Replace elbow

## BOOM - CREEPS UP/DOWN

TROUBLESHOOTING

Trouble	Probable Cause	Remedy
Boom creeps up/down	Internal leakage in boom cylinder	With the hydraulic pump disengaged, remove the two hoses from the boom cylinder and plug them. If after a while the boom creeps down, the cylinder is leaking internally. Rebuild or replace cylinders). If the boom does not creep down with the ports plugged and creeps only with the engine running and the hydraulic pump engaged, the fault lies with the pilot valve. Proceed as below.
	Wrong replacement solenoids used	Check old spools and replace with an exact match.
	Pressure hose in wrong control port	Review hydraulic schematics to verify correct plumbing.





Crushing hazard

NEVER go under a raised boom or rear door. To avoid injury or death:
NEVER loosen or disconnect any h

- NEVER loosen or disconnect any hydraulic components while the hydraulic pump is running.
- Always vent residual pressure from the hydraulic system before disconnecting any hydraulic components. High pressure hydraulic oil will injure by injection into the skin and by cutting.

### **BOOM - SYSTEMS**

### TROUBLESHOOTING

The boom is raised hydraulically, but is lowered by gravity, although hydraulics are required to open the pilot operated check for the gravity down operation.

The boom can swing a full 90 degrees to either side from center.

#### **Boom Operating Systems**

There are two operating systems for the boom. The hydraulic system, and the electrical system.

#### **Boom Hydraulics**

- Fan and PD machines the boom is normally operated by a hydraulic pump driven off the PTO A.
- **Options -** In some instances your boom functions can be driven from a hydraulic pump on the auxiliary engine.

#### **Boom Failure**

If boom fails to operate properly, the problem will normally lie in either the hydraulic system or the electrical system.

#### **Hydraulic Problem**

The manual overrides are used to determine if the problem is hydraulic.

Test all six boom functions, by operating each override. If the unit does not operate with manual overrides, then troubleshooting must be focused on the hydraulic system and valves.



Always return all manual overrides to their default position for proper operation.

## **WARNING**

#### **Crushing hazard**

To avoid serious injury or death while servicing powered systems:



- NEVER go under a raised boom, debris body, rear door or other powered system.
- Relieve all residual pressure in pneumatic and hydraulic circuits.
- NEVER loosen or disconnect any hydraulic components while the hydraulic pump is running.
- The unit must be off and hydraulics disengaged when performing electrical or hydraulic service. Before operating any of the manual overrides, ensure that the solenoid override buttons move freely.
- Verify all areas are clear and safe before manually overriding any pneumatic, electrical or hydraulic circuit.
- To stop unexpected movements turn off all pendants and remote controls.
- Remove the ignition keys and post a lockout/tagout sign on the chassis steering wheel and engine control panels as required.

## BOOM - HYDRAULIC SYSTEM - PUMP

Many hydraulic system problems are due to low or wrong hydraulic oil. Before investing too much time and effort into troubleshooting, always check the hydraulic oil level and the hydraulic oil specifications. See the Maintenance Section of this manual for hydraulic oil service and specifications.

#### Noisy hydraulic pump.

Insufficient oil supply in the reservoir will "starve the pump" and cause it to deliver charges of air instead of oil when hoist is in the extreme raised position.

The primary causes of pump noise are a lack of hydraulic oil known as "starving the pump," or operating in extremely cold temperatures. Check the hydraulic oil level daily before operating. In extremely cold weather, allow the unit to warm up completely and slowly operate the hydraulic controls until the hydraulic oil has warmed. See the Maintenance Section for information on hydraulic oil level and specifications.

- 1. Check hydraulic oil reservoir level and service as needed.
- **Note:** Raising the hoist at a higher speed than necessary may also "starve the pump," which will reduce hoisting speed and result in damage to the unit.
- 2. Keep the truck engine speed at a moderate level when using the hydraulic controls.

#### Extreme temperatures effects pump efficiency.

- 1. During hot weather, the oil may become thin and cause the hoist to be slow in raising because the pump efficiency is reduced by the thin oil.
- 2. During cold weather, the oil may become thick and cause the hoist to be slow in raising. Thick oil will also retard the descent. Pump efficiency is reduced because the oil is unable to flow readily enough to supply the pump. This is another case of "starving the pump."
- 3. Be sure to have the right viscosity oil for your operating conditions. (See suggested oils in the Maintenance section.)

#### Lift cylinder creeping down or drifting.

The terms "creeping down" and "drifting" refer to the hydraulic cylinder dropping slowly during operation. The primary cause of this is a loss of hydraulic pressure, either internally or due to leaks in the system. Faulty pilot operated (PO) check valves can cause this.

## **WARNING**

#### **Crushing hazard**

To avoid serious injury or death while servicing powered systems:



- NEVER go under a raised boom, debris body, rear door or other powered system.
- Relieve all residual pressure in pneumatic and hydraulic circuits.
- NEVER loosen or disconnect any hydraulic components while the hydraulic pump is running.
- The unit must be off and hydraulics disengaged when performing electrical or hydraulic service. Before operating any of the manual overrides, ensure that the solenoid override buttons move freely.
- Verify all areas are clear and safe before manually overriding any pneumatic, electrical or hydraulic circuit.
- To stop unexpected movements turn off all pendants and remote controls.
- Remove the ignition keys and post a lockout/tagout sign on the chassis steering wheel and engine control panels as required.

Visually check for oil leaks at the following points:

- Cylinder sleeve packing
- Hoses and connections
- Tubing and connections

#### Hydraulic squeal.

If the hydraulic system squeals when the raise button is pushed, check the following:

- 1. Check the suction tube for overload of debris build-up causing by-pass of relief valve.
- 2. Verify hydraulic pressure settings for relief valve, load sense standby and compensator.
- 3. Check hydraulic oil level. See the Maintenance section.

