
PowerAssist[®]

Counterweight Assisted Hoist System

Installation Manual



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Introduction: How the system works

⚠ WARNING!

INCORRECT COUNTERWEIGHT CAN OVERLOAD HOIST AND CAUSE LOAD TO FALL

UNDERSTAND HOW THIS SYSTEM WORKS. COUNTERWEIGHT SYSTEM PROPERLY AT TIME OF INSTALLATION. APPLY DEVICES AND WARNING LABELS TO PREVENT USER FROM ALTERING COUNTERWEIGHT

NOTICE!

THIS INSTALLATION INSTRUCTION IS FOR A SYSTEM WITH A BATTEN CAPACITY OF 2000LB OR LESS. CONTACT JR CLANCY FOR SYSTEMS REQUIRING A MAX LOAD GREATER THAN 2000LBS.

The PowerAssist is designed to be installed with a dedicated counterweight arbor. In the most common application the arbor is loaded with one half of the capacity of the counterweight set, *not to exceed 1000 lbs*. In this case, when the batten is loaded with 2000 lbs of equipment, the load is counterweighted by 1000 lbs and the winch bears the remaining 1000 lbs. See figure 1 below.

When the batten has no load on it, the 1000 lbs weight of the arbor is supported by the winch. See figure 2 below.

Other arrangements are possible. However, in no case may the winch be subjected to loads of over 1000 lbs.

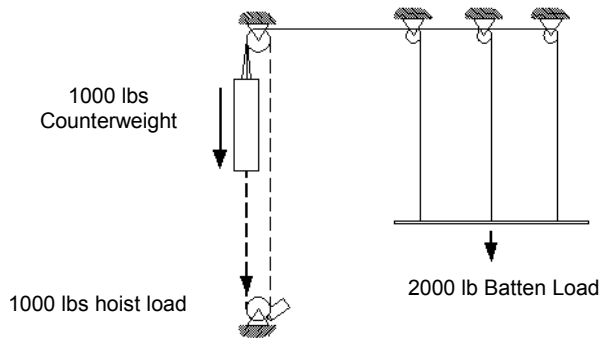


Figure 1: Counterweight assist hoist system with full load on batten

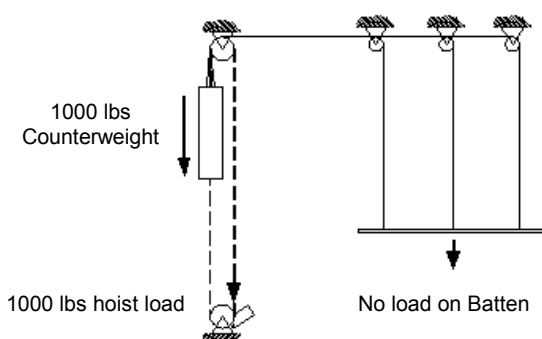


Figure 2: Counterweight assist hoist system with batten unloaded

Project Planning

⚠ WARNING!

USE OF HOIST WITH INADEQUATE RIGGING EQUIPMENT CAN CAUSE LOAD TO FALL

CONSULT A QUALIFIED PROFESSIONAL TO DETERMINE IF EXISTING RIGGING SYSTEMS AND BUILDING STRUCTURE ARE ADEQUATE FOR AUTOMATION WITH THIS MACHINE

⚠ WARNING!

LOAD MAY FALL IF HOIST NOT SECURELY ANCHORED TO BUILDING STRUCTURE

CONSULT A QUALIFIED PROFESSIONAL TO MAKE SURE THAT THE ANCHORS AND THE BUILDING STRUCTURE ARE CAPABLE OF WITHSTANDING LOADS WITH THE APPROPRIATE DESIGN FACTORS

1. Use of PowerAssist with existing rigging equipment

The PowerAssist can be used to add powered hoisting and electronic control to existing manual counterweight sets. However if existing equipment is to be used, the system must be carefully inspected to ensure that it is suitable. Inspection should be performed by a Qualified Professional who should examine all components to be reused, including but no limited to:

Guides

- Counterweight assist arbors must be guided sufficiently such that in no case can the arbor catch on surrounding objects or structure. Wire guides are *not* recommended unless they are single arbor system located far enough away from other rigging or objects to ensure safe operation even with the loose guidance that they provide.
- Guide rail splices should be well aligned so that shoes cannot catch.
- Guide shoes should be in good condition and able to keep the arbor from twisting.

Arbors

- The connection to the arbor must be capable of withstanding the capacity of the hoist at the points where the drive chain/rope is to attach at both the top and the bottom of the arbor with an appropriate design factor. Consult the original equipment manufacturer or a qualified Professional Engineer to determine if the arbor is suitable for this application.
- Arbors with cast iron fittings should not be used.

Blocks, Cables, and Rigging Hardware

- When installed properly, the additional loads that the hoist places on the head blocks and loft blocks are small. However, all rigging components must be rated and installed with the appropriate design factors. Determining the suitability of the rigging requires careful inspection and engineering methods. Consult the original equipment installer or a qualified Professional Engineer to determine if the rigging system is suitable for this application.

- Note that some older head blocks feature sheaves in which the pitch diameter of the operating line is different from that of the lift lines. This type of sheave cannot be used with the PowerAssist system.

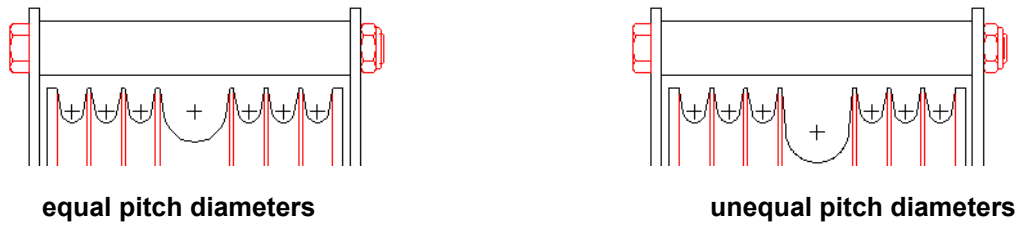


Figure 3: Sheave pitch diameters

2. Winch mounting conditions

The building structure to which the hoist is anchored must be of sufficient strength to resist the loads at the appropriate design factors. The PowerAssist exerts 1000 lbs of uplift, plus dynamic forces, on the structure below. Consult a qualified Structural Engineer to determine if the building is capable of resisting these loads.

3. Special tools

Due to the special nature of the roller chain used in the PowerAssist system, we recommend that the installer invest in a chain breaking tool for #60 to #100 roller chain. This will drive out the rivet head pins quickly and without damaging the side plates (See Figure 4a). The Chain pins may also be removed by grinding away the rivet head and driving the pin thru with a flat pinned punch. The pin diameter is 0.234 inches.

NOTICE!

**DO NOT DAMAGE CHAIN LINK PLATES WHEN GRINDING AWAY RIVET HEAD.
DAMAGED LINKS MUST BE REMOVED.**

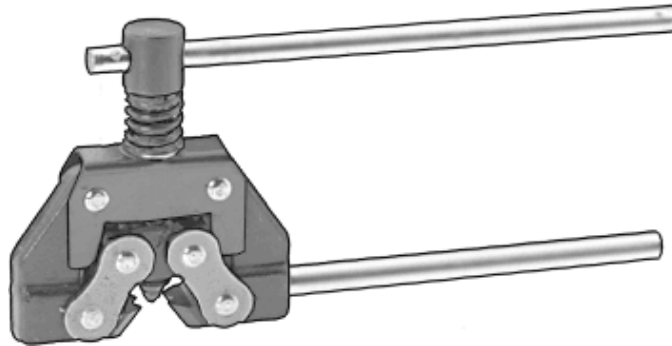


Figure 4a. Chain breaking Tool

A custom made stripping guide should be manufactured to strip the ends of the cables safely (See Appendix B for fabrication details). A sharp razor knife is all that is required to cut the cable jacket.

JR Clancy Recommends using Nicopress swages to terminate the drive cable. The cable is 3/8 7X 19 Galvanized Utility Cable. Several Nicopress swaging tools exist to make these connections in the field such as Nicopress no. 3512 Hydraulic compression tool (See Figure 4b).



Figure 4b. Chain breaking Tool

Installing the PowerAssist

NOTICE!

INSTALLATION AND ADJUSTMENT OF RIGGING COMPONENTS SHOULD ONLY BE PERFORMED BY TRAINED PROFESSIONALS.

⚠ WARNING! LOAD MAY FALL IF PARTS ARE SUBSTITUTED

USE ONLY THE PARTS PROVIDED BY THE FACTORY TO ASSEMBLE THIS MACHINE

⚠ WARNING! MOVING PARTS CAN CRUSH OR CUT

KEEP HANDS AND FEET AWAY FROM MACHINERY IN MOTION

⚠ WARNING! ELECTRICAL SHOCK HAZARD

INSTALLATION OF THIS MACHINE REQUIRES HIGH VOLTAGE ELECTRICAL WIRING. THIS WORK SHOULD BE DONE ONLY BY QUALIFIED PERSONNEL

1. Nomenclature

The terms seen in Figure 5 and Figure 6 will be used throughout this manual

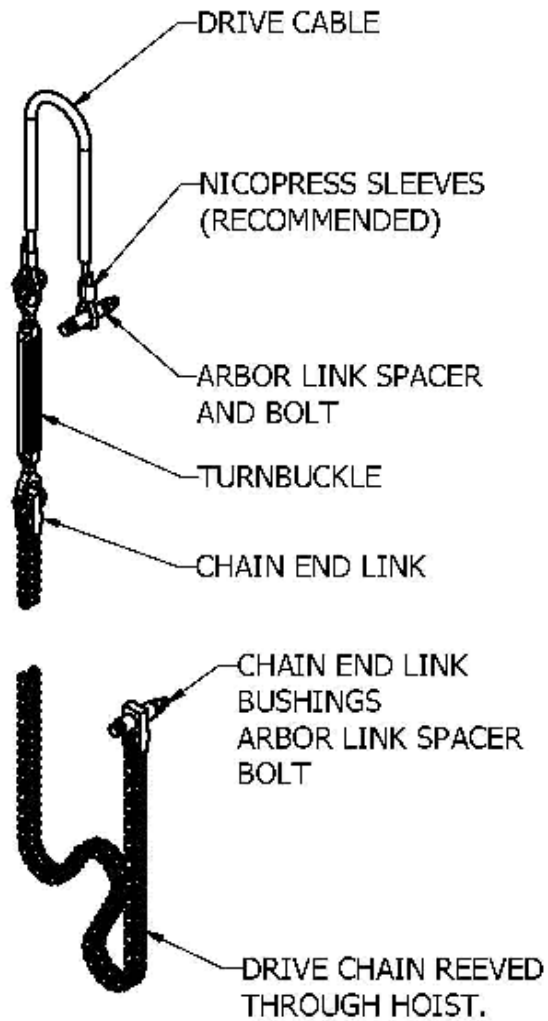


Figure 5: Drive chain nomenclature

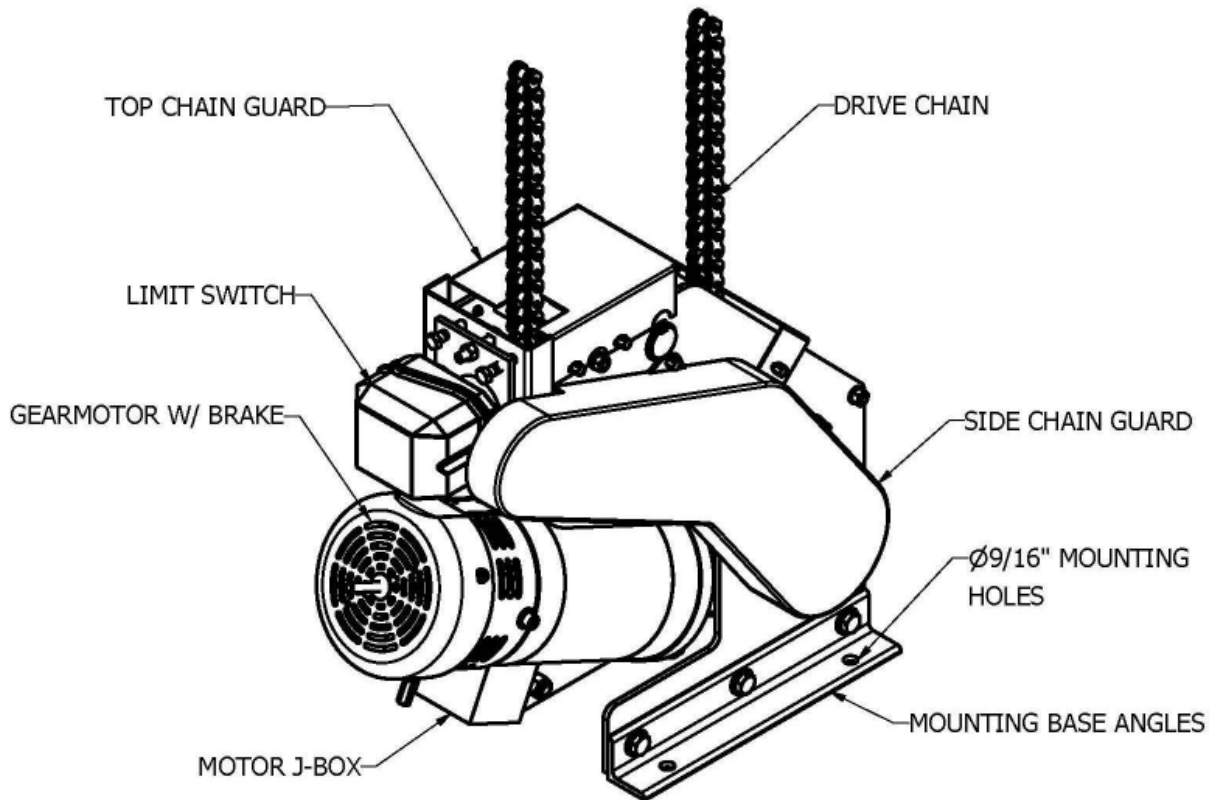


Figure 6: Hoist nomenclature

2. Install the counterweight rigging hardware

1. Install counterweight rigging per the manufacturer's instructions. Install everything including counterweight for the pipe batten weight. Do not install a hand line.
2. If you are using existing rigging, see the Project Planning section of this manual to ensure that the components are suitable for this application.

3. Anchor the hoist to the building structure

⚠ WARNING!

INCORRECT COMPONENTS CAN CAUSE LOAD OR ARBOR TO FALL

SET MUST BE PROPERLY COUNTERBALANCED BEFORE REMOVING EXISTING FLOOR BLOCK

1. If using existing rigging, make sure the system set is properly counterbalanced and then untie the hand line from the bottom of the arbor and then remove the floor block from the guide system.
2. Place the PowerAssist on the floor beneath the arbor. Center the sprockets between the guide tees as seen in Figure 7.
3. Align the offstage side of the offstage sprocket with the center of the arbor as seen in Figure 8.
4. The PowerAssist hoist is provided with four 9/16" holes in the base for anchoring to the facility. A fastener must be installed in each of these holes. We recommend that each fastener have an ultimate strength of at least 8,000 lbs.

⚠ WARNING! LOAD MAY FALL IF HOIST NOT SECURELY ANCHORED TO BUILDING STRUCTURE. CONSULT A QUALIFIED PROFESSIONAL TO MAKE SURE THAT THE ANCHORS AND THE BUILDING STRUCTURE ARE CAPABLE OF WITHSTANDING LOADS WITH THE APPROPRIATE DESIGN FACTORS.

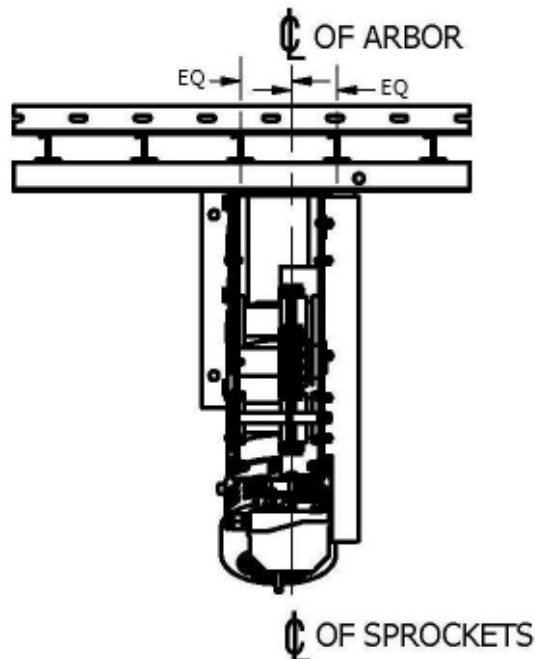


Figure 7: Centering the sprockets beneath the arbor

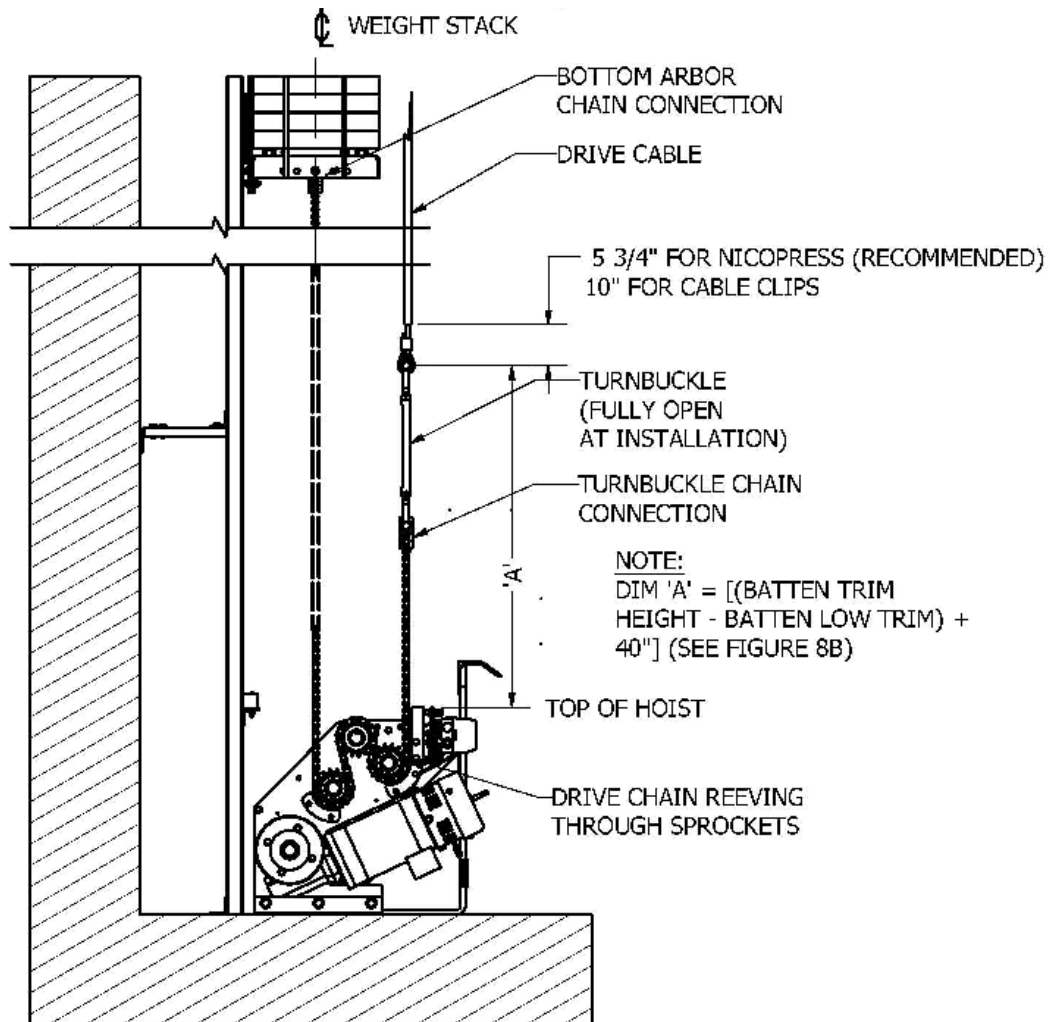


Figure 8A: Hoist alignment and chain reeving

4. Energize the hoist and verify operation

1. Wire the hoist per the provided electrical drawings.
2. Turn on the power and make sure the sprockets are rotating in the right directions for the up and down control buttons.
3. Adjust the limit switches so that the machine can move in either direction for 10 feet without hitting any limits.

5. Install the drive cable

1. Bring the batten in to low trim, or as close to the floor as possible, and secure it.

⚠ WARNING! IMPROPER COUNTERWEIGHT CAN CAUSE LOAD TO FALL
MAKE SURE THAT SET IS CORRECTLY WEIGHTED BEFORE REMOVING HAND LINE

2. If the arbor is rigged with an existing hand line, make sure that the set is correctly counterweighted and then untie the hand line from the top of the arbor. Pull the hand line through the head block. Remove the rope lock and floor block. Leave the line attached to the bottom of the arbor, or install a temporary hand line there for future use.
3. Strip the jacket from *one end only* of the drive cable 11 1/2" inches from the end. Install a thimble and Nicopress oval sleeve. Two 3/8" forged cable clips may also be used for this termination if necessary by stripping 20 inches from the end of the cable.

⚠ WARNING! IMPROPER INSTALLATION OF SLEEVES OR CLIPS CAN CAUSE
LOAD TO FALL. FOLLOW MANUFACTURERS INSTRUCTIONS FOR INSTALLING AND INSPECTING CLIPS AND SWAGES

4. Reeve the drive cable through the head block with the terminated end offstage over the arbor. Bring the terminated end of the drive cable down to the top of the arbor and Insert the Arbor Link Spacer provided with the hoist through the wire rope thimble and into the arbor top. Bolt through the arbor top with a 1/2-13 UNC Grade 5 hex bolt. The Arbor Link Spacer can be identified by the two grooves turned into the part at each end. See figure 8
5. The on stage end of the drive cable should be left hanging down by the hoist. *With the batten as close to the floor as possible*, use a tape measure to measure the distance from the floor to the bottom of the batten. Record this number and subtract from it the height of the batten at low trim. (It is usually desirable to make the low trim for the PowerAssist set the same as the other battens.) Add 40 inches to this number to get dimension "A" as seen in figure 8 and 8A. This is the distance from the top of the hoist to the center of the eye in the cable. **Do not cut the cable at this location.**

Distance from floor to bottom of batten when drive cable is installed.		
Subtract distance from floor to bottom of batten at desired low trim	-	
Add 40 inches	+	40
<hr/>		
Distance from top of hoist to center of eye: "A"		
Subtract 5 3/4" inches if using Nicopress, 10 inches if using clips	-	
<hr/>		
Distance from top of hoist to cut line on drive cable		

Figure 8B: Calculating the height of the onstage drive cable cut and termination

6. Subtract the correct number from distance A as seen in figure 8A to calculate the distance from the top of the hoist to the point where the drive cable should be cut. Cut the drive cable.
7. Measure back from the new end of the cable 11 ½” inches (20 inches if using cable clips) and make a new mark. This is the point where the cable must be stripped back to. Strip the jacket from the cable. See Appendix B.
8. Use a thimble and Nicopress oval sleeve to terminate the cable as shown in Figure 8A.

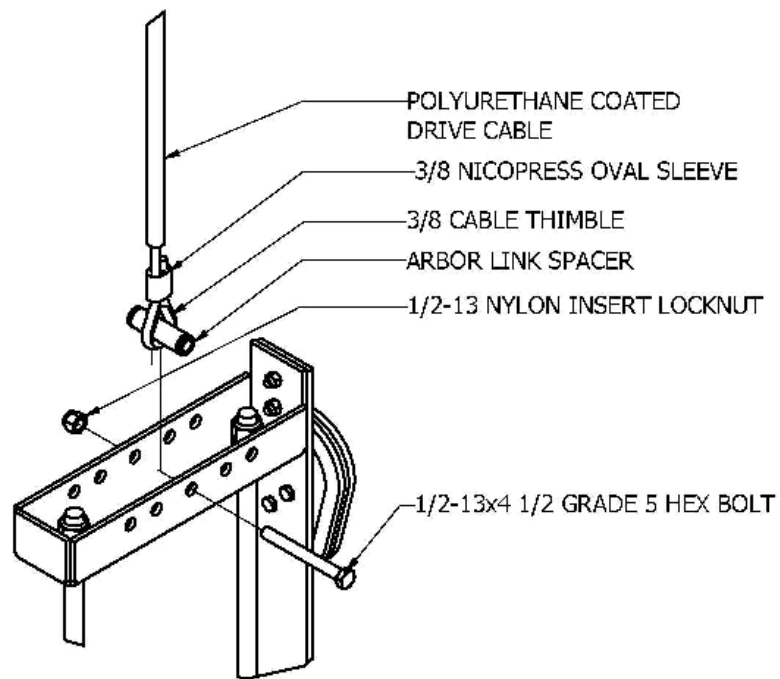


Figure 9: Connection of the drive rope to the top of the arbor

6. Attach the drive chain to the drive cable

1. Extend the turnbuckle as to its full length.
2. Pin the turnbuckle into the thimble of the wire rope and fasten the cotter pins.
3. Attach the Chain End Link to the end of the Drive Chain as seen in figure 10.
4. Inspect any chain connections within the length provided to make sure all mending links are properly installed.
5. Pin the turnbuckle into the Chain End Link and fasten the cotter pin as seen in figure 8A.
6. Haul the hand line down to pull the batten and the roller chain up until the batten is at high trim. Add enough counterweight to the arbor to balance the system and compensate for the roller chain weight, and then add approximately 30 more pounds.

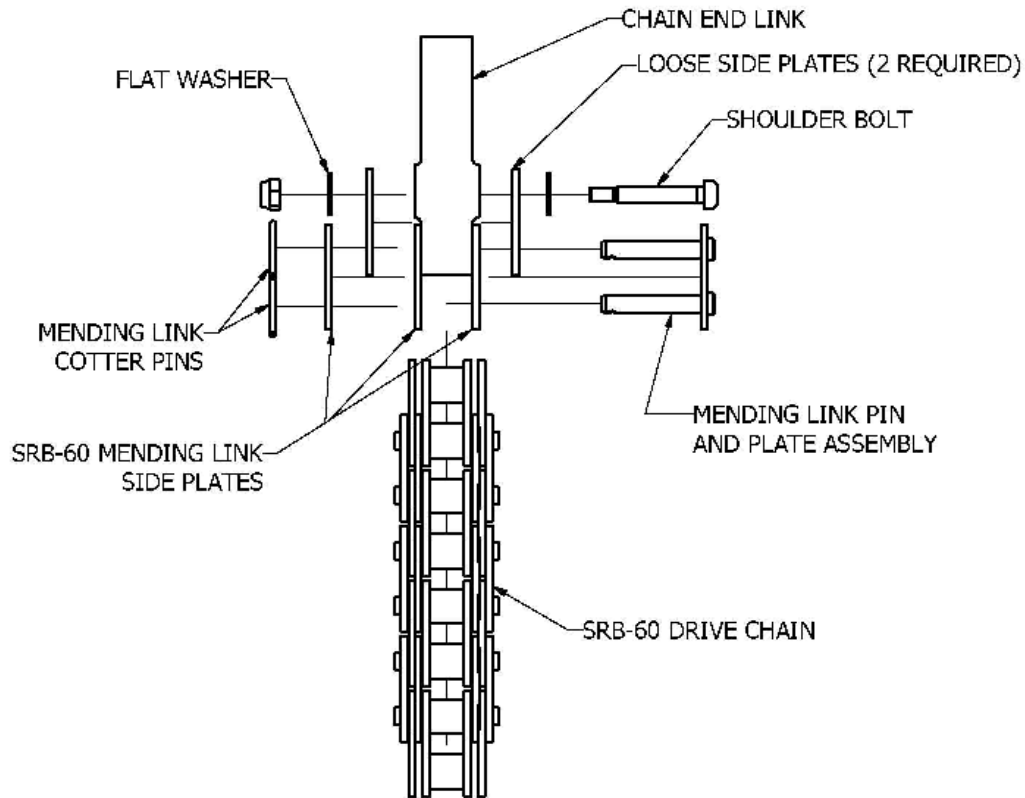


Figure 10: Terminating the drive chain.

7. Install the drive chain into the hoist

1. Remove the top cover of the hoist
2. Energize the machine and carefully feed the free end of the drive chain into the hoist. Run enough chain through to reeve around the idlers as shown in figure 8.

**⚠ WARNING! MOVING PARTS CAN CRUSH OR CUT.
KEEP BODY PARTS AWAY FROM MACHINE WHEN MOVING**

3. Reinstall the top chain cover.

**⚠ WARNING! LOAD WILL FALL IF CHAIN IS DRIVEN OUT OF HOIST.
LOCK OUT POWER TO HOIST IF UNATTENDED BEFORE CHAIN IS FULLY
INSTALLED.**

8. Attach the drive chain to the underside of the arbor

1. Start with the batten at high trim (arbor at low trim). Run the motor to raise the arbor by a few inches (if required) so that it is at least 6 inches above the stop batten, and so that there is no slack in the onstage side of the drive line.
2. Temporarily install the Chain End Link into the underside of the arbor using the Arbor Link Spacer and the ½" bolt. See Figure 11. It is not necessary to install the nut onto the bolt in this step, merely pin the parts in place temporarily.

⚠ WARNING! INCORRECT COUNTERWEIGHT CAN OVERLOAD HOIST OR RIGGING AND CAUSE LOAD TO FALL. HOIST CAPACITY IS 1000 LB IMBALANCE. DO NOT EXCEED HOIST OR RIGGING CAPACITY. DO NOT ADD OR REMOVE COUNTERWEIGHT UNLESS THE ARBOR/AND OR LOAD ARE SECURED

3. For new installations with empty battens, preload the drive chain by adjusting the weight in the arbor to equal one half the set capacity plus the pipe weight. **For existing systems with loads already on the battens this step should be skipped.**
4. Bring the free end of the Drive Chain up to the Chain End link. **Make sure that the turnbuckle is fully extended, and that there is no slack anywhere in the drive cable or chain.** Pull the end of the chain up to the arbor. Mark the chain pin nearest to and *below* the bottom of the end link and use a chain tool to press out this pin.
5. Remove the Chain End Link from the bottom of the arbor and attach it to the chain as shown in Figure 10.
6. Insert the Arbor Link Spacer provided with the hoist through the wire rope thimble and into the arbor top. Bolt through the arbor top with a ½-13 UNC Grade 5 hex bolt. The Arbor Link Spacer can be identified by the two grooves turned into the part at each end. See figure 11.

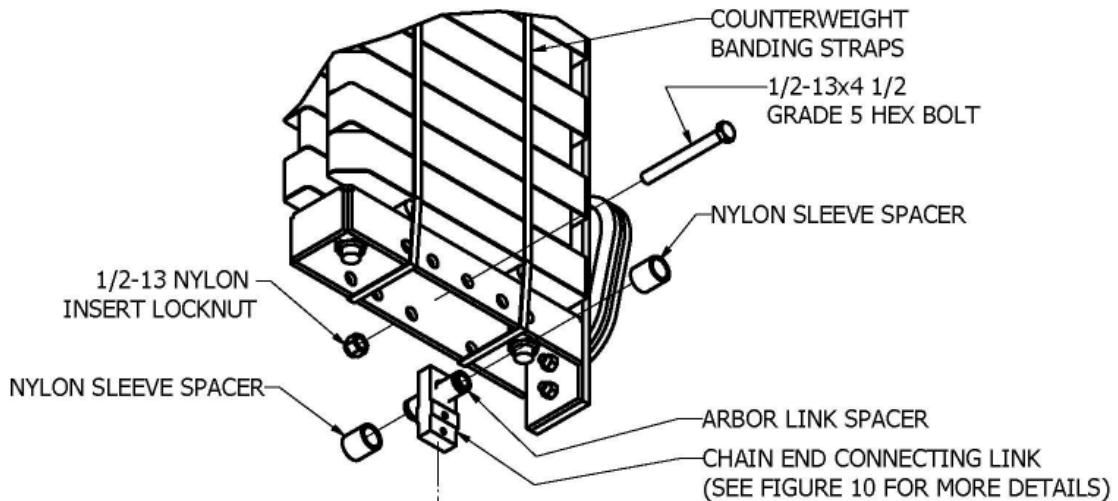


Figure 11: Attaching the drive chain to the bottom of the arbor

9. Adjust the counterweight and tension the drive chain

⚠ WARNING! OVERTIGHTENING TURNBUCKLE CAN OVERLOAD HOIST AND CAUSE LOAD TO FALL. DO NOT TIGHTEN TURNBUCKLE MORE THAN INDICATED BELOW.

⚠ WARNING! INCORRECT COUNTERWEIGHT CAN OVERLOAD HOIST OR RIGGING AND CAUSE LOAD TO FALL. HOIST CAPACITY IS 1000 LB IMBALANCE. DO NOT EXCEED HOIST OR RIGGING CAPACITY. DO NOT ADD OR REMOVE COUNTERWEIGHT UNLESS THE ARBOR/AND OR LOAD ARE SECURED

NOTICE! THE FOLLOWING PROCEDURE IS FOR SYSTEMS WITH A BATTEN CAPACITY OF 2000 LBS OR LESS. CONTACT JR CLANCY FOR OTHER INSTRUCTIONS WHEN INSTALLING SYSTEMS OF GREATER CAPACITY.

1. Double check all connections to make sure the drive chain and rope are securely fastened. Add or remove counterweight so that the arbor is loaded to one half the capacity of the batten and rigging, but not to exceed 1000 lbs.
- 2A. **For new installations with empty battens**, drive the batten all the way out to high trim. This will put the greatest length of chain possible into tension.
- 2B. **For existing systems with loads already on the battens**, experiment with the batten position until you find the condition in which the greatest length of chain possible is put into tension.

3. Adjust the turnbuckle on the onstage side of the drive line until all slack is removed from the drive chain.
4. Use iron wire to mouse the turnbuckle and prevent unintentional rotation.

NOTICE Connect the chain to the bottom of the arbor with the arbor in the down position and the full system imbalance capacity of the hoist on the chain in order to minimize re-tensioning required after “break in”.

10. Set the Limit Switches

Set the limit switches for the hoist using the procedure in Appendix A.

11. Install arbor weight warning signs

▲ WARNING! INCORRECT COUNTERWEIGHT CAN OVERLOAD HOIST AND CAUSE LOAD TO FALL. SECURE COUNTERWEIGHT AND INSTALL WARNING SIGNS TO PREVENT USERS FROM TAMPERING WITH WEIGHTS

Install the warning sign securely onto the arbor rods in such a way as to prevent the addition or removal of weight.

▲ WARNING! FOR SYSTEMS WITH A BATTEN CAPACITY GREATER THAN 2000 LBS REMOVAL OF WEIGHT FROM EITHER THE BATTEN OR THE ARBOR CAN RESULT IN OVERLOAD OF HOIST. THE SYSTEM INSTALLER MUST ATTACH SAFETY WARNING LABELS ONTO THE LOAD AT THE POINT OF ATTACHMENT TO PREVENT USERS FROM REMOVING THE LOAD AND OVERLOADING THE HOIST.

12. Chain tension adjustment after break in

The drive chain will go through an initial “break in” period which will result in significant slack developing in the chain as it runs. The turnbuckle must be adjusted as this occurs to ensure safe operation. The owners must be notified of this condition and steps taken to make sure the chain is adjusted properly.

Operating and Maintaining the PowerAssist



WARNING!

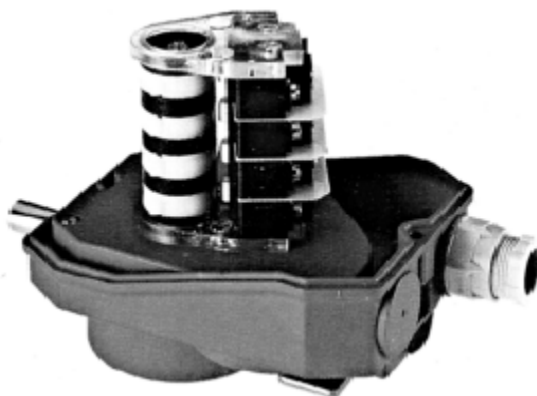
Improper use of this equipment can result in injury or death

Read the Operation manual before using this equipment. Do not operate without proper training and authorization. You are responsible for identifying & evaluating any hazards and determining the correct operation method to be used.

Operation and maintenance of the PowerAssist system is covered in the PowerAssist Operations and Maintenance Manual. Contact JR Clancy to obtain a copy of this document prior to operating this machinery.

Appendix A: Rotary Limit Switches

The following section describes the procedure used in setting Ravasi rotary limit switches.



Establish Rotation

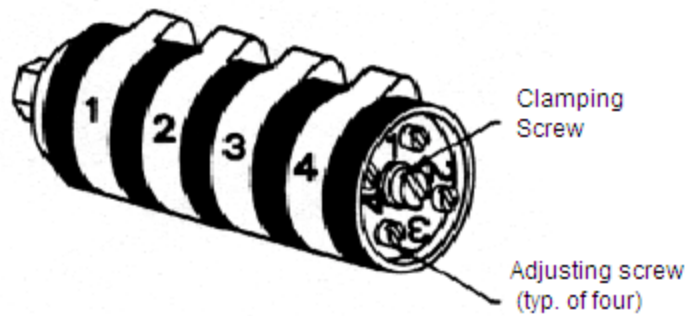
- Remove limit switch cover.
- Drive winch in UP direction – note direction of cam stack rotation.
- Mark switch cover or label inside switch to record cam stack rotation.
- Avoid contacting screw terminals on operating switches while winch system is on.

Determine Travel

- Determine where load must stop to avoid damage/misalignment – set overtravel to stop short of this point.
- Determine what range of normal travel of load must be – set normal limits to stop load at these points.
- For each end of travel, set overtravel limit first, then set end-of-travel limit.
- Make sure that the operator can clearly see the entire load for its entire travel, or that spotters are in place to observe and clearly communicate with the operator.

Adjust Limit

- Drive the winch to the desired end of travel
- Re-verify cam stack rotation (when the winch travels up, does the cam stack rotate clockwise or counterclockwise). Determine which side of the desired switch the limit cam must strike (i.e. if the cam stack rotates clockwise when the winch travels down, and you are setting a down limit, the cam must actuate the down limit while moving in a clockwise direction)



- Loosen the central cam stack clamping screw (1/2 turn).
- Locate the adjusting screw for the desired limit by referring to the numbers adjacent to the adjusting screws. Note that the lowest switch in the cam stack (down overtravel) is switch 1, the next switch (down limit) is switch 2, the next switch (up limit) is switch 3, and the highest switch in the stack (up overtravel) is switch 4.
- Rotate the adjusting screw to adjust the limit cam lobe to a position where the selected limit switch is just actuated (audible click).
- Once the limit cam is at the proper place, tighten the cam stack clamping screw.

Test Limit

- Drive winch away from limit until limit is cleared (use overtravel bypass switch to move winch off overtravel limit).
- Drive winch toward limit until limit stops motion.
- Assess stopping position (measurement vs. target)
- Drive winch off limit (use overtravel bypass switch to move winch off overtravel limit).

Refine Limit Adjustment

- Repeat the Adjust Limit procedure, as detailed above.
- Move cam lobe closer to switch to make switch trip sooner (decrease travel distance).
- Move cam lobe further from switch to make switch trip later (increase travel distance).
- Make sure to tighten cam stack clamping screw after each adjustment!
- Retest limit adjustment until winch stops at desired position.

Adjust Remaining Limits

- Once overtravel limit is set, set normal limit at same end of travel.
- Check to ensure that there is sufficient distance between normal limit and overtravel limit – if the winch strikes both limits before stopping, increase the distance between the limits by moving the normal limit to stop the load sooner.
- Once all limits are set, check that cam stack clamping screws are tightened, and then replace the limit switch cover.

Appendix B: Stripping coated cable

The following section describes the procedure used to strip the coating from the coated PowerAssist drive cable.

NOTICE!

CUT THE PLASTIC JACKET ONLY.

IF THE AIRCRAFT CABLE IS NICKED OR OTHERWISE DAMAGED DURING TERMINATION, THAT PART SHOULD BE CUT OFF AND THE CABLE RETERMINATED

Step 1: Measure the distance to be stripped back and mark it on the cable. (20 inches for cable clip installation or 11 1/2 inches for nicopress installation).

Step 2: Use a razor knife to score the cable jacket around the full circumference at this location.

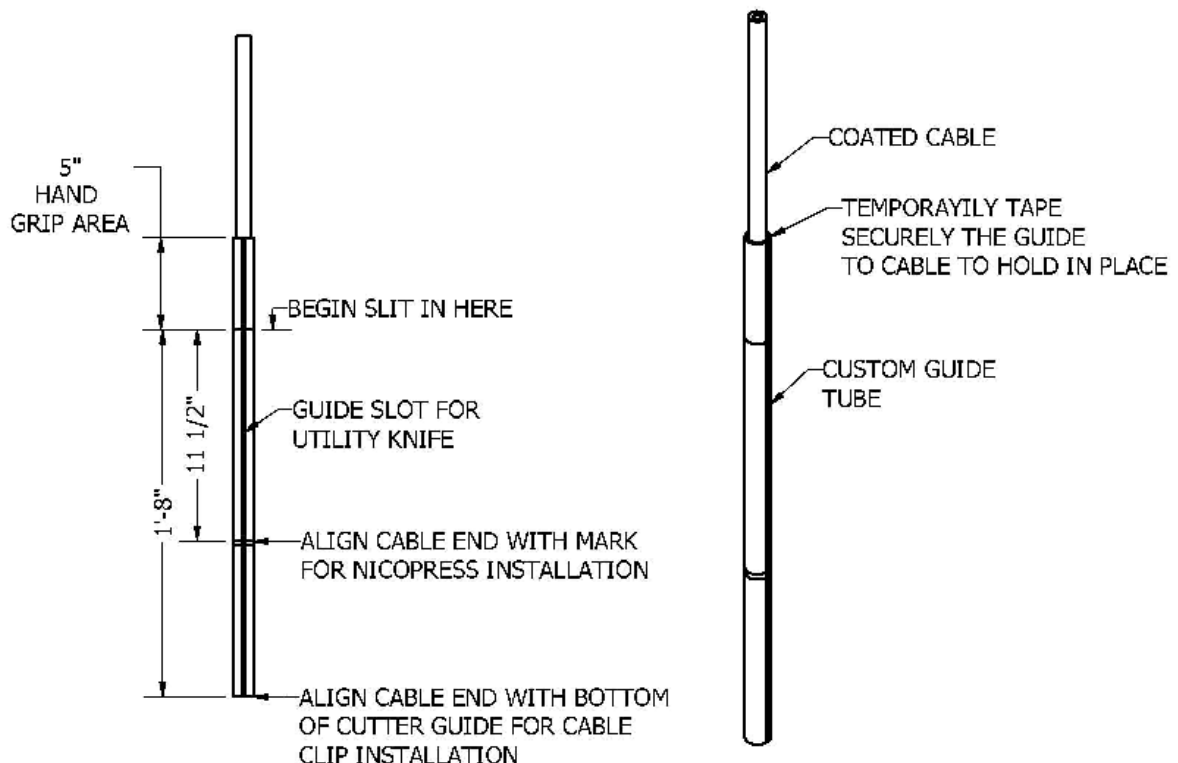


Figure B-1: Cutter guide installation

Step 3: Install cutter guide (See *Figure B-1*) aligning bottom of cable with bottom of guide for cable clip installation or with indicator mark for nicopress installation. You can use gaff tape or duct tape to hold the cutter guide in place while you make the slit in the coated cable. See figure B-2 for fabrication details on cutter guide.

Step 4: Use a razor knife to score the cable jacket along its length between the scored mark and the end of the cable using the saw cut in the guide as a cutting edge.

Step 5: Remove the cutter guide.

Step 6: Press the center of the knife blade into the end of the cable at an angle of about 45 degrees. Rotate the knife to “pop” the jacket open at this end.

Step 7: Use your fingers to split the jacket open. Bend the jacket backwards to break it at the scored mark.

CUTTER GUIDE MANUFACTURING DETAILS

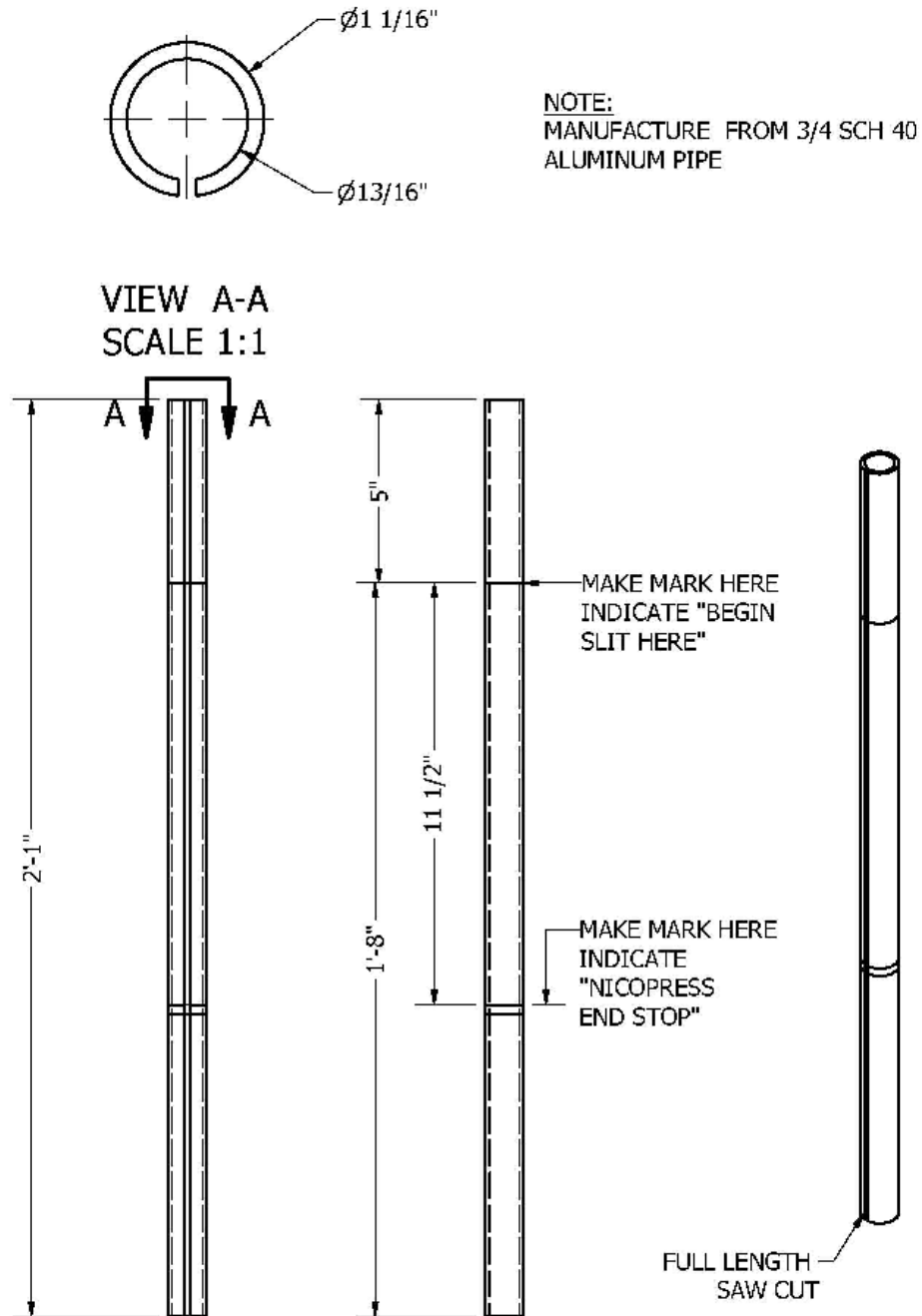


FIGURE B-2: CUTTER GUIDE

REVISION HISTORY

Rev	Date	Description
DRAFT	21FEB07	DRAFT RELEASE
0	27APR07	INITIAL RELEASE