



Installation, Maintenance and Service Manual BHA

Billet Handler

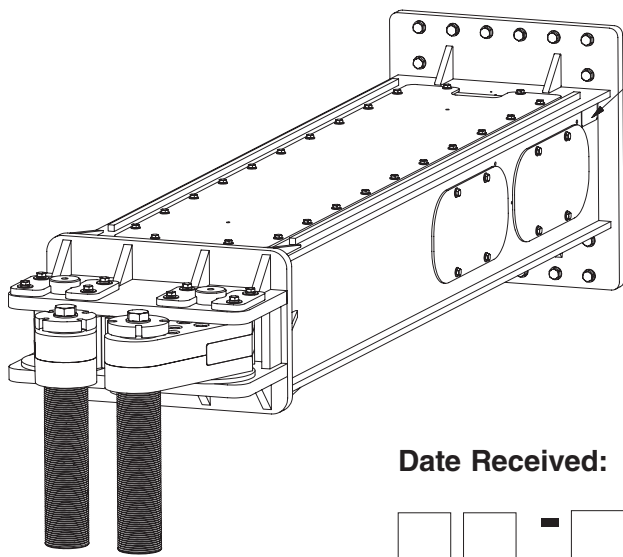
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SECTION 1 NAMEPLATE LOCATION

NOTICE

When you receive your attachment, locate the Long Reach nameplate and record the information to the blank nameplate tag with the date received in the space provided on the bottom of this page. If the name plate is missing, look for the serial number stamped directly into the metal at the original location and consult factory.



APPROX.
S/N PLATE
LOCATION

Date Received:

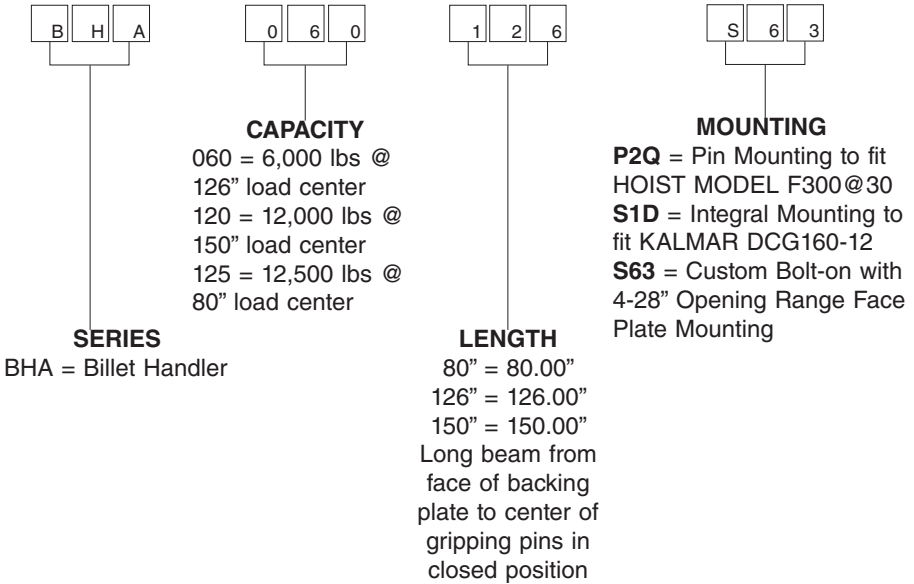
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LONG REACH A Division of Allied Systems Company		21433 SW Oregon Street Sherwood OR 97140 USA www.alliedsystems.com	2500005 rF		
MODEL NO.:			SERIAL NO.:		
CAPACITY AT LOAD CENTER:		KG @		MM	
		MASS:		KG	
		(LBS) @		(IN)	
		(LBS)		(LBS)	
MAXIMUM HYDRAULIC PRESSURE:		BAR		L/min	
		FLOW:		HCG:	
		(PSI)		(GPM)	
				(IN)	
				VCG:	
				(IN)	
				LCG:	
				(IN)	
DATE:			SEE TRUCK NAMEPLATE FOR COMBINED TRUCK & ATTACHMENT CAPACITY		

SECTION 2 MODEL NUMBER DESCRIPTION

Each attachment is identified by a model number and a serial number located on the name plate attached to the unit prior to shipment. Long Reach's model numbers are designed to describe how an attachment is equipped. The guide below illustrates the information that is represented in a model number. Always include model and serial number when ordering parts or requesting service information.

BHA Series Model Number:



SECTION 3 SAFETY SUMMARY

3.1 Safety Information

Safety is Everyone's Responsibility

Whether you are new on the job or a seasoned veteran, these safety tips may prevent injury to you, to others, or to the materials you are handling. Always be alert, watch out for others, and follow these suggestions:

Attachments handle material, not people.

Safety starts with common sense, good judgement, properly maintained equipment, careful operation, and properly trained operators.

The safety instructions and warnings, as documented in this manual and shipped with the machine, provide the most reliable procedures for the safe operation and maintenance of your Long Reach attachment. It's your responsibility to see that they are carried out.

3.2 Product Modifications

Any alterations to the product, that have not been approved by Allied Systems Company or use of any non-OEM replacement parts will void the warranty, and may introduce serious safety hazards. Any non-OEM parts used, or any alterations made are done so at your own risk to personnel safety. This includes the addition of accessories and attachments not manufactured by Allied Systems Company.

3.3 Safety Regulations

Know your company's safety rules. Some companies have site-specific directions and procedures. The methods outlined in your operator's manual provide a basis for safe operation of the machine. Because of special conditions, your company's material handling procedures may be somewhat different from those shown in this manual.

3.4 Safety Symbols

The following terms define the various precautions and notices:



Indicates a hazardous situation which, if not avoided, WILL result in death or serious injury. Carefully read the message to prevent serious injury or death.



WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury. Carefully read the message to prevent serious injury or death.



CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. Carefully read the message to prevent minor or moderate injury.

NOTICE

Describes information that is not related to personal injury, but may cause equipment damage or void the warranty.



