LIFT SYSTEMS

2020SC OPERATIONAL MANUAL

CONFORMS TO ASME B30.1 2015

Lift Systems, Inc.
1505 7th Street
East Moline, IL 61244
+1-309-764-9848
www.lift-systems.com
info@lift-systems.com

Operations Manual 158 06/29/2023

PREFACE

This unit is the result of Lift Systems Inc. advanced technology and quality awareness in design, engineering, and manufacturing. At the time of delivery from the factory, this unit met or exceeded all applicable requirements of the American National Standards Institute. All information, illustrations, and specifications contained within this manual are based on the latest product information available at the time of publication. It is essential that all personnel involved in the use and/or care of this unit read and understand the Operator's Manual.

Given reasonable care and operation, according to the guidelines set forth in the manuals provided, this unit should provide many years of excellent service before requiring major maintenance.

Never alter or modify this unit in any way that might affect its structural integrity or operational characteristics without the specific written approval of Lift Systems Inc. Unauthorized alterations or modifications will void the warranty. Of greater concern, is the possibility that unauthorized modifications could adversely affect the safe operation of this unit, resulting in personal injury and/or property damage.

Set-up requirements, work procedures, and safety precautions for each situation are the responsibility of the personnel involved in the use and/or care of this unit.

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MSDS

Forms

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MODEL SPECIFICATIONS

- Weight of each lifting unit; 1900lbs
- Lifting unit dimensions; 72”H 28” W 51” L
- Capacity of power units in gallons; 19 gallons
- Maximum capacity of 2-point system: 20 tons.
- Maximum capacity of each leg: 10 tons.
- Retracted height: 72”
- Maximum extended height: 16’
- Maximum operating pressure: 1800psi

POWER OPTIONS

ELETRIC OPTION

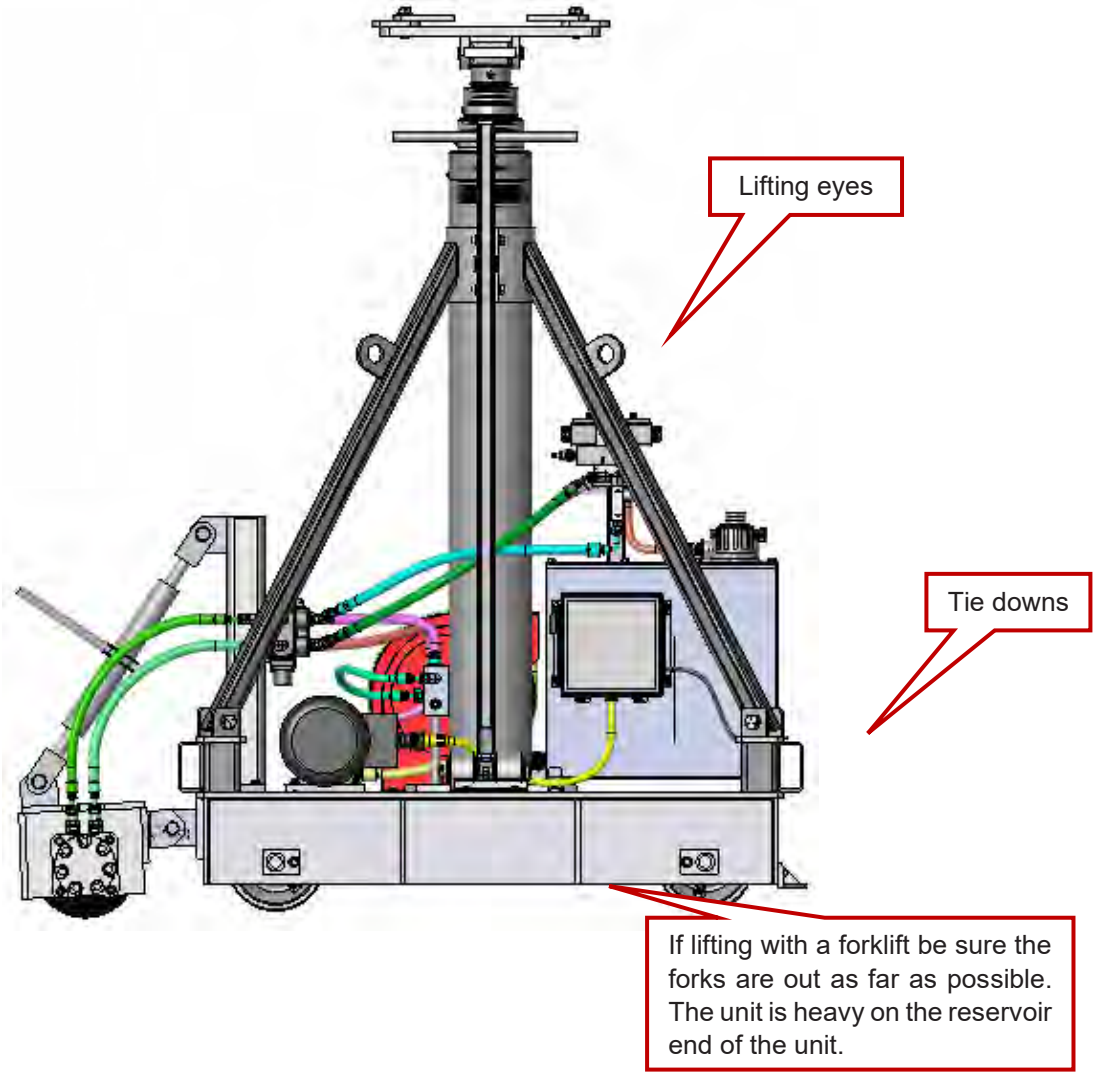
1-1/2HP, 1800RPM @ 115/208-230VAC, 1.12KW, FLA 15.2/8.2-706 @ 60 Hz single phase.

1HP. 1500RPM @ 110/220VAC, .75KW, FLA 15.6/7.8 @ 50 Hz single phase.

FRAME SIZE 56HC

Handling of Lifting Units

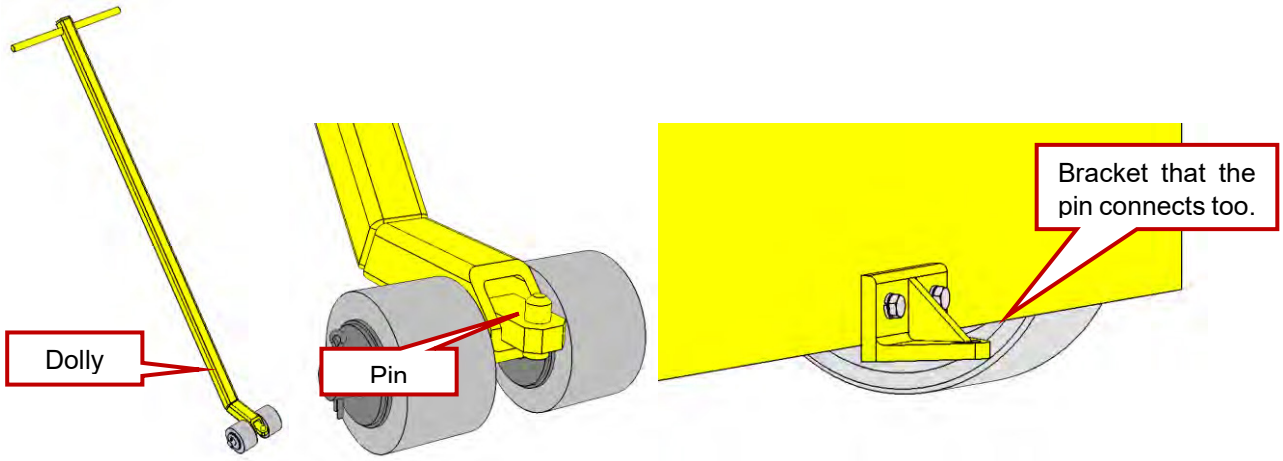
Each lifting unit is provided with lifting eyes so that they can be easily and safely handled. For lifting when in the upright position, use the two lifting eyes show in above picture. They can also be picked up and move with a small forklift, by sliding the forks under the unit. Always make sure the forks are spread out as far as possible when lifting the units.



NOTE

Do not attempt to lay the units over on their sides. The reservoirs are not completed sealed and they will leak oil. If they must laid over be sure to drain the reservoirs.

The maneuvering dolly allows the lifting units to be positioned accurately during setup. Never attempt to reposition or steer a lifting unit while loaded. To use the dolly, insert the pin on the dolly into the bracket that is located on the one end of the base. Push down on the handle of the dolly which will lift that end of the base to where the wheels are off the ground. The base can be pushed or pulled into position. To steer simply pull the dolly to the left or right.



INTRODUCTION

Introduction

The lift system consists of two or more bases. Standard equipment consists of:

- Maneuvering Dolly
- Self-contained power unit
- Double-acting telescopic cylinder
- High capacity, low friction wheels
- Lifting beam attachment assembly
- Remote Control

Some units may have optional equipment such as:

- Power drive
- Hard poly type tires
- European style power system

This manual will concentrate on standard equipment usage and safety procedures. Optional equipment is discussed in separate inserts to this manual.

Design

This lift system is designed for accurate precise lifting and smooth movement of loads specified by the load chart. It is designed to be very stable when used in accordance with good and safe rigging practices by competent rigging and maintenance personnel. All procedures set forth in this manual are based on the safe operation of this lift system under proper operating conditions and without deviations from the system as it was originally intended to be used.

All Lift Systems equipment is designed and tested to the following codes and standards.

- AISC Allowable Stress Design 14th Edition.
- AWWS D1.12010, Structural Steel Welding.
- Certified Material Mill Reports traceable to the appropriate heat numbers for all affected parts are mandatory and retained in serial numbered machine files.
- LPI and MPI I accordance with ASNT, level 2 including NDE qualified personnel.
- Specification for structural joints using ASTM A325 or A490 bolts, ASIC.
- Raw material designation in accordance with ASTM or AISI standards.
- Slings in accordance with ASME B30.9
- Hydraulic Gantry Systems in accordance with ASMEb30.1-2015 telescopic hydraulic Gantry Systems.
- Mobile Pick and Carry machines in accordance with ASME B56.7 Industrial Hoist trucks.
- Lift Units in accordance with SAEJ1078 – a recommended method of analytically determining the competence of hydraulic telescopic cantilevered booms.
- Model testing accordance with current ASME and CE standards.

- Custom design/build projects such as for the nuclear industry are governed by specific codes which may require greater factors of safety than those governing commercial standard products.

Operating Characteristics and Limitations

Personnel should receive training prior to operating this system. Do not rely on past experiences with similar types of lifting devices. Learn the strengths and limitations of this system.

CAPACITIES & STABILIZATION

The lift system must be located on a firm, level surface. All safety devices must be engaged prior to operation. The lift system must not be operated to capacities beyond those specified by the manufacturer (see load chart on the power unit).

WARNINGS & CAUTIONS

Anyone authorized to operate and maintain the system must become completely familiar with this manual.

Since the safety of personnel through the proper use of the system is paramount, warnings and cautions have been used throughout this manual to emphasize these areas of concern. They are defined as follows:

WARNING!

If not followed could end in injury or death to personnel.

Caution!

If not followed could end in damage or loss of the system.

MAINTENANCE RECORDS & EQUIPMENT UTILIZATION LOGS

Accurate records on the usage and the maintenance of the system are highly recommended.
Authorized personnel must update the records each time the system is in use or maintenance duties are performed.

There are several warning signs on the system, which fall into four categories. The labels are harmonized to meet both ANSI and the EU Machinery Directive:

- ***DANGER:*** Notifies the operator when there is a hazardous situation, which has a **high** probability of death or severe injury.

- ***WARNING:*** Notifies the operator when there is a hazardous situation, which has **some** probability of death or severe injury.

- ***CAUTION:*** Notifies the operator when there is a hazardous situation, which may result in minor or moderate injury.

- ***MANDATORY ACTION:*** This label tells you about an action that NEEDS to be taken to avoid the hazard (e.g. “read manual”).

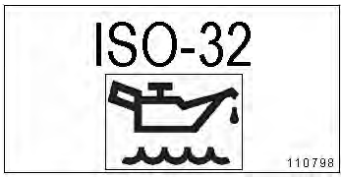
- ***WARNING SIGN:*** This label is meant to tell you what the hazard is (e.g. “fire hazard”).

- ***PROHIBITION SIGN:*** This label tells you about an action NOT to take to avoid a hazard (e.g. “no open flame”).

- ***CAUTION:*** Without the safety, alert symbol tells you about potential “property damage only.”

Make sure that you can read all warning and instruction labels. If you cannot read the words or see the pictures, clean the label with soap, water, and a cloth. If the label is damaged, missing or cannot be read, you must replace the label. Contact Lift

Decals



Hydraulic oil type

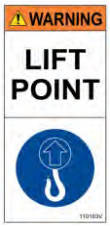
Not a lift point

Inspection date

Jack number

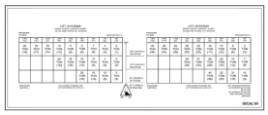
Grease point

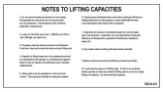
Cautions



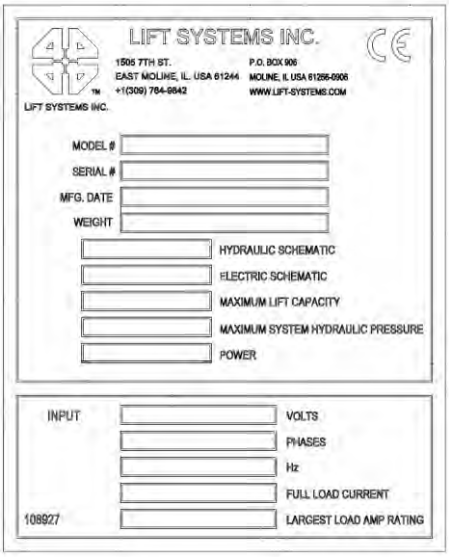
Lift point


Motor and pump rotation direction.


Load chart



Notes for lifting



Name plate

Company Logo

DO'S, DON'TS AND WARNINGS

ALWAYS DO THE FOLLOWING

- Understand all system operations, including the safety procedures, before accepting any operating or maintenance responsibility.

- Perform complete pre-start inspection of the system before each use. Perform required maintenance functions before beginning lifting or traveling.

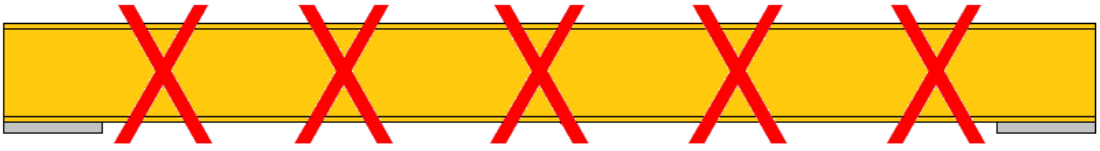
- Be alert to any space problems and clearances required, including overhead cranes in the area, before starting any system movement. Plan your lift in advance.

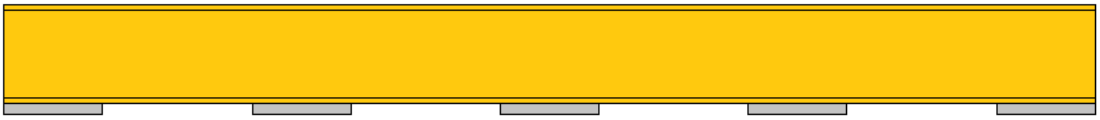
- Check to make sure all lifting units are level and plumb at all points. Check often during lifting and traveling to make sure that the system remains level and plumb. Use accurate levels to determine whether the system is level and plumb.

- Check all rigging (shackles, chokers, etc.) to verify capability of handling specified load. It is the customers responsibly to ensure all rigging attachments are rated for the lift.

- Have all lifting beams and runway track approved by a qualified professional engineer before the lift. Check for structural verification of the capacities based upon lifting points and load distribution. Check for stress level and deflection in both.

- Use runway track. Shim the runway track every three feet. Have a qualified professional engineer verify capacity to span lengths greater than three feet, or when the system will be traveling over pits or open areas in the floor.





- Use proper operating procedures. Verify that all safety devices are properly connected and engaged.
- Check the load chart before lifting the load to determine the exact pressure needed to lift the load. Use the load chart checklist provided.

- Use signalmen to alert the operator of hazards he cannot see from the operator station. Clear the work area of all personnel not essential to the safe operation of the lift system while lifting or traveling. Use a signaling device to alert personnel that a lift or traveling operation is beginning. Shut off power unit(s) when not in use.

- Keep all cords clear of travel area. Secure the twin-line hoses to the lifting unit(s) when traveling. Cover any hydraulic lines with fire retardant material if torch or welding work will be performed near the lift system.

NEVER DO THE FOLLOWING:

- Operate the system without performing all necessary inspections, preparation, and proper set-up beforehand.

- Allow unauthorized or inexperienced personnel to operate the system.

- Operate a malfunctioning system. Shut down and seek qualified assistance.

- Leave the system controls unattended with the engine running, or when a load is suspended.

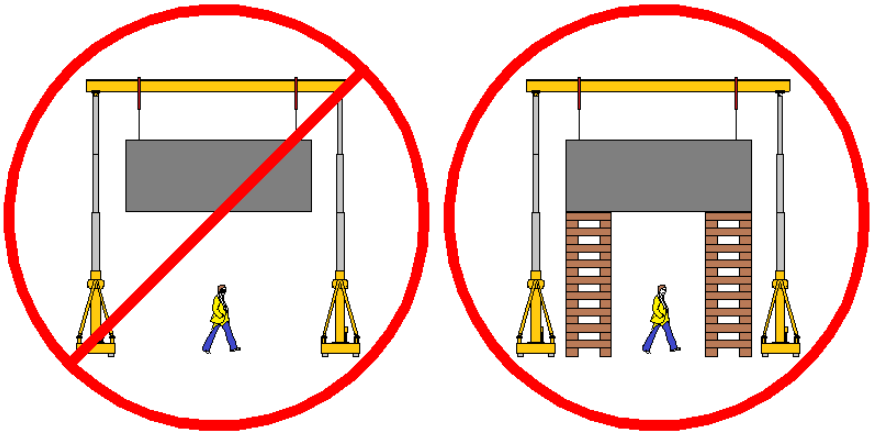
- Lift more than the maximum capacity of the third stage, unless the third stage is fully retracted.

- Take anyone's word for the weight of a load. Check the pressure readings against your load chart.

- Use sight method of determining whether the lift beam(s) or lifting units are level and plumb. Use accurate level measuring devices (tapes or level-lift system).

- Use runway track to traverse pits, basements, tunnels, or unsupported areas unless a qualified professional engineer has verified the track capacity and the foundation loading capacity beforehand.

- Allow people to do any work under a suspended load unless safety cribs or stands are installed to support the load during the process.



- Allow anyone to override or bypass safety devices.

- Allow anyone to change or alter the plumbing, electrical, or fabricated assemblies without the expressed permission of the manufacturer.

- Underestimate the power of this system.

- Never allow anyone to stand on a unit when lifting, lowering or traveling.

WARNING!

Do not adjust any factory-preset valves without the express permission and written technical instructions from the manufacturer.

WARNING!

Do Not attempt to adjust any part of the wedge system or the proximity switches without express permission and written technical instructions from the manufacturer. Improperly adjusted wedges and proximity switches could result in damage to the system.

WARNING!

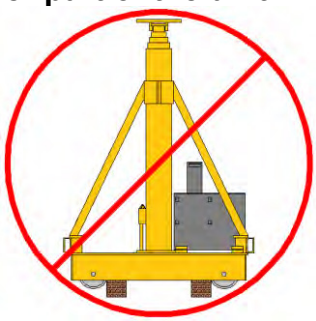
Do Not Weld on any part of the system. Never attach a welding ground to the lifting units. Doing so could cause an electrical arc between the cylinder pistons and the bores of the cylinders. This can cause damage that could score the bores causing internal bypass and the cylinder will no longer to be able to hold a load until it is repaired.

WARNING!

Do Not Lubricate the boom slider pad paths with bearing grease, graphite, never-seize, or any other type of heavy grease. Doing so will only cause the boom sections to stick and hang up. Use only a Teflon based spray on gel lubricant.

WARNING!

Never crib under the base of the lifting unit, doing will cause the lifting unit to become unstable, and the lifting unit is designed for the carrying the load with the wheels not any other part of the unit.



WARNING!

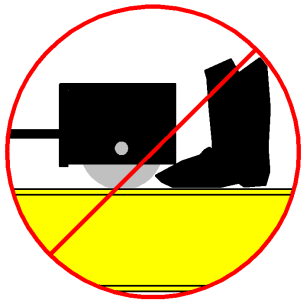
Never allow the header plate to be attached to an unlevel object; doing so can cause the system to become unstable causing the lifting unit to be kicked out from under the load.

WARNING!

Always use spotters when traveling to ensure the system does not run off the end of the track. They should be supplied with some sort of signal device to alert the operator if the system comes dangerously close to the end of the track.

WARNING!

Always keep feet clear of wheels when traveling.



WARNING!

Before lifting or traveling make sure all the selector valves are in the same position. Having one in lift and one in propel can be extremely dangerous. The system can quickly become unstable which can cause damage, injury or even death.

WARNING!

Never attempt to lift a load during strong winds or gusts. It is possible for the load to swing or the entire system to move down the track in strong winds.

WARNING!

Never attempt to make a lift during a storm or when lighting may occur.

WARNING!

Never use power cords that are too small or too long. Doing so can cause the circuit breakers to trip, motors to overheat and cause the motor starters to overheat and fail. Cords should be at 12 gauge or larger with the length at a minimum. If a power outlet is too far away consider using a portable generator.

Preparation and Setup

Pre-start Inspection

It is the user's responsibility to inspect the lift system before operation begins. It is recommended that inspection of the system take place though other personnel recently operated the lift system.

The walk-around inspection, or visual inspection, is the most efficient method of checking your system. The purpose of the inspection is to insure that the system is in good operating order before it is used.

Pre-operational Checklist

Before making, every lift an inspection should be made of the system. Below is a checklist of items to inspect.

- If gas or diesel powered, check the engine oil levels.
- If water-cooled, check the water level.
- Check fuel level.
- If electric option check to see if there sufficient power at job site to operate the system.
- Check for strange noises coming from electric motor when running.
- Check power cords for the proper gauge. Use 12gauge or larger, 10 gauge is the preferred size.
- Check power cords for damage.
- Check hydraulic oil level. (The lift cylinders must be fully retracted.)
- Check oil for cloudy or milky appearance. (This means there could be water in the oil, which causes loss of lubrication and component failure.)
- Check for leakage around tops of cylinders. (A little dampness over time is normal; oil running down the cylinder is not, new rod seals maybe required.)
- Check hose reel hoses for damage. (A damaged hose could burst under pressure.)

- Check all hoses that are exposed to sunlight for cracks. This would mainly be the power unit hoses. Sun light can cause the outer cover of the hoses to become brittle and crack over time.

- Check the cylinder bolts; the lock washers should be fully compressed. (Retighten if needed.)

- Check wheel box bolts for tightness.

- Check pressure gauges, they should read zero when the system is not running (If the gauge will not go to zero then it is faulty.)

- Do a visual check of all exterior welds for cracks on the lifting units.

- Check for signs of oil leakage from lifting units. (If there is then check the lifting unit for loose hoses and fittings.)

- Check for oil leakage around the mounting surface of the pumps on the power units. (If leakage is visible the shaft seal on the pump maybe leaking.)

- With the power unit running check the indicator on the hydraulic filter to see if it is reading dirty. (If it is then it should be changed.)

- With the power unit running attempt to retract the cylinder when it's already fully retracted. The maximum operating pressure will be the highest pressure shown on the load chart.

- Check track bolts for tightness.

- Check track for debris. (Anything such as caked on dirt should be scrapped off)

On page J-2 there is a Pre-lift check list that can be used in preparation of making a lift. Lift Systems advises that this form be used before making a lift. It is also advisable to make copies of this form and save the one in this manual as a master.

Annual Inspection

Beside the pre-operational checklist, it is also recommended that the system have an annual inspection. This can be performed by the user or a company representative. On page J-3 is an annual inspection form that is to be used for the annual inspection. It is advisable to make copies of the forms and save the one in the manual. However, if more copies are required, call the factory and they will be happy to supply them. In addition it is also advisable to perform a certified load test annually. This can be performed at the factory which normally includes maintenance and any repairs that are deemed necessary for safe operation. It is also possible to perform the certified load test at the

customer's facility with a company representative present. If the customer wishes to perform the test at their site, the customer must have known test weights that are certified.

Overall Cleanliness

Check all system surfaces to be sure they are cleared of any oil, or foreign objects (rags, papers, tools, etc.).

Hydraulics

Check for fluid leaks or any signs of physical damage or wear in the hydraulic system.

Lubrication

Check the maintenance record to see if lubrication is necessary before operation. A lubrication chart is provided with details on specifications.

Check the oil level in the hydraulic reservoir. With the cylinder fully retracted, it should be at the top of the sight gauge. One inch of air space is required above the sight gauge level for oil expansion.

Structural

Check the entire unit for any signs of physical damage. Look for any signs of failure. Consult the factory if any damage or failure has occurred.

Maintenance Records

Update your maintenance records each time the system is serviced. The lift of this system will depend upon its proper care and maintenance.

Equipment Utilization Records

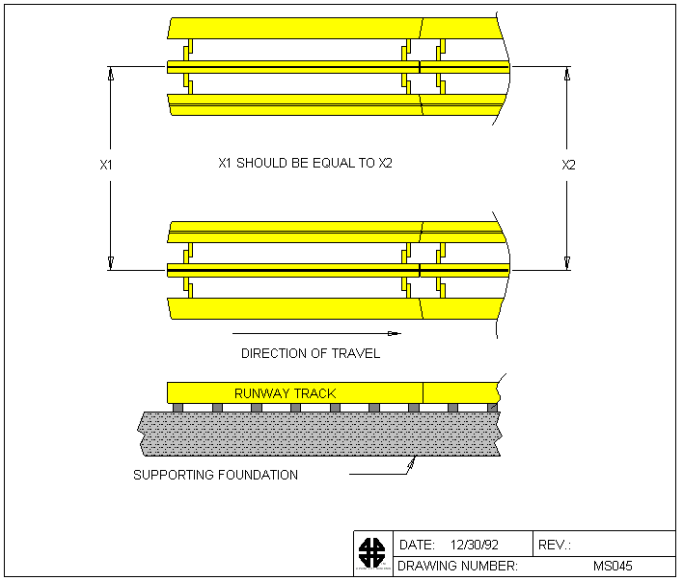
Authorized users should document usage of the system to assist other personnel in operating and maintaining this system properly.

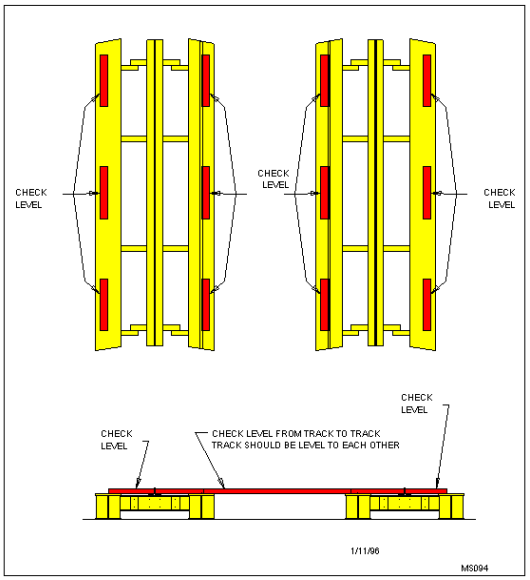
Preparation and Setup
If runway track is used

1. Set the track on a support surface. Bolt it together Runway tracks should be shimmed carefully to insure that the system remains level and plumb while it is traveling. (Consult the factory for track specifications). Make certain that the supporting foundation is adequate to support the total load. If in doubt, the supporting foundation should be verified by a qualified professional engineer.

2. Roll units in position. Lifting units must be level and plumb always. Check the lifting units and correct as needed.

3. The lifting units must be kept as close to the load as possible to minimize deflection in the lifting beams.





WARNING!

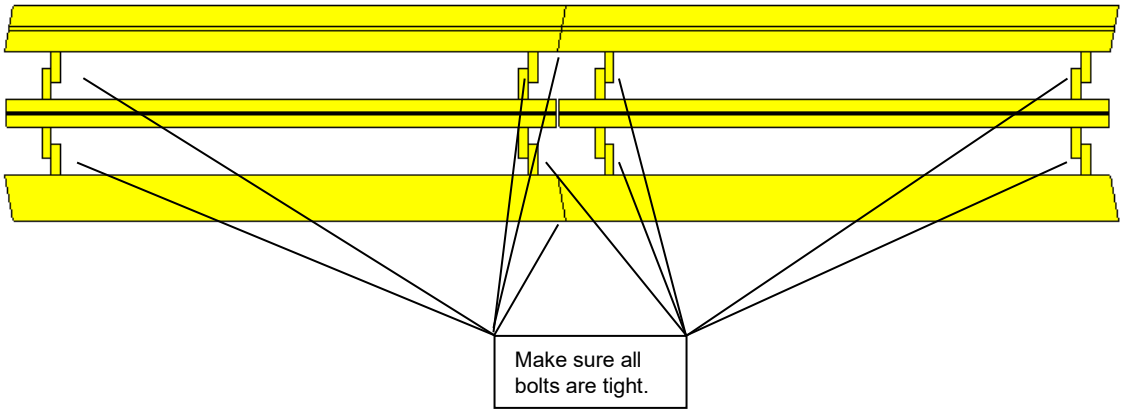
If placing the track on everything other than concrete such as dirt or gravel use crane mats to help spread the load out over ground. Sitting the track on dirt, gravel or similar types of earth the track could settle and sink causing the system to go rapidly out of level.

Warning!

If traveling is required, track must then be used to ensure the units travel in a straight line and parallel to each other.

Warning!

Make absolutely sure the track sections are bolted to each other end to end and never use the track without the cross members. Failure to do so could cause the track to slip out from under the lifting units causing serious damage to the load or equipment and, injury or death to personnel.



Warning!

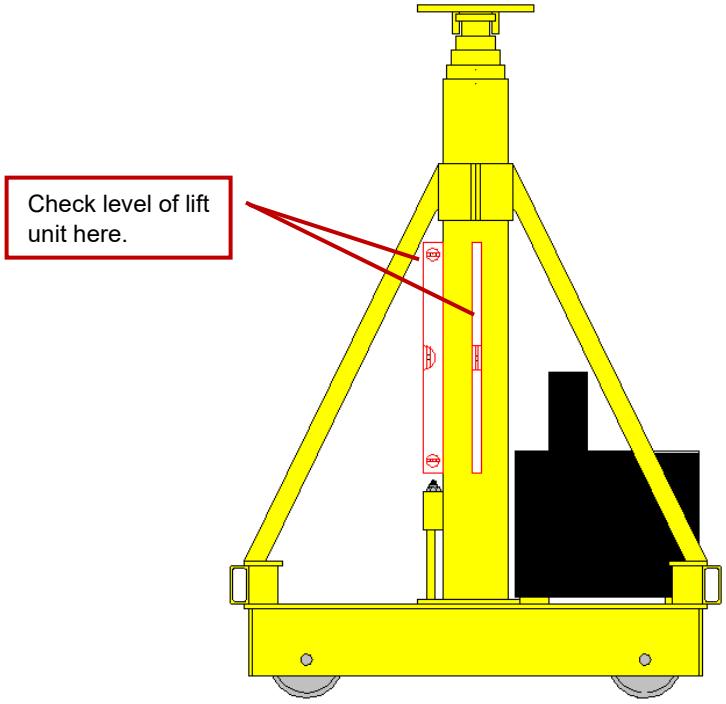
Track must be kept level; otherwise, the system will become side-loaded and unstable.

WARNING!

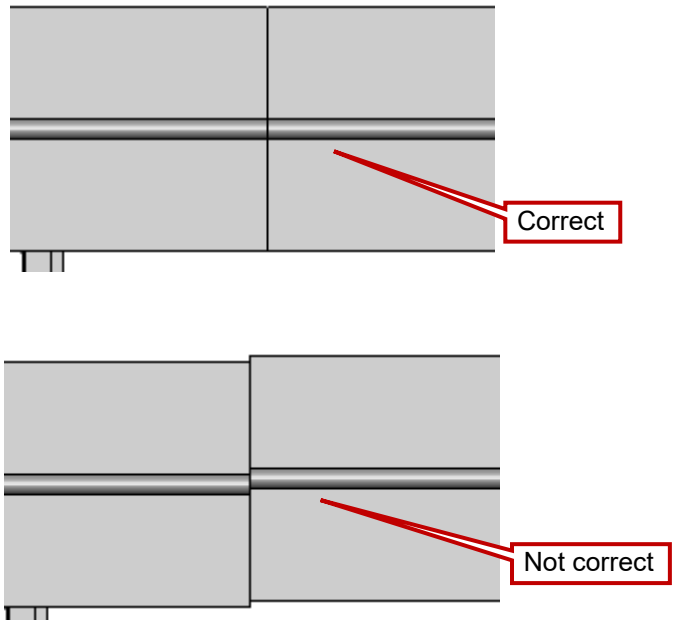
If setting the track up on frozen ground even with crane mats use extreme caution. In the right conditions such as when the ambient temperature raises to near above freezing the weight of the load can force the frost out of the ground causing the ground to shift or to settle which will cause the system to go rapidly out of level.

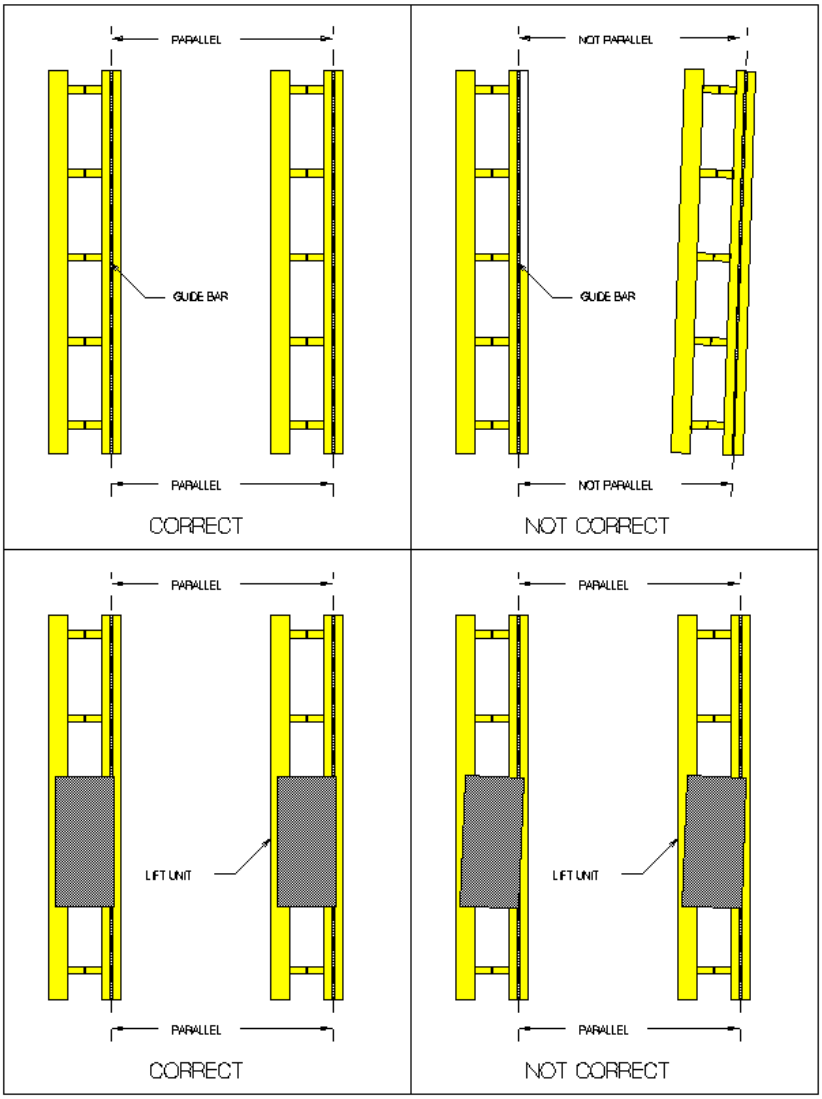
WARNING!

If setting the track up inside a building where there may be a basement or some sort of a void be sure to consult with an engineer to determine if the flooring can adequately support the weight of the system and the load.



When bolting the track section together make sure the guide bars are in alignment. If a misaligned guide bar can have a cause a wheel to get hung up cause that leg to stop traveling.





4. The lifting points on the beam, where lifting links are placed should be kept as close to the lifting units as possible to minimize deflection.

5. The lifting beam span should be as short as possible to minimize deflection.

6. The load on each lifting unit should be as equal as possible to minimize the chance of overload.

In addition to these steps, it is recommended that the practices in the published by "Recommended Practices for Telescopic Hydraulic Gantry Systems" manual, by the S.C.R.A. are followed. This manual maybe purchased through the S.C.R.A. website http://www.scranet.org/store/.

