PRODIGY

HXX



Operation & Maintenance Manual

Operation & Maintenance Manual HXX PD/Fan & Prodigy

Release history

- 0 Initial release (AC 4-1-2019)
- 1 Updated warranty. (AC 12-10-2019)
- 2 Maintenance release. (AC 4-21-2020)
- 3 Maintenance release. Updated vacuum relief valve. (AC 1-7-2021)
- 4 Maintenance release. (AC 9-28-2021)
- 5 Maintenance release. (AC 12-8-2021)
- 6 Maintenance release. (DE 6-20-2022)
- 7 Added master disconnect switch page. (AC 12-13-2022)
- 8 Edited disconnect page to updated decal/clarify function (DE 2-9-2024)
- 9 Airbag suspension content update (DE 4-3-2024)
- 10 Adding Hetronic ERGO-S content (DE 5-21-2023)
- 11 Added Dumping Best Practices and Longterm Storage content (DE 9-13-2024)
- 12 Edited Blower Temp Control Information (DE 10-3-2024)
- 13 Added Boom and Body Out of Position content, water pump oil spec (DE 1-16-2025)
- 14 Edited water cabinet page 200/created feature key (DE 3-28-2025)

Manual and Parts Page Files

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.

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.

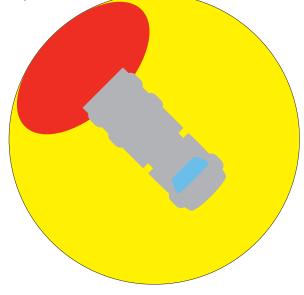
SAFETY INSTRUCTIONS

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.



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.

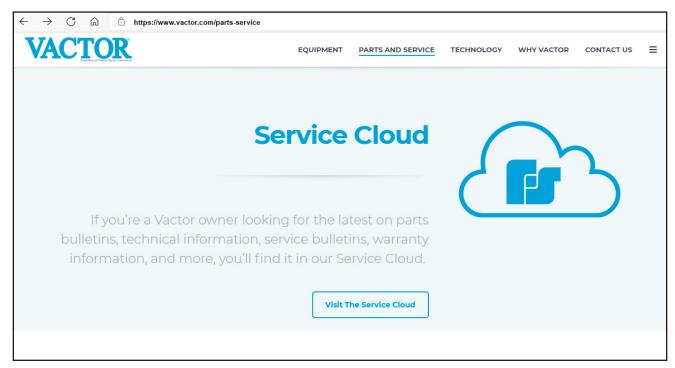
Guzzler/TRUVAC/Westech/Vactor Manual

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.

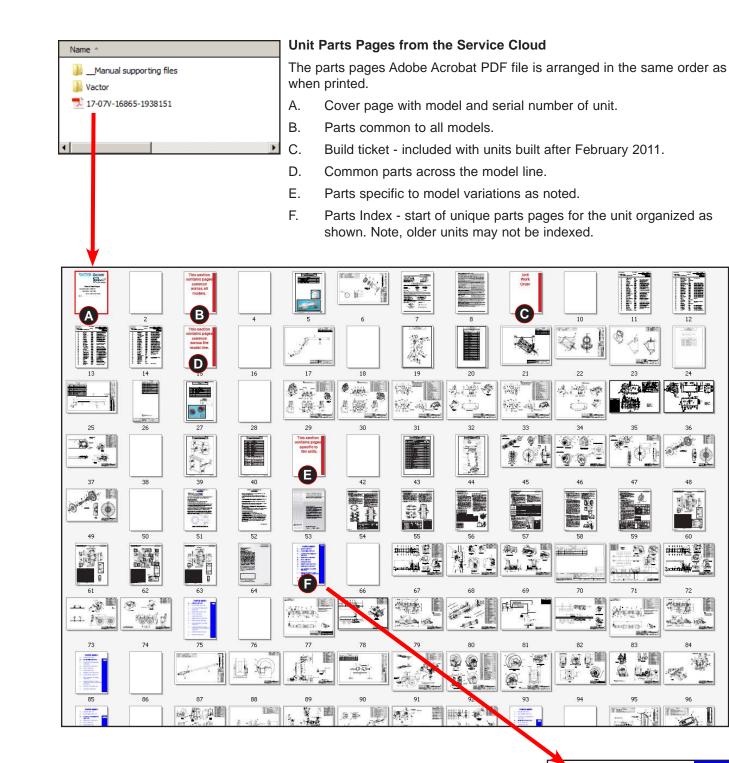
Once in you will find parts manuals for over 7000 Vactor products. Each manual contains relevant drawings and parts lists for the assemblies that make up the machine as a whole. The purpose of the EPC is to provide you with the parts information that is relevant to your machine.

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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- 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

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





INTRODUCTION

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 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



All units all have the serial plate in the same general location on the passenger side near the controls or water heater (if equipped). Options may obscure direct viewing.

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

	Serial Numbers				
		Exar	nple: 03-02GL-4125		
Year made	Month made	Product Code	Manufacturing Location	Sequential build number	
03	02	G	L	4125	
		G - Guzzler	No letter - Streator IL		
E - Elgin E - Elgin IL		E - Elgin IL			
V - Vactor C - Long Bea		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		

	FEDERAL	SIGNAL
	Environmenta	l Solutions

DELIVERY, INSTALLATION AND WARRANTY REGISTRATION FORM

Serial Number:	Dealer Name	9:			
Hours: Miles:	Delivery Date:	In-Service	e Date:**		
	** Form must be accompanied by a letter of request/explanation if different from Delivery da				
Comments:					
Dealer Representative ESG Representative					
Print Name S	Signature	Print Name	Signature		
To assure warranty protection retail customer agent at the			signed by an authorized		
Failure to complete, sign a	nd return form to the fa	ctory will void the limited	warranty.		
We have reviewed the ESC operation, service, and main day of,	ntenance responsibilitie	es for the above ESG pro	nd understand the warranty, oduct dated this		
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 a with product?	fter 6 months to inquire	about machine reliability	y and level of satisfaction		
Name:		Phone # (_)		
Customer Representatives	Present at Delivery				
Print Name	Print Name	Print	Name		
Signature	Signature	Signa	ature		
For information regard warranty administrator			15) 673-3841 • attn		
VACTOR MFG., LLC, 16. Original to Manufacturer		ATOR IL 61364 • ATTN WA to Dealer	ARRANTY ADMINISTRATOR Copy to Customer		

Operation

Operation

HXX

OVERVIEW - PD

OPERATION



Vacuum Excavation occurs when high-pressure water or pressurized air breaks up and cuts the soil, while a high-flow vacuum system lifts the soil up and out of the excavation area.

Buried natural gas, petroleum pipelines, and water mains can be quickly and efficiently uncovered with greatly reduced risk of strike. Fiber optic lines, cables, and other utilities can be efficiently located without the damage that can happen with traditional mechanical digging.

Operators can dig with precision, establishing a less invasive method for slot trenching, potholing, and pipe location.

This manner of excavation causes less surface damage, reduces disruption of traffic and other

surface activities and can be easier and less expensive to repair.

Non-destructive vacuum excavation is quickly gaining acceptance by cities, utilities, and contractors as a relatively safe, effective alternative to traditional excavation methods in a wide range of applications such as line location, installation and repair for utilities and pipelines, sewer and pipe, rehabilitation, slot trenching, waterline maintenance and repair, directional digging, excavation in congested areas, sign and pole installation, landscaping excavation and precision digging.

Vacuum excavation also is the preferred approach in confined locations that simply don't accommodate even the most compact standard mechanical excavators.



Overview - Fan

OPERATION



Vacuum Systems

TRUVAC offers both positive displacement (PD) and fan hydro excavation machines. The fan produces higher air flow for typical hydro excavation applications right off the truck. For most digging, the Fan will offer higher production capabilities than a PD.

When using the HXX for non-traditional applications such as drilling mud removal or remote site/access excavations where long or heavy pulls are expected, the PD's higher vacuum capability will out-perform the fan.



OVERVIEW - PRODIGY



HXX

The Prodigy provides customers with a lightweight and easier to maneuver alternative to the full-size HXX PD. The Prodigy utilizes PD air conveyance, is standard with hydroexcavation, and can include air excavation capabilities. The Prodigy's size makes the unit the ideal vacuum excavator for municipalities and utility companies with its lightweight, compact design and multiple excavation media options.



OVERVIEW - WATER OR AIR?

Both mediums have very distinct advantages. Air vacuum excavators use compressed air to loosen the soil and positive displacement blowers to vacuum the spoils into the debris body. Hydroexcavation uses high-pressure water to loosen soils, and the residual slurry spoils are easily extracted into the debris body.

Water excavation

Water is the most productive process, especially in rocky soils. It outperforms air because it moves large amounts of material faster and more efficiently favoring larger excavation jobs. Heated water (optional) can be used to cut through frozen soils. There is minimal abrasion to the underground utilities. Water system components tend to have a longer useful lifespan then compressed air systems.

Hydro-excavation advantages:

- In frozen ground or harder materials, water can be heated with on-board water heaters to aid in cutting through these materials.
- Hydro-excavation equipment can often be used for adjacent applications, such as tank cleaning. With the on-board high pressure water pump, hydro-excavators can perform many alternate applications that cannot be completed with pneumatic excavators.
- Hydro-excavation does not produce the sandblasting effect the way air does. This reduces the potential for damage to underground utilities.
- Water is also a lubricant, which helps to prolong the life of the excavation equipment by reducing wear on the vacuum hose and other components in the air stream.

Optional Air excavation

Compressed air offers some advantages under the right conditions. It is not limited by the limited supply of water and on small jobs where the hole will back filled right after the work is completed. It may be a safer choice when working around buried power cables. Air, however does produce a sandblasting effect that may create issues with dust and abrasion.

Some utility companies, departments of transportation (DOTs) or power plants specify air vacuum excavation for a given job for a number of reasons. Air vacuum excavation is desired in applications where the soil tends to be loose, water is not readily available, in small-scale excavation projects or where immediate backfill of the hole is required. When working around buried electrical lines or brittle utilities, air vacuum excavation is often preferred due to the lower operating pressures.

Air vacuum excavation advantages:

- Air is limitless. Onboard compressors generate the required pressure on demand so there are is no need to refill water.
- Air is nonconductive. When vacuuming around live electrical wires, pneumatic excavation can be a preferred choice over hydro-excavation.
- Air vacuum excavation provides dry spoils which can immediately be returned to the excavation site. Many applications in the utility segment require exposing the utility, making the repair, and then backfilling the material. This can't be done with hydro-excavation.
- Air vacuum excavation uses lower excavation pressures compared to hydro-excavation.
 Protective coatings and brittle underground utilities can easily be damaged when using hydro-excavation if the operator is not careful.

OVERVIEW - BASIC OPERATION

The operational systems on the TRUVAC 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 excavating machine.

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/fan. The 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

- 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.

OVERVIEW - BASIC OPERATION

You have three things that you can control; blower/ fan speed, water volume and water pressure.

Blower/fan speed controls the volume of air and the speed of the air through the pipe and into the debris tank. If you are in conditions where the soil breaks up easily, you can run at a higher rpm. This allows material to move faster.

If the ground is very hard or frozen, slow the speed down. You are not able to move the volume of material in these conditions and slowing down the blower/fan saves fuel and allows for a better working environment. How far from the truck are you having to work? The longer the distance the higher the blower speed. The shorter the distance, the lower the blower speed. Material moving through a hose or pipe has a friction factor. The more hose or pipe, the higher is this factor. Its actually called *friction loss*.

Understanding the vacuum system

The term "vacuum system" as it pertains to any Hydro Excavator product is actually a misnomer. We should be talking about an "air movement system" because that's really what it is. Air picks the material up and carries it into the debris body.

Air must be moving in order to move material. If the nozzle is totally submerged in the material no air can get in. When this happens, the material is pulled up only so high in the tube and it sits there. In the case of a blower (PD) machine, air movement becomes even more important because air is what cools the blower. Restricted air flow can cause the blower to over heat which can cause damage to the blower. The chart below shows the percent of restriction that is created as an eight (8) inch nozzle is closed down.

	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%			

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.

NOTICE

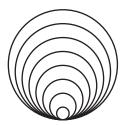
Machine Can Be Damaged

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.



VACUUM SYSTEM OVERVIEW

All HXX units have a vacuum system powered by either a positive displacement (PD) blower or a fan. They differ in their applications and capabilities.

Trucks equipped with a PD system can lift sludge or a column of water, while fan system trucks cannot. Fan systems can move much more air than PD systems, so they move material faster, but they cannot lift as much.

Filtration is more important on PD units. If the blower gets plugged, it can stall. If fan units get plugged, they continue to spin.

PD Models

The positive displacement, rotary lobe type blower is powered by the truck's diesel engine and is coupled to the truck power transmission chain by means of a transfer case. The transfer case is positioned between the transmission and the rear axle. When engaged, the transfer case diverts power away from the road wheels to drive a blower, which is the source of airflow.

Fan Models

The fan is powered hydraulically.

All Models

The blower or fan sucks air out of the tank, creating an area of low pressure in the tank. Air from outside the tank rushes into the tank through the attached hoses. This equalizes the pressure differential. Any loose material in the path of the rushing air is conveyed by the high-speed air stream to the debris tank via the hoses.

When material enters the debris tank, the transition from a hose to the larger debris tank causes the air speed to drop considerably. The incoming air strikes a specially designed deflector plate that directs the material flow downward. The now slower airflow cannot sustain the debris in the air and the material falls into the tank. This is the first of three stages of filtration.

Any lighter, powdery material still suspended in the airflow is conveyed to the cyclone chambers, the second filtration stage. There, due to the forced centrifugal action of the flow, most of the dust particles separate and collect in the dead air space of the hopper. By this stage of filtration, about 96% of the material has dropped out of the airflow.

Exiting the cyclone, nearly dust-free air passes through the final stage of filtration. It enters the final filter. After leaving the microstrainer, the air flow passes through the blower and the silencer before being exhausted into the atmosphere.

Optimizing Speed

Running the system at higher speeds than necessary is not only uneconomical in terms of excessive fuel consumption, accelerated wear and tear on the engine, transmission, and the blower; but will also prevent the filtration system from working properly. Minimum working speed will reduce wear.

Selecting Hoses

To help prevent or reduce clogging, use large diameter (6 inches or larger), smooth bore hose in as straight a line as possible.

For maximum output, the system is designed to use 6-inch diameter hose. Hose sizes smaller than that will cause additional friction losses and a higher percentage of the available engine and blower power will be used up in overcoming these inefficiencies. This will result in a dramatic increase in time required to complete a job.

If it is necessary to use smaller hose diameters, use multiple connections. Their combined area should equal that of an 6-inch hose.

To reduce friction losses use metallic, smooth-bore piping as much as possible and flexible hose for bends and curves. When bends in the hose run must be made, they should be wide and gradual. Using inexpensive, lightweight hose lengths for the last few working feet at the operator's end will provide greater maneuverability and less operator fatigue.

Vacuum System Components

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

- Suction Hose (as required)
- Boom
- Debris Body
- Float-Ball Vacuum Shut-Off (liquids only)
- Vacuum Relief Valves (automatic & manual)
- Blower (vacuum pump) or Fan
- Silencer (inlet and discharge)

WATER SYSTEM OVERVIEW - DIGRIGHT®

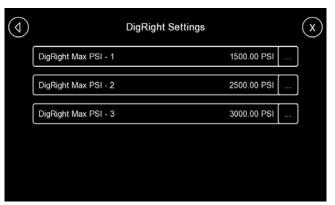
According to hydroexcavation best practices, there are set pressure limits based on the depth of the excavation. For example, when excavating 18 inches below the surface, the water pressure limit is 1,500 psi. The maximum water pressure allowed in any situation with a straight jet nozzle is 2,500 psi, and when using a spinner, the limit is 3,000 psi. DigRight® technology coupled with TRUVAC's multi-flow, variable water displacement water pump feature, allows the operator of a TRUVAC HXX HydroExcavator® to select a maximum water pressure limit to prevent the pressure from exceeding site or industry requirements.

The system consists of a push button on the control panel with four default selections: off (manual control); 1,500 psi; 2,500 psi; and 3,000 psi. It automatically adjusts the pump's water displacement to match the user's nozzle selection. It also prevents wear and tear on check valves, unloader valves, and relief valves by avoiding bypassing water, which is typical with other variable water flow systems. Preventing bypassing of water also saves fuel and money by eliminating wasted energy.

The variable water flow, multi-flow, pump allows water flow adjustment with the push of a button for digging in various conditions. The DigRight® Technology water system allows the operator to set a maximum pressure to meet required pressure limitations. TRUVAC's DigRight® Technology includes:

- User selectable max water pressure settings to control the pump's maximum pressure output. Three defaulted selectable pressure limitations based on industry best practices for digging around utilities.
- The default settings are also custom configurable to tailor to your needs.
- A simple 'double-click' on the control brings the system to a pre-set set pressure level or the pressure can be increased incrementally to the maximum setting.

Air Comp Off Pump SW Home **DiG** Multi-flow Up Multi-flow Down Setting 1: Setting 2: Pump SW Pump Output Setting 3: 3000 ich Here to Adjust Max PSI Pump System Pump Hours: 0.0 00 Approx. Gallons In Tank: 360 Water Tank Temp васк 120 °F



DigRight® is user configurable

The standard water system is rated at 10 gpm @3000 psi, the maximum pressure recommended for safe excavation. It is powered by a hydraulically operated triplex piston water pump. Each unit includes a standard handgun hose 3/8 inch x 75 ft. on a heavy duty retractable reel. The handgun and water pump can be mounted in an optional heated cabinet for protection against cold weather conditions. The TRUVAC HXX can be configured to include an additional handgun reel, hose, and digging lances for improved productivity.

Note: For proper functioning DigRight® requires a nozzle rated at 6gpm @ 3000psi.

OPERATIONS OVERVIEW

Hydro excavation trucks have four major systems: vacuum, water, filtration, and hydraulic.

Vacuum System

The term "vacuum system" as it pertains to any Hydro Excavator product is actually a misnomer. It should be called an "air movement system." Air picks up material and carries it to the debris body.

Air must be moving in order to move material. If the nozzle is submerged, no air can get in and material cannot reach the debris body. Air movement is even more important on PD units because the air cools the blower.

On PD units, the vacuum module is powered by the truck's diesel engine and is coupled to the truck's power transmission chain through the transfer case. When the transfer case is engaged, it diverts power away from the road wheels to drive the blower.

On fan units, the fan is driven hydraulically.

Vacuum System Components: Suction hose, boom, debris body, float ball vacuum shut off, vacuum relief valve, blower or fan, silencer (PD only), vacuum enhancer (optional)

Water System

Water is held in the water tank. It can be heated with the water heater for clay or cold weather applications. It can be recirculated to keep it from freezing and to maintain a consistent temperature.

Water is pumped out under pressure through a hose to the handgun or wand. The high pressure water is used to cut up soil into chunks small enough to fit in the vacuum hose.

Water System Components: water tank, water pump, handgun, nozzle, water heater (optional), recirculator (optional), air purge, water hose and reel, water filter

Filtration System

The filtration system cleans the air coming into the system by removing all dirt, dust and foreign matter from the air. The filtration system's primary purpose is to protect the blower from damage by carryover material.

Filtration System Components: debris body and deflector, prefilter, cyclone filter, filter element, microstrainer (PD only), silencer (PD only)

Hydraulic System

The hydraulic system powers many of the functions on the unit. The hydraulic pumps are usually driven by the PTO or transfer case system.

Operations Overview

When operating the HXX unit, two people operate the machine. One person uses the wand or water handgun to break up the soil. The other person operates the vacuum hose to remove the soil.

The operators can use blower/fan speed, water pressure, and water volume to optimize excavation in various environmental and soil conditions.

As the material is cut up, the vacuum hose carries the material into the tank. The transition from the hose to the debris body causes the air speed to drop. The incoming air strikes a deflector plate that directs the material flow downward. The now slower airflow cannot sustain the debris in the air and the material falls into the tank.

Any lighter powdery material still suspended in the airflow is conveyed to the cyclone chambers. There, due to the forced centrifugal action of the flow, most of the dust particles separate and collect in the dead air space of the hopper.

Exiting the cyclone, the nearly dust-free air passes through the filter and microstrainer (PD only). The air then passes through the fan or blower. On PD units, the air passes through a silencer.

When the job is done or the debris body is full, the debris body is dumped and cleaned for the next use.

The proper amount of water and / or air being used depends greatly on the soil conditions and the weather conditions at the time.

Weather can and does play a big factor in doing the job. Is the ground frozen? Is the ground sun baked and dry? Is it raining out and the ground is sloppy and muddy? Is the ground sandy or dry clay? Is it real hard and rocky ground? Is it soft ground? All of these and other questions have a direct affect on the job you are trying to do!



The filtration system is designed to clean the air coming into the system by removing all dirt, dust and foreign matter from the air. The filtration system's primary purpose is to protect the blower by removing all material from the air stream before it reaches the blower.

- 1 Waste material first enters the Hydro-Excavator through the boom located on top of the tank.
- 2 The deflector plate knocks the bulk of the material out of the airstream and it falls to the floor of the debris tank. The deflector plate is located inside the rear and at the top of the tank. In the tank, the air travel is slowed as it goes through it to the other end and leaves the debris tank.

- 3 The air flows into the secondary prefilter or cyclone chamber.
- 4 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 is directed to the filter element.
- 6 The air stream leaves the filter element and enters the microstrainer section of the housing. It is the safety dropout point for any objects which may accidentally enter the filtration system.
- 6 Finally, the air passes through the vacuum pump (blower) and out through the silencers.

OPERATION

MATERIAL FLOW OVERVIEW - HXX FAN



HXX

The filtration system is designed to clean the air coming into the system by removing all dirt, dust and foreign matter from the air. The filtration system's primary purpose is to remove all material from the air stream before it reaches the fan.

Inlet

Waste material first enters the Hydro Excavator through the boom located on top of the tank.

2

1

Debris Body

The deflector plate knocks the bulk of the material out of the airstream and it falls to the floor of the debris body. The deflector plate is located immediately inside the rear and at the top of the tank. Air travels through the debris body to the other end and leaves through the prefilter.

3 Prefilter

The air flows into the secondary prefilter or dual cyclone chambers.

4 Cyclone

Centrifugal force hurls the denser particles toward the cyclone walls (not shown) where they spiral downward into the collection hopper. The lighter and by now relatively particle-free air is directed to the filter element.

5 Fan

Finally, the air passes through the fan.

Note: There is no prefilter, microstrainer or silencer on units equipped with fans.

Hydro-Excavation - Getting Started

Vacuum Excavation occurs when high-pressure water or pressurized air breaks up and cuts the soil, while a high-flow vacuum system lifts the soil up and out of the excavation area.

Buried natural gas, petroleum pipelines, and water mains can be quickly and efficiently uncovered with greatly reduced risk of strike. Fiber optic lines, cables, and other utilities can be efficiently located without the damage that can happen with traditional mechanical digging.

Operators can dig with precision, establishing a less invasive method for slot trenching, pot holing, and pipe location.

This manner of excavation causes less surface damage, reduces disruption of traffic and other surface activities and can be easier and less expensive to repair.

Non-destructive vacuum excavation has quickly gaining acceptance by cities, utilities, and contractors as a relatively safe, effective alternative to traditional excavation methods in a wide range of applications such as line location, installation and repair for utilities and pipelines, sewer and pipe, rehabilitation, slot trenching, waterline maintenance and repair, directional digging, excavation in congested areas, sign and pole installation, landscaping excavation and precision digging.

The following pages provide basic resources to plan and operate a hydro-excavation digging site safely.

Follow all federal, state, and local regulations for locating utilities before starting work.

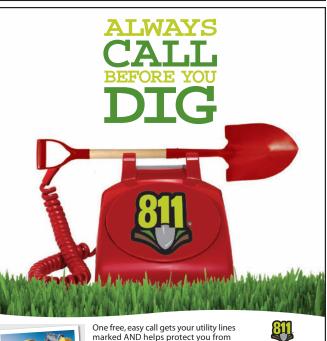
WARNING

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).





marked AND helps protect you from injury and expense. Safe Digging Is No Accident: Always Call 811 Before You Dig

Know what's below. Always call 811 before you dig Visit call811.com for more information. Korgen what's below.

Do Not Enter an Unprotected Trench!



For your safety:

- Slope or bench trench walls, or
- Shore trench walls with supports, or
- Shield trench walls with trench boxes.
- Provide safe access through the use of ladders, ramps or stairways.
- Keep heavy equipment away from trench edges.
- Know where underground utilities are prior to digging.
- Keep excavated or other materials at least 2 feet back from the edge of trench.

OSHA's role is to assure the safety and health of workers by setting and enforcin standards; providing training, outreach and education; establishing partnerships and encouraging continual improvement in workplace safety and health.

To get more information, report an emergency or contact your local office: www.osha.gov • (800) 321-OSHA • TTY (877) 889-5627



Operation

HYDRO-EXCAVATION - RESOURCES

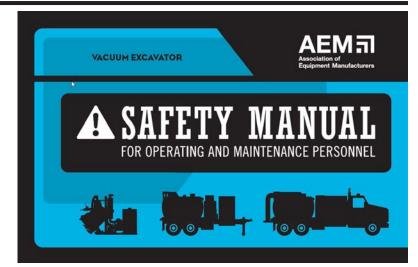
OPERATION

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



Operators using or working around high pressure water systems need to take additional precautions including specialized personal protection equipment. Additional information on high pressure water safety is available from the WJTA.

Also available from the WJTA:

Recommended Practices for the Use of High Pressure Waterjetting Equipment

Recommended Practices for the Use of Industrial Vacuum Equipment



WaterJet Technology Association 917 Locust Street, Suite 1100 St Louis MO 63101-1419

314-241-1445 Fax 314-241-1449 e-mail: wjta@wjta.org website: www.wjta.org



INDUSTRY BEST PRACTICES FOR THE USE OF HIGH PRESSURE WATERJETTING EQUIPMENT



RECOMMENDED PRACTICES FOR THE USE OF INDUSTRIAL VACUUM EQUIPMENT POURTH EDITION, JAKY 2020

Underground power lines may require special precautions including cutting power to the lines and the use of special protective bonding equipment.

Kri-Tech is a source of protective bond mats used during hydro-excavation:



Kri-Tech Products Ltd. Box 364, Mirror Alberta Canada T0B 3C0

877-788-3883 Fax: 403-788-3723 Email: info@kri-tech.net website: www.kri-tech.net

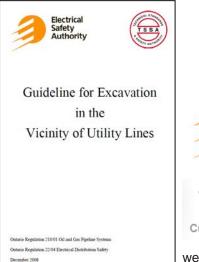
HYDRO-EXCAVATION - RESOURCES



Common Ground Alliance 2300 Wilson Boulevard Suite 400 Arlington, Virginia 22201

703-836-1709 Fax: 309-407-2244 websites: www.commongroundalliance.com www.call811.com www.cga-dirt.com



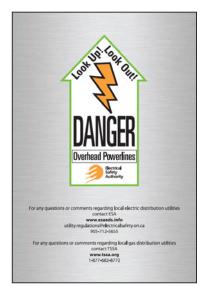




Ontario Regional Common Ground Alliance

195 King Street, Suite 105 St Catharines, Ontario L2R 3J6

866-446-4493 Fax: 866-838-6739 Email: office@orga.com website: www.orcga.com





Work Safe for Life

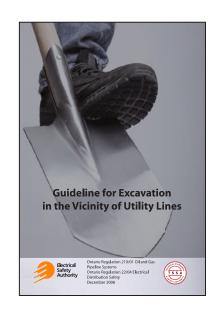
Centre for Health and Safety Innovation 5110 Creekbank Road, Suite 400 Mississauga, ON L4W 0A1

800-263-5024 Fax: 905-625-8998 Email: info@ihsa.ca website: www.ihsa.ca



1-877-ESA-SAFE 1-877-372-7233 Customer Service Center

website: www.esasafe.com



Vactor Personal Protection Equipment - PPE

Follow all requirements for PPE when operating and servicing. The Occupational Safety and Health Administration (OSHA) requirements apply to most workers. The following information is from OSHA 3151-12R 2003. The full document can be obtained from www.osha.gov.

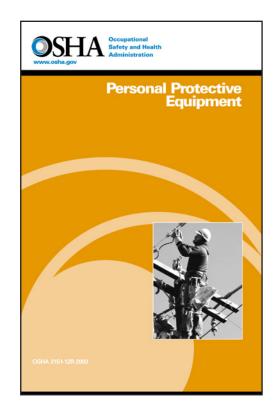
A hazard assessment should be made to determine the correct level of footwear safety protection. Underground electrical utilities may require the use of insulating gloves and dielectric footwear. The minimum requirements for gloves are compliant with OSHA 1910.137, OSHA 1910.268, NFPA 70E and exceeds the ASTM D120 and European EN60903 standards. Refer to NFPA 70E for dielectric footwear.

National Fire Protection Association (NFPA)

1 Batterymarch Park Quincy, MA 02169-7471 Telephone: (800) 344-3555

NOTICE

Reference to OSHA regulations are for informational purposes only and not intended as legal advice.



ASTM Labeling Chart Natural Rubber Electrical Insulating Gloves							
Class Color	Proof Test Voltage AC/DC	Max. Use Voltage AC/DC	Insulating Rubber Glove Label				
00 Beige	2,500 / 10,000	500 / 750	10 ASTM D120 ENKORGO CLASS 00 TYPE I MAX USE VOLT SOV AC				
0 Red	5,000 / 20,000	1,000 / 1,500	10 ASTM D120 EN60600 CLASS D TYPE I MOX USE VOLT 100V AC				
1 White	10,000 / 40,000	7,500 / 11,250	10 ASTM D120 EN60503 CLASS 1 TYPE I MAX USE VOLT 7200V AC				
2 Yellow	20,000 / 50,000	17,000 / 25,500	10 ASTM D120 EN60803 CLASS 2 TYPE I MAX USE VOLT 17009V AN				
3 Green	30,000 / 60,000	26,500 / 39,750	10 ASTM D125 ENe0203 CLASS 3 TYPE I MAX USE VOLT 28000V A				
4 Orange	40,000 / 70,000	36,000 / 54,000	10 ASTM D120 EN60503 GLASS 4 TYPE I MAX USE VOLT SECON AC				

HYDRO-EXCAVATION - SITE PREPARATION

Refer to the Vactor/Guzzler/TRUVAC/Westec Safety Manual for general site preparation. Site specific regulations may also apply.

- 1. Call 811 before all digging operations to locate and mark off all known utilities
- 2. All buried utilities suspected to be damaged must be de energized prior to digging.
- 3. Follow all recommended procedures for electrical bonding. Ground mats may be required.
- Verify all equipment is in safe working order and suitable for the work to be performed. Water flows above 10gpm are normally not suitable due to the higher risk of erosion problems.
- 5. The working end of the vacuum tube should be equipped with a soft nonconductive end to help reduce the risk of contact or damage to buried lines and pipes.
- 6. Water pressure, volume and temperature can have a big impact on the risk of damaging the various underground utilities. Some testing may be required to avoid damage. Lower the water pressure and temperature when getting close to the utilities. The water nozzles must always be in motion.
- 7. Teamwork is very important when trenching and digging large holes. One person is operating the wand or hand gun. The other person is positioning the boom so the vacuum tube is in the right position to move the material as soon as it breaks away. It is not productive to try to wash the material to the nozzle or to try to vacuum the material a great distance to the nozzle.

The operational systems on the units 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 excavating machine.

