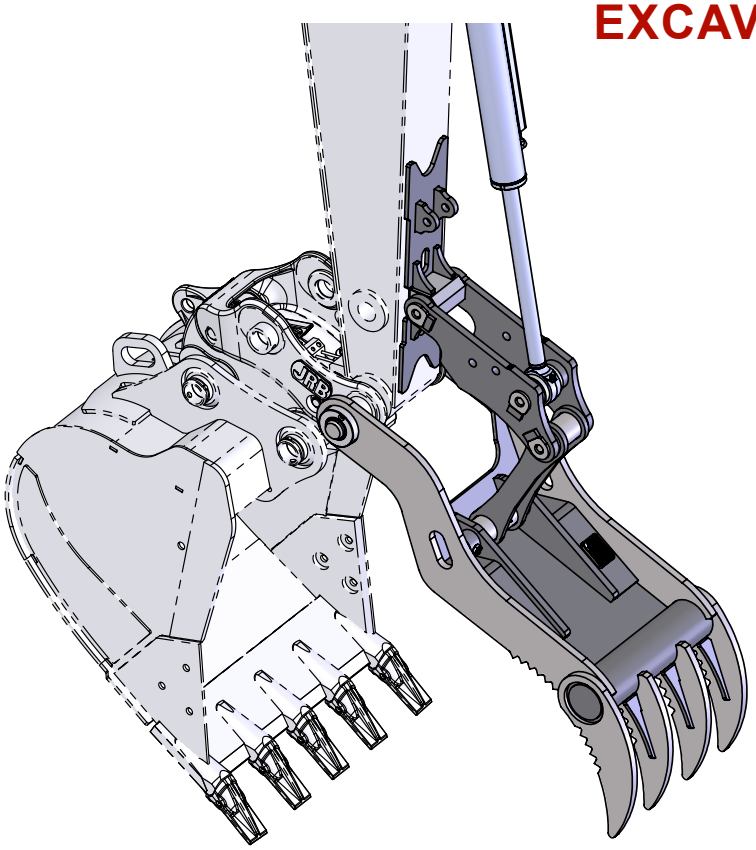
PALADIN CP

OPERATOR'S MANUAL

HYDRAULIC PROGRESSIVE LINK THUMB

FOR EXCAVATORS



SERIAL NUMBER: _____

MODEL NUMBER: _____

Manual Number: OM-LTM-001
Date: September 2020
Rev.

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PREFACE

GENERAL COMMENTS

Congratulations on the purchase of your new Paladin 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. Keep this manual available for reference. Provide this 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 and stress level
- job site organization, working material condition and environment

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

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

SAFETY STATEMENTS

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

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

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

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

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

GENERAL SAFETY PRECAUTIONS

WARNING!

READ MANUAL PRIOR TO INSTALLATION

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

READ AND UNDERSTAND ALL SAFETY STATEMENTS

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

KNOW YOUR EQUIPMENT

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

GENERAL SAFETY PRECAUTIONS

WARNING!

PROTECT AGAINST FLYING DEBRIS

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

WARNING!

LOWER OR SUPPORT RAISED EQUIPMENT

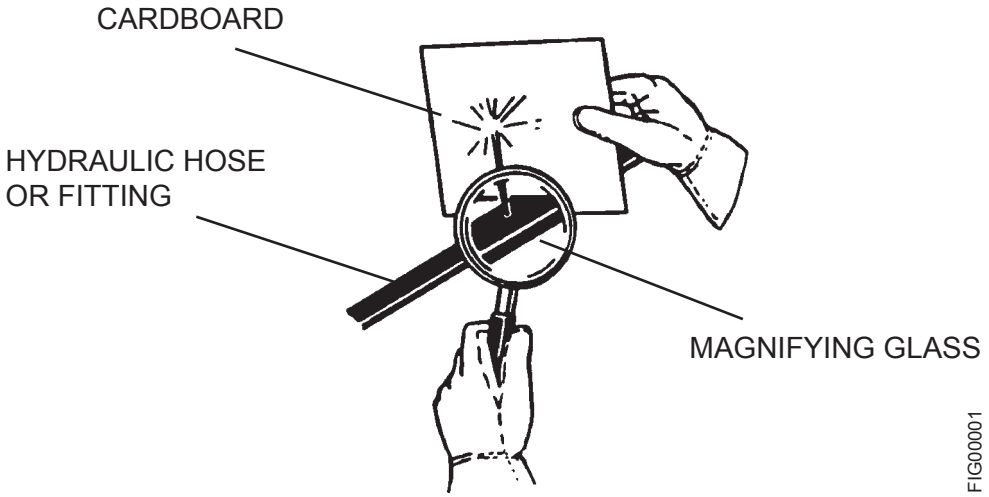
Do not work under raised booms without supporting them. Do not use support material made of concrete blocks, logs, buckets, barrels, or any other material that could suddenly collapse or shift positions. Make sure support material is solid, not decayed, warped, twisted, or tapered. Lower booms to ground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

WARNING!

USE CARE WITH HYDRAULIC FLUID PRESSURE

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

- Keep unprotected body parts, such as face, eyes, and arms as far away as possible from a suspected leak. Flesh injected with hydraulic fluid may develop gangrene or other permanent disabilities.
- If injured by injected fluid, see a doctor at once. If your doctor is not familiar with this type of injury, ask him or her 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 prime mover's manual for these instructions.

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

WARNING!

CALIFORNIA PROPOSITION 65 WARNING

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

EQUIPMENT SAFETY PRECAUTIONS

WARNING!

KNOW WHERE UTILITIES ARE

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

WARNING!

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

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

WARNING!

REMOVE PAINT BEFORE WELDING OR HEATING

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

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

WARNING!

END OF LIFE DISPOSAL

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

OPERATING THE ATTACHMENT

- Never use your attachment for a work platform or personnel carrier.
- Do not exceed the lifting capacity of your prime mover.
- Operate only from the operator's station.
- 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.
- Never lift, move, or swing a load or attachment over anyone.
- 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.

EQUIPMENT SAFETY PRECAUTIONS

TRANSPORTING THE ATTACHMENT

- Travel only with the attachment in a safe transport position to prevent uncontrolled movement. Drive slowly over rough terrain and slopes.
- 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., as a cave-in could result.

MAINTAINING THE ATTACHMENT

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

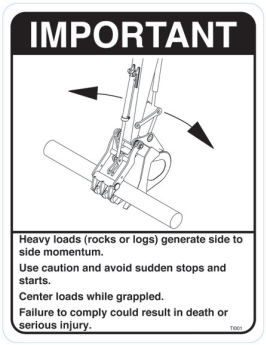
DECALS

DECAL PLACEMENT

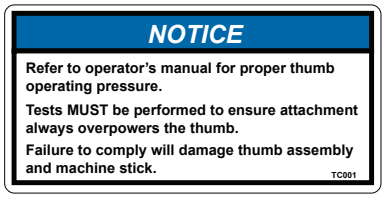
GENERAL INFORMATION

The diagram below shows the location of decals used with the attachment. The decals are identified by their part numbers and with reductions of the actual decals. Use this information to order replacements for lost or damaged decals. Be sure to read all the decals before operating equipment. They contain information you need to know for both safety and product longevity.

