



Battle Ax H Series

Skid Loader Mulching Head

88

Owner's Manual and Parts Book
(Originating with Serial Number 104-101)



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.

All Loftness products have a one (1) year limited warranty. The XLB10 Grain Bag Loader has a two (2) 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;
- Improper knife replacement;
- Missing knives;
- Striking foreign objects
- Lack of lubrication
- Failures caused by running in an "out-of-balance" condition;
- Tires;
- Conveyors;
- Auger wear;
- Saw blades;
- Brakes and brake pads; and
- Hydraulic hoses damaged by being caught in "pinch points" or by moving parts.

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. (October 2020)





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 and set hydraulic flow per power unit manufacturer owner's manual for preferred flow.
- ____ Recorded the Serial Number / Make / Model of the power unit.
Power unit. S/N _____ Make _____ Model _____
- ____ Recorded the Serial Number and Model of the Loftness attachment. S/N _____ Model _____
- ____ Verified power unit manufacturer outlined Auxiliary coupler orientation for pressure, return & case drain line.
- ____ Verified/recorded rotor RPM at full throttle per model & chart in Loftness owner's manual. RPM _____
- ____ Performed an Auxiliary system pressure stall check on the power unit only and verified that max pressure rating is achieved per power unit manufacturer specifications. Recorded pressure observed _____ PSI

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 hydraulics to operate attachment.
- ____ 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 and set hydraulic flow per power unit manufacturer owner's manual for preferred flow.
- ____ Recorded the Serial Number / Make / Model of the power unit.
Power unit. S/N _____ Make _____ Model _____
- ____ Recorded the Serial Number and Model of the Loftness attachment. S/N _____ Model _____
- ____ Verified power unit manufacturer outlined Auxiliary coupler orientation for pressure, return & case drain line.
- ____ Verified/recorded rotor RPM at full throttle per model & chart in Loftness owner's manual. RPM _____
- ____ Performed an Auxiliary system pressure stall check on the power unit only and verified that max pressure rating is achieved per power unit manufacturer specifications. Recorded pressure observed _____ PSI

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)
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Signed/Date

Email to: Cheryl Schmalz

Cheryl@loftness.com

CUSTOMER COPY



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Ordering Code

Battle Ax H Series (Example)

The ordering code will consist of two numbers (machine size), two letters (machine type), one letter (tooth type), two numbers (motor system), one letter (sprocket/belt combo), one number (threshold setting), and one letter (options). An example for a Battle Ax of this type would be as shown below.

88BHS41T1.S

SIZE

88 = 88" Cut

TYPE

BH = Battle Ax Skid Loader

TOOTH

Q = Quadco Planer

H = Hard Surface

S = Standard Double Carbide

MOTOR SYSTEM

41 = Parker Variable Displacement

48 = Parker Variable Displacement Without Brake

SPROCKET / BELT COMBO

A = 48/38 37MM 1568 - Standard Speed

B = 45/40 37MM 1568 - Standard Speed

D = 45/43 37MM 1568 - Standard Speed

H = 43/45 37MM 1568 - Standard Speed

I = 40/45 37MM 1568 - Standard Speed

J = 40/48 37MM 1568 - Standard Speed

T = 50/35 37MM 1568 - High Speed

U = 48/37 37MM 1568 - High Speed

V = 48/40 37MM 1568 - High Speed

D = 45/43 37MM 1568 - High Speed

H = 43/45 37MM 1568 - High Speed

I = 40/45 37MM 1568 - High Speed

THRESHOLD SETTING

1 = 1600 PSI - Variable Displacement

2 = 2200 PSI - Variable Displacement

3 = 2800 PSI - Variable Displacement

4 = 3400 PSI - Variable Displacement

5 = 4000 PSI - Variable Displacement

OPTION

S = Universal Skid Mount

H = Hydraulic Pusher



Owner Information

Thank you for your decision to purchase a Battle Ax skid loader-mounted shredder from Loftness. To ensure maximum performance of your machine, 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" diameter material. Intermittently cuts larger diameter material. For best results, operate the machine as low to the ground as possible without the teeth striking ground or other obstructions. Lifting or tilting the Battle Ax 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, large branches etc. The teeth cut and pulverize the grass, weeds and brush. The Battle Ax deposits cut material over the entire width-of cut, which eliminates bunching or windrowing behind the machine.

Operate and maintain this machine 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.

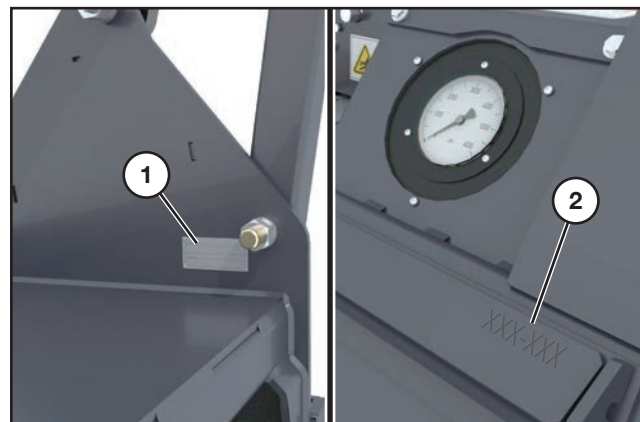
Make sure that all personnel have read this owner's manual and thoroughly understand safe and correct operating, installation and maintenance procedures.

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 machine 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.

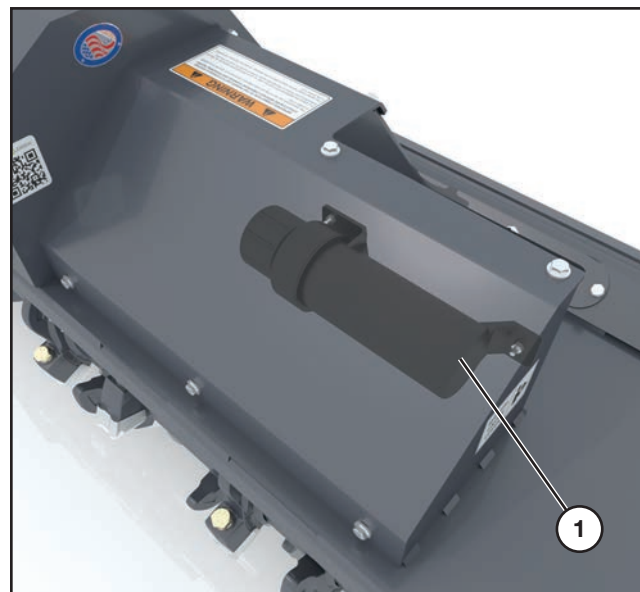
Serial Number Location



The machine serial number is shown in the tag (1), and is also stamped into the frame (2) on the skid steer mounting bracket.

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

Manual Storage



Keep the owner's manual and the entire documentation packet in the manual holder (1) provided on your Battle Ax. The owner's manual must be available for all operators.

Refer to "Removing Center Cover" on page 24 for instructions to safely remove the center cover and access the owner's manual.

Introduction

Battle Ax H Series Features

- Power Requirement - 90 to 150HP
- Downward Rotation Design
- Premium Strength Steel Body & Rotor
- Front Mounted
- Hydraulic Driven
- Universal Skid Steer Mount - Other Mounts Available
- Manual or Hydraulic Pusher Bar
- Claw Hooks On Tree Pusher
- 17 in. (43 cm) Diameter Rotor (1600-2300 RPM)
- 2-1/2 in. (63.5 mm) Piloted Double Taper Roller Bearings
- Anti Wrap Bearing Protection
- Heavy Duty Bearing Block
- Variable Displacement Piston Type Motor
- Dual Cross-Over Relief Protection
- Pressure Gauge
- Steel Chain Deflectors
- Synchronous Belt
- Tapered-Lock Sprockets
- Skid Shoes - Adjustable +.5 in. to -1.5 in. (+12.7 to -38.1 mm)
- Hydraulic Hoses and Hose Holder
- Adjustable Shear Bar
- Double Carbide; Quadco Planer Teeth (sharpenable); or Hardened Quadco Teeth

Safety First



Safety Alert Symbol

This message alert symbol identifies important safety messages on the machine 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 machine 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 this machine 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 machine operators are aware of the dangers indicated by safety decals applied to the machine, 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 machine to protect the operator.

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

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 this machine 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 machine and attachment by disengaging all controls. See "Mandatory Shut-Down Procedure" on page 5.

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

Mandatory Shut-Down Procedure

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

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

Safety Instructions

Safety Rules

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

- Read and observe all warnings decals on the machine before attempting to operate the attachment. Do not attempt to operate this attachment 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 machine or be thrown striking other objects.
- Do not allow any people and animals within 300 feet of the machine and attachment during operation.
- Do not allow anyone to operate the attachment 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 machine.
- Always use an approved roll bar and seat belt for safe operation. Overturning a machine without a roll bar and seat belt can result in injury or death.
- Use the handholds and step plates when getting on and off the machine to prevent falls. Keep steps and platform cleared of mud and debris.
- Always have an operator in the machine while the attachment is in operation. Never leave the machine and attachment running and unattended.
- Operate the attachment 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 attachment.
- The adjustable push bar could contact the machine in some positions. Before starting the power unit, set the push bar in the most forward position, then slowly rotate the attachment back while an assistant checks for clearance. Repeat this process in the other settings to determine which positions are usable with your machine.
- Never attempt to make any adjustments while the attachment is running or the key is in the "ON" position in the machine. Before leaving the operator's position, disengage power to the attachment, shut off engine and remove ignition key.
- Disengage auxiliary hydraulics and place all machine 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 machine and attachment before attempting to operate. Know how to stop the machine and attachment before starting it.
- Repeated impact of the knives with hard objects can cause excessive wear and damage to the skid-loader or attachment. Be sure to maintain recommended ground clearance as specified in this manual.
- Should excessive vibration occur, disengage the auxiliary hydraulics immediately and shut off engine. Do not continue to operate the attachment until the problem has been determined and corrected.
- Do not start, operate, or work on this attachment until you have carefully read and thoroughly understand the contents of this manual and the operator's manual for your machine.
- Keep children, bystanders and other workers off and away from the machine and attachment during operation. No riders allowed.
- Before inspecting, cleaning, lubricating, adjusting or servicing any part of the attachment, 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.

Safety Instructions

Safety Rules (Cont'd)

- 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 machine and attachment, 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 machine and attachment.
- Before working under the attachment, 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 machine.
- It is the operator's responsibility to be aware of machine and attachment operation and work area hazards at all times.
- Never operate the attachment without adequate light and visibility.
- Keep hands and feet clear! Never step over or climb over the attachment 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 machine and attachment.
- Operators are responsible to be aware of safety hazard areas and follow instructions on warning, caution, or danger decals applied to the machine.
- Know the area before operating the machine. Be aware of power lines or other equipment.

- Do not lubricate parts while the machine is running.
- Do not smoke while servicing the machine.

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!*

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 machine. If the decal should become worn or missing, replace immediately

Safety Instructions

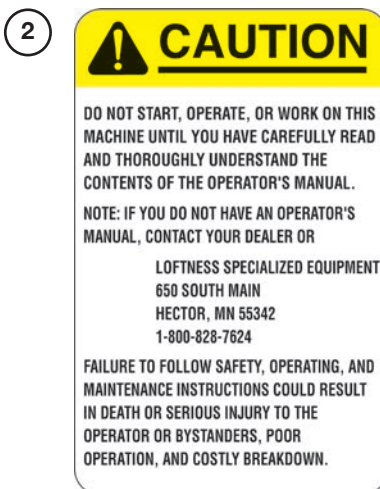
Safety Decal Locations

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

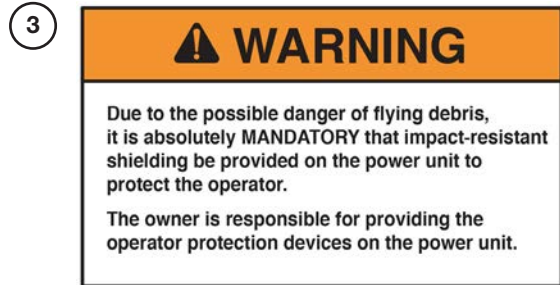
NOTE: This section shows where safety-related decals are applied on the machine. For all machine decals see "Machine Decals and Signs" on page 61.



Part No. N68724



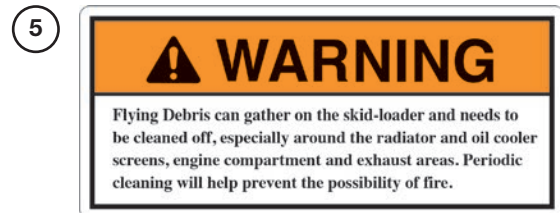
Part No. 4256



Part No. N17013



Part No. N68716



Part No. N20661

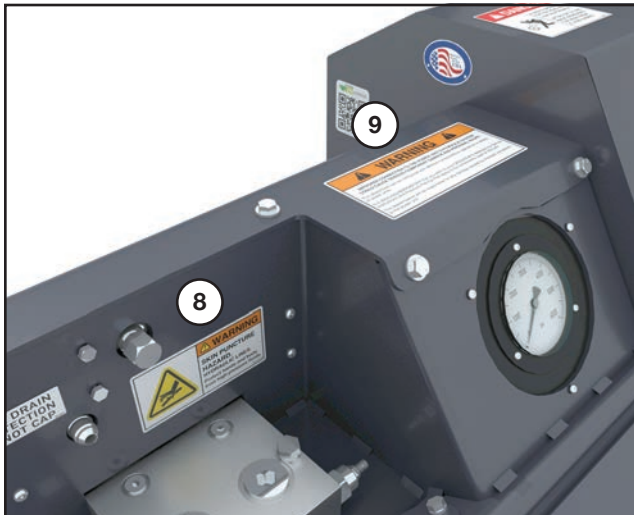


Part No. 200491

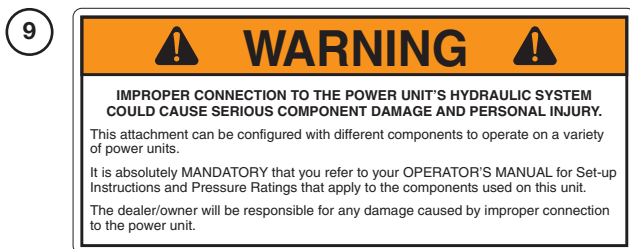


Part No. 203264

Safety Decal Locations (Cont'd)



Part No. N23506



Part No. N28385



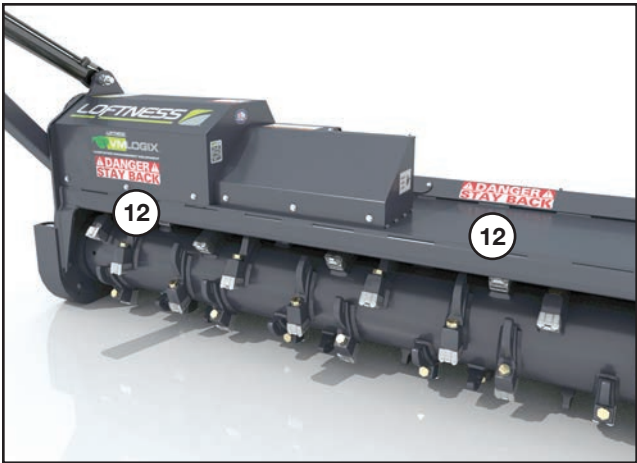
Part No. N68716



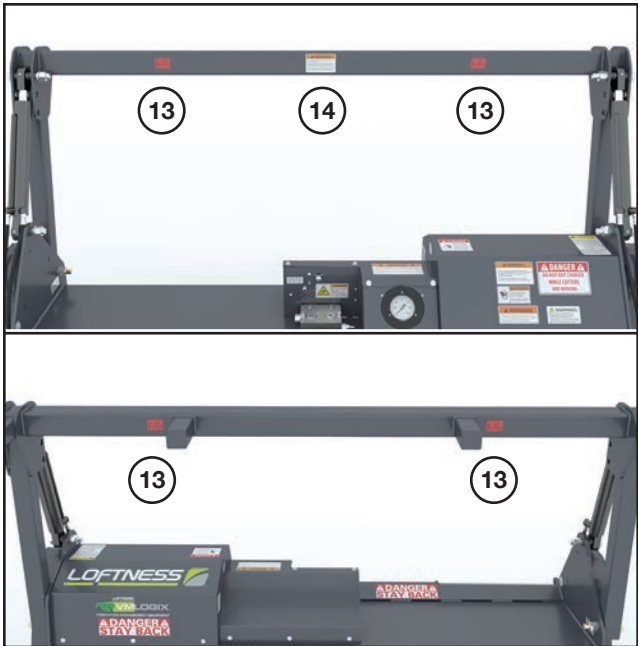
Part No. N28386

Safety Instructions

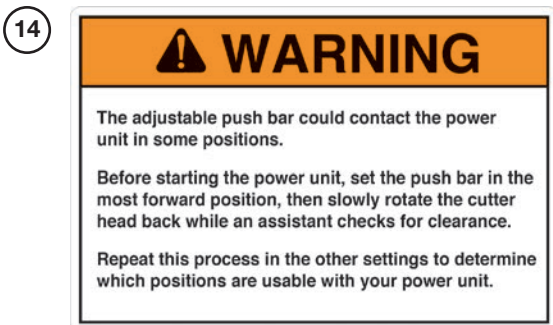
Safety Decal Locations (Cont'd)



Part No. 4334

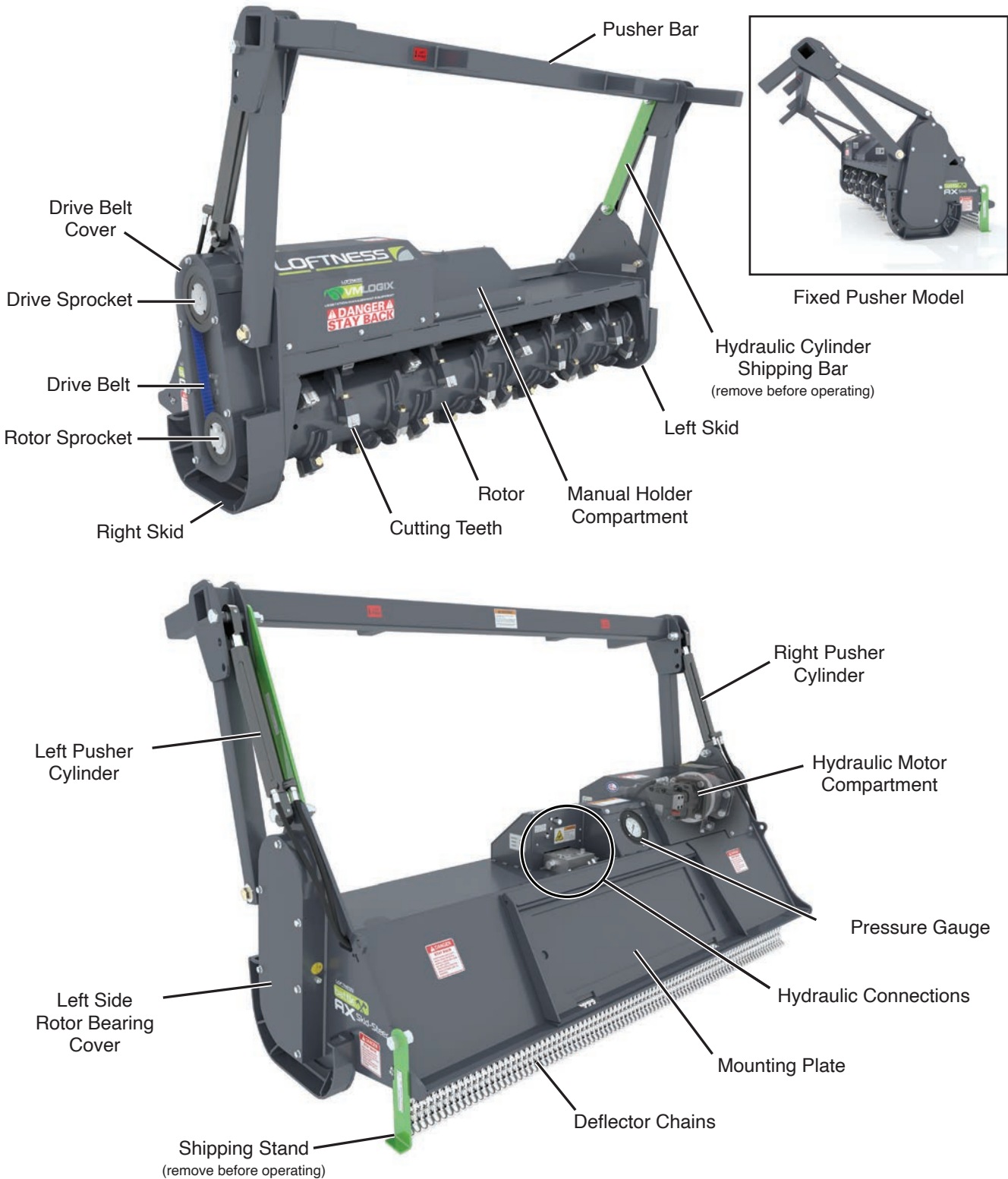


Part No. N29769



Part No. N17014

Battle Ax H Series Identification





Set-up Instructions

Pusher Bar Assembly

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.