On page I-1 of this manual is a Pre-Lift Planning checklist that was taken from the S.C.R.A. manual, which may be used for planning a lift. It is recommended that copies are made and the original in this manual remains in the manual as a master.

Lay out the lift dimensions on paper

(Refer to the drawing below.)

Do a dimensional layout of the lifting arrangement before doing any set-up. There are five critical dimension points which must be laid out before setting up to pick a load.

A. The wheel boxes on each lifting unit must be extended, if possible, for maximum stability.

B. The lifting units must be kept as close to the load as possible to minimize deflection in the lifting beams. Place runway track accordingly.

C. The lifting points on the beam (where the lifting links are placed on the beam) need to be kept as close to lifting unit as possible to minimize deflection.

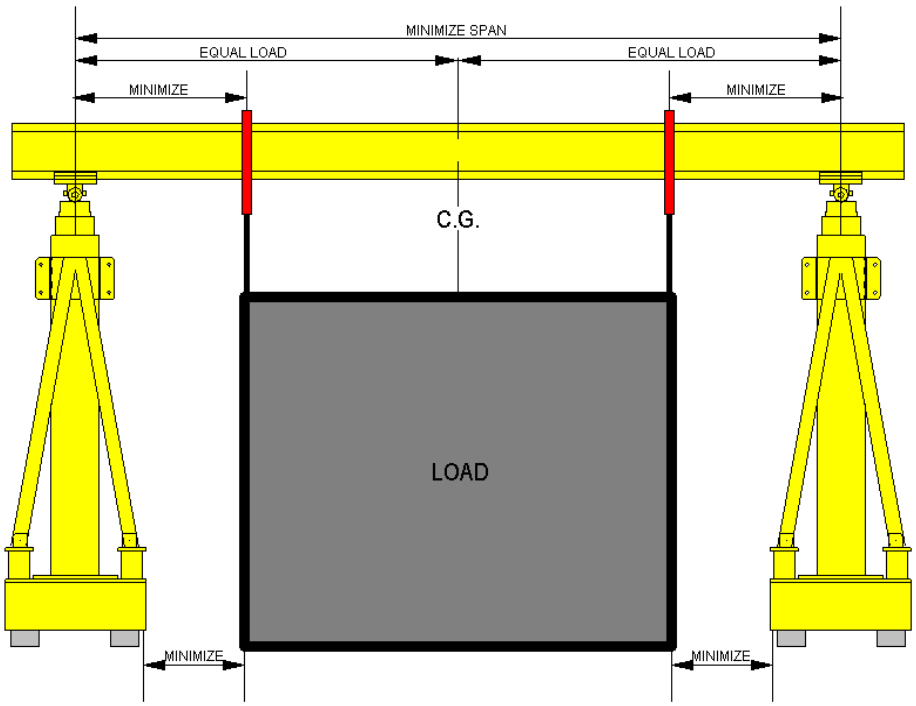
D. The lifting beam span needs to be as short as is possible to minimize deflection.

E. The loads on all lifting links need to be as equal as possible to minimize the chance of overload.

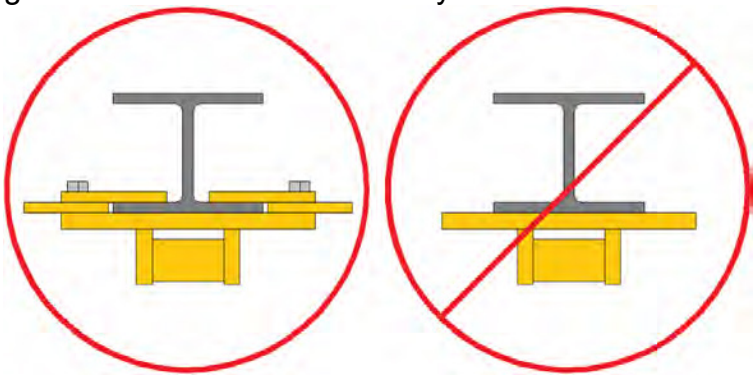
F. If in doubt on what size lift beam is required Lift Systems does have a lift beam program on the internet for sizing lift beams. Go to http://www.liftbeam.com here for a fee a person can sign up and then use the program to calculate the size of beam required.

Caution!

The layout of the lift must consider these critical points. If there is any question about the load, center of gravity, or distribution of the load equally among the lifting units, contact a qualified engineer for verification of the layout.



7. Place beams onto header plates and install safety beam clips. If lifting links are to be used, place links onto the beams before setting them in place and position according to placement of lifting devices or chokers necessary to lift the load.



8. Attach the load with rigging equipment rated for the full capacity of the lift unit. Rigging equipment should have appropriate safety factors.

9. Upon starting the system, allow it to idle for a few minutes and listen for any unusual noises.

10. If the system is equipped with a drive option, make sure the drives are freewheeling before the lift is attempted.

Caution!

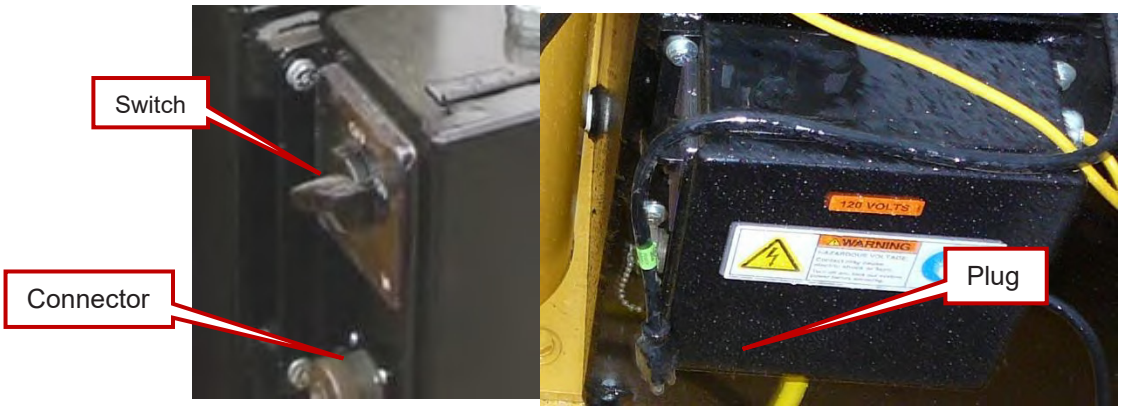
If any unusual noises are heard, shut the system down and refer to the troubleshooting section of this manual for possible problems and resolutions.

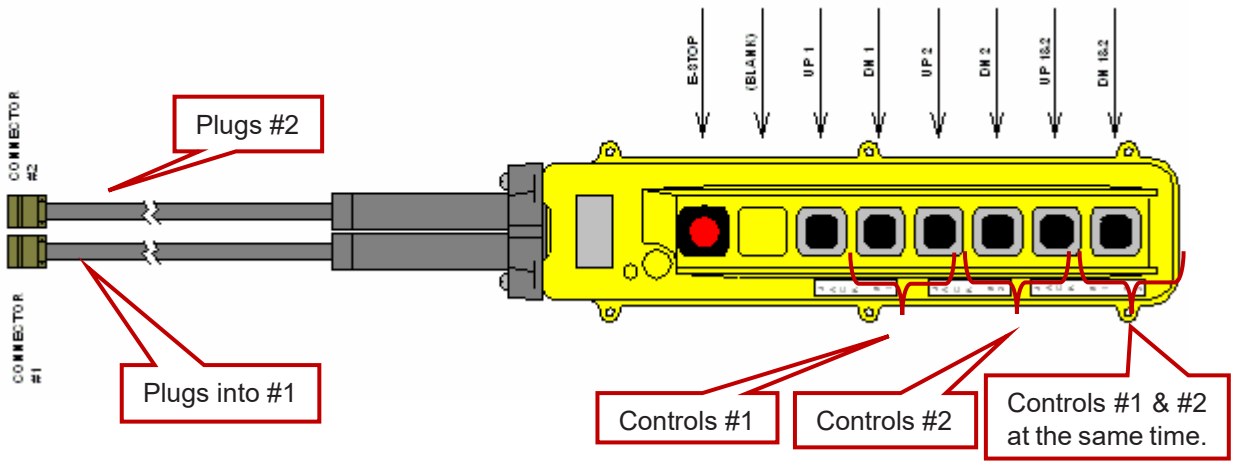
Operation

Connecting and basic operation

To operate the 2020SC two 20amp (110VAC) circuits will be required, (220VAC is available) if both bases are plugged into the same circuit. The circuit breaker will trip when the motors begin to see a load either when lifting a load or during lowering of the system. In addition, using a too long of a power cord or to small of gauge of wire can cause the breakers to trip. Whenever there is a problem with the motors stalling or the breakers tripping first try replacing the cords with a shorter cord, heavier gauge cord or both. 10 gauge is the preferred size.

Before connecting the power cords, first connect the pendent control, the connectors on the pendent should be label 1 and 2. Make sure they correspond with the bases. The “ON/OFF” switch is in the “OFF” position and the E-Stop on the pendent is depressed. Connect the power cords, pull the E-Stop and turn the “ON/OFF” switches to “ON”. Do not use the E-Stop to turn the system on and off.





Before attaching any kind of rigging to the system it should be cycled to ensure it is functioning properly. Press the “UP” button for #1 and let the #1 cylinder extend a couple inches, stop and then press the “Down” button for #1 to retract the cylinder. Repeat for #2 then extend and retract both using the buttons that control both at the same time. Cycle the system up and down into all three stages, to ensure there is no leakage around the rod seals and to ensure there is not a voltage or amperage issue.

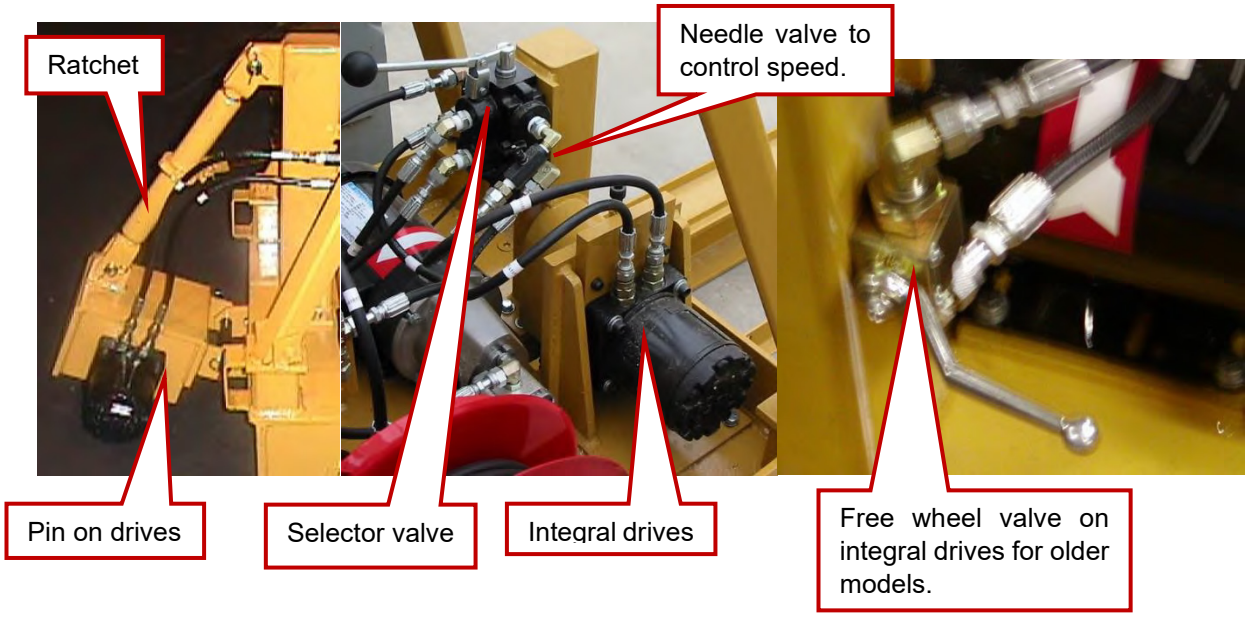
Pressure Gauges

On each unit there is a hydraulic pressure gauge. The gauge shows how evenly the load is distributed. These gauges read when cylinders are extended and retracted. When beginning a lift, as the gauge needle stops and the load begins to lift, check pressure readings against the load chart. Check the gauge on each lifting unit against the other lifting units being used. The readings should be very close.

The greater the weight of the load, the faster the movement of the load when retracting. When retracting the cylinder, the gauge will read full system pressure, when the cylinder is operated empty. This is necessary to retract the cylinder in an unloaded condition, because of the differences of the piston sizes. The retract side of the piston is much smaller than the extend side. Therefore, it requires more pressure to move the piston.

Travel

If the system is equipped with drives move the handle on the selector valve to the propel position. If the drives are the pin on type, ratchet the wheels down so they make contact. Press the “UP” buttons for #1 and #2 and make sure both units travel in the same direction. Do the same with the “DOWN” buttons and repeat with the buttons for operating both at once. If the system has the integral drives, make sure the free wheel valve is in the propel position. Operate the drive as mentioned above.

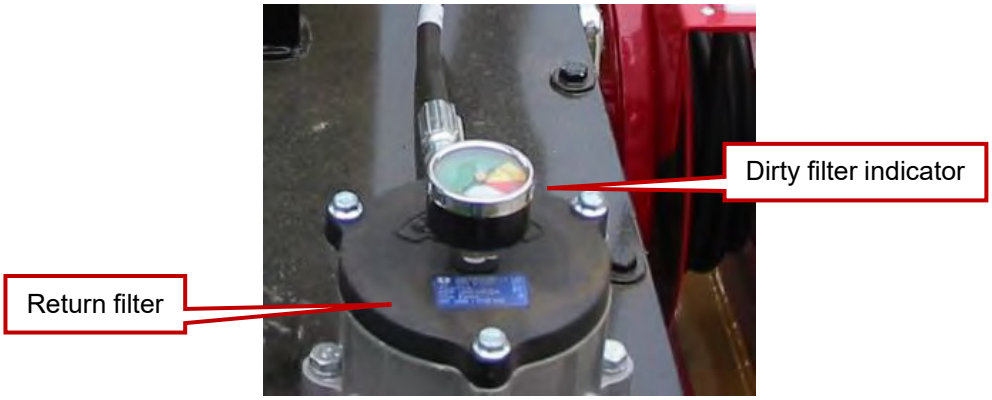


Hydraulic Oil Sight Level Gauge and Thermometer:

The sight level gauge is useful in determining the amount of oil in the power unit reservoir. The gauge is typically mounted on the long inside surface of the oil reservoir at the top. This gauge will indicate full when all cylinders in the lifting units are fully retracted. Do not overfill the reservoir. Leave 1 to 2 inches of air space for oil expansion when hot. The gauge also shows the temperature of the hydraulic oil. If there is no sign of oil in the sight gauge with all the cylinders fully retracted, oil must be added before using the system.

Hydraulic Oil Filter Dirt Indicator:

Each unit is equipped with a return filter that is mounted in the top of the reservoir. On each filter there is a dirty filter indicator. Some indicators are color coded, if the needle get into the red area the filter element must be replaced. Other indicators just have numbers; if the needle goes beyond 20 then the element needs to be replaced.



Operating temperatures

This system has a wide range of operating temperatures. However, for temperatures below 32 degrees Fahrenheit (0 degrees Celsius) it is advisable to start the system and let it run to circulate the oil, which will warm it up. For prolong cold temperature usage a tank heater would be beneficial to keep the oil warm when the system is setting idle. Temperatures reaching 0 degrees Fahrenheit (-18 degrees Celsius), operation is not advisable unless the oil is designed to perform at these temperatures. Because of the type of duty cycle of the system heat is not normally a factor. However, the oil should never exceed 180 degrees Fahrenheit (82 degrees Celsius) which is where the oil can start to break down.

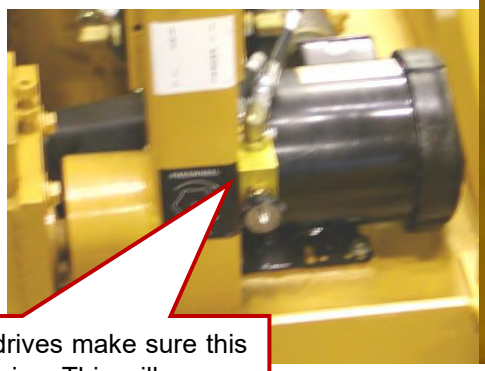
Lifting a load

If the system appears to be operating normally, the cylinders should be tested without a load by extending the cylinders about 6” then retract them.

After testing without a load has been completed, and all operations seem normal, the load may be applied. Check all clearances, clear lifting area of all personnel not required to make the lift, come up tight to the load, and apply a part of the load to the lifting units.

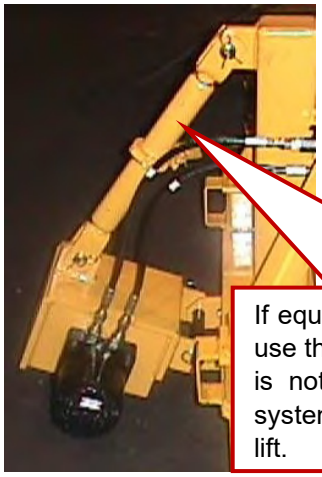
When lifting capacity loads, the user must always proceed slowly and continually check to make sure that the lifting units and beams are level and plumb in all directions. Use measuring or leveling devices. Do not rely on eyesight to determine if the lifting beams are level.

Before attempting the lift make sure the drives if equipped are in freewheel. Otherwise severe side loading can occur to the cylinders causing leakage and/or damage to the cylinders. See pictures on next page.



If equipped with integral drives make sure this knob is turned fully clockwise. This will ensure the drives are in free wheel when beginning the lift. This is on the some of the earlier models the later model will have a ball valve. Turn the handle to the open position for freewheeling.

Some models have a ball valve.



If equipped with the pin on ratchet type drives use the ratchet to lift the drive wheel up so that is not making contact. This will ensure the system will in free wheel when beginning the lift.

Check the load chart again to determine the amount of hydraulic pressure to lift the load. Do not lift the load completely without knowing the pressure required.

Jog the control switches to slowly apply pressure in the Cylinder until the pressure gauge reaches the pressure reading you have gotten from the load chart. Applying pressure rapidly may cause a false pressure reading.

Warning!

If the pressure specified on the load chart is reached and the load is not lifting.

A. The load could be heavier than calculated.

B. The load is tied or fastened down.

C. The lifting units are not level and plumb, causing side loads on the cylinders and more pressure needed to overcome the friction caused by side load.

D. Faulty gauges.

E. Excessive beam deflection, causing a cylinder side load

Stop!

Check the lifting units for level and plumb, the beam and track (as required) for deflection. If the lift set-up is proper, the load may be heavier than calculated. If you continue to increase the pressure, you may overload the rigging equipment (chokers and shackles). Make sure the rigging can take the increased load before going to higher pressures.

Caution!

Recheck the level and plumb in all directions after a substantial part or the entire load is applied to the lift system. Do this often during the lift.

Lower the load a short distance to make sure that all safety holding valves are operating properly and the load can be lowered.

Warning!

This system is equipped with anti-friction steel bearing wheels and is easily moved under any load conditions. Extreme care should be taken to prevent the system from operating on a downhill condition. The system may move by itself if not held back or blocked properly. This system must always be level and plumb.

Caution!

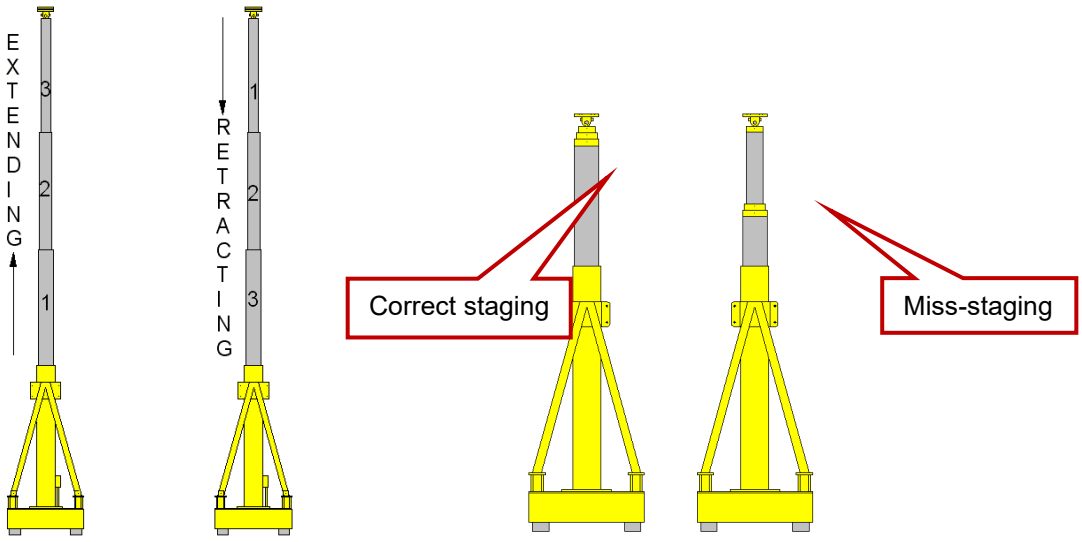
Watch beams constantly for deflection and/or signs of excessive loading. Excessive deflection of beams causes severe side-loading of cylinders.

Cylinders must be extended at equal length with beam level. Use a measuring device (tapes or level lift system). Users must constantly monitor exact cylinder extension, level and plumb.

Cylinder sections should extend in the following sequence:

- Large bottom section first
- Mid-section next
- Top section last

Cylinder sections should retract in reverse sequence. The cylinder may sequence incorrectly under no load or rigging load conditions, but restaging will occur when the load strain is put on the lifting beams. If the cylinders miss-stage during set up, then slowly come into the load when lifting the load. This should restage the cylinders.



Warning!

Do not come into the load suddenly if the cylinders are in a miss-stage condition. Gently ease into the load so the cylinders can restage using the load to induce the right sequence hydraulically. If the sections do not extend and/or retract in proper sequence with a load, consult the manufacturer immediately.

Warning!

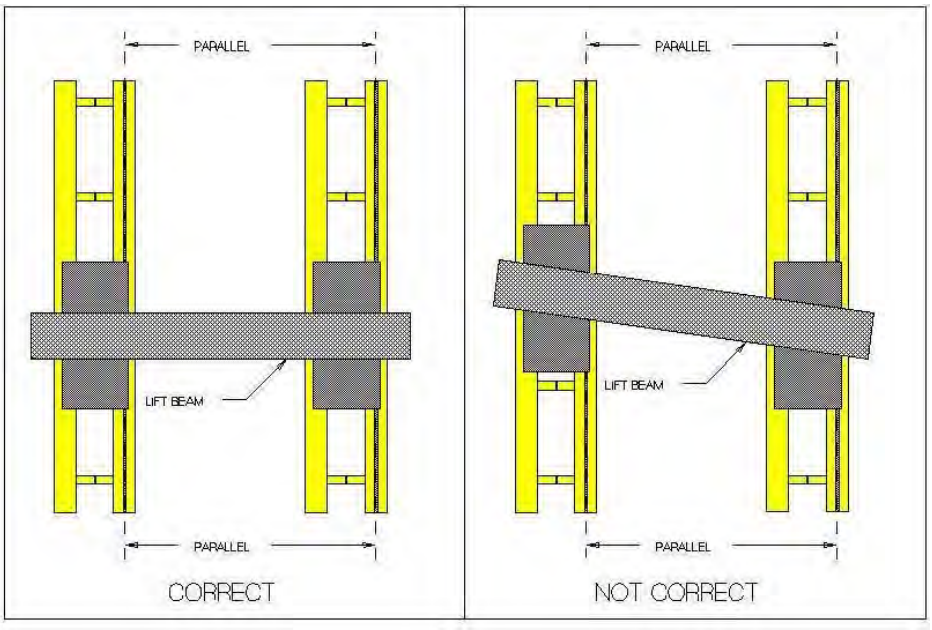
<u>Always</u> make sure the ends of the header beam extend out over the edge of the header plates. If they are not there is the chance the lifting unit could be forced out from under the beam if it were to become unleveled.

Traveling

The system lifting units must always be level and plumb during lifting and traveling with loads. When traveling with loads, track should be level and parallel to line of travel. Shim all low areas to ensure that the system units remain level and plumb during travel. Avoid sudden stops and starts that could cause the load to swing. Always make sure the cords stay clear of the wheels when traveling. There is an adjustable needle valve for controlling the travel speed.

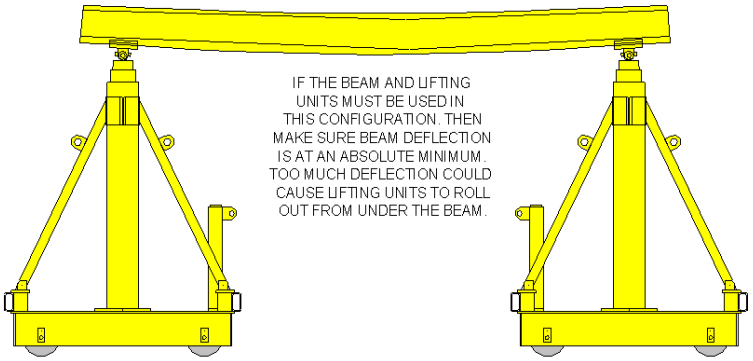
Caution!

The lifting units should always operate parallel to each other. Incorrect relationship between system units, such as allowing one side to get ahead of the other while traveling, will create side loads in extended cylinders creating rapid packing wear and possible damage to the cylinder rods. See following drawing on the next page.



Warning!

If the wheels of the lifting units are to be in the same direction as the beam length, then make sure beam deflection is at an absolute minimum. Too much beam deflection may cause the lifting units to roll out from under the beam, causing the load and the lifting units to fall over.



While lowering the load, if the load is heavier on one side, it will come out of level rapidly when retracting the cylinders. Use a level-lift system or measuring tapes. Keep the load level.

Warning!

The foundation supporting the track (as required) and the lifting units must be firm enough to support the combined weight of the load, lifting units, beam and track without settling or sinking. Any change in the support area under the track or lifting units during the lift or while traveling is very dangerous and must always be monitored by the personnel operating the system.

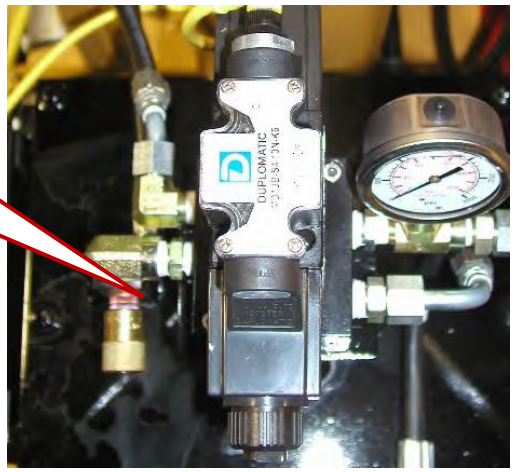
Warning!

The weight of the load adds to the speed when retracting the cylinders. Be careful!! It may be necessary to jog the control switches to slowly lower the load. Alternatively, the flow control can be adjusted to slow the speed of the system when in a load condition. See the next page for more information.

Controlling the speed when loaded

The 2020SC system is equipped with flow control valves. Each lifting unit has its own flow control so they can be adjusted accordingly to the load it is carrying. The heavier the load the faster the system will lower. To use the flow controls, turn the knob clockwise to slow the cylinder down, and counterclockwise to speed the cylinder up. Each flow control has colored rings to help take the guesswork out of where to adjust them. You can never be too slow when lowering a load, so it is better to start out setting them slow. However, use caution when adjusting; even with the colored rings it is still possible to have one adjusted faster or slower than the other. In addition, it also depends how the load is centered with the system. If one cylinder is carrying more of the load than the other cylinder, then that cylinder will want to lower faster. It is advisable once the controls are adjusted to lower the system slightly to determine if one needs to be slowed down some more. **These are not intended to keep the system level, only to control the speed. It is still the operators' responsibility to make sure the system stays level and plumb.**

Flow control valve can be used to control lowering speed when in a loaded condition.



Summary

The preceding guidelines are intended for use with hydraulic jack units as supplied by Lift Systems, Inc.

Warning!

If there are any other problems, do not attempt to make the lift. Refer to the troubleshooting section or call the manufacturer for further troubleshooting assistance. Failure to follow this safety procedure could result in severely hazardous conditions, injury to personnel, and could cause serious damage to the system.

How to Use the Pressure Gauges and Load Chart

The safest method is to use the load chart before lifting the load. Determine how much pressure is required to lift the load. The load figured must include any lift beams and other rigging. If you reach that pressure reading, you are exerting the amount of hydraulic force required to lift the load. See pages E-13 & E14 for load charts and worksheet. If the load is not moving, it may be because:

1. The load could be heavier than calculated.
2. The load is tied or fastened down.
3. The lifting units are not level and plumb causing side loads on cylinders, and more pressure needed to overcome the friction caused by side load.
4. The beam and rigging were not added in the load calculations.
5. Faulty gauges.
6. Excessive beam deflection, causing cylinder side load.

Warning!

If you continue to lift, you may overload and break chokers and shackles, or overload and cause deflection in the lifting beam, track, cylinders, or foundation support under the lifting units.

Attach the load to the lifting beams, or links, with rigging equipment rated properly for the weight of the load being lifted. (Make sure all rigging equipment is adequate to handle the load to include proper safety factors.)

How to Use the Control Valve and Pressure Gauges to Verify the Load Using the Load Chart Check List on page E-13.

Before the lift, fill out the load chart checklist with the pressure required at each lifting unit.

"Lift Load" Pressure:

First, use the load chart provided to determine the amount of pressure needed to lift the required load. Make sure the additional weight of any rigging or lifting beams used are included in the calculation of total load. Next, fill in the pressure required for each lifting unit in the "lift load" line on the form. Then, the operator will know when the lifting unit(s) reaches the pressure reading, which should be moving the load.

"Stop Limit" Pressure:

Determine the smallest amount of safety factor available in lifting beams, track, and rigging in case of overload. Convert this to a load figure. This figure should be equal to, or greater than, the load you have calculated above. Use the load chart again to fill in "stop limit" pressure. The range of pressure between "lift load" and "stop load" must not be more than 200 PSI. In the case of a maximum load for that stage, the pressure to lift or stop will be the same.

Before starting the lift, all propel, or drive options should be unpinned or shifted to freewheel. When beginning a lift, pull the valve handles gradually to insure accurate readings on pressure gauges. As pressure increases to the predetermined lift pressure, watch for the load to begin moving. If the load begins moving before the pressure is reached, the load weighs less than calculated. Depending upon the weight of the load, further movement of the handles may result in faster movement of the load. A higher-pressure reading may occur due to increased resistance with increased flow and natural frictional losses in hoses, couplers, and valves.

Caution!

When the load starts to clear its supporting foundation, it may want to sway a little so it can find its center with the lifting system. The lifting process should be stopped until the load has stopped swaying.

If the load has not moved when the "stop limit" pressure is reached the operator should stop. If you continue to lift, you may overload and break chokers and shackles, or cause deflection in lifting beams, runway track, or the foundation support under the lifting units. Identify the problem and take whatever steps are required to solve it, and then proceed with the lift.

Warning!

If the pressure specified on the load chart is reached and the load is not lifting:

1. The load is heavier than calculated.
2. The load is tied or fastened down.
3. The lifting units are not level and plumb, causing side loads with more pressure needed to overcome the friction caused by the side load.
4. Faulty gauges.
5. Excessive beam deflection.

STOP!!!! Check the lifting units for level and plumb, the beams and track for deflection. If the setup is proper, the load is probably heavier than expected. Increasing the pressure may overload the rigging equipment (chokers and shackles). Make sure the rigging can handle the increased load before going to higher pressures.

Caution!

Recheck for level and plumb in all directions after a substantial portion, or the entire load, is applied to the system.

LOAD CHART CHECKLIST

LIFTING UNIT #1			LIFTING UNIT #2		
Approximate lifting weight _____			Approximate lifting weight _____		
Approximate pressure			**Approximate pressure**		
Stage	Lift load	Stop Limit	Stage	Lift load	Stop Limit
#1	PSI	PSI	#1	PSI	PSI
#2	PSI	PSI	#2	PSI	PSI
#3	PSI	PSI	#3	PSI	PSI

LIFTING UNIT #3			LIFTING UNIT #4		
Approximate lifting weight _____			Approximate lifting weight _____		
Approximate pressure			**Approximate pressure**		
Stage	Lift load	Stop Limit	Stage	Lift load	Stop Limit
#1	PSI	PSI	#1	PSI	PSI
#2	PSI	PSI	#2	PSI	PSI
#3	PSI	PSI	#3	PSI	PSI

CAUTION!

The load charts are with all the cylinders equally loaded. If the total weight of the load is well within the lift limits of the system it is still possible to overload at least one cylinder, depending on how the weight is distributed on each cylinder.

NOTE

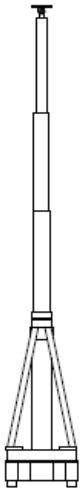
The pressures shown on the load charts are how much pressure it takes to support the load. The actual pressure required to move the load will be higher.

Load Charts

LIFT SYSTEMS

MODEL 4040SC CAPACITY CHART
40 (36) TON 4 POINT LIFT SYSTEM

4040LC02 REV. D
DECAL133



PRESSURE	1,800 PSI (124 BAR)	1,600 (110)	1,400 (97)	1,200 (83)	1,000 (69)	800 (55)	600 (41)	400 (28)	200 (14)
16' 0" (4877 mm) 3rd STAGE	40 TON (36)	38 TON (34)	33 TON (29)	28 TON (25)	23 TON (20)	19 TON (17)	14 TON (12)	9 TON (8)	4 TON (3)
12' 8" (3861 mm) 2nd STAGE				40 TON (36)	37 TON (33)	29 TON (26)	22 TON (19)	14 TON (12)	7 TON (6)
9' 4" (2845 mm) 1st STAGE						40 TON (36)	32 TON (29)	21 TON (19)	10 TON (9)

6' 0" (1829 mm)

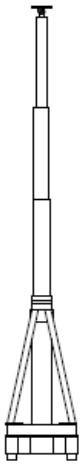
STANDARD (METRIC)

THIS CHART IS BASED ON LIFT SYSTEMS CYL# CYL70

LIFT SYSTEMS

MODEL 2020SC CAPACITY CHART
20 (18) TON 2 POINT LIFT SYSTEM

2020LC02 REV. D
DECAL132



PRESSURE	1,800 PSI (124) BAR	1,600 (110)	1,400 (97)	1,200 (83)	1,000 (69)	800 (55)	600 (41)	400 (28)	200 (14)
16' 0" (4877 mm) 3rd STAGE	20 TON (18)	19 TON (17)	16 TON (14)	14 TON (12)	11 TON (9)	9 TON (8)	7 TON (6)	4 TON (3)	2 TON (1)
12' 8" (3861 mm) 2nd STAGE				20 TON (18)	18 TON (16)	14 TON (12)	11 TON (9)	7 TON (6)	3 TON (2)
9' 4" (2845 mm) 1st STAGE						20 TON (18)	16 TON (14)	10 TON (9)	5 TON (4)

6' 0" (1829 mm)

STANDARD (METRIC)

THIS CHART IS BASED ON LIFT SYSTEMS CYL# CYL70

LIFT SYSTEMS PATENTS
U.S. PATENTS #4,573,853
#5,181,693
UK PATENT #2,154,543
AND VARIOUS OTHER PATENTS

If the gauges read a higher pressure than expected, make another walk-around inspection to make sure that the beam deflection is not excessive. This condition must always be avoided.

Be certain that the load is not tied down. Verify, if possible, the weight of the load, beam, and rigging.

Beams

Always be certain that beams used are of proper strength to carry the load to be lifted and that the spacing of the lifting links, or other load attachments, is sufficient to ensure proper and safe loadings within the capacity of the beams.

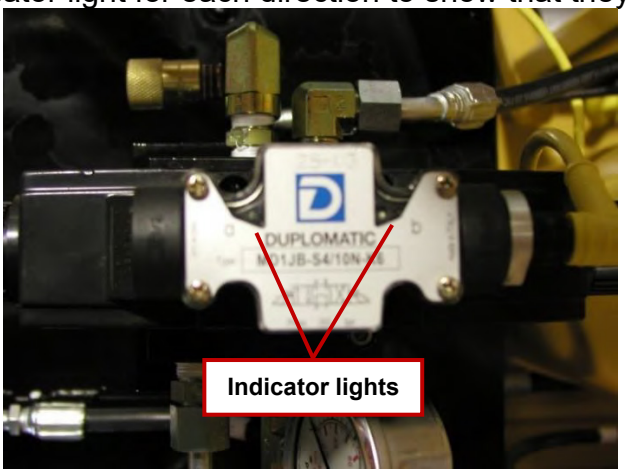
A qualified, professional engineer should verify all lifting beam load capacities before making a lift. There is a lift beam program available at http://www.liftbeam.com you can use. You must sign up and there are fees required to use the application. In addition, when going to the lift beam site, there you will find a chart for hydraulic gantry hand signals.

