SWEEPSTER BY PALADIN

OPERATOR'S MANUAL

ANGLE SWEEPER
AH / CH / RLH / RLCH Series

FOR
UTILITY TRACTORS

Serial Number: _____

Model Number: _____

Manual Number: 51-4163
Date: August 2018
Serial Number: 0916001 & Up
Rev. 4

TABLE OF CONTENTS

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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.

10344 1-31-17-5

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.

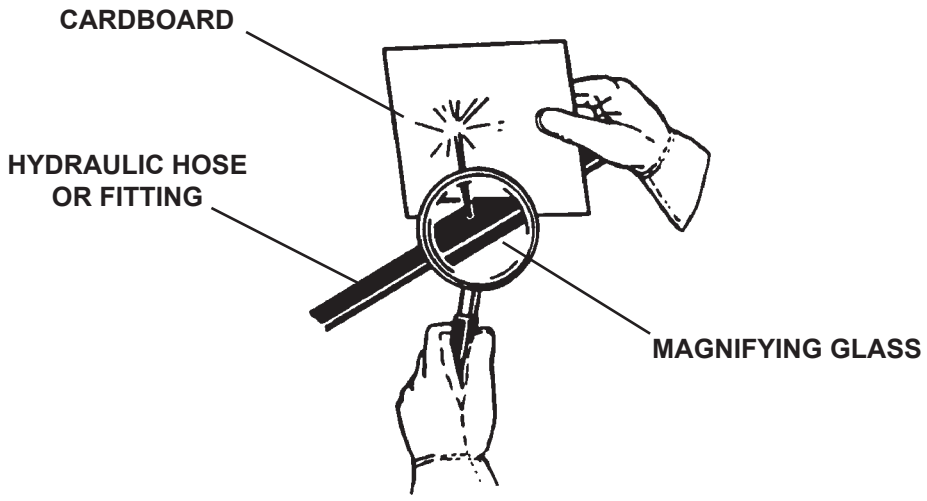
WARNING! LOWER OR SUPPORT RAISED EQUIPMENT

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

TRANSPORTING THE SWEEPER

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

MAINTAINING THE SWEEPER

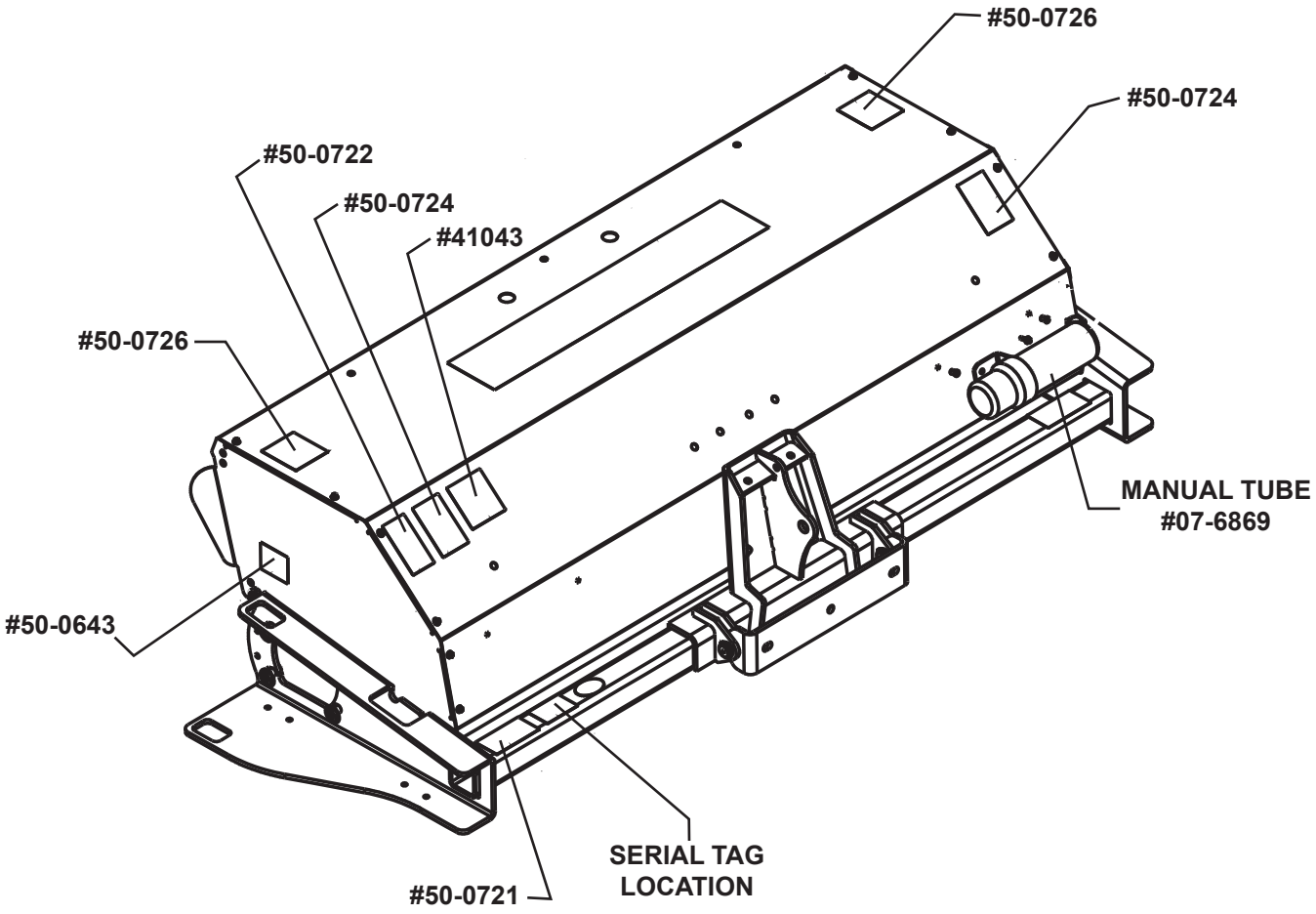
- Before performing maintenance, lower the attachment to the ground, apply the brakes, turn off the engine and remove the key.
- Never perform any work on the attachment unless you are authorized and qualified to do so. Always read the operator service manuals before any repair is made. After completing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

DECALS

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.

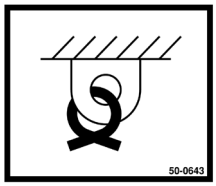


IMPORTANT: Keep all safety decals clean and legible. Replace all missing, illegible, or damaged safety decals. When replacing parts with safety decals attached, the safety decals must also be replaced. Safety decals are available, free of charge, from your local dealer or Paladin.

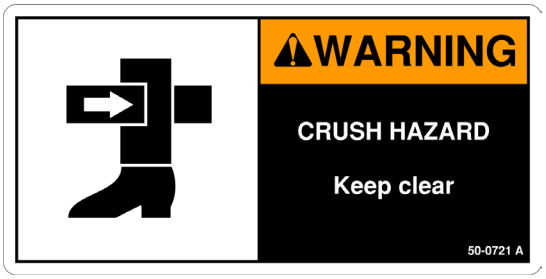
REPLACING SAFETY DECALS: Clean the area of application with nonflammable solvent, then wash the same area with soap and water. Allow the surface to fully dry. Remove the backing from the safety decal, exposing the adhesive surface. Apply the safety decal to the position shown in the diagram above and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

DECALS

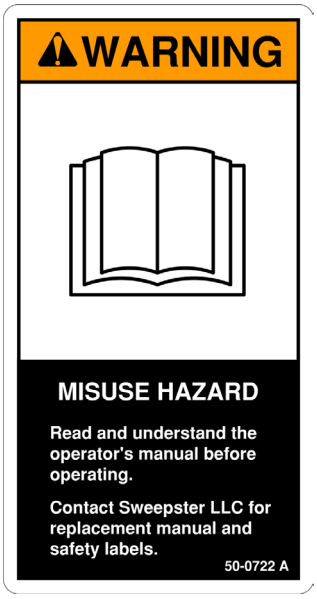
#41043
WARNING!
HAZARDOUS DUST



#50-0643
TIE DOWN POINT



#50-0721
WARNING! CRUSH HAZARD



#50-0722
WARNING! MISUSE HAZARD

#50-0724
WARNING! HIGH PRESSURE FLUID

#50-0726
WARNING! FLYING OBJECTS & ENTANGLEMENT

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

INSTALLATION

GENERAL INFORMATION

The AH and CH series brooms mount to the front of your utility tractor and use a pump that is either PTO or crankshaft driven. You can choose from numerous tractor mounting assemblies that will operate your broom using various pump, tank and valve options.

The RLH and RLCH series brooms mount to the rear 3-point hitch mechanism of your utility tractor and is driven by either the tractor hydraulics or a power pack.

These instructions will help you to mount your broom onto your prime mover. Follow the instructions for the drive and mounting options that fit your prime mover and then the instructions for installing the broom onto the prime mover.

PUMP & TANK ASSEMBLIES

FRONT PUMP MOUNTING INSTRUCTIONS

NOTICE: The following are general instructions. Refer to the instructions included with your pump kit that are specific for your particular prime mover.