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/fan. The nozzle is designed to





Underground hazards

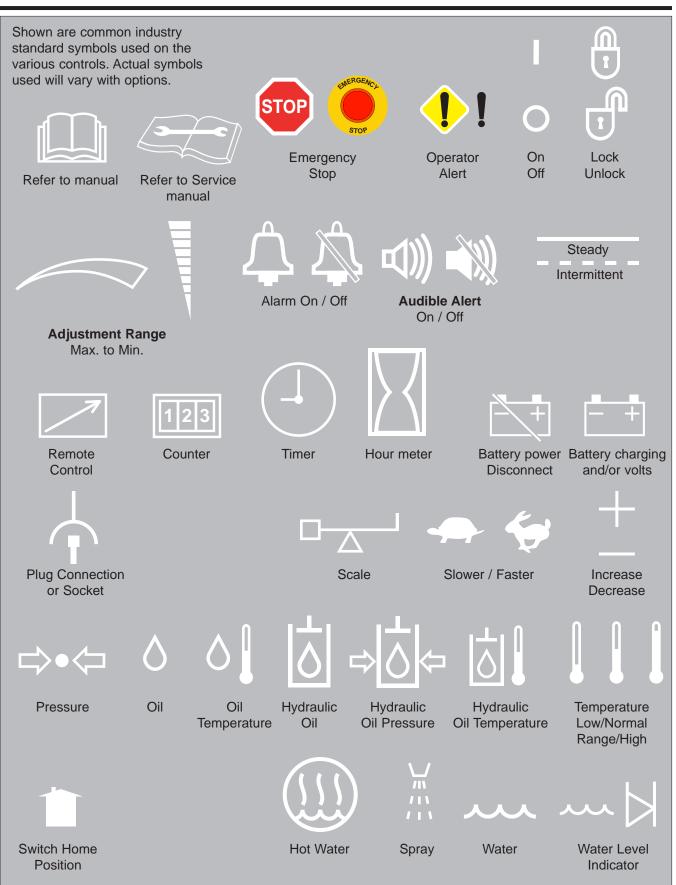
Gas and electrical utility damage can result in fire, explosion and electrocution. To avoid injury or death:

- Before digging locate all underground utilities. Always call 811 before digging.
- Shut off gas lines and electrical power
- Always use nozzles designed for excavating applications to reduce the risk of damage.



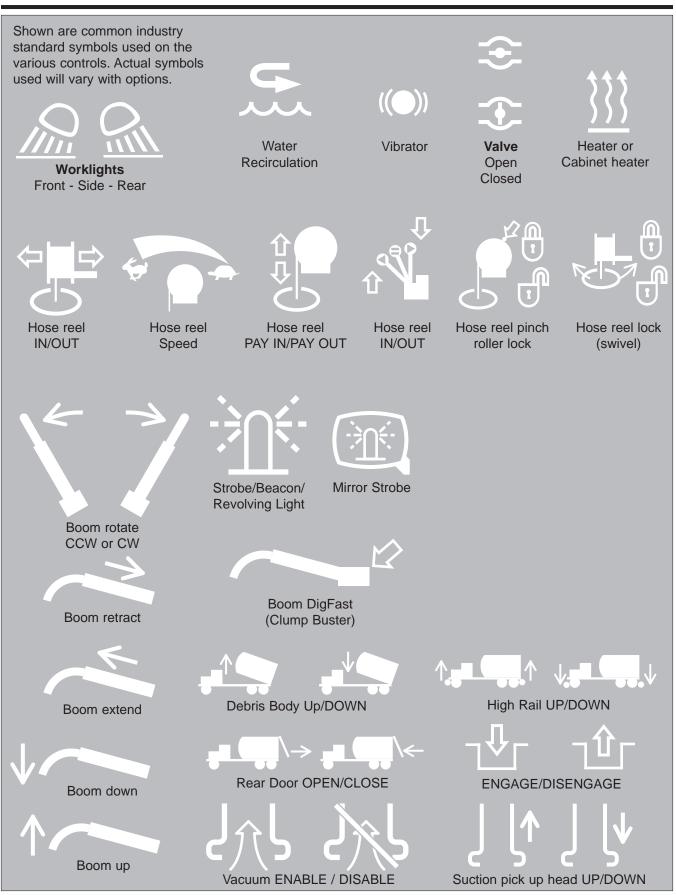
pull air into the pipe to move material. The end is serrated with small holes; if the end is submerged no air is pulled in through the holes.

OPERATION



SYMBOLS

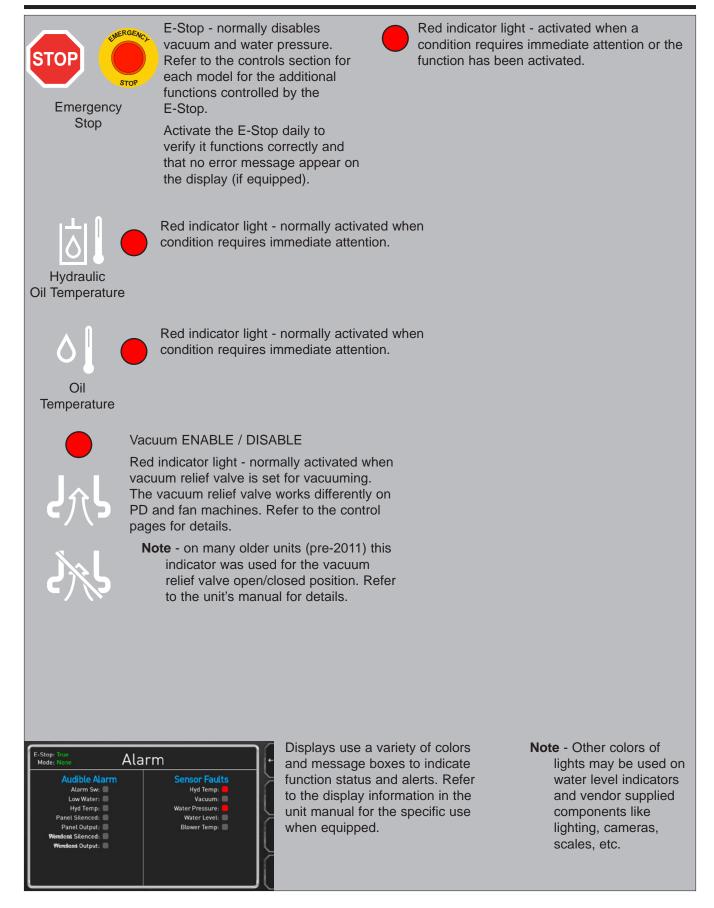
Symbols



Symbols



INDICATORS & SWITCH BEHAVIOR



CONTROL PANEL - OVERVIEW

Operation



The master control panel containing many of the operator controls is located adjacent to the water tank on the passenger side. The panel is illuminated any time there is power to the master control panel.

- 1 IntelliView[™] display The IntelliView[™] display displays most of the functionality of the unit. Among the things displayed are: chassis engine, 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.
 - Note: Display is designed to operate at an internal temperature range of -13° (F) to 167° (F). Outside that range the display will shut down and the backlight will flash like a heart beat.
- 2 Emergency Stop Switch Opens the vacuum relief, turns off the hydraulic functions including the water pump/air compressor, and throttles down the engine. Before switching the E-stop to OFF reset ALL switches to their OFF positions and the vacuum relief to disable. Restart all functions as normal.

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

3 IntelliView[™] display control switches

The IntelliView[™] display is operated by three Vansco controllers inside master control panel.





CONTROL PANEL - OVERVIEW

4 **Remote Control Switch -** Switches between control panel, wireless remote control and the optional wired pendant.

Remote Control Indicator - light is on for the activated remote system

- Note: There is a two second delay in the control logic whenever the Remote Control Switch is moved from one position to another. Whenever changing the position of the Remote Control Switch position, wait two seconds before trying to operate any functions, or it will be necessary to re-activate the switch a second time to operate the component.
- 5 System controls function group switches
- 6 Body controls function group switches
- 7 Boom controls function group switches
- 8 Options controls function group switches

HXX Control Panel - System Control Switches

OPERATION



Throttle Switch - This switch provides the operator the ability to control the engine speed from the master control panel. The switch is a three-way momentary switch. The throttle switch allows the operator to increase engine speed (rpm) by continuing to hold it in an upward position. When the throttle switch is held in a downward position, the engine rpm will decrease.

vacuum کژک

Vacuum ENABLE/DISABLE - Operates a valve that either disables the vacuum at the hose end or enables vacuum at the hose end. The valve defaults to disabled to relieve the vacuum at the hose end when the E-Stop switch is off or blower/fan is disengaged. Blower must be running to function.

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

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.

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.

When power is cut the spring return air solenoid defaults to the Disable position.

Vacuum enable indicator - Indicates the vacuum relief valve has been shut off and the vacuum is enabled.

Water Pump Switch - Activates the water pump. This switch disables the boom switches on the control panel. The first time this switch is activated after the master control switch has been turned on the pump speed defaults to the lowest setting.

> **Note:** This switch over rides the water pump switch on the pendant control. This switch must be OFF in order for the switch on the pendant control to function. The switch must also be OFF for the boom switches on the control panel to work.



HXX **CONTROL PANEL - SYSTEM CONTROL SWITCHES**

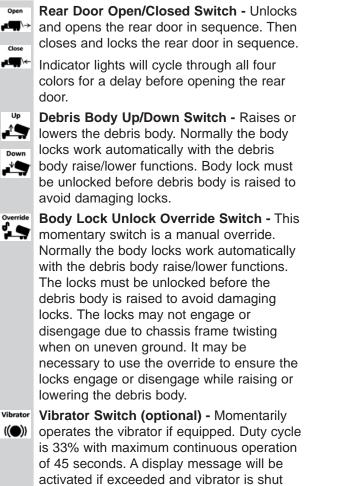
OPERATION

Flow

Flow	Multi•Flow Switch - This switch incrementally adjusts the water flow from the pump by adjusting pressure settings. The flow can be adjusted from 3-10 gpm (3-20 gpm with optional 20 gpm pump). Adjust to get the desired flow with a given nozzle at a certain PSI setting. The first time this switch is activated after the master control switch has been turned on the pump speed defaults to the lowest setting. Switching SET PSI setting defaults to lowest setting. Holding the switch will incrementally ramp the pressure up or down. Double tapping the [™] switch will automatically raise the pressure to the maximum selected DigRight [™] setting.	System Controls
Recirc	Recirculator Switch - Activates an auxiliary hydraulic pump to recirculate water through the system. This switch disables the boom switches on the control panel. Activation allows the pump to run in road mode with a factory preset flow rate.	
Set PSI	Set PSI Switch - DigRight™ - Toggles through four settings:	
	Red - Max PSI OFF - Water system functions without the pressure transducer.	
	Amber - starts at 1000psi, 1500PSI max. default.	
	Green - starts at 1500psi, 2500PSI max. default.	
	Blue - starts at 1500psi, 3000PSI max. default.	
	On system start up, Set PSI will default to last selected Setting.	
	For each of the 3 DigRight™ Settings, the Max PSI is user adjustable via the Water Screen.	
	Note: DigRight [™] system relies on the pressure transducer to function correctly. If the transducer fails the system will default to the off setting, and the truck can be operated in the standard multi-flow mode via controlling the current to the proportional valve.	
	in the standard multi-flow mode via controlling the current to the	

HXX **CONTROL PANEL - BODY CONTROL SWITCHES**

OPERATION





Open

Close

Up

Down

down for 90 seconds. Duty cycle for electric vibrator only. Indicator will be red when duty cycle is reached.

- Option
- Option

HXX **CONTROL PANEL - BOOM CONTROL SWITCHES**

OPERATION



Extend

Retract

....

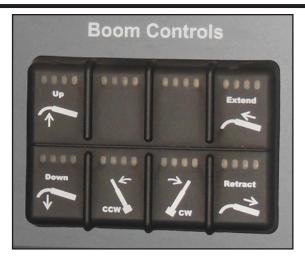
7....

Boom Up/Down Switch - Move the boom up or down. Operates at a faster speed when run from the control panel to reduce job set up time.

- Option -
- Option -

Boom Extend Retract Switch - Extends or retracts the boom. Operates at a faster speed when run from the control panel to reduce job set up time.

Boom Rotate Switch - Rotates the boom left or right. Operates at a faster speed when run from the control panel to reduce job set up time.



CONTROL PANEL - OPTION SWITCHES

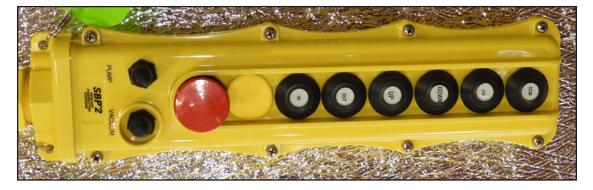
- 1 Air Switch Activates the optional air system. The indicator light is on when the air compressor is active. Switching off/on in too short of a time will activate the air compressor shutdown system. The shut down system must complete its cycle before the indicator light will show on.
- 2 Cabinet Heater Switch This switch turns the heater on in the control panel compartment.
- 3 Sludge Pump Switch Operates optional off load pumps.
- 4 **Tool Package Switch -** Optional for hydraulically operated tools.
- **5 Tool Flow Switch -** Optional for adjusting the flow to hydraulically operated tools.
- 6 Vacuum Enhancer Switch Optional. Momentarily closes the vacuum enhancer valve in the debris body.
- 7 Load Limit Option. Indicator light when limit is reached
- 8 Option
- 9 Pendant Used for wireless system
- **10 Rear Work Light Switch -** Activates the rear work lights.
- **Side Work Light Switch -** Activates the side work lights.
- **12 Boom Work Light Switch -** Activates the boom work lights.
- 13 Pendant Used for wired pendant



Operation

HXX Wired Pendant (Optional) - Vansco System

Operation



When activated the optional wired pendant takes over the boom functions and vacuum relief from the master control panel. It also provides an additional E-stop. To use set the Remote Control switch to Pendant.

Vacuum Enable sets the vacuum relief valve to allow vacuum at the hose end. Blower must be running to function.

Vacuum Disable sets the vacuum relief valve to relieve the vacuum at the hose end. Blower must be running to function.



Attach pendant to receptacle on the master control panel

OMNEX WIRELESS CONTROL OPERATION

To operate the radio remote set the control panel switch to wireless. Actual functions and controls will vary with model and options. All controls function the same as on the control panels.

A manufacturer's manual is provided with the unit. Refer to it for specific details on batteries.

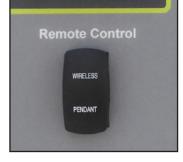
Note: Boom rotation speed is slower when operated from the radio remote than from the control panel. Press the green shift key while rotating the boom to match the control panel speed.

The radio remote controls the boom operation, up/ down, left/right, extend and retract. It controls the vacuum enable/disable. It can turn the water pump on/off and operate the multi-flow. It also can control the engine throttle rpm. The maximum distance the radio control can effectively operate from the truck depends a lot on the operating environment. Buildings, terrain, other pieces of large equipment between the operator and the truck, will affect operating distance. The optimum distance would be about 500 feet under ideal conditions.

Hold the green shift button down to use the green labeled functions.

Linking multiple controls

Various wireless controls are available and it is possible to link more than one at a time. Control priority is by the order the controls were linked starting with the first unit linked.



Wireless Operation Wireless ON 1. Set engine to idle 2A. Belly pack: a. Engage the emergency stop on the remote

- b. Press and release the Power switch on the remote
- c. Disengage the emergency stop on the remote
- 2B. Handheld remote:
 - a. Press and release the Power switch on the remote
- 3. Set to wireless remote at control panel
- 4. Wireless will now be engaged and duplicate controls will be disabled

Wireless OFF

- 1. Set engine to idle
- 2. Remote control switch to OFF/Pendant
- Engage emergency stop on the remote
 Refer to manual for details. 49824 rev

Wireless receiver (normally located inside the master control panel)



SAFETY INSTRUCTIONS

HXX

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.



OMNEX WIRELESS CONTROL - E-STOP

- Loss of communication between transmitter and receiver
- Dead Batteries in transmitter
- Loss of power to Receiver

E-stop has the same effect as any other E-stop on the vehicle. Wireless E-stop is bypassed when the remote control switch (secondary controls) is in the OFF position so that the transmitter can be turned off when not in use without creating a system E-stop.

The function of lower red button on the remote varies with the unit's configuration. On some units it will also be an E-stop. If set up as an E-stop the remote must be relinked to clear the E-stop function.

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.



HXX OMNEX Wireless Control - Body Controls (Optional)

To operate the optional body control radio remote set the control panel switch to wireless. Actual functions and controls will vary with model and options. All controls function the same as on the control panels.

A manufacturer's manual is provided with the unit. Refer to it for specific details on batteries.

The radio remote controls the body operation, up/ down and rear door open/close/lock/unlock. It also can control the engine throttle rpm. The maximum distance the radio control can effectively operate from the truck depends a lot on the operating environment. Buildings, terrain, other pieces of large equipment between the operator and the truck, will affect operating distance. The optimum distance would be about 500 feet under ideal conditions.

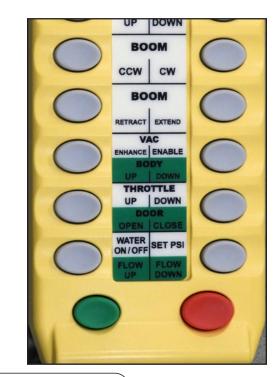
Hold the green shift button down to use the green labeled functions.

Linking multiple controls

Control priority is by the order the controls were linked starting with the first unit linked.

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.







Crushing hazard. Serious injury or death can result from falling debris body. Never go under a raised debris body without the safety prop(s) in place. Debris body must be clean and empty for service work.

On firm level ground raise the body above the height of the props. Tilt the prop(s) in place. Lower debris body until it just rests on the prop(s). Use all props.

Shut down and lock out the entire system and chassis before servicing. Unload any items stored in debris body before using machine.

Refer to manual for details.



Crushing hazard.

Serious injury or death can result from falling rear door. Never go under the rear door when open. Use door prop(s) or safety pin(s) to secure door before entering body, working under or around the door.

Open the rear door to just clear the prop(s) and lower door until it just rests on the prop(s). On units that use a safety pin(s) open the door until the pin holes are aligned and insert pin. Use all props or pins. Shut down and lock out the entire system and chassis before servicing. Unload any items stored in debris body before using machine.



Electrocution hazard. Serious injury or death can result from electrocution.

Check for overhead wires and obstructions before raising debris body, opening rear door or raising optional equipment. Never leave debris body, rear door or optional equipment raised or partly raised while vehicle is unattended. Never move vehicle with debris body, rear door or optional equipment raised.

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

1800128 rl

MASTER CONTROL PANEL - FAN UNITS

HXX

The master control panel is the same as for the PD units except as noted here. The main display also changes for the fan system.

- Fan Switch Activates the fan for vacuum. 1
 - Note: Fan will not engage when the engine RPM is above 900RPM.



Vacuum/Work Mode

- 1. Apply parking brake, engine to idle and select NEUTRAL
- Master Switch to ON
 Select Work Mode
- 4. Select DRIVE, (4-4) and wait 10sec for vacuum mode to be fully activated
- 5. Select Fan at the master control panel

Road Mode

- Set engine to idle
- 2. Select NEUTRAL
- Select Road Mode
- 4. Master Switch to OFF





PD Blower

Fan

INTELLIVIEW[™] DISPLAY - OVERVIEW

PANEL 15 inHg 10 2Ó 25 3/4 WATER PSI 250 200 -20 25 200 150 15 1/2150 100 10 Target PSI: 2500 100 Max PSI: 2500 30. 0 VAC SLOWER RPM × 100 Ś - } Ū, PANEL 1:26 🔁 🔇 (R) ()15 ٩F 10 2Ó 200 3/4 WATER PSI 150 25 1/2100 Target PSI: 2500 1/4Max PSI: 2500 50 0 30. ٥. CHASSIS RPM X100 Å 3

••••		Alarm
Back	$\left \underline{\Delta} \right $	Menu
Ā	OK	Δ
↓	∇	···

The IntelliView[™] displays most of the functionality of the unit. Among the things displayed are: chassis engine, 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.

- **Note:** Display is designed to operate at an internal temperature range of -13° (F) to 167° (F). Outside that range the display will shut down and the backlight will flash like a heart beat.
 - Option
 - Option



-

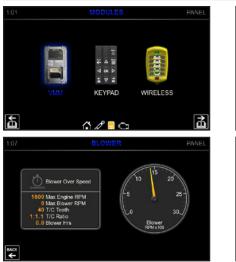
Alarm - on/off. Indicator will be red when alarm is active.

Back - same as on screen arrow

Up - select next item

Menu Menu - screen configuration pages. This \equiv can not be accessed through the touch screen. Left - select next item OK - select item ОК Right - select next item D **←** Back - same as on screen arrow Down - select next item → Forward - same as on screen arrow ۵Ď) Note: many of the control panel switches have indicator lights. Refer to the individual switch information for details.

INTELLIVIEW[™] - MAIN PAGES



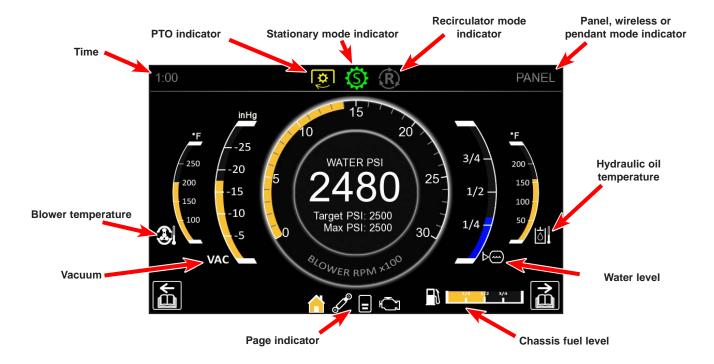


The IntelliView[™] system has five main pages for normal operation. Use the forward or back icons to toggle through them.

- **Modules -** Includes selections for wireless operation and diagnostics.
- Chassis Includes basic chassis information.
- **Operation -** Primary screen for routine operation.
- Blower or Fan Operational RPM's and water pressure.
- **Function Group -** Specific information for all active options and functions. There is a different screen for fan and PD.



On screen items can typically appear in three different states.

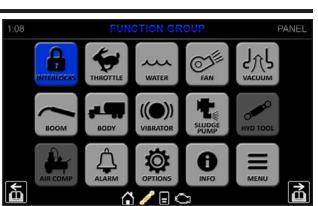


INTELLIVIEW[™] DISPLAY - FUNCTION GROUP PAGES

OPERATION



The Function Group pages leads to all these screens. Refer to the Troubleshooting section for details.



(S)



SUBMIT

INTELLIVIEW[™] DISPLAY - SET UP PAGES

The Menu switch activates various

settings.

screens for screen display and option

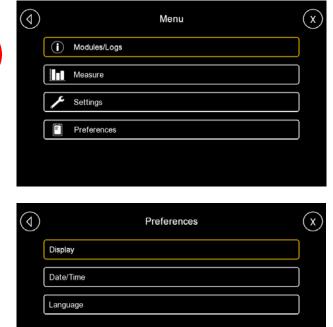


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HXX

....

OPERATION



\bigcirc	Settings	\mathbf{x}
	User Preferences)
	Boom Standby]
	DigRight Settings]
	Boom Rotation)
	Water Pump]
	A the second second)

(\mathbf{A}) (\mathbf{x}) User Preferences Display Time YES Units Imperial

The HXX systems are controlled by three VANSCO controllers. This overview covers all the basic interactions of the various systems. It should be consulted before troubleshooting or service is performed to verify correct operation. The functionality is broken down to these areas:

- Debris body
- Boom
- Chassis
- Water / Air
- Vacuum
- Control panel
- Wireless unit
- Miscellaneous
- Options

Debris body

Controls the debris body dump functions, rear door and body locks.

- Has the lowest priority of all hydraulic functions
- Uses a common valve
- Must be in stationary mode to function
- Door unlocks automatically when opening and locks automatically when fully closed
- Body lock opens automatically when debris body is moving
- Body will automatically lock if any of the requirements for unlocking are removed or if manually overridden
- Body will only raise after body locks are open
- Body will lower without waiting for body locks to be open

Boom

Controls the boom functions.

- Operates from the control panel, pendant, or wireless unit
- Boom only operates in stationary mode (does not operate in recirculator mode)
- Boom will not operate in conjunction with vacuum enhance
- Boom will not operate while hydraulic pipe rack is moving
- Boom will not operate from the control panel if the panel water pump switch is ON or if the panel air mode switch is ON

Chassis

Controls the interaction between the chassis and the HXX module functions.

- Throttle control method differs based on engine model
- Maxforce, Mack, and Volvo are hard-wired
- Mercedes-Benz and Detroit Diesel use TSC1
- Cummins and Cat uses PTO
- PTO engagement with automatic transmission requires:
 - Stationary mode or recirculation mode
 - Engine running below 850 rpm
 - PTO switch
- PTO engagement/disengagement with manual transmission requires:
 - Engine running below 850 rpm
 - PTO switch
 - Clutch IN
 - Vehicle speed less than 5 mph
 - Master switch
 - Blower mode switch & transfer case ball switch OR road mode switch

Water / Air

Controls the water systems and optional air compressor system.

- Charge pump always runs whenever water pump runs
- Water and air cannot be ON at the same time
- Water pump can run in stationary mode or in recirculation mode
- Water pump must be shut off to leave recirculation mode
- Air compressor can only run in stationary mode
- Water pump can be activated from the control panel, pendant, or wireless unit
- Air compressor can only be activated from the control panel
- In recirculation mode while in road mode the water pump runs at a set speed
- In stationary mode the water pump speed can be adjusted from the control panel multi-flow switch or wireless unit
- After maintaining high pressure for 12

seconds, the air compressor will run at a reduced speed until the pressure drops

 Water heater is disabled while water tank temperature is at least 100° F and water return line is at least 120° F

Vacuum

Controls the vacuum system.

- Engaging the transfer case for blower mode requires:
 - Master switch
 - Parking brake ON
 - Blower mode switch and not road mode switch (i.e. the absence of the other switch)
- With manual transmission:
 - Clutch IN
 - Vehicle speed less than 5 mph
- With automatic transmission:
 - Range indicator signal
 - Output shaft speed less than 20 rpm
 - Transmission in neutral
- Closing the vacuum relief valve requires:
 - Stationary mode
 - Transmission in fourth gear (automatic transmission only)
 - Vacuum enable switch from active source (control panel, pendant, or wireless unit)
 - Blower running
- Blower temperature control

	Blower		
Control function	Roots 824	Hibon 8702	Robuschi
Alarm at	380° F	265° F	285° F
Vacuum relief opens at	395° F	300° F	300° F
Vacuum relief closes at	365° F	270° F	270° F

Control panel

Control panel switch operation.

• Switches on the control panel will not function if they are ON when the control panel becomes active, they have to be cycled OFF and back ON to function Switches are only active when master switch is ON and both wireless and pendant are OFF

Standard wireless unit

- Activated with switch on control panel
- Switches on the wireless unit will not function if they are ON when the wireless unit becomes active, they have to be cycled OFF and back ON to function
- Includes boom functions, vacuum enable, vacuum enhance, throttle control, multi-flow control, water pump ON / OFF, and E-stop

Miscellaneous

Various controls and subsystems that affect the system.

- Cooling fan
 - Turns ON when hydraulic oil temperature reaches 130° F
 - Turns OFF when hydraulic oil temperature goes below 110° F
- Audible Alarm
 - Sounds when blower temperature reaches 380° F
 - Sounds when hydraulic oil temperature reaches 180° F
 - Sounds when water tank is LOW, pump is ON, and truck is not in recirculation mode
 - Sounds when water tank temperature reaches 100° F and water return line temperature reaches 120° F at the same time
 - Alarm Silence switch turns OFF audible alarm for two minutes OR another alarm occurs (water tank alarm silence turns OFF audible alarm for the duration of the alarm)
- E-Stop
 - Causes:
 - Control panel E-stop button pressed
 - Control panel wireless switch ON while wireless is not active or has E-stop button pressed
 - Control panel pendant switch ON while pendant is not plugged in or has E-stop button pressed
 - Hydraulic oil temperature is at

OPERATION

least 200° F

- Effects:
 - Opens vacuum relief valve
 - Commands throttle to idle speed
 - Shuts off water pump
 - Disables pump pack (4th gear lock up enable for Allison transmission)
 - Takes truck out of stationary mode or recirculation mode
- IQAN messages
 - Ignition wire connection to a Vansco unit failed
 - Master switch wire connection to a Vansco failed
 - Blower over-speed
 - High blower temperature
 - High hydraulic temperature
 - High water tank temperature
 - E-stop condition
 - Missing or failed temperature sensor
 - Low water
 - Electric vibrator max duty cycle

Options (must be purchased and installed to function)

- Water recirculation
 - Must be in stationary mode to start recirculation
 - Other conditions for starting and continuing recirculation:
 - Master switch ON
 - Water pump ON
 - NO E-stop condition
 - Cannot turn on recirculation if water pump is turned on via wireless or pendant
 - Flow is reduced if clutch is in with a manual transmission to facilitate gear shifting
- Air compressor
 - Must be in stationary mode
 - Water must be off
 - Panel air switch must be ON

- Air compressor ready input
- Runs at reduced speed if air pressure remains above predetermined threshold
- Control pendant
 - Activated with switch on control panel
 - Switches that are ON when pendant becomes active will NOT be active until they are cycled OFF and back ON
 - Includes boom controls, vacuum enable, water ON / OFF, and E-stop
- Second T110 wireless unit
 - Activated with switch on control panel
 - Switches on the wireless unit will not function if they are ON when the wireless unit becomes active, they have to be cycled OFF and back ON to function
 - Includes debris body functions, throttle control, multi-flow control, water pump ON / OFF, electric vibrator and E-stop
- T300 wireless unit
 - Upgrade from standard T110 wireless
 unit
 - Controls the same functions as the standard T110 wireless unit
- Tool package
 - Must be in stationary mode with tool package switch ON
 - Tool valve UP / DOWN switches control proportional valve
 - Proportional valve value is retained until truck leaves stationary mode
 - Sludge pump will interrupt or prevent tool package operation
 - Hydraulic debris body vibrator will interrupt or prevent tool package operation
- Offload Sludge pump
 - Must be in stationary mode with sludge
 pump switch ON
 - Hydraulic debris body vibrator will interrupt or prevent sludge pump operation
- Hydraulic debris body vibrator
 - Operates in stationary mode only

- Controlled from control panel or second T110 wireless unit
- Electric debris body vibrator
 - Operates in stationary mode only
 - Controlled from control panel or second T110 wireless unit
 - 33% duty cycle with maximum continuous operation of 45 seconds
- Automatic pipe rack
 - Uses same hydraulics as boom
 - Only works in stationary mode
 - Automatic pipe rack has priority over boom and vacuum enhance
 - Can operate at the same time as debris body and door
 - All other requirements for operating boom hydraulics must be met
- Vacuum enhance
 - Part of boom hydraulics
 - Has priority over debris body, but not pipe rack
 - Will not operate in conjunction with boom
 - Uses different proportional valve settings for open/close
 - Switches on control panel and wireless unit
 - Vacuum enhance switch ON closes valve in vacuum line
 - Valve in vacuum line automatically opens whenever vacuum enhance switch is NOT ON
 - Must be in stationary mode to close valve
- Water heater (boiler)
 - Enabled when water pump is ON in stationary mode (does not work in road mode)
 - Does NOT run in recirculation mode
 - Disabled if water tank temperature is at least 100° F and water return line temperature is at least 120° F

TRUVAC

WIRELESS REMOTE CONTROLS

The pendant 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.

Note: The boom brake is locked out when the debris body is raised or out of the fully down position (HXX Paradigm only).

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

The vacuum relief on/off button relieves the air flow at the boom inlet in an emergency.

Units normally come equipped with a wireless remote and **wireless** emergency **shutoff** wrist strap (WSO). The WSO triggers the E-stop.

Note: On some models the wireless pendant can be used as a wired pendant.

The ring on the wireless remote and wireless emergency shutoff is normally attached to the lance and the module to one of the operator's arms. If the operator looses control of the lance the attached cord will trigger the wireless emergency shutoff.

Note: ParaDIGM wired remote will

only work when the wireless switch on the master control panel is set to ON.

Charging

The wireless remote needs charged before use. When the batteries are completely dead, with no charge at all, they will need to be hard wire charged. The batteries will need to be put in an individual charger or

connected to the tether to charge the batteries. If they still do not take a charge then they will need to be replaced. The induction charger will not charge a completely dead unit. Other charging options are also available.

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.

The WSO uses a replaceable CR123A battery.



TRUVAC WIRELESS REMOTE CONTROLS - PAIRING

Wireless remotes normally only need pairing when either the receiver or transmitter are replaced,

Wireless remote

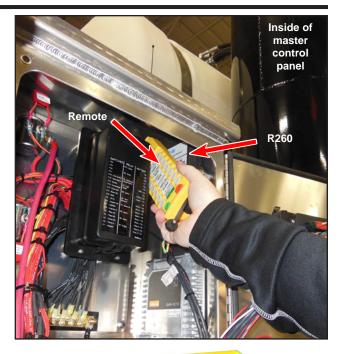
- 1. Hold down the red button.
- 2. Hold down the green button.
- 3. Wait until the splash screen appear, in this case, wait until you see the Vactor logo appears on the screen.
- 4. Release the red button.
- 5. Release the green button. The remote is now in service mode.