Header Plates

The centerline of the lifting beam must be kept directly over the centerline of cylinders. If using a narrower beam than that for the header plates are designed, use spacers on both sides of the beam to keep it centered on the header plates. Header plates are designed to pivot which helps keep the load on the center line of the lifting unit when the beam come slightly out of level.

Directional Valves for Lift/Lower & Propel

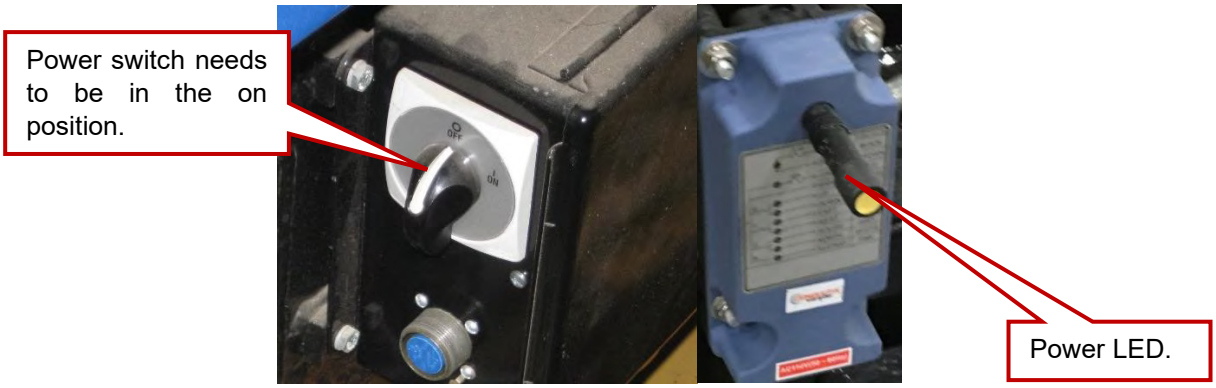
Electric shift valves for lift and lower or for propel option are mounted on a pedestal on top of the hydraulic reservoir. Propel may be controlled by a manual valve mounted on pedestal on the base top plate. These valves must not be used for a step. Electric shift valves are spring loaded to the neutral position in case of power or valve failure. If a lifting unit malfunctions, check these valves to make sure they are shifting properly. Each valve is equipped with a manual override in the event one should quit working. They are also equipped with an indicator light for each direction to show that they are being energized.



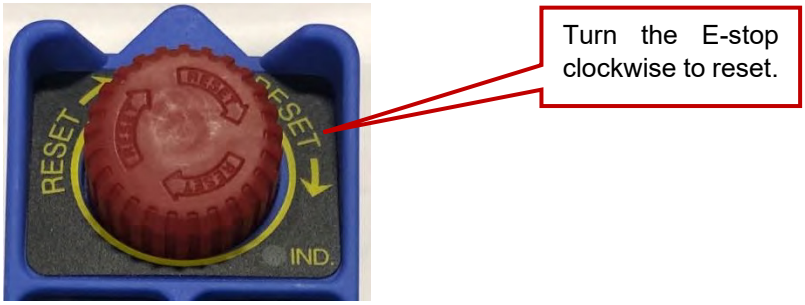
Optional Conductix Wireless Radio

The optional wireless radio by Conductix Wampfler can be easily added to the 2020 and 2033 minijack systems. Each system consists of two receivers, one for each jack and two transmitters (one is a spare in the event one gets damaged.)

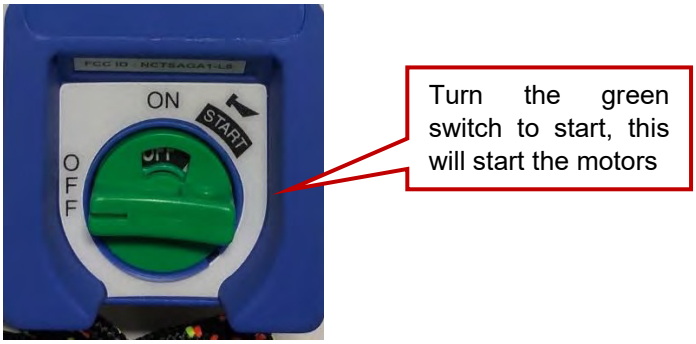
To use the wireless system, the jacks into the proper power source, turn the power switch on each jack to the on position. At which point a red LED on the receiver will turn on to show it is powered up. If LED fails to light up there is a 0.5A fuse inside the receiver, refer to page 14 in the radio manual for the location of the fuses.



Take the transmitter and make sure the e-stop is in the out position.



Turn the green switch to start, this will turn on the electric motors.

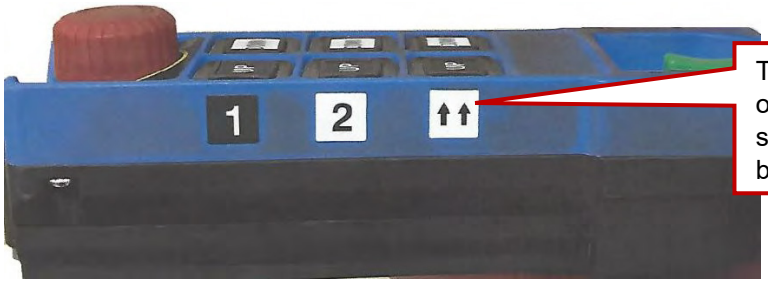


Once the motors are running the system can now be raised and lowered. The transmitter has a total of six buttons. There is a button for up for each jack, a button for lower for each jack and there are two buttons for controlling both jacks at the same time, one for up and one for down.

These are for jack #1.

These are for jack #2.

These are for both jacks.



There are ae labels on the side that shows what buttons are what.

Travel with the wireless works in the same fashion as with the tethered pendants, refer to page E-2.

Utilization Chart			
Date	**Operator**	**Location**	**Hours Utilized**

Maintenance

Hydraulic Oil

Oil in a hydraulic system performs the dual function of lubrication and transmission of power. Careful selection of oil should be made with the assistance of a reputable supplier, helping to ensure the satisfactory operation and life of this system and its components. Some factors important in selecting a good grade of hydraulic oil are:

- The oil must contain additives to insure high anti-wear characteristics.
- The oil must have proper viscosity to maintain sealing and lubricating qualities at the expected operating temperature of the hydraulic system.
- The oil must have rust and oxidation inhibitors for satisfactory system operation.

The manufacturer recommends the use of Mobil DTE 24 or its equivalent. Specifications for this oil are as follows.

HYDRAULIC OIL

LSI SPEC NO	MILITARY SPEC NO	EQUIVALENT LUBRICANTS	SAE GRADE	MANUFACTURER
LU002	NOT AVAILABLE	TELLUS 32	10	SHELL AG
		VITAM GF 32	10	ARAL AG
		D. T. E. 25	10	MOBIL OIL AG
		RANDO HD-A	10	TEXACO

Wheel Lubrication

The wheels on which this lift system moves are equipped with grease fittings on the hub of each wheel and should be greased monthly. Bearings should be filled with a good grade of EP (extreme pressure) grease.

To gain access to the grease fittings, the individual lifting units should be raised with a forklift and blocked up to allow you to move, remove to service the wheels.

Caution!

Care should be taken not to change the proper placement of any shims when moving or removing the wheel. Wheels must be shimmed snugly in place.

Caution!

Do not operate this unit without oil under any condition.

When it becomes necessary to add oil to this system, make sure that all oil added to the reservoir is strained through a 10-micron filter. An adequate filter can be purchased at your local fluid power distributor or an industrial supply house. Check parts list for filter replacement numbers.

Oil Maintenance

Cleanliness!!! Hydraulic components are precision built units. Cleanliness is imperative to the long life and good operating condition of this system. When working with the hydraulic oil it is advisable to read the MSDS located in the back of this section to become familiar with the hazards and proper handling of the oil in case there is a spillage or some other mishap.

Caution!

The major cause of hydraulic system failure is dirt in the oil and related hydraulic components. Keep all systems clean when on the job site and covered when not in use.

Oil Level & Temperature

The oil level must be checked before operation when the cylinder is fully retracted. Keeping the oil level in the power unit 1” – 1.5” from the top of the tank will insure that the hydraulic pump has oil. The hydraulic oil level gauge is on the side of the hydraulic tank. If there is no sign of oil in the sight gauge with all the cylinders fully retracted, oil must be added before using the system.

The gauge also has a built-in thermometer. The temperature range is 85 F to 175F (29.5C to 79.5C). If the oil is too cold, operation will be slow and pressure readings will be artificially high. If the oil is too hot, it will shorten the life of the oil and cause a buildup of sludge in the system. With proper maintenance and operating temperature, the oil has a life of about 1500 hours.

Suction Strainer

These systems are supplied with a 100-mesh suction strainer in the reservoir and a 10-micron return line filter. Refer to the Replacement Parts appendix of this manual for the filter element specifications and the instructions for changing elements.

The 100-mesh suction strainer allows the unit to run for a long time before the strainer becomes clogged to the point at which it will affect the operation of this system. Periodic inspection and cleaning of the strainer are recommended.

To gain access to the strainer, the cylinder should be extended to lower the oil level in the reservoir. Remove the reservoir lid. Drain the remaining oil into a suitable container. Disconnect the suction line of the pump at the reservoir. Unscrew the strainer

from the black pipe coupling in the reservoir. Wash in suitable solvent. Blow out with air from the inside out. When replacing the strainers, reverse the procedure above. Replace old oil drained with new.

Hydraulic Filter

The hydraulic filter is in the top of the hydraulic reservoir. The filter housing is equipped with a filter condition indicator. When the indicator reads 20 inches of vacuum or more the filter should be replaced.

If there is a major failure of the pump, or other system components, the filter element should be replaced, as well as cleaning all the oil in the system and inside the reservoir.

- Pump the oil out of the reservoir into a suitable container.
- Wipe out the inside of the reservoir to remove all dirt.
- Pump oil back into the reservoir being sure to strain the oil through a 10-micron filter.

Operating temperatures

This system has a wide range of operating temperatures. However, for temperatures below 32 degrees Fahrenheit (0 degrees Celsius) it is advisable to start the system and let it run to circulate the oil, which will warm it up. For prolong cold temperature usage a tank heater would be beneficial to keep the oil warm when the system is setting idle. Temperatures reaching 0 degrees Fahrenheit (-18 degrees Celsius), operation is not advisable unless the oil is designed to perform at these temperatures. Because of the type of duty cycle of the system heat is not normally a factor. However, the oil should never exceed 180 degrees Fahrenheit (82 degrees Celsius) which is where the oil can start to break down.

System Maintenance

1. All hydraulic filters should be changed at least once a year.
2. Wheels and all bearings should be greased at least once a month with a good grade of high-pressure grease. This includes the wheel bearings and the steerable wheel mechanism thrust bearings if equipped.
3. Have a hydraulic oil sample tested once (general wear, metal and contaminated tests.) If high water content is suspected (milk in color with low lubricity), ask for the Carl Fischer method of water content tests.
4. Inspect hoses and gaskets for wear monthly and service as needed.
5. The cylinder manufacturer suggests that all cylinders be cycled once per week to keep all seals lubricated.
6. Use the maintenance on page 50 to keep a record of maintenance preformed.

Bolt Torque

When preforming any maintenance or repairs, all hardware shall be torqued to the values shown on the below chart. All bolts one inch and larger shall have never-seize applied and torqued to the lubricated value. All bolts smaller than one inch shall have Loctite 242 (blue) applied with the dry value being used. Use the chart below.

CLASS C SOLUTIONS GROUP HEX HEAD CAP SCREWS

Suggested assembly torques in: Foot-pounds/(Inch-pounds)

						BOWMALLOY®		
		SAE GRADE 5		KARTITE®/GRADE 8 GRADE 8		WITH BOWMALLOY HEX NUT		WITH DURA-TORQ HEX NUT CAD/WAX
DIA.	TPI	DRY THREADS	LUBRICATED THREADS	DRY THREADS	LUBRICATED THREADS	DRY THREADS	LUBRICATED THREADS	
1/4	20	8 † (96)	5 † (60)	12 † (144)	7 † (84)	17 † (205)	10 † (120)	11 (132)
	28	10 † (120)	6 † (72)	14 † (170)	9 † (96)	19 † (230)	11 † (136)	13 (156)
5/16	18	17 † (205)	10 † (120)	25 † (300)	15 † (180)	34 † (410)	20 † (240)	21 (252)
	24	19 † (230)	12 † (144)	27 † (325)	17 † (195)	38 † (450)	22 † (265)	23 (276)
3/8	16	31 † (370)	19 † (230)	44 † (530)	26 † (310)	60	36 † (430)	33 (396)
	24	35 † (420)	21 † (250)	49 † (590)	30 † (360)	68	41 † (495)	38 (456)
7/16	14	49 † (590)	30 † (360)	70	42 † (505)	98	58	60
	20	56 (670)	33 † (395)	78	47 † (565)	108	66	65
1/2	13	76	45 † (540)	108	64	148	90	95
	20	86	51 † (610)	120	72	166	100	105
9/16	12	110	66	154	92	214	128	140
	18	122	74	172	104	238	142	150
5/8	11	150	90	212	128	295	176	185
	18	170	102	240	144	335	200	205
3/4	10	265	160	375	226	520	315	290
	16	295	178	420	250	580	345	355
7/8	9	430	260	606	365	841	505	505
	14	475	285	674	405	926	555	585
1	8	645	385	909	545	1261	756	775
	14	723	435	1020	610	1414	849	900
1-1/8	7	794	475	1287	772	1785	1071	1150
	12	890	535	1444	867	2003	1202	
1-1/4	7	1120	672	1817	1090	2519	1512	1600
	12	1241	744	2013	1208	2790	1674	
1-3/8	6	1469	881	2382	1428	3303	1982	
	12	1672	1003	2712	1627	3761	2257	
1-1/2	6	1949	1169	3161	1897	4384	2630	
	12	2194	1316	3557	2134	4933	2960	

†Installation with an inch pound torque wrench is recommended. The inch pound torque value is listed in parenthesis.

GUIDELINES FOR THE USE OF THIS CHART

These specifications are the recommended assembly torques for various grades of Class C Solutions Group threaded fasteners with the following qualifications:

1. All torque values shown are for turning the NUT while holding the head of the bolt with a wrench.
2. Torque values are calculated at 75% of proof load. This provides a safety factor.
3. All dry torque values are given for the "as received" condition, such as plated hex head cap screws.
4. All torque values are based on the use of through hardened flat washers, such as Bowmalloy® flat washers, under the bolt head and nut or only under the bolt head in a tapped hole application. This provides a uniform hard, smooth bearing surface.
5. Lubricated torque values are calculated based on applying Class C Solutions Group Anti-Seize Compound to the threads before assembly.

Cylinder Packing Replacement Procedures

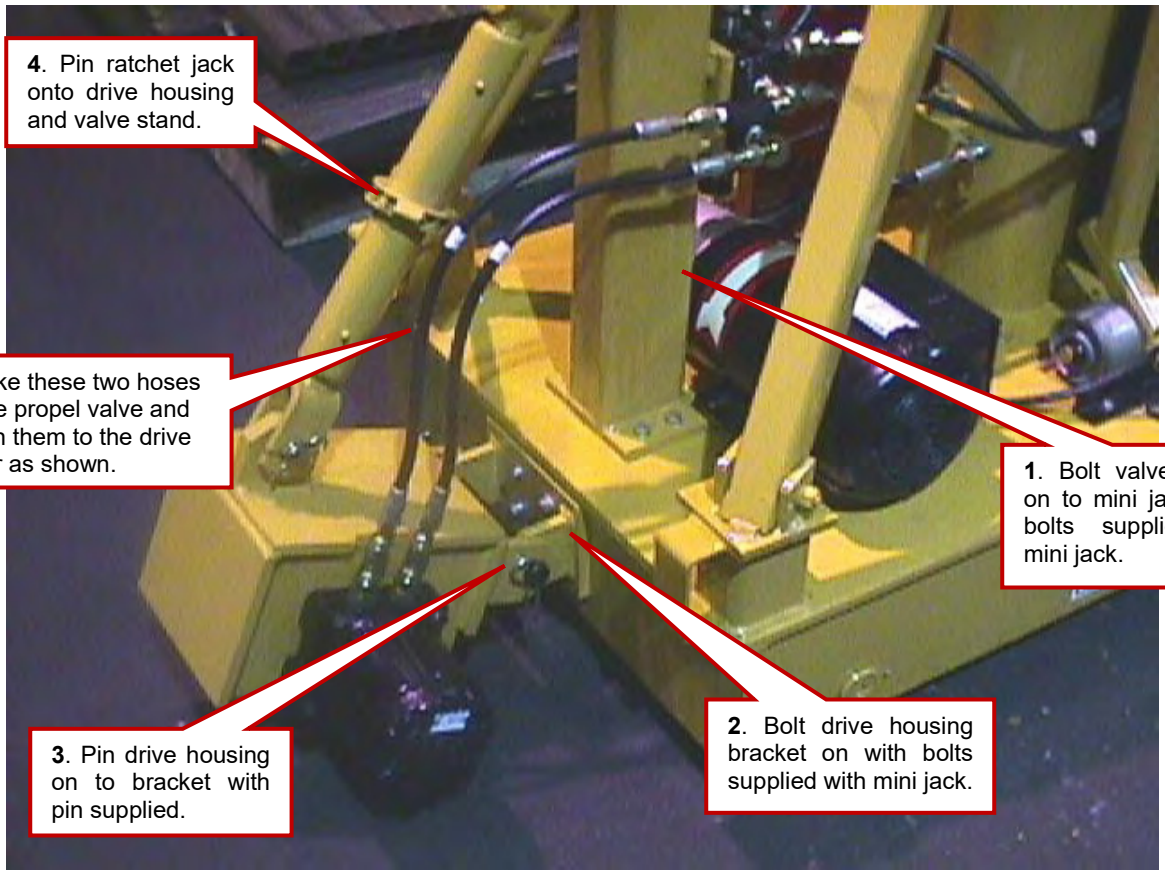
Lift system has used various cylinders from various suppliers over the years. This is a task should not be attempted it at a job site. It is best to send the system back to the factory where we are fully equipped to service the cylinders. In addition, we are also equipped to load test the system when the re-sealing is complete. If you choose to take the cylinders to someone other than Lift Systems for resealing, make sure they are experienced with this type of cylinder and will stand behind the work they performed in the event there are problems.

If you choose to attempt this task yourself, you will first need to contact the factory for the replacement seals and information on the seal locations and procedures. You will need the system model number and serial number. You may be asked to provide the cylinder serial number.

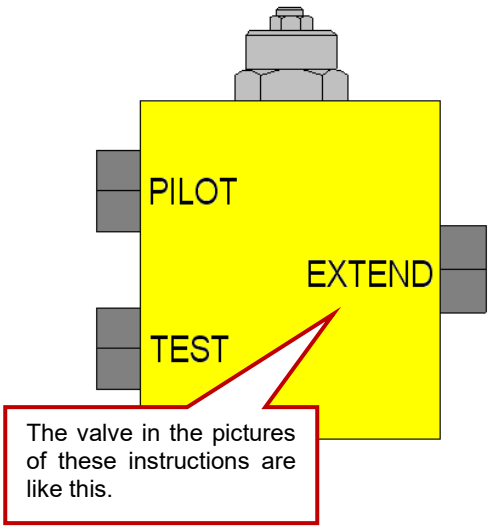
Bleeding procedures for lifting units

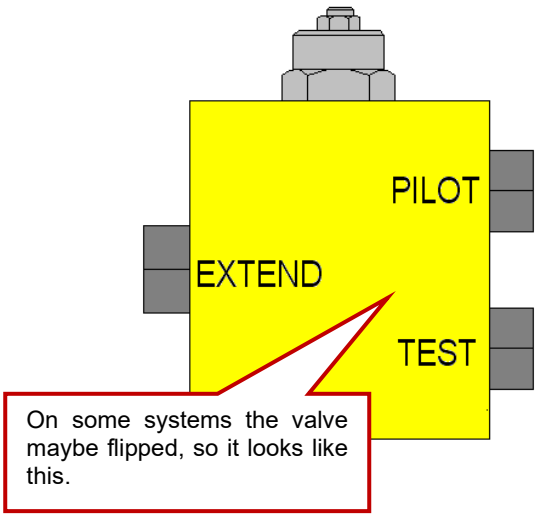
All units have the air bled out of them at the factory before test and shipment and should not need further bleeding once delivered. However, if air is somehow introduced into the system, the following methods may be used to bleed the system. The more current open cylinder gantries are equipped with bleeder screws in the rod seal glands and the small rod of the cylinders. The most effective method used to bleed these is to leave the cylinders retracted and apply very low pressure to the retract side of the cylinder and hold it there. While the pressure is being applied, turn the screw on the large gland counter-clockwise, just enough to where any air can escape from the screw and continue to do so until you have a steady flow of oil. Continue to do this with each bleed screw. This will eliminate most of the air; you may need to let the power unit set for a few hours to let any air that has mixed with the oil in the reservoir settle out. Otherwise you will pump the air right back into the cylinder. For any air that maybe trapped on the extend side of the cylinder It will work its way out when the cylinder is cycled a few times.

ADDING PIN ON DRIVES

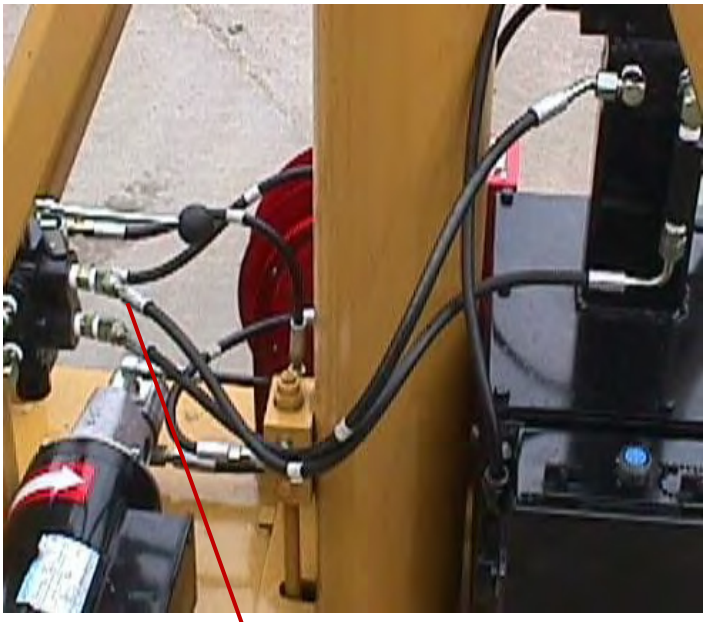


The counterbalance valve bodies on the cylinders vary from machine to machine. So pay close attention to which ones your system has. Getting the extend port and pilot port connected wrong will cause the cylinder to operate in reverse.



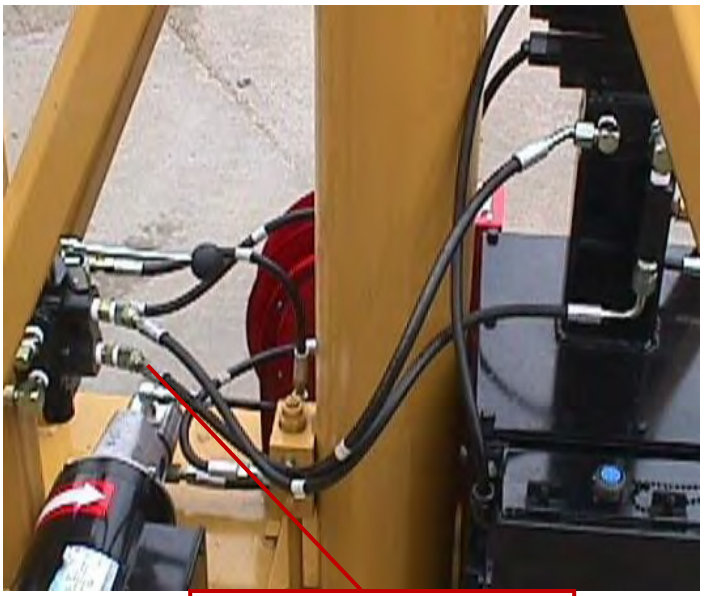


6. Remove this hose from here. This is the extend port which varies from machine to machine. On some systems this port is on the left hand side of the valve body. And the pilot and test port are on the right side.

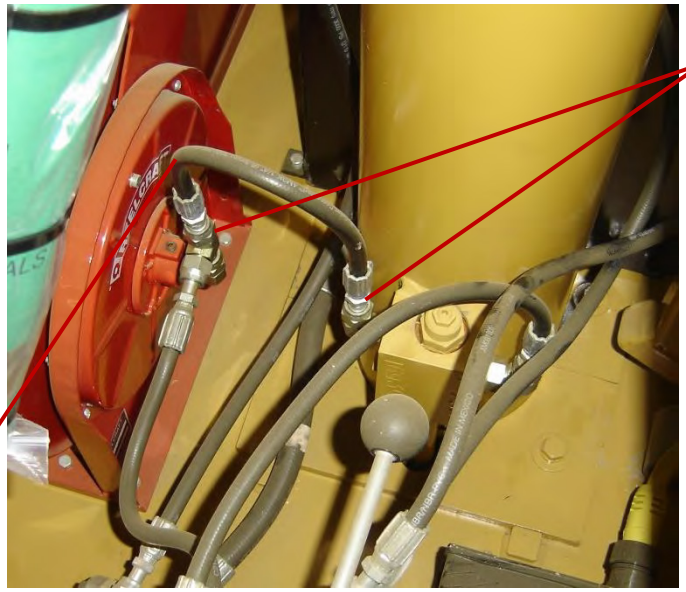


7. And then reattach the hose to here.

8. Remove hose from here.



9. And reattach the hose to here.



10. Turn both of these fittings so that they are pointing upward. The fitting on the cylinder is the pilot port and on some systems the port on the valve body are reversed with the pilot being on the right hand side. The port below the pilot port is a test port.

11. Take the short hose that was connected to them and put it back on so it looks like this. It must go to the pilot port on the valve body.

12. Take this hose on the drive valve and connect it to the hose reel as shown.

13. Take this hose on drive valve and connect it to the lift cylinder as shown. It must go to the extend port.

Maintenance Chart			
Date	**Hour Meter Reading**	**Maintenance Performed**	**Service Performed By**

Troubleshooting

Always check the basic things first.	1. Is the pump working properly?
	2. Are the filters dirty?
	3. Is the hydraulic tank full of oil?
	4. Is the oil clean or contaminated?
	5. Are relief valves set to proper pressures?
Look for simple problems first.	1. The system may not be level or plumb.
	2. Load heavier than expected or stuck down in some way.
	3. All bolts may not have been removed.

Problem: Slow extension

Causes	Solutions
A. Load is heavy in area closest to that cylinder.	A. Reposition rigging and the load.
B. Cylinder has internal bypass.	B. Reseal or replace cylinder.
C. System pressure set to low.	C. Adjust relief valve Consult factory.
D. Severe side load.	D. Set load down and re-level.
E. Pump not producing full pressure.	E. Replace pump.
F. System is at capacity	F. A larger system may be required.

Problem: Slow retraction.

Causes	Solutions
A. Flow control is closed.	A. Open flow control some more.
B. Pump not producing full pressure.	B. Replace pump.
C. System pressure to low.	C. Adjust relief valve. Consult factory.
D. Air in upper cylinder area.	D. Bleed cylinder.
E. Contamination in system, drain, and flush cylinder and system.	E. Replace oil.
F. Bulged or deformed cylinder.	F. Replace bulged or deformed cylinder section(s).
G. Internal bypass in the cylinder.	G. Reseal or replace cylinder.

Problem: Leakage when extending.

Causes	Solutions
A. Severe side loading.	A. Check for lifting units out of level, beam deflection or lifting units staging out of sequence with each other.
B. Worn packing.	B. Replace packing.

Problem: Not staging properly.

Causes	Solutions
A. Warning! Severe side loading Very dangerous! System is out of level, runway track or floor could be settling.	A. Lower the load and reset properly.
B. Air in the cylinders	B. Bleed cylinders
C. Cylinder has internal bypass.	C. Reseal or replace cylinder.

Problem: Electric Motor stalls when under load.

Causes	Solutions
A. Pressure set to high	A. Pressure should be set to the highest pressure stated on the load chart.
B. Motor drawing too many amps due to a too long or too small of a cord.	B. Use shorter or heavier gauge cord.

Problem: Circuit breaker keeps tripping.

Causes	Solutions
A. Too, long of cord	A. Use shorter cord
B. Gauge of cord too small.	B. Use heavier gauge cord.
C. Both units are plugged into the same circuit.	C. Make sure both units are on separate circuits
D. Pressure to high.	D. Reset pressure.

Problem: Lift cylinder does not retract.

Causes	Solutions
A. System pressure set too low.	A. Adjust relief valve. Consult factory.
B. Ruptured hose.	B. Check for oil leaking from hose and replace.
C. Safety holding valve at base of cylinder faulty.	C. Replace.
D. Pilot line from retract line to Safety-holding valve is plugged/restricted.	D. Replace pilot line.
E. Flow control is closed.	E. Open flow control.

Problem: Lift cylinder does not extend.

Causes	Solutions
A. System pressure set too low.	A. Adjust relief valve. Consult factory.
B. Ruptured hose.	B. Check for oil leaking from hose and replace.
C. Safety holding valve at base of cylinder faulty.	C. Replace.
D. Pilot line from retract line to Safety-holding valve is plugged/restricted.	D. Replace pilot line.

Problem: Erratic extension or retraction.

Causes	Solutions
A. Air in system.	A. Bleed system.
B. Pump cavitation, tank low on oil.	B. Fill with oil and check pump.
C. Contamination in system.	C. Drain and flush system. Replace oil.
D. Bulged or deformed cylinder.	D. Replace bulged or deformed cylinder section(s).
E. Warning! Severe side loading Very dangerous! System is out of level, runway track or floor could be settling.	E. Lower the load and reset properly.

It is advisable after a lift is completed and there has been some leakage around the rods seals to cycle the cylinders a few times to see if the leakage stops. If it does, then the leakage was probably due to side loading of the cylinder. If the leakage continues, then the rod seals need attention and the factory should be contacted.

Testing a Cylinder for Bypass

There are two ways a cylinder can be checked for bypass the, first one listed below is the easiest. In addition, someone who has knowledge of hydraulics and how cylinders work should do this test. Done incorrectly, damage to the cylinder and injury may be possible.

1. Extend the cylinder an inch or two.

2. Disconnect the extend side of the twin line hose (this will be the male coupler on the base or the female on the power unit) then cap and plug off and pilot line going to the counter balance valve located on the bottom of the cylinder. On a self-contained system without couplers cap and plug the line going to the extend port.

3. Take a marker and make a mark on the chrome of the cylinder at the wiper.

4. Try to retract the cylinder and hold it there for one minute.

5. Watch the cylinder while it is in retract mode, if it extends even slightly there is oil bypassing the piston seals. The cylinder will need servicing. (However, a very small amount could be acceptable so please consult factory to determine what is acceptable. In addition, some brands of cylinders have cast iron piston rings, which will have some bypass and these require a different test. See step number six. Please consult the factory to determine which type you have.)

6. For cylinders with cast iron piston rings, you will need a flow meter that is good for ten to twenty gallons a minute.

7. Connect the twin line hose to the power unit and the base.

8. Connect the flow meter into the retract line, (this will be the female coupler on the base and the male coupler on the power unit) with the arrow pointing towards the power unit. This will read the return flow while the cylinder is extending.

9. Extend the cylinder.

10. When the cylinder reaches the end of its stroke and its maximum pressure setting, continue to hold it there and check the reading on the flow meter.

11. For the cylinders with cast iron piston rings, the reading should be no more than one gallon per minute. For piston with soft seals, the reading should be zero.

12. Now change the flow meter over to the extend line and make sure the arrow is pointing towards the power unit.

13. Retract the cylinder.

14. When the cylinder is fully retracted, continue to keep full pressure on the cylinder.

15. Check the reading on the flow meter. It should be no more than one gallon per minute for cast iron piston rings and zero for soft piston seals.

16. If you are not sure about running these test or have any questions please call the factory and ask for someone in the service department.

Repair Section

Steel wheel and bearing replacement

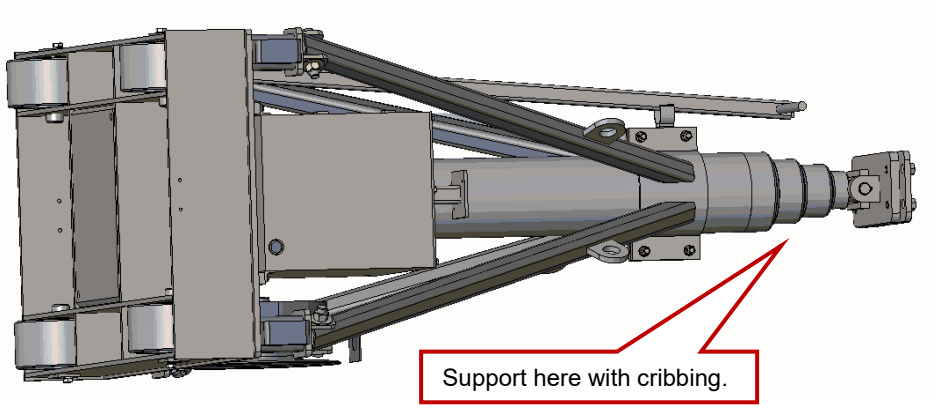
1. Items required
    a. ¾” wrench
    b. Dead blow hammer
    c. Grease gun and multipurpose grease.
    d. 9/16” Allen wrench for drain plug.

2. Since the 2020 and the 2033 models do not have wheels boxes, there is really only one safe way to replace them. First the hydraulic oil must be drained from the tank. It can either be pumped out or by using the drain plug.

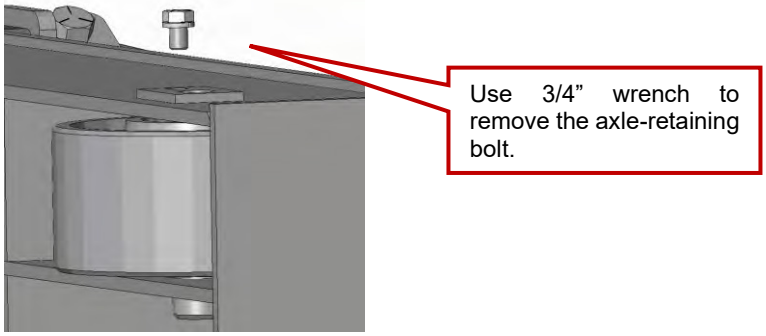
To pump out the tank remove the filter assembly from the tank.

Alternatively, the tank can be drained by using the drain plug.

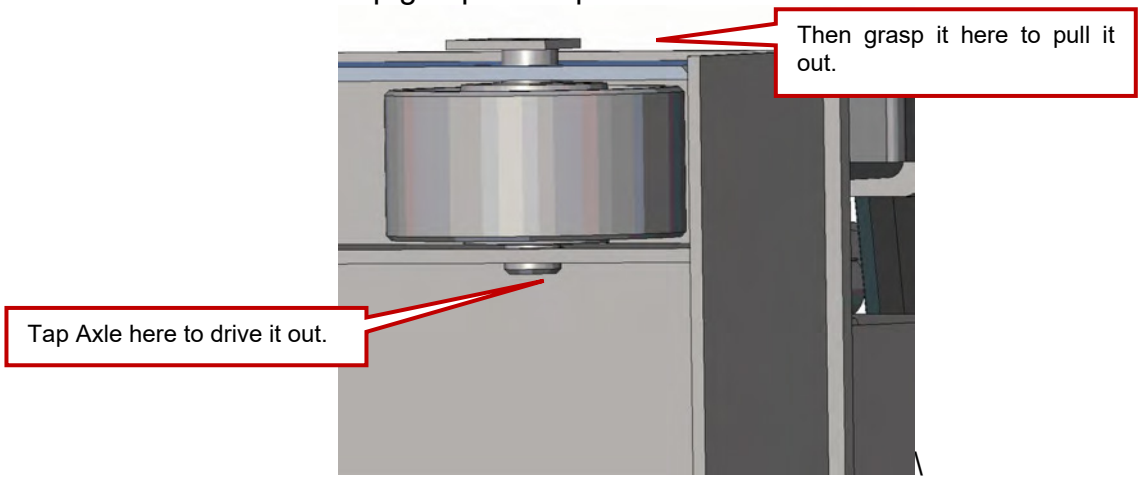
3. Once the oil is removed lay the unit over onto its side with the wheels that are going to be replace upward. Be sure to put some sort of cribbing under the cylinder for support. You want to keep the top of the tank slightly raised so any remaining oil will not seep out from around the lid.