1. Remove any parts, such as a knockout, that block access to the tractor engine's crankshaft pulley.
2. Attach the mounting assembly to the tractor.
3. Secure the drive hub to the pulley. Some tractors require a crankshaft adapter.
4. Install the pump mounting bracket on the front of the tractor.
5. Assemble the coupling halves and fasten the chain around them.
6. Apply grease to the pump and drive shafts.
7. Slide the coupling assembly onto the pump shaft.
8. Place the keyed end of the drive shaft in the chain coupler.
9. Slide the drive shaft into the drive hub.
10. Fasten the pump to the bracket. Position the pump so the inlet faces the right side of the unit. Do not secure with hardware.
11. Center the chain coupler and tighten set screws.
12. Install the tank and valve assembly.
13. Install hydraulic fittings and hoses.
    a. Attach the barb fitting to the pump inlet and the adapter fitting to the pump outlet.
    b. Connect the suction hose to the tank outlet and to the barb fitting on the pump inlet. Secure with clamps.
    c. Attach the hose to the valve and the pump's outlet port. Tighten the fittings.
14. Go to "SWING ASSEMBLY INSTALLATION".

REAR PUMP MOUNTING INSTRUCTIONS

NOTICE: The following are general instructions. Refer to the instructions included with your pump kit that are specific for your particular prime mover.

1. Install the mounting assembly on the tractor.
2. Attach the pump to the rear PTO shaft and secure with the chain provided. This prevents the pump from spinning or sliding off the shaft.

CAUTION! Avoid damage to the pump and other hydraulic components. Do not use rear pump drive on PTO's faster than 540 RPM.

3. Install the tank and valve assembly.

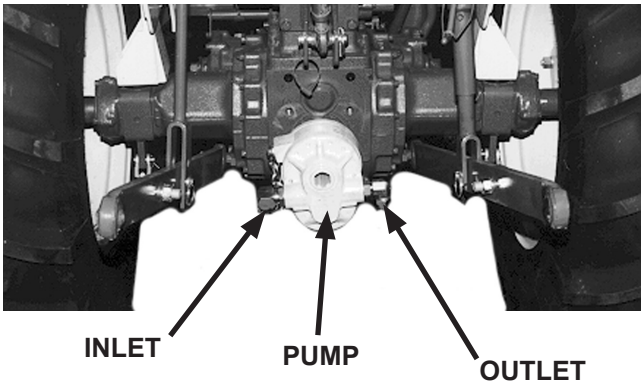
INSTALLATION

4. Install hydraulic fittings and hoses.
   a. Attach the hose barb to the pump inlet and the adapter fitting to the pump outlet.
   b. Connect the suction hose to the tank outlet and to the barb fitting on the pump inlet. Secure with clamps.
   c. Attach the pressure hose to the valve and the pump's outlet port. Tighten fittings.
5. Go to "SWING ASSEMBLY INSTALLATION".

3-POINT MOUNT & SWING ASSEMBLY INSTALLATION

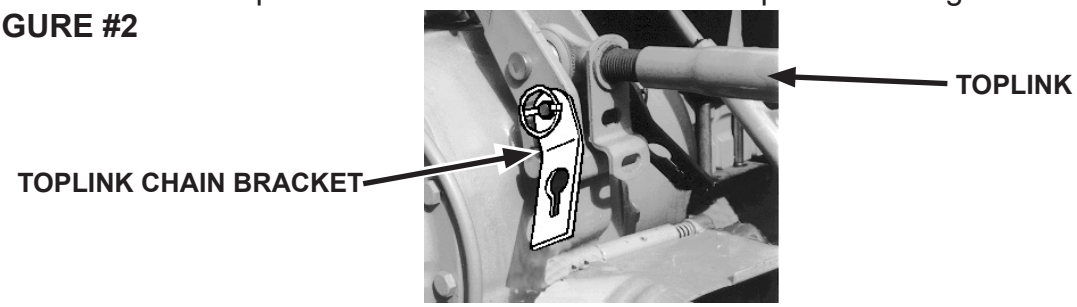
1. Slide the pump onto the rear PTO and secure with a chain as instructed in the "REAR PUMP MOUNTING INSTRUCTIONS". If the hydraulic fittings were not installed in the pump from the factory install them now. (Install the hose barb fitting to the inlet port on the pump and the elbows into the outlet port of the pump.) See Figure #1.

FIGURE #1



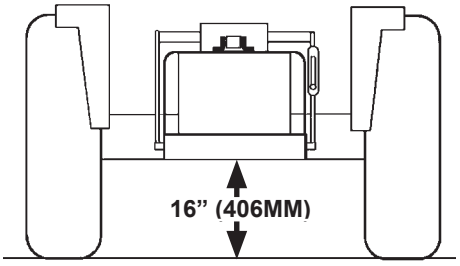
2. Attach chain support plates to the swing assembly using the hitch pins supplied. Plates go to the inside of the frame with bends to the center.
3. Connect one chain to each chain support plate using the double link clevis's provided.
4. Fasten the toplink chain brackets to the tractor top link. See Figure #2.

FIGURE #2



5. Position the swing assembly behind the 3-point hitch. (Half-moon swing plate to the rear on the swing plate applications).
6. Lower 3-point hitch arms.
7. Slide 3-point hitch arms onto the mounting pins on the swing assembly. Secure in place.
8. Attach the tractor toplink to the top of the swing assembly using the pin provided.
9. Raise the 3-point hitch until the distance from the slot in the center of the swing plate to the ground measures 16" (406mm). See Figure #3.

FIGURE #3



INSTALLATION

10. Level the swing assembly from front to back using the top link and from side to side using the adjustment on the 3-point hitch arms.
11. Attach chains installed in Step #3 to the toplink chain brackets in such a fashion to maintain the 16” (406mm) distance.

NOTICE: For best sweeping results, keep the swing assembly at least 16” (406mm) above the ground (we recommend 21” (533mm) above the ground when sweeping snow). Failure to maintain these distances allows for swept material to be carried over the brush and back onto the swept area.

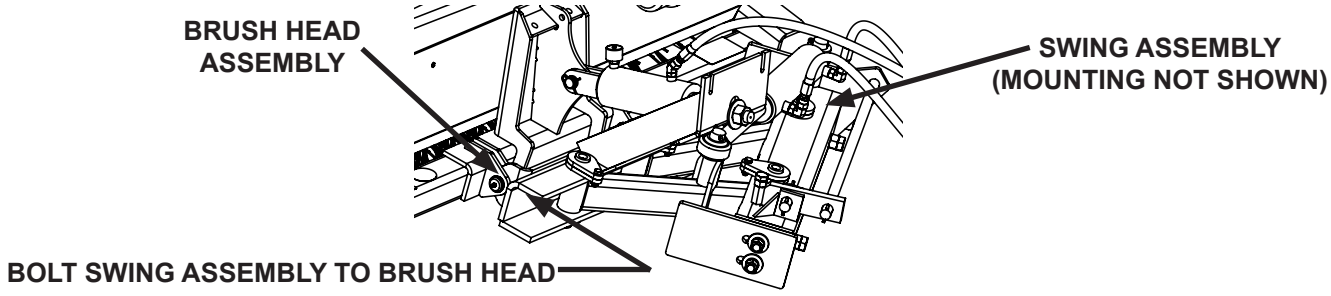
SWING ASSEMBLY INSTALLATION

1. Position the swing assembly in front of the mounting assembly. Remove the pin(s) from the swing assembly.
2. Align holes in the swing assembly with ears on the mounting assembly. Slide pin(s) through the holes and secure with cotter pin(s).
3. Go to “BRUSH HEAD ASSEMBLY”.

BRUSH HEAD ASSEMBLY INSTALLATION

1. Position the brush head assembly in front of the swing assembly aligning the mounting holes.
2. Install the swing assembly to the brush head assembly using the hardware provided for the assemblies you have received. See Figure #1.

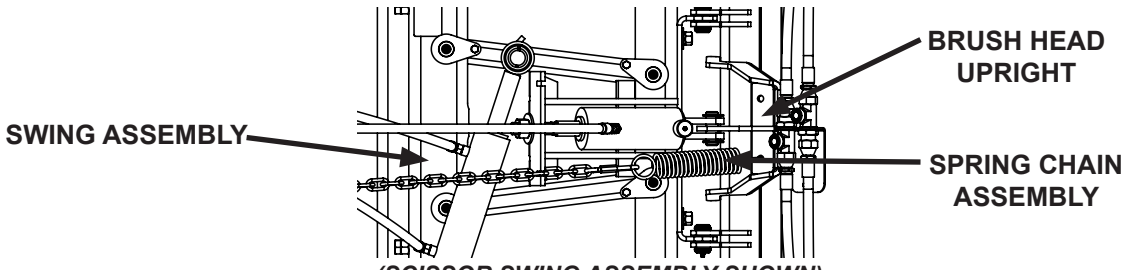
FIGURE #1



(SCISSOR SWING ASSEMBLY SHOWN)

3. Tighten hardware.
4. Assemble the spring chain assembly/assemblies and attach the spring end(s) to the brush head upright. Place the chain in a slot on the swing plate upright. See Figure #2.

