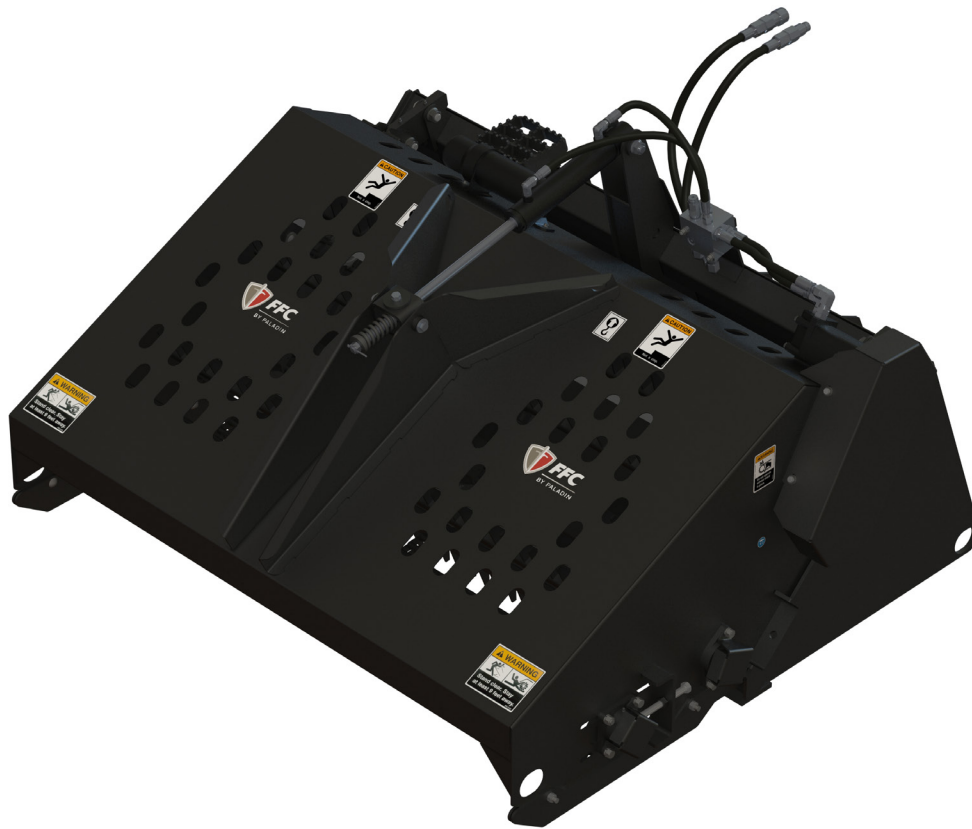




# OPERATOR'S MANUAL

## AUTORAKE®



SERIAL NUMBER: \_\_\_\_\_

MODEL NUMBER: \_\_\_\_\_

Manual Number: MR25595  
Models: LAF6864 & LAF6874  
Serial Number: B011498 & UP  
Release Date: August 2018  
Rev. 6



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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.

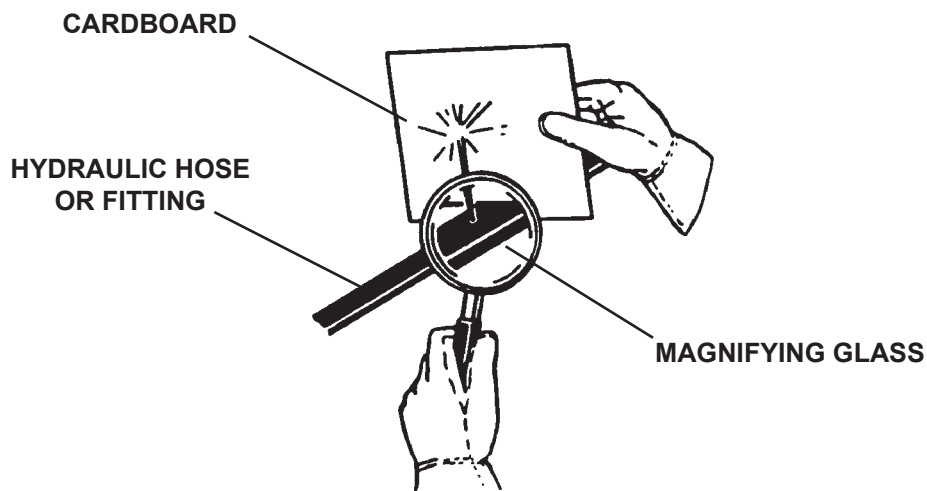
### WARNING!



#### 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.



## 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

- To avoid rolling over do not raise the attachment above five feet off the ground or to a height where visibility is obstructed, whichever is lower.
- Do not lock the auxiliary hydraulics of your prime mover in the "ON" position.
- Keep everyone at least nine feet away from this product when operating.
- 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.



## **OPERATING THE ATTACHMENT**

- An operator must not use drugs or alcohol, which can change his or her alertness or coordination. An operator taking prescription or over-the-counter drugs should seek medical advice on whether or not he or she can safely operate equipment.
- Before exiting the prime mover, lower the attachment to the ground, apply the brakes, turn off the prime mover's engine and remove the key.



## **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.
- When driving on public roads use safety lights, reflectors, Slow Moving Vehicle signs etc., to prevent accidents. Check local government regulations that may affect you.
- Do not drive close to ditches, excavations, etc., cave in could result.
- Do not smoke when refueling the prime mover. Allow room in the fuel tank for expansion. Wipe up any spilled fuel. Secure cap tightly when done.



