

# Operator's Quick Reference Safety Guide



## Harben Jettters



**115 Series**



**E Series / E-180**



**Enclosed Units  
& Skid Units**



**Truck Units**



**Mk4 Light Van  
Pack**

# 1.0 Introduction

## Focused on Your Jetting Needs

Harben® has been creating innovative, high pressure drain and sewer cleaning equipment for over 30 years, selling thousands of high quality and reliable machines throughout the U.S., Canada, Mexico, and the Caribbean.

Through our nationwide network of service and distribution centers, we offer a complete range of competitively priced drain jetters and accessories that get the job done, are affordable within your budget and will continue to operate efficiently and cost effectively for many years.



## Contents

This Operator's Quick Reference Safety Guide is intended to allow operators to quickly become familiar with the essential controls and safety requirements of Harben® jetters. It does not replace the full operation and maintenance manual which should be read and which contains additional operation and safety information.

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Throughout this manual various warnings are given with the following icon. Where shown, failure to follow the instruction can result in serious injury or even death.



Please pay particular attention to these recommendations

## 2.0 Scope of Supply



Harben® drain jetters have been designed to the highest standards so that they will work safely and reliably for many years. It is important that you take time to read the information provided in this guide so that you understand how to make the most of the jetter and how to use it safely.

Harben® jetters are powerful pieces of industrial equipment and should only be operated by competent users who understand that serious injury or death can occur through misuse.

The jetters described in this Operator's Quick Reference Safety Guide are intended to be used for high pressure water jetting in drain and sewer systems from 2 inches up to 18 inches diameter.

They will remove soft blockages, tree roots and hard scale, liquefying f.o.g.'s and restoring drain flow by blasting high pressure water through a drain nozzle connected to the end of a high pressure hose. Some models can be fitted with jump jet kits to increase the effective cleaning distance.

Harben jetters use diesel or gas engines to power a high pressure water pump up to (5,000 psi) / (18 gpm).

Additional accessories can be purchased from Harben, such as: floor cleaners, jetting guns and jet pumps which extend the range of work that can be carried out with the jetter. Separate details are available on request.

## 3.0 Health & Safety



Throughout this manual various warnings are given with the following icon. Where shown, failure to follow the instruction can result in serious injury or even death.

### 3.1 Safety Notes

- Operating procedures throughout this manual must be adhered to. In the case of conflicting or ambiguous instructions, reference must be made to a Site Manager or Safety Officer before commencing work.
- Any person operating, working with, or passing near the jetter must wear the necessary Personal Protective Equipment (PPE).
- The Site Management should make available to operators or persons working with the jetter the appropriate technical documentation and should ensure such persons read and understand the documentation prior to commencing their duties.
- Special tools should be used where recommended.
- Prior to any maintenance or repair work being carried out the jetter must be shut down, de-pressurised and equipment isolated.
- Any maintenance requirements in this manual should be adhered to as minimum maintenance requirements. Maintenance records should be up to date at all times.
- Guards which are located within the jetter must be fitted and must not be loosened or removed while the jetter is operational. Should it be necessary to remove any guard for access, it must be re-fitted and secured before start up.

### 3.2 Use of High Pressure Equipment

- All persons using high pressure jetting equipment should be fully conversant with relevant operating instructions, safety notes and Codes of Practice.
- Operators must be competent in all aspects of jetter use.
- All high pressure water jetting operations should be under the control of a fully trained supervisor, who will be aware of the potential hazards to operators and passers-by
- Warning notices, 'DANGER - HIGH PRESSURE JETTING' should be displayed at all possible access points to the jetting area. Notices are available from Harben Inc.
- Before starting the jetter, ensure that you, and anyone else who may be in control at any time, are fully aware of its controls and their function.
- It is especially important that everyone knows how to stop the jetter in case of an emergency.
- Ensure that all the pre-operational checks have been completed, and that any necessary actions have been taken.
- Do not operate the jetter near any persons or animals.

High pressure jetting can be extremely dangerous if it is not properly controlled by fully trained personnel





### 3.3 Potential Hazards and Misuse of High Pressure Equipment

- Never use a jetter that isn't regularly serviced according to the manufacturer's recommendations.
- When a jetter is used to clean drains & sewers that are contaminated with a hazardous substance it is possible these may be entrained in the resulting aerosol and inhaled by operators. Consider using respiratory protection.
- Never start the jetter when frozen. Operating a jetter while frozen could cause high speed ice bullets to be ejected from the jetter hose on machine start up.
- Never start jetting a drain, sewer or pipe unless the jet nozzle is safely inside the drain and pointing in the direction that you intend it to travel.
- When drain jetting a drain, sewer or pipe with an inside diameter that is not small enough to prevent the hose from turning back on itself, a drain jet extension (a piece of straight rigid tube equivalent to the pipe diameter) should be fitted between the end of the hose and the nozzle.
- Always use a safety leader hose at the beginning of the main jetting hose to alert operators when the jet nozzle is nearing the manhole entrance.
- Always consider the use of a tiger tail hose feed guide to protect the jetting hose from abrasion and prevent premature failure.
- Be aware that high pressure hoses can generate static electricity which may need to be controlled when working in hazardous areas.
- When jetting drains or sewers if there is a danger to the general public from hoses laying across public walkways they must be covered in such a way as to protect against injury from hose failure and tripping hazards.
- Before starting work check and ensure the drain jets have no blocked holes or nozzles as this may cause the pumping system to over pressurise which could result in burst disc failure or bursting the jetting hose.
- Never attempt to unblock a fully choked drain or pipe before considering the consequence of releasing the blockage and having a plan to deal with it. E.g. flooding, material ejection, drain nozzle ejection.
- Never attempt to clean drains or pipes in one pass because this could lead to debris build up behind the jet nozzle causing a pressure build up in the drainage system. Be aware that a pressure build up in the drain or pipe could cause the jet nozzle to be ejected at speed back towards the operator.
- Never enter the manhole to either place the jet nozzle into or extract it from the drain entrance unless the required confined space regulations have been met.
- Never work in a manhole with a radio remote control transmitter that is not classified for use in such areas.
- Never use the hydraulic hose reel facility as a winch to retract a jetting hose that has become stuck in the drain or pipe. Damage to the hose could be caused that will make subsequent hose failure more likely.
- Never allow jetting hoses to become kinked and always remove from service any jetting hose with an outer cover that has worn through to the reinforcing braid.
- Never use the high pressure jetting hose for any purpose other than sewer, drain or pipe cleaning, e.g. winching vehicles or other plant.
- Never use jetting nozzles and/or accessories that have not been calibrated for the jetting machine pump performance as this could cause rapid over pressurisation catching operators unaware.

