



Southern
States, Inc.

The Quality Name in High Voltage Switching

TYPE RDC, RDA, RDA-1
69 kV -230 kV
All Ampere Ratings

INSTALLATION &

INSTRUCTION

MANUAL

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 (“SLLC”) 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 SLLC 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 SLLC. 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. SLLC shall, upon prompt written notice from the Warranty Holder, correct a nonconforming Product by repair or replacement at the sole discretion of SLLC of the nonconforming Product or any part or component of a nonconforming Product necessary in SLLC’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 SLLC’s liabilities and responsibilities hereunder. SLLC’s duty to perform under this limited warranty may be delayed, at SLLC’s sole option, until SLLC has been paid in full for all products purchased by the Warranty Holder. No such delay will extend the Warranty Period. If SLLC does not make such repair or replacement, SLLC’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 SLLC. This Limited Warranty will not apply to any Product that has been subjected to improper or abnormal use of the Product. SLLC has no responsibility to repair or replace any Product or component thereof manufactured by another party, but SLLC will assign, to the extent assignable, to the Warranty Holder any manufacturers’ warranty that applies to products and components not manufactured by SLLC.

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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

Southern States switches designated RDC, RDA, and RDA-1 in the 69 through 230 kV range come in current ratings from 600 up to 3000 continuous amperes. The illustration below shows the basic design configuration of these switch lines; however, individual differences may exist between different models due to different mounting schemes, insulator types and sizes, and customer requirements. But regardless of their appearance, all RDC, RDA, and RDA-1 switches share basic mechanical details, and the installation procedure is the same for all.

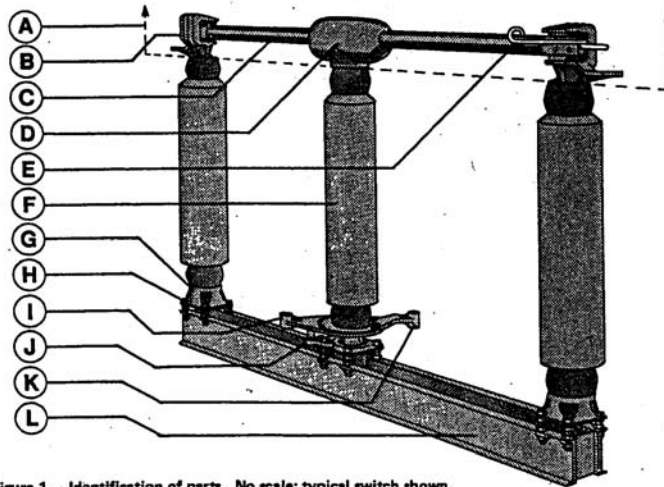


Figure 1 - Identification of parts. No scale; typical switch shown.

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

- | | |
|---|---|
| A - Live Parts (Parts above the insulators), which include: | J - Bearing Stop(s) |
| B - Switch Jaw(s), | K - Auxiliary Arm (Not used on all installations. When supplied, will be on one phase of each three-phase switch, only. See the Operating Mechanism Drawing.) |
| C - Switch Blade, | |
| D - Hinge Mechanism, and | |
| E - Arcing Horn(s) | |
| F - Rotating Insulator | L - Switch Base (When lifting or handling, make sling attachments to the Switch Base, only - not to the insulators or the live parts.) |
| G - Mounting Adaptor(s) | |
| H - Jack Screw(s) | |
| I - Switch Arm | |

Since these switches are normally shipped without insulators, installation consists of removing the live parts from the base, mounting the base on the structure, mounting the insulators to the base, and mounting the live parts to the insulators.

These switches may be assembled on the structure, or assembled on the ground and hoisted to the structure according to preference. When assembling switches on the ground, be sure the base rests on a firm, level surface. Metal sawhorses, or their equivalent, may have to be constructed for this purpose.

When hoisting switches, **LIFT BY THE SWITCH BASE ONLY.**

Before mounting the switches on the structure, refer to the Operating Mechanism drawing, because there may be differences in the switch poles that require that they be mounted in specific locations.

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

These instructions give the general procedure for installing and adjusting Types RDC, RDA, and RDA-1 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.

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. Using any convenient means, match mark the lower parts of the hinge assembly with the switch arm and the rotating hub to ensure correct re-assembly as shown in figure 2. Also match mark one blade tip with its jaw.

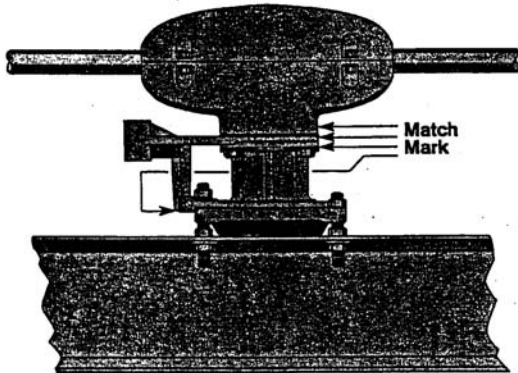


Figure 2-A 115-161 kV (89 kV normally uses single channel base.)

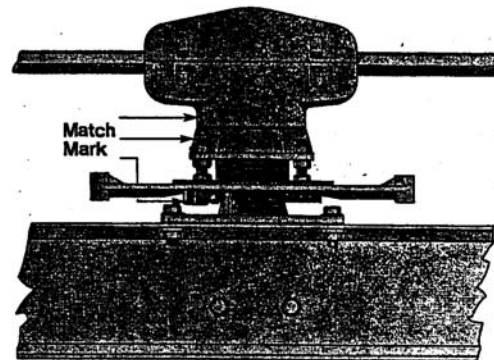


Figure 2-B 230 kV

3. Rotate the switch arm to relieve the contact pressure on the switch blade. Remove the live parts from the adaptors and save the bolts for re-use (IF they are of a type specified on the Unit Assembly Drawing for insulator mounting — galvanized, stainless steel, or bronze).
NOTE: Some poles may have an auxiliary switch arm. Check the Op. Mech. drawing for proper adjustment of this arm.
4. Mount the insulators as indicated in figure 3 using the bolts specified in the field assembly bolt list (SF Drawing). Be sure that the match marks made earlier line up. Check the Unit Assembly drawing; spacers may have to be discarded if a grounding switch is used.

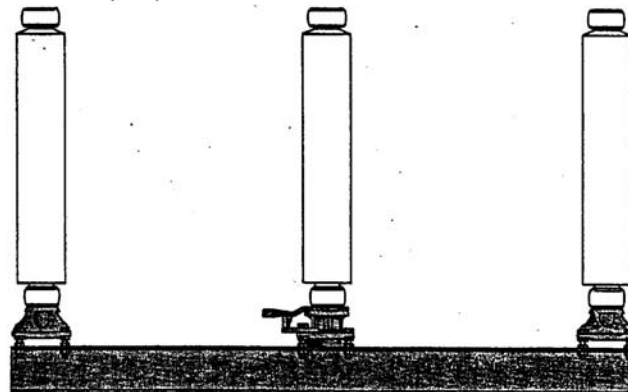


Figure 3

5. Use a plumb bob or level and true up the end insulators. It is important that they be perpendicular to the base in both planes. Use the jack screws to level these stacks. (Due to the overhang of the insulator skirts, it will be necessary to use a piece of scrap metal or wood to extend the plumb bob string beyond the skirts.) See figure 4 for jack screw adjustments procedure.

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 best procedure to do this is described below.

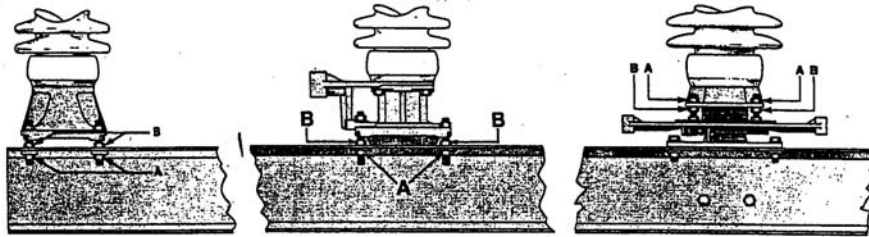


Figure 4

To adjust the insulator stack, first loosen all four nuts (A). Tilt the insulator to the required position by screwing up or down on nuts (B). Retighten nuts (A).

Note: When adjusting jack screws it is important that the actual height of the insulator remain the same. To do this, adjust opposite screws equally; that is, run one nut up a certain number of turns, and the other one down the same amount of turns. By doing this, the insulator stack will remain at its original height, but its angle of tilt will change.

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 several inches. 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.

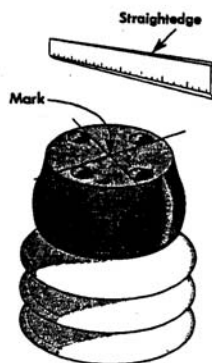


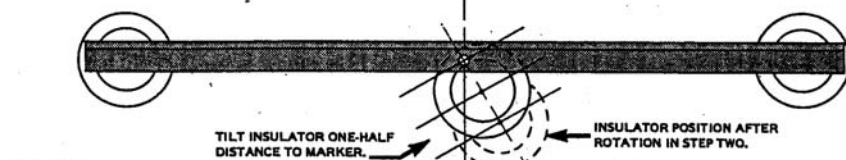
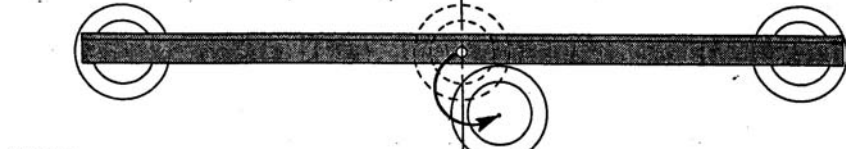
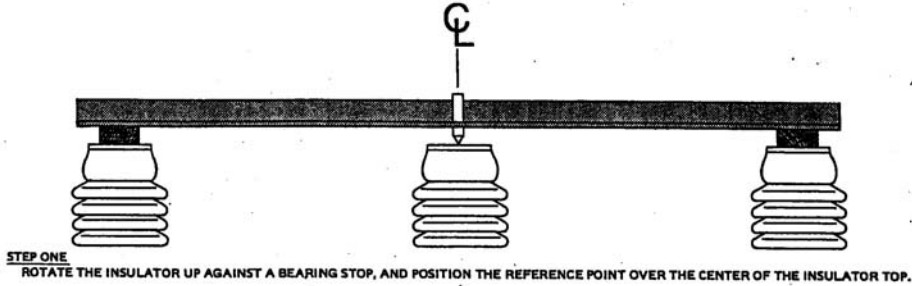
Figure 5-A

Find and mark exact center of rotating insulator. See figure 5 next page.

Figure 5 — Adjusting the rotating insulator for concentric rotation (for switches rated 230 kV only. For 161 kV and below, use levels or plumb lines to true the rotating insulator.)

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.



Once the center insulator rotates true, do not disturb the settings of its jack screws. Any further adjust...

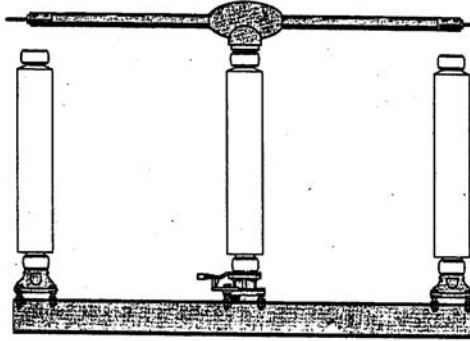
6. Mount the hinge and blade assembly as shown in figure 6. Be sure that the match marks made earlier are aligned. The jaws also may be mounted at this time.

NOTE: If applicable, at this time also mount accessories such as: grounding switch jaw, quick break device, outriggers, etc. as shown on the Op. Mech. drawing. Use the spacers supplied to maintain equal height of the live parts on the rotating and the stationary insulators.

Figure 6

FIRST make sure the match marks made earlier are all aligned.

THEN mount the blade assembly. Again, make sure the match marks made earlier are aligned.



Proper Contact Engagement

7. 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.*

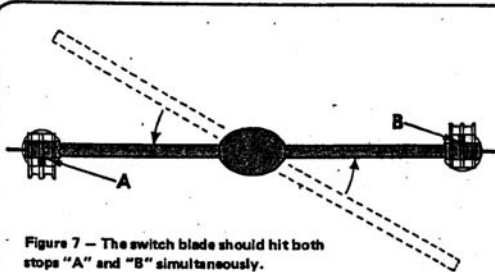


Figure 7 - The switch blade should hit both stops "A" and "B" simultaneously.

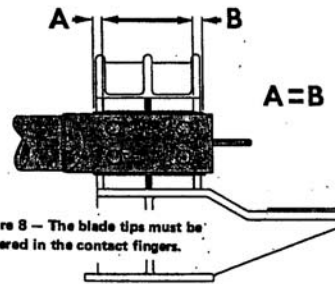


Figure 8 - The blade tips must be centered in the contact fingers.

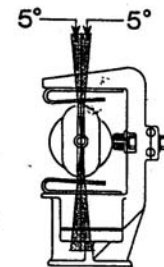


Figure 9

- 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° 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.

8. If the switch has been assembled on the ground, at this time mount it on the structure. **LIFT BY THE SWITCH BASE ONLY.**

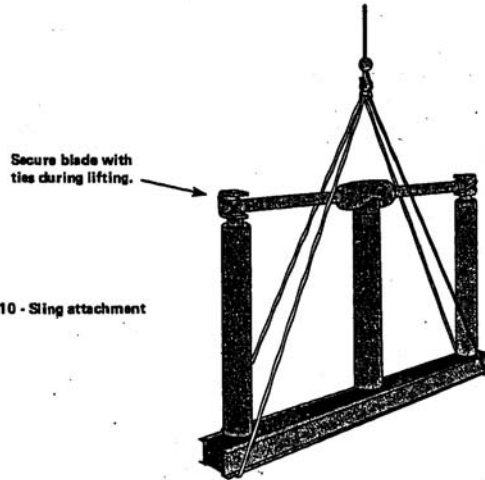


Figure 10 - Sling attachment

9. NOTE: Final adjustment usually cannot be made on these switches until the conductors are attached, because conductor loads often pull tall insulator stacks several inches out of plumb. Therefore, if possible, install the conductors at this time to avoid the possibility of having to readjust the switch later. If the adjustments described in step 7 were made while the switch was on the ground, carefully check contact engagement after the switch is bolted to the structure and the conductors are attached.
10. Install the arcing horn on each jaw as shown in figure 11. The 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. (See Figures 12 and 13.)

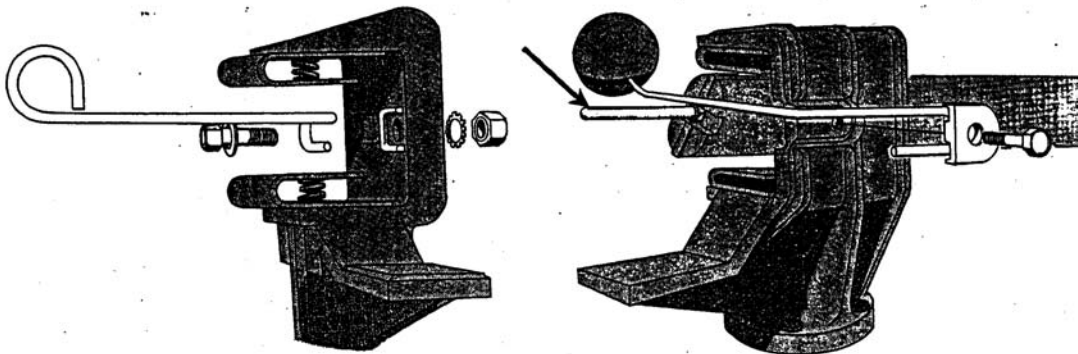


Figure 11 - Arcing horn attachment. Blade arcing horn (arrow) goes under jaw horn.

Arcing Horn Adjustment:

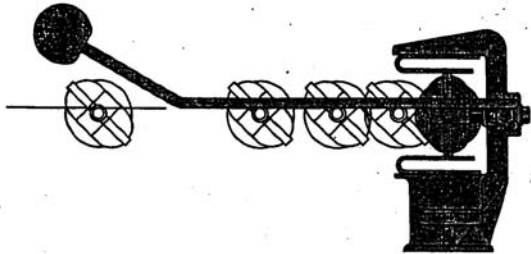


Figure 12 - Correct arcing horn adjustment has horn parallel to movement of the blade tip, allowing light contact through full length of engagement.

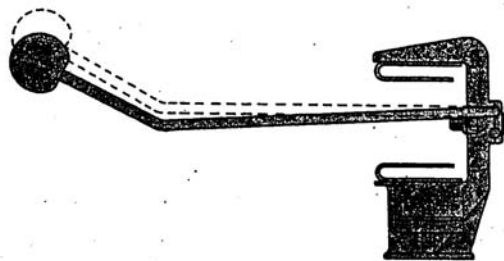
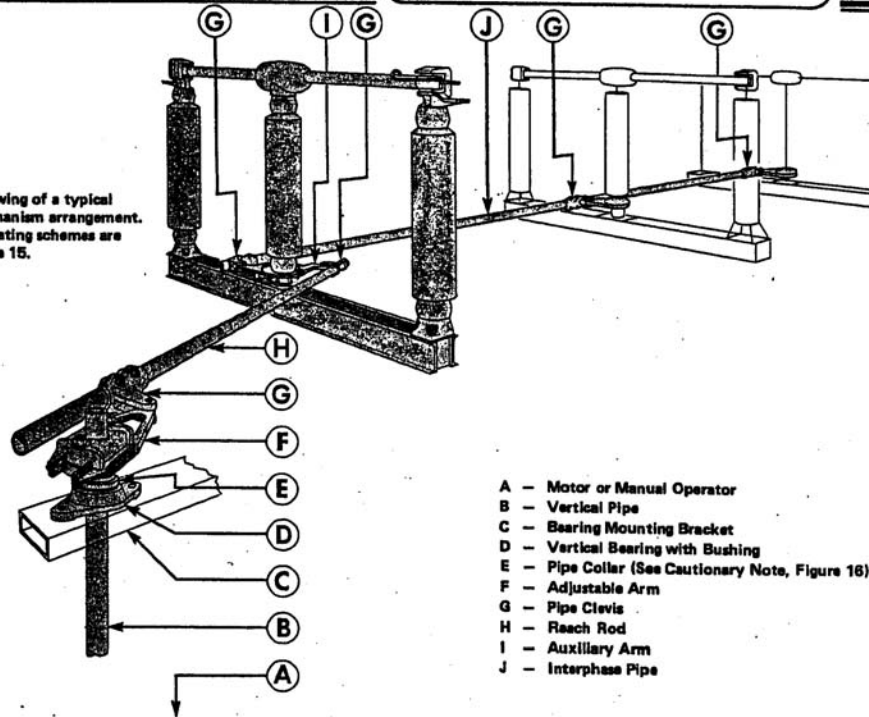


Figure 13 - Improper adjustment allows arcing horn to droop into blade path. Could cause contact overheating.

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

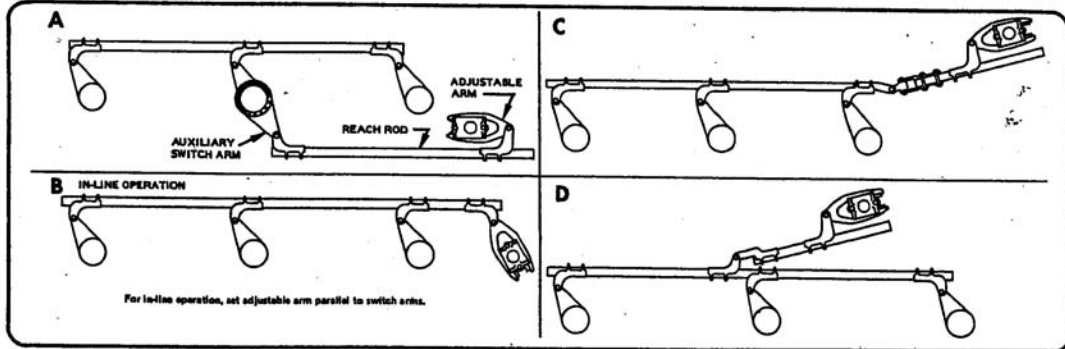
Operating Mechanism

Figure 14 - Schematic drawing of a typical operating mechanism arrangement. Alternate operating schemes are shown in figure 15.



- A - Motor or Manual Operator
- B - Vertical Pipe
- C - Bearing Mounting Bracket
- D - Vertical Bearing with Bushing
- E - Pipe Collar (See Cautionary Note, Figure 16)
- F - Adjustable Arm
- G - Pipe Clevis
- H - Reach Rod
- I - Auxiliary Arm
- J - Interphase Pipe

FIGURE 15



- I. Included with every switch is an Operating Mechanism Drawing (Op. Mech. 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, reach rod, and interphase pipe. *Be sure that pipe collar above the vertical bearing supports the full weight of the vertical 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.

NOTE: When a switch pole is equipped with an auxiliary arm, the best method for operating mechanism attachment is to wait until after this pole is completely adjusted before installing the interphase pipe. (This will eliminate trying to coordinate and adjust all three poles at once.)

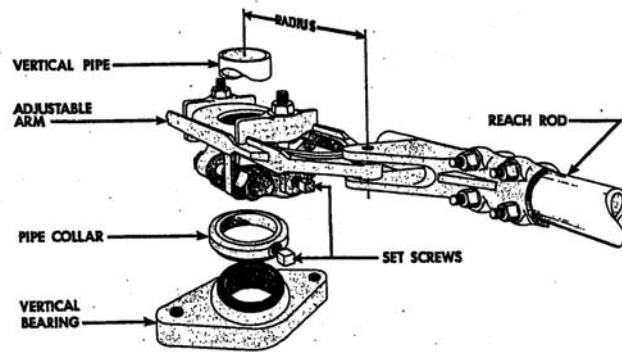


Figure 16 - Adjustable arm assembly. CAUTION: Pipe collar must support full weight of pipe.

- II. After mounting all operating mechanism components, use any convenient means to match mark all clevis connections, adjustable arm, and manual operator attachment 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.

Op. Mech. Adjustment

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 in figure 17.
 - 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.

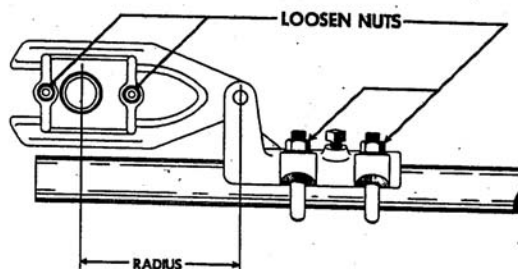


Figure 17

3. 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 in figure 17.
 - 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 inter-phase 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.)

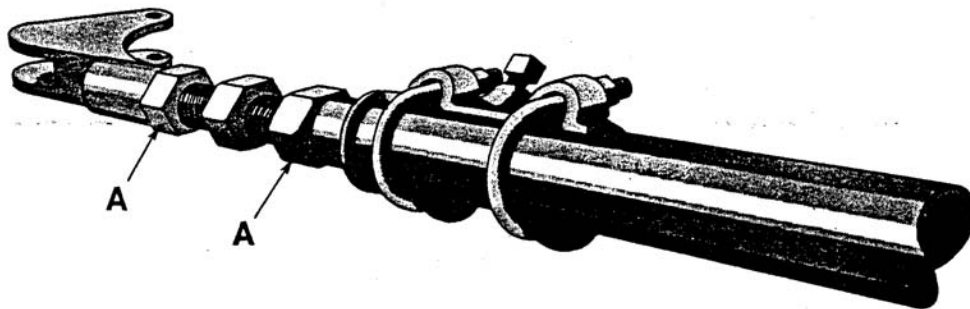
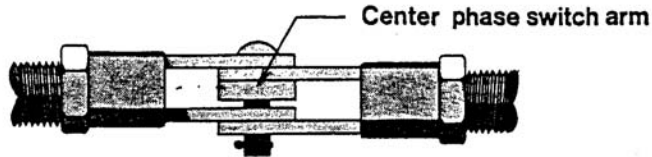
VI. MAINTENANCE

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

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).

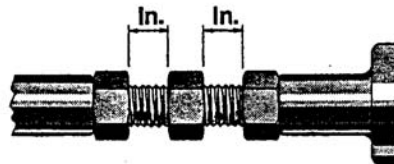


Operating mechanism adjustments consist mainly of incremental lengthenings and/or shortenings of the pipes that connect the switch arms together. To make these adjustments, simply loosen both jam nuts "A" and screw the stud in or out as required. Be sure to retighten both jam nuts securely.

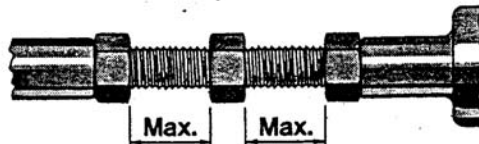
CAUTION! DANGER: Do not screw the stud out of the clevises. This could cause the pipe to fall, resulting in serious injury to personnel below.

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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