LONG REACH®

# Installation, Maintenance and Service Manual LP, PLP

## Load Push Attachments

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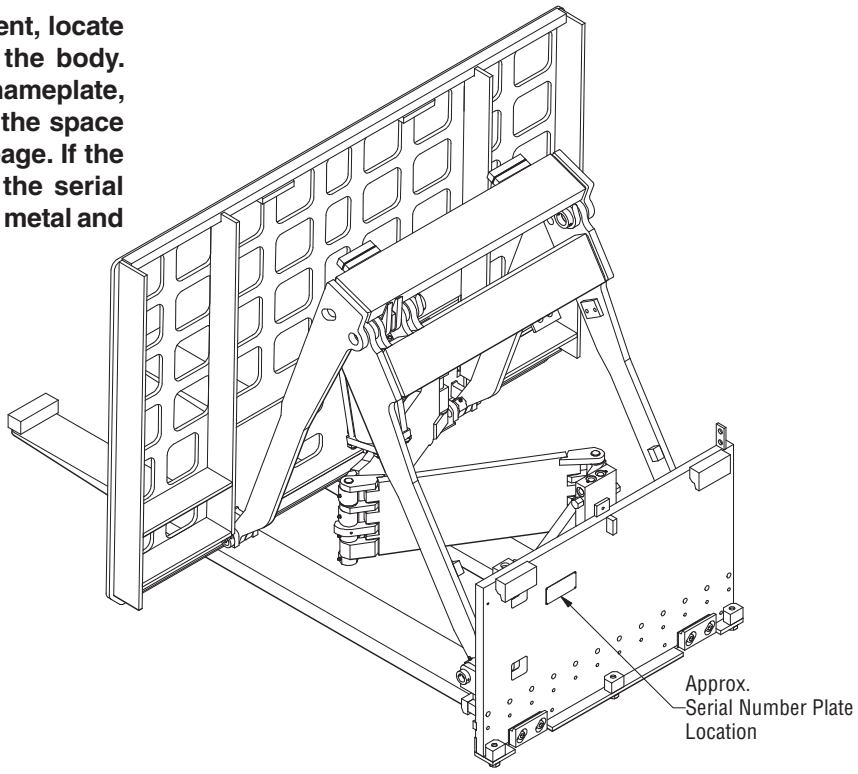
## SECTION 1 NAMEPLATE LOCATION

# NOTICE

**When you receive your attachment, locate the Long Reach nameplate on the body. Copy the information from the nameplate, along with the date received, in the space provided on the bottom of this page. If the nameplate is missing, look for the serial number stamped directly into the metal and consult factory.**




**Date received:**

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2500005 rF

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| MODEL NO.: | | | | SERIAL NO.: | | | | |
| CAPACITY AT LOAD CENTER: | | KG @ | | MM | MASS: | | KG | AET: | | MM |
| | | (LBS) @ | | (IN) | | | (LBS) | | | (IN) |
| MAXIMUM HYDRAULIC PRESSURE: | | BAR | FLOW: | L/min | HCG: | | MM | VCG: | | MM | LCG: | | MM |
| | | (PSI) | | (GPM) | | | (IN) | | | (IN) | | | (IN) |
| DATE: | | SEE TRUCK NAMEPLATE FOR COMBINED TRUCK & ATTACHMENT CAPACITY | | | | | | | | | | | |

# SECTION 2 SAFETY SUMMARY

## 2.1 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.

## 2.2 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.

## 2.3 Safety Symbols

The following terms define the various precautions and notices:

**⚠ DANGER**

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

**⚠ CAUTION**

**Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury, or equipment damage or void the machine warranty. Carefully read the message that follows to prevent minor or moderate injury.**

***NOTICE***

**Describes information that is useful but not safety related.**

**⚠ WARNING**

**Multiple hazards.**

**Ignoring safety warnings may cause equipment damage, personal injury or death.**

**All possible safety hazards cannot be foreseen and included in this manual. The operator must always be alert to possible hazards that could endanger personnel or damage the equipment.**

## 2.4 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.

## 2.5 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.

## 2.6 Personnel Safety

- When removing or installing dismountable attachments always keep hands and feet free from dangerous positions or pinch points. Never leave a dismounted 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 1)

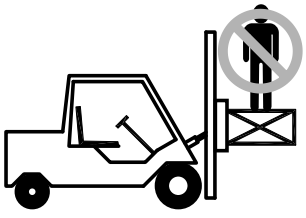

**Figure 1**

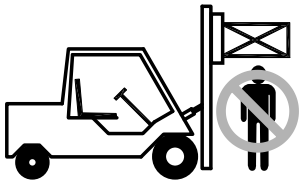

**Figure 2**

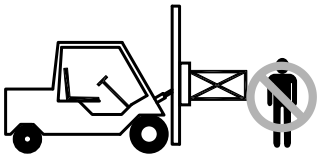

**Figure 3**

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

## 2.7 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.

## 2.8 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.

## 2.9 Hydraulic Hazards

**⚠ DANGER**

**Injection hazard.**

**Infection and gangrene will result when hydraulic oil penetrates the skin. See a doctor immediately to prevent loss of limb or death.**

**Use a piece of cardboard to check for hydraulic leaks.**

- 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.

## 2.10 Electrical Hazards

**⚠ WARNING**

**Electrocution hazard.**

**Contact with energized equipment may result in injury or death and will damage equipment.**

**Remain at least 25 feet from high voltage electrical wires.**

- 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.

## 2.11 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.

**⚠ WARNING**

**Suffocation hazard.**

**Engine exhaust fumes can cause death.**

**Remove the exhaust fumes from the area with an exhaust pipe extension, or 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.

## 2.12 Load Handling

- Treat an unloaded forklift with an attachment as partially loaded.

**⚠ CAUTION**

**Equipment overload hazard.**

**Injury or equipment damage may result if the capacity of the truck and attachment combined are less than the attachment capacity.**

**Consult truck nameplate for truck capacity with an attachment installed.**

- 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.