4. With the unit laid over, remove the ½" hex head bolt with a 3/4" wrench.



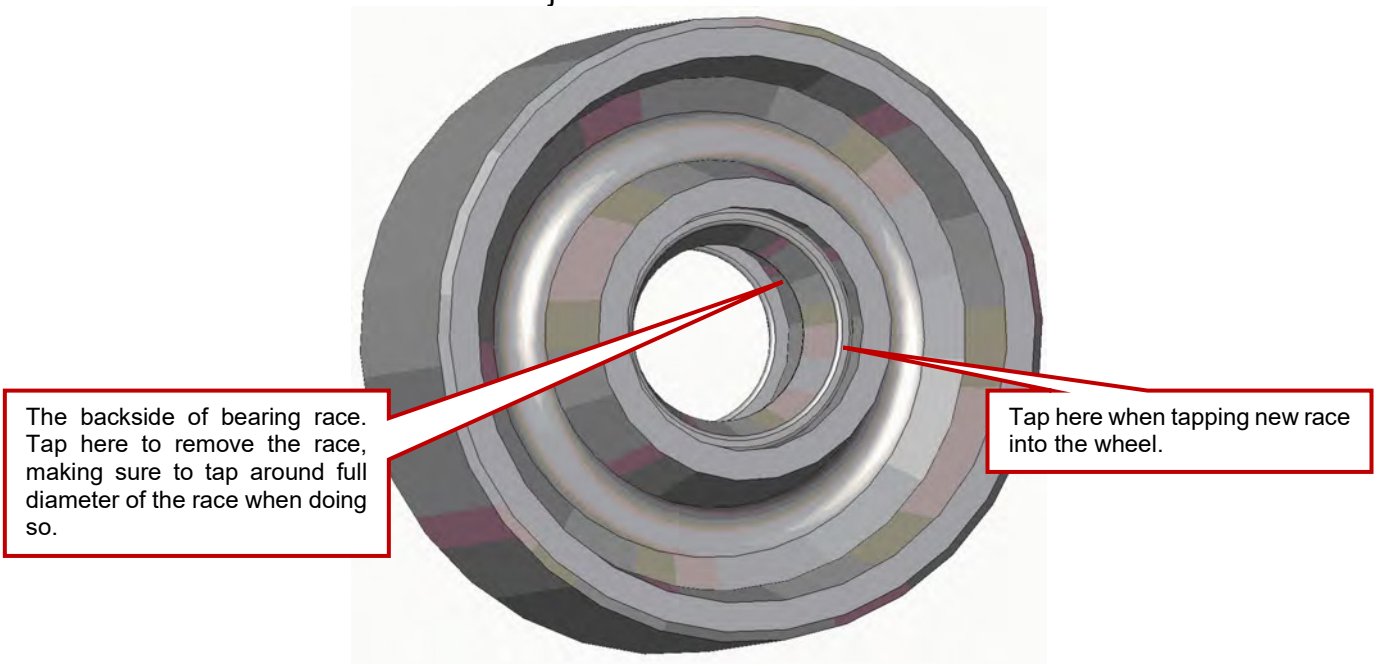
5. With the bolt removed use a dead blow hammer to tap the axle upward. Once the ear on the axle is up grasp it and pull the axle out.



6. With the axle removed slide the wheel out of the pocket. Make sure to catch the bearing and spacer on the bottom side of the wheel. Keep track of where the spacers were since they will need to go back in from where them came.

7. If replacing just the bearings, thoroughly clean the wheel and inspect the bearing race for damage. If it appears to be in good condition then there is no reason to replace it. If it is damaged it will need to be replaced.

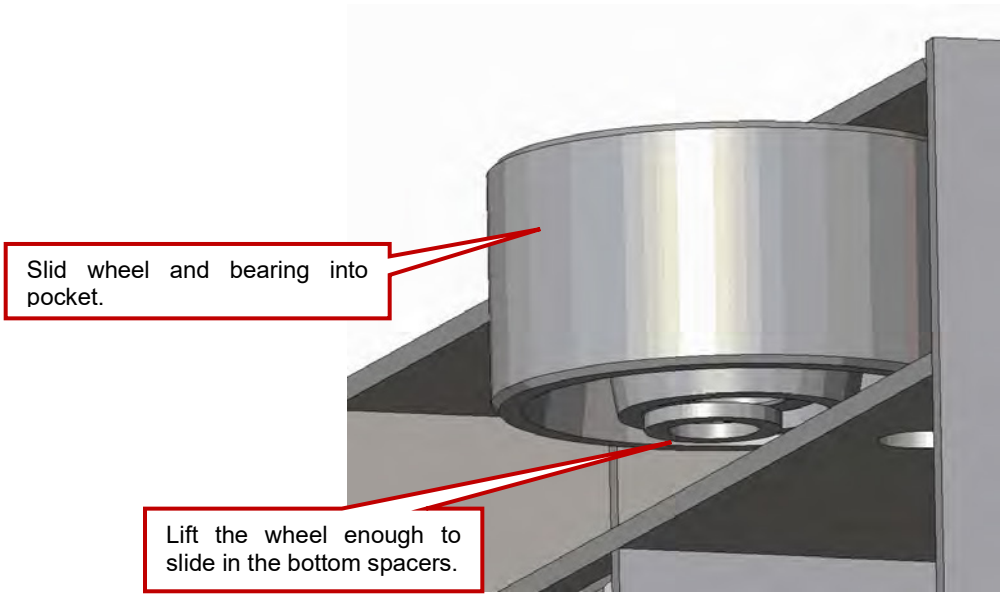
8. With the wheel lying on its side, and the damaged race on the bottom side, use a brass bar to tap the race out of the wheel. It will be necessary to tap around the entire diameter of the bearing; do not try tapping just in one location as this will cause the race to become jammed.



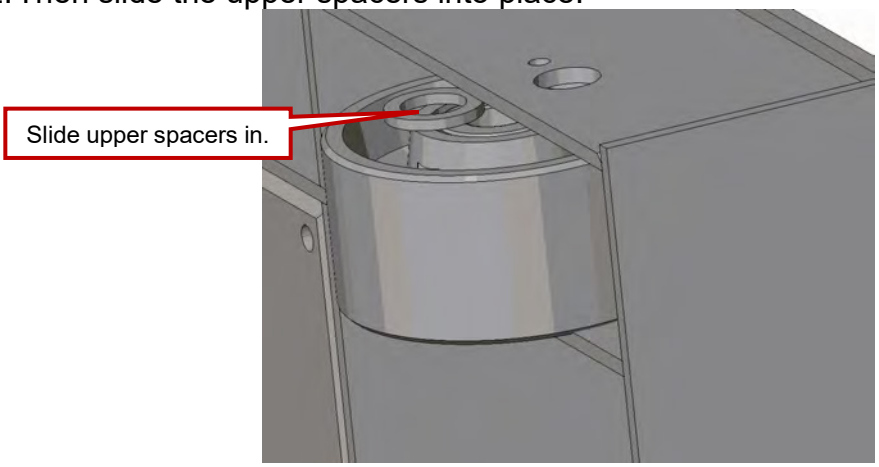
9. The simplest way to install the new race is to press it in with a small hydraulic press. Use a piece of round stock that is slightly smaller than the outer diameter of the race so that the tapered surface is not damaged. Press the race in until it is seated against the shoulder inside the wheel. If a press is not available, the race can be tapped in with a soft faced hammer of some kind until it is flush with the hub of the wheel, at this point use a piece of brass to tap the race in until it is seated against the shoulder. Use caution not to damage the tapered surface.

10. Before inserting the new bearings, make sure, they have been packed with grease, either by using a bearing packer or by hand. Make sure to leave a thick coat of grease on the outer portion of the bearings. This will help hold the bearings in place.

11. Take the wheel with the bearing and slide them in to the pocket. With the wheel in the pocket, lift so that the bottom spacers can be slid in.



12. Then slide the upper spacers into place.



13. Line the wheel and spacers up with the axle holes. It may be necessary to use a screwdriver or something to move the spacers around. It is easier to line up the upper spacer first. Then insert the axle and then line up the lower spacers.

14. Align the hole in the retainer on the axle with the tapped hole, install the keeper bolt, and tighten.

15. Using a grease gun pump the wheels full of grease until it just starts to come out from around the bearings.

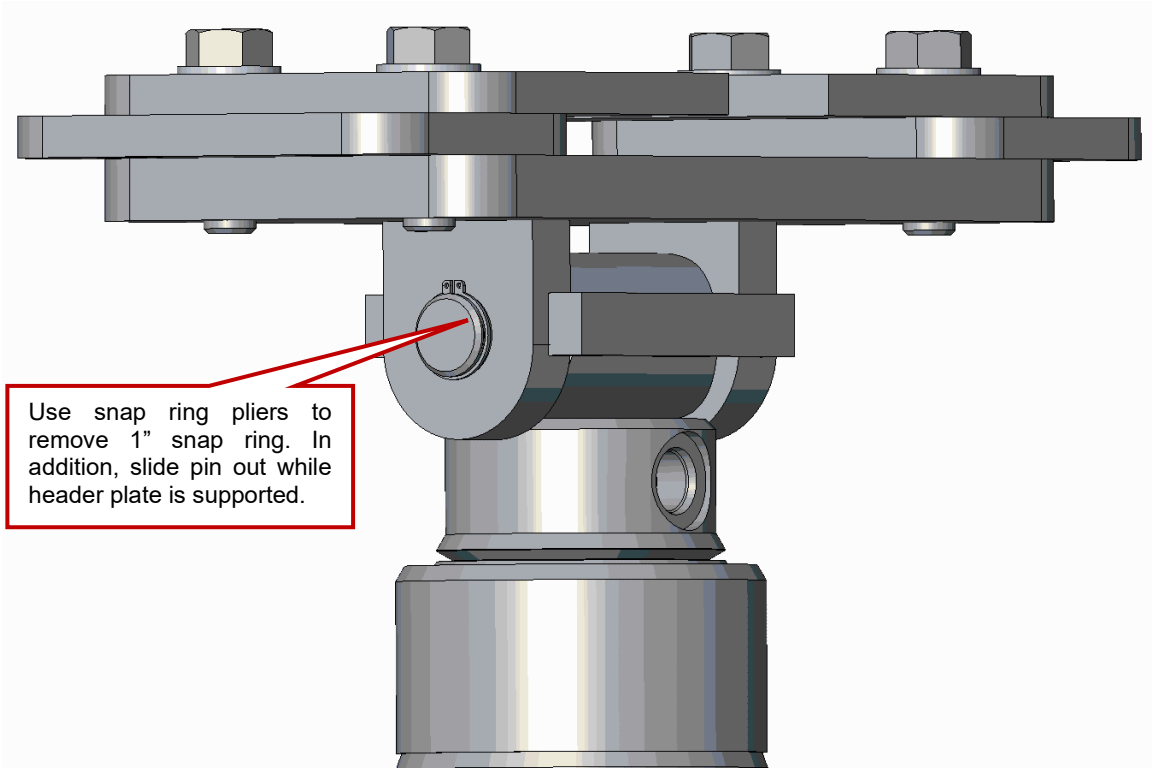
16. Repeat with the other wheel if required.

17. Stand the unit back up and lay it on the other side if those wheels require service. If not fill the tank back up with oil.

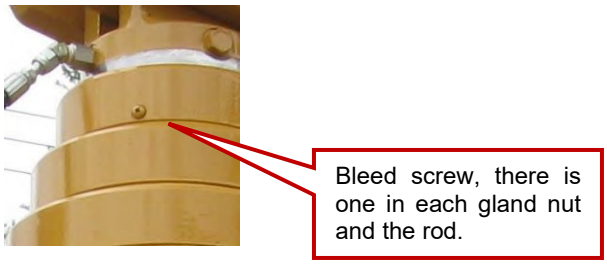
Cylinder removal

1. Items needed
    a. Two (2) Pieces of #8 SAE male plug, Lift Systems # F131
    b. One (1) piece of #4 SAE male plug, Lift System # F129
    c. One (1) piece of #4 O-ring face cap Lift Systems # C51
    d. One (1) piece of #4 O-ring face -plug Lift Systems # C52
    e. One (1) piece of #6 O-ring face cap Lift Systems # C29
    f. One (1) piece of #6 O-ring face plug Lift Systems # C33
    g. Two (2) large wire ties
    h. Two (2) 10” adjustable wrenches
    i. External snap ring pliers for 1” pin
    j. One (1) 3/4” socket with ratchet.
    k. #3 Phillips screwdrivers.

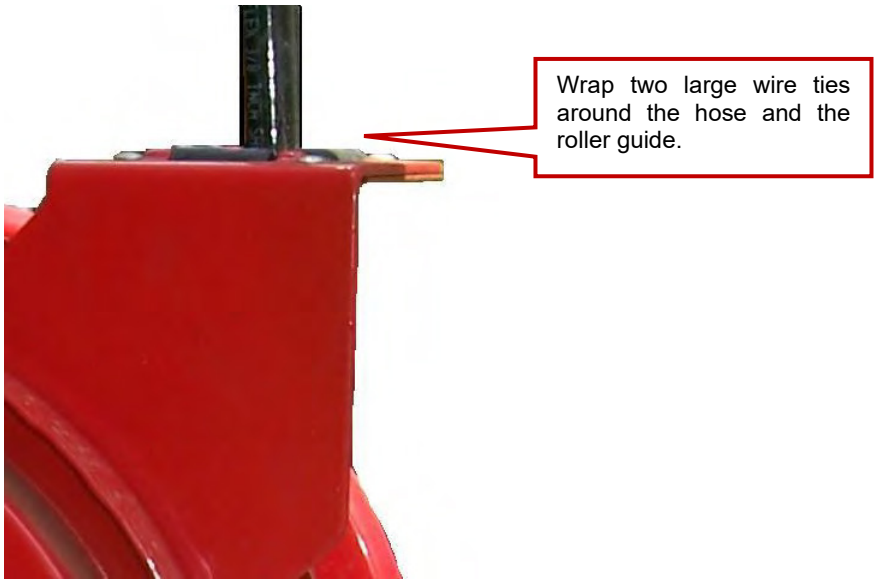
2. Use the 1” external snap ring pliers to remove one of the snap rings from the header plate pin, have someone hold the header plate, slid the pin out, and then lift the header plate off.



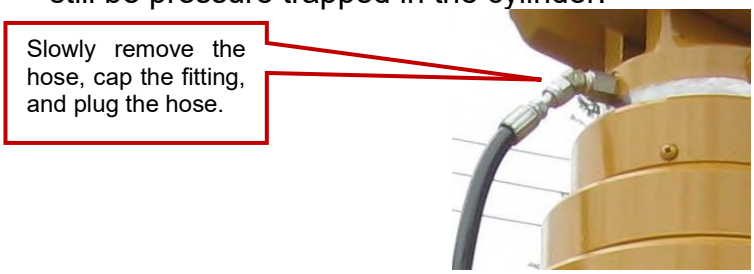
3. Because pressure could be built up inside the cylinder, loosen up the bleed screws on the cylinder to help release that pressure. Use rags to wipe up the oil as it is coming out around the screws.



4. Using two large wire ties, wrap them around the hose and the roller guide on the hose reel, this will keep the hose from being unwound.



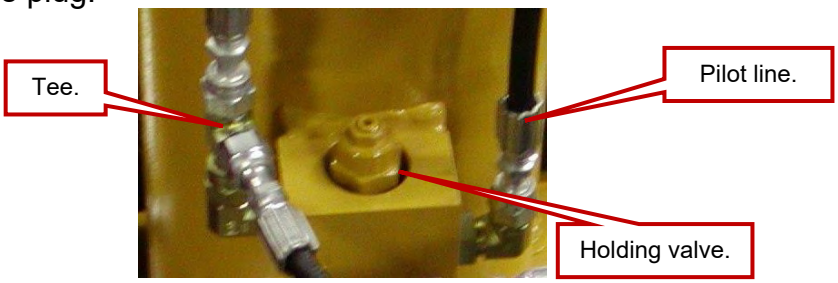
5. Slowly disconnect the hose from the top of the cylinder. Use caution, there may still be pressure trapped in the cylinder.



6. Cap off the 45-degree fitting to which the hose was attached to with the #6 O-ring face cap. Plug the hose with the #6 O-ring face plug.

7. Remove the fittings at the top of the cylinder and plug the port with a #8 SAE male plug.

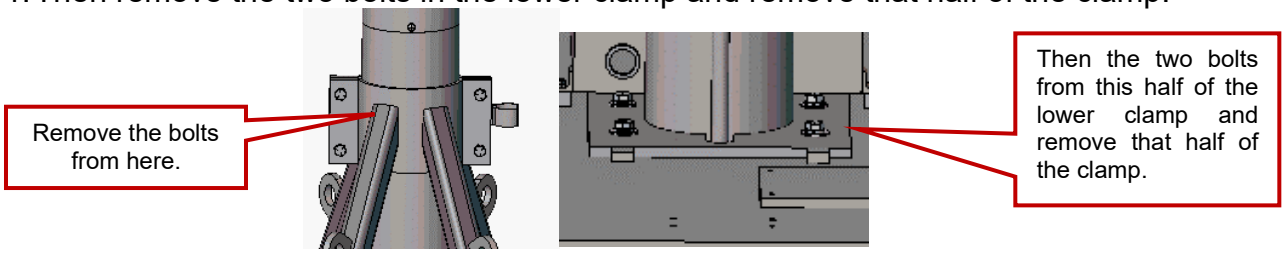
8. At the bottom of the cylinder disconnect the pilot line from the holding valve, cap the fitting with a #6 O-ring face cap, and plug the hose with a #6 O-ring face plug. Then disconnect the tee fitting from the holding valve, leaving the hoses attached to the tee, and cap the fitting with a #6 O-ring face cap and plug the hose with a #6 O-ring face plug.



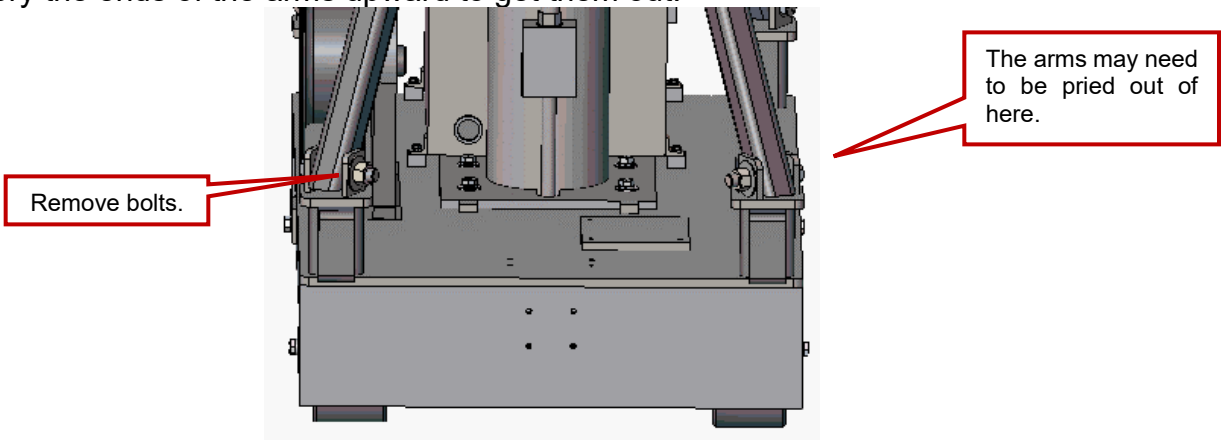
9. Remove the small elbow fitting and plug the port with a #4 SAE male plug. Then remove the larger elbow and plug the port with a #8 SAE male plug.

10. Starting with the upper cylinder clamp remove the 4 four ½" nuts and bolts.

11. Then remove the two bolts in the lower clamp and remove that half of the clamp.

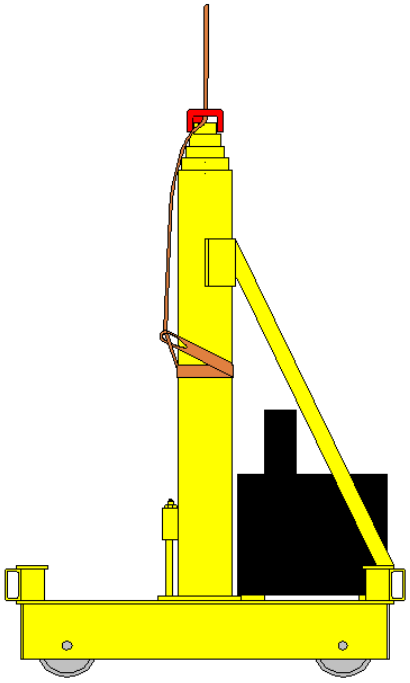


12. Now remove the bolts at the bottom of the support arms and pull the support arms up and out. Two different size bots have been used over the years the newest models us a ¾" bolt and the older models use a ½" bolt. It may be necessary to pry the ends of the arms upward to get them out.



13. Make sure there is not any oil on the cylinder which could cause the sling to slip. If there is, clean it off. Wrap the 14' sling twice around the cylinder in a choker, making sure it is tightly wrapped around the cylinder. The factory has an eye that

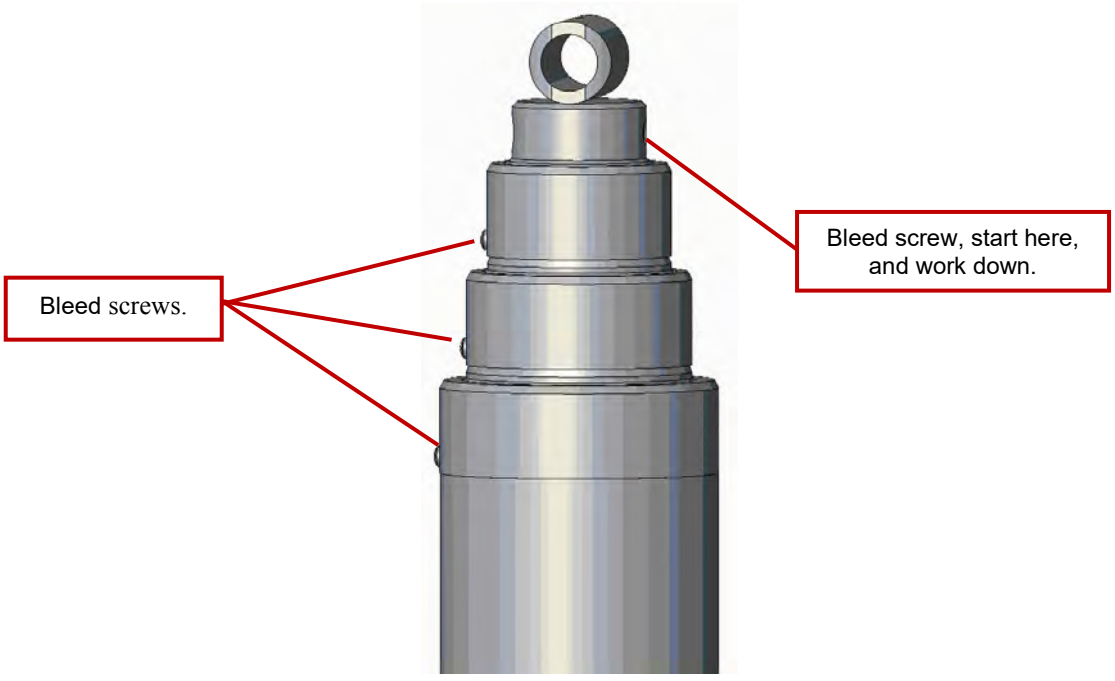
can be pinned into the rod eye and then run the sling can be routed through it. This keeps the cylinder hanging straight up and down when lifting it out of the unit.



14. To reinstall just reverse the steps.

15. When the cylinder is fully installed, it will need to be bled.

16. Put the cylinder into retract and loosen the bled screws starting with the top one. Leave the screw loose until there is oil coming out from around it. Then continue to the next one down.



Replacing the A-line Counter balance Valve

1. Items required
   a. 9/16” wrench
   b. 1-1/8” wrench or 1-1/8” socket and ratchet.
   c. Foot pound torque wrench.

2. Make sure the cylinder is fully retracted and not loaded. If it is not the cylinder will retract on its own once the counter balance is removed and there will be no way to control it.

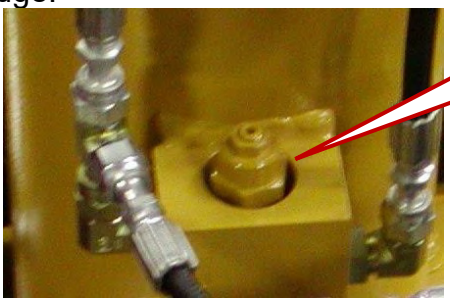
Warning!

Do not ever remove the A-line counter balance valve with the cylinder extended or in a loaded condition. It will retract on its own and cannot be stopped once the counterbalance is removed.

Caution!

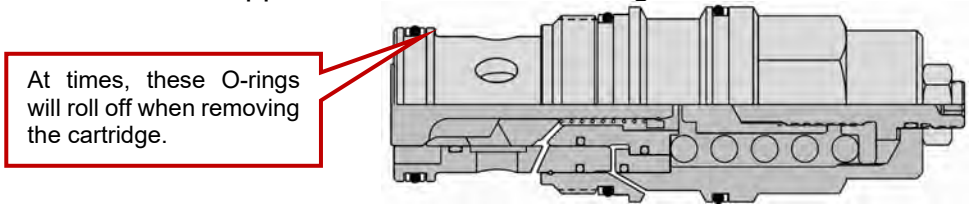
The cartridges need to be properly set at the factory. If not supplied by the factory, the cartridge will not be properly adjusted and it may not hold the load.

3. Using compressed air, blow any dirt or foreign particles out from the counterbalance cartridge.



4. Use a 1-1/8” wrench, turn cartridge counter clockwise to remove it. Pull the cartridge out once it is completely unscrewed.

5. Occasionally the O-rings on the cartridge may roll off the cartridge during removal. If this happens, make sure the O-rings are not left in the valve body.



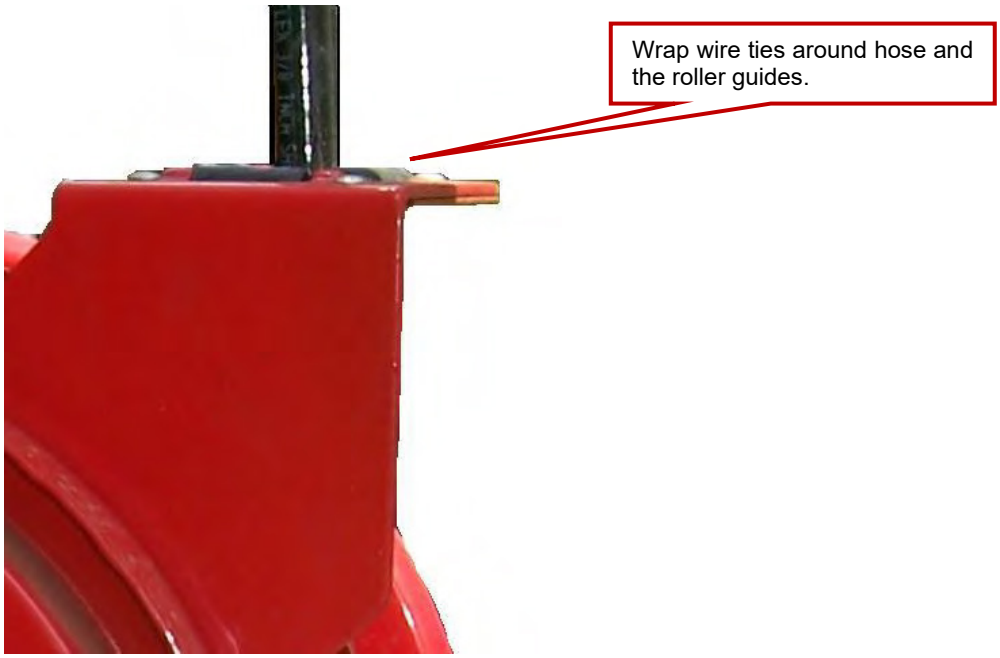
6. Insert new cartridge and turn it clockwise to tighten until the cartridge is seated. Then torque the cartridge to 30-35ftlbs.

Replacing the HR011 hose reel

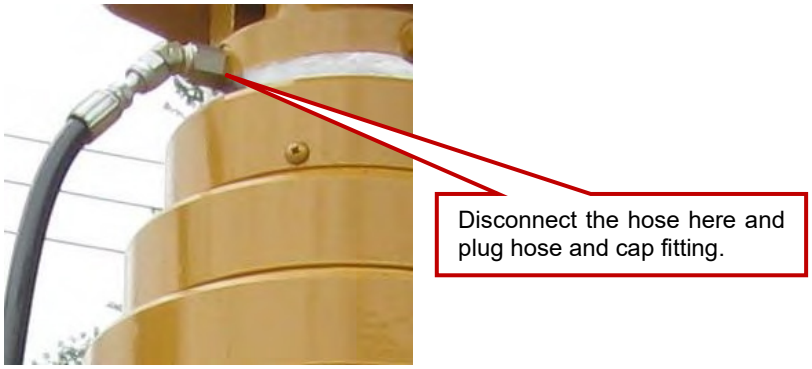
1. Items required
   a. One (1) piece of #8 O-ring face cap Lift Systems # C30.
   b. One (1) piece of #8 O-ring face plug Lift Systems # C34.
   c. Three (3) pieces of #6 O-ring face cap Lift Systems # C29.
   d. Three (3) pieces of #6 O-ring face plug Lift Systems # C33.
   e. Two (2) large wire ties.
   f. 5/16” socket and ratchet.
   g. 10” adjustable wrench
   h. 7/16” socket and ratchet (1/4” drive.
   i. Set of open-end wrenches.

2. Since there could be pressure built up inside the cylinder, loosen up the bleed screws on the cylinder to help release the pressure. Use rags to wipe up the oil as it comes out around the screws.

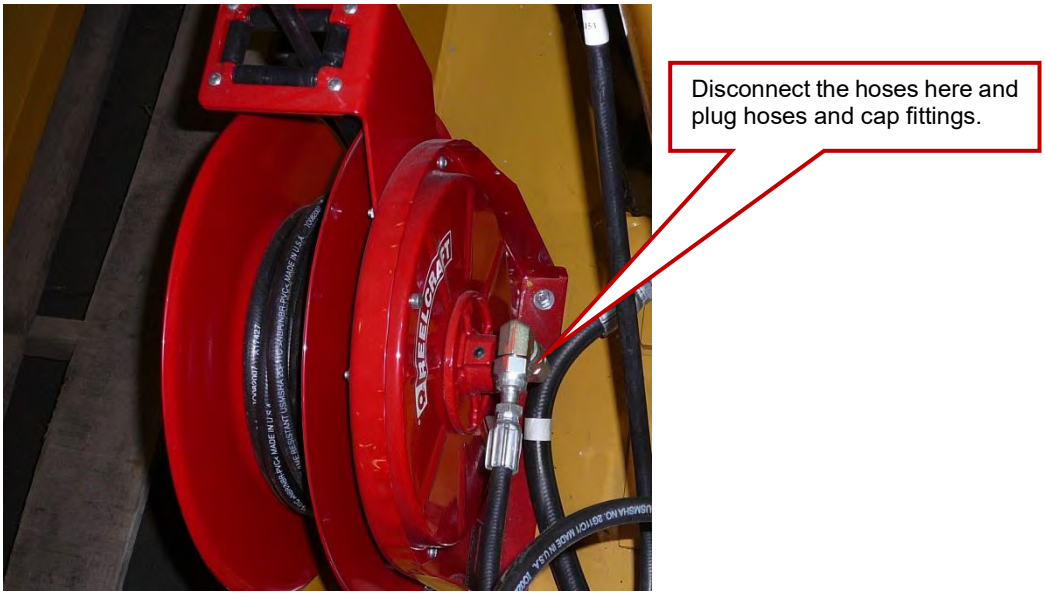
3. Take two wire ties and use them to tie the hose to the reel.



4. Disconnect the hose at the top of the cylinder, plug the hose, and cap the fitting on the cylinder with the #6 flat face O-ring cap and plug.



5. Disconnect the hose.



6. Use 5/16” socket and ratchet and remove the four hose reel mounting bolts. Lift the reel off and set it on a bench.

7. Clamp the reel securely down on a workbench.

8. Put on a pair of work gloves, firmly grasp the hose, cut the wire ties, and slowly let the reel take up the hose. When the end of the hose clears the rollers, hold on to the drum of the reel and let it slowly, unwind until all the tension is off.

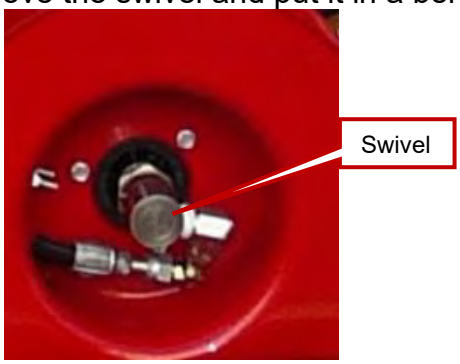
9. Unwrap the hose from the reel.

10. Using a 13/16” wrench disconnect the hose from the reel, plug hose and cap fitting with #6 flat face O-ring cap and plug.

11. Using a 7/16” socket and ratchet remove the clamp. Then remove the hose.

12. Unscrew the entire assembly from the reel and, from the other side of the reel, remove the fittings with a 7/8” wrench.

13. Remove the fittings from the swivel. This can be done with the swivel either in the reel or out of the reel. Have a wrench that fits the hex on the swivel on hand. It will then be easier to remove the swivel and put it in a bench vise.



14. Clean the threads on the fitting and apply new pipe sealant or Teflon tape. Assemble the new fittings into the new reel in the same pattern as they were in the old reel.

15. Once the fittings are installed, attach the hose to the swivel and tighten with a 13/16” wrench.

16. Install the clamp around the hose and tighten, do not crush the hose when tightening the clamp.

17. With the reel securely clamped to a bench, wrap all the hose around the reel.

18. With a firm grip, pull the hose so the reel turns with it. When the hose reaches the end, let it slowly return. The first time doing this, the reel should stop before all of the hose is taken up. Wrap the remaining hose around the reel and pull it out again. The reel needs to be tight. However, if the reel stops before all the hose is run out, then it is too tight. There should be one or two turns from that point.

19. With the hose wrapped on the reel and the tension set, run the hose through the rollers, leaving enough hose extended to go through the top plate of the lifting unit. Tie the hose off to the reel as was done with when removing the old reel.

20. Set reel back into lifting unit and bolt it back into place.

21. Attach the lower hoses of the lifting unit back on to the reel and tighten with a wrench.

22. If there is enough hose still extended, attach it to the fitting at the top of the cylinder. Do not tighten it until the wire ties have been cut loose. This will allow any twists in the hose to relax, and the hose should remain straight. Then tighten the hose.

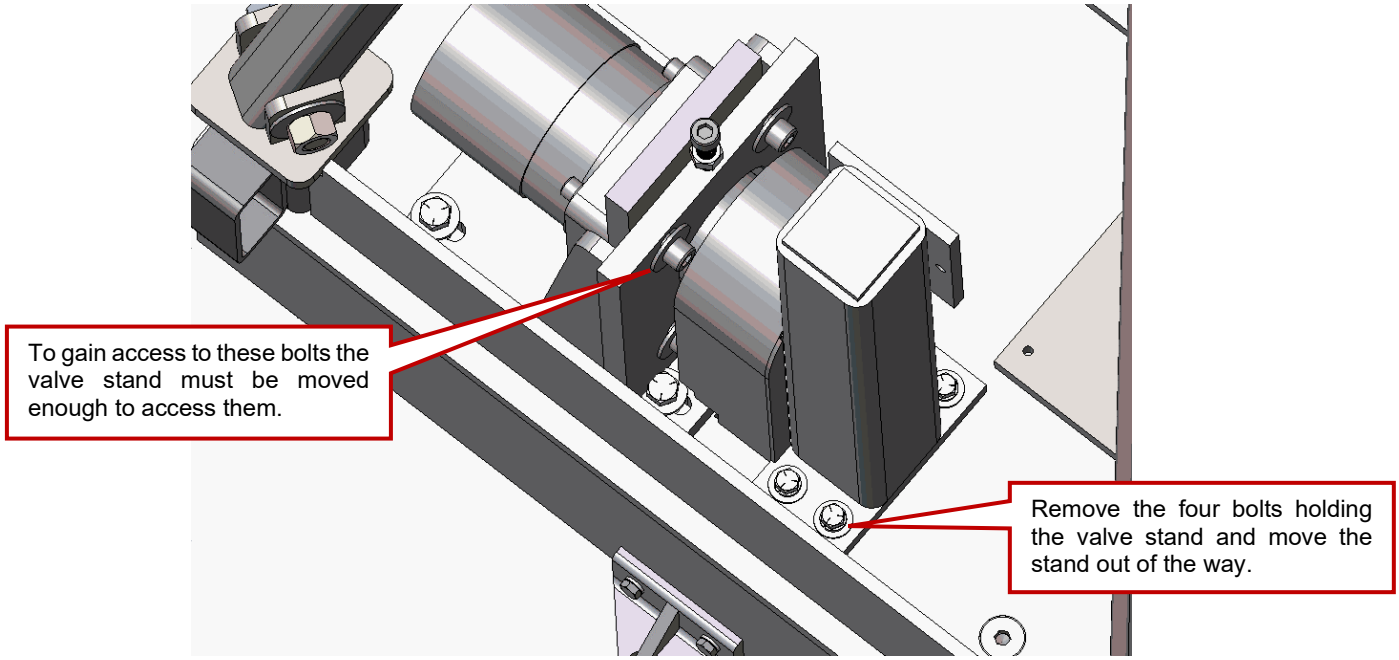
23. If there isn’t enough hose left extended, firmly grasp the hose and have someone cut the wire ties. Pull the hose upward and attach it to the fitting.

