SWEEPSTER
BY PALADIN

OPERATOR'S MANUAL

ANGLE SWEEPER
M24 Series - MRM / CTM / L4800

SERIAL NUMBER: _____

MODEL NUMBER: _____

Manual Number: 51-3000
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800-456-7100 I www.paladinattachments.com 2800 N. Zeeb Rd., Dexter, MI. 48130, United States of America

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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.

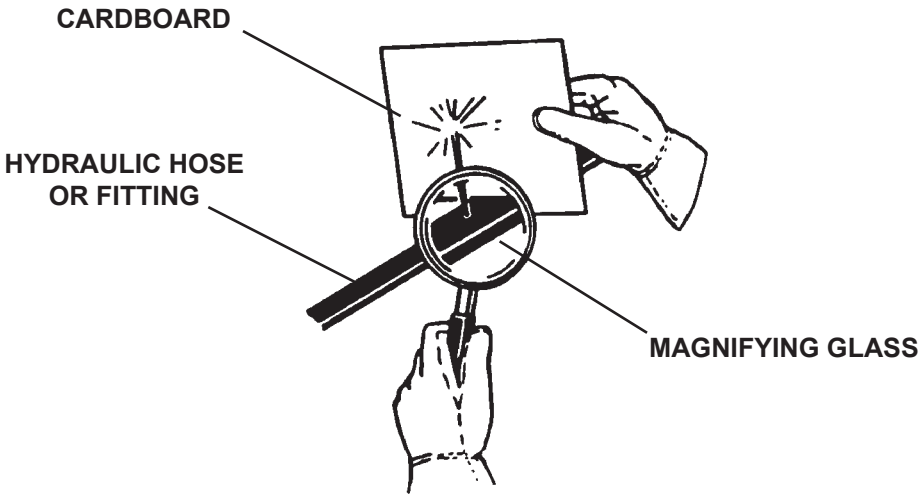
WARNING! **LOWER OR SUPPORT RAISED EQUIPMENT**

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, disengage PTO, apply the brakes, turn off the prime mover’s engine and remove the key.
- Never lift the lowest portion of the attachment plate higher than 5’ above the ground.
- Do not lock the auxiliary hydraulics of your prime mover in the “ON” position.

EQUIPMENT SAFETY PRECAUTIONS

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

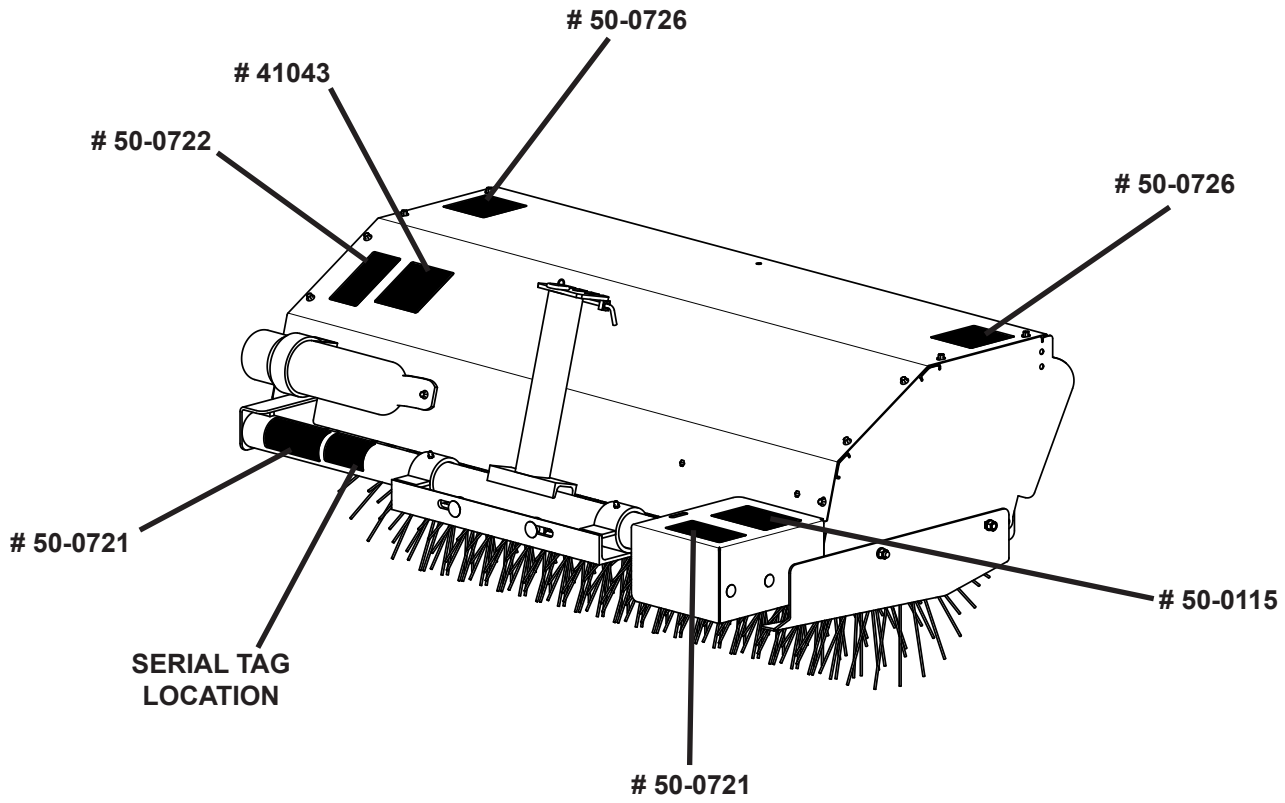
- Before performing maintenance, lower the attachment to the ground, disengage the PTO, apply the brakes, turn off the engine and remove the key.
- Be sure all rotation has stopped before approaching the sweeper.
- Disengage the PTO shaft before making any adjustments or repairs.
- Never perform any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

DECAL 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.



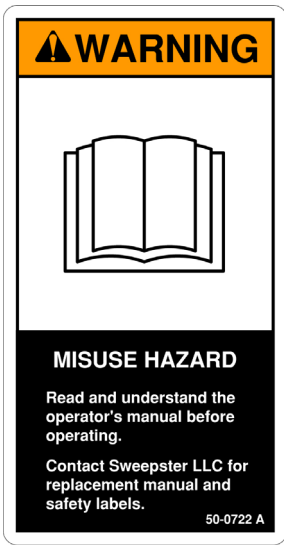
IMPORTANT: Keep all safety decals clean and legible. Replace all missing, illegible, or damaged safety decals. When replacing parts with safety decals attached, the safety decals must also be replaced. Safety decals are available, free of charge, from your local dealer or Paladin.

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

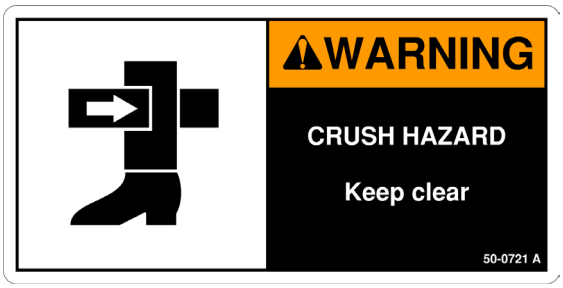
 # 50-0726 WARNING!
FLYING OBJECTS & ENTANGLEMENT

 # 41043 WARNING!
HAZARDOUS DUST



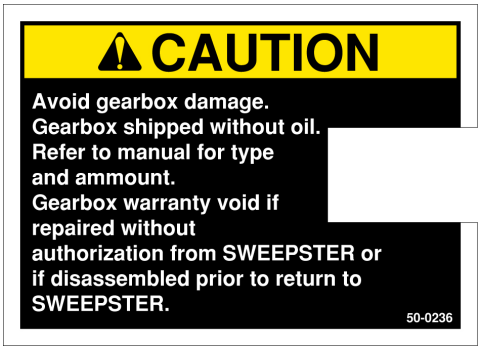
 # 50-0722 WARNING!
MISUSE HAZARD

 # 50-0115 DANGER!
ROTATING DRIVELINE

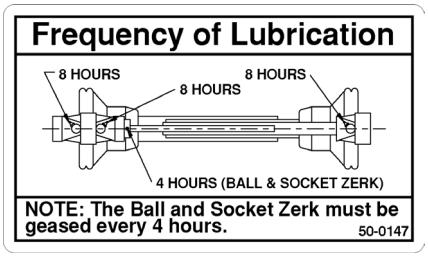


 # 50-0721 WARNING! CRUSH POINT

 # 50-0591 CAUTION! NO STEP
(SELECT DRIVE ASSEMBLIES ONLY)



 # 50-0236 GEARBOX, CHECK OIL
(HUBCITY GEARBOXES ONLY)



 # 50-0147 FREQUENCY OF LUBE
(WEASLER PTO SHAFTS ONLY)

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

SET-UP

Due to the various different combinations of prime movers, options and applications available for this sweeper, most of the instructions are provided with the individual mounting kits, drive kits and options selected when purchased. This section will cover some of the basic instructions for setting up your prime mover and sweeper.

MOUNTING KIT

Install the mounting kit assembly onto your prime mover by following the instructions provided with your mounting kit and your prime mover manual.

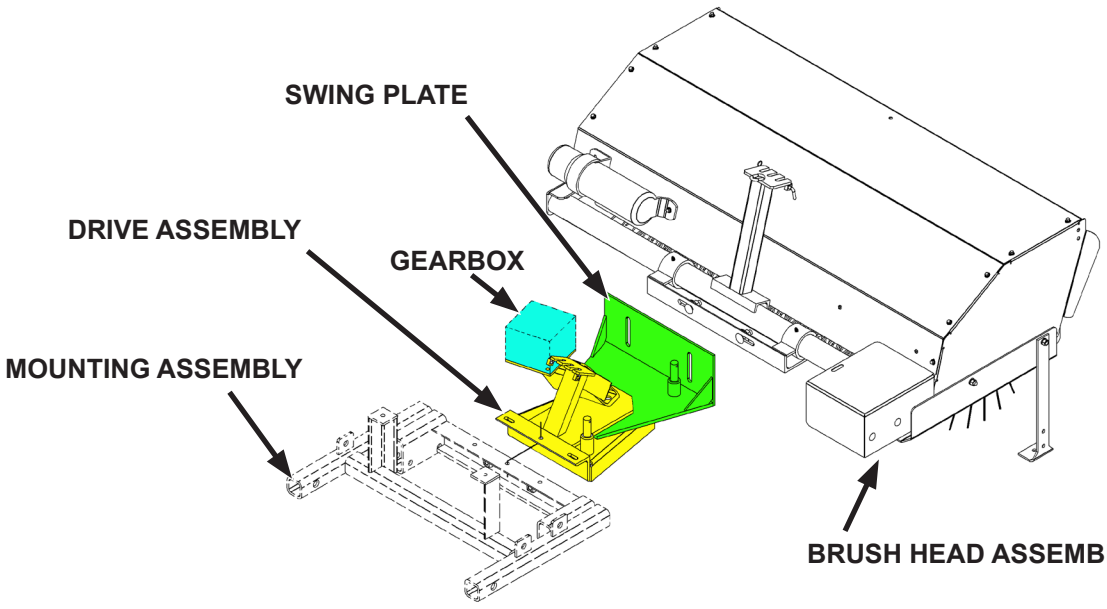
DRIVE ASSEMBLY

NOTICE! Some mounting kit assemblies include a gearbox. Skip to Brush Head Assembly if your mounting kit included the gearbox.