## 2.13 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 4)

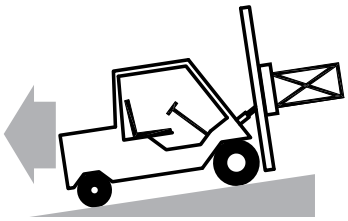

**Figure 4**

- 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.

## 2.14 Operator's Controls

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 5)

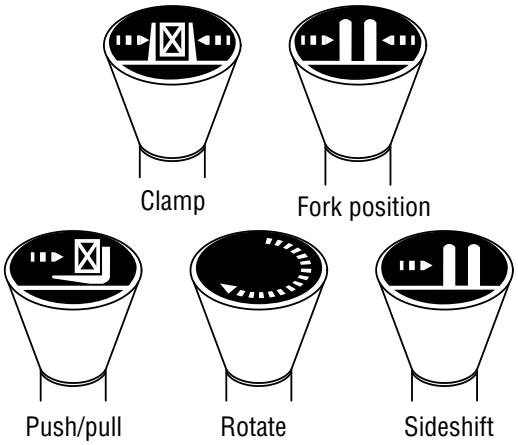


**Figure 5, Operator controls**

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.

**⚠ CAUTION**

**Equipment damage hazard.**

**Injury or equipment damage may result if the attachment does NOT operate smoothly.**

**Do not take malfunctioning equipment on the job. Check with your supervisor about needed repairs.**

## 2.15 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 reacquaint 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 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.

### 2.16 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.

## ⚠ WARNING

**Load loss hazard.**

**Injury or equipment/load damage may result if a fork positioner attachment is used to clamp a load. The fork positioner does not have enough clamping force to safely hold a load.**

