BRADCO BY PALADIN

OPERATOR'S MANUAL

FLAIL MOWER

PATENTED

SERIAL NUMBER: _____

MODEL NUMBER: _____

Manual Number: 51-4644
Part Number: 23130, 23131, 23140
Release Date: December 2018
Rev. 6

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PREFACE

GENERAL COMMENTS

Congratulations on the purchase of your new product! This product was carefully designed and manufactured to give you many years of dependable service. Only minor maintenance (such as cleaning and lubricating) is required to keep it in top working condition. Be sure to observe all maintenance procedures and safety precautions in this manual and on any safety decals located on the product and on any equipment on which the attachment is mounted.

This manual has been designed to help you do a better, safer job. Read this manual carefully and become familiar with its contents.

WARNING! Never let anyone operate this unit without reading the "Safety Precautions" and "Operating Instructions" sections of this manual.
Always choose hard, level ground to park the vehicle on and set the brake so the unit cannot roll.

Unless noted otherwise, right and left sides are determined from the operator's control position when facing forward.

NOTE: The illustrations and data used in this manual were current (according to the information available to us) at the time of printing, however, we reserve the right to redesign and change the attachment as may be necessary without notification.

BEFORE OPERATION

The primary responsibility for safety with this equipment falls to the operator. Make sure the equipment is operated only by trained individuals that have read and understand this manual. If there is any portion of this manual or function you do not understand, contact your local authorized dealer or the manufacturer to obtain further assistance. Keep this manual available for reference. Provide the manual to any new owners and/or operators.

SAFETY ALERT SYMBOL

This is the "Safety Alert Symbol" used by this industry. This symbol is used to warn of possible injury. Be sure to read all warnings carefully. They are included for your safety and for the safety of others working with you.

SERVICE

Use only manufacturer replacement parts. Substitute parts may not meet the required standards.

Record the model and serial number of your unit on the cover of this manual. The parts department needs this information to insure that you receive the correct parts.

SOUND AND VIBRATION

Sound pressure levels and vibration data for this attachment are influenced by many different parameters: some items are listed below (not inclusive):

- prime mover type, age, condition, with or without cab enclosure and configuration
- operator training, behavior, stress level
- job site organization, working material condition, environment

Based on the uncertainty of the prime mover, operator, and job site, it is not possible to get precise machine and operator sound pressure levels or vibration levels for this attachment.

NOTE: A list of all Paladin Patents can be found at http://www.paladinattachments.com/patents.asp.

SAFETY STATEMENTS

THIS SYMBOL BY ITSELF OR WITH A WARNING WORD THROUGHOUT THIS MANUAL IS USED TO CALL YOUR ATTENTION TO INSTRUCTIONS INVOLVING YOUR PERSONAL SAFETY OR THE SAFETY OF OTHERS. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN INJURY OR DEATH.

DANGER — **THIS SIGNAL WORD INDICATES A HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, WILL RESULT IN DEATH OR SERIOUS INJURY.**

WARNING — **THIS SIGNAL WORD INDICATES A HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN DEATH OR SERIOUS INJURY.**

CAUTION — **THIS SIGNAL WORD INDICATES A HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN MINOR OR MODERATE INJURY.**

NOTICE — **NOTICE IS USED TO ADDRESS PRACTICES NOT RELATED TO PHYSICAL INJURY.**

GENERAL SAFETY PRECAUTIONS

WARNING!

READ MANUAL PRIOR TO INSTALLATION

Improper installation, operation, or maintenance of this equipment could result in serious injury or death. Operators and maintenance personnel should read this manual, as well as all manuals related to this equipment and the prime mover thoroughly before beginning installation, operation, or maintenance. **FOLLOW ALL SAFETY INSTRUCTIONS IN THIS MANUAL AND THE PRIME MOVER'S MANUAL(S).**

READ AND UNDERSTAND ALL SAFETY STATEMENTS

Read all safety decals and safety statements in all manuals prior to operating or working on this equipment. Know and obey all OSHA regulations, local laws, and other professional guidelines for your operation. Know and follow good work practices when assembling, maintaining, repairing, mounting, removing, or operating this equipment.

KNOW YOUR EQUIPMENT

Know your equipment's capabilities, dimensions, and operations before operating. Visually inspect your equipment before you start, and never operate equipment that is not in proper working order with all safety devices intact. Check all hardware to ensure it is tight. Make certain that all locking pins, latches, and connection devices are properly installed and secured. Remove and replace any damaged, fatigued, or excessively worn parts. Make certain all safety decals are in place and are legible. Keep decals clean, and replace them if they become worn or hard to read.

GENERAL SAFETY PRECAUTIONS

WARNING! PROTECT AGAINST FLYING DEBRIS

Always wear proper safety glasses, goggles, or a face shield when driving pins in or out, or when any operation causes dust, flying debris, or any other hazardous material.

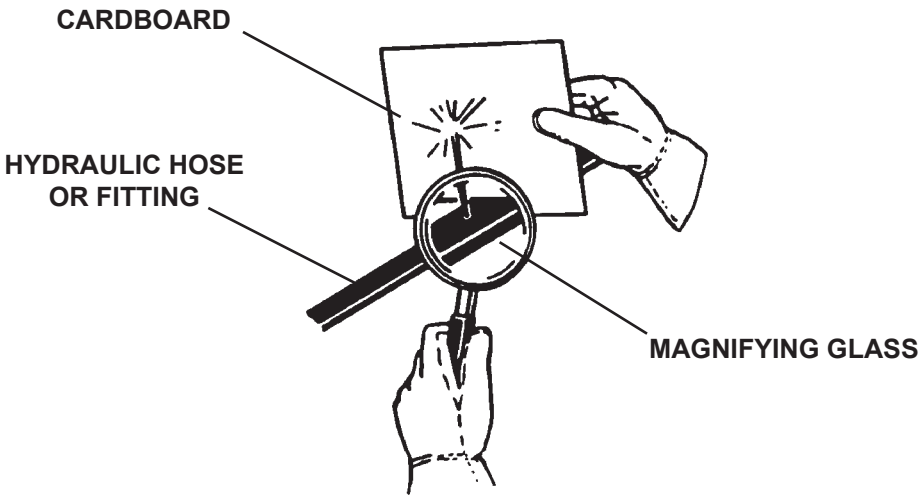
WARNING! LOWER OR SUPPORT RAISED EQUIPMENT

Do not work under raised booms without supporting them. Do not use support material made of concrete blocks, logs, buckets, barrels, or any other material that could suddenly collapse or shift positions. Make sure support material is solid, not decayed, warped, twisted, or tapered. Lower booms to ground level or on blocks. Lower booms and attachments to the ground before leaving the cab or operator's station.

WARNING! USE CARE WITH HYDRAULIC FLUID PRESSURE

Hydraulic fluid under pressure can penetrate the skin and cause serious injury or death. Hydraulic leaks under pressure may not be visible. Before connecting or disconnecting hydraulic hoses, read your prime mover's operator's manual for detailed instructions on connecting and disconnecting hydraulic hoses or fittings.

- Keep unprotected body parts, such as face, eyes, and arms as far away as possible from a suspected leak. Flesh injected with hydraulic fluid may develop gangrene or other permanent disabilities.
- If injured by injected fluid, see a doctor at once. If your doctor is not familiar with this type of injury, ask him to research it immediately to determine proper treatment.
- Wear safety glasses, protective clothing, and use a piece of cardboard or wood when searching for hydraulic leaks. **DO NOT USE YOUR HANDS! SEE ILLUSTRATION.**



GENERAL SAFETY PRECAUTIONS

WARNING!