24. Start power unit, retract the cylinder, and hold it until it comes up to full pressure. At the same time have someone check for leaks. If leaks are found, stop and repair them. Repeat until full pressure is achieved. Then fully extend and retract the cylinder to verify the hose reel is working properly.

Chain Tensioning and Motor Replacement on Integral Drives

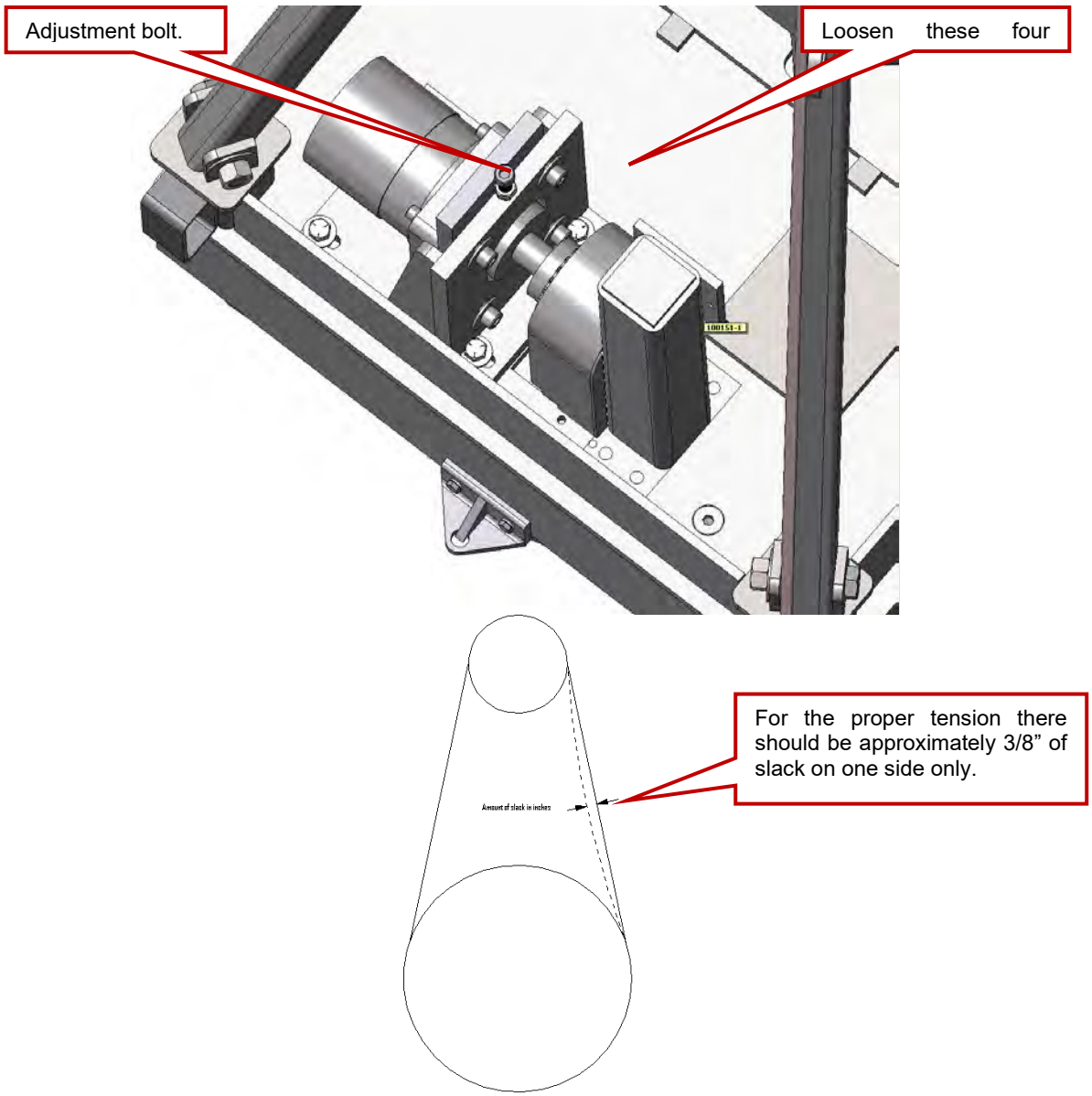
1. Items Required
    a. ¾” wrenches
    b. ¾” socket and ratchet
    c. Two 6” extensions for socket
    d. 3/8” Allen wrench or drive for ratchet.
    e. Pliers
    f. Gear puller
    g. Two (2) pieces of #6 O-ring face cap Lift Systems # C29
    h. Two (2) pieces of #6 O-ring face plug Lift Systems # C33

2. In order to tighten the chain, the valve stand/chain guard must be moved enough to access the lower bolts on the motor mount. It should be possible to leave the hoses connected.



3. To tighten the chain, loosen the four ½” bolts with 3/8” Allen wrench.

4. Using 3/8” Allen wrench turn the adjustment bolt clockwise to tighten. Use the guide below for proper tension.



5. When the proper tension is achieved, tighten the four bolts.

6. To replace the motor, first it may be necessary to run the drive to get the chain's master link in a position, which provides easy access.

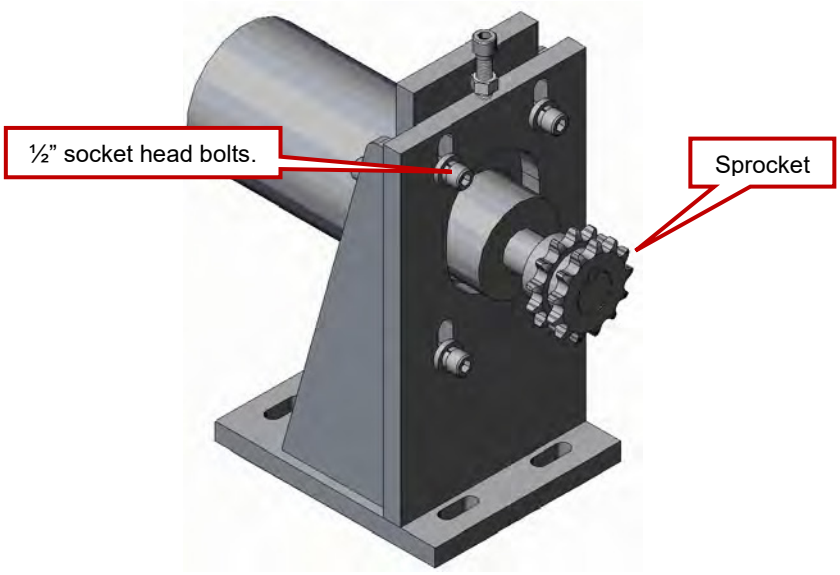
7. See Step #2

8. Loosen up the four bolts and back off the adjustment bolt. In addition, remove the master link in the chain so it can be removed.

9. Disconnect the hoses from the motor cap and plug the hoses and fittings with the #6 flat face caps and plugs. Make sure to tag or mark them so they can be put back in the correct locations.

10. Remove the four ½” socket head bolts that hold the motor to the mount with a 3/8” Allen wrench or a driver on a ratchet and remove the motor. Some models may have hex head bolts requiring a ¾” wrench.

11. Remove the sprocket from the motor. A gear puller may be required to get the sprocket off.



12. Install the sprocket onto the new motor and snug the set screws.

13. Install new motor into the mount, making sure the ports are in the same locations as the old one.

14. Remove the fittings from the old motor and install them into the new motor. They are an O-ring type of fitting so there is no need to use a pipe sealant.

15. Install chain, loosen the sprocket, and move as needed to line up the chain, then tighten the set screws.

16. Adjust the tension of the chain as stated in steps 2, 3 and 4.

17. Connect the hoses.

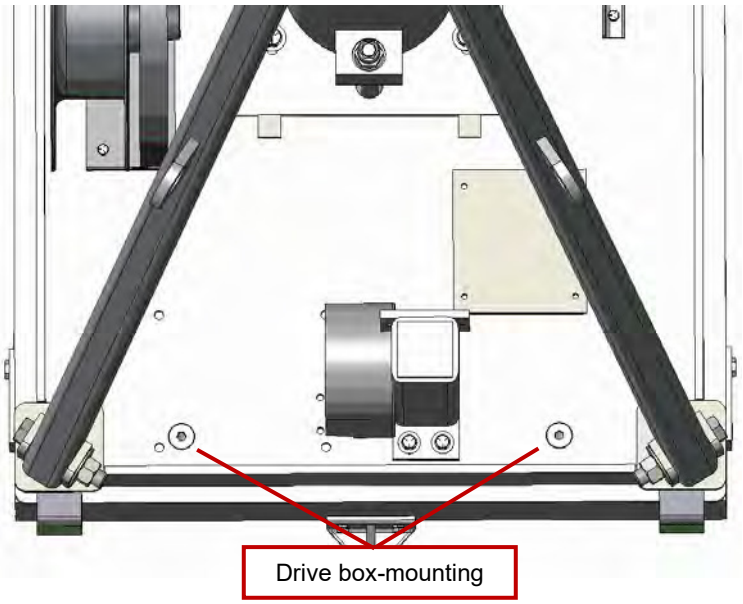
18. Operate the drive and check for leaks. Recheck the tension of the chain.

Replacing Bearings on Integral Drives

1. Items Required
    a. Allen wrench set.
    b. ¾” wrench or socket.
    c. Pliers
    d. 3/16” Allen driver for a ratchet.
    e. 3/8” Allen driver for ratchet.
    f. Torque wrench

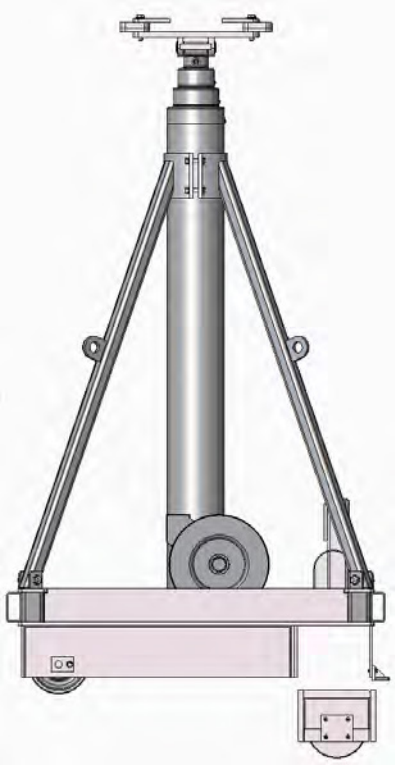
2. The drive motor and mount will need to be removed, follow the instructions for replacing the motor but do not take the motor out of the motor mount, remove the mount with the motor in it.

3. With the drive motor removed, the mounting bolts for the drive box can be accessed.

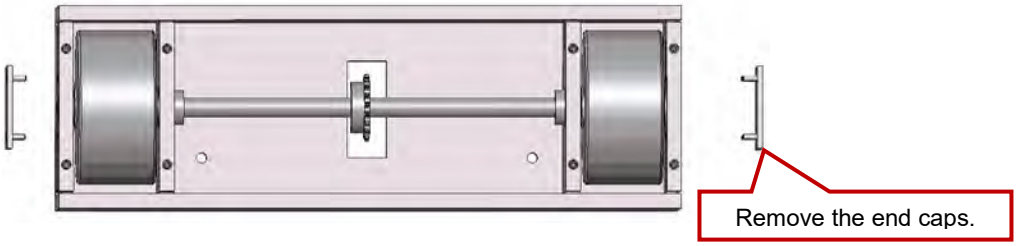


4. Use a 3/8” hex driver to remove the bolts.

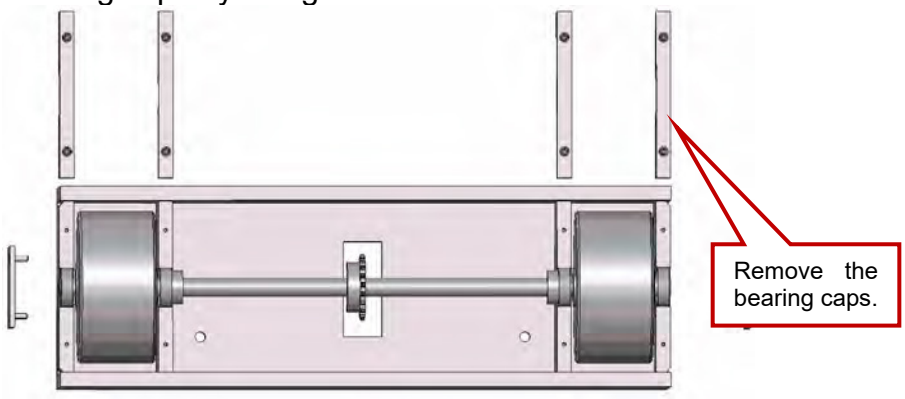
5. With the mounting bolts removed lift the unit up and off the drive box with a forklift.



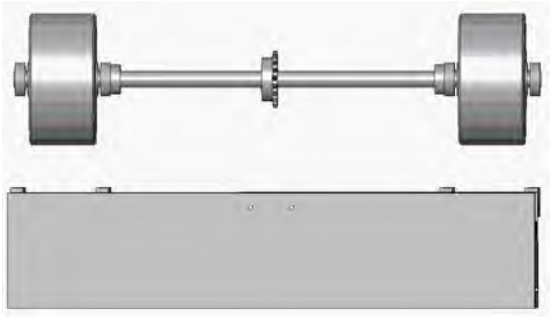
6. Roll the drive box over onto its top so that the wheels are up.
7. Remove the end caps by using a 5/35” Allen wrench.



8. Remove the bearing caps by using a 3/16” Allen driver.



9. Lift the axle out of the box.



10. With the axle out it will be possible to slide the wheels and bearings off the axle. There may be spacers between the wheels and bearings, keep track of where those spacers go. If just replacing the bearings the locking collars can be left in place.

11. Slide the new bearings, wheel, and spacers back onto the axle in the order they came off. If the pillow block bearing was removed and/or replaced, do not tighten the set screws until the bearing has been bolted down.

12. Set the axle back into the drive box, making sure the axle is centered and not protruding past either end of the box.

13. Install the bearing caps making sure to put them in the same location as they came out, snug the bolts with 3/16” Allen driver.

14. Torque the bearing cap bolts to 14ftlbs dry or 11ftlbs oiled.

15. Replace end caps.

16. Roll drive box over so it is upright and install back into lifting unit. It may be necessary to set the drive box on some blocks so it stays upright.

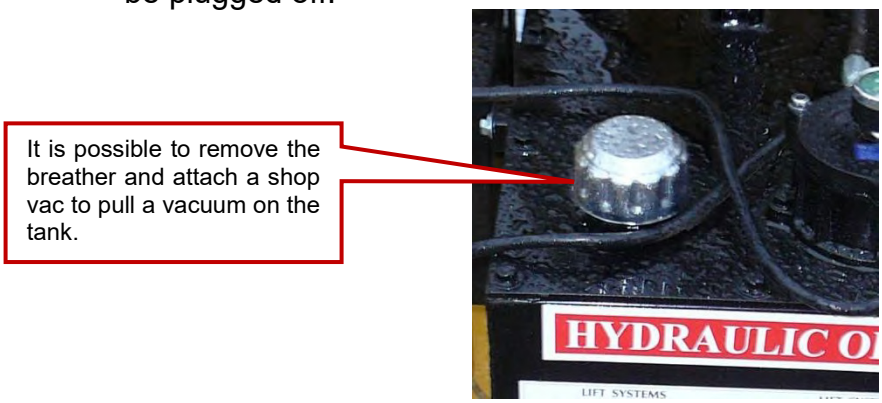
17. Set the unit back on to the drive box and install the mounting bolts.

18. Reinstall the drive motor as stated in the section for replacing the motor.

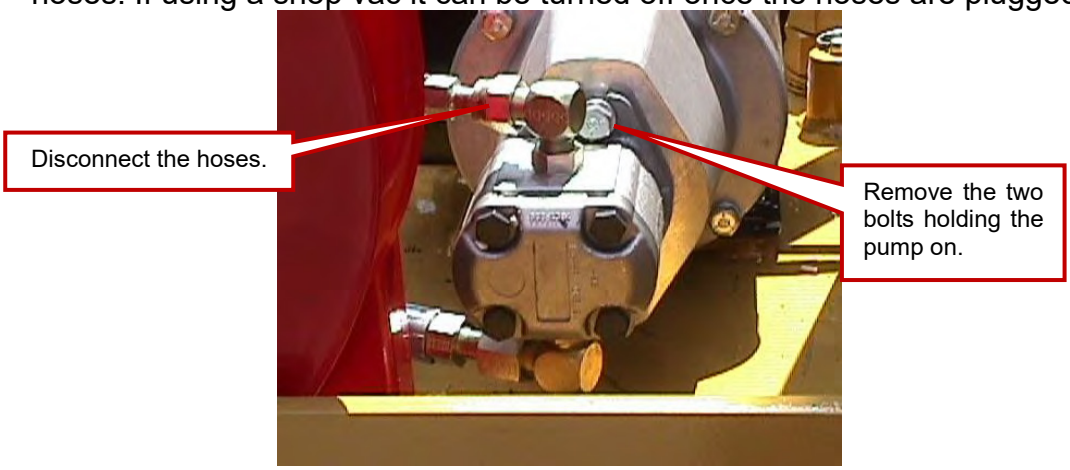
Replacing the pump

1. Items required
    a. One (1) piece of #6 O-ring face cap Lift Systems # C29.
    b. One (1) piece of #6 O-ring face plug Lift Systems # C33.
    c. One (1) piece of #8 O-ring face cap Lift Systems # C30.
    d. One (1) piece of #8 O-ring face plug Lift Systems # C34.
    e. 9/16” socket and ratchet.
    f. Allen wrench set.
    g. 15/16” open-end wrench.
    h. 13/16” open-end wrench.

2. Before the hoses can be disconnected from the pump, the tank must be drained. A shop vacuum can be attached to the breather, this will draw a vacuum on the tank preventing oil loss when the hoses are disconnected, and then the hose can be plugged off.

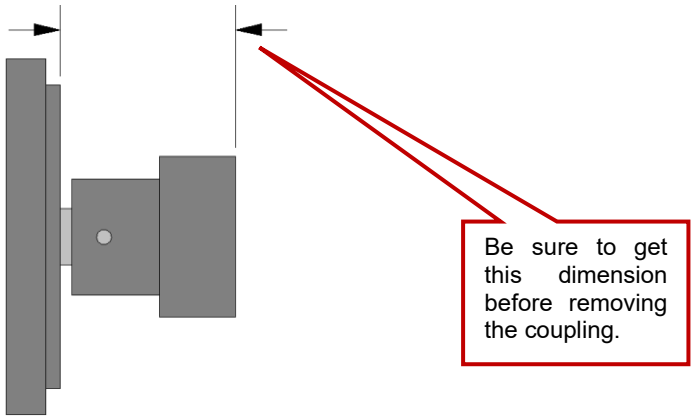


3. Disconnect the hoses from the pump. In addition, cap the fittings and plug the hoses. If using a shop vac it can be turned off once the hoses are plugged.



4. Remove the two 3/8” bolts holding the pump on to the pump mount with a 9/16” wrench.

5. Pull the pump off the mount, the pump will have a drive coupling on its shaft. Before removing the coupling get a measurement from the pump to the end of the coupling and write it down. When the coupling is installed on the new pump, it must be set at the same dimension.



6. Install the coupling onto the new pump, setting it at the same dimension as the old one and tighten the set screw.

7. Before installing the pump, there is a rubber insert the goes between the coupling on the pump and the coupling on the motor, make sure this insert is in place before installing the pump.

8. Line up the coupling and insert the pump into the housing, then line the mounting holes making sure the small port is up and install the bolts and tighten.

9. Remove the fittings from the old pump and install them into the new pump, these are an O-ring type fitting and there is no need to use thread sealer.

10. If using a shop vacuum turn it back on and attach the hoses to the fittings and tighten.

11. If the tank was drained, refill the tank.

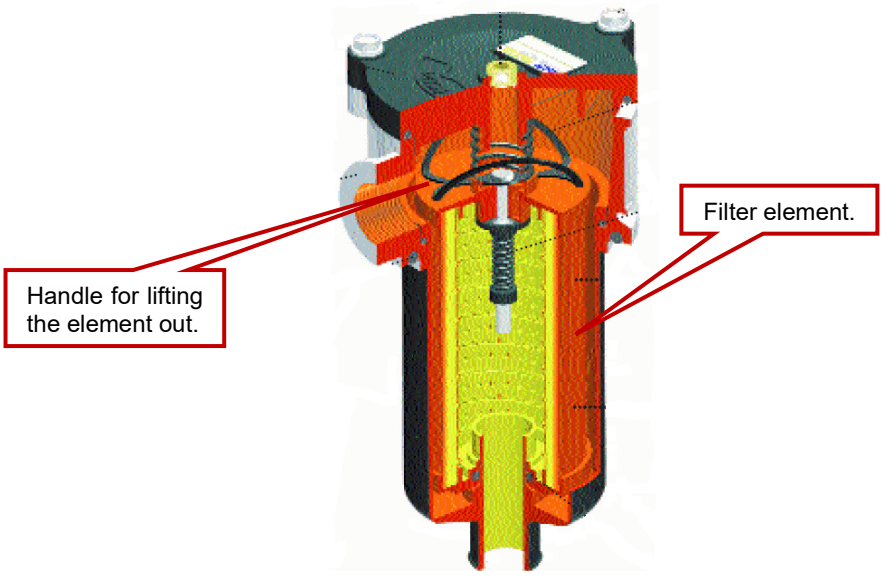
Replacing return filter elements

1. Items required
    a. Catch pan.
    b. ¼” or 3/8” socket set or small wrench set.

2. This system has a tank top type return filter and since it sits in the top of the tank there is no need to drain the tank.

3. Remove the (3) three hex bolt bolts on top of the filter.

4. Under the top will be the filter element, it may have a handle to lift it out of the housing.



5. Set new element into housing and replace the top.

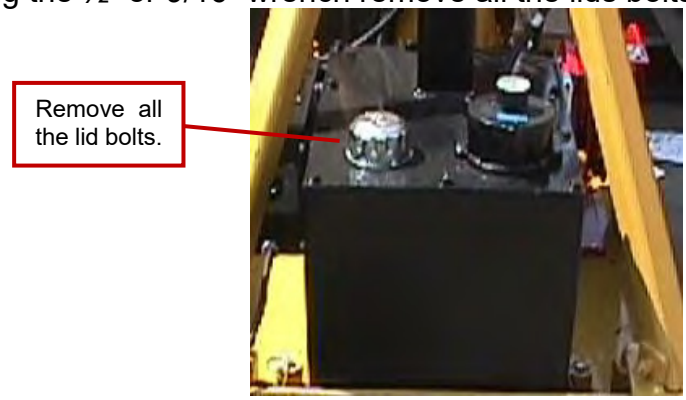
6. Install the bolts and tighten all three equally.

Replacing or cleaning suction strainer

1. Items required
    a. Pump with filters.
    b. Large adjustable wrench or pipe wrench.
    c. Pipe sealant.
    d. 15/16” wrench.
    e. 13/16” wrench.
    f. Silicone sealant
    g. Gasket material.
    a. One (1) piece of #8 O-ring face cap Lift Systems # C30.
    h. One (1) piece of #8 O-ring face plug Lift Systems # C34.
    b. Three (3) piece of #6 O-ring face cap Lift Systems # C29.
    i. Three (3) piece of #6 O-ring face plug Lift Systems # C33.
    j. ½” and 9/16” wrench.

2. Using a 13/16” wrench disconnect the A, B and Pressure hose from the control valve and cap and plug the hoses and fittings.

3. Using the ½” or 9/16” wrench remove all the lids bolts and lift the lid off the tank.



4. If the oil is still usable pump it into a clean container but be sure to pump it through a 10-micron filter, this will filter out any particles that may be present in the oil. If the oil is not reusable then pump it into a waste container.

5. Disconnect the suction hose from the strainer and cap and plug the hose and fitting.

6. Leaving the 90 degree fitting remove the strainer from the tank by using the 15” adjustable wrench.

7. If the strainer is to be cleaned, use a cleaning solvent to remove any dirt that might be on the strainer, then using compressed air blow the strainer out.

8. If the strainer is being replaced, apply a pipe sealant to the threads and screw in the strainer and tighten. Then remove the fitting from the old strainer, clean the threads and apply a pipe sealant and screw it into the strainer.

9. Reconnect the suction hose.

10. Pump the oil through a 10-micron filter back into the tank. This is recommended for new oil also.

11. Before putting the lid back on, the check the gasket. If it is fully attached to the lid and not damaged then clean off the side that goes on the tank and apply new silicone sealant. If the gasket needs replacing, then remove old gasket and sealant from the lid and replace it with a new gasket and sealant. New gaskets can be cut out of gasket material, cut them in one-inch strips.

12. Check for leaks around the strainer.

Checking and Adjusting Operating Pressure

Normally the operating pressure does not require any adjusting. It is possible over time because of age and wear it may need to be slightly adjusted. In addition, the pressure should never be adjusted higher than the highest pressure called out on the load charts, doing so the system could be over loaded, which could cause damage to the system, injury, and/or death to personnel.

1. Items required
    a. Standard Allen wrench set.
    b. Small adjustable wrench.

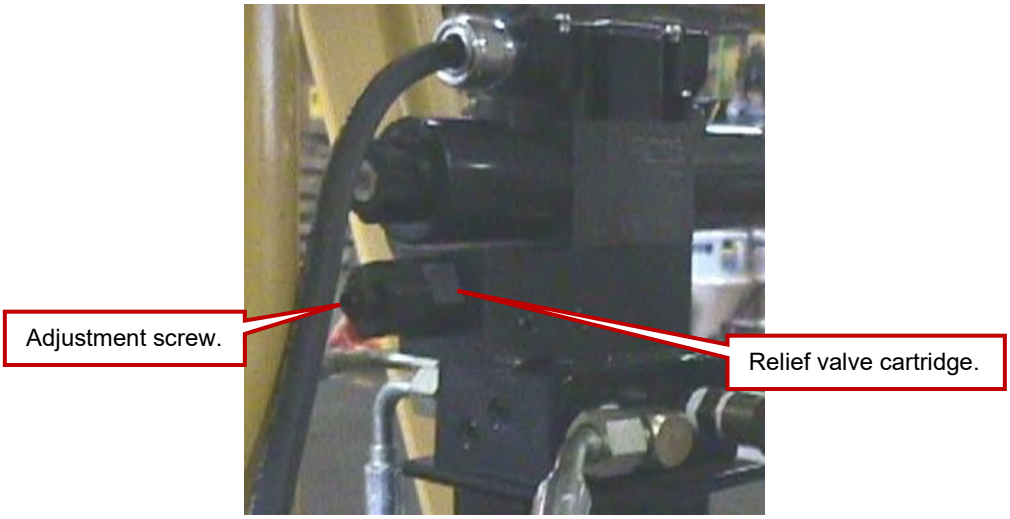
2. Make sure the system does not have a load on it.

3. Start power unit.

4. With the system fully retracted, push and hold the retract button for that unit.

5. Read pressure on the gauge while the button is being held. The reading should be the highest pressure stated on the load charts.

6. To adjust, loosen the jam nut on the relief cartridge and turn the adjustment screw clockwise to increase and counter clockwise to decrease the pressure.



Replacing Typical Internal Gland Seals

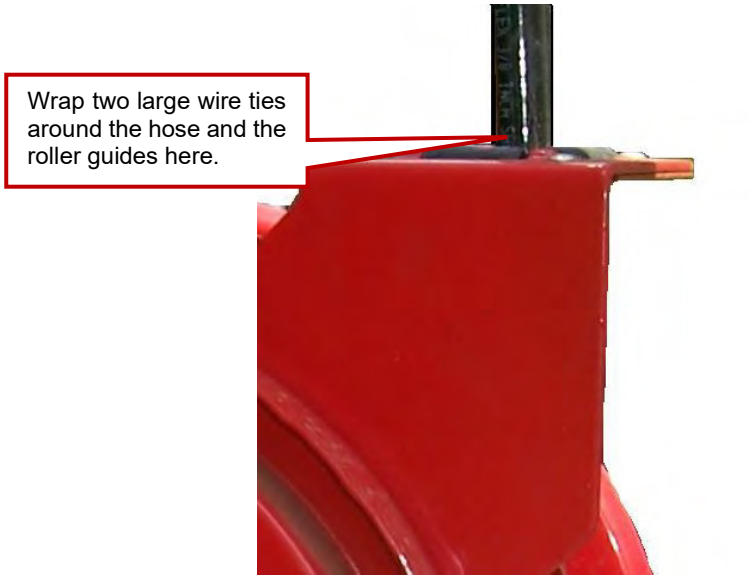
Replacement of the gland or rod seals on an open cylinder gantry can be accomplished with the cylinder still installed. This is just a basic guideline and is not meant for any one model of cylinder. It is an absolute must to refer to the seal call out in the parts section of the manual.

1. Make sure the cylinder is fully retracted.

2. Remove the header plate.

3. Loosen the bleeder screws to relieve any pressure that may be trapped within the cylinder. Be sure to wipe up all oil that may drain from the bleed screws.

4. Using two large wire ties, wrap them around the hose and the roller guides on the hose reel. This prevents the hose from being reeled up by the hose reel.



5. Have a bucket ready in case there is still some pressure in the cylinder. Disconnect the hose from the fitting at the top of the cylinder and place the bucket under the fitting to let all oil drain from the cylinder.

6. Most internal glands are designed so they will pass over the smaller ones; the factory can confirm this. Therefore, if the largest gland needs a new seal it is not necessary to remove the smaller glands. However, the bleed screws will need to be removed.

7. Remove the fittings at the top of the cylinder and plug the ports with a #8 SAE plug. If the small gland is being removed the ports will have to remain open until the small gland is removed.

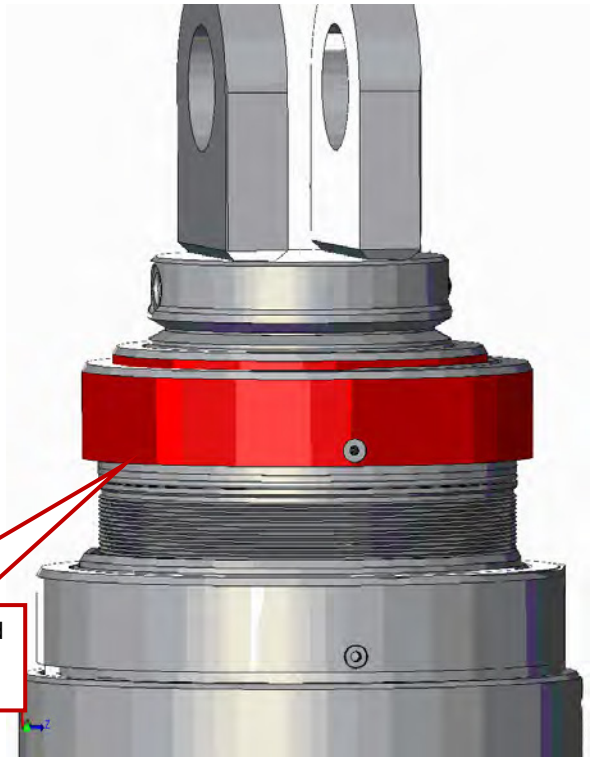
8. Remove the bleed screws.

9. Using a heavy-duty chain wrench such as the 36 inch Rigid Model C36, turn the desired gland counter clockwise. There could be as much as 1-5/8” of thread depending on the model of cylinder.

10. Due to the amount of press on the rod seals, once the threads are clear of each other the gland may not simply lift off.

11. Continue turning the gland, putting some upward force on it at the same time. This may help slide the gland upward and off the rod or sleeve.

12. If the gland will not slide off, use a soft face dead blow hammer and tap on the bottom edge of the gland, working the hammer around the full diameter of the gland.



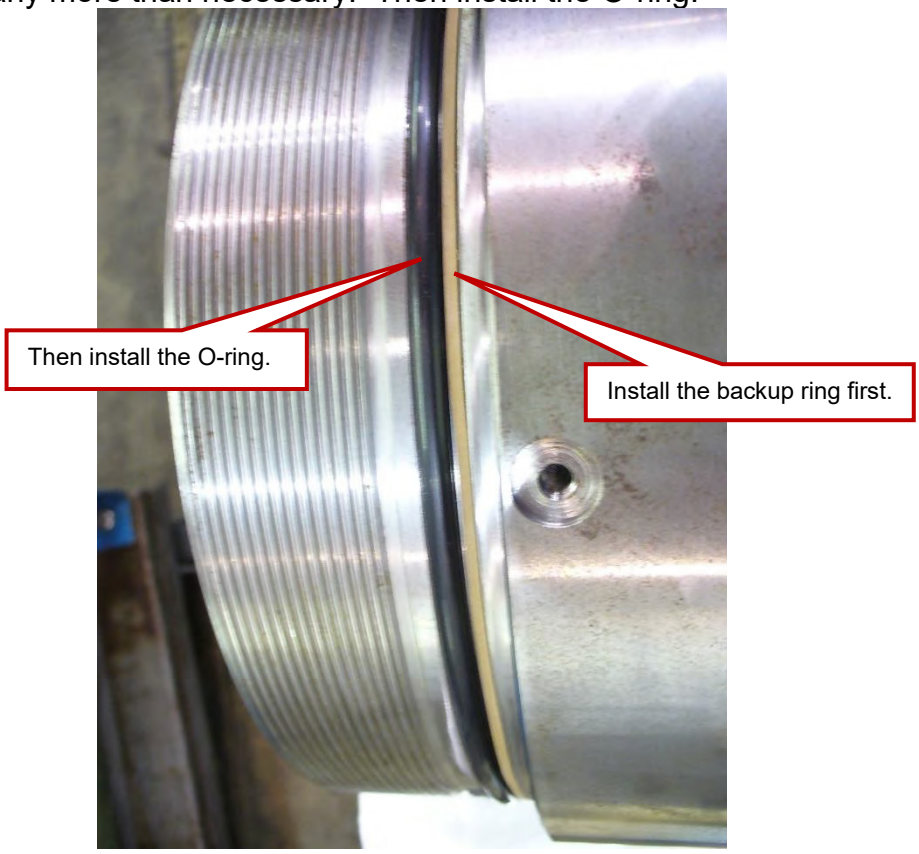
13. With the gland off, remove old seals and thoroughly clean the gland with a cleaning solvent.

14. Inspect the gland for any rust that may have formed in the seal grooves and threads. Use a die grinder with a small wire wheel to clean off the rust.

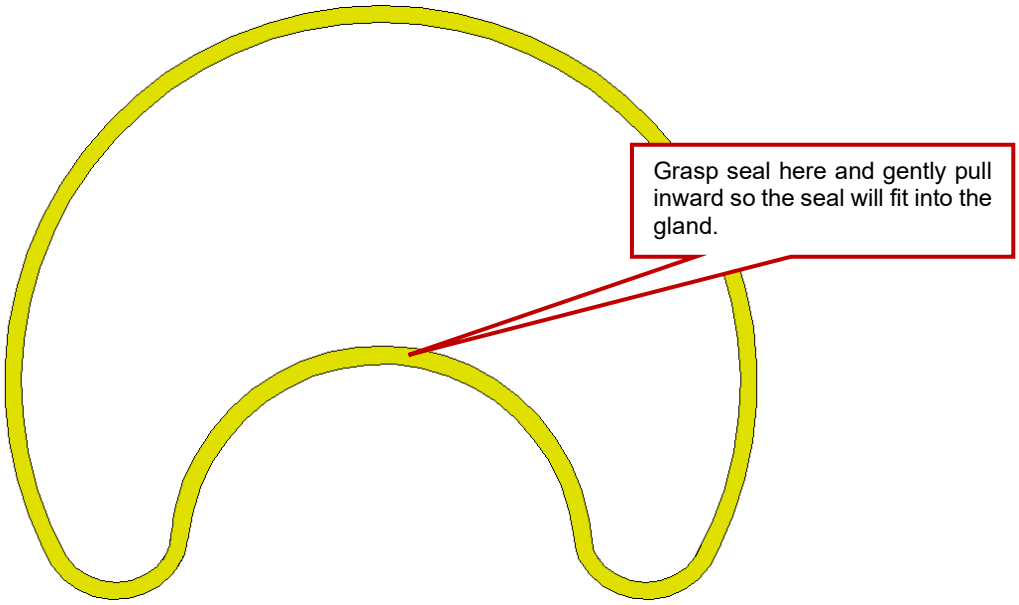
15. Closely inspect the threads. If any rough spots are found, use the wire wheel to smooth them out. A rough spot in the threads could cause the gland to become stuck so tightly that it will have to be cut off.