CAUTION

All possible safety hazards cannot be foreseen so as to be included in this manual. Therefore, the operator must always be alert to possible hazards that could endanger personnel or damage to the equipment.

Obey the following warnings before using your machine to avoid equipment damage, personal injury or death.

3.5 Labeling

- Change capacity, operation, and maintenance instruction plates, tags, or decals when a forklift truck is equipped with an attachment. If the truck is equipped with front-end attachments other than factory installed attachments, truck must be marked to identify the attachments and show the approximate weight of the truck and attachment combination at maximum elevation with load laterally centered.

3.6 Training

- Make sure all operators are trained in the fork and attachment adaptation, operation, and use limitations. Retrain an operator if a new attachment is added to the forklift. Consult the operator's manual for instructions on how to use the new equipment.
- Know the mechanical limitations of your forklift.

- Modifications or additions that affect capacity or safe operation must have prior written approval from the forklift truck manufacturer. Capacity, operation, and maintenance instruction plates, tags, or decals shall be changed accordingly.
- Never use free rigging for a below-the-forks lift. It could affect the capacity and safe operation of a lift truck.

3.7 Personnel Safety

- When removing or installing dismountable attachments always keep hands and feet free from dangerous positions or pinch points. Never leave a dismantled attachment in a dangerous position.
- Keep hands, feet, long hair and clothing away from power-driven parts. Do not wear loose fitting clothing or jewelry while performing maintenance and lubrication in these areas.
- Never jump on or off the machine.
- Never stand on top of material being raised, lowered, or transported. (Figure 3-1)

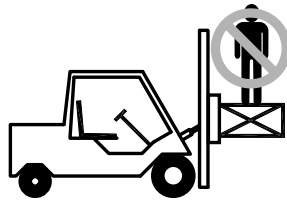


Figure 3-1,

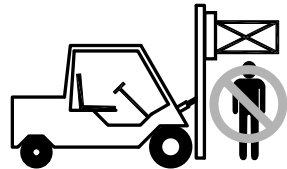


Figure 3-2,

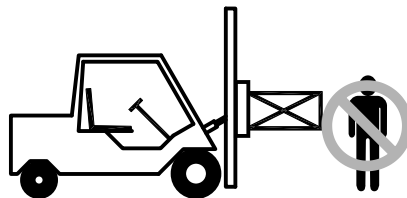


Figure 3-3,

- Never use the attachment or its load to support a man-carrying device.
- Never allow anyone under a load or under the carriage. (Figure 3-2)

- Never stand in front of or beside an attachment that is being operated. Never allow another person to approach an attachment that is being operated. (Figure 3-3)
- Never leave an attachment or load in an elevated position.
- Never reach through the mast of the truck. Keep all parts of the body within the driver's compartment.
- Always operate an attachment from the operator's seat, never while standing next to the lift truck.
- Do not allow riders on the truck at any time.
- Always use reverse when carrying a load that impedes full vision. Watch for pedestrians when transporting.
- Always use personal protective equipment (PPE) appropriate to the situation.

3.8 Pre-start Checks

- Check your equipment before you operate it. If anything looks wrong, unusual or different, report it before using the attachment.
- Do not operate this machine if you know of malfunctions, missing parts, and/or mis-adjustments. These situations can cause or contribute to an accident or damage to the machine. Stop the machine immediately if problems arise after starting.
- Check to make sure the attachment on your truck is the same as on the truck capacity plate.
- Check for hydraulic leaks and cracked hoses or fittings. Check the hydraulic oil level in the lift truck hydraulic reservoir.
- All electrical cables and connectors must be in good condition. Use caution in wet weather to avoid danger from electrical shock.
- Always check the attachment for proper fit and engagement of the truck carriage.

3.9 Operation Warnings

- You must be trained to operate this equipment prior to operation. Be extremely careful if you do not normally operate this machine. Reorient yourself to the machine before starting, then proceed slowly.
- Always operate an attachment from the driver's seat.
- Always lower the attachment if you need to leave the lift truck. A lift truck supporting a load requires your full attention.

3.10 Hydraulic Hazards



DANGER

Small hydraulic hose leaks are extremely dangerous, and can inject hydraulic oil under the skin, even through gloves. Infection and gangrene are possible when hydraulic oil penetrates the skin. See a doctor immediately to prevent loss of limb or death.

- Wear personal protective equipment, such as gloves and safety glasses, whenever servicing or checking a hydraulic system.
- Assume that all hydraulic hoses and components are pressurized. Relieve all hydraulic pressure before disconnecting any hydraulic line.
- Never try to stop or check for a hydraulic leak with any part of your body; use a piece of cardboard to check for hydraulic leaks.

3.11 Electrical Hazards



WARNING

Remain at least 25 feet from high voltage electrical wires. Failure to do so may result in injury or death and will damage equipment.

- All electrical cables and connectors must be in good condition (free of corrosion, damage, etc). Use caution in wet weather to avoid danger from electrical shock. Never attempt electrical testing or repair while standing in water.
- Do not wear electrically conductive jewelry, clothing, or other items while working on the electrical system.

3.12 Maintenance Warnings

Maintenance, lubrication and repair of this machine can be dangerous unless performed properly. You must have the necessary skills and information, proper tools and equipment. Work in a method that is safe, correct, and meets your company's requirements.

- Do not attempt to make adjustments, or perform maintenance or service unless you are authorized and qualified to do so.
- Include attachments in a scheduled maintenance and inspection program. Tailor inspection steps to the attachment.
- Unless specified in service procedures, never attempt maintenance or lubrication procedures while the machine is moving or the engine is running.

- Always perform all maintenance and lubrication procedures with the machine on level ground, parked away from traffic lanes.

NOTICE

Local laws and regulations may require that additional safety measures be taken.

