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Safety and Operation Manual Vacuum Systems

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Manual Part No. E850000

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California Proposition 65

 **WARNING** 

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

FORWARD

This manual contains important safety information and operational instructions for your McLaughlin system. Read and understand this manual before operating this equipment. Failure to do so may result in serious personal injury or equipment damage.

Keep this manual with the equipment at all times for future reference. If you sell this equipment, be sure to give this manual to the new owner. A replacement copy of this manual is available through your local McLaughlin dealer or by contacting McLaughlin Group, Inc. directly at:

McLaughlin Group, Inc..
2006 Perimeter Road
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The illustrations, instructions and specifications in this manual are subject to change. McLaughlin Group, Inc. reserves the right to make product changes at any time. Contact your McLaughlin Group, Inc. dealer for the latest information on McLaughlin equipment.

Hazard Alert Decals

BE AWARE OF SAFETY INFORMATION

This is the safety-alert sign. This symbol is placed in the manual and on your machine to alert you to potential bodily injury or death.



SIGNAL WORDS

The safety-alert icon is used with the following signal word: **DANGER, WARNING, AND CAUTION.** When you see these words in the manual or on decals on your machine, carefully read and follow all instructions. Watch for these words and learn their meanings.

DANGER Imminent hazard which, if not avoided, will result in death or serious injury.



WARNING Potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION Potentially hazardous situation which, if not avoided, may result in minor personal injury or property damage.



READ YOUR OPERATOR'S MANUAL

Read and understand the operator's manual for your machine. Do not operate your machine unless you have read and understand the warnings and instructions contained in it. Contact your McLaughlin dealer if your manual becomes damaged or lost.



Keep hands, feet and clothing away from moving parts.

Keep all shields and guards in place. Do not modify or remove guards.

Turn off the machine before servicing.

Notes

A large rectangular area with horizontal lines for taking notes.

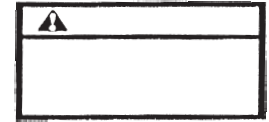
Specific Hazard Alert Symbols

READ MANUAL

Carefully read and understand all safety decals and proper operating techniques.

The safety decals in this manual contain important information. Understanding these decals will help you operate your equipment properly. Replace missing or damaged decals.

Allow only authorized personnel to operate equipment. Closely supervise inexperienced operators.



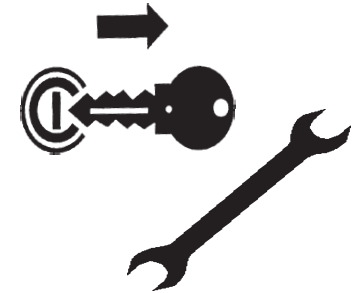
SERVICE AND MAINTENANCE

Make sure the machine is always in good working condition. Safety devices must always be installed and be functioning properly.

Check machine daily before operating.

Do not modify this machine. Use only McLaughlin repair parts

Follow service and maintenance intervals.



PERSONAL PROTECTIVE EQUIPMENT

Proper protective equipment is required for safe operation of this equipment.

Protective Equipment:

- | | |
|--------------------|--------------------------|
| 1. Hard hat | 2. Safety Glasses/Shield |
| 3. Safety Vest | 4. Ear Protection |
| 5. Electric Gloves | 6. Electric Boots |

Wear close fitting clothes.

Avoid jewelry such as bracelets, necklaces and watches. Restrain long hair.



WARRANTY RETURN GOODS POLICY

LIMITED WARRANTY

The Manufacturer warrants its products to be free from defects in material and workmanship for a period of twelve months from the date of shipment from the factory. The Manufacturer shall not be responsible for any damage resulting to or caused by its products by reason of installation, improper storage, unauthorized service, alteration of the products, neglect or abuse, or use of the product in a manner inconsistent with its design. This warranty does not extend to any component parts not manufactured by Manufacturer; however, Manufacturer's warranty herein shall not limit any warranties made by manufacturers of component parts which extend to Buyer.

Claims for defects in material and workmanship shall be made in writing to Manufacturer within ten days of discovery of defect. Manufacturer may either send a service representative or have the product returned to its factory at Buyer's expense for inspection. Upon notification of defect, Manufacturer will issue a return goods authorization number to Buyer. The return goods authorization number must accompany the product returned. If judged by the Manufacturer to be defective in material or workmanship, the product will be replaced or repaired at the option of the manufacturer, free from all charges except authorized transportation. Buyer shall be responsible for all maintenance services consisting of lubrication and cleaning of equipment, replacing expandable parts, making minor adjustments, and performing operating checks, all in accordance with procedures outlined in Manufacturer's maintenance literature.

THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES AND NO REPRESENTATIONS, GUARANTEES, OR WARRANTIES, EXPRESS OR IMPLIED, (INCLUDING BUT NOT LIMITED TO A WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE), ARE MADE BY THE MANUFACTURER IN CONNECTION WITH THE MANUFACTURE OR SALE OF ITS PRODUCTS. NO EMPLOYEE, DISTRIBUTOR, OR REPRESENTATIVE IS AUTHORIZED TO CHANGE THIS WARRANTY ON BEHALF OF MANUFACTURER THE REMEDIES OF BUYER SET FORTH HEREIN ARE EXCLUSIVE AND ARE IN LIEU OF ALL OTHER REMEDIES. THE LIABILITY OF MANUFACTURER WHETHER IN CONTRACT, TORT, UNDER ANY WARRANTY, OR OTHERWISE SHALL NOT EXTEND BEYOND ITS OBLIGATION TO REPAIR OR REPLACE, AT ITS OPTION ANY PRODUCT OR PART FOUND BY MANUFACTURER TO BE DEFECTIVE IN MATERIAL OR WORKMANSHIP. MANUFACTURER SHALL NOT BE LIABLE FOR COST OF INSTALLATION AND/OR REMOVAL OR BE RESPONSIBLE FOR DIRECT, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES OF ANY NATURE.

GENERAL RETURNS OF MERCHANDISE

1. All returns must be pre-authorized
 - A. Please call our parts department for an RGA number
 - B. Please include RGA number on the outside of box
 - C. Include any required paper work or special instructions
 - D. Items returned without an RGA number will not be accepted
2. All returns are subject to a 20% restock charge.
3. Special items are non-returnable
 - A. Non-stock parts
 - B. Custom parts
 - C. If you are unsure about a parts status when ordering, ask your McLaughlin representative if the item fits on of the above conditions.
4. Items must be returned within thirty days of original order date.
5. Items not returned within 30 days from the date of RGA is issued will not be accepted.
6. The item(s) must be in new condition. Used item(s) are not returnable.

HOT FLUID UNDER PRESSURE

Hot fluid can burn or scald.

Wear protective clothing when servicing.



BATTERY ACID AND FLAMMABLE FUMES

The battery contains acid which can cause severe burns. Avoid contact with eyes, skin and clothing.

Fumes from the battery may explode. Keep sparks and flame away from battery. Cables and tools may cause sparks. Protect eyes and face from battery.



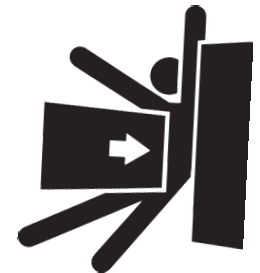
CRUSHING WEIGHT

The spoil, tank, and door are very heavy. Stay clear of the door when dumping the tank.

Trailer mounted systems may roll or tip if not properly secured to the towing vehicle. The following must be followed for operation, dumping, and servicing the tank.

1. The trailer tongue must be properly attached to the towing vehicle.
2. The towing vehicle's tires must be chocked.
3. The towing vehicle's parking brake must be applied.

Skid mounted units must be properly secured to transporting vehicle or system before operating or servicing. Transporting vehicle must have wheels chocked and parking brake applied during operation and servicing.



SUFFOCATION HAZARD

This machine produces a high volume of air flow.

Direct contact of the mouth and/or nose to the vacuum air flow can result in death by suffocation.

Do not allow hoses or tools to come in contact with skin, hair and clothing.

Never put the suction end of a tool or hose near your face. The vacuum can collapse your lungs.

Never use this machine in a manner that is inconsistent with its intended design.



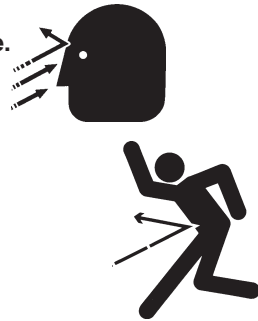
FLYING OBJECT HAZARD

This machine uses either water or air under pressure.

The ground engaging tools can cause objects to become airborne.

Flying objects can cause injury or property damage.

Keep all nonessential people away from the work area.



TRANSPORTING MACHINE

Make sure all components are stored properly.

Turn off the engine and relieve water system pressure.

Trailer units should be verified for the following:

- 1) The hitch, safety chains, and trailer wiring is properly connected.
- 2) The jack is in its fully retracted position.

Close all valves and doors.

Remove wheel chocks.