#### Boom fails to raise when up button is pushed.

- Check operation of pendant control buttons. Use boom valve manual over rides to determine if the root cause is hydraulic or electrical in origin.
- 2. Check for proper hydraulic oil level. See the Maintenance Section for information on hydraulic oil service and specifications.
- 3. Check the hydraulic pump as follows:
  - a. Insert a pressure gauge in the gauge port of the boom control valve.
  - b. When solenoid is actuated, check the operating pressure, which should be 2600psi with function dead headed.
  - c. If hydraulic pressure is below 2600psi, refer to pressure check/setting section.
- 4. Check the suction tube to see if it is loaded with mud or debris, which is causing excessive weight. Clean as needed.

#### Boom only raises part way.

Check hydraulic oil level in the hydraulic reservoir. See the Maintenance Section for hydraulic oil service and specifications.

#### Boom won't lower.

If the boom fails to lower from the raised position, follow this procedure:

- 1. Increase the engine speed to 1,500rpm to increase oil flow and pressure.
- 2. Depress solenoid release button to be sure spool is in the down position.

If the solenoid is centered and goes in the down position, check the control button switches.

#### **Telescopic Boom**

The boom has a set of seals, a total of 9 segmented seals on the upper tube. **The seals are not water tight but have air gaps between each seal.** These gaps allow air to be pulled in to assist in keeping material from getting lodged bet ween the inner and outer tubes.

#### **Extendable Boom**

The boom is fixed and therefore, seals are not needed.

#### **Boom Seals**

These seals fit inside a metal casing and are segmented so as to allow air into the tubes and they also serve to act as a guide. The air leaking between the segments keeps material from building up between the tubes. This material can leak out when the vacuum is off. During operation the boom should be in at least a slightly raised position (above horizontal) to direct the material towards the debris body.

#### **Telescopic Boom**

Upper/Lower Tubes The boom is able to extend its reach by virtue of having one tube inside another tube (upper & lower tubes).

The upper tubes have solid rear mounts and spring loaded front mounts to allow for alignment when extending and retracting the boom.

#### **Mounts & Wear Pads**

The wear pads align and position the inner tube inside the outer tube on the boom. The spring loaded upper mounts provide movement to keep the inner and outer tubes aligned on the vacuum tube.

**Note:** Manufacturing tolerances, clearance stack up, or bearing pad wear can cause the boom to stick. Shims are available to correct this problem. Refer to Tech Tip No.033, 10/31/07. Shim Part No. 62028-F.







### TROUBLESHOOTING

### **BOOM - LEAKS & MECHANICAL**

#### **Telescopic Boom Operation**

#### Operation of boom prior to shutting down

Proper operation of the boom is to slightly raise the boom and keep pulling air through it so as to ensure water and material are removed from the boom before shutting down.

The three most common problems encountered during operations are:

- Water leaking,
- Upper Mounts Bent
- Boom Will Not Retract

Water leaking between the seals is caused by improper operation and/or maintenance.

Leaking is caused by failing to pull enough free air or in some cases, the air gaps are plugged.

#### **Upper Mounts Bent**

The upper mounts get bent by material either being jammed between the upper tubes or from a build up of ice.

When upper mounts get bent, the vacuum tube is thrown out of alignment.

To remedy the problem, the mounts will have to be replaced.

#### **Boom Rotation**

Standard boom rotation is 180 degrees.

Rotation is achieved through the use of two hydraulic cylinders.

Careful attention should be paid to a regular maintenance program for greasing the cylinder pivot points and turret.

## Debris Leaks From Seal Between Inner and Outer Tubes

Debris will leak from the seal between the inner and outer boom tubes while vacuuming when excess debris has accumulated between the tubes. Debris will leak from the seal after shut down when the vacuum system has been shut down with debris still in tube. To clean tube, follow one or more of these steps as needed:

- 1. Raise boom, and allow vacuum to clear tube of all debris.
- 2. If leak does not stop:
  - a. Extend and retract boom while washing seal area with handgun.
  - b. Repeat step 1.
- 3. If leak still does not stop:
  - a. Clean area between inner and outer boom.
  - b. Repeat step 1.
- 4. If leaks continue, disassemble the boom and check for debris, damage and wear.
- 5. The seals can be disassembled and cleaned.

#### **Debris Leak From Bottom Of Inner Tube**

Excess debris can corrode holes in bottom of tube. Check bottom of inner tube for holes. Replace if necessary.

#### Debris Hose And Tube Wear Out Quickly

Highly abrasive debris will damage inside of hoses and tubes. To reduce wear and tear from abrasive debris, take these corrective measures:

- 1. Add more water to debris by using a water ring or handgun.
- 2. Reduce engine Rpm, which reduces airflow and abrasion from debris.
- 3. Work more often from the front of the truck rather than working from the sides, which creates an "elbow" and more wear.
- 4. Rotate the boom hose(s) 90°.

## Vactor

## **RODDER PUMP CHECK VALVES**

- **Problem:** Rodder Pump is not pumping water or reaching system pressure on both either stroke of the pump.
- **Note:** This guide assumes that you have verified that your nozzles are not excessively worn before going further.



- 1. Verify that we have good water flow to the Rodder Pump.
  - This can be done by having a small amount of water in the water tank and removing the 3" drain plug at the 'T'-fitting of the Rodder Pump plumbing.
  - b. If your unit is supplied with a knife valve at the Rodder Pump you may just close the valve and then remove the drain plug to verify the flow of water without wasting an entire load of water.
- 2. If you have sufficient water flow continue to Step #4.
- 3. If you do not have sufficient flow check listed areas for a possible blockage.
  - a. Inspect 3" y-strainer screen at Rodder Pump.
  - b. Inspect lower cross-over tube for blockage.
  - c. Inspect front of cooler/heat exchanger for blockage.
  - d. Verify 3" supply hose has no blockage between the cooler/heat exchanger and the Rodder Pump.

### TROUBLESHOOTING



 Install gauge set-up into bottom of Rodder Pump (See notes at end of guide for part numbers).



