



**PALADIN™**  
POWERFUL ATTACHMENT TOOLS

# OPERATOR'S HANDBOOK

## AUTORAKE®



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

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

Original  
Manual Number: MR25595-X  
Rev 2

STANLEY Dubuis 17-19, rue Jules Berthanneau-BP 3406 41034 Blois Cedex, France



## Notes


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# PREFACE

## GENERAL INFORMATION

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.

**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 the attachment.

**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 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 manufacturer to obtain further assistance. Keep this manual available for reference. Provide this manual to any new owners and/or operator’s

## 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 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 impossible 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 IS USED WHERE SERIOUS INJURY OR DEATH WILL RESULT IF THE INSTRUCTIONS ARE NOT FOLLOWED PROPERLY.



## **WARNING**

THIS SIGNAL WORD IS USED WHERE SERIOUS INJURY OR DEATH COULD RESULT IF THE INSTRUCTIONS ARE NOT FOLLOWED PROPERLY.



## **CAUTION**

THIS SIGNAL WORD IS USED WHERE MINOR INJURY COULD RESULT IF THE INSTRUCTIONS ARE NOT FOLLOWED PROPERLY.

## **NOTICE**

NOTICE INDICATES A PROPERTY DAMAGE MESSAGE.

## 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 POWER UNIT'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 and 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**



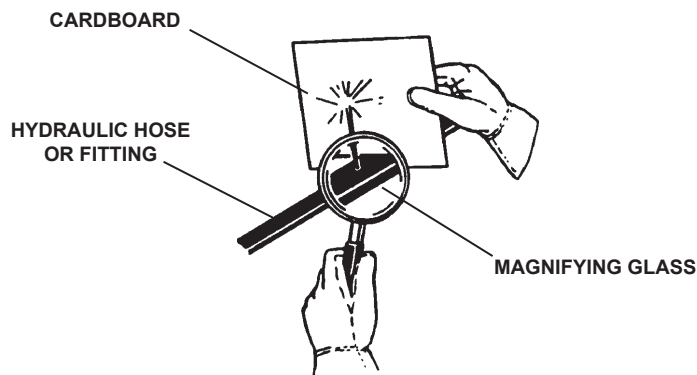
Do not work under raised booms without supporting them. Do not use support material made of concrete blocks, logs, buckets, barrels or any other material that could suddenly collapse or shift positions. Make sure support material is solid, not decayed, warped, twisted, or tapered. Lower booms to ground level or onto 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 movers 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 immediately to determine proper treatment.
- Wear safety glasses, protective clothing, and use a sound 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 Protection 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 tool 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.

## **WARNING! 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 operators 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

Obey all the safety instructions listed in this section and throughout this manual.

**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.

**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! Failure to obey the following procedures could result in death or serious injury.**



- Never lift this product above (a) the operator's eye level or (b) to a height where visibility is obstructed, whichever is lower.
- Do not roll back this product so far that the load falls off toward or on the operator.
- 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.