Following are some basic instructions for installing a drive assembly. Be sure to follow the instructions provided with your drive assembly.

1. Position the drive assembly in front of the mounting assembly with the gearbox up. See Figure #1
2. Place the rear of the drive assembly on the front of the mounting assembly. Install hardware provided with your kit in the center hole. Do not tighten.
3. Loosely install hardware provided in the outer holes. Do not tighten.

FIGURE #1



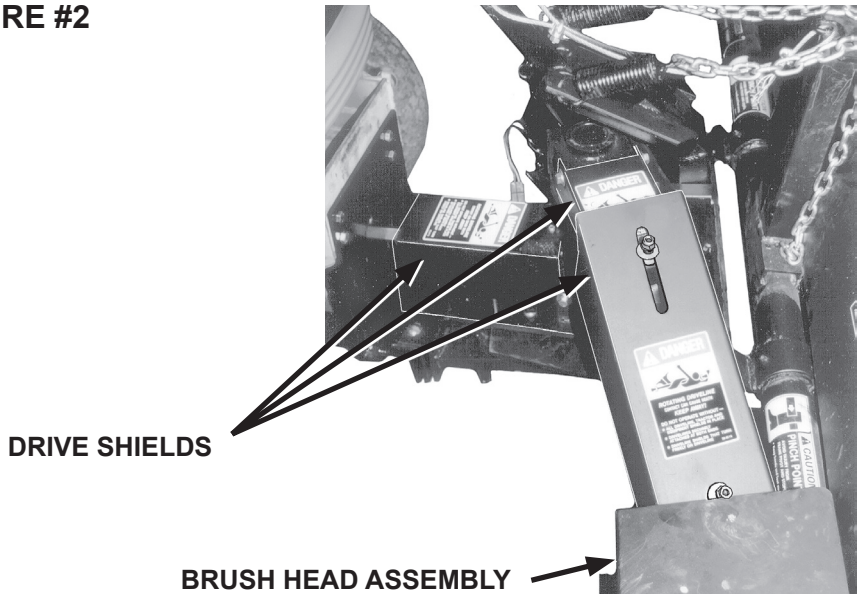
THIS GRAPHIC IS A GENERAL REPRESENTATION. ALL MOUNTINGS, DRIVES AND SWING PLATES VARY ACCORDING TO THE PRIME MOVER AND DRIVE OPTIONS.

SET-UP

NOTICE! If the mounting assembly includes angles and an input shield, place angles on the holes before installing hardware.

4. Connect the driveline to the prime mover and to the gearbox on the drive assembly. (Follow instructions provided with the mounting/drive assembly for your application.)
5. Tighten hardware. See ***BOLT TORQUE SPECIFICATIONS***
6. Install all driveline and gearbox shields. To make installation easier, install the washers, and nut toward the outside of the shield. See Figure #2

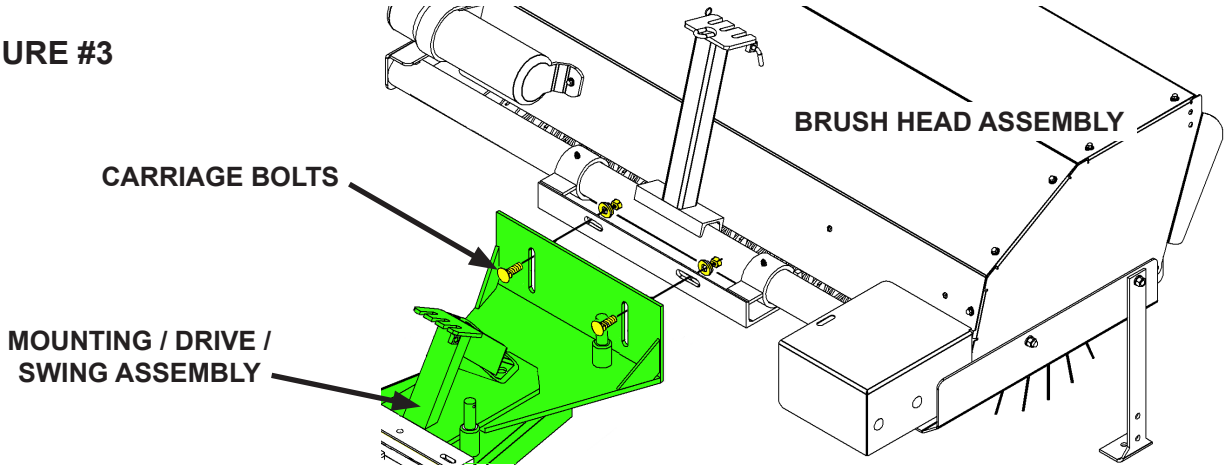
FIGURE #2



BRUSH HEAD ASSEMBLY

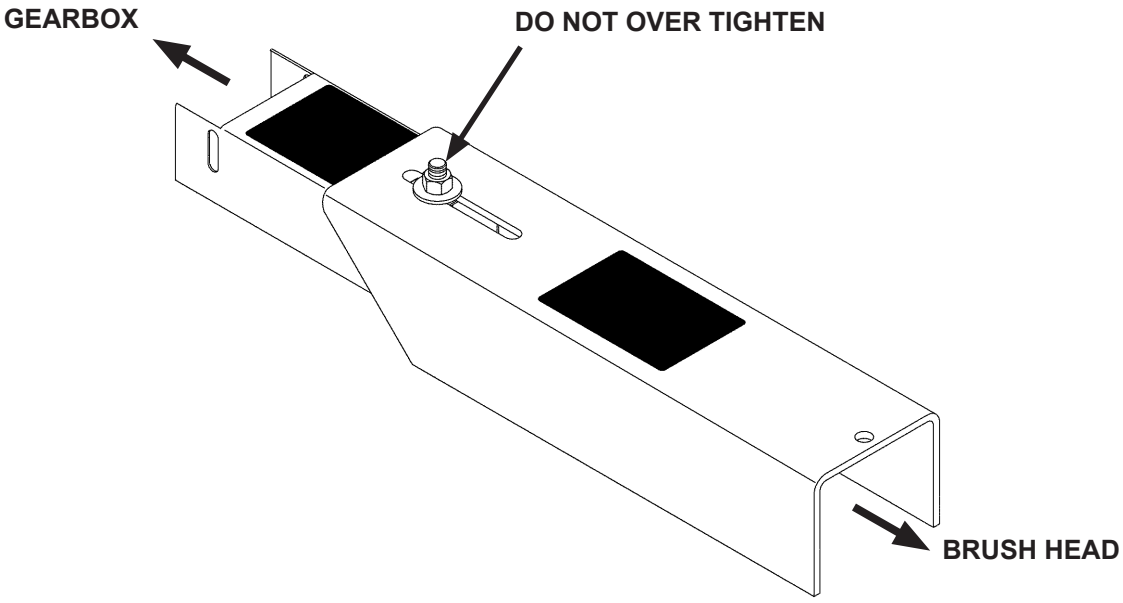
1. After installing the mounting assembly onto the prime mover and drive assembly onto the mounting assembly, position the brush head assembly in front of the prime mover. Refer to Figure #3
2. Secure the brush head assembly to the drive assembly using two carriage bolts, washers and nuts. Be sure to position the hardware as high as possible in the slots. See Figure #3

FIGURE #3



3. Connect the output drive shaft to the gearbox and hex shaft on the right side of the brush head assembly. Tighten universal joint set screws.
   - If the sweeper has a telescoping drive shaft, it may need to be cut to length. Be sure to cut the same amount off both halves. See PTO Shaft Adjustment.
   - If the sweeper has a rectangular drive shaft and it is too long, shorten it by loosening the set screw on the universal joint mounted to the drive assembly gearbox and then sliding the drive shaft in.
4. Install the output driveline shields. Do not over tighten lock nuts. The shield must be able to slide back and forth when the brush head is lowered and raised. See Figure #4

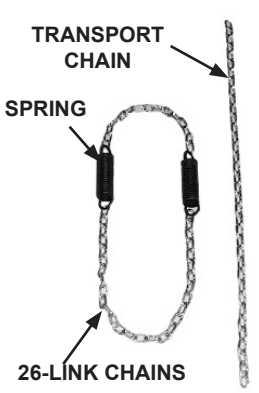
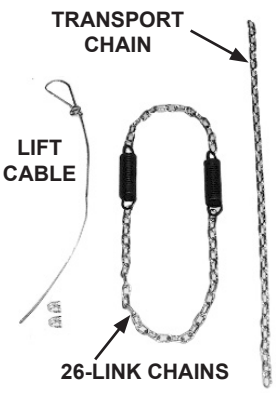
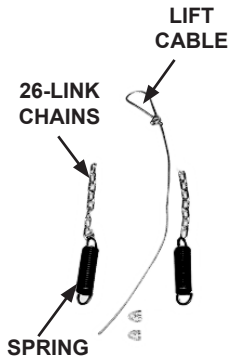
FIGURE #4



SET-UP

SPRING CHAIN ASSEMBLY INSTALLATION

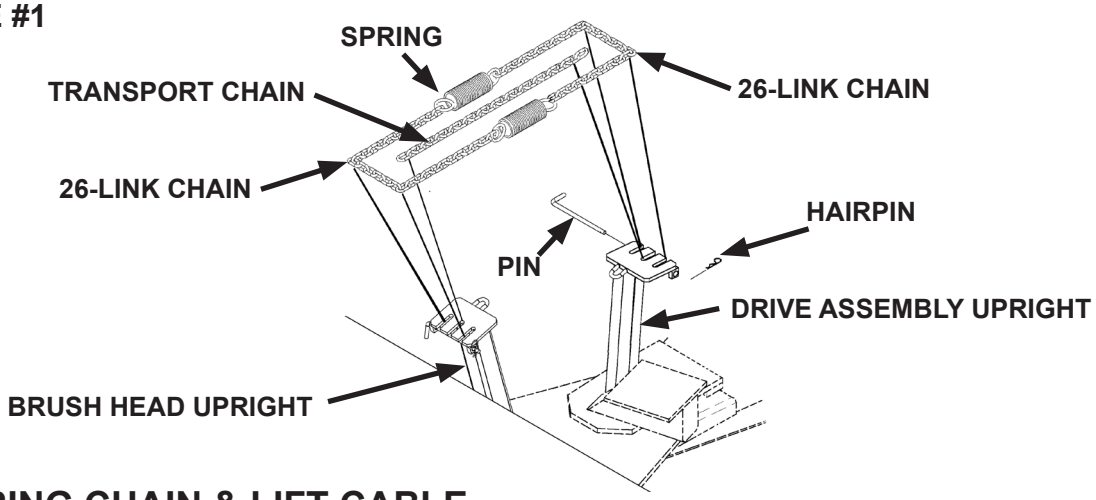
Follow the instructions that match your sweeper configuration.

