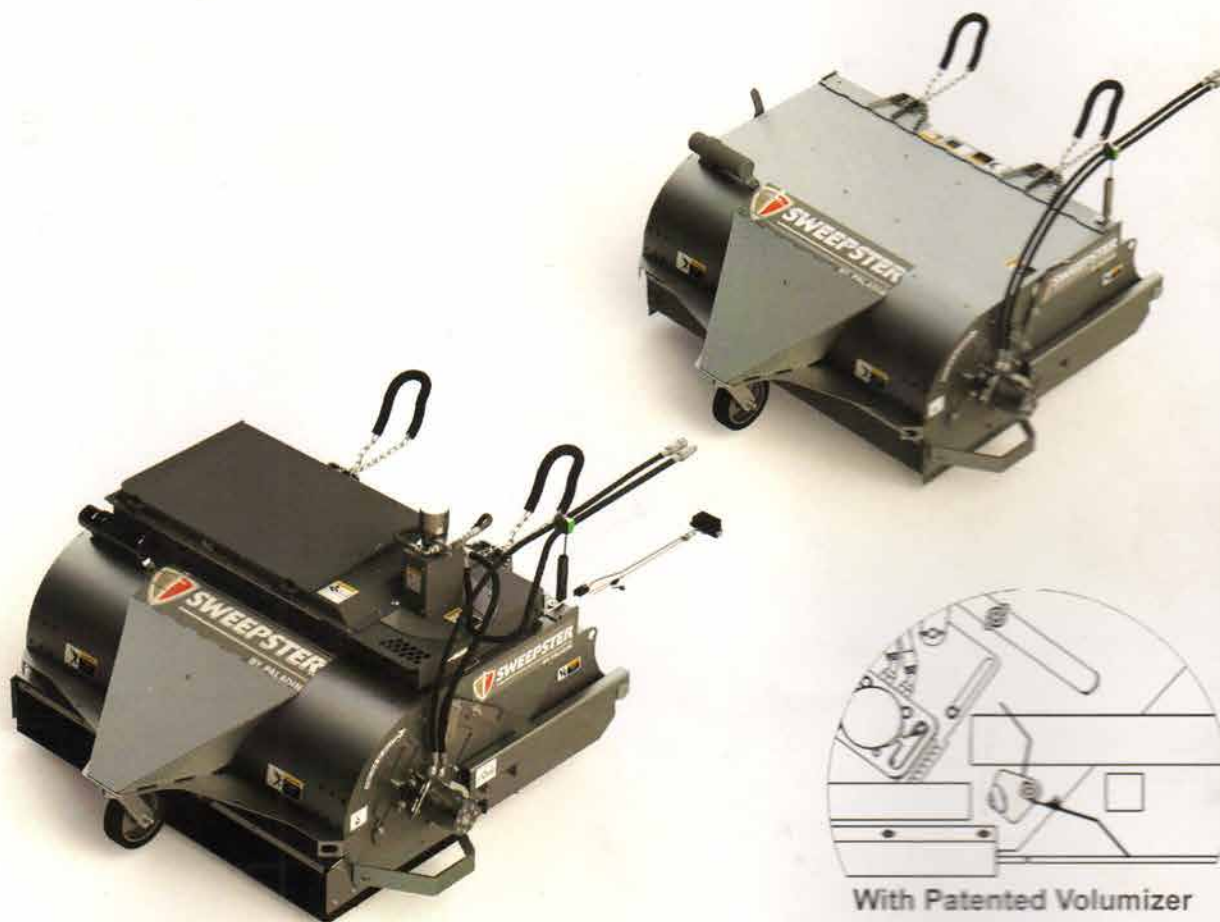




OPERATOR'S MANUAL

COLLECTION SWEEPER VRS/VSS Series



SERIAL NUMBER: _____

MODEL NUMBER: _____

With Patented Volumizer

Manual Number: 51-4019
Release Date: January 2018
Rev. 4

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PREFACE

GENERAL COMMENTS

Congratulations on the purchase of your new product! This product was carefully designed and manufactured to give you many years of dependable service. Only minor maintenance (such as cleaning and lubricating) is required to keep it in top working condition. Be sure to observe all maintenance procedures and safety precautions in this manual and on any safety decals located on the product and on any equipment on which the attachment is mounted.

This manual has been designed to help you do a better, safer job. Read this manual carefully and become familiar with its contents.

WARNING!  **Never let anyone operate this unit without reading the "Safety Precautions" and "Operating Instructions" sections of this manual. Always choose hard, level ground to park the vehicle on and set the brake so the unit cannot roll.**

Unless noted otherwise, right and left sides are determined from the operator's control position when facing the attachment.

NOTE: The illustrations and data used in this manual were current (according to the information available to us) at the time of printing, however, we reserve the right to redesign and change the attachment as may be necessary without notification.

BEFORE OPERATION

The primary responsibility for safety with this equipment falls to the operator. Make sure the equipment is operated only by trained individuals that have read and understand this manual. If there is any portion of this manual or function you do not understand, contact your local authorized dealer or the manufacturer to obtain further assistance. Keep this manual available for reference. Provide the manual to any new owners and/or operators.

SAFETY ALERT SYMBOL



This is the "Safety Alert Symbol" used by this industry. This symbol is used to warn of possible injury. Be sure to read all warnings carefully. They are included for your safety and for the safety of others working with you.

SERVICE

Use only manufacturer replacement parts. Substitute parts may not meet the required standards.

Record the model and serial number of your unit on the cover of this manual. The parts department needs this information to insure that you receive the correct parts.

SOUND AND VIBRATION

Sound pressure levels and vibration data for this attachment are influenced by many different parameters: some items are listed below (not inclusive):

- prime mover type, age, condition, with or without cab enclosure and configuration
- operator training, behavior, stress level
- job site organization, working material condition, environment

Based on the uncertainty of the prime mover, operator, and job site, it is not possible to get precise machine and operator sound pressure levels or vibration levels for this attachment.

NOTE: A list of all Paladin Patents can be found at <http://www.paladinattachments.com/patents.asp>.

SAFETY STATEMENTS



THIS SYMBOL BY ITSELF OR WITH A WARNING WORD THROUGHOUT THIS MANUAL IS USED TO CALL YOUR ATTENTION TO INSTRUCTIONS INVOLVING YOUR PERSONAL SAFETY OR THE SAFETY OF OTHERS. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN INJURY OR DEATH.



DANGER

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



WARNING

THIS SIGNAL WORD INDICATES A HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN DEATH OR SERIOUS INJURY.



CAUTION

THIS SIGNAL WORD INDICATES A HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN MINOR OR MODERATE INJURY.

NOTICE

NOTICE IS USED TO ADDRESS PRACTICES NOT RELATED TO PHYSICAL INJURY.

GENERAL SAFETY PRECAUTIONS

WARNING!



READ MANUAL PRIOR TO INSTALLATION

Improper installation, operation, or maintenance of this equipment could result in serious injury or death. Operators and maintenance personnel should read this manual, as well as all manuals related to this equipment and the prime mover thoroughly before beginning installation, operation, or maintenance. **FOLLOW ALL SAFETY INSTRUCTIONS IN THIS MANUAL AND THE PRIME MOVER'S MANUAL(S).**



READ AND UNDERSTAND ALL SAFETY STATEMENTS

Read all safety decals and safety statements in all manuals prior to operating or working on this equipment. Know and obey all OSHA regulations, local laws, and other professional guidelines for your operation. Know and follow good work practices when assembling, maintaining, repairing, mounting, removing, or operating this equipment.



KNOW YOUR EQUIPMENT

Know your equipment's capabilities, dimensions, and operations before operating. Visually inspect your equipment before you start, and never operate equipment that is not in proper working order with all safety devices intact. Check all hardware to ensure it is tight. Make certain that all locking pins, latches, and connection devices are properly installed and secured. Remove and replace any damaged, fatigued, or excessively worn parts. Make certain all safety decals are in place and are legible. Keep decals clean, and replace them if they become worn or hard to read.

GENERAL SAFETY PRECAUTIONS

WARNING!



PROTECT AGAINST FLYING DEBRIS

Always wear proper safety glasses, goggles, or a face shield when driving pins in or out, or when any operation causes dust, flying debris, or any other hazardous material.

WARNING!



LOWER OR SUPPORT RAISED EQUIPMENT

Do not work under raised booms without supporting them. Do not use support material made of concrete blocks, logs, buckets, barrels, or any other material that could suddenly collapse or shift positions. Make sure support material is solid, not decayed, warped, twisted, or tapered. Lower booms to ground level or on blocks. Lower booms and attachments to the ground before leaving the cab or operator's station.

