GROUND HOG HT1000

OPERATIONS MANUAL

HOG™ TECHNOLOGIES

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Thank you for purchasing the HT1000. We know that you have other options available to you and consider it a blessing that you chose our product. We affectionately nicknamed this unit the Ground Hog SR. This compact Hog Tool is best known for its reliability, user-friendly features, and simple quality.

We are excited to welcome you and your crew to the Ground Hog Operators' Team. Whether you use this unit on roads and highway markings, airport runway rubber removal, parking lots, bridges, parking garages or other decks and floors we are committed to working with you to get the highest productivity with the finished profile you need. The Ground Hog, in the hands of a trained operator with a work ethic of excellence, will be a fitting complement to our mutual commitment to delivering quality on every job.

We have designed a training program specifically for the Ground Hog. During the training experience your team will be given the knowledge and skills necessary to maintain, achieve maximum productivity, troubleshoot and repair your Ground Hog. We would love to provide you with information on the benefits of this event.

Please take the time to read this operation manual before attempting to operate your water blasting system. You will find that it is an important aid in the operation and maintenance of your new equipment. The information is intended as a guide and cannot cover every question you may have. We encourage you to contact Hog Technologies for any additional information or technical assistance you might need. We maintain an experienced support team that is available 24 hours a day 7 days a week along with a well-stocked inventory of parts and accessories for your convenience. Please contact us toll free at (772) 214-1714 or online at Www.hogtechnologies.com or www.stripehogsupport.com

We take this opportunity to say thank you again from all of us here at The Hog Farm. We hope you will come and see us very soon.

NOTES

Hog Technologies Limited Warranty

Hog Technologies warrants its components to be free from defects in material and workmanship while under normal use and service. Hog Technologies will, at its option, either repair or replace free of charge any such part that appears to us to be defective in material or workmanship during the warranty period. The warranty evaluation by Hog Technologies as to the cause of the defect shall be conclusive.

For approved warranty shipments, Hog Technologies will provide no charge Fed-ex ground or Fed-Ex Economy shipping. If customer requests expedited shipping, the difference in the shipping costs will be invoiced to the customer.

Hog Technologies reserves the right to request the component(s) to be returned, freight pre-paid, for analysis before proceeding with any warranty claim. The customer shall be responsible for payment of any replacement components requested. If the warranty claim is approved by Hog Technologies, credit will be issued for the components under warranty.

No warranty is made, either expressed or implied, for defects, failures or malfunctions resulting from corrosion, misapplication, over-pressurization, insufficient or lack of maintenance and any modifications to the component as supplied by Hog Technologies.

Any components replaced during the period of warranty will be warranted only during the period of the initial warranty, and no extensions shall be made, unless in writing by Hog Technologies in addition to the provision of the terms of the original warranty.

Hog Technologies will not be liable for damage, abnormal wear or consequential damage to their system components resulting from the use of replacement components that are not furnished by Hog Technologies.

Hog Technologies will not be liable for charges incidental to the removal of damaged or defective components, lost time and profits, or any consequential damages resulting from failure of the component.

Hog Technologies reserves the right to make improvements to future models without the need to retrofit or upgrade prior models. Hog Technologies shall not be obligated to perform retrofits and/or modifications to components manufactured prior to the incorporation of the new design and specifications.

Components that are not originally manufactured by Hog Technologies, including but not limited to, the truck chassis, Jetstream Pump, OMSI (Gear Box), Dresser Roots Blower, are warranted only to the extent of the original manufacturer's warranty and are subject to their allowance to us if found defective by them. Copies of other manufacturers warranty statements are supplied at the time of sale. Hog Technologies will assist with warranty claims on components not originally manufactured by Hog Technologies.

*For approved warranty claims that include labor: If such labor is provided at customer location and not at Hog Technologies headquarters, Hog Technologies reserves the right to invoice customer for reimbursement of travel-related expenses.

Hog Technologies Warranty Schedule
Warranty starts from the date of acceptance by the purchaser. Date of acceptance shall be defined as the time that the Stripe Hog is received by the purchaser. Acceptance of the Stripe Hog shall imply agreement to the terms and conditions of this warranty.

- **1 - 365 Days: 100% Parts and 100% Labor ***

NOTES

High pressure, water blasting equipment can cause serious injury or even death if it is not operated or maintained properly. This manual has been written to include a number of safety instructions to assure the safe operation and maintenance of the equipment. These instructions are in the form of a General Safety Section as well as individual NOTICE, CAUTION, WARNING and DANGER statements. There are also WARNING AND DANGER LABELS located on some components. You should read these warnings carefully and make sure you understand the nature of the hazard as well as the precautions and recommended procedures required to ensure your safety. The following definitions apply:

⚠ CAUTION ⚠

HAZARDS OR UNSAFE PRACTICES WHICH COULD RESULT IN MINOR PERSONAL INJURY OR PRODUCT AND PROPERTY DAMAGE.

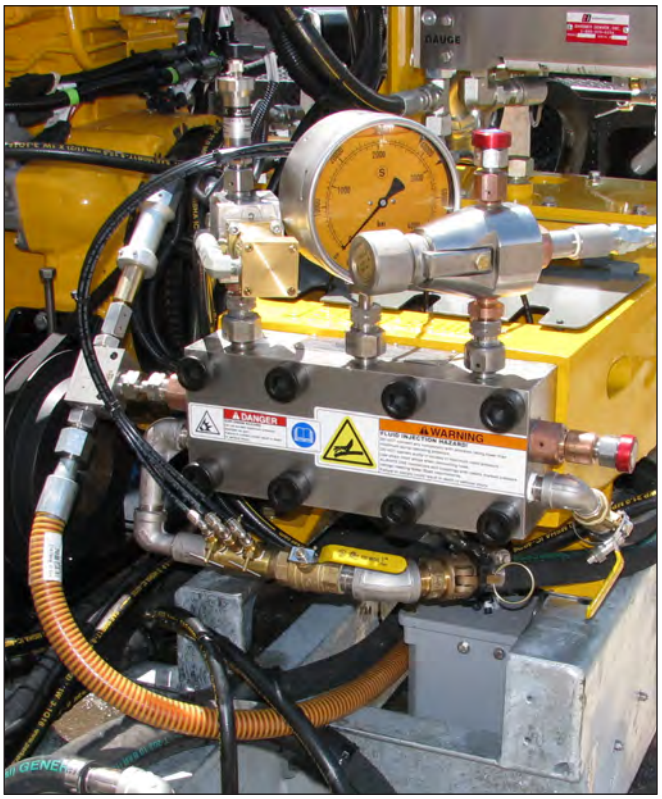
⚠ WARNING ⚠

HAZARDS OR UNSAFE PRACTICES WHICH COULD RESULT IN SEVERE PERSONAL INJURY OR DEATH.

⚠ DANGER ⚠

INDICATES A HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, WILL RESULT IN DEATH OR SERIOUS INJURY.

NOTICE:
INDICATES A SITUATION WHICH CAN CAUSE DAMAGE TO THE MACHINE, PERSONAL PROPERTY, AND/OR THE ENVIRONMENT OR CAUSE THE EQUIPMENT TO OPERATE IMPROPERLY.



Typical Warning Labels On UHP Pump

IMPORTANT NOTE:
Every precaution has been taken by Hog Technologies to reduce the risks associated with possible injury and damage from electrical faults, high pressure water and hydraulic components or mechanical failure. However, your own precaution and good maintenance procedures are necessary in order to maintain a safe working environment.

All instructions given in this book are as seen from the rear looking forward. Common industry terminology is used throughout the manual.

WARNING

INCORRECT USE OF HIGH PRESSURE WATER BLASTING EQUIPMENT MAY CAUSE SERIOUS INJURY OR EVEN DEATH.

DO NOT USE THIS EQUIPMENT WITHOUT PROPER SUPERVISION AND TRAINING.

ALL OPERATING AND MAINTENANCE PERSONNEL MUST BE THOROUGHLY TRAINED IN SAFE OPERATION, INSTALLATION AND MAINTENANCE OF THIS EQUIPMENT AND PROVIDED WITH ADEQUATE SUPERVISION.

BEFORE ATTEMPTING TO CONNECT, OPERATE, OR REPAIR THIS EQUIPMENT, THOROUGHLY READ THESE INSTRUCTIONS AND ANY SAFETY WARNING OR INSTRUCTION PAMPHLETS INCLUDED WITH YOUR SHIPMENT.

FOR ANY QUESTIONS CONCERNING SAFE OPERATION AND MAINTENANCE PROCEDURES, CONTACT YOUR HOG TECHNOLOGIES REPRESENTATIVE PRIOR TO USE.

(772) 223-7393 OR (877) 964-7312
HOG TECHNOLOGIES
WWW.HOGTECHNOLOGIES.COM

1.1 General Safety

Use Professional Training

Operating high pressure water blasting equipment requires professional training, including safe work practices and procedures. Only professionally trained personnel should be allowed to setup, operate, or maintain high pressure water blasting equipment. If you have not completed the Hog Technologies basic training course you will be a danger to yourself and others. The velocity of water at the nozzle tip exceeds that of a bullet coming out of a gun. Contact with the high pressure blast can result in the loss of a limb or water injection into the bloodstream. If injection occurs in a vulnerable part of the body death may result.

Always Read Instructions

Read this manual and all other water blasting equipment operation manuals and instructions prior to using any Waterblasting product. Contact Hog Technologies (877-HOG ROAD) should any questions arise.

Major Component Operation Manuals

The suppliers of some major components such as engines, electric motors and pumps, provide their own operation manuals which have been included with your equipment. You should read the information in this manual and the manuals of other manufacturers completely and have a thorough understanding of all component systems and their proper operation before operating your equipment.

REMEMBER - IT IS YOUR RESPONSIBILITY TO ENSURE THAT YOUR EQUIPMENT IS SAFE FOR YOU AND YOUR CREW. ALWAYS EXERCISE GOOD JUDGMENT WHEN INSTALLING OR REPAIRING EQUIPMENT AND WHILE OPERATING WATER BLASTING EQUIPMENT.

Work Area Safety

Remember, safety is first! Only set up to work in areas properly protected from traffic and other hazards. Individuals being struck by vehicles or mobile equipment lead to many work zone fatalities or injuries. Work zones need traffic controls identified by signs, cones, barrels and barriers. You should always wear high visibility clothing with a fluorescent background and made of retro-reflective material to be more visible to motorists and reduce the possibility of an accident. Work stations should always be illuminated.

Outfit all operators with proper safety apparel. Always use eye protection to shield from projected debris. Use ear protection to protect from noise levels generated from pump, vacuum and water blasting head. It is very important to wear steel toed boots that provide good traction on slippery surfaces.

Never wear loose clothing. Loose clothing can get caught on moving or rotating parts causing serious injury or even death.

Most ultra-high pressure water blasting operations generate noise levels above 90 dB. Hearing protection is required in accordance with OSHA standards.

OSHA's Permissible Noise Exposure	
90 dB	8.0 hours
92 dB	6.0 hours
95 dB	4.0 hours
97 dB	3.0 hours
100 dB	2.0 hours
102 dB	1.5 hours
105 dB	1.0 hours
110 dB	30 minutes
115 dB	15 minutes

WARNING

ALL PERSONNEL EXPOSED TO 90 DB OR GREATER NOISE LEVELS SHOULD RECEIVE INSTRUCTION IN THE CORRECT USE OF EAR PROTECTION SO THAT THEIR NOISE EXPOSURE LIES WITHIN THE LIMITS SPECIFIED BY OSHA. NEVER ALLOW ANYONE NEAR THE WORK AREA WITHOUT PROPER EAR PROTECTION.

REMEMBER: ULTRA-HIGH PRESSURE BLASTING CAN CAUSE DEBRIS TO BE PROJECTED UNEXPECTEDLY IN AND AROUND THE WORK AREA THAT CAN CAUSE SEVERE INJURY. MAKE SURE ALL PERSONNEL STAY CLEAR OF THE BLASTING AREA AND USE HARD HATS, EYE AND EAR PROTECTION.

Always be sure your work area is clear of people whenever the ultra-high pressure pump is engaged.

Use Only Products Intended For High Pressure Water Blasting Use

Know the pressure ratings of all equipment being used and never exceed the service rating of the weakest component. This system is designed to work with pressures up to but not exceeding 40,000 psi (2758 bar). Ultra-High Pressure replacement parts must have a stated minimum burst rating of 1.5 times the maximum operating pressure. All equipment pressure rating and warning tags should be left intact.

Product Changes

Hog Technologies is committed to the continuous improvement of our products. As a result, some of the equipment described in this manual or pictured in the catalog may change or no longer be available.

All information, illustrations, and specifications contained in this manual are based on the latest product information available at the time of publication. Hog Technologies reserves the right to make changes at any time, without notice, in colors, materials, equipment, specifications, and models.

If you have questions about the equipment on your Ground Hog, please contact the Customer support Department at (877) HOG ROAD or (001) (772) 214-1714.

Never Alter a Hog Technologies Product

Do not alter any product without written consent from the manufacturer. Any alterations could have serious consequences including bodily harm or death. Alterations without manufacturer consent will void the warranty.

Inspect Equipment

Inspect the condition of all components prior to use. Do not use any item that is in questionable condition. Use only components which are marked with the recommended operating pressure. Never exceed the operating pressure of the weakest component in the system.

IMPORTANT NOTE:
SOME HOG TECHNOLOGIES EQUIPMENT USES INTERNAL COMBUSTION ENGINES AND FLAMMABLE FUEL. EVERY PRECAUTION HAS BEEN TAKEN BY HOG TECHNOLOGIES TO REDUCE THE RISKS ASSOCIATED WITH POSSIBLE INJURY AND DAMAGE FROM FIRE OR EXPLOSION, BUT YOUR OWN PRECAUTION AND GOOD MAINTENANCE PROCEDURES ARE NECESSARY TO ENSURE THE SAFE OPERATION OF YOUR EQUIPMENT.

Store Components Properly

Protect all components from damage when not in use. Secure for travel.

Freezing Conditions

Water and vacuum systems, hoses and the water blasting head should be drained of all water or filled with an antifreeze solution. For the 40K pump system, refer to pump manufacturer's procedures for maintaining equipment in freezing climates.

Prior to starting operations, the operation of all equipment components must be checked carefully to ensure they are not frozen, have not been damaged by frozen water and are operating properly.

1.2 Blasting Safety

Safety First – ALWAYS!

Whenever the high pressure pump is engaged for setting pressure or operations, always be sure work area is clear of people, hands, feet, etc. before engaging the high pressure.

⚠ WARNING ⚠

INJURIES FROM ULTRA-HIGH PRESSURE WATER BLASTING ARE VERY SERIOUS AND CAN RESULT IN A FATALITY. ALWAYS MAKE SURE ALL PERSONNEL ARE A SAFE DISTANCE FROM THE WORK AREA BEFORE THE PRESSURE PUMP IS ENGAGED. NEVER PUT HANDS, FEET OR ANY PART OF YOUR BODY IN OR NEAR THE HIGH PRESSURE STREAM.

Equip All Personnel with Proper Safety Gear

Handheld waterblasting equipment can be extremely dangerous if proper precautions are not observed. Operators handling the waterblasting devices must be extremely carefully and wear protective gear designed for waterblasting. Remember that high pressure can instantly cause severe injury or death if any part of the body is contacted

by the high pressure stream. Waterblasting tool operators must be equipped with the following; heavy duty, steel toed, non-skid knee high boots, a heavy duty, protective rain suit, gloves, hard hat with safety shield or goggles and ear protection.

Support team operators should be equipped with a minimum of steel towed, non-skid safety boots, heavy duty work clothes, gloves, hard hat, safety glasses or goggles and ear protection.

WARNING

ULTRA-HIGH PRESSURE BLASTING CAN CAUSE DEBRIS TO BE PROJECTED UNEXPECTEDLY IN AND AROUND THE WORK AREA THAT CAN CAUSE SEVERE INJURY. MAKE SURE ALL PERSONNEL STAY WELL CLEAR OF THE BLASTING AREA AND USE HARD HATS, EYE AND EAR PROTECTION.

DANGER

AVOID SERIOUS INJURY OR DEATH. NEVER APPROACH A PERSON THAT IS RUNNING A HAND TOOL DURING UHP OPERATIONS UNLESS THE PERSON CAN SEE YOU. MAKE SURE THAT THE PERSON STOPS BLASTING BEFORE YOU GET WITHIN RANGE OF POTENTIAL BLAST.

WHEN BLASTING, NEVER TURN AROUND SUDDENLY WITHOUT STOPPING THE PRESSURE FIRST IN CASE A PERSON HAS APPROACHED YOU WITHOUT YOUR KNOWLEDGE.

ALWAYS STOP THE PUMP BEFORE PASSING THE TOOL.

Check Water Supply

Use only clean water in any ultra-high pressure system. ***DO NOT*** *accept water drawn from retention ponds, canals or other non-potable sources.*

Purge System

Before attaching a spray bar to the Hog Head assembly, engage the high pressure pump at low speed to purge the system. Any dirt or debris in the system can clog nozzle orifices and cause system pressure to spike excessively, causing damage to components.

Check Water Blasting Head

Check the blasting head and spray bar for smooth and proper operation before each shift. Do not use equipment that has not been checked thoroughly.

Check Control Components

Check all controls, switches and control panel devices to ensure each is working properly before beginning operations. Do not use equipment if any device is malfunctioning.

Know Your Surroundings

Always be aware of, and pay attention to your surroundings. – i.e. - pump, hoses, people, walls, moving vehicles, live lanes of traffic, etc.

Test System

With the spray bar and high cohesive nozzles installed, operate the pump at low pressure to check for nozzle accuracy and leaks in spray bar, connections or nozzles. Should any repairs or adjustments be necessary, disengage the pump to relieve all pressure before making any required repairs or adjustments.

Always Use At Least Two Operators.

For safety purposes, at least two operators should always be present during waterblasting operations with one tool and three operators present when operating two tools. The primary operator handling the waterblasting tool must have direct control of the water pressure. The secondary operator (assistant), should observe operations from a safe distance (at least 12 feet (366 cm) and be able to shutdown system pressure from a secondary control to quickly relive pressure in case of an emergency.

Brace Yourself and Be Prepared

Operators of handheld tools should always be braced and maintain firm, solid footing at all times before beginning pressure testing the system or blasting. Be ready, if water volume from the pump is excessive. Excessive force from the spray bar can be enough to lift the Ground Hog off the ground causing loss of control and/or the blast to cross the path of people or equipment. Always make sure other members of the crew are a safe distance from the operator before blasting operations begin to ensure there is no chance for them to come in contact with the high pressure stream if the operator loses control.

If waterblasting in a man lift, on scaffolding or above ground level, always use a fall protection device such as safety belts, harnesses, and fall nets. Never operate handheld waterblasting equipment while standing on slippery surfaces.

CAUTION

TO AVOID POSSIBLE INJURY AND DAMAGE TO EQUIPMENT, USE ONLY THOROUGHLY TRAINED PERSONNEL TO PERFORM MAINTENANCE OR REPAIRS. ALWAYS TEST ALL COMPONENTS AT LOW PRESSURE.

Start at Low Pressure

Always start blasting with the system at low pressure and slowly increase RPM to operating pressure. Engage and disengage the high pressure control lever two times at operating pressure to check the operation of the blasting head and control valve before starting blasting operations.

Set System Pressure

With system operating properly, set your pressure according to methods described by pump manufacturer's instructions. Refer to the pump operating manual for specifications and instructions.

Check Dumping Pressure

When setting pressure ***ALWAYS*** ensure that the system pressure drops to less than 100 psi (7 bar) immediately when the DUMP VALVE control lever is released. If this does not relieve system pressure immediately to below 100 psi (7 bar) when released, do not use the unit until repairs are made.

Use the Minimum Pressure Required

Do not exceed the operating pressure of the system's lowest pressure-rated component. All equipment pressure rating and warning tags should be left intact.

Be Prepared

If the equipment malfunctions or a malfunction is suspected, immediately stop all blasting activity and relieve the pressure in the system before attempting any repair. Always follow manufacturer's repair instructions.

Never Blast When the Tool is Stopped

Always make sure High Pressure switch or lever is OFF ***BEFORE*** motion is stopped. Damage to the surface will occur if blasting continues when high pressure is supplied to a waterblasting tool that is not moving.

Stop the Pump Before Passing the Tool

Passing off handheld waterblasting tools is extremely dangerous due to the possibility of accidental trigger activation.

When passing a Hand Hog tool to another person, always stop the pressure then, place the unit safely on the ground. Once the unit is neutralized and secure, the other person can take possession of it and begin working again.

High Cohesive Nozzle Flow Chart - FLOW - GPM @ Pressure Indicated					
Orifice	**20KPSI**	**26KPSI**	**30KPSI**	**36KPSI**	**40KPSI**
Dia./ins	(1379 Bar)	(1723 Bar)	(2068 Bar)	(2482 Bar)	(2758 Bar)
0.005	0.08	0.09	0.09	0.10	0.11
0.006	0.11	0.12	0.13	0.15	0.15
0.007	0.15	0.17	0. 18	0. 20	0. 21
0.008	0.19	0.22	0. 24	0. 26	0. 28
0.009	0.25	0.28	0. 30	0. 33	0. 35
0.010	0.30	0.35	0. 37	0. 41	0. 43
0.011	0.37	0.42	0. 45	0. 49	0. 52
0.012	0.44	0.50	0. 54	0. 59	0. 62
0.013	0.51	0.59	0. 63	0. 69	0. 73
0.014	0.60	0.68	0. 73	0. 80	0. 84
0.015	0.68	0.78	0. 84	0. 92	0. 97

1.2 Nozzle Safety

Check Flow Rating

Combined nozzle flow rate must be compatible with the pump discharge and pressure rating. Refer to the nozzle flow chart in this manual.

Check Pressure Rating

Use only nozzles with a manufacturer's pressure rating of at least the pump's operating pressure or a burst rating of no less than 60,000 psi (4,137 BAR.)

Check Orifices

Prior to installation, make sure the nozzles have no clogged orifices. Also, check to ensure nozzles are sharp and not excessively worn.

Check Connections

Be sure to never force a nozzle into the blasting head. Clean threads to ensure nozzle is not cross-threading. Use an ample amount of anti-seize on threads only, never on the seat of the nozzle. Inspect the seat area on nozzle to ensure a tight seal. If it is damaged, do not use.

Clogged Nozzles

If a nozzle appears clogged, immediately disengage pump. Remove any clogged nozzles and replace with new nozzles. Any particles of the smallest size will clog nozzles. Clogged nozzles can create excessive pressure in pump.

Remove Nozzle from Service if:

A) Nozzle is split or damaged.

B) Nozzle is clogged.

C) Nozzle water spray is fanned out.

D) Nozzle's ability to hold pressure is suspect.

E) Nozzle's hex head is worn excessively from blasting.

F) Nozzle threads are damaged.

1.3 Hose Safety

General

Ultra-High Pressure hoses are tough, but not invincible. They require proper care and handling to achieve the normal service life of 300 - 600 hours. If the hoses are abused, the service life will be much shorter.

Stretched or abused hose can fail prematurely and unexpectedly, which could cause injury to personnel. Hoses that have been exposed to excessive stretching or kinks should be removed from service and discarded.

Hoses Present Tripping Hazards

Be careful to layout the hoses to reduce risk of entanglement and tripping.

Check Connections

Check the condition of the connection threads prior to connecting any fittings or hoses. Use an anti-seize compound on all fittings and hoses to prevent “galling,” as galling will destroy the threads, fittings and/or hose ends.

Tighten Connections

Properly tighten all high pressure connections. Usually, snug plus a 15% tightening will properly seal connections.

Take Proper Care of Your Hose

A) Protect the hose from contact with sharp objects, abrasive surfaces and foot or wheel traffic.

B) Never subject Ultra-High Pressure hose to a tight radius (less than 30” (.8 m) or pull on a coiled hose. Always make sure the hoses are straight with no coils before pulling on the hose to deploy it.

C) Never pull hard on an Ultra-High Pressure hose or expose the hose to heavy loads like dragging equipment or deploying long lengths of hose. This can stretch the hose and weaken it. Never pull more than 25 feet of hose by a coupler or fitting. Always move long lengths of hose by the hose itself to keep the strain off the fittings.

D) When using a tractor or a hog tool, always operate the equipment well within the maximum distance to avoid straining or damaging hoses.

Check Burst Rating

Do not use an Ultra-High Pressure hose that does not have a listed burst rating or with a burst rating of less than 60,000 PSI (4,137 BAR).

Retire Hose from Service if:

A) Cover is damaged and reinforcing wires are exposed to rust and corrosion.

B) Cover is loose and/or has blisters or bulges.

C) Hose has been crushed or kinked.

D) End fitting shows evidence of damage, slippage or leakage.

E) Hose has been exposed to pressures of 2 times the operating pressure.

F) Hose has been stressed or stretched.

Check Dump Valve Water Hose

Any hose used for returning dumped water back to the pump or vacuum line must have a large enough diameter and psi strength so that potentially dangerous release pressure is allowed full flow and release pressure is contained safely. Keep hose in good condition.

1.4 High Pressure Fitting Safety

Fitting Ratings

Use high pressure fittings with a rating of 60,000 psi (4137 BAR.)

Check Fittings

Do not use fittings that have been cross threaded or have damaged threads.

Fitting Connections

Use anti-seize compound on ***all*** hose and fitting connections to prevent galling. Do NOT apply anti-seize to the seating area of any connections.

DANGER

AN INJURY CAUSED BY HIGH PRESSURE WATERJETS CAN BE SERIOUS. YOU SHOULD READ THIS WARNING STATEMENT CAREFULLY AND ALWAYS CARY THE MEDICAL INFORMATION CARD WITH YOU.

- **IN THE EVENT OF ANY WATERJET INJURY:**
- **SEEK MEDICAL ATTENTION IMMEDIATELY. DO NOT DELAY.**
- **INFORM THE DOCTOR OF THE CAUSE OF THE INJURY.**
- **SHOW THE DOCTOR THE MEDICAL INFORMATION CARD OR THIS WARNING STATEMENT AND NOTE TO PHYSICIAN BELOW.**
- **TELL THE PHYSICIAN WHAT TYPE OF WATERJET PROJECT WAS BEING PERFORMED AT THE TIME OF THE ACCIDENT AND THE SOURCE OF THE WATER.**

MEDICAL ALERT

NOTE TO PHYSICIAN

This patient may be suffering from a waterjet injury. Evaluation and management should parallel that of a gunshot injury. The external manifestations of the injury cannot be used to predict the extent of internal damage. Initial management should include stabilization and a thorough neurovascular examination. X-rays can be used to asses subcutaneous air and foreign bodies distant from the site of the injury. Injuries to extremities can involve extensive nerve, muscle, vessel damage as well as cause a distal compartment syndrome. Injuries to the torso can involve internal organ damage. Surgical consultation should be obtained. Aggressive irrigation and debridement is recommended. Surgical decompression and exploration may also be necessary. Angiographic studies are recommended preoperatively if arterial injury is suspected. Bandages with a hygroscopic solution ($mgso_4$) and hyperbaric oxygen treatment have been used as adjunctive therapy to decrease pain, edema and subcutaneous emphysema. Unusual infections with uncommon organisms in immunocompetent patients have been seen; the source of the water is important in deciding on initial, empiric antibiotic treatment, and broad-spectrum intravenous antibiotics should be administered. Cultures should be obtained.

NOTES

HT1000 Ground Hog

2.1 HT1000 Overview

The Ground Hog is a walk behind, Ultra High Pressure waterblasting tool equipped with a rotating spray bar. High pressure water, vacuum and hydraulic oil pressure is supplied by an Ultra High Pressure (UHP) water pump, vacuum blower and hydraulic system on a Waterblasting truck, skid unit or customer supplied, remote power system.

Hydraulic pressure hydraulic fluid that rotates the spray bar and UHP water flow are turned ON and OFF by control levers on the Ground Hog handle. Switches in the control levers are connected to electric solenoid valves on the power system that control the flow of pressurized hydraulic fluid to the spray bar thru-shaft motor and the valve that turns high pressure water ON and OFF.

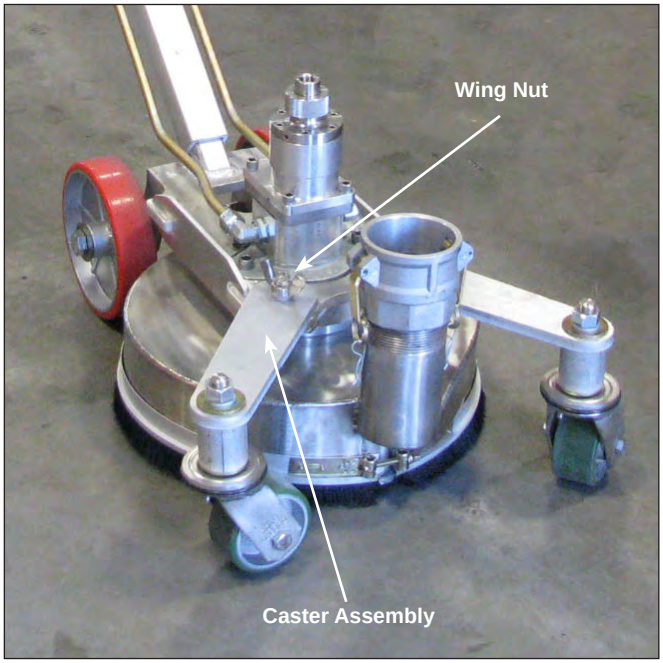
The Ground Hog is designed for operating pressures of up to 40,000 psi (2,758 bar) and to be directly connected to the accessory ports on the Waterblasting truck, trailer or skid mounted unit. If the Ground Hog is connected to a non Waterblasting power system that includes a hydraulic system, the unit must be equipped with a hydraulic manifold and a 12 or 24 volt electrical system with a harness and electric solenoids designed to be used with Waterblasting handheld Hog Tools. The manifold design must include individual port groups for the hydraulic system with solenoid

valves that control Ground Hog functions separately. The Waterblasting HT500 Hog Pack is an available option that can be used with power systems that don't include a hydraulic system.

