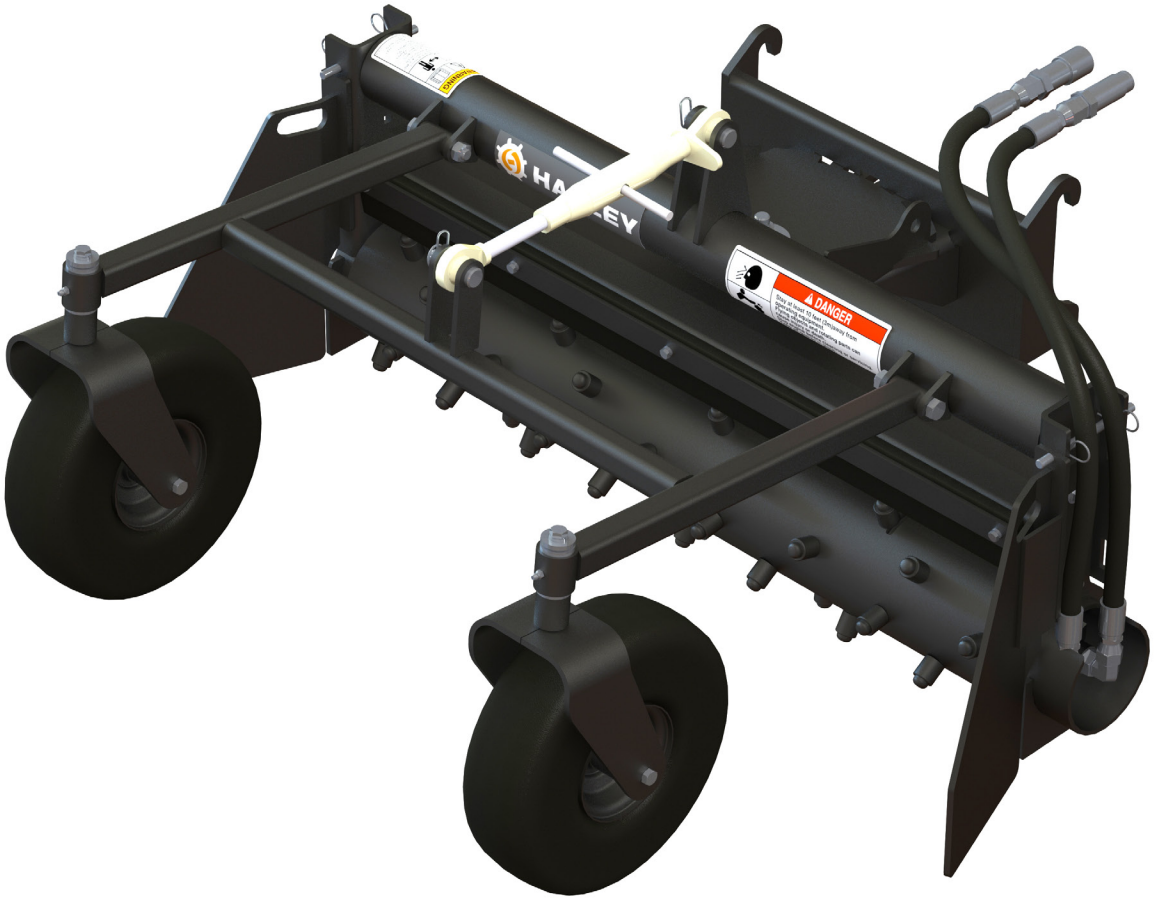
HARLEY BY PALADIN

OPERATOR'S MANUAL

POWER BOX RAKE®
W3 Model



SERIAL NUMBER: _____

MODEL NUMBER: _____

Manual Number: 51-4143
Release Date: April 2019
Serial Number: 0921200 & Up
Rev. 3

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.

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.

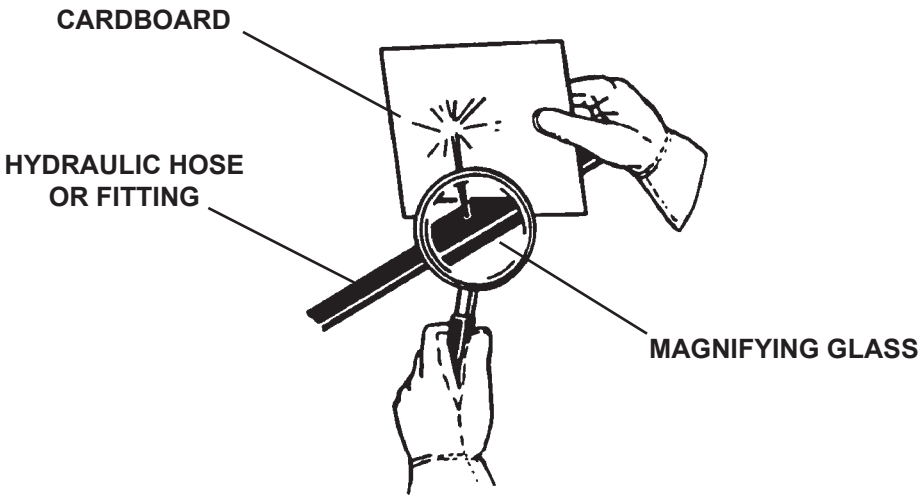
WARNING! LOWER OR SUPPORT RAISED EQUIPMENT

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 ATTACHMENT

- Do not exceed the lifting capacity of your prime mover.
- Operate only from the operator's station.
- When operating on slopes, drive up and down, not across. Avoid steep hillside operation, which could cause the prime mover to overturn.
- Keep the heavy end of the machine uphill.
- Reduce speed when driving over rough terrain, on a slope, or turning, to avoid overturning the vehicle.
- Never direct discharge toward people, animals, or property.
- 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 leaving the power unit controls, lower the attachment to the ground, apply the brakes, turn off the power unit's engine.

EQUIPMENT SAFETY PRECAUTIONS

TRANSPORTING THE ATTACHMENT

- Travel only with the attachment in a safe transport position to prevent uncontrolled movement. Drive slowly over rough ground and on slopes.
- When transporting on a trailer: Secure attachment at recommended tie down locations using tie down accessories that are capable of maintaining attachment stability.
- Do not drive close to ditches, excavations, etc., cave in could result.
- Do not smoke when refueling the prime mover. Allow room in the fuel tank for expansion. Wipe up any spilled fuel. Secure cap tightly when done.