**CAUTION! NOT A STEP!**

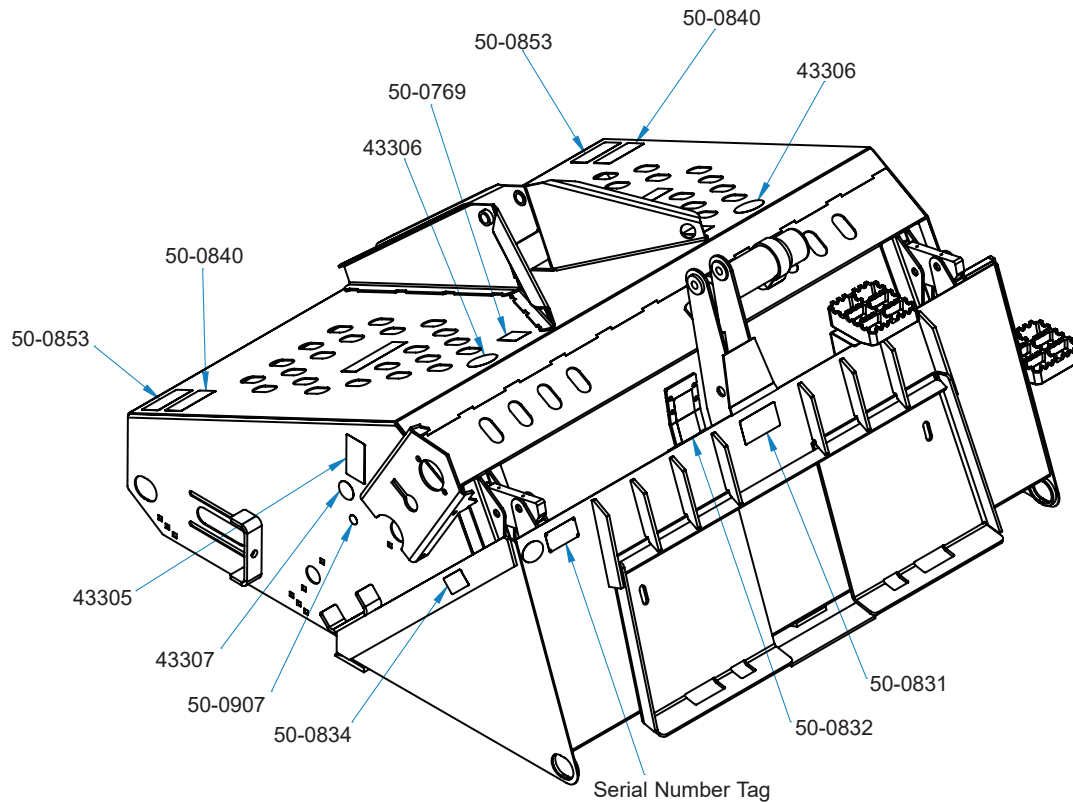


**Failure to obey instructions in this section may result in personal injury.**

- Do not use the top of this product as a step. Under certain conditions, this area can be slippery.



# SAFETY SIGN LOCATIONS



## INSTRUCTIONS

- Keep all safety signs clean and legible.
- Replace all missing, illegible, or damaged safety signs.
- Replacement parts for parts with safety signs attached must also have safety signs attached.
- Safety signs are available, free of charge, from your dealer or Paladin.

## PLACEMENT OR REPLACEMENT OF SAFETY SIGNS

1. Clean area of application with non-flammable solvent, wash same area with soap and water.
2. Allow the surface to fully dry.
3. Remove backing from safety sign, exposing adhesive surface.
4. Apply safety sign to position shown in diagram, smooth out bubbles.

# SAFETY SIGNS



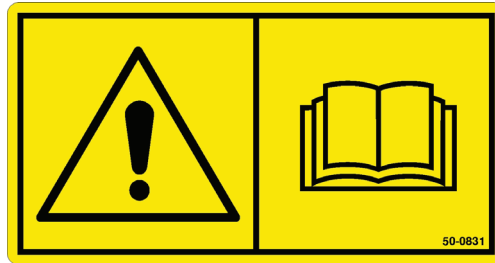
50-0832

**HAZARD: WARNING! HIGH PRESSURE FLUID HAZARD. ESCAPING HYDRAULIC FLUID CAN HAVE ENOUGH PRESSURE TO PENETRATE SKIN.** Consult physician immediately if skin penetration occurs.

**AVOIDANCE: KEEP SAFE DISTANCE AWAY FROM HAZARD. RELIEVE PRESSURE BEFORE DISCONNECTING LINES. DO NOT** use hands to check for leaks. *Failure to heed this warning could result in serious injury or death.*



**43307 MANDATORY ACTION: READ MANUALS:** Read manuals for important information.



50-0831

**HAZARD: GENERAL WARNING.**

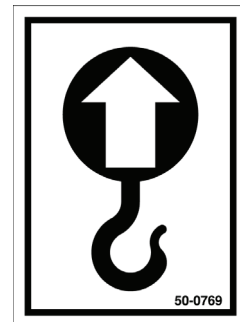
**AVOIDANCE: READ HANDBOOK - DO NOT OPERATE OR SERVICE UNLESS YOU HAVE READ AND UNDERSTAND THE INSTRUCTIONS AND SAFETY INFORMATION IN THE OPERATOR'S HANDBOOK AND ALL PRIME MOVER MANUALS.** *Failure to follow the instructions or heed the warnings could result in serious injury or death.*



