[redacted]

Types **RDA & RDA-1**

Double End Break
Disconnect Switch

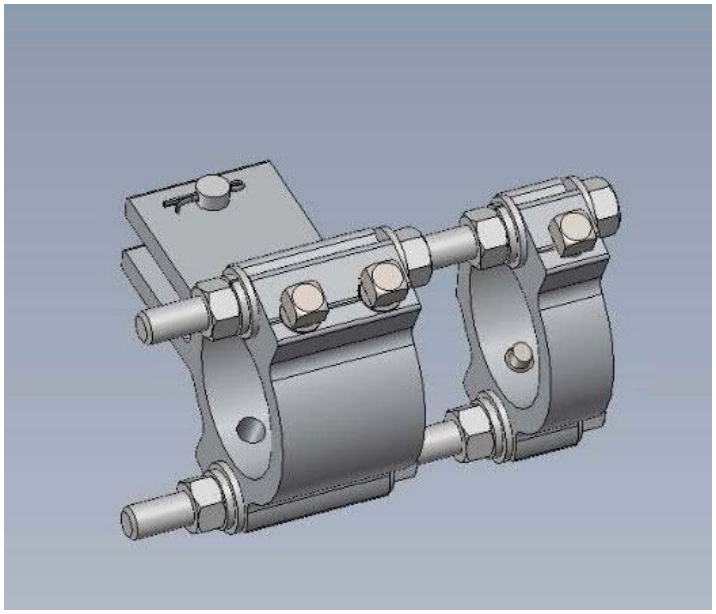
69 kV - 230 kV,
All Ampere Ratings

INSTALLATION & INSTRUCTION MANUAL

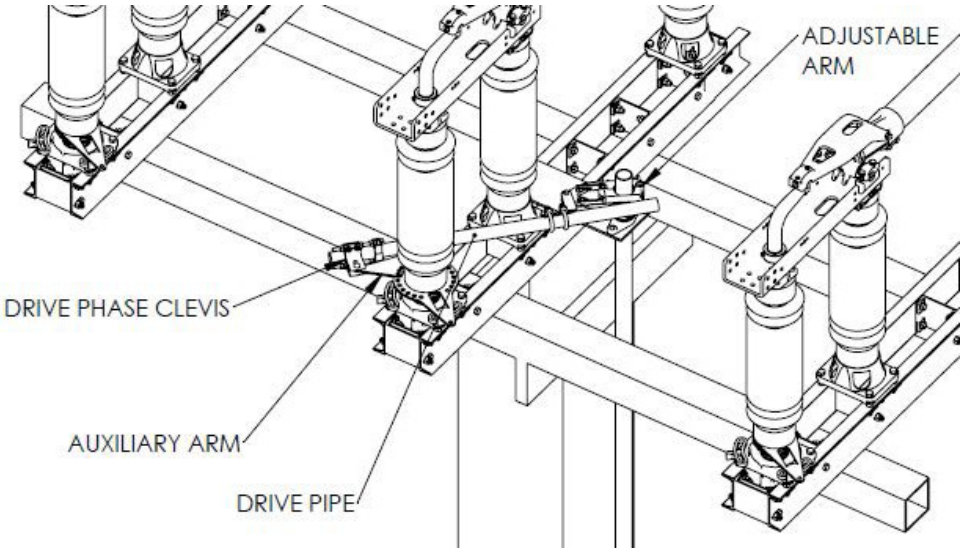
The Quality Name in High Voltage Switching

ATTENTION:

Southern States will begin supplying a portion of new operating mechanism designs with Rapid-Set clevises for orders designed after 9/1/23. If your Operating Mechanism print calls for Rapid-Set clevises (see image below for an example), please utilize the instructions on the following pages for all linkage adjustments. If not, please adhere to the standard instructions provided.

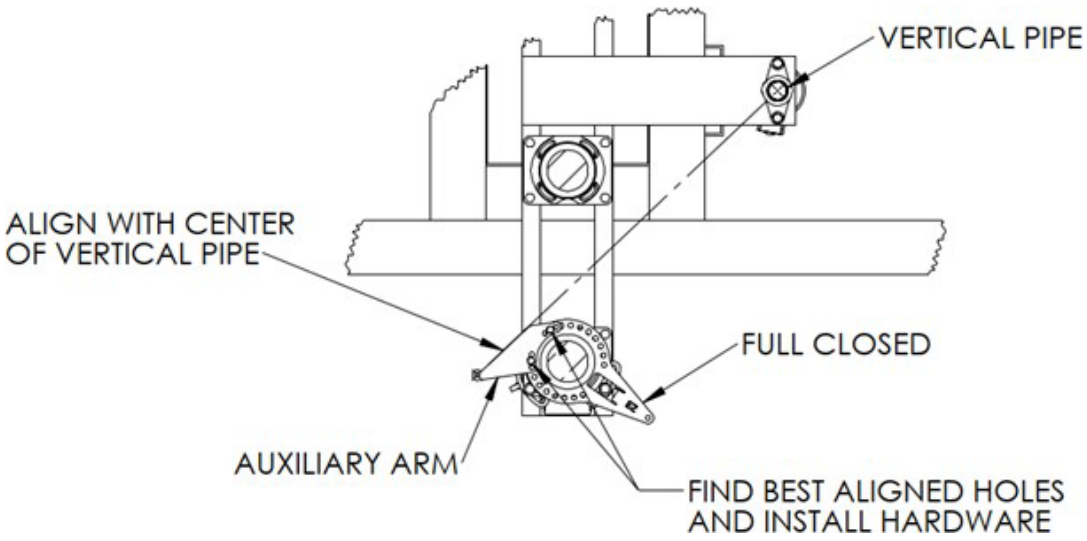


Please scan or use the link below for video instructions of Rapid-Set.
Southern States Rapid Set Instructions



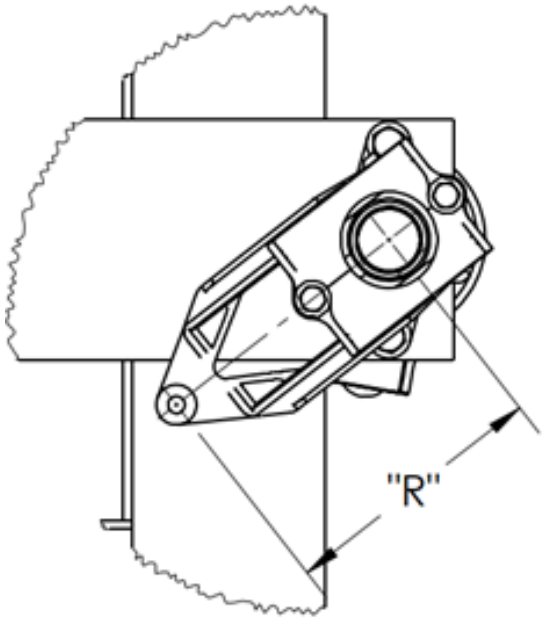
STEP 1:

Install the auxiliary arm by aligning the straight edge of the arm with the center of the vertical pipe and bolting it into place using two of the provided mounting holes. Do this with the switch phase set to the full closed position as shown below.