- Never rely on the hydraulic system to support any part of the machine during maintenance or lubrication. Never stand under a component that is supported only by the hydraulics. Make sure it is resting on its mechanical stops or appropriate safety stands.
- Use caution when working around hot fluids. Always allow lubricating and hydraulic oils to cool before draining. Burns can be severe.
- Use extreme caution when using compressed air to blow parts dry. The pressure should not exceed 30 psi (208 kPa) at the nozzle. Never use compressed air on yourself. Air pressure penetrating your skin can be fatal.
- Engine exhaust fumes can cause death. If it is necessary to run the engine in an enclosed space, remove the exhaust fumes from the area with an exhaust pipe extension. Use ventilation fans and open shop doors to provide adequate ventilation.
- Before disconnecting hydraulic lines, be sure to lower all loads and relieve all hydraulic pressure. The load could fall on you, or escaping hydraulic oil could cause severe personal injury.
- Prevent personal injury or equipment damage by using a lifting device with a lifting capacity greater than twice the weight of any equipment to be lifted.

3.13 Load Handling

- Treat an unloaded forklift with an attachment as partially loaded.
- Never overload the attachment. Refer to the attachment nameplate for the rated capacity of the attachment. Refer to the truck nameplate for the maximum net working capacity of the truck/attachment combination.
- Never use a load to support or move another object. Doing so can easily exceed the holding capacity of the attachment.
- Always check loads to be handled. Correct loads that are broken, unbalanced, loose, or too heavy.
- Never lift, lower, side shift, pivot, rotate, or tilt loads while traveling. Repositioning loads while traveling affects the stability of the truck and may impede vision or clearances.
- Do not use an attachment to open or close boxcar doors. Doing so can severely damage the attachment and cause loss of warranty. Damage to clamp arms may result in product damage.

- Do not carry loose items or unsupported loads on top of a clamped load.
- Never use chains, cables, or other devices in conjunction with an attachment for load handling.
- Never clamp loads other than what the attachment was designed to handle.
- Always carry cylindrically shaped loads in the vertical position, not the horizontal.
- Always clamp loads with the contact pads, if applicable, not the arm or arm base.
- Never rotate a load that is off center to the centerline of rotation. Severe damage to the rotator could result.
- Always ensure that the load is the same width as the pallet and neatly stacked when using a carton clamp.

3.14 Load Positioning

- Be accurate in load placement. It's important to know what the load will do when it's released.
- Always carry loads as close to the floor as possible, consistent with the surface being traversed. Scraping or bumping the floor surface with the load or the attachment can severely damage the attachment and cause product damage. The mast should be tilted back.
- Always keep the load positioned as close as possible to the horizontal center of the lift truck.
- Always back down ramps or inclines. Driving forward down a ramp or incline with a clamped load will lessen the stability of the truck. (Figure 3-4)

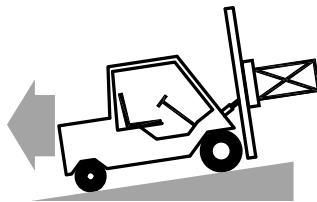


Figure 3-4,

- Do not cross dock boards or dock levelers with the attachment or carriage fully lowered. Ramming the front or rear of the attachment against a dock board can cause severe damage.
- Limit lift truck movement to a minimum when high stacking. Limit sideshift movement to a minimum when high stacking.
- Always be observant when high stacking. Look for poorly stacked loads, overhead obstacles, broken cartons, or damaged products in the stack.

- Travel slowly around corners. Sound horn on blind corners. Be careful of tail swing and overhead clearances. Watch in all directions. Avoid sudden stops.

3.15 Operator's Controls

Prior to connecting the truck hydraulic system to the attachment, the truck hydraulic system **must** be cleaned through the filtration system. This will eliminate any contamination that may exist in the auxiliary hydraulic system of the truck.



The capacity of the truck and attachment combined may be less than the attachment capacity. Injury and equipment damage could result if truck is overloaded. Consult truck nameplate!



The dealer and/or the user are responsible for installing any valving required to meet the recommended hydraulic pressures and flow. The required valving can be furnished by the dealer, the truck factory or Long Reach.

Some lift trucks are equipped with a single lever to control both hoist and tilt functions, others have separate levers for each function. Refer to your lift truck manual for more information.

For clarity, the direction of arm movement is shown on the control handle. To move the arms in the direction shown, pull the handle towards the operator. To move the arms in the opposite direction, the push the handle away from the operator. (Figure 3-5)

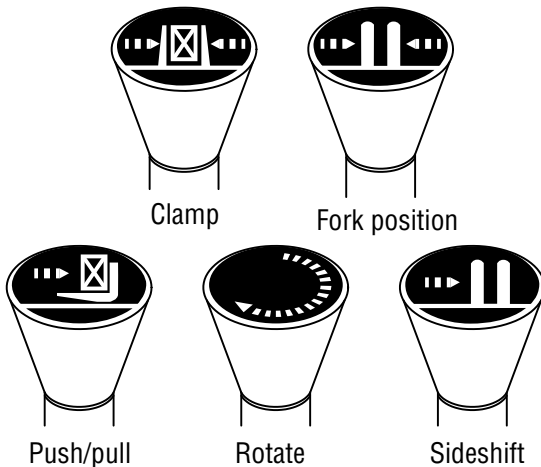


Figure 3-5,

Lifting speed is controlled by the speed of the engine and the position of the control lever. Engine speed has no effect on lowering speed.

Before going on the job, shift the truck control levers one way and then the other to determine which direction the attachment moves when the levers are shifted. Make sure the attachment moves smoothly throughout its travel, without binding or pinching hoses.

NOTICE

Do not attempt to pull a load onto the platens with a misaligned faceplate. Product damage and/or equipment damage could result.



WARNING

If the attachment does NOT operate smoothly, do not take it on the job. Check with your supervisor about needed repairs to avoid injury or equipment damage.

3.16 Clamp Open Control

Effective October 7, 2010, safety standard ANSI/ITSDF B56.1, Section 7.25.7 covers all lift trucks with a load bearing clamp (paper roll clamp, carton clamp, etc.), and requires the driver to make two distinct motions before opening or releasing the clamp. For example, you must press a switch and then move a lever to unclamp the load. This requirement applies to new and used attachments being mounted on trucks which shipped from the factory after October 7, 2010, and is a recommended feature to be installed on dealer orders and existing applications.