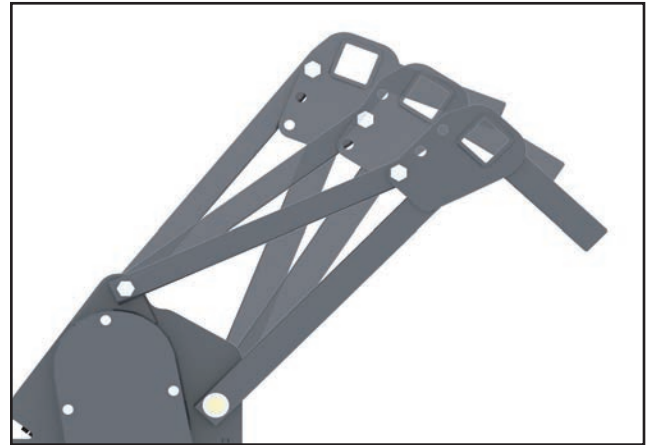
Remove the top nut (1) and washer (2), then the bottom nut (3) and washer (4) securing the shipping bar (5). Keeping the bolts in position, slide the shipping bar off of the bolts.

Reinstall the hardware back into position and tighten securely.

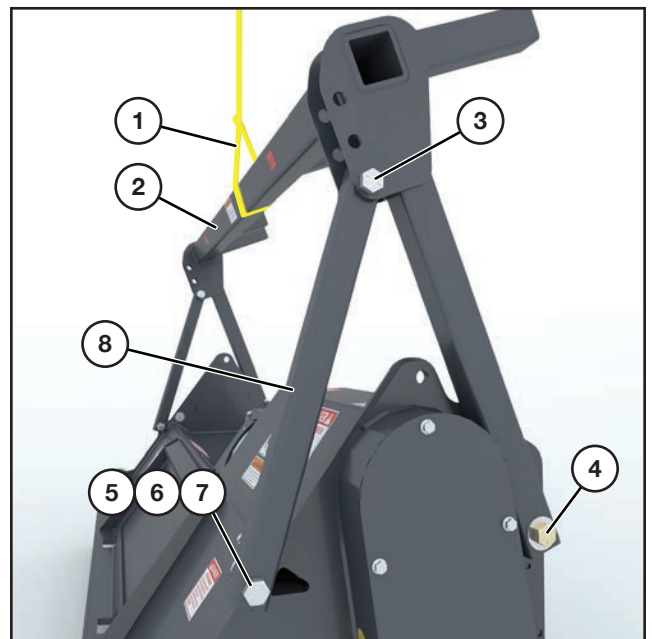
The shipping bar may be discarded.

Fixed Pusher Models

The Battle Ax with the fixed pusher bar is shipped with the pusher bar in an upright position. Follow the procedure below to get the machine into the operating position.



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



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

Ensure pusher bar (2) is being safely supported.

Loosen nuts at locations 3 and 4. Then remove nut (5), bolt (6), and washer (7) securing the rear arm (8) to the rear of the frame.

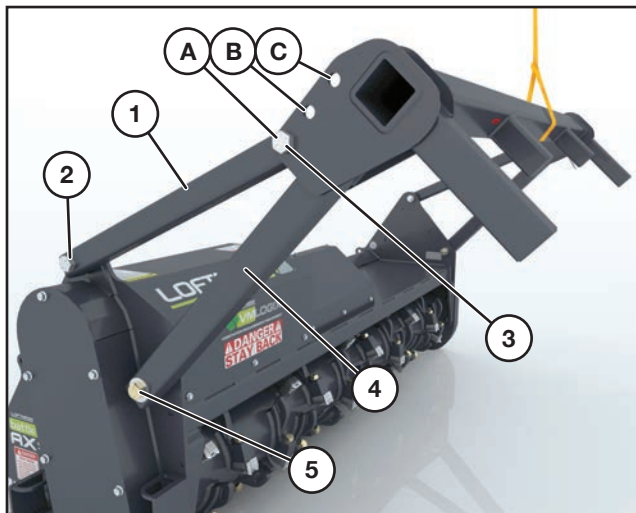
Repeat procedure on the opposite side of the Battle Ax.

(Procedure continued on following page.)

Set-up Instructions

Pusher Bar Assembly (Cont'd)

Fixed Pusher Models (Cont'd)



Move the rear arm (1) into position so the hole in the lower end of the arm aligns with the top hole (2) of the side plate (indicated by the shipping tag). Remove the shipping tag.

NOTE: The pusher bar is factory-set so the upper hole in the rear arm aligns with hole "A". If a different pusher bar angle is desired, remove nut and bolt (3) from their current position while holding on to the rear arm (1). Once the hardware is removed, let the rear arm rest on pusher bar side assembly (4).

Repeat procedure on other side of the Battle Ax.

Raise or lower the pusher bar and align the rear arm (1) with the desired hole (A, B, or C) on the pusher bar side assembly.

Reinstall all hardware and tighten (2, 3, and 5) securely. This must be done on both sides.

Remove lifting device.

Remove Shipping Stand



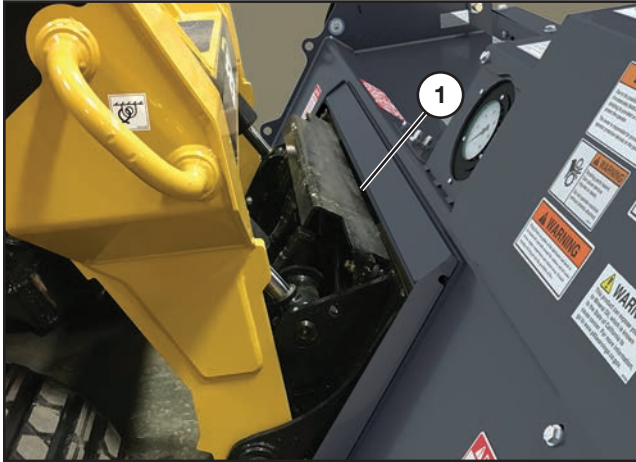
A stand (1) is secured to the Battle Ax to keep it stable during shipping. This can be removed after the pusher bar has been moved to the operating position.

NOTE: Do not discard the shipping stand and hardware. It is used to stabilize the Battle Ax during storage. Keep in a secure location until ready to store.

Set-up Instructions

Installing the Battle Ax to the Loader

Fully raise the attachment-locking levers on the loader mounting plate.



Tilt the loader mounting plate ahead. Drive forward with the loader and hook the top edge of the loader mounting plate under the top flange (1) on the Battle Ax mounting plate. Be careful not to damage the locking levers on the loader mounting plate.

Tilt the loader mounting plate back until the Battle Ax mounting plate is firmly against the loader mounting plate, but **Do Not** lift the attachment off the ground.



WARNING: Before you leave the operator's seat: Lower the lift arms, put the attachment on the ground. Stop engine and remove ignition key. Engage the parking brake.

Fully lower the attachment-locking levers on the loader mounting plate.

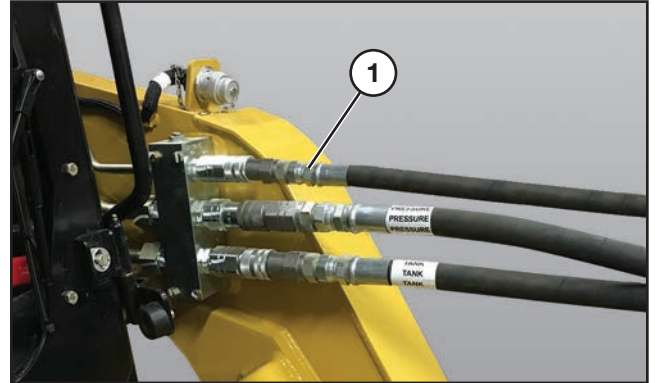


WARNING: Locking-wedge pins must extend through the holes in attachment-mounting plate. Levers must be fully down in the locked over-center position. Failure to secure wedge pins can allow attachment to come off, causing serious injury or death.

Hydraulic Connections



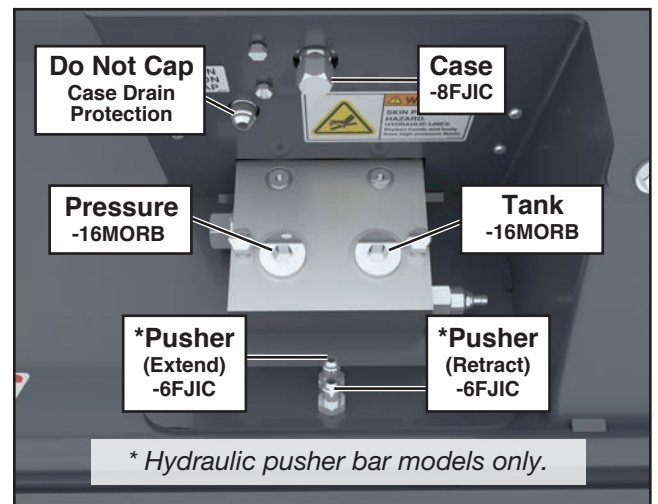
WARNING: Hydraulic Lines. Protect hands and body from high pressure fluids. Pressurized fluids can penetrate the skin. Disconnect and lock out power source before disconnecting and/or connecting hydraulic hoses.



NOTE: The hydraulic hose quick couplers shown above are not supplied with the Battle Ax.

Install the Battle Ax quick couplers to the loader.

NOTE: The case drain quick coupler (1) of the Battle Ax must be connected to the loader's auxiliary hydraulic system for proper operation of the Battle Ax.



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

Set-up Instructions

Flushing Loop (#41 Closed Motor Models only)

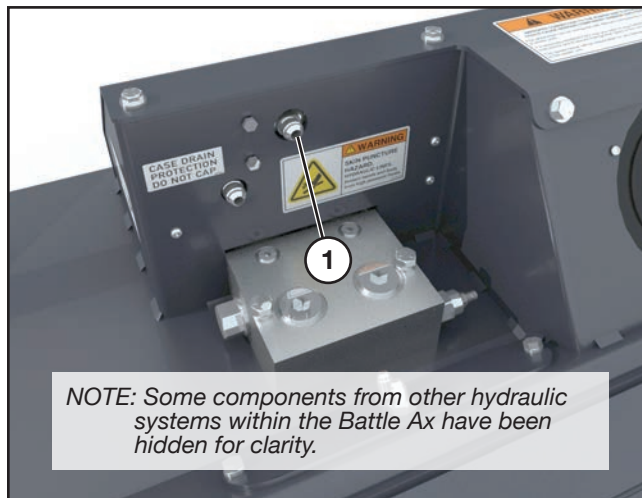
Note: Use the loader hydraulics to set the Battle Ax on blocks for this procedure. Refer to “Checking Rotor Rotation” on page 16 for reference.



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

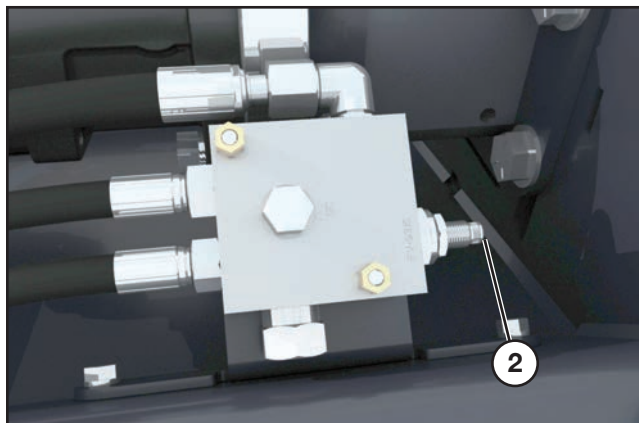
Remove the motor cover. See “Removing Motor Cover” on page 24 for instructions.

Inserting Flow Meter



Disconnect the case drain hose from the case drain fitting (1) and insert a hydraulic flow meter into the case drain line between the fitting and the case drain hose. Make sure all connections are tight.

Start loader and engage the hydraulics.



Locate manifold behind motor and adjust cartridge (2) to achieve 2-1/2 gallons per minute (GPM).

Once proper GPM flow has been reached, shut down the power from the loader.



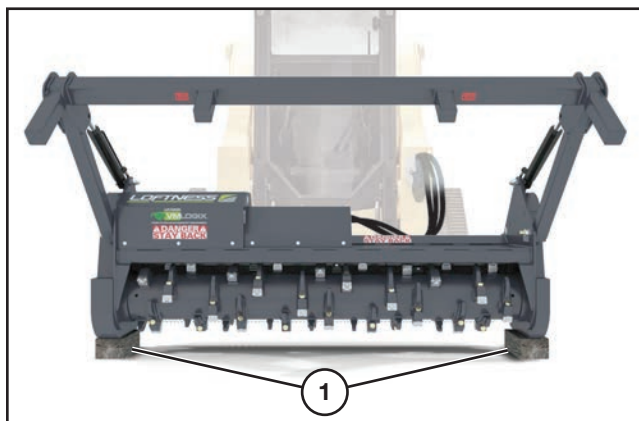
DANGER: Shut down power from the loader before proceeding.

Remove flow meter and reconnect the case drain line to the manifold fitting. Tighten the connection.

Checking Rotor Rotation



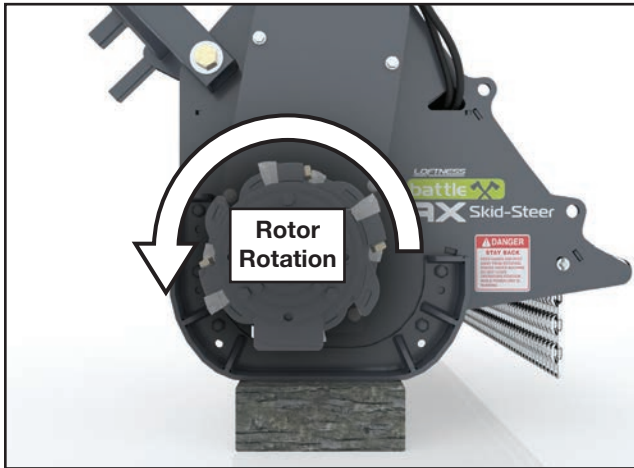
DANGER: Keep hands, feet, and clothing clear of rotor and bearings while the loader is running.



Raise the Battle Ax off the ground and place blocks (1) underneath the skids. Lower the Battle Ax down on the blocks.

(Procedure continued on following page.)

Checking Rotor Rotation (Cont'd)



Engage the loader auxiliary hydraulics, the rotor should start rotating in a forward direction. The rotation should be counterclockwise as viewed from the left side of the Battle Ax.

NOTE: If the rotor is rotating backward, reverse the quick couplers (not supplied) on the Battle Ax hydraulic hoses. Re-install the couplers (not supplied) on the loader and test for correct rotor rotation.



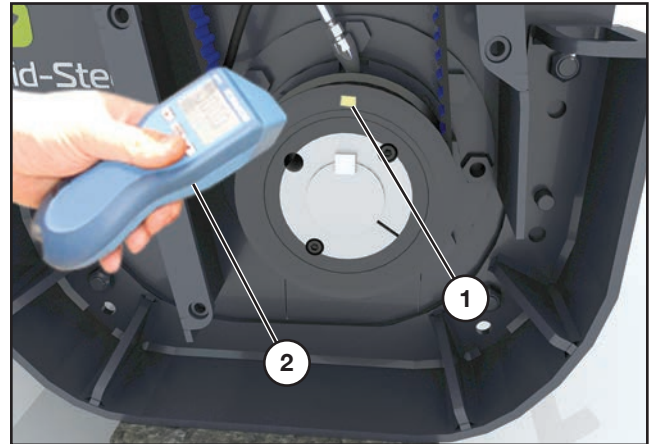
WARNING: The Battle Ax can be damaged if rotor is operated in reverse rotation.

NOTE: Keep the Battle Ax on the blocks for checking the rotor speed. See next procedure for instructions.

Checking Rotor Speed



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



Remove the belt cover. See “Removing Belt Cover and Left End Bearing Cover” on page 23 for instructions.

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

Start the loader and engage the auxiliary hydraulics.



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

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

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

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

Shut down the loader when done.

See “Motor & Sprocket Selection Chart” beginning on page 29 for rotor RPM. If it is outside this recommended range, it may be necessary to disconnect the Battle Ax and test the hydraulic output of the loader with a flow meter to see if it corresponds with the factory specifications.

Turn power off from loader and return the belt cover to position, securing with the eight bolts.

Set-up Instructions

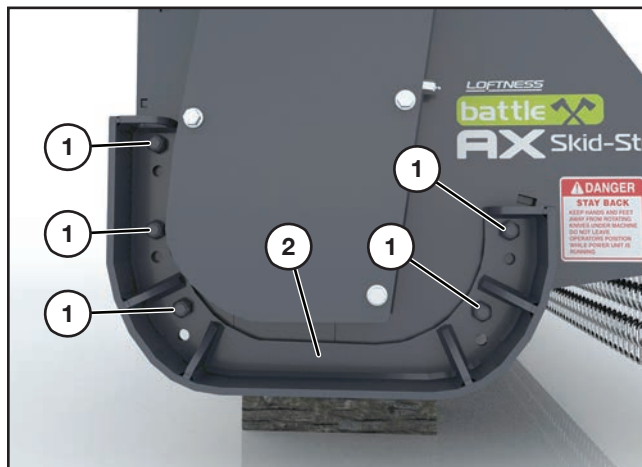
Skid Adjustment

The skids can be adjusted to increase or decrease the distance between the ground and the rotor.

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



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



Remove the five nuts with carriage bolts (1). Then raise or lower the skid (2) to the desired height, aligning the corresponding holes in the skid with the set of holes in the main frame.

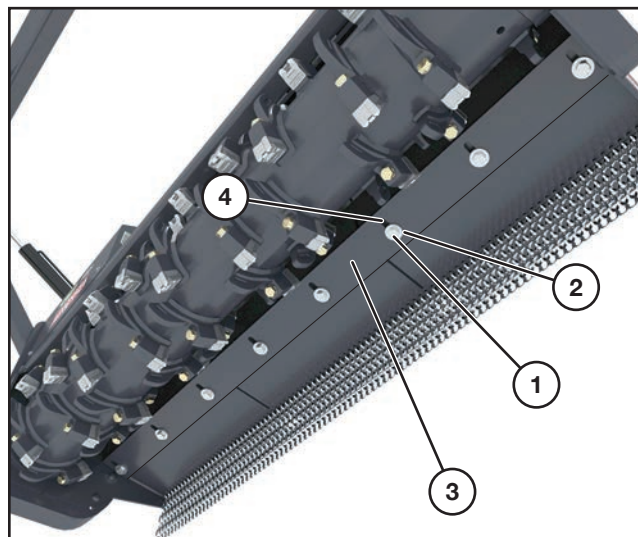
Re-install the bolts and nuts. Tighten nuts securely against the skid.

Repeat the procedure on the opposite side.

IMPORTANT: Any time a skid height is adjusted, the opposite side skid must also be adjusted so the height of both skids are identical.

NOTE: Use this same procedure to replace the skids when they become worn or damaged.

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 particle size and horsepower requirements.



WARNING: Shut down and disconnect the hydraulic hoses from the loader 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 machine 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 MACHINE!**

Operating Instructions

Getting Started

Visually inspect the unit before starting the machine up. 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 machine 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 the machine.



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 machine to protect the operator.



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



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



WARNING: Do not operate the attachment above the rated RPM. Check with your Loftness dealer to be sure your attachment is set-up with the correct sprockets to match the hydraulic flow GPM (Gallons Per Minute) of your machine.