50-0834

**HAZARD: WARNING! PINCH POINT HAZARD.**

**AVOIDANCE: KEEP HAND SAFE DISTANCE AWAY FROM HAZARD.** *Failure to heed this warning could result in serious injury or death.*



50-0769

**LIFT POINT (HOOK)**



50-0840

**HAZARD: WARNING! FLYING OBJECTS HAZARD.**

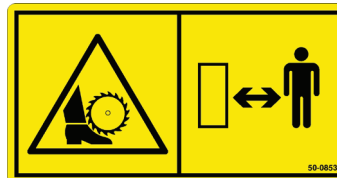
**AVOIDANCE: KEEP SAFE DISTANCE AWAY FROM HAZARD. REMOVE ALL PEOPLE, ANIMALS AND PROPERTY THAT COULD BE INJURED OR DAMAGED BY FLYING DEBRIS FROM THE AREA.** *Failure to heed this warning could result in serious injury or death.*



**43306 CAUTION! NOT A STEP**



**50-0907 MANDATORY ACTION:** Grease every 8 hours.



50-0853

**HAZARD: DANGER! ENTANGLEMENT HAZARD**

**AVOIDANCE:** Keep safe distance away from hazard. *Failure to heed this warning will result in serious injury or death.*



43305

**HAZARD: WARNING! GUARD COVERING MOVING PARTS**

**AVOIDANCE:** Guards and covers must be in place. Read Operator's Manual. *Failure to heed this warning could result in serious injury or death.*

# INSTALLATION & SET-UP

## **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).**

### **Loaders**

1. Place rake on a firm, large, level surface.
2. Refer to operator's manual(s) for your prime mover, loader, and quick-attach and follow mounting instructions.
3. Carefully raise loader and cycle the rollback/dump cylinders to check clearances and verify all mounting procedures have been successfully completed.

**NOTICE!** *Lubricate all grease fittings before connecting rake to prime mover's hydraulic system. Refer to AUTORAKE® MAINTENANCE and follow the instructions.*

### **3 Point Hitch Category 1 or 2**

1. Place rake on a firm, large, level surface. Make sure rake is in operating position and level.
2. Read and understand the Operation and Maintenance manual for your tractor before installing this product.
3. Remove topline on your tractors' 3 point and drive tractor backwards into position to connect lower links to attachment mounting ears. Ears have a combination category 1 & 2 hitch pin installed. You need to make sure outer pin matches your tractors' category. Select a hole position on mounting ears that aligns or is a little above lower link points with tractor link arms fully lowered and connect arms.
4. The upper link cylinder provided with rake requires a category #2, 1" diameter pin to attach to tractors' upper link point. If you have a category #1 tractor you will have to add bushings to the pin to make it a category #2 size pin. It is important that when you pin the end of the cylinder to the tractors' upper link point there is between 4" and 5" of exposed cylinder rod. If you have less the bucket will not roll back enough and if you have more the bucket will not dump properly. Move the cylinder pin hole position on the mounting ears until you attain the recommended amount of exposed cylinder rod.

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

# 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.

## READ AND UNDERSTAND ALL SAFETY STATEMENTS



Read all safety decals and safety statements in all manuals before beginning any AutoRake® hydraulic connection. 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.

## Loaders

1. Disconnect hydraulic hose quick couplers from one another and attach to prime mover. See instructions in prime mover's manual.
2. Carefully raise loader and cycle rollback/dump cylinders to check hose clearances and check for any interference. Operate hydraulic cylinder(s) on rake to make the same checks.
3. Cycle the hydraulic cylinder(s) on this product several times from fully retracted to fully extended until all air has been completely removed from the cylinder(s).

## 3 Point Hitch Category 1 or 2

1. This product requires two sets of auxiliary hydraulics. Purchase proper couplers and hoses for the upper link cylinder locally and attach to the tractor per the instructions in your tractors' operators manual.
2. Carefully raise the link arms and cycle the upper link cylinder to check hose clearances, interferences, and acceptable range of motion to roll back and dump the bucket. Operate the hydraulic cylinder on the attachment to make the same checks.
3. Cycle hydraulic cylinder(s) on rake several times from fully retracted to fully extended until all air has been completely removed from cylinder(s).