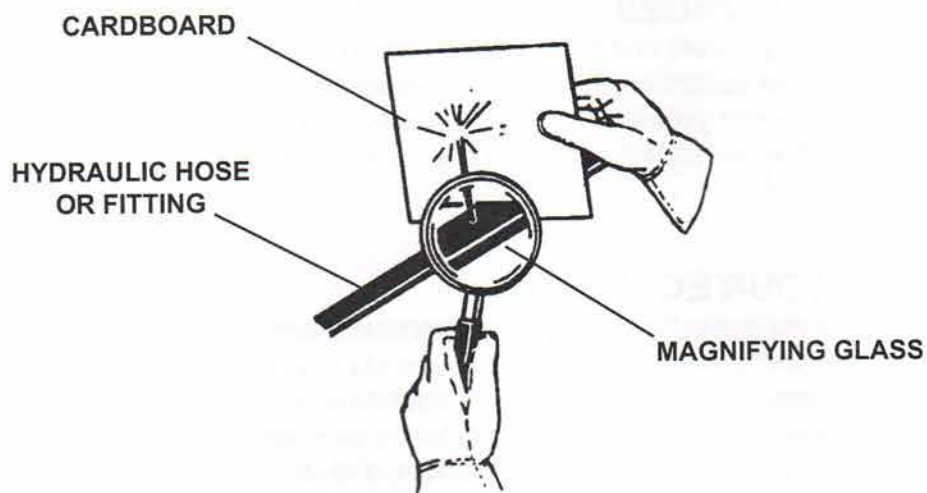
WARNING!



USE CARE WITH HYDRAULIC FLUID PRESSURE

Hydraulic fluid under pressure can penetrate the skin and cause serious injury or death. Hydraulic leaks under pressure may not be visible. Before connecting or disconnecting hydraulic hoses, read your prime mover's operator's manual for detailed instructions on connecting and disconnecting hydraulic hoses or fittings.

- Keep unprotected body parts, such as face, eyes, and arms as far away as possible from a suspected leak. Flesh injected with hydraulic fluid may develop gangrene or other permanent disabilities.
- If injured by injected fluid, see a doctor at once. If your doctor is not familiar with this type of injury, ask him to research it immediately to determine proper treatment.
- Wear safety glasses, protective clothing, and use a piece of cardboard or wood when searching for hydraulic leaks. **DO NOT USE YOUR HANDS!** SEE ILLUSTRATION.



GENERAL SAFETY PRECAUTIONS

WARNING!



DO NOT MODIFY MACHINE OR ATTACHMENTS

Modifications may weaken the integrity of the attachment and may impair the function, safety, life, and performance of the attachment. When making repairs, use only the manufacturer's genuine parts, following authorized instructions. Other parts may be substandard in fit and quality. Never modify any ROPS (Roll Over Protection Structure) or FOPS (Falling Object Protective Structure) equipment or device. Any modifications must be authorized in writing by the manufacturer.

WARNING!



SAFELY MAINTAIN AND REPAIR EQUIPMENT

- Do not wear loose clothing or any accessories that can catch in moving parts. If you have long hair, cover or secure it so that it does not become entangled in the equipment.
- Work on a level surface in a well-lit area.
- Use properly grounded electrical outlets and tools.
- Use the correct tools for the job at hand. Make sure they are in good condition for the task required.
- Wear the protective equipment specified by the tool manufacturer.



SAFELY OPERATE EQUIPMENT

Do not operate equipment until you are completely trained by a qualified operator in how to use the controls, know its capabilities, dimensions, and all safety requirements. See your machine's manual for these instructions.

- Keep all step plates, grab bars, pedals, and controls free of dirt, grease, debris, and oil.
- Never allow anyone to be around the equipment when it is operating.
- Do not allow riders on the attachment or the prime mover.
- Do not operate the equipment from anywhere other than the correct operator's position.
- Never leave equipment unattended with the engine running, or with this attachment in a raised position.
- Do not alter or remove any safety feature from the prime mover or this attachment.
- Know your work site safety rules as well as traffic rules and flow. When in doubt on any safety issue, contact your supervisor or safety coordinator for an explanation.

EQUIPMENT SAFETY PRECAUTIONS

WARNING!



KNOW WHERE UTILITIES ARE

Observe overhead electrical and other utility lines. Be sure equipment will clear them. When digging, call your local utilities for location of buried utility lines, gas, water, and sewer, as well as any other hazard you may encounter.

WARNING!



EXPOSURE TO RESPIRABLE CRYSTALLINE SILICA DUST ALONG WITH OTHER HAZARDOUS DUSTS MAY CAUSE SERIOUS OR FATAL RESPIRATORY DISEASE.

It is recommended to use dust suppression, dust collection and if necessary personal protective equipment during the operation of any attachment that may cause high levels of dust.

WARNING!



REMOVE PAINT BEFORE WELDING OR HEATING

Hazardous fumes/dust can be generated when paint is heated by welding, soldering or using a torch. Do all work outside or in a well ventilated area and dispose of paint and solvent properly. Remove paint before welding or heating.

When sanding or grinding paint, avoid breathing the dust. Wear an approved respirator. If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.

WARNING!



END OF LIFE DISPOSAL

At the completion of the useful life of the unit, drain all fluids and dismantle by separating the different materials (rubber, steel, plastic, etc.). Follow all federal, state and local regulations for recycling and disposal of the fluid and components.



OPERATING THE SWEEPER

- Do not exceed the lifting capacity of your prime mover.
- Operate only from the operator's station.
- When operating on slopes, drive up and down, not across. Avoid steep hillside operation, which could cause the prime mover to overturn.
- Reduce speed when driving over rough terrain, on a slope, or turning, to avoid overturning the vehicle.
- An operator must not use drugs or alcohol, which can change his or her alertness or coordination. An operator taking prescription or over-the-counter drugs should seek medical advice on whether or not he or she can safely operate equipment.
- Before exiting the prime mover, lower the attachment to the ground, turn off the prime mover's engine, remove the key and apply the brakes.
- Remove any large objects from the work area that could harm operator or others if thrown by sweeper.

EQUIPMENT SAFETY PRECAUTIONS



TRANSPORTING THE SWEEPER

- Travel only with the attachment in a safe transport position to prevent uncontrolled movement. Drive slowly over rough ground and on slopes.
- When transporting on a trailer: Secure attachment at recommended tie down locations using tie down accessories that are capable of maintaining attachment stability.
- When driving on public roads use safety lights, reflectors, Slow Moving Vehicle signs etc., to prevent accidents. Check local government regulations that may affect you.
- Do not drive close to ditches, excavations, etc., cave in could result.
- Do not smoke when refueling the prime mover. Allow room in the fuel tank for expansion. Wipe up any spilled fuel. Secure cap tightly when done.