WARNING: Flying debris can gather on the loader 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 this machine.

Operation



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



Tilt attachment mounting frame back and raise the Battle Ax slightly above the ground when moving the machine.

NOTE: Operate the Battle Ax as low to the ground as possible without the teeth striking ground or other obstructions.



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

Lower mulching head so skids are on ground.

Set engine speed to low idle and engage the mulching head.

Slowly increase engine speed to high idle.

Move the loader and Battle Ax forward and begin mowing.

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

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.

Operating Instructions

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 loader is running. Shut down and lock out power from the loader before attempting to remove debris by hand.

Log Moving

Disengage hydraulic power to rotor before moving logs and brush with pusher bars.



Raise the loader lift arms and tilt the Battle Ax forward until the push bar extensions are over the log or item being moved. Lower the lift arms and position the log between push bar extensions and the Battle Ax. Move the loader backwards, dragging the log to the desired location.

Detaching Battle Ax

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

Lower the Battle Ax to the ground.

Shut off engine and remove key.

Make sure the rotor has stopped completely before continuing.

Disconnect hydraulic hoses connected to the Battle Ax.

Detach the loader from the mounting plate.



WARNING: Do not attempt to detach the Battle Ax while the loader is running. Shut down and lock out power from the loader 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	Machine		X				
	Loose Bolts					X	
	Hoses and Wiring	X					
	Oil Leaks	X					
	Rotor Bearing				X		
	Teeth	X					
Every 100	Belt Tension	X					
	Drive Belt	X					
	Safety Labels	X					
Every 500	Hydraulic Motor	X					
	Overhung Load Adapter	X					X

Lubrication

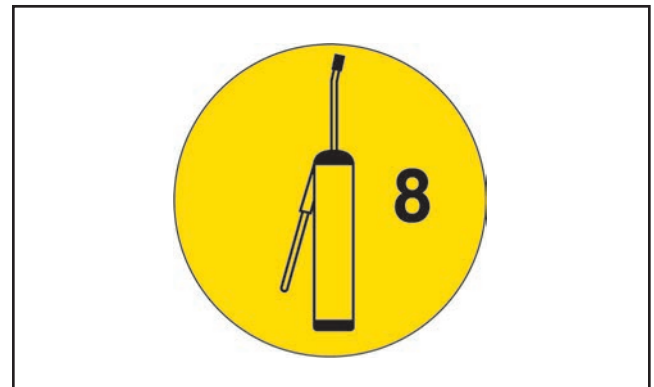
Grease Points Location

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.



DANGER: Shut down and lock out power from the loader before lubricating the Battle Ax. Failure to do so could result in serious injury or death.



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

See "Battle Ax H Series Identification" on page 11 for component location and identification.

(Procedure continued on following page.)

Maintenance

Lubrication (Cont'd)

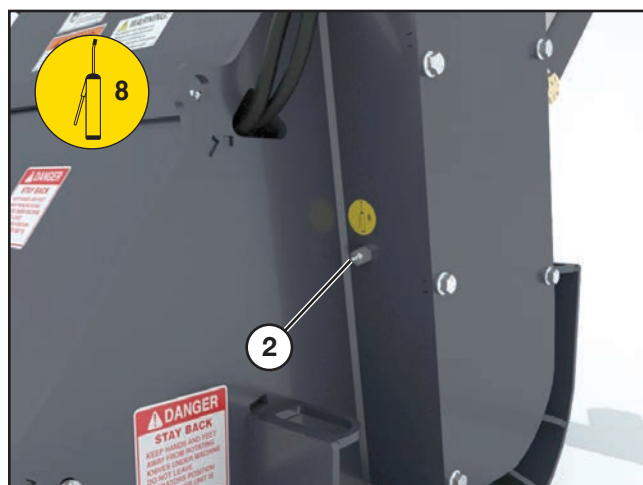
Grease Points Location (Cont'd)



Location: Left side rotor bearing (1).

Interval: Every 8 hours of operation.

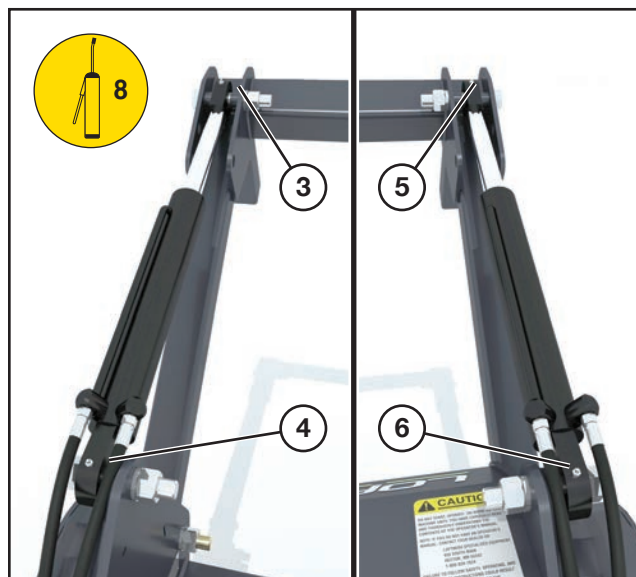
NOTE: Rotor bearings cannot be damaged by over-greasing. Lubricate the fittings until a small amount of grease is purged from the bearing.



Location: Right 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.

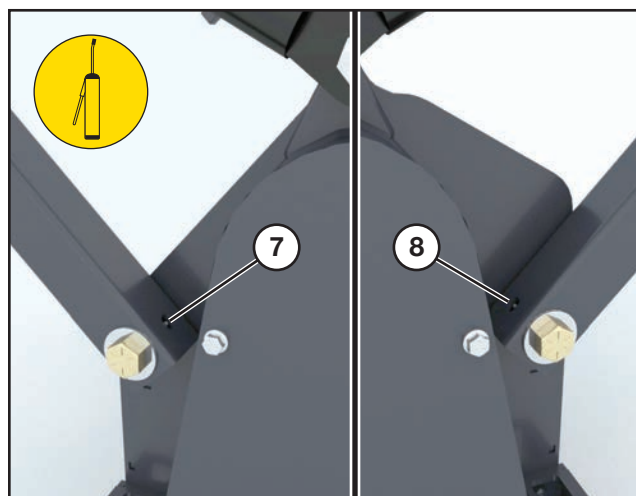


Location: Left side pusher cylinder (3 and 4).
(Hydraulic pusher models only.)

Interval: Every 8 hours of operation.

Location: Right side pusher cylinder (5 and 6).
(Hydraulic pusher models only.)

Interval: Every 8 hours of operation.

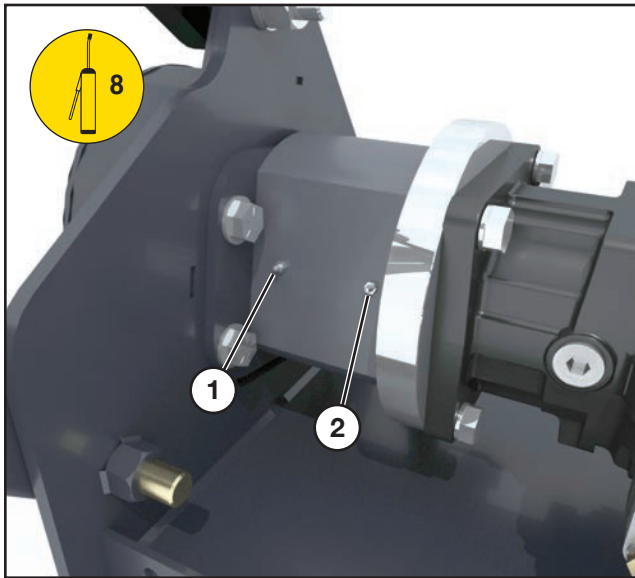


Location: Pusher Arms (7 and 8).
(Fixed and hydraulic pusher models;
Pusher arm may need to be tilted forward
to access.)

Interval: Every 50 hours of operation.

Lubrication (Cont'd)

Overhung Load Adapter



NOTE: The overhung load adapter requires synthetic grease NLGI #1, or NLGI #2.

Remove the motor cover to access the grease zerks. See "Removing Motor Cover" on page 24 for instructions.

Location: Overhung load adapter (1 and 2).

Interval: Five pumps of grease per zerk for every 500 hours of operation.

Removing Belt Cover and Left End Bearing Cover

NOTE: The removal procedure is the same for the right side belt cover and the left side bearing cover. The right side cover is shown for the removal procedure.



DANGER: Shut down power from the loader before removing the cover(s). Failure to do so could result in serious injury or death.



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

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

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

Maintenance

Removing Motor Cover



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



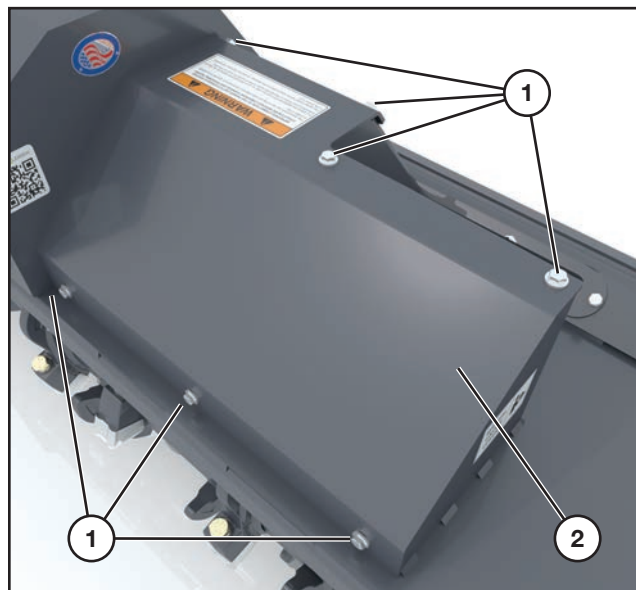
Remove the 3 bolts (1) on the front of the motor cover (2) followed by the two bolts (3) at the rear.

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

Removing Center Cover



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



Remove the seven bolts (1) and lift the cover (2) off.

NOTE: The owner's manual is located under the center cover.

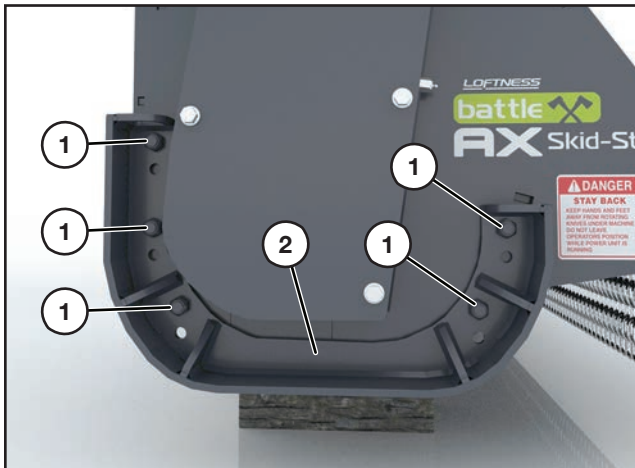
When maintenance/repairs are complete and/or the owner's manual has been accessed, return the cover back into position and tighten and secure all bolts.

Skid Replacement

To replace worn or damaged skids, lift the Battle Ax off of the ground about 6 inches. Place blocks under the rotor (not under teeth) to support the Battle Ax when lowered. Do not place blocks under the skids.



WARNING: Shut down and lock out power from the loader before replacing the skid(s). Failure to do so could result in serious injury or death.



CAUTION: The skids are heavy. Support each skid when removing.

Remove the five nuts with carriage bolts (1) and pull the worn/damaged skid (2) away from the frame.

Position the new skid in the same hole alignment as the previous skid.

Re-install the bolts and nuts. Tighten nuts securely against the skid.

NOTE: If a different mulching height is desired, either raise or lower the skid to align with the corresponding holes in the frame - the lower set of holes in the skid are for a shorter cut; the upper set of holes in the skid are for a longer cut.

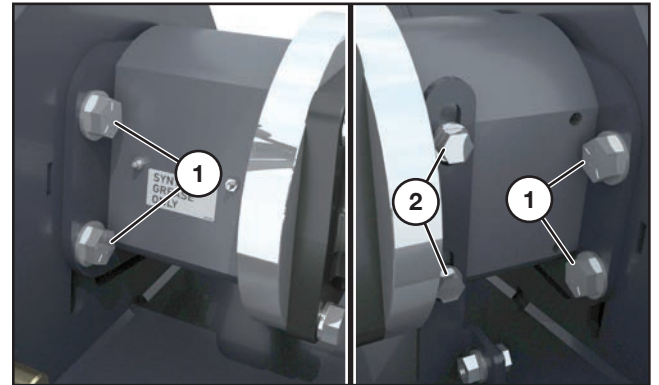
IMPORTANT: Any time a skid height is adjusted, the opposite side skid must also be adjusted so the height of both skids are identical.

Belt Tension Adjustment

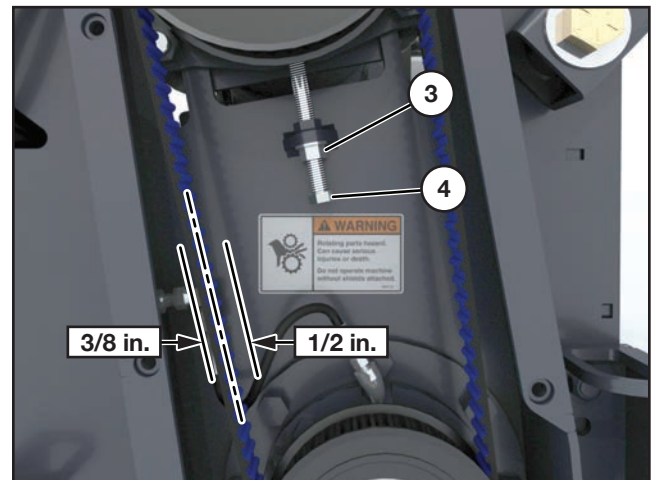


DANGER: Shut down and lock out power from the loader before adjusting the drive belt. Failure to do so could result in serious injury or death.

Remove belt cover and motor cover. Refer to “Removing Belt Cover and Left End Bearing Cover” on page 23 and “Removing Motor Cover” on page 24 for instructions.



Loosen the four mounting bolts (1). Then loosen the overhung load adapter support bracket bolts (2).



Loosen the jam nut (3). Then turn the hex bolt (4) to either increase or decrease belt tension.

Belt should move no more than 3/8 in. (9.5 mm) to the left, and no more than 1/2 in. (12.7 mm) to the right when pressure applied at the midpoint.

Retighten the jam nut (3).

Retighten overhung load adapter support bolts (1) and the mounting bolts (2).

Maintenance

Replacing Belt

To replace the belt, follow the procedures for “Belt Tension Adjustment” preceding this subsection and decrease the belt tension additionally to allow the belt to slide over the top sprocket.

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

Install the belt and adjust the tension accordingly. Refer again to the “Belt Tension Adjustment” procedure and follow the instructions completely.

Sprocket Removal

The steps to remove either the upper or lower sprocket are identical. For this procedure the upper sprocket is discussed. Follow the same procedure to remove the lower sprocket.

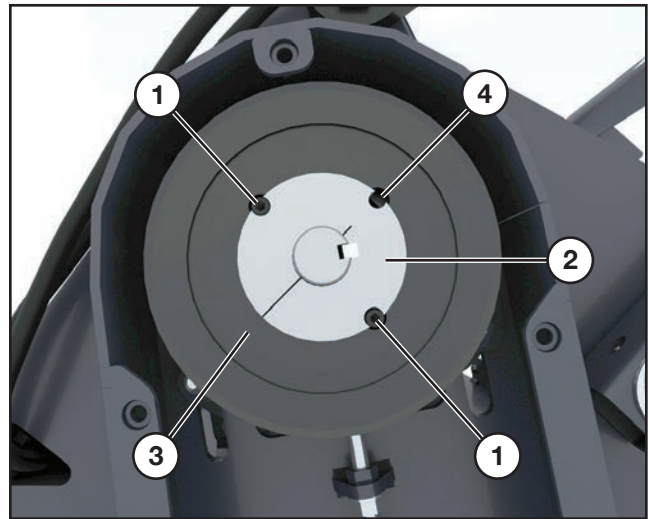
NOTE: See page 40 for a master drawing of all belt/sprocket combinations. The page provides a reference to an exploded view with a complete parts list for each combination.

1. Disconnect or turn off all power to the Battle Ax.



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

Remove the drive belt by following the instructions in “Belt Tension Adjustment” and “Replacing Belt” on page 26.



2. Remove the two screws (1) from the taper lock bushing (2) of the sprocket (3).
3. Insert one of the screws into the threaded hole (4).
4. Tighten the screw until bushing grip is released. (If excessively tight, lightly hammer face of sprocket using drift pin or sleeve).

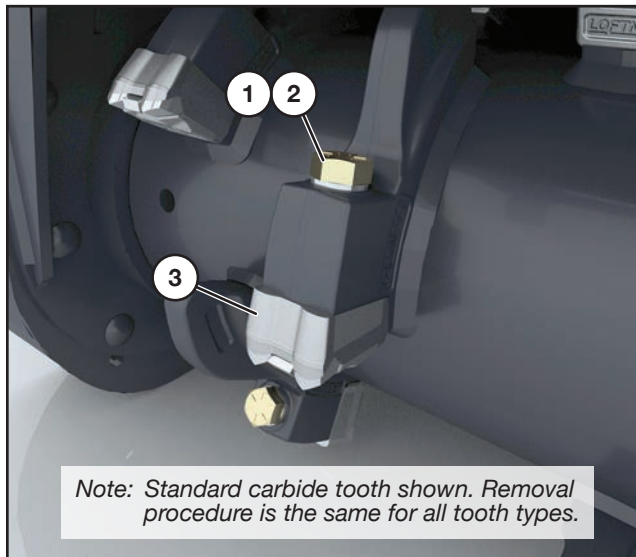
NOTE: Never hit sprocket directly with hammer.

5. Replace the sprocket by cleaning the shaft, bore of bushing, outside of bushing and hub bore of all oil, paint and dirt. File away any burrs.
6. Insert bushing into hub. Match the hole pattern, not threaded holes (each complete hole will be threaded on one side only).
7. Apply a thread-locking compound to screws and thread into the two opposing holes.
8. Position assembly on shaft and alternately torque screws to 35 ft.-lbs.
9. To increase gripping force, hammer face of bushing using drift or sleeve.

NOTE: Do not hit bushing directly with hammer.

10. Re-torque screws after hammering.
11. Recheck screw torque after initial run-in, and periodically thereafter, repeat steps 4, 5 & 6 if loose.
12. Check alignment of the sprocket. Repeat sprocket removal and assembly procedures if necessary.

Tooth Removal and Installation



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

Use copper based anti-seize when reinstalling the bolts. Torque to 240 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.

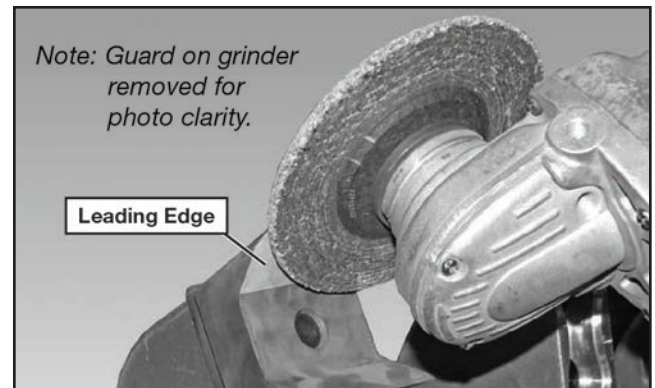
Tooth Sharpening (Quadco tooth only)

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

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



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



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.

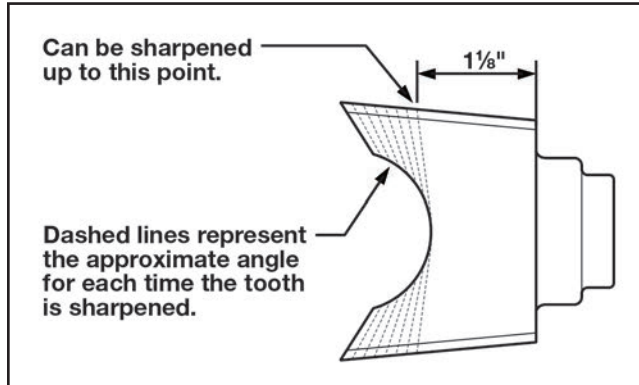
NOTE: When re-sharpening teeth using a hand grinder, avoid overheating the tooth by lightly grinding each tooth, moving across the entire row of teeth before returning to the first tooth to repeat the procedure.