FIGURE #2

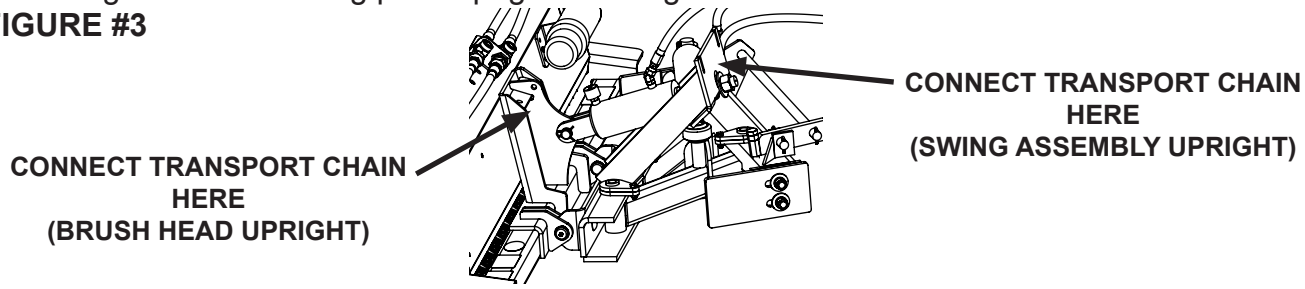


(SCISSOR SWING ASSEMBLY SHOWN)

INSTALLATION

5. Connect the transport chain that is connected to the brush head upright, to the remaining slot on the swing plate upright. See Figure #3.

FIGURE #3



(SCISSOR SWING ASSEMBLY SHOWN)

NOTICE: Use the transport chain to take weight off of the spring chain assembly while transporting the unit between job sites.

6. ***PUMP/TANK HYDRAULICS***: Attach both .75” hoses to the brush head fittings. Connect the bottom hose to the filter base and the top hose to the run port on the valve.
TRACTOR REMOTE HYDRAULICS: Attach both .75” hoses to the brush head fittings. Connect the bottom hose to the prime mover return coupler and the top hose to the pressure coupler.

NOTICE: If 12 GPM is not available from the primer mover remote hydraulics, contact Sweepster to purchase the optional power pack.

SWING CYLINDER INSTALLATION

1. Connect the two hoses provided to the fittings located on the swing cylinder.
2. Attach adapter fittings to the hose ends.
3. Connect the adapter fittings to either the remote valves (manual valves), the “A” and “B” ports (electric valves) or prime mover remote hydraulics.

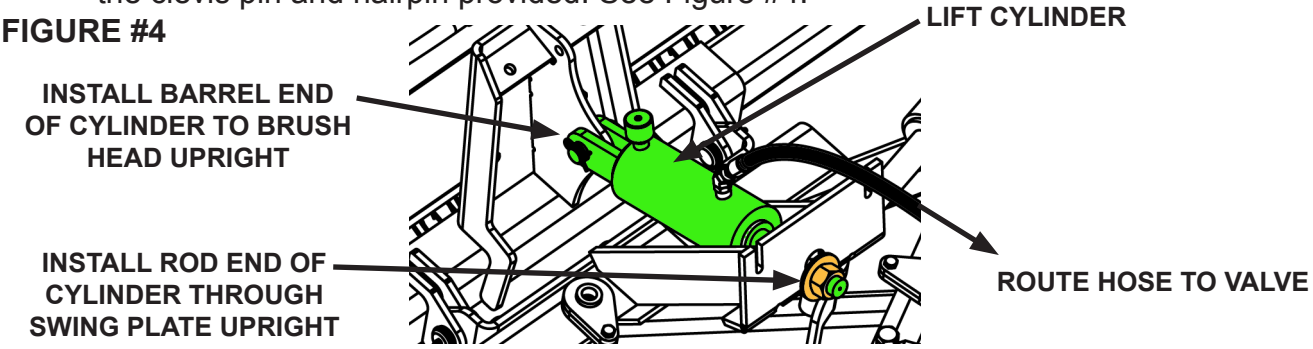
LIFT CYLINDER INSTALLATION

1. Slide the rod end of the lift cylinder through the plate on the swing plate upright. Install flat washer and nut provided.

NOTICE: Avoid cylinder damage by only placing one nut on the cylinder rod. Adjustment to the lift cylinder MUST be made before the unit is put into operation. Adjust cylinder barrel so it does NOT touch swing plate gussets.

2. Attach the barrel end of the lift cylinder to the center ear on the brush head upright. Use the clevis pin and hairpin provided. See Figure #4.

FIGURE #4



INSTALLATION

3. Connect the hose provided to the elbow on the cylinder and then to the first valve that has a single port (manual valves), the “L” port (electric valves) or prime mover remote hydraulics.

MANUAL ANGLE KIT INSTALLATION

1. Slide the inner link into the outer link. See Figure #1.
2. Place the link ends on swing assembly pins. Secure in place. See Figure #1.
3. Position the brush head assembly at the desired angle. Align holes in both links and install lock pin to keep the brush head assembly in position. See Figure #2.

FIGURE #1

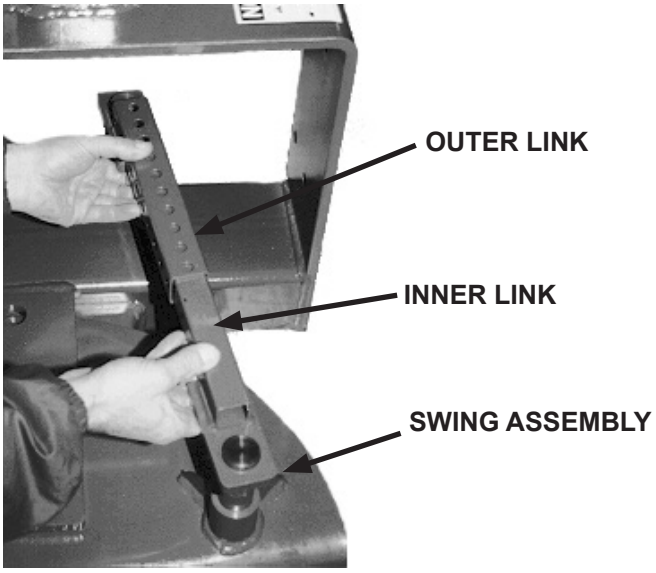
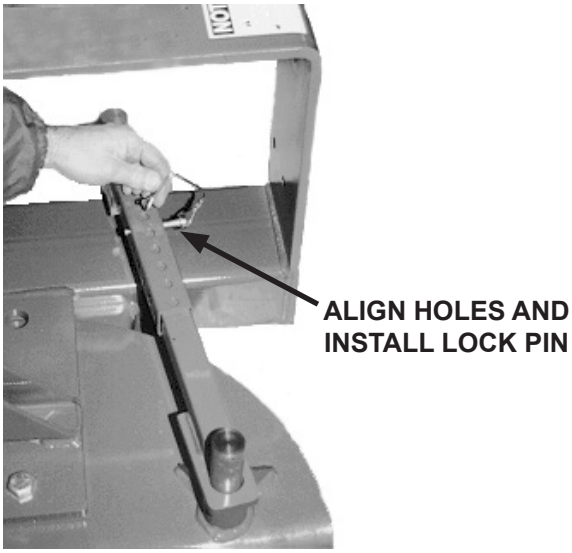


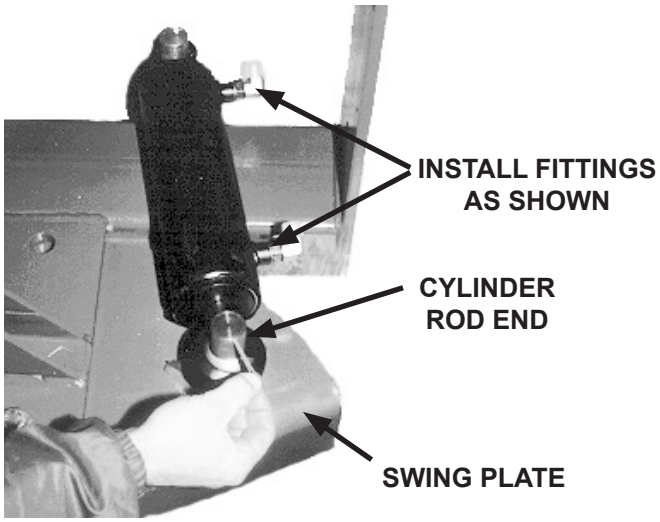
FIGURE #2



HYDRAULIC ANGLE KIT INSTALLATION

1. Attached fittings in cylinder ports if not already installed at factory. See Figure #1.
2. Install the cylinder with the barrel end on the swing assembly and the rod end on the swing plate. Secure with cotter pins.
3. Connect a hose to each fitting on the cylinder followed by the adapter fittings provided.
4. Connect hoses to remote valves on the prime mover.