## 3.0 Health & Safety

### 3.3 Potential Hazards and Misuse of High Pressure Equipment

- Never attempt to clean a drain or pipe with a nozzle that has more forward force than rear force. It could be ejected back toward the operator causing injury.
- Never attempt to clean a drain or pipe with a chain flail type jet that has unequal chain lengths as this could lead to severe vibration and high pressure hose failure.
- When using a venturi jet pump to remove fluid from a flooded manhole never place your fingers into the pump inlet as they could be trapped by the vacuum and cause injury.
- When using a venturi jet pump to remove fluid from a flooded manhole always secure the free end of the pump hose securely and ensure adequate drainage is in place to deal with high volumes of pumped water.
- Never use a dry shut type foot control valve on a jetter that does not have a pressure unloader valve as this could result in burst disc failure or bursting the jetting hose.
- Never use a dry shut type jetting gun valve on a jetter that does not have a pressure unloader valve as this could result in burst disc failure or bursting the jetting hose.
- When using a dry shut type system be aware that high pressure can be retained in the jetting hose even after the machine has been shut down. Always discharge pressure in a safe manner after machine shut down.
- Never point the gun at anyone as injury from high pressure water will occur if the jet stream comes into contact with body parts.
- Never work on a slippery surface because the reaction force of the jetting gun could cause you to become unstable and lose your footing.
- Never work from a ladder as the reaction force of the jetting gun could cause the ladder to fall backwards from the working area causing possible injury.
- Never work from scaffolding unless it is designed, erected and managed by competent persons and it is adequately secured to prevent it being pushed over by jetting gun reaction forces.
- When using the jetting gun to clean hard surfaces be aware that splash back could contain hard debris travelling at speed.
- When using the jetting gun to clean contaminated surfaces be aware that splash back could contain dangerous contaminants.
- Never use the jetting gun to clean a surface that could be damaged or penetrated by the water pressure unless that is the desired effect.
- Always ensure that an adequate area is cordoned off around the working zone so that flying debris and contamination cannot injure passers by.
- Be aware that the use of water jetting guns fitted with oscillating or rotating heads tend to produce higher hand arm vibration levels than simple fixed head jets.
- When using a jetting gun or nozzle to clean at floor level wear suitable protective foot wear.
- Never use a high pressure jetting gun to clean down PPE while you or others are still wearing it as serious injury and death could result. 
- Never use a high pressure jetting gun to wash or cool down livestock as serious injury and death could result. 
- Drainage systems may carry bacteria and micro-organisms which can cause severe illness or death. Avoid exposing eyes, nose, mouth, ears, hands, cuts or abrasions to waste water or faecal matter during drain cleaning operations. After working around drainage systems help protect yourself by always washing hands, arms and other areas of the body with hot, soapy water and, if necessary, flush mucous membranes with clean water. Disinfect soiled equipment by washing surfaces with a hot soapy wash using a strong detergent.

### 3.4 Personal Protective Equipment (PPE) 3.6 Pressure Safety Devices

All persons using high pressure water jetting equipment should use all necessary PPE suitable for the task being carried out. This includes, but is not limited to:

- Ear protection
- Eye protection: a helmet with chin guard and visor is recommended
- Hand protection
- Waterproof clothing
- Safety boots with toe protection



**Please note:** A site specific job hazard analysis must be completed to analyze which PPE must be worn.

### 3.5 Hoses

The following checks must be made before use:

- High pressure jetting hoses must be checked along their entire length at the start of each shift to ensure that they are free from external damage. Hoses with exposed or broken reinforcing braid or damaged couplings and fittings may fail without warning and must be replaced immediately.
- Before use check end fittings and couplings for damage to threads, sealing faces and rounding of connection nuts. Only use the correct size spanner to tighten the hose fitting. Stilson or adjustable spanner type tools with serrated teeth must not be used.
- Hoses that have been used **MUST NOT** be re-ended under any circumstances.
- If water appears from the hose, coupling or connector, often first sighted as a fine mist, then the hose is damaged and could burst or a joint is loose or defective.  
**STOP THE JETTER IMMEDIATELY!**  
No attempt should be made to adjust any hose, coupling or connector whilst that part of the system is under pressure.



- Pressure relief valves should be checked for functionality and certified by the manufacturer or their authorised representative at least every 6 months.
- Pressure discs (burst discs) should be replaced at least every 6 months to ensure continued safe operation and only manufacturer's original replacements should be used.
- Under no circumstance should a foreign object be used in place of a manufacturer's pressure disc (burst disc).