NOTICE:
IF YOU INTEND TO USE A NON WATERBLASTING POWER SYSTEM, YOU SHOULD CONTACT WATERBLASTING CUSTOMER SERVICE DETERMINE IF THE UNIT WILL ACCOMMODATE HOG TOOL OPERATION AND/OR FOR THE PROPER MODIFICATION KITS AND SETTINGS THAT MAY BE REQUIRED.

DANGER

HANDHELD ULTRA HIGH PRESSURE TOOLS CAN CAUSE SEVERE INJURY OR EVEN DEATH TO OPERATORS OR SUPPORT PERSONNEL IF THE OPERATOR LOOSES CONTROL OF THE TOOL. IT IS CRITICAL THAT THE GROUND HOG IS CONNECTED TO A POWER SYSTEM THAT INCLUDES THE ABILITY FOR THE OPERATOR TO IMMEDIATELY SUSPEND HIGH PRESSURE WATER WHEN THE CONTROL LEVER IS RELEASED. NEVER OPERATE THE GROUND HOG CONNECTED TO EQUIPMENT THAT DOES NOT IMMEDIATELY SHUTDOWN HIGH PRESSURE WATER FLOW TO THE SPRAY BAR WHEN THE CONTROL LEVER IS RELEASED.



Hog Head Casters & Wing Nuts

2.2 Hog Head

Overview

The Hog Head is a single blasting head design mounted on the Ground Hog chassis. Front and rear castor wheels support the head at a preset height to prevent the spray bar from contacting the pavement.

The term "Standoff" refers to the height of the spray bar above the pavement. The standoff distance is set by adjusting the wheels that support the Hog Head. Standoff directly affects removal performance and should be checked periodically and adjusted as required.

The factory preset standoff distance is 1.5" (3.5 cm) from the spray bar to the pavement. Spacers on each front caster adjust the height of the Hog Head. Adjustment may be required to maintain proper clearance by adding spacers as the castor wheels wear.

Large wing nuts on the caster support arms allow the caster assemblies to be rotated in and out. Caster assemblies can be rotated parallel to the handle to reduce the width of the Ground Hog for storage or to allow the Hog Head to get closer to curbs and walls. Move the caster assemblies out to a 45 degree angle to provide maximum stability for most operating situations. Make sure to tighten the wing nuts securely once the caster assemblies are in the desired position.

High pressure water from the power system is supplied by the UHP hose connected to a special fitting at the top of the thru-shaft hydraulic motor.

The center of the rotating shaft is drilled to allow high pressure water to pass through the motor shaft to the spray bar. A special swivel seal assembly provides a positive seal for the connection to the high pressure hose while allowing the thru-shaft to turn freely. A brass button seal provides a positive seal for the spray bar to thru-shaft connection.

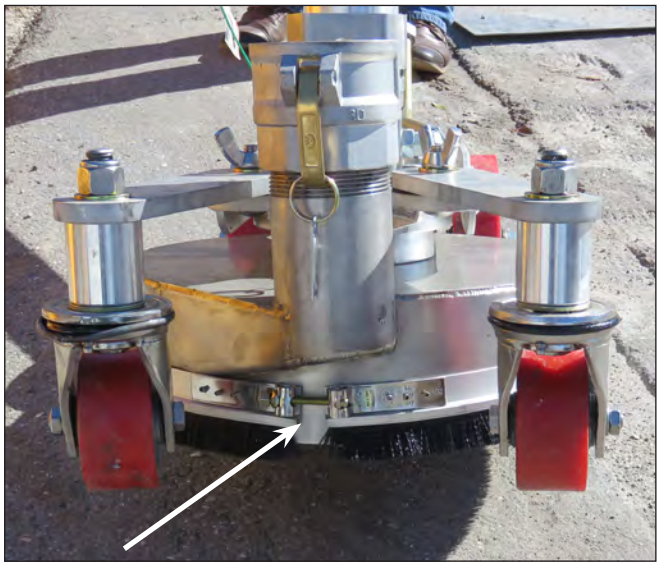
The Hog Head design allows the operator to choose several different length spray bars for specific removal widths. The operator can choose spray bar rotation speeds between 700 and 3000 RPM using the adjustable control valve on the Ground Hog handle.

Wear Brush

A wear brush clamped to the blasting head shroud provides a partial seal between the blasting head and pavement. The wear brush regulates vacuum air flow into the shroud and reduces the amount of debris and water exiting the blasting head during operations. The wear brush is an important safety feature of the blasting head system. It must be installed properly and adjusted or replaced as necessary.

Refer to the Wear Brush section in the Routine Maintenance section of this manual for additional information on adjusting and replacing the wear brush.

NOTICE:
ALWAYS MAKE SURE TO CHECK THE HOG HEAD FOR SMOOTH AND PROPER OPERATION BEFORE EACH SHIFT. DO NOT USE EQUIPMENT THAT HAS NOT BEEN CHECKED THOROUGHLY.



Wear Brush & Wear Brush Clamp

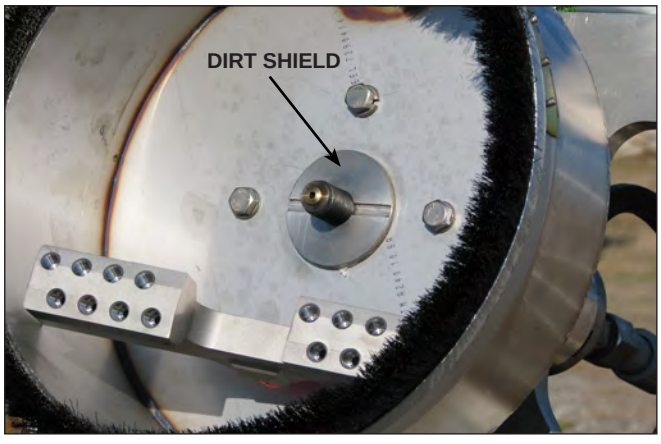
Shroud

The shroud is the heavy duty stainless steel housing attached to the bottom of the thru-shaft motor that encases the spray bar, keeping water and debris contained for optimal vacuum extraction. The vacuum hose is connected to the top of the shroud by cam lock connectors.

Shroud

Dirt Shield

The dirt shield that protects the thru-shaft motor is located between the spray bar and blast head shroud. It consists of a special felt seal that is held against the bottom of the shroud by a stainless steel flat washer threaded on the shaft. The felt seal should be inspected and adjusted whenever the spray bar is removed. The dirt shield should be replaced if it is damaged or worn and be adjusted "finger tight." If it is too tight it will prevent the spray bar from rotating.



Dirt Shield Installed

2.3 Hydraulic Motor & Rotating Spray Bar

Overview

Hydraulic power for the thru-shaft motor that rotates the spray bar is supplied by pressure and return hydraulic hoses that connect to the hydraulic motor. The motor is turned ON when the spray bar control lever is squeezed and OFF when the lever is released. Hydraulic oil is returned to the power system by the return hose.

The spray bar rotation speed, 0 to maximum speed (3000 RPM) is regulated by an adjustable needle valve on the Ground Hog Handle. If your unit is powered by a Waterblasting truck, trailer, skid mounted power unit or the HT500 Hog Pack, maximum hydraulic pressure is preset at the factory to limit the Ground Hog spray bar rotation speed to 3000 RPM maximum.

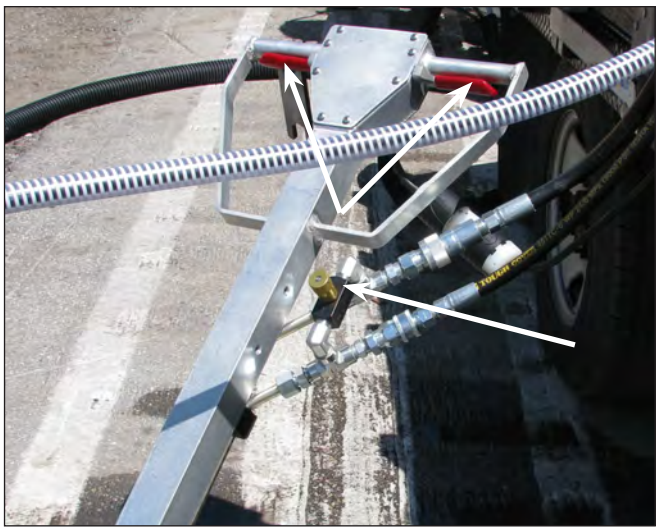
If your unit is powered by a non Waterblasting power system, maximum hydraulic pressure to the Ground Hog must be regulated to prevent spray bar rotation in excess of 3000 RPM. Maximum spray bar rotation speed should be checked weekly or whenever the Ground Hog is connected to a different power unit. It should also be checked after the hydraulic manifold is serviced.

To check the rotation speed, connect a Waterblasting digital tachometer to the sensor on the side of the hydraulic motor. Make sure high pressure water to the Ground Hog is suspended and the rotation speed control valve on the Ground Hog is set to 0. Then activate the power system hydraulic system, squeeze the thru-shaft motor control lever and monitor spray bar rotation speed as the control valve is opened. If adjustments are required, contact Waterblasting Customer Service for assistance.

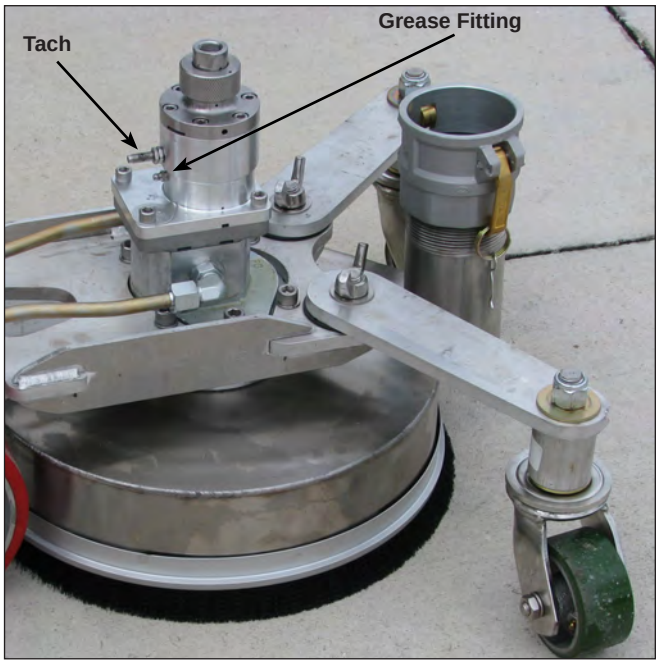
⚠ CAUTION ⚠

HEAD ROTATION SPEEDS EXCEEDING 3000 RPM WILL DAMAGE THE BEARINGS AND THRU-SHAFT MOTOR. DAMAGE CAUSED BY EXCESSIVE RPM WILL NOT BE COVERED BY THE HOG TECHNOLOGIES WARRANTY.

The spray bar is attached to a thru-shaft that runs through the hydraulic motor. The spray bar mounts on the end of the thru-shaft. High pressure water is delivered to the spray bar by a hole drilled in the center of the thru-shaft.

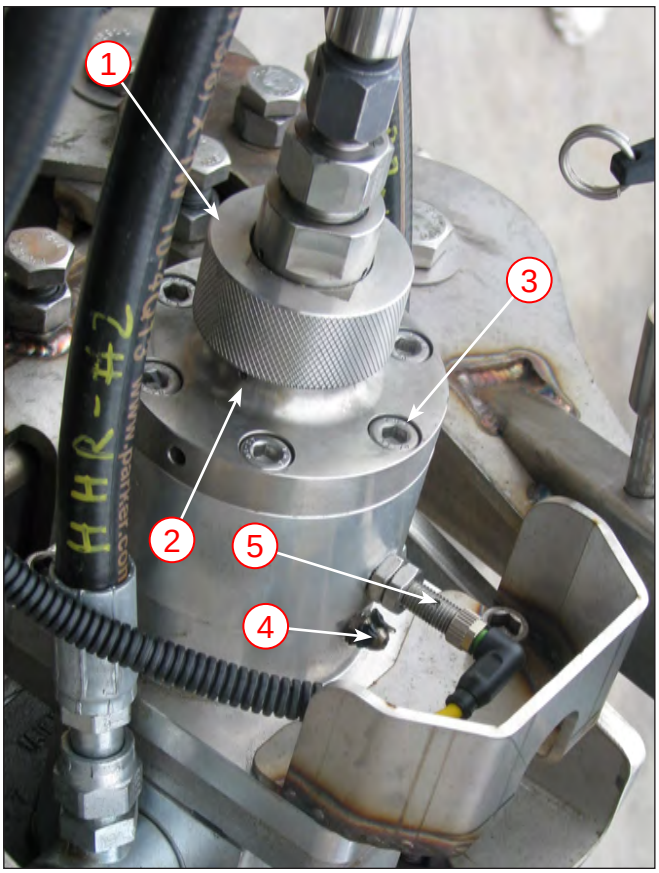


Typical Hog Tool Control Levers & Adjustable Head Rotation Speed Control Valve

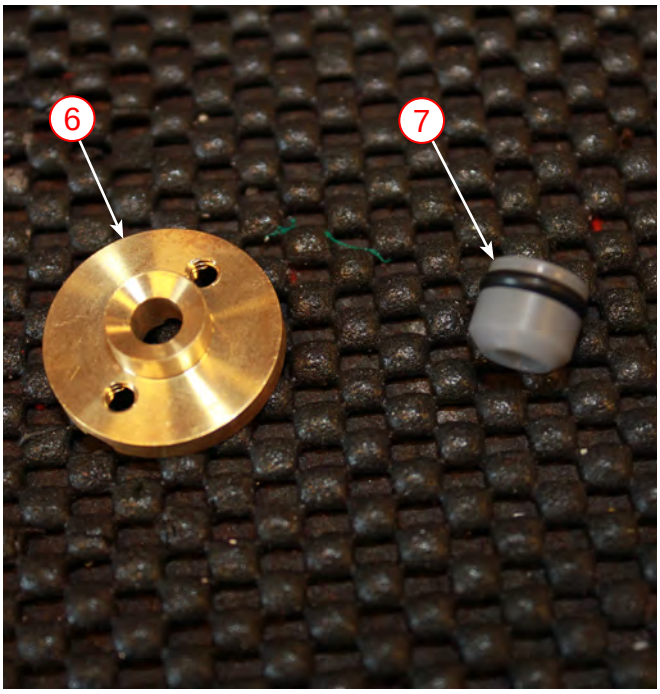


Thru-shaft Motor Grease Fitting & Tachometer Connection

The tapered bearing at the upper end of the thru-shaft motor is equipped with a grease fitting and requires grease at the start of each day. Grease should be pumped into the bearing until clean grease comes out of the relief holes in the motor housing on each side of the bearing. The lower thru-shaft motor bearing is sealed and requires no lubrication.



Typical Thru-Shaft Motor Components



Swivel Seal & Brass Backup Ring

1.	Swivel Nut
2.	Swivel Seal Weep Hole
3.	Thru-shaft Cover
4.	Grease Fitting
5.	Speed Sensor
6.	Brass Backup Ring
7.	Swivel Seal

2.4 Thru-Shaft, Spray Bars & Nozzles

Thru-Shaft Motor

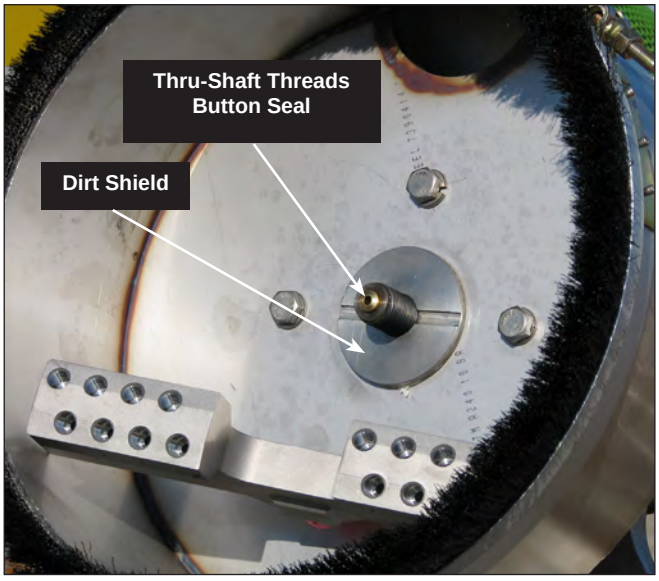
The hydraulic powered thru-shaft motor rotates the spray bar on the blasting head assembly. The center of the rotating shaft is drilled to allow high pressure water to pass through the shaft to the spray bar. A specially designed swivel seal and brass backup ring create a water tight, high pressure seal at the connection of the high pressure hose to the thru-shaft. The hose is secured to the rotating shaft housing by the swivel nut. ***The swivel nut is hand tightened only.*** If the nut becomes loose, the hose will wobble and damage the swivel seal. Additionally, if the swivel nut is overtightened by using a pipe wrench or pliers, the swivel seal will be damaged. The swivel nut must be checked daily to ensure it is tight and that the swivel seal is not leaking. Any water dripping from the weep holes just below the swivel nut while the system is pressurized indicates the seal is leaking and must be replaced. Operating the blasting head with a leaking swivel seal will cause complete failure of the seal, stopping blasting operations.

The RPM of the thru-shaft motor is controlled by the needle valve on handle. A speed sensor on the thru-shaft motor housing provides a connection for the optional Waterblasting tachometer used to verify spray bar rotation speed.

CAUTION

THE THRU-SHAFT MOTOR BEARINGS MUST BE LUBRICATED DAILY WITH THE GREASE SPECIFIED IN THE MAINTENANCE MATRIX. FAILURE TO LUBRICATE THE BEARINGS DAILY OR USING GREASE OTHER THAN THE GREASE SPECIFIED BY WATERBLASTING WILL VOID THE WARRANTY.

Typical Spray Bar With Nozzles On Thru-Shaft



Spray Bar Assembly & Thru-Shaft

Spray Bar

The spray bar is a quick change design that is attached to the threaded thru-shaft. Spray bars are constructed of high quality stainless steel and available in various sizes. Aggressive and non-aggressive spray patterns are available for all heads.

Spray bar selection is determined by requirements of the removal being performed. The width of the spray bar selected is critical. When removing paint lines, it should be sized to the width of the line whenever possible. In most situations, the spray bar selected should be 2" (5 cm) wider than the width of the line to reduce the potential for damage and increase productivity by concentrating the blasting pressure over the painted line.

When selecting a spray bar the following should be considered:

- The size of the line marking, the spray bar should be 2" (5 cm) wider than the marking.
- The type of marking being removed. (Paint, thermal or rubber)
- The thickness of the material being removed.
- The type of road surface. (Concrete or asphalt)
- Profile requirements per job specifications.

Hog Technologies offers a variety of spray bar configurations to meet requirements of all types of removal projects. Examples of available spray bar configurations are included in the Operation section of this manual. You can also contact our customer support department for assistance in selecting the correct spray bar and/or nozzle configuration for your project at (877) HOG-ROAD.

Refer to the Maintenance section of this manual for instructions to install or replace spray bars and nozzles.

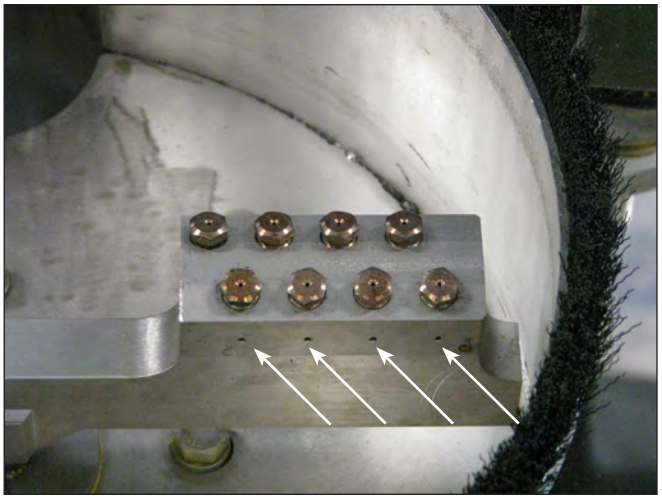
NOTICE:
AFTER INSTALLATION OF NEW NOZZLES AND/OR A SPRAY BAR, THE WEEP HOLES ON ALL HIGH PRESSURE FITTINGS SHOULD BE CHECKED FOR LEAKS UNDER PRESSURE. THIS SHOULD BE DONE PRIOR TO REPLACING THE SPRAY BAR PROTECTOR. THERE SHOULD NOT BE ANY WATER LEAKING FROM THE WEEP HOLES. ANY LEAKAGE IS AN INDICATION OF AN INSTALLATION ERROR, NOZZLE NOT SEATED CORRECTLY OR A DAMAGED COMPONENT.

CAUTION

BEFORE ATTACHING THE NEW SPRAY BAR TO THE HOG HEAD ASSEMBLY, ENGAGE PUMP AT LOW PRESSURE TO PURGE THE SYSTEM. ANY DIRT OR DEBRIS IN THE SYSTEM CAN CLOG NOZZLE ORIFICES AND CAUSE SYSTEM PRESSURE TO SPIKE EXCESSIVELY CAUSING DAMAGE TO COMPONENTS OR RUPTURE DISCS ON THE UHP PUMP TO BURST.

Spray Bar Protector

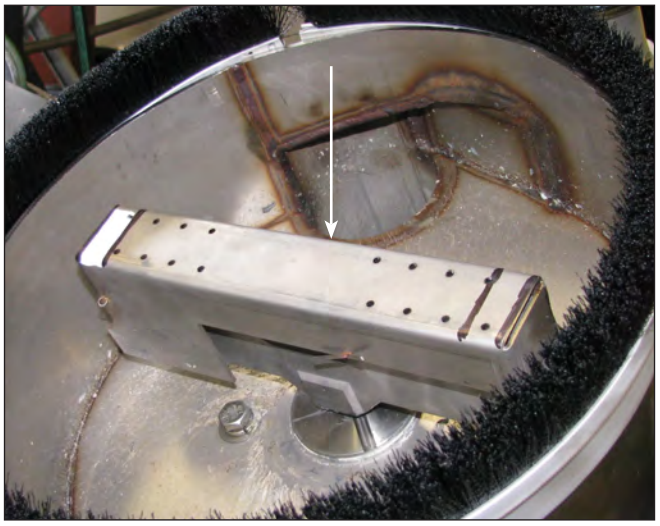
Each spray bar is equipped with a spray bar protector that is held in place with one or two cotter pins. The spray bar protector shields the nozzles and spray bar from damage caused by debris during blasting operations. Never perform ultra-high pressure blasting operations without the spray bar protector installed as this will dramatically shorten the life of the nozzles and spray bar.



Typical Spray Bar, Nozzles & Weep Holes

Nozzles

Ultra high pressure is produced by restricting the flow of water at the nozzles on the blasting head. Each nozzle delivers a stream of water at extremely high pressure that is determined by nozzle orifice size and it's Gallon Per Minute (GPM) flow at desired pressure. The performance ranges from least aggressive (.005") to most aggressive (.015"). The condition of the nozzles is critical to removal performance and maintaining a tight, cohesive stream as water is forced through the nozzles. Maximum productivity and 98% removal without damage requires nozzles to be in excellent condition. Nozzles should be inspected before the start of each shift as part of the pre-operation check or when the operator notices a loss in pressure or a change in performance while blasting. If visual inspection of the nozzle spray pattern indicates that the pattern is not in the #1-4 quality range as indicated on the Nozzle Quality Guide in this section, the nozzle must be replaced.



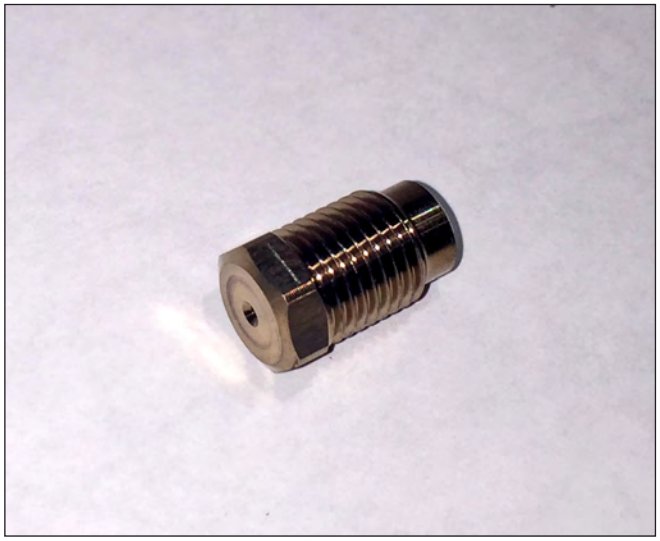
Typical Spray Bar Protector

Testing And Inspecting Nozzles:

To inspect and test the nozzles, tilt the Ground Hog as much as possible and secure it. Then remove the spray bar protector. The protector will disrupt the spray pattern causing inaccuracies when inspecting or testing nozzle performance.

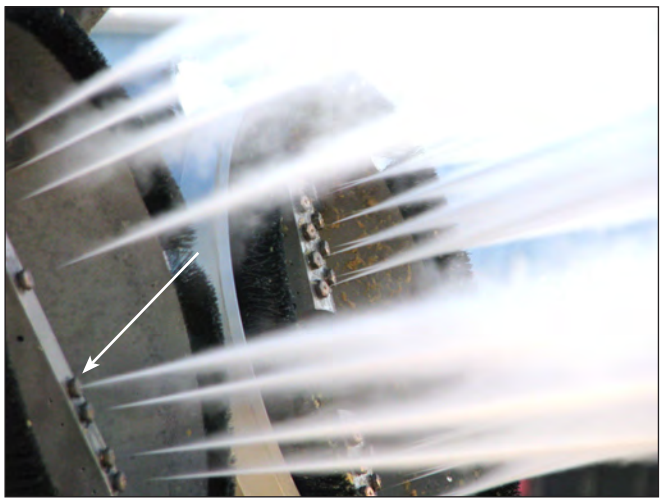
Once the spray bar protector is removed and all personnel are well clear of the blasting head, activate the high pressure system and set the operating pressure to a safe level. Make sure the head rotation control valve/speed dial is set to 0 so the spray bar does not rotate.

Staying well clear of the water jets, no closer than 18", visually inspect the spray pattern of each nozzle. If the spray is tight with a cohesive stream for 1/2-1 1/2 inches (1.3-3.8 cm) from the nozzle, it rates as grade 4 or better (Refer to the Nozzle Quality Guide in this section of the manual) and it is good.