FIGURE #1

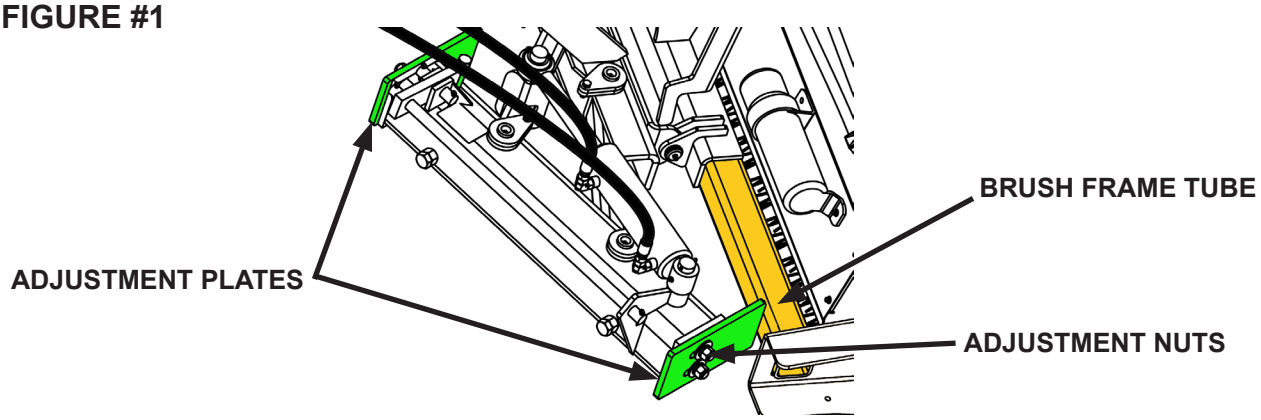


INSTALLATION

ADJUSTING SCISSOR SWING

1. Loosen nuts securing the adjustment plates to the swing frame. See Figure #1.

FIGURE #1



2. Swing the brush head completely to the right.
3. Slide the right side adjustment plate toward the brush head until it is snug on the brush frame tube. Torque hardware to specifications. (See Bolt Torque Specifications)
4. Swing the brush head completely to the left.
5. Slide the left side adjustment plate toward the brush head until it is snug on the brush frame tube. Torque hardware to specifications. (See Bolt Torque Specifications)
6. Swing the brush head assembly both directions and check to ensure that the adjustment plates fit tightly to the brush frame. If not, repeat Steps #2 through #5.

BEFORE USE

1. Fill hydraulic tank up to 2” (51mm) from the top. Use ISO VG-46 hydraulic oil.
2. With tractor parking brake ON and tractor in neutral, prime the hydraulic pump. (If so equipped.)
   FRONT PUMP UNITS: Turn the engine on and off in short bursts without starting.
   REAR PUMP UNITS: Rapidly engage and disengage the PTO while the engine is running.
3. Check oil in tank and add as required to bring to proper level.
4. Run the engine at a slow idle 2-5 minutes. Stop engine and check for hydraulic leaks. Make any required adjustments before proceeding.
5. Start the tractor. Engage the brush and let it run while watching for excess vibration or other problems. Test swing and lift functions. Make any required adjustments before proceeding.
6. Perform the following procedures (if so equipped):
   - Adjusting Scissor Swing.
   - Leveling (See Maintenance Section).
   - Setting Brush Pattern.
   - Adjusting Spring Chain Assemblies.
   - Adjusting Transport Chain.

INSTALLATION

DETACHING

1. Before exiting the prime mover, lower the attachment to the ground, apply the brakes, turn off the prime mover's engine, and remove the key.
2. Follow prime mover operator's manual to relieve pressure in the hydraulic lines.
3. Disconnect sweeper hydraulic lines from the prime mover. Connect hydraulic couplers together or install caps to prevent contaminants from entering the hydraulic system. Store hoses off of the ground to help prevent damage.
4. 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.

BEFORE OPERATING SWEEPER:

- Learn sweeper and prime mover controls in an off-road location.
- Be sure that you are in a safe area, away from traffic or other hazards.
- Perform daily maintenance as indicated in Maintenance Schedule.
- Remove from the sweeping area all property that could be damaged by flying debris.
- Be sure all persons not operating the sweeper are clear of the sweeper discharge area.
- Always wear proper apparel such as a long sleeved shirt buttoned at the cuffs; safety glasses, goggles or a face shield; ear protection; and a dust mask.

WHILE OPERATING SWEEPER:

- When operating sweeper, adhere to all government rules, local laws and other professional guidelines for your sweeping application.
- Before leaving the operators area for any reason, lower the sweeper to the ground. Stop the prime mover engine, set the brakes and remove the key from the ignition.
- Minimize flying debris - use the slowest rotating speed that will do the job.
- Keep hands, feet, hair and other loose clothing away from all moving parts.
- Leave the brush hood (shield) and all other shields and safety equipment in place when operating the sweeper.
- Be aware of extra weight and width a sweeper adds. Reduce travel speed accordingly.
- When sweeping on rough terrain, reduce speed to avoid “bouncing” the sweeper. Loss of steering can result.
- Never sweep toward people, buildings, vehicles or other objects that can be damaged by flying debris.
- Only operate the sweeper while you are in the seat of the prime mover. The seat belt must be fastened while you operate the prime mover. Only operate the controls while the engine is running. Protective glasses must be worn while you operate the prime mover and while you operate the sweeper.
- While you operate the sweeper slowly in an open area, check for proper operation of all controls and all protective devices. Note any repairs needed during operation of the sweeper. Report any needed repairs.

OPERATION

OPERATION

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. Ensure that the adjustment bolts are equally adjusted in order to prevent an uneven wear pattern. To adjust pattern see “Adjusting Brush Pattern”.

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.

MANUAL ANGLE

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.

HYDRAULIC ANGLE

1. Start the prime mover.
2. Engage the PTO. (Rear or mid PTO units only)
3. Position the brush head at the desired angle by using the valve control for the swing function.

CONTROLS

Run, swing and lift functions vary according to how the unit is equipped.

MANUAL VALVES WITH CONTROL RODS

LIFT: Push the control rod to “LOWER” brush head. Pull the control rod to “RAISE” brush head.

SWING: Push the control rod to “ANGLE LEFT”. Pull the control rod to “ANGLE RIGHT”.

BRUSH: Push the control rod to “STOP” brush rotation. Pull the control rod to “START” brush rotation.

MANUAL VALVES WITH CONTROL HANDLES

LIFT: Control handle closest to the operator. Push forward to “LOWER” brush head. Pull back to “RAISE” brush head.

SWING: Second handle from the operator. Push forward to “ANGLE LEFT”. Pull back to “ANGLE RIGHT”.

BRUSH: Third handle from the operator. Push forward to “STOP” brush rotation. Pull back to “START” brush rotation.

VALVES

The sweeper controls are activated by switches on the control box. Refer to operation decal on control box.

PRIME MOVER VALVES

The sweeper controls are activated by prime mover controls.

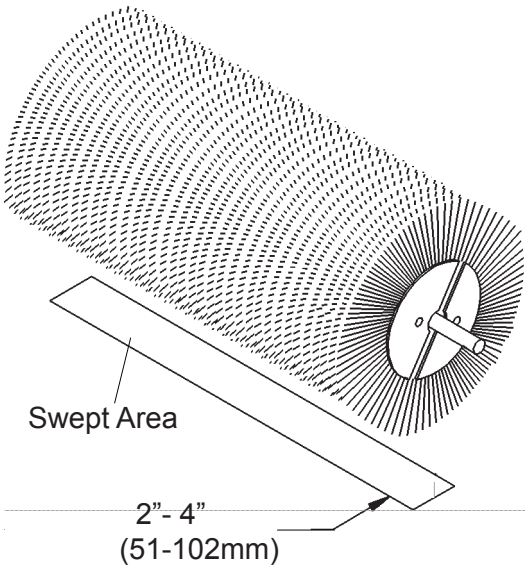
MAINTENANCE

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 10 seconds.
4. Raise the sweeper and back 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 refer to adjusting the Spring-Chain Assembly.

FIGURE #1



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 assemblies.

To adjust the transport chain:

1. Raise the sweeper.
2. Tighten the transport chain.
3. Lower the sweeper so the transport chain supports the weight of the sweeper.

ADJUSTING SPRING-CHAIN ASSEMBLY

The spring-chain assembly allows the brush head to pivot up and down.

To adjust the brush pattern:

1. Raise the sweeper on all front mounted units.
   Lower the sweeper on all rear mounted units.
2. Tighten the transport chain and lower the sweeper so the transport chain supports the weight of the sweeper.
3. Move the spring-chain forward in the swing assembly chain holder to lower the brush head or back in the holder to raise it.

OPERATION

SWEEPING

To sweep:

1. **Manual angle only** - Swing the brush head assembly the direction that you want to direct debris.
2. Start the prime mover at idle and raise the brush.
3. Start brush rotation.
4. **Hydraulic angle only** - Swing the brush head assembly the direction that you want to direct debris.
5. Engage the brush and then lower it to the ground.
6. Increase prime mover engine rpm to sweeping speed.