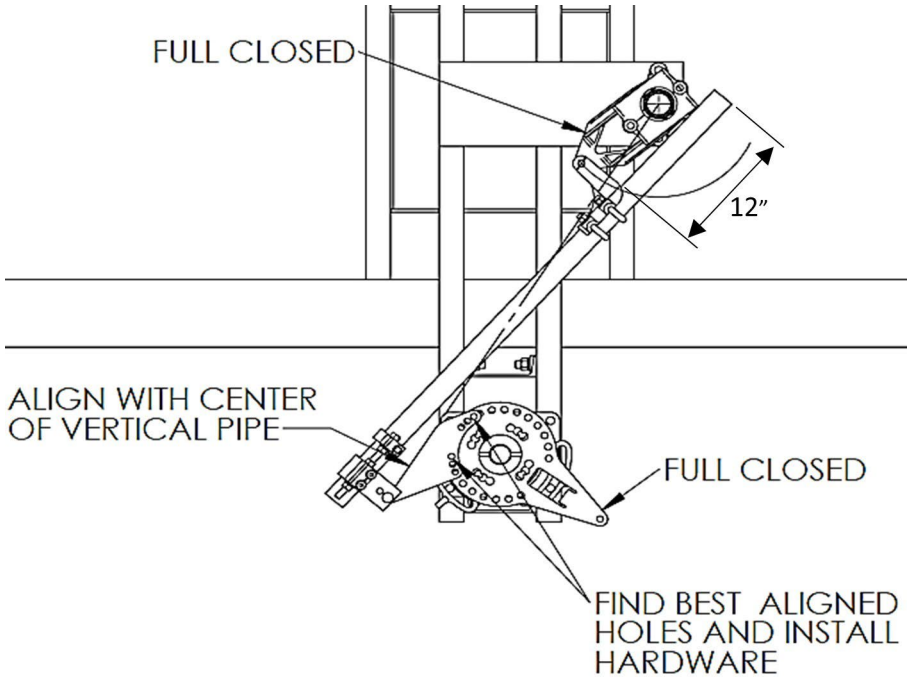
STEP 2:

Install the adjustable arm with the radius “R” set to the recommended length provided in the operating mechanism drawings.



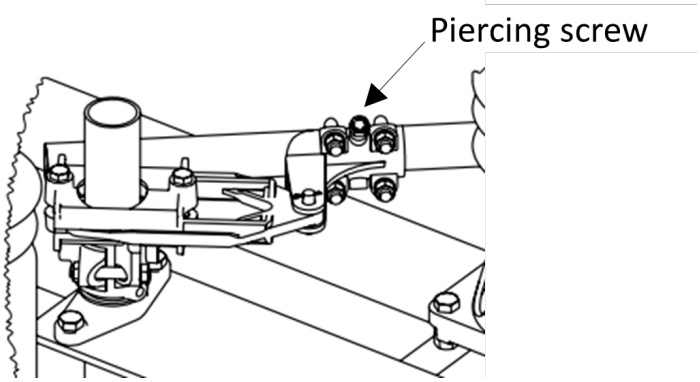
STEP 3:

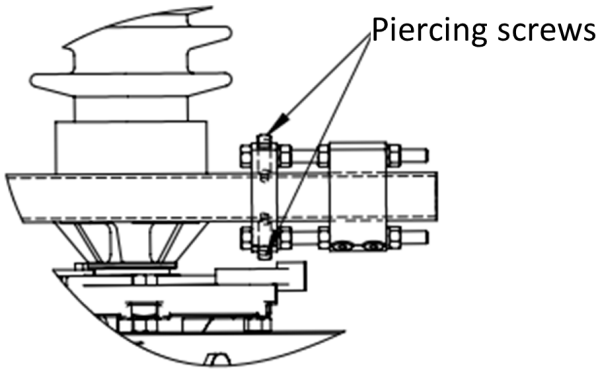
Install the auxiliary arm Rapid-Set clevis and drive pipe. Ensure that roughly 12” of pipe extends beyond the adjustable arm clevis connection so that the pipe makes contact with the adjustable arm in the position shown. This may be the open or closed position depending on the job specific drawings. The pipe should contact the adjustable arm in this position.



STEP 4:

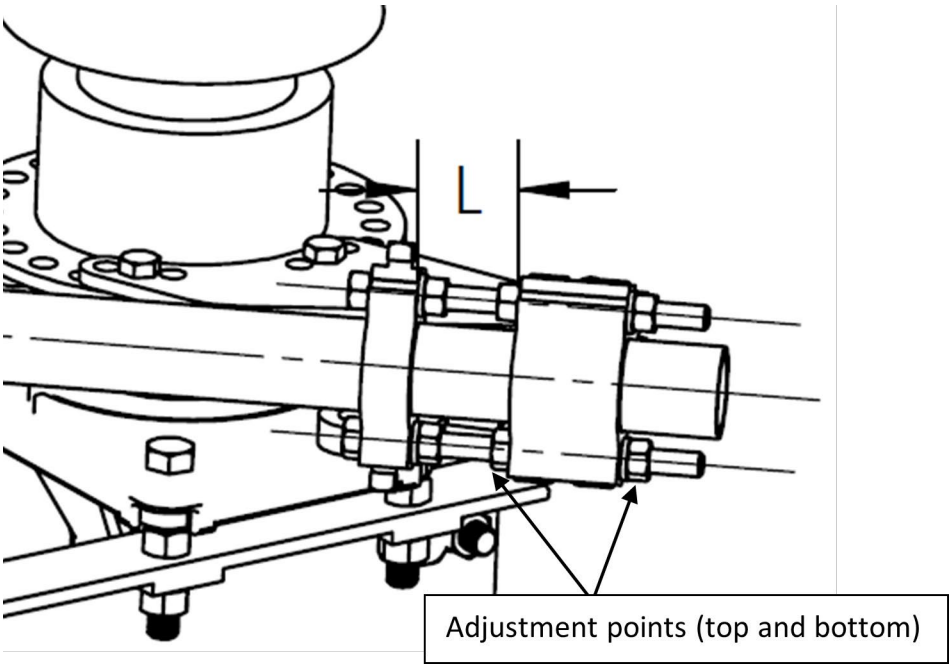
With the auxiliary arm properly aligned with the vertical pipe and the switch phase in the full closed position, pierce the pipe at both ends. **NOTE:** U-bolt style clevises require pre-drilling on all pipes thicker than SCH40. Drill guides are provided on the operating mechanism BOM when required. Pierce the adjustable arm clevis by hand tightening until it penetrates the pipe and continue until snug (note piercing screw may still have threads showing). Do not remove plastic caps from the Rapid-Set clevis at this time. To pierce the Rapid-Set clevis, tighten each piercing screw until the head contacts the aluminum extrusion. Do not over tighten.





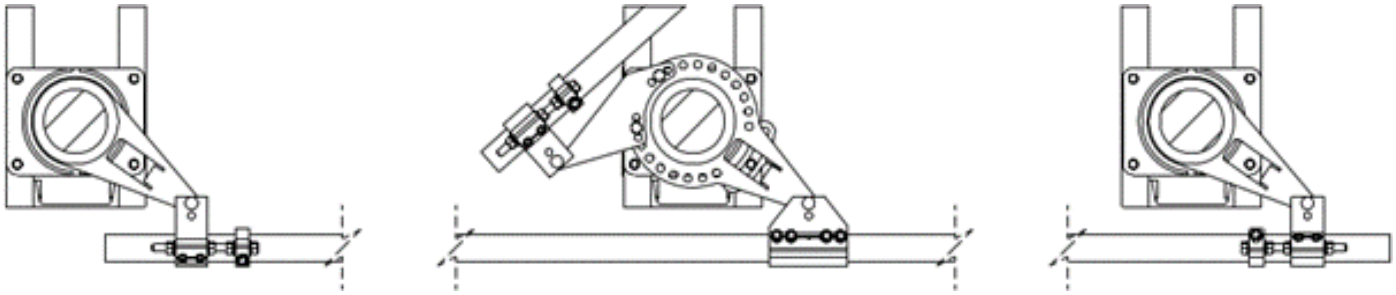
STEP 5:

Begin to manually open the phase using the operator. Observe the phase closed and open stops during operation and modify the length of the adjustable arm as needed to provide the proper amount of travel. Lengthen the arm to add travel and shorten the arm to decrease travel. The mechanism should have sufficient toggle (spring load) during closed and open position. To balance the force at closed and open positions, adjust the length “L” of the Rapid-Set clevis by adjusting the four nuts shown below. Ensure that both the top and bottom sets are adjusted in equal increments.