Spray Bar Nozzle

Typical Good Nozzles with a Tight Cohesive Stream Shown on Hog Head Spray Bar



Typical Bad Nozzle - Note Stream Fans Out at Nozzle Shown on Hog Head Spray Bar

DANGER

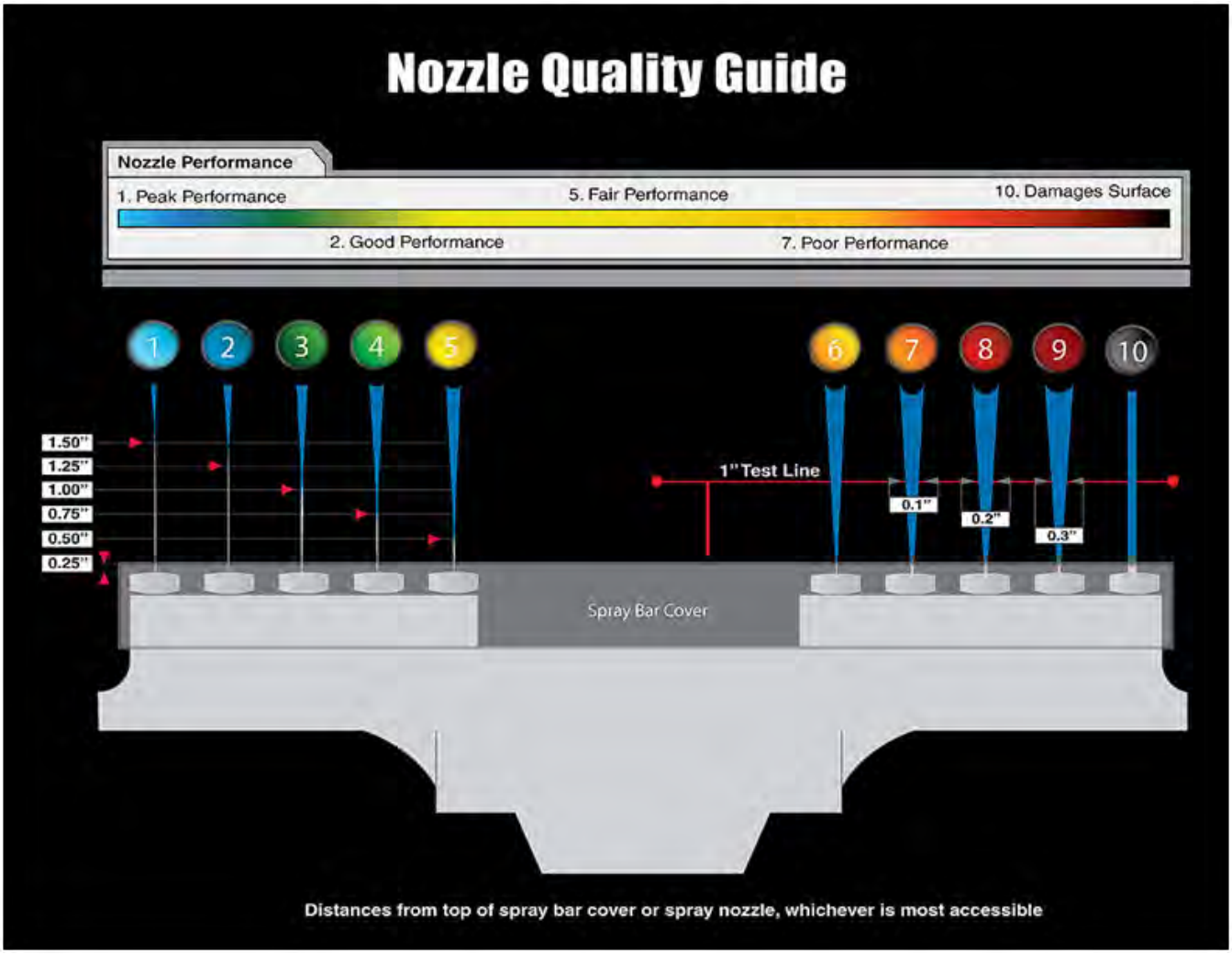
THE HIGH PRESSURE STREAM FROM THE SPRAY NOZZLES CAN CAUSE SEVERE INJURY OR DEATH IF IT COMES IN CONTACT WITH HANDS, FEET OR ANY PART OF A PERSON'S BODY. IT CAN ALSO PROJECT LOOSE DEBRIS IN THE AREA OF THE HOG HEAD WITH ENOUGH FORCE TO CAUSE SERIOUS INJURY, PARTICULARLY TO THE EYES. HIGH PRESSURE WATER CAN TEAR OFF SKIN AND INJECT WATER DIRECTLY INTO THE BLOOD STREAM WHICH CAN BE FATAL. ALWAYS DEACTIVATE THE HIGH PRESSURE SYSTEM BEFORE RAISING THE HOG HEAD. MAKE SURE THE AREA IS CLEAR OF PEOPLE, HANDS AND FEET BEFORE STARTING THE ENGINE AND ENGAGING THE DUMP VALVE SWITCH TO ACTIVATE THE HIGH PRESSURE SYSTEM TO TEST AND INSPECT THE NOZZLES WITH THE HOG HEAD RAISED.

If a nozzle rates as a 5 or higher on the Nozzle Quality Chart, it is worn or damaged and must be replaced. Nozzles are easy and quick to replace. Refer to the nozzle replacement procedure in the Maintenance section of this manual for detailed instructions for replacing nozzles.

Nozzles typically last 12-16 hours of blast time, however, you can experience shorter or longer nozzle life, depending on the source and quality of water being used. Any dirt or debris in the system can clog a nozzle orifice causing a spike in the high pressure system which will rupture the burst discs and could cause damage to components.

NOTICE:
NOZZLES MUST ALWAYS BE CHECKED WITH THE SPRAY BAR PROTECTOR REMOVED TO AVOID INACCURATE READINGS. START THE PUMP AT LOW PRESSURE AND SLOWLY INCREASE TO OPERATING PRESSURE TO CHECK NOZZLE QUALITY AS WELL AS LEAKS ON THE SPRAY BAR, NOZZLES AND HOSES. SHUTDOWN THE ENGINE TO RELIEVE ALL WATER AND HYDRAULIC PRESSURE BEFORE MAKING ANY REQUIRED REPAIRS OR ADJUSTMENTS. TO INCREASE THE LIFE EXPECTANCY OF THE SPRAY BARS AND NOZZLES, ALWAYS REMEMBER TO INSTALL THE SPRAY BAR PROTECTORS BEFORE BEGINNING BLASTING OPERATIONS.

You can select different nozzle sizes in a variety of spray bar configurations to accommodate the material to be removed and the type of substrate. The Nozzle Quality Guide in this section and Spray Bar Configuration Diagrams located in the Operation section will provide assistance in choosing the right nozzle configurations for most removal applications. The number of nozzles in a spray bar should be considered in every removal situation. The number of nozzles and the nozzle orifice size will determine the aggressiveness of the spray bar. As the operator becomes more experienced, nozzle selection becomes easier. You can also contact Hog Technologies Customer Support toll free at (877) HOG-ROAD for assistance in selecting the proper spray bar and nozzle configuration for your job.



A nozzle should be removed from service if any of the following are indicated:

- Nozzle is split or damaged
- Nozzle is clogged
- Nozzle water spray is fanned out
- Nozzle's ability to hold pressure is suspect
- Nozzle's hex head is worn excessively from blasting
- Nozzle threads are damaged

When replacing nozzles make sure to check the flow and pressure rating. Use only nozzles with a manufacturer's pressure rating of at least the UHP pump's maximum operating pressure. We recommend that you only use nozzles, high pressure hoses and fittings supplied by Hog Technologies to ensure the nozzles and other components are compatible with your ultra-high pressure system water blasting system.

2.5 Hydraulic Hoses, UHP Hoses & Electrical Cables

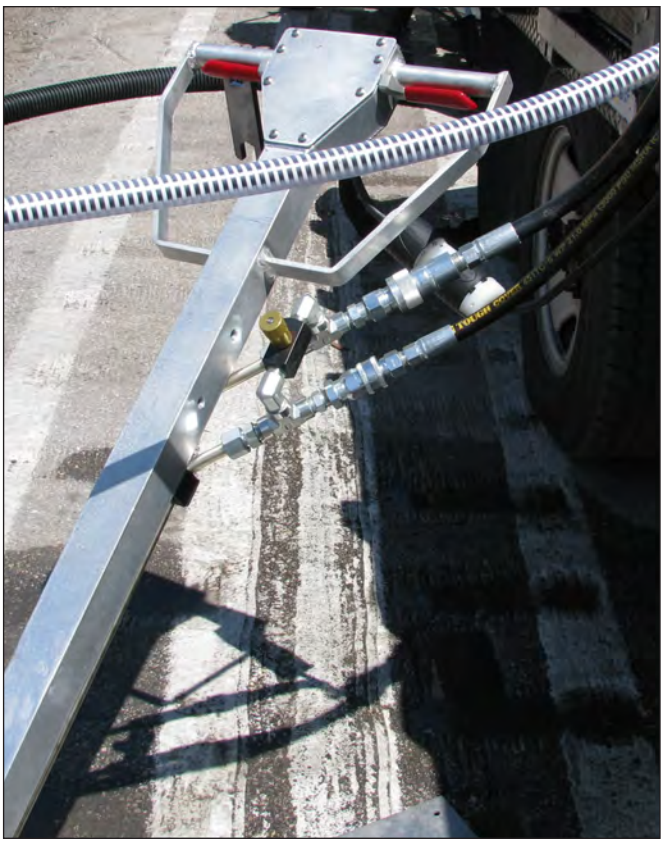
General

The condition of the hoses is critical to the proper operation of the Ground Hog. It is important that they be stored and handled properly to ensure they are not damaged or kinked during deployment and storage. It is also important that they are routed such that tight bends and kinks are completely avoided and that the hoses and electrical cables are properly protected to reduce chaffing.

The hydraulic and UHP pressure hoses are under extremely high pressure that can cause severe injury or death to someone near a damaged hose. The high pressure hoses and electrical cables that run from the power systems to the Hog Tool should always be protected by a webbing style anti-chaffing material. The anti-chaffing material helps prevent wear and damage to hoses and electrical cables. Anti-chaffing also can reduce damage or injury if a hose or fitting were to burst.

Protection from damage caused by traffic in the work area should be considered during the deployment of the hoses and electrical cables. It is recommended that hoses and cables routed in or near traffic areas be marked with cones and signs warning of high pressure.

When storing hoses they should be neatly coiled. Store the hoses in a safe location to keep them clean and to reduce the possibility for damage and deterioration. Covering exposed fittings with tape or plastic covers designed for this purpose will keep them clean and reduce the possibility for dirt to enter the fittings and hoses.



Typical Hydraulic Hose Quick Connectors On Ground Hog

Hydraulic Hoses

Hydraulic hoses with the proper fittings for the Ground Hog are typically supplied with your Tool as optional equipment. The hose pressure rating, diameter and fittings are selected to provide maximum safety and performance for the Hog Tool when it is connected to a Waterblasting power unit. If replacement hoses are required, you should only use hoses from Hog Technologies or hoses with the same specifications as the originals.

When connecting hydraulic hoses, always make sure the fittings are clean before making the connection. Dirty connectors are a major cause of hydraulic motor failure and valve problems.

Once the hoses are connected, operate the hydraulic system at idle speed and activate the control levers on the Ground Hog. With the unit still at idle, allow hydraulic oil to circulate through the Ground Hog motor and back to the hydraulic reservoir. This will flush any debris that may have been in the hoses or fittings through the system to the hydraulic filter, where it will be trapped and therefore removed from the oil.

Hydraulic Hoses and Electrical Control Harness w/ anti-chaffing
Typical Power System End w/ Quick Connectors

UHP Hoses

The condition of the high pressure water hoses is critical to the proper operation of the Ground Hog. It is important that they be stored and handled properly to ensure they are not damaged or kinked during deployment and storage. It is also important that they are routed such that tight bends and kinks are completely avoided and that the hoses are properly protected to reduce chaffing.

The UHP pressure hoses are under extremely high pressure that can cause severe injury or death to someone near a damaged hose. The hoses should always be protected by an anti-chaffing material. The anti-chaffing material helps prevent wear and damage to hoses. It also can reduce damage or injury if a hose or fitting were to burst.

Protection from damage caused by traffic in the work area should be considered during the deployment of the hoses. It is recommended that hoses routed in or near traffic areas be marked with cones and signs warning of high pressure.

When storing hoses, they should be neatly coiled. Place the hoses in a safe location to keep them clean and reduce the possibility for damage and deterioration. Covering exposed fittings with tape or plastic covers designed for this purpose will protect the fittings and reduce the possibility for dirt to enter the fittings and hoses.

UHP Hoses, Connections and Fittings

Waterblasting systems operate at ultra high pressures of up to 40,000 PSI (2,758 Bar). Therefore, it is critical that the operator and maintenance personnel inspect the high pressure hoses, fittings, nozzles and other components frequently.

A visual inspection of the high pressure system should be conducted each day before each shift. Any hose or component that is questionable or shows any sign of deterioration, wear or leakage should be replaced immediately and before operating any waterblasting equipment. A more thorough inspection of the high pressure pumps and components should be conducted at each routine service interval.

Check the condition of threads prior to connecting any fittings or hoses. Use an anti-seize compound on all fitting and hose threads to prevent "galling." Galling is the term for thread damage that occurs from heat build up in the threads of stainless steel fittings as they are tightened. Galling will destroy the threads and lockup the fittings before they are tight, destroying the fittings and/or hose ends rendering them unusable. Be careful not to get anti-seize on the seating area of any fitting.

Typical Ground Hog UHP Hose Connected to Hog Head

When connecting UHP hoses, always make sure the fittings and hoses are clean before making the connection. Dirty connectors and hoses are a major cause of clogged or damaged nozzles. After the hoses are connected to the high pressure control valve and the Ground Hog, always remove the spray bar and purge the system as described in this manual.

Always test the system following repairs or at the start of each shift by operating the system at low pressure first. Then slowly bring the equipment up to operating pressure while carefully monitoring the replaced components.

WARNING

REFER TO THE GENERAL SAFETY SECTION OF THIS MANUAL FOR A LIST OF PRECAUTIONS TO BE OBSERVED WHEN OPERATING OR SERVICING ULTRA HIGH PRESSURE EQUIPMENT. USE ONLY THOROUGHLY TRAINED PERSONNEL TO PERFORM MAINTENANCE OR REPAIRS ON THE HIGH PRESSURE SYSTEM.

Take care of your hoses. Protect the hoses from contact with sharp objects, abrasive surfaces and foot or wheel traffic. Add additional anti-chaffing material to protect hoses when necessary. Never operate the high pressure system with a hose that is questionable.

When replacing damaged or worn hoses, check the burst rating marked on the hose. Do not use a high pressure hose that does not have a listed burst rating or with a burst rating of less than 54,000 PSI (3,723 Bar). To ensure you are using the correct hoses, we recommend that you only use hoses purchased from Hog Technologies.

Retire a UHP Hose from Service if:

A) Cover is damaged and reinforcing wires are exposed to rust and corrosion;

B) Cover is loose, has blisters or bulges;

C) Hose has been crushed or kinked;

D) End fitting shows evidence of damage, slippage or leakage;

E) Hose has been exposed to pressures of 2 times the operating pressure.

F) Hose has been kinked, stressed or stretched.

Ground Hog UHP & Vacuum Hoses Connected to Hog Head

2.6 Vacuum Hose

A 3″ vacuum hose with quick connect fittings runs from the debris tank inlet to the vacuum fitting on the Ground Hog blasting head. Consistent and proper vacuum is important to the proper operation of the vacuum system. Debris buildup, kinks, damage or leaks will cause a reduction in vacuum at the blasting head, reducing efficiency or cause operations to stop completely.

Many problems with vacuum hoses are caused by damage or kinks. You should avoid tight bends and maximize the radius of all hose curves to minimize the chance of a kink. It is very important to protect the hoses from contact with sharp objects, abrasive surfaces, foot or wheel traffic and to inspect the hoses daily to ensure there is no damage or kinks.

The inside walls of vacuum suction hoses develop wear points caused from the high velocity of abrasive debris traveling inside the hoses. The wear points are most prevalent in the outside radius of tight bends near the blast head and where the debris hose rises to connect to the vacuum power unit. The life of the hoses in these areas can be extended by rotating the hoses 120 degrees once each week.

Vacuum Hose Connection
Notice seal inside connection. Always make sure the seal is in place before connecting the vacuum hose.

Some types of debris will buildup on the inside walls of the vacuum hoses to the point where it restricts debris flow in the system and reduces vacuum at the blast head. Debris buildup inside the hoses can be removed by tapping the outside walls with a dead blow hammer while the system is operating at maximum vacuum. This will flex the hose walls and cause the debris to break off and be sucked into the debris tank.

Damaged areas can be repaired by cutting out the damaged area and splicing in new hose. Temporary repairs can be made using duck tape.

Make sure to protect the hoses from damage and abrasion from dragging on the pavement. This is particularly important when working a long distance from the vacuum power unit. In some situations anti-chaffing protection may need to be added to the hoses in contact areas.

Typical Control Levers &
Adjustable Head Rotation Speed Control Valve

2.7 Ground Hog Control Systems

High pressure water and hydraulic pressure that rotates the spray bar is turned ON and OFF by the levers on the Ground Hog. The lever control mechanism activates a switch in the handle assembly that is connected to a harness that connects the Ground Hog to the control circuits on the manifold and the valves that activate the functions of the Ground Hog. When the levers are squeezed, the switch closes the circuit that activates (opens) a solenoid valve on the manifold that sends pressurized hydraulic oil to the hydraulic motor causing it to rotate the spray bar at the preselected RPM and to the hydraulically activated valve that turns the high pressure water ON and OFF. When the levers are released, the valve closes, immediately stopping the flow of high pressure hydraulic oil to the hydraulic motor and to the by-pass mode or a Dump Valve, which turns OFF the high pressure water flow.

Hydraulic control valves on manifolds manufactured by Hog Technologies are equipped with a by-pass knob on the top of the solenoid that manually opens the valve for testing purposes and for adjusting the needle valves to set maximum pressure to the high water pressure control valve or Hog Tool hydraulic motor. The manual by-pass position is intended to be used only for testing and adjustment purposes.

DANGER

OPERATING THE GROUND HOG WITH THE SOLENOID VALVE IN THE BY-PASS POSITION IS EXTREMELY DANGEROUS.

THE OPERATOR CANNOT TURN OFF THE HIGH PRESSURE WATER SUPPLY OR HYDRAULIC PRESSURE TO THE SPRAY BAR MOTOR IF THE MODE VALVE IS IN BY-PASS MODE. IN SOME SITUATIONS, THIS COULD CAUSE THE OPERATOR TO LOSE CONTROL OF THE HOG TOOL AND ALLOW THE HIGH PRESSURE WATER STREAM TO CONTACT THE OPERATOR'S BODY OR THE BODY OF ANOTHER PERSON, RESULTING IN SERIOUS INJURY OR DEATH.

ADDITIONALLY, AN OUT OF CONTROL ULTRA HIGH PRESSURE TOOL CAN WHIP AROUND AND CAUSE SEVERE DAMAGE TO EQUIPMENT AND INJURY OR DEATH TO PERSONNEL HIT BY THE TOOL.

NEVER OPERATE THE GROUND HOG OR ANY OTHER HOG TOOL WITH HIGH PRESSURE WATER SUPPLIED WHEN THE MODE VALVES ARE IN BY-PASS MODE OR NOT OPERATING PROPERLY.

IF A MODE VALVE IS NOT OPERATING PROPERLY, SHUTDOWN WATERBLASTING OPERATIONS IMMEDIATELY, STOP ALL ENGINES AND PUMPS. THEN FIND AND CORRECT THE PROBLEM BEFORE RESUMING OPERATIONS.

Spray bar rotation speed is controlled by opening or closing the needle valve on the handle that restricts hydraulic fluid flow. Rotate the valve counterclockwise to open the valve and increase rotation speed. Rotate the valve clockwise to close the valve and decrease rotation speed or stop spray bar rotation for testing purposes.

DANGER

NEVER USE A STRAP, WIRE TIE OR ANY OTHER DEVICE TO HOLD THE GROUND HOG CONTROL LEVER ON. THE OPERATOR WILL NOT BE ABLE TO RELEASE THE LEVER AND STOP WATERBLASTING OPERATIONS IN AN EMERGENCY WITH THE LEVER SECURED IN THE ON POSITION. THIS COULD CAUSE THE OPERATOR TO LOSE CONTROL OF THE GROUND HOG AND ALLOW THE HIGH PRESSURE WATER STREAM TO CONTACT THE OPERATOR'S BODY OR THE BODY OF ANOTHER PERSON, RESULTING IN SERIOUS INJURY OR DEATH.

NOTICE:
ALL OPERATORS AND SUPPORT PERSONNEL SHOULD READ THE MANUAL INCLUDED WITH THE ULTRA HIGH PRESSURE AND VACUUM POWER SYSTEM TO MAKE SURE THEY UNDERSTAND THE SYSTEM IN THEORY AND OPERATION BEFORE OPERATING THE GROUND HOG WITH THE SYSTEM.

Ground Hog Connected To A Trailer Mounted Waterblasting UHP & Vacuum Power System - Ready For Operation

3.1 Startup/Shutdown Introduction

A thorough understanding of the power system and all Waterblasting components is essential to the proper operation of the Ground Hog and associated water blasting systems. Never allow inexperienced and untrained personnel to operate this equipment. This manual is provided to enhance your knowledge of the Ground Hog. The manufacturers of the power system components supply manuals for their equipment. Make sure you have read this manual and the manuals for the power system carefully and fully understand the systems in theory and operation.

Before operating the Ground Hog, check the fluid levels in the power system and hydraulic reservoir. To make operation as safe and productive as possible, it is important to conduct a thorough pre-operation inspection before operating the machine. You should walk around the equipment and visually inspect the Ground Hog blasting head, high pressure hoses, hydraulic hoses, vacuum hoses, and all water blasting system components for obvious signs of leaks, wear and deterioration. The inspection should be conducted in an orderly and consistent fashion to ensure all critical points are inspected each time. Do not operate the unit until all questionable components are repaired or replaced.

The startup and shutdown procedures described in this section are for a Ground Hog connected to a typical water blasting power system. This information is provided as a general guide and overview of the process for educational purposes. The exact procedure for your unit may be slightly different, depending on the options and power system selected.

NOTICE:
ALWAYS CHECK THE HOG HEAD NOZZLES AND SPRAY BAR FOR WEAR AND DAMAGE BEFORE EACH SHIFT. REFER TO HIGH PRESSURE HOSES AND NOZZLES IN THE WATER BLASTING SYSTEMS SECTION FOR INFORMATION ON INSPECTING SPRAY BARS AND NOZZLES.

3.2 Equipment Setup

1. Position the power system as close to the work area as possible. Make sure the location is level and protected from vehicle and foot traffic or other activities that could cause damage to the unit or hoses. If the power system is mounted on a trailer, make sure the wheels are blocked.
2. Layout the electrical harness, high pressure water, hydraulic and vacuum hoses from the power system to the Ground Hog.
3. Inspect hoses and electrical harness for chaffing and damage. Replace or repair as required.
4. Make sure Anti-chaffing is added to the hoses & electrical harness if necessary.
5. Make sure the UHP hose connectors are clean, then properly connect the hose to the UHP pump. Use a wrench to tighten the fittings to the proper torque.
6. Check the swivel seal and replace the seal if necessary.
7. Connect the UHP hose to the thru-shaft pump/ swivel seal connection and hand tighten the swivel nut.
8. Connect the electric control cables to the UHP power system and the Ground Hog.

NOTICE:
ONLY HAND TIGHTEN THE SWIVEL NUT. IF THE SWIVEL NUT IS OVERTIGHTENED BY USING A PIPE WRENCH OR PLIERS, THE SWIVEL SEAL WILL BE DAMAGED.

9. Inspect all hose fittings and electrical connections. Make sure they are tight and properly connected. When the inspection is completed the equipment is ready for operation.

3.3 Routine Startup

Pre-Op Inspection Check List:

The Pre-operation Inspection in this section and the Pre-Op Check List in Appendix 4 is provided as a guideline. Additional items should be added to the checklist as determined by company policy, your operating environment, and other factors unique to your situation.

The following instructions provide a general overview and introduction to the pre-operation (Pre-Op) inspection. The Pre-Op Checklist provides an itemized checklist that should be used when performing a pre-operation inspection.

1. Inspect all hoses and electrical harness for chaffing and signs of wear.
2. Verify hydraulic, UHP and vacuum hose connections are tight and secure.
3. Check fuel levels and make sure you have enough for the shift.
4. Check fluid levels on the power system. Refer to the engine and power system operating manuals.
5. Check clean water tank level and fill if necessary.
6. Check all power system components for oil leaks, damaged or loose bolts and parts.
7. Evaluate the blasting surface and the material to be removed. Choose the appropriate spray bar and nozzles best suited for the job.

NOTICE:
YOU SHOULD CONSIDER THE DESIRED OR EXPECTED PROFILE OF THE BLASTED SURFACE IN YOUR SELECTION. THERE ARE MANY VARIABLES THAT AFFECT BLASTING EFFICIENCY, PRODUCTIVITY AND THE PROFILE OF THE BLASTED SURFACE. AS THE OPERATOR BECOMES MORE EXPERIENCED, THE SELECTION PROCESS BECOMES MORE REFINED AND EASIER.

8. Grease hydraulic motor thru-shaft bearing and caster wheels.
9. Make sure the spray bar protector is in place and secure.
10. Check the dirt shield and wear brush settings. Adjust if necessary.
11. Verify standoff height. Adjust if necessary.
12. Inspect the Ground Hog for loose components, worn caster wheels and damage.

Startup Procedure

1. Make sure the Ground Hog control levers and thru-shaft motor control valve are in the OFF position or set to 0..
2. If the Ground Hog UHP hoses have been re-connected since the last operation, the UHP system will need to be purged. Remove the spray bar and set it in a safe, clean location with the nozzles facing up. If the hoses have not been reconnected since the last operation, skip this step.
3. Start the power system engine and allow it to warm up for several minutes.
4. If the spray bar was removed in step 2, activate the UHP system at low pressure to purge the system. Then shutdown the power system, install the spray bar and follow the starting procedure to restart the power system. If the spray bar was not removed, skip this step.
5. Make sure the power system is operating normally and ready for waterblasting.
6. With the Ground Hog in the hands of the operator, tilted so the nozzles can be seen and pointed in a safe direction, a support person monitoring and controlling the UHP power systems and all personnel clear, slowly raise the throttle to a safe operating RPM.
7. Activate the Ground Hog UHP lever and gradually raise the RPM on the power system engine to increase pressure. Monitor all systems as the pressure increases to the desired blasting pressure. Be ready to shutdown the system if a problem occurs.
8. Check the nozzle spray pattern and the spray bar weep holes for leaks.
9. Check all high pressure hose fittings and components for leaks. If leaks are found, shutdown all systems and correct the problem before waterblasting.

NOTICE:
ANY LEAKING UHP FITTINGS, SWIVEL SEAL OR NOZZLES MUST BE CORRECTED. HIGH PRESSURE WATER LEAKS WILL QUICKLY DAMAGE FITTINGS, SEALS OR BLASTING HEADS IF THEY ARE NOT ADDRESSED.

Typical Hog Tool Control Levers &
Adjustable Head Rotation Speed Control Valve

10. Slowly turn the thru-shaft motor control valve clockwise to verify spray bar rotation. Then set the desired spray bar RPM.
11. Release the UHP control lever to stop UHP pressure to the spray bar and lower the blast head to the ground.
12. With the pressure and spray bar RPM set and Ground Hog nozzles working properly, waterblasting operations can begin.

ANY CONTACT WITH HIGH PRESSURE WATER IS VERY DANGEROUS AND CAN BE FATAL! USE EXTREME CAUTION DIRECTING THE PRESSURE STREAM WHEN HIGH PRESSURE IS ENGAGED.

3.3 Ground Hog Operating Guidelines

Overview

Before you start the job, you should evaluate the pavement and material to be removed. Choose the appropriate spray bar and nozzles best suited for the job. You should also consider the desired or expected profile of the blasted surface in your selection. There are many variables that affect blasting efficiency, productivity and the profile of the blasted surface. As the operator becomes more experienced, the selection process becomes more refined and easier.

Generally, large, high volume (.013 - .015) nozzles are the most aggressive and provide faster results. However, they also provide greater potential for damage and a course profile. Consequently, high volume nozzles should be used only on strong pavement (concrete or newer pavement). Small, low volume (.007 - .011) nozzles are less aggressive and will provide somewhat slower results but provide less potential for damage and a smoother profile. Low volume nozzles are well suited for weak pavement (older or damaged pavement). Low volume nozzles are typically a better choice for inexperienced operators on any surface.

Hog Technologies offers an on-site training program that dramatically reduces the learning curve and increases productivity. If you are new to water blasting, we highly recommend that you consider this factory training for your operators. You can also contact Hog Technologies Customer Service department for assistance in choosing spray bars and nozzles or more information regarding the factory training program.

⚠ CAUTION ⚠

THE BLASTING SURFACE WILL BE DAMAGED IMMEDIATELY IF HIGH PRESSURE BLASTING IS ACTIVATED WITHOUT THE GROUND HOG MOVING. ALWAYS MAKE SURE THE GROUND HOG IS MOVING BEFORE SQUEEZING THE LEVERS AND SUPPLYING HIGH PRESSURE TO THE SPRAY BAR.

Before Blasting Operations Begin

- Evaluate the Pavement and Select a Spray Bar.
- Strong pavement withstands high aggression spray bars. This is generally concrete or new asphalt.
- Cracked pavement is weak and will require a less aggressive spray bars.
- Brittle pavement is a challenge and will require less aggressive spray bars and reduced pressure.
- When removing paint lines, consider spray bar width. Choose a spray bar 2” wider than the line being removed to provide right/left tolerance plus slight over spray to reduce the potential for missed areas and need to re-do sections.
- Pre-clean the work area with a power broom if necessary before blasting.

Engaging The Water Blasting System

1. Position an operator on the power system.
1. Position an operator on the Ground Hog and position it a short distance before the material to be removed.
2. Make sure the control levers are set to the OFF position.
3. Activate the power system by following the manufacturer’s startup instructions.
4. Raise engine speed to the operation RPM and set the pressure (refer to Section 3.3)
5. If necessary, activate the vacuum system.
6. Make sure the Ground Hog operator is ready, then turn activate the high pressure water and vacuum systems.
7. With the Hog Tool moving at the desired speed, squeeze the high pressure and thru-shaft motor control levers to activate spry bar rotation and send high pressure water to the spray bar. Begin blasting operations.
8. Use the thru-shaft motor control knob to make final adjustment to the spray bar rotation speed.

Remember, never activate UHP pressure at the blasting head while the Hog Tool is not moving.

9. Make sure to keep an operator stationed at the power system control panel at all times during water blasting operations. The power system operator must be prepared to immediately respond to commands from Ground Hog operator or shutdown the system in an emergency.