NOTICE: Avoid hydraulic pump damage on rear pump units. Do not run the engine at speeds above standard PTO RPM.

7. Travel forward at 5 mph (8 kph) or less.

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.

OPERATION

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.

STORAGE:

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

Do not store polypropylene brushes in direct sunlight. The material can deteriorate and crumble before the bristles are worn out. Keep polypropylene brush material away from intense heat or flame.

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

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.

OPERATION

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

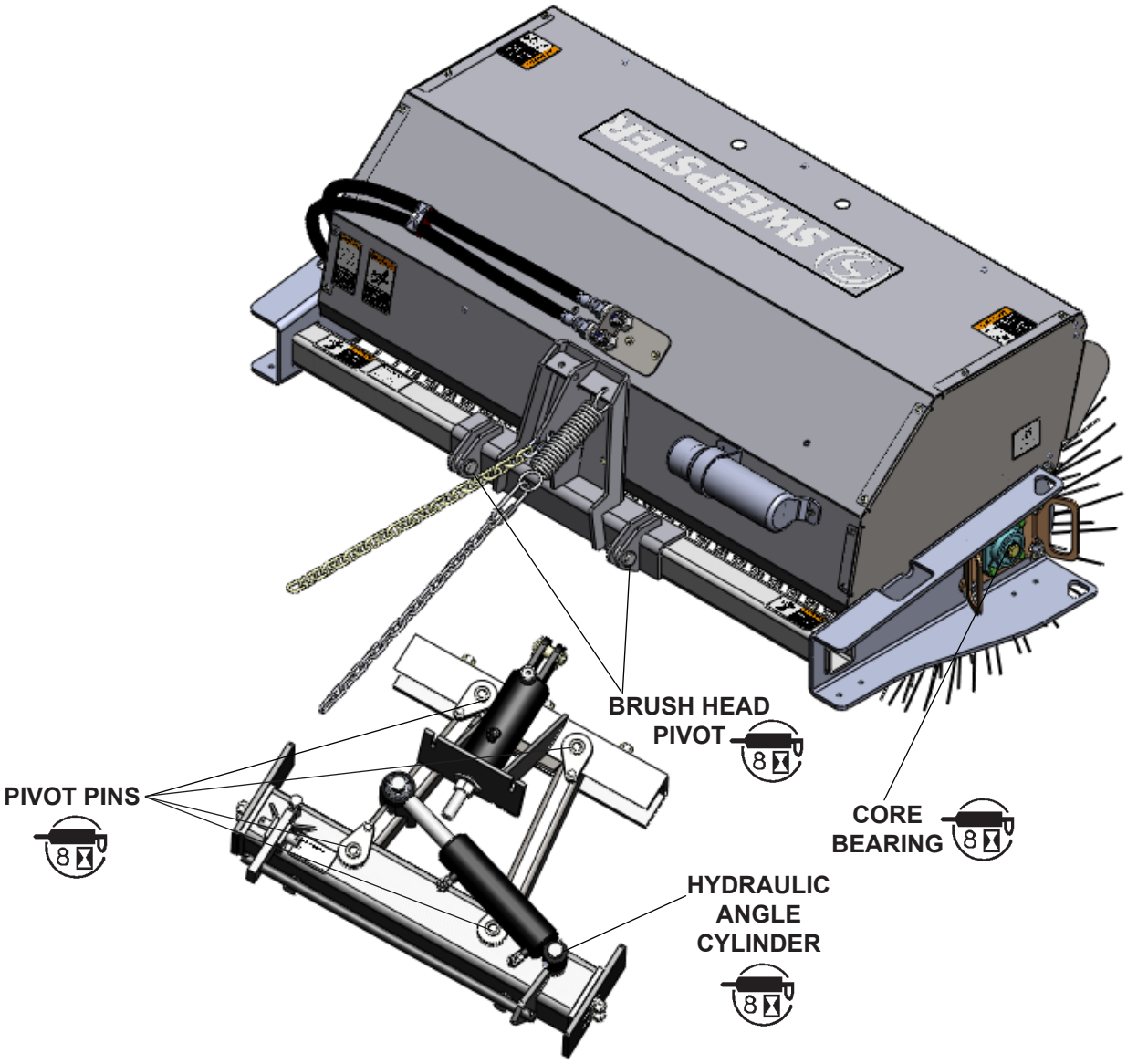
"Follow all local government regulations that may apply along with recommended tie down points and any equipment safety precautions at the front of this manual when transporting your attachment."

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.



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

OIL CLEANLINESS REQUIREMENTS

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

MAINTENANCE

GENERAL INFORMATION

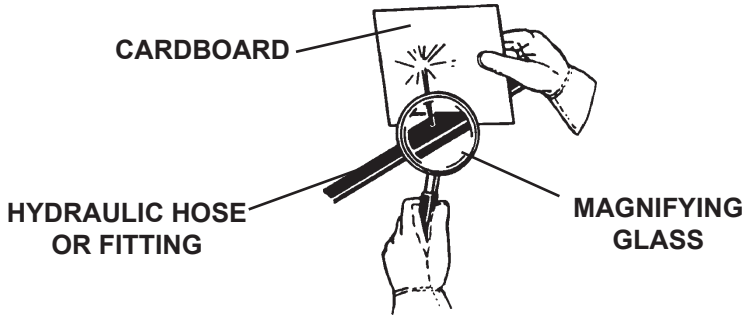
Regular maintenance is the key to long equipment life and safe operation. Maintenance requirements have been reduced to an absolute minimum. However, it is very important that these maintenance functions be performed as described below.

Procedure	Daily (Every 8 Hours)	See Prime Mover Manual
Level brush head assembly.	✔	
Check brush pattern. (See Brush Pattern Adjustments)	✔	
Check hydraulic system for leaks and tighten as necessary. Check for damage and replace as needed.	✔	
Lubricate grease fittings.	✔	
Check prime mover hydraulic system for adequate oil levels.	✔	
Check for missing or loose hardware. Replace or tighten if necessary. (See Bolt Torque Specifications)	✔	
Check for missing or damaged safety decals and replace as necessary.	✔	
Retract rods and grease threaded ball ends on cylinders to prevent rust.	✔	
Clean prime mover air filter.		✔

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.



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MAINTENANCE

LEVELING

Level the sweeper for even brush wear and effective use.

CAUTION! Avoid injury. Before adjusting the sweeper, always turn off the sweeper and the prime mover engine and remove the key.

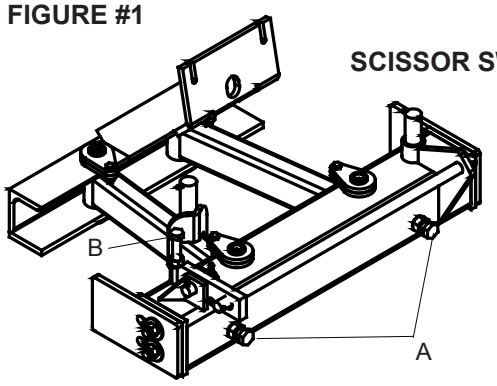
1. Move the sweeper to a flat, paved surface.
2. Lower the brush head assembly so the brush is 2” (51 mm) above the ground.
3. Engage the parking brake and shut down the prime mover. Be sure to relieve pressure to the auxiliary hydraulic lines.
4. Unfasten safety restraints and exit prime mover.
5. Check if the swing assembly is level by using a bubble level. To make corrections:

Scissor Swing/Plate Swing-Tractor Front Mount - Turn leveling bolts (A) in or out in equal amounts. If the front of the swing assembly is high, turn the leveling bolts in. If it is low, turn the leveling bolts out. See Figure #1 and #2.

RLH/RLCH Rear Mount - Adjust the toplink. If the rear of the swing assembly is high, lengthen the toplink. If low, shorten the toplink.

FIGURE #1

SCISSOR SWING



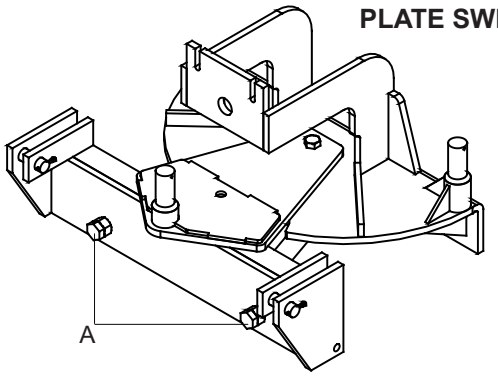
6. Position the brush head assembly straight ahead. On each side, measure from the brush frame to the ground See Figure #3. If measurements are not equal:

Scissor Swing - Turn adjustment screw (B) in to lower the right side of the brush head assembly. Turn it out to lower the left side. See Figure #1.

Plate Swing on Tractor - Loosen hardware that attaches the swing assembly to the brush head assembly; lower the high side of the brush head until both sides are an equal distance above the ground. Tighten the hardware.