## **MAINTAINING THE ATTACHMENT**

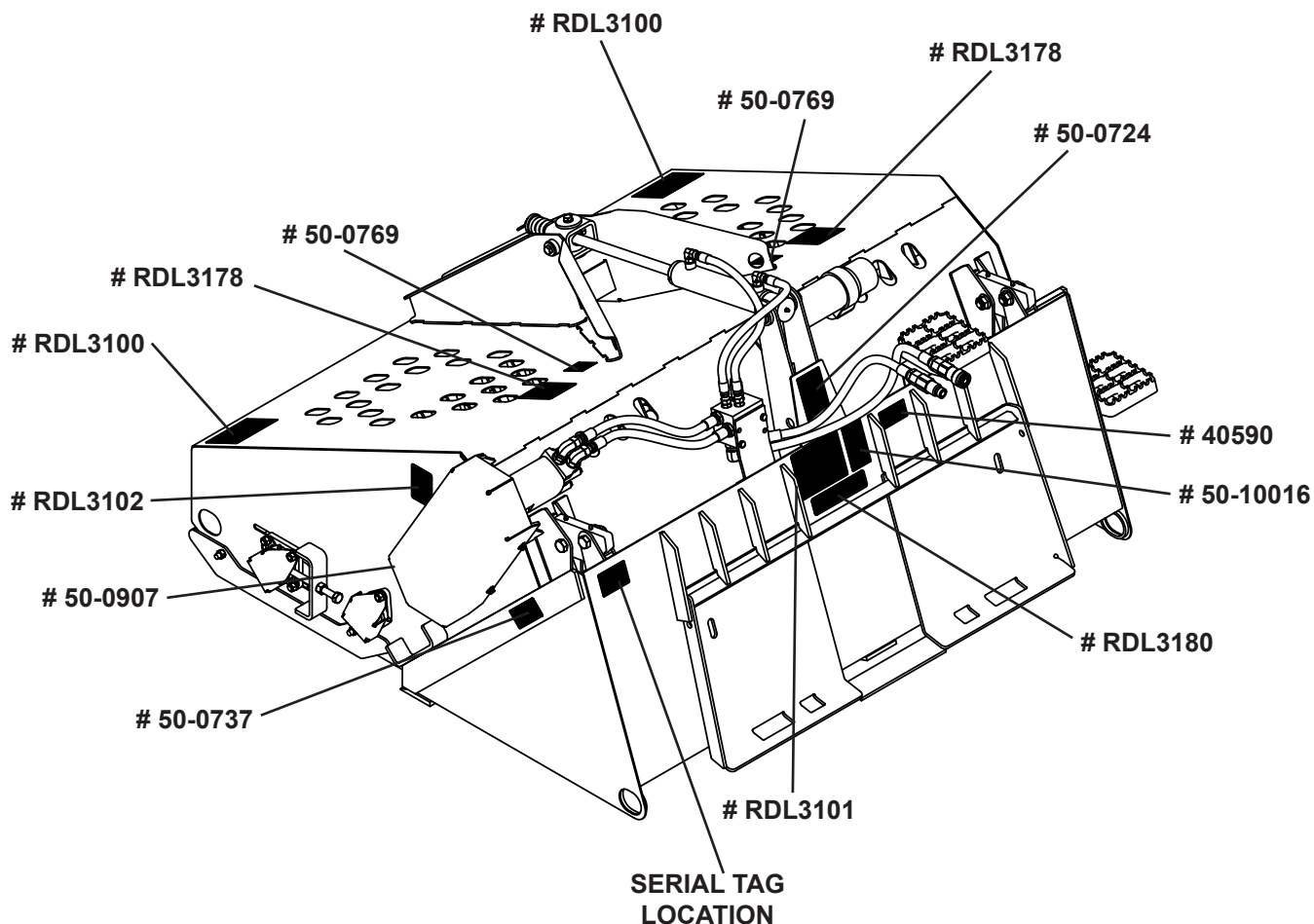
- Before performing maintenance, lower the attachment to the ground, apply the brakes, turn off the engine and remove the key.
- Never perform any work on the attachment unless you are authorized and qualified to do so. Always read the operator service manuals before any repair is made. After completing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

# DECALS

## DECAL PLACEMENT

### GENERAL INFORMATION

The diagram on this page shows the location of the decals used on your attachment. The decals are identified by their part numbers, with reductions of the actual decals located on the following page. Use this information to order replacements for lost or damaged decals. Be sure to read all decals before operating the attachment. They contain information you need to know for both safety and product longevity.



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

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

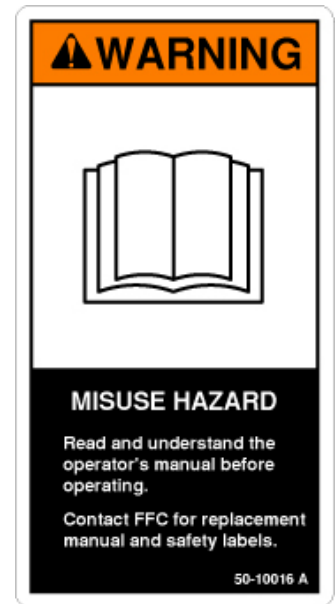
## DECALS



# RDL3101 WARNING! ROLLOVER HAZARD



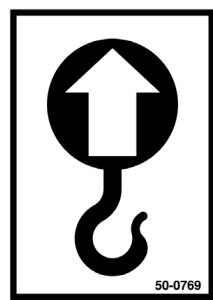
# 50-0724 WARNING! HIGH  
PRESSURE FLUID



# 50-10016 WARNING!  
MISUSE HAZARD



# RDL3100 WARNING! STAND CLEAR



# 50-0769  
IMPORTANT! LIFT  
POINT



# 50-0907 MANDATORY  
ACTION! LUBE



# 50-0737 WARNING! PINCH POINT



# RDL3178 CAUTION! NOT  
A STEP



# RDL3102 WARNING!  
SHIELDS



# RDL3180 IMPORTANT! CHAIN TENSION



# 40590 CAUTION! DO NOT USE HI-FLOW

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

# INSTALLATION

## GENERAL INFORMATION

The following instructions will help you to mount your AutoRake® onto your prime mover. The AutoRake® uses the quick-attach system for ease of installation. Therefore, if you know how to attach your loader bucket, attaching the AutoRake® should prove no problem.

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.

## 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.***

1. Remove any attachment from the front of the prime mover.
2. Following all standard safety practices and the instructions for installing an attachment in your prime mover operator's manual, install the attachment onto your prime mover.

**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.



3. Lower the unit to the ground and relieve pressure to the auxiliary hydraulic lines.
4. Following the safety shut down procedure for your prime mover, shut down and exit the prime mover.
5. 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.
6. Following the standard start up procedure for your prime mover, start the prime mover and run all cylinders on the attachment to purge any air from the system. Check for proper hydraulic connection, hose routing and hose length.
7. Attachment installation is complete.

## DETACHING

1. Before exiting the prime mover, lower the attachment to the ground, apply the brakes, turn off the prime mover's engine, and remove the key.
2. Follow prime mover operator's manual to relieve pressure in the hydraulic lines.
3. Disconnect power and return hoses from the auxiliary hydraulics.
4. Follow your prime mover operator's manual for detaching (removing) an attachment.
5. 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

## INTENDED USE

This rake has been designed and built to prepare and grade soil by collecting sticks, small debris and rocks less than 6 inches in diameter. This rake is not designed to remove rocks larger than 6 inches, stumps or any type of pavement or compacted soil. 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.