- 5. Install a test nozzle in the water nozzle test can that guarantees you can reach your units desired pressure.
- 6. Before engaging Rodder Switch verify that the Rodder Ball Valve is in the 'On' or 'Open' position.
- 7. Start unit and engage hydraulics as specified in the start-up portion of your units manual.

## RODDER PUMP CHECK VALVES

- 7. Engage Rodder Pump switch at hose reel.
- 8. Slowly raise engine RPM to desired operating RPM and system pressure.



- 9. Test gauges are installed on either side of the water piston. As one side comes to stroke you will notice pressure build on that particular gauge.
  - As one side of the pump starts to increase pressure you'll see the opposite side of the stroke drop pressure.
  - b. You may see a slight difference in pressure between the different strokes of the pump. This is normal and expected based on differences in the check valves.
- 10. If gauges reach system pressure on the gauge for it's particular stroke of the pump you have verified that the pump is producing pressure.
  - If both sides reaches it's desired pressure it verifies that the check valves are working properly and the piston seals are still intact.
  - b. Failure to reach system pressure on either gage indicates a potential check valve or internal seal problem.
- **Note:** The maximum pressure reading is affected by engine RPM, hydraulic flow rates and the proper nozzle being utilized in your test canister.
  - c. Failure to reach pressure on both gages is typically attributed to other areas such as low engine or pto rpm, low hydraulic pump output, improper nozzles or potentially worn seals.
- **Note:** Nozzles plugged by black plastic are a sign of seal deterioration.

- 11. To isolate a specific check valve problem first swap the 3" check valves left to right and run the test again. If the pressure drop or loss follows the check valve that inlet check valve is bad.
- 12. Follow the same procedure for the exhaust 2" check valves.



- 13. If the pressure drop is only on one stoke but does not follow either check valve, check the detent block assembly for short shifting.
  - a. Short shifting can be caused by a clogged breather(s).
  - b. A compensator rod that is not completing a full stroke.
  - b. A bad proximity sensor.
- **Note:** It is rare that more than one check valve will fail at the same time.

Parts List			
ltem	Part No.	Description	Qty.
	41280	SCREEN 80 MESH 3"	1
	61464	TEST CAN WELDMENT	1
	29384D	CHECK VALVE 3"	2
	29385	CHECK VALVE - 2"	2
	46846D	GAUGE, PRESS, 0-5000 PSI	2
	71718K	ADAPT, HYD, 4JIC X 8ORB, STR	2
	70517D	ADAPT, HYD, 4JIC X 4NPTF, STR	2
	47365K	HYD HOSE ASS'Y - 1/4 X 53"	2
	47829	FLOW METER, WATER, 10-150GPM, 1.25"NPT	1



## **REAR DOOR LOCK ADJUSTMENT**

The rear door will need adjustment to compensate for seal wear. There are two adjustments available. The locking blocks are attached to the debris body and are used to set an even spacing for the door seal. These will not normally need to be adjusted.

The second are the locking rods. Unlock and open the rear door. Adjust one locking rod at a time. Loosen the nut at the clevis. Rotate rod +/- in full turns only so that rod flat is aligned with the locking block. Tighten nut at the clevis. Repeat until all locking rods have been adjusted. Close and lock rear to verify proper operation. Locks should be fully engaged into the locking blocks.









## **REAR DOOR LOCK ADJUSTMENT**

## TROUBLESHOOTING

Door lock setting procedure:

- **Note:** A person at the rear of the unit watching the locks and one at the controls makes this task easier and provides immediate warning in case the locks are not set properly.
- **Note:** Washers are utilized to set proper rod/block engagement clearance. Seal adjustments are performed utilizing rod adjustments.
- 1. Engage hydraulics as described previously in the manual.
- 2. At the debris body directional valve for the debris body door select open and hold there until door is fully open and you hear the oil going across the relief in the directional valve.
- 3. Move directional valve handle to the lock position.
- 4. Door locks will begin to move immediately after selecting lock.
- 5. Stop locks before they begin to enter the



blocks.

- 6. Verify that there is a 1/8" gap between rods and blocks.
  - a. If the gap is less then 1/8" you can add washers to reach the required gap.
  - b. If the gap is more then 1/8" you will need to remove washers.
- 7. The rods should all be extending and entering the blocks at the same time. This allows a smooth and even pull of the door seal against the lip.



- 8. The positioning and adjustment of the locking rods is achieved by loosening the jam nut and turning the rod either in or out of the turn buckle. You must guarantee that the beveled side of the rod is aligned to slide into the block.
- 9. Once the gap and alignment have been verified and set finish by locking the door.
- 10. Once the door is fully locked tighten up the rod jam nuts against the turnbuckle.

## Vactor

## AUTO TRANS - AIR SHIFTER

If the transfer case will not shift because of an electrical failure on the Vactor module, a manual override is available on the Transfer case shifting air valve. Transfer case shifting is handled by an air valve located on the rear side of the transfer case mount. Valve must be powered in both directions to eliminate unintended transfer case shifting (and prevent transfer case damage) due to a loss of vehicle power or a bad connection. Manual overrides are available for each function of this valve.

### TROUBLESHOOTING





## Vactor MANUAL TRANS - AIR SHIFT - AIR FILTER/DRYFR

All units with air shift have a desiccant air dryer and air filter for the air used by the air shifter.

The air filter element replaced every 2 years or when the pressure drop becomes 14psi, whichever comes first, to prevent damage to the element. The filter drain is automatic during normal use.

Note: Contaminates removed from the compressed air system must be disposed of in accordance with local, state and federal standards.

#### Air filter maintenance

**Note:** Never put desiccant in the air filter housing.

- 1. Depressurize unit. If equipped, air valve will allow the system to bleed down when off.
- 2. Remove bowl assembly by turning counterclockwise.
- 3. Inspect bowl daily for damage or deteriorated seals. Replace with original manufacturer's approved seals and bowls. If bowl becomes dirty, replace it or clean it by wiping the bowl with a soft dry cloth or mild detergent.
- 4. Remove filter element and discard.
- 5. Install new filter
- 6. Before returning to service, insure that all seals have been reinstalled or replaced.
- 7. Reinstall bowl assembly.

