Southern States

The Quality Name in High Voltage Products

Type EV (Aluminum)
Type EVB (Copper/Bronze)
Vertical Break, Disconnect Switch
Voltage: 7.2kV - 46kV
Amps: All Ratings

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

Safety Information

DANGER

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

WARNING

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

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

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

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

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

LIMITED WARRANTY

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

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

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

Revised 7/14/15

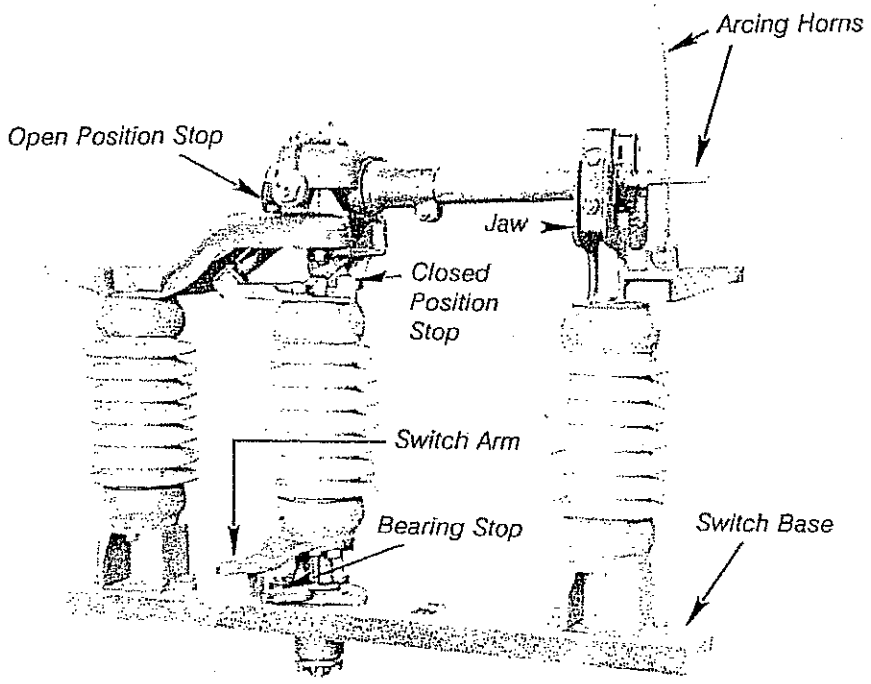

Figure 1: Identification of parts (EV 34.5 kV shown)

1. Uncrate all switch poles, remove the shipping ties and check for damage in transit. If any damage is noted, file a claim with the carrier immediately, and notify the factory.
2. Study the operating mechanism drawing supplied with each switch: there may be differences in switch poles that require their mounting in specific locations.
3. Check the mounting structure for proper elevation and levelness. If the mounting surface is not level, shims should be used to level the switch base.
4. Mount each pole in its proper location, using the bolts specified on the operating mechanism drawing. When lifting, attach slings to the SWITCH BASE, ONLY (Figure 2).

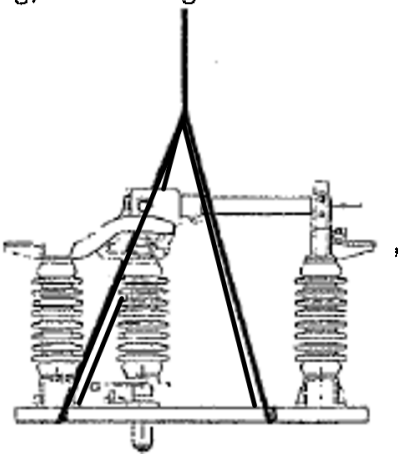

Figure 2: Recommended sling attachment

5. If applicable, attach the arcing horns as shown on the unit assembly drawing. Arcing horns should touch lightly throughout their length when the switch is being opened and closed, and not bind or rub together hard enough to cause difficult operation. Bend the stationary horn as required.

6. Manually operate each pole to check for proper contact alignment (See Figure 3). The switch is making proper contact when:

A. the blade comes down into the jaw exactly in the middle, without dragging on either side;
B. the blade tip is centered in the contacts fore and aft;
C. the jaw contact leaves make full linear contact along both surfaces of the blade tip;
D. and the blade tip stops rotating when horizontal.