Do's

- Only allow trained personnel to operate the Ground Hog and waterblasting equipment.
- Make sure the fuel tank is full at the beginning of each shift.
- Allow the engine and hydraulic components to warm up for several minutes before beginning waterblasting operations.
- Make sure the hydraulic oil temperature is at least 60 degrees Fahrenheit (16 degrees Celsius) before beginning waterblasting operations.
- Purge UHP hose and allow the hydraulic oil to recirculate for several minutes if the hoses have been reconnected since the last operation.
- Make sure Ground Hog operators are equipped with knee high safety boots, protective clothing, hard hat with a shield or safety goggles, gloves and OSHA approved hearing protection.
- Make sure the Ground Hog operator has a firm grip on both handles and is ready before providing full pressure to the Ground Hog.
- Have a trained support person monitoring the Ground Hog and power system at all times during waterblasting operations.
- Visually check all hoses, fittings and Ground Hog components for leaks or other problems frequently during waterblasting operations.
- Immediately stop waterblasting operations if leaks develop or any component of the Ground Hog or UHP power system is not operating properly.
- Adjust the pressure for the pavement. Typically a blast pressure between 32,000 and 38,000 psi is used.
- Stop blasting before stopping the Ground Hog. Blasting with the unit stopped will damage the blasting surface and Hog Head.
- Stop blasting before changing direction.
- When in doubt, choose a less aggressive spray bar. It is always best to error on the side of caution.
- Check the pavement frequently and watch the outer edges of the lines for damage. Continuously make adjustments as required..
- Always shutdown the power system before leaving the Ground Hog unattended or passing it to another person.
- Allow the vacuum system to operate for a couple of minutes at shutdown to clear vacuum hoses of water and debris.

Don'ts

- Do not allow untrained personnel to operate the Ground Hog or waterblasting equipment.
- Do not allow anyone to operate a Ground Hog without proper safety equipment including knee high safety boots, protective clothing, hard hat with a shield or safety goggles, gloves and OSHA approved hearing protection.
- Do not operate the Ground Hog without a support person to monitor the power system and be able to immediately shut it down in an emergency.
- Do not supply full pressure to the Ground Hog until the operator is ready.
- Do not continue blasting with a damaged nozzle. It can cause damage, wastewater, reduce the power of other nozzles and slow production.
- Do not blast directly on sealed joints in the pavement. Especially weather stripping on bridges or runways.
- Do not blast over pavement markers/reflectors. Markers can damage the blast head and spray bar and should be removed prior to blasting.
- Do not blast over damaged or uneven pavement that can damage the blast head and spray bar.
- Do not continue blasting with fittings, hoses or components that are leaking or not working properly.
- Do not operate the Ground Hog if the power system controls are not operating properly.
- Do not allow the UHP power system to run for extended periods at maximum RPM when the Ground Hog control levers are shutdown.
- Do not leave the Ground Hog unattended or pass it to another person while high pressure water is being supplied to the blast head.

WARNING

THE FORCE FROM THE BLASTING HEAD CAN EXCEED 50 LBS, CAUSING LOSS OF CONTROL AND/OR THE BLAST TO CROSS THE PATH OF PEOPLE OR EQUIPMENT. ALWAYS MAKE SURE OTHER MEMBERS OF THE CREW ARE A SAFE DISTANCE FROM THE OPERATOR BEFORE BLASTING OPERATIONS BEGIN TO ENSURE THERE IS NO CHANCE FOR THEM TO COME IN CONTACT WITH THE HIGH PRESSURE STREAM IF THE OPERATOR LOSES CONTROL.

3.4 Routine Shutdown

The shutdown procedure should be followed each time the water blasting system and Ground Hog are deactivated.

Shutdown Procedure:

1. Release the control lever on the Ground Hog. UHP pressure at the Ground Hog will immediately be suspended.
2. Allow the vacuum blower to operate for a couple of minutes after shutting down the high water pressure to clear waste water from hoses and dry out blower system.
3. If the engine on the power system does not automatically drop to idle and the UHP pressure in the system drop to near 0, the support person should immediately reduce the UHP pressure and reduce the RPM on the power system engine to idle.
4. Allow the power system engine to run at idle for several minutes to cool internal components.
5. Shutdown the power systems engine and when safe to do so, then disconnect the hoses.
6. Properly store and secure all hoses. Make sure all UHP hose fittings are protected from dirt and damage with tape or plastic caps designed to protect the fittings.
7. Properly store and secure the Ground Hog.

3.5 Emergency Shutdown

In addition to the Ground Hog operator, a support person should be monitoring the operation of the Ground Hog and UHP support system whenever waterblasting operations are underway. The support person should always be in position to immediately perform the following emergency operations.

DANGER

1. **IMMEDIATELY SHUTDOWN THE POWER SYSTEM ENGINE. THIS WILL INSTANTLY SUSPEND OPERATIONS OF THE ENTIRE SYSTEM FROM THE UHP POWER SYSTEM TO THE GROUND HOG.**
2. **ALL WATERBLASTING SYSTEMS ARE NOW SHUTDOWN.**
3. **WHEN THE SITUATION PERMITS, RETURN ALL SWITCHES TO THE "OFF" POSITION AND RESET THE THROTTLE ON THE POWER SYSTEM ENGINE CONTROLS TO IDLE.**

3.6 Operating in Freezing Conditions

1. Allow the vacuum blower to operate for a couple of minutes after shutting down the high pressure to clear waste water from vacuum hoses and dry out vacuum system.
2. Remove the UHP hose connected to the Ground Hog and drain all water from Ground Hog components.
3. Drain all water from UHP hoses and store properly.
4. Make sure to refer to the UHP power system manuals and follow all instructions for operation and shutdown in freezing conditions.

CAUTION

IF YOU OPERATE AT FREEZING TEMPERATURES OR EVEN TEMPERATURES BELOW 60 DEGREES FAHRENHEIT (160 CELSIUS), IT WILL BE NECESSARY TO OPERATE THE POWER SYSTEM AT IDLE SPEED ONLY UNDER LOAD, UNTIL HYDRAULIC OIL HEATS UP ABOVE 60 DEGREES FAHRENHEIT (160 CELSIUS).

4.1 Lubrication & General Maintenance Introduction

Lubrication Points

You should become familiar with the location of all grease fittings as they require frequent lubrication. The thru-shaft bearing requires specialized lubricant.

Refer to the Maintenance Matrix chart in the Scheduled Maintenance section in this manual and component manufacturer's operating and/or maintenance manuals for lubricant specifications and maintenance schedules.

Some lubrication points require grease daily or weekly. In extremely wet or dirty conditions the requirements could increase. The lubrication frequency outlined in this section should be considered the minimum requirement.

Before operating or performing any maintenance, make sure the power system is properly shutdown and secured in the service position.

Service Position

Properly shutting down and securing the Ground Hog and power system for service is critical to the safety of the operator and/or service personnel.

Use the following procedure to place the Ground Hog in the service position:

1. Make sure the power system is shutdown to disable the UHP water system.
2. Disconnect the UHP water and hydraulic hoses. Use tape or plastic caps to protect the fittings and prevent dirt from entering the hoses.
3. Follow all Lockout/tagout and additional shutdown procedures established in your company safety guidelines to complete the service position.

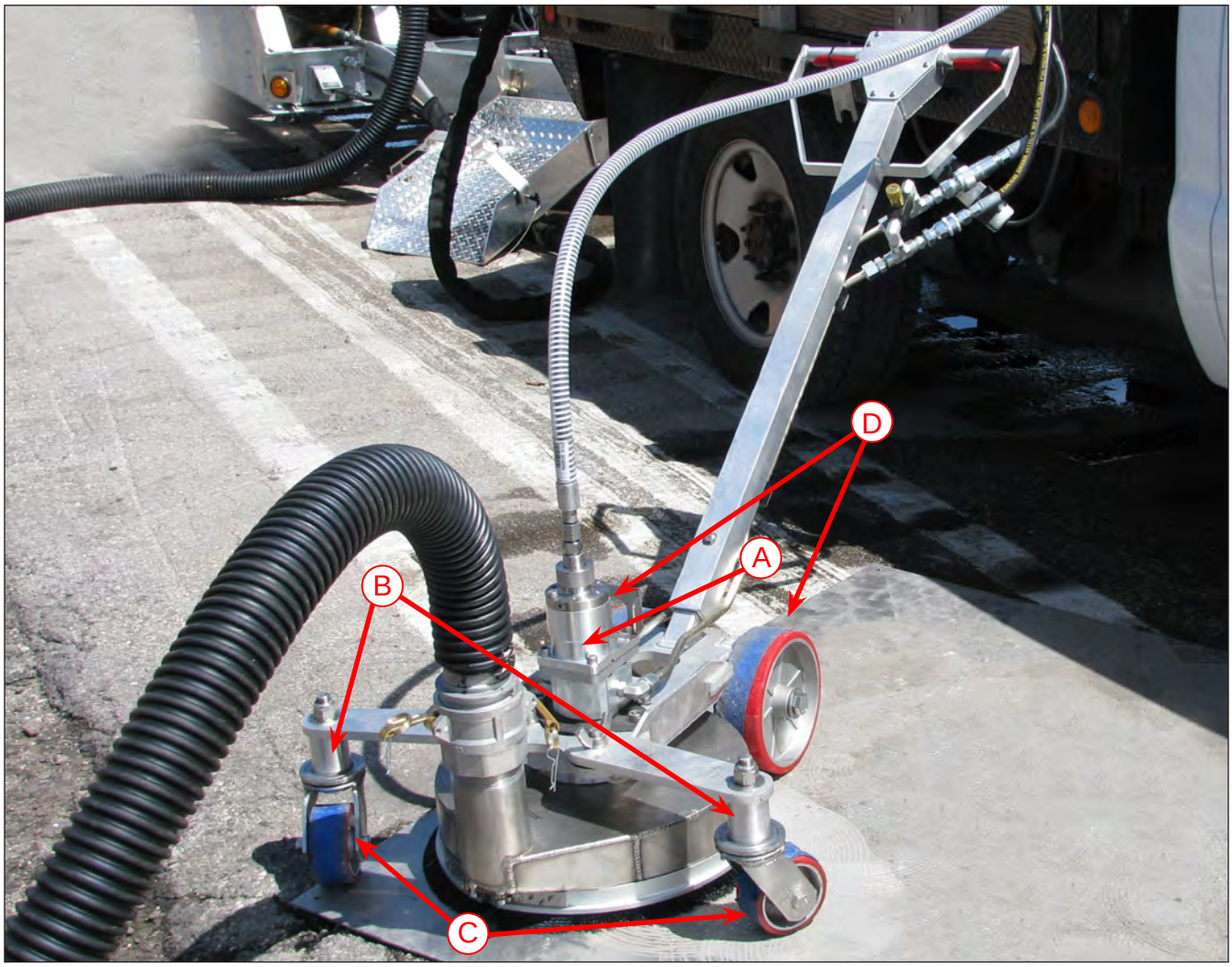
⚠ WARNING ⚠

SEVERE INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT CAN RESULT IF THE POWER SYSTEM IS STARTED UNEXPECTEDLY DURING SERVICE. ALWAYS FOLLOW THE RECOMMENDED PROCEDURES TO PLACE THE UNIT IN THE SERVICE POSITION AND APPLY LOCKOUT/TAGOUT PROCEDURES BEFORE ALLOWING ANYONE TO SERVICE COMPONENTS.

Typical Power System
Make sure it is shutdown & perform Lockout/Tagout procedures before servicing equipment.

Ground Hog With Hydraulic, Vacuum & UHP Hoses Connected

Remove UHP & vacuum hoses from Ground Hog before performing any service.



Ground Hog Lubrication Points

A. Grease Thru-Shaft Bearing
B. Grease Front Casters
C. Grease Front Wheels
D. Grease Rear Wheels

4.2 Lubrication

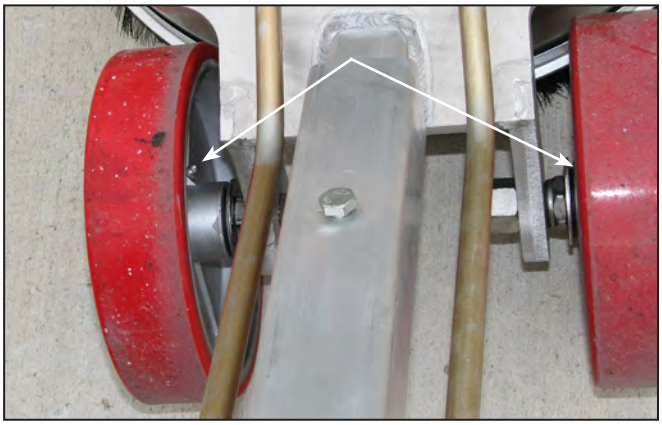
The lubrication points shown in the photo provides a guide to the location of the lubrication points on your Ground Hog.

The following service procedures apply.
Daily:

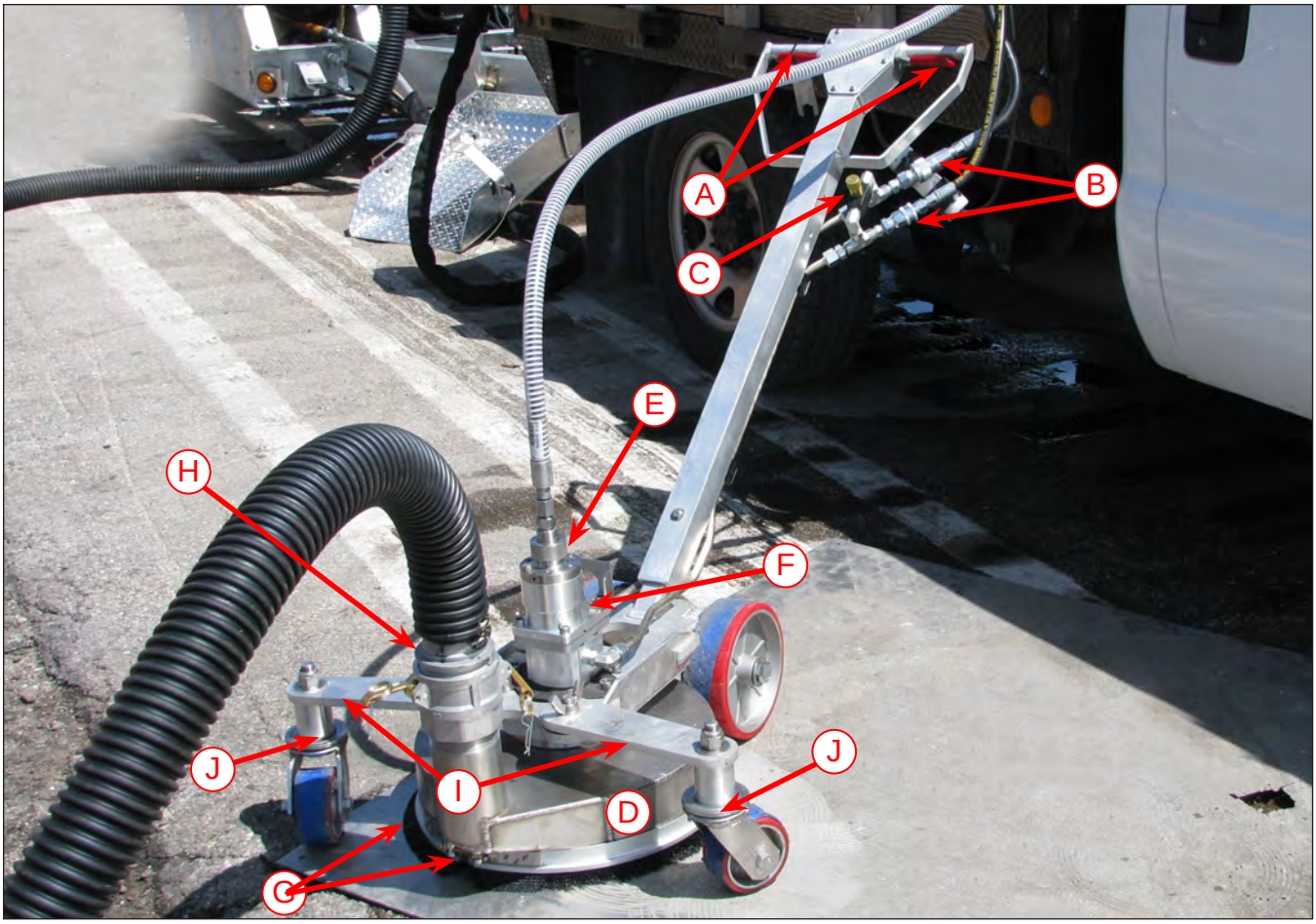
- Grease the thru-shaft bearing daily with Mobile PolyRex EM Grease. Make sure to pump grease into the bearing until clean grease comes out of the pressure relief hole.

Periodic:

- Clean and grease wheels and caster assemblies weekly.



Wheel Grease Fittings



Ground Hog Components

A. Handles and Control Lever
B. Hydraulic Hose Connections
C. Spray Bar Speed Control Valve
D. Hog Head and Shroud
E. Swivel Seal and Swivel Nut
F. Thru-shaft motor Grease Fitting & Pressure Relief Hole
G. Wear Brush and Wear Brush Clamp
H. Vacuum Hose Connection
I. Front Caster Wheel Assemblies
J. Front Caster Wheel Shims

4.3 General Inspection & Maintenance

Ground Hog Housing & Chassis Components

Daily:

- Check for obvious loose nuts and bolts.
- Check the wear brush for wear and proper adjustment. Adjust and replace as necessary.
- Check UHP pressure hoses for deterioration and wear. Correct problems or replace questionable components before waterblasting.
- Check hydraulic hoses and connections for leaks. Tighten if necessary.
- Inspect all vacuum hoses and fittings weekly for signs of deterioration, chaffing and leaks. Repair or replace as necessary.
- Check Control Levers. Make sure it is free and working properly.
- Check spray bar speed control valve for proper operation.
- Thoroughly clean and wipe down the Ground Hog at the end of each work day.

Periodic Maintenance

- Check wheel casters for excessive wear and the standoff height. Add shims to adjust if necessary.
- At least once a month spray the exposed wire harness plug connectors with a protector.

Ground Hog UHP System Components

Daily:

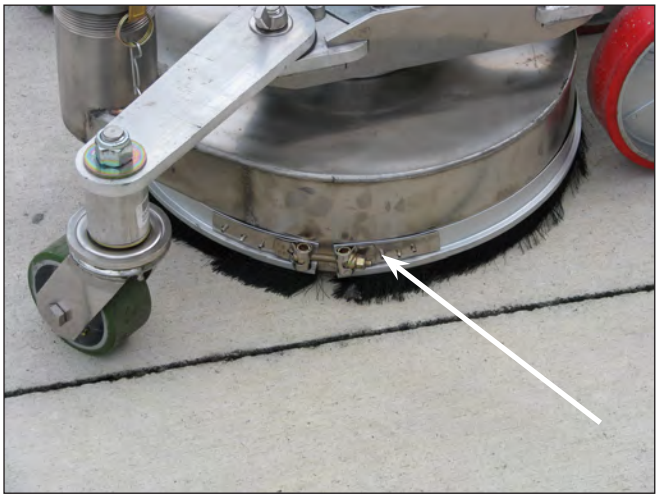
- Check all hoses and fittings for leaks and proper operation. Repair or replace leaking or malfunctioning components before operating the system.
- Test UHP system under high pressure by activating the control lever to turn high pressure ON & OFF several times before beginning normal waterblasting operations.
- Test and inspect nozzles and spray bar for proper operation and leaks. Correct any problems or questionable components before waterblasting.
- Check the swivel seal weep holes for leaks.
- Check thru-shaft motor to spray bar connection for leaks. Water dripping out of the threaded connection indicates the button seal in the connection is leaking and must be serviced.

Typical Spray Bar & Nozzles

Swivel Nut & Seal

4.4 Wear Brush Replacement

The Ground Hog wear brush bristles will slowly wear during operation. Consequently, the wear brush will require adjustment periodically to keep the bristles in contact with the pavement to provide proper vacuum air flow. It will also need to be adjusted when the shroud and/or wear brush is replaced.



Typical Ground Hog Blasting Head Shroud & Wear Brush Assembly

Use the following procedure to adjust the wear brush assembly:

1. Shutdown the power system and place it in the service position.
2. Note the gap between the bottom of the brush and the surface.
3. Loosen the brush clamp on the blast head.
4. Tap the brush down evenly using a dead blow hammer until the bristles are just touching the surface and the gap is eliminated.
5. Make sure the brush bristles are not pressed hard against the pavement. If the brush is set too tight against the surface, it will cause premature wear to the bristles resulting in reduced vacuum air flow and accelerated brush wear.
6. Tighten the clamp and recheck. Readjust if necessary.

Use the following procedure to replace the wear brush assembly:

1. Shutdown the power system and place it in the service position.
2. Tilt the Ground Hog on its side and support it.
3. Loosen the wear brush clamp on the blast head.
4. Work the existing brush off the blasting head shroud.
5. Slide the new brush assembly onto the shroud and snug the clamp.
6. Rotate the Ground Hog so it is resting on the wheels.
7. Loosen the clamp and tap the brush down evenly using a dead blow hammer until the bristles are just touching the surface and the gap is eliminated.
8. Make sure the brush bristles are not pressed hard against the pavement. If the brush is set too tight against the surface, it will cause premature wear to the bristles resulting in reduced vacuum air flow and accelerated brush wear.
9. Tighten the clamp and recheck. Readjust if necessary.

4.5 Dirt Shield Replacement

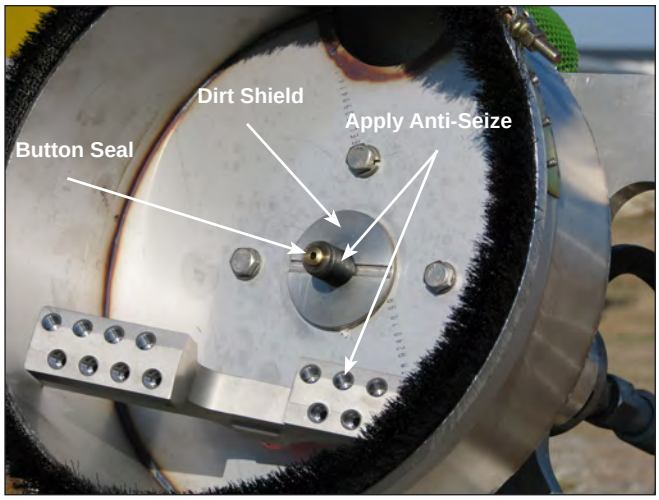
The dirt shield should be inspected daily to ensure it is tightened properly and that the felt seal is in good condition.

Use the following procedure to replace a damaged or worn felt seal:

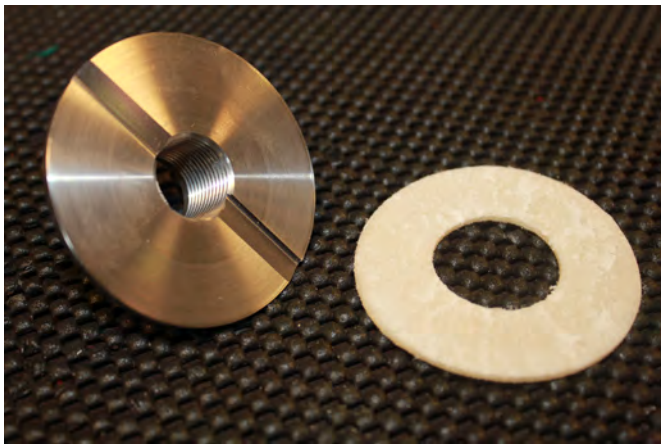
1. Shutdown the power system and place it in the service position.
2. Tilt the Ground Hog on its side and support it in that position.
3. Remove the spray bar protector.
4. Hold the thru-shaft so it won't turn with a 3/4" (19 mm) wrench inserted in the slot at the base of the thru-shaft motor.
5. Turn the spray bar counterclockwise by hand until it is free of the shaft.
6. Remove brass button.
7. Use a stainless steel wire brush to clean the dirt from the thru-shaft threads.
8. While still holding the thru-shaft with the wrench, remove the dirt shield by turning it counterclockwise.
9. Remove the felt seal. Then clean the dirt shield and shroud.
10. Place a new felt seal on the dirt shield and apply a light coating of anti-sieze to the thru-shaft threads.
11. Hold the thru-shaft with the 3/4" (19 mm) wrench, install the new dirt shield and hand tighten.

NOTICE:
ONLY HAND TIGHTEN THE DIRT SHIELD. NEVER USE TOOLS TO TIGHTEN THE DIRT SHIELD. IF THE DIRT SHIELD IS TIGHTENED MORE THAN HAND TIGHT IT WILL CAUSE THE SPRAY BAR TO ROTATE SLOWLY OR NOT ROTATE AT ALL.

12. Activate the power system. Purge the blast head at low pressure to remove debris that could clog the nozzles.
13. Deactivate the power system and return it to the service position.



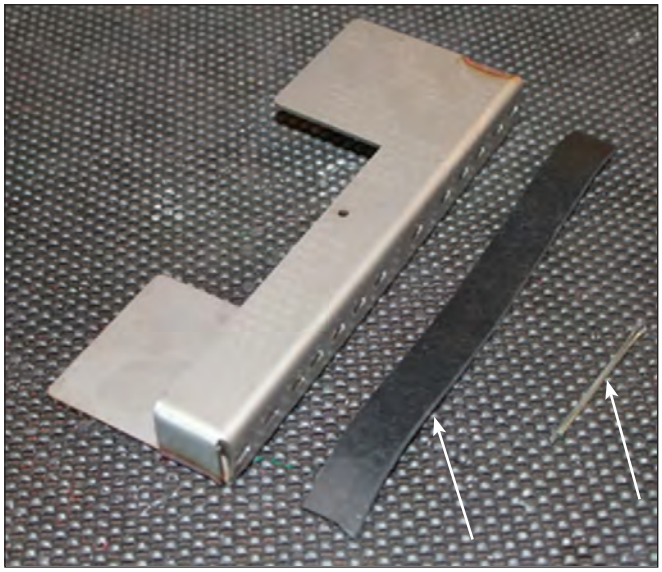
Typical Dirt Shield Installation



Brass Dirt Shield & Felt Seal

14. Install a new brass button seal, hold the thru-shaft with the wrench and reinstall the spray bar.
15. Tighten the spray bar by turning it clockwise ***slowly*** until it stops. Then seat the seal by turning the spray bar another 15%. Make sure you remove the wrench when the installation is complete.
16. Install the spray bar protector and gasket.
17. Rotate the Ground Hog so it is resting on the wheels.

Typical Blasting Head With Spray Bar Protector Installed



Spray Bar Protector, Cotter Pin & Gasket

4.6 Nozzle Installation

The condition of the nozzles is critical to removal performance and maintaining a tight, cohesive stream as water is forced through the nozzles. Maximum productivity and 98% removal without damage requires all nozzles to be in excellent condition.

Nozzles should be inspected before the start of each shift as part of the pre-operation check or when the operator notices a loss in pressure or a change in performance while blasting. If visual inspection of the nozzle spray pattern indicates that the pattern is not in the number 1-4 quality range as indicated on the Nozzle Quality Guide, the nozzle must be replaced.

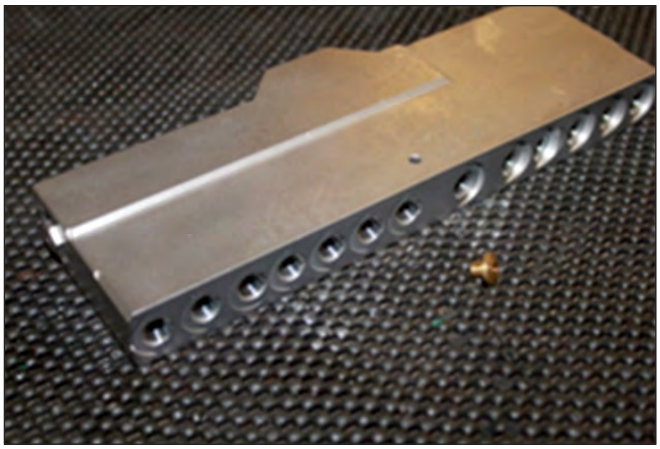
Nozzle Replacement Procedure:

1. Make sure the waterblasting system is shut-down with the power system in the service position.
2. Remove the spray bar protector cotter pin and the spray bar protector.
3. Remove worn or damaged nozzles.
4. Reactivate the power system and the water blasting system by following the steps in the Startup Procedure.
5. Purge the system at low pressure to flush debris from the spray bar.

Typical HT1000 Spray Bay Without Spray Bar Protector

6. Once the spray bar is flushed, deactivate the waterblasting system and return the power system to the service position.
7. Apply a light coat of anti-seize to the threads on the new nozzles.
8. Install the nozzles being careful not to get any anti-sieze on the seat area of the nozzle or the spray bar.

9. Tighten each nozzle finger tight, then torque to 10 ft lbs.
10. Reactivate the waterblasting system by following the steps in the Startup Procedure.
11. Follow the steps in the Startup Procedure to pressure test the spray bar and nozzles.
12. Confirm at least a 1 inch, needle tight, water jet is coming from each nozzle.
13. When the pressure test is complete, deactivate the waterblasting system and return the power system to the service position.
14. Replace the spray bar protective cover and gasket.