DO NOT MODIFY MACHINE OR ATTACHMENTS

Modifications may weaken the integrity of the attachment and may impair the function, safety, life, and performance of the attachment. When making repairs, use only the manufacturer's genuine parts, following authorized instructions. Other parts may be substandard in fit and quality. Never modify any ROPS (Roll Over Protective Structure) or FOPS (Falling Object Protective Structure) equipment or device. Any modifications must be authorized in writing by the manufacturer.

WARNING!

SAFELY MAINTAIN AND REPAIR EQUIPMENT

- Do not wear loose clothing or any accessories that can catch in moving parts. If you have long hair, cover or secure it so that it does not become entangled in the equipment.
- Work on a level surface in a well-lit area.
- Use properly grounded electrical outlets and tools.
- Use the correct tools for the job at hand. Make sure they are in good condition for the task required.
- Wear the protective equipment specified by the tool manufacturer.

SAFELY OPERATE EQUIPMENT

Do not operate equipment until you are completely trained by a qualified operator in how to use the controls, know its capabilities, dimensions, and all safety requirements. See your machine's manual for these instructions.

- Keep all step plates, grab bars, pedals, and controls free of dirt, grease, debris, and oil.
- Never allow anyone to be around the equipment when it is operating.
- Do not allow riders on the attachment or the prime mover.
- Do not operate the equipment from anywhere other than the correct operator's position.
- Never leave equipment unattended with the engine running, or with this attachment in a raised position.
- Do not alter or remove any safety feature from the prime mover or this attachment.
- Know your work site safety rules as well as traffic rules and flow. When in doubt on any safety issue, contact your supervisor or safety coordinator for an explanation.

WARNING!

CALIFORNIA PROPOSITION 65 WARNING.

This product may contain a chemical known to the state of California to cause cancer, or birth defects or other reproductive harm. www.P65Warnings.ca.gov

EQUIPMENT SAFETY PRECAUTIONS

WARNING!

KNOW WHERE UTILITIES ARE

Observe overhead electrical and other utility lines. Be sure equipment will clear them. When digging, call your local utilities for location of buried utility lines, gas, water, and sewer, as well as any other hazard you may encounter.

WARNING!

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

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

WARNING!

REMOVE PAINT BEFORE WELDING OR HEATING

Hazardous fumes/dust can be generated when paint is heated by welding, soldering or using a torch. Do all work outside or in a well ventilated area and dispose of paint and solvent properly. Remove paint before welding or heating.

When sanding or grinding paint, avoid breathing the dust. Wear an approved respirator. If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.

WARNING!

END OF LIFE DISPOSAL

At the completion of the useful life of the unit, drain all fluids and dismantle by separating the different materials (rubber, steel, plastic, etc.). Follow all federal, state and local regulations for recycling and disposal of the fluid and components.

OPERATING THE ATTACHMENT

- Block off work area from bystanders, livestock, etc. Flying debris can cause severe injury or death. The attachment is capable of producing large amounts of flying debris in all directions.
- Operate only from the operator's station.
- Do not engage or disengage the drum while the engine rpm's are above low idle.
- Do not operate the attachment with a rotator option installed on the excavator.
- Use extreme caution when operating "over the side". Machine stability is greatly reduced during "over the side" operation of an attachment.
- Do not lift loads in excess of the capacity of the prime mover. Lifting capacity decreases as the load is moved further away from the unit.
- 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.

EQUIPMENT SAFETY PRECAUTIONS

OPERATING THE ATTACHMENT

- The attachment should not be used as a parking brake to immobilize your prime mover or used in any way to assist in moving your prime mover. Follow the instructions in your prime mover operator's manual before leaving the operator's station.
- Do not contact any portion of the prime mover during mower operation.
- An operator must not use drugs or alcohol, which can change his or her alertness or coordination. An operator taking prescription or over-the-counter drugs should seek medical advice on whether or not he or she can safely operate equipment.
- Before exiting the prime mover, wait for all movement to stop, lower the attachment to the ground, apply the brakes, turn off the prime mover's engine and remove the key.

TRANSPORTING THE ATTACHMENT

- Travel only with the attachment in a safe transport position to prevent uncontrolled movement. Drive slowly over rough ground and on slopes.
- When transporting on a trailer, secure attachment at recommended tie down locations using tie down accessories that are capable of maintaining attachment stability.
- Watch for proper clearance of the boom and attachment during transporting. Uneven ground can cause the boom to move in all directions.
- When driving on public roads use safety lights, reflectors, Slow Moving Vehicle signs etc., to prevent accidents. Check local government regulations that may affect you.
- Do not drive close to ditches, excavations, etc., cave in could result.
- Do not smoke when refueling the prime mover. Allow room in the fuel tank for expansion. Wipe up any spilled fuel. Secure cap tightly when done.

MAINTAINING THE ATTACHMENT

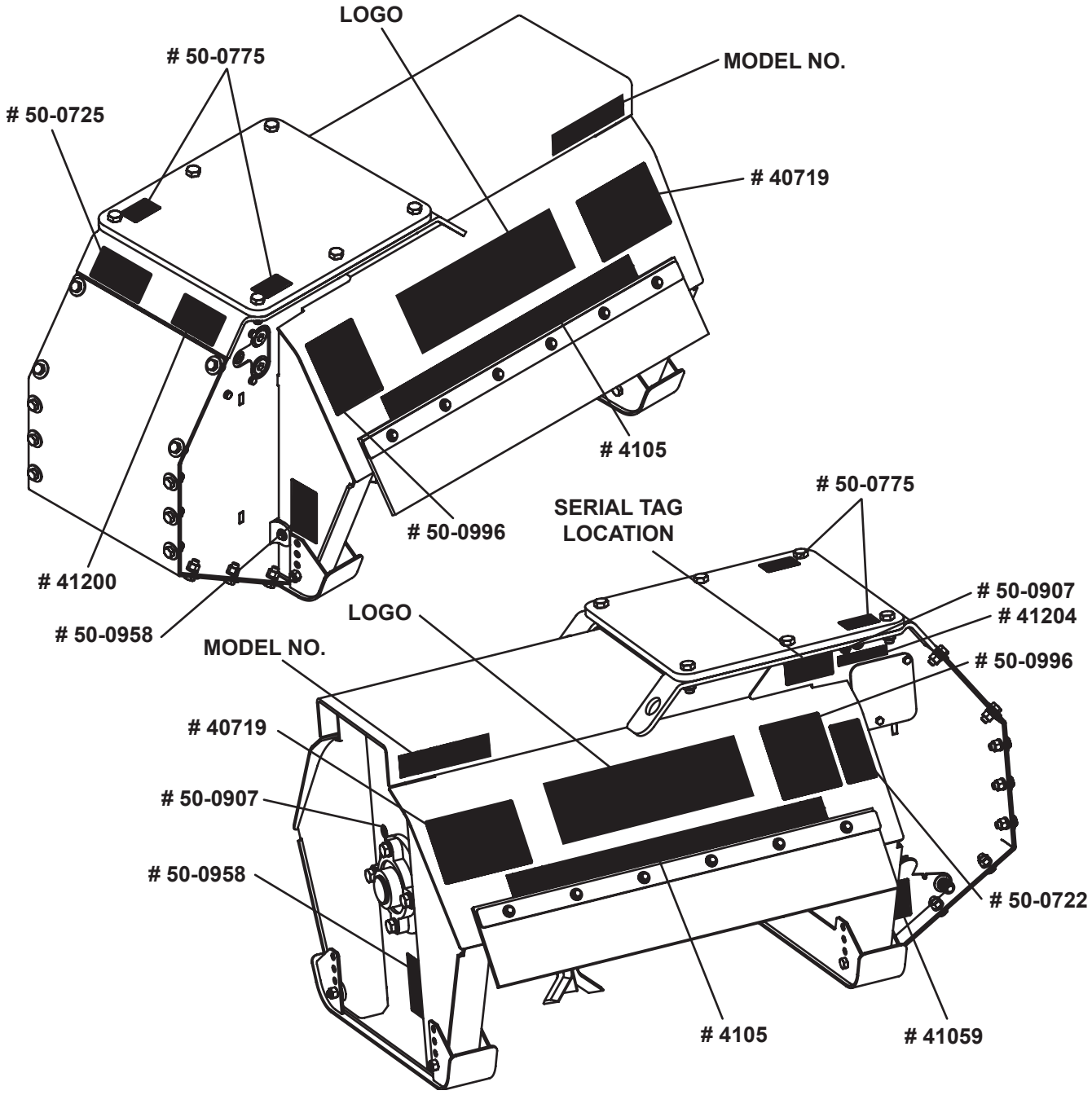
- Before performing maintenance wait for all movement to stop, lower the attachment to the ground, apply the brakes, turn off the engine and remove the key.
- Never perform any work on the attachment unless you are authorized and qualified to do so. Always read the operator service manuals before any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