A	B	C	D	E
Spring Chain/ Transport Chain	Spring Chain/Lift Cable	Spring Chain/Transport Chain/Lift Cable	Spring Chains Lift Cable	Spring Chain STD Hydraulic Lift
				

(A) SPRING CHAIN & TRANSPORT CHAIN

1. Connect two, 26-link chains and two springs to form a loop.
2. Place chains in the outside slots in the drive assembly upright and in the brush head upright. See Figure #1
3. Place the 36-link transport chain in the center slot in the drive assembly and in the brush head upright.
4. Slide a pin in the holes under the drive assembly and brush head uprights. Secure in place with hairpins.

FIGURE #1

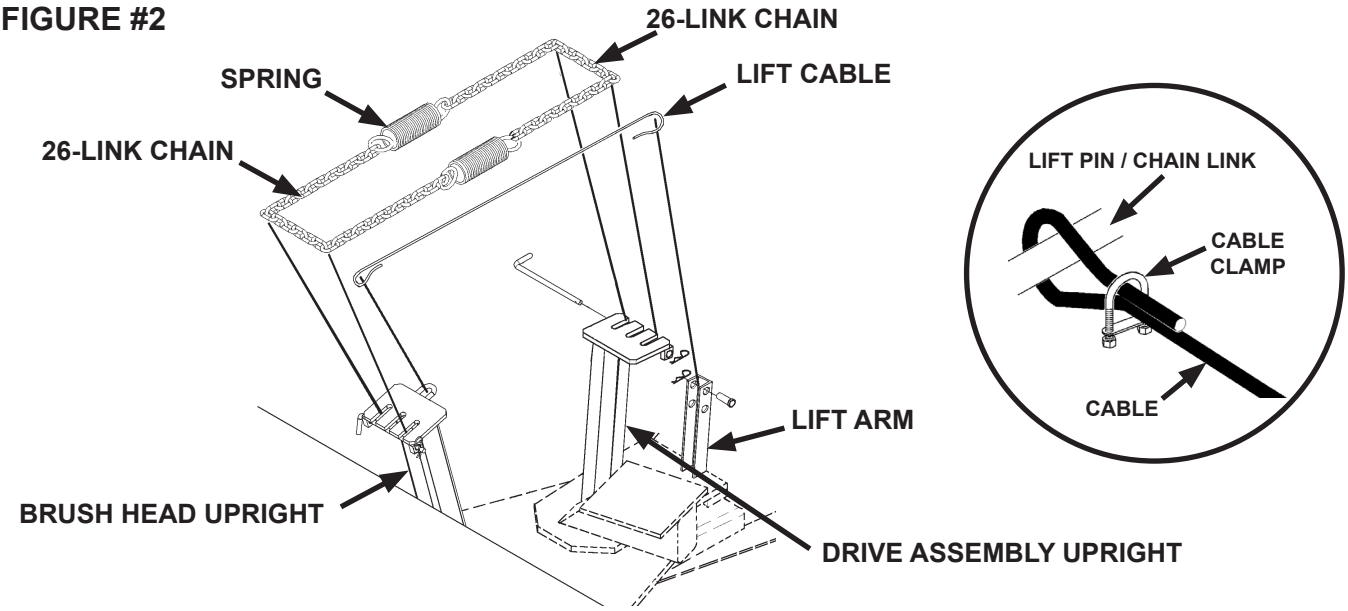


(B) SPRING CHAIN & LIFT CABLE

1. Connect two, 26-link chains and two springs to form a loop.
2. Place chains in the outside slots in the drive assembly upright and in the brush head upright. See Figure #2
3. Route one end of the lift cable through the chain link welded to the brush head upright and secure in place using cable clamp provided.
4. Loop the other end of the cable around the pin in the lift arm and secure in place with the remaining cable clamp.

SET-UP

FIGURE #2



CAUTION! INSURE CABLE IS PROPERLY INSTALLED AND CLAMP IS SECURE.

5. Install the optional electrical or hydraulic lift system.
6. Raise the brush head assembly using the lift system. If the brush head assembly raises 4” (101mm) off the ground, the lift cable is properly adjusted. If the brush assembly does not raise enough, shorten the cable between the uprights. If the brush head assembly raises too much, lengthen the cable between the uprights.

(C) SPRING CHAIN, TRANSPORT CHAIN & LIFT CABLE

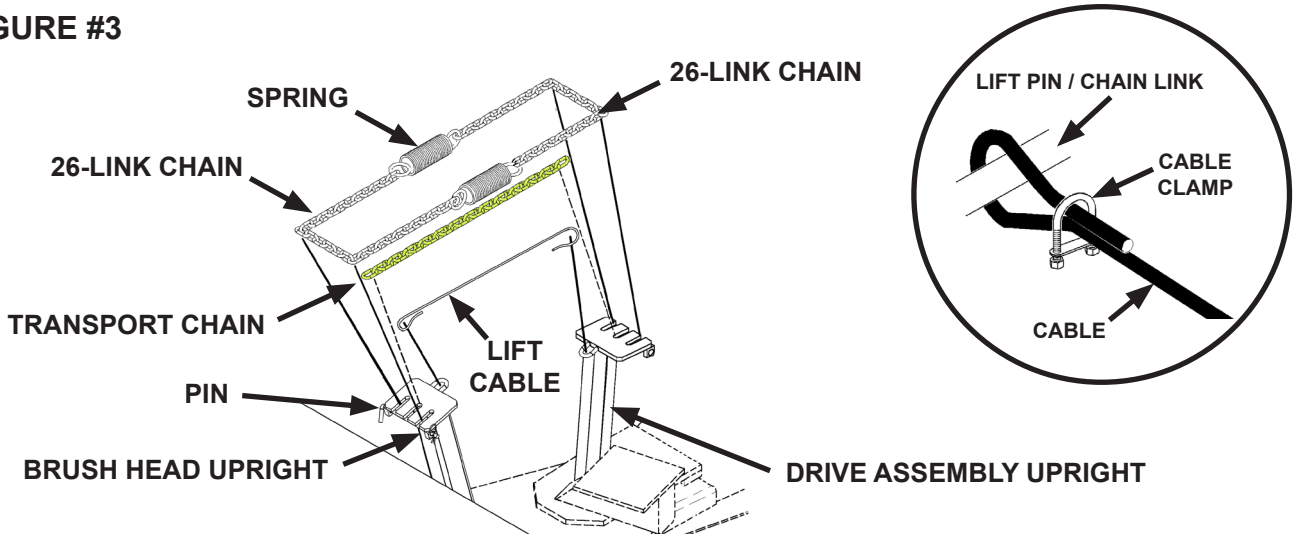
1. Connect two, 26-link chains and two springs to form a loop.
2. Place chains in the outside slots in the drive assembly upright and in the brush head upright. See Figure #3
3. Route one end of the lift cable through the chain link welded to the brush head upright and secure in place using cable clamp provided.
4. Loop the other end of the cable through the chain link welded to the drive assembly upright and secure in place with the remaining cable clamp.

CAUTION! INSURE CABLE IS PROPERLY INSTALLED AND CLAMP IS SECURE.

5. Place the 36-link transport chain in the center slot in the drive assembly and in the brush head upright. See Figure #3

SET-UP

FIGURE #3

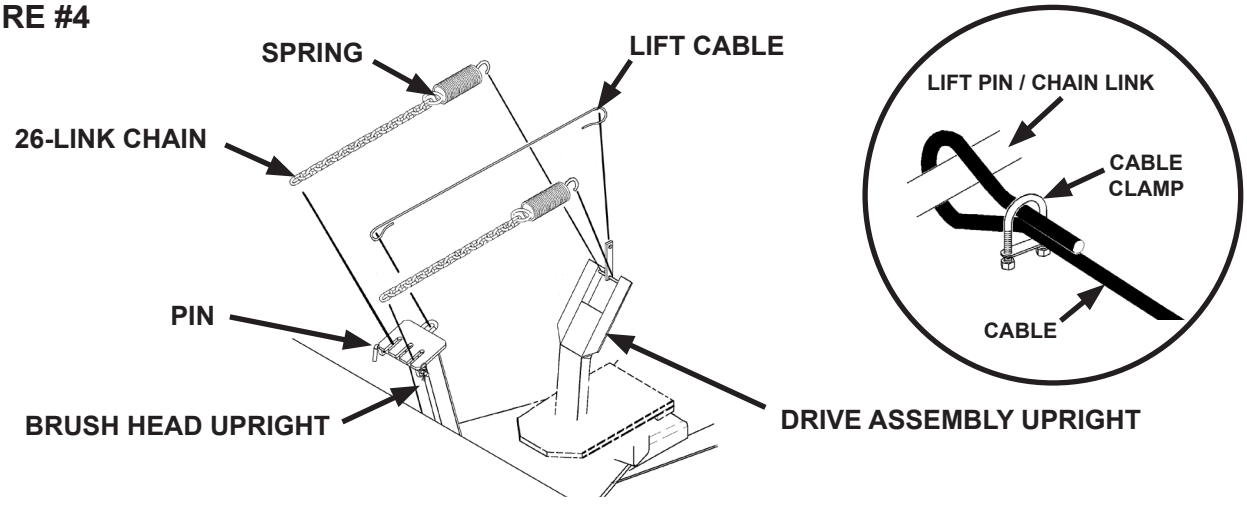


6. Slide a pin in the holes under the drive assembly and brush head uprights. Secure in place with hairpins.
7. Install the optional electrical or hydraulic lift system.
8. Raise the brush head assembly using the lift system. If the brush head assembly raises 4” (101mm) off the ground, the lift cable is properly adjusted. If the brush assembly does not raise enough, shorten the cable between the uprights. If the brush head assembly raises too much, lengthen the cable between the uprights.

(D) SPRING CHAINS & LIFT CABLE

1. Attach a spring to one end of each chain.
2. Hook the springs in the holes on the drive assembly upright.
3. Place chains in the outside slots in the brush head upright.
4. Slide a pin in the holes under the drive assembly upright. Secure in place with a hairpin. See Figure #4
5. Route one end of the lift cable through the chain link welded to the brush head upright and secure in place using cable clamp provided.

FIGURE #4



SET-UP

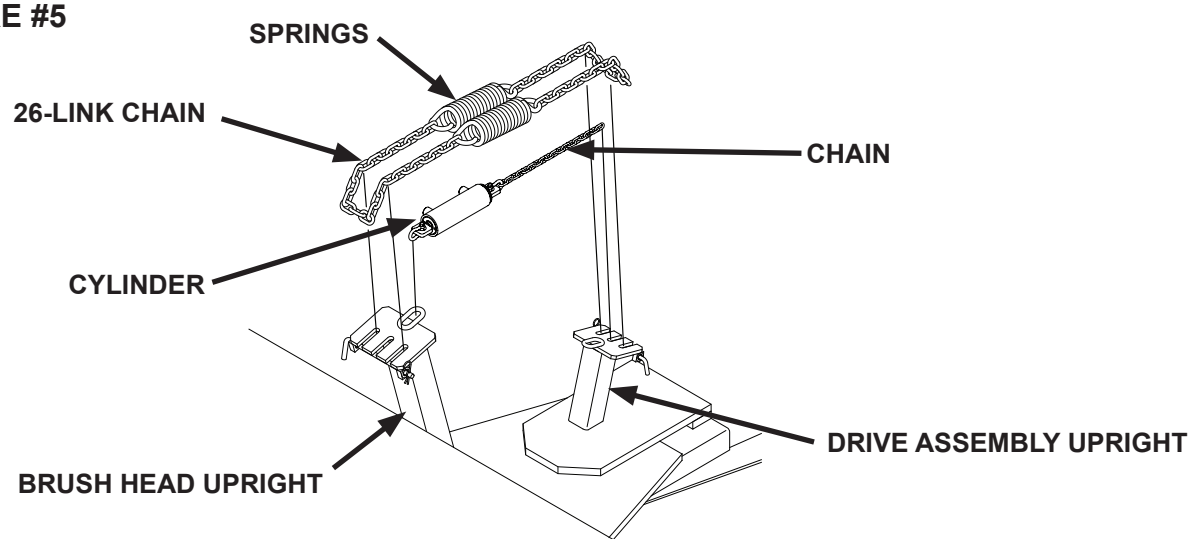
CAUTION! INSURE CABLE IS PROPERLY INSTALLED AND CLAMP IS SECURE.

5. Loop the other end through the hole in the lift arm on the drive assembly upright and secure in place using cable clamp provided See Figure #4
6. Install the optional electrical or hydraulic lift system.
7. Raise the brush head assembly using the lift system. If the brush head assembly raises 4” (101mm) off the ground, the lift cable is properly adjusted. If the brush assembly does not raise enough, shorten the cable between the uprights. If the brush head assembly raises too much, lengthen the cable between the uprights.

(E) SPRING CHAIN & STANDARD HYDRAULIC LIFT

1. Connect two, 26-link chains and two springs to form a loop.
2. Place chains in the outside slots in the drive assembly upright and in the brush head upright. See Figure #5
3. Following the instructions provided with your hydraulic lift assembly, attach the fittings to the cylinder followed by hoses and couplers.
4. Install a shackle onto the rod end of the cylinder and attach to the link on one upright.

FIGURE #5



5. Install the remaining shackle, with the chain attached, onto the barrel end of the cylinder. Place the chain in the center slot in the other upright.

Notice! Chain length may need to be shortened to fit your setup.

6. Connect quick couplers to the front remote hydraulic outlets on the prime mover.
7. Completely collapse the cylinder to check for adjustment. If the brush head assembly raises 4” (101mm) off the ground, the hydraulic lift is properly adjusted. If the brush head assembly does not raise enough shorten the chain length between the cylinder and upright. If the brush head assembly raises too much add to the chain length.

SET-UP

ELECTRIC LIFT SYSTEM

NOTICE! Sweepers for commercial turf tractors and those with a hydraulic lift option do not use an electric lift system.

1. Locate a convenient, open area on the prime mover dash to mount the lift switch.

NOTICE! Before drilling, check behind the dash to make sure that you will not drill into any wires or other objects.

2. Use a center punch to mark the lift switch location. Drill a pilot hole with a .25” bit and then drill a .50” finish hole.
3. Insert the switch and secure it with a nut.
4. Route the control wires and connector to the front of the prime mover. If necessary, strap or tape wires to the frame to prevent them from hanging down.

NOTICE! Keep wires away from hot and/or moving parts.

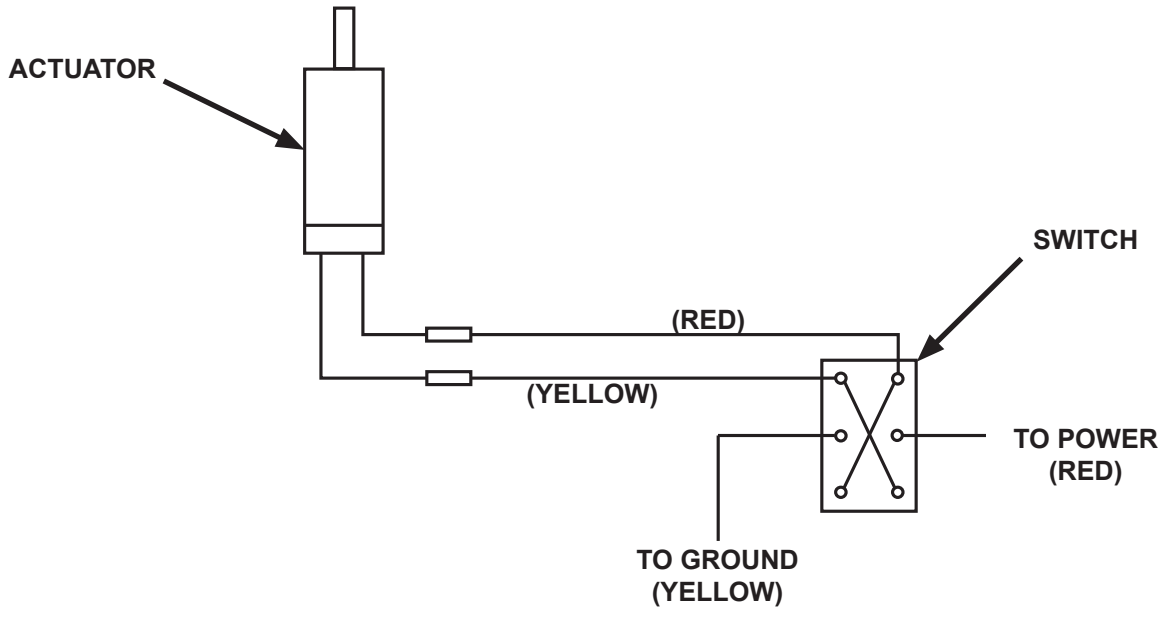
5. Connect the red wire to the prime mover power supply. Connect the yellow wire to a good ground, preferably the battery ground or prime mover frame. See Figure #1

NOTICE! Add a 13-amp, 12-volt in line fuse if the power supply is not fused.

6. Connect the wires from the lift switch to the actuator.

NOTICE! If it is necessary to replace a wire, use a 14-gauge or heavier wire.

FIGURE #1



SET-UP

POWER (PTO) SHAFT ADJUSTMENT

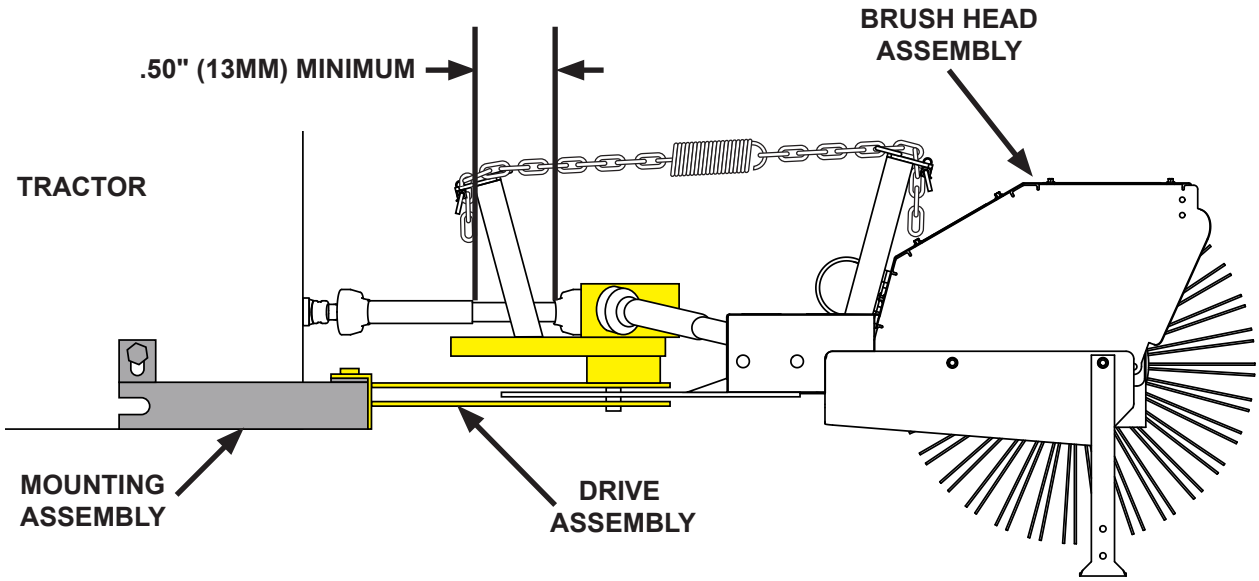
Confirm the minimum and maximum working lengths of the driveshaft. The telescoping tubes must overlap by at least 1/3 of their length while in use. The (PTO) drive assembly may need to be shortened to fit up to your tractor correctly and to prevent the drive assembly from “bottoming out” and causing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



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.**

INSTALLATION

GENERAL INFORMATION

After completing the Set-Up instructions in this manual your sweeper should be properly installed onto the mounting / drive assembly for your application. Install any optional hydraulic angle or deflector kits by referring to the instructions provided with your kit. You are now ready for operation.

IMPORTANT: Rear ballast may be required to maintain full prime mover stability. Refer to the specifications for your sweeper and your prime mover operator's manual.

The following instructions are for detaching and re-installing your sweeper onto your prime mover after initial set-up and installation.

INSTALLATION

1. Following all standard safety practices and the instructions for installing an attachment in your prime mover operator's manual, install the attachment with mounting bracket onto your prime mover.

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

2. Following the safety shut down procedure for your prime mover, shut down and exit the prime mover.
3. Install the PTO driveline to the prime mover: 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.**

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

4. Remove storage stands or any blocking holding the brush head off the ground.
5. For models with hydraulic lift or angle: After making sure that the hydraulic couplers are free from any foreign material or contaminants, connect the couplers to the hydraulic system of your prime mover.
6. Following the standard start up procedure for your prime mover, start the prime mover and if applicable, 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.

INSTALLATION

DETACHING

NOTICE: Do not store the sweeper with weight on the brush. Weight will deform the bristles, destroying the sweeping effectiveness. Place the brush head on blocks or lower the optional storage stands.

1. Place the brush head on blocks or lower the storage stands.
2. Before exiting the prime mover, lower the attachment onto blocks or storage stands, disengage PTO, apply the brakes, turn off the engine, and remove the key.
3. For models with hydraulic lift or angle: After relieving pressure in the hydraulic lines, disconnect hoses from the auxiliary hydraulics on the prime mover and store hoses off the ground to help prevent damage.
4. Detach the PTO from the prime mover.
5. Follow your prime mover operator's manual for detaching (removing) an attachment. (Remove the attachment by disconnecting / unbolting the mounting assembly from the prime mover.)

OPERATION
CONTROLS

STARTING AND STOPPING THE SWEEPER

Starting The Sweeper

1. Start the prime mover at idle and raise the brush.
2. Engage the PTO at idle to start brush rotation.
3. Lower sweeper to the ground and increase engine RPM to desired sweeping speed.

Stopping The Sweeper

1. Decrease engine RPM to idle.
2. Raise brush off the ground.
3. Disengage PTO at idle.

TRAVEL DIRECTION

Travel should be in the forward direction and brush rotation always away from the operator.

BRUSH SPEED

To increase brush speed, increase engine RPM. Use the LOWEST speed needed to complete the job at hand. In general, half throttle provides the necessary engine speed. Vary brush, engine and travel speeds to match sweeping conditions.

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 Kit with Tube Links

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

Manual Angle Kit with T-Pin

1. Pull up on the T-pin.
2. Position the brush head at the desired angle.
3. Allow the pin to spring back into place.

Optional Hydraulic Angle Kit

1. Start the prime mover.
2. Engage auxiliary hydraulic controls.
3. Position the brush head at the desired angle.

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 OPERATING SWEEPER:

- Learn sweeper and prime mover controls in an off-road location.
- Run prime mover and sweeper at low idle.
- Before exiting the prime mover, lower the attachment to the ground, disengage PTO, apply the brakes, turn off the prime mover's engine and remove the key.
- Only operate the sweeper from the primer mover operator's station. Only operate controls while the engine is running. Protective glasses must be worn while you operate prime mover and sweeper.

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.

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

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

Model M24 sweepers are powered from the 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.

NOTICE! Do not run the engine at speeds which make the PTO run faster than the recommended speed marked on the prime mover's tachometer.

4. Travel forward at 5 MPH (8kph) or less.

NOTICE! When approaching obstacles, like utility poles or fire hydrants, slow engine and travel speed to avoid hitting these hazards.

OPERATION

OPERATING TIPS

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

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

LARGE AREAS

When sweeping a large area, such 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 ¾ 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 mounting holes be 12" (305mm) 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, 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 speed and ground speed 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.

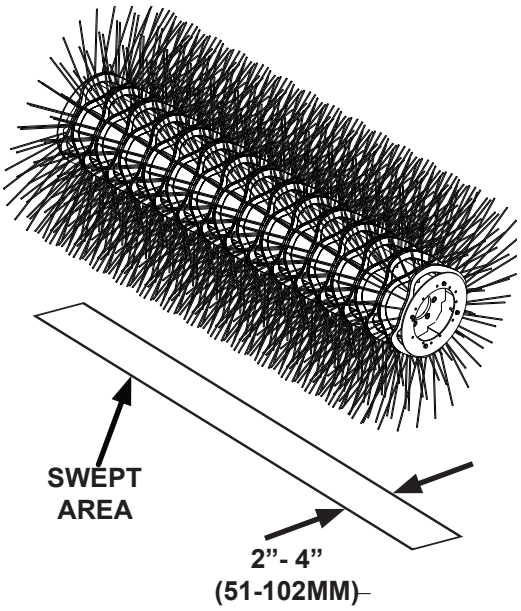
OPERATION

BRUSH PATTERN ADJUSTMENT

A properly adjusted brush offers the best sweeper performance. To check 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; then, lower it so bristle tips touch the ground. Run the sweeper in a stationary position for 10-30 seconds.
4. Raise the sweeper and back away; switch off the sweeper and engine and remove the key. The brush pattern left in the dust should be 2"-4" (51-102mm) wide, running the length of the brush. See Figure #1
5. Adjust the brush pattern as necessary. See ***ADJUSTING SPRING CHAIN ASSEMBLY***

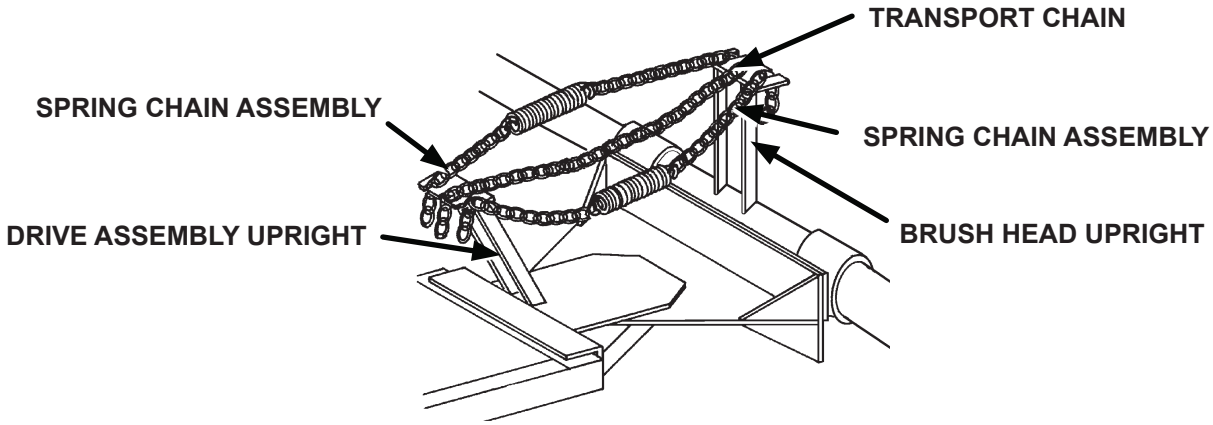
FIGURE #1



ADJUSTING SPRING CHAIN ASSEMBLY

The spring chain assembly sets the brush pattern by restricting up and down movement of the brush head assembly. (The following instructions are for the (A) Spring Chain & Transport Chain configuration. See ***SPRING CHAIN ASSEMBLY INSTALLATION*** for all other applications. See Figure #2

FIGURE #2



To adjust the brush pattern:

1. Lower the sweeper to the ground.
2. Raise the brush head assembly with the lift system you have.
3. Increase or decrease the number of links in the spring chain assembly between the drive assembly upright and the brush head upright. See Figure #2
   - Increase the number of links to lower the brush head.
   - Decrease the number of links to raise the brush head.
4. Adjust the transport chain.

OPERATION

ADJUSTING TRANSPORT CHAIN

NOTICE! Spring Chain assemblies B, D & E do not have a 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. Raise the sweeper.
2. Tighten the transport chain.
3. Lower the sweeper so the transport chain supports the weight of the sweeper.

STORAGE

The following storage procedure will help you to keep your product in top condition. It will also help you get off to a good start the next time your attachment is needed. We therefore strongly recommend that you take the extra time to follow these procedures whenever your unit will not be used for an extended period of time.

IMPORTANT: When detaching your unit for short or long term storage be sure to follow the Detaching Instruction in the Installation Section of this manual.

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, bolts 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.

OPERATION

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).

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

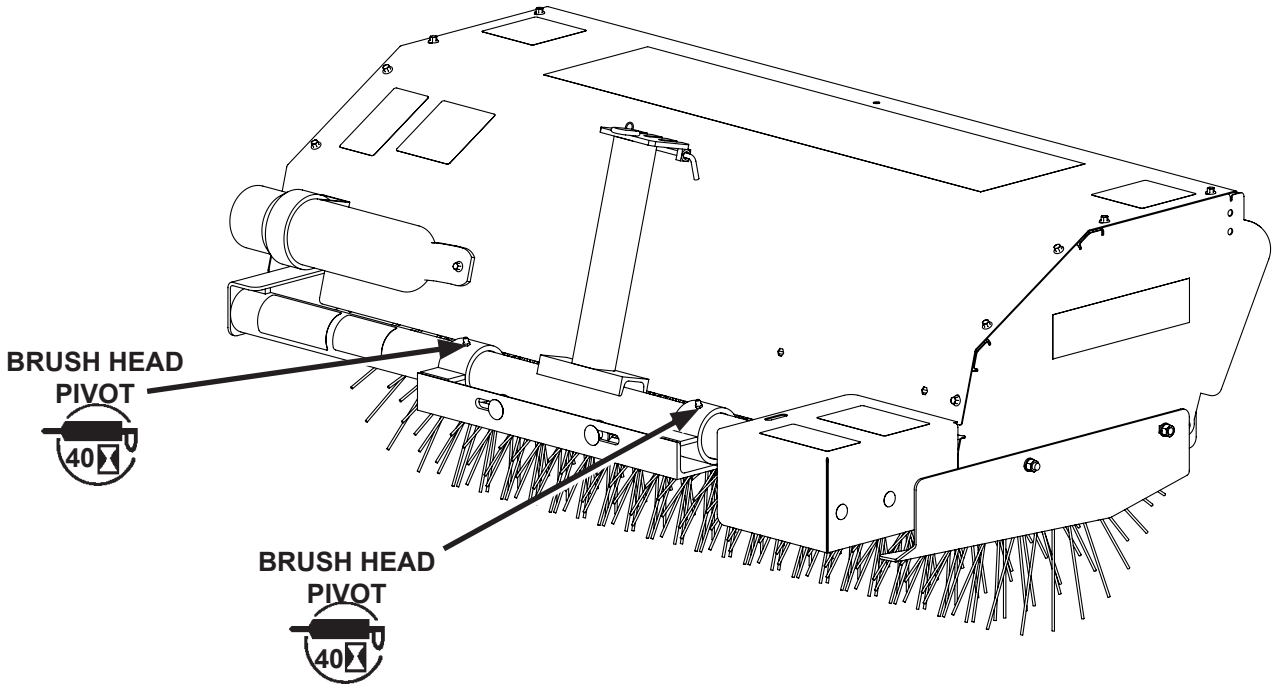
LUBRICATION

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.

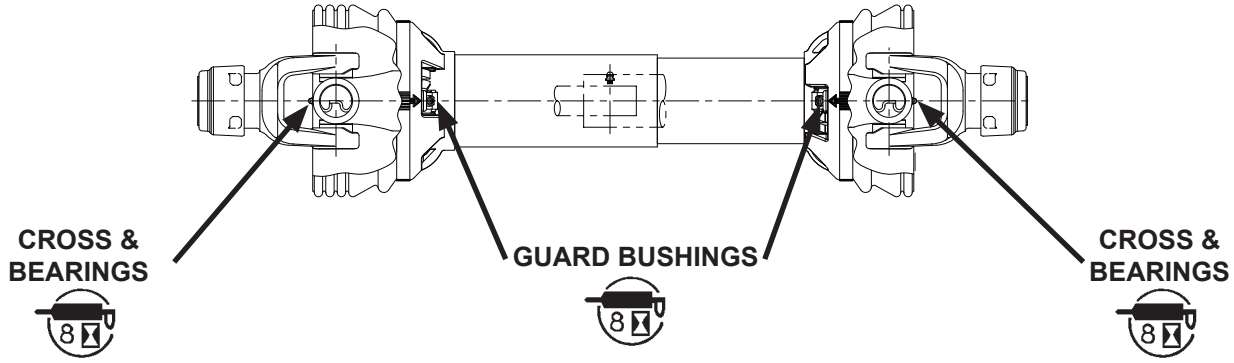
Lubricate every 20 hours of operation with NL-GI2 grease or an equivalent.

Lubricate weekly or every 40 hours of operation, whichever comes first, with SAE Multi-Purpose Lubricant or an equivalent SAE Multi-Purpose type grease.



PTO DRIVELINES

- Lubricate the outboard hub and the PTO every (8) eight hours.
- Grease PTO driveline inner tube before putting attachment into operation and every (20) twenty hours thereafter.

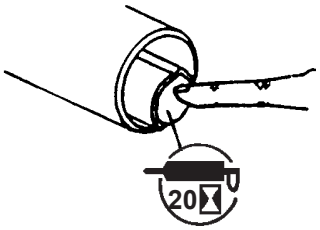


IMPORTANT: Avoid excessive greasing. Dirt collects on exposed grease and greatly increases wear. After greasing, wipe off excessive grease from fittings.

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.**

LUBRICATING GEARBOX

After the first 100 operating hours, drain the oil and flush the gearbox with an approved, nonflammable, nontoxic solvent. Refill with oil.

Following the first oil change, change oil after every 2,500 operating hours or 6 months, whichever comes first.

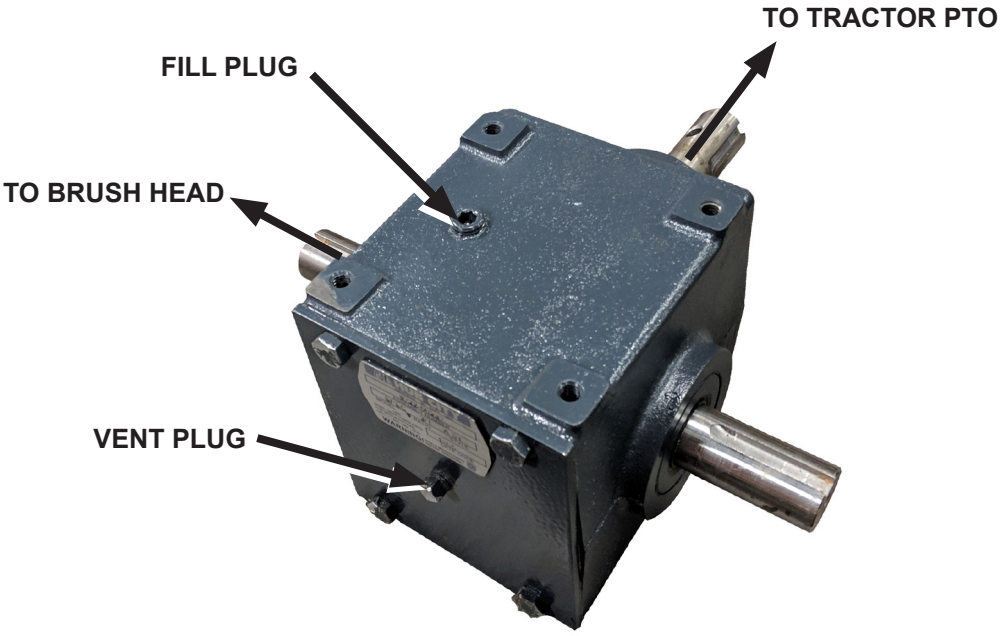
Hubcity gearboxes

To check gearbox lubricant level, remove the vent plug located in the hinged area of gearbox shield. If lubricant seeps out the hole, the gearbox is full.

To add lubricant:

1. Remove the vent and fill plugs.
2. Pour multi-purpose 220-weight gear lubricant into the fill hole until lubricant runs out the vent hole.
3. Replace both plugs.

An empty gearbox takes 19oz of lubricant.



MAINTENANCE

GENERAL INFORMATION

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

Procedure	Daily (Every 8 Hours)	Twice a Week (Every 20 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.	✔			
Check brush pattern. (See Brush Pattern Adjustments)	✔			
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.	✔			
Lubricate all PTO grease fittings with high quality grease.	✔			
Lubricate all brush head grease fittings with high quality grease.			✔	
Check sprocket alignment. (See Aligning Sprockets)			✔	
Check drive chain for adjustment. (See Adjusting Drive Chain)			✔	
Inspect wires & apply silicon spray to connectors. (if equipped)			✔	
Lubricate PTO driveline.		✔		
Lubricate & check drive chain for frozen links. (See Drive Chain Conditioning)				✔
Change oil in gearbox.				✔

BREAK-IN PERIOD

Change oil in gearbox after the first 100 hrs or 30 days of operating and then quarterly.

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.**

MAINTENANCE

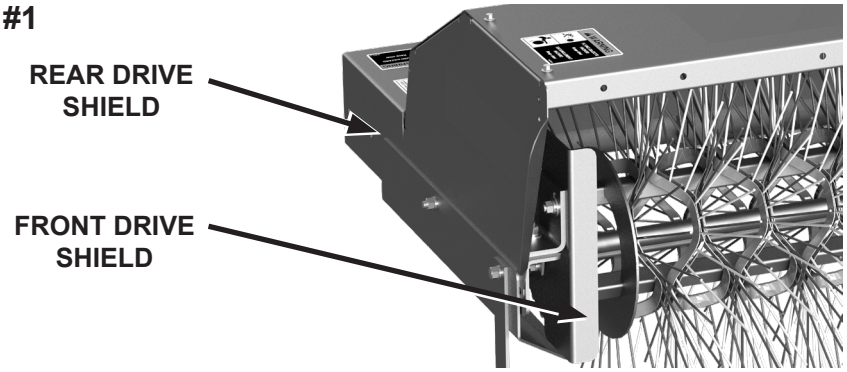
DRIVE CHAIN CONDITIONING

1. Remove drive chain.
   a. Remove rear drive shield.
   b. Loosen flange bearing carriage bolts and slide bearing forward.
   c. Remove chain from back sprocket, locate master link and remove.
2. Soak chain in penetrating oil.
3. Bend back and forth.
4. Lubricate chain.
5. Reinstall chain by reversing the above procedure. (Replace if necessary.)
6. Adjust drive chain. See ***ADJUSTING DRIVE CHAIN***

ADJUSTING DRIVE CHAIN

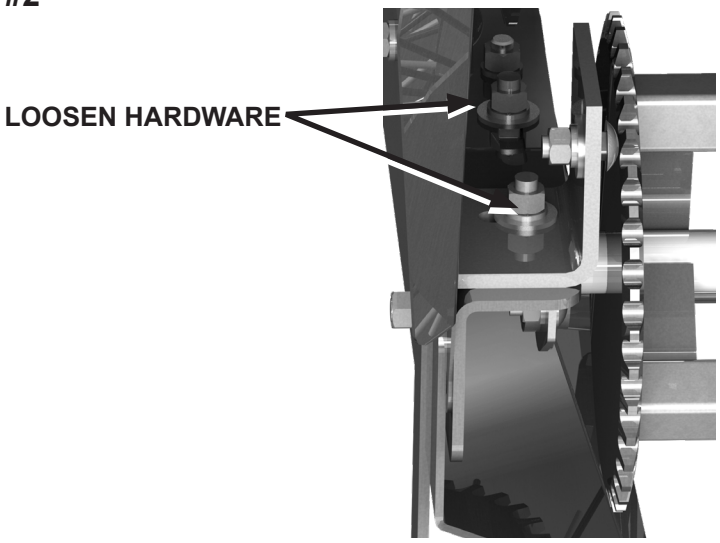
1. Remove the front drive shield. See Figure #1

FIGURE #1



2. Loosen but do not remove 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” (10-13mm) of play in the chain.

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

4. Tighten bolts on each bearing assembly.
5. Reinstall the front drive shield.

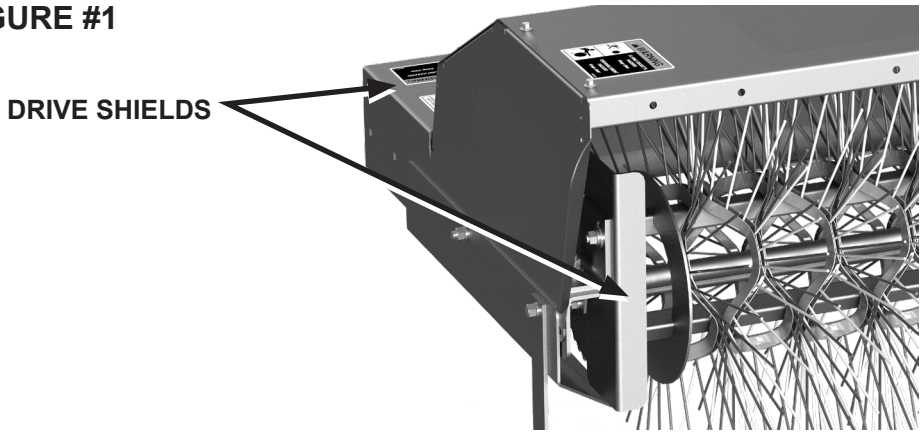
WARNING! AVOID SERIOUS INJURY OR DEATH. Do not operate the sweeper without all shields in place.

ALIGNING SPROCKETS

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

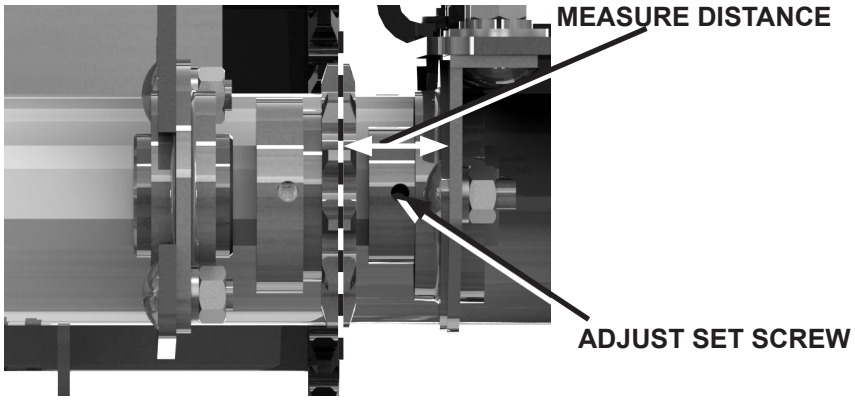
1. Remove front and rear drive shield from the fixed chain guard. See Figure #1

FIGURE #1



2. For each sprocket, measure from inside the frame to the center of the sprocket. 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 drive shields.

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

MAINTENANCE

LEVELING

Level your sweeper before each use for efficient sweeping and even brush wear.

1. Drive the unit to a level, paved area.
2. Raise storage stands.
3. Lower the brush into the sweeping position with the weight of the brush head on the spring chain assembly and the bristles just touching the ground.
4. Level the mounting/swing assembly using a level.
   - If the front of the assembly is high, turn the leveling screws clockwise to lower it.
   - If the front of the assembly is low, turn the leveling capscrews counterclockwise to raise it. See Figure #1
5. With the brush head assembly straight ahead, measure from each end of the brush frame tubing to the ground. See Figure #2.
6. If the measurements are not equal, loosen hardware that attaches the brush head assembly to the swing assembly and slide the low side of the brush head assembly up in the slots on the swing assembly.
7. Repeat steps 5 and 6 until measurements are equal. Tighten hardware to specification.
8. Swing the brush head assembly to the right. Measure from each end of the brush frame tubing to the ground. Then, swing the brush head assembly to the left. Measure from each end of the brush frame tubing to the ground.
   - If all 4 measurements are the same, the brush head assembly is level.
   - If the measurements are not equal, adjust the drive assembly upright. For measurements that resemble Figure #3, turn the leveling capscrews counterclockwise. For measurements that resemble Figure #4, turn the leveling capscrews clockwise.
9. Repeat step 8 until the brush head assembly is level.

FIGURE #1

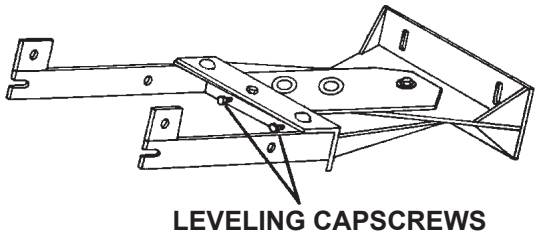


FIGURE #2

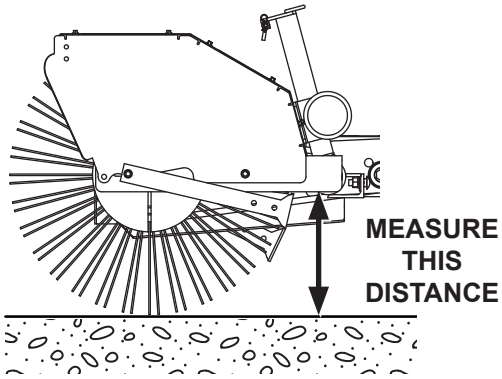


FIGURE #3

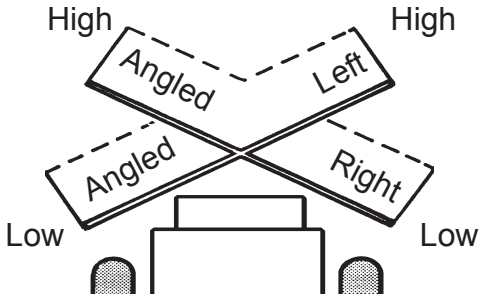
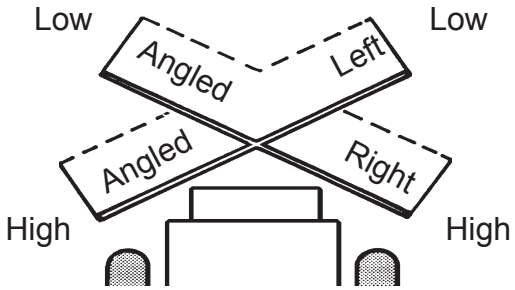


FIGURE #4



MAINTENANCE

REPLACING BRUSH SECTIONS

1. Remove the front bolt from inside the right side of the brush frame. This allows you to remove the drive shield and right mounting bracket. See Figure #1
2. Remove the middle bolt from the right side of the brush frame.
3. Remove the 2 bolts from the left side of the brush frame. See Figure #2

FIGURE #1

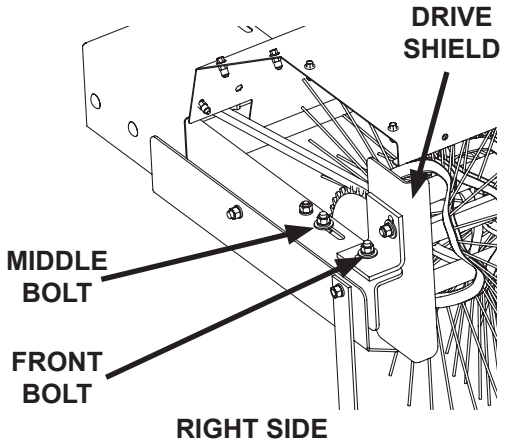
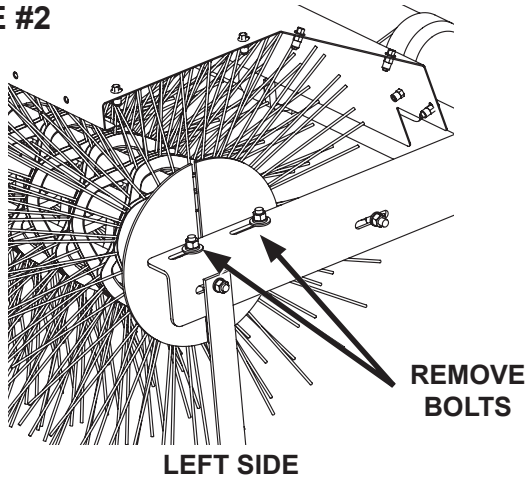
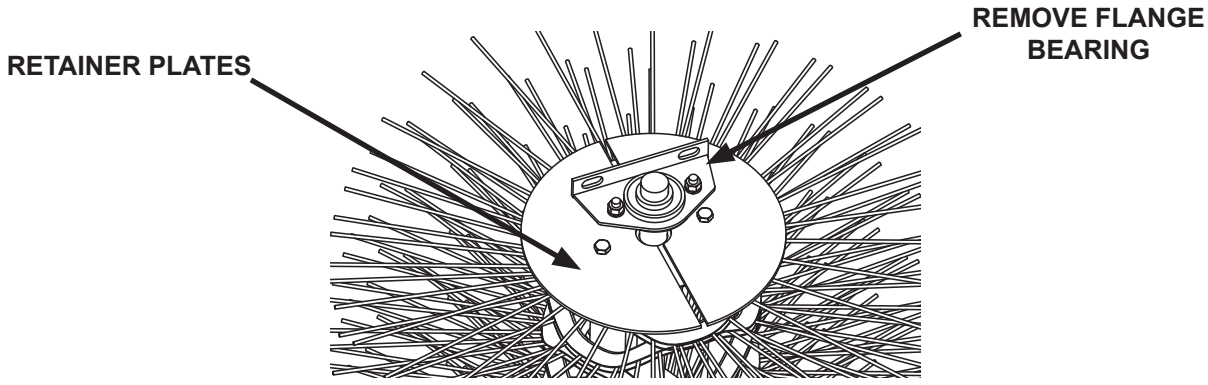


FIGURE #2



4. Remove the drive chain from the core sprocket.
5. Pull the brush out of the brush frame.
6. Stand the brush on end and rest it on blocks.
7. Unbolt & remove the flange bearing. See Figure #3
8. Remove retainer plates.