### 3.7 Carbon Monoxide Poisoning

- Ensure enclosed units are fully vented after using the jetter.
- Do not use the jetter in enclosed areas.
- The operator should have rear and side doors open when operating the machine.
- It is advisable to carry a carbon monoxide monitor in the rear or the vehicle and the cab of the vehicle as an early warning of any gas build up.



The vehicle & jetter use an engine that could cause build-up of carbon monoxide gases in the vehicle storage areas. Towing jettors use an engine that could cause build-up of carbon monoxide gases in enclosed areas.

## 4.0 Technical Specifications

- ✓ Included
- x3 # of Nozzles Included
- ? Optional



	115 Series	E Series / E-180	Enclosures / Skids
Pressure	Up To 3000 psi	Up To 4000 psi	Up To 4000 psi
Flow	10 gpm	Up To 18 gpm	Up To 18 gpm
Pump	Hawk XLTI	Harben 8-22 "P"	Harben 8-22 "P"
Engine	Honda GX690	Kubota, Deutz, or Hatz	Kubota, Deutz, or Hatz
Engine Power	16 kW / 22hp	36 kW / 49 hp	36 kW / 49 hp
Engine Cooling	Air Cooled	Water/Air Cooled	Water/Air Cooled
Run Time Meter	Engine Monitor	Engine Monitor	Engine Monitor
Fuel Type	Gas	Diesel	Diesel
Fuel Capacity	5 Gallons	17.9 Gallons	17.9 Gallons
Standard Tank Capacity	110 Gallons	300 to 350 Gallons	300 to 700+ Gallons
Hose Type	3/8" (200 ft)	1/2" x 500 ft	1/2" x 500 ft
Hose Reel	Pivoting	Fixed or Pivoting	Fixed or Pivoting
Hose Reel Control	Manual	Hydraulic	Hydraulic
Hose Feed	N/A	✓	✓
Inlet Hose Reel	1/2" 50m (170 ft)	NA	NA
Standard Drain Jets	x3	x2	x2
Drain Jet Extension	✓	✓	✓
Safety Leader Hose	✓	✓	✓
Radio Remote	?	?	?
Jump Jet Kit	N/A	?	?
Anti Freeze Kit	✓	✓	✓
Dry Weight (lbs) *	595 lbs	3,200 lbs	Varies With Vehicle Size
Max Weight (lbs) *	1,325 lbs	6,115 lbs	Varies With Vehicle Size
Dimensions (L x W x H) m	45 3/4" x 47 1/4" x 44"	15' x 7' x 6'6"	Varies With Vehicle Size

\*All weights & dimensions are approximate.



# 4.0 Technical Specifications

- ✓ Included
- x2 # of Nozzles Included
- ? Optional



	Truck Units	Light Van Pack
Pressure	4,000 to 10,000 psi	Up To 4000 psi
Flow	Up To 35 gpm	Up To 18 gpm
Pump	Harben "P", "Q", or Century	Harben 'P' Type
Engine	Varies With Pump Choice	Kubota V2400
Engine Power	Varies With Pump Choice	36 kW / 48 hp
Engine Cooling	Water Cooled	Water Cooled
Run Time Meter	Engine Monitor	Engine Monitor
Fuel Type	Diesel	Diesel
Fuel Capacity	29 Gallons	5 Gallons
Standard Tank Capacity	300 to 700 Gallons+	103 Gallons (213 Gal option)
Hose Type	1/2" or 3/4" x 500'+	1/2" x 500' (Black)
Hose Reel	Pivoting	Fixed
Hose Reel Control	Hydraulic	Hydraulic
Hose Feed	✓	✓
Inlet Hose Reel	NA	3/4" x 75'
Standard Drain Jets	x2	x2
Drain Jet Extension	✓	✓
Safety Leader Hose	✓	✓
Radio Remote	?	?
Jump Jet Kit	N/A	✓
Anti Freeze Kit	✓	✓
Dry Weight (lbs) *	Varies With Tank Capacity	1,388 lbs
Max Weight (lbs) *	Varies With Tank Capacity	2,250 lbs
Dimensions (L x W x H)	Varies With Chassis Choice	67" x 39 1/4" x 60 5/8"

**\*All weights & dimensions are approximate.**

# 5.0 Controls

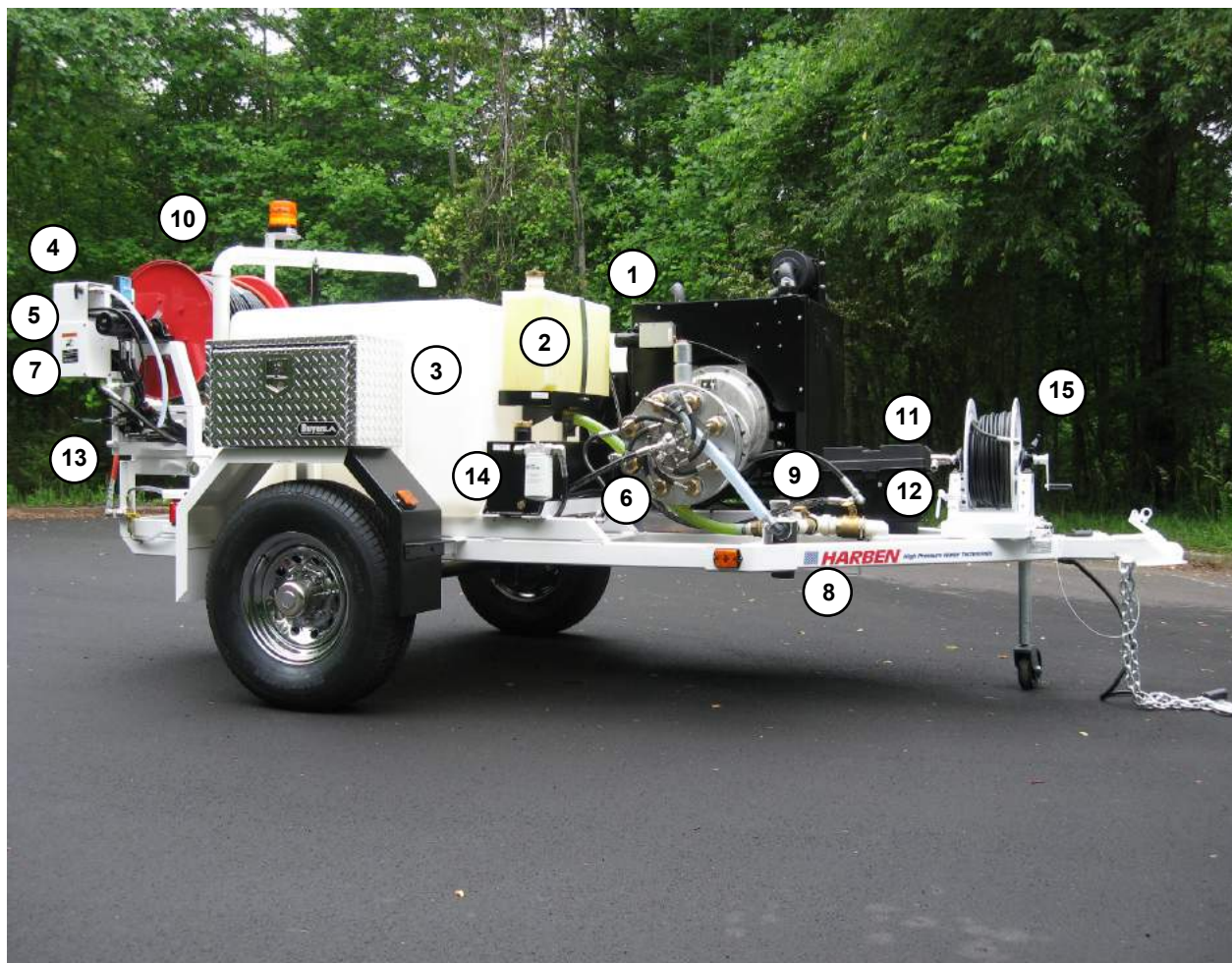
## 5.1 115 Van Pack



1	Gas tank	9	Inlet water filter
2	Antifreeze tank	10	Antifreeze valve
3	Water tank	11	High pressure hose reel
4	Inlet hose reel	12	High pressure selector valve
5	Throttle & choke	13	Tank drain
6	Engine controller	14	Tank overflow
7	Emergency stop	15	Pressure control valve
8	Pressure gauge		

*\*Manual controlled version shown here*

## 5.2 E Series/ E-180 Series \*

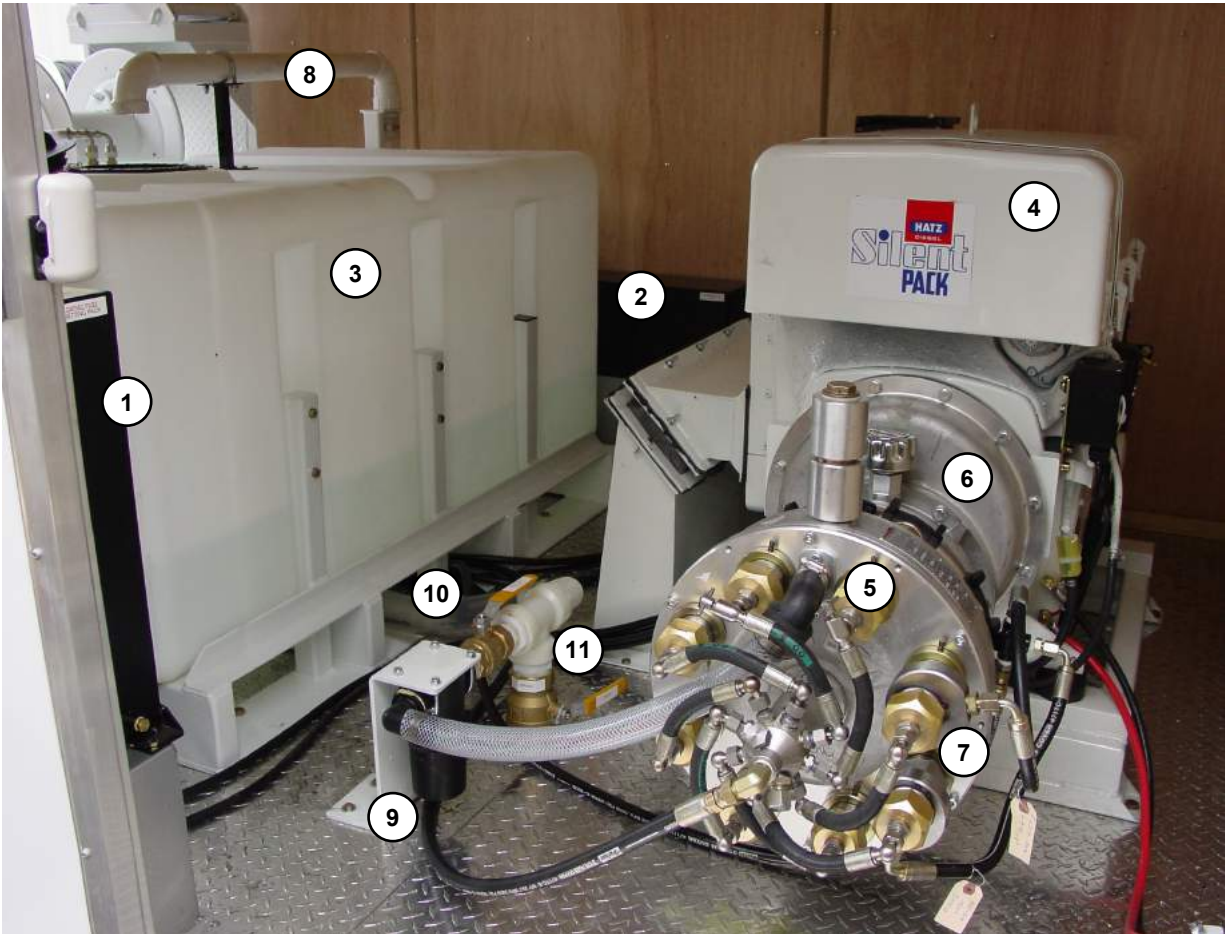


1	Diesel tank	9	Antifreeze valve
2	Antifreeze tank	10	High pressure hose reel
3	Water tank	11	Battery box
4	Radio control unit	12	Tank drain
5	Engine controller	13	Hose reel control lever
6	Jump Jet	14	Hydraulic tank
7	Pressure gauge	15	Mini jet kit
8	Inlet water filter		

*\*Radio controlled version shown here*

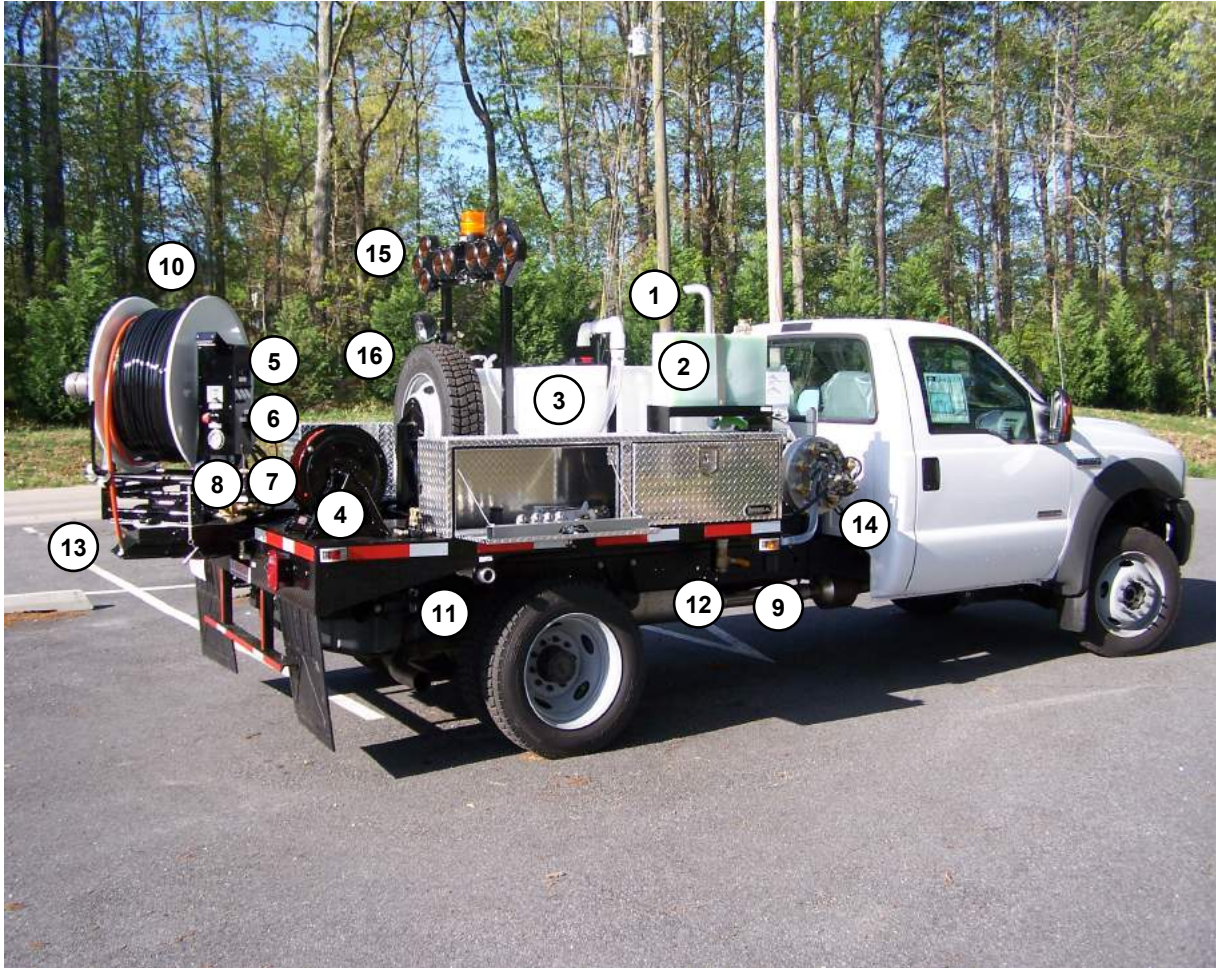
# 5.0 Controls

## 5.3 Enclosures/Skids \*



1	Diesel tank	7	Jump jet
2	Hydraulic tank	8	Tank fill line
3	Water tank	9	Water in-line filter
4	Engine	10	Water inlet valve
5	Pump	11	Water drain valve
6	Gear box		

## 5.4 Truck Units \*

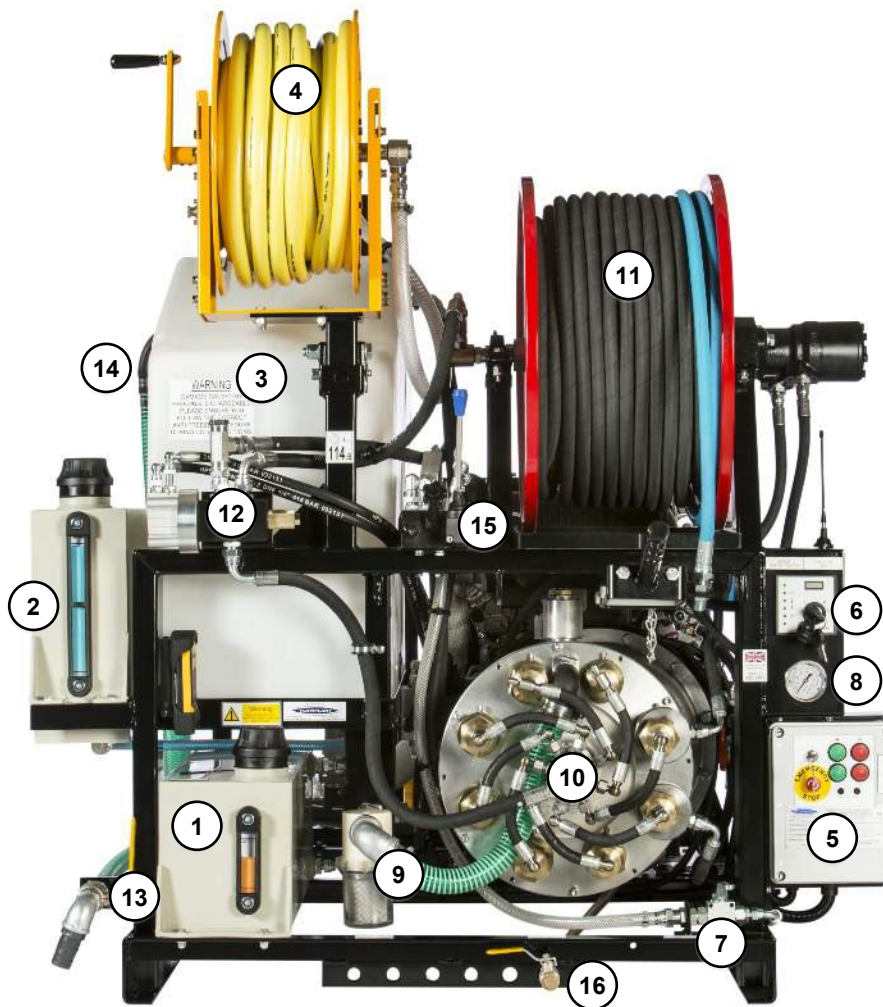


1	Diesel tank	9	Inlet water filter
2	Antifreeze tank	10	High pressure hose reel
3	Water tank	11	Water inlet fill
4	Mini hose reel	12	Tank drain
5	Radio control unit	13	Hose feed guide
6	Engine controller	14	Pump
7	Hose reel control lever	15	Arrow board
8	Pressure gauge	16	Spare tire carrier

*\*Radio controlled version shown here*

## 5.0 Controls

### 5.5 Lightpack \*



1	Diesel tank	9	Inlet water filter
2	Antifreeze tank	10	Pump
3	Water tank	11	High pressure hose reel
4	Inlet hose reel	12	High pressure diverter valve
5	Radio control unit	13	Tank drain
6	Engine controller	14	Tank overflow
7	Jump jet	15	Hose reel control lever
8	Pressure gauge	16	Engine oil drain

*\*Radio controlled version shown here*

## 6.1 Daily Checks

Carry out all daily checks before you operate the jetter:

- Pump oil level
- Gearbox oil level
- Water filter cleanliness
- Engine oil level
- Fuel level
- All jets are clean and free from debris
- All jetting hoses are free from damage and abrasion

If the jetter has been in operation for more than 100 hours, other routine maintenance checks may need to be carried out. For a more comprehensive guide to routine maintenance, refer to Section 6.10.

## 6.2 Hydraulic Hose Reel (Optional)

The fixed hydraulic control lever has two positions:

- In
- Out

A "freespun" selector is available as an option. In "freespun" mode you can rotate the reel without hydraulic power. The speed of the hydraulic motor can be controlled with a reel speed control valve. (Optional)

It is important to take note of the following points when operating the reel:

- Never wind the hose onto the reel when it is not pressurised. An unpressurised hose will wind very tightly around the reel and cause the drum to crush.
- If the hose becomes trapped in a drain you must stop winding the reel immediately, stop jetting and wind the hose manually. Failure to stop can result in the hose crushing the drum, and/or the hose being permanently damaged.
- If the hose has been wound on too tightly it must be completely unwound and then rewound loosely on the reel.

## 6.3 Pre-Start Procedure

- Park the vehicle/jetter safely on a level surface with the engine switched off, the vehicle/towing vehicle left in gear and with the hand brake applied. (Truck/Enclosures).



- Never attempt to use the hydraulic reel with the jetter uncoupled from the towing vehicle.
- Connect the inlet reel (Vanpack, Enclosures) to a main water supply and fill the jetter tank. When full, turn the water supply off and replace the water tank lid.
- Push the hydraulic control lever (optional) to the 'freespun' position and feed off enough high pressure hose to reach the work area. Return control lever to center position.
- Check the emergency stop is in the out position. (Vanpack)
- Check the high pressure valve is in the DUMP/ Return to tank mode.