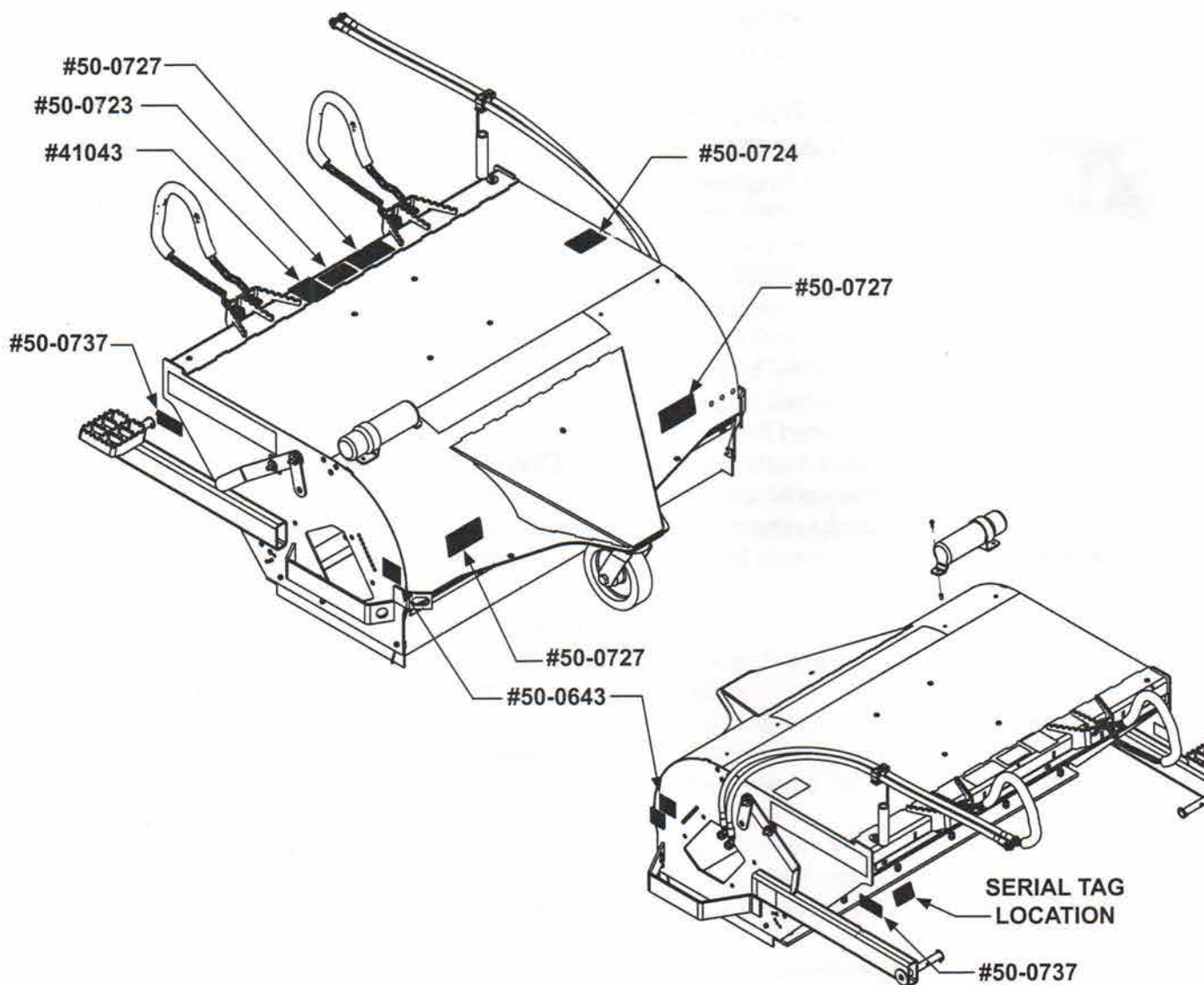
MAINTAINING THE SWEEPER

- Before performing maintenance, lower the attachment to the ground, apply the brakes, turn off the engine and remove the key.
- Never perform any work on the attachment unless you are authorized and qualified to do so. Always read the operator service manuals before any repair is made. After completing maintenance or repair, check for correct functioning of the attachment. If not functioning properly, always tag "DO NOT OPERATE" until all problems are corrected.
- Worn, damaged, or illegible safety decals must be replaced. New safety decals can be ordered from Paladin.
- Never make hydraulic repairs while the system is under pressure. Serious personal injury or death could result.
- Never work under a raised attachment.

DECALS

GENERAL INFORMATION

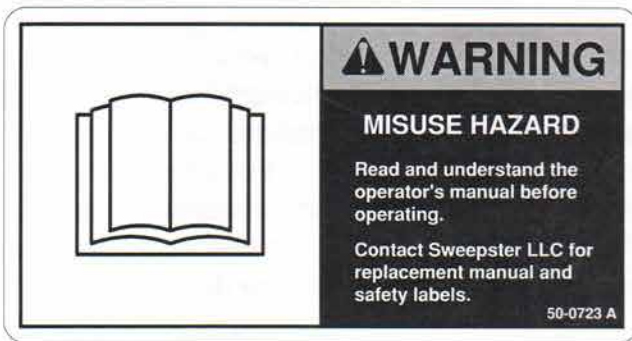
The diagrams on this page show the location of the decals used on your attachment. The decals are identified by their part numbers, with reductions of the actual decals located on the following page. Use this information to order replacements for lost or damaged decals. Be sure to read all decals before operating the attachment. They contain information you need to know for both safety and product longevity.



IMPORTANT: Keep all safety decals clean and legible. Replace all missing, illegible, or damaged safety decals. When replacing parts with safety decals attached, the safety decals must also be replaced.

REPLACING SAFETY DECALS: Clean the area of application with nonflammable solvent, then wash the same area with soap and water. Allow the surface to fully dry. Remove the backing from the safety decal, exposing the adhesive surface. Apply the safety decal to the position shown in the diagram above and smooth out any bubbles.

DECALS



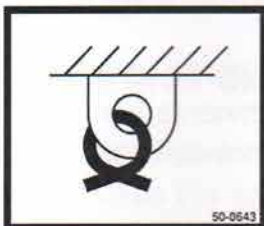
#50-0723 WARNING DECAL: MISUSE HAZARD



#50-0737 WARNING DECAL: PINCH POINT HAZARD



#50-0727 WARNING DECAL: FLYING OBJECTS



#50-0643 TIE DOWN
POINT DECAL



#50-0724 WARNING DECAL:
HIGH PRESSURE FLUID



#41043 WARNING DECAL:
HAZARDOUS DUST

**NOTE: CONTACT YOUR LOCAL DEALER FOR MODEL NUMBER
AND LOGO DECALS**

INSTALLATION

GENERAL INFORMATION

The following instructions will help you to mount your sweeper onto your prime mover. The sweeper uses the quick-attach system for ease of installation. Therefore, if you know how to attach your loader bucket, attaching the sweeper should prove no problem.

Remember to read all safety warnings, decals and operating instructions before operating the attachment. If there is any portion of this manual that you do not understand, contact your dealer.

INSTALLATION

1. Remove any attachment from the front of the prime mover.
2. Following all standard safety practices and the instructions for installing an attachment in your prime mover operator's manual, install the attachment onto your prime mover.

WARNING! To avoid serious personal injury, make sure the attachment is securely latched to the attachment mechanism of your unit. Failure to do so could result in separation of the attachment from the prime mover.



3. Lower the unit to the ground and relieve pressure to the auxiliary hydraulic lines.
4. Following the safety shut down procedure for your prime mover, shut down and exit the prime mover.
5. After making sure that the hydraulic couplers are free from any foreign material or contaminants, connect the couplers to the auxiliary hydraulic system of your prime mover.
6. Following the standard start up procedure for your prime mover, start the prime mover and run all cylinders (if so equipped) on the attachment to purge any air from the system. Check for proper hydraulic connection, hose routing and hose length.
7. Attachment installation is complete.

DETACHING

1. Before exiting the prime mover, lower the attachment to the ground, apply the brakes, turn off the prime mover's engine, and remove the key.
2. Follow prime mover operator's manual to relieve pressure in the hydraulic lines.
3. Disconnect power and return hoses from the auxiliary hydraulics.
4. Follow your prime mover operator's manual for detaching (removing) an attachment.
5. Connect hydraulic couplers together or install caps to prevent contaminants from entering the hydraulic system. Store hoses off of the ground to help prevent damage.

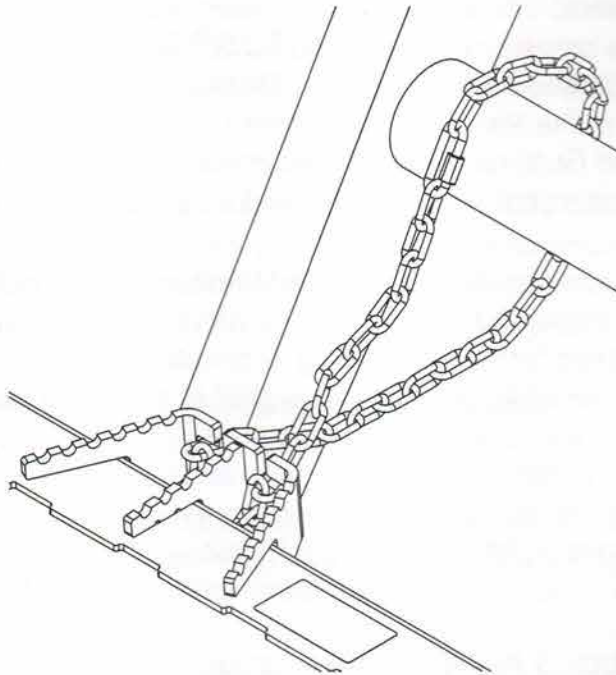
INSTALLATION

ATTACHING CHAINS

Chains connect the sweeper to the prime mover loader arms to allow for the high-dump feature of the VRS/VSS series sweeper. The sweeper can be operated without the chains installed.

1. Attach chains to prime mover grab bars using one 5/16 quick link.
2. Attach chains to sweeper using one 5/16 wide jaw quick clip per side. Leave the chains loose with equal slack in both sides. **Do not entangle hydraulic hoses.** See Figure #1

FIGURE #1



3. Connect hydraulic hoses to prime mover remote hydraulics.

CAUTION!



AVOID EQUIPMENT DAMAGE AND PERSONAL INJURY. Chains must be of equal length and long enough to keep the sweeper level during dumping. Short chains may cause the sweeper body to tip back and damage the sweeper body.

ADJUSTING CHAINS

1. Make sure chains are loose.
2. Raise the sweeper and then dump the bucket slowly. The sweeper will dump correctly if chains have the proper tension.
3. If the sweeper tips down when test dumping:
 - a. Tighten both chains by the same amount but no more than two links each.
4. Repeat steps 2 and 3 until the sweeper dumps correctly.

OPERATION

INTENDED USE

This sweeper is designed solely for use in construction cleanup, road maintenance and similar operations. Use in any other way is considered contrary to intended use. Compliance with and strict adherence to operation, service and repair conditions, as specified by the manufacturer, are essential elements of intended use.