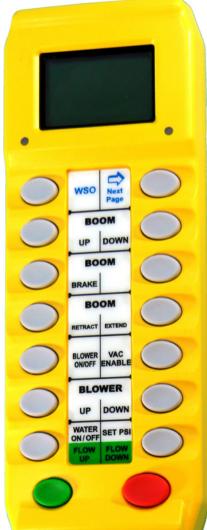
R260 - receiver

- 6. Put a magnet next to the top left corner of the R260, near the EATON logo. The magnet on the rear of the remote can be used as shown.
- 7. Wait until the E-STOP led rapidly blinking green.
- 8. Remove the magnet. E-STOP led light solid green. The R260 is now in pairing mode.

Wireless remote

- 9. Move the remote closer to the R260.
- 10. Press and release the green button.
- 11. The screen will indicate the pairing result.





TRUVAC

Wireless Remote Controls - Pairing - Emergency Shutoff

OPERATION

Operation with the emergency shutoff

- 1. Water Pump is off
- 2. Set wireless on 🗢
- 3. Press Wireless switch at master control panel.
- 4. Press WSO Enable on the wireless
 - a. Enable can only be cycled with water pump off. Once pump is on WSO enable is locked out, to avoid accidently turning it off or on.
 - b. Or lcon appears on the Display when Enabled

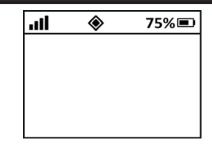
Note: FLXX-C - press both WSO buttons

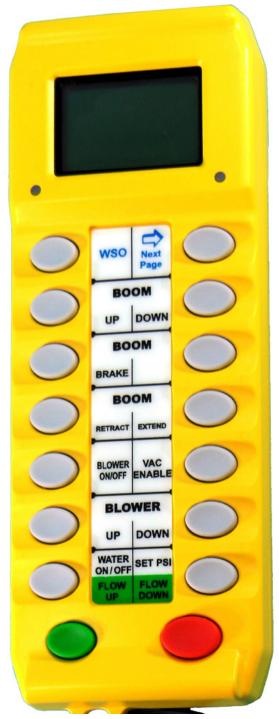
- 5. Connect WSO lanyard
 - a. WSO connected icon ♦ appears on the display
- 6. Set Water Pump On
- Note: if the WSO lanyard is disconnected during operation, the water pump will turn off and center dot icon \diamond will disappear.

Only one WSO can be actively paired.

Operation without WSO

- 1. Water Pump is off
- 2. Set wireless on 🔴
- 3. Press Wireless switch at panel
- 4. Set Water Pump On





WIRELESS REMOTE - HETRONIC ERGO S HANDHELD

OPERATION



The handheld remote is a portable control used by the operator wirelessly. 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 joystick are momentary switches. Upon releasing the joysitck, the boom will cease moving. Boom controls are proportional.

The E-stop button is used in case of an emergency by disengaging the PTOs/hydraulic system.

The common controls include:

- Debris Body Controls
- Boom Controls
- Vacuum Controls
- Water Pump Pump ON/OFF
- Water Pressure variable
- Throttle UP/DOWN
- Vibrator
- Sludge Pump



Unit operator must hold the remote during digging 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 PTOs/hydraulic system. Maintain clear access to all E-stops and place an operator near one.

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TRUVAC

Note: DO NOT remove USB cover or dongle that is inside the cover. This insures that the firmware stays with the remote and maintains its IP67 waterproof rating.





REMOTE - CONNECTING WIRELESS

OPERATION

Step 1: Pull out E-Stop button.



Step 2: Power on the remote by holding the Power (RPM+) button on the right side of the remote until the screen powers on.



Step 3: Engage Wireless Mode by selecting the WIRELESS position on the Remote Control toggle switch located on the main control panel.



Step 4: Momentarily press the Pair button on the left side of the remote (screen will prompt when needed).



To turn remote off:

- Push E-Stop button in
- Hold Power (RPM+) button until remote shuts down

REMOTE - E-STOP

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 remote without accidently creating an E-Stop condition.

The following will trigger an E-stop:

- The remote off/E-stop button is pressed (remote E-Stop works any time remote is on and connected)
- The E-stop on the control panel is pressed (panel ٠ E-Stop works regardless of mode)
- The battery dies •
- The wireless goes out of range •

E-Stop



Press the red E-Stop button located on top of remote.

After pressing the E-Stop on the 2 wireless remote, the following screens will display.

> To return to work condition, do the following:



Pull out remote E-Stop button.

Press the Pair button when the screen prompts to do so.









REMOTE - BANNERS

OPERATION



Standard Mode Selection

Dump Controls Mode Selection

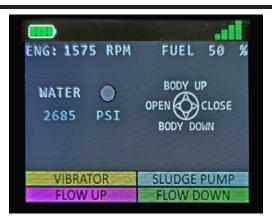
REMOTE - DISPLAYS

OPERATION



Vacuum and Water Page Standard Mode

- Allows boom control via the boom joystick
- Displays vacuum and water data



Dump Controls Page Dumping Mode

- Allows debris body controls via the boom joystick
- Displays water data

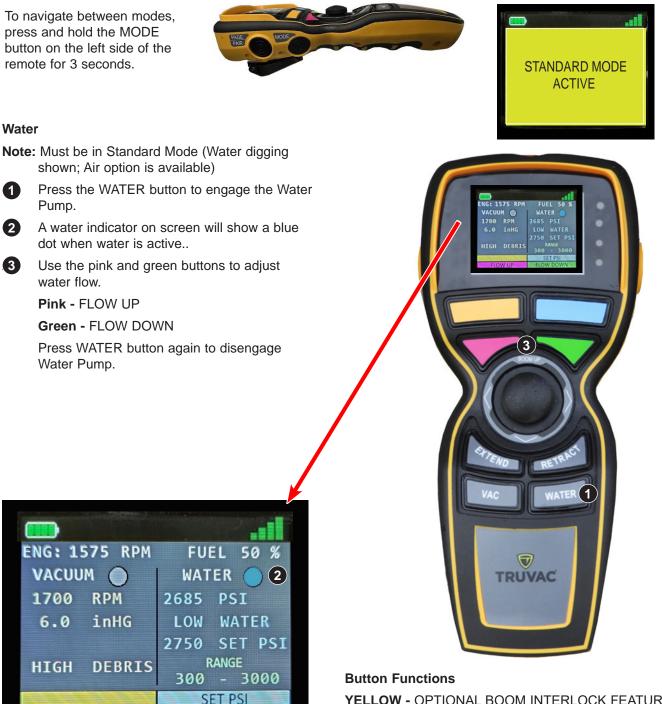
	575 RPM	FUEL 50 %
VACUU		AIR 🔵
1700	RPM	250 PSI
6.0	inHG	HIGH MODE
		150 °F TEMP
HIGH	DEBRIS	
		A REAL PROPERTY AND A REAL
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Vacuum and Air Page Standard Mode

- Allows boom control via the boom joystick
- Displays vacuum and air data

REMOTE FUNCTIONS - WATER AND VACUUM

OPERATION



YELLOW - OPTIONAL BOOM INTERLOCK FEATURE BLUE - WATER PUMP PRESSURE PINK - WATER FLOW UP GREEN - WATER FLOW DOWN EXTEND - BOOM EXTEND RETRACT - BOOM RETRACT VAC - VACUUM RELIEF WATER - WATER PUMP

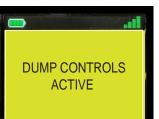
FLOW DOWN

FLOW UP

REMOTE FUNCTIONS - DUMP CONTROLS

To navigate between modes, press and hold the MODE button on the left side of the remote for 3 seconds.





Dump Controls

Note: Must be in Dump Controls Mode

Controlling the debris body dumping functions is done using the joystick. Only one function is allowed at a time (cannot open rear door while raising the debris body). The PAGE/PAIR button must be held simultaneously when moving the joystick. This interlock function is designed to ensure that the body/door functions are not unintentionally activated.

Note: Joystick is not proportional for dump controls. It must be fully pressed in the desired direction for the function to operate





Joystick Functions UP - BODY UP DOWN - BODY DOWN RIGHT - CLOSE REAR DOOR LEFT - OPEN REAR DOOR Button Functions YELLOW - VIBRATOR

BLUE - SLUDGE PUMP PINK - FLOW UP (WATER) GREEN - FLOW DOWN (WATER)

Operation

REMOTE - BATTERY REPLACEMENT AND STORAGE

OPERATION

Battery Pack

The battery is located in the bottom of the remote. If battery is pulled, the unit goes into E-Stop mode and must be reset from the control panel.



Press in and pull out battery

Note: If battery pack becomes broken, lost, or you would like to purchase additional packs, please contact Vactor Parts & Service to order the battery pack:

Phone: 877-342-5374

Service Cloud: Vactor.com > Parts and Service > scroll down to Service Cloud

Charging Dock



Wired Pendant Cord

The remote can also be operated using a corded pendant insert. One end plugs into the battery compartment of the remote and the other plugs into the tether port, located on the main control panel.



Wireless Remote - Wired Pendant

- Press in and pull out battery from bottom of remote.
 - Attach threaded end of cord connector to the Pendant port on the control panel.
- 3 Plug the battery insert end of the cable into the remote.
- Press the WIRELESS position on the Remote Control toggle switch.

Large Crane-Style Wired Pendant

- Plug threaded fitting end into contol panel.
- 2 Press the PENDANT position on the Remote Control toggle switch.



Note: On the Remote Control toggle switch, WIRELESS will illuminate blue. PENDANT will illuminate green.

DEBRIS BODY

OPERATION

The debris body is a single cylindrical shell that can be hydraulically raised or lowered for the purpose of dumping material collected during operations. The debris body is the primary dropout point for any material vacuumed through the vacuum hose. Actual size and capacity will vary with the HXX model.

From the vacuum hose, debris flows into the body to the deflector plate, which separates debris from the airstream. The bulk of the debris falls to the bottom of the debris body. The air flows past the two float-ball vacuum shut-off valves to the cyclonic housing.

During use the debris body is held down by a pair of locks. The locks must be fully unlocked to prevent damage to the locks.

Float Balls

Float balls protect the vents. They consist of a stainless steel ball suspended from the top of the debris tank. The ball is an automatic shut off. If the body fills with water the float balls block the air vents to stop suction and prevent flooding the blower/fan. The float balls only work on liquids.

As the debris body is filled with liquids, the float ball rises and will shut off the air flow to the blower/fan when the debris body is "full."

The floatballs may be encased inside an optional debris screen. The screen filters debris from the air before it exits the body to the blower/fan.

Clean the debris screens with the handgun **EVERY TIME** the debris body is dumped. It is important to keep these clean because debris clogged in the screen will result in a loss of airflow and productivity.

Checking the Debris Level

If the unit is equipped with an inspection port, the level of solid debris can be checked visually.

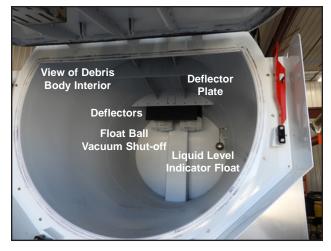
Visually keep track of how much material you vacuum, especially if the unit does not have an inspection port.

Check the level of liquid matter with the level indicator on the side of the debris body.

Body Locks

The debris body locks to keep the inlet and outlet seals engaged when the unit is not parked on level flat ground. The locks actuate automatically with the debris body controls.







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

DEBRIS BODY OUT-OF-POSITION

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. Red light for body out-of-position illuminates

Park Brake Released

- 1. Red light for body out-of-position illuminates
- 2. Alarm sounds





OPERATION

DEBRIS BODY - REAR DOOR & LOCKS

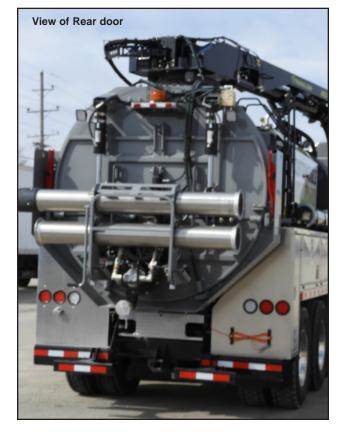
The body is emptied by hydraulically raising the body and allowing the material to be dumped from the back by gravity. On the back of the debris body is the rear door with locks that opens to empty the debris body. The rear door is hydraulically opened and closed. The hydraulic system must be turned on for the rear door to open or close. The door is hinged from the top.

The rear door has a gasket around the perimeter to seal the debris body.

Note: The rear door seal gasket and corresponding surface of the debris body must be kept clean to ensure safe and adequate operation of the unit. This can be done with the handgun. Remember to always wipe the rear door clean before closing, to prevent accidental damage to the gasket from foreign material sticking to the body or the gasket.







OPERATION

DEBRIS BODY - LIQUID LEVEL GAUGE

The liquid level gauge is a float type gauge that indicates the level of liquids inside the debris body.

The lowest measurement indicates the debris body is about half full.

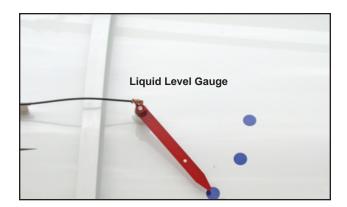
The highest mark indicates the debris body is full and should be decanted or dumped.

Note: Operators should not rely on it as the only indicator for dumping. It does not measure the level of dry debris and does not protect against weight limits.

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.



DECANT VALVE OPTION

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.

Note: The decant valve cannot be used during vacuuming operations.

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.

First position the unit over the container or manhole. 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 shut off the decanting process.





AWARNING

Crushing / Tipping Hazard To avoid injury or death:

- 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.

AWARNING

Crushing Hazard

次

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.

VACUUM PIPE

The rear door holds extra vacuum tubing needed in certain operations.

The vacuum pipe, or tube, is attached by quick clamps. The clamps lock by an over center action and should fit tightly.

Removing the Vacuum Pipes

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

- 1. Remove locking pins before to lower the pipe rack.
- 2. Hold on to the pull bar handle when lowering or raising the pipe rack.
- 3. Reinstall locking pins after pipe rack is raised.

Storing the Vacuum Pipes

When stowing the pipes in the rack, place the most used pipe in the upper position. This will aid in retrieving the pipes in the order needed. Secure the pipes to the rack.



VACUUM SYSTEM - INLET/OUTLET SEALS

HXX

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 vacuum system 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



BOOM SAFETY FOR ALL MODELS



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 section in manual.



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 boom.

Refer to manual for details.

HXX

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.

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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.

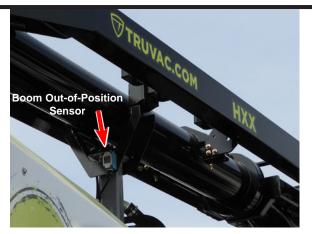
Functionality

Park Brake Set

1. Red light for boom out-of-position illuminates

Park Brake Released

- 1. Red light for boom out-of-position illuminates
- 2. Alarm sounds





Воом

OPERATION

The optional boom is stored in a cradle on top of the debris body. It is connected to the debris body at a pivot point near the top rear center of the tank. See photo.

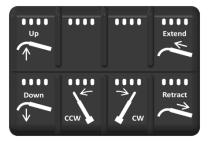
The boom swings from the passenger side around the rear of the unit until it reaches the driver side of the tank. Built in stops prevent it from going over the tank.

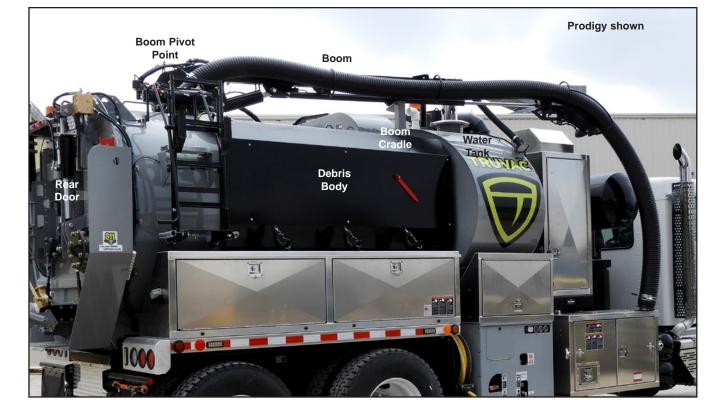
Boom Motion

All the boom's motions are controlled hydraulically. The boom can extend and retract, move up and down, and rotate with a hydraulic gear motor. The gear motor meshes with a gear on the bottom of the boom turret. Hydraulic oil flow to the gear motor is controlled by an electric over hydraulic solenoid operated by a switch on the various controls.

Boom Controls

The boom is operated by switches located on the control panel, the optional pendant control or optional wireless remote.

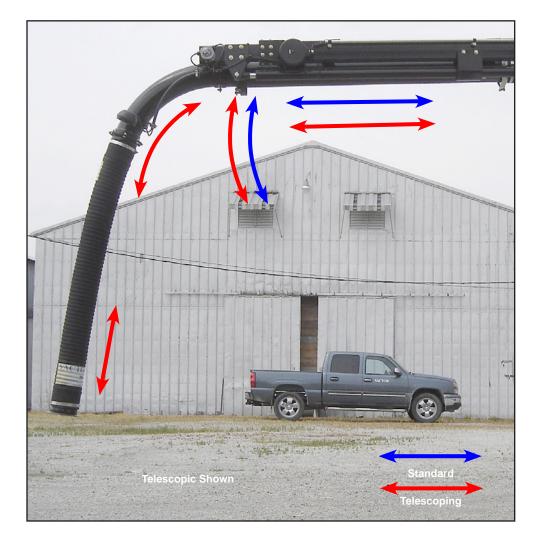




Воом

The boom can rotate all the way around to the other side of the unit from the parked travel position. It can be raised or lowered or extended and retracted. When being extended or retracted the end hose slides along the trough at the end of the boom. The results in the hose end being raised as the boom extends or lowered as the boom retracts.

The optional telescopic boom is similar except that the boom hose moves with the end of the boom as it extend or retracts. This gives more precise control of the boom hose at the working end.



VACUUM TUBE

The vacuum tube is maneuvered and controlled using the boom controls. 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.
- 2. Stand the nozzle on the ground.
- 3. Lower the boom until the vacuum tube and 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.



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.

OPERATION

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.

(D) 1800174

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.

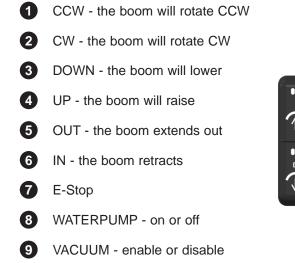
- Rope or other supports should be provided to support the run. Hose and tube assemblies are not intended to support their weight on vertical drops or runs up.
- Long hose/tube runs should be supported at multiple locations to prevent tip overs and connection failures.
- Hose and tubes can pull connections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



HXX

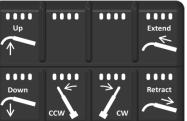
BOOM - WIRED PENDANT (OPTIONAL)

The pendant is a portable control box used by the operator to direct the operation of the boom among other operations. It is connected to the master control panel with a cable. Actual configuration may vary with model and options. The function of the buttons are:

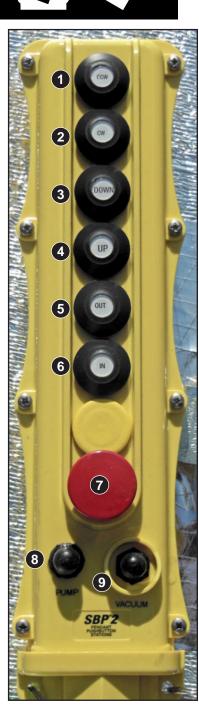


The boom control buttons are momentary switches. When the button is released, the boom will stop moving.

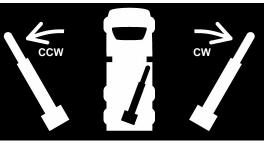
Note: The water pump switch and the recirculator switch on the main control panel must be OFF in order for the pendant control to operate properly.



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OPERATION



BOOM - OPERATION

To take the boom out of its stored position, the boom must be raised slightly to clear the boom cradle that it rests upon. Once clear of the cradle, it can be raised, lowered or rotated horizontally. Further it can be extended or retracted as circumstances dictate.

Storing the Boom

The boom must be lowered and parked in the boom cradle for transport. Swing it into position over the top of the tank and allow it to seat in the boom cradle. Lower the boom, until it firmly rests in the cradle. While lowering the end of the hose should be guided onto the hose keeper.

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

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

de la manguera de succión.

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

SEGURIDAD en el manual para detalles. 1800174

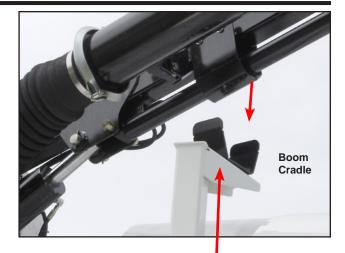
Manténgase lejos de la boquilla Apague el compresor de

altovacío antes de conectar la manguera, tubos o accesorios. Mantenga el extremo de la

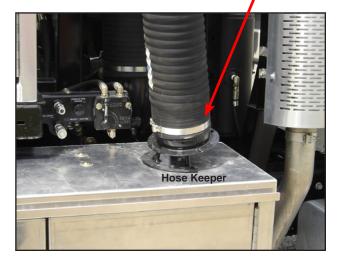
Effective Date April 2, 2025

Refiérase a la sección de

OPERATION







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.

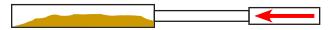
Vacuum line routing

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.



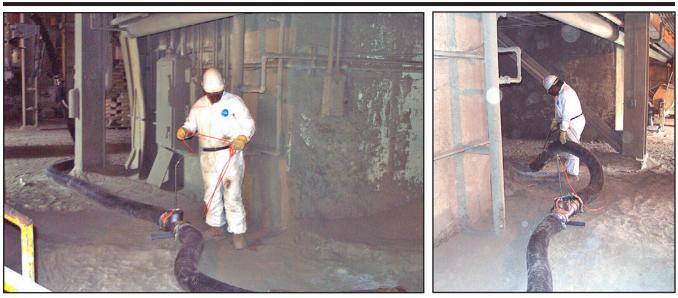
If a smaller hose is needed, install a reducer at the truck and run the smaller hose all the way through. Use the largest size that can be handled safely and easily.

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	ole I	lose	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

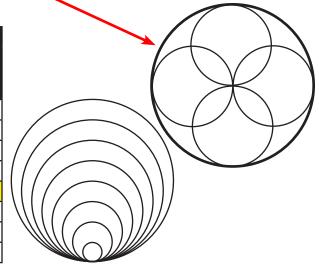
Two 4" hoses equals 6" hose run

Sixteen 2" hoses = 8" hose run

Seven 3" hoses = 8" hose run

Four 4" hoses equals 8" hose run

	Hose R	estriction		
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%



OPERATION

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.



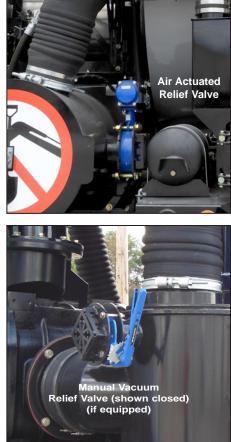
Use proper hearing protection when in the vicinity of this device which emits a loud, sharp sound. Follow safety precautions to prevent injury from high velocity flow of materials.

- **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.





FILTRATION SYSTEM OVERVIEW

The filtration system cleans the air coming into the system by removing dirt, dust and foreign matter. The filtration system's primary purpose is to protect the blower by removing material from the air stream before it reaches the blower. Fan units do not require the same degree of filtration.

There are four stages to the filtration system:

- First Stage: Debris Tank Collection
- Second Stage: Cyclone Filter
- Third Stage: Filter Element
- Fourth Stage: Strainer

Waste material first enters the Hydro-Excavator through the boom located on top of the tank.

When material enters the debris tank, the transition from a hose to the larger debris tank causes the air speed to drop considerably. The incoming air strikes a specially designed deflector plate that directs the material flow downward.

The deflector plate knocks the bulk of the material out of the airstream and it falls to the floor of the debris tank. The deflector plate is located inside the rear and at the top of the tank. In the tank, the air travel is slowed as it goes through it to the other end and leaves the debris tank. The now slower airflow cannot sustain the debris in the air and the material falls into the tank. This is the first of four stages of filtration.

2

1

Any lighter, powdery material still suspended in the airflow is conveyed to the cyclone

chambers. the second filtration stage. There, due to the forced centrifugal action of the flow, most of the dust particles separate and collect in the dead air space of the hopper. By this stage of filtration, about 96% of the material has dropped out of the airflow. The air flows into the secondary prefilter or cyclone chamber. 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 is directed to the filter element.
- The air stream leaves the filter element and enters the strainer section of the housing. It is the safety dropout point for any objects which may accidentally enter the filtration system.

Finally, the air passes through the vacuum pump (blower) or fan.

On PD units, the air passes out through the silencers.

Note: Fan units do not have a prefilter, strainer or silencer.

CYCLONE SEPARATORS

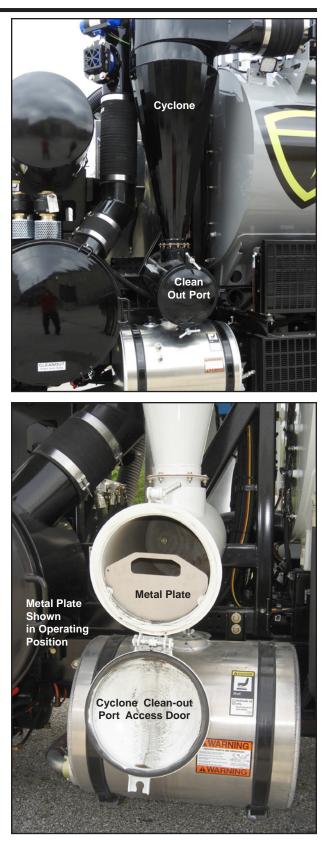
Air leaving the float-ball vacuum shut-off in the debris tank enters a cyclone housing. It protects the blower by removing material from the air stream before it reaches the blower.

Debris collects in the bottom of the cyclone and is removed through the clean-out port access door. When cleaning, remove the metal plate that is immediately inside the clean-out port. The plate keeps debris from falling out when the door is opened. Lift straight up on the plate to remove it.

Cleaning The Cyclone

Debris collects in the bottom of the cyclone. It is removed through the clean-out port access door. Clean it out daily.

- 1. Standing to the side, open the clean out port.
- 2. Lift straight up to remove the metal plate that is immediately inside the clean out port.
- 3. Remove any debris.
- 4. Replace the metal plate and access door.
- **Note:** When swinging the bottom access door open, it is advisable to stand to the side opposite of the opening. When the door is opened, excess material may be released.



OPERATION

HXX

STRAINER - (PD ONLY)

OPERATION



From the cyclone outlet, air enters the strainer housing. The strainer is a perforated screen filter located on the intake side of the blower. Its purpose is to prevent any objects or foreign matter that have entered the system from reaching the blower. The strainer is covered by an automotive style air filter element.

Note: There is no strainer on Fan units.

The air filter and strainer should be checked before each and every operation. Follow this procedure.

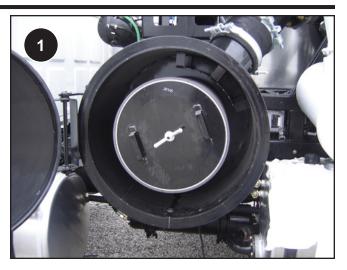
Draining - Service Daily

A drain plug is provided at the bottom of the strainer to drain any excess moisture that has collected in the strainer during operations. It is plugged during normal operations. At the end of each day, the drain plug should be removed to drain the water and left open until the next use.

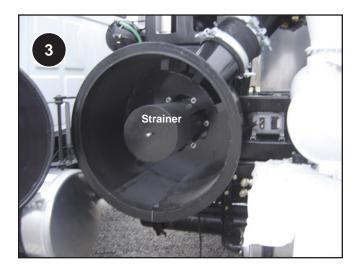
The strainers should be checked daily.

Cleaning the air filter and strainer and removing foreign matter.

- To open the door covering the housing, release the latches that hold the door closed. After the door is unlatched, it can be swung open.
- 2. Inside, the filter is positioned in the center of the strainer housing. Remove the wingnut to allow the air filter to be removed.





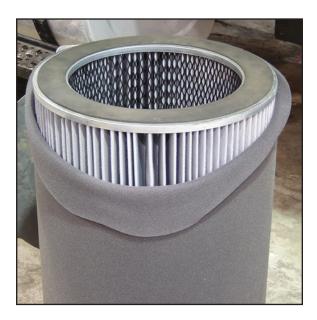


STRAINER - (PD ONLY)

3. Inspect the filter and remove any foreign matter or substance and clean if necessary.

The outer foam element can be removed for cleaning. The elements may be washed in warm soapy water, vacuumed, gently blown out or replaced. The filter should be dry before reinstallation.

- **Note:** During initial start up of normal operations with a new filter, note the vacuum level with the air operated vacuum relief open. The filter should be cleaned or replaced when the vacuum level increases about 1 in-Hg above the initial clean filter level with the air operated vacuum relief open.
- 4. With the filter removed, inspect the interior of the strainer housing and remove any foreign matter or substance with a shop vacuum, and clean if necessary.
- 5. While the filter is removed, drain any moisture from the strainer housing by opening both drains located at the bottom of the strainer.
- 6. After the moisture has completely drained from the housing, close the drain and place the filter back in the housing in the same manner as it was removed. Apply some antiseize grease to the wingnut threads for easier removal.
- 7. Close the strainer door and securely latch it.



OPERATION

WATER SYSTEM - OVERVIEW

OPERATION

Water is held in the water tank. It can be heated with the optional waterheater for clay or cold weather applications. It can be recirculated to keep it from freezing and to maintain a consistent temperature.

Water is pumped out under pressure through a hose to the handgun or wand. The high pressure water is used to cut up soil into chunks small enough to fit in the vacuum hose.

The water system on this unit consists of a water tank, water filter, water pump, hose reel, a water heater, various size hoses with quick disconnect couplers, ball valves and an air purge system. The various size hoses with quick couplers allows for easy connecting and disconnecting of the different systems for draining and storage.



WATER SYSTEM - WATER PUMP

The standard water pump on this unit is capable of producing 10 gallons a minute at 3000 PSI (20 gpm optional). It is both pressure and flow compensated to ensure the operator maximum performance at a variety of flows or pressures, all through the hand gun.

The water pump is controlled by a hydraulic proportional valve and the system controller. The first time the water pump switch is activated after the master control switch has been turned on the pump speed defaults to the lowest setting. This is adjusted with the multiflow switch.

The water pump is hydraulically driven. Follow the step by step instructions located in the cab of the truck for proper engagement of the hydraulics. Prior to engaging the water pump, connect the hose reel hose to a water hand gun, a water wand or the recirculator.

Note: The water system must be full prior to connecting or turning on the water heater. The water heater will not fire if there is no water flow. See water heater instructions for proper operation of the water heater.

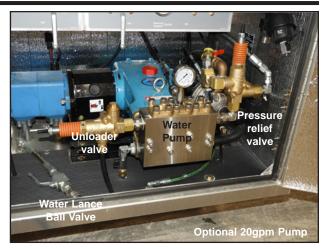
Once the hydraulics are engaged and all of the water hoses connected, turn the water pump switch to the ON position. Adjust the multiflow switch on the control panel to achieve the flow and pressure needed for the particular job. Pressure will be in relationship to the flow setting and hand gun nozzle being used.

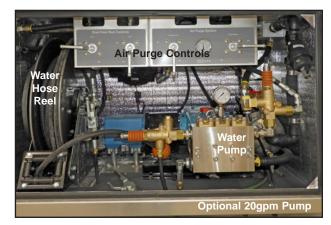
Water Lance Ball Valve

The water lance ball valve is removed when using the optional recirculator.

When using the handgun, use quick couplers to remove the water lance ball valve.

Operation





Water System Manual Relief Valve

If the handgun nozzle plugs during operation turn off the water pump and open the relief valve to relieve

pressure in the handgun. Then remove the nozzle and clean the orifice.





WATER SYSTEM - HANDGUN

This unit is equipped with a high pressure handgun. The high pressure handgun can only be connected to the hose reel located in the water pump cabinet. The high pressure water system uses up to the full water pump pressure of 3000 psi and can only be used with the special high pressure handgun or a high pressure wand. The high pressure system also uses a high pressure water unloader valve and ball valve.

Note: Should the handgun high pressure relief valve trip (or open), water will unload straight down on the ground. The main control unloader dumps to the suction line.





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 digging lance and extensions can be stored behind the rear bumper for transport.



WATER SYSTEM - NOZZLES

Digging Faster With Less Water

The new HXXpose[™] nozzle from Vactor blasts with a 0 degree stream of water up to 3000 PSI while rotating at a high speed to provide an 18 degree cone of coverage.

Productive:

• Ideal for potholing. The rotating water jet agitates a larger area of soil with the same amount of water as a straight jet nozzle for higher efficiency.

Ruaaed:

- High wear resistance tungsten carbide internals
- 1/2 inch FNPT stainless steel casing for corrosion resistance

Safer:

• Urethane outer coating protects from electrical conduction

Specifications:

Minimum Inlet Pressure: 1,000 PSI (69 bar) Maximum Inlet Pressure: 3,000 PSI (207 bar) Maximum Water Temperature: 180 degrees F (82 degrees C) Housing Material: Stainless Steel Coating Nozzle T Inlet Con

Rebuild ki

Material: Urethane	ľ
p Material: Tungsten Carbide	
nection Thread: 1/2 inch FNPT	
its available	



			FLOW RATE CHART (GPM)				
Nozzle Size	Nozzle Part #	Repair Kit Part #	@ 1000 Psi	@ 1500 Psi	@ 2000 Psi	@ 2500 Psi	@ 3000 Psi
3.0	508544-30	508544A-30	1.5 GPM	1.8 GPM	2.1 GPM	2.4 GPM	2.6 GPM
4.0	508545-30	508545A-30	2.0 GPM	2.4 GPM	2.8 GPM	3.2 GPM	3.5 GPM
5.0	508546-30	508546A-30	2.5 GPM	3.1 GPM	3.5 GPM	4.0 GPM	4.3 GPM
6.0	508547-30	508547A-30	3.0 GPM	3.7 GPM	4.2 GPM	4.7 GPM	5.2 GPM
8.0	508548-30	508548A-30	4.0 GPM	4.9 GPM	5.7 GPM	6.3 GPM	6.9 GPM
10.0	508549-30	508549A-30	5.0 GPM	6.1 GPM	7.1 GPM	7.9 GPM	8.7 GPM
12.0	508550-30	508550A-30	6.0 GPM	7.3 GPM	8.5 GPM	9.5 GPM	10.4 GPM
		1					1

HXX



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HXX Water System - Water Heater - Optional

OPERATION

The optional water heater is used for winter operation and in clay applications. Complete all necessary hose connections prior to turning on the water heater. Follow the supplied detailed instructions for the water heater supplied by the manufacturer of the water heater.

Note: The minimum pressure is 1,200 PSI for the water heater to fire which with the minimum flows. The smaller water heater must have 3 gpm of water flow before it will ignite. The larger water heater must have 8 gpm of water flow before it will ignite. Water heater BTU ratings vary by model and manufacturer.

Heater controls are located below the heater. Separate operating instructions are supplied for the heater in the Options section.

The temperature gauge and heater settings are in Fahrenheit. Do not set temperature above 180 degrees Fahrenheit.



Hot Water Can Burn

Avoid contact with the water stream.

The water heater can produce water

at temperatures greater than 125° (F). and could result in death or serious injury from burns.



Fire hazard

Do not use water heater when unit is in motion.

For proper combustion air flow and to avoid fuel build up the unit must be stationary and the cabinet door must be open during operation.





Hotsy Water Heater Control Panel

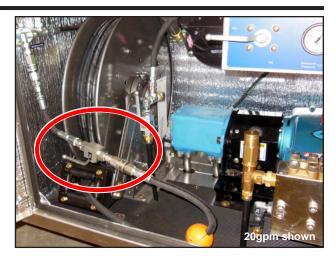
HXX WATER SYSTEM - RECIRCULATOR/PREHEAT - OPTIONAL

OPERATION

If the unit is equipped with a recirculator, water can be recirculated to reduce the risk of freezing. If equipped with a water heater the water can also be preheated while stationary. Flow can be adjusted during preheat.

Recirculating water keeps the water from freezing. The water heater can be used to preheats\ the water for cold weather applications, certain soil types, and cleaning the HXX unit. The water heater can not be used with the recirculator.

The adjacent picture shows the hose reel connected to the recirculator. Adjust the ball valve to build up enough pressure to allow the water heater to operate. Set the Multiflow to maximum to allow full flow for faster heating.



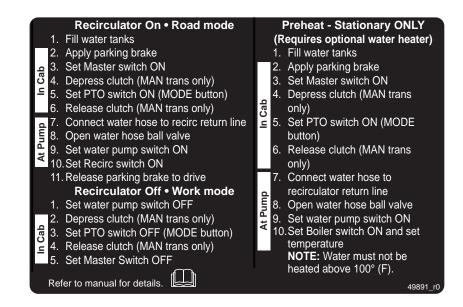




Fire hazard

Do not use water heater when unit is in motion.

For proper combustion air flow and to avoid fuel build up the unit must be stationary and the cabinet door must be open during operation.



HXX

WATER SYSTEM - AIR PURGE

OPERATION

The air purge system uses compressed air to remove water from the water lines, hoses and some components prior to storage in cold weather. The controls are located inside the water pump cabinet.

Air from the chassis reservoir is used to pressurize an auxiliary air tank. An air protection valve located on the chassis reservoir protects the brake system. If air pressure in the chassis reservoir drops to a critical level, the protection valve closes to protect the brake system air pressure. The brake system has priority over any auxiliary components. As added protection, a check valve in the purge system allows air to flow into the water system but prevents water from entering the air system.

Late 2011 a charge pump isolation valve was added to help purge the water pump valve area. The following is the procedure for the updated system.

Note: The chassis air reservoir should be at 90psi when activating the air purge system. It may be necessary to refill the auxiliary tank multiple times to completely purge the water system.

Purge the water system:

Follow the steps indicated below after each use for winterizing the water system.

If the unit is equipped with a dual hose reels then the rear reel should be purged first. Isolate the front reel, purge the rear, then isolate the rear reel and purge the front reel.

Note: The water system should be drained. Refer to the water tank pages in this section.



- 1. Open the ball valve at the end of the hose on the hose reel to depressurize the system.
- 2. Disconnect the ball valve assembly from the end of the hose reel hose so the male end of quick disconnect is open to allow the purge air to flow freely.
- 3. Pull all the hose off the hose reel and lay it flat on the ground to gravity assist the water bleeding process.
- Open the ball valve on the Air Purge panel marked FILL RESERVOIR. Close the ball valve when the gauge shows 90psi.
- 5. Close the charge pump isolation valve. This will create back pressure and force the check valves open when the air purge and Cat pump are turned on.
- **Note:** Air above 90psi and high volume can damage the pump seal retainers and ceramic plungers.



HXX

WATER SYSTEM - AIR PURGE

- Turn the water pump on for 10-15 seconds at lowest speed and at the same time SLOWLY turn on the ball valve marked PURGE SYSTEM. Allow the air to drop to 15psi. Close ball valve and shut the pump off. Recharge tank to 90psi and repeat purging until all the water is drained.
- 7. It should not be necessary to run the pump more than the 10-15 seconds with the suction line closed; but additional air purging may be necessary.
- 8. Remove the water filter.
- 9. Repeat purging procedure to blow out the hose reel and lines until all the water is drained.
- 10. Allow the hose to go back on the hose reel slowly . This will ensure all the water has been drained from it.
- 11. Open the two charge pump drains.
- 12. Open all mini ball valves on the pump.
- 13. Open the charge pump isolation valve. This is the normal operating position.
- 14. Repeat for each work station.

When the water hose is purged of water, put the water pump ball valve in the OPEN position. Put other systems, such as the handgun, open for purging. After the system is purged, place the Fill reservoir and Purge System ball valves in the OFF position.

Note: Leave all drain plugs open to keep residual water from the tanks from migrating to the system during transport.



20gpm system sho

Operation

Vactor

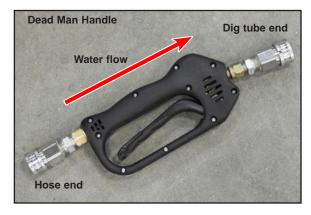
DIGGING LANCE

Various digging lance packages are available. All use the dead man handle to control flow to the nozzle. The dig tubes and nozzles are connected with quick couplers. Multiple tubes can be used for a longer reach as needed.

Note: Always connect the trigger handle as shown for correct operation.

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







Options

WATER TANK

The water tank is used to hold water for use during operations. The tank is located between the chassis cab and the debris body.

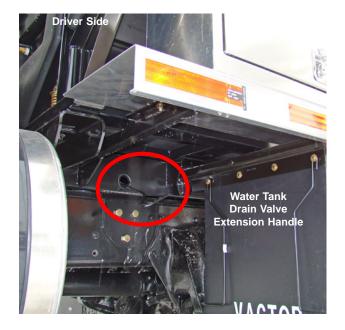
The tank can be either stainless steel or composite.

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

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.







WATER TANK - FILLING

Filling the Water Tank

- 1. Park the truck centered with the hydrant on the passengers side of the unit.
- 2. Remove the cap on the hydrant and flush the hydrant, or water supply, until water runs clear.

Note: Always follow procedures established by the water supplier.

- 3. Remove the water fill hose from its compartment and attach it securely to the hydrant or water source.
- 4. Make sure the water filter screen is clean and in place. Be sure both gaskets are on the filter housing cap.
- 5. Attach the other end of the water fill hose to the water tank hose connection located at the bottom and front of the tank.
- 6. Shut the valves on the bottom of the water tank.
- 7. Turn on the master switch on the main control panel so the water tank indicator lights work to show the water level in the tank.
- 8. Turn on the hydrant and allow the tank to fill.
- 9. Turn off the hydrant when the tank is full and disconnect the hose.
- 10. Replace any cap previously removed.
- 11. Drain any water from the hose and replace it in its storage compartment.

Monitor the lights on the control panel and be ready to turn the water supply off when the lights indicate 3/4 full.

Note: Close the valve after the tanks have been filled with clean water.

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.).

OPERATION

- 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.

NOTICEPump Can Be
DamagedDo not operate pump
without water.Refer to manual for details.

WATER TANK & SYSTEM - DRAINING

When not in use, typically overnight, the watertanks should be drained and empty. Drain the water system weekly to allow the components to air out.

- 1. Remove the Y strainer water filter and leave the filter out.
- 2. Open the tank drains and leave them open. Some units have more than one drain.

To open the water tank drain, pull the T handles located on the bottom front of the water tank on the passenger and driver side.

- 3. Allow water to drain from the system.
- 4. Slowly cycle the T handled drain valves open and closed three times to drain any residual water in the valve housing. Leave the valves open when done.
- 5. Unwind all hose from the hose reel and open the ball valve at the end of the hose to allow the water to drain.
- 6. Turn the water pump on for no more than 10 seconds to push water out of the pump.
- Open the drain ball valve for the water pump and the two drain petcocks on the boost pump.
- 8. Slowly rewind the hose onto the hose reel. Leave all the drain plugs, ball valves, and petcocks in the open position.
- 9. Disengage the hydraulics as directed in the cab.
- **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.
- **Note:** The composite water tank is made in two sections. The main drain valve will drain most of the water out. A smaller drain plug is located on the passenger side about in front of the rear wheels to remove the remaining water in that tank section.

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.



NOTICE

Water pump can be damaged Do not operate water pump without water. Water System Can Be Damaged By Freezing Ice in the water system can severely 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.
- Run the water pump for a few seconds to clear any remaining water.



fer to manual for details.

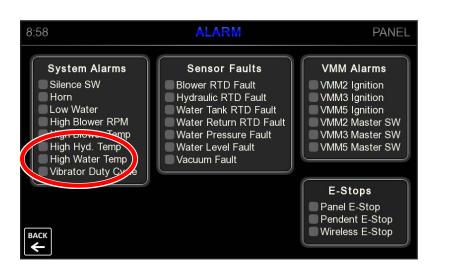
COMPOSITE WATER TANK

The composite water tank is insulated and will greatly reduce the temperature drop of the water requiring far less preheating, thus saving time, energy and money. The water is also insulated from freezing without preheating for a longer time.

The tank is equipped with a temperature probe to monitor water temperature which is displayed at the master control panel. The water must not be heated above 100° (F) if heated. An alarm will display when the water exceeds 100° (F).

Capacity is about 1200 gallons.

Repair - repair of the tanks is limited to punctures 1" diameter and smaller. Cracks and large holes cannot be effectively repaired due to the foam liner and the characteristics of the material.





NOTICE

Overheating water tank can damage tank insulation. Water must not be heated above 100° (F). Consult the factory for additional information. 49857 rB

Note: The composite water tank is made in two sections. The main drain valve will drain most of the water out. A smaller drain plug is located on the passenger side about in front of the rear wheels to remove the remaining water in that tank section.



Operation

PTO & TC Systems

OPERATION

Note: Refer to the shift decals in your cab for specific operation.

Types of Hydraulic Pump Systems

Hydraulic power can be supplied by different hydraulic pump systems operated by either a PTO, or a transfer case (TC) mounted pump. All of the main functions of the various systems are activated by hydraulic power from these systems.

ΡΤΟ

The power takeoff (PTO) on the truck transmission drives one hydraulic pump. On units with automatic transmissions, this pump is normally activated through the Mode switch in the cab.

The PTO driven pump normally runs the hydraulic cooling system fan, charge pump, water pump and the optional recirculation system.

Transfer Case (TC)

The transfer case normally powers the blower on PD machines and if equipped some hydraulic systems with a hydraulic pump. The TC normally drives the hydraulic pump for fan units.

Engaging and Disengaging the Hydraulics

If hydraulics are required while not in blower/ fan mode, engage the hydraulics by following the instructions in the cab of the truck.

In normal operation all hydraulic systems must be running.

Never allow vehicle to idle with blower engaged. The blower should not be operated at idle rpm's. To reduce wear on the transfer case run up the engine RPM until the transfer case gear noise smooths out. Some units with manual transmissions may need to go as high as 1200RPM's.



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.



The MODE switch is normally used on automatic transmissions.

HXX **ENGAGING THE VACUUM & HYDRAULIC SYSTEMS**

OPERATION

49890 r

Recirculator On • Road mode

The operator must be in the driver's seat in the truck cab to engage or disengage the blower or hydraulics.

Consult the chassis manual for additional details. Instruction decals are normally located in all cabs, usually on the back of the visor.



Engaging the Blower/Vacuum and **Hvdraulics**

- Make sure the vacuum relief valve is 1. open.
- 2. With the parking brake on, start and idle the engine with the transmission in neutral.
- Set the master switch to ON. 3.
- Follow the instructions for engaging the 4. hydraulics / setting the PTO to ON.
- 5. Set the fan/blower to ON. Only operate at an airflow level sufficient to convey the material without causing carryover.
- 6. Once the system is operating, set vacuum to ENABLE.
- Note: When engaging or disengaging the blower, make sure the blower has completely stopped turning before attempting shift in or out of dear.

CAUTION

Driveline can be damaged.

Open vacuum relief valve.

Lower engine RPM to idle before engaging or disengaging blower.

Failure to open vacuum relief valve and lower engine RPM to idle before engaging or disengaging blower may result in serious engine, transmission or blower damage.

1. Fill water tanks 1. Apply parking brake 2. Apply parking brake 2. Set Master switch ON 3. Depress clutch (MAN trans only) 3. Set Master switch ON Cab 4. Depress clutch (MAN trans only) 5. PTO switch ON if required (MODE 2 5. Set PTO switch ON (MODE button) 6. Release clutch (MAN trans only) 6. Shift to designated gear or select Connect water hose to recirc return line At Pump 8. Open water hose ball valve 9. Set water pump switch ON Release clutch (MAN trans only) Road Mode 10.Set Recirc switch ON 1. Depress clutch (MAN trans only) 11. Release parking brake to drive Recirculator Off • Work mode Set water pump switch OFF 2. Depress clutch (MAN trans only) Set PTO switch OFF (MODE Bepress cutor (MAN trans only)
 Set PTO switch OFF (MODE button)
 Release clutch (MAN trans only) 5. Release clutch (MAN trans only) 5. Set Master Switch OFF 6. Set Master Switch OFF



Refer to manual for details.

Blower Mode

4. Set Work mode

button)

DRIVE

2. Shift to Neutral 3. Set to Road mode

button)

7.

4.

Never allow vehicle to idle with blower engaged. The blower should not be operated at idle rpm's. To reduce wear on the transfer case run up the engine RPM until the transfer case gear noise smooths out. Some units with manual transmissions may need to go as high as 1200RPM's.

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.

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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.

- 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 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 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.
- 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 work and oncoming traffic, if possible. This procedure uses the weight of the unit 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.

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.

Detailed pages for PD and fan units follow.

HXX OPERATING PROCEDURES - VISUAL INSPECTION - PD

Before taking your Vactor HXX to the job site, be sure to follow the check list for maintenance and lubrication in the maintenance section of your manual.

Visual Inspection

The operator should make a visual inspection of the Vactor HXX unit before use. A properly conducted pretrip inspection will prevent safety hazards and extend the life of the HXX unit. PD units:

- 1. Make a visual inspection of the engine compartment, for oil or water/coolant leaks and loose or worn belts and hoses. Check and adjust fluid levels as needed. When finished under the hood, securely fasten the hood straps.
- 2. Beginning at the front of the truck, inspect all lighting, head lights, running and marker lights and turn signals, beacon lights, engine hood, windshield, should be free of crack and excessive pitting and bumpers for condition and attachment.
- Moving to the right side of the unit, inspect tires for tread depth, air pressure and securement, mirrors for vision and securement. Cab access for condition, doors operate smoothly and side glass for condition.
- 4. Battery box and batteries, check the tie downs, battery cable condition and tightness and the batteries should not signs of swelling which could indicate freezing or an overcharging condition.
- 5. Blower exhaust silencer, that it was drained the night before and the cap was left off, reinstall the drain cap. Inspect the blower outlet and inlet attachment for loose bolts or signs of excessive heat. Inspect the inlet silencer for condition. Both silencers are equipped with rain caps to prevent water from entering make sure they are in place and move freely.
- 6. Open the water heater cabinet and inspect the water heater for signs of excessive heat, water and fuel leaks. Inspect all wiring and valves to ensure the water heater is ready for service. Does the heater ignite, check this before going to a jobsite.
- 7. Open the water pump cabinet, check that the water filter/strainer was removed the previous day, reinstall it. Give a thorough inspection of the charge pump, hydraulic drive pump its coupler to the CAT pump and ensure all

opened drain valves are closed. Ensure all ball valves operate freely and do not leak.

- 8. Inspect the air compressor hose and hose reel, make sure the hose coupler twist locks have the rubber gaskets and the hose is free of defects. Some air leaks may require the use of an electronic ear/listening device to pinpoint air system leaks
- 9. Inspect the vacuum nozzle for wear and holes, inspect the elbow transition to the upper boom.
- 10. Inspect the water tanks for leaks, open the control panel cabinet and ensure the water level indicator is functioning, since the water system was drained the previous day the level indicator should be reading empty.
- 11. Open the master control cabinet. Ensure the cabinet is fully stocked with the needed tools and remotes to operate the unit, does the wireless remote activate are the batteries in adequate stage of charge? Does the wired pendant controller operate the controlled functions? Are there extra clamps for the vacuum hose sections? Do all the switches on the panel work?
- 12. Open any remaining tool boxes and check their inventory.
- 13. Deploy the ladder (if equipped) and inspect the boom, boom seals, boom pivot, hydraulic motor for leaks and ensure the turret gear has been lubricated. Inspect the boom hydraulic for condition and the wire harness going to the boom solenoid valves is secured.
- 14. Rear hose reel cabinet, some cabinets are equipped with heaters ensure the heaters are operational if equipped, inspect the hose and reel in this cabinet, extra lance or wand section if needed. Make sure the hand gun is in one of the cabinets.
- 15. Check the rear lighting, brake lights, four ways, running and clearance light, license plate light and back up lights, The backup alarm should sound when the reverse lights come on. If equipped with an arrow board that it flashes in both directions, or a beacon light is operational and visible from the rear of the unit.
- 16. Rear bumpers are in place secure and labeled with conspicuity tape according to your local DOT requirements.

OPERATING PROCEDURES - VISUAL INSPECTION - PD

HXX

- 17. Inspect the rear door seals for evidence of leaks or improper sealing, the best time to see a leak at the seal is when the debris body is full, remember to care for the seal and its mating surface after each dumping.
- Inspect the hydraulic cylinders for actuation and leaks. Make sure the door latches are engaging the latches and they enter approximately the same distance for uniform clamping pressure.
- 19. Ensure the rear door safety props are in place and functional.
- 20. If equipped with the optional sludge pump inspect its mounting and when not in use the hydraulic lines must be connected to the dummy plugs on the rear door.
- 21. Inspect any rear door decants for leaks and function.
- 22. Inspect the wire harness and hydraulic lines up the side of the body for attachment and condition.
- 23. Inspect the condition of the debris body as you walk around the unit, note any discrepancies and report to maintenance.
- 24. Inspect the make/break seal at the body to cyclone transition for evidence of leaks, this seal must be washed at each dump cycle.
- 25. Open any tool box or cabinet and inventory for jobsite needs. Clamps, auxiliary lighting, hydrant wrenches spare batteries etc.
- 26. Inspect the hydraulic oil cooler for cleanliness, it must be washed once a week to ensure adequate heat transference.
- 27. Inspect and clean the cyclonic cleanout, this door must remain open after dumping and cleaning to allow the cyclones to dry out.
- 28. Open the air compressor cabinet and inspect the air compressor for fluid levels, air filter cleanliness and overall condition.
- 29. Inspect the hydraulic tank, proper level with the correct fluid, the PD units have a separate filter head and cartridge located on the return line to the reservoir, ensure the restriction indicator is operating in the "green" zone if not the filter must be serviced. NOTE: cold hydraulic fluid can cause a false reading on the restriction indicator, allow the fluid to reach operating temperature before condemning the filter.

- 30. Inspect the rubber hose coming from the cyclonic filter housing, the clamps are in place and the tube is free of holes.
- 31. Inspect the Final Filter, the prefilter should be free of dried mud and allow free air flow to the element, if it is restrictive it can be washed in warm soapy water and dried. The filter element should be clean allowing air to flow freely to the blower inlet without creating any restriction. One way to know filter condition, when the filter is new observe the vacuum gauge on the control panel, when the airflow reveals an increase of 1" of Hg or more the filter needs servicing.
- 32. Crack the air tank bleeder petcocks open to expel any accumulated moisture, just because the unit may be equipped with an air dryer doesn't exclude the air tanks from a little preventative maintenance.
- Check the level of the DPF reservoir, if low fill to the appropriate level. The location of the DPF reservoir will vary by chassis manufacturer.
- 34. Fill the unit with diesel fuel daily.
- 35. Inspect the exhaust system for leaks and the clamps are secure.
- 36. Inspect all hydraulic component for leaks and ensure they function when the function is activated.
- 37. Inspect all fluid levels for the transfer case and blower reservoirs. The site gauge should have a ¼" air bubble in the top of the gauge.

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 safety precautions an operator should take to ensure correct setup and operation.

Be especially aware of underground utilities.

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

HXX Operating Procedures - Visual Inspection - Fan

Before taking your Vactor HXX to the job site, be sure to follow the check list for maintenance and lubrication in the maintenance section of your manual.

Visual Inspection

The operator should make a visual inspection of the Vactor HXX unit before use. A properly conducted pretrip inspection will prevent safety hazards and extend the life of the HXX unit. The inspection procedure for the fan units will be the same with the exception of a few components. The fan units do not use a transfer case, blower or final filter.

Fan units:

- 1. Make a visual inspection of the engine compartment, for oil or water/coolant leaks and loose or worn belts and hoses.. Check and adjust fluid levels as needed. When finished under the hood, securely fasten the hood straps.
- 2. Beginning at the front of the truck, inspect all lighting, head lights, running and marker lights and turn signals, beacon lights if equipped, engine hood, windshield, should be free of crack and excessive pitting and bumpers for condition and attachment.
- Moving to the right side of the unit, inspect tires for tread depth, air pressure and securement, mirrors for vision and securement. Cab access for condition, doors operate smoothly and side glass for condition.
- 4. Open the water heater cabinet and inspect the water heater for signs of excessive heat, water and fuel leaks. Inspect all wiring and valves to ensure the water heater is ready for service. Does the heater ignite, check this before going to a jobsite.
- 5. Open the water pump cabinet, check that the water filter/strainer was removed the previous day, reinstall it. Give a thorough inspection of the charge pump, hydraulic drive pump its coupler to the CAT pump and ensure all opened drain valves are closed. Ensure all ball valves operate freely and do not leak.
- 6. Inspect the air compressor hose and hose reel, if equipped.
- 7. Inspect the vacuum nozzle for wear and holes, inspect the elbow transition to the upper boom.
- 8. Inspect the water tanks for leaks and over condition, open the control panel cabinet and

ensure the water level indicator is functioning, since the water system was drained the previous day the level indicator should be reading empty.

- 9. Open the master control cabinet. Ensure the cabinet is fully stocked with the needed tools and remotes to operate the unit, does the wireless remote activate are the batteries in adequate stage of charge? Does the wired pendant controller operate the controlled functions? Are there extra clamps for the vacuum hose sections? Do all the switches on the panel work?
- 10. Open any remaining tool boxes and check their inventory.
- 11. Deploy the ladder (if equipped) and inspect the boom, boom seals, boom pivot, hydraulic motor for leaks and ensure the turret gear has been lubricated. Inspect the boom hydraulic for condition and the wire harness going to the boom solenoid valves is secured.
- 12. Rear hose reel cabinet, some cabinets are equipped with heaters ensure the heaters are operational if equipped, inspect the hose and reel in this cabinet, extra lance or wand section if needed. Make sure the hand gun is in one of the cabinets.
- Inspect (10) the exhaust system for attachment and clamps, ensure there are no leaks

Continuing the inspection to the rear of the truck;

- 14. Check the rear lighting, brake lights, four ways, running and clearance light, license plate light and back up lights, The backup alarm should sound when the reverse lights come on. If equipped with an arrow board that it flashes in both directions, or a beacon light is operational and visible from the rear of the unit.
- 15. Rear bumpers are in place secure and labeled with conspicuity tape according to your local DOT requirements.
- 16. Inspect the rear door seals for evidence of leaks or improper sealing, the best time to see a leak at the seal is when the debris body is full, remember to care for the seal and its mating surface after each dumping.

OPERATING PROCEDURES - VISUAL INSPECTION - FAN

HXX

OPERATION

- 17. Inspect the hydraulic cylinders for actuation and leaks. Make sure the door latches are engaging the latches and they enter approximately the same distance for uniform clamping pressure.
- 18. Ensure the rear door safety props are in place and functional.
- 19. If equipped with the optional sludge pump inspect its mounting and when not in use the hydraulic lines must be connected to the dummy plugs on the rear door.
- 20. Inspect any rear door decants for leaks and function.

Moving to the left side of the unit inspect as follows;

- 21. Battery box and batteries, check the tie downs, battery cable condition and tightness and the batteries should not signs of swelling which could indicate freezing or an overcharging condition.
- 22. Inspect the wire harness and hydraulic lines up the side of the body for attachment and condition.
- 23. Inspect the condition of the debris body as you walk around the unit, note any discrepancies and report to maintenance.
- 24. Inspect the make/break seal at the body to cyclone transition for evidence of leaks, this seal must be washed at each dump cycle.
- 25. Open any tool box or cabinet and inventory for jobsite needs. Clamps, auxiliary lighting, hydrant wrenches spare batteries etc...
- 26. Inspect the hydraulic oil cooler for cleanliness, it must be washed once a week to ensure adequate heat transference.
- 27. Inspect and clean the cyclonic cleanout, this door must remain open after dumping and cleaning to allow the cyclones to dry out.
- 28. Open the air compressor cabinet if equipped.
- 29. Inspect the hydraulic tank, proper level with the correct fluid, the PD units have a separate filter head and cartridge located on the return line to the reservoir, ensure the restriction indicator is operating in the "green" zone if not the filter must be serviced. NOTE: cold hydraulic fluid can cause a false reading on the restriction indicator, allow the fluid to reach operating temperature before condemning the filter.

- Inspect the rubber hose coming from the cyclonic filter housing, the clamps are in place and the tube is free of holes.
- 31. Crack the air tank bleeder petcocks open to expel any accumulated moisture, just because the unit may be equipped with an air dryer doesn't exclude the air tanks from a little preventative maintenance.
- 32. Check the level of the DPF reservoir, if low fill to the appropriate level. The location of the DPF reservoir will vary by chassis manufacturer.
- 33. Fill the unit with diesel fuel daily.
- 34. Inspect all hydraulic component for leaks and ensure they function when the function is activated.

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 safety precautions an operator should take to ensure correct setup and operation.

Be especially aware of underground utilities.

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

ARRIVAL AT JOB SITE - PARKING

Upon arriving at the job site, turn on the strobe lights and arrow-boards to alert any traffic that may be in the area.

Plan your parking spot to optimize safety and ease of work. Inspect the work site for overhead power lines before positioning the truck. Be aware of underground utilities.

Put the vehicle in the best possible position for the easiest and safest access to the work site and material to be loaded. Park on firm level ground and ensure the ground is stable enough to hold the truck securely.

Observe the job site carefully. Look for overhead obstructions, traffic movement, pedestrian walkways, and for places where traffic control devices should be positioned. Always use a co-worker's assistance when spotting the vehicle.

Once you have decided on a parking spot, park the vehicle. Set the parking brake and turn on flashers. Whenever possible, park the truck between yourself and oncoming traffic when working in traffic areas.

Chock the wheels. Set out road cones, if necessary, to keep traffic and people away from the hydro excavation activities. Place the cones at a distance so water and debris spray can be contained within the work area.

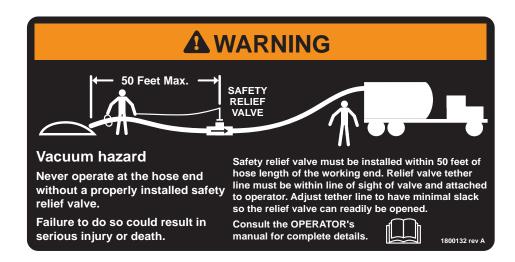
OPERATION







Always set the brake. Chock the wheels to prevent it from rolling.



SETTING UP THE EQUIPMENT

OPERATION

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Vacuum Tubing

Remove the boom from its stowed position. Add the vacuum tubes necessary for the job at hand. Clamp the vacuum hose to the end of the boom.

Continue attaching hose or tubing to the required length. Use a short and direct route, making sure that hose runs are as straight and have as few bends and turns as possible. Make any unavoidable turns gradual.

Use rigid aluminum tubes for longer runs. Lightweight, smooth bore flexible hose is recommended at the working end. Only use vacuum hose that has a smooth bore. This reduces loss of air velocity due to friction.

Install the tube with a rubber end at the working end of the tubing. The rubber end prevents damage to utilities and the holes allow extra air to enter the system.

Install the in-line vacuum relief valve according to the Vactor/Guzzler Safety Manual. The pull cord should be tethered to the belt of the hose handler so the vacuum pressure can be relieved in an emergency. Leave the relief valve open during setup.

Use as large tubing as possible. To reduce the risk of a plugged vacuum hose do not reduce the diameter of hose in mid-stream. 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.

Ground the hose pipe and the truck as routine safety precaution to eliminate static electricity buildup while excavating.

Keep the pendant switch for the vacuum relief valve as close to the working end of the hose as possible. This is to break the vacuum in an emergency.

Water Hose

Open the water pump cabinet and roll out enough high pressure hose to reach the work area. Allow sufficient excess to avoid hindering operator movement, but not so much as to create an excessive tripping hazard.

Thoroughly inspect the hose and high pressure handgun for wear, damage, or loose fittings.

Select the nozzle tip for your specific application.

AWARNING

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

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.

HXX

START VACUUMING OPERATIONS

OPERATION



Master Control Panel

These functions are performed at the master control panel located on the passenger side of the exterior of the truck.

- Engage the fan/blower according to the instructions in the cab. Fan units are activated at the master control panel after the hydraulic system is engaged.
- Increase the engine rpm with the throttle switch until the engine rpm is 800 or 1200 rpm depending the chassis. This is a starting point and will be adjusted later as required to efficiently vacuum site material.
- **Note:** Only operate the blower/fan at a level sufficient enough to efficiently convey the material. If the blower/fan is operated at too high an rpm, fuel will be wasted and the material will not properly separate from the air stream.
- Activate the remote pendant. If used, install the optional wired remote pendant by inserting it into the plug located at the bottom of the master control panel.
- **Note:** Vacuum Relief Valves The air operated vacuum relief valve needs to be closed. If not closed, there will be no air flow to transfer the material.
- 4

Enable the vacuum.

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.



Never allow vehicle to idle with blower engaged. The blower should not be operated at idle rpm's. To reduce wear on the transfer case run up the engine RPM until the transfer case gear noise smooths out. Some units with manual transmissions may need to go as high as 1200RPM's.

START VACUUMING OPERATIONS

After securing the work area, chocking the wheels, engaging the parking brake, choosing a nozzle, assembling the hoses and vacuum tubes, turning on the water pump, and putting on PPE, you can begin the hydro excavation process.

Verify all safety devices, especially relief valve, operate properly prior to beginning operations.

The operator holds the remote. In event of an emergency, the vacuum can be relieved quickly and easily.

Teamwork

Work as a team when trenching and digging large holes. One person operates the wand or handgun. The other person positions the vacuum tube so it is in the right position to move material.

Vacuum the material as soon as it breaks away. It is not productive to try to wash the material to the nozzle or to try to vacuum the material a great distance to the nozzle.

AWARNING

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.

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

Setting Up

Open the water pump cabinet and roll out enough high pressure hose to reach the work area. Allow sufficient excess to avoid hindering operator movement, but not so much as to create an excessive tripping hazard.

Thoroughly inspect the hose and high pressure hand gun for any wear, damage, or loose fittings.

Selecting a Nozzle

Select the nozzle tip for your specific application. All nozzles are rated in gallons per minute. Be sure there is enough water flow to moisten the material adequately to prevent carryover of debris through the debris body and into the vacuum source.

Nozzle head design is important in different soil conditions. Hard or rocky conditions, one or two orifices in the nozzle head works best. Soft or sandy conditions, three or four orifices work best. There is not one nozzle that works best in all conditions.

Low flow nozzle advantages: More precise, less water, more efficient water use, less pressure, safer process.

High flow nozzle advantages: Greater digging production, less wear on the vacuum system.

High flow nozzle disadvantages: More frequent dumping, messy dump area, fatigued operators, larger, more water use and longer cleanup procedures.

Cutting the Soil

Use the high pressure hand gun to cut the soil into chunks small enough to fit into the vacuum hose.

Select a water flow rate that moistens the material enough to vacuum it adequately to prevent carryover of debris to the vacuum source, but not so much as to make mud. Just enough to cut the soil into moist chunks.

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.

AWARNING

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).

OPERATING THE VACUUM HOSE

Vacuuming the Soil

When ready to begin, the truck must be running. Use the following procedures.

- 1. Communicate with the hose handler. When hose handler is ready, use the throttle control to adjust the fan/blower speed to the desired rpm.
- **Note:** The appropriate level of rpm is the lowest rpm that will readily convey the material into the hose and carry it to the tank. This will depend on the density of the material, and the distance it has to travel to the tank as well as the type of hose used. The blower should not be operated at idle rpm. Maintain at least 1200 rpm to reduce wear on the transfer case.
- 2. Position the vacuum hose near the material to be vacuumed.

Keep the suction end of the pipe or hose slightly above the material to be vacuumed. Never submerge the tube. Make sure it is always receiving both air and material. Submerging the nozzle in the material cuts off the air flow preventing material movement. This also creates a loading and unloading effect on the blower when the nozzle is lifted. This load / unload effect can cause undo stress on bearings and hydraulic components in the system which creates premature failure of the component.

3. Begin vacuuming taking care to allow some air to enter the hose along with the debris.

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.

Determining Blower Speed

Do not over speed the blower. Over speeding the blower will create excessive overflow of the debris into the cyclone chamber resulting in a drop in efficiency. It will also make the engine work harder than it really has to, decreasing the overall life of the unit.

Air Flow

It is the air flow that takes the material with it into the debris body. If there is no air flow, there is no material flow either.

If the flow is non-existent or sluggish, increase the rpm in steps and observe the vacuuming and flow rate. Stop raising the rpm when satisfactory flow of material is achieved.

If the air flow is not large enough to carry the material, increase the rpm at the control panel to just a little more than required to have a free flow of the material.

As the debris body fills, the air speed increases, leading to material carryover. Gradually reduce the vacuum speed as the debris body fills to reduce carryover.

Debris Level

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

Check the debris level if air flow diminishes suddenly.

VACUUMING TIPS

Operations Tips

- Always use the vacuum tube with the rubber end at the working end of the tube.
- Never hold the open end of the hose with your hand while vacuum system is on. Always open vacuum relief valves and reduce rpm before attempting to dislodge any obstruction in the vacuum tube.
- 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.
- If air flow is not sufficient to convey the material, increase the rpm in moderation.
- Eliminate unnecessary bends or turns in the tube.
- If there is a sudden drop in air flow, check the debris level.

Safety Tips

- Never wear loose clothing or untied hair when working on or near the unit or the open end of the tube.
- Always check the working condition of all safety devices before starting the Vactor unit.
- Observe all safety instructions and markings on the unit. Use ear plugs, safety glasses and gloves.
- Be aware that the air system becomes hot during vacuum operations.
- Never attempt to "guide" or push debris to the open end of the vacuum hose with your foot or hand. Vacuum suction is powerful enough to suck a limb into the hose.
- Never remove obstructions from the nozzle while the system is operating.
- Never hold the open end of the hose with your hand while vacuum system is on.
- Never reach into a vacuum hose to free clogs. Always open vacuum relief valves, reduce rpm before attempting to dislodge any obstructions in the vacuum hoses.

In an EMERGENCY the VACUUM and WATER must be stopped

Activate the E-Stop STOP

To shut down the system:

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

WARNING

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.

Refer to SAFETY

manual for details.

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

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.

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

Effective Date April 2, 2025

OPERATION

OPERATIONS

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

- 1. Communicate with the hose handler. When hose handler is ready, increase the rpm to the desired level.
- **Note:** The appropriate level of rpm is the lowest rpm that will readily convey the material into the hose and carry it to the tank. This will depend on the density of the material, and the distance it has to travel to the tank as well as the type of hose used.



Never allow vehicle to idle with blower engaged. The blower should not be operated at idle rpm's. To reduce wear on the transfer case run up the engine RPM until the transfer case gear noise smooths out. Some units with manual transmissions may need to go as high as 1200RPM's.

- Start vacuuming. If the flow is non-existent or sluggish, increase the rpm in steps and observe the vacuuming and flow rate. Stop raising the rpm when satisfactory flow of material is achieved.
- 2. Position the vacuum hose near the material to be vacuumed.
- 3. Begin vacuuming taking care to allow some air to enter the hose along with the debris.
- **Note:** It is the air flow that takes the material with it into the debris body. If there is no air flow, there is no material flow either.

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

If the air flow is not large enough to carry the material, increase the rpm at the control panel to just a little more than required to have a free flow of the material. Do not over speed the airflow as that will create excessive overflow of the debris into the cyclone chamber resulting in a drop in efficiency. It will also make the engine work harder than it really has to decreasing the overall life of the unit.

Vacuum Hazard

NEVER operate the vacuum system without the Vacuum Relief Valve being installed. Failure to install and operate the Vacuum Relief Valve properly may result in serious injury and / or death.

OPERATION

The INLINE VACUUM RELIEF VALVE must be INLINE within 50 feet from the end of the hose or pipe for proper operation.

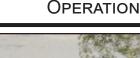
OPERATIONS - BASIC PROCEDURES

All vacuum trucks move material through air conveyance. They rely on air movement to entrap and carry away the debris. It is very important to keep the suction end of the pipe or hose in the right position so it is always receiving air and material. Submerging the nozzle in the material cuts off the air flow preventing material movement. This also creates a loading and unloading effect on the blower when the nozzle is lifted. This load / unload effect can cause undue stress on bearings and hydraulic components in the system which creates premature failure of the component.

It is very important when trenching and digging large holes that you work as a team. One person is operating the wand or hand gun. The other person is positioning the boom so the vacuum tube is in the right position to move the material as soon as it breaks away. It is not productive to try to wash the material to the nozzle or to try to vacuum the material a great distance to the nozzle.

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 water stream can be used to move material toward the tip of the nozzle.





OPERATIONS - SPECIAL CIRCUMSTANCES

Freezing Temperatures

Blower speed rpm is important when working in freezing or near freezing temperatures. High speeds or rpm's cause high wind chill factors due to the large air velocity being created. This can lead to ice buildup in the vacuum nozzle or boom which blocks material movement.

Use hot water, when available, and lower fan / blower speeds to reduce the problem. If you do get an ice build up in the boom, shut the vacuum system down. Use hot water to heat the boom tubes or get the unit inside where it can warm up. Once the boom tubes are warm, slowly retract the boom.

Start the vacuum system. If hot water is available, spray the hot water in the suction hose / nozzle. This will allow the ice to move into the debris body. You may need to do this in one to two foot increments, in order to fully retract the boom.

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.

Rocky Ground

Blower/fan rpm is important in rocky ground. Set the air velocity so rocks don't hang in the pipe. Air tends to move around rocks causing them to hang in the air stream. Adjust the rpm to the lowest setting to move the material efficiently. You may need to increase speed for larger rocks. This is especially true in freezing conditions.

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.





OPERATIONS - VACUUMING

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.
- The weather and operating conditions cannot be controlled, but the blower speed, water volume and water pressure can be. The blower 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 can run at higher speeds and allow faster material pickup. The blower speed must be adjusted to move maximum amounts of material without carry-over into the blower/fan.
- 5. Blower/fan speed is important when working in freezing temperatures. High blower 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 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 blower 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 blower/fan speed should be. The shorter the distance, the lower the blower/fan 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.

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.

OPERATIONS - MAKING AIR VELOCITY ADJUSTMENTS

The weather and operating conditions cannot be controlled, but the blower speed, water volume and water pressure can be.

Blower/Fan Speed

The blower speed controls the volume of air and the speed of air movement through the pipe and into the debris body.

Use a higher rpm for heavier material. Lower rpm for lighter. Higher air speed causes a wind chill factor, causing ice buildup.

Material

Proper 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.

If the soil or material breaks up easily, the blower can run at higher speeds and allow faster material pickup.

Freezing Temperatures

Blower/fan speed is important when working in freezing temperatures. High blower 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.

Carryover

Watch the blower exhaust for carry-over material. Any type of carry-over should be avoided.

The blower speed must be adjusted to move maximum amounts of material without carry-over into the blower/fan.

Distance

The further the distance from the work site to the debris body, the higher the blower/fan speed should be. The shorter the distance, the lower the blower/fan 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.

Debris Level

As the debris body fills, the air speed increases, leading to material carryover. As the debris body fills, gradually reduce the fan speed to reduce carryover.

NOTICE

HXX

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.

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OPERATIONS - WATER PRESSURE AND VOLUME ADJUSTMENTS

Water Pressure

Be sure to wear all proper safety equipment prior to operating any high pressure hand gun or wand. Adjust the pressure for the job at hand. Keep in mind that different units may have different pressure ratings.

Lower pressures are good in easy digging conditions and when working around older utilities where the protective cover may be in poor condition. It is also safer and uses less water. Keep the nozzle as close to the ground that you are cutting to maximize the water pressure. In general, 2000 psi at the nozzle is more than enough for excavating in the worst conditions. Higher pressures get into higher safety concern. Any gain is far outweighed by the safety issues.

Remember, the number of orifices divided into the water volume you want determines the water flow for each nozzle. If you have 3 gpm and two nozzles then 1.5 gpm goes out each nozzle. Refer to the nozzle chart in the Water System section.



Typical nozzles



Water Volume

This is the most important factor in productive and profitable hydro-excavating. Several factors determine the proper water volume to be used.

How damp is the material?

The material must be wet enough to prevent any dust from carrying over into the blower.

How far do you have to haul the debris and how long will it take to dump?

If you can dump on site and not travel far, higher water volumes are more productive (4-8 gpm). If you have to travel longer distances to dump, an hour or more round trip, lower volumes are more productive (3-4 gpm).

What are the soil conditions?

Soft or sandy soils allow for higher water volumes to move more material faster. Hard packed, clay or rocky soils require lower volumes and slower working conditions to cut the soil into chunks small enough to fit in the vacuum hose or tube.

What are you doing?

Digging pot holes or locating utility lines requires lower volumes. Digging trenches or larger holes, where you are in one area for a longer time, higher volumes work better. You may need to experiment with different volumes to determine what is most productive.

Example: Using lower volumes took longer to dig the pole hole but were able to dig twice as many holes in a day because the debris box didn't fill up as fast with water, therefore less time dumping!

What nozzle head are you using?

Nozzle head design is important in different soil conditions. Hard or rocky conditions, one or two orifices in the nozzle head works best. Soft or sandy conditions, three or four orifices work best. There is not one nozzle that works best in all conditions. Keep in mind that water nozzles wear out. Pay attention to how much water is used in an hour or two to check water flow.

SHUTTING DOWN OPERATIONS

Operations can continue until the debris body capacity is reached, at which time all operations must cease.

Note: Never overfill the debris body. Normally, if it does not exceed the GVWR (gross vehicle weight rating), the debris body should not be filled more than 60% - 75% of its rated volumetric capacity.

In liquid vacuuming, the level indicator or the change in the sound of the blower/fan (the float ball will get sucked up) will indicate a full tank and time to stop vacuuming.

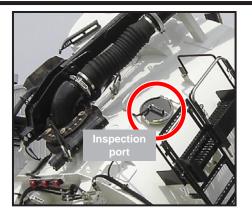
If equipped the level can be checked by looking through the inspection port. To check the level of solid debris in the tank, open all vacuum relief valves, reduce the blower/fan RPM and open the inspection port. Use a flashlight to get a clearer view of the content level.

If the unit is not equipped with an inspection port, pay attention to the amount of debris that has been vacuumed. Experience will tell when the debris body is ready to be dumped. If the debris body is full, vacuuming operations must cease.

Ceasing Operations

- Remove the vacuum hose from the work area. Let it suck air for some time to allow any material still in the hose to be carried into the tank. Then run some water through the suction tube to clean the inside of the suction tube, hose and boom.
- 2. Disable the vacuum.
- 3. Set water system to off.
- 4. Reduce the rpm to idle.
- 5. Inside the truck cab, disengage the blower/fan following the blower/fan shut down procedure.
- 6. Disconnect water wand or high pressure hand gun and store in cabinet.
- 7. Hold onto water line and let it rewind slowly onto hose reel.
- 8. Disconnect digging tubes and store them.
- 9. Remove any safety equipment and store in cabinet.

OPERATION



NOTICE

To avoid transmission and/or PTO damage

When not in use, the PTO should be disengaged. Always check for the red PTO warning light before driving truck. This light indicates that the PTO is engaged. Never drive truck with the PTO engaged unless using recirculation mode or vac-on-go intended for use while driving.

Never attempt to engage PTO while the truck is moving.

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.

SHUTTING DOWN OPERATIONS

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.

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 WAR

- 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.

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DUMPING SAFETY

OPERATION



Crushing hazard.

Serious injury or death can result from falling debris body. Never go under a raised debris body without the safety prop(s) in place. Debris body must be clean and empty for service work. On firm level ground raise the body above the height of the props. Tilt the prop(s) in place. Lower debris body

until it just rests on the prop(s). Use all props. Shut down and lock out the entire

system and chassis before servicing. Unload any items stored in debris body before using machine.

Refer to manual for details.

AWARNING



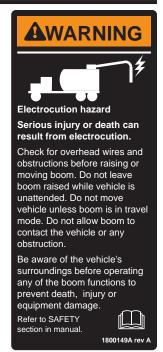
Crushing hazard. Serious injury or death can result from falling rear door. Never go under the rear door when open. Use door prop(s) or safety pin(s) to secure door before entering body, working under or around the

door. Open the rear door to just clear the prop(s) and lower door until it just rests on the prop(s). On units that use a safety pin(s) open the door until the pin holes are aligned and insert pin. Use all props or pins. Shut down and lock out the entire system and chassis before servicing. Unload any items stored in debris body before using machine.



from electrocution Check for overhead wires and obstructions before raising debris body, opening rear door or raising optional equipment. Never leave debris body, rear door or optional equipment raised or partly raised while vehicle is unattended. Never move vehicle with debris body, rear door or optional equipment raised.

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



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.



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.

SAFETY **INSTRUCTIONS**

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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.



DUMPING - DEBRIS BODY

When the Rear Door Open switch is activated, the locks disengage and the rear door opens.

Rear Door Close closes the door and then the locks engage.

Dumping the Debris Body

The truck engine must be running to dump the debris body. 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.
- 2. Ensure there is adequate clearance overhead for the debris body to rise.
- 3. Set the parking brake.
- 4. If truck is equipped with air ride suspension, dump air suspension so that the rear of the truck is at its lowest point.
- 5. Inspect the rear of the unit and the area that the material will be dumped.
- 6. Engage the hydraulics.
- 7. Stow and extend the boom so that the hose clears the water tank when raising the debris body.
- 8. Open the rear door.
- 9. Raise debris body and allow material to fall out.
- 10. Clean and lower the body according to the procedures in this manual.

Vibrator (optional)

After the body has been raised, the vibrator can be used to dislodge any material that is attached to the sides of the debris body. Activate the vibrator mechanism intermittently with the switch on the master control panel. Only use short vibrating blasts. **Do NOT use long or continuous blasts.**

Body Lock Override

The Body Lock function overrides the automatic lock/unlock function when using the Body Dump function. It may be needed when there is some frame twisting of the truck chassis when sitting uneven ground.

To release the locks under this condition activate and hold the Body Lock UNLOCK switch then activate the Body Dump LOWER switch to force the

Crushing / Tipping Hazard

To avoid injury or death:

- 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.





body LOWER a small amount which maybe enough for the locks to release. Then while continuing to activate the Body Lock UNLOCK switch activate the Body Dump RAISE switch.

The Body Lock switch can also help set the body locks if there is a slight twist in the chassis. Under a twist condition when fully lowering the body there can be "spring back" of the body when the Body Dump LOWER switch is released. This spring back may be enough so as to not allow the body locks to engage. To engage the body locks; activate the Body Dump LOWER switch and the activate the Body Lock LOCK switch, release the Body Dump LOWER switch then release the Body Lock LOCK switch.



OPERATION

CLEANING - DEBRIS BODY

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

Using the handgun, wash out the debris body, paying particular attention to the door seal, lock bolts, level indicator, float balls, screens, vacuum enhancer (if equipped), etc. and the inside of the rear door.

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

Lower the debris body to the down position. Lower the rear door and wash the rear door and rear of the unit. The rear door must close with an air and watertight seal. Make sure all debris is removed from the seal before closing the door.

Turn off the water pump and put the wash hose and gun away.

Lowering Debris Body/Closing Door

After the debris body has been emptied and the seal cleaned, store the rear door props and lower the body 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 debris body.









OPERATION

DEBRIS BODY - REAR DOOR SAFETY PROP

HXX

OPERATION

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).

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

- 1. Unlock and open the rear door enough to set the props in place.
- Using the reach pole slightly raise up and pull out both body props. Both props must always be used.
- 3. Lower the door so it just touches both props.

If the door is powered in to the props there will be a popping sound of the prop break away feature. If this happens immediately stop closing the rear door. Refer to the maintenance section for how to service.

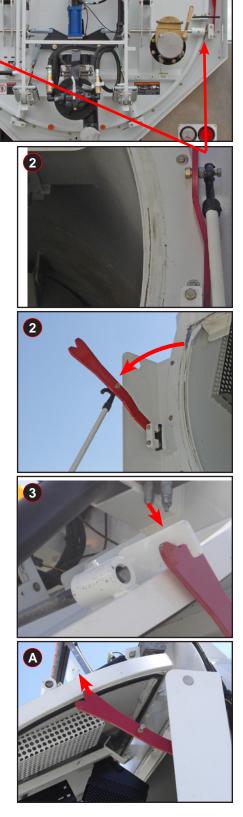
4. Verify the prop is properly seated in to the socket as shown. If not raise the door enough for the prop to clear and lower again.

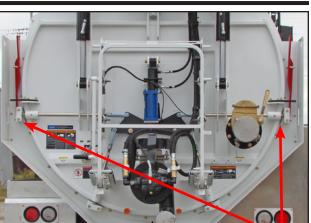
Disengaging Safety Prop

- A. Raise the door to just enough for the prop to clear the door.
- B. Push the prop to the stored position.
- C. The door can now be closed.

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.





DEBRIS BODY - SAFETY PROP

At any time the debris body is raised to obtain 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 unit should be parked on a flat level surface.

- 1. Raise the debris body so that the front of the body clears the safety prop or as shown, tilt the prop in to position after dumping.
- **Note:** It must be high enough in the air to allow the safety prop to clear the body and swing fully into position with the prop rest under the body.

Safety prop in stored position. Note that the safety prop handle is pointing towards the front of the unit when prop is stored. Turn handle in direction of arrow to raise safety prop.

- 2. Rotate the safety prop towards the prop rest.
- 3. After the top of the prop is in position, lower the body until the prop is just resting in the prop rest. Do not power the debris body down on to the prop. This will secure the body from falling.

Disengaging Safety Prop

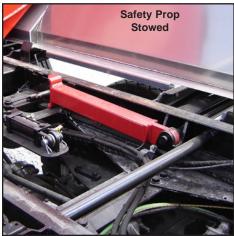
- 1. Raise the debris body just enough to clear the safety prop, rotate the prop back to the stored position.
- 2. The debris body can now be lowered.

Safety prop is in position. Note that the safety prop handle is pointing towards the back of the unit when prop is engaged. Turn handle in direction of arrow to disengage safety prop and return it to its horizontal stowed position.









DEBRIS BODY - PRODIGY SAFETY PROP

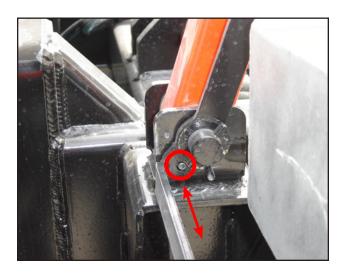
HXX

At any time the debris body is raised 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.

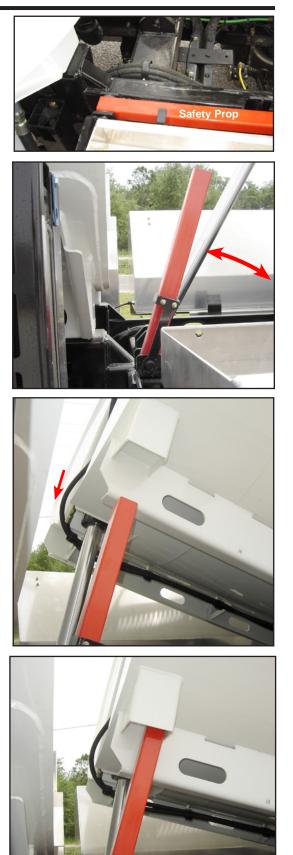
- 1. Raise the debris body so that the front of the body clears the safety prop or as shown, tilt the prop in to position after dumping.
- **Note:** It must be high enough in the air to allow the safety prop to clear the body and swing into position with the prop rest under the body.
- 2. Tilt the safety props towards the prop rest. Push or pull on the prop handle as needed to engage the retaining pin that hold the prop in the up position.
- 3. After the top of the prop is in position, lower the body until the prop is just resting in the prop rest. Do not power the debris body down on to the prop. This will secure the body from falling.

Disengaging Safety Prop

- 1. Raise the debris body just enough to clear the safety prop socket, unlock the prop and lower back to the stored position.
- 2. The debris body can now be lowered.



OPERATION



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.

AWARNING



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



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		Date	
Note	S	I	
Area	s NOT decontamina	ated	
1			
2			
3			
4			
5			
Last	material in unit		
M	SDS/SDS attached		Yes - No
Clea	aning agents used		Yes - No
M	SDS/SDS attached		Yes - No
Othe	r		
1	Unit fully winterize	ed?	Yes - No
2	Water tanks draine	ed and flushed?	Yes - No
3	All filters, strainer	s, filter bags cleaned or replaced?	Yes - No
4	4 Exterior of unit cleaned?		Yes - No
5	Debris body, cyclo	one(s), bag house(s), dump tube(s) clea	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.



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 ^U 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.



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



Replace any that have excessive build up.

Verify ground

bonding cable.

Check filters if

equipped.



Check all microstrainers and strainer baskets as equipped.



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

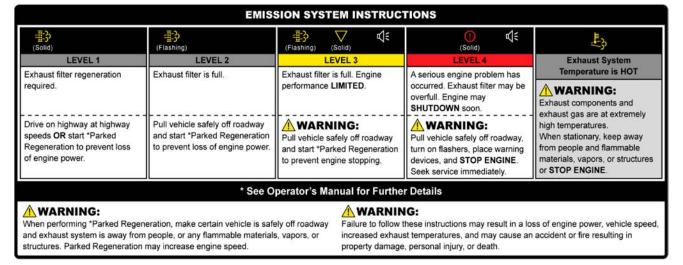


Consult OEM chassis and engine operation and maintenance manuals for complete details on operation.

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%."

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.



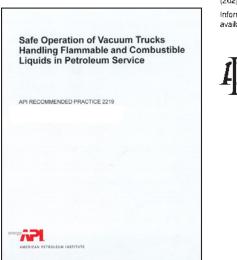


Follow recommended safety practices while performing all work. Refer to the FS Solutions/Guzzler/Vactor/TRUVAC/Westech Safety Manual for additional information.

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.



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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
•	American Petroleum Institute Quality Registrar	Ph: Fax:	202-682-8130 202-682-8070
•	Monogram Program	Ph: Fax:	202-962-4791 202-682-8070
•	Engine Oil Licensing and Certification System	Ph: Fax:	202-682-8233 202-962-4739
•	Petroleum Test Laboratory Accreditation Program	Ph: Fax:	202-682-8129 202-682-8070

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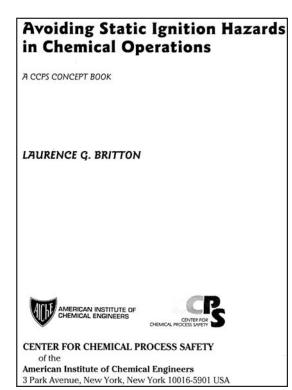
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Get The Job Done Right.

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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Library of Congress Cataloging-in Publication Data Britton, Laurence G., 1951– Avoiding static ignition hazards in chemical operations / Laurence G. Britton. p. cm. — (A CCPS concept book) Includes bibliographical references and index. ISBN 0-8169-0800-1 I. Electrostatics. 2. Chemical plants—Safety measures. I. Title. B. Series TP155.3.B75 1999 99-35855 6601.2804—dc21

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.

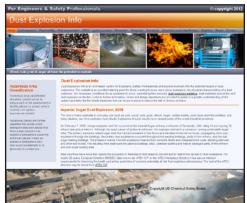
There is an increased risk of fire and/or explosion from combustible dust. The following section provides resources will assist in solving those issues.

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

Effective Date April 2, 2025

DUST - RESOURCES

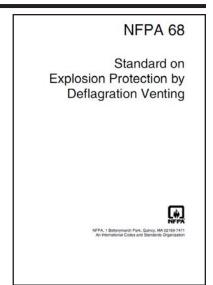
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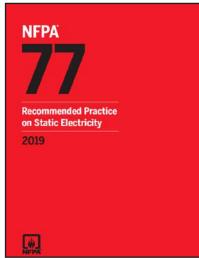
National Fire	Protection	Association	(NFPA)	
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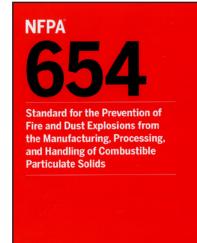
1 Batterymarch Park Quincy, MA 02169-7471 Telephone: (800) 344-3555

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® FactSheet

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

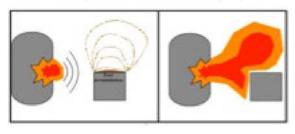
In addition to the familiar fire triangle of oxygen, heat, and fuel (the dust), dispersion of dust particles in sufficient quantity and concentration can cause rapid combustion known as a deflagration. If the event is confined by an enclosure such as a building, room, vessel, or process equipment, the 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.



DSG FS-3791 05/2015



OPERATION

OSHA FactSheet



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

	Engineering and	Required Respiratory Protection and Minimu 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/m³ (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/m³, 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 progra

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.

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Options

TRUVAC HXX

HYDRAULIC TOOL PACKAGE - OPTIONAL

The hydraulic tool package is used to provide hydraulic power for the operation of hand tool attachments (chain saws, jackhammers and pumps). Quick couplers are used to connect the hand tool to the vehicle hydraulic system.

The controls and hose connectors are normally located in the passenger side.

Make sure the quick couplers are firmly and correctly attached to the vehicle. A leaking or poorly attached quick coupler can allow hydraulic fluid to escape.

Use the hydraulic tool package as follows:

- 1. Connect the hand tool return and pressure hoses to the quick couplers.
- 2. Using the instructions posted in the cab, engage the hydraulics.
- 3. Adjust the flow for the individual hydraulic tool being used.
- Note: The system is normally capable of 15gpm maximum at 1800psi maximum.





VACUUM ENHANCER

Located inside the debris body at the boom inlet is the optional vacuum enhancer. It is a valve that can be used to shutoff vacuum to the boom.

When closed, the vacuum level rises in the debris body. Opening the vacuum enhancer boom shutoff produces a sudden surge of in-rushing air to assist in opening a plugged hose or boom turret.

There is a risk of the boom turret or vacuum hose becoming plugged when the material, for example clay, is vacuumed without enough water. The sticky material will build up until the boom turret or vacuum lines become plugged.

Activating the vacuum enhancer

Activate the switch for about one minute and release. Time will vary with the application. This creates the air surge. The vacuum enhancer should only be activated for a few minutes at a time. If the blockage does not clear after two or three attempts, the blockage requires manual cleaning.

The vacuum enhancer is not intended to relieve vacuum at the end of the vacuum hose.

Maintenance

The vacuum enhancer boom shutoff should be washed off with water during normal cleaning. Visually verify proper operation by cycling the vacuum enhancer boom shutoff by standing outside the debris body and clear of the rear door. Replace the shutoff door as required due to wear.







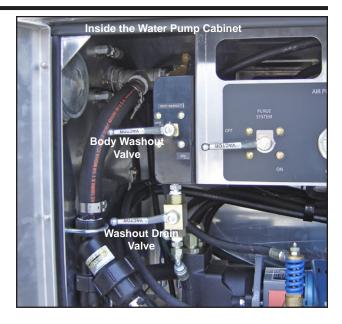
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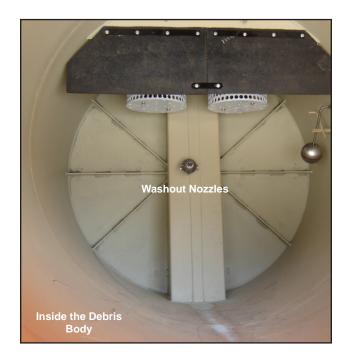
DEBRIS BODY WASHOUT

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 that can be activated by a debris body washout valve. Operate only long enough to fully clean out the debris body to avoid unnecessary abrasive wear to the debris body.

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 body washout ball valve in the ON position.
- 4. Using the instructions posted in the cab, engage the hydraulics.
- 5. Set water pump to ON and adjust flow as needed.
- 6. Adjust the chassis engine speed until the desired pressure is achieved. Maintain the engine rpm until washout or dumping is complete.
- 7. When debris body washout is complete, reduce the chassis engine rpm.
- 8. Place the water pump switch in the OFF position.
- 9. Place the body washout ball valve in the OFF position.
- 10. Lower the debris body after it has fully drained and close the rear door.
- 11. Place both the body washout ball valve and the washout drain valve in the ON/OPEN position until fully drained.





All replacement nozzles need to be the fan-style as originally supplied. Replacements should be oriented the same as the originals.



HXX

Offload - Sludge Pump

The sludge pump provides the option of emptying the debris body by a valve and hose for liquid or semi-liquid material only. Additionally, the pump can be removed from the unit and used to pump material from one location to another by submerging it in the material.

material. The material is pumped through a valve located on the back of the debris body at the bottom. The pump is hydraulically operated by a switch at the

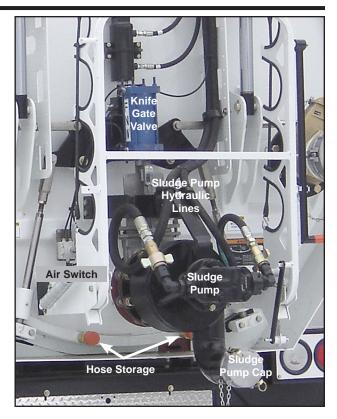
Note: The sludge pump can be used during vacuum operations. The sludge pump can be turned on when the indicator level on the back of the truck shows about 3/4 full.

Use of the sludge pump must stop to avoid pumping solid material when the level drops, as shown by the level indicator. Vacuum performance will be degraded while pumping off and gets worse as the material level lowers. Actual performance varies with the unit configuration, vacuum level and material being pumped off.

Operating the pump

master control panel.

- 1. Turn on the hydraulic system.
- 2. Remove the cap covering the end of the sludge pump pipe by releasing both tabs located on each side of the cap. Allow the cap to hang freely by the chain attached to it. Attach the hose if needed.
 - **Note:** Hose can be hooked up to the end of the pipe to direct the flow of material, or it can be pumped directly out of the end of the pump.
- 3. Open the knife gate valve. This valve, when open, allows material to be pumped from the debris body. The valve is located directly on the pipe extending from the back of the debris body. The switch for the valve is normally located next to the pump.
 - Note: When finished pumping, close the knife gate valve.



NOTICE

Sludge pump can be damaged

Do not use the sludge pump for unloading solids.

Removing the Pump

The pump can be removed from the unit.

- 1. Close the knife gate valve before removing.
- 2. Remove the nuts holding the pump in place on the debris body.
- Disconnect the two hydraulic lines from the pump.
- 4. Lift the pump off and set aside.
- 5. Attach the hydraulic lines to the back of the debris body. They are screwed directly onto the storage stubs located near the pump.

WATERHEATER - ALKOTA - OVERVIEW

Options

Operation Overview of 400,000 BTU and 800,000 BTU Systems

The water heater is designed to control the temperature of the water. The heater output temperature is controlled by an adjustable thermostat control. The water heater normal ratings are from 400,000 BTU at 3 to 10 GPM or 800,000 BTU at 3 to 20 GPM. This will depend on what type of water heater and water pump installed.

A water heater with an electronic temperature control will allow the water heater to heat different volumes of water without overheating and going into steam. The electric temperature control has a microprocessor in it that senses a rapid heat rise and shows the accent of the heat. The electronic temperature control will typically have 4 to 5 on/off cycles in 60 seconds at 2.8 to 6 GPM. At volumes over 6 GPM the E.T.C. will typically run solid during operation.

The adjustable temperature control is similar to the electronic control except the temperature is set with a calibrated dial.

The primary controls are designed with a safety system that shuts down after about 13 seconds if no flame is detected.

Routine Maintenance

The system should be run for at least 15 minutes every month to maintain proper operation. Inspect for road debris and animal nesting before use. Clean as needed before operation.



WATERHEATER - ALKOTA - CONTROLS

The controls are located under the water heater inside the cabinet on all versions. The 400,000 and 800,000 BTU units use the same control panel.

- Burner ON/OFF Master switch to operate or shut down water heater.
- Hour Meter Hours unit burner switch is on.
- **Power indicator light** indicates there is power at the primary control.
- Fuel Solenoid indicator light indicates that the fuel solenoid is active.
- **Temperature Control** Turn to adjust to desired water temperature. The burner will not operate in the OFF setting.

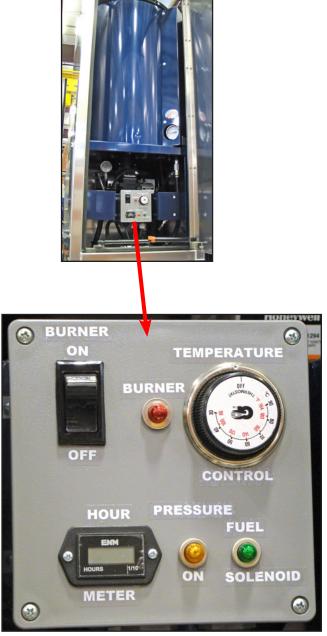
Pressure indicator light - indicates that the minimum flow and pressure of water is moving through the system. This light is triggered by the pressure switch located inside the water pump cabinet (may also be located in heater cabinet). To achieve the minimum hydraulic pressure to activate the pressure switch

requires proper water nozzle selection.

High Temperature Relief Valve

replaced if activated.







Options

This valve will relieve the system to a drain hose when the system overheats or reaches 5000psi. This is a fail safe type of valve and must be

WATERHEATER - ALKOTA - GENERAL OPERATION

- Check to make sure fuel tanks have at least a ¼ tank of fuel. Heater will not ignite if fuel falls below this level.
- 2. Ensure water tank has water in it.
- 3. Open door on heater cabinet, this must remain open during operation to provide adequate air flow to the burner and to prevent overheating of the system.
- 4. Turn burner power switch to the "ON" position.
- 5. Set desired water temperature. Do not exceed 180° F.
- 6. Turn on water pump and begin digging.
- 7. The green flow indicator light will light when proper water flow/pressure is sensed by the pressure switch. Proper nozzle selection is required to produce needed flow.
- 8. When green indicator light is on the burner will receive the signal to ignite.
- 9. Burner will turn on/off automatically to keep water temperature within the set range.

If for any reason the water heater does not fire after 15 seconds, the fuel solenoid will lock out due to no flame. This can be reset by turning the burner power switch "off" and waiting 10 seconds. Return the burner power switch to the "on" position. If after 3 consecutive attempts and the burner does not ignite, discontinue use, start trouble shooting the water heater (refer to water heater troubleshooting section). The fuel solenoid indicator light will be on when the fuel solenoid is powered.

- 10. At lower water volumes the burner will cycle on/off as much as 4 to 5 times per minute. At higher volumes the burner will run continuously.
- 11. It is recommended the water heater be turned off and allowed to cool with water flowing through the coil. This will decrease the amount of scale build-up in the coil.

It is recommended to change the fuel nozzle after every 1000 hours of operation.

Some locations do not require heat for operation due to higher temperatures or soft materials being vacuumed. It is recommended to start your burner and let it run for 10-15 minutes once per month to ensure proper operation and prevent fuel from draining back to tank or debris from accumulating on the coils.



800,000 BTU unit shown





Fire hazard

Do not use water heater when unit is in motion.

For proper combustion air flow and to avoid fuel build up the unit must be stationary and the cabinet door must be open during operation.

Notes:

- Enabled when water pump is ON in stationary mode (does not work in road mode)
- Does NOT run in recirculation mode
- Disabled if water tank temperature is at least 100° F and water return line temperature is at least 120° F. (Does not apply to 2100i CB units)

WATERHEATER - ALKOTA - PERFORMANCE

Burner performance is not affected until the elevation is over 2000 ft. As elevation increases above sea level, the ambient air contains less oxygen. Because there is less available oxygen per Cubic foot of air, the burner must deliver a higher volume flow (cfm) of air to provide the proper amount of oxygen for the amount of oil being burned. This is the reason that an increase in the burner air setting or a fuel nozzle downsize may be required as elevation increases. For every 1000 ft. above sea level there is a 1.84% rate reduction in the burner. During normal operation there should not be any visible smoke. If smoke is observed shut down and correct the burner setup. If not corrected the heat exchanger will be covered in soot and efficiency will be reduced.

The water flow determines the on/off cycle rate of the burner and the resulting temperature rise.

All burner nozzles sizes are in gallons per hour at 100psi fuel pressure.

High Elevation Nozzles		
Part No.	Description	
49785A	ALKOTA 400K NOZZLE 4000-8000 X 2.5GPM	
49785B	ALKOTA 400K NOZZLE 8000+ X 2GPM	
49785C	ALKOTA 800K NOZZLE 4000-8000 X 4.5GPM	
49785D	ALKOTA 800K NOZZLE 8000+ X 4GPM	

WATERHEATER - ALKOTA - PRESSURE SWITCH

OPTIONS

This flow indicator light is triggered by the pressure switch located inside the water pump cabinet (may also be located in heater cabinet). To achieve the minimum hydraulic pressure to activate the flow switch requires proper water nozzle selection. The pressure switch is actually triggered off the hydraulic motor for the water pump.

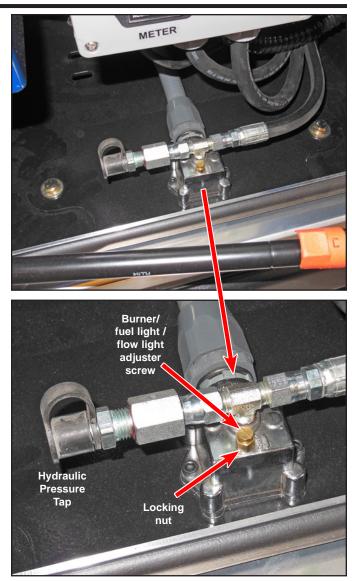
This procedure sets up a replacement pressure switch:

- 1. Attach the hose ball valve to the water lance hose. The water will be discharged to the ground during the test.
- 2. Locate the pressure switch. If it has one set screw, it controls the burner, fuel light and flow light. If two, one is for the burner/fuel light and the other turns on the flow light.
- Install a tee and pressure tap in the 1/4 inch line going to the switch (if one is not installed). Connect a suitable pressure gauge.
- 4. Run the throttle at a moderate speed with multiflow to maximum.
- 5. Slowly close the ball valve until the pressure gauge reads 940 psi. At this point turn the switch adjuster screw(s). When the flow light just turns on, lock the screw down. Turn the other screw, and the burner should fire. Lock that screw down by holding the screw in place with a screwdriver and snugging up the lock nut. The heater controller takes a few seconds to react to the signal from the switch. Turn the adjusting screws slowly, even pausing to ensure the switch point is at 940 psi.
- 6. Verify the adjustments by operating normally with the gun. When you squeeze the trigger, the flow light, the burner and the fuel light should come on after a few seconds. Release the handle. The burner and flow light should go off. Repeat to ensure proper operation.

Alternate 45277D-30 pressure switch

This switch is normally set to 1200psi. Always verify settings with the schematics for the unit.

To adjust set point: Loosen the adjusting collar screw, then turn CW to increase and CCW to decrease set point.



45277-30 Pressure switch Located on floor of water heater cabinet.

Alternate 45277D-30 Pressure switch Located on floor of water heater cabinet.



Anti-Freeze Tank

The anti-freeze tank provides a supply of anti-freeze that can be drawn into the water pump system to reduce the risk of freezing during transport. The tank is normally located behind the water heater cabinet on the passenger side. There is a sight tube to indicate the liquid level. The control valves may be located inside the water pump cabinet or above the cabinet as shown here.

Prepare for transport

- 1. Turn off the water to the water pump.
- 2. Before operating the handgun open the antifreeze tank and pump valves.
- 3. Operate the handgun at low speed until antifreeze can be seen coming out the nozzle.
- 4. Stop the handgun and shut down the water pump.
- 5. Close the anti-freeze tank and pump valves.
- 6. The water pump is now ready for transport.

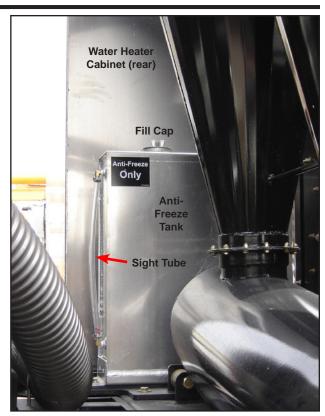
Prepare for use

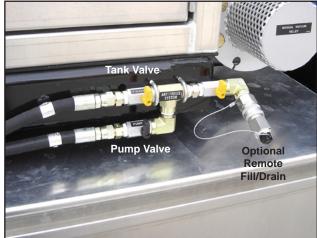
- 1. Turn off the water to the water pump.
- 2. Aim the handgun hose in to the fill cap opening on the anti-freeze tank or to the quick coupling if equipped.
- 3. Operate the water pump at low speed until all the anti-freeze has been pumped from the system. This should only take a few seconds.
- 4. Shut down the water pump.
- 5. The water system is now ready for use.

Maintenance

On a yearly basis at the end of the cold weather, flush and drain the antifreeze tank and system.







Two styles of anti-freeze tanks are in use. The newer style is shown at left and the older above. The plumbing on newer machines allows the antifreeze to be purged back into the reservoir for reuse. This is done by setting the valves to allow the return flow.

AIR EXCAVATION

Air excavation is similar to hydro-excavation in operation.

Vactor offers Air-Spade® digging tools for use with the optional air compressor system. Refer to the manufacturer's manual for operation, service and maintenance.

Air-based vacuum system offers the same benefits of the water-based vacuum excavation trucks with the following advantages:

- With air, spoils stay dry so they can be used for backfilling
- Air eliminates mud disposal problems
- Air reduces erosion of road base or around utilities
- Air units are smaller and more versatile and can get into tight areas.
- Air units are quieter and therefore less disruptive

Note: Working with air will require more frequent maintenance of the air filter.



HXX

AWARNING

(2)

3

150 PSI

110 PSI

(1)

AIR COMPRESSOR - CONTROLS

OPERATOONS

The air system on this unit consists of an air compressor and hose reel.

The hydraulic system must be engaged to operate with air. Follow the step by step instructions located in the cab of the truck for proper engagement of the hydraulics. Prior to

engaging the air system, connect the hose reel hose to the air gun and prepare to operate.

The system is designed so that either the air or water system can operate, but not both at the same time.

Controls

- 1. High/Low switch If equipped, 150psi for digging and 110psi for air tools.
- Reset switch Resets system after unit has gone in to a shut down mode. A message will be displayed when a reset is required.
- 3. Hour meter Used to track service intervals.
- Pressure gauge Do not operate above 150 psi.
- Temperature gauge Indicates operating temperature. Unit will go in to shut down at 240° (F).

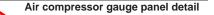
Automatic blow down valve

There is an integrated blow down valve in the compressor system. It is located at the downstream side of the coalescer head and will automatically bleed the sump to zero pressure when the compressor is disengaged. Blow down time interval takes between 30 to 60 seconds and is controlled by a pressure sensor. If the air switch at the master control panel is quickly switched quickly cycled the air indicator light will not go on until the blow down time interval has completed.

Operation

To operate, switch air on at the master control panel.

The unit is equipped with a load sensing ability. The rpm's drops to an idle mode after 10 seconds of no load and return to full speed when the gun is triggered.







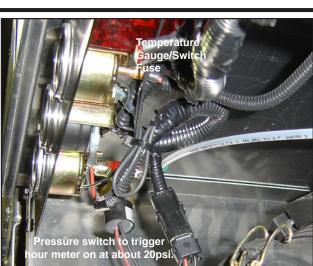
AIR COMPRESSOR - CONTROLS

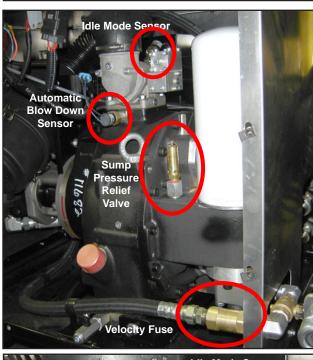
OPERATOONS

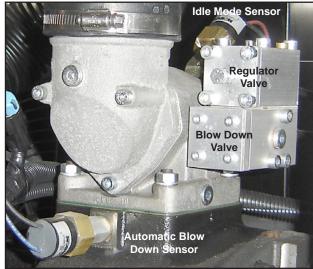
Shut down systems

- Excess flow (velocity fuse) Closes when full free air flow is detected. Resets automatically when problem is corrected.
- Temperature shut down Unit will go in to shut down at about 240° F. Use the reset switch to restart after correcting the problem. The temperature gauge is also the switch for this function. The normal reading about 175° -200° F. A sensing probe goes to the lower rear of the unit.
- **High pressure shut down** Unit will go in to shut down after 150 psi is reached. Use the reset switch to restart after correcting the problem. A message will be displayed when a reset is required. The gauge is also the switch for this function.
- Housing pressure relief Opens at 175 psi to protect the compressor. Resets automatically when problem is corrected.
- **Note:** Two similar air compressors are in service and are similar in appearance.

Sensor	Mode
Idle mode	Normally Open
Automatic blow down	Normally Closed
Hour meter switch	Normally Open
Temperature (gauge)	Normally Open
Pressure (gauge)	Normally Open







HXX

AIR COMPRESSOR - DECALS



300040

meet occupational

safety and health

administration

standards



HOT OIL UNDER PRESSURE! WILL CAUSE SEVERE PERSONAL INJURY OR DEATH. Do not piping when com-pressor is running or pressurized. Shut down compressor and relieve system of all pressure before removing valves, caps, plugs or piping 30003

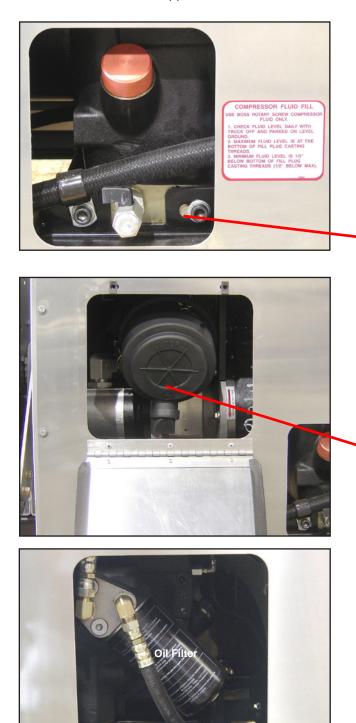


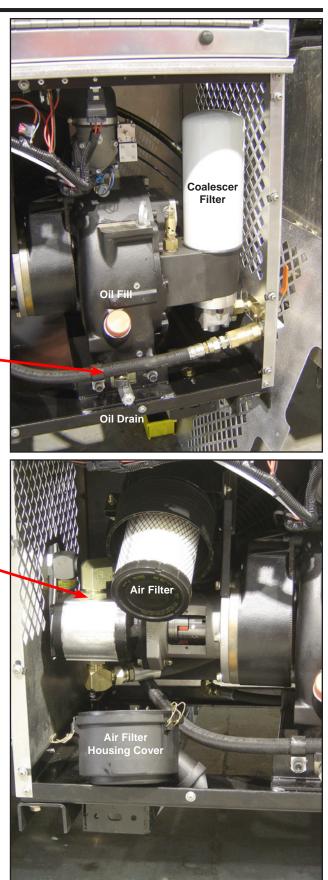
AIR COMPRESSOR - SERVICE

Refer to the manufacturer's manual for service and maintenance.

The oil filter is accessed through the side access panel from underneath.

Note: Two similar air compressors are in service and are similar in appearance.





HXX

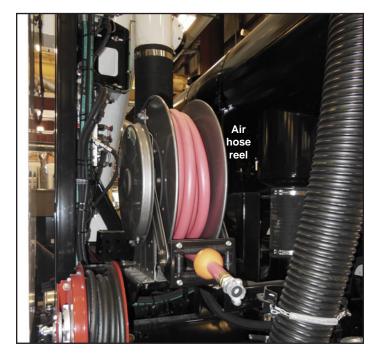
AIR COMPRESSOR - BOSS 375

The Boss 375 is a larger PTO driven air compressor for air only units. Refer to the Boss 375 manual for service details.

The hour meter, pressure gauge and temperature gauge are normally located under the passenger seat in the cab.

OPERATION





AIR COMPRESSOR - STANDARD - CONTROLS

HXX

OPERATION

The air system on this unit consists of an air compressor and hose reel.

The hydraulic system must be engaged to operate with air. Follow the step by step instructions located in the cab of the truck for proper engagement of the hydraulics. Prior to engaging the air system, connect the hose reel hose to the air gun and prepare to operate.

The system is designed so that either the air or water system can operate, but not both at the same time.

Controls

- 1. **Reset switch -** Resets system after unit has gone in to a shut down mode. A message will be displayed when a reset is required.
- 2. Pressure gauge Do not operate above 150 psi.
- **3.** Hour meter Used to track service intervals.
- Temperature gauge Indicates operating temperature. Unit will go in to shut down at 240° (F).

Operation

To operate switch to air mode at the master control panel.





HXX

AIR COMPRESSOR - DECALS



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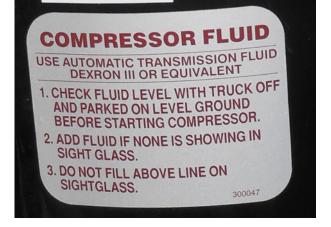
administration

standards



PERSONAL INJURY OR DEATH. Do not remove valves caps, plugs or piping when com-pressor is running or pressurized. Shut down compressor and relieve system of all pressure before removing valves, caps, plugs or piping 3000

Connect air hoses only Read the operators Driveshaft in in full compliance Do not manual before rotation. Switch with OSHA Standard 29 starting this unit. CFR 1926:302(b)(7) off engine and operate The required safety devices should be Failure to adhere to instructions disconnect battery without tested in accordance can result in severe or electrical supply with their manufacturer's personal injury. recommendations before attempting fan guard Replacement to verify that they manuals can be to work or perform reduce pressure in case of hose failure purchased from: in place. maintenance on and will not nuisance Boss Industries, Inc. the compressor trip with the hose and tool combinations 1761 Genesis Dr. LaPorte, IN 46350 package. in use. 300043 300041 300042 300039



BACKFILL HOPPER

OPERATION

The backfill hopper option is only available on air only units and it is located in place of the water tank. The backfill hopper is normally vacuum filled with sand, dirt, etc. to be dumped into a pothole to replace the spoils removed while digging.

Filling

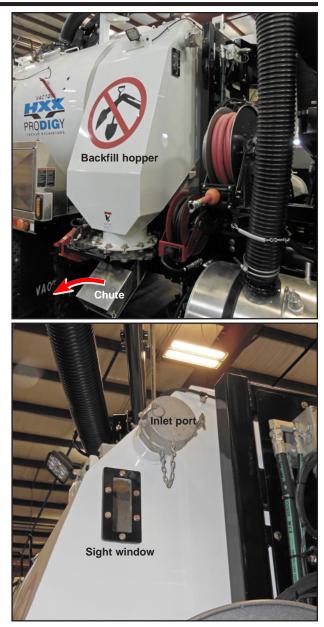
The backfill hopper is vacuum filled by attaching a vacuum hose to the backfill hopper inlet port.

- 1. Engage the PTO to activate the hydraulics.
- Attach a vacuum hose to the backfill hopper inlet port.
- 3. Engage the blower.
- 4. Activate the backfill Hopper Vacuum switch.
- 5. Use the inlet hose to vacuum up the fill material.
- 6. Stop vacuuming when the material level reaches the sight window.
- 7. Set the backfill Hopper Vacuum to OFF.
- 8. Remove and store the inlet hose.
- **Note:** Use only the minimal amount of vacuum to load the backfill hopper. The backfill hopper is intended for smaller material like sand or dirt. Stringy material like mulch will plug the ports. The hopper Vacuum switch opens a valve to the air path between the debris body and cyclone and activates the vacuum enhancer to provide vacuum to fill the backfill hopper.

Operation

Normal operation requires that the unit be positioned with the backfill hopper dump chute over the hole to be filled. The backfill Hopper Valve switch is used to control the dumping. Lower the chute extension before dumping.

The backfill hopper should be emptied and cleaned and the end of the work day. Material should not be stored in the backfill hopper.





Maintenance

Maintenance

MODEL & SERIAL NUMBER LOCATION

MAINTENANCE



Normal location of Serial No. Plate for HXX units is on the driver side on the front part of the subframe. Options may obscure direct viewing.





Alternate location of Serial No. Plate for HXX units is on the passenger side under the access steps. Options may obscure direct viewing.

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		
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	Lift cylinder	1st week				
9	Debris body hinges	1st week				
10	Rear door hinges	1st week				
11	All clamp and lid screws	1st week				
12	Change blower oil if equipped	100 hours				
13	Change transfer case oil if equipped	100 hours				
14	Change hydraulic oil filter	100 hours				
15	Driveline joints	1st week				
16	Grease boom	1st week				
17	Inspect / repair leaks	1st week				
18	Change oil & lube water pump	50 hours				
19	Air compressor if equipped (see manufacturer's ma	inual)				
	Additional for	r Fan Unit	S			
1	Verify spindle box oil level to sight eye	1st week				

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.

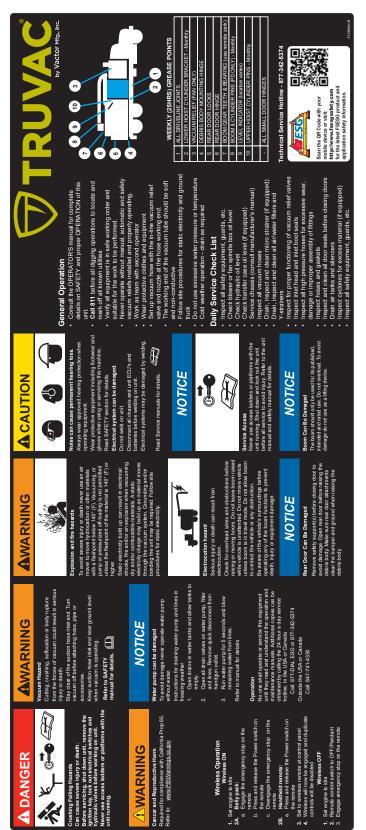
SERVICE CHECKLIST

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 blower/spindle box oil level	х	-	-		
2	Check hydraulic oil level	х				
3	Service chassis (consult manufacturer's manual)	х	х	х	х	х
4	Inspect all door seals		х			
5	Inspect all vacuum hoses	х				
6	Wash and clean entire truck		х			
7	Inspect all safety equipment, guards, etc.	х	х			
8	Inspect, drain and clean blower micro strainer	х				
9	Inspect all warning labels		х			
10	Inspect proper functioning of vacuum relief valves	х				
11	Inspect and clean debris body screens	х				
12	Inspect make/break seals	х				
13	Drain air tank(s)	х				
14	Drain silencer(s)	х				
15	Inspect and clean cyclone & dust box	х				
16	Check transfer case oil level if equipped	х				
17	Check water Y-strainer Filter Screen	х				
18	Check Body/Boom Seals for Leakage & Condition		х			
19	Check all chassis fluid levels	х				
20	Flush high pressure water pump		х			
21	Inspect and rotate vacuum suction hose			х		
22	Inspect water heater for leaks, damage, etc		х			
23	Inspect and clean water tank sensor probes				х	
24	Inspect high pressure wand and hand gun for damage	х				
25	Water pump oil and piston lube points	х				
26	Run water heater for 15 minutes if equipped			х		
27	OMSI transfer case air shift - drain air filter if equipped	х				
28	OMSI transfer case air shift - check air dryer if equipped	Х				
29	Check Y-strainer screens	х				
30	Check blower driveline	х				
31	Inspect water & hydraulic hoses for wear or damage	X X				
32	Inspect hoses and gaskets for leaks and wear					
33	Inspect make/break and boom tube seals		Х			
34	Check pressure limiting devices (hydraulic and water reliefs)		Х			
35	Air compressor if equipped (see manufacturer's manual)	X	X	X	X	X
35	Service water pump (see manufacturer's manual)	Х	Х	X	X	Х

SERVICE CHECKLIST

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



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.

Vactor

LUBRICATION CHECKLIST

MARTERANCE

	Lubrication 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	All grease zerks (unless otherwise noted)		х			
2	Lift cylinder		Х			
3	Box hinges			х		
4	Rear door hinges			х		
5	All clamp and lid screws		х			
6	Change blower oil			First	х	
7	Change transfer case oil			First	х	
8	Change hydraulic oil and filter			First Filter		х
9	Driveline joints		х			
10	Check the tightness of the blower oil case plugs			х		
11	Grease boom swivel bearing (2)		х			
12	Grease boom sleeve (3)			х		
13	Grease boom lift Cylinder (1)			х		
14	Grease boom hinge pin (1)			х		
15	Grease boom pivot pin			х		
16	Grease Debris Body Hoist Cylinder (2)			х		
17	Grease Debris Body Hinge (2)			х		
18	Grease Debris Body Door Hinge (4)			х		
19	Grease Debris Body Rear Door/Hyd. Locks (4)		х			
20	Grease Debris Body Fill Indicator (1)		х			
21	Place 3 drops of oil in each oil hole on Cat water pump			х		
22	Grease all drive shafts (3) and PTO shaft (3)		х			
22	Air compressor if equipped (see manufacturer's manual)			grease	oil	
23	Water pump (see manufacturer's manual)		500 h	irs or 3 m	onths	
	Additional for Fan	Units				
1	Change spindle box oil (Part no. 48611-30). Fill to center of eye				х	

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.

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

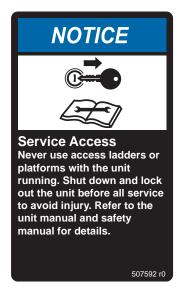
Contacting moving parts with clothes or body can cause injury or death:



- 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.



HXX

LUBRICANTS

MAINTENANCE

Transfer Cases				
	OMSI	NOTES		
1	BP Autran SYN 295	Standard Fill		
•	API 80W-90 (hydrostatic drive box in creep drive rail units)	Standard Fill		

a.	Roots Blower Lubricant				
	Fluid	NOTES			
1	Castrol ALPHA HC 220/Isolube 220	Standard Fill - refer to Root's manual for additional recommendations based on ambient conditions.			

	Hibon Blower Lubricant	
	Fluid	NOTES
1	Castrol ALPHA HC 220/Isolube 220 (Guzzler & Ace)	Standard Fill
2	Castrol SHL Lubricant 220	
3	Conoco SynCon Synthetic R&O 220	
4	Mobil SHL 630	

Robuschi Blower Lubricant				
	Fluid	NOTES		
1	Castrol ALPHA HC 220/Isolube 220	Standard Fill - refer to Robuschi manual for additional recommendations based on ambient conditions.		

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).

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 six months 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





Hydraulic Oil Filter

The oil filters supplied by Vactor/Guzzler are equipped with a high efficiency absolute filtering media. Many common 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/Guzzler uses and recommends only the use of absolute filters.

The hydraulic oil filter is normally located on the driver side above the hydraulic oil tank.

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.

If equipped, 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.

To change the filter, follow these steps.

- 1. Shut down the system and relieve pressure in the filter line.
- 2. Remove the housing.
- 3. Install the new element.
- 4. Pre-fill the new style housing to the top of the filter element. This reduces the amount of air introduced into the system
- 5. Reinstall the housing
- Start the hydraulic pumping system and check for leaks. If oil seepage is noted, apply additional hand torque to the canister until seepage stops.





MAINTENANCE

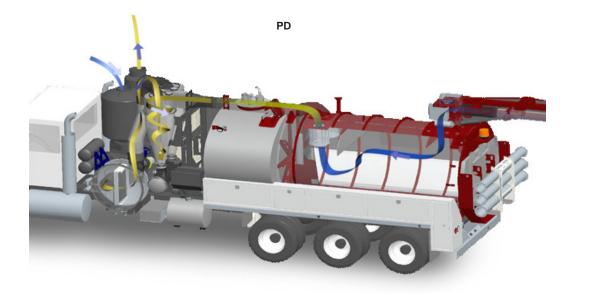
MATERIAL FLOW

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.





HXX

PRE-JOB / DAILY CHECKLIST

MAINTENANCE

	Pre-Job/Daily Checklist					
	Engine Off, Engine Cool			Engine ON		
Check	Item	Date	Check	Item	Date	
	Radiator Coolant		Ì	Engine Sound and Exhaust		
	Battery Water			Foot Brakes		
	Hydrometer	1		Emergency Brake		
	Drive Belts			Power Steering		
	Fan			Cab Lights		
	Alternator			Headlights		
	Crankcase Oil			Taillights		
	Fuel Tank			Turn Signals, Rear		
	Transmission Fluid		Ì	Turn Signals, Front		
	Brake Function		1	Clearance Lamps, Front		
	Brake Fluid		Ì	Clearance Lamps, Rear		
	Instrument Gauges		1	Marker Lamps, Front		
	Windshield Wipers	1	Ì	Marker Lamps, Rear		
	Windshield Washers	1	İ	Instrument Panel Lamps		
	Mirrors		1	Instrument Panel Gauges		
	Tire Wear	1	İ	Horn		
	Tire Damage		Ì	Heating and Ventilating		
	Tire Inflation	1		Air Conditioning		
	Hoses		Ì	Mirrors		
	Frame			Test Drive		
	1			1		
	Engine Off			Engine On, Park Brake Set		
Check	Item	Date	Check	Item	Date	
	Hydraulic Pump Oil Level	1	Ì	Open Rear Door		
	Blower/fan spindle box Oil Level		Ì	Install Rear Door Safety Prop		
	Vacuum Relief Valves	1	İ	Inspect Vacuum Float Balls		
	Transfer Case Oil Level			Inspect, Clean Rear Door Seal		
	Access Door Secured			Store Rear Door Safety Prop		
	Hoses, Tubing, and Loose Items Secured			Close Rear Door		
	Water Pump Case Oil Level			Hydraulic Pump ON when PTO is Engaged		
				Verify Blower/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.

WATER PUMP RELIEF PRESSURE

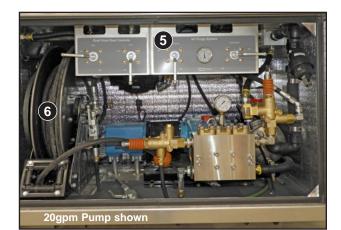
Monitor the relief pressure on the water pump weekly.

- 1. Insert a small nozzle tip on the end of the handgun.
- 2. Increase the engine rpm to achieve 3000 psi reading on the water pressure gauge.
- 3. Increase the engine rpm further. If the system is operating correctly, the pressure should not exceed 3000 psi.
 - 1 Water Pump
 - 2 Unloader Valve
 - **3** Pressure Relief Valve
 - 4 Water Lance Ball Valve

5 Air Purge Controls6 Water Hose Reel







WATER PUMP SERVICE

MAINTENANCE

Refer to the manufacturer's manual for service details.

Notes:

- 1. First oil change on a new pump is at 50 hours.
- 2. CAT Pumps oil change interval is three months or 500 hours, whichever comes first.
- Vactor requires a special oil for use in all CAT Pumps models that provides additional protection in high ambient temperatures. The Vactor part number is 41600A-30. Consult Vactor Parts or Service for other container sizes.







Refer to manual for details.

41600B

WINTERIZING WATER SYSTEM

MAINTENANCE

Winterizing

Draining the water system

- 1. Remove Y strainer water filter and leave out.
- 2. Open the tank drains and leave them open. The composite water tank has two drain valves.
- 3. Allow water to drain from the system.
- 4. Slowly cycle the T handled drain valves to drain any residual water and leave open.
- 5. Unwind all hose to allow the water to drain.
- 6. Turn the water pump on for no more than 10 seconds to push water out of the pump.

If equipped with air purge

- 7. If equipped set the dual hose real valves to rear ON and Front OFF.
- 8. Open the ball valve at the end of the hose on the hose reel to depressurize the system and remove the valve assembly.
- 9. Open the FILL RESERVOIR valve on the Air Purge and close when the gauge shows 90psi.
- 10. Close the charge pump isolation valve.
- 11. Turn the water pump on for 10-15 seconds at lowest speed while SLOWLY turning on PURGE SYSTEM. Allow the air to drop to 15psi, recharge tank to 90psi and repeat purging until all the water is drained.
- 12. Repeat purging procedure to blow out the hose reel and lines until all the water is drained.
- 13. Place the Fill reservoir and Purge System ball valves in the OFF position.

For all units

- 14. Slowly rewind the hose onto the hose reel.
- 15. Open the two charge pump drains.
- 16. Open all mini ball valves on the pump.
- 17. Open the charge pump isolation valve.
- 18. If equipped set the dual hose real valves to rear OFF and Front ON and repeat purging process.
- 19. Disengage the hydraulics.
- 20. Put the water pump ball valve in the OPEN position.

If equipped - Anti-Freeze System

Prepare for transport

- 1. Turn off the water to the water pump.
- 2. Open the antifreeze tank and pump valves.
- 3. Operate the handgun at low speed until antifreeze can be seen coming out the nozzle.
- 4. Stop the handgun and shut down the water pump.
- 5. Close the anti-freeze tank and pump valves.
- 6. The water pump is now ready for transport.

Refer to manual for details.

AWARNING

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).

NOTICE

Water pump can be damaged

Do not operate water pump without water.

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.

If equipped - Anti-Freeze System Prepare for use

- 1. Turn off the water to the water pump.
- 2. Attach the handgun hose to quick coupling return to the anti-freeze tank.
- 3. Operate the water pump at low speed until all the anti-freeze has been pumped from the system.
- 4. Shut down the water pump.
- 5. The water system is now ready for use.

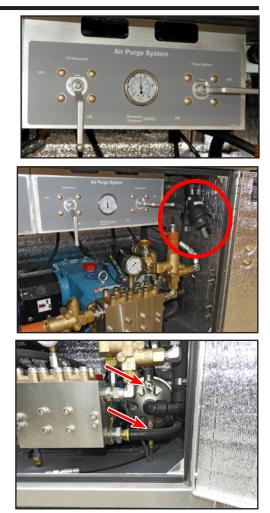
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WINTERIZING WATER SYSTEM

Follow the steps indicated below for winterizing the water system.

- **Note:** The water system should be drained. See the section entitled "water tank" in the Operations Section.
- Open the ball valve at the end of the hose on the hose reel and pull the hose off the reel to allow all of the water to be purged from it.
- Turn water pump on for 10 seconds to push any water out of the pump.
- Open the ball valve on the Air Purge panel marked FILL RESERVOIR. Close the ball valve when the gauge shows 100 psi.
- Turn on the ball valve marked PURGE SYSTEM. Allow air pressure to drop to 40 psi. Close ball valve. Recharge tank to 100 psi and repeat purging the heater until all water is drained.
- Remove the water filter.
- Repeat purging procedure to blow out the hose reel and lines until all water is drained.
- Allow the hose to go back onto the reel slowly. This will ensure all of the water has been purged from it.
- **Note:** The purging procedure should be repeated prior to starting a new job to be sure all lines are free of ice.
- Open the two (2) boost pump drains indicated by the arrows in the picture in the lower right.
- **Note:** The composite water tank is made in two sections. The main drain valve will drain most of the water out. A smaller drain plug is located on the passenger side about in front of the rear wheels to remove the remaining water in that tank section.

MAINTENANCE



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.

CLEANING THE CYCLONE

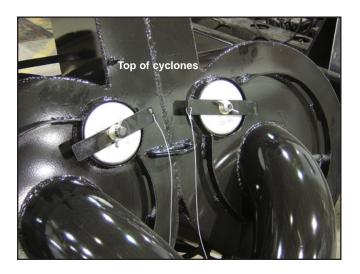
The vacuum filtration system requires some specific cleaning for optimal operation. The cyclones need to be cleaned when a job is completed, the unit will be driven and parked between work, or there will be more than a shift of downtime between work.

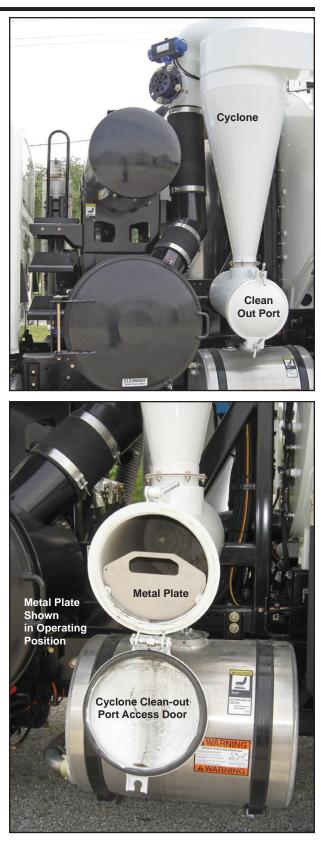
Some special conditions may require more frequent cleaning, such as high humidity combined with certain materials.

Access to the interior of the cyclone for cleaning purposes can be gained through the top and bottom. From the top of the cyclone, material and debris can be swept into the clean out ports along the perimeter of the housing. The clean out ports are openings in the top of the cyclone that allow debris to fall to the bottom of the cyclone for later removal. At the bottom of the cyclone housing, the access door can be opened and the material that has fallen and collected in the bottom of the housing can be completely removed.

After each operation clean and wipe down the access door on top of the cyclone, the door gasket and its mating surface.

Note: When swinging the bottom access door open, it is advisable to stand to the side. When the door is opened, excess material may be released.



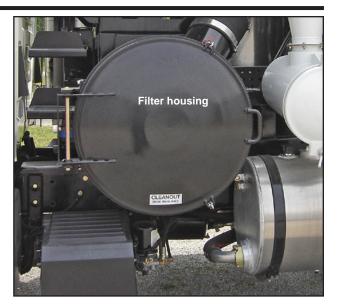


MAINTENANCE

Filter

A drain is provided at the bottom of the filter which is used to drain any excess moisture that has collected in the filter during operations. It is closed during normal operations. At the end of the day, the drain is opened to drain the water. The drain is opened by unlatching both latches on each side of the drain cap and pulling the cap off. The drain cap has a safety chain attached to it and the safety chain is attached to the bottom of the filter. This keeps the drain cap from being inadvertently misplaced.

- **Note:** Further disassembly and cleaning of the filter may be required if a lot of material (water, etc.) comes out of the drain.
- **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.



MAINTENANCE

Воом

MAINTENANCE

Hose

The flexible hose connected to the boom should be rotated end to end as well as turned on its axis 180 degrees. This should occur on a regular basis and at least no later than 100 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.

Lubrication

Lubricate the boom bearing weekly, check for leaky hoses, loose connections, loose or broken wiring, and hardened vacuum hoses.

This unit is equipped with a special heavy-duty swivel bearing and a worm gear drive. The bearing has three grease zerks. Two are on the inside and one is on the external gear. This bearing must be lubricated weekly, or every 25 operating hours. The boom must be rotated in 45 degree increments when greasing. Coat the gear teeth with grease.

Note: Failure to rotate the boom when greasing can cause premature failure of the bearing. Any one of the grease fittings can be used. It is not necessary to grease all three fittings.

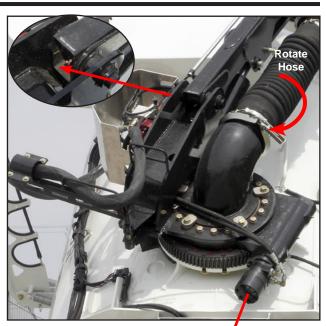
Grease all boom pivot points. Fully extend the boom and wash it down including the tube seals. Then grease the extension.

Note: If the seal is squeaking when extending or retracting, do not grease it. The seal is dry and/or dirty. Maintain a clean boom, inside and out, to alleviate problems.

Cleaning

A buildup of dirt in the hose will cause leaky boom seals and the majority of boom malfunctions. Run clean water through the boom at least on a weekly basis, preferably after each job is finished.

Rinse off the outside of the boom when extending or retracting to keep the seal moist and clean.



Prodigy boom shown



PD - TRANSFER CASE

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.

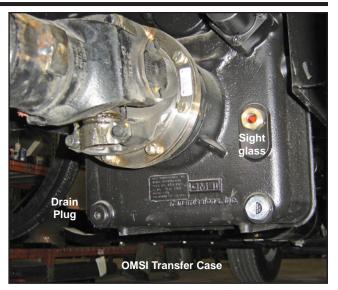
Check oil level daily and service as needed. Fill to center of sight glass. Every 500 hours or six months, whichever comes first, drain, flush and refill with BP Autran SYN 295 or equivalent. Verify with the case ID tag.

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.

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

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).



Never allow vehicle to idle with blower engaged. The blower should not be operated at idle rpm's. To reduce wear on the transfer case run up the engine RPM until the transfer case gear noise smooths out. Some units with manual transmissions may need to go as high as 1200RPM's.

MAINTENANCE

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



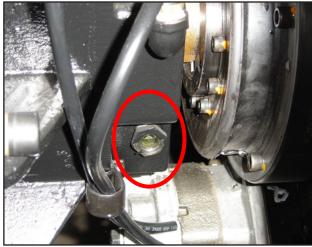
Check blower oil daily or the start of each shift.

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 manufacturer's manual.









PD - BLOWER OIL CHANGE

Blower oil should be drained and replaced every 500 hours or whenever it becomes contaminated by water, chemicals, or any material which could cause congealing or be abrasive.

Oil changes at more frequent intervals may be necessary if oil condition becomes poor.

Remove debris from the oil fill plugs and sight gauges of the blower.

Oil draining

In the event of temperatures below 68° F (20°C) let the machine run for several minutes in order to heat the oil and to make it more fluid.

- 1. Remove the upper fill plugs (one each end).
- 2. Remove the drain plug at each end and let the oil flow out completely.
- 3. Install and tighten the draining plug. Replace sealant on fill plugs (use LOCTITE PST56747 or equivalent).

Oil filling

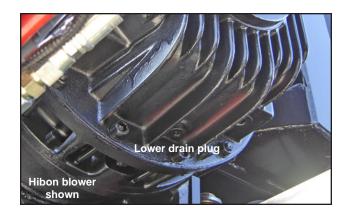
- 1. Remove the upper fill plugs (one each end).
- 2. Fill the tank to the maximum level in the sight gauge (about 3.15 quarts in each end).
- 3. Install and tighten the fills plugs.
- 4. Start the unit up and run the blower about 1000 rpm for 10 minutes Stop the blower and let the levels stabilize for about 30 minutes.
- Check that the oil level at each sight gauge is correct. Add oil as required to bring it to the center of the sight gauge on the rear gauge. The front gauge should be in the middle of the upper half of the sight gauge window.
- **Note:** Do not overfill the blower. 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.

Verifications and regular maintenance

If the oil sight gauges are dirty and make verification difficult, completely clean the cases and/or replace the gauges.









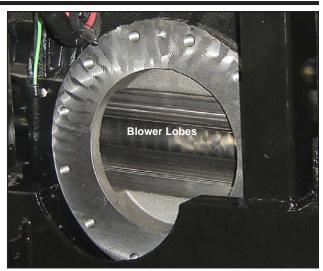
MARTERATION

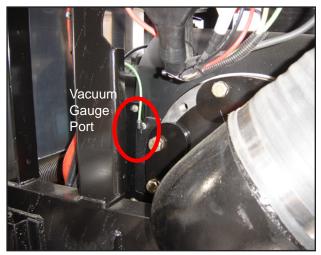
PD - BLOWER - STORAGE

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.

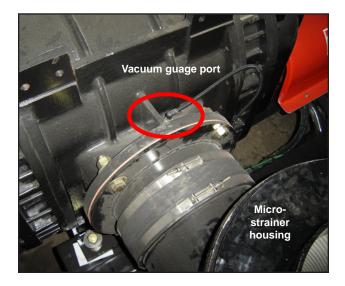
Short term in high humidity conditions allow the blower to run for 3-5 minutes with the vacuum relief open to dry out the system. Then with the blower at idle speed and the vacuum relief open spray up to 8 ounces of Liquid Wrench® NONFLAMMABLE Penetrant and Lubricant L312 or L-412 or equivalent rust preventative in to the vacuum relief or in the vacuum gauge port (remove hose to gauge first).

Leave the drain plugs out of the microstrainer housing when not in use. This prevents rain water from building up in the microstrainer housing.





Vacuum gauge port location varies with blower



MARPERANCE

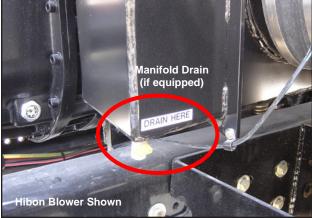
PD - BLOWER - SOUND SYSTEM

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.





MARTERANCE

PD - FILTER HOUSING

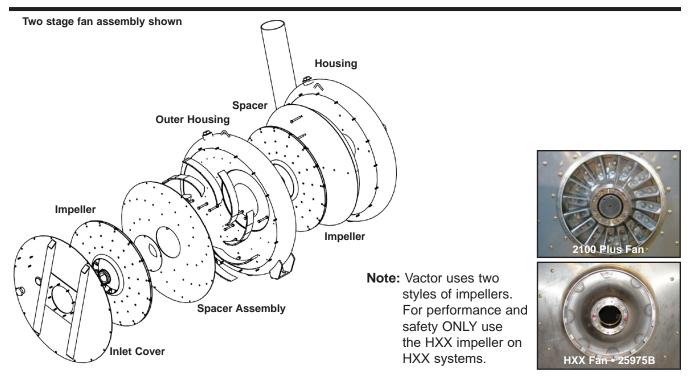
A drain is provided at the bottom of the filter which is used to drain any excess moisture that has collected in the filter during operations. It is closed during normal operations. At the end of the day, the drain is opened to drain the water. The drain is opened by unlatching both latches on each side of the drain cap and pulling the cap off. The drain cap has a safety chain attached to it and the safety chain is attached to the bottom of the housing. This keeps the drain cap from being inadvertently misplaced.

- **Note:** Further disassembly and cleaning of the filter may be required if a lot of material (water, etc.) comes out of the drain.
- **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.

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HXX

FAN - IMPELLER ASSEMBLY



Assembly procedure for Vactor Mfg. spindle box, part number 48312A

1. Place the spindle box on fan base weldment. All four feet of the box must stand-flat at the same time on the base.

If the box does not sit flat on base weldment, **do not proceed.** Consult the factory.

- Bolt down the box to base. Check the fan shaft to fan housing for perpendicularity. The shaft should be centered and square to housing back plane.
- 3. Remove motor mount shipping cover.
- 4. Lubricate the internal and external drive splines with Vactor Mfg. part number 48611-30 synthetic lubricant.

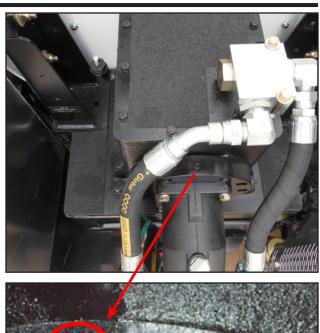
Do not substitute any other lubricant. Do not leave drive splines dry.

- 5. Assemble O-ring (part number 48327-30) on to motor pilot face. Keep the O-ring in place with as little grease as possible.
- 6. Align and slide the drive splines together. Splines should fit together snugly.

Note: Do not hammer the hydraulic motor into the housing. Striking the motor can damage internal motor and spindle box bearings and/or components.

If the splines are too snug to hand assemble, install alignment pins in bolt holes at opposing corners of motor mounting pad and install threaded rods in remaining bolt holes of motor mounting pad. Place machine nuts over the threaded rods and evenly draw the motor into the housing while slowly rotating the shaft. Do not use excessive torque, splines should be snug but not tight.

- 7. Remove the alignment pins and threaded rods, if used, and replace with assembly bolts.
- 8. Fill the spindle box with 10 quarts of Vactor Mfg. part number 48611-30 synthetic oil (Shell Omala 68) or equivalent. Remove fill vent plug or leave motor slightly loose in housing to vent air as oil enters box. Fill the box through the vent tube to the midpoint of the sight eye.







9. After assembly is complete, run the unit for several minutes to circulate oil throughout the box. Shut the unit down. Immediately after the fan has come to a complete stop, check the oil level in the sight gauge. Do this before any oil has had a chance to flow back into the sump. Top off to the midpoint of the sight eye. This oil level should only be checked after the unit has been run.

Note: It is normal for the oil level to be above the midpoint on the gauge at cold start-up.

HXX Fan - Expandable Shaft Coupling 47801C

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Assembly procedure

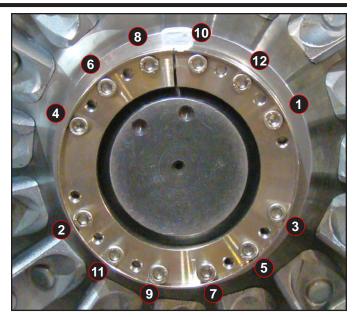
- 1. Remove coupling from wrapper; retain instructions included with wrapper.
- 2. Remove all visible oil, grease, debris, etc from surface of shaft and coupling.
- 3. Slowly slide coupling into impeller hub. Coupling should protrude slightly from back face of impeller hub. If coupling does not extend completely through hub then: remove coupling from hub, remove excess weld bead from front of hub bore, and reinsert coupling into hub. Repeat this action, removing excess weld bead, until coupling does protrude slightly from back 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 12 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.

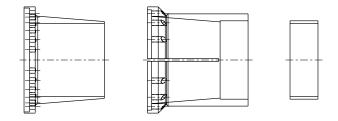
The coupling may be loosened and retighten as often as needed to adjust the impeller assembly. However, once the bolts have been torqued passed 105 in-lbs they cannot be reused. If they are loosened, they MUST be discarded and replaced with new bolts! It is critical that any adjustments needed for proper assembly be done prior to final torquing in the assembly process.

47801BA - REPLACEMENT BOLTS

- 9. Increase torque in increments of 25 in-lbs.
- 10. When balancing the impeller, torque the bolts to 75in-lbs 11. When assembling the coupling in the final impeller / shaft assembly, torque bolts to 144 in-lbs.



Torque sequence



Note: Coupling is rebuildable. Brass bushing must not be reused if damaged. Contact Vactor Parts and Service for assistance.



FAN CLEANING

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 impeller housing. Drain hoses are normally routed out on the passenger side.



The fan must be off during WARNING cleaning.

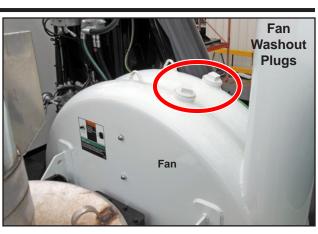
Cleaning the Impeller

- 1. Dump the debris body.
- 2. Shut down the fan.
- 3. Remove the expansion drain plugs from the drain hoses.
- 4. Remove the impeller washout plugs on top of the impeller housing.
- Using a low water pressure, high flow nozzle 5. on the hand gun, insert the hand gun nozzle into the washout ports.
- 6. Thoroughly clean the impeller and inside housing. Slowly flush out any debris in the impeller housing. The flow of water will rotate the impeller as you are flushing it, giving you an opportunity to view the surface of the impeller.

Do not allow any carryover debris to remain in the impeller housing or it will lead to impeller wear.

6. After washing out the impeller and housing, use a flashlight to inspect the impeller blades









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.

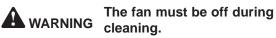
MANNERMANICE

FAN CLEANING

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 air exhaust stream.

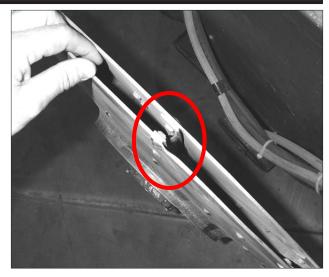
7. If necessary, replace the impeller(s).

Optional fan housing washout system



This system is part of the handgun system. To use:

- 1. Open drain to each housing.
- 2. Activate the water pump.
- 3. Continue running water until the housing drains run clear.
- 4. Set the water pump to OFF.
- 5. Reinstall drain plugs to each housing if needed.
- **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.



Worn Fan



Good Fan

After inspecting impeller(s) realign nozzles to face rearward when reinstalling hole plugs. Verify that nozzles are not plugged.



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HXX Fan

FAN - VACUUM VALVE SYSTEM

The vacuum valve is an air actuated butterfly valve that when deactivated, eliminates most of the air flow to the vacuum hose by allowing air to be drawn directly through the valve into the fans and debris body. Vacuum in debris body is also relieved.

The valve is activated using the pendant control, wireless, or main panel. All E-stops also activate the vacuum valve.

Refer to the butterfly valve adjustment page for details on servicing.

Vacuum valve

HXX Fan Fan - Hydraulic Component Start-up Procedures

Closed Loop Pump and Motor Start-Up

From a hydrostatic component standpoint, the goal at system start up is to put into functional operation, the hydrostatic system in such a way as to preserve the designed life span of the system. The following start up procedure should be adhered to whenever a new pump or motor is initially installed into a machine, or a system is restarted after a pump or motor has been removed and/or replaced.

- Fill the reservoir with hydraulic fluid. This fluid should be passed through a 10 micron filter prior to entering the reservoir. The use of contaminated oil will result in damage to the components.
- Fill the pump and/or motor housing with clean hydraulic fluid. Fill the housing by pouring oil into the upper most case drain port. This will ensure that the housing contains as much oil as possible and offers the greatest amount of lubrication to the internal components.
- Fill the inlet line leading from the reservoir to the pump if there is not significant head pressure from the oil tank. It is crucial that air trapped in this line is purged out before starting the unit.
- Fill the main loop lines with clean hydraulic fluid. Removing the connection from the highest point is the best way to fill these lines.
- Install a 1000 PSI pressure gauge in the charge pressure gauge port in order to monitor the charge pressure during start up. 1000 PSI pressure gauge is p/n 40799B.
- With the engine at idle engage the split shaft and monitor the charge pressure. Once charge pressure is established, let the system run at idol for an additional 5 minutes.
- After running the system for about 5 minutes at minimum engine RPM, Engage the fan. This will cause the oil to flow and purge any remaining air from the loop lines

If charge pressure remains constant and all of the previous steps have been taken, the system can be run at normal operating RPM.

TRUVAC

PRESSURE WASHING/CLEANING

Units may be equipped with a 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 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. The handgun must not exceed 3000 psi or a maximum volume of 10 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.

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 3000psi 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.



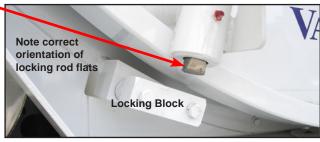
REAR DOOR LOCK ADJUSTMENT

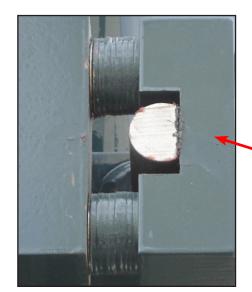
The rear door will need adjustment to compensate for seal wear. There are two adjustments available. The locking blocks are attached to the debris body and are used to set an even spacing for the door seal. These will not normally need to be adjusted.

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.

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)
- 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:

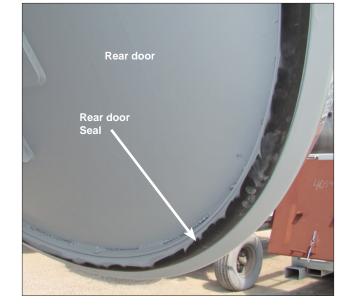


body before using machine.

Refer to manual for details.

the hydraulic functions to prevent death, injury or equipment damage.

1800128 r



- 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

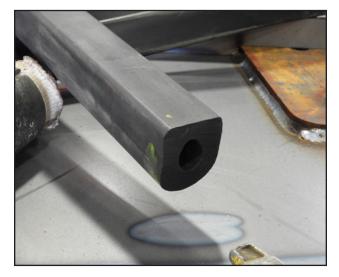
MAINTENANCE

Procedure When Replacing the Door Seal

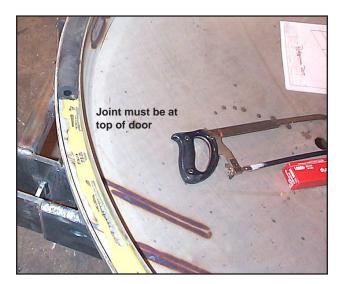
- 1. Completely remove the seal and clean the seal channel of all glue and dirt.
- 2. Apply a generous amount of adhesive to all sides of the seal channel.



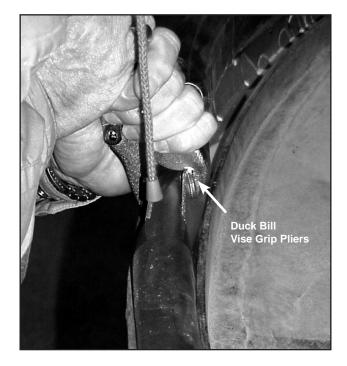
3. Make sure the end of the seal is cut squarely for a proper seal at the end of the procedure. A hacksaw works well.



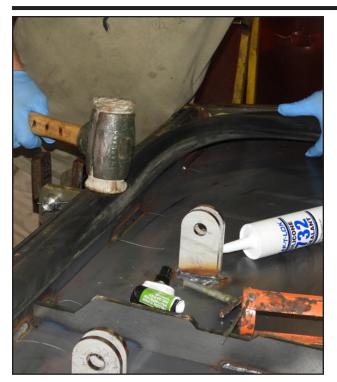
4. Starting at the top of the door, place the flat surface of the new seal into the seal channel.



- 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.



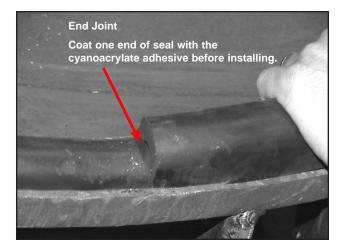
Rear Door – Seal



- 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.



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.

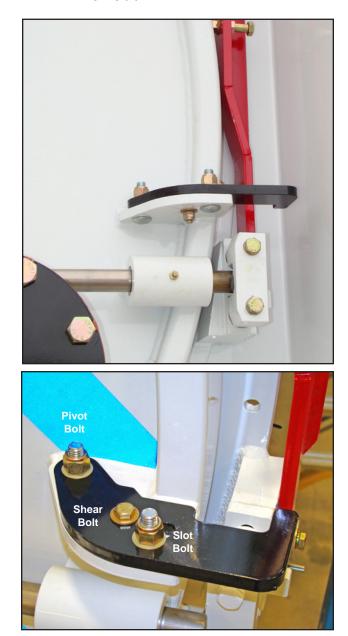
Remove the pivot and slot bolts and replace if damaged with standard grade 5 bolts. Reinstall all washers as shown.

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).



BODY LOCKS

The debris body is equipped with body locks to keep the debris body properly in place when on uneven ground. One lock is located on each side of the subframe just behind the debris body hoist cylinder. Chassis frame can twist moving the debris body and preventing proper engagement of the inlet/outlet seals resulting in a loss of vacuum.

Each lock air cylinder is equipped with a sensor that verifies that the lock has disengaged.

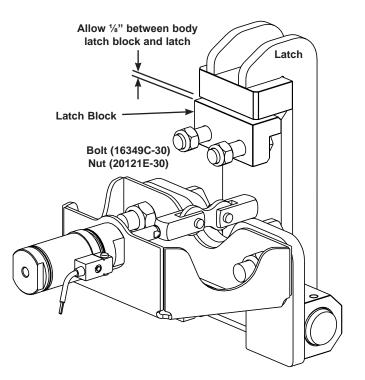
The lock assemblies do not require any normal service beyond normal wash down cleaning.

The debris body lock has a break-away feature. The latch block bolts will shear off with a loud popping sound in the event the body locks do not properly disengage when raising the debris body. The Body Lock/Unlock Override Switch is used when the locks may not engage or disengage due to chassis frame twisting when on uneven ground.

Replacement bolts must be $\frac{1}{2}$ -13UNC x 2" long grade 5 only.







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.*

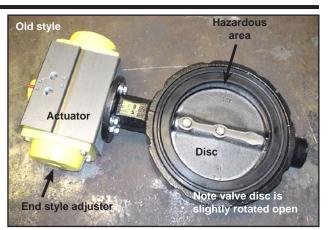
Butterfly pneumatic actuators are designed to allow adjustment without the removal of the actuator end caps. Typically there is a jam nut located on each end of the actuator in the center of the end cap. Newer style butterfly valves have the adjuster bolt on the side of the actuator. One adjuster controls 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 OPERATED VACUUM RELIEF VALVE

Vactor

The air operated vacuum relief 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 or optional wireless remote. Proper operation should be verified daily by verifying 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 relief 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. Do not 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 relief valves to ensure proper valve operation. See the section "Vacuum Relief Valves" in the Operations section.

The vacuum relief valve is actuated by a switch located on the main control panel or a switch located on the pendant control. The switch controls an air valve which sends air pressure to the valve either opening or closing, whichever is needed. The vacuum relief valve needs to be open for normal vacuuming using the boom and debris hose. When the vacuum relief valve is closed, air flow is blocked to the boom and debris hose.











AIR OPERATED VACUUM RELIEF VALVE

Whether it is manually or automatically operated, a switch energizes an electric over air solenoid valve. This allows pressurized air to fill a chamber on the actuator for the butterfly valve which opens or closes depending on whether the 'on' or the 'off' solenoid is actuated.

As with any other electrical system in Vactor products, the master switch 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. It is in very rare cases that there is a mechanical reason for the failure of the valve. 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. 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.



hazard Moving parts can crush and cut. Keep clear when valve or mechanism is operating.

Electrical

Is the master switch in the control panel turned on? Check for loose connections at the mating plugs. Open the control panel door and check for blown fuses, 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.

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.

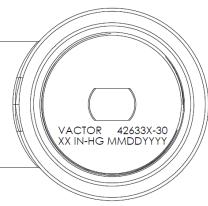
The relief valve opens at a preset level to admit extra air into the blower. The valve will whistle when this happens. Steps should be taken to reduce the vacuum.

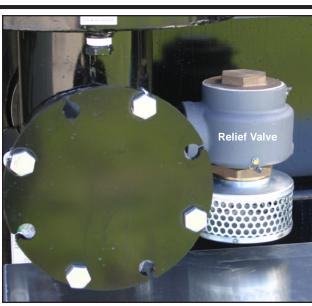
Mid-2020 Vactor started using a second supplier for vacuum relief valves. Both are supplied using the same part numbers for the 15, 16 and 18 IN-HG applications. The new valves can be identified by the stamping shown. The new valves are not user adjustable and must be replaced.

Note: The new 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.

Adjusting the older Kunkle Relief Valve

- 1. To adjust, start the blower.
- 2. Then block off the intake pipe to about 80 percent.
- 3. Slowly raise the RPM and watch the vacuum level rise.
- The relief valve should start to open at 1-1/2" HG less than the blower rating and be open fully at the rated inches of HG.
- 5. Reduce the engine RPM to idle and remove the intake pipe block.







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. 1800173



NEVER adjust the valves with vacuum on the system.

- 6. Loosen the set screws on the top of the valve and, with a large pipe wrench, screw the top of the valve in or out to adjust the level at which the relief valve opens.
- 7. Start back at step 1 and repeat as required.
- 8. These valves can also be disassembled, cleaned and reset.

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 or service 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.





Vactor BLOWER - KUNKLE AUTOMATIC RELIEF VALVE - SERVICING

Kunkle brand vacuum relief valves (Automatic Valves) are preset at the factory to the setting suitable for the particular unit. If it becomes necessary to service them it is very necessary that the valves be reset to the correct setting before putting them back in service. Below is the service and resetting procedure for these valves. Vactor Manufacturing Inc. accepts no responsibility for damage caused by improper or unauthorized resetting of the valves. Over a period of time, especially if the valves operate frequently they may suck in some dirt which might either clog them and prevent their function or wear them out causing damage to the seats and cause leaks.

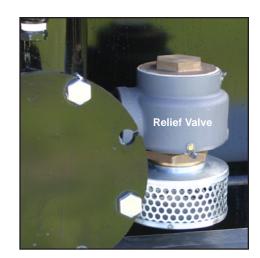
To service the valves, remove them from the unit and work on a clean work bench. Clamp the valve in a vise using soft jaws to prevent damage to the cast shell. Do not over tighten the vise as the valves might distort causing difficult dismantling and damage to the threads. Remove the two screws holding the identification plate and the plate and save them. Using a suitable tool, scrape off the silicone bead around the cap. Slowly loosen the cap and remove it.

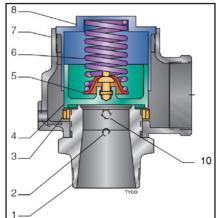
Remove the spring and the seat. Check the seat for deep scoring or pitting marks at the seating surfaces. Check for burrs, wear marks or cracks. Check for spring deformity or rust/ corrosion on coils. Check for damaged threads or cracks of the valve body. Replace if any component is observed to be damaged. Clean all components in parts washing solution and air dry. Assembly is reverse of disassembly. Do not lubricate any part as it might attract dirt and cause unnecessary wear.

Press down firmly on the cap after seating the spring and start the threads. Do not tighten the cap more than two or three turns as the valve still has to be set. Do not install the identification plate or its screws yet. Apply liquid or paste Teflon on the male threads of the nipple welded on the micro-strainer or the blower hat or the blower box as the case might be and screw on the female side of the automatic valve by hand. Tighten the valve on the nipple no more than one turn with a wrench. Point the opening of the valve downwards or between 4 o'clock and 8 o'clock positions, never upwards.



The valve is spring loaded. Use care while dismantling the valve. Always wear safety glasses and protective gloves while working with the valves.





Automatic Vacuum Relief Valve			
Item	Description		
1	NOZZLE		
2	SET SCREW		
3	REGULATOR DISC		
4	DISC		
5	SPRING STEP		
6	SPRING		
7	BODY		
8	COMPRESSION SCREW		
9	STEM		
10	REGULATOR RING SET SCREW		

Vactor BLOWER - KUNKLE AUTOMATIC RELIEF VALVE - SERVICING

MAINTENANCE

Setting The Valve

Attach an accurate vacuum gauge (+/- 2% accuracy) to the tee provided at the blower inlet. (One side of this tee is already attached to the vacuum gauge in the control panel, the other is plugged, remove this plug to attach the test vacuum gauge). Make sure that all doors and ports on the truck are shut except for the vacuuming port farthest from the blower (rear port hole or the boom vacuuming port).

Cap off all Automatic valves except the one that is to be set. If more than one are to be set, set them one at a time, capping off all but one. Have a thick board, large enough to cover the vacuum port and strong enough to resist a strong vacuum, handy. Start engine and engage the blower following the normal blower engaging procedure. Increase the RPM with the throttle at the control panel to about 1500. Place the board on the port covering it about 3/4th of the opening. Gradually increase blocking of the opening till the valve just begins to open (you will hear a whistling sound and if you put a thin sheet of metal at the valve opening you can feel it suck in). At this point, note the vacuum reading on the test vacuum gauge. Tighten the cap to increase the setting and loosen it to reduce the setting. Tighten or loosen the cap in small increments and repeat the procedure till the valve just opens at the recommended vacuum. (Check your blower manual for vacuum capabilities/settings of your unit).

Note: Do not set the Automatic valve(s) at a higher vacuum than it/they was/were originally set at. Doing so will not only void any warranties but also seriously harm the blower.

After setting the relief valve, cross check it once more and then install the identification plate and its screws. These screws hold the cap in place and prevent it from vibrating loose and so prevent the setting of the valve from changing. Run a bead of silicone caulk at the join of the cap to the valve body to prevent any vacuum leakage at that point. Do not operate the machine till the silicone is dry or it will get sucked in and defeat its purpose.







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.

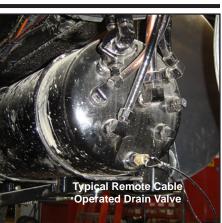
Freezing conditions can create situations where the frozen water can slow down or stop the proper operation of the various components in an air system. This can include chassis brakes, air valves and air cylinders that operate safety systems such as vacuum reliefs. When operating under these conditions 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.

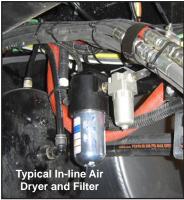
Consult the Vactor Manufacturing Service Group for recommendations and systems suited to your applications.







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.



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

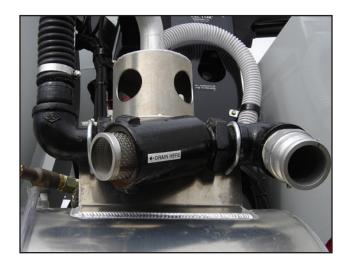




3" Y-strainer on water pump - Disassembled



2" Y-strainer at water fill - Disassembled



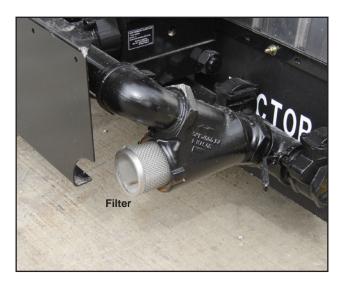
Y-Strainer

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.

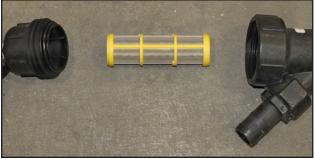
The second gasket seals the cover to the filter screen. If this gasket is missing, debris can bypass the filter screen and get into the water tank and eventually into the water pump causing damage to the pump. Both gaskets must be intact and in place. Replace any damaged or missing gasket.

Circle Ci



Typical composite Y Strainer. Cap unscrews to remove filter.







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.





Series	Strap & Bolt Kit P/N	Bolt Torque (Ft-Lbs)
1710	48332D-30	115-135
1760	48332D-30	115-135
1810	48332D-30	115-135
SPL250	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 Applications					

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	
EM	0.4	1.3	1.5	
M4	2.2	3.3	3.7	
M5	4.5 6.5 7.5		7.5	
M6	7.5 11.0 13.0		13.0	
MB	18 30 33		33	
M1O	35 50 63		63	
M12	65 95 1		110	
M14	105 150		177	
M16	160	235	277	
M20	320	460	542	
M24	550	790 937		

	TORQUE IN 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 1		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 TOROUED TO GRADE 8.8 STANDARDS

Troubleshooting

Troubleshooting

SUCTION

Trouble	Probable Cause	Remedy
	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.
Air volume (suction) at hose pickup point drops.	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
		Switch to rubber hose or steel pipe.
Hoses soften or melt.	Material is too hot for plastic 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

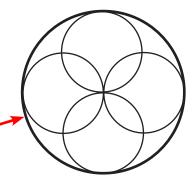
If ice builds up in the boom, shut down the vacuum system. Use hot water to heat the boom tubes or move the vehicle to a warm place. Slowly retract the boom when the tubes have warmed up. Do not retract the boom with ice build up in the vacuum tube. Damage to the boom and/or seal can occur. If hot water 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.

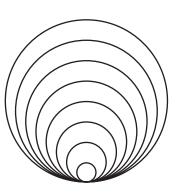
SUCTION

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 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 is 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?

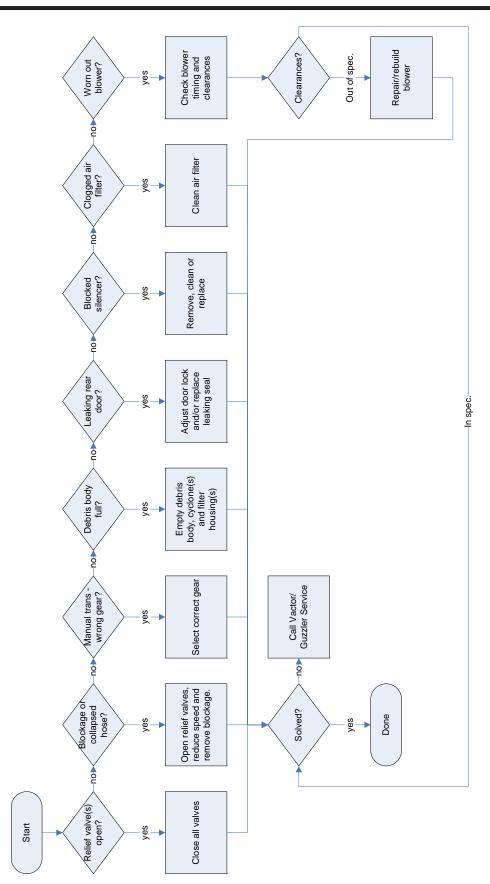
Any dust particle that passes through the system, however small it may be, at the high speed it is traveling sand blasts the internals of the blower and eventually wear it out. The tolerances between the moving and stationary parts in a blower are very minute and they get even smaller as the metals expand 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.
- 8. 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.

HXX



HXX

FILTRATION SYSTEM - CYCLONES (OPTIONAL)

TROUBLERERATION

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.	

Rear Door

Trouble	Probable Cause	Remedy
Rear door will not operate.	Hydraulic pump is not engaged.	Engage hydraulic pump.
	Leaks and blockages.	Check hydraulic oil level in sight gauge. Ensure main supply valve is open.
		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.
	Electrical	Check for power at fuse.
		Check dump function solenoid coil.
		Verify switches and relays
Rear door leaks on way to dump site.	Leaking rear door seals.	Seal is not holding. After dumping, clean off seal and inspect gasket for cuts.
		Replace door seal.
		Adjust door locks

BLOWER

Trouble	Probable Cause	Remedy
Noisy.	Low oil.	Check sight gauge and add oil.
	Bearings bad.	Disassemble and replace.
	Timing out	Place transfer case in neutral and with engine OFF manually rotate the blower. If interference is felt call service.
	Low RPM	Never allow vehicle to idle with blower engaged. The blower should not be operated at idle rpm's. To reduce wear on the transfer case run up the engine RPM until the transfer case gear noise smooths out. Some units with manual transmissions may need to go as high as 1200RPM's.
Runs hot.	Too much or too little oil.	Check sight gauge and service as needed.
	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.
Bearing cover paint discolored.	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.

BLOWER

Trouble	Probable Cause	Remedy
No vacuum	Doors not sealed.	Secure locks, check for debris; replace seals if worn.
	Clamps on joints not sealed	Check for proper attachment.
	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
Protective strainer plugged (float ball cages)	Screen assemblies plugged	Dump debris, open body, lower safety props, clean screens.
	Float balls stuck.	Remove and flush with water or air.
No air flow.	Engine speed too low.	Verify engine operation
	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.



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
	Engine speed too low.	Verify engine operation
	Excessive discharge pressure.	Check inlet vacuum and discharge pressure, and compare these figures with 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.
Dust plume through blower (silencer) exhaust.	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.
	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.
	Overloaded microstrainer.	Open the microstrainer door and clean out the housing area. NOTE: 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.

NOTICE

Machine Can Be Damaged

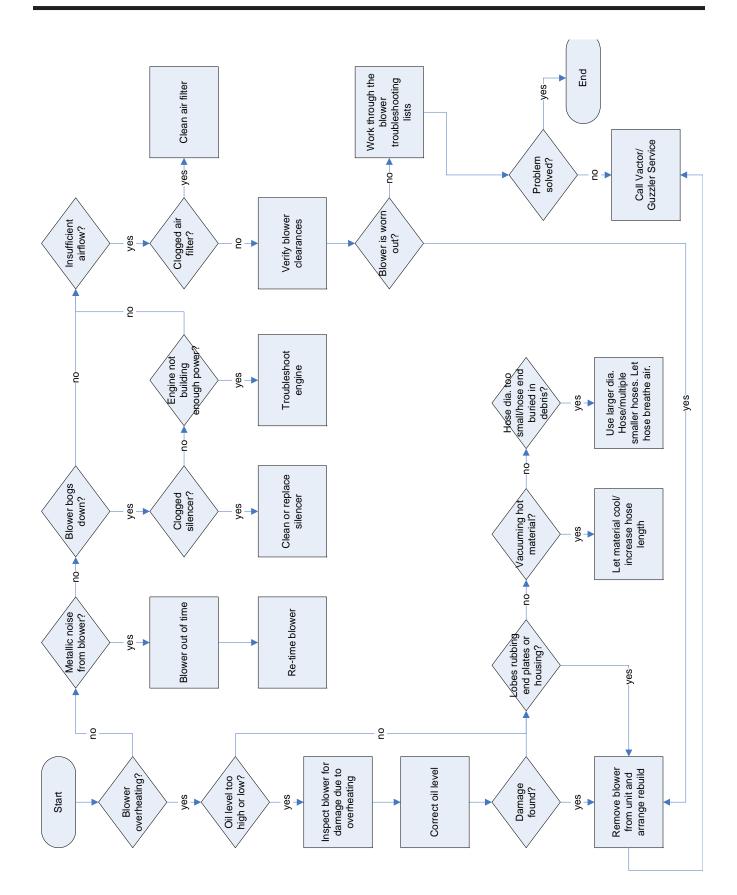
To avoid damage to the blower/fan and drive train immediately shut down the unit when any vibrations or material discharge at the exhaust is noticed. Immediately stop operations and correct problem.

Trouble	Probable Cause	Remedy
	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.
Overheating of bearings or 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.
	Driver of blower loose.	Tighten mounting bolts securely.
	Driveline bearings	Check and replace as needed both UPPER and LOWER driveline bearings.
	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.

BLOWER

Trouble	Probable Cause	Remedy
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.
	Silencer or muffler defects.	Check for holes and/or leaks.
Noisy blower.		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.

TROUBLESTERATION



TRANSFER CASE

TROUBLESTERATION

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. The blower should not be operated at idle rpm's. To reduce wear on the transfer case run up the engine RPM until the transfer case gear noise smooths out. Some units with manual transmissions may need to go as high as 1200RPM's.
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.

HXX Electrical Equipment Disconnect Switch

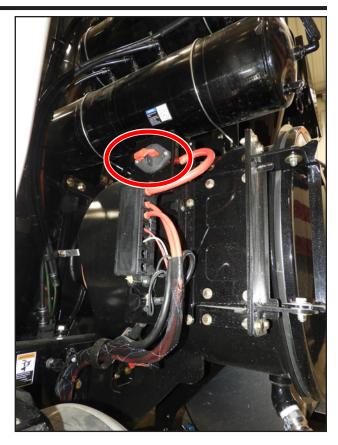
Units are equipped with an electrical equipment disconnect switch which can be found on the driver side behind the cab. This switch is used in the event of servicing the machine or jump starting the chassis. Switching to OFF separates the chassis electrical systems from the TRUVAC systems.

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.

Below the switch is the main power fuse box. Circuits are normally labeled under the cover. Refer to the unit specific schematics for details.



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.

TROUBLESTERATION

WATER SYSTEM - OVERVIEW

The water system is the component that allows the hydro-excavation feature to function. This system includes the following items:

- Water tank
- Water pump
- Air purge
- Water heater (optional)
- Recirculator (optional)

Watertank

The water tank is located just in front of the debris body. The tank capacity is up to about 1300 gallons depending on model. The tank may have a ladder attached to reach the top of the tank for filling or maintenance depending on model. The tank is normally filled through a Camloc fitting at piping to an air gap install with a 2.5" hydrant hose and Y-strainer in-line (A).

The tank is equipped with a 2" lever gate valve to shut off flow to the water pump controlled by a t-handle. An electric donut heater is optional. These are accessed by the step area passenger side. Tank drain is a 3" lever gate valve controlled by a t-handle located under tank, accessed through the driver side rear wheels.

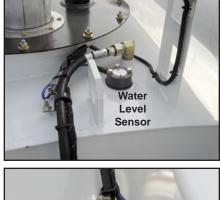
The water tank is equipped with a level indicating system with a display on the master control panel. Depending on local water quality the water level sensor rods require periodic maintenance and cleaning to function properly. See the Prodigy water level page for additional details.

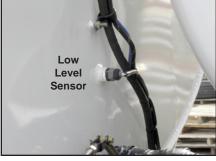
Level sensors are located towards the bottom of the tank on the front side. The sensors have an arrow which designates proper alignment. This arrow must be pointed up. The sensor provides a ground signal.

TROUBLESPERATION









Vactor

WATER SYSTEM - WATER PUMP

Model - gpm	Max psi	Max rpm unloaded	Approx. hyd. oil flow (gpm)
660- 10 gpm	3000	1500	19
3560- 20 gpm	3000	1500	38

Located inside the water pump cabinet is either the standard 10gpm Cat water pump or the optional 20 gpm unit.

The water pump is rated at 10 or 20 gpm. However, the nozzle size at the end of the handgun will determine how much flow you actually have.

Once water leaves the tank through the shut-off valve, it travels to the water pump via 2" insulated hose.

An 1 ¼" y-strainer is located inside the pump cabinet. Water flows through the strainer and is guided to the charge pump. The strainer must be kept clean.

> Charge pump - activated by the water pump switch, boosts the water pressure to supply positive inlet conditions at the pump.

B

D

A

Unloader valve (primary system relief)

Secondary relief valve

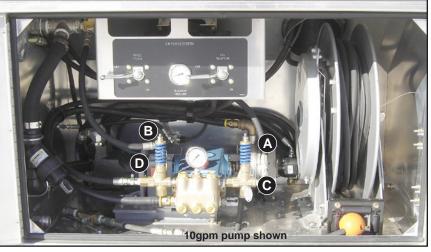
Hydraulic motor - the main pump, driven by the PTO, hydraulically provides flow to the hydraulic manifold, which controls the motor.

Operation

The boom will not function if the water pump switch is in the ON position at the control panel. If it is desired to control the boom while water operations are in work, the remote switch must be ON and the water pump switch should be OFF. The water pump will now be controlled through the hand held transmitter.

The system logic is designed to avoid a mishap if a single operator tries to operate from the panel and work the hose simultaneously.

The water pump is activated electrically by the water pump switch. The switch energizes the #3 relay sending power to the water pump solenoid and the charge pump solenoid.





Y-strainer shown assembled and with element removed for cleaning.



Five common questions to ask if the water pump is not making pressure or making low pressure.

- 1. Is the pump turned on correctly?
- a. Chassis ignition power to on.
- b. PTO engaged
- c. Water pump switch to on and recirculator switch off.
- d. If the above conditions are met and the pump still does not work, there is an electrical or a hydraulic issue.

Refer to the **HXX Diagnostic** manual located on the USB key that came with the manuals for detailed troubleshooting.

2. Is there a nozzle installed?

- a. Make sure that you have a nozzle installed on the end of the handgun or the digging wand
- b. Make sure the nozzle is clean of foreign debris which could create spikes allowing the unloader to cycle sporadically
- c. Make sure you have the correct nozzle size for the required flow
 - i. Nozzle to big-flow but low pressure
 - ii. Nozzle to small-creates excessive pressure can stall pump
- 3. Is the multiflow switch fully increased?
- a. If noticing a low flow coming out of the end of the handgun/or dig pipe check that the multiflow switch is able to be increased
- b. If no response, check for power
- 4. Is there adequate inlet conditions?
- a. Identify the water level in the tank
- b. Check that the outlet valve from tank is open
- c. If still low flow/pressure
 - i. Close outlet valve
 - ii. Remove screen from y-strainer and inspect
 - 1. If dirty clean with compressed air (flush w/water in field)
 - 2. Reinstall
 - iii. Open the outlet valve on the water tank
 - iv. Check for increased pressure/flow
 - v. If flow is still low
 - 1. Make sure water pump is off
 - 2. Pull charge pump line to the inlet head off and direct it away by holding it toward the ground
 - 3. Turn water pump on and observe stream intensity
 - 4. If stream is intense and shoots out 20-25 feet inlet conditions are good
 - a. Hook line back to inlet head
 - **Note:** this can be checked with a pressure gauge plumbed in (10 psi or better)
 - 5. If stream is weak
 - a. Replace charge pump

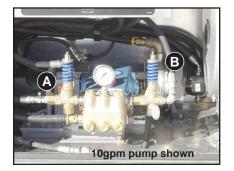
5.

Is the pump producing enough flow? (water escaping)

- a. If the pump has adequate water supply and the pressure is still low
- b. Check to see that the pump is unloading by letting go of the handgun
 - If it is not unloading the unloader check valve may be sticking causing partial bypass
 - ii. You can pull the unloader apart and clean this out
 - iii. If corroded replace unloader
- c. Check the inlet and outlet valves on the inlet head for contamination
 - i. Remove the three upper and lower hex head caps on the inlet head
 - ii. Allow water to free flow through the pump checking for debris
- d. After flushing check the water pressure by running the pump
 - i. If pressure is still low the replace seals

Setting the secondary relief and unloader valves

- 1. Attach handgun with the standard nozzle.
- 2. Unit needs to be running and water pump on.
- 3. With the handgun triggered tighten unloader valve (A) to 3500psi. At that point adjust the relief valve (B) so it just trickles.
- 4. With the handgun triggered adjust the unloader valve (A) to 3000psi.
- When the handgun trigger is released there should be about a 100psi spike to around 3100psi and then the gauge will go to zero. The pump should still be running.
- 6. Repeat step 5 to verify pressure is consistent.
- 7. Secure lock nuts on both valves.



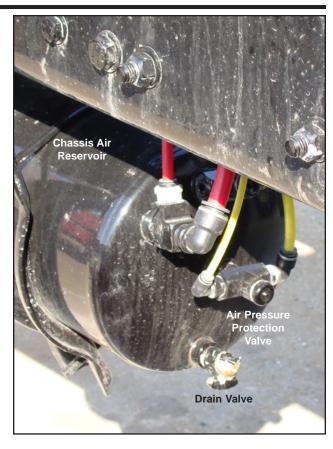
Vactor Chassis Air Pressure Protection Valve

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

SERVICE PARTS

Hand gun nozzles - refer to the data chart in the Operation section.

Part Number	Description	Frequency (hours)	PD units	Fan units
46938JF-30	Remtron plastic carry bag	As Needed	•	•
48611-30	Spindle Box Lube, Shell Omala RL 68	500	•	•
48209A-30	Filter Element for 48208A Hydraulic Filter	500		•
42431B-30	Filter Element for 62643B Hydraulic Filter	500		•
42431-30	Filter Element for 62643 Hydraulic Filter	500	•	
48749A-30	Kit, Seal Cat 3560	1500	•	•
48567-30	Kit, Seal Cat 660	1500	•	•
48749B-30	Kit, Valve Cat 3560	2000	•	•
48556-30	Kit, Valve Cat 660 (2 required)	2000	•	•
48565-30	Spider for motor coupling Cat 660	As Needed	•	•
48047MC-30	Spider for motor coupling Cat 3560	As Needed	•	•
46441D-30	Unloader Valve Cat 660 (pump# 48947L / 10gpm)	As Needed	•	•
46441E-30	Relief Valve Cat 660	As Needed	•	•
46441EA-30	Seal Kit, Buna-N for 46441E Relief Valve	As needed	•	•
46441EB-30	Seal Kit, Viton for 46441E Relief Valve	As needed	•	•
46441G-30	Unloader Valve Cat 3560 (pump# 48047N / 20gpm)	As Needed	•	•
46441H-30	Relief Valve Cat 3560	As Needed	•	•
39893-30	Boom Turret Cover Gasket	As Needed	•	•
70404M-30	Debris Hose, Red 8" x 34"	As Needed	•	•
43958A-30	Debris Hose, Red 8" x 136" (Ext.Boom)	As Needed	•	•
46564D-30	Debris Hose, Red 8" x 60" (Tel. Boom)	As Needed	•	•
70404M-30	Debris Hose, Red, Gum Lined 8" x 36"	As Needed	•	•
1140363A-30	Air Filter, Final Filter 19.60D x 14ID x 28.5 tall (round style for HXX PD)	As Needed	•	
1140363B-30	Air Filter, Final Filter 19.60D x 14ID x 21.5 tall (round style for Prodigy)	As Needed	•	
1140467D-30	Air Filter, Final Filter 20 x 30 x 3.5 (old square style for HXX PD)	As Needed	•	
35096-30	8" to 6" Reducer Flange	As Needed	•	•
34141-30	6" to 4" Reducer Flange	As Needed	•	•
46471A-30	Quick Clamp 4"	As Needed	•	•
32087-30	Quick Clamp 6"	As Needed	•	•
16584-30	Quick Clamp 8"	As Needed	•	•
51770-30	Band Lock, 8" FLG to 6" MBL	As Needed	•	•
50271-30	Bank Lock, 8" FLG to 6" FMBL	As Needed	•	•
51188-30	Band Lock, 8" FLG to 8" FMBL	As Needed	•	•
1280043-30	Band Lock, 8" FLG to 6" FMBL	As Needed	•	•
42577-30	Band Lock Assembly 4"	As Needed	•	•
42578-30	Band Lock Assembly 6"	As Needed	•	•
42579-30	Band Lock Assembly 8"	As Needed	•	•
42580-30	Band Lock, Female 4"	As Needed	•	•
42581-30	Band Lock, Female 6"	As Needed	•	•
42582-30	Band Lock, Female 8"	As Needed	•	•

Prodigy

SERVICE PARTS

Part Number	Description	Frequency (hours)	PD units	Fan units
42583-30	Band Lock, Male 4"	As Needed	•	•
42584-30	Band Lock, Male 6"	As Needed	•	•
42585-30	Band Lock, Male 8"	As Needed	•	•
42589-30	Band Lock, Gasket 4"	As Needed	•	•
42590-30	Band Lock, Gasket 6"	As Needed	•	•
42591-30	Band Lock, Gasket 8"	As Needed	•	•
42586-30	Band Lock, Clamps 4"	As Needed	•	•
42587-30	Band Lock, Clamps 6"	As Needed	•	•
42588-30	Band Lock, Clamps 8"	As Needed	•	•
43322-30	PVC Flex Hose Bulk 4"	As Needed	•	•
43323-30	PVC Flex Hose Bulk 6"	As Needed	•	•
43716-30	PVC Flex Hose Buk 8"	As Needed	•	•
25637D-30	Aluminum Pipe 8" x 72"	As Needed	•	•
25637E-30	Aluminum Pipe 8" x 90"	As Needed	•	•
25637G-30	Aluminum Pipe 8" x 120"	As Needed	•	•
25262-30	Aluminum Pipe Handle 8"	As Needed	•	•
29314-30	Water Ring 8"	As Needed	•	•
20188M-30	Quick Disconnect (Water) 1/2" Male	As Needed	•	•
20188L-30	Quick Disconnect (Water) 1/2" Female	As Needed	•	•
40589-30	Quick Disconnect 1/2" to 1/2" NPT	As Needed	•	•
27771K-30	Ceramic Lined Elbow 8"	As Needed	•	•
89444-30	Digging Lance Fiberglass	As Needed	•	•
500619A-30	Digging Lance Pipe Assy. 83"	As Needed	•	•
500619B-30	Digging Lance Pipe Assy. 108"	As Needed	•	•
500619C-30	Digging Lance Pipe Assy. 48"	As Needed	•	•
500619E-30	Digging Lance Pipe Assy. 83" w/nozzle	As Needed	•	•
500619F-30	Safety Shutoff Valve Assy.	As Needed	•	•
89714-30	Nozzle Guard Assembly, 3.2 GPM	As Needed	•	•
89714A-30	Nozzle Guard Assembly, 4.8 GPM	As Needed	•	•
89714B-30	Nozzle Guard Assembly, 9.6 GPM	As Needed	•	•
89714C-30	Nozzle Guard Assembly, 16.5 GPM	As Needed	•	•
89714D-30	Nozzle Guard Assembly, 6.4 GPM	As Needed	•	•
86230-30	Nozzle, 3 Insert with out Guard (Inline)	As Needed	•	•
86230D-30	Nozzle, 2 Insert with out Guard	As Needed	•	•
89714A-30	Nozzle, 3 Insert with out Guard	As Needed	•	•
89713-30	Nozzle Tube, Guard (plastic)	As Needed	•	•
47390KJ-30	Heating Coil for 47390K (400K BTU unit)	As Needed	•	•
47390LD-30	Heating Coil for 47390L (940K BTU unit)	As Needed	•	•

SERVICE PARTS

Hand gun nozzles - refer to the data chart in the Operation section.

Part Number	Description	Frequency (hours)	PD units	Fan units
49209-30	Air Spade			
49209-30	AIR EXCAVATION KIT, PREMIUM	As Needed	•	•
49209A-30	AIR-SPADE SERIES 2000 TOOL	As Needed	•	•
49209B-30	AIR-SPADE 3FT EXTENSION POLE	As Needed	•	•
49209C-30	AIR-SPADE 10FT LIGHTWEIGHT HOS	As Needed	•	•
49209D-30	AIR-SPADE 45* ANGLED ADAPTER	As Needed	•	•
49209E-30	AIR-SPADE HANDLE	As Needed	•	•
49209F-30	AIR-SPADE 4FT EXTENSION POLE	As Needed	•	•
49209G-30	AIR-SPADE NOZZLE, 150 CFM	As Needed	•	•
49209H-30	AIR-SPADE NOZZLE, 105 CFM	As Needed	•	•
49209J-30	AIR-SPADE HANDLE REBUILD KIT	As Needed	•	•
49209K-30	DIRT GUARD, AIR SPADE	As Needed	٠	•
	3000 Series Air Spade			
49931-30	3000 SERIES AIR SPADE	As Needed	٠	•
49931A-30	FLEX LEADER HOSE, 1" X 25FT.	As Needed	٠	•
49931B-30	LANCE EXTENSION, 3' LG	As Needed	•	•
49931C-30	NOZZLE, 330 SCFM	As Needed	•	•
503054A-30	AIR EXCAVATION KIT, 330 SCFM	As Needed	٠	•
	Fuses (normally located in the battery box)			
507865-30	80A MEGA FUSE	As Needed	•	•
507865A-30	150A MEGA FUSE	As Needed	•	•
507865B-30	350A MEGA FUSE	As Needed	•	•



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