OPERATOR'S MANUAL

COLLECTOR SWEEPER
203 & 204 CS/VCS SERIES

MANUFACTURED BY:

PALADIN ATTACHMENTS
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Manual Number: 51-4034-CASE
Rev. 3
November 2018

SERIAL NUMBER:_____

MODEL NUMBER:_____

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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 forward.

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.

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.

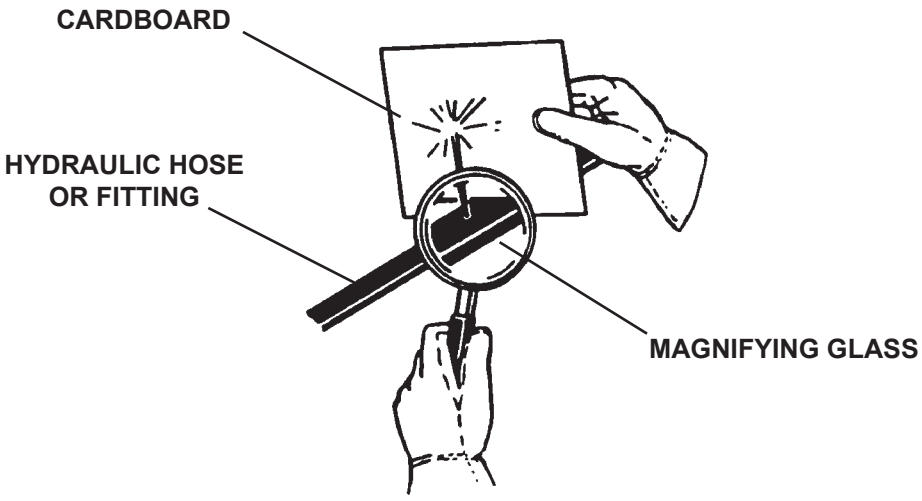
WARNING! **LOWER OR SUPPORT RAISED EQUIPMENT**

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 Protective 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 ATTACHMENT

- 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, apply the brakes, turn off the engine and remove the key

EQUIPMENT SAFETY PRECAUTIONS

TRANSPORTING THE ATTACHMENT

- 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 ATTACHMENT

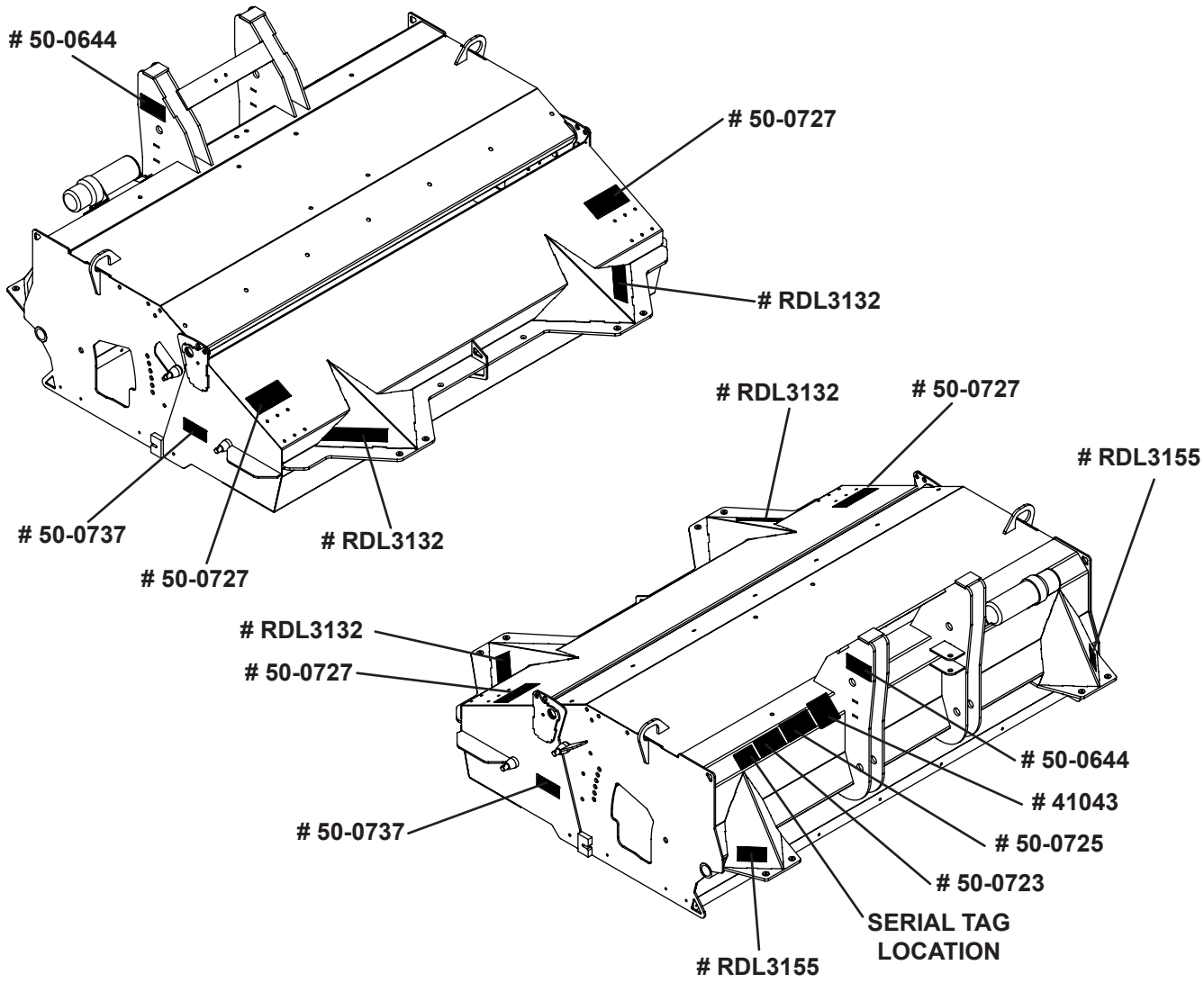
- Before performing maintenance lower the attachment to the ground, apply the brakes, turn off the engine and remove the key.
- Never perform any work on the attachment unless you are authorized and qualified to do so. Always read the operator service manuals before any repair is made. After completing 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

DECAL PLACEMENT

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. Safety decals are available, free of charge, from your local dealer or Paladin.

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

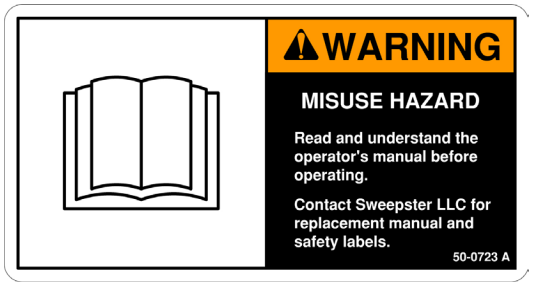
 # 41043 WARNING! HAZARDOUS DUST

 # 50-0727 WARNING! FLYING OBJECTS

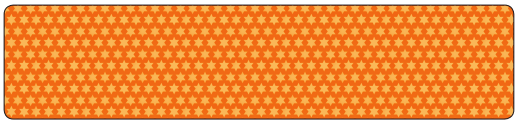
 # 50-0644 WARNING! PINCH AREA

 # 50-0725 WARNING! HIGH PRESSURE FLUID

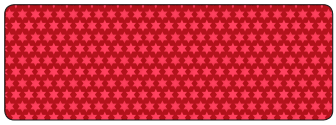
 # 50-0737 WARNING! PINCH POINT HAZARD



 # 50-0723 WARNING! MISUSE HAZARD



 # RDL3132 - REFLECTIVE TAPE - AMBER



 # RDL3155 - REFLECTIVE TAPE - RED

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. 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

NOTICE! Lubricate all grease fittings before connecting this product to your prime mover's hydraulic system. Refer to Lubrication page and follow the instructions.

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 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.

