



Southern States, Inc.

The Quality Name in High Voltage Products

Types: LHA, LH4, LH6

Grounding Switches

All Ratings

30 Georgia Ave,
Hampton, GA 30228
770-946-4562 Telephone
770-946-8106 Fax

Safety Information

DANGER

IMPROPER HANDLING, INSTALLATION, OPERATION OR MAINTENANCE OF THIS EQUIPMENT MAY CAUSE IMMEDIATE HAZARDS WHICH WILL LIKELY RESULT IN SERIOUS PERSONNEL INJURY OR DEATH.

WARNING

The equipment covered by this publication must be handled, installed, operated and maintained by qualified persons who have direct knowledge and experience dealing with the hazards involved and are thoroughly trained in the handling, installation, operation and maintenance of high voltage transmission and distribution equipment. These instructions are meant for only such **Qualified Persons**. They are not intended to be a substitute for adequate training and experience in safety procedures for this type of equipment.

A **Qualified Person** is one who is trained in and has skills necessary:

- to read and comprehend this instruction book – understanding that these instructions are general in nature
- to accept personal responsibility to prepare and maintain an intrinsically safe work environment and maintain control of the work site to safeguard all persons present
- to develop and implement a proper rigging, lifting, and installation plan along with all safety precautions required to insure safe and proper lifting and installation of the equipment.
- to distinguish between energized and non energized parts
- to determine proper approach distances to energized parts
- to properly work with and around energized or de-energized equipment that may be pressurized with gas
- for proper use of personal protective equipment, insulating and shielding materials, insulated tools for working near energized and /or pressurized electrical equipment
- to recognize and take necessary precautions for the unique and dynamic conditions of site and specialized equipment to maintain a safe work environment during handling, installation, operation, and maintenance of high voltage switching equipment

The instructions in this manual are general guidelines for this type of equipment and not specific to the equipment supplied. Portions of it may not be applicable or may not have complete instructions for your specific equipment.

If you do not understand any part of these instructions or need assistance, contact Southern States Service Division at 770-946-4562 during normal business hours (EST) or 770-946-4565 after normal business hours.



LIMITED WARRANTY

SSLLC warrants only to the Warranty Holder (hereinafter defined as the “End User” or the “Immediate Purchaser”, as applicable, pursuant to the terms and conditions of this Limited Warranty as set forth below), that the Product identified below will, upon shipment, be free of defects in workmanship and material for the applicable Warranty Period. The “Warranty Period” is that period of time during which this Limited Warranty is effective, and such period begins on the invoice date issued by SSLLC for the Product, and continues until the earlier to occur of (1) 12 months from the date of installation, (2) 18 months from the date of invoice by SSLLC, or (3) as otherwise specified on the Southern States Proposal. “Installation” shall be defined as the Product being assembled in the intended service location and does not require energization to be complete. If the Product is both purchased and installed within the United States or Canada, this Limited Warranty is granted to each end user of the Product who acquired the Product for its own use during the Warranty Period (“End User”). In all other situations, this Limited Warranty is granted only to the first purchaser of the Product (“Immediate Purchaser”) from SSLLC. No primary or remote purchaser or owner of the Product who is not a Warranty Holder may claim any benefit under this Limited Warranty, or any remedial promise included in this Limited Warranty. SSLLC shall, upon prompt written notice from the Warranty Holder, correct a nonconforming Product by repair or replacement at the sole discretion of SSLLC of the nonconforming Product or any part or component of a nonconforming Product necessary in SSLLC’s discretion to make such Product conforming. Any transportation charges, labor for removing, reinstalling the Product or part, and/or costs related to providing access to the Product shall be the responsibility of the Warranty Holder. Correction in this manner will constitute the Warranty Holder’s exclusive remedy and fulfillment of all SSLLC’s liabilities and responsibilities hereunder. SSLLC’s duty to perform under this limited warranty may be delayed, at SSLLC’s sole option, until SSLLC has been paid in full for all products purchased by the Warranty Holder. No such delay will extend the Warranty Period. If SSLLC does not make such repair or replacement, SSLLC’s liability for damages on account of any claimed nonconformity will in no event exceed the purchase price of the Product in question. This Limited Warranty does not apply to any Product that has been disassembled, repaired, or altered by anyone other than SSLLC. This Limited Warranty will not apply to any Product that has been subjected to improper or abnormal use of the Product. SSLLC has no responsibility to repair or replace any Product or component thereof manufactured by another party, but SSLLC will assign, to the extent assignable, to the Warranty Holder any manufacturers’ warranty that applies to products and components not manufactured by SSLLC.

THIS LIMITED WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES. THERE ARE NO OTHER EXPRESS, IMPLIED, OR STATUTORY WARRANTIES. ALL IMPLIED WARRANTIES WHICH MAY ARISE BY IMPLICATION OF LAW, OR APPLICATION OF COURSE OF DEALING OR USAGE OF TRADE, INCLUDING, BUT NOT LIMITED TO, IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, NONINFRINGEMENT OR OTHERWISE ARE EXPRESSLY EXCLUDED. SSLLC SHALL NOT BE LIABLE OR RESPONSIBLE FOR ANY CONSEQUENTIAL, INCIDENTAL, INDIRECT, EXEMPLARY, SPECIAL, OR PUNITIVE DAMAGES, EVEN IF SSLLC HAS BEEN ADVISED OF THE POSSIBILITY OF SAME. THE WARRANTY HOLDER IS SOLELY RESPONSIBLE FOR THE SUITABILITY OF THE PRODUCT FOR ANY PARTICULAR APPLICATION.

Southern States, LLC

Equipment Receipt, Installation, Use, Operation and Maintenance Terms

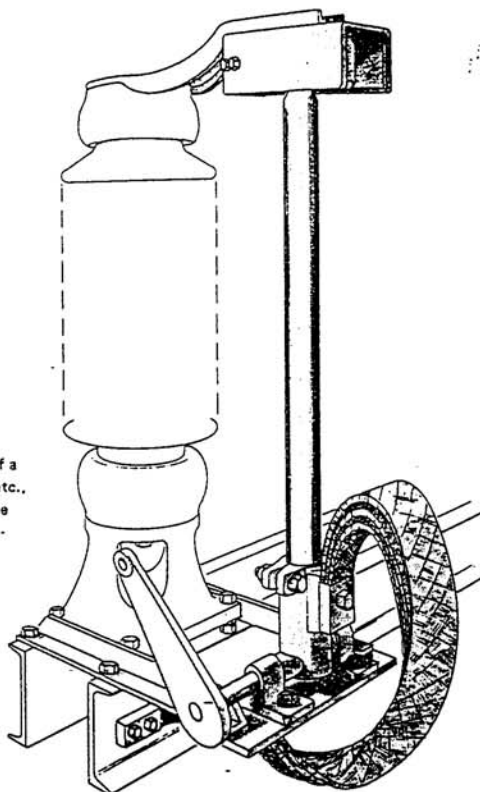
("Terms of Use")

The purchaser ("Purchaser") of certain Equipment (the "Equipment") identified in the Instruction Manual accompanying these Terms of Use sold by Southern States, LLC ("Southern States"), by Purchaser's acceptance or Use of Equipment in any way, agrees to the Terms of Use set forth below (the word "Use" herein means receipt, testing, inspection, installation, operation, maintenance and otherwise handling the Equipment):

- Purchaser represents and warrants that it is fully qualified to Use the Equipment, and that it is a sophisticated user of the Equipment with a high level of expertise in the Use of the Equipment and Purchaser knows that Southern State is relying on Purchaser's sophistication and expertise with respect to the Equipment.
- The Purchaser will, within seven (7) days after receipt of the Equipment, inspect the Equipment and identify and notify Southern States in writing of any missing parts, damage or defects observed in the Equipment.
- The Purchaser will Use the Equipment, only in conformity with all manuals, data sheets and instructions provided by Southern States, and in keeping with sound engineering, utility and safety practice. Purchaser will at its own expense, provide all necessary labor, supplies, and facilities required to Use the Equipment.
 - The Purchaser may use its own personnel or engage a third party to Use the Equipment. The Purchaser shall insure that it only utilizes personnel who are fully qualified or certified by a reputable certification agency to Use the Equipment. In the event that Purchaser cannot find such qualified personnel, the Purchaser will notify Southern States and seek its advice to determine a mutually agreeable solution.
 - By separate agreement, Southern States may provide such services and the personnel to conduct such services in connection with the installation of the Equipment. In the event Southern States agrees to provide personnel to install, maintain, and operate the Equipment, such personnel will function only in an advisory capacity and shall have no responsibility for the supervision, or the quality or workmanship of such installation, maintenance, or operation of the Equipment.
- The Purchaser shall not install and operate the Equipment in a way such that a single point of Equipment failure leads to a cascading event or consequential damage to any person or property. Purchaser shall ensure redundancy in its system at all times. Purchaser acknowledges and agrees that electric service is by nature subject to interruptions due to Equipment failures and shall not agree to provide service free from the effects of Equipment failures
- The Equipment will be maintained and inspected as provided by this instruction manual and in compliance with best industry practices, but in no event will the Equipment be inspected and tested less frequently than once in every 6 months.
- The Purchaser shall not repair, dismantle, or alter any of the Equipment without Southern States' written consent.
- Any failure of Equipment either in service, testing or inspection will be promptly reported in writing to Southern States within 24 hours of the failure so that adequate evidence can be collected, appropriate diagnostic tests can be conducted, and analysis of the failure can be determined.
- Southern States will have no liability for any direct, indirect, consequential or remote damage or injury, whether or not foreseen or foreseeable, to the Purchaser or any third party or person for any damages or injury to person or property caused by Purchaser's or any third party's actions, whether or not negligent, in the Use of the Equipment. Purchaser shall indemnify and hold Southern States and its employees, officers and directors against any damage or injury caused in whole or part by Purchaser's or any third party's action whether or not negligent, resulting from the Use of the Equipment. Southern States expressly rejects any liability to third parties. The Purchaser expressly waives any claim against Southern States, its employees, officers, directors and affiliates, for injury or damage to person or property resulting from Use of the Equipment not directly and solely caused by Southern States' negligence. For the purposes of clarity, Southern States shall not be liable, and be fully indemnified by the Purchaser, for the following related to the Equipment: normal wear and tear, excessive use and loading, improper interference or maintenance on the part of the Purchaser or third parties, incomplete or false information given by the Purchaser, inappropriate or improper Use, faulty operation, installation or start-up, faulty or careless handling, improper maintenance, use of unsuitable operating materials/substitute materials, defective construction work, hazardous ambient conditions unknown to the Purchaser, chemical, electro-chemical or electrical influences, changes to the subject of delivery made without Southern States consent.
- In the event that Southern States is found by a court of competent jurisdiction or a properly empaneled arbitral body to be liable to the Purchaser for any reason, Southern States shall be entitled to a reduction in the liability by taking into account the exceptions provided by statute, law, and any counterclaims Southern States may have against Purchaser.
- The failure of Purchaser to comply with these Terms of Use herein shall void any and all warranties related to the Equipment. These Terms of Use shall be deemed to be part of the binding contractual agreements between Purchaser and Southern States related to the Equipment and shall govern over any inconsistent term or provision in such other contractual agreements.

NOTE: All illustrations in this manual are sketches, with no scale. Refer to assembly and operating mechanism drawings provided with each switch.

Figure 1 - Typical grounding switch usage, shown mounted on the jaw end of a vertical break switch. Depending upon customer specifications, clearances, etc., the grounding switch may be rotated 90° to the left or right so that the blade opens parallel to the switch base. (Although installation and adjustment procedures are identical, this is not a modification to be made in the field.)



Type LH-6 shown. The LHA does not use shunts.

The LHA, LH-4 and LH-6 grounding switches generally are shipped already mounted and adjusted on line switches rated 46 kV and below and require no adjustment. Depending upon shipping constraints, ratings of 69 kV and above may require some assembly and adjustment.

These switches can be used on either the jaw or hinge end of a line switch, or both. On center break switches they are arranged so that their jaw is attached to either (or both) line switch blades. They also are sometimes mounted on station post columns, and not attached to a line switch.

As with line switches, these grounding switches can be mounted upright, underhung, or vertically. Operation can be either three-pole, group operated, or single pole, by manual crank, swing handle or motor drive. And finally, they may be arranged so that their blades open parallel to the base, or perpendicular to it.

Fortunately, the installation procedures for all these mounting and operating schemes are very similar as well as simple. Regardless of the configuration, they all use a system of pipes, bearings, and adjustable length arms to open and close the switch from the ground.

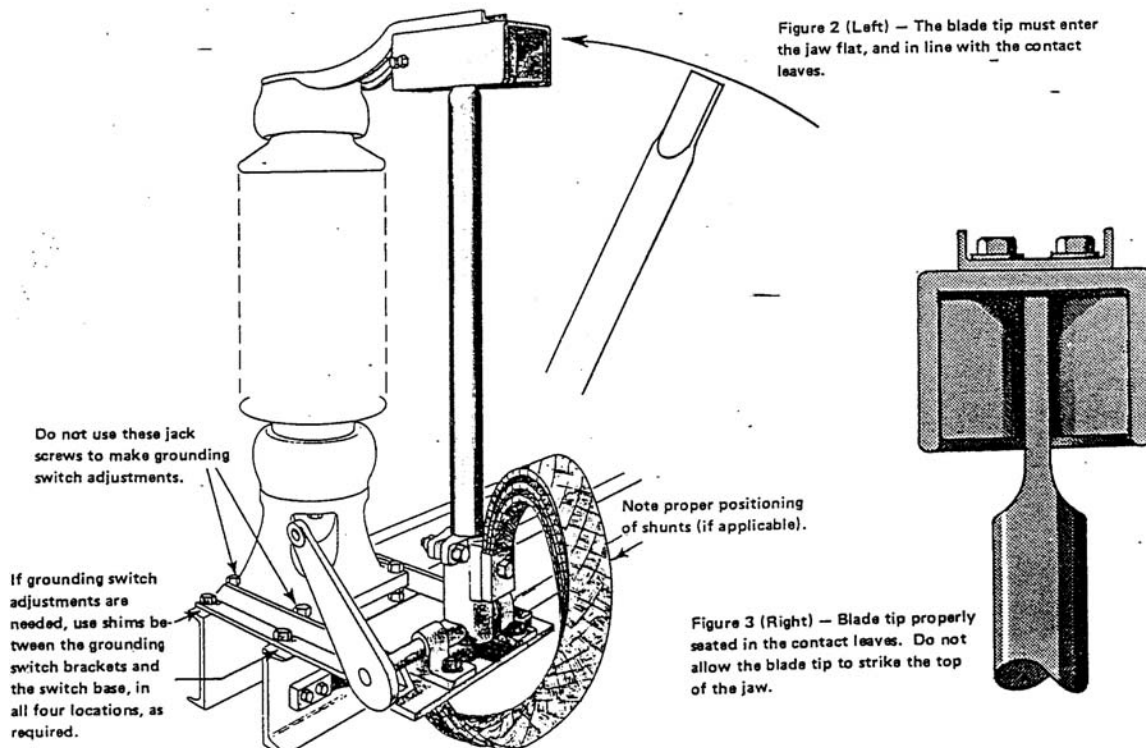
Usually, mechanical interlocks also are used to ensure personnel and equipment safety. Interlocks (mechanical and/or electrical) prevent the line switch and the grounding switch from being closed at the same time. The instructions for their installation are on a separate sheet.

It is important to remember that adjustments to these switches are made to the hardware that supports the grounding switch — not to the hardware that supports the insulator. This is so as not to disturb the adjustments already made to the line switch, which should be installed first.

It may be necessary to make adjustments not described in this manual. If any question should arise during installation or adjustment of this equipment, call your local Southern States representative, or the factory.

The general procedure for installing these switches is as follows:

1. Uncrate all equipment and check for damage in transit. If any damage is noted, file a claim with the carrier immediately, and notify the factory.
2. Refer to the operating mechanism drawing and the unit assembly drawing that accompanies each switch. If the grounding switch was not shipped attached to the line switch base, (if applicable) mount it as shown in Figure 1.
3. Because the grounding switch cannot be adjusted until after the line switch adjustments are complete, at this point, refer to the line switch instruction manual and completely install and adjust that equipment. (The grounding switch jaw is installed when mounting the line switch live parts to the insulators. Note: When a grounding switch jaw bracket and a spacer both are used, the spacer goes *above* the bracket.)
4. After the line switch is completely installed and adjusted, insert the grounding switch blade into its blade socket and tighten the clamping bolt.
5. Operating it by hand, close the grounding switch, checking for proper contact alignment. As with the line switch, certain conditions must be present for proper contact.
 - A. The blade tip must enter the jaw in the center, in a straight line.
 - B. The blade tip must be as high in the jaw contact leaves as possible without striking the top of the jaw.
 - C. The blade tip must penetrate deeply enough into the jaw that it comes firmly against the blade stop.





6. ADJUSTMENT PROCEDURES:

- A. To adjust for proper blade tip entry into the jaw contacts, simply loosen the clamping bolt and twist the blade in its socket until the tip is perfectly flat going into the contacts. Before tightening the clamping bolt, check to make sure the blade tip is making maximum contact with the contact leaves. Slide the blade up or down in its socket to make this adjustment. Tighten the clamping bolt securely.
- B. If the blade does not enter the jaw properly, that is, should it be out of line either to the left or right, loosen all four mounting bolts and place shims between the mounting surfaces. The blade must move through an arc that is on the same plane as the jaw contacts.
- C. When these switches are completely closed, the blade should come to rest firmly against the stop in the jaw. If this condition is not observed, use shim stock in the manner described in paragraph to move the blade tip forward or back in the jaw, as required.

7. After a thorough check of all bolts for tightness, go on to the operating mechanism section of this manual.

Note: In certain cases the grounding switch blade in the open position may rest a few degrees above or below horizontal. This in no way will affect the line-to-ground clearance of this equipment.

Figure 4 — Sketch of the general arrangement of the operating pipes on a typical grounding switch. The grounding switch is shown closed.

The counterbalance spring (A) is used only on higher ratings.

The mechanical interlock (B) may not always be used. Instructions for this item are on a separate sheet.

A universal knuckle may be used at location "C." Refer to the operating mechanism drawing.

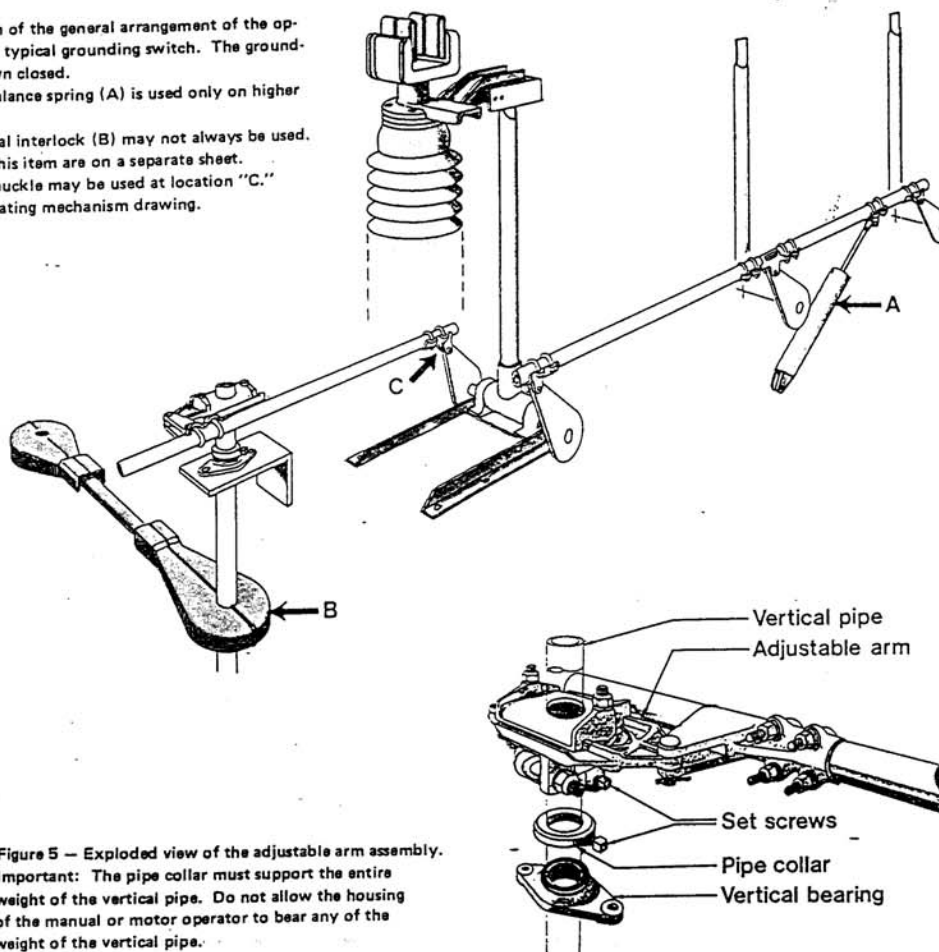


Figure 5 — Exploded view of the adjustable arm assembly.
Important: The pipe collar must support the entire weight of the vertical pipe. Do not allow the housing of the manual or motor operator to bear any of the weight of the vertical pipe.

OPERATING MECHANISM INSTALLATION and ADJUSTMENT: —

(Three-phase operation)

1. Refer to the operating mechanism drawing and lay out all parts and check them against the bill of material.
2. Using the sketch in Figure 4 as a guide and the operating mechanism drawing for specifics and dimensions, install mounting brackets, bearings and bushings, pipes, clevises, manual operating device adjustable arm, etc. Be sure to install any encircling member (such as key interlock, pipe guide, etc.) on the vertical pipe at this time.
3. Some higher ratings of these switches will have a counterbalance spring in the operating mechanism. Refer to the op. mech. drawing and install this spring at this time.
4. Tighten all set screws to grip the pipe securely, but do not drive any set screws through the wall of the pipe at this time.
5. After mounting all operating mechanism components, use any convenient means to match mark all clevis connections, adjustable arm, and manual operator attachments to check for slippage during trial operations.
6. If a motor operator is used, at this point refer to the motor operator installation instructions for mounting and trial operations.

7. **ADJUSTMENT:** If a motor operator is used, DO NOT use electrical operation until all adjustments are made. All grounding switch poles should be closed, all line switch poles open.
- The adjustable arm should travel 180° *from toggle closed to the open position. Manually test operate.
 - If the switch does not fully open, the radius of the arm is too short. To correct:
 - a. Check first to see that nothing has slipped.
 - b. Return the switch to the closed position.
 - c. Loosen the adjustable arm and clevis bolts as shown below.
 - d. Lengthen the radius of the adjustable arm about 1/4 inch and allow the clevis to reposition itself the same distance (shortening the pipe).
 - e. Test operate again and adjust as necessary.

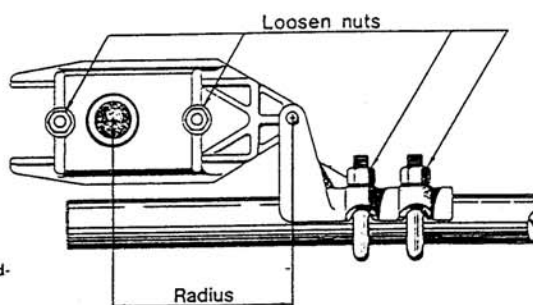


Figure 6 — Top view of the adjustable arm assembly.

- If the switch is fully open before the control handle reaches the open position, the radius of the adjustable arm is too long. To correct:
 - a. Check to see that nothing has slipped.
 - b. Return the switch to the closed position.
 - c. Loosen the adjustable arm and clevis bolts as shown above.
 - d. Shorten the radius of the adjustable arm about 1/4 inch and allow the clevis to reposition itself the same distance (lengthening the pipe).
 - e. Test operate again and adjust as necessary.

All poles of the fully adjusted switch should operate simultaneously. Slight adjustment of the interphase clevises may be necessary to coordinate all three poles.

- When the switch is completely adjusted, securely tighten all bolts and tighten all set screws until the pipe walls are pierced. (For heavy wall pipe, drill the set screw holes, using the threaded drill guides supplied and a 1/4" drill.)

8. MAINTENANCE

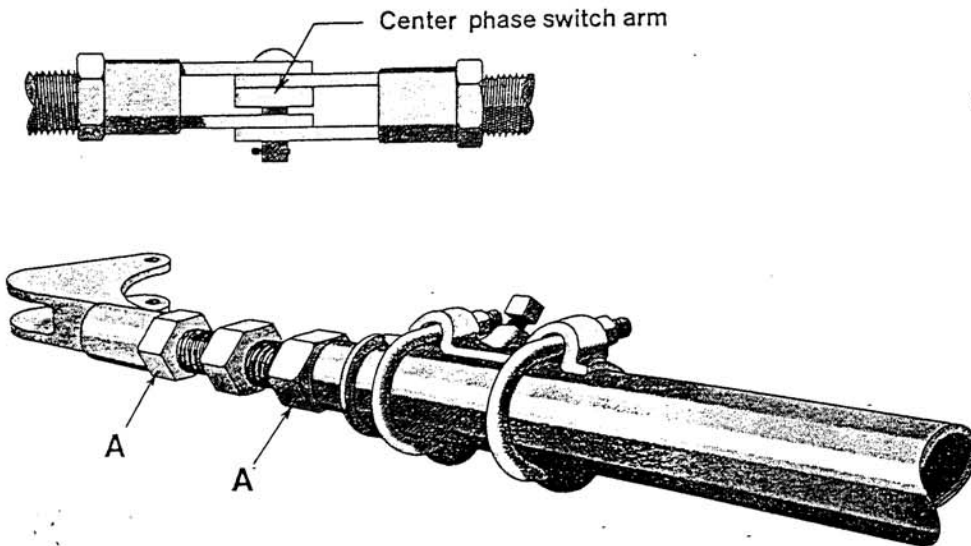
It is suggested that maintenance on these switches be performed in accordance with ANSI STANDARDS C37.35-1976.

*Exceptions may occur. Refer to the Op. Mech. drawing.

General instructions for threaded clevises



When threaded clevises are specified, one is generally attached to the adjustable arm, and two more to the center phase switch arm (Refer to the plan view of the operating mechanism drawing, and the illustration below).

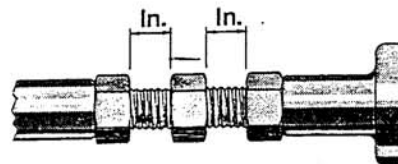


Operating mechanism adjustments consist mainly of incremental lengthenings and/or shortenings of the pipes that connect the switch arms together. To make these adjustments, simply loosen both jam nuts "A", and screw the stud in or out as required. Be sure to retighten both jam nuts securely.

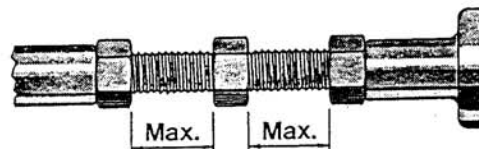
CAUTION! DANGER: Do not screw the stud out of the clevises. This could cause the pipe to fall, resulting in serious injury to personnel below.