**Always support the load with the forks. Do not use fork positioning attachments as clamps.**

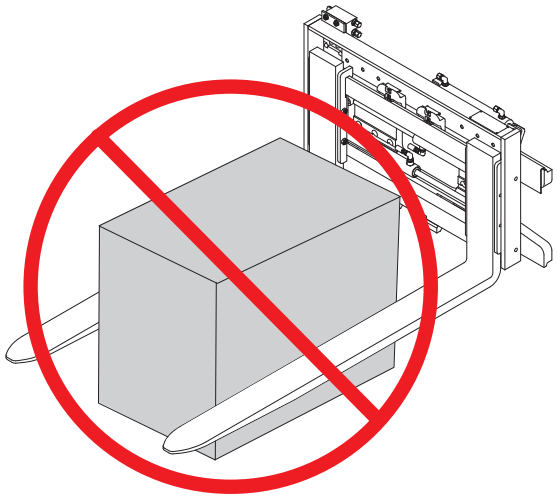

**Figure 6, Do not clamp**

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

**Figure 7, 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.

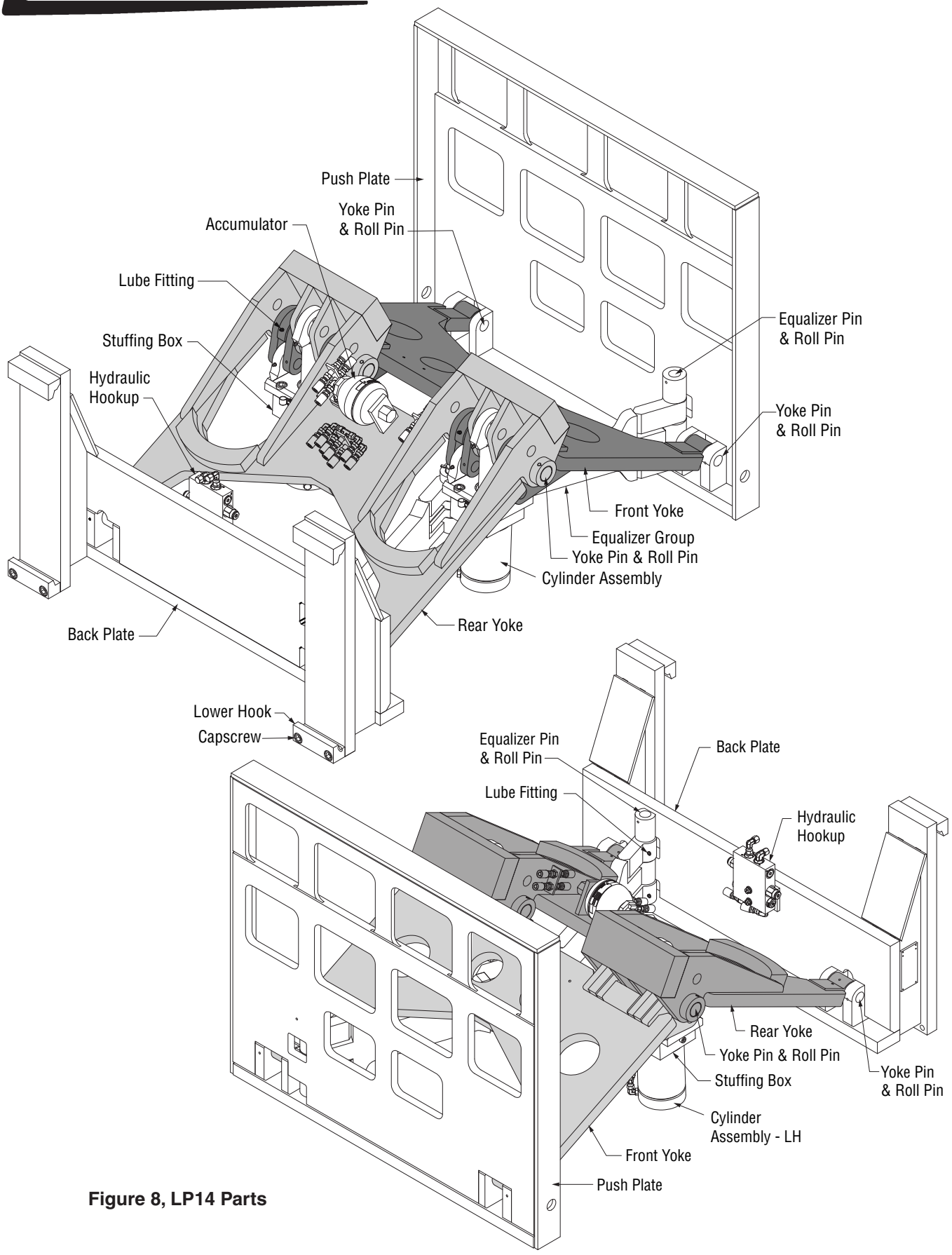


**Figure 8, LP14 Parts**

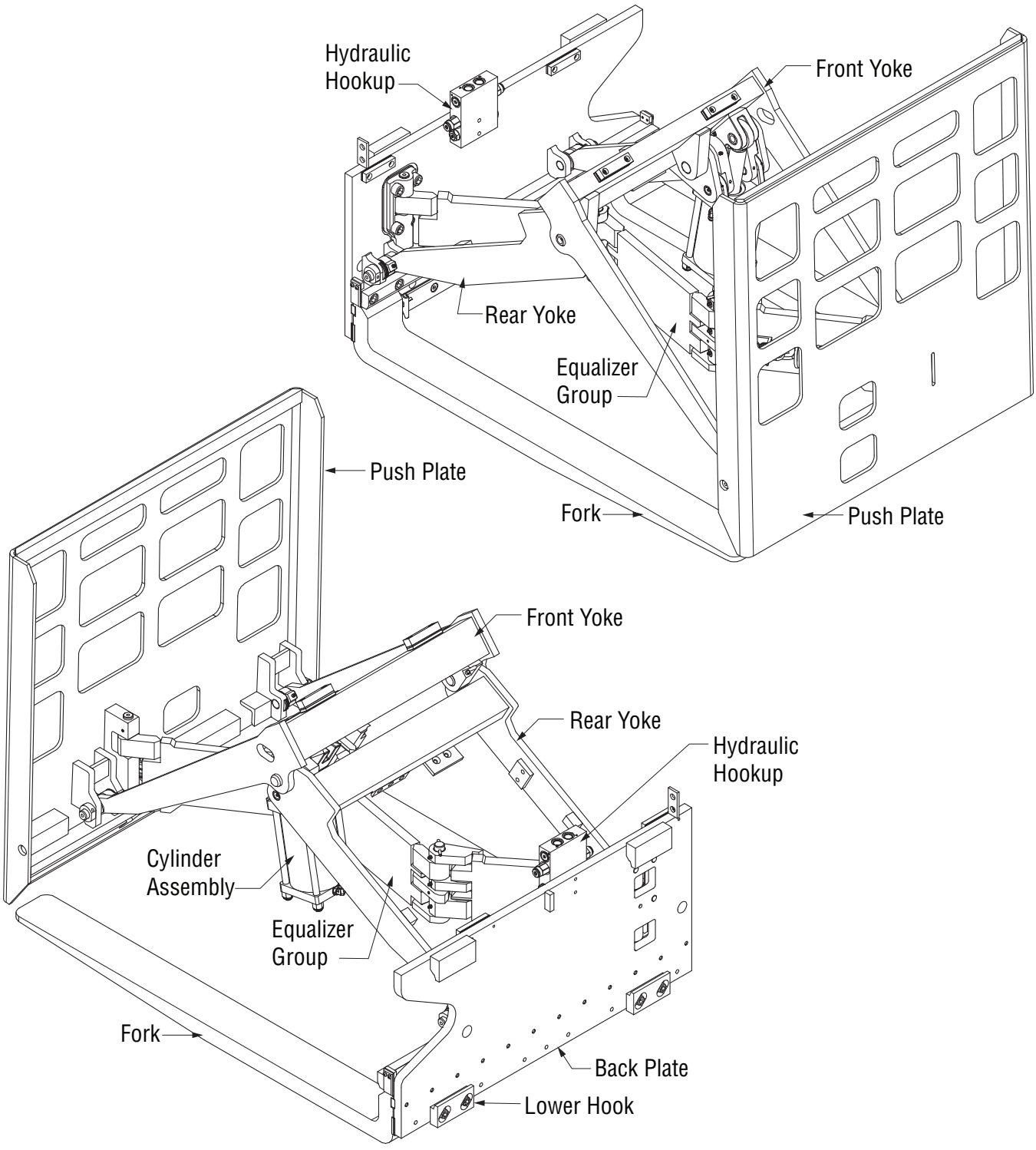


**Figure 9, LP50 Parts**

# SECTION 3 INSTALLATION

## 3.1 Truck Requirements

Long Reach attachments have been designed to operate within specific limits. Operating pressures above the recommended maximum may cause damage to the attachment and may void the warranty. Operating pressure specifications for your attachment can be found on the attachment nameplate. (Section 1)

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. Hydraulic flow specifications for your attachment can be found on the attachment nameplate. (Section 1)

**NOTICE**

**The dealer and/or the user must provide and install the valving required to meet the recommended hydraulic pressures and flow, or must arrange installation of the required valving at the truck factory.**

**The attachment model description, found on your shipped invoice, will state the following truck requirements: flow (gpm), psi, and minimum truck carriage width.**

1. The truck carriage must conform to the American National Standard (ANSI) dimensions shown in ANSI/ITSDF B56.11.4-2013.
2. Make sure the truck carriage is clean, conforms to ANSI recommendations, and the notches are not damaged.
3. The truck hydraulic system must supply the attachment with hydraulic oil that meets the specifications required to operate the attachment properly. Find specifications for your attachment on the attachment nameplate. (Section 1)

**⚠ WARNING**

**Equipment overload hazard.**

**Overloading the truck may cause equipment damage.**

**Consult truck nameplate to determine the capacity of the truck and attachment combination, as it may be less than the capacity shown on the attachment alone.**

## 3.2 Tools Required:

To work on these attachments you will need a metric set of Allen wrenches, socket drivers and wrenches, 10mm to 14 mm; hex head socket drivers 6 mm to 14 mm; plus the following:

a. 11/16" end wrench

b. 3/4" end wrench

c. 13/16" end wrench

## 3.3 Hydraulics

The lift truck hydraulic system must meet the following specifications:

1. Supply petroleum-based hydraulic oil
2. 7-10 GPM (26.5-37.8 LPM)
3. 2200-2300 PSI (150-160 Bar)
4. At least one auxiliary function (two auxiliary functions required if attachment is equipped with sideshift)

## 3.4 Attachment Handling Safety

Handling push-pull attachments safely means paying close attention to stabilizing the mechanism assembly to prevent unwanted or unexpected movement during any procedure.