**NOTICE!** *When shipped, hydraulic cylinder(s) on this product contained air or an air-fluid mixture. The orifices beneath the port(s) of the cylinder barrels will restrict exit of air. Failure to remove all air from hydraulic cylinder(s) can cause uneven, jerky cylinder movement when hydraulic controls are being operated and unwanted cylinder movement when controls are not being operated.*

**WARNING!** Do not lock auxiliary hydraulics of prime mover in the "ON" position. Failure to obey this warning could result in death or serious injury.



# OPERATION

**WARNING!** Failure to obey the following procedures could result in death or serious injury.



- Never lift rake above (a) the operator's eye level or (b) to a height where visibility is obstructed, whichever is lower.
- Do not roll back this product so far that the load falls off toward or on the operator.
- Do not lock the auxiliary hydraulics of your prime mover in the "ON" position.
- Keep everyone at least nine feet (2.7m) away from rake when operating.

**CAUTION! NOT A STEP!**



**Failure to obey instructions in this section may result in personal injury.**

- Do not use the top of this product as a step. Under certain conditions, this area can be slippery.

**NOTICE!** *Attempting to pick up large rocks, large tree branches, etc.*

***CAN result in damage to rake and  
WILL void all Paladin warranties.***

**NOTICE!** *Using this product to till compacted soil*

***CAN result in damage to rake and  
WILL void all Paladin warranties.***

Before using rake, make sure that:

- the area is free of all boulders 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.
- the 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, (If rake chain does not move but hydraulic cylinder begins to retract, activate auxiliary hydraulics in opposite direction to get rake chain to operate.)
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.**

To begin raking:

1. Activate auxiliary hydraulics for operating the rake chain, (If rake chain does not move but hydraulic cylinder begins to retract, activate the auxiliary hydraulics in opposite direction to get rake chain to operate.)
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

To achieve best possible results:

- 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 needed to achieve the desired results depending on what those results are and what the initial conditions are.
- The wide variety of soil types, moisture conditions, compaction levels, foliage densities, and rock and debris quantities that can be encountered mean that the operator may need to make adjustments based upon the operator's experience.

***NOTICE! Opening the main housing and using the bucket for standard bucket operations CAN result in damage to rake and WILL void all Paladin warranties.***

## 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.

## GENERAL STORAGE:

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.
- Inflate tires to recommended tire pressure.
- Fill fuel tank and hydraulic oil tank to maximum.
- Check antifreeze properties and drain fluids as appropriate.

Removal from Storage:


- Remove cover.
- 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.

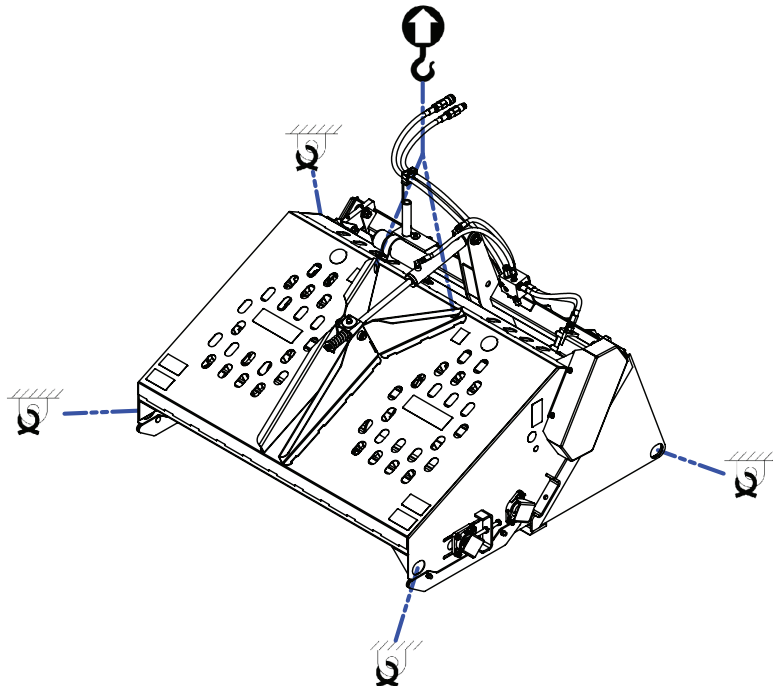
**WARNING!**  **USE LIFTING ACCESSORIES (CHAINS, SLINGS, ROPES, SHACKLES AND ETC.) THAT ARE CAPABLE OF SUPPORTING THE SIZE AND WEIGHT OF YOUR ATTACHMENT. Secure all lifting accessories in such a way to prevent unintended disengagement. Failure to do so could result in the attachment falling and causing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

## 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.**



## MAINTENANCE

Procedure	Before Each Use	After Every 10 Hours	After Every 30 hours	After Every 250 Hours	Before Extended Storage (60 Days)
Tighten Hardware	✓				
Check and Tighten Hydraulic Fittings and Hoses	✓				
Inspect all Safety Signs	✓				
Replace Damaged or Excessively worn parts	✓				
Grease Fittings (11)		✓			
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				✓	
Oil Drive & Rake Chains (3)					✓



# 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.*

Before making any adjustments to your AutoRake always follow these four steps:

1. Park prime mover on level surface with rake properly attached.
2. Place prime mover's transmission in "Park" and engage parking brake.
3. Lower rake onto level surface.
4. Shut off prime mover's engine, remove starter key, wait for all moving parts to come to a complete stop and relieve all pressure in hydraulic lines.

## DRIVE CHAIN ADJUSTMENT

1. Remove four bolts from drive chain shield. (Two from the top-front face and two from the bottom-rear face.)
2. Remove shield by pulling straight out to the left.
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 inches (.97cm) to .5 inches (1.3cm).
4. Retighten the idler sprocket nut to 304 ft. lbs. (412N-m), + or - 22 ft. lbs (30N-m).
5. Recheck the chain deflection and repeat steps 7 and 8 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 ADJUSTMENT

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 .63 inches (1.6cm) dia. x 6 inches (15cm) long tightener bolt.
3. Tighten the tightener bolts until a midpoint deflection of .75 inches (1.9cm) to 1 inch (2.5cm) 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 1.5 inches (3.8cm) to 2 inches (5cm) may be easier to measure.)
4. Retighten 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 retighten 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 steps 5 to 8 until both the specified deflection and desired line of travel has been attained.

## TROUBLESHOOTING

Problem	Possible Cause	Possible Solution
Rake throwing too much soil	Depth adjustment plates in wrong position	Move adjustment plates to a lower hole in the housing.
Rake missing items that should be collected	Depth adjustment plates in wrong position	Move adjustment plates to a higher hole in the housing.
Rake binds up and stops	Rock or debris stuck inside	Reverse to clean
Chain wandering or hopping	Chain is loose	Adjust tension on chain
Shroud will not raise in reverse	Hydraulic hoses or fittings are loose or damaged	Tighten or replace hoses or fittings

# SPECIFICATIONS

## Prime Mover Specifications

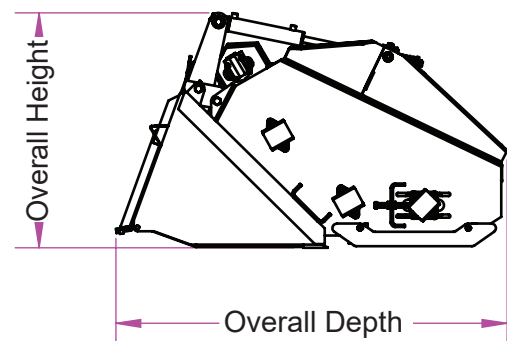
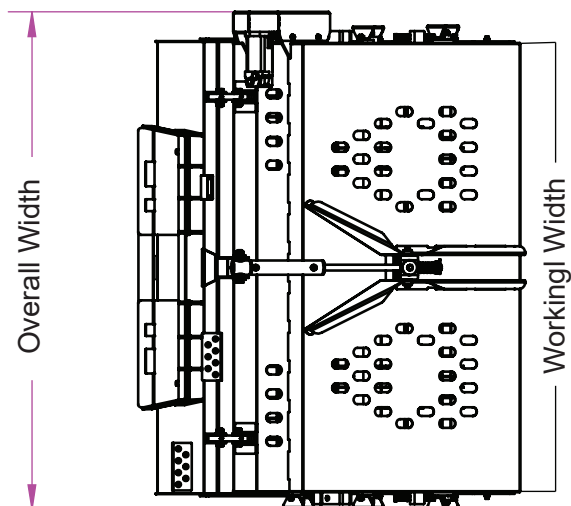
**NOTICE!** Exceeding any of the maximum recommended prime mover specifications **CAN** result in damage to this product and **WILL** void all Paladin warranties.

DESCRIPTION	SPECIFICATIONS
Rated net Engine Horsepower of Prime Mover	110 hp. maximum
Weight of Prime Mover without AutoRake®	11,500 lbs. ( 5216 kg) maximum
Hydraulic Pressure Output	4,000 psi (276 bar) maximum
Hydraulic Flow Output	25 gpm (95 lpm) maximum
Rear Ballast	As required to maintain full prime mover stability. (Note the Shipping Weight on the specifications page, then see the operator's manual(s) for your prime mover, loader, and quick-attach for ballasting needs.)

## AUTORAKE® Specifications

Model Number	LAF6864	LAF6874
Overall Width	74 inches (188 cm)	84 inches (213 cm)
Overall Height	40 inches (102 cm)	40 inches (102 cm)
Overall Depth	64 inches (163 cm)	64 inches (163 cm)
Working Width	66 inches (168 cm)	76 inches (193 cm)
Quantity of Teeth	396	462
Bucket Capacity	13 cu. ft. (.368 cu. m)	15 cu. ft. (.425 cu.m)
Shipping Weight	1092 lbs (495 kg)	1200 lbs (544 kg)

All replacement hydraulic hoses must have a minimum rated working pressure of 4,000 psi (276 bar).



# 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



**PALADIN**<sup>TM</sup>  
CONSTRUCTION GROUP



## EU DECLARATION OF CONFORMITY

*I, the undersigned, on behalf of:*

Manufacturer/Technical Document Holder

Paladin Construction Group  
2800 N. Zeeb Road  
Dexter, MI 48130 USA  
Phone: 734-996-9116  
Fax: 734-996-9014

*hereby declare that the following product:*

Description of Equipment:

**Hydraulically operated Tree Spade for compact tool carrier (CTC),  
mini excavator and skid steer loader applications. Used for  
removing or transplanting trees and shrubs.**

Attachment Model:

**2030, 2625, 3625, 4425, 2415, 3215, 4415**

Serial Number:

Conforms to:

**2006/42/EC Machinery Directive;  
EN ISO 4254-1; EN ISO 14121-1;  
EN ISO 12100-1; EN ISO 12100-2;  
EN ISO 2867; EN 982**

Certification method:

**Self-certified, per Annex  
V of the Directive**

Name and address of the person in the Community authorized to compile the technical construction file:

**STANLEY Dubuis  
17-19, rue Jules Berthanneau-BP 3406 41034  
Blois Cedex, France**

At Delhi, Signature, Title, Date

Signature: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_

## UKCA DECLARATION OF CONFORMITY

The undersigned, representing the following manufacturer:

**Manufacturer:** Paladin Attachments  
2800 N Zeeb Rd.  
Dexter, MI 48130  
United States

Declares that the product(s)

**Product identification:**

Description: HYDRAULIC CABLES CUTTING TOOLS WITH 18V RECHARGEABLE BATTERY  
Model: **BCP040GC - BCP045GC - BCP055GC - BCP065CC - BCP085G+**  
Serial number: L-00001 à L-99999

Conforms to the UK Regulations:

The supply of Machinery (Safety) Regulations 2008, S.I. 2008/1597 (as amended)

Electromagnetic Compatibility Regulations, 2016, S.I. 2016/1091 (as amended)

The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012, S.I. 2012/3032 (as amended)

Designated Standards:

SI 2008/1597 NF EN ISO 15744 (December 2008)  
NF EN ISO 3744 (February 2012)  
NF EN ISO 20643 (September 2008)  
NF EN ISO 11201 (December 2010)  
NF EN 12096 (September 1997)

SI 2016/1091 EN 62233 (September 2013)  
EN 55014-1 (June 2017)  
EN 55014-2 (July 2015)  
EN 62311 (October 2008)

S.I. 2012/3032 NF EN IEC 63000 (December 2018)

The undersigned is responsible for compilation of the technical file and makes this declaration on behalf of DUBUIS.

Signature

Blois, July 28, 2021

Patrick VERVIER,

Engineering Manager