Typical Spray Bar & Nozzle

Nozzle Pressure Test - All Nozzles Good

Thru-Shaft Cover Housing & Swivel Nut

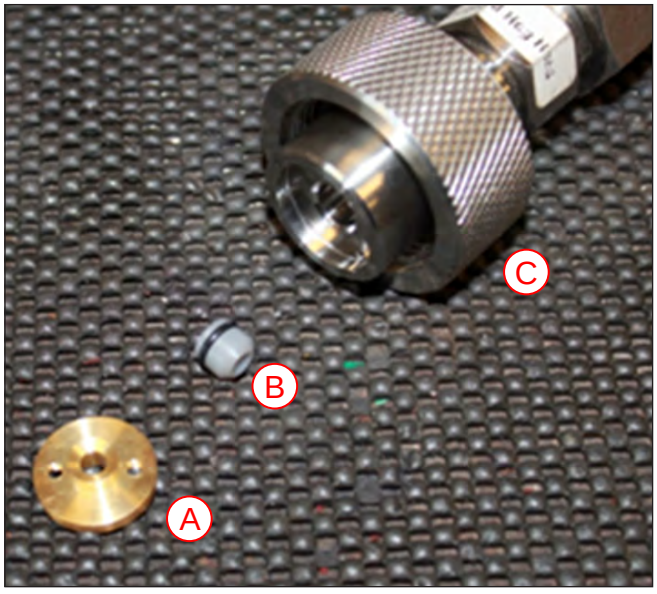
Swivel Tit In Thru-shaft Cover Housing

4.7 Swivel Seal Replacement

The swivel seal must be inspected at the start of each shift and replaced at the first sign of leakage to avoid damage to the swivel nut and thru-shaft cover housing. Swivel seal leakage is indicated by water dripping from the weep holes in the housing just below the swivel nut.

Use the following procedure to replace the seal:

1. Make sure the water blasting system is shut-down and the power system is in the service position.
2. Loosen the swivel nut on the top of the thru-shaft motor. Be sure to pull the hose and adapter straight up so you don't bend the swivel tit inside the fitting.
3. Rotate the end of the high pressure hose toward you until the swivel seal adapter is visible.
4. Insert two 6-32 screws into the brass back-up ring. Tighten the screws evenly to push the brass back-up ring out of the high pressure hose adapter.



Swivel Seal Assembly

A. Brass Back-Up Ring
B. Swivel Seal
C. Swivel Nut Assembly

5. Once the brass back-up ring is removed, inspect the swivel seal seat and the edges of the seat in the back-up ring closely. If there is any sign of wear or damage, replace the brass back-up ring. It is recommended that the back-up ring be replaced every 3rd or 4th swivel seal replacement.
6. Insert the swivel seal removal tool into the bottom of the worn swivel seal and turn counterclockwise until the tool grips the swivel seal. Continue turning the tool counterclockwise while pulling on the swivel seal until the seal is removed.
7. Make sure all debris has been cleaned out of the swivel seal adapter and the thrust housing cap at the top of the thru-shaft motor.
8. Apply a small amount of silicone grease on the O-ring for the swivel seal and on the swivel tit. This provides lubrication for the seal and swivel tit at startup when the swivel seal connection and thru-shaft are dry.
9. Install the brass back-up ring onto the swivel tit with the beveled seat facing up. Make sure the brass back-up ring is seated completely.
10. Install the lubricated swivel seal onto the swivel tit with the beveled edge facing down. Be sure the swivel seal is seated against the brass back-up ring.
11. Make sure the swivel seal adapter is perfectly aligned with the thru-shaft motor and install the swivel seal adapter onto the thru-shaft motor.
12. Hand tighten the swivel nut.

NOTICE:
IT IS VERY IMPORTANT TO KEEP THE ADAPTER ALIGNED STRAIGHT RELATIVE TO THE THRU-SHAFT MOTOR WHILE PUSHING THE ADAPTER OVER THE SWIVEL SEAL AND ONTO THE THRU-SHAFT COVER HOUSING. IF THE ADAPTER IS NOT STRAIGHT, THE SWIVEL TIT COULD BECOME BENT OR BROKEN DURING INSTALLATION.

NEVER USE TOOLS TO TIGHTEN THE SWIVEL NUT. THE SWIVEL SEAL AND NUT WILL BE DAMAGED IF THE NUT IS TIGHTENED MORE THAN HAND TIGHT.

4.8 High Pressure Hose Installation

The ultra-high pressure hoses should be inspected weekly or every 50 hours and replaced as required. Use the following procedure when replacing a pressure hose.

When replacing damaged or worn high pressure hoses, check the burst rating marked on the hose. Always use a replacement hose with an equal or greater pressure rating.

Replacing a high pressure hose from the power system to the Ground Hog:

1. Make sure the water blasting system is shutdown with the power system in the service position.
2. To avoid contamination that could clog nozzles, always make sure hose fittings and the area around the hose connections are thoroughly cleaned.
3. Remove the old high pressure hose and cap the fittings to prevent contamination.
4. If the hose to be replaced is routed through a tight area, use the 7/8" hose coupler fitting in the Spare Parts System and attach an end of the new hose to the fitting on the old hose. Cap the other fitting on the new hose to prevent contamination, then carefully pull the old hose out while guiding the new hose into place.
5. If the new hose will be routed on its own and not pulled through by the old hose, cap both ends to prevent contamination and carefully route the hose into position.
6. Verify the routing of the hose, making sure it is not in contact with sharp edges or near a source of heat that could damage the hose. Install anti-chaffing or heat deflectors to protect the hose if necessary.

High Pressure Hose

7. Remove the caps and apply a light coat of anti-seize to the threads of each fitting. Then attach the fittings and tighten to specifications.
8. Follow the steps in the Startup Procedure to purge the UHP hose at low pressure to remove debris that could have entered the system while changing the hose.
9. Shutdown the water blasting system and return the power system to the service position.
10. Install the protective cap on the power system UHP hose fitting to prevent contamination until it is connected to the Ground Hog.

NOTICE:
GROUND HOG HIGH PRESSURE HOSES MUST BE PROTECTED WITH ANTI-CHAFFING.

4.9 Vacuum Hose Replacement & Rotation Procedure

Debris buildup, kinks, clogs or leaks in the system will cause a reduction in airflow at the blasting head, reducing the efficiency of operation or causing operations to stop completely. Debris buildup inside the hoses can be removed by periodically tapping the outside walls with a dead blow hammer while the system is operating at maximum vacuum. This will flex the hose walls and cause built up debris to break off and be sucked into the debris tank.

The internal walls of vacuum hoses develop wear points caused from the high velocity of abrasive debris traveling inside the hoses. The wear points are most prevalent in the outside radius of tight bends near the blasting head and where the debris hose rises to the power unit.

The life of the hoses in these areas can be extended by rotating the hoses 120^0 every 50 hours. Vacuum hoses should be inspected daily and replaced as needed.

Make sure the water blasting system is shutdown with the power unit in the service position before rotating or replacing vacuum hoses.

NOTICE:
DAMAGED VACUUM HOSES CAN BE REPAIRED USING DUCT TAPE AS A TEMPORARY SOLUTION TO EXTEND THE LIFE OF THE VACUUM HOSE.

Vacuum Hose Replacement

1. Make sure the water blasting system is shutdown with the power system in the service position.
1. Release the cam locks at the hose connection fittings.
2. Remove the old vacuum hose assembly.
3. If the cam lock fittings are in good condition and can be reused, cut the old hose off of the fittings. Then install the fittings in the new vacuum hose.
4. Make sure the seal is in good condition and seated in the fitting. Connect the new vacuum hose assembly and close the cam locks.

Vacuum Hose Rotation

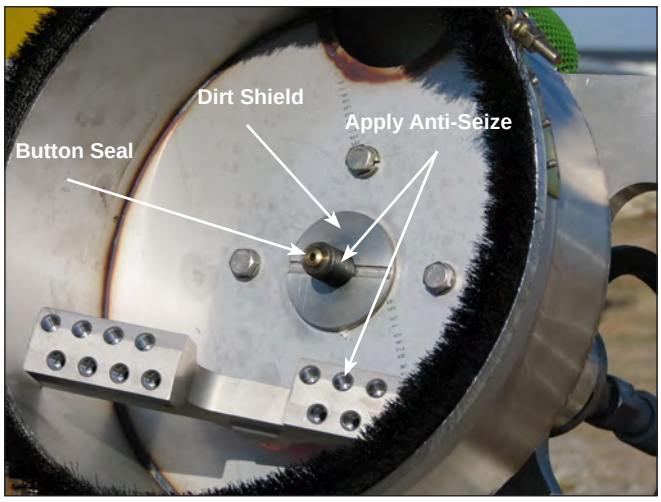
1. Make sure the water blasting system is shutdown with the power system in the service position.

Typical Vacuum Hose

Ground Hog Vacuum Hose Connection & Seal

1. Mark the position of the hose, then release the cam locks at the hose fittings.
2. Using the marks as a reference, rotate the hose 120 degrees.
3. Secure the hose in the new position with the cam locks.

Shroud Installed



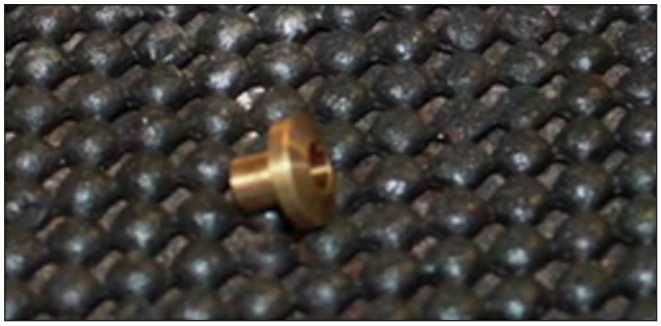
Spray Bar & Dirt Shield Components

4.10 Shroud Installation

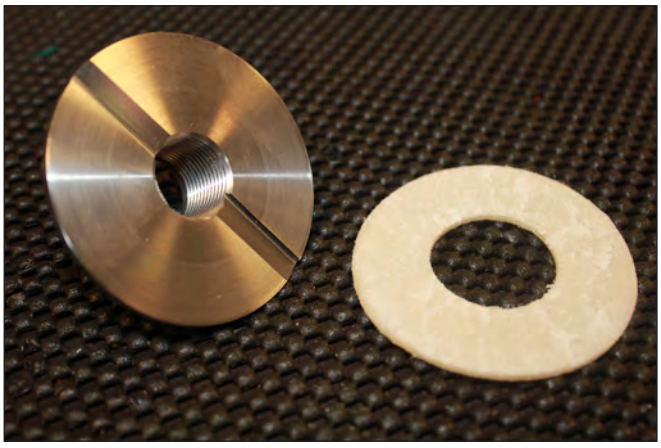
If the shroud becomes damaged, it must be replaced following the steps outlined in this section.

Removing the shroud:

1. Make sure the water blasting system is shut-down with the power system in the service position.
2. Remove the vacuum hose from the shroud.
3. Remove the spray bar protector.
4. Hold the thru-shaft with a 3/4" (19 mm) wrench inserted in the slot at the base of the thru-shaft motor to prevent it from turning.
5. Turn the spray bar counterclockwise by hand until it is free of the shaft.
6. Remove brass button.
7. Use a stainless steel wire brush to clean the dirt from the thru-shaft threads.
8. While still holding the thru-shaft with the wrench, remove the dirt shield by turning it counterclockwise.
9. Remove felt seal. Then clean the dirt shield and shroud.
10. Loosen and remove the bolts holding the shroud in place.
11. Remove the shroud from the blast head.



Typical Spray Bar Button Seal



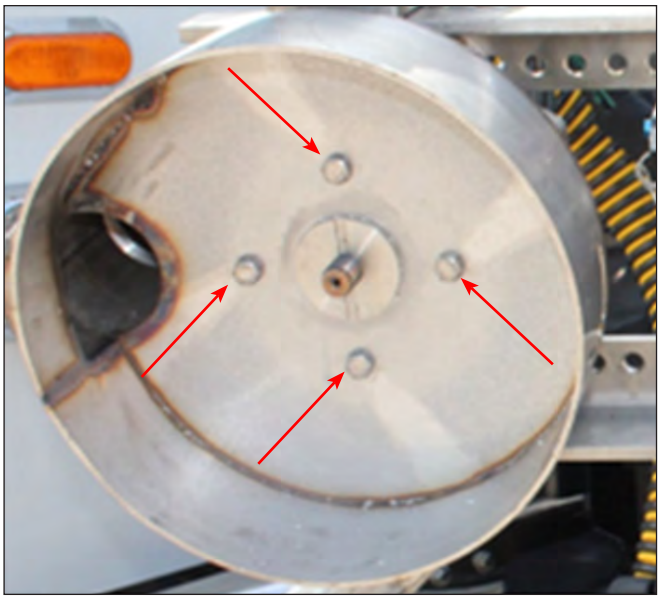
Dirt Shield & Felt Seal

Installing a new shroud:

1. Clean the bottom of the thru-shaft motor housing of dirt and debris.
2. Place the new shroud on the housing and align the bolt holes. Insert the shroud bolts and tighten finger tight.
3. Clean the dirt shield and install a new felt seal.
4. Apply anti-seize to the thru-shaft threads and hold the thru-shaft with the 3/4" (19 mm) wrench.
5. Install the dirt shield and seal. Adjust the shroud slightly if necessary to align the center hole in the shroud with the shoulder on the dirt seal.
6. Verify shroud alignment and hand tighten the dirt shield.

NOTICE:
ONLY HAND TIGHTEN THE DIRT SHIELD. NEVER USE TOOLS TO TIGHTEN THE DIRT SHIELD. IF THE DIRT SHIELD IS TIGHTENED MORE THAN HAND TIGHT IT WILL CAUSE THE SPRAY BAR TO ROTATE SLOWLY OR NOT ROTATE AT ALL.

7. With the dirt shield installed, tighten the shroud bolts to specifications.
8. Activate the water blasting system and purge the blast head at low pressure to remove debris that could clog the nozzles.
9. Shutdown the water blasting system and return the power system to the service position.
10. Install a new brass button seal, hold the thru-shaft with the wrench and reinstall the spray bar.
11. Tighten the spray bar by turning it clockwise ***slowly*** until it stops. Then seat the seal by turning the spray bar another 15%. Make sure you remove the wrench when the installation is complete.
12. Install the spray bar protector.
13. Reinstall the vacuum hose to the shroud.
14. If the wear brush on the damaged shroud is in good condition, install the existing brush on the new shroud. If it is damaged, install a new wear brush.



Shroud Mounting Bolts

Spray Bar Protector, Cotter Pin & Gasket

4.11 Thru-Shaft Motor Bearing Pre-Load

Introduction

The thru-shaft assembly is a key component in the Stripe Hog system. It is responsible for turning the spray bar and holds the blasting head components together. With proper, routine care your thru-shaft assemblies will provide you with many years of reliable service.

We call it the thru-shaft assembly because the shaft that holds and spins the spray bar runs through the hydraulic motor. The Thru-Shaft itself has up to 12 gallons per minute of water running through it at up to 40,000 psi. The friction of that much flow at that high of pressure causes a net thrust of 1,000 lbs.

To support the Thru-Shaft against the thrust, we use an angular contact bearing that we call the “thrust bearing.” This bearing is found inside the top section of the assembly as you can see in the schematics and exploded parts view in later pages. It is imperative that the thru-shaft be held in a precise vertical position so it can perform properly. This is accomplished using what we call a spanner nut. The spanner nut threads onto the thru-shaft and rests on top of the thrust bearing. By turning the spanner nut clockwise, we can raise the thru-shaft position in the assembly. Conversely, by turning it counterclockwise we can lower it within the assembly. Turning the spanner nut is called “Adjusting the Preload.”

It is important to set the preload on a regular basis. It only takes about 20 minutes to complete the process and we recommend it to be done every 40 hours of use. As the thrust bearing wears down the thru-shaft is lowered. As the shaft lowers, the motor becomes less powerful and less efficient because oil can bypass the internal gears.

We have developed a specific process to walk you through step by step. In the following pages you will learn all that you need to know to ensure many years of reliable service. We highly recommend that you follow the procedure carefully and exactly as described. If you have any questions please contact the Technical Support Team. We are available 24 hours every day of the year.

Tools and Materials Required

Tools

2 - Medium Sized Flat Blade Screwdrivers

1 - Medium Sized Channel Lock Pliers

1 - 3/4” (19 mm) Open End Wrench

1 - 15/16” (24 mm) Deep Well Socket

1 - 1 1/8” (28 mm) Deep Well Socket

1 - 1/2” Drive Rachet Wrench

1 - 1/2” Drive Torque Wrench

1 - Spanner socket (weldment tool)
(Supplied in your Tool Kit)

1 - 6 mm Allen Wrench

1 - Feeler Gauge .015”

1 - Small Hammer

Supplies

- Anti-Seize
- Grease Gun and Mobile Poly Rex EM Grease
- Rags or Paper Towels
- Brake Cleaner

NOTICE:
USE ANTI-SEIZE COMPOUND ON BOLT AND THRU-SHAFT THREADS AND THREADED HOSE CONNECTIONS TO PREVENT GALLING.

WARNING

INJURIES FROM ULTRA-HIGH PRESSURE WATER BLASTING IS VERY SERIOUS AND CAN RESULT IN A FATALITY. ALWAYS MAKE SURE ALL PERSONNEL ARE A SAFE DISTANCE FROM THE WORK AREA BEFORE THE PRESSURE PUMP IS ENGAGED. NEVER PUT HANDS, FEET OR ANY PART OF YOUR BODY IN OR NEAR THE HIGH PRESSURE STREAM.

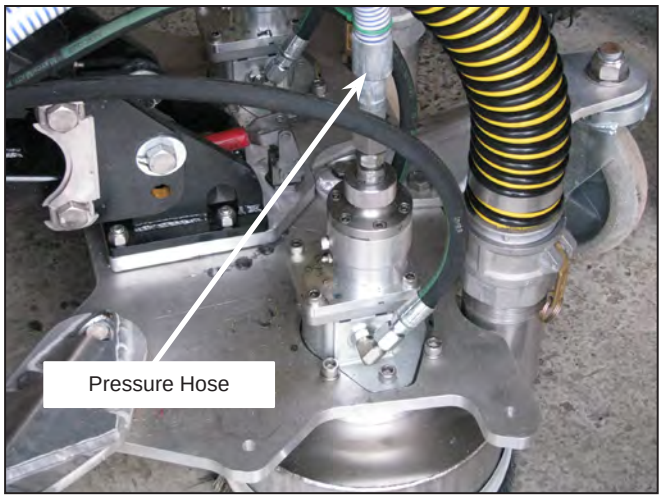


Figure 1: High pressure hose on top of the thru-shaft motor

Figure 2: High pressure hose removed

Step 1
Remove the High Pressure Hose
Remove the high pressure hose from the top of the thru-shaft motor by turning the hand nut at the base of the hose counterclockwise. If the hand nut is too tight to turn by hand, use the channel lock pliers to free it, then continue loosening it by hand. Figure 1 and 2.

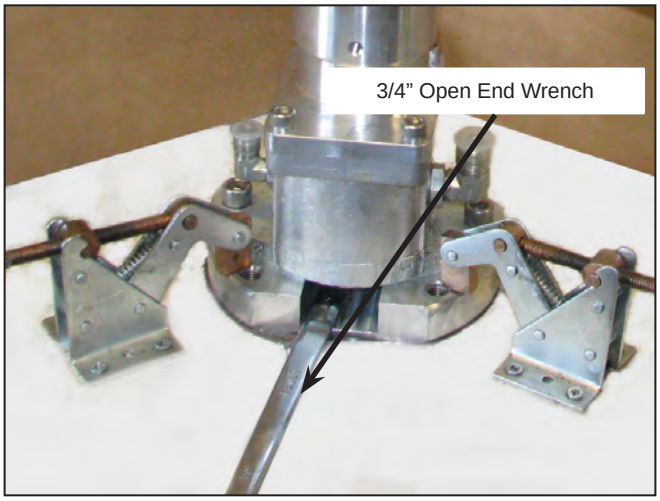


Figure 3: Thru-shaft motor on work bench showing position of slot and 3/4" open end wrench.

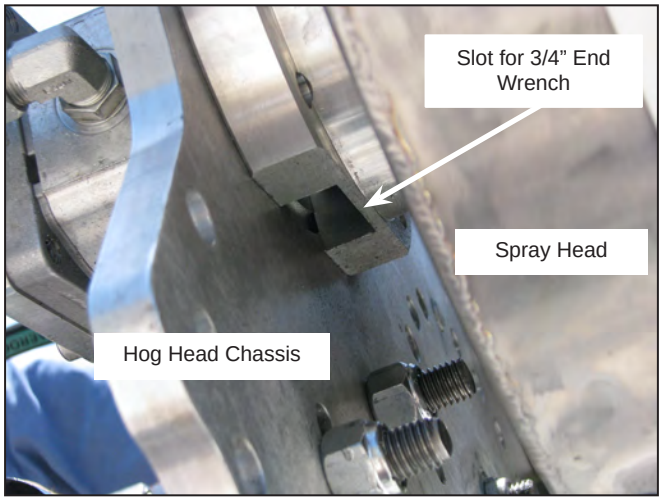


Figure 4: Location of slot in thru-shaft motor mounted on hog head for 3/4" open end wrench.

Step 2
Insert Wrench to Hold Thru-Shaft
Insert the 3/4" (19mm) open end wrench through the slot in the base of the thru-shaft motor. The slot is located between the hog head chassis and the spray head. Figure 3 and 4.

Figure 5: Use two medium flat head screwdrivers to remove the thrust housing cap. Note that the bolts are loose and left in place to prevent thrust housing cap from falling and being damaged during removal.

Step 3

Remove Thrust Housing Cap

Use a 6mm Allen wrench and a cross pattern to remove the 6 Allen head bolts that secure the thrust housing cap to the thrust housing. Make sure to leave each bolt loose and turned 3 threads in as shown in figure 5. The loosened bolts will allow the cap to be removed and prevent the possibility of the cap falling once it is free from the thrust housing.

Use the two medium sized, flat head screwdrivers and insert them into the slots at each side of the base of the thrust housing cap. Slowly and carefully twist the screwdrivers to work the cap evenly off the thrust housing until it is free. Figure 5.

Note that the O-ring seal in the thrust housing cap will provide some resistance until it is clear of the thrust housing. The cap will tend to “pop” slightly when the O-ring clears the base.

Once the thrust housing cap is free, remove the Allen bolts and the cap.

Inspect the cap and O-ring seal for damage. Replace O-ring if necessary and place the cap assembly in a safe, clean location. Figure 6.

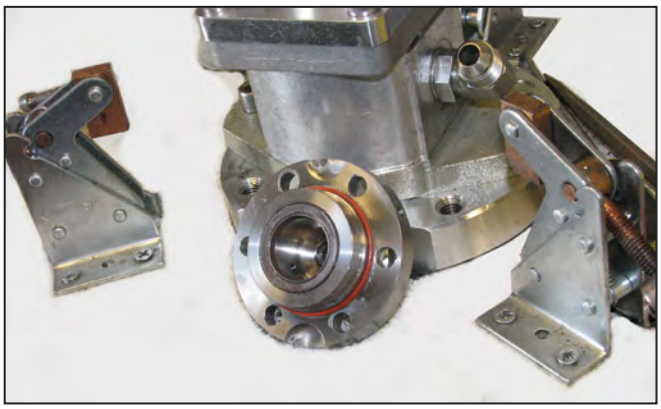


Figure 6: Thrust housing cap removed. Note the O-ring seal and the slots for the screwdrivers. Make sure the cap and O-ring is in good condition and clean.

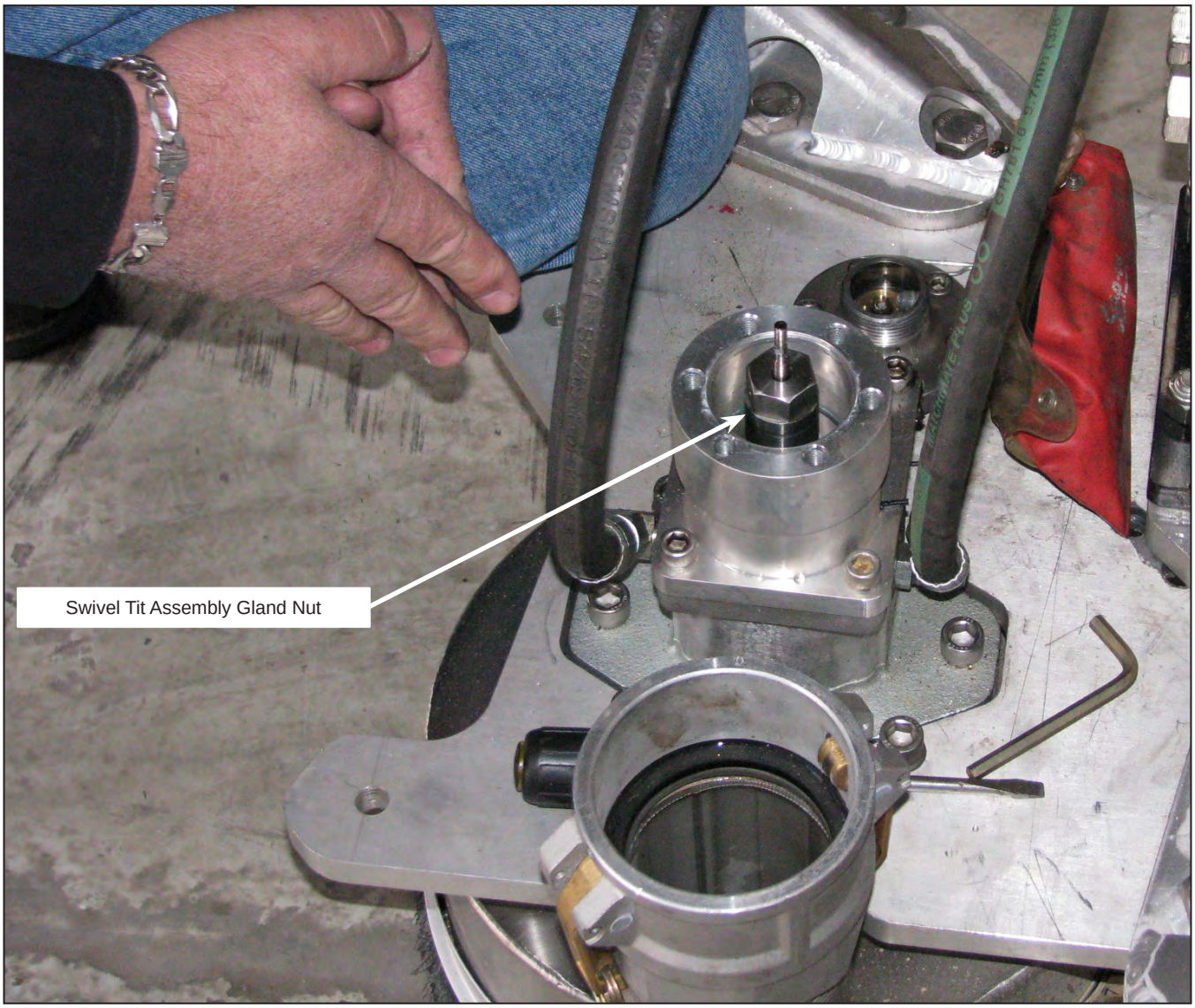


Figure 7: Swivel Tit gland nut to be removed by turning counterclockwise with a 15/16" deep well socket or box end wrench.

Step 4
Remove Swivel Tit Assembly/Gland Nut
While holding the thru-shaft with the 3/4" (19mm) open end wrench through the slot in the motor base, use a 15/16 (24mm) deep well socket or box end wrench to remove the swivel tit gland nut by turning it counterclockwise. Inspect the swivel tit assembly and set it in a safe, clean location. Figure 7 and 8.

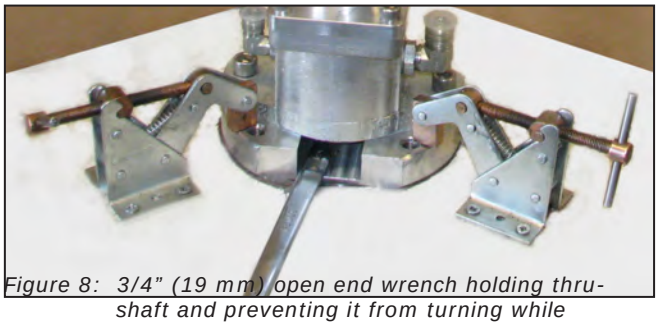


Figure 8: 3/4" (19 mm) open end wrench holding thru-shaft and preventing it from turning while removing swivel tit assembly/gland nut.