## ⚠ WARNING

**Crush hazard.**

**The mechanism assembly will collapse and may cause injury if not stabilized.**

**Be sure attachment is stable, and attach a lifting device to the mechanism assembly before starting service procedures.**

1. Support the mechanism assembly through the faceplate, near its center of gravity when the unit is fully retracted. Make sure any lifting equipment used is rated for the load being lifted.

2. Make sure there is NO residual pressure in the hydraulic system when working on the attachment. Cycle levers back and forth to relieve hydraulic pressure after turning off the lift truck. Observe all cautions and warnings in this manual.

## ⚠ WARNING

**Crush Hazard.**

**Serious injury could result if residual hydraulic pressure causes faceplate to drift outward.**

**Cycle all hydraulic circuits as described above to relieve all system pressure.**

### 3.5 Attachment Installation

### 3.5.1 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.

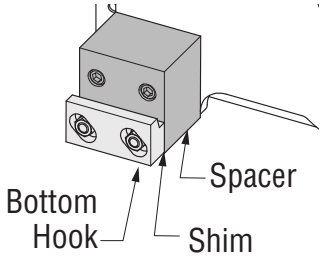


**Figure 10, Remove the bottom bolt-on hook**

### 3.5.2 Quick Hooks

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

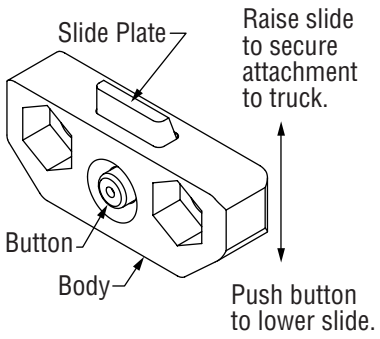


**Figure 11, Push-button style quick**

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.

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

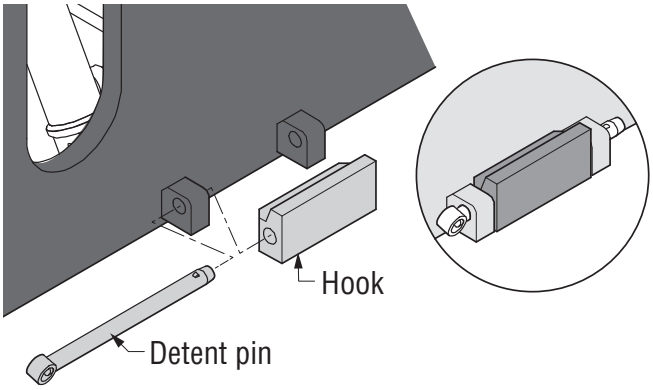


**Figure 12, Detent pin style quick hook**

### 3.5.3 General

4. Center the truck behind the attachment and drive toward the attachment with the mast tilted forward approximately 4 degrees.

5. Line up the locking lug (under the hanger plate, if applicable) with the appropriate notch on the truck's carriage. Check that the bronze sideshifting wear strips are in the proper place, if applicable.

6. Slowly 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).

7. Inspect for proper engagement of the locking lug in the corresponding notch of the truck's carriage. Inspect any wear strips, if applicable, to insure they are properly aligned in the top hooks.

8. Weld on the supplemental locking lug that is supplied with the attachment, (two pieces of 1/2" x 1/2" x 2.00" steel included with the attachment) with either E-6011 or E-6013 welding rod, or equivalent, on each side of the truck carriage. (Figure 13)

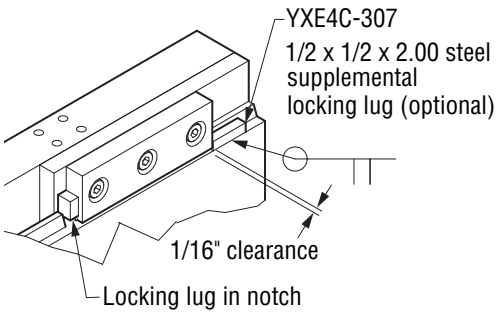


**Figure 13, Locking lug**

9. Install the bolt-on lower hooks. Inspect clearance to the carriage on lower hooks. Adjust the lower hooks for a maximum clearance of 3/32" (see Figure 14). Tighten the bolts to 40-50 ft-lbs.

## NOTICE

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

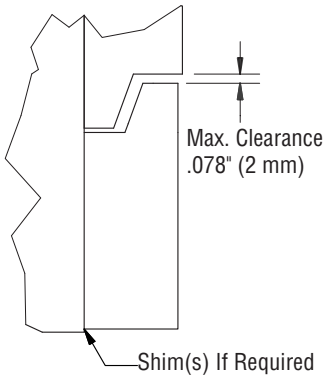


**Figure 14, Lower hook clearance**

10. If quick hooks are installed, simply raise the slide plate until the button clicks into place.

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

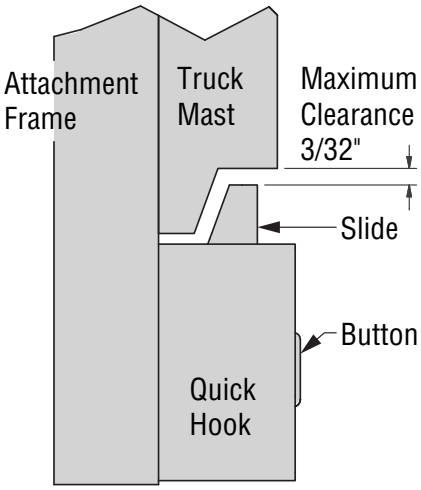


**Figure 15, Quick hook inspection**

## ⚠ WARNING

**Equipment failure hazard.**

**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.**

11. To ensure proper locking of the slide plate, use a screwdriver to try to pry down the slide plate. If the slide plate is not locked in place, inspect and correct any cause that might restrict the slide plate from going up enough to allow the button to become fully engaged.

