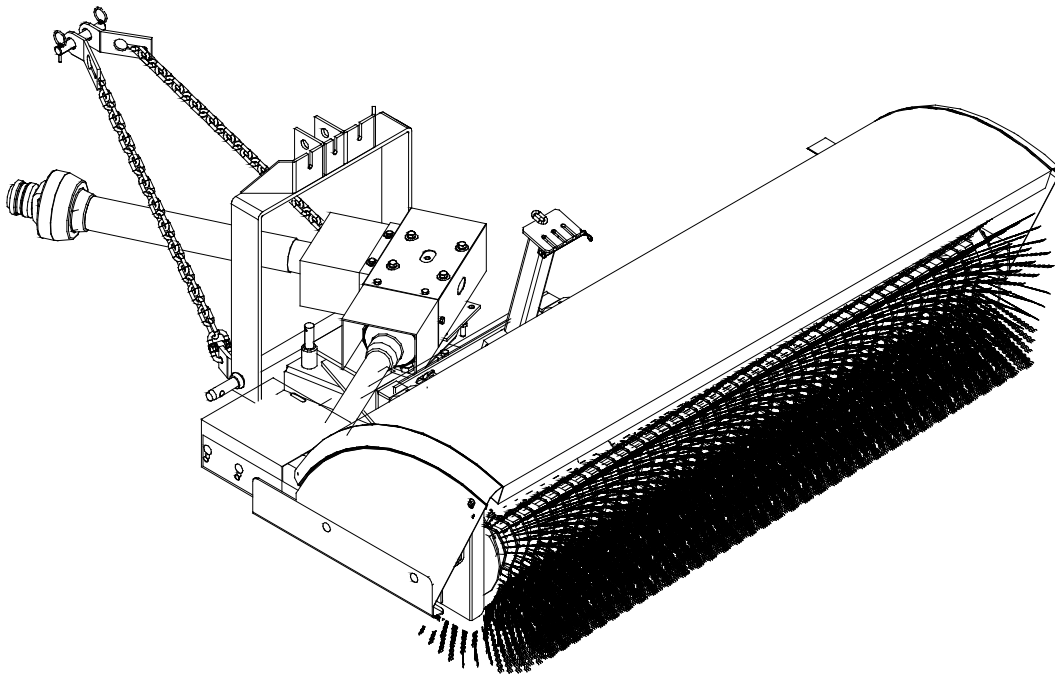




# **SWEEPSTER**

BY PALADIN

## **OPERATOR'S AND PARTS MANUAL RMRM Series Rear-Mounted Mechanical Sweeper**



**Serial Number:** \_\_\_\_\_

**Model Number:** \_\_\_\_\_

**Manual Number: 51-0046-3**

**Release Date: January 2014**

**Rev. 1**

## Notes

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## Notes

# INTRODUCTION

## Importance of this manual



### **READ THIS MANUAL BEFORE ATTEMPTING TO OPERATE THE EQUIPMENT.**

This operator's manual should be regarded as part of the sweeper. Suppliers of both new and secondhand sweepers are advised to keep documentation indicating that this manual was provided with the sweeper.

The manual contains information regarding installation, operation and maintenance required for this sweeper and optional equipment. It also includes detailed parts lists.

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## **Purpose of sweeper**

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

This sweeper should be operated, serviced and repaired only by persons who are familiar with its characteristics and acquainted with relevant safety procedures.

Accident prevention regulations, all other generally recognized safety regulations and all road traffic regulations must be observed at all times.

Any modifications made to this sweeper may relieve the manufacturer of liability for any resulting damage or injury.

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## **Contacting SWEEPSTER**

If you have any questions about information in this manual or need to order parts, please call, write, fax or e-mail SWEEPSTER.

SWEEPSTER  
2800 North Zeeb Road  
Dexter, Michigan 48130  
Phone: (734) 996-9116 - (800) 456-7100  
FAX: (734) 996-9014  
e-mail: [sweepster@paladinbrands.com](mailto:sweepster@paladinbrands.com)

For help with installation, operation or maintenance procedures, contact our Technical Service Department. Direct product questions and parts orders to our Sales Department.

When ordering parts or accessories, be prepared to give the following information:

- Sweeper model, serial number and date of purchase
- Prime mover, make and model
- Part number, description and quantity

---

## **Terms Used in Manual**

*Right-hand, left-hand, front and rear* are determined from the operator's perspective (either the operator's seat or standing behind a walk-behind unit), facing forward in the normal operating position.

*Prime mover* refers to the tractor, truck, loader or tow vehicle that the sweeper is mounted on or towed by.

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## **Optional Equipment**

Installation instructions for optional equipment, if applicable, are included in the optional equipment package.

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## Specifications & Features

Due to continuous product improvement, specifications and features may change without notice.

## Warranty

To validate the warranty for this unit, fill out the warranty card or warranty pages located at the back of this manual. Then, send this information to SWEEPSTER.

## Safety Information Read this manual

*Read all safety information in this manual.*  
All operators must read and understand the entire contents of this manual before

---

### Safety Alert Symbol

This safety alert symbol indicates important safety messages in this manual. When you see this symbol, be alert to the possibility of injury. Carefully read the message that follows.

General safety practices are listed on Safety Information pages and specific safety information is located throughout this manual.

## Hazard Definitions

**WARNING!** Indicates a potentially **hazardous situation** which, if not avoided, could result in death or serious injury.



**CAUTION!** Indicates a potentially **hazardous situation** which, if not avoided, may result in minor or moderate injury.



**NOTICE!** Used for instructions when machine damage may be involved.



## Operation

**CAUTION!** **A sweeper is a demanding machine.** Only fully trained operators or trainee operators under supervision of a fully trained person should use this machine.



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.
- Check all hardware holding the sweeper to the prime mover, making sure it is tight.
- Replace any damaged or fatigued hardware with properly rated fasteners. See Maintenance Section.
- Check prime mover tire pressure before sweeping.
- Check tire ratings to be sure they match the prime mover load. Weigh the sweeper end of the prime mover, if necessary, to insure proper tire rating.
- 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.

**WARNING!** Never raise the sweeper more than a few feet off the ground.



The sweeper can tip back or the prime mover can tip over causing death or serious injury.

- Before leaving the operator's area for any reason, lower the sweeper to the ground. Stop the prime mover engine, set the parking brake and remove the key from the ignition.
- Minimize flying debris - use the slowest rotating speed that will do the job. See Operation Section: Operating Tips.
- Keep hands, feet, hair and 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 and prime mover.
- Be aware of the 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 operating position. The safety restraint 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.

## Service & Repair - General

**CAUTION!** Do not modify the sweeper in any way. Personal injury could result. If you have questions, contact your dealer or Sweepster.

Repair or adjust the sweeper in a safe area, away from traffic and other hazards.



Before adjusting or servicing - lower the sweeper to the ground, set parking brake, shut down the prime mover and remove the key from the ignition.

When working on or around the sweeper, safely secure it from falling or shifting.

**WARNING!**

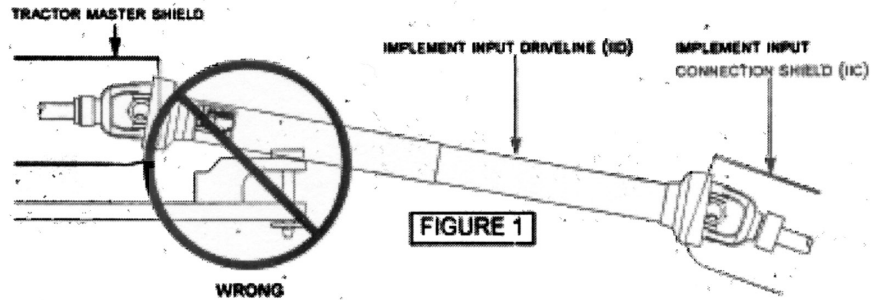


**EXPOSURE TO RESPIRABLE CRYSTALLINE SILICA DUST ALONG WITH OTHER HAZARDOUS DUSTS MAY CAUSE SERIOUS OR FATAL RESPIRATORY DISEASE.**

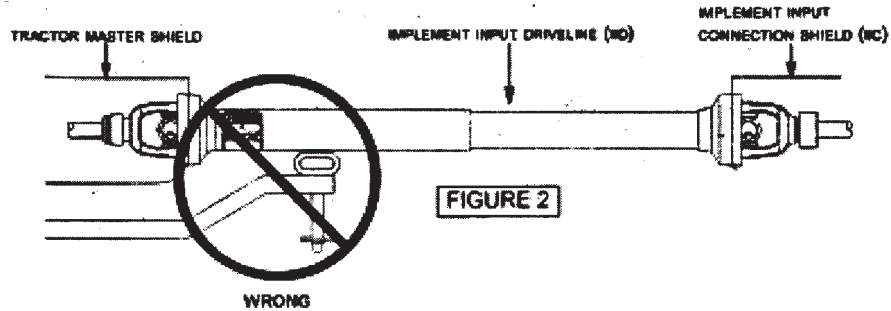
It is recommended to use dust suppression, dust collection and if necessary personal protective equipment during the operation of any attachment that may cause high levels of dust.