MAINTAINING THE ATTACHMENT

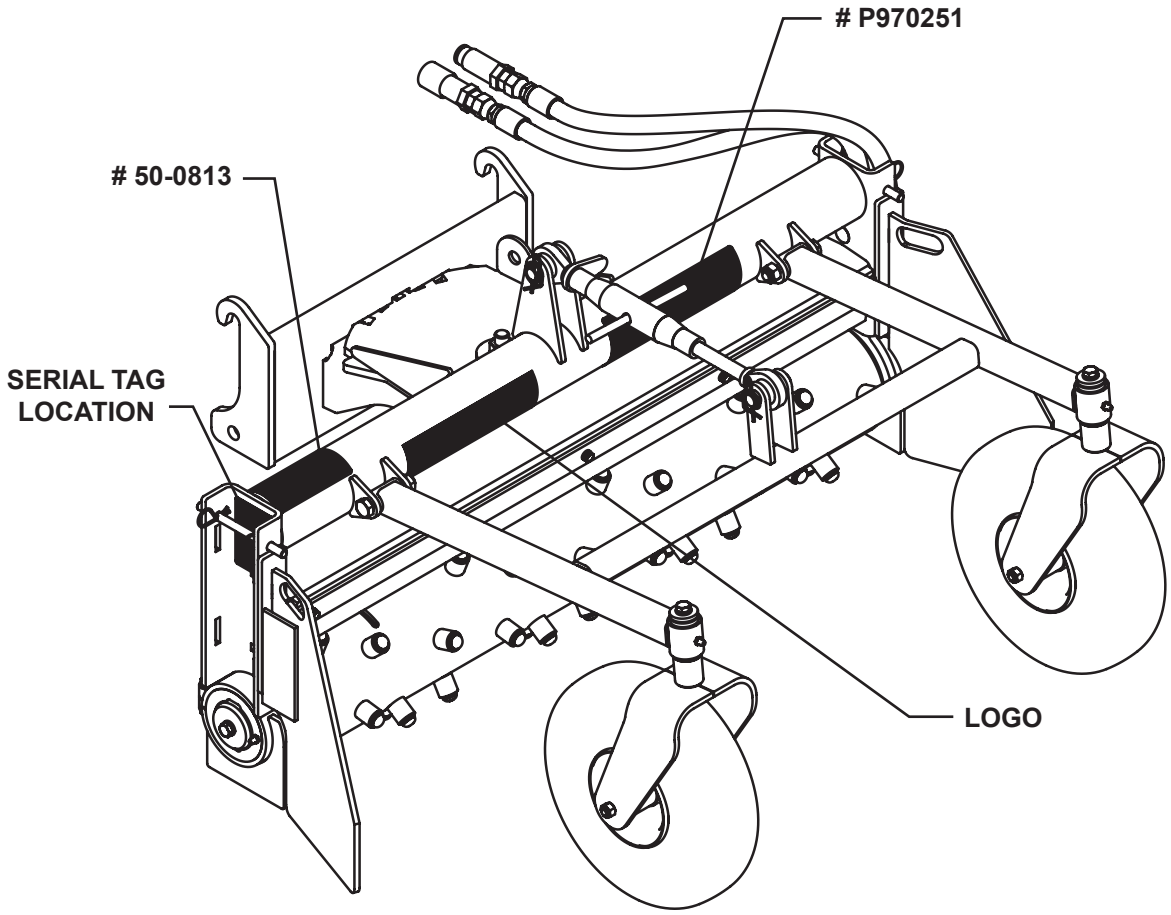
- Before performing maintenance lower the attachment to the ground, apply the brakes, turn off the engine.
- Never perform any work on the attachment unless you are authorized and qualified to do so. Always read the operator service manuals before any repair is made. After completing maintenance or repair,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

DECALS

DECAL PLACEMENT

GENERAL INFORMATION

The 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.

SAFETY DECALS

 # P970251 DANGER! FLYING OBJECTS AND ROTATING PARTS

 # 50-0813 WARNING! READ MANUAL AND KEEP BACK

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

INSTALLATION

GENERAL INFORMATION

The following instructions will help you to mount your W3 Power Box Rake® onto your prime mover. The rake uses a quick-attach system for ease of installation onto the Harley Power Unit (HPU).

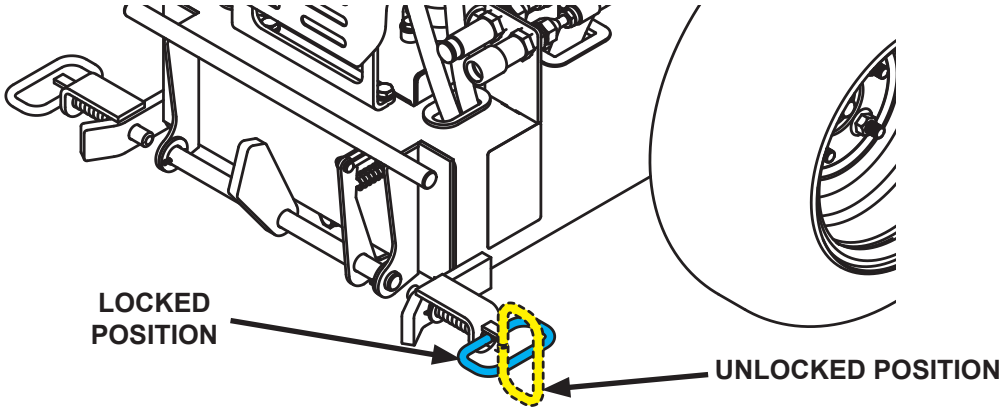
Remember to read all safety warnings, decals and operating instructions before operating the attachment. If there is any portion of this manual that you do not understand, contact your dealer.

NOTICE! The Harley W3 Power Box Rake® was designed for use with the Harley HPU13 Power Unit.

INSTALLATION

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

FIGURE #1



1. Remove any attachment from the front of the HPU.
2. Unlock the quick attach by pulling out the attachment lock handles on the HPU and rotate 90°. See Figure #1
3. Drive the HPU forward engaging the attachment carrier rod with the hooks on the rake, and relieve pressure to the auxiliary hydraulic lines.
4. Following the safety shut down procedure for HPU, shut down the power unit.
5. Rotate the attachment lock handles 90° and check that the pins are fully engaged.