DECALS

DECAL PLACEMENT

GENERAL INFORMATION

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



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

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

DECALS

4105 DANGER! STAND CLEAR

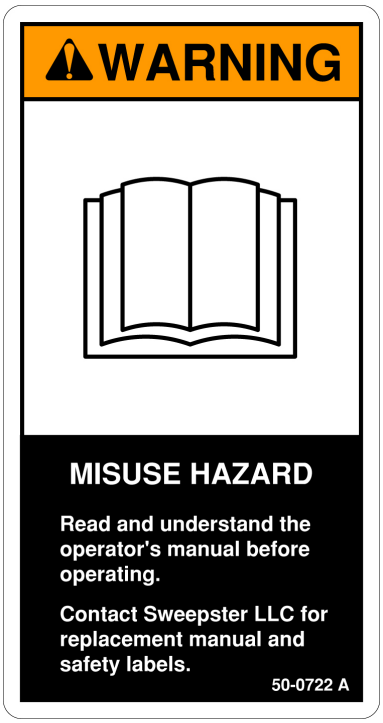
50-0958 WARNING! CRUSH HAZARD

50-0996 DANGER! CUTTING HAZARD, ENTANGLEMENT HAZARD

50-0725 WARNING! HIGH PRESSURE FLUID HAZARD

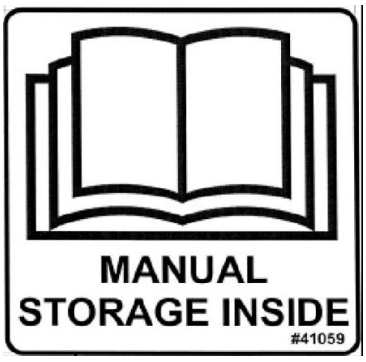
40719 DANGER! FLYING DEBRIS

DECALS



 # 50-0722 WARNING! MISUSE HAZARD

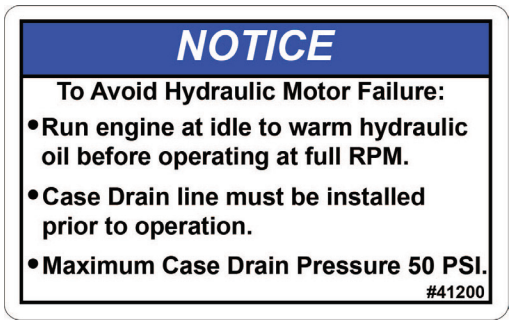
 # 50-0775 WARNING! CRUSH HAZARD



 # 41059 MANUAL STORAGE INSIDE

 # 41204 PATENT WEBSITE

 # 50-0907 MANDATORY ACTION - LUBE EVERY 8 HOURS



 # 41200 NOTICE! MAX CASE DRAIN PRESSURE

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

INSTALLATION

GENERAL INFORMATION

Bradco Flail Mowers are designed to be easy to use and maintain. They are operated by the prime mover's auxiliary hydraulics. Due to the various different prime movers that this attachment can be mounted on, the mower is shipped without hydraulic hoses. These hoses can be purchased from your local dealer.

WARNING! The prime mover must be equipped with an operator enclosure that will provide a safe operating environment whenever working with material or objects that may intrude into the operator's station.

HOSE REQUIREMENTS:

Power and return hoses and couplers along with a case drain hose and coupler must be purchased from your dealer to install the mower onto your prime mover. The hoses must be long enough not to bind or pinch during operation and the power and return hoses must be rated for 4000 PSI (276 bar) or greater. During installation the case drain line must be connected first followed by the power and return hoses. The power & return ports to the manifold are SAE #12 and the case drain is SAE #06.

WARNING! TO AVOID SERIOUS PERSONAL INJURY. Hoses must be rated for 4000 psi (276 bar) or greater.

INSTALLATION

Your mower was shipped complete with appropriate mounting for your specific unit. Hoses and couplers of proper length and size must be furnished by you or your dealer.

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

WARNING! TO AVOID SERIOUS PERSONAL INJURY, make sure the attachment is securely latched to the attachment mechanism of your prime mover. Failure to do so could result in separation of the attachment from the prime mover.

3. Lower the unit to the ground and relieve pressure to the auxiliary hydraulic lines.
4. Following the safety shut down procedure for your prime mover, shut down and exit the prime mover.
5. Install your hydraulic hoses (power, return and case drain), along with any adapter fittings and quick couplers to the attachment. After making sure that the hydraulic lines are free from any foreign material or contaminants, connect the case drain line and then power and return hoses to the auxiliary hydraulic system of your prime mover. Secure all hoses with hose clamps or zip ties.

NOTICE: When attaching the hoses to the prime mover, the case drain line must be connected first and then the power and return hoses. When disconnecting the hoses, it is recommended to disconnect the case drain line last. This will help prevent any over-pressurization of the motor case line.

INSTALLATION

6. Following the standard start up procedure for your prime mover, start the prime mover and run the attachment to purge any air from the system. Check for proper hydraulic connection, hose routing and hose length.
7. Attachment installation is complete.

