



Battle Ax

Tractor Mulching Head

20 Series

Owner's Manual and Parts Book
(Originating w/Serial Number 98-104)



Model Number: _____
Serial Number: _____
Date of Purchase: _____





LOFTNESS SPECIALIZED EQUIPMENT, INC.

LIMITED WARRANTY POLICY

The limited warranty policy begins upon delivery of the unit to the original customers.

The following Loftness products have a two (2) year limited warranty;

XLB10 Grain Bag Loader, Battle Ax L-series Skid Steer, Battle Ax S-series Skid Steer, Battle Ax H-series Skid Steer, Battle Ax Excavator 20-series, Battle Ax Excavator 30-series, Battle Ax Excavator 40-series, Battle Ax Excavator 50-series, Battle Ax Extreme, Bad Ax Skid Steer, Timber Ax Skid Steer, Stump Ax, BT20, Kwik Cut.

All other Loftness products have a one (1) year limited warranty.

If any Loftness product is used as rental or leased equipment the limited warranty period is for only 30 days from the delivery date to the original customers.

Loftness Specialized Equipment, hereinafter referred to as LOFTNESS, a manufacturer of quality machinery since 1956, warrants new LOFTNESS machinery and/or attachments at the time of delivery to the original purchaser, to be free from defects in material and workmanship when properly set up and operated in accordance with the recommendations set forth in the LOFTNESS Operator's Manual.

LOFTNESS' liability for any defect with respect to accepted goods shall be limited to repairing the goods at an authorized dealer or other LOFTNESS designated location, or replacing them as LOFTNESS shall elect. The above shall be in accordance with LOFTNESS warranty adjustment policies.

WARRANTY REQUIREMENTS

Warranty registration form must be filled out and returned to Loftness Specialized Equipment to validate all warranty claims.

To receive a warranty claim, a return authorization from LOFTNESS must be obtained. The failed part may then be returned in an untampered status. This warranty does not include freight or delivery charges incurred when returning machinery for servicing. Dealer mileage, service calls and pick-up/delivery charges are the customer's responsibility.

LIMITATIONS OF WARRANTY

LOFTNESS products are designed to provide years of dependable service when proper use and maintenance is adhered to. The potential for misuse in many applications exists; therefore, a limited warranty is provided as follows.

This warranty shall not apply to any machine or attachment which shall have been repaired or altered outside the LOFTNESS factory or authorized LOFTNESS dealership or in any way so as in LOFTNESS' judgment, to affect its stability or reliability, nor which has been subject to misuse, negligence or accident, nor to any machine or attachment which shall not have been operated in accordance with LOFTNESS' printed instructions or beyond the company recommended machine rated capacity. LOFTNESS may elect to have an area representative evaluate the condition of the machine before warranty is considered.

In addition, this limited warranty provides no coverage for general wear or maintenance items, misuse, environmental conditions and/or contamination for which they were not designed or not intended, including but not limited to the following items;

Use of machine beyond its rated capacity, Conveyors, Improper knife replacement, Auger wear, Missing knives, Saw blades, Striking foreign objects, Brakes and brake pads, Lack of lubrication, Tires, Failures caused by running in an "out-of-balance" condition, Hydraulic hoses damaged by being caught in "pinch points" or by moving parts, and Damage caused by excessive force from the power unit.

EXCLUSIONS OF WARRANTY

Except as otherwise expressly stated herein, LOFTNESS makes no representation or warranty of any kind, expressed or implied. **The implied warranty of merchantability and fitness for a particular purpose are excluded from this limited warranty.** The remedies set forth in this warranty are the only remedies available to any person under this warranty. LOFTNESS shall have no liability to any person for incidental, consequential or special damages of any description, whether arising out of express or implied warranty or any other contract, negligence, or other tort or otherwise. This exclusion of consequential, incidental and special damages is independent from and shall survive any finding that the exclusive remedy failed of its essential purpose. Upon purchase, the buyer assumes all liability, all personal injury and property damage resulting from the handling, possession or use of the goods by the buyer.

No agent, employee or representative of LOFTNESS has any authority to bind LOFTNESS to any affirmation, representation or warranty concerning its machinery and/or attachments except as specifically set forth herein. (August 2023)





To the Dealer:

In order to ensure compatibility / performance of the Loftness attachment and the customer's power unit, it is IMPERATIVE that this Pre-Delivery Inspection ("PDI") be completed using the customer's actual power unit.

PRE-DELIVERY INSPECTION

Dealer: By initialing each line I understand and promise that I have completed the following:

____ Verified the attachment is set up properly for customers power unit. (check model code with manual)

____ Greased all grease zerks till grease purges out of bearing.

____ Removed all shipping brackets.

____ Adjusted push bar out of shipping position. (if equipped) (full forward position recommended)

____ Installed head on customer's unit that will be running the attachment.

____ Recorded the Serial Number and Model of the Loftness attachment. S/N _____ Model _____

____ Verified/recorded rotor RPM at 540 PTO RPM per model. RPM _____

____ Verify PTO is sized correctly per instructions (pg 14-16) in the manual.

PDI completed by: _____ Print

Signed/Date

Contact Loftness factory if any of the tests are not within power unit or Loftness specifications.

DELIVERY

____ Showed customer all grease zerks.

____ Showed customer adjustable push bar options. (if equipped)

____ Showed customer how to properly engage PTO to operate attachment at proper 540 RPM output.

____ Reviewed owner's manual, all on-product warnings and instructions, and safe operation with customer.

____ Assisted customer with completing / submitting Warranty Registration Form to Loftness by one of the below options.

Dealer also needs to submit a copy of this completed PDI to Loftness and maintain the copy in owner's manual for unit.

Mail to:

Loftness Specialized Equipment
PO Box 337
Hector, MN 55342

Delivered to Customer by: _____ Print

Signed/Date

Email to: Cheryl Schmalz

Cheryl@loftness.com

LOFTNESS COPY



To the Dealer:

In order to ensure compatibility / performance of the Loftness attachment and the customer's power unit, it is IMPERATIVE that this Pre-Delivery Inspection ("PDI") be completed using the customer's actual power unit.

PRE-DELIVERY INSPECTION

Dealer: By initialing each line I understand and promise that I have completed the following:

____ Verified the attachment is set up properly for customers power unit. (check model code with manual)

____ Greased all grease zerks till grease purges out of bearing.

____ Removed all shipping brackets.

____ Adjusted push bar out of shipping position. (if equipped) (full forward position recommended)

____ Installed head on customer's unit that will be running the attachment.

____ Recorded the Serial Number and Model of the Loftness attachment. S/N _____ Model _____

____ Verified/recorded rotor RPM at 540 PTO RPM per model. RPM _____

____ Verify PTO is sized correctly per instructions (pg 14-16) in the manual.

PDI completed by: _____ Print

Signed/Date

Contact Loftness factory if any of the tests are not within power unit or Loftness specifications.

DELIVERY

____ Showed customer all grease zerks.

____ Showed customer adjustable push bar options. (if equipped)

____ Showed customer how to properly engage PTO to operate attachment at proper 540 RPM output.

____ Reviewed owner's manual, all on-product warnings and instructions, and safe operation with customer.

____ Assisted customer with completing / submitting Warranty Registration Form to Loftness by one of the below options.

Mail to:

Loftness Specialized Equipment
PO Box 337
Hector, MN 55342

Delivered to Customer by: _____ Print

Signed/Date

Email to: Cheryl Schmalz

Cheryl@loftness.com

CUSTOMER COPY



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Warranty

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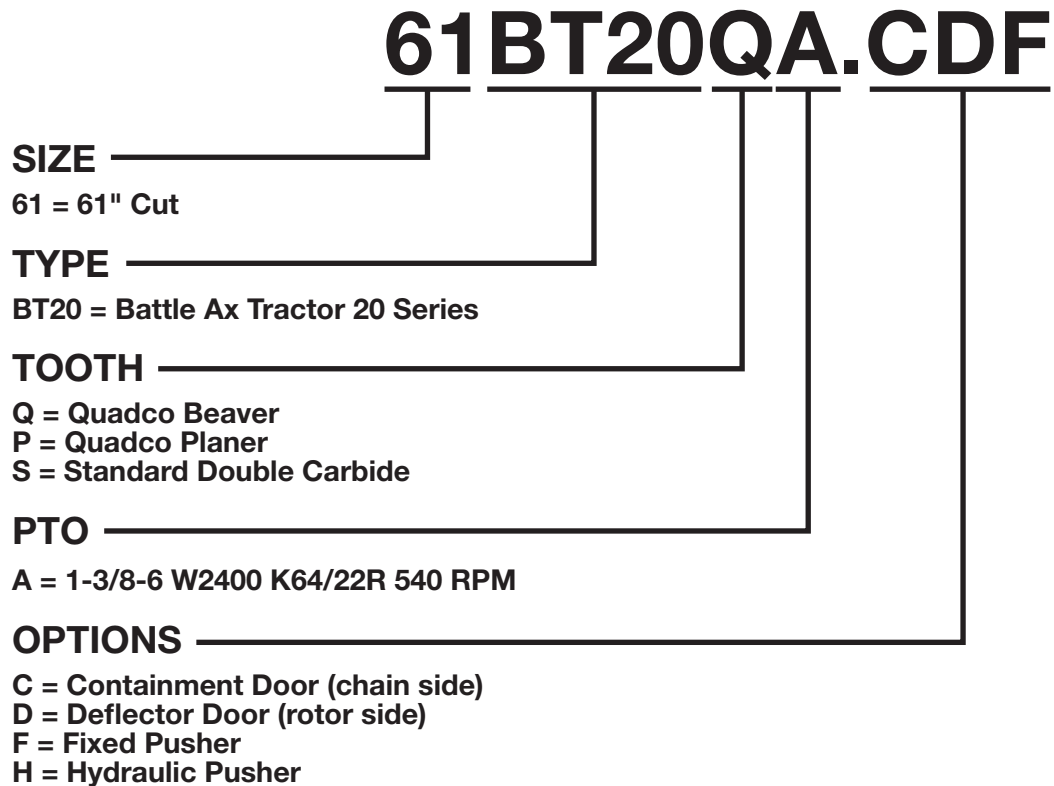
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Ordering Code

Battle Ax Tractor 20 Series (Example)

The ordering code will consist of two numbers (mulcher size), two letters and two numbers (mulcher type), one letter (cutter type), one letter (PTO) and one or more letter(s) (options). An example for a Battle Ax Tractor 20 Series of this type would be as shown below.





Owner Information

Thank you for your decision to purchase a Battle Ax 20 Series tractor-mounted mulcher from Loftness. To ensure maximum performance of your mulcher, it is mandatory that you thoroughly study the owner's manual and follow its recommendations. Proper operation and maintenance are essential to prevent injury or damage and to maximize machine life.

The Loftness Battle Ax is an effective, reliable machine used for maintaining grass, weeds, brush and trees. Efficiently cuts and mulches up to 6 in. diameter material. Intermittently cuts larger diameter material. Lifting or tilting the mulcher increases the risk of flying debris. Because of the high speed of the teeth, the life of the teeth will be reduced if it is operated in rocky terrain or in areas where many obstacles are present. Areas to be mowed should be free of debris such as rocks, bottles, etc. The teeth cut and pulverize the grass, weeds, and brush. The mulcher deposits cut material over the entire width-of-cut, which eliminates bunching or windrowing behind the mulcher.

Operate and maintain this mulcher in a safe manner and in accordance with all applicable local, state, and federal codes, regulations and/or laws, and in compliance with on-product labeling and these instructions.

Make sure that all personnel have read this owner's manual and thoroughly understand safe and correct operating, installation and maintenance procedures.

Continuous improvement and advancement of Loftness products may result in changes to your equipment that may not be reflected in this publication. Loftness reserves the right to make product improvements to the mulcher at any time. Although great care has been taken to ensure the accuracy of this publication, Loftness does not assume any liability for errors or omissions.

Warranty Policy

Be sure to read and understand the Warranty Policy at the beginning of this manual. It is also important that you fill out the Warranty Registration form(s) completely with your dealer so as not to void the warranty.

Serial Number Location



The Battle Ax serial number is shown in the tag (1), and is also stamped into the frame (2).

Always use your model and serial number when requesting information or when ordering parts.

Owner's Manual Access



The Battle Ax is shipped with a printed owner's manual. The manual must be available for all operators. Keep in a safe, dry location.

To access a digital owner's manual, use a smart phone to scan the QR Code (1) located adjacent to the serial number tag. This code will link to the Battle Ax owner's manual on the Loftness website.

Introduction

Battle Ax Features

- Downward Rotation Design
- Premium Strength Steel Body & Rotor
- Cat. I, Adaptable to Cat. II, Free-Link or Quick Hitch
- Centered or 16 in. (40.64 cm) Offset to the Right
- PTO Driven
- Claw Hooks On Tree Pusher
- Two-stage Cutting Chamber - Uses 2 Shear Bars, Producing A Finer Mulch With Less Passes
- 70 HP Gearbox & Driveline
- 540 RPM PTO Shaft with Cut-Out Clutch
- Rotor Speed 2200 RPM
- 13.5 in. (34 cm) Diameter Rotor.
- Efficient Staggered/Spiral Tooth Pattern
- Shankless, Planer (Sharpenable), or Double Carbide Teeth
- 1.75 in. (44.5 mm) Piloted Double Taper Roller Bearings.
- Anti Wrap Bearing Protection
- Heavy Duty Bearing Block
- 3-Band V-Belt
- Tapered-Lock Sheaves
- Skid Shoes
- Steel Chain Deflectors
- Adjustable Shear Bar
- Built-In Depth Gauges - Controls Cutting Depth
- Hydraulic Hoses
- Adjustable Tree Pusher - (Optional) (Hydraulic or Fixed)
- Containment Door (Optional)
- Deflector Door (Optional)

Safety First



Safety Alert Symbol

This message alert symbol identifies important safety messages on the mulcher and in the owner's manual. When you see this symbol, be alert to the possibility of personal injury and carefully read the message that follows.

In the owner's manual and on decals used on the Battle Ax, the words **DANGER, WARNING, CAUTION, IMPORTANT, and NOTE** are used to indicate the following:

DANGER: This word warns of immediate hazards which, if not avoided, will result in severe personal injury or death. The color associated with Danger is RED.



WARNING: This word refers to a potentially hazardous situation which, if not avoided, could result in severe personal injury or death. The color associated with Warning is ORANGE.

CAUTION: This word refers to a potentially hazardous or unsafe situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices. The color associated with Caution is YELLOW.

IMPORTANT: Highlights information that must be heeded.

NOTE: A reminder of other related information that needs to be considered.

If Safety Decals on the mulcher are ISO two panel pictorial, decals are defined as follows:

- The first panel indicates the nature of the hazard.
- The second panel indicates the appropriate avoidance of the hazard.
- Background color is YELLOW.
- Prohibition symbols such as  and  if used, are RED.

Be certain all operators are aware of the dangers indicated by safety decals applied to the Battle Ax, and be certain they follow all safety decal instructions. Contact Loftness for safety decal replacement.

Loftness cannot anticipate every possible circumstance that may involve a potential hazard. The warnings in this owner's manual are not all inclusive.

Owner's Responsibility

Due to the potential danger of flying debris, it is the owner's responsibility and is "**ABSOLUTELY MANDATORY** that **IMPACT-RESISTANT SHIELDING**" be installed on the tractor to protect the operator.

It is **ABSOLUTELY MANDATORY** that all personnel read and follow all safety precautions before operating the tractor and mulcher.

Make sure that all personnel have read this owner's manual, and thoroughly understand safe and correct installation, operation, and maintenance procedures.

Operate and maintain the mulcher in a safe manner and in accordance with all applicable local, state, and federal codes, regulations and/or laws; and in compliance with on-product labeling and this owner's manual instructions.

Make sure that all personnel know how to stop the tractor and mulcher by disengaging all controls. See "Mandatory Shut-Down Procedure" on page 5.

Make sure the mulcher is installed on the tractor correctly before being placed into service. At regular intervals thereafter, the mulcher should be serviced in accordance with procedures outlined in this owner's manual.

Mandatory Shut-Down Procedure

- Stop the tractor and mulcher on a level surface and lower the mulcher to the ground.
- Move throttle to idle position.
- Disengage all power to the mulcher.
- Shut off engine and remove the key.

Wait until the rotor has stopped completely before inspecting the mulcher.

Safety Instructions

Safety Rules

These are general safety considerations. Additional precautions may be necessary to operate your Battle Ax in a safe manner. Be certain you are operating the tractor and mulcher in accordance with all safety codes, OSHA rules and regulations, insurance requirements and local, state, and federal laws.

- Read and observe all warning decals on the mulcher before attempting to operate. Do not attempt to operate the mulcher unless all factory devices and decals are in place. Keep safety decals clean of dirt and grime. Keep all guards, shields and decals in place.
- Remove from area of operation all foreign objects such as bottles, rocks, wire, etc., that might become tangled in the rotor, causing damage to the mulcher or be thrown striking other objects.
- Do not allow any people and animals within 300 feet of the tractor and mulcher during operation.
- Do not allow anyone to operate the mulcher until he or she has read the owner's manual and is completely familiar with all safety precautions. Keep the work area clear of all unauthorized personnel.
- Do not allow persons under the influence of alcohol, medications, or other drugs that can impair judgment or cause drowsiness to operate or maintain the tractor and mulcher.
- Always use an approved roll bar and seat belt for safe operation. Overturning a tractor without a roll bar and seat belt can result in injury or death.
- Use the hand holds and step plates when getting on and off the tractor or mulcher to prevent falls. Keep steps and platform cleared of mud and debris.
- Always have an operator in the tractor while the mulcher is in operation. Never leave the tractor and mulcher running and unattended.
- Operate the mulcher only from the operator's seat.
- Keep your feet on the pedals, (floor plates) seat belt fastened snugly and seat bar lowered, (if equipped), when operating the mulcher.
- The adjustable push bar could contact the tractor in some positions. Before starting the power unit, set the push bar in the most forward position, then slowly rotate the mulcher back while an assistant checks for clearance. Repeat this process in the other settings to determine which positions are usable with your tractor.
- Never attempt to make any adjustments while the mulcher is running or the key is in the "ON" position in the tractor. Before leaving the operator's position, disengage power to the mulcher, shut off engine and remove ignition key.
- Disengage PTO and place all tractor controls in neutral and engage the parking brake before starting the engine.
- Become familiar with and know how to operate all safety devices and controls on the tractor and mulcher before attempting to operate. Know how to stop the tractor and mulcher before starting it.
- Repeated impact of the knives with hard objects can cause excessive wear and damage to the tractor or mulcher. Be sure to maintain recommended ground clearance as specified in this manual.
- Should excessive vibration occur, disengage the PTO and shut off engine. Do not continue to operate the mulcher until the problem has been determined and corrected.
- Do not start, operate, or work on the mulcher until you have carefully read and thoroughly understand the contents of this manual and the operator's manual for your tractor.
- Keep children, bystanders and other workers off and away from the tractor and mulcher during operation. No riders allowed.
- Before inspecting, cleaning, lubricating, adjusting or servicing any part of the mulcher, always exercise the Mandatory Shut-Down Procedure. See "Mandatory Shut-Down Procedure" on page 5. After service has been performed, be sure to restore all guards, shields and covers to their original position.
- Make sure the operator's area is clear of any distracting objects. Keep work areas clean and free of grease and oil to avoid slipping or falling.
- Make sure all controls, (levers, pedals and switches), are in NEUTRAL position before starting the engine.
- Before leaving the operator's position for ANY reason or allowing anyone to approach the tractor and mulcher, always perform the mandatory shutdown procedure.
- Do not wear loose hanging clothes, neckties or jewelry around rotating parts. Long hair is to be placed under a cap or hat. These precautions will help prevent you from becoming caught in any moving parts on the tractor and/or mulcher.

Safety Instructions

Safety Rules (Cont'd)

- Before working under the mulcher, be certain it is securely blocked!
- Do wear safety glasses, ear protection, respirators, gloves, hard hats, safety shoes and other protective clothing when required.
- Periodically check all guards, shields and structural members. Replace or repair anything that could cause a potential hazard.
- Do not replace components or parts with other than factory-recommended service parts. To do so may decrease the effectiveness of the mulcher.
- It is the operator's responsibility to be aware of tractor and mulcher operation and work area hazards at all times.
- Never operate the mulcher without adequate light and visibility.
- Keep hands and feet clear! Never step over or climb over the mulcher while the rotor is engaged or the engine is running; entanglement could occur.
- Operators are responsible to know the location and function of all guards and shields including but not limited to belt drives and rotor. Operators are responsible to make certain that all guards are in place when operating the tractor and mulcher.
- Operators are responsible to be aware of safety hazard areas and follow instructions on warning, caution, or danger decals applied to the mulcher.
- Know the area before operating the mulcher. Be aware of power lines or other equipment.
- Do not lubricate parts while the mulcher is running.
- Do not smoke while servicing the mulcher.

Hydraulic Safety

- The hydraulic system is under high pressure. Make sure all lines and fittings are tight and in good condition. These fluids escaping under high pressure can have sufficient force to penetrate skin and cause serious injury.

- Never check for leaks by using any part of your body to feel for escaping fluid.



WARNING: *Contact with high pressure fluids may cause fluid penetration and burn hazards. Fluid that is under pressure can penetrate body tissue. Fluid penetration can cause serious injury and possible death. If fluid is injected into the skin, seek medical attention immediately!*

PTO Safety

- Keep all guards and shields in place when operating the PTO. Replace any damaged or missing guards and shields before operating the PTO.
- Keep children, bystanders and other workers away from the tractor and mulcher while it is being operated or while the PTO is engaged. No riders allowed.
- Do not wear loose hanging clothes, neckties or jewelry. Long hair is to be placed under a cap or hat. These precautions will help prevent you from becoming caught in any moving parts on the mulcher.
- Read and understand the tractor operation and maintenance manual regarding safe and proper operation for PTO driven equipment.
- Never step over or crawl around the equipment while the PTO is engaged; entanglement could occur.
- Do not exceed 540 RPM PTO speed.
- Disengage PTO driveline and place in the stored position when the mulcher is transported.
- Never use a steel hammer when connecting or disconnecting a PTO shaft.
- Engage and disengage the PTO slowly at idle speed to prevent unnecessary stress to the driveline.
- DO NOT USE PTO ADAPTERS OF ANY KIND.
- Use only recommended shear bolts.

California Proposition 65 Warning



WARNING: *This product can expose you to Mineral Oil, which is known to the State of California to cause cancer. For more information, go to www.p65warnings.ca.gov.*

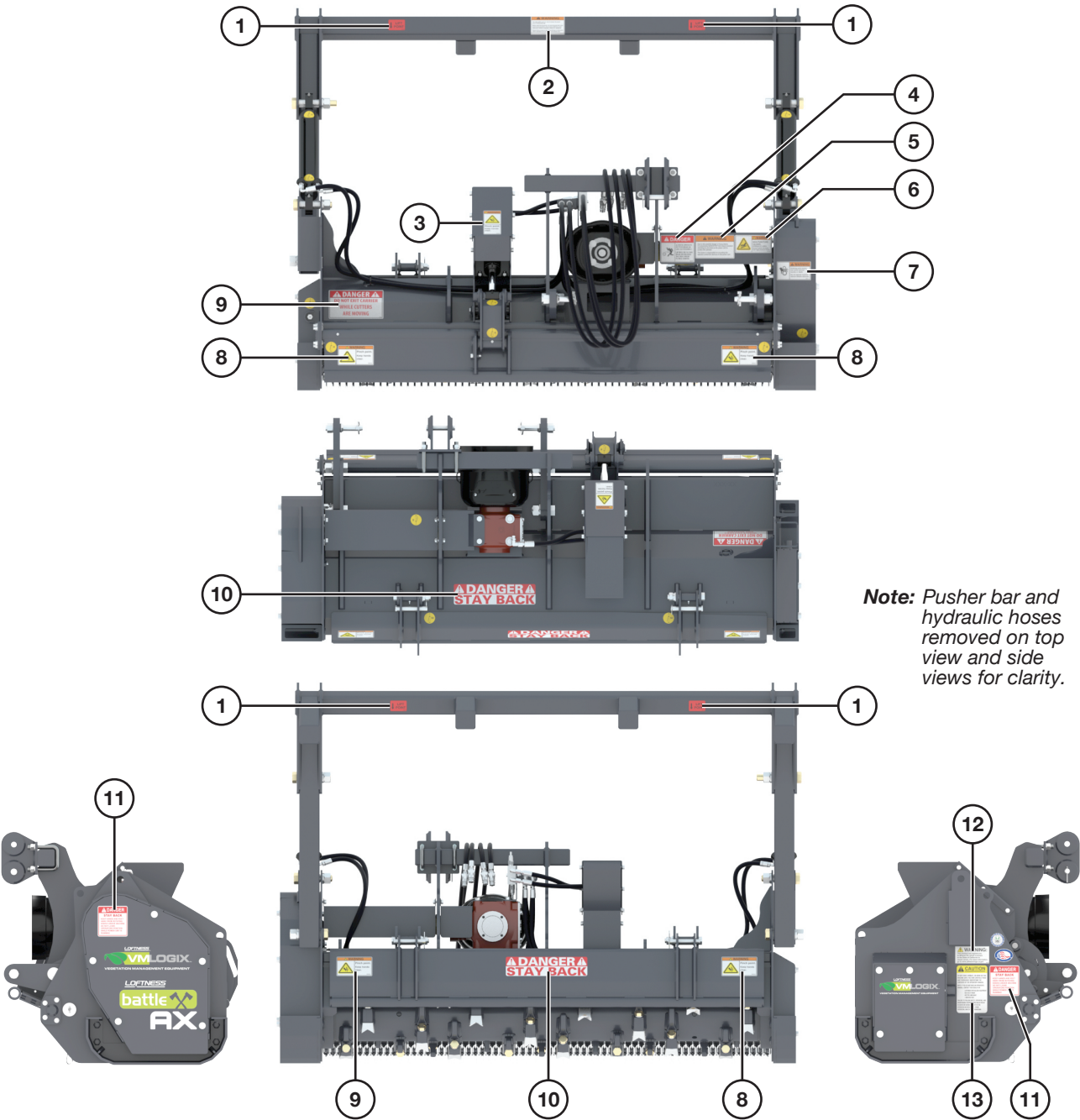
A decal with this warning statement is adhered to the Battle Ax. If the decal should become worn or missing, replace immediately.

Safety Instructions

Safety Decal Locations

Check and replace any worn, torn, hard to read, or missing safety decals on your mulcher.

NOTE: This section shows where safety-related decals are applied on the mulcher. For all mulcher decals see “Battle Ax Decals and Signs” on page 57.

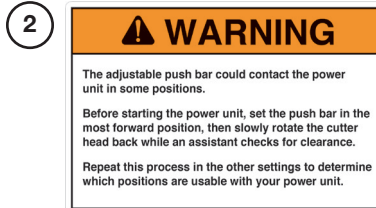


See the following page for detailed images of the safety decals called out above.

Safety Decal Locations (Cont'd)



Part No. N29769



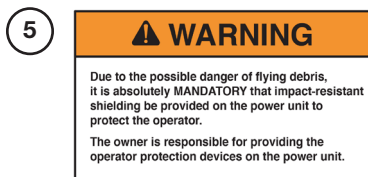
Part No. N17014



Part No. N23507



Part No. N68724



Part No. N17013



Part No. N23506



Part No. N68716



Part No. 206502



Part No. 200491



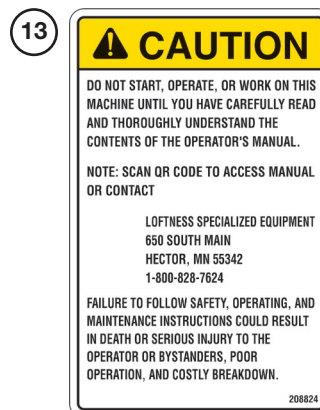
Part No. 4334



Part No. N28386



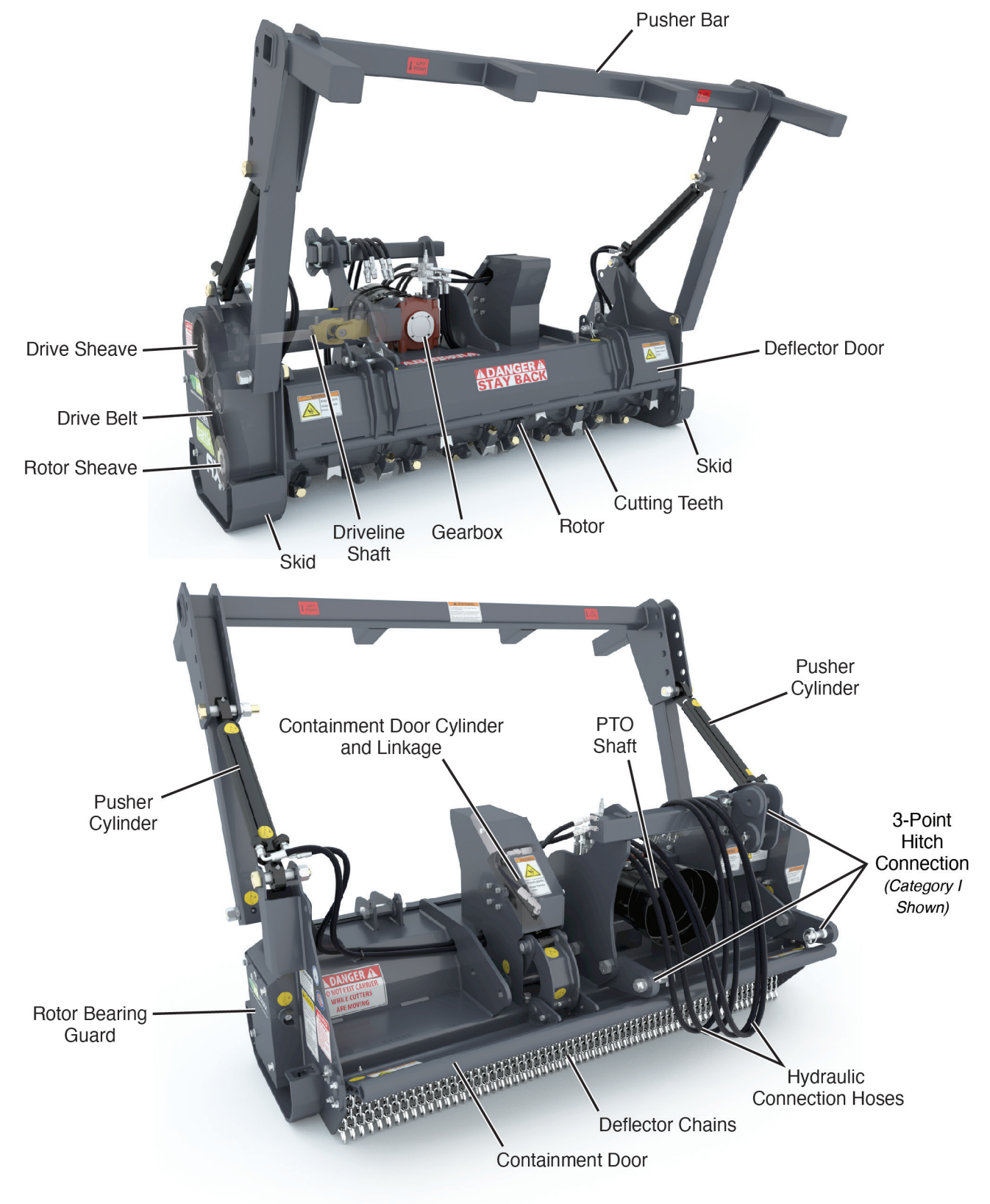
Part No. 203264



Part No. 208824

Safety Instructions

Battle Ax Identification



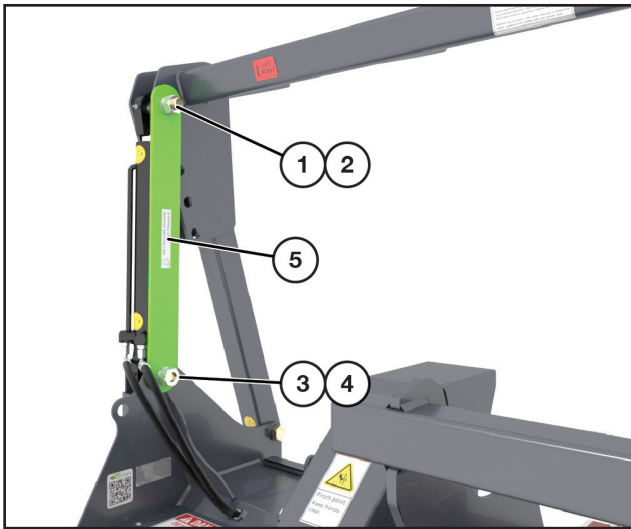
Set-up Instructions

Pusher Bar Assembly

The Battle Ax is shipped with the pusher bar in an upright position. Depending on your model, follow either the Hydraulic Pusher Model or Fixed Pusher Model instructions to move the pusher bar into operating position.

Hydraulic Pusher Models

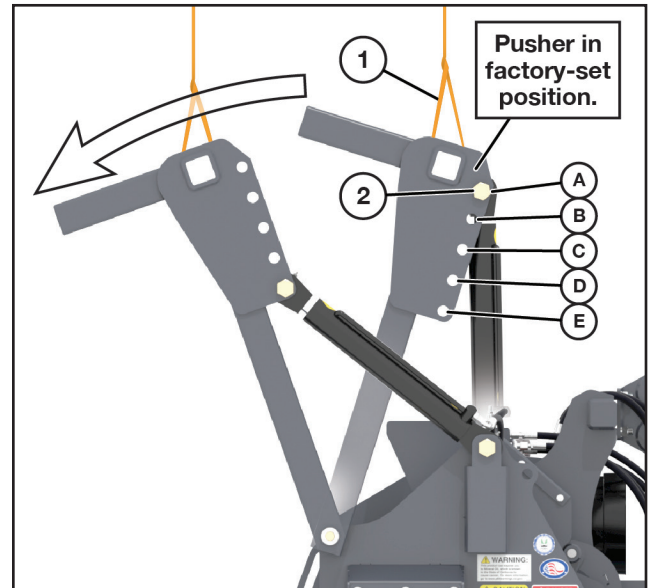
Before the Battle Ax with the hydraulic pusher option can be put into service, the shipping bar will need to be removed.



Remove the top nut (1) and washer (2), then the bottom nut (3) and washer (4) securing the shipping bar (5). Keeping the bolts in position, slide the shipping bar off of the bolts.

Reinstall the hardware back into position and tighten securely.

The shipping bar may be discarded.



NOTE: The pusher cylinders are factory set with the rod ends aligning with the top hole (A) in the side of the pusher. Repositioning the rod end of the cylinders to another hole (B, C, D, E) in the sides of the pusher will provide a different range of motion for the pusher bar during operation. If a different hole position is desired follow the procedure below.

NOTE: Repositioning the pusher cylinders will require two people and the use of an approved lifting device (1) to support the pusher bar as it is being adjusted.

Ensure pusher bar is being safely supported.

Remove the nut, washer, bolt, and bushings from the top hole/cylinder rod end (2) on both the left side and right side pusher cylinders.

Using the hoist, adjust the angle of the pusher bar while simultaneously positioning one of the cylinders until the hole in the rod end aligns with the desired hole in the side of the pusher.

NOTE: A punch may be needed to assist with alignment.

Reinstall the hardware in the correct order and hand-tighten.

Move the other cylinder into place so the hole in the rod end aligns with the corresponding hole position as the opposite side. Reinstall the hardware in the correct order.

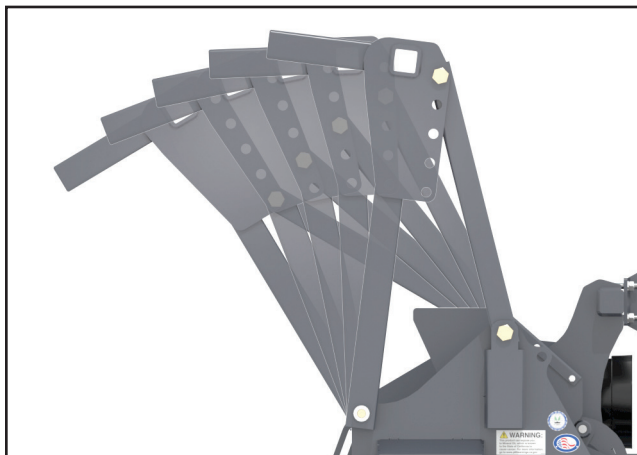
Tighten all hardware on both sides.

The strap/chain from the hoist can now be removed.

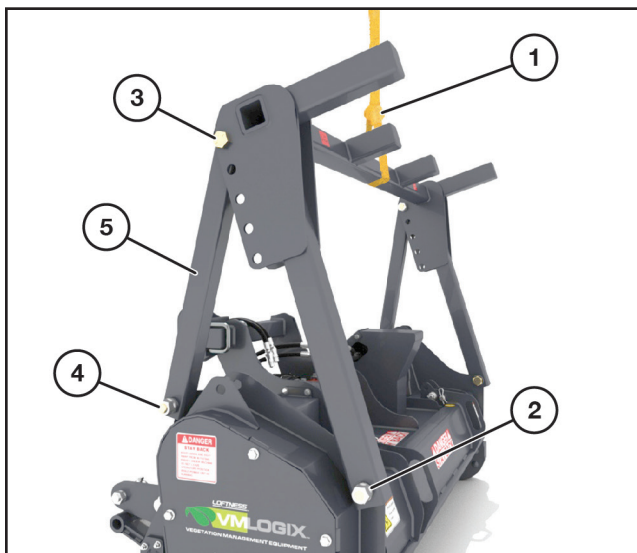
Set-up Instructions

Pusher Bar Assembly (Cont'd)

Fixed Pusher Models



The fixed pusher bar can be set into one of five different operating positions as shown above. Determine which of the five positions is desired before assembling.



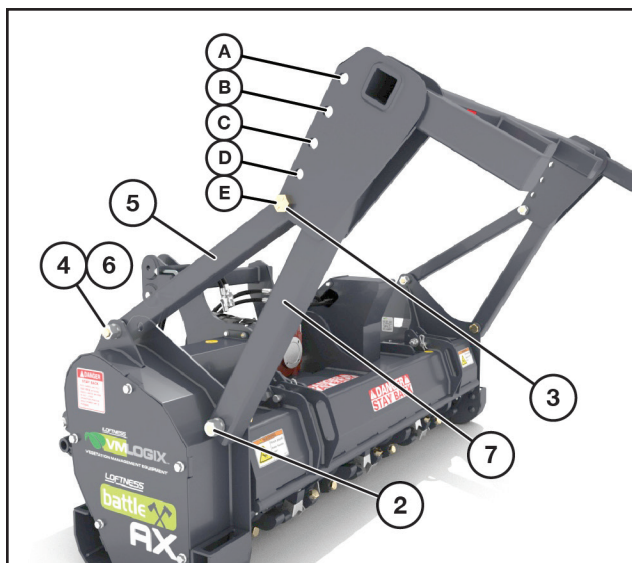
NOTE: Assembling the pusher bar requires two people and the use of an approved lifting device (1) to support the push bar as it is being adjusted.

Ensure the pusher bar is being safely supported.

Loosen the nuts at locations 2 and 3.

Remove the nut, bolt, and washer at location 4 that secures the arm (5) to the frame during shipping.

Repeat the procedure on the other side



Move arm (5) into position so the hole in the lower end of the arm aligns with the operation hole (6) of the side plates on the frame (indicated by the shipping tag). Remove the shipping tag.

NOTE: The pusher bar is factory-set so the upper hole in each arm aligns with hole "A". Repositioning the upper hole in the arms to another hole (B, C, D, E) in the sides of the pusher will provide a different angle for the pusher bar during operation. If a different hole position is desired follow the procedure below.

Remove the nut, bolt, and washer (3) from the top hole of the pusher side and upper hole of the arm. Once the hardware is removed, let the arm rest on pusher bar side assembly (7). Repeat the procedure on other the side.

Using the hoist, adjust the angle of the pusher bar while simultaneously positioning one of the arms until the upper hole in the arm aligns with the desired hole in the side of the pusher.

NOTE: A punch may be needed to assist with alignment.

Reinstall the hardware in the correct order and hand-tighten.

Move the opposite arm into place so upper hole aligns with the corresponding hole position as the opposite side. Reinstall the hardware in the correct order.

Tighten all hardware on both sides.

The strap/chain from the hoist can now be removed.

Set-up Instructions

Installing the Battle Ax to the Tractor

The Battle Ax can be attached to any tractor, up to 70 HP, that has a standard A.S.A.E. three-point hitch and operates at the standard 540 RPM PTO speed under normal conditions.

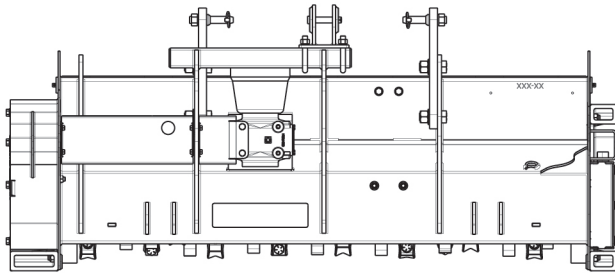


WARNING: Operating the mulcher in excess of the recommended operating speed can cause premature wear or damage to the tractor and/or mulcher and could result in personal injury.

Refer to the following diagrams for your particular hitch application. Make note of the mounting position of the lower mount arms. The 1 in. X 2-3/4 in. mounting bolts are inserted through the mulcher hitch mount plates first, with a nut and lock washer securing the lower mount arm.

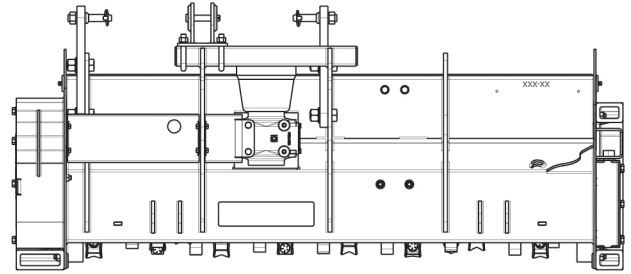
The mulcher comes equipped with Category I pins.

Category I Hitch Centered



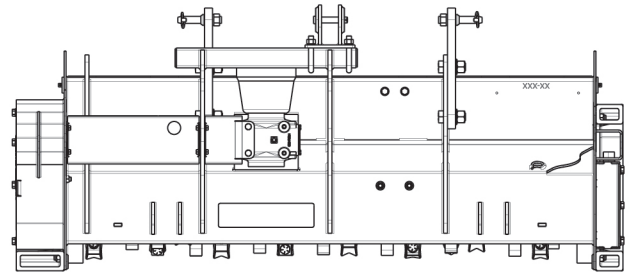
Top three-point and lower mount arms in the centered position.

Category I Hitch Offset



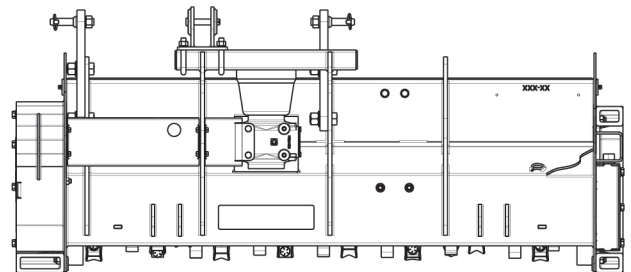
Top three-point and lower mount arms in the offset position.

Category II Hitch Centered



Top three-point and lower mount arms in the centered position.

Category II Hitch Offset



Top three-point and lower mount arms in the offset position.

NOTE: The use of a Quick Hitch will also require Category II pins and bushings, and will increase the drive shaft operating length. Refer to "PTO Connection" on page 14 for instructions.

Set-up Instructions

Installing the Battle Ax to the Tractor (Cont'd)

Connecting the Battle Ax

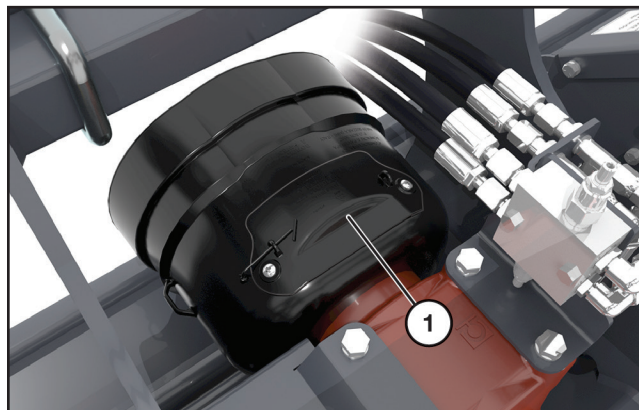
Attach the tractor lift arms to the category hitch pins of the Battle Ax lower mount arms and secure with lynchpins.

Attach the tractor top link to the hole in mulcher top three-point mount.

Connect and adjust the stabilizer bars or chains to prevent side sway.

IMPORTANT: Due to increased weight of the three-point mounted mulcher, a weight ballast must be applied to the front of the tractor. Fluid in tires, wheel weights, front tractor weight, or any combination of these methods is suitable. The tractor front end weight should be at least 20% of the total tractor weight with implement raised.

PTO Connection



To attach the drive shaft to the mulcher open the access panel (1) on the PTO shield that is attached to the mulcher.

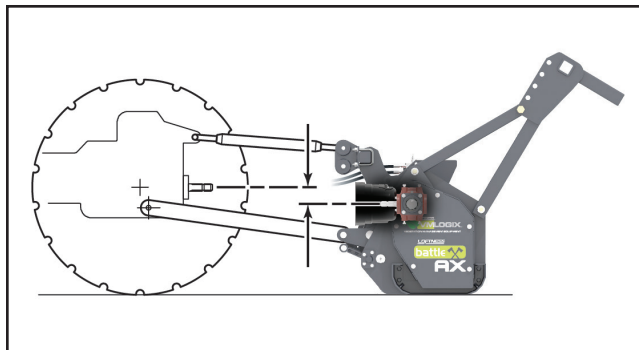
Remove the clamp cone bolt from the PTO and then slide the PTO onto the gearbox shaft until the groove in the PTO yolk aligns with the groove in the gearbox shaft. Reinstall the clamp cone bolt and tighten to 74 ft-lb (100 Nm). Reinstall the access panel on the shield.

The tractor end of the drive shaft fits A.S.A.E. standard 1-3/8 in. diameter 540 RPM tractor PTO shafts. Pull the collar back to install or remove the drive shaft.

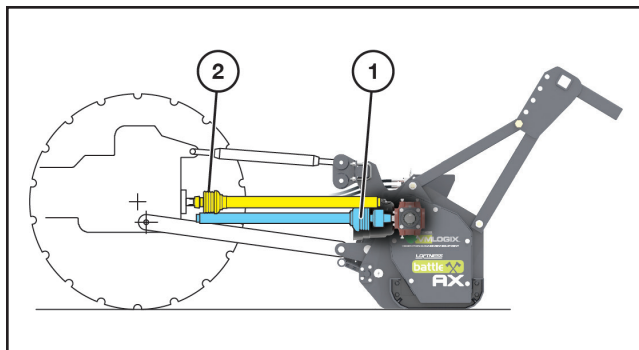
Drive Shaft Sizing Procedure

Due to the variation of many different tractor/implement hitch points, the drive shaft must be sized for your particular application. Follow the procedure below for shortening the drive shaft.

1. Attach mulcher to tractor lift arms in centered position.



2. Adjust tractor top link until gearbox input shaft is parallel with tractor input shaft.
3. Separate the PTO shaft into two parts.



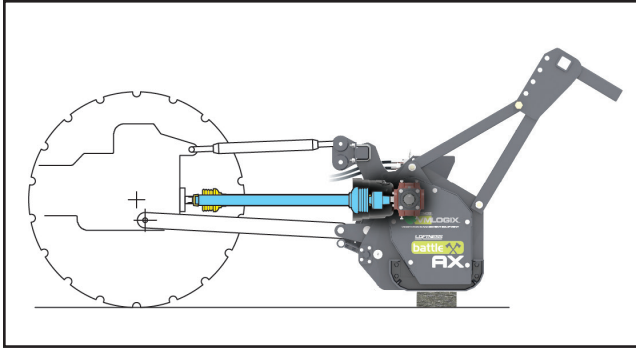
4. Attach rear drive shaft half (1) onto the mulcher gearbox.

Attach tractor end of drive shaft (2) onto the tractor PTO shaft.

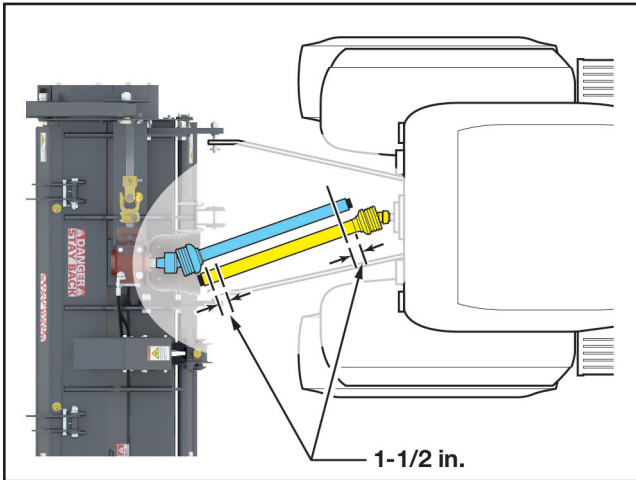
(Procedure continued on following page.)

Installing the Battle Ax to the Tractor (Cont'd)

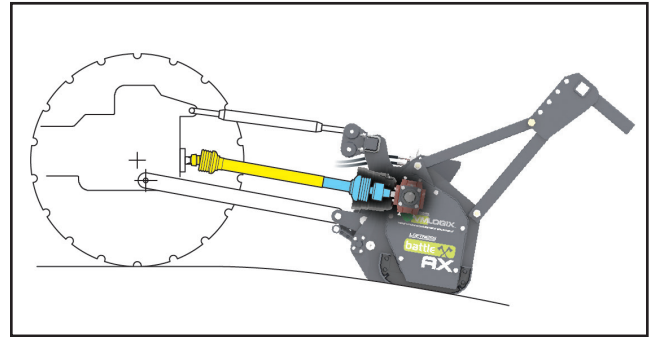
Drive Shaft Sizing Procedure (Cont'd)



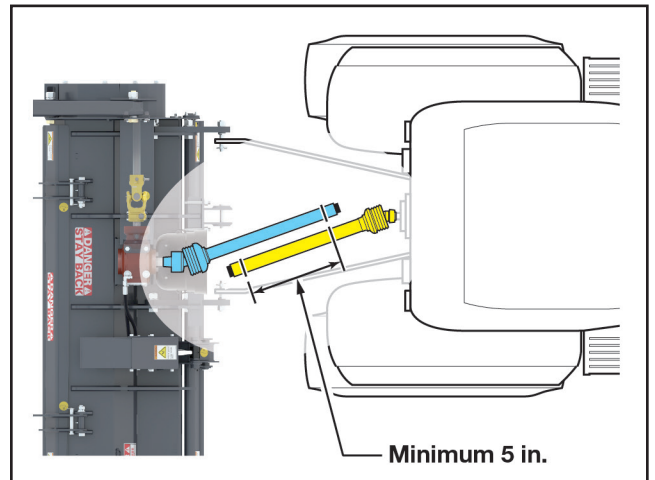
5. Raise and lower the mulcher to determine the position which has the shortest distance between gearbox input shaft and PTO shaft. Block mulcher securely where the shortest distance was determined.



6. Hold drive shaft halves parallel to each other. Measure 1-1/2 in. back from universal joint bell shield and mark on opposite half. Do this on both halves.
7. Raise and lower the mulcher to determine the position which has the greatest distance between gearbox input shaft and PTO shaft. Block mulcher securely where the greatest distance was determined.



NOTE: For this step take into consideration that the mulcher may be operated below grade.



8. Hold attached drive shaft halves parallel to each other and measure the distance between the two marks (applied in step 6). This measurement will indicate the overlap of the two halves. There must be a minimum of 5 in. overlap or the drive shaft cannot be used.

IMPORTANT: Never operate equipment with less than 5 in. overlap.

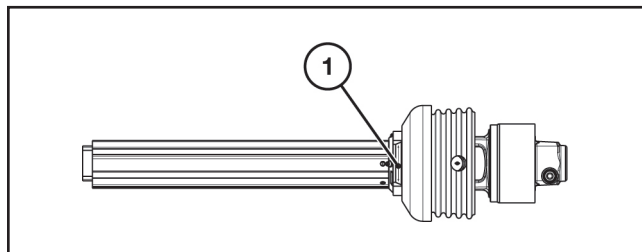
9. Remove drive shaft from mulcher gearbox and tractor.

(Procedure continued on following page.)

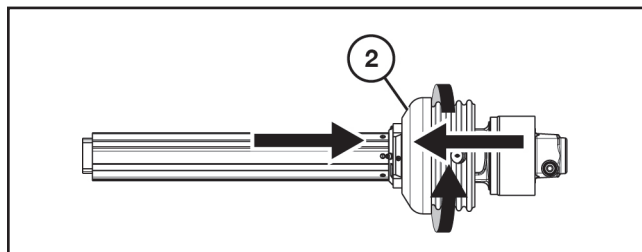
Set-up Instructions

Installing the Battle Ax to the Tractor (Cont'd)

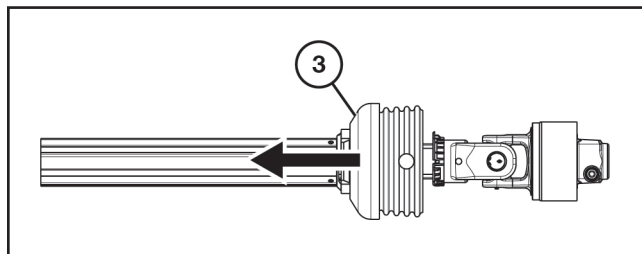
Drive Shaft Sizing Procedure (Cont'd)



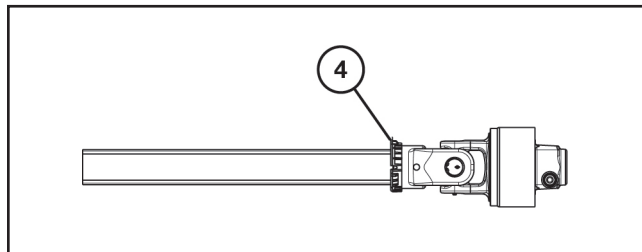
10. Remove top screw (1).



11. Turn the shield cone (2) into the assembly position.



12. Pull off the shield half (3).



13. Remove the bearing ring (4).

14. Clamp guard in padded vise. Cut off the shield where marked (step 6).

15. Using the cut off section of shield as a guide, cut off the same amount of the shaft.

IMPORTANT: Do not cut the steel shafts flush with the ends of the plastic tubes. The steel tubes should protrude from the plastic tubes the same amount as they did prior to any cutting.

16. Repeat steps 10 and 15 to the other drive shaft half.

17. Deburr cut ends of drive shaft sections and remove all chips and filings.

18. Reassemble the guards back onto the PTO.

19. Apply grease to male drive shaft half. Assemble drive shaft and install on tractor and mulcher, making sure the yokes lock into place. Make certain drive shaft shielding is in place.

IMPORTANT: Before operating the mulcher, carefully check to make sure the driveline will not bottom out or become disengaged.

Hydraulic Connections



WARNING: Hydraulic Lines. Protect hands and body from high pressure fluids. Pressurized fluids can penetrate the skin. Disconnect and lock out power source before disconnecting and/or connecting hydraulic hoses.



Install the mulcher quick couplers to the tractor.

IMPORTANT: It is the owner's responsibility to assure that the hydraulic hoses from the power unit to the mulcher are not caught in pinch points, or in any way damaged by moving parts.

Set-up Instructions

Checking Rotor Speed



DANGER: Shut down power from the tractor before removing the belt cover and applying reflective tape to the sheave. Keep the Battle Ax skids on blocks for this procedure.



Remove the belt cover. See “Removing Belt Cover” on page 26 for instructions.

Apply a small piece of reflective tape (1) to the outer edge of the lower sheave.

Start the tractor and engage the PTO.



DANGER: Keep hands, feet, and clothing clear of the rotor, belt, and sheaves while the tractor is running.

Point an electronic (photo) tachometer (2) towards the edge of the sheave to check the rotor speed.

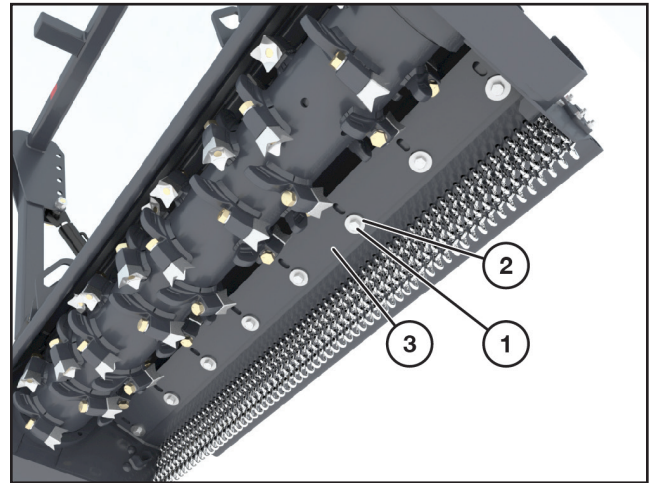
NOTE: The tachometer is not supplied with the Battle Ax.

Test the rotor RPM with the tractor engine at full throttle.

Disengage the PTO and shut down the tractor when done.

Return the belt cover to position, securing with the five bolts.

Cutter Bar Adjustment



NOTE: The cutter bar can be adjusted back or forward to increase or decrease the distance between the bar and the rotor.

Most operators find the best performance is achieved by adjusting the cutter bar as close as the slots will allow (approximately a 1/4" gap from knife to cutter bar). A wider gap generally increases finished partical size and horsepower requirements.



WARNING: Shut down and disengage the PTO from the tractor before adjusting the cutter bar.

Loosen the series of bolts (1) with washers (2) securing the cutter bar (3) to the frame. Move the cutter bar either forward or back making sure the distance moved is consistent through the entire length of the cutter bar. Retighten bolts.

Over time, the cutter bar edge will become worn and rounded from use. There are a total of 4 wear edges available by removing and flipping the bar, side to side and front to back.



CAUTION: If adjusting the cutter bar after the mulcher has been used, the cutter bar should be completely removed to clear any debris away from contact surfaces before assembly and tightening. FAILURE TO DO SO COULD RESULT IN SEVERE DAMAGE TO THE mulcher!.

Set-up Instructions



Operating Instructions

Getting Started

Visually inspect the unit before starting the tractor. Check for loose or missing parts. Check all bolts for tightness.

For best results, the areas to be mowed should be free of debris such as bottles, metal objects, rocks, wire, etc. The teeth cut and pulverize the brush, grass and weeds.

For first-time users, start the tractor in a clear, open area and become familiar with the controls. Run throttle at half speed and travel at a low speed. Raise the mulching head only slightly until comfortable with the mulcher.



WARNING: Due to the potential danger of flying debris, it is the owner's responsibility and is "ABSOLUTELY MANDATORY that IMPACT-RESISTANT SHIELDING" be installed on the tractor to protect the operator.



WARNING: Lifting or tilting the mulcher increases the risk of flying debris.



DANGER: Keep hands and feet out! Do not step on or climb over the unit while mulcher is in operation, or engine is running. Do not carry passengers.



WARNING: Do not operate the mulcher above the rated RPM.



WARNING: Flying debris can gather on the tractor and needs to be cleaned off, especially around the radiator, oil cooler screens, engine compartment, and exhaust areas. Periodic cleaning will help prevent the possibility of fire.



DANGER: DO NOT allow ANY people or animals within 300 feet of the work area while operating the mulcher.

Operation



WARNING: Always stop engine and remove key before leaving operators seat.



Raise the Battle Ax slightly above the ground when moving the mulcher.

Lower mulching head so skids are on ground.

Set engine speed to low idle and engage the PTO.

IMPORTANT: To avoid damage or excessive wear, always engage or disengage PTO with engine at idle speed.

Slowly increase engine speed to high idle.

Move the tractor and mulcher forward or backwards and begin mowing.

NOTE: Various mowing conditions, and desired finished cut appearance, will determine proper ground speed.



CAUTION: Operating the mulcher below the rated RPM speed will reduce rotor speed and cause improper cutting. In difficult conditions, reduce tractor speed by downshifting gears while maintaining rated engine RPM. Severely difficult conditions may require a delay until conditions improve.

(Procedure continued on following page.)

Operating Instructions

Operation (Cont'd)

Operating Tips

To reduce rotor jams, approach brush and trees at a slow speed.

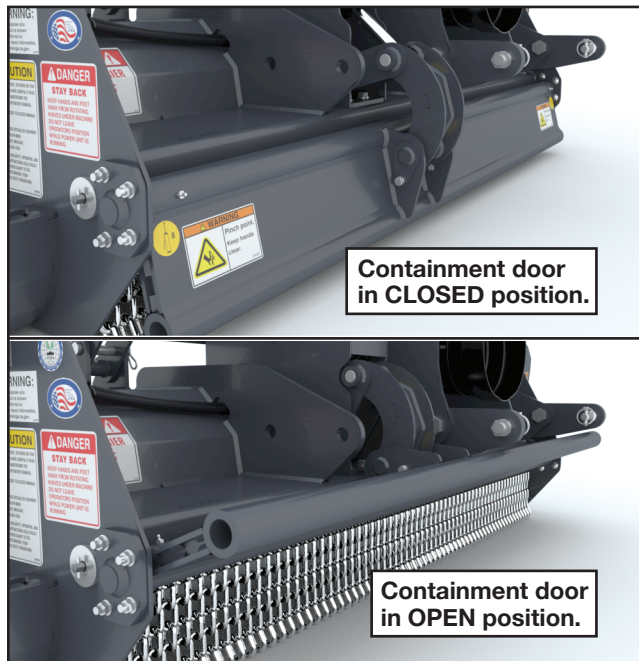
When operating the mulching head near the ground, keep as low to the ground as possible without the teeth striking ground or other obstructions.

NOTE: Because of the high speed of the rotor, the life of the teeth will be reduced if it is operated in rocky terrain or in areas where many obstacles are present.

IMPORTANT: Avoid lifting the mulcher excessively high while in operation. This can lead to unnecessary driveline stress and wear.

Containment Door (Optional)

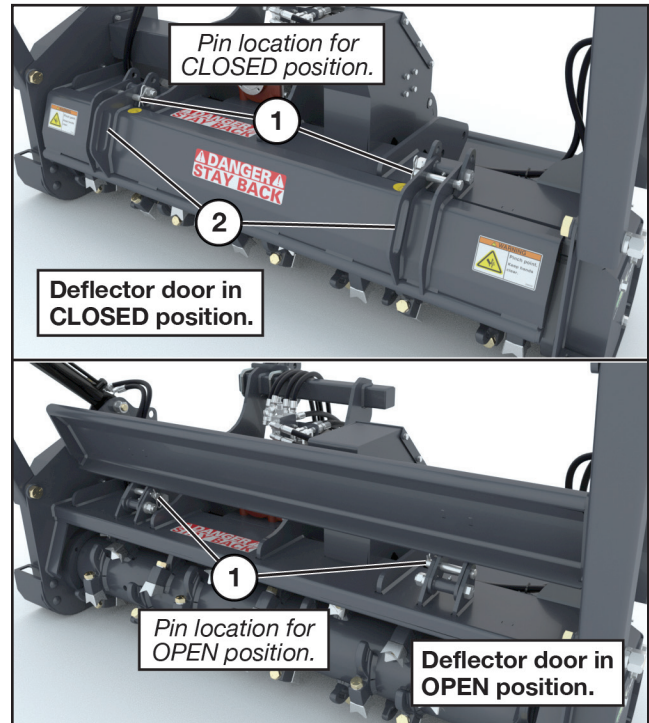
The containment door can either be placed in the closed or open position depending on the material being mulched or the mulcher application.



Use the tractor's hydraulics to control the angle/opening of the containment door.

Deflector Door (Optional)

The deflector door can either be placed in the closed or open position depending on the material being mulched or the mulcher application.



To change position of the deflector door, remove the two pins with hairpin clips (1). Use the handles (2) on the outside of the door to pivot the door into either position.

CAUTION: The deflector door may be heavy for some operators. Use a second person to assist lifting if needed.

Reinsert the pins and secure with the hairpin clips. Refer to the image above for pin placement for either configuration.

Clearing Jams

If the rotor stalls, or gets jammed with debris, stop rotor and raise slightly. Start rotor again to free debris

WARNING: Do not attempt to dislodge jams by hand while the tractor is running. Shut down and lock out power from the tractor before attempting to remove debris by hand.

Log Moving (Hydraulic Pusher Models Only)



Disengage the PTO before moving logs and brush with pusher bars.

Raise the mulcher, then extend the pusher cylinders until the push bar extensions are over the log or item being moved. Lower the mulcher and position the log between push bar extensions and the mulcher. Move the tractor forwards, dragging the log to the desired location.

Detaching the Battle Ax

Park the tractor on a dry level surface. Place blocks underneath the skids if necessary.

Lower the mulcher to the ground.

Shut off engine and remove key.

Make sure the rotor has stopped completely before continuing.

Disconnect hydraulic hoses and coil neatly on top of the mulcher.

Detach the tractor from the mulcher.



WARNING: Do not attempt to detach the mulcher while the tractor is running. Shut down and lock out power from the tractor before detaching.



General Maintenance

To ensure efficient operation, you should inspect, lubricate, and make necessary adjustments and repairs at regular intervals. Parts that are starting to show wear should be ordered ahead of time, before a costly breakdown occurs and you have to wait for replacement parts. Keep good maintenance records, and adequately clean your Battle Ax after each use.

Proper lubrication is important. Too little lubricant will cause premature failure of a bearing. Too much lubrication usually causes high operating temperature and early failure of seals. Follow all lubrication instructions and schedules included in this section.

Maintenance Schedule

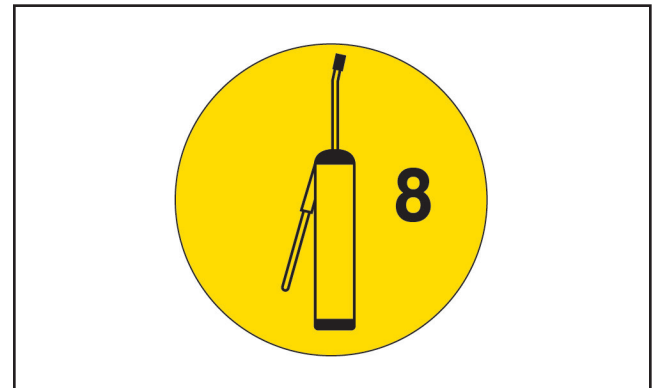
HOURS	SERVICE POINTS	SERVICE REQUIRED					
		CHECK	CLEAN	CHANGE	GREASE	ADJUST	OIL
Every 8	Tractor and Mulcher		X				
	Loose Bolts					X	
	Hoses and Wiring	X					
	Oil Leaks	X					
	Rotor Bearing				X		
	Teeth	X					
	PTO				X		
	U-joint				X		
	Drive Shaft Bearing				X		
	Pusher				X		
	Containment Door				X		
Every 50	Deflector Door				X		
	Belt Tensioner Slide				X		
Every 100	Belt Tension	X					
	Drive Belt	X					
	Safety Labels	X					
	Gearbox	X					
Every 250 or Annually	Gearbox			X			

Lubrication

Grease Points Location

Use a #2 general purpose lithium based grease unless noted otherwise.

NOTE: Replace any broken or missing grease fittings. Be sure to clean fittings before greasing.



NOTE: Lubricate the grease point every "X" hours indicated on the decal adjacent to the grease point.

See "Battle Ax Identification" on page 10 for component location and identification.

(Procedure continued on following page.)

Maintenance

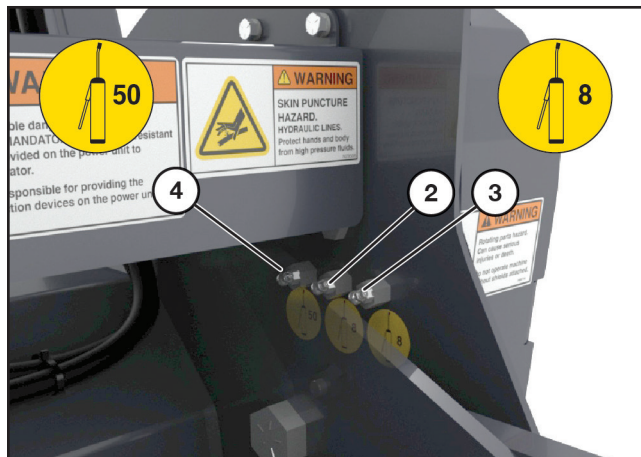
Lubrication (Cont'd)

Grease Points Location (Cont'd)



Location: Right side rotor bearing (1).
Interval: Every 8 hours of operation.

NOTE: Rotor bearings cannot be damaged by over-greasing. Lubricate the fittings until a small amount of grease is purged from the bearing.

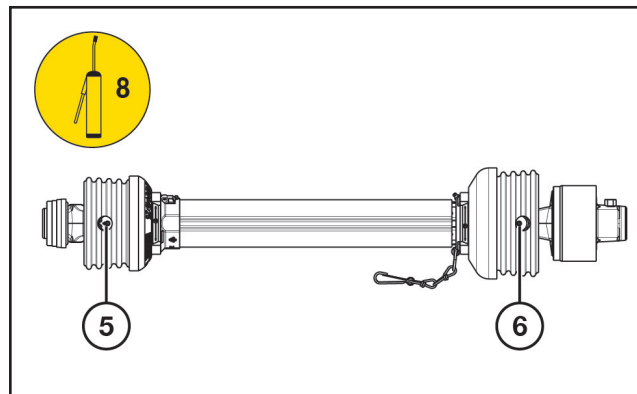


Location: Left side rotor bearing (2).
Interval: Every 8 hours of operation.

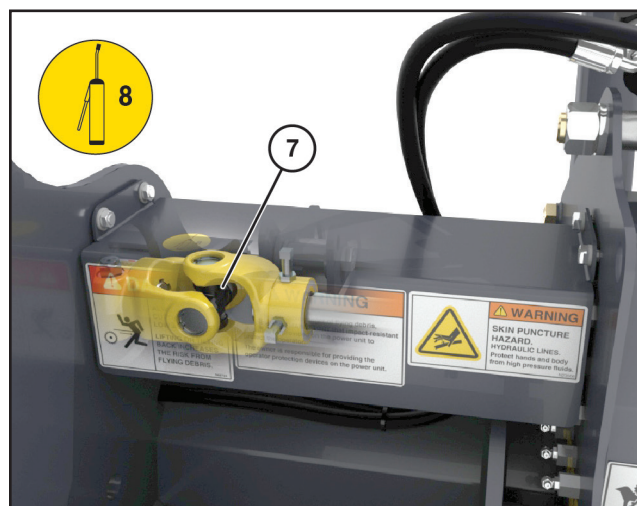
NOTE: Rotor bearings cannot be damaged by over-greasing. Lubricate the fittings until a small amount of grease is purged from the bearing.

Location: Driveline bearing (3).
Interval: Every 8 hours of operation.

Location: Belt Tensioner Slide (4).
Interval: Every 50 hours of operation.



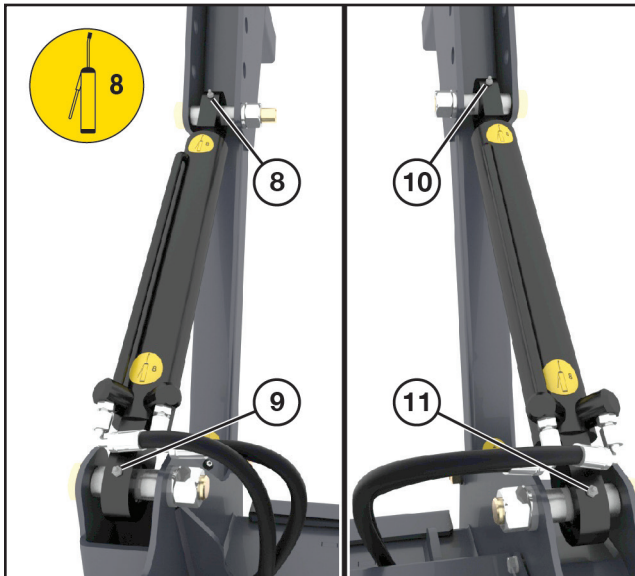
Location: PTO (5 and 6).
Interval: Every 8 hours of operation.



Location: Driveline U-Joint (7).
Interval: Every 8 hours of operation.

Lubrication (Cont'd)

Grease Points Location (Cont'd)

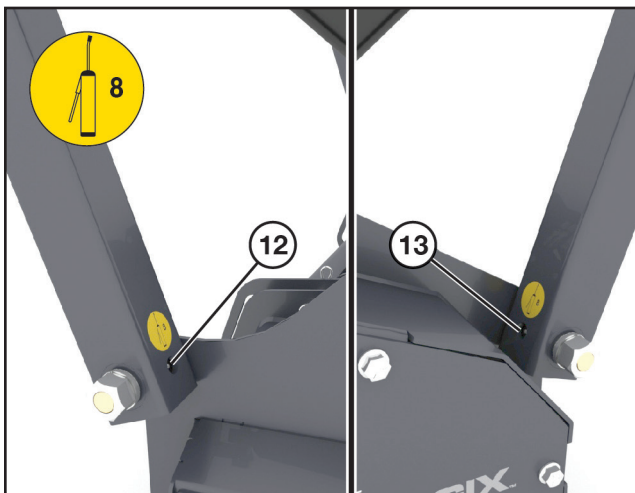


Location: Right side pusher cylinder (8 and 9).
(Hydraulic pusher models only.)

Interval: Every 8 hours of operation.

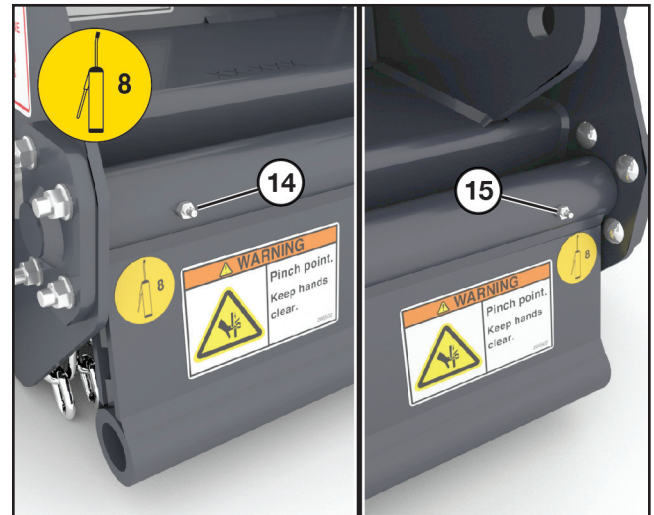
Location: Left side pusher cylinder (10 and 11).
(Hydraulic pusher models only.)

Interval: Every 8 hours of operation.



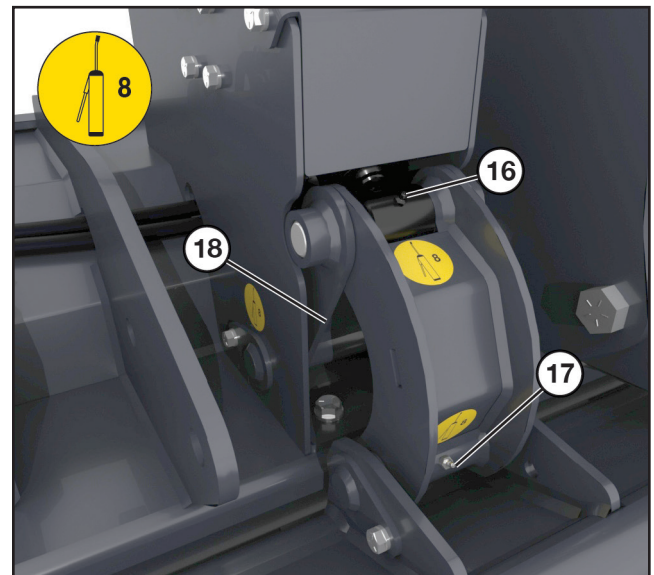
Location: Pusher Arms (12 and 13).
(Fixed and hydraulic pusher models;
Pusher arm may need to be tilted forward
to access.)

Interval: Every 8 hours of operation.



Location: Containment door hinges (14 and 15).
(On models with optional containment door
only.)

Interval: Every 8 hours of operation.



Location: Containment door linkage (16, 17, and 18).
(On models with optional containment door
only.)

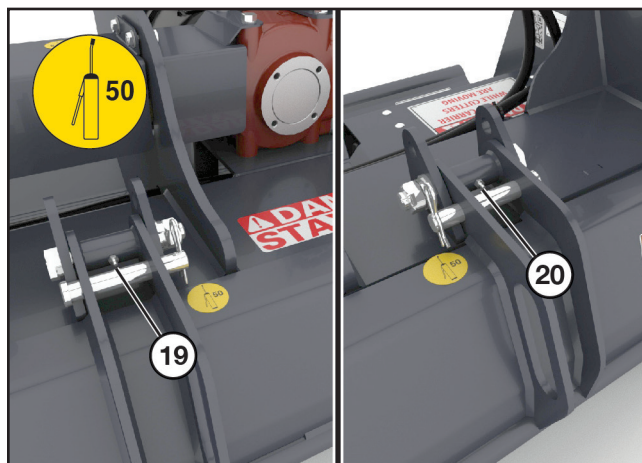
Interval: Every 8 hours of operation.

NOTE: The containment door will need to be in the
vertical (closed) position to access the grease
point 18.

Maintenance

Lubrication (Cont'd)

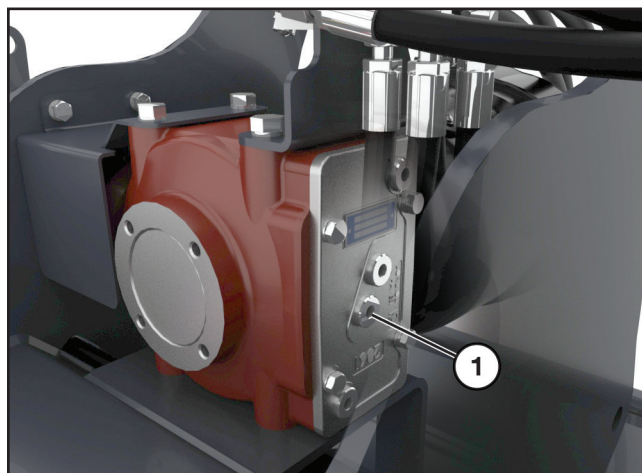
Grease Points Location (Cont'd)



Location: Deflector door (19 and 20).
(On models with optional deflector door only.)

Interval: Every 50 hours of operation.

Gearbox



Check the oil level every 100 hours and keep filled to the check plug level (1) shown above.

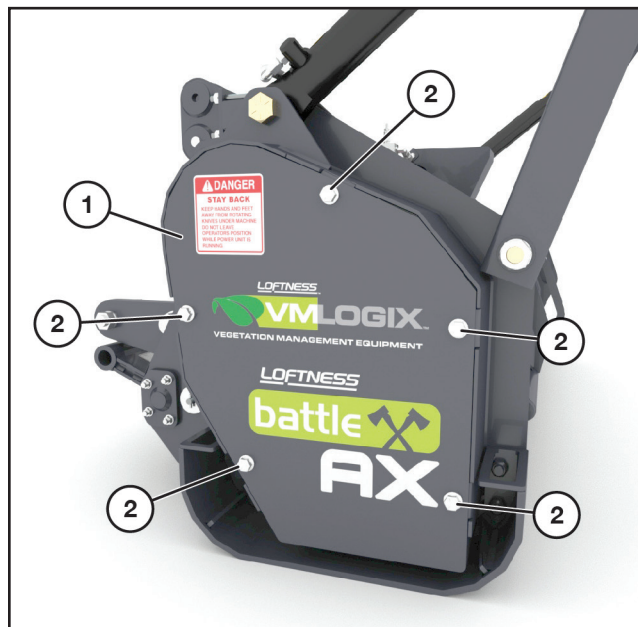
Use S.A.E. #90 gear oil.

Drain and refill the gearbox after every 250 hours of running time, and at the beginning of each season.

Removing Belt Cover



DANGER: Shut down power from the tractor before removing the belt cover. Failure to do so could result in serious injury or death.



To remove the belt cover (1), unscrew the five bolts (2) and lift the cover off of the frame.



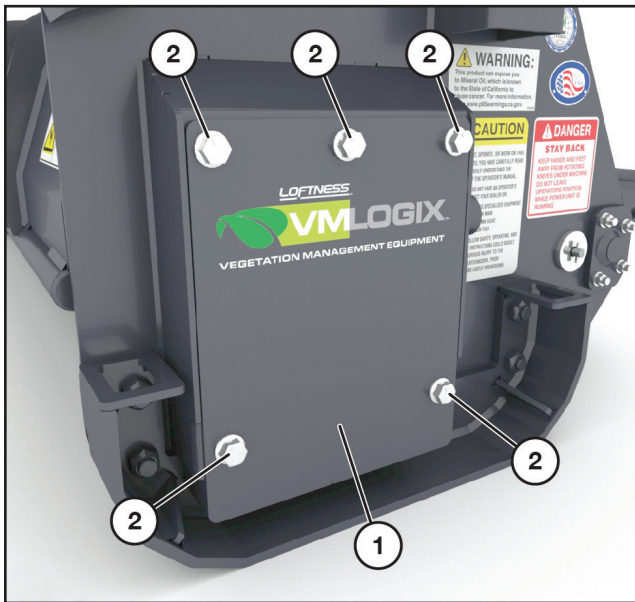
CAUTION: The belt cover is heavy. Support the cover when removing.

When maintenance/repairs are complete, return the cover back into position and tighten and secure all bolts.

Removing Bearing Cover



DANGER: Shut down power from the tractor before removing the bearing cover. Failure to do so could result in serious injury or death.



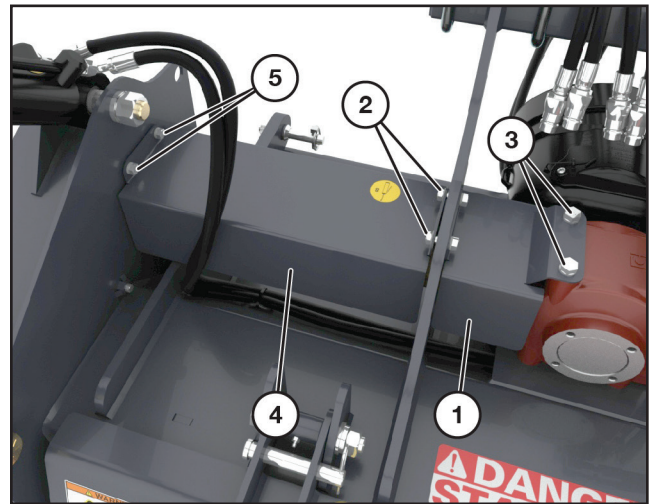
To remove the bearing cover (1), unscrew the five bolts (2) and lift the cover off of the frame.

When maintenance/repairs are complete, return the cover back into position and tighten and secure all bolts.

Removing Drive Shaft Covers



DANGER: Shut down power from the tractor before removing the drive shaft covers. Failure to do so could result in serious injury or death.



To remove the inside cover (1), remove the two bolts with washers and nuts (2), then remove the two bolts with washers (3) that are secured to the gearbox.

To remove the outside cover (4), remove the two remaining bolts (5) that are secured to the mulcher frame.

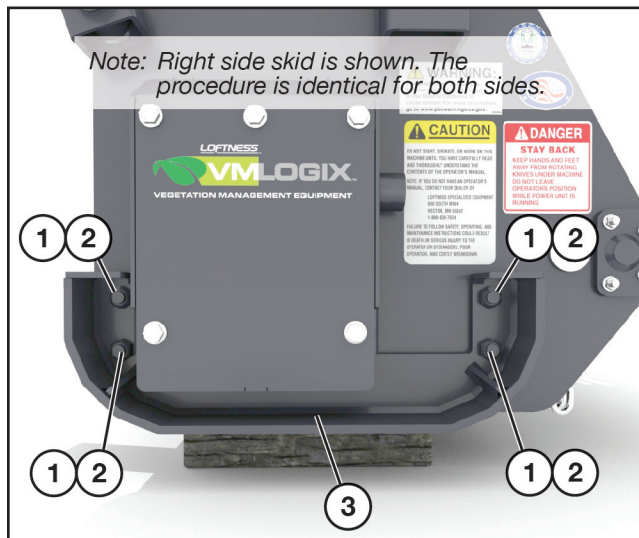
When maintenance/repairs are complete, return the covers back into position and tighten and secure all bolts.

Maintenance

Skid Removal/Replacement



WARNING: Shut down and lock out power from the tractor before removing skids. Failure to do so could result in serious injury or death.



Lift the Battle Ax off of the ground about 6 inches. Place blocks under the rotor (not under teeth) to support the mulcher when lowered. Do not place blocks under the skids.

Remove nuts (1) and slide carriage bolts (2) out. Lower the skid (3) and remove.

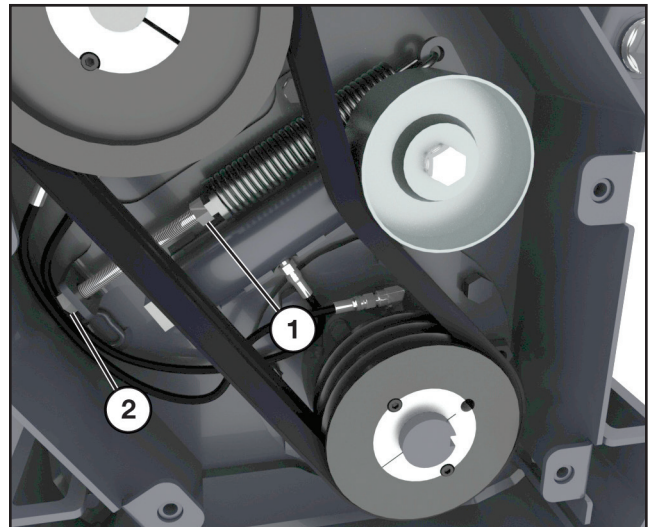
To install a new or repaired skid, align holes in skid with holes on frame. Re-install the bolts, add the nuts and tighten securely against the skid.

Belt Adjustment



WARNING: Shut down and lock out power from the tractor before adjusting the drive belt. Failure to do so could result in serious injury or death.

Remove the belt cover. Refer to "Removing Belt Cover" on page 26 for instructions.



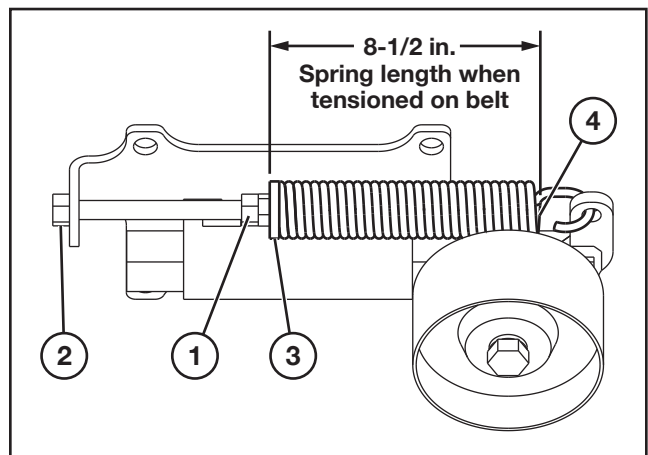
Loosen jam nut (1).

Turn adjustment bolt (2) clockwise to increase spring tension.

Turn adjustment bolt (2) counterclockwise to decrease spring tension when replacing drive belt.

Remove the belt while belt tension is released.

NOTE: When replacing or installing a new belt, align the grooves in the belt with the upper and lower pulleys.



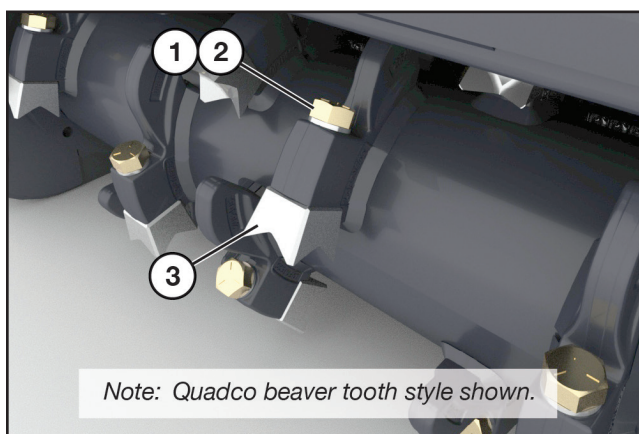
Turn the adjustment bolt (2) clockwise until the distance from the collar (3) to the end of the spring (4) is approximately 8-1/2 in. Tighten jam nut (1).

Tooth Removal and Installation



DANGER: Shut down and lock out power from the tractor before removing teeth. Failure to do so could result in serious injury or death.

To easily access the cutter teeth, place the deflector door into the open position and safely secure with the pins. See “Deflector Door (Optional)” on page 20 for instructions.



Remove the bolt (1), washer (2), and tooth (3).

Use copper based anti-seize when reinstalling the bolts. Torque to 200 ft.-lbs.

IMPORTANT: When a damaged tooth is replaced, the tooth directly opposite (180 degrees) must be replaced at the same time to retain balance.

Tooth Sharpening

NOTE: The teeth need to be kept sharp to maintain the most effective operation of the mulcher. Daily inspection and touch up is recommended.

NOTE: The teeth can either be removed from the rotor or remain installed for sharpening.



DANGER: Shut down and lock out power from the tractor before removing teeth or sharpening while on the rotor. Failure to do so could result in serious injury or death.



WARNING: Rotor must be stabilized to prevent accidental rotation any time the rotor is exposed for service work.

Note: Guard on grinder removed for photo clarity.

Leading Edge

NOTE: The cutter teeth have been heat treated to a specific hardness. Care must be taken to avoid overheating the leading edge of the tooth while sharpening. If the coloring in the tooth changes to either a blue or brown during the sharpening, you have removed the temper and the tooth will not hold it's cutting edge.

NOTE: When re-sharpening teeth using machine shop equipment, avoid overheating the teeth by using a flood coolant system.

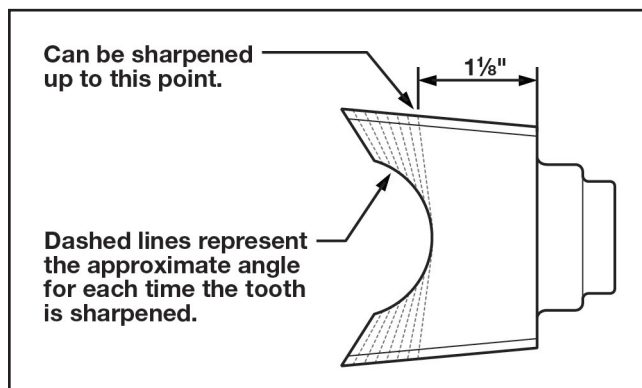
NOTE: When re-sharpening teeth using a hand grinder, avoid overheating the tooth by lightly grinding each tooth, moving across the entire row of teeth before returning to the first tooth to repeat the procedure.

NOTE: Sharpen each tooth equally to maintain rotor balance. Always return tooth to it's original location if it is removed from the rotor for sharpening.

(Procedure continued on following page.)

Maintenance

Tooth Sharpening (Cont'd)



NOTE: *It is not necessary to match the factory angle on the underside of the cutting edge when re-sharpening. Sharpen each tooth at a slight angle for each successive sharpening (represented by the dashed lines shown in the illustration above). When the cutting edge of the tooth is 1-1/8 in. from the back side of the tooth, the tooth must be replaced.*

Storage

End of Season

- Clean entire Battle Ax thoroughly.
- Clean belt and sheaves, relax the belt tension. See "Belt Adjustment" on page 28.
- Lubricate all parts of the mulcher. See "Lubrication" on page 23.
- Make a list of all worn or damaged parts and replace them.
- Paint all parts that are worn or rusted.
- Store the mulcher in a clean, dry area.
- Secure hoses on mulcher to avoid damage.
- Review the mulcher operator's manual.

Beginning of the Season

- Review the Battle Ax operator's manual.
- Lubricate all parts of the mulcher. See "Lubrication" on page 23.
- Tighten all bolts, nuts, and set screws. See "Torque Specifications" on page 63.
- Adjust belt tension. See "Belt Adjustment" on page 28.
- Replace all damaged, worn or missing decals.
- Install the mulcher on a tractor and test for proper operation.



WARNING: DO NOT allow ANY people or animals within 300 feet of the work area while operating the mulcher.

Troubleshooting

PROBLEM	CAUSE	SOLUTION
Excessive Vibration	Broken or missing teeth.	Replace teeth.
	Mud and/or debris wrapped around the rotor.	Clean the Battle Ax.
	Faulty drive line bearing.	Replace bearing(s).
	Faulty rotor bearing.	Replace bearing(s).
	Damage to rotor (includes bent end of shafts, missing balance weights, or actual rotor deformity from striking rocks, etc.)	Consult factory.
Uneven Cutting	Teeth dull or worn excessively.	Replace teeth.
	Engine RPM too slow.	Adjust tractor RPM to full throttle.
	Travel speed too fast.	Reduce ground speed.
Rotor Will Not Turn	Faulty drive line bearing.	Replace bearing(s).
	Faulty rotor bearing.	Replace bearing(s).
	Belt damaged.	Replace belt.
	Belt slipping.	Clean or replace belt. Adjust tension.

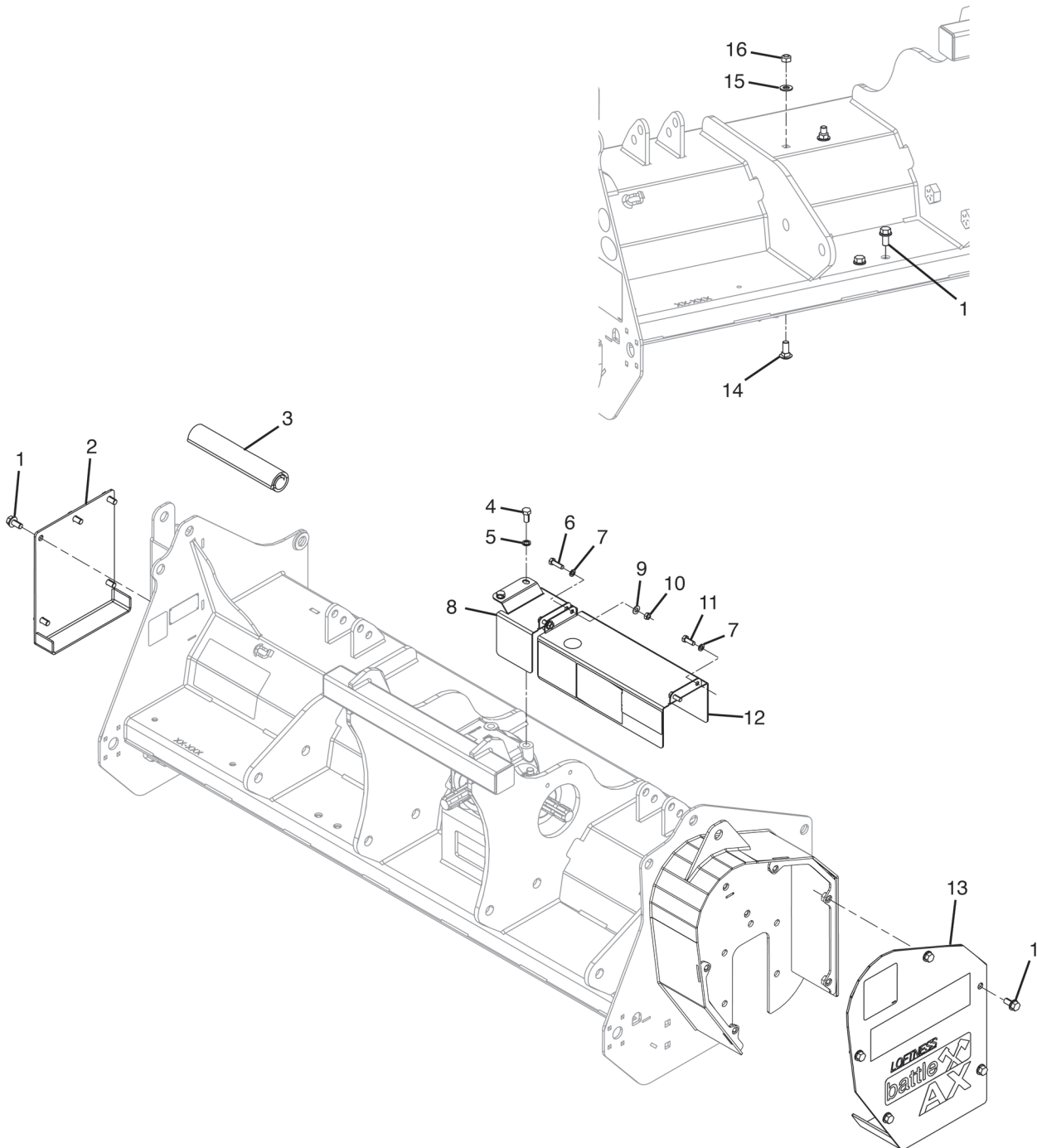




PARTS IDENTIFICATION

Parts Identification

Covers, Manual Holder

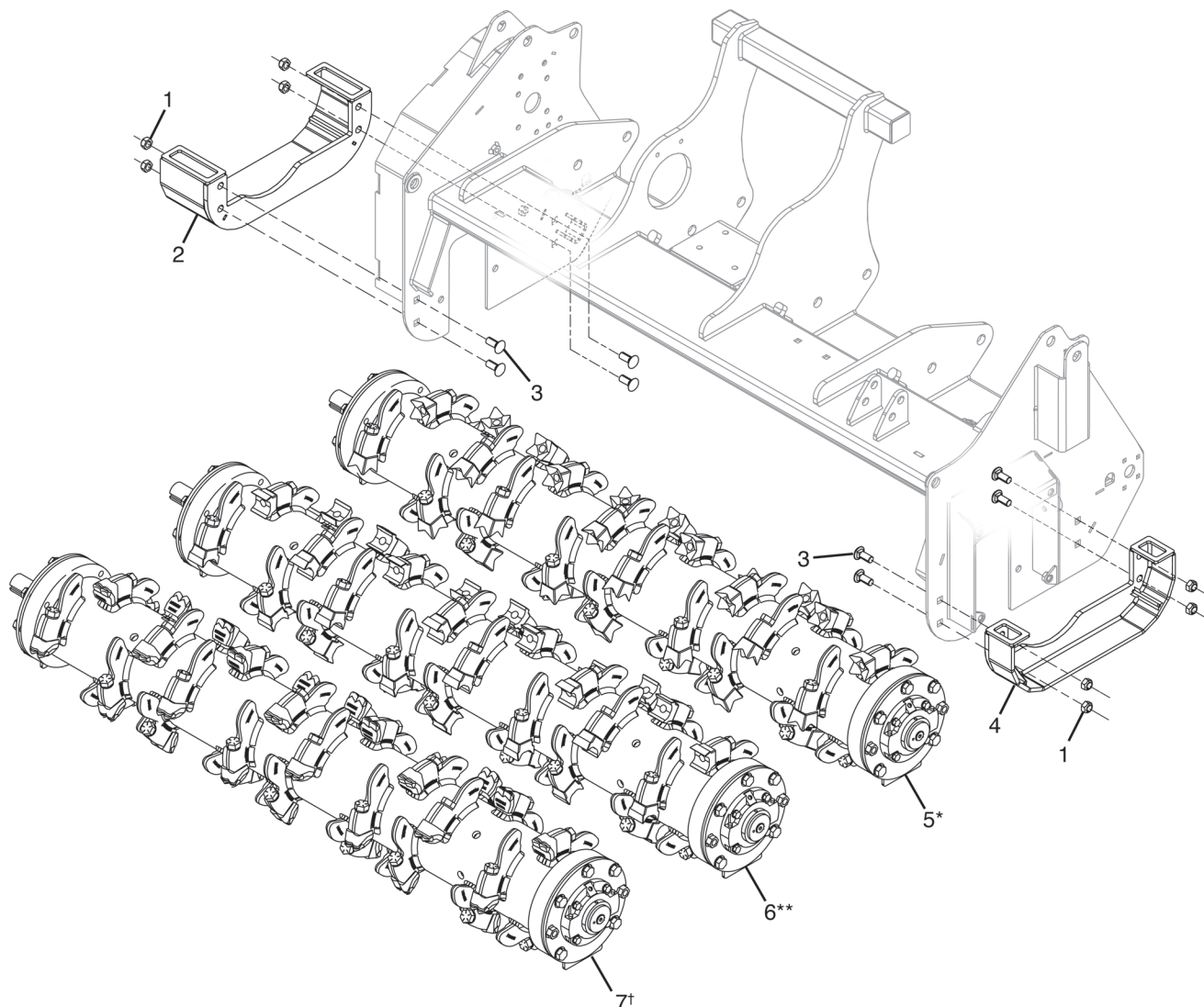


Covers, Manual Holder

#	QTY.	PART #	DESCRIPTION
1	12	N26748	BOLT, 1/2" X 1" SER FLG
2	1	202381	COVER, BXL 3-PT BEARING
3	1	202361	MANUAL, BT20
4	2	N38307	BOLT, M12 X 25 MM
5	2	N16472	WASHER, 1/2 NORDLOCK
6	2	4005	BOLT, 3/8" X 1-1/4" GRADE 5
7	4	N16470	WASHER, 3/8 NORDLOCK
8	1	206448	COVER, 3-PT DRIVELINE S
9	2	N31741	WASHER, FLAT 3/8" SAE
10	2	4233	NUT, STANDARD 3/8"
11	2	4195	BOLT, 3/8" X 1" GRADE 5
12	1	206425	COVER, 3-PT OUTER W/DECALS
13	1	209079	COVER, BT20 BELT
14	2	4038	BOLT, CARRIAGE 1/2" X 1-1/4"
15	2	4068	WASHER, 1/2" SAE FLAT
16	2	4054	NUT, LOCK 1/2" TOP

Parts Identification

Rotor, Skid Shoes



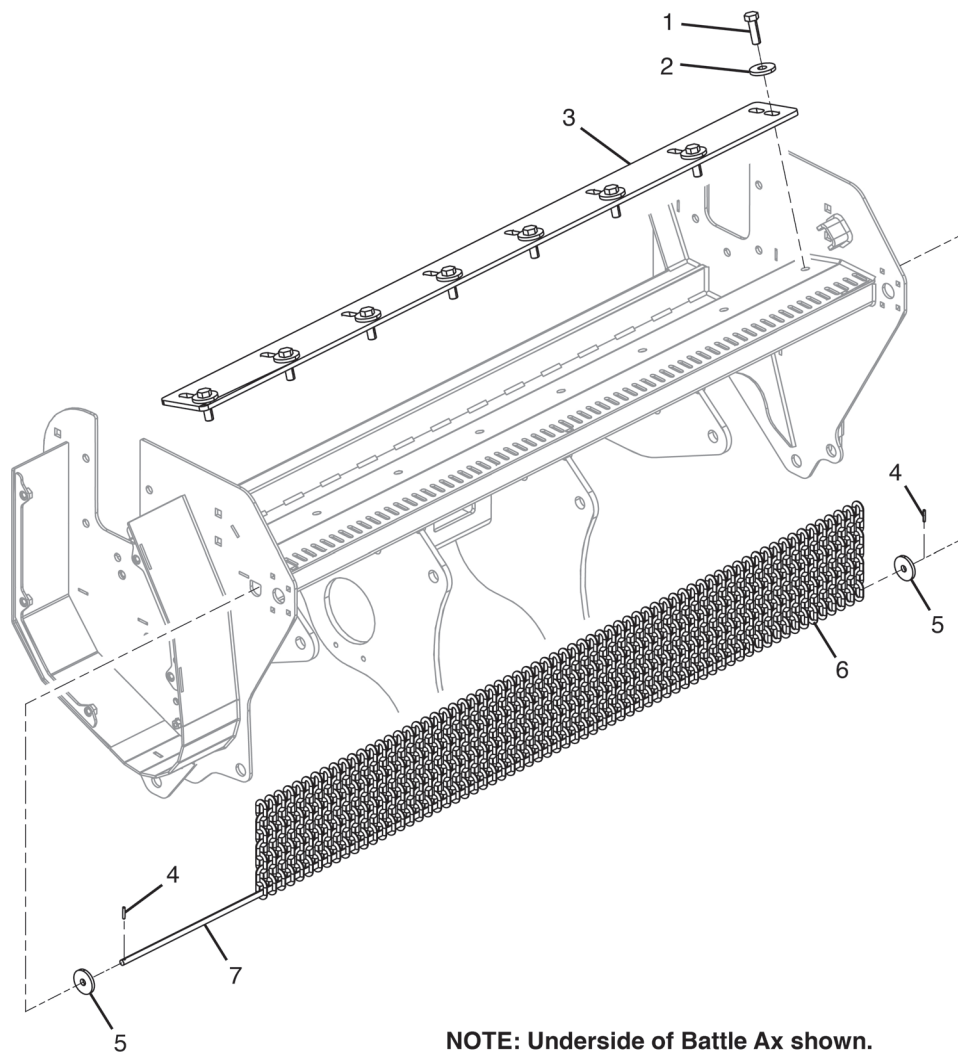
* For parts breakdown of item 5, Rotor with Beaver Teeth, see page 50.

** For parts breakdown of item 6, Rotor with Planer Teeth, see page 48.

† For parts breakdown of item 7, Rotor with Double Carbide Teeth, see page 52.

#	QTY.	PART #	DESCRIPTION
1	8	4055	NUT, LOCK 5/8" TOP
2	1	202350	SKID, BXL 3-PT LEFT
3	8	4386	BOLT, CARRIAGE 5/8" X 1-1/2"
4	1	202409	SKID, BXL 3-PT RIGHT
5	1	202324	ROTOR, 61" BATTLE AX W/QUADCO BEAVER
6	1	209161	ROTOR, 61" BT20 W/QUADCO PLANER
7	7	209590	ROTOR, 61 BT20 W/BETEK CARBIDE

Cutter Bar, Deflector Chains

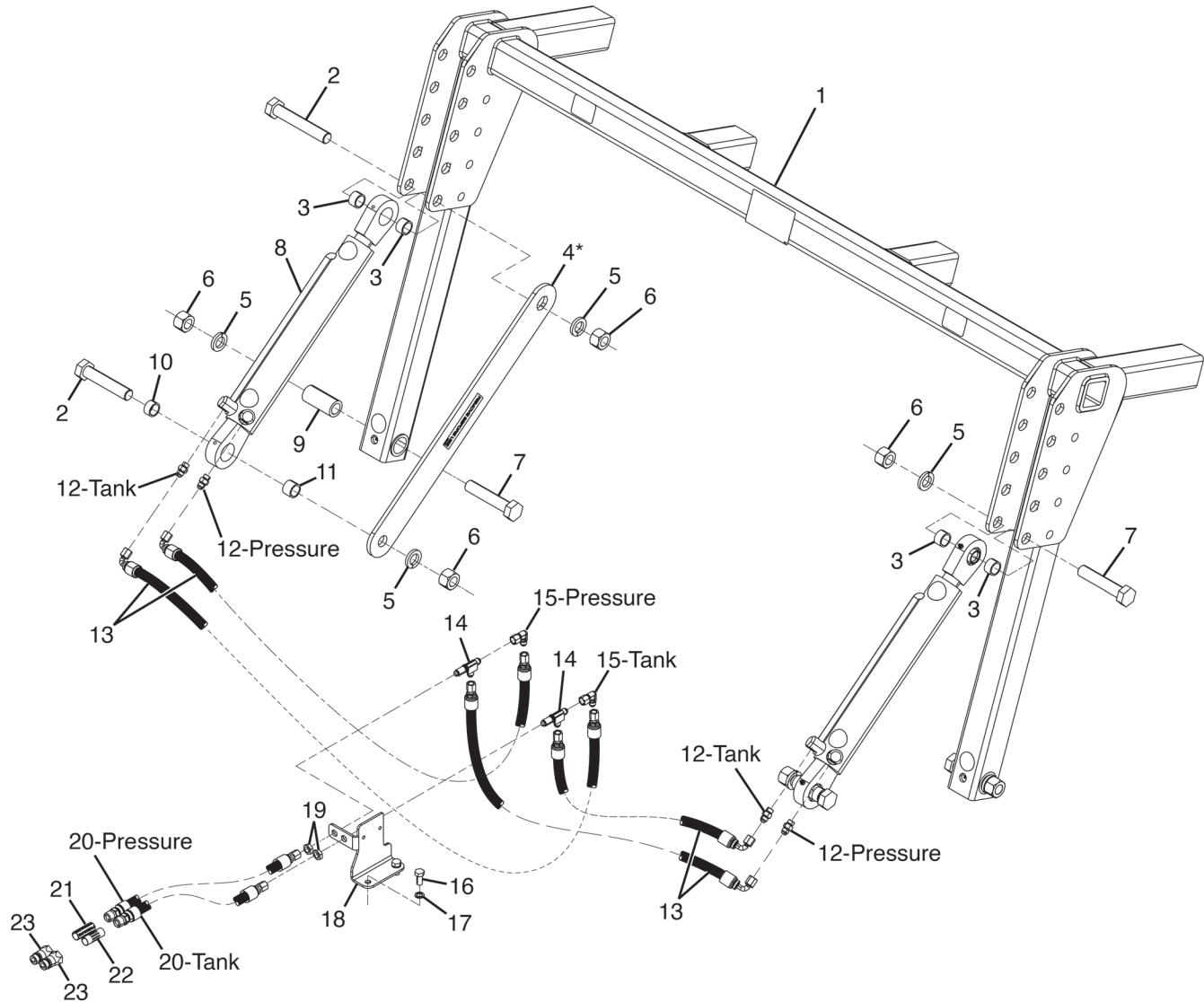


NOTE: Underside of Battle Ax shown.

#	QTY.	PART #	DESCRIPTION
1	8	4042	BOLT, 5/8" X 2" FINE THRD. GR. 8
2	8	208800	WASHER, 2.00 OD X .688 ID X .25 T
3	1	202514	PLATE, BXL 3-PT RECUTTER 61"
4	2	4375	PIN, ROLL 3/16" X 1"
5	2	4074	WASHER, 2" OD X 1/2" ID X 1/4"
6	66	N20796	CHAIN, 5/16 DEFLECTOR 7 LINK
7	1	209106	ROD, 61 CHAIN

Parts Identification

Hydraulic Pusher Bar Assembly (206499)



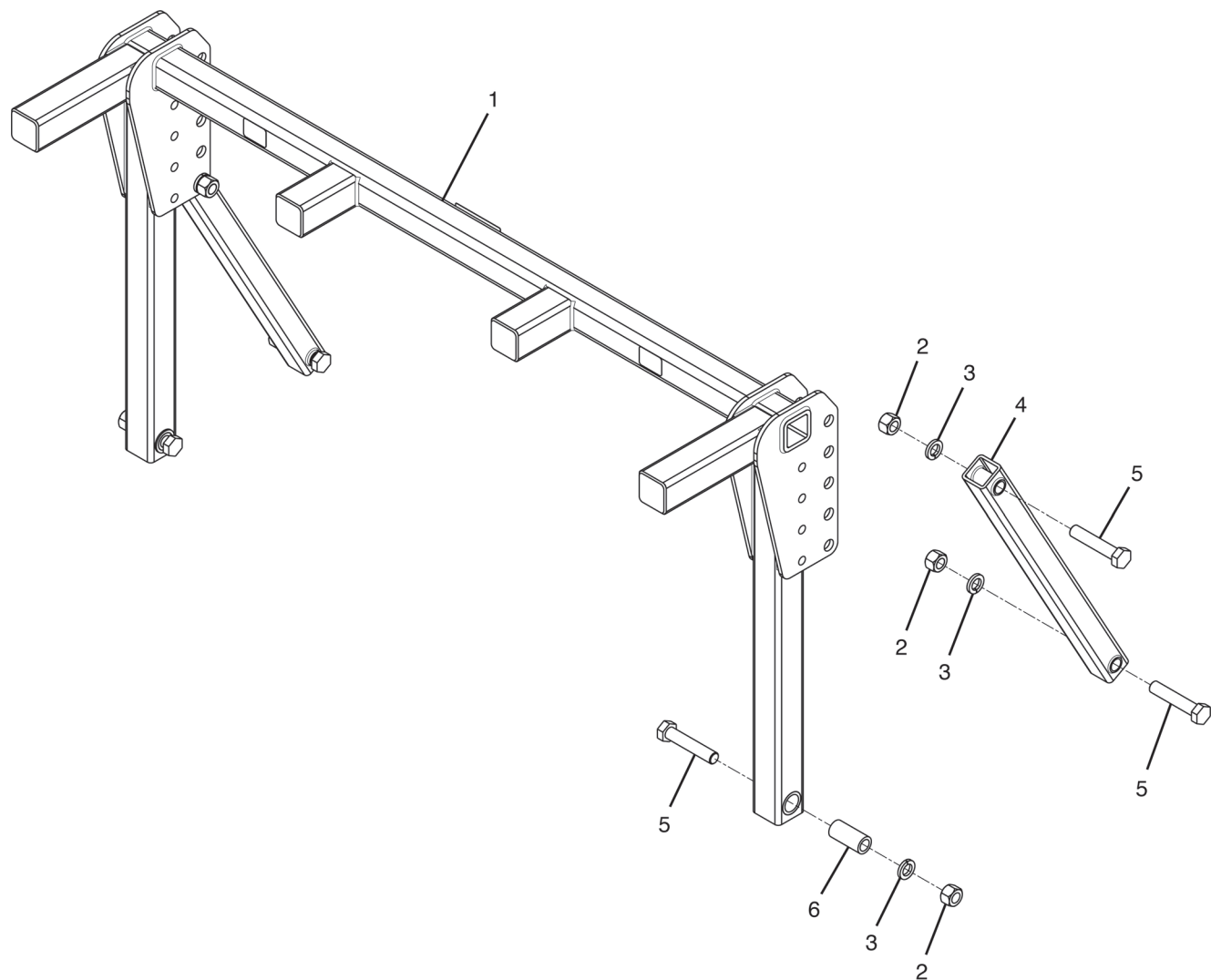
* - Item 4 (Shipping Bar) is for shipping purposes and may be discarded after set-up.

Hydraulic Pusher Bar Assembly (206499)

#	QTY.	PART #	DESCRIPTION
1	1	202550	PUSHER, 61" BXL 3-PT W/ DECALS
2	2	N28583	BOLT, 1 X 6" FN TH GR 8
3	4	202560	BUSHING, 1.010ID X .719
4	1	206521	BAR, SHIP BXL PUSHER W/DECAL
5	6	4166	WASHER, 1" LOCK
6	6	4490	NUT, 1"-14UNF STANDARD
7	4	N17023	BOLT, 1-14 X 5" GR. 8 FN. THR
8	2	207326	CYLINDER, 2.25BORE 1.5ROD 14ST
9	2	202556	BUSHING, 1.5 X 1.01 X 2.75 L
10	2	202561	BUSHING, 1.010ID X .625
11	2	209108	BUSHING, 1.010ID X .875
12	4	N24821	ADAPTER, 6MOR - 6MJIC
13	4	206515	HOSE, 3/8 X 62 -6FJX -6FJX90
14	2	207404	TEE, BULKHEAD UNION RUN -6MJIC
15	2	N29078	ELBOW, 90 DEG - 6MJIC - 6FJIC
16	2	N38307	BOLT, M12 X 25 MM
17	2	N16472	WASHER, 1/2 NORDLOCK
18	1	206517	PLATE, HYDRAULICS MOUNT
19	2	N24780	NUT, LOCK BULKHEAD -6
20	2	206507	HOSE, 3/8 X 54 -6FJX -8MP
21	1	N24822	DECAL, PRESSURE
22	1	N24823	DECAL, TANK
23	2	N11825	COUPLER, 1/2" MALE PIONEER

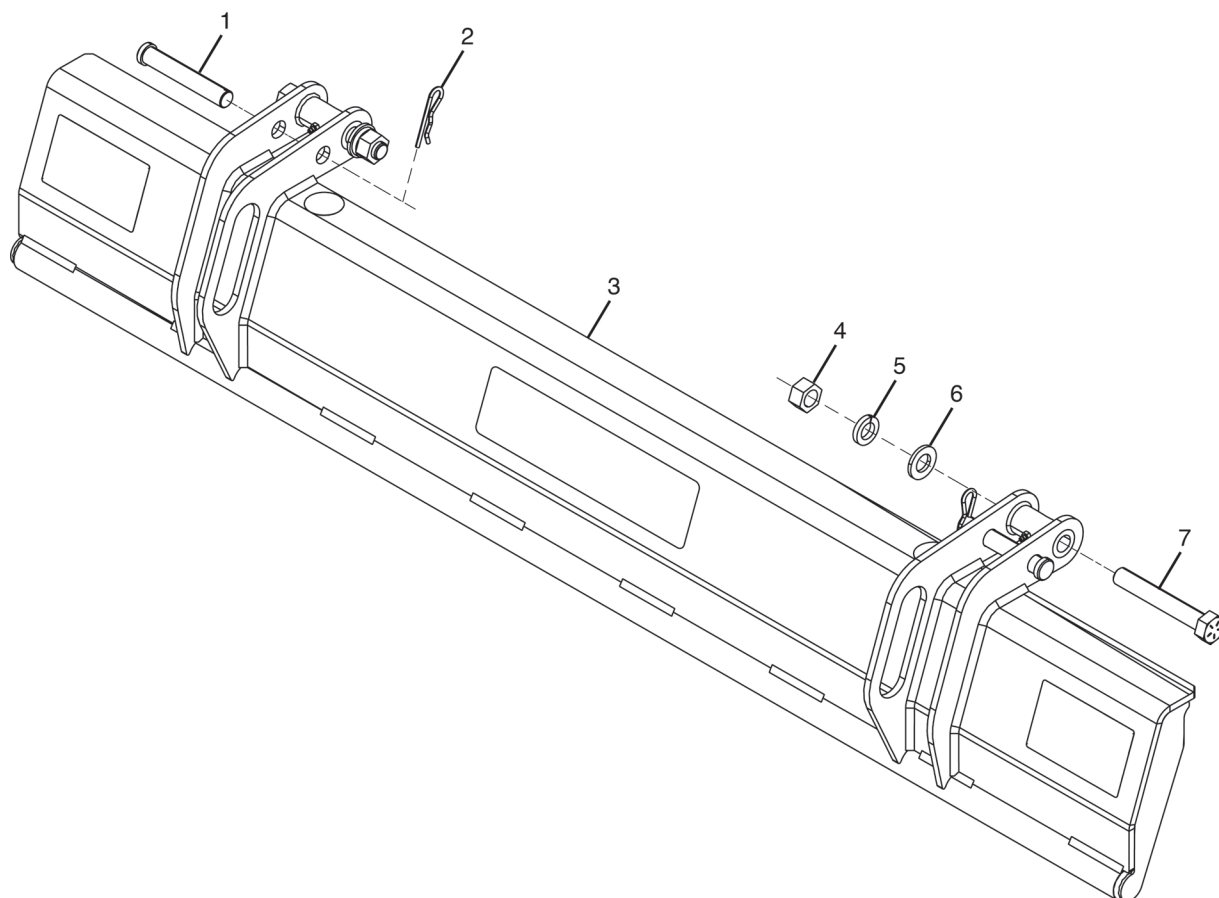
Parts Identification

Pusher Bar, Fixed (209158)



#	QTY.	PART #	DESCRIPTION
1	1	202550	PUSHER, 61" BXL 3-PT W/ DECALS
2	6	4490	NUT, 1"-14UNF STANDARD
3	6	4166	WASHER, 1" LOCK
4	2	209112	TUBE, BXL PUSH 29.5 W/ BUSHING
5	6	N17023	BOLT, 1-14 X 5" GR. 8 FN. THR
6	2	202556	BUSHING, 1.5 X 1.01 X 2.75 L

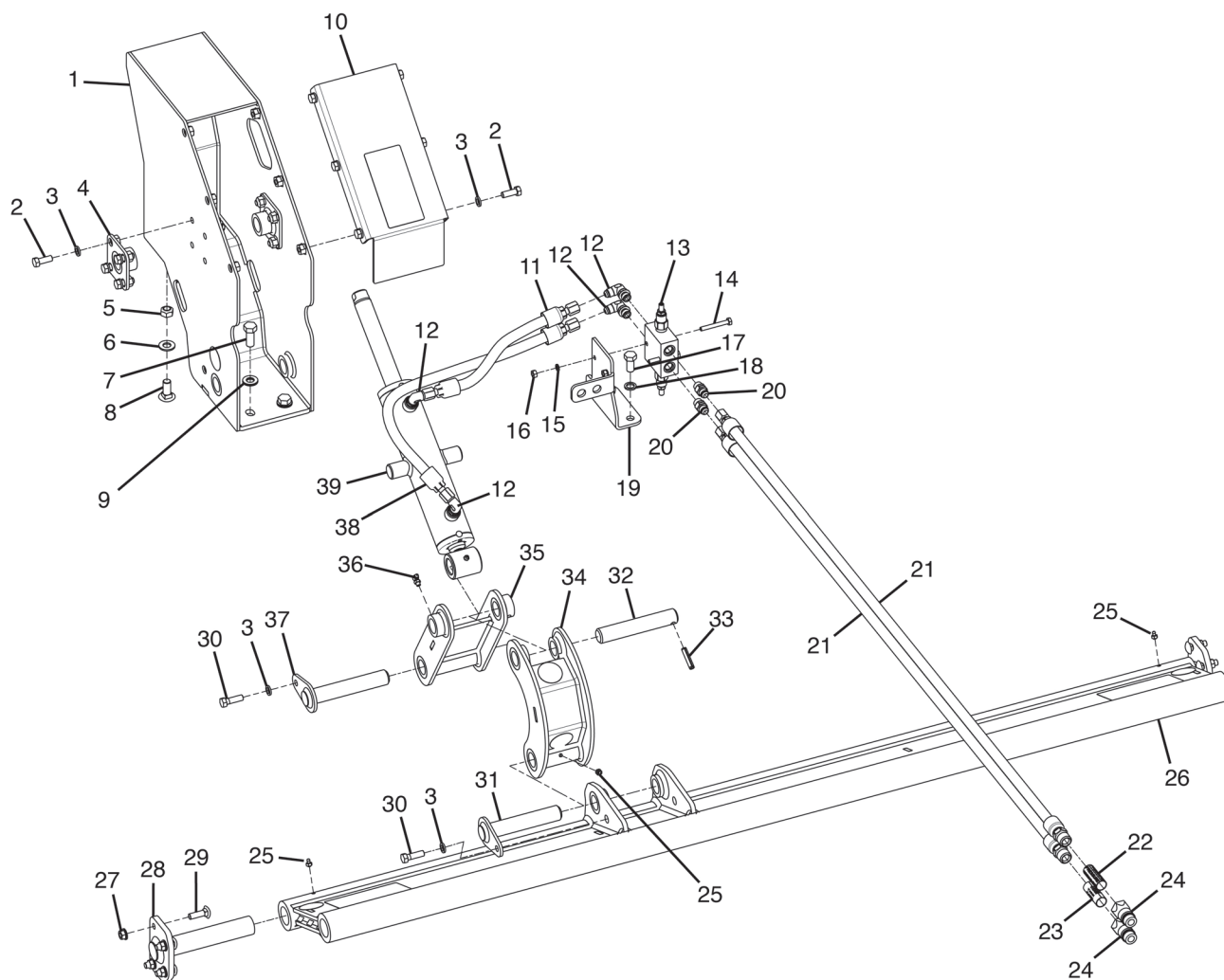
Deflector Door (202567)



#	QTY.	PART #	DESCRIPTION
1	2	202548	PIN, 1/2" X 4-1/4" PLATED
2	2	4393	CLIP, HAIRPIN 5/32" X 2-1/2"
3	1	202569	DOOR, BT20 DEFLECTOR W/ DECAL
4	2	4341	NUT, 3/4" FINE THREAD GRADE 8
5	2	4287	WASHER, 3/4" LOCK
6	2	N35327	WASHER, FLAT 3/4" SAE
7	2	4577	BOLT, 3/4" X 5" FN TH GR 8

Parts Identification

Containment Door, Hydraulic (209084)



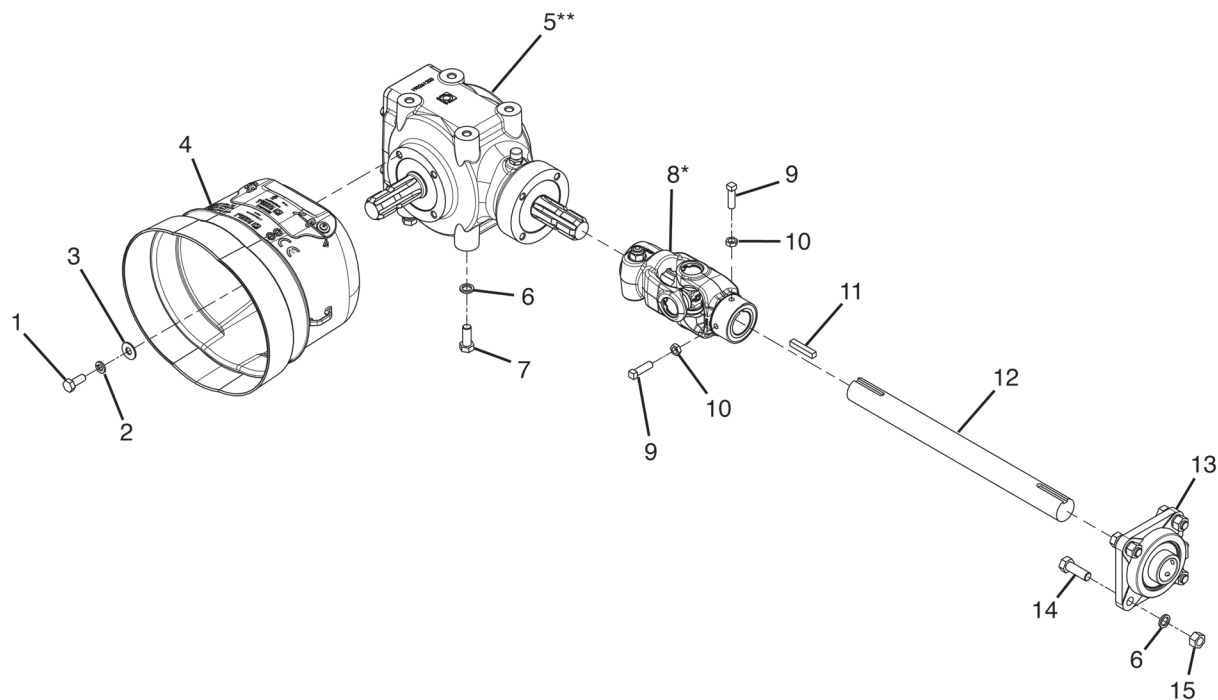
#	QTY.	PART #	DESCRIPTION
1	1	209091	WELDMENT, CYLINDER HOUSING
2	14	4195	BOLT, 3/8" X 1" GRADE 5
3	16	N16470	WASHER, 3/8 NORDLOCK
4	2	206478	MOUNT, TRUNNION
5	2	4054	NUT, LOCK 1/2" TOP
6	2	4068	WASHER, 1/2" SAE FLAT
7	2	4012	BOLT, 1/2" X 1-1/4" GRADE 5
8	2	4038	BOLT, CARRIAGE 1/2" X 1-1/4"

Containment Door, Hydraulic (209084)

#	QTY.	PART #	DESCRIPTION
9	2	N37780	WASHER, NORD-LOCK 1/2" SP
10	1	206525	COVER, CYLINDER W/ DECAL
11	1	206511	HOSE, 3/8 X 13 -6FJIC -6FJIC
12	4	N26204	ELBOW, 90 DEG - 6MJIC - 6MOR
13	1	N24645	VALVE, CROSSPORT RELIEF
14	2	N16072	BOLT, 1/4" X 2" GR. 5 FULL THD
15	2	N16468	WASHER, 1/4 NORDLOCK
16	2	4230	NUT, STANDARD 1/4"
17	2	N38307	BOLT, M12 X 25 MM
18	2	N16472	WASHER, 1/2 NORDLOCK
19	1	206517	PLATE, HYDRAULICS MOUNT
20	2	N24821	ADAPTER, 6MOR - 6MJIC
21	2	206507	HOSE, 3/8 X 54 -6FJX -8MP
22	1	N24822	DECAL, PRESSURE
23	1	N24823	DECAL, TANK
24	2	N11825	COUPLER, 1/2" MALE PIONEER
25	3	4105	GREASE-ZERK, 1/4" SCREW-IN
26	1	209085	DOOR, BT20 CONTAIN W/ DECALS
27	8	4979	NUT, LOCK 3/8" SER FLG
28	2	206462	PIN, DOOR HINGE COMPLETE
29	8	4390	BOLT, 3/8" X 1-1/4" CARRIAGE
30	2	4005	BOLT, 3/8" X 1-1/4" GRADE 5
31	1	206487	PIN, DOOR LINK A
32	1	206490	PIN, DOOR LINK C
33	1	206481	PIN, ROLL 3/16IN X 1 1/8IN
34	1	206471	LINK, LOWER
35	1	206465	LINK, DOOR ACTIVATING
36	1	4107	GREASE-ZERK, 1/4" SCREW-IN 90 DEG
37	1	206488	PIN, DOOR LINK B
38	1	206509	HOSE, 3/8 X 23 -6FJIC -6FJIC
39	1	206459	CYLINDER, 2 X 6 1.125 ROD

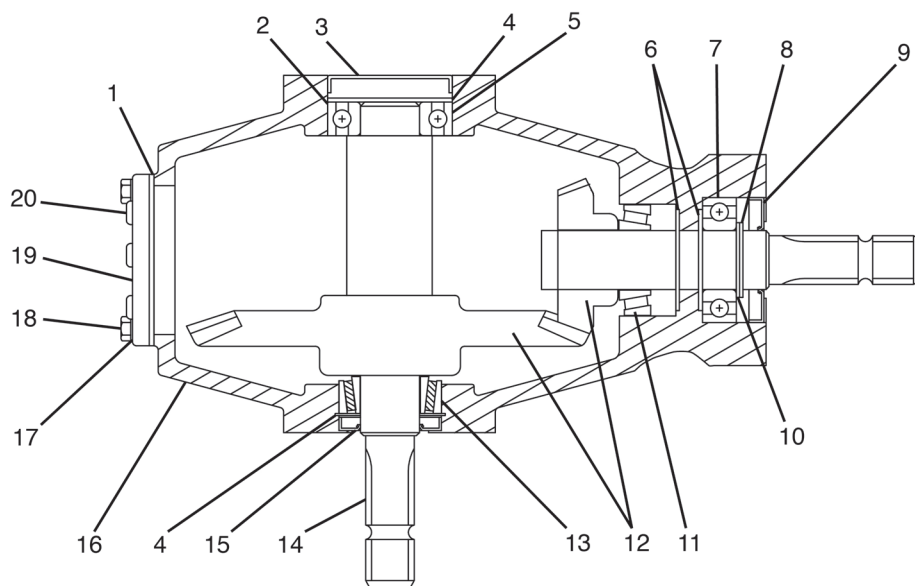
Parts Identification

Driveline



#	QTY.	PART #	DESCRIPTION
1	4	4346	BOLT, M10 X 25MM GRADE 8.8
2	4	4065	WASHER, 3/8 LOCK
3	4	4064	WASHER, FLAT 3/8"
4	1	8421	SHIELD, TILLER PTO LARGE BELL
5	1	8400	GEARBOX, BONDIOLI 2061 1:3.1
6	8	N16472	WASHER, 1/2 NORDLOCK
7	4	4373	BOLT, M12 X 30 MM GR 8.8
8	1	N17031	U-JOINT, BONDIOLI #5
9	2	4082	SCREW, SQ HEAD SET 3/8 X 1-1/4
10	2	4061	NUT, 3/8" JAM
11	2	7189-04	KEY, 5/16" X 1-3/4"
12	1	202342	SHAFT, 61" PTO BA DRIVELINE
13	1	N30227	BEARING, 1-3/8" DODGE 4-BLT FL
14	4	4013	BOLT, 1/2" X 1-1/2" GRADE 5
15	4	4250	NUT, STANDARD 1/2

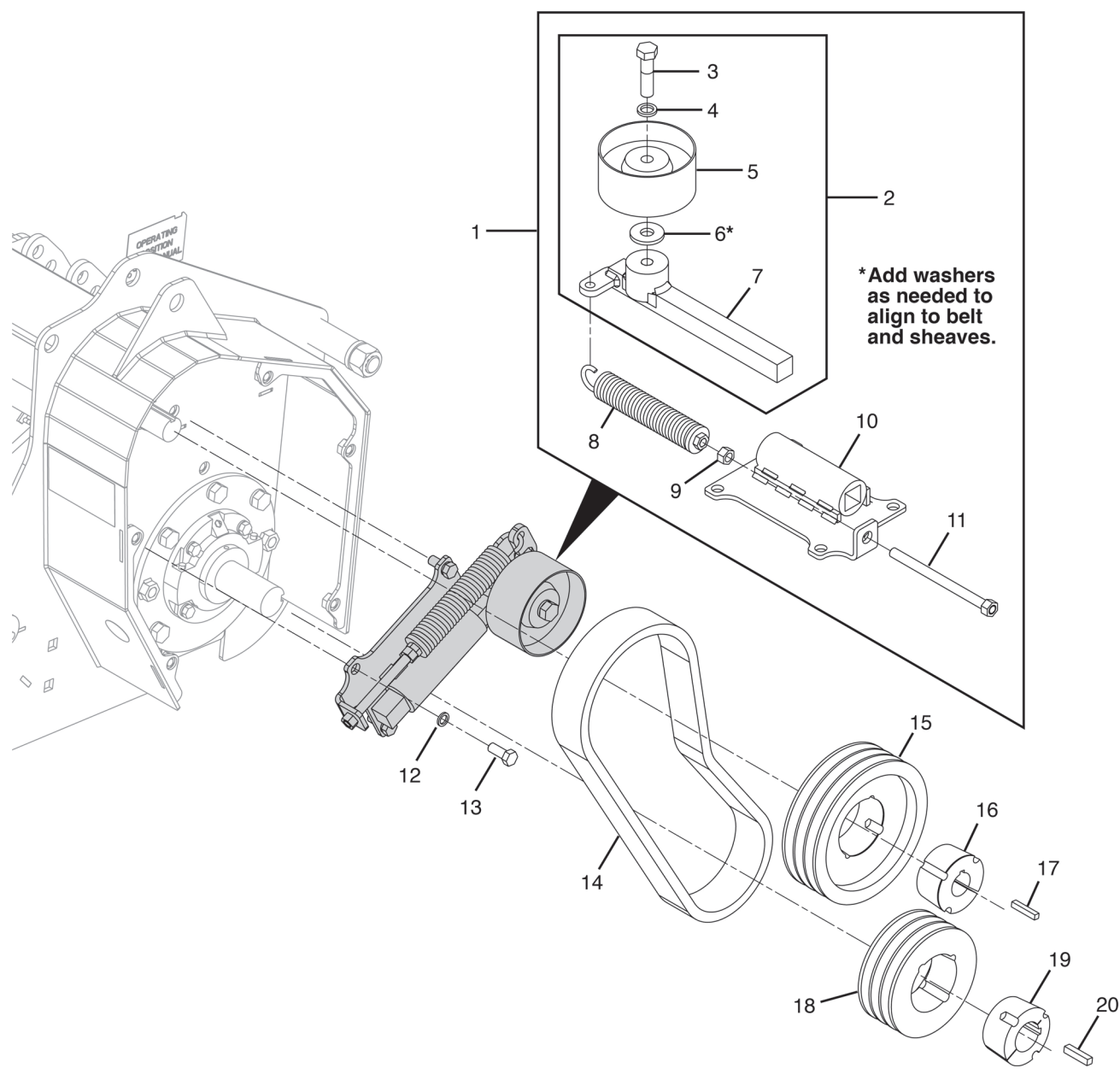
Gearbox, Bondioli 2061 1:3.1 (8400)



#	QTY.	PART #	DESCRIPTION
1	1	8400-04	GASKET, COVER
2	1	8400-10	KIT, RING THROUGH SHAFT
3	1	8400-17	CAP, HOUSING
4	2	8400-08	SNAP-RING, THROUGH SHAFT
5	1	8400-12	BEARING, BALL THROUGH SHAFT
6	2	8001-07	SNAP-RING, PINION SHAFT INNER
7	1	8400-11	BEARING, BALL PINION SHAFT
8	1	8001-06	SNAP-RING, PINION SHAFT OUTER
9	1	8001-15	SEAL, PINION SHAFT OIL
10	1	8400-09	KIT, RING PINION SHAFT
11	1	8001-13	BEARING, TAPERED ROLLER PINION SHAFT
12	1	8400-19	GEAR, SET (RATIO 1:3.10)
13	1	8400-14	BEARING, TAPERED ROLLER THROUGH SHAFT
14	1	8400-03	SHAFT, THROUGH
15	1	8400-15	SEAL, THROUGH SHAFT OIL
16	1	8400-01	HOUSING, CAST IRON
17	4	8413-03	WASHER, COVER SCREW
18	4	8001-04	SCREW, COVER
19	1	8400-02	COVER, HOUSING
20	3	8001-19	PLUG, OIL

Parts Identification

Belt and Sheaves

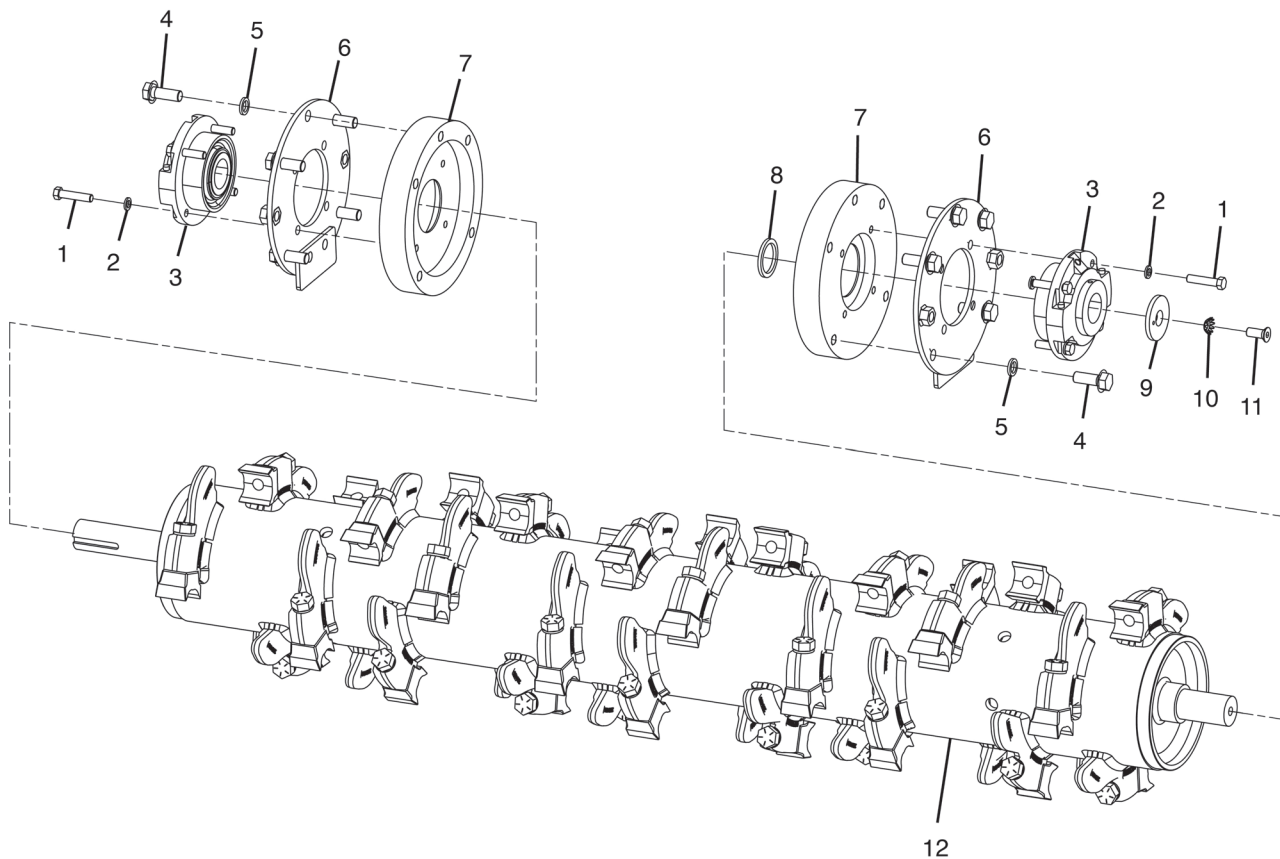


Belt and Sheaves

#	QTY.	PART #	DESCRIPTION
1	1	202370	TENSIONER, BELT 3 BAND 5" OD
2	1	202371	SLIDE, BELT TIGHT SQ ASSY BXL
3	1	202377	BOLT, 5/8" X 2-1/2" GR8 UNC
4	1	N16473	WASHER, 5/8 NORDLOCK
5	1	8409	PULLEY, IDLER 5" OD X 2-1/2" FF
6	1	N28269	WASHER, HARDENED 5/8 1-3/4OD
7	1	202372	SLIDE, WLDMNT BXL SQ BELT TENSIN
8	1	N24211	SPRING, BELT TIGHTENER
9	1	4250	NUT, STANDARD 1/2
10	1	202420	BASE, BELT TIGHT SQ SLIDE
11	1	202376	ROD, THREADED 1/2 X 6.91 W/NUT
12	4	N16472	WASHER, 1/2 NORDLOCK
13	4	4012	BOLT, 1/2" X 1-1/4" GRADE 5
14	1	8403	BELT, 3B X 51"
15	1	N17045	SHEAVE, 3B X 8.0 TPL 2517
16	1	202348	BUSHING, 1-3/8 TPL 2517
17	1	7189-04	KEY, 5/16" X 1-3/4"
18	1	N34042	SHEAVE, TAPERLOCK 6.0 PD 3-BAND
19	1	8127	BUSHING, 1-3/4 KW TAPERLOCK
20	1	7121-02	KEY, 3/8" X 1-3/4"

Parts Identification

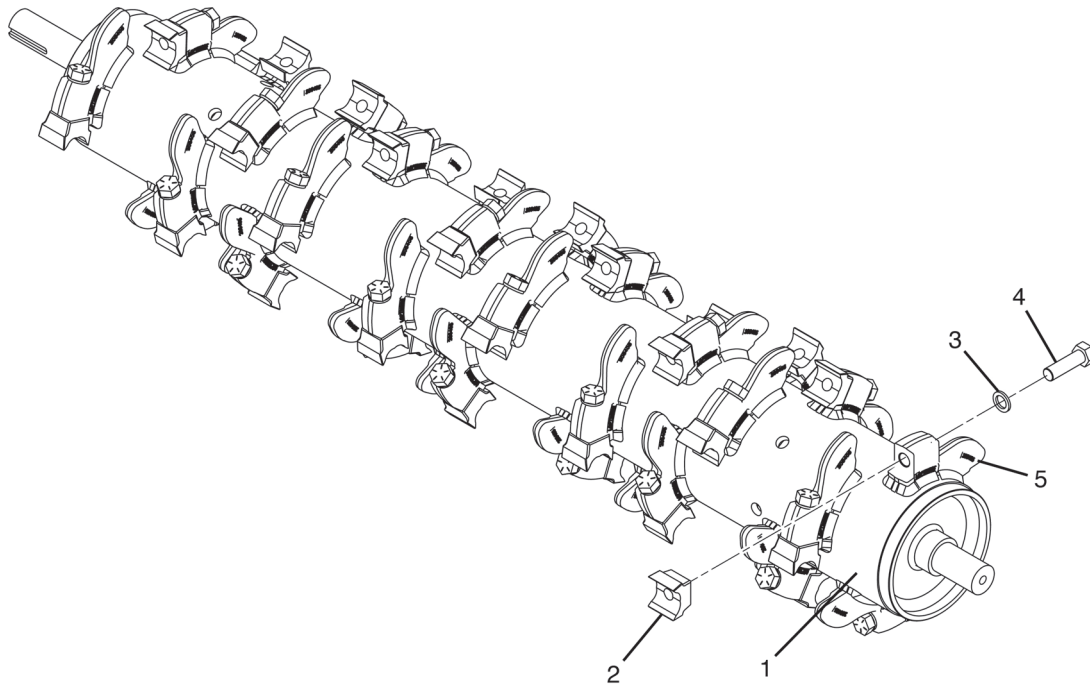
Rotor Assembly with Quadco Planer Teeth (209161)



* For parts breakdown of item 12, Rotor (209162), see page 49.

#	QTY.	PART #	DESCRIPTION
1	8	201358	BOLT, 7/16" X 2" GR 8 FN TH
2	8	N16471	WASHER, 7/16 NORDLOCK
3	2	201356	BEARING, 1-3/4" PILOT ROLLER
4	10	N13747	BOLT, 5/8" X 1-3/4" FN TH GR 8
5	10	N16473	WASHER, 5/8 NORDLOCK
6	2	209587	MOUNT, BEARING WELDMENT BT20
7	2	201357	ANTIWRAP, 1 PIECE CARBIDE 8"
8	1	201359	BUSHING, 1-3/4"ID X 2-1/4"OD
9	1	209547	PLATE, BEARING RET. 2.625 OD
10	1	N16472	WASHER, NORD-LOCK 1/2"
11	1	4435	BOLT, 1/2" X 1-1/2" GR 8 FN TH
12	1	209162	ROTOR, 61 BT20 W/QUADCO PLANER 8

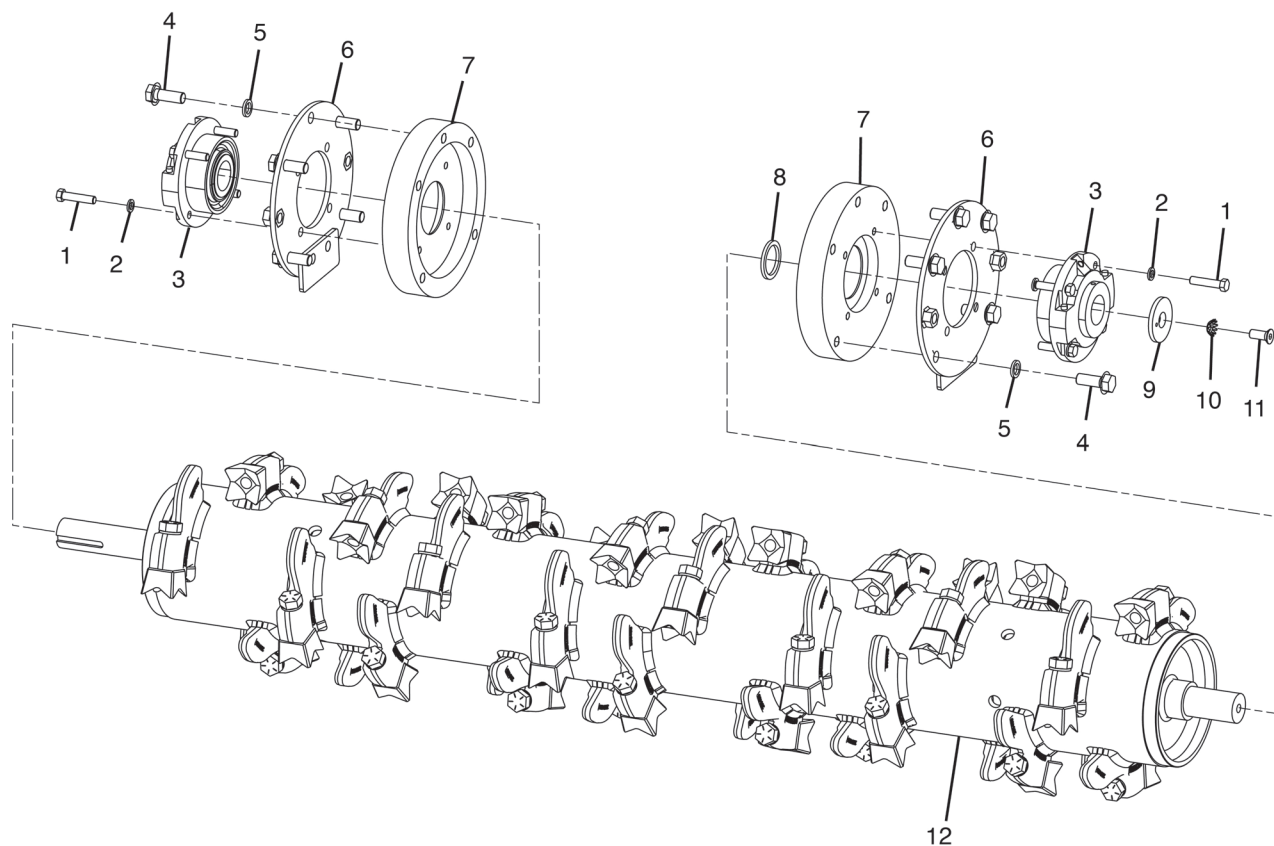
Rotor with Quadco Planer Teeth (209162)



#	QTY.	PART #	DESCRIPTION
1	1	202322	ROTOR, 61" BA SPIRAL W/O CUTTER 8"
2	38	202970	TOOTH, QUADCO PLANER W/MOD TIP
3	38	N16474	WASHER, 3/4 NORDLOCK
4	38	N21308	BOLT, 3/4" X 3" FN THRD GR 8
5	38	206405	MOUNT, BATTLEAX LIGHT

Parts Identification

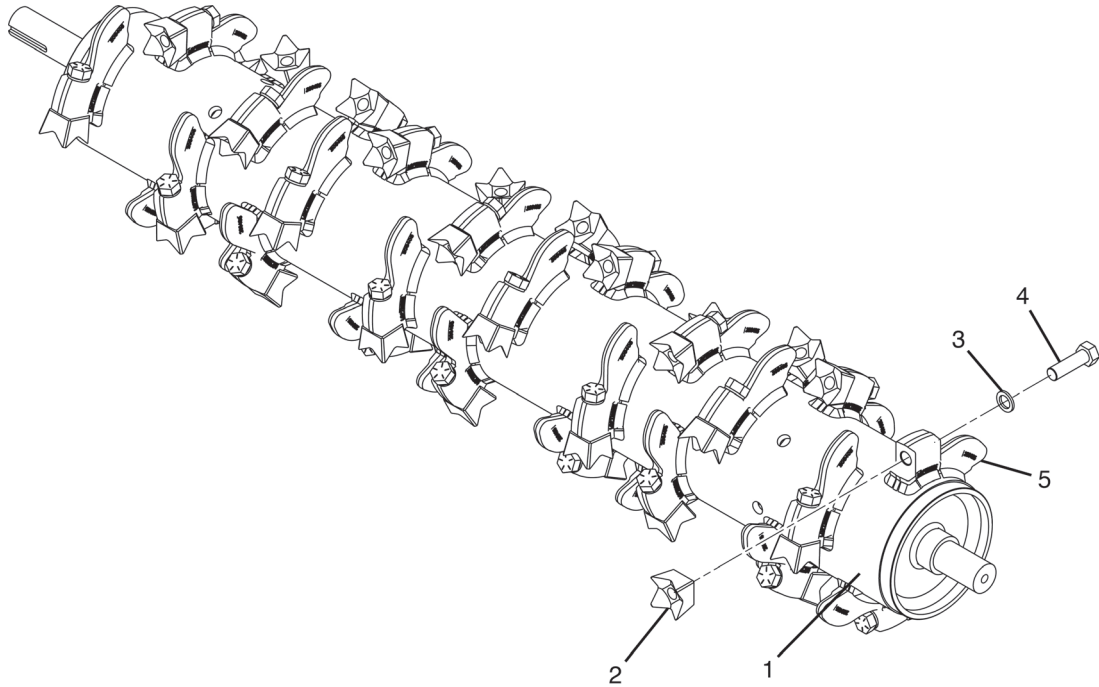
Rotor Assembly with Quadco Beaver Teeth (202324)



* For parts breakdown of item 12, Rotor (202323), see page 51.

#	QTY.	PART #	DESCRIPTION
1	8	201358	BOLT, 7/16" X 2" GR 8 FN TH
2	8	N16471	WASHER, 7/16 NORDLOCK
3	2	201356	BEARING, 1-3/4" PILOT ROLLER
4	10	N13747	BOLT, 5/8" X 1-3/4" FN TH GR 8
5	10	N16473	WASHER, 5/8 NORDLOCK
6	2	209587	MOUNT, BEARING WELDMENT BT20
7	2	201357	ANTIWRAP, 1 PIECE CARBIDE 8"
8	1	201359	BUSHING, 1-3/4"ID X 2-1/4"OD
9	1	209547	PLATE, BEARING RET. 2.625 OD
10	1	N16472	WASHER, NORD-LOCK 1/2"
11	1	4435	BOLT, 1/2" X 1-1/2" GR 8 FN TH
12	1	202323	ROTOR, 61" BA W/QUADCO QH10103 8"

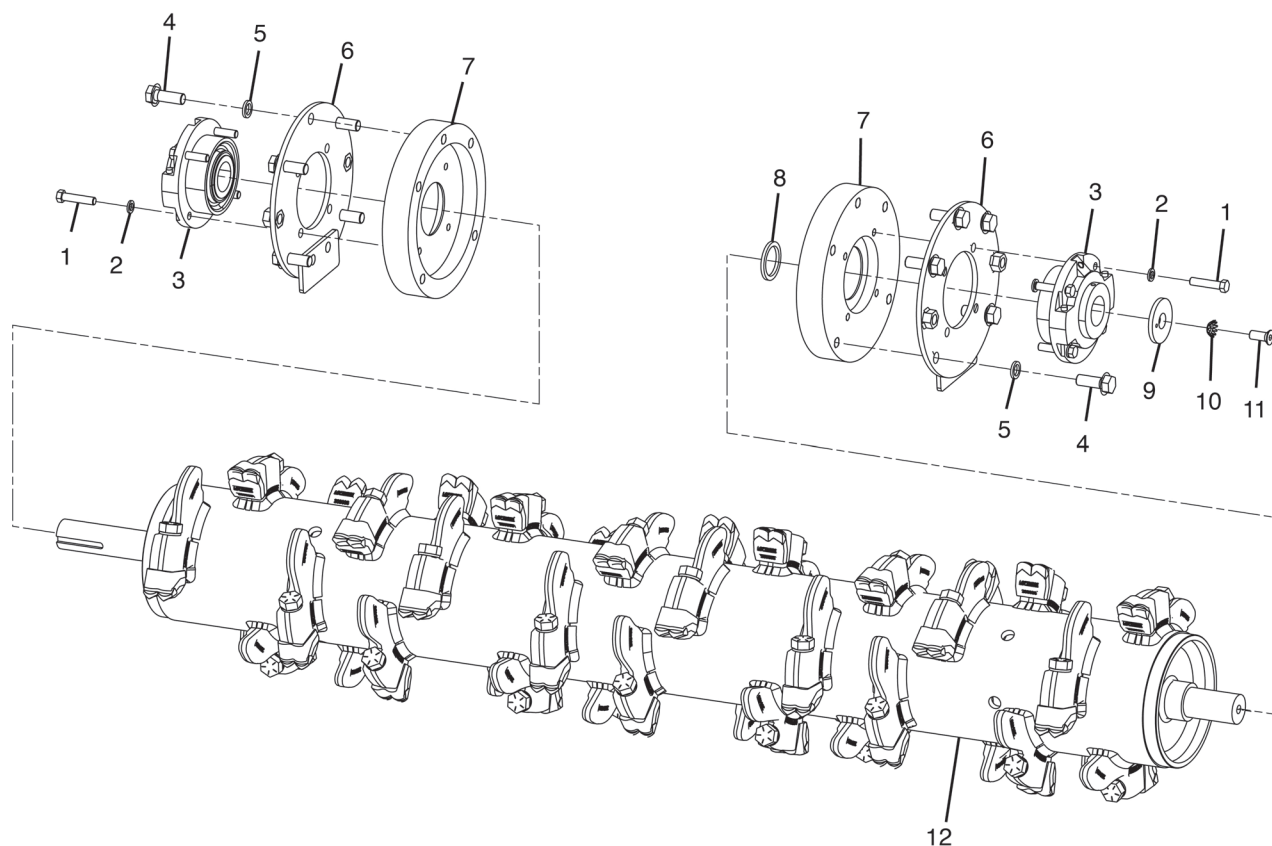
Rotor with Quadco Beaver Teeth (202323)



#	QTY.	PART #	DESCRIPTION
1	1	202322	ROTOR, 61" BA SPIRAL W/O CUTTER 8"
2	38	N156042	TOOTH, SHANKLESS
3	38	N16474	WASHER, 3/4 NORDLOCK
4	38	N21308	BOLT, 3/4" X 3" FN THRD GR 8
5	38	206405	MOUNT, BATTLEAX LIGHT

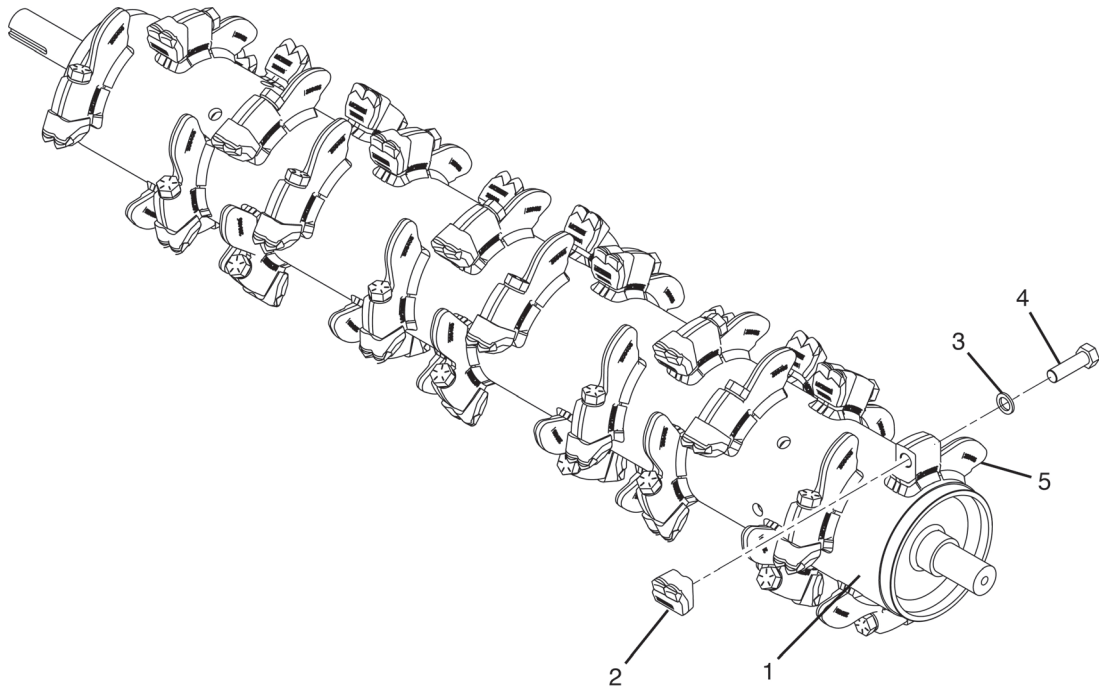
Parts Identification

Rotor Assembly with Carbide Teeth (209590)



#	QTY.	PART #	DESCRIPTION
1	8	201358	BOLT, 7/16" X 2" GR 8 FN TH
2	8	N16471	WASHER, 7/16 NORDLOCK
3	2	201356	BEARING, 1-3/4" PILOT ROLLER
4	10	N13747	BOLT, 5/8" X 1-3/4" FN TH GR 8
5	10	N16473	WASHER, 5/8 NORDLOCK
6	2	209587	MOUNT, BEARING WELDMENT BT20
7	2	201357	ANTIWRAP, 1 PIECE CARBIDE 8"
8	1	201359	BUSHING, 1-3/4"ID X 2-1/4"OD
9	1	209547	PLATE, BEARING RET. 2.625 OD
10	1	N16472	WASHER, NORD-LOCK 1/2"
11	1	4435	BOLT, 1/2" X 1-1/2" GR 8 FN TH
12	1	209591	ROTOR, 61 BT20 W/BETEK CARBIDE

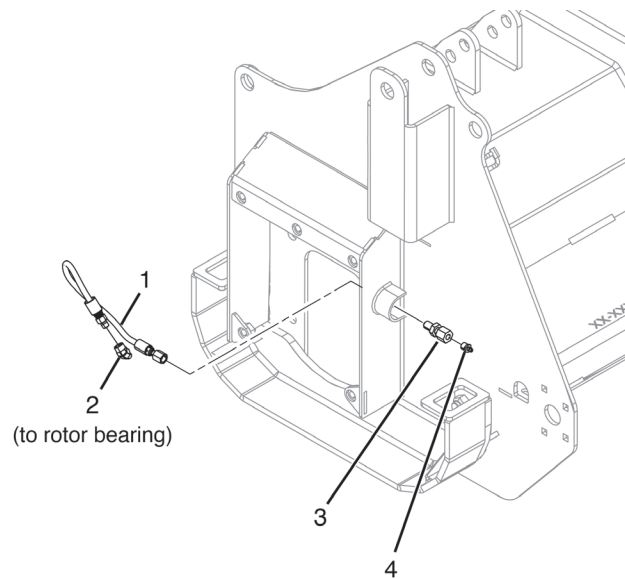
Rotor with Carbide Teeth (209591)



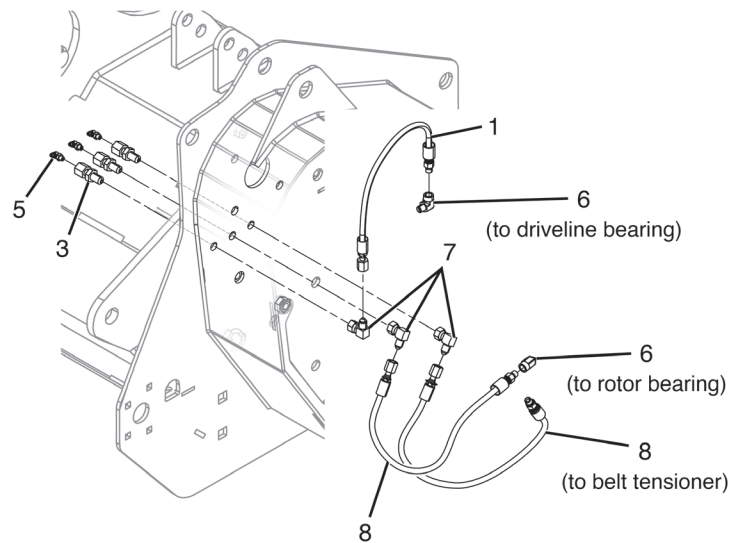
#	QTY.	PART #	DESCRIPTION
1	1	202322	ROTOR, 61" BA SPIRAL W/O CUTTER 8"
2	38	209036	TOOTH, CARBIDE BATTLEAX LIGHT
3	38	N16474	WASHER, 3/4 NORDLOCK
4	38	N21308	BOLT, 3/4" X 3" FN THRD GR 8
5	38	206405	MOUNT, BATTLEAX LIGHT

Parts Identification

Lubrication



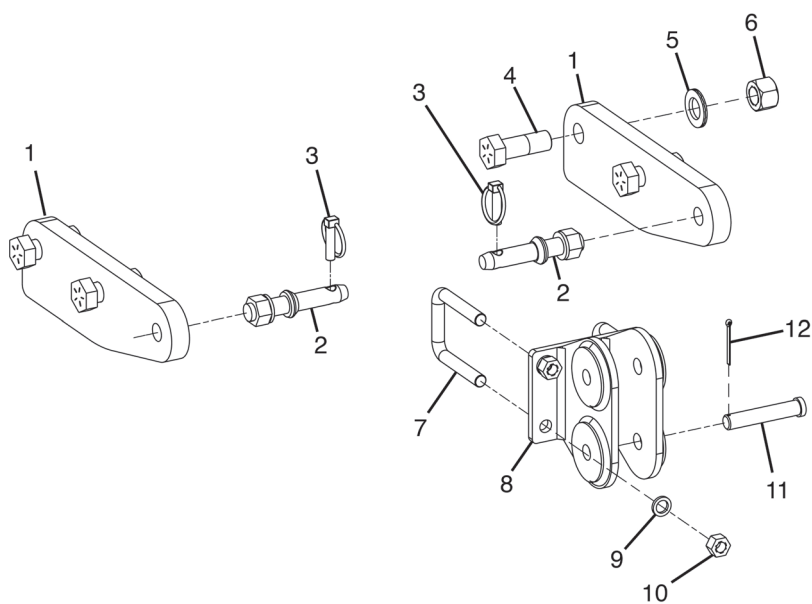
Right side rotor bearing lubrication.



Left side rotor bearing lubrication.

#	QTY.	PART #	DESCRIPTION
1	2	4304	HOSE, GREASE 1/8" x 15" W/FITTINGS
2	1	4471	ELBOW, 1/8" BLK 45 DEG STREET
3	4	4304-10	BULKHEAD, FITTING-GREASE HOSE
4	1	N17007	GREASEZERK, 1/8" NPT
5	3	N25062	GREASEZERK, 90 DEG 1/8" NPT
6	2	4472	ELBOW, 1/8" 90 DEG.STREET
7	3	N25125	ELBOW, 90 DEG - 4FJIC - 4MJIC
8	2	208377	HOSE, GREASE 1/8IN x 20IN

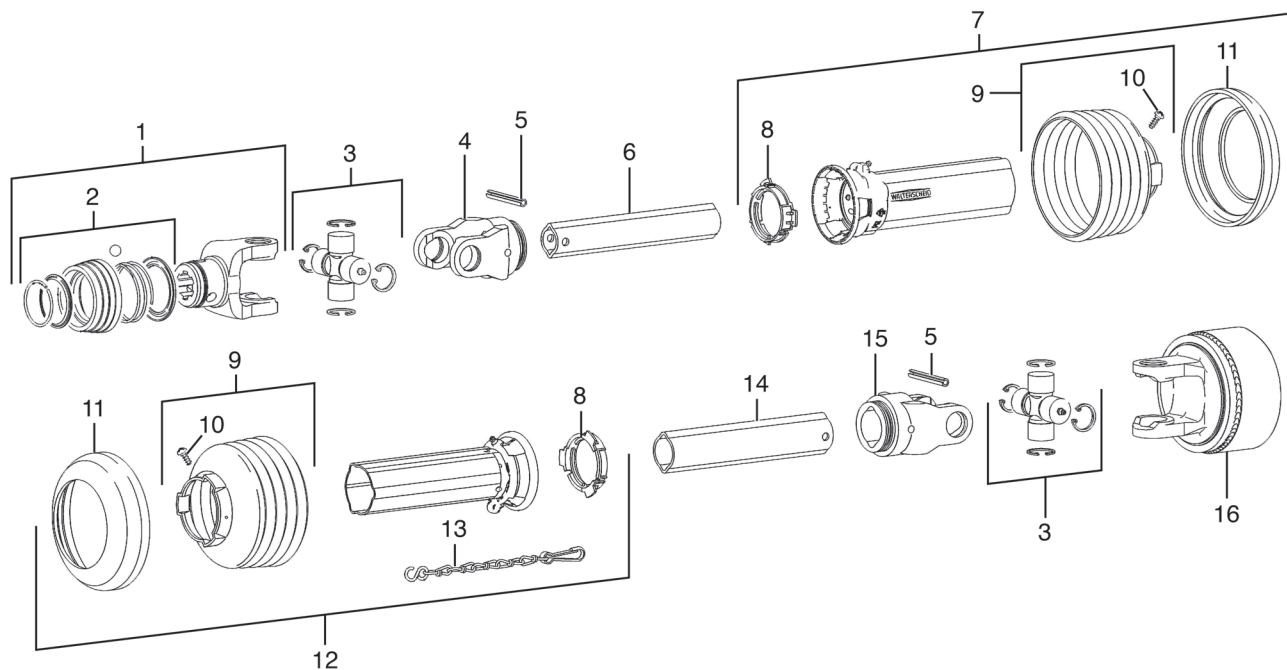
Three-Point Hitch



#	QTY.	PART #	DESCRIPTION
1	2	209105	PLATE, LOWER HITCH ARM
2	2	4101	PIN, HITCH CATAGORY #1
3	2	206498	PIN, LINCH 7/16 X 1-3/4
4	4	209110	BOLT, 1-14 X 2-3/4 FN TH GR 8
5	4	209022	WASHER, NORDLOCK 1 SP
6	4	209109	NUT, STANDARD 1IN FN TH GR 8
7	2	4361	BOLT, U 5/8-11NC X 2-5/8" X 4" GR 5
8	1	206441	MOUNT, 3-PT HITCH TOP
9	4	N16473	WASHER, 5/8 NORDLOCK
10	4	4058	NUT, STANDARD 5/8"
11	1	N16043	PIN, 3/4" X 3-3/4"
12	1	4092	PIN COTTER 5/32" X 2"

Parts Identification

PTO Driveshaft (209230)



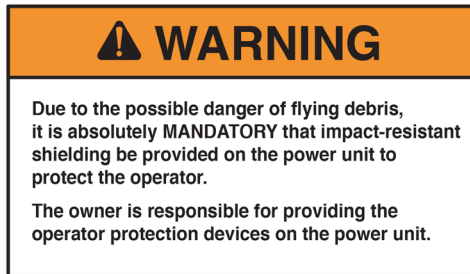
#	QTY.	PART #	DESCRIPTION
1	1	N23478	YOKE, 1-3/8IN 540 RPM ASGE
2	1	212278	LOCK, SIZE B COMPLETE
3	2	212280	KIT, CROSS AND BEARING COMPL
4	1	N23481	YOKE, WALT INBOARD 1B
5	2	N23480	PIN, WALT PTO SPRING 10 X 80 -
6	1	212281	TUBE, PROFILE TRACTOR HALF
7	1	212276	GUARD, OUTER HALF
8	2	N10348	RING, PTO.BEARING SC 25 PL-TYPE
9	9	212283	CONE, GUARD
10	2	N11750	SCREW, WALT PTO SHIELD
11	2	N27146	COLLAR, WALT PTO RFCMNT
12	1	212277	GUARD, INNER HALF
13	1	N10356	CHAIN, PTO SAFETY
14	1	212282	TUBE, PROFILE IMPLEMENT HALF
15	1	N23484	YOKE, WALT INBOARD 2A
16	1	212279	CLUTCH, CAM-TYPE CUT OUT

Battle Ax Decals and Signs

NOTE: All safety related decals are also shown in the Safety Instructions Section along with their location on the mulcher. See "Safety Decal Locations" on page 8.

Check and replace any worn, torn, hard to read or missing decals on your mulcher.

Part No. N17013



Part No. 4334



Part No. N23506



Part No. N68724



Part No. N28386



Part No. 200491



Part No. 208824



Part No. N68716



Parts Identification

Battle Ax Decals and Signs (Cont'd)

Part No. 206502



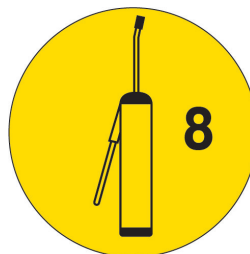
Part No. 203264



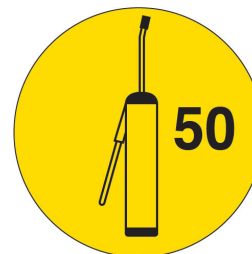
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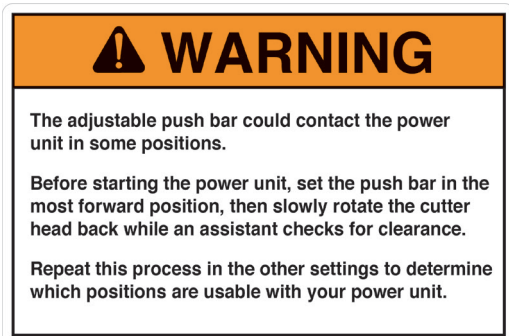
Part No. N28010



Part No. N28012



Part No. N17014



Part No. N13517



Part No. 4138



Part No. N29769



Part No. N13721



Battle Ax Decals and Signs (Cont'd)

Part No. N28576 - (Large)



Part No. N28577 - (Small; on Thumb)



Part No. N49280 - (Large)



Part No. 209449



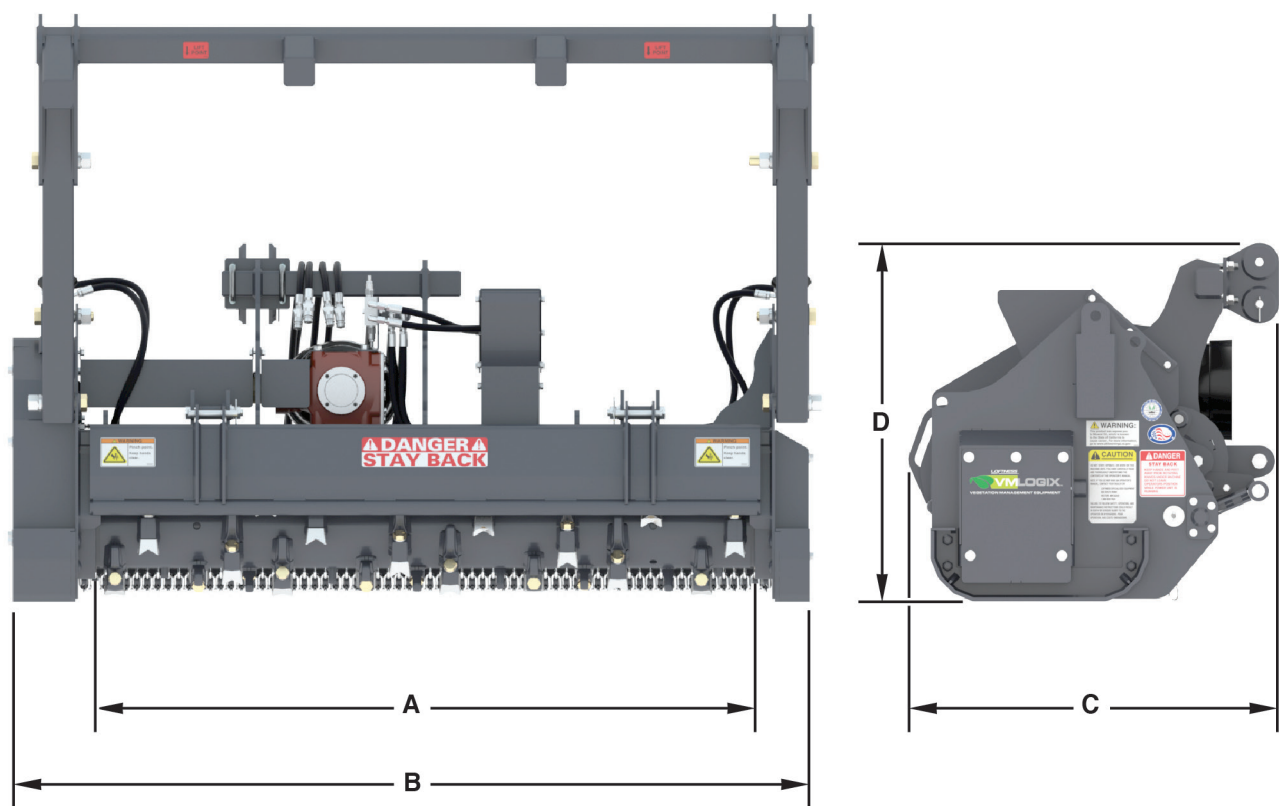


Specifications

DESCRIPTION	BATTLE AX TRACTOR 20 SERIES
Cutting Width	61 in. (154.9 cm)
Operating Capacity	6 in. (15.2 cm) Continuous
	8 in. (20.3 cm) Intermittent
Gearbox	70 HP Gearbox & Driveline
PTO	540 RPM
Rotor Bearings	1.75 in. Piloted Double Taper
Rotor Tip Diameter	13.5 in. (34.3 cm)
Mount	Cat. I, Adaptable to Cat. II, Free-Link or Quick Hitch
Shear Bar	Adjustable
Knives	Beaver, Planer or Standard Double Carbide Teeth
Skid Shoes	Stationary
Deflector	Steel Chain
Anti-Wrap Protection	Bearing

Appendix

Dimensions



DESCRIPTION	BATTLE AX TRACTOR 20 SERIES
Cutting Path (A)	61 in. (154.9 cm)
Overall Width (B)	77.0 in. (195.6 cm)
Overall Depth (C) (without pusher)	33.0 in. (83.9 cm)
Overall Height (D) (without pusher)	29.0 in. (73.7 cm)
Number Of Teeth	38
Crated Weight (with hydraulic pusher)	~1900 lbs (861 kg)

Torque Specifications

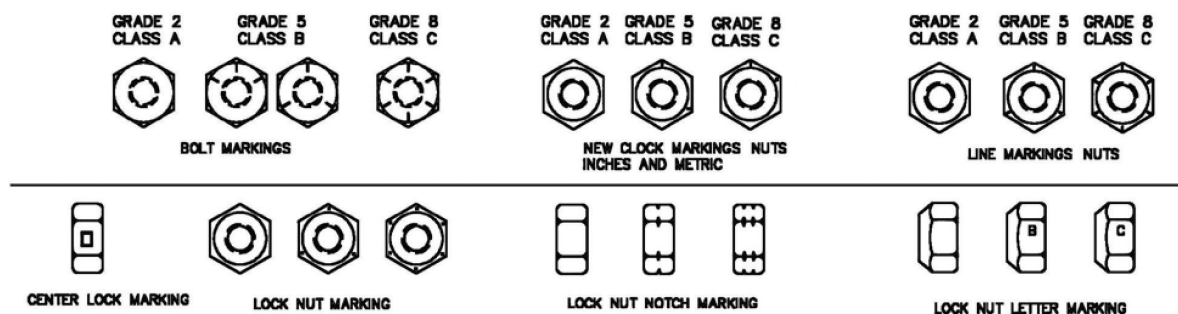
Inches Hardware and Lock Nuts

TORQUE CHARTS

Minimum Hardware Tightening Torques

Normal Assembly Applications
(Standard Hardware and Lock Nuts)

SAE Gr. 2	SAE Grade 5		SAE Grade 8		LOCK NUTS			
Nominal Size	Unplated or Plated Silver	Plated W / ZnCr Gold	Unplated or Plated Silver	Plated W / ZnCr Gold	Unplated or Plated Silver	Plated W / ZnCr Gold	Grade W / Gr. 5 Bolt	Grade W / Gr. 8 Bolt
1/4	55 in.-lb. (6.2 N•m)	72 in.-lb. (8.1 N•m)	86 in.-lb. (9.7 N•m)	112 in.-lb. (12.6 N•m)	121 in.-lb. (13.6 N•m)	157 in.-lb. (17.7 N•m)	61 in.-lb. (6.9 N•m)	86 in.-lb. (9.8 N•m)
5/16	115 in.-lb. (13 N•m)	149 in.-lb. (17 N•m)	178 in.-lb. (20 N•m)	229 in.-lb. (26 N•m)	250 in.-lb. (28 N•m)	324 in.-lb. (37 N•m)	125 in.-lb. (14 N•m)	176 in.-lb. (20 N•m)
3/8	17 ft.-lb. (23 N•m)	22 ft.-lb. (30 N•m)	26 ft.-lb. (35 N•m)	34 ft.-lb. (46 N•m)	37 ft.-lb. (50 N•m)	48 ft.-lb. (65 N•m)	19 ft.-lb. (26 N•m)	26 ft.-lb. (35 N•m)
7/16	27 ft.-lb. (37 N•m)	35 ft.-lb. (47 N•m)	42 ft.-lb. (57 N•m)	54 ft.-lb. (73 N•m)	59 ft.-lb. (80 N•m)	77 ft.-lb. (104 N•m)	30 ft.-lb. (41 N•m)	42 ft.-lb. (57 N•m)
1/2	42 ft.-lb. (57 N•m)	54 ft.-lb. (73 N•m)	64 ft.-lb. (87 N•m)	83 ft.-lb. (113 N•m)	91 ft.-lb. (123 N•m)	117 ft.-lb. (159 N•m)	45 ft.-lb. (61 N•m)	64 ft.-lb. (88 N•m)
9/16	60 ft.-lb. (81 N•m)	77 ft.-lb. (104 N•m)	92 ft.-lb. (125 N•m)	120 ft.-lb. (163 N•m)	130 ft.-lb. (176 N•m)	169 ft.-lb. (229 N•m)	65 ft.-lb. (88 N•m)	92 ft.-lb. (125 N•m)
5/8	83 ft.-lb. (112 N•m)	107 ft.-lb. (145 N•m)	128 ft.-lb. (174 N•m)	165 ft.-lb. (224 N•m)	180 ft.-lb. (244 N•m)	233 ft.-lb. (316 N•m)	90 ft.-lb. (122 N•m)	127 ft.-lb. (172 N•m)
3/4	146 ft.-lb. (198 N•m)	189 ft.-lb. (256 N•m)	226 ft.-lb. (306 N•m)	293 ft.-lb. (397 N•m)	319 ft.-lb. (432 N•m)	413 ft.-lb. (560 N•m)	160 ft.-lb. (217 N•m)	226 ft.-lb. (306 N•m)
7/8	142 ft.-lb. (193 N•m)	183 ft.-lb. (248 N•m)	365 ft.-lb. (495 N•m)	473 ft.-lb. (641 N•m)	515 ft.-lb. (698 N•m)	667 ft.-lb. (904 N•m)	258 ft.-lb. (350 N•m)	364 ft.-lb. (494 N•m)
1	213 ft.-lb. (289 N•m)	275 ft.-lb. (373 N•m)	547 ft.-lb. (742 N•m)	708 ft.-lb. (960 N•m)	773 ft.-lb. (1048 N•m)	1000 ft.-lb. (1356 N•m)	386 ft.-lb. (523 N•m)	545 ft.-lb. (739 N•m)



Appendix

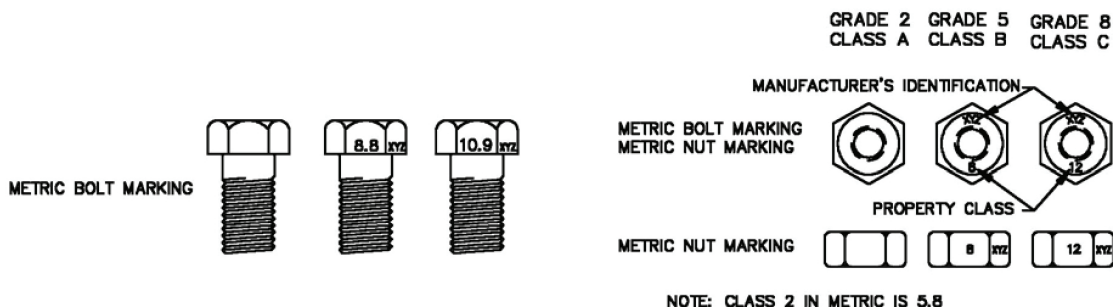
Torque Specifications (Cont'd)

Metric Hardware and Lock Nuts

TORQUE CHARTS Minimum Hardware Tightening Torques

Normal Assembly Applications
(Metric Hardware and Lock Nuts)

Nominal Size	Class 5,8		Class 8,8		Class 10,9		Lock nuts
	Unplated or Plated Silver	Plated W / ZnCr Gold	Unplated or Plated Silver	Plated W / ZnCr Gold	Unplated or Plated Silver	Plated W / ZnCr Gold	Class 8 W / CL. 8,8 Bolt
M4	1.7 N•m (15 in.-lb.)	2.2 N•m (19 in.-lb.)	2.6 N•m (23 in.-lb.)	3.4 N•m (30 in.-lb.)	3.7 N•m (33 in.-lb.)	4.8 N•m (42 in.-lb.)	1.8 N•m (16 in.-lb.)
M6	5.8 N•m (51 in.-lb.)	7.6 N•m (67 in.-lb.)	8.9 N•m (79 in.-lb.)	12 N•m (102 in.-lb.)	13 N•m (115 in.-lb.)	17 N•m (150 in.-lb.)	6.3 N•m (56 in.-lb.)
M8	14 N•m (124 in.-lb.)	18 N•m (159 in.-lb.)	22 N•m (195 in.-lb.)	28 N•m (248 in.-lb.)	31 N•m (274 in.-lb.)	40 N•m (354 in.-lb.)	15 N•m (133 in.-lb.)
M10	28 N•m (21 ft.-lb.)	36 N•m (27 ft.-lb.)	43 N•m (32 ft.-lb.)	56 N•m (41 ft.-lb.)	61 N•m (45 ft.-lb.)	79 N•m (58 ft.-lb.)	30 N•m (22 ft.-lb.)
M12	49 N•m (36 ft.-lb.)	63 N•m (46 ft.-lb.)	75 N•m (55 ft.-lb.)	97 N•m (72 ft.-lb.)	107 N•m (79 ft.-lb.)	138 N•m (102 ft.-lb.)	53 N•m (39 ft.-lb.)
M16	121 N•m (89 ft.-lb.)	158 N•m (117 ft.-lb.)	186 N•m (137 ft.-lb.)	240 N•m (177 ft.-lb.)	266 N•m (196 ft.-lb.)	344 N•m (254 ft.-lb.)	131 N•m (97 ft.-lb.)
M20	237 N•m (175 ft.-lb.)	307 N•m (226 ft.-lb.)	375 N•m (277 ft.-lb.)	485 N•m (358 ft.-lb.)	519 N•m (383 ft.-lb.)	671 N•m (495 ft.-lb.)	265 N•m (195 ft.-lb.)
M24	411 N•m (303 ft.-lb.)	531 N•m (392 ft.-lb.)	648 N•m (478 ft.-lb.)	839 N•m (619 ft.-lb.)	897 N•m (662 ft.-lb.)	1160 N•m (855 ft.-lb.)	458 N•m (338 ft.-lb.)





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