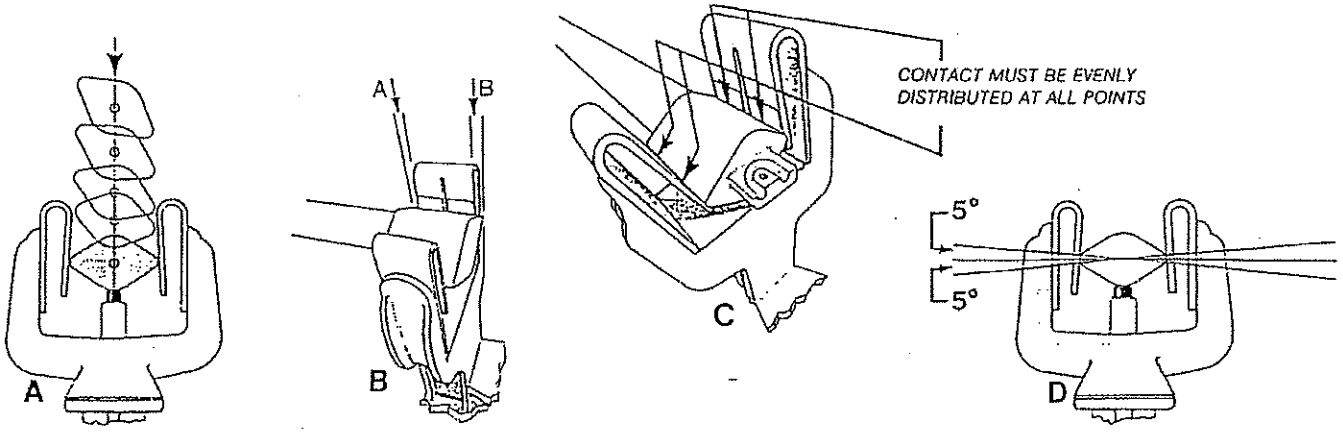

Figure 3: A - Proper blade motion. B - Lengthwise contact alignment (A must equal B). C - Axial alignment. Evenly distributed contact at all points, on both sides. D - Blade tip horizontal in switch jaw.

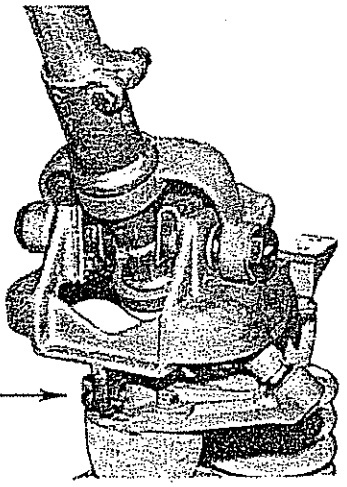

Figure 4: Closed position stop ⟶

ADJUSTMENTS: The bolt holes in the base that mount the jaw insulator are slotted longitudinally, and the bolt holes in the other end of the base are slotted transversely. to adjust "A" or "B" above, loosen the appropriate bolts and shift the insulator(s) as required.

To adjust for condition "C", loosen the bolts that mount the jaw to the insulator top and rotate the jaw against the bolt hole tolerances.

The closed position stop bolt (Figure 4) controls the blade rotation. Adjust it, and the bearing stop bolt on the base as necessary.

IMPORTANT: Be sure to check for "A", "B" and "C" <u>after</u> conductors are installed. Conductor loads can cause contact misalignments.

GENERAL INSTALLATION NOTE: The live part open and closed position stops are properly adjusted when touching lightly. The bearing stops should not touch, but have between 1/16" and 1/8" clearance.

7. The switch is shipped with the standard blade openings shown in Figure 5. However, for vertical and underhung switches, the blade open angles are easily adjustable with the open position stop. Any adjustment to the live part stops will require resetting the bearing stops.

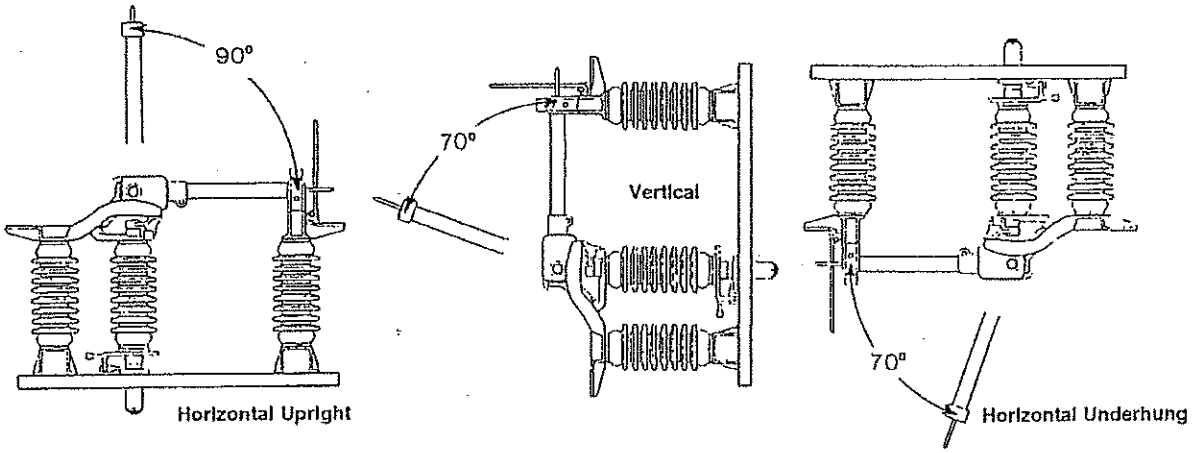

Figure 5: Blade open angles

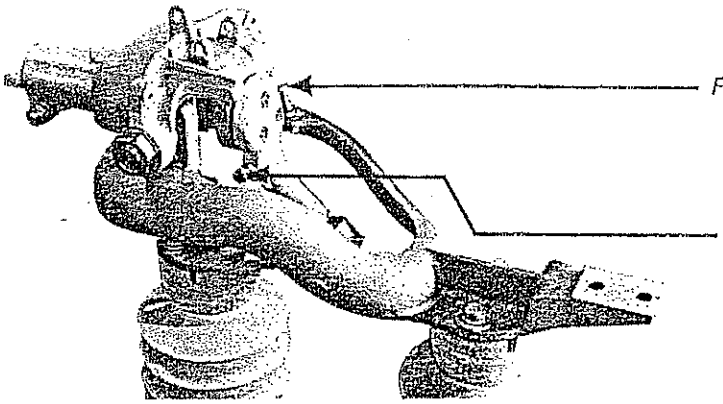

Figure 6: Open position stop

Figure 7: "Kickoff bolt"

8. The "kickoff bolt" is an operating setting made and pinned at the factory. It should not be tampered with.
9. Unpack and lay out all operating mechanism components--pipes, brackets, clevises, bearing, adjustable arm, etc.--and check these items against the bill of material on the operating mechanism drawing.
10. Install and adjust the operating mechanism as directed on the following pages.

OPERATING MECHANISM INSTALLATION

Manual and Motor Operated

The same general method is used to operate all types of switches, the only difference being in relatively minor details made necessary by different types of structures, different requirements for vertical pipe rotations, clearances, etc.

Figure 8 shows a 34.5 kV switch, and can be used as an example of operating mechanisms for all vertical break switches, regardless of mounting positions. The operating pipes may be arranged in any of four basic ways (Figure 9); however, the operating principle remains the same, and the method of installation and adjustment is identical.

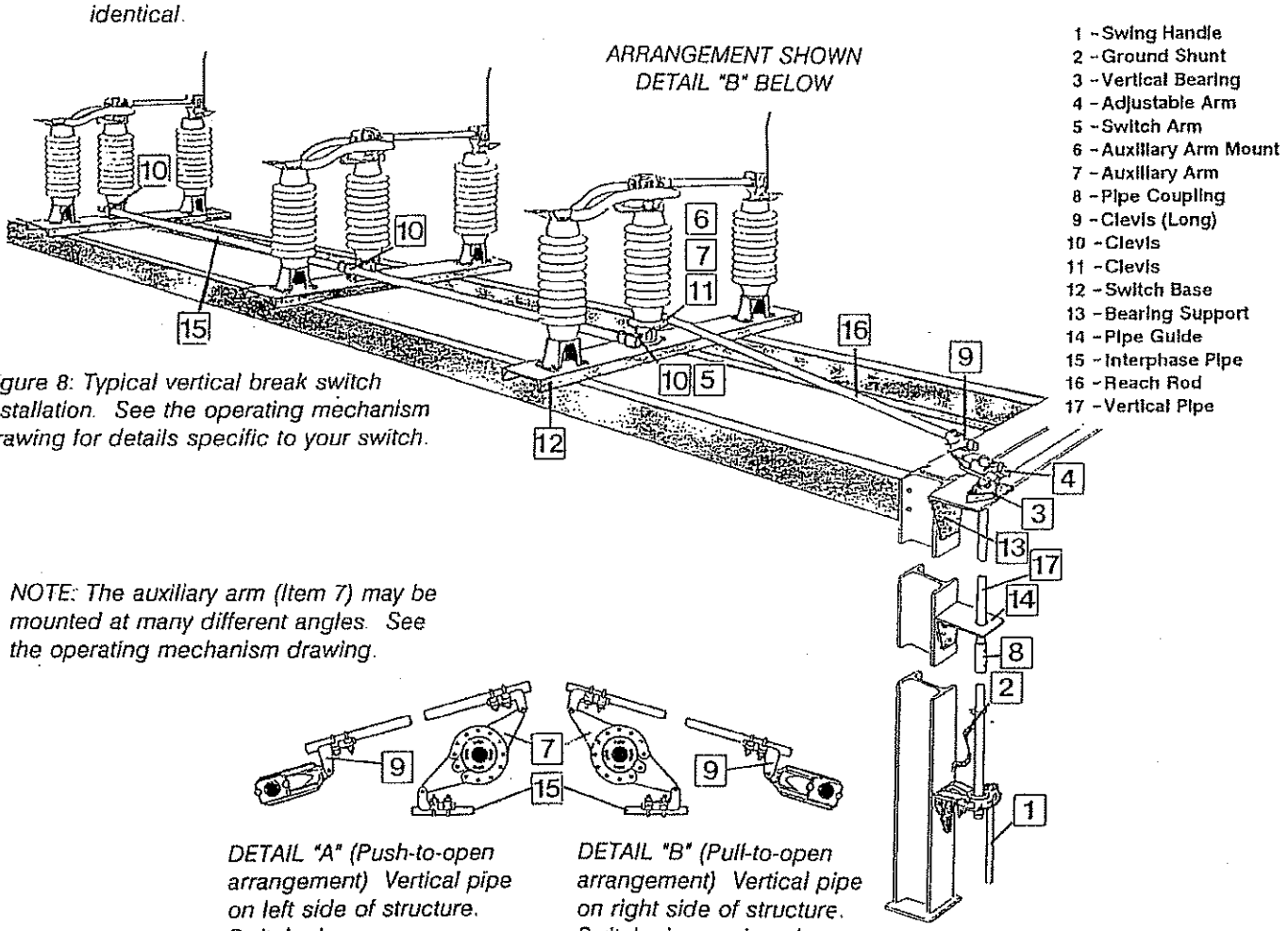

Figure 8: Typical vertical break switch installation. See the operating mechanism drawing for details specific to your switch.

NOTE: The auxiliary arm (Item 7) may be mounted at many different angles. See the operating mechanism drawing.

DETAIL "A" (Push-to-open arrangement) Vertical pipe on left side of structure. Switch shown open

DETAIL "B" (Pull-to-open arrangement) Vertical pipe on right side of structure. Switch shown closed.

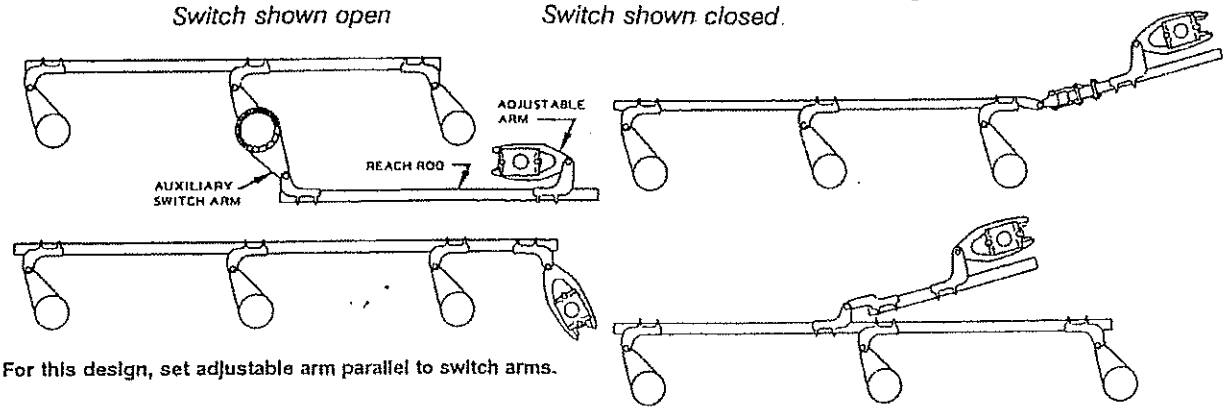

Figure 9: Alternate operating schemes that may be used.

Refer to the Operating Mechanism Drawing provided with your switch, and follow these steps:

1. Have all switch poles completely closed. Install all components shown on Operating Mechanism Drawing, including interphase pipe, vertical pipe, all brackets, bushings, etc., and the adjustable crank arm.

   IMPORTANT: The weight of the vertical pipe must be supported entirely by the pipe collar above the vertical bearing. The housing of neither the manual gear operator nor the motor operator was designed to support this weight. Additionally, if the vertical pipe is not suspended at the length shown on the drawing, the decoupler mechanism will jam.

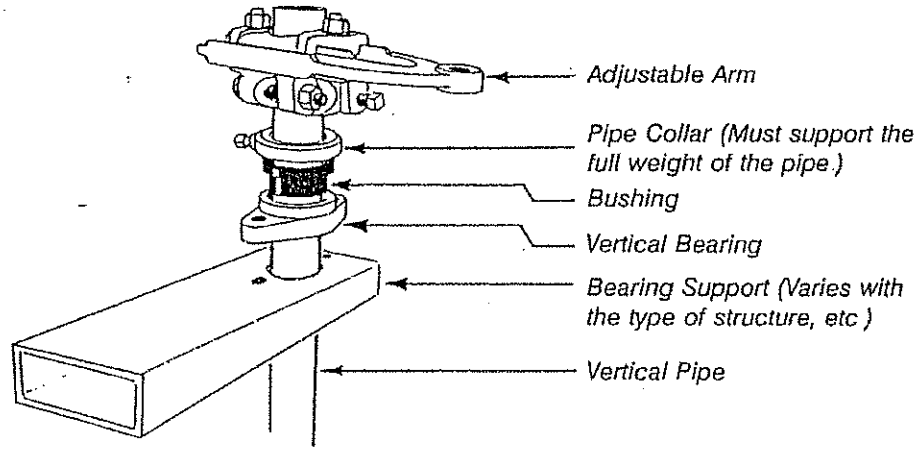

Figure 10: The pipe collar must support the full weight of the pipe.

   GENERAL INSTALLATION NOTE: When a switch uses an auxiliary switch arm, installation will be easier if this pole is adjusted before installing the interphase pipe. This will eliminate trying to coordinate and adjust all three poles at once.

   GENERAL INSTALLATION NOTE: If there are self-piercing set screws, tighten them only enough to grip the pipe (match mark to check for slippage), and drive them in only after adjustments are completed.

2. When all components are installed, if a motor operator is used, at this point refer to its installation instructions for mounting, checkout procedure, and trial operations.

OPERATING MECHANISM ADJUSTMENT

If a motor operator is used, DO NOT operate electrically until the following adjustments are complete.

The one factor most important to smooth, synchronized operation of all three switch poles, the length of the adjustable arm shown on the Operating Mechanism Drawing, is by necessity a calculated dimension. Most likely, this setting will require minor adjustment. To adjust precisely:

1. Although there may be *occasional* exceptions, the adjustable arm should travel 180° from toggle closed to toggle open. Manually test operate.
2. If the switch does not fully open, the radius of the arm is too short. To correct:
   A. Check first to see that nothing has slipped.
   B. Return the switch to the closed position.
   C. Loosen the adjustable arm and clevis bolts as shown below.
   D. Lengthen the radius of the adjustable arm about ¼" and allow the clevis to reposition itself the same distance (shortening the pipe).
   E. Test operate again, and adjust as necessary.

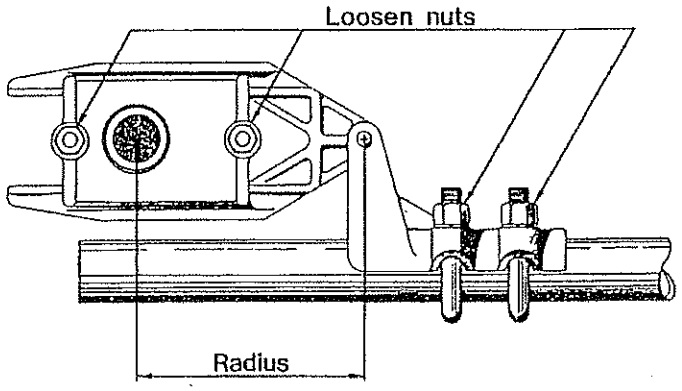

Figure 11: Changing the radius of the adjustable arm

3. If the switch is fully open before the full 180° travel of the arm, the radius of the adjustable arm too long. 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 show above.
   D. Shorten the radius of the adjustable arm about ¼" and allow the clevis to reposition itself the same distance (lengthening the pipe).
   E. Test operate again, and adjust as necessary.

   All three poles of the switch should operate simultaneously. Slight shifting of the clevises along the length of the interphase pipe may be necessary to coordinate all three poles.

4. When the switch is completely adjusted, securely tighten all bolts, and tighten all set screws until the pipe walls are pierced. (For heavy wall pipe, drill the set screw holes, using the threaded drill guides supplied, and a ¼" drill.)

This concludes the installation and adjustment of the line switch. For installing grounding switches or other equipment, refer to their individual instructions. If you require further information on this equipment, please get in touch with your local Southern States representative, or the factory.

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INSTALLING DIRECT OPERATING MECHANISMS

The direct operating mechanism is sometimes used on lower rated switches (usually 69 kV and below). It is a much simpler method of switch operation, since the vertical operating pipe is attached directly to a bearing shaft that extends below the base of one of the switch poles.

IMPORTANT: Be sure to make a final check of the contact alignment shown on page 2 after installing conductors to both ends of the switch.

1. Put all the poles in the fully closed position.
2. Install the operating components as shown on the operating mechanism drawing. This will include the interphase pipe, universal coupling, vertical pipe guide(s), vertical pipe and swing handle or gear operator. (For a motor operator, at this point refer to the motor operator instructions.) Match mark attachment points that might slip during trial operations, but do not drive in self-piercing set screws, yet.

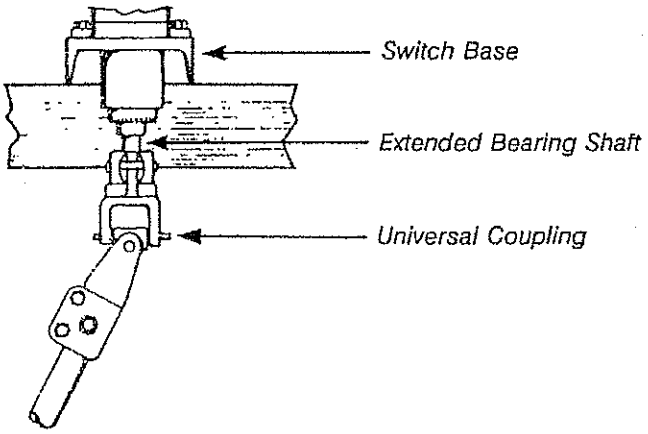

Figure 12: Vertical pipe attachment to the universal coupling

3. Manually test operate. The rotation required to open and close the switch should match the rotation between the stops of the operator. These stops are factory set, but can be reset as required.
4. The clevises on the interphase pipe may have to be shifted slightly to synchronize all three switch poles.
5. When the switch is completely adjusted, 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 ¼" bit.)

This concludes the installation and adjustment of the line switch For installing grounding switches or other equipment, refer to their individual instructions. If you require further information on this equipment, please get in touch with your local Southern States representative, or the factory.

MAINTENANCE

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

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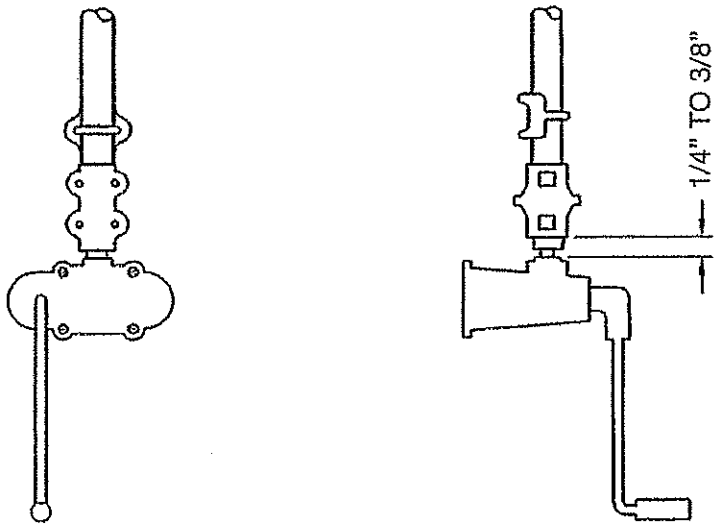
Installation & Adjustment Procedures

If a Manual Geared Operator is furnished:

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



Type HOGO Geared Operator Installation

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

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

Place all switch poles in the fully closed position

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

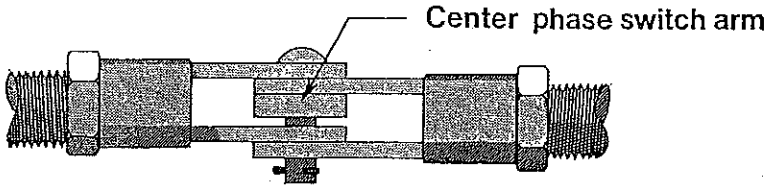
The Adjustable Arm setting indicated on the Operating Mechanism Drawing is a calculated dimension. Adjust as required for exact setting.

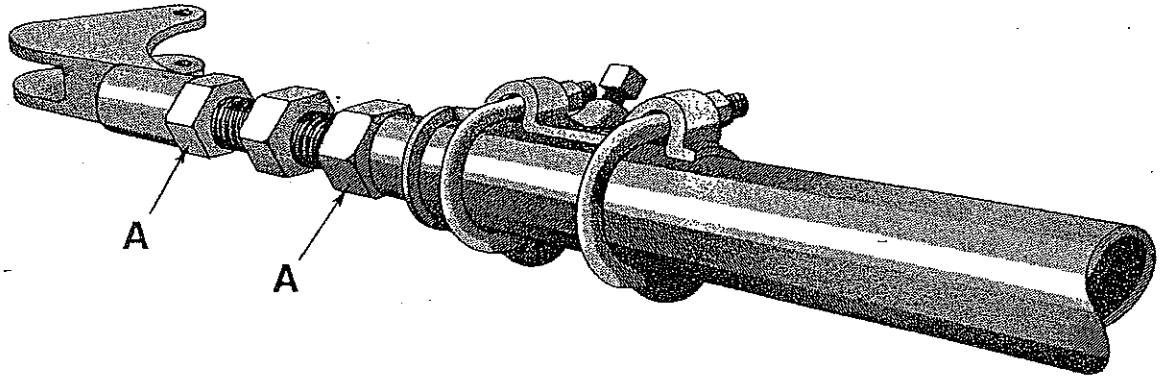
Manually test operate

General instructions for threaded clevises

Southern States

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



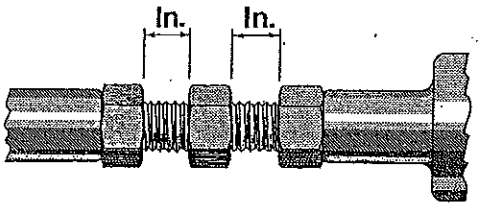


Operating mechanism adjustments consist mainly of incremental lengthenings and/or shortenings of the pipes that connect the switch arms together. To make these adjustments, simply loosen both jam nuts "A" and screw the stud in or out as required. Be sure to retighten both jam nuts securely.