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 (Quadco tooth only) (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 sprockets, relax the belt tension.
- Lubricate all parts of the machine. See "Lubrication" on page 21.
- Make a list of all worn or damaged parts and replace them.
- Paint all parts that are worn or rusted.
- Store Battle Ax in a clean, dry area.
- Review the Battle Ax operator's manual.
- Secure hoses on machine to avoid damage.

Beginning of the Season

- Review the Battle Ax operator's manual.
- Lubricate all parts of the machine. See "Lubrication" on page 21.
- Tighten all bolts, nuts, and set screws. See "Torque Specifications" on page 67.
- Adjust belt tension. See "Belt Tension Adjustment" on page 25.
- Replace all damaged, worn or missing decals.
- Install the Battle Ax on a loader and test for proper operation.



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

Motor & Sprocket Selection Chart

Standard Speed

GPM	VARIABLE DISPLACEMENT MOTOR NUMBER PARKER	DISPLACEMENT	LOFTNESS PART NUMBER	ROTOR RPM	TOP SPROCKET (LOFTNESS NUMBER) BOTTOM SPROCKET (LOFTNESS NUMBER) BELT LENGTH (LOFTNESS NUMBER)
33	41,48	90cc - 110cc (5.4921ci - 6.71ci)	207679	1753-1435	48 Top Sprocket N38492 38 Bottom Sprocket N38490 1568 37 Synchronous Belt N34646 Model Code "A"
34				1806-1478	
35				1859-1521	
36				1912-1565	
37				1965-1608	
38	41,48	90cc - 110cc (5.4921ci - 6.71ci)	207679	1798-1472	45 Top Sprocket N47578 40 Bottom Sprocket N38491 1568 Synchronous Belt N34646 Model Code "B"
39				1845-1510	
40				1892-1549	
41				1940-1587	
42				1988-1626	
43	41,48	90cc - 110cc (5.4921ci - 6.71ci)	207679	1893-1549	45 Top Sprocket N47578 43 Bottom Sprocket N34647 1568 Synchronous Belt N34646 Model Code "D"
44				1937-1584	
45				1981-1621	
46				2025-1657	
47				2069-1692	
48	41,48	90cc - 110cc (5.4921ci - 6.71ci)	207679	1929-1579	43 Top Sprocket N34647 45 Bottom Sprocket N47578 1568 Synchronous Belt N34646 Model Code "H"
49				1969-1611	
50				2010-1645	
51				2050-1677	
52				2090-1709	
53	41,48	90cc - 110cc (5.4921ci - 6.71ci)	207679	1981-1621	40 Top Sprocket N38491 45 Bottom Sprocket N47578 1568 Synchronous Belt N34646 Model Code "I"
54				2019-1652	
55				2056-1683	
56				2093-1713	
57				2131-1744	
58	41,48	90cc - 110cc (5.4921ci - 6.71ci)	207679	2033-1663	40 Top Sprocket N38491 48 Bottom Sprocket N38492 1568 Synchronous Belt N34646 Model Code "J"
59				2068-1692	
60				2103-1721	
61				2138-1749	
62				2173-1778	

(High Speed chart on following page.)

Maintenance

Motor & Sprocket Selection Chart (Cont'd)

High Speed

GPM	VARIABLE DISPLACEMENT MOTOR NUMBER PARKER	DISPLACEMENT	LOFTNESS PART NUMBER	ROTOR RPM	TOP SPROCKET (LOFTNESS NUMBER) BOTTOM SPROCKET (LOFTNESS NUMBER) BELT LENGTH (LOFTNESS NUMBER)
32	41,48	90cc - 110cc (5.4921ci - 6.71ci)	207679	1923-1573	50 Top Sprocket N38471 35 Bottom Sprocket 203001 1568 37 Synchronous Belt N34646 Model Code "T"
33				1983-1623	
34				2043-1671	
35				2103-1720	
36				2163-1770	
37				2223-1819	
38	41,48	90cc - 110cc (5.4921ci - 6.71ci)	207679	2073-1697	48 Top Sprocket N38492 37 Bottom Sprocket 203003 1568 Synchronous Belt N34646 Model Code "U"
39				2128-1741	
40				2182-1786	
41				2237-1830	
42				2292-1875	
43	41,48	90cc - 110cc (5.4921ci - 6.71ci)	207679	2171-1776	48 Top Sprocket N38492 40 Bottom Sprocket N38491 1568 Synchronous Belt N34646 Model Code "V"
44				2221-1817	
45				2272-1859	
46				2322-1900	
47				2372-1940	
48	41,48	90cc - 110cc (5.4921ci - 6.71ci)	207679	2113-1729	45 Top Sprocket N47578 43 Bottom Sprocket N34647 1568 Synchronous Belt N34646 Model Code "D"
49				2157-1764	
50				2201-1801	
51				2245-1837	
52				2289-1872	
53	41,48	90cc - 110cc (5.4921ci - 6.71ci)	207679	2130-1743	43 Top Sprocket N34647 45 Bottom Sprocket N47578 1568 Synchronous Belt N34646 Model Code "H"
54				2170-1775	
55				2210-1809	
56				2250-1841	
57				2290-1875	
58	41,48	90cc - 110cc (5.4921ci - 6.71ci)	207679	2168-1774	40 Top Sprocket N38491 45 Bottom Sprocket N47578 1568 Synchronous Belt N34646 Model Code "I"
59				2206-1804	
60				2244-1836	
61				2281-1866	
62				2318-1897	

(Variable Motor Setting chart on following page.)

Motor & Sprocket Selection Chart (Cont'd)

Variable Motor Settings

LOADER HYDRAULIC SYSTEM PRESSURE VARIABLE MOTORS	SETTING NUMBER	MOTOR THRESHOLD SETTING
Muncie Motor (no setting available)	0	N/A
2800psi - 3499psi (Parker only)	1	1600 (110 bar)
3500psi - 3899psi (Parker only)	2	2200 (152 bar)
3900psi - 4399psi (Parker only)	3	2800 (193 bar)
4400psi - 5099psi (Parker only)	4	3400 (234 bar)
5100psi - 5999psi (Parker only)	5	4000 (275 bar)

NOTE: Consult factory for instructions to change threshold setting. Variable Motors arrive from factory at setting #2.

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 overhung load adapter.	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 machine 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.
Oil Leak At Hydraulic Control Valve Cover.	Pinched case drain hose.	Check hose.
	Disconnected case drain hose.	Reconnect hose.

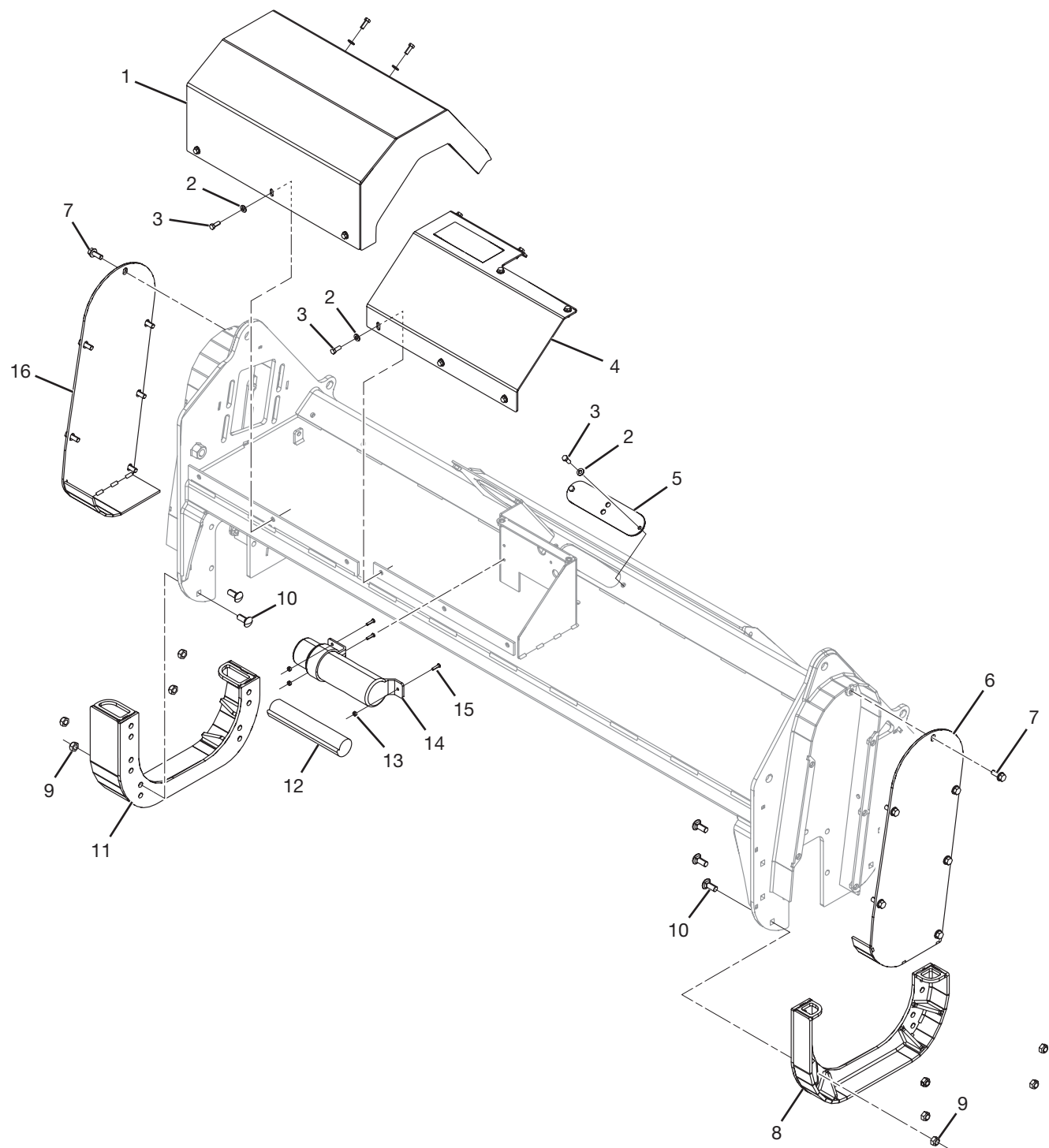




PARTS IDENTIFICATION

Parts Identification

Battle Ax H Series Covers, Skids, Manual Holder



Battle Ax H Series Covers, Skids, Manual Holder

#	QTY.	PART #	DESCRIPTION
1	1	207220	COVER, MOTOR W/DECALS
2	14	N37756	WASHER, NORD-LOCK 3/8" SP
3	14	4195	BOLT, 3/8" X 1" GRADE 5
4	1	207273	COVER, CENTER
5	1	207253	PLATE, BULKHEAD
6	1	207271	COVER, LEFT BEARING
7	12	N18360	BOLT, 1/2-13 X 1-1/4 SER FLG
8	1	207185	SKID SHOE, NON DRIVEN
9	10	4055	NUT, LOCK 5/8" TOP
10	10	4386	BOLT, CARRIAGE 5/8" X 1-1/2"
11	1	207187	SKID SHOE
12	1	208522	MANUAL, BATTLEAX H SERIES
13	3	4050	NUT, 1/4" LOCK
14	1	N19600	HOLDER, 01-315A STND.MANUAL
15	3	N38198	BOLT, BHCS 1/4-20 UNC X 1
16	1	207264	COVER, BELT RIGHT

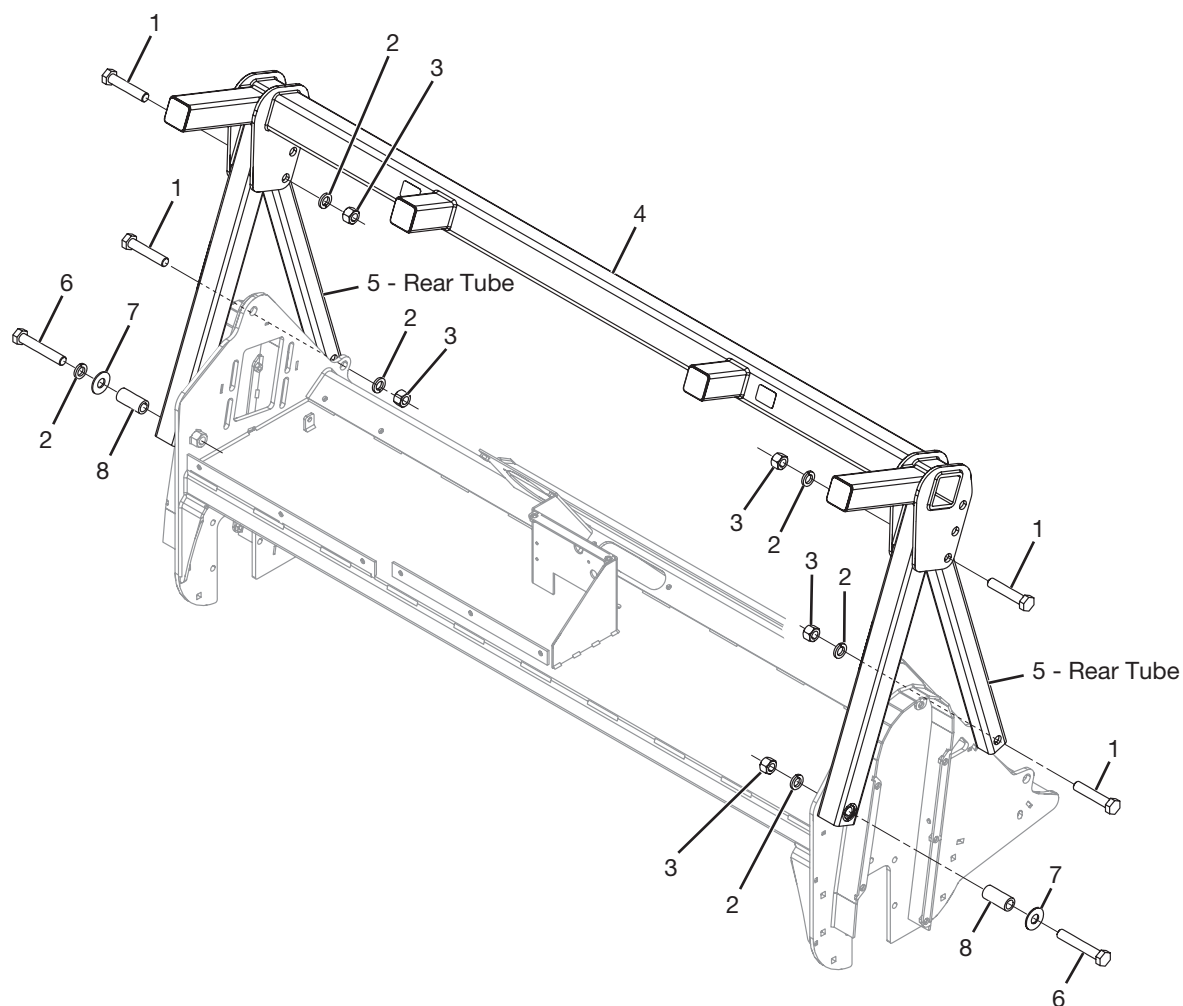


Battle Ax H Series Cutter Bar, Deflector Chains, Stand, and Belt Adjustment

#	QTY.	PART #	DESCRIPTION
1	1	N21496	BOLT, 1" X 2" GR 8 FN TH
2	1	N68757	STAND, W/DECALS
3	1	4166	WASHER, 1" LOCK
4	1	4490	NUT, 1"-14UNF STANDARD
5	2	4375	PIN, ROLL 3/16" X 1"
6	2	4064	WASHER, FLAT 3/8"
7	1	207160	ROD, CARBIDE 94.5 CHAIN
8	92	N15589	CHAIN, CARBIDE AX REAR
9	8	N21308	BOLT, 3/4" X 3" FN THRD GR 8
10	8	4479	WASHER, 2OD X 3/4ID X 1/4TK
11	1	207170	PLATE, RECUTTER
12	1	N27483	BOLT, 1/2" X 5" GR 5 FL TH
13	1	4250	NUT, STANDARD 1/2
14	1	4068	WASHER, 1/2" SAE FLAT

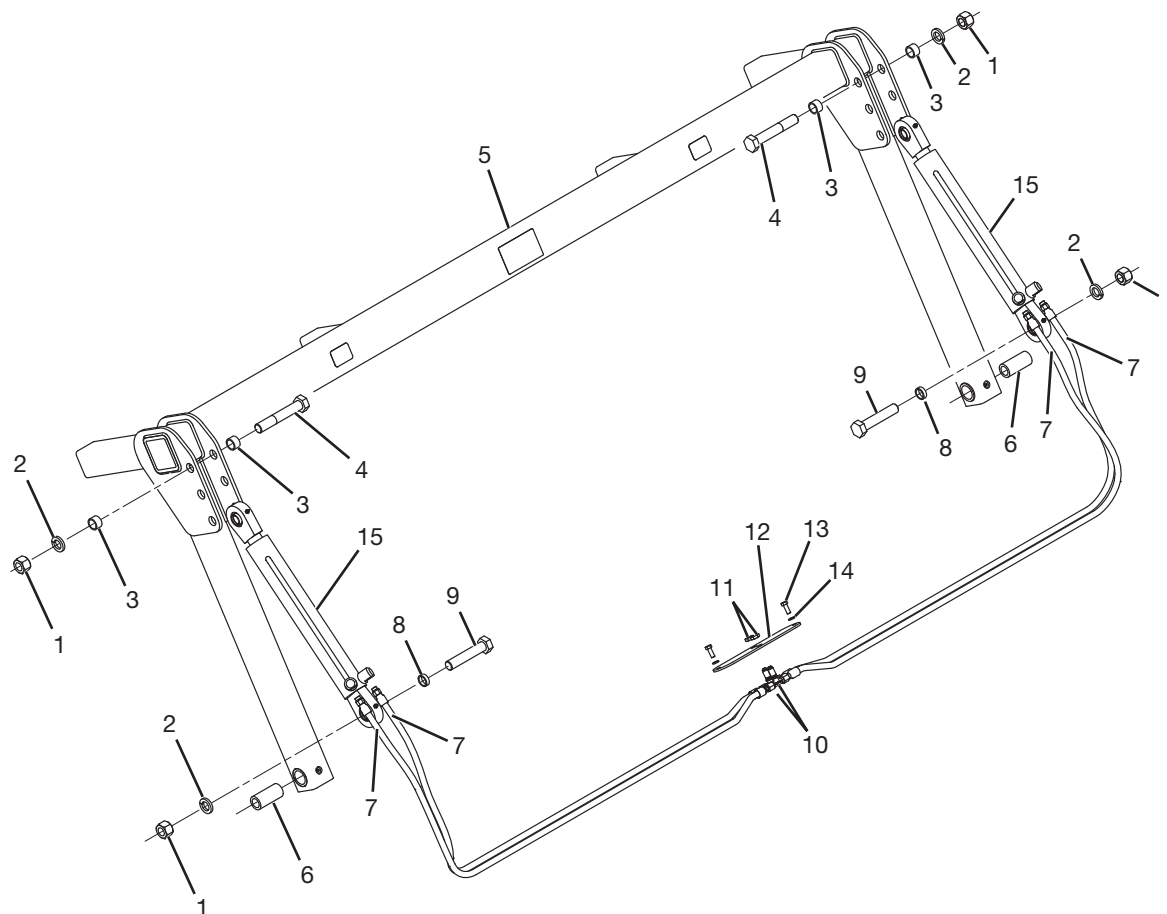
Parts Identification

Pusher, Fixed



#	QTY.	PART #	DESCRIPTION
1	4	N17023	BOLT, 1-14 X 5" GR. 8 FN. THR
2	6	4166	WASHER, 1" LOCK
3	5	4490	NUT, 1"-14UNF STANDARD
4	1	207171	PUSHER, 88 W/DECALS
5	2	207211	TUBE, PUSHER SHORT W/BUSHING
6	2	N28583	BOLT, 1 X 6" FN TH GR 8
7	2	4356	WASHER, 1" FLAT
8	2	207334	BUSHING, FIXED PUSHER