12. Check all fittings, connections and bolts for any interference.

### 3.6 Hydraulic Connections

1. Prior to 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. Purging can be accomplished 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 16)

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

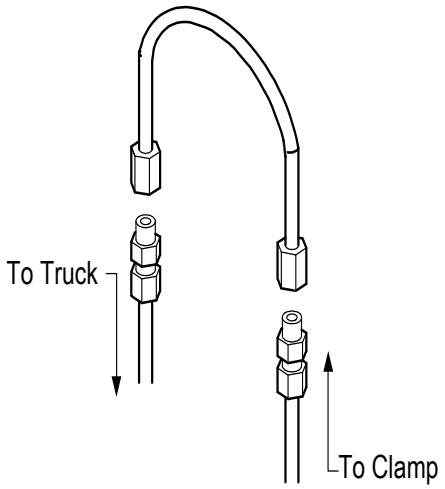


**Figure 16, Jumper line**

1. Install the hoses from the truck to the attachment. For specific hydraulic schematics and installation information, please see your serial number specific parts documentation, available online in the Manuals and Publications tab at **www.alliedsystems.com.**

2. Inspect installation to make sure hoses are not kinked or pinched between the truck carriage and attachment.

5. 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.**

6. With the mast in the vertical position, extend the attachment push plate all the way. Now check that the truck's hydraulic oil reservoir level is at the recommended level.

7. 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 4 SERVICE PROCEDURES

## 4.1 General

Not all procedures require that the attachment be removed from the truck. Review each procedure before beginning. Make sure any lifting equipment used is rated for the load being lifted.

## 4.2 Pivot Pin Installation and Removal

Refer to Section 3.4 Attachment Handling Safety for safe handling requirements.

1. Before removing the pin, remove the bolt and retaining pin and insert a brass drift punch into the retaining pin hole. Check to see if the pin will rotate by hand. If the pin is difficult to hand turn, lower or raise the lifting device and then check the pin again.

2. To prevent damage to the bushing, the brass drift should have a minimum diameter of 0.5" (12.7 mm) at the bore end.

**⚠ CAUTION**

**Bushing damage.**

**The bushing could be damaged if the hole for the roll pin is allowed to enter the bushing.**

**Make sure the pivot pin does not move inward.**

3. Each pivot pin is retained with a roll pin. Carefully remove pins without passing the hole through the bushing. This is accomplished by removing and installing the pin as shown in Figure 17.

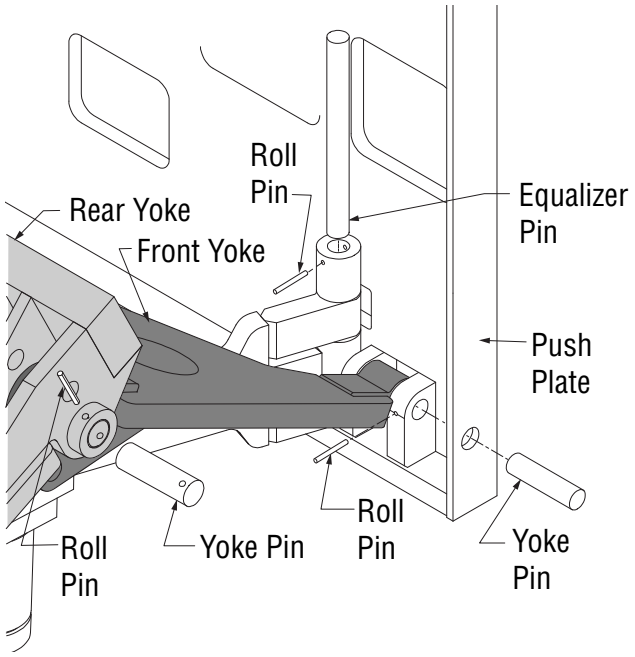


**Figure 17, Pin installation**

4. To reinstall, follow the removal steps in reverse.

## 4.3 Cylinder Removal

Refer to Section 3.4 Attachment Handling Safety for safe handling requirements.

1. Extend mechanism fully.

2. The lifting device supporting the mechanism may need to be raised or lowered to access the cylinder pivot pins.

3. Before disconnecting any hydraulic connections, turn off truck power and activate the truck's hydraulic functions in both directions to bleed off the hydraulic pressure.

**⚠ WARNING**

**Crush Hazard.**

**Serious injury could result if residual hydraulic pressure causes faceplate to drift outward.**

**Cycle the hydraulic circuit as described above to relieve all system pressure.**

4. Disconnect and cap supply lines to the manifold on the cylinder. Disconnect and cap gripper hoses attaching to the manifold. Tag hoses for reassembly.

5. Remove eyebolts retaining cylinder pivot pins.

6. Tap out cylinder pivot pins from the side opposite the eyebolts. The end of the pivot pin with the eyebolt hole should never pass through the cylinder end. Support the cylinder (weight: 30 lbs/13.6 kg) to avoid possible injury when the pins are removed.

7. Set aside cylinder pivot pins, washers, and eyebolts.

## 4.4 Cylinder Installation

Refer to Section 3.4 Attachment Handling Safety for safe handling requirements.