FIGURE #3

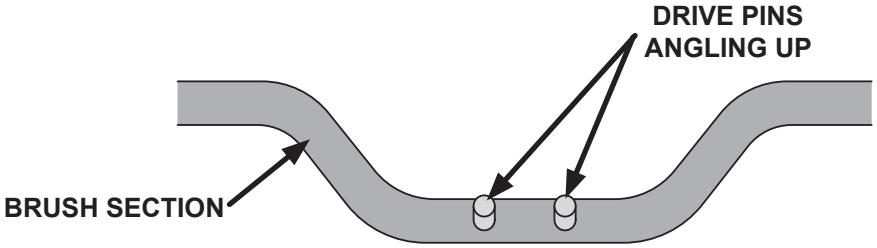


9. Remove old sections from the core.
10. Install new sections:

Note: Drive pin direction can be difficult to determine. Inspect your sections to determine up and down directions. See Figure #4

MAINTENANCE

FIGURE #4



a. Number the tubes on the core as 1, 2 and 3. See Figure #5
b. Slide the first section onto the core with the drive pins on both sides of tube 1. Make sure that drive pins angle up. See Figure #5

FIGURE #5

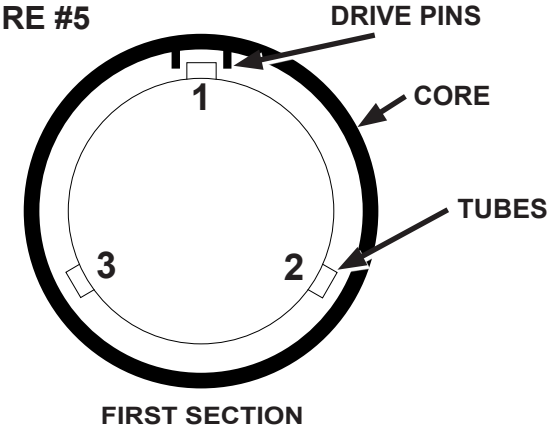
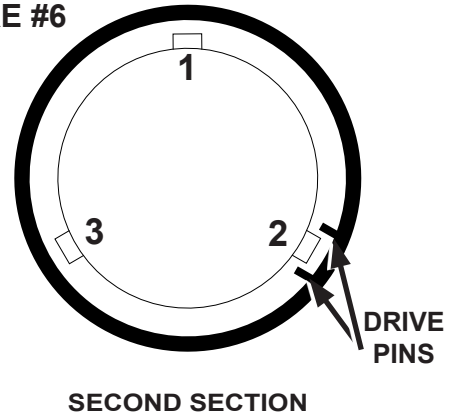


FIGURE #6



NOTICE! When using a wire brush kit or a mixed poly/wire brush kit, place a poly section first and last on the core to prevent damage to the hood, driveline and frame.

c. Place the second section on the core with drive pins on both sides of tube 2. Be sure drive pins angle down. See Figure #6
d. Slide the third section onto the core with 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.

11. Place the retainer plates on the brush and reinstall the capscrews.
12. Position the brush in front of the brush hood.
13. Slide the brush into the left side of the brush frame. Reinstall the hardware but do not tighten completely.
14. Slide the right side of the brush into the brush frame. Position the drive chain on the core sprocket and reinstall the middle bolt but do not tighten.
16. Install the front drive shield and mounting bracket and reinstall the front bolt.
17. Tighten the hardware on the left side.
18. Align the sprockets and adjust the drive chain. See ***ALIGNING SPROCKETS*** and ***ADJUSTING DRIVE CHAIN***

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”

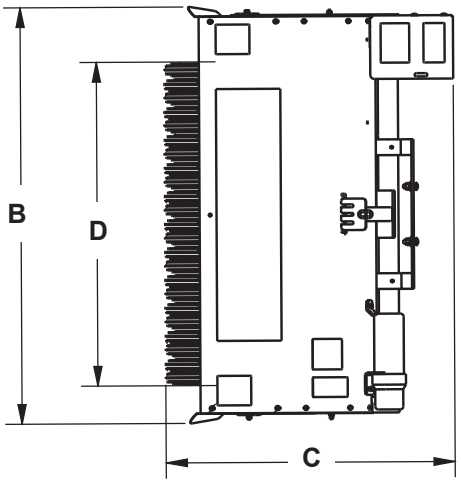
TROUBLESHOOTING

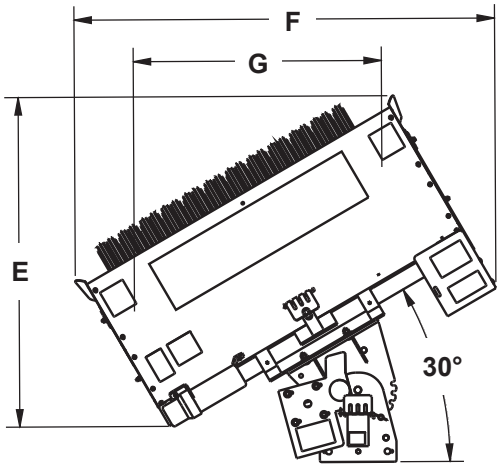
PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
BRUSH ROTATES WRONG DIRECTION	Incorrect gearbox or gearbox flipped.	Contact Paladin service department.
BRUSH HEAD ASSEMBLY "BOUNCES" WHEN SWEEPING	Brush pattern needs adjustment.	See Brush Pattern Adjustment.
	Ground speed too fast and/or brush speed too slow.	Find correct combination of ground and brush speeds.
	Core is bent.	Replace core.
BRUSH WEARS UNEVENLY	Brush head assembly is not level.	Level brush head. See Leveling.
BRUSH WEARS VERY QUICKLY	Brush pattern not adjusted correctly.	See Brush Pattern Adjustment.
	Brush speeds too high.	Reduce brush speeds.
DRIVE CHAIN FALLS OFF REPEATEDLY	Core not riding on sprocket.	Align core.
	Not enough tension on chain.	Slide core forward.
GEARBOX DOES NOT TURN	Broken shaft or gear.	Do not open a gearbox still under warranty; contact Paladin for replacement parts.
OIL LEAKING FROM PINION HOUSING, CAPS, CAPSCREWS OR PIPE PLUGS	Loose hardware.	Tighten hardware to specification using Loctite® if required. Replace gaskets if necessary.
HIGH INTERNAL OPERATING TEMPERATURE (ABOVE 200ºF [93.33ºC])	Damaged bearings.	Replace bearings.
	Oil level too low.	Add oil.
EXCESSIVE END PLAY IN SHAFTS (.005 INCHES [.13MM] OR MORE) WHEN COUPLINGS ARE REMOVED	Worn gearbox bearings.	Contact Paladin service department.
EXCESSIVE BACKLASH	Worn sprockets.	Adjust drive chain; replace sprockets, if necessary.
END AND/OR INBOARD YOKE EARS SPREAD	Drive shaft too long.	Adjust drive shaft length; replace parts if necessary.
	Axial forces too high - running above recommended RPM.	Clean and grease profile tubes; replace parts; replace both tubes, if necessary.

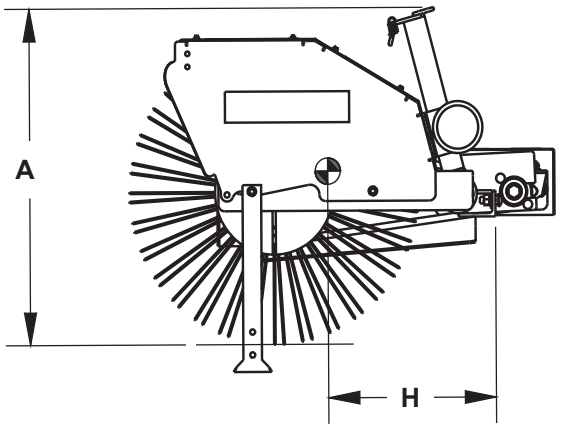
TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
END 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 if necessary.
END YOKE BEARING CAPS BLUED	Insufficient lubrication.	Follow lubrication instructions. Replace parts if necessary.
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 if necessary.
	Drive shaft too long.	Adjust drive shaft length.
INBOARD YOKE BEARING CAPS BLUED	Insufficient lubrication.	Follow lubrication instructions; replace parts if necessary.
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; replace parts if necessary.
SHIELD TUBES DAMAGED	Shields contact components on tractor and/or sweeper.	Allow more clearance; replace parts if necessary.
SHIELD CONE DESTROYED	Shield cone contacts components on tractor and/or sweeper.	Allow more clearance; replace parts if necessary.
TELESCOPING SECTIONS DISTORTED	Overload caused by high starting and peak torques or blocking.	Engage and disengage at idle; replace parts if necessary.
ELECTRIC LIFT DOES NOT LIFT	Disconnected wires.	Reconnect wires.
	Switch failure.	Replace switch and/or actuator, if necessary.
HYDRAULIC LIFT DOES NOT LIFT	Disconnected hoses.	Reconnect hoses.
	Hydraulic pump failure.	Contact dealer for service.

SPECIFICATIONS







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

DESCRIPTION	4’	5’	6’
A. Overall Height	25.70”	25.70”	25.70”
B. Overall Width	52.90”	65.90”	78.90”
C. Overall Length*	34.20”	34.20”	34.20”
D. Sweeping Width	41.10”	54.10”	67.10”
E. Overall Length @ 30°*	47.30”	53.80”	60.30”
F. Overall Width @ 30°	60.40”	71.60”	82.90”
G. Sweeping Width @ 30°	35.60”	46.90”	58.90”
H. Center of Gravity - Horizontal*	13.50”	13.60”	14.20”
Weight (lbs)*	175#	209#	243#
Recommended Horsepower	15-30 HP		
Maximum PTO Speed	540 RPM		

*Specifications do not include mounting or drive assembly.

BOLT TORQUE SPECIFICATION

GENERAL TORQUE SPECIFICATION TABLES

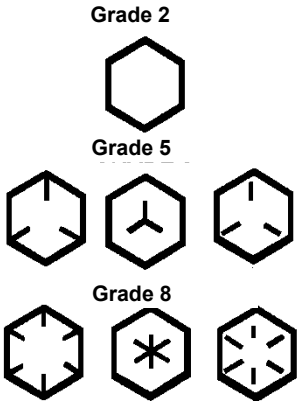
Use the following charts when determining bolt torque specifications, when special torques are not given. Always use grade 5 or better when replacing bolts.

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 Ft-lbs		SAE GRADE 5 TORQUE Newton-Meter		SAE GRADE 8 TORQUE Ft-lbs		SAE GRADE 8 TORQUE 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

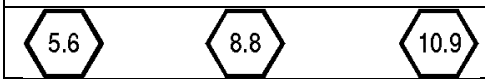
Bolt head identification marks as per grade.
NOTE: Manufacturing Marks Will Vary



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***.