Southern States

The Quality Name in High Voltage Products

RDA-1-V
345kV

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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

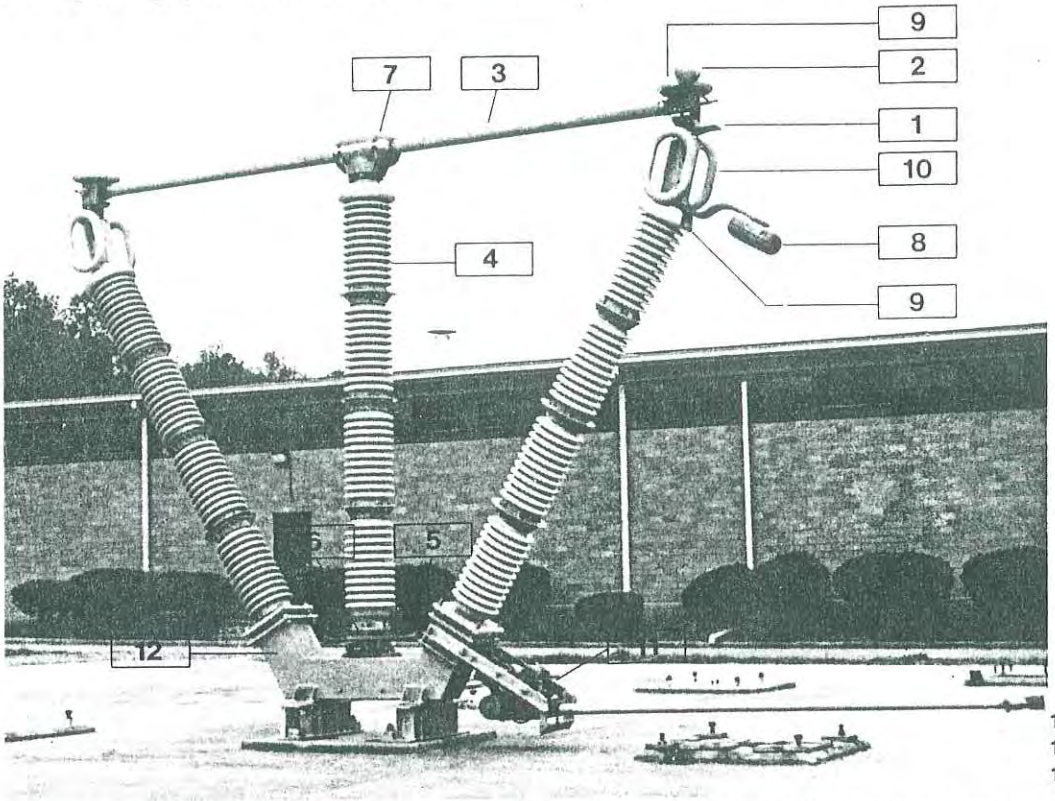
Southern States, LLC ("SSLLC") warrants only to the Warranty Holder (hereinafter defined as the "End User" or the "Immediate Purchaser", as applicable, pursuant to the terms and conditions of this Limited Warranty as set forth below), that the Product identified below will, upon shipment, be free of 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) the expiration of the Warranty Duration period, or (2) the Number of Operations, both as specified in the table below. 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.

Product Purchased Region	Product Installed Region	Warranty Holder	Warranty Duration
U.S and Canada	U.S and Canada	End User	Five (5) Years
All Other Conditions		Immediate Purchaser	Earlier of 1 year from installation or 18 months from shipment

Revised 7/14/15

These instructions give the general procedure for installing and adjusting Southern States RDA-1-V switches. It may be necessary to make adjustments not described in this manual. If any questions should arise concerning the installation or adjustment of this equipment, please call your local Southern States representative, or the factory.



1 - Jaw
2 - Arcing Horns
3 - Switch Blade
4 - Rotating Insulator
5 - Switch Arm
6 - Jack Screws
7 - Blade Operating Assembly
8 - Grounding Switch Jaw
9 - Corona Shield
10 - Corona Ring
11 - Grounding Switch Hinge
12 - Switch Base

Figure 1 - Identification of parts. This switch is equipped with a grounding switch, which is optional. These switches may be installed piece-by-piece on the structure, or assembled on the ground first, then hoisted to the structure as a completely assembled unit. If the latter, the switch base must be bolted down to a firm, stable surface to prevent overturn in both directions. Approximate weight of a single pole, with insulators and grounding switch, is 3900 pounds (1770 kilograms).

Do not change any factory setting on the switch unless directed to in this manual.

FIELD ASSEMBLY:

1. Uncrate the switches, remove the shipping ties, and check for damage in transit. If any damage is found, immediately file a claim with the carrier and notify the factory.
2. Refer to the Operating Mechanism Drawing and mount the switch base in position. Use a level to ensure proper mounting. If the switch base does not sit level, use shims to correct mounting surface irregularities.

Note: The drawings in this manual are for illustration only and may differ in actual appearance from your switch.

3. Mount the insulators, beginning with the center stack, using the bolts specified in the field assembly bolt list. The easiest way to mount the insulators on these switches is to remove the top nuts from the jack screws that support the mounting adaptors, remove the mounting adaptors from the base, and bolt them directly to the bottom of the insulator stack. Then the entire stack can be lifted to the base and slipped down on the jack screw studs. (See Figure 2.)

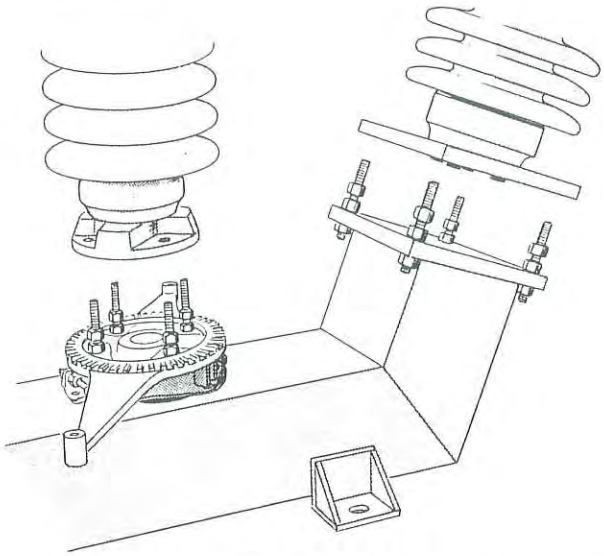


Figure 2 — Insulator mounting.

4. Adjustments to these switches mainly concern getting the insulator stacks properly aligned. This is done with the jack screws that support the adaptors to which the insulators are bolted. The rotating insulator requires special attention to ensure good switch operation. It is necessary that this stack rotate about its axis uniformly; that is, it must not "wobble" as it rotates.

However, due to irregularities in the mounting faces of individual insulator units, it is not unusual for an insulator stack to be out of alignment six inches or more. And while this switch is designed to tolerate a certain amount of misalignment, the rotating insulator should be adjusted so that evident "wobble" is 1/4 inch or less.

The best procedure to achieve this is described on the following page. Refer to figure 4 to determine the center of the rotating insulator, and follow the procedure on the next page to true up the center stack.

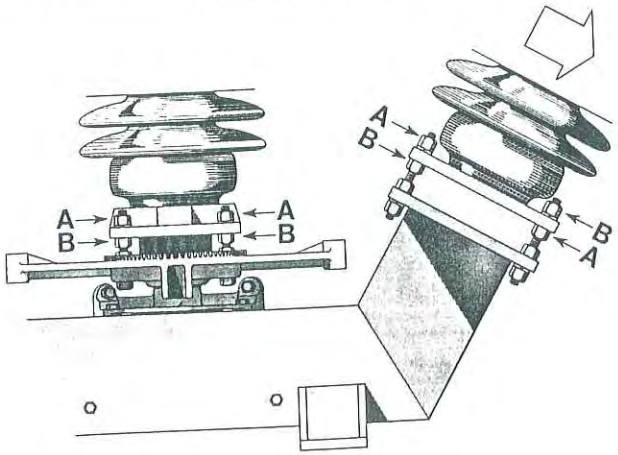


Figure 3 — Jack screw adjustment.

Adjustments are made in pairs, and equally. For example, to tilt the outboard (right hand) insulator in the direction of the arrow, loosen both top nuts "A" and both bottom nuts "A" an equal number of turns, until the desired position is reached. Then tighten all four nuts "B" securely.

To tilt it in the opposite direction, first loosen both top nuts "B" and both bottom nuts "B." Then run both top nuts "A" down and both bottom nuts "A" up an equal number of turns. Be sure to retighten all four nuts "B."

The center (rotating) insulator is adjusted by loosening all four nuts "A." then running nuts "B" up or down as required. Once again, be sure to retighten opposing nuts "A" securely.

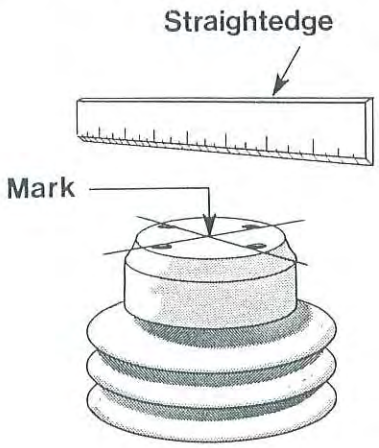
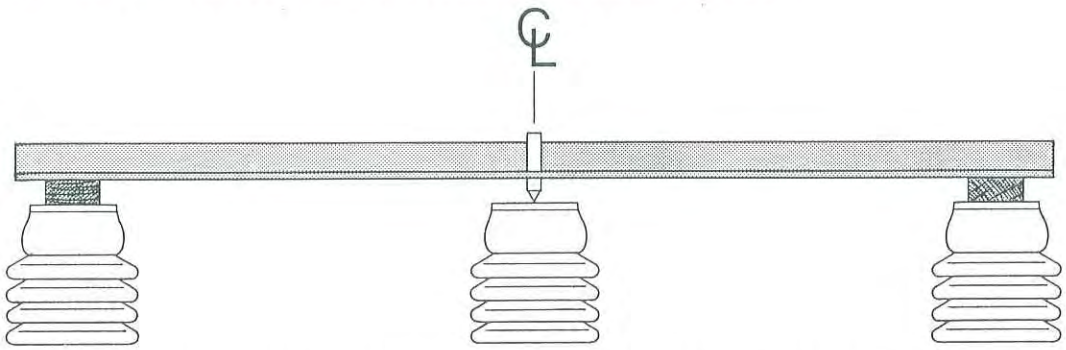


Figure 4 — Find and mark exact center of rotating insulator. See figure 5, next page.

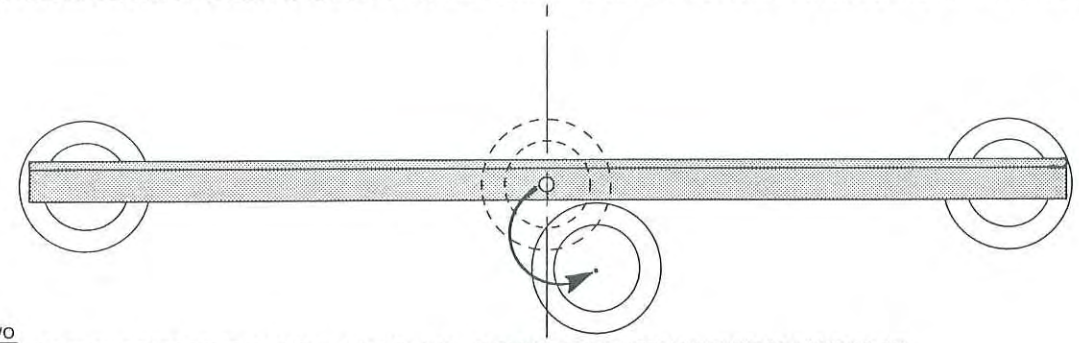
Figure 5 — Adjusting the rotating insulator for concentric rotation.

PREPARATION

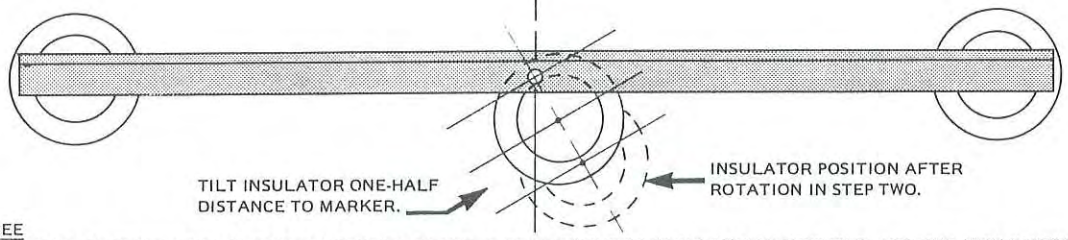
(A) Place a mark on the exact center of the rotating insulator. (B) Make a marker of any convenient material such as metal angle or lumber. (C) Make a sharp pointer and attach it to the center of the marker. Place the marker over the center of the rotating insulator in such a manner that it can be used as a reference point but does not drag on the insulator top during rotation. Blocks of wood, etc. can be used on the ends to compensate for sag. The marker should be free to be repositioned, as described below.



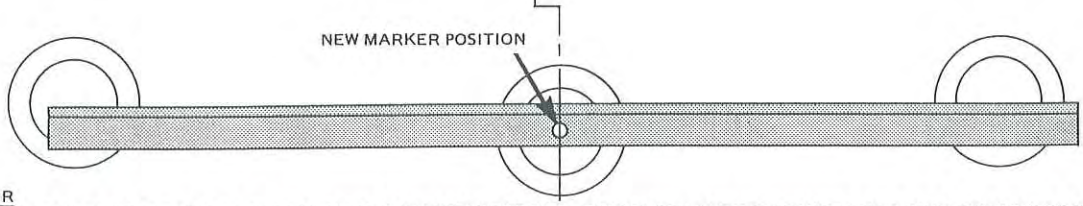
STEP ONE
ROTATE THE INSULATOR UP AGAINST A BEARING STOP, AND POSITION THE REFERENCE POINT OVER THE CENTER OF THE INSULATOR TOP.



STEP TWO
ROTATE THE INSULATOR TO THE OPPOSITE BEARING STOP. OBSERVE FOR ECCENTRIC ROTATION ("WOBBLE").



STEP THREE
IF DURING ROTATION THE INSULATOR HAS WOBBLED, LEAVE IT AGAINST THE BEARING STOP IN STEP TWO. USE THE JACK SCREWS THAT MOUNT THE ROTATING INSULATOR TO THE BEARING TO TILT IT BACK ONE-HALF THE DISTANCE TO THE REFERENCE POINT ON THE MARKER.



STEP FOUR
ROTATE THE INSULATOR BACK TO THE BEGINNING POSITION (STEP ONE). REPOSITION THE REFERENCE POINT OVER THE CENTER OF THE INSULATOR. REPEAT THE LAST THREE STEPS UNTIL THE INSULATOR ROTATES TRUE.

THIS METHOD WORKS WHETHER THE ROTATING INSULATOR IS OUT OF ADJUSTMENT AXIALLY, LATERALLY, OR ANY COMBINATION IN BETWEEN.

Once the center insulator rotates true, do not disturb the settings of its jack screws. Any further adjustments will be made with the jaw insulator jack screws.

5. Mount the jaw adaptors. Two 1/2" spacers are used between the corona shield and the adaptor. If a grounding switch jaw is to be mounted, use only one spacer (placed between the shield and the grounding switch jaw bracket), and discard the extra spacer. (See figure 6.)

TIMESAVING TIP for mounting live parts when hardware must be placed between the insulator and the live parts: Use two studs of sufficient length to allow later removal (easily made by cutting the heads off two bolts) to align the parts. Bolt the live parts down with mounting bolts, using the two free holes; then remove the studs and screw in the other two bolts.

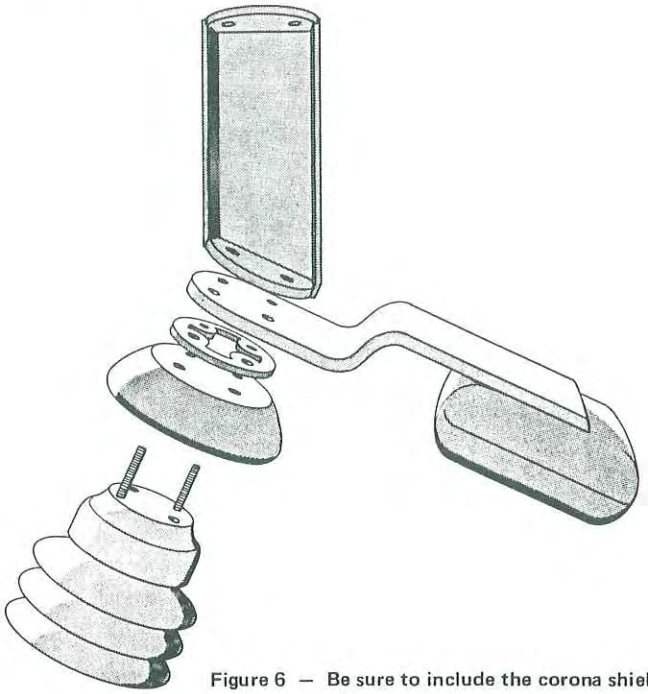


Figure 6 — Be sure to include the corona shield and the proper number of spacers.

6. Mount the jaws as indicated in figure 7. This would also be a convenient time to mount the arcing horns, jaw corona shield, and corona rings.

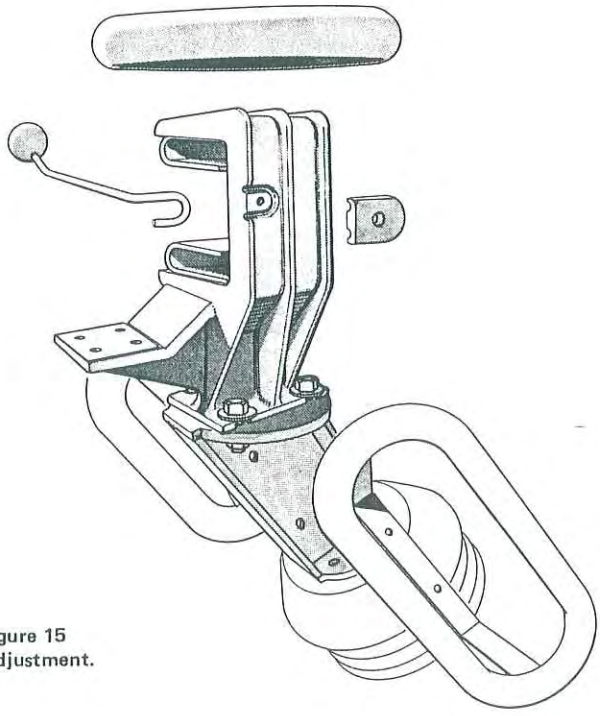


Figure 7 — See figure 15 for arcing horn adjustment.

7. Mount the blade assembly, ("watermelon,") as shown in figure 8. *Note: The blade assembly must be oriented on the center stack so as to allow an additional 45 degrees of stack rotation after the blade tips enter the jaws. This is essential, as it provides blade rotation into the contacts, which establishes high contact pressure.*

The easiest way to mount the blade assembly is to remove the top insulator unit (after precisely match-marking it with the next unit down) and bolt the parts together on the ground, where alignment will be more convenient. Then hoist the blade mechanism assembly and top insulator section into position as an assembled unit and reattach the insulator sections. This will eliminate having to align three non-captive parts in the air.

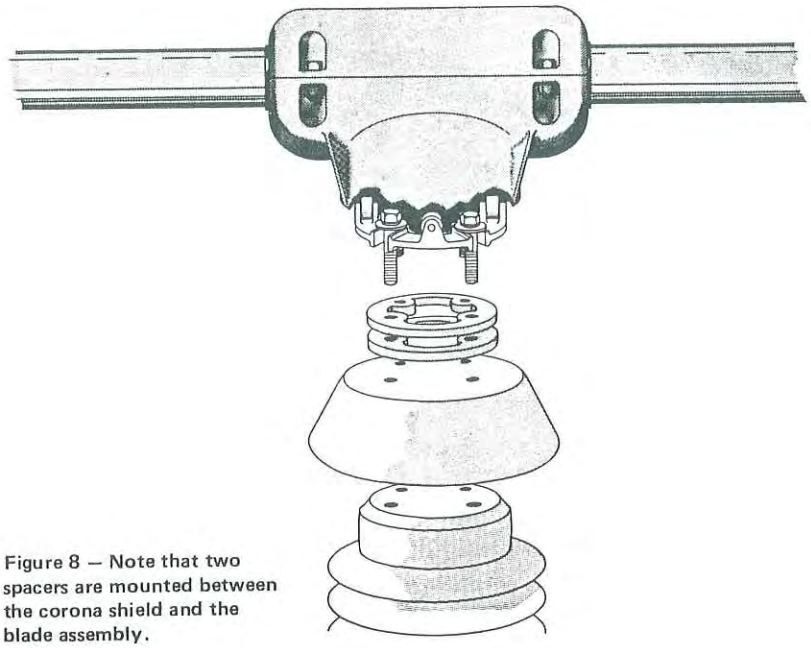


Figure 8 — Note that two spacers are mounted between the corona shield and the blade assembly.

8. Carefully close the switch, checking for proper contact engagement described below. *NOTE: Final adjustment usually cannot be made to these switches until the conductors are attached. Therefore, the conductors should be bolted on before proceeding further. If this is not possible, be sure to recheck the contact engagements described in A through D below after the conductors are tied on and before energizing the switch.*

If the switch has been assembled on the ground, no further work should be attempted until it is mounted on the structure.* At this time, secure the switch blade closed, using wire or other suitable ties around both jaws, and hoist the switch to the structure. Attach slings to the SWITCH BASE, ONLY - not to the insulators or live parts.

*If equipped with a grounding switch, mount it in position also and tie its blade securely closed before lifting. See page 11 for attachment of this equipment.

Proper Contact Engagement:

A. The blade tips must hit the stops in the jaws simultaneously. Misalignments can be corrected by tilting the jaw insulator stacks with the jack screws.

B. The blade tips should enter the jaws centrally, without dragging on either contact surface. Misalignments can be corrected by jacking the jaw up or down with the jack screws.

C. The silver of the blade tips should be centered on the silver of the jaw contacts: Misalignment can be corrected by tilting the jaws toward or away from the center stack, using the jaw jack screws.

D. Although the switch is fully closed and will have adequate contact pressure if the blade has rotated to within plus or minus 5^{o} of perpendicular in the contacts, every effort should be made to get the tips as nearly vertical in the contacts as possible. Adjust the bearing stops as required.

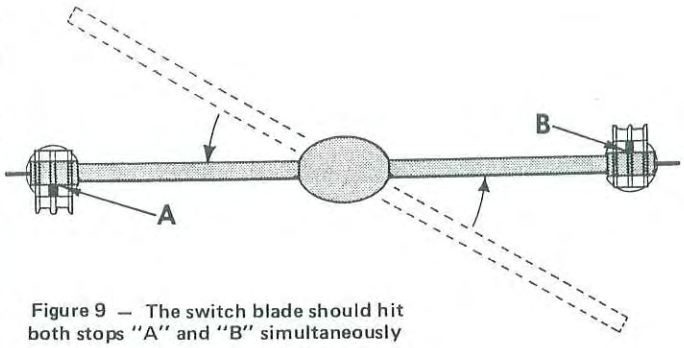


Figure 9 — The switch blade should hit both stops "A" and "B" simultaneously

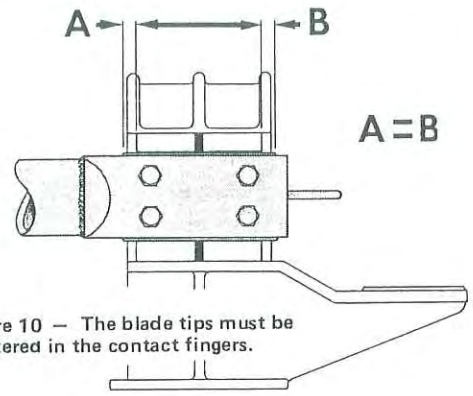


Figure 10 — The blade tips must be centered in the contact fingers.

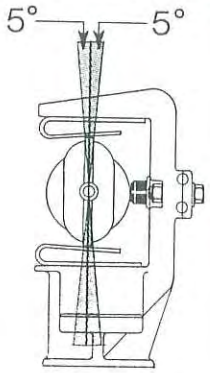


Figure 11

E. After the above contact engagement adjustments are completed, refer to figure 12 and shorten both jack screws "A" by four flats, and lengthen both jack screws "B" by four flats on both jaw stacks. This procedure establishes proper preload against insulator deflection, and is essential for switch operation. Note the relationship of the parts in figure 12; the jaws must be loaded toward the blade.

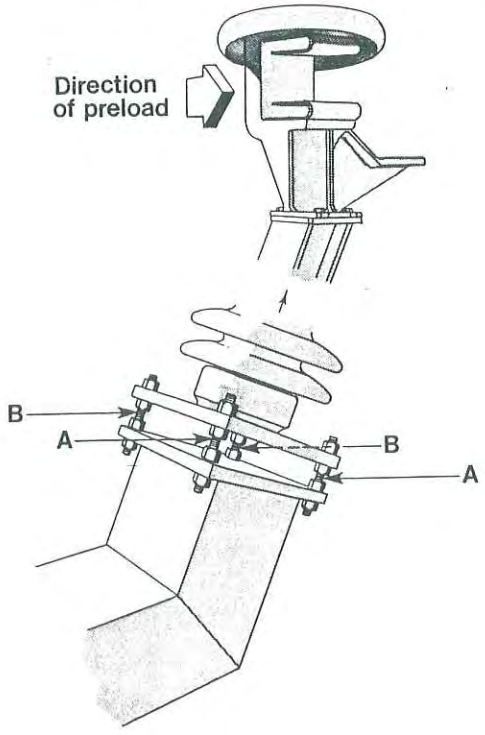


Figure 12

9. Occasionally, uneven or slightly misaligned insulator caps will make proper contact adjustment impossible to achieve, using jack screws alone. This condition could appear in two places: One, a jaw could be misaligned horizontally, preventing full contact with the complete length of the blade tip, as suggested in figure 13. To correct, place shims between the hardware mounting surfaces as needed to produce full, even contact between all contact fingers and the entire length of the blade tip.

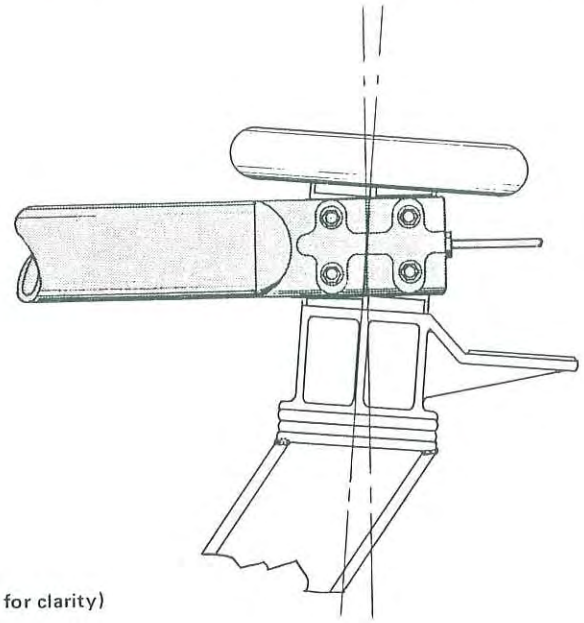


Figure 13 - Jaw misalignment (exaggerated for clarity)

10. Also, even though the center insulator is rotating true, the watermelon could be misaligned, causing one blade tip to be high, the other low, beyond the range of jack screw adjustment. To correct this, do not disturb the rotating insulator adjustment, but rather simply place shims between the rotating insulator cap and the watermelon mounting plate (figure 14).

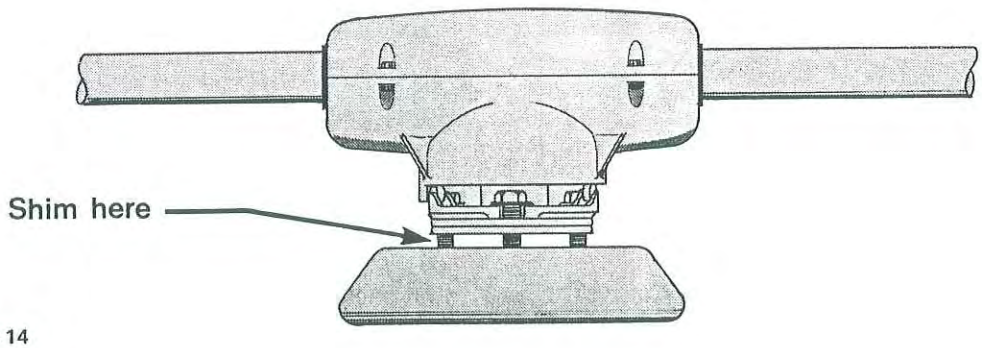


Figure 14

11. The arcing horns should touch *lightly* throughout their stroke. Arcing horns rubbing together with excessive pressure can cause the blade to rotate outside the contacts, causing switch malfunction. Bend the stationary horn as required to achieve enough pressure for contact, but not so much as to cause binding.

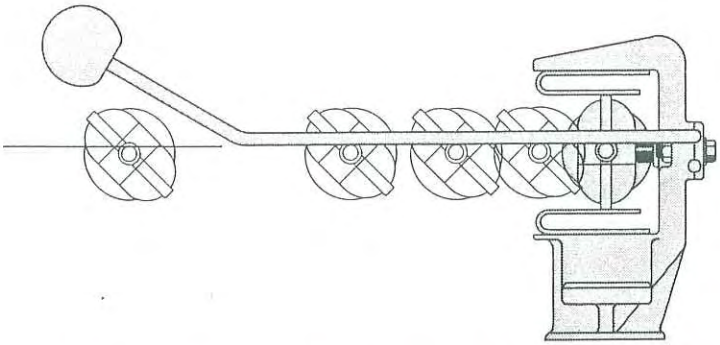


Figure 15 — Correct arcing horn adjustment has horn parallel to movement of the blade tip, allowing light contact through full length of engagement. Blade arcing horn goes under jaw horn.

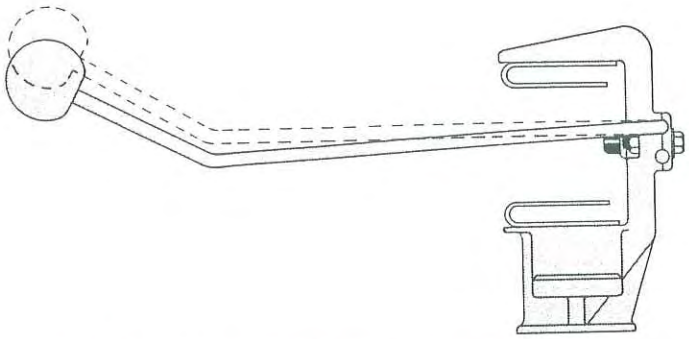


Figure 16 — Improper adjustment allows arcing horn to droop into blade path. *Could cause switch malfunction.*

12. When all adjustments are made, install the operating mechanism as directed on the following pages.

Operating Mechanism

This switch is usually opened and closed as a three-phase unit by one operator, which may be either manual or motor driven. The best way to install operating mechanisms of this type is to install and adjust the mechanism of the main pole first (the one with the auxiliary switch arm), then attach the interphase pipes and adjust the other two poles. This will eliminate trying to coordinate and adjust all three poles at the same time.

I. Included with every switch is an Operating Mechanism Drawing. Study this drawing carefully, and with all switch poles closed install mounting brackets, bushings, manual operating devices (if used), vertical pipe, adjustable crank arm, etc. *Be sure that pipe collar above the vertical bearing supports the full weight of the vertical pipe.*

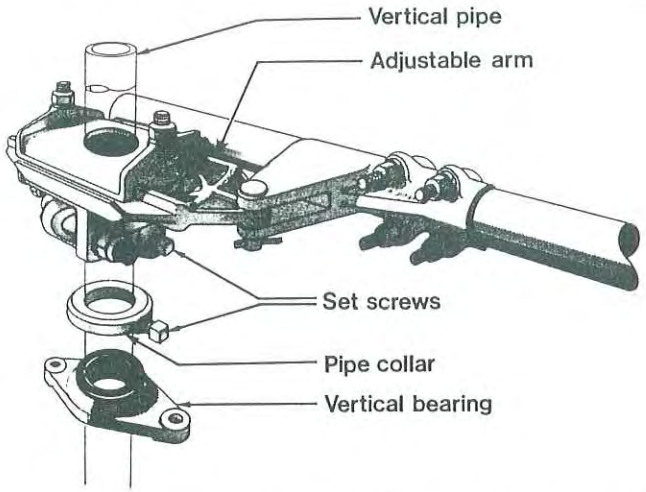


Figure 17 — Adjustable arm assembly. Pipe collar must support full weight of pipe.

IMPORTANT: On some installations you will find self-piercing set screws in the pipe clevises. These screws should be tightened to only grip the pipe during initial adjustments: Do not pierce the pipe until directed to do so. For threaded clevises, see the last page of these instructions.

II. 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.

III. If a motor operator is to be used, at this point refer to the motor operator installation instructions for mounting and trial operations.

IV. Place all switch poles in the fully closed position.

V. ADJUSTMENT: *(If motor operator is used DO NOT use electrical operation until all line switch adjustments are made.)*

1. The adjustable arm should travel 180° from toggle closed to toggle open. Manually test operate.
2. 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.

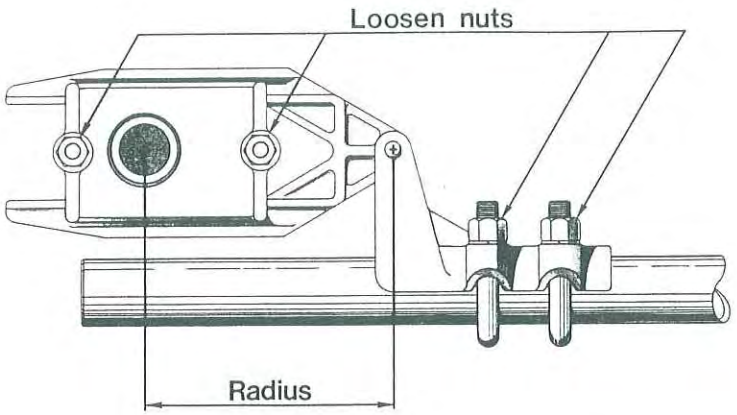


Figure 18 – Adjustable arm assembly.

3. If the switch is fully open before the full travel of the mechanism, 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 (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.

4. 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.)

VI. MAINTENANCE

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

GROUNDING SWITCH INSTALLATION

1. If the line switch is equipped with a grounding switch, refer to Figure 19 and mount the grounding switch hinge to the flanges on the line switch base as shown.

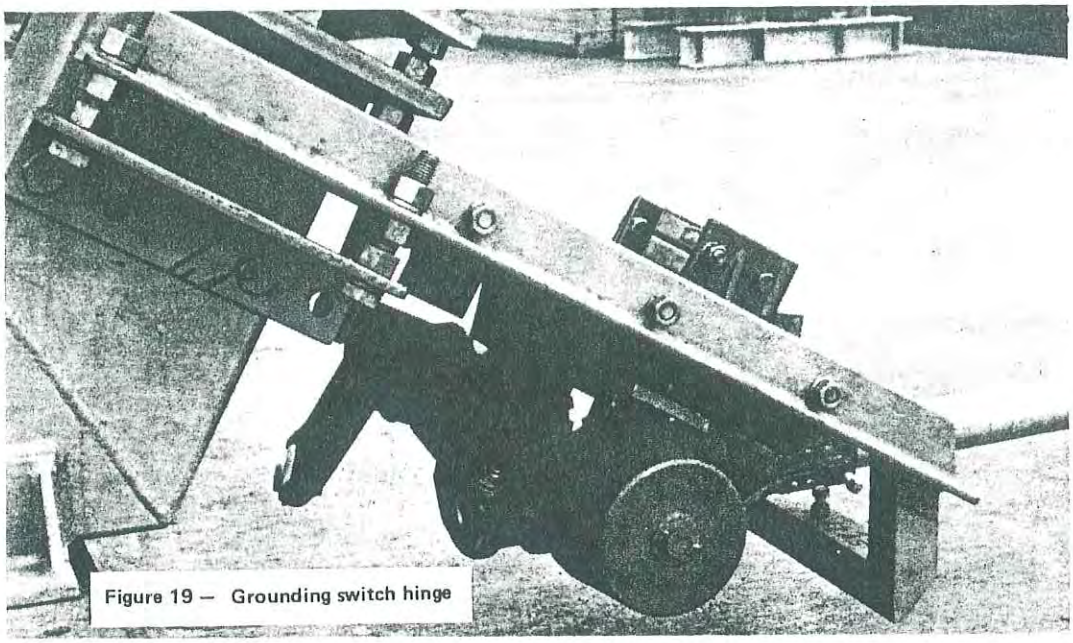


Figure 19 — Grounding switch hinge

2. Insert the grounding switch blade into the blade socket. Rotate the blade in its socket so that when the grounding switch is fully closed the blade tip will be perpendicular in the jaw contact fingers as shown in Figure 20.

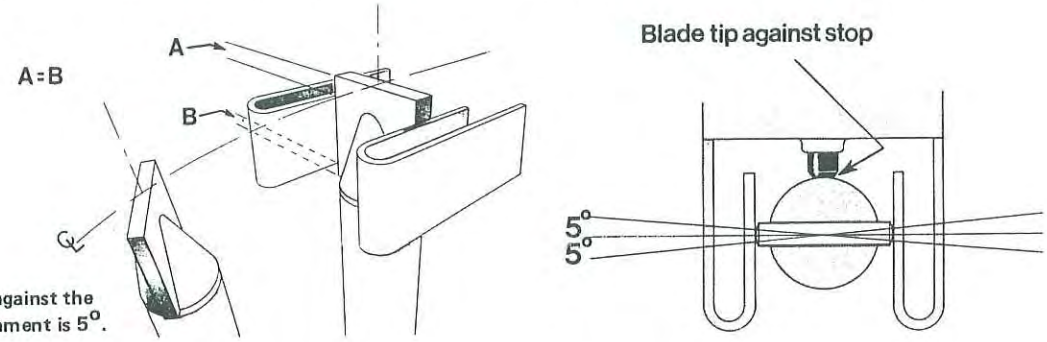


Figure 20 — The blade tip must be firmly against the stop in the jaw. Allowable rotation misalignment is 5°.

3. Slide the blade up or down in its socket as required to achieve equal lengthwise contact of the blade tip across the jaw contact fingers.
   When the requirements of Step 2 and Step 3 are met, tighten the blade socket clamping bolt securely, but do not drive in the set screw, yet.

4. Make sure the blade tip enters the jaw in the center, without dragging on either side. Also make sure the blade tip comes to rest firmly against the stop in the jaw. To adjust for these two requirements, use the jack screws to tilt the entire grounding switch hinge as needed.
   IMPORTANT: Use the jack screws that support the grounding switch hinge — not the jack screws that support the insulator stack.

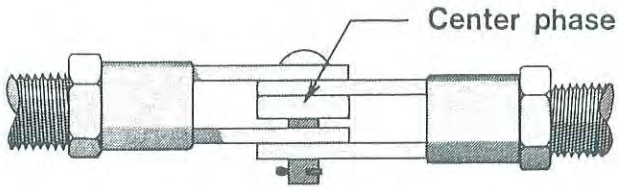
5. After the adjustments in Step 4 are made, recheck the adjustments made in Steps 2 and 3. When everything is properly adjusted, drive in the self-piercing set screw in the blade socket.

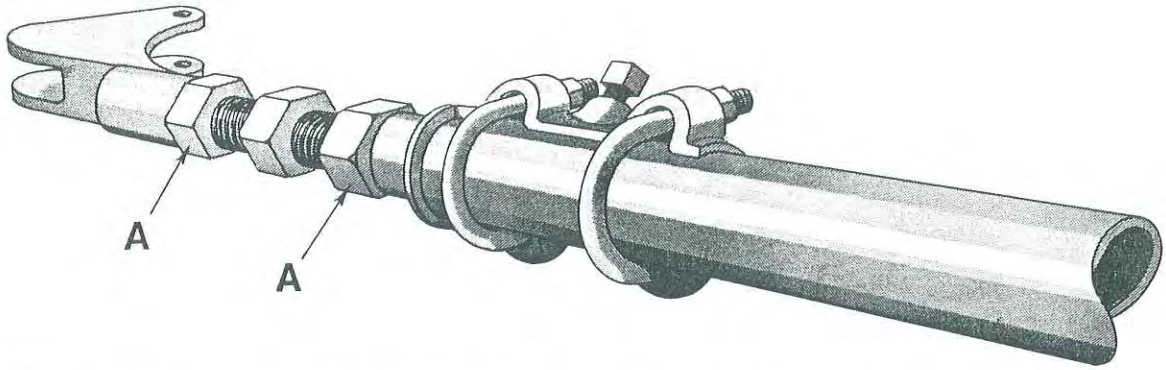
6. Refer to the Operating Mechanism Drawing and install all operating mechanism components. The grounding switch operating mechanism is adjusted in exactly the same manner as the line switch's, which is described on page 9 and 10.

General instructions for threaded clevises

Southern States

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).



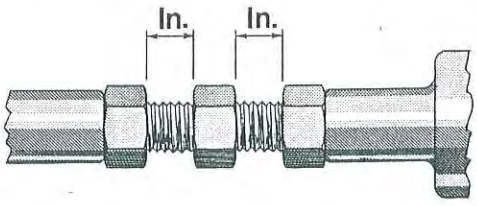


Operating mechanism adjustments consist mainly of incremental lengthenings and/or shortenings of the pipes that connect the switch arms together. To make these adjustments, simply loosen both jam nuts "A" and screw the stud in or out as required. Be sure to retighten both jam nuts securely.

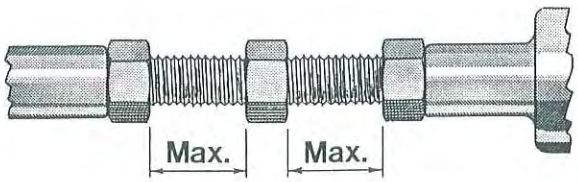
CAUTION! DANGER: Do not screw the stud out of the clevises. This could cause the pipe to fall, resulting in serious injury to personnel below.

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".

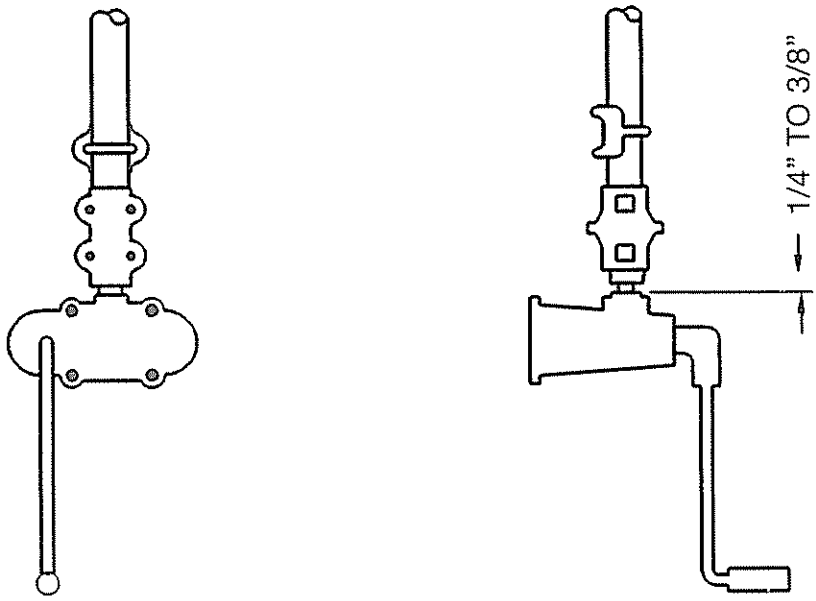


Southern States

Installation & Adjustment Procedures

If a Manual Geared Operator is furnished:

- Operator Handle is factory set to rotate either clockwise or counter-clockwise to open the switch.
- Operator Handle should hang vertically and free in both the open and closed positions – This will permit insertion of a customer furnished padlock.



Type HOGO Geared Operator Installation

- Position the Floating Coupling approximately 1/4-Inch to 3/8-Inch above the operator.
- The Pipe Collar above the Vertical Bearing must support the entire weight of the Vertical Operating Pipe. Do not allow the manual or electrical motor operator housing to bear any weight.
- The maintenance-free operator is filled with grease and sealed at the factory.

If an Electrical Motor Operator is furnished, refer to separate Instruction Manual.

Place all switch poles in the fully closed position.

Caution: If furnished with a Motor Operator, **do not** use electrical operation until all switch adjustments are complete.

The Adjustable Arm setting indicated on the Operating Mechanism Drawing is a calculated dimension. Adjust as required for exact setting.

Manually test operate.

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