3.17 Industry Standards

ANSI/ITSDF B56.1-2016 is the published sequence and direction standard for lever- and hand-type controls.

NOTICE

The chart on the following page shows industry standards. Your equipment may be different. If you do not routinely operate this equipment, refresher training is recommended. You must acquaint yourself with this manual and the equipment before starting, and then proceed slowly.

Special controls such as automatic devices should be identified, preferably according to the recommendations in Figure 3-6

When a function is controlled by a pair of push buttons, they should operate in the same sense as the lever controls. For example, pushing a button located to the rear (relative to the operator's position) should serve the same function as moving a control lever to the rear.

Function	Direction of motion	
	Load	Operator's hand on control handle, facing the load*
Hoist	Up Down	Rearward or up Forward or down
Reach	Retract Extend	Rearward or up** Forward or down
Tilt	Rearward Forward	Rearward or up** Forward or down
Sideshift	Right Left	Rearward or up Forward or down
Push-pull	Rearward Forward	Rearward or up** Forward or down
Rotate, lateral	Clockwise Counterclockwise	Rearward or up Forward or down
Rotate, longitude	Rearward Forward	Rearward or up Forward or down
Load stabilizer	Down Up	Rearward or up Forward or down
Swing	Right Left	Rearward or up Forward or down
Slope	Clockwise Counterclockwise	Rearward or up Forward or down
Fork position	Together Apart	Rearward or up Forward or down
Trip	Engage Release	Rearward or up Forward or down
Grip	Engage Release	Rearward or up Forward or down
Truck stabilizer	Raise Lower	Rearward or up Forward or down
Clamp	Clamp Release	Rearward or up Forward or down

Figure 3-6, ANSI/ITSDF

Sequence of location and direction of motion for lever or hand-type controls

- * For high lift order picker trucks and center control pallet trucks, predominant motion of the operator's hand when actuating the control handle while facing away from the load.
- ** The sense of rotation of the control handle is intended to be in the same direction as the desired motion of the mast or load

SECTION 4 INSTALLATION PROCEDURE

4.1 Truck Requirements

Long Reach attachments have been designed to operate within specific limits. Operating pressures above the stipulated maximum may cause structural damage to the attachment and may result in loss of warranty. Hydraulic flow less than the recommended rates, or the use of small I.D. hoses may reduce operating speed. Higher flow can result in excessive heat buildup, erratic operation and damage to the truck/attachment hydraulic system.

NOTICE

The dealer and/or the user are responsible for installing any valving required to meet the recommended hydraulic pressures and flow. The required valving can be furnished by the dealer, the truck factory or Long Reach. The model description, found on your shipped invoice, will state the following truck requirements: flow (gpm), psi, and minimum truck carriage width.

4.2 Hydraulics

1. The truck hydraulic system must supply to the attachment hydraulic oil that meets the specifications required to operate the attachment properly.
2. When the truck hydraulic system pressures exceed this maximum, a relief valve is recommended in the attachment auxiliary system of the truck or on the attachment. Consult the truck factory and/or Long Reach for guidance.

4.3 Attachment Installation

1. Customer is to supply the mounting plate for the attachment.
2. The attachment is bolted to the mounting plate using 16 supplied 3/4 UNC X 3 hex head capscrews that have been treated with high strength/high temp Loctite Thread-locker 272 (Red) and 16 hard flat washers. Torque the bolts to 278 ft/lbs.

4.3.1 Bolt-On Hooks

First, remove the lower bolt-on hooks and, if applicable, make a note of any factory-installed shims. Shims are used to create space between the hook and carriage.

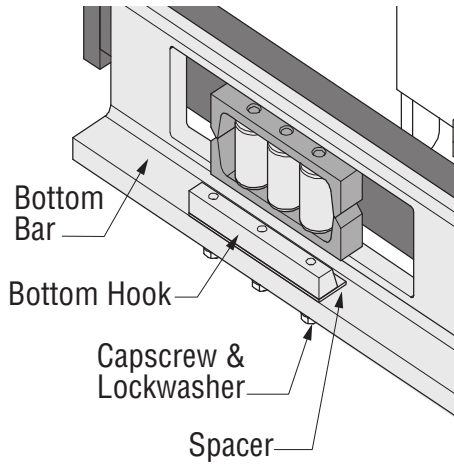


Figure 4-1, Remove the bottom bolt-on hooks

4.3.2 Quick Hooks

There are two kinds of quick hook, detent-pin style and push-button style.

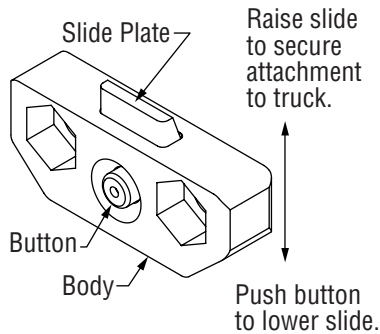


Figure 4-2, Push-button style quick hook

For push button quick hooks, depress the button on the back of the hook and allow the slide plate to drop.

Removing push button quick hooks is NOT recommended.

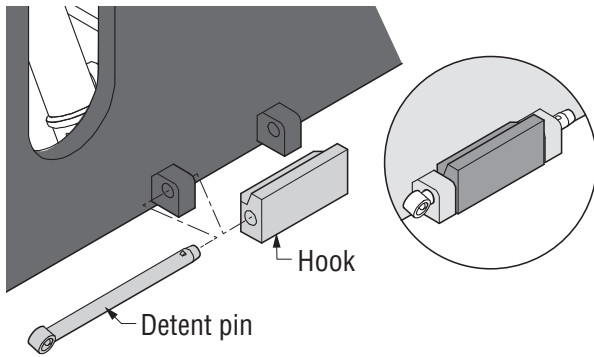


Figure 4-3, Detent pin style quick hook

For detent-pin style quick hooks, just pull the pin and remove it. The hook will come loose.