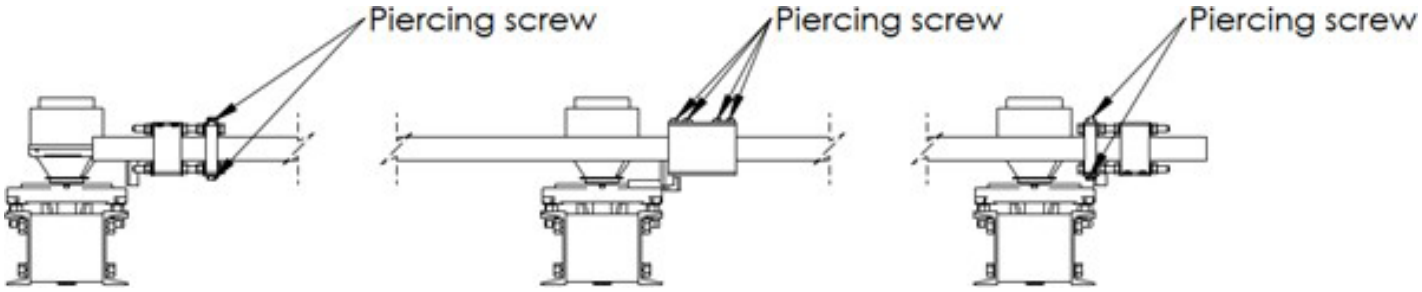
STEP 6:

After the drive phase is adjusted to operate correctly, set all phases to full closed, and install the interphase pipe following the procedure below.

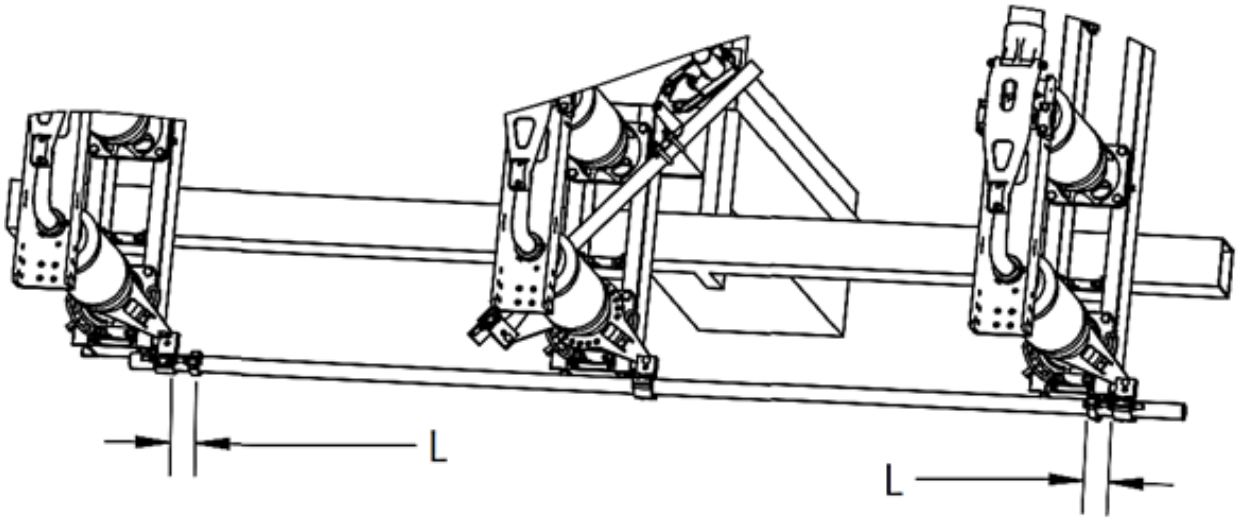


For switches driven by the center phase:

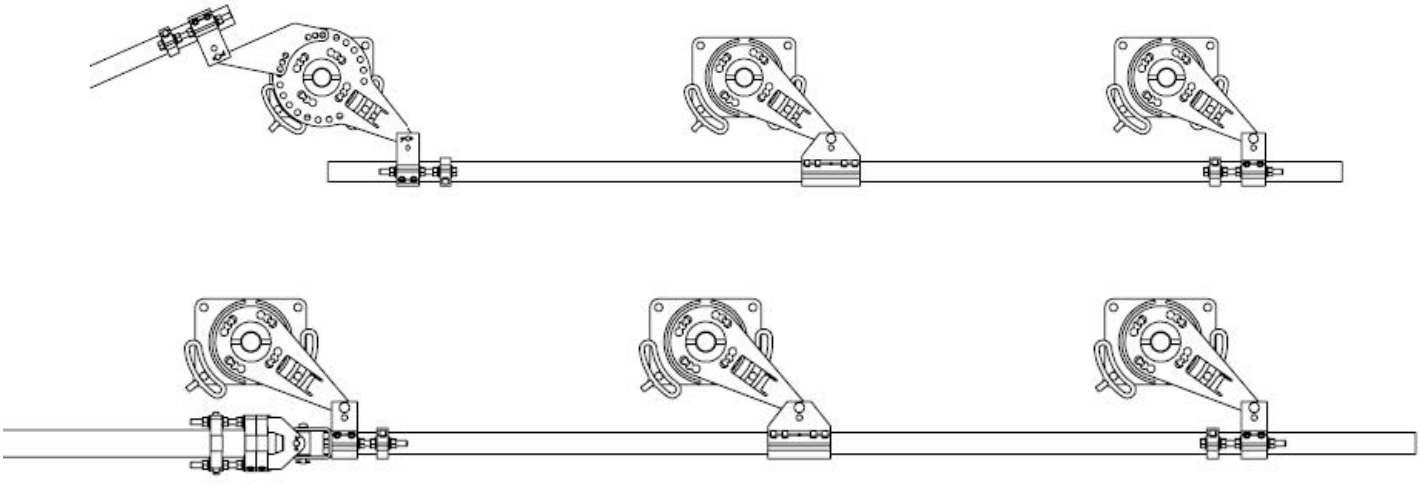
a. With the interphase pipe centered and all clevises in place, pierce the interphase pipe at the locations shown. Do not remove plastic caps at this time.



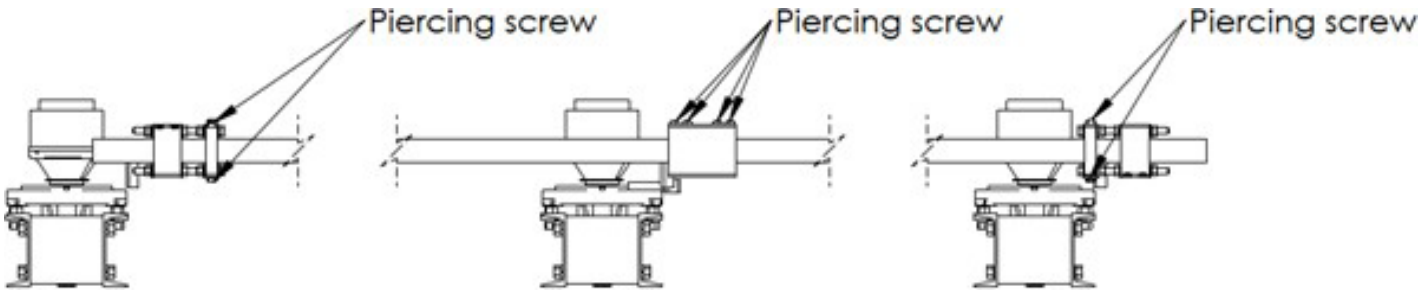
b. Adjust the timing of the two driven phases by adjusting the length “L” of each Rapid-Set clevis.



