



# OPERATOR'S AND PARTS MANUAL

## MH88 MULCHERS PATENTED



**PALADIN**  
LIGHT CONSTRUCTION GROUP



*The Power of Combined Excellence*



SERIAL NUMBER: \_\_\_\_\_

MODEL NUMBER: \_\_\_\_\_

Manual Number: OM784  
Part Number: 75684  
Rev. 2

## **READ ENTIRE OPERATOR'S & PARTS MANUAL BEFORE OPERATING!**

**DANGER!** ROTATING DRUM HAZARD! STAY BACK! OBJECTS CAN BE THROWN!  
DO NOT operate near bystanders.



**DANGER!** TO AVOID SERIOUS PERSONAL INJURY OR DEATH THE BRADCO  
MULCHER MUST NOT BE ATTACHED TO ANY POWER UNIT THAT  
DOES NOT HAVE A FORESTRY GUARD PACKAGE INSTALLED.



**DANGER!** FLYING DEBRIS HAZARD. CLEAR AREA OF BYSTANDERS AND LIVE-  
STOCK BEFORE OPERATING. THE MULCHER IS CAPABLE OF PRO-  
DUCING LARGE AMOUNTS OF FLYING DEBRIS IN ALL DIRECTIONS.



**WARNING!** Before leaving the operator's seat: Lower the lift arms against frame  
and place unit on the ground. Disengage auxiliary hydraulics. Engage  
parking brake. Stop Engine. Remove the key.



**WARNING!** These BRADCO Mulchers should never be operated at a height that  
will expose the operator to flying debris.



If there is any portion of this manual or function you do not understand, com-  
tact your local authorized dealer or the manufacturer.

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# PREFACE

## GENERAL COMMENTS

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

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

**WARNING!** Never let anyone operate this unit without reading the "Safety Precautions" and "Operating Instructions" sections of this manual.



**Always choose hard, level ground to park the vehicle on and set the brake so the unit cannot roll.**

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

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

## BEFORE OPERATION

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

## SAFETY ALERT SYMBOL



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

## SERVICE

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

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

## SOUND AND VIBRATION

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

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

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

**NOTE: A list of all Paladin Patents can be found at <http://www.paladinbrands.com/patents.asp>.**

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# SAFETY STATEMENTS



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



## DANGER

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



## WARNING

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



## CAUTION

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

## NOTICE

NOTICE INDICATES A PROPERTY DAMAGE MESSAGE.

## GENERAL SAFETY PRECAUTIONS

### WARNING!

#### READ MANUAL PRIOR TO INSTALLATION



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



#### READ AND UNDERSTAND ALL SAFETY STATEMENTS

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



#### KNOW YOUR EQUIPMENT

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

## GENERAL SAFETY PRECAUTIONS

### WARNING!



### PROTECT AGAINST FLYING DEBRIS

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

### WARNING!



### LOWER OR SUPPORT RAISED EQUIPMENT

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

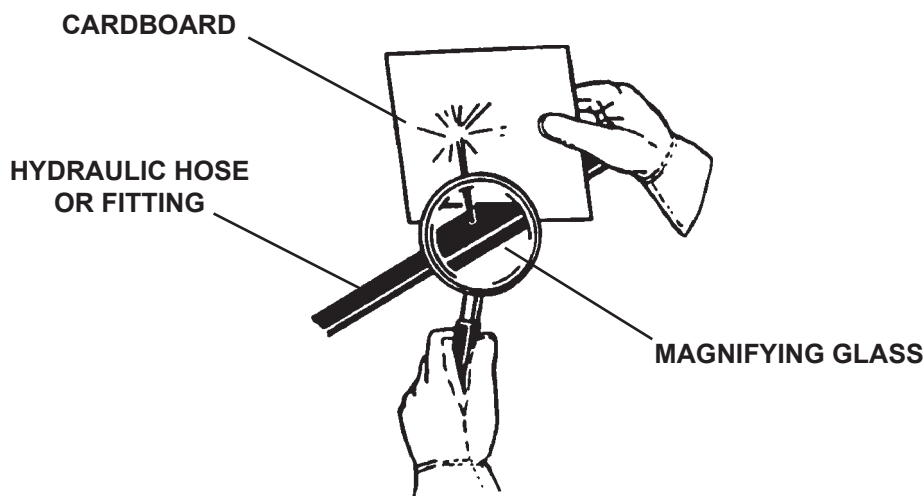
### WARNING!



### USE CARE WITH HYDRAULIC FLUID PRESSURE

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

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





# GENERAL SAFETY PRECAUTIONS

## WARNING!



### DO NOT MODIFY MACHINE OR ATTACHMENTS

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

## WARNING!



### SAFELY MAINTAIN AND REPAIR EQUIPMENT

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



### SAFELY OPERATE EQUIPMENT

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

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

## EQUIPMENT SAFETY PRECAUTIONS

### WARNING!



#### KNOW WHERE UTILITIES ARE

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

### WARNING!



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

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

### WARNING!



#### REMOVE PAINT BEFORE WELDING OR HEATING

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

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

### WARNING!



#### END OF LIFE DISPOSAL

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



#### OPERATING THE MULCHER

- Block off work area from bystanders, livestock, etc. Flying debris can cause severe injury or death. The mulcher is capable of producing large amounts of flying debris in all directions.
- Do NOT operate without a forestry guard package installed on the prime mover.
- Operate only from the operator's station.
- Be aware when mulching standing trees, there is a danger of the treetop falling back onto the operator's cab.
- Do not engage or disengage the drum while the engine rpm's are above low idle.
- Do not operate the mulcher at a height that will expose the operator to flying debris.
- Do not lift loads in excess of the capacity of the prime mover. Lifting capacity decreases as the load is moved further away from the unit.
- When operating on slopes, drive up and down, not across. Avoid steep hillside operation, which could cause the prime mover to overturn.
- Reduce speed when driving over rough terrain, on a slope, or turning, to avoid overturning the vehicle.
- An operator must not use drugs or alcohol, which can change his or her alertness or coordination. An operator taking prescription or over-the-counter drugs should seek medical advice on whether or not he or she can safely operate equipment.
- Before exiting the prime mover, lower the attachment to the ground, apply the brakes, turn off the prime mover's engine, and remove the key.

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# EQUIPMENT SAFETY PRECAUTIONS



## TRANSPORTING THE MULCHER

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



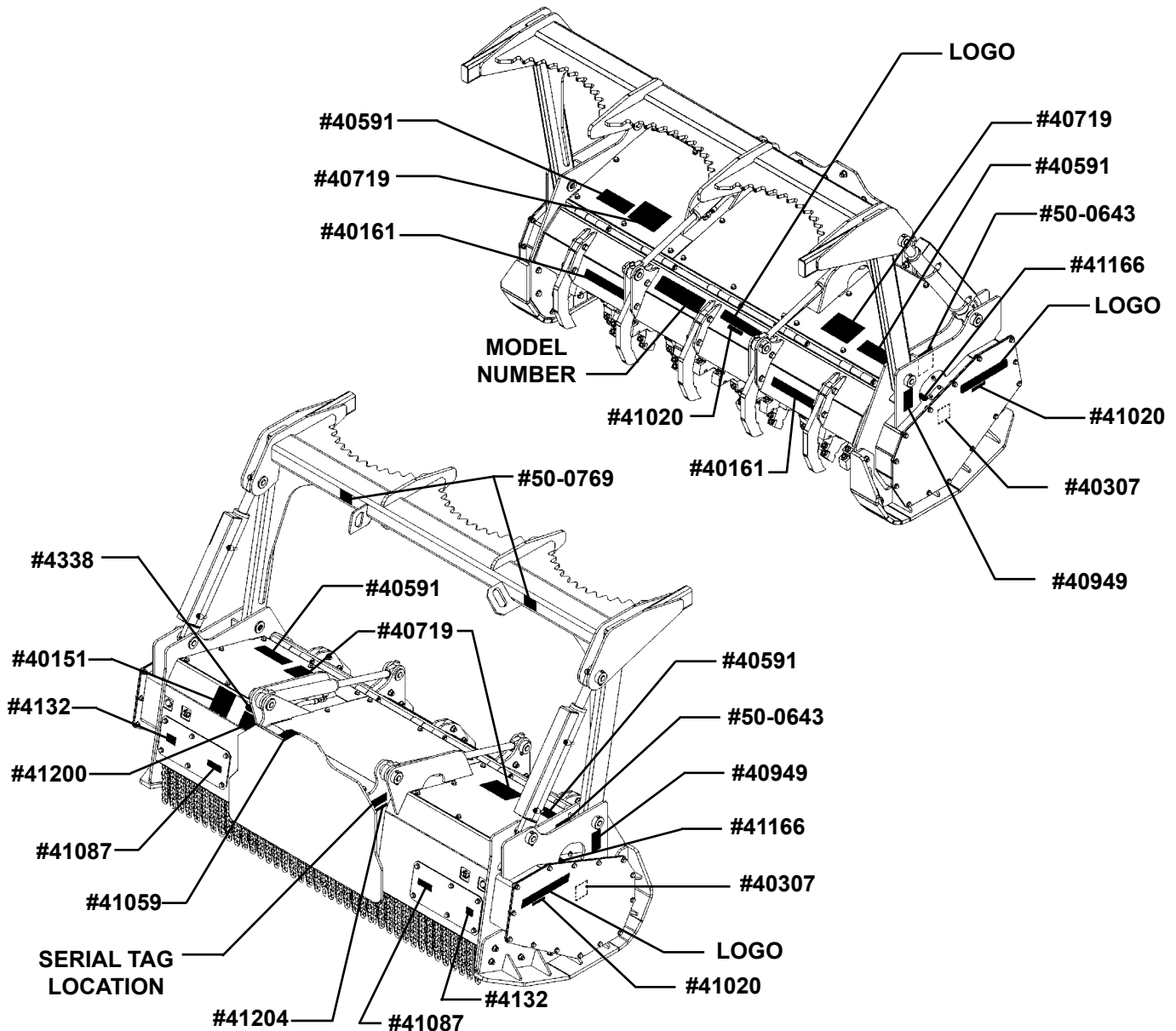
## MAINTAINING THE MULCHER

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

# DECALS

## GENERAL INFORMATION

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



**IMPORTANT:** Keep all safety signs clean and legible. Replace all missing, illegible, or damaged safety signs. When replacing parts with safety signs attached, the safety signs must also be replaced.

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

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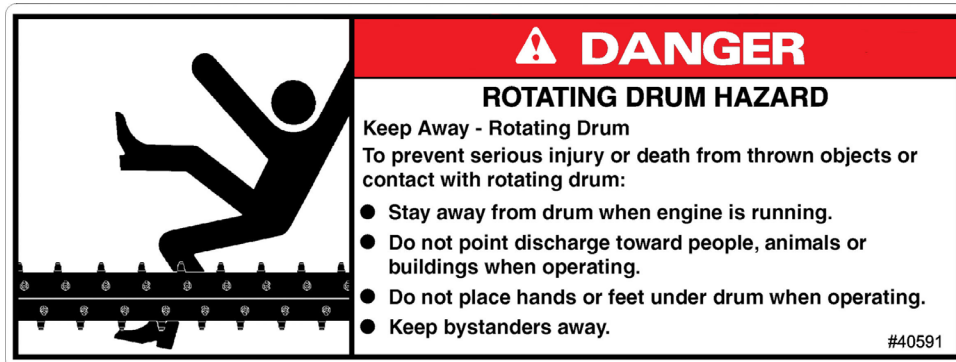
# DECALS



**DANGER! FLYING DEBRIS  
PART #40719**



**WARNING! HIGH PRESSURE FLUID  
PART #40151**



**DANGER! ROTATING DRUM  
PART #40591**



**STAND CLEAR  
PART #40161**



**WARNING! GUARDS  
PART #40949**

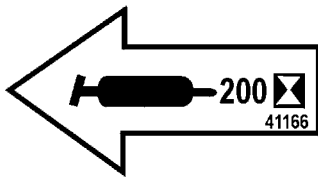
## DECALS



DANGER! GUARD MISSING  
PART #40307  
(LOCATED ON MAINFRAME UNDER  
DRIVE COVERS)



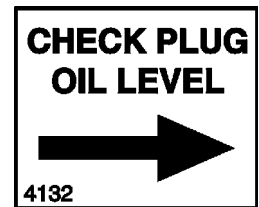
MADE IN U.S.A.  
PART #4338



GREASE EVERY 200 HOURS  
PART #41166



CLEAN DEBRIS - 40 HOURS  
PART #41087



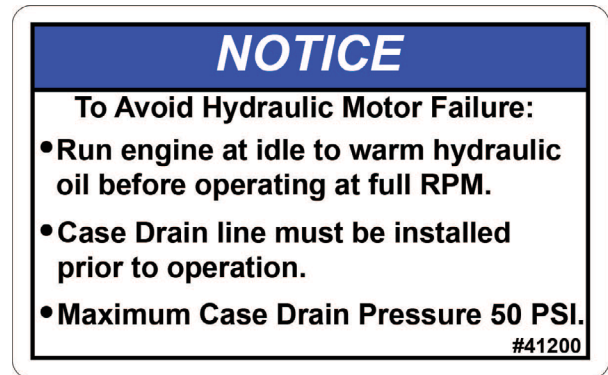
CHECK OIL LEVEL  
PART #4132



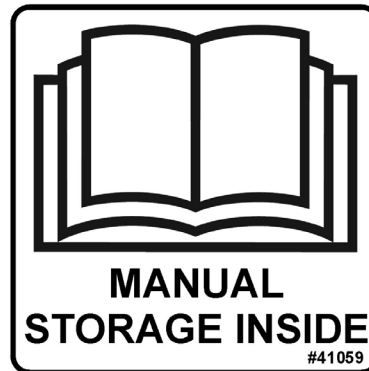
PATENT SITE: <http://paladinbrands.com/patents.asp>  
PART #41204



MULCHER LOGO  
PART #41020



NOTICE! MOTOR FAILURE  
PART #41200



MANUAL STORAGE  
PART #41059

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

# SET-UP

## MOTOR DISPLACEMENT

Due to the range of prime movers the BRADCO MH88 mulchers are designed for, the motor minimum displacement is adjustable to various GPM and rotor RPM to give you optimum productivity for your particular application. The displacement must be adjusted and then “locked in”.

For optimum productivity and proper operation the minimum displacement on the MH88 mulcher motors need to be adjusted for the “ACTUAL” GPM of your prime mover and the desired RPM of the mulcher rotor. With the engine at full throttle, set the rotor RPM between 1400-1500 RPM. (Factory settings are 118 CC on all MH88-3H (300 HP) mulchers, 123 CC on the MH88-4H (400 HP) mulchers.)

**NOTICE: Insufficient RPM (below 1400) will greatly reduce the productivity of your unit while overspeeding (above 1500) can cause serious damage to the motor and teeth.**

See the following charts for correct adjustment of the minimum displacement screw for the motor minimum displacement.

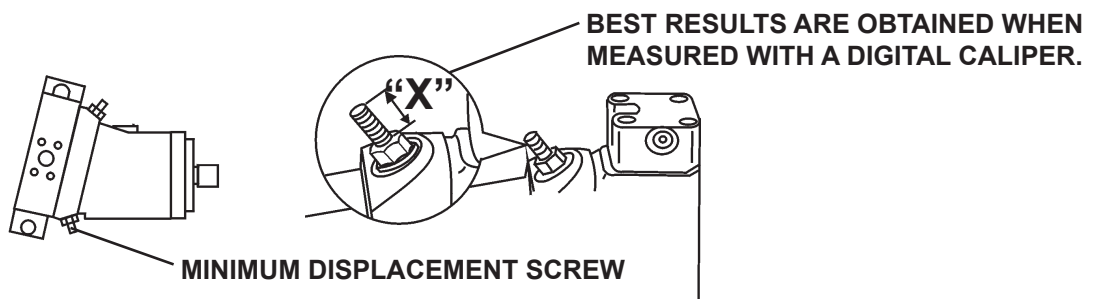
### To Adjust Minimum Displacement Screw:

**Loosen and hold the locking nut while turning the minimum displacement screw to the desired dimension and then hold the limit screw while turning the locking nut and therefore locking it in place.**

It is recommended that the drum RPM be checked with a tachometer after adjustments have been completed. To increase RPM, increase “X” dimension. To decrease RPM decrease the “X” dimension. The maximum displacement limit screw is adjusted at the factory.

**IMPORTANT: Prime mover must be at operating temperature prior to checking the rotor RPM with tachometer.**

**IMPORTANT: Adjust the minimum displacement screws equally on both hydraulic motors to evenly distribute the power transfer to the rotor.**



These mulchers includes a 6mm allen wrench and 19mm wrench to adjust the displacement screws.

## SET-UP

| <b>112000 HYDRAULIC MOTOR (#116823 MULCHER - 300 HP)</b> |                          |   |                          |   |
|--|--------------------------|---|--------------------------|---|
|  | <b>1400 ROTOR RPM</b>    |   | <b>1500 ROTOR RPM</b>    |   |
| <b>GPM</b>   | <b>DISPLACEMENT (CC)</b> | <b>SCREW (M12X120)<br/>DIMENSION X (IN)</b> | <b>DISPLACEMENT (CC)</b> | <b>SCREW (M12X120)<br/>DIMENSION X (IN)</b> |
| 100  | 114.6                    | .73   | 107.0                    | .84   |
| 101  | 115.8                    | .71   | 108.1                    | .82   |
| 102  | 116.9                    | .70   | 109.1                    | .81   |
| 103  | 118.1                    | .68   | 110.2                    | .79   |
| 104  | 119.2                    | .66   | 111.3                    | .78   |
| 105  | 120.4                    | .65   | 112.4                    | .76   |
| 106  | 121.5                    | .63   | 113.4                    | .75   |
| 107  | 122.7                    | .62   | 114.5                    | .73   |
| 108  | 123.8                    | .60   | 115.6                    | .72   |
| 109  | 125.0                    | .58   | 116.6                    | .70   |
| 110  | 126.1                    | .57   | 117.7                    | .69   |
| 111  | 127.3                    | .55   | 118.8                    | .67   |
| 112  | 128.4                    | .53   | 119.8                    | .66   |
| 113  | 129.5                    | .52   | 120.9                    | .64   |
| 114  | 130.7                    | .50   | 122.0                    | .63   |
| 115  | 131.8                    | .49   | 123.1                    | .61   |
| 116  | 133.0                    | .47   | 124.1                    | .60   |
| 117  | 134.1                    | .45   | 125.2                    | .58   |
| 118  | 135.3                    | .44   | 126.3                    | .56   |
| 119  | 136.4                    | .42   | 127.3                    | .55   |
| 120  | 137.6                    | .41   | 128.4                    | .53   |

| <b>112000 HYDRAULIC MOTOR (#116824 MULCHER - 400 HP)</b> |                          |   |                          |   |
|--|--------------------------|---|--------------------------|---|
|  | <b>1400 ROTOR RPM</b>    |   | <b>1500 ROTOR RPM</b>    |   |
| <b>GPM</b>   | <b>DISPLACEMENT (CC)</b> | <b>SCREW (M12X120)<br/>DIMENSION X (IN)</b> | <b>DISPLACEMENT (CC)</b> | <b>SCREW (M12X120)<br/>DIMENSION X (IN)</b> |
| 120  | 124.9                    | .58   | 116.6                    | .70   |
| 121  | 125.9                    | .57   | 117.5                    | .69   |
| 122  | 127.0                    | .55   | 118.5                    | .67   |
| 123  | 128.0                    | .54   | 119.5                    | .66   |
| 124  | 129.1                    | .53   | 120.5                    | .65   |
| 125  | 130.1                    | .51   | 121.4                    | .63   |
| 126  | 131.1                    | .50   | 122.4                    | .62   |
| 127  | 132.2                    | .48   | 123.4                    | .61   |
| 128  | 133.2                    | .47   | 124.3                    | .59   |
| 129  | 134.3                    | .45   | 125.3                    | .58   |
| 130  | 135.3                    | .44   | 126.3                    | .56   |
| 131  | 136.3                    | .42   | 127.3                    | .55   |
| 132  | 137.4                    | .41   | 128.2                    | .54   |
| 133  | 138.4                    | .39   | 129.2                    | .52   |
| 134  | 139.5                    | .38   | 130.2                    | .51   |
| 135  | 140.5                    | .36   | 131.1                    | .50   |

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# INSTALLATION

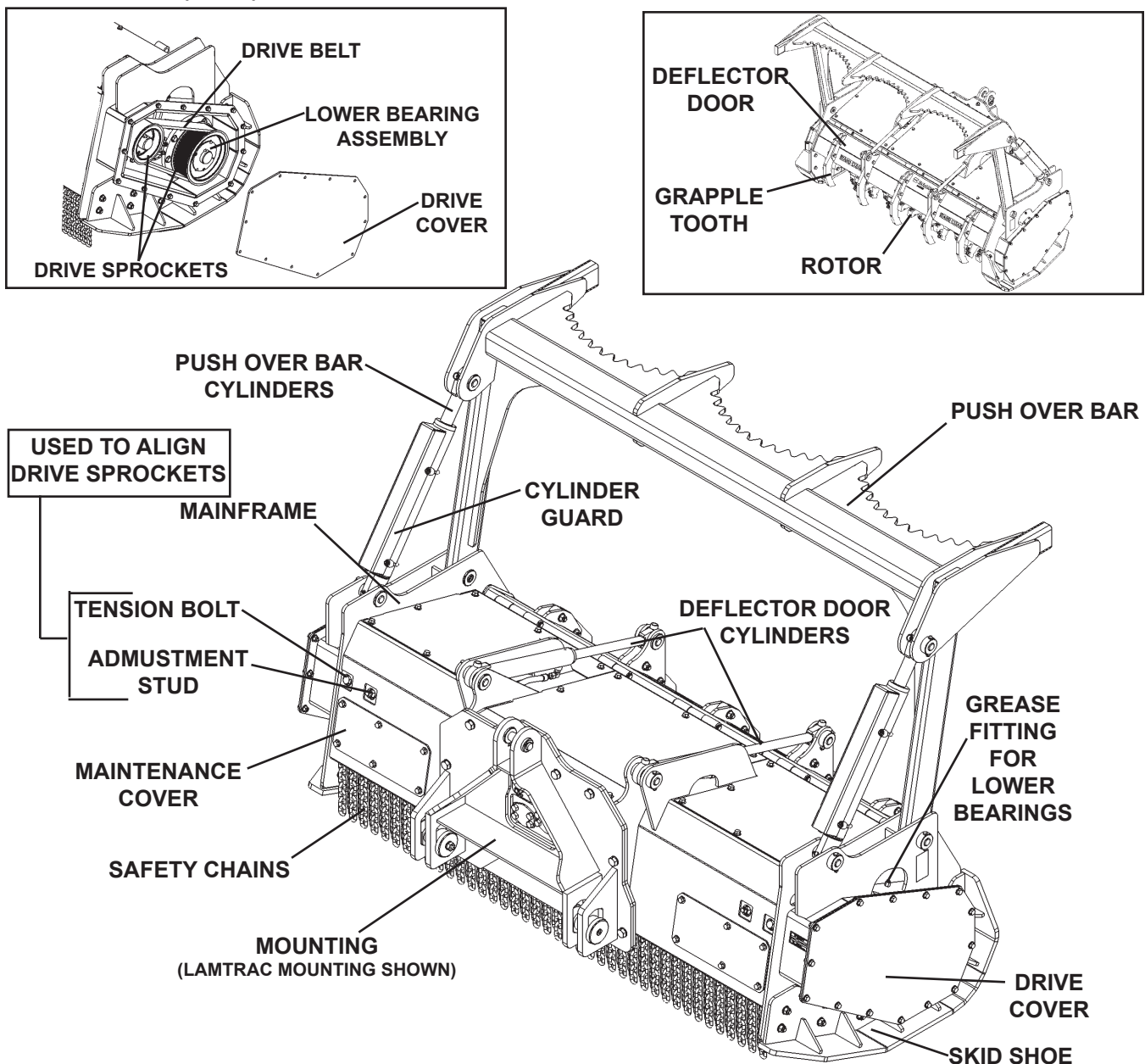
## GENERAL INFORMATION

The BRADCO MH88 Mulchers were designed to be used on forestry machines with a minimum of 7200 lbs lift capacity and a minimum of 275 Hydraulic HP.

**NOTICE:** DO NOT operate the BRADCO MH88 Mulcher on any prime mover that does not meet the minimum, or exceeds the maximum, operating criteria found in the Specifications Section of this manual.

## NOMENCLATURE

Throughout this manual, reference is made to various mulcher components. Study the following diagrams to acquaint yourself with the various names of these components. This knowledge will be helpful when reading through this manual or when ordering service parts. There is a complete parts breakdown for each mulcher at the back of this manual.