FIGURE #2

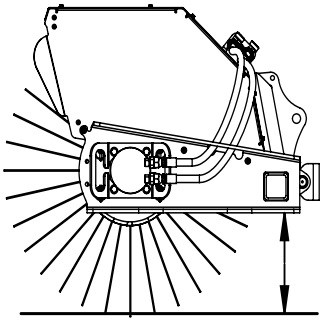
PLATE SWING



RLH/RLCH - Raise or lower adjustable 3-point hitch arm.

7. Angle the brush head assembly to the right. Measure from each side of the brush frame to the ground. Then swing the brush head assembly to the left. Measure from each end of the brush frame to the ground. If the measurements are the same, the brush head is level.

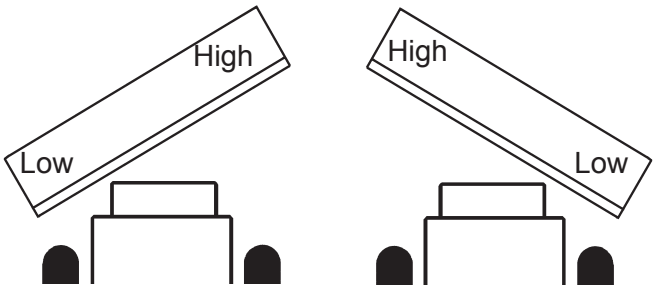
FIGURE #3



MAINTENANCE

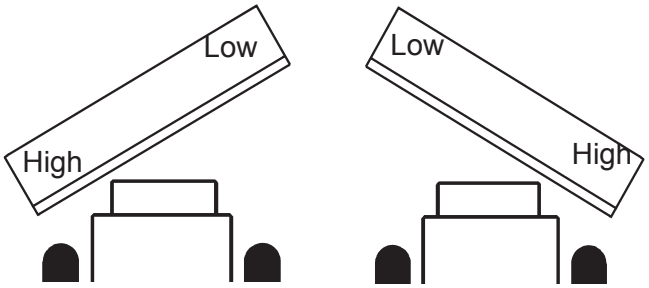
If the measurements resemble Figure #4.
Scissor Swing: Turn leveling screws out. See Figure #1 "A".
Plate Swing: Turn leveling screws out. See Figure #2 "A".
RLH/RLCH: Lengthen tractor toplink.

FIGURE #4



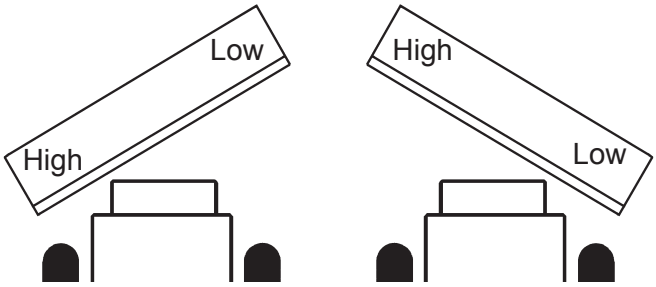
If the measurements resemble Figure #5.
Scissor Swing: Turn leveling screws in. See Figure #1 “A”.
Plate Swing: Turn leveling screws in. See Figure #2 “A”.
RLH/RLCH: Shorten tractor toplink.

FIGURE #5



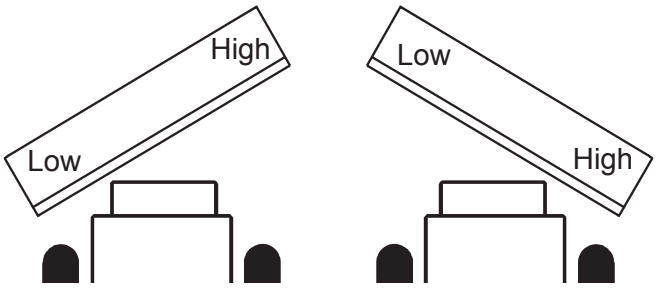
If the measurements resemble Figure #6.
Scissor Swing: Turn adjustment screws in. See Figure #1 “B”.
Plate Swing: Loosen hardware that attaches the swing assembly to the brush head assembly. Lower the left side of the brush head until both sides are an equal distance above the ground. Tighten hardware.
RLH/RLCH: Lower the adjustable 3-point hitch arm.

FIGURE #6



If the measurements resemble Figure #7.
Scissor Swing: Turn leveling screws out. See Figure #1 “B”.
Plate Swing: Loosen hardware that attaches the swing assembly to the brush head assembly. Lower the right side of the brush head until both sides are an equal distance above the ground. Tighten hardware.
RLH/RLCH: Raise the adjustable 3-point hitch arm.

FIGURE #7

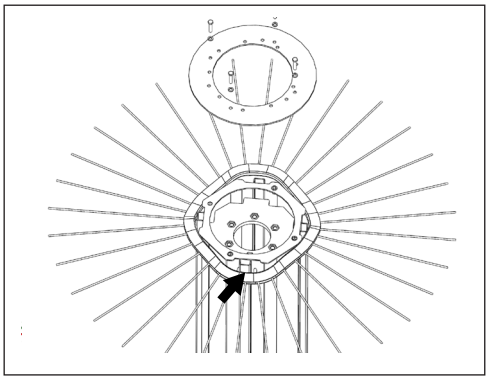


MAINTENANCE

REPLACING BRUSH SECTIONS

1. With the broom resting on the ground, remove the motor mount(s) lynch pins and bearing mount lynch pins (if so equipped) from the left and right side of your broom. Retain the pins for reinstallation.
2. Remove the motor/bearing assemblies from the core taking extra care not to tangle hoses.
3. Remove core from the brush head assembly.
4. Remove retaining plate from the core assembly.
5. Remove old brush sections.
6. Stand the core on end and install new brush sections by doing the following:
   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 #1.
   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 #2.
   c. Continue installing sections, rotating each section 180°, and alternating the direction of the drive pins until the core is full.

FIGURE #1



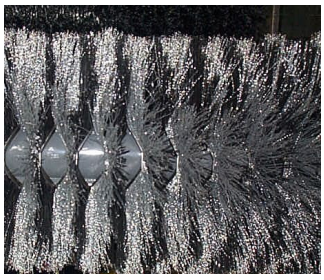
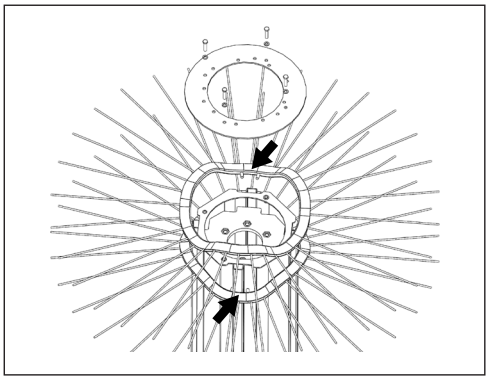


FIGURE #2



7. Reinstall the retaining plate onto the core assembly using the existing hardware.
8. Lay the core back onto the ground and re-position into the brush frame assembly.
9. Slide motor and/or bearing assemblies back into the core taking care not to tangle hoses.
10. Secure in place using the existing lynch pins.

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

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
Brush rotates in wrong direction	Hoses installed incorrectly	Switch hoses at bulk head fittings
Brush slows or stops when sweeping	Brush pattern too wide	Adjust brush pattern to 2”-4” (51-102mm) wide. See Brush Pattern Adjustment
	Travel speed too fast	Reduce travel speed
	Trying to sweep too much material at once	Make several passes with sweeper
	Relief pressure set too low	Set relief pressure to 2000 psi (138.0 bars)
	Pump has failed	Contact dealer to repair or replace
	Hydraulic motor is failing	Repair or replace as required
	Filter plugging	Change or clean hydraulic oil filter
Brush head assembly “bounces” during sweeping	Travel speed too fast and/or brush speed too slow	Find correct combination of ground and brush speeds
	Spring-chain assembly too loose	Adjust spring-chain assembly: See: Adjusting Spring-Chain Assembly
	Core is bent	Replace core
Brush wears into cone shape	Sweeper is not level	Level sweeper before each use: See: Leveling
	Tires on prime mover at different pressures or are different sizes	Check tire sizes and rating: make corrections as necessary
Brush wears very quickly	Brush pattern too wide	Adjust brush pattern to 2”-4” (51-102mm) wide. See Brush Pattern Adjustments
Springs on spring-chain assemblies stretching	Transport chain too loose when traveling between job sites	See Adjusting Transport Chain
	Travel speeds too fast when sweeping	Reduce travel speed