#### **Desiccant dryer maintenance**

Vactor uses a number of different dryers. These instructions are for the Wilkerson model XO6 series dryer. Consult Vactor Service for other dryers.

The only servicing required for silica gel units is when the desiccant color or moisture indicator has changed from Blue (dry) to Pink (wet).

- Depressurize unit. If equipped, air valve will 1. allow the system to bleed down when off.
- 2. Loosen the clamp ring and remove the bowl from the top housing.
- Pour out used desiccant and dispose of 3. properly or recharge per the manufacturer's instructions.
- 4. Open new container and refill bowl to within 1/2" of the top.
- Replace bowl and bowl guard. Be sure 5. guard is securely locked in place before repressurizing the unit.
- Before returning to service, insure that all 6. seals have been reinstalled or replaced.

## TROUBLESHOOTING



Normal location is on the driver side on the boom pedestal.



**High pressure** 



cause severe injury or death.

Always relieve pressure before servicing.

Part No.	Description	Qty.
48113-30	DRYER, DESICCANT AIR	1
48113A-30	DESICCANT MEDIA	1
48113B-30	PLASTIC BOWL	1
48113C-30	METAL BOWL COVER	1
48113D-30	O-RING SEAL	1
49223-30	FILTER, AIR, 1/4" NPT W/ DRAIN	1

#### Desiccant dryer fill level



### Vactor Manual Trans - Air Shift - Air Manifold

OMSI and Cotta transfer cases with disconnects are standard. These require the blower to be disengaged from the cab. Optional OMSI transfer cases with clutches allow the blower to be disengaged from the hose reel.

The air controls for both systems are similar in that they use common air dryer/air filter and use an air manifold valve system. The air valves all have LED indicator lights so operation can be verified. There are also manual over ride buttons for testing. Normal location is on the driver side on the boom pedestal.

Both systems are interlocked to the parking brake and master switch.

### TROUBLESHOOTING





## **Vactor** Manual Trans - Air Shift - 49217 Air Manifold

Normally used on OMSI and COTTA transfer cases with disconnects. These require the blower to be disengaged from the cab.



	Port	Function	Setting
1		Harness plug	NA
2		Solenoid valve - blower	NA
3		Solenoid valve - road mode	NA
4		Solenoid valve - work mode	NA
5		Solenoid valve - vacuum relief	NA
6	А	Vacuum relief OPEN	NA
7	В	Vacuum relief CLOSED	NA
8	А	Road mode	NA
9	В	Work mode	NA
10	А	Blower disengage	NA
11	В	Blower engage	NA
12		Exhaust port muffler - replace if plugged	NA
13		Air inlet port	85psi min.

## **Vactor** Manual Trans - Air Shift - 49218 Air Manifold

### TROUBLESHOOTING

Normally used on OMSI transfer cases with a clutch. This option allows the blower to be disengaged from the hose reel.





**Note:** If there are restrictions in air flow (i.e. dirty air filter, etc.) when the vacuum relief activates normally, the blower clutch may disengage due to the pressure drop.

	Port	Function	Setting
1		Harness plug	NA
2		Solenoid valve - blower	NA
3		Solenoid valve - road mode	NA
4		Solenoid valve - work mode	NA
5		Solenoid valve - vacuum relief	NA
6		Valve - transfer case clutch. This valve is isolated from the others in the manifold. There should not be any air leakage to it between the blocks.	NA
7		Pilot line - blower engage	NA
8		Air pressure switch	preset to 85psi
9	А	Air line - work mode	NA
10	В	Air line - road mode	NA
11		Supply air line - transfer case clutch	NA
12		Exhaust port muffler - replace if plugged	2 exhaust ports
13		Air inlet port	110psi min.
14		Flow control - blower	0-30psi in 1-2secs
15	В	Vacuum relief OPEN	NA
16	A	Vacuum relief CLOSED	NA
17		Supply air line for item 6	NA

# Manual Trans - OMSI Air Shift - Commissioning

### TROUBLESHOOTING

Vactor Mfg. part no. 48051, 48051D, 48051E, 48052, 48052B (TC's with clutch)

#### Prior to the initial operation of the transfer case (TC), check that the following items are correctly assembled:

- The TC is filled with 11 quarts of fluid. Refer to the OMSI manual for type. Fluid must be visible at mid point of sight eye on rear of case.
- Oil filter and plumbing are also to be filled with ATF. (approximately one quart)
- Air and hydraulic fitting adapters (reference the air shift schematic that came with the unit) are correctly installed with their respective seal rings and seal ring retain



seal rings and seal ring retainer washers.

- 4. Oil filter cartridge mounting head is mounted above oil level sight eye. This will prevent oil draining out when changing the filter cartridge.
- 5. Vacuum port pressure gage is easily visible on filter mounting head.
- 6. Air system is correctly plumbed with the air filter and desiccant dryer positioned for easy maintenance access and monitoring.
- Pressure switch (p.n. 40755B) is adjusted to 85-90 psi. Alternate style 49291 switch is preset.
- 8. If TC breather vent is not mounted on top case port, then move from existing position and remount on the top port, plug previous opening

#### Initial TC operation and trouble shooting:

- 1. At hose reel operator station, the "low lube pressure" light should now go off when work mode is engaged and input shaft is rotating. If the "low air pressure" and "low lube pressure" light are not lit prior to starting the blower, then the indicator light and/or air pressure switch are defective and need to be replaced. If blower and/or TC are not operating as stated, then correct as specified below.
  - a) On the outlet manifold of the lube pump (see photo), crack open the drain plug one revolution so air may purge from the pump plumbing.
  - b) With one operator in the truck cab and another monitoring the TC from a safe

distance, shift the TC into work mode.

