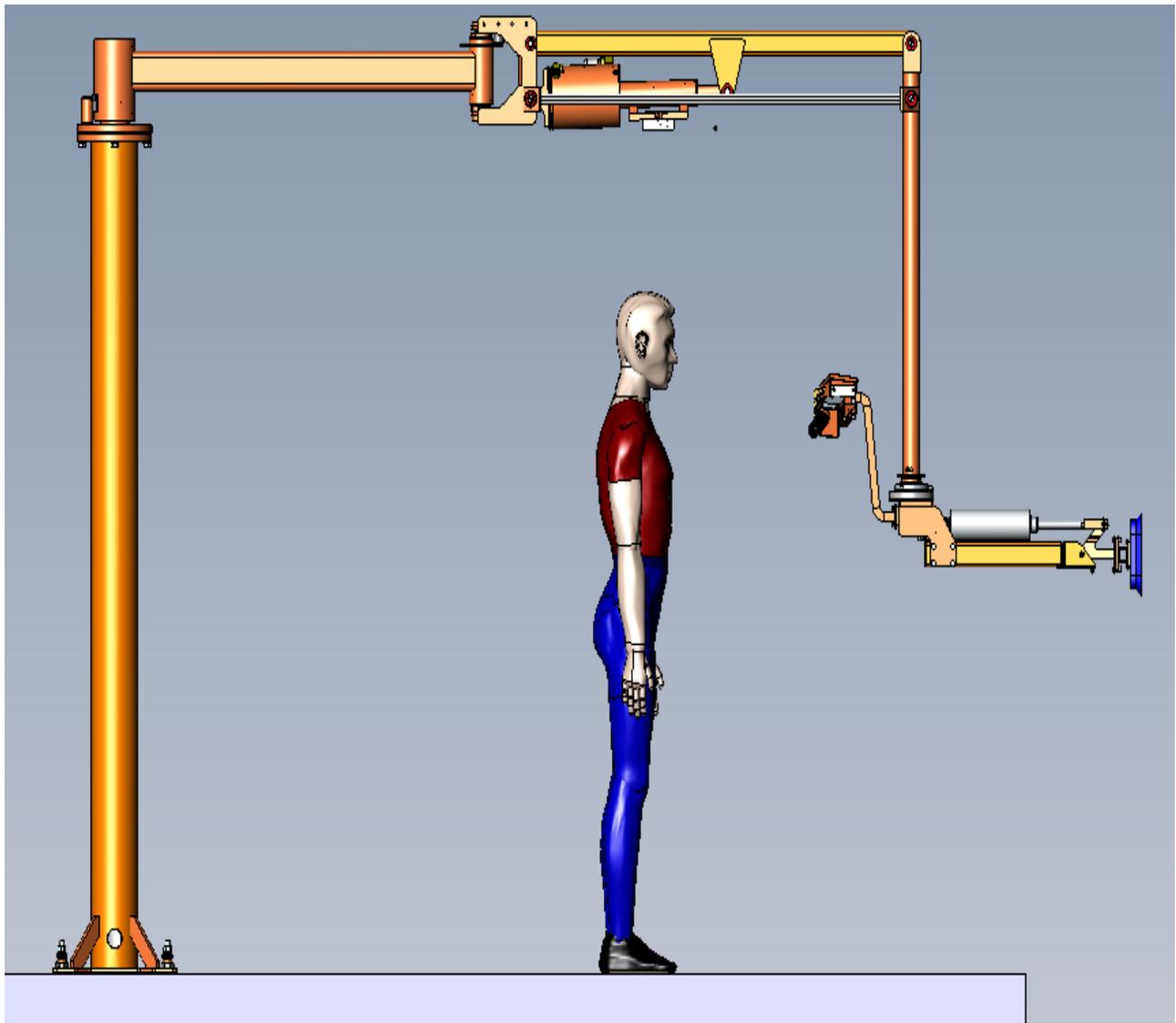


# OPERATOR SERVICE MANUAL

## LODEARM 3030



Material Handling Solutions Featuring  
**Positech • Conco**

April 22, 2009

MAG Automation & Controls  
4950 Marlin Drive  
Machesney Park IL 61115

### **GENERAL MACHINE CONFIGURATION**

**MODEL:** LA-3030                    **SERIAL NO:** 007251-01A    **RUN NO:** AHS7251

**TOOL SERIAL NO:** 007251-02A

**OPERATING PRESSURE:** 90 psi

**SCFM:** 35                            **MAX PAYLOAD & TOOL CAPACITY:** 40 lbs.

#### **THE MACHINE INCLUDES THE FOLLOWING:**

1. PROFILE LODEARM 3030,W PITCHING VAC TOOL (AHS007251-02-A)
2. LA FIRST ARM ASSY-WO BRAKES-48 (200125701-052)
4. MAIN LIFT ARM ASSY-LA 3030, STEEL (200133806-054-A)
5. 6.040 LIFT CYLINDER LODEARM 3030, ELF W/LL (9608916-A)
6. DOWNSHAFT WELDMENT (200121601-045)
7. TOOL ASSEMBLY-VAC WPEJ (200907605-A)
8. PNEUMATIC SCHEMATIC (200907001-A) with:
  1. Metering Control Circuit
  2. Vacuum On Control
  3. Gripper Safety Circuit
  4. Lift Cyl Safety Lock Valve
  5. Timed Blow Off
  6. Vacuum Off Control
  7. Minimum Lift Cylinder PSI
  8. Soft Pitch Control
- 10 PEDESTAL WLDMNT-LA/RA/AJB40, 96.0L, STEEL (200028800-087)
11. COLOR: Orange (150-P013100)

## CONTENTS OF OPERATOR'S/ SERVICE MANUAL

**MACHINE DESCRIPTION:** Lodearm with  
Standard Features & Options as Listed

**FOR:** MAG

**RUN NO:** AHS7251

**MODEL:** Lodearm 3030

**SERIAL NO:** 007251-01A

**TOOL SERIAL NO:** 007251-02A

**CONTROL NO:** OS-009113

**COMPILED BY:** Karen Siepker

| <b>ITEM</b> | <b>DESCRIPTION</b>                           | <b>SHEET NO.</b> | <b>REV.</b> |
|-------------|--|------------------|-------------|
|             | <b>DO AND DO NOT</b>                         |                  |             |
| 1           | Machine Profile LA 3030W/Pitching Vac Tool   | AHS007251-02     |             |
| 2           | Lodearm Operation/Service Manual             | 1 – 51           |             |
| 3           | Main Lift Arm Assy-LA3030, 54L & Parts List  | 200133806-054A   |             |
| 4           | LA First Arm Assy-WO Brakes-52” & Parts List | 200125701-052A   |             |
| 5           | LA 3030 MJ Assy-Standard & Parts List        | 200315004        |             |
| 6           | Lodearm Lift Cylinder Assy & Parts List      | 9608916          | A           |
| 7           | LA REA 3000/300 Rot/No Air                   | 9218914-300      | E           |
| 8           | Tool Assy-Vac W/PEJ & Parts List             | 200907605        | A           |
| 9           | Horz PEJ Assy-1500 In-Lb                     | 200908507        | A           |
| 10          | RH Steering Handle/W/ Single PB Box          | 200819608        |             |
| 11          | LH Steering Handle/With Single PB            | 200819607        |             |
| 12          | Pneumatic Schematic & Parts List             | 200907001        | A           |
| 13          | Schematic-Soft Pitch 1/8 NPT                 | 200828906        |             |
| 14          | Mtg Plate Assy-GSC W/Valves And Fittings     | 200723600        | A           |
| 15          | Pedestal Mtg-Sam G/LA/RA/AJB-40 & Parts List | 200112701        | A           |
| 16          | Material Safety Data Sheet                   | 1 – 15           |             |
| 17          | Pneumatic Service Checklist                  | 1 page           |             |
| 18          | Recommended Spare Parts List                 | 1 page           |             |



# Safe Operation & Maintenance Guidelines

**Important to read and understand  
before operating, or maintaining this equipment**

## Do's and Do Not's

The following are Do's and Do Not's for safe operation of the manipulator. A few minutes spent reading these rules can make an operator aware of his/her own safety and the safety of others. Frequent examinations and periodic inspections of the equipment and conscientious observance of safety rules will help prevent injuries, lost production time and money.

### Warning - To avoid injury: **THE DO'S**

- **DO** read the operation instructions in this manual.
- **DO** become familiar with the operating controls, procedures and warnings.
- **DO** make sure that if the manipulator is mounted on a portable base, the support surface is flat and that the leveling jacks touch the floor.
- **DO** maintain firm footing while operating the manipulator.
- **DO** operate the manipulator arms by pushing and pulling directly in front of the body.
- **DO** make sure that the load is free to move and will clear all obstructions.
- **DO** make sure that all persons stay clear of the suspended load.
- **DO** warn personnel of an approaching load.
- **DO** promptly report any malfunction, unusual, performance, or damage to the manipulator.
- **DO** use energy control practices outlined in Lock-out/Tag-out procedures to identify danger, or neutralize power to the manipulator prior to adjustments, or maintenance procedures.
- **DO** inspect the manipulator regularly, replace any damaged or worn parts, and keep appropriate records of maintenance.
- **DO** use Positech parts when repairing the manipulator.
- **DO** check all bearings on the manipulator for proper operation.
- **DO** inspect all hydraulic, or pneumatic cylinders for external leakage.
- **DO** check oil level in the reservoirs and maintain filter condition.

### Warning - To avoid injury: **THE DO NOT'S**

- **DO NOT** raise more than the rated load.
- **DO NOT** use a damaged unit or a unit that is not working correctly.
- **DO NOT** allow your attention to be diverted while operating the manipulator.
- **DO NOT** operate the manipulator arms by pushing and pulling that requires twisting of the back.
- **DO NOT** use the manipulator to lift, support, or transfer people.
- **DO NOT** lift loads over people.
- **DO NOT** allow unauthorized personnel within the working area of the manipulator.
- **DO NOT** leave a suspended load unattended unless safety precautions have been taken.
- **DO NOT** remove or obscure any warning labels on the manipulator.
- **DO NOT** adjust or repair the manipulator unless qualified to perform such maintenance or repair.



**This symbol warns people of possible danger**

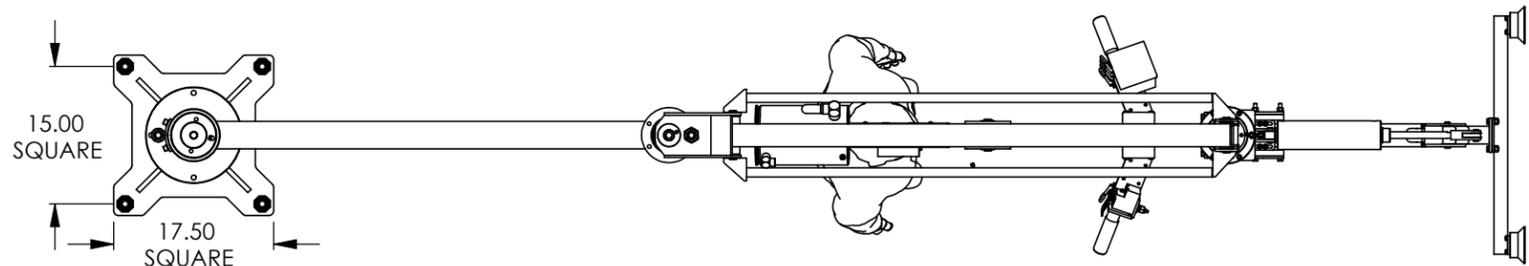
## IMPORTANT SAFETY INSTRUCTIONS



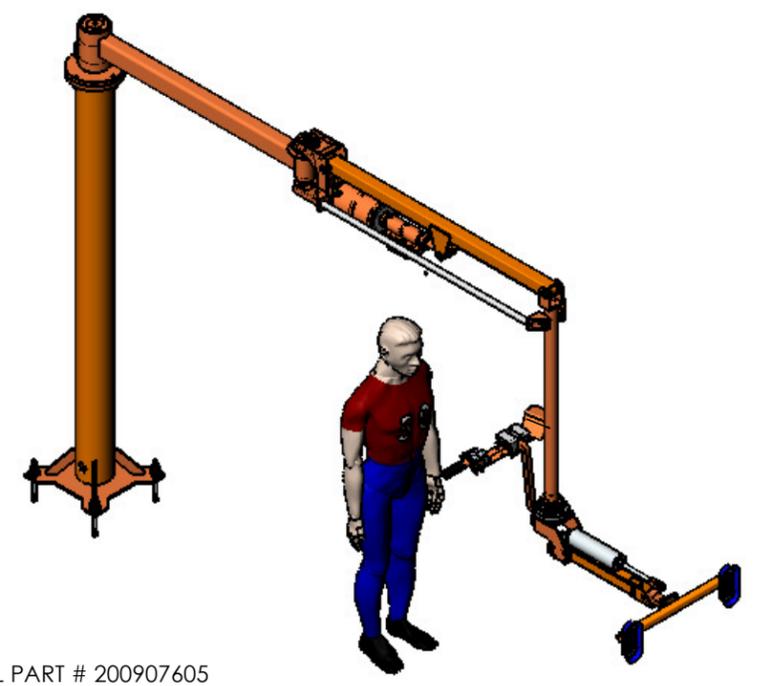
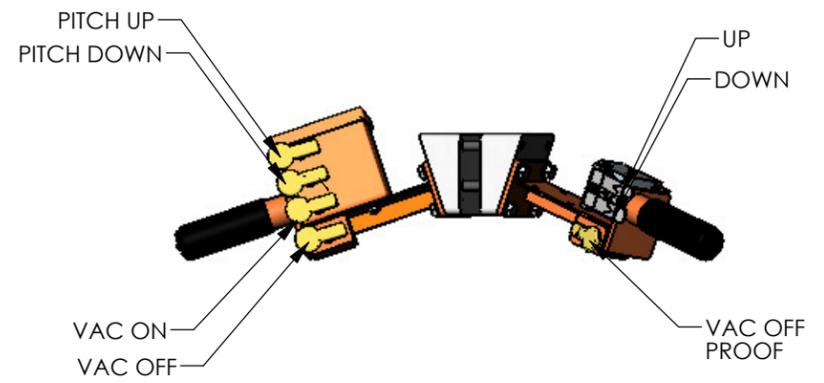
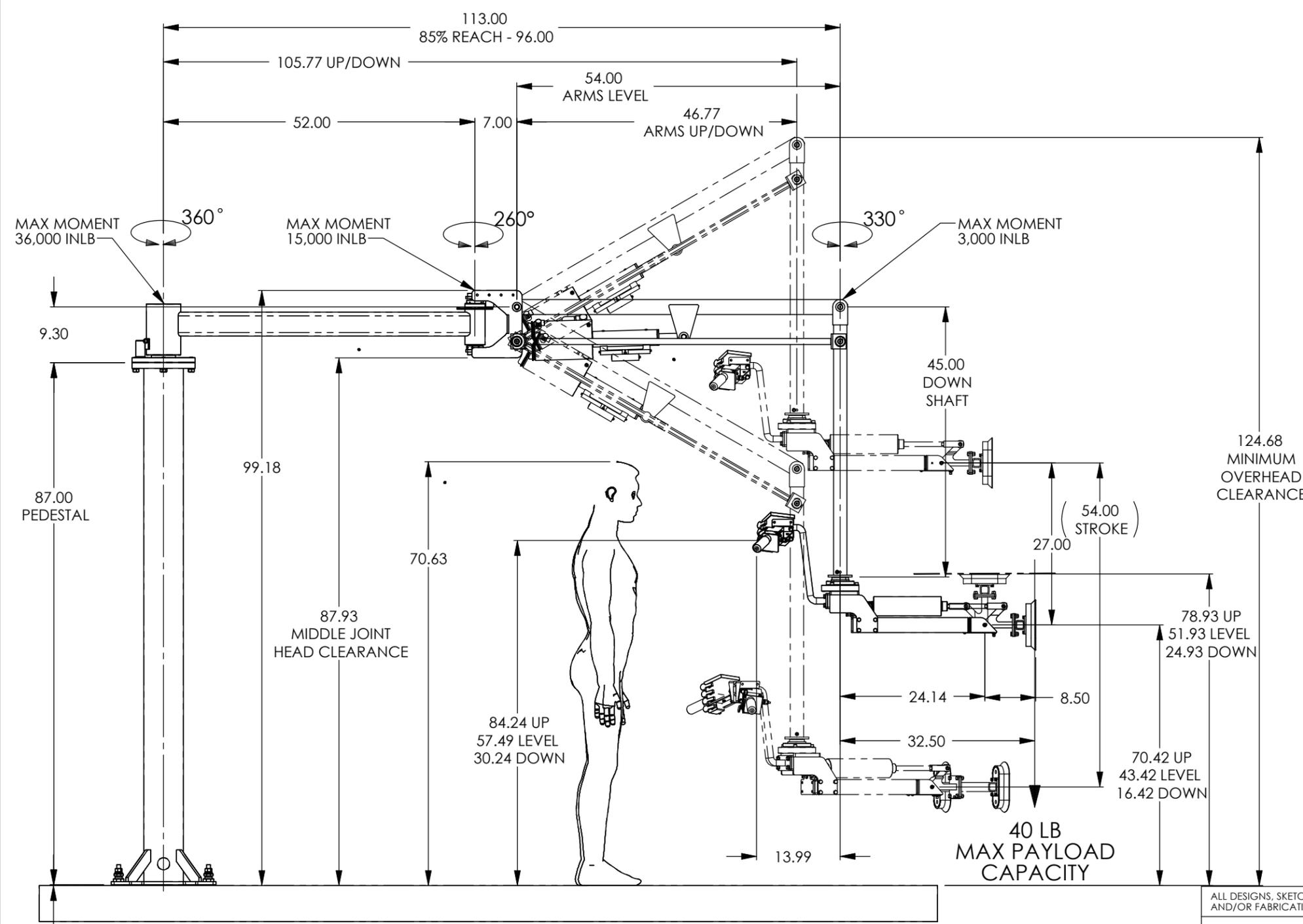
When using powered manipulators, basic safety precautions should always be followed to reduce risk of damage, and personal injury, including the following:

### READ ALL INSTRUCTIONS

- **REVIEW, AND PRACTICE SAFE OPERATION OF THE MANIPULATOR.** Become familiar with, and practice the Do's and Do Not's for safe operation of the manipulator.
- **KEEP WORK AREA CLEAN.** Cluttered work areas invite injuries.
- **CONSIDER WORK AREA ENVIRONMENT.** Don't expose the manipulator to rain or wet locations. Keep work area well lit. The standard manipulator is **NOT** designed for explosive atmospheres. Special non-standard designs may be required for use in extreme environments. Consult the factory with questions.
- **KEEP CHILDREN AWAY.** All visitors, and personnel not familiar with the work range of the manipulator should be kept away from the area.
- **NEVER LIFT PEOPLE WITH MANIPULATOR OR TOOLING.** The manipulator is not designed as a manlift device. Although the manipulator typically has this lift capacity, lifting of personnel is **ABSOLUTELY PROHIBITED**.
- **DON'T FORCE THE MANIPULATOR, or TOOLING.** The machine will do the job better and safer at the realistic rate for which it was intended.
- **DON'T OVERREACH OR TWIST.** Keep proper footing and balance at all times. Use the vertical rotation axes provided by the bearings of the equipment to proper position your body so pushing the loaded manipulator is always possible.
- **USE RIGHT TOOL.** Use the tooling for what it was designed to handle. Don't force a small tool or attachment to do the job of a heavy-duty tool.
- **CHECK DAMAGED PARTS OR LOOSE CONNECTIONS.** Before further use of tool, or manipulator, a guard or other part that is damaged should be carefully checked to determine that it would operate properly and perform its intended function. Check for alignment of moving parts, binding of moving parts, breakage of parts, mounting, and any other conditions that may affect operation. Use the troubleshooting guide, and routine maintenance checklist for inspecting the equipment at regularly scheduled time periods. Contact the factory for service assistance, and directions.
- **USE CAUTION WHEN INSTALLING, OR PERFORMING ROUTINE MAINTENANCE.** See the specific instructions contained in this manual for lifting, and placing the manipulator. Support the lift arm structure when servicing the main lift cylinder. Have a second person assist with lift speed, and other adjustments.
- **PROPERLY STORE, AND HANDLE THE MATERIALS USED FOR MAINTAINING THE MANIPULATOR.** Material Safety Data Sheets (MSDS) are included for proper storage, handling, and use of lubricants, and other materials used for maintaining the manipulator equipment.



- NOTES:
1. THE CUSTOMER IS TO SUPPLY CLEAN COMPRESSED AIR AT 90 PSI (120 PSI MAXIMUM) AND 35 SCFM. SET THE SYSTEM REGULATOR TO 90 PSI.
  2. COLOR: ORANGE
  3. MAXIMUM MACHINE MOMENT = 36,000 IN-LBS  
SYSTEM WEIGHT (INCLUDING PAYLOAD) = 550 LBS  
MACHINE CAPACITY = 160 LBS
  4. MACHINE SERIAL NUMBER: AHS007251-01A  
MACHINE MODEL NUMBER: LA 3030  
RUN NUMBER: AHS007251  
PNEUMATIC SCHEMATIC: 200907001
  5. USE 85% OF REACH FOR LAYOUT PURPOSES.



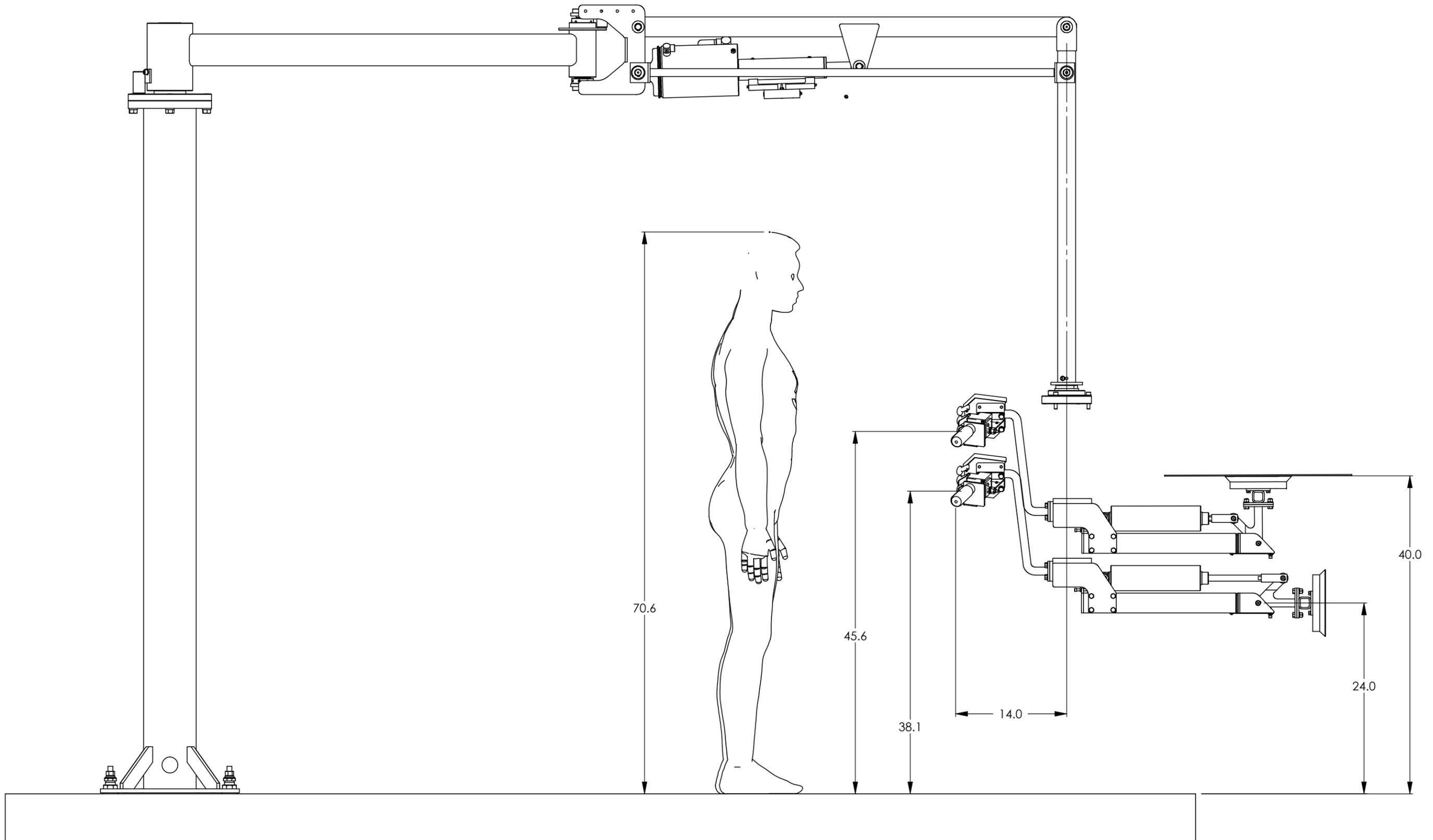
|      |                              |     |             |
|------|------------------------------|-----|-------------|
| A    | RAISED CONTROL HANDLE HEIGHT | KJB | 30-Mar-2009 |
| REV. | DESCRIPTION                  | BY  | DATE        |

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|  |                      |               |        |
|--|----------------------|---------------|--------|
| PROFILE VIEW-LA 3030 W PITCHING VAC TOOL |                      |               |        |
| SCALE: 1:20                              | DATE: 13-MAR-2008    | DRAWN BY: KJB |        |
| CLASS CODE: 920                          | DWG NO: AHS007251-02 | SHT: 1 of 2   | REV: A |

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PROFILE VIEW-LA 3030 W PITCHING VAC TOOL

|                 |                      |               |        |
|-----------------|----------------------|---------------|--------|
| SCALE: 1:12     | DATE: 13-MAR-2008    | DRAWN BY: KJB |        |
| CLASS CODE: 920 | DWG NO: AHS007251-02 | SHT: 2 of 2   | REV: A |

# OPERATOR SERVICE MANUAL

## SUPERIOR FEATURES OF YOUR LODEARM/REACTION ARM AIR MANIPULATOR

Positech manufactures the LodeArm 3030, the LodeArm 4500, and the Reaction Arm as air operated lift assist devices (manipulators). These manipulators are rated for payloads ranging from 0 to 275-LB, at 90-PSI air input. These manipulators are intended for universal mounting, either floor mounted, overhead mounted from the ceiling, or from an overhead rail system.

Users benefit from the increased safety, versatility, and efficiency, as well as the low maintenance requirements that have been designed into these machines. Positech is not aware of any other machines, currently offered, which can match all of these superior features.

### FEATURES

#### **A. DESIGN FACTOR**

Positech manipulators are structurally designed to a 5:1 design factor against failure based on the ultimate tensile strength of the materials used.

#### **B. LOST LOAD CONTROL DEVICE (LodeArm Models w/ metering control only)**

In addition to the standard lift cylinder, Positech uses an independently sealed hydraulic cylinder to prevent uncontrolled vertical travel of the arm. This uncontrolled movement could be caused if a payload is inadvertently lost during transfer. For example: If a part-supporting sling should break, the compressed air in the lift cylinder would ordinarily cause the arm to move upward in an uncontrolled, violent manner. However, Positech's Lost Load Device is designed to prevent this dangerous movement. When properly adjusted, the lost load valve on the cylinder will detect unusual vertical speeds, it will then stop the upward travel within a few inches following the loss of the load, and will allow the arm to move upward at a controlled speed. The Lost Load Device provides easy adjustment, for sensitivity, by the user.

Since oil is used only in the independently sealed lost load cylinder, and not in the main lift cylinder, this eliminates objectionable, messy oil misting at various points on the machine, including at the operator's metering valve controls.

#### **C. END-OF-ARM LOADING**

The Reaction Arm and LodeArm series manipulators are designed with parallel linkage lift arms, which keeps the tool mount horizontal. The parallel linkages make it possible to mount an extended tool from the end of the arms, with an end-joint moment capacity of 3,000 to 5,000 in-lb. This permits users to extend the tooling and payload well beyond the end of the arm and still fully rotate 360 degrees, continuously around a vertical axis, at the end of the arm.

#### **D. UNIVERSAL MOUNTING**

These manipulators can be mounted either from a floor-mounted pedestal or from an overhead mount, such as the ceiling or on a rail system.

#### **E. "MAGIC VALVE" (DUPLEX CONTROLS)**

Positech machines have either metering valve or balance controls as standard equipment.

As an option, Positech also offers duplex controls. The automatic balancing "Magic Valve". This allows a machine to have the benefit of both metering valve and balance controls.

With Positech's duplex controls, once any load is lifted by way of the operator's metering valve control, it is immediately and automatically balanced when the operator flips a switch. No adjustments need to be made and no additional buttons need to be pushed.

**F. PNEUMATIC SAFETY FEATURES AND OPTIONS**

All Positech air manipulators have a lift cylinder safety-blocking valve, as standard equipment. This safety feature locks the air pressure in the main lift cylinder if a sudden loss of air supply pressure occurs. As a result, the arm will not drop dangerously when air supply pressure is suddenly interrupted.

Other pneumatic safety and control features are also offered as optional equipment. These include:

**Gripper Cylinder Safety Locking Valve**

(Payloads won't immediately drop if system pressure is lost).

\*Standard on all gripper and pitching end-joint cylinders.

**Gripper Safety Circuit**

(Will not release unsupported loads.)

**Vacuum Safety Check Valve**

(Vacuum tooling will not immediately drop nonporous payloads due to a sudden air supply pressure interruption.)

**Automatic Activation of Balance Circuit with Safety Vacuum Sensing**

(Detects adequate load support vacuum before balancing the payload. Disengages the payload balance circuit before the payload is released.) \*Allows single switch control for normal operation.

**Automatic Activation of Balance Circuit**

(Activates the balance circuit, after the gripper is engaged. Disengages the gripper after the balance circuit is shifted to "no load".)

\*Allows single switch control for normal operation.

**Gripper Pressure Regulator**

(Will help to avoid crushing the payload.)

**G. MADE IN THE USA**

The entire Positech line of manipulators and tools are designed and built in our factory in Laurens, Iowa. All parts and fully factory supported and are, therefore, easily provided. Included in the Operator's/Service Manual is a recommended list of spare parts (most of which are readily available).

**H. AFTER SALES SUPPORT**

Positech is committed to your satisfaction through the sale of trouble-free equipment. The care taken, both during the proposal process and the design and build stages ensure superior performance.

However, if problems do arise, you are not forgotten after delivery. Positech personnel respond immediately and efficiently to calls for service.

## INSTALLATION INSTRUCTIONS

### A. INSTALLATION SUMMARY

**NOTE:**

Where provided, any checked blanks apply to your manipulator. Where blanks are not provided, this information applies to all manipulators.)