OPTIONAL SPRINKLER KITS INSTALLATION

See instructions provided with your Sprinkler Kit.

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.

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.

BEFORE USE

Run prime mover and sweeper at low idle. Check for hydraulic leaks or other problems, make corrections, if necessary, before using sweeper.

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

CONTROLS

STARTING AND STOPPING THE SWEEPER

The sweeper use the prime mover hydraulic flow to operate. To start the brush, turn on the prime mover auxiliary hydraulics. To stop the brush, turn off the auxiliary hydraulic flow. To avoid motor damage, do not stop the sweeper at high engine speed. Decrease engine RPM before turning off the hydraulic flow.

TO DUMP HOPPER

NOTICE! AVOID SWEEPER DAMAGE. Ensure there is adequate clearance before dumping to allow hopper movement. Avoid hitting objects with the hopper.

Empty the debris by raising the sweeper directly above the container and reversing the auxiliary hydraulic flow to the sweeper. This will extend the cylinders on the hopper, therefore dumping the collected material. Engage the forward hydraulic flow to close the hopper.

DIRECTING DEBRIS

Observe wind direction. Sweeping with the wind makes sweeping more effective and helps keep debris off the operator.

BRUSH, ENGINE & TRAVEL SPEEDS

NOTICE! AVOID SWEEPER DAMAGE. Reduce travel speed to avoid hitting immovable objects.

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

OPERATING

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.

Avoid excessive downward pressure on brush sections to prevent excessive wear. A 2” – 4” (5-10 cm) wide pattern is sufficient for most applications. Ensure that motor and bearing plates are equally adjusted to prevent uneven wear pattern.

The terms *swing* and *angle* are used interchangeably.

OPERATION

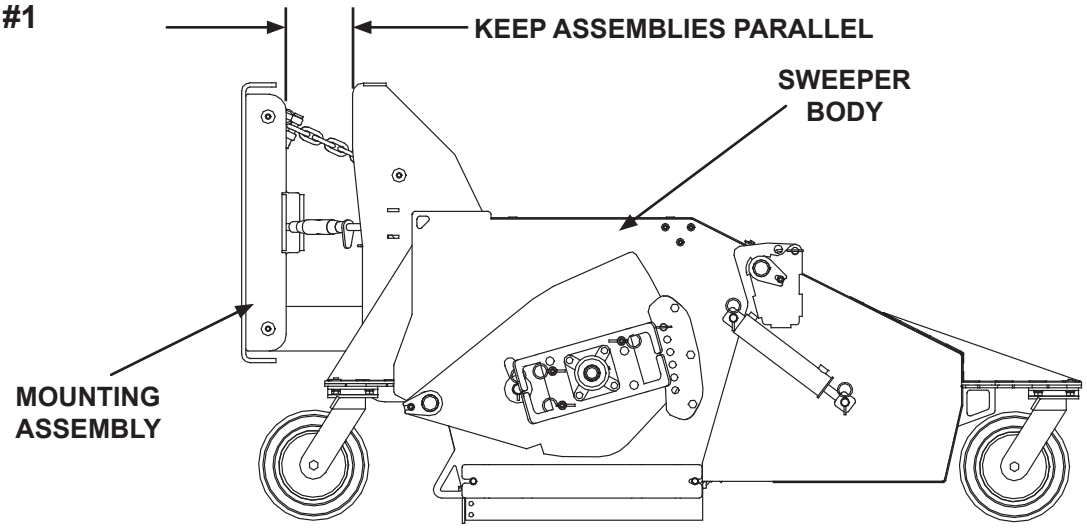
1. Perform daily maintenance as indicated in the Maintenance Schedule.
2. When operating attachment, adhere to all government rules, local laws and other professional guidelines for your application.
3. Only operate attachment while you are in the seat of the prime mover. With all safety devices provided on your prime mover engaged.
   a. Only operate controls while the engine is running.
   b. Always wear proper 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.
   c. Keep hands, feet, hair, and other loose clothing away from moving parts.
4. Learn attachment controls in off-road location, away from traffic or other hazards.
5. Be sure all bystanders are clear of the discharge area.
6. Leave brush hood and all other shields and safety equipment in place when operating the sweeper and prime mover.
7. Before exiting the prime mover, lower the attachment to the ground, apply the brakes, turn off the engine and remove the key.
9. Be aware of extra weight and width attachment adds. Reduce travel speed accordingly.
   a. Reduce speed when driving over rough terrain, on a slope, or turning, to avoid “bouncing” the attachment. Loss of control can result.
   b. Minimize flying debris - use slowest rotating speed that will do the job. Never sweep towards people, buildings, vehicles or other objects that can be damaged by flying debris.
   c. Carry attachment low to ground so operator has good visibility and stability. Avoid sudden movements from one side to the other side when you carry the attachment.

NOTICE! AVOID SWEEPER DAMAGE. Do not operate broom with prime mover loader arms in float. This broom is not designed to carry the weight of the prime mover loader arms.

NOTICE! When disconnecting unit from sweeper be sure to disengage locking mechanism.

NOTICE! Keep sweeper body & mounting assembly parallel when operating the sweeper. See Figure #1

FIGURE #1



OPERATION

DIRT & GRAVEL

To keep dust at a minimum, plan 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 travel 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

- Travel slowly – 1-2 mph.
- Sweep a path less than the full width of the sweeper.
- Increase engine speed if debris becomes very heavy.

BRUSH PATTERN ADJUSTMENT

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” wide, running the length of the brush. See Figure #1
5. Adjust the brush pattern as necessary according to the following instructions.
   a. If the brush pattern is too wide, pull the quick pin and move it up one notch. Repeat on the opposite side. See Figure #2
   b. If the brush pattern is too narrow, pull the quick pin and move it down one notch. Repeat on the opposite side.
6. Repeat steps #1 through #5 until the brush pattern is 2” – 4” inches wide.

FIGURE #1

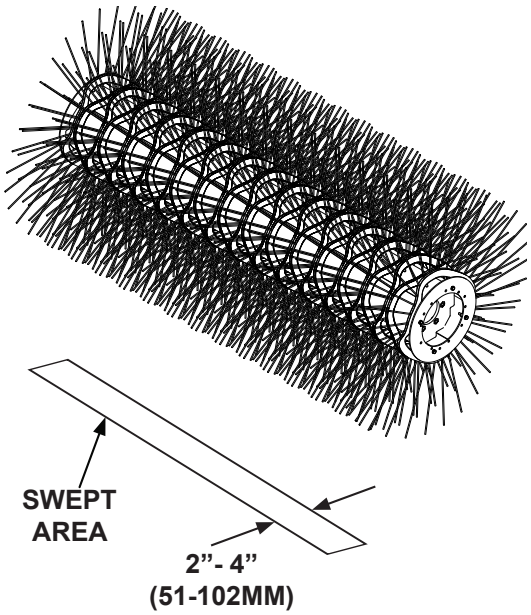
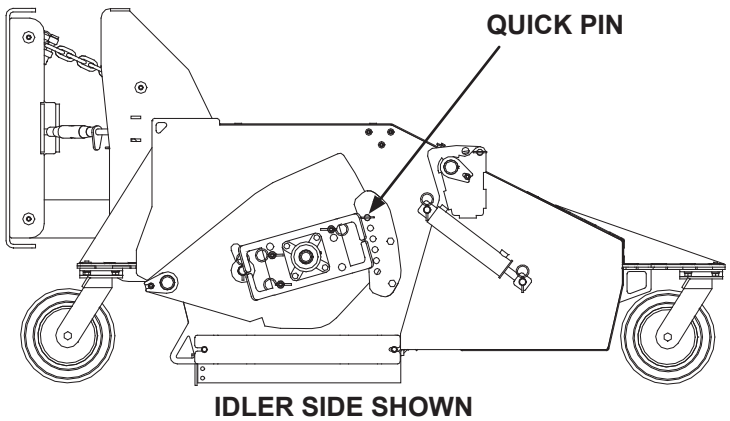


FIGURE #2



IDLER SIDE SHOWN

OPERATION

WATERLESS DUST ABATEMENT SYSTEM (VACUUM ATTACHMENT)

The Patented Waterless Dust Abatement System (vacuum) significantly reduces dust production during sweeper operation. No water tank or sprayer needed and the filter can be “shaken” from inside the prime mover cab, dislodging loose debris from the filter directly into the hopper. The vacuum pulls air from the sweeping chamber, filters the dust out and exhausts clean air.

Operation

Refer to the Vacuum Attachment operators manual before operating the Vacuum Sweeper.

Before activating the Waterless Dust Abatement System (vacuum) check to ensure the sweeper’s skirting and bucket body seals are properly adjusted and functioning. The fan should be turned off during wet or damp conditions.

The filter should be shaken before dumping or when filter obstruction occurs.

To Shake Filter:

- Turn off sweeper and vacuum fan motor
- Operate the shaker motor for 5-10 seconds by activating the shaker control switch.

If filter is still clogged refer to **“Checking and Replacing Filter”** in the Maintenance Section

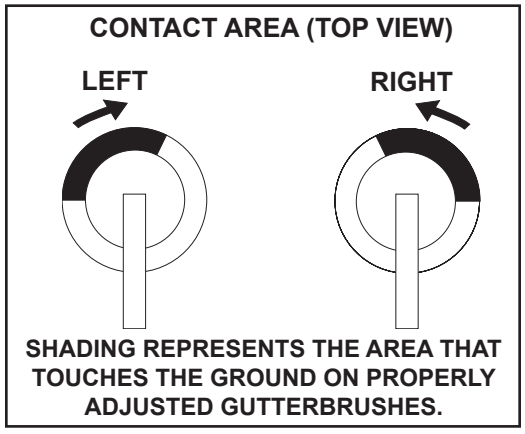
NOTICE! Running shaker while fan is ON will imbed dirt in filter. This will cause extra maintenance and possible damage to filter.

NOTICE! Do not use container sweeper, bucket broom or vacuum sweeper without filter.

NOTICE! Attachment is not designed for use with portland cement, lime and grain collection.

OPTIONAL GUTTERBRUSH OPERATION

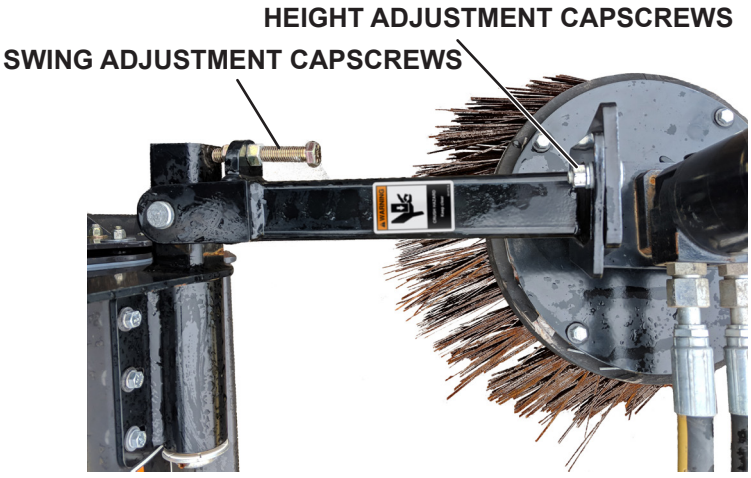
The gutterbrushes are designed for sweeping forward only. When sweeping next to curbs or walls with a gutterbrush, only the bristle tips should touch the vertical surface. When the gutterbrush height is properly adjusted, bristles contact the ground as shown.



To adjust the gutterbrush height:

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

OPERATION



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

To adjust gutterbrush swing:

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

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

OPTIONAL DUST SUPPRESSION (SPRINKLERS)

The dust suppression systems are available for a 12 Volt or 24 Volt system and both contain a 25 or 85 gallon water tank and enough nozzles and hose to use with or without the optional gutterbrushes. See instructions provided with your Spinkler Kit.

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.

OPERATION

- Clean the unit thoroughly, removing all mud, 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.
- Replace decals that are damaged or in unreadable condition.
- Store unit in a dry and protected place. Leaving the unit outside will materially shorten its life.

Additional Precautions for Long Term Storage:

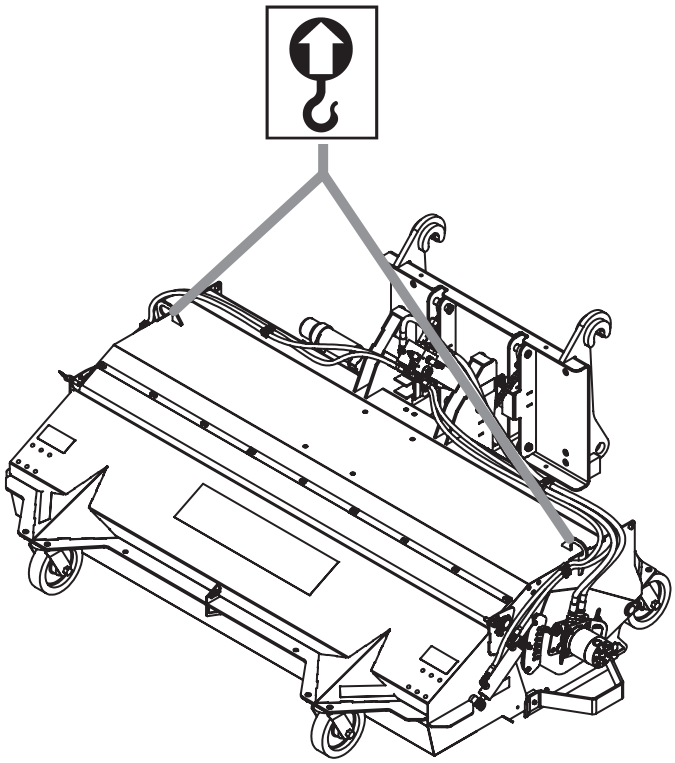
- Touch up all unpainted surfaces with paint to prevent rust.

REMOVAL FROM STORAGE

- Wash unit and replace any damaged 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. See Diagram:



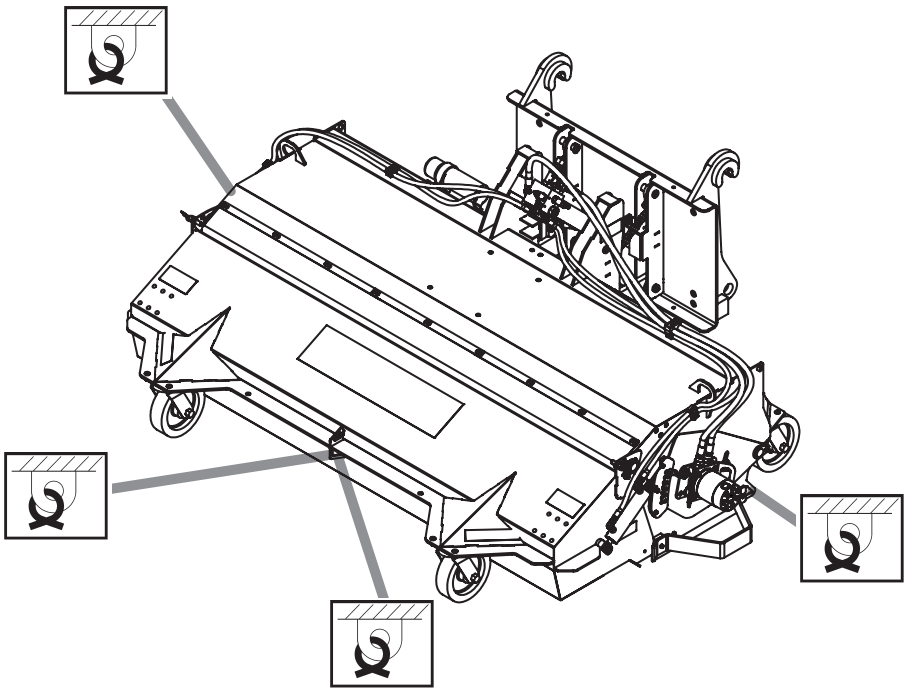
OPERATION

- Attach lifting accessories to unit at recommended lifting points.
- 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.

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. See Diagram:



- Attach tie down accessories to unit as recommended.
- 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

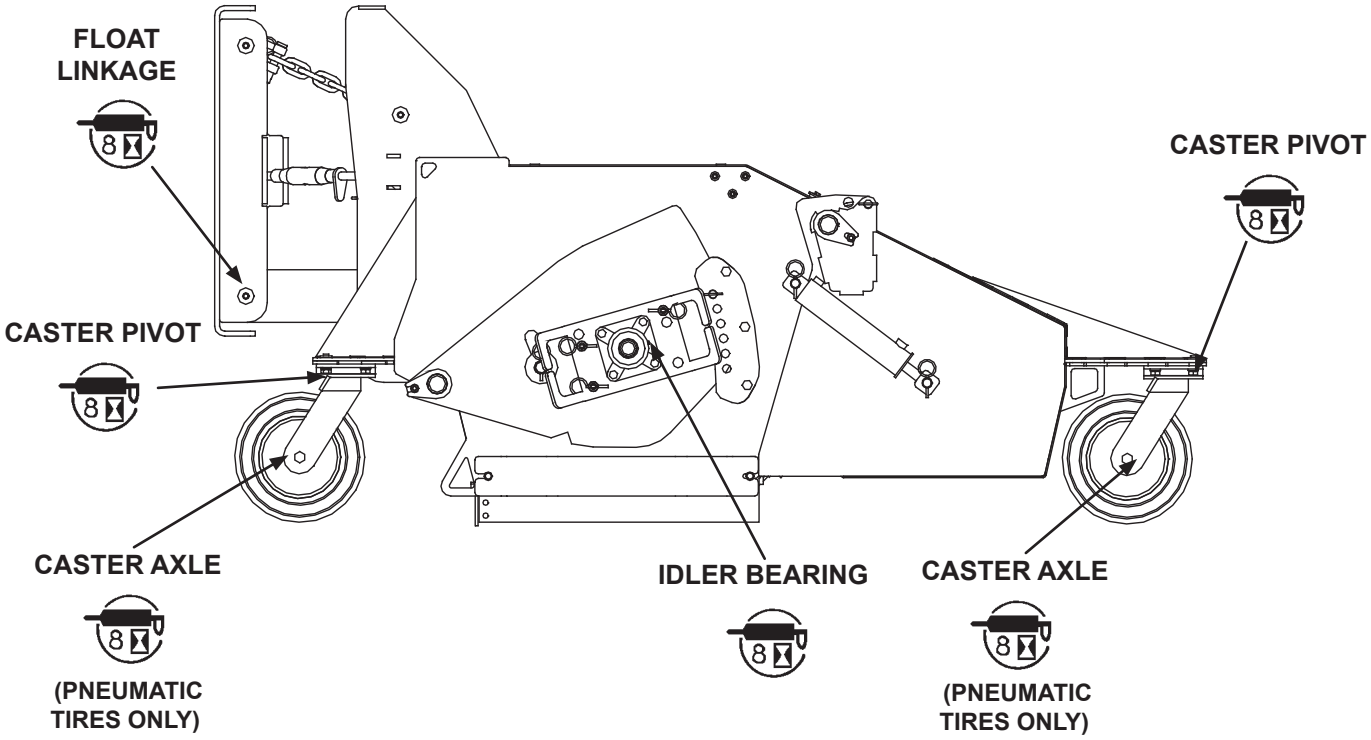
Follow all local government regulations that may apply along with recommended tie down points and any equipment safety precautions at the front of this handbook when transporting your attachment.

LUBRICATION

LUBRICATION

All parts provided with grease fittings should be lubricated as indicated. If any grease fittings are missing, replace them immediately. Clean all fittings thoroughly before using grease gun.

Lubricate daily or every 8 hours of operation, whichever comes first, with SAE Multi-Purpose Lubricant or an equivalent SAE Multi-Purpose type grease.



IMPORTANT: Avoid excessive greasing. Dirt collects on exposed grease and greatly increases wear. After greasing, wipe off excessive grease from fittings.

MAINTENANCE AND SERVICE

GENERAL INFORMATION

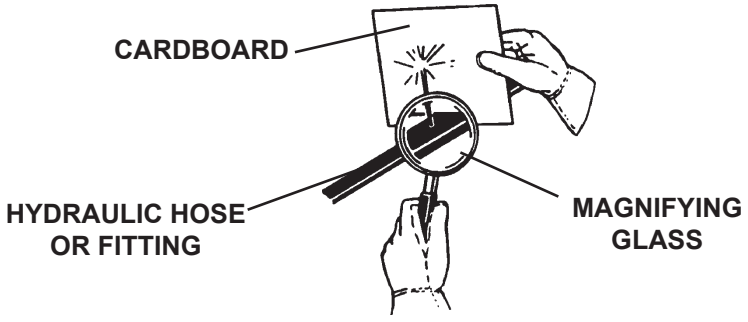
Regular maintenance is the key to long equipment life and safe operation. Maintenance requirements have been reduced to an absolute minimum. However it is very important that these maintenance functions be performed as described below.

Procedure	Daily (Every 8 Hours)
Check brush pattern (See Brush Pattern Adjustment)	✔
Check for missing or loose hardware. Replace or tighten if necessary. (See Bolt Torque Specifications)	✔
Check for missing or damaged safety decals and replace as necessary.	✔
Visually inspect the machine for worn parts or cracked welds, and repair as necessary	✔
Check tire pressures. (Pneumatic tire units only)	✔
Check prime mover tire ratings to be sure they match the load. Weigh sweeper end of prime mover to insure proper tire rating.	✔
Check wheels for damage, and repair as necessary	✔
Check hydraulic system for leaks and tighten as necessary. Check for damage and replace as needed.	✔

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.

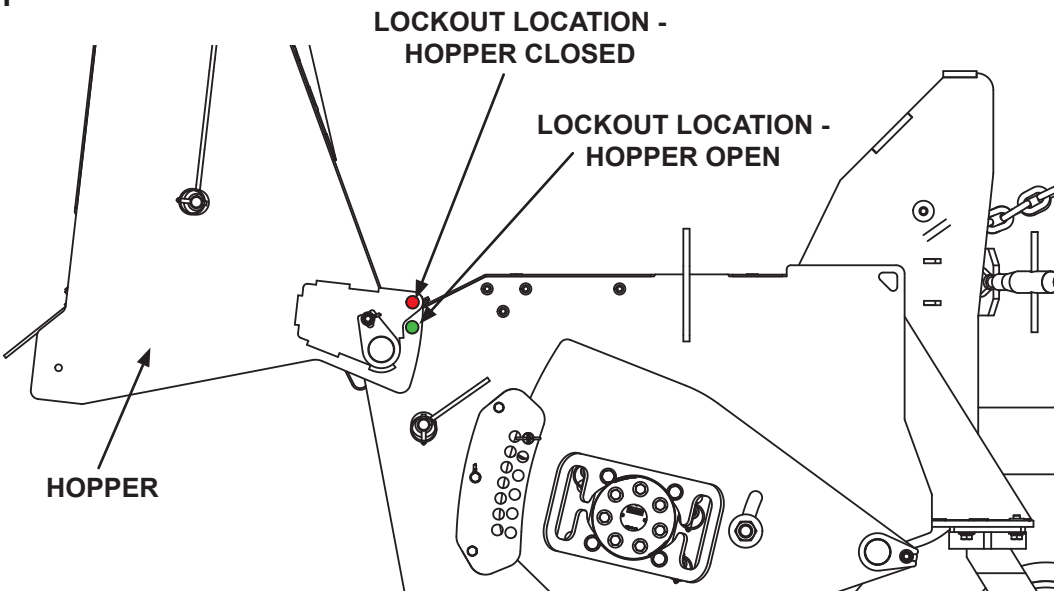


MAINTENANCE AND SERVICE

REPLACING BRUSH SECTIONS

1. Open hopper and install hopper lockout pin. See Figure #1

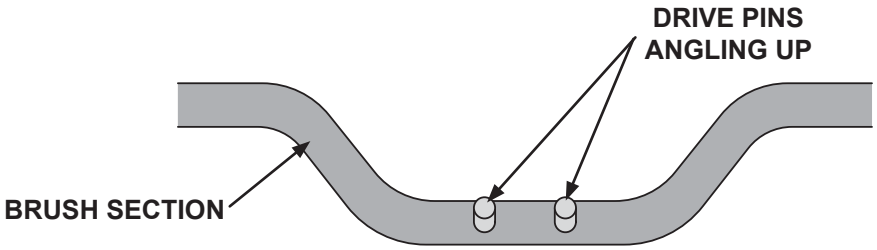
FIGURE #1



2. Remove three lock pins for motor mount(s). Retain hardware for reinstallation. Remove motor mount(s).
3. Remove three lock pins for bearing mount(s). Retain hardware for reinstallation. Remove bearing mount(s).
4. Roll core from sweeper body.
5. Remove the retaining plate. Retain hardware for reinstallation.
6. Remove old sections.
7. Install new sections by doing the following:

Note: Drive pin direction can be difficult to determine. Inspect your sections to determine up and down directions. See Figure #2

FIGURE #2

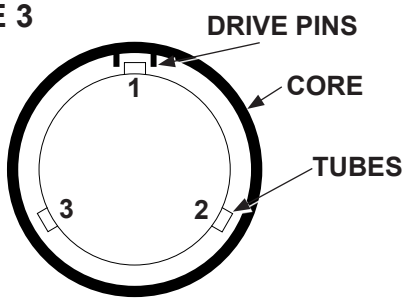


For CS26 / VCS26:

a. Number the tubes on the core as 1,2 and 3. See Figure #3
b. Slide the first section onto the core with the drive pins on each side of tube 1. Make sure that the drive pins angle up. See Figure #3
c. Place the second section on the core with the drive pins on each side of tube 2. Be sure the drive pins angle down. See Figure #4
d. Put the third section on with the drive pins around tube 3. Be sure the drive pins angle up.

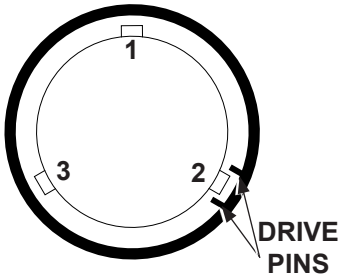
e. Slide sections on until the core is full, making sure to alternate the tubes used and the direction of the drive pins.

FIGURE 3



FIRST SECTION

FIGURE 4



SECOND SECTION

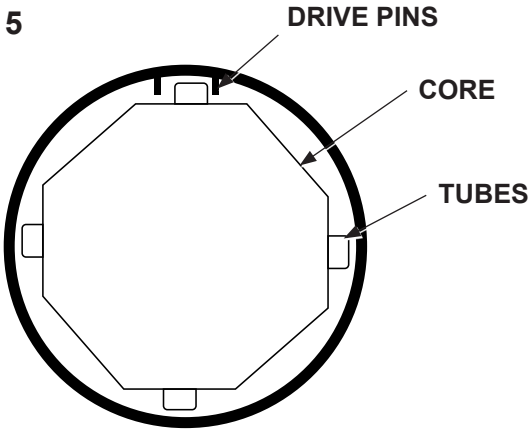
For CS32 / VCS26:

a. Slide the first section onto the core with the drive pins on each side of a tube. Make sure that all the drive pins angle in the same direction. See Figure #5

b. Install a second section rotated 180° from the first section, keeping the drive pins angled in the same direction as the first section. See Figure #6

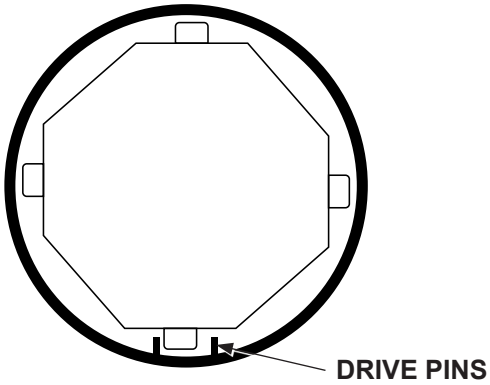
c. Continue installing sections, rotating each section 180° until the core is full.

FIGURE 5



FIRST SECTION

FIGURE 6



SECOND SECTION

8. Re-attach the retaining plate.
9. Lay core on ground and roll back into sweeper body.
10. Re-attach the bearing plate(s) with previously removed hardware.
11. Attach motor mount(s) with hardware removed in step 2.
12. Remove lockout pin and close hopper.

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	12.69	11.4
46	19.38	34	6.0	13.31	12.1

MAINTENANCE AND SERVICE

CYLINDER SEAL REPLACEMENT

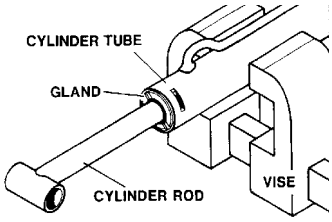
The following information is provided to assist you in the event you should need to repair or rebuild a hydraulic cylinder. When working on hydraulic cylinders, make sure that the work area and tools are clean and free of dirt to prevent contamination of the hydraulic system and damage to the hydraulic cylinders. Always protect the active part of the cylinder rod (the chrome section). Nicks or scratches on the surface of the rod could result in cylinder failure. Clean all parts thoroughly with a cleaning solvent before reassembly.

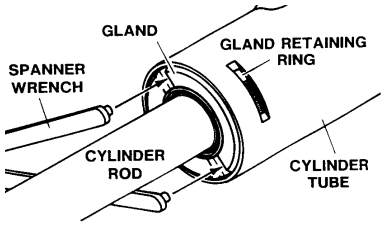
DISASSEMBLY PROCEDURE

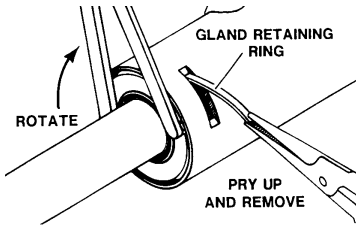
IMPORTANT: Do not contact the active surface of the cylinder rod with the vise. Damage to the rod could result.

RETAINING RING TYPE GLAND

1. Mount the cylinder tube securely in a vise. **NOTICE:** Do not clamp too tight and distort the tube.
2. Rotate the gland with a spanner wrench (available from your dealer), until the gland retaining ring appears in the milled slot.

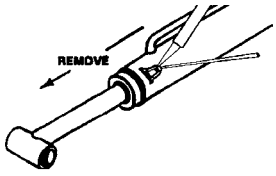


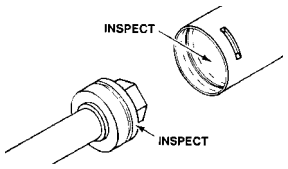


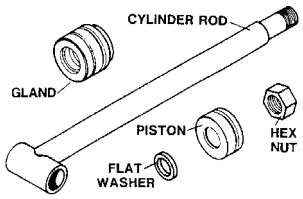


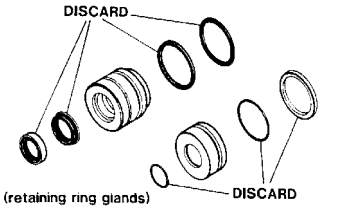
Pry up the end of the gland retaining ring with a pointed tool. Rotate the gland with a spanner wrench while removing the retaining ring. **NOTE: The gland and piston seal(s) can be pulled out and cut as they appear in the milled slot during disassembly. After cutting, pull them on out through the milled slot.**

3. Pull the cylinder rod from the cylinder tube.







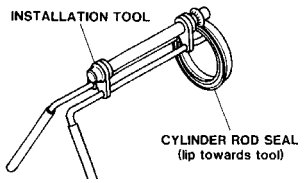


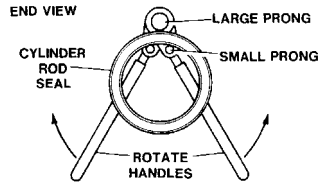
4. Inspect the piston and the bore of the cylinder tube for deep scratches or galling. If damaged, the piston and cylinder tube must be replaced.
5. Remove the hex nut, piston, flat washer or spacer tube (if so equipped), and gland from the cylinder rod. If the cylinder rod is rusty, scratched, or bent, it must be replaced.
6. Remove and discard all old seals.

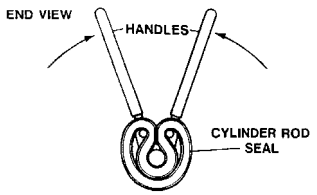
ASSEMBLY PROCEDURE

IMPORTANT: Replace all seals even if they do not appear to be damaged. Failure to replace all seals may result in premature cylinder failure.

1. Install the cylinder rod seal in the gland first. Be carefull not to damage the seal in the process as it is somewhat difficult to install. A special installation tool is available to help with installing the seal. Simply fit the end of the tool over the seal so that the large prong of the tool is on the outside of the seal, and the two smaller prongs on the inside. The lip of the seal should be facing towards the tool. Rotate the handles on the tool around to wrap the seal around the end of the tool.







MAINTENANCE AND SERVICE

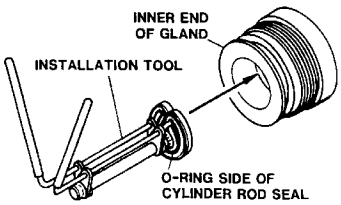
Now insert the seal into the gland from the inner end. Position the seal in its groove, and release and remove the tool. Press the seal into its seat the rest of the way by hand.

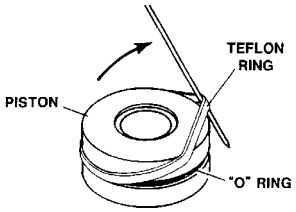
NOTE: Threaded gland is shown in diagram for reference only.

2. Install the new piston ring, rod wiper, O-rings, and backup washers, if applicable, on the piston. Be careful not to damage the seals. Caution must be used when installing the piston ring. The ring must be stretched carefully over the piston with a smooth, round, pointed tool.

3. Slide the gland onto the cylinder rod being careful not to damage the rod wiper. Then install the spacer, or flat washer (if so equipped), small O-ring, piston, and hex nut onto the end of the cylinder rod.

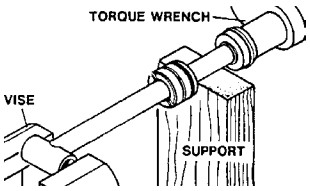
4. Secure the cylinder rod (mounting end) in a vise, with a support at its center. Torque the nut to the value shown on the chart for the thread diameter of the cylinder rod.

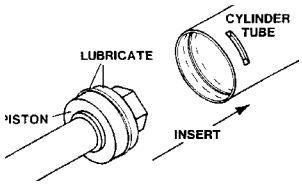


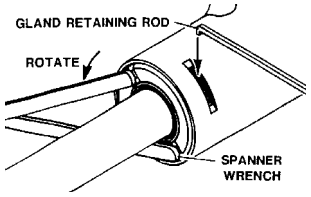


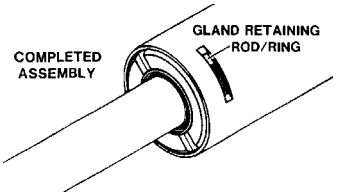
Thread Diameter	POUNDS - FEET
7/8"	150-200
*1"	230-325
1-1/8"	350-480
1-1/4"	490-670
1-3/8"	670-900

*** 1" Thread Diameter WITH 1.25" Rod Diameter**
Min. 230 ft. lbs. Max. 250 ft. lbs.









IMPORTANT: Do not contact the active surface of the cylinder rod with the vise. Damage to the rod could result.

IMPORTANT: Ensure that the piston ring fits squarely into the cylinder tube and piston groove, otherwise the ring may be damaged and a leak will occur.

5. Apply a lubricant (such as Lubriplate #105) to the piston and teflon ring. Insert the cylinder rod assembly into the cylinder tube.

6. Rotate the gland with a spanner wrench until the hole (drilled into the retaining slot of the gland) appears in the milled slot of the cylinder tube. Insert the hooked end of the gland retaining rod into the hole.

Rotate the gland until the gland retaining rod forms a ring between the gland and the cylinder tube. When complete, the bent end of the gland retainer ring should be hidden (not turned so it is exposed in the slot) to prevent it from popping out.

WARNING! **Cylinders serviced in the field are to be tested for leakage prior to the attachment being placed in work. Failure to test rebuilt cylinders could result in damage to the cylinder and/or the attachment, causing severe personal injury or even death.**

TROUBLESHOOTING

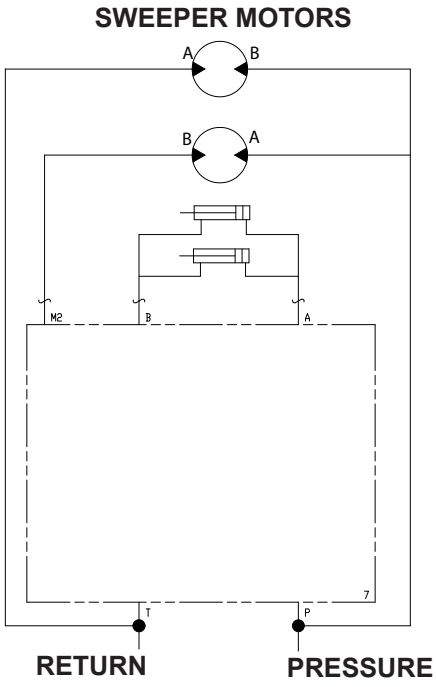
PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
MOTOR FOR BROOM WILL NOT OPERATE	Auxiliary hydraulics control on prime mover is activated in the wrong position.	Verify controls. See prime mover owners manual.
	Hoses improperly connected to prime mover.	Connect hoses correctly to prime mover.
	Hoses on prime mover are obstructed.	Clear obstruction on prime mover.
	Hoses on broom are obstructed.	Clear obstruction on broom.
	The motor has failed.	Replace the motor.
SLUGGISH BROOM OPERATION	Insufficient oil flow from the prime mover.	Increase engine RPM.
	One or more seals have failed in the motor.	Replace the seals or motor.
	Hydraulic filter on prime mover is dirty.	Replace filter.
THE MOTOR RUNS BUT THE BROOM DOES NOT RUN	Motor shaft has a sheared key.	Replace key.
OIL LEAKS FROM THE MOTOR	One or more seals have failed in the motor.	Replace the seals or motor.
	Seals on the fittings are damaged.	Replace seals or fittings.
	Fittings are loose or damaged.	Tighten or replace fittings.
	Hydraulic hoses are loose or damaged.	Tighten or replace hoses.
BRUSH ROTATES IN WRONG DIRECTIONS	Hoses installed incorrectly.	Switch hose connections.
BRUSH SLOWS OR STOPS WHEN SWEEPING	Brush pattern too wide.	Adjust brush pattern.
	Travel speed too fast.	Reduce travel speed.
	Trying to sweep too much material at once.	Reduce amount of material being swept, make more passes.
	Hydraulic motor is failing.	Replace motor.
BRUSH WEARS VERY QUICKLY	Brush pattern is too wide.	Adjust brush pattern.

TROUBLESHOOTING

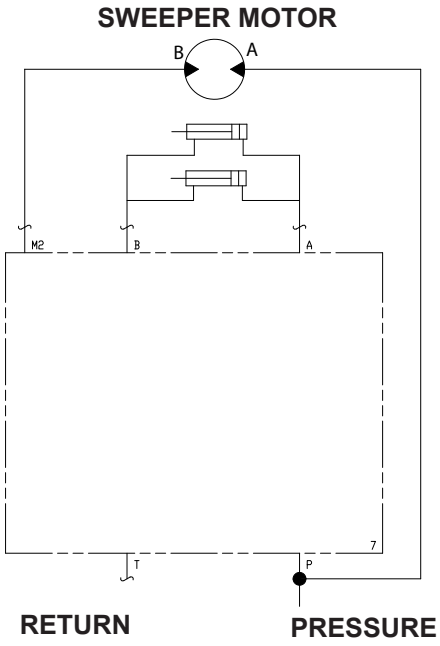
PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
EXCESSIVE HYDRAULIC OIL TEMPERATURE	Low hydraulic oil level on the prime mover.	Add hydraulic fluid.
	Hydraulic hoses are obstructed.	Clear obstructions in hoses.
	Hydraulic oil is dirty.	Replace hydraulic oil and filter on prime mover.
	Quick couplers are not properly seated.	Reconnect quick couplers properly.
	Brush pattern too wide.	Adjust brush pattern.
	Travel speed too fast.	Reduce travel speed.
	Trying to sweep too much material at once.	Reduce the amount of material being swept. Make more passes.
	Hydraulic motor failure.	Replace motor.
HYDRAULIC QUICK COUPLER LEAKS	Quick coupler is not installed completely or damaged.	Connect properly or replace.
DUST NOT ABATED WHEN USING VACUUM	Vacuum attachment not operating correctly.	Refer to Vacuum Attachment manual.

TROUBLESHOOTING

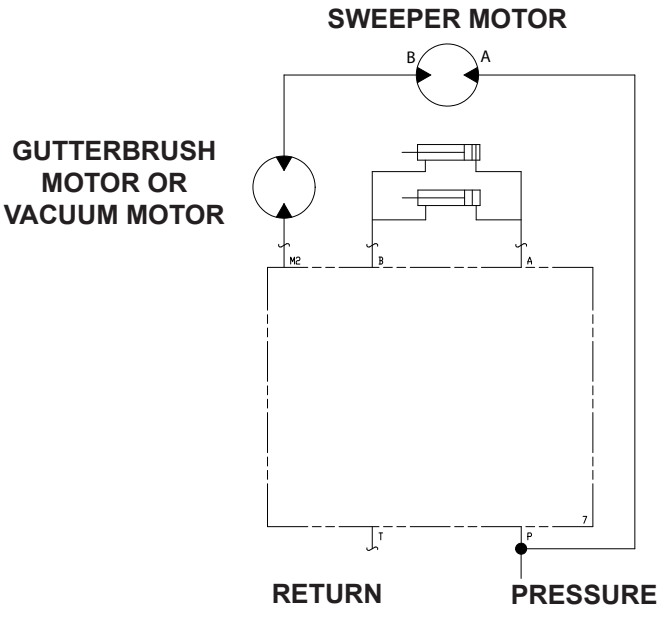
HYDRAULIC SCHEMATICS



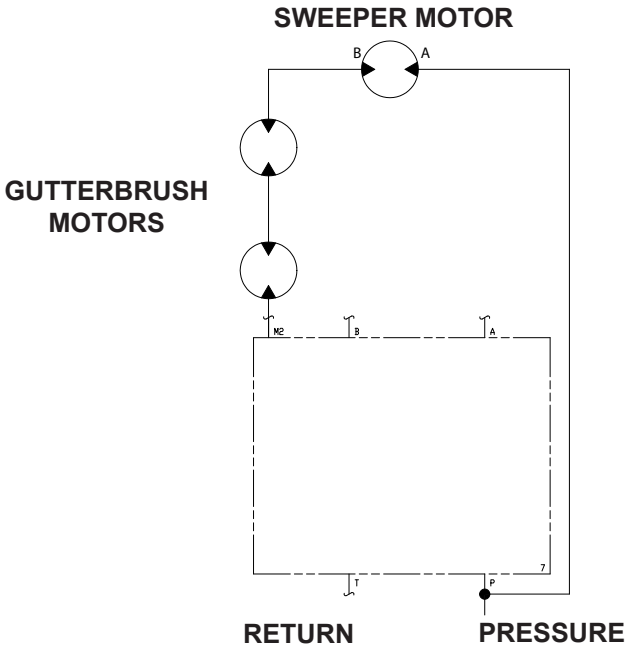
DUAL MOTOR



SINGLE MOTOR



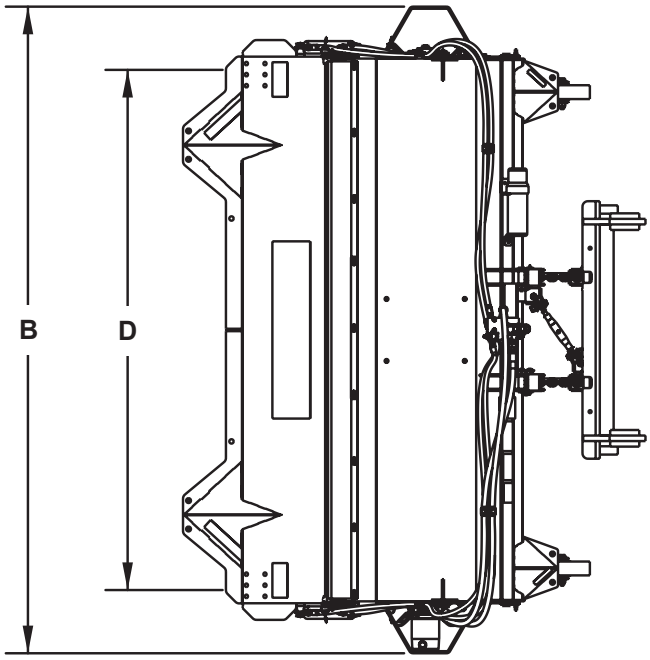
OPTIONAL SINGLE GUTTERBRUSH
OR HYDRAULIC VACUUM



OPTIONAL DUAL
GUTTERBRUSH

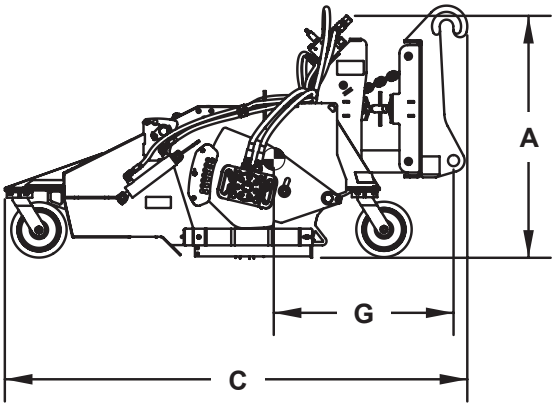
SPECIFICATIONS

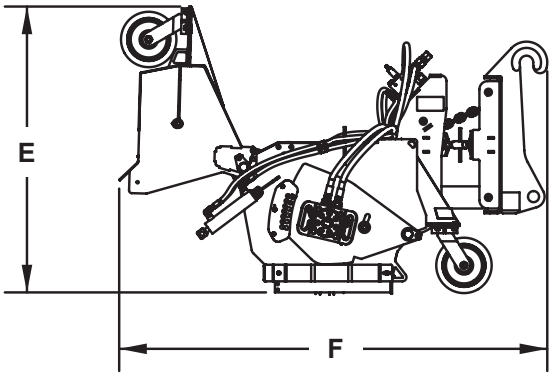
CS SERIES



SPECIFICATIONS AND DESIGN ARE SUBJECT TO CHANGE WITHOUT NOTICE AND WITHOUT LIABILITY THEREFOR.

ALL SPECIFICATIONS INCLUDE JRB 416 MOUNTING





SPECIFICATIONS

CS SERIES

203 SERIES

26” Brush Head (CS26)

DESCRIPTION	6’	7’	8’
A. Overall Height	43.70”	43.70”	43.70”
B. Overall Width	93.00”	105.00”	117.00”
C. Overall Length	83.50”	83.50”	83.50”
D. Sweeping Width	72.00”	84.00”	96.00”
E. Overall Height - Open	52.00”	52.00”	52.00”
F. Overall Length - Open	77.30”	77.30”	77.30”
G. Center of Gravity - Horizontal	31.60”	32.00”	32.50”
Weight - Single 24.7 CID Motor (lbs)	1690#	1785#	1880#
Weight - Dual 24.7 CID Motor (lbs)	1730#	1825#	1920#
Hydraulic Flow - Single 24.7 CID Motor	15-25 GPM		
Hydraulic Flow - Dual 24.7 CID Motor	26-50 GPM		
Maximum Pressure	3500 PSI		

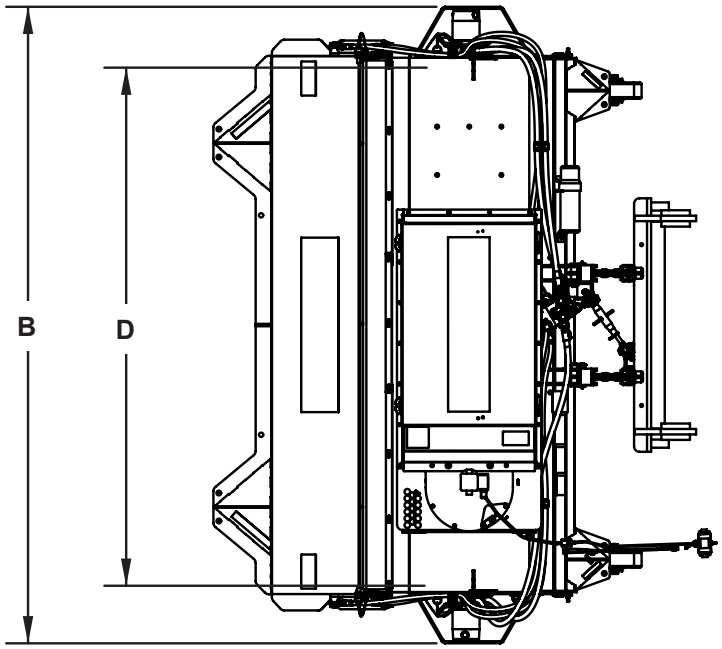
204 SERIES

32” Brush Head (CS32)

DESCRIPTION	8’	9’
A. Overall Height	39.70”	39.70”
B. Overall Width	116.80”	128.80”
C. Overall Length	80.30”	80.30”
D. Sweeping Width	96.00”	108.00”
E. Overall Height - Open	59.20”	59.20”
F. Overall Length - Open	79.60”	79.60”
G. Center of Gravity - Horizontal	32.50”	32.80”
Weight - Single 24.7 CID Motor (lbs)	1850#	1955#
Weight - Dual 24.7 CID Motor (lbs)	1890#	1995#
Hydraulic Flow - Single 24.7 CID Motor	15-25 GPM	
Hydraulic Flow - Dual 24.7 CID Motor	26-50 GPM	
Maximum Pressure	3500 PSI	

SPECIFICATIONS

VCS SERIES



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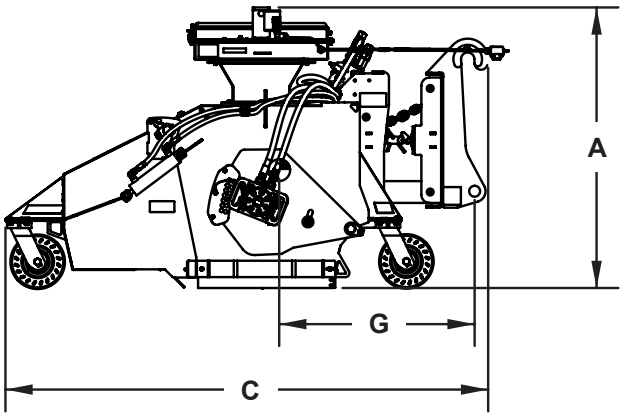
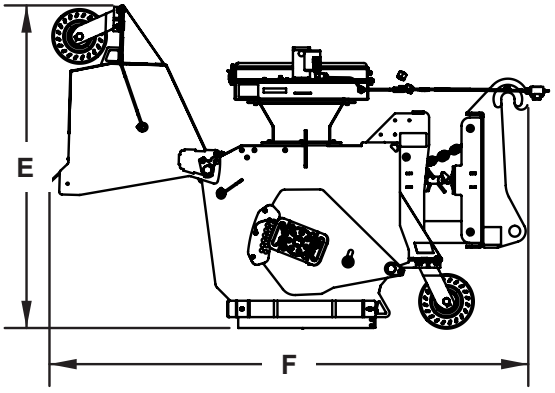
ALL SPECIFICATIONS INCLUDE JRB 416 MOUNTING





SPECIFICATIONS

VCS SERIES

203 SERIES

26” Brush Head (VCS26)

DESCRIPTION	6’	7’	8’
A. Overall Height	54.20”	54.20”	54.20”
B. Overall Width	93.00”	105.00”	117.00”
C. Overall Length	83.50”	83.50”	83.50”
D. Sweeping Width	72.00”	84.00”	96.00”
E. Overall Height - Open	54.20”	54.20”	54.20”
F. Overall Length - Open	77.30”	77.30”	77.30”
G. Center of Gravity - Horizontal	32.20”	32.60”	33.00”
Weight - Single 24.7 CID Motor (lbs)	1856#	1955#	2045#
Weight - Dual 24.7 CID Motor (lbs)	1900#	1990#	2080#
Hydraulic Flow - Single 24.7 CID Motor			15-25 GPM
Hydraulic Flow - Dual 24.7 CID Motor			26-50 GPM
Maximum Pressure			3500 PSI

204 SERIES

32” Brush Head (VCS32)

DESCRIPTION	8’	9’
A. Overall Height	51.50”	51.50”
B. Overall Width	116.80”	128.80”
C. Overall Length	88.50”	88.50”
D. Sweeping Width	96.00”	108.00”
E. Overall Height - Open	59.20”	59.20”
F. Overall Length - Open	87.80”	87.80”
G. Center of Gravity - Horizontal	35.90”	36.20”
Weight - Dual 24.7 CID Motor (lbs)	2310#	2440#
Hydraulic Flow - Dual 24.7 CID Motor		26-50 GPM
Maximum Pressure		3500 PSI

BOLT TORQUE SPECIFICATION

GENERAL TORQUE SPECIFICATION TABLES

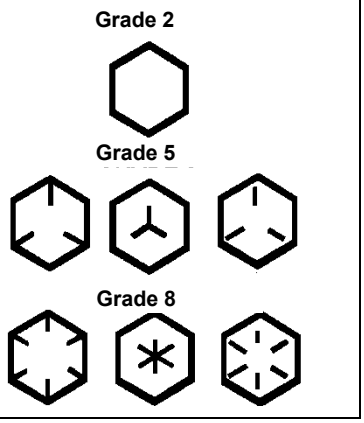
Use the following charts when determining bolt torque specifications, when special torques are not given. Always use grade 5 or better when replacing bolts.

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.

Bolt Size		SAE GRADE 5 TORQUE				SAE GRADE 8 TORQUE			
		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

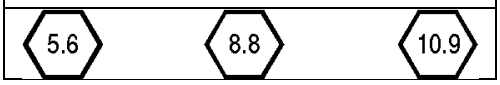
Bolt head identification marks as per grade.
NOTE: Manufacturing Marks Will Vary



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***.