- c) Spin the TC, at engine idle, until ATF exits around the loose drain plug.
- d) If no oil exits after 10 seconds, then refer to sections 4.0 - 6.0 of the operation and maintenance manual to correct.
- e) When oil does exit from the drain plug: shift TC to "ROAD MODE", stop chassis engine, and retighten the fitting. The lube system must be pumping oil through the TC prior to operating the hydraulic and blower systems.
- 2. At hose reel operator station, the low lube pressure light will now go off when work mode is engaged and input shaft is rotating.
- Operate TC for 20 seconds to distribute oil throughout inside of case. Allow TC to sit undisturbed until the lube oil has returned to the bottom of the case. Check fluid level in sight eye and adjust as need to correct level.
- 4. Engage air clutch (with chassis engine at idle) to power blower by turning control switch past the ON position and into the PERMISSIVE position. The truck air system must have a minimum of 110 psi to operate and control the TC correctly. Hold control switch in the PERMISSIVE position until "low air pressure" light goes out. This should take no more that 5 seconds.
#### Vactor Manual Trans - OMSI Air Shift - Commissioning

#### TROUBLESHOOTING

Vactor Mfg. part no. 48051, 48051D, 48051E, 48052, 48052B (TC's with clutch)

- 5. Release control switch to the "ON" position. Blower should continue to spin and operate normally, if not, or blower takes more than 5 seconds to start, correct as specified below.
  - a) With trucks air tanks full, engine stopped, the clutch control valves exposed and electrical system on: repeat step 4. Listen for air leaks in the clutch control valves and plumbing.
  - b) Correct leaks. If "low air pressure" light goes out but then comes back on after control switch returns to the "ON" position, then a leak still exists in the air control system or the electrical controls are wired incorrectly. Air leaks could exist anywhere in the system, including inside the TC clutch.
  - c) Repeat steps "a" and "b" until all leaks are found and corrected, then proceed below.
  - d) If blower still does not start after 5 seconds then: place a tee air fitting into the clutch air supply hose immediately adjacent to the air swivel joint at the rear of the air clutch. Run a temporary air hose from this point to an air gage that can be seen from the front operators' station.
  - e) Repeat step 4. The air gage should register a steady building of pressure from 0 to 30 psi during the first 1 to 2 seconds of clutch start up. This confirms that the air control solenoid valve has opened and that air is flowing through the flow control valve. Once at 25-30 psi the pressure should quickly jump to full system pressure (minimum of 110 psi). This confirms that the pilot operated valve has opened allowing full system air to flow to the clutch. As the air pressure builds and passes 85-90 psi, the "low air pressure" light should come on.
  - f) On units equipped with the old style air controls, if this light goes out at a lower or higher pressure than 85-90 psi then adjust the air pressure switch to the correct setting. For new style air controls replace the air pressure switch.



- g) If 25-30 psi of pressure builds in more or less time than 1 to 2 seconds, or pressure does not build at all, then adjust/open the air flow control valve to increase or decrease the clutch engage speed as needed to meet the above recommendations.
- Repeat step "5". If problems still exist consult with Vactor factory service personnel after confirming filters are clean.
- i) Remove temporary plumbing, gages and restore valve enclosure to normal operating condition.
- 6. TC is now ready for operation

MANUAL TRANS - AIR SHIFT - OMSI AIR SHIFT - CONTROLS TROUBLESHOOTING



#### Vactor Manual Trans - OMSI Air Shift - Low Lube System

#### TROUBLESHOOTING

The transfer case is equipped with a low lubrication safety system to identify faults and protect the TC and clutch. The system consists of a lube pump, check valve and pressure switch with indicator light. The check valve is set at 22psi and creates pressure to activate the pressure switch. The pressure switch activates the low lube warning light if pressure falls below 11psi. If the low lube light is on the lubrication system should be evaluated.

The light should only be on when in the work mode and the transmission prop shaft is NOT turning. If this light is not on under these conditions, then the light or pressure switch may be faulty.

If the truck is in the work mode, and the transmission prop shaft is turning at 1000 rpm, (do not run the TC for more than a few second under these conditions) and the light is still on then, stop and do the following.

- 1. Confirm that the lube pump is pumping fluid by checking the filter vacuum gage and fluid level.
- 2. Check that the lube check valve is not stuck open with debris.
- 3. If the problem is still not corrected, then re-run the **Initial TC operation 1)a-e** of the TC commissioning procedure.

If the indicator light is on only at low RPM but goes out at higher RPM then: remove the lube check valve; clean and inspect the valve poppet for freedom to open and close; and reinstall. The poppet (depending on the age of the TC) may have small grooves cut into the sealing face to help bleed air out of the lube system at start up.



Front hose reel control panel

#### Note:

Air shift should engage within about 2-5 seconds. If longer then air flow control valve should be adjusted to correct.



Low lube pressure indicator

# NOTICE

#### Machine Can Be Damaged

To avoid damage:

- Never overfill or under fill lubricant or fluid levels.
- Maintain proper fill levels.
- Always use the correct lubricant or fluid.
- Overfilling can cause overheating in gear lubrication systems.
- NEVER operate with either a malfunctioning lubrication system or indicator light ON (if equipped).

#### TROUBLESHOOTING







#### **Vactor** Manual Trans - Air Shift Schematic Manifold 49218

TROUBLESHOOTING

#### **Vactor** Chassis Air Pressure Protection Valve

All pneumatic controls added to the chassis by Vactor are fed from the chassis air reservoir through an air pressure protection valve. This valve acts like an electrical fuse by not allowing the reservoir air pressure to drop below about 70psi. When air pressure drops to about 75psi the valve closes and shuts off the Vactor systems. Normal chassis operating air pressure is about 120psi. By limiting the available air pressure to a minimum of 75psi the chassis will still have functional brakes and other needed systems.

The valve typically fails due to debris in the air system and corrosion. The valve may work intermittently or fail either open or closed. If the valve fails open, an air leak may deplete the chassis air system if there is a significant system failure on the Vactor side. If the valve fails closed no air will be supplied to the Vactor systems. Either can be verified by putting an air gauge in the system. The valve is not user serviceable and must be replaced.