(Do not adjust any controls without reading the instructions.)

1. Inspect the support structure or concrete floor and verify its ability to withstand the expected loading conditions (Installation Instructions, Section B).
2. **If applicable:**
  - Counterweight the mobile-base.
  - Extend the mobile base corner jacks to level the base. Only the four screw jacks should be contacting the floor (Installation Instructions, Section C-2).
3. **Attach the floor pedestal, overhead spacer, or other machine mounting hardware to the support structure, concrete floor, mobile base, or trolley, (Installation Instructions, Section D).**
4. **Provide an adequate air supply to the manipulator's air input location at the bottom of the manipulator's main post (Installation Instructions, Section E).**
5. **Lift the manipulator off the pallet carefully and locate it close to the mounting surface.**

**CAUTION:**

Do not disconnect the manipulator from the pallet, until after the machine is supported by the forklift (see Installation Instructions, Section F-1).

6. **Connect the air supply line to the manipulator (Installation Instructions, Section F-1).**
7. **Attach the manipulator to the pedestal, spacer, or other mounting structure (Installation Instructions, Section F-2).**
8. **Attach the tooling to the end of the manipulator arm. Connect all airlines to the tooling (Installation Instructions, Section G).**
9. **Provide air pressure to the manipulator and check for leaks.**

**NOTE:**

Balance control machines have one bleed location (see Machine Adjustments, Section H).

10. **Level the manipulator (and tooling if applicable), adjust the controls, (Machine Adjustments, Section A) and perform safety tests (Maintenance Instructions, Section J).**

## B. MACHINE SUPPORT LOADING

### 1. Vertical Loading:

| <u>ITEM</u>            | <u>STATIC WEIGHT (LBS / Kg)</u> |
|------------------------|---------------------------------|
| Trolley-----           | 0 / 0                           |
| Pedestal / Spacer----- | 186 / 84                        |
| Base Machine-----      | 286 / 129                       |
| Tooling-----           | 72 / 32                         |
| Payload-----           | 40 / 18                         |
| Mobile Base-----       | 0 / 0                           |
| Other-----             | 0 / 0                           |
| <b>TOTAL</b>           | <b>584 / 264</b>                |

### 2. Main Post Moment Loading:

| <u>ITEM</u>                            | <u>MAXIMUM STATIC (IN-LBS)</u> |
|--|--------------------------------|
| Base Machine (at main post = 286 x 50) | 14,300                         |
| Tooling (at main post = 72 x 123)      | 8,856                          |
| Payload (at main post = 40 x 146)      | 5,840                          |
| Other (at main post = 0 x 0) 0         |                                |
| <b>TOTAL</b>                           | <b>28,996 (IN-LBS)</b>         |

### 3. End Joint Moment Loading

| <u>ITEM</u>                      | <u>MAXIMUM STATIC (IN-LBS)</u> |
|----------------------------------|--------------------------------|
| Tooling (at end joint = 72 x 10) | 720                            |
| Payload (at end joint = 40 x 33) | 1,320                          |
| Other (at end joint = 0 x 0) 0   |                                |
| <b>TOTAL</b>                     | <b>2,040 (IN-LBS)</b>          |

4. The machine's maximum static load (vertical) on one jack of the mobile base or one truck when trolley mounted is        lbs.

5. **IMPORTANT:** The values provided above are for static loading conditions. Positech recommends using a minimum design factor of five to one (5:1) based on the supporting structure's ultimate strength to allow for dynamic loading. Positech also recommends a maximum supporting structure deflection of 1/4 degree to maintain the machine's levelness. Concrete requirements for Positech supplied floor pedestals (see Installation Instructions, Section D-1-b).

## C. MOBILE SUPPORTS

### 1. Trolley Installation:

- a) Rails should be parallel within 1/4 inch and level within 1/4 degree along their entire length. Maximum slope, of 1 inch, over 450 inches.
- b) Rails should be cross-braced and rigidly supported at sufficiently close intervals to accommodate the Machine Support Loading (see Installation Instructions, Section B).
- c) Be careful not to damage any airlines or other fragile components of the trolley when disconnecting the equipment from the pallet and attaching the lifting device to be used. Place the trolley between the rails with the wheels between the flanges by sliding it in at one end of the rails.
- d) Be sure that safety stops are installed at both ends of the rails to prevent the trolley trucks from exiting rails.
- e) Inspect the rope-operated brake on a non-powered trolley for proper engagement with the bottom of the trolley rails.

### 2. Mobile or Portable Base Installation:

- a) If the mobile base is not counterweighted, add the required counterweights (see the mobile base assembly drawing provided).
- b) Level the base by extending the corner jacks so that only the four jack pads are contacting the floor.

#### **CAUTION!**

The machine may upset if the corner jacks are not properly extended.

## D. MACHINE MOUNTING HARDWARE

### 1. Floor Pedestals:

#### **NOTE:**

With the optional screw jacks, each should be screwed 1/16 inch through the bottom (or top) of the pedestal (or spacer) base at this time (final adjustment will be performed after the machine is assembled).

#### a) Mobile or Portable Base Attachment:

Install the four bolts and lock washers provided through the pedestal base (and optional screw jacks) into the tapped holes provided in the base. Refer to the pedestal assembly drawing for proper bolt installation (below). Proper bolt torque must be applied when installed (see Machine Adjustments, Section A-2).

#### b) Concrete Floor Attachment:

- i. There should be no cracks within 48 inches of the pedestal centerline.
- ii. The base bolts may be installed directly into the concrete floor (using the pedestal base as a template) if the following conditions are satisfied (see drawing on the next page):

(a) *The reinforced concrete is at least 6 inches thick and has a minimum strength of 3500-PSI.*





- ix. Torque the nut to seat the bolt into the concrete. Nut torque should be 250 ft.-lb. Loosen the nut about one-half turn to allow for leveling adjustments. The seating torque is **NOT** the final installation torque.
- x. Install the remaining three bolts by repeating steps iii. through vii.
- xi. After all anchor bolts are in place, proper bolt torque must be applied (see Machine Adjustments, Section A-2).

c) Other Support Structure Attachments:

- i. The support structure must be capable of safely supporting the manipulator. See Machine Support Loading (Installation Instructions, Section B) for structural strength requirements.
- ii. The pedestal base can be used as a drilling template, or bolt center dimensions can be used from the pedestal assembly drawing provided.
- iii. Drill .562-inch diameter holes through the support structure if bolts and nuts are to be used (Positech recommends using lock nuts or lock washers). If threaded holes are to be used, verify a minimum of one bolt diameter thread engagement (allow for leveling shims or optional screw jack adjustments). It is better to use a longer bolt and lock nut even with threaded mounting holes.
- iv. Refer to the pedestal assembly for proper optional screw jack installation.
- v. See Machine Adjustments, Section A-2, for proper base bolt torque and machine leveling instructions (level the manipulator after assembly is complete).

2. Overhead Spacers

(All overhead spacers are provided with leveling jacks.)

a) Trolley Attachment: (For customer supplied trolley, see fixed attachment below.)

- i. Refer to the overhead spacer drawing for proper bolt and screw jack installation.
- ii. Bolt the spacer to the mating four-bolt pattern on the trolley mounting plate. Use the bolts and nuts provided.
- iii. See Machine Adjustments, Section A-2, for proper base bolt torque and leveling instructions.

b) Fixed Attachment:

**CAUTION:**

Bolts must be SAE grade 5 (minimum) and 5/8 inch diameter.)

- i. The support structure must be capable of safely supporting the manipulator. See Machine Support Loading (Installation Instructions, Section B) for structural strength requirements.
- ii. The spacer base can be used as a drilling template, or bolt center dimensions can be used from the overhead spacer assembly drawing provided.
- iii. Drill 11/16 inch diameter holes through the support structure if bolts and nuts are to be used (Positech recommends using lock nuts or lock washers). If threaded holes are to be used, verify a minimum of one bolt diameter thread engagement (allow for screw

jack adjustments). It is better to use a longer bolt and locknut even with threaded mounting holes.

iv. Refer to the Overhead Spacer Assembly drawing for proper screw jack installation.

v. See Machine Adjustments, Section A, for proper base bolt torque and machine-leveling instructions (level the manipulator after assembly is complete.)

**3. Customer Supplied Mounting Hardware:**

a) The support structure must be capable of safely supporting the manipulator. See Machine Support Loading (Installation Instructions, Section B) for structural strength requirements.

b) Please proceed through the instructions before attaching the manipulator to its support.

**E. AIR SUPPLY REQUIREMENTS**

Your Positech Model LODEARM air manipulator requires clean, regulated compressed air at 90-PSI (6.20 bar) for its rated load capacity (120-PSI or 8.26 bar maximum allowed) at 35 SCFM (990 NLM), when operating at a vertical rate of 24 inch/sec.

The minimum supply line size is 3/8 NPT.

**NOTE:**

Supply line sizes may need to be larger for long lines, low system pressures, vacuum tooling air requirements, etc. The manipulator will lift the payload slowly, or not at all, if the air supply requirements are not met.

Positech recommends the installation of an in line air filter conveniently mounted for regular service before the manipulator connection. The air filter supplied with the manipulator can then act as a secondary filter. This will help protect the valves, cylinders and other component from damage due to air supply contaminates.

**F. ATTACHING THE MANIPULATOR TO ITS SUPPORT**

**1. Lifting the Manipulator:**

a) Remove the top and sides of any crating and protective wrappings from around the manipulator. Inspect if for signs of damage due to shipping. Document damage and make any claims to the carrier.

**CAUTION:**

Do not disconnect the manipulator from the pallet underneath or it could fall over!

b) Lift the machine to a position about 6 to 12 inches above (or below) the mounting flange which mates to the main post bearing.

c) Connecting the Air Supply:

**IMPORTANT:**

Quick-disconnect couplers must be locked securely to avoid separation during operation of the manipulator. Twist locks must be turned approximately 90 degrees.

**CAUTION:**

The air supply should be shut off at this time.

d) If necessary, pull the air supply line provided through the hole in the side of the pedestal near the bottom or in the spacer near the top. Connect the swiveling quick disconnect to

its mating connection installed in the bottom of the main post.

- e) Connect your air supply line to the end of the hose or pipe provided.

**CAUTION:**

The air supply to the manipulator should be shut off at this time.

**2. Attaching the Manipulator to the Pedestal:**

- a) Lift (or lower) the manipulator slowly to the mounting flange. Keep the slack pulled out of any airlines running through or around the mounting hardware to prevent kinks or crushing.
- b) Start the four 5/8-11 bolts with lock washers provided through the floor pedestal (or overhead spacer) flange and into the threaded holes in the main post bearing spindle flange.
- c) Tighten the bolts evenly and cross-torque them to between 150 and 200 ft.-lb.

**G. ATTACHING THE TOOLING**

**1. Manipulator With Rotating End-joint:**

- a) Tooling is typically attached in one of two ways. In the case of the Reaction Arm, the tool is attached directly to the end of the down-shaft. In the case of a Lode Arm, the tool will be attached to an end-joint, which is either pinned into the end of the down shaft or attached using a "box frame" bolted to the end of the down shaft. The "box frame" is used when 360-degree rotation is desired.
- b) Connect any airlines required to operate the tooling to their fittings by matching the line identifiers and the markings on the end joint.

**NOTE:**

Some airlines may be more easily connected before connecting the tool adapter to the down shaft flange.

- c) Use hose clamps and plastic ties, which are normally provided, to secure any loose air lines to the manipulator and its accessories before operating.

**H. PRESSURIZING THE AIR SYSTEM**

**NOTE:**

Balance control manipulators should have the "Load/No Load" control in the "No Load" position.

1. Provide air pressure to the manipulator from the air supply line. The line pressure should be 90-PSI or 6.21 bar (maximum of 120-PSI or 8.27 bar).
2. Screw in the filter/regulator/lubricator (FRL) air pressure adjustment until 90-PSI shows on the gauge at that location (on the main arm). See the FRL instructions provided.
3. Check the manipulator and its accessories for leaks.

**NOTE:**

Balance control manipulators have one built-in adjustable bleed at the black balance valve on the main post. The bleed is a sensitivity adjustment for the balance circuit and should not need adjustment.

If any unusual leaks are detected, locate them and turn off the supply pressure. Replace any damaged airlines or components. Turn the system pressure back up and re-inspect the system for leaks.

- 4. After reading the balance control adjustment instructions on Page 16, set the no load regulator to balance the tooling. Move the arm up and down slowly to initialize the diaphragm cylinder. The movement should be smooth and without binding. DO NOT force the arm vertically past a bind. Instead, move it the other direction as far as possible and try again to move it gently through the bind zone. If binding persists contact Positech for a replacement cylinder.

**Your Positech air manipulator is now installed and ready for final adjustment.**

## **MACHINE ADJUSTMENTS**

### **A. LEVELING THE MANIPULATOR**

Refer to the mounting assembly print for bolt and screw jack requirements.

#### **1. General Information:**

##### **IMPORTANT:**

The main post must be as straight up and down as possible. One method for leveling is to place a machinist's level flat on the manipulator mounting flange at the top/bottom of the main post. Level it in two directions, 90 degrees apart. The bubble in an accurate level should stay nearly centered as the manipulator is rotated around its main bearing axis.

A second method, which is less accurate, is to level the mounted manipulator so the machine does not drift around the main post when in any position.

##### **NOTE:**

The optional main post drag brake must be loosened for the second method to be effective.

#### **2. Floor Pedestal Leveling:**

##### **IMPORTANT:**

Torque the anchor bolt nuts to 100 ft.-lb.

- a) Standard Pedestal (Without Screw Jacks)
  - i. Check the manipulator's levelness.
  - ii. If the manipulator is not level, loosen the anchor bolt nuts slightly. Insert shims under the base plate near the bolts until the manipulator is level when the anchor bolts are tight. Recheck the manipulator's levelness and readjust if necessary.
- b) Pedestal With Optional Screw Jacks
  - i. Be sure that all four of the anchor-bolt nuts are snug but not tight.
  - ii. Loosen the locking jam nut on the screw jacks.
  - iii. Adjust the four screw jacks until the manipulator is level.
  - iv. Tighten the jam nuts to the threaded base plate and torque the anchor bolt nuts to 100 ft.-lb.
  - v. Recheck the manipulator's levelness and readjust if necessary.

#### **3. Re-leveling:**

##### **IMPORTANT:**

The manipulator will probably require re-leveling after one or two weeks of use. This is due to the final setting of the concrete anchor bolts or settling of the support structure.

The manipulator may require re-leveling every few months, particularly after seasonal temperature changes. The support structure may settle and will likely be affected by thermal expansion and contraction.

## **B. DRAG BRAKE ADJUSTMENTS**

### **1. Middle Joint Drag Brake:**

A drag brake is provided to restrict side to side swinging of the parallel arms with respect to the first arm. If the parallel arm moves, too freely for your needs, tighten the drag brake-adjusting plug for the desired amount of drag. This adjustment is sometimes used to overcome drift when a manipulator has been installed slightly out of level.

#### **NOTE:**

The manipulator is usually shipped with no middle joint drag applied.

### **2. Optional Main Post Rotation Drag Brake:**

An operator can choose the amount of friction he wants on the main post rotation by selectively tightening or loosening the adjusting plug at the main post rotation bearing.

#### **NOTE:**

The manipulator is usually shipped with, considerable, main post rotation drag applied.

## **C. LOST LOAD SAFETY CYLINDER ADJUSTMENT (LODE ARM ONLY)**

The sensitivity of the lost load cylinder can be easily adjusted (see cylinder assembly drawing for details). The lost load cylinder is too "sensitive" if it "locks" the upward movement of the arms during normal operation.

To reduce the sensitivity of the locking valve, loosen the chrome jam nut and screw out (counterclockwise) the adjusting screw 1/8 turn. Without re-tightening the jam nut, check the upward travel again for over-sensitivity. If necessary, repeat the previous step and re-check until the upward travel does not lock at normal operating speeds. When satisfied, re-tighten the jam nut and resume operation. To increase sensitivity follow the same procedures by turning the adjusting screw in (clockwise) 1/8 turn at a time.

#### **NOTE:**

To "unlock" the lost load cylinder, lower the arm slightly and wait a few seconds. The lost load cylinder allows the arm to move slowly upward when it is "locked". The lost load cylinder is factory adjusted and will probably not require adjustment at installation. See Safety Tests (Maintenance Instructions, Section J-2) to confirm proper operation.

## **D. AIR SYSTEM ADJUSTMENTS**

#### **NOTE:**

Refer to the air schematic provided for the specific adjustments, which apply to your manipulator. The schematic indicates air system adjustment locations, effects, settings, valve types, airline sizes, etc. The following instructions describe how to adjust the various "types" of valves on the manipulator.

### **1. Pressure Regulators:**

- a) Filter/regulator/lubricator (FRL) pressure adjustment: See FRL instructions provided.
- b) Other small control air regulators: Pull the adjusting cap out gently to unlock it. Screw the cap in (clockwise) to increase the pressure. Unscrew the cap (counterclockwise) to reduce the pressure. Push in the adjusting cap to lock it in place.

#### **NOTE:**

The cap should not unscrew all the way out of the thread and fall off.

### **2. Needle Valves:**

Loosen the jam nut on the adjusting screw. Turn the screw in (CW) to restrict flow. Back the screw out (CCW) to increase flow.

**NOTE:**

Needle valves are often used as a "delay" or "speed" control.

See drawing No. 8610701 (below) for a list of symbols to identify the adjustable valves on the air schematic. Valve descriptions:

| SYMBOL | VALVE TYPE                        | SYMBOL | VALVE TYPE  |
|--------|-----------------------------------|--------|---|
|        | FILTER-REGULATOR-LUBRICATOR (FRL) |        | VACUUM OR PRESSURE SEQUENCE VALVE (NORMALLY OPEN)   |
|        | AIR PRESSURE REGULATOR            |        | VACUUM OR PRESSURE SEQUENCE VALVE (NORMALLY CLOSED) |
|        | BALL CHECK FLOW CONTROL           |        | ADJUSTABLE EXHAUST                                  |
|        | ADJUSTABLE NEEDLE VALVE           |        | METERING VALVE WITH ADJ. EXHAUST                    |

*Postitech*  
LAURENS, IOWA 50554

\*ADJUSTABLE VALVE SCHEMATIC SYMBOLS\*

FDR SAM'S G, K, P, AND LS

|            |      |          |         |          |     |
|------------|------|----------|---------|----------|-----|
| SCALE      | NONE | DATE     | 4-17-86 | DRAWN BY | JLJ |
| CLASS CODE | 727  | DWG. NO. | 8610701 | REV.     |     |

**3. Ball Check Flow Controls:**

These are simply needle valves with a ball check by-pass to control flow in one direction and allow full flow in the opposite direction. Their adjustment and use are identical to those of needle valves.

**4. Adjustable Exhausts:**

These perform the same function as a needle valve and are located at vents. Adjustment is similar to needle valves.

**5. Pressure Sequence Valve:**

These valves are somewhat confusing. They go **NORMAL** (as shown on schematic) when the higher **PRESSURE** is sensed.

This valve "breaks" (normally open) or "completes" (normally closed) a flow path through the valve when pilot pressure exceeds the adjusted or set pressure. To adjust the sequencing pressure level: Loosen the bronze jam nut. Turn the adjusting screw in (CW) to increase the sequencing pressure. Back the screw out (CCW) to decrease the sequencing pressure. Tighten the jam nut after adjusting.

**CAUTION:**

Do not unscrew the adjusting screw too far or it will come out, followed by a spring and disk.

Pressure sequence valves may be used to operate a "high flow" valve on machines with metering valve controls. Also, they are used to control the sensitivity of gripper safety circuits.

**6. Vacuum Sequence Valve:**

These valves are somewhat confusing. They go **NORMAL** (as shown on schematic) when the higher **VACUUM** is sensed.

This valve "breaks" (normally open) or "completes" (normally closed) a flow path through the valve when the pilot vacuum exceeds the adjusted or set sequencing vacuum. To adjust the sequencing vacuum level: Loosen the bronze jam nut. Turn the adjusting screw in (CW) to increase the sequence vacuum. Back the adjusting screw out (CCW) to decrease the sequencing vacuum. Tighten the jam when set.

**CAUTION:**

Do not unscrew the adjusting screw too far or it will come out, followed by a spring and disk.

Vacuum sequence valves are used to control the sensitivity of vacuum safety circuits and vacuum sensed auto activation of balance circuits when using vacuum tooling.

**7. Balance Control Adjustments:**

To balance the tooling only: Switch the "Load/No Load" control to the "No Load" position. Carefully adjust the "No Load Pressure Regulator" until the lift cylinder pressure balances the tool and does not drift up or down. Lock the adjusting cap.

**NOTE:**

The "No Load" pressure should not have to be readjusted and you may wish to tape the adjusting cap in position.

To balance the tooling with the payload: Unscrew the "Load pressure Regulator" out all the way. (The adjusting cap should not fall off.) Attach the tooling to the payload as in normal operation. Switch the "Load/No Load" control to the "Load" position. Carefully turn the "Load Pressure Regulator" in (CW) for a higher lift cylinder pressure until the tool with its payload begins to drift slowly upward. Back off the "Load Pressure Regulator" a little so that the tool and payload are balanced (there should be no tendency to drift up or down after vertical movements). Lock the adjusting cap.

**CAUTION:**

This regulator must be readjusted each time the payload weight changes.

**NOTE:**

Either balance setting can be adjusted to have an upward or downward bias depending upon operator preference.

**8. Duplex Control Adjustments:**

The duplex controls only have a "No-Load" pressure adjustment unless other special circuits are purchased.

The "No Load" adjustment is provided to balance the tooling any time the "Balance" mode is selected, and no payload is being supported by the manipulator. To set the "No Load" adjustment:

- a) Gently pull out the adjustment knob's cap to unlock it. Back out the "No Load" adjustment knob (CCW) all the way, while in the "Metering" mode. The adjusting knob should not fall off.
- b) Set the tooling down firmly, without any payload, on a support.
- c) Select the "Balance" mode.

- d) Turn in the "Balance Adjustment" knob slowly (CW), until the tooling can be floated off the support and does not drift up or down.

**NOTE:**

If the tool drifts upward, back out the adjusting knob slightly. Selecting the "Metering" mode, set the tooling down firmly on the support, and repeat steps c and d above.

- e) Press in the cap on the adjusting knob to lock it in place.

**NOTE:**

Refer to the air schematic provided for other "Duplex Control" adjustments.

**9. Metering Valve Controls Adjustments:**

Refer to the air schematic provided for adjustments.

**E. TOOL PITCHING LIMIT ADJUSTMENTS**

Refer to the Pitching End Joint Assembly provided for adjustment locations.

**F. LEVELING THE TOOLING**

You may wish to trim the tooling levelness to compensate for any deflection, which occurs when the end joint is side loaded. Positech manipulators are built very rigidly. However, all materials deflect to some extent when loaded and you may wish to compensate for this.

If you decide to adjust the tooling, make adjustments with no payload and then attach the most common payload and check for satisfactory levelness. Readjust as necessary but remove the payload while making adjustments.

Refer to the rotating end joint assembly drawing provided.

1. Loosen the three mounting bolts fastening the tool to the end joint.
2. Adjust the three set screws and re-tighten the three mounting bolts evenly until the tool is level. As the screws are adjusted the mounting bolts may need to be tightened or loosened to provide adjustment clearance.

**IMPORTANT:**

Torque the socket head bolts evenly to 10 ft.-lb. maximum.

3. Check the tool level and readjust the three jacks if necessary.
4. Torque the mounting bolts evenly to 40 ft.-lb. Make a final check of the tool level.

**IMPORTANT:**

Do not disassemble the end joint. The ball bearings may fall out and be lost.

## OPERATING INSTRUCTIONS

All of the manipulator operating controls are clearly labeled at the factory.



### **A. METERING VALVE CONTROLS**

A variable speed powered up/down control. Simply operate the labeled up or down control as needed. Refer to the air schematic provided for adjustments.



### **B. BALANCE CONTROLS**

A "Load/No Load" control switch and two adjustable regulators are provided. The "No Load" setting allows the operator to float the tooling into the desired location. After the tooling has been connected to the payload, switch the control to the "Load" position in order to float the payload to the desired location.

#### **CAUTION:**

The "Load Adjustment" will need to be reset if the payload weight changes. The "No Load Adjustment" will need to be reset if the tooling weight changes. Read the Balance Control Adjustments (Machine Adjustments, Section D-7) before adjusting the controls and operating manipulator.

#### **NOTE:**

Machines with "Auto Activation of the Balance Circuit" must be switched to "Load" for the "Load Balance Circuit" to be automatically engaged after the payload is gripped.



### **C. DUPLEX CONTROLS**

This optional feature combines "Metering Valve Controls" with "Balance Controls". For "Metering Valve Control" operation, switch the "Metering/Balance" selector to the "Metering" position. Operate the controls as described for "Metering Valve Controls" (Operating Instructions, Section A, above).

For "Balance Control" operation, switch the "Metering/Balance" selector to the "Balance" position while the tooling and payload is stationary and supported by the "Metering Controls". When the switch is placed in the "Balance" position the proper balance pressure is automatically set. The tooling and any payload may now be floated to the desired location.

Read the Duplex Control Adjustments (Machine Adjustments, Section D-8), before adjusting the controls and operating the manipulator.

## MAINTENANCE INSTRUCTIONS

### A. **AIR SUPPLY**

Your Positech air manipulator has an air supply filter/regulator/lubricator (lubricator optional.) (FRL) located near the top of the main post. Refer to the FRL instructions provided for proper maintenance, cleaning and adjustment. Use SAE #10 oil in the lubricator. Service intervals will vary with the quality and volume of the air supplied. Adjust the lubricator for one drop in each ten minutes of machine control operation.

#### **NOTE:**

The manipulator requires clean, regulated air. Positech recommends an upstream filter and regulator in the air supply. This allows the manipulator's filter and regulator to act as secondary units. This will help protect the valves, cylinders, and other components from damage. Manipulators with vacuum generators require a "non-lubricated" air supply.

### B. **MAIN POST ROTATION BEARING**

#### **IMPORTANT:**

Inspect the bearing every 1000 hours of machine use and after each machine overload of more than 10% for any signs of bearing looseness or bolt looseness. If the bearing shows any sign of out-of-limit looseness, replace the bearing immediately. **DO NOT** operate the manipulator if the main post bearing shows any sign of bearing wear or bolt looseness.

#### **1. To check for bearing wear:**

#### **CAUTION:**

If the main post spindle flange is observed to be pulling away from the main post pedestal flange, allowing a gap between the two flanges, tighten the four mounting bolts immediately.

- a) Rotate the manipulator slowly around the main post. Watch and listen to the bearing very closely. If any signs of bearing roughness are detected, replace the bearing immediately.

#### **CAUTION:**

Do not operate the manipulator with a worn, main post rotation bearing or loose bearing bolts. To do so may result in the manipulator breaking away from its support and causing serious damage to equipment and personnel.

- 2. Check the torque of the mounting bolts every 1000 hours of machine use. The bolts should be evenly cross-torqued to 150 to 200 ft.-lb.**

### C. **LIFTING THE MANIPULATOR**

Refer to Installation Instructions, Section F-1.

### D. **MACHINE LEVELING**

Refer to Machine Adjustments, Section A, for service interval and instructions.

### E. **BALL, ROLLER AND NEEDLE BEARINGS**

These are packed with grease and sealed at the factory. The ball, roller and needle bearings shouldn't require lubrication and are, therefore, virtually maintenance free. Manufacturer part numbers for many of these items are provided in the parts lists for your convenience.

### F. **VALVES**

All air valves are replacement items if they should become defective. Manufacturer's part numbers for many of these items are provided in the parts lists. Refer to the air schematic and its parts list provided for proper valve identification.

## **G. VACUUM FILTERS**

Refer to the schematic assembly drawing provided for vacuum filter locations. Most filters may be cleaned if necessary. The service interval will vary depending upon the particular tooling application. Refer to the schematic drawings and parts lists for identification.

## **H. TOOLING BEARINGS**

Refer to the tooling assembly drawing(s) provided for any tooling bearing locations and descriptions. Grease zerks are provided if necessary. Service intervals will vary according to the type and usage of the tooling. Manufacturer's part numbers for many of these items are provided in the parts lists.

## **I. LIFT CYLINDER**

The lift cylinder requires no maintenance. If the lift cylinder develops a leak past the seals, it will need to be repaired or replaced. For a replacement cylinder, contact Positech. Refer to the Recommended Spare Parts List for seal kit information.

### **1. Lift Cylinder Removal:**

- a) Place a block under the lifting assembly to firmly support it with the arm in the fully down position.
- b) Depressurize the lift cylinder as follows:
  - i. For metering valve controls and duplex controls: Operate the down control until the air-flow out of the cylinder stops.
  - ii. For balance controls: Select the "No Load" balance circuit lower the arm and back out (CCW) the "No Load Adjustment" all the way (it should not fall off).

### **NOTE:**

The arms should now be completely supported by the block under the lift assembly.

- c) Disconnect the air supply.
- d) Disconnect the valves mounted to the side of the cylinder. Be careful not to lose the O-ring seals around the portholes.
- e) Carefully remove the connector at either end of the lift cylinder.

### **CAUTION:**

The cylinder will extend or retract when the first bolt is removed, due to gravity. **DO NOT** manually extend or retract diaphragm cylinders.

### **2. Lift Cylinder Installation:**

Reverse the procedures for removal as described above.

## **LOST LOAD SAFETY CYLINDER (LODE ARM ONLY)**

The lost load cylinder should not use or leak a noticeable amount of its hydraulic fluid. The cylinder should be kept full of type FA automatic transmission fluid. Use the pipe plug near the top of the cylinder to check the fluid level every 3 months and keep it full. Fluid will run out if it is full. Bleeding is not required.

### **NOTE:**

Be sure to always seal, replace and tighten the pipe plug after inspection.

If the lost load cylinder begins to leak a noticeable amount of hydraulic fluid, it will need to be repaired or replaced.

For a replacement cylinder contact Positech Corp. Refer to the Recommended Spare Parts List for seal kit information. Refer to the Lost Load Cylinder Assembly Drawing for details.

**NOTE:**

Replacement cylinders do not include the lost load cylinder, locking valve, which is bolted to the side of the lost load cylinder.

**J. SAFETY TESTS**

**1. Lift Cylinder Safety Locking Valve**

Instantaneously remove the air supply to the manipulator. For example: Break a fitting loose or disconnect a quick disconnect in the air supply line to the machine so the manipulators system pressure drops instantly to atmospheric pressure. The arm end should not drop more than a few inches. The air pressure in the cylinder should be trapped, restricting the lift arms vertical movement. If the cylinder pressure is not trapped, the blocking valve will need replacement.