CHANGING THE MANIFOLD SIDE

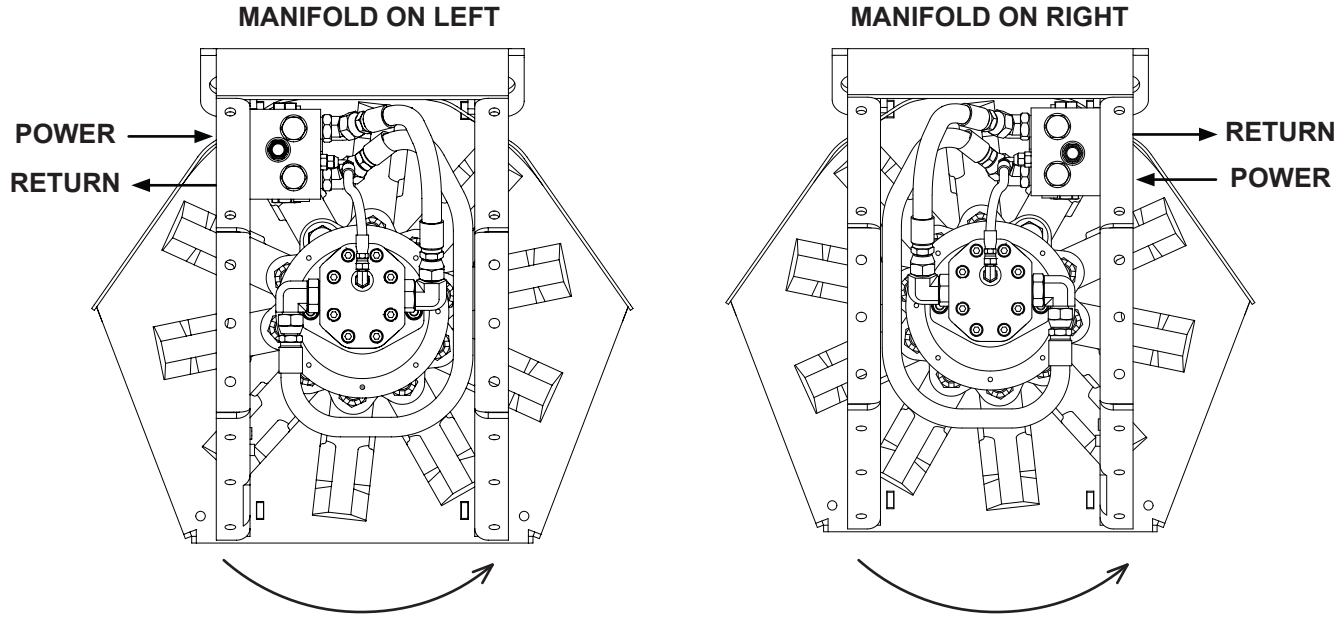
The manifold can be positioned on either the left or right side of the flail mower for ease of coupling.

1. Position the mower on the ground.
2. Unbolt the thumb saddle/end cover and remove.
3. Disconnect any hydraulic hoses routed to the prime mover.
4. Remove manifold cover and set aside.
5. Disconnect the hydraulic hoses and fitting from the manifold and motor.
6. Unbolt the manifold.

NOTICE! The manifold is free after unbolting and can fall.

7. Rotate the manifold within the housing to align with the mounting space on the other side.
8. Bolt the manifold into place using the same hardware.
9. Reconnect the hydraulic hoses & fittings to the motor. The longer hose should be connected to the same side of the motor that the manifold is on, routing the hose around the motor. Be careful not to pinch or bind any hydraulic hoses inside the mower. See Figure #1

FIGURE #1



10. Reattach the manifold cover to the other side of the housing & the thumb saddle/end cover.
11. Connect hydraulic lines to the manifold.

INSTALLATION

DETACHING

1. On firm level ground, wait for all movement to stop, lower the attachment to the ground, apply the brakes, turn off the engine and remove the key.
2. Follow prime mover instructions for relieving pressure in lines.
3. Disconnect the power and return hoses from the auxiliary hydraulics. Disconnect the case drain line. **NOTE: It is recommended to disconnect the case drain line last.**
4. Follow your prime mover operator's manual for detaching (removing) an attachment.
5. Connect hydraulic couplers together or install caps to prevent contaminants from entering the hydraulic system. Store hoses off of the ground to help prevent damage.

OPERATION

INTENDED USE

This mower is designed to cut grasses, weeds, light to medium brush and saplings/trees up to 4 inches diameter. Consistent cutting of material larger than 4 inch diameter will result in accelerated blade wear and blade breakage. 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.

OPERATION

WARNING! Block off the work area from bystanders and livestock. Flying debris can cause severe personal injury or death. Do not engage or disengage the attachment while the engine rpm's are above low idle.

WARNING! Before leaving the operator's station, wait for all movement to stop, lower the attachment to the ground, disengage the auxiliary hydraulics, apply the brakes, turn off the engine, and remove the key.

1. Clear area of all hidden obstacles and debris, such as large rocks, fencing, class, metal, etc., that could injure the operator or damage the attachment.
2. With the attachment lowered and the blades off the ground, start the engine and set the throttle to idle.
3. Engage auxiliary hydraulic flow.
4. Slowly increase throttle to maximum flow.

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

5. Be sure attachment is operating smoothly at full throttle and then start the mower operation. **NOTE: All mowing operation should be done with the excavator stationary. Do not mow while the excavator is in motion.**

IMPORTANT: Operation should be stopped immediately if operator's vision becomes obstructed by dust or debris.

NOTICE! Continual monitoring of hydraulic oil temperature and water temperature of the prime mover is required during mower operation. If temperature rises too high the mower must be removed from the brush/debris and the prime mover returned to an idle until it has cooled down sufficiently to continue operation.

STALLING

If the attachment stalls, remove the mower from the material and allow it to regain speed. Reduce the load on the mower to prevent further stalling.

OPERATION

BRUSH CLEARING

Starting at the top and using a sweeping action, swing the unit back and forth through the brush while lowering at a pace that will not decrease the motor rpm. Once the brush has been cleared, maintain a consistent mower height and sweep from side to side for a more finished surface.

NOTICE: Consistent cutting of material larger than 4" in diameter will result in excessive blade wear and breakage.

CASE DRAIN

The maximum case drain pressure is 50 PSI. The case drain hose coming from the mower to the prime mover must never become pinched, removed from the machine while in operation, or have any type of restriction at any time. Any quick connect fitting used on the case drain line should be bidirectional, with no check valve or flow restrictions. Any type of restriction in this line will cause severe hydraulic system damage and could void warranty. When connecting the mower onto your unit you should always connect the case drain line first, and when disconnecting the mower you should always disconnect the case drain line last.

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.
- Lubricate grease fittings.
- Seal hydraulic system from contaminants and secure all hydraulic hoses off the ground to help prevent damage.
- Replace decals that are damaged or in unreadable condition.
- Store unit in a dry and protected place. Leaving the unit outside will materially shorten its life.

Additional Precautions for Long Term Storage:

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

REMOVAL FROM STORAGE

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

LIFT POINTS

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

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

OPERATION

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.

- Attach tie down accessories to unit as recommended.
- Check unit stability before transporting.

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

TRANSPORTING

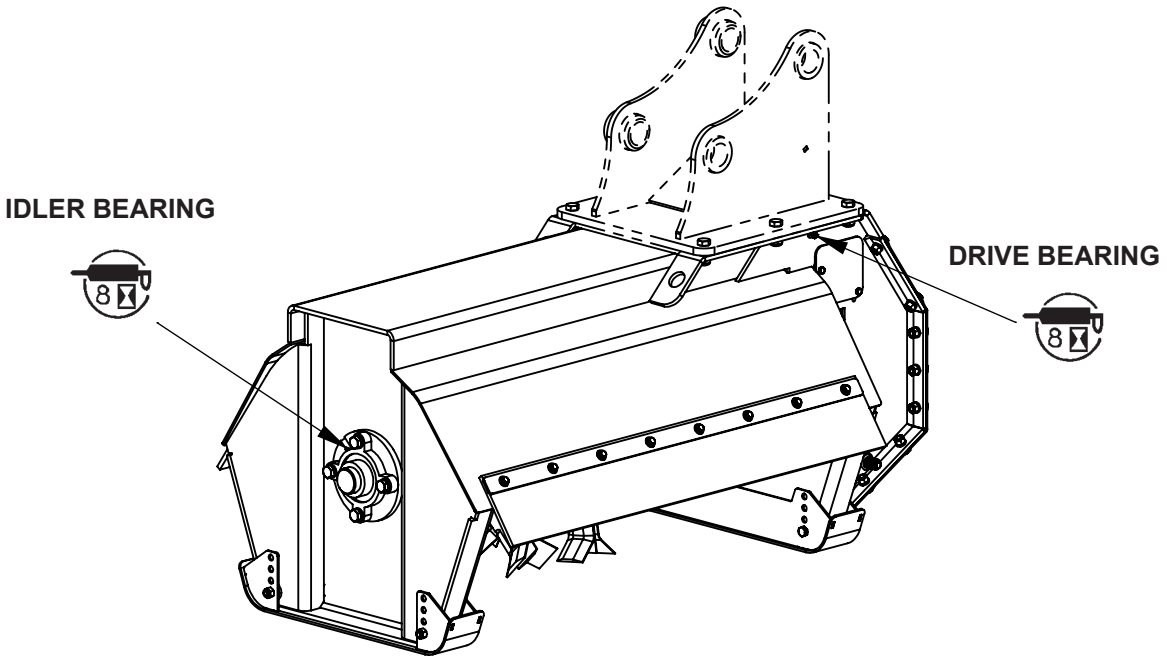
Follow all local government regulations that may apply along with recommended tie down points and any equipment safety precautions at the front of this handbook when transporting your attachment.