**Note:** There are a variety of these valves in service. Some are supplied by the chassis manufacturers. Appearance will vary.

#### TROUBLESHOOTING



- A.... WATER SECTION
- B....HOSE REEL SECTION
- C....HYDRAULIC/PNEUMATIC SECTION
- D....ELECTRICAL SECTION
- E....P.T.O. SECTION
- F....BOOM SECTION
- G.... DEBRIS BODY SECTION
- H....REAR DOOR SECTION
- I. . . . AUX. ENGINE / BLOWER SECTION
- J . . . FAN & FAN DUCT / FINAL FILTER & FINAL FILTER DUCT SECTION
- K.... WATER TANK SECTION
- L . . . OPTIONS SECTION

P/N	HOSE REPAIR
66286B-30	HOSE SWAGE REPAIR KIT (MACHINE & DIES) - 3/4"
66286-30	HOSE SWAGE REPAIR KIT (MACHINE & DIES) - 1"
66286A-30	HOSE SWAGE REPAIR KIT (MACHINE & DIES) - 1 1/4"
45267-30	SPLICER/MENDER SWAGE (BLUE BAND) - 3/4" - 2500 PSI
45267A-30	SPLICER/MENDER SWAGE (BLUE BAND) - 3/4" - 3000 PSI
46142-30	SPLICER/MENDER SWAGE (BLUE BAND) - 1" - 2500 & 3000 PSI
44153-30	SPLICER/MENDER SWAGE (BLUE BAND) - 1-1/4" - 2500 & 3000 PSI
45268-30	MALE END SWAGE (BLUE BAND) - 3/4" - 2500 PSI
45268A-30	MALE END SWAGE (BLUE BAND) - 3/4" - 3000 PSI
43605-30	MALE END SWAGE (BLUE BAND) - 1" - 2500 & 3000 PSI
44107-30	MALE END SWAGE (BLUE BAND) - 1-1/4" - 2500 & 3000 PSI
47748D-30	HOSE SWAGE REPAIR KIT (MACHINE & DIES) - SHARK
47748E-30	SPLICER/MENDER SWAGE - SHARK
47748F-30	MALE END SWAGE - SHARK
P/N	RODDER HOSE
46916A-30	3/4" X 400' PLASTIC RODDER HOSE - 3000 PSI (BLUE)
46916-30	3/4" X 500' PLASTIC RODDER HOSE - 3000 PSI (BLUE)
46916F-30	3/4" X 600' PLASTIC RODDER HOSE - 3000 PSI (BLUE)
46916E-30	3/4" X 800' PLASTIC RODDER HOSE - 3000 PSI (BLUE)
43569-30	1" X 400' PLASTIC RODDER HOSE - 2500 PSI (ORANGE)
43570-30	1" X 500' PLASTIC RODDER HOSE - 2500 PSI (ORANGE)
43571-30	1" X 600' PLASTIC RODDER HOSE - 2500 PSI (ORANGE)
43569E-30	1" X 800' PLASTIC RODDER HOSE - 2500 PSI (ORANGE)
46113B-30	1" X 400' PLASTIC RODDER HOSE - 3000 PSI (BLUE)
46113-30	1" X 500' PLASTIC RODDER HOSE - 3000 PSI (BLUE)
46113C-30	1" X 600' PLASTIC RODDER HOSE - 3000 PSI (BLUE)
46113D-30	1" X 800' PLASTIC RODDER HOSE - 3000 PSI (BLUE)
476504-30	1" X 400' RUBBER RODDER HOSE (SHARK) - 3000 PSI (Black)
476505-30	1" X 500' RUBBER RODDER HOSE (SHARK) - 3000 PSI (Black)
476506-30	1" X 600' RUBBER RODDER HOSE (SHARK) - 3000 PSI (Black)
44109-30	1-1/4" X 500' PLASTIC RODDER HOSE - 2500 PSI (ORANGE)
P/N	LEADER HOSE
20201-30	3/4" X 36" LEADER HOSE
31096-30	1" X 30" LEADER HOSE
47650B-30	1" X 60" (SHARK) LEADER HOSE
44314-30	1-1/4" X 36" LEADER HOSE
40067B-30	3/4" SWIVEL
40196-30	1" SWIVEL
52846-30	FLEXIBLE HOSE GUIDE ASSEMBLY - 36"
47650M-30	1" x 120" SHARK LEADER HOSE
47651C-30	3/4" X 120" SHARK LEADER HOSE

P/N	NOZZLES
	Note: designate flow, pressure & size when ordering
58756-30	SANITARY NOZZLE - 30 DEGREE - refer to the nozzle page
58926-30	SAND NOZZLE - 30 DEGREE - refer to the nozzle page
58927-30	PENETRATOR NOZZLE - 30 DEGREE - refer to the nozzle page
60308-30	PENETRATOR NOZZLE - 15 DEGREE - refer to the nozzle page
36058B-30	#10 STORM SEWER NOZZLE (TC INSERTS)
44205-30	TUNGSTEN CARBIDE INSERTS FOR 36058B
31685-30	FINNED PIPE WELD - 1 X 12" WIDE
34955-30	FINNED PIPE WELD - 1 X 12" NARROW
40797-30	BODY WASH-OUT NOZZLE - 60gpm only
P/N	BOOM
44861J-30	7-BUTTON PENDENT CONTROL w/30' CABLE
44861L-30	7-BUTTON PENDENT CONTROL w/30' CABLE w/VACUUM RELIEF
191138-30	JOYSTICK
27771-30	STEEL ELBOW - 70 DEGREE
34763-30	6" X 36" - ALUMINUM PIPE
34763A-30	6" X 60" - ALUMINUM PIPE
34766-30	6" X 78" - ALUMINUM Catch BASIN NOZZLE w/FLANGED END
34763B-30	6" X 90" - ALUMINUM PIPE
25637C-30	8" X 36" - ALUMINUM PIPE
25637-30	8" X 60" - ALUMINUM PIPE
25268-30	8" X 78" - ALUMINUM Catch BASIN NOZZLE w/FLANGED END
25637A-30	8" X 96" - ALUMINUM PIPE
77045-30	6" SNORKEL NOZZLE KIT
50507-30	8" SNORKEL NOZZLE KIT
58990A-30	6" ADJUSTABLE AIR ADAPTER
58990-30	8" ADJUSTABLE AIR ADAPTER
47392-30	6" X 64" RUBBER DEBRIS HOSE
53348-30	6" HOSE END
45730-30	6" T-BOLT BAND CLAMP
42593-30	6" KING CLAMP
46564-30	8" X 62" RUBBER DEBRIS HOSE
46564A-30	8X60" RUBBER DEBRIS HOSE,8X60,RED GUM LINER
58795-30	8" HOSE END
46634-30	8" T-BOLT BAND CLAMP
32087-30	6" QUICK CLAMP
43442-30	6" GASKET
16584-30	8" QUICK CLAMP
16585-30	8" GASKET