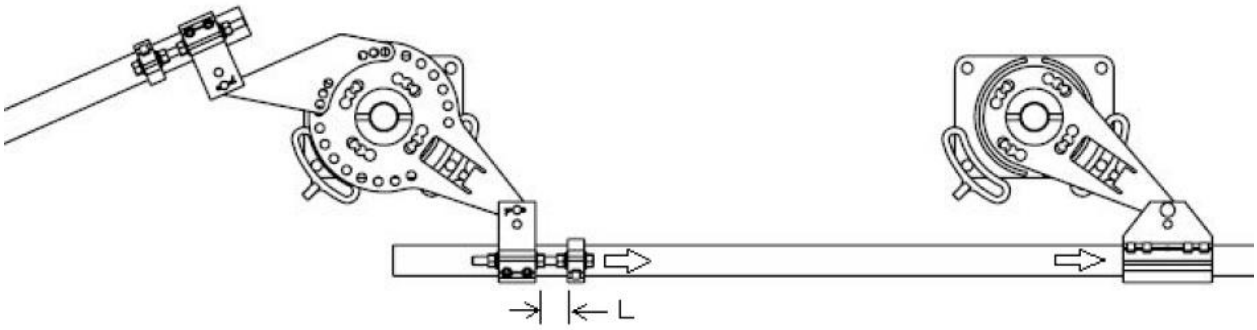
For switches driven by one of the end phases:



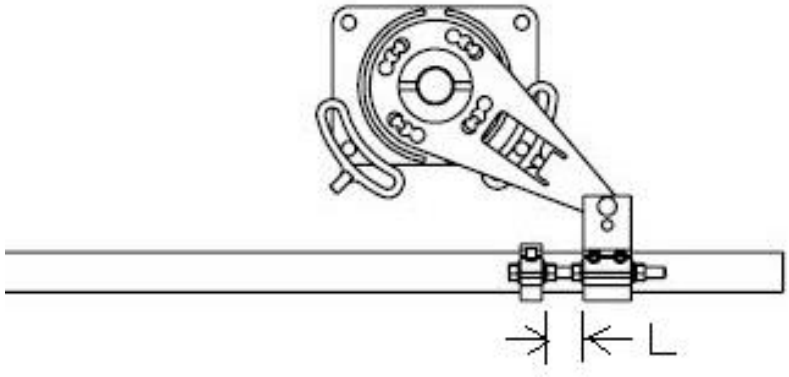
a. With the interphase pipe centered and all clevises in place, pierce the interphase pipe with at the locations shown. Do not remove plastic caps at this time.



b. Adjust the timing of the center phase by adjusting the length “L” of the Rapid-Set clevis attached to the drive phase.



c. Set the timing of the last phase by adjusting the length “L” of the Rapid-Set clevis attached to the last phase.

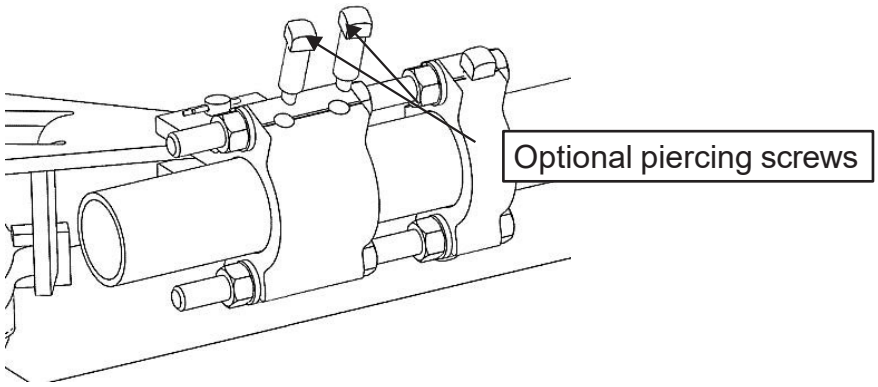


STEP 7:

With all the phases adjusted, open and close the three phase assembly and inspect for proper operation. Once adjustments are finalized, pierce all remaining connections (switch operator, adjustable arm, etc).

STEP 8:

Each Rapid-Set clevis is provided with 2 extra piercing screws. These are for optional use. To install, remove the plastic cover caps and insert the piercing screws as shown below. Note, adding these will restrict any additional adjustment. Remove them before making any future adjustments and then reinstall them on the bottom side of the clevis.



Safety Information

WARNING

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. **Please ensure that you are using the latest installation and maintenance instructions.**

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. Please ensure that you are using the latest installation and maintenance instructions.

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 (8:00am – 4:30pm EST, M-F) or 770-946-4565 after normal business hours.

The Quality Name in High Voltage Switching

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 States 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.

Southern States

The Quality Name in High Voltage Switching

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.

Type RDA, RDA-1

Double End Break Disconnect Switch

69 kV – 230 kV

Table of Contents

List of Tables and Figures

Tables Page

Figures Page

Summary & Introduction

Important

The information contained herein is general in nature and not intended for specific application purposes. It does not relieve the user of responsibility to use sound practices in application, installation, operation, and maintenance of the equipment purchased. Southern States reserves the right to make changes in the specifications shown herein or to make improvements at any time without notice or obligation. Should a conflict arise between the general information contained in this publication and the contents of drawings or supplementary material, or both, the latter shall take precedence.

Summary

These instructions do not purport to cover all details or variations in equipment, or provide for every possible contingency to be met in connection with installation, operation or maintenance. Should information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the local Southern States Representative.

The contents of this instruction manual should not become part of or modify any prior or existing agreement, commitment or relationship. The sales contract contains the entire obligation of Southern States. The Warranty contained in the contract between the parties is the sole warranty of Southern States. Any statements contained herein do not create new warranties or modify the existing warranty.

Introduction

The Southern States type **RDA and RDA-1** are three insulator double end break group-operated outdoor air disconnect switches. Standard with aluminum live part construction, these switches offer maximum versatility and ice breaking capability in the harshest of conditions. Each switch can be operated using a manual or electrical motor operator and mounted upright, vertically, or underhung.

The installation procedure for all mounting positions and operating schemes are similar and explained herein. A system of pipes, bearing, and adjustable length arms are utilized to open and close the switch from a ground level operator.

The instructions contained within this manual are necessary for the safe installation, maintenance, and operation of the RDA and RDA-1 switch. A qualified person, familiar with this of type equipment, should carefully read and follow the instructions.

These instructions are intended to provide a general guideline for the installation, adjustment, and maintenance of the RDA and RDA-1 switch. It is not possible to cover all details, equipment variations, and potential conditions. Contact Southern States, LLC in the event conditions associated with a specific application are not sufficiently addressed.

All photographs and sketches in this manual are for illustration purposes only and may not be to scale. Refer to the Unit Assembly drawing or the Operating Mechanism drawing provided with each disconnect switch for specific details. During installation, it may be necessary to make adjustments other than those described in this manual. Contact your local representative or the factory if questions should arise.

Southern States After Sales and Service Department is available for field installation assistance along with providing parts support for all Southern States products.

Contact After Sales and Service at 770-946-4562, 7:30am-4:00pm EST Monday-Friday.
After Hours: 770-946-4565

Distinctive signal words are used to indicate the degree of hazard that may be encountered by the user. Identification of the signal words and their definition follow:

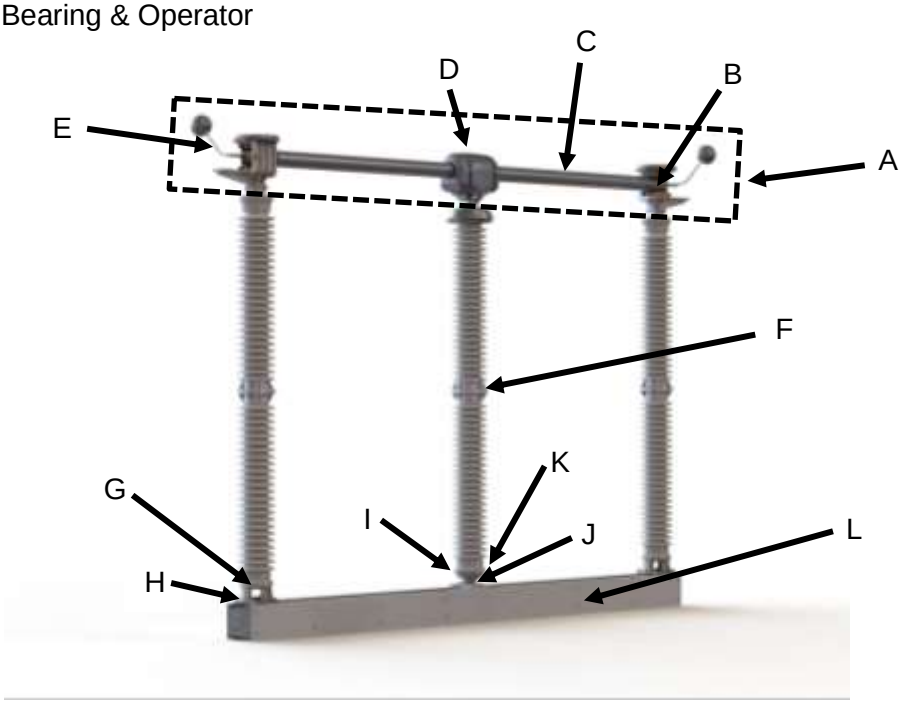
⚠ DANGER	Indicates an imminently hazardous situation, which, if not avoided, will result in death or serious injury.
⚠ CAUTION	Indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.
⚠ WARNING	Indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury.

Product Description

Typical Switch

The RDA and RDA-1 switch consist of the following single pole assemblies:

- Live Parts (*A*) – *Switch jaws, switch blade, hinge mechanism, & arcing horns*
- Base
- Insulators
- Interphase & Control Pipes with Hardware
- Outboard Bearing & Operator



A – Live Parts (Parts Above the Insulator)
B – Switch Jaw[s]
C – Switch Blade
D – Hinge Mechanism
E – Arcing Horns
F – Rotating Insulator
G – Mounting Adaptor[s]
H – Jack Screw[s]
I – Switch Arm
J – Bearing Stop[s]
K – Auxiliary Arm Mounting
L – Switch Base

Figure 1: Typical Double End Break Disconnect Switch & Common Terminology

Ratings

RDA Ratings							
Maximum Voltage Rating	**123 kV**	**145 kV**	**170 kV**	**245 kV**	**362 kV**	**550 kV**	**800 kV**
BIL	550 kV	650 kV	750 kV	900 / 1050 kV	1050 / 1300 kV	1550 / 1800 kV	2050 kV
Rated Power Frequency	60 Hz						
Continuous Current	5000 A					2000 – 4000 A	2000 A
Short-Time Symmetrical Withstand (3 sec)	80 kA RMS					63 kA RMS	
Peak Withstand	208 kA					164 kA	
Ambient Temperature Rating	-40^{O}C to +50^{O}C Standard *(-50^{O}C Optional)*						

RDA-1 Ratings								
Maximum Voltage Rating	**38 kV**	**48.3 kV**	**72.5 kV**	**123 kV**	**145 kV**	**170 kV**	**245 kV**	**362 kV**
BIL	200 kV	250 kV	350 kV	550 kV	650 kV	750 kV	900 / 1050 kV	1050 / 1300 kV
Rated Power Frequency	60 Hz							
Continuous Current	**1200 A** / **2000 A** / **3000 – 4000 A**							
Short-Time Symmetrical Withstand (3 sec)	**38 kA RMS** / **63 kA RMS** / **80 kA RMS**							
Peak Withstand	**99 kA** / **164 kA** / **208 kA**							
Ambient Temperature Rating	-40^{O}C to +50^{O}C Standard *(-50^{O}C Optional)*							

Receiving, Handling & Storage

Receiving & Unpacking

Unpack the equipment and check for damages or shortages immediately. The bill-of-material from the Unit Assembly (switch) and Operating Mechanism drawings should be used for this purpose and can be found in the carboard tube housing inside the op mech container. If damage or a shortage is noted, file a claim immediately with the carrier and contact the factory.

Storage

All components of the RDA and RDA-1 double end break disconnect switch are suitable for outdoor use and do not have any special storage requirements. If a motor operator is furnished be sure to connect the heater circuit, using the provided external wiring, while the unit is in storage. Discard the wiring upon installation.

Typical crating is intended for storage less than 1 year. If long term storage is required please notify factory at time of order placement so that special crating can be used.

Installation & Adjustment Procedures

Preferred Switch Assembly Method

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 and Figure 3. Also match mark one blade tip with its jaw.

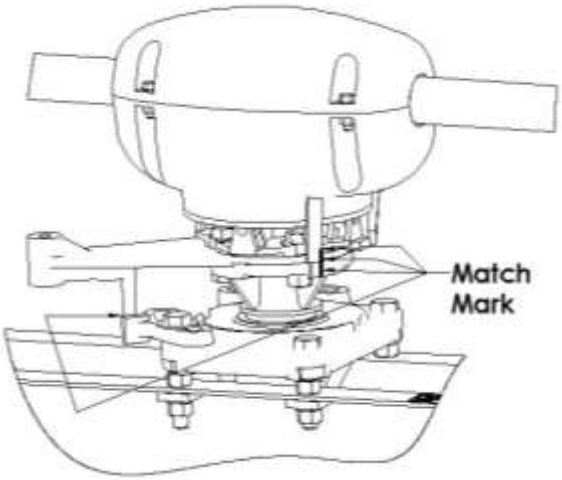


Figure 2: Hinge Assembly Match Mark (115 – 161 kV)

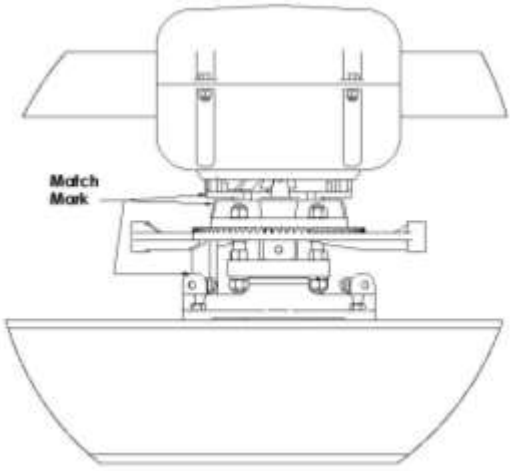


Figure 3: Hinge Assembly Match Mark (230 kV)

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 arm mounting. Check the operating mechanism drawing for proper adjustment of this arm.

4. Mount the insulators as indicated in Figure 4 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.

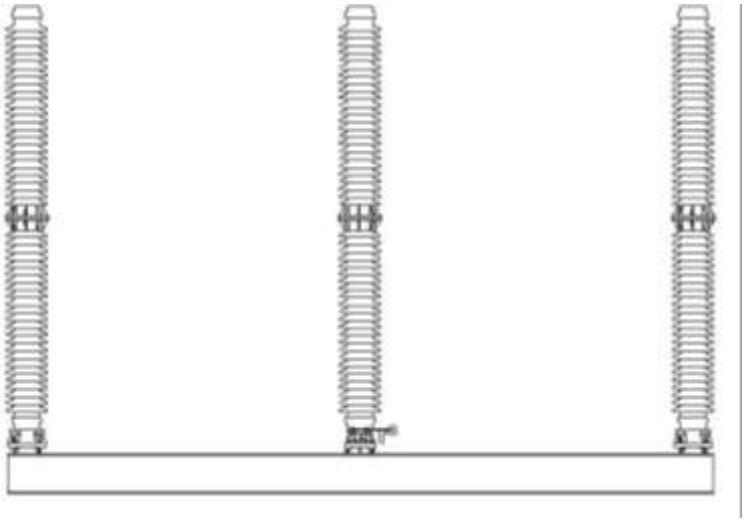
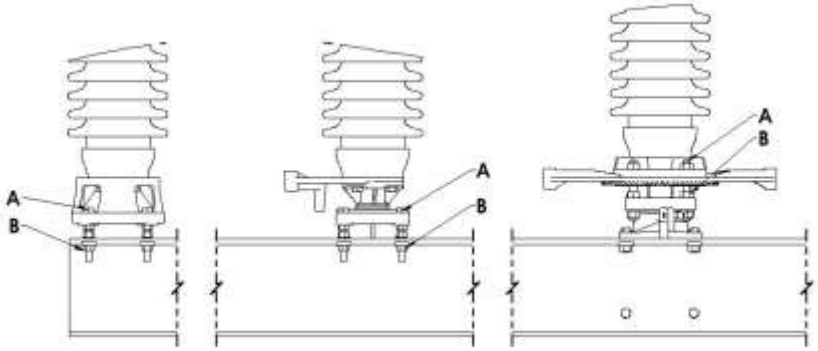


Figure 4: Insulator Mounting

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



6. Figure 5 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.

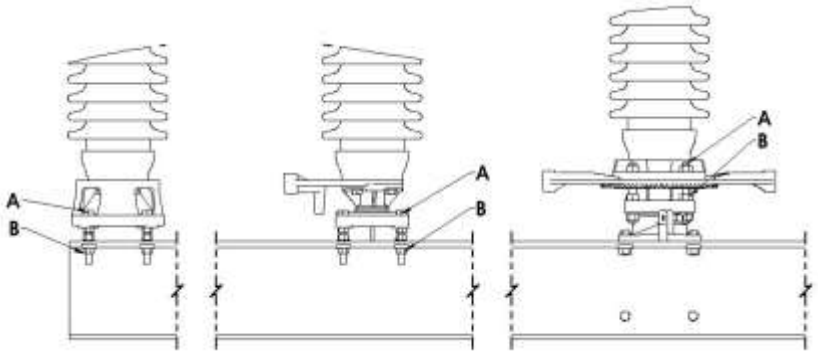


Figure 5: Jack Screw Adjustment Procedure

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). Re-tighten 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.