REMEMBER: A fully loaded or partially loaded unit will pull differently than when it is empty. A loaded unit requires longer stopping distances. Also, liquid tend to “slosh” when stop.

Make sure that the tires are inflated properly and that the brakes work properly.

MATERIAL DENSITY CHART - AEM Vacuum Excavation Equipment Committee

NOTE: The weight of H2O is 8.3 lb. per Gal.

	Specific Gravity	lb. per cu. Foot	lb. per cu. Yard	kg. per cu. Meter	0% H2O lb. per Gal.	25% H2O lb. per Gal.	50% H2O lb. per Gal.	75% H2O lb. per Gal.
Earth, loam, dry, excavated	1.25	78	2106	1249	10.4	9.9	9.36	8.83
Earth, moist, excavated	1.44	90	2430	1442	12	11.1	10.17	9.23
Sand, loose	1.44	90	2430	1442	12	11.1	10.17	9.23
Caliche	1.44	90	2430	1442	12	11.1	10.17	9.23
Earth, packed	1.52	95	2565	1522	12.7	11.6	10.5	9.4
Earth, wet, excavated	1.6	100	2700	1601	13.4	12.1	10.83	9.57
Sand, dry	1.6	100	2700	1601	13.4	12.1	10.83	9.57
Clay, wet lump	1.6	100	2700	1601	13.4	12.1	10.83	10.83
Sand, rammed	1.68	105	2835	1682	14	12.6	11.17	9.73
Gravel, dry, 1/4 to 2 inch	1.68	105	2835	1682	14	12.6	11.17	9.73
Earth, soft loose mud	1.73	108	2916	1730	14.4	12.9	11.37	9.83
Sand and Gravel, dry	1.73	108	2916	1730	14.4	12.9	11.37	9.83
Clay, wet excavated	1.83	114	3078	1826	15.2	13.51	11.77	10.04
Sand, water filled/wet	1.92	120	3240	1922	16	14.11	12.17	10.24
Earth, dense	2	125	3375	2002	16.7	14.61	12.51	10.4
Sand and Gravel, wet	2	125	3375	2002	16.7	14.61	12.51	10.4
Gravel, wet, 1/4 to 2 inch	2	125	3375	2002	16.7	14.61	12.51	10.4
Sand, wet packed	2.08	130	3510	2082	17.4	15.11	12.84	10.57

VARIABLES AFFECTING VOLUME OF H2O REQUIRED FOR EXCAVATION

1. Material type
2. Material purity
3. Compaction
4. Water Content
5. PSI of water wand
6. GPM of water flow
7. CFM of vacuum
8. IN/HG of vacuum
9. Individual operator

Source: Pocket Ref by Thomas J. Glover, Copyright 1989-1999, 2nd Edition, pg 427-436

CLEAN UP

1. Remove hose handle and remote and then remove first section of hose. Lower the boom to a position to easily remove second section of hose.
2. Retract boom and Raise boom to clear all obstruction in travel path. Unlock pin and swing boom back into position on top of bracket.
3. Clean hoses and place them into designated storage space.
4. Lower engine throttle and turn off engine. Store the remote back into place inside door.



WARNING: FAILURE TO FOLLOW ANY OR ALL OF THE SAFETY INSTRUCTIONS IN THIS MANUAL, COULD RESULT IN DEATH OR SERIOUS INJURY. DO NOT USE THIS MACHINE IN A MANNER THAT IS INCONSISTENT WITH ITS INTENDED DESIGN.

Hazard Alert Decal Placement

HAZARD ALERT DECAL MAINTENANCE

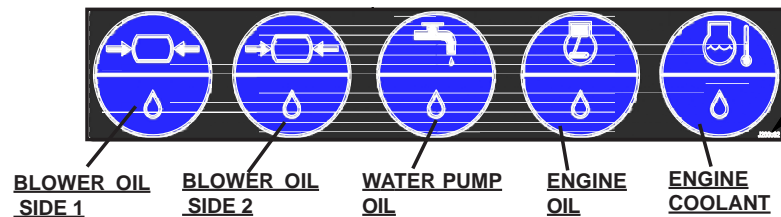
Hazard alert decals on your machine contain important information that will help you operate your equipment safely.

Decals maintenance:

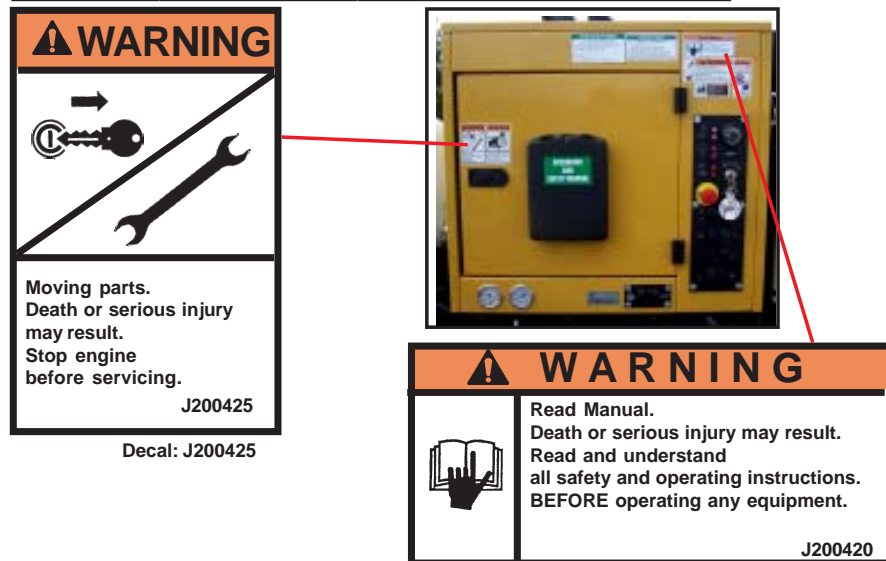
1. Keep decals clean. Clean with soap and water. Do not use harsh chemicals, or spray decals directly with a high pressure washer.
2. Replace decals when they become damaged or hard to read. Clean the surface of dirt, grease and oil before applying.
3. When replacing a machine component with a decal on it, replace the decal also.
4. See your local dealer or contact McLaughlin for replacement decals.
5. Replacement part number appears on each decal, as well as in this manual.

DIESEL POWER PACKS - SKID ONLY

REMOTE OIL DRAIN PORTS



DIESEL POWER PACKS - CURB SIDE



REVERSE FLOW

Reverse flow is used to unclog obstructions from hoses or remove debris from spoil tank.

1. When vacuuming, flow control valve is in vacuum position.
2. When clog occurs close gate valve on tank and or (optional) boom.
3. Move flow directional valve to pressure.
4. Allow system to build to 5 p.s.i., pressure relief valve will now allow system to go passed 5 p.s.i.
5. Make sure hose is positioned in safe direction.
6. Open gate valve to the obstructed hose.
7. Once obstruction is relieved return flow control valve into vacuum.

REMOVING DEBRIS FROM SPOIL TANK

1. Attach hose to lower gate valve to transfer spoil material from tank to designated area.
2. Make sure flow control valve is in neutral.
3. Start the unit and put the unit in high throttle.
4. Move the control flow valve to pressure.
5. Open the lower gate valve with hose attached and pointed in safe direction.
6. Place the flow valve back into neutral.
7. Close bottom gate valve and turn machine off.
8. At this point operator can either go back to work or remove solid waste from the tank.

BOOM

1. Remove the remote from the curbside door.
2. Start the unit and switch throttle to high.
3. Using the remote, raise the boom so it clears all obstruction in the travel path.
4. Use the remote to unlock the pin on manual boom and grab the rope to swing the boom into position.
5. Let go of button to lock pin into place.
6. (Hydraulic Boom) Use the remote to move boom into desired position.
7. Using the remote lower the boom so the hose handle can be easily removed and first section of hose can easily be attached.
8. Attach first section of hose then raise the boom to attach second section of hose. Attach hose handle to the lowest section of hose at an easy operating position and attach the remote for easy operation.
9. At this point boom is ready for operational use.

WATER SYSTEM FREEZE PROTECTION

All vacuum systems supplied with a water system should be filled with antifreeze if being stored or transported in freezing conditions. Systems not filled with antifreeze are susceptible to freezing water system damage.

UNITS SUPPLIED WITH WATER SYSTEMS ONLY

1. Remove the drain plug from the strainer and remove excess water from the system.
2. Reinsert the drain plug.
3. Verify no tools are connected to the high pressure water hose.
4. Place the end of the high pressure water hose in the water tank.
5. Units with antifreeze tanks should now close the ball valve at the water tank. Units not supplied with an antifreeze tank must leave the ball valve at the water tank open.
6. Pour 1-2 gallons of antifreeze into the antifreeze tank and open the antifreeze ball valve. Units supplied without an antifreeze tank should pour 2-3 gallons of antifreeze into the water tank.



CAUTION: DO NOT LET THE WATER PUMP RUN DRY. MAKE SURE A LEVEL OF ANTIFREEZE IS VISIBLE AT ALL TIMES. RUNNING THE WATER PUMP DRY WILL RESULT IN WATER PUMP DAMAGE.