1. Extend the cylinder fully.

2. Install the cylinder pivot pins with the washers. Tap in gently from the side with the retaining pin hole to avoid damage to the bushing. The lifting device supporting the mechanism may need to be raised or lower to exactly match the hole locations.

3. Reinstall the retaining eyebolts on both cylinder pins.

4. Reconnect the supply lines and the gripper hoses to the manifold.

5. Reconnect the hydraulics to the attachment.

## 4.5 Cylinder Disassembly

1. Remove the cylinder from the attachment. See Section 4.3 for removal instructions.

2. Clamp the cylinder lightly at the base end using a soft-jawed vise. Use a block or other support under the rod end of the cylinder. (Figure 18)

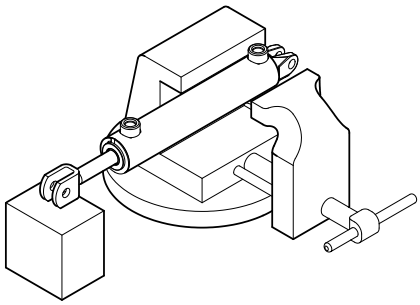

**Figure 18, Cylinder vise**

3. Use a spanner wrench or similar tool to unscrew the gland cap from the cylinder tube.

4. Remove the rod assembly from the cylinder tube.

5. 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 19)

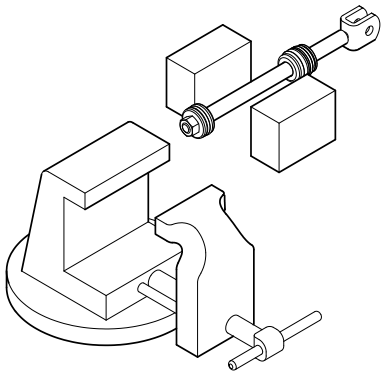

**Figure 19, Cylinder shaft**

6. Remove the piston retaining nut and remove the piston.

7. Carefully pry up on the piston seals using a blunt tip screw driver being careful not to scratch the seal grooves. Cut the seals to remove from the piston. (Figure 20)

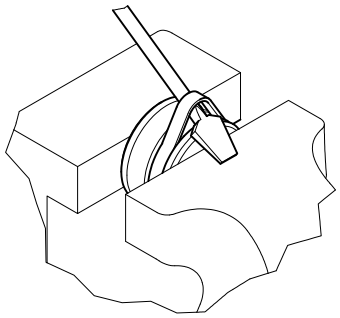

**Figure 20, Remove piston seal**

8. Use the same procedure as above to remove the seals from the gland cap.

## 4.6 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 outside diameter.

**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.**

## 4.7 Cylinder Assembly

1. Spray the piston, gland cap, and seals with WD40 or other similar product to ease seals installation.

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 21)

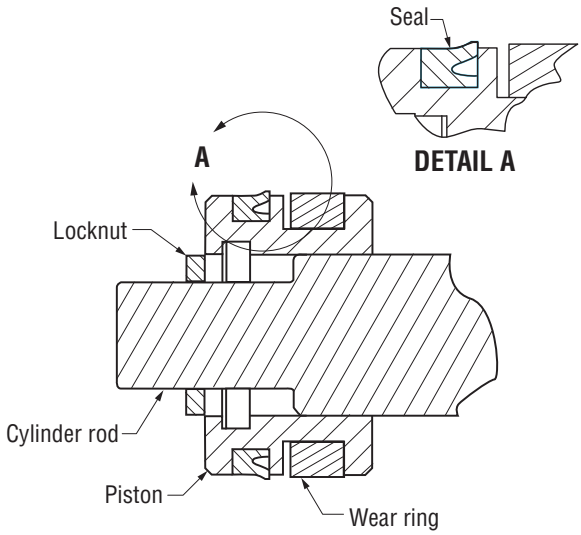


**Figure 21, Piston seal**

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 22)

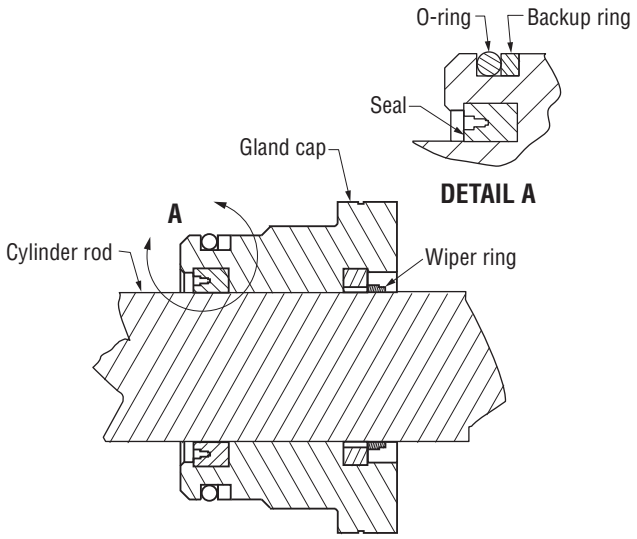


**Figure 22, Gland cap seal**

4. Install the piston on the rod and tighten the locknut to 70-75 ft-lbs.

5. 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.

6. 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.

7. Tighten the gland cap using a spanner wrench.

## 4.8 Cylinder Installation

1. Install the clevis pin and cotter pin into the base end of the cylinder.

2. Attach the hydraulic connections to the cylinder.

3. Extend the cylinder until the rod end hole lines up with the mounting hole. Install the clevis pin and cotter pin into the end of the cylinder.

## 4.9 Faceplate Angle Adjustment

1. Extend mechanism fully and turn off lift truck.
2. Support the pushplate so that it does not tip.
3. Remove the bolts securing the front stabilizer to the outer secondary arm.
4. Use the stabilizer arm holes to align the pushplate at the desired angle. Insert bolts into the threaded holes and tighten securely.
5. Cycle the unloaded attachment to verify that there is no catching or binding.