11535 4-12-12-2

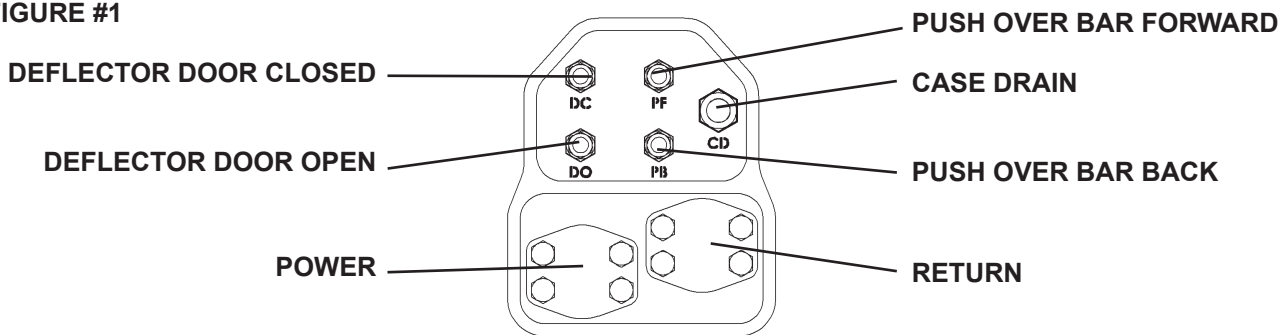
# INSTALLATION

## ATTACHING

**NOTE:** Before attaching the mulcher to your prime mover, make sure a forestry guard package has been installed onto the prime mover. This is required to protect the operator from possible thrown objects.

A separate mounting kit is required to install the BRADCO Mulcher onto your prime mover. Install the mounting bracket (s) for you prime mover to the mulcher mainframe (Lam-trac mounting is shown in nomenclature diagrams.) Install the BRADCO Mulcher by following your prime mover operator's manual for proper installation of an attachment. When attaching the hoses to the prime mover, the case drain line must be connected first, then the power and return hoses. See Figure #1 for proper hose connection location.

FIGURE #1



When disconnecting the hoses, it is recommended to disconnect the case drain line last. This will prevent any over pressurization of the motor case on the mulcher head. **NOTE:** The case drain line must be installed from the mulcher head to the prime mover hydraulic tank. The case drain line must be unrestricted all the way to the tank.

**IMPORTANT:** Over pressurization of motor case can be caused by a kinked or pinched hose, improper connection, obstruction or damaged coupler on the case drain line. Make any necessary adjustments and/or reroute hoses before operating. Route hoses in such a fashion to prevent pinching or chafing.

**WARNING!** To Avoid Serious Personal Injury, make sure the mulcher is securely latched to the attachment mechanism of your unit. Failure to do so could result in separation of the attachment from the unit.



Clear the area of all bystanders during installation.

## DETACHING

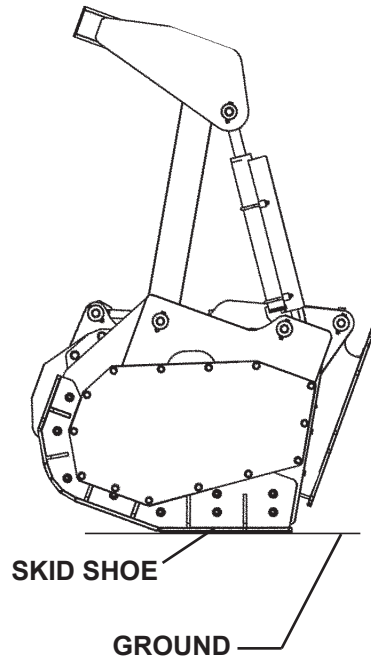
On firm, level ground. Lower the mulcher so it is positioned on the back of the skid shoes. See Diagram on following page.

Follow your prime mover operator's manual to relieve pressure in the hydraulic lines.

Disconnect hydraulic lines. (When disconnecting the hoses, it is recommended to disconnect the case drain line last. This will prevent any over pressurization of the motor case on the mulcher head.)

# INSTALLATION

## STORAGE POSITION



**NOTE:** Install caps and/or plugs to hydraulic lines to prevent contaminants from entering the hydraulic system.

Follow your prime mover operator's manual for detaching (removing) an attachment.

**WARNING!** Clear the area of all bystanders during removal.



**IMPORTANT:** DISENGAGE THE AUXILIARY HYDRAULICS, STOP THE ENGINE, ENGAGE PARKING BRAKE AND REMOVE KEY BEFORE LEAVING THE OPERATOR'S STATION.

# OPERATION

**INTENDED USE:** This unit was designed to mulch brush and trees (up to 20" in diameter), and mulching and/or mixing debris approximately 1.50" below ground level while traveling in forward or reverse. Use in any other way is considered contrary to the intended use.

## GENERAL INFORMATION


The BRADCO Mulcher is perfect for clearing tall weeds, heavy brush and hardwood tree's. There are two MH88 models of the mulcher available, one is set for 300 HP prime movers and the other for 400 HP prime movers. Due to this arrangement, thorough knowledge of the prime mover is necessary for machine operation. Read and understand your prime mover's operator's manual before attempting to use the mulcher.

Follow the installation instructions for installing the mulcher onto your prime mover.

**WARNING!**  **Block off the work area from bystanders and livestock. Flying debris can cause severe personal injury or death. The mulcher is capable of producing large amounts of flying debris in all directions.**

**Do not operate without a forestry guard package installed on your prime mover.**

**Do not engage or disengage the rotor while the engine rpm's are above a low idle.**

**WARNING!**  **Before exiting the prime mover, lower the attachment to the ground, disengage auxiliary hydraulics, engage parking brake, turn off the engine and remove the key.**

## CASE DRAIN

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

**NOTE: Oil leaking out of the optional case drain relief valves can be caused by a kinked hose, improper connection, obstruction or a damaged coupler on the case drain line. Make any necessary adjustments before operating the mulcher. If your unit is not equipped with an optional case drain relief valve, check for kinked hoses, improper connections, obstructions or damaged couplers before operating to prevent over pressurization of the motor case causing severe hydraulic system damage which is not covered by warranty.**

## HYDRAULIC PUSH OVER BAR

The hydraulic push over bar is used to push on standing trees as you are mulching to help direct the fall of the tree away from the operator and prime mover. Extreme caution should be used when mulching larger trees and the amount of force applied to prevent the tree from falling back onto the operator or prime mover.

# OPERATION

## HYDRAULIC DEFLECTOR DOOR

The hydraulic deflector door is operated by two hydraulic cylinders. The deflector door is designed to deflect debris and mulched material towards the ground. Extreme caution should be used when operating this attachment and should never be used with bystanders or any other personnel present.

**DANGER!** **TO PREVENT PERSONAL INJURY OR DEATH. DO NOT OPERATE WITH BYSTANDERS OR OTHER PERSONNEL PRESENT. FLYING DEBRIS FROM THE FRONT OR REAR OF THE MACHINE IS POSSIBLE EVEN IF THE DEFLECTOR DOOR IS CLOSED.**



The deflector door can be open or closed when operating in either direction. However, we recommend that the door be open when operating in a forward motion with the mulcher engaged. This will prevent brush or standing trees from pushing on the deflector door and bending it in towards the rotor and therefore causing damage to the door and/or teeth. When traveling in reverse we recommend closing the deflector door to direct the debris and mulch down to the ground and produce a smooth clean looking finished product. Ultimately, safety is the responsibility of the operator and he should be aware of his surroundings at all times.

## OPERATION

**DANGER!** **To avoid serious personal injury or death the BRADCO mulcher must not be attached to any prime mover that does not have a forestry guard package installed.**



Read and understand all warnings and precautions in this manual and on the machine before operating the mulcher. The Bradco mulcher is relatively simple to use, and with the help of the information in this manual and a little practice you should become proficient in its operation and able to develop procedures suitable to your particular situation.

### Starting The Mulcher

1. Start the attachment with the engine at an idle only.
2. Run engine at idle to warm hydraulic oil.

**NOTE: The rotor will only turn in one direction. If rotor is not turning check for proper hydraulic hose hook up. (Refer to Installation Instructions) If you have the correct hydraulic hook up and rotor is still not turning contact factory.**

3. Check position of the deflector door and push over bar. Make sure they are in the correct position for the job at hand.
4. Position the prime mover, check that all personnel and bystanders are out of the area, start rotor and increase engine speed.
5. Be sure the mulcher is operating smoothly at full throttle and then start forward travel while monitoring hydraulic pressure and rotor rpm.


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

# OPERATION

## Stopping The Rotor

Disengage the rotor by first idling the engine all the way down and allow the rotor to slow down as far as it will go and then disengage the auxiliary hydraulics. Failure to follow this shut down procedure will cause severe damage to the hydraulic and drive system of the attachment.

## GENERAL OPERATING TIPS

**DANGER!**  When operating, never raise the mulcher high enough that you see the safety chains. If the safety chains are visible debris can be discharged back towards the operator causing severe bodily injury or death.

**GROUND SPEED:** Ground speed can be determined by watching the pressure gauge (on the prime mover) and slowing down whenever the gauge approaches maximum operating pressure. Operating at ground speed that is too fast will cause the rotor to engage too much material and stall. As you slow down the ground speed and reduce the amount of material going through the mulcher the pressure gauge will go down.

**STALLING:** If the attachment stalls, the operator will have to stop and remove the mulcher from the material and allow the rotor to regain speed. Slow down your ground speed to prevent further stalling.

**JAM:** When a jam occurs, shut off the hydraulics. Move the mulcher to a clear area, tip forward and drive in reverse to force the rotor to rotate without hydraulics and therefore discharging the jam. Setting the center of the rotor down on a log or felled tree and driving in reverse will help to clear even the biggest of jams.

**BRUSH:** When clearing brush, travel forward through the brush at a pace that will not decrease the rotor rpm. Once you are completely through, tip the mulcher forward slightly and reverse. This will re-mulch the brush and produce a more finished surface.

**NOTE:** Traveling too fast will not properly mulch the material.

**TREES:** Start at the trunk, with the mulcher tilted back slightly and the deflector door open. When you are 1/2 of the way through the tree extend the push over bar, applying force to assist in pushing the tree over. Grind down the remainder of the trunk to prevent the prime mover from getting “hung up”. Position the mulcher on top of the tree and travel forward removing the limbs. Lower the unit and travel back and forth over each section of the trunk until gone. This may take many passes depending on the diameter of the tree.

**CAUTION!**  Take extra care when mulching dead standing trees. There is a danger of the tops falling back onto the operator’s cab, causing injury or property damage.

**GROUND MULCHING / MIXING:** The mulcher head is capable of mulching and mixing debris approximately 1.50” below ground level. Keep in mind that excessive ground engaging will rapidly decrease the life of the cutting teeth, sometimes up to as much as 50%. When doing excessive ground engaged mulching, inspect the cutting teeth more often to ensure the teeth are not worn to the point that the holders are wearing down also.

# OPERATION

## STORAGE

- Clean the unit thoroughly, removing all mud, dirt, and grease.
- Inspect for visible signs of wear, breakage, or damage. Order any parts required and make the necessary repairs to avoid delays upon removal from storage.
- Tighten loose nuts, capscrews and hydraulic connections.
- Coat exposed portions of the cylinder rods with grease.
- Seal hydraulic system from contaminants and secure all hydraulic hoses off the ground to help prevent damage.
- Replace decals that are damaged or in unreadable condition.
- Store unit in a dry and protected place. Leaving the unit outside will materially shorten its life. Be sure unit is stored setting on the back of the skid shoes. See Diagram

**NOTE: When placing into storage for two months or more, change oil in overhung load adapter. See Maintenance instructions.**

### Additional Precautions for Long Term Storage:

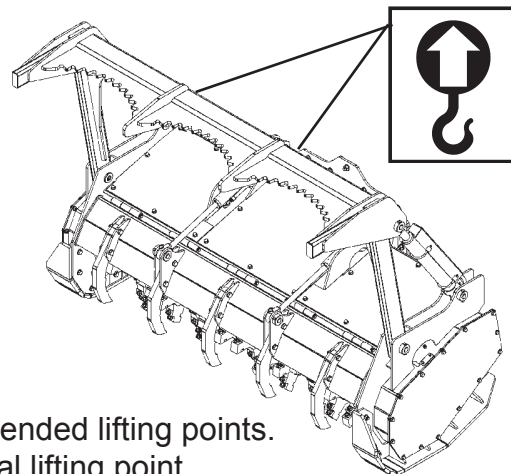
- Touch up all unpainted surfaces with paint to prevent rust.

## REMOVAL FROM STORAGE

- Wash unit and replace any damaged and/or missing parts that were not already replaced.
- Check hydraulic hoses for damage and replace as necessary.

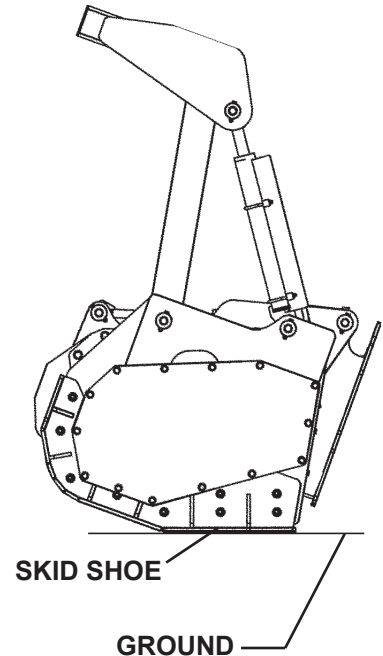
## LIFT POINTS

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



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

## STORAGE POSITION





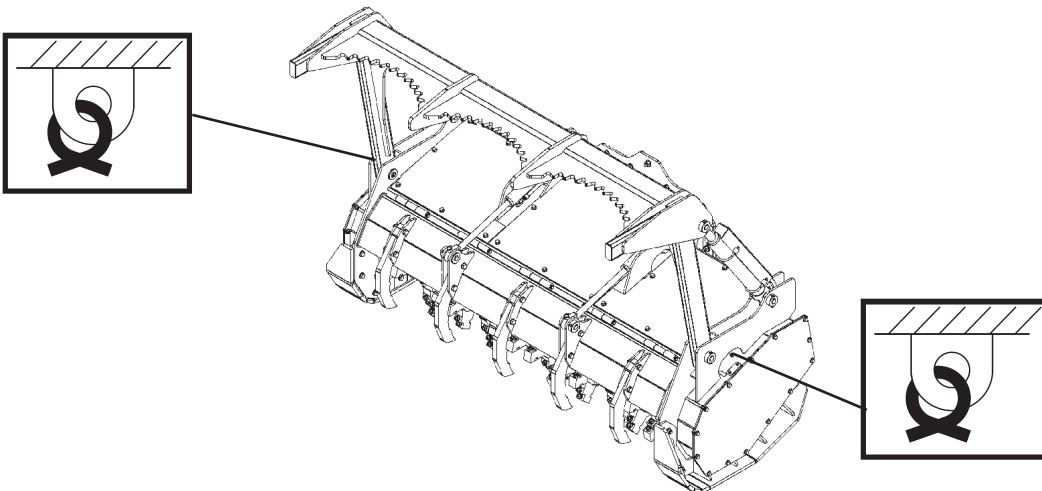
# OPERATION

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



## TIE DOWN POINTS

Tie down points are identified by tie down decals where required. Securing to trailer at other points is unsafe and can damage attachment. Do not attach tie down accessories around cylinders or in any way that may damage hoses or hydraulic components. See Diagram



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

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



## TRANSPORTING

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



# MAINTENANCE & SERVICE

## GENERAL INFORMATION

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

**WARNING! Never do any maintenance to the Mulcher while it is running. Exercise the MANDATORY SAFETY SHUTDOWN PROCEDURE BEFORE working on or around the Mulcher.**

| Procedure  | Daily | Every<br>40<br>Hours | Every<br>120<br>Hours | Every<br>200<br>Hours | Every<br>1000<br>Hours |
|--|-------|----------------------|-----------------------|-----------------------|------------------------|
| Case Drain - Check for complete engagement of hose or coupler.                                       | ✓     |                      |                       |                       |                        |
| Check for kinked or pinched hoses. Reroute as required.  | ✓     |                      |                       |                       |                        |
| Hydraulic Oil - Check prime mover hydraulic system for adequate oil levels.                          | ✓     |                      |                       |                       |                        |
| Hardware - Check for tightness (see Bolt Torque Specifications)                                      | ✓     |                      |                       |                       |                        |
| Hardware - Replace any missing or damaged bolts or nuts with approved replacement parts.             | ✓     |                      |                       |                       |                        |
| Hydraulic System - Check for leaks and tighten as necessary. Check for damage and replace as needed. | ✓     |                      |                       |                       |                        |
| Decals - Check for missing or damaged safety decals and replace as necessary.                        | ✓     |                      |                       |                       |                        |
| Teeth - Replace worn, damaged or missing teeth.  | ✓     |                      |                       |                       |                        |
| Inspect attachment for any worn parts or cracked welds. Repair as required.                          | ✓     |                      |                       |                       |                        |
| Clean rotor of any accumulated debris and dirt.  | ✓     |                      |                       |                       |                        |
| Clean internal mulcher compartments, including drive belt housing area.                              |       | ✓                    |                       |                       |                        |
| Check drive belt tensions.   |       |                      | ✓                     |                       |                        |
| Check oil level in overhung load adapters. (See maintenance instructions.)                           |       |                      | ✓                     |                       |                        |
| Lubricate rotor bearings 2-3 pumps. <b>Over lubricating will cause premature bearing failure.</b>    |       |                      |                       | ✓                     |                        |
| Change oil in overhung load adapters. (See maintenance instructions.)                                |       |                      |                       |                       | ✓                      |

**IMPORTANT: When replacing parts, use only factory approved replacement parts. Manufacturer will not claim responsibility for use of unapproved parts or accessories, and/or other damages as a result of their use.**

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# MAINTENANCE & SERVICE

## BREAK-IN PERIOD

| Procedure   | After First 8 Hours | After First 16 Hours | After First 40 Hours | After First 120 Hours |
|---|---------------------|----------------------|----------------------|-----------------------|
| Check drive belt tensions.  | ✓                   | ✓                    | ✓                    | ✓                     |
| Check torque on taper-lock bushing set screws. (#113595 to 84 ft. lbs. and #113596 to 142 ft. lbs.) | ✓                   |                      |                      | ✓                     |
| Change oil in overhung load adapters.   |                     |                      |                      | ✓                     |

**NOTE:** Repeat Break-In Period whenever belt, sprockets or overhung load adapter is replaced.

## LUBRICATION SPECIFICATIONS

|                       |   |
|-----------------------|---|
| LOWER BEARINGS        | NLGI GRADE 2 LITHIUM GREASE WITHOUT GRAPHITE OR MOLYBDENUM ADDITIVES.                                 |
| OVERHUNG LOAD ADAPTER | SYNTHETIC ISO 150 GEAR LUBE WITHOUT GRAPHITE OR MOLYBDENUM ADDITIVES. (APPROXIMATELY 16 OZ. CAPACITY) |

## LUBRICATING LOWER BEARINGS

Lubricate lower bearings with 2-3 pumps of grease every 200 hours. Over lubricating will cause premature bearing failure.

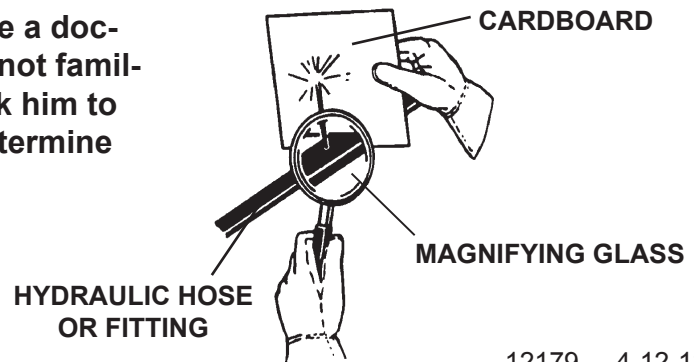
**NOTE:** The bearing lubrication fittings are located on the top of the drive belt housing compartments along with a grease relief vent plug. Normal pressure build-up during operation may result in grease escaping from relief vent plugs. Continue lubricating at specified intervals.

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



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

If injured by injected fluid, see a doctor at once. If your doctor is not familiar with this type of injury, ask him to research it immediately to determine proper treatment.



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# MAINTENANCE & SERVICE

**WARNING!** Before performing maintenance or service lower the attachment to the ground, disengage auxiliary hydraulics, turn off the engine, remove the key and apply the brakes.



**WARNING!** Never perform any work on this attachment unless you are authorized and qualified to do so. Always read the operator's manuals before any repair is made. After completing maintenance or service, check for correct functioning of the attachment. If not functioning properly, always tag "DO NOT OPERATE" until all problems are corrected.



## REPLACING TEETH

Worn, broken or missing teeth will cause excessive machine vibration and reduce productivity. It is important that all teeth are attached properly. Double sided, reversible teeth can be rotated when worn or if carbide points are broken or missing.

1. Remove existing tooth.
2. Check to make sure the mounting surface and bolt holes are clean and free of debris. (Any accumulation of debris can cause the tooth not to seat properly in the slot resulting in unsafe operation.)
3. Position the new tooth onto the holder and after both bolts have been started, push the tooth up into the mounting slot and tighten with an impact wrench. Torque to 150 ft. lbs.

**NOTE:** Replace any damaged bolts or washers. Install washers with the side that is higher in the center towards the bolt head.

**NOTICE:** Failure to start both bolts into the tooth first before tightening a bolt, can bind the other bolt, and damage the bolt and possibly the cutting tooth, rendering the tooth and bolt unusable.

**WARNING!** Improper mounting can void warranty and cause serious injury and/or death. Use only manufacturer replacement parts.



## DRIVE BELT TENSIONING AND/OR REMOVAL

Due to thermal expansion of the sprockets during operation the belt tension will vary between a cold unit and one that has just been in operation. We recommend checking tension after operation for the most accurate results and also servicing both belts at the same time.

Although there are various ways of checking belt tension we recommend using a single barrel (pencil type) belt tension tester which can be purchased locally.

**CAUTION!** Due to the hot temperatures of the components when checking the belt tension on a mulcher that has been in operation, gloves are required to prevent personal injury.



# MAINTENANCE & SERVICE

## CHECKING BELT TENSION

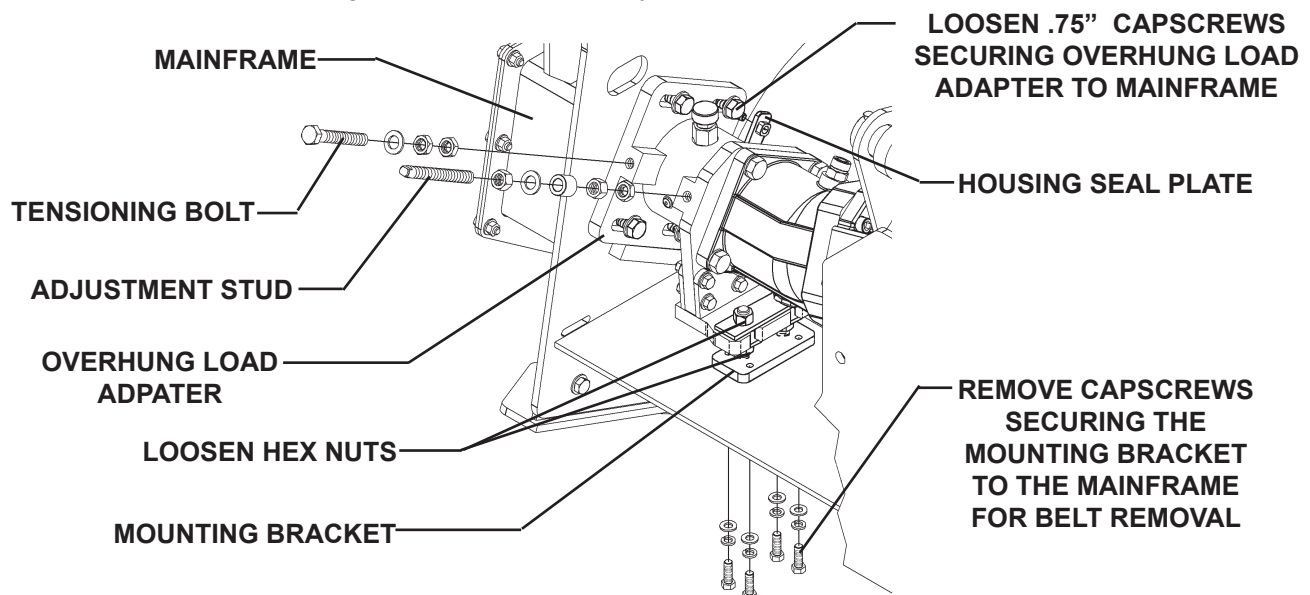
1. Remove the belt tension access cover from the top of the drive housing or the drive belt cover from the side of the drive housing to check belt tension. (Depending on the type of tension tester being used.)
2. If using a pencil type tension tester, insert through hole in top of drive housing compartment and check belt tension. Check belt tension half way between the two sprockets and in the center of the belt. See tension chart.

**NOTE: Belt tension should be checked in four places evenly spaced around one full rotor rotation. Take the average of the four readings. Test the tension of the belt by checking the deflection in the belt halfway between the two sprockets.**

| MODELS  | NEW BELT                       |                               | USED BELT (24 + HOURS OF USE) |                               |
|---------|--------------------------------|-------------------------------|-------------------------------|-------------------------------|
|         | WARM TENSION                   | COLD TENSION (70°F)           | WARM TENSION                  | COLD TENSION (70°F)           |
| MH88-3H | 90-94 HZ                       | 58-62 HZ                      | 77-81 HZ                      | 37-41 HZ                      |
|         | .29" Deflection @ 92-98 lbs.   | .29" Deflection @ 49-53 lbs.  | .29" Deflection @ 72-78 lbs.  | .29" Deflection @ 27-29 lbs.  |
|         | .10" Deflection @ 26-28 lbs.   | .10" Deflection @ 11-13 lbs.  | .10" Deflection @ 19-21 lbs.  | .29" Deflection @ 27-29 lbs.  |
| MH88-4H | 96-100 HZ                      | 69-73 HZ                      | 82-86 HZ                      | 48-52 HZ                      |
|         | .29" Deflection @ 101-109 lbs. | .29" Deflection @ 61-66 lbs.  | .29" Deflection @ 78-86 lbs.  | .29" Deflection @ 35-38 lbs.  |
|         | .08" Deflection @ 26-28 lbs.   | .125" Deflection @ 22-24 lbs. | .08" Deflection @ 19-22 lbs.  | .125" Deflection @ 11-13 lbs. |

## ADJUSTING BELT TENSION AND/OR REMOVAL

1. Remove the drive belt cover, top outside compartment cover and rear maintenance access cover on the back of the mulcher.
2. After testing the tension of the belt(s) (See "**CHECKING BELT TENSION**") loosen the two cap screws on the housing seal plate (completely remove seal plate for belt removal).

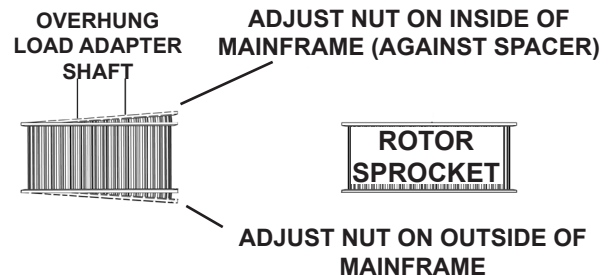


## MAINTENANCE & SERVICE

3. Loosen the four hex nuts supporting the bottom side of the overhung load adapter to the mounting bracket and back off the hex nuts and jam nuts on the tensioning bolt and adjustment stud.
4. Loosen the four capscrews securing the overhung load adapter to the mainframe. (If adjusting belt tension go to Step #9 . Go to Step #5 to remove drive belt.)
5. Remove the capscrews underneath the mainframe retaining the overhung load adapter mounting bracket and remove the mounting bracket. From back of mainframe remove hex nut and washer from adjustment stud.
6. Loosen the tensioning bolt. Slide the motor/overhung load adapter assembly forwards towards the rotor approximately 1.50" to release tension from drive belt.
7. Remove belt from sprockets. **NOTE: Do not force the drive belt off sprocket flanges as belt damage can occur.**
8. Install new belt and position the motor/overhung load adapter assembly, in approximately the same location it was in before the belt was removed. Tighten all four of the .75" capscrews on the overhung load adapter and reinstall the mounting bracket to bottom of mainframe using loctite 271 on capscrews. Torque to specification. Adjust belt tension using cold tension specifications.
9. Adjust the belt tensioning bolt until the proper tension is achieved. Turn the tensioning bolt clockwise to increase belt tension and counter-clockwise to decrease belt tension.
10. Retighten the .75" capscrews securing the overhung load adapter to the mainframe.
11. Recheck belt tension and adjust as required.
12. Once the proper tension has been achieved, tighten the .75" capscrews securing overhung load adapter to mainframe and check sprocket alignment.

### TO CHECK SPROCKET ALIGNMENT:

- a. Apply straight edge to outside edge of both sprockets.
- b. Refer to sprocket alignment diagram in "SPROCKET REMOVAL AND INSTALLATION" for maximum gap allowance.
- c. If front of sprocket is tilted towards the inside of mainframe, adjust nut on adjustment stud (inside of mainframe) towards spacer. If the front of the sprocket is tilted away from the mainframe, adjust the nut on the adjustment stud that is located outside of the mainframe.
- d. Recheck belt tension.



13. Torque the capscrews securing the overhung load adapter to the mainframe. Torque to 250 ft. lbs.
14. Tighten all hex nuts and jam nuts on tensioning bolt, adjustment stud and on overhung load adapter mounting bracket.
15. Install the housing seal plate so that it is against the overhung load adapter and tighten capscrews. **NOTE: Housing seal plate is in place to minimize debris from entering the drive belt compartment and therefore reducing belt life.**
16. Install drive belt cover and maintenance access cover using existing hardware.
17. Reinstall the top compartment cover.

**NOTE: Belt damage can occur if belt is too loose, too tight or if debris is present. Do not operate without drive cover installed.**

# MAINTENANCE & SERVICE

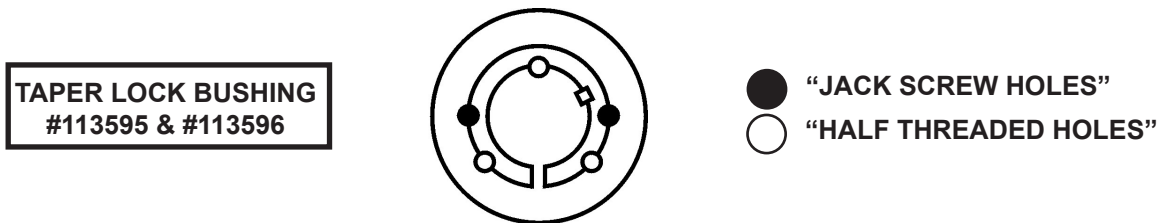
## SPROCKET REMOVAL AND INSTALLATION

### TAPER LOCK BUSHING IDENTIFICATION AND ORIENTATION

When replacing sprockets, it is recommended to update both sprockets at the same time along with both sprockets on the opposing side of the mulcher.

#### Removal

1. Remove the drive belt. See “**DRIVE BELT TENSIONING AND/OR REMOVAL**”
2. Loosen the taper lock assembly (bushing) in the sprocket by removing all mounting screws.



3. Insert screws into all jack screw holes indicated in the diagram.
4. Loosen the bushing by alternately tightening the screws in small but equal increments until the taper sprocket and bushing surfaces disengage.

#### Installation

1. Position the overhung load adapter housing, in approximately the same location it was in before the belt was removed, and tighten all four of the .75” capscrews on the overhung load adapter to ensure proper alignment of the shaft and housing.

**NOTE: The overhung load adapter housing must be properly seated flat against the mainframe of the mulcher for proper alignment of the sprockets. If there are any gaps along this surface, remove the housing and clean any debris from the surface. Reinstall and tighten.**

2. The taper lock bushing assembly needs to be reassembled for proper installation. DO NOT use “Never Seize” on bushing or bolts.
3. Clean the shaft, bore of bushing, outside of bushing and the sprocket hub bore of all oil, paint and dirt. File away any burrs. **NOTE: The use of lubricants can cause sprocket breakage. USE NO LUBRICANTS IN THIS INSTALLATION.**
4. Insert the bushing into the sprocket hub. Match the hole pattern, not the threaded holes (each complete hole will be threaded on one side only.)
5. LIGHTLY oil the set screws and thread them into the half-threaded holes indicated on the diagram.

**NOTE: Do not lubricate the bushing taper, hub taper, bushing bore, or the shaft. Doing so could result in sprocket breakage.**

**NOTE: If both sprockets were removed, install the larger driven sprocket first making sure that it will clear the grease lines and drive belt cover.**

6. With the key in the shaft keyway, position the assembly onto the shaft allowing for small (.03” - .06”) axial movement of the sprocket, towards the outside of the unit, which will occur during the tightening process. Make certain the shaft is completely through the bushing. **NOTE: If the locking assembly will not slide onto the shaft, you may have the locking assembly too tight or you may need to drive a wedge into the slot of the taper lock bushing which will therefore increase the bushing bore.**

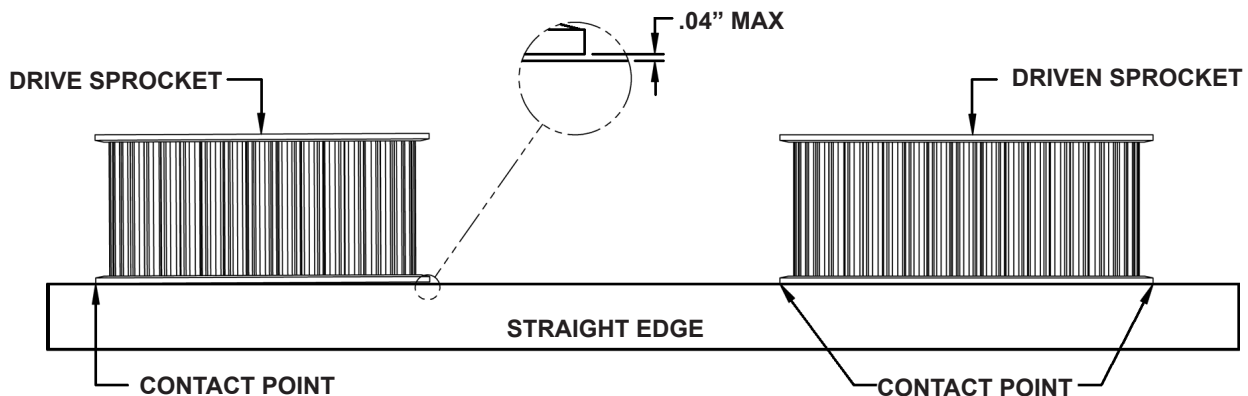
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## MAINTENANCE & SERVICE

7. Alternately tighten the set screws until the sprocket and taper lock bushing are seated together. Do not apply enough torque to the set screws that the sprocket and taper lock bushing will not slide on the shaft for alignment purposes.

**NOTE: Do not use worn hex key wrenches. Doing so may result in a loose assembly or may damage screws.**

8. If both sprockets were removed, install the second one using the same procedure.
9. Align the sprockets using a straight edge. The outside edge of both sprockets must be aligned. Torque the set screws to approximately one-half of the recommended torque to lock the bushings onto the shaft. See torque table below. Recheck sprocket alignment.



**NOTICE: Failure to align the sprockets correctly will decrease the life of the belt.**

10. Install the drive belt and tension just enough to prevent the sprockets from rotating.

**NOTICE: Never force the belt over the sprocket flange as internal damage to the belt will occur.**

11. Continue to alternate tightening of the set screws on the bushings to the recommended torque value shown in table.
12. To increase the bushing gripping force, hammer the face of the bushing using a drift or sleeve (do not hit the bushing directly with the hammer).
13. Re-torque the bushing screws after hammering.
14. Recheck all screw torque values after the initial drive run-in, and periodically thereafter. Tighten as required.
15. Follow instructions for retensioning the drive belt and cover installation. See “**DRIVE BELT TENSIONING AND/OR REMOVAL**”.

| BUSHING     |     | BOLTS            |  | TORQUE WRENCH |           |
|-------------|-----|------------------|--|---------------|-----------|
| PART NUMBER | QTY | SIZE             |  | LBS - FT.     | LBS - IN. |
| 113595      | 3   | .50" UNC X 1.50" |  | 84            | 1008      |
| 113596      | 3   | .62" UNC X 1.75" |  | 142           | 1704      |

**NOTICE: Excessive bolt torque can cause sprocket and/or bushing breakage.**

**NOTE: To insure proper bushing/sprocket performance, full bushing contact on the shaft is recommended.**



# MAINTENANCE & SERVICE

## ROTOR REMOVAL AND INSTALLATION

An overhead hoist is required when removing or servicing the rotor.

**WARNING!** Before removal of the lower bearing assemblies in preparation of removing or servicing the rotor, disconnect the mulcher from the prime mover, remove mounting hitch and position the mulcher flat on the face of the mainframe hitch mounting face.



1. Support the rotor with the overhead hoist.

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



2. Follow Steps #1 through #8 under “REPLACING AND/OR SERVICING THE LOWER BEARINGS”.
3. Remove the right and left skid shoes along with the side filler plates.
4. Remove the dirt rings by removing the four .25” flat head screws.
5. With the dirt rings free to “float”, begin rotor removal by gently swinging the rotor out through the slots in the mulcher mainframe completely freeing the rotor from the mainframe.

**NOTICE:** *Be careful not to let rotor shaft ends come into contact with the mainframe which could cause damage to the rotor shaft threads or create dents or burrs in the shaft.*

6. Reverse process for installing the rotor back into the mainframe.
7. Follow Steps #15 and #17 through #25 under “REPLACING AND/OR SERVICING THE LOWER BEARINGS”.

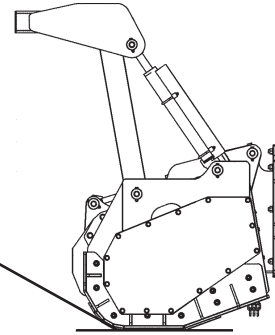


# MAINTENANCE & SERVICE

## CHECKING AND/OR CHANGING OIL IN OVERHUNG LOAD ADAPTER

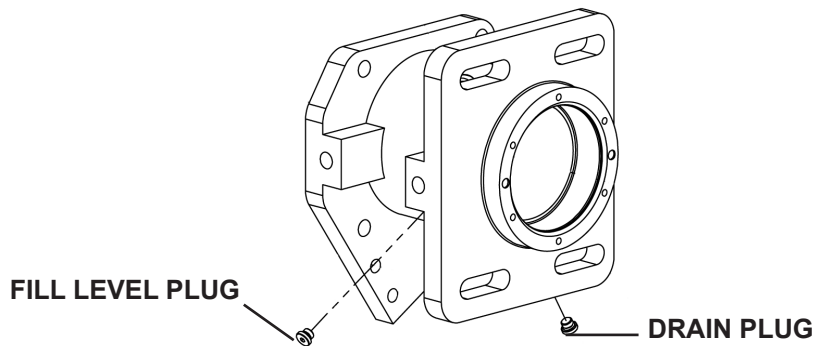
Before checking, adding or changing the oil in the overhung load adapter, mulcher must be sitting in operating position with skid shoes flat on the ground as shown. See “**LUBRICATION SPECIFICATIONS**” for oil type and capacity.

MULCHER POSITION WITH SKID SHOES FLAT ON GROUND



### CHECKING AND/OR ADDING OIL

1. Remove rear maintenance cover from the back of the mulcher. Clean around the fill level plug and remove plug. Check to make sure oil level is at fill level plug.



**NOTICE: The Overhung Load Adapter assembly is a sealed system. If oil level is low, check all seals for damage.**

2. If oil is required, replace fill level plug and remove the top side compartment cover. Clean around vent breather cap to prevent contaminants from entering the bearing assembly, and remove cap.
3. Add oil. (See Lubrication Specifications)
4. Wait a few minutes to allow oil to settle, filling all voids of the overhung load adapter assembly. Place a container below the fill level plug and remove the fill level plug, allowing all excess oil to drain into the container.

**NOTICE: Do not over lubricate the overhung load adapter assembly as this will cause excess heat generation and all excess oil will be purged from the breather cap.**

5. Replace fill level plug, vent breather cap and all covers.

### CHANGING OIL

To maximize the life of the overhung load adapter bearings, it is recommended to change oil after the initial 120 hours of operation of a new mulcher or replacement overhung load adapter assembly. Follow Maintenance schedule after the break in period as oil will break down over time. Oil must be changed in both overhung load adapters at the same time. Change oil in one side and then follow the same procedure to change the oil on the opposite side of the mulcher.

## MAINTENANCE & SERVICE

**NOTICE:** Oil should be drained while it is warm and therefore has a low viscosity. If changing oil after the mulcher has been in operation, allow time for the oil AND housing to cool down. If changing oil prior to operating, engage mulcher hydraulics at a low engine idle and run for approximately 5 minutes to warm the oil. Take extra precautions to avoid burns when doing maintenance on a mulcher after it has been in operation. Components can be very hot.

1. Remove maintenance cover from the back of the mulcher and top side compartment cover.
2. Clean around the drain plug and vent breather cap and then remove the vent breather cap. (Removing the vent breather cap will allow the oil to drain faster.)
3. Place a container under the drain plug to catch the oil and then remove the drain plug. Allow time for all oil to drain from the overhung load adapter and then reinstall the drain plug.
4. Add approximately 16 oz. of recommended oil (See Lubrication Specifications). Wait a few minutes to allow oil to settle, filling all voids of the overhung load adapter assembly. Place a container below the fill level plug and remove the fill level plug, allowing all excess oil to drain into the container.

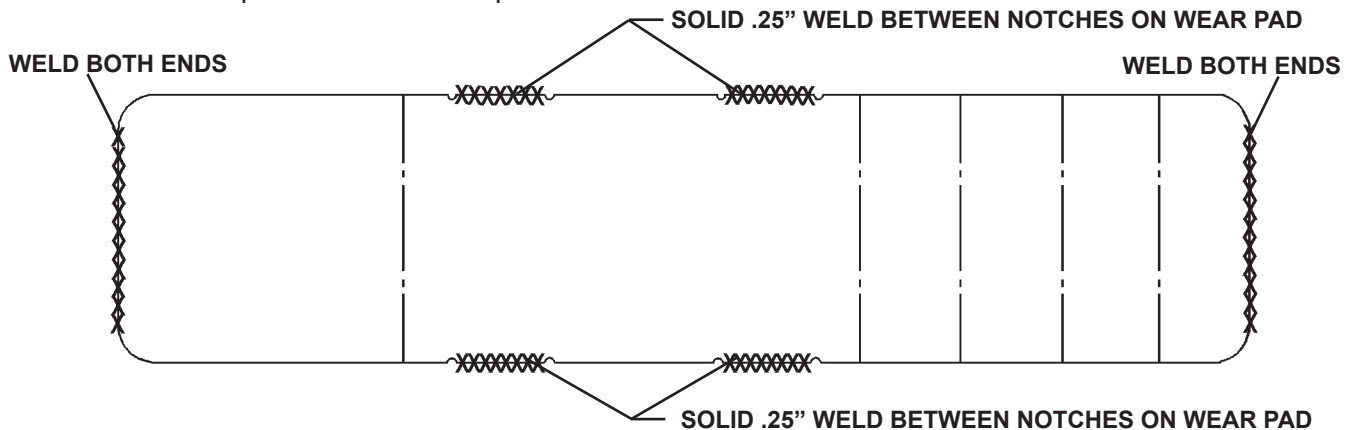
**NOTICE:** Do not over lubricate the overhung load adapter assembly as this will cause excess heat generation and all excess oil will be purged from the breather cap.

5. Replace fill level plug, vent breather cap and all covers.

## REPLACING SKID SHOE WEAR PADS

The weld-on wear pads on your mulcher left and right skid shoe is replaceable. Refer to the parts diagram for your mulcher to order replacement wear pads.

1. Position the mulcher in a well ventilated area and remove the skid shoe(s) from the mainframe.
2. Remove any existing wear pad that is still on the skid shoe along with any paint that is around the weld area. Follow all safety precautions listed in the front of this manual for removing paint before welding.
3. Position the new wear pad onto the skid shoe. Place a .25" weld at the locations shown on the diagram below.
4. Prime and paint the new wear pad and skid shoe.



5. Reinstall skid shoe onto mainframe using existing hardware.

# MAINTENANCE & SERVICE

## QUALIFIED TECHNICIAN MAINTENANCE

**WARNING!** Before performing maintenance or service, lower the attachment to the ground, disengage auxiliary hydraulics, turn off the engine, remove the key and apply the brakes.



**WARNING!** Never perform any work on this attachment unless you are authorized and qualified to do so. Always read the operator's manual before any repair is made. After completing maintenance or service, check for correct functioning of the attachment. If not functioning properly, always tag "DO NOT OPERATE" until all problems are corrected.

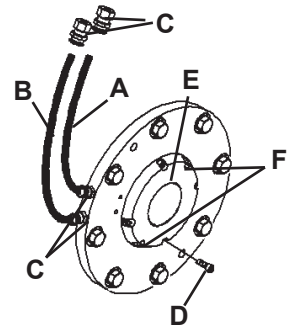


### REPLACING AND/OR SERVICING THE LOWER BEARINGS

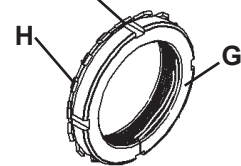
An overhead hoist and the optional bearing socket assembly #116733 is recommended when servicing the lower bearing assemblies. Due to the high torque values required when servicing the lower bearing assemblies we recommend using a torque multiplier with a working range that will accomplish torques between 800-1200 ft. lbs.

1. Remove the drive belts. See "DRIVE BELT TENSIONING AND/OR REMOVAL"
2. Remove the lower sprockets on rotor shaft. See "SPROCKET REMOVAL AND INSTALLATION".
3. Disconnect grease lines (A) and relief lines (B). (Push gray extrusions on straight connector's (C) inward while pulling hose lines outward.) Plug or cap fittings and hoses to prevent contaminants from entering the lubrication system.
4. Remove the four socket head capscrews (D) and the outer seal cap (E). (You may have to install two of the socket head capscrews into the push off holes (F) to remove the outer seal cap.)
5. Clean any visible grease from the lower bearing assembly.
6. Remove the bearing lock nut (G) and bearing lock washer (H).

RIGHT LOWER BEARING ASSEMBLY

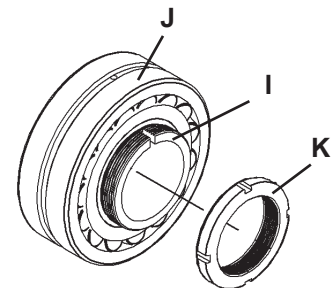


LOCKING TAB - BENT OUT



**NOTE:** Be sure the rotor is properly supported before lower bearing removal. The locking tab must be bent out of the bearing lock nut (G) prior to removal of the nut. Failure to bend out the locking tab can result in damaging the locking washer (H).

7. It is recommended to use the bearing lock nut provided in the bearing socket assembly #116733 to remove the withdrawal sleeve (I) which is locking the bearing (J) to the rotor shaft. Install the bearing lock nut (K) with the chamfer side of the lock nut towards the bearing to prevent damage. Tighten the lock nut (K) onto the withdrawal sleeve (I) using the bearing socket and a 1" drive ratchet, breaker bar or torque multiplier to "pull" the withdrawal sleeve out of the bearing inner race. Do not completely remove the withdrawal sleeve from the bearing.

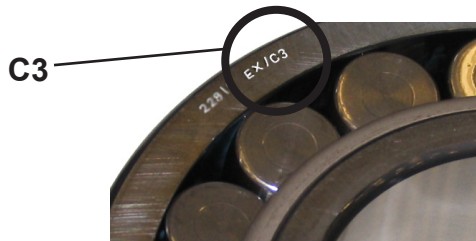
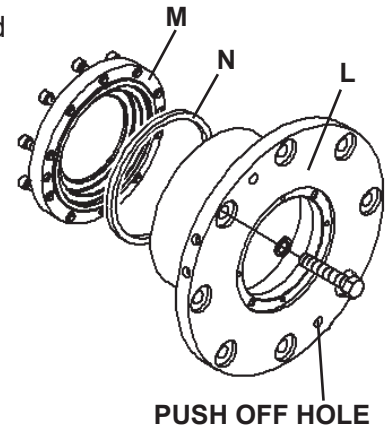


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# MAINTENANCE & SERVICE

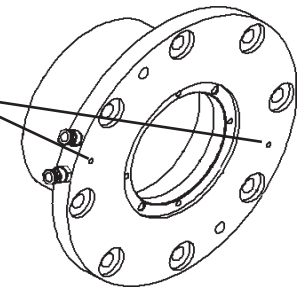
## QUALIFIED TECHNICIAN MAINTENANCE

8. Remove the ten .62" capscrews from the bearing housing (L) and install two of them into the push off holes to aid in the removal of the bearing housing. Remove the bearing housing.
9. Remove the twelve socket head capscrews from the inner seal cap (M) and remove the inner seal cap and spacer ring (N - fixed bearing assembly only). **NOTE: Two of the capscrews may need to be installed into the push off holes in the inner seal cap for removal.**
10. Slide or press the bearing out the back of the housing (L).
11. Inspect the inside of the bearing housing, the withdrawal sleeve and rotor shaft for defects, such as burrs, worn surfaces or any surface imperfections. Inspect the rotor shaft seals for damage. **NOTE: It is recommended to replace rotor shaft seals when replacing bearings.**



FIXED BEARING IDENTIFICATION

LOWER FLOATING HOUSING IDENTIFICATION TWO .19" HOLES (SEE PARTS SECTION)



**NOTICE: Although both bearings look alike they are different. Be sure to identify and install the correct bearing during replacement. The fixed side bearing #111669 will have a "C3" on the bearing rim while the floating bearing #112669 will not. All other identification marks, letters and numbers are related to manufacturer and do not have any significance in distinguishing between the two bearings. Take extra care to install the correct bearing into the correct housing. The floating bearing housing has two .19" identification holes located on face of housing. See Above Diagram**

12. Clean all lower bearing components and rotor shaft, removing all grease and contaminants. Apply a light coat of machine oil to the inside of the bearing housing and install the new bearing with the smaller side of the taper in the bearing inner race to the inside of the housing. Check diagram for correct bearing orientation.
  - a. Position the bearing as straight as possible with the bearing housing.
  - b. Position a tube over the bearing, contacting the outer race of the bearing only, and lightly tap until the bearing is aligned with the housing.
  - c. Once alignment has been achieved the floating side bearing will easily slide into place while the fixed side bearing will need a press. Ensure fixed bearing is fully seated into the housing.

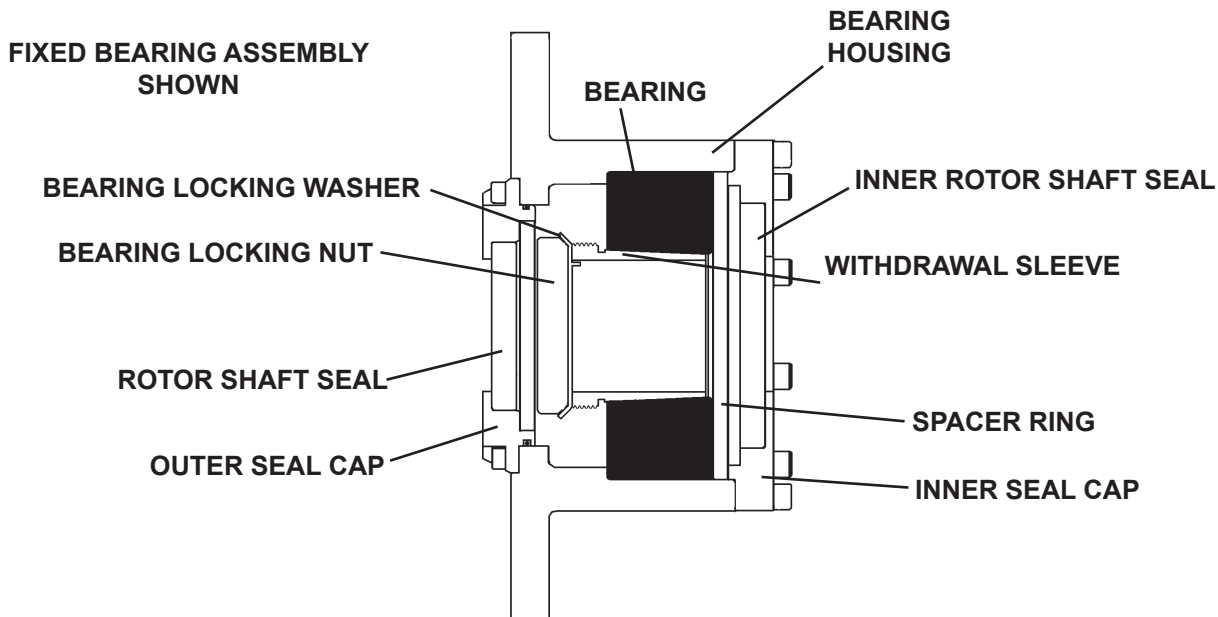
**NOTE: Apply force to the outer race of the bearing only to prevent damage.**

# MAINTENANCE & SERVICE

## QUALIFIED TECHNICIAN MAINTENANCE

13. Pack the bearings with grease and install the bearing spacer ring (fixed bearing assembly only).
14. Apply a light film of grease to the inside of both seal cap shaft seal bores and install the rotor shaft seals.

**NOTE: Apply force to the outer rim of the rotor shaft seals to prevent seal damage.**



15. Apply light film of grease between the dual lips of the inner rotor shaft seals and on the rotor shaft itself where the shaft seal will be located taking extra care not to apply too much. Excessive grease will be wiped off of the seal during installation onto the rotor shaft and become trapped between the bearing inner race and the shoulder on the rotor shaft. This can wear away during operation resulting in a loose bearing.
16. Position the inner seal cap onto the housing with the push off holes aligned with the counter bore holes in the housing to prevent damage during future maintenance. Install the inner seal cap using the existing capscrews and loctite 271. Torque to 25 ft. lbs.
17. Clean the inner bore surfaces of the bearing of all protective oil coating and apply a light coat of machine oil to the inner race of the bearing and all surfaces of withdrawal sleeve and rotor shaft. Loosely install the withdrawal sleeve into the bearing.
18. Position the bearing assembly onto the rotor shaft and secure in place using the existing .62" hardware and loctite 271. Check that the lower bearing assemblies are correctly oriented. Torque all capscrews to 180 ft. lbs.
19. Install the bearing lock washer. Apply a coat of machine oil to the threads on the bearing lock nut and install the lock nut onto the rotor shaft. Lightly torque to approximately 50 ft. lbs.

# MAINTENANCE & SERVICE

## QUALIFIED TECHNICIAN MAINTENANCE

**NOTE:** Tighten the fixed bearing lock nut first since it provides axial location of rotor.

### 20. FIXED LOWER BEARING ASSEMBLY - ONLY

Torque bearing lock nut to 800 ft. lbs.

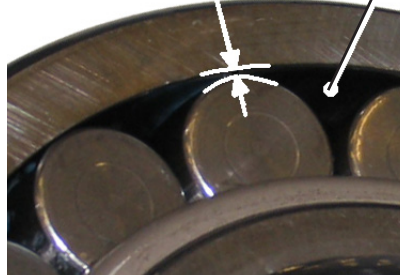
A bearing lock washer tab must align with a slot in bearing lock nut.

***It is recommended to check internal radial clearance of bearings with a feeler gauge.***

- Rotate rotor several times to seat bearing rollers. Fixed bearing should be mounted with minimum 0.0020" of internal radial clearance.
- Using a feeler gauge, insert a 0.0020" blade between two unloaded rollers at top of bearing. Rotate rotor until blade is over a roller. The feeler gauge blade should pull out with minimal force. Continue to rotate rotor and check in four different places.
- If feeler gauge blade cannot be pulled from bearing at all four locations the bearing lock nut is too tight. Remove bearing lock nut and pull withdrawal sleeve out slightly. Repeat process at less torque. **NOTE: if a minimum of 600 ft. lbs. of torque cannot be achieved, contact factory.**
- Remember a bearing lock washer tab must align with a slot in bearing lock nut.

CHECK FOR RECOMMENDED INTERNAL RADIAL CLEARANCE AT TOP OF BEARING

INSERT FEELER GAUGE BLADE HERE AND ROTATE BEARING TO CHECK FOR RECOMMENDED CLEARANCE.



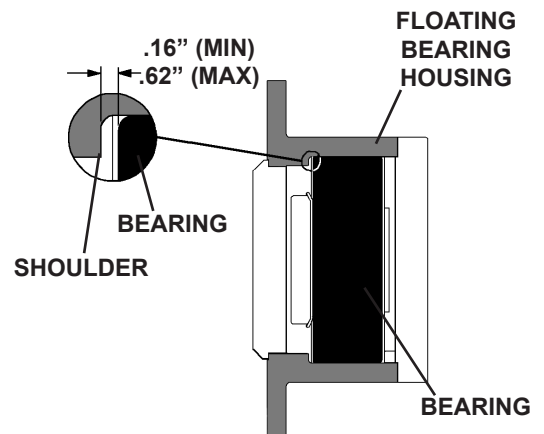
### 20. FLOATING BEARING ASSEMBLY - ONLY

Torque bearing lock nut to 1000 ft. lbs.

A bearing lock washer tab must align with a slot in bearing lock nut.

Check gap between bearing and shoulder on floating lower bearing housing. A gap of .16" min. to .62" max. should remain to allow for thermal expansion and contraction of rotor shaft.

***It is recommended to check internal radial clearance of bearings with a feeler gauge.***



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# MAINTENANCE & SERVICE

## QUALIFIED TECHNICIAN MAINTENANCE

- a. Rotate rotor several times to seat bearing rollers. The floating bearing should be mounted with minimum 0.0015" of internal radial clearance.
  - b. Using a feeler gauge, insert a 0.0015" blade between two unloaded rollers at top of bearing. Rotate rotor until blade is over a roller. The feeler gauge blade should pull out with minimal force. Continue to rotate rotor and check in four different places.
  - c. If feeler gauge blade cannot be pulled from bearing at all four locations, the bearing lock nut is too tight. Remove bearing lock nut and pull withdrawal sleeve out slightly. Repeat process at less torque. **NOTE: if a minimum of 800 ft. lbs. of torque cannot be achieved, contact factory.**
  - d. Remember a bearing lock washer tab must align with a slot in bearing lock nut.
21. Remove rotor supports. After verifying that rotor spins freely, bend lock washer tab over to lock bearing lock nut in place. Never back the bearing lock nut off to align lock washer tab, always tighten bearing lock nut to achieve tab alignment.
  22. Reconnect the relief and grease lines. Pump grease into the bearing assemblies to be sure grease is coming out through the rollers of the bearing.

**NOTE: Use NLGI Grade 2 Lithium grease only. Grease must not contain any graphite or molybdenum additives which will cause premature bearing failure.**

23. With outer seal cap removed, pump grease into bearing housing until it is approximately half full. Do not over grease since this will cause excess heat generation during operation.
24. Apply a light film of grease to o'ring and install on outer seal cap. Pack grease between dual lips of shaft seal. Install outer seal cap onto bearing assembly.

**NOTE: Push off holes in the outer seal cap should be aligned with counter bore holes in housing to prevent damage to housing during future maintenance. Secure in place using existing .25" sockethead capscrews and loctite 271. Torque to 12 ft. lbs.**

25. Reinstall the belt, sprockets and covers following the belt and sprocket installation procedure.

## REPLACING AND/OR SERVICING THE OVERHUNG LOAD ADAPTERS AND HYDRAULIC MOTORS

**NOTE: An overhead hoist is recommended when removing the hydraulic motor and overhung load adapter assembly.**

***NOTICE: Due to the complexity of servicing the drive shaft, bearings and housing, these parts are not replaceable. Hydraulic motor and overhung load adapter maintenance and service is limited to replacing the gasket, seals and o'rings. All other field service will void warranty.***

**REMANUFACTURED OVERHUNG LOAD ADAPTERS ARE AVAILABLE FROM THE FACTORY. (PART #114246R = RIGHT SIDE OVERHUNG LOAD ADAPTER AND PART #114247R = LEFT SIDE OVERHUNG LOAD ADAPTER.) CONTACT CUSTOMER SERVICE FOR DETAILED INSTRUCTIONS. DO NOT DISASSEMBLE.**

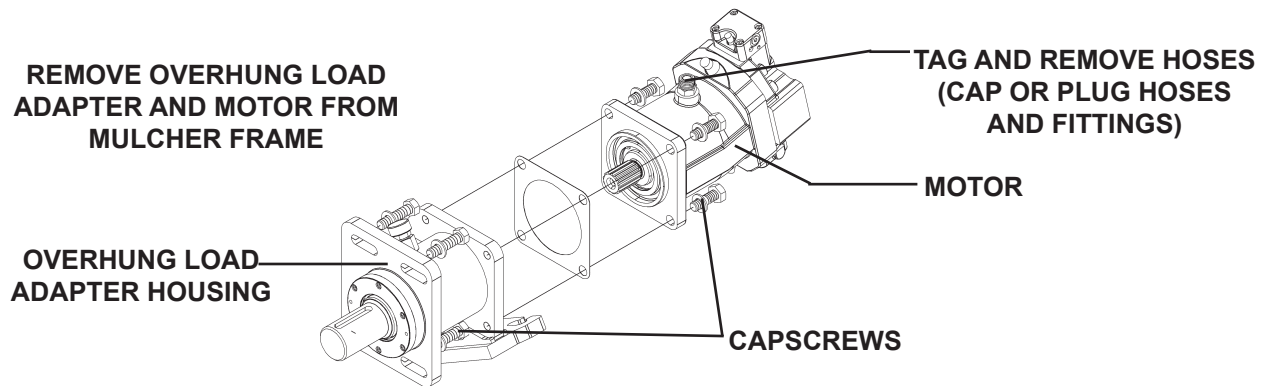
# MAINTENANCE & SERVICE

## QUALIFIED TECHNICIAN MAINTENANCE

### REMOVAL - OVERHUNG LOAD ADAPTER

1. Remove the drive belt. See “**DRIVE BELT TENSIONING AND/OR REMOVAL**”
2. Securely attach hoist to the motor and overhung load adapter housing to support it for removal.
3. Remove the upper sprocket. See “**SPROCKET REMOVAL AND INSTALLATION**”.
4. Tag and remove hoses from the hydraulic motor. Cap or plug hoses and fittings to prevent contaminants from entering the hydraulic system.
5. Remove the tension bolt, adjustment stud and .75” capscrews securing the overhung load adapter to the side of the mulcher mainframe.
6. Slide the motor and housing assembly out of the mulcher mainframe. Drain oil from overhung load adapter housing by removing the drain plug.
7. Place overhung load adapter housing and motor assembly on a clean surface. Remove the cap-screws securing the motor to the housing and separate the housing from the motor.
8. Remove motor gasket and inspect for damage. Replace as required.
9. Inspect motor shaft seal for damage and replace as required.

**NOTE: Field service of internal motor seals will void warranty.**



**IMPORTANT: If installing a remanufactured overhung load adapter, the old overhung load adapter assembly must be returned to the factory with the seal cap removed from the remanufactured assembly and installed on the assembly to be returned to receive maximum credit.**

### INSTALLATION - OVERHUNG LOAD ADAPTER

1. After replacing motor gasket and/or seals (if required) install overhung load adapter over the output shaft on the hydraulic motor and reinstall the existing capscrews. Torque .75” capscrews to 230 ft. lbs.
2. Using an overhead hoist, install motor and overhung load adapter assembly into mulcher mainframe using the existing .75” capscrews and washers, tension bolt and adjustment stud.
3. Install upper sprocket and drive belt. See “**SPROCKET REMOVAL AND INSTALLATION**”.
4. Fill overhung load adapter assembly with oil. All adapter assemblies are shipped from factory without oil. See “**LUBRICATION SPECIFICATIONS**”.
5. Reconnect hydraulic hoses to motor. Torque motor/hose clamp capscrews to 70 ft. lbs.

### OVERHUNG LOAD ADAPTER SEAL REPLACEMENT

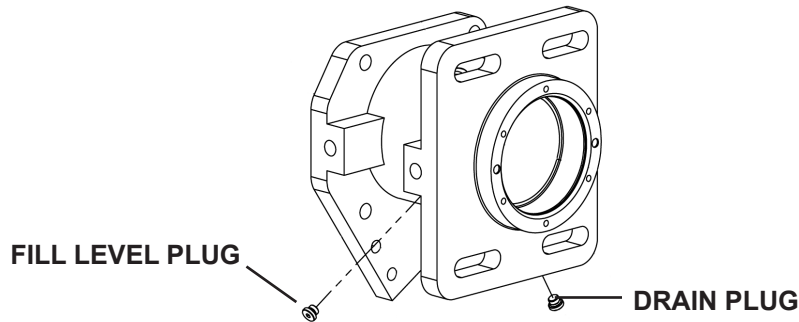
1. Remove the drive belt. See “**DRIVE BELT TENSIONING AND/OR REMOVAL**”
2. Remove the upper sprocket. See “**SPROCKET REMOVAL AND INSTALLATION**”.
3. Drain oil from housing by removing the drain plug.

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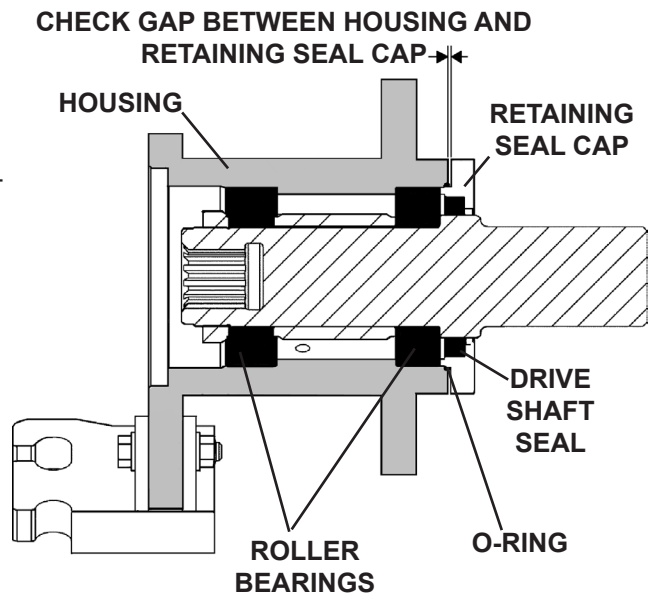
# MAINTENANCE & SERVICE

## QUALIFIED TECHNICIAN MAINTENANCE



4. After ensuring that the capscrews securing the retaining seal cap to the overhung load adapter remain at 25 ft. lbs., check the gap between the retaining seal cap and the adapter housing between capscrews using a feeler gauge. This gap should be between 0.0015" and 0.010".
5. Remove the retaining seal cap. To assist in removal, two capscrews may be installed into the push off holes in the retaining seal cap.
6. If a minimum gap of 0.0015" did not exist between the retaining seal cap and bearing housing inspect the bearing for signs of "creeping". If any signs of bearing creep have been detected, the retaining seal cap should be replaced.

**NOTE:** When the bearing is trying to "creep" out of its normal location and pushing out on the retaining seal cap, there will be signs of wear on the outer rim of the bearing where it comes into contact with the retaining seal cap.



7. Remove drive shaft seal from the retaining seal cap and inspect o'ring for damage. Replace as required.
8. Lubricate drive shaft seal bore of retaining seal cap with light film of grease and install new drive shaft seal.

**NOTE:** Apply force to the outer rim of the drive shaft seal to prevent seal damage.

9. Lubricate o'ring with a light film of grease and install into retaining seal cap.
10. Apply grease to the dual lips of the drive shaft seal and install retaining seal cap onto overhung load adapter assembly. Be careful to not "roll" lips of drive shaft seal during installation.

**NOTE:** Push off holes in the retaining seal cap should be aligned with counter bore holes in housing to prevent damage to housing during future maintenance. Secure in place using existing .31" sockethead capscrews and loctite 271. Torque to 25 ft. lbs.

11. Repeat step #4 to assure a minimum gap of 0.0015" and a maximum gap of 0.010" remains.
12. Install upper sprocket and drive belt. See "SPROCKET REMOVAL AND INSTALLATION".
13. Fill overhung load adapter assembly with oil. See "LUBRICATION SPECIFICATIONS".
14. Replace all covers.

# MAINTENANCE AND SERVICE

## CYLINDER SEAL REPLACEMENT

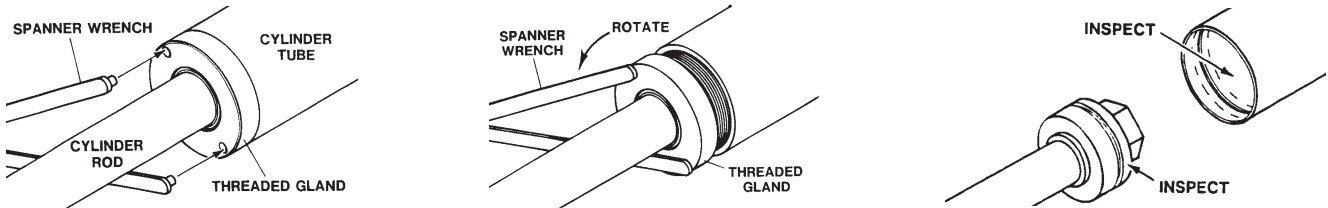
The following information is provided to assist you in the event you should need to repair or rebuild a hydraulic cylinder. When working on hydraulic cylinders, make sure that the work area and tools are clean and free of dirt to prevent contamination of the hydraulic system and damage to the hydraulic cylinders. Always protect the active part of the cylinder rod (the chrome section). Nicks or scratches on the surface of the rod could result in cylinder failure. Clean all parts thoroughly with a cleaning solvent before reassembly.

### DISASSEMBLY PROCEDURE

**IMPORTANT:** Do not contact the active surface of the cylinder rod with the vise. Damage to the rod could result.

#### THREADED TYPE GLAND

1. Rotate the gland with a spanner wrench counterclockwise until the gland is free of the cylinder tube.
2. Pull the cylinder rod from the cylinder tube and inspect the piston and the bore of the cylinder tube for deep scratches or galling. If damaged, the piston AND the cylinder tube must be replaced.



3. Remove the hex nut, piston, flat washer or spacer tube (if so equipped), and gland from the cylinder rod. If the cylinder rod is rusty, scratched, or bent, it must be replaced.
4. Remove and discard all the old seals.

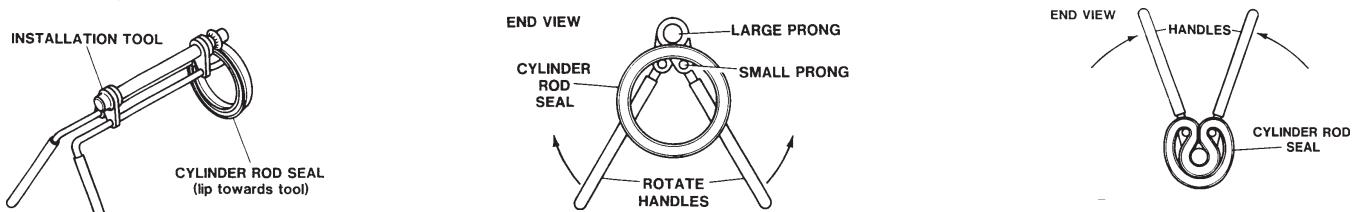


#### ASSEMBLY PROCEDURE

**IMPORTANT:** Replace all seals even if they do not appear to be damaged. Failure to replace all seals may result in premature cylinder failure. **NOTE:** Seal kits will service most cylinders of similar bore size and rod diameter.

1. Install the cylinder rod seal in the gland first. Be careful not to damage the seal in the process, as it is somewhat difficult to install.

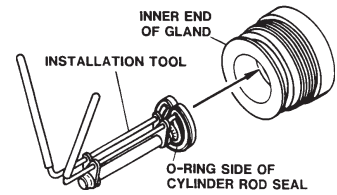
**NOTE:** A special installation tool (Part #65349) is available to help with installing the seal. Simply fit the end of the tool over the seal so that the large prong of the tool is on the outside of the seal, and the two smaller prongs on the inside. The lip of the seal should be facing towards the tool. Rotate the handles on the tool around to wrap the seal around the end of the tool.



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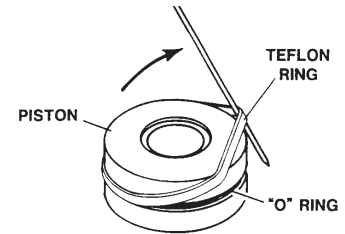
# MAINTENANCE AND SERVICE

Now insert the seal into the gland from the inner end. Position the seal in its groove, and release and remove the tool. Press the seal into its seat the rest of the way by hand.



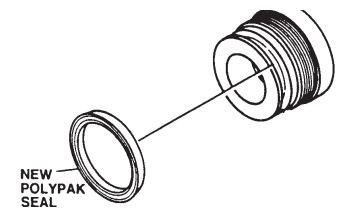
- Install the new piston ring, rod wiper, O-rings and backup washers, if applicable, on the piston.

Be careful not to damage the seals. Caution must be used when installing the piston ring. The ring must be stretched carefully over the piston with a smooth, round, pointed tool.



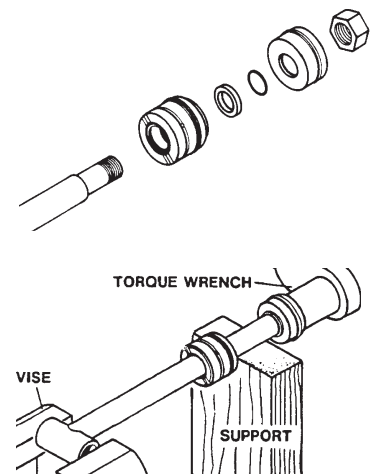
- After installing the rod seal inside the gland, as shown in step #1, install the external seal.

**NOTE:** Threaded glands may have been equipped with a separate O-ring and backup washer system or a polypak (all in one) type seal. Current seal kits contain a polypak (all in one) type seal to replace the discarded seal types on ALL THREADED GLANDS.



- Slide the gland onto the cylinder rod, being careful not to damage the rod wiper. Then install the spacer, or flat washer (if so equipped), small o-ring, piston, and hex nut onto the end of the cylinder rod.
- Secure the cylinder rod (mounting end) in a vise with a support at its center. Torque the nut to the amount shown for the thread diameter of the cylinder rod (see chart).

| Thread Diameter   | POUNDS - FEET |
|---|---------------|
| 7/8"  | 150-200       |
| *1"   | 230-325       |
| 1-1/8"  | 350-480       |
| 1-1/4"  | 490-670       |
| 1-3/8"  | 670-900       |
| <b>* 1" Thread Diameter WITH 1.25" Rod Diameter</b><br><b>Min. 230 ft. lbs. Max. 250 ft. lbs.</b> |               |



**IMPORTANT:** Do not contact the active surface of the cylinder rod with the vise. Damage to the rod could result.

- Apply a lubricant (such as Lubriplate #105) to the piston and teflon ring. Insert the cylinder rod assembly into the cylinder tube.

**IMPORTANT:** Ensure that the piston ring fits squarely into the cylinder tube and piston groove, otherwise the ring may be damaged and a leak will occur.

- Use a spanner wrench to rotate the gland clockwise into the cylinder. Continue to rotate the gland with the spanner wrench until it is tight.

**WARNING!** Cylinders serviced in the field are to be tested for leakage prior to the attachment being placed in work. Failure to test rebuilt cylinders could result in damage to the cylinder and/or the attachment, cause severe personal injury or even death.



# TROUBLESHOOTING

| <u>PROBLEM</u>                           | <u>POSSIBLE CAUSE</u>  | <u>POSSIBLE REMEDY</u>   |
|--|--|--|
| <b>Rotor not turning.</b>                | Auxiliary hoses not hooked up to the prime mover.                      | Check for proper coupler engagement/hose connection.   |
|  | Obstruction in hydraulic lines.  | Remove obstruction and replace if necessary.   |
|  | Hydraulic motor damaged or seals blown.                                | Call Bradco service department for instructions.   |
|  | Auxiliary control valve not engaged.                                   | Verify hydraulic flow using inline flow meter or other attachment.   |
|  | Rocks and debris caught between rotor and mainframe.                   | Remove debris. (See "General Operating Tips")  |
|  | Damaged quick coupler.   | Replace if necessary.  |
|  | Drive belts broken.  | Replace both drive belts.  |
|  | Improper hose connection.  | Switch power and return hoses.   |
|  | Check valve cartridge in main manifold block is damaged.               | Inspect and replace check valve cartridge as required.   |
| <b>Rotor rotates sluggishly.</b>         | Insufficient hydraulic flow from the prime mover.                      | Refer to prime mover owners manual and verify hydraulic flow using an inline flow meter or other attachment.                 |
|  | Damaged quick coupler.   | Replace if necessary.  |
|  | Hydraulic motor damaged or seals blown.                                | Call Bradco service department for instructions.   |
|  | Oil or fuel filter on prime mover needs replaced.                      | Refer to prime mover owners manual.  |
|  | A broken drive belt (one).   | Replace and check second drive belt.   |
|  | Check valve cartridge in main manifold block is damaged.               | Inspect and replace check valve cartridge as required.   |
|  | Relief valve setting adjusted too low on prime mover or main manifold. | Refer to prime mover owners manual. Check relief pressures. (Prime mover should always relieve pressure before the mulcher.) |
| <b>Hydraulic cylinder not operating.</b> | Insufficient hydraulic flow from the prime mover.                      | Refer to prime mover owners manual and verify hydraulic flow using an inline flow meter or other attachment.                 |
|  | Cylinder rod bent.   | Visually inspect the cylinder for damage.  |
|  | Cylinder seals damaged.  | Replace cylinder seals.  |
|  | Obstruction in hydraulic lines.  | Remove obstruction and replace if necessary.   |
|  | Push over bar cylinder only: Cartridge in flow divider valve damaged.  | Inspect and replace flow divider cartridge as required.  |

11551 4-13-12-2

# TROUBLESHOOTING

| <b><u>PROBLEM</u></b>             | <b><u>POSSIBLE CAUSE</u></b>  | <b><u>POSSIBLE REMEDY</u></b>  |
|-----------------------------------|---|--|
| <b>Insufficient power.</b>        | Insufficient hydraulic flow from the prime mover.                         | Refer to prime mover owners manual and verify hydraulic flow using an inline flow meter or other attachment.                 |
|                                   | Relief valve setting adjusted too low on prime mover or main manifold.    | Refer to prime mover owners manual. Check relief pressures. (Prime mover should always relieve pressure before the mulcher.) |
|                                   | Hydraulic motor damaged or seals blown.                                   | Call Bradco service department for instructions.   |
|                                   | Oil or fuel filter on prime mover needs replaced.                         | Refer to prime mover owners manual.  |
|                                   | Incorrect motor displacement setting.                                     | Reset motor displacement for your prime mover. See Set-Up Instructions.  |
|                                   | Check valve cartridge in main manifold block is damaged.                  | Inspect and replace check valve cartridge as required.   |
|                                   | Damaged quick coupler.  | Replace if necessary.  |
| <b>Excessive oil temperature.</b> | Hydraulic oil level too low.  | Refer to prime mover owners manual.  |
|                                   | Obstruction in hydraulic lines.   | Remove obstruction and replace if necessary.   |
|                                   | Hydraulic oil or oil filter in prime mover needs replaced.                | Refer to prime mover owners manual.  |
|                                   | Relief valve setting adjusted too low on prime mover or main manifold.    | Refer to prime mover owners manual. Check relief pressures. (Prime mover should always relieve pressure before the mulcher.) |
|                                   | Obstructed radiator/cooler on prime mover.                                | Clean radiator/cooler.   |
|                                   | Incorrect motor displacement setting.                                     | Reset motor displacement for your prime mover. See Set-Up Instructions.  |
|                                   | Operating the mulcher at maximum pressure for an extended amount of time. | Slow down the speed and/or the down pressure on the mulcher until operating below maximum pressure.                          |
| <b>Drive belt cracking.</b>       | Excessive low temperatures.   | Moderate temperatures, especially at start up.   |
|                                   | Exposed to oil solvents/chemicals.  | Eliminate exposure to chemicals and shield drive.  |
|                                   | Incorrect drive belt tension.   | Re-tension belt. See Belt Tensioning.  |
|                                   | Sprocket's misaligned.  | Align sprockets using straight edge.   |

# TROUBLESHOOTING

| <u>PROBLEM</u>  | <u>POSSIBLE CAUSE</u>  | <u>POSSIBLE REMEDY</u>   |
|---|--|--|
| <b>Leaking Oil.</b>   | Loose or damaged hydraulic line.                                       | Tighten or replace.  |
|   | Overhung load adapter failure.   | Replace if necessary.  |
|   | O'Rings on fittings damaged.   | Replace if necessary.  |
|   | Hydraulic motor damaged or seals blown.                                | Call Bradco service department for instructions.   |
|   | Fittings loose or damaged.   | Tighten or replace.  |
|   | Cylinder seals damaged.  | Replace cylinder seals.  |
|   | Case drain not properly connected or coupler damaged.                  | Engage coupler or replace. Check hose connections.                                       |
|   | Case drain hose pinched.   | Check hose routing and adjust as required.   |
| <b>Hydraulic cylinders only operating in one direction.</b>         | Contaminants in the hydraulic system.                                  | Refer to prime mover owners manual.  |
|   | Push over bar cylinders only: Cartridge in flow divider valve damaged. | Inspect and replace flow divider cartridge as required.                                  |
| <b>Push over bar cylinders not extending or retracting equally.</b> | Repeatedly limiting cylinder stroke.                                   | Run push over bar cylinders through their full cycle until flow divider valve has reset. |
| <b>Excessive or uneven tooth wear on drive belt.</b>                | Incorrect drive belt tension.  | Re-tension belt. See Belt Tensioning.  |
|   | Sprocket(s) misaligned.  | Align sprockets using a straight edge.   |
|   | Sprocket(s) worn.  | Replace if necessary.  |
|   | Debris in drive assembly.  | Remove debris and replace covers.  |
| <b>Drive belt skipping or ratcheting.</b>                           | Drive belt under tensioned.  | Re-tension belt. See Belt Tensioning.  |
|   | Sprocket(s) worn.  | Replace worn sprocket(s).  |
|   | Debris in drive assembly.  | Remove debris and replace covers.  |
|   | Insufficient warm up time.   | Follow correct warm up procedure.  |
| <b>Excessive vibration during operation.</b>                        | Teeth are worn, broken or missing.                                     | Inspect and replace as necessary.  |
|   | Bearing failure.   | Inspect and replace as necessary.  |
|   | Rotor obstruction.   | Clear all debris from rotor and teeth. (See General Operating Tips)                      |
|   | Incorrect drive belt tension.  | Re-tension belt. See Belt Tensioning.  |




# BOLT TORQUE SPECIFICATIONS

## GENERAL TORQUE SPECIFICATION TABLES

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




## SAE BOLT TORQUE SPECIFICATIONS

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

| Bolt Size |             | SAE GRADE 5 TORQUE |      |               |      | SAE GRADE 8 TORQUE |      |               |      | Bolt head identification marks as per grade. NOTE: Manufacturing Marks Will Vary   |
|-----------|-------------|--------------------|------|---------------|------|--------------------|------|---------------|------|--|
|           |             | Pounds Feet        |      | Newton-Meters |      | Pounds Feet        |      | Newton-Meters |      |  |
| Inches    | Millimeters | UNC                | UNF  | UNC           | UNF  | UNC                | UNF  | UNC           | UNF  |  |
| 1/4       | 6.35        | 8                  | 9    | 11            | 12   | 10                 | 13   | 14            | 18   | <p>GRADE 2</p>  <p>GRADE 5</p>  <p>GRADE 8</p>  |
| 5/16      | 7.94        | 14                 | 17   | 19            | 23   | 20                 | 25   | 27            | 34   |  |
| 3/8       | 9.53        | 30                 | 36   | 41            | 49   | 38                 | 46   | 52            | 62   |  |
| 7/16      | 11.11       | 46                 | 54   | 62            | 73   | 60                 | 71   | 81            | 96   |  |
| 1/2       | 12.70       | 68                 | 82   | 92            | 111  | 94                 | 112  | 127           | 152  |  |
| 9/16      | 14.29       | 94                 | 112  | 127           | 152  | 136                | 163  | 184           | 221  |  |
| 5/8       | 15.88       | 128                | 153  | 174           | 207  | 187                | 224  | 254           | 304  |  |
| 3/4       | 19.05       | 230                | 275  | 312           | 373  | 323                | 395  | 438           | 536  |  |
| 7/8       | 22.23       | 340                | 408  | 461           | 553  | 510                | 612  | 691           | 830  |  |
| 1         | 25.40       | 493                | 592  | 668           | 803  | 765                | 918  | 1037          | 1245 |  |
| 1-1/8     | 25.58       | 680                | 748  | 922           | 1014 | 1088               | 1224 | 1475          | 1660 |  |
| 1-1/4     | 31.75       | 952                | 1054 | 1291          | 1429 | 1547               | 1700 | 2097          | 2305 |  |
| 1-3/8     | 34.93       | 1241               | 1428 | 1683          | 1936 | 2023               | 2312 | 2743          | 3135 |  |
| 1-1/2     | 38.10       | 1649               | 1870 | 2236          | 2535 | 2686               | 3026 | 3642          | 4103 |  |

## METRIC BOLT TORQUE SPECIFICATIONS

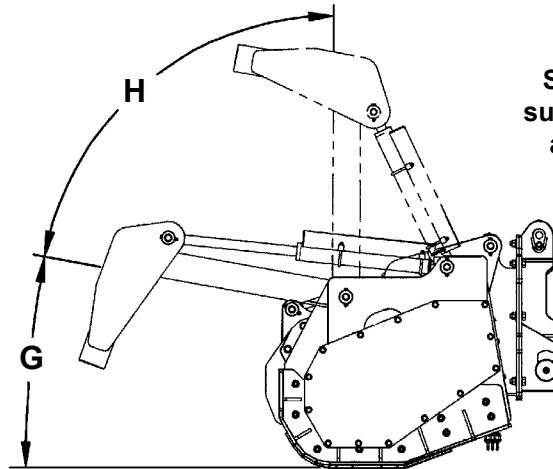
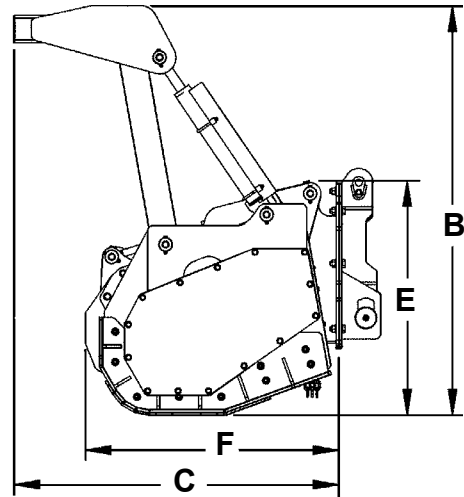
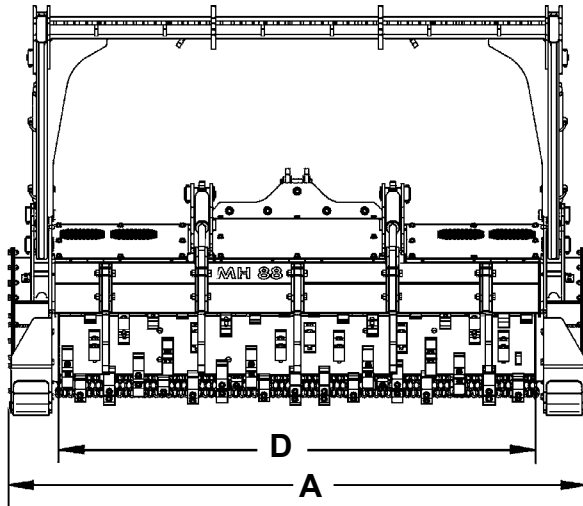
**NOTE:** The following torque values are for use with metric hardware that is unplated and either dry or lubricated with engine oil. Reduce torque 15% when using hardware that has extreme pressure lubricants, plating or hard washer applications.

| Bolt head identification marks as per grade.   |   |   |
|--|---|---|
|  |  |  |

| Size of Bolt | Grade No. | Pitch (mm) | Pounds Feet | Newton-Meters | Pitch (mm) | Pounds Feet | Newton-Meters |
|--------------|-----------|------------|-------------|---------------|------------|-------------|---------------|
| M6           | 5.6       | 1.0        | 3.6-5.8     | 4.9-7.9       | -          | -           | -             |
|              | 8.8       |            | 5.8-4       | 7.9-12.7      |            | -           | -             |
|              | 10.9      |            | 7.2-10      | 9.8-13.6      |            | -           | -             |
| M8           | 5.6       | 1.25       | 7.2-14      | 9.8-19        | 1.0        | 12-17       | 16.3-23       |
|              | 8.8       |            | 17-22       | 23-29.8       |            | 19-27       | 25.7-36.6     |
|              | 10.9      |            | 20-26       | 27.1-35.2     |            | 22-31       | 29.8-42       |
| M10          | 5.6       | 1.5        | 20-25       | 27.1-33.9     | 1.25       | 20-29       | 27.1-39.3     |
|              | 8.8       |            | 34-40       | 46.1-54.2     |            | 35-47       | 47.4-63.7     |
|              | 10.9      |            | 38-46       | 51.5-62.3     |            | 40-52       | 54.2-70.5     |
| M12          | 5.6       | 1.75       | 28-34       | 37.9-46.1     | 1.25       | 31-41       | 42-55.6       |
|              | 8.8       |            | 51-59       | 69.1-79.9     |            | 56-68       | 75.9-92.1     |
|              | 10.9      |            | 57-66       | 77.2-89.4     |            | 62-75       | 84-101.6      |
| M14          | 5.6       | 2.0        | 49-56       | 66.4-75.9     | 1.5        | 52-64       | 70.5-86.7     |
|              | 8.8       |            | 81-93       | 109.8-126     |            | 90-106      | 122-143.6     |
|              | 10.9      |            | 96-109      | 130.1-147.7   |            | 107-124     | 145-168       |
| M16          | 5.6       | 2.0        | 67-77       | 90.8-104.3    | 1.5        | 69-83       | 93.5-112.5    |
|              | 8.8       |            | 116-130     | 157.2-176.2   |            | 120-138     | 162.6-187     |
|              | 10.9      |            | 129-145     | 174.8-196.5   |            | 140-158     | 189.7-214.1   |
| M18          | 5.6       | 2.0        | 88-100      | 119.2-136     | 1.5        | 100-117     | 136-158.5     |
|              | 8.8       |            | 150-168     | 203.3-227.6   |            | 177-199     | 239.8-269.6   |
|              | 10.9      |            | 175-194     | 237.1-262.9   |            | 202-231     | 273.7-313     |
| M20          | 5.6       | 2.5        | 108-130     | 146.3-176.2   | 1.5        | 132-150     | 178.9-203.3   |
|              | 8.8       |            | 186-205     | 252-277.8     |            | 206-242     | 279.1-327.9   |
|              | 10.9      |            | 213-249     | 288.6-337.4   |            | 246-289     | 333.3-391.6   |

# SPECIFICATIONS

## 88" MULCHERS



**Specifications and design are subject to change without notice and without liability therefor.**

| DESCRIPTION                               | MH88-3H                      | MH88-4H                     |
|---|------------------------------|-----------------------------|
| A. Overall Width .....                    | 106.50"                      | 106.50"                     |
| B. Overall Height .....                   | 75.25"                       | 75.25"                      |
| C. Overall Length.....                    | 59.75"                       | 59.75"                      |
| D. Cutting Width .....                    | 88.00"                       | 88.00"                      |
| E. Height Without Push Over Bar.....      | 43.13"                       | 43.13"                      |
| F. Length Without Push Over Bar .....     | 46.63"                       | 46.63"                      |
| G. Minimum Push Bar Angle.....            | 10°                          | 10°                         |
| H. Push Bar Working Range .....           | 80°                          | 80°                         |
| Operating Pressure (PSI).....             | 5000-5800                    | 5000-5800                   |
| Hydraulic Flow (GPM).....                 | 100-120                      | 120-135                     |
| Required Hydraulic Horsepower (HP).....   | 275-350                      | 350-425                     |
| Number of Teeth .....                     | 64                           | 64                          |
| Weight (LBS) (not including mount).....   | 6850#                        | 6850#                       |
| <b><u>Auxiliary Hydraulic Circuit</u></b> |                              |                             |
| Maximum Operating Pressure (PSI).....     | 3000                         | 3000                        |
| Maximum Hydraulic Flow (GPM) .....        | 16                           | 16                          |
| <b><u>Cylinder Specifications</u></b>     |                              |                             |
|   | <b><u>Deflector Door</u></b> | <b><u>Push Over Bar</u></b> |
| Bore .....                                | 2.00"                        | 2.75"                       |
| Rod Diameter.....                         | 1.25"                        | 1.75"                       |
| Stroke.....                               | 14.56"                       | 20.00"                      |



# Limited Warranty

Except for the Excluded Products as described below, all new products are warranted to be free from defects in material and/or workmanship during the Warranty Period, in accordance with and subject to the terms and conditions of this Limited Warranty.

1. Excluded Products. The following products are excluded from this Limited Warranty:

(a) Any cable, part that engages with the ground (i.e. sprockets), digging chain, bearing, teeth, tamping and/or demolition head, blade cutting edge, pilot bit, auger teeth and broom brush that either constitutes or is part of a product.

(b) Any product, merchandise or component that, in the opinion of Paladin Light Construction<sup>1</sup>, has been (i) misused; (ii) modified in any unauthorized manner; (iii) altered; (iv) damaged; (v) involved in an accident; or (vi) repaired using parts not obtained through Paladin Light Construction.

2. Warranty Period. The Limited Warranty is provided only to those defects that occur during the Warranty Period, which is the period that begins on the first to occur of: (i) the date of initial purchase by an end-user, (ii) the date the product is first leased or rented, or (iii) the date that is six (6) months after the date of shipment by Paladin Light Construction as evidenced by the invoiced shipment date (the "Commencement Date") and ends on the date that is twelve (12) months after the Commencement Date.

3. Terms and Conditions of Limited Warranty. The following terms and conditions apply to the Limited Warranty hereby provided:

(a) Option to Repair or Replace. Paladin Light Construction shall have the option to repair or replace the product.

(b) Timely Repair and Notice. In order to obtain the Limited Warranty, (i) the product must be repaired within thirty (30) days from the date of failure, and (ii) a claim under the warranty must be submitted to Paladin Light Construction in writing within thirty (30) days from the date of repair.

(c) Return of Defective Part or Product. If requested by Paladin Light Construction, the alleged defective part or product shall be shipped to Paladin Light Construction at its manufacturing facility or other location specified by Paladin Light Construction, with freight PRE-PAID by the claimant, to allow Paladin Light Construction to inspect the part or product.

Claims that fail to comply with any of the above terms and conditions shall be denied.

## **LIMITATIONS AND EXCLUSIONS.**

**THIS LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND ANY WARRANTY BASED ON A COURSE OF DEALING OR USAGE OF TRADE.**

**IN NO EVENT SHALL PALADIN LIGHT CONSTRUCTION BE LIABLE FOR CONSEQUENTIAL OR SPECIAL DAMAGES.**

**IN NO EVENT SHALL PALADIN LIGHT CONSTRUCTION BE LIABLE FOR ANY LOSS OR CLAIM IN AN AMOUNT IN EXCESS OF THE PURCHASE PRICE, OR, AT THE OPTION OF PALADIN LIGHT CONSTRUCTION, THE REPAIR OR REPLACEMENT, OF THE PARTICULAR PRODUCT ON WHICH ANY CLAIM OF LOSS OR DAMAGE IS BASED. THIS LIMITATION OF LIABILITY APPLIES IRRESPECTIVE OF WHETHER THE CLAIM IS BASED ON BREACH OF CONTRACT, BREACH OF WARRANTY, NEGLIGENCE OR OTHER CAUSE AND WHETHER THE ALLEGED DEFECT IS DISCOVERABLE OR LATENT.**

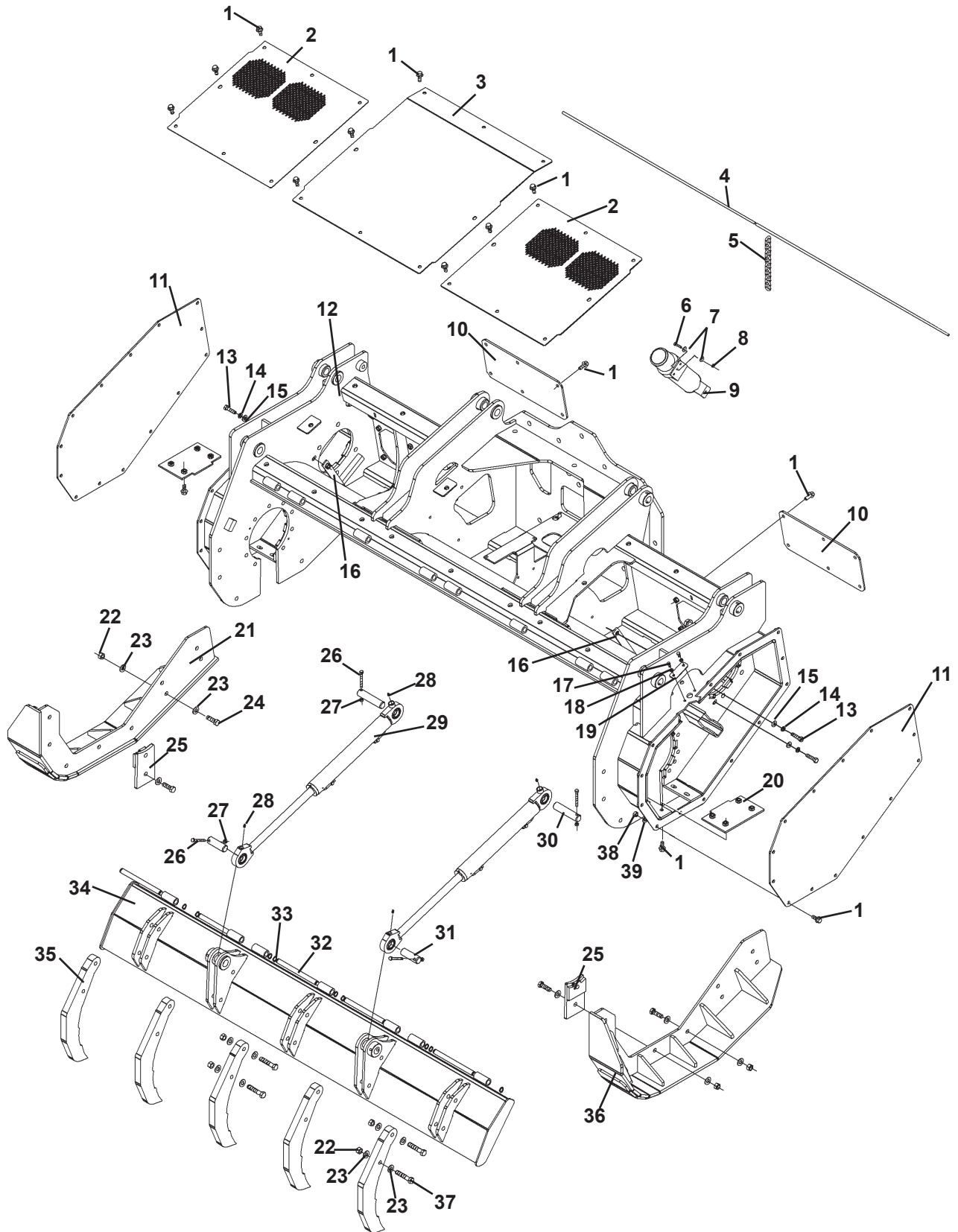
<sup>1</sup>Attachment Technologies Inc., a subsidiary of Paladin Brands Holding, Inc. (PBHI) is referred to herein as Paladin Light Construction.

# 88" MULCHER ASSEMBLIES

MH88-3H MULCHER ASSEMBLY - 300HP #116823

MH88-4H MULCHER ASSEMBLY - 400HP #116824

## MAINFRAME



12164 4-13-12

## 88" MULCHER ASSEMBLIES

MH88-3H MULCHER ASSEMBLY - 300HP #116823

MH88-4H MULCHER ASSEMBLY - 400HP #116824

### MAINFRAME

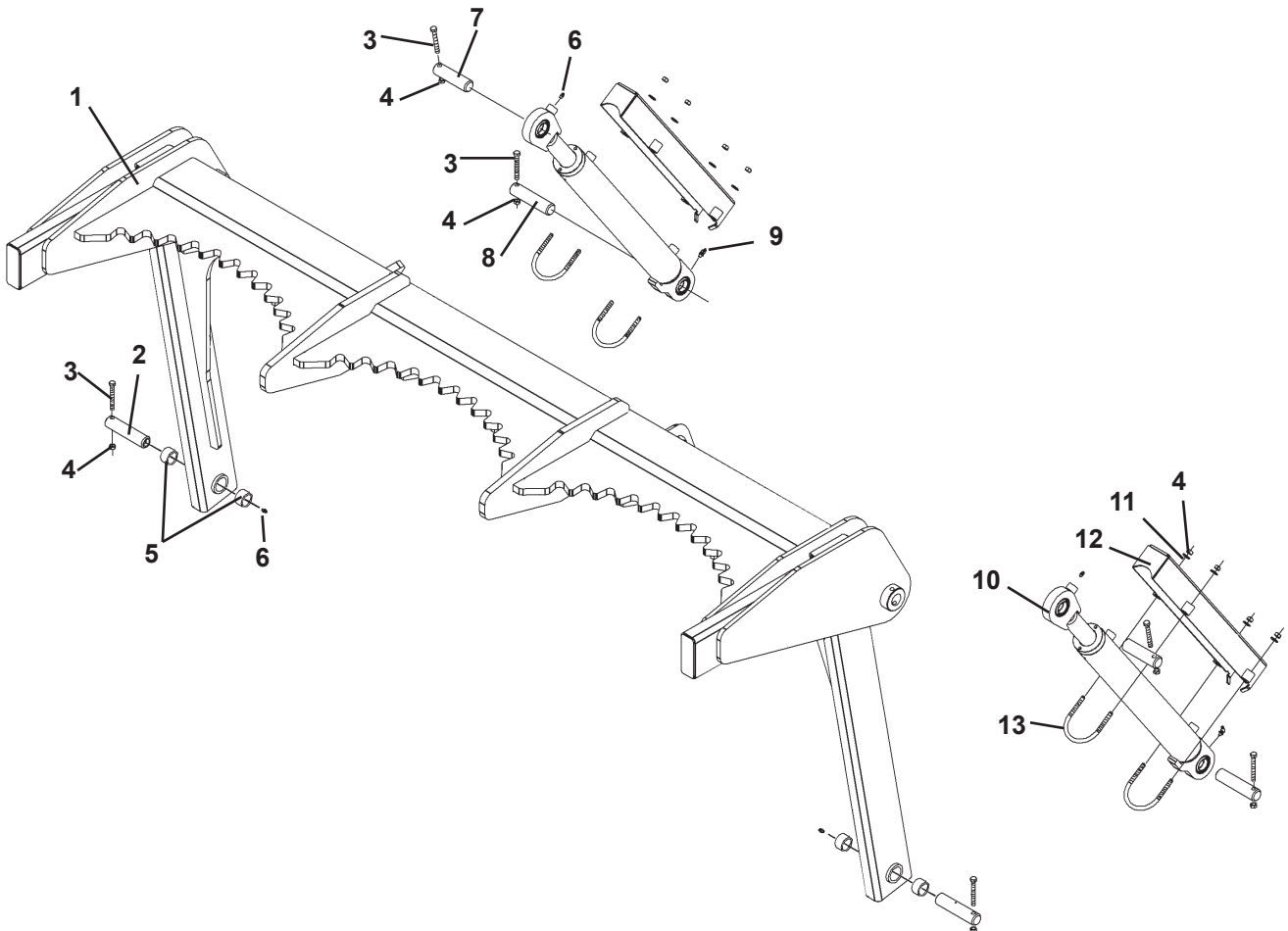
| <u>ITEM</u> | <u>REQ'D</u> | <u>PART NO.</u> | <u>DESCRIPTION</u>  |
|-------------|--------------|-----------------|---|
| 1           | 72           | 10221           | .50" UNC X 1.25" Serrated Flange Hex Capscrew                     |
| 2           | 2            | 116641          | Outside Compartment Cover   |
| 3           | 1            | 116642          | Center Compartment Cover  |
| 4           | 6            | 111963          | Chain Holder Bar  |
| 5           | 118          | 801-260         | Chain   |
| 6           | 2            | 1023            | .31" UNC X 1.25" Hex Capscrew                                     |
| 7           | 4            | 1513            | .31" Flat Washer  |
| 8           | 2            | 1934            | .31" UNC Deformed Lock Nut  |
| 9           | 1            | 25453           | Manual Storage Tube   |
| 10          | 2            | 111987          | Maintenance Cover   |
| 11          | 2            | 111957          | Drive Belt Cover  |
| 12          | 1            | 111891          | Mainframe   |
| 13          | 4            | 1092            | .50" UNC X 2.00" Hex Capscrew                                     |
| 14          | 4            | 1505            | .50" Lock Washer  |
| 15          | 4            | 1646            | .50" Hard Flat Washer   |
| 16          | 2            | 114444          | Housing Seal  |
| 17          | 4            | 1021            | .31" UNC X .75" Hex Capscrew                                      |
| 18          | 4            | 1502            | .31" Lock Washer  |
| 19          | 2            | 110175          | Belt Tension Access Cover   |
| 20          | 2            | 112719          | Drive Housing Filler Plate (Install capscrews using Loctite 271.) |
| 21          | 1            | 113197          | Right Skid Shoe   |
|             | -            | 112715          | Replacement Skid Shoe Wear Plate                                  |
| 22          | 28           | 1839            | .62" UNC Deformed Lock Nut  |
| 23          | 56           | 1627            | .62" Hard Flat Washer   |
| 24          | 18           | 1116            | .62" UNC X 2.00" Hex Capscrew                                     |
| 25          | 2            | 112716          | Side Plate Filler   |
| 26          | 4            | 1051            | .38" UNC X 3.00" Hex Capscrew                                     |
| 27          | 4            | 1837            | .38" UNC Deformed Lock Nut  |
| 28          | 4            | 6616            | Grease Fitting  |
| 29          | 2            | 112721          | Deflector Door Cylinder   |
|             | -            | 45822           | Replacement Seal Kit  |
| 30          | 2            | 112713          | Pivot Pin 5.56" Long  |
| 31          | 2            | 111961          | Pivot Pin 3.81" Long  |
| 32          | 5            | 111962          | Pivot Pin 9.50" Long  |
| 33          | 10           | 10222           | Snap Ring   |
| 34          | 1            | 112725          | Deflector Door  |
| 35          | 5            | 111959          | Deflector Door Grapple Tooth                                      |
| 36          | 1            | 113198          | Left Skid Shoe  |
|             | -            | 112715          | Replacement Skid Shoe Wear Plate                                  |
| 37          | 10           | 1121            | .62" UNC X 3.25" Hex Capscrew                                     |
| 38          | 28           | 1841            | .50" UNC Deformed Lock Nut  |
| 39          | 28           | 1527            | .50" Flat Washer  |

# 88" MULCHER ASSEMBLIES

MH88-3H MULCHER ASSEMBLY - 300HP #116823

MH88-4H MULCHER ASSEMBLY - 400HP #116824

PUSH OVER BAR



## 88" MULCHER ASSEMBLIES

MH88-3H MULCHER ASSEMBLY - 300HP #116823

MH88-4H MULCHER ASSEMBLY - 400HP #116824

### PUSH OVER BAR

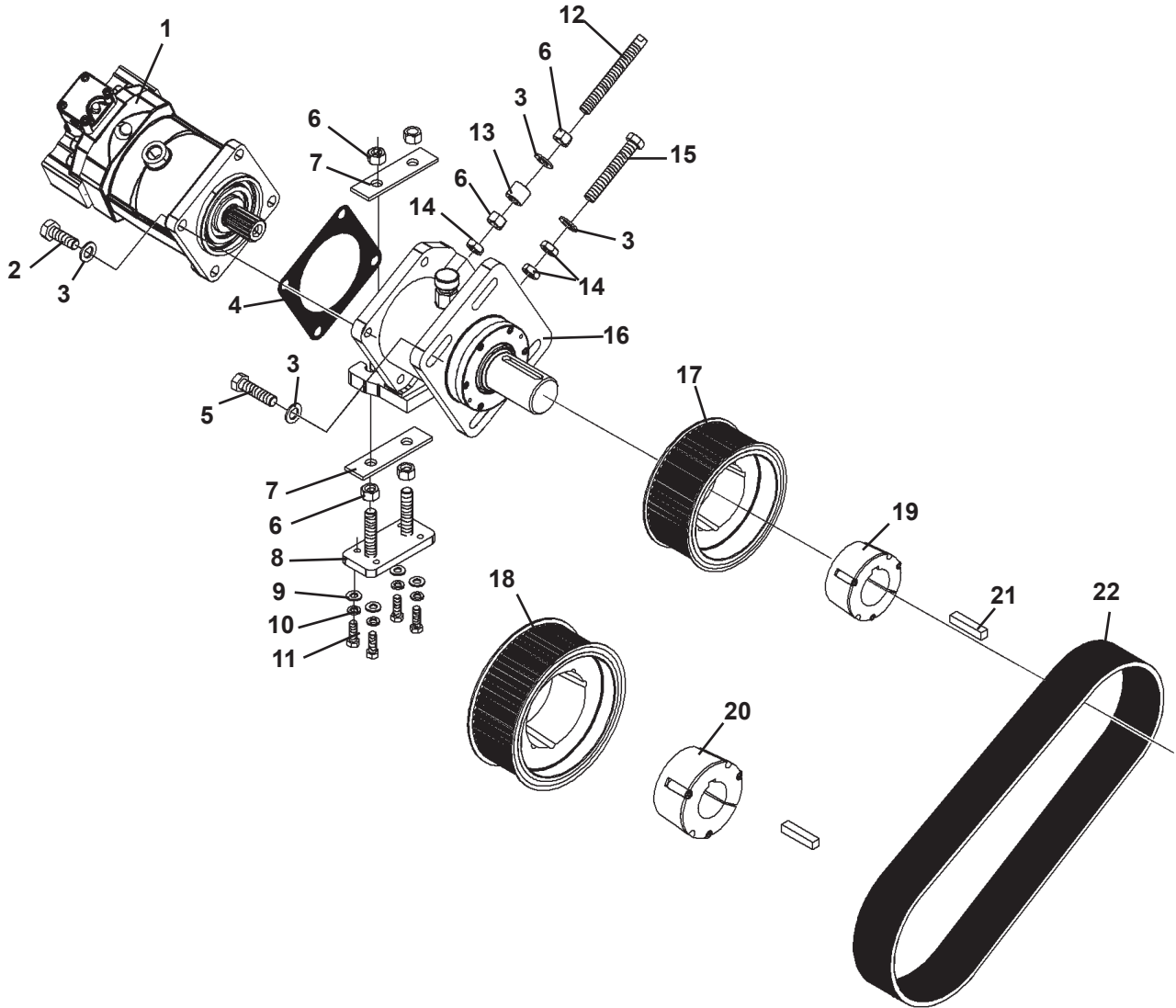
| <u>ITEM</u> | <u>REQ'D</u> | <u>PART NO.</u> | <u>DESCRIPTION</u>              |
|-------------|--------------|-----------------|---------------------------------|
| 1           | 1            | 113196          | Push Over Bar                   |
| 2           | 2            | 111960          | Pivot Pin 5.31" Long            |
| 3           | 6            | 1051            | .38" UNC X 3.00" Hex Capscrew   |
| 4           | 14           | 1837            | .38" UNC Deformed Lock Nut      |
| 5           | 4            | 65203           | Split Bushing                   |
| 6           | 4            | 6616            | Grease Fitting                  |
| 7           | 2            | 111983          | Pivot Pin 4.56" Long            |
| 8           | 2            | 111982          | Pivot Pin 5.31" Long            |
| 9           | 2            | 84688           | 45° Grease Fitting              |
| 10          | 2            | 113576          | Cylinder Assembly               |
|             |              | 45552           | Replacement Seal Kit            |
| 11          | 8            | 1525            | .38" Flat Washer                |
| 12          | 2            | 113584          | Hose Guard                      |
| 13          | 4            | 10223           | .38" UNC X 3.50" X 4.13" U-Bolt |

# 88" MULCHER ASSEMBLIES

MH88-3H MULCHER ASSEMBLY - 300HP #116823

MH88-4H MULCHER ASSEMBLY - 400HP #116824

LEFT AND RIGHT DRIVE ASSEMBLY



## 88" MULCHER ASSEMBLIES

MH88-3H MULCHER ASSEMBLY - 300HP #116823

MH88-4H MULCHER ASSEMBLY - 400HP #116824

LEFT AND RIGHT DRIVE ASSEMBLY

| <u>ITEM</u> | <u>REQ'D</u> | <u>PART NO.</u> | <u>DESCRIPTION</u>   |
|-------------|--------------|-----------------|--|
| 1           | 2            | 112000          | Hydraulic Motor  |
|             | -            | 46066           | Replacement Motor Shaft Seal   |
| 2           | 8            | 1140            | .75" UNC X 2.25" Hex Capscrew  |
| 3           | 20           | 1649            | .75" Hard Flat Washer  |
| 4           | 2            | 106948          | Motor Gasket   |
| 5           | 8            | 1143            | .75" UNC X 3.00" Hex Capscrew (Torque to 250 ft. lbs.)   |
| 6           | 12           | 1231            | .75" UNC Hex Nut   |
| 7           | 4            | 116388          | Overhung Load Adapter Washer Plate   |
| 8           | 2            | 111988          | Overhung Load Adapter Mounting Bracket   |
| 9           | 8            | 1646            | .50" Hard Flat Washer  |
| 10          | 8            | 1505            | .50" Lock Washer   |
| 11          | 8            | 1090            | .50" UNC X 1.50" Hex Capscrew (Install with Loctite 271.)  |
| 12          | 2            | 113994*         | Adjustment Stud  |
| 13          | 2            | 115207          | Spacer   |
| 14          | 6            | 1245            | .75" UNC Jam Nut   |
| 15          | 2            | 10205*          | Tensioning Bolt  |
| 16          | 1            | 114246          | Right Overhung Load Adapter<br>(Refer to Maintenance Section when ordering replacement adapter.) |
|             | 1            | 114247          | Left Overhung Load Adapter<br>(Refer to Maintenance Section when ordering replacement adapter.)  |
| 17          | 2            | 113597          | 53 Tooth Sprocket - 300 HP   |
|             | 2            | 113600          | 50 Tooth Sprocket - 400 HP   |
| 18          | 2            | 113598          | 60 Tooth Sprocket - 300 HP   |
|             | 2            | 113601          | 63 Tooth Sprocket - 400 HP   |
| 19          | 2            | 113595          | Taper Lock Bushing (3525 X 2.750) (Torque set screws to 84 ft. lbs.)                             |
| 20          | 2            | 113596          | Taper Lock Bushing (4030 X 2.750) (Torque set screws to 142 ft. lbs.)                            |
| 21          | 4            | 113603          | Key  |
| 22          | 2            | 113602          | Drive Belt   |

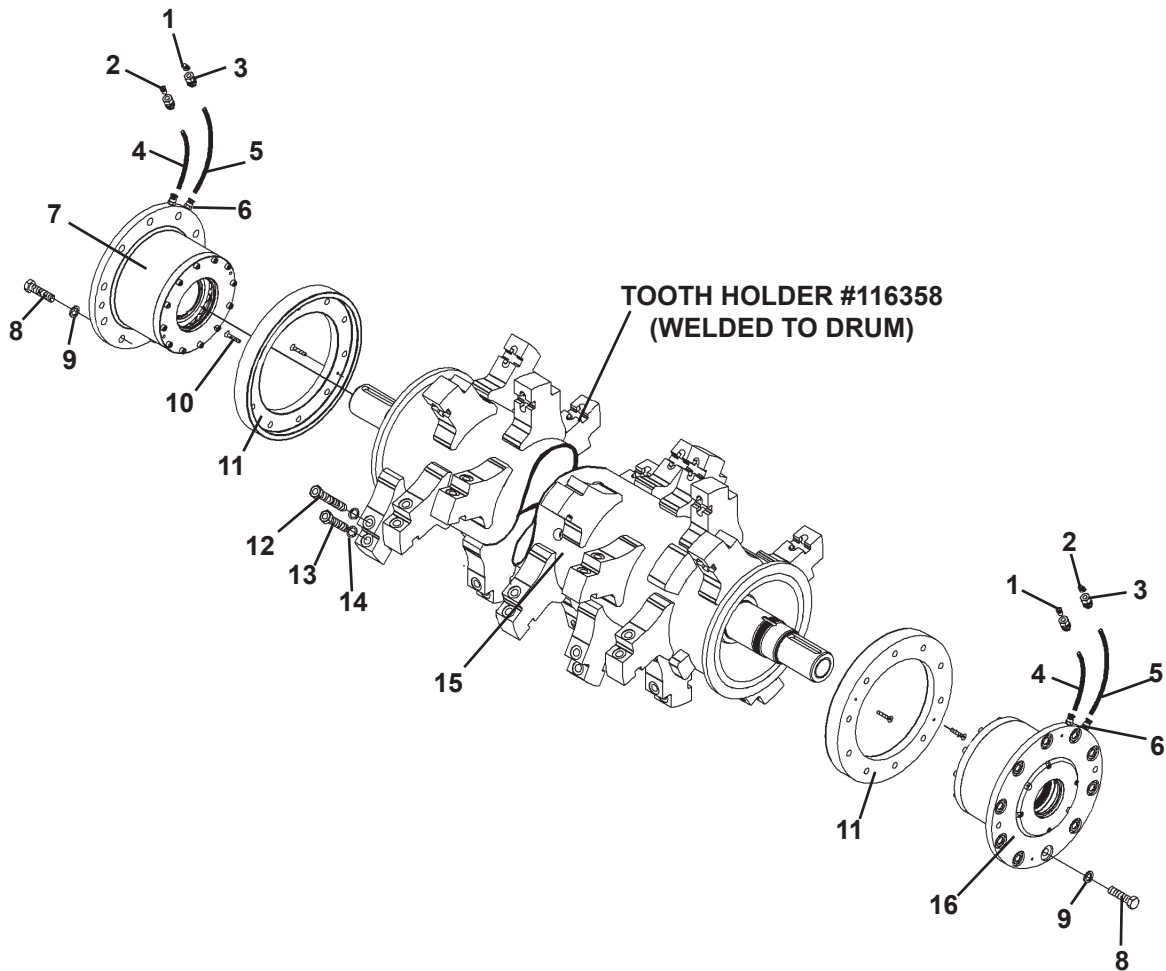
**NOTE: Use Tensioning Bolt #10205 and Adjustment Stud #113994 to align sprockets. Maximum mis-alignment is .25" or .0625" per linear foot.**

# 88" MULCHER ASSEMBLIES

MH88-3H MULCHER ASSEMBLY - 300HP #116823

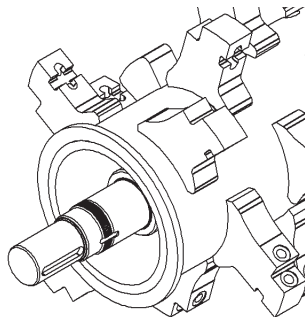
MH88-4H MULCHER ASSEMBLY - 400HP #116824

## ROTOR ASSEMBLY

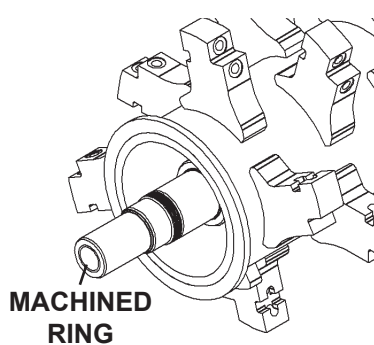


### LOWER BEARING / ROTOR END IDENTIFICATION

#### FIXED BEARING ASSEMBLY



#### FLOATING BEARING ASSEMBLY





## 88" MULCHER ASSEMBLIES

MH88-3H MULCHER ASSEMBLY - 300HP #116823

MH88-4H MULCHER ASSEMBLY - 400HP #116824

### ROTOR ASSEMBLY

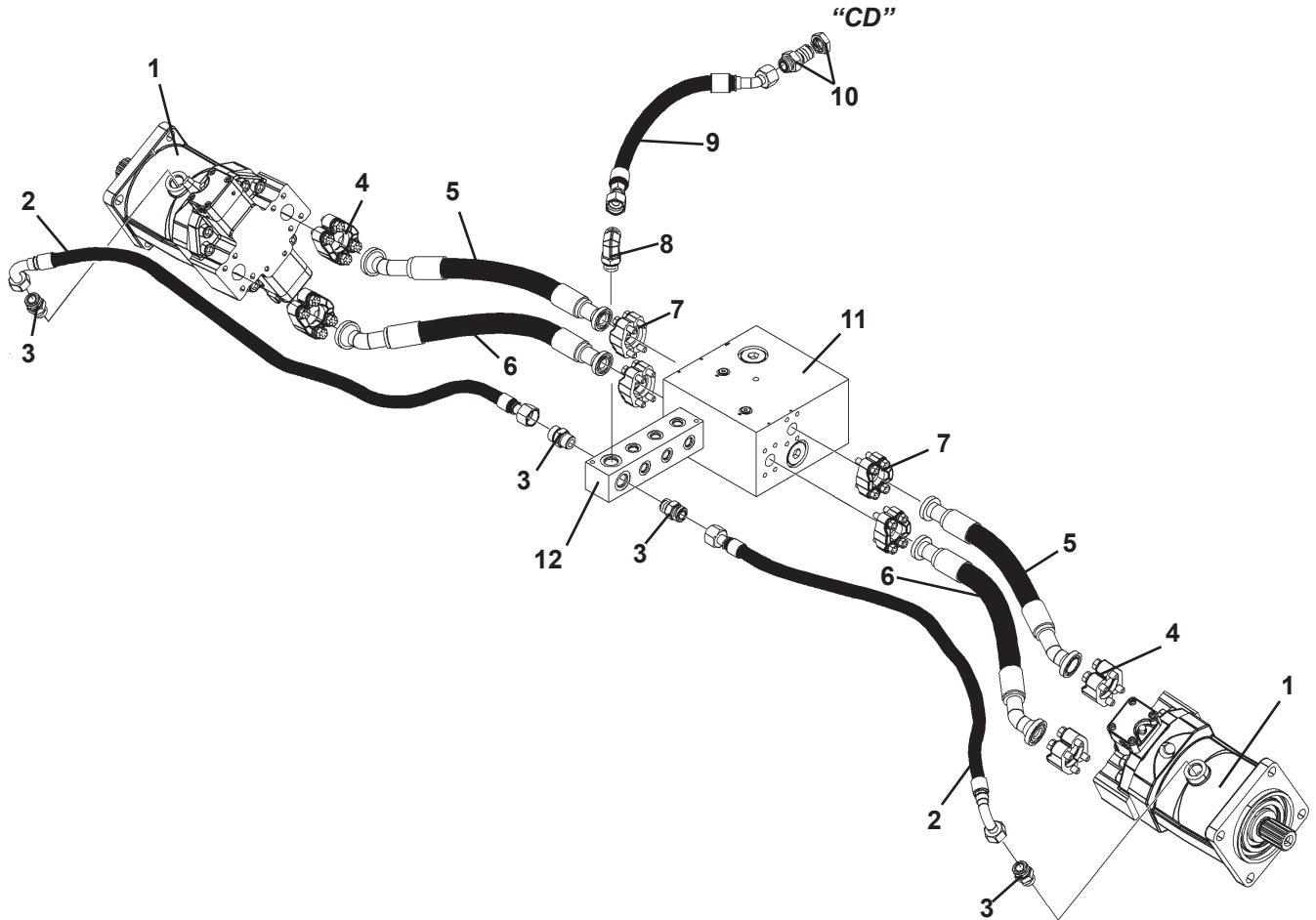
| <u>ITEM</u> | <u>REQ'D</u> | <u>PART NO.</u> | <u>DESCRIPTION</u>   |
|-------------|--------------|-----------------|--|
| 1           | 2            | 113935          | Relief Vent  |
| 2           | 2            | 6133            | 90° Grease Fitting   |
| 3           | 4            | 30466           | Straight Bulkhead Connector 2FP-31" Tube   |
| 4           | 2            | 116386          | Nylon Hose .31" X 6.25"  |
| 5           | 2            | 116387          | Nylon Hose .31" X 9.00"  |
| 6           | 4            | 30465           | Straight Connector (Included in Lower Bearing Assemblies)  |
| 7           | 1            | 116354          | Fixed Lower Bearing Assembly (See Fixed Bearing Assembly for bearing identification.) (See Maintenance Section for instructions on properly setting bearing assembly.)       |
| 8           | 20           | 1821            | .62" UNC X 2.50" Hex Capscrew Grade 8<br>(Install with Loctite 271 and torque to 180 ft. lbs.)   |
| 9           | 20           | 10200           | .62" Nord Lock Washer  |
| 10          | 4            | 1702            | .25" UNC X 1.50" Flat Head Screw   |
| 11          | 2            | 111668          | Dirt Ring Flange   |
| 12          | 64           | 700-111         | M16 X 110mm Hex Capscrew 1.5P  |
| 13          | 64           | 700-114         | M16 X 75mm Hex Capscrew 1.5P   |
| 14          | 128          | 10165           | 16mm Lock Washer   |
| 15          | 1            | 116353          | Rotor (Balanced)   |
| 16          | 1            | 116355          | Floating Lower Bearing Assembly (See Floating Bearing Assembly for bearing identification.) (See Maintenance Section for instructions on properly setting bearing assembly.) |

# 88" MULCHER ASSEMBLIES

MH88-3H MULCHER ASSEMBLY - 300HP #116823

MH88-4H MULCHER ASSEMBLY - 400HP #116824

MAIN HYDRAULIC CIRCUIT



## 88" MULCHER ASSEMBLIES

MH88-3H MULCHER ASSEMBLY - 300HP #116823

MH88-4H MULCHER ASSEMBLY - 400HP #116824

### MAIN HYDRAULIC CIRCUIT

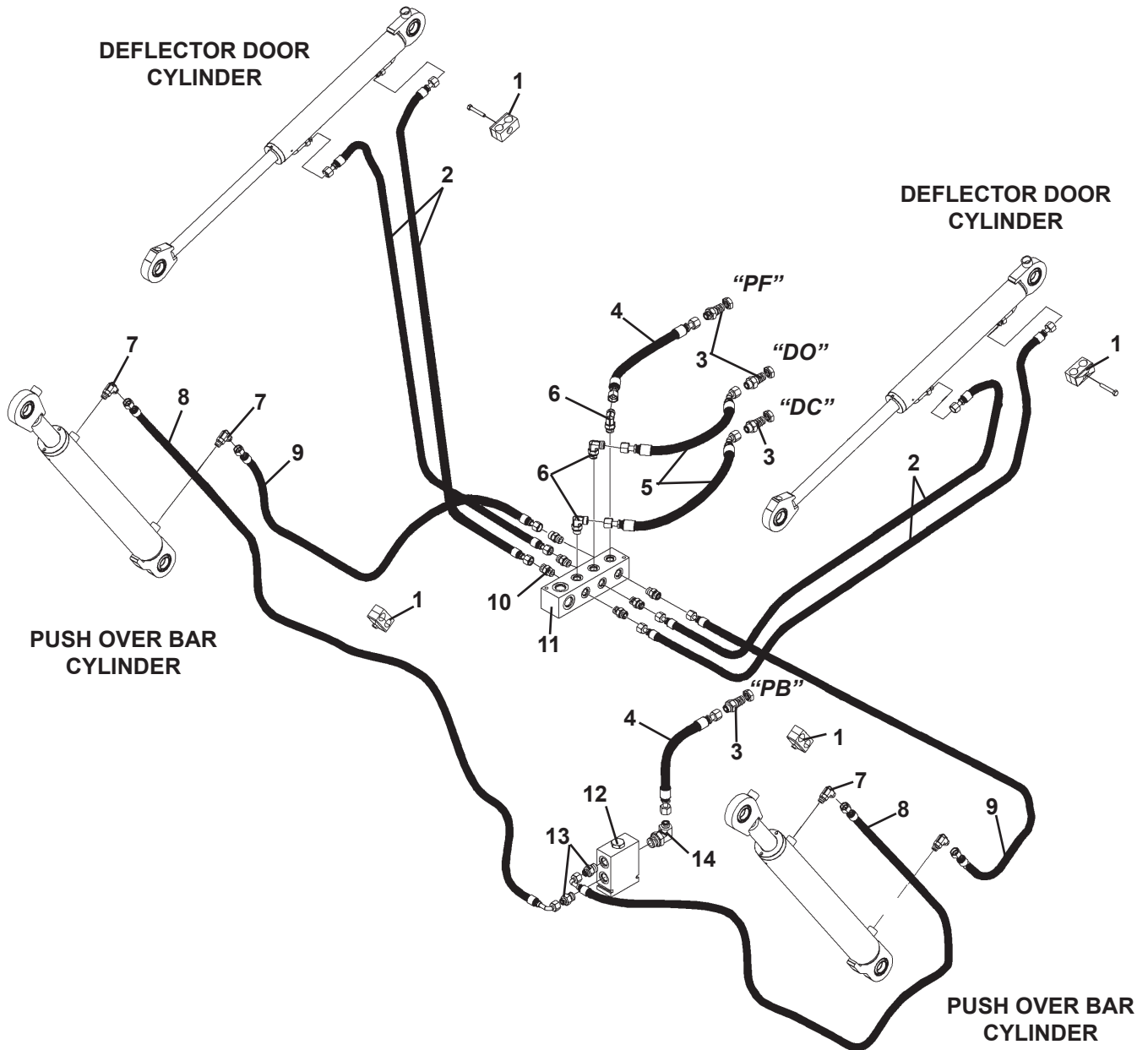
| <u>ITEM</u> | <u>REQ'D</u> | <u>PART NO.</u> | <u>DESCRIPTION</u>                                       |
|-------------|--------------|-----------------|--|
| 1           | 2            | 112000          | Hydraulic Motor  |
| 2           | 2            | 38651           | Hose .62" X 44" 12FFS-12FFS 90°                          |
| 3           | 4            | 201-354         | Straight Connector 12MFS-12MBo                           |
| 4           | 4            | 30436           | Code 62 Clamp Assembly - 1.25"                           |
|             | -            | 3391            | Replacement O'Ring                                       |
| 5           | 2            | 38647           | Hose 1.00" X 21.25" 16 FLH-20FLH 30°                     |
| 6           | 2            | 38646           | Hose 1.00" X 22.25" 16 FLH-20FLH 45°                     |
| 7           | 4            | 3428            | Code 62 Clamp Assembly - 1.00"                           |
|             | -            | 3390            | Replacement O'Ring                                       |
| 8           | 1            | 30418           | 90° Elbow 12MBo-12MFS                                    |
| 9           | 1            | 38654           | Hose .75" X 23" 12FFS-12FFS 45°                          |
| 10          | 1            | 30387           | Straight Bulkhead Connector 12MFS                        |
| 11          | 1            | 113708          | Main Manifold Block                                      |
|             | 4            | 1088            | .50" UNC X 1.00" Hex Capscrew (Install with Loctite 271) |
|             | 4            | 1505            | .50" Lock Washer   |
| 12          | 1            | 114688          | Auxiliary Junction Manifold Block                        |
|             | 2            | 1031            | .31" UNC X 3.25" Hex Capscrew                            |
|             | 2            | 1934            | .31" UNC Deformed Lock Nut                               |

# 88" MULCHER ASSEMBLIES

MH88-3H MULCHER ASSEMBLY - 300HP #116823

MH88-4H MULCHER ASSEMBLY - 400HP #116824

AUXILIARY HYDRAULIC CIRCUIT



## 88" MULCHER ASSEMBLIES

MH88-3H MULCHER ASSEMBLY - 300HP #116823

MH88-4H MULCHER ASSEMBLY - 400HP #116824

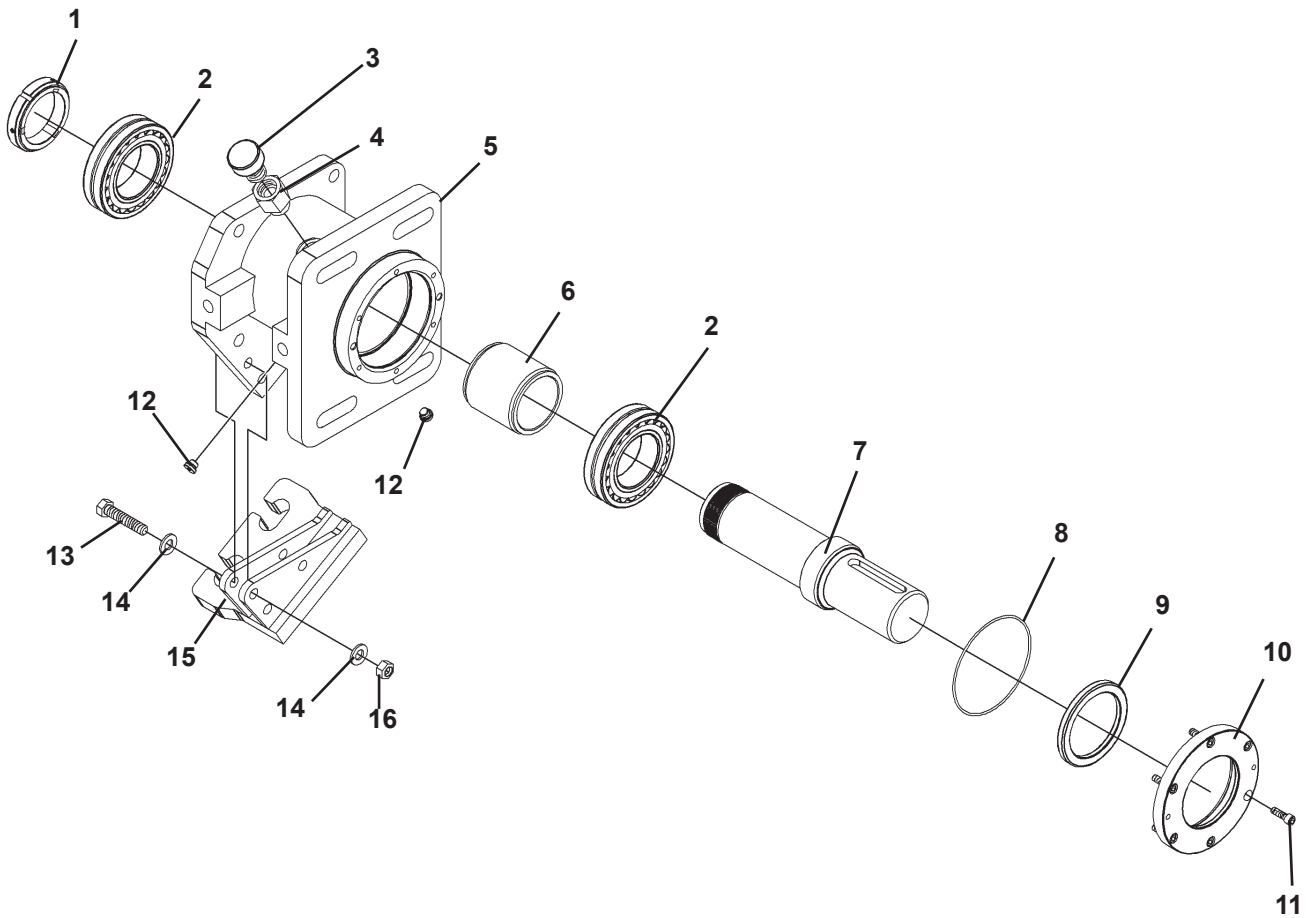
### AUXILIARY HYDRAULIC CIRCUIT

| <u>ITEM</u> | <u>REQ'D</u> | <u>PART NO.</u> | <u>DESCRIPTION</u>                 |
|-------------|--------------|-----------------|------------------------------------|
| 1           | 4            | 17025           | Hose Clamp (Included in Mainframe) |
| 2           | 4            | 38008           | Hose .38" X 32" 6FFS-6FFS          |
| 3           | 4            | 30291           | Straight Bulkhead Connector 8MFS   |
| 4           | 2            | 38653           | Hose .50" X 15.50" 8FFS-8FFS       |
| 5           | 2            | 38652           | Hose .50" X 18.50" 8FFS-8FFS 45°   |
| 6           | 3            | 30286           | 90° Elbow 8MFS-8MBo                |
| 7           | 4            | 30204           | 90° Elbow 6MFS-6MBo                |
| 8           | 2            | 38648           | Hose .38" X 90" 6FFS-6FFS 90°      |
| 9           | 2            | 38649           | Hose .38" X 66" 6FFS-6FFS          |
| 10          | 6            | 30324           | Straight Connector 6MFS-8MBo       |
| 11          | 1            | 114688          | Auxiliary Junction Manifold Block  |
|             | 2            | 1031            | .31" UNC X 3.25" Hex Capscrew      |
|             | 2            | 1934            | .31" UNC Deformed Lock Nut         |
| 12          | 1            | 46065           | Flow Divider Valve                 |
|             | 2            | 1029            | .31" UNC X 2.75" Hex Capscrew      |
|             | 2            | 1934            | .31" UNC Deformed Lock Nut         |
| 13          | 2            | 30376           | Straight Connector 6MFS-10MBo      |
| 14          | 1            | 201-375         | 90° Elbow 8MFS-12MBo               |

# OVERHUNG LOAD ADAPTER ASSEMBLIES

RIGHT OVERHUNG LOAD ADAPTER ASSEMBLY #114246

LEFT OVERHUNG LOAD ADAPTER ASSEMBLY #114247



# OVERHUNG LOAD ADAPTER ASSEMBLIES

RIGHT OVERHUNG LOAD ADAPTER ASSEMBLY #114246

LEFT OVERHUNG LOAD ADAPTER ASSEMBLY #114247

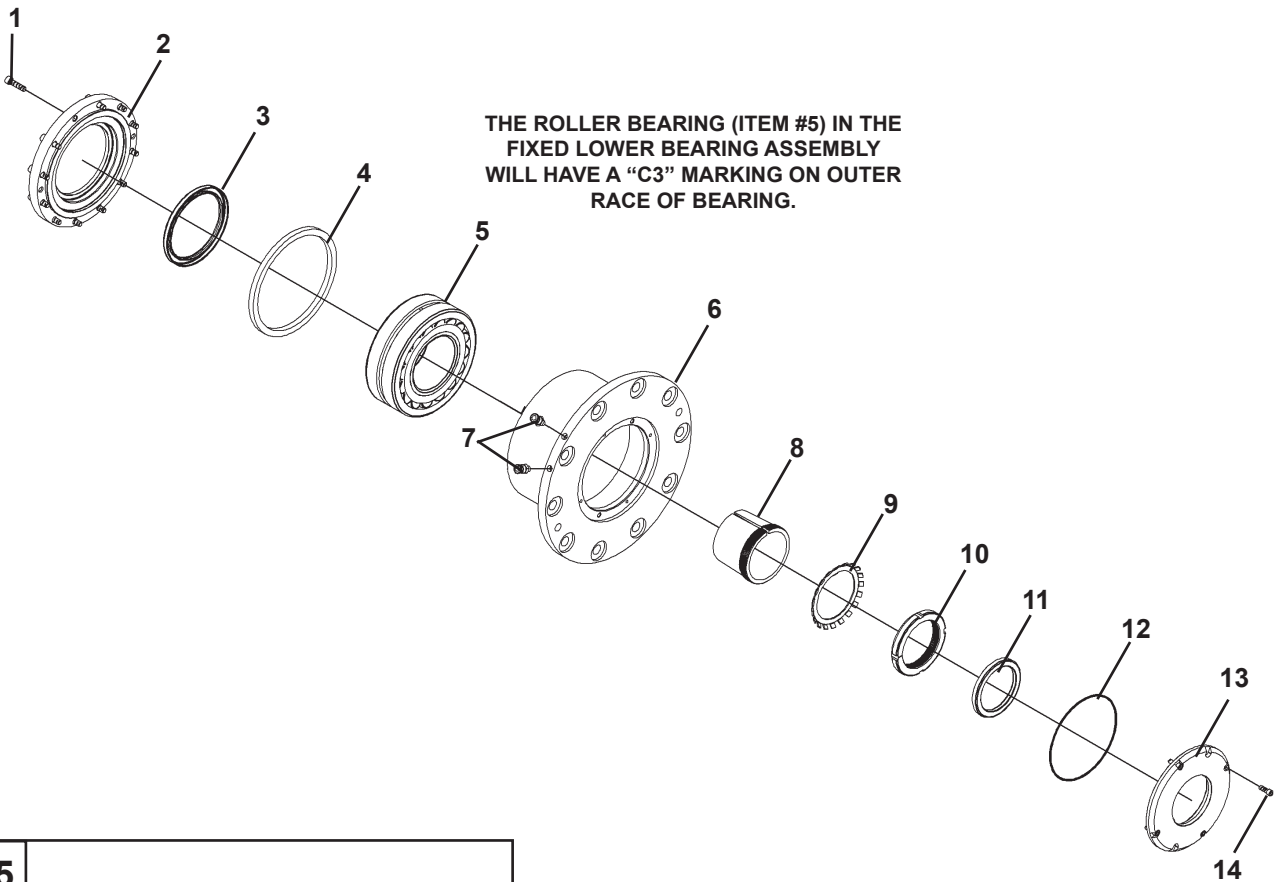
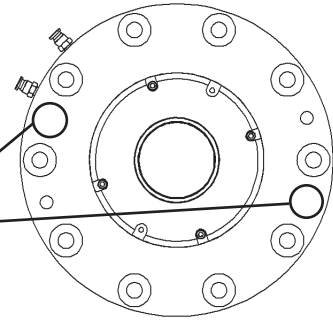
| <u>ITEM</u> | <u>REQ'D</u> | <u>PART NO.</u> | <u>DESCRIPTION</u>  |
|-------------|--------------|-----------------|---|
| 1           | 1            | NSS             | Bearing Lock Nut  |
| 2           | 2            | NSS             | Roller Bearing  |
| 3           | 1            | 54645           | Breather Cap  |
| 4           | 1            | 3124            | Straight Connector 12MBo-12FP   |
| 5           | 1            | NSS             | Bearing Housing   |
| 6           | 1            | NSS             | Bearing Spacer  |
| 7           | 1            | NSS             | Drive Shaft   |
| 8           | 1            | 114647          | O'Ring  |
| 9           | 1            | 114449          | Drive Shaft Seal  |
| 10          | 1            | 114386          | Retaining Seal Cap  |
| 11          | 6            | 10066           | .31" UNC X 1.00" Sockethead Capscrew<br>(Install with Loctite 271. Torque to 25 ft. lbs.) |
| 12          | 2            | 30280           | 4MBo Socket Hex Plug  |
| 13          | 3            | 1965            | .50" UNC X 2.50" Hex Capscrew - Grade 8   |
| 14          | 6            | 1646            | .50" Hard Flat Washer   |
| 15          | 1            | 117195          | Right Mounting Bracket - Overhung Load Adapter  |
|             | 1            | 117196          | Left Mounting Bracket - Overhung Load Adapter   |
| 16          | 3            | 1841            | .50" UNC Deformed Lock Nut  |
|             |              | NSS             | Not Sold Separately   |

**NOTE: DUE TO THE COMPLEXITY OF REPLACING THE DRIVE SHAFT, BEARINGS AND HOUSING THESE PARTS ARE NOT SOLD SEPARATELY. REFER TO MAINTENANCE SECTION FOR ORDERING REPLACEMENT OVERHUNG LOAD ADAPTERS.**

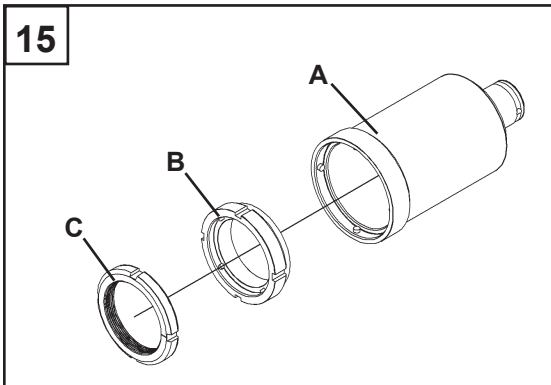
# LOWER BEARING ASSEMBLY

## FIXED LOWER BEARING ASSEMBLY #116354

THE FIXED LOWER BEARING ASSEMBLY DOES NOT HAVE THE TWO .19" IDENTIFICATION HOLES



THE ROLLER BEARING (ITEM #5) IN THE FIXED LOWER BEARING ASSEMBLY WILL HAVE A "C3" MARKING ON OUTER RACE OF BEARING.





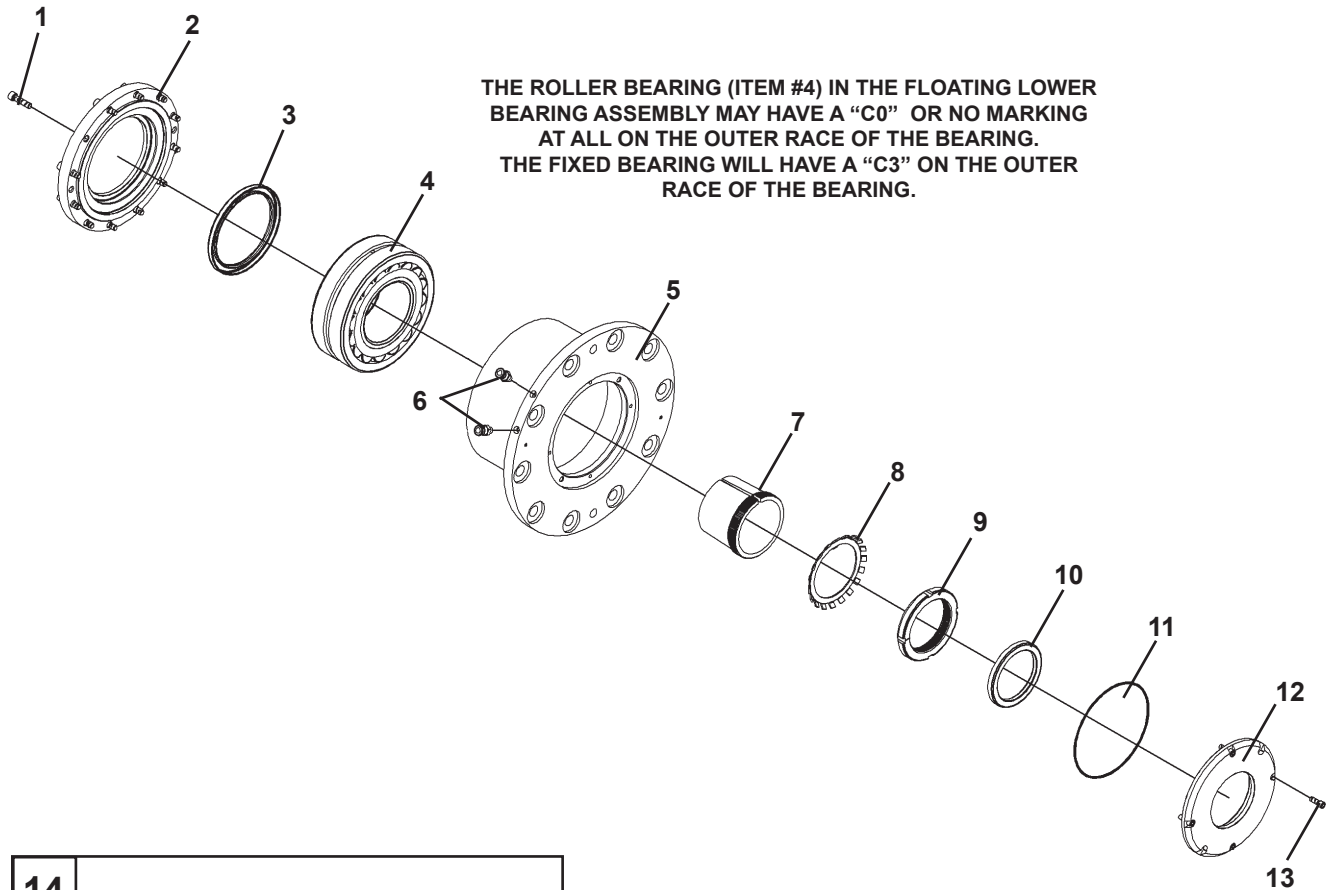
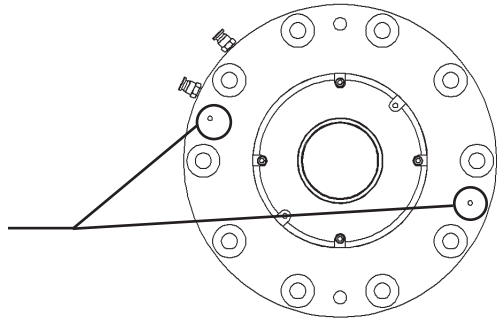
**LOWER BEARING ASSEMBLY**  
**FIXED LOWER BEARING ASSEMBLY #116354**

| <b><u>ITEM</u></b> | <b><u>REQ'D</u></b> | <b><u>PART NO.</u></b> | <b><u>DESCRIPTION</u></b>  |
|--------------------|---------------------|------------------------|--|
| 1                  | 12                  | 700-64145              | .31" UNC X 1.25" Sockethead Capscrew<br>(Install with Loctite 271 and torque to 25 ft. lbs.)           |
| 2                  | 1                   | 116378                 | Inner Seal Cap   |
| 3                  | 1                   | 116375                 | Rotor Shaft Seal   |
| 4                  | 1                   | 111667                 | Bearing Spacer Ring  |
| 5                  | 1                   | 111669                 | Roller Bearing (C3 marking on outer race.)<br>(Refer to Maintenance Section for Service Instructions.) |
| 6                  | 1                   | 116376                 | Fixed Bearing Housing  |
| 7                  | 2                   | 30465                  | Straight Connector 2MP-.31" Tube   |
| 8                  | 1                   | 116373                 | Withdrawal Sleeve  |
| 9                  | 1                   | 116372                 | Bearing Lock Washer  |
| 10                 | 1                   | 116371                 | Bearing Lock Nut   |
| 11                 | 1                   | 116374                 | Rotor Shaft Seal   |
| 12                 | 1                   | 45951                  | O'Ring   |
| 13                 | 1                   | 116379                 | Outer Seal Cap   |
| 14                 | 4                   | 1944                   | .25" UNC X .75" Sockethead Capscrew<br>(Install with Loctite 271 and torque to 12 ft. lbs.)            |
| 15                 | -                   | 116733                 | Optional Bearing Socket Assembly<br>(Refer to Maintenance Section for Service Instructions.)           |
|                    |                     | 116735                 | (A) Bearing Socket   |
|                    |                     | 116736                 | (B) Bearing Socket Insert  |
|                    |                     | 116380                 | (C) Bearing Lock Nut (For removal of Withdrawal Sleeve.)   |