7. Open the spoil tank inlet and start the engine. Operate the engine at low speed during antifreezing.
8. Turn the water pump on.
9. Open the hose reel ball valve on units supplied with a hose reel.
10. Hold the antifreeze switch up.
11. Watch the flow coming out of the end of the water hose. Release the antifreeze switch as soon as antifreeze is detected coming out of the hose. Remember not to let the antifreeze in the tank to run completely out.
12. Close the hose reel ball valve on units supplied with a hose reel.
13. Units not supplied with the in-tank cleanout system skip to step 17.
14. Open the gate valve in the tank door and open the tank cleanout ball valve.
15. Hold the antifreeze switch up.
16. Watch the flow coming out the tank door valve. Release the antifreeze switch as soon as antifreeze is detected. Close the gate valve in the tank door and close the tank cleanout valve.
17. Hold the antifreeze switch up.
18. Watch the flow returning to the water tank via the bypass hose. This can be seen by looking in the water tank. Release the antifreeze switch when antifreeze is detected.
19. On units with an antifreeze tank, open the water tank ball valve allowing the excess antifreeze to flow into the suction plumping. Close the antifreeze ball valve.
20. Turn off the water pump.
21. Turn the engine off. The system is antifreezed.

DIESEL POWER PACKS - CURB SIDE

INSTRUCTIONS

- #### DUMP PROCEDURE MANUAL DOOR
1. Open gate valve - drain liquid - close gate valve
 2. Remove inlet port plug
 3. Click FULL TANK OVERRIDE switch to ON position - Start engine
 4. Install inlet port plug to build vacuum
 5. Unlock tank door
 6. DO NOT STAND AT REAR OF UNIT - shut off engine
 7. Wait for vacuum to release the door - start engine
 8. Hold TANK RAISE switch up to raise tank
 9. After dumping, hold TANK LOWER switch down to lower tank
 10. Lock tank door

J200466

Decal: J200466

UNITS WITH
MANUAL
LOCKING DOOR

INSTRUCTIONS

- #### DUMP PROCEDURE HYDRAULIC DOOR
1. Open gate valve on tank inlet - tank will not build vacuum
 2. Click FULL TANK OVERRIDE switch to ON position
 3. Start engine
 4. Hold TANK RAISE switch up to open door and raise tank
 5. After dumping, hold TANK LOWER switch down to lower tank and close door
 6. Shut off engine

J200481

Decal: J200481

UNITS WITH
MANUAL
LOCKING DOOR



DIESEL POWER PACKS - CURB SIDE CONTINUED

WARNING

Electricity, or Gas
Explosion Can Kill

Locate Utilities
Call 888-258-0808

Decal: J000210

DANGER

Crushing weight.
Rolling or tilting trailer will cause death or serious injury.
Chock tires and apply parking brake before operating or servicing.
Do not operate unless attached to the towing vehicle.
J200400

Decal: J200400



INSTRUCTIONS

START PROCEDURE

1. Fill water tank
2. Open ball valve-prime water pump
3. Remove port plug from inlet port
4. Preheat engine - (cold start) 15 seconds
5. Depress murphy switch - start engine
6. When light goes out release murphy switch

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Decal: J200468

WARNING

Rotating pulleys and belts.
Do not operate without guards in place.
J200445

Decal: J200445

OPERATION AND SAFETY MANUAL

Decal: J200465

TANK CLEANING (Units supplied with a water system)



DANGER: CRUSHING WEGHT. ROLLING OR TILTING UNIT WILL CAUSE DEATH OR SERIOUS INJURY. CHOCK TIRES AND APPLY PARKING BRAKE BEFORE OPERATING OR SERVICING. DO NOT OPERATE OR SERVICE UNLESS ATTACHED TO VEHICLE.

Units with spoil in the tank should follow the instructions for emptying the spoil tank before proceeding.

1. Start the engine.
2. With the tank empty and the door unlocked, raise the tank. (Models supplied with a hydraulic locking door must install the door safety pin while working under the raised door.) (V100G/D Models are supplied with a door holder to allow for access and cleaning.)
3. Attach the spray wand to the water hose.
4. Run the engine at high speed.
5. Turn the water pump clutch switch on.
6. Open the hose reel ball valve. (VSK100G/D model do not have a ball valve.)



WARNING: HIGH PRESSURE WATER FROM CAN CAUSE SERIOUS INJURY. WEAR PROTECTIVE CLOTHING AND DO NOT POINT HIGH PRESSURE WATER TOOLS TOWARD BODY PARTS.

7. The unit may now be cleaned with the spray wand and automatic tank cleanout if supplied. Care should be taken when cleaning the door seal with the spray wand. The door seal may be damaged if the spray wand is held in close proximity to the door seal or sprayed with high pressure.
8. The automatic tank cleanout is operated by opening the tank cleanout ball valve. Material will be washed out of the spoil tank. Close the tank cleanout valve when the tank is adequately clean.
9. Close the hose reel ball valve and turn the water pump clutch switch off.
10. Release trapped water pressure in the water hose by squeezing the trigger on the spray wand gun.
11. Lower the tank. Run the engine at low. Turn the key to the off position and remove the key.
12. Securely store all tools and hoses prior to departing.

TOOL AND HOSE CLEANING

All tools and hoses should be cleaned prior to storage. Debris build up on the tools and hoses will reduce performance.

1. Connect the dirty tool and hoses to the spoil tank inlet.
2. Connect the spray wand to the high pressure water hose.
3. Start the engine and operate at high speed.
4. Turn the water pump clutch switch on.
5. Open the hose reel ball valve. (VSK100G/D model do not have a ball valve.)



WARNING: HIGH PRESSURE WATER FROM CAN CAUSE SERIOUS INJURY. WEAR PROTECTIVE CLOTHING AND DO NOT POINT HIGH PRESSURE WATER TOOLS TOWARD BODY PARTS.

6. Reduce the pressure on the spray wand to its minimum setting.
7. Use the spray wand to wash off the tool and hose. Material on the inside of the tool and hose will be vacuumed into the spoil tank.
8. When finished, close the hose reel ball valve and turn the water pump clutch switch off.
9. Release trapped water pressure in the water hose by squeezing the trigger on the spray wand gun.
10. Run the engine at low. Turn the engine off and remove the key.
11. Securely store all tools and hose prior to departing.

EMPTYING THE SPOIL TANK - HYDRAULIC LOCKING DOOR



WARNING: DO NOT VACUUM HAZARDOUS MATERIAL WITH THIS SYSTEM. CONSULT FEDERAL, STATE, AND LOCAL REGULATIONS REGARDING CLASSIFICATIONS OF HAZARDOUS MATERIAL.

Emptying the vacuum spoil tank presents several hazards that the operator should be aware of.



DANGER: CRUSHING WEIGHT. SPOIL AND DOOR WILL CAUSE DEATH AND SERIOUS INJURY. UNLOCK DOOR ONLY UNDER VACUUM. STAY AWAY FROM DOOR WHEN DUMPING.




DANGER: CRUSHING WEGHT. ROLLING OR TILTING UNIT WILL CAUSE DEATH NOR SERIOUS INJURY. CHOCK TIRES AND APPLY PARKING BRAKE BEFORE OPERATING OR SERVICING. DO NOT OPERATE OR SERVICE UNLESS ATTACHED TO VEHICLE.

Before beginning vacuum operations, a plan and site for disposing of the spoil in the tank should be established.

1. Before arriving at the disposal site, verify the water tank has an adequate level for cleanup if equipped.
1. After arriving at the disposal site, set the parking brake and chock the wheels.
2. Open the inlet port.
3. It is recommended that liquids be drained from the tank, prior to raising the tank. Use the gate valve located in the bottom of the door to drain excess liquids.
4. At the operator's console, turn the vacuum tank full override switch on and make sure the water pump clutch is off. Override is only required when the spoil tank is full.
5. Start the engine at low idle.
6. Hold the raise tank switch up. The door will unlock and open followed by the tank raising.
7. Once the tank has been emptied, it may be cleaned while in the raised position. Units not cleaned after dumping should have the door seal and mating flange wiped clean of debris that may damage the seal when sealing the door.
8. Open the cyclone door and remove debris. Close the cyclone door.
9. Lower the tank and close the door. Turn the engine key counter-clockwise to the off position and remove the key.
10. The air filter should be cleaned once a day. Open the air filter door and inspect the air filter element. If the air filter element is dirty, remove and clean with water. The air filter may be cleaned with the spray wand. The cleaned air filter may be installed after it has been cleaned and allowed to dry. Damaged air filters should be replaced immediatly. The unit should not be opeareted without the air filter element; damage to the blower will result.
11. Securely store all tools and hoses prior to leaving the spoil disposal site.