16. Rinse off the gland with cleaning solvent to remove all dust particles, then dry it off with compressed air.

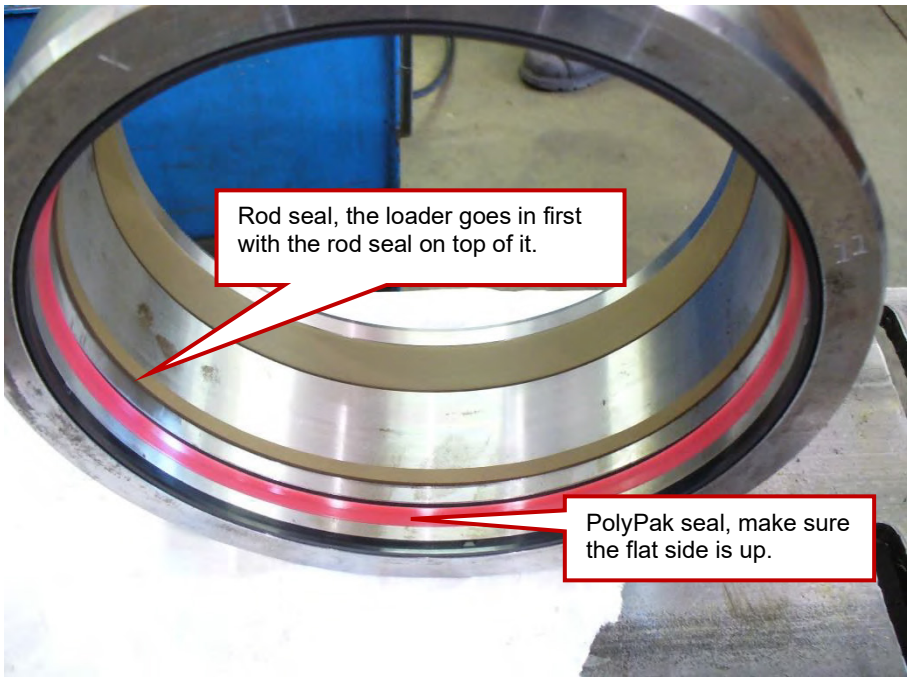
17. Install the outer seals, beginning with the backup ring. Do not let the ring roll or stretch any more than necessary. Then install the O-ring.



18. Install the loader and the rod seal, using caution not to break the rod seal. Form it as shown below, so it will fit in the gland. Take the portion that is not folded and put it into the groove, then gently let the rest of the seal fold back into position so it goes into the groove.

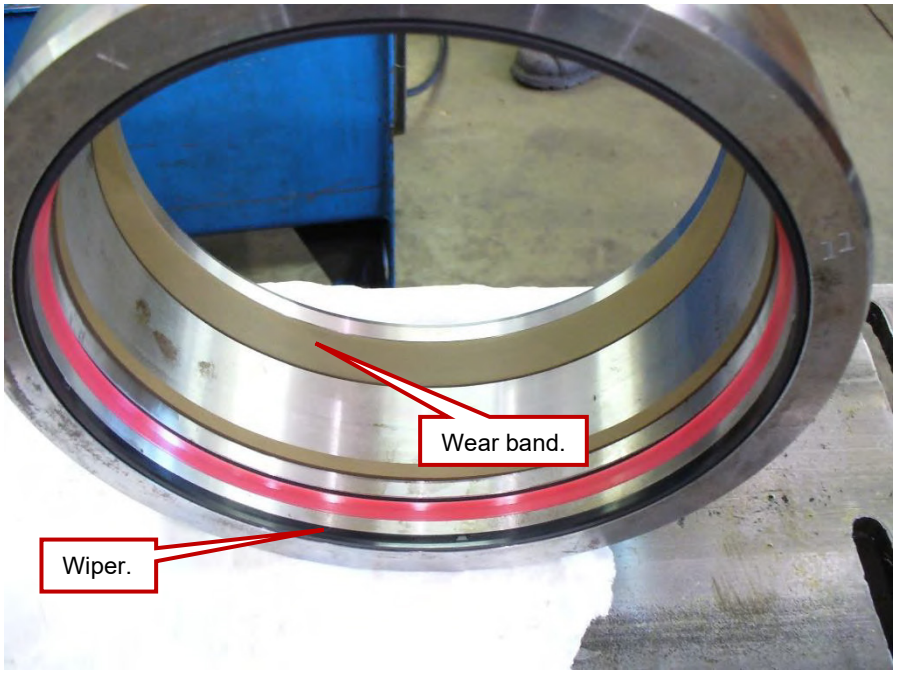


19. Install the Poliak seal making sure the flat surface of the poly is up towards the top of the gland.



20. Before the wear band can be installed it will need to be cut to length. There should be 1/16” gap between the ends of the wear band when is installed properly.

21. Install the wiper.



22. Coat the entire inner diameter of the gland with heavy oil.

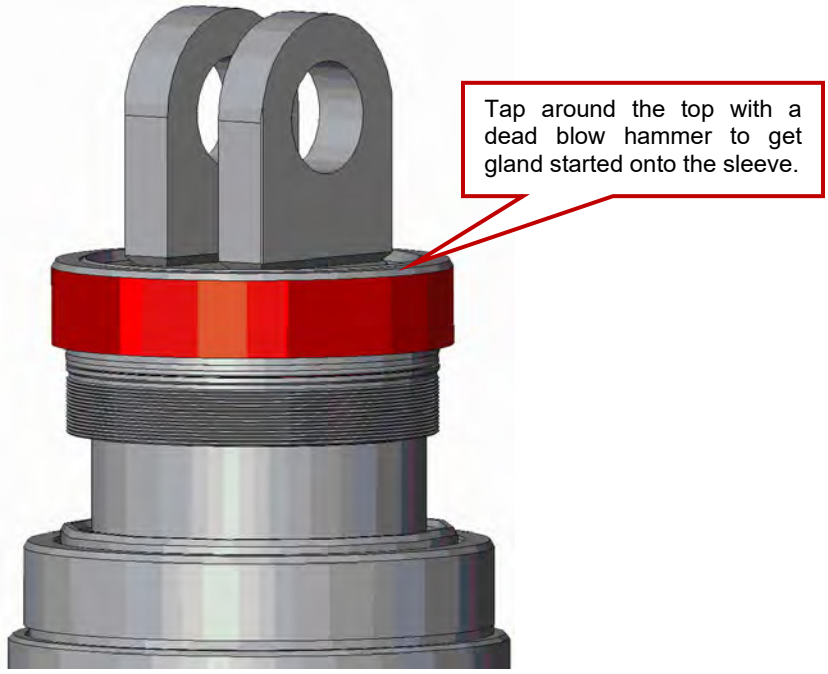
23. Apply a thin coat of anti-seize to the threads of the gland.

24. Apply a coat of oil to the outer O-rings.

25. If the area into which the gland threads into is full of oil, it will be necessary to get some of the oil out either by mopping it up with rags or some other means.

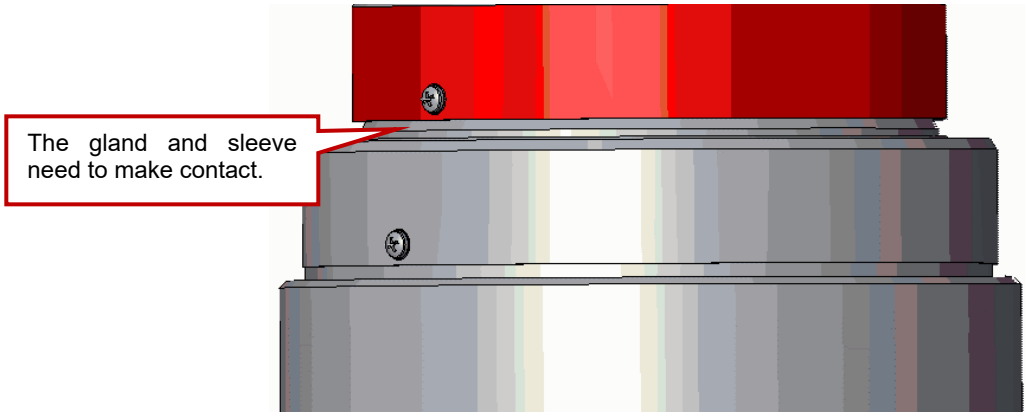
26. Set the gland on to the top of the sleeve.

27. Using a dead blow hammer, tap on the top of the gland to get it started onto the sleeve. Make sure to tap around the full diameter of the gland, not in just one or two locations. The gland will be a tight fit due to the amount of press on the seals.



28. Once the gland is down on the sleeve and the seals are past the end of the gland take the chain wrench and turn the gland. At the same time, apply some downward pressure. The gland should slide down, settling into the sleeve into which it threads.

29. Carefully turn the gland until it starts to thread itself in. Continue turning the gland until it is fully threaded down and the shoulders of the gland and sleeve make contact.



30. When complete, reinstall the bleed screws, fittings and reconnect the hose.

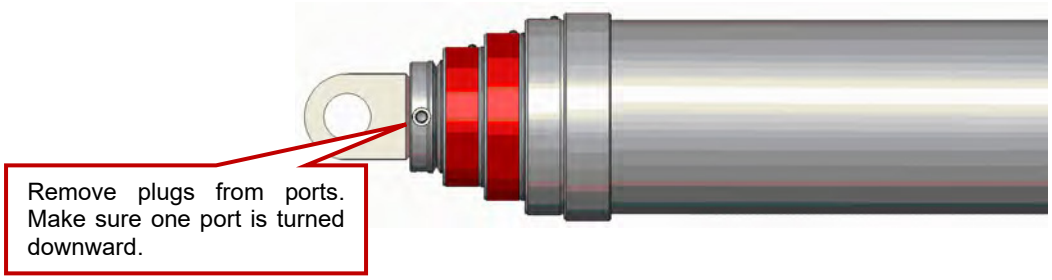
31. Start the power and put the unit into retract. Check for leaks.

32. Slowly extend the cylinder and have someone open the bleed screws to remove any air in the cylinder.

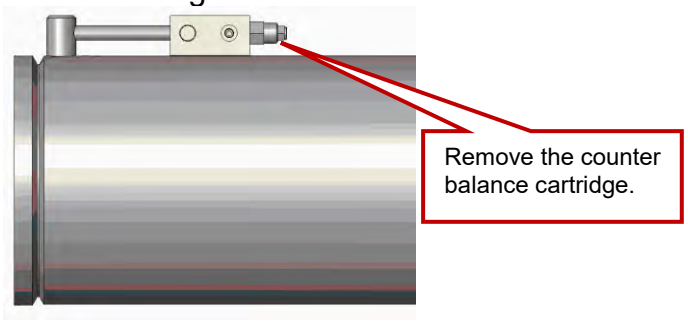
Basic Guidelines for a Complete Cylinder Reseal

It is not advisable to attempt a complete cylinder reseal in the field or at a jobsite due to the large amount of oil that will be lost during the disassembly. This task should only be attempted on a bench that is designed to securely hold the cylinder and is equipped with catch pans to catch the oil. This is just a guideline for replacing the seals only. It does not include any instructions for honing, repairing, and re-chroming; these types of repairs must be completed by a qualified repair facility. This is just a basic guideline and is not meant for any one model of cylinder.

1. Remove the cylinder from the lifting unit. (See section on cylinder removal.)
2. Lay cylinder down and sit it on the bench with the counter balance valve upward.
3. Securely clamp or chain the cylinder to the bench.
4. Remove port plugs in the rod and let the oil drain out. If necessary, turn the rod so one of the ports is pointed down.



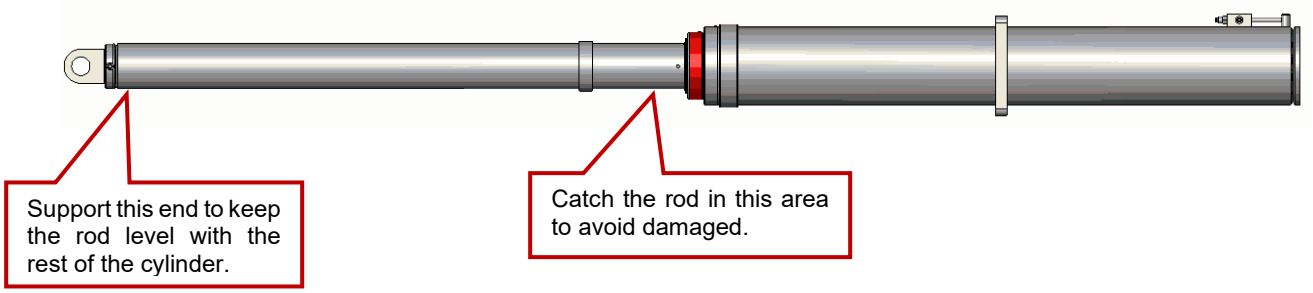
5. Remove the counter balance cartridge.



6. Using a chain wrench, turn the small gland nut counter clockwise to remove. Be sure to support the end of the rod to take the weight off the gland nut when turning it. Otherwise the gland could seize up. Make sure to do this on all sections.
7. Due to the amount of press on the rod seals, once the threads are clear of each other the gland may not simply slide off.

8. If the gland will not slide off, use a soft face dead blow hammer and tap on the bottom edge of the gland, working the hammer around the full diameter of the gland.
9. With the small gland removed, the rod can be pulled out. However, it will be necessary to support the end of the rod to keep it level with the rest of the cylinder. An overhead crane or a jib works well for this.

10. Before the rod is completely removed, it is advised to catch the piston end either with a sling or by placing something under it that is soft enough not to damage the piston.



11. Repeat steps 6, 7, and 8 with the remaining sections. Make sure to place the rods and sleeves on something such as wood that will not scratch or damage them.

12. Starting with the barrel, thoroughly clean the inside with a cleaning solvent.

13. Thoroughly inspect the inner diameter of the barrel for damage or scratches. Small cosmetic scratches that cannot be felt are the result of normal wear. If any scratches that can be felt are found, the barrel will need to be honed.

14. Check the threads for any roughness. If roughness is found, use a die grinder with a wire wheel to smooth it out.(Use wire wheels only)

15. Clean up all dust particles created by the wire wheel.

16. Cover the end of the barrel to prevent damage and to keep it clean.

17. Remove old seals from the sleeves and rod, one at a time.

18. Thoroughly clean the sleeves, inside and out, with a cleaning solvent.

19. When one is thoroughly cleaned, inspect the inner diameter for scratches as with the barrel. Check the condition of the threads as was done with the barrel.

20. Inspect outside for chrome damage. Check for pitting, flaking, dents, and scratches. Cosmetic scratches are normal from wear and are acceptable. If there is any other damage, the item will need to be stripped, repaired, and re-chromed.

21. Continue until all sleeves and rods are cleaned and inspected.

22. Remove the seals from the glands and thoroughly clean the glands with a cleaning solvent.

23. Inspect the glands for any rust that may have formed in the seal grooves and threads. Use a die grinder with a small wire wheel to clean off the rust.

24. Closely inspect the threads; if any rough spots are found use the wire wheel to smooth them out. A rough spot in the threads could cause the gland to become stuck so tightly it will have to be cut off.

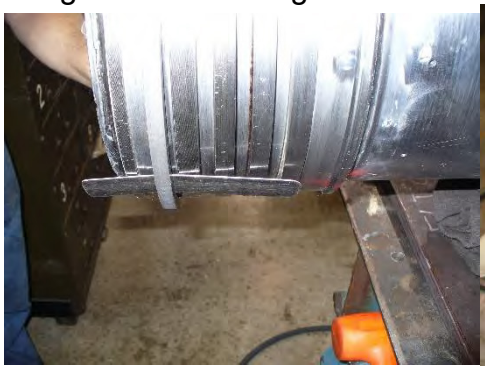
25. Rinse the gland off with cleaning solvent to remove all dust particles and dry it off with compressed air.

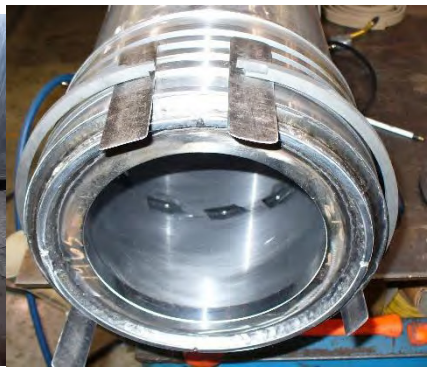
26. If no damage is found, and everything has been cleaned, then the pistons and gland can be prepped for assembly.

27. Starting with the large sleeve install the cast iron piston ring that is the furthest away from the end of the piston. Make sure to refer to the cylinder seal callouts in the parts section of the operator's manual.

28. Slip the ring onto the end of the piston as shown.

29. Use something such as four (4) pieces of banding material as shown in the pictures below. This allows the ring to be slid down to the groove without being caught in the other grooves. Banding material works well due to its thinness and it stiffness.





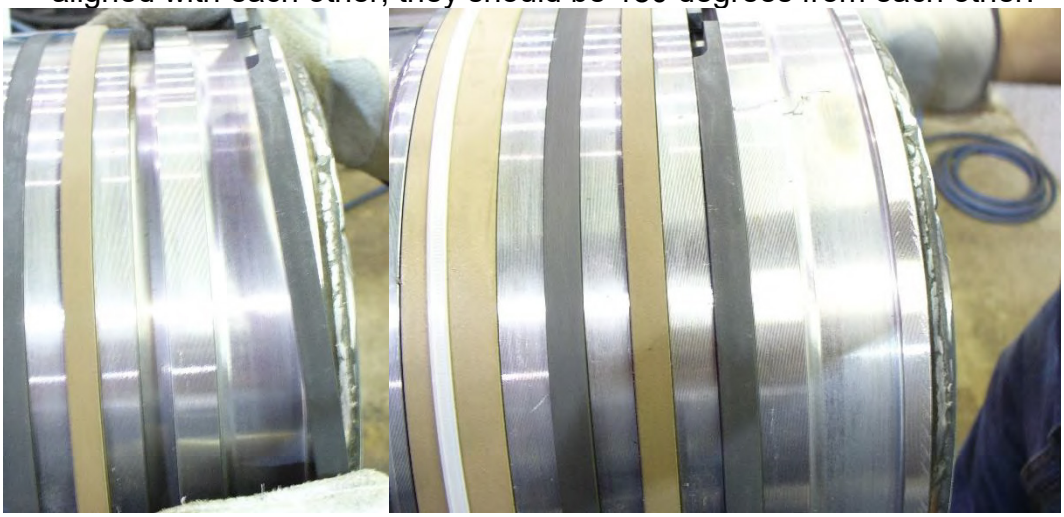
30. Install the loader into the center groove; do not let the loader roll when installing it.

31. Before the piston buffer seal can be installed, it must be heated in an oven at 450 degrees for 20 minutes. A pizza oven works well for this.

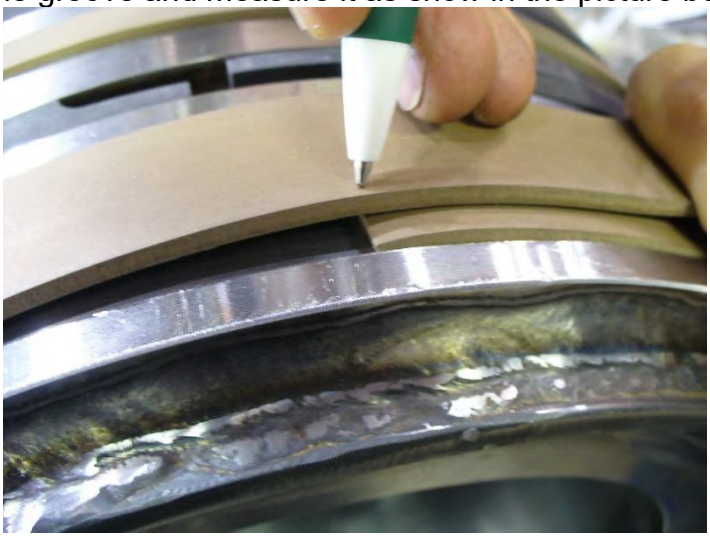
32. Working quickly, while the seal is still hot, slip it over the piston and into the groove on top of the loader.

33. Using compressed air, blow cool air on the seal, working around the full diameter of the seal. This will cool and shrink the seal into the groove. The seal should be tight and it should not move or spin in the groove.

34. Install the last cast iron piston ring. Make sure the ends of the piston rings are not aligned with each other; they should be 180 degrees from each other.

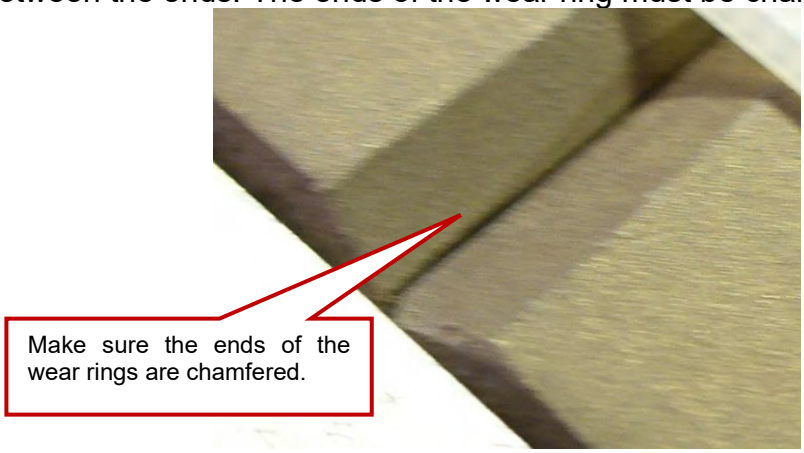


35. The wear rings must first be measured before they are installed. Set the wear ring material in the groove and measure it as show in the picture below.

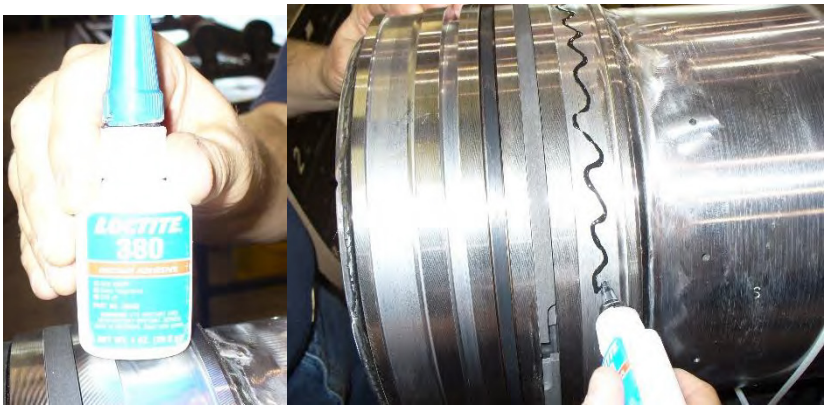


36. Cut the wear ring material with a razor knife.

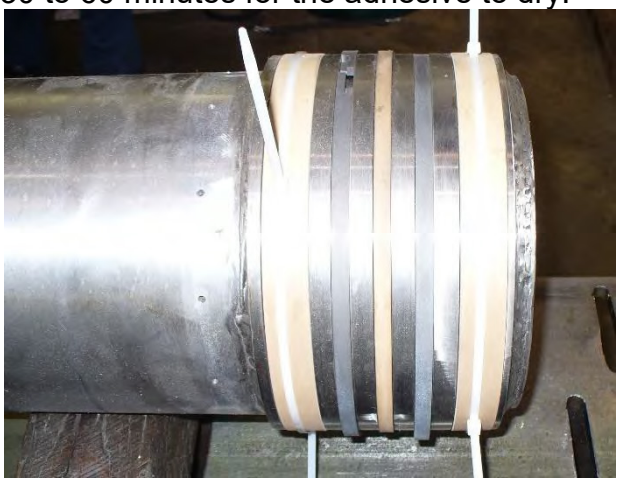
37. Place the wear ring in the groove and check the length; there should be 1/16” gap between the ends. The ends of the wear ring must be chamfered as shown.



38. Using Loctite 380 instant adhesive spread a thin coat over the wear ring groove as shown.



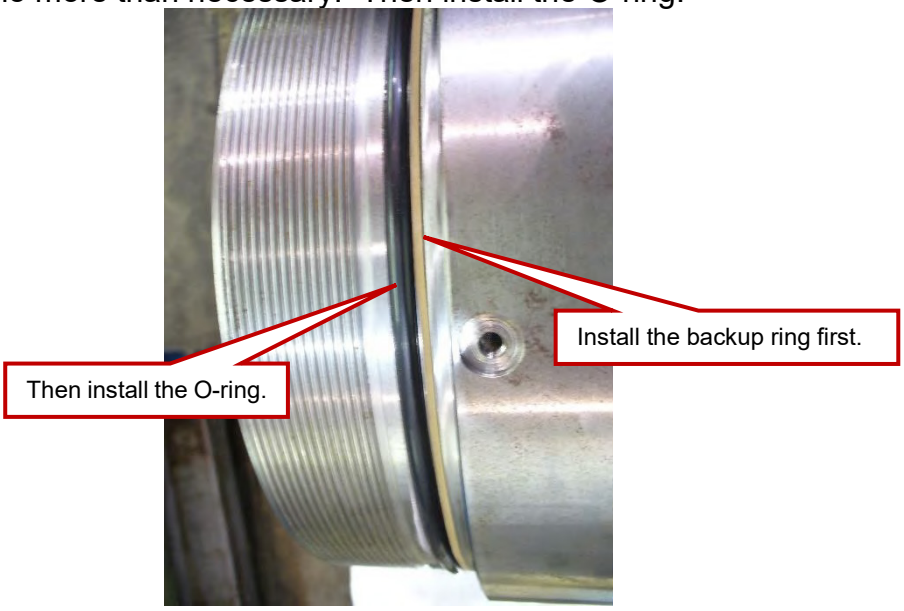
39. Place the wear ring material in the grooves and hold them in place by using zip ties. It will take 30 to 60 minutes for the adhesive to dry.



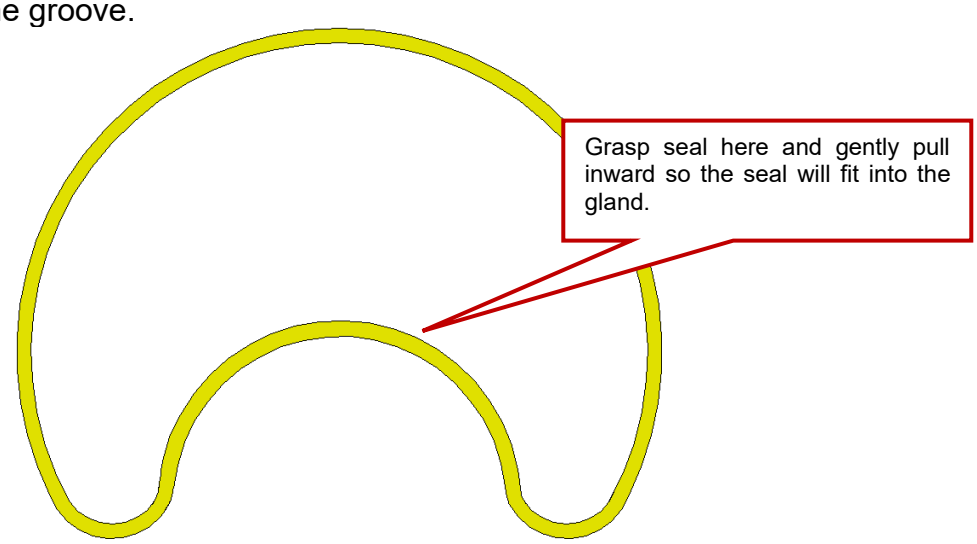
40. Prep the remaining pistons by following the above steps.

41. After the pistons are complete then the glands can be prepped.

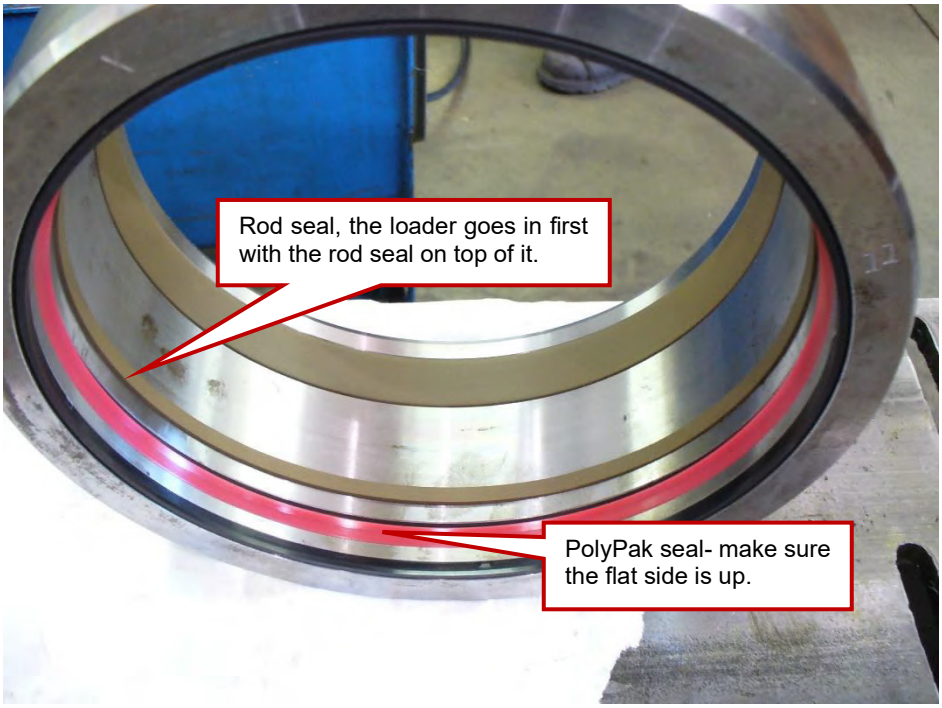
42. Install the outer seals, starting with the backup ring. Do not let the ring roll and stretch it no more than necessary. Then install the O-ring.



43. Install the loader and the rod seal but use caution not to break the rod seal. Form it as shown below so it will fit in the gland. Take the portion that is not folded and put it into the groove. Then gently let the rest of the seal fold back into position so it goes into the groove.

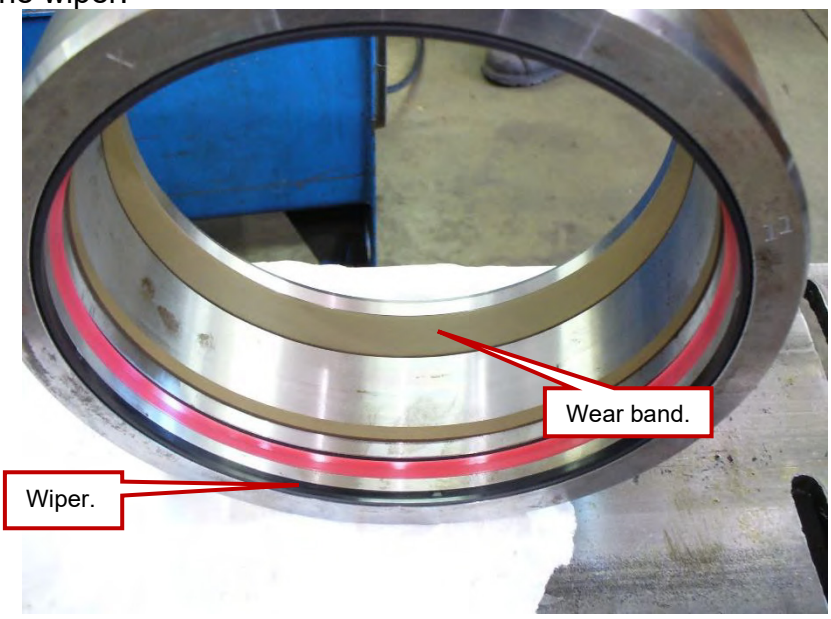


44. Install the PolyPak seal making sure the flat surface of the poly is up towards the top of the gland.



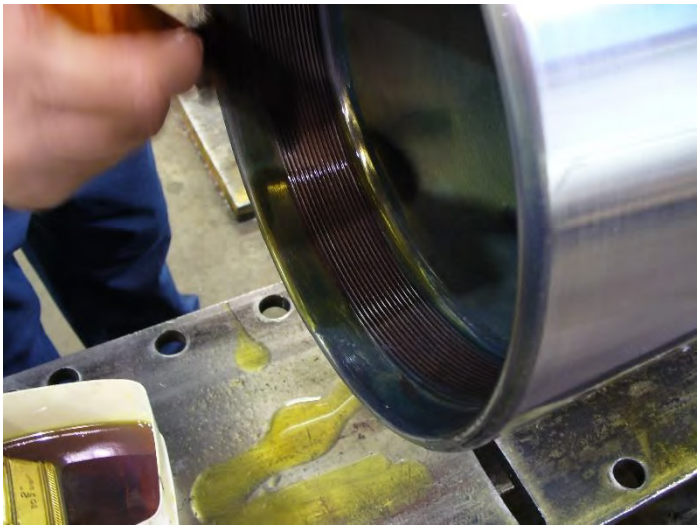
45. Before the wear band can be installed it will need to be cut to length. There should be 1/16” gap between the ends of the wear band when it is installed.

46. Install the wiper.



47. Prep the rest of the glands in the same manner as above.

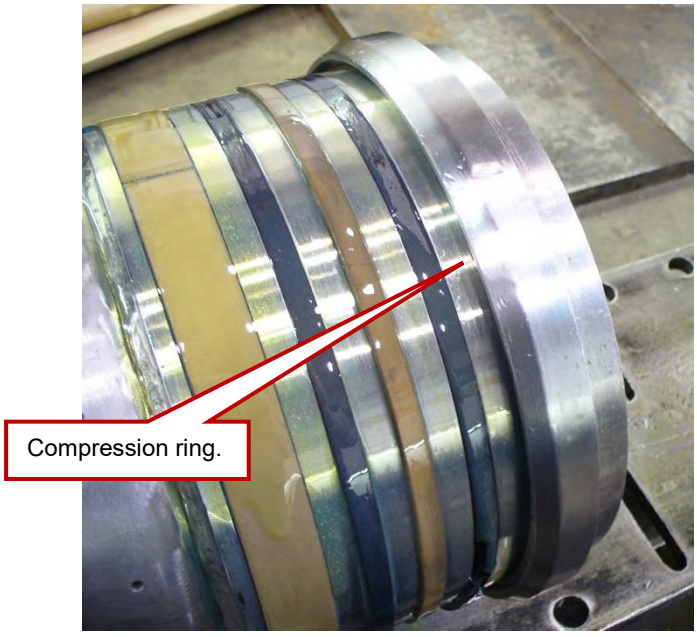
48. Take the barrel and coat the first six inches of the inner diameter of the barrel with a heavy oil.



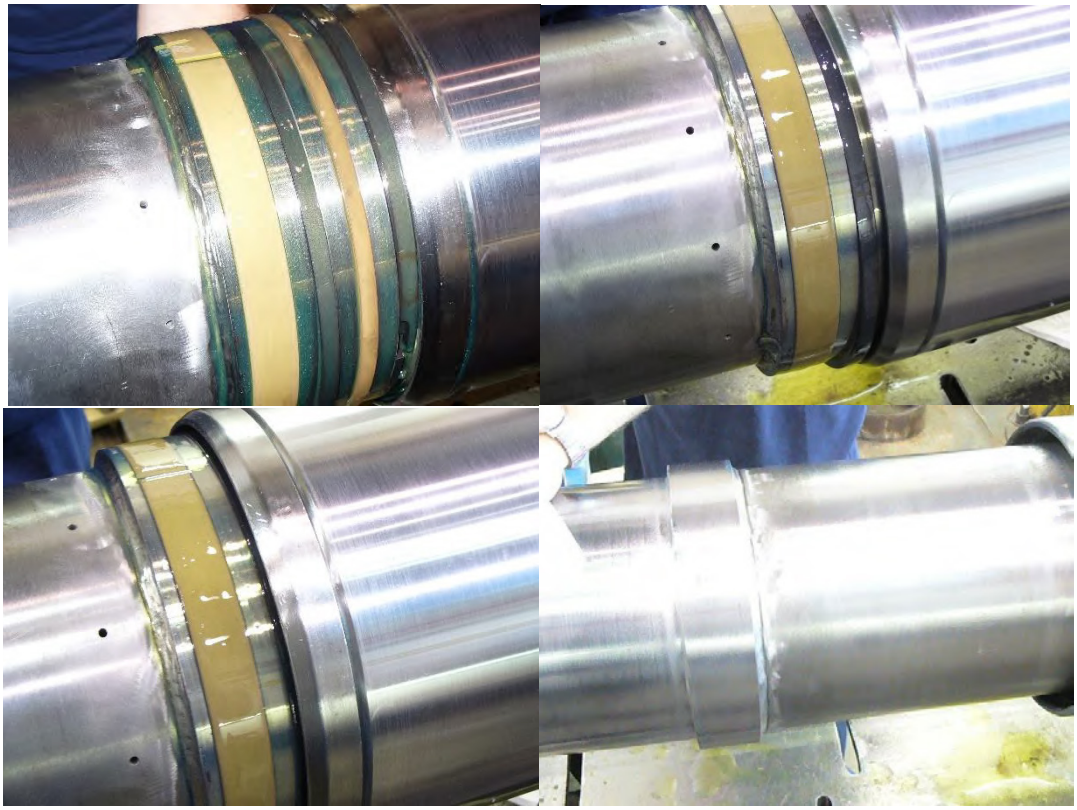
49. Take the large sleeve, remove the zip ties, and coat the entire piston with heavy oil.