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

6. After making sure that the hydraulic couplers are free from any foreign material or contaminants, connect the couplers to the auxiliary hydraulic system of your prime mover.
7. Following the standard start up procedure for your HPU, start the power unit and run all cylinders on the attachment to purge any air from the system. Check for proper hydraulic connection, hose routing and hose length.
8. Attachment installation is complete.

DETACHING

1. Place the endplates in the storage position for added stability (towards the prime mover). See Endplates.
2. Before leaving the power unit controls, apply the brakes, and turn off the prime mover's engine.
3. Follow prime mover operator's manual to relieve pressure in the hydraulic lines.
4. Disconnect power and return hoses from the auxiliary hydraulics.
5. Pull out the attachment lock handles on the HPU and rotate 90°.
6. Connect hydraulic couplers together or install caps to prevent contaminants from entering the hydraulic system. Store hoses off of the ground to help prevent damage.

OPERATION
CONTROLS

POWER ROLLER

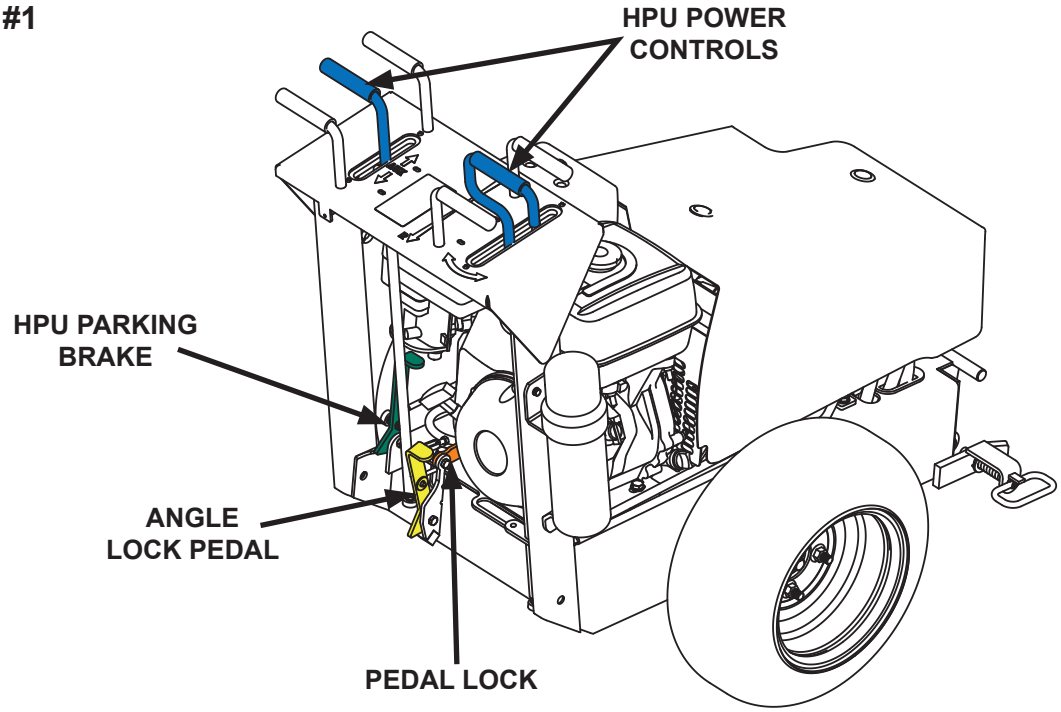
Roller should be level with the ground. The power rake should also be level with the ground front to back. To accomplish this, raise or lower gauge wheels.

To allow the roller to penetrate deeper into the ground, swivel the toplink. To achieve the opposite, lower the gauge wheels. Further depth control can be achieved by tilting the rake forward on gauge wheels to raise roller, or by tilting the rake back to raise gauge wheels and allow more roller penetration.

MANUAL ANGLE

A foot pedal is provided on the HPU to release the angling mechanism. See Figure #1

FIGURE #1



To angle:

1. Following the safety shut down procedure for HPU, shut down the unit.
2. Depress the angle lock pedal and flip the pedal lock over to keep the pedal depressed.
3. Angle the rake to the desired position.
4. Release the lock & allow the pedal to spring closed.

NOTICE! Adjusting the angle of the rake slightly after following the above procedure may be necessary to get the angle lock to fully engage.

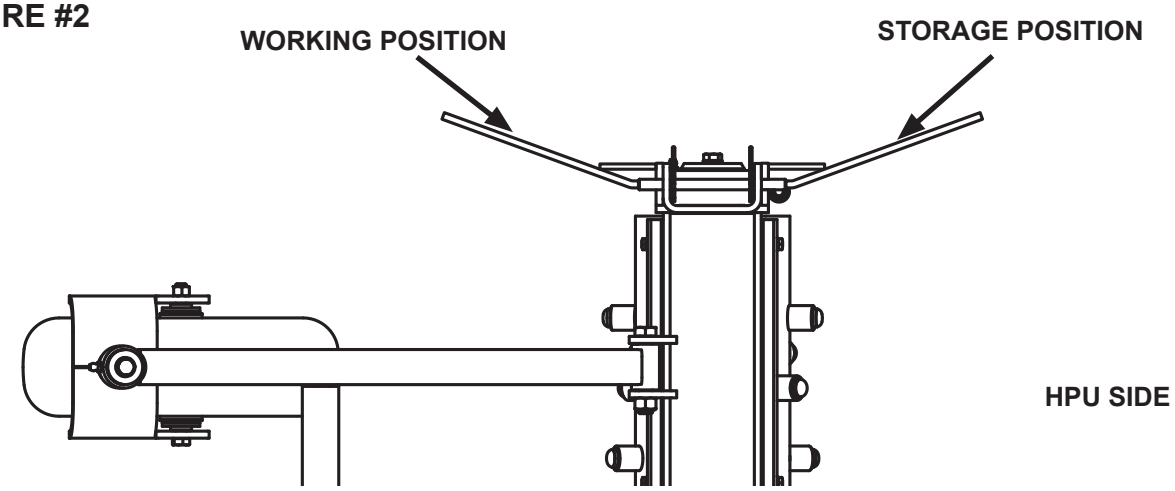
OPERATION
CONTROLS

ENDPLATES

The function of the endplates is to contain the material in front of the roller while the clean material passes between the roller and barrier. See Figure #2

With the endplates mounted in the working position and the roller straight (parallel with prime mover), material can be moved along, filling in the low spots.