DIESEL POWER PACKS - STREET SIDE

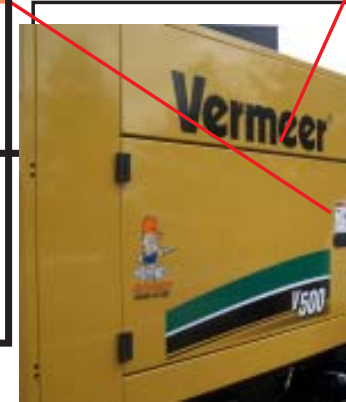
⚠ WARNING



Rotating pulleys and belts.
Do not operate without guards in place.

J200445

Decal: J200445



⚠ WARNING




Moving parts.
Death or serious injury may result.
Stop engine before servicing.

J200425


Decal: J200425

BATTERIES

⚠ WARNING



Flammable fumes.
Fumes may explode or catch.
Keep away from sparks and open flame.



Battery acid can burn skin and eyes.
Protect face, hands and body when servicing.

J200430

Decal: J200430



INSIDE DIESEL ENCLOSURE



VSK100G



VT750G

TRAILER TONGUES



Decal: J200400



WATER COMPONENTS



Decal: J200450

Reorder No. J200450



EMPTYING THE SPOIL TANK - MANUAL LOCKING DOOR



WARNING: DO NOT VACUUM HAZARDOUS MATERIAL WITH THIS SYSTEM. CONSULT FEDERAL, STATE, AND LOCAL REGULATIONS REGARDING CLASSIFICATIONS OF HAZARDOUS MATERIAL.

Emptying the vacuum spoil tank presents several hazards that the operator should be aware of.



DANGER: CRUSHING WEIGHT. SPOIL AND DOOR WILL CAUSE DEATH AND SERIOUS INJURY. UNLOCK DOOR ONLY UNDER VACUUM. STAY AWAY FROM DOOR WHEN DUMPING.



DANGER: CRUSHING WEIGHT. ROLLING OR TILTING UNIT WILL CAUSE DEATH NOR SERIOUS INJURY. CHOCK TIRES AND APPLY PARKING BRAKE BEFORE OPERATING OR SERVICING. DO NOT OPERATE OR SERVICE UNLESS ATTACHED TO VEHICLE.

Before beginning vacuum operations, a plan and site for disposing of the spoil in the tank should be established.

1. Before arriving at the disposal site, verify the water tank has an adequate level for cleanup if equipped.
2. After arriving at the disposal site, set the parking brake and chock the wheels.
3. Open the inlet port.
4. It is recommended that liquids be drained from the tank, prior to raising the tank. Use the 4" gate valve located in the door to drain excess liquids.
5. At the operator's console, click the vacuum tank full override switch on and make sure the water pump clutch is off. Override is only required when the spoil tank full light is on.
6. Start the engine at low idle. Close the inlet port.
7. With the engine running at idle, and all inlet ports closed, vacuum will be reached when the vacuum relief valve opens. A whistling sound is heard when the vacuum relief valve opens.
8. With the relief valve whistling, the door may be unlocked. Turn the door handle counterclockwise until fully loose.
9. Return to the operator controls and shut off the engine. Keep all personnel clear of the rear of the unit. Wait for the vacuum to drop. As the vacuum drops, the door will release allowing the spoil to dump from the tank.
10. Start the engine and raise the tank. The spoil in the tank is very heavy. Stay clear of the door while raising the tank.
11. Once the tank has been emptied, it may be cleaned while in the raised position. Units not cleaned after dumping should have the door seal and mating flange wiped clean of debris that may damage the seal when sealing the door.
12. Open the cyclone door and remove debris. Close the cyclone door.
13. The air filter should be cleaned once a day. Open the air filter door and inspect the air filter element. If the air filter element is dirty, remove and clean with water. The air filter may be cleaned with the spray wand. The cleaned air filter may be installed after it has been cleaned and allowed to dry. Damaged air filters should be replaced immediately. The unit should not be operated without the air filter element; damage to the blower will result.
14. Lower the tank. Turn the engine key counter-clockwise to the off position and remove the key.
15. Securely store all tools and hoses prior to leaving the spoil disposal site.

VACUUM EXCAVATION

Vacuum excavation is the process of removing material whether wet or dry by a powerful air stream. This is accomplished use of the vacuum tool.



WARNING: DO NOT VACUUM HAZARDOUS MATERIAL WITH THIS SYSTEM. CONSULT FEDERAL, STATE, AND LOCAL REGULATIONS REGARDING CLASSIFICATIONS OF HAZARDOUS MATERIAL.

To begin the job site operation:

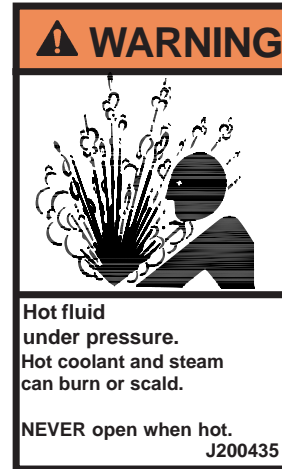
1. Position the vacuum unit as close to the area to be excavated as possible.
2. Set the parking brake and chock wheels.
3. Place necessary traffic control measures.
4. Start the power unit and allow the engine to warm up. (Refer to the Start-up Procedure in this section of the manual.)
5. Use proper personal protection equipment.
6. Attach the vacuum hose to the vacuum tool.
7. Attach the vacuum hose to the inlet port on the spoil tank. If additional hose is needed, attach using the cam lock fittings provided on the hose ends. Short hose lengths are recommended to reduce vacuum hose clogging. If the vacuum hose is connected to the spoil tank and the engine is running, the vacuum tool will be vacuuming. To stop the vacuuming, shut down the engine on the power unit.



DANGER: SUFFOCATION HAZARD WILL CAUSE SERIOUS INJURY OR DEATH. KEEP HOSES AND VACUUM TOOLS AWAY FROM FACE AND BODY.

8. When vacuuming fluids, it is more efficient to turn the liquid into an aerosol by not completely submerging the remediation tool in the fluid. By keeping part of the vacuum tool out of the fluid, the airflow through the vacuum tube will move the material quicker to the spoil tank. This technique is also effective when vacuuming deep vertical distances.
9. The spoil tank is equipped with a "full tank" engine shut down sensor for fluid applications. When the fluid level in the tank reaches capacity, a sensor will automatically shut down the engine. This prevents overfilling the tank and sending fluid into the filtration system. When the vacuum system automatically shuts down, empty spoil tank. (Refer to the section titled Emptying the Spoil Tank.)
9. When vacuuming dry materials, the "full tank" shutdown sensor will not work. Vacuuming should be stopped when the debris level in the spoil tank has reached the sight or when debris can be heard circulating in the cyclone separator.
10. When finished, the engine should be shut down if not automatically shut down and the key removed. All tools and hoses should be securely stored before traveling to the spoil disposal site.

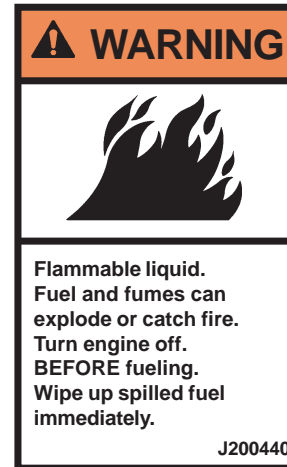
RADIATORS



Decal: J200435



FUEL TANKS



Decal: J200440



VT750G

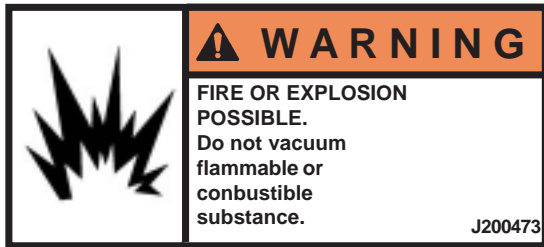


DIESEL UNITS



VSK100G/D

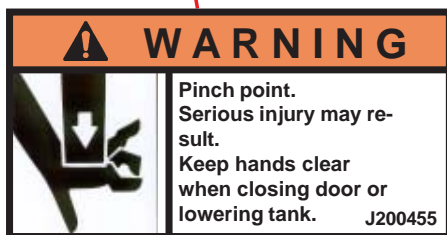
SPOIL TANKS



Decal: J200473



Decal: J200415



Decal: J200455

POTHOLING EXCAVATION (Systems Supplied With Water Only)

Potholing excavation is achieved by use of the reduction tool. This tool combines the operations of "reducing" and "removing" material from the ground. The end result being a small pothole that allows for the visual identification of buried utilities. In the reduction step, high pressure water is used to reduce the soil to a size small enough to be vacuumed. It is important to let the water do the "reducing" of the soil so as not to damage the utility being exposed with the end of the tool. In the removing step the "reduced" soil is vacuumed out of the excavated pothole.