## 4.10 Fork Removal

1. Fully extend the pushplate.
2. Lower the attachment until forks rest evenly on the floor.
3. Remove the fork lock bar, upper hook retaining bolts, upper hooks, and shims. Keep the shims with their corresponding hooks.
4. Raise the attachment up and off of the lower hook and back away from the forks.

## 4.11 Fork Installation

1. Position forks side by side on the floor using the fork lock bar as a template. Space the forks at the desired width.
2. Align the fork pair to the center of the attachment. Raise the attachment until it clears lower fork hooks. Drive truck forward until carriage contacts the forks.
3. Lower the attachment slowly into the fork's lower hooks.
4. Install the upper hooks and shims. (Figure 5-15) Leave the hook retaining bolts loose. (Figure 5-13) Raise the attachment approximately 1/2" from the floor. Retract the pushplate to 4" from the platen tips. (Figure 5-16)
5. Adjust the forks so that both tips are no more than .25" in height difference. (Figure 23)

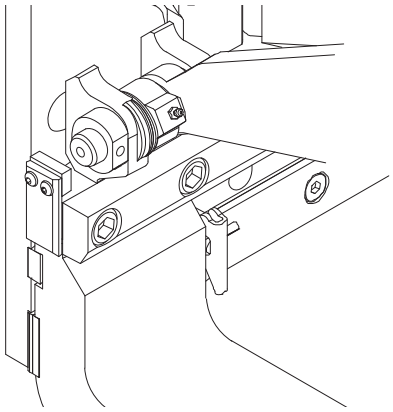

**Figure 23, Hook installation**

**NOTICE**

**Add shims to lower tip. Remove shims to raise tip. Each thick shim will move 48" long fork tip ± 0.42".**

6. Install the fork lock bar and position the forks to line up with their corresponding lock notches on the bar. Install the M12 socket head bolt into the top of the fork heel.
7. Torque the M16 fork hook retaining bolts to 225 N-m (166 ft-lbs).
8. Operate the attachment to ensure that there is no binding or interference.

## 4.12 Fork Repositioning

1. Extend the mechanism, and turn off the lift truck.
2. Remove the M12 socket head bolt on the top of the fork heel.
3. Place a lifting device around the forks at center of forks. Raise forks until they begin to disengage from the fork heel.
4. Slide the fork in the desired direction, aligning its final position with a cut-out in the fork position bar and a threaded hole on the top of the heel.
   a. If the fork does not slide, loosen the five bolts on the platen heel.

b. Upon re-tightening, the bolts MUST have medium strength thread locker applied and be torqued to 165ft-lbs (225 N-m).

5. Replace the M12 socket head bolt and torque.

6. Remove the lifting device.

### 4.13 Mechanism Disassembly

1. Remove the faceplate assembly from the mechanism.

   a. Extend the mechanism ¾ of the way to access the eyebolts on the faceplate. Remove the retaining pins but not the secondary mechanism pivot pins.

   b. Extend the mechanism fully. Shut the truck off. Disconnect, cap and tag hydraulic connections.

   c. Support the faceplate with an appropriate lifting device+**).**

   d. Disconnect and cap the gripper lines at the manifold on the main cylinder. Tag for reassembly.

**DANGER**

**Injection Hazard.**

**Infection and gangrene will result when hydraulic oil penetrates the skin. See a doctor immediately to prevent loss of limb or death.**

**Before cycling the hydraulics, verify that all of the capped ports are tightened to prevent leakage or sprays.**

   e. Remove the eyebolts and the secondary mechanism pivot pins on the faceplate.

   f. Remove the four bolts that secure the front stabilizer to the outer secondary arms. This will disconnect the faceplate assembly from the mechanism.

2. Remove the mechanism from the rear frame.

   a. During the mechanism removal and disassembly, note the position and quantity of all spacers and washers for reassembly.

   b. With the gripper ports capped, retract the mechanism fully, then turn off the lift truck and cycle the auxiliary function several times to bleed the pressure from the lines.

   c. Disconnect the lines supplying the manifold at the manifold. Cap all ports and hoses. Remove the hoses from the retaining clips on the inner primary arm as well.

   d. Support the mechanism with an appropriate lifting device with enough capacity to support the entire weight of the unit.

**WARNING**

**Crush Hazard.**

**Death or serious injury could result if inner mechanism arms are not supported during mechanism disassembly.**

**Support the inner arms when the main cylinder is removed.**

   e. Remove the eyebolt on the primary mechanism pivot pin and tap out the primary mechanism pivot pin. Use a rod that has a radius of at least 0.25" (6.2 mm) on the contact end to avoid damage to the bushings. After the pin is out, carefully remove the rod that was used to extract the pin, use care as the mechanism may shift once the extraction rod is removed.

   f. Lift the rear stabilizer on the mechanism out of the rear frame to remove the mechanism.

3. Disassemble the mechanism.

   a. Remove the four snap rings retaining the outer primary and secondary arms, and remove the two bolts holding the rear stabilizer in place. Take off the rollers and the washers on the rear stabilizer as well. Remove the outer arms together. They should slide off without the use of a hammer; if not, the bushings may need to be replaced.

   b. Support the mechanism before removing the cylinder. Use the same lifting point used to remove the mechanism from the rear frame. Remove the main cylinder. The inner arms of the mechanism will collapse unless supported.

c. Remove the retaining pins on the top mechanism pivot pins and tap out the pins. Use a .5" (12.4 mm) diameter rod on the contact end to avoid damage to the bushings in the inner secondary arm. Tap the pins into the center of the mechanism. Do not pass the retaining pin hole across the bushings in the primary arm.