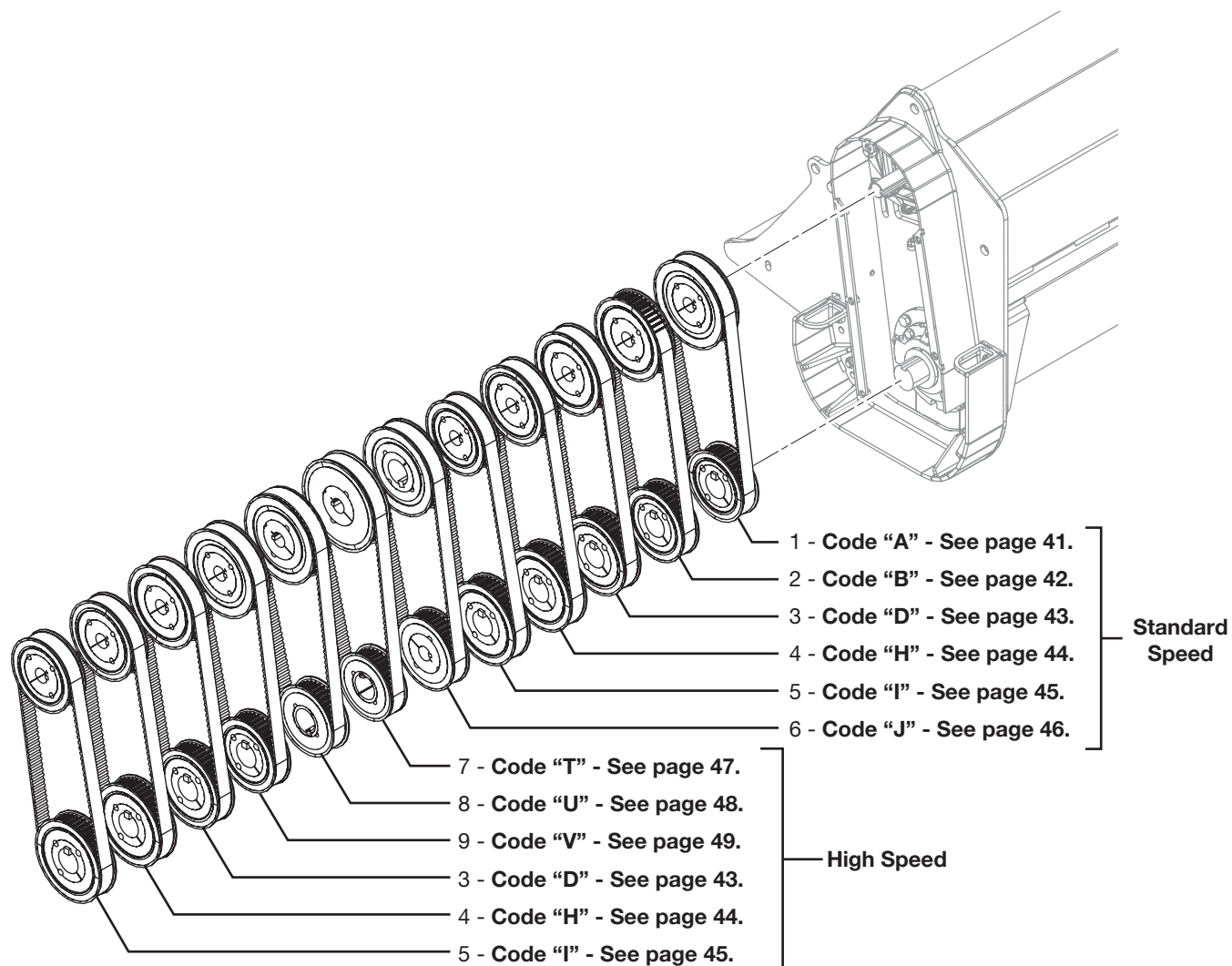
Pusher, Hydraulic



#	QTY.	PART #	DESCRIPTION
1	4	4490	NUT, 1"-14UNF STANDARD
2	4	4166	WASHER, 1" LOCK
3	4	207322	BUSHING, 1.010ID X .75
4	2	N28583	BOLT, 1 X 6" FN TH GR 8
5	1	207171	PUSHER, 88 W/DECALS
6	2	207213	BUSHING, PUSHER HYD
7	4	207244	HOSE, 3/8 69 -6MJIC -6MORB
8	2	207333	BUSHING, 1.01 ID X .375 LONG
9	2	N17023	BOLT, 1-14 X 5" GR. 8 FN. THR
10	2	200796	TEE, BULKHEAD -6 MJIC
11	2	N24780	NUT, LOCK BULKHEAD -6
12	1	207253	PLATE, BULKHEAD
13	2	4195	BOLT, 3/8" X 1" GRADE 5
14	2	N16470	WASHER, 3/8 NORDLOCK
15	2	207326	CYLINDER, 2.25BORE 1.5ROD 14ST

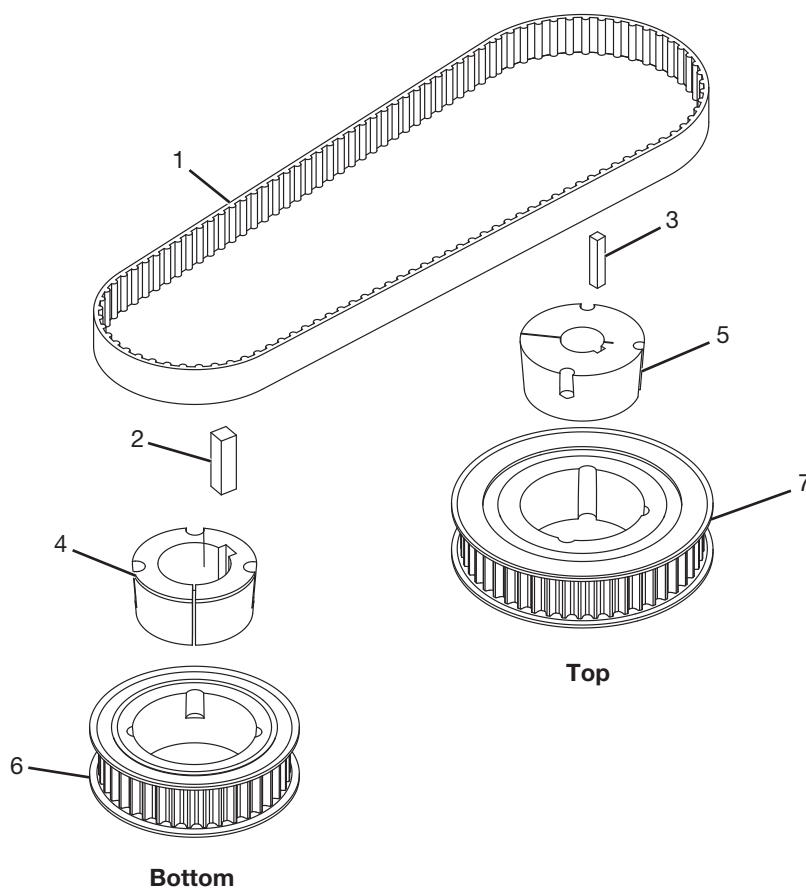
Parts Identification

Belt and Sprocket Options



#	QTY.	PART #	DESCRIPTION
1	1	207284	BELT ASSY, 37MM A
2	1	207279	BELT ASSY, 37MM B
3	2	207280	BELT ASSY, 37MM D
4	2	207189	BELT ASSY, 37MM H
5	2	207281	BELT ASSY, 37MM I
6	1	207282	BELT ASSY, 37MM J
7	1	208429	BELT ASSY, 37MM T
8	1	207283	BELT ASSY, 37MM U
9	1	207285	BELT ASSY, 37MM V

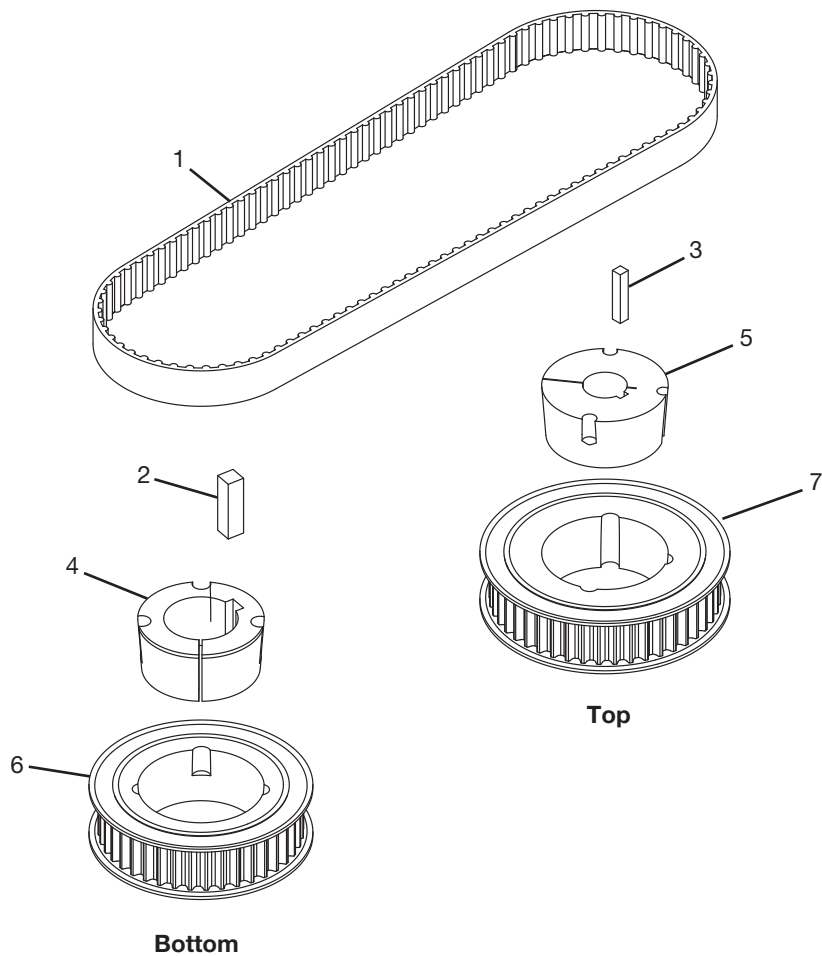
Belt Assembly, 48T 38B 37MM 1568 - Code "A" (207284)



#	QTY.	PART #	DESCRIPTION
1	1	N34646	BELT, POLY CHAIN 14MM 1568 X 37
2	1	200499	KEY, 5/8" X 2-1/4"
3	1	7121-03	KEY, 3/8" X 2"
4	1	207190	BUSHING, TPLK 2-1/2 3020
5	1	N20805	BUSHING, 1-1/2" TPL 3020
6	1	N38490	SPROCKET, 14MM 38 TOOTH 37
7	1	N38492	SPROCKET, 14MM 48 TOOTH 37

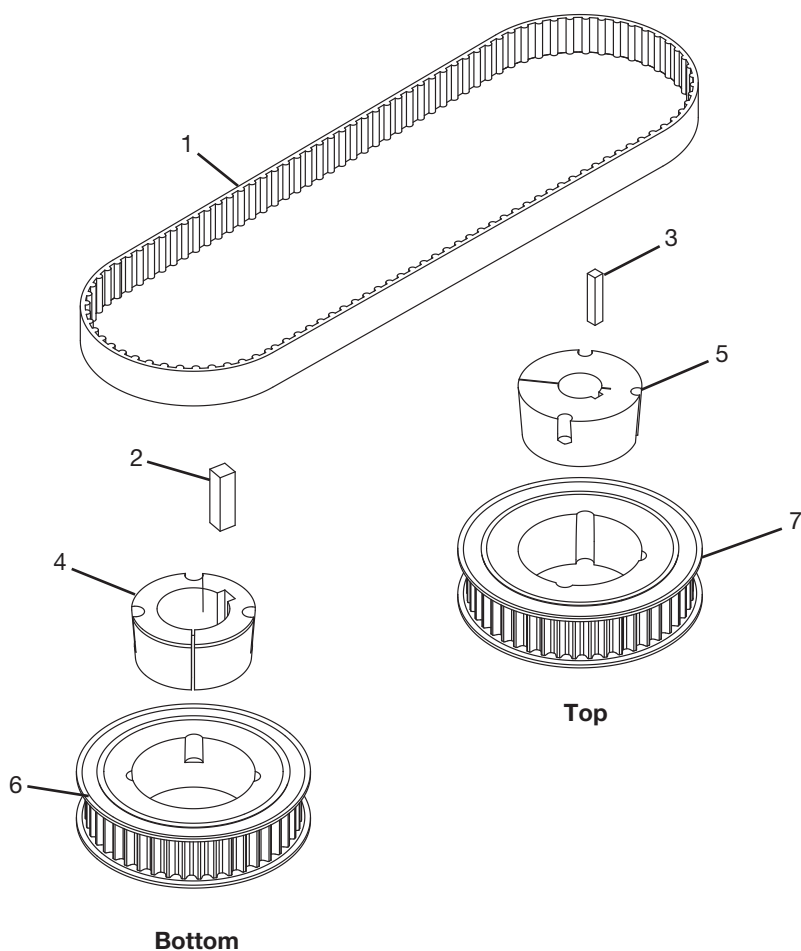
Parts Identification

Belt Assembly, 45T 40B 37MM 1568 - Code "B" (207279)



#	QTY.	PART #	DESCRIPTION
1	1	N34646	BELT, POLY CHAIN 14MM 1568 X 37
2	1	200499	KEY, 5/8" X 2-1/4"
3	1	7121-03	KEY, 3/8" X 2"
4	1	207190	BUSHING, TPLK 2-1/2 3020
5	1	N20805	BUSHING, 1-1/2" TPL 3020
6	1	N38491	SPROCKET, 14MM 40 TOOTH 37
7	1	N47578	SPROCKET, 14MM 45 TOOTH 37

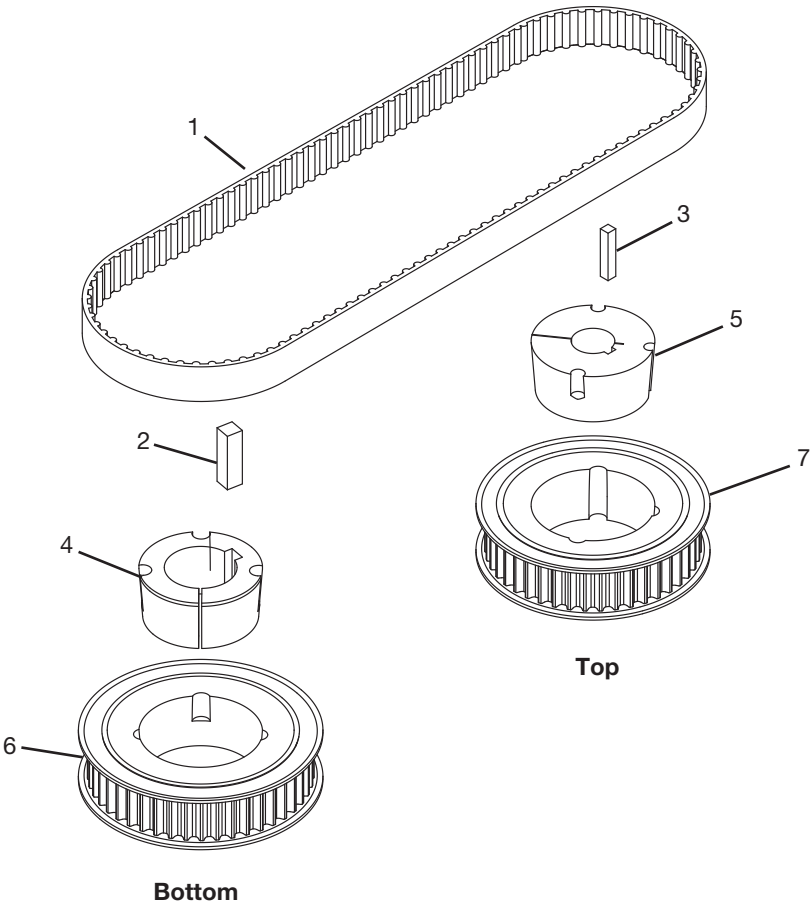
Belt Assembly, 45T 43B 37MM 1568 - Code "D" (207280)



#	QTY.	PART #	DESCRIPTION
1	1	N34646	BELT, POLY CHAIN 14MM 1568 X 37
2	1	200499	KEY, 5/8" X 2-1/4"
3	1	7121-03	KEY, 3/8" X 2"
4	1	207190	BUSHING, TPLK 2-1/2 3020
5	1	N20805	BUSHING, 1-1/2" TPL 3020
6	1	N34647	SPROCKET, 14MM 43 TOOTH 37
7	1	N47578	SPROCKET, 14MM 45 TOOTH 37

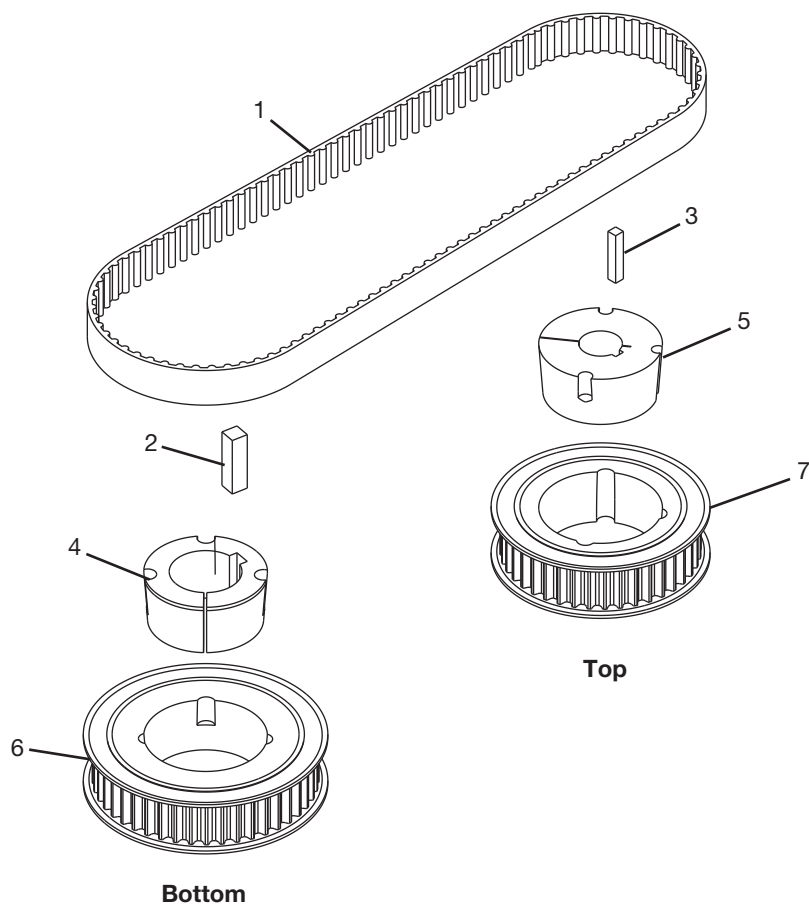
Parts Identification

Belt Assembly, 43T 45B 37MM 1568 - Code "H" (207189)



#	QTY.	PART #	DESCRIPTION
1	1	N34646	BELT, POLY CHAIN 14MM 1568 X 37
2	1	200499	KEY, 5/8" X 2-1/4"
3	1	7121-03	KEY, 3/8" X 2"
4	1	207190	BUSHING, TPLK 2-1/2 3020
5	1	N20805	BUSHING, 1-1/2" TPL 3020
6	1	N47578	SPROCKET, 14MM 45 TOOTH 37
7	1	N34647	SPROCKET, 14MM 43 TOOTH 37