# Installation Safety

*If this implement is attached to a tractor with a clevis hitch (hammer-strap) style drawbar, the hammer-strap must be removed to prevent damage to the IID guarding and the IID telescoping members. [See Figure 1]*



*If this implement is attached to a tractor with an offset in the drawbar, be certain it is in the down position to prevent damage to the IID guarding and the IID telescoping members. [See Figure 2]*



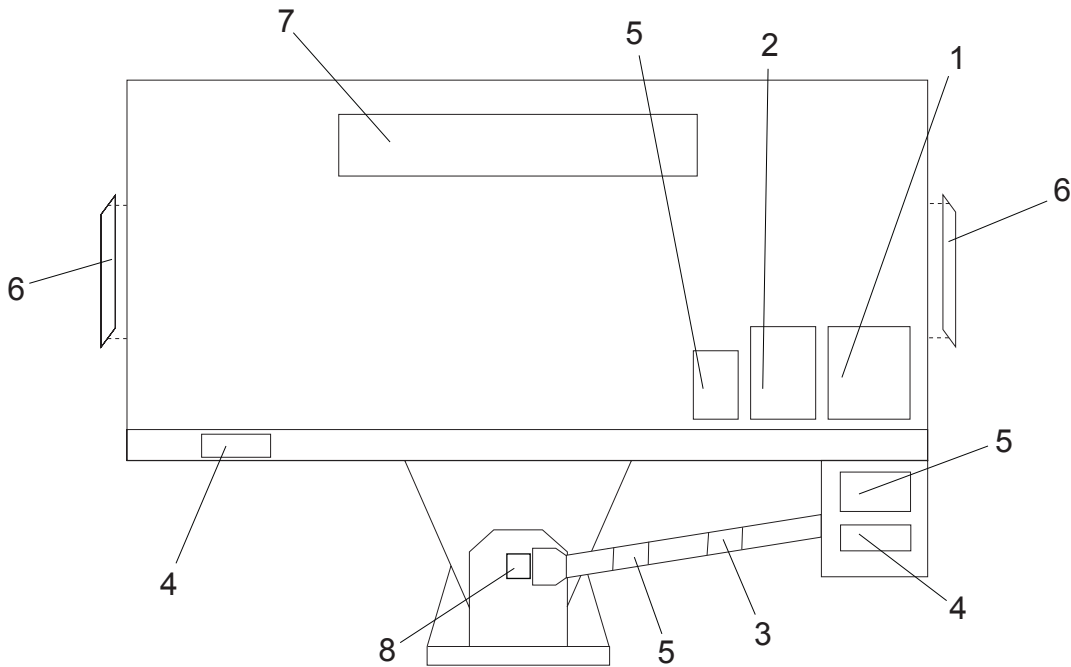


## Notes

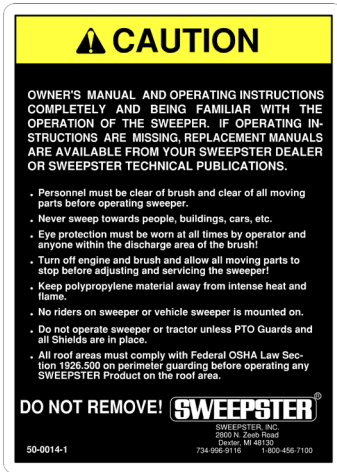
## SAFETY SIGNS AND LABELS

There are several specific safety signs on this sweeper. The exact location of the hazards and the description of the hazards are reviewed in this section.

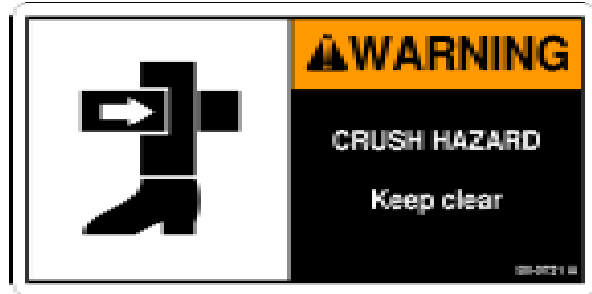
Placement or Replacement of Safety Signs	Instructions
<ol style="list-style-type: none"> <li>1. Clean the area of application with nonflammable solvent, and then wash the same area with soap and water.</li> <li>2. Allow the surface to fully dry.</li> <li>3. Remove the backing from the safety sign, exposing the adhesive surface.</li> <li>4. Apply the safety sign to the position shown in the diagram above and smooth out any bubbles.</li> </ol>	<ul style="list-style-type: none"> <li>•Keep all safety signs clean and legible.</li> <li>•Replace all missing, illegible, or damaged safety signs.</li> <li>•Replacement parts, for parts with safety signs attached, must also have safety signs attached.</li> <li>• Safety signs are available, free of charge, from your dealer or from SWEEPSTER.</li> </ul>



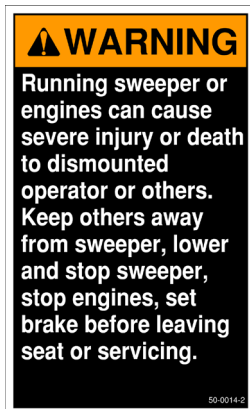
Item	Part	Qty	Description
1.	50-0014-1	1	Label, Caution, Read Manual, General Safety
2.	50-0014-2	1	Label, Warning, Running Sweeper & Engine
3.	50-0064-1	1	Label, Frequency of Lubrication, Walterscheid CV Shaft Only
	50-0147	1	Label, Frequency of Lubrication, Weasler CV Shaft Only
4.	50-0721	2	Label, Warning, Crush Hazard
5.	50-0115	1	Label, Danger, Rotating Driveline
6.	50-0184	1	Label, Small, White, SWEEPSTER
7.	50-0185	1	Label, Medium, White, SWEEPSTER
8.	50-0236	1	Label, Gearbox, Check Oil



1. 50-0014-1



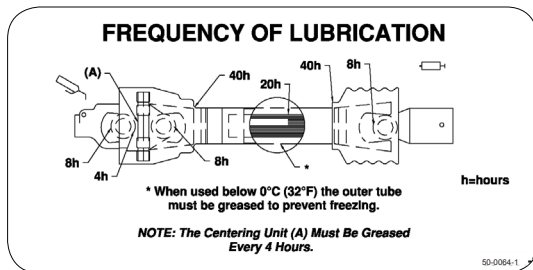
4. 50-0721



2. 50-0014-2



5. 50-0115

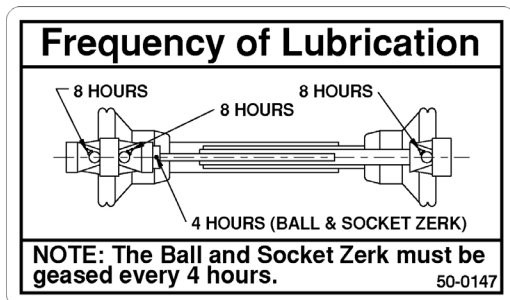


3. 50-0064-1

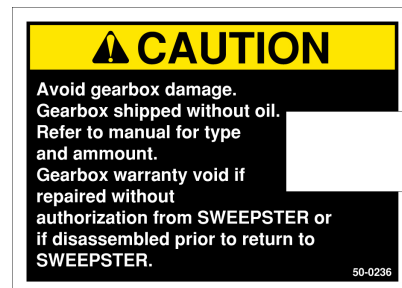


6. 50-0184

7. 50-0185



3. 50-0147



8. 50-0236

**NOTE:** Model RMRMAF sweepers are designed to attach to SAE Category 1 three- point hitches and run off 40 rpm rear PTO's.

**NOTE:** For wet, heavy and/or deep snow, adjust support chains so the mounting assembly remains 16-18 inches (406-457mm) off the ground when the unit is lowered.

## INSTALLING SWEEPER

1. Position the mounting assembly behind the tractor.
2. Lower three-point hitch arms completely.
3. Pin 2 keyhole plates to the tractor toplink with pins from the tractor (figure 1)
4. Raise the mounting assembly and place the mounting assembly's pins in the hitch arms. Secure with ring pins.
5. Connect the tractor toplink arm to the top of the mounting assembly (figure 2). Secure with a pin.
6. Adjust support chains, which are attached to the mounting assembly and keyhole plates.
  - a. Raise hitch arms until the center of the mounting assembly's rear plate is 12 inches (305mm) above the ground (figure 3).
  - b. Choose the link in each chain that will keep the mounting assembly at that measurement.
  - c. Raise hitch arms slightly.
  - d. Place links (chosen in step 6b) in keyhole slots.
  - e. Lower the mounting assembly until the center of the rear plate is 12 inches (305mm) above the ground.

## CAUTION! AVOID EQUIPMENT DAMAGE.



Positioning the Sweeper too close to the ground (less than 12 inches (305mm)) can result in damage to the sweeper hood and gearbox. Keep the proper distance.