4.4 Installations with Bolt-On Hooks

1. Center the truck behind the attachment and drive toward it with the mast tilted forward about 4 degrees.
2. Line up the locking lug (if equipped) with the notch closest to the center on the truck's carriage.
3. Raise the truck carriage completely to engage the top hooks with the truck carriage. Tilt carriage back until the unit is against the carriage bottom fork bar (0 degrees).
4. Inspect for proper engagement of the locking lug in the notch that puts the attachment closest to the center of the truck's carriage.
5. Weld on the (optional) extra locking lug supplied with the attachment, (two pieces of 1/2" x 1/2" x 2.00" steel, shipped loose) with either E-6011 or E-6013 welding rod, or equivalent, on each side of the truck carriage.

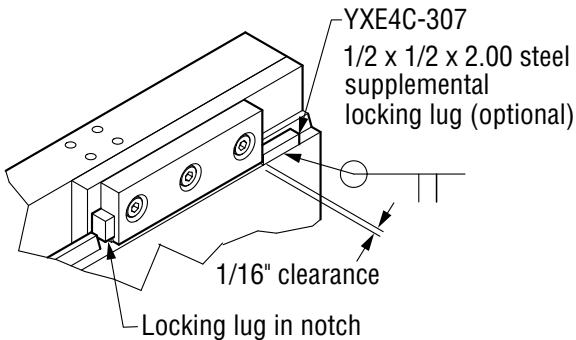


Figure 4-4, Welding the optional locking lug

- Install the bolt-on lower hooks. Check the clearance between the carriage and the lower hooks. Loosen the bolts on the front of the hooks, and slide them up or down so the clearance is no more than $3/32$ ".

On Class II and Class III units, tighten the $3/8$ " bolts to 33 ft-lbs. On Class IV units tighten the $1/2$ " bolts to 77 ft-lbs. On units using $9/16$ " UNC bolts, tighten the bolts to 112 ft-lbs.

NOTICE

Make note of any factory-installed spacers or shims. Shims are used to create clearance between the hook and carriage.

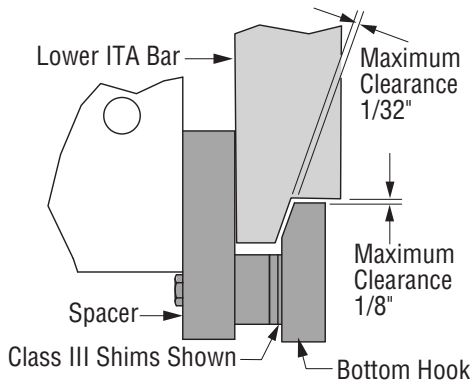


Figure 4-5, Adjusting bolt-on bottom hooks with spacers

4.5 Installations with Quick Hooks

- Follow steps 1-5 under bolt-on hooks.

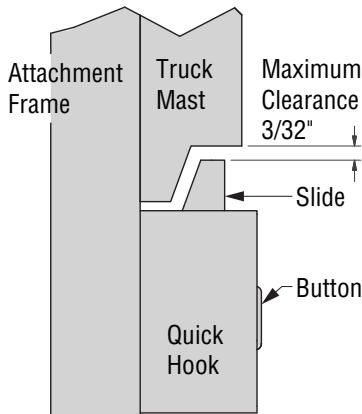


Figure 4-6, Quick hook inspection

2. Raise the slide plate until the button clicks into place.



The attachment could fall off the truck if the quick hook is not properly installed.

Slide plate must click into place. If the slide plate does not click into place because the truck carriage prevents the slide plate from being raised up high enough, install shims between the attachment and the body of the quick hooks.

4.6 Hydraulic Connections

1. Before connecting the truck hydraulic system to the attachment, the system **must** be purged through the filtration system. This will eliminate any contamination that might exist in the auxiliary hydraulic system of the truck.
2. Purge the system by installing a jumper line and operating each hydraulic function (clamp, rotate and side shift, if equipped) in each direction for a minimum of 30 seconds. (Figure 4-7)

Hoses should meet or exceed SAE100 RI Type AT, with maximum working pressure of 3,000 psi for all attachment functions.

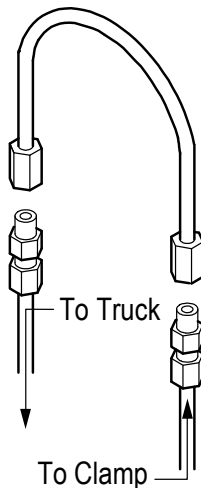


Figure 4-7, Jumper line setup

3. Locate the slot in the top cover plate of the attachment. Remove the caps covering the relief valve ports and attach customer supplied hydraulic hoses. (Figure 4-8).

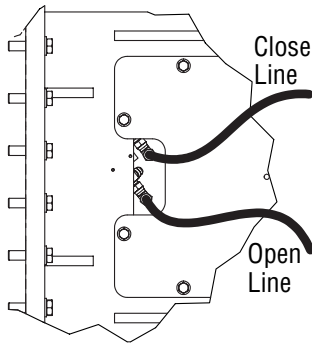


Figure 4-8, Hydraulic Connection

4. Never operate the truck or attachment until hydraulics are properly connected.

 **WARNING**

Any alterations to the original attachment may affect performance or safety and result in loss of warranty.

5. Inspect installation to make sure hoses are not kinked or pinched between the truck carriage and attachment.
6. Operate the attachment continuously for several minutes to determine that all hydraulic connections are secure with no leaks, and to remove any air in the hydraulic system.

NOTICE

Equipment damage and loss of performance could result if air is trapped in the hydraulic system.

Activate the hydraulic functions several times after hydraulic service has been performed, to bleed trapped air out of the system before returning attachment to service.