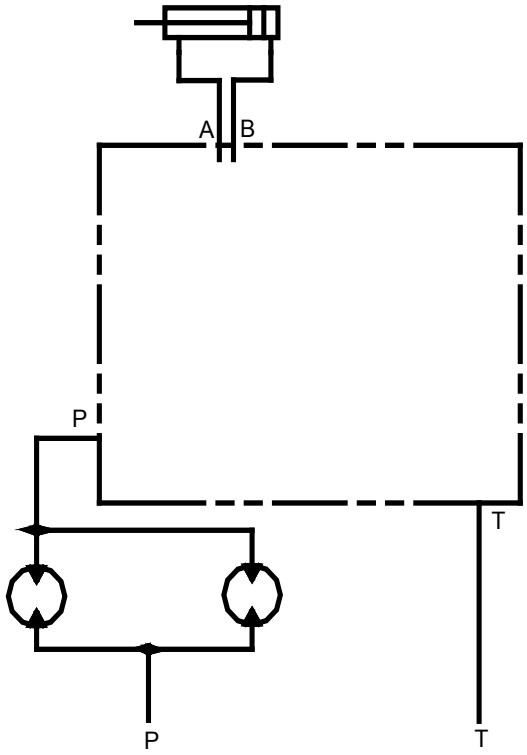
TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
Hydraulic cylinder neither extends nor retracts	Manual valve - Control rods not connected or are binding	Check control rod linkage; make sure all parts are connected and are not binding; fix if necessary
	Electric valve - Set screw in flow divider on manifold too tight	Loosen jam nut and then turn set screw in until it stops; turn set screw out 1 1/2 turns; tighten jam nut
	Electric valve - No power from controls because wires are broken or disconnected	Reconnect wires if disconnected; replace wires if broken
	Electric valve - No power from controls because switch is broken	Replace switch
	Hydraulic oil level too low	Fill tank to 2”-3“ (51-76mm) from top of tank with ISO VG-46 oil
	Hoses or fittings loose or disconnected	Tighten hoses and fittings
	Restriction in hoses	Remove bends in hoses, remove obstructions inside hoses
Hydraulic cylinder only extends or only retracts	Electric valve - Set screw in flow divider on manifold out of adjustment	Loosen jam nut and then turn set screw in until it stops; turn set screw out 1 1/2 turns; tighten jam nut
	Electric valve - Dirt or debris in spools	Contact Sweepster Technical Service
Hydraulic cylinder extends or retracts too quickly	Manual valve - Flow too high because restrictor fitting missing from cylinder	Reinstall restrictor fitting on barrel end of cylinder
	Manual valve - Flow too high even though restrictor fitting is installed	Contact Sweepster for smaller orifice fitting
	Electric valve - Set screw in flow divider on manifold too loose	Loosen jam nut and then turn set screw in until it stops; turn set screw out 1 1/2 turns; tighten jam nut

TROUBLESHOOTING

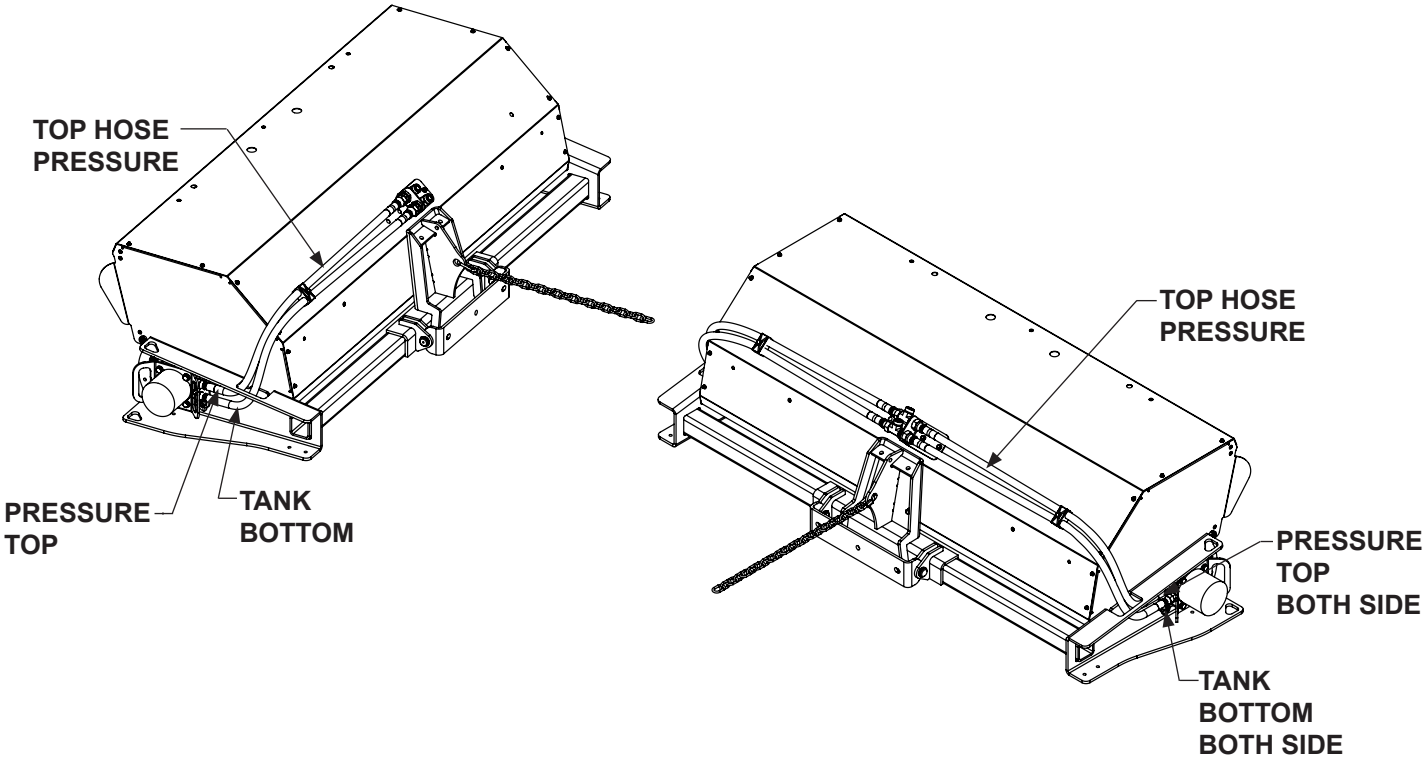
PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
Hydraulic system overheats	Hydraulic oil level too low	Add hydraulic oil to tank until it comes to 2” (51mm) from top
	Restriction in hoses	Remove bends in hoses; remove obstructions inside hoses / Replace Hose
	Host pump flow rate exceeds maximum rate of broom	Contact host manufacturer for proper flow control method
Hydraulic quick couplers leak	Quick coupler poppet is unseated	Reseat poppet; replace quick coupler if poppet is beyond repair
Hydraulic motor seals leak	Back pressure exceeds 1000 psi	Contact Sweepster
	Motor is failing	High number of hours on motor; Contact dealer to rebuild or replace
Hydraulic oil flows from breather cap on hydraulic tank	Hydraulic tank too full	Grain hydraulic tank until level is 2” (51mm) from top

HYDRAULIC SCHEMATIC



TROUBLESHOOTING

HYDRAULIC HOSE ROUTINGS



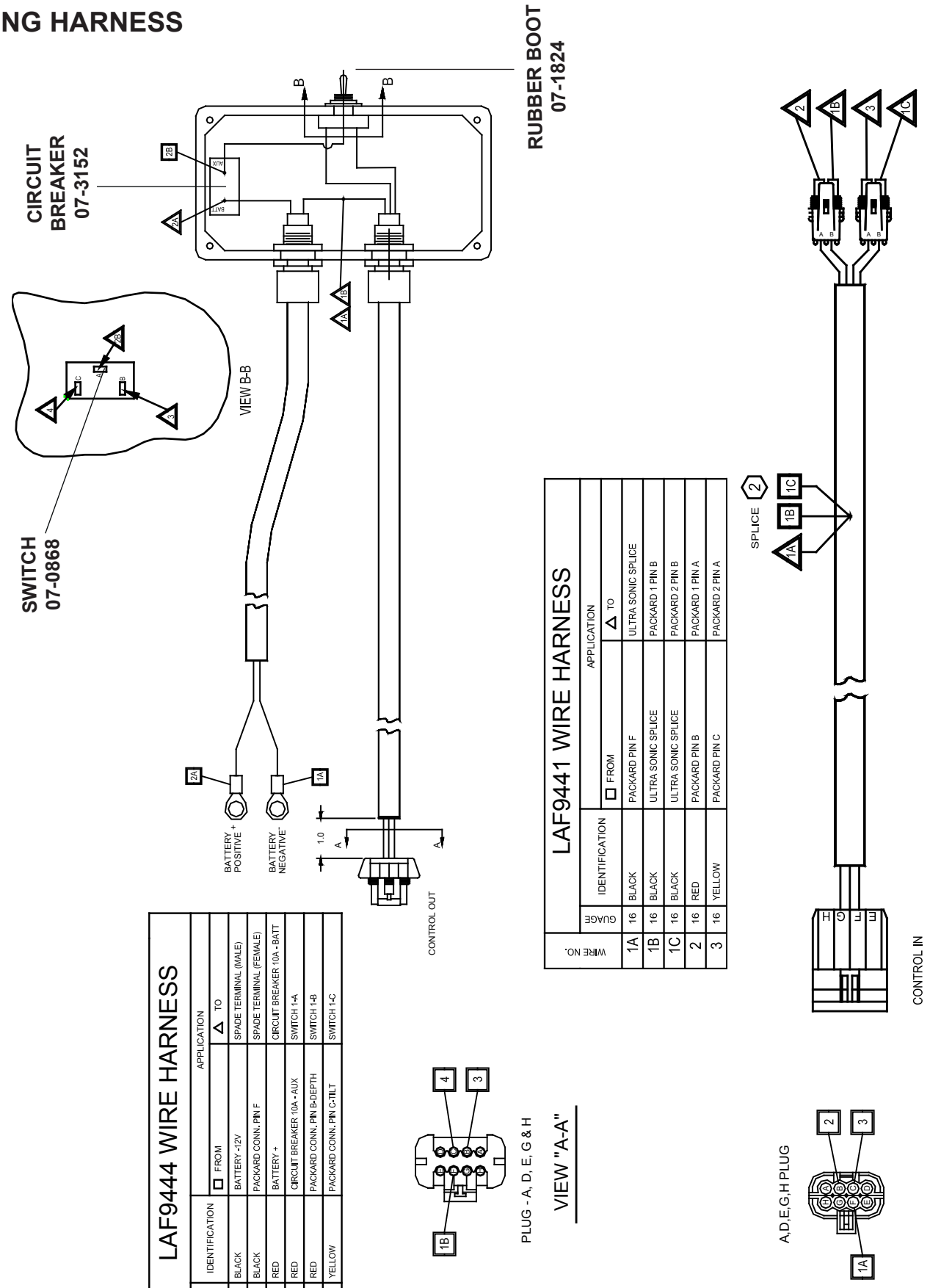
Manual Angle: Connect pressure line to female quick couplers. Connect return line to male quick couplers.