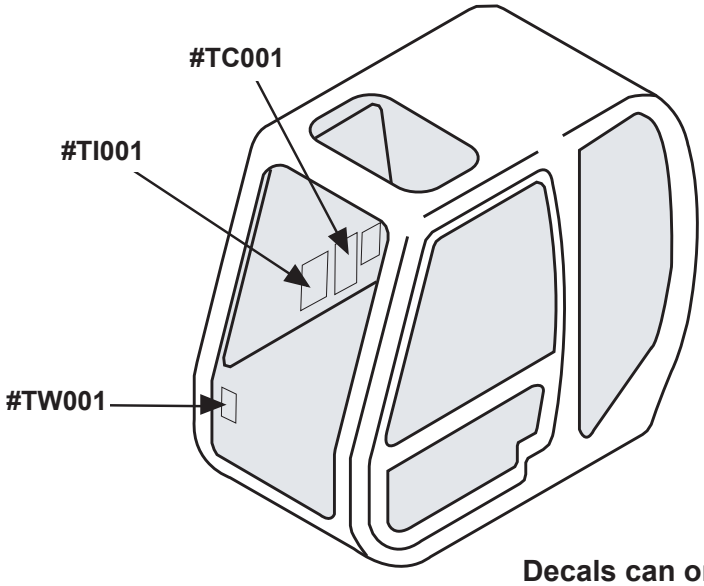
WARNING! CLEARANCE HAZARD
PART #TW001

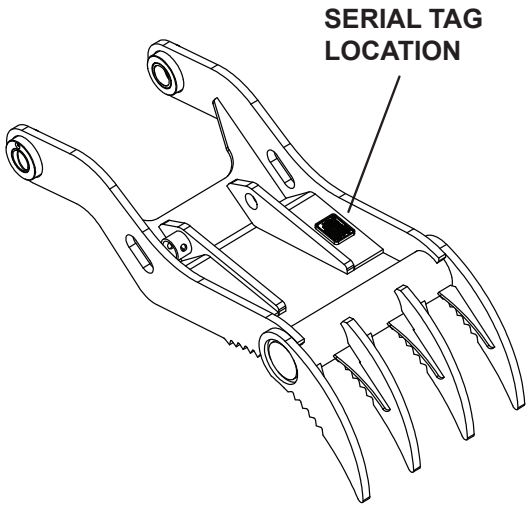


IMPORTANT! LOAD IMBALANCE
PART #TI001



NOTICE! HYDRAULIC PRESSURE
PART #TC001





Decals can only be ordered as kit # TK03

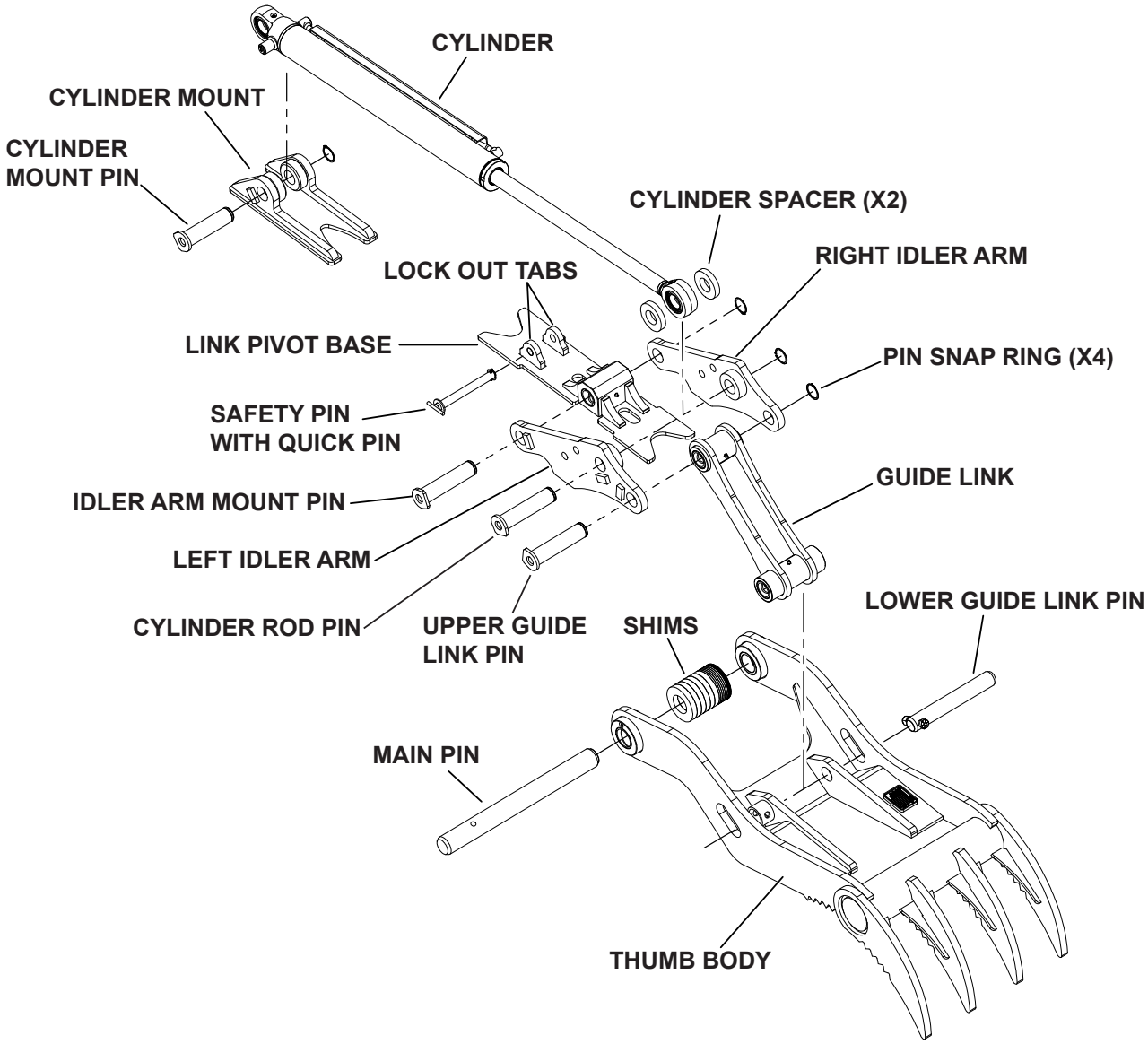
IMPORTANT: Keep all safety decals clean and legible. Replace all missing, illegible or damaged safety decals. When replacing parts with safety decals attached, the safety decals must also be replaced.

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

INSTALLATION

NOMENCLATURE

Throughout this manual, reference is made to various thumb components. The purpose of this page is to acquaint you with the various names of these components. This knowledge will be helpful when reading through this manual or when ordering service parts.



INSTALLATION

GENERAL INFORMATION

The following instructions will help you install the thumb onto your prime mover. There are many different types of attachments that can be used with the thumb. Care should be taken in coordinating installation of the appropriate attachment (bucket, etc.) and thumb combination for your particular prime mover. The prime mover must have an auxiliary hydraulic system to operate the thumb.

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

WARNING!

KEEP ALL UNNECESSARY PERSONNEL FROM INSTALLATION AREA. Attachment can drop without warning if not properly attached. Failure to do so could result in serious injury or death.

WARNING!

ALWAYS PERFORM INSTALLATION AND MAINTENANCE WITH THUMB IN A SAFE POSITION. Do not attempt to assemble or disassemble the thumb when in such a position that heavy components could fall and cause injury. Use a hoist or similar device to help support heavy components if needed.

TOOLS NEEDED:

The following is a list of common tools that may be needed to install the thumb.

- Standard English and metric wrench sets
- Standard English and metric Allen wrench sets
- Phillips head and flat head screwdrivers
- Two or more people
- 8 lb. Hammer
- Lift chain and strap
- Grinder for weld preparation
- Welder capable of E-7018 low hydrogen or equivalent.
- Wire cutters and crimpers
- Measuring tape
- Torque wrench
- Vacuum Pump

SET-UP

- Thoroughly clean the arm / bucket joint area at the end of the prime mover's stick to avoid bearing contamination.
- Disconnect battery before doing any welding on the prime mover. If possible, disconnect the on-board computer. Failure to do so could result in damage to the prime mover's electrical system.

  NOTE: See Specifications Section for welding specifications before performing any welding. All welding should be performed by a certified welder.
- If using a coupler, ALWAYS remove the bucket from the coupler before installing the thumb. DO NOT remove the bucket or coupler from the prime mover stick.
- If installing the thumb on a prime mover with an extendable stick, the stick must be in the fully retracted position.

INSTALLATION

ATTACHING TO PRIME MOVER

Place coupler or bucket flat on the ground. See Figure #1.

Remove the OEM stick pin.

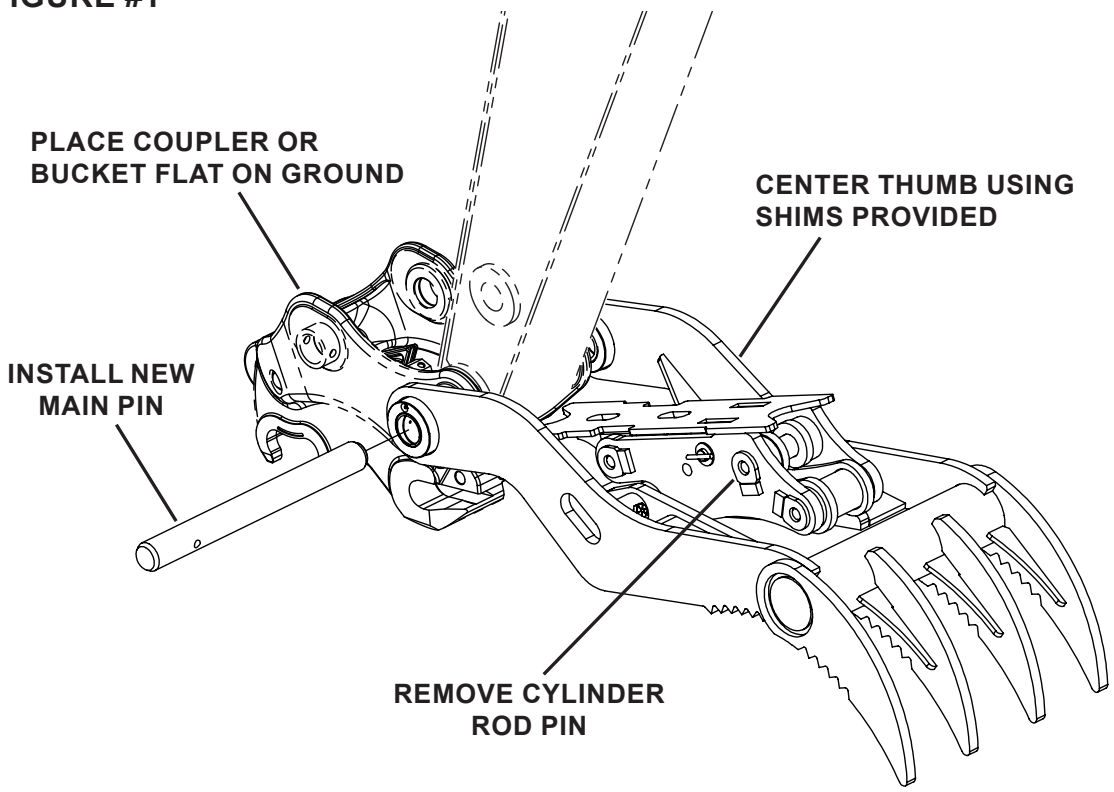
Align thumb body mounting bosses with the coupler or bucket and stick. Use shims as needed to center thumb body. **NOTE: Thumb linkages are pre-installed at factory.**

With thumb body aligned and centered, install new main pin and secure using OEM pin locking bolt and nut. See Figure #1.

Remove the cylinder rod pin from thumb linkage.

After installing the thumb body, check for proper fit and clearance before proceeding.

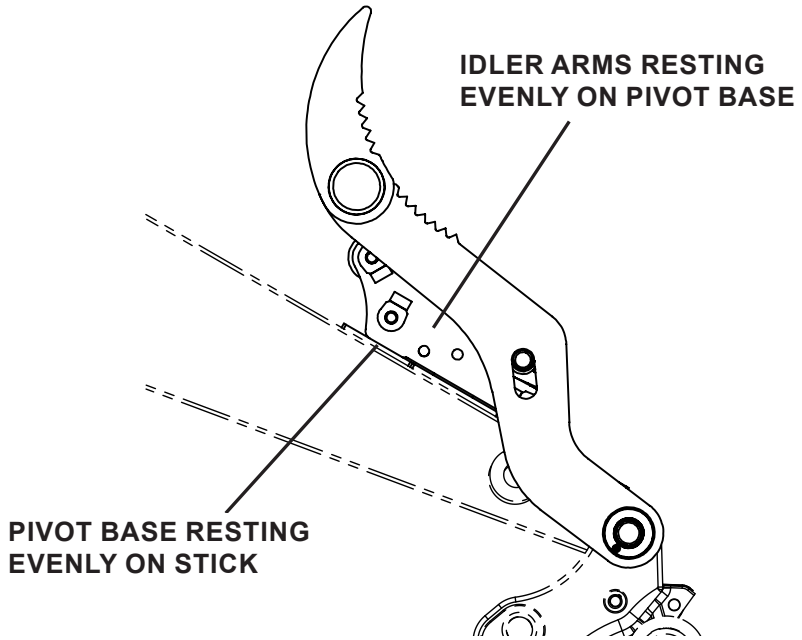
FIGURE #1



INSTALLATION

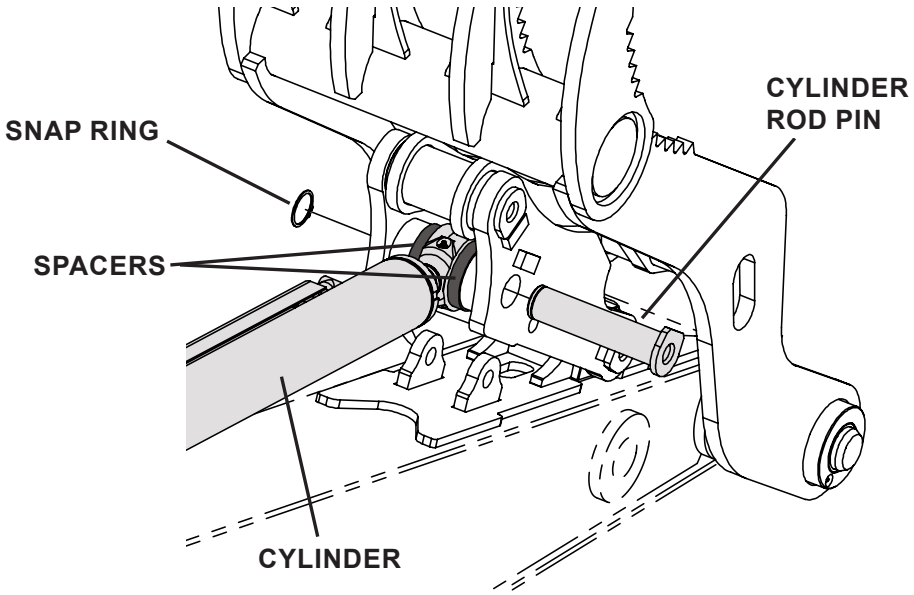
Carefully rotate thumb and linkage back until the pivot base is centered and resting evenly on the stick. Make sure the idler arms are resting evenly on the pivot base. See Figure #2. Remove paint from around the pivot base. Tack weld the pivot base in place.

FIGURE #2



Attach cylinder to linkage, using pin as shown. Use cylinder spacers to center cylinder rod end between idler arms. Secure pin using snap ring. See Figure #3.

FIGURE #3



INSTALLATION

With thumb rotated back and idler arms resting evenly on the pivot base, install the cylinder into the cylinder mount using the cylinder mount pin. Secure the pin using the snap ring. See Figure #4.

Center the cylinder mount on the stick. Leave a minimum of 0.12” to 0.19” of stroke in the cylinder rod to keep it from bottoming out when the thumb is rotated back. See Figure #5.

NOTE: Leaving 0.12” to 0.19” of stroke in the cylinder is not a defined measurement and should be adjusted accordingly after checking alignment and clearances, making sure the thumb stops on the pivot base as intended.

Remove paint from around cylinder mount and tack weld in place.

FIGURE #4

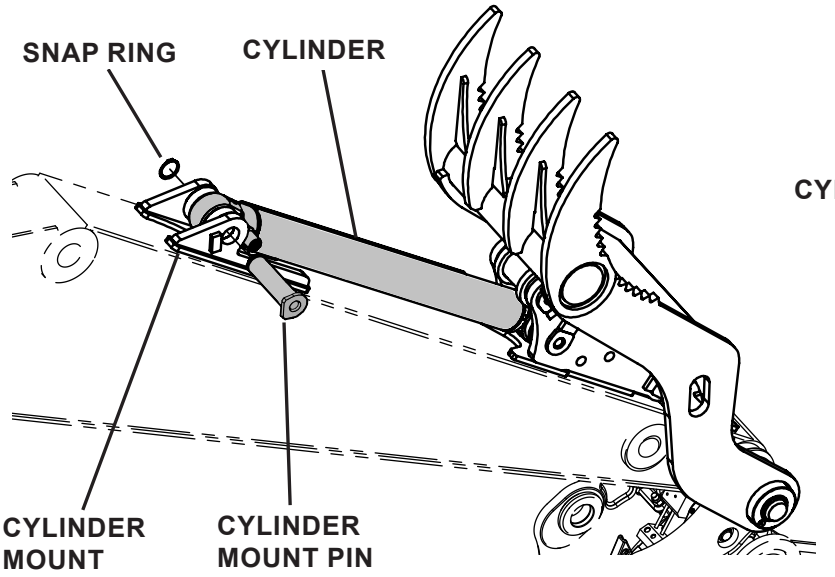
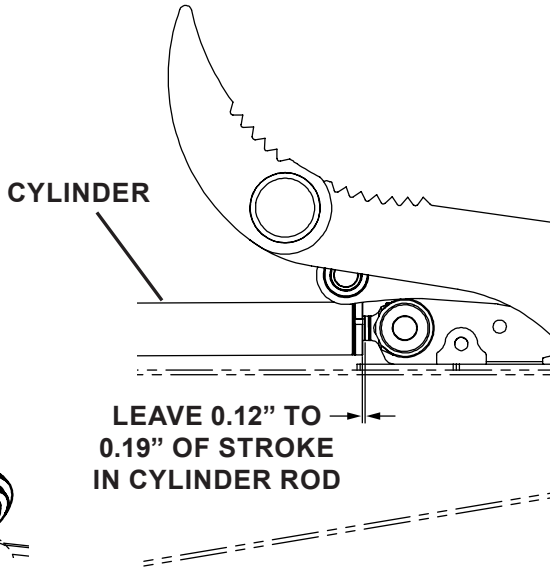


FIGURE #5



NOTICE! Improper alignment could impair thumb performance and cause damage to the prime mover and attachments.

Perform a final check of alignment and clearances by rotating the thumb through its full range of motion. Verify the thumb stops as intended at both ends of the cylinder stroke. Check that all pins, bolts and nuts are installed and tightened.

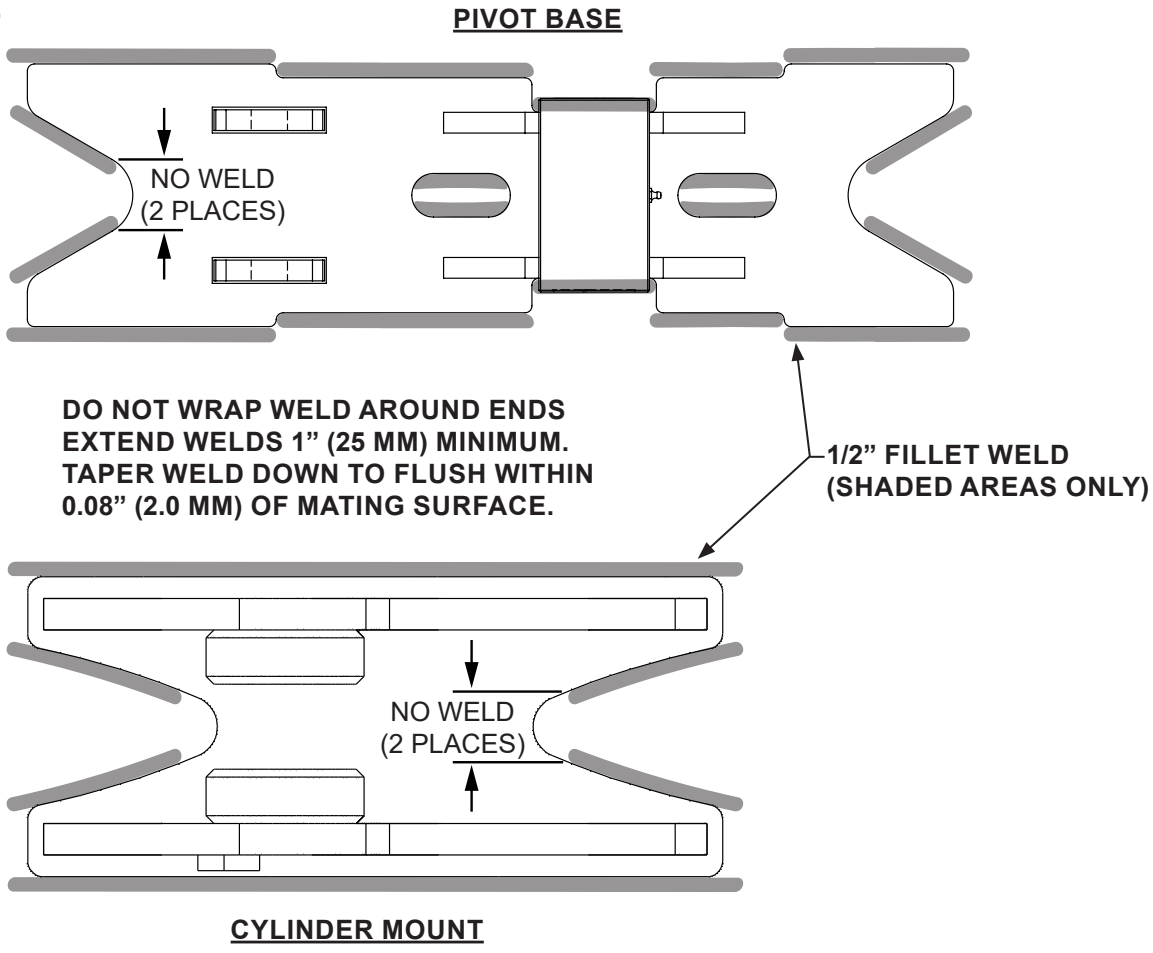
INSTALLATION

NOTICE! DO NOT WELD ACROSS WIDTH OF PRIME MOVER'S STICK.
Always weld parallel to the long axis of the arm. Failure to do so could result in weakening of the prime mover stick.

PROTECT SURROUNDING AREA BEFORE WELDING
Weld spatter can cause damage to components such as pins, cylinders, hydraulic hoses and fittings, etc.

Once the thumb is properly positioned and clearances have been checked, proceed with final welding of the pivot base and the cylinder mount. See Figure #6. See Specifications Section for proper pre-heat temperature for 1/2" GR50 material. Allow welds to cool and touch up paint.

FIGURE #6



INSTALLATION

CONNECTING HYDRAULICS

1. Before starting, consult the manual provided in the hydraulic kit for your specific make and model.
2. Turn off the prime mover engine and then turn the ignition key back to the ON position. DO NOT start the engine.
3. Relieve the hydraulic pressure in the system. Turn the ignition key to the OFF position and remove it from the ignition switch.
4. Following the prime mover's service manual, bleed the air pressure from the hydraulic oil tank. The hydraulic oil pressure supply to operate the thumb will attach to the bucket cylinder retract circuit. Relieving all hydraulic pressure will minimize loss of hydraulic fluid.
5. Attach vacuum pump to the prime mover's hydraulic fluid reservoir to minimize drainage of hydraulic fluid.
6. Finish attaching all hydraulic hose and fittings needed for installation.
7. Turn off vacuum pump and remove it from the hydraulic fluid reservoir.
8. Check that all hydraulic fittings are tight.

Hydraulic pressure on the thumb cylinder should not exceed 2250 PSI. It is essential to ensure the bucket always overpowers the thumb. Refer to prime mover operator's/service manual for procedures on checking and adjusting auxiliary circuit valve to the recommended pressure.

CYLINDER CHART

CYLINDER PART NO.	BORE x STROKE	PORT SIZE	MAXIMUM PRESSURE
90x1211x838CC	90mm x 838mm	-8 SAE O-RING	2250 PSI
100x1183x775CC	100mm x 775mm	-12 SAE O-RING	
100x1297x889CC	100mm x 889mm		
125x1319x889CC	125mm x 889mm		
125x1478x1042CC	125mm x 1042mm		
140x1474x1016CC	140mm x 1061mm		
140x1556x1092CC	140mm x 1092mm		

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
Thumb cylinder does not extend or retract properly.	Hoses or valves plugged by dirt.	Remove hoses and valve. Clean hoses and valve spool. Blow air through valve to check operation.

OPERATION

INTENDED USE

The thumb is designed to be used in conjunction with a specific attachment and prime mover type for loading, unloading and transporting objects or material. Use in any other way is considered contrary to the intended use.

MISUSE

Forms of misuse include, and are not limited to: using the thumb to “rake” material, to “push” or “pull” material, using the sides of the thumb to move material, using the thumb with rope/chain as a lifting device or using the thumb as a “pry bar” to dislodge objects.

Misuse of the thumb may cause damage to the bucket, stick and boom and result in a loss of warranty and serious personal injury or death.

OPERATING THE THUMB

The thumb is operated using the auxiliary hydraulic system of the prime mover. Because of this, thorough knowledge of the prime mover’s controls is necessary. Read and understand the prime mover’s operator’s manual for information regarding proper operation before attempting to use the thumb.

If a coupler is used with the thumb, refer to the coupler’s operator’s manual for proper operation instructions.

- The operator should become familiar with the prime mover controls and how they function to operate the attachment.
- DO NOT curl an empty bucket into the thumb. Damage to both the bucket and the thumb may occur.
- Always center the load between the thumb and bucket. Close the thumb to the fullest extent possible and lift the load slightly to be certain it is secure. DO NOT lift load high in the air and then attempt to adjust the thumb.

NOTE: If the load appears to be unstable, lower it to the ground, open the thumb and reposition the load to attain full stability. Repeat until full stability is achieved.

- Keep people away from equipment while in use. DO NOT allow anyone between the thumb and bucket while the prime mover is running.
- DO NOT curl prime mover stick in toward boom while the thumb is in the operating position. If the thumb contacts the prime mover, damage to the thumb and/or prime mover may occur.
- Always keep the thumb rotated back fully while not in use. Lock the thumb in position using safety pin.

Because a heavy load (rock or logs) can generate a great deal of momentum in side-to-side movements, the operator should always use caution and avoid sudden stops and starts.

OPERATION

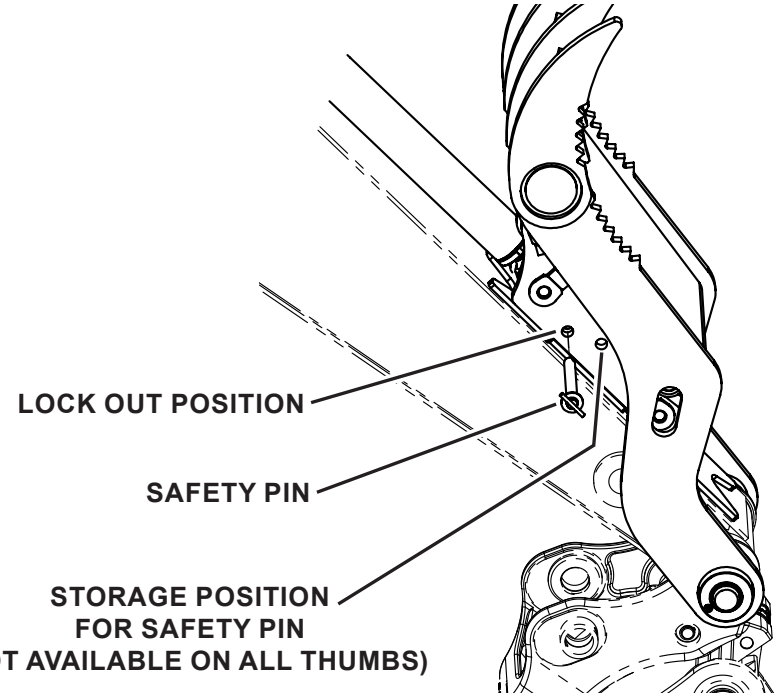
LOCKING OUT THE THUMB

When the thumb is not in use, it should be rotated out of the way and locked in position using the safety pin provided.

Using the prime mover's controls, rotate the thumb back until the idler arms rest on the pivot base and the lock out holes of the idler arms align with those in the lock out tabs. Insert the safety pin and secure using the quick pin. See Figure #1.

Some thumbs will have a designated location for storing the safety pin when the thumb is in use. See Figure #1. If your thumb does not have this location for storing the safety pin, keep the safety pin in the cab of the prime mover when the thumb is in use.

FIGURE #1



STORAGE:

- Clean the unit thoroughly, removing all mud, dirt, and grease.
- Apply a light coating of oil to all exposed metal parts to prohibit corrosion.
- 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.
- Seal hydraulic system from contaminants and secure all hydraulic hoses off the ground to help prevent damage
- Store unit in a dry and protected place. Leaving the unit outside will materially shorten its life.

Additional Precautions for Long Term Storage:

- Touch up all unpainted surfaces with paint to prevent rust

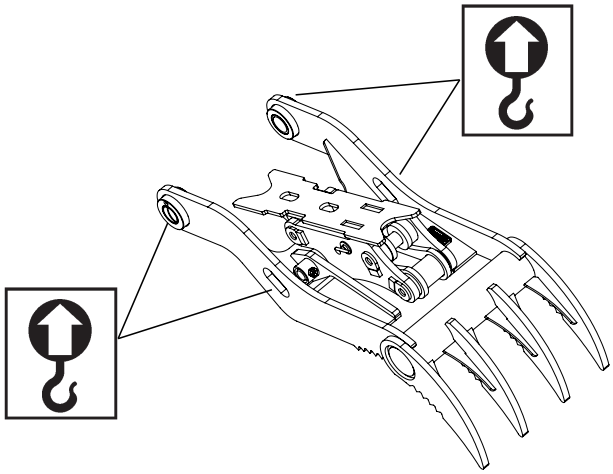
REMOVAL FROM STORAGE:

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

OPERATION

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

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

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

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

WARNING! Verify that all tiedown 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 tiedown points and any equipment safety precautions at the front of this handbook when transporting your attachment.

MAINTENANCE

GENERAL INFORMATION

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

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.

WARNING!  **DO NOT MODIFY ATTACHMENT: Modifications may weaken the integrity of the attachment and may impair the function, safety, life and performance of the attachment.**

PROCEDURE	EVERY 8 HOURS (DAILY)
Check prime mover hydraulic system to ensure an adequate level and cleanliness of hydraulic oil.	✔
Check for missing or loose hardware. Replace or tighten as necessary. See Bolt Torque Specifications.	✔
Check hydraulic system for leaks and tighten as necessary. Check for damage and replace as needed.	✔
Check for missing or damaged safety decals and replace as necessary.	✔
Check for worn parts or cracks. If cracks exist in structure or welds, remove from prime mover and contact Paladin Customer Service.	✔
Lubricate grease fittings.	✔
Check that mounting pins and pin locking hardware are secure.	✔

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

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

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

LUBRICATION

GENERAL INFORMATION

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

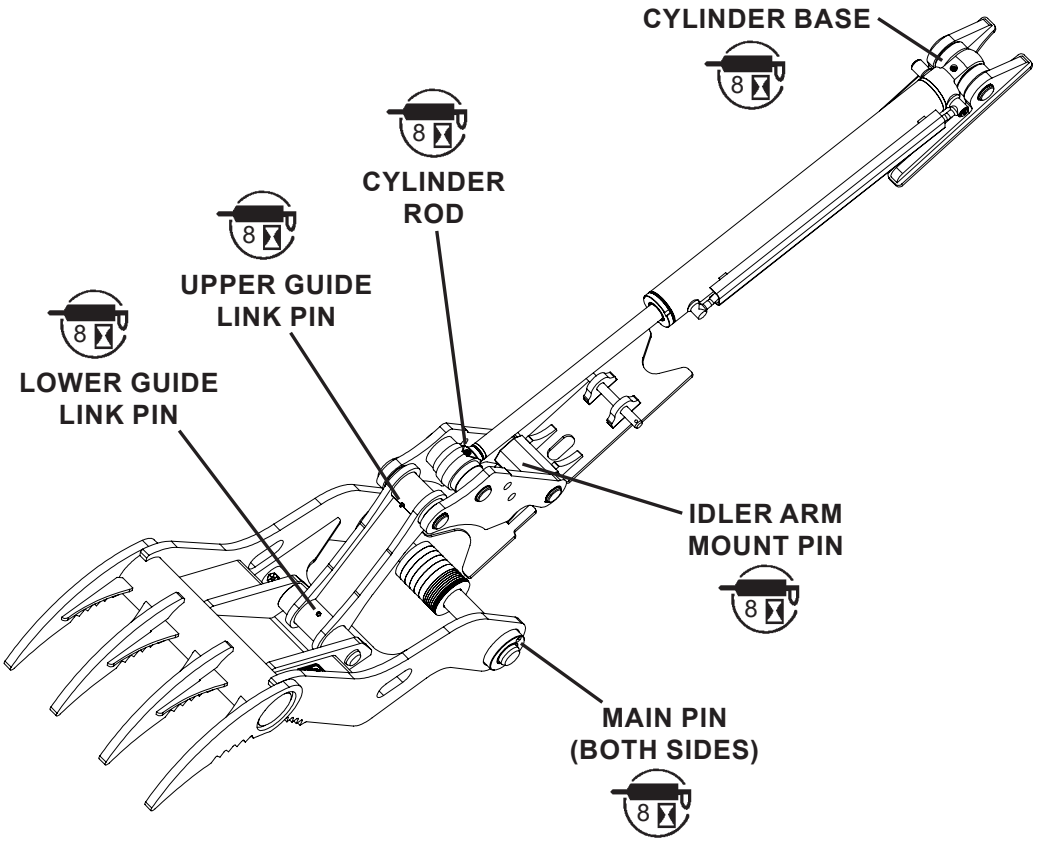
All parts provided with grease fittings should be lubricated as indicated. If any grease fittings are missing, replace them immediately. Clean all fittings thoroughly before using grease gun.

LUBRICATION SYMBOLS

Lubricate daily or every 8 hours of operation, whichever comes first, with SAE Multi-Purpose Lubricant or an equivalent SAE Multi Purpose type grease.

LUBRICATION DIAGRAM

The following diagram is provided to help you locate all the points on your attachment that need lubricating. Be sure to follow the lubrication intervals as noted by the lubrication symbols used on this page. Always replace any missing grease fittings as soon as possible.



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

SPECIFICATIONS

WELDING SPECIFICATIONS FOR INSTALLATION PROCESS

The purpose of this section is to provide specific details and instruction for the installation process of the thumbs stated within. Articles to be addressed are as follows:

- Approved Welding Process/Electrodes and Protection - (SMAW/GMAW)
- Weld Quality - VWI *(AWS D1.1. 2004 Edition)*
- Specific Weld Sizes and Locations

Article I. **Approved Welding Process/Electrodes and Protection**

Section 1.01 The SMAW or GMAW process is suited for the installation process of all thumbs produced by C&P. If an SMAW process is chosen for this installation, the type of electrode to be utilized is an E-7018.

Refer to AWS D1.1 Section 5.3.2.1, 2004 Edition for Low - Hydrogen Electrode Storage Condtions

The conditions for maintaining the specified electrodes shall be satisfied prior to the installation process.

If the GMAW process is utilized, the classification strength of the filler metal should meet the same characteristics/properties as that of the E-7018 of the SMAW process.

Article II. **Weld Quality - (VWI)**

Section 2.01 To insure the highest level of quality is provided a Visual Weld Inspection should be performed after the welding process is complete. This process should be performed in accordance with *AWS D1.1 Section 4.8.1 Visual Inspection***.** If any discontinuities or discrepancies are identified they should be repaired in accordance to *AWS D1.1, Section 5.26 Repairs.*

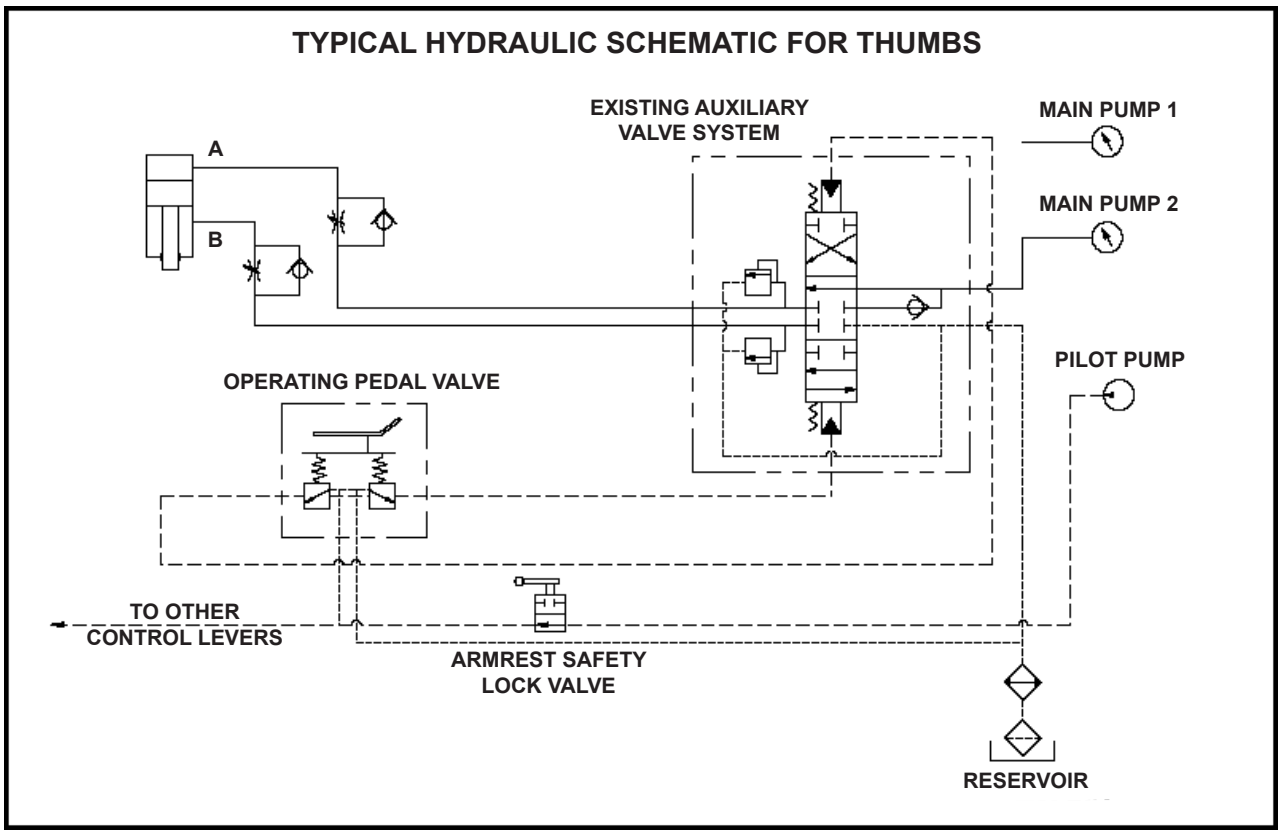
Article III. **Specific Weld Sizes and Locations**

Section 3.01 Refer to installation instructions for specific weld sizes and locations.

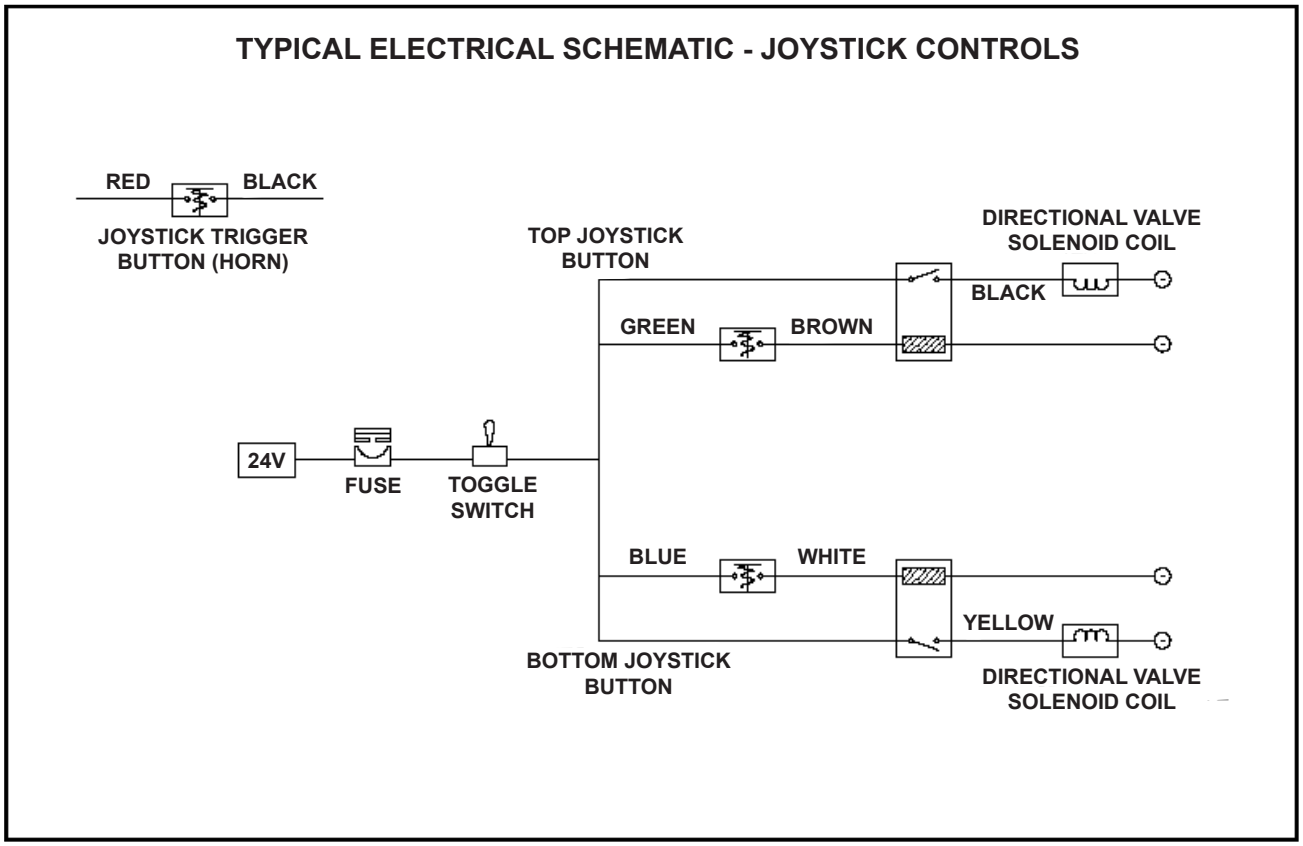
WELDING PRE-HEAT CHART	
METAL TYPE	**PRE-HEAT TEMPERATURE**
GR50 & GR60 < 1/2”	70°F
GR50 & GR60 > 1/2”	150°F
T1	250°F
AR400, AR425, AR500	350°F
4140RB (Round Bar)	400°F
15B30	450°F

SPECIFICATIONS

HYDRAULIC SCHEMATIC



ELECTRICAL SCHEMATIC



SPECIFICATIONS

BOLT TORQUE SPECIFICATIONS

GENERAL TORQUE SPECIFICATION TABLES

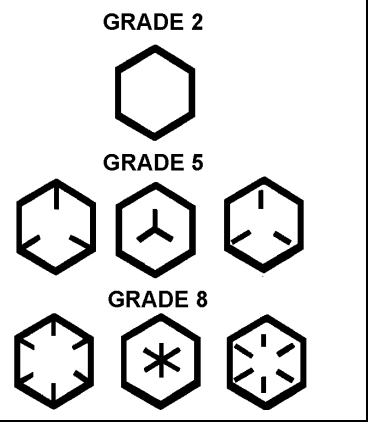
Use the following charts when determining bolt torque specifications when special torques are not given. Always use grade 5 or better when replacing bolts.

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

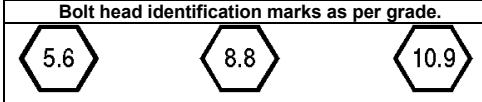
Bolt head identification marks as per grade.
NOTE: Manufacturing Marks Will Vary



METRIC BOLT TORQUE SPECIFICATIONS

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

Bolt head identification marks as per grade.



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

PARTS

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

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

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

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

NOTE: Most daily and emergency parts orders (in stock) received by 12:00 P.M. (Eastern Standard Time) will be shipped the same day.

SERVICE DEPARTMENT
(330) 734-3000
(800) 428-2538

For Fax and E-mail Orders
PHASales@paladinattachments.com
(330) 734-3018

WARRANTY

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