LUBRICATION

LUBRICATION

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

Lubricate daily or every 8 hours of operation, whichever comes first, with a high quality NLGI 2 Lithium-Complex grease or an equivalent NLGI 2 Lithium-Complex type grease.



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

MAINTENANCE

GENERAL INFORMATION

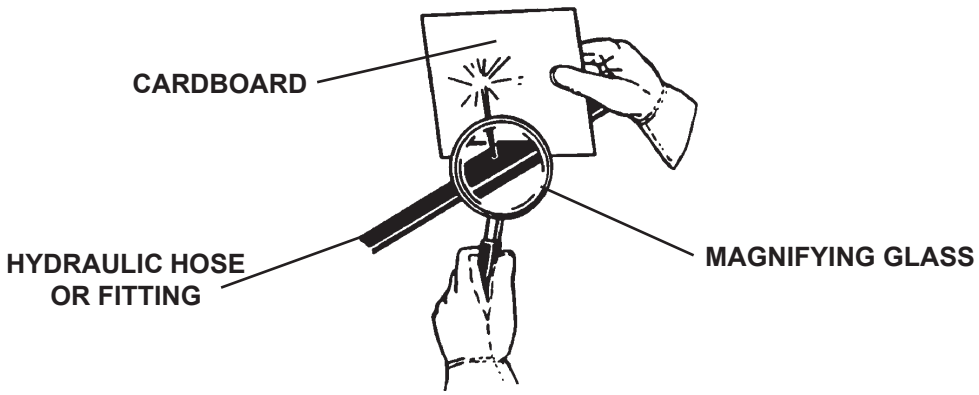
Regular maintenance is the key to long equipment life and safe operation. Maintenance requirements have been reduced to an absolute minimum. However it is very important that these maintenance functions be performed as described below.

Procedure	Every 8 Hours (Daily)	Every 40 Hours (Weekly)
Check for missing or loose hardware. Replace or tighten as necessary. See Bolt Torque Specifications	✔	
Check hydraulic system for leaks and tighten as necessary. Check for damage and replace as needed.	✔	
Check for missing or damaged safety decals and replace as necessary.	✔	
Inspect attachment for any worn parts or cracked welds. Repair as required.	✔	
Lubricate grease fittings.	✔	
Check roll pins for proper installation in flail bolts.	✔	
Clean unit and rotor from all mud, dirt, debris, and grease.	✔	
Re-torque excavator mounting bolts. See Bolt Torque Specifications.		✔

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

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

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

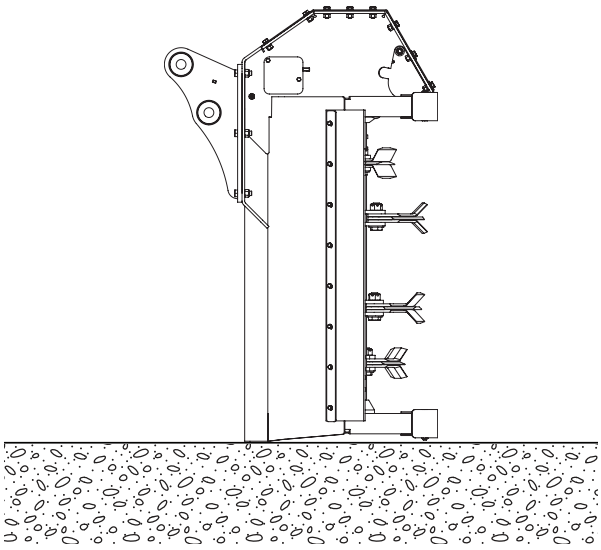


MAINTENANCE

FLAIL BLADE REPLACEMENT

1. Position mower with rotor axis perpendicular to the ground, with the motor side pointing upward and the idler end resting on the ground. See Figure #1

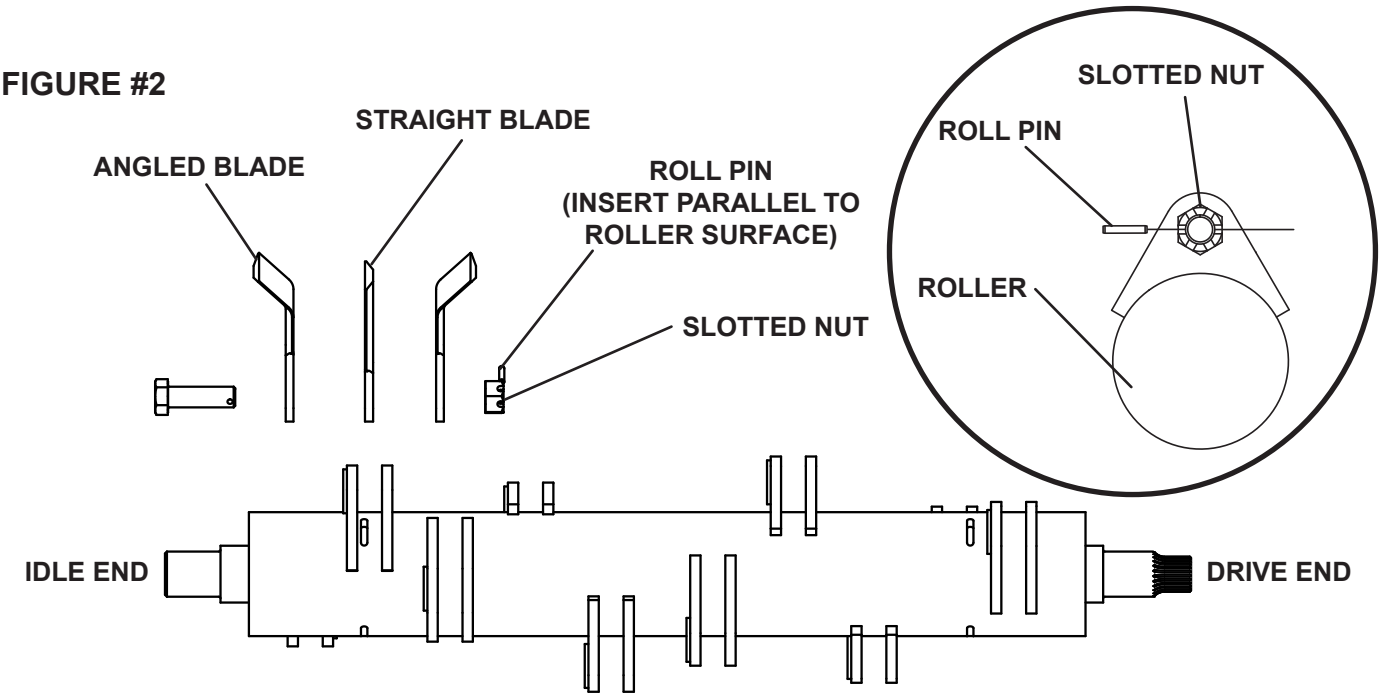
FIGURE #1



2. Drive roll pin out of the slotted nut.
3. Unbolt flail blade assembly.
4. Replace damaged blades.
5. Re-assemble flail blades, tighten slotted nut until snug with mounting tabs, install roll pin. See Figure #2

NOTE: Install roll pins parallel to the roller surface to facilitate blade replacement.

FIGURE #2



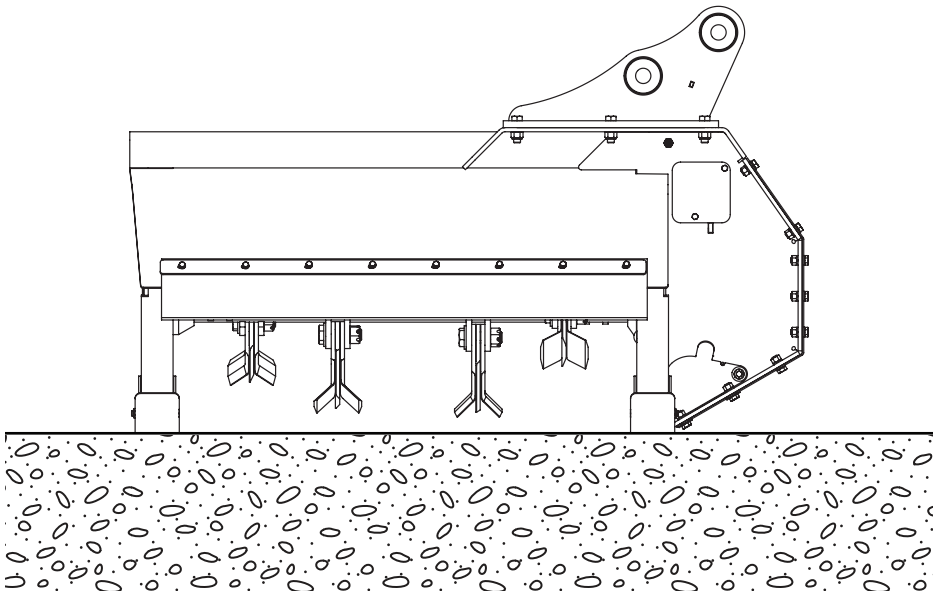
NOTICE! The flail blade assemblies closest to the end of the roller should have the nuts on the outside.

MAINTENANCE

DEFLECTOR FLAP REPLACEMENT

1. Position mower with rotor axis parallel to the ground and with the skid shoes on the ground. See Figure #1

FIGURE #1



2. Unbolt hardware from deflector retainer.
3. Remove damaged deflector and install new deflector.
4. Re-install deflector retainer using existing hardware. Torque to specifications.

MOTOR/TORSION DISC REPLACEMENT

Never perform any work on the attachment unless you are authorized and qualified to do so. After completing maintenance or repair, check for correct functioning of the attachment. If not functioning properly, always tag "DO NOT OPERATE" until all problems are corrected.

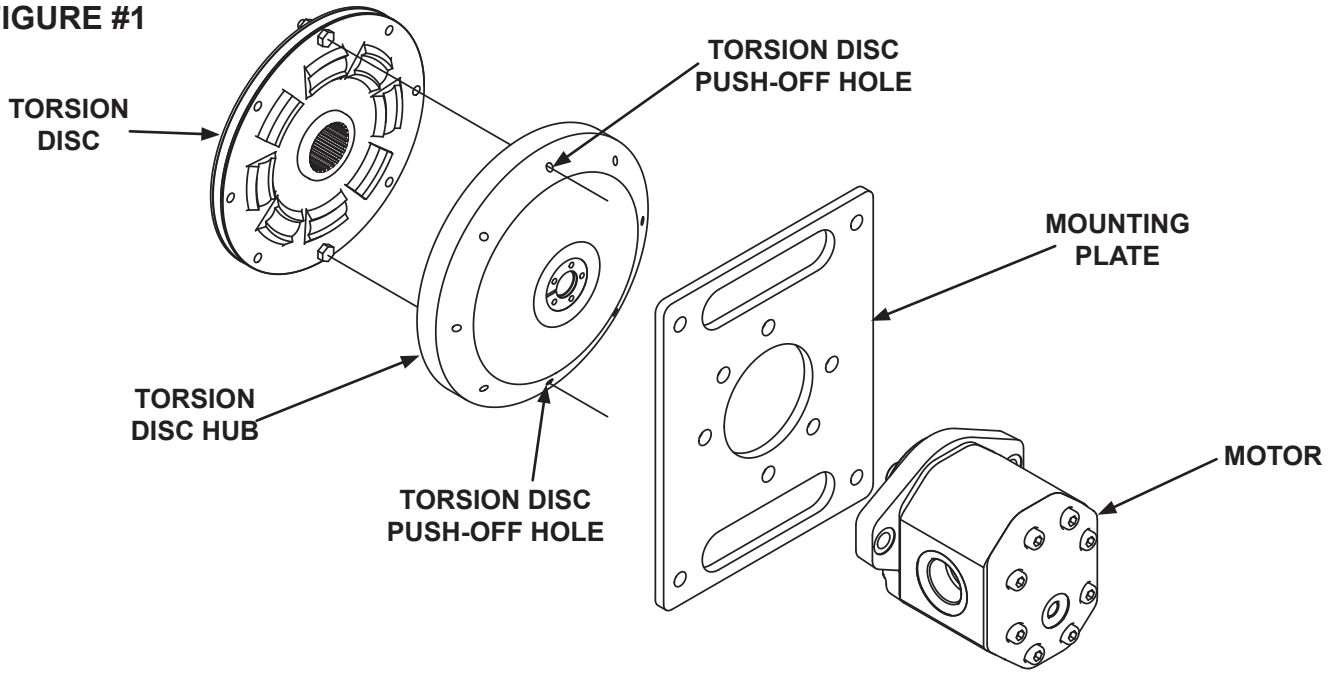
Disassemble

1. Position mower with rotor axis perpendicular to the ground, with the motor side pointing upward and the idler end resting on the ground.
2. Unbolt the thumb saddle/end cover and remove.
3. Tag & disconnect hydraulic lines from the motor and set aside.
4. Unbolt mounting plate bolts from the flail mower body.
5. Lift the motor/torsion disc assembly off of the splined rotor shaft (use of a shop crane is recommended).