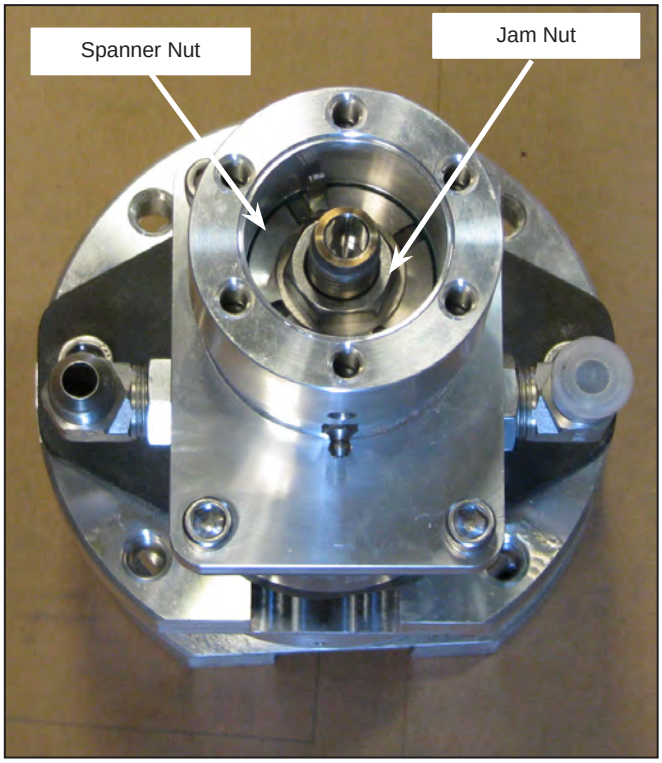


Figure 9: Jam nut and seal nut. Make sure to loosen Jam nut 4 full turns first.

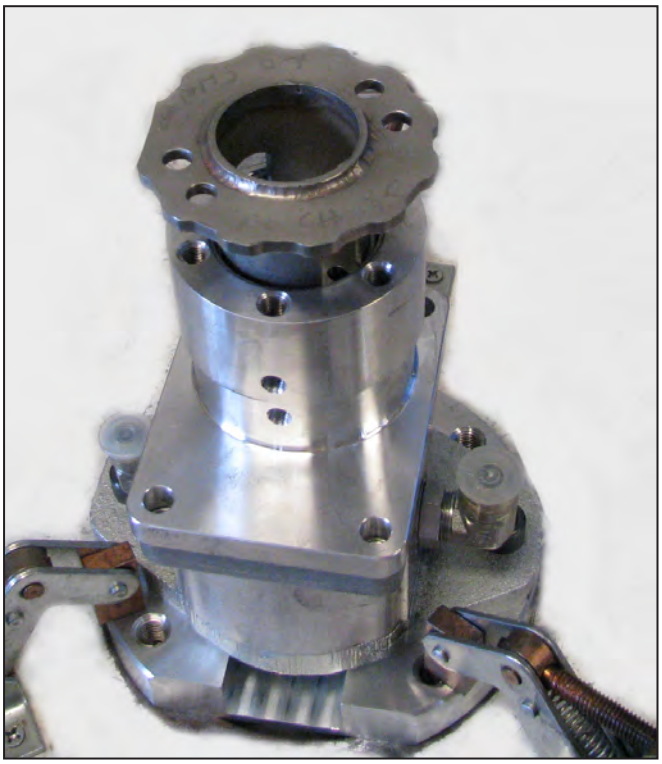


Figure 10: Use spanner to turn spanner nut.

Step 5

Loosen Jam Nut and Set the Bearing Preload

Insert the Spanner Tool and center on the Thrust Housing Cap Bolt holes.

Make sure the spanner Tool rests down into the tiny slots in the spanner nut and is down evenly all around the thrust housing. Figure 10.

Install two cap bolts and turn them until finger tight.

While Holding the Thru-Shaft with the 3/4" wrench through the slot in the motor base, use a 1 1/8" deep well socket to loosen the jam nut two full turns. Figure 11.

While holding the Thru Shaft Remove the Cap Bolts and tighten the Spanner tool as far as possible.

Continue to hold the Thru-Shaft and loosen the Spanner Nut 1/4 turn.

Install two Cap Bolts finger tight to hold the Spanner Tool in place. Figure 11.

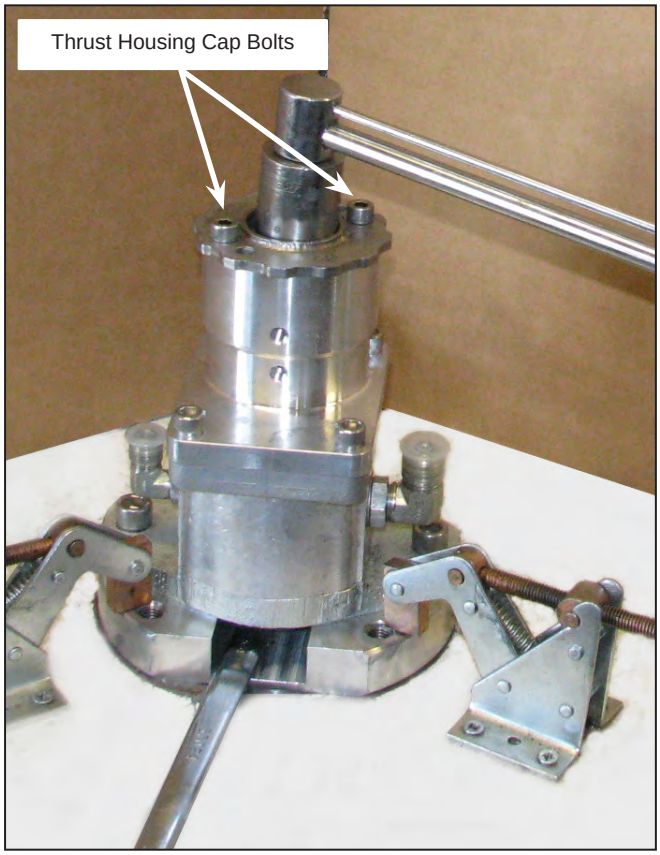


Figure 11: Spanner tool secured with thrust housing cap bolts.

WARNING

WHEN LOOSENING THE SPANNER SOCKET AND SEAL NUT ONE BOLT HOLE TO SET THE BEARING PRELOAD OR WHEN TIGHTENING THE JAM NUT, IT IS CRITICAL THAT THE THRU-SHAFT IS HELD FIRMLY WITH THE 3/4" (19MM) OPEN END WRENCH SO THAT IT DOES NOT MOVE AT ALL. IF THE WRENCH AND THRU-SHAFT MOVE DURING THIS PROCEDURE, THE BEARING PRELOAD WILL BE INCORRECT AND THE THRU-SHAFT MOTOR WILL NOT OPERATE PROPERLY.

IF THE THRU-SHAFT MOVES DURING WHILE SETTING THE BEARING PRELOAD, YOU MUST REPEAT STEP 5 TO ENSURE PROPER BEARING PRELOAD.

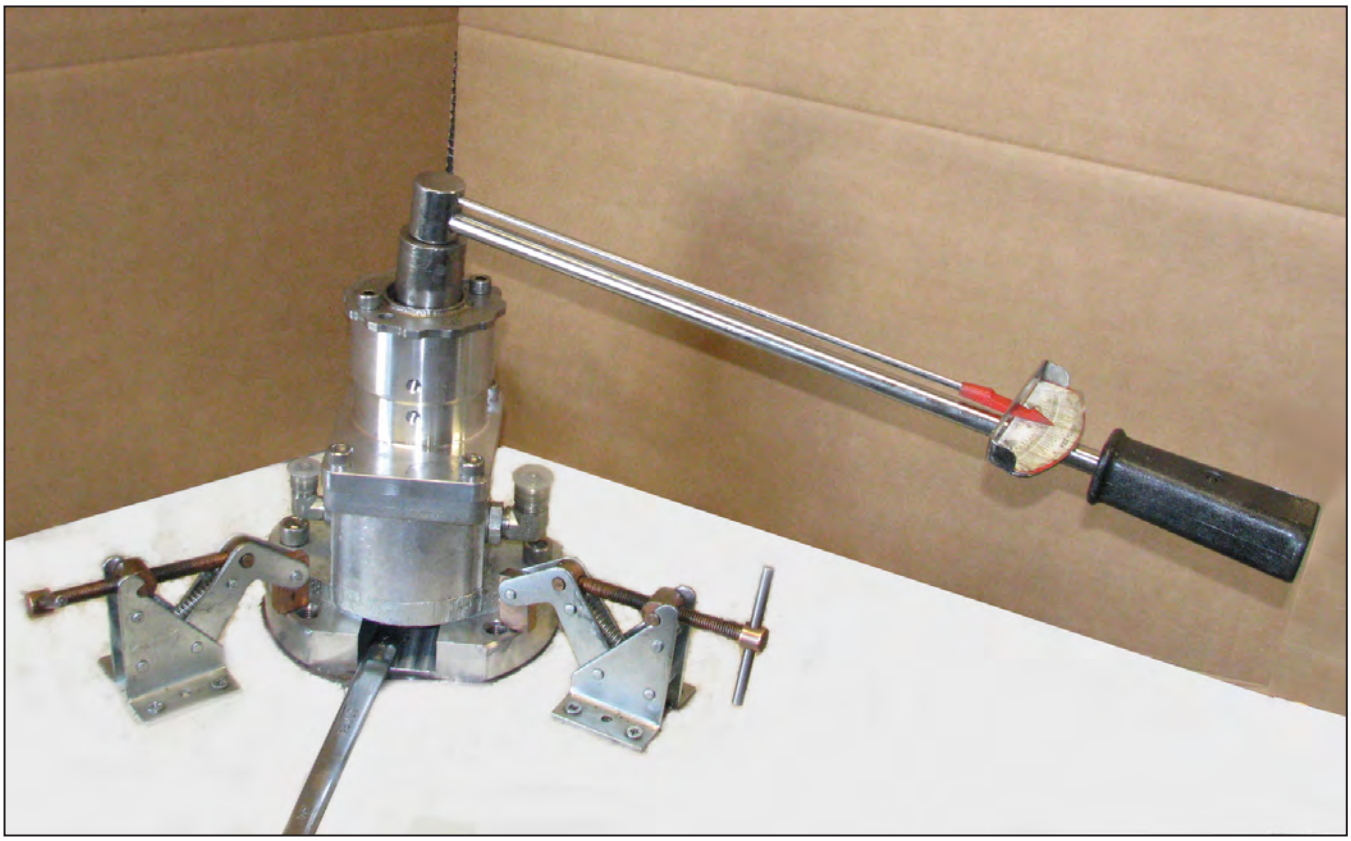


Figure 12: Thrust housing cap bolts securing the spanner tool are snug and a torque wrench and 1 1/8" deep well socket is used to tighten the jam nut to 50 Ft lbs.

Step 6
Set the Jam Nut Torque and Remove Spanner socket (Weldment Tool)

Tighten the bolts holding the spanner socket to "snug."

While holding the thru-shaft with the 3/4" (19mm) open end wrench through the slot in the motor base and the spanner socket held with the thrust housing cap bolts, use a 1 1/8" (28mm) deep well socket and a torque wrench to tighten the jam nut to 50 ft lbs. Figure 12. ***Make sure the thru-shaft and 3/4" (19mm) open end wrench do not move at all during this procedure!!***

Remove the thrust housing cap bolts from the spanner socket and remove it from the housing. Now it is safe to move the thru-shaft.

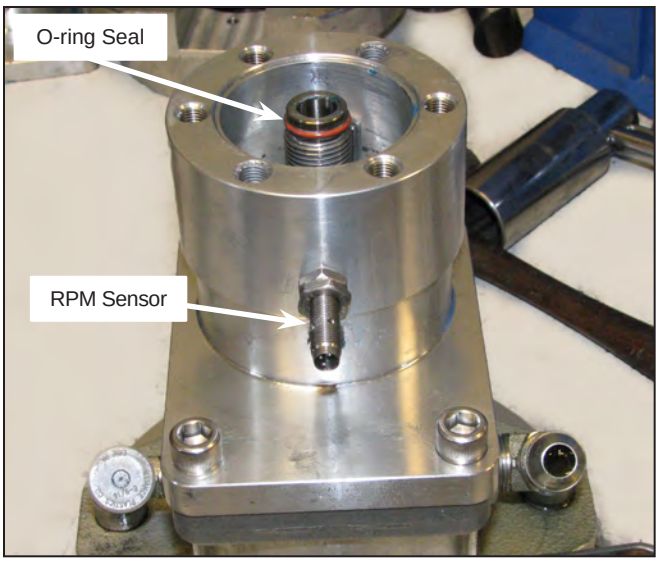


Figure 13: O-ring seal seat at the top of the thru-shaft greased and the threads below the seal coated with anti-seize.

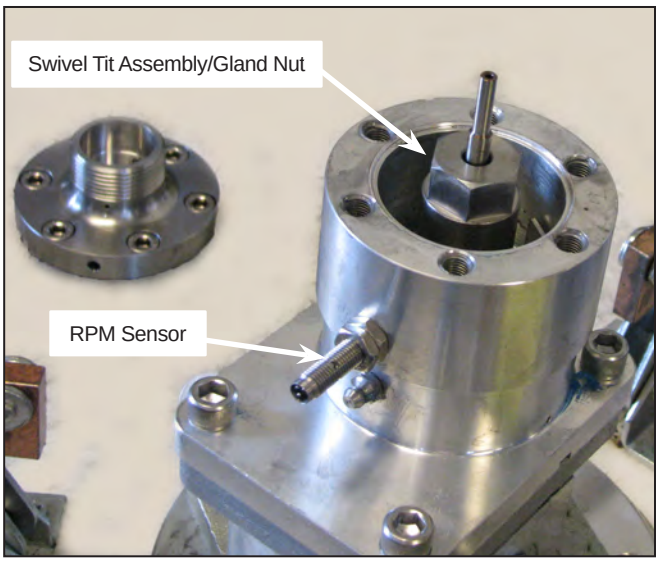


Figure 14: Swivel tit assembly/gland nut installed on the thru-shaft and torqued to 50 Ft lbs.

Step 7
Set The Rpm Sensor To Counter Washer Gap
Set the gap between the rpm sensor and the counter washer tabs. Use a feeler gauge of .015 (fifteen thousandths) to set the gap. Turn the Thru-Shaft until one tab lines up with the Sensor. Make sure that you do not scrape the rubber end with the tab as it will ruin the sensor. Figures 13 & 14.

If the gap is more than .015" use a flat screw driver and hammer to lightly tap the tab closer to the sensor.

If the gap is tighter than .015" use a flat screwdriver to pry the tab away from the sensor.

Turn the Thru-Shaft until the other tab lines up with the sensor and repeat the process. It is important that you keep the gap within two thousandths either way. If there is more than .05 thousandths variance from one tab to the other it can confuse the PLC system and stop head rotation.

Step 8
Install The Swivel Tit Assembly/Gland Nut.
Inspect the O-ring seal near the top of the thru-shaft and make sure it is not damaged. Replace the O-ring if it shows any sign of nicks, cuts, deterioration or wear. Then apply a light layer of grease to the O-Ring. The grease will help the swivel tit assembly slide over the O-ring and reduce the possibility for the O-ring to be pushed out of the seat or damaged as the swivel tit assembly is installed. Figure 13.

Apply anti-seize to the thru-shaft threads. The anti-seize is extremely important and will prevent the stainless steel threads on the shaft and swivel tit assembly from galling and seizing. ***If anti-seize is not used and the threads seize, the thru-shaft and the swivel tit assembly will be ruined and the thru-shaft motor will have to be completely disassembled and rebuilt!!***

While holding the thru-shaft with the 3/4" (19mm) open end wrench, install the swivel tit assembly/gland nut and hand tighten. Then use a 15/16" (24mm) deep well socket and a torque wrench to tighten swivel tit assembly/gland nut to 50 ft lbs. Figure 14.

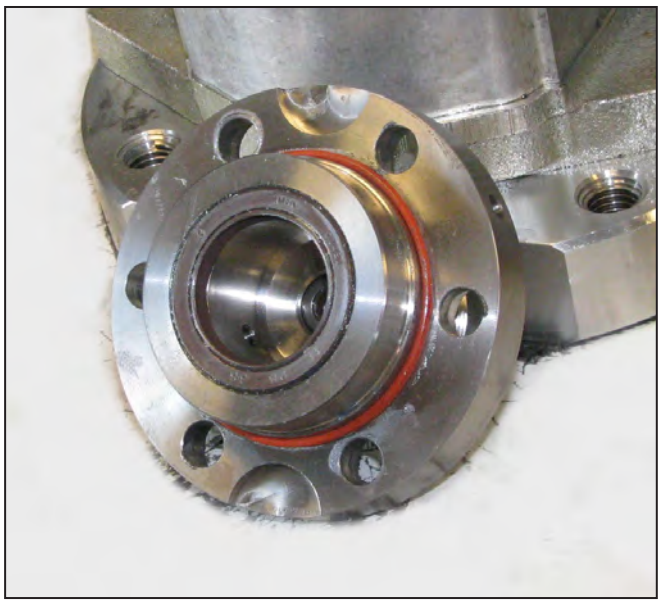


Figure 15: Inspect and grease the O-ring seal on the thrust housing cap.

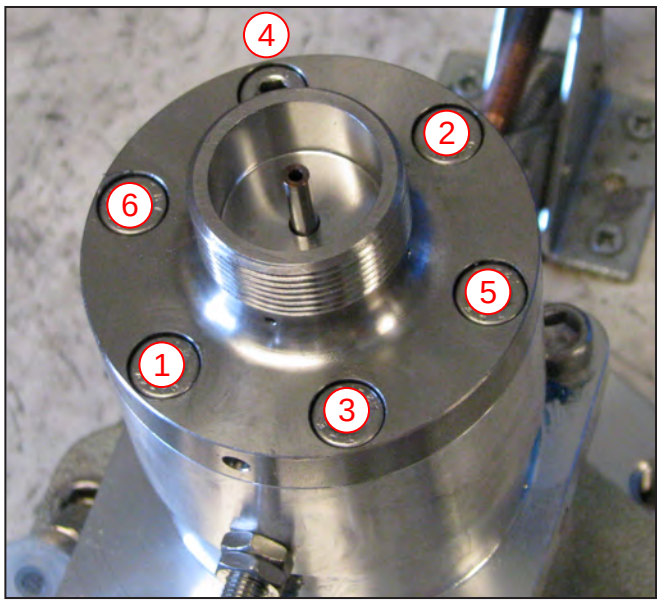


Figure 16: Apply anti-seize to the thrust housing bolts and tighten them in a crisscross pattern to snug using a 6 mm Allen wrench.

Step 9

Install The Thrust Housing Cap.

Inspect the O-ring seal in the thrust housing cap. Replace the O-ring if it shows any sign of nicks, cuts, deterioration or wear. Then apply light layer of grease to the O-Ring. The grease will help the cap assembly slide into the torque housing and reduce the possibility for the O-ring to be pushed out of the seat or damaged as the assembly is installed. Figure 15.

Set the thrust housing cap on top of the thrust housing and carefully press it into the housing. Align the bolt holes in the cap to the threaded holes in the thrust housing. Apply Anti-seize to the 3/8" Allen bolts and hand tighten using a crisscross pattern. Use the 6 mm Allen wrench to tighten the thrust housing cap bolts to "snug" using a crisscross pattern. Figure 16.

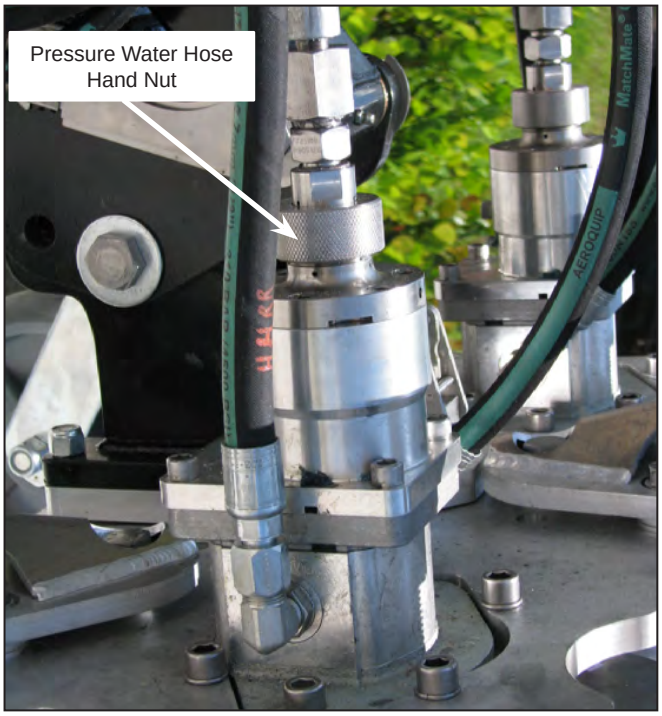


Figure 17: Apply anti-seize to the thrust housing threads and install the high pressure water line.

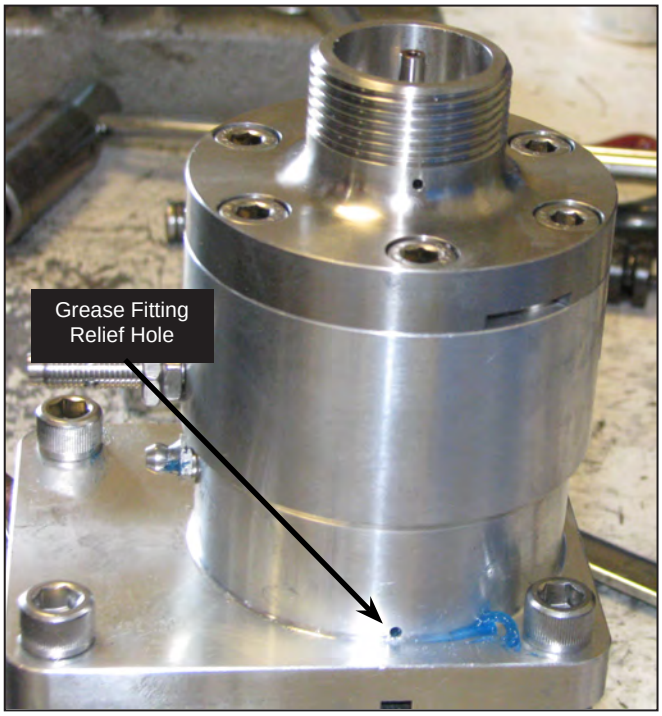


Figure 18: Thru-shaft bearing grease fitting and grease relief holes in thrust housing base.

Step 10

Install the High Pressure Water Hose and Grease the Thru-Shaft Bearings.

Apply anti-seize to the threads on the top of the thrust housing cap and install the high pressure water hose. Hand tighten the hand nut on the pressure hose.

Use a grease gun and apply grease to the thru-shaft bearing until grease comes out of the relief hole on the side of the thrust housing.

Step 11

Run the Thru-Shaft Motor Without Water Pressure, Then Under Full Water Pressure.

Remove all tools and materials from the hog head and raise it to the full up position.

Activate the hydraulic system and run the thru-shaft motor at maximum rpm for 15 minutes. ***Make sure not to apply water pressure during this step.***

Running motor without water pressure will fully test the thru-shaft motor operation and allow the bearings and seals to work themselves in. If the spray bar does not turn initially, use a 2' piece of wood or a broom handle to rotate the spray head counterclockwise to get it started. Figure 19.

If the thru-shaft motor is assembled properly, it will start on its own each time it is activated from this point forward. If it continues to stall on start up, contact Waterblasting Customer Service for assistance.

Once the initial run up is complete and with the spray head still turning at maximum rpm, make sure all personnel are well clear of the spray head and apply full water pressure. Run the thru-shaft motor for another 15 minutes. Figure 20.

When testing is complete and with the unit still running at maximum pressure, check the weep holes in the thrust housing cap just below the high pressure hose connection for water leakage. If water is dripping from the holes, the swivel seal in the hose fitting will need to be changed. If no water is dripping from the weep holes and the spray bar is still rotating at maximum rpm, your unit is ready to be put back into service. Figure 21.

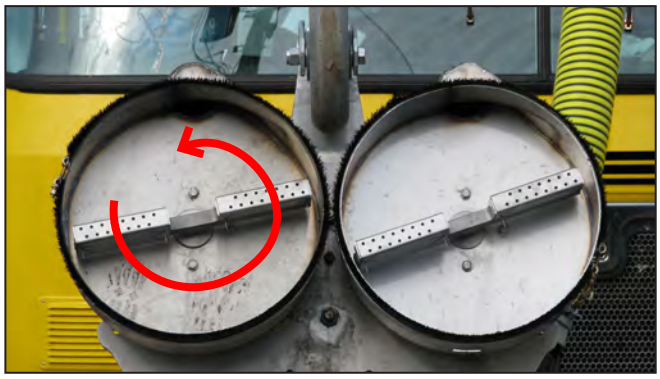


Figure 19: Counterclockwise spray head rotation. Operate 1st 15 minutes at maximum rpm with no water pressure.

Figure 20: Operate another 15 minutes at maximum rpm and full water pressure.

WARNING

INJURIES FROM ULTRA-HIGH PRESSURE WATERBLASTING ARE VERY SERIOUS AND CAN RESULT IN A FATALITY. ALWAYS MAKE SURE ALL PERSONNEL ARE A SAFE DISTANCE FROM THE WORK AREA BEFORE THE PRESSURE PUMP IS ENGAGED. NEVER PUT HANDS, FEET OR ANY PART OF YOUR BODY IN OR NEAR THE HIGH PRESSURE STREAM.

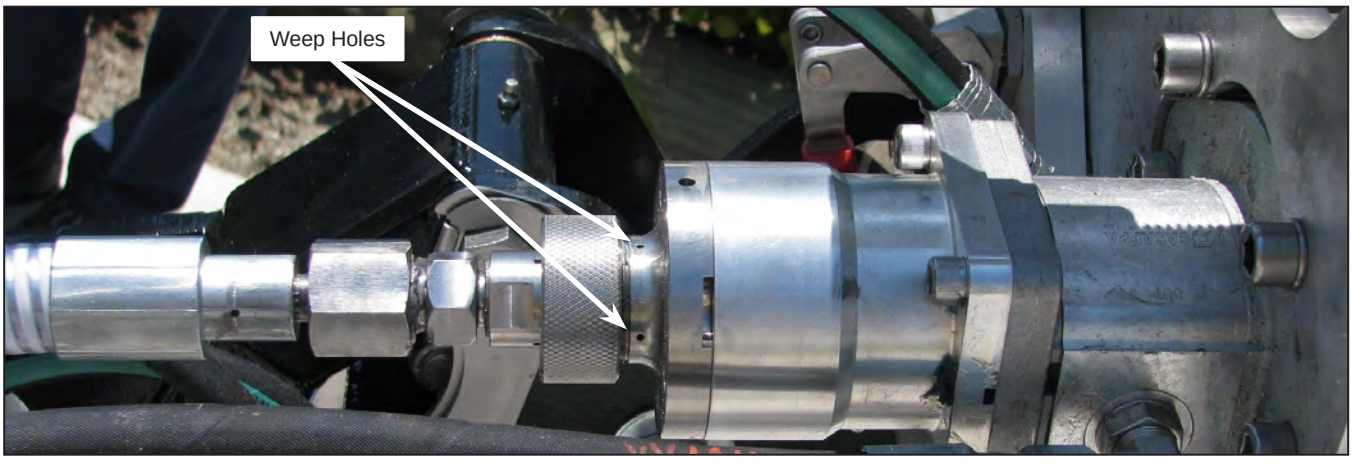


Figure 21: Check for water dripping from weep holes just below the high pressure water hose connection.

NOTES

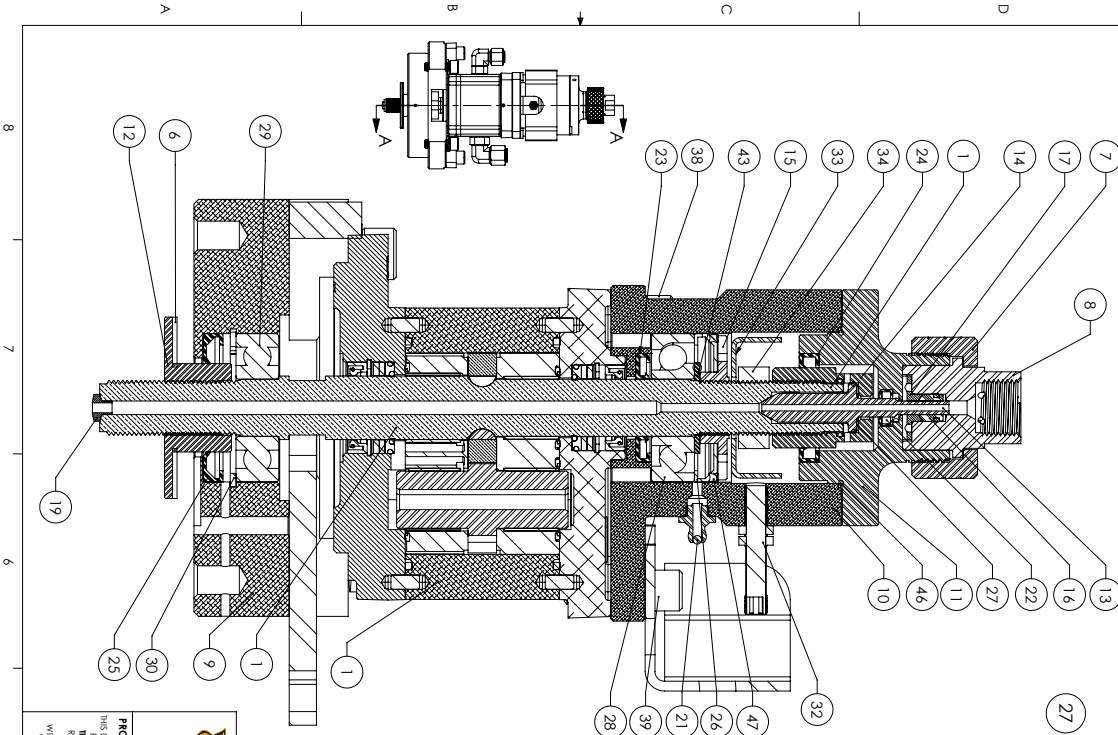
4.12 Hog Tool Maintenance Matrix

EQUIPMENT	COMPONENT	INTERVALS	LUBRICANT SPECIFICATIONS
Ground Hog	Thru-shaft motor Bearings	Daily	Mobil PolyRex EM Grease ***No Substitutes***
Ground Hog	Chassis Wheels and Casters	Daily	General Multi Purpose Grease

This chart is a guide only. It should never be used to supersede equipment manufacturer's specifications.