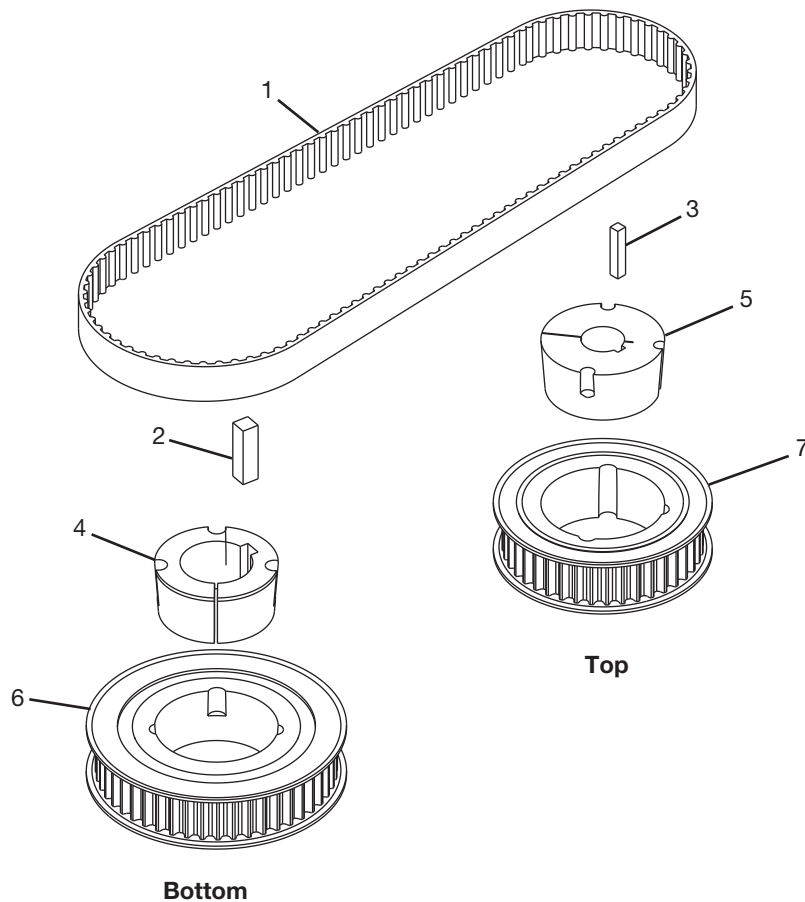
Belt Assembly, 40T 45B 37MM 1568 - Code "I" (207281)



#	QTY.	PART #	DESCRIPTION
1	1	N34646	BELT, POLY CHAIN 14MM 1568 X 37
2	1	200499	KEY, 5/8" X 2-1/4"
3	1	7121-03	KEY, 3/8" X 2"
4	1	207190	BUSHING, TPLK 2-1/2 3020
5	1	N20805	BUSHING, 1-1/2" TPL 3020
6	1	N47578	SPROCKET, 14MM 45 TOOTH 37
7	1	N38491	SPROCKET, 14MM 40 TOOTH 37

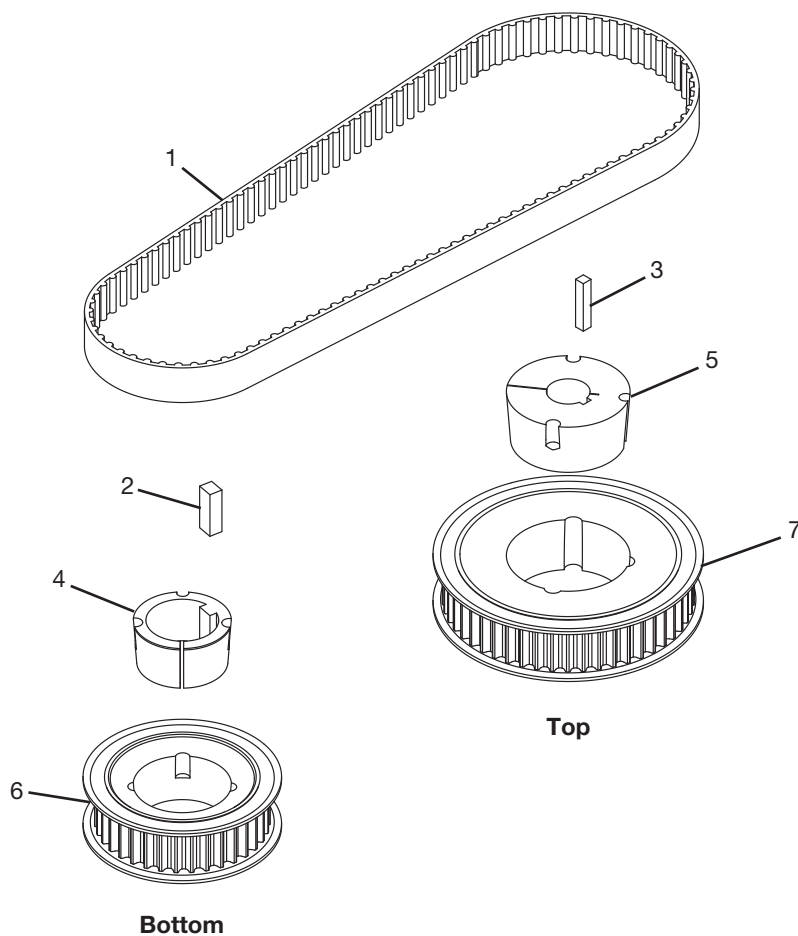
Parts Identification

Belt Assembly, 40T 48B 37MM 1568 - Code "J" (207282)



#	QTY.	PART #	DESCRIPTION
1	1	N34646	BELT, POLY CHAIN 14MM 1568 X 37
2	1	200499	KEY, 5/8" X 2-1/4"
3	1	7121-03	KEY, 3/8" X 2"
4	1	207190	BUSHING, TPLK 2-1/2 3020
5	1	N20805	BUSHING, 1-1/2" TPL 3020
6	1	N38492	SPROCKET, 14MM 48 TOOTH 37
7	1	N38491	SPROCKET, 14MM 40 TOOTH 37

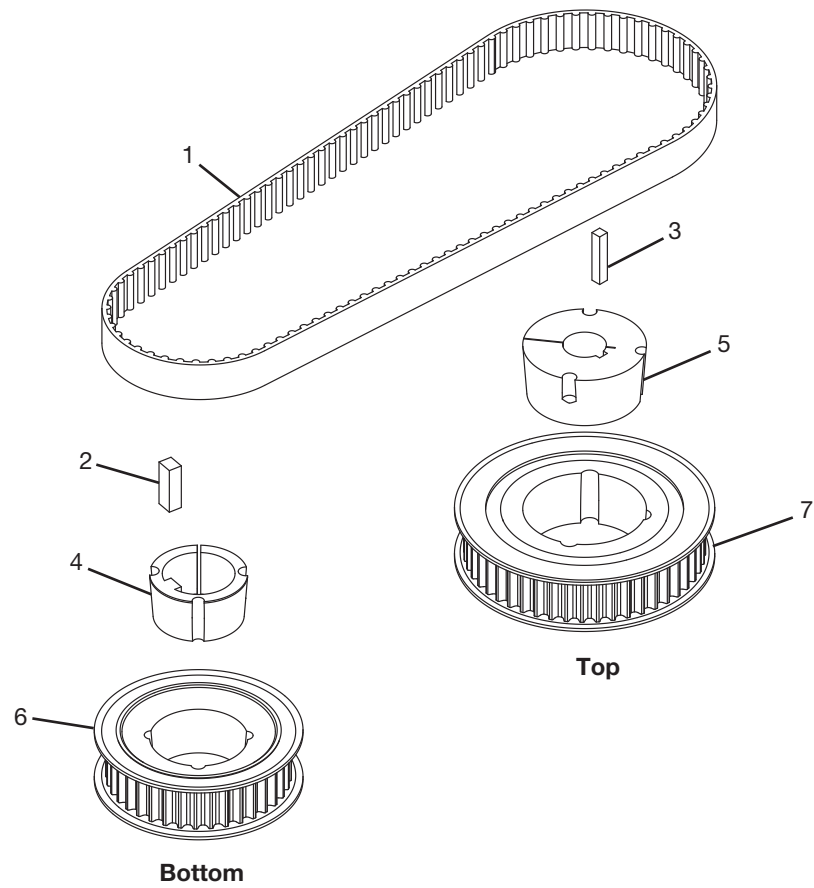
Belt Assembly, 50T 35B 37MM 1568 - Code "T" (208429)



#	QTY.	PART #	DESCRIPTION
1	1	N34646	BELT, POLY CHAIN 14MM 1568 X 37
2	1	208430	KEY, 1/2 X 5/8 X 1.75 LONG
3	1	7121-03	KEY, 3/8" X 2"
4	1	206657	BUSHING, 2-1/2IN TPL 2517
5	1	N20805	BUSHING, 1-1/2" TPL 3020
6	1	203001	SPROCKET, 14MM 35 TOOTH 37
7	1	N38471	SPROCKET, 14MM 50 TOOTH 37

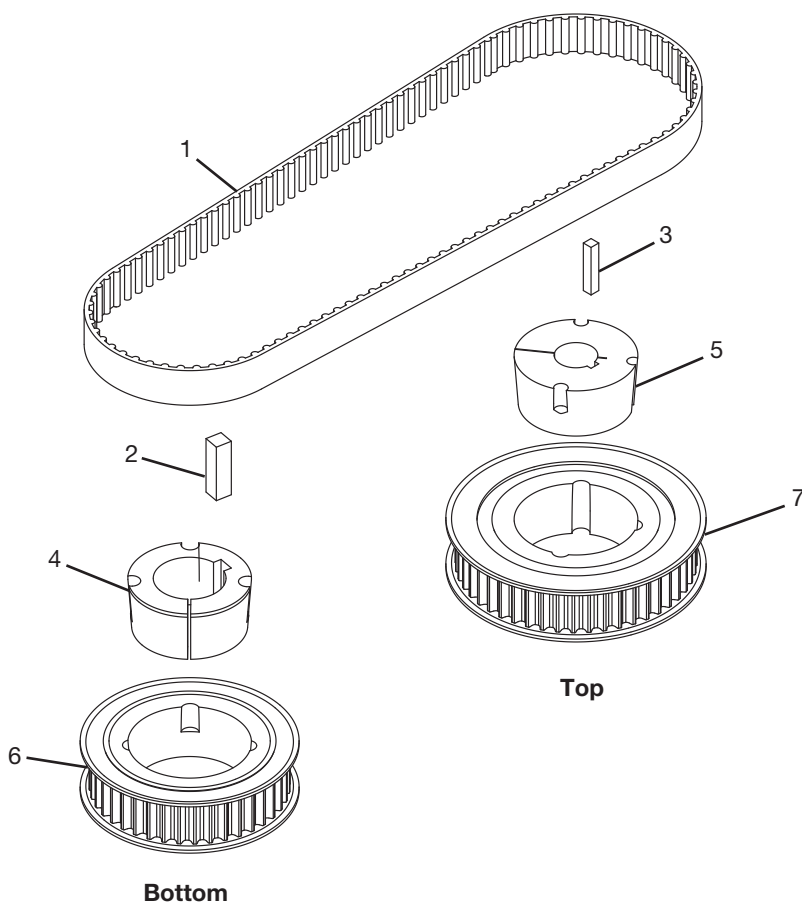
Parts Identification

Belt Assembly, 48T 37B 37MM 1568 - Code "U" (207283)



#	QTY.	PART #	DESCRIPTION
1	1	N34646	BELT, POLY CHAIN 14MM 1568 X 37
2	1	208430	KEY, 1/2 X 5/8 X 1.75 LONG
3	1	7121-03	KEY, 3/8" X 2"
4	1	206657	BUSHING, 2-1/2IN TPL 2517
5	1	N20805	BUSHING, 1-1/2" TPL 3020
6	1	203003	SPROCKET, 14MM 37 TOOTH 37
7	1	N38492	SPROCKET, 14MM 48 TOOTH 37

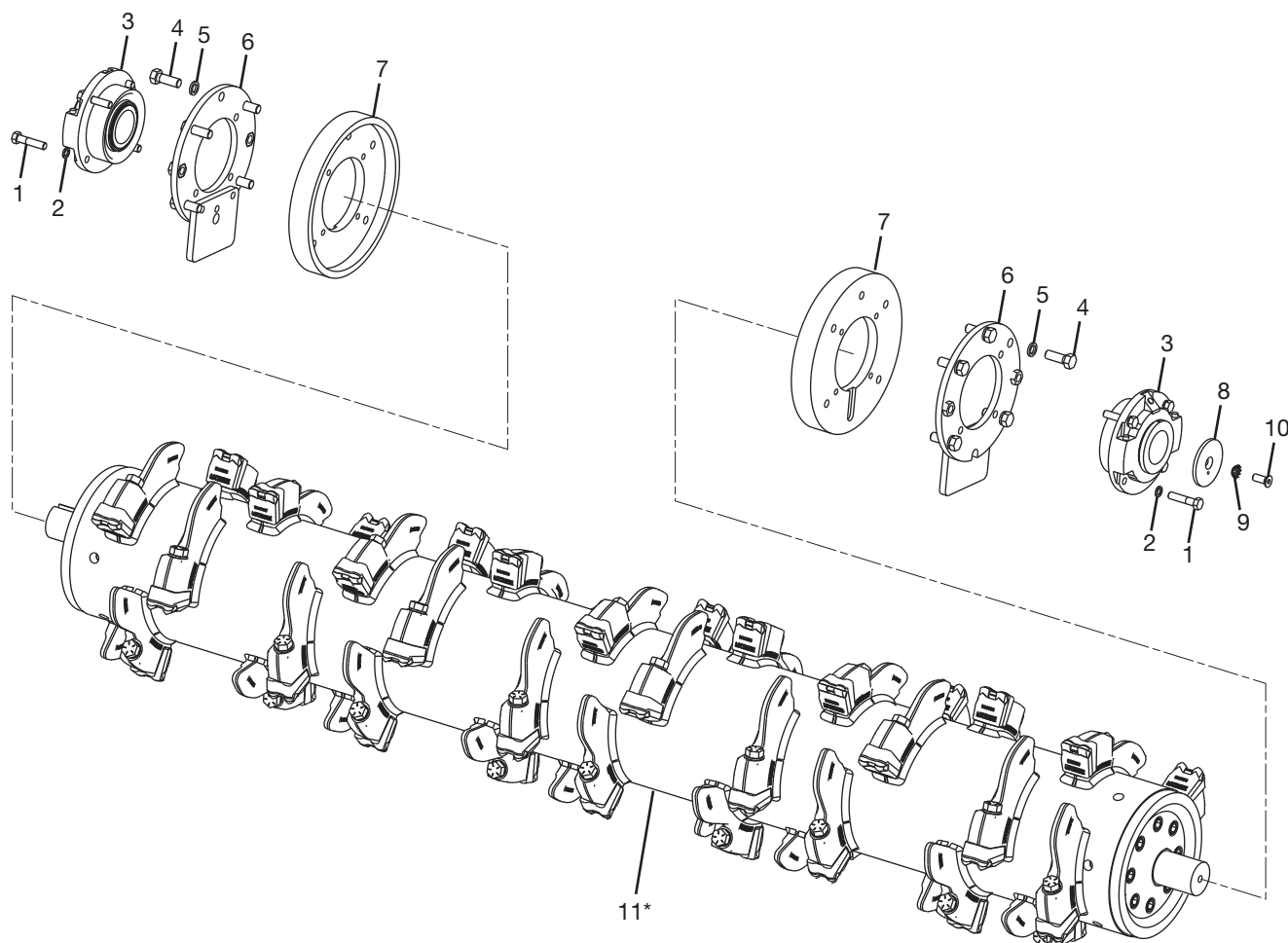
Belt Assembly, 48T 40B 37MM 1568 - Code "V" (207285)



#	QTY.	PART #	DESCRIPTION
1	1	N34646	BELT, POLY CHAIN 14MM 1568 X 37
2	1	200499	KEY, 5/8" X 2-1/4"
3	1	7121-03	KEY, 3/8" X 2"
4	1	207190	BUSHING, TPLK 2-1/2 3020
5	1	N20805	BUSHING, 1-1/2" TPL 3020
6	1	N38491	SPROCKET, 14MM 40 TOOTH 37
7	1	N38492	SPROCKET, 14MM 48 TOOTH 37

Parts Identification

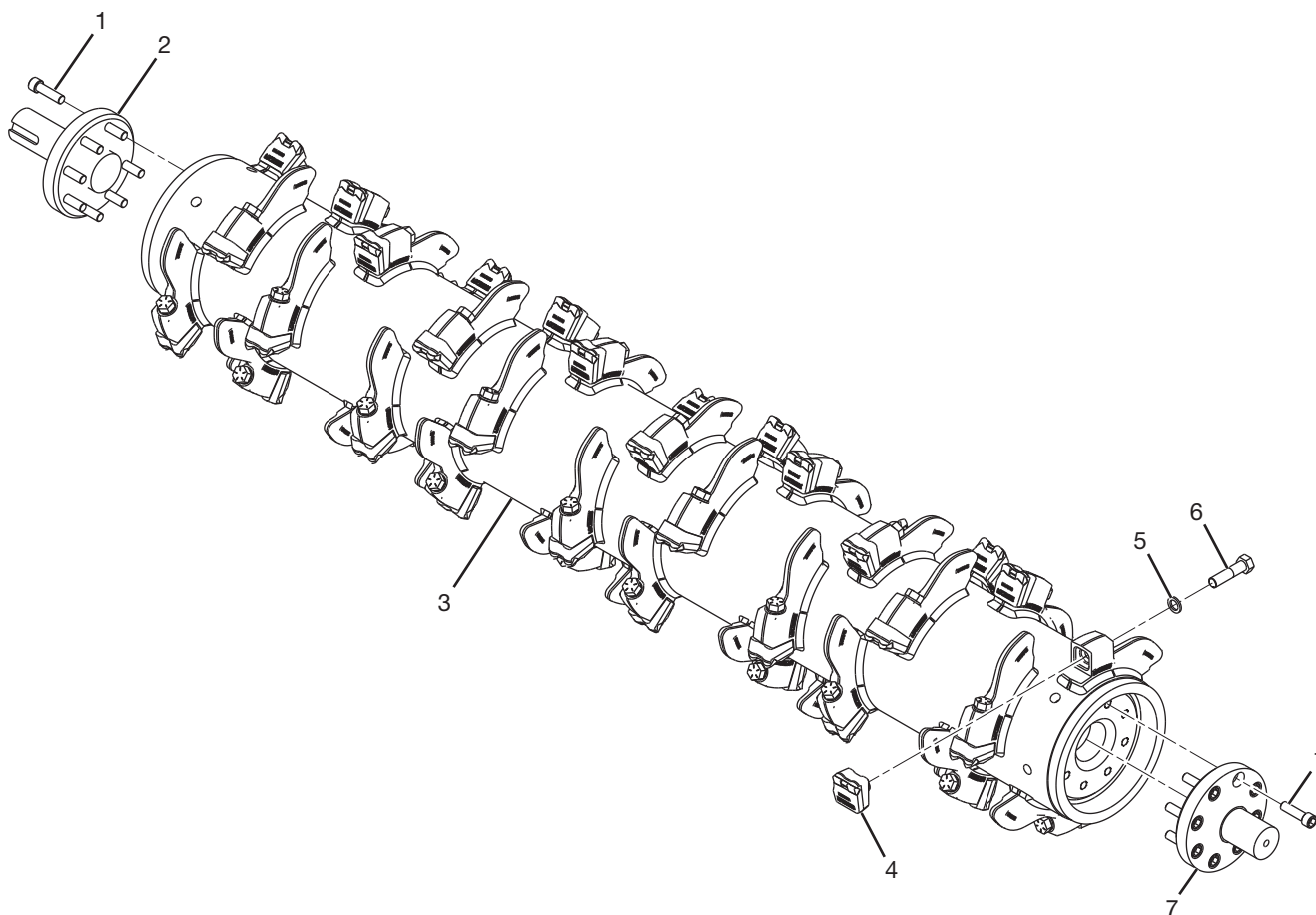
Rotor Assembly, 88" with Carbide Tooth (207150)



* For parts breakdown of item 11 - Rotor (207151), see page 51.