7. With the mast in the vertical position, open the attachment arms all the way. If you are working with a paper roll clamp, close the arms all the way. Now check that the truck's hydraulic oil reservoir level is at the recommended level.
8. Before placing the attachment in operation check the following:
 - a. Inspect all hoses and fittings for leaks and routing clearance. Be sure to include clearance of jumper hoses to the mast.
 - b. Check the valve and cylinder for leaks.
 - c. Check cotter pins at each end of the cylinder for security.

SECTION 5 SERVICE PROCEDURE

5.1 Attachment Removal



WARNING

Before disconnecting any hydraulic connections be sure to turn off the trucks power and activate the trucks hydraulic functions in both directions to bleed off the hydraulic pressure.

1. Lower the attachment onto pallets or suitable blocking that will support it when disconnected from the truck.
2. Disconnect the hydraulic connections at the attachment from the truck.
3. Remove the 16 bolts that secure the attachment to the mounting plate. You may have to heat the bolt heads first to soften the Loctite that secures them.



WARNING

When hydraulic servicing has been performed, before returning attachment to service be sure to activate the hydraulic functions several times to bleed out trapped air in the system.

5.2 Cylinder Removal

1. Remove the top cover plate and rear side plates to access the cylinder mounting bolts.
2. Remove the capscrew that secures the lockpin on the rod end of the cylinder. Remove the lockpin and the clevis pin.
3. Retract the cylinder rod, then slightly extend back out to relieve pressure in the accumulator. Make sure the clevis is clear of the rack weldment.



WARNING

Make sure pressure has been discharged from accumulator before removing the hose.

4. Disconnect the hydraulic hoses. It will be necessary to remove the relief valve to access the mounting bolts.
5. Secure the cylinder assembly to a winch or hoist then remove the cylinder base mounting bolts to free the cylinder. It may be necessary to heat the bolt heads first to soften the loctite that secures them.

5.3 Cylinder Installation

1. Carefully lower the cylinder into the main body
2. Secure the base with six 3/4" capscrews that have been treated with loctite thread-locker 272 (red) and washers. Torque the capscrews to 278 ft-lbs.
3. Attach the relief valve inside the upper housing. Attach the hydraulic connections to the cylinder. Attach the hose from the accumulator to the check valve.
4. Extend the cylinder until the rod end clevis hole lines up with the mounting hole in the rack weldment. Install the clevis pin and secure it with the lockpin. Use a 3/8" capscrew to secure the lockpin.
5. Turn on the trucks power and activate the cylinder several times to bleed out trapped air.

5.4 Cylinder Disassembly

1. Remove the cylinder from the attachment. See removal instructions.
2. Using a spanner wrench, turn the head assembly counter-clockwise until it clears the cylinder. (Figure 5-1)

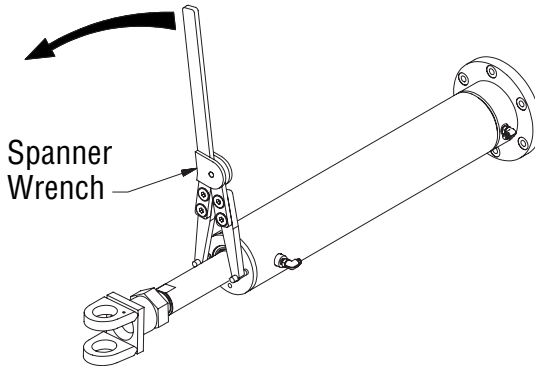


Figure 5-1, Spanner Wrench

3. Remove the piston rod assembly, with the head assembly still on the rod from the cylinder tube. (Figure 5-2)

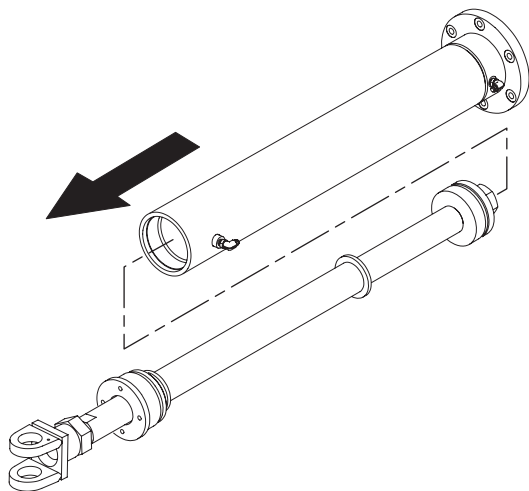


Figure 5-2, Piston Rod Removal

4. Clamp the rod assembly in a soft jawed vise on the wrench flats, not on the rod surface. If the rod does not have wrench flats use two pieces of wood on both sides of the rod to prevent scarring. (Figure 5-3)

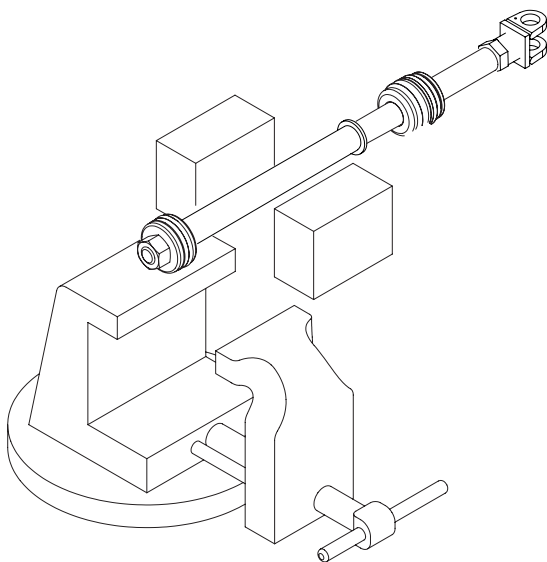


Figure 5-3, Cylinder Shaft

5. Remove the piston retaining nut and remove the piston assembly. (Figure 5-4)

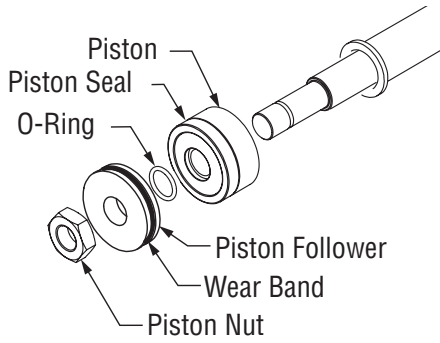


Figure 5-4, Piston Removal

6. Slide the piston seal off the piston noting the direction the seal is facing. When the new seal is installed make sure it faces in the same direction.
7. Carefully pry up on the gland cap seals using a blunt tip screw driver being careful not to scratch the seal grooves. Cut the seals to remove from the gland cap. (Figure 5-5)