## 6.4 Starting the Engine (Manual Jetter)

If your machine is fitted with a radio remote control go to section 6.5

- Turn the ignition key to the first position to energise.
- Once the glow plug light has switched off, or, after approximately 5 seconds on a diesel engine, turn the key to the second position to start the engine.
- If the jetter is fitted with a gas engine, and you are starting from cold, you will need to pull out the choke while starting. Push it back in after the engine has run for approximately 5 seconds.
- If there are any warning lights on the engine controller switch off the engine and consult the engine manual supplied with your jetter. Only use a machine with manual controls where your risk assessment has shown that it is safe to do so!




## 6.0 Operations

### 6.5 Starting the Engine (Radio Controlled Jetter)

When operating the jetter using a radio handset it will be necessary to power the radio handset on separately from the unit control panel.

- Be sure water tank is filled and main valve is open. Bleed air as necessary.
- Turn on unit panel using the toggle switch and enter four digit code to activate.
- At this point, the machine can be run using the pendant OR the panel.
- Prepare for jetting by choosing the nozzle for the application and attach it to the jetting hose end. Place the nozzle a safe distance into the pipe to be cleaned.
- Start the engine using the "start engine" button.


 **Please Note:** The pump is now "live" as water is flowing through the pump and "dumping" back into the water tank. (Dump Mode)

- The panel will show two pressures. The pressure "setting" display is the pressure you wish to jet the line with. Starting at 1,500 psi the unit can be increased 500 psi increments up to 4,000 psi. The second pressure display is the pressure gauge showing the current pressure.
- Use the "psi up" and "psi down" buttons to reach your desired pressure.
- Should the pendant stop communicating with the panel due to distance, battery failure, etc... the water valve will shut off for safety..

### 6.6 Operating the Jetter


An emergency shutdown can be initiated at any time by switching off the engine with the engine "on/off" button or pressing the E-Stop button!

- Check the nozzle is inserted about five feet into the drain before turning the high pressure water ON.
- Once inserted, switch the high pressure water ON (on manual jettors) or press the water ON button on the radio handset.
- To increase the engine speed, or to increase pressure, rotate the throttle counterclockwise (on manual jettors) or press the 'psi up' button on the radio handset.
- To shut down the jetter decrease the engine speed and switch the high pressure water OFF (on manual jettors) or press the water OFF on the radio handset.

 **Please Note:** Always retrieve and rewind your hose while under some sort of pressure to prevent crushing your hose reel drum.

### 6.7 Using a Pressure Control Valve

If the jetter has been fitted with a pressure control valve, or a flow diverter, you can adjust the jetting pressure independently of the engine revs.

 **Please Note:** To avoid stalling it is advisable to run the engine at a minimum of 1/2 full speed.

- Before starting, check the pressure control valve is wound out to avoid any sudden pressure increase.
- Start the jetter as described in Sections 6.4 /6.5.
- With high pressure water ON, wind in the pressure control valve to increase the pressure.
- To shut down the jetter decrease the engine speed and switch the high pressure water OFF (on manual jettors) or press the water OFF on the radio handset. Unwind the pressure control valve.



## 6.8 Using a Gun


### 6.8.1 Dump Style Gun

A dump style gun has two barrels. When the trigger is pulled, water comes from the main barrel, through a jet, at high pressure. When it is released the water is dumped safely through a secondary barrel at low pressure.


### 6.8.2 Dry Shut Gun

A dry shut gun must only be used when an unloader valve is fitted to the jetter. When the gun trigger is released the water is diverted through the unloader valve and back to the jetter tank.

If you do not have an unloader valve fitted when using a dry shut gun you will cause serious damage to your jetter, as well as possible serious or fatal injury to the operator.

 **Please Note:** After turning off the jetter always point the gun at the ground and pull the gun trigger to safely release any trapped pressure.

## 6.9 Frost Precautions

 Attempting to use a frozen jetting machine can lead to ice pellets being ejected from the hose at high speed with risk of serious injury or death!

It is recommended that during cold periods in the weather you run antifreeze throughout your jetter including the main jetting hose. If you suspect your jetter has frozen then you should not attempt to start it. This can cause serious damage to your equipment resulting in costly repairs.

Harben® jetters can be fitted with an antifreeze kit as an option.

To antifreeze the machine:

- Drain the water tank
- Check your antifreeze tank is full with a 50/50 antifreeze mix
- Close the main water valve and open the antifreeze valve feeding the pump. Turn the antifreeze valve at the rear of the unit horizontal.

- Be sure the water valve is switch from "dump" mode to "high pressure" mode.
- Start the jetter and open the water valve (on manual jetters) or press the 'water on' button on the radio panel. If equipped, open the jump jet valve until hose turns green then shut.



**Please Note:** If you allow the jetter to run on dump all of the antifreeze will be diverted to the main tank and will be wasted.

- After approximately 35-40 seconds, the return hose to the water tank will turn green as well. This indicates the system is winterized and the unit can now be turned off.
- The antifreeze will push any residual water ahead of it back to the water tank.

To de-antifreeze the machine:

- Fill the water tank
- Open the main water valve and close the antifreeze valve. Turn the antifreeze valve at the rear of the unit vertical.
- Be sure the water valve is turned to "high pressure" mode.
- Start the jetter and turn on the water or on the remote use the "water on" button. If equipped, open the jump jet valve until water passes through then shut off.
- After about 35-40 seconds the antifreeze line will turn from green to clear. The system is now dewinterized. Switch to water OFF (on manual jetters) or press the "water off" button on the radio panel when the antifreeze tank is full.
- Switch off the jetter ignition.