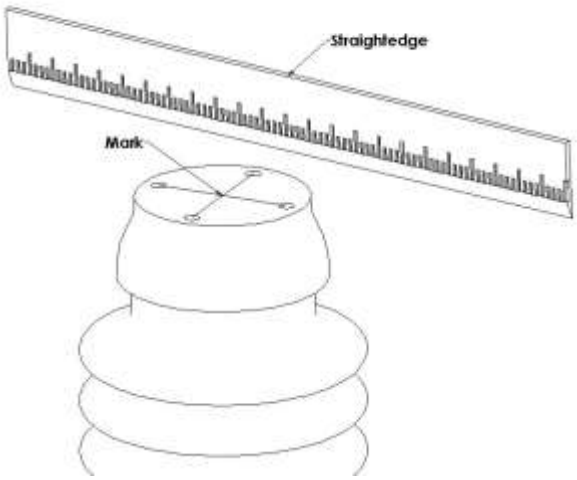
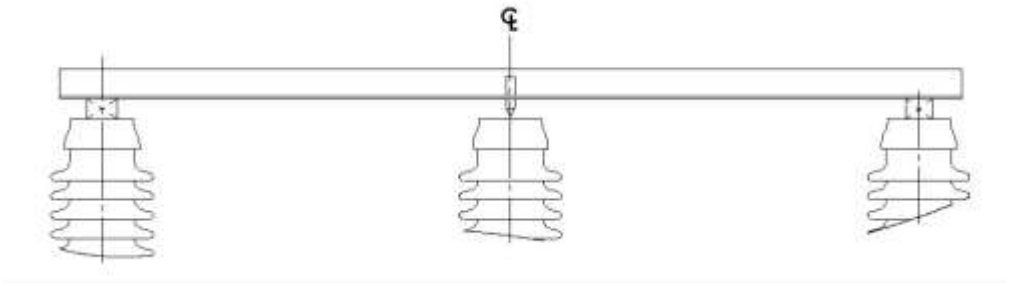


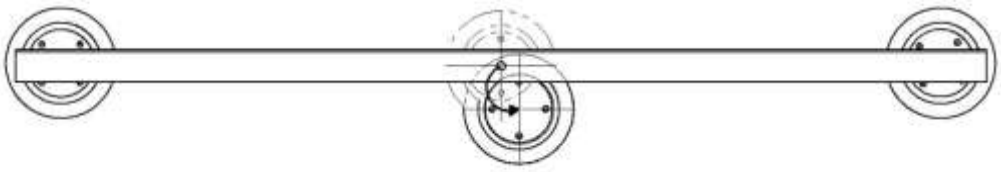
Figure 6: Rotating Insulator

Figure 7: Adjusting the Rotating Insulator for Concentric Rotation (230 kV only)

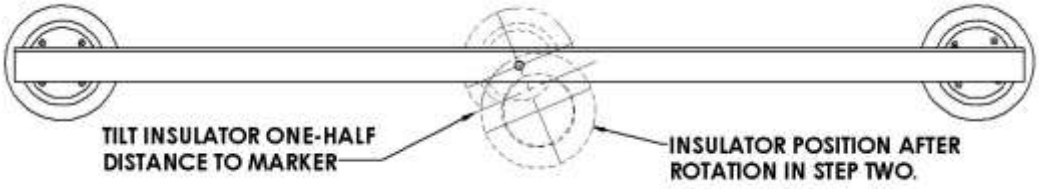
For 161 kV & below, use levels or plumb lines to true the rotating insulator



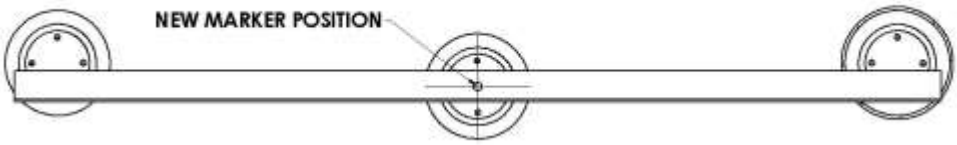
Step 1: Rotate the insulator up against a bearing stop and position the reference point over the center of the insulator top.



Step 2: Rotate the insulator to the opposite bearing stop. Observe for eccentric rotations (“wobble”)



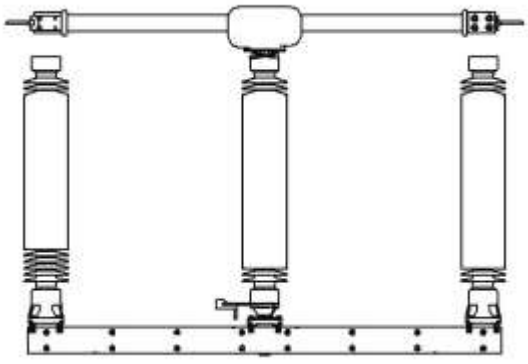
Step 3: If during rotation the insulator has wobbled, **leave it against the bearing stop in step two**. Use the jack screws that mount the rotating insulator to the bearing to tilt it back **one-half** the distance to the reference point on the marker.



Step 4: 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.

7. Mount the hinge and blade assembly as shown in figure 8. 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 operating mechanism drawing. Use the spacers supplied to maintain equal height of the live parts on the rotating and the stationary insulators.



1. Make sure the match marks made earlier are all aligned
2. Mount the blade assembly. Again, make sure the match marks made earlier are aligned.

Figure 8: Hinge & Blade Assembly Mounting

Proper Contact Engagement

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.

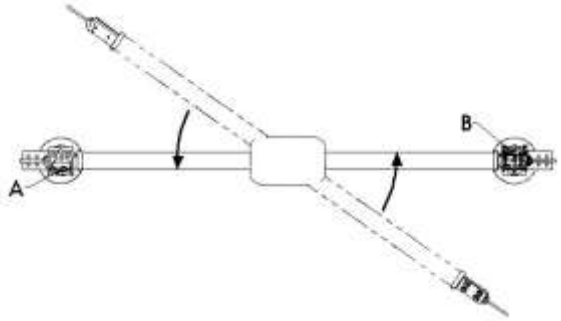


Figure 9: Switch Blade

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

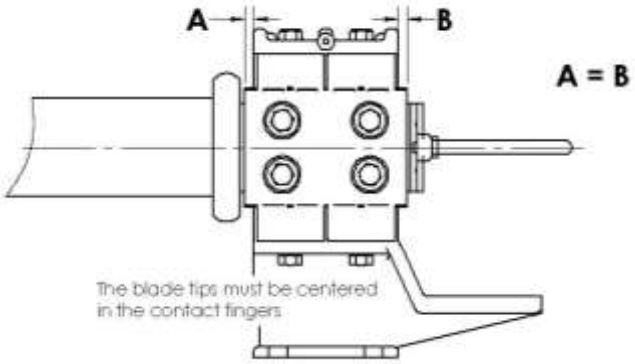


Figure 10: Blade Tip

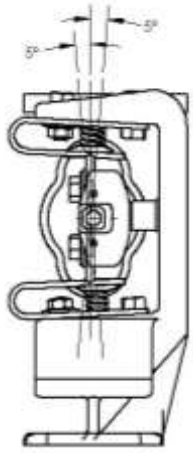


Figure 11: Blade Rotation

Note that the blade is sitting on the bump stop as mentioned in 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.

9. If the switch has been assembled on the ground, at this time, mount it on the structure. **Lift by the switch base only.**

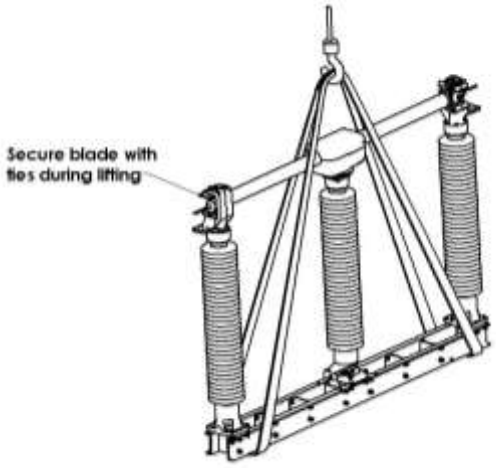


Figure 12: Sling Attachment

10. 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.

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.

11. Install the arcing horn on each jaw as shown in Figure 13. 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.)

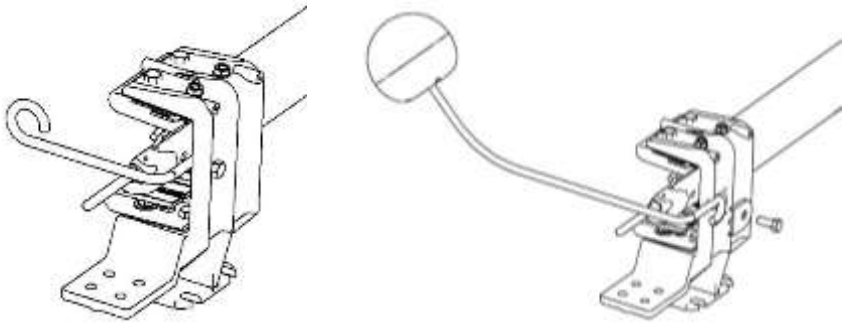


Figure 13: Arcing Horn Attachment

Blade arcing horn (arrow) goes under arc horn.

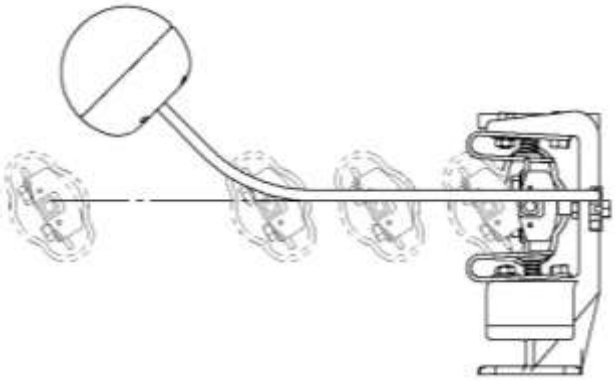


Figure 14: Arcing Horn Blade Tip

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

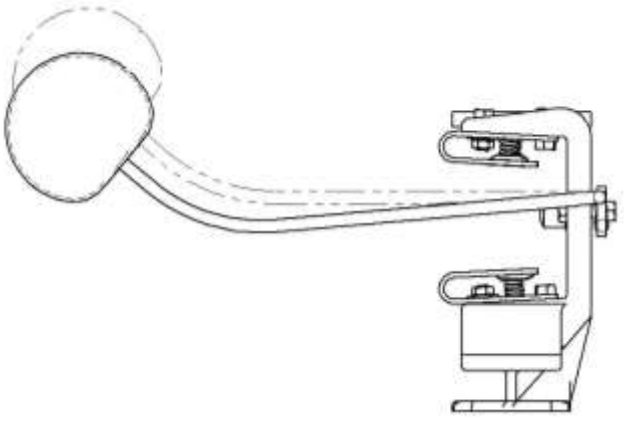


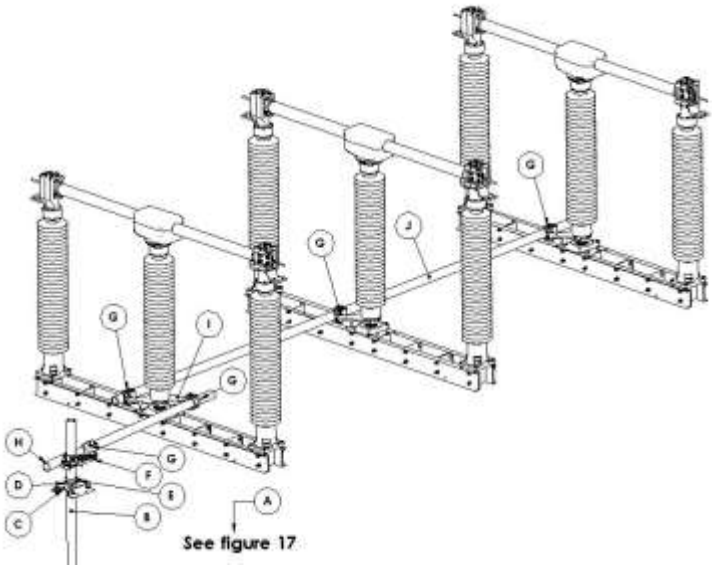
Figure 15: Improper Arcing Horn Adjustment

Improper adjustment allows arcing horn to drop into blade path.

This could cause contact overheating.

12. When all adjustments are made, install the operating mechanism as directed in the following section:

Operating Mechanism



A – Motor or Manual Operator
B – Vertical Pipe
C – Bearing Mounting Bracket
D – Vertical Bearing with Bushing
E – Pipe Collar (See Cautionary Note – Figure 18)
F – Adjustable Arm
G – Pipe Clevis
H – Reach Rod
I – Auxiliary Arm
J – Interphase Pipe

Figure 16: Schematic Drawing of a Typical Operating Mechanism

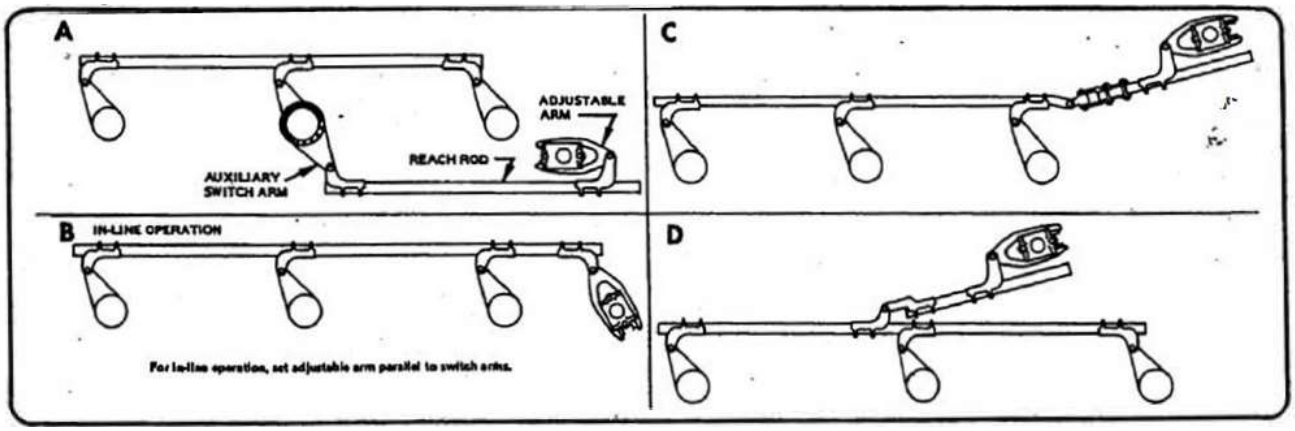


Figure 17: Motor or Manual Operator

1. Included with every switch is an operating mechanism drawing (op. mech drawing). Study this drawing carefully. With all switch poles closed, install mounting brackets, bushings, manual operating devices (if used), vertical pipe, adjustable crank arm, reach rod, and interphase pipe. Match mark all pipe clevises to monitor for slippage. *Be sure the pipe collar above the vertical bearing supports the full weight of the vertical pipe.*

NOTE: 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.

Adjust the switch by the driven phase first. Once adjusted, tie the other phases together and finish adjusting.

