



MN-PV-CIS-127

Hydrovac Competency Manual

MN-PV-CIS-127 – Hydrovac Competency Manual
Rev 2

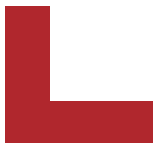
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Training Expectation Letter

It is required that this document is completed prior to the Employee starting training on a P&V Hydrovac Truck. This document will serve as formal record that all parties have reviewed and understand the expectations for training on the Hydrovac Truck.

Trainee Name:

Date of Discussion:

Expectations of Supervisor/Leader

- Ensuring trainee has scheduled time for training.
- Ensure trainee has reviewed and understand the technical documentation
- Ensure trainee has been provided a demonstration on equipment operation
- Verify field competency sign offs once completed
- Ensure trainee is working with a competent mentor until they are competent themselves
- Provide support for the assessor, mentor, trainer and trainee whenever possible.
- Ensure training documentation is sent to CEDA Training Department

Expectations of Trainer, Mentor, assessor

- Must be qualified in the position for which he/she is training.
- Educate and support trainee with technical review package.
- Ensure trainee has been provided a demonstration on equipment operation
- Review trainee's technical knowledge and verify acceptable understanding
- Educate and support trainee with field tasks identified in the competency check sheet
- Verify trainee has the ability to perform tasks identified in the competency check sheet
- Communicate to Supervisor that the technical review and field competency is complete

Expectations of Trainee

- Complete all prerequisites outlined within the training program.
- Understand the training process outlined in this document.
- Understanding systems and spending time in the field.
- Ensure all lessons and tasks are signed off by the appropriate personnel as indicated on the training documents.
- Inform Supervisor/Leader on progress of training through face to face meetings.
- Will utilize all the materials provided to ensure a comprehensive training program is followed.
- Provide feedback on the training process and any updates that are required to the training material.
- Inform Supervisor/Leader of any training barriers that may exist during the training process.

Training Expectation Acceptance Agreement

I, _____ understand the expectations of me as a trainee as outlined in this document

(Operator Name)

Operator\Trainee

Name

Signature

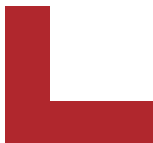
Date (MM/DD/YY)

Supervisor/Leader

Name

Signature

Date (MM/DD/YY)



Acknowledgement

This manual has been developed using information and knowledge obtained from manufacturer's documentation and input from experienced Operators. Additionally, this manual has been validated by numerous Subject Matter Experts at CEDA. We welcome any comments or suggestions pertaining to this manual and its contents.

Many thanks to those who have demonstrated a clear dedication to CEDA and our values by participating in the creation of this program.

Michael Humen (Edmonton, AB)

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Objective

Welcome to CEDA HYDROVAC TRAINING

This program is designed to provide you with the training necessary to carry out your job in a manner that safeguards yourself, those around you and our environment. Upon Completion of this Module you will be able to:

- Review Hydrovac Operations
- Operate Hydrovac Unit
- Maintain/ Care for Hydrovac Unit
- Review CEDA-Specific Safety Standards – Vacuum Operations

Employee(s) will demonstrate knowledge & skill in the proper application of equipment through practical application.

Instructions

All material must be completed in the order presented to ensure that prerequisites are met.

Employees will demonstrate knowledge and skill in the proper application of equipment through practical demonstration and application.

NOTE: All forms and procedures included are those required by CEDA. Work must be performed in accordance with these standards. On Client work sites, there may be additional standards and modified work procedures that will also have to be met.

Description: This is a knowledge and practical skill that requires written material to be reviewed along with the completion of an on-the-job demonstration prior to the test being written.

Whenever possible, the on-the-job demonstration should be completed at a job site or the shop under controlled conditions.

Arrange a time with your Mentor/Supervisor/Trainer to complete the On-the-Job Demonstration, where you will observe the proper operation of the Wet Vacuum unit and its components.

Assessment of Competency: Successful completion of this competency requires:

- A score of 100% on the written examination.
- A successful demonstration by trainee requiring a sign-off from Trainer.



Prerequisites

- CEDA Orientation
- CEDA Introduction to Vacuum Trucks
- CEDA Introduction to High Pressure Water Blasting
- Specific work location Orientation

Below is a list of the learning resources that are included and others you must obtain the most recent version from your Supervisor.

- General Excavation Procedure
- Excavating Hydrants and Lines Procedure
- Air Systems Winterization Procedure
- CEDA Pre-Trip Inspection (Vehicle Inspection Report)
- Site specific documentation
- Job Hazard Analysis for the work
- CEDA FLHA
- Other CEDA procedures and practices that pertain to the job being completed

NOTE: All forms and procedures included are those required by CEDA. Work must be performed in accordance with these standards and can be found in CEDA Health, Safety and Environment Management System (HSEMS) or be requested from your Leader. On Client work sites, there may be additional standards and modified work procedures that will also have to be met.

General Overview

Federal & Provincial Legislation

All work must be completed in accordance with applicable Municipal, Provincial, & Federal Acts & Regulations, including but not limited to:

Transportation of Dangerous Goods (TDG)

- Vehicle must be DOT Approved and be equipped with appropriate safety devices
- DOT approved vehicles will have sticker on side of unit
- Operator must place appropriate placards on side of vehicle
- Operator must prepare bill of lading prior to transporting materials

The Workplaces Hazardous Materials Information System (WHMIS)

- All CEDA field employees working with or around equipment will have WHMIS and TDG training prior to starting work.

Occupational Health & Safety (OH&S)

Seat Belts

Anytime a vehicle (CEDA owned or personal) is being operated during business hours for business use, or on CEDA property, the occupants must be wearing seatbelts.



Personal Protective Equipment (PPE)

To operate the Hydrovac unit, employees must have and utilize the following personal protective equipment (PPE):

- CSA Certified Hard Hat
- CSA Certified Safety Boots (Boot Grips when required)
- Fire Retardant Coveralls
- Hearing Protection (plugs or muffs)
- Approved Gloves for the Site/Task
- Safety Glasses with Side Shields.
- Rain Gear as Required



For hot materials, the following additional personal protective equipment may also be required:

- Rubber gloves
- Steel-toed rubber boots
- Face shield

Workplace Organization

CEDA's goal is to reduce waste (time, energy and materials) by maintaining an orderly and clean workplace, including our trucks and equipment. We ask that you take pride in the equipment you operate; treat it as if it were your own. A clean and organized vehicle/workspace is a safer vehicle/workspace. There are many ways to eliminate waste:

Allocation & Utilization of Resources: Have the right people and equipment in the right place, at the right time. Use equipment and resources on tasks and activities that are required and add value to our business.

Improve Productivity: Eliminate redundant or unnecessary steps/tasks without negative impact to the safety or quality of our products and services.

Use of Materials: Ensure equipment is stocked with required supplies (filter bags, duct tape etc.) before leaving for jobsite – replace the materials you have used during the shift to ensure that the next crew is adequately stocked. Use the correct materials in the quantities required to do the job safely & correctly.

Preventative Maintenance: Tools and equipment should be assessed as per the performance maintenance schedule to ensure safe operation. Regular maintenance will reduce costly breakdowns in the field.

There are steps we can take to improve our current state and move towards a more productive, organized and safe work environment. Improving workplace organization will reduce costs, improve morale and create a safer work environment. The following steps outline how best to achieve an organized workplace:

Sort, organize and eliminate unnecessary items from the workplace to eliminate clutter. Keep only essential items.

- Tools and equipment that are not utilized for day-to-day operations should be repurposed within the organization or discarded.
- Garbage or loose items should be removed or properly stored.

Prioritize tools, parts and materials based on usage and keep them in easily-accessible places.

- A place for everything and everything in its place.

Create storage areas that are easy to access and clearly laid out:

- Tools and equipment should be stored clean and ready for use.

- 
- Storage areas and stored items should be properly identified using signage, labels or a visual outline.

Set clear standards for workplace organization:

- Hold yourself and others accountable for keeping the work areas clean and safe. Make workplace organization a standard work rule in your area.
- Clean general work areas and equipment after each shift.
- Put clean tools away in the proper place.
- Note any spills, leaks or other messes – clean and report if equipment requires maintenance
- Inspect the area(s) regularly and immediately record and correct any infractions. Handle deviations from work rules in a timely manner.
- Review processes and procedures regularly and adjust as required.