**Please Note:** Regularly check the antifreeze strength during cold weather periods. Add antifreeze as needed.



**Please Note:** Harben® suggests the use of propylene glycol type antifreeze because it is less damaging to the environment. Under no circumstances should any antifreeze mix be disposed of into the sewer system or be allowed to enter any water courses.

## 6.0 Operations

### 6.10 Routine Maintenance

We recommend that maintenance be carried out by a recommended service agent. Maintenance should only be carried out with the engine turned off and when cold.

Frequency	Action
Daily	<ul style="list-style-type: none"><li>● Check inlet water filter element</li><li>● Check engine oil level on dip stick</li><li>● Visual check for hose damage/water leaks</li><li>● Check emergency stop button operation</li><li>● Check ball hitch lock</li><li>● Check ball hitch for wear</li><li>● Check handbrake operation</li><li>● Check brake adjustment</li><li>● Check tire pressure</li><li>● Check trailer lights</li></ul>
Weekly / 24 Hours	<ul style="list-style-type: none"><li>● Visually inspect jetter for security, checking for any loose, damaged or missing parts</li><li>● Check air filter cleanliness</li><li>● Check engine fuel filter for contamination</li></ul>
3 Monthly / 50 Hours	<ul style="list-style-type: none"><li>● First service contact Harben®</li><li>● Replace pump oil (only required for first service only)</li><li>● Adjust trailer braking system if necessary.</li></ul>
6 Monthly / 100 Hours	<ul style="list-style-type: none"><li>● Inspect tanks and fittings for leaks</li><li>● Tighten any loose joints</li><li>● Check condition of 12 volt start battery</li><li>● Grease battery terminals for protection</li></ul>
Yearly / 200 Hours	<ul style="list-style-type: none"><li>● Intermediate service of engine, gearbox and pump required (contact Harben®)</li><li>● Closely inspect the structural integrity of the framework for signs of stress and cracking</li><li>● Carry out detailed inspection of pipes, hoses and fittings</li><li>● Check unloader valve operation</li></ul>
2 Yearly / 400 Hours	<ul style="list-style-type: none"><li>● Major service of engine, gearbox and pump required (contact Harben®)</li><li>● Check wiring terminals/connections and continuity of electrical earth</li></ul>

## 7.1 Engine Faults

Problem	Possible Cause	Recommended Action
Engine shutdown	Low oil pressure	Check and replace switch if faulty Check oil pressure, if pressure is low refer to engine handbook
	Coolant temperature	Check and replace switch if faulty Check water temperature in radiator, if very hot refer to engine handbook
	Emergency stop in	Twist to release
	Low engine charge	Check alternator belt tension Check terminals on alternator Check engine idle speed, reset if necessary Refer to engine handbook

## 7.2 System Faults

Problem	Possible Cause	Recommended Action
Low system pressure	Worn or incorrect size of cutting nozzle	Replace the old jetting nozzle with a new one
	Engine speed slow	Adjust to correct speed
	Leaks from hose, pipes and connections	Check the connections for tightness, replace if needed
	Blocked inlet filter	Clean or replace element
	Inlet hose too long	Shorten hose length
	Loss of water through dump line of selector valve or gun when high pressure selected	Check seats and seals
	Loss of water through dump line of remote control kit, if fitted	Check seats and seals
High system pressure	Blocked nozzle, selector valve or gun	Clean the items and flush out the delivery line
	Incorrect nozzle size	Replace the nozzle
	Incorrect bore size	Replace the hose
	Engine speed high	Adjust to correct speed
	Crushed delivery hose	Replace if necessary
	Two gun choke left in gun when operating as single gun unit	Replace with standard choke
Low water level	Blocked or dirty pre-filters	Clean or replace elements
	Faulty ball valve assembly	Replace if necessary
	Wrong seat in ball valve assembly	Replace the seat if necessary
	Low inlet pressure	Increase pressure

## 7.0 Fault Finding

### 7.2 System Faults (continued)

Problem	Possible Cause	Recommended Action
<b>Pump not running evenly (refer to pump manual)</b>	Air in water	Water bleed pump
	Air in crankcase oil	Oil bleed pump
	Worn drive coupling	Replace flexible elements and examine coupling
	Faulty inlet or delivery valve	Check valve condition
	Valve nut over tightened	Check tightness of inlet & delivery nut
<b>Burst disc failure or safety relief valve operating (also refer to high system pressure problem)</b>	Incorrect burst disc	Replace with correct disc
	Incorrect valve setting	Check certificate/setting
	Faulty valve	Repair or replace if required
	Faulty or fatigued burst disc	Replace with new disc

### 7.3 Useful Links

- [www.Harben.com](http://www.Harben.com)
- [www.engines.honda.com](http://www.engines.honda.com)
- [www.deutzamericas.com](http://www.deutzamericas.com)
- [www.kubotaengine.com](http://www.kubotaengine.com)
- [www.hatzusa.com](http://www.hatzusa.com)



# 8.0 Appendix

## 8.1 Service History



Serial Number:		
Unit Number:		
Date of Manufacture:		
Date: .....	Official Harben® Stamp & Signature	
Engineer: .....		
Type of Service: .....	Please state if other service provider is used: .....	
Date: .....	Official Harben® Stamp & Signature	
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Date: .....	Official Harben® Stamp & Signature	
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Type of Service: .....	Please state if other service provider is used: .....	
Type of Service - Intermediate, Yearly		

# 8.0 Appendix



## 8.1 Service History

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Unit Number:		
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