50. Lift the sleeve, making sure it is level with the barrel by using a level.

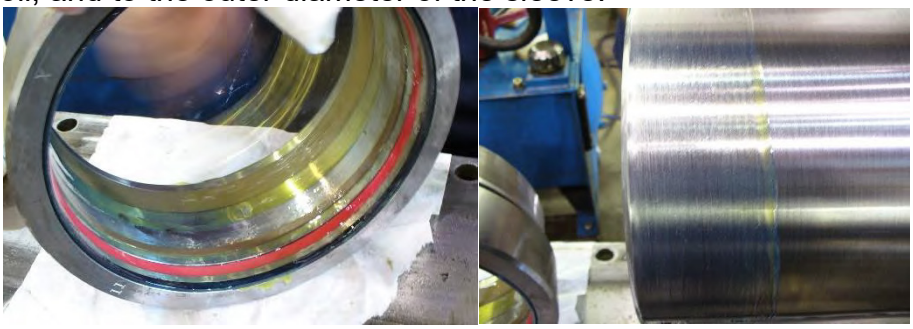
51. The factory has special compression rings for compressing the seals so that the sleeve can be inserted into its mating part. This ensures that damage does not occur to the seals or to the threads of the mating part. It is advisable to create a similar device.



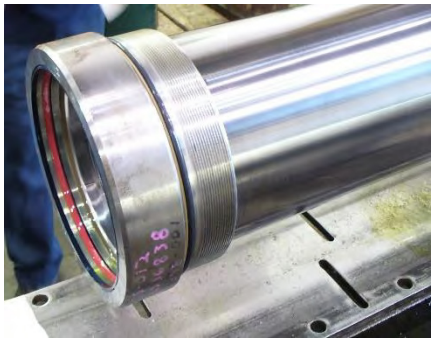
52. Slowly and carefully push the sleeve into its mating part.



53. With sleeve installed, take the appropriate gland and coat the entire inside with heavy oil, and to the outer diameter of the sleeve.



54. Carefully slide the gland over the end of the sleeve.



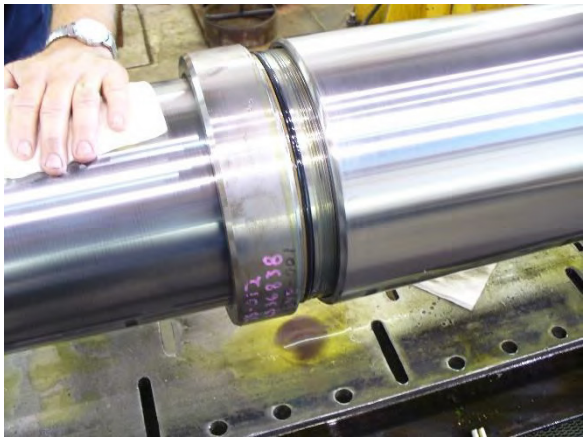
55. When the end of the sleeve makes contact with the first rod seal, the gland will become tight. Using a dead blow hammer, tap the top of the gland to work it onto the sleeve. **Do not use a steel hammer**.

56. Once the gland is past the end of the sleeve use a dead blow hammer and something such as a piece of nylon to drive the gland down the sleeve. **Do not use steel**.

57. As the gland reaches its mating part, stop before it makes any contact. Check the level of the sleeve to ensure it is level with its mating part. The two parts have to be level with each other in order for the gland to be threaded in.

58. Put heavy oil on the outer seals of the gland and anti-seize on the threads.

59. Carefully tap the gland into its mating part, stopping just before the threads of both parts make contact.



60. Using the chain wrench, slowly turn the gland clockwise, simultaneously applying a small amount pressure towards the mating part until the threads are engaged.

61. Continue slowly turning the gland until it is fully seated.

62. Repeat steps 48 through 60 with the remaining sleeves and rods.

63. Replace counter balance valve and the bleed screws.
64. Reinstall cylinder.

65. Turn on the power unit and put cylinder into retract. At the same time, open the bleed screw to remove as much air as possible.

66. The cylinder should always be load tested and checked for drift after a complete reseal before ever going on a job.

OPTIONS

Level-Lift System

The unique design of the Level-Lift system puts accurate information instantly at the operator's fingertips. The sensor(s) will transfer information on the horizontal level of the load directly to the readout. Load corrections can be made immediately, front to back, as well as side to side.

The Level-Lift system consists of three (3) main components packaged in a handsome carrying case for easy storage and mobility. The interior of the case is custom fit to the Level-Lift components giving durable and safe transport from job to job. All components are calibrated and tested at the factory.

For set-up, calibrations, and use of the Level-Lift system, please refer to the instruction manual provided in each carrying case.

Propels

Lift Systems offers three propel options, Cylinder type, Pin on hydrostatic drive, and Integral. Follow the instructions for the specific propel option with which your lifting units are equipped.

Warning!

Never propel with a load that is raised more than is required for clearance. The higher the load the less stable the system.

Using the Propels

1) Cylinder type.

a) Pin the cylinder onto the two ears located just below the quick couplers using the 7/8" x 6-1/2 hitch pin supplied.

b) Using the 7/8" and 4 1/2" hitch pin connect the propel shoe to the rod of the cylinder. The runners of the shoe should sit on the center rail of the track.

c) Connect the hoses of the cylinder to the right hand couplers on the base.

d) To operate the cylinder, shift the valve handle on the base to propel position. You can now extend and retract the cylinders by moving the control valve handles on the power unit. For Model 2020SC with Propel controlled from the remote pendant, move the Lift/Propel switch to the Propel mode then use the lift/lower switches to control lifting unit movement.

e) Now you can lift the load. However, make sure the **cylinders are not pinned** to the center rail. **The bases must center themselves with the load.**

f) If wanting to pull the load, extend the cylinders to the furthest hole on the center rail and pin the shoe to the rail with 3/4" x 6- 1/4" hitch pin. Using the control valve, retract the cylinders until you reach the desired position. Make sure **you keep the load even.** If the cylinders come to the end of their stroke. Then unpin and extend them and re-pin them as before and repeat until the desired position is achieved.

g) If you want to push a load, use the above procedure starting with the cylinders retracted and extend to move the load.

h) When you are ready to lower the load, shift the valve handle into the lift position and **make sure the cylinders are not pinned** to the track. **The bases must center themselves with the load.**

2) Pin on chain drives with ratchet jacks.

a) Pin the drive housing on to the tangs located just above the wheel boxes.

b) Pin the ratchets to the tangs that are located on the top of the housings.

c) Extend the ratchet until you can pin the other end to the tangs located on the base.

d) Use the ratchets to raise the housing until the tires are no longer making contact. There is a small lever on the ratchets to change the direction of the ratchet.

Integral Drives

As with the pin on drive you must also shift the selector to Propel. However, for free-wheeling there is an additional valve that must be shifted to free wheel the drive when lifting or lowering the load.

Side Shifts

Lift Systems offers four types of side shifts or “Trolley” systems.

1) Cylinder type with slider pad dolly.
2) Cylinder type with wheeled dolly.
3) Continuous Hydrostatic drive with wheeled dolly.
4) Continuous chain drive with wheeled dolly.

If you order a side shift system instructions specific to that system will be included at the end of this section.

Side shift or “Trolley” systems allow safe movement of the load latitudinally, or perpendicular to the direction of movement of the lifting units. Due to stability and capacity factors, the capacity of the system is de-rated by a minimum of 40% when using side shift systems. As with all other phases of the lift plan, a professional engineer should be consulted regarding the use of side shifts or “Trolleys”.

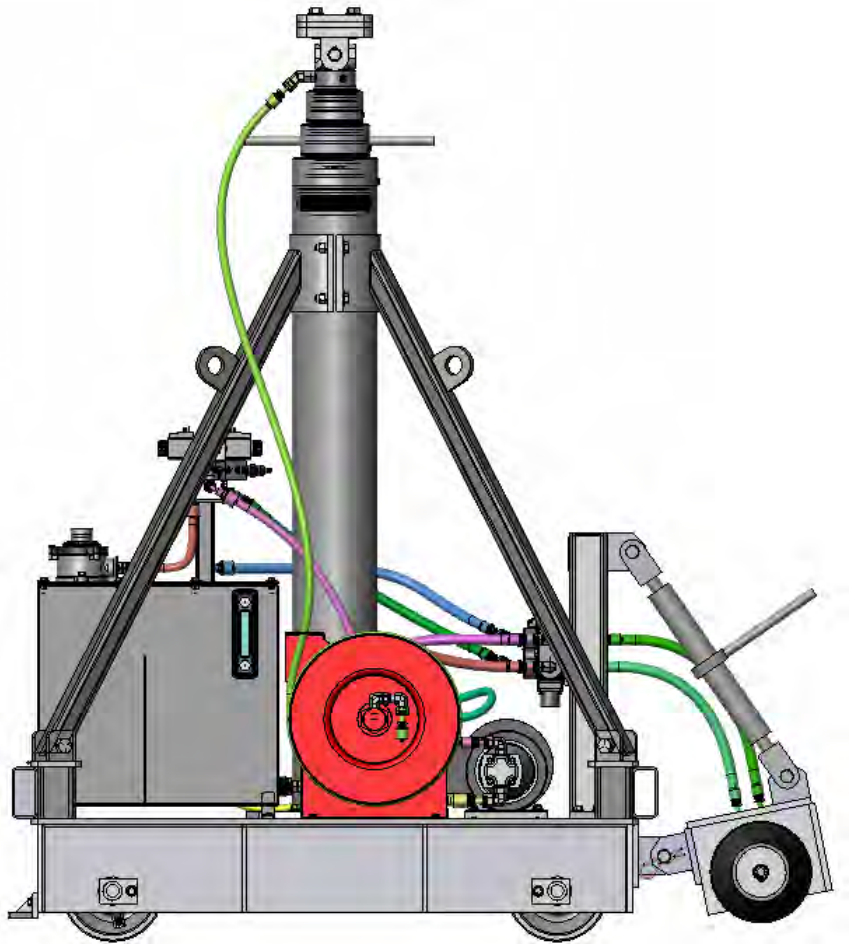
Warning!

Always move slowly and smoothly when using side shift or “Trolley” systems. The inertia of a rapidly moving load may exceed the stability of the lifting units causing loss of the load and possible injury or death to personnel.

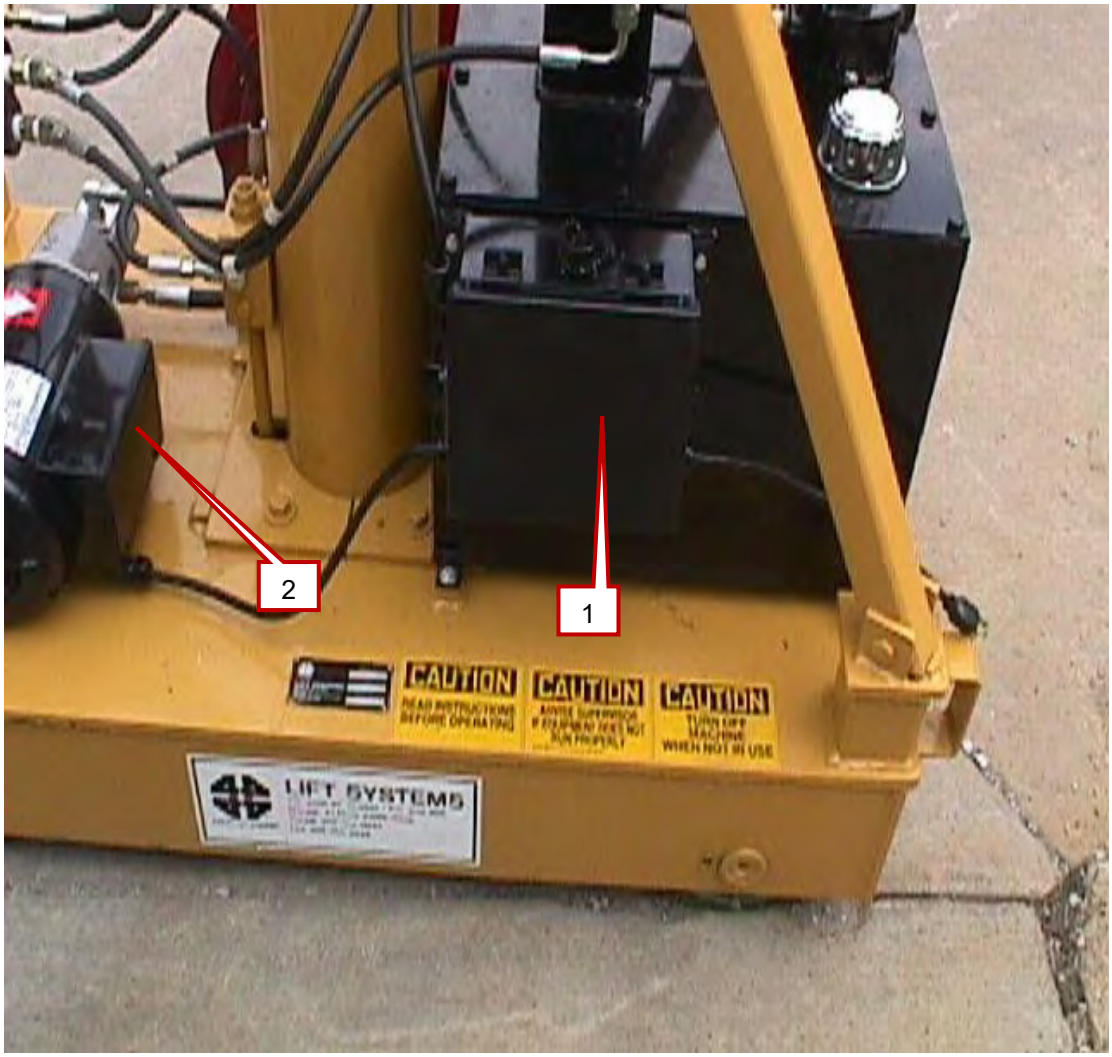
Warning!

The header beam should never be more than ½” of level over a 20ft. span.

PARTS

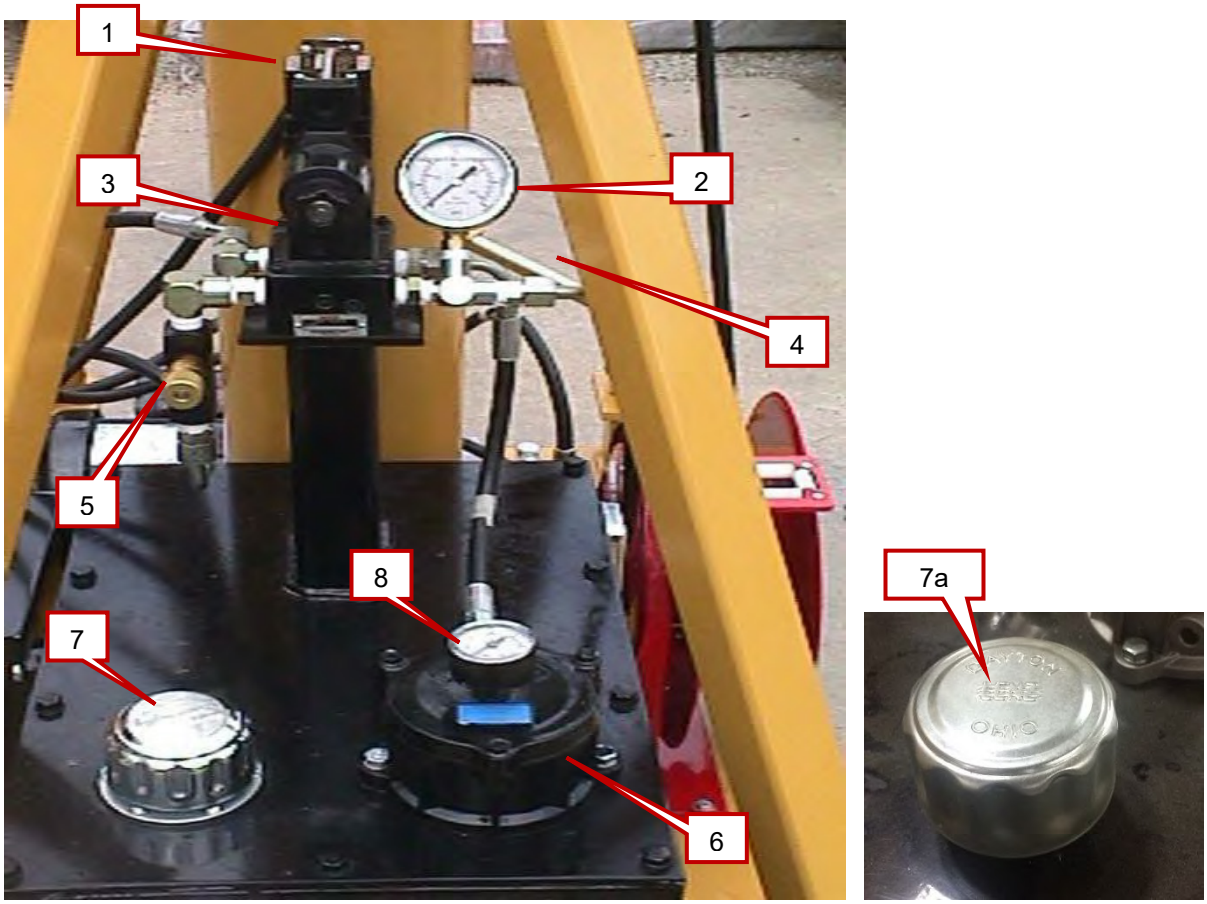


2020SC WITH DRIVE OPTION

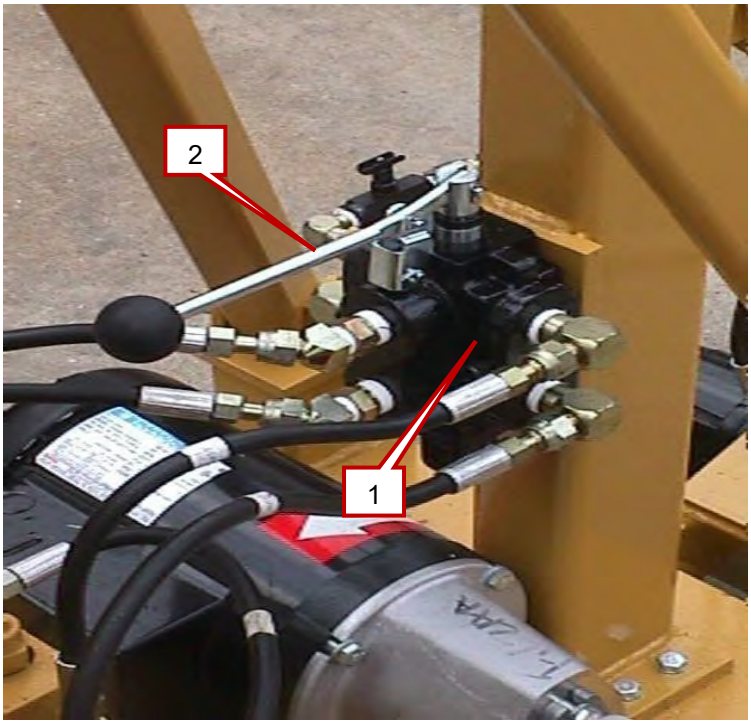


1. ME241 Remote Control Box

2. EM56 Motor (120/240V 50/60 Hz)

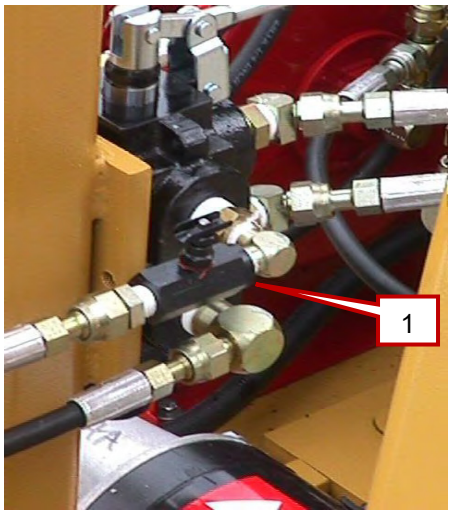


1. DV86 Control Valve
2. MG05 Pressure Gauge
3. RV029 Relief Valve (set at 1800psi)
4. MVP100 Sub plate
5. FCV34 Flow Control, control retract speed
6. HF22 Return Filter(FE24 Replacement element)
7. FB02 Filler Breather (older systems)
   a. FB11 Filler Breather on newer systems.
8. MG36 Dirty filter gauge

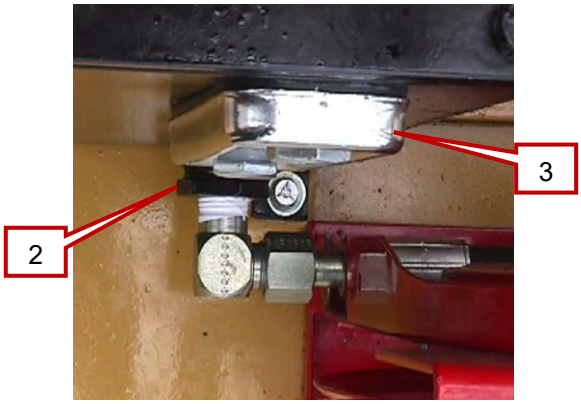


1. DV76 Selector valve for drive option
2. MVP076 Handle kit

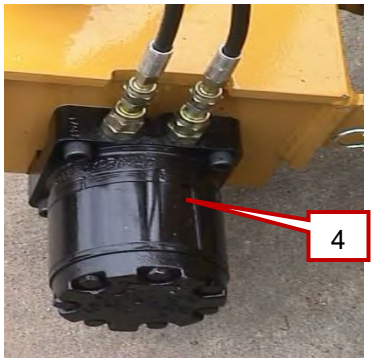
3. CBV11 Counterbalance valve(set at 2400psi)



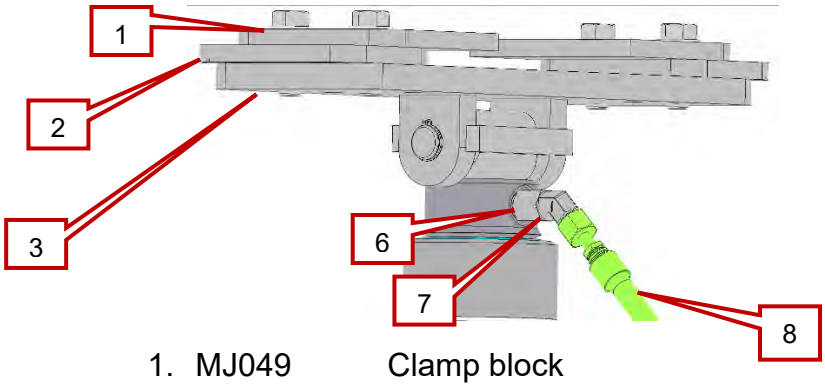
1. FCV20 Needle valve for speed control on drive option



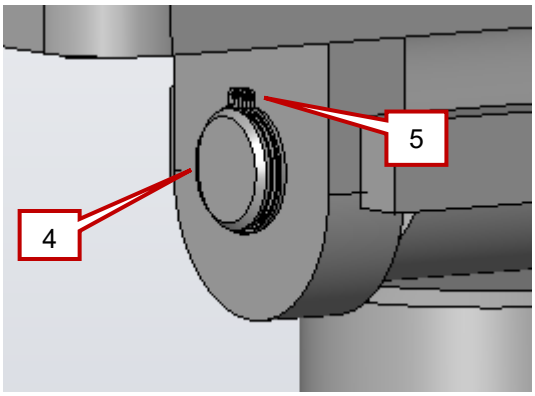
2. ST12 Suction strainer
3. MG01 oil level gauge



4. HM22 Drive motor

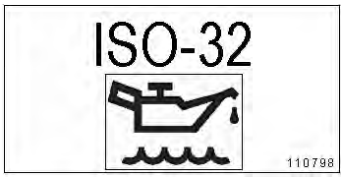


1. MJ049 Clamp block
2. MJ047 Spacer block
3. 116922 Header plate



4. MJ048 Pin
5. MP708 Retaining ring
6. F059 FEMALE PIPE ADAPTER
7. F180T 45 DEGREE MALE ELBOW
8. HA0082T Hose reel hose

Decals



Hydraulic oil type

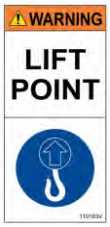
Not a lift point

Inspection date

Jack number

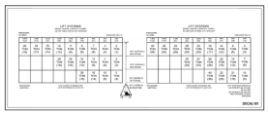
Grease point

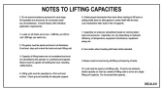
Cautions



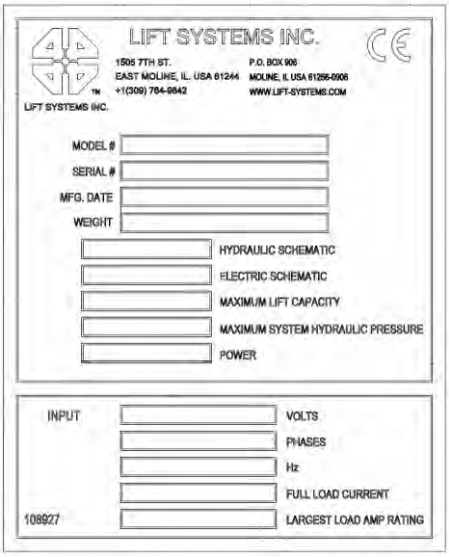
Lift point


Motor and pump rotation direction.


Load chart



Notes for lifting

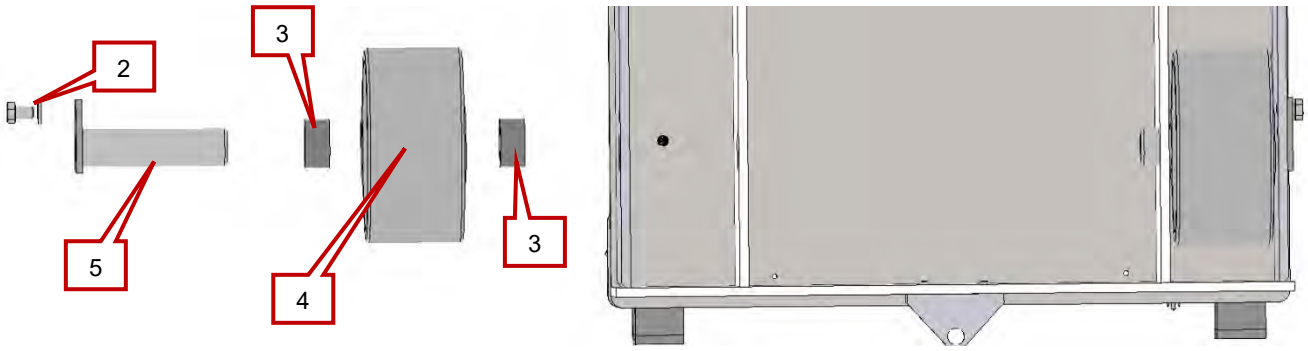


Name plate

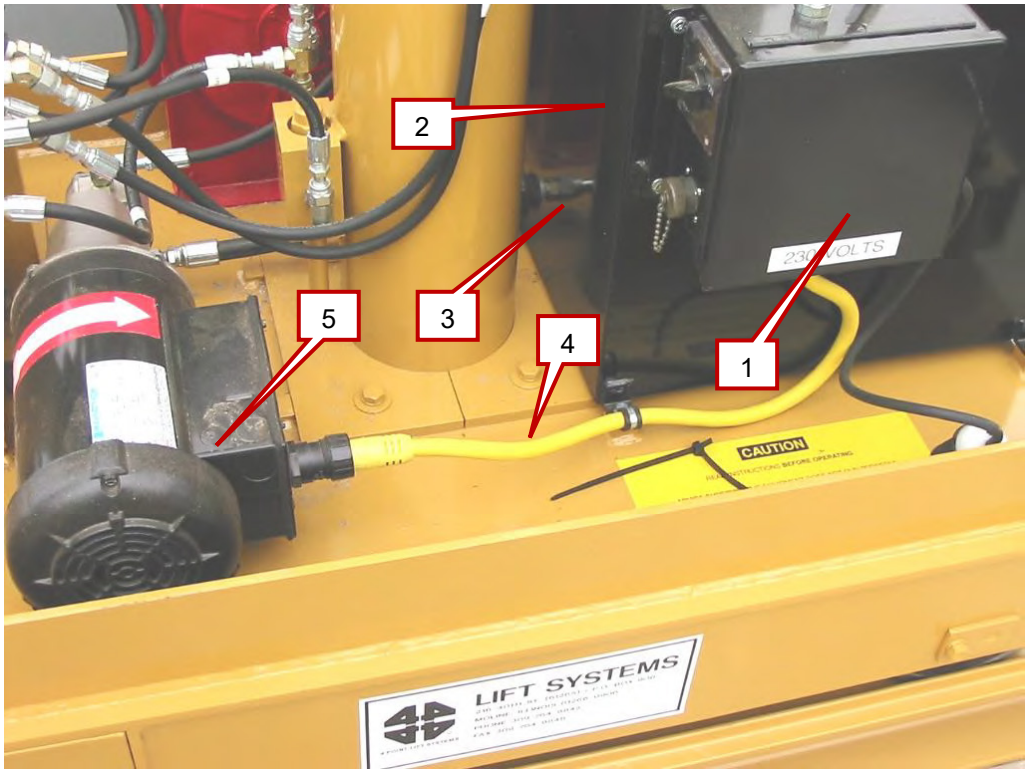
Company Logo

1. MP707 Control pendant
   a. ME252 & ME248 replacement connectors not shown.
   b. 107850 20ft extension cords for MP707 not shown. (2 required)
   c. 122869 40ft extension cords for MP707 not shown. (2 required)

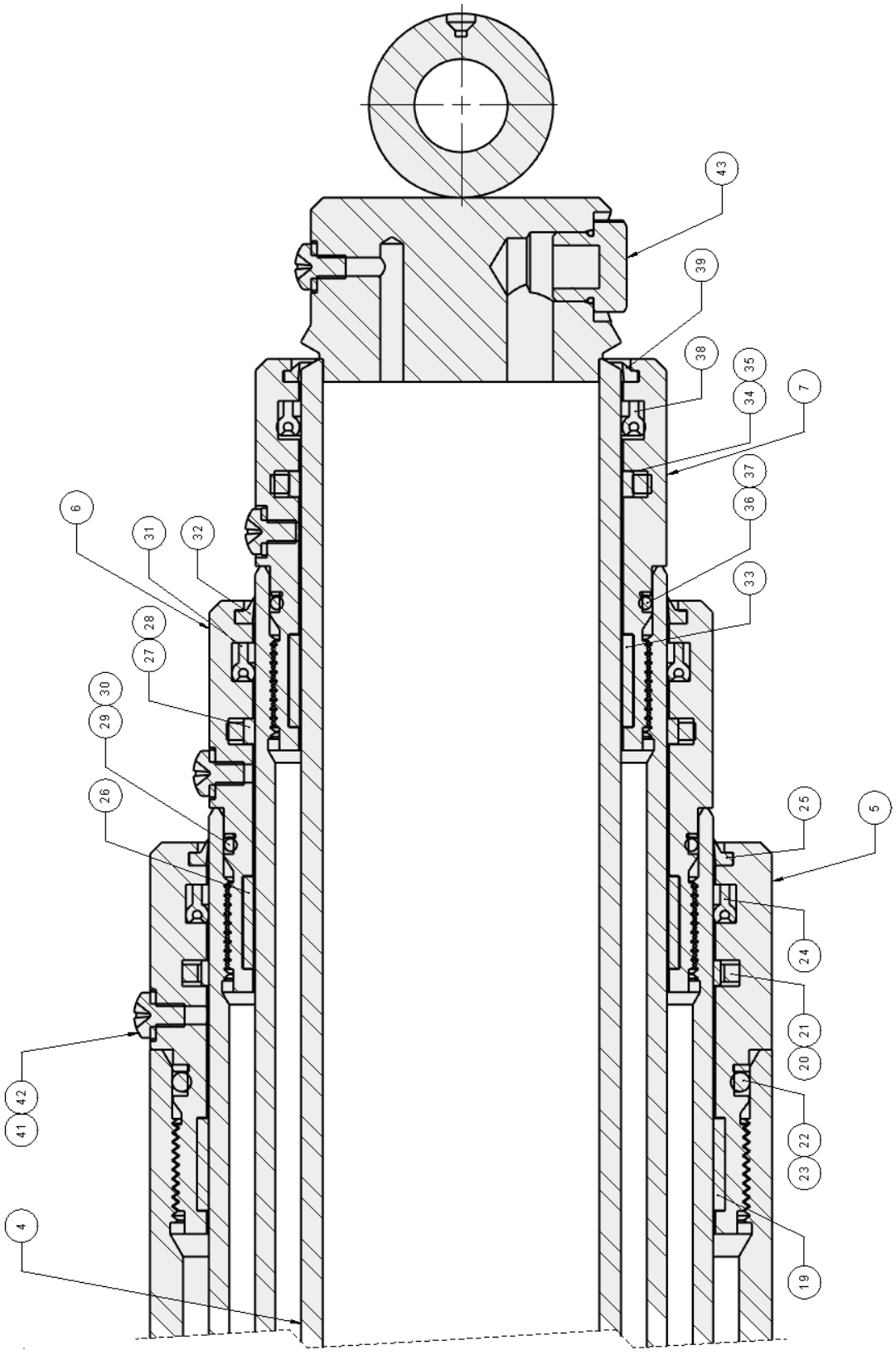
Newer Units with Bushings Instead of Bearings