Equipment Overview

Hydrovac Basics

Many clients have the need to locate and excavate buried utilities such as gas, power, water, telephone, fibre optic and process lines. These lines can be located with sensors or surveys. However, the client is reluctant to expose the line(s) with a mechanical means because the lines can heave and shift underground over time. Rather than using a backhoe and risk damaging the lines, a hydrovac unit is used to safely expose the lines. In some circumstances, a hydrovac unit is used for general excavation purposes when larger excavating equipment cannot be used. Hydrovac is desired by many clients because the operation is clean; no dirt is left behind.

Hydrovacs use a pressurized water system to break-up the soil, gravel, rock, sand or other compacted materials. This produces mud which is removed by the vacuum system. A boiler unit contained inside the passenger side cabinet is used during the winter months to heat the water which helps melt the ice or frost in the area being excavated. In most cases, the materials excavated are a soil and water mixture and are not considered hazardous. Once these materials are collected, they are offloaded at the client site.

Each operator must be aware of all controls (including safety controls) and the operating limits of the particular vacuum unit in operation. The subsequent training materials contained in this learning module describe the general operating overview and is not intended to replace the manufacturer's Operator Manual for any given Hydrovac. Every effort has been made to ensure that key elements of vacuum operations have been included. The following section identifies and describes the general components found on the hydrovac.



Air Flow



This diagram illustrates the direction of air flow when the system is under negative pressure (vacuum). As the blower creates negative pressure in the system, air is drawn down the boom and into the tank. A dual intake system inside the tank then draws the air out of the tank, and passes through the cyclone separator. Any particles that escape the tank will be trapped at the bottom of the cyclone as the air continues down a vertical channel into the micro screen filter and on to the blower. From the blower it travels through the dual silencers and vented to the atmosphere.

Major Components of the Hydrovac

The Hydrovac is a transportable vacuum system consisting of the following

- Vacuum (Debris) Tank
- Water Tank
- Control Panel (including Wireless Handheld Remote)
- Boiler
- Antifreeze System
- Hydraulic System
- Filter
- Dual Silencers, and
- Blower

Each of these components will be discussed in more detail on the following pages.

Vacuum Debris Tank

Pressure tested vacuum cargo tanks are used to collect and transport the excavated debris. The tank is also referred to as the “collector body”. The cargo tanks are made of carbon steel and have a capacity of 13 ‘cubes’ (cubic yards).

During normal operation, negative pressure is created within the tank causing a vacuum effect. The entire system must be air-tight so negative pressure can be created.



Cargo Tank

The vacuum unit can operate when a negative pressure of approximately -5 to -27 inHg is created however, the unit is most efficient at approximately -20 inHg. The vacuum gauge is located on a control panel located on the inside of the Passenger side cabinet.

When there is no pressure in the tank, the pressure gauge will read “0”. As vacuum builds within the system the gauge will begin to display negative pressure.



Vacuum Gauge

Dumping

The rear of the tank is sealed with the exception of a mud sweep door. The tank was designed with a mud sweep to avoid having to enter the tank for cleaning and dumping.

The only method of dumping when using the Hydrovac is through use of the mud sweep. The hydraulic mud sweep is controlled from the manual control block or the wireless handheld remote.

To operate, simply unlock and open the mud door. Then activate the mud sweep by using the wireless remote. The mud sweep pushes with 50,000 lbs. of force but may require more than one sweep to empty the tank.



Bottom View of Mud Sweep Door (Open Position)

Note: Always remember to place the mud sweep in the default position during loading; that is towards the front of the truck. When opening the rear door to utilize the mud sweep the door pins (as seen below) must be securely in place.



Door Pin in Resting Position



Door Pin in Hinges

Always check for excess wear on the lift ram supply (mud sweep) prior to dumping. If this fails, the door will close automatically with no way of locking it. The mud sweep door is sealed to the tank with a rubber gasket.

The rubber gasket on the outer edge must be air tight in order to create the vacuum necessary for routine operation.

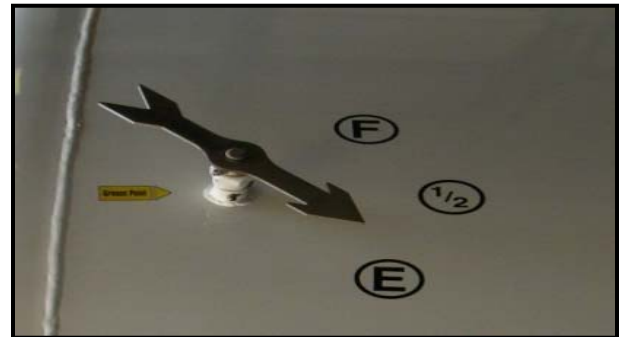
The shut-off ball (pictured left) is each contained inside a basket directly below the vacuum intake ports. The ball inside the basket, like the indicator float, is also hollow. As the material inside the tank rises, so too does the ball.

When too much material is drawn into the tank, the ball automatically seals the vacuum line intake ports, preventing materials from entering the cyclone, micro filter and blower.



Mud Sweep in Stored Position

The level indicator float is simply a rod with a hollow steel ball on the end. As the material fills the tank, the ball rises. The indicator on the outside of the tank displays to the operator the level inside the tank (right).



Tank Level Indicator on Exterior

The tank has a drain valve used to drain excess liquids from the vacuum cargo tank. This keeps the larger materials away from these drains. Nearly all liquids drawn into the cargo tank can be removed, resulting in a relatively dry payload; this is useful for sites when you need to dump liquid or solids in different areas depending on the site.



Tank Drain Valve

Water Tank

The pressure tested water tank is used to hold the supply water to the boiler in excavating operations. The water tank is made of carbon steel, is epoxy coated and has a capacity of 8956 Litres (8.9 Cubes). This water is fed through a high pressure pump that is used to break-up the soil and other compacted material. Since this water runs through a high pressure pump, the supply must be clean.



Water Storage Tank

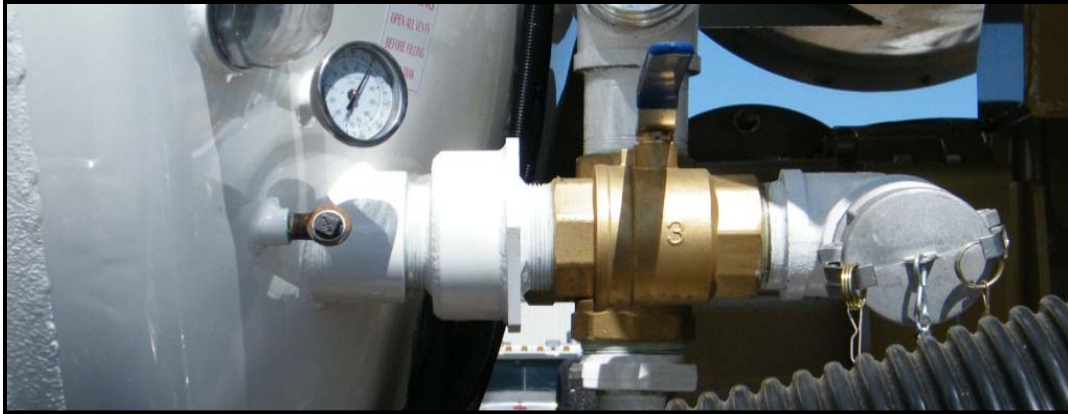
The tank is filled using the load line on the passenger side of the unit. A water hose is hooked up to the fill line and water is added until the correct level is reached. Water tanks may be filled at the client site provided a clean supply can be provided.

The five sight glasses on the outside of the tank displays to the operator the level inside the tank (below). The water tank must be drained daily in cold weather to prevent freezing and once per week during warm weather to ensure sand, rust and gunk are kept out of the tank.



Exterior Tank Level Indicator

A drain located on the passenger side of the truck behind the passenger side cabinet can be used to empty the water tanks.



Fill/Drain Valve

Water Pump

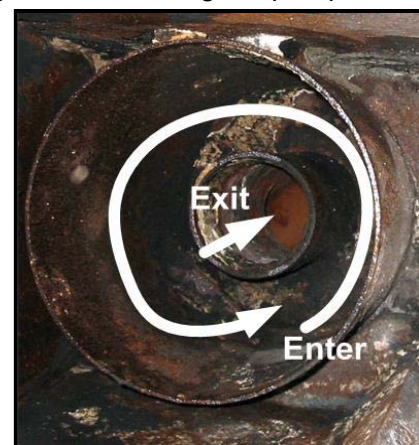
The water pump, a Cat tri-plex water pumps that puts out between 14 to 60 gallons per minute (gpm) at 0 to 3,000 psi is located in the Passenger side cabinet between the cab and tank of the Hydrovac. The water pump is hydraulically driven.

To operate, ensure the anti-freeze tank and air purge valves are closed. Proceed to open the water tank supply valve and with the open hose in hand, engage the water pump drive located on the remote or dial located on the control panel. Connect the dig wand and flush prior to attaching the spinner tip. Attach tip and start water at low pressure to make sure tip spins, increase pressure and start digging.



The water system is set by the factory at a maximum system pressure of 2,700 psi. Operating at pressures exceeding 2,700 psi may cause infrastructure damage. Water leaving the pump travels through a pressure hose and connects to the hose reel. This reel contains 50 feet of hose that is used to connect to the dig wand (lance).

The cyclone is integrated within the water tank. It is used to collect debris, mist and other particles that may escape from the main tank during vacuum operations. The image to the right is that of a cyclone from a dry vacuum unit and is used to illustrate the principle of the cyclone. The image was taken from the bottom of the cyclone. Air and debris enter the cyclone and travel in a vortex or swirl pattern. The heavier materials fall to the bottom of the cyclone, while the cleaner air



exits through the center of the cyclone and on to the micro filter and pump.

Cyclone Principle

At the bottom of the cyclone is a collection chamber where the larger debris that escapes the main vacuum tank can be found. The collection chamber has a 3" clean out with a cam lock cap. Remove cap and flush until water comes out clean. The debris must be cleaned after each job.



Cyclone Cleanout

Control Panel

The control panel shown to the right is mounted on the inside of the passenger side cabinet compartment.

The panel also contains a:

- A water temperature control gauge
- A boiler, a water pump and handheld remote on/ off switches.

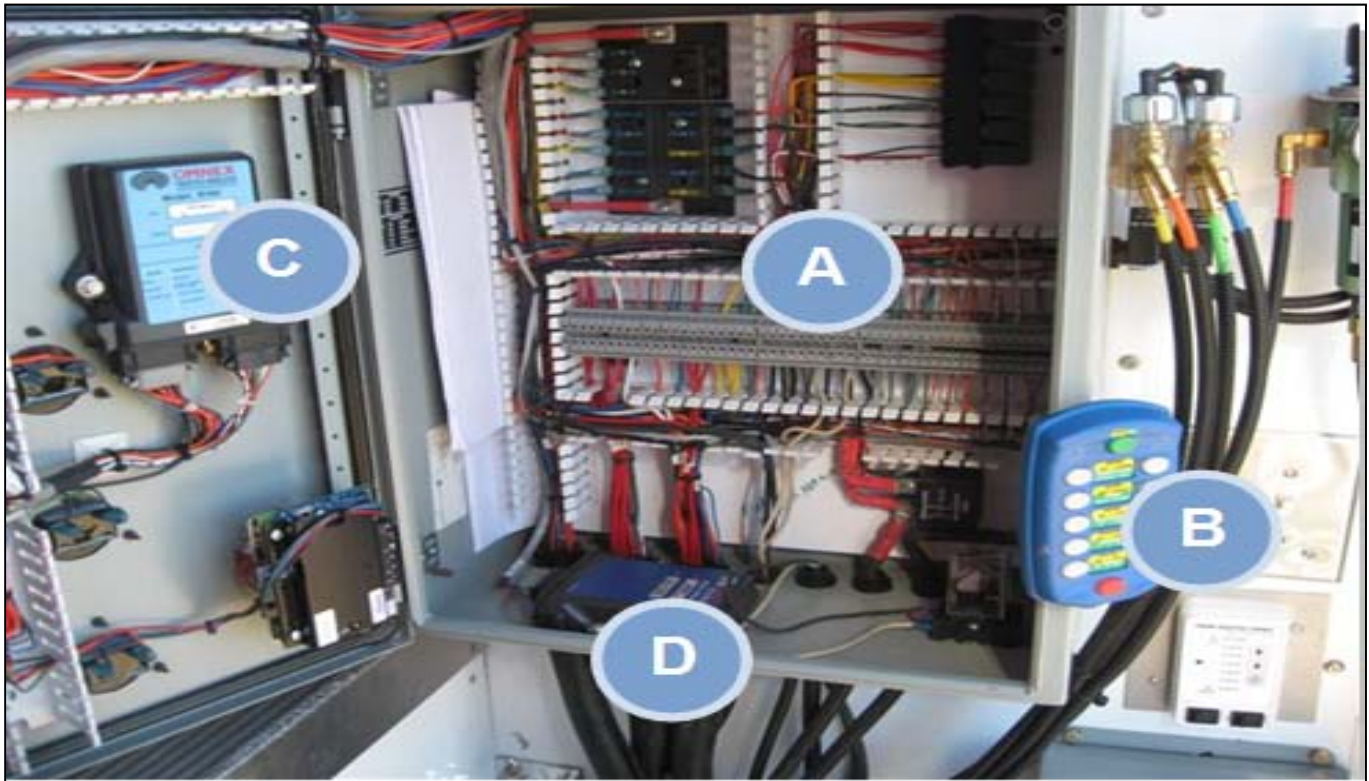
The blower, boiler and pump hours are all recorded individually.



Control Panel

The electrical panel is located behind the control panel once the control panel door is opened. Inside are all the circuits operating the hydraulic functions and other electrical devices.

The handheld wireless remote is controlled by the wireless receiver, shown as 'C' in the picture to the right. The electrical panel is shown as 'A', the water pump control module 'D' and the wireless handheld remote is identified as 'B'.



Inside Control Panel

Boiler

The boiler is located above the water pump in the passenger side cabinet. It supplies hot water for the hydrovacing/ digging process in cold conditions to help with breaking up ice or frost. It is covered by an aluminum shroud for protection. The operator must frequently monitor the temperature of the water and fuel pressure to ensure optimum operating condition.

As mentioned previously, the boiler on/ off switch is located on the control panel. Inverter "on" to operate.



Boiler

Shown below are the components of the boiler.



Boiler Components

A – Chimney Lid; The Chimney Lid must be open prior to using the burner

B – Chimney Switch; Chimney lid cable must be connected to the chimney switch in order for the burner to fire

C – Temperature Gauge; This will tell you the temperature of the water as it leaves the burner

D – Fuel Pressure Gauge; This gauge must read a pressure between 80-110 PSI in order for the burner to fire properly

E – Air Dampers; Helps the fuel to burn clean, correct fuel to air ratio must be achieved, (Can be adjusted to allow clean burning)

F – Burner; Consists of nozzles that atomize the fuel and electrodes that ignite the fuel along with the right air mixture heats the water

G – Flow Switch; Consists of a flapper valve that opens up when water starts to flow (Valve sends a signal that water has started)

As mentioned previously, the boiler is operated by the controls on the lower left portion of the control panel. The volt meter indicates when the unit has reached the correct voltage to operate the boiler, if volt meter does not show voltage, check the inverter and make sure it is turned on. The temperature control gauge is pre-set between 140 and 150°F; refer to the temperature gauge shown as 'C' for the current water temperature.

The boiler contains air dampers, shown as 'E' in the picture above. Dampers keep carbon from building up on the coils and maintain heat transfer.



Boiler Control Panel

If the boiler is emitting too much smoke, simply adjust the damper by opening it until the smoke is reduced. After using the boiler, the unit must be cooled before it is shut-off.

Note: Always remember to remove the inspection cover prior to igniting the burner.

Antifreeze System

The antifreeze system must be used to winterize the boiler unit and water pump when the temperature drops below freezing. The system consists of the antifreeze tank, lines, valves, and the antifreeze solution. Approximately 20 gallons of antifreeze is stored in the tank and is circulated through the boiler unit at the conclusion of cold weather operations.

During winter months, the antifreeze must be purged prior to starting any new jobs. The antifreeze can be deposited back into the antifreeze storage tank or properly disposed of antifreeze is considered an environmental hazard and should be handled accordingly.

Upon job completion during the winter months (October – May), the lines will need to be blown down to remove all water or winterized to prevent freezing.

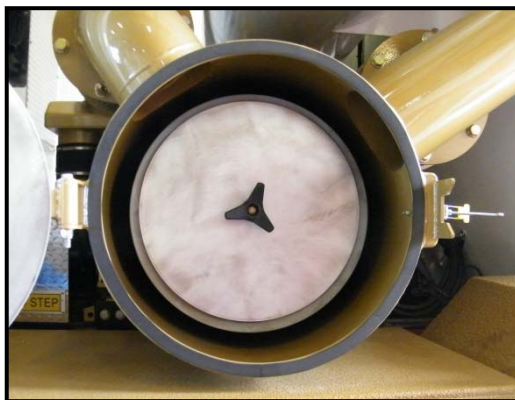
The Hydrovac air system has a bypass line that can be connected to the high pressure system. This is used to purge any water out of the system. Ensure the unit is running when blow down is performed as the blow down system takes air from the unit.

Micro screen (Filter)

The micro screen (or filter) is another device designed to remove debris from the system. The filter prevents large particles that may have escaped the cyclone from entering the blower. The filter should be inspected prior to starting the blower and must be cleaned at the end of each job.



Closed Micro Screen Chamber



Open Micro Screen Chamber

Air travels from the outside of the filter through to the inside of the filter. Material that is one micron or larger is captured on the outside of the filter.



Micro screen inside Chamber

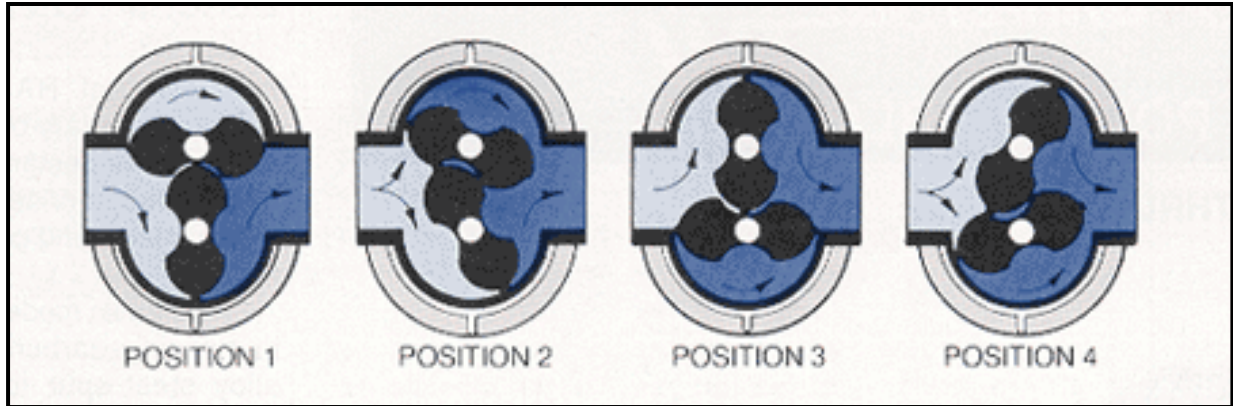


Micro screen

The filter should be washed from the inside out as the dirt gets pulled into the outside of the filter.

Blower

The Blower used on the Hydrovac is called a “rotary lobe blower.” The blower is located between the cabinet and cargo tank. The diagram below shows the operation of a rotary positive blower. The basic unit consists of two figure eight shaped impellers mounted on parallel shafts.

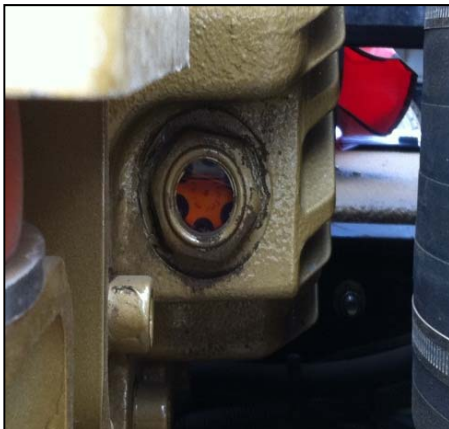


Flow through a Basic Rotary Lobe Blower

These impellers rotate in opposite directions within an elongated cylindrical housing. As each impeller passes the inlet, it traps a definite volume of air and carries it around the casing to the discharge, where it is expelled. The cycle repeats four times with every revolution.

The blower is powered by the unit engine through a transfer case and operates effectively with an engine rpm of 900-1390 RPMs. The brakes must be engaged and the truck in 7 high for maximum performance of blower

The blower has a site glass where the operator can view the level of oil. The blower must have at least half of the site glass filled with oil.



Front Sight Glass



Rear Sight Glass

Dual Silencers

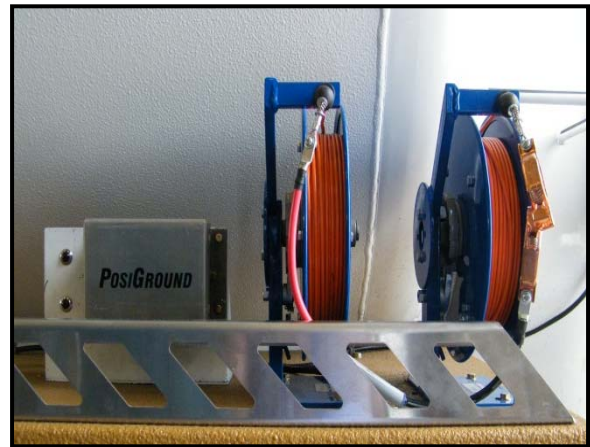
The Hydrovac is equipped with dual silencers. Mounted above the blower is the inlet silencer. Air from the atmosphere enters the inlet silencer through the top and cools the blower during operation. The discharge silencer is mounted above the inlet silencer. The air drawn through the vacuum system is discharged through the vent at the top of this device.

Auxiliary Equipment

Grounding System

The Tornado Hydrovac is equipped with a 'PosiGround' grounding system. Prior to starting operations, the unit must be grounded directly to the earth or bonded to another object that is inherently grounded, such as a large storage tank or underground piping. Grounding minimizes the electrical potential differences between objects and the earth to prevent a static charge. Grounding brings all parts of any system to zero electrical potential by allowing electrical currents to dissipate through the earth.

The PosiGround system consists of a set of cables that require proper connection to the grounding source and confirmation of the connection is obtained by verifying the reading on the PosiGround indicator. Shown below are a bad connection (left) and a good connection (right).



Fire Extinguisher

A fire extinguisher is mounted at the front of the tank on the driver's side.



Vacuum Breaker

In case of emergency, opening the vacuum breaker will release the vacuum pressure in the system. There is a switch on the remote control and control panel.



Hydraulic System

The hydraulic system drives many components of the Hydrovac including the mud sweep, door latch system, and water pump and is driven by the front transfer case. The hydraulic system consists of a PTO, return filter, oil level sight glasses, oil temperature gauge, pressure gauge, valve block and oil tank.

The hydraulic fluid is stored in this reservoir, shown to the right. There are two sight glasses located on the tank with red arrows. Mounted on the exterior just below the sight glasses is a thermometer. The operating temperature should not exceed 130°F.



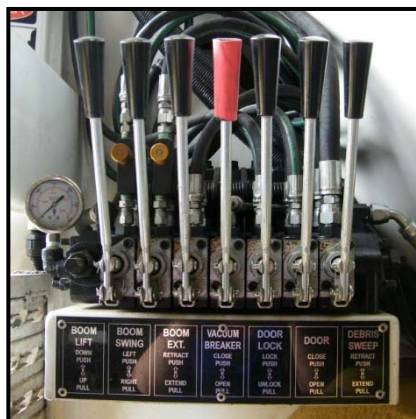
Hydraulic Filter/Tank/Sight Glasses & Temperature

The system is cooled by a hydraulic cooling fan. This fan helps maintain optimum operating temperatures for the hydraulic fluid. Impurities that can damage the hydraulic system are removed by the red hydraulic filter. It is important to service the filter regularly.

The hydraulic bank is where the operator can control various functions of the unit. From this location the operator controls the mud sweep, tailgate lift (tank rear door), and tailgate latches. The operator engages the remote control and water



Located to the left of the hydraulic bank is a hydraulic pressure gauge. Once the hydraulic pump is engaged, the pressure should read between 400 – 600 psi. Standard operating pressure should read between 2,000 – 2,500 psi. To adjust, simply tweak the pressure relief on the valve block.



Wireless Handheld Remote Control

The remote control allows the operator or laborer to control various functions of the Hydrovac including engine idle, boom, vacuum, water pressure and emergency kill.

To operate, turn on the remote, on/ off switch located on the control panel. Press the green on/ off switch located at the top of the wireless handheld remote and the use of controls shown in yellow will be available. If the green button is pressed twice, the controls shown in green on the remote will be available for use. These are also known as the 'second function' buttons.

The remote usually has a magnet in the back for convenient storage and should always be put back in the bracket when not in use. Remotes should not be left in your pocket due to risk of accidentally engaging a button.

If the controls on the wireless remote become unavailable, use the controls on the main control panel as back up.



Note: If the boom has not moved within 10 minutes, the wireless remote will automatically shut itself off. This also causes the water to be shut off. To reactivate, press the green button once more.

Note: If for any reason the emergency shutdown button is activated, the functions of the wireless remote are unavailable except the unit RPM.

Additional Features

Hydraulic and Blower Switches



These switches are located on the dash of the unit. You will notice that they are protected with a cover to keep them from being activated or deactivated accidentally. Hydraulic switch can be activated with the transmission in neutral but the blower needs the transmission in gear to operate. The light in the middle of the switches will illuminate when either switch is activated.

Boom Alarm Light / Buzzer

The boom alarm and buzzer will activate when the switch for the Hydraulics is deactivated and the boom is not returned to the stowed position. This safety feature will help you realize that your boom is not stowed back in the cradle properly and attention is required. This feature should be checked as part of your pretrip prior to leaving for the job.



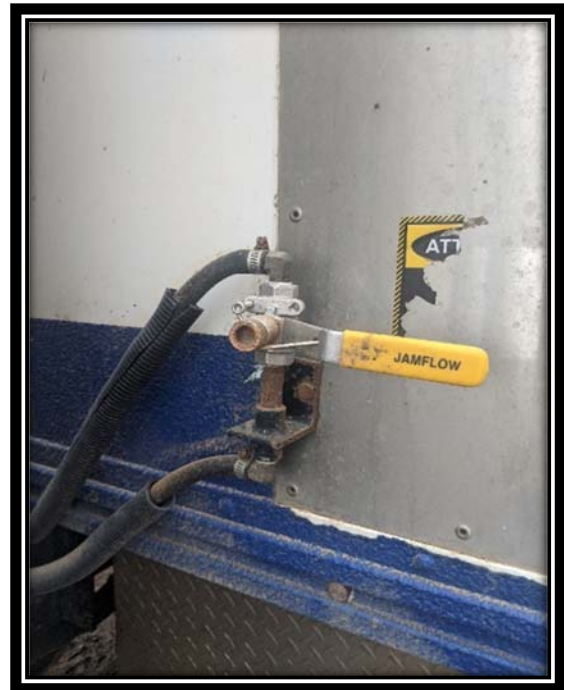
Air System Winterizing



This is a picture of the Alcohol Pots or Sniffers. These will add airline antifreeze to the air system as air builds to keep all the air actuated components from freezing on your truck in the winter operations. These should be checked and filled as required on the pretrip as well. The air system should be depressurized prior to removing the fill nut. If you are unsure of how to fill, please ask your supervisor

Blower Diesel Flush

The Diesel Flush is used in winter operation to remove moisture from the blower to keep from freezing. A frozen blower can cause job delays and catastrophic equipment failure. This valve is spring loaded as to make sure it is never left in the open position and is usually located on the driver side right behind the cab. A simple count of 1-2-3 with the valve in the open position with the vacuum on will be suffice to winterize the blower.



Air Tank Drain Cable

The air tanks also need to be drained both in the winter and in the summer. All the air tanks should have a cable attached to the valve and a quick pull and a count of 1-2-3 will be suffice, but if you still see moisture coming out, keep pulling until all moisture is relieved.



Winterization Valves



Both these valves will be utilized in the winterizing of the pump and water system. The main water valve must be closed first, then, with the open end hose in hand, open the red valve periodically to give it just enough air to remove the water, this will take up to a couple of minutes, then open the glycol valve and activate pump at low speed to bring glycol into the system, this could also take a couple of minutes to complete.

Recirculation Fitting

The Recirculation Fitting is used to recirculate water with the boiler running and heat it up during winter operations. It keeps the water system from freezing up, and with the new style trucks, the water tank goes under the debris tank, so it keeps the debris from freezing in making offloading easier during winter operations. This is located on the passenger side of the tank next to the fill valve.



3000 PSI Pressure Relief Valve

This is a very important safety device. This is a device that will relieve any pressure that exceeds it. This one is set up for 3000 PSI, and we can tell by the amount of notches that are in the brass fitting at the top, each notch is 1000 PSI. Although there are different ratings, so be sure to read the fitting before installing it on the system. This is located right as the pipping leaves the boiler.



Rear Door Isolation Valve



The Rear Door Isolation Valve is in place to keep the door from accidentally being open and the load being dumped on the ground. It keeps hydraulic pressure from activating the door locks, so before you open the rear door, you need to open this valve and close after the unit has been dumped and washed out.

Power Inverter



The Power Inverter is what supplies the boiler with power to operate. If the boiler does not have power supply, the volt meter will not move, make sure the inverter is on first and second, check to make sure the GFI plug is not tripped. If it is, turn off the inverter, unplug the boiler, reset the plug and plug the boiler back in. This is the same type of plug that you would find in your washroom for the razor or as an outdoor plug.

Boiler Panel

This is the boiler panel, the volt meter is pictured in the lower right corner of the panel. Right now it is showing no power because the power switch is turned off but if the inverter was off or the GFI was tripped, it would also show zero power with power switch turned on.



Activation Switches



The top switch, when activated, will start the Regen process. This process will burn off the Particulate filter. To activate you first have to wait for a notification light on the dash to ask for a regen, then push and hold the button until the RPM's increase. You must not move the truck until the process is over and the RPM's return to idle.

The middle switches consist of Air Suspension Dump, which exhausts all the air from your air bags. The next is a Differential lock that gives the axle that has traction the control to move the unit. Do not engage while spinning. The last two are Axle locks and are to be used only in moving straightforward or straight back direction.

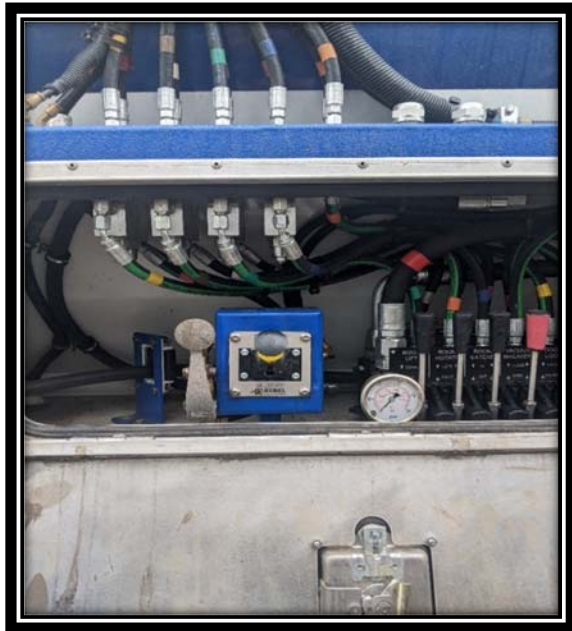
The last 3 are the cruise control, and two PTO switches. Cruise control is used to idle up the unit when parked and in PTO mode, never let the truck idle. The PTO switch is to engage the PTO for the wash pump use and when washing out debris tank on unit. The PTO2 switch will engage the Blower when the unit is parked and transmission in gear. You cannot drive with the PTO or Blower engaged.

Pump & Pressure Relief Valve

This is a view of the pump through the inspection door, this is another type of a Pressure Relief valve, get to know your unit and how to winterize each.



Air Actuators & Hydraulic Bank



These controls are located on the passenger side at the rear of the unit. The silver handle is to activate the hose reel for the washout hose at the rear of the unit. The round black knob with the yellow plunger is to activate the door locks once the door is in the full open position. The hydraulic bank has all the functions that the remote will have. Notice the vacuum breaker lever is a different color so that in an emergency you know where it is.

Grease Points



This is a great set up on the new Rebel hydrovacs, but not all are like this. Greasing the unit is part of the daily preventative maintenance. Get to know your unit and the location of the grease points. Be sure to swing boom while greasing the turret so that you do not only grease the worm gear but the whole ring gear. Under the hood on the driver side is another remote grease point.

Hydrovac Operations

Principles of Operation

The efficiency of a hydrovac can be determined by the amount of airflow created and is measured in Cubic Feet per Minute (CFM). Generally, the more air volume that can be moved per minute, the greater the efficiency of the unit.

A second method used to determine the efficiency of a hydrovac is by measuring the amount of pressure (often referred to as suction) produced at the suction head and measured in inches of mercury (inHg).

A closed system is required so that negative vacuum pressure can be produced and maintained for effective operation. All vents and mating surfaces that make up the vacuum system must be in a closed position. There are several areas (i.e. drains, inspection hatches, etc.) on the hydro-excavator that an operator must be aware of that may cause the system to lose its negative pressure.

Intake

The intake is located on the boom and is used to draw materials loosened by the high pressure water system into the tank. The intake is 8" in diameter and is very difficult to handle by one operator without great physical exertion. Often, the 8" line is coupled to a smaller 6" line.

The operator must be very careful when operating the boom and intake while the lines are being exposed as the boom/ intake can cause significant damage to the lines if the intake is allowed to come into contact with you or an object.

There are several factors that determine load rates. Larger hose diameters provide greater loading rates, however rates are reduced as hose length increases. A smooth bore hose with few bends will provide the most efficient results.



8" Intake Hose Without Cap

Lance

The lance operator is responsible for directing the high pressure water towards the area requiring excavation. The lance must never be directed at any person. The water at the tip of the spray area is at 3,000 psi. This spray is capable of causing serious injury, including amputation.

The lance operator must wear proper PPE, including full face protection and safety shoes, to protect from large particles of flying debris.

The lance must be operated with a minimum 48" extension. Additional extensions can be used as required.

The lance is also used for general clean-up of equipment. For example, once offloading is complete, the rear cargo door should be thoroughly cleaned, especially the gasket area, so that a proper seal will be created on the vacuum cargo tank.



Wash Wand



Lance & Extensions

Operating Limits

It is important to operate the hydro-excavator within the specified parameters set forth by the manufacturer. Failure to do so will likely result in premature equipment failure.

Physical Limits	Consequences of Deviations
25" – 30" of mercury (vacuum system pressure maximum)...	<i>... Equipment wear/ damage ... Personal injury ... Overflow of materials ... Blow-out of seals</i>
Operation with rear axle disengaged...	<i>... Vehicle could move if engine throttle is increased</i>
Operate on level ground for loading and dumping...	<i>... Vehicle could shift</i>
Engine maximum 800-1330 rpm (as per manufacturer's recommendation) ...	<i>... Excessive wear on the pump might occur</i>



Worker Roles & Responsibilities

CEDA Hydrovac trucks shall be operated with a two-person crew. A two person crew typically contains one (1) Operator and one (1) Labourer, both roles receive this training. It is the responsibility of both individuals to ensure they are aware of the composition of the materials that are loaded. When necessary, refer to the ***Material Safety Data Sheets*** for proper handling guidelines.

Specific details for each role were communicated at the point of hire and can be very generally summarized as the following:

Laborer

Utilized as spotter for all equipment moves. Rotates turns on the spray and vacuum while excavating

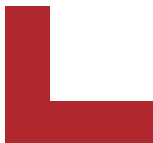
Operator

In addition to Laborer duties, the Operator is responsible for driving (where applicable), general maintenance and overall the operation of the Wet Vacuum unit.

Any Operator driving CEDA vehicles must hold a valid Class 1 or Class 3 license AND must have passed CEDA's driving assessment.

Operate Hydrovac

ACTION	NOTES
Start Up	
1. OBTAIN work permit.	
2. COMPLETE daily pre-job checklist, Tool Box Talk.	
3. PARK unit a safe distance from excavation area...	<i>... minimum of 6 feet.& use spotter to position equipment ... put wheel chocks in place.</i>
4. FLAG/ TAG work area...	<i>... with DANGER DO NOT ENTER flagging, signs and pylons.</i>
5. GROUND Hydrovac.	
6. RIG IN hoses and pipes...	<i>... inspect hoses & install whip checks at each connection on high pressure lines, attach clamps on pipe connections.</i>
Operation	



7. PRESSURE UP unit...	... start with low pressure to avoid flying debris. ... do not exceed 10,000 psi.
<i>Note: If equipment is defective, shut down and repair or replace equipment as required. Do not attempt repairs while high pressure unit is running or vacuum unit is operating.</i> <i>Note: If at any time the job becomes unsafe, shut down all equipment and notify your supervisor immediately.</i>	
ACTION	NOTES
Shut Down	
8. PLACE barricades a minimum of 6 feet diameter away from excavation site...	... upon job completion or at the end of shift.
9. DISENGAGE pump.	
10. SHUT DOWN high pressure unit.	
11. CLEAN work site	
12. SIGN-OFF work permit and leave site.	

Hydrovac Maintenance

As with any equipment used regularly, all components of the Tornado Hydrovac must receive the appropriate preventative maintenance in order to operate properly. Perform the required maintenance for routine operation.

Required Maintenance	Frequency
Oil Change*	50 hours initial 250 hours
Check oil level	Daily/ Prior to operation

Note: The oil level is correct when it reaches the middle of the sight glass. The oil level can only be checked with the machine stopped & everything sitting for at least 5 minutes.



Note: The hydraulic oil does not need replacing unless a component failure occurs. If a component failure occurs the entire system must be drained and flushed before re-commissioning the system.

After 200 – 250 hours of operation the hydrovac requires scheduled maintenance to be performed by a certified mechanic. Additionally, if problems persist, ensure the hydrovac is serviced when necessary to ensure the safe and efficient operation of the unit.

Use the standard CEDA Work Order Form and provide the required documentation to initiate required maintenance.

Winterization

Due to the inclement weather conditions, appropriate winterization of the Hydrovac is critical for proper operation. The winterization procedure is as follows:

ACTION	NOTES
Purge System	
1. DRAIN water tank...	<i>... Completely prior to purging the system.</i>
2. CLOSE water valve on tank.	
3. PULL the valve of the wand hose out of the cabinet with the valve open.	
4. OPEN bottom air supply valve on anti-freeze pot...	<i>... Slowly. ... Leave air valve open until water stops coming out.</i>
5. CLOSE bottom air supply valve.	
Winterize	
1. OPEN the anti-freeze valve.	
2. OPEN the top air supply valve on the anti-freeze tank...	<i>... Slowly.</i>
Note: <i>The air pushes the anti-freeze out of the anti-freeze tank and moves it through the water system until anti-freeze exits the valve on the hose (you will smell the anti-freeze when it starts coming out.)</i>	
3. CLOSE top air supply valve on anti-freeze tank.	
4. CLOSE anti-freeze supply valve.	
5. CLOSE valve on the hose and reel up the hose.	
Reclaim Anti-Freeze	
1. ENSURE all valves are closed...	<i>... On anti-freeze tank.</i>
2. OPEN pressure relief ball valve...	<i>... On anti-freeze tank cap.</i>
3. REMOVE the anti-freeze tank cap...	<i>... Once the pressure is relieved.</i>
4. PULL wand hose out of cabinet...	<i>... Place valve opening in the anti-freeze tank opening.</i>





5. OPEN wand hose valve.	
6. OPEN bottom air supply valve on the anti-freeze tank...	<i>... Slowly. ... Wait for the anti-freeze to quit coming out of the blast hose valve.</i>
7. CLOSE bottom air supply valve...	<i>... On anti-freeze tank.</i>
8. REMOVE blast hose from the anti-freeze tank.	
9. REPLACE anti-freeze tank cap.	
10. CLOSE pressure relief valve.	

Troubleshooting Hydrovac

To efficiently run the Hydrovac unit, the operator must be aware of the common failures that might prevent smooth operation. The following is a list of common problems encountered.

COMPONENT	PROBLEM/ SYMPTOM	CORRECTIVE ACTION(S)
Blower	<i>The Hydrovac will not produce vacuum (suck)</i>	Ensure blower indicator light on (dash) is ON
		Ensure air solenoid is engaged
		Ensure vacuum breaker closed
		Ensure filter is clean
		Ensure housing door to the filter is sealed
		Ensure cyclone clean
		Ensure tank is full
		Ensure float ball in debris tank is not stuck
		Check for debris or obstructions in the boom hose
		Ensure transfer case engaged
		Check that the silencers are free of all obstructions
		Ensure blower is spinning
		Ensure valves on the dump door closed?
		Ensure dump door closed
	<i>The vacuum system is howling</i>	Ensure vacuum breaker is completely closed and sealed





		Ensure there are no leaks in the boom turret
		Check that all hose connections are properly fastened and sealing
		Ensure debris door sealed
		Ensure decant valve sealed shut
	<i>The blower is overheating</i>	Ensure the fluid level in the blower is at the correct level <i>Prolonged deadheading should be avoided. When this is necessary to do a job, allow the truck to get some more air from time to time by opening the vacuum breaker, or releasing the dig tube from a sumped position.</i>
	<i>The blower will not turn</i>	Ensure blower lobes are not frozen to the housing
		Check for debris in the blower
		Ensure the transfer case is engaging <i>With the transfer case in neutral, the blower can be turned by hand to insure that the blower is frozen or not.</i>
		Ensure truck is in gear
Water Pump	<i>There is no water</i>	Ensure water valve located on the water tank is open
		Ensure banjo water filter clean
		Check for water in the tank
		Ensure water tank is not frozen
		Check the fill line from the tank to the pump is not frozen
		Ensure pump is turning
		Check that the PTO is engaged
		Ensure wand tips free of debris
		Ensure ball valve on the end of the dig wand is open
		Ensure valve from the hydraulic tank is open to supply pump
	<i>There is inadequate water pressure</i>	Run through the above water source issues first
		Check wand tips to ensure they have not bored out, or are missing





		Consult the CAT info sheet in the Manual for further instructions if the above steps do not fix the problem
Control Panel	<i>Engine RPM will not increase/decrease</i>	Ensure your feet are off the clutch and brake pedals, and they are pulled up
		Check to make sure speedometer is reading 0 (Zero) MPH/KmPH while the blower is engaged
		Ensure the parking brake is engaged
		Ensure PTO mode switch is ON and press set
		Ensure both remote and manual Set/Reset have been tested to rule out a faulty switch
		If your foot-feed (throttle) works while the PTO on/off switch is engaged, then the truck ECM is not receiving a signal from the PTO on/off switch. In normal operation this would disable the foot-feed.
		Check connection wiring of the PTO on/off switch
Control Panel continued	<i>Engine RPM will not increase/decrease continued</i>	Problems may include ECM wiring that has been shorted or disconnected, or possible truck programming issues. Contact Tornado for assistance.
	<i>Other control panel functions are not operating</i>	Check fuses.
Boiler	<i>The boiler will not light</i>	Ensure that the boiler switch is in the ON position
		Ensure the water already at operating temperatures, which will signal the temperature module to not fire.
		Check that there is pressure at the fuel gauge
		Check fuel supply if insufficient pressure is present at the gauge. Pump the primer ball and inspect the fuel filter
		If after priming, fuel remains absent, inspect the fuel lines from the fuel tank to the water pump cabinet to insure that they are intact. Look inside fuel tank on the chassis to insure that the drop tube on the fuel pickup is intact
		Ensure the boiler blower motor turning





		Check that the chimney is open on top of the blower housing
		Ensure there is water flow as the boiler will not fire if there is no water flow
		If the above are all in place, remove the burner nozzle assembly from the boiler housing, and visually inspect electrodes for condition, spacing and moisture. The electrodes should be spaced 3/32" from the boiler nozzle and 3/32" apart
		For 12 volt systems only: Test pressure switch to insure it is functioning correctly. If the boiler squeals, then the ignition system is attempting to light. This would signal that the 12-volt ignition system is functioning correctly. If the boiler does not sound like it is attempting to light, then check power supply to the ignition coil. If there is power to the coil, then the ignition coil will need to be replaced.
Boiler continued	<i>The boiler lights, but will not continue to function</i>	Remove and inspect flame-detection eye. Is the flame eye damaged or sooted over? The flame eye is mounted below the ignition coil, inside the burner. If damaged, replace. If dirty, then clean
		If flame eye is intact, check fuel level in the fuel tank and dip tube level/condition
		Insure that the chimney is open; otherwise the boiler will fire, but will not have enough air to continue to burn
Top gun Boom	<i>The boom will not move</i>	Refer to steps related to hydraulic failure. Most likely the problem is with the hydraulics.
		Warm up hydraulics by running the unit. <i>When very cold outside, the boom may ice up at the turret gear, or the hydraulics may be cold.</i>
		Ensure that the orbit motor which drives the rotation of the boom is functional
		Review the Remote-Control troubleshooting steps if all hydraulic components are sound
	<i>The boom is plugged</i>	Check to make sure the tank is not full as the float arm may be stuck



		Detach dig tube and look through it to ensure there are no obstructions. When accessing top of unit fall protection must be worn
		Detach dig hose at first connection (C), located at the boom cradle, and check for obstructions <i>CAUTION – this section of hose, especially if plugged with mud, could weigh up to 400lbs.</i>
		Extend the boom out fully 90-degrees from the truck Tie-off the black hose to the cradle to prevent it from getting away Remove clamp and look into telescope for obstructions
		Detach dig hose at the back of the boom pipe <i>This should be done by unclamping the 8" hose, not by unbolting the rock head cover. Shine a flashlight into the boom pipe to visually inspect the next connection</i>
Top gun Boom continued	<i>The boom is plugged continued</i>	Detach the hose at the rock head (B) and look for obstructions <i>At the same time you should visually inspect the wear plate on the backside of the rock head for excessive wear or holes. If any exist, replace wear plate.</i>
Mud Sweep	<i>The mud sweep will not sweep</i>	Check the hydraulic pressure on the gauge at the control block to insure that proper pressure exists. Hold the manual "sweep retraction" hydraulic handle and the pressure on the gauge should hold at 1,800 PSI (standard maximum system pressure is between 2,000 PSI and 2,500 PSI). The sweep must be fully retracted in order to perform this test. The test must be run with the chassis running at full operating RPM
		If the sweep is running too slowly, the truck RPM must be brought up to full operating RPM to maximize hydraulic performance
		Check the hoses and connections to the sweep rams
		Visually inspect the sweep assembly to insure that it is not disfigured or bent



Wireless Remote	<i>The wireless remote has stopped working</i>	Ensure the light on the handheld remote go on when ON button is depressed. If not, change or re-charge the battery
		When activating functions on the remote handheld remote, the lights on the receiver should go on, showing that there is a connection between the handheld remote and receiver. First re-test with a fresh battery; if that does not remedy the issue, there is a problem with the handheld remote or the receiver and ground
		Ensure that the antenna connections are in place
		Ensure there is power getting to the receiver
		If the handheld remote test lights reflect that there is power and signal, when pressing buttons on the handheld remote, but the “output” light does not come on, then there is a receiver problem. This will most likely require a replacement receiver
Wireless Remote	<i>The wireless remote has stopped working</i>	Ensure the handheld remote light flashes faster when function buttons are depressed. If not, the buttons could have water damage or need replacing. If the receiver does not receive a signal, the handheld remote may need to be reprogrammed to the receiver
		If all attempts fail, refer to the Omnex manufacturer’s manual for further troubleshooting instruction
Hydraulic System	<i>Hydraulics are not working</i>	Check oil level in hydraulic tank
		Ensure valves are open on the tank
		Ensure that the suction line valve is in the open position. The valve is located on the hydraulic tank
		Ensure hydraulic switch on
		Ensure dash light on
		Ensure air solenoid is engaging, or check for air pressure (located on the main control panel)
		Operate the hydraulics manually, to ensure that it is not purely a remote control problem
		Check hydraulic oil filter





		Check for leaks in fittings and hose
		Check for leaks in rams
		Ensure that the hydraulic pump is functioning
		Confirm that the system pressure is operating at least 1800 PSI
		Contact a Tornado service representative If you are experiencing any difficulty with either the auxiliary hydraulic system, or water pump drive hydraulic system



Multiple Choice Questions (Technical Quiz)

Complete the following test, and have it graded by your assessor. If any questions are answered incorrectly, your assessor will explain what the correct answer is, and why it is correct. Once you understand the correct answer, both the assessor and students initials are required to indicate that mentoring or coaching has taken place.

Question	Assessor's Initials	Student's Initials
1. Hydrovac operations are usually a two person operation. a. True b. False		
2. A vacuum unit is most efficient when ____ mmHg is produced. a. -5 b. -10 c. -12 d. -20		
3. The filter must be cleaned at the end of each job and should be inspected prior to starting the pump. a. True b. False		
4. The type of Blower utilized by CEDA hydrovac units is: a. Liquid ring b. Rotary lobe c. Sliding vane d. None of the above		
5. The water pump is capable of delivering water at 3,000 psi. a. True b. False		
6. Water pump hammering may be a result of: a. A plug in the suction line. b. Low water in tank. c. Not priming the pump d. All of the above		
7. The capacity of the water storage tanks is: a. 1,000 US gallons b. 2,000 US gallons c. 3,000 US gallons d. None of the above		
8. Load rates are reduced when: a. hose length increases. b. the number of bends in the hose increases. c. smooth bore hoses are used. d. a and b only		
9. Water storage tanks and lines must be empty during winter months when the hydrovac is not in use. a. True b. False		



10. The _____ is a “fire on demand” system that operates only when water is flowing through it. a. Vacuum Pump b. Triplex Pump c. Water Tank d. Boiler Unit		
11. What is used to winterize the pump and boiler unit? a. Alcohol b. Glycol c. Alcohol/ Water Mixture d. Glycol/ Alcohol Mixture		
12. If you experience high water pressure from the lance: a. The engine idle may be too low. b. The water tank may be low. c. There may be a plugged orifice in the nozzle. d. All of the above		
13. Cyclones remove large particles of debris and moisture that escape the tank. a. True b. False		
14. Traps should be cleaned: a. Weekly b. Monthly c. Daily d. Every 6 months		
15. The hydraulic system should not exceed: a. 160°F b. 320°F c. 130°F d. 420°F		
16. The boom must be secured and capped for transportation. a. True b. False		
17. The lance can deliver water up to 3,500 psi. a. True b. False		
18. If the boom does not rotate: a. The hydraulic pump may not be engaged. b. The transport tie-down may still be attached. c. Both a and b d. None of the above		
19. Grounding must occur during every operation. a. True b. False		
20. Negative pressure should not exceed: a. -35mmHg b. -30mmHg c. -38mmHg d. -40mmHg		
21. In order to generate vacuum, all ports, hatches and valves must be open. a. True b. False		
22. When the hydrovac is under negative pressure, the air moves through the unit in the following order:		





a. Tank, Intake, Filter, Cyclone, Blower, Discharge Silencer b. Discharge Silencer, Intake, Tank, Cyclone, Filter, Blower c. Intake, Tank, Cyclone, Filter, Blower, Discharge Silencer d. Intake, Tank, Filter, Cyclone, Blower, Discharge Silencer		
23. The rear door is seated to the tank with a rubber gasket. This gasket on the outer edge must be air tight in order to create the vacuum necessary for routine operation. a. True b. False		
24. Micro screen/ filter should be inspected: a. monthly. b. weekly. c. daily. d. None of the above		
25. A loss or reduction in vacuum may be a result of: a. Plug in vacuum hose. b. Plug in filter. c. Hole in hose. d. All of the above		



Practical Assessment – Hydrovac Operations

This form is to be filled out by the assessor as they observe the student successfully demonstrate these items in order to be deemed competent.

Assessment Check List

#	Locate the following components:	Trainee Initials	Assessor's Initials
Hydrovac Components			
1	Vacuum Cargo Tank.		
	Shut-off ball(s)		
	Float level indicator (interior)		
	Tank level indicator (exterior)		
2	Rear Door		
3	Door Latches		
4	Mud Sweep		
5	Tank Level Indicator		
6	Drain Valve		
7	Water Storage Tanks		
8	Fill Valve		
9	High Pressure Pump and Pressure Relief Valve		
10	Pressure Hose		
11	Boiler Unit		
12	Pressure and Temperature Gauges		
13	Thermostat		
14	Anti-freeze System		
	Glycol Tank		
15	Power Inverter		
16	Operator Controls		
17	Air Purge System Hose		
18	Cyclone		
17	Filter		
18	Hydraulic Bank and Levers		
19	Blower		
	Site Glass (for pump oil)		
20	Intake and Discharge Silencers		
21	Emergency Shutoff Switches		
22	Hydraulic System		
	Reservoir Tank		
	Filter		
	Cooler		



23	Remote Control		
24	Boom		
25	Lance and extensions		
26	Grounding System		
Purge System			
1	Drain water tank.		
2	Close water valve on tank.		
3	Pull the valve of the wand hose out of the cabinet with the valve open.		
4	Open bottom air supply valve on anti-freeze pot.		
5	Close bottom air supply valve.		
Winterize			
1	Open the anti-freeze valve.		
2	Open the top air supply valve on the anti-freeze tank.		
3	Close top air supply valve on anti-freeze tank.		
4	Close anti-freeze supply valve.		
5	Close valve on the hose and reel up the hose.		
Reclaim Anti-Freeze			
1	Ensure all valves are closed.		
2	Open pressure relief ball valve.		
3	Remove the anti-freeze tank cap.		
4	Pull wand hose out of cabinet.		
5	Open wand hose valve.		
6	Open bottom air supply valve on the anti-freeze tank.		
7	Close bottom air supply valve.		
8	Remove blast hose from the anti-freeze tank.		
9	Replace anti-freeze tank cap.		
10	Close pressure relief valve.		
Air System Winterization (For Units Utilizing Alcohol Pots)			
1	Drain-off air pressure.		
2	Open drain valve on pot.		
3	Remove fill nut from top of alcohol pot.		
4	Close drain valve on pot.		
5	Fill pot with brake line antifreeze.		
Air System Winterization (For Units Utilizing Alcohol Pots) continued			
6	Replace fill nut.		
7	Close all air bleed valves on system and re-pressurize.		





Assessment Sign Off

All boxes must be completed before signing an employee competent.

- ☐ Expectation Letter Signed
- ☐ Minimum 100 hours of on the job training completed
- ☐ On the Job Practical Assessment Completed by an approved Assessor
- ☐ Has reviewed and understands the operator manuals for the Wet Vacuum Units
- ☐ Reviewed and understands Procedures and Safety Documentation
- ☐ Technical review and Knowledge Exam complete
- ☐ Training documentation sent to CEDA Training Department

Assessor

I, _____ have taken the below named employee through this Assessment, and he/she has successfully demonstrated competence in the areas identified.

Signature Date

Student

I, _____ have completed this competency, including the on-job demonstration, practical assessment and multiple-choice questions. I understand the information presented and agree to follow all of the rules and procedures set out by CEDA.

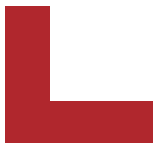
Signature Date





Revision Log

Revision Date	Section Affected	Changes Made
October 21, 2021	All	Updated Template, multiple changes throughout.





Training Change Request Form

Date: _____

Location: _____

Name: _____

Contact information: _____

Email/Phone number

Description

Please use the back of this sheet to make additional comments.

Section Name: _____

Page Number: _____

Description of Problem/ Suggested Resolution:

