

TYPE RDA 500 kV
3-Phase Operation
Torsional Crank Arm Drive



**Southern
States**

Instruction Manual

The Quality Name In High Voltage Products

ATTENTION:

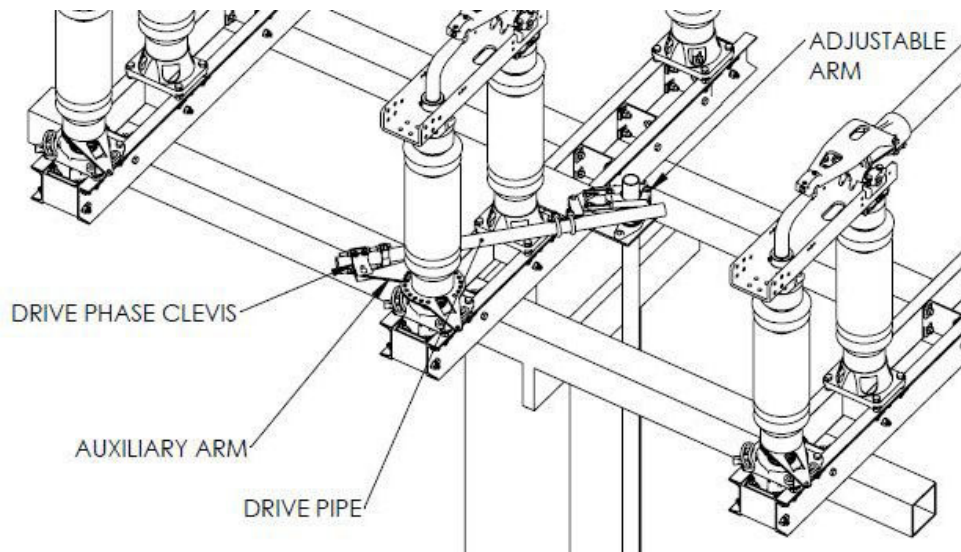
Southern States will begin supplying a portion of new operating mechanism designs with Rapid-Set clevises for orders designed after 9/1/23. If your Operating Mechanism print calls for Rapid-Set clevises (see image below for an example), please utilize the instructions on the following pages for all linkage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





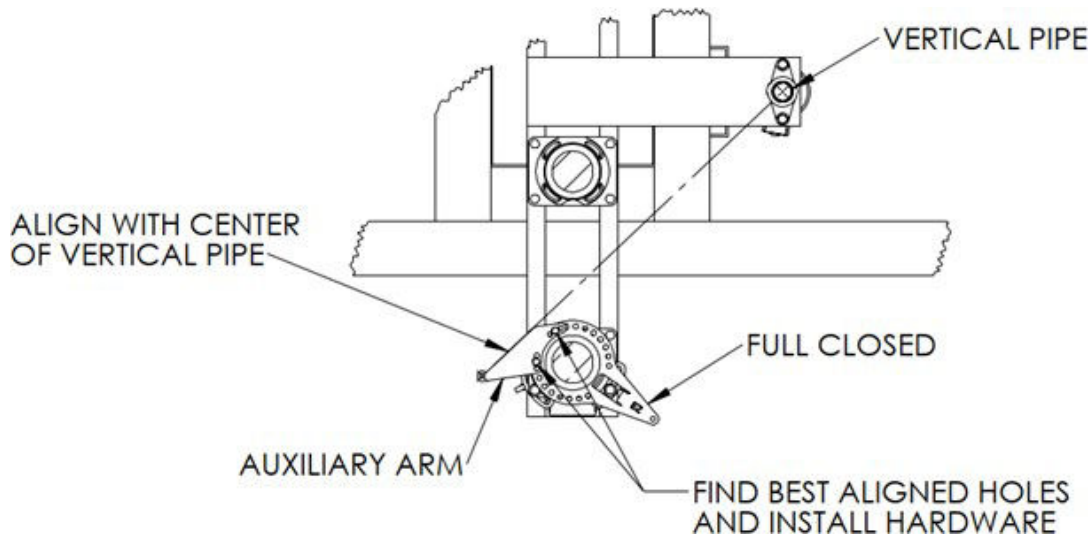
Please scan or use the link below for video instructions of Rapid-Set.

[Southern States Rapid Set Instructions](#)



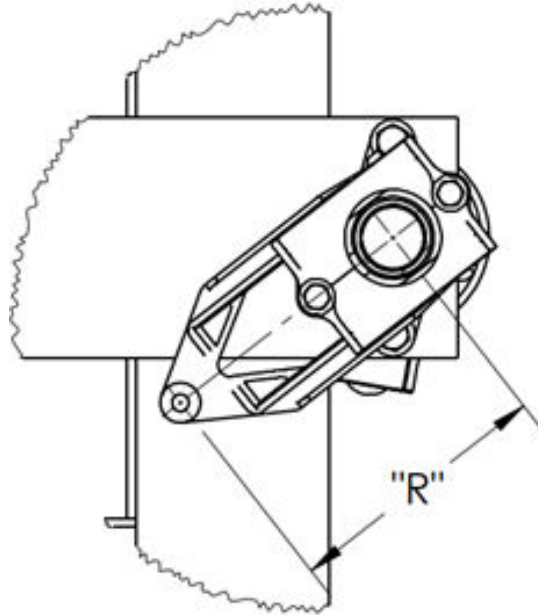
STEP 1:

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.



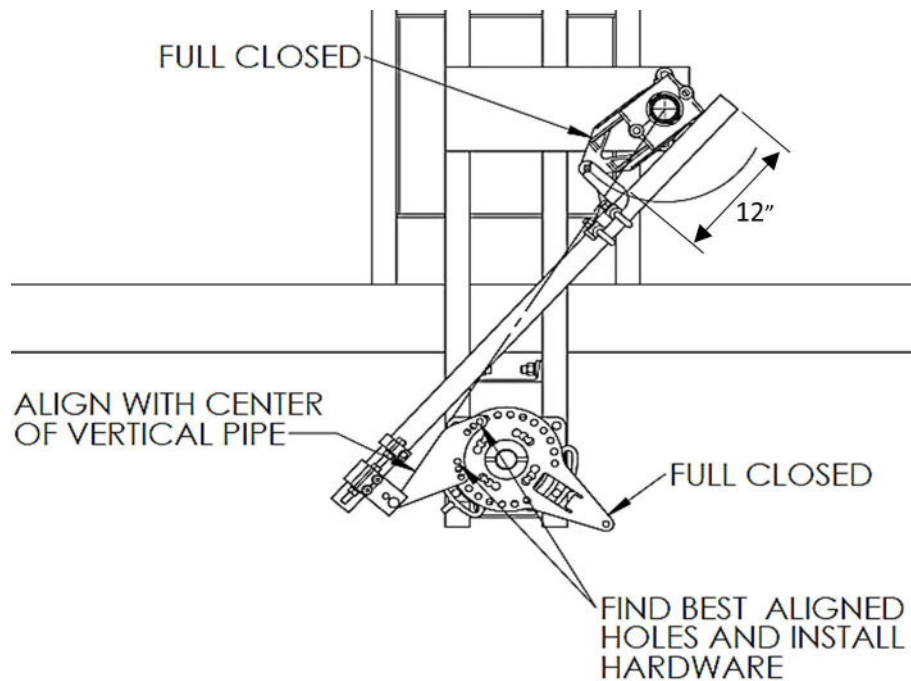
STEP 2:

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



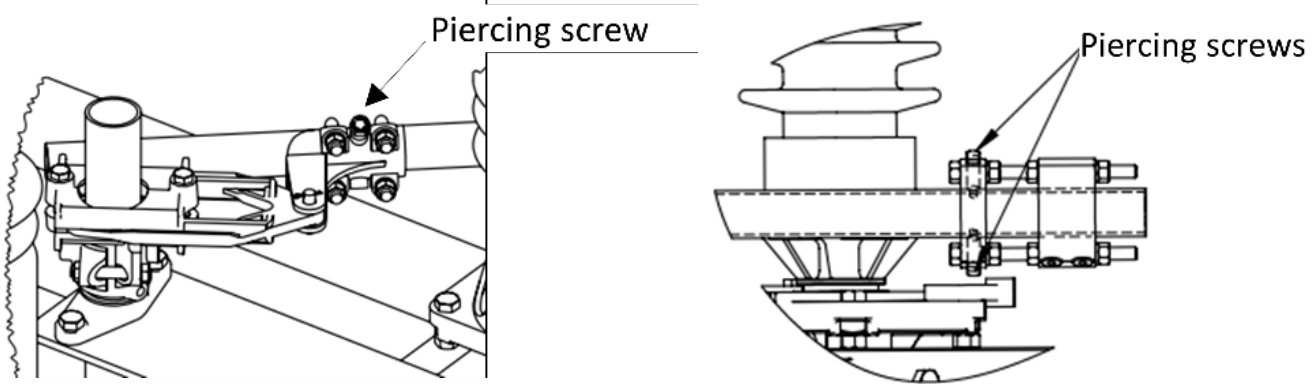
STEP 3:

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.



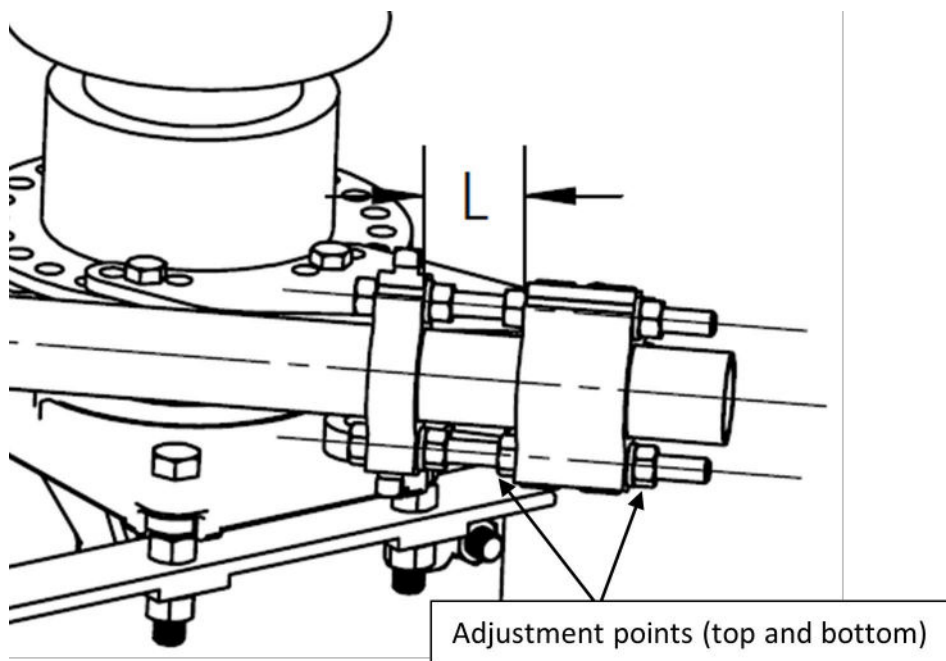
STEP 4:

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.



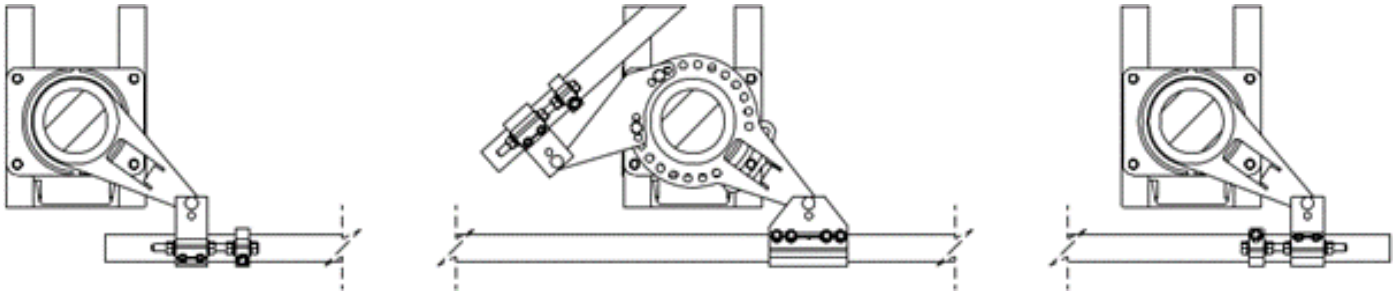
STEP 5:

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.



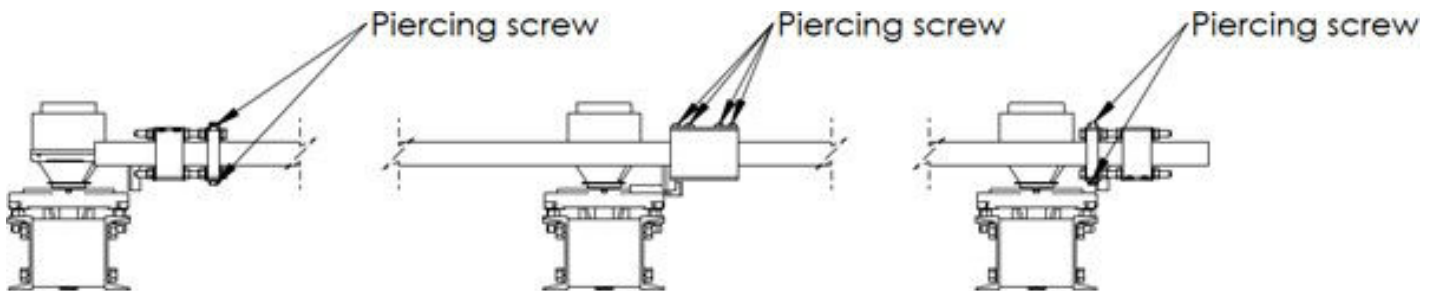
STEP 6:

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

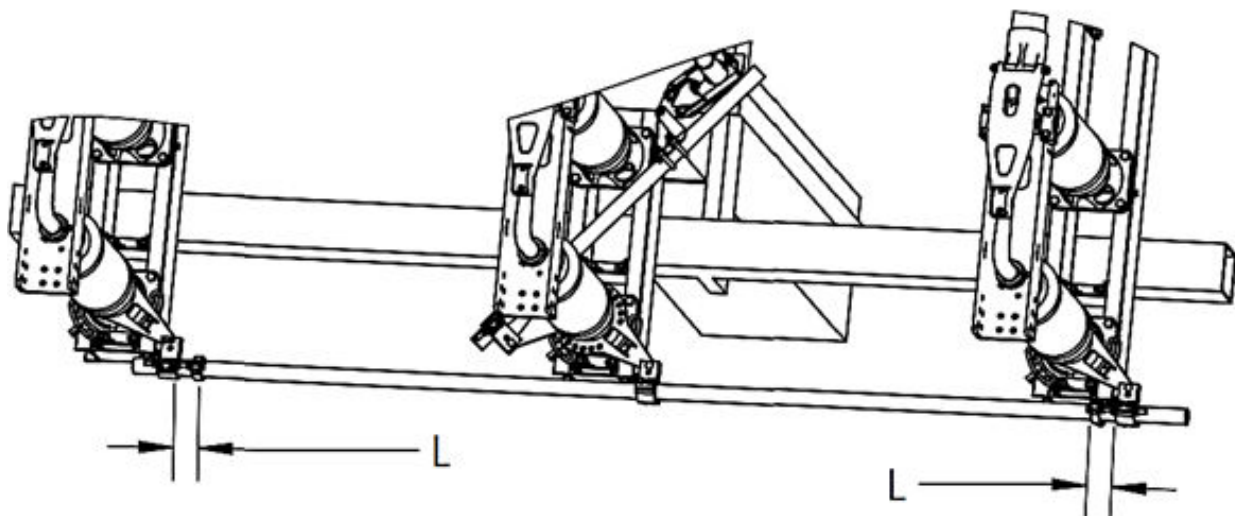


For switches driven by the center phase:

- 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.



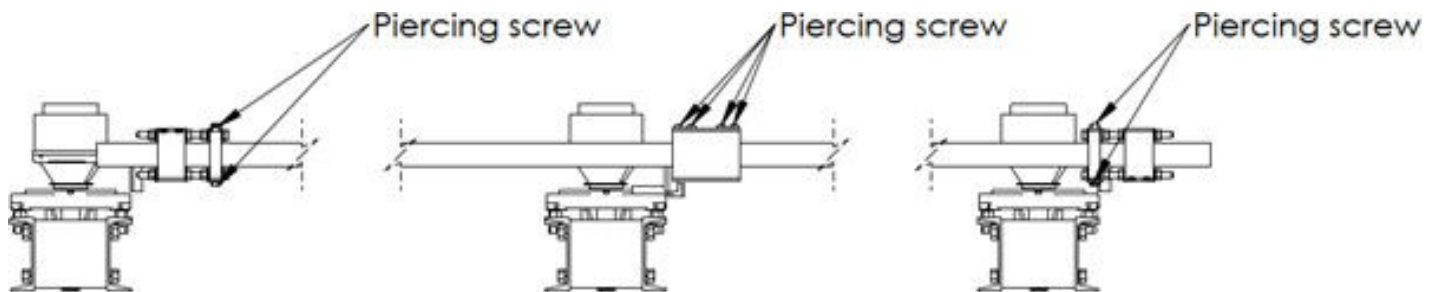
- Adjust the timing of the two driven phases by adjusting the length "L" of each Rapid-Set clevis.



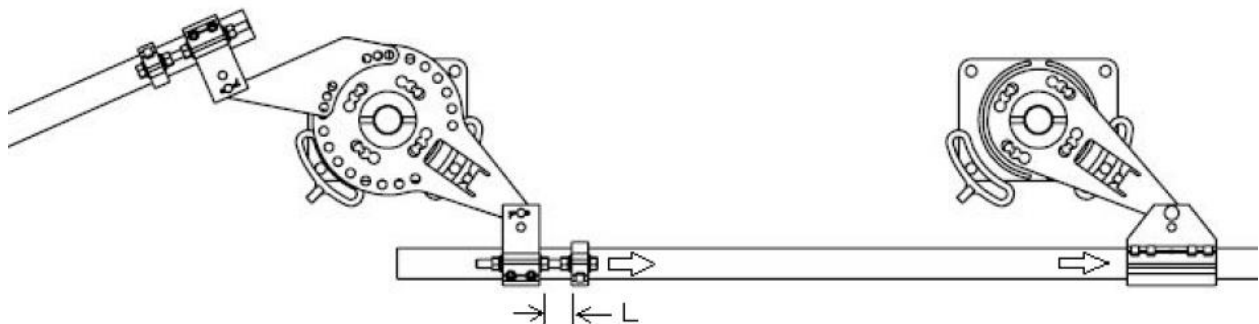
For switches driven by one of the end phases:



- 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 these, remove the plastic cover caps and install them as shown below. Note, adding these will restrict any additional adjustment. Remove them before making any adjustments and then reinstall them on the bottom side of the clevis.



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.

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. SLLC SHALL NOT BE LIABLE OR RESPONSIBLE FOR ANY CONSEQUENTIAL, INCIDENTAL, INDIRECT, EXEMPLARY, SPECIAL, OR PUNITIVE DAMAGES, EVEN IF SLLC 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

Southern States, LLC

Equipment Receipt, Installation, Use, Operation and Maintenance Terms

("Terms of Use")

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

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

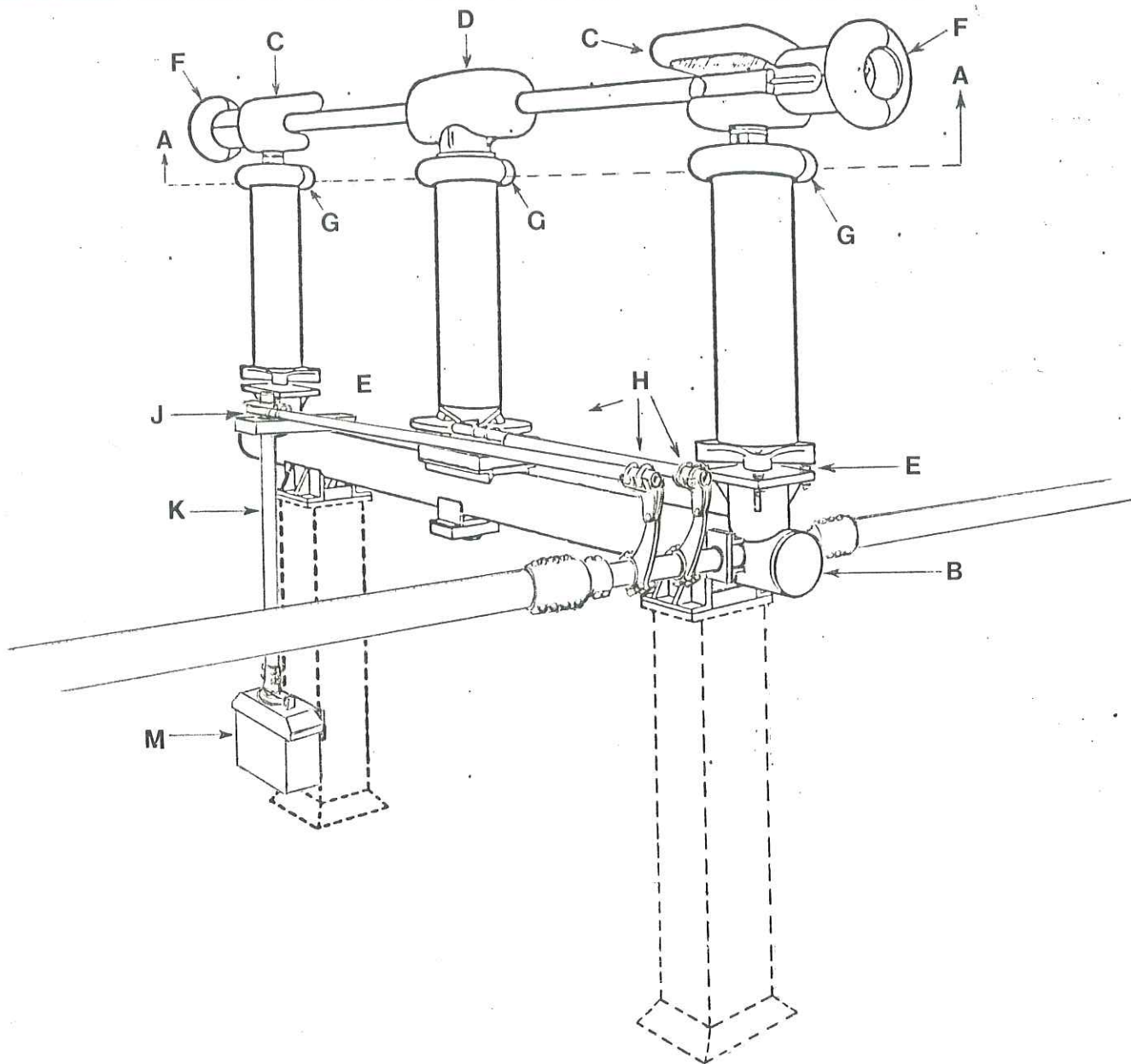


Figure 1 — This illustration shows an RDA with motor operation. The purpose of this drawing is to show relationships of the parts, and not specific components. For mounting dimensions, refer to the Operating Mechanism drawing that comes with each switch.

- | | | |
|-----------------------------------|------------------------|--|
| A — Live parts | E — Jack screws | J — Vertical bearing |
| B — Base | F — Corona shields | K — Vertical pipe |
| C — Jaws | G — Corona rings | |
| D — Live part operating mechanism | H — Clevis connections | M — Motor operator (or manual gearbox) |

These instructions give the general procedure for adjusting RDA 500 kV 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.

These instructions describe the steps to install this switch on the structure — that is, first bolting the base to the station columns, then the insulators to the base, and so on. Another procedure that is often used is assembling the entire switch on the ground, then hoisting it to the structure. This can save many operations from a bucket truck, but since each switch weighs approximately 7000 pounds, heavier equipment may be needed. To use this alternate method:

1. Bolt the base to a firm mounting surface that is level and stable. Metal sawhorses, or their equivalent, may have to be constructed.
2. Follow the steps in paragraphs I, II, III, V, and VI.
3. At the completion of paragraph VI lift the assembled switch pole to the mounting structure and bolt it into place. When doing this, be sure to refer to the Operating Mechanism drawing, because there are differences in each switch pole, and they must be positioned properly.
4. Proceed with the adjustment described in paragraph VII.

NOTE: All drawings in this manual are for illustration only. Actual switch components may differ slightly in appearance.

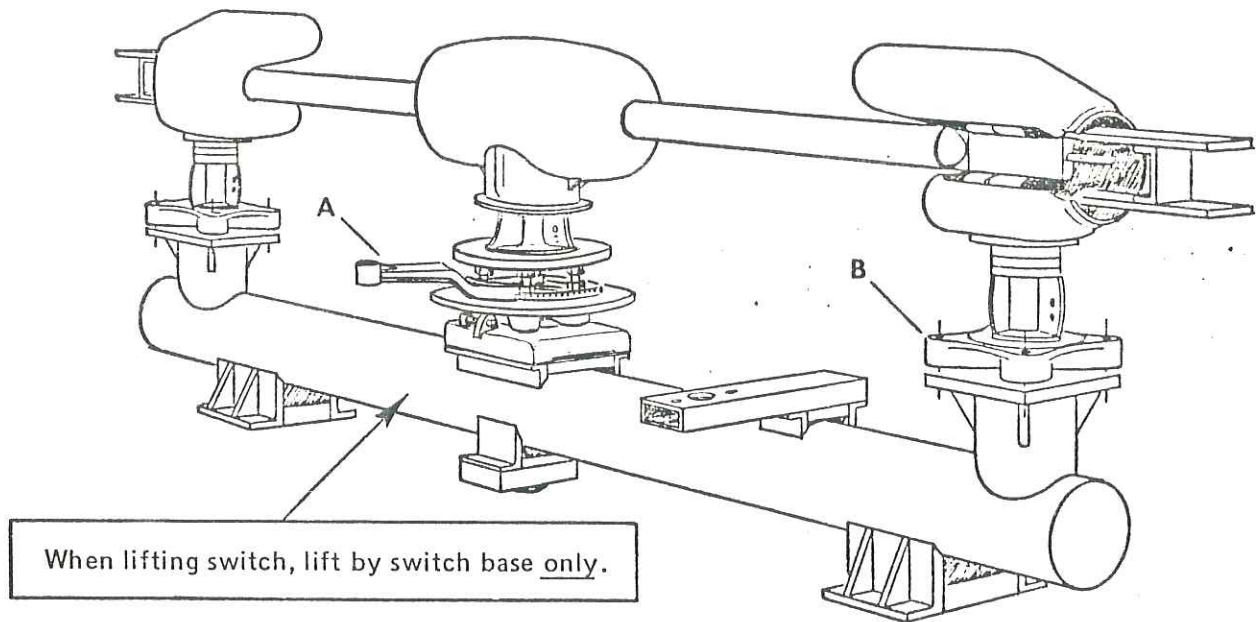


Figure 2 — Type RDA 500 kV as shipped. Corona shields and rings, operating mechanism components, motor operators, manual gearboxes, insulators, and bolts are shipped boxed separately. The operating arm is labeled "A". The insulator mounting adaptors are "B".

I. UNPACKING AND INSPECTION

1. Remove all shipping ties and check for damage in shipment. Unpack and lay out all boxed components, bolts, operating pipes, etc., and check against the bill of material on the Operating Mechanism drawing.
2. Do not attempt to make any adjustment or install any component until directed to do so in this manual.
3. Read this instruction manual before beginning any work.

II. INSTALLATION

Installation consists of partial disassembly (removal of the live parts from the base on which they are shipped), mounting the base on the structure, mounting the insulators to the base, and mounting the live parts atop the insulators. Certain adjustments are also necessary, since insulator and structure irregularities prevent fine adjustment at the factory.

III. REMOVAL OF THE LIVE PARTS

OPEN SWITCH BEFORE UNBOLTING LIVE PARTS

1. Make reference marks as shown in figure 3 to ensure correct reassembly.
2. Open the switch by rotating the operating arm "A".
3. Remove the bolts that mount the jaws to the base adaptor. See Figure 4. There will be two 1/2 inch spacers that fit under each jaw. Retain these spacers with the jaw for later use.

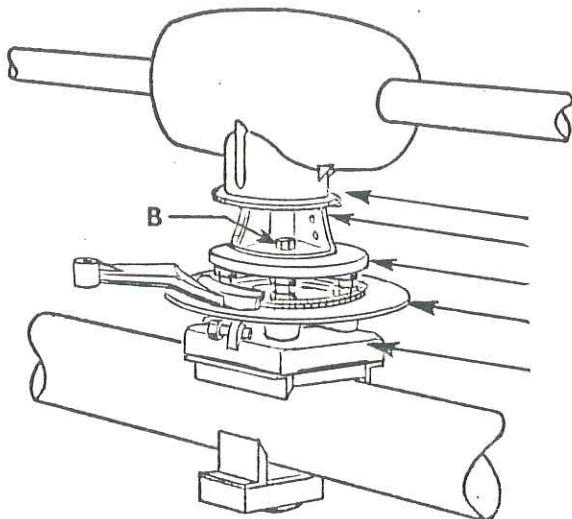


Figure 3 — Match mark the live part operating mechanism ("Watermelon"), the insulator mounting adaptor, the operating arm, and the bearing to the base. This ensures proper reassembly.

MATCH
MARK

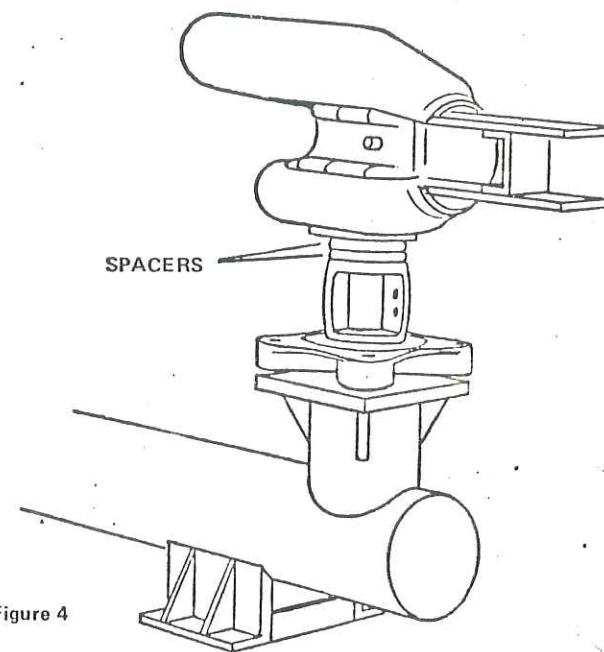


Figure 4

4. After matchmarking the components shown in Figure 3, remove the blade and "Watermelon," housing as a unit by removing the shipping bolts "B".

IV. MOUNTING THE BASE

Check the Op. Mech. drawing for the proper position of each switch pole, and verify that the mounting surfaces have the correct spacing and elevation. Bolt the switch base to its mounting position, using the bolts specified on the Op. Mech. drawing.

The mounting surfaces must be level. If they are not, use shims between the switch base mounting feet and the structure to level the switch base.

V. MOUNTING THE INSULATORS

1. If possible, assemble all insulator stacks on the ground, and hoist each stack as a completed unit. In mounting the insulator stacks, the best method is to unscrew the top nuts from the jack screws and remove the mounting adaptor from the switch base; the adaptor then can be more easily bolted to the bottom of the insulator stack, due to better access with a socket wrench. Refer to the Field Assembly Bolt List (SF drawing) for the proper bolts.
NOTE: All insulator to adaptor bolts and nuts are high strength A-325. Hoist the stack and adaptor to the base and bolt down securely with the top jack screw nuts.

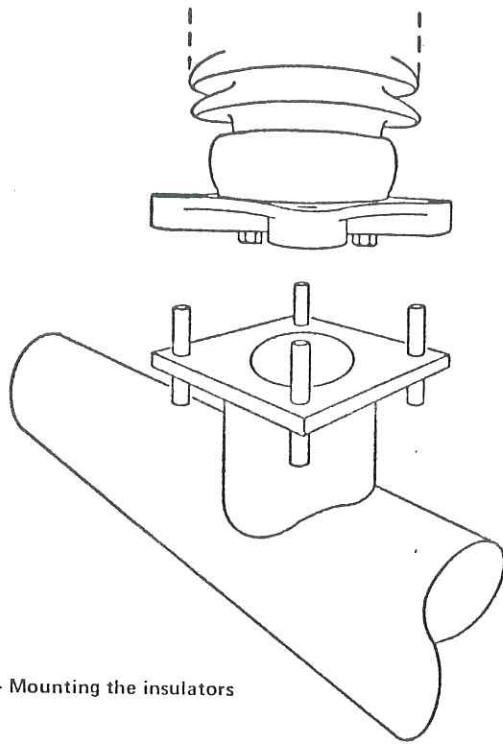


Figure 5 — Mounting the insulators

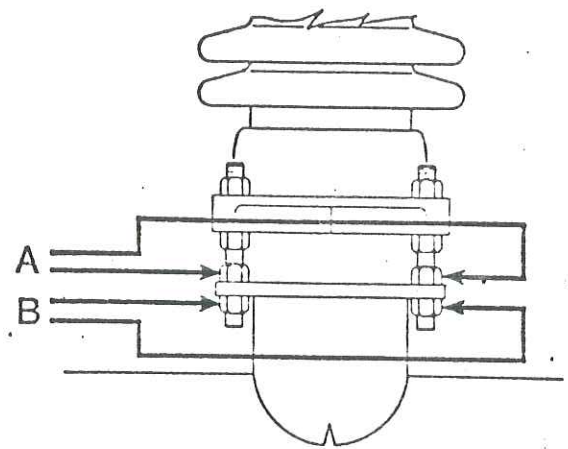


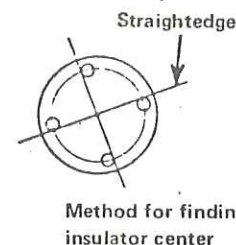
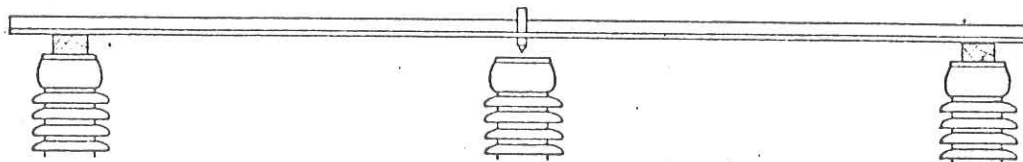
Figure 6 — To adjust the insulator stack, loosen four nuts (B). Tilt insulator to required position by screwing up or down on nuts (A). Retighten nuts (B).

2. 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.)
3. 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 1/2 inch or less. The best procedure to achieve this is described on the following page.

Figure 7 — Adjusting the rotating insulator for concentric rotation.

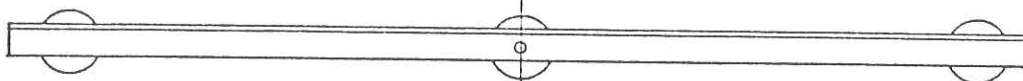
PREPARATION

Make a marker of any convenient material such as metal angle or lumber. 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.



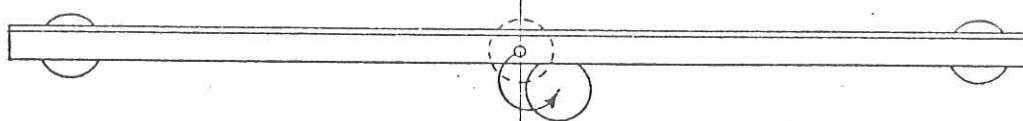
STEP ONE

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



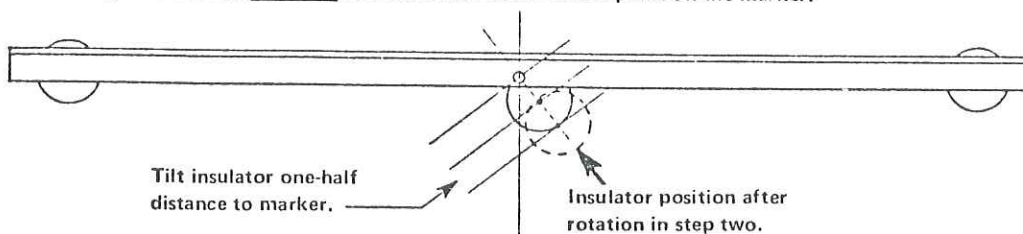
STEP TWO

Rotate the insulator to the opposite bearing stop. Observe for eccentric rotation ("wobble").



STEP THREE

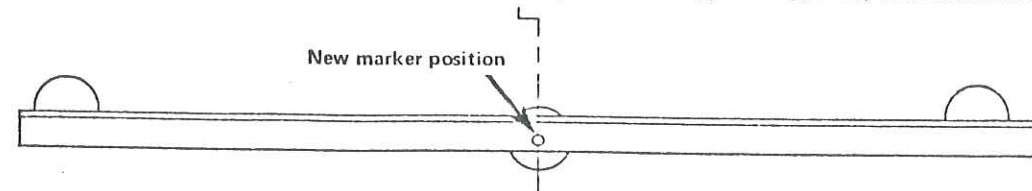
If during rotation the insulator has wobbled, leave it against the bearing stop in step two. Use the jack screws that mount the rotating insulator to the bearing to tilt it back one-half the distance to the reference point on the marker.



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.



NOTE: IMPORTANT: — Once the insulator is adjusted to rotate true, DO NOT READJUST or otherwise change its jack screw settings.

VI. MOUNTING THE LIVE PARTS

1. Mount the "Watermelon" housing and blade assembly to the center insulator, making sure the match marks are aligned.

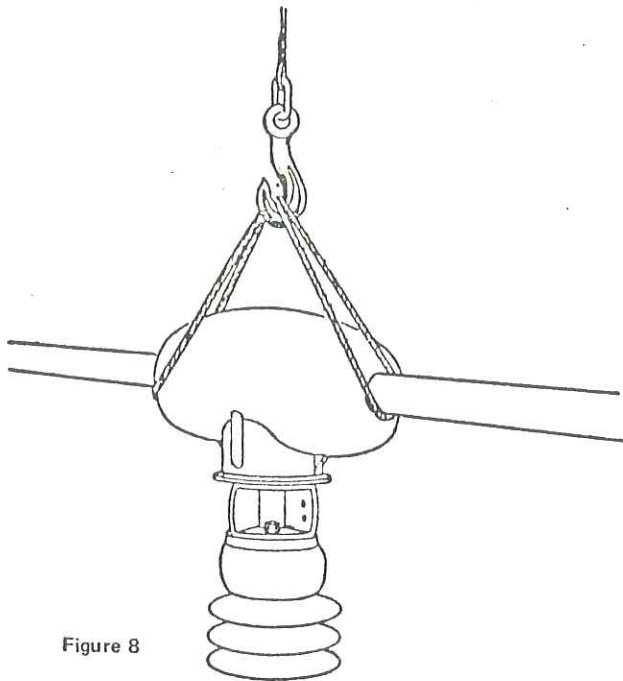


Figure 8

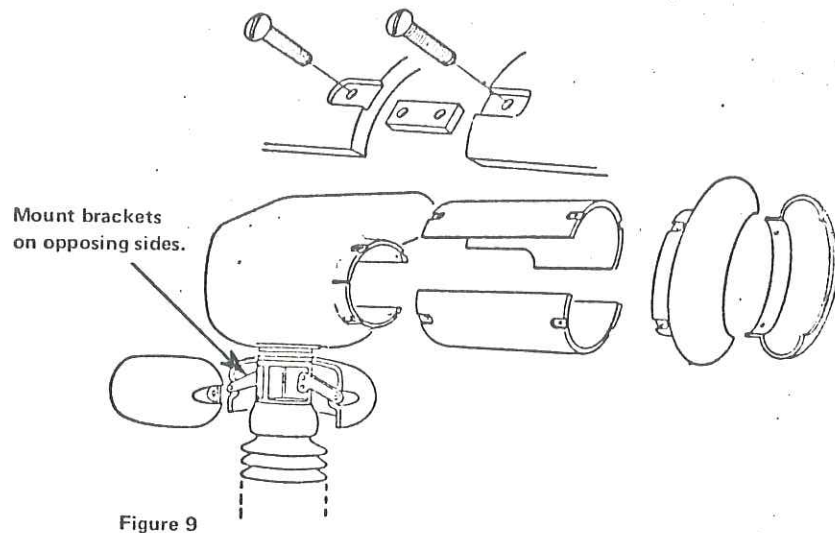


Figure 9

2. Mount the two jaws on their respective stacks. It will be necessary to open the switch slightly to do this.
If a grounding switch is used, the grounding switch jaw should be mounted at this time. Refer to the Op. Mech. Drawing and mount the grounding switch jaw bracket, and only one spacer. The spacer is mounted above the grounding switch jaw bracket.
3. The corona rings may be attached whenever convenient. However, the shields that cover the terminals cannot be mounted until after the conductors are attached.
Note: The brackets to which the jaw rings are mounted are attached on opposing sides of the jaw mounting surfaces. See figure 9.

4. Final adjustment usually cannot be accomplished until the conductors are installed. This is because it is not unusual for the weight of long conductors to pull tall insulator stacks several inches out of plumb. For this reason, the conductors should be installed at this time to avoid later readjustments of the switch.
5. The arcing horns should be attached at this time. (Figure 10) The arcing horns should rub together with sufficient pressure to maintain contact throughout their stroke; however, they should not bind or force the blade out of alignment. The jaw horn can be bent as required to achieve proper contact.

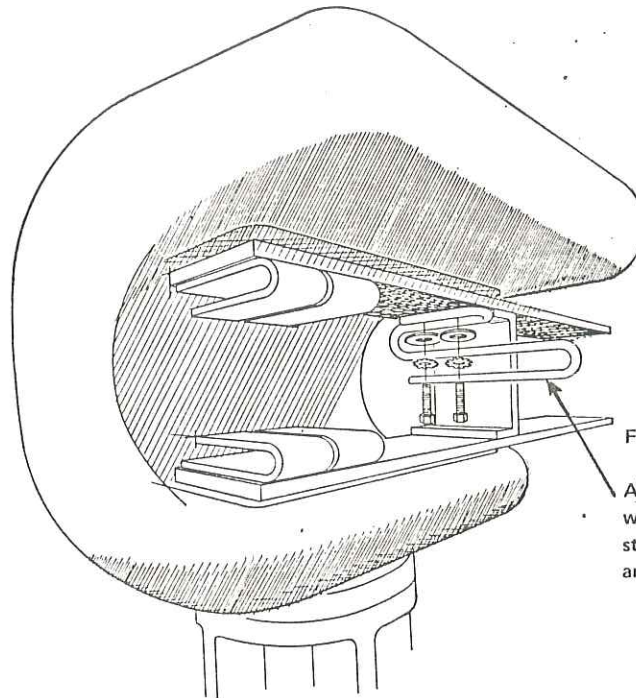


Figure 10

Arcing horn is attached with two 1/2 x 1-1/4 stainless steel hex bolts, plus E.S.P.W. and plainwasher.

VI. ADJUSTMENT

Although adjusted at the factory before shipment, any of several factors can cause minor adjustments to become necessary in the field. Final adjustments usually cannot be made until the conductors are attached to the switch terminals.

Requirements of proper adjustment (prior to installing the operating mechanism):

1. The blade must enter each jaw on a horizontal plane. It also must enter each jaw centrally, without dragging on either the upper or lower jaw contact surface. (Figure 11) Misalignments can be corrected by using the jack screws on the insulator that supports the jaw to raise or lower the jaw as necessary to permit central entry of the blade.
2. Each blade tip must strike the bumper in each jaw simultaneously when closing. (Figure 12)
 - If a jaw appears to receive the blade tip early or late, use the jack screws to tilt the jaw insulator toward or away from the blade tip as required.

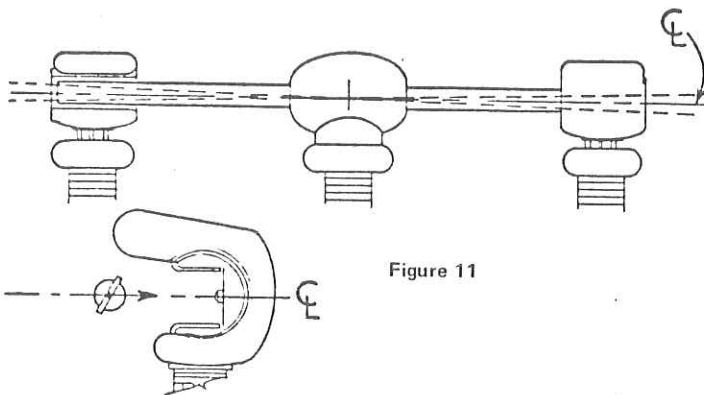


Figure 11

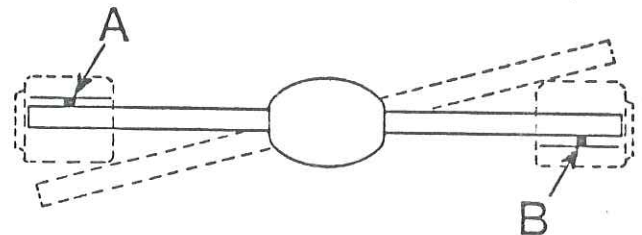


Figure 12

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

3. The silver on the jaw contact leaves must be centered on the silver strips of the blade tip. (Figure 13)
 - If proper contact centering is not observed, adjust the jack screws of the jaw insulator to tilt the jaw fore or aft (on the base centerline) to center the contact surfaces.
4. When the operating arm at the base of the rotating insulator is against the closed position stop, the blade tip should be vertical in the jaw contacts. (Figure 14)
 - If necessary, run the closed position stop in or out to achieve proper contact. These switches will have adequate contact pressure if the blade tip is as much as five degrees off vertical; however, every attempt should be made to get the tip as nearly perpendicular in the contacts as possible.

Only after these four requirements are satisfied should the operating mechanism be installed.

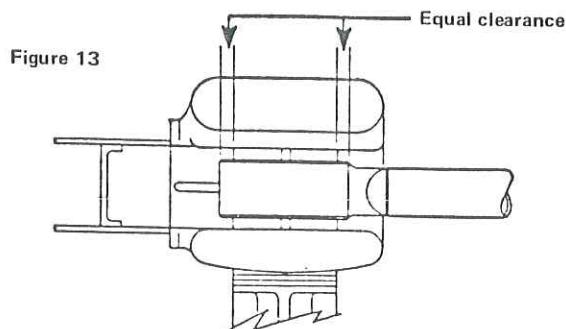


Figure 13

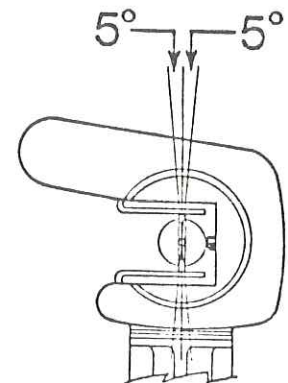


Figure 14

VII. MAINTENANCE

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

8. Contact Misalignments and Corrective Procedures

- A. BLADE TIP MOVES, OR ATTEMPTS TO MOVE, VERTICALLY DURING FINAL ROTATION IN CONTACTS.

Corrective Procedure: The center insulator is not rotating true. Recheck adjustments described in figure 7.

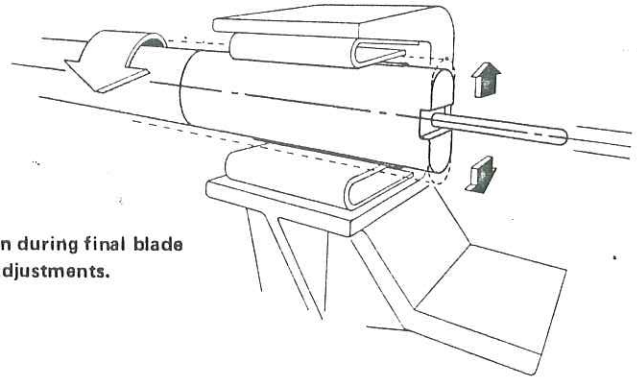


Figure A — Blade tip attempts to move up or down during final blade rotation. Recheck rotating insulator adjustments.

- B. BLADE TIP HIGH AND SHORT ON ONE JAW, LOW AND LONG ON THE OTHER.

Corrective Procedure: See next page.

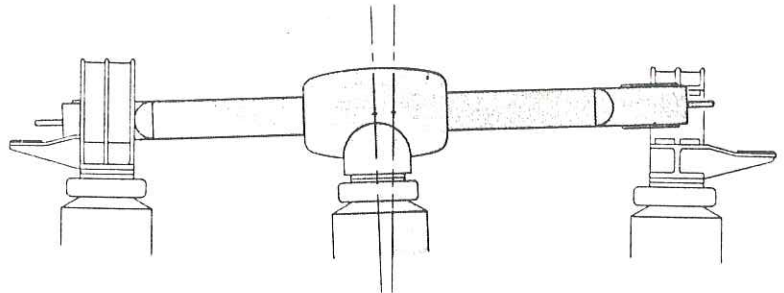


Figure B — Blade misalignment requiring bearing adjustment.

- C. ONE BLADE TIP STRIKING ONE JAW AHEAD OF THE OTHER.

Corrective Procedure: See next page.

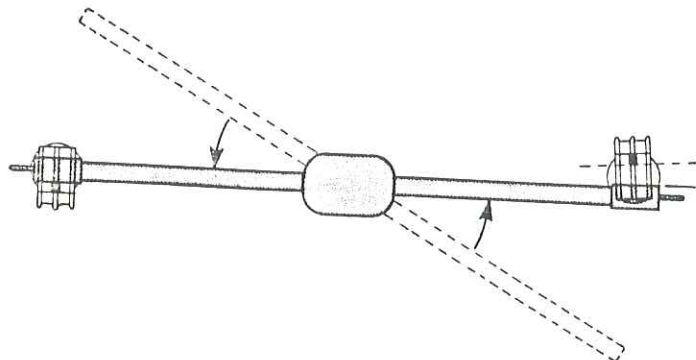


Figure C — Blade striking one jaw ahead of the other.

Corrective Procedure for Misalignments "B" and "C" on Previous Page:

If either condition "B" or "C" is encountered, and if it is certain that both jaw insulator stacks are properly plumbed, it will be necessary to adjust the rotating insulator bearing. This is done as follows:

Place the switch in an "almost-closed" position, and loosen the lower bearing housing bolts as shown.

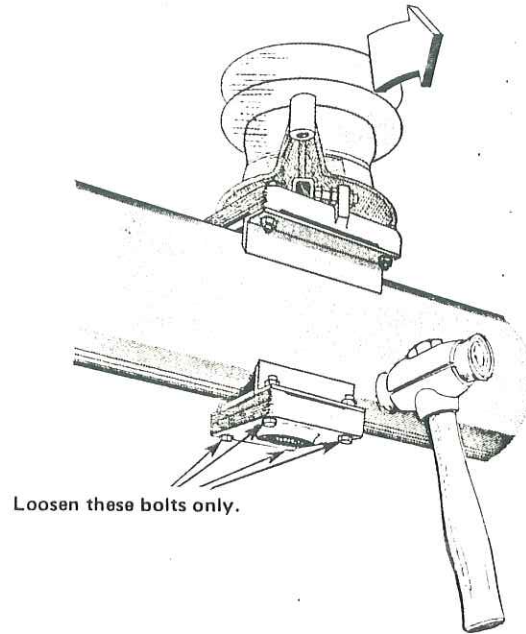


Figure D — Tap the lower bearing housing in the same direction the insulator is leaning. For example, in figure B in which the stack is leaning toward the left side of the picture, tap the housing in that direction to tilt the stack back to perpendicular, which is to the right of its present centerline.

Use a non-metallic mallet (rawhide or similar) to tap the lower housing until the blade tips are horizontal in the jaws. *Note:* Due to the height of the stack, very little movement of the bearing housing produces considerable movement of the blade tips.

Do not use excessive muscle when making this adjustment. Tap the housing only with enough force to produce incremental movements of the insulator stack. The lower bearing housing is cast aluminum, which is very strong but can break if struck too hard.

Be sure to retighten the bearing housing bolts securely.

D. BLADE TIP ENTERS JAW, BUT "WALKS OUT" WHEN ROTATING TO VERTICAL IN CONTACTS.

Corrective Procedure: First, recheck the rotating insulator to make sure it is rotating true (see figure 7). If concentric rotation is verified but the blade tip still walks out, use the jack screws on the base of the affected jaw stack to adjust the height of the jaw so that the leading edge of the blade tip touches the contact fingers first. This will establish a "bite-in" action that will assist proper contact seating. However do not allow the blade to drag across the jaw contacts during entry.

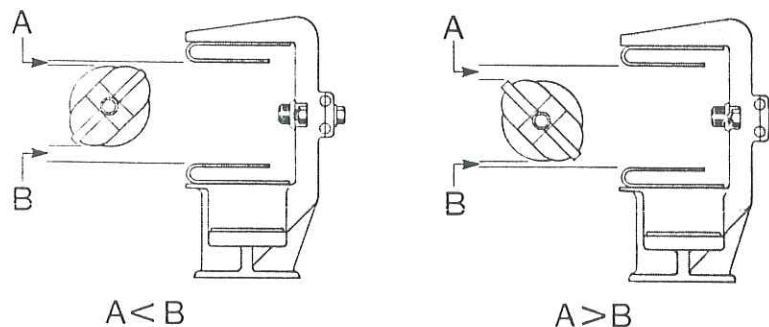


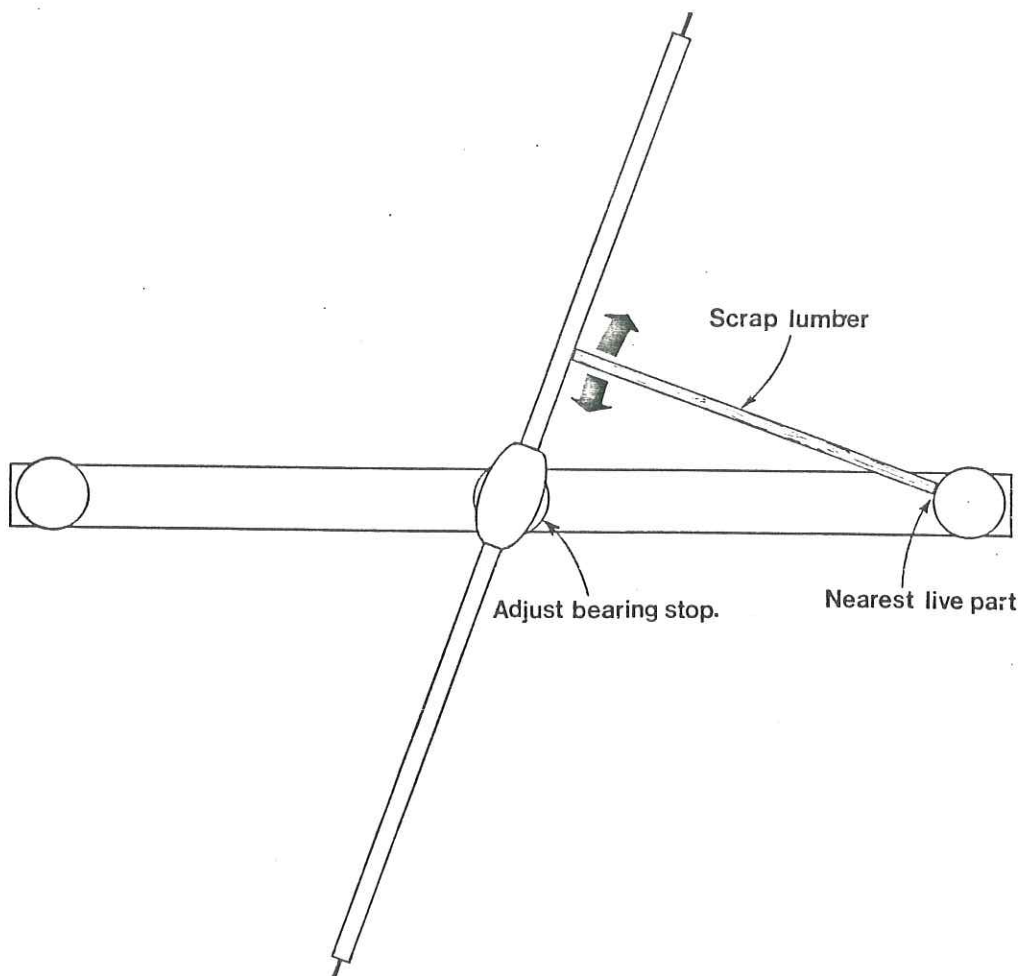
Figure — Adjust jaw up or down so that leading edge of blade tip touches the contact fingers first. However, do not allow blade contact surfaces to drag across jaw fingers during entry.



Installation Instructions Supplement

After all contact adjustments are made and the switch is operating satisfactorily - but before installing the operating mechanism pipes - check each switch pole for proper metal-to-metal open gaps. This is done in the following manner:

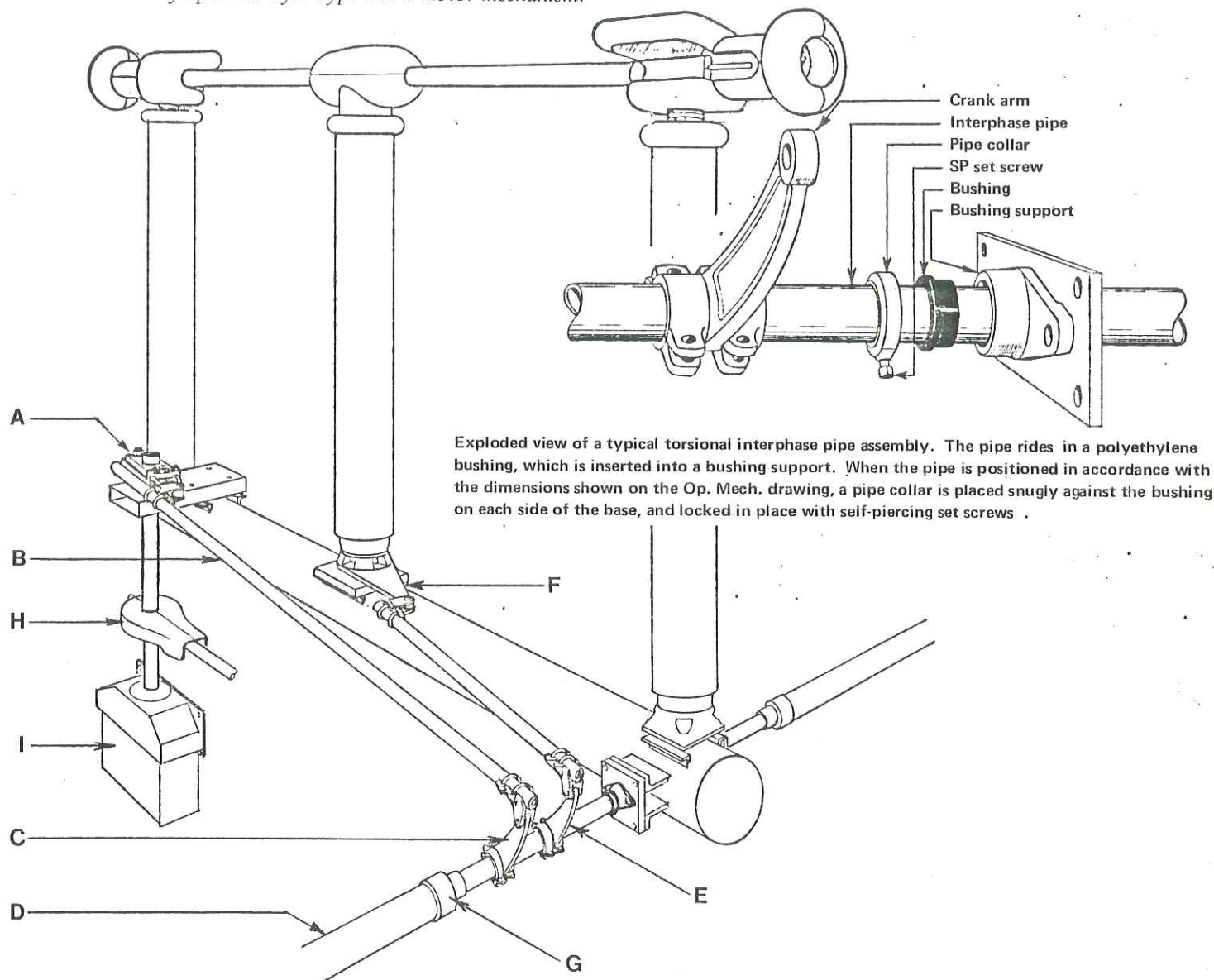
- Refer to the unit assembly drawing for the open gap dimension.
- Open the switch completely and measure the open gap. The easiest way to do this is to cut a board to the proper length and, placing it against the jaw, as shown below, move it in an arc toward the blade and hinge parts. Check both ends of each switch pole.
- If the switch blade is within the arc of the board, back off the open position stop on the insulator bearing on the base until the correct gap is obtained. Make sure the tang on the switch arm touches the stop bolt head, because this is the open position reference point when installing the operating pipes.
- Make sure that all three poles have the same open gap.





OPERATING MECHANISM INSTALLATION AND ADJUSTMENT;

This switch uses a torsional interphase pipe with crank arms to open and close all three poles of the switch at once. It is electrically operated by a Type VM-1 motor mechanism.



Sketch of the center pole switch with the operating mechanism of the line switch attached. The purpose of this illustration is to show relationships of the components, and not specific parts. For dimensions, refer to the Op. Mech. drawing.

- A - Line switch adjustable arm
- B - Line switch main drive pipe (reach rod)
- C - Line switch main drive crank arm
- D - Line switch interphase pipe
- E - Line switch crank arm (3 per switch)
- F - Line switch operating arm (switch arm)
- G - Reducer coupler
- H - Mechanical interlock (partial)
- I - Motor operator

(Do not attempt to adjust the grounding switch, if supplied, until after the line switch and its operating mechanism is installed, adjusted, and operating satisfactorily.)

VIII. INSTALLATION OF THE OPERATING MECHANISM:

1. Place the switch in the completely closed position.
2. Refer to the Operating Mechanism drawing and Figure 1, and install all brackets and support members, including (if applicable) pipe guides, motor mechanism supports, key interlock adaptors, braidless grounding devices, and vertical bearings.
3. Hang the vertical pipe through the vertical bearing as indicated below. The pipe collar above the bearing must support the entire weight of the pipe. Set the length of the pipe to the height above the top of the foundation shown on the Op. Mech. drawing. The interlock housings must be placed on the vertical pipes at this time (if applicable), but the connecting pipe between them can be installed later.

Note: When installing the operating mechanism, tighten all set screws to grip the pipe securely, but do not pierce the pipe until all adjustments are made. Match mark all parts that might slip during trial operations.

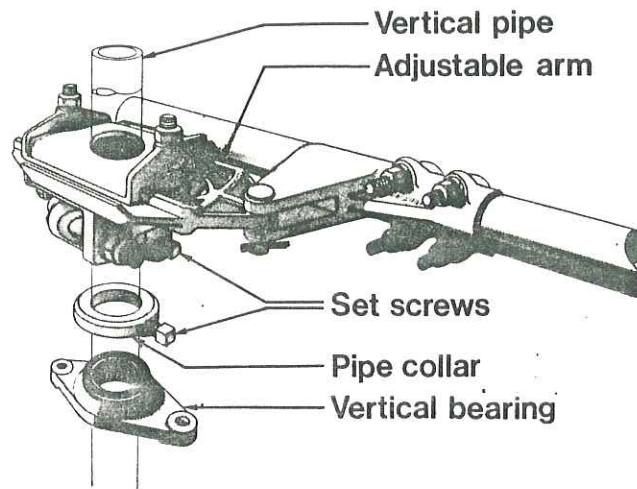


Figure 15 — Adjustable arm assembly. Pipe collar must support full weight of pipe.

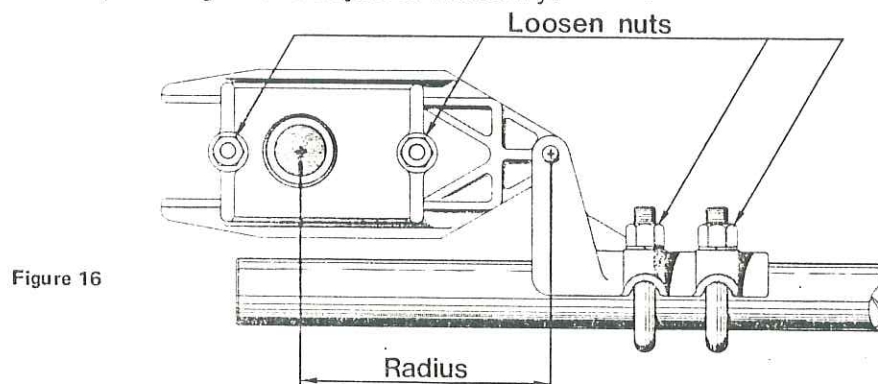
4. Mount the adjustable arm and set its position and radius as shown.
5. Attach the clevises to the reach rod and install this assembly as indicated.
6. Mount the manual gear operator. If the switch is motor operated, at this point refer to the motor mechanism installation instructions.

IX. ADJUSTMENT:

The switch is completely closed when the blade tips are completely vertical in the contacts as shown in Figure 14 on page 8. It is fully open when the operating arm on the rotating stud bearing travels to within 1/8 inch of the open position stop.

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 16.
 - 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.



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 16.
 - 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.
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 inch 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: Recommended Installation & 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.

Recommended Inspection Maintenance

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)



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 joints 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)



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

- Follow instructions for 5-year Routine Inspection and Maintenance



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