Hydraulic Angle: Connect pressure line to female quick couplers. Connect return line from brush motor(s) to “P” port on manifold. Connect “T” port on manifold to male quick couplers.

NOTICE: Your broom comes equipped with standard ISO 16028 hydraulic couplers. The female coupler is the pressure (power) and the male coupler is the return. If your prime mover male coupler is NOT the pressure line you will need to switch the quick couplers on the broom power and return lines.

TROUBLESHOOTING

WIRING HARNESS

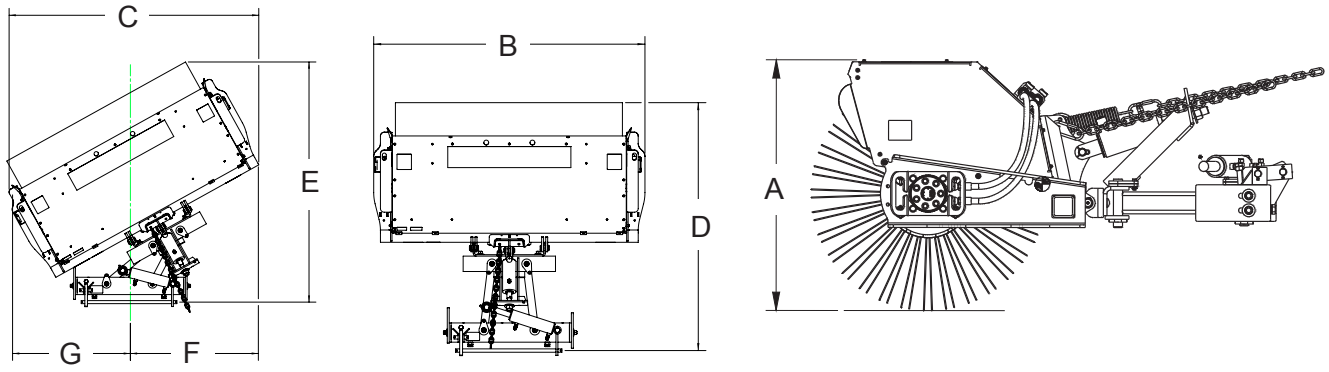


LAF9444 WIRE HARNESS				
WIRE NO.	GUAGE	IDENTIFICATION	APPLICATION	
			□ FROM	△ TO
1A	16	BLACK	BATTERY -12V	SPADE TERMINAL (MALE)
1B	16	BLACK	PACKARD CONN. PIN F	SPADE TERMINAL (FEMALE)
2A	16	RED	BATTERY +	CIRCUIT BREAKER 10A - BATT
2B	16	RED	CIRCUIT BREAKER 10A - AUX	SWITCH 1-A
3	16	RED	PACKARD CONN. PIN B-DEPTH	SWITCH 1-B
4	16	YELLOW	PACKARD CONN. PIN C-TILT	SWITCH 1-C

LAF9441 WIRE HARNESS				
WIRE NO.	GUAGE	IDENTIFICATION	APPLICATION	
			□ FROM	△ TO
1A	16	BLACK	PACKARD PIN F	ULTRA SONIC SPLICE
1B	16	BLACK	ULTRA SONIC SPLICE	PACKARD 1 PIN B
1C	16	BLACK	ULTRA SONIC SPLICE	PACKARD 2 PIN B
2	16	RED	PACKARD PIN B	PACKARD 1 PIN A
3	16	YELLOW	PACKARD PIN C	PACKARD 2 PIN A

SPECIFICATIONS

SCISSOR SWING SHOWN



DESCRIPTION	SWEEPER WITH SCISSOR SWING 4’	5’	6’	7’	8’	9’
A. Overall Height	34.40”	34.40”	34.40”	34.40”	34.40”	34.40”
B. Overall Width	67.80”	79.80”	91.80”	103.80”	115.80”	127.80”
Sweeping Width	48.00”	60.00”	72.00”	84.00”	96.00”	108.00”
C. Overall Width @ 30°Angle	66.90”	77.30”	87.70”	98.10”	108.50”	118.90”
Sweeping Width @ 30°Angle	41.60”	52.00”	62.40”	72.80”	83.20”	93.60”
D. Overall Length	67.90”	67.90”	67.90”	67.90”	67.90”	67.90”
E. Overall Length @ 30° Angle	69.90”	72.90’	75.90”	78.90”	81.90”	84.90”
F. Offset @ 30° Angle - Lead Edge	32.25”	37.50”	42.75”	48.00”	53.75”	58.50”
G. Offset @ 30° Angle - Trail Edge	31.25”	36.50”	41.75”	47.00”	52.25”	57.50”
Weight - Single Motor (lbs)	710#	765#	820#	870#	925#	985#
Weight - Dual Motor (lbs)	740#	795#	850#	900#	955#	1010#

DESCRIPTION	SWEEPER WITH PLATE SWING 4’	5’	6’	7’	8’	9’
A. Overall Height	34.40”	34.40”	34.40”	34.40”	34.40”	34.40”
B. Overall Width	67.80”	79.80”	91.80”	103.80”	115.80”	127.80”
Sweeping Width	48.00”	60.00”	72.00”	84.00”	96.00”	108.00”
C. Overall Width @ 30°Angle	66.90”	77.30”	87.70”	98.10”	108.50”	118.90”
Sweeping Width @ 30°Angle	41.60”	52.00”	62.40”	72.80”	83.20”	93.60”
D. Overall Length	62.20”	62.20”	62.20”	62.20”	62.20”	62.20”
E. Overall Length @ 30° Angle	67.90”	70.90”	73.90”	76.90”	79.90”	82.90”
F. Offset @ 30° Angle - Lead Edge	20.50”	25.75”	31.00”	36.25”	41.50”	46.75”
G. Offset @ 30° Angle - Trail Edge	43.00”	48.00”	53.00”	58.00”	62.00”	67.00”
Weight - Single Motor (lbs)	675#	730#	780#	835#	890#	945#
Weight - Dual Motor (lbs)	705#	760#	810#	865#	920#	975#

Hydraulic Flow - Single 18 CID Motor ..... 10-18 GPM
Hydraulic Flow - Single 28 CID Motor ..... 15-25 GPM
Hydraulic Flow - Dual 18 CID Motor ..... 18-36 GPM
Maximum Pressure 28 CID Motor ..... 3000 PSI
18 CID Motor ..... 3500 PSI

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

BOLT TORQUE SPECIFICATIONS

GENERAL TORQUE SPECIFICATION TABLES

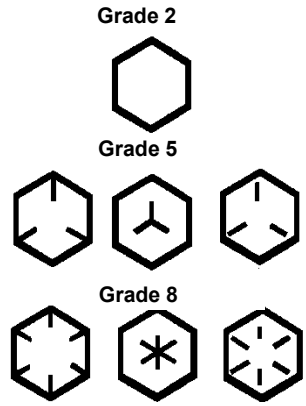
Use the following charts when determining bolt torque specifications, when special torques are not given. Always use grade 5 or better when replacing bolts.

SAE BOLT TORQUE SPECIFICATIONS

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

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

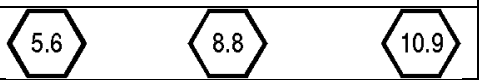
Bolt head identification marks as per grade.
NOTE: Manufacturing Marks Will Vary



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***.