#	QTY.	PART #	DESCRIPTION
1	8	N20043	BOLT, 1/2" X 2-1/4" FN TD GR 8
2	8	N16472	WASHER, 1/2 NORDLOCK
3	2	207180	BEARING, 2-1/2
4	10	N13747	BOLT, 5/8" X 1-3/4" FN TH GR 8
5	10	N16473	WASHER, 5/8 NORDLOCK
6	2	207153	MOUNT, 2-1/2 BEARING WELDMENT
7	2	207183	ANTIWRAP, CARBIDE 11, 2.5 BRG"
8	1	N21464	WASHER, 3 1/2"OD BRNG RET.
9	1	4076	WASHER, 1/2" EXT CNTSK LOCK
10	1	4468	BOLT, 1/2-20UNF X 1-1/4 FL HD
11	1	207151	ROTOR, 88" BH W/CARBIDE

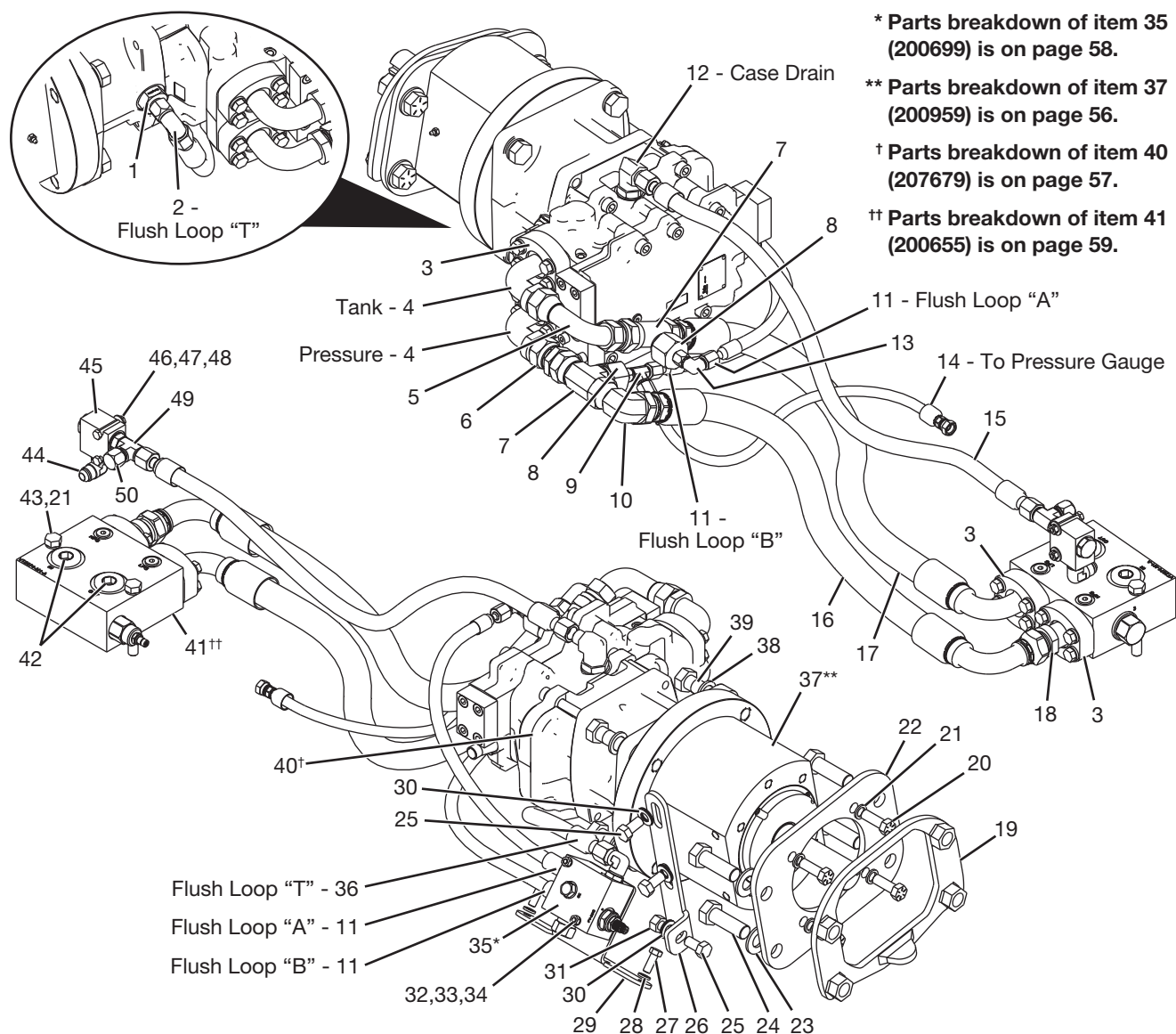
Rotor, 88" with Carbide Tooth (207151)



#	QTY.	PART #	DESCRIPTION
1	16	N38265	BOLT, SHCS 5/8 X 2-1/4 FN GR 8
2	1	207155	WASHER, DRIVE 2.500 BOLT-ON
3	1	207154	ROTOR, 88 BH W/O CUTTER
4	44	N49090	TOOTH, BATTLE AX CARBIDE
5	44	N16474	WASHER, 3/4 NORDLOCK
6	44	N21308	BOLT, 3/4" X 3" FN THRD GR 8
7	1	207156	WASHER, DRIVEN 2.500 BOLT-ON

Parts Identification

Motor Assembly, #41 Closed 6000PSI (207201)



* Parts breakdown of item 35 (200699) is on page 58.

** Parts breakdown of item 37 (200959) is on page 56.

† Parts breakdown of item 40 (207679) is on page 57.

†† Parts breakdown of item 41 (200655) is on page 59.

#	QTY.	PART #	DESCRIPTION
1	1	N29731	ADAPTER, 8MJC - 12MOR
2	1	N24827	ELBOW, 90 DEG - 8FJC - 8MJC
3	4	N20288	KIT, SPLIT FLANGE SFXK-16
4	2	N20818	ELBOW, 90DEG 16MJIC-16 CODE 62
5	1	N28903	ELBOW, 90DG TUBE 16MJIC-16FJIC
6	1	N19271	ADAPTER, 16MJIC - 16FJIC SWVL
7	2	N19272	TEE, 16MJIC-16FJIC-16MJIC
8	2	N30420	ADAPTER, -16MJIC -6MJIC
9	1	N37279	TEE, -6MJIC-6FJIC-6MJIC
10	1	N19270	ELBOW, 90 DEG - 16MJC - 16FJC

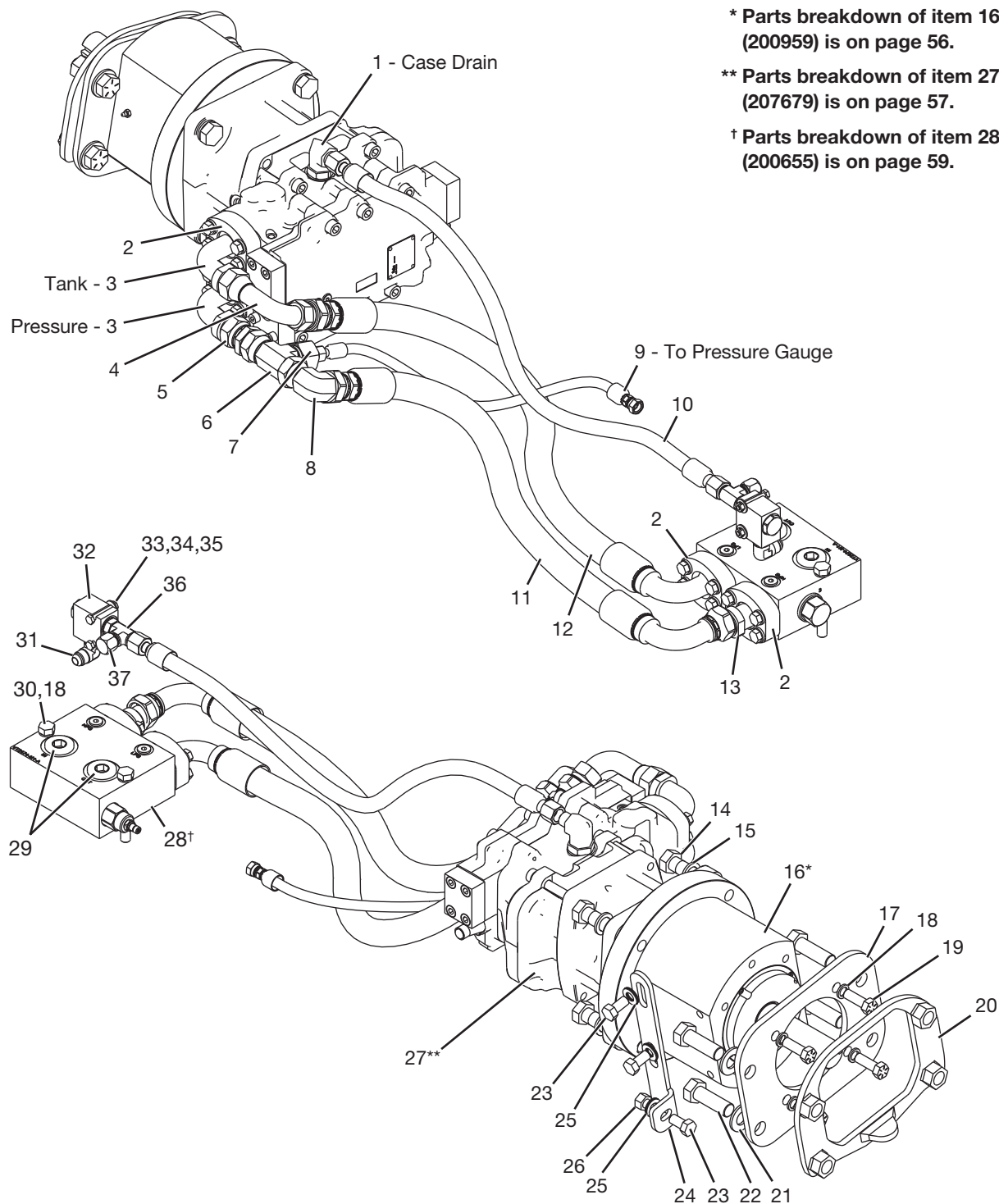
Parts Identification

Motor Assembly, #41 Closed 6000PSI (207201)

#	QTY.	PART #	DESCRIPTION
11	2	207112	HOSE, 3/8 24 -6FJIC-8MORB
12	1	N26333	ELBOW, 90 DEG - 8MJIC - 12MOR
13	1	N29078	ELBOW, 90 DEG - 6MJIC - 6FJIC
14	1	207113	HOSE, 1/4 X 31 -4FPSW -6FJIC
15	1	207342	HOSE, 1/2 36 -8FJIC -8FJIC
16	1	207845	HOSE, 1 38 -16FJIC -16FJIC90
17	1	207340	HOSE, 1 32 -16FJIC -16CD6290
18	1	N21497	ADAPTER, -16MJIC-16 CODE 62
19	1	N45488	PLATE, WELDMENT MOTOR
20	4	4466	BOLT, 1/2" X 1-1/2" GRADE 8
21	6	N16472	WASHER, 1/2 NORDLOCK
22	1	N41636	PLATE, MOUNT MOTOR
23	4	N28567	WASHER, 3/4 NORDLOCK SP
24	4	4343	BOLT, 3/4" X 2-1/4" FN TH GR 8
25	3	4011	BOLT, 1/2" X 1" GRADE 5
26	1	N49792	PLATE, SUPPORT MOTOR ASSY
27	2	4195	BOLT, 3/8" X 1" GRADE 5
28	2	N16470	WASHER, 3/8 NORDLOCK
29	1	207129	MOUNT, FLUSH LOOP
30	3	N37780	WASHER, NORD-LOCK 1/2" SP
31	1	4250	NUT, STANDARD 1/2
32	2	4003	BOLT, 1/4" X 2-1/2" GRADE 5
33	2	N16468	WASHER, 1/4 NORDLOCK
34	2	4230	NUT, STANDARD 1/4"
35	1	200699	FLUSHING LOOP
36	1	207114	HOSE, 1/2 X 24 -8FJIC-8FJIC
37	1	200959	OHLA, C TO D ASSEMBLED
38	4	N16474	WASHER, 3/4 NORDLOCK
39	4	4475	BOLT, 3/4" X 2-1/4" GRADE 5
40	1	207679	MOTOR, VARIABLE 90CC-110CC
41	1	200655	MANIFOLD, RELIEF 5000PSI,CHECK
42	2	N28284	PLUG, 16MOR HOLLOW HEX
43	2	4357	BOLT, 1/2" X 4" GRADE 5
44	2	N11952	ELBOW, 90 DEG - 08MJIC - 08MOR
45	1	N157054	VALVE, RELIEF 100PSI
46	2	4001	BOLT, 1/4" X 1-3/4" GRADE 5
47	2	3183	WASHER, FLAT 1/4"
48	2	4050	NUT, 1/4" LOCK
49	1	N11953	TEE, 8MJIC-8MOR-8MJIC
50	1	N21385	CAP, 8FJIC

Parts Identification

Motor Assembly, #48 6000PSI (207828)



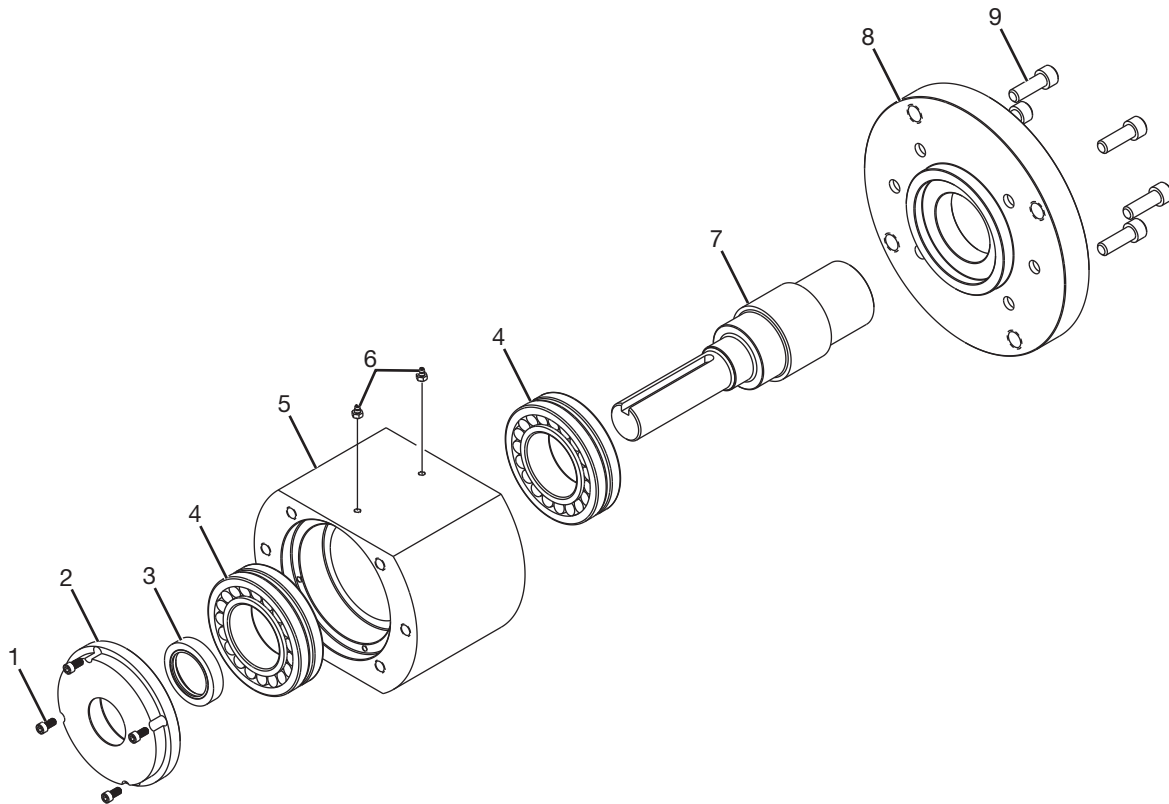
Parts Identification

Motor Assembly, #48 6000PSI (207828)

#	QTY.	PART #	DESCRIPTION
1	1	N26333	ELBOW, 90 DEG - 8MJC - 12MOR
2	4	N20288	KIT, SPLIT FLANGE SFXK-16
3	2	N20818	ELBOW, 90DEG 16MJIC-16 CODE 62
4	1	N28903	ELBOW, 90DG TUBE 16MJIC-16FJIC
5	1	N19271	ADAPTER, 16MJIC - 16FJIC SWVL
6	1	N19272	TEE, 16MJIC-16FJIC-16MJIC
7	1	N30420	ADAPTER, -16MJIC -6MJIC
8	1	N19270	ELBOW, 90 DEG - 16MJC - 16FJC
9	1	207113	HOSE, 1/4 X 31 -4FPSW -6FJIC
10	1	207342	HOSE, 1/2 36 -8FJIC -8FJIC
11	1	207845	HOSE, 1 38 -16FJIC -16FJIC90
12	1	207340	HOSE, 1 32 -16FJIC -16CD6290
13	1	N21497	ADAPTER, -16MJIC-16 CODE 62
14	4	4475	BOLT, 3/4" X 2-1/4" GRADE 5
15	4	N16474	WASHER, 3/4 NORDLOCK
16	1	200959	OHLA, C TO D ASSEMBLED
17	1	N41636	PLATE, MOUNT MOTOR
18	6	N16472	WASHER, 1/2 NORDLOCK
19	4	4466	BOLT, 1/2" X 1-1/2" GRADE 8
20	1	N45488	PLATE, WELDMENT MOTOR
21	4	N28567	WASHER, 3/4 NORDLOCK SP
22	4	4343	BOLT, 3/4" X 2-1/4" FN TH GR 8
23	3	4011	BOLT, 1/2" X 1" GRADE 5
24	1	N49792	PLATE, SUPPORT MOTOR ASSY
25	3	N37780	WASHER, NORD-LOCK 1/2" SP
26	1	4250	NUT, STANDARD 1/2
27	1	207679	MOTOR, VARIABLE 90CC-110CC
28	1	200655	MANIFOLD, RELIEF 5000PSI,CHECK
29	2	N28284	PLUG, 16MOR HOLLOW HEX
30	2	4357	BOLT, 1/2" X 4" GRADE 5
31	1	N11952	ELBOW, 90 DEG - 08MJIC - 08MOR
32	1	N157054	VALVE, RELIEF 100PSI
33	2	4001	BOLT, 1/4" X 1-3/4" GRADE 5
34	2	3183	WASHER, FLAT 1/4"
35	2	4050	NUT, 1/4" LOCK
36	1	N11953	TEE, 8MJIC-8MOR-8MJIC
37	1	N21385	CAP, 8FJIC

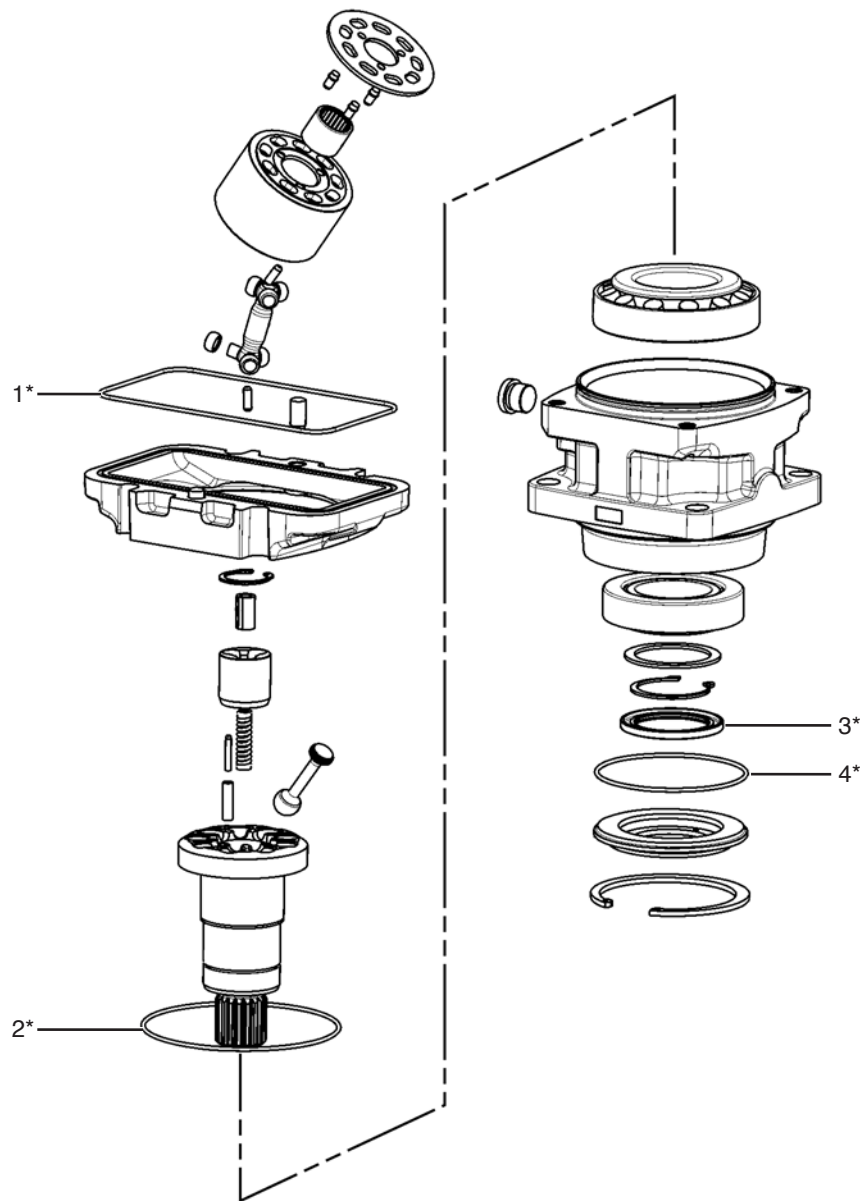
Parts Identification

Overhung Load Adapter (200959)