**NOTE:**

Slowly turning down the system pressure, (with a regulator, for example), will not seat the blocking valve and the arm will drift down.

**2. Lost Load Safety Cylinder (Lode Arm Only)**

Test the cylinder as follows:

**CAUTION:**

Stand clear of the tooling so it won't hit you if it moves quickly upward.

- a) Balance Control Test: With no load present at the end of arm, switch the balance circuit to the "Loaded" condition. The arm should travel quickly upward for only a few inches before locking, and then it should move slowly upward.
- b) Duplex Control Test: With the "Metering" control circuit selected. Turn in the "No Load Adjustment" one or two full turns (CW). With no load applied to the arm, switch to the "Balance" control circuit. The arm should travel quickly upward for only a few inches before locking, and then it should move slowly upward.
- c) Metering Control Test: Adjust the maximum "up speed" so the machine can travel upward with no payload at a very fast rate. Quickly operate the up control at maximum speed. The arm should travel quickly upward for only a few inches before locking, and then it should move slowly upward.

**NOTE:**

If the lost load safety cylinder does not operate properly refer to the Machine Adjustments, Section C, for details on the Lost Load Safety Locking Valve. Also check the cylinder oil level (Maintenance Instructions, Section I-2).

**CAUTION:**

Be sure to properly adjust the balance, duplex, or metering controls before operating the manipulator. If the locking valve adjustments do not correct any improper operation of the lost load safety cylinder, replace the locking valve immediately.

### **3. Gripper Safety Circuit (GSC)**

**CAUTION:**

Do not perform this test while gripping the payload. Test weights should be hung from the tooling.

**NOTE:**

The GSC is factory adjusted and may not require further adjustment. All adjustable valves are labeled. See the air schematic provided for valve locations and other information.

- a) Lift a 22 LB. test weight using the Metering or Balance Controls.
- b) Press the gripper control button.

**NOTE:**

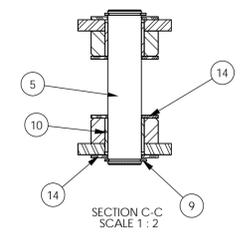
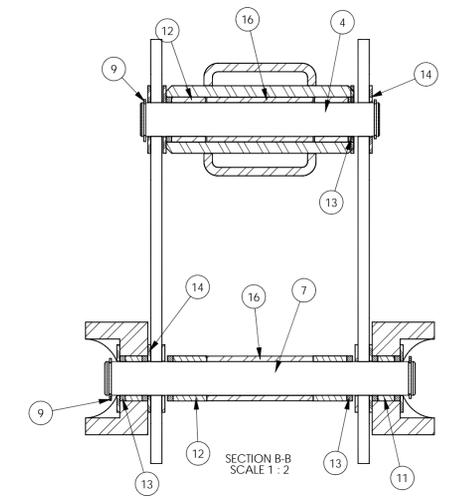
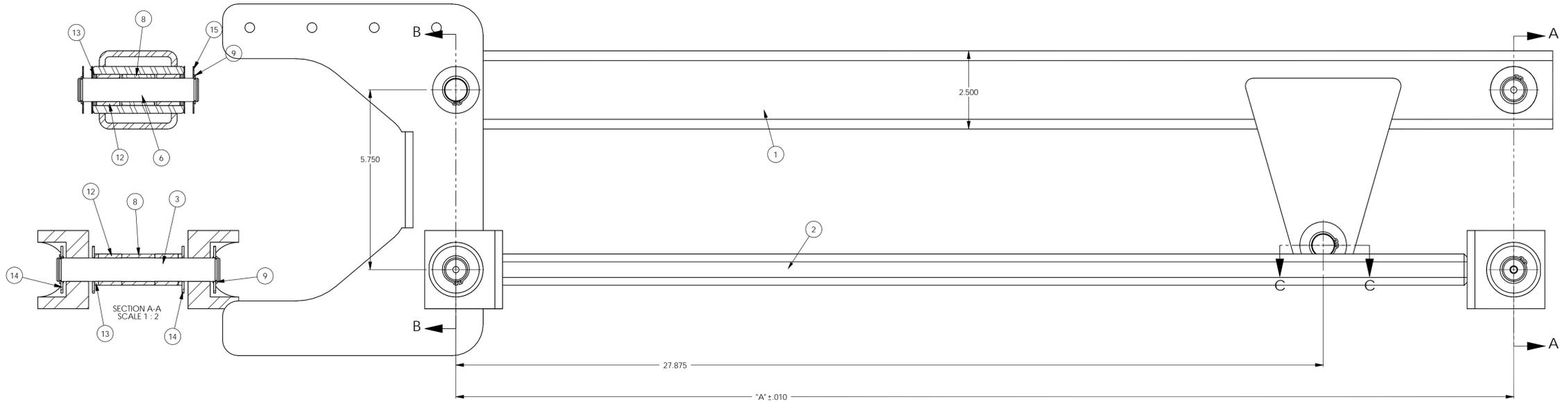
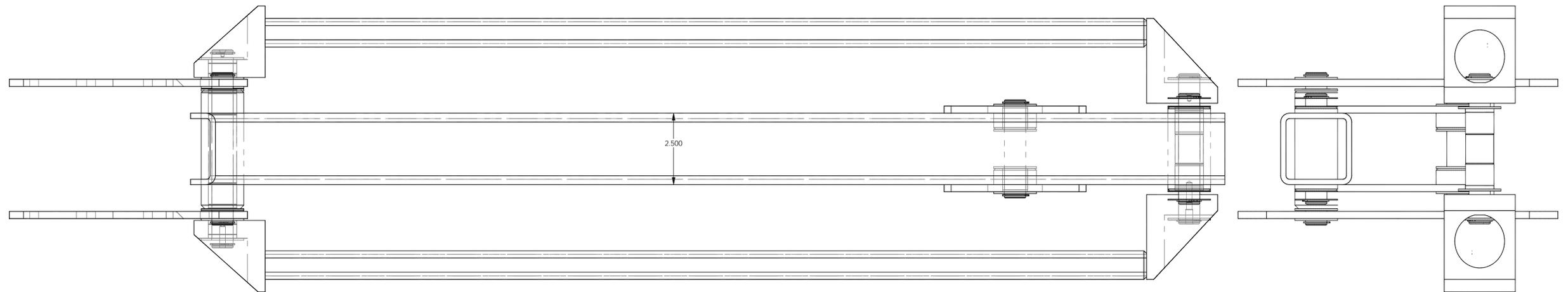
The gripper should not open or close. If the gripper operates, unscrew the GSC adjuster screw until the gripper will not operate.

- c) Slowly set down the payload using the Metering or Balance Controls. The gripper should now operate.

**NOTE:**

If the gripper does not operate, turn in the GSC adjuster screw until the gripper will operate. Repeat steps a) and b).

| ITEM NO | QTY | PART NUMBER   | DESCRIPTION  |
|---------|-----|---------------|--|
| 1       | 1   | 200120902-XXX | MAIN LIFT ARM WLD.MNT. - LA 3030 34.00L. STEEL         |
| 2       | 2   | 200617870-XXX | OFFSET PARALLEL ARM WELDMENT- ST                       |
| 3       | 1   | 8827007       | U-FRAME / PL. PARALLEL ARM/ MJ PIN                     |
| 4       | 1   | 200134406-051 | PIN-0.750 X 5.1 FREE, HARDENED                         |
| 5       | 1   | 200134406-032 | PIN-0.750 X 3.2 FREE, HARDENED                         |
| 6       | 1   | 9100413       | DOWN ARM / PL PIN                                      |
| 7       | 1   | 9100802       | MIDDLE JOINT PL PIN                                    |
| 8       | 2   | 9103807       | 990 OD X .760 ID X 1.065 SLEEVE                        |
| 9       | 10  | P000434       | 750 SHAFT TRIJARC S100.75 EXT                          |
| 10      | 2   | P000468       | JOURNAL BRG (FIBERGLIDE) .875OD X .750ID X .750LG (P3) |
| 11      | 2   | P000491       | OPEN NDJ BRG .750 ID X 1.000 OD X .375W                |
| 12      | 8   | P005751       | OPEN NDJ BRG .750IDx1.000ODx.750W                      |
| 13      | 12  | P005829       | OIL SEAL .750 ID X 1.0 OD X .188 W                     |
| 14      | 18  | 200119709     | WASHER - NYLON .765 ID x 1.500 OD x .065THK            |
| 15      | 4   | 9100803       | 1.500 X .760/.770 X .031 NYLON WASH.                   |
| 16      | 2   | 200627216     | SLEEVE - .990 OD. X .755 ID. X 2.375 LG                |



MATERIAL:  
 QTY:  
 WEIGHT: 42.786 LBS  
 SIMILAR TO: 200133806

| REV. | DESCRIPTION                                   | BY  | DATE      |
|------|---|-----|-----------|
| A    | CHANGED TO NEW STYLE ARM LINKS, WAS 200120903 | DWB | 28-Jun-06 |

ALL DIMENSIONS UNLESS OTHERWISE SPECIFIED ARE IN INCHES AND DECIMALS THEREOF.  
 DIMENSIONS IN PARENTHESES ARE FOR INFORMATION ONLY.  
 DIMENSIONS IN BRACKETS ARE FOR INFORMATION ONLY.  
 DIMENSIONS IN DASHES ARE FOR INFORMATION ONLY.  
 DIMENSIONS IN BOLD ARE FOR INFORMATION ONLY.  
 DIMENSIONS IN ITALIC ARE FOR INFORMATION ONLY.  
 DIMENSIONS IN UNDERLINE ARE FOR INFORMATION ONLY.  
 DIMENSIONS IN STRIKEOUT ARE FOR INFORMATION ONLY.  
 DIMENSIONS IN SMALL CAPS ARE FOR INFORMATION ONLY.  
 DIMENSIONS IN ALL CAPS ARE FOR INFORMATION ONLY.  
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 DIMENSIONS IN UPPER CASE ARE FOR INFORMATION ONLY.  
 DIMENSIONS IN MIXED CASE ARE FOR INFORMATION ONLY.  
 DIMENSIONS IN SPECIAL CHARACTERS ARE FOR INFORMATION ONLY.  
 DIMENSIONS IN UNUSUAL CHARACTERS ARE FOR INFORMATION ONLY.  
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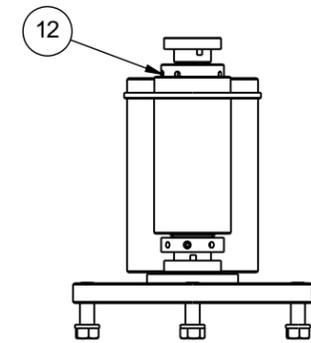
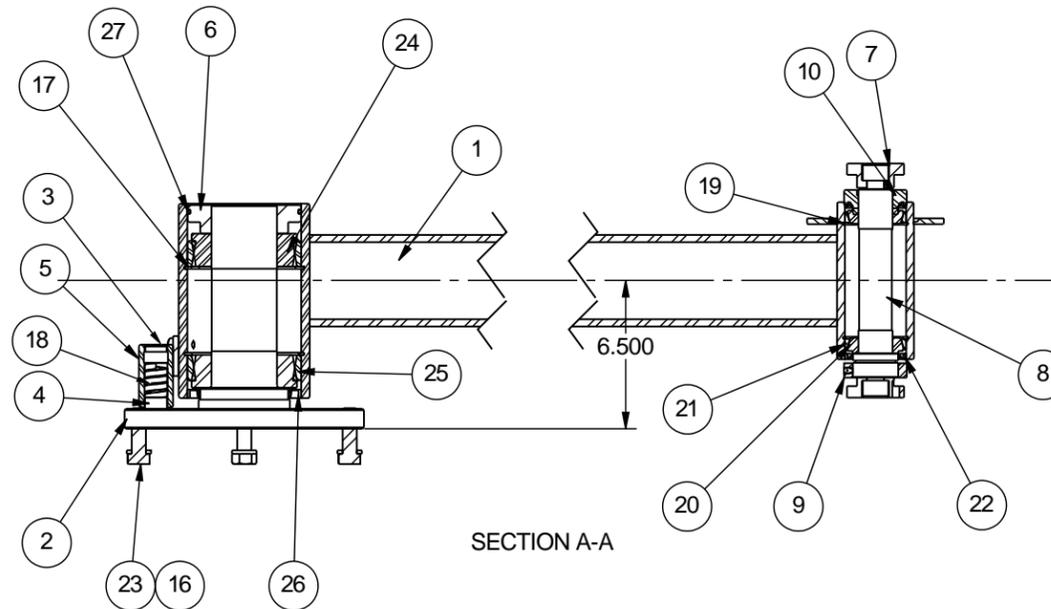
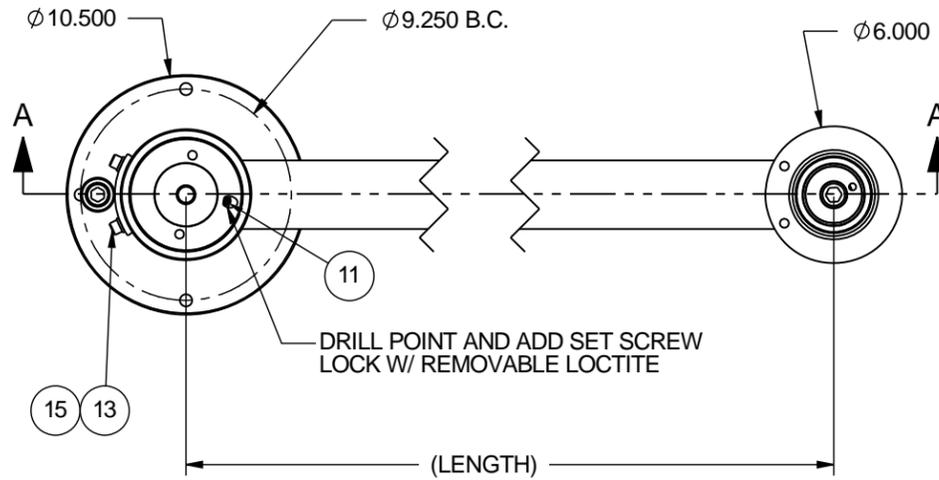
**Postech** POSTECH INDUSTRIES, INC.  
 LAURENS, IOWA 50554

MAIN LIFT ARM ASSY. - LA 3030, STEEL

UNDESIGNED TOLERANCES:  
 .XX ± .050  
 .XXX ± .030  
 ANGLE ± .5 DEG

FOR:  
 DWG: D SCALE: 1:2 DATE: 6/27/2006 DRAWN BY: JAM/DWB  
 SHT: CLASS CODE: 910 DWG. NO.: 200133806- REV: A

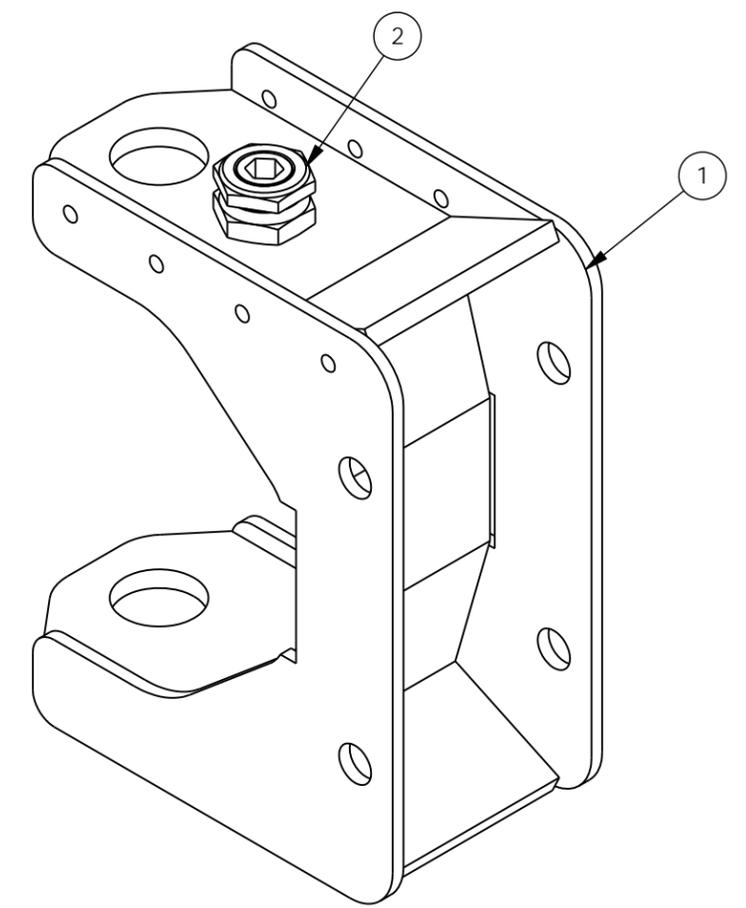
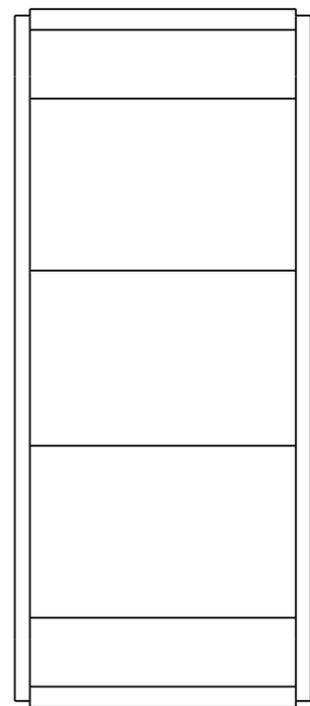
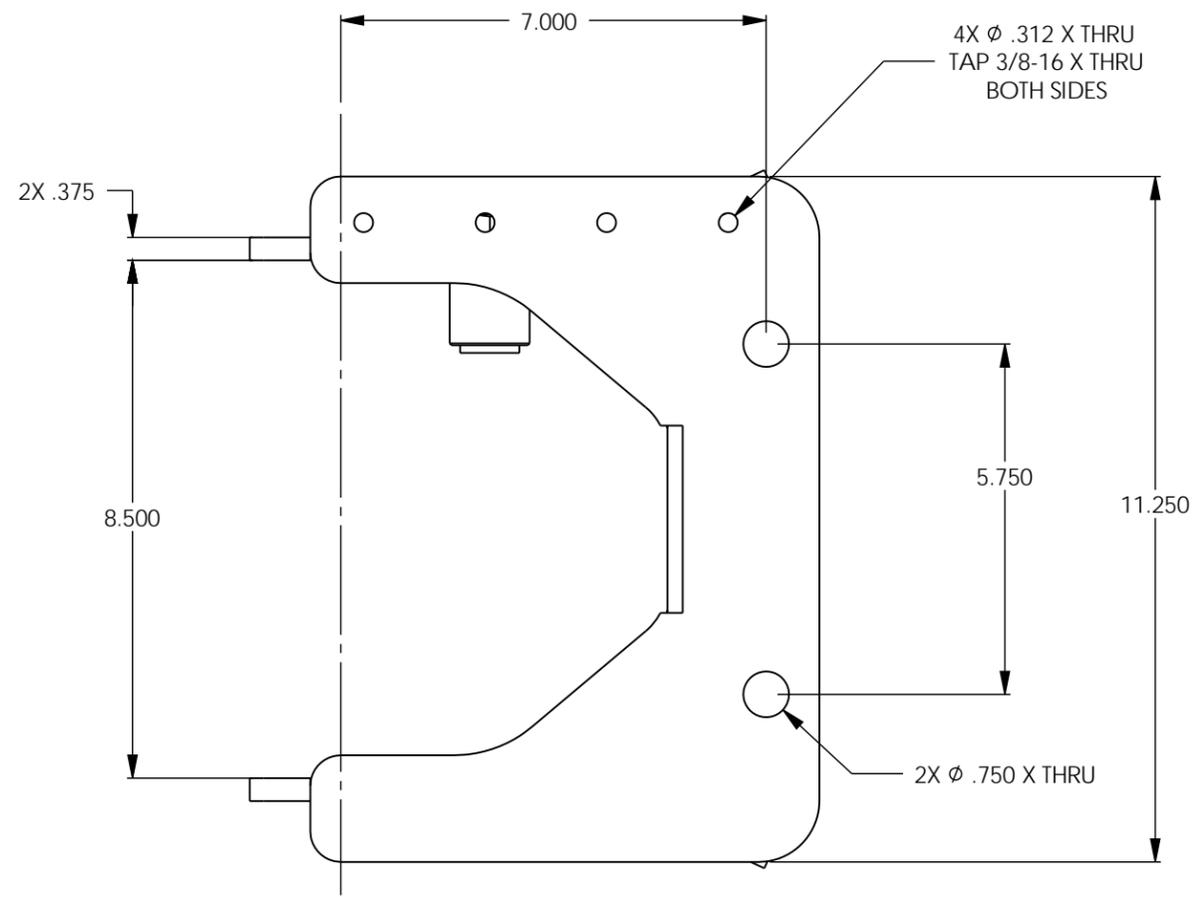
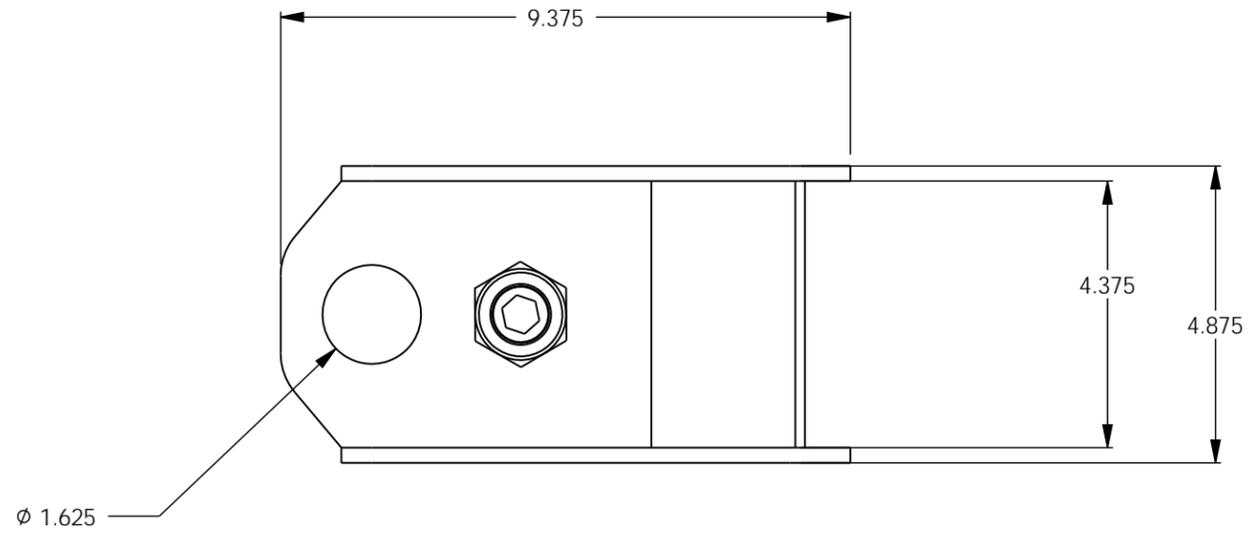
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|---------------|-------------------------------|---------------|--------|
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| 200125701-025 | LA/RA FIRST ARM ASSY. 25 .00L | 200125702-025 | 25.00  |
| 200125701-026 | LA/RA FIRST ARM ASSY. 26 .00L | 200125702-026 | 26.00  |
| 200125701-027 | LA/RA FIRST ARM ASSY. 27 .00L | 200125702-027 | 27.00  |
| 200125701-028 | LA/RA FIRST ARM ASSY. 28 .00L | 200125702-028 | 28.00  |
| 200125701-029 | LA/RA FIRST ARM ASSY. 29 .00L | 200125702-029 | 29.00  |
| 200125701-030 | LA/RA FIRST ARM ASSY. 30 .00L | 200125702-030 | 30.00  |
| 200125701-031 | LA/RA FIRST ARM ASSY. 31 .00L | 200125702-031 | 31.00  |
| 200125701-032 | LA/RA FIRST ARM ASSY. 32 .00L | 200125702-032 | 32.00  |
| 200125701-033 | LA/RA FIRST ARM ASSY. 33 .00L | 200125702-033 | 33.00  |
| 200125701-034 | LA/RA FIRST ARM ASSY. 34 .00L | 200125702-034 | 34.00  |
| 200125701-035 | LA/RA FIRST ARM ASSY. 35 .00L | 200125702-035 | 35.00  |
| 200125701-036 | LA/RA FIRST ARM ASSY. 36 .00L | 200125702-036 | 36.00  |
| 200125701-037 | LA/RA FIRST ARM ASSY. 37 .00L | 200125702-037 | 37.00  |
| 200125701-038 | LA/RA FIRST ARM ASSY. 38 .00L | 200125702-038 | 38.00  |
| 200125701-039 | LA/RA FIRST ARM ASSY. 39 .00L | 200125702-039 | 39.00  |
| 200125701-040 | LA/RA FIRST ARM ASSY. 40 .00L | 200125702-040 | 40.00  |
| 200125701-041 | LA/RA FIRST ARM ASSY. 41 .00L | 200125702-041 | 41.00  |
| 200125701-042 | LA/RA FIRST ARM ASSY. 42 .00L | 200125702-042 | 42.00  |
| 200125701-043 | LA/RA FIRST ARM ASSY. 43 .00L | 200125702-043 | 43.00  |
| 200125701-044 | LA/RA FIRST ARM ASSY. 44 .00L | 200125702-044 | 44.00  |
| 200125701-045 | LA/RA FIRST ARM ASSY. 45 .00L | 200125702-045 | 45.00  |
| 200125701-046 | LA/RA FIRST ARM ASSY. 46 .00L | 200125702-046 | 46.00  |
| 200125701-047 | LA/RA FIRST ARM ASSY. 47 .00L | 200125702-047 | 47.00  |
| 200125701-048 | LA/RA FIRST ARM ASSY. 48 .00L | 200125702-048 | 48.00  |
| 200125701-049 | LA/RA FIRST ARM ASSY. 49 .00L | 200125702-049 | 49.00  |
| 200125701-050 | LA/RA FIRST ARM ASSY. 50 .00L | 200125702-050 | 50.00  |
| 200125701-051 | LA/RA FIRST ARM ASSY. 51 .00L | 200125702-051 | 51.00  |
| 200125701-052 | LA/RA FIRST ARM ASSY. 52 .00L | 200125702-052 | 52.00  |
| 200125701-053 | LA/RA FIRST ARM ASSY. 53 .00L | 200125702-053 | 53.00  |
| 200125701-054 | LA/RA FIRST ARM ASSY. 54 .00L | 200125702-054 | 54.00  |
| 200125701-055 | LA/RA FIRST ARM ASSY. 55 .00L | 200125702-055 | 55.00  |
| 200125701-056 | LA/RA FIRST ARM ASSY. 56 .00L | 200125702-056 | 56.00  |
| 200125701-057 | LA/RA FIRST ARM ASSY. 57 .00L | 200125702-057 | 57.00  |
| 200125701-058 | LA/RA FIRST ARM ASSY. 58 .00L | 200125702-058 | 58.00  |
| 200125701-059 | LA/RA FIRST ARM ASSY. 59 .00L | 200125702-059 | 59.00  |
| 200125701-060 | LA/RA FIRST ARM ASSY. 60 .00L | 200125702-060 | 60.00  |
| 200125701-061 | LA/RA FIRST ARM ASSY. 61 .00L | 200125702-061 | 61.00  |
| 200125701-062 | LA/RA FIRST ARM ASSY. 62 .00L | 200125702-062 | 62.00  |
| 200125701-063 | LA/RA FIRST ARM ASSY. 63 .00L | 200125702-063 | 63.00  |
| 200125701-064 | LA/RA FIRST ARM ASSY. 64 .00L | 200125702-064 | 64.00  |
| 200125701-065 | LA/RA FIRST ARM ASSY. 65 .00L | 200125702-065 | 65.00  |
| 200125701-066 | LA/RA FIRST ARM ASSY. 66 .00L | 200125702-066 | 66.00  |
| 200125701-067 | LA/RA FIRST ARM ASSY. 67 .00L | 200125702-067 | 67.00  |
| 200125701-068 | LA/RA FIRST ARM ASSY. 68 .00L | 200125702-068 | 68.00  |
| 200125701-069 | LA/RA FIRST ARM ASSY. 69 .00L | 200125702-069 | 69.00  |
| 200125701-070 | LA/RA FIRST ARM ASSY. 70 .00L | 200125702-070 | 70.00  |
| 200125701-071 | LA/RA FIRST ARM ASSY. 71 .00L | 200125702-071 | 71.00  |
| 200125701-072 | LA/RA FIRST ARM ASSY. 72 .00L | 200125702-072 | 72.00  |
| 200125701-073 | LA/RA FIRST ARM ASSY. 73 .00L | 200125702-073 | 73.00  |
| 200125701-074 | LA/RA FIRST ARM ASSY. 74 .00L | 200125702-074 | 74.00  |
| 200125701-075 | LA/RA FIRST ARM ASSY. 75 .00L | 200125702-075 | 75.00  |
| 200125701-076 | LA/RA FIRST ARM ASSY. 76 .00L | 200125702-076 | 76.00  |
| 200125701-077 | LA/RA FIRST ARM ASSY. 77 .00L | 200125702-077 | 77.00  |
| 200125701-078 | LA/RA FIRST ARM ASSY. 78 .00L | 200125702-078 | 78.00  |
| 200125701-079 | LA/RA FIRST ARM ASSY. 79 .00L | 200125702-079 | 79.00  |
| 200125701-080 | LA/RA FIRST ARM ASSY. 80 .00L | 200125702-080 | 80.00  |



| ITEM NO. | QTY. | PART NO.      | DESCRIPTION                                    |
|----------|------|---------------|--|
| 1        | 1    | 200125702-XXX | LA/RA FIRST ARM WELDMENT                       |
| 2        | 1    | 200211506     | MP BRNG SPINDLE WELD-LA/RA, SPEC. 46,000 IN-LB |
| 3        | 1    | 7915604       | BRAKE ADJUSTING PLUG                           |
| 4        | 1    | 8223700       | BRAKE PUCK                                     |
| 5        | 1    | 9106409       | MAIN POST DRAG BRAKE HOUSING                   |
| 6        | 1    | 9106411       | RETAINING NUT/MAIN BEARING - LA                |
| 7        | 2    | 9106419       | MID JNT BRG SHAFT/PIVOT HSG SLEEVE             |
| 8        | 1    | 9106420       | LA MJ SHAFT SPEC. - 9000 IN-LB, W/ FLNG.       |
| 9        | 1    | 9106421       | MIDDLE JNT BRG SHAFT ADJ NUT-LOWER             |
| 10       | 1    | 9106422       | MJ BRG SHAFT ADJ NUT- UPPER                    |
| 11       | 1    | P000084       | CPPTSSS 5/16-24 X 3/8                          |
| 12       | 4    | P000094       | BRSTPSSS 5/16-24 NF X .375                     |
| 13       | 2    | P000106       | SHCS 3/8-16 X 3/4                              |
| 14       | 2    | P000179       | SHCS 3/4-10 X 1-1/2                            |
| 15       | 2    | P000256       | HLOCK 3/8                                      |
| 16       | 4    | P000261       | HLOCK 5/8                                      |
| 17       | 2    | P000425       | 5.000 BORE TRUARC N5000-500 INT                |
| 18       | 1    | P000542       | DANLY SPRING NO 9-1607-36                      |
| 19       | 2    | P001809       | 2.677 BORE TRUARC N5000-268 INT                |
| 20       | 2    | P003475       | CONE BRG. 1.500 ID TIMKEN 19150                |
| 21       | 2    | P003476       | CUP BRNG. 2.687 OD TIMKEN 19268                |
| 22       | 2    | P003477       | OIL SEAL 2.00 SHAFT C/R 19783                  |
| 23       | 4    | P003600       | HHCS 5/8-11 NC X 2.000                         |
| 24       | 2    | P005749       | CONE BRG 2.875 ID TIMKEN 567                   |
| 25       | 2    | P005750       | CUP BRNG 5.00 OD TIMKEN 563                    |
| 26       | 1    | P005752       | OIL SEAL 3.875 SHAFT DIA C/R 38691             |
| 27       | 1    | X001248       | -248 O-RING 4.750 ID X.125 N1000 70            |

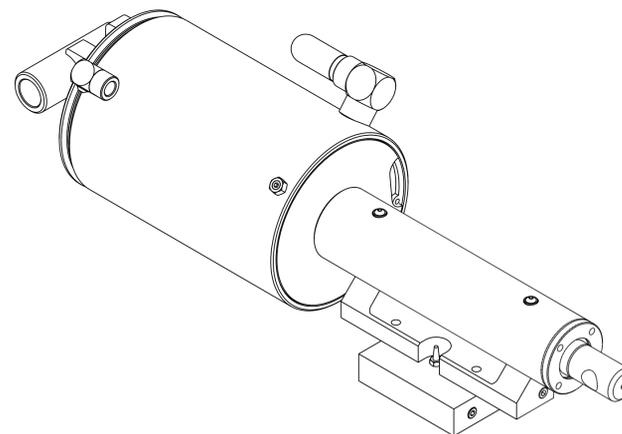
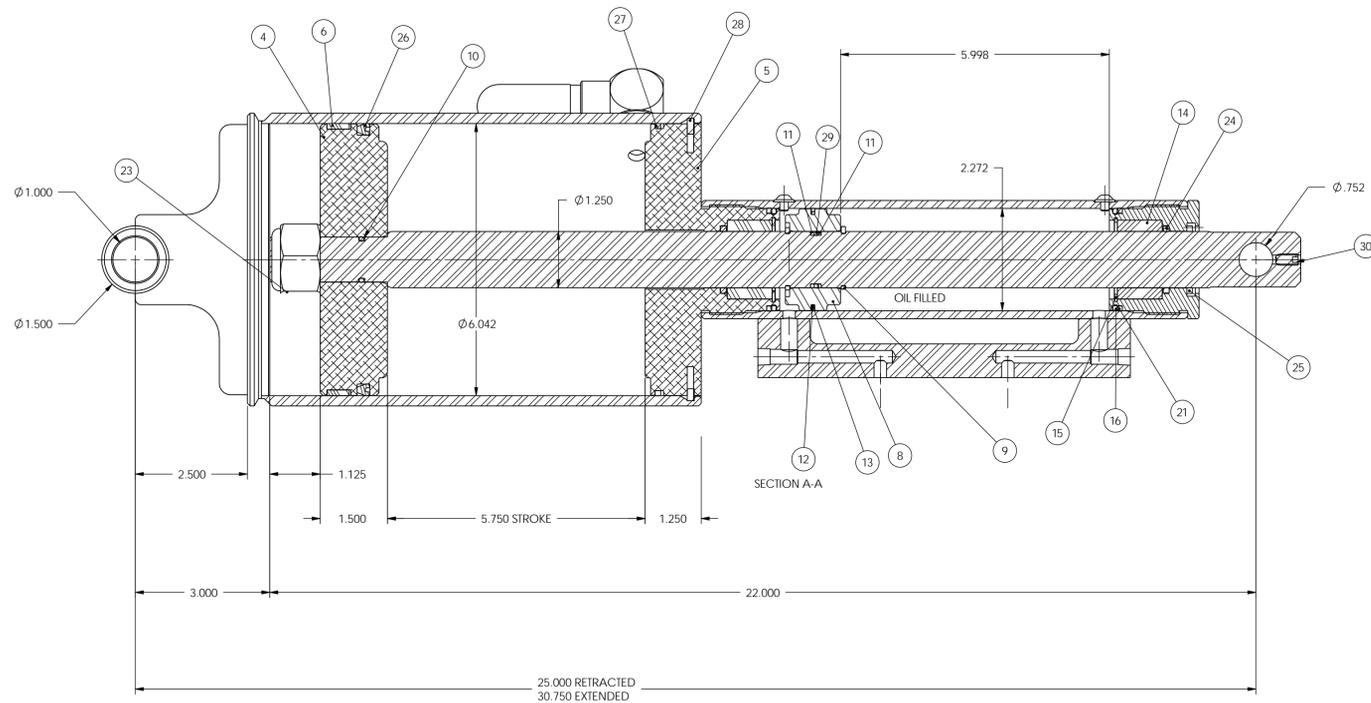
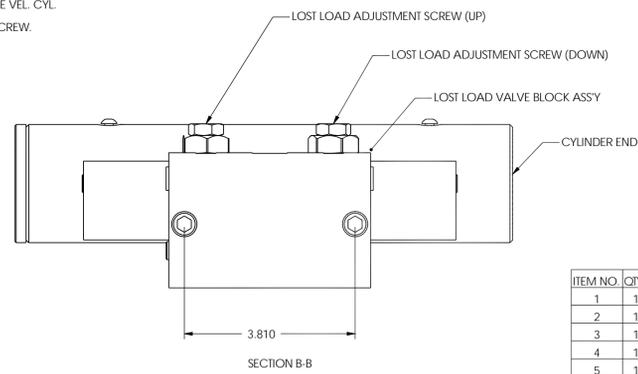
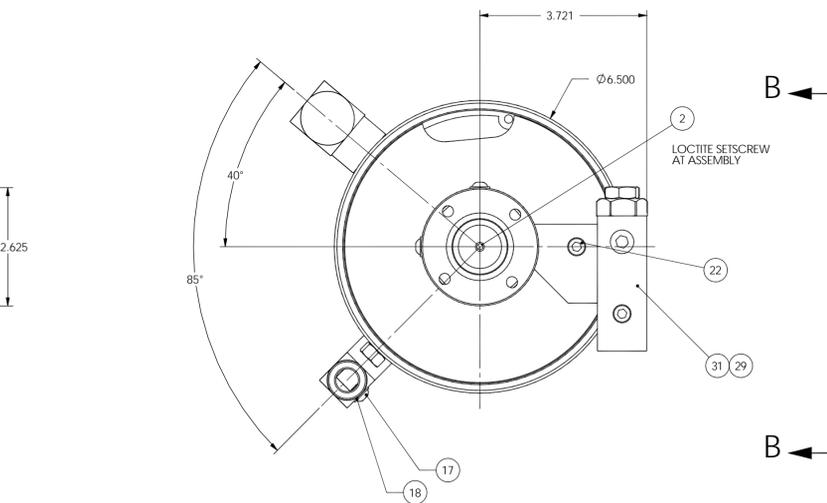
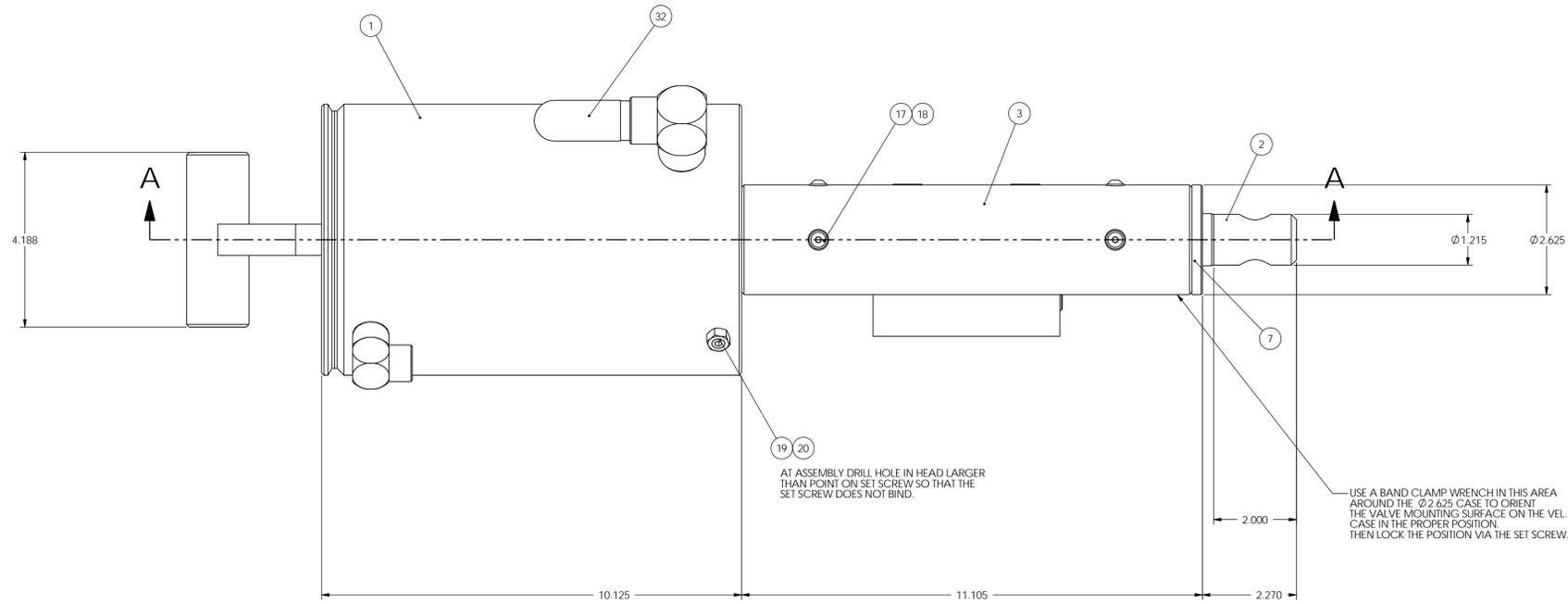
|                        |  |                     |               |
|------------------------|--|---------------------|---------------|
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| ASSEMBLY               |  |                     |               |
| DEBURR ALL SHARP EDGES |  LAURENS, IOWA 50554<br><b>LA\RA FIRST ARM ASSY</b>   |                     |               |
| UNSPECIFIED TOLERANCES | FOR:   |                     |               |
| .XX ± .050             | DWG SIZE: B  | SCALE: 1:8          | DATE: 14SEP01 |
| .XXX ± .030            | CLASS CODE: 780  | DWG. NO.: 200125701 | DRAWN BY: TWC |
| ANGLE ± .5 DEG         |  |                     | REV:          |

| ITEM NO | QTY | PART NO. | DESCRIPTION                     |
|---------|-----|----------|---------------------------------|
| 1       | 1   | 9106423  | LA 3030 MJ PIVOT HSG WELD       |
| 2       | 1   | 8629413  | DRAG BRAKE ASSEMBLY - MAIN POST |



APPROX WEIGHT: 17 LBS

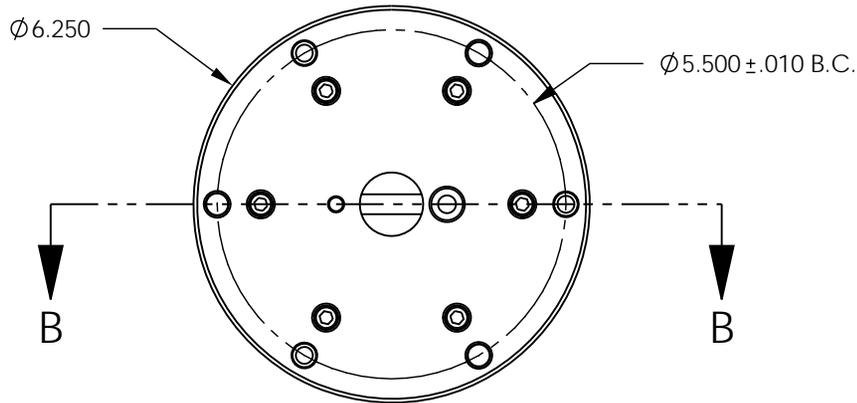
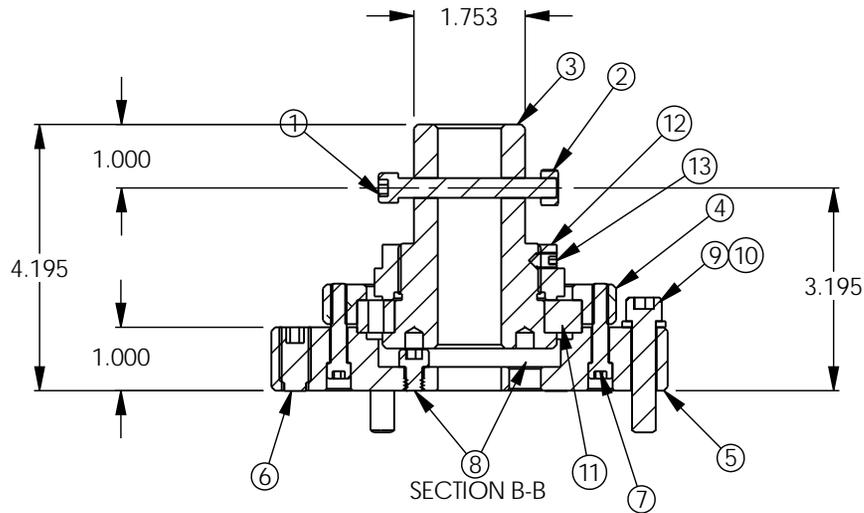
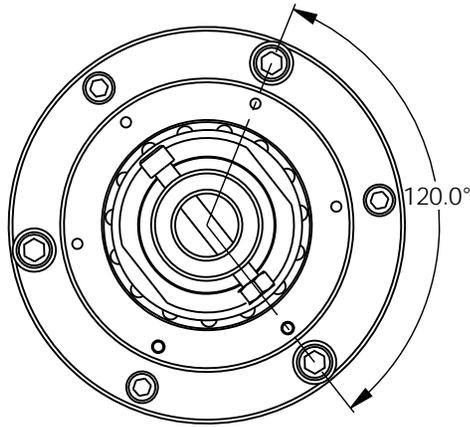
| REV                    | DESCRIPTION  | DATE            |
|------------------------|--|-----------------|
| MFG ROUTING            | ALL DESIGNS, SKETCHES AND DRAWINGS ARE THE PROPERTY OF POSITECH. LETTING, OR ALLOWING TO BE LET, THE KNOWLEDGE FOR DESIGN AND/OR FABRICATION FROM SAID DESIGNS, SKETCHES OR DRAWINGS WITHOUT THE WRITTEN CONSENT OF POSITECH IS EXPRESSLY FORBIDDEN. |                 |
| ASS'Y                  |  |                 |
| DEBURR ALL SHARP EDGES | <br>LAURENS, IOWA 50554   |                 |
| UNSPECIFIED TOLERANCES | LA 3030 MJ ASSY-STANDARD   |                 |
| FOR:                   |  |                 |
| DWG SIZE: B            | SCALE: 1:3   | DATE: 30MAY2003 |
| CLASS CODE: 910        | DWG. NO.: 200315004  | DRAWN BY: JAM   |
| ANGLE $\pm$ .5 DEG     | REV:   |                 |



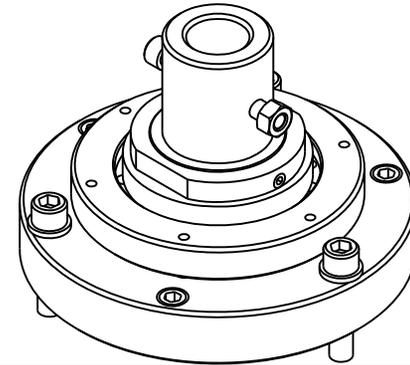
| ITEM NO. | QTY. | PART NO. | DESCRIPTION                                      |
|----------|------|----------|--|
| 1        | 1    | 9106731  | LA 6.040 DIA LIFT CYL CASE                       |
| 2        | 1    | 9210501  | LA LIFT CYL SHAFT-3030/4500                      |
| 3        | 1    | 9106733  | EXCESS VELOCITY CYLINDER CASE ASSY               |
| 4        | 1    | 9504804  | LA 6.040 DIA LIFT CYLINDER PISTON                |
| 5        | 1    | 9106758  | LA 6.040 DIA LIFT CYLINDER HEAD                  |
| 6        | 1    | 9106765  | LA 6.040 DIA PISTON WEAR RING                    |
| 7        | 1    | 8607912  | LOST LOAD CYLINDER HEAD                          |
| 8        | 1    | 8617900  | PISTON - LOST LOAD CYLINDER                      |
| 9        | 2    | P000452  | 1.250 SHAFT TRUARC 5160-125 EXT                  |
| 10       | 1    | X001117  | -117 O-RING .813 ID X .094 N1000 70              |
| 11       | 2    | X200121  | 2-121 BACK-UP WASHER                             |
| 12       | 1    | 8533601  | PISTON SEAL 2.270 BORE                           |
| 13       | 1    | X001033  | 033 O-RING 2.000ID X .070 N10                    |
| 14       | 2    | 8607911  | NYLON BUSHING                                    |
| 15       | 2    | P000408  | 1.750 BORE TRUARC N5000-175 INT                  |
| 16       | 2    | X001226  | 226 O-RING 2.000ID X .125 N10                    |
| 17       | 5    | 09856    | #10-32 NF X .250 BHCS                            |
| 18       | 5    | 09836    | STAT-O-SEAL PARKER NO 600-0101-10                |
| 19       | 1    | P004581  | 5/16-24 NF X .625 HDP SS                         |
| 20       | 1    | P002580  | THIN HT NYL. INS. L.NUT .312-24                  |
| 21       | 2    | X200226  | BACK-UP 2.00 ID X .125 POLY-U                    |
| 22       | 2    | P000333  | 1/8 NPT PLUG                                     |
| 23       | 1    | P002113  | FULL HEIGHT NY-INS LOCKNUT 1.000-14              |
| 24       | 2    | P001263  | -218 O-RING 1-1/4"ID, 1/8"CS 70BN                |
| 25       | 1    | P004234  | OIL SEAL 1.250 SHAFT C/R 12330                   |
| 26       | 1    | 09822    | U-CUP W/ROUNDED LIP #4274E40805500               |
| 27       | 1    | 09801    | -256 O-RING 5.750 ID X .125 CS                   |
| 28       | 1    | P003059  | 6.000 BORE TRUARC N5000-600 INT                  |
| 29       | 1    | X001121  | 121 O-RING 1.062ID X .094 N1000 70               |
| 30       | 1    | P000069  | HX SKT CP PNT S/S 250-20 X .500                  |
| 31       | 1    | 9109900  | DUAL DIRECTION EXCESS VELOCITY SAFETY LOCK VALVE |
| 32       | 1    | P005767  | SILENCER/MUFFLER P. PLASTIC                      |

|  |  |                  |
|--|--|------------------|
| REV  | DESCRIPTION  | DATE             |
| A  | REWORKED THE HEAD AND UPDATED THE ASSEMBLY DRAWING | 10/10/01         |
| WELDING  | ASSEMBLY   | DATE             |
| XXX  |  |                  |
| <b>DEBURR ALL SHARP EDGES</b>                      |  |                  |
|  |  |                  |
| LA 3030 LIFT CYL ASSY-6.040 BORE, W/ LL & ELF SEAL |  |                  |
| UNSPECIFIED TOLERANCES:                            |  |                  |
| XX ± .050  | DWG D  | SCALE: 1:2       |
| XXX ± .030   | DWG SIZ  | DATE: 29 MAR 96  |
| ANGLE ± 5 DEG                                      | CLASS CODE   | DWG NO.: 9608916 |
|  |  | REV: A           |

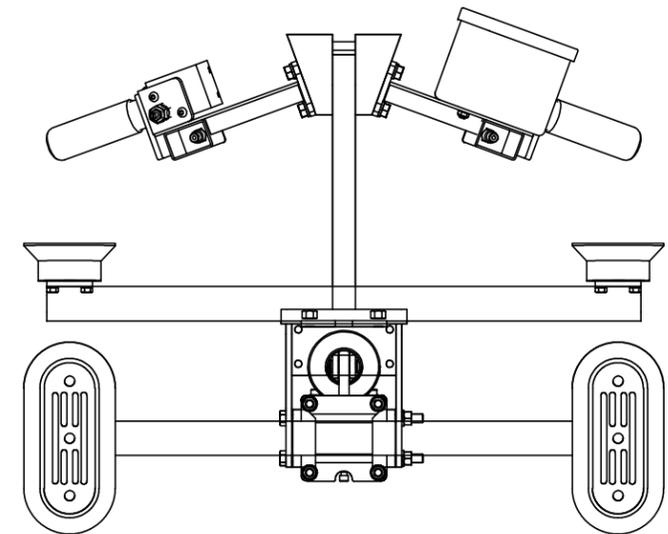
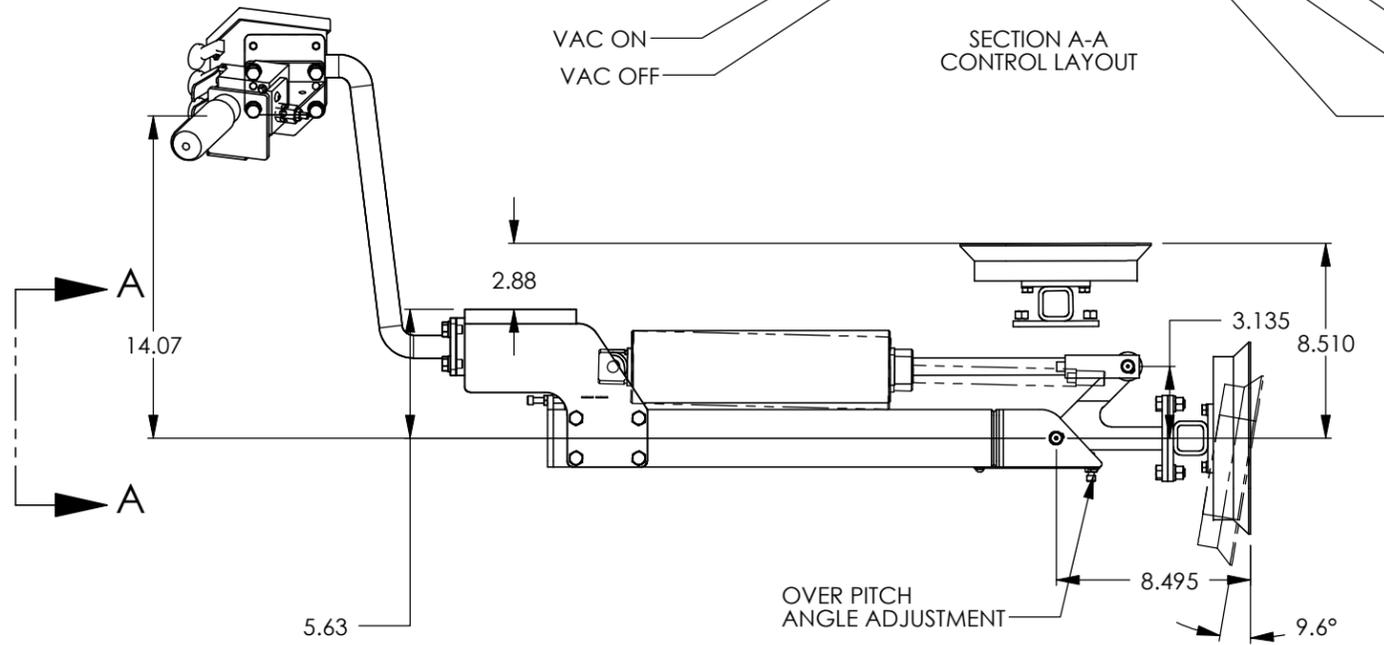
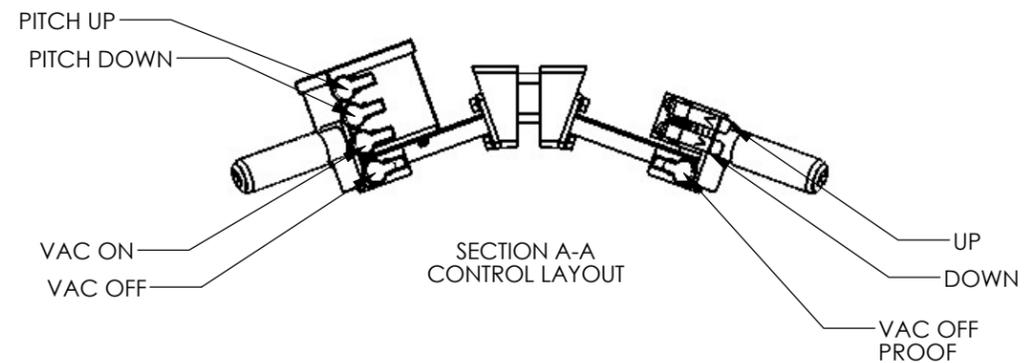
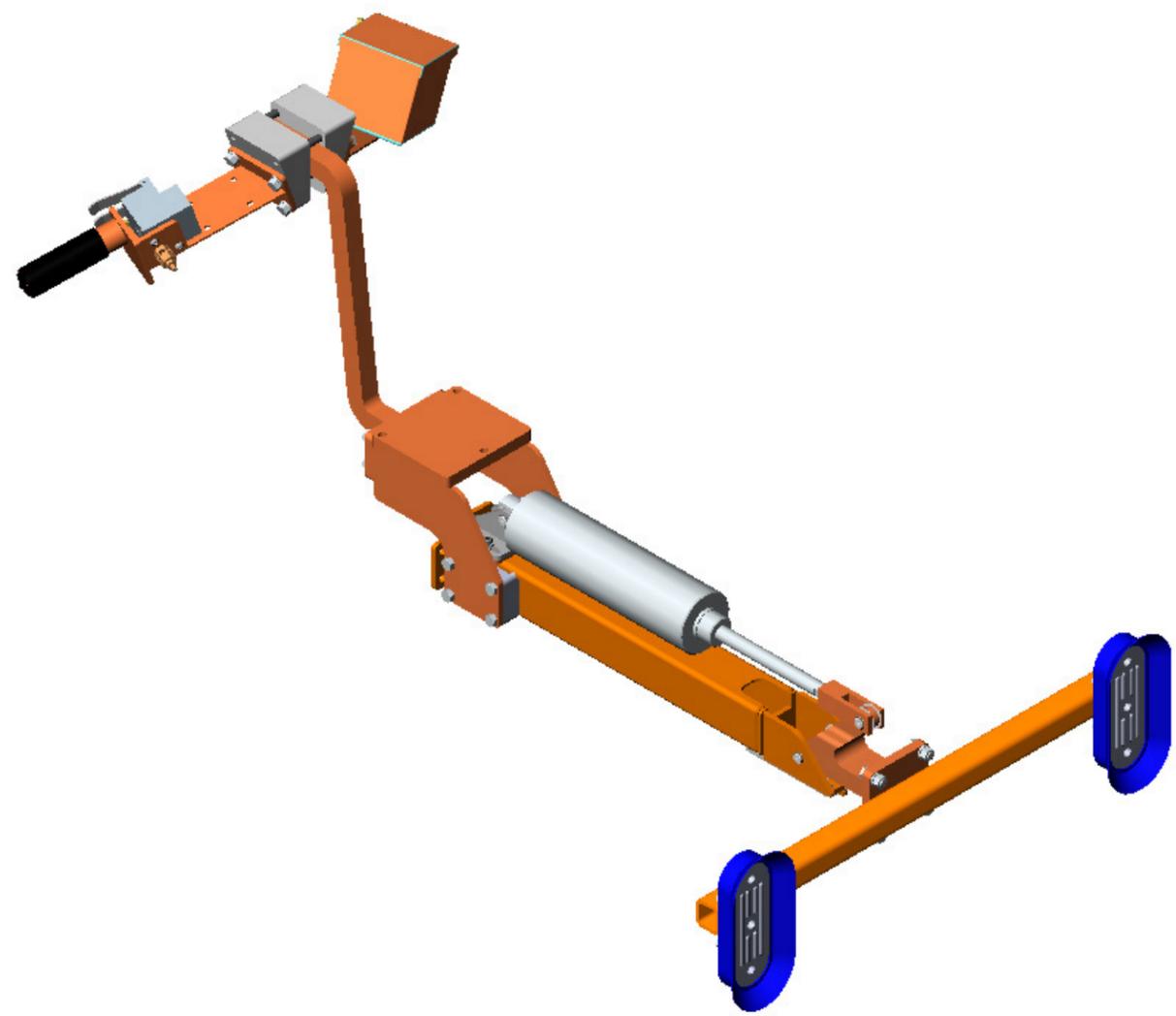
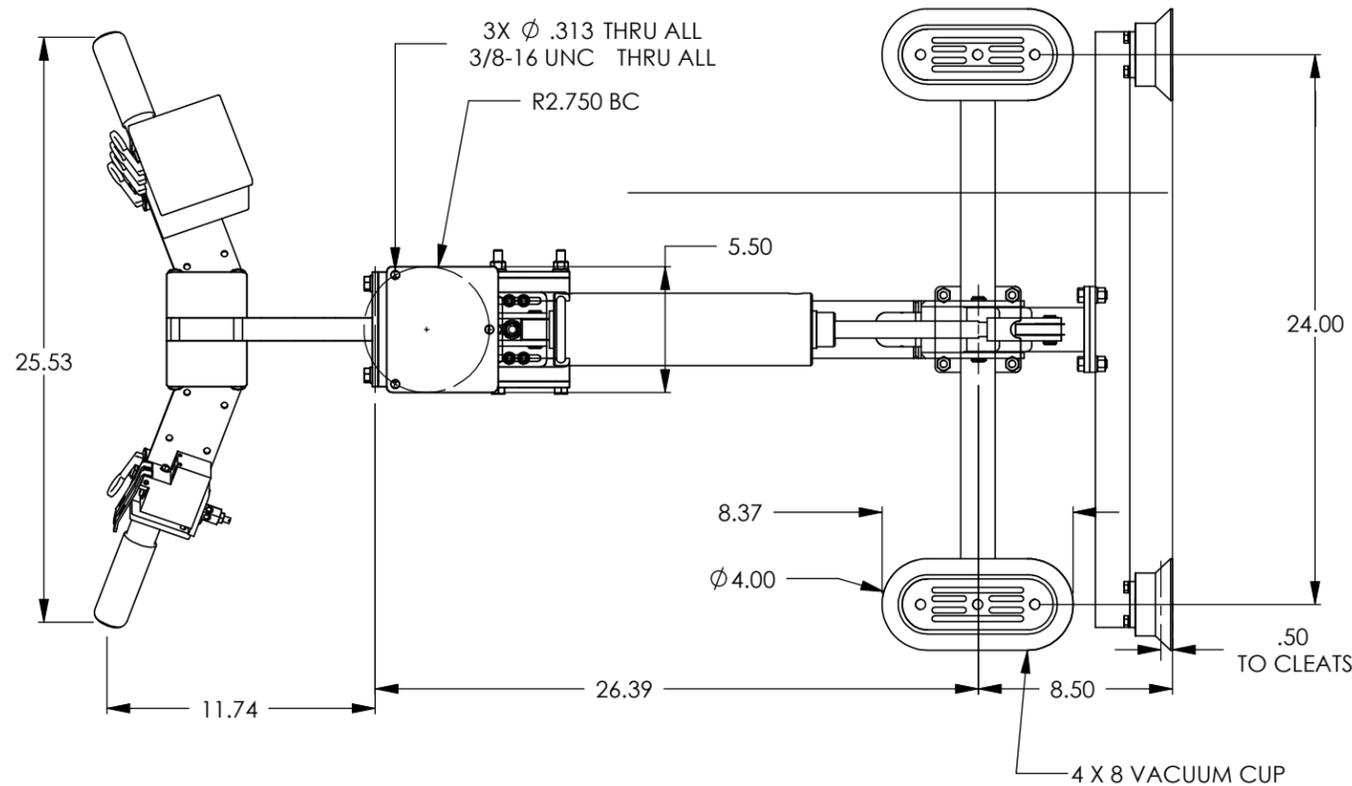
REDRAWN IN SOLIDWORKS  
22 AUG 01 DWB



| ITEM NO. | QTY. | PART NO. | DESCRIPTION                             | MATERIAL | MQTY  |
|----------|------|----------|---|----------|-------|
| 1        | 1    | P004639  | SKT HD C/S .312-24 X 2.500 LG           |          |       |
| 2        | 1    | P002580  | THIN HT NYL. INS. L'NUT .312-24         |          |       |
| 3        | 1    | 9218911  | LA ENDJOINT BRG MTG SHAFT               | R000203  | 3.780 |
| 4        | 1    | 9201526  | LA UPPER BRG. RETAINING PL              | R000452  | .875  |
| 5        | 1    | 9218913  | LA ENDJOINT LOWER BRG MTG. PLATE        | R000454  | 1.000 |
| 6        | 3    | P004038  | HX SKT HF DGP S/S.500 X 1.000           |          |       |
| 7        | 6    | P000064  | SHCS 1/4-20 X 1-1/4                     |          |       |
| 8        | 2    | 9220201  | MODIFIED SKT HD C/S 5/16-18             | P000102  |       |
| 9        | 3    | P004288  | SHCS 3/8-16 X 1-3/4                     |          |       |
| 10       | 3    | P000256  | HLOCK 3/8                               |          |       |
| 11       | 1    | P005808  | CROSSED ROLLER BRG - 90MM x 60MM x 13MM |          |       |
| 12       | 1    | 9218912  | LA ENDJOINT BRG. ADJ NUT                | R001183  | .875  |
| 13       | 1    | P000073  | HX SCKT BRS TIP SS - 1/4-28 x .375      |          |       |



|                        |                                      |  |               |
|------------------------|--------------------------------------|--|---------------|
| E                      | CHANGED TO SOLID WORKS PRINT         | JAM  | 9-13-00       |
| D                      | CHANGED NAME, WAS 9218914-330        | MJR  | 1-26-94       |
| C                      | ITEM #7 WAS 1.000 LG                 | MDO  | 12-2-93       |
| B                      | Ø1.752-3 WAS Ø1.748-9                | MJR  | 5-11-93       |
| A                      | LENGTHEN SHAFT 4.195 WAS 3.570 OAL   | MJR  | 5-10-93       |
| REV                    | DESCRIPTION                          |  | DATE          |
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| WELDING                | ASSEMBLY                             |  |               |
|                        | XXX                                  |  |               |
| CHKD                   |                                      |  LAURENS, IOWA 50554  |               |
| APP'D                  |                                      |  |               |
| DEBURR ALL SHARP EDGES | LODEARM REA-3000 / 300 ROT. / NO AIR |  |               |
| UNSPECIFIED TOLERANCES | FOR:                                 |  |               |
| .XXX ± .030            | DWG SIZE: A                          | SCALE: 1:3   | DATE: 7-8-92  |
| .XX ± .050             |                                      |  | DRAWN BY: DJG |
| ANGLE ± .5 DEG         | CLASS CODE: 915                      | DWG. NO.: 9218914_300  | REV: E        |



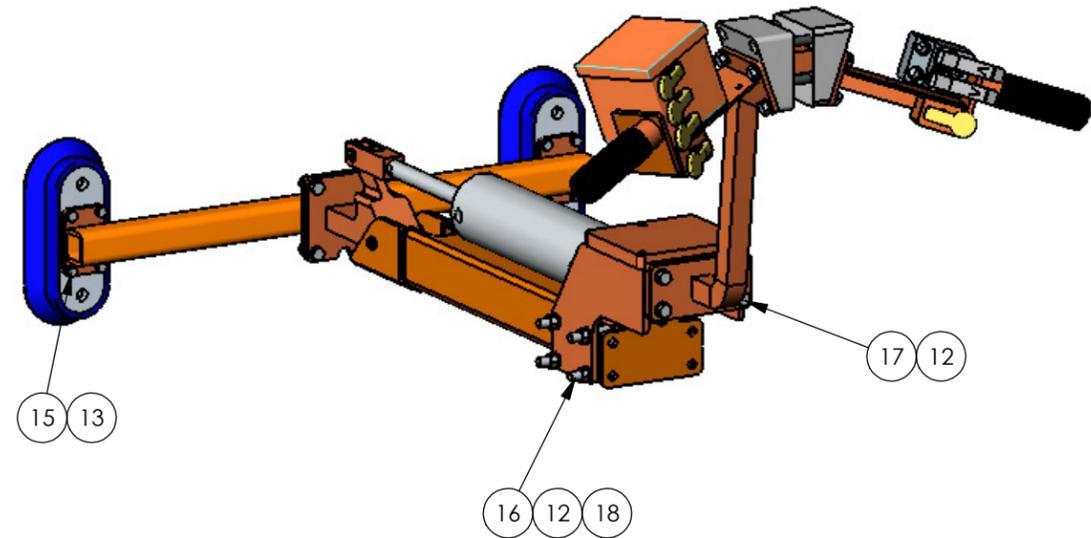
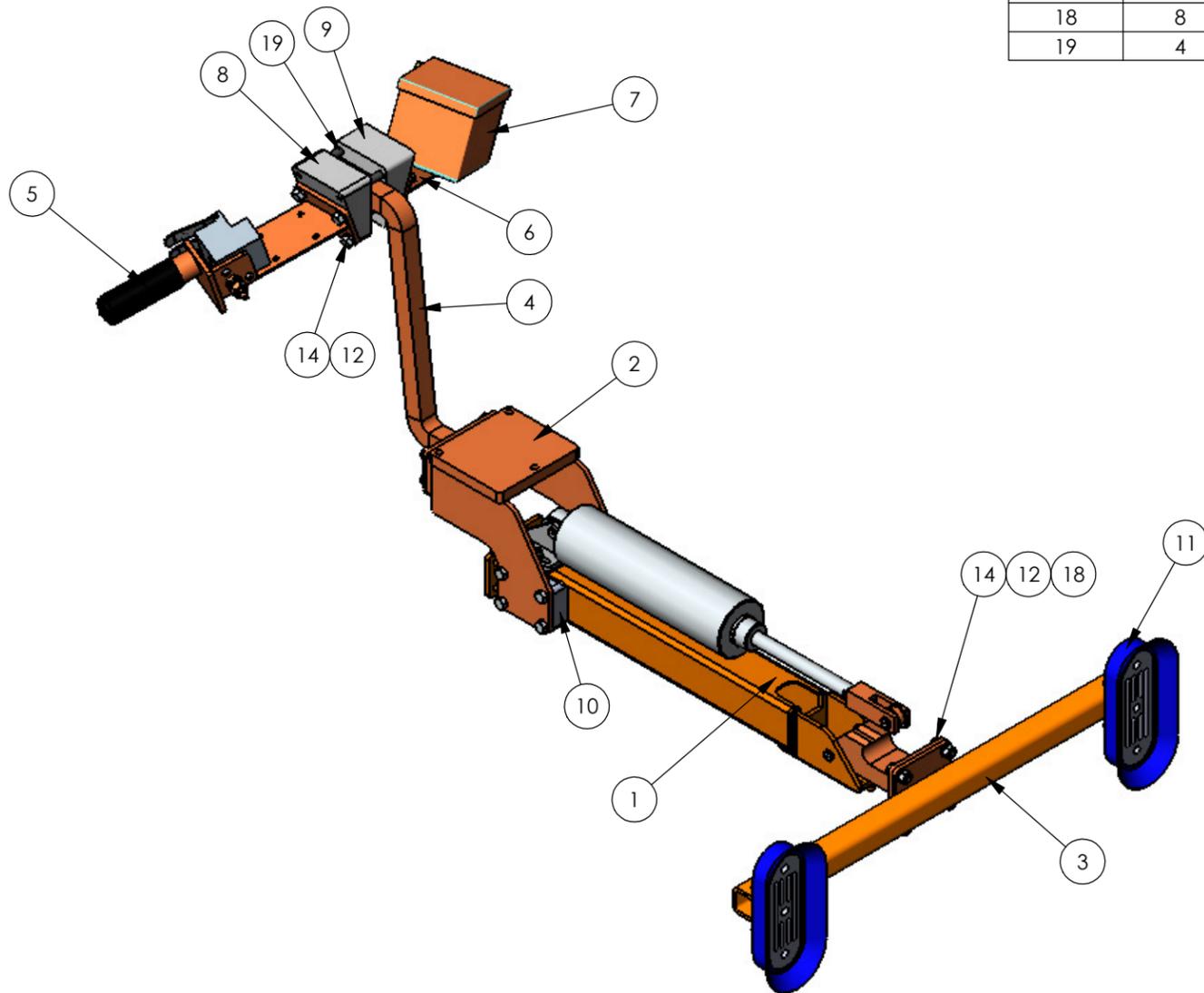
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|      |                     |     |             |
|------|---------------------|-----|-------------|
| A    | UPDATED TO AS BUILT | KJB | 12-May-2009 |
| REV. | DESCRIPTION         | BY  | DATE        |



|                      |                   |               |        |
|----------------------|-------------------|---------------|--------|
| TOOL ASSY-VAC W/ PEJ |                   |               |        |
| SCALE: 1:8           | DATE: 17-Mar-2009 | DRAWN BY: KJB |        |
| CLASS CODE: 523      | DWG NO: 200907605 | SHT: 1 of 2   | REV: A |

| ITEM NO | QTY | PART NUMBER | DESCRIPTION   | MATERIAL    | MQTY  |
|---------|-----|-------------|---|-------------|-------|
| 1       | 1   | 200908507   | HORZ PEJ ASSY-1500 IN-LB, EXT   |             |       |
| 2       | 1   | 200908555   | WELDMNT - LA TOOL MOUNT   |             |       |
| 3       | 1   | 200908509   | WELDMNT - VAC CUP FRAME (2 CUPS, 24.00 SPACED)                                |             |       |
| 4       | 1   | 200908559   | EOC,12.25 UP X 9.0 BACK   |             |       |
| 5       | 1   | 200819608   | RH (MAX) STEERING HANDLE/ W SINGLE PB BOX (SAM MT.) WITH PB AND MAX INSTALLED |             |       |
| 6       | 1   | 200819607   | LH STEERING HANDLE/ WITH SINGLE PB BOX (SAM MT.) WITH PB INSTALLED            |             |       |
| 7       | 1   | 200201701   | CONT ENCL - 4X4X4, LH, W/3 CONTROLS   |             |       |
| 8       | 1   | 200606940   | ADAPTOR - AL, 20 DEG DOWN SAM STEERING HANDLE, 4X 3/8-16                      | 037-R001160 | 3.500 |
| 9       | 1   | 200606860   | ADAPTOR - AL, 20 DEG DOWN SAM STEERING HANDLE, 4X 3/8 C'BORE                  | 037-R001160 | 3.500 |
| 10      | 2   | 200230303   | PLATE- AL, 1.00 X 3.50 X 2.50, 4X.406D, 2X2.75, 2Y1.75                        | 037-R000435 | 3.500 |
| 11      | 2   | P016259     | VAC CUP-VI CAS #VC-90-4x8, 50 DURO, 4X 1/4-20, 1.5 X 2.5 BP                   |             |       |
| 12      | 20  | P000256     | HLOCK 3/8   |             |       |
| 13      | 8   | P002574     | HLOCK 1/4   |             |       |
| 14      | 12  | P000107     | HHCS 3/8-16 NC X 1.000  |             |       |
| 15      | 8   | P000068     | HHCS 1/4-20 NC X .750   |             |       |
| 16      | 4   | P003042     | HHCS 3/8-16 NC X 6.000  |             |       |
| 17      | 4   | P004810     | HHCS 3/8-16 NC X .625   |             |       |
| 18      | 8   | P000217     | FHHN 3/8-16   |             |       |
| 19      | 4   | P005827     | SHCS 3/8-16 X 2-1/4   |             |       |



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TOOL ASSY-VAC W/ PEJ

SCALE: 1:8

DATE: 17-Mar-2009

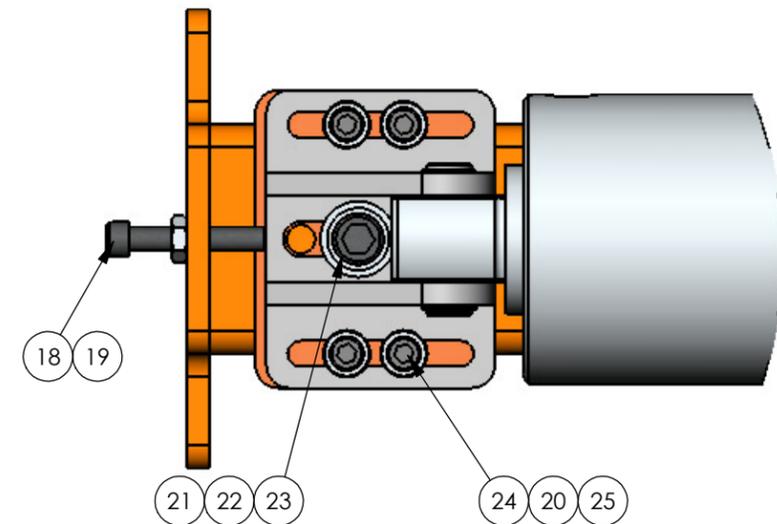
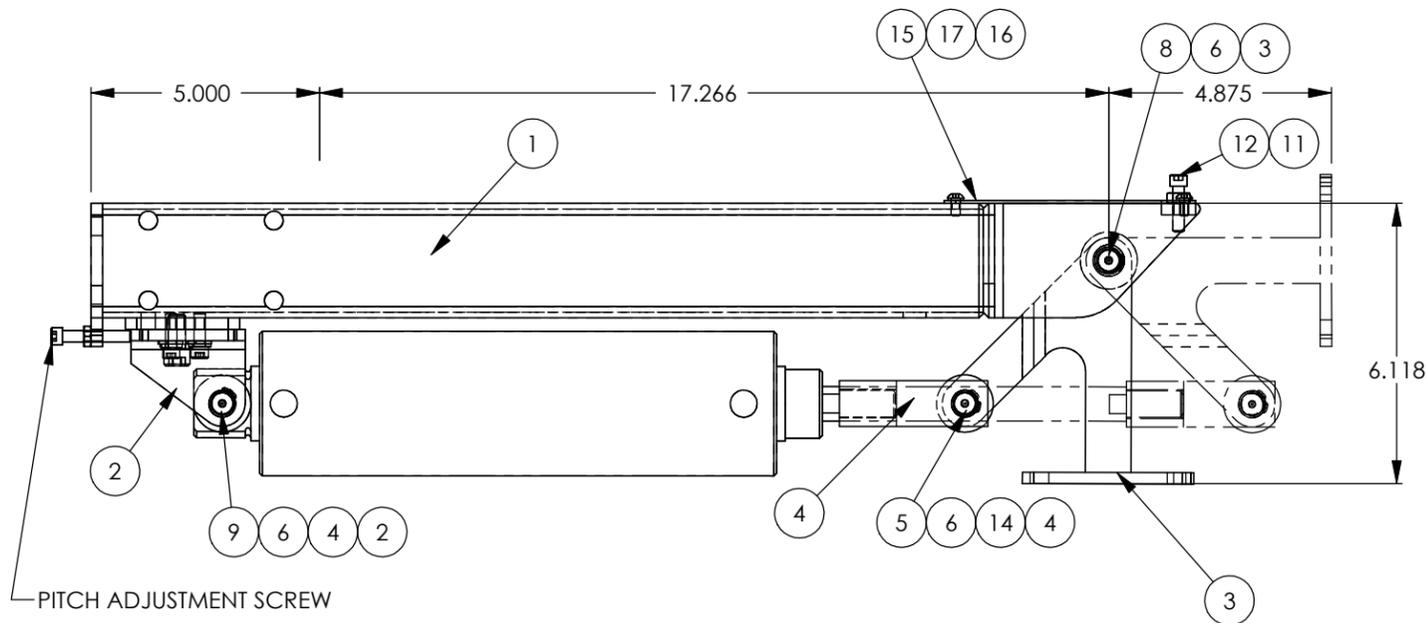
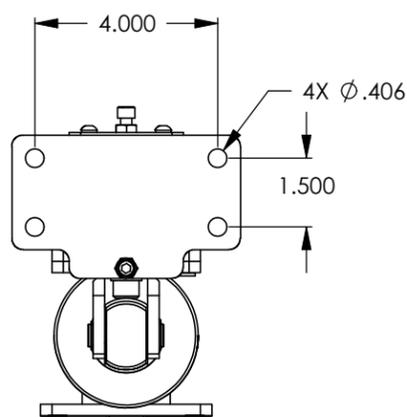
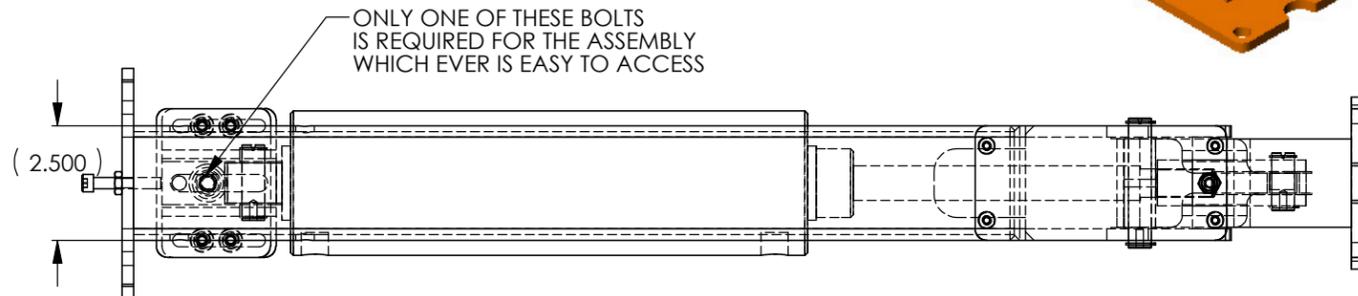
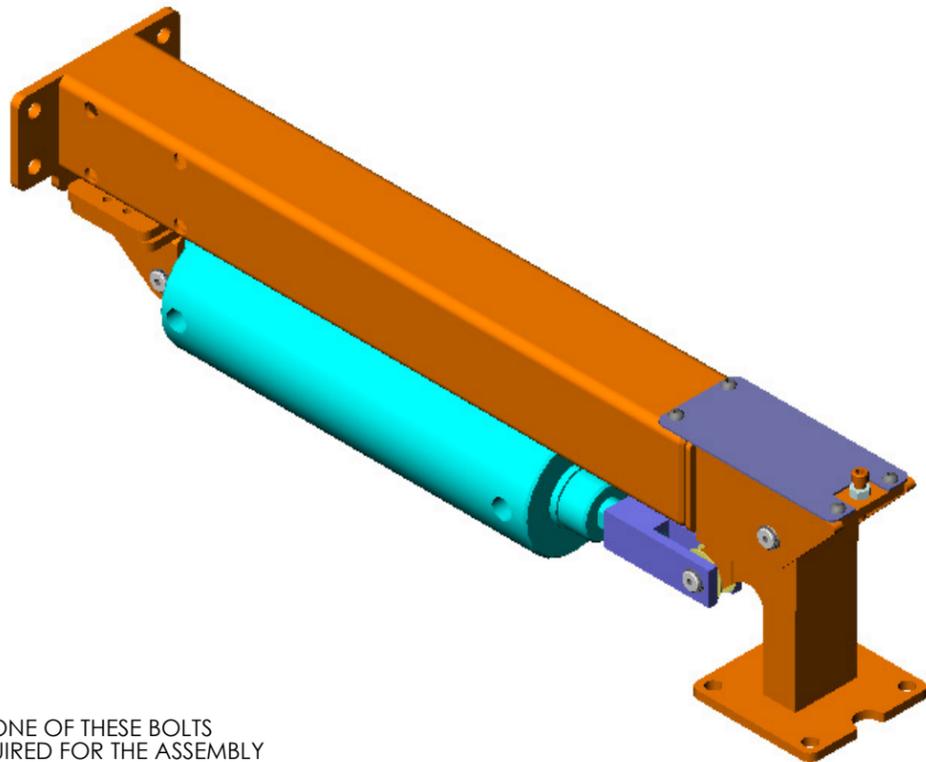
DRAWN BY: KJB

CLASS CODE: 523

DWG NO: 200907605

SHT: 2 of 2

REV: A



| ITEM NO | QTY | PART NUMBER | DESCRIPTION                             |
|---------|-----|-------------|---|
| 1       | 1   | 200908508   | PEJ FRAME WELD-1500 IN-LB               |
| 2       | 1   | 9708500     | BRACKET, CYLINDER MOUNT, ADJUSTABLE     |
| 3       | 1   | 200028683   | PIVOT SHAFT WELDMENT                    |
| 4       | 1   | 9708503     | CLEVIS, 5/8-18 CYL SHAFT, 3.25 LONG     |
| 5       | 1   | 9708504     | PIN (.500 DIA X 1.063 HARDENED)         |
| 6       | 6   | P000432     | .500 SHAFT TRUARC 5100-50 EXT           |
| 7       | 1   | P008866     | AIR CYL 3.00 BORE X 7.00 STROKE         |
| 8       | 1   | 9410416     | PIN (.500 DIA X 2.625 HARDENED)         |
| 9       | 1   | 9629911     | PIN (.500 DIA X 1.443 HARDENED)         |
| 10      | 1   | P003734     | JOURNAL BRG .593 OD X .500 ID X .365 LG |
| 11      | 1   | P001538     | JAM NUT HEX .250-20                     |
| 12      | 1   | P002570     | SOCKET HD CAP SCR .250-20 X 1.000       |
| 13      | 2   | P009933     | SEALED BRG-.5 OD X .688 OD X .875 LG    |
| 14      | 6   | 8500805     | 1.250 X .515 X .031 NYLON WASHER        |
| 15      | 1   | 200030194   | PEJ COVER                               |
| 16      | 4   | P002005     | #10 EXTERNAL TOOTH LOCK WASHER          |
| 17      | 4   | P000044     | BHSCS 10-32 X 3/8                       |
| 18      | 1   | P000067     | SHCS 1/4-20 X 1-1/2                     |
| 19      | 1   | P001538     | JAM NUT HEX .250-20                     |
| 20      | 4   | P002574     | HLOCK 1/4                               |
| 21      | 1   | P000255     | SAE 3/8                                 |
| 22      | 1   | P000256     | HLOCK 3/8                               |
| 23      | 1   | P000106     | SHCS 3/8-16 X 3/4                       |
| 24      | 4   | P000063     | SHCS 1/4-20 X 3/4                       |
| 25      | 4   | P002399     | USS #10                                 |

| REV. | DESCRIPTION         | BY  | DATE        |
|------|---------------------|-----|-------------|
| A    | UPDATED TO AS BUILT | KJB | 12-May-2009 |

UNLESS OTHERWISE SPECIFIED  
 .X ± .1  
 .XX ± .03  
 .XXX ± .005  
 1/X ± 1/32  
 ANGLE ± .5°  
 WELD +1/8  
 -0

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BREAK ALL SHARP EDGES TO .005 MAX

DWG SIZE: B  
 WGT: 19.734 LBS  
 SIM TO: 200317803  
 MATL DESC:

MATL:  
 TO BE MFG TO QWI-75-15

PARTS TO BE MFG TO QWI-75-15

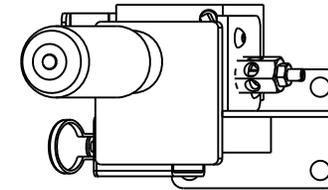
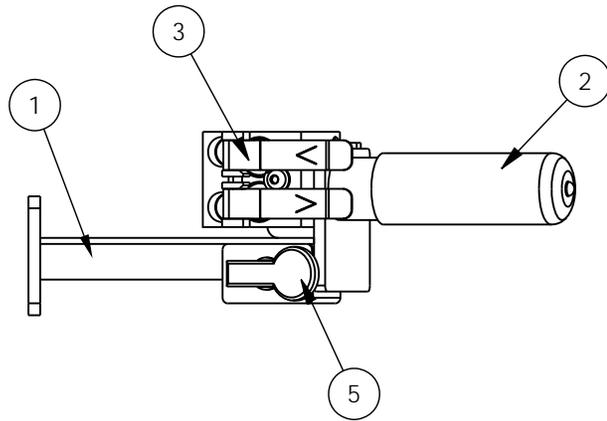
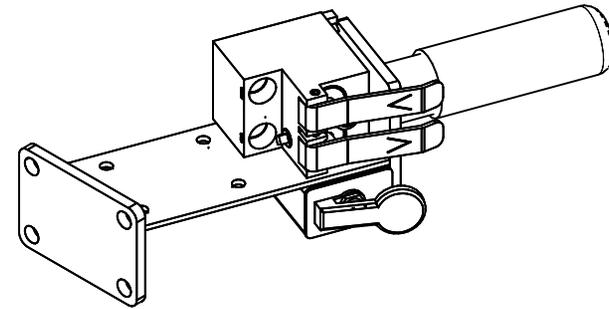
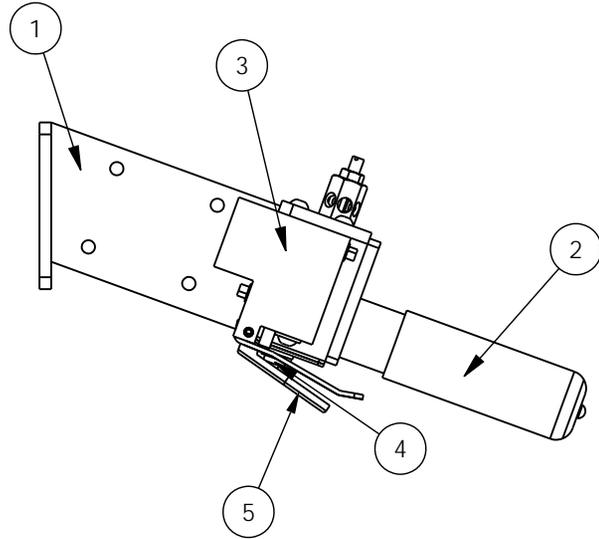


HORZ PEJ ASSY-1500 IN-LB, EXT

SCALE: 1:4  
 DATE: 26-Mar-2009  
 CLASS CODE: 666  
 DWG NO: 200908507

DRAWN BY: KJB  
 SHT: 1 of 1  
 REV: A

| ITEM NO | QTY | PART NUMBER | DESCRIPTION   | MATERIAL | MQTY |
|---------|-----|-------------|---|----------|------|
| 1       | 1   | 200817203   | RIGHT HAND MAX STEERING HANDLE / W, SINGLE BUTTON BOX (SAM MT.) |          |      |
| 2       | 1   | P005356     | PVC CAP - 1 1/4 X 4 BLACK                                       |          |      |
| 3       | 1   | 9409802     | HAND CONTROL METERING ASSY "MAX"                                |          |      |
| 4       | 1   | P006747     | PUSH BUTTON FOR 3 WAY AIR VALVE                                 |          |      |
| 5       | 1   | P000730     | HUMPHERY OPER VAL ACTUATOR                                      |          |      |

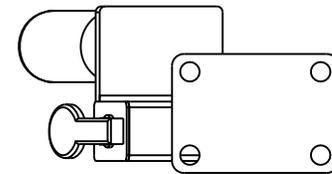
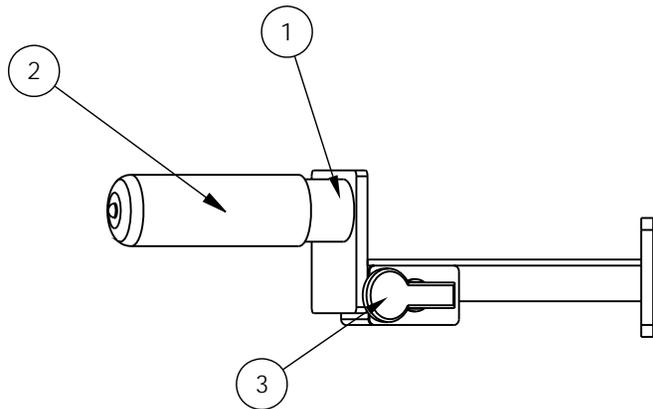
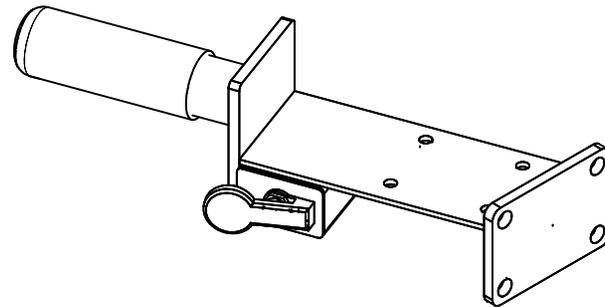
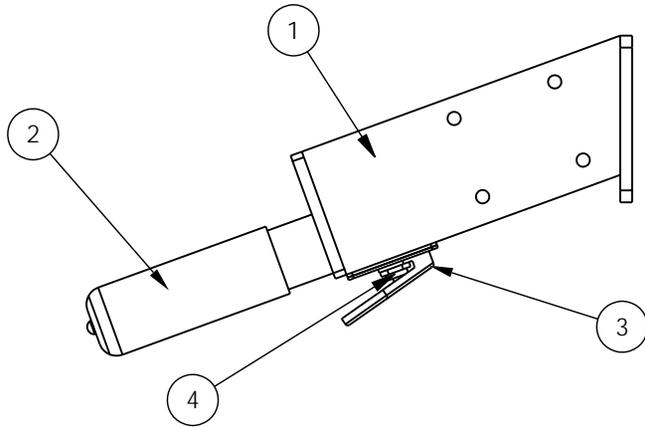


|  |   |                           |                |                              |
|--|---|---------------------------|----------------|------------------------------|
| UNLESS OTHERWISE SPECIFIED<br>.X ± .1<br>.XX ± .03<br>.XXX ± .005<br>1/X ± 1/32<br>ANGLE ± .5°<br>WELD ± 1/8<br>.0 | ALL DESIGNS, SKETCHES AND DRAWINGS ARE THE PROPERTY OF POSITECH CORPORATION LETTING, OR ALLOWING TO BE LET, THE KNOWLEDGE FOR DESIGN AND/OR FABRICATION FROM SAID DESIGNS, SKETCHES OR DRAWINGS WITHOUT THE WRITTEN CONSENT OF POSITECH CORPORATION IS EXPRESSLY FORBIDDEN. |                           |                |                              |
|  | BREAK ALL SHARP EDGES TO .005 MAX   |                           |                |                              |
|  | DWG SIZE: A   | WGT: 4.185 LBS<br>SIM TO: | MATL:<br>MQTY: | PARTS TO BE MFG TO QWI-75-15 |
|  | MATL DESC:  |                           |                |                              |



|   |                   |               |      |
|---|-------------------|---------------|------|
| RH (MAX) STEERING HANDLE/ W SINGLE PB BOX (SAM MT.) WITH PB AND MAX INSTALLED |                   |               |      |
| SCALE: 1:4  | DATE: 7/14/2008   | DRAWN BY: KJB |      |
| CLASS CODE: 675   | DWG NO: 200819608 | SHT: 1 of 1   | REV: |

| ITEM NO | QTY | PART NUMBER | DESCRIPTION   | MATERIAL | MQTY |
|---------|-----|-------------|---|----------|------|
| 1       | 1   | 200817501   | LEFT HAND STEERING HANDLE/ WITH SINGLE PB BOX (SAM MT.) |          |      |
| 2       | 1   | P005356     | PVC CAP - 1 1/4 X 4 BLACK                               |          |      |
| 3       | 1   | P000730     | HUMPHERY OPER VAL ACTUATOR                              |          |      |
| 4       | 1   | P006747     | PUSH BUTTON FOR 3 WAY AIR VALVE                         |          |      |



|  |   |                |       |
|--|---|----------------|-------|
| UNLESS OTHERWISE SPECIFIED<br>.X ± .1<br>.XX ± .03<br>.XXX ± .005<br>1/X ± 1/32<br>ANGLE ± .5°<br>WELD ± 1/8<br>.0 | ALL DESIGNS, SKETCHES AND DRAWINGS ARE THE PROPERTY OF POSITECH CORPORATION LETTING, OR ALLOWING TO BE LET, THE KNOWLEDGE FOR DESIGN AND/OR FABRICATION FROM SAID DESIGNS, SKETCHES OR DRAWINGS WITHOUT THE WRITTEN CONSENT OF POSITECH CORPORATION IS EXPRESSLY FORBIDDEN. |                |       |
|  | BREAK ALL SHARP EDGES TO .005 MAX   |                |       |
|  | DWG SIZE: A   | WGT: 2.766 LBS | MATL: |
|  |   | SIM TO:        | MQTY: |
|  | MATL DESC:  |                |       |



PARTS TO BE MFG TO QWI-75-15

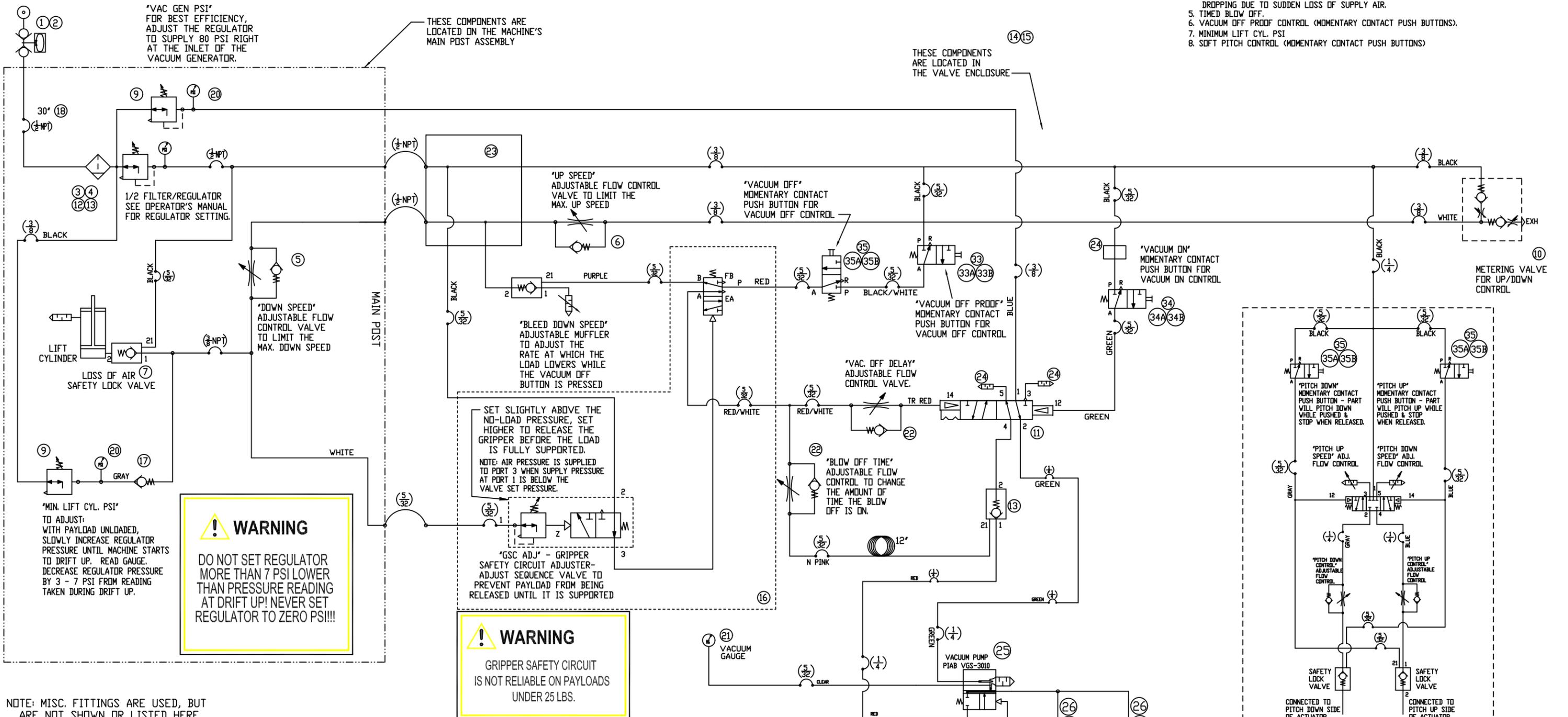
|  |                   |               |      |
|--|-------------------|---------------|------|
| LH STEERING HANDLE/ WITH SINGLE PB BOX (SAM MT.) WITH PB INSTALLED |                   |               |      |
| SCALE: 1:4   | DATE: 14-Jul-2008 | DRAWN BY: KJB |      |
| CLASS CODE: 675  | DWG NO: 200819607 | SHT: 1 of 1   | REV: |

THE CUSTOMER IS TO SUPPLY COMPRESSED AIR (AT 120 PSI MAXIMUM ALLOWED) SEE OPERATOR'S MANUAL &/OR PROFILE FOR PRESSURE & SCFM REQUIREMENT).

"VAC GEN PSI" FOR BEST EFFICIENCY, ADJUST THE REGULATOR TO SUPPLY 80 PSI RIGHT AT THE INLET OF THE VACUUM GENERATOR.

THESE COMPONENTS ARE LOCATED ON THE MACHINE'S MAIN POST ASSEMBLY

THESE COMPONENTS ARE LOCATED IN THE VALVE ENCLOSURE



**WARNING**  
DO NOT SET REGULATOR MORE THAN 7 PSI LOWER THAN PRESSURE READING AT DRIFT UP! NEVER SET REGULATOR TO ZERO PSI!!!

**WARNING**  
GRIPPER SAFETY CIRCUIT IS NOT RELIABLE ON PAYLOADS UNDER 25 LBS.

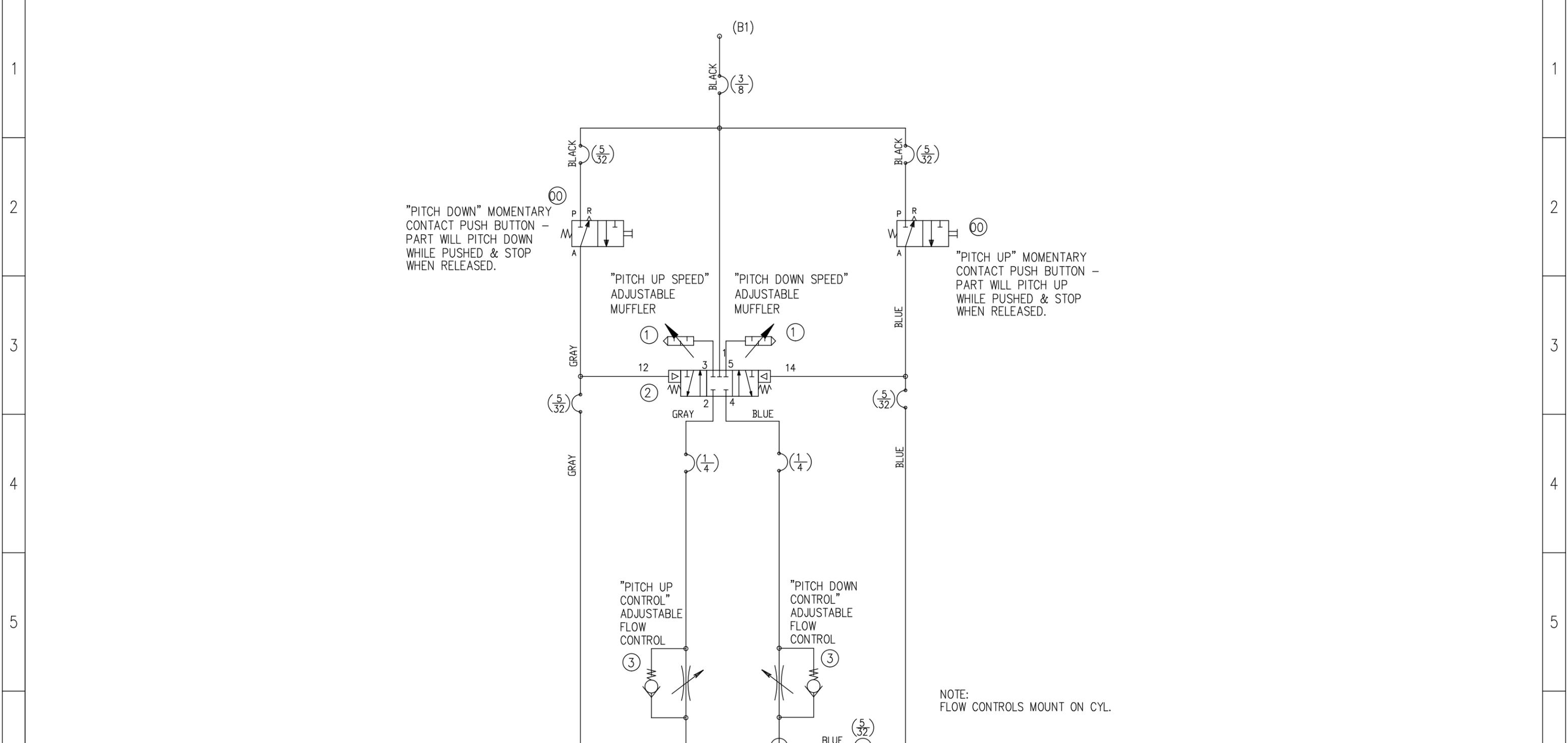
NOTE: MISC. FITTINGS ARE USED, BUT ARE NOT SHOWN OR LISTED HERE

- FEATURES**
- METERING VALVE CONTROL CIRCUIT UP/DOWN
  - VACUUM ON CONTROL (MOMENTARY CONTACT PUSH BUTTON).
  - GRIPPER SAFETY CIRCUIT TO PREVENT THE VACUUM FROM SHUTTING OFF UNTIL THE PAYLOAD IS SUPPORTED.
  - LIFT CYLINDER SAFETY LOCK VALVE TO PREVENT THE ARM FROM DROPPING DUE TO SUDDEN LOSS OF SUPPLY AIR.
  - TIMED BLOW OFF.
  - VACUUM OFF PROOF CONTROL (MOMENTARY CONTACT PUSH BUTTONS).
  - MINIMUM LIFT CYL. PSI
  - SOFT PITCH CONTROL (MOMENTARY CONTACT PUSH BUTTONS)

| NO. | QTY | PART NO.      | DESCRIPTION                            | NO. | QTY | PART NO.      | DESCRIPTION                               | NO. | QTY | PART NO.      | DESCRIPTION                            |
|-----|-----|---------------|--|-----|-----|---------------|---|-----|-----|---------------|--|
| 1   | 1   | 128-P004161   | FOSTER GK DISC SKT 1/2 NPT 5205        | 16  | 1   | 504-200723600 | MTG PLATE ASSY-GSC W/VALVES AND FITTINGS  | 31  | 1   |               |  |
| 2   | 1   | 128-P004162   | FOSTER GK DISC TIP 1/2 NPT 54S-5       | 17  | 1   | 133-P006193   | SMC PNEUMATIC CHECK VALVE NAK2000-N02     | 32  | 1   |               |  |
| 3   | 1   | 131-P009885   | FIL/REG 3/8PORT X 1/4 BODY NDRGRN 72G  | 18  | 30' | 128-P004223   | .500ID FDA APPROVED MULTI-PURP HOSE       | 33  | 0   | 678-200817203 | RIGHT HAND HANDLE/W, SINGLE BUTTON BOX |
| 4   | 1   | 131-P010177   | PORTING BLOCK NDRGRN #4216-01          | 19  | 1   | 133-P004350   | SMC FLOW CONTROL VALVE NAS-2000-N01       | 33A | REF | 133-P000730   | HUMPHREY OPER VAL ACTUATOR ND 34T      |
| 5   | 1   | 133-P004036   | SMC FLOW CONT VAL 'MOUT' NAS-3200-N03  | 20  | 3   | 131-P003816   | PARKER REGULATOR GAUGE ND P177413         | 33B | REF | 133-P006747   | PUSH BUTTON (3) WAY AIR VALVE HUMPHREY |
| 6   | 1   | 133-P005776   | SMC FLOW CONT VAL 'M-IN' NAS-3210-N03  | 21  | 1   | 130-P016001   | VACUUM GAUGE 1/4 NPT W/GREEN PIE SHAPE    | 34  | 0   | 678-200819607 | LH HANDLE/ WITH SINGLE PB BOX          |
| 7   | 1   | 133-P009174   | PILOT OPER CHECK VALVE 3/8 NPT         | 22  | 2   | 133-P003674   | SMC FLOW CONTROL VALVE NAS-1000-M5        | 34A | REF | 133-P000730   | HUMPHREY OPER VAL ACTUATOR ND 34T      |
| 8   | 1   | 504-200828906 | SCHEMATIC-SOFT PITCH 1/8 NPT           | 23  | 1   | 860-8733105   | DOWN ARM DUAL HOSE BLOCK                  | 34B | REF | 133-P006747   | PUSH BUTTON (3) WAY AIR VALVE HUMPHREY |
| 9   | 2   | 131-P004365   | AIR REGULATOR 1/4 NPT PARKER 14R-1-13F | 24  | 2   | 108-P000335   | BREATHER VENT PLG 1/4NPT                  | 35  | 0   | 678-200201701 | CONT ENCLD-4X4, LH, W/3 CONTROLS       |
| 10  | REF | 790-9409802   | METERING CONT ASSY (R/H) W/D HANDLE    | 25  | 1   | 130-P018021   | Vac Trap- Plab, VT1-AS CDAX P112-2,#1041  | 35A | REF | 133-P000730   | HUMPHREY OPER VAL ACTUATOR ND 34T      |
| 11  | 1   | 133-P010041   | NDRGRN SPORT 2PDS 2PIL 1/4 NPT         | 26  | 4   | 128-P005772   | 1/4NPT REUSABLE CP PARKER 20190-4-6       | 35B | REF | 133-P006747   | PUSH BUTTON (3) WAY AIR VALVE HUMPHREY |
| 12  | 1   | 131-P010176   | QUICK CLAMP NDRGRN #4214-51            | 27  | 38  | 128-P005770   | 3/2ID TEFLON HOSE S/S BRAID, PARKER 919-6 | 36  |     |               |  |
| 13  | 1   | 133-P006051   | PILOT OPER CHECK VALVE 1/4 NPT         | 28  |     |               |   | 37  |     |               |  |
| 14  | 1   | 700-9907715   | ENCL-VALVE, 25 X 6.000 X3.750 BOTTOM   | 29  | 1   |               |   | 38  |     |               |  |
| 15  | 1   | 700-9907716   | ENCL-VALVE, 25 X 6.00X 3.750 COVER     | 30  | 1   |               |   | 39  |     |               |  |

**WARNING**  
PART SURFACE QUALITY OR DEFECTS WILL CONTRIBUTE TO REDUCED VACUUM CUP SEAL QUALITY AND PART SECURITY FOR LIFTING. DO NOT ATTEMPT TO LIFT PAYLOAD IF THE GREEN INDICATOR LIGHT IS NOT SHOWN AND VACUUM GAUGE INDICATES A LEVEL BELOW 20 IN. HG.

|  |                   |                                     |                  |
|--|-------------------|-------------------------------------|------------------|
| 17'  | 26                | 27                                  | LEFT VACUUM CUP  |
| 21'  | 26                | 27                                  | RIGHT VACUUM CUP |
| A  |                   | UPDATED TO AS BUILT AND HOSE COLORS | SLF 20-MAY-2009  |
| REV  | DESCRIPTION       |                                     | DATE             |
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| <b>Positech</b><br>CORPORATION   |                   | PNEUMATIC SCHEMATIC                 |                  |
| SCALE: NONE  | DATE: 23-MAR-2009 | DRAWN BY: SLF                       |                  |
| CLASS CODE: 504  | DWG NO: 200907001 | SHT: 1 of 1 REV: A                  |                  |



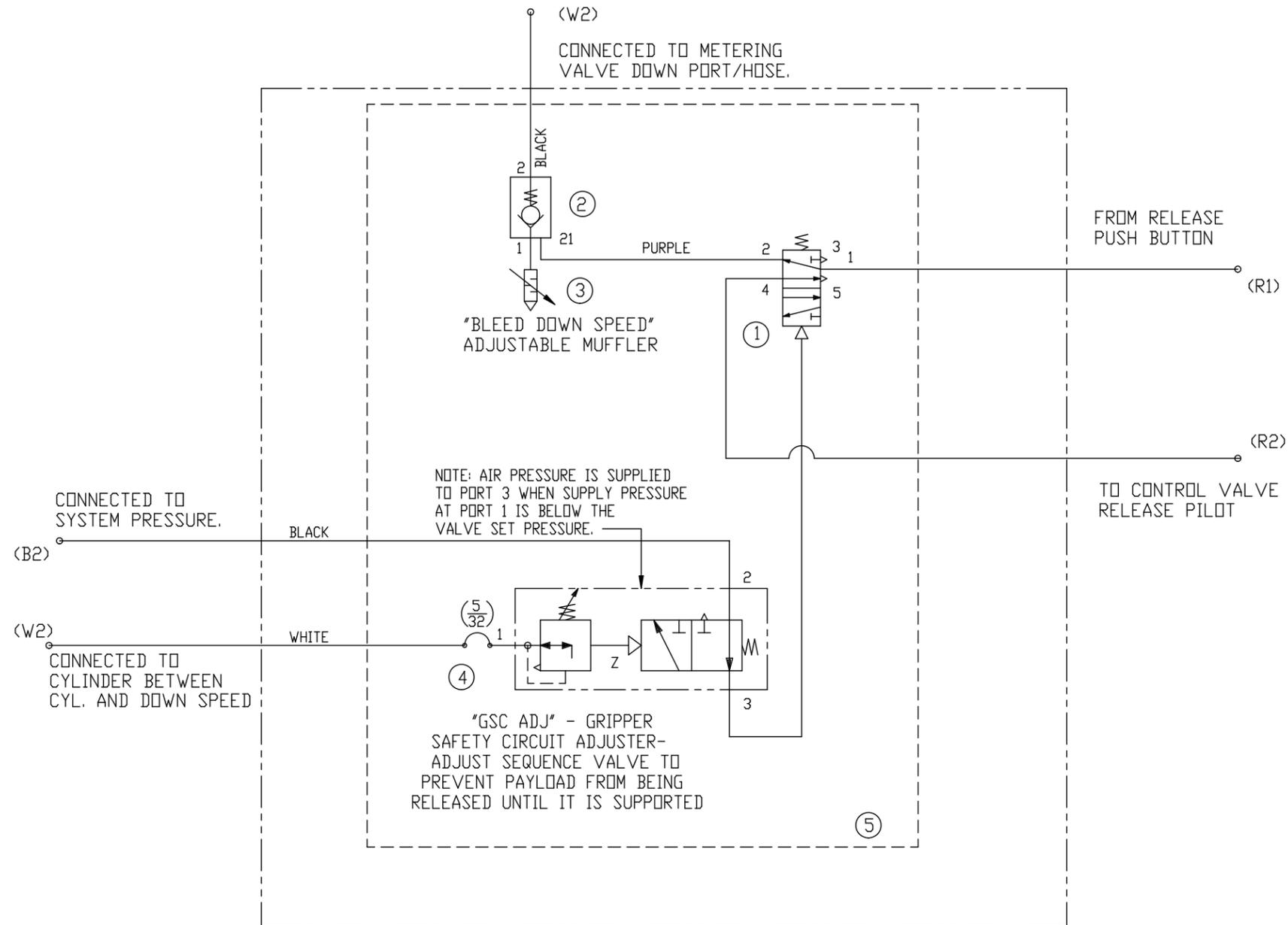
|     |      |             |  |
|-----|------|-------------|--|
| 7   |      |             |  |
| 6   |      |             |  |
| 5   |      |             |  |
| 4   | 2    | 133-P006065 | PILOT OPER CHECK VALVE 1/8 NPT NORGNEN |
| 3   | 2    | 133-P009134 | FLOW C'TROL "METER-IN" 1/4TUBEX1/8NPT  |
| 2   | 1    | 133-P009371 | AIR VAL 5PORT,3POS,2PIL,1/8NPT NORGNEN |
| 1   | 2    | 108-P006289 | SILENCER/MUFFLER SPEED CON'T 1 /8NPT   |
| NO. | QT'Y | PART NO.    | DESCRIPTION                            |

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**Positech CORPORATION**

SOFT PITCH 1/8 NPT

|                 |                   |                    |
|-----------------|-------------------|--------------------|
| SCALE: NONE     | DATE: 15-OCT-2008 | DRAWN BY: SLF      |
| CLASS CODE: 504 | DWG NO: 200828906 | SHT: 1 of 1 REV: - |



NOTE: MISC. FITTINGS ARE USED, BUT ARE NOT SHOWN OR LISTED HERE

| NO. | QTY | PART NO.      | DESCRIPTION                             |
|-----|-----|---------------|---|
| 1   | 1   | 133-P008959   | NORGREN 5PORT 2POS 10-32 AIR VALVE      |
| 2   | 1   | 133-P006051   | PILOT OPER CHECK VAL 1/4 NPT            |
| 3   | 1   | 108-P004661   | SILENCER/MUFFLER SPEED CONT 1/4 NPT     |
| 4   | 1   | 133-P003829   | CROUZET MANDSTATS VALVE 81-502-160      |
| 5   | 1   | 613-200719900 | MTG. PLATE - 3.0X3.0X.375 GSC/VALVES    |
| 6   | 4   | 129-P006088   | ELBOW 90D SWVL 10-32M X .156 TUBE       |
| 7   | 3   | 171-P001260   | SPACER, NYLON #10X1/2' LG RAF#1159-10-N |
| 8   | 5   | 124-P000602   | STAT-O-SEAL PARKER NO 600-0101-10       |
| 9   | 3   | 118-X001007   | -.007 O-RING .156 ID X .062 NI000 70    |
| 10  | 1   | 100-P012336   | S/SBHSCS 10-32 X 7/8                    |
| 11  | 3   | 100-P004991   | S/SBHSCS 10-32 X 1/4                    |
| 12  | 11  | 129-P003656   | CONNECTOR 10-32 M THRD X .156 TUBE      |
| 13  | 3   | 100-P006085   | S/SBHSCS 10-32 X 3/4                    |
| 14  | 3   | 129-P005271   | BANJO STUD MANIFOLD 10-32               |
| 15  |     |               |   |
| 16  |     |               |   |
| 17  |     |               |   |
| 18  |     |               |   |

NOT SHOWN

| REV | DESCRIPTION                          | DATE          |
|-----|--------------------------------------|---------------|
| A   | CHANGED ITEM #7 SPACER TO .500" LONG | JAC 25OCT2007 |

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WELDING ASSEMBLY

CHKD \_\_\_\_\_

APP'D \_\_\_\_\_

DEBURR SHARP EDGES

UNSPECIFIED TOLERANCES

.XXX ±.030

.XX ±.050

ANGLE ±.5 DEG

**Positech CORPORATION**  
LAURENS, IOWA 50554

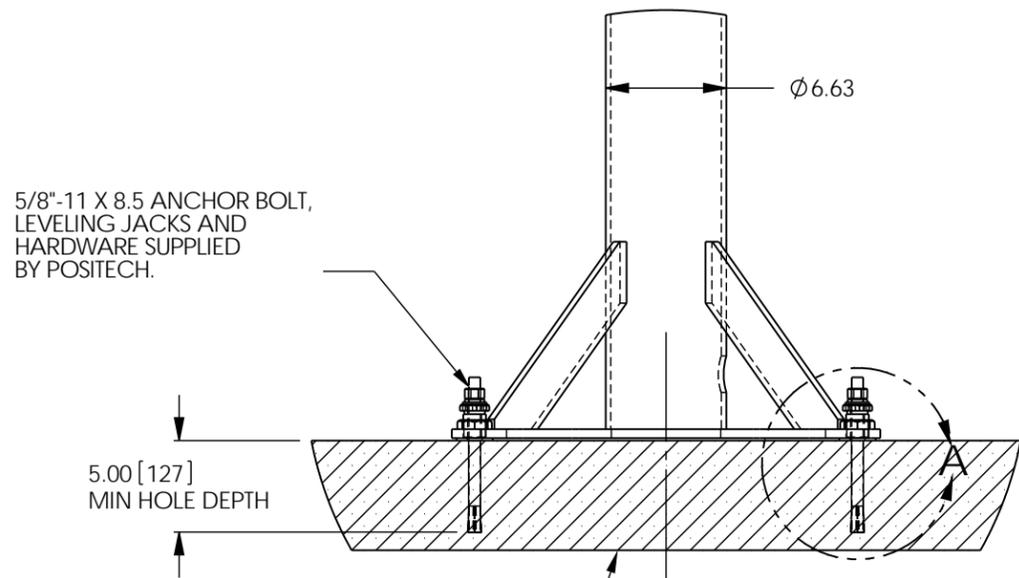
MTG PLATE ASSY-GSC W/VALVES AND FITTINGS

FOR:

|            |      |          |           |          |     |
|------------|------|----------|-----------|----------|-----|
| SCALE      | NONE | DATE     | 24AUG2007 | DRAWN BY | JAC |
| CLASS CODE | 504  | DWG. NO. | 200723600 | REV.     | A   |

| ITEM NO | QTY | PART NUMBER | DESCRIPTION                               |
|---------|-----|-------------|---|
| 1       | 4   | P000297     | CONCRETE ANCHOR BOLT - 5/8-11 NC X 8.5 LG |
| 2       | 4   | P000261     | HLOCK 5/8                                 |
| 3       | 4   | 7631503     | LEVELING JACK- 1 1/4-12 X 1.5 X .762 ID   |
| 4       | 4   | 7635303     | NUT-1 1/4-12, JAM TYPE, LEVELING JACK     |
| 5       | 4   | P000262     | USS 3/4 PL                                |

ADJUST LEVELING JACKS SO THE TOP OF THE PEDESTAL IS LEVEL. TIGHTEN HARDWARE. APPLY GROUT UNDER PEDESTAL IF DESIRED.



5/8"-11 X 8.5 ANCHOR BOLT, LEVELING JACKS AND HARDWARE SUPPLIED BY POSITECH.

FULLY REINFORCED CONCRETE WITH A MINIMUM STRENGTH OF 3500 PSI AND A MINIMUM DEPTH OF 6.00". NO CRACKS ARE TO BE PRESENT WITHIN 48" OF PEDESTAL CENTERLINE.

MAIN POST CENTERLINE  
MAXIMUM STATIC MOMENT FROM MACHINE, TOOLING, & PAYLOAD:

45,000 IN LBS

**ANCHOR BOLT INSTALLATION INSTRUCTIONS**

1.) DRILL A HOLE PERPENDICULAR TO THE WORK SURFACE WITH A DIAMETER EQUAL TO THE ANCHOR DIAMETER. DRILL THE HOLE TO A DEPTH EXCEEDING MINIMUM EMBEDMENT (5.00" FOR 5/8"-11 ANCHOR). TO ENSURE FULL HOLDING POWER. IT IS ACCEPTABLE TO DRILL FULLY THROUGH THE CONCRETE TO ALLOW THE BOLTS TO BE LATER DRIVEN INTO THE EARTH SHOULD THE MACHINE BE MOVED IN THE FUTURE. DO NOT REAM THE HOLE OR ALLOW THE DRILL TO WOBBLE.

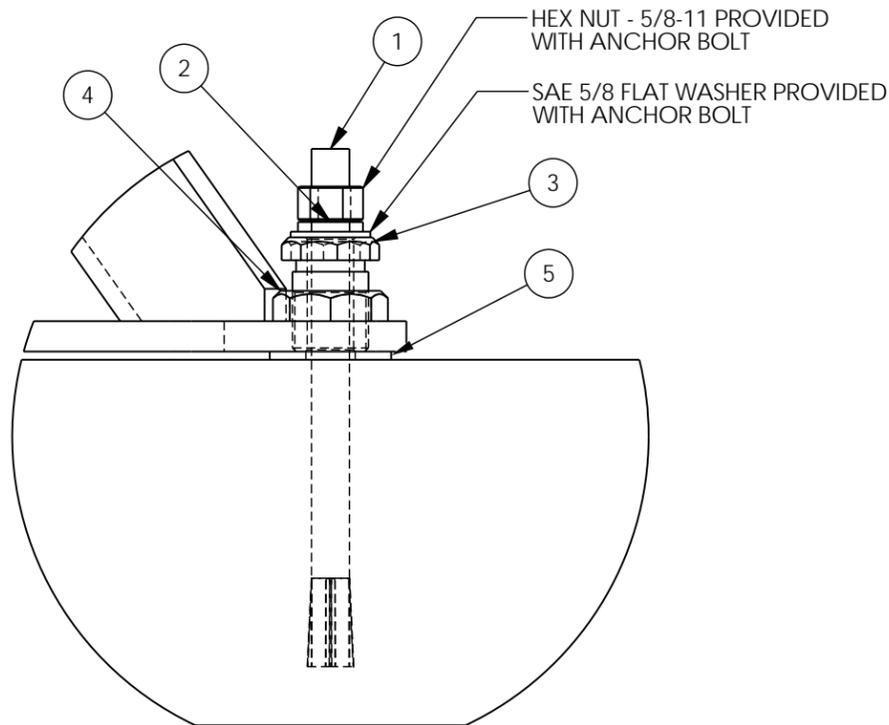
2.) CLEAN THE HOLE USING COMPRESSED AIR AND A NYLON BRUSH. A CLEAN HOLE IS NECESSARY FOR PROPER PERFORMANCE.

3.) ASSEMBLE A WASHER BETWEEN PEDESTAL SCREW JACK AND FLOOR.

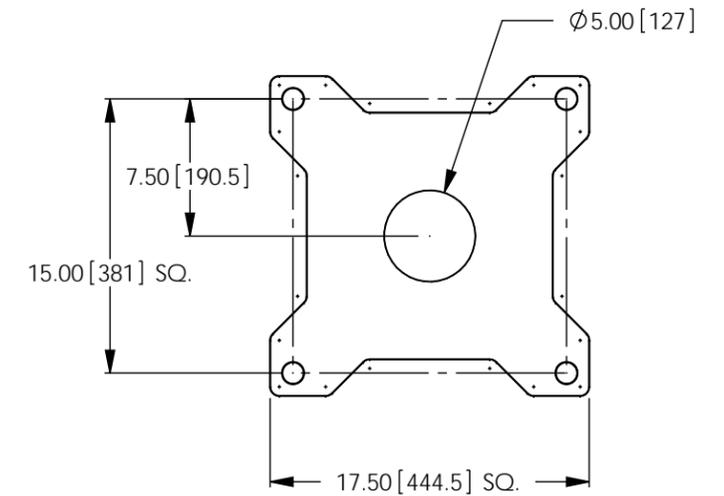
4.) ASSEMBLE THE NUT ON THE ANCHOR SO THE NUT RESTS FLUSH TO JUST ABOVE THE TOP OF THE ANCHOR. PLACE ANCHOR IN HOLE. STRIKE SHARPLY WITH HAMMER TO DRIVE DOWN. FRICTION-FIT ANCHOR DESIGN MAY REQUIRE MORE FORCE THAN OTHER ANCHOR DESIGNS.

5.) TORQUE ANCHORS TO 85-110 FT-LBS.

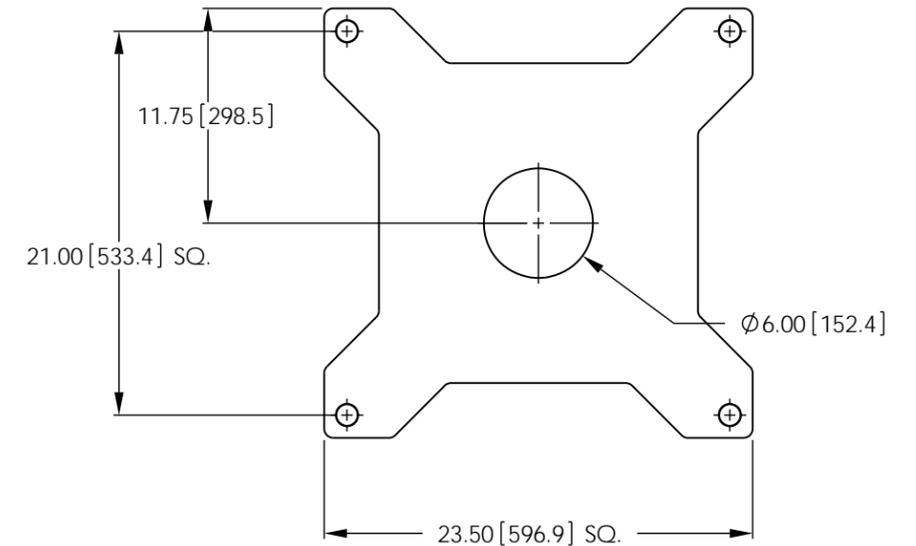
6.) NOTE: THE DEEPER THE HOLE IS DRILLED, THE GREATER THE PULL OUT FORCE BECOMES. ANCHOR EMBEDMENT DEPTH NOT TO EXCEED 1 1/2 TIMES THE ANCHOR BOLT DIAMETER FROM THE OPPOSING FACE OF CONCRETE SLAB.



DETAIL A  
SCALE 1 : 3



LODEARM/REACTION ARM/AJB-40



SAM G

|      |   |     |           |
|------|---|-----|-----------|
| A    | ADDED LA/RA/AJB-40 AND ANCHOR BOLT DETAIL AND BOM | JAC | 11JAN2005 |
| REV. | DESCRIPTION                                       | BY  | DATE      |

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**PEDESTAL MTG. - SAM G/LA/RA/AJB-40**

FOR: SAM G/LA/RA/AJB-40

|                 |                     |               |               |
|-----------------|---------------------|---------------|---------------|
| DWG SIZE: B     | SCALE: 1:10         | DATE: 4/21/01 | DRAWN BY: BLS |
| CLASS CODE: 730 | DWG. NO.: 200112701 | REV: A        |               |

MATERIAL SAFETY DATA SHEET

June 20,2002

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME Marvel Air Tool Oil  
PRODUCT CODE MM080, MM085, MM086, MM088R, MM089 MM  
CHEMICAL FAMILY Petroleum Distillates  
CHEMICAL NAME Complex Mixture of Hydrocarbons  
FORMULA Mixture

MANUFACTURER

Marvel Oil Company, Inc.  
5655 W. 73rd Street  
Chicago, IL 60638  
Phone: 708-563-3766  
Fax: 708-563-3715

EMERGENCY TELEPHONE NUMBERS

Transportation:  
CHEMTREC; 800-424-9300  
Medical:  
ROCKY MTN POISON CTR: 800-332-3073

2. POSITION/INFORMATION ON INGREDIENTS

| COMPONENT                | CAS NUMBER | CONCENTRATION (wt %) |
|--------------------------|------------|----------------------|
| Naphthenic Hydrocarbons  | 64742-52-5 | 70 - 80              |
| Mineral Spirits          | 08052-41-3 | 20 - 30              |
| Chlorinated Hydrocarbons | 00095-50-1 | 0 - 1                |

EXPOSURE LIMITS 8 hrs. TWA (ppm)

|                          | OSHA PEL      | ACGIH TLV     |
|--------------------------|---------------|---------------|
| Naphthenic Hydrocarbons  | 5 as oil mist | 5 as oil mist |
| Mineral Spirits          | 100           | 100           |
| Chlorinated Hydrocarbons | 25            | 25            |

3. HAZARDS IDENTIFICATION.

POTENTIAL HEALTH EFFECTS

INHALATION; Can cause nasal and respiratory irritation, dizziness, weakness, fatigue, nausea, headache, possible unconsciousness and even asphyxiation.

INGESTION; Can cause gastrointestinal irritation, nausea, vomiting and diarrhea. Aspiration into lungs can cause pneumonitis which can be fatal.

SKIN CONTACT; Prolonged or repeated contact can cause moderated irritation, defatting or dermatitis.

EYE CONTACT; Can cause severe irritation, redness, tearing or blurred vision.

4. FIRST AID MEASURES

EYE; Flush with large amounts of water, lifting upper and lower eyelids occasionally. Get medical attention.

SKIN; Thoroughly wash exposed area with soap and water. Remove contaminated clothing. Launder before re-use.

INHALATION; Remove person to fresh air. If breathing is difficult, administer oxygen. If breathing has stopped, give artificial respiration. Keep person warm and quiet. Call a physician.

INGESTION; Do not induce vomiting. Keep person quiet and warm. Get medical attention. Aspiration of material into lungs can cause chemical pneumonitis which can be fatal.

#### 5. FIRE FIGHTING MEASURES

FLASH POINT; 128° F (53° C) TCC

EXTINGUISHING MEDIA; Carbon dioxide, dry chemical, foam.

SPECIAL FIRE FIGHTING PROCEDURES; Wear self-contained breathing apparatus with full facepiece operated with positive pressure-demand when fighting large fires.

#### 6. ACCIDENTAL RELEASE MEASURES

SPILL OR LEAK PROCEDURES; Ventilate area. Remove sources of ignition. Prevent entry into sewers and waterways. Pick up free liquid for recycle and/or disposal. Absorb small amounts on inert material for disposal.

#### 7. HANDLING AND STORAGE

STORAGE TEMPERATURE (MIN./MAX.): -40°F (-40°C)/ 120°F (49 C)

SHELF LIFE; 3 years minimum when the original container is kept tightly closed and properly stored.

SPECIAL SENSITIVITY; None

HANDLING AND STORAGE PRECAUTIONS; Empty containers may be dangerous since fumes may still exist. Observe precautions given for this product as stated in this document.

#### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

EYE PROTECTION REQUIREMENTS; Splash goggles.

SKIN PROTECTION REQUIREMENTS; Wear chemically resistant gloves.

RESPIRATOR/VENTILATION REQUIREMENTS; Provide sufficient ventilation to avoid exposure levels above the established TLV's.

EXPOSURE LIMITS; Not established for product as whole.

|                 |       |             |         |
|-----------------|-------|-------------|---------|
| Mineral Spirits | NIOSH | 100 ppm TWA |         |
| Oil Mist        | OSHA  |             | 5 mg/m3 |

#### 9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL FORM; Thin liquid  
COLOR Red  
ODOR; Wintergreen  
BOILING POINT; Not determined  
MELT / FREEZE POINT: - 60° f ( -51° C )  
PH: Not applicable  
SOLUBILITY IN WATER; Insoluble  
SPECIFIC GRAVITY; 0.876 @ 60° F (15.6° C )  
% VOLATILE BY WEIGHT; 25%  
VAPOR PRESSURE; Not determined  
VAPOR DENSITY; Not determined

10. REACTIVITY

STABILITY; Stable

HAZARDOUS POLYMERIZATION; Will not occur.

INCOMPATIBILITIES; Strong oxidizing agents.

DECOMPOSITION PRODUCTS; Carbon monoxide, carbon dioxide and hydrocarbons.

11. TOXICOLOGICAL INFORMATION

ACUTE INHALATION; Aspiration into lungs can cause pneumonitis which can be fatal.

CHRONIC INHALATION; Not determined

ACUTE SKIN CONTACT; Prolonged or repeated contact can cause moderate irritation, defatting or dermatitis.

CHRONIC SKIN CONTACT; Not determined.

ACUTE EYE CONTACT; Can cause severe irritation, redness, tearing or blurred vision.

12. ECOLOGICAL INFORMATION

No data available.

13. DISPOSAL CONSIDERATIONS

Ignitable hazardous waste, EPA Hazardous Waste Number D001

WASTE DISPOSAL METHOD; Dispose of product in accordance with all local, state and federal laws and regulations.

14. TRANSPORT INFORMATION

DOT INFORMATION;

PROPER SHIPPING NAME; Non Bulk Not regulated  
Bulk  
Petroleum distillates, n.o.s.

TECHNICAL SHIPPING NAME; Fuel and oil additive

HAZARD CLASS; Non Bulk Bulk ORM-D Class 3

UN NUMBER; UN 1268

PRODUCT RQ (lbs); None

LABEL; Non Bulk Bulk ORM-D Flammable  
Liquid

PLACARD; Non Bulk Bulk None Flammable  
Liquid

FREIGHT CLASS BULK; PG 111

FREIGHT CLASS PACKAGE; None

PRODUCT LABEL None

15. REGULATORY INFORMATION

TSCA STATUS; All ingredients listed.

CERCLA REPORTABLE QUANTITY; None

SARA TITLE 111;

SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES None

SECTION 311/312 HAZARDOUS CATEGORIES

|                            |     |
|----------------------------|-----|
| Acute Health               | Yes |
| Chronic Health             | Yes |
| Fire                       | Yes |
| Reactive                   | No  |
| Sudden Release of Pressure | No  |

SECTION 313

| CHEMICAL NAME         | CAS NUMBER | CONCENTRATION |
|-----------------------|------------|---------------|
| Ortho-dichlorobenzene | 00095-50-1 | 0-0.25 %      |

RCRA STATUS; If discarded in its purchased form, this product would be an ignitable waste with an EPA Hazardous Waste Number of D001. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product should be classified as a hazardous waste. (40CFR261.20-24)

CANADIAN STATUS; All materials contained in this product are listed on the Canadian Domestic Substances List.

EUROPEAN UNION; All materials contained in this product are listed on EINECS.

STATE REGULATORY INFORMATION

The following chemicals are specifically listed by individual states; other product specific health and safety data in other sections of the MSDS may also be applicable for state requirements. For details on your regulatory requirements you should contact the appropriate

agency in your state.

| COMPONENT/<br>CAS NUMBER | CONCENTRATION     | STATE CODE    |
|--------------------------|-------------------|---------------|
| p-dichlorobenzene        | less than 150 ppm | CA 00106-46-7 |

CA = Material known to the state of California to cause cancer and/or birth defects. (California Proposition 65).

16. OTHER INFORMATION

|                     |              |      |
|---------------------|--------------|------|
| HMIS CLASSIFICATION | Health       | 2    |
|                     | Flammability | 2    |
|                     | Reactivity   | 0    |
|                     | PPI          | B    |
| NFPA RATING         | Health       | 2    |
|                     | Fire         | 2    |
|                     | Reactivity   | 0    |
|                     | Special      | None |

REASON FOR ISSUE      Update to ANSI format

PREPARED BY            Richard P. Kelly

TITLE                    Technical Manager

APPROVAL DATE        June 21, 2002

SUPERCEDES DATE     November 7, 2000

REVISION NUMBER     #04

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**MATERIAL SAFETY DATA SHEET**

-----  
**1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

Product Name: **Case IH Trandrualic Fluid**  
Product description: Transmission/Hydraulic Fluid

**MANUFACTURER:** Northland Products Company  
1000 Rainbow Drive  
Waterloo, IA 50704  
319-234-5585, 1-800-772-1724

**EMERGENCY TELEPHONE NUMBERS:**  
Chemtrec: 1-800-424-9300

-----  
**2. COMPOSITION/INFORMATION ON INGREDIENTS**

|                     | <u>wt. Percent</u> | <u>CAS Registry #</u> |
|---------------------|--------------------|-----------------------|
| Lube Oil Base Stock | 90-95              | 064742-54-7           |
| Petroleum Additives | 5-10               | Mixture               |

-----  
**3. HAZARD IDENTIFICATION**

**Emergency Overview:**

Clear, Amber, Liquid. (May be dyed or odormasked.)  
Health studies have shown that petroleum hydrocarbons pose potential human health risks which may vary from person to person. Exposure to liquids, mists, vapors and fumes should be minimized.

**POTENTIAL HEALTH EFFECTS:**

**INHALATION:**

Vapors are minimal under normal conditions but should be avoided, concentrations may reach levels that could cause slight irritation.

**EYE CONTACT:**

May cause slight temporary eye irritation. Corneal injury is unlikely. Vapors or mists may irritate eyes.

**SKIN CONTACT:**

May cause skin irritation. Discontinue use if irritation persists.

**INGESTION:**

Ingestion of oil may irritate the digestive tract and could cause diarrhea. Single dose oral toxicity is greater than 5000 mg/Kg in rats.

**OTHER:**

The TLV has not been determined for this material. The TLV for oil mists is 5 mg/cubic meter.

**Hazardous Material Identification System (HMIS):**

Health-1, Flammability-1, Reactivity-0 (Based on components)

---

**4. FIRST AID MEASURES**

**INHALATION:**

Remove the victim from the area to fresh air. Call a physician. Give oxygen if victim is breathing hard.

**EYE CONTACT:**

Flush eyes with large amounts of water immediately for 15 minutes or until irritation subsides. If irritation persists, get medical attention.

**SKIN CONTACT:**

Wash affected areas thoroughly with soap and water. Remove contaminated clothing and wash them before wearing again. Call a physician if irritation persists.

**INGESTION:**

Call a doctor immediately. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person.

---

**5. FIRE FIGHTING MEASURES**

Flash point : 350°F Minimum (COC)

Flammable limits : Not Determined

Autoignition Temperature: Not Available

**GENERAL HAZARD:**

May release vapors that form flammable mixtures when temperatures are at or above the flash point. Toxic gases will form upon combustion.

**FIRE FIGHTING INSTRUCTIONS:**

Either allow fire to burn out under controlled conditions or extinguish with foam, CO<sub>2</sub>, or dry chemical. Try to cover liquid spills with foam. Shut off fuel to fire if possible to do so without hazard.

**FIRE FIGHTING EQUIPMENT:**

NIOSH approved self-contained breathing apparatus and eye protection are required for fire fighting personnel on all indoor fires and any significant outdoor fires.

**HAZARDOUS COMBUSTION PRODUCTS:**

Smoke, fumes, carbon monoxide, carbon dioxide and water.

**NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)**

Health-1, Flammability-1, Reactivity-0 (Based on components)

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**6. ACCIDENTAL RELEASE MEASURES**

Notify the appropriate authorities immediately. Take all actions necessary to prevent adverse effects of the spill. Eliminate ignition sources. Shut off leak if safe to do so. Dike spilled liquid with sand/earth and dispose of properly. DO NOT use sawdust or other combustible materials. Prevent product from entering sewers or waterways.  
National Response Center 1-800-424-8802

---

**7. HANDLING AND STORAGE**

STORAGE TEMPERATURE: Ambient      STORAGE PRESSURE: Atmospheric

**GENERAL:**

Keep container closed. Loosen closure cautiously before opening. Store in well ventilated area away from incompatible materials. (See Section 10) Keep away from heat, sparks and flames. Empty container may still retain hazardous properties.

---

**8. EXPOSURE CONTROLS / PERSONAL PROTECTION**

**ENGINEERING CONTROLS:**

Use mechanical ventilation to control vapor concentrations in confined spaces. General ventilation should be sufficient for most operations.

**PERSONAL PROTECTION:**

**Respirator:**

Use an air supplied respirator when concentrations are over the exposure limits.

**Protective Clothing:**

Wear rubber gloves, rubber boots, a chemical worker's suit and chemical splash goggles as appropriate.

---

**9. PHYSICAL AND CHEMICAL PROPERTIES**

|                     |                               |
|---------------------|-------------------------------|
| Boiling point       | : >500°F                      |
| Vapor pressure      | : Not determined              |
| Vapor density       | : Not determined              |
| Solubility in water | : Insoluble                   |
| Specific gravity    | : 0.88 approximately          |
| pH                  | : Not available               |
| Odor                | : Petroleum (Could be masked) |
| Appearance          | : Clear Amber (Could be dyed) |
| Physical state      | : Liquid                      |

---

**10. STABILITY AND REACTIVITY**

**GENERAL:**

This product is stable and will not polymerize.

**INCOMPATIBLE MATERIALS AND CONDITIONS TO AVOID:**

Strong oxidizing agents.

**HAZARDOUS DECOMPOSITION:**

None.

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**11. TOXICOLOGICAL INFORMATION**

No component of this product present at levels greater than 0.1% is identified as a carcinogen by NTP, IARC or OSHA.

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**12. ECOLOGICAL INFORMATION**

No data is available.

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**13. DISPOSAL CONSIDERATIONS**

Ensure disposal is in compliance with Federal-State-Local laws. Do not landfill or dispose of in sink drains or sewers.

---

**14. TRANSPORTATION INFORMATION**

DOT (Department of Transportation):

|                       |                              |
|-----------------------|------------------------------|
| Proper shipping name  | : Petroleum Lubricating Oil. |
| Hazard class          | : Not regulated              |
| Identification number | : Not regulated              |
| Labeling              | : Not regulated              |

---

**15. REGULATORY INFORMATION**

TSCA (Toxic Substance Control Act):

All components of this product are listed on the U.S. TSCA inventory.

CERCLA (Comprehensive Response Compensation, and Liability Act):

This product is not subject to any special reporting under the requirements of CERCLA. We recommend you contact local authorities to determine local reporting requirements.

SARA TITLE III (Superfund Amendments and Reauthorization Act):

311/312 Hazard Categories:

This material is not classified as hazardous by OSHA under 29 CFR part 1910.1200(d).

313 Reportable Ingredients:

Contains 1.8 weight percent of Zinc compounds.

---

**16. OTHER INFORMATION**

THE INFORMATION PRESENTED HEREIN HAS BEEN COMPILED FROM SOURCES CONSIDERED TO BE DEPENDABLE AND IS ACCURATE TO THE BEST OF NORTHLAND PRODUCTS COMPANY'S KNOWLEDGE; HOWEVER, NORTHLAND PRODUCTS COMPANY MAKES NO WARRANTY WHATSOEVER, EXPRESSED OR IMPLIED, OF MERCHANTABILITY OR FITNESS FOR THE PARTICULAR PURPOSE, REGARDING THE ACCURACY OF SUCH DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF. NORTHLAND PRODUCTS COMPANY ASSUMES NO RESPONSIBILITY FOR THE INJURY TO THE RECIPIENT OR TO THIRD PARTY PERSONS OR FOR ANY DAMAGE TO ANY PROPERTY AND RECIPIENT ASSUMES ALL SUCH RISKS.

MATERIAL SAFETY DATA SHEET



**SECTION 1 - PRODUCT AND COMPANY INFORMATION**

Refinish Products  
19699 Progress Drive  
Strongsville, OH 44149

**EMERGENCY PHONE NUMBERS (412) 434-4515 (U.S.)**  
(24 hours/day):

(514) 645-1320 (Canada)  
01-800-00-21-400 (Mexico)  
0532-83889090 (China)

**TECHNICAL INFORMATION:** (740) 363-9610 (DELAWARE, OH) 8:00 a.m. - 5:00 p.m. EST  
**PRODUCT SAFETY/MSDS INFORMATION:** (412) 492-5555 7:00 a.m. - 4:30 p.m. EST  
**Product ID:** ALK-200R (0808)  
**PRODUCT NAME:** CLEAR BASE  
**SYNONYMS:** None  
**ISSUE DATE:** 06/13/2006  
**EDITION NO.:** 4  
**CHEMICAL FAMILY:** ALKYD

**EMERGENCY OVERVIEW:**  
Flammable. Keep away from heat, sparks, flames, and other sources of ignition. Do not smoke. Extinguish all flames and pilot lights. Turn off stoves, heaters, electrical motors, and other sources of ignition during use and until all vapors/odors are gone. CAUSES SEVERE EYE IRRITATION. MAY CAUSE MODERATE SKIN IRRITATION. MAY BE HARMFUL IF ABSORBED THROUGH THE SKIN. VAPOR AND/OR SPRAY MIST HARMFUL IF INHALED. VAPOR IRRITATES EYES, NOSE, AND THROAT. VAPOR GENERATED AT ELEVATED TEMPERATURES IRRITATES EYES, NOSE AND THROAT. HARMFUL OR FATAL IF SWALLOWED.

**SECTION 2 - COMPOSITION INFORMATION**

The following ingredient(s) marked with an "x" are considered hazardous under applicable U.S. OSHA and/or Canadian WHMIS regulations. If no ingredients are listed, then there are no U.S. OSHA and/or Canadian WHMIS hazardous ingredients in this product.

| Material/<br>CAS Number  | Percent    | Hazardous |  |
|--|------------|-----------|--|
| XYLENES<br>1330-20-7   | 15 - 40    | X         |  |
| METHYL ETHYL KETONE<br>78-93-3                                 | 7 - 13     | X         |  |
| ETHYL BENZENE<br>100-41-4                                      | 3 - 7      | X         |  |
| 2-BUTOXY ETHANOL<br>111-76-2<br>(As Glycol ethers)<br>111-76-2 | 3 - 7<br>* | X         | See Sections 8<br>and 15 for<br>information. |

**SECTION 3 - HAZARDS IDENTIFICATION**

**ACUTE OVEREXPOSURE EFFECTS**

**EYE CONTACT:**  
Causes severe eye irritation. Redness, itching, burning sensation and visual disturbances may indicate excessive eye contact.  
**SKIN CONTACT:**  
May cause moderate skin irritation. Dryness, itching, cracking, burning, redness, and swelling are conditions associated with excessive skin contact.  
**SKIN ABSORPTION:**  
May be harmful if absorbed through the skin.

**INHALATION:**  
Vapor and/or spray mist harmful if inhaled. Vapor irritates eyes, nose, and throat. Vapor generated at elevated temperatures irritates eyes, nose and throat.  
**INGESTION:**  
Harmful or fatal if swallowed.  
**SIGNS & SYMPTOMS OF OVEREXPOSURE:**  
Repeated exposure to high vapor concentrations may cause irritation of the respiratory system and permanent brain and nervous system damage. Eye watering, headaches, nausea, dizziness and loss of coordination are indications that solvent levels are too high. Intentional misuse by deliberately concentrating and inhaling the contents can be harmful or fatal. Dryness, itching, cracking, burning, redness, and swelling are conditions associated with excessive skin contact.

**MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:** Not applicable.  
**CHRONIC OVEREXPOSURE EFFECTS**  
Avoid long-term and repeated contact.  
Repeated exposure to vapors above recommended exposure limits (see Section 8) may cause irritation of the respiratory system and permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling the contents can be harmful or fatal. Prolonged exposure to an ingredient(s) in this product may cause kidney and/or liver damage. High exposures to xylenes in some animal studies have been reported to cause health effects on the developing embryo and fetus. These effects were often at levels toxic to the mother. There is some evidence that repeated exposure to organic solvent vapors in combination with constant loud noise can cause greater hearing loss than expected from exposure to noise alone. The effects of long-term, low level exposures to this product have not been determined. Safe handling of this material on a long-term basis should emphasize the prevention of all contact with this material to avoid any effects from repetitive acute exposures. See Section 11, of this MSDS for a detailed list of chronic health effects information available on individual ingredients in this product.

**SECTION 4 - FIRST AID MEASURES**

If ingestion, irritation, any type of overexposure or symptoms of overexposure occur during or persists after use of this product, contact a POISON CONTROL CENTER, EMERGENCY ROOM OR PHYSICIAN immediately; have Material Safety Data Sheet information available.  
**EYE CONTACT:**  
Remove contact lens and pour a gentle stream of warm water through the affected eye for at least 15 minutes. If irritation persists, contact a poison control center, emergency room, or physician as further treatment may be necessary.  
**SKIN CONTACT:**  
Run a gentle stream of water over the affected area for 15 minutes. A mild soap may be used if available. If any symptoms persist, contact a poison control center, emergency room, or physician as further treatment may be necessary.  
**INHALATION:**  
Remove from area to fresh air. If symptomatic, contact a poison control center, emergency room or physician for treatment information.  
**INGESTION:**  
Gently wipe or rinse the inside of the mouth with water. Sips of water may be given. Never give anything by mouth to an unconscious person. Contact a poison control center, emergency room or physician right away as further treatment may be necessary.

**SECTION 5 - FIRE FIGHTING MEASURES**

**FLAMMABLE PROPERTIES**  
**FLASHPOINT:** 50 Degrees F ( 10 Degrees C)  
**FLASHPOINT TEST METHOD:**  
Pensky-Martens Closed Cup  
**UEL:** Not Available.

LEL: 1.6

**AUTOIGNITION TEMPERATURE:**

Not Available.

**EXTINGUISHING MEDIA:**

Use National Fire Protection Association (NFPA) Class B extinguishers (carbon dioxide, dry chemical, or universal aqueous film forming foam) designed to extinguish NFPA Class IB flammable liquid fires. Water spray may be ineffective. Water spray may be used to cool closed containers to prevent pressure build-up and possible autoignition or explosion when exposed to extreme heat.

**PROTECTION OF FIREFIGHTERS:**

Fire-fighters should wear self-contained breathing apparatus and full protective clothing.

**UNUSUAL FIRE AND EXPLOSION HAZARDS:**

When this product is used, the overspray and other combustible materials such as paint booth filters, rags, masking materials, etc., contaminated by coating material are subject to spontaneous combustion. Wetting the contaminated materials and not packing them tightly together in refuse containers will minimize the potential for this to occur. Keep this product away from heat, sparks, flame, and other sources of ignition (i.e., pilot lights, electric motors, static electricity). Invisible vapors can travel to a source of ignition and flash back. Do not smoke while using this product. Keep containers tightly closed when not in use. Closed containers may explode when overheated. Do not apply to hot surfaces. Toxic gases may form when this product comes in contact with extreme heat. May produce hazardous decomposition products when exposed to extreme heat. Extreme heat includes, but is not limited to, flame cutting, brazing, and welding.

**SKIN/GLOVES:**

Wear protective clothing to prevent skin contact. Apron and gloves should be constructed of: impermeable material. No specific permeation/degradation testing have been done on protective clothing for this product. Recommendations for skin protection are based on infrequent contact with this product. For frequent contact or total immersion, contact a manufacturer of protective clothing for appropriate chemical impervious equipment. Clean contaminated clothing and shoes.

**RESPIRATOR:**

Overexposure to vapors may be prevented by ensuring proper ventilation controls, vapor exhaust or fresh air entry. A NIOSH- approved air purifying respirator with the appropriate chemical cartridges or a positive-pressure, air-supplied respirator may also reduce exposure. Read the respirator manufacturer's instructions and literature carefully to determine the type of airborne contaminants against which the respirator is effective, its limitations, and how it is to be properly fitted and used. Provide general dilution or local exhaust ventilation in volume and pattern to keep the concentration of ingredients listed in Section 2 below the lowest suggested exposure limits, the LEL below the stated limit, and to remove decomposition products during welding or flame cutting.

**GENERAL HYGIENE - ESTABLISHED EXPOSURE LIMITS**

If Threshold Limit Values (TLVs) have been established by ACGIH, OSHA, Ontario or PPG, they will be listed below. These limits are intended for use in the practice of industrial hygiene as guidelines or recommendations in the control of potential workplace health hazards. These limits are not a relative index of toxicity and should not be used by anyone without industrial hygiene training.

**SECTION 6 - ACCIDENTAL RELEASE MEASURE**

**STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:**

Provide maximum ventilation. Only personnel equipped with proper respiratory, skin, and eye protection should be permitted in the area. Remove all sources of ignition. Take up spilled material with sand, vermiculite, or other noncombustible absorbent material and place in clean, empty containers for disposal. Only the spilled material and the absorbant should be placed in this container.

**SECTION 7 - HANDLING AND STORAGE**

**PRECAUTIONS TO BE TAKEN DURING HANDLING AND STORAGE:**

Vapors may collect in low areas. If this material is part of a multiple component system, read the Material Safety Data Sheet(s) for the other component or components before blending as the resulting mixture may have the hazards of all of its parts. Containers should be grounded when pouring. Avoid free fall of liquids in excess of a few inches.

**STORAGE:**

Do not store above 120 degrees F.(48 degrees C.). Store large quantities in buildings designed and protected for storage of NFPA Class IB flammable liquids.

**SECTION 8 - EXPOSURE CONTROLS & PERSONAL PROTECTION**

**ENGINEERING CONTROLS:**

Provide general dilution or local exhaust ventilation in volume and pattern to keep the concentration of ingredients listed in Section 8 below the lowest suggested exposure limits, the LEL below the stated limit, and to remove decomposition products during welding or flame cutting.

**PERSONAL PROTECTIVE EQUIPMENT**

**EYES:**

Wear chemical-type splash goggles when possibility exists for eye contact due to splashing or spraying liquid, airborne particles, or vapors.

| Material/<br>CAS Number           | Percent | ACGIH TLV | ACGIH<br>STEL      | OSHA PEL  | OSHA<br>STEL       |
|-----------------------------------|---------|-----------|--------------------|-----------|--------------------|
| XYLENES<br>1330-20-7              | 15 - 40 | 100 ppm   | 150 PPM            | 100 ppm   | 150 ppm            |
| METHYL ETHYL<br>KETONE<br>78-93-3 | 7 - 13  | 200 ppm   | 300 ppm            | 200 ppm   | 300 ppm            |
| ETHYL BENZENE<br>100-41-4         | 3 - 7   | 100 ppm   | 125 ppm            | 100 ppm   | 125 ppm            |
| 2-BUTOXY<br>ETHANOL<br>111-76-2   | 3 - 7   | 20 PPM    | Not<br>established | S- 25 ppm | Not<br>established |

| Material/<br>CAS Number           | Percent | Ontario<br>TWA | Ontario<br>STEL    | PPG IPEL           | PPG STEL           |
|-----------------------------------|---------|----------------|--------------------|--------------------|--------------------|
| XYLENES<br>1330-20-7              | 15 - 40 | 100 ppm        | 150 ppm            | Not<br>established | Not<br>established |
| METHYL ETHYL<br>KETONE<br>78-93-3 | 7 - 13  | 200 ppm        | 300 ppm            | Not<br>established | Not<br>established |
| ETHYL BENZENE<br>100-41-4         | 3 - 7   | 100 PPM        | 125 PPM            | Not<br>established | Not<br>established |
| 2-BUTOXY<br>ETHANOL<br>111-76-2   | 3 - 7   | S- 20 PPM      | Not<br>established | Not<br>established | Not<br>established |

**Key:** ACGIH=American Conference of Governmental Industrial Hygienists; OSHA=Occupational Safety and Health Administration; TLV=Threshold Limit Value; TWA=Time Weighted Average; PEL=Permissible Exposure Limit (1989 Vacated values); IPEL=Internal Permissible Exposure Limit; Ceiling=TLV or PEL Ceiling Limit; STEL=TLV or PEL Short-Term Exposure Limit; Skin= Skin Absorption Designation. [C- Ceiling Limit; S-Potential Skin Absorption; R-Respirable Dust]  
**Additional Information** Not applicable.

**SECTION 9 - PHYSICAL & CHEMICAL PROPERTIES**

**(FORMULA VALUES, NOT SALES SPECIFICATIONS)**

**SPECIFIC GRAVITY:** .941  
**PHYSICAL STATE:** Liquid  
**Percent Solids:** 40.82

Percent Volatile by Volume: 64.960  
pH: Not available.  
ODOR THRESHOLD: Not available.  
Vapour Pressure: 21.9 mmHg  
ODOR/APPEARANCE: Viscous liquid with an odor characteristic of the solvents listed in Section 2.  
VAPOR DENSITY: HEAVIER THAN AIR  
Evaporation Rate: 189  
BOILING POINT OR RANGE: 172- 381Degrees F  
Freezing Point or Range: Not Applicable.  
Melting Point or Range(°C): Not Applicable.  
Partition coefficient (n-octanol/water): Not Applicable.  
WEIGHT PER GALLON: 7.84 (U.S.) / 9.4 (IMPERIAL)

#### SECTION 10 - STABILITY AND REACTIVITY

##### STABILITY:

This product is normally stable and will not undergo hazardous reactions.

##### CONDITIONS TO AVOID:

None Known.

##### INCOMPATIBLE MATERIALS:

Avoid contact with strong alkalis, strong mineral acids, or strong oxidizing agents.

##### HAZARDOUS POLYMERIZATION:

None Known.

##### HAZARDOUS DECOMPOSITION PRODUCTS:

- Carbon monoxide - Carbon dioxide - Lower molecular weight polymer fractions

#### SECTION 11 - TOXICOLOGICAL INFORMATION

##### ACUTE TOXICITY

| Material/<br>CAS Number           | Percent | ORAL<br>LD50 (g/kg) | DERMAL<br>LD50 (g/kg) | INHALATION<br>LC50 (mg/l) |
|-----------------------------------|---------|---------------------|-----------------------|---------------------------|
| XYLENES<br>1330-20-7              | 15 - 40 | 4.30 g/kg           | 1.70 g/kg             | 21.88 g/L. 4 hr.          |
| METHYL ETHYL<br>KETONE<br>78-93-3 | 7 - 13  | 2.74 g/kg           | 13.00 g/kg            | Not Available             |
| ETHYL BENZENE<br>100-41-4         | 3 - 7   | 3.50 g/kg           | 17.80 g/kg            | Not Available             |
| 2-BUTOXY<br>ETHANOL<br>111-76-2   | 3 - 7   | .47 g/kg            | .22 g/kg              | 2.18 g/L. 4 hr.           |

##### CHRONIC TOXICITY

##### Ingredient Target Organ/Chronic Effects:

- Bone marrow and blood tissues - Blood - Carcinogen - Ear - Kidney - Liver - Embryotoxin - Teratogen - Brain - Central nervous system - Lung

##### Mutagenicity Toxicity:

This has not been tested for this product.

##### Reproductive Toxicity:

This has not been tested for this product.

##### SUPPLEMENTAL HEALTH INFORMATION:

| Material/<br>CAS<br>Number           | Percent | Ingredient Specific Animal Data:   |
|--------------------------------------|---------|--|
| METHYL<br>ETHYL<br>KETONE<br>78-93-3 | 7 - 13  | This product contains methyl ethyl ketone (MEK). MEK has been shown to cause minor embryotoxic/fetotoxic effects in laboratory animals exposed for prolonged periods at high concentrations via inhalation. The potential for human exposure to high concentrations is expected to be low due to the irritating effects of MEK at low concentrations.  |
| ETHYL<br>BENZENE<br>100-41-4         | 3 - 7   | Ethylbenzene has been reported by NTP to cause cancer in laboratory animals following a chronic (2 year) inhalation exposure. Dose levels of 75, 250 and 750 ppm were used, with evidence of carcinogenicity found in the kidneys of rats and the lung and liver of mice at 750 ppm. The No Observed Effect Level (NOEL) was 75 ppm. The relevance of these findings to humans is uncertain, but appropriate safeguards should be employed to reduce or eliminate inhalation exposure to ethylbenzene.   |
| 2-BUTOXY<br>ETHANOL<br>111-76-2      | 3 - 7   | This product contains an ethylene series glycol ether and/or acetate which has been shown to cause adverse effects on the kidneys, liver, blood and/or blood-forming tissue. In a two-year NTP inhalation study, there was no significant increase in the incidence of any type of tumor in rats exposed to 2-butoxy ethanol at concentrations up to 125 ppm except a questionable trend in the incidence of adrenal gland tumors in female rats. When mice were exposed to concentrations of 62.5, 125, and 250 ppm, there was some evidence of carcinogenicity found in the liver of male mice and the forestomach of female mice at 250 ppm. This product contains an ingredient which has been shown to cause adverse reproductive effects in animals at doses which are also toxic to the mother. |

#### SECTION 12 - ECOLOGICAL INFORMATION

##### POTENTIAL ENVIRONMENTAL EFFECTS

Ecotoxicity: No Information Available.

##### ENVIRONMENTAL FATE

Mobility: No information available.  
Biodegradation: No information available.  
Bioaccumulation: No Information Available.

##### PHYSICAL/CHEMICAL

Hydrolysis: No information available.  
Photolysis: No information available.

#### SECTION 13 - DISPOSAL CONSIDERATIONS

Provide maximum ventilation, only personnel equipped with proper respiratory and skin and eye protection should be permitted in the area. Take up spilled material with sawdust, vermiculite, or other absorbent material and place in containers for disposal.

Waste material must be disposed of in accordance with federal, state, provincial and local environmental control regulations. Empty containers should be recycled by an appropriately licensed reconditioner/salvager or disposed of through a permitted waste management facility. Additional disposal information is contained on the Environmental Data Sheet for this product, which can be obtained from your PPG representative.

#### SECTION 14 - TRANSPORTATION INFORMATION

Proper Shipping Name: Paint  
NOS Technical Name: None  
Hazard Class: 3  
Subsidiary Class(es): None  
UN Number: UN1263  
Packing Group: III

USA - RQ Hazardous Substances: Xylenes, Ethyl Benzene

**Refinish Products  
19699 Progress Drive  
Strongsville, OH 44149**

**Product ID:** ALK-200R (0808)  
**PRODUCT NAME:** CLEAR BASE

**USA-RQ Hazardous Substance** Xylenes>281.34 Pounds, Ethyl  
**Threshold Ship Weight:** Benzene>15949.12 Pounds  
**Marine Pollutant Name:** None  
**USA Shipments Only - RQ Threshold Ship Weight:** This is the total weight of this product that must be shipped to exceed the RQ quantity.

\*=Chronic Effects.

HMSIS=Hazardous Materials Identification System; NFPA=National Fire Protection Association;

Safe handling of this product requires that all of the information on the MSDS be evaluated for specific work environments and conditions of use.

**SECTION 15 - REGULATORY INFORMATION**

**INVENTORY STATUS**

**U.S. TSCA:** This product and/or all of its components are listed on the U.S. TSCA Inventory or is otherwise exempt from TSCA Inventory reporting requirements.

**FEDERAL REGULATIONS**

**US Regulations**

| <u>Material/<br/>CAS Number</u>   | <u>Percent</u> | <u>CERCLA HS -<br/>RQ (LBS)</u> | <u>SARA EHS-<br/>TPQ (LBS)</u> | <u>SARA 313</u> |
|-----------------------------------|----------------|---------------------------------|--------------------------------|-----------------|
| XYLENES<br>1330-20-7              | 15 - 40        | 100 lbs                         | Not Listed                     | Listed          |
| METHYL ETHYL<br>KETONE<br>78-93-3 | 7 - 13         | 5000 lbs                        | Not Listed                     | Not Listed      |
| ETHYL BENZENE<br>100-41-4         | 3 - 7          | 1000 lbs                        | Not Listed                     | Listed          |
| 2-BUTOXY<br>ETHANOL<br>111-76-2   | 3 - 7          | Not Listed                      | Not Listed                     | Not Listed      |
| (As Glycol ethers)<br>111-76-2    | *              | Not Listed                      | Not Listed                     | Listed          |

**PREPARED BY:** Product Safety Department

**REASON FOR REVISION:** Section 11 has been updated. Section 1 has been updated. Section 3 has been updated. Date. Edition. Updated MSDS format.

This Material Safety Data Sheet has been prepared in accordance with Canada's Workplace Hazardous Materials Information System (WHMIS) and the OSHA Hazard Communication Standard (29 CFR 1910.1200), the supplier notification requirements of SARA Title III, Section 313 and other applicable right-to-know regulations.

Additional environmental information is contained on the Environmental Data Sheet for this product, which can be obtained from your PPG representative.

ALK-200R 000002 (00408706.001)(06/12/06)  
060609, 000, 0808

\*\*\* END OF MSDS \*\*\*

**SARA 311/312**

Health (acute): Yes  
Health (chronic): Yes  
Fire (flammable): Yes  
Pressure: No  
Reactivity: No

**WHMIS HAZARD CLASS:** - Class B, Division 6 - Class D, Division 2, Subdivision A - Class D, Division 2, Subdivision B - Class D, Division 1, Subdivision B

**STATE/PROVINCIAL REGULATIONS**

**CALIFORNIA PROP. 65:** WARNING: This product contains a chemical known to the State of California to cause cancer.

**Additional Information**

| <u>Material/<br/>CAS Number</u> | <u>Percent</u> | <u>IARC<br/>Group<br/>1(Kno<br/>wn<br/>Human<br/>Carc.)</u> | <u>IARC<br/>Group<br/>2A<br/>(Proba<br/>ble<br/>Carc.)</u> | <u>IARC<br/>2B (Suspec<br/>ted<br/>Carc.)</u> | <u>ACGIH<br/>Carc.</u> | <u>NTP<br/>Known<br/>Carc.</u> | <u>OSHA<br/>Carc.</u> |
|---------------------------------|----------------|---|--|---|------------------------|--------------------------------|-----------------------|
| ETHYL BENZENE<br>100-41-4       | 3 - 7          | N   | N  | Y   | N                      | N                              | Y                     |

**Key:** IARC- International Agency on the Research of Cancer; ACGIH- American Conference of Governmental Industrial Hygienists; NTP- National Toxicology Program \*Denotes chemical as NTP Known Carcinogen; + Denotes NTP Possible Carcinogen; OSHA- Occupational Safety and Health Administration.

**SECTION 16 - OTHER INFORMATION**

**Hazard Rating Systems**

**NFPA Rating:** 2 30

**HMIS Rating:** 2\*30

**Rating System:** 0=Minimal, 1=Slight, 2=Moderate, 3=Serious, 4=Severe,

**MATERIAL SAFETY DATA SHEET**

-----  
**1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

Product Name: **NORPLEX II GREASE**  
Product description: Petroleum based Lithium complex grease

**MANUFACTURER:**

Northland Products Company  
1000 Rainbow Drive  
Waterloo, IA 50704  
319-234-5585, 1-800-772-1724

**EMERGENCY TELEPHONE NUMBERS:**

Chemtrec: 1-800-424-9300

-----  
**2. COMPOSITION/INFORMATION ON INGREDIENTS**

|   | <u>wt. Percent</u> | <u>CAS Registry #</u> |
|---|--------------------|-----------------------|
| Distillates (Petroleum)<br>hydrotreated heavy paraffinic        | >93                | 64742-54-7            |
| or Distillates (Petroleum)<br>solvent-dewaxed heavy paraffinic  |                    | 64742-65-0            |
| and Distillates (Petroleum)<br>solvent-refined heavy napthenic  |                    | 64741-96-4            |
| and Distillates (Petroleum)<br>solvent-dewaxed heavy napthenic  |                    | 64742-63-8            |
| or Residual oils (Petroleum)<br>solvent-dewaxed heavy napthenic |                    | 64742-62-7            |
| and Residual oils (Petroleum)<br>hydrotreated                   |                    | 64742-57-0            |
| and Lithium Complex Soap Thickener                              |                    | Mixture               |
| Proprietary Additives   | <7                 | Mixture               |

-----  
**3. HAZARD IDENTIFICATION**

**Emergency Overview:**

Smooth dark blue grease with a mild to bland odor.  
Health studies have shown that petroleum hydrocarbons pose potential human health risks which may vary from person to person. Exposure to liquids, mists, vapors and fumes should be minimized.

**POTENTIAL HEALTH EFFECTS:**

**INHALATION:**

Vapors are minimal under normal conditions but should be avoided, concentrations may reach levels that could cause slight irritation.

**EYE CONTACT:**

May cause slight temporary eye irritation. Corneal injury is unlikely.

**SKIN CONTACT:**

May cause skin irritation or dermatitis. Discontinue use if irritation persists.

---

**3. HAZARD IDENTIFICATION** (Continued)

INGESTION:

This product has a low order of acute oral and dermal toxicity, however minute amounts aspirated into the lungs during ingestion or vomiting may cause mild to severe pulmonary injury and possibly death.

OTHER:

Acute oral LD50 (Rat) greater than 5 g/kg of body weight.

Acute dermal LD50 (Rabbit) > 3.16 g/kg of body weight.

**Hazardous Material Identification System (HMIS):**

Health-1, Flammability-1, Reactivity-0 (Based on components)

---

**4. FIRST AID MEASURES**

INHALATION:

Normal use should not result in exposure. If overcome by vapor from hot product, immediately remove from exposure and call a physician. Administer oxygen or resuscitation if breathing is irregular or has stopped.

EYE CONTACT:

Flush eyes with large amounts of water immediately for 15 minutes or until irritation subsides. If irritation persists, get medical attention.

SKIN CONTACT:

Wash affected areas thoroughly with soap and water. Remove contaminated clothing and wash them before wearing again. Call a physician if irritation persists. High pressure injection of this product into or under the skin should be evaluated by a physician as a surgical emergency. Treatment within the first few hours may significantly reduce the ultimate extent of the injury.

INGESTION:

Call a doctor immediately. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person.

---

**5. FIRE FIGHTING MEASURES**

Flash point : 430°F (COC)

Upper flammability limit : 7.0 %

Lower flammability limit : 0.9 %

Autoignition temperature : > 500°F

GENERAL HAZARD:

May release vapors that form flammable mixtures when temperatures are at or above the flash point. Toxic gases will form upon combustion.

---

**5. FIRE FIGHTING MEASURES** (Continued)

FIRE FIGHTING INSTRUCTIONS:

Either allow fire to burn out under controlled conditions or extinguish with foam, CO<sub>2</sub>, or dry chemical. Try to cover liquid spills with foam. Shut off fuel to fire if possible to do so without hazard.

FIRE FIGHTING EQUIPMENT:

NIOSH approved self-contained breathing apparatus and eye protection are required for fire fighting personnel on all indoor fires and any significant outdoor fires.

HAZARDOUS COMBUSTION PRODUCTS:

Smoke, fumes, carbon monoxide, carbon dioxide, sulfur oxides, phosphorus oxides, metal oxides and water.

**NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)**

Health-1, Flammability-1, Reactivity-0 (Based on components)

---

**6. ACCIDENTAL RELEASE MEASURES**

Notify the appropriate authorities immediately. Take all actions necessary to prevent adverse effects of the spill. Eliminate ignition sources. Shut off leak if safe to do so. Dike spilled liquid with sand/earth and dispose of properly. DO NOT use sawdust or other combustible materials. Prevent product from entering sewers or waterways. National Response Center 1-800-424-8802

---

**7. HANDLING AND STORAGE**

STORAGE TEMPERATURE: Ambient STORAGE PRESSURE: Atmospheric

GENERAL:

Keep container closed. Loosen closure cautiously before opening. Store in well ventilated area away from incompatible materials. (See Section 10) Keep away from heat, sparks and flames. Empty container may still retain hazardous properties.

---

**8. EXPOSURE CONTROLS / PERSONAL PROTECTION**

ENGINEERING CONTROLS:

Use mechanical ventilation to control vapor concentrations in confined spaces. General ventilation should be sufficient for most operations.

PERSONAL PROTECTION:

Respirator:

Use an air supplied respirator when concentrations are over the exposure limits.

Protective Clothing:

Wear rubber gloves, rubber boots, a chemical worker's suit and chemical splash goggles as appropriate.

---

**9. PHYSICAL AND CHEMICAL PROPERTIES**

Boiling point : >590°F ASTM D2887  
Vapor pressure : < 0.01 mm Hg @ 20°C  
Vapor density : > 5  
Solubility in water : Insoluble  
Specific gravity : 0.93 approximately  
pH : Not available  
Odor : Mild/Bland petroleum odor  
Appearance : Smooth dark blue  
Physical state : Semi-solid (Grease)

---

**10. STABILITY AND REACTIVITY**

GENERAL:

This product is stable and will not polymerize.

INCOMPATIBLE MATERIALS AND CONDITIONS TO AVOID:

Strong oxidizing agents.

HAZARDOUS DECOMPOSITION:

None.

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**11. TOXICOLOGICAL INFORMATION**

No component of this product present at levels greater than 0.1% is identified as a carcinogen by NTP, IARC or OSHA.

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**12. ECOLOGICAL INFORMATION**

No data is available.

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**13. DISPOSAL CONSIDERATIONS**

Ensure disposal is in compliance with Federal-State-Local laws.  
Do not landfill or dispose of in sink drains or sewers.

---

**14. TRANSPORTATION INFORMATION**

DOT (Department of Transportation):

Proper shipping name : Not regulated  
Hazard class : Not regulated  
Identification number : Not regulated  
Labeling : Not regulated

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**15. REGULATORY INFORMATION**

RQ (Reportable Quantity): 40 CFR 302 (CERCLA 102)  
No RQ for product or any constituent >1% or 0.1% (Carcinogen)

TPQ (Threshold Planning Quantity): 40 CFR 355 (SARA 301-304)  
No TPQ for product or any constituent >1% or 0.1% (Carcinogen)

TSCA (Toxic Substance Control Act):  
All components of this product are listed on the U.S. TSCA inventory.

TSCA 12b reportable chemical substances:  
Isopropanol (IPA) CAS# 67-63-0  
9-Octadecene-1-amine CAS# 112-90-3

CERCLA (Comprehensive Response Compensation, and Liability Act):  
This product is not subject to any special reporting under the requirements of CERCLA. We recommend you contact local authorities to determine local reporting requirements.

SARA TITLE III (Superfund Amendments and Reauthorization Act):

311/312 Hazard Categories: 40 CFR 370  
Not Applicable.

313 Reportable Ingredients: 40 CFR 372  
Contains 1.5 weight percent of Zinc compounds.

---

**16. OTHER INFORMATION**

THE INFORMATION PRESENTED HEREIN HAS BEEN COMPILED FROM SOURCES CONSIDERED TO BE DEPENDABLE AND IS ACCURATE TO THE BEST OF NORTHLAND PRODUCTS COMPANY'S KNOWLEDGE; HOWEVER, NORTHLAND PRODUCTS COMPANY MAKES NO WARRANTY WHATSOEVER, EXPRESSED OR IMPLIED, OF MERCHANTABILITY OR FITNESS FOR THE PARTICULAR PURPOSE, REGARDING THE ACCURACY OF SUCH DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF. NORTHLAND PRODUCTS COMPANY ASSUMES NO RESPONSIBILITY FOR THE INJURY TO THE RECIPIENT OR TO THIRD PARTY PERSONS OR FOR ANY DAMAGE TO ANY PROPERTY AND RECIPIENT ASSUMES ALL SUCH RISKS.

# SERVICE CHECKLIST FOR POSITECH PNEUMATIC MANIPULATORS

SER-012, REV. IR

Company \_\_\_\_\_ Date \_\_\_\_\_ Model \_\_\_\_\_

Asset Number \_\_\_\_\_ Location \_\_\_\_\_ Serial # \_\_\_\_\_

Check with operator about any possible concerns with unit. Operate the unit to verify any operator complaints and check for the following. List any item that is not to Positech's OEM specifications.

| OK                       | Corrective Action Required | Corrective Action Completed | Inspection Items<br><b>All items in which the corrective action was not completed must have an action plan to correct the problem!</b> |
|--------------------------|----------------------------|-----------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/>   | <input type="checkbox"/>    | Inspect structure for cracked welds.   |
| <input type="checkbox"/> | <input type="checkbox"/>   | <input type="checkbox"/>    | Inspect for loose or missing fasteners.  |
| <input type="checkbox"/> | <input type="checkbox"/>   | <input type="checkbox"/>    | Check the level of the manipulator.  |
| <input type="checkbox"/> | <input type="checkbox"/>   | <input type="checkbox"/>    | Check all bearings on the manipulator for proper operation.  |
| <input type="checkbox"/> | <input type="checkbox"/>   | <input type="checkbox"/>    | Check adjustment of Drag Brakes.   |
| <input type="checkbox"/> | <input type="checkbox"/>   | <input type="checkbox"/>    | Check air supply to manipulator.   |
| <input type="checkbox"/> | <input type="checkbox"/>   | <input type="checkbox"/>    | Check oil level in lubricator <input type="checkbox"/> Setting <input type="checkbox"/>  |
| <input type="checkbox"/> | <input type="checkbox"/>   | <input type="checkbox"/>    | Test for proper operation of Lost Load Cylinder <input type="checkbox"/> Leaks <input type="checkbox"/>                                |
| <input type="checkbox"/> | <input type="checkbox"/>   | <input type="checkbox"/>    | Clean and lubricate Horizontal Roller and Shelf.   |
| <input type="checkbox"/> | <input type="checkbox"/>   | <input type="checkbox"/>    | Clean and lubricate Vertical Guide Rollers.  |
| <input type="checkbox"/> | <input type="checkbox"/>   | <input type="checkbox"/>    | Inspect condition and routing of all external hoses.   |
| <input type="checkbox"/> | <input type="checkbox"/>   | <input type="checkbox"/>    | Check Rotary Air Joint for leaking between passages.   |
| <input type="checkbox"/> | <input type="checkbox"/>   | <input type="checkbox"/>    | Inspect all cylinders for external leakage.  |
| <input type="checkbox"/> | <input type="checkbox"/>   | <input type="checkbox"/>    | Check the Safety Lock Valves to ensure they are operating to specifications.   |
| <input type="checkbox"/> | <input type="checkbox"/>   | <input type="checkbox"/>    | Check all pneumatic connections for leaks.   |
| <input type="checkbox"/> | <input type="checkbox"/>   | <input type="checkbox"/>    | Test that air circuitry operates according to schematic.   |
| <input type="checkbox"/> | <input type="checkbox"/>   | <input type="checkbox"/>    | Check Gripper Safety Circuit (GSC) for proper operation.   |

**Description of items repaired or still in need of repair and plan of action to complete repairs. Also any additional items requiring repair not listed above.**

**Parts Supplied by Positech for repair of unit.**

Service Technician \_\_\_\_\_ Date \_\_\_\_\_

CUSTOMER/ADDRESS: MAG Automation & Controls  
4950 Marlin Drive  
Machesney Park IL 61115

MODEL: Lodearm 3030 SERIAL NO: 007251-02A

RUN NO: AHS7251

| Print/Part No. | Part Description  | No. Reqd.<br>Per Unit |
|----------------|---|-----------------------|
| 133-P008959    | AIR VALVE 10-32/5PORT/2POS NORGREN #V08N536AX0130                           | 1                     |
| 133-P006051    | PILOT OPER CHECK VALVE 1/4 NPT, FOSTER 133-P006051, OR NORGREN #12-4GA-2828 | 1                     |
| 133-P003829    | MANOSTAT VALVE (N.O.) CROUZET #81-502-160                                   | 1                     |
| 133-P006065    | PILOT OPER CHECK VALVE 1/8 NPT NORGREN #12-4GA-1818 OR POLYCON PCBCV-2      | 2                     |
| 133-P009134    | AIR VAL FLOW C'TROL "METER-IN" 1/4TUBEX1/8NPT MALE 90 DEGREE                | 2                     |
| 133-P009371    | AIR VAL 5PORT,3POS,2PIL,1/8NPT NORGREN #V60P6DDA-XP0200(ALLBLK)             | 1                     |
| 133-P004036    | SMC FLOW CONT VAL "MOUT" NAS- 3200-N03                                      | 1                     |
| 133-P005776    | FLOW CONTROL VAL/W 3/8 PORTS SMC #NAS-3210-N03                              | 1                     |
| 133-P009174    | PILOT OPER CHECK VALVE 3/8 NPT NORGREN #12-4GA-3838                         | 1                     |
| 133-P006051    | HITCH PIN T PUSH BUT .500X 5.0 FREE   | 2                     |
| 133-P010041    | AIR VALVE NORGREN #V61R5DDAXP0200   | 1                     |
| 133-P006193    | PNEUMATIC CHECK VALVE SMC #NAK-2000-N02                                     | 1                     |
| 133-P004350    | SMC FLOW CONTROL VALVE #NAS-2000-N01  | 1                     |
| 133-P003674    | SMC FLOW CONTROL VALVE AS-1000-M5-USE FITTING 129-P015682, SMC M-5N         | 2                     |
| 133-P000730    | HUMPHREY OPER VAL ACTUATOR NO 34T   | 2                     |
| 133-P006747    | PUSH BUTTON (3) WAY AIR VALVE HUMPHREY #3P                                  | 3                     |
| 132-P008111    | UP STEM SEAL KIT FOR METERING VALVE   | 1                     |
| 132-P008112    | DOWN STEM SEAL KIT FOR METERING VALVE                                       | 1                     |
| 130-P016259    | VAC CUP-VI CAS #VC-90-4x8, 50 DURO, 4X 1/4-20, 1.5 X 2.5 BP                 | 2                     |
|                |   |                       |
|                |   |                       |
|                |   |                       |

ALL MANUFACTURED SPARE PART ITEMS REQUIRING PAINT WILL BE PAINTED TO MATCH YOUR MACHINE, IF ORANGE (STANDARD), BLUE OR YELLOW. IF YOUR MACHINE WAS A SPECIAL COLOR, WE WILL EITHER PRIME PAINT THE PART (GRAY) OR YOU MAY SEND US YOUR PAINT, WHICH WE WILL RETURN WITH THE PART.

NOTE: Please check prices before ordering because they are subject to change.  
\$50.00 minimum order policy.

Positech, 191 Rush Lake Road , Laurens, IA 50554 Phone:712-841-4548 Fax: 712-841-4765