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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.

#### **IMPORTANT**

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
- b 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 <a href="http://www.paladinattachments.com/patents.asp">http://www.paladinattachments.com/patents.asp</a>.

## **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.



INDICATES A HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, WILL RESULT IN DEATH OR SERIOUS INJURY



INDICATES A HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN DEATH OR SERIOUS INJURY



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 AND UNDERSTAND MANUAL**

- ▶ Read and understand this manual and other safety information provided with this equipment and base machine (prime mover) and be sure all controls and instructions are understood before attempting to install, operate or maintain this equipment.
- ▶ Read and follow all safety warnings and instructions.
- ▶ Do not discard safety instructions. Give to the operator.
- ▶ Improper installation, operation or maintenance of this equipment could result in serious injury, death or property damage.

#### **READ AND UNDERSTAND ALL SAFETY STATEMENTS**

- ▶ Read all safety statements in this manual and on your equipment safety decals.
- ▶ Keep safety decals in good condition. Replace missing or damaged safety decals.
- ▶ Because the manufacturer cannot foresee all hazardous circumstances, the precautions listed in this manual and on the equipment are not all-inclusive. If a procedure, method, tool or part is not specifically recommended by the manufacturer, determine whether it is safe for you and others, and that the equipment will not be damaged or made unsafe as a result of your decision to implement it.



#### PERSONAL PROTECTIVE EQUIPMENT (PPE)

▶ Always wear personal protective equipment (PPE) appropriate for the job, such as eye protection, ear protection, gloves, head protection,

breathing protection and safety shoes. PPE should be worn at all times when operating, maintaining or observing the tool.

► Use PPE that conforms to standards ANSI Z87.1 (Eye and Face Protection), ANSI Z89.1 (Head Protection), ANSI Z41.1 (Foot Protection) and ANSI S12.6 (S3.19) (Hearing Protection).





M003 M004
Wear Ear Wear Eye
Protection Protection

M016 Wear a Mask

▶ Do not wear loose fitting clothing, jewelry, long hair or gloves with cut or frayed fingers. These items can become entangled in the equipment causing hazards such as choking, scalping, lacerations, severed or broken appendages.

#### **KNOW YOUR EQUIPMENT**

- ▶ Know your equipment's capabilities, dimensions, and controls before operating.
- ▶ Do not operate a damaged, improperly adjusted, modified or incompletely assembled tool.
- ▶ Make sure all safety guards and devices are installed.
- ► 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.
- ► Inspect the tool before each use and ensure all safety decals are in place and legible. Contact manufacturer if replacement decals are needed.
- ► Know and follow good work practices when assembling, maintaining, repairing, mounting, removing or operating this equipment.

#### SAFELY OPERATE EQUIPMENT

- ▶ Establish a training program for all operators to ensure safe operation.
- ▶ Do not operate the tool unless thoroughly trained or under the supervision of a qualified operator or instructor.
- ► Know and obey all OSHA regulations, local laws, and other professional guidelines for your operation.
- ► Know your work site safety rules. When in doubt on any safety issue, contact your supervisor or safety coordinator.
- ▶ Assess hazards to yourself and others around you before operating the tool. Start in a work area without bystanders. A hazard to bystanders can include, but is not limited to, the risk of serious injury or death caused by the tool or accessories being dropped from an elevated height. Keep children out of the work area.
- ▶ Do not operate the equipment from anywhere other than the correct operator's position.
- ▶ Do not alter or remove any safety feature from the prime mover or tool.
- ▶ Stay alert, watch what you are doing and use common sense when operating the tool. Do not operate the tool if you are tired or under the influence of drugs, alcohol or medication. A moment of inattention while operating the tool may result in serious

## General Safety Precautions

injury.

#### **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

#### **DUST AND FUMES**

- ▶ WARNING: Dust created by power sanding, sawing, grinding, drilling, and other job site activities may contain chemicals known to cause cancer, birth defects or other reproductive harm. Some examples of these chemicals are:
  - Lead from lead-based paints
  - Crystalline silica from quartz, bricks, cement and other masonry products
  - Arsenic and chromium from chemically-treated lumber
- ➤ To reduce your exposure to these chemicals: work in a well ventilated area and work with approved safety equipment, such as dust masks that are specially designed to filter out microscopic particles. Protect yourself and those around you.



- Research and understand materials you are working with.
- ▶ Follow correct safety procedures and comply with all applicable national, state or provisional health and safety regulations relating to them, including, if appropriate, arranging for the safe disposal of the materials by a qualified person.
- ▶ Use dust suppression or dust collection methods when using a tool that may cause high levels of dust.
  - Control dust or fumes at the point of emission.
  - Direct tool exhaust to minimize disturbance of dust.
  - Operate and maintain the tool as recommended in this manual to minimize dust.
  - Use respiratory protection in accordance with employers instruction or as required by occupational health and safety regulations.
  - Avoid prolonged contact with dust. Allowing dust to get into your mouth, eyes or on the skin may promote absorption of harmful chemicals.

#### SAFELY MAINTAIN AND REPAIR EQUIPMENT

- **▶** Work in a clean and dry area.
- ▶ Keep the work area well lit.
- ▶ Work on a level surface.
- ▶ Use properly grounded electrical outlets and tools.
- ▶ Use the correct tools for the job at hand.
- ► Ensure tools are working properly and safely by performing preventative maintenance procedures.
- ► Wear protective equipment specified by the tool manufacturer.
- ▶ Do not perform any work on the tool 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, remove all maintenance tools and unused parts from equipment.
- ► Check for correct operation of the tool. If not operating properly, shut down the prime mover, follow proper Lock-Out / Tag-Out procedures and tag "DO NOT OPERATE" until all problems are corrected.

#### **USE CARE WITH HYDRAULIC FLUID PRESSURE**

- ▶ DO NOT attempt to make repairs to hydraulic lines or components while the system is
  - pressurized. Hydraulic fluid under pressure can penetrate the skin and cause serious injury or death. Follow proper procedures for relieving pressure from hydraulic system before connecting of disconnecting hydraulic lines or components.
- ► Wear personal protective equipment (PPE) such as safety glasses, gloves and protective clothing at all times.
- ► Hydraulic leaks under pressure may not be easily visible. Keep hands and other body parts away from a suspected leak. Flesh injected with hydraulic fluid may develop gangrene or other permanent disabilities. Use a piece of cardboard or wood when searching for hydraulic leaks.



- ▶ Hydraulic fluid can become hot during operation. DO NOT come in contact with hot hydraulic fluid as it could cause severe burns.
- ▶ If exposed to hydraulic fluid, wash hands immediately.
- ▶ Inspect and clean couplers before use. Replace damaged couplers immediately.
- ▶ Ensure the couplers are properly connected and are tight.
- ▶ Do not smoke while working on the hydraulic system.

#### DO NOT MISUSE OR MODIFY EQUIPMENT

- ▶ Use and maintain the tool as stated in this manual. Misuse of the tool can cause serious injury.
- ▶ Do not modify the tool in any way. Modifications may weaken its integrity and may impair its function, safety, life and performance. When making repairs use only factory recommended replacement parts, following authorized instructions. Use of parts that are not factory approved may be substandard in fit and quality and may cause damage and void the warranty.
- ▶ Do not 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.

#### **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.

## **Equipment Safety Precautions**

## <u>^</u>

#### **WARNING!**

#### **OPERATING THE BRUSH CUTTER**

- ▶ Clear area of bystanders and livestock before operating. The brush cutter (tool) is capable of producing large amounts of flying debris in all directions. Do not operate the brush cutter without a shatterproof door or front shield installed on the prime mover.
- ▶ Let others know when and where you will be working. Make sure no one is behind the equipment or for several hundred feet in any direction around the equipment when in operation. Never allow anyone to approach the brush cutter when in operation.
- ► Make sure all covers and front deflector chains are installed before operating the brush cutter
- ▶ Make sure lift limiting chain(s) are properly installed before operating the brush cutter.
- ▶ Do not operate the brush cutter with the back of the tool more than 12" (305 mm) above the ground.
- ▶ 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.
- ▶ Do not operate without good visibility or light.
- ▶ Do not exceed the rated operating capacity of your prime mover.
- ▶ Do not exceed the rated lifting capacity of your prime mover.
- ► Test all controls before you begin operation.
- ▶ Operate only from the operator's station.
- ▶ Never try to board or exit the equipment while it is running.
- ▶ Keep all step plates, grab bars, pedals, and controls free of dirt, grease, debris, and oil.
- ▶ Do not place hands or feet under deck while in operation or with engine running.
- ▶ Do not raise the brush cutter when the blades are rotating.
- ▶ Use extreme caution when operating on or crossing gravel drives, walkways or roads.
- ▶ When operating on slopes, drive up and down, not across. Avoid steep hillside operation, which could cause the prime mover to overturn.
- ▶ Reduce speed when driving over rough terrain, on a slope, or turning, to avoid overturning the vehicle.
- ▶ Do not operate equipment if tired or under the influence of drugs or alcohol, which can impair alertness or coordination. A person taking prescription or over-the-counter medications should seek medical advice before he or she can safely operate equipment.
- ▶ Never leave the brush cutter unattended when in the raised position.
- ▶ Before exiting the prime mover, lower the brush cutter to the ground (both skids on the ground), disengage the auxiliary hydraulics, apply the parking brake, turn off the prime mover's engine and remove the key.

#### TRANSPORTING THE BRUSH CUTTER

- ► Travel only with the brush cutter in a safe transport position to prevent uncontrolled movement. Drive slowly over rough ground and on slopes.
- ▶ When transporting on a trailer: Secure brush cutter at recommended tie down locations using tie down accessories that are capable of maintaining tool stability.



- ▶ Disconnect from hydraulic power source, during transporting, when installed on prime mover.
- ▶ 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.

#### **MAINTAINING THE BRUSH CUTTER**

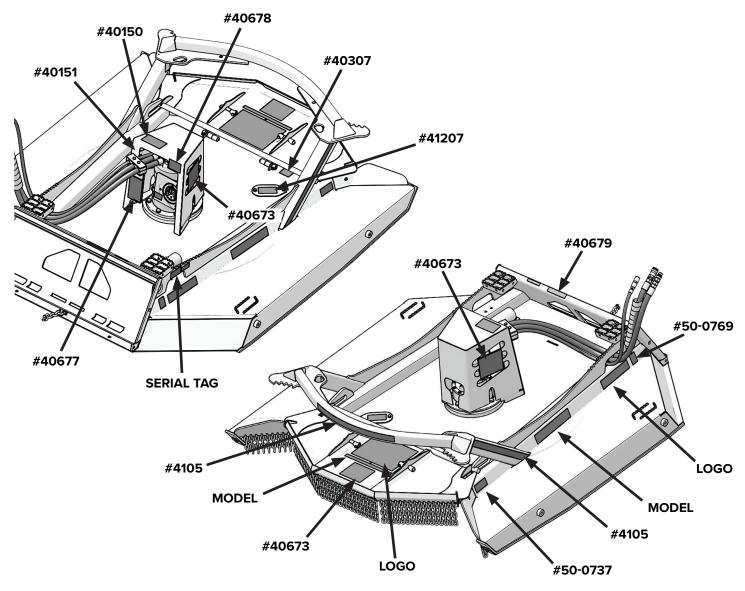
- ▶ Before performing maintenance, disengage the auxiliary hydraulics, lower the brush cutter to the ground, apply the parking brake, turn off the prime mover's engine and remove the key.
- ▶ Make sure all rotation has stopped before making any adjustments or repairs.
- ▶ Never perform any work on the brush cutter 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 brush cutter. If not functioning properly, shut down the machine, follow proper Lock-Out / Tag-Out procedures and 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. Stop the prime mover engine and cycle control levers to release hydraulic pressure before servicing or adjusting hydraulic systems.
- ► Avoid working under raised loader arms and/or brush cutter. Serious damage or personal injury could result.
- ▶ If the brush cutter must be in a raised position for maintenance or any other reason, support the brush cutter securely to prevent accidental release of the lifting mechanism.
- ▶ Make sure support material is solid, not decayed, warped, twisted, or tapered. Do not use support material made of concrete blocks, logs, buckets, barrels, or any other material that could suddenly collapse or shift positions.

## **Decals**

#### Decal Placement

#### **GENERAL INFORMATION**

The diagram on this page show the location of the decals used on your tool. 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 tool. 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.





#### ♠ DANGER!

# 40673 - ROTATING BLADE

#### **SAFETY INSTRUCTIONS**

AVOID STALLING ROTARY CUTTER Continuous blade rotation is required to prevent overheating of hydraulic system.

#### TO RESTART BLADE ROTATION:

- Disengage auxiliary hydraulics.
- Remove rotary cutter from debris.
- Engage auxiliary hydraulics to start blade rotation.

## REPEATED STALLING OF ROTATING BLADE:

- Disengage auxiliary hydraulics.
- Remove rotary cutter from debris.
  Review operating conditions and
- size/density of material.

   Make necessary corrections to
- avoid future stalling.
- Engage auxiliary hydraulics to start blade rotation.

SEE OPERATOR'S MANUAL FOR MORE INSTRUCTIONS.  $$_{406}$$ 

# 40677 - SAFETY INSTRUCTIONS



#### **WARNING!**

Keep all components in good repair.

# 40151 - HIGH PRESSURE FLUID

### **A WARNING**

## BEFORE LEAVING OPERATOR'S SEAT:

- Lower lift arms against frame and place unit on the ground.
- 2. Disengage auxiliary hydraulics.
- Stop Engine.
- 4. Engage Parking Brake.

0678

#### **↑** WARNING!

# 40678 - BEFORE LEAVING OPERATOR'S SEAT



# 50-0769 - LIFT POINT

#### NOTE

Contact your local dealer for model number and logo decals.

## **Decals**

**Decal Placement** 

## DANGER STAND CLEAR

♠ DANGER!

# 4105 - STAND CLEAR



DANGER!

# 40307 - GUARD MISSING



**WARNING!** 

# 40150 - READ MANUAL



LIFT LIMITING CHAIN MUST BE PROPERLY INSTALLED DURING OPERATION OF ROTARY CUTTER. 4067

WARNING!

# 40679 - LIFT LIMITING CHAIN



**↑** WARNING!

# 50-0737 - PINCH POINT



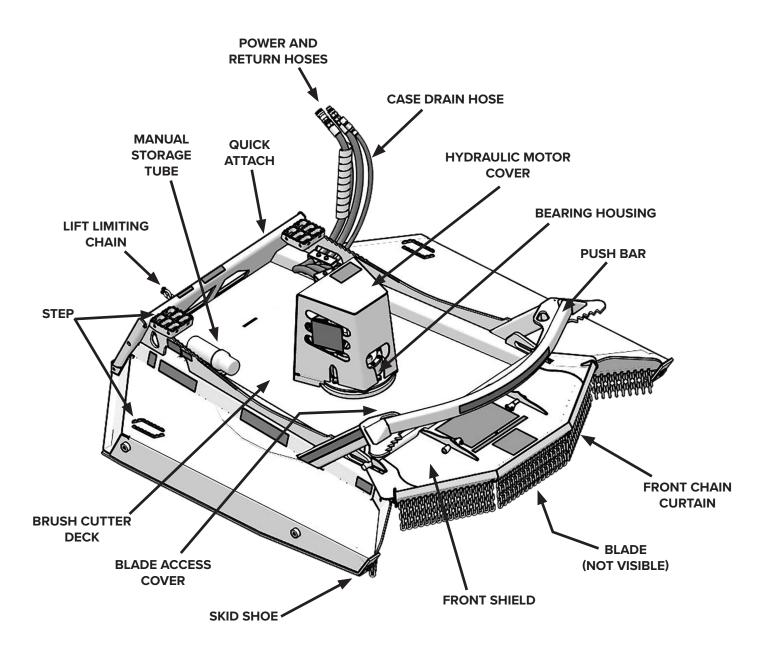
**WARNING!** 

**# 41207 - MOVING PARTS** 



## **Nomenclature**

The purpose of the diagram below is to acquaint you with the various names of the brush cutter components. This knowledge will be helpful when reading through this manual or when ordering service parts.



## Installation

#### **GENERAL INFORMATION**

The following instructions will help you to mount your brush cutter (tool) onto your prime mover. The brush cutter is operated by the prime mover's auxiliary hydraulics and mounts to the quick attach mechanism for easy operator hook-up.

Your prime mover must have an auxiliary hydraulic system and a shatterproof door or front shield to operate the brush cutter.



#### **WARNING!**

#### **FLYING DEBRIS HAZARD**

Do not use the brush cutter with a prime mover that does not have a shatterproof door or front shield installed. Failure to do so could result in serious injury or death.

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

#### PRE-INSTALLATION



#### **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).



#### **WARNING!**

#### **PALLET BANDING CAN BE SHARP**

Always wear Personal Protective Equipment (PPE) when unpacking, installing, using, or maintaining the tool.

#### LACERATIONS AND OTHER PERSONAL INJURY CAN OCCUR.

- 1. Carefully remove the pallet banding.
- 2. Remove the tool from the shipping pallet.
- 3. Place on level, hard ground (e.g. concrete floor). Use wood blocking if necessary.



INSTALLATION

- 1. Lower any installed tool, on the front of the prime mover, to the ground and relieve pressure in the auxiliary hydraulic lines.
- 2. Remove tool from the prime mover as instructed in your prime mover operator's manual.
- 3. Install the brush cutter onto your prime mover. Follow all standard safety practices and the installation instructions in your prime mover operator's manual.



#### **WARNING!**

#### **CRUSH HAZARD**

Make sure the tool is properly locked to the prime mover before operation. Failure to do so could result in separation of the tool from the prime mover causing serious injury or death.

#### **CONNECTING HYDRAULICS**



#### **WARNING!**

#### **HIGH PRESSURE FLUID HAZARD**

Hydraulic fluid under pressure can penetrate the skin and cause serious injury or death. Follow proper procedures for relieving pressure from hydraulic system before connecting of disconnecting hydraulic lines or components.

Wear personal protective equipment (PPE) such as safety glasses, gloves, and protective clothing at all times.

- 1. Lower the tool to the ground (both skids on the ground), apply the parking brake, turn off the prime mover's engine and remove the key.
- 2. Exit the prime mover.
- 3. Inspect the hydraulic couplers and make sure they are free from any foreign material or contaminants.
- 4. Connect the tool case drain hose to the case drain on your prime mover.

#### **IMPORTANT**

The case drain hose must be connected to the case drain of the prime mover before the power and return hoses are connected.

#### NOTICE

Make sure the case drain female coupler is fully engaged to the prime mover connection. Immediate hydraulic motor seal failure will occur if the case drain hose is not properly connected.

5. Connect the tool power and return hoses to the auxiliary hydraulic system of your prime mover. Route hoses in such a way to avoid pinching or chafing.

## Installation

6. Following the standard start up procedure for your prime mover, start the prime mover and run the tool to purge any air from the hydraulic system. Check for proper hydraulic connection, hose

#### **LIFT LIMITING CHAIN**



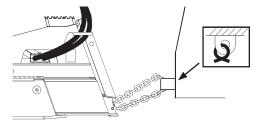
#### **WARNING!**

#### **FLYING DEBRIS HAZARD**

routing, and hose length.

Do not use the brush cutter without the limiting chain(s) installed. The back of the brush cutter should never be more than 12" (305 mm) off the ground for proper and safe cutting. Failure to do so could result in serious injury or death.

- 1. Connect the lift limiting chain to the front of your prime mover.
- 2. Raise the brush cutter 12" (305 mm) above ground level.
- 3. Route the end of the lift limiting chain from the back of the brush cutter and then through the tie down mechanism on the front of your prime mover.
- 4. Tie the chain securely back to itself with the shackle provided, to limit the lifting capabilities of the cutter to 12" (305 mm) maximum.



#### DETACHING

- 1. Lower the tool to the ground (both skids on the ground), apply the parking brake, turn off the prime mover's engine, and remove the key.
- 2. Follow the prime mover operator's manual to relieve pressure in the hydraulic lines.
- 3. Exit the prime mover.
- 4. Disconnect the tool hoses from the auxiliary hydraulic connections of the prime mover.

#### NOTE

It is recommended that the case drain hose be disconnected after the power and return hoses.

- 5. Connect the tool's male and female hydraulic couplers together or install dust caps and plugs to prevent contaminants from entering the hydraulic system. Store hoses off of the ground to help prevent damage.
- 6. Remove the lift limiting chain(s).
- 7. Remove (detach) the tool from the prime mover as instructed in your prime mover operator's manual.



## **Operation**

#### **INTENDED USE**

The brush cutter is designed for cutting brush and small trees up to 10" (254 mm) in diameter while still maintaining a 12" (305 mm) maximum ground clearance. Use in any other way is considered contrary to its 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.

#### **GENERAL INFORMATION**

The brush cutter attaches to the quick-attach mechanism of your prime mover. Due to this arrangement, thorough knowledge of the prime mover controls is necessary for machine operation. Read and understand your prime mover's operator's manual for information regarding operation before attempting to use the brush cutter. Follow all installation instructions for the proper installation of the tool onto your prime mover before attempting to operate your brush cutter.



#### **WARNING!**

#### **FLYING DEBRIS HAZARD**

The brush cutter is capable of producing large amounts of flying debris in all directions.

- ▶ Clear area of bystanders and livestock before operating.
- ▶ Do not operate the brush cutter without a shatterproof door or front shield installed on the prime mover.
- ▶ Let others know when and where you will be working. Make sure no one is behind the equipment or for several hundred feet in any direction around the equipment when in operation.
- ▶ Never allow anyone to approach the brush cutter when in operation.
- ▶ Make sure all protective covers and front deflector chains are installed before operating the brush cutter.
- ▶ Make sure lift limiting chain(s) are properly installed before operating the brush cutter.
- ▶ Do not operate the brush cutter with the back of the tool more than 12" (305 mm) above the ground.
- ▶ The front shield should always be in the down position except during operation.

#### **ROTATING BLADE HAZARD**

- ▶ Do not place hands or feet under deck while in operation or with engine running.
- ▶ Do not raise the tool when the blades are rotating.
- ▶ Before exiting the prime mover, lower the tool to the ground (both skids on the ground), disengage the auxiliary hydraulics, apply the parking brake, turn off the prime mover's engine and remove the key.

## **Operation**

#### PRESSURE GAUGE

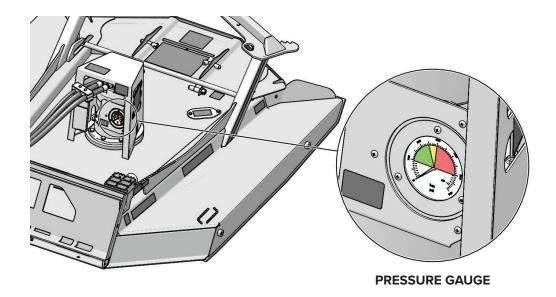
The brush cutter has a pressure gauge located on the back of the motor cover. The pressure gauge shows when maximum rotational energy is stored in the cutting blade for optimum production and also where the stall point reading is for your prime mover and brush cutter.

Due to the range of prime movers that the brush cutters are mounted on, we recommend finding your ideal reading (steady state or stable unchanging condition), along with the stall point on the gauge before operating.

Once the steady state and stall point is found and you become familiar with operating your tool, you will soon be able to tell at a glance when your tool is ready for operation and also when you need to slow or stop operation to avoid stalling.

#### NOTE

Your STALL POINT is identified when operating the tool and noting the reading or location of the needle on the gauge when your brush cutter stalls.



#### Locating the Ideal Gauge Reading (Steady State)

- 1. Verify area is clear of all bystanders.
- 2. Start your prime mover.
- 3. Lift the tool approximately 6" 8" (152 203 mm) off the ground.
- 4. With the engine at half throttle engage the auxiliary hydraulics to start flow to the tool.
- 5. Slowly increase engine RPM to full throttle.

#### IMPORTANT

If excessive noise or vibration exists, disengage the auxiliary hydraulics and shut down the prime mover immediately. Determine the cause of the problem and correct before continuing operation.



6. Once the prime mover is operating smoothly at full RPM, check the pressure gauge. When the needle on the gauge becomes stable or unchanging, you have your ideal reading. (This may take several seconds.)

#### **IMPORTANT**

To get an accurate reading when operating in cold weather, allow the oil in your prime mover to warm up before identifying your ideal reading on the gauge.

#### **CUTTING OPERATION**

- 1. Raise the back of the tool off of the ground approximately 4" (102 mm) to allow the material to clear from under the cutting deck as you travel forward.
- 2. Place the front skid shoes 2" 6" (51 152 mm) off the ground. This is the preferred position for cutting grass and heavy vegetation.
  - Never drive your prime mover with the front of the brush cutter tilted to the point your view is obstructed. Always make sure you can see what you are cutting.
  - ► Check the work area. Never operate the brush cutter in populated areas where thrown objects could injure persons or damage property.
  - ▶ Never raise the tool and expose yourself or anyone else to the rotating blades. If you can see the blades then the back of the tool is raised too high. Maximum ground clearance at any time is 12" (305 mm).
- 3. Activate the auxiliary hydraulics with the engine at half throttle.
- 4. Slowly increase engine speed.
- 5. Be sure the brush cutter is operating smoothly and at full speed, and then start forward travel while monitoring pressure gauge.

#### NOTE

Monitor hydraulic pressure to prevent forcing your prime mover or tool from repeatedly going over relief and therefore causing overheating of the hydraulic system.

## **Operation**

Cutting Large Brush and Small Trees (Up To 10" (254 mm) In Diameter:

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**WARNING!** 

#### **CRUSH HAZARD**

Trees can fall in any direction. It is the operator's responsibility to be certain the area is safe and clear of people, animals and personal property. Failure to do so could result in serious injury or property damage.

- 1. Roll the front of the brush cutter up 12" 24" (305 610 mm). DO NOT LIFT THE BACK OF THE CUTTER!
- Slowly drive into the tree. The front shield will raise up allowing the push bar on the brush cutter
  to push against the tree. Due to the angle of the brush cutter this will allow the blades to notch
  into the tree which will allow the push bar to bend the tree over and finish the cut.
- 3. If the push bar is unable to bend the tree, back up the prime mover and increase the angle of the brush cutter slightly.
- 4. Repeat Step #2 and #3 until the notch is sufficient (for the size of brush or tree you are cutting) to permit the push over bar to bend the tree.
- 5. When the cut is complete the remaining tree stump can be cut shorter using the brush cutter blades.
- 6. The tree can now be mulched by rotating the front of the brush cutter down slightly and driving forward. Repeat, if necessary. Remember do not lift the back of the cutter.

### **Avoid Repeatedly Stalling the Brush Cutter:**

Continuous rotation of the blade carrier is required to prevent overheating of the hydraulic system. Overheating of the hydraulic system is caused if hydraulic oil is repeatedly forced over the relief valve setting on either the prime mover or brush cutter (whichever is less). This can also cause the brush cutter to stall.

Take note of the maximum pressure gauge reading when the system goes over relief on your application (prime mover and brush cutter combination). Careful monitoring of the pressure gauge, on the brush cutter, will help you prevent the equipment from going over relief.

#### If the Brush Cutter Stalls:

- 1. Disengage the auxiliary hydraulics.
- 2. Remove the brush cutter from the material being cut.
- 3. Review operating conditions and the size/density of the material being cut. Make necessary corrections.

#### **Restarting the Cutting Blades:**

- 1. Make sure the condition that caused the brush cutter to stall has been corrected.
- 2. Engage the auxiliary hydraulics to start blade rotation.
- 3. Make sure the brush cutter is operating smoothly and at full speed, and then start forward travel while monitoring the pressure gauge.



#### TROUBLESHOOTING OPERATING CONDITIONS

Below are listed a few operating conditions that may cause repeated stalling of your brush cutter, and suggestions on how to correct them.

#### **Grass is Too Long or Thick:**

If cutting heavy vegetation, you may need to slow travel speed or make smaller passes (less than full cut) to prevent overloading and stalling the tool. Although the brush cutter is not designed for mowing grass, by monitoring blade sharpness and travel speed this can be accomplished.

#### **Brush is Too Large in Diameter:**

The brush cutter is NOT designed to cut trees larger than 10" (254 mm) in diameter. If brush is smaller than 10" in diameter and the cutter is stalling, check sharpness of the blades (see "Maintenance") and cut using the procedure described earlier in this section for Cutting Large Brush and Small Trees.

#### **Brush is Too Thick or Heavy:**

If cutting heavy or thick brush, you may need to slow travel speed or make smaller passes (less than full cut), to prevent overloading. If the blades seem to be unable to handle the volume of brush, slow down the travel speed until the tool reaches full speed before proceeding.

#### **Scalping the Ground or Bottoming Out:**

Be aware of changes in the terrain. Stay alert for drop-offs and holes. Check the terrain and the deck position before restarting and continuing cutting.

#### **Striking Foreign Objects:**

Stay alert for rocks, fencing, abandoned wells, septic tanks, or other foreign objects. If the brush cutter comes into contact with a foreign object, stop the tool, shut off the engine and disconnect the hydraulic couplers from the prime mover. Inspect the tool and repair any damage before restarting and continuing cutting. (Never try to weld or straighten damaged blades.) Inspect the work area for any other items, and if they are too large to be removed from the area, they should be flagged clearly.

#### NOTE

If the blades become bent or damaged, they can cause excessive vibration. Replace bent or damaged blades before proceeding (see "Replacing Cutting Blades").

## **Operation**

#### **STORAGE**

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

- Clean the tool thoroughly, removing all mud, dirt, and grease.
- ▶ Sharpen or replace blades. Replace all blades at the same time and do not try to weld or straighten damaged blades; loss of integrity may result.
- ▶ Inspect for visible signs of wear, breakage, or damage. Order any parts required, and make the necessary repairs to avoid delays when starting next season. Purchase only approved replacement parts.
- ► Tighten all loose nuts, cap screws, and hydraulic connections.
- Check the drive bearing housing for proper lubricant level.
- ▶ Seal hydraulic system from contaminants and secure all hydraulic hoses off the ground to help prevent damage.
- ▶ Replace decals if damaged or in unreadable condition.
- ▶ Apply a rust-preventive spray to all moving parts and to the bottom of the deck.
- ▶ Store the tool in a dry and protected place. Leaving the tool outside will materially shorten its life.

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

▶ Touch up all unpainted and exposed areas with paint, to prevent rust.

#### REMOVAL FROM STORAGE

- Remove all protective coverings.
- ► Check hydraulic hoses for deterioration and replace if necessary.
- ► Check all nuts and bolts for proper tightness, especially those securing the motor, bearing housing and blades.



#### **LIFT POINTS**



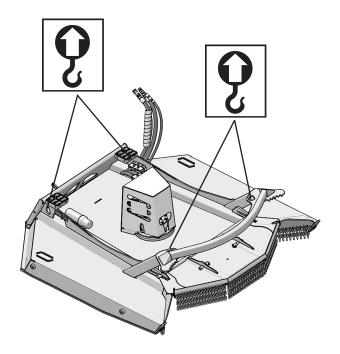
#### **WARNING!**

#### **CRUSH HAZARD**

Use lifting accessories (chains, slings, ropes, shackles and etc.) that are capable of supporting the size and weight of your tool. Secure all lifting accessories in such a way to prevent unintended disengagement. Failure to do so could result in the tool falling and causing serious personal injury or death.

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

- ▶ Attach lifting accessories to tool at recommended lifting points.
- ▶ Bring lifting accessories together to a central lifting point.
- ▶ Lift gradually, maintaining the equilibrium of the tool.



## **Operation**

#### **TIE DOWN POINTS**



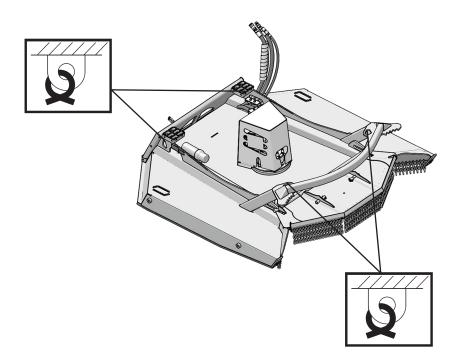
#### **WARNING!**

#### **CRUSH HAZARD**

Verify that all tie down accessories (chains, slings, ropes, shackles and etc.) are capable of maintaining tool stability during transporting and are attached in such a way to prevent unintended disengagement or shifting of the tool. Failure to do so could result in serious personal injury or death.

Tie down points are identified below (same as lift points). Securing to trailer at other points is unsafe and can damage the tool. 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 tool as recommended.
- Check tool stability before transporting.



#### **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 tool.



## Lubrication

#### **LUBRICATION**

Economical and efficient operation of any machine is dependent upon regular and proper lubrication of all moving parts with a quality lubricant. Neglect leads to reduced efficiency, wear, breakdown, and needless replacement of parts.

The oil level in the drive bearing housing should be checked once a week. Fill as necessary with a mild extreme pressure lubricant API-GL-5, No. 80 or 90 weight gear lubricant.

#### NOTE

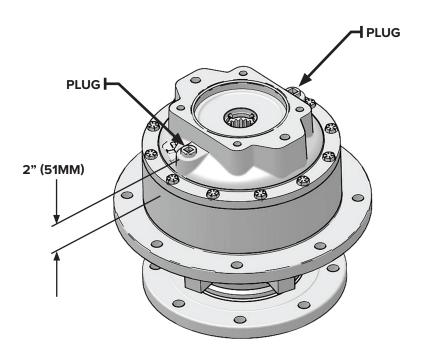
The oil level should be approximately 2" (51 mm) from the top when measuring down from the plug.

#### To Check Oil Level:

1. Remove plug from front of drive bearing housing. Lubricant should be visible.

#### To Add Oil:

- 1. Remove plug from end of front of the drive bearing housing and add lubricant.
- 2. Replace plug.



## **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.



#### **WARNING!**

#### **CRUSH HAZARD**

Lower the brush cutter so both skid shoes are on the ground, set the parking brake, stop the prime mover engine, and remove the key before leaving the operator's seat.

If the brush cutter must be left raised for maintenance, block it securely to prevent accidental release of the lifting mechanism.

Relieve hydraulic system pressure and disconnect the brush cutter from the hydraulic power source. Failure to do so could result in serious injury or death.

#### **HIGH PRESSURE FLUID HAZARD**

Hydraulic fluid under pressure can penetrate the skin and cause serious injury or death. Fluid 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!

PROCEDURE	EVERY 8 HOURS (DAILY)	EVERY 40 HOURS (WEEKLY)	1200 Hours
Check prime mover hydraulic system to ensure an adequate level and cleanliness of hydraulic oil.	<b>~</b>		
Check cutting blade mounting bolt tightness. Tighten as needed. See "Bolt Torque Specifications".	<b>~</b>		
Check for missing or loose hardware. Replace or tighten as needed. See "Bolt Torque Specifications".	<b>~</b>		
Check hydraulic system for leaks. Tighten or replace components as needed.	~		
Check cutting blades for damage. Sharpen or replace as needed.	<b>~</b>		



PROCEDURE	EVERY 8 HOURS (DAILY)	EVERY 40 HOURS (WEEKLY)	1200 Hours
Check that all safety guards and devices are installed correctly.	<b>~</b>		
Check for missing or illegible safety decals. Replace as needed.	<b>~</b>		
Check oil level in drive bearing housing. Add oil as needed.		<b>✓</b>	
Change oil in drive bearing housing.			<b>~</b>

## **Maintenance**

#### **REPLACING CUTTING BLADES**

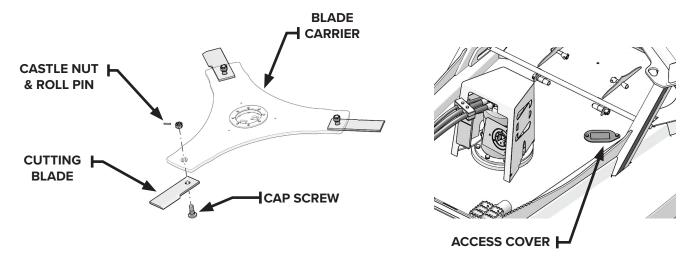
When replacing or sharpening the blades, the tool does not require blocking. Place tool firmly on the ground and disconnect the hydraulic couplers.

The blades should be inspected regularly (every 8 hours) to ensure they are intact, sharp, and tightened correctly. We recommend replacing all three blades at the same time and NEVER try to weld or straighten damaged blades, as loss of blade integrity may result.

#### NOTICE

If one blade needs replaced, it is recommended that all blades be replaced at the same time to insure proper balance of the blade carrier. Improper balance will cause vibration and possible component failure.

- 1. With tool firmly on the ground and hydraulic couplers disconnected, loosen the cap screws on the access cover and rotate cover open.
- 2. Rotate the blade carrier until one of the blades is in the access opening and remove the roll pin, castle nut and the cap screw. Remove the blade.



#### NOTE

When replacing the blades or sharpening the blades, be sure to install the blades in the same orientation as they were in when removed.

- 3. Replace or sharpen blade and then loosely bolt blade into position on the carrier. (Install cap screw from the bottom up, with the castle nut towards the access opening.)
- 4. Repeat steps #2 and #3 for the remaining two blades.
- 5. After all blades have been replaced, torque the 1-1/8 UNC Grade 8 cap screws to specification. See "Bolt Torque Specifications" and install new roll pins.
- 6. Shut access cover and tighten cap screws.



#### REPLACING HYDRAULIC MOTOR

When replacing the hydraulic motor, the tool should be setting firmly on the ground with the hydraulic couplers disconnected. Be sure all rotation has stopped before making any adjustments or repairs.

#### NOTE

Field replacement of the internal motor seals voids warranty.

- 1. Remove motor cover.
- Tag and remove hydraulic hoses from motor.

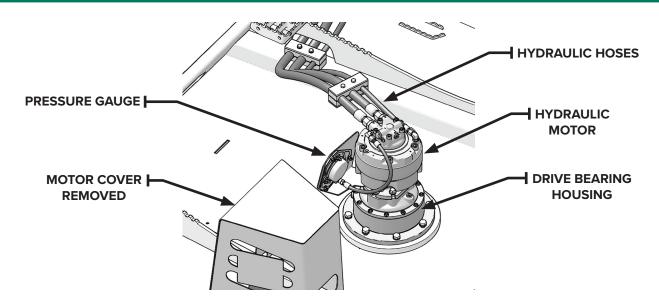
#### **IMPORTANT**

If couplers were not disconnected from the prime mover prior to removing the control valve, oil will drain from the prime mover causing extensive oil loss. Keeping the hoses lower than the open motor ports should result in minimal oil loss.

3. Remove the cap screws holding the motor to the drive bearing housing, and remove the motor. Check motor seal for damage and replace if required.

#### NOTE

If motor shaft seal was damaged you will need to drain the existing oil from the drive bearing housing and replace with new before installing the new motor. See "Changing Drive Bearing Housing Oil".



- 4. Grease the new motor spline shaft.
- 5. Install the new motor with o'ring onto the drive bearing housing re-using the four 1/2" UNC Grade 8 and two 5/8" UNC Grade 8 cap screws. Torque to specifications. See "Bolt Torque Specifications". Use Loctite 271 or equivalent on cap screw threads.
- 6. Re-install motor cover re-using three 5/8" UNC Grade 8 cap screws and torque to specification. See "Bolt Torque Specifications". Use Loctite 271 or equivalent on cap screw threads.

## **Maintenance**

#### **REPLACING DRIVE BEARING HOUSING**

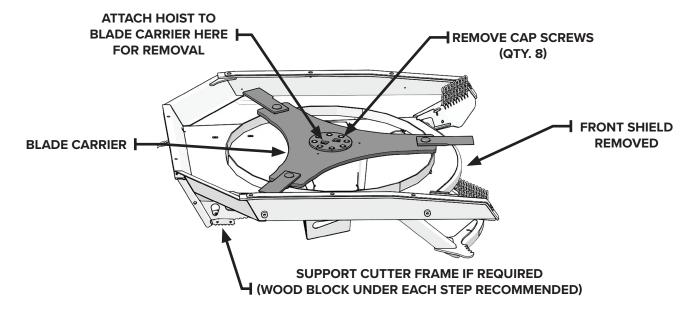
When replacing the drive bearing housing, the tool must be detached from the prime mover in a clean, open location with a hoist available that has adequate lift capacity for lifting the tool. **Be sure all rotation has stopped before making any adjustments or repairs.** 

1. With the tool disconnected from the prime mover and the front shield removed, attach a hoist to the two front lift locations on the push bar and slowly lift the brush cutter and place it upside down with the blade carrier wheel exposed.

#### NOTE

Be prepared for possible shifting of the brush cutter as it is clears the ground. Block the cutter, if required, to ensure it is completely stable before proceeding.

- 2. Remove the eight cap screws securing the drive bearing housing to the blade carrier. See diagram.
- 3. Attach the hoist to the blade carrier assembly and remove from the brush cutter and set aside. The blade carrier weighs between approximately 350 lbs (159 kgs) for the 72" cutter and 400 lbs (182 kgs) for the 84" cutter (with blades installed).



- 4. With the blade carrier assembly removed. Attach the hoist onto the front lifting holes on the push bar and set the tool back onto the skid shoes.
- 5. Remove motor cover and set aside.
- 6. Remove the cap screws holding the motor to the drive bearing housing, and remove the motor, setting it into a clean container to help prevent any contaminants from entering the hydraulic system. Check motor o'ring for damage and replace if required.



- 7. Remove the cap screws securing the drive bearing housing to the cutter deck.
- 8. Install new drive bearing housing, re-using the five 5/8" UNC Grade 8 cap screws. Torque to specification. See "Bolt Torque Specifications". Use Loctite 271 or equivalent on cap screw threads.
- 9. Remove plugs from top of housing and fill with a mild extreme pressure lubricant APIGL-5, No. 80 or 90 weight gear lubricant. Replace plugs.
- 10. Grease the hydraulic motor spline shaft.
- 11. Re-install the motor assembly and o'ring onto the drive bearing housing re-using the four 1/2" UNC Grade 8 and two 5/8" UNC Grade 8 cap screws. See "Bolt Torque Specifications". Use Loctite 271 or equivalent on cap screw threads.
- 12. Re-install motor cover re-using three 5/8" UNC Grade 8 cap screws and torque to specification. See "Bolt Torque Specifications". Use Loctite 271 or equivalent on cap screw threads.
- 13. Re-attach the hoist to the two front lift locations on the push bar and slowly lift the brush cutter and place it upside down.

#### NOTE

Be prepared for possible shifting of the brush cutter as it is clears the ground. Block the cutter, if required to ensure it is completely stable before proceeding.

- 14. Attach the hoist to the blade carrier assembly and set it into place aligning the holes on the blade carrier to the ones on the bearing housing.
- 15. Re-install the eight 3/4" UNC Grade 8 cap screws securing the drive bearing housing to the blade carrier. Torque to specification. See "Bolt Torque Specifications". Use Loctite 271 or equivalent on cap screw threads.
- 16. Attach the hoist onto the front lifting holes on the push bar and set the tool back onto the skid shoes.

Follow the installation procedure for attaching the tool onto your prime mover.

## **Maintenance**

#### **CHANGING DRIVE BEARING HOUSING OIL**

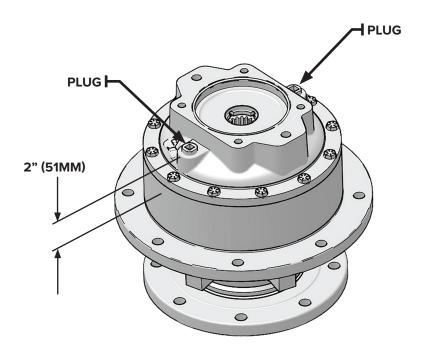
When changing the oil in the drive bearing housing, the tool should be setting firmly on the ground with the hydraulic couplers disconnected. We recommend removing the existing oil with a fluid removal pump.

- 1. Remove one of the plugs in the drive bearing housing and place the extraction hose into the housing so that it reaches the bottom.
- 2. Place the output hose into an approved container or drum that will hold the waste oil.
- 3. Following the instructions for your fluid removal pump, remove all oil from the drive bearing housing. Once the oil has been drained from the housing, remove the pump.
- 4. Fill the housing with approximately 2.50 quarts (2.4 liters) of a mild extreme pressure lubricant API-GL-5, No. 80 or 90 weight gear lubricant.

#### NOTE

Oil level should be approximately 2" (51 mm) from the top when measuring down from the plug.

5. Replace plug and tighten.





## **Tool Disposal**



#### **Hydraulic Oil**

Hydraulic oil can contaminate the air, ground and water if not properly recycled. Recycle hydraulic oil in accordance with all State, Federal and local laws, at your local oil recycling facility.

#### **Hydraulic Hoses**

Hang hydraulic hoses to drain. Collect the oil for recycling. Contact your local municipal recycling authorities for an approved hydraulic hose recycling site.

#### **Gear Oil**

Drain the gear oil and collect it for recycling. Do not throw away or pour down the drain. Contact your local municipal recycling authorities for recycling instructions.

#### **Tool Body**

Disassemble the tool and dispose of all non-metal parts. Recycle the metal components. Contact your local municipal recycling authorities for recycling instructions.

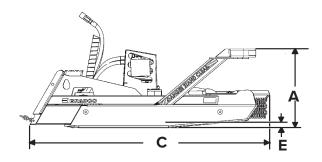
## **Troubleshooting**

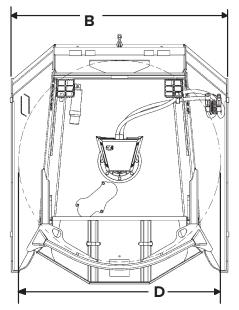
PROBLEM	Possible Cause	Possible Solution
EXCESSIVE VIBRATION	Blades bent.	Replace bent blades. (All blades should be replaced at the same time.)
	Blades damaged or worn.	Replace worn blades. (Recommended that all blades be replaced at the same time.)
	Bearing failure. (To diagnose bearing failure; rotate blade carrier slowly and listen for bearing noise.)	Replace Drive Bearing Housing.
	Foreign material in blade carrier assembly.	Remove any foreign material from blade carrier assembly.
CUTTER STALLS TOO EASILY OR LOSS OF POWER	Power and return hoses reversed. (This tool will turn in reverse direction until placed under load, then hydraulic flow will bypass drive motor.)	Check flow direction and switch hydraulic couplers.
	Bearing failure. (To diagnose bearing failure; rotate blade carrier slowly and listen for bearing noise. Bearing failure will reduce power available to function correctly.)	Replace Drive Bearing Housing.
	Foreign material in blade carrier assembly.	Remove any foreign material from blade carrier assembly.
	Imbalance of blade carrier assembly.	Check excessive vibration section for possible causes and remedies.
	Control valve cartridge or o'ring failure.	Replace as required.
BLADES NOT ROTATING	Auxiliary hoses not hooked up to the prime mover correctly	Check coupler engagement.
	Power and return hoses reversed.	Check flow direction and switch hydraulic couplers.
	Foreign material in blade carrier assembly.	Remove any foreign material from blade carrier assembly.
	Hydraulic motor damaged.	Call Paladin service department for instructions.
	Bearing failure. (To diagnose bearing failure; rotate blade carrier slowly and listen for bearing noise.)	Replace Drive Bearing Housing.
	Obstruction in hydraulic line.	Clear obstruction. Replace as required.



PROBLEM	Possible Cause	Possible Solution
BLADES NOT ROTATING AT FULL RPM	Insufficient hydraulic flow.	Refer to prime mover manual. Verify hydraulic flow using in line flow meter or other attachment.
	Damaged quick coupler.	Replace damaged coupler.
	Hydraulic motor damaged.	Call Paladin service department for instructions.
	Bearing failure. (To diagnose bearing failure; rotate blade carrier slowly and listen for bearing noise.)	Replace Drive Bearing Housing.
OIL LEAKING	Hydraulic hose damaged.	Replace hose.
	Hydraulic fittings loose or damaged.	Tighten or replace. Check o-ring on fitting and replace if necessary.
	Hydraulic motor damaged.	Call Paladin service department for instructions.
	Drive bearing shaft seal damaged.	Call Paladin service department for instructions.
		(NOTE: REPLACING SHAFT SEAL WILL VOID WARRANTY.)

## **Specifications**





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

HIGH PERFORMANCE SERIES BRUSH CUTTERS	5	
DESCRIPTION	72"	84"
A. Overall Height	30.50" (775 mm)	30.50" (775 mm)
B. Overall Width	77.13" (1959 mm)	89.13" (2264 mm)
C. Overall Length	89.40" (2271 mm)	98.45" (2501 mm)
D. Cutting Width	72.00" (1829 mm)	84.00" (2134 mm)
E. Min. Cutting Height (Skid Shoes On Ground)	2.50" (63.5 mm)	2.50" (63.5 mm)
Deck Thickness	0.25" (6.35 mm)	0.31" (7.87 mm)
Weight (lbs)	1895 lbs (859 kg)	2178 lbs (988 kg)
Recommended Flow Range	30-45 gpm (114-170 lpm)	30-40 gpm (114-151 lpm)
Required Skid Steer Lifting Capacity	2600 lbs (1179 kg)	3000 lbs (1361 kg)
Cutting Capacity (Maximum Tree Diameter)		10.00" (254 mm)
Maximum Operating Pressure (Tool)		4000 psi (276 bar)

## **Bolt Torque**

## **Specifications**

#### **GENERAL TORQUE SPECIFICATION TABLES**

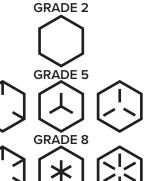
Use the following charts when determining bolt torque specifications when special torques are not given. Always use grade 5 or better when replacing bolts.

#### SAE BOLT TORQUE SPECIFICATIONS

#### IMPORTANT

The following torque values are for use with extreme pressure lubricants, plating or hard washer applications Increase torque 15% when using hardware that is not plated and either dry or lubricated with engine oil.

Во	SAE GRADE 5 TORQUE BOLT SIZE POUNDS FEET NEWTON-METERS					SAE GRADE 8 TORQUE 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



BOLT HEAD IDENTIFICATION

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.

0' (5')							
Size of Bolt	Grade No.	Pitch (mm)	Pounds Feet	Newton-Meters	Pitch (mm)	Pounds Feet	Newton-Meters
	5.6		3.6-5.8	4.9-7.9		-	-
M6	8.8	1.0	5.84	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

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## **Parts**

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

When servicing your tool, 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 tool.

The product control number, model and serial number for your tool 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 tool.

#### **IMPORTANT**

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 <a href="https://www.paladinattachments.com">www.paladinattachments.com</a>.

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