## 4.14 Bushing Replacement

1. Bushings are all fiber-type. Where bushings are installed in a blind hole, cut the bushing along its axis using a hacksaw blade or a die grinder. Use caution to avoid cutting into the walls of the bore.
2. If possible, tap the bushing through the bore. Tapping the bushing to rotate it in the bore will also make the extraction easier. Use caution to avoid damage to the bushing bore.
3. If the bore that holds the bushing is cut or dented, use a fine grit sandpaper to remove any burrs before installing a new bushing.
4. To install a new bushing use installation tool, part numbers X-202145 and X-202146, to support the bushing during installation.
5. DO NOT use a hammer when installing a new bushing. Use an arbor press, capable of 7 tons (6.3 metric tons). Due to bore size, using a hammer could install the bushing at an angle and cause damage to the bushing and reduce its usable life.
6. When installing a .75" ID bushing, the press must be monitored so that the bushing is not pushed through the bore. Due to installation tool design and the size of the bushing, it can be pushed fully through the bore.

## 4.15 Mechanism Reassembly

1. To assemble the mechanism, follow disassembly steps in reverse.

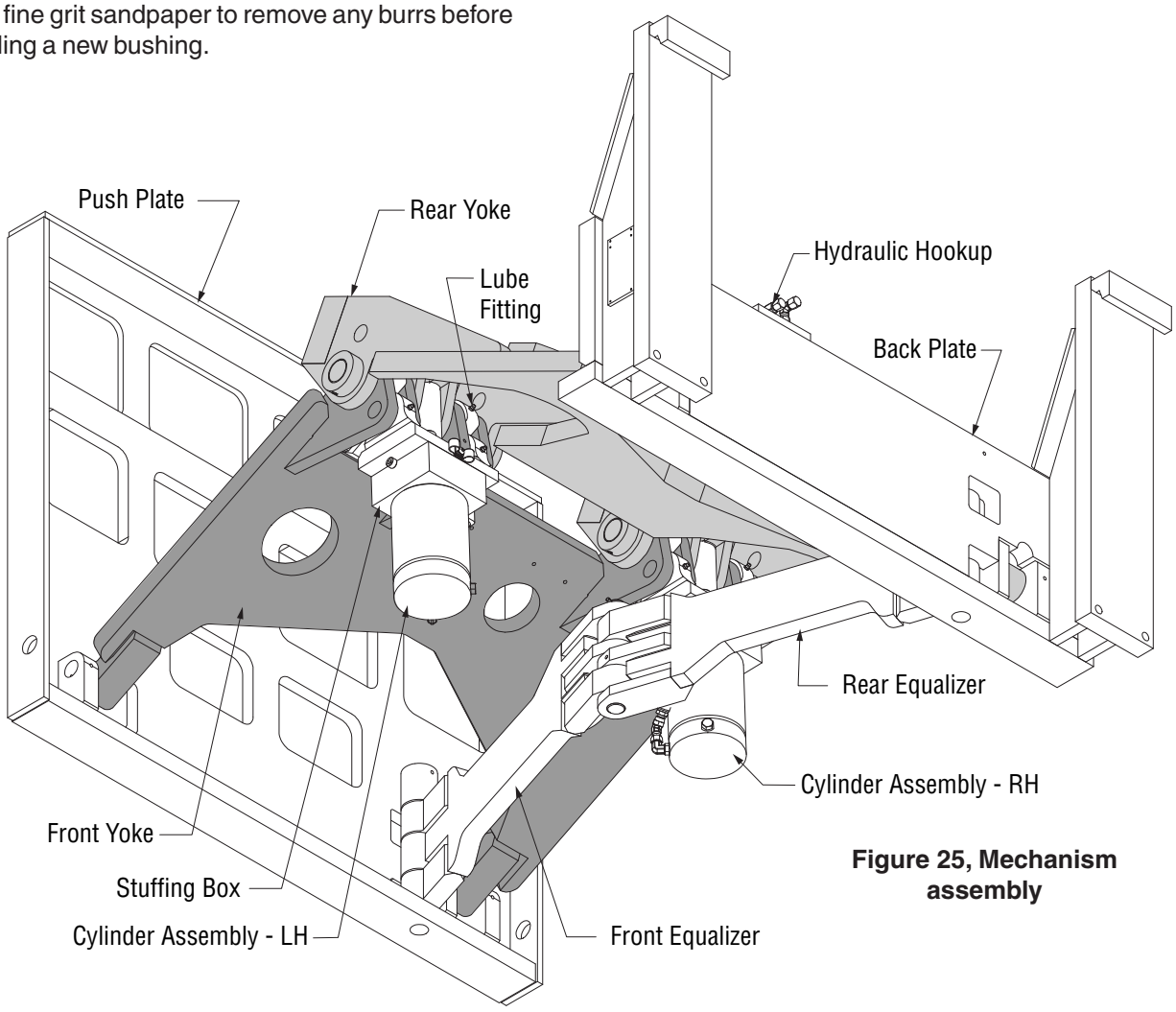


**Figure 25, Mechanism assembly**

# SECTION 5 MAINTENANCE

## 5.1 Schedule

### Daily:

1. Visually inspect all hoses, fittings, cylinders, and valves for signs of hydraulic leaks.
2. Inspect hoses for wear/pinching and replace as required.
3. Inspect forks for nicks, dents, rough spots, and repair as required.
4. Visually inspect lower hook installation and check unit for external damage or cracks.

### 40 Hour Maintenance:

1. Complete the above daily checks.
2. Inspect retaining pins and replace as required.
3. Tighten mechanism pivot retaining pin bolts.
4. Lube bronze top hooks if needed.
5. Lube mechanism if desired. (Use light oil)
6. Check lower hook clearance (3/16" = 5mm maximum) and adjust as required.

### 500 Hour Maintenance

1. Perform 40 hour inspection.
2. Inspect bushings for excessive clearance (1/32" = 1mm maximum) at all pivots and replace as required.
3. Tighten and torque all bolts.

   a. Top hooks: 225 N-m

   b. Lower hooks: 225 N-m

   c. Fork hooks: 225 N-m

### Recommended Grease:

Mobile XHP222 Special, or similar quality EP-2 with Lithium Complex Base.

## 5.2 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. Dry refers to parts that have been degreased, both mating parts.

| 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 |