FIGURE #2



These plates can be mounted to the front or back of the power rake, depending on the raking direction. When you move the endplates from front to back, you must move the left endplate to the right side and the right endplate to the left side.

On a hard level surface position the endplates mounted in the storage position to ensure stability when disconnecting the power rake.

OPERATION

INTENDED USE

This power rake is designed solely for removing rock, small debris, and thatching. 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.

MOTOR BREAK-IN

The hydraulic drive motor runs off the auxiliary circuit of the prime mover. The power rake should be run at 30% power for one hour for proper motor break-in.

GENERAL OPERATION

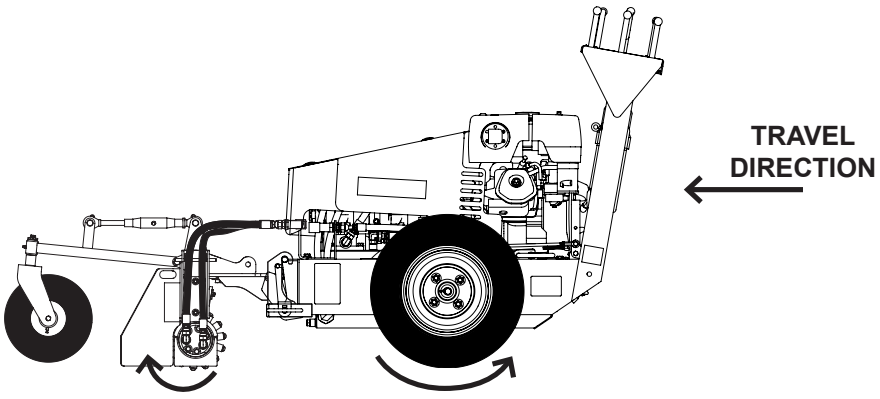
The power rake hydraulic motor drives the roller, which digs into the ground, cultivating and pulling up rocks, roots, and debris. The clean soil goes between the roller and barrier, while the rocks, roots, and debris work to the side in a windrow. With the endplates mounted in the working position and the rake straight, material can be moved along, filling in the low spots. Also, rocks, roots, and debris can be collected and moved to another location for hauling away. The power rake allows fast raking of large areas of ground.

When power raking, the depth will determine how much dirt is carried ahead of the roller. The ideal depth will vary with conditions and can be anywhere from skimming the surface to about 3” deep. See instructions in Power Roller to set roller depth. Roller rotation is bi-directional and direction is controlled by prime mover hydraulic controls.

When windrowing the level of dirt may be halfway up on the barrier. The volume or density of the material being raked will dictate how many times a windrow can be moved. When moving the windrow the level of the dirt may be to the top of the barrier. Try to prevent material from flowing over the top.

- Follow your HPU operator’s manual for safely starting up the power unit.
- Engage hydraulic control lever for auxiliary attachment.
- Increase engine RPM to give desired RPM at the roller. Normal operating speed is approximately 270 RPM. If operating in heavy rock, reduce the speed slightly.
- Move the HPU forward or backward as desired. Ground speed should be between 3 and 5 MPH under normal conditions. In heavy rock, reduce the ground speed to 1 to 3 MPH. For the roller to operate effectively, it must rotate in the opposite direction of the prime mover wheels, See Figure #1. Roller rotation direction is controlled by prime mover hydraulic controls.

FIGURE #1



OPERATION

PULVERIZING TOPSOIL

For breaking up compacted soil or conditioning hardened baseball diamonds:

- Remove the endplates to allow for material to be moved out of the way and not slow the raking process.
- Roll attachment plate back to lift guide wheels so only the toothed roller is in contact with the ground.
- Maintain sufficient RPM to avoid stalling the roller.

DEBRIS REMOVAL

Once the surface material has been loosened the process of removing debris can begin. Positioning of roller and endplates will be determined by your worksite. Rakes can either move the debris forward to collect at end of the pass or windrow debris to the outside for collecting.

- Endplates should be installed in the direction of travel.
- Raise the guide wheels allowing them to control the depth of the roller.
- The roller can be angled to windrow the debris to the outside for collecting.
- Travel speed should be increased for this process.

FINISH GRADING

For finish grading you will collect material from the high spots and deposit it in the low areas.

- Tilt the rake forward so the teeth on the roller are barely touching the ground.
- Travel speed should be increased for this process.

CHANGING GRADE

Grade modification can be accomplished during finish grading by angling the rake to collect and windrow the maximum amount of material toward targeted areas.

THATCHING EXISTING GRASS AREAS

The gauge wheels should be raised to support the rake on the front gauge wheels and toothed roller raised so teeth are just grazing the surface. Travel speed should be slow and careful.

SPREADING FILL AND TOPSOIL

- Position the rake so it is tilted on the gauge wheels. (Depth of cut is not the objective.)
- Endplates installed.
- Set angle to windrow as needed to control material movement.

SHUTTING DOWN

1. Before exiting the prime mover apply the brakes.
2. Follow prime mover operator’s manual to relieve pressure in the hydraulic lines.
3. Turn off the prime mover’s engine.

OPERATION

STORAGE:

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

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

Make sure the disconnected power rake is stored on a hard, level surface. Endplates mounted in the storage position increase stability.

- Clean the unit thoroughly, removing all mud, dirt and grease.
- Inspect for visible signs of wear, breakage or damage. Order any parts required and make the necessary repairs to avoid delays upon removal from storage.
- Tighten loose nuts, capscrews and hydraulic connections.
- 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.
- Inflate tires to recommended tire pressure.

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.

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.