Please refer the manufacturer's operation and maintenance manuals for additional information.

NOTES



27 USE ONLY ACCORDING TO ENGINEERING RECOMMENDATIONS

ITEM NO.	20025-001C QTY.	PART NUMBER	DESCRIPTION
1	1	20026-001	MOTOR, THRU SHAFT, HOG HEAD, ROTATION
2	1	37037	ADAPTER, 90, 8X8, MORB/MORS
3	1	37057	ADAPTER, 90, 6X6, MORB/MORS
4	1	37507	CAP, 6, FORS
5	1	37508	CAP, 8, FORS
6	1	50097	DETAIL, SEAL, FELT, GASKET, DRT
7	1	50098-001	DETAIL, NUT, SWIVEL
8	1	50099-001	DETAIL, ADAPTER, SWIVEL, SEAL
9	1	50100-001	DETAIL, ADAPTER, FLANGE, THRU SHAFT
10	1	50101-001	DETAIL, HOUSING, THRUST ASSEMBLY, THRU SHAFT
11	1	50102-001	DETAIL, COVER, THRUST ASSEMBLY, THRU SHAFT
12	1	50103	DETAIL, SHIELD, DIRT, THRU SHAFT
13	1	50105-001	DETAIL, TIT, SWIVEL
14	1	50106-001	DETAIL, NUT, GLAND, THRU SHAFT
15	1	50107-001	DEATIL, NUT, SEAL, GREASE, THRU SHAFT
16	1	50252-001	SEAL, SWIVEL
17	2	52100	RING, BACK UP, BRASS
18	1	52101-001	FILTER, DEBRIS, WRENCH SLOT, THRU-SHAFT
19	1	52102-001	SEAL, BRASS BUTTON
20	6	60135	SCREW, SHCS, M8, SS
21	1	60146	FITTING, ZERK, GREASE, M8
22	1	60153	SEAL, UPPER, SWIVEL SHAFT
23	1	60158	SEAL, LOWER, THRUST ASSEMBLY
24	1	60159	SEAL, UPPER THRUST ASSEMBLY
25	1	60160	SEAL, LOWER HOUSING
26	1	60161	SEAL, LOWER THRUST ASSEMBLY
27	1	60244-001	WASHER, BRASS, COMPRESSION, SWIVEL TIT
28	1	60950	BEARING, ANGULAR CONTACT BALL, THRUST ASSEMBLY
29	1	60951	BEARING, RADIAL, DOUBLE SEAL, LOWER HOUSING
30	1	60952	RING, INTERNAL RETAINING, STEEL
31	4	67048	HELICAL INSERT, 3/8-16, SS
32	1	68290	PROXIMITY, SWITCH, METALIC
33	1	70153-001	FABRICATION, WASHER, COUNTER, THRU SHAFT
34	1	70837	NUT, JAM, SS
35	1	71155-001	WRENCH, THRU SHAFT ASSEMBLY
36	1	72317-001	FABRICATION, GUARD, PROXIMITY SENSOR, THRU-SHAFT
37	1	80044-001	WELMENT, TOOL HOGHEAD ASSEMBLY, THRU SHAFT
38	2	90003-1333	SCREW, SHCS, 3/8-16, SS
39	2	90003-1360	SHCS, 3/8-16, SS
40	2	90031-0711	SCREW, SHCS, M12, SS
41	4	90031-0713	SHCS, M12, SS
42	4	90075-0010	SPLIT LOCK WASHER, M12, SS
43	1	90090-0220	SHIM, ROUND
44	1	90092-1005	O-RING, SWIVEL TIT
45	1	90092-1007	O-RING, SILICONE, SWIVEL TIT
46	1	90092-1023	O-RING, UPPER THRUST ASSEMBLY
47	1	90095-0281	O-RING, SEAL, DOUBLE, COUNTER

REV	ZONE	DESCRIPTION	DATE	ENG APPROVAL
01	-	ECN 15-026	6/12/2015	DG
G	-	ECN 15-028	6/12/2015	DG
H		ECN 14-103	12/9/2014	DG

WATERBLASTING TECHNOLOGIES REVISIONS

HOG TECHNOLOGIES
3341 S.E. SLATER STREET
STUART, FLORIDA 34997
(772) 223-7393

PROPRIETARY AND CONFIDENTIAL
THIS DOCUMENT CONTAINS INFORMATION PROPRIETARY TO WATERBLASTING TECHNOLOGIES. IT IS NOT TO BE REPRODUCED, USED IN ANY FORM, OR STORED ELECTRONICALLY WITHOUT THE WRITTEN PERMISSION OF WATERBLASTING TECHNOLOGIES.

UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DIMENSIONS ARE IN INCHES	DRAWN	DG	7/15/2008
TOLERANCES:	CHECKED	DG	-
FRACTIONS ± 1/32	ENG APPR.	DG	02/26/08
ANG: MACH ± 0°30' BEND ± 2°	MFG APPR.	-	-
DECIMALS XX ± .01	Q.A.	-	-
XXX ± .005			
HOLE Ø XXX ± .005			
INTERPRET GEOMETRIC TOLERANCING PER: ASME Y14.5M			
MATERIAL N/A	PERP	.003/IN	
	STRAIGHTNESS	.003/IN	
	FLATNESS	.005/IN	
FINISH N/A	THREADS: EXTERNAL - CLASS 2A INTERNAL - CLASS 2B		
	MACHINED SURFACES	63 U.O.S.	

TITLE: ASSEMBLY, HEAD, THRU, SHAFT, HOG HEAD

NEXT ASSY	USED ON
N/A	

APPLICATION

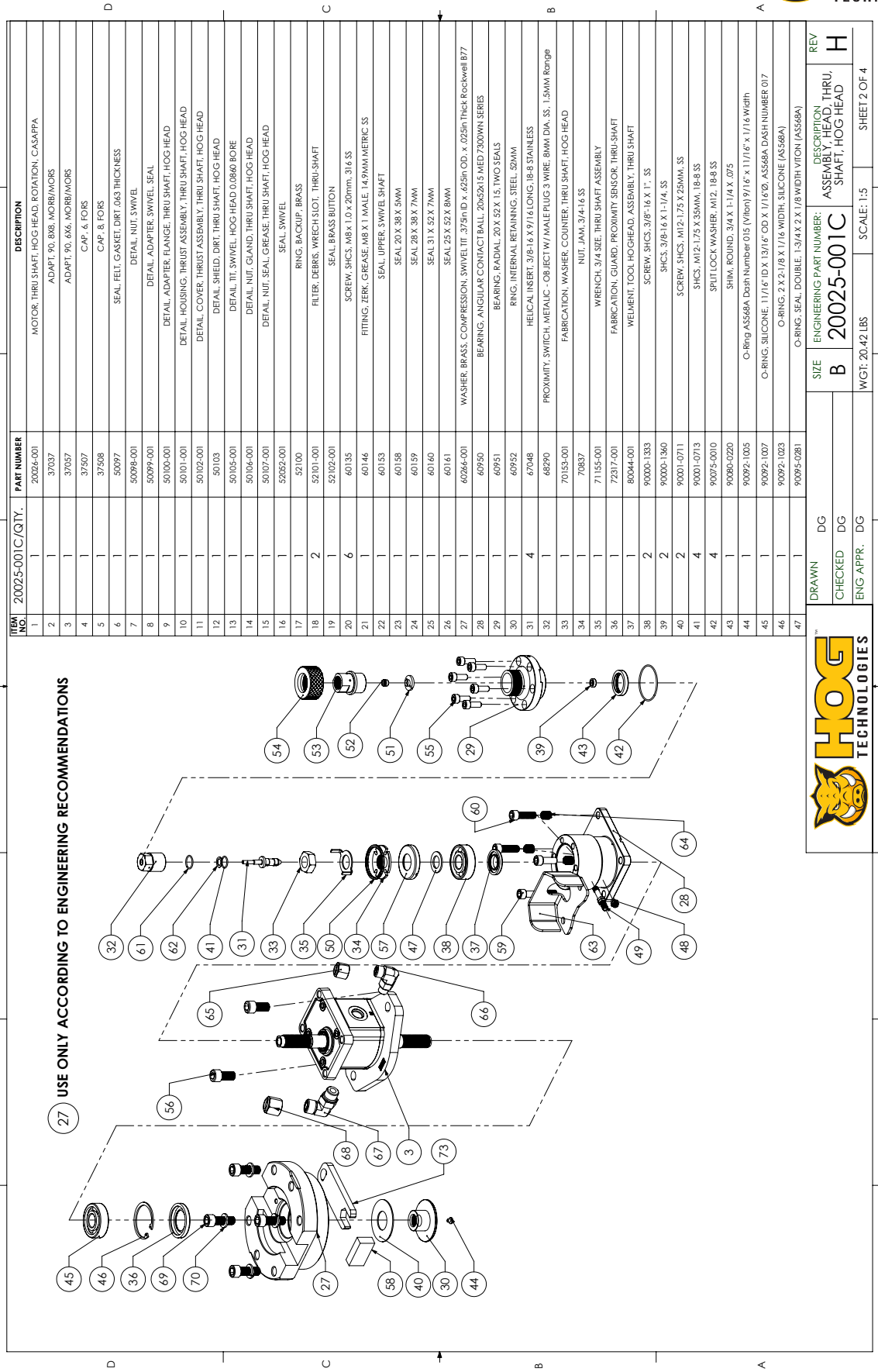
DO NOT SCALE DRAWING

PART NO. 20025-001C

SIZE	DWG. NO.	REV
B	20025	H

SCALE: 2:3	WGT: 20.42 LBS	SHEET 1 OF 4

OLD PART NO. CS1000-TS



ITEM NO.	20025-001C/QTY.	PART NUMBER	DESCRIPTION
1	1	20026-001	MOTOR, THRU SHAFT, HOG HEAD, ROTATION, CASAPPA
2	1	37037	ADAPT, 90, 8X8, MORB/MORS
3	1	37057	ADAPT, 90, 6X6, MORB/MORS
4	1	37507	CAP, 6, FORS
5	1	37508	CAP, 8, FORS
6	1	50097	SEAL, FELT, GASKET, DIRT, .063 THICKNESS
7	1	50098-001	DETAIL, NUT, SWIVEL
8	1	50099-001	DETAIL, ADAPTER, SWIVEL, SEAL
9	1	50100-001	DETAIL, ADAPTER, FLANGE, THRU SHAFT, HOG HEAD
10	1	50101-001	DETAIL, HOUSING, THRUST ASSEMBLY, THRU SHAFT, HOG HEAD
11	1	50102-001	DETAIL, COVER, THRUST ASSEMBLY, THRU SHAFT, HOG HEAD
12	1	50103	DETAIL, SHIELD, DIRT, THRU SHAFT, HOG HEAD
13	1	50105-001	DETAIL, TIT, SWIVEL, HOG HEAD 0.0860 BORE
14	1	50106-001	DETAIL, NUT, GLAND, THRU SHAFT, HOG HEAD
15	1	50107-001	DETAIL, NUT, SEAL, GREASE, THRU SHAFT, HOG HEAD
16	1	52052-001	SEAL, SWIVEL
17	1	52100	RING, BACKUP, BRASS
18	2	52101-001	FILTER, DEBRIS, WRECH SLOT, THRU-SHAFT
19	1	52102-001	SEAL, BRASS BUTTON
20	6	60135	SCREW, SHCS, M8 x 1.0 x 20mm, 316 SS
21	1	60146	FITTING, ZERK, GREASE, M8 X 1 MALE, 14.9MM METRIC SS
22	1	60153	SEAL, UPPER, SWIVEL SHAFT
23	1	60158	SEAL 20 X 38 X 5MM
24	1	60159	SEAL 28 X 38 X 7MM
25	1	60160	SEAL 31 X 52 X 7MM
26	1	60161	SEAL 25 X 52 X 8MM
27	1	60266-001	WASHER, BRASS, COMPRESSION, SWIVEL TIT .375in ID x .625in OD, x .025in Thick Rockwell B77
28	1	60950	BEARING, ANGULAR CONTACT BALL, 20x52x15 MED 7300WN SERIES
29	1	60951	BEARING, RADIAL, 20 X 52 X 15, TWO SEALS
30	1	60952	RING, INTERNAL RETAINING, STEEL, 52MM
31	4	67048	HELICAL INSERT, 3/8-16 X 9/16 LONG, 18-8 STAINLESS
32	1	68290	PROXIMITY, SWITCH, METALIC - OBJECT W/ MALE PLUG 3 WIRE, 8MM DIA, SS, 1.5MM Range
33	1	70153-001	FABRICATION, WASHER, COUNTER, THRU SHAFT, HOG HEAD
34	1	70837	NUT, JAM, 3/4-16 SS
35	1	71155-001	WRENCH, 3/4 SIZE, THRU SHAFT ASSEMBLY
36	1	72317-001	FABRICATION, GUARD, PROXIMITY SENSOR, THRU-SHAFT
37	1	80044-001	WELMENT, TOOL HOGHEAD, ASSEMBLY, THRU SHAFT
38	2	90000-1333	SCREW, SHCS, 3/8"-16 X 1", SS
39	2	90000-1360	SHCS, 3/8-16 x 1-1/4 SS
40	2	90001-0711	SCREW, SHCS, M12-1.75 X 25MM, SS
41	4	90001-0713	SHCS, M12-1.75 X 35MM, 18-8 SS
42	4	90075-0010	SPLIT LOCK WASHER, M12, 18-8 SS
43	1	90080-0220	SHIM, ROUND, 3/4 X 1-1/4 X .075
44	1	90092-1005	O-Ring AS568A Dash Number 015 (Viton) 9/16" x 11/16" x 1/16 Width
45	1	90092-1037	O-RING, SILICONE, 11/16" IDX 13/16" OD X 1/16"Ø, AS568A DASH NUMBER 017
46	1	90092-1023	O-RING, 2 X 2-1/8 X 1/16 WIDTH, SILICONE (AS568A)
47	1	90095-0281	O-RING, SEAL, DOUBLE, 1-3/4 X 2 X 1/8 WIDTH, VITON (AS568A)

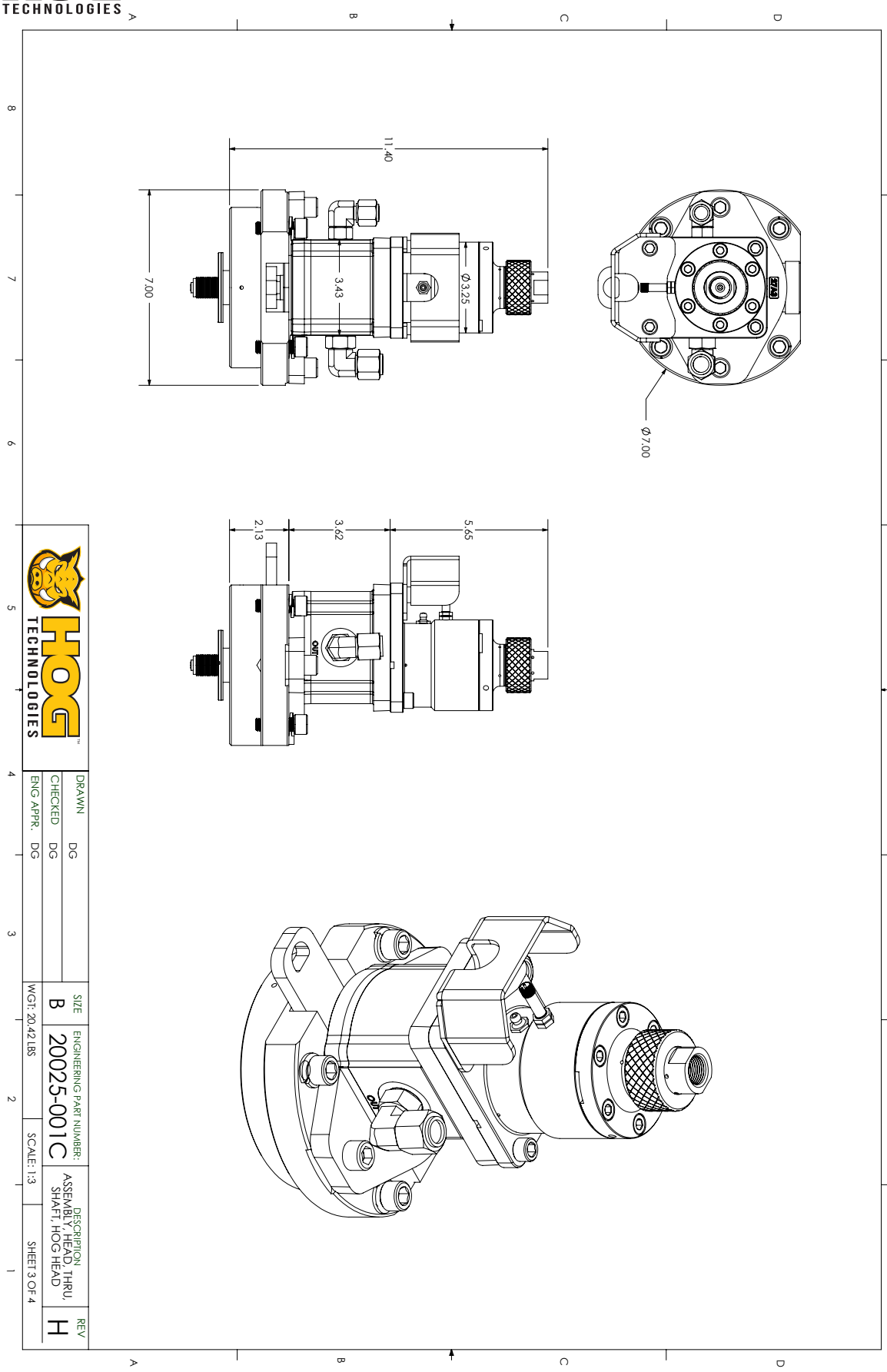
DRAWN	DG	
CHECKED	DG	
ENG APPR.	DG	

SIZE	ENGINEERING PART NUMBER:	DESCRIPTION	REV
B	20025-001C	ASSEMBLY, HEAD, THRU, SHAFT, HOG HEAD	H

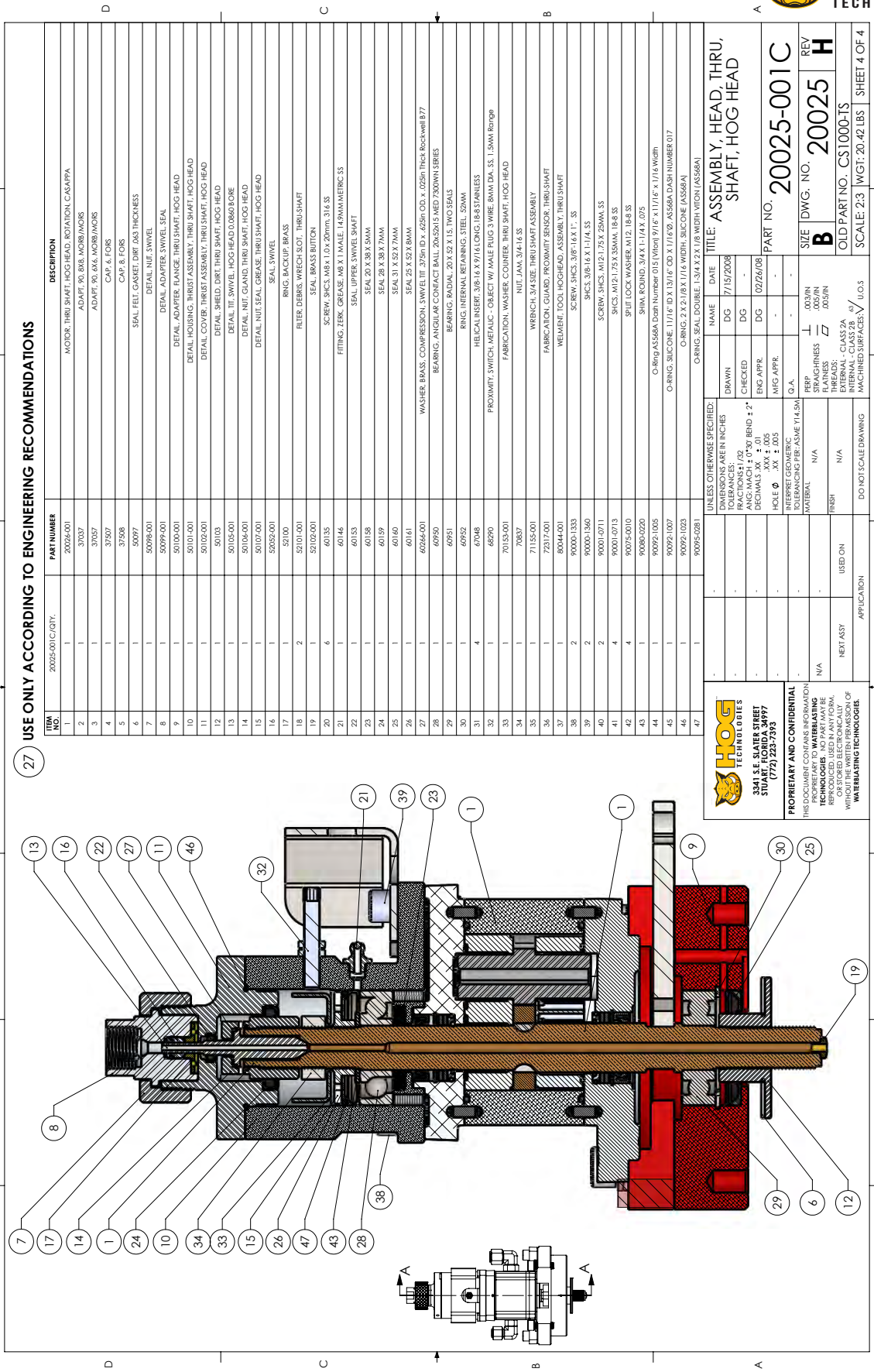
WGT: 20.42 LBS | SCALE: 1:5 | SHEET 2 OF 4

27 USE ONLY ACCORDING TO ENGINEERING RECOMMENDATIONS

Hog Head Thru-Shaft Assembly - 2



Hog Head Thru-Shaft Assembly - 3



Hog Head Thru-Shaft Assembly - 4

Water Blasting System Troubleshooting

PROBLEM	CAUSE AND SOLUTION
Noise & Vibration	
Hog Head noisy.	• Spray bar rotation extremely high. Turn speed control valve knob counterclockwise to reduce head speed. • Spray bar is hitting shroud (1). Shroud is bent or damaged. Repair or replace shroud. • Spray bar is hitting shroud (2). Thru-shaft motor bearings are loose causing spray bar to hit shroud. Repair thru-shaft motor. • Thru-shaft motor bearing needs grease. Grease thru-shaft motor bearing.
Spray Bar Rotation	
Spray bar rotation slow or stopped.	• Insufficient power system engine RPM - raise RPM of power system engine • Manual pressure valve (speed control valve) on Ground Hog handle is not adjusted properly - adjust valve • Hydraulic oil level on power system is low - fill hydraulic oil tank & check for leaks • Hydraulic hose is kinked or damaged - replace kinked or damage hydraulic hose • Worn or missing O ring in quick connect hydraulic oil fitting - replace quick connect fitting • Hydraulic filter is clogged - replace filter • Hydraulic oil is too hot - make sure hydraulic oil cooler is clean and operating properly • Low voltage to solenoid valves and they are not opening properly - correct low voltage problem • Hydraulic pump is defective - repair or replace pump • Thru-shaft motor is defective. Repair or replace motor. • Dirt shield is too tight. Remove dirt shield and install new dirt shield seal. Tighten finger tight. • Debris packed around thru-shaft or spray bar. Clean thru-shaft or spray bar. • Hog Head shroud is concave and not convex. Repair or replace shroud.
Spray Bar Rotation speed is excessive.	• Speed control valve on Ground Hog handle is not adjusted properly. Adjust valve. • Speed control valve is defective. Replace valve.

PROBLEM	CAUSE AND SOLUTION
High Pressure Blasting System	
Water dripping from hose fitting indicator port.	• Fitting Loose. Tighten fitting or replace hose and fitting. • Fitting is damaged. Replace hose and fitting.
Water dripping from spray Bar and spray bar weep holes	• Water leaking at spray bar threads - tighten spray head or replace button seal. • Water dripping from weep holes in spray bar - nozzle is not seated properly. Tighten or replace nozzle. If leak doesn't stop, replace spray bar and nozzles.
Water dripping from weep hole on thru-shaft motor high pressure hose connection.	• Swivel nut is loose. Hand tighten swivel nut. • Swivel seal is worn or damaged. Remove and replace worn or damaged seal. • Cracked swivel or thru-shaft. Remove and inspect shaft assembly. Replace damaged or cracked components.
Low blasting pressure at nozzles.	• Power system engine speed is too low. Raise engine speed. • Pressure control valve is not working properly. Repair Valve • Worn or blown nozzles. Change nozzles. • Nozzles are leaking. Tighten or replace nozzles. • Oversized nozzles. Refer to chart to correct nozzle pattern. • Water leaks in UHP hoses, fittings. Tighten loose fittings or replace defective hoses and damaged fittings. • Worn or missing button seal between spray bar and shaft. Replace button seal. • Swivel seal is worn or damaged. Replace damaged swivel seal. • Swivel shaft is cracked. Replace damaged swivel shaft.

PROBLEM	CAUSE AND SOLUTION
Vacuum System	
Vacuum loss or failure.	• Vacuum blower is not engaged. Activate power system vacuum blower. • Vacuum system on power supply has a problem and is not operating properly. Troubleshoot and repair vacuum system on power supply. • Vacuum RPM not high enough. Adjust RPM higher. • A vacuum hose is worn through or damaged. Replace worn or damaged vacuum hose. • Vacuum hose plugged with debris. Hit hose with dead blow hammer to breakup debris. Replace hose if necessary. • Worn or improperly adjusted shroud wear brush. Adjust or replace wear brush. • Broken vacuum hose or fitting. Inspect hose & fittings and replace any parts damaged. • Seal damaged or missing in fitting. Replace missing or damaged seal. • Vacuum line plugged with debris. Remove clogged hose, flush to remove blockage or replace with new hose if necessary

NOTES

Mobile Tool System

Mobile Tool System

Rubber Hammer
#2 or #4 Hammer
2 Grease Guns with hose
Brass Wire Brush (Big and Small)
Putty Knife/Scraper
12" or 15" Pipe Wrench
Torque Wrench (50 foot lbs.) 3/8" Drive
Feeler Gauges
60-96 Piece Socket Set
Utility Knife (3 pieces)
Tool Box
6 Piece Screw Driver Set
Open End Wrench Set - 1/4"-7/8"
Needle Nose Pliers
Snap Ring Pliers
15" Crescent Wrench (adjustable)
12" Crescent Wrench (adjustable)
12" Channel Lock Pliers
Triangle Metal File (Small)
Pick Set (Dental Pick Type)
Allen Wrench Set (Standard and Metric)
Metric set must include 7mm allen
Deep Socket for Thru-Shaft - 1 1/8"
Deep Socket for Thru-Shaft - 15/16"
Brake Parts Cleaner (3 cans)
Scotch Bright Scratch Pads (Red)
Open End Wrench - 15/16"
Converter 3/8" to 1/2" for Torque Wr.
The mobile tool system has been designed as a complete system of tools required for the Stripe Hog. To reduce unnecessary downtime always ensure your mobile tool system is complete during the Pre-Operational checklist

Ground Hog Spare Parts Kit

Hog Technologies offers a spare parts kit for the Ground Hog waterblasting Tool. This comprehensive kit includes all parts and seals that routinely need to be replaced.

The parts kit is available at www.striphogsupport.com or by contacting Waterblasting Customer Service.

PRE-OP CHECK LIST

Mobile Spare Parts and Tool System

- ☐ Mobile Spare Parts System Complete
- ☐ Mobile Tool System Complete

Fluid Levels

- ☐ Power System Fluid Levels
- ☐ Hydraulic Fluid Reservoir Fluid Level
- ☐ Clean Water Tank Level

Grease Points

- ☐ Thru-shaft motor Bearings
- ☐ Caster Wheel Bearings
- ☐ Caster Swivels

Hoses, Cables & Fittings

- ☐ UHP Hoses Connected & Torqued To Specifications
- ☐ Vacuum Hoses Connected Properly
- ☐ Hydraulic Hoses Connected Properly
- ☐ All Hoses Inspected For Chaffing Or Damage
- ☐ Electrical Harness & Plugs For Chaffing & Damage
- ☐ Anti-Chaffing Added If Necessary

Hog Head & Spray Bars

- ☐ Caster Wheels In Good Condition
- ☐ Spray Bar & Nozzles Correct
- ☐ Nozzles Grade 4 Or Better
- ☐ Spray Bar Cover In Place
- ☐ Swivel Seal OK
- ☐ Dirt Shield OK
- ☐ Swivel Nut Tight
- ☐ No Loose Or Damaged Components
- ☐ Wear Brush Properly Adjusted & Clamp Tight
- ☐ Standoff Height Set
- ☐ UHP System Purged If Necessary

Operational Testing

- ☐ Power System Operating Properly
- ☐ All Controls Working
- ☐ Engage/Disengage High Pressure - Verify Valve Operation
- ☐ Engage/Disengage Thru-Shaft Motor - Verify Operation
- ☐ High Pressure & Nozzle Spray Test Completed
- ☐ UHP Pressure Set
- ☐ Spray Bar Rotation Speed Set
- ☐ Verify No UHP Hose Fitting Or Component Leaks
- ☐ Verify No Vacuum Hose Or Hose Fitting Leaks
- ☐ Verify No Hydraulic Hose Or Fitting Leaks

NOTES

Waterblasting Glossary of Terms

1 Micron Cartridge Filter - Traps smaller particles that may come from the clean water tank and pass through the charge pump.

10 Micron Bag Filter – Traps larger particles that may come from the clean water tank and pass through the charge pump.

100 Micron Debris Bag – Installed in debris tank on hooks to collect debris and filter water.

Ball Valve – ON/OFF valves used to control water flow and draining tanks.

Basic Training Course – 5 days of on-site training to operate and maintain the stripe hog unit.

Bilge Box – box beneath the ultra-high pressure manifold that contains the sump to collect lubrication and cooling water from the UHP pump.

Bilge Pump – Pumps or removes the water from the bilge box to the debris tank.

Blast Head – The shroud and spray bar that deliver high pressure water to the pavement.

Blower – Pulls airflow through the vacuum system.

Brush Assembly – Attaches to the bottom of the shroud providing a partial seal between the blast head and the road surface to reduce the amount of debris and water exiting during water blasting operations.

Wear Brush Clamps – Clamps to the shroud to secure the brush and provide adjustment.

Burst Rating – The PSI at which a component will rupture.

Manual Bypass Valve – Located on the ultra-high pressure pump and used to manually adjust pressure.

Cam Lock Connector – Installed at the end of each vacuum hose fitting to secure the hose.

Castor Plate – Supports the hog head and prevents the spray bar from touching the ground.

Cavitation – Occurs when liquid is subjected to rapid changes of pressure that cause the formation of cavities in the flow of water that can damage equipment.

Charge Pressure – Pressurized water supply to the UHP pump.

Charge Pressure Gauge – Digital gauge that displays the charge pressure in PSI.

Charge Pump – Centrifugal pump that supplies water to the ultra-high pressure pump.

Chassis – Steel frame that holds the truck body and motor.

Circuit Breaker - A device for interrupting an electric circuit to prevent excessive current, as that caused by a short circuit, from damaging components in the circuit or from causing a fire.

Clean Water Level Sensor – Sensor that reads the level of water in the clean water tank and indicates the information on the PLC.

Clean Water Tank – Modular tanks located on the rear of the chassis used to store the clean water supply for the UHP system.

Cutoff Ball Valve – Located inside the debris tank as a safety feature to stop the flow of vacuum if the tank becomes full.

Debris Tank – Collects all debris removed from the road surface through the vacuum hose.

Dirt Shield – Threaded flat washer that protects the lower radial bearing of the thru-shaft from dirt and debris.

Diverter Valve – Safety feature on the ultra-high pressure pump that recirculates water to the blast head or back to the clean water tank.

Double blast head design – Allows two heads to be mounted on the hog arm and operate simultaneously

Felt Gasket – Attaches to the dirt shield to protect the shroud from damage while the spray bar is rotating.

Fill Connection – Located on the driver side of the truck and accommodates large hoses to fill the water tank.

Fill Hose – Hose used to connect fill connection to clean water source.

Fill Valve – Valve that accommodates large hoses used for filling the clean water tank.

Flapper – Installed on the top of the silencer to keep water and debris from entering the system.

Float Mode – Releases up or down hydraulic pressure on the hog arm to allow the hog head assembly to float over uneven surfaces to avoid damage to the blast head.

Forward Tank – Tank on the truck chassis reserved for the clean water tank.

GPM – Gallons per minute of water produced by the ultra-high pressure pump.

Head Rotation Speed Dial – Controls the speed of the blast heads when operating in manual mode.

Hg – Symbol that indicates inches mercury. Used to measure vacuum air flow. Maximum vacuum is -7psi

Hog Arm – 5-axis arm that raises, lowers and moves the blast heads right and left.

Hog Head Assembly – Attaches to the front of the chassis and consists of the hog arm, spray bar, shroud, wheels and casters.

Holding Tank – Area below the debris tank that catches the recovered water that drains from the 100 micron debris bag.

Impeller – The rotating internal component in a pump or blower that moves the water or air.

Inlet Port On Debris Tank – Receives water and debris from the vacuum hose connected to the shroud.

Joystick Console – Console in the cab of the truck that houses the joystick, start/stop button, head rotation speed dial, truck speed dial, and digital high pressure and charge pressure gauges, float and forward rocker switches.

Kunkle Valves – Vacuum safety relief valve that opens when there is excessive vacuum.

Manhole – Opening on the top of each clean water tank that provides access to the interior of the tank. This should always remain locked.

Manual Bypass Valve – Manual adjustment valve that releases small amounts of water back to the clean water tank to adjust pressure

Manual High Pressure Gauge – Manual gauge on the UHP pump that displays the operating pressure of the pump.

Metering Valve – Controls the flow of cooling and lubrication water to the stuffing box.

OSHA – Government agency tasked with maintaining a safe and healthy work environment.

PLC – Programmable logic controller located in the cab of the truck and displays digital information on the water blasting system.

Poly Chain Carbon Drive Belt - A high tensile strength belt designed for high horsepower industrial applications. Used to drive the UHP pump and blower.

Potable Water – Clean water that is suitable for drinking.

Pressure Switch 1/2 – Controls the head rotation hydraulic coils. If the charge water pressure drops below 30 psi the pressure switch will stop the heads from spinning.

Pressure switch 18/30 – Controls the OMSI 40K clutch. If the charge water pressure drops below 30 PSI, this pressure switch will disengage the clutch.

PSI – Pounds per square inch, a unit of pressure.

Restriction – Limit the amount of water or air that can pass through a given area.

Retaining hooks – Hooks on the inside of the debris tank used to hold the 100 micron debris bag.

RPM – Revolutions per minute. The revolutions of the engine crankshaft, pump or motor each minute.

Rupture Disc – Pressure relief device to protect equipment from over pressurization.

Shroud – The stainless steel circular component that protects the spray head from debris.

Shutoff Cartridge – Component of the diverter valve that shuts off the flow of water.

Silencer – Muffles the sound of the airflow being pulled through the vacuum blower.

Sight Tube – Clear pipe on side of the clean water tank and debris tank that indicates the level of the water.

Spray Bar – Rectangle stainless steel component that attaches to the thru-shaft and holds the nozzles.

Spray Bar Protector – Cover for the spray bar that shields the nozzles and spray bar from damage caused by debris during blasting operations.

Standoff Distance – Distance from the spray bar to the surface.

Stripe Hog – Ultra high pressure water blasting equipment manufactured by Hog Technologies to remove paint and rubber from road surfaces.

Supply Valve – Located between the clean water tank and the charge pump that is used to control the flow of water.

Swivel Nut – Locks the ultra-high pressure hose onto the thru-shaft.

Swivel Seal – Utilized to create the ultra-high pressure seal required for the ultra-high pressure hose connection.

T-Handle Adjustment Rod – Used to manually adjust the castors and wheels on the hog head assembly.

T-Handle Pin Lock System – Used on the 5-axis hog arm as a safety feature to prevent the hog arm from drifting downward while the truck is in Drive Mode.

Thru-Shaft – Hydraulic thru-shaft motor that connects and rotates the spray bar on the hog head assembly.

Two Stage Filter System – Process of the water passing through 2 filters prior to reaching the ultra-high pressure pump to reduce debris in the system.

Two Way "Y" Connector – Splitter that allows the use of two vacuum hoses from one source.

Ultra High Pressure Hose – Hose rated at 40,000 psi that connects to the thru-shaft and the ultra-high pressure pump.

Ultra High Pressure Pump (UHP Pump) – Piston type positive displacement pump that supplies ultra high water pressure to the spray bars.

Univalve – Separates the high and low pressure water in the Ultra-High Pressure pump.

Vacuum Filter – Filter cartridge inside the vacuum filter canister that traps debris in the vacuum air flow before it enters into the blower.

Vacuum Hose – 4" hose connects to the shroud at the blast head to transport airflow to the debris tank. 6" hose draws airflow from the debris tank to the filter canister.

Vacuum Hose Wear Points – Areas inside a vacuum hose that become worn and weak from abrasion created by the high velocity debris travelling inside the hose.

Ground Hog Specifications

OPERATING PRESSURE	*40,000 psi (2750 bar)*
FLOW RATE	*6.5-9.2 gallons (25-35 liters)*
CUTTING PATH	*14” (.36 m)*
WEIGHT	*105 lbs (47.6 kg)*
CLEANING CAPACITY	*500-1,500 ft 2/hr (46.5-139.4 m 2/hr)*
VACUUM	*Demand 800 CFM (22.7 cubic meters)*
MAXIMUM SPRAY BAR ROTATION SPEED	*3000 RPM*
CONSTRUCTION	*Aluminum, Stainless and Steel*

NOTES

Nozzle Configuration Chart

SPRAY BAR CONFIGURATION CHARTS FOR ALL MODELS

High Cohesive Nozzle Flow Chart - FLOW - GPM @ Pressure Indicated					
Orifice	**20KPSI**	**26KPSI**	**30KPSI**	**36KPSI**	**40KPSI**
Dia./ins	(1379 Bar)	(1723 Bar)	(2068 Bar)	(2482 Bar)	(2758 Bar)
0.005	0.08	0.09	0.09	0.10	0.11
0.006	0.11	0.12	0.13	0.15	0.15
0.007	0.15	0.17	0. 18	0. 20	0. 21
0.008	0.19	0.22	0. 24	0. 26	0. 28
0.009	0.25	0.28	0. 30	0. 33	0. 35
0.010	0.30	0.35	0. 37	0. 41	0. 43
0.011	0.37	0.42	0. 45	0. 49	0. 52
0.012	0.44	0.50	0. 54	0. 59	0. 62
0.013	0.51	0.59	0. 63	0. 69	0. 73
0.014	0.60	0.68	0. 73	0. 80	0. 84
0.015	0.68	0.78	0. 84	0. 92	0. 97

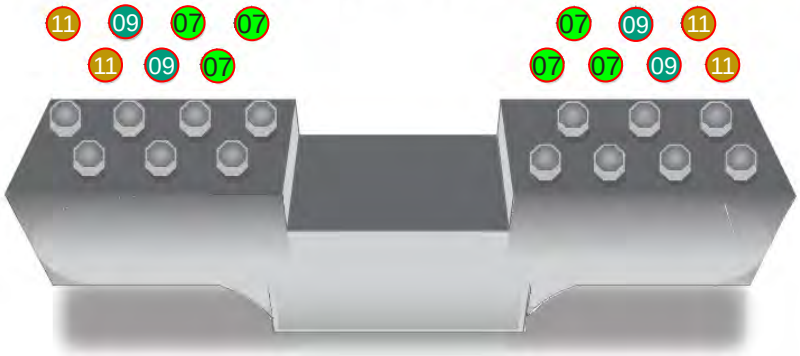
THE GPM IN EACH SETUP IS CALCULATED PER SPRAY BAR

Spray BAR Configuration Charts

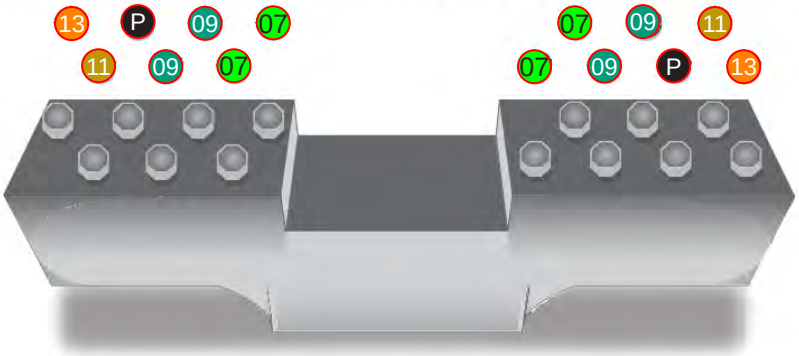
SPRAY BAR NOZZLE CONFIGURATION CHART

(These configurations are to be used as a general guide for flat line marking removal which may need to be altered to suit your situation.)

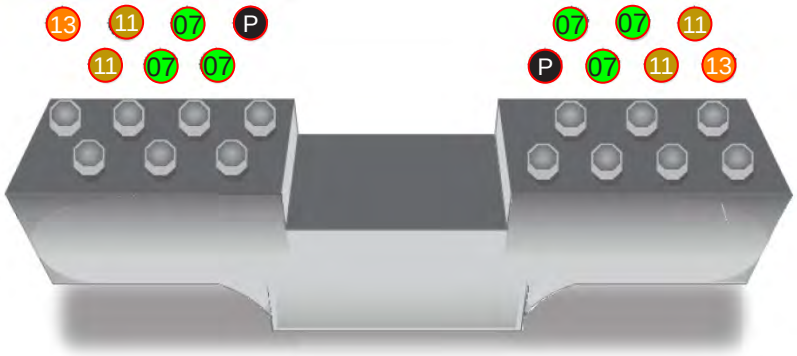
6”, 14 Nozzle Spray Bar – 4” lines – Least Aggressive 4.48 GPM @ 36K PSI / 4.74 GPM @ 40K PSI



6”, 14 Nozzle Spray Bar - 4” lines - Medium Aggressive 4.48 GPM @ 36K PSI / 4.74 GPM @ 40K PSI



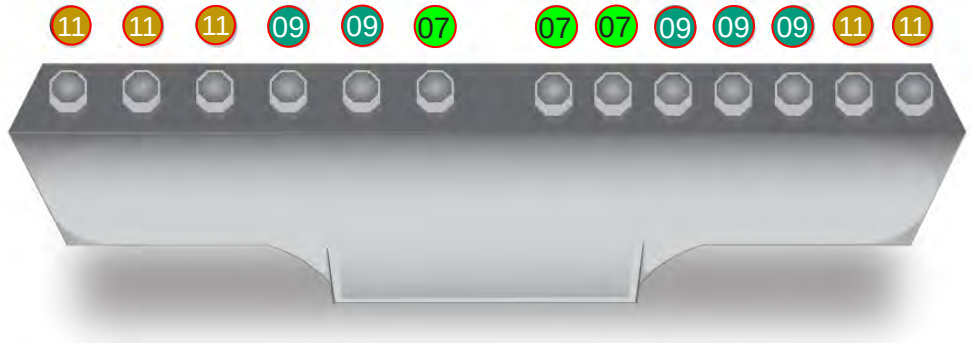
6”, 14 Nozzle Spray Bar - 4” lines - Most Aggressive 4.54 GPM @ 36K PSI / 4.8 GPM @ 40K PSI



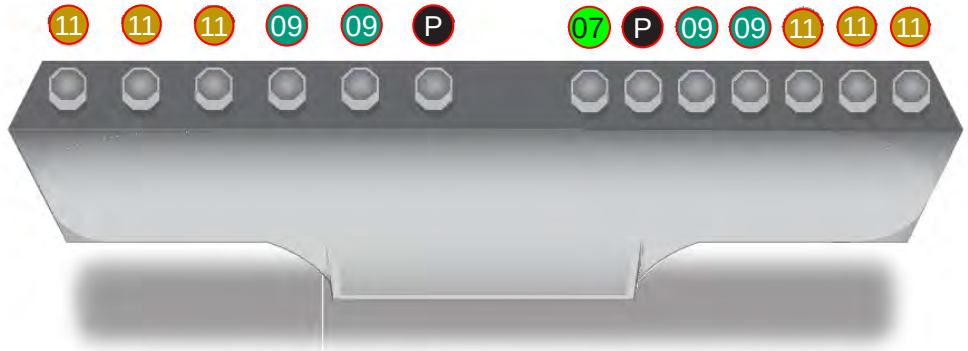
SPRAY BAR NOZZLE CONFIGURATION CHART

(These configurations are to be used as a general guide for flat line marking removal which may need to be altered to suit your situation.)

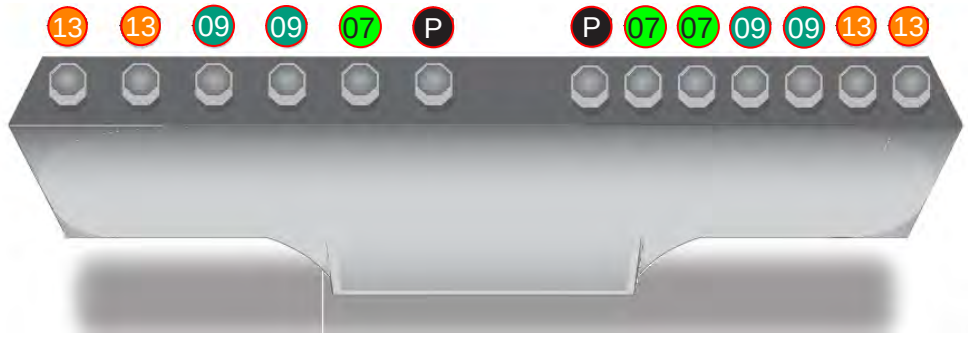
8” Least Aggressive Set Up 4.70 GPM @ 36K / 4.98 GPM @ 40K PSI



8” Medium Aggressive Set Up 4.46 GPM @ 36K / 4.73 GPM @ 40K PSI



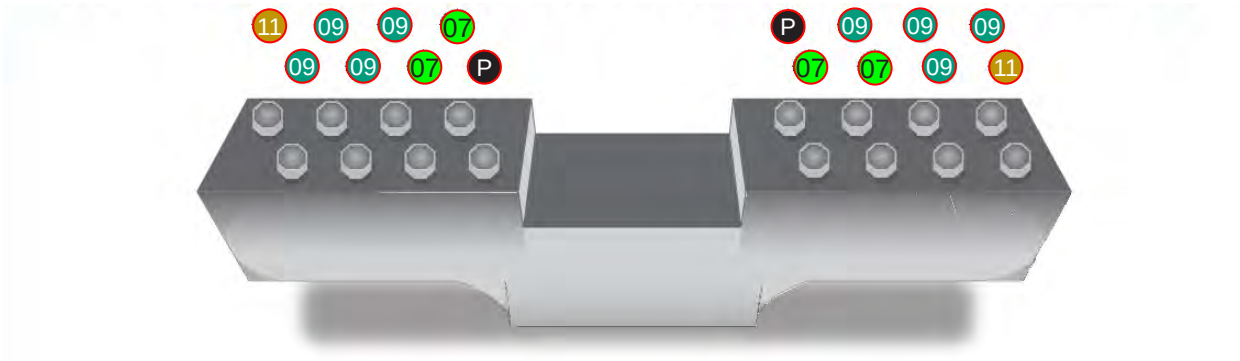
8” Most Aggressive Set Up 4.68 GPM @ 36K / 4.95 GPM @ 40K PSI



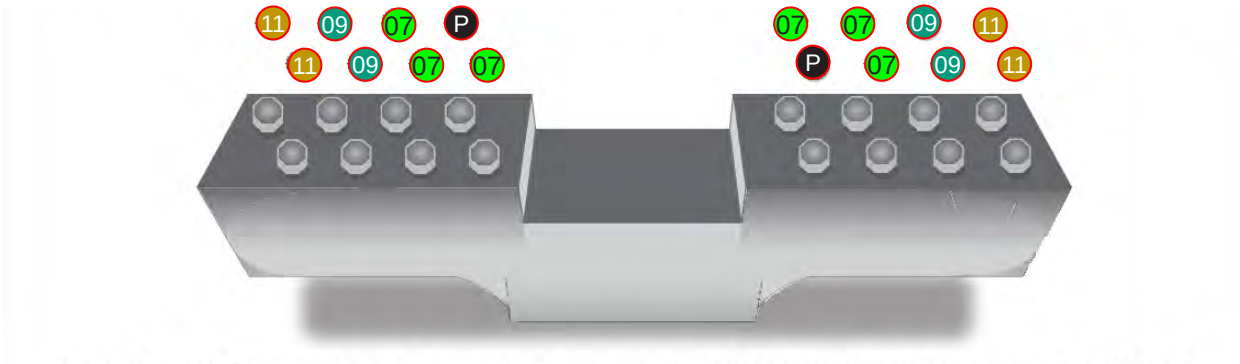
SPRAY BAR NOZZLE CONFIGURATION CHART

(These configurations are to be used as a general guide for flat line marking removal which may need to be altered to suit your situation.)

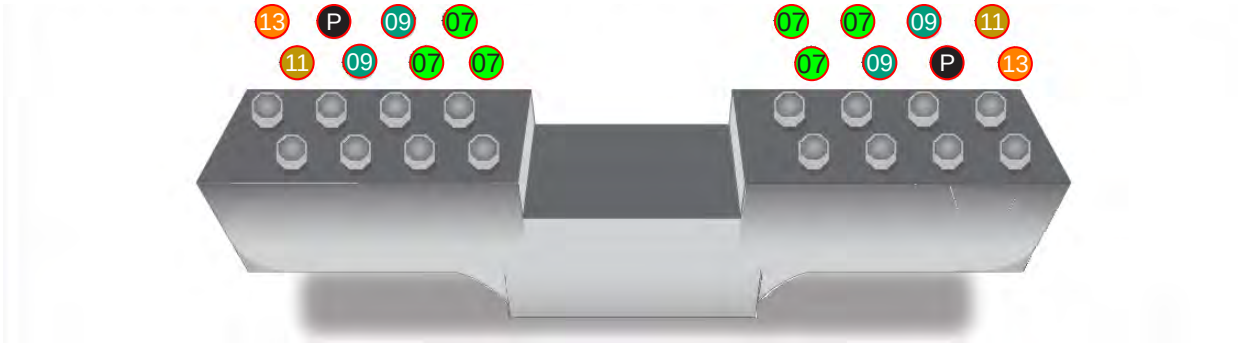
8” & 10”, 16 Nozzle - Least Aggressive Set Up 4.42 GPM @ 36K PSI / 4.68 GPM @ 40K PSI



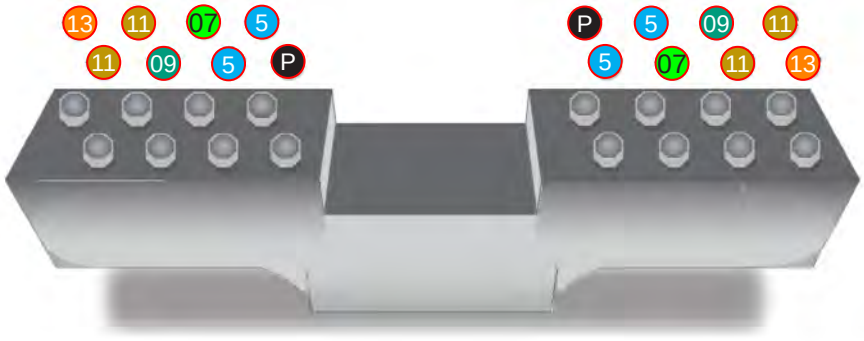
8” & 10”, 16 Nozzle - Medium Aggressive Set Up 4.48 GPM @ 36K PSI / 4.74 GPM @ 40K PSI



8” & 10”, 16 Nozzle - Most Aggressive Set Up 4.88 GPM @ 36K PSI / 5.16 GPM @ 40K PSI



8” & 10”, 16 Nozzle - Most Aggressive Set Up 4.80 GPM @ 36K PSI / 5.10 GPM @ 40K PSI



SPRAY BAR NOZZLE CONFIGURATION CHART

(These configurations are to be used as a general guide for flat line marking removal which may need to be altered to suit your situation.)

14", Least Aggressive Set Up 4.61 GPM @ 36K PSI / 4.88 GPM @ 40K PSI

14", Medium Aggressive Set Up 4.64 GPM @ 36K PSI / 4.91 GPM @ 40K PSI

14", Most Aggressive Set Up 4.68 GPM @ 36K PSI / 4.94 GPM @ 40K PSI

SPRAY BAR NOZZLE CONFIGURATION CHART

(These configurations are to be used as a general guide for rubber removal and/or curing compound removal which may need to be altered to suit your situation.)

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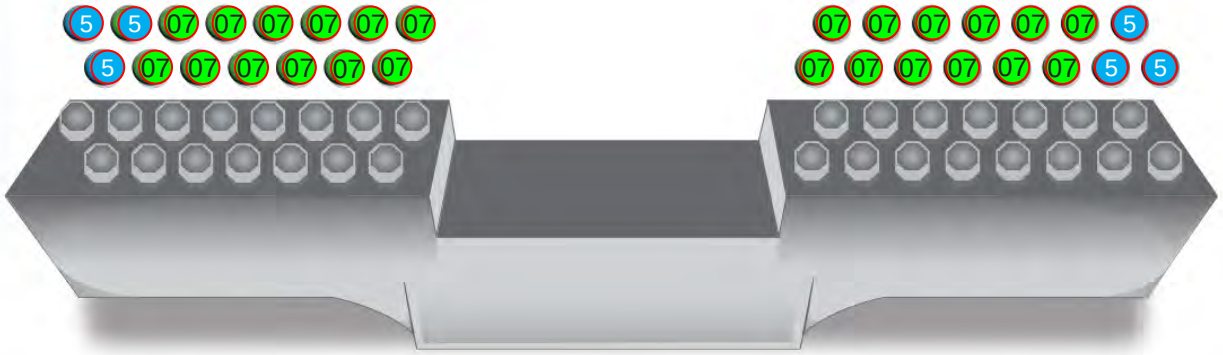
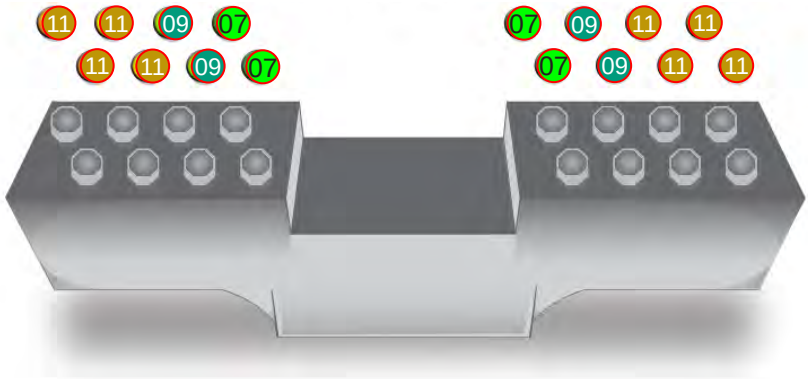
SPRAY BAR NOZZLE CONFIGURATION CHARTS FOR ALL STRIPE HOG MODELS

14”, 22” & 36”, 30 Nozzle - Rubber Removal and/or Curing Compound Removal - 30K to 33K PSI



8” & 10”, 16 Nozzle - Curing Compound Removal Set-Up - Set Up - 25K - 35K PSI



Nozzle Calculation Sheet

36K Nozzle Calculation Sheet

Size	GPM	Quantity	Total GPM

Total Accumulative GPM

40K Nozzle Calculation Sheet

Size	GPM	Quantity	Total GPM

Total Accumulative GPM

Remember to multiply the total by two if you have a two head system. The total should not exceed 11.8 gpm. If it does, you will not achieve pressure.

Remember that the total available gpm varies by 12% for individual machines.

NOTES

Customer Support

24 / 7 CUSTOMER SERVICE

Hog Technologies Customer Service Department stands ready to answer your questions and provide technical assistance 24 hours a day, 7 days a week.

Customer Service can also assist you with part orders.

Always contact Hog Technologies Customer Service Department for assistance and cross reference specifications for parts you intend to purchase locally.

PARTS

All replacement parts are available directly through Hog Technologies.

Get the parts you need when you need them.

Next day delivery is available in most locations.

Same day delivery available in some areas for parts ordered before 10 AM Eastern Standard Time

CUSTOMER SERVICE HOT LINE - (001) (772) 214-1714
www.hogtechnologies.com
www.stripehogsupport.com

Hog Technologies will not be responsible for damages or loss caused by substituted parts purchased locally or from another vendor or manufacturer.

WARNING

NEVER ATTEMPT TO USE COMMONLY AVAILABLE PLUMBING PARTS, FITTINGS, AND HOSES IN HIGH PRESSURE SYSTEMS! ALL FITTINGS TO BE USED WITH HIGH PRESSURE OPERATIONS MUST BE PROPERLY DESIGNED, STAMPED, RATED AND APPROVED BY HOG TECHNOLOGIES! FAILURE TO HEED THIS WARNING MAY RESULT IN DAMAGE TO COMPONENTS AND SEVERE INJURY OR DEATH!

Stripe Hog Support Web Site

Typical Registration & Log On Window

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