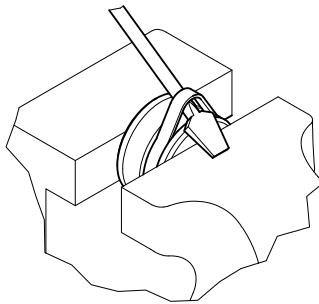


Figure 5-5, Gland Cap Seal

5.5 Cylinder Inspection

Inspect the cylinder tube bore for:

1. Deep scratches or nicks.
2. Signs of galling or excessive wear.
3. Out-of-roundness or deformities of the barrel.

Inspect the piston for:

1. Scratches or nicks on seal grooves.
2. Wear on O.D.

Inspect the cylinder rod for:

1. Scratches or nicks on the rod surface.
2. Straightness of the rod.
3. Damaged threads.

Inspect the gland cap for:

1. Scratches or nicks in seal grooves.
2. Damaged threads or spanner wrench holes.
3. Excessive wear in bore.

Replace any component found to be defective.

5.6 Cylinder Assembly

1. Spray the piston, gland cap, and seals with wd40 or other similar product to ease slipping of the seals in place.
2. Note the direction of the seal on the piston. Improper installation will result in poor performance. The cupped side or O-ring side of the seal should be facing the gland cap. (Figure 5-6)

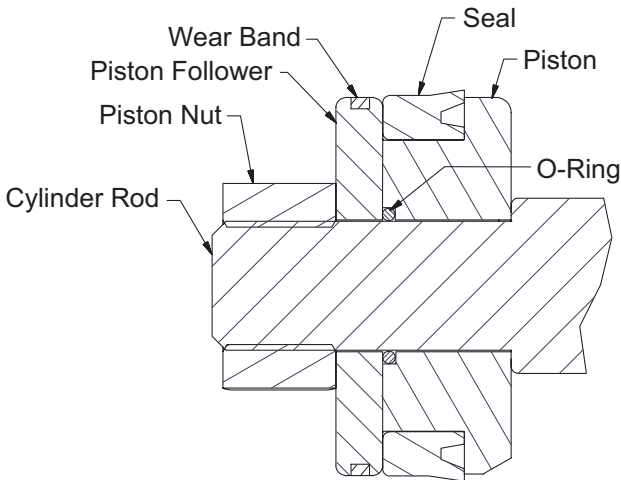


Figure 5-6, Piston Seal

3. Install the seals and wipers in the gland cap. Note the direction of the seals. The cupped side or O-ring side of the seal should be facing the piston. (Figure 5-7)

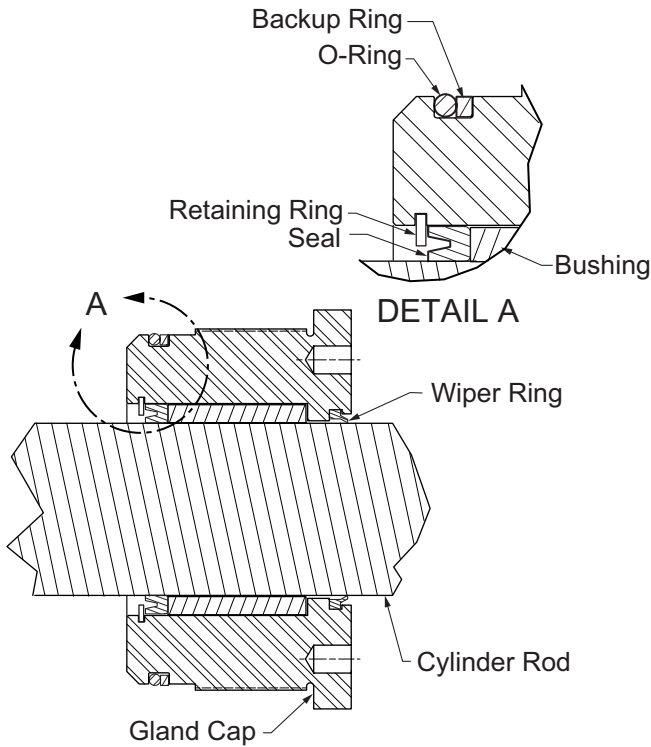


Figure 5-7, Gland Cap Seal

4. Install the gland cap on the cylinder rod being extremely careful not to cut the rod seal on the threads of the rod or rod shoulder. If available, use a sleeve or plastic electrical tape to cover the rod threads.
5. Install the piston on the rod and tighten the locknut to 90 ft-lbs (0.56 UNF), 22 ft-lbs (0.75 UNF).
6. Spray the inside of the cylinder tube with lubricant to ease inserting the rod and piston. Insert the rod and piston into the cylinder tube. Tap the rod in with a rubber mallet if resistance is encountered.
7. Tighten the gland cap using a spanner wrench.