To begin the job site operation:

1. Position the vacuum unit as close to the area to be excavated as possible.
2. Set the parking brake and chock wheels. (Trailer units must remain hooked to the towing vehicle.)
3. Start the power unit and allow the engine to warm up. (Refer to the Start-Up Procedure in this section of the manual.)
4. Place necessary traffic control measures.
5. Use proper personal safety protection equipment, including electric boots and gloves.
6. When preparing to pothole in a grassy area, use a spade or other appropriate digging tool to loosen and remove the grass plug over the area to be excavated. If pot-holing under asphalt or concrete, use a hydraulic or air operated breaker or saw to remove the top material and expose the earth.
7. Connect the water line to the reduction tool.
8. Attach the vacuum hose to the reduction tool.
9. Attach the vacuum hose to the inlet port on the spoil tank. If additional hose is needed, attach using the cam lock fittings provided on the hose ends. Short hose lengths are recommended to reduce vacuum hose clogging. If the vacuum hose is connected to the spoil tank and the engine is running, the reduction tool will be vacuuming. To stop the vacuuming, shut down the engine on the power unit.



DANGER: SUFFOCATION HAZARD; WILL CAUSE SERIOUS INJURY OR DEATH. KEEP HOSES AND VACUUM TOOLS AWAY FROM FACE AND BODY.

10. Turn on the water pump clutch and open the hose reel valve.
11. Position the reduction tool vertically at the desired potholing location.
12. Squeeze the reduction tool trigger lever and move the reduction tool in a semi-circular motion with the handle. This will allow the water jets to excavate a cylindrical hole in the ground.



WARNING: FLYING OBJECTS CAN CAUSE SERIOUS INJURY OR BLINDNESS. WEAR EYE PROTECTION.



WARNING: HIGH PRESSURE WATER CAN CAUSE SERIOUS INJURY. WEAR PROTECTIVE CLOTHING AND DO NOT POINT HIGH PRESSURE WATER TOOLS TOWARD BODY PARTS.

13. As the reduction step continues to expose the utility, be aware of changes in soil conditions. A soft area that allows faster penetration will usually mean that the reduction tool is approaching the utility. When resistance is encountered, stop. Remove the reduction tool from the pothole and identify the utility or obstruction.
14. The jetting action of the reduction tool will also clear the underside of small utilities. If the utility can not be completely exposed from one hole, the hole size must be enlarged to allow observation of the complete utility. It is important to be able to observe the entire utility to determine its size.
15. The spoil tank is equipped with a "full tank" engine shut down sensor for fluid applications. When the fluid level in the tank reaches capacity, a sensor will automatically shut down the engine. This prevents overfilling the tank and sending fluid into the filtration system. When the vacuum system automatically shuts down, empty spoil tank. (Refer to the section titled Emptying the Spoil Tank.)
16. When finished potholing, close the hose reel ball valve and turn off the water pump clutch. The engine should be shut down if not shut down automatically and the key removed. Squeeze the reduction tool trigger lever to release trapped water pressure prior to unhooking. All tools and hoses should be securely stored before traveling to the spoil disposal site.

JOB SITE PREPARATIONS

When pot-holing for non-destructive exposure of underground utilities prior to excavating, trenching or boring, coordinate with all local utilities and mapping services. The area of the proposed excavation should be marked. The one call service should have been contacted and the area marked or cleared. Any underground plant owners not participating in the one call system should be notified and have their underground facilities marked. Use a pipe and cable locator to do a search of the area to be excavated to determine if any unmarked facilities exist. This may also help determine a more precise location of any marked facilities. Consult area utility maps or seek advice on non-metallic pipes such as sewer or storm water lines that may not be marked.



WARNING: WHEN EXPOSING UTILITY LINES FOR AVOIDANCE IN A DIGGING APPLICATION, VERIFY THAT THE EXPOSED LINE IS THE CORRECT LINE. EXCAVATIONS MAY CONTAIN MULTIPLE LINES OR ABANDONED LINES, AS WELL AS THE LINE TO BE EXPOSED.

Establish and maintain traffic control procedures to keep the vacuum crew safe during the operation. Traffic cones or barricades should be used to establish a "safe" area around the vacuum work site. When working in low light conditions, use work lights to illuminate the area and provide visibility.

Determine the proper safety equipment to wear. When doing vacuum slurry excavation, it is required that the reduction tool operator wear electric insulated boots and gloves. This is to protect the operator from becoming shocked or electrocuted if the reduction tool comes into accidental contact with a leaking power line.



DANGER: ELECTRIC SHOCK CAN KILL. ALWAYS WEAR PROTECTIVE BOOTS AND GLOVES WHEN USING A REDUCTION TOOL FOR EXCAVATION.

Electric boots and gloves should be maintained by following the manufacturer's specific instructions. Read and follow those directions carefully. They are contained in section 5 of this manual. Replace worn out or torn boots and gloves. Always wear personal protective equipment including hard hat, reflective vest, work boots and safety glasses. Ear protection should also be used when operating the vacuum system.



WARNING: DO NOT WEAR LOOSE FITTING CLOTHING OR LONG HAIR. THEY CAN BE SUCKED INTO THE VACUUM HOSE AND CAUSE SERIOUS INJURY .

Keep bystanders and spectators away from the vacuum system and work site. Loose flying debris can injure or blind bystanders. Allow only authorized personnel with proper safety equipment in the work area.

SPOIL TANKS (CONT.)

INSTRUCTIONS

DUMP PROCEDURE MANUAL DOOR

1. Open gate valve - drain liquid - close gate valve
2. Remove inlet port plug
3. Click FULL TANK OVERRIDE switch to ON position - Start engine
4. Install inlet port plug to build vacuum
5. Unlock tank door
6. DO NOT STAND AT REAR OF UNIT - shut off engine
7. Wait for vacuum to release the door - start engine
8. Hold TANK RAISE switch up to raise tank
9. After dumping, hold TANK LOWER switch down to lower tank
10. Lock tank door

J200466

Decal: J200466

UNITS WITH
MANUAL
LOCKING DOOR



DANGER



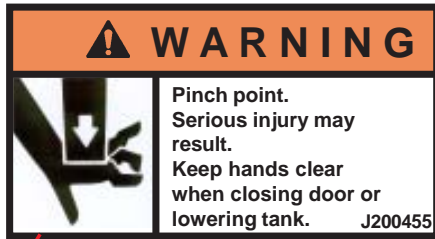
Crushing weight.

Spoil and door will cause death or serious injury. Unlock door only under vacuum. Stay away from door when dumping.

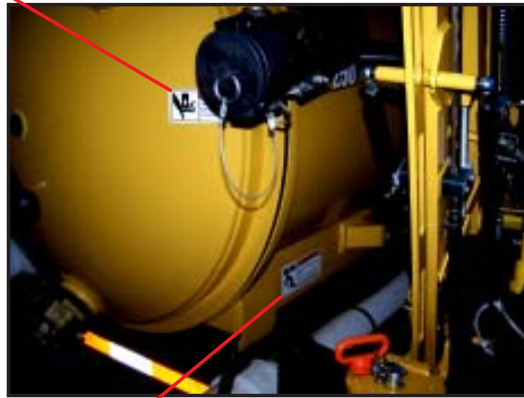
J200410

Decal: J200410

SPOIL TANKS (CONT.)



Decal: J200455



Decal: J200458

3.9

PRE-OPERATING INSTRUCTIONS

Before operating the vacuum system on a job site, the operator should be trained in slurry vacuum excavation and cable locating. All sections of the manual should be read and understood. Prior to beginning to excavate a hole, the operator should:

1. Check all fluid levels in the engine, vacuum pump, and water pump.
2. Check all vacuum hoses and tools for blockages and damage.
3. Check all filters and clean or replace as necessary.



CAUTION: DO NOT OPERATE WITHOUT FILTER SYSTEM INTACT.

4. Inspect all safety equipment, boots, gloves, etc. for wear and damage. Replace if necessary.
5. Check any utility maps for locations of buried utilities that need to be exposed.
6. If excavations are to be conducted near or on roadways, make sure local authorities are contacted for regulations regarding traffic control and safety.
7. Know the contents of the material you are excavating or remediating.
8. Know the local regulations for disposing of liquid material and/or mud.
9. Have a place or a plan for the disposal of the material taken into the tank.



WARNING: DO NOT VACUUM HAZARDOUS OR FLAMMABLE MATERIAL WITH THIS SYSTEM. CONSULT FEDERAL, STATE, AND LOCAL REGULATIONS REGARDING CLASSIFICATIONS OF HAZARDOUS MATERIAL.

CONNECTING VACUUM HOSES AND TOOLING

1. Remove vacuum hose from storage.
2. Install male hose end into female hose end on tank inlet port and lock the cam levers. If there is a boom on the machine, attach the male hose end into the female hose end on the end of the boom and lock the cam levers.
3. Attach additional vacuum hoses as needed for distance.
4. Remove the necessary tooling from the tool storage.
5. Attach necessary tooling onto the end of the vacuum hose and lock the cam levers.



6.1

Operation of Machine

STARTING THE GAS ENGINE



WARNING: MOVING PARTS. DEATH OR SERIOUS INJURY MAY RESULT. DO NOT OPERATE WITHOUT GUARDS IN PLACE.

1. Remove the inlet cap from the Spoil Tank.
2. Throttle Control must be in the Idle Speed position. (Do not start the engine at full throttle.)
3. Pull the choke out on the engine.
4. Turn key clockwise to start engine. Let the engine run for a minute.
5. Press the choke in on the engine. Allow engine to warm up for 3-5 minutes before using the machine.