***NOTICE! Attempting to pick up large rocks, large tree branches, etc. can result in damage to rake.***

***NOTICE! Using this product to till compacted soil can result in damage to rake.***

Before using rake, make sure that:

- area is free of all rocks larger than 6 inches (15cm) diameter, and any other item that is too large for the bucket or could get wrapped around the rake chain.
- soil is relatively loose and any compacted areas have been tilled with another piece of equipment to a depth of 2 inches (5cm) or deeper.

## LOADER RAKING

**All raking must be done while moving backward.**

To begin raking:

1. Activate auxiliary hydraulics for operating rake chain,

***NOTICE! If rake chain does not move but hydraulic cylinder begins to retract, activate auxiliary hydraulics in opposite direction for rake chain operation.***

2. Lower loader arms completely and set loader arm control in float position.
3. Tilt rake forward until the weight of the rake portion is resting on the depth adjustment plates.
4. Move prime mover slowly backward.

## 3-POINT HITCH RAKING

**All raking must be done while moving forward & require a 3 point hitch adapter.**

To begin raking:

1. Activate auxiliary hydraulics for operating the rake chain,

***NOTICE! If rake chain does not move but hydraulic cylinder begins to retract, activate auxiliary hydraulics in opposite direction for rake chain operation.***

2. Lower 3 point link arms completely.
3. Tilt rake backward by extending upper link cylinder until the weight of the rake portion is resting on the depth adjustment plates.
4. Move tractor slowly forward.

# OPERATION

## OPERATING TIPS

- If rake is throwing too much soil into bucket, depth adjustment plates should be placed in a lower hole on main housing.
- If the rake is slipping over items that should be collected, then the depth adjustment plates should be placed in a higher hole on the main housing.
- Multiple passes may be required to achieve desired results.
- Adjustments may need to be made due to the wide variety of soil types, moisture conditions, compaction levels, foliage densities, rocks and debris.

***NOTICE! Opening the main housing and using the bucket for standard bucket operations can result in damage to rake.***

## DUMPING

1. Shut off auxiliary hydraulics.
2. Move to dump site and park on firm, level ground.
3. Activate auxiliary hydraulics in opposite direction of what was used to operate the rake chain. This will retract hydraulic cylinder and open main housing.
4. Raise rake about four feet above ground.
5. Dump bucket and reverse process. You are ready to resume raking. **Note: Rake chain will move when main housing is closing.**

## STORAGE

- 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.
- Coat exposed portions of the cylinder rods with grease.
- Lubricate grease fittings.
- Seal hydraulic system from contaminants and secure all hydraulic hoses off the ground to help prevent damage.
- Store unit in a dry and protected place. Leaving the unit outside will materially shorten its life.

### **Additional Precautions for Long Term Storage:**

- Touch up all unpainted surfaces with paint to avoid rust.

## REMOVAL FROM STORAGE

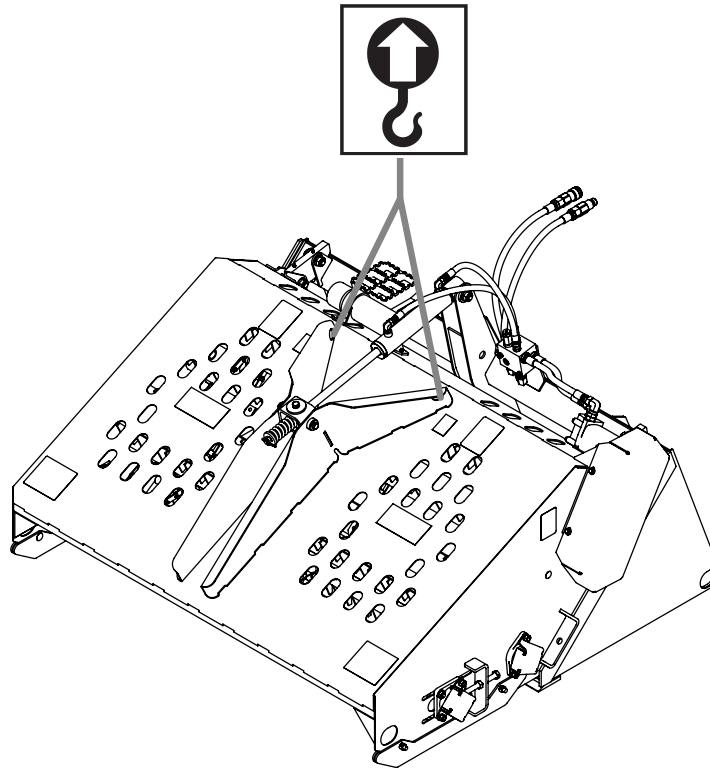
- Wash unit and replace any damage and/or missing parts.
- Lubricate grease fittings.
- Check hydraulic hoses for damage and replace as necessary.




# OPERATION

## LIFT POINTS

Lifting points are identified by lifting decals where required. Lifting at other points is unsafe and can damage attachment. Do not attach lifting accessories around cylinders or in any way that may damage hoses or hydraulic components. See diagram:



- 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.

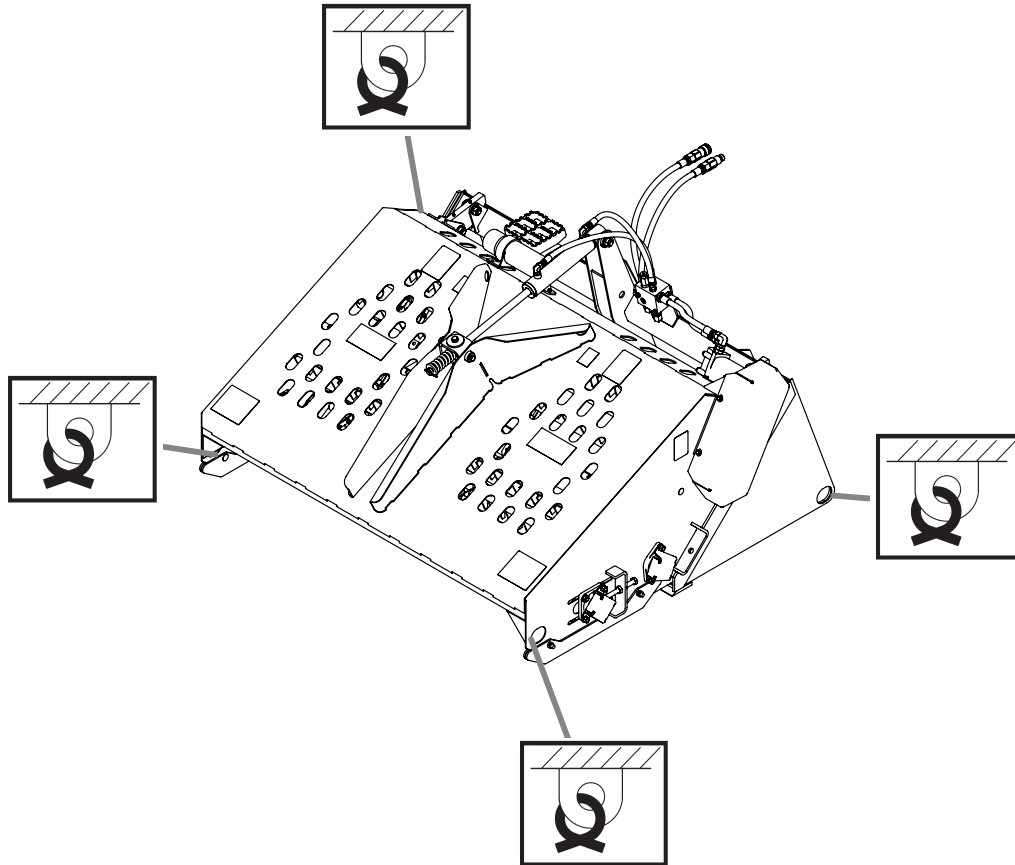
**WARNING!**  **USE LIFTING ACCESSORIES (CHAINS, SLINGS, ROPES, SHACKLES AND ETC.) THAT ARE CAPABLE OF SUPPORTING THE SIZE AND WEIGHT OF YOUR ATTACHMENT. Secure all lifting accessories in such a way to prevent unintended disengagement. Failure to do so could result in the attachment falling and causing 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. See diagram:



- 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

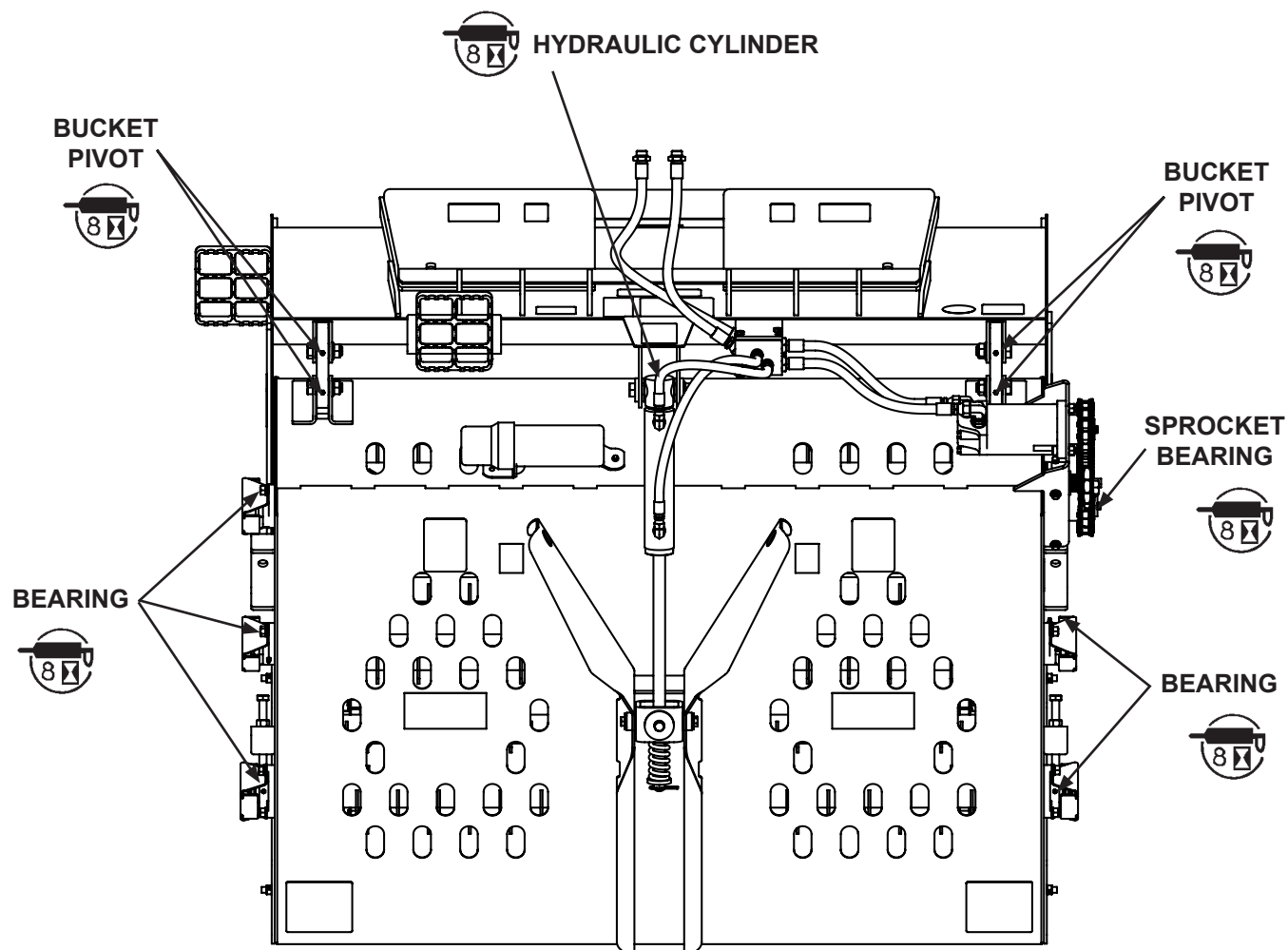
“Follow all local government regulations that may apply along with recommended tie down points and any equipment safety precautions at the front of this handbook when transporting your attachment.”

# LUBRICATION

## LUBRICATION

All parts provided with grease fittings should be lubricated as indicated. If any grease fittings are missing, replace them immediately. Clean all fittings thoroughly before using grease gun.