5.7 Wear Plug Replacement

1. Remove the two threaded plugs located underneath the rack weldment. (Figure 5-8)

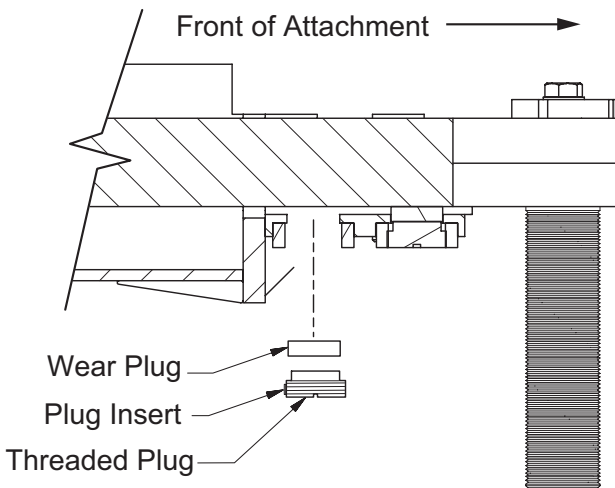


Figure 5-8, Wear Plugs

2. Remove the old wear plugs.
3. Replace the plug inserts located in the threaded plugs before reinstalling.
4. Install the new wear plugs and secure them in place with the threaded plugs.

5.8 Gripper Pin Replacement

1. Check gripper pins for wear or cracks. Replace them when necessary.
2. Loosen the capscrew that secures the gripper pin. It may be necessary to heat the bolt head to soften the loctite that secures it. While holding the gripper pin remove the capscrew that holds the gripper pin in place. (Figure 5-9)

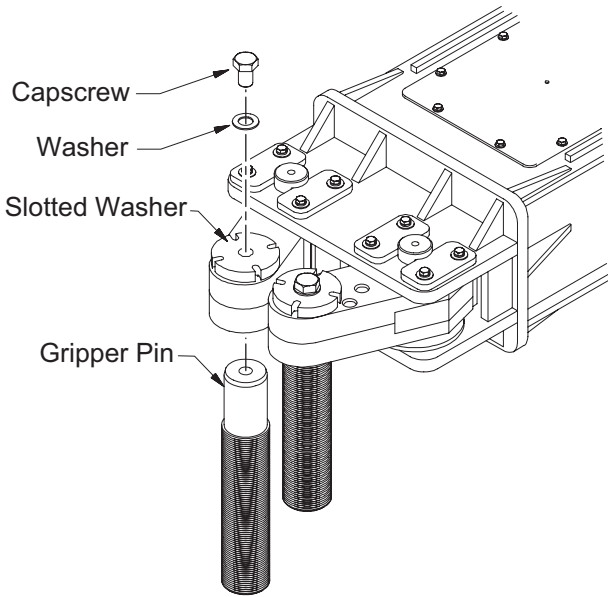


Figure 5-9, Wear Plugs

3. Insert the new gripper pin and secure it with the capscrew that has been treated with Loctite threadlocker 272 (red). Torque the capscrew to approximately 1000 ft-lbs.

5.9 Grease Fitting Locations

1. Use a standard lithium grease when necessary on the grease fittings located in the gear pins. (Figure 5-10)

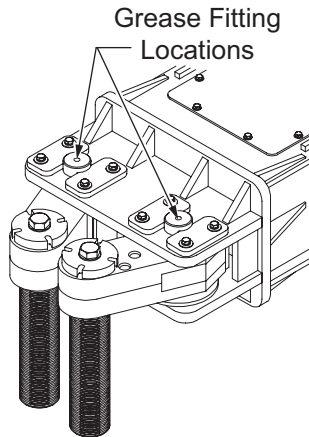


Figure 5-10, Grease Fitting Locations

SECTION 6 MAINTENANCE

6.1 Schedule

Daily:

1. Visually inspect all hoses, fittings, cylinders, and valves for signs of hydraulic leaks.
2. Visually inspect for external damage or cracks.

100 Hour Maintenance:

1. Complete the above daily checks.
2. Check all hoses and fittings for wear or damage. Inspect for hydraulic leaks.
3. Check for loose or missing bolts.

6.2 Torque Specifications

The following torque values are to be used on all fasteners unless otherwise specified.

Lubricated refers to fasteners in the "As Received" condition, which is normally a light preservative oil coating on unplated fasteners and no oil coating on plated fasteners. No special steps are taken to add further lubrication prior to assembly.

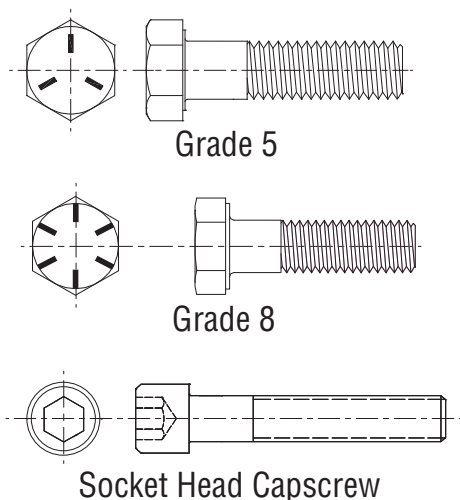


Figure 6-1, Bolt Identification

GRADE 8 COARSE THREAD		GRADE 5 COARSE THREAD		SOCKET HEAD COARSE THREAD	
Bolt Size	Lubricated Torque	Bolt Size	Lubricated Torque	Capscrew Size	Lubricated Torque
1/4"	11 ft-lbs	1/4"	7.5 ft-lbs	1/4"	12.5 ft-lbs
5/16"	23	5/16"	16	5/16"	26
3/8"	40	3/8"	28	3/8"	46
7/16"	63	7/16"	45	7/16"	74
1/2"	96	1/2"	68	1/2"	115
9/16"	140	9/16"	98	9/16"	160
5/8"	195	5/8"	140	5/8"	215
3/4"	340	3/4"	240	3/4"	385
7/8"	550	7/8"	390	7/8"	615
1"	820	1"	580	1"	920
1-1/8"	1,160	1-1/8"	715	1-1/8"	1,305
1-1/4"	1,640	1-1/4"	1,010	1-1/4"	1,840
1-3/8"	2,150	1-3/8"	1,330	1-3/8"	2,415
1-1/2"	2,850	1-1/2"	1,760	1-1/2"	3,205

Figure 6-2, Torque Specification

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