P/N	Y-STRAINER FILL
45803-30	2" STRAINER SCREEN
46137-30	2" CAGE GASKET
46138-30	2" CAP GASKET
41280-30	3" STRAINER SCREEN (IF REQUIRED)
41272-30	3" CAGE GASKET (IF REQUIRED)
41271-30	3" CAP GASKET (IF REQUIRED)
20720A-30	HYDRANT HOSE (NO ENDS) - 2-1/2" X 25'
20695-30	CLAMP - 2-1/2"
20199B-30	HYDRANT HOSE END - 2-1/2"
P/N	VACTOR RODDER PUMP
29385-30	CHECK VALVE - 2"
29384D-30	CHECK VALVE - 3"
45834-30	PROXIMITY SENSOR
45906-30	PROXIMITY SENSOR CONNECTOR
29826A-30	DRAIN PLUG - 3/4"-16NF
P/N	HANDGUN CIRCUIT
45109-30	WATER HANDGUN ASSEMBLY
31014AG-30	EXTENSION HOSE - 1/2' X 300"
40029-30	RELIEF VALVE
20188A-30	FEMALE COUPLER - 1/2"
20189-30	MALE COUPLER - 3/4"
P/N	WATER TANKS
45113-30	FLOAT - 6"
45731-30	EXPANSION PLUG - 2"
P/N	AUXILIARY ENGINE
47773-30	SWITCH - START
47772-30	SWITCH - THROTTLE CONTROL
P/N	BLOWER UNIT
42645-30	VACUUM GAUGE
46846-30	VACUUM GAUGE, MODEL 2103
42633-30	RELIEF VALVE - 3" VACUUM
P/N	HOSE REEL
46846D-30	PRESSURE GAUGE - 5000 PSI
46829-30	3/4" SWIVEL JOINT, 90 DEGREE TM
40052-30	1" SWIVEL JOINT, 90 DEGREE TM
40052A-30	REPAIR KIT FOR 3/4" AND 1" SWIVEL JOINTS
16399L-30	PILLOW BLOCK BEARING
61297D-30	STOP TOOTH BLOCK
45551-30	AIR CYLINDER - HOSE REEL LOCK
45553-30	AIR VALVE - HOSE REEL LOCK

P/N	BALL VALVES
40575-30	1/2" BALL VALVE
40575D-30	1/2" BALL VALVE HANDLE
40575C-30	1/2" BALL VALVE SEAL KIT
46581-30	3/4" BALL VALVE
40576-30	1" BALL VALVE
40576D-30	3/4" & 1" BALL VALVE HANDLE
40576C-30	1" BALL VALVE SEAL KIT
P/N	MISC Electrical - Verify with your unit's schematics
45543-30	RELAY - CIRCUIT BOARD
49539-30	DUST BOX DOOR SEAL
20358-30	LIGHT, RED WARNING
44622-30	SWITCH, H/R IN/OUT
47772C-30	SWITCH, PUMP MODE
46159B-30	T/C TACH SENSOR
20358-30	LIGHT, INDICATOR
49345-30	OIL TEMP SENSOR
44594C-30	RELAY, SNAP OFF
44622-30	SWITCH, 3 POSITION
45554A-30	SWITCH
20357-30	SWITCH, ON/OFF
1191490-30	SWITCH
45834-30	SENSOR, PROXIMITY
47776-30	SWITCH, E-STOP
1191461-30	LIGHT, DUAL INDICATOR
1191449-30	SWITCH, MASTER
40755B-30	SWITCH, PRESSURE
1191461A-30	SWITCH, VAC/RECIRC
40241-30	SWITCH, RODDER ON/OFF W/LOCK
46908-30	POTENTIOMETER, WATER PRESSURE
40241A-30	SWITCH, VACUUM RELIEF
47199-30	RELAY, STARTER
44594C-30	RELAY, SNAPOFF
47773C-30	SWITCH, IGNITION
46846D-30	GAUGE, PRESSURE

P/N	MISC.
42431-30	HYDRAULIC FILTER ELEMENT - 10 MICRON (about 7" tall)
42431A-30	HYDRAULIC FILTER ELEMENT - 10 MICRON (about 11" tall • any system with more than two hydraulic pumps)
49443A-30	REACH POLE X 5'
48113A-30	DESICCANT MEDIA (for 48113 filter)
49223-30	AIR FILTER W/DRAIN
49654-30	INLET SEAL ASSY
49333A-30	DEBRIS HOSE CYCLONE (each)
45817C-30	FLEXIBLE COUPLING 6" ID (each)
20857-30	CLAMP 6"
47394K-30	DEBRIS HOSE (RUBBER) 10" X 14" LONG
70406-30	TOGGLE CLAMP
45716-30	COMPRESSION JOINT
48858-30	COUPLING, RIGID PIPE 3"