OPERATION

Before operating verify that your sweeper is adjusted properly & is equipped for your job requirements. Check your brush pattern and make any necessary adjustments to the Volumizer according to the instructions located later in this section

VSS Series sweepers: The vacuum attachment requires that the sweeper's skirting and bucket body seals are properly adjusted and functioning. During wet or damp conditions the fan should be turned off and be sure the filter is shaken before dumping or when filter obstruction occurs. Refer to the Vacuum Attachment Operator's Manual.

Gutterbrooms: The Gutterbrooms are designed for sweeping next to curbs or walls. See Option Gutterbroom operation and adjustment instructions located later in this section.

1. Perform daily maintenance as indicated in Maintenance Schedule.
2. When operating sweeper, adhere to all government rules, local laws and other professional guidelines for your sweeping application.
3. Only operate sweeper while you are in the seat of the prime mover. With all safety devices provided on your prime mover engaged.
 - a. Only operate controls while the engine is running.
 - b. Always wear proper personal protective equipment; safety glasses, goggles or face shield; ear protection; and dust mask.
 - c. Keep hands, feet, hair and other loose clothing away from all moving parts.

WARNING! AVOID SERIOUS INJURY. Check for large objects that could harm operator or others if thrown by sweeper. Remove items before operating.



4. Learn sweeper and prime mover controls in off-road location.
5. Be sure you are in a safe area, away from traffic or other hazards.
6. Be sure all persons not operating the sweeper are clear of sweeper discharge area.
7. Check tire ratings & pressures to be sure they match the prime mover load. Weigh sweeper end of prime mover to insure proper tire rating.
8. Leave brush hood (shield) and all other shields and safety equipment in place when operating sweeper and primer mover.
9. Be aware of extra weight and width a sweeper adds. Reduce travel speed accordingly.
 - a. When sweeping on rough terrain, reduce speed to avoid "bouncing" the sweeper. Loss of steering can result.
 - b. Minimize flying debris - use slowest rotating speed that will do the job. Never sweep toward people, buildings, vehicles or other objects that can be damaged by flying debris.
 - c. Carry sweeper low to ground so operator has good visibility and stability. Avoid sudden movements from one side to the other side when you carry a sweeper.

OPERATION

10. Avoid excessive downward pressure on brush sections to prevent excessive wear. A 2 to 4 inch (5-10 cm) wide pattern is sufficient for most applications.
11. Before leaving operators area for any reason, lower sweeper to ground. Stop prime mover engine, set brakes, remove key from ignition.

OPERATING TIPS

NOTICE! *Avoid sweeper damage. Do not ram into piles. Use a dozer blade for this type of job.*

BRUSH, ENGINE & TRAVEL SPEEDS

Vary brush, engine and travel speeds to match sweeping conditions.

STUCK ON MATERIAL

When encountering stuck on material that cannot be removed by the normal operation, lower the brushes by setting the "T" handle quick pins in the lowest position. This will allow for additional down pressure to be applied for hard to sweep material.

DIRT & GRAVEL

To keep dust at a minimum, plan your sweeping for days when it is overcast and humid or after it has rained. Also, sweep so the wind blows at your back.

Low brush speeds and moderate ground speeds work best for cleaning debris from hard surfaces. Brush speeds that are too fast tend to raise dust because of the aggressive sweeper action.

To sweep gravel, use just enough brush speed to "roll" the gravel, not throw it.

HEAVY DEBRIS

For 2 inches (51mm) or more of heavy debris, a maximum brush speed in the low range and ground speeds of less than 5 mph (8 kph) are recommended.

THATCH

Low brush speeds and low prime mover speeds do the best thatching job.

To prevent the brush from pulling itself into the ground, follow the **Brush Pattern Adjustment** instructions so the bristle tips barely touch the grass.

If the brush pulls into the grass and stalls while sweeping, use the lift to raise the brush. Do not increase throttle to override a stall out.

To keep thatch from blowing back into a swept area, sweep with the wind at your back.

OPERATION

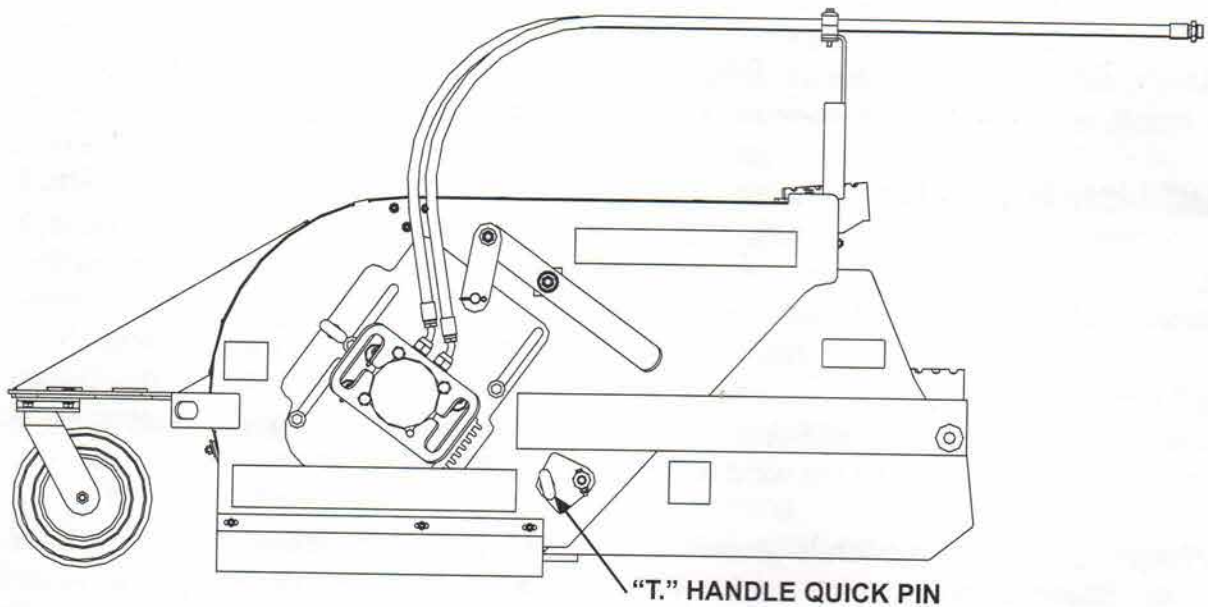
VOLUMIZER FEATURE

The Volumizer is designed to allow the level of debris to be controlled in the hopper and to prevent carry over of material.

VOLUMIZER ADJUSTMENT

As brush sections wear, the volumizer can be adjusted by pulling the "T" handle quick pin and moving it down one notch. See Figure #2

FIGURE #2



VOLUMIZER REMOVAL

To remove volumizer for pan sweeping, remove M10 screw and mounting pin from bearing side, then remove M6 screw and weld handle on motor side. Next, secure bucket and lift body to pull out volumizer.

OPERATION

BRUSH PATTERN

A properly adjusted brush offers the best sweeper performance. To check the brush pattern:

1. Move the sweeper to a dusty, flat surface.
2. Set the prime movers parking brake and leave the engine running.
3. Start the sweeper at a slow speed; then, lower it so the boom arms bottom out. Run the sweeper in a stationary position for 10 seconds.
4. Raise the sweeper and back away; switch off the engine and remove the key from the prime mover. The brush pattern left in the dust should be 2-4 inches wide, running the length of the brush. See Figure #1
5. Adjust the brush pattern as necessary according to the following instructions. See Figure #2
 - a. If the brush pattern is too wide, pull the "T" handle quick pin and move it up one notch. Repeat on the opposite side.
 - b. If the brush pattern is too narrow, pull the "T" handle quick pin and move it down one notch. Repeat on the opposite side.
 - c. Use the sight indicator to be sure sweeper brush is level at all times.
6. Repeat steps #1 through #5 until the brush pattern is 2-4 inches wide.

FIGURE #1

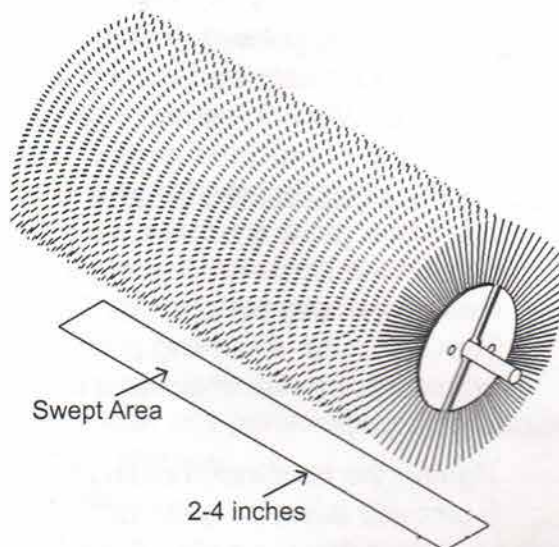
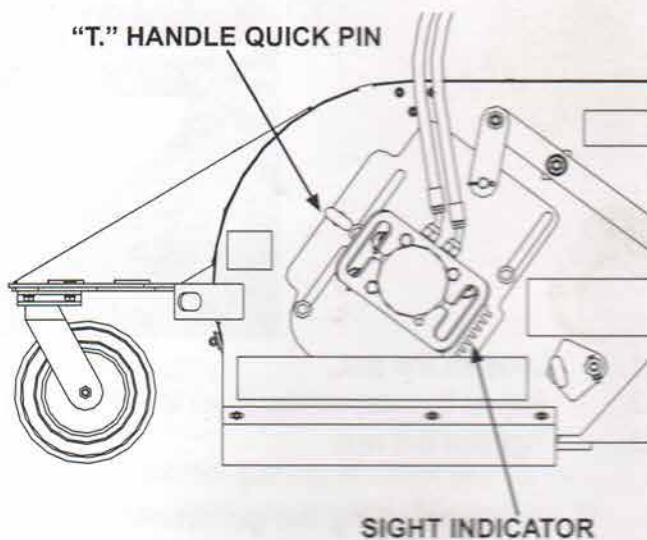


FIGURE #2



OPERATION

OPTIONAL GUTTERBROOM OPERATION

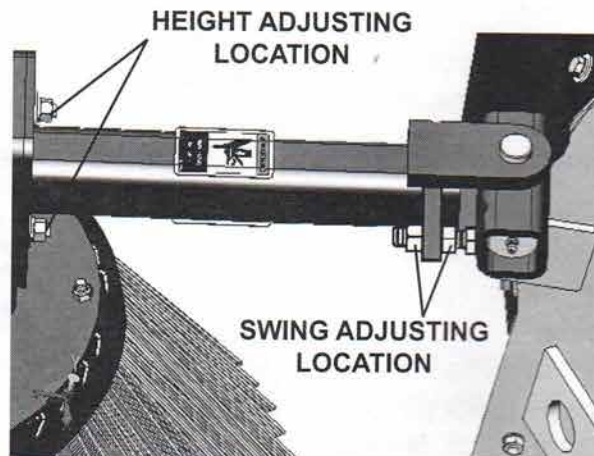
The gutterbrooms are designed for sweeping forward only. When sweeping next to curbs or walls with a gutterbroom, only the bristle tips should touch the vertical surface. When the gutterbroom height is properly adjusted, bristles contact the ground as shown.

To adjust the gutterbroom height:

1. Lower the gutterbroom to the ground.
2. Loosen the hardware holding the gutterbroom motor mounting plate.
3. Turn the motor mounting plate to the left or right.
4. Adjust the tension chain so it holds the gutterbroom in place.
5. Tighten the hardware holding the motor mounting plate.

A properly adjusted gutterbroom extends the main brush's sweeping path, leaving no streaks between the two paths. For this to happen the inside edge of the gutterbroom brush pattern must line up with the outside edge of the sweeper brush pattern.

To adjust gutterbroom swing:

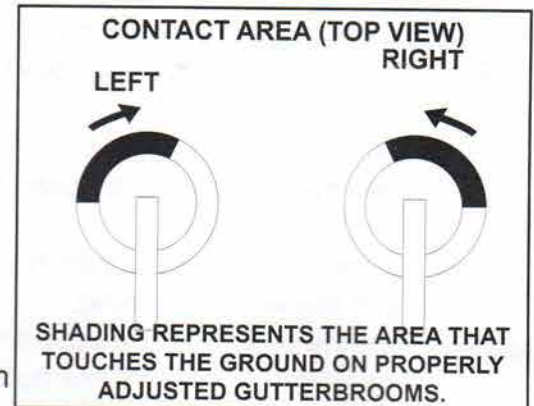


1. Loosen the nut.
2. Adjust the cap screw (turn it in for more swing or out for less swing).
3. Tighten the nut.

When not using the gutterbroom for a short period of time, adjust the tension chain until the gutterbroom is raised 1" - 2" off the ground. When not using the gutterbroom for extended periods of time, unhook the hydraulic hoses from the gutterbroom motor, remove the gutterbroom assembly and connect the hydraulic hoses to run only the main sweeper.

OPTIONAL DUST SUPPRESSION

The dust suppression systems are available for a 12 Volt or 24 Volt system and both contain a 25 gallon water tank and enough nozzles and hose to use with or without the optional gutterbrooms.



OPERATION

STORAGE

NOTICE! *Do not store the sweeper with weight on the brush. Weight will deform the bristles, destroying the sweeping effectiveness. To avoid this problem, place the sweeper on blocks or use storage stands.*

Do not store polypropylene brushes in direct sunlight. The material can deteriorate and crumble before the bristles are worn out.

Keep polypropylene brush material away from intense heat or flame.

- Clean the unit thoroughly, removing all snow, dirt and grease.
- Inspect for visible signs of wear, breakage or damage. Order any parts required and make the necessary repairs to avoid delays upon removal from storage.
- Tighten loose nuts, capscrews and hydraulic connections.
- Coat exposed portions of the cylinder rods with grease.
- Lubricate grease fittings.
- Seal hydraulic system from contaminants and secure all hydraulic hoses off the ground to help prevent damage.
- Store unit in a dry and protected place. Leaving the unit outside will materially shorten its life.

ADDITIONAL PRECAUTIONS FOR LONG TERM STORAGE:

- Touch up all unpainted surfaces with paint to avoid rust.

REMOVAL FROM STORAGE:

- Remove cover.
- Wash unit and replace any damage and/or missing parts.
- Lubricate grease fittings.
- Check hydraulic hoses for damage and replace as necessary.

LIFT POINTS

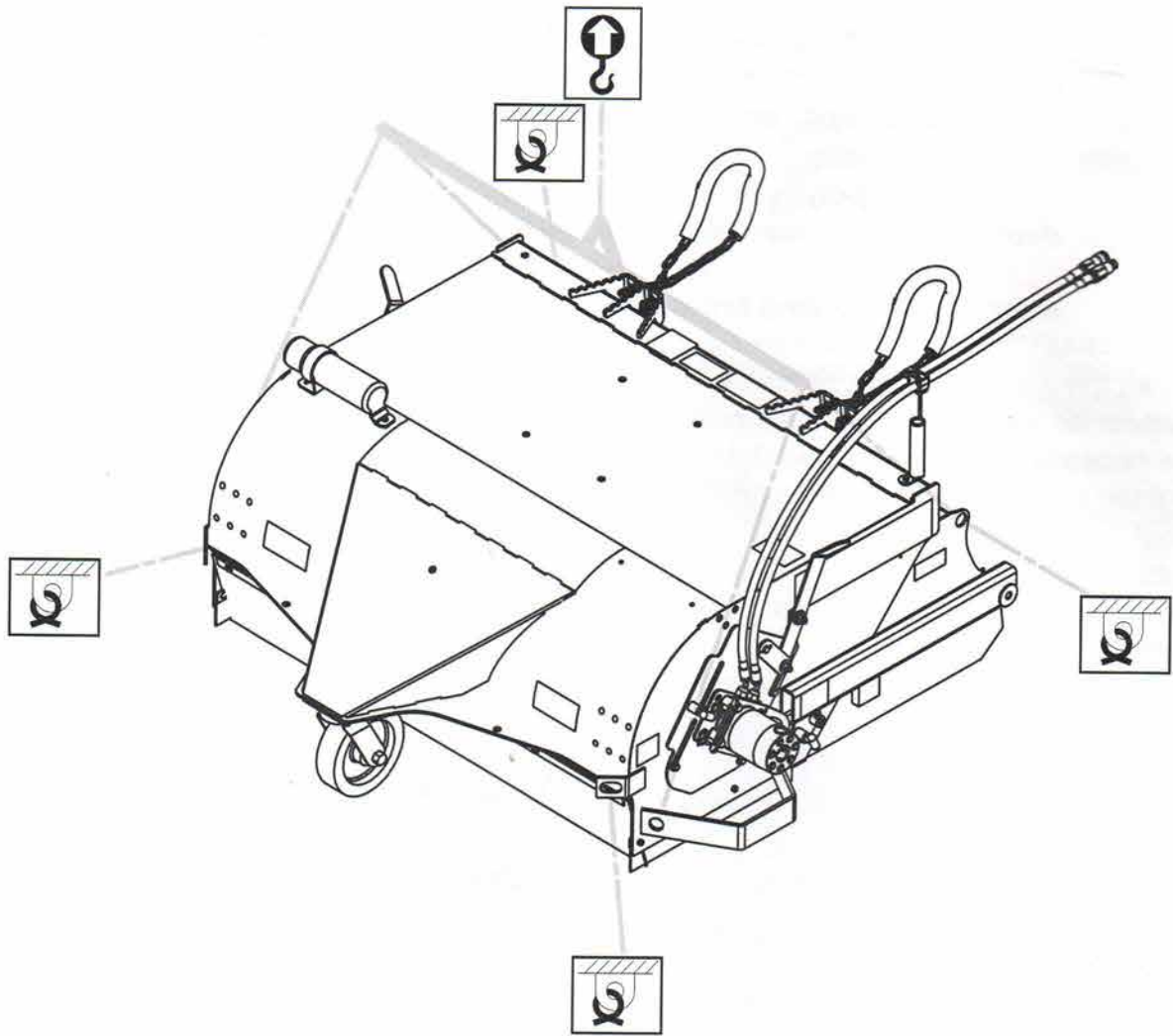
Lifting points are identified by lifting decals where required. Lifting at other points is unsafe and can damage attachment. Do not attach lifting accessories around cylinders or in any way that may damage hoses or hydraulic components.

- Attach lifting accessories to unit at recommended lifting points, if marked.
- Bring lifting accessories together to a central lifting point.
- Lift gradually, maintaining the equilibrium of the unit.

WARNING! **USE LIFTING ACCESSORIES (CHAINS, SLINGS, ROPES, SHACKLES AND ETC.) THAT ARE CAPABLE OF SUPPORTING THE SIZE AND WEIGHT OF YOUR ATTACHMENT.** Secure all lifting accessories in such a way to prevent unintended disengagement. Failure to do so could result in the attachment falling and causing serious personal injury or death.



OPERATION



TIE DOWN POINTS

Tie down points are identified by tie down decals where required. Securing to trailer at other points is unsafe and can damage attachment. Do not attach tie down accessories around cylinders or in any way that may damage hoses or hydraulic components.

- Attach tie down accessories to unit as recommended, if marked.
- Check unit stability before transporting.

WARNING!



VERIFY THAT ALL TIE DOWN ACCESSORIES (CHAINS, SLINGS, ROPES, SHACKLES AND ETC.) ARE CAPABLE OF MAINTAINING ATTACHMENT STABILITY DURING TRANSPORTING and are attached in such a way to prevent unintended disengagement or shifting of the unit. Failure to do so could result in serious personal injury or death.

TRANSPORTING

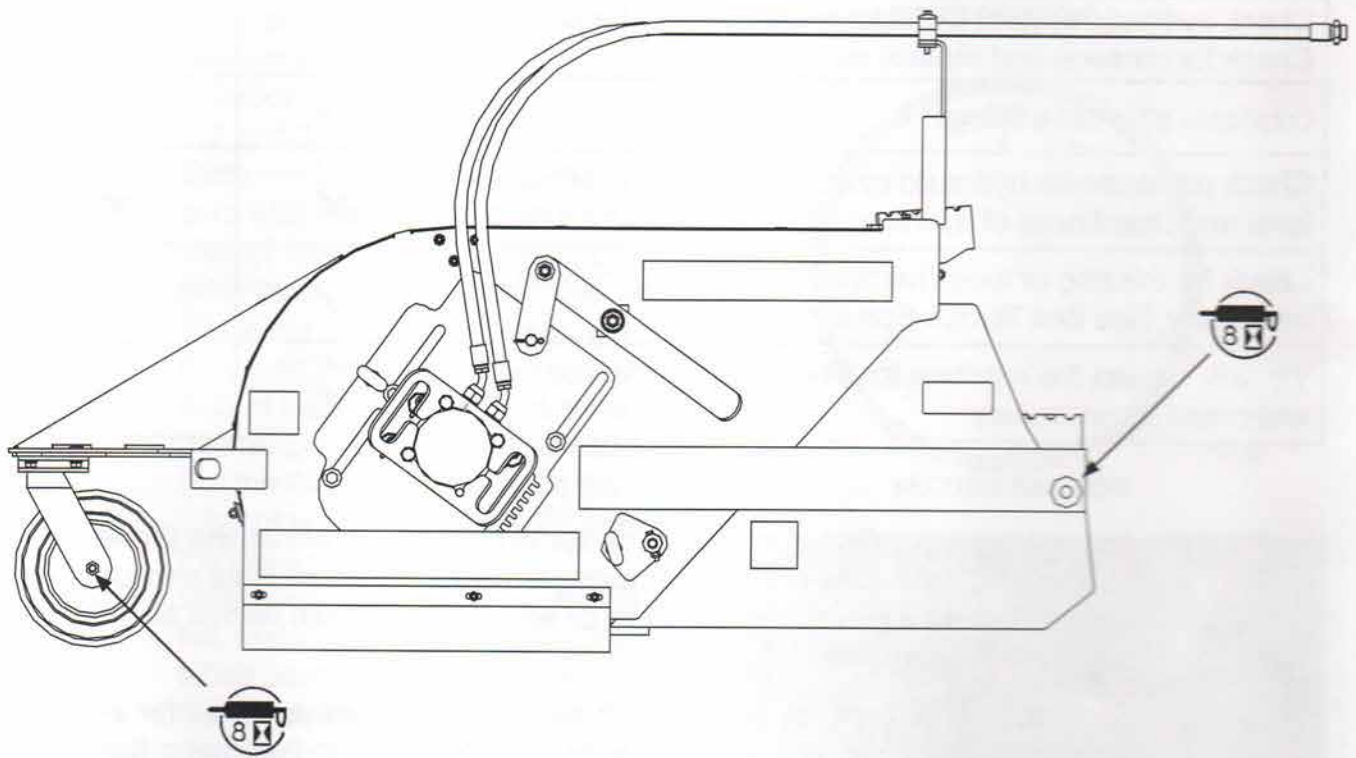
"Follow all local government regulations that may apply along with recommended tie down points and any equipment safety precautions at the front of this handbook when transporting your attachment."

LUBRICATION

LUBRICATION POINTS

The following grease fittings should be greased before each use. See figure for locations.

1. Caster (2 fittings)
2. Bucket Pivot (1 Fitting each)



OIL CLEANLINESS REQUIREMENTS

NOTICE! All hydraulic fluid shall be filtered before use in this product to obtain the ISO cleanliness standard of 17-14 or better, unless explicitly specified otherwise.

MAINTENANCE

GENERAL INFORMATION

Regular maintenance is the key to long equipment life and safe operation. Maintenance requirements have been reduced to an absolute minimum. However, it is very important that these maintenance functions be performed as described below.

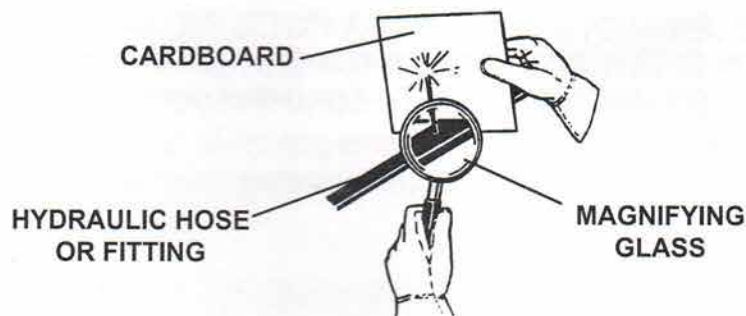
Procedure	Daily	See Prime Mover Manual
Replace any missing bolts or nuts with approved replacement parts.	✓	
Check brush pattern. See Operating Section.	✓	
Check hydraulic system for leaks and tighten as necessary. Check for damage and replace as needed.	✓	
Lubricate all grease fittings.	✓	
Check prime mover hydraulic system to ensure an adequate level and cleanliness of hydraulic oil.	✓	✓
Check for missing or loose hardware. Replace or tighten if necessary. See Bolt Torque Specifications	✓	
Visually inspect the machine for worn parts or cracked welds, and repair as necessary.	✓	

WARNING! Escaping hydraulic / diesel fluid under pressure can penetrate the skin causing serious injury. Fluid escaping from a very small hole can be almost invisible. Use a piece of cardboard or wood, rather than hands to search for suspected leaks.



Keep unprotected body parts, such as face, eyes, and arms as far away as possible from a suspected leak. Flesh injected with hydraulic fluid may develop gangrene or other permanent disabilities. If injured by injected fluid, see a doctor at once.

Stop the engine and relieve pressure before connecting or disconnecting lines. Tighten all connections before starting engine or pressurizing lines.



MAINTENANCE

REPLACING BRUSH SECTIONS

1. Remove four motor mount screws. Retain hardware for reinstallation. Remove motor mount.
2. Detach four bearing mount screws from side plate. Retain hardware for reinstallation.
3. Lift sweeper body leaving core on ground.
4. Remove the core hat plate. Retain hardware for reinstallation.
5. Remove old sections.
6. Install new sections:
 - a. Number the tubes on the core as 1, 2 and 3. See Figure #1
 - b. Slide the first section onto the core with the drive pins on either side of tube 1. Make sure that the drive pins angle up. See Figure #1
 - c. Place the second section on the core with the drive pins on either side of tube 2. Be sure the drive pins angle down. See Figure #2
 - d. Put the third section on with the drive pins around tube 3. Be sure the drive pins angle up.
 - e. Slide sections on until the core is full, making sure to alternate the tubes used and the direction of the drive pins.
7. Re-attach the core hat plate.
8. Lay core on ground. Lower body over core.
9. Re-attach the bearing plate with previously removed hardware.
10. Attach motor mount with hardware removed in step one.

FIGURE 1

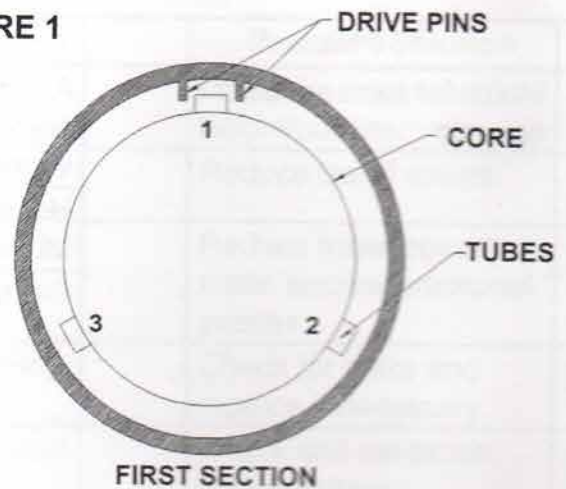
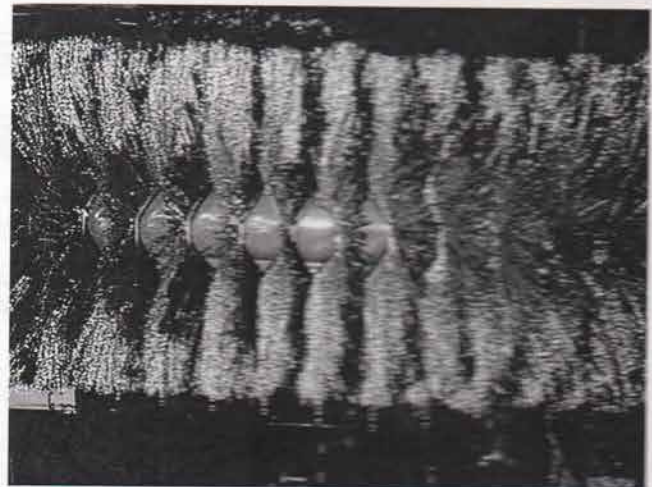
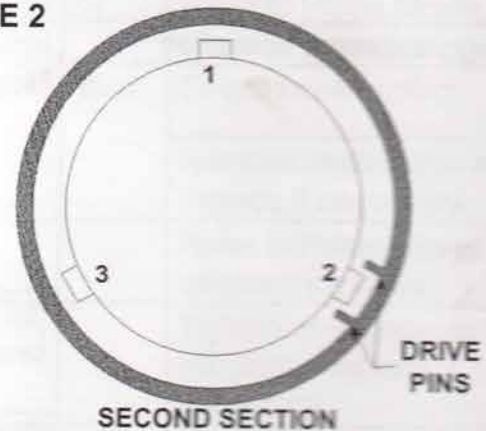


FIGURE 2



Worn Section Standard				Reference Information	
Section OD, New	Ring ID	Section OD, Worn	Exposed Bristle, Worn	Bristle Length	Exposed Bristle, New
24	6.38	17	3.8	8.50	7.5
26	8.00	18	4.0	9.00	8.0
32	10.00	22	5.0	11.00	10.0
36	10.00	24	6.0	13.00	12.0
36	10.63	25	6.0	12.89	11.4
46	19.38	34	6.0	13.31	12.1

TROUBLESHOOTING

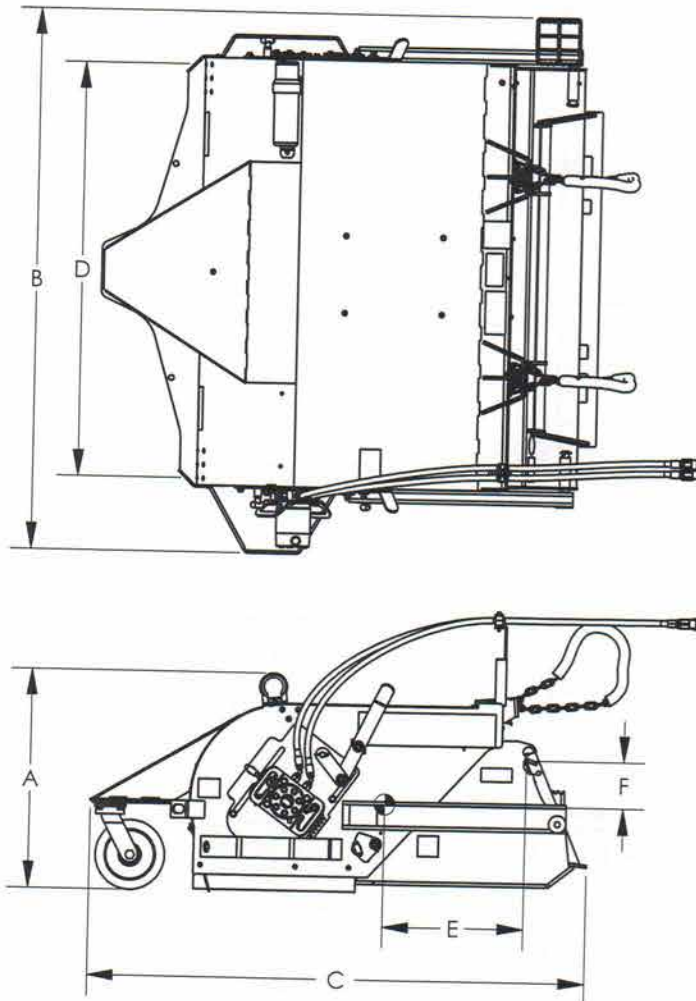
Problem	Possible Cause	Possible Solution
Motor for sweeper will not operate	Auxiliary hydraulics control on prime mover is activated in the wrong position.	Refer to Prime Mover operator's manual.
	Hoses from sweeper to Prime Mover incorrectly connected.	Refer to Prime Mover operator's manual.
	Obstruction in hydraulic line.	Check hose routing.
		Remove obstruction and replace if necessary.
	Motor failure.	Check for leaks and replace motor if necessary.
Sluggish broom operation	Insufficient oil flow from Prime Mover.	Check compatibility between sweeper hydraulic flow requirements and Prime Mover.
		Increase throttle.
	Hydraulic motor damaged or seals blown.	Check for leaks and replace motor if necessary.
	Prime Mover hydraulic filter is dirty.	Refer to Prime Mover operator's manual.
The motor runs but the broom does not run	Sheared motor shaft key.	Replace motor key.
Oil leaks from the motor	Motor seals damaged.	Replace motor shaft seal or motor if necessary.
	Seals on hydraulic fitting damaged.	Replace hydraulic fitting.
	Hydraulic fittings loose or damaged.	Tighten or replace as required.
	Hydraulic lines loose or damaged.	Tighten or replace as require.
Brush rotates in wrong directions	Hoses installed incorrectly.	Switch hoses at the motor end.

TROUBLESHOOTING

Problem	Possible Cause	Possible Solution
Brush slows or stops when sweeping	Brush pattern too wide	Check and set brush height/pattern.
	Travel speed too fast	Reduce travel speed.
	Trying to sweep too much material at once.	Reduce travel speed or make smaller/additional passes.
	Hydraulic motor is failing	Check for leaks and replace if necessary.
Brush wears very quickly	Brush pattern is too wide	Check and set brush height/pattern.
Excessive hydraulic oil temperature	Low hydraulic oil level on the prime mover	Refer to Prime Mover operator's manual.
	Hydraulic hoses are obstructed	Check hose routing.
		Remove obstruction and replace if necessary.
	Hydraulic oil is dirty	Refer to Prime Mover operator's manual.
	Quick couplers are loose	Tighten or engage quick couplers. Replace if necessary.
Hydraulic quick coupler leaks	Quick coupler poppet is unseated	Tighten or replace quick couplers.
Cylinder speed too slow	Manifold failure.	Replace. (Call Service Department)
	Hoses pinched or obstructed.	Check hose routing, remove obstruction and replace if necessary.
Brush not touching ground before cutting edge	Brush "T" handle quick pins set too high.	Check brush pattern and install "T" handle quick pins.
Dust escaping from sweeper	Skirting flaps or seals damaged	Replace as necessary.

SPECIFICATIONS

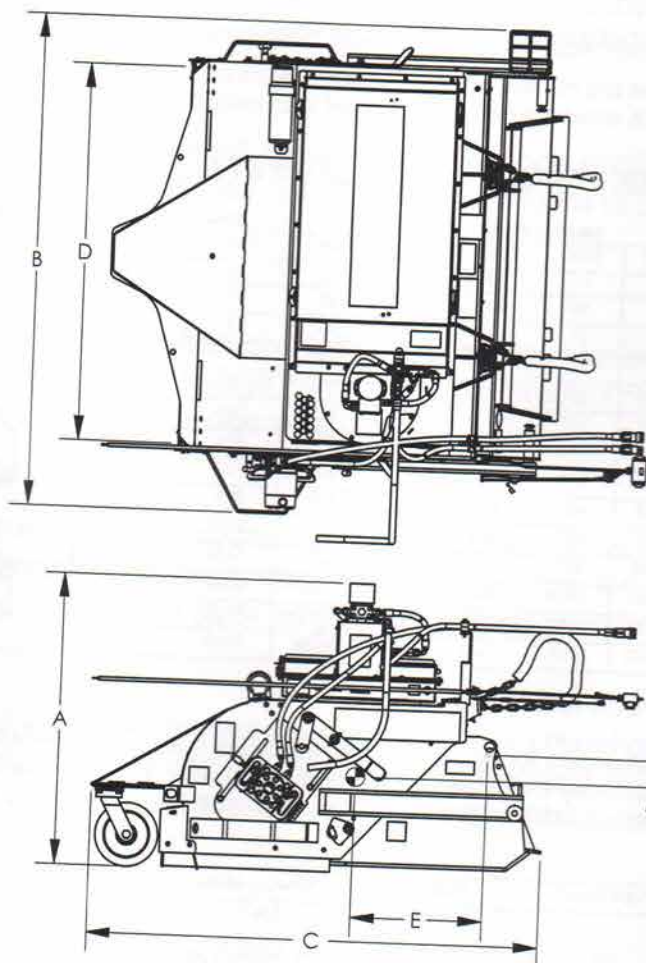
VRS Pickup Brooms



DESCRIPTION	7'	8'	9'
A. Overall Height	31.70"	31.70"	31.70"
B. Overall Width	78.50"	90.50"	102.50"
C. Overall Length	72.50"	72.50"	72.50"
D. Sweeping Width	60.00"	72.00"	84.00"
E. Center of Gravity (Horizontal)	20.50"	20.30"	20.20"
F. Center of Gravity (Vertical)	6.70"	6.70"	6.70"
Weight (lbs)	1150#	1275#	1400#
Hydraulic Flow - 25 CID Motor 12-25 GPM Maximum Pressure - 25 CID Motor 3000 PSI SPECIFICATIONS AND DESIGN ARE SUBJECT TO CHANGE WITHOUT NOTICE AND WITHOUT LIABILITY THEREFOR.			

SPECIFICATIONS

VSS Pickup Brooms



DESCRIPTION	7'	8'	9'
A. Overall Height	46.50"	46.50"	46.50"
B. Overall Width	78.50"	90.50"	102.50"
C. Overall Length	72.50"	72.50"	72.50"
D. Sweeping Width	60.00"	72.00"	84.00"
E. Center of Gravity (Horizontal)	21.00"	20.90"	20.80"
F. Center of Gravity (Vertical)	4.20"	4.30"	4.40"
Weight (lbs)	1400#	1525#	1650#
Hydraulic Flow - 25 CID Motor 12-25 GPM Maximum Pressure - 25 CID Motor 3000 PSI			
SPECIFICATIONS AND DESIGN ARE SUBJECT TO CHANGE WITHOUT NOTICE AND WITHOUT LIABILITY THEREFOR.			

BOLT TORQUE SPECIFICATIONS

GENERAL TORQUE SPECIFICATION TABLES

Use the following charts when determining bolt torque specifications, when special torques are not given. Always use grade 5 or better when replacing bolts.

SAE BOLT TORQUE SPECIFICATIONS

Note: The following torque values are for use with extreme pressure lubricants, plating or hard washer applications. Increase torque 15% when using hardware that is unplated and either dry or lubricated with engine oil.

		SAE GRADE 5 TORQUE				SAE GRADE 8 TORQUE				Bolt head identification marks as per grade. NOTE: Manufacturing Marks Will Vary
Bolt Size		Ft-lbs		Newton-Meter		Ft-lbs		Newton-Meter		
Inches	mm	UNC	UNF	UNC	UNF	UNC	UNF	UNC	UNF	
1/4	6,35	8	9	11	12	10	13	14	18	
5/16	7,94	14	17	19	23	20	25	27	34	
3/8	9,53	30	36	41	49	38	46	52	62	
7/16	11,11	46	54	62	73	60	71	81	96	
1/2	12,70	68	82	92	111	94	112	127	152	
9/16	14,29	94	112	127	152	136	163	184	221	
5/8	15,88	128	153	174	207	187	224	254	304	
3/4	19,05	230	275	312	373	323	395	438	536	
7/8	22,23	340	408	461	553	510	612	691	830	
1	25,40	493	592	668	803	765	918	1037	1245	
1-1/8	25,58	680	748	922	1014	1088	1224	1475	1660	
1-1/4	31,75	952	1054	1291	1429	1547	1700	2097	2305	
1-3/8	34,93	1241	1428	1683	1936	2023	2312	2743	3135	
1-1/2	38,10	1649	1870	2236	2535	2686	3026	3642	4103	


Grade 2



Grade 5



Grade 8



METRIC BOLT TORQUE SPECIFICATIONS

NOTE: The following torque values are for use with metric hardware that is unplated and either dry or lubricated with engine oil. Reduce torque 15% when using hardware that has extreme pressure lubricants, plating or hard washer applications.

Bolt head identification marks as per grade.		
		

Bolt Size	Grade No.	Pitch (mm)	Ft-lbs	Newton-Meter	Pitch (mm)	Ft-lbs	Newton-Meter
M6	5.6	1,0	3.6-5.8	4.9-7.9	-	-	-
	8.8		5.8-4	7.9-12.7		-	-
	10.9		7.2-10	9.8-13.6		-	-
M8	5.6	1,25	7.2-14	9.8-19	1,0	12-17	16.3-23
	8.8		17-22	23-29.8		19-27	25.7-36.6
	10.9		20-26	27.1-35.2		22-31	29.8-42
M10	5.6	1,5	20-25	27.1-33.9	1,25	20-29	27.1-39.3
	8.8		34-40	46.1-54.2		35-47	47.4-63.7
	10.9		38-46	51.5-62.3		40-52	54.2-70.5
M12	5.6	1,75	28-34	37.9-46.1	1,25	31-41	42-55.6
	8.8		51-59	69.1-79.9		56-68	75.9-92.1
	10.9		57-66	77.2-89.4		62-75	84-101.6
M14	5.6	2,0	49-56	66.4-75.9	1,5	52-64	70.5-86.7
	8.8		81-93	109.8-126		90-106	122-143.6
	10.9		96-109	130.1-147.7		107-124	145-168
M16	5.6	2,0	67-77	90.8-104.3	1,5	69-83	93.5-112.5
	8.8		116-130	157.2-176.2		120-138	162.6-187
	10.9		129-145	174.8-196.5		140-158	189.7-214.1
M18	5.6	2,0	88-100	119.2-136	1,5	100-117	136-158.5
	8.8		150-168	203.3-227.6		177-199	239.8-269.6
	10.9		175-194	237.1-262.9		202-231	273.7-313
M20	5.6	2,5	108-130	146.3-176.2	1,5	132-150	178.9-203.3
	8.8		186-205	252-277.8		206-242	279.1-327.9
	10.9		213-249	288.6-337.4		246-289	333.3-391.6

PARTS

In order to provide you with the most UP-TO-DATE part information, all parts for this attachment have been moved to our website at **www.paladinattachments.com/Manuals**. Please use these diagrams and parts lists to locate replacement parts.

When servicing your attachment, remember to use only original manufacturer replacement parts. Substitute parts may not meet the standards required for safe, dependable operation.

To facilitate parts ordering when contacting the factory, please have the product control number (PCN or C/N) or model and serial number of your product ready to ensure that you receive the correct parts for your specific attachment.

The product control number, model and serial number for your attachment should be recorded in the space provided on the cover of this manual. This information may be obtained from the serial number identification plate located on your attachment.

NOTE: Most daily and emergency parts orders (in stock) received by 10:30 A.M. (Eastern Standard Time) will be shipped UPS Ground the same day received. UPS Next Day orders must be received by 1:30 PM (Eastern Standard Time.)

SERVICE DEPARTMENT

(734) 996-9116

(800) 456-7100

For Fax and E-mail Orders

PLC_Sales@paladinattachments.com

(734) 996-9014

WARRANTY

In order to provide you with the most UP-TO-DATE Warranty information, Paladin Warranty Statement and Warranty Procedures along with Warranty Registration and Claim Forms have been moved to our website at **www.paladinattachments.com**.