OPERATION

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

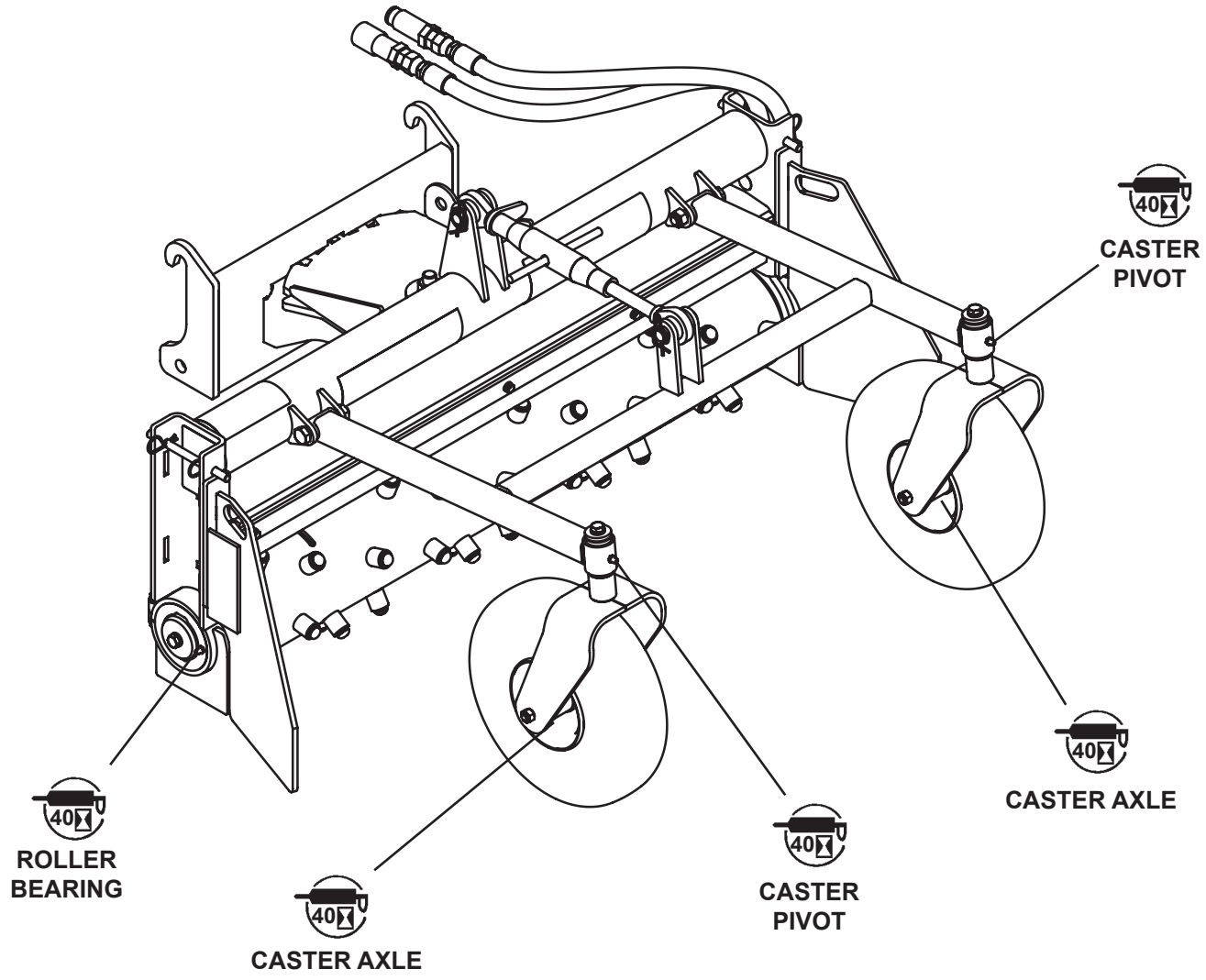
"Follow all local government regulations that may apply along with recommended tie down points and any equipment safety precautions at the front of this manual when transporting your attachment."

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



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

MAINTENANCE

GENERAL INFORMATION

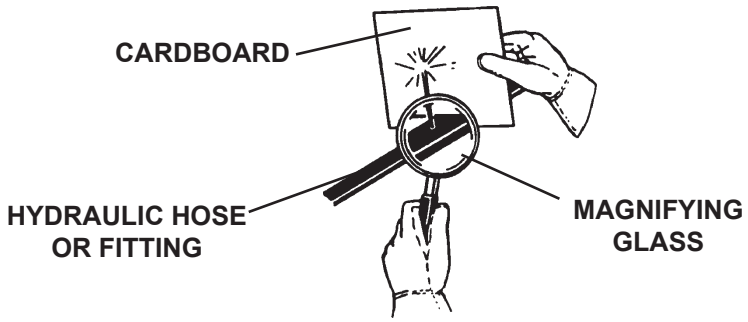
Regular maintenance is the key to long equipment life and safe operation. Maintenance requirements have been reduced to an absolute minimum. However, it is very important that these maintenance functions be performed as described below.

Procedure	Daily (Every 8 Hours)	Weekly (Every 40 Hours)
Check prime mover hydraulic system to ensure an adequate level and cleanliness of hydraulic oil.	✔	
Check for missing or loose hardware. Replace or tighten as necessary. See Bolt Torque Specifications	✔	
Check hydraulic system for leaks or damage. Replace or tighten as necessary.	✔	
Check for missing or damaged safety decals and replace as necessary.	✔	
Inspect attachment for any worn parts or cracked welds. Repair as required.	✔	
Lubricate grease fittings.		✔
Check tire pressure. (Varies, refer to tire stamping for pressure requirements)		✔

WARNING! **Escaping hydraulic / diesel fluid under pressure can penetrate the skin causing serious injury. Fluid escaping from a very small hole can be almost invisible. Use a piece of cardboard or wood, rather than hands to search for suspected leaks.**

Keep unprotected body parts, such as face, eyes, and arms as far away as possible from a suspected leak. Flesh injected with hydraulic fluid may develop gangrene or other permanent disabilities. If injured by injected fluid, see a doctor at once.

Stop the engine and relieve pressure before connecting or disconnecting lines. Tighten all connections before starting engine or pressurizing lines.