COLD WEATHER STARTING

Refer to engine maintenance section for proper oil requirements before operating in cold temperature conditions. Let engine run 5-10 minutes before releasing the choke. Do not use aerosol Starting Fluids.

STARTING THE DIESEL ENGINE



WARNING: MOVING PARTS. DEATH OR SERIOUS INJURY MAY RESULT. DO NOT OPERATE WITHOUT GUARDS IN PLACE.

1. Remove the inlet cap from the Spoil Tank.
2. Open inlet gate valve in Spoil Tank. (If applicable)
3. Move air flow handle to start position. (Reverse flow units only.)
4. Throttle Switch must be in the Low Speed position. (Do not start the engine at full throttle.)
5. Turn key counter-clockwise and hold for 10-15 sec. (Pre-heat)
6. Turn key clockwise to start engine.
7. Allow engine to warm up at idle speed for 3-5 minutes before using the machine.

COLD WEATHER STARTING:

Refer to engine maintenance section for proper oil requirements before operating in cold temperature conditions. Increase Pre-heat time to 20 sec. (Do not preheat for more than 20 sec.) If engine fails to start, continue to pre-heat between attempts.

IMPORTANT: Do not use aerosol Starting Fluids.

SHUTDOWN PROCEDURE

1. Reduce engine speed to idle.
2. Verify all switches are in the down position.
3. Move air flow handle to start position. (Reverse flow units only)
3. Shut off the engine and remove the key.
4. Relieve water pressure from the Water Assisted Tools by squeezing trigger.

JUMP STARTING



WARNING: FLAMMABLE FUMES. FUMES MAY EXPLODE OR CATCH FIRE. KEEP AWAY SPARKS AND OPEN FLAME. BATTERY ACID CAN BURN SKIN AND EYES. PROTECT FACE, HANDS AND BODY WHEN SERVICING.

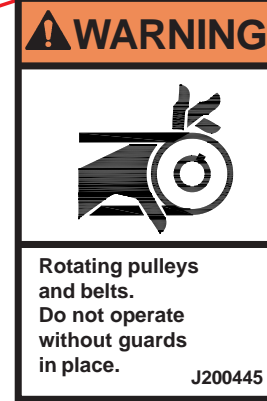
Use only a 12 volt system for jump starting. Use only an approved set of jumper cables. Avoid inadvertent contact with cables and surrounding components.

1. Connect first RED clamp to POSITIVE (+) terminal of discharged battery.
2. Connect second RED clamp to POSITIVE (+) terminal of charged battery.
3. Connect first BLACK clamp to machine frame of the machine with the charged battery.
4. Connect second BLACK clamp to machine frame of the machine with the discharged battery.

GAS ENGINES AND GUARDS



VSK100G



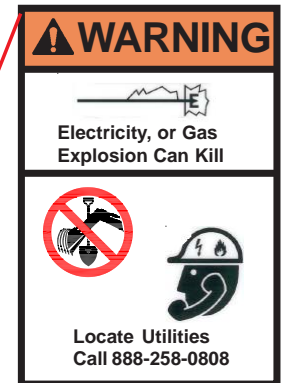
Decal: J200445



ALL GAS UNITS



Decal: J200465



Decal: J000210



Decal: J200400

TOOLS



Decal: J200415



Decal: J200450

Reorder No. J200450



ELECTRIC SAFETY GLOVES AND BOOTS

Electric safety gloves and boots must be carefully inspected before each use.

The rubber gloves must be field air-tested before each use. Rubber gloves must be inspected inside and out. Also, gloves must always be stored with the board on the outside, never inside out. Finally, gloves must also be stored in the glove bag to protect against mechanical and chemical damage. The ASTM In-Service Specification F-496 requires that the electrical retest interval not exceed 6 months. In addition, a visual inspection of gloves shall be made in the field by a designated person at intervals not to exceed 6 months. Contact McLaughlin for a list of test labs in your area.

Rubber gloves are the basic protection from electric shock, because the hands are the most likely portion of the body to make initial contact with energized parts.

In order for rubber gloves and boots to provide protection they should be put on before a person is in a position where it may be possible to touch energized utilities or equipment.

Do not allow rubber gloves or boots to come in contact with any petroleum based products, such as inhibitors, hydraulic fluids, and other lubricants. Also, do not allow fuels, such as gasoline or diesel to come in contact with the gloves. Wipe gloves clean, with a clean rag, as soon after contact as possible. Do not spray gloves off with high pressure water.

Electric safety boots provide no protection when other parts of the body are in contact with the ground (ex. while kneeling).

Visually inspect rubber gloves, leather outers, and rubber boots before each use.

1. Check for signs of physical damage (cuts, rips, tears, etc.).
2. Check for signs of physical deterioration (stiffness, thin or swollen spots, discolored areas, etc.).
3. If damage is suspected, replace immediately.

Field air test procedure for rubber gloves.

1. Grab the cuff and pull it over the fingers.
2. Hold the glove downward and twirl the cuff upward toward your body to close the cuff.
3. Bend the rolled cuff into a "U" shape to trap the air inside the glove.
Squeeze the inflated glove to pop out the fingers.
4. Squeeze the inflated glove and look for damage exposed by inflation.
5. Hold the inflated glove close to your face and ear. Squeeze the glove to feel and listen for air escaping from any holes.
6. Turn the glove right side out.

Rinse gloves and boots daily with clean water inside and out and allow to dry thoroughly before returning to service. Apply a coat of Armor-All protectant to the outer surface of the boots.



DANGER: ELECTROCUTION POSSIBLE. CONTACT WITH ELECTRIC LINES WILL CAUSE DEATH OR SERIOUS INJURY. LOCATE ALL UNDER GROUND UTILITIES. ALWAYS WEAR PERSONAL PROTECTION EQUIPMENT.



DANGER: DAMAGED GLOVES OR BOOTS DO NOT PROVIDE ADEQUATE ELECTRICAL PROTECTION.

TOOLS

Remove dirt and mud daily. Do not allow mud to buildup on the inside of the tool. This will restrict the flow of debris and reduce the performance of the tool. Check that nozzles are clean and working properly. Unplug clogged nozzles. Clean and replace nozzles as necessary. Check daily the fittings and the condition of the hoses on the tools. Tighten or replace as necessary. Replace broken and worn-out tools.

VACUUM HOSES

Clean hoses with water. Do not spray with high pressure water tools. High pressure water from the high pressure water tools can cut the hoses. Check hoses for holes, cracks etc. Salvage damaged hoses by cutting off the damaged section. Replace hoses when necessary.

VACUUM GAUGE

The vacuum gauge pointer may not rest at zero, due to internal case pressure. Reset gauge if it shows a vacuum when the machine is turned off and the tank ports are open.

1. Open Control Panel.
2. Flip lever on top of gauge to "OPEN" position. Allow gauge to vent.
3. Flip lever to "CLOSED" position.
4. Close Control Panel.

TRAILER

The trailer provided with your equipment has an Electric or Surge Break-away brake. This brake engages if the trailer ever separates from the towing vehicle.



WARNING: DO NOT USE BREAK AWAY DEVICE AS PARKING BREAK.

Operation: Secure cable to the tow vehicle hitch. Leave slack in cable to allow for the turning radius of the trailer.

System check. System requires a 12Volt, 5A / hr battery. (Not required on surge brakes.)

1. Disconnect trailer electrical connector.
2. Pull out the cable switch on trailer with electric brakes. Pull the surge brake lever forward on surge brake trailers.
3. Pull the trailer forward with the tow vehicle.
4. The brakes of the trailer should be engaged and provide resistance to motion.
5. Install the cable switch.
6. Connect the trailer electrical connector.

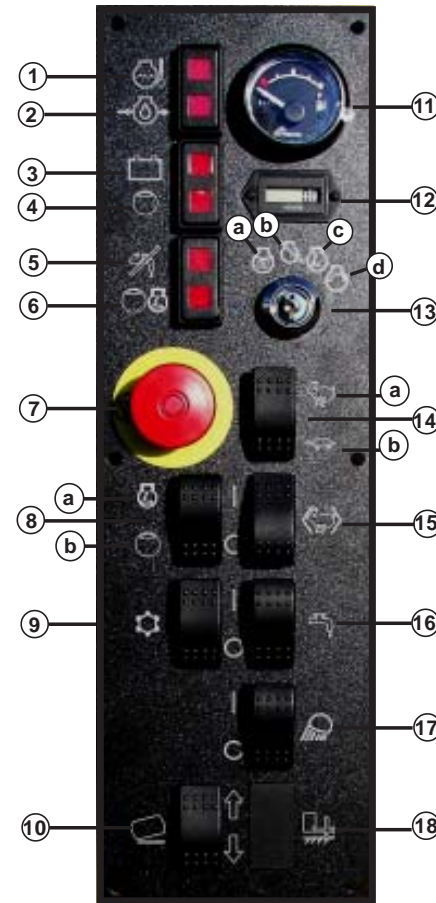
Service Intervals:

Wheel bearings: Grease Annually. Remove center plug in axles and grease with standard wheel bearing grease.

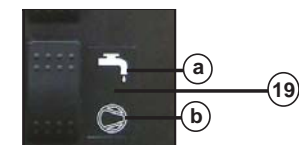
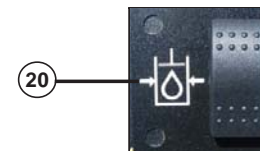
Brakes: Check brakes daily. Adjust as necessary.

Tires: Check tires for wear and correct air pressure daily.

DIESEL CONTROLS



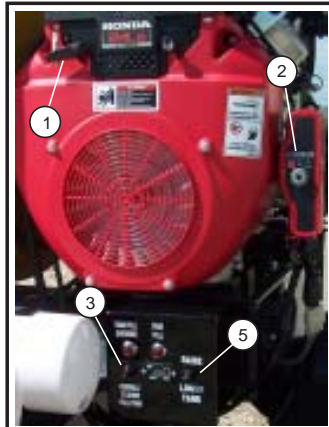
1. Coolant Temperature Indicator
2. Oil Pressure Indicator
3. Battery Indicator
4. Full Tank Indicator
5. Low Water Indicator
6. Full Tank Override Indicator
7. Emergency Stop
8. Full Tank Override Switch
 - a. Engine Will Run While Tank Is Full
 - b. Engine Will Shut Off When Tank Is Full
9. Antifreeze Switch
10. Tank Raise/Tank Lower
11. Fuel Gauge
12. Hour Meter
13. Ignition Switch
 - a. Preheat
 - b. Off
 - c. Run
 - d. Start
14. Throttle Switch
 - a. High Throttle
 - b. Low Throttle
15. Automatic Throttle
16. Water Pump Switch
17. Work light Switch
18. Hydraulic Jack Switch
19. Compressor Switch
 - a. Water Pump On/Compressor Off
 - b. Compressor On/Water Pump Off
20. Aux. Hydraulic Switch



GAS CONTROL



VSK100G (Control Decal Sheet Part #8040427)



VT750G (Control Decal Sheet Part #J200056)

1.	Throttle Control	Down Position Up Position	Runs engine at idle. Runs engine at full throttle.
2.	Ignition Switch Clockwise	First Stop Second Stop	Turns on electrical system. Starts engine.
3.	Toggle Switch	Override To Dump Full Tank	Bypasses the the level float switch in the spoil tank that normally shuts the engine down when the spoil tank is full.
4.	Toggle Switch	Water Pump	Turns water pump on and off.
5.	Toggle Switch	Up Position Down Position	Raises Tank Lowers Tank

WATER PUMP

Belt Tension: Check belts daily for the first week, weekly thereafter. Tension should be measured with a Browning belt tension checker or equal. Tighten to the specification below. Replace when worn or stretched.

Belt Tension Spec: New Belts - 10 lbs. of force (44 N).

Recommended Fluid Type: General Pump Series 100 oil or SAE 30, NON-DETERGENT, Motor Oil. Remove fill cap and fill crankcase to dot on oil gauge window.

Service Intervals: Check oil level daily.
Change oil after 50 hr. break-in period.
Change oil every 400 hrs, or every 3 months, whichever comes first.



WARNING: NEVER ATTEMPT TO CHANGE OR ADD OIL WHILE WATER PUMP IS RUNNING. PERSONAL INJURY OR EQUIPMENT FAILURE WILL RESULT. ALLOW UNIT TO COOL DOWN BEFORE ATTEMPTING MAINTENANCE.

AIR FILTER ELEMENT

Service Intervals: Inspect element daily. Clean with low pressure water as needed. Replace when worn. **Replace damaged elements immediately. Never operate without the element.**

CYCLONE SEPARATOR

Service Intervals: Open and clean housing after dumping tank. Wipe clean with a towel. Do not spray water into the housing while the engine is running.

GREASE GUN LUBE POINTS

2	Tank Pivot Bar	2 Pumps (N/A on VSK100G/D)
1	Tank Door	1 Pump (N/A on Hydraulic Doors)
1	Trailer Jack	2 Pumps
1	Engine Shaft	2 Pump (Only on HD Units)
1	Boom Break	1 Pump (Boom Units Only)
1	Boom Tube Seal	2 Pumps (Boom Units Only)
1	Reverse Flow Handle	1 Pump (Reverse Flow Units Only)
2	Reverse Flow Valve	1 Pump (Reverse Flow Units Only)

Service Intervals: Grease all fittings weekly.
Use an EP NLGI 2 Grease with additives to protect against wear, rust and oxidation.

ELECTRIC - HYDRAULIC POWER PACK

Recommended Fluid Type: Industrial Type Hydraulic Fluid .

Temperature Range: 0-120°F (-18°-40°C) SAE 10 grade hydraulic oil or Dextron II ATF.
32 - 175°F (0-80°C) SAE 20 grade hydraulic oil.

Capacity: 3 qts. (2.8 l)

Relief Valve Setting: 2500 psi (173 bar)

Service Intervals: 200 hrs, or annually, whichever comes first.

Filter: Clean screen filter if the pump loses performance.

DOOR SEAL

Clean the door seal daily and after emptying the tank.

MAINTENANCE

GAS ENGINE (Per Specs in Honda GX670 Operator's Manual)

Engine Oil Specs:

SAE 10W-30, API SJ	
Above 50°F (10°C)	SAE 30 or SAE 10W-30
0°-50°F (0°-18°C)	SAE 5W-30 / 10W-30
Below 0°F (-18°C)	SAE 5W-30

Service Intervals: Refer to engine Operator's Manual for complete Service Schedule.

- Change engine oil: First 20 hrs., every 100 hrs.
- Change oil filter: Every 200 hrs.
- Clean air filter: Every 50 hrs.
- Change air filter: Every 200 hrs.
- Change fuel filter cartridge: Every 200 hrs.

DIESEL ENGINE (Per Specs in Kubota Operator's Manual)

Engine Oil Specs:

Should be MIL-L-2104C or have properties of API classification CD/CE grades.	
Above 77°F (25°C)	SAE 30 or SAE 10W-30 / 10W-40
32°-77°F (0°-25°C)	SAE 20 or SAE 10W-30 / 10W-40
Below 32°F (0°C)	SAE 10W or SAE 10W30 / 10W-40
Temperature range expected before next oil change.	

Service Intervals: Refer to engine Operator's Manual for complete Service Schedule.

- Change engine oil: First 50 hrs., every 200 hrs.
- Change oil filter: First 50 hrs, every 200 hrs.
- Check and/or replace: Every 100 hrs.
- Change fuel filter cartridge: Every 400 hrs.
- Engine coolant: check coolant level daily, change coolant every 2 years.

Fill with a 50/50 mix of water and automotive antifreeze. NOTE: Use only ethylene glycol type antifreeze.



WARNING: NEVER ATTEMPT TO CHANGE OR ADD OIL WHILE ENGINE IS RUNNING. PERSONAL INJURY OR EQUIPMENT FAILURE WILL RESULT. ALLOW UNIT TO COOL DOWN BEFORE ATTEMPTING ANY MAINTENANCE.

BLOWER

Recommended Fluid Type: Industrial Type, Heavy Duty, NON-DETERGENT Motor Oil

Temperature Range:

30° F (-1°C) and under	SAE 20
30-90° F (-1-32°C)	SAE 30
90° F (32°C) and above	SAE 40

Fill each gear end separately.

Remove breather from each gear end.

Pour oil through the breather port.

Keep oil at proper level in each sight gauge.

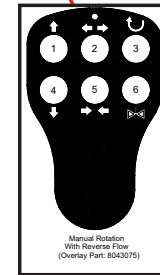
Service Intervals: Check oil level daily. Change oil every 400 hrs. or twice annually.



WARNING: NEVER ATTEMPT TO CHANGE OR ADD OIL WHILE BLOWER IS RUNNING. PERSONAL INJURY OR EQUIPMENT FAILURE WILL RESULT. ALLOW UNIT TO COOL DOWN BEFORE ATTEMPTING ANY MAINTENANCE.

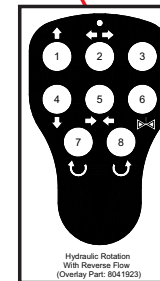
BOOM CONTROLS

MANUAL ROTATION WITH REVERSE FLOW BOOM TRANSMITTER



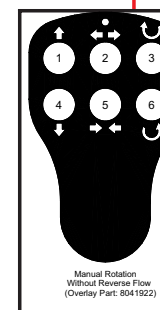
- BOOM RAISE
- BOOM LOWER
- BOOM EXTEND
- BOOM RETRACT
- BOOM BREAK
- GATE VALVE

HYDRAULIC ROTATION WITH REVERSE FLOW BOOM TRANSMITTER



- BOOM RAISE
- BOOM LOWER
- BOOM EXTEND
- BOOM RETRACT
- BOOM ROTATION (CCW)
- BOOM ROTATION (CW)
- GATE VALVE

MANUAL AND HYDRAULIC ROTATION WITHOUT REVERSE FLOW BOOM TRANSMITTER



- BOOM RAISE
- BOOM LOWER
- BOOM EXTEND
- BOOM RETRACT
- BOOM ROTATION (CCW)
- BOOM ROTATION (CW)

VACUUM TANK DOOR

Door Handle

The vacuum tank door should only be unlocked under full vacuum. The area behind the unit must be clear of all personnel before opening the door.