2. HHCS037 ½-13X3/4” bolt with ¾” lock washer
3. MP777 Garlock bushing
4. W63 8” forged Wheel
5. 42WBA05 Axle



1. MJREM01 CONTROL BOX (This box is used on 110/220volt systems.)
2. S50 ON/OFF SWITCH
3. ME251 PENDANT CONNECTOR
4. ME640 CORD
5. ME641 PLUG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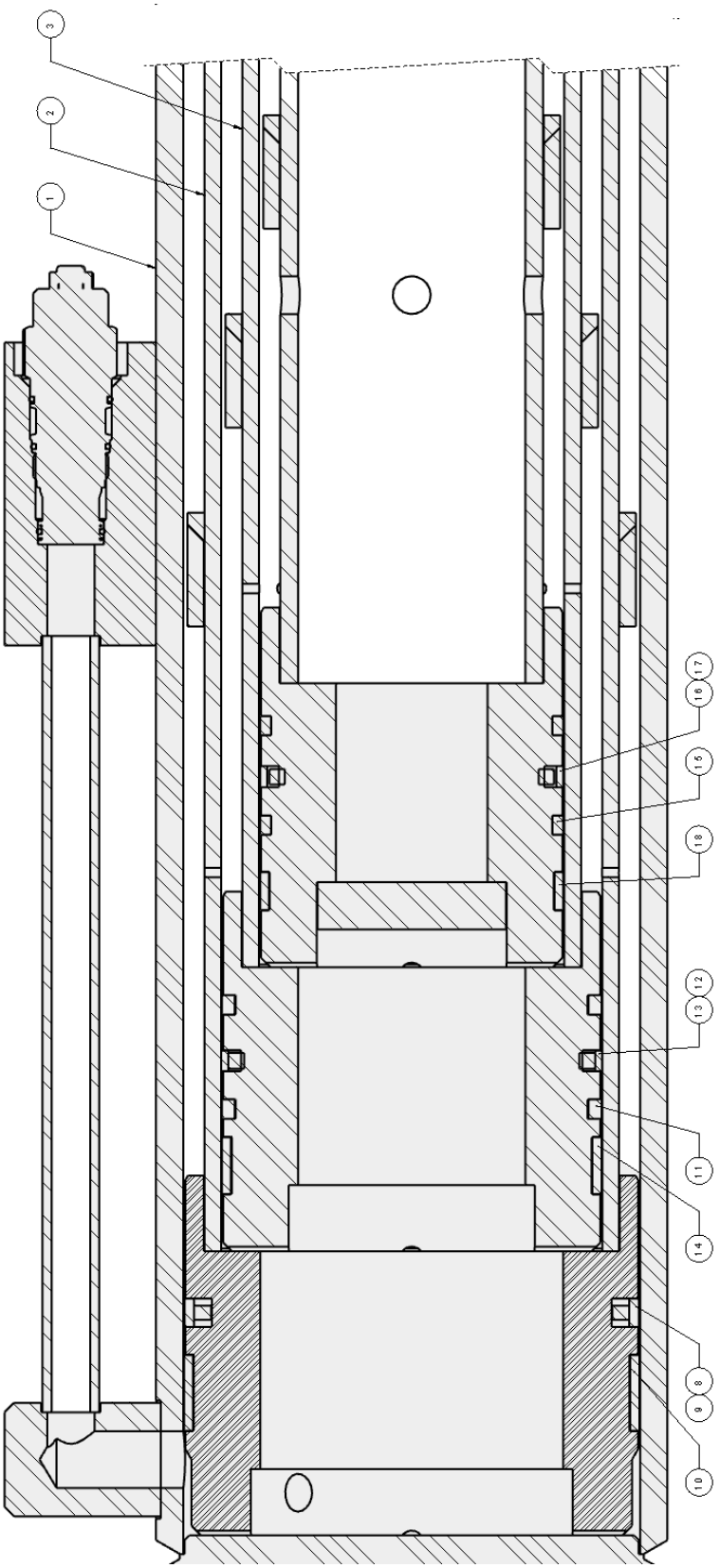
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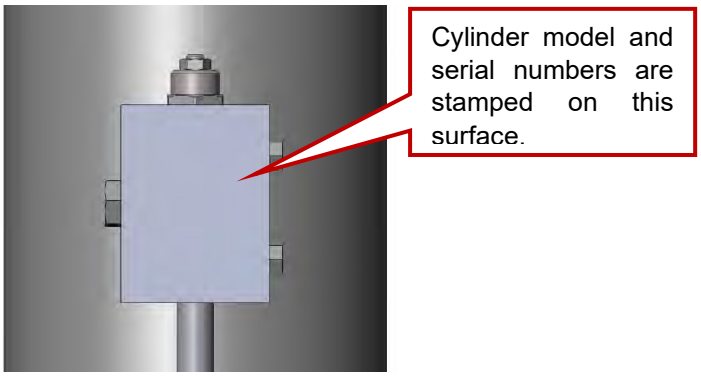
ITEM#	QTY.	PART#	DESCRIPTION	MATERIAL	WT EACH LBS
1	1	05-002	BARREL WELDMENT	SEE BOM	126.9
2	1	100-004	1ST SLEEVE PLATING	SEE BOM	72.9
3	1	100-005	2ND SLEEVE PLATING	SEE BOM	58.2
4	1	50-002	ROD WELDMENT	SEE BOM	52.7
5	1	75-001	BARREL GLAND DETAIL	SEE BOM	9.0
6	1	75-002	1ST SLV PACKING GLAND DETAIL	SEE BOM	5.5
7	1	75-003	2ND SLEEVE GLAND DETAIL	SEE BOM	4.4
8	1	28-4610-21A	PISTON SEAL 8.00 DIA	BRONZE FILLED TEFLON	0.3
9	1	28-4610-21X	LOADER	N/A	0.2
10	1	W-007	WEAR RING	N/A	0.7
11	2	28-5004-8	CIPR 5" X 1/4" X 3/16"	N/A	0.2
12	1	28-4610-17X	LOADER	N/A	0.2
13	1	28-4610-17A	PISTON SEAL, 5.500 ID X .375	N/A	0.1
14	1	W-008	WR 5"OD X 3/4"	N/A	0.4
15	2	28-5004-20	CIPR, 4"OD, .249"HT, .142"CS	IRON	0.1
16	1	28-4610-13A	PISTON SEAL	N/A	0.1
17	1	28-41420	SQUARE ORING; -340	BUNA-N 70 Durometer	0.0
18	1	W-009	WEAR RING; 4"OD; 1/8"CS; .5"HT; 12.75" WEAR TAPE	BRONZE FILLED PTFE	0.0
19	1	W-010	WR 5-3/4"OD X 1"	N/A	0.6
20	1	28-5043-7A	BR2 BUFF SEAL 5-1/2"OD	N/A	0.1
21	1	28-5043-7X	LOADER FOR 5-1/2" ROD	N/A	0.2
22	1	28-4173-36A	ORING; -360	BUNA-N 90 DUROMETER	0.03
23	1	28-4173-36X	BACK UP RING; -360	URETHANE	0.01
24	1	28-3980H62	HALLITE POLYPAK 5-1/2" X 6" X 3/8"	N/A	0.3
25	1	28-3707-24	AN WIPER FOR 5-1/2" ROD	N/A	0.2
26	1	W-011	WR 4-3/4"OD X 1"	N/A	0.5
27	1	28-5043-1A	BR2 BUFF SEAL FOR 4-1/2" ROD	N/A	0.1
28	1	28-5043-1X	LOADER FOR 4-1/2" ROD	N/A	0.2
29	1	OR139-0486-249	O-RING; -249	BUNA-N 90 DUROMETER	0.01
30	1	BU118-0486-249	BACK UP RING; -249; CONTOURED	BUNA-N 90 DUROMETER	0.00
31	1	28-3980H50	HALLITE POLYPAK 4-1/2" X 5" X 3/8"	N/A	0.2
32	1	28-3707-16	AN WIPER FOR 4-1/2" ROD	N/A	0.1
33	1	W-012	WEAR RING; 3.5"ID; .125"CS; 1"HT; 11.5" WEAR TAPE	BRONZE FILLED PTFE	0.1
34	1	28-5043-8A	BUFFER SEAL; 3.5"ID; .281"HT; .120"CS	BRONZE FILLED PTFE	0.0
35	1	28-5043-8X	SQUARE ORING; -343	BUNA-N 90 DUROMETER	0.0
36	1	OR139-0386-241	O-RING; -241	BUNA-N 70 DUROMETER	0.01
37	1	BU118-0388-241	BACK UP RING; -241; CONTOURED	BUNA-N 90 DUROMETER	0.00
38	1	28-3980H8	U-CUP; 3.5"ID; .25"CS; .375"HT; ASSYMMETRIC; TWINLIP; UNLOADED	URETHANE	0.0
39	1	28-3707-1	AN WIPER, AN-33	URETHANE	0.0
40	1	CBV11	CBEA-LHN COUNTER BALANCE VALVE	STEEL WITH BUNA-N SEALS	0.76
41	4	55-998	SEAL WASHER 1/4" PRESSSURE-SEALING	ZINC PLATED STEEL	0.0
42	4	PHPS001	PHPS, 1/4-20 X 3/8, ZINC PLATED PAN HEAD PHILLIPS SCREW	STEEL	0.012
43	2	F131	#8 ORING PLUG	STEEL	0.01
44	2	F120	721FS004 HEX HEAD PLUG	STEEL	0.0
REF	-	K272-5250-8	SEAL KIT FOR 1-5250 (REVISION B)	N-A	N-A

When ordering cylinder seals, you must have the cylinder serial number, over time the part numbers for the seals may have changed.



MSDS

MATERIAL SAFETY DATA SHEET

RILCO
RILCO Premium AW Hydraulic Oil (all grades)
Date of Preparation: March 23, 2013

SECTION 1: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: RILCO Premium AW (all grades)

Chemical Family: Blend

Manufactured for: RILCO Oil Company, Inc.
1320 1st St
Rock Island, IL 61201

EMERGENCY TELEPHONE NUMBERS:
RILCO Oil Company, Inc. (309) 788-5631 Normal Business Hours
(800) 779-6456 After Business Hours

SECTION 2: COMPOSITION/INFORMATION AND INGREDIENTS

Chemical Ingredient
Base Lubricating Oil 95-99%
Proprietary Additives 1-5%

SECTION 3: HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: *Oil mist, if generated.*

HMIS Hazard Rating
H 1
F 1
R 0

US OSHA HAZARD COMMUNICATION STANDARD: Product assessed in accordance with OSHA 29 CFR 1910.1200 and determined not to be hazardous.

Potential Health Effects:
Inhalation: Vapor pressure is very low. Vapor inhalation under ambient conditions is normally not a problem.
Eye Contact: Expected to be minor eye irritant.
Skin Contact: Repeated or prolonged skin contact may cause dermatitis.
Ingestion: Not expected to be acutely toxic.
Chronic: None known.

SECTION 4: FIRST AID MEASURES

Inhalation: Remove to fresh air. If not breathing, give artificial respiration, preferably mouth to mouth. If breathing is difficult give oxygen. Get medical attention.
Eye Contact: Flush eyes with large amounts of water until irritation subsides. If irritation persists, get medical attention.
Skin Contact: No treatment is necessary under ordinary circumstances. Remove contaminated clothing. Wash contaminated area thoroughly with soap and water. If redness or irritation occurs and persists, seek medical attention.
Ingestion: If swallowed, DO NOT induce vomiting. If victim exhibits signs of lung aspiration such as coughing or chocking, seek immediate medical attention.

SECTION 5: FIRE-FIGHTING MEASURES

Flashpoint (method): 396 deg F (ASTM D-92)
Flammable Limits: Not established
Autoignition Temperature: No Data Available
Extinguishing Media: Use dry chemical, foam, or carbon dioxide.
Fire-Fighting Instructions: Dense smoke may be generated while burning. Carbon monoxide, carbon dioxide, and other oxides may be generated as products of combustion. Avoid breathing smoke and vapor.
Fire-Fighting Equipment: Wear self-contained breathing apparatus and protective clothing. Water may be used to cool containers exposed to heat or flame.
Hazardous Combustion By-products: None.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Spill/Leak Procedures: Remove sources of ignition. Contain any spills with dikes or absorbents to prevent migration and entry into sewers or streams. Take up small spills with absorbent pads. Large spills may be taken up with pump or vacuum.

SECTION 7: HANDLING AND STORAGE

Storage Temperature: Ambient
Storage Pressure: Atmospheric
General: Keep container closed. Store in a cool, well-ventilated place. Keep away from heat, sparks and flame. Empty containers may contain residues.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Limits: This product does not contain any components with OSHA or ACGIH Exposure limits.
Ventilation: Good general ventilation at source of vapor.
Personal Hygiene: Always wash hands and face with soap and water before eating, drinking or smoking.
Respiratory Protection: Respiratory protection is not required under conditions of normal use. If vapor or mist is generated when the material is heated or handled, use an organic vapor respirator with a dust or mist filter.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance/Odor: Petroleum odor, clear, amber liquid
Vapor Density: > 1 (air =1.0)
Solubility in Water: Insoluble
Specific Gravity: 0.87

SECTION 10: STABILITY AND REACTIVITY

Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: None known
Materials to Avoid: Strong oxidizing agents.

SECTION 11: TOXICOLOGICAL INFORMATION

Oral Toxicity (rats): Practically non-toxic (LD50: greater than 2000 mg/kg.)
Dermal Toxicity (rabbits): Practically non-toxic (LD50: greater than 2000 mg/kg.)
Inhalation Toxicity (rats): Practically non-toxic (LC50: greater than 5 mg/l).
Eye Irritation (rabbits): Practically non-irritating. (Draize score: greater than 6 but 15 or less.)
Skin Irritation (rabbits): Practically non-irritating. (Primary Irritation Index: greater than 0.5 but less than 3.)

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicity: No data available.

SECTION 13: DISPOSAL CONSIDERATIONS

Regulatory Information: All disposals must comply with federal, state and local requirements.

SECTION 14: TRANSPORTATION INFORMATION

U.S. Department of Transportation (DOT)
Highway/Rail (Bulk): Not Regulated
Highway/Rail (Non-Bulk): Not Regulated

SECTION 15: REGULATORY INFORMATION

TSCA: This material is in compliance with the Toxic Substances control Act (15 USC 2601-2629) and is listed in the TSCA Inventory.

Hazard Categories for SARA 311/312 Reporting:
- Health Immediate (Acute) No
- Health Delayed (Chronic) No
- Physical Fire No
- Physical Sudden Release of Pressure No
- Physical Reactive No
- Physical Nuisance Mist/Dust Only No

01=SARA 313	11=NJRTK	21=TSCA Sect 5(a)(2)	02=MASS RTK
12=CERCLA 3024	22=TSCA Sect 6	03=NTP Carcinogen	
13=MN RTK	23=TSCA Sect 12 (b)		

04=CA Prop 65-Carcin 14=ACGIM TWA 24=TSCA Sect 8(a)
05=CA Prop 65-Repro Tox 15=ACGIH STEL 25=TSCA Sect 8(d) 06=IARC Group 1 16=ACGIH Calc TLV 26=TSCA Sect 4(a) 07=IARC Group 2A 17=OSHA PEL 27=Canadian WHMIS
08=IARC Group 2B 18=DOT Marine Pollutant 28=OSHA CEILING 09=SARA 302/304
20=EPA Carcinogen 10=PA RTK

The following components of this material are found on the regulatory lists indicated.

DISTILLATES, HYDROTREATED LIGHT PARAFFINIC is found on lists: 14, 15, 17

NEW JERSEY RTK CLASSIFICATION: Under the New Jersey Right-to-Know Act L. 1983 Chapter 315 N.J.S.A.

34:5A-1 et. seq., the product is to be identified as follows: PETROLEUM OIL

Disclaimer: RILCO Industrial Lubricants, Inc. believes this information is accurate but not all-inclusive in all circumstances. It is the responsibility of the user to determine suitability of the material for their purposes. No warranty, expressed or implied, is given.

Shell Gadus S3 V220C 2
MSDS# 18078
Version 1.3
Effective Date 02/05/2014
According to OSHA Hazard Communication Standard, 29 CFR 1910.1200

Material Safety Data Sheet

1. MATERIAL AND COMPANY IDENTIFICATION

Material Name : **Shell Gadus S3 V220C 2**
Product Code : 001D8425
Uses : Automotive and industrial grease.

Manufacturer/Supplier : **SOPUS Products**
PO BOX 4427
Houston, TX 77210-4427
USA
SDS Request : 877-276-7285

Emergency Telephone Number
Spill Information : 877-242-7400
Health Information : 877-504-9351

2. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Identity	CAS No.	Concentration
Asphalt, fumes	8052-42-4	1.00 - 5.00 %

A lubricating grease consisting of highly-refined mineral oil and additives.
The highly refined mineral oil contains <3% (w/w) DMSO-extract, according to IP346.

3. HAZARDS IDENTIFICATION

Emergency Overview

Appearance and Odour : Red. Semi-solid at ambient temperature. Slight hydrocarbon.

Health Hazards : High-pressure injection under the skin may cause serious damage including local necrosis.
Safety Hazards : Not classified as flammable but will burn.
Environmental Hazards : Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Health Hazards : Not expected to be a health hazard when used under normal conditions.

Health Hazards
Inhalation : Under normal conditions of use, this is not expected to be a primary route of exposure.
Skin Contact : Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis.
Eye Contact : May cause slight irritation to eyes.
Ingestion : Low toxicity if swallowed.
Other Information : High-pressure injection under the skin may cause serious damage including local necrosis. Used grease may contain harmful impurities.

Signs and Symptoms	:	Local necrosis is evidenced by delayed onset of pain and tissue damage a few hours following injection. Oil acne/folliculitis signs and symptoms may include formation of black pustules and spots on the skin of exposed areas. Ingestion may result in nausea, vomiting and/or diarrhoea.
Aggravated Medical Conditions	:	Pre-existing medical conditions of the following organ(s) or organ system(s) may be aggravated by exposure to this material: Skin.
Environmental Hazards	:	Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Additional Information	:	Under normal conditions of use or in a foreseeable emergency, this product does not meet the definition of a hazardous chemical when evaluated according to the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

4. FIRST-AID MEASURES

General Information	:	Not expected to be a health hazard when used under normal conditions.
Inhalation	:	No treatment necessary under normal conditions of use. If symptoms persist, obtain medical advice.
Skin Contact	:	Remove contaminated clothing. Flush exposed area with water and follow by washing with soap if available. If persistent irritation occurs, obtain medical attention. When using high pressure equipment, injection of product under the skin can occur. If high pressure injuries occur, the casualty should be sent immediately to a hospital. Do not wait for symptoms to develop. Obtain medical attention even in the absence of apparent wounds.
Eye Contact	:	Flush eye with copious quantities of water. If persistent irritation occurs, obtain medical attention.
Ingestion	:	In general no treatment is necessary unless large quantities are swallowed, however, get medical advice.
Advice to Physician	:	Treat symptomatically. High pressure injection injuries require prompt surgical intervention and possibly steroid therapy, to minimise tissue damage and loss of function. Because entry wounds are small and do not reflect the seriousness of the underlying damage, surgical exploration to determine the extent of involvement may be necessary. Local anaesthetics or hot soaks should be avoided because they can contribute to swelling, vasospasm and ischaemia. Prompt surgical decompression, debridement and evacuation of foreign material should be performed under general anaesthetics, and wide exploration is essential.

5. FIRE-FIGHTING MEASURES

Clear fire area of all non-emergency personnel.

Flash point	:	> 250 °C / 482 °F (COC)
Upper / lower	:	Typical 1 - 10 %(V)(based on mineral oil)

Flammability or Explosion limits		
Auto ignition temperature	:	> 320 °C / 608 °F
Specific Hazards	:	Hazardous combustion products may include: A complex mixture of airborne solid and liquid particulates and gases (smoke). Carbon monoxide may be evolved if incomplete combustion occurs. Unidentified organic and inorganic compounds.
Suitable Extinguishing Media	:	Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.
Unsuitable Extinguishing Media	:	Do not use water in a jet.
Protective Equipment for Firefighters	:	Proper protective equipment including breathing apparatus must be worn when approaching a fire in a confined space.

6. ACCIDENTAL RELEASE MEASURES

Avoid contact with spilled or released material. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. See Chapter 13 for information on disposal. Observe the relevant local and international regulations.

Protective measures	:	Avoid contact with skin and eyes. Use appropriate containment to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers.
Clean Up Methods	:	Shovel into a suitable clearly marked container for disposal or reclamation in accordance with local regulations.

7. HANDLING AND STORAGE

General Precautions	:	Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.
Handling	:	Avoid prolonged or repeated contact with skin. Avoid inhaling vapour and/or mists. When handling product in drums, safety footwear should be worn and proper handling equipment should be used. Properly dispose of any contaminated rags or cleaning materials in order to prevent fires.
Storage	:	Keep container tightly closed and in a cool, well-ventilated place. Use properly labelled and closeable containers. Store at ambient temperature.
Recommended Materials	:	For containers or container linings, use mild steel or high density polyethylene.
Unsuitable Materials	:	PVC.
Additional Information	:	Polyethylene containers should not be exposed to high temperatures because of possible risk of distortion.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational Exposure Limits

Material	Source	Type	ppm	mg/m3	Notation
Oil mist, mineral	ACGIH	TWA(Inhalable fraction.)		5 mg/m3	
Oil mist, mineral	OSHA Z1	PEL(Mist.)		5 mg/m3	

Additional Information : Due to the product's semi-solid consistency, generation of mists and dusts is unlikely to occur.

Biological Exposure Index (BEI)
No biological limit allocated.

Exposure Controls : The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. Appropriate measures include: Adequate ventilation to control airborne concentrations. Where material is heated, sprayed or mist formed, there is greater potential for airborne concentrations to be generated.
Define procedures for safe handling and maintenance of controls. Educate and train workers in the hazards and control measures relevant to normal activities associated with this product. Ensure appropriate selection, testing and maintenance of equipment used to control exposure, e.g. personal protective equipment, local exhaust ventilation. Drain down system prior to equipment break-in or maintenance. Retain drain downs in sealed storage pending disposal or for subsequent recycle. Always observe good personal hygiene measures, such as washing hands after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

Personal Protective Equipment : Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.

Respiratory Protection : No respiratory protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid breathing of material. If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation.

		Check with respiratory protective equipment suppliers. Where air-filtering respirators are suitable, select an appropriate combination of mask and filter. Select a filter suitable for combined particulate/organic gases and vapours [boiling point >65°C(149 °F)].
Hand Protection	:	Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) made from the following materials may provide suitable chemical protection: PVC, neoprene or nitrile rubber gloves. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended. For continuous contact we recommend gloves with breakthrough time of more than 240 minutes with preference for > 480 minutes where suitable gloves can be identified. For short-term/splash protection we recommend the same, but recognise that suitable gloves offering this level of protection may not be available and in this case a lower breakthrough time may be acceptable so long as appropriate maintenance and replacement regimes are followed. Glove thickness is not a good predictor of glove resistance to a chemical as it is dependent on the exact composition of the glove material. Glove thickness should be typically greater than 0.35 mm depending on the glove make and model.
Eye Protection	:	Wear safety glasses or full face shield if splashes are likely to occur.
Protective Clothing	:	Skin protection not ordinarily required beyond standard issue work clothes.
Monitoring Methods	:	Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate. Validated exposure measurement methods should be applied by a competent person and samples analysed by an accredited laboratory. Examples of sources of recommended exposure measurement methods are given below or contact the supplier. Further national methods may be available. National Institute of Occupational Safety and Health (NIOSH), USA: Manual of Analytical Methods http://www.cdc.gov/niosh/ Occupational Safety and Health Administration (OSHA), USA: Sampling and Analytical Methods http://www.osha.gov/ Health and Safety Executive (HSE), UK: Methods for the Determination of Hazardous Substances http://www.hse.gov.uk/

		Institut für Arbeitsschutz Deutschen Gesetzlichen Unfallversicherung (IFA), Germany. http://www.dguv.de/inhalt/index.jsp L'Institut National de Recherche et de Securité, (INRS), France http://www.inrs.fr/accueil
Environmental Exposure Controls	:	Take appropriate measures to fulfil the requirements of relevant environmental protection legislation. Avoid contamination of the environment by following advice given in Chapter 6. If necessary, prevent undissolved material from being discharged to waste water. Waste water should be treated in a municipal or industrial waste water treatment plant before discharge to surface water. Local guidelines on emission limits for volatile substances must be observed for the discharge of exhaust air containing vapour.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Red. Semi-solid at ambient temperature.
Odour	:	Slight hydrocarbon.
pH	:	Not applicable.
Initial Boiling Point and Boiling Range	:	Data not available
Dropping point	:	Typical 240 °C / 464 °F
Flash point	:	> 250 °C / 482 °F (COC)
Upper / lower Flammability or Explosion limits	:	Typical 1 - 10 %(V) (based on mineral oil)
Auto-ignition temperature	:	> 320 °C / 608 °F
Vapour pressure	:	< 0.5 Pa at 20 °C / 68 °F (estimated value(s))
Specific gravity	:	Typical 0.9 at 15 °C / 59 °F
Density	:	Typical 900 kg/m3 at 15 °C / 59 °F
Water solubility	:	Negligible.
n-octanol/water partition coefficient (log Pow)	:	> 6 (based on information on similar products)
Kinematic viscosity	:	Not applicable.
Vapour density (air=1)	:	> 1 (estimated value(s))
Electrical conductivity	:	This material is not expected to be a static accumulator.
Evaporation rate (nBuAc=1)	:	Data not available

10. STABILITY AND REACTIVITY

Stability	:	Stable.
Conditions to Avoid	:	Extremes of temperature and direct sunlight.
Materials to Avoid	:	Strong oxidising agents.
Hazardous Decomposition Products	:	Hazardous decomposition products are not expected to form during normal storage.

11. TOXICOLOGICAL INFORMATION

Basis for Assessment	:	Information given is based on data on the components and the toxicology of similar products.

Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).

Acute Oral Toxicity : Expected to be of low toxicity: LD50 > 5000 mg/kg , Rat
Acute Dermal Toxicity : Expected to be of low toxicity: LD50 > 5000 mg/kg , Rabbit
Acute Inhalation Toxicity : Not considered to be an inhalation hazard under normal conditions of use.
Skin Irritation : Expected to be slightly irritating. Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis.
Eye Irritation : Expected to be slightly irritating.
Respiratory Irritation : Inhalation of vapours or mists may cause irritation.
Sensitisation : Not expected to be a skin sensitiser.
Repeated Dose Toxicity : Not expected to be a hazard.
Mutagenicity : Not considered a mutagenic hazard.
Carcinogenicity : Not expected to be carcinogenic. Product contains mineral oils of types shown to be non-carcinogenic in animal skin-painting studies. Highly refined mineral oils are not classified as carcinogenic by the International Agency for Research on Cancer (IARC).

Material	:	Carcinogenicity Classification
Highly refined mineral oil (IP346 <3%)	:	ACGIH Group A4: Not classifiable as a human carcinogen.
Highly refined mineral oil (IP346 <3%)	:	IARC 3: Not classifiable as to carcinogenicity to humans.
Highly refined mineral oil (IP346 <3%)	:	GHS / CLP: No carcinogenicity classification

Reproductive and Developmental Toxicity : Not expected to be a hazard.
Additional Information : Used grease may contain harmful impurities that have accumulated during use. The concentration of such harmful impurities will depend on use and they may present risks to health and the environment on disposal. ALL used grease should be handled with caution and skin contact avoided as far as possible. High pressure injection of product into the skin may lead to local necrosis if the product is not surgically removed.

12. ECOLOGICAL INFORMATION

Ecotoxicological data have not been determined specifically for this product. Information given is based on a knowledge of the components and the ecotoxicology of similar products. Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).

Acute Toxicity : Poorly soluble mixture. May cause physical fouling of aquatic organisms. Expected to be harmful: LL/EL/IL50 10-100 mg/l (to aquatic organisms) LL/EL50 expressed as the nominal amount

of product required to prepare aqueous test extract.

Mobility	:	Semi-solid under most environmental conditions. If it enters soil, it will adsorb to soil particles and will not be mobile. Floats on water.
Persistence/degradability	:	Expected to be not readily biodegradable. Major constituents are expected to be inherently biodegradable, but the product contains components that may persist in the environment.
Bioaccumulation	:	Contains components with the potential to bioaccumulate.
Other Adverse Effects	:	Product is a mixture of non-volatile components, which are not expected to be released to air in any significant quantities. Not expected to have ozone depletion potential, photochemical ozone creation potential or global warming potential. Contains zinc naphthenate. Very toxic: LC/EC/IC50 0.1 - 1 mg/l (to aquatic organisms)

13. DISPOSAL CONSIDERATIONS

Material Disposal	:	Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations. Do not dispose into the environment, in drains or in water courses.
Container Disposal	:	Dispose in accordance with prevailing regulations, preferably to a recognised collector or contractor. The competence of the collector or contractor should be established beforehand.
Local Legislation	:	Disposal should be in accordance with applicable regional, national, and local laws and regulations.

14. TRANSPORT INFORMATION

US Department of Transportation Classification (49CFR)
This material is not subject to DOT regulations under 49 CFR Parts 171-180.

IMDG
This material is not classified as dangerous under IMDG regulations.

IATA (Country variations may apply)
This material is either not classified as dangerous under IATA regulations or needs to follow country specific requirements.

15. REGULATORY INFORMATION

The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

Shell Gadus S3 V220C 2
MSDS# 18078
Version 1.3
Effective Date 02/05/2014
According to OSHA Hazard Communication Standard, 29 CFR 1910.1200

Material Safety Data Sheet

Federal Regulatory Status

Notification Status

EINECS	All components listed or polymer exempt.
TSCA	All components listed.
DSL	All components listed.

Comprehensive Environmental Release, Compensation & Liability Act (CERCLA)

Shell Gadus S3 V220C 2 ()	Reportable quantity: 37 lbs
Zinc compounds, NOS (25103-54-2)	
Asphalt, fumes (8052-42-4)	Reportable quantity: 100 lbs

Shell classifies this material as an "oil" under the CERCLA Petroleum Exclusion, therefore releases to the environment are not reportable under CERCLA.

The components with RQs are given for information. Under Section 311 of the Clean Water Act (CWA) this material is considered an oil. As such, spills into surface waters must be reported to the National Response Center at (800) 424-8802.

SARA Hazard Categories (311/312)
No SARA 311/312 Hazards.

SARA Toxic Release Inventory (TRI) (313)

Zinc compounds, NOS (25103-54-2)	2.70%

State Regulatory Status

California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)

This material does not contain any chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

New Jersey Right-To-Know Chemical List

Zinc compounds, NOS (25103-54-2) 2.70%	Listed.
Asphalt, fumes (8052-42-4) 2.00%	Listed.

Pennsylvania Right-To-Know Chemical List

Asphalt, fumes (8052-42-4) 2.00%	Special hazard. Listed.

16. OTHER INFORMATION

NFPA Rating (Health, Fire, Reactivity)	:	0, 1, 0
SDS Version Number	:	1.3
SDS Effective Date	:	02/05/2014
SDS Revisions	:	A vertical bar (|) in the left margin indicates an amendment from the previous version.
SDS Regulation	:	The content and format of this MSDS is in accordance with the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
SDS Distribution	:	The information in this document should be made available to all who may handle the product.
Disclaimer	:	The information contained herein is based on our current knowledge of the underlying data and is intended to describe the product for the purpose of health, safety and environmental requirements only. No warranty or guarantee is expressed or implied regarding the accuracy of these data or the results to be obtained from the use of the product.

FORMS

Pre-Lift Planning Checklist

Project Data

Project:
Project Number:
Client/Owner:
Date of Lift:
Location of Lift:
Description of Lift:
Number of Gantry legs used:

Lift Type

Straight Up and Down:
Straight Up and Down with travel:
Stand up and Lay over:
Straight up and down w/ Side shifting:
Multiple beam lifts:
Load on top of header beams:
Combination lifts:
Other:

Lifted Load Data

Description:
Weight
How was weight determined:
Weight was determined by whom:

Load center of Gravity is:

Centered:
Off-centered:

Lifting component data

Component	Capacity	Deadweight
Link Links		
Header beams		
Slings		
Shackles		
Special lifting devices		

Total calculated load:

Maximum calculated load per gantry leg:

Gantry Data

Gantry model:
Serial number:
Manufacturer:
Number of stages:
Gantry weight:

Gantry is:

Externally propelled:
Self propelled:

Gantry support surface:

Concrete floor on grade:
Elevated floor:
Hardwood timber mats:
Softwood timber mats:
Crib stack:
Soil:
Other:

Have calculated bearing pressures been checked against allowable pressures on bearing surfaces? O Yes | O NO

Gantry system configuration:

Gantry will begin lift in what stage:
Gantry will finish lift in what stage:
Any special lifting devices:
Header beam span:
Loading point(s):

Rated capacity per gantry leg:

Maximum calculated load per gantry leg as percent of rated capacity:

Prepared by: Date:

Lift Planner Signoff: Date:

Project Manager Signoff: Date:

Pre-Lift Checklist

Date _____ Company Name _____

Job# _____ Location _____

1. Lift plan in place:

Yes:	No:

2. Secure Area:

Close off with caution tape and other visible working signs or barriers necessary to prevent unauthorized entry into work area.	
Check for overhead crane operation. Shut down and lock out if telescopic hydraulic gantry system extends higher than overhead crane.	
Notify area foreman of impending operation.	
Clear non-essential personnel from the area.	
Check for hazards: electrical, wind, water, etc.	
Do not allow other equipment or crews not directly related to the lift to work in the area.	
Make sure there are clear access routes for the crew to use in case of an emergency.	
Move everyone clear of lift area.	

3. Notify Owner:

Notify job site security/safety department of impending lift.	
Notify job site engineer of impending lift and pre-lift meeting.	

4. Pre-Lift Safety Meeting:

Check area for debris.	
Assign personnel to specific tasks.	
Explain in detail how lift will be safely accomplished.	
Verify personnel understand their tasks.	
Identify escape routes and other emergency procedures.	
Confirm method(s) of communication to be used during the lift.	
Explain what will be done under different emergency situations.	

5. Pre-Lift Telescopic Hydraulic Gantry System Check.

Fuel supply	
Fluid levels.	
Ensure quick disconnects are engaged	
Gantry legs for plumb	
Rigging for plumb.	
Gantry legs for parallel alignment.	
Header beams for levelness per lift plan.	
Operational check of all functions.	
Control levers in proper positions to begin lift.	
Clearances.	

6. Site Specific Pre-Lift Items

Lift Supervisor Name _____ Gantry Operator Name _____

Lift Supervisor Signature _____ Gantry Operator Signature _____

Open Cylinder Gantry Annual Inspection Checklist

Owner/User:		Model #	Serial #
Service Status:	Date:	Technician:	

Status: √ = Satisfactory X = Deficiency R = Recommendation N/A = Does not Apply

Item No	Item	Status
	Historical Data	
1	Current Annual Inspection	
2	Maintenance Records	
3	Repair/Modification Records	
4	Load Test Reports	
5	Other	
	General	
6	Sheet Metal	
7	Guards/ Covers	
8	Housekeeping	
9	Safety/Warning Decals	
10	Corrosion	
11	Hydraulic Oil Leaks	
12	Hours	
13	Other	
	Left Hand Power Unit	
14	Tagged with weight & capacity	
15	Leaks	
16	Pressure Settings	
17	Controls Identified	
18	Instruments/Gauges	
19	Welds	
20	Hydraulic Oil Leaks	
21	Decals	
22	Load Charts	
23	Performance	
24	Exhaust System	
25	Belt/Hoses	
26	Guards/Covers	
27	Coolant	
28	Engine Oil	
29	Air Filter	
30	Oil Filter	
31	Fuel Filter	
32	Engine Mounts	
33	Hydraulic Filters	
34	Couplers	
35	Electrical Components	
36	Electrical Connectors	
37	Other	

Item No	Item	Status
	Right Hand Power Unit	
38	Tagged with weight & capacity	
39	Leaks	
40	Pressure Settings	
41	Controls Identified	
42	Instruments/Gauges	
43	Welds	
44	Hydraulic Oil Leaks	
45	Decals	
46	Load Charts	
47	Performance	
48	Exhaust System	
49	Belt/Hoses	
50	Guards/Covers	
51	Coolant	
52	Engine Oil	
53	Air Filter	
54	Oil Filter	
55	Fuel Filter	
56	Engine Mounts	
57	Hydraulic Filters	
58	Couplers	
59	Electrical Components	
60	Electrical Connectors	
61	Other	
	Base #1	
62	Tagged with weight & capacity	
63	Cylinder Leaks	
64	Cylinder Seals	
65	Welds	
66	Hoses	
67	Selector Valve	
68	Hydraulic Leaks	
69	Level and Plumb	
70	Counter Balance Settings	
71	Safety Relief Settings	
72	Decals	
73	Header Plates	
74	Header Pins	
75	Wheel Bearings Greased	
76	Couplers	
77	Other	

Owner/User:		Model #	Serial #

Status: √ = Satisfactory X = Deficiency R = Recommendation N/A = Does not Apply

Item No	Item	Status
	Base #2	
78	Tagged with weight & capacity	
79	Cylinder Leaks	
80	Cylinder Seals	
81	Welds	
82	Hoses	
83	Selector Valve	
84	Hydraulic Leaks	
85	Level and Plumb	
86	Counter Balance Settings	
87	Safety Relief Settings	
88	Decals	
89	Header Plates	
90	Header Pins	
91	Wheel Bearings Greased	
92	Couplers	
93	Other	
	Base #3	
94	Tagged with weight & capacity	
95	Cylinder Leaks	
96	Cylinder Seals	
97	Welds	
98	Hoses	
99	Selector Valve	
100	Hydraulic Leaks	
101	Level and Plumb	
102	Counter Balance Settings	
103	Safety Relief Settings	
104	Decals	
105	Header Plates	
106	Header Pins	
107	Wheel Bearings Greased	
108	Couplers	
109	Other	
	Base #4	
110	Tagged with weight & capacity	
111	Cylinder Leaks	
112	Cylinder Seals	
113	Welds	
114	Hoses	
115	Selector Valve	
116	Hydraulic Leaks	
117	Level and Plumb	
118	Counter Balance Settings	
119	Safety Relief Settings	
120	Decals	
121	Header Plates	
122	Header Pins	
123	Wheel Bearings Greased	
124	Couplers	
125	Other	

Item No	Item	Status
	Load Charts	
126	Per Configuration	
127	Durable	
128	Legible	
129	Visible from Operator	
130	Secured	
Drives		
131	Cylinders	
132	Hydraulic Leaks	
133	Hoses	
134	Couplers	
135	Bearings	
136	Welds	
137	Chains	
138	Selector Valves	
139	Other	
	C.AR.L.	
140	Pendent	
141	Electrical Connectors	
142	Interconnect Cables	
143	Transducers	
144	Modules	
145	Encoders	
146	Radio	
147	Other	
	Optional Side Shifts	
148	Cylinders	
149	Hydraulic Leaks	
150	Hoses	
151	Couplers	
152	Wheels	
153	Bearings	
154	Welds	
155	Chains	
156	Center bar	
157	Links	
158	Other	

Owner/User:		Model #	Serial #

No Load Function Test			
Extend:	Retract:	Travel:	Side Shift:

Load Test			
Stage	Rated Capacity	Test Weight	% of Rated Capacity
First Stage			
Second Stage			
Third Stage			
Fourth Stage			

PASS	N/A	FAIL	EXPLANATION:

No Load Function Test			
Extend:	Retract:	Travel:	Side Shift:

Load Test			
Stage	Rated Capacity	Test Weight	% of Rated Capacity
First Stage			
Second Stage			
Third Stage			
Fourth Stage			

PASS	N/A	FAIL	EXPLANATION:

Deficiency/ Recommendation Report

Date:	Owner/User:	Unit:

D = Deficiency R = Recommendation

D/R	Item	Explanation	Signature of Representative once in compliance.	Date

Owner/User:			Model #	Serial #
D/R	**Item**	**Explanation**	**Signature of Representative once in compliance.**	**Date**

Owner/User:			Model #	Serial #
D/R	**Item**	**Explanation**	**Signature of Representative once in compliance.**	**Date**

Document is NOT VALID unless signed by BOTH "Technician" and "Representative" below

Technician: Company Representative: