SWEEPSTER BY PALADIN

OPERATOR'S MANUAL

ANGLE SWEEPER
RHFA Series

FOR
UTILITY TRACTORS

Serial Number: _____

Model Number: _____

Manual Number: 51-4150
Date: August 2018
Serial Number: 0832005 & Up
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 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.

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.

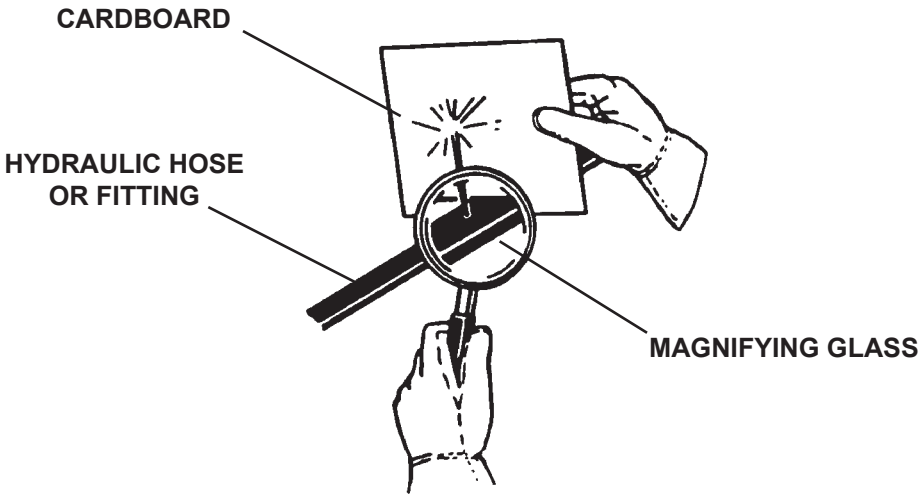
WARNING! **LOWER OR SUPPORT RAISED EQUIPMENT**

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 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.

WARNING! **CALIFORNIA PROPOSITION 65 WARNING.**

This product may contain a chemical known to the state of California to cause cancer, or birth defects or other reproductive harm. www.P65Warnings.ca.gov

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 traveling on rough terrain, reduce speed to avoid "bouncing" the sweeper. Loss of steering can result.
- 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 prime mover's engine and remove the key.
- Remove any large objects from the work area that could harm operator or others if thrown by sweeper.

EQUIPMENT SAFETY PRECAUTIONS

OPERATING THE SWEEPER

- PTO Operated Attachment: Rotating driveline contact can cause death. Do not operate without all driveline, tractor and equipment shields in place.
- Check driveline shields turn freely on driveline.
- Check driveline connections before operation. Be sure quick disconnect locks are operating and locked.
- Keep hands, feet and clothing away from power driven parts while tractor engine is running. Failure to do so could result in serious injury or death.
- Do not exceed specified RPM of your sweeper.
- Never leave the attachment unattended when in the raised position.

TRANSPORTING THE SWEEPER

- Disengage PTO before transporting.
- 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

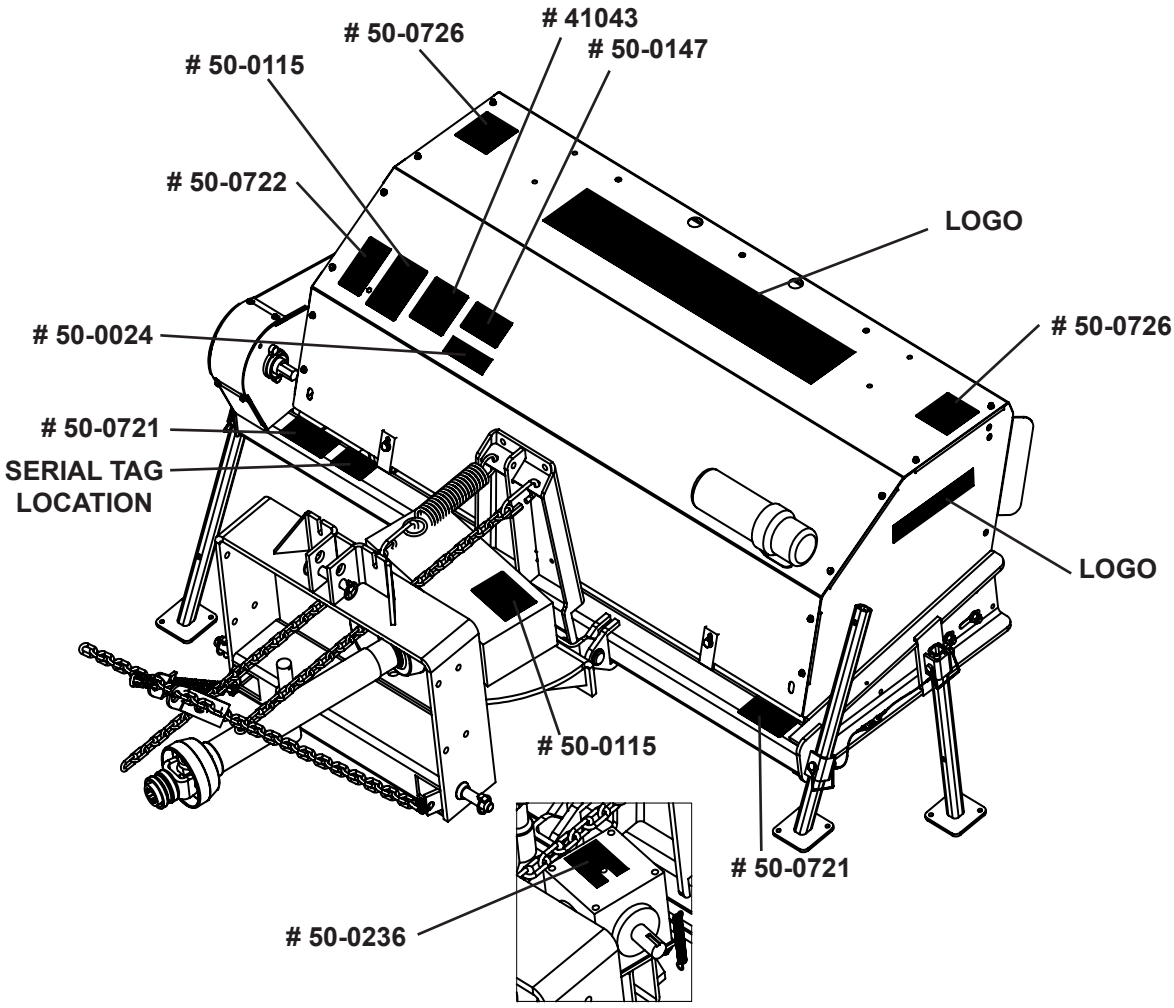
- Before performing maintenance, lower the attachment to the ground, disengage the PTO, apply the brakes, turn off the engine and remove the key. Be sure all rotation has stopped before approaching the sweeper. Disengage the PTO shaft before making any adjustments or repairs.
- Never perform any work 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 unless PTO has been disengaged and sweeper is securely blocked.

DECALS

DECALS PLACEMENT

GENERAL INFORMATION

The diagram on this page shows 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.

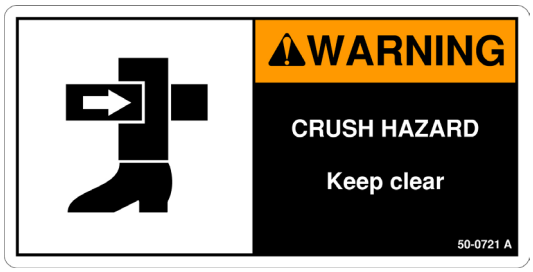


IMPORTANT: Keep all safety decals clean and legible. Replace all missing, illegible, or damaged safety decals. When replacing parts with safety decals attached, the safety decals must also be replaced. Safety decals are available, free of charge, from your local dealer or Paladin.

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.

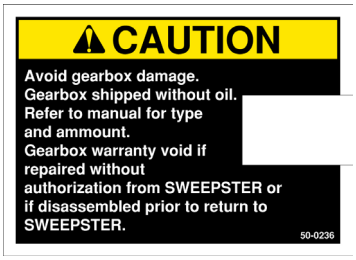
DECALS

 # 50-0115 DANGER!
ROTATING DRIVELINE



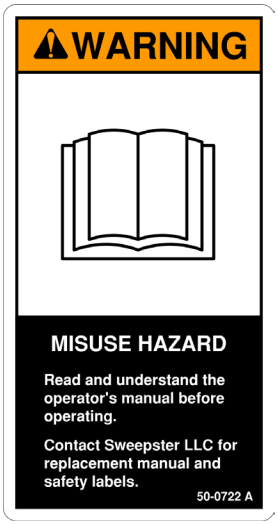
 # 50-0721 WARNING!
CRUSH HAZARD

 # 41043 WARNING!
HAZARDOUS DUST

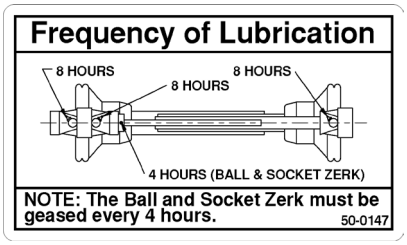


 # 50-0236 GEARBOX
CHECK OIL

 # 50-0726 WARNING! FLYING
OBJECTS & ENTANGLEMENT



 # 50-0722 WARNING!
MISUSE HAZARD



 # 50-0147 FREQUENT LUBE

 # 50-0024 MAXIMUM RAISE

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

INSTALLATION

RHFA sweepers are designed to attach to SAE Category I or Category II 3-point hitches. To attach this sweeper to a Category II hitch, you must order Category II hitch pins.

This sweeper has been assembled so it sweeps while traveling forward. It can, however, sweep while moving in reverse. See “Reversing Sweeping Direction” to sweep while driving in reverse.

DRAW BAR STYLE & INSTALLATION

Before installing onto your tractor check drawbar style and position. If your tractor is equipped with a clevis hitch (hammer-strap) style of drawbar it must be removed before installation. (See Figure #1) If your tractor is equipped with an offset style drawbar, the offset must be in the down position before installation. (See Figure #2)

FIGURE #1

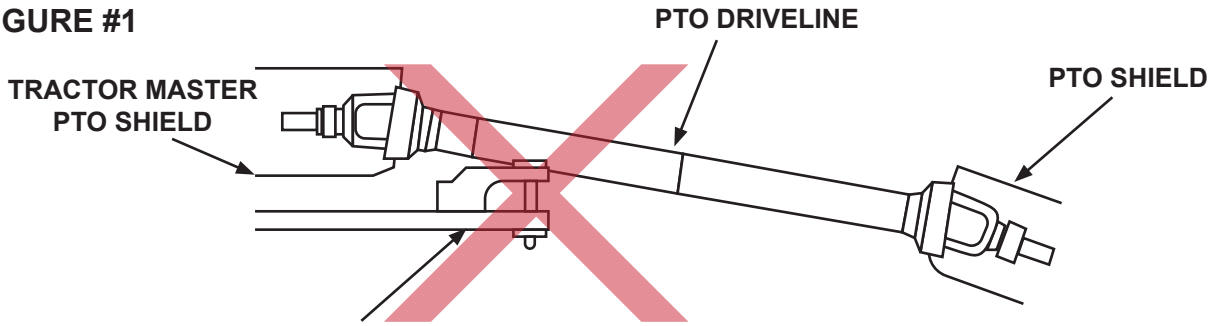
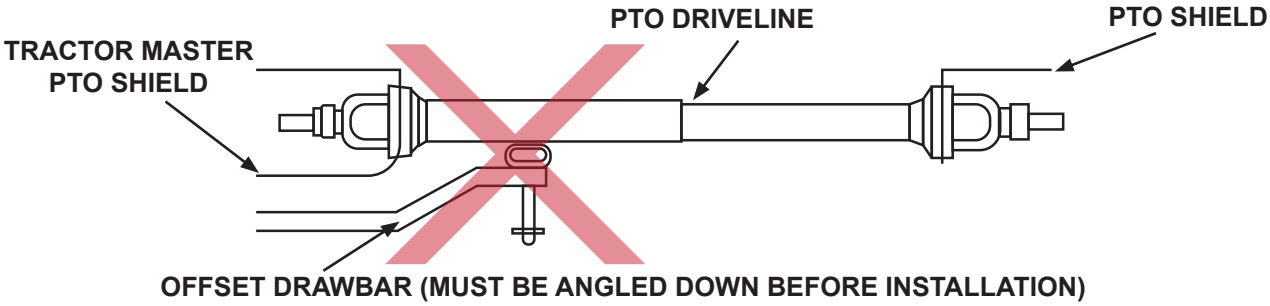


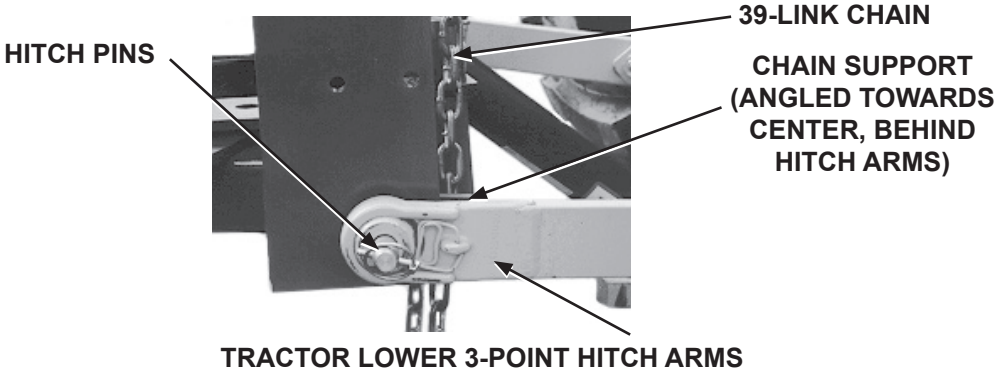
FIGURE #2



INSTALLATION

1. Install hitch pins into the mounting frame while placing the chain supports on the inside of the mounting frame (bend towards the center) and secure in place with the hardware supplied with the hitch pins. See Figure #1
2. Connect a 39 link chain to each chain support using the two double link clevis pins provided. See Figure #1.

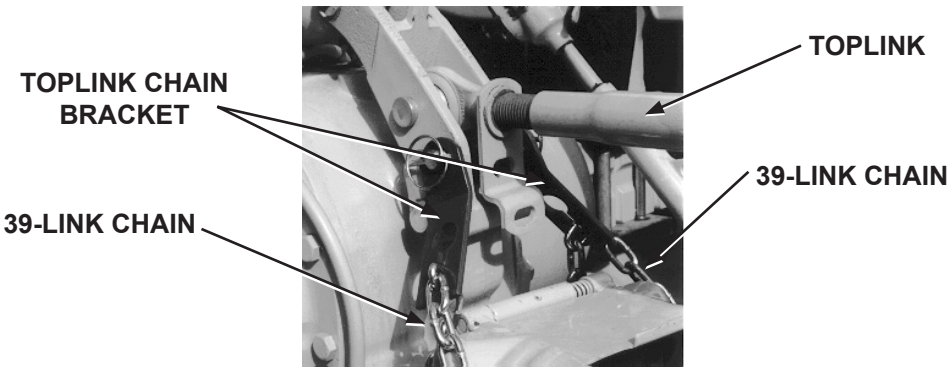
FIGURE #1



INSTALLATION

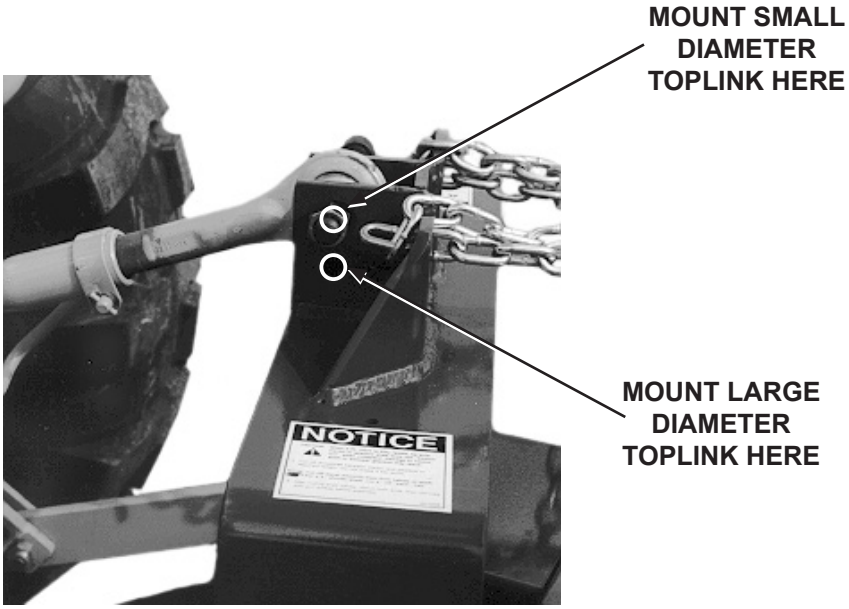
3. Install both toplink chain brackets to the tractor top link with the existing pins from the tractor. See Figure #2

FIGURE #2



4. Position the mounting assembly behind the tractor with the swing plate toward the rear.
5. Lower the tractor 3-point hitch arms.
6. Install the mounting assembly hitch pins onto the tractor 3-point hitch arms and secure with klik pins provided. See Figure #1
7. Connect the tractor top link to the mounting assembly matching the pin size and mounting hole for your application. Secure with existing pin. See Figure #3

FIGURE #3

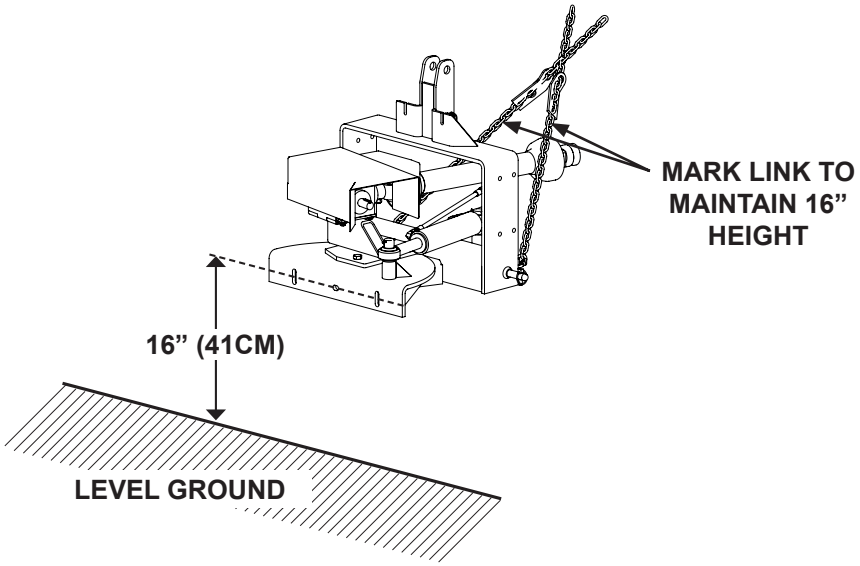


NOTE: For a small-diameter toplink, use the pin provided with the sweeper and the top hole in the mounting frame ears. For large-diameter toplink, use the bottom hole and a customer-supplied pin. See Figure #3

8. Adjust toplink chains, which are attached to the mounting assembly and toplink chain bracket.
   a. Raise hitch arms until center of bolt holes on the mounting assembly rear plate are 16” (406mm) above the ground. See Figure #4

INSTALLATION

FIGURE #4



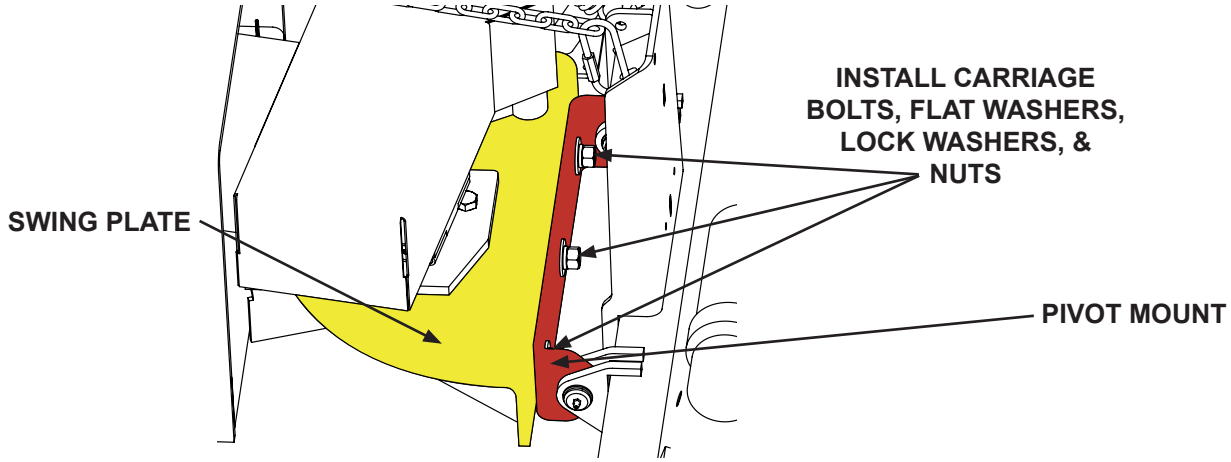
b. Mark the link in each chain that will maintain this measurement.
c. Raise hitch arms slightly & place the pre-marked links in the toplink chain brackets.
d. Lower the mounting assembly & verify the rear plate is 16" (406mm) above the ground.

NOTE: For wet, heavy and/or deep snow, adjust support chains so the mounting assembly remains 20"-22" (508-559mm) off the ground when the unit is lowered.

NOTICE! Avoid equipment damage. Positioning the sweeper too close to the ground, less than 16" (406mm) can result in damage to the sweeper hood and gearbox.

9. Position the brush head assembly behind the mounting assembly.
10. Aligning the slots in the swing plate and brush head pivot plate loosely install the carriage bolts and hardware provided. Make sure the top edges of the plates are parallel with each other and then tighten hardware securing the mounting assembly to the brush head. See Figure #5

FIGURE #5

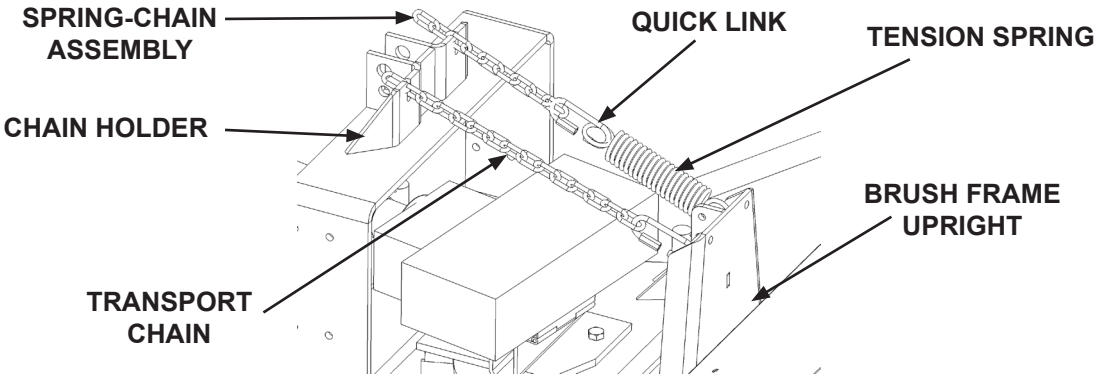


NOTE: Make sure the top edges of the plates are parallel with each other. This becomes very important when adjusting the sweeper after installation.

INSTALLATION

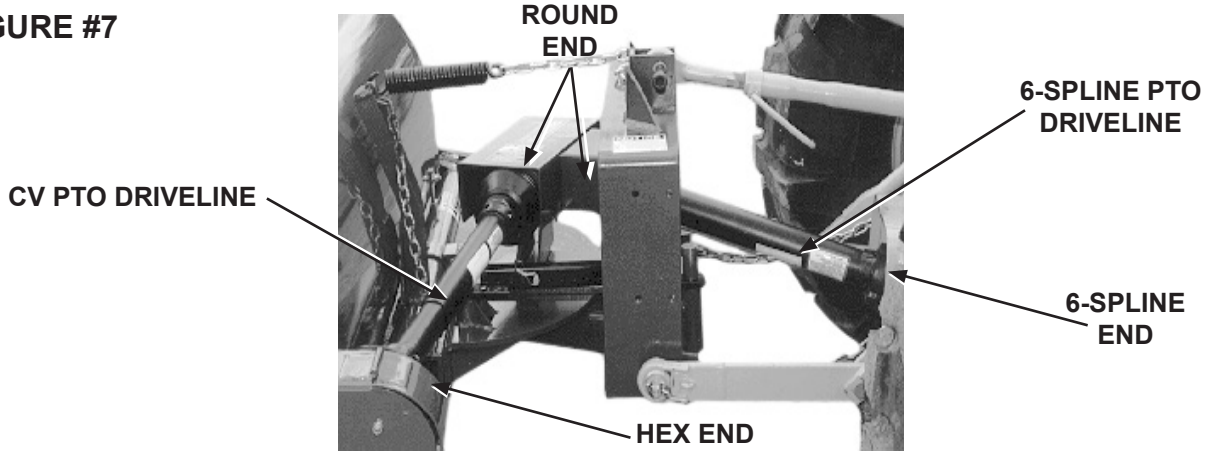
11. Install the spring-chain assembly. See Figure #6
    a. Place a tension spring on one end of a 27-link chain, using a 5/16 wide jaw quick link.
    b. Attach the spring to the brush frame upright.
    c. Connect the chain to a slot in the chain holder on the mounting assembly.

FIGURE #6



12. Connect the transport chain that is attached to the brush frame upright, to the remaining slot in the chain holder on the mounting assembly. See Figure #6
13. Install the CV (constant velocity) PTO driveline shaft. See Figure #7
    a. Connect the hex end of the CV shaft to the hex shaft on the brush head assembly.
    b. Attach the round end of the CV shaft to the gearbox output shaft.
    c. Tighten set screws and jam nuts.
14. Install the 6-Spline PTO driveline shaft. See Figure #7
    a. Connect the round end of the PTO shaft to the gearbox input shaft. Tighten the set screw and jam nut.
    b. Connect the 6-spline end of the PTO shaft to the tractor PTO. (Pull back on the driveline yoke collar and align the splines of the yoke with the PTO shaft. Push yoke onto the PTO shaft releasing the locking collar.) **NOTE: Push and pull the driveline back and forth until locked in place.**

FIGURE #7



WARNING! The locking collar must slide freely and the locking balls seated in the groove on the tractor PTO shaft before operating. A driveline not attached correctly could come loose from the tractor resulting in personal injury and damage to the attachment.

INSTALLATION

NOTE: It may be necessary to shorten the telescoping shaft. The shaft must slip freely as the brush head assembly is raised and lowered. Raise and lower the sweeper slowly to check that the telescoping shaft is the proper length. See "Power (PTO) Shaft Adjustment".

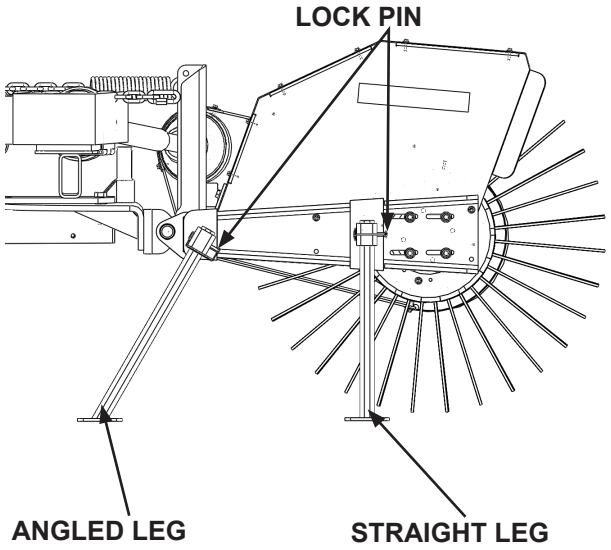
NOTICE! Avoid driveline damage. Check the length of the telescoping members to insure the driveline will not bottom out or separate when turning and/or going over rough terrain.

NOTICE! The PTO is customized for your specific application. If the PTO shaft is too long, severe PTO and gearbox damage is possible. DO NOT FORCE THE PTO TO FIT. Warranty is void if the correct PTO is not installed. There should never be less than .50" of overlap within the PTO.

WARNING! Do not use a PTO adapter to attach your sweeper to a non-matching tractor PTO. Serious personal injury and/or equipment failure can result. Consult an authorized dealer for assistance if the sweeper PTO does not match the tractor PTO.

15. Adjust the toplink so the swing frame is perpendicular to the ground.
16. Install the manual or hydraulic angle kit. See angle kit installation instructions
17. Install storage stands. See Figure #11

FIGURE #11



a. Slide the straight legs into the tubes near the bearing assembly. Align a hole in the leg with one in the tube. Secure with lock pins.
b. Slide the angled legs into the tubes toward the mounting assembly. Align holes and secure with lock pins.

NOTE: Storage legs are designed to keep the brush off the ground when the sweeper is detached. When the sweeper is installed, slide legs up and pin them in the tubes to keep them out of the way.

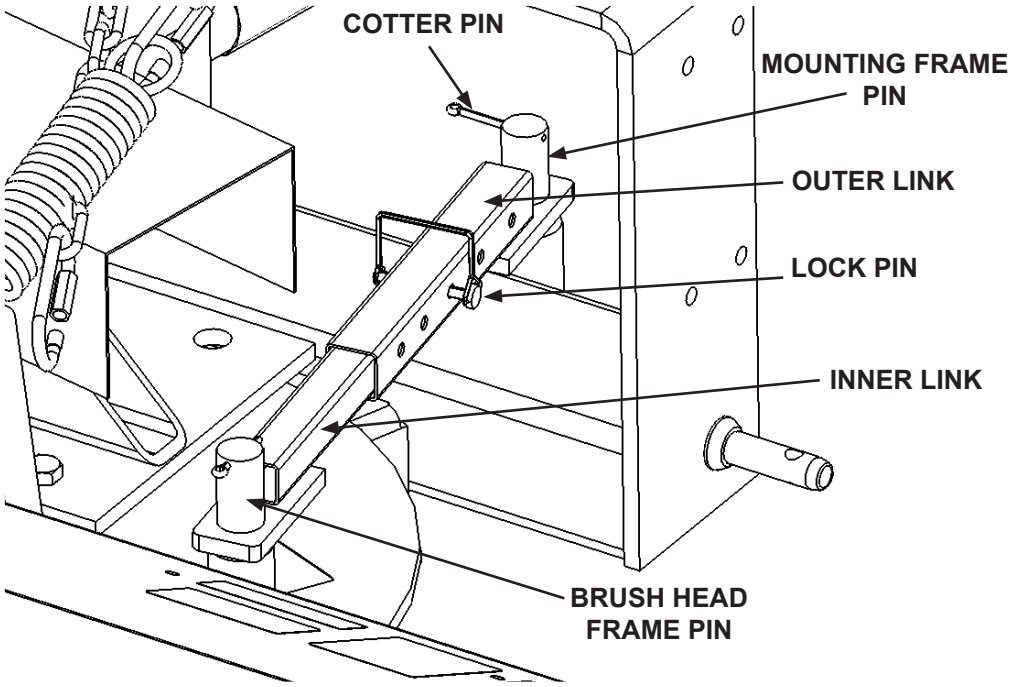
18. Install any other options. See provided instructions.

INSTALLATION

MANUAL ANGLE INSTALLATION

1. Slide the inner link (with one hole) into the outer link.
2. Place assembly on large pins welded to the sweeper. The inner link goes on the brush head frame pin. See Figure #8
3. Secure with cotter pins.
4. Swing the sweeper to the desired angle. Make sure to align a set of holes in the links.
5. Insert a lock pin in the aligned holes.

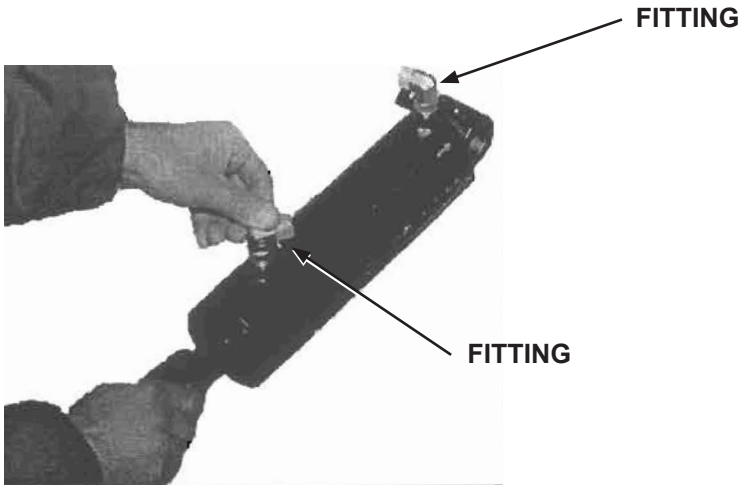
FIGURE #8



HYDRAULIC ANGLE INSTALLATION

1. If not already installed, attach fittings to the cylinder. See Figure #9

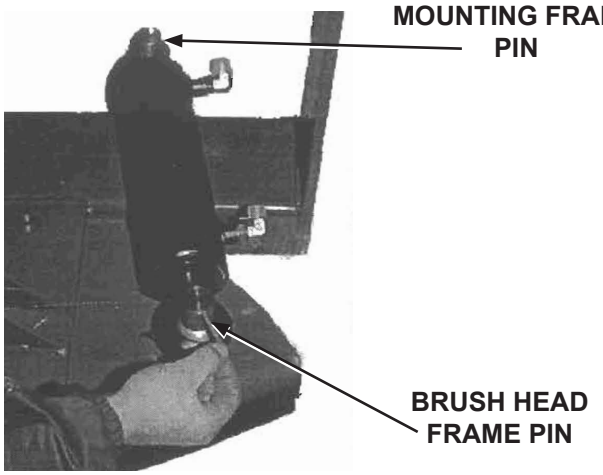
FIGURE #9



2. Install the cylinder with the barrel end on the mounting frame pin and the rod end on the brush head frame pin Secure with cotter pins. See Figure #10

INSTALLATION

FIGURE #10

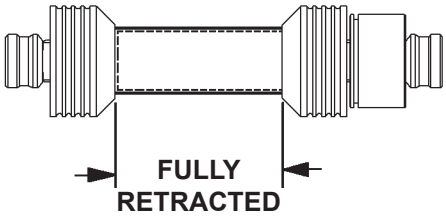


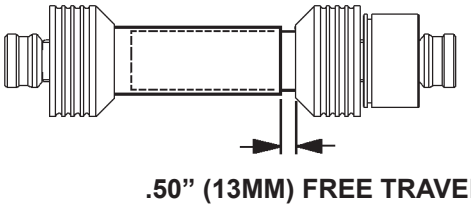
3. Connect a hose to each fitting on the cylinder.
4. Attach adapter fittings to the hose ends.
5. Connect the adapter fittings to prime mover remote valves.

NOTE: Additional hydraulic equipment, such as quick couplers and valves are customer supplied.

POWER (PTO) SHAFT ADJUSTMENT

Confirm the minimum and maximum working lengths of the driveshaft. The telescoping tubes must overlap by at least 1/3 of their length while in use. The (PTO) drive assembly may need to be shortened to fit up to your tractor correctly and to prevent the drive assembly from “bottoming out” and causing extensive damage to the tractor PTO drive assembly.





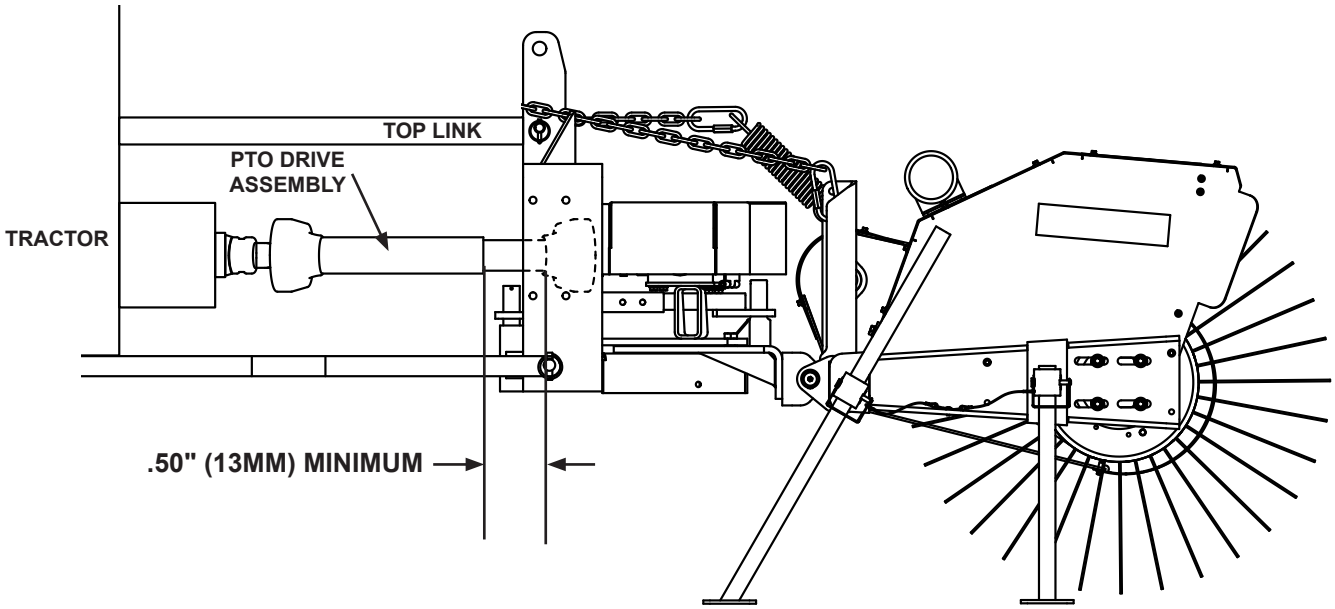
The shaft assembly is shortest when the shaft is straight inline with the attachment. There should be a minimum of .50" (13mm) of free travel before the shaft is fully retracted. To check:

1. Lower the attachment until the shaft is parallel to the ground and is straight inline with the attachment gearbox.
2. Check to see if there is a minimum of .50" free travel.

If there is not at least .50" (13mm) of free travel DO NOT OPERATE ATTACHMENT.

NOTICE! If the drive shaft “bottoms out” before it is straight inline with the attachment, stop and call your nearest dealer or the attachment manufacturer before operating.

INSTALLATION



CAUTION! **Failure to have the required distance of clearance will damage the power take off (PTO) of your tractor. The minimum and maximum length of the PTO must be checked whenever this attachment is used on a different tractor.**

DETACHING

NOTICE! Hoses for the hydraulic angle kit must be removed before the quick attach is disengaged. Pulling the sweeper with the hoses could result in damage to the prime mover or sweeper.

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 (if so equipped).
3. Lock storage legs in lowered position.
4. Disconnect hydraulic angle hoses from the rear remote hydraulics (if so equipped).
5. Install caps onto the hydraulic hoses to prevent contaminants from entering the hydraulic system. Store hoses off of the ground to help prevent damage (if so equipped).
6. Follow your prime mover operator's manual for detaching (removing) an attachment.

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.

RAISING & LOWERING THE SWEEPER

To raise and lower the sweeper, use 3-point lift arms. Do not use a toplink cylinder.

NOTICE! Use lower 3-point arms (not a toplink cylinder) to raise & lower the sweeper.

NOTICE! Avoid driveline damage do not run brush in raised position. Only run the brush with the sweeper lowered.

ANGLING THE SWEEPER

Use the angle feature to control the direction debris exits the sweeper. Angling the brush head the same direction as the wind also helps reduce the amount of material that blows onto the operator and the surface swept.

Manual Angle

1. Remove the lock pin from links.
2. Position the brush head at the desired angle.
3. Aligning holes in the inner and outer link, insert and close the lock pin.

Hydraulic Angle

1. Start the prime mover.
2. Position the brush head at the desired angle by using the valve control for the swing function.

OPERATION

Before operating: level the sweeper, set the angle, and adjust the brush pattern according to the instructions in this manual.

Carry the sweeper low to the ground so the operator has good visibility and stability. Avoid any sudden movements.

Avoid excessive downward pressure on the brush sections to prevent excessive wear. A 2”- 4” wide pattern is sufficient for most applications. Verify the top edges of the mounting assembly and brush head plates are parallel to prevent an uneven wear pattern. Adjust if necessary and tighten hardware. To adjust pattern see “Brush Pattern Adjustment”.

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

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

Model RHFA sweepers are powered from the rear PTO shaft at 540 rpm maximum.

1. Start the prime mover at idle and raise the brush.
2. Start brush rotation by engaging the PTO at idle.

3. Lower sweeper to the ground and increase prime mover engine rpm to the desired sweeping speed for your application.

NOTE: This sweeper has been assembled so it sweeps while traveling forward. It can, however, sweep while driving in reverse. See "Reversing Sweeping Direction".

OPERATING TIPS

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

LARGE AREAS

When sweeping a large area, as a parking lot, make a path down the middle and sweep to both sides. This reduces the amount of debris that the sweeper must sweep to one side.

SNOW

Fast brush speeds and slow travel speeds are needed to sweep snow effectively. Start at 3/4 throttle and the lowest gear of the prime mover. For wet and/or deep snow, increase to almost full throttle. This helps keep snow from packing up inside the brush hood.

NOTICE: For best sweeping results, we recommend that the swing assembly be 21" (533mm) above the ground. Failure to maintain this distance allows for swept material to be carried over the brush and back onto the swept area.

- In deep snow you may need to make multiple passes to get down to a clean surface.
- Always sweep with the wind at your back.

DIRT & GRAVEL

To keep dust at a minimum, use the optional dust suppression kit or plan sweeping for days when it is overcast and humid or after it has rained.

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.

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

HEAVY DEBRIS

- Travel slowly - 2 to 3 mph (3-5 kph).
- Sweep a path less than the full width of the sweeper.
- Increase engine speed if debris becomes very heavy.

THATCH

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

To prevent the brush from pulling itself into the ground, adjust the spring-chain assembly 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.

Use a combination of brush speeds and ground speeds that rolls up a neat windrow.

To keep thatch from blowing back onto a swept area, sweep with the wind at your back or in the direction the brush is angled.

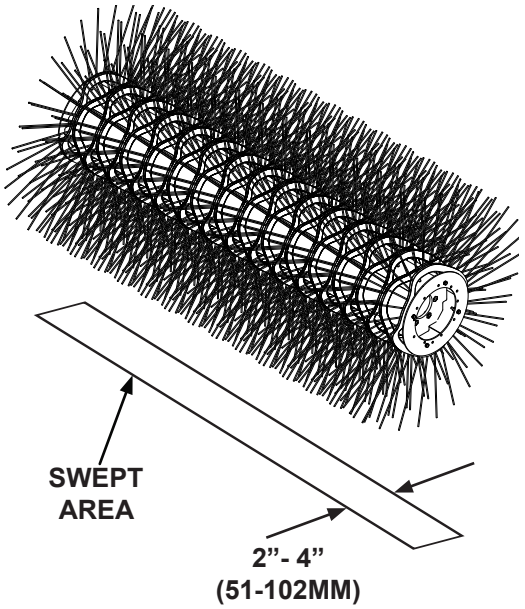
OPERATION

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 mover's parking brake and leave the engine running.
3. Start the sweeper at a slow speed: lower it so the bristle tips touch the ground. Run the sweeper in a stationary position for 30 seconds.
4. Raise the sweeper and pull away; switch off the engine and remove the key. The brush pattern left in the dust should be 2"-4" (51-102 mm) wide, running the length of the brush. (Compare the swept area with Figure #1.)
5. Adjust the brush pattern as necessary, see "Adjusting Spring-Chain Assembly".

FIGURE #1



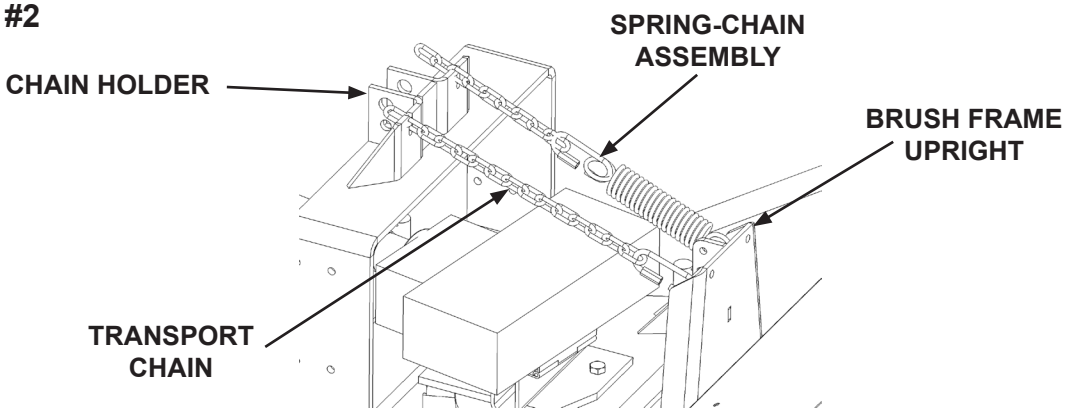
Note: If the brush pattern is uneven leveling should be performed. See Leveling.

ADJUSTING SPRING-CHAIN ASSEMBLY

The spring-chain assembly sets the brush pattern by restricting up and down movement of the brush head assembly. See Figure #2

To adjust the brush pattern:

FIGURE #2



1. Lower straight storage legs (closest to the bearing assembly).
1. Lower the sweeper until tension is relieved from the spring.
2. Increase of decrease the number of links in the spring-chain assembly between the mounting assembly chain holder and the brush frame upright.
   - Increase the number of links to lower the brush head.
   - Decrease the number of links to raise the brush head.
3. Adjust the transport chain.

OPERATION

ADJUSTING TRANSPORT CHAIN

The transport chain supports the weight of the brush head assembly during transport between work sites and during adjustment of the spring-chain assembly. When sweeping, the transport chain should have one or two links of slack. See Figure #2

To adjust the transport chain for moving between sites:

1. Lower the sweeper to the ground.
2. Pull the transport chain tight and secure it in the mounting assembly chain holder.
3. Raise the sweeper off the ground with the hitch lift. Most of the weight of the brush head assembly should be on the transport chain, not on the spring-chain assembly.

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 legs.

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 (if so equipped).
- Coat exposed portions of the cylinder rods with grease (if so equipped).
- Lubricate grease fittings.
- Seal hydraulic system from contaminants and secure all hydraulic hoses off the ground to help prevent damage (if so equipped).
- 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 avoid rust.

REMOVAL FROM STORAGE:

- Wash unit and replace any damage and/or missing parts.
- Lubricate grease fittings.
- Check hydraulic hoses for damage and replace as necessary (if so equipped).

OPERATION

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.
- 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.

- 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

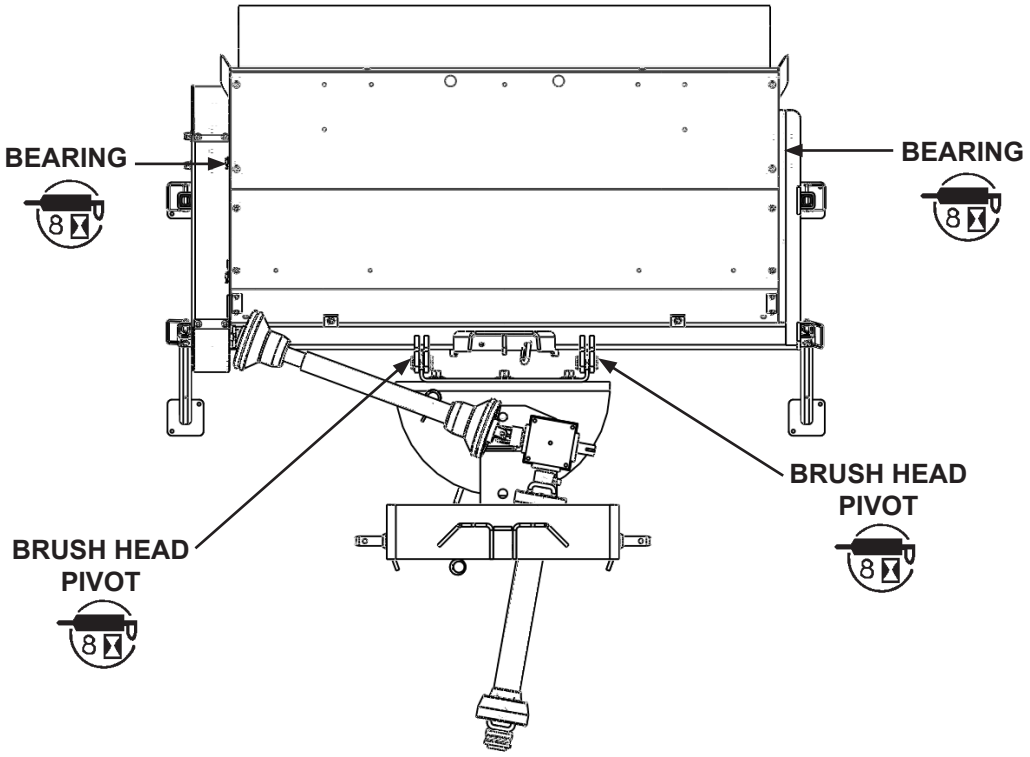
“Follow all local government regulations that may apply along with recommended tie down points and any equipment safety precautions at the front of this manual when transporting your attachment.”

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.

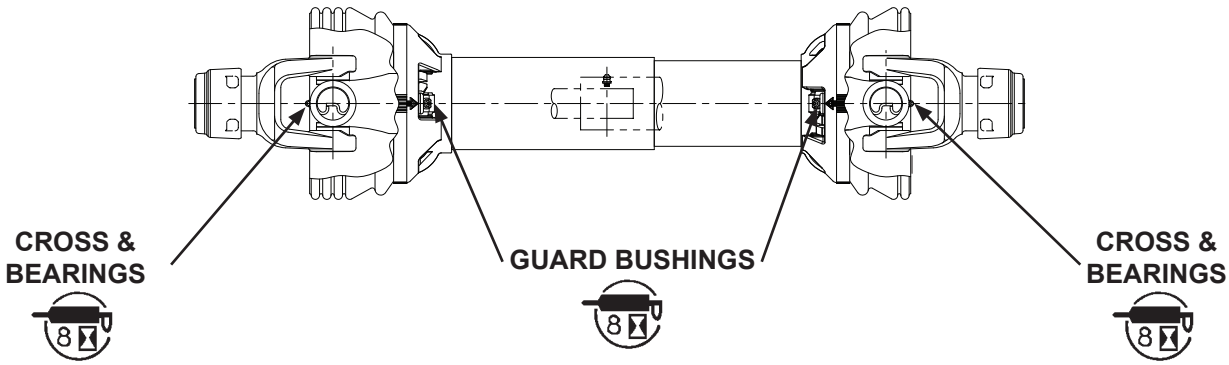
Lubricate daily or every 8 hours of operation, whichever comes first, with SAE Multi-Purpose Lubricant or an equivalent SAE Multi-Purpose type grease.



GEARBOX SHIELD REMOVED FOR CLARITY

PTO DRIVELINES

- Lubricate the outboard hub and the PTO every (40) forty hours.
- Grease PTO driveline inner tube before putting attachment into operation and every (20) twenty hours thereafter.

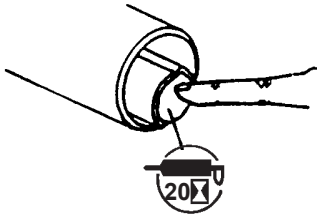


IMPORTANT: Avoid excessive greasing. Dirt collects on exposed grease and greatly increases wear. After greasing, wipe off excessive grease from fittings.

LUBRICATION

*** When used in winter the outer tube must be greased to prevent it freezing solid!**

GREASE INSIDE OF OUTER TELESCOPING TUBE (EVERY 20 HOURS)



- **It is recommended to use NL-GI2 grease or equivalent for all grease points.**

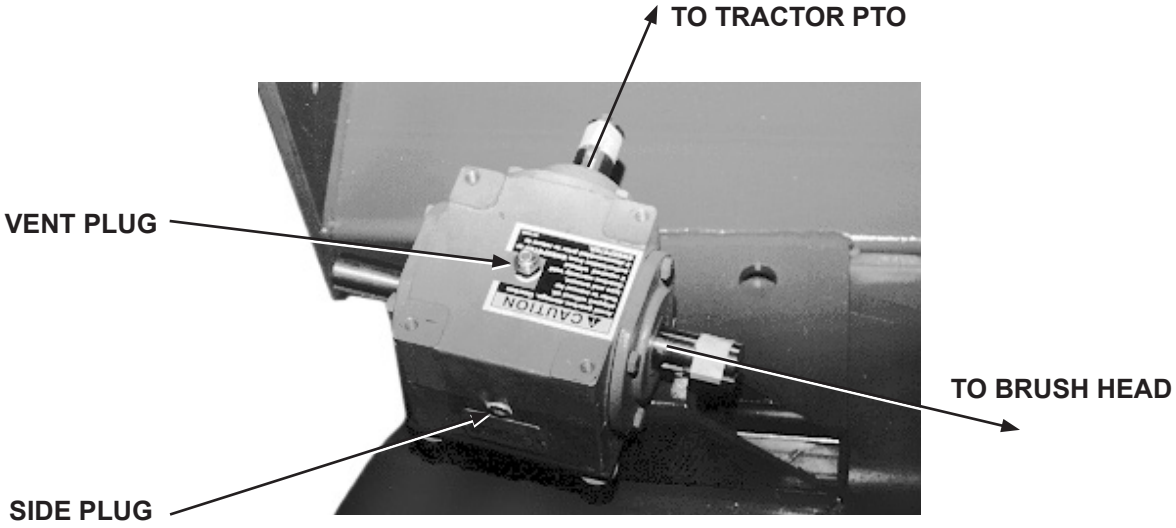
GEARBOX

To check gearbox lubricant level, remove the side plug located in the hinged area of gearbox shield.

- If lubricant seeps out the hole, the gearbox is full.
- If not, add multipurpose 90-weight gear lubricant.

To add lubricant:

1. Remove the top and side plugs.
2. Pour multipurpose 90-weight gear lubricant into the top hole until lubricant runs out the side hole.
3. Replace both plugs.



MAINTENANCE

GENERAL INFORMATION

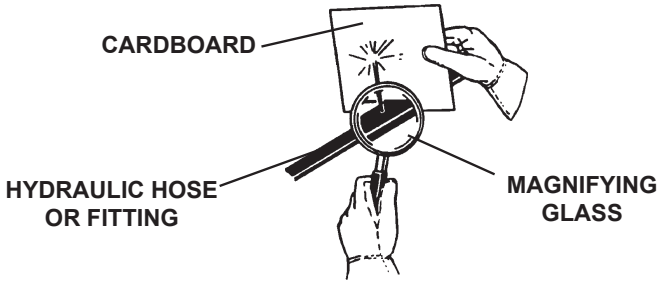
Regular maintenance is the key to long equipment life and safe operation. Maintenance requirements have been reduced to an absolute minimum. However, it is very important that these maintenance functions be performed as described below.

Procedure	Daily (Every 8 Hours)	Weekly (Every 40 Hours)	Quarterly (Every 3 Months)
Check hardware for tightness (See Bolt Torque Specifications)	✔		
Check universal joints for wear. Tighten set screws and jam nuts.	✔		
Lubricate all grease fittings with high quality grease.	✔		
Check brush pattern. (See Brush Pattern Adjustments.) Adjust spring-chain assembly. (See Adjusting Spring-Chain Assembly.) Level brush head assembly.	✔		
Check hydraulic system for leaks and tighten as necessary. Check for damage and replace as needed.	✔		
Check prime mover hydraulic system for adequate oil levels.	✔		
Check for missing or damaged safety decals and replace as necessary.	✔		
Check sprockets alignment. (See Aligning Sprockets.)		✔	
Check drive chain for adjustment. (See Adjusting Drive Chain.)		✔	
Remove drive chain from sprockets; soak in motor oil. To loosen stiff links, soak in penetrating oil; bend back and forth. Replace chain if this does not work.			✔

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.



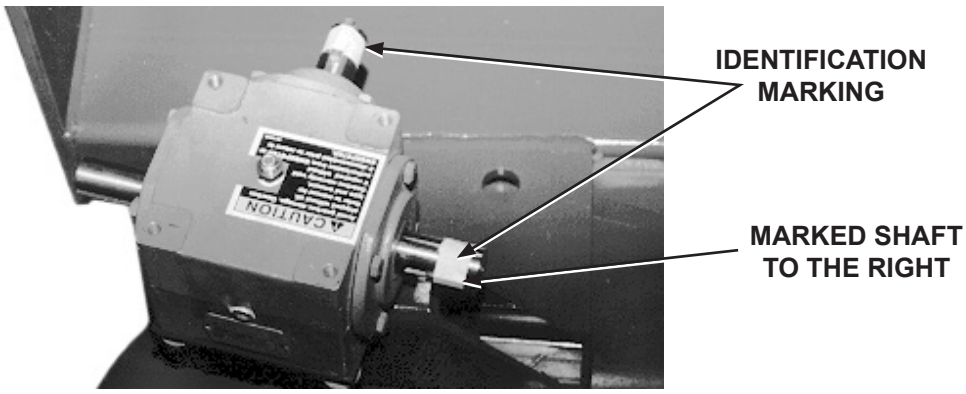
MAINTENANCE

REVERSING SWEEPING DIRECTION

All RHFA sweepers are shipped with the gearbox set to sweep forward while driving forward. To reverse the gearbox rotation to sweep while backing up:

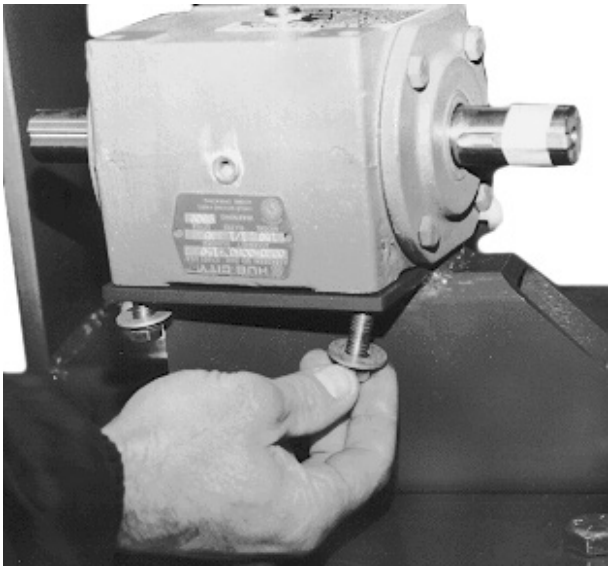
1. Remove PTO drivelines and the shield from the gearbox. Mark gearbox shafts for identification purposes (we used white tape). See Figure #1.

FIGURE #1



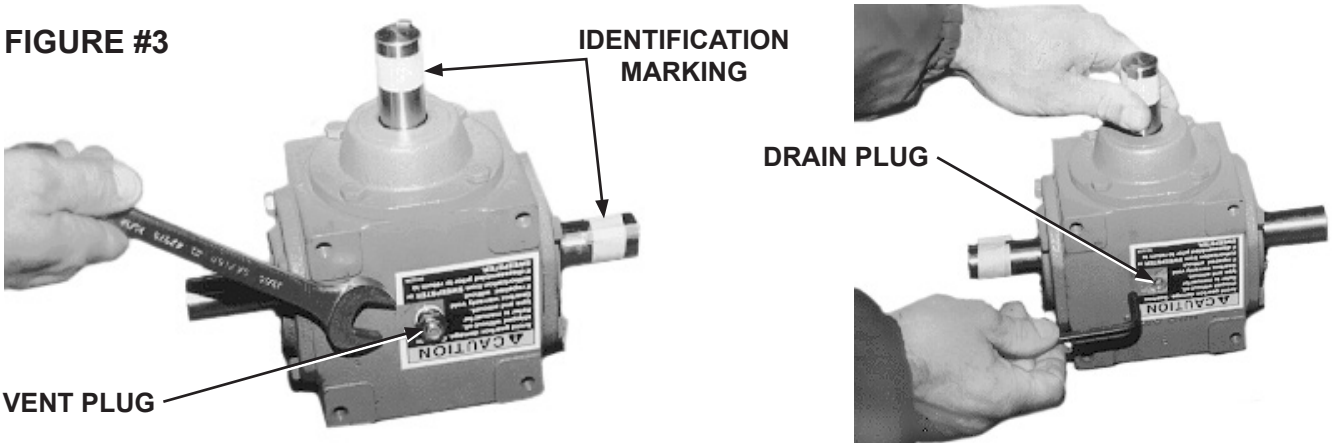
2. Remove the gearbox from the mounting assembly. See Figure #2

FIGURE #2



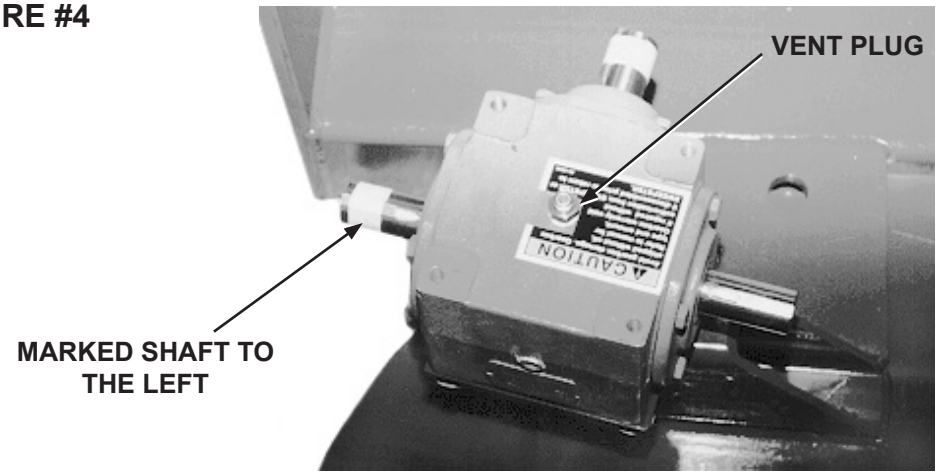
3. Remove the vent plug and drain plug & switch locations (reinstall plugs in the opposite holes). Tighten both plugs securely. See Figure #3

FIGURE #3



4. Flip gearbox over and reinstall. The vent plug must be on top of the gearbox. See Figure #4

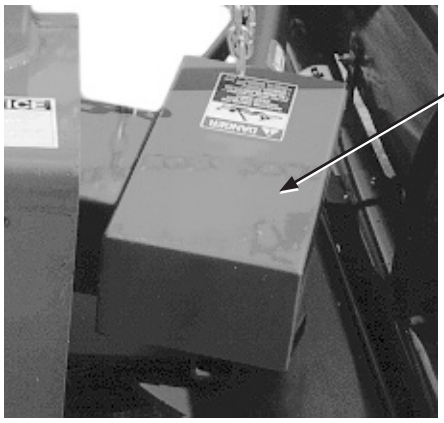
FIGURE #4



5. Reinstall the gearbox shield. See Figure #5.

WARNING! AVOID SERIOUS INJURY OR DEATH. Do not operate the sweeper without all shields installed.

FIGURE #5



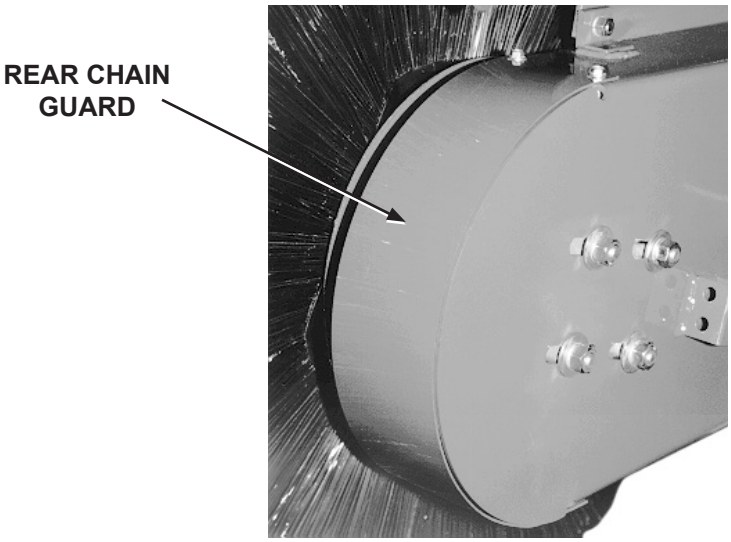
6. Install PTO drivelines on gearbox shafts. Tighten set screws and jam nuts.
7. Check gearbox lubricant level. Fill if necessary.
8. Operate the unit at a low rpm while observing for excessive vibrations or other problems. Correct before using the unit.

MAINTENANCE

ADJUSTING DRIVE CHAIN

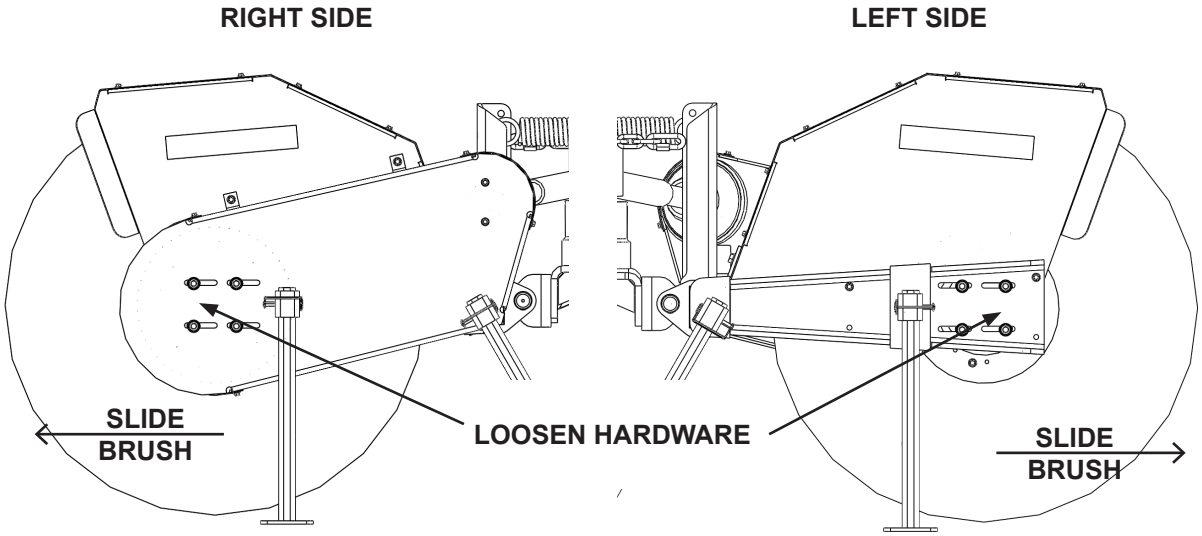
1. Remove the rear chain guard. See Figure #1

FIGURE #1



2. Loosen but do not remove four bolts securing bearing assemblies on both sides of the brush head assembly. See Figure #2

FIGURE #2



3. Slide the brush away from mounting assembly until there is .38” to .50” (10 to 13mm) of play in the chain. See Figure #2

NOTICE! Avoid drive chain and sprocket damage. The drive chain must have .38” to .50” (12mm to 13mm) of play. Overtightening wears the chain and sprockets prematurely.

4. Tighten four bolts on each bearing assembly to hold the assemblies in place.
5. Reinstall the rear chain guard.

WARNING! **AVOID SERIOUS INJURY OR DEATH.** Do not operate the sweeper without all shields in place.

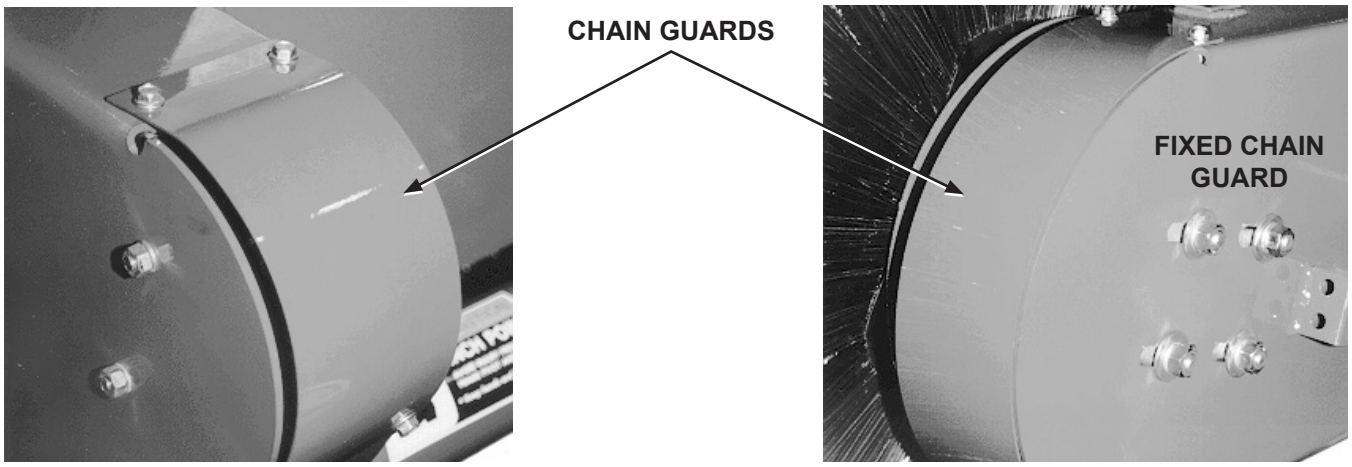
MAINTENANCE

ALIGNING SPROCKETS

Keep sprockets aligned to prevent chain derailment and reduce wear on the drive chain and sprockets.

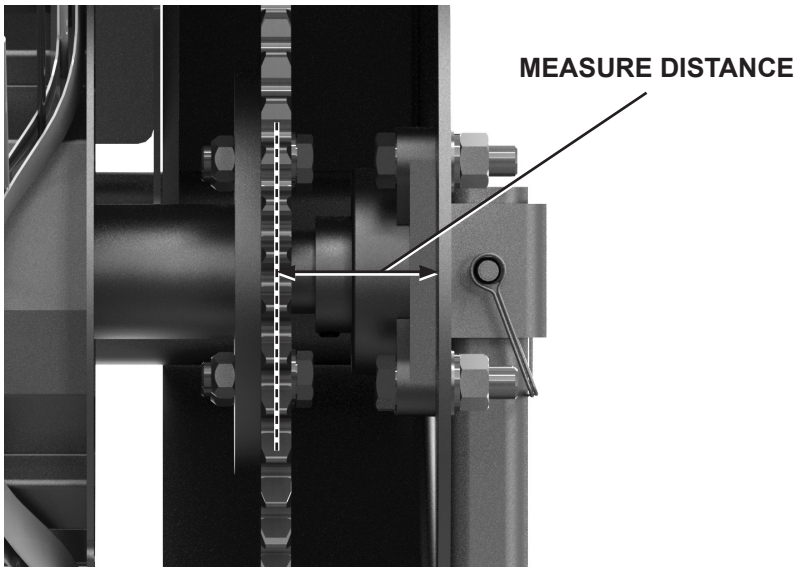
1. Remove front and rear chain guards from the fixed chain guard. See Figure #1

FIGURE #1



2. For each sprocket, measure from inside the fixed chain shield to the center of the chain. See Figure #2

FIGURE #2



3. Compare measurements.
   - If they are the same, sprockets are aligned.
   - If they are different, loosen the set screw on the small sprocket. Adjust it until it is the same distance as the large one. Tighten the set screw.
4. Reinstall chain shields.

WARNING! AVOID SERIOUS INJURY OR DEATH. Do not operate the sweeper without all shields in place.

MAINTENANCE

REPLACING BRUSH SECTIONS

1. Remove front and rear chain guards.
2. Rotate the brush to locate the master link. Remove the master link and chain.
3. Remove four capscrews holding bearing assemblies from both sides of sweeper. See Figure #1
4. Pull the brush out from under the hood.
5. Remove retaining plate from the core assembly.
6. Remove old brush sections.
7. Stand the core on end and install new brush sections by doing the following:

FIGURE #1

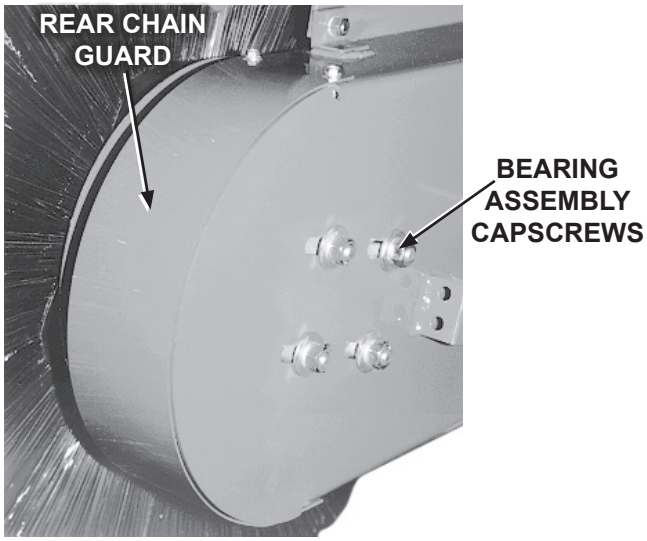
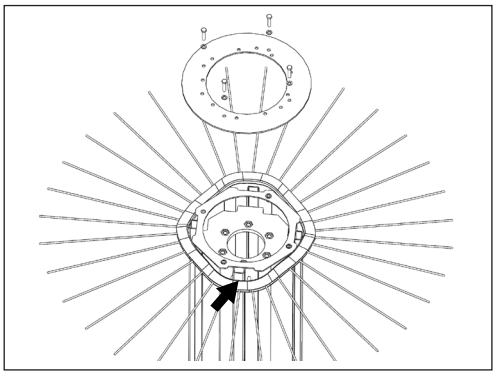


FIGURE #2



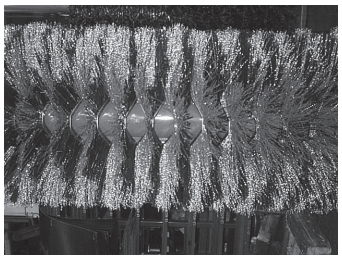
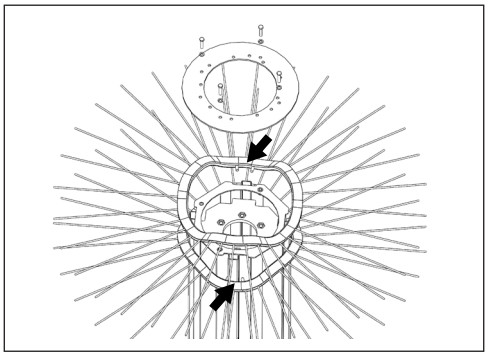


FIGURE #3



a. Slide the first section onto the core with the drive pins on each side of a tube. Make sure that the drive pins angle up. See Figure #2.
b. Install the second section with drive pins angled down and positioned on each side of the tube located 180° from the first section. See Figure #3.
c. Continue installing sections, rotating each section 180°, and alternating the direction of the drive pins until the core is full.

NOTE: If the last section will take more space than is left, but more than .50” (13mm) remains, nest the last section on the previous one by placing both section drive pins on same tube.

NOTE: With new brushes, bristles may bend into the chain. Trim them to prevent chain derailment.

8. Reinstall the retaining plate onto the core assembly using the existing hardware.
9. Lay the core back onto the ground and re-position into the brush frame assembly.
10. Reattach capscrews, washers & nuts to the bearing assemblies.
11. Relink the chain onto the sprockets and align sprockets; see “Aligning Sprockets”.
12. Adjust the chain; see “Adjusting Drive Chain”
13. Reinstall front and rear chain guards.

MAINTENANCE

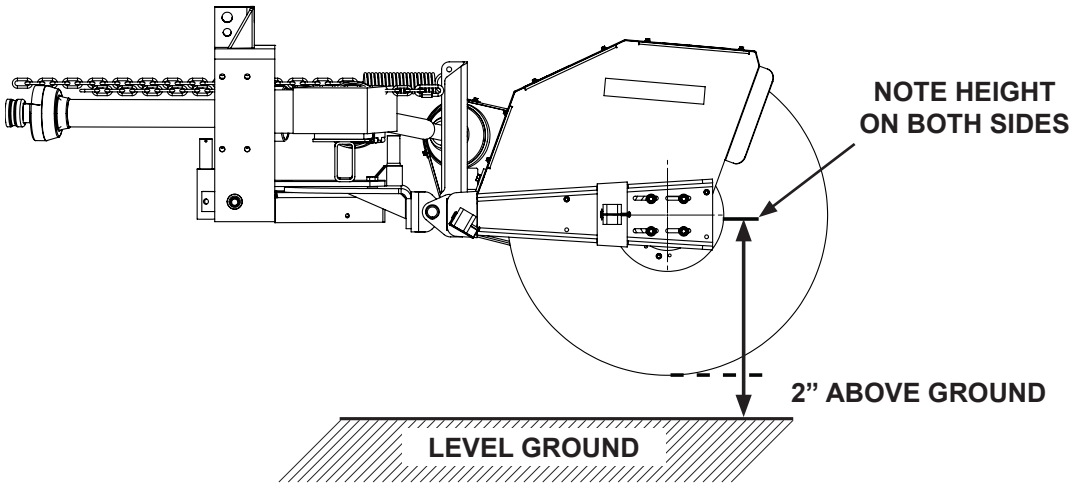
Worn Section Standard				Reference Information	
Section OD, New	Ring ID	Section OD, Worn	Exposed Bristle, Worn	Bristle Length	Exposed Bristle, New
24	6.38	17	3.8	8.50	7.5
26	8.00	18	4.0	9.00	8.0
32	10.00	22	5.0	11.00	10.0
36	10.00	24	6.0	13.00	12.0
36	10.63	25	6.0	12.69	11.4
46	19.38	34	6.0	13.31	12.1

LEVELING

Level the sweeper for even brush wear and effective use.

1. Move the unit to a dusty, paved surface.
2. Lower the brush head assembly so the bristle tips are 2” (51mm) above the ground.
3. Engage the parking brake and shut down the prime mover. Unfasten safety restraints and exit prime mover.
4. Swing the brush head assembly straight ahead.
5. At each end of the brush head, measure from the center of the core shaft to the ground. See Figure #1
   - If measurements are the same, go to step 6.
   - If measurements are not equal, make sure the top edges of the mounting assembly and brush head plates are parallel. Adjust, if necessary, and tighten the hardware. Then, lengthen or shorten the adjustable hitch arm. Repeat until measurements are equal.

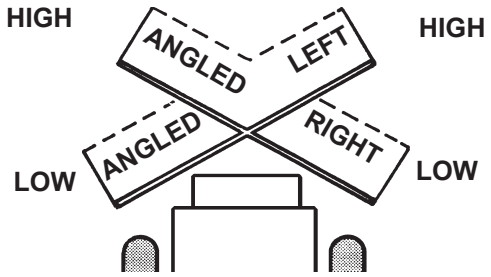
FIGURE #1



6. Swing the sweeper to the right. Take measurements as in step 5. Swing sweeper to the left and measure again.
   - If all measurements are equal, the sweeper is level.
   - If measurements are not equal, level the mounting assembly with the toplink. Follow instructions below, repeat until the sweeper is level.

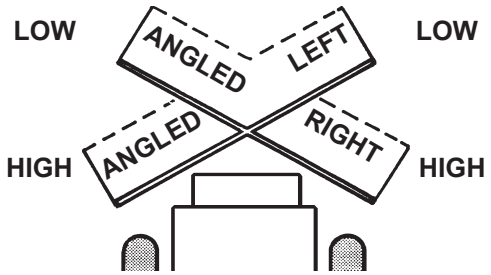
   a. If measurements resemble Figure #2, lengthen the top link.

FIGURE #2



   b. If measurements resemble Figure #3, shorten the toplink.

FIGURE #3



NOTE: Make sure the PTO driveline does not hit the mounting frame when the unit is raised. Reset lift limits if necessary.

TROUBLESHOOTING

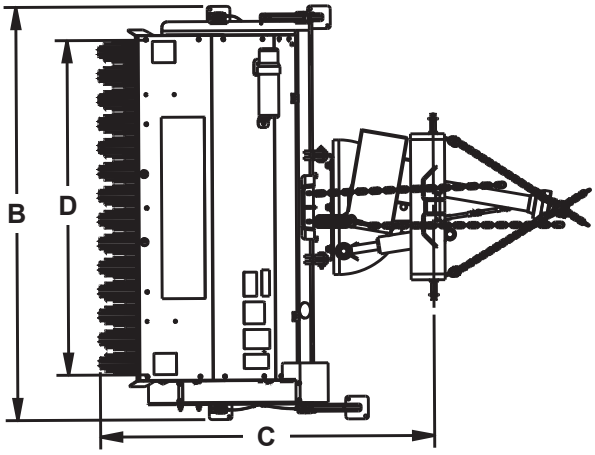
NOTICE! Do not open a gearbox still under warranty; contact Paladin for replacement parts and service policy.

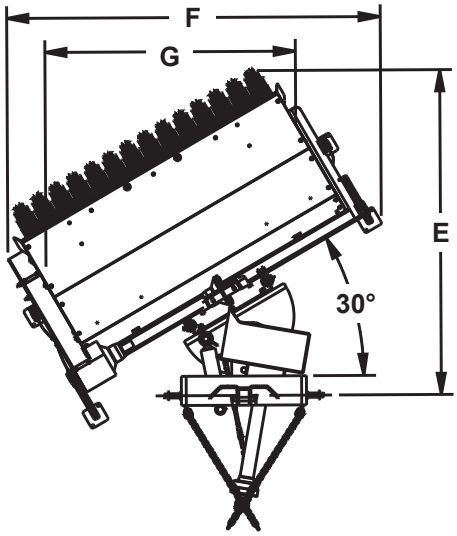
PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
POOR SWEEPING	Not maintaining proper PTO speed.	Check PTO speed with tachometer and operate at proper RPM.
	Traveling too fast.	Adjust speed.
BRUSH ROTATES WRONG DIRECTION	Gearbox is flipped.	Remove gearbox, switch vent plug and drain plug, remount gearbox. (See Reversing Sweeping Direction).
BRUSH HEAD ASSEMBLY "BOUNCES" DURING SWEEPING	Spring-chain assembly needs adjustment.	Adjust spring-chain assembly. (See Adjusting Spring-Chain Assembly).
	Ground speed too fast and/or brush speed too slow.	Find correct combination of ground and brush speeds.
	Core is bent.	Replace core.
BRUSH WEARS UNEVENLY	Brush head not level.	Level brush head. (See Leveling).
BRUSH WEARS VERY QUICKLY	Spring-chain assembly not adjusted correctly.	Adjust spring-chain assembly. (See Adjusting Spring-Chain Assembly).
	Brush speeds too high.	Use slower brush speeds.
DRIVE CHAIN FALLS OFF REPEATEDLY	Sprockets not aligned.	Align sprockets. (See Aligning Sprockets).
	Too little tension on drive chain.	Tighten drive chain. (See Adjusting Drive Chain).
GEARBOX DOES NOT TURN	Broken shaft or gear.	Do not open a gearbox still under warranty; contact Paladin for replacement parts and service policy.
OIL LEAKING FROM PINION HOUSING, CAPS, CAP SCREWS OR PIPE PLUGS	Loose hardware.	Retighten hardware or remove and coat with Loctite® before tightening; if necessary, replace gaskets.
HIGH INTERNAL OPERATING TEMPERATURE (ABOVE 200° F [93.33° C])	Damaged bearings.	Replace bearings.
	Insufficient oil.	Add oil.
EXCESSIVE END PLAY OF SHAFTS (.005" [.13MM] OR MORE) WHEN COUPLINGS ARE REMOVED	Worn bearings.	Remove gaskets between caps and gear case; replace.
EXCESSIVE BACKLASH	Worn gears.	Adjust gears; replace if necessary.

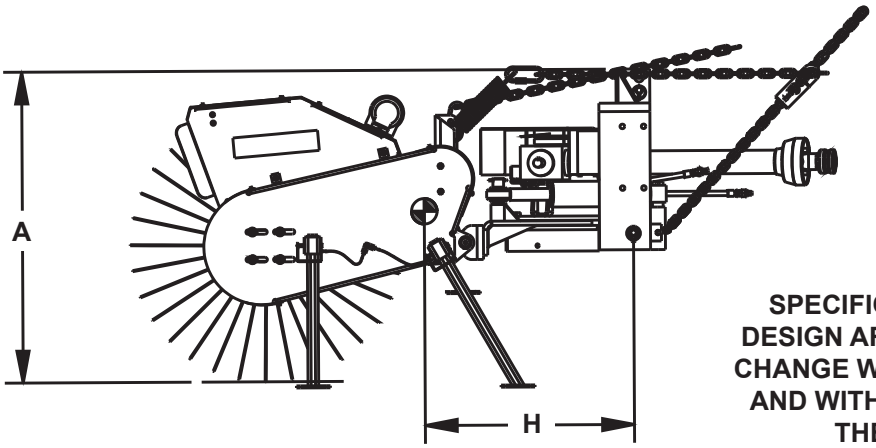
TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
END AND/OR INBOARD YOKE EARS SPREAD	Drive shaft too long.	Adjust drive shaft length. (See PTO Adjustment). Replace parts if necessary.
	Axial forces too high - running above recommended rpm.	Clean and grease profile tubes; replace parts; replace both tubes, if necessary.
END AND/OR INBOARD YOKE BEARING CAPS BLUED	Insufficient lubrication.	Follow lubrication instructions. (See Lubrication). Replace parts if necessary.
END AND/OR INBOARD YOKE EARS HAVE PRESSURE MARKS	Excessive bend angle when shaft rotates.	Avoid running brush in raised position; switch off tractor PTO during cornering or when lifting the brush head; replace parts.
	Drive shaft too long.	Adjust drive shaft length.
SHIELD TUBE DEFORMED AND SPLIT ON ONE SIDE	Shield tube too short or no overlap at all when drive shaft is extended.	Adjust shield tube length. (See PTO Adjustment). Replace parts if necessary.
SHIELD TUBES DAMAGED	Shields contact components on tractor and/or sweeper.	Allow more clearance. Reset lift limits, according to prime mover manual Replace any damaged part.
SHIELD CONE DESTROYED	Shields contact components on tractor and/or sweeper.	Allow more clearance. Reset lift limits, according to prime mover manual Replace any damaged part.
TELESCOPING SECTIONS DISTORTED	Overload caused by high starting and peak torques or blocking.	Engage and disengage at idle. Replace parts if necessary.
TELESCOPING SHAFT BENT	Tractor toplink not adjusted correctly.	Adjust tractor toplink so swing frame is perpendicular to ground.
PTO WILL NOT TELESCOPE	Improper lubrication.	Separate and fill female tube half full of grease.
	PTO twisted.	Replace twisted portion. Caution operator not to ground out machine.
	Bent PTO.	PTO too long. Size to tractor according to manual.
	Shields damaged.	Replace PTO shield.
PTO TWISTED	Not maintaining correct PTO speed.	Maintain proper PTO speed.

SPECIFICATIONS







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

DESCRIPTION	5’	6’	7’	8’
A. Overall Height	36.60” (92.96 cm)	36.60” (92.96 cm)	36.60” (92.96 cm)	36.60” (92.96 cm)
B. Overall Width	72.90” (185.16 cm)	84.90” (215.65 cm)	96.90” (246.13cm)	108.90” (276.60 cm)
C. Overall Length	59.20” (150.37 cm)	59.20” (150.37 cm)	59.20” (150.37 cm)	59.20” (150.37 cm)
D. Sweeping Width	60.00” (152.4 cm)	72.00” (182.88 cm)	84.00” (213.36 cm)	96.00” (243.84 cm)
E. Overall Length @ 30° Angle	67.20” (170.69 cm)	70.20” (178.30 cm)	73.20” (185.93 cm)	76.20” (193.55 cm)
F. Overall Width @ 30° Angle	76.90” (195.33 cm)	87.30” (221.74 cm)	97.70” (248.16 cm)	108.10” (274.58 cm)
G. Sweeping Width @ 30° Angle	52.00” (132.08 cm)	62.40” (158.50 cm)	72.80” (184.91 cm)	83.20” (211.33 cm)
H. Center of Gravity (Horizontal)	24.60” (62.48 cm)	25.50” (64.77 cm)	26.30” (66.80 cm)	27.00” (68.58 cm)
Weight	730# (331 kg)	780# (353 kg)	835# (378 kg)	885# (401 kg)
(Add +40 lbs [18 kg] for Hydraulic Angle)				
PTO RPM				540

BOLT TORQUE SPECIFICATION

GENERAL TORQUE SPECIFICATION TABLES

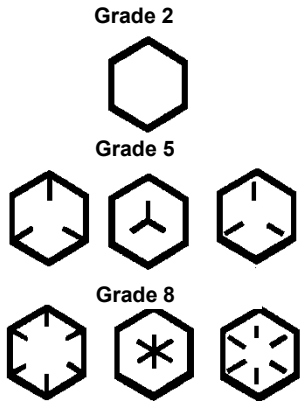
Use the following charts when determining bolt torque specifications, when special torques are not given. Always use grade 5 or better when replacing bolts.

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

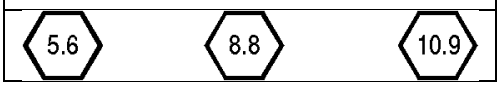
Bolt head identification marks as per grade.
NOTE: Manufacturing Marks Will Vary



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

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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***.