MAINTENANCE

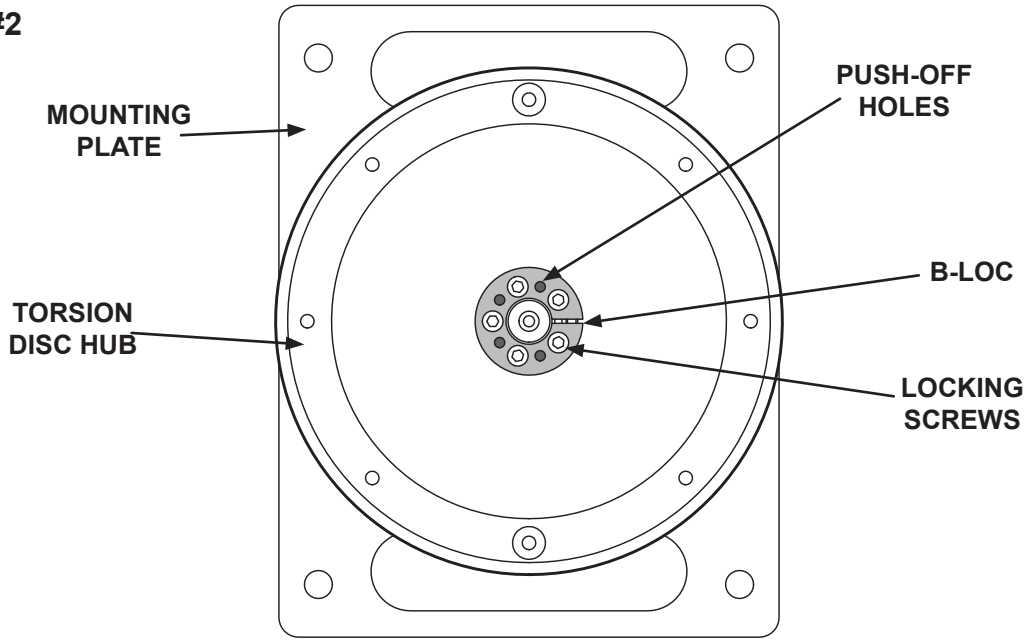
6. Disassemble the torsion disc from the torsion disc hub, note that the torsion disc backing plate may be stuck to the torsion disc hub. There are two threaded holes, in between the mounting holes. A bolt can be threaded into the back side of the torsion disc hub to break the torsion disc backing plate from the torsion disc hub. See Figure #1

FIGURE #1



7. Disassemble the B-loc by loosening all locking screws by approximately four complete turns and transferring at least 3 screws to the push-off threads located in flange of collar.
8. Release connection by evenly tightening all push-off screws (not exceeding ¼ turns) in a diametrically opposite sequence. See Figure #2

FIGURE #2

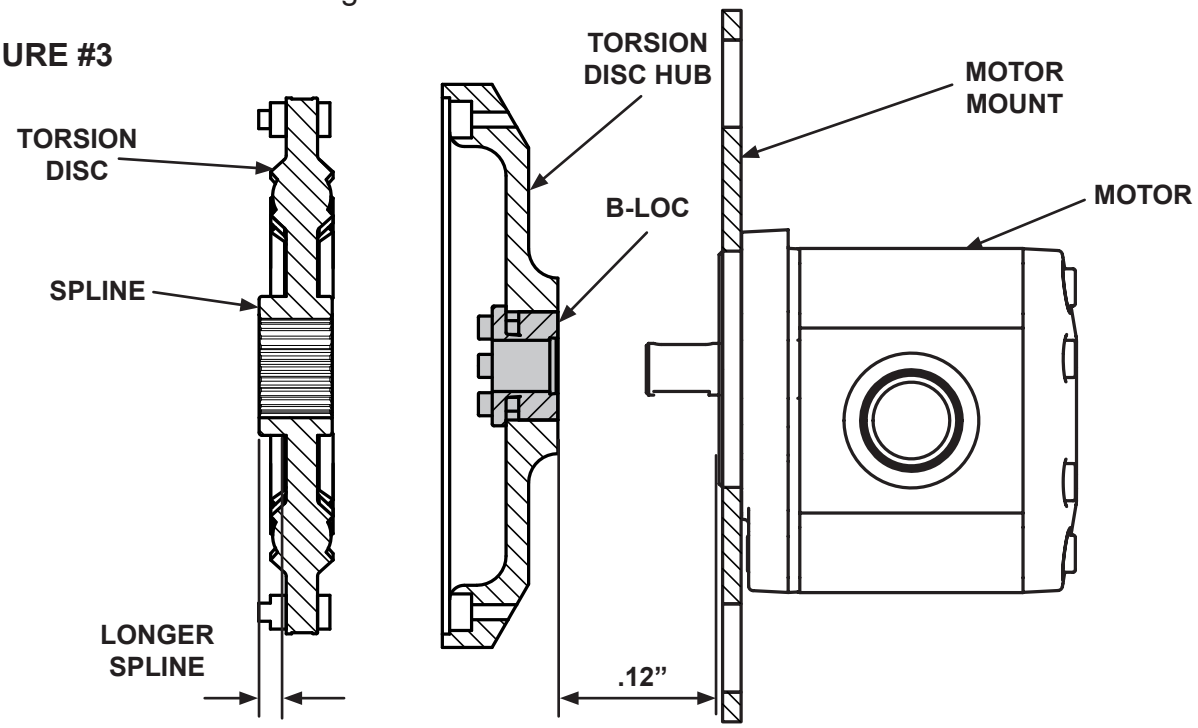


9. Remove B-loc and torsion disc hub from motor shaft.
10. Unbolt motor from mounting plate.
11. Remove hoses from manifold and unbolt/remove manifold.
12. Replace damaged components as required.

To Re-assemble

1. Bolt the motor to the mounting plate.
2. Use a .12 inch spacer or spacer tool #13-18341 (not included) to gap the motor plate to the torsion disc hub.
3. Install B-loc and tighten to 12.5 ft-lbs in a clock-wise or counterclockwise sequence, using only ¼ (i.e. 90º) turns for several passes until ¼ turns can no longer be achieved. Continue to apply torque for 1 to 2 more passes.
4. Reset torque wrench to 12 ft-lbs and check all locking screws. No screw should turn at this point, if so, repeat step 3.
5. Apply Loctite #262 (or equivalent) to bolts and fasten the torsion disc assembly to the adapter hub, making sure that the shorter side of the spline coupling is facing the torsion disc hub. See Figure #3

FIGURE #3



6. Loosely install hydraulic fittings on motor.
7. Apply anti-seize to the spline shaft.
8. Lift the motor/torsion disc assembly and slide onto rotor spline shaft, making sure the splines fully engage the coupling.
9. Bolt the motor mounting plate to the housing.
10. Bolt the hydraulic manifold to the housing and loosely connect hydraulic hoses.
11. Connect hydraulic hoses to the motor and tighten all connections making sure the hoses are routed in such a fashion to prevent pinching or chafing with sharp edges.
12. Bolt the thumb saddle/end cover to the housing.
13. Connect hydraulic hoses to the prime mover and check for leaks.

MAINTENANCE

DRIVE BEARING REPLACEMENT

1. Follow disassembly instructions for Motor/Torsion Disc Replacement.
2. Loosen set screws on flanged bearing.
3. Unbolt from the drive mounting plate.
4. Remove bearing from rotor shaft. **Note: the use of a 3-jaw puller may be required to remove the bearing.**
5. Clean the shaft with emery paper to ensure a good fit with the new bearing.
6. Apply anti-seize to the shaft then install the new bearing.
7. Apply Loctite #262 (or equivalent) to the bolts and fasten the bearing to the drive mounting plate.
8. Tighten the set screws to 273 in-lbs.
9. Follow Re-assembly instructions for Motor/Torsion Disc Replacement.

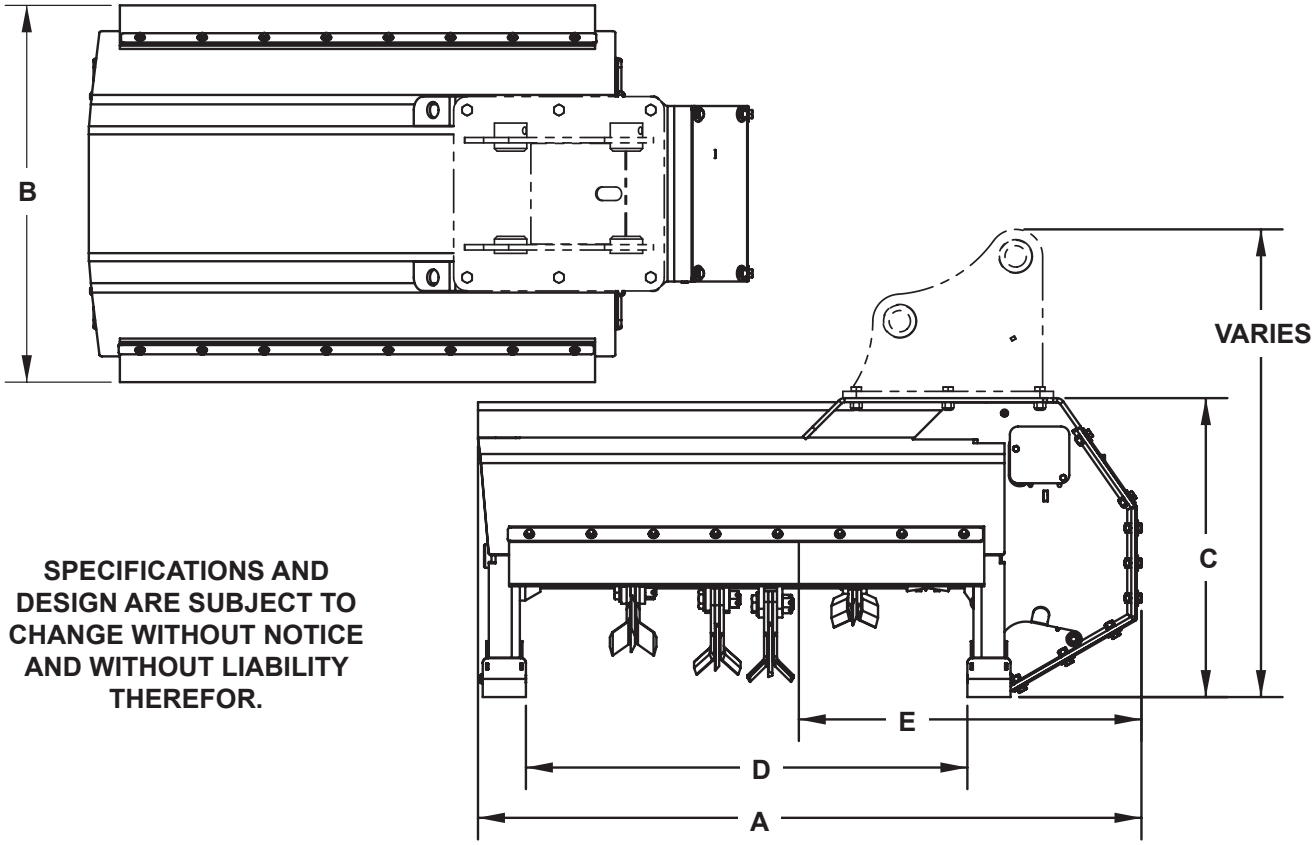
IDLER BEARING REPLACEMENT

1. Position mower with rotor axis parallel to the ground, with the skid shoes on the ground.
2. Loosen set screw on flanged bearing.
3. Unbolt bearing from housing.
4. Remove bearing from rotor shaft. **Note: the use of a 3-jaw puller may be required to remove the bearing.**
5. Clean the shaft with emery paper to ensure a good fit with the new bearing.
6. Apply anti-seize to the shaft then install the new bearing.
7. Apply Loctite #262 (or equivalent) to the bolts and fasten the bearing to the drive mounting plate.
8. Tighten the set screws to 273 in-lbs.

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
EXCESSIVE VIBRATION	Damaged/Missing blade.	Replace blade.
	Worn blades.	Replace blades as matched set.
	Loose mounting bolts.	Tighten mounting bolts.
	Worn idler/drive bearing.	Replace bearing(s).
	Bent rotor.	Replace rotor.
ROTOR NOT TURNING	Auxiliary hoses not hooked up to the prime mover.	Check coupler engagement.
	Obstruction in hydraulic lines.	Remove obstruction. Replace if necessary.
	Hydraulic motor damaged or seals blown.	Call Paladin service department for instructions.
	Auxiliary control valve not engaged.	Verify hydraulic flow using in-line flow meter or other attachment.
ROTOR ROTATES SLUGGISHLY	Insufficient hydraulic flow.	Refer to prime mover manual, verify hydraulic flow using in-line flow meter or other attachment.
	Damaged quick coupler.	Replace coupler.
	Hydraulic motor damaged or seals blown.	Call Paladin service department for instructions.
LEAKING OIL	Loose or damaged hydraulic line.	Tighten or replace.
	O-Rings damaged on hydraulic fittings.	Replace O-Ring.
	Hydraulic motor damaged or seals blown.	Call Paladin service department for instructions.
	Case drain not properly connected or coupler damaged.	Engage or replace coupler.

SPECIFICATIONS



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

	FME30	FME30 THUMB READY	FME40 THUMB READY
DESCRIPTION	**23130**	**23131**	**23140**
A. Overall Length	51.50″	51.50″	61.50″
B. Overall Width	34.90″	34.90″	34.90″
C. Overall Height	27.70″	27.70″	27.70″
D. Cutting Width	30.00″	30.00″	40.00″
E. Center of Gravity - Horizontal	26.80″	26.80″	31.80″
Weight (lbs)	830#	855#	1175#
Motor Option	A – F	A – F	E – H

Hydraulic Pressure	3500 PSI
Motor **A** Flow Range	8-9 gpm
Motor **B** Flow Range	10-11 gpm
Motor **C** Flow Range	12-14 gpm
Motor **D** Flow Range	14-16 gpm
Motor **E** Flow Range	17-22 gpm
Motor **F** Flow Range	22-28 gpm
Motor **G** Flow Range	27-33 gpm
Motor **H** Flow Range	32-40 gpm
Hydraulic Port Diameter	SAE #12
Case Drain Port Diameter	SAE #06

BOLT TORQUE SPECIFICATION

GENERAL TORQUE SPECIFICATION TABLES

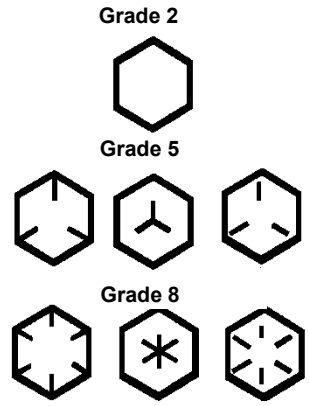
Use the following charts when determining bolt torque specifications, when special torques are not given. Always use grade 5 or better when replacing bolts.

SAE BOLT TORQUE SPECIFICATIONS

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

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

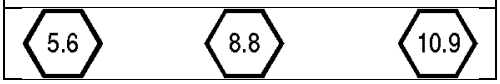
Bolt head identification marks as per grade.
NOTE: Manufacturing Marks Will Vary



METRIC BOLT TORQUE SPECIFICATIONS

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

Bolt head identification marks as per grade.



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

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PARTS

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

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

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

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

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

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

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

WARRANTY

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