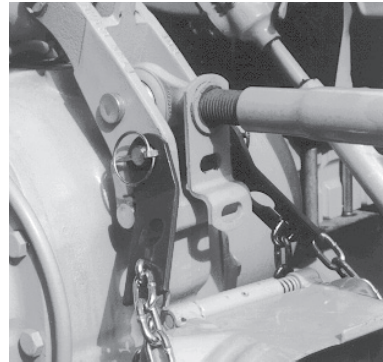


figure 1

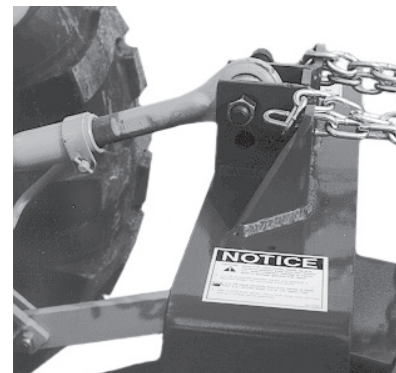


figure 2

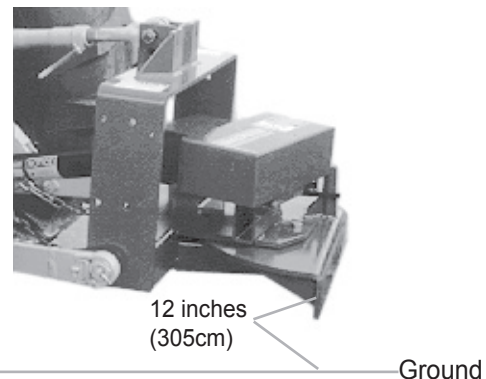


figure 3

Ground

7. Position the brush head assembly behind the mounting assembly.
8. Align slots in the mounting assembly's rear plate and the brush head's frame plate. Secure with carriage bolts, flat washers, lock washers and nuts.

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

9. Install the spring-chain assembly.
  - a. Place a tension spring on one end of a 27-link chain.
  - b. Attach the spring to the brush frame upright.
  - c. Connect the chain to a slot in the chain holder on the mounting assembly.
10. Connect the transport chain, already attached to the brush frame upright, to the remaining slot in the chain holder on the mounting assembly.
11. Install the constant velocity (CV) shaft.
  - a. Connect the hex end of the CV shaft to the hex shaft on the brush head assembly.
  - b. Attach the round end of the CV shaft to the gearbox output shaft.
  - c. Tighten set screws and jam nuts.
12. Install the telescoping shaft.
  - a. Connect the round end of the telescoping shaft to the gearbox input shaft. Tighten the set screw and jam nut.

- b. Connect the splined end of the telescoping shaft to the tractor PTO.

**NOTE:** It may be necessary to shorten the telescoping shaft. The shaft must slip freely as the brush head assembly is raised and lowered. Raise and lower the sweeper **slowly** to check that the telescoping shaft is the proper length.

**CAUTION! AVOID DRIVELINE DAMAGE.**



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

13. Install the manual angle kit.

**NOTE:** For hydraulic angle, refer to options in the back of the manual.

- a. Slide the tube with one hole into the other tube.
- b. Place tubes on large pins welded to the mounting assembly. The tube with one hole goes on the swing plate.
- c. Secure with two cotter pins.
- d. Swing the sweeper to the desired angle. Make sure to align a set of holes in the tubes.
- e. Insert a lock pin in the aligned holes.
14. Install any other options. See the back of this manual for installation instructions.
15. Go to Adjustments.

## ADJUSTMENTS

### Leveling

For best performance, level the sweeper immediately after installation and as part of regular maintenance.

1. Move the unit to a dusty, paved surface.
2. Lower the brush head assembly so the bristle tips are 2 inches (51mm) off the ground.
3. Swing the brush head assembly straight ahead.
4. At each end of the brush head, measure from the center of the core shaft to the ground.
  - If measurements are the same, go to step 5.
  - If measurements are not equal, make sure the top edges of the mounting assembly and brush head plates are parallel. Adjust, if necessary, and tighten the hardware. Then, lengthen or shorten the adjustable hitch arm to make measurements the same. Repeat step 4 until measurements are equal.
5. Swing the sweeper to the right. Take measurements as in step 4. Swing sweeper to the left and measure again.
  - If all measurements are equal, the sweeper is level.
  - If measurements are not equal, level the mounting assembly with the topline. Follow instructions shown in figure 1

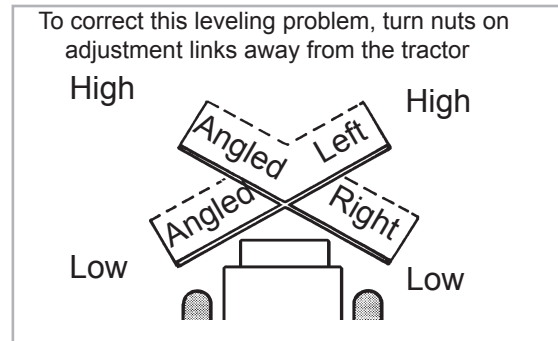


figure 1

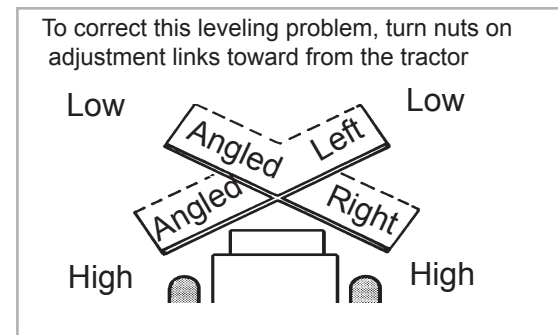


figure 2

### Adjusting Brush Pattern

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

1. Move the sweeper to a dusty, flat surface.
2. Set the prime mover's parking brake and leave the engine running.
3. Start the sweeper at a low speed; then, lower it completely to the surface so the bristle tips touch the ground. Run the sweeper in a stationary position for 30 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 2-3 inches (51-76mm) wide, running the entire length of the brush. (compare the swept area with figure 3)

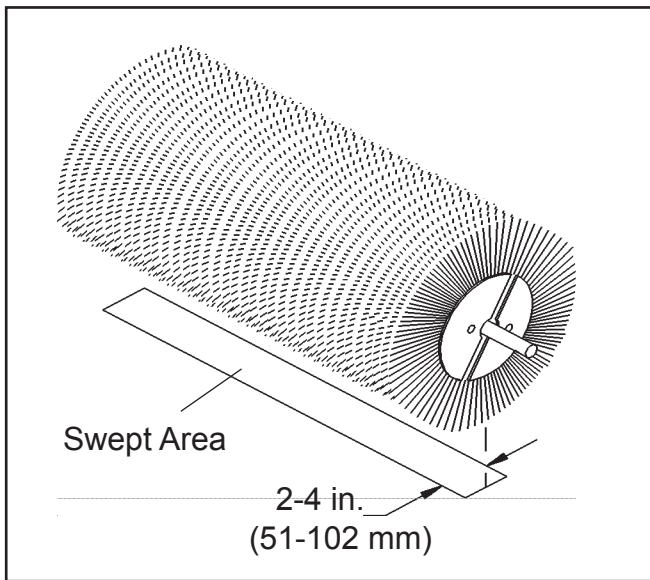


Figure 3

### Adjusting Spring-Chain Assembly

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

To adjust the brush pattern:

1. Raise the sweeper.
2. Increase or decrease the number of links in the spring-chain assembly between the mounting assembly chain holder and the brush head assembly chain holder.
  - Increase the number of links to lower the brush head assembly or
  - Decrease the number of links to raise the brush head assembly.
3. Adjust the transport chain.

### Adjusting Transport Chain

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

To adjust the transport chain for moving between sites:

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

### Sweeping

Model RMRMAF sweepers are designed to attach to SAE Category I three-point hitches and run off 540 rpm rear PTO's.

To start the sweeper, engage the PTO at idle. To stop, disengage the PTO at idle.

This sweeper has been assembled so it sweeps while moving forward. It can, however, sweep while moving in reverse. See Reversing Sweeping Direction to change brush rotation.

### Raising & Lowering

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

#### **CAUTION! AVOID TIP-AND-TILT CYLINDER AND SWEEPER DAMAGE.**



Raise and lower the sweeper only with 3-point lift arms. Do not use a tip-and-tilt cylinder.

#### **CAUTION! AVOID DRIVELINE DAMAGE.**



Do not run brush in raised position. Only run the brush with the sweeper lowered.

## Angling

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.

To swing the brush head assembly using a manual angle kit: remove the lock pin, swing the brush head to the desired angle by hand and then replace the lock pin.

---

## Operating Tips

**CAUTION! AVOID SWEEPER DAMAGE.** Do not ram into piles of material. Use a dozer blade for this type of work.



## Snow

High brush speeds and slow ground 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.

In deep snow you may need to make more than one pass to get down to a clean surface.

To keep snow from blowing back onto a swept area, always sweep so the wind is at your back or so it follows the brush angle.

## Dirt & Gravel

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

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

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

## Heavy Debris

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

## Thatch

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

To prevent the brush from pulling itself into the ground, adjust the spring-chain assembly so the bristle tips barely touch the grass.

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

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

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

---



## MAINTENANCE SCHEDULE

For best performance, regularly maintain your sweeper. Carefully follow this schedule and other recommendations.

PART	SCHEDULE			
	Before Operation	Every 8 Hours	Every 40 Hours	When Necessary
<b>Brush Head:</b> Check brush pattern; adjust as necessary. (See Adjusting Brush Height) Level brush head. (See Leveling)		✓		
<b>Drive Chain:</b> Lubricate with oil or chain lubricant.			✓	
<b>Drive Shaft:</b> Lubricate universal joints with high-quality grease. Tighten universal joint set screw.		✓		
<b>Electric Lift:</b> Inspect wires. Apply silicon spray to connections.			✓	
<b>Gearbox:</b> Check oil level; fill with SAE 80-90 weight oil. Inspect for oil leaks. Check end play in shafts. Clean			✓	
<b>Hardware:</b> Check for and tighten loose hardware.	✓			
<b>Hydraulic Lift Option:</b> Inspect hydraulic hoses and connections. Replace damaged or worn parts.			✓	
<b>Mounting Frame:</b> Lubricate with high-quality grease.			✓	
<b>Safety Signs:</b> Clean to keep instructions readable.				✓
<b>Swing Plate:</b> Lubricate with high-quality grease.			✓	
<b>Tractor Air Cleaner:</b> Clean or replace following instructions in tractor's owner's manual.				✓
<b>V-Belt:</b> Check tension. Replace belt showing signs of wear.		✓		

### Constant Velocity (CV) Drive Shaft Lubrication

Lubricate with high-quality grease before starting work and after every eight operating hours.

Clean and grease the drive shaft before each period of non-use.

To prevent freezing in winter, grease the shield tubes.

### Gearbox Lubrication

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, oil after every 2,500 operating hours or six months, whichever comes first.

## Reversing Sweeping Direction

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

1. Remove drive shafts and the shield from the gearbox.
2. Remove the gearbox from the mounting assembly (figure 1)
3. Remove the vent plug and drain plug (figures 2 and 3). Reinstall plugs in the opposite holes. Tighten both plugs securely.
4. Reinstall the gearbox (figure 4). The vent plug must be on top of the gearbox.
5. Reinstall the gearbox shield.

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



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

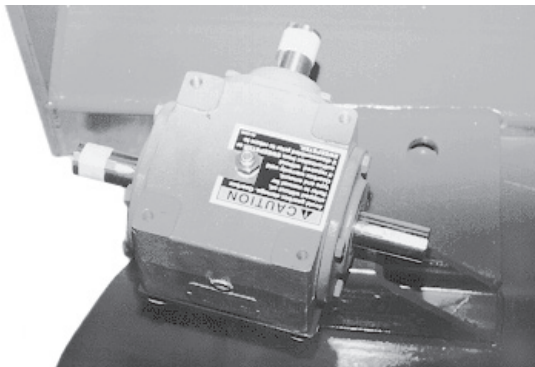


figure 4

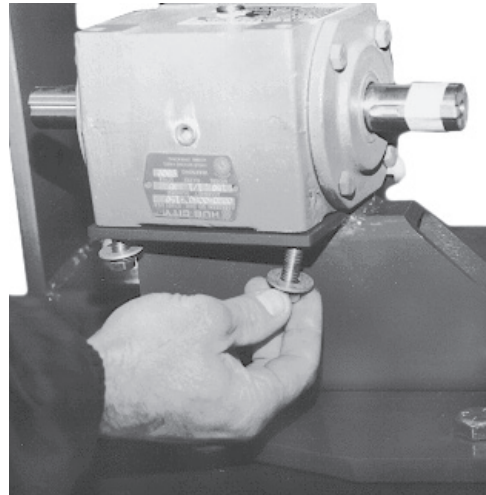


figure 1

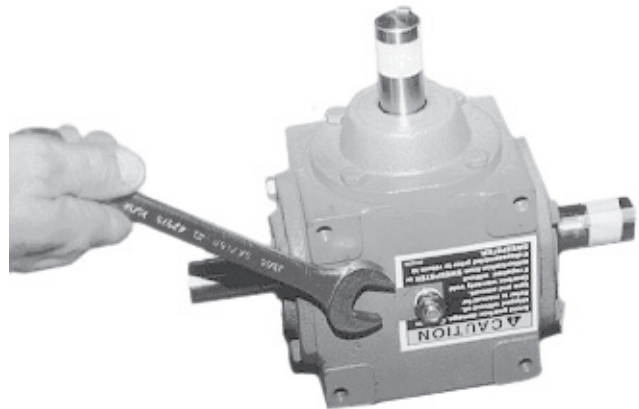


figure 2

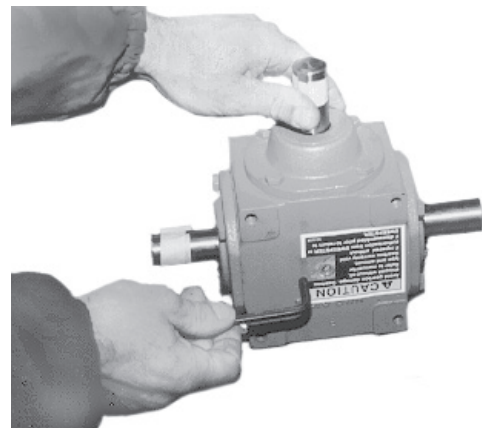


figure 3

## Notes

## Brush Section Replacement

1. Remove the rear bolt from inside the left-hand side of the brush frame. This allows you to remove the shield and mounting bracket (Figure 1).
2. Remove the front bolt from the left-hand side of the brush frame (Figure 1).
3. Remove the two bolts from inside the right-hand side of the brush frame (Figure 2).
4. Pull the brush head out of the brush frame.
5. Stand the brush head on end and rest it on blocks.
6. Loosen the screws on the retainer plate and take off the retainer halves (Figure 3).
7. Remove old sections from the core.
8. Install new sections by doing the following.
  - a. Number the tubes on the core as 1, 2, 3 (Figure 4).

**Note:** When using half poly-half wire sections, place a poly section first and last on the core to prevent damage to the hood, driveline and frame.

- b. Slide the first section onto the core with the drive pins on both sides of tube 1. Make sure that the drive pins face up (Figure 5).
- c. Place the second section on the core with the drive pins on both sides of tube 2. Be sure the drive pins face down.
- d. Put the third section on with the drive pins around tube 3. Be sure the drive pins face up.

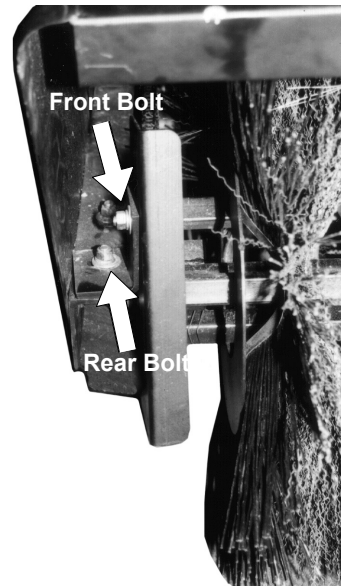


figure 1

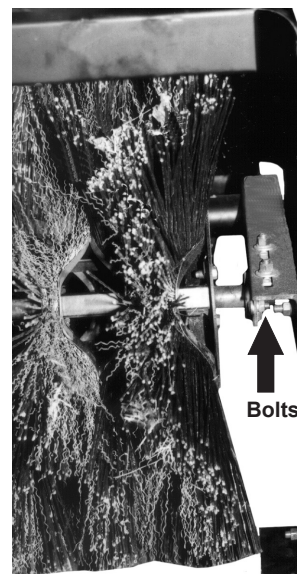


figure 2



figure 3

## Brush Section Replacement Continued



figure 4

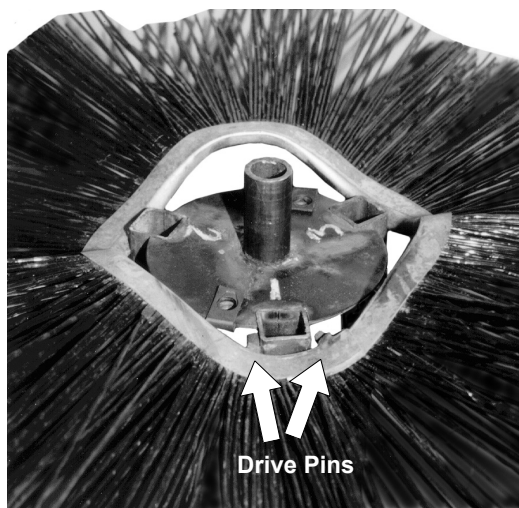


figure 5

- e. Slide sections on until the core is full, making sure to alternate the tubes used and the direction of the drive pins.
9. Put the retainer halves on the brush head and reinstall the screws.
10. Position the brush head in front of the brush hood.
11. Place the drive chain around the core sprocket.
12. Slide the brush head into the right-hand side of the brush head frame. Replace the bolts but do not tighten them completely.
13. Slide the left-hand side of the brush head into the brush frame. Replace the rear bolts but do not tighten them.
14. Replace the shield and reinstall the front bolt.
15. Tighten the bolts on the right-hand side.
16. Pull the drive chain tight; then, tighten the hardware on the left-hand side.

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

### Brush Head

Problem	Possible Cause	Possible Solution
Brush rotates wrong direction	For gearboxes with three shafts - gearbox flipped	Take gearbox off, switch breathing cap and plug and remount gearbox
	For gearbox with two shafts - incorrect gearbox	Contact SWEEPSTER for replacement
Brush head assembly “bounces” during sweeping	Spring-chain assembly too loose	Adjust spring-chain assembly: see: Adjusting Spring-Chain Assembly
	Travel speed too fast and/or too slow	Find correct combination of ground and brush speeds: do not travel at more than 5mph (8kph)
Brush wears unevenly	Sweeper is not level	Level sweeper before each use: see: Leveling
Brush wears very quickly	Spring-chain assembly not adjusted correctly	Adjust spring-chain assembly: see: Adjusting Spring-Chain Assembly
Drive chain falls off repeatedly	Core not riding on sprocket	Align core
	Too little tension on chain	Slide core forward

### Gearbox

Problem	Possible Cause	Possible Solution
Gearbox does not run	Broken shaft or gear	Do not open a gearbox still under warranty; contact SWEEPSTER for replacement parts
Oil leaking from pinion housing caps, cap screws or pipe plugs	Loose hardware	Retighten or remove and coat with Loctite® before tightening; if necessary, replace gaskets
High internal operating temperature (above 200° F [93° C])	Damaged bearings	Replace bearings
	Inadequate oil level	Add oil
Excessive end play of shafts (.005 inches [.13mm] or more) when couplings are removed	Worn bearings	Remove gaskets between caps and gear case; replace if necessary
Excessive backlash	Worn gears	Adjust gears, replace, if necessary

## Troubleshooting

### Constant Velocity (CV) Drive Shaft

Problem	Possible Cause	Possible Solution
End and/or inboard yoke ears spread	Drive shaft too long	Adjust drive shaft length; replace parts
	Axial forces too high running above recommended rpm	Clean and grease profile tubes; replace parts; replace both tubes, if necessary
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
End yoke bearing caps blued	Insufficient lubrication	Follow lubrication instructions. See: CV Drive Shaft Lubrication, replace parts
Inboard yoke ears have pressure marks	Excessive bend angle when shaft rotates	Avoid running brush in raised position; switch off tractor PTO during cornering or when lifting the brush head; replace parts
	Drive shaft too long	Follow lubrication instructions; replace parts
Inboard yoke bearing caps blued	Insufficient lubrication	Follow lubrication instructions; replace parts
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
Shield tubes damaged	Shields contact components on tractor and/or sweeper	Allow more clearance; replace parts
Shield cone destroyed	Shield cone contacts components on tractor and/or sweeper	Allow more clearance; replace parts
Telescoping sections distorted	Overload caused by high starting and peak torques or blocking	Engage and disengage at idle; replace parts

### Lift System

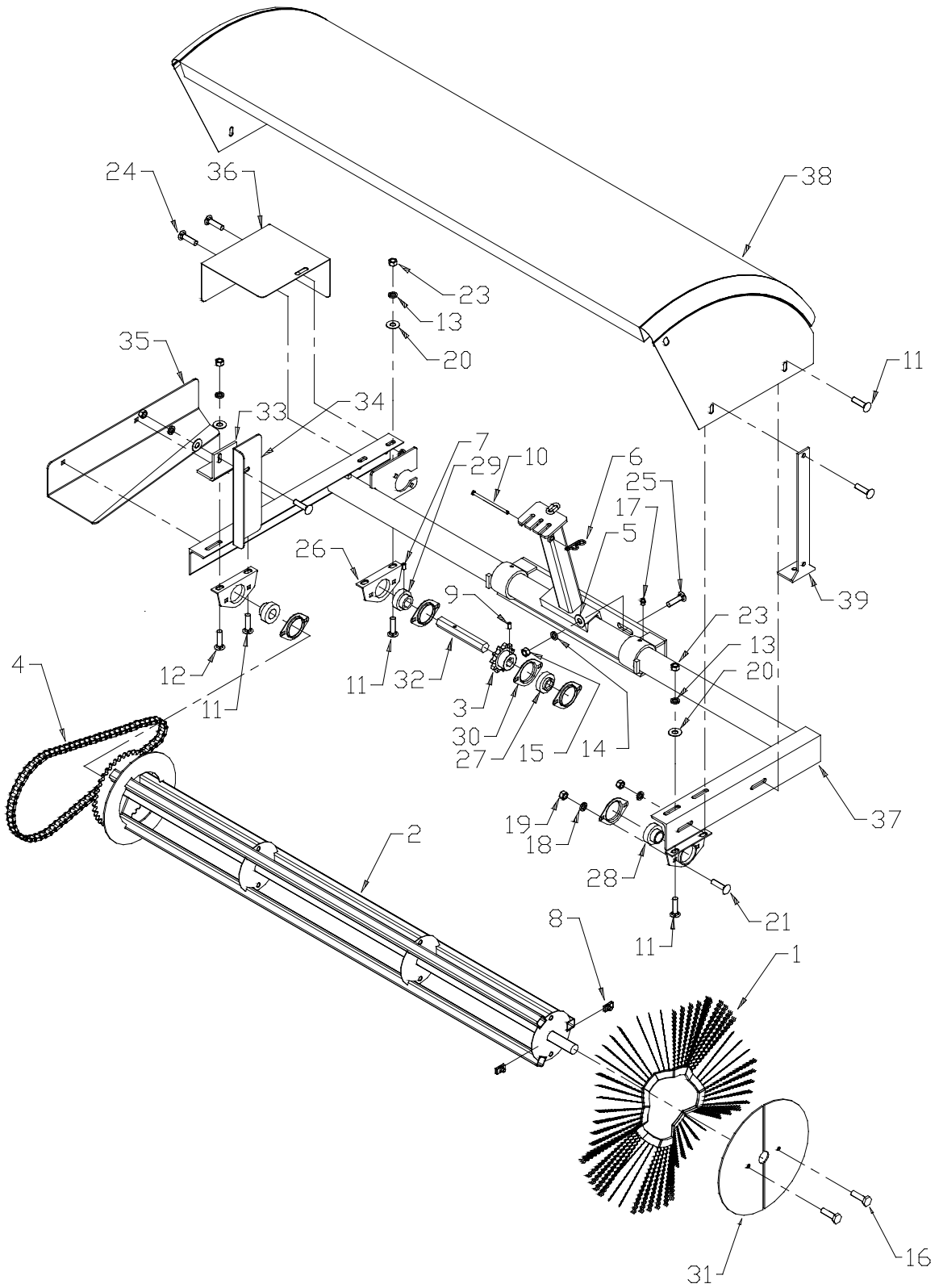
Problem	Possible Cause	Possible Solution
Electric lift doesn't lift	Disconnect wires	Check and connect wires
	Switch failure	Replace switch; replace actuator, if necessary
Hydraulic lift doesn't lift	Disconnected hoses	Check and connect hoses
	Hydraulic pump failure	Contact dealer for service

# Brush Head

Item	Part	Qty	Description
1.	01-0001C	1	Set, Section, 24, Poly, Convolute, 4
	01-5016	1	Set, Section, 24, Mixed, Convolute, 4
	01-0017C	1	Set, Section, 24, Poly, Convolute, 5
	01-5017	1	Set, Section, 24, Mixed, Convolute, 5
	01-0537C	1	Set, Section, 24, Poly, Convolute, 6
	01-5018	1	Set, Section, 24, Mixed, Convolute, 6
2.	01-0550	1	Weld, Core, 4
	01-0209	1	Weld, Core, 5
	01-0640	1	Weld, Core, 6
3.	06-0238	1	Sprocket, 50B12 x 7/8, Hex
4.	06-0275	1	Chain, #50, 88 Links
5.	07-0156	2	Washer, Flat, Gr8, 1/2
6.	07-0209	1	Clip, Hairpin, 16GA x 1 3/8
7.	07-0239	1	Pin, Spring, Lock, Gr2, 3/16 x 1 1/4
8.	07-0240	2	Nut, Lock, Stamped, 5/16 x 18
9.	07-1187	1	Screw, Set, Gr2, 1/4-28 x 1/4
10.	07-1709	1	Pin, Clevis, 1/4 x 4 1/2
11.	07-1716	10	Bolt, Carriage, Gr5, 3/8-16 x 1
12.	07-1717	1	Bolt, Carriage, Gr5, 3/8-16 x 1 1/4
13.	07-1718	13	Washer, Lock, Split, Medium, 3/8
14.	07-1762	2	Washer, Lock, Split, Medium, 1/2
15.	07-1764	2	Nut, Hex, Gr8, 1/2-13
16.	07-1973	2	Screw, HHC, Gr8, 5/16-18 x 1 1/4
17.	07-0223	2	Fitting, Zerk, Straight, 1/8NPT
18.	07-3273	8	Washer, Lock, Split, Medium, 5/16
19.	07-3278	8	Nut, Hex, Gr8, 5/16-18
20.	07-3279	7	Washer, Flat, Gr8, 3/8
21.	07-3438	8	Bolt, Carriage, Gr5, 5/16-18 x 1
23.	07-3654	13	Nut, Hex, Gr8, 3/8-16
24.	07-3699	2	Bolt, Carriage, Gr5, 3/8-16 x 3/4
25.	07-3708	2	Bolt, Carriage, Gr5, 1/2-13 x 1 1/2
26.	08-0003	3	Flange, Bearing, PBS Only
27.	08-0005	5	Flange, Bearing, 2 Hole
28.	08-0006	2	Bearing, 1RD, with Collar
29.	08-0034	1	Bearing, 7/8 Hex, with Hole
30.	08-0037	1	Bearing, 7/8 Hex, without Hub
31.	11-1804	1	Plate, Retainer, Section
32.	11-3725-37	1	Shaft, Hex, 7/8 x 5, with Hole
33.	11-9604	1	Plate, Mounting, Shield
34.	11-9605	1	Shield, Drive, Core, Front
35.	11-9611	1	Shield, Brush, Side, Right
36.	11-9638-1	1	Shield, Drive, Core, Rear
37.	11-9972-1	1	Weld, Frame, Brush, 4
	11-9972-2	1	Weld, Frame, Brush, 5
	11-9972-3	1	Weld, Frame, Brush, 6
38.	13-3558	1	Weld, Hood, 4
	13-3560	1	Weld, Hood, 5
	13-3563	1	Weld, Hood, 6
39.	13-8936	2	Plate, Shipping Stand



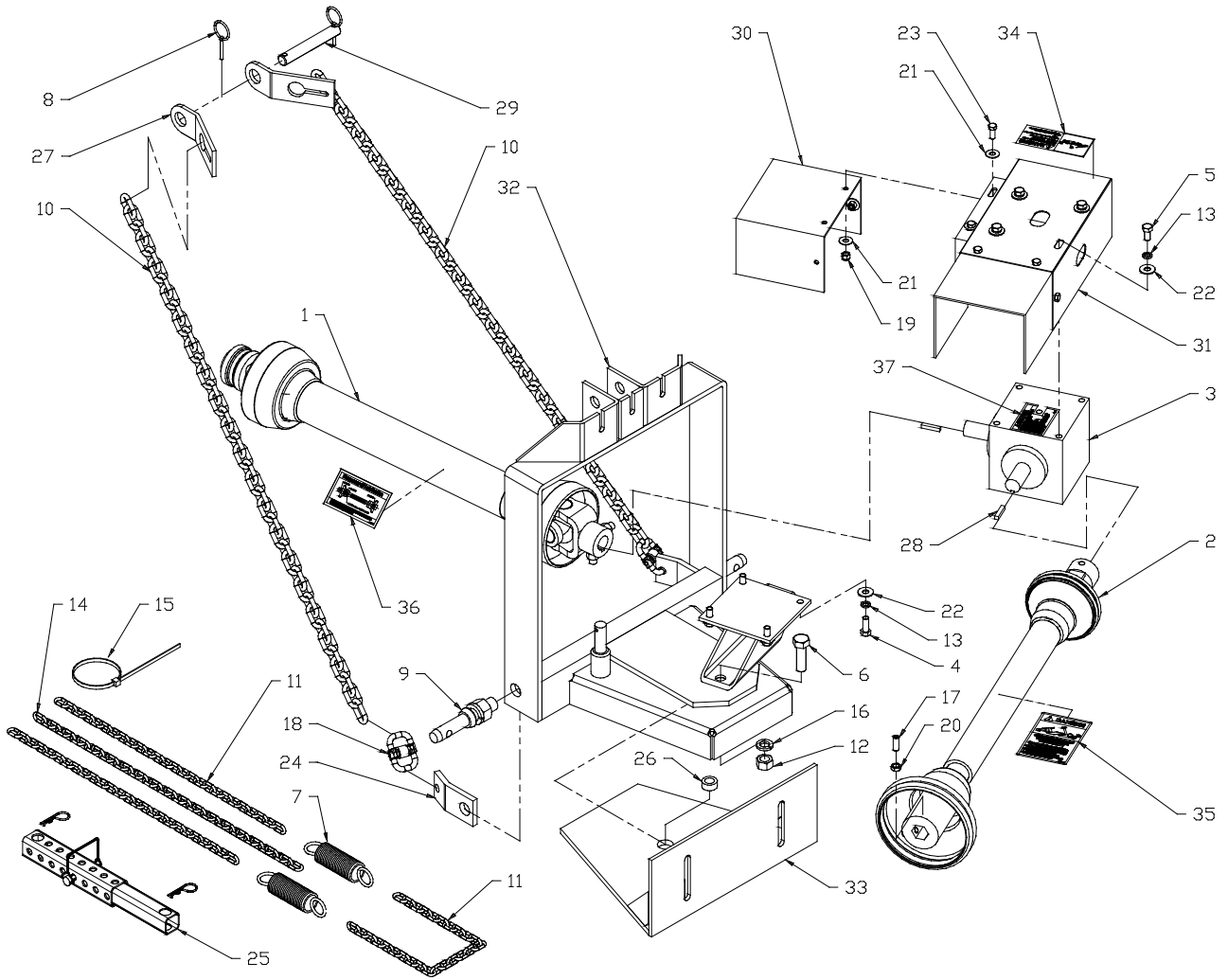
# Brush Head



## Mounting & Drive Assemblies

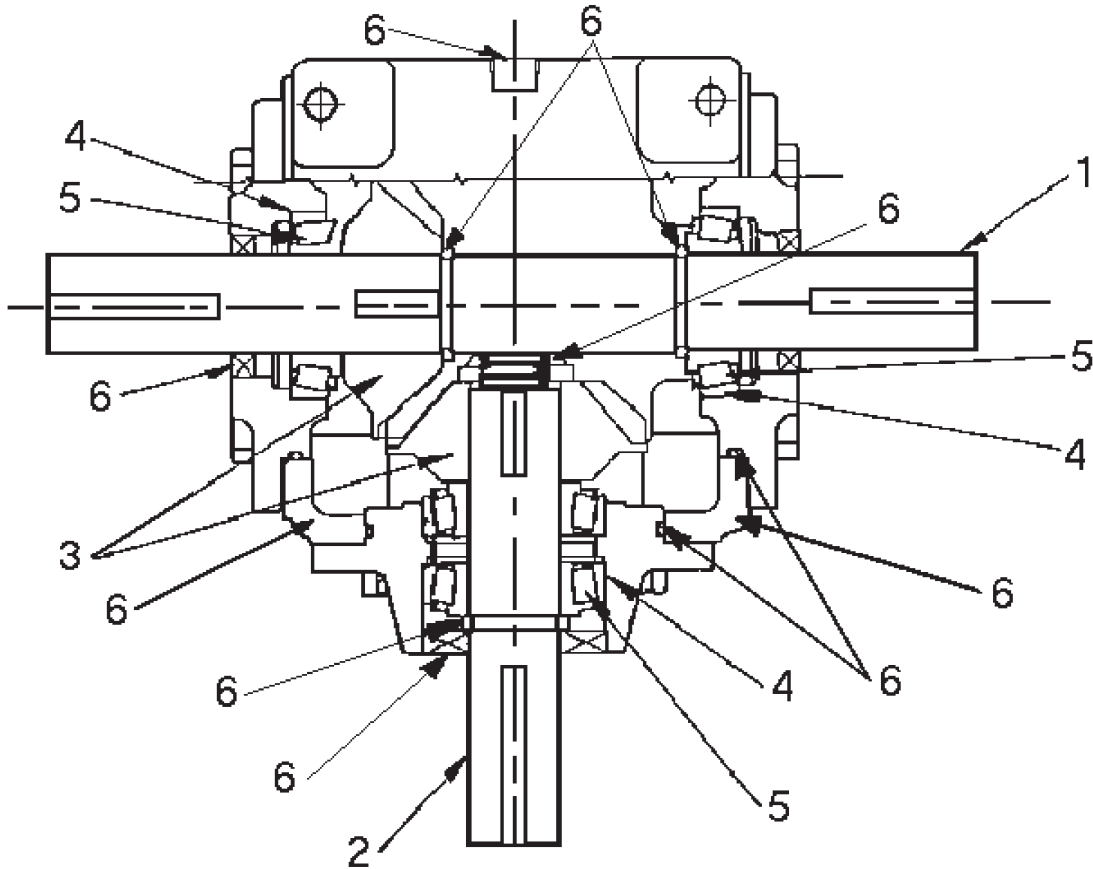
Item	Part	Qty	Description
1.	05-1367	1	Shaft, Drive, 1 3/8, 6 Spline
2.	05-0983-1	1	Shaft, Telescoping, CV, 1 RD, 7/8 Hex Output, 38 1/4 Extended
3.	05-1111	1	Gearbox, Hubcity, 1:1, 3 Shafts
4.	07-0018	4	Screw, HHC, Gr8, 3/8-16 x 1
5.	07-0023	4	Screw, HHC, Gr2, 3/8 x 3/4
6.	07-0066	1	Screw, HHC, Gr8, 5/8-11 x 2
7.	07-0237	2	Spring, Tension, 1 13/32 x 6
8.	07-0244	2	Pin, Linch, 1/4
9.	07-0285	2	Pin, CAT 1, Gr2, Hitch
10.	07-0290	2	Chain, 1/4, 39 Links
11.	07-0387	3	Chain, 3/16, 26 Links
12.	07-1294	1	Nut, Hex, Gr8, 5/8-11
13.	07-1718	8	Washer, Lock, Split, Medium, 3/8
14.	07-1759	1	Chain, 3/16, 36 Link
15.	07-1817	2	Tie, Plastic, 15, Black, Reuse
16.	07-1872	1	Washer, Lock, Split, Medium, 5/8
17.	07-1941	6	Screw, Set, Gr2, 3/8-16 x 1
18.	07-2032	2	Clevis, Double Link, 9/32, Gr80
19.	07-3270	8	Nut, Hex, Nylock, Gr8, 5/16-18
20.	07-3272	6	Nut, Hex, Jam, Gr8, 3/8-16
21.	07-3275	12	Washer, Flat, Gr8, 5/16
22.	07-3279	8	Washer, Flat, Gr8, 3/8
23.	07-3436	8	Screw, HHC, Gr8, 5/16-18 x 3/4
28.	13-1430	2	Key, 1/4 x 1 1/4
29.	13-2002	1	Pin, Toplink, 3-Point
30.	13-3873	2	Flap, Cover
31.	13-3874	1	Weld, Shield
32.	13-3875	1	Weld, Frame, Mounting
33.	13-4206	1	Weld, Plate, Swing, Top Pin
34.	50-0010-1	1	Label, Danger Rotating Dr
35.	50-0115	1	Label, Danger Rotating Drive Line
36.	50-0147	1	Label, Frequent CV Shaft
37.	50-0236	1	Label, Gearbox, Check Oil

# Mounting & Drive Assemblies



# Gearboxes

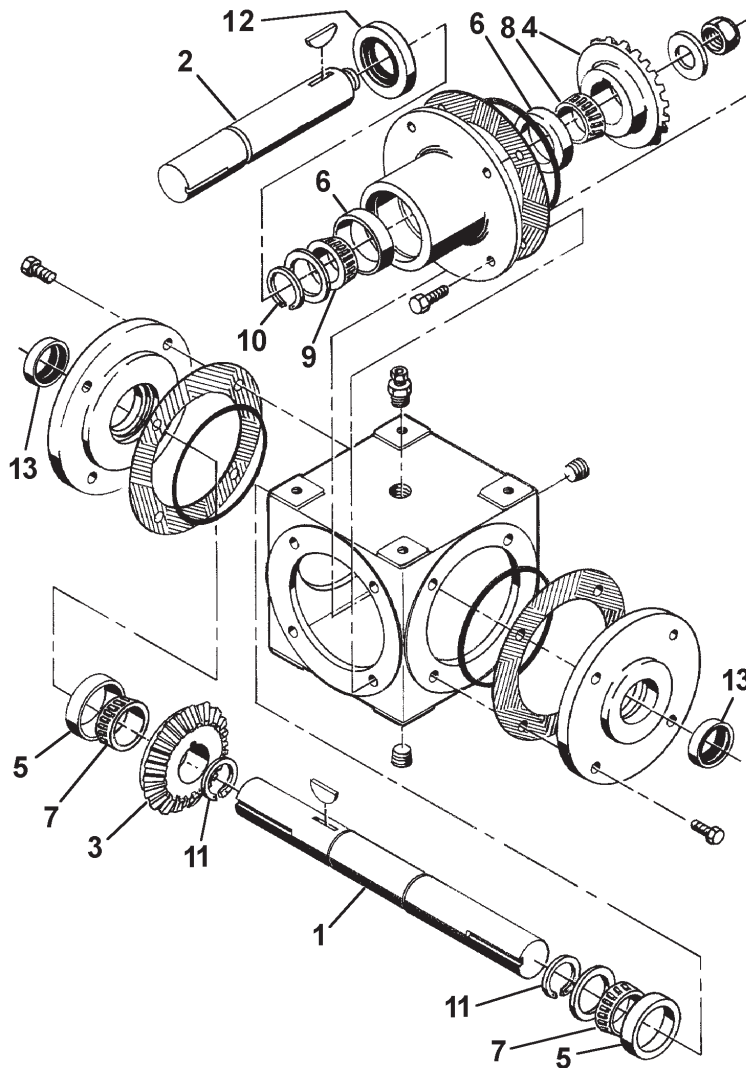
Gearbox 05-1111  
1:1 Ratio



Item Part	Qty	Description
1.05-1136	1	Shaft, Cross
2.05-1137	1	Shaft, Pinion
3.05-0503	2	Gear, Straight Bevel
4.05-0507	4	Cone, Bearing
5.05-0506	4	Cup, Bearing
6.05-1138	1	Kit, Repair

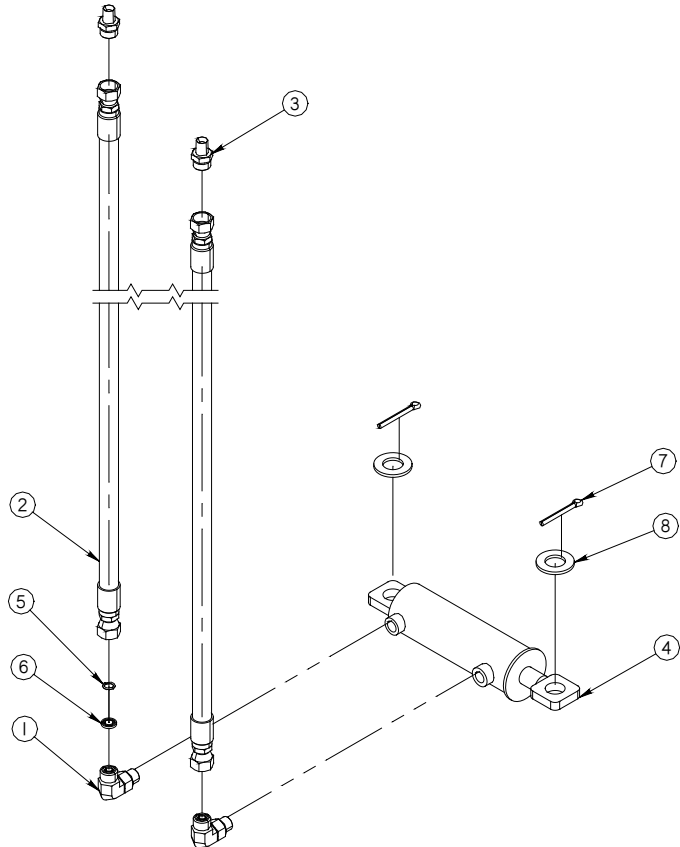
# Gearboxes

**Gearbox 05-1112**  
**3:1 Ratio**



Item	Part	Qty	Description
1.	05-1158	1	Shaft, Cross
2.	05-1159	1	Shaft, Pinion
3.	05-1160	1	Gear, St Bev, 42T
4.	05-1161	1	Gear, St Bev, 14T
5.	05-1162	2	Cup, Bearing
6.	05-1163	2	Cup, Bearing
7.	05-1164	2	Cone, Bearing
8.	05-1165	1	Cone, Bearing
9.	05-1166	1	Cone, Bearing
10.	05-1175	2	Ring, Snap
11.	05-1176	2	Ring, Snap
12.	05-1177	1	Seal, Front
13.	05-1178	2	Seal, Rear

## Option - Hydraulic Angle



### Replacement Parts for 03-5719:

46072 Seal Kit  
114406 Cylinder Rod

### Item Part Qty Description

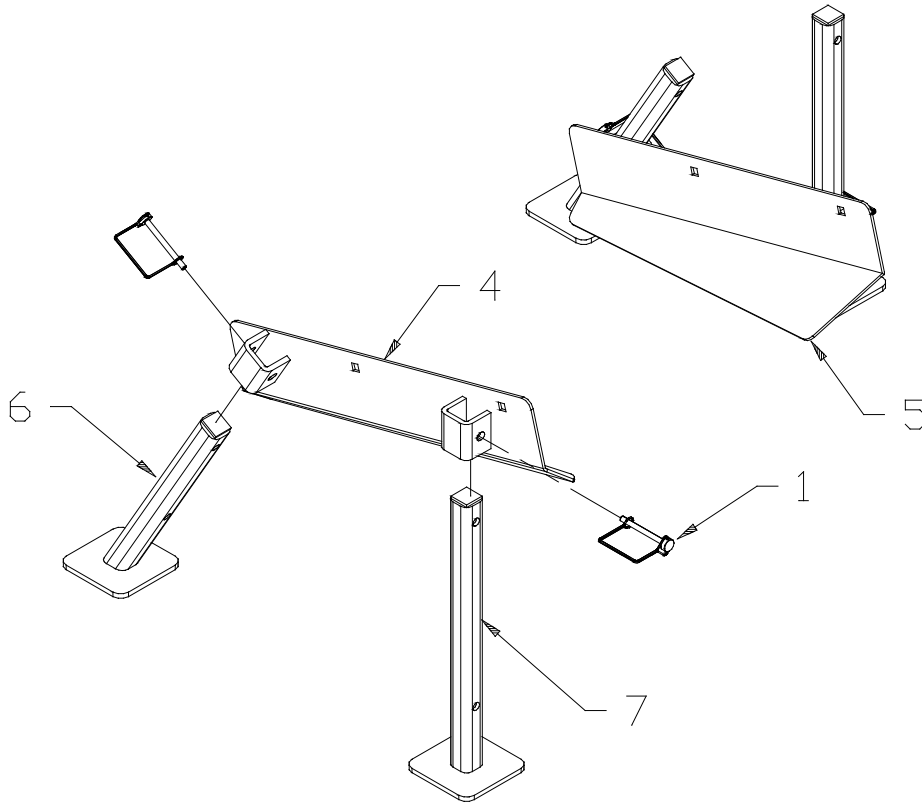
1.	03-2092	2	Fitting, Elbow, HP, 90°, 9/16MOR, 3/8MFS
2.	03-2159	2	Fitting, Adapter, HP, 3/8MFS, 1/4MP
3.	03-2270	2	Hose, 3/8 x 728, 2W, 3/8FFS, 3/8FFS
4.	03-3381	1	Cylinder, 1.75 x 4 x 9 (09/23/09 & Before)
	03-5719	1	Cylinder, 1.75 x .75 x 4, 3.5K (09/24/09 & After)
5.	03-3573	1	O-Ring, Face Seal, 3/8
6.	03-4668	1	Plate, Hydraulic, Orifice, .028
7.	07-0206	2	Pin, Cotter, Gr2, 3/16 x 2
8.	07-1782	2	Washer, Flat, Gr2, 3/4

### Installation

1. Remove the manual angle kit if installed.
2. Install adapter fittings on both cylinder ports.
3. Install the flow restrictor fitting on the rear adapter fitting. A restrictor fitting is necessary for proper operation and to prevent damage to the hydraulic swing kit.
4. Hook one hose to the restrictor fitting and one to the front adapter fitting.
5. Place the swing cylinder on the swing assembly pins. Install a washer and cotter pin on each swing assembly pin to secure the swing cylinder.
6. Connect hoses to the tractor hydraulics.

**NOTE** -Because of the numerous types of quick coupler fittings available, the user furnishes quick coupler fittings for this kit.

## Option - Storage Stands



Item	Part	Qty	Description
1.	07-1607	4	Pin, Lock, 5/16, Square Bail
4.	13-0538	1	Weld, Mounting, Stand/Shield, Brush Head, Right
5.	13-0539	1	Weld, Mounting, Stand, Brush Head, Left
6.	13-0540	2	Weld, Stand, Angle Cut, Rear
7.	13-0541	2	Weld, Stand, Straight, Front

### Installation

- Remove the shield from the drive side of the brush head.
- Install the shield/stand from the kit in place of the shield just removed.
- Install the other shield included in the kit.
- On one side of the brush head assembly, slide a straight stand into the tube near the bearing assembly. Align a hole in the stand with one in the tube. Secure with a lock pin.
- Slide an angled stand into the tube toward the front of the brush frame. Align holes and secure with a lock pin.
- Repeat steps 4 and 5 on the other side of the brush head assembly.

**NOTE** -Storage stands are designed to keep the brush off the ground when sweeper is dismounted. When the sweeper is mounted, slide stands up in the tubes to keep them out of the way.

# 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				Bolt head identification marks as per grade. NOTE: Manufacturing Marks Will Vary
		Pounds Feet		Newton-Meters		Pounds Feet		Newton-Meters		
Inches	Millimeters	UNC	UNF	UNC	UNF	UNC	UNF	UNC	UNF	
1/4	6.35	8	9	11	12	10	13	14	18	
5/16	7.94	14	17	19	23	20	25	27	34	
3/8	9.53	30	36	41	49	38	46	52	62	
7/16	11.11	46	54	62	73	60	71	81	96	
1/2	12.70	68	82	92	111	94	112	127	152	
9/16	14.29	94	112	127	152	136	163	184	221	
5/8	15.88	128	153	174	207	187	224	254	304	
3/4	19.05	230	275	312	373	323	395	438	536	
7/8	22.23	340	408	461	553	510	612	691	830	
1	25.40	493	592	668	803	765	918	1037	1245	
1-1/8	25.58	680	748	922	1014	1088	1224	1475	1660	
1-1/4	31.75	952	1054	1291	1429	1547	1700	2097	2305	
1-3/8	34.93	1241	1428	1683	1936	2023	2312	2743	3135	
1-1/2	38.10	1649	1870	2236	2535	2686	3026	3642	4103	


**GRADE 2**



**GRADE 5**






**GRADE 8**



## METRIC BOLT TORQUE SPECIFICATIONS

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

Bolt head identification marks as per grade.		
		

Size of Bolt	Grade No.	Pitch (mm)	Pounds Feet	Newton-Meters	Pitch (mm)	Pounds Feet	Newton-Meters
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



**angle or angle assembly** - portion of the sweeper that allows the brush head assembly to angle.

**BP** - black pipe.

**brush head assembly** - assembly that includes the core, hood, and brush frame.

**brush pattern** - area of dirt removed from sweeping surface; with a properly adjusted sweeper; the pattern is the same width for the entire length.

**castellated** - having battlements like a castle.

**caution** - indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

**core** - weldment that holds brush sections.

**danger** - indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

**F** - female.

**FS** - face seal.

**front** - side that is in front when facing the normal forward direction of travel of the machine.

**gpm** - gallons per minute.

**HP** - high pressure.

**hood** - brush shield.

**hydraulic angle kit** - means of swinging an assembly hydraulically.

**important** - used for instructions when machine damage may be involved.

**in.** - inches.

**kph** - kilometers per hour.

**lb** - pounds.

**left-hand** - side that is on the left when facing the normal forward direction of travel of the machine.

**lift cylinder** - means of raising the brush head assembly hydraulically.

**lps** - liters per second.

**M** - male.

**mm** - millimeters.

**mph** - miles per hour.

**manual angle kit** - means of swinging the brush head assembly mechanically.

**mid pump unit** - sweeper in which the pump is mounted on the mid PTO.

**mounting assembly** - portion of the sweeper that attaches to the prime mover; designed specifically for each prime mover.

**NPT** - national pipe thread.

**note** - indicates supplementary information.

**OR** - o-ring.

**psi** - pounds per square inch.

**PTO** - power take off; shaft on the prime mover used to drive attachments.

**plate swing** - swing assembly that includes a half-moon plate.

**power pack** - auxiliary hydraulic package used when prime mover hydraulics do not have enough flow available.

**prime mover** - refers to the tractor, truck, loader or other vehicle to which a sweeper is attached.

**qty** - quantity.

**quick change core** - core designed in a way that allows brush sections to be changed without removing hoses from motors.

**rpm** - revolutions per minute.

**rear** - side that is in rear when facing the normal forward direction of travel of the machine.

**rear pump unit** - sweeper in which the pump is mounted on a rear PTO.

**retainer** - removable plate or set of plates that keeps sections on the core.

**right-handed** - side that is on the right when facing the normal forward direction of travel of the machine.

**section** - single brush wafer.

**section set** - replacement brush wafers.

**sprinkler system** - system that sprays water ahead of the sweeper used to reduce dust.

**sprinkler tank** - assembly that includes the water reservoir and mounting used in a sprinkler system.

**stands** - devices designed to keep the components off the ground when the sweeper is dismounted.

**swing or swing assembly** - portion of the sweeper that allows the brush head assembly to angle.

**swing cylinder** - means of angling the brush head assembly hydraulically.

**tank assembly, hydraulic** - assembly that includes the hydraulic reservoir, filter and fittings; may also incorporate valves.

**warning** - indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

**weld** - weldment.

**windrow** - pile of debris.

**zerk** - grease fitting.

## Limited Warranty

Except for the Excluded Products as described below, all new products are warranted to be free from defects in material and/or workmanship during the Warranty Period, in accordance with and subject to the terms and conditions of this Limited Warranty.

1. Excluded Products. The following products are excluded from this Limited Warranty:

(a) Any cable, part that engages with the ground (i.e. sprockets), digging chain, bearing, teeth, tamping and/or demolition head, blade cutting edge, pilot bit, auger teeth and broom brush that either constitutes or is part of a product.

(b) Any product, merchandise or component that, in the opinion of Paladin Light Construction<sup>1</sup>, has been (i) misused; (ii) modified in any unauthorized manner; (iii) altered; (iv) damaged; (v) involved in an accident; or (vi) repaired using parts not obtained through Paladin Light Construction.

2. Warranty Period. The Limited Warranty is provided only to those defects that occur during the Warranty Period, which is the period that begins on the first to occur of: (i) the date of initial purchase by an end-user, (ii) the date the product is first leased or rented, or (iii) the date that is six (6) months after the date of shipment by Paladin Light Construction as evidenced by the invoiced shipment date (the "Commencement Date") and ends on the date that is twelve (12) months after the Commencement Date.

3. Terms and Conditions of Limited Warranty. The following terms and conditions apply to the Limited Warranty hereby provided:

(a) Option to Repair or Replace. Paladin Light Construction shall have the option to repair or replace the product.

(b) Timely Repair and Notice. In order to obtain the Limited Warranty, (i) the product must be repaired within thirty (30) days from the date of failure, and (ii) a claim under the warranty must be submitted to Paladin Light Construction in writing within thirty (30) days from the date of repair.

(c) Return of Defective Part or Product. If requested by Paladin Light Construction, the alleged defective part or product shall be shipped to Paladin Light Construction at its manufacturing facility or other location specified by Paladin Light Construction, with freight PRE-PAID by the claimant, to allow Paladin Light Construction to inspect the part or product.

Claims that fail to comply with any of the above terms and conditions shall be denied.

### **LIMITATIONS AND EXCLUSIONS.**

**THIS LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND ANY WARRANTY BASED ON A COURSE OF DEALING OR USAGE OF TRADE.**

**IN NO EVENT SHALL PALADIN LIGHT CONSTRUCTION BE LIABLE FOR CONSEQUENTIAL OR SPECIAL DAMAGES.**

**IN NO EVENT SHALL PALADIN LIGHT CONSTRUCTION BE LIABLE FOR ANY LOSS OR CLAIM IN AN AMOUNT IN EXCESS OF THE PURCHASE PRICE, OR, AT THE OPTION OF PALADIN LIGHT CONSTRUCTION, THE REPAIR OR REPLACEMENT, OF THE PARTICULAR PRODUCT ON WHICH ANY CLAIM OF LOSS OR DAMAGE IS BASED. THIS LIMITATION OF LIABILITY APPLIES IRRESPECTIVE OF WHETHER THE CLAIM IS BASED ON BREACH OF CONTRACT, BREACH OF WARRANTY, NEGLIGENCE OR OTHER CAUSE AND WHETHER THE ALLEGED DEFECT IS DISCOVERABLE OR LATENT.**

<sup>1</sup>Attachment Technologies Inc., a subsidiary of Paladin Brands Holding, Inc. (PBHI) is referred to herein as Paladin Light Construction.

February 10, 2010