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



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

## OIL CLEANLINESS REQUIREMENTS

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

# MAINTENANCE

## GENERAL INFORMATION

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

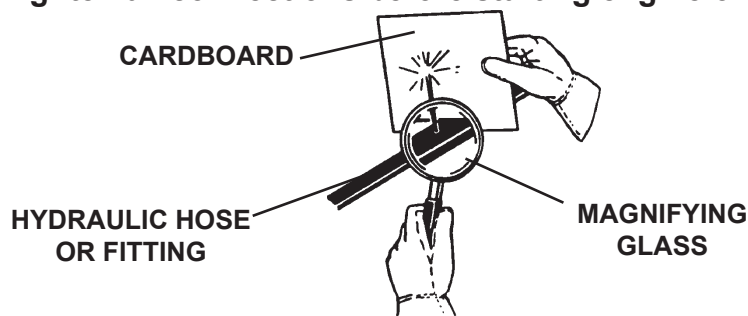
Procedure	Daily (Every 8 hours)	Weekly (Every 40 hours)	Monthly (Every 250 Hours)	Before Extended Storage (60 Days)
Check for missing or loose hardware. Replace or tighten if necessary. See Bolt Torque Specifications	✓			
Check hydraulic system for leaks and tighten as necessary. Check for damage and replace as needed.	✓			
Check for missing or damaged safety decals and replace as necessary.	✓			
Visually inspect the machine for worn parts or cracked welds, and repair as necessary.	✓			
Lubricate all grease fittings.	✓			
Check Drive and Rake Chain Tension.		✓		
Check Rake Chain Tracking.		✓		
Check Drive Chain, Sprockets, Shaft and Idler Shaft for wear.			✓	
Check for Bent Rake Chain Teeth and replace as needed.			✓	
Oil Drive & Rake Chains.				✓

**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

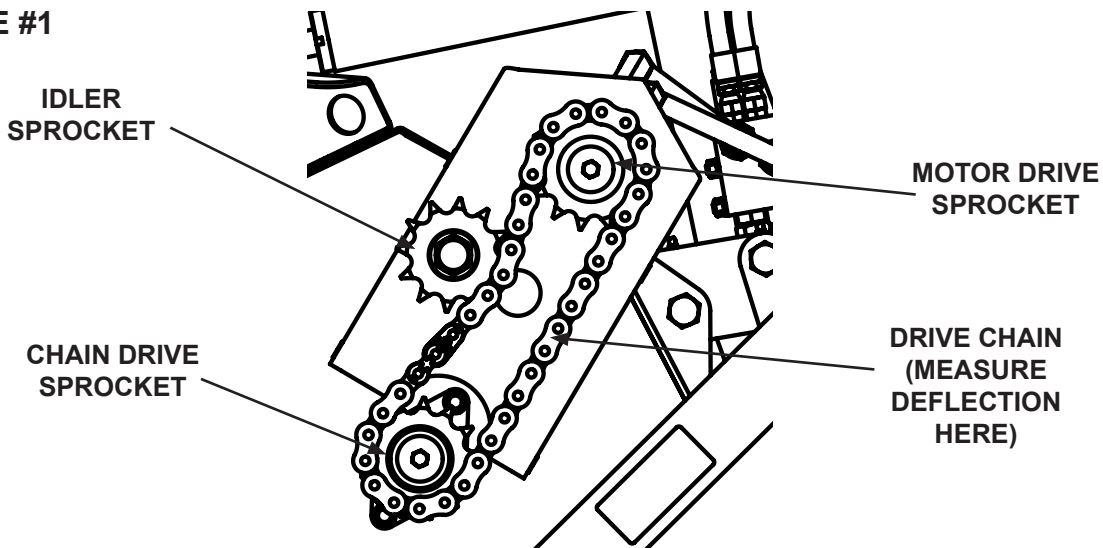
**NOTICE!** When replacing parts use only factory approved replacement parts. Manufacturer will not claim responsibility for use of unapproved parts or accessories and/or other damages as a result of their use.

### DRIVE CHAIN TENSION ADJUSTMENT

The proper tension on the drive chain results in the longest run of chain having a .38" - .50" (.97 - 1.3 cm) midpoint deflection.

1. Remove four bolts from drive chain shield.
2. Remove shield.
3. Loosen nut on idler sprocket and push sprocket toward chain until the opposite chain run (i.e. the longest) has a midpoint deflection of .38" - .50" (.97 - 1.3 cm). See Figure #1
4. Tighten the idler sprocket nut to 304 ft. lbs. (412N-m), + or - 22 ft. lbs (30N-m).

FIGURE #1



5. Recheck the chain deflection and repeat steps 3 & 4 if the deflection is not within the above specified range.
6. Replace the drive chain shield and bolts. Tighten the bolts to 20 ft. lbs. (27N-m), + or - 2.0 ft. lbs. (2.7N-m)