Be sure the initial setting is correct, and do not adjust beyond the maximum allowable dimension. If adjustment beyond the maximum allowable dimension is needed, loosen the U-bolts on the outboard phase clevis and reposition the pipe toward the center phase.

Initial dimension for 3/4" stud is 11/16";
1" stud is 1/2".



Maximum allowable for 3/4" stud is 1-3/16".
Maximum allowable for 1" stud is 1".



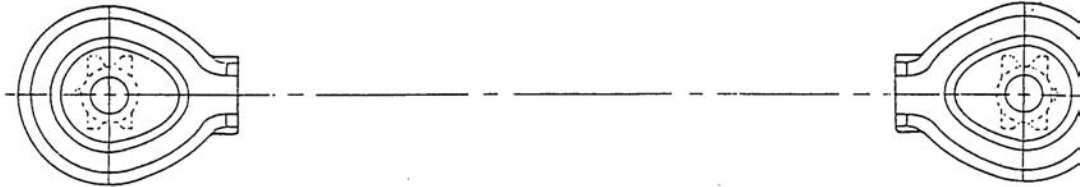


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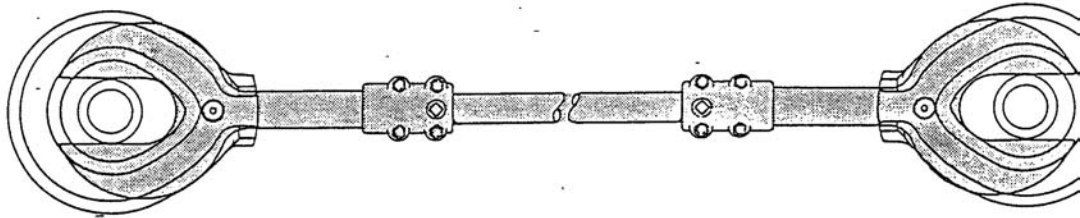
Mechanical Interlocks Installation

To Install:

1. Place the line switch in the fully open position and the grounding switch in the fully open position.
2. Refer to the operating mechanism drawing for location, and mount the cams to each vertical pipe. It is important that the cams be on the same elevation, so check this dimension closely. The openings in the cams must be precisely aligned, facing each other. Use a taut string to check this alignment before driving in the self-piercing set screws.

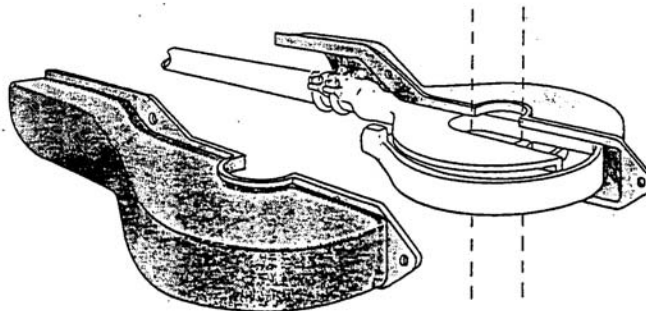


3. Attach the cam followers (yoke assemblies) to the horizontal pipe, making sure that both ends are aligned in the same plane. Do not drive in the self-piercing set screws yet.
4. Place the yoke assemblies on the cams. The correct position is with the cam follower rollers touching the inside lobe of each cam. Adjust by loosening the clamping bolts on a yoke assembly and repositioning the assembly as necessary.



5. Test operate MANUALLY. The line switch should close, then open, but the cam follower on the grounding switch operating pipe should move into the cam opening, blocking any operation of the grounding switch.
With the line switch open, close the grounding switch, checking for the same lockout of the line switch operating pipe.
6. When satisfactory operation is obtained, drive in all self-piercing set screws.
7. Install the ice shields. These members simply clamp around the cams and yoke assemblies, preventing ice accumulation and restraining any uplift on the yokes.

NOTE: Full lockout is obtained after 60° of rotation of one operating pipe, and continuous through 300° total rotation (240° after full lockout).



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