To Open The Door:

1. Remove the plug from the inlet port.
2. Start the engine and operate at low speed.
3. Insert the inlet port plug back into inlet port.
4. A minimum of 5" Hg vacuum must be achieved.
5. Turn the door handle counterclockwise until it unscrews.
6. Turn off the engine and remain at the control panel until the vacuum releases the door.
7. With the area behind and around the door clear of personnel, the tank may be raised.



DANGER: CRUSHING WEIGHT. SPOIL AND DOOR WILL CAUSE DEATH OR SERIOUS INJURY. UNLOCK DOOR ONLY UNDER VACUUM. STAY AWAY FROM DOOR WHEN DUMPING.

WATER SYSTEM

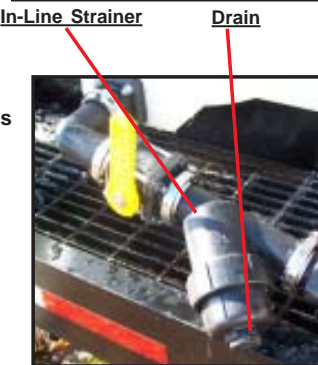
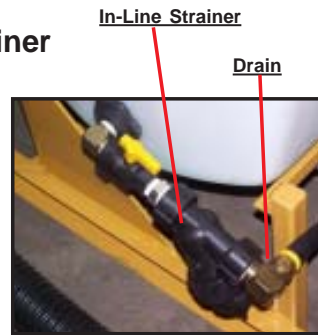
Water Tank Ball Valve and In-Line Strainer

The Water Tank Ball Valve is located on the bottom of the tank, on the operator's side.

1. On Turn handle in line with the valve.
2. Off Turn handle perpendicular to the valve.

The ball valve on the water tank must always be open when the water pump is drawing water from the tank. Operating the water pump with the ball valve closed will result in damage to the water pump. Close the ball valve to clean the strainer or service the water system without draining the tank.

The in-line strainer protects the water pump from particles that may cause damage. A drain plug is located at the bottom of the strainer which may be used to drain the entire system. The strainer should be periodically checked for debris and cleaned.

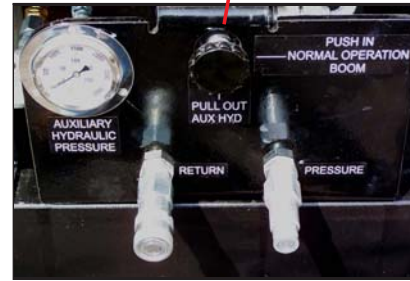


Options: Aux. Hydraulic

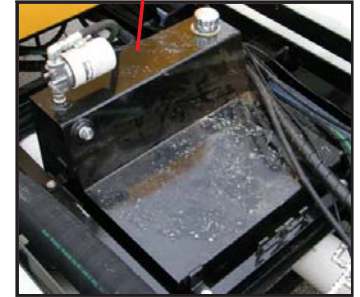
Auxillary Hydraulics

Auxillary hydraulics allow for the connection of hydraulic tools and the rotation of a hydraulic boom. The controls are located below the engine control panel. The hose connections are also located at the controls.

CONTROLS



HYDRAULIC TANK



Hydraulic Jack

The Hydraulic Jack is located at the front of the trailer. The Hydraulic Jack is used to automatically raise/ lower trailer tongue.

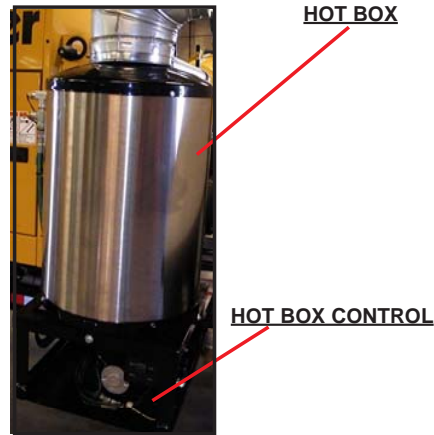


HYDRAULIC JACK

Options

Hot Box

The Hot Box is located on side of the trailer skid. The Hot Box is used to heat the water used by the machine.



Reverse Flow

Pressure Pushes air out of the tank ports and boom if supplied.

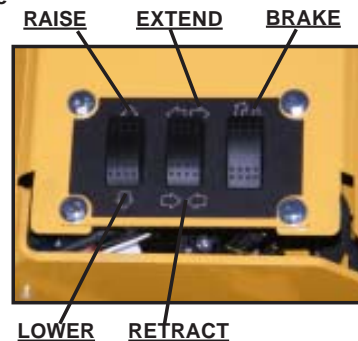
Neutral Air Circulates inside the blower. Use this position to start the engine.

Vacuum Pulls air into the tank.



Emergency Manual Override Boom Operation

The intent of the manual override switches is to provide a means to operate the boom to get it into the storage cradle in the occurrence that the transmitter has become damaged or lost.



WATER SYSTEM

Water Assisted Tools

Water Assisted Tools have the water control on the tool. A trigger lever controls the water flow.

1. On Squeeze the trigger lever.
2. Off Release the trigger lever.

Changing tool in operation:

1. Turn off the water pump clutch at the control panel.
2. Squeeze the trigger lever to relieve pressure in the hose.
3. Disconnect the Water Supply Hose and change tools.
4. Turn on the water pump clutch at the control panel.



WATER SYSTEM

Control Valves

The Control Valves are located on each water hose reel and beside the tank. The valve beside the tank controls the in-tank cleanout.

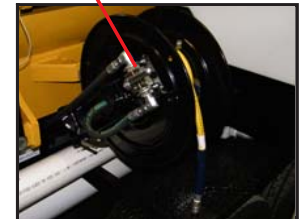
1. On Turn handle in line with the body.
2. Off Turn handle perpendicular to body.

Tools may be changed while the engine is running by closing the hose reel valve and relieving the tool pressure.

Use this valve to relieve system pressure in the water hose.

NOTE: To relieve system pressure, tool must be disconnected from hose.

Hose Reel Valve



Tank Cleanout Valve

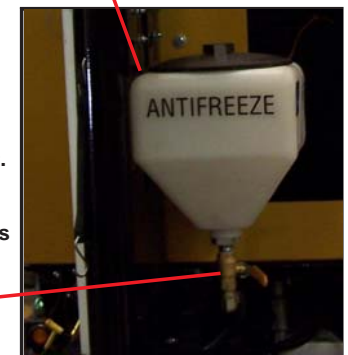


WATER SYSTEM

Antifreeze and Valve

The antifreeze tank is plumbed into the water pump inlet. The antifreeze tank ball valve is located directly beneath the tank. The valve should remain closed during the antifreeze procedure. Always verify the antifreeze tank is not empty and the water tank ball valve is closed before opening the antifreeze ball valve.

Antifreeze Tank

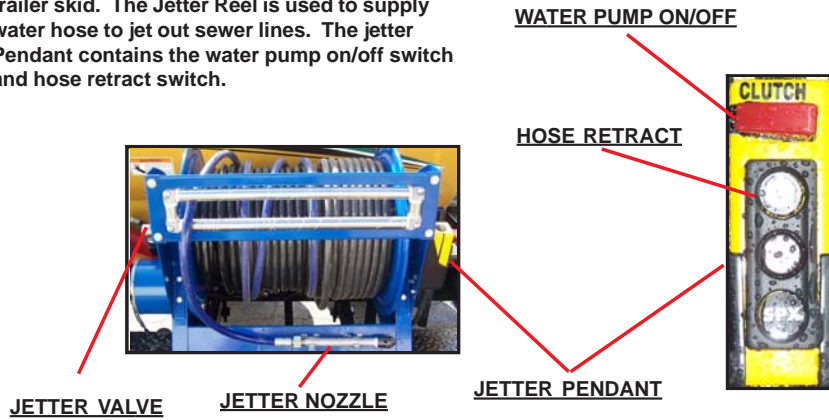


Ball Valve

Options

Jetter

The Jetter Reel is located on the side of the trailer skid. The Jetter Reel is used to supply water hose to jet out sewer lines. The jetter Pendant contains the water pump on/off switch and hose retract switch.



Arrow Board

The Arrow Board is located at the back, on the top of the Spoil Tank. It signals directions to on coming traffic to go around machine while working.



Options

Valve Rotator

The Spin Doctor valve rotator is used to exercise valves. It is located at the backend of the trailer skid. There are two versions; the G2 and the ValveSTAR version. The G2 is standard, and the ValveSTAR incorporates GPS. An additional manual will be included for this option.

G2



ValveSTAR



Controls