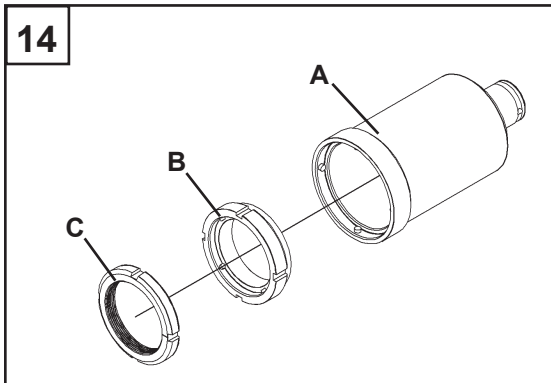
# LOWER BEARING ASSEMBLY

## FLOATING LOWER BEARING ASSEMBLY #116355

**THE FLOATING LOWER BEARING ASSEMBLY HAS TWO .19" IDENTIFICATION HOLES**



**THE ROLLER BEARING (ITEM #4) IN THE FLOATING LOWER BEARING ASSEMBLY MAY HAVE A "C0" OR NO MARKING AT ALL ON THE OUTER RACE OF THE BEARING. THE FIXED BEARING WILL HAVE A "C3" ON THE OUTER RACE OF THE BEARING.**

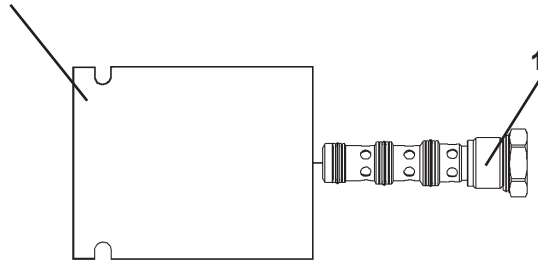


**LOWER BEARING ASSEMBLY**  
**FLOATING LOWER BEARING ASSEMBLY #116355**

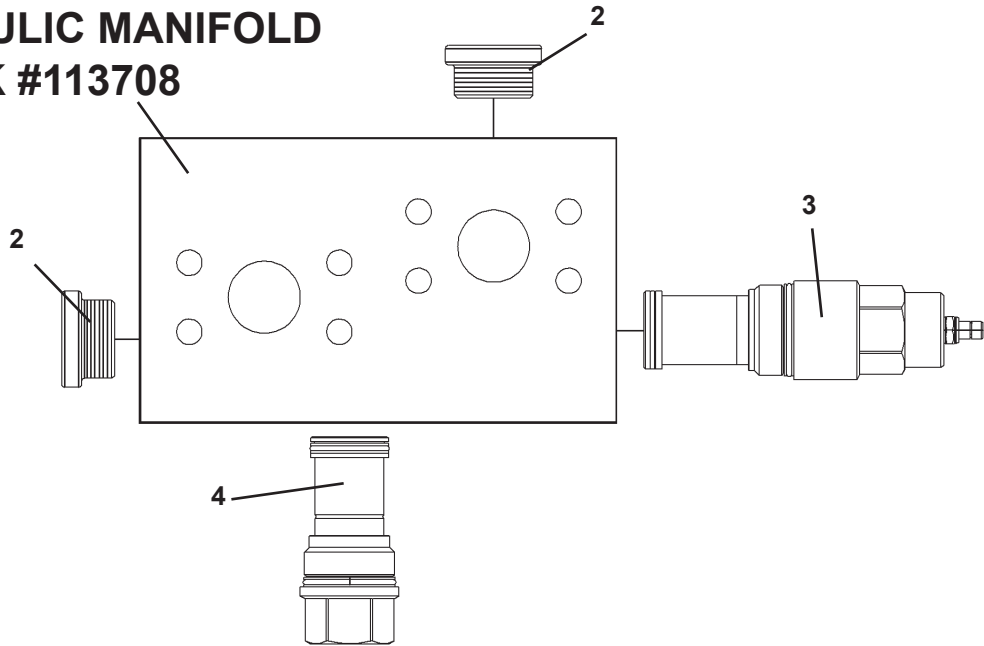
| <u>ITEM</u> | <u>REQ'D</u> | <u>PART NO.</u> | <u>DESCRIPTION</u>   |
|-------------|--------------|-----------------|--|
| 1           | 12           | 700-64145       | .31" UNC X 1.25" Sockethead Capscrew<br>(Install with Loctite 271 and torque to 25 ft. lbs.)                 |
| 2           | 1            | 116378          | Inner Seal Cap   |
| 3           | 1            | 116375          | Rotor Shaft Seal   |
| 4           | 1            | 112669          | Roller Bearing (C0 or no marking on outer race.)<br>(Refer to Maintenance Section for Service Instructions.) |
| 5           | 1            | 116377          | Floating Bearing Housing   |
| 6           | 2            | 30465           | Straight Connector 2MP-.31" Tube   |
| 7           | 1            | 116373          | Withdrawal Sleeve  |
| 8           | 1            | 116372          | Bearing Lock Washer  |
| 9           | 1            | 116371          | Bearing Lock Nut   |
| 10          | 1            | 116374          | Rotor Shaft Seal   |
| 11          | 1            | 45951           | O'Ring   |
| 12          | 1            | 116379          | Outer Seal Cap   |
| 13          | 4            | 1944            | .25" UNC X .75" Sockethead Capscrew<br>(Install with Loctite 271 and torque to 12 ft. lbs.)                  |
| 14          | -            | 116733          | Optional Bearing Socket Assembly<br>(Refer to Maintenance Section for Service Instructions.)                 |
|             |              | 116735          | (A) Bearing Socket   |
|             |              | 116736          | (B) Bearing Socket Insert  |
|             |              | 116380          | (C) Bearing Lock Nut (For removal of Withdrawal Sleeve.)   |

**HYDRAULIC VALVES**  
ASSEMBLY #113708 & ASSEMBLY #46065  
REPLACEMENT PARTS

**FLOW DIVIDER VALVE**  
**#46065**



**MAIN HDYRAULIC MANIFOLD**  
**BLOCK #113708**

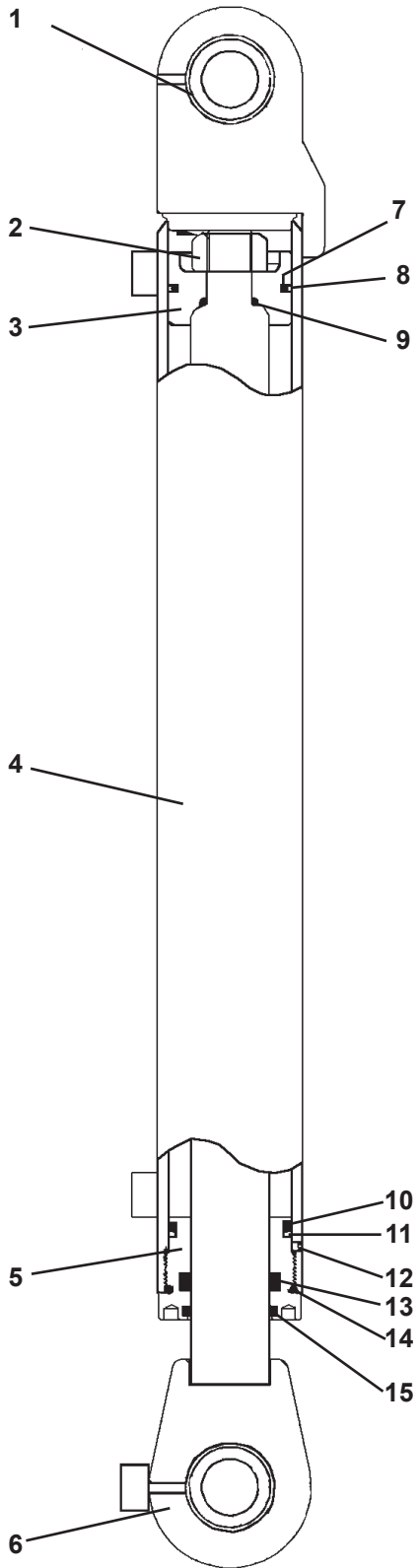


**HYDRAULIC VALVES**  
ASSEMBLY #113708 & ASSEMBLY #46065  
REPLACEMENT PARTS

| <u>ITEM</u> | <u>REQ'D</u> | <u>PART NO.</u> | <u>DESCRIPTION</u>                   |
|-------------|--------------|-----------------|--------------------------------------|
| 1           | 1            | 46114           | Valve Cartridge                      |
| 2           | 2            | 30459           | Plug                                 |
| 3           | 1            | 46113           | Pressure Relief Cartridge (5600 PSI) |
| 4           | 1            | 46112           | Check Valve Cartridge                |

# PUSH OVER BAR CYLINDER ASSEMBLY

ASSEMBLY #113576



# PUSH OVER BAR CYLINDER ASSEMBLY

ASSEMBLY #113576

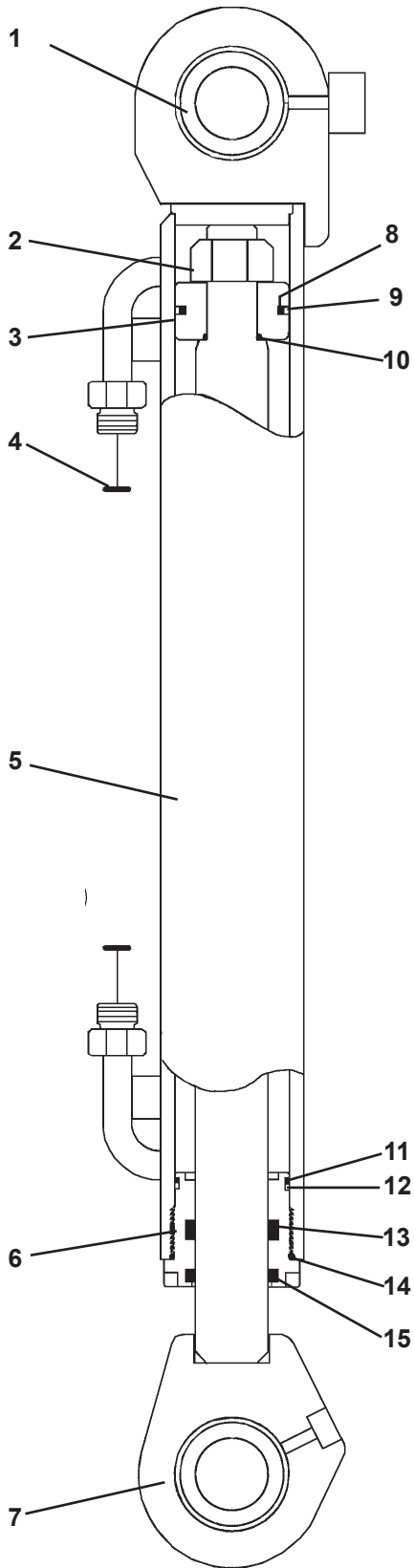
| <u>ITEM</u> | <u>REQ'D</u> | <u>PART NO.</u> | <u>DESCRIPTION</u>   |
|-------------|--------------|-----------------|--|
| 1           | 2            | 62523           | Self Aligning Bushing  |
| 2           | 1            | 1483            | Hex Nut (Torque to 230-325 ft. lbs.)                           |
| 3           | 1            | 105320          | Piston   |
| 4           | 1            | 113577          | Cylinder Tube  |
| 5           | 1            | 77442           | Cylinder Gland   |
| 6           | 1            | 113578          | Cylinder Rod   |
| 7           | 1            | 45250*          | O'Ring   |
| 8           | 1            | 45251*          | Piston Ring  |
| 9           | 1            | 4641*           | O'Ring   |
| 10          | 1            | 45557*          | O'Ring   |
| 11          | 1            | 45249*          | Back-Up Washer   |
| 12          | 1            | 1927            | Set Screw (Install with Loctite 271. Torque to 40-45 in. lbs.) |
| 13          | 1            | 45119*          | Poly Pak Seal  |
| 14          | 1            | 4570*           | O'Ring   |
| 15          | 1            | 45370*          | Rod Wiper  |

**NOTE: Seal Kit #45552 includes all parts marked with an asterisk (\*). parts are not sold separately.**



# DEFLECTOR DOOR CYLINDER ASSEMBLY

ASSEMBLY #112721



12195 4-16-12

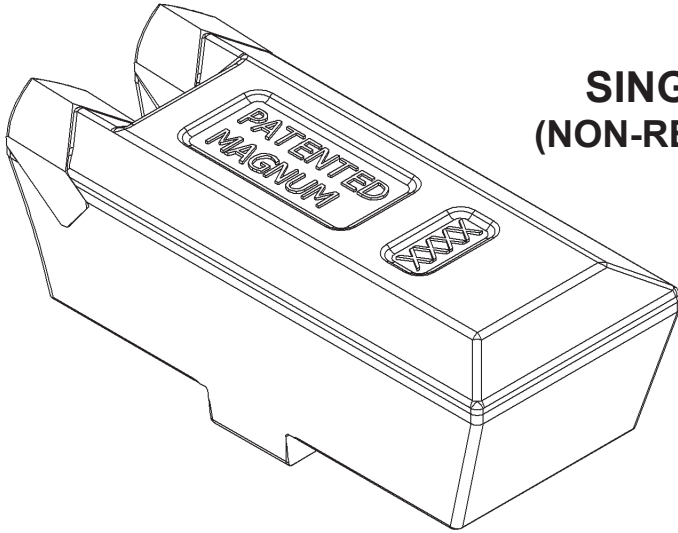
# DEFLECTOR DOOR CYLINDER ASSEMBLY

ASSEMBLY #112721

| <u>ITEM</u> | <u>REQ'D</u> | <u>PART NO.</u> | <u>DESCRIPTION</u>  |
|-------------|--------------|-----------------|---|
| 1           | 2            | 62523           | Self Aligning Bushing   |
| 2           | 1            | 1482            | Hex Nut (Torque to 150-200 ft. lbs.)                              |
| 3           | 1            | 6992            | Piston  |
| 4           | 2            | 45794           | O'Ring  |
| 5           | 1            | 112722          | Cylinder Tube   |
|             | 1            | 1927            | Set Screw (Install with Loctite 271 and torque to 40-45 in. lbs.) |
| 6           | 1            | 18994           | Cylinder Gland  |
| 7           | 1            | 111970          | Cylinder Rod  |
| 8           | 1            | 4637*           | O'Ring  |
| 9           | 1            | 4636*           | Piston Ring   |
| 10          | 1            | 4635*           | O'Ring  |
| 11          | 1            | 4633*           | O'Ring  |
| 12          | 1            | 4634*           | Back-Up Washer  |
| 13          | 1            | 45219*          | Poly Pak Seal   |
| 14          | 1            | 45823*          | O'Ring  |
| 15          | 1            | 45389*          | Rod Wiper   |

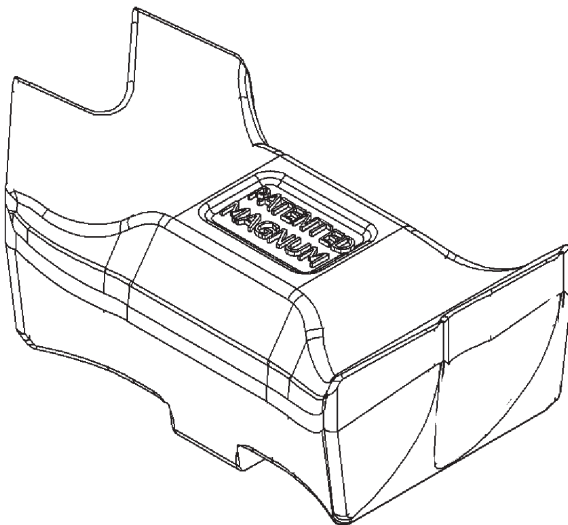
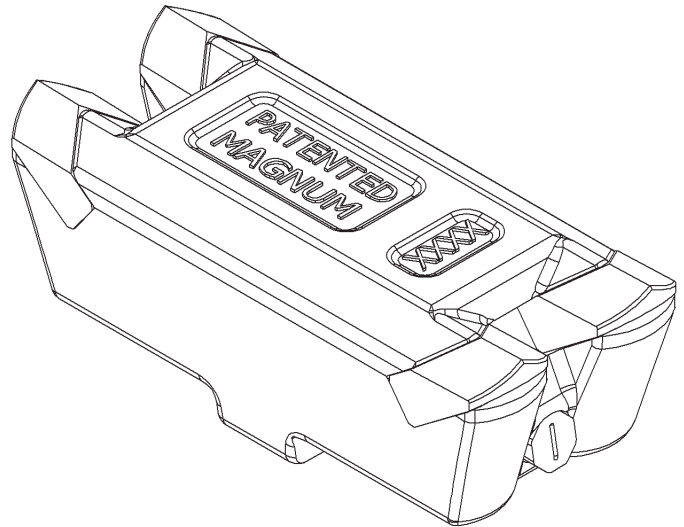
**NOTE: Seal Kit #45822 includes all parts marked with an asterisk (\*). parts are not sold separately.**

## TOOTH KIT OPTIONS



**SINGLE TOOTH (#600-112-1)  
(NON-REVERSIBLE HAMMER TOOTH)**

**DOUBLE TOOTH (#600-168)  
(REVERSIBLE HAMMER TOOTH)**



**CLAW TOOTH (#111588)  
(REVERSIBLE CLAW TOOTH)**

## TOOTH KIT OPTIONS

### SINGLE TOOTH (#600-112-1) TOOTH SETS

| <u>KIT PART NO.</u> | <u>TOOTH QTY</u> | <u>DESCRIPTION</u>                |
|---------------------|------------------|-----------------------------------|
| 109471              | 10               | Single Tip, Non-reversible, Tooth |
| 116087              | 26               | Single Tip, Non-reversible, Tooth |
| 113936              | 27               | Single Tip, Non-reversible, Tooth |
| 116090              | 44               | Single Tip, Non-reversible, Tooth |
| 109472              | 50               | Single Tip, Non-reversible, Tooth |
| 111793              | 54               | Single Tip, Non-reversible, Tooth |
| 113738              | 64               | Single Tip, Non-reversible, Tooth |
| 109473              | 100              | Single Tip, Non-reversible, Tooth |

### DOUBLE TOOTH (#600-168) TOOTH SETS

| <u>KIT PART NO.</u> | <u>TOOTH QTY</u> | <u>DESCRIPTION</u>            |
|---------------------|------------------|-------------------------------|
| 109468              | 10               | Double Tip, Reversible, Tooth |
| 116088              | 26               | Double Tip, Reversible, Tooth |
| 113937              | 27               | Double Tip, Reversible, Tooth |
| 116091              | 44               | Double Tip, Reversible, Tooth |
| 109469              | 50               | Double Tip, Reversible, Tooth |
| 111794              | 54               | Double Tip, Reversible, Tooth |
| 113932              | 64               | Double Tip, Reversible, Tooth |
| 109470              | 100              | Double Tip, Reversible, Tooth |

### CLAW TOOTH (#111588) TOOTH SETS

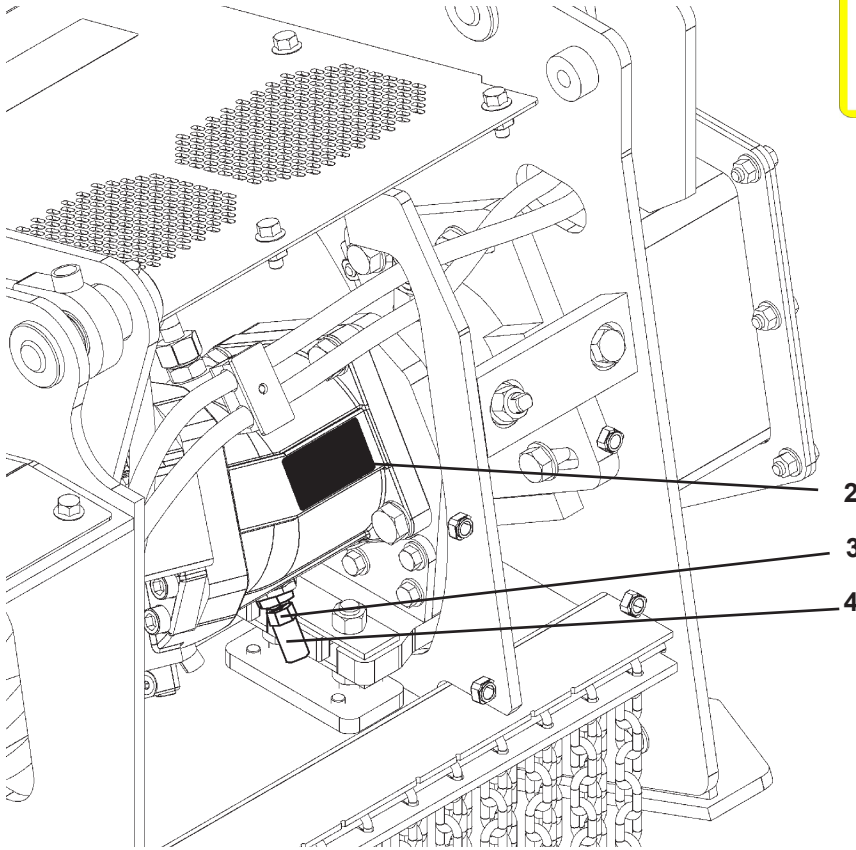
| <u>KIT PART NO.</u> | <u>TOOTH QTY</u> | <u>DESCRIPTION</u>            |
|---------------------|------------------|-------------------------------|
| 112579              | 25               | Claw Tooth, Reversible, Tooth |
| 116089              | 26               | Claw Tooth, Reversible, Tooth |
| 113938              | 27               | Claw Tooth, Reversible, Tooth |
| 116092              | 44               | Claw Tooth, Reversible, Tooth |
| 112580              | 50               | Claw Tooth, Reversible, Tooth |
| 112578              | 54               | Claw Tooth, Reversible, Tooth |
| 113933              | 64               | Claw Tooth, Reversible, Tooth |
| 112581              | 100              | Claw Tooth, Reversible, Tooth |

**NOTE: INSTALLATION HARDWARE IS INCLUDED IN MULCHER ASSEMBLY.  
(M16 X 110MM CAPSCREW - #700-111, M16 X 75MM CAPSCREW - #700-114, AND 16MM  
LOCK WASHER - #10165)**

# OPTIONAL ACCESSORIES

1

**MAINFRAME  
(BACK PLATE REMOVED FOR CLARITY)**



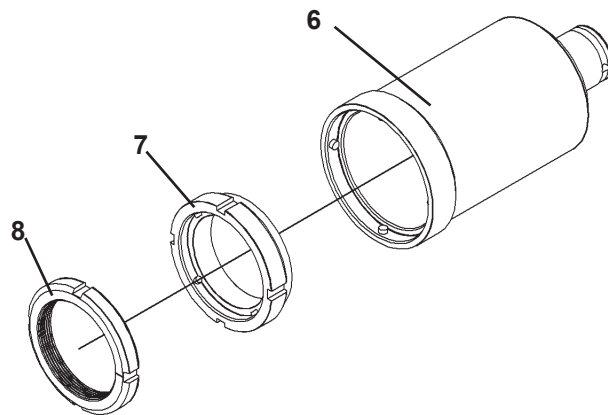
## **CAUTION**

To prevent damage to motor seals:  
Excessive backpressure will allow hot oil  
to drain from this relief valve.

Check backpressure on host machine and  
repair as necessary. #41078

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## OPTIONAL ACCESSORIES

| <u>ITEM</u> | <u>REQ'D</u> | <u>PART NO.</u> | <u>DESCRIPTION</u>                                   |
|-------------|--------------|-----------------|--|
| 1           | -            | 116933          | Case Drain Relief Kit (Includes items #2 through #4) |
| 2           | 2            | 41078           | Caution Decal  |
| 3           | 2            | 3284            | Straight Connector 8FP-12MBo                         |
| 4           | 2            | 112703          | Case Drain Relief Valve                              |
| 5           | -            | 116733          | Socket Assembly (Includes items #6 through #8)       |
| 6           | 1            | 116735          | Bearing Socket                                       |
| 7           | 1            | 116736          | Bearing Socket Insert                                |
| 8           | 1            | 116380          | Bearing Lock Nut (For Removal of Withdrawal Sleeve.) |