	Hydraulic Cylinder Seal Kits											
CYL P/N	SEAL KIT P/N	Description										
45180A-30	45180AA-30	DOOR OPEN/CLOSE										
45066C-30	45064EA-30	DOOR UNLOCK/LOCK										
45658K-30	45658HA-30	DEBRIS BODY UP/DOWN										
46961-30	46961A-30	HOSE REEL EXTEND/RETRACT										
45107J-30	45107HA-30	BOOM IN/OUT										
45136F-30	45136DA-30	UPPER BOOM IN/OUT (5X5)										
45136E-30	45136DA-30	LOWER BOOM IN/OUT (5X5)										
45064E-30	45064EA-30	BOOM LEFT/RIGHT #1										
45947D-30	45064EA-30	BOOM LEFT/RIGHT #2										
63666E-30	63666FA-30	BOOM UP/DOWN										

-	Nozzle	S		1-1/4	" Nozz	es	_
1" X 60 GPM X 2	2000 PSI			1-1/4" X 60 GPN	1 X 2000 P	81	
Nozzle	Vane	Multiflow		Nozzle	Vane	Multiflow	
Sanitary 30°	58756BFB	58756BFB		Sanitary 30°	48976AFB	48976AFB	Specia
Sand 20°	60307BFB	60307BFB		Sand 20°	48974AFB	48974AFB	Reque
Sanitary 15°	AN	60306BBB		Sanitary 15°	NA	48973AFB	
General Purnose 30°	AN	58929RFR		General Purnose 30°	AN NA	589294FB	
1" X 60 GPM X 2	2500 PSI			1-1/4" X 60 GPN	4 X 2500 P\$	SI	
Nozzle	Vane	Multiflow		Nozzle	Vane	Multiflow	Specia
Sanitary 30°	58756BFC	58756BFC		Sanitary 30°	48976AFC	48976AFC	Reque
Sand 20°	60307BFC	60307BFC		Sand 20°	48974AFC	48974AFC	
Sanitary 15°	NA	60306BBC		Sanitary 15°	NA	48973AFC	
Ceneral Dumose 30°	NA NA	60308BDC		Ceneral Durnose 30°	AN NA	489/5ADC	
		0.1022000				0002000	
1" X 80 GPM X 2	2000 PSI			1-1/4" X 80 GPN	A X 2000 PS	51	
Nozzle	Vane	Multiflow		Nozzle	Vane	Multiflow	
Sanitary 30°	58756BJB	58756BFB		Sanitary 30°	48976AJB	48976AJB	
Sand 20°	60307BJB	60307BFB		Sand 20°	48974AJB	48974AJB	
Sanitary 15°	NA	60306BBB		Sanitary 15°	NA	48973AFB	
Penetrator 15°	AN	60308BHB		Penetrator 15°	AN	48975AFB	
General Purpose 30°	NA	28929BJB		General Purpose 30°	NA	28929AJB	
1" X 80 GPM X 2	2500 PSI			1-1/4" X 80 GPN	1 X 2500 PS	0	
Nozzle	Vane	Multiflow		Nozzle	Vane	Multiflow	
Sanitary 30°	58756BJC	58756BFC		Sanitary 30°	48976AJC	48976AJC	
Sand 20°	60307BJC	60307BFC		Sand 20°	48974AJC	48974AJC	
Sanitary 15°	NA	60306BBC		Sanitary 15°	NA	48973AFC	
Concrol Durance 200	NA	60308BHC		Cenetrator 15°	NA	48975AFC	
General Fulpose SU	E L	00323000		General Fulpose SU	¥N	00953900	
1" X 100 GPM X	(2000 PSI			1-1/4" X 100 GP	M X 2000 F	SI	
Nozzle	Vane	Multiflow		Nozzle	Vane	Multiflow	
Sanitary 30°	58756BLB	58756BJB	Special	Sanitary 30°	48976ALB	48976AJB	
Sand 20°	60307BLB	60307BJB	Request	Sand 20°	48974ALB	48974AJB	
Sanitary 15°	AN	60306BFB		Sanitary 15°	NA	48973AFB	
Penetrator 15	NA	EHE80209		Penetrator 15	NA	48975AFB	
General Purpose 30°	NA	58929BLB		General Purpose 30°	NA	58929ALB	
1" X 100 GPM X	(2500 PSI			1-1/4" X 100 GP	M X 2500 F	SI	
Nozzle	Vane	Multiflow		Nozzle	Vane	Multiflow	
Sanitary 30°	58756BLC	58756BJC	Special	Sanitary 30°	48976ALC	48976AJC	
Sand 20°	60307BLC	60307BJC	Request	Sand 20°	48974ALC	48974AJC	
Sanitary 15°	AN No			Sanitary 15° Depotrator 16°	NA	489/3AFC	
General Purpose 30°	AN N	58929BLC		General Purpose 30°	NAN	58929ALC	

#### STANDARD NOZZLES

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zles	PSI	e Multiflow	BB 49268CBB	BB 49270CBB	49274CAB	49274CAB	58929CBB	PSI	e Multiflow	BC 49268CBC	BC 49270CBC	49274CAC	49274CAC	58929CBC
Noz	< 2000	Vane	49268C	49270C	NA	NA	NA	< 2500	Vane	49268C	49270C	NA	NA	NA
3/4"	3/4" X 60 GPM >	Nozzle	Sanitary 30°	Sand 20°	Sanitary 15°	Penetrator 15°	General Purpose 30°	3/4" X 60 GPM >	Nozzle	Sanitary 30°	Sand 20°	Sanitary 15°	Penetrator 15°	General Purpose 30°



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#### High pressure

Operating tool outside of sewer line may result in serious injury or death. Sewer maintenance tools operate at high pressure. Position tool two feet into sewer line before operating. Build pressure slowly to ensure tool is positioned correctly. Turn off pressure source before removing tool from sewer line.

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Manual • 2100i • Late 2022 & Newer