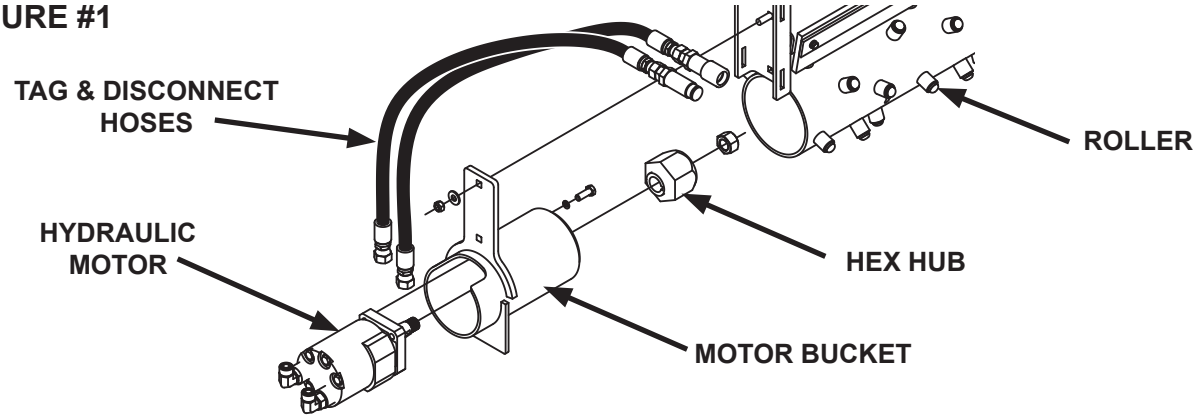


MAINTENANCE

HYDRAULIC MOTOR REPLACEMENT

1. Relieve pressure from the hydraulic system.
2. Remove endplate from motor side.
3. Tag and disconnect hydraulic hoses from the motor.
4. Remove the two capscrews securing the motor bucket to the roller frame. See Figure #1

FIGURE #1



5. With the roller either blocked up or resting on the ground, slide the motor bucket and hydraulic motor out of the frame.
6. Remove the hex hub by unscrewing the nut within the hex hub.
7. Remove the hex hub.
8. Remove the hardware securing the motor to the motor bucket.
9. Install hydraulic fittings (if not disconnected with hoses) onto the new motor and install the motor onto the motor bucket using existing hardware.
10. Reattach hex hub to the new motor with the existing nut.
11. Position the motor bucket back onto the roller frame inserting the hex hub into the hex hub receiver plate in the roller. Secure in place using the existing hardware removed in Step #4.
12. Connect hoses to the new hydraulic motor.

REPLACING ROLLER BEARING

Highest quality triple-seal bearings are used on the power rake. Lubrication of the bearings will vary considerably with conditions. As a rule, bearings should be under-lubricated rather than over-lubricated. Over lubrication can cause seals to blow out.

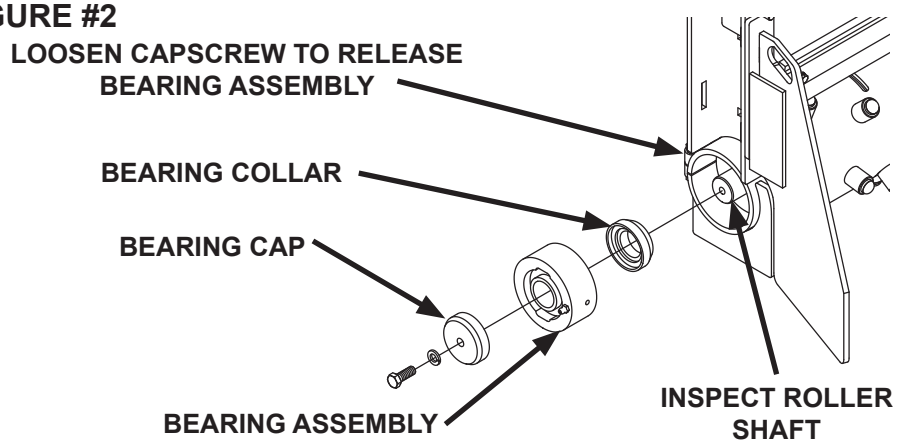
We recommend installing a complete bearing assembly but the bearing insert is also replaceable.

The special protective collars protect bearings from vine and wire wrap, and dirt buildup next to the bearing seal. The bearing protector is sandwiched onto the shaft which rotates within a close clearance from the outer race of the bearing. Grease coming from the bearing oozes into the protective collar, keeping dust and particles from entering the seal area, increasing the bearing life.

1. Remove capscrew securing the bearing cap to the shaft and remove bearing cap. See Figure #2
2. With the roller either blocked or resting on the ground, loosen capscrew on the idler end cap (bearing protectors) that hold the bearing assembly in place. (A pry bar may be required to pry the end cap apart to free the bearing assembly.

MAINTENANCE

FIGURE #2



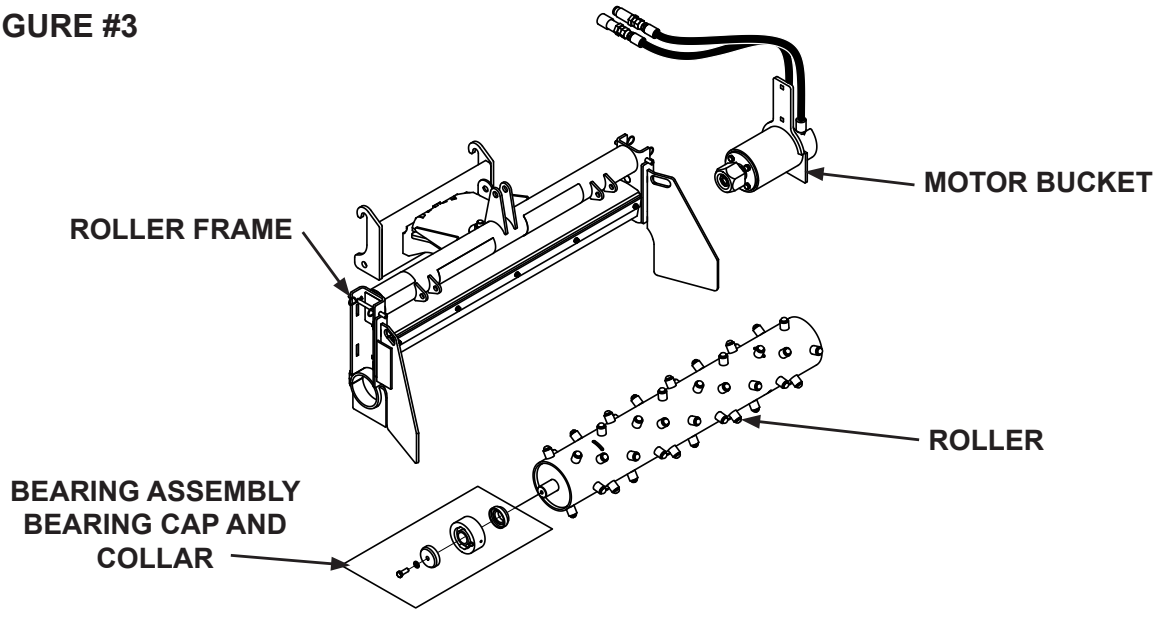
3. Remove roller bearing assembly.
4. Inspect the roller shaft and bearing collar for damage or excessive wear. Replace the bearing assembly and any other damaged parts making sure all surfaces are clean and in good condition.
5. Reverse Steps #1-#3 to install new bearing assembly.
6. Lubricate the new bearing assembly.