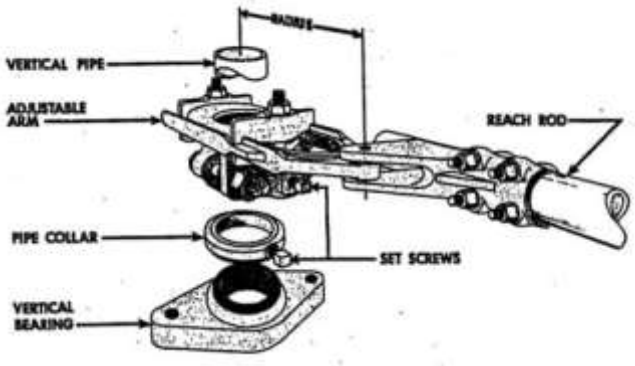


Figure 18: Adjustable Arm Assembly

⚠ CAUTION Pipe collar must support full weight of pipe.

2. After mounting all operating mechanism components, use any convenient means to match mark all clevis connection, adjustable arm, and manual operator attachment to check for slippage during trial operations.

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

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

Operating Mechanism Adjustment

1. The adjustable arm should travel at least 180^{O} 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 19.
    d. Lengthen the radius of the adjustable arm about ¼ inch and allow the clevis to reposition itself the same distance (shortening the pipe). If done is a neutral position, you will have to move the clevis manually.
    e. Test operate again and adjust as necessary

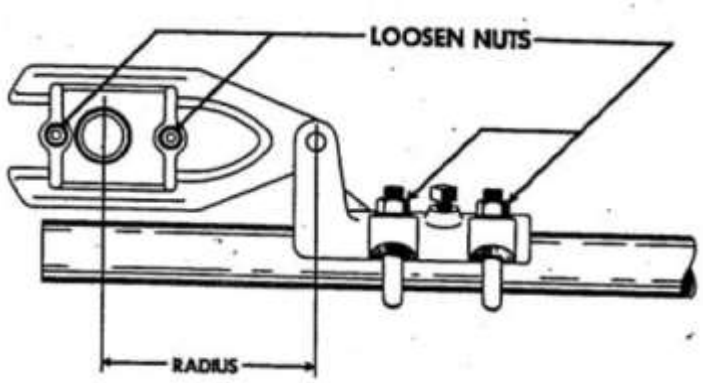


Figure 19: Adjustable Arm & Clevis Bolts

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 19.
    d. Shorten the radius of the adjustable arm about ¼ 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, apply slight pressure to the piercing bolts to prevent slippage. For heavy wall pipe, drill the set screw holes, using the threaded drill guides supplied and a ¼" drill.

Recommended Inspection & Maintenance

Southern States' disconnect switches are designed to operate with minimum maintenance. While disconnecting switches are not readily serviced at frequent intervals, *periodic inspection is important for satisfactory operation and maximized overall life*. Frequency of inspection and maintenance depends on the installation site, weather, atmospheric conditions, experience of operating personnel, and any special operation requirements.

During operational testing, the switch should be opened and closed several times, if possible, to clean the contacts and free the moving parts. A visual inspection, when the switch is wet, or temperature scanning detector may indicate hot spots that could serve as potential sources of trouble. Directional microphones or ultrasonic detectors can be used to locate local corona sources on the switches which can be eliminated during normal switch maintenance.

NOTE

It is recommended that maintenance on these switches be performed in accordance with ANSI STANDARDS **C37.30.1-2011**. In addition, well-established live-line servicing and maintenance procedures may be used in accordance with user practices and local and OSHA regulations.

Table 1: Recommended Installation and Maintenance Table

		Installation Tests	Patrolling Inspection 6-months	Routine 5 Year *	Periodic 10 Year *
Insulators	Contamination	X	X	X	X
	Damage	X	X	X	X
Cabinet (if motor operator supplied)	Any loose parts on the floor of the cabinet?	X	X	X	X
	Wiring Secure	X	X	X	X
	Links Secure	X	X	X	X
	Inspect Mechanism for loose parts	X	X	X	X
	Heaters Energized	X	X	X	X
	Door Seal	X	X	X	X
Mechanical	Operational Tests	X		X	X
Electrical	Contact Resistance	X		X	X
Liveparts Inspection	Inspect Contacts	X		X	X
	Inspect Arcing Horns	X		X	X

*__NOTE:__ Inspection/maintenance is suggested to be performed every two (2) years when installed in harsh environments with excessive airborne contaminants such as salt spray and industrial pollutants.

Patrolling Inspection (6 Months)

The patrolling inspection is a largely visual inspection on an energized unit in service. The frequency of the inspection is determined by the local conditions and policies of the owner of the equipment.

- Inspect the insulators for breaks, cracks, burns, or cement deterioration. Clean insulators particularly where abnormal conditions such as salt deposits, cement dust, or acid fumes exist to minimize possibility of a flashover.
- If an accompanying motor operator is supplied, check the cabinet for loose parts and ensure that all wiring is secure, the heater is energized, and the door is sealed.

Routine Inspection and Maintenance (5 year)

> ⚠ DANGER The disconnect switch must be de-energized, disconnecting from all electrical power sources before servicing.

- Perform patrolling inspection (above), checking insulators and cabinet
- Once the disconnect switch is de-energized, test operate the switch multiple times.
- Check the switch for alignment, contact pressure, eroded contacts, corrosion, and mechanical malfunction, replacing damaged or eroded components if necessary. If contact pitting is minor, smooth the surface with a clean, fine sandpaper. It is recommended to clean and reapply C5-A grease during any operation or maintenance cycle, as exposed surfaces *(such as contacts)* are vulnerable to environmental conditions and contaminants that can decrease the effectiveness of the grease over time. During reapplication, clean and wipe down the contact surfaces with a green Scotchbrite pad, reapply C5-A grease, and remove any excess grease until an evenly coated, thin film is present.
- Inspect arcing horns for signs of excessive arc damage and replace if necessary.
- Check blade lock or latch for adjustment.
- Inspect all live parts for scarring, gouging, or sharp points that could contribute to excessive radio noise and corona. Check corona balls and rings for damage that could impair effectiveness.
- Inspect interphase linkages, operating rods, levers, bearings, etc. to assure that adjustments are correct, all joins are tight, and pipes are not bent.
- Check for simultaneous closing of all blades and for proper seating in the closed position.
- Inspect and check all safety interlocks while testing for proper operation.

Periodic Inspection and Maintenance (10 year)

> ⚠ DANGER The disconnect switch must be de-energized, disconnecting from all electrical power sources before servicing.

- Follow instructions for 5-year Routine Inspection and Maintenance

Appendix

Appendix A: General Installation Notes

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 above.)

Operating mechanism adjustments consist mainly of incremental lengthening 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.

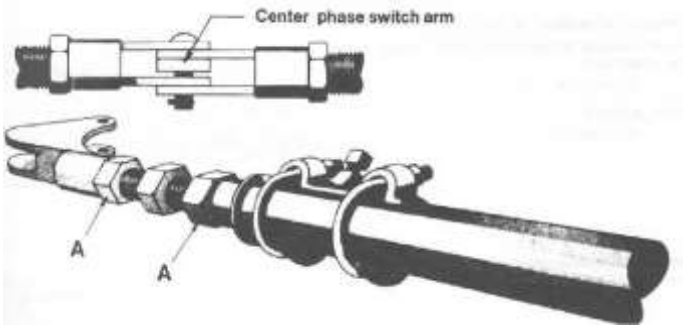


Figure 20: Threaded Clevises

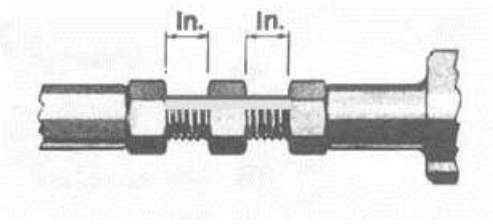
⚠ DANGER

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.

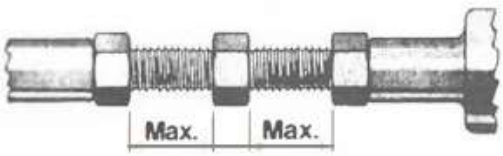
Initial Dimension For:

- *3/4" stud:* **11/16"**
- *1" stud:* ***1/2"***



Maximum Allowable For:

- *3/4" stud:* **1 3/16"**
- *1" stud:* ***1"***



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