#	QTY.	PART #	DESCRIPTION
1	4	200940	BOLT, SHCS 1/4-20 X 1/2
2	1	200963	PLATE, FRONT REAR
3	1	N28447	SEAL, FRONT SHAFT OHLA
4	2	200966	BEARING, SPHERICAL 65MM X 120MM
5	1	200960	BODY, OHLA
6	2	4105	GREASE-ZERK, 1/4" SCREW-IN
7	1	200961	SHAFT, OHLA SPLINE 1.50
8	1	200967	ADAPTER, OHLA C-D
9	6	N28529	BOLT, SHCS 1/2" X 1-1/2"

Hydraulic Motor, Variable 90cc to 110cc (207679)

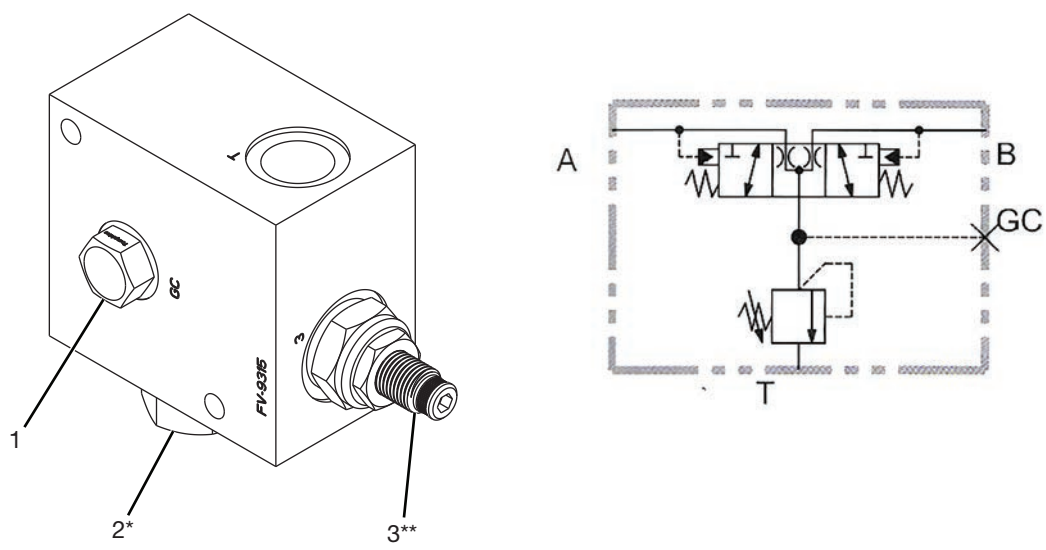


NOTE: Other items included in kit should only be replaced by authorized service center.

#	QTY.	PART #	DESCRIPTION
*	1	N28376	SEAL KIT (Includes Items 1, 2, 3, and 4)
1	1	-	O-RING 194.1 X 3 V80 / 220 X 3 V80
2	1	-	O-RING 144.5 X 3 V70 / 168 x 3 V70
3	1	-	SHAFT SEAL 60 X 80 X 6
4	1	-	O-RING 114.5 X 3 V80

Parts Identification

Manifold, Closed Loop Flushing (200699)

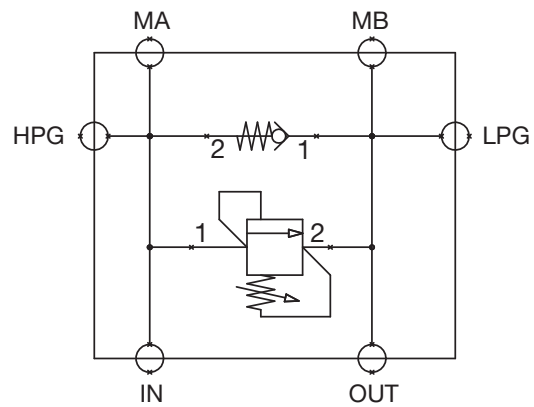
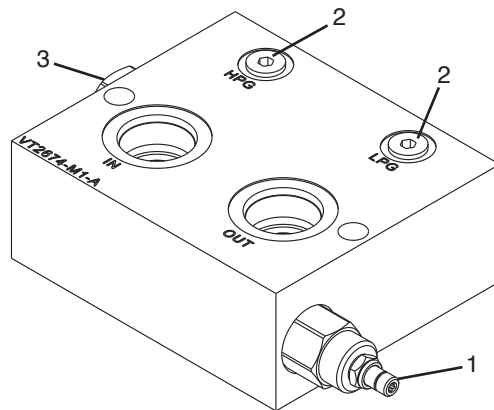


* Use item 4, part number 207139, for seal kit for item 2.

** Use item 5, part numbr 207140, for seal kit for item 3.

#	QTY.	PART #	DESCRIPTION
1	1	N28286	PLUG, 6MOR HEX
2	1	207115*	CARTRIDGE, SHUTTLE HOT OIL
3	1	207116**	VALVE, RELIEF
4	1	207139	KIT, SEAL (Not Shown) - for cartridge 207115
5	1	207140	KIT, SEAL (Not Shown) - for relief valve 207116

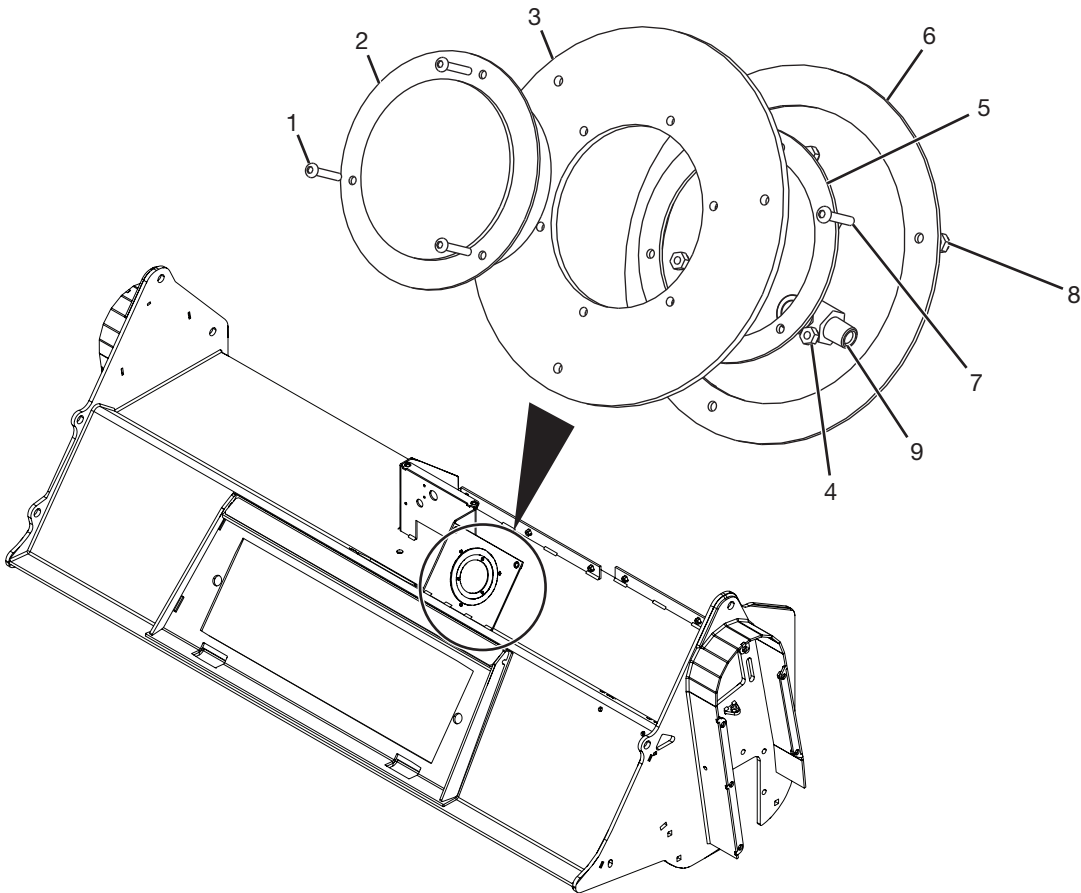
Manifold, Relief 5000 PSI, Check (200655)



#	QTY.	PART #	DESCRIPTION
1	1	N28099	VALVE, RELIEF 5000PSI
2	2	N14118	PLUG, 6MOR HEX
3	1	200695	VALVE, CHECK

Parts Identification

Pressure Gauge



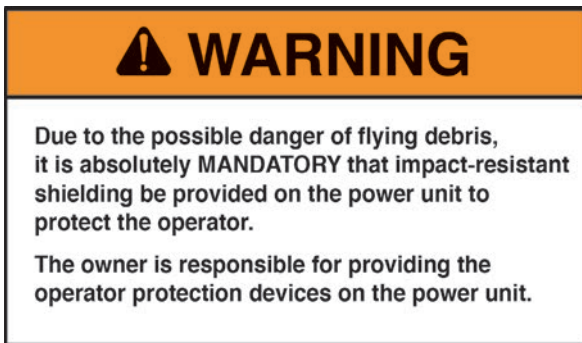
#	QTY.	PART #	DESCRIPTION
1	3	N16132	BOLT, BHCS #8-32 X 1
2	1	200692	GAUGE, 0-6000PSI 4" PRESS
3	1	N16332	FLANGE, MOUNT GAUGE
4	3	N16133	NUT, NYLON INSERT #8
5	1	N16331	FLANGE, MOUNT GAUGE #8
6	1	N16335	FLANGE, MOUNT #10
7	3	N16333	BOLT, BHCS #10-32 X 1
8	3	N16334	NUT, NYLON INSERT #10
9	1	N16162	ELBOW, 1/4" BLK 90 DEG STREET

Machine Decals and Signs

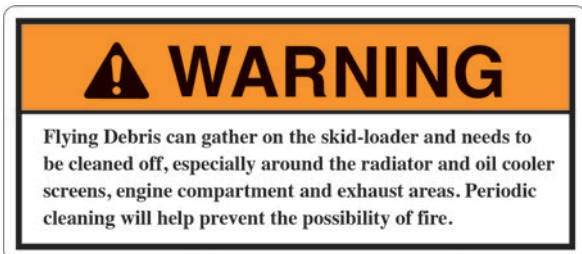
NOTE: All safety related decals are also shown in the *Safety Instructions Section* along with their location on the machine. See “*Safety Decal Locations*” on page 8.

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

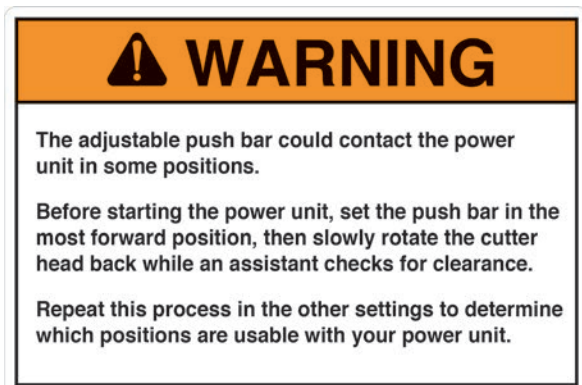
Part No. N17013



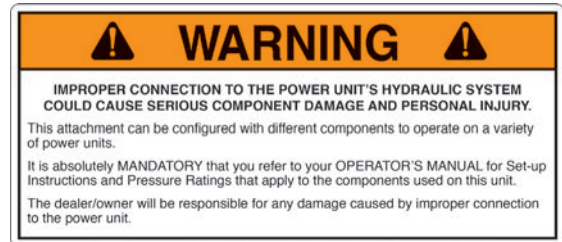
Part No. N20661



Part No. N17014



Part No. N28385



Part No. N68716



Part No. N28386



Part No. 4334



Part No. 203264



Parts Identification

Machine Decals and Signs (Cont'd)

Part No. N23506



Part No. 200491



Part No. N68724



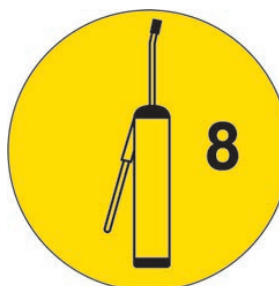
Part No. N29769



Part No. 4256



Part No. N28010



Part No. 207851



Machine Decals and Signs (Cont'd)

Part No. N13721



Part No. N13517



Part No. 4138



Part No. N33105



Part No. N26973



Part No. N28576



Part No. 200249



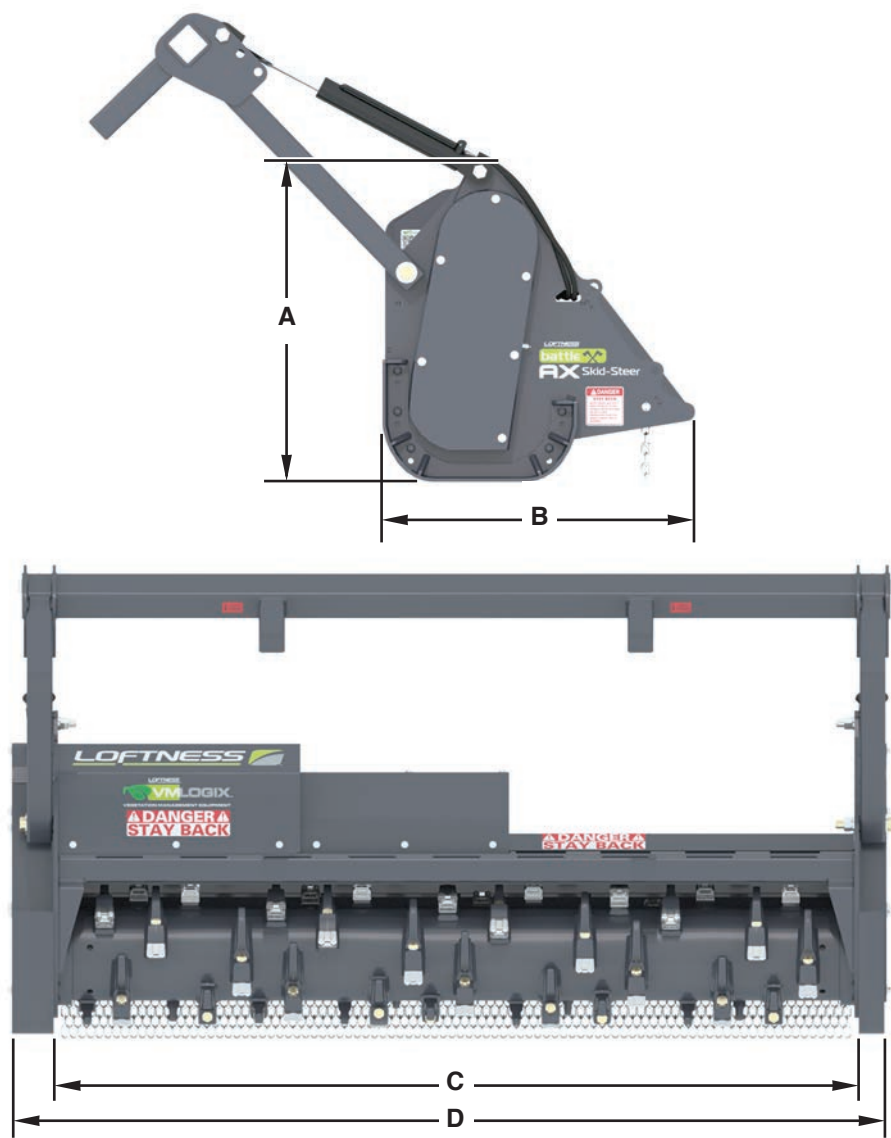


Specifications

DESCRIPTION	BATTLE AX H SERIES
Cutting Width	88 in. (223.5 cm)
Operating Capacity	6 in. (15.2 cm) Continuous
	10 in. (25.4 cm) Intermittent
Capacity Monitor	Pressure Gauge
Motor	Variable Displacement Piston Type Motor
Rotor Bearing	2.50 in. Piloted Double Taper
Rotor Tip Diameter	17 in. (43.2 cm)
Sprockets	Taperlock
Belt	14 mm x 37 Synchronous
Mount	Mounts for Select Power Units
Shear Bar	Adjustable
Pusher Bar	Adjustable Rigid Bar, or Hydraulic
Knives	Double Carbide Teeth
	Quadco Planer Teeth, Sharpenable (Optional)
	Quadco Planer Teeth Hardened (Optional)
Skid Shoes	Adjustable .5 in. (1.3 cm) Above Grade to 1.5 in. (3.8 cm) Below Grade
Deflector	Steel Chain
Anti-Wrap Protection	Bearing

Appendix

Dimensions



DESCRIPTION	BATTLE AX H SERIES
Operating Height (A)	37.26 in. (94.64 cm)
Overall Length (B)	36.30 in. (92.20 cm)
Cutting Width (C)	93.625 in. (237.80 cm)
Overall Width (D)	101.50 in. (257.81 cm)
Number Of Knives	44
Weight	3,816 lb. (1730 kg)
Crated Weight	3,990 lb. (1809 kg)

Torque Specifications

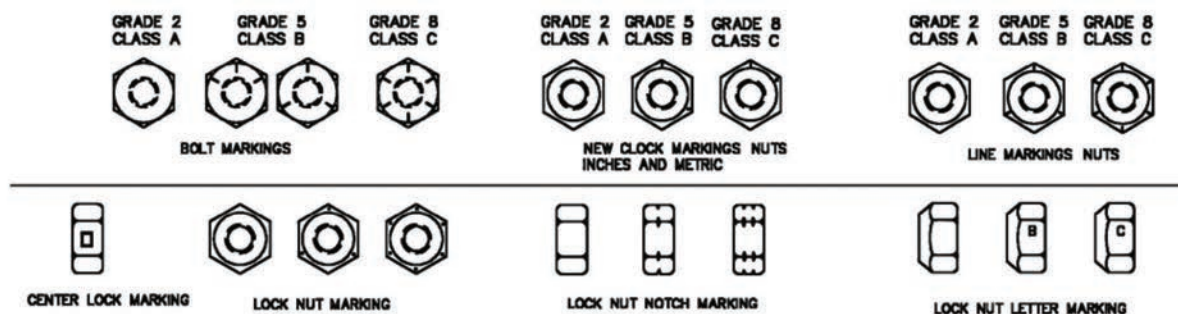
Inches Hardware and Lock Nuts

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)



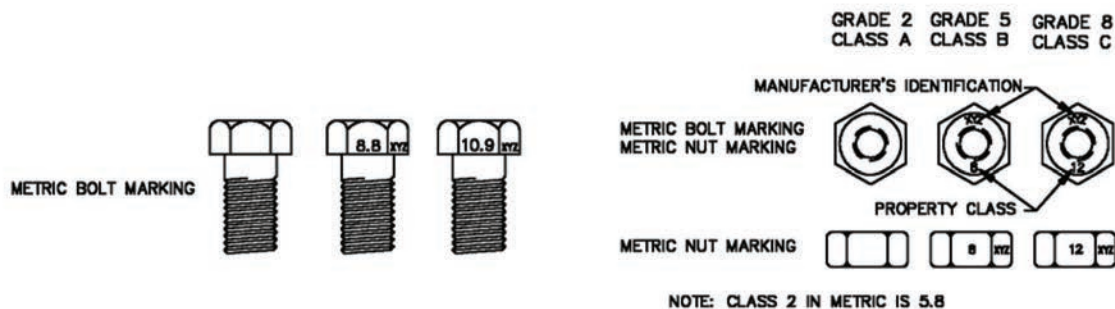
Appendix

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.)	131N•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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