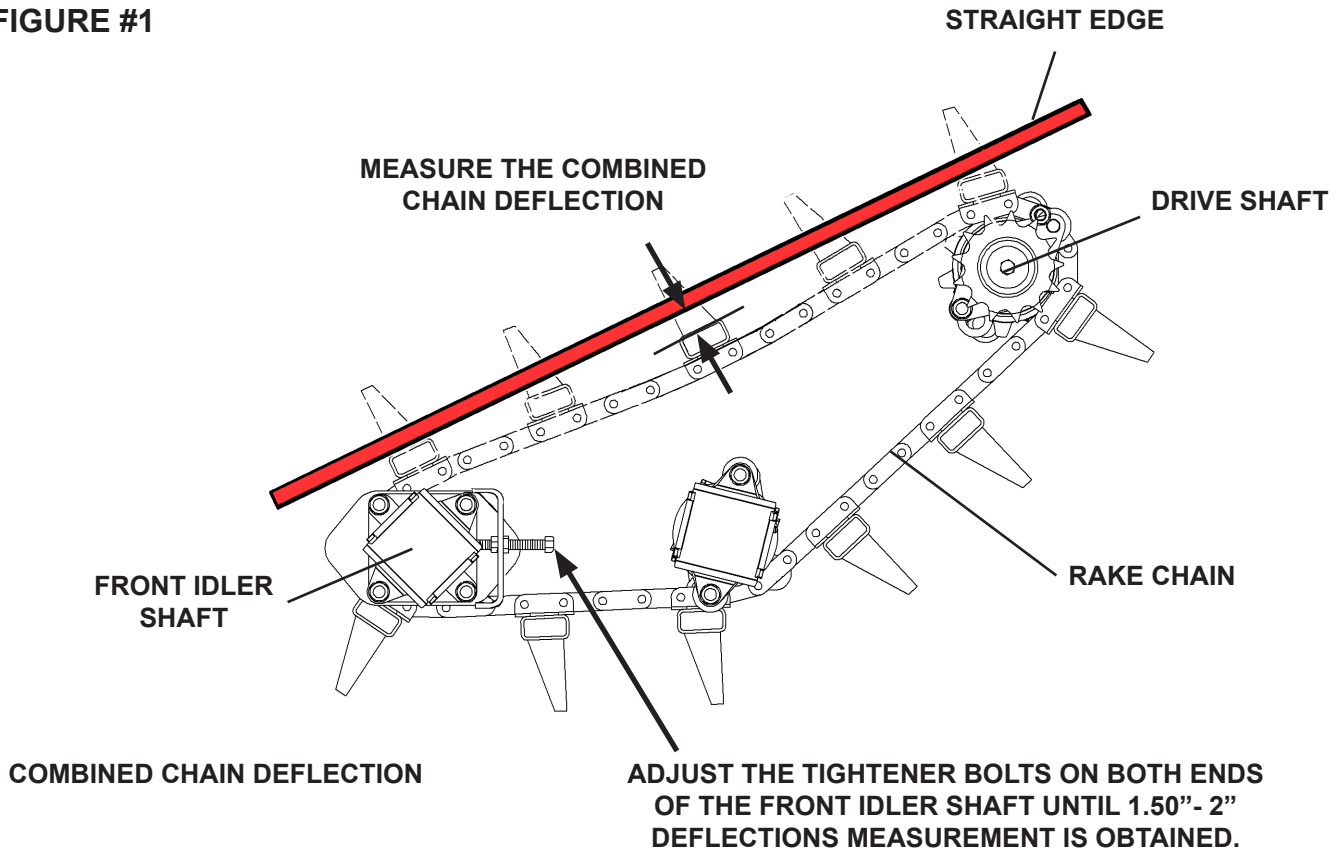
### RAKE CHAIN TENSION ADJUSTMENT

The proper tension on the rake chain results in the top run of chain (i.e. from the front idler shaft to the drive shaft) having a .75" - 1" (1.9 - 2.5 cm) midpoint deflection. (Note: For this chain, the combined up and down midpoint deflection of 1.50" - 2" (3.8 - 5 cm) may be easier to measure.)

1. Loosen the four nuts that secure the bearing on one end of the front idler shaft. Repeat this process for the other end of the front idler shaft.
2. For each of the two front idler shaft bearings, loosen the jam nut on the .62" UNC X 6" tightener bolt. See Figure #1

# MAINTENANCE

FIGURE #1



3. Tighten the tightener bolts until a midpoint deflection of .75" - 1" (1.9 - 2.5 cm) between the idler shaft and the drive shaft has been achieved for each of the roller chain portions of the rake chain. (By utilizing a tape measure and a long, slender hook device, the combined up and down midpoint deflection of 1.50" - 2" [3.8 - 5 cm] may be easier to measure.) See Figure #1
4. Tighten the four nuts on each of the two bearings to 84 ft. lbs. (113.9N-m), + or - 6.0 ft. lbs (8M\_N-m). and tighten the jam nut on the two tightener bolts to 169 ft. lbs. (229N-m), + or - 12 ft. lbs (16N-m).
5. Recheck the chain deflection for compliance with the above specifications and check the chain travel to make sure that the chain is centered on the idlers. Repeat until both the specified deflection and desired line of travel has been attained.

## RAKE CHAIN ALIGNMENT

Check the rake chain travel to make sure that the chain is centered on the center idler. Shift the front idler if centering is necessary.

1. Remove the shaft end guard from both sides of the front idler.
2. Unbolt the .38" capscrews & washers from the ends of the idler.
3. Rearrange the three bushings to slide the idler to be centered on the chain.
4. Reinstall washers and capscrews.
5. Reattach shaft end guard.

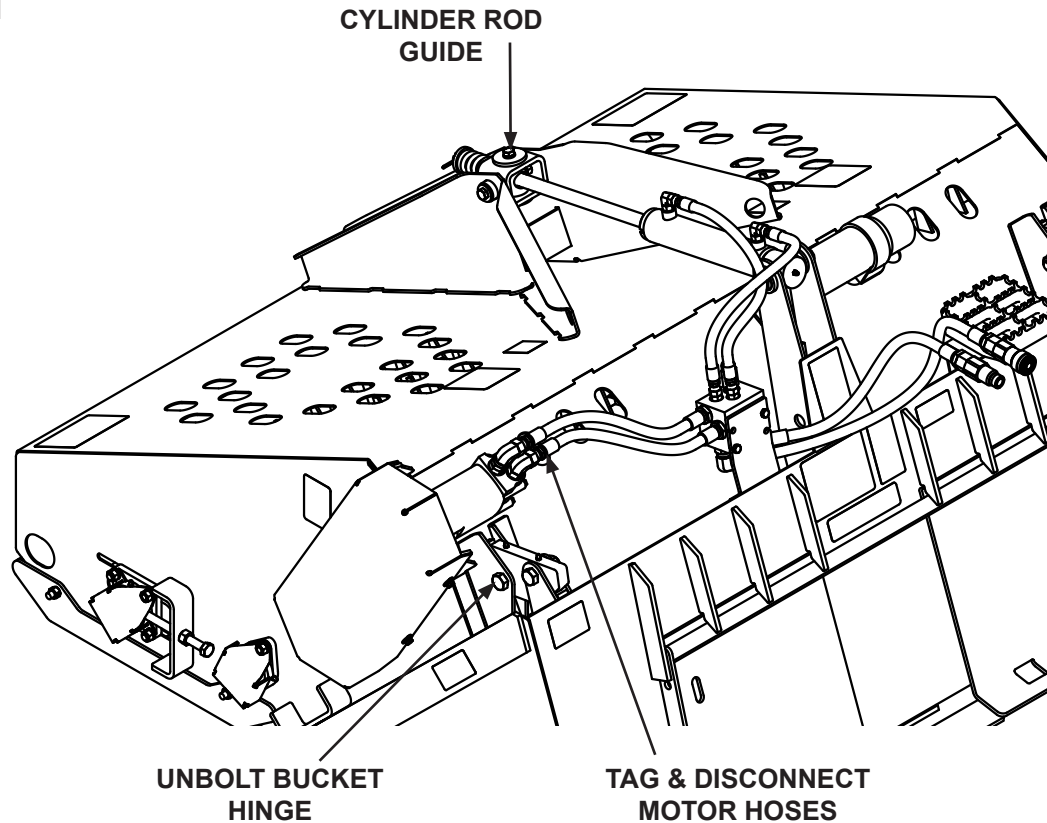
# MAINTENANCE

## RAKE CHAIN REMOVAL

*An overhead hoist is required when removing or replacing the rake chain.*

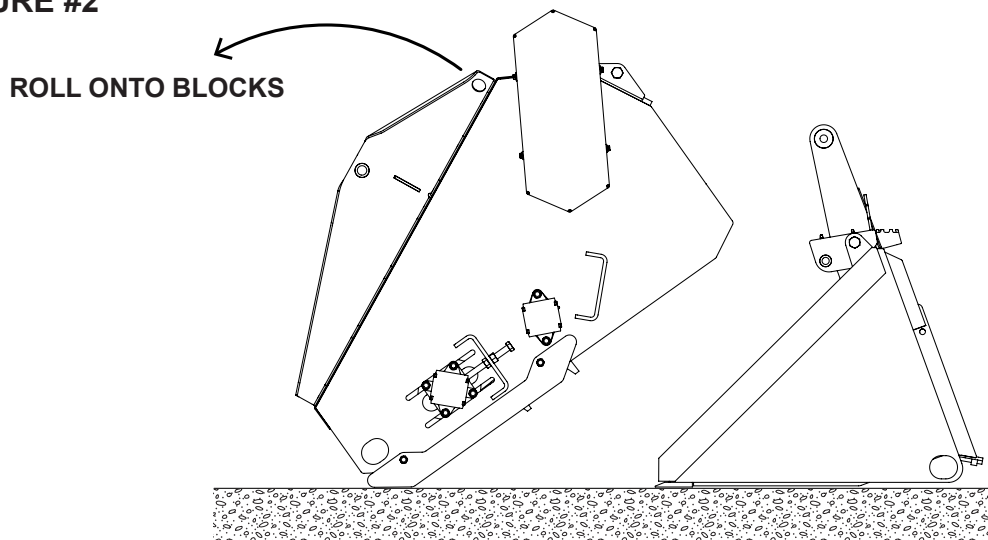
1. Tag and remove hydraulic hoses from motor. Hydraulic fluid will leak from motor and hoses. See Figure #1

**FIGURE #1**




2. Disconnect hydraulic cylinder from main housing, by unbolting cylinder rod guide; leave cylinder attached to bucket.
3. Unbolt bucket hinges from frame.
4. Using a lifting device roll the frame over onto blocks. See Figure #2

**FIGURE #2**



## MAINTENANCE

**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.**

5. Loosen tension on the rake chain. See Rake Chain Adjustment.
6. Remove quick links
7. **For single-chain units:**
  - a. Remove the cotter pin.
  - b. Drive connecting link pins free.
  - c. Repeat for all three chains, connecting link should be located in the same position.
  - d. Feed chain around hexagonal drive shaft and remove. **NOTE: Drive chain weighs more than 50 lbs.**
- For sectional-chain units:**
  - a. Locate the damaged rake bar. On either side are quick links.
  - b. On each chain, remove cotter pin.
  - c. Drive quick link pins free.
  - d. Repeat on the other side of the rake bar.

## RAKE CHAIN INSTALLATION

### For full chain replacement:

1. Feed chain around axles, hexagonal drive shaft should be free moving but may be stiff. Make sure the chains are straight on the sprockets.
2. Reconnect chains by connecting the quick links.
3. Re-tension rake chain. See Rake Chain Adjustment.
4. Turn rake by hand a few turns to ensure chain does not bind.
5. Using a lifting device roll the frame back onto the bucket.
6. Reconnect hinges, cylinder and motor hoses.

### For individual bar section replacement:

1. Connect new rake section to one end of the existing chain.
2. Install quick link pins and cotter pins to secure new section.
3. Feed chain around axles, hexagonal drive shaft should be free moving but may be stiff. Make sure the chains are straight on the sprockets.
4. Reconnect chains by connecting the quick links.
5. Re-tension rake chain. See Rake Chain Adjustment.
6. Turn rake by hand a few turns to ensure chain does not bind.
7. Using a lifting device roll the frame back onto the bucket.
8. Reconnect hinges, cylinder and motor hoses.

## TROUBLESHOOTING

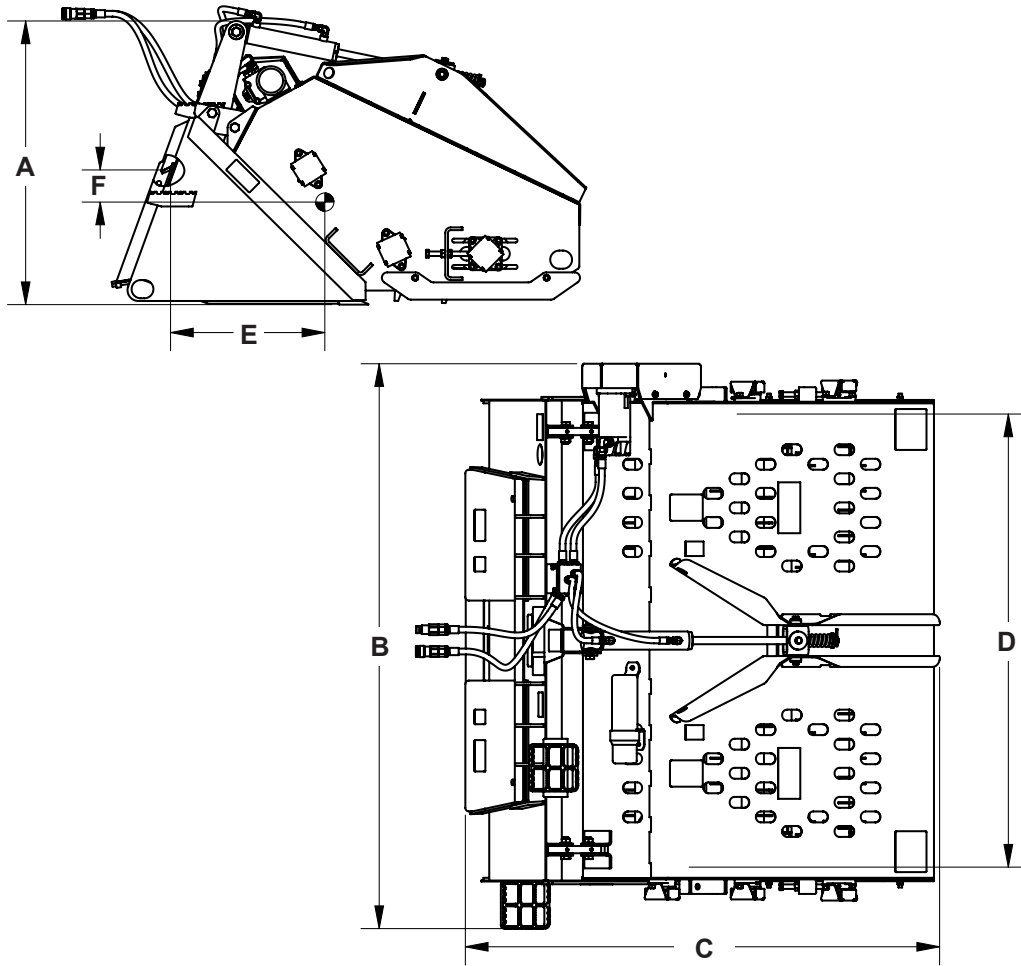
PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
<b>RAKE THROWING TOO MUCH SOIL</b>	Depth adjustment plates in wrong position.	Move adjustment plates to a lower hole in the housing.
<b>RAKE MISSING ITEMS THAT SHOULD BE COLLECTED</b>	Depth adjustment plates in wrong position.	Move adjustment plates to a higher hole in the housing.
<b>RAKE BINDS UP AND STOPS</b>	Rock or debris stuck inside.	Reverse to clean.
<b>CHAIN WANDERING OR HOPPING</b>	Chain is loose.	Adjust tension on chain.
<b>SHROUD WILL NOT RAISE IN REVERSE</b>	Hydraulic hoses or fittings are loose or damaged.	Tighten or replace hoses or fittings.
<b>MOTOR FOR AUTORAKE® WILL NOT OPERATE</b>	Auxiliary hydraulics control on prime mover is activated in the wrong position.	Refer to Prime Mover operator's manual.
	Hoses from AutoRake® to Prime Mover incorrectly connected.	Refer to Prime Mover operator's manual.
	Obstruction in hydraulic line.	Check hose routing. Remove obstruction and replace if necessary.
	Motor failure.	Check for leaks and replace motor if necessary.
<b>SLUGGISH RAKE OPERATION</b>	Insufficient oil flow from Prime Mover.	Check compatibility between AutoRake® hydraulic flow requirements and Prime Mover. Increase throttle.
	Hydraulic motor damaged or seals blown.	Check for leaks and replace motor if necessary.
	Prime Mover hydraulic filter is dirty.	Refer to Prime Mover operator's manual.
<b>OIL LEAKS FROM THE MOTOR</b>	Motor seals damaged.	Replace motor shaft seal or motor if necessary.
	Seals on hydraulic fitting damaged.	Replace hydraulic fitting.
	Hydraulic fittings loose or damaged.	Tighten or replace as required.
	Hydraulic lines loose or damaged.	Tighten or replace as required.
<b>RAKE ROTATES IN WRONG DIRECTIONS</b>	Hoses installed incorrectly.	Switch hoses at the motor end.
<b>RAKE SLOWS OR STOPS WHEN RAKING</b>	Travel speed too fast.	Reduce travel speed.
	Hydraulic motor is failing.	Check for leaks and replace if necessary.



## TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
<b>EXCESSIVE HYDRAULIC OIL TEMPERATURE</b>	Low hydraulic oil level on the prime mover.	Refer to Prime Mover operator's manual.
	Hydraulic hoses are obstructed.	Check hose routing.  Remove obstruction and replace if necessary.
	Hydraulic oil is dirty.	Refer to Prime Mover operator's manual.
	Quick couplers are loose.	Tighten or engage quick couplers. Replace if necessary.
<b>HYDRAULIC QUICK COUPLER LEAKS</b>	Quick coupler poppet is unseated.	Tighten or replace quick couplers.
<b>CYLINDER SPEED TOO SLOW</b>	Manifold failure.	Replace. (Call Service Department)
	Hoses pinched or obstructed.	Check hose routing, remove obstruction and replace if necessary.
<b>THE MOTOR RUNS BUT THE AUTORAKE® DOES NOT RUN</b>	Sheared motor shaft key.	Replace motor key.

## SPECIFICATIONS



DESCRIPTION	LAF6864	LAF6874
A. Overall Height	39.10" (99.31 cm)	39.10" (99.31 cm)
B. Overall Width	77.70" (197.36 cm)	87.70" (222.76 cm)
C. Overall Length	65.30" (165.86 cm)	65.30" (165.86 cm)
D. Raking Width	62.00" (157.48 cm)	72.00" (182.88 cm)
E. Center of Gravity - Horizontal	21.20" (53.45 cm)	21.40" (54.36 cm)
F. Center of Gravity - Vertical	4.40" (11.18 cm)	4.50" (11.43 cm)
Weight (lbs)	1350# (612 kg)	1455# (659 kg)
Hydraulic Flow - Continuous.....20 GPM (75.70 lpm)		
Hydraulic Flow - Intermittent.....30 GPM (113.56 lpm)		
Maximum Pressure.....4000 PSI (275.79 bar)		
Maximum Prime Mover Power.....110 HP (82.02 kW)		

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




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.		
		

Bolt Size	Grade No.	Pitch (mm)	Ft-lbs	Newton-Meter	Pitch (mm)	Ft-lbs	Newton-Meter
M6	5.6	1,0	3.6-5.8	4.9-7.9	-	-	-
	8.8		5.8-4	7.9-12,7		-	-
	10.9		7.2-10	9,8-13,6		-	-
M8	5.6	1,25	7.2-14	9,8-19	1,0	12-17	16,3-23
	8.8		17-22	23-29,8		19-27	25,7-36,6
	10.9		20-26	27,1-35,2		22-31	29,8-42
M10	5.6	1,5	20-25	27,1-33,9	1,25	20-29	27,1-39,3
	8.8		34-40	46,1-54,2		35-47	47,4-63,7
	10.9		38-46	51,5-62,3		40-52	54,2-70,5
M12	5.6	1,75	28-34	37,9-46,1	1,25	31-41	42-55,6
	8.8		51-59	69,1-79,9		56-68	75,9-92,1
	10.9		57-66	77,2-89,4		62-75	84-101,6
M14	5.6	2,0	49-56	66,4-75,9	1,5	52-64	70,5-86,7
	8.8		81-93	109,8-126		90-106	122-143,6
	10.9		96-109	130,1-147,7		107-124	145-168
M16	5.6	2,0	67-77	90,8-104,3	1,5	69-83	93,5-112,5
	8.8		116-130	157,2-176,2		120-138	162,6-187
	10.9		129-145	174,8-196,5		140-158	189,7-214,1
M18	5.6	2,0	88-100	119,2-136	1,5	100-117	136-158,5
	8.8		150-168	203,3-227,6		177-199	239,8-269,6
	10.9		175-194	237,1-262,9		202-231	273,7-313
M20	5.6	2,5	108-130	146,3-176,2	1,5	132-150	178,9-203,3
	8.8		186-205	252-277,8		206-242	279,1-327,9
	10.9		213-249	288,6-337,4		246-289	333,3-391,6

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## PARTS

In order to provide you with the most UP-TO-DATE part information, all parts for this attachment have been moved to our website at [www.paladinattachments.com/Manuals](http://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](http://www.paladinattachments.com).