ROLLER REPLACEMENT

Due to the weight of the roller assembly, you will need additional help or a lifting device available when replacing the roller assembly.

1. Remove the motor-side endplate and two capscrews securing the motor bucket to the roller frame.
2. With the roller resting on the ground, slide the motor bucket and hydraulic motor out of the frame.
3. On the right side of the frame, loosen capscrew on the idler end cap (bearing protector) that holds the bearing assembly in place. (A pry bar may be required to pry the end cap apart to free the bearing assembly.
4. Slide the roller and bearing assembly out of the roller frame. See Figure #3

FIGURE #3

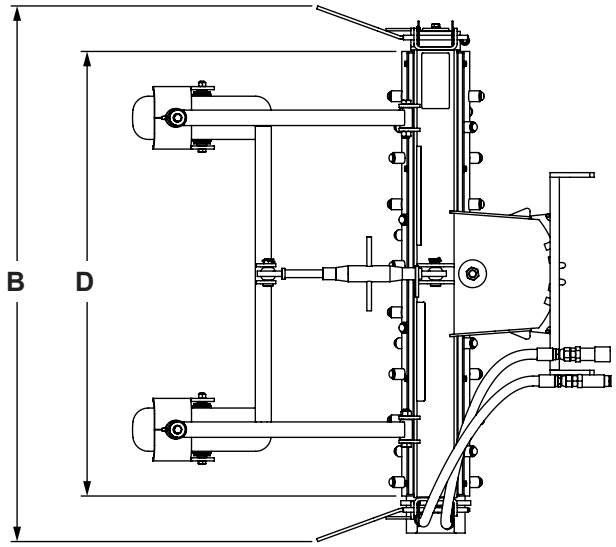


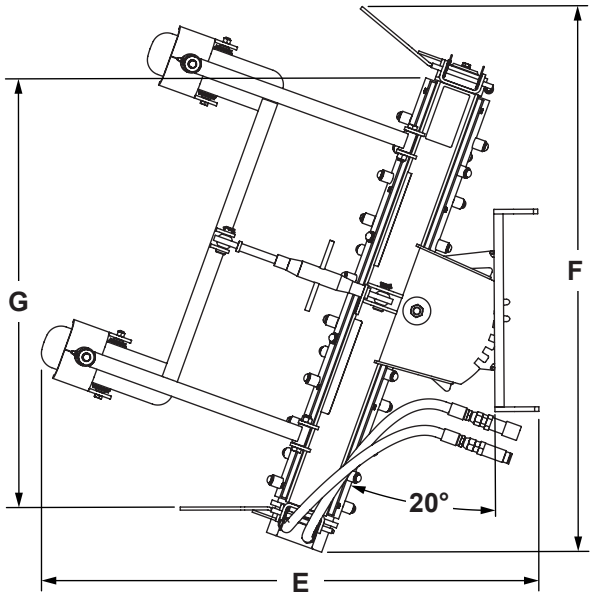
5. Remove the bearing cap, bearing assembly and collar from the roller shaft and loosely install on the new roller.
6. Position the new roller and bearing assembly onto the roller frame. Verify that the bearing is centrally located on the shaft and in the idler end cap (bearing protector) on the frame. Tighten the bearing cap.
7. Install the motor bucket (with hydraulic motor) onto frame aligning the hex hub with the hex receiver plate in the roller. Tighten hardware.
8. Check that the roller clears the frame on both ends. After making sure the bearing assembly is “seated” in the idler end cap (bearing protector), tight the capscrews securing it in place.
9. Run the power rake and watch for any interference between the roller and the roller frame.

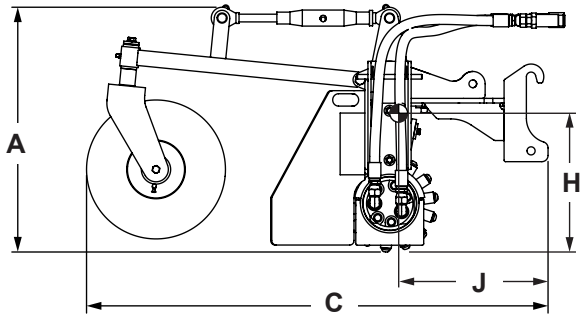
TROUBLE SHOOTING

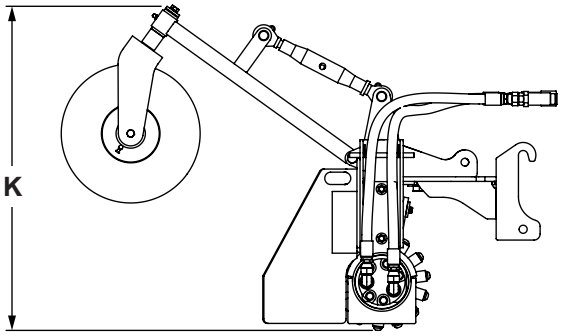
PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
ROLLER WILL NOT TURN.	Hydraulic valve on power unit not engaged.	See power unit Operator's Manual for auxiliary hydraulic operation procedure.
	Relief valve setting on power unit not properly adjusted.	Check relief pressure setting set at 2450 psi.
	Worn, damaged, insufficient, or inadequate pump.	Repair or replace hydraulic pump.
	Insufficient oil in system.	Service the power unit hydraulic reservoir.
	Hose ends not completely engaged.	Check hose coupling and engage properly.
	Obstruction in hydraulic lines.	Replace obstructed or damaged line.
	Obstruction between roller and barrier.	Reverse roller to clear obstruction.
OIL LEAKS.	Worn or damaged seal.	Replace leaking seal.
	Loose or damaged hoses.	Replace damaged hoses and secure loose hoses.
	Loose or damaged connections.	Replace damaged hose connections and tighten loose fittings.

SPECIFICATIONS









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

DESCRIPTION	SPECIFICATION
A. Overall Height	19.82″
B. Overall Width	44.37″
C. Overall Length	37.37″
D. Raking Width	36.00″
E. Overall Length @ 20°	40.23″
F. Overall Width @ 20°	44.19″
G. Raking Width @20°	34.72″
H. Center of Gravity - Vertical	8.65″
J. Center of Gravity - Horizontal	17.04″
K. Overall Height - Caster up	26.25″
Weight (lbs)	385#
Maximum Pressure	2400 PSI
Hydraulic Flow	6 GPM

BOLT TORQUE SPECIFICATION

GENERAL TORQUE SPECIFICATION TABLES

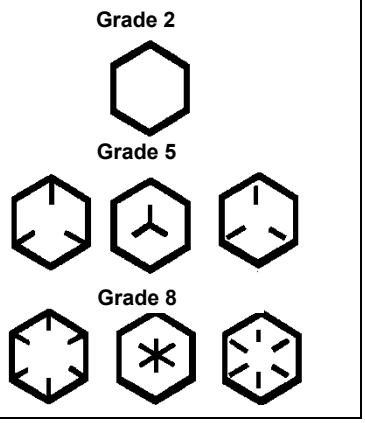
Use the following charts when determining bolt torque specifications, when special torques are not given. Always use grade 5 or better when replacing bolts.

SAE BOLT TORQUE SPECIFICATIONS

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

Bolt Size		SAE GRADE 5 TORQUE				SAE GRADE 8 TORQUE			
		Ft-lbs		Newton-Meter		Ft-lbs		Newton-Meter	
Inches	mm	UNC	UNF	UNC	UNF	UNC	UNF	UNC	UNF
1/4	6,35	8	9	11	12	10	13	14	18
5/16	7,94	14	17	19	23	20	25	27	34
3/8	9,53	30	36	41	49	38	46	52	62
7/16	11,11	46	54	62	73	60	71	81	96
1/2	12,70	68	82	92	111	94	112	127	152
9/16	14,29	94	112	127	152	136	163	184	221
5/8	15,88	128	153	174	207	187	224	254	304
3/4	19,05	230	275	312	373	323	395	438	536
7/8	22,23	340	408	461	553	510	612	691	830
1	25,40	493	592	668	803	765	918	1037	1245
1-1/8	25,58	680	748	922	1014	1088	1224	1475	1660
1-1/4	31,75	952	1054	1291	1429	1547	1700	2097	2305
1-3/8	34,93	1241	1428	1683	1936	2023	2312	2743	3135
1-1/2	38,10	1649	1870	2236	2535	2686	3026	3642	4103

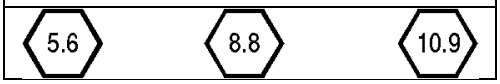
Bolt head identification marks as per grade.
NOTE: Manufacturing Marks Will Vary



METRIC BOLT TORQUE SPECIFICATIONS

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

Bolt head identification marks as per grade.



Bolt Size	Grade No.	Pitch (mm)	Ft-lbs	Newton-Meter	Pitch (mm)	Ft-lbs	Newton-Meter
	5.6		3.6-5.8	4,9-7,9		-	-
M6	8.8	1,0	5.8-.4	7,9-12,7	-	-	-
	10.9		7.2-10	9,8-13,6		-	-
	5.6		7.2-14	9,8-19		12-17	16,3-23
M8	8.8	1,25	17-22	23-29,8	1,0	19-27	25,7-36,6
	10.9		20-26	27,1-35,2		22-31	29,8-42
	5.6		20-25	27,1-33,9		20-29	27,1-39,3
M10	8.8	1,5	34-40	46,1-54,2	1,25	35-47	47,4-63,7
	10.9		38-46	51,5-62,3		40-52	54,2-70,5
	5.6		28-34	37,9-46,1		31-41	42-55,6
M12	8.8	1,75	51-59	69,1-79,9	1,25	56-68	75,9-92,1
	10.9		57-66	77,2-89,4		62-75	84-101,6
	5.6		49-56	66,4-75,9		52-64	70,5-86,7
M14	8.8	2,0	81-93	109,8-126	1,5	90-106	122-143,6
	10.9		96-109	130,1-147,7		107-124	145-168
	5.6		67-77	90,8-104,3		69-83	93,5-112,5
M16	8.8	2,0	116-130	157,2-176,2	1,5	120-138	162,6-187
	10.9		129-145	174,8-196,5		140-158	189,7-214,1
	5.6		88-100	119,2-136		100-117	136-158,5
M18	8.8	2,0	150-168	203,3-227,6	1,5	177-199	239,8-269,6
	10.9		175-194	237,1-262,9		202-231	273,7-313
	5.6		108-130	146,3-176,2		132-150	178,9-203,3
M20	8.8	2,5	186-205	252-277,8	1,5	206-242	279,1-327,9
	10.9		213-249	288,6-337,4		246-289	333,3-391,6

PARTS

In order to provide you with the most UP-TO-DATE part information, all parts for this attachment have been moved to our website at ***www.paladinattachments.com/Manuals***. Please use these diagrams and parts lists to locate replacement parts.

When servicing your attachment, remember to use only original manufacturer replacement parts. Substitute parts may not meet the standards required for safe, dependable operation.

To facilitate parts ordering when contacting the factory, please have the product control number (PCN or C/N) or model and serial number of your product ready to ensure that you receive the correct parts for your specific attachment.

The product control number, model and serial number for your attachment should be recorded in the space provided on the cover of this manual. This information may be obtained from the serial number identification plate located on your attachment.

NOTE: Most daily and emergency parts orders (in stock) received by 10:30 A.M. (Eastern Standard Time) will be shipped UPS Ground the same day received. UPS Next Day orders must be received by 1:30 PM (Eastern Standard Time.)

SERVICE DEPARTMENT
(734) 996-9116
(800) 456-7100

For Fax and E-mail Orders
PLC_Sales@paladinattachments.com
(734) 996-9014

WARRANTY

In order to provide you with the most UP-TO-DATE Warranty information, Paladin Warranty Statement and Warranty Procedures along with Warranty Registration and Claim Forms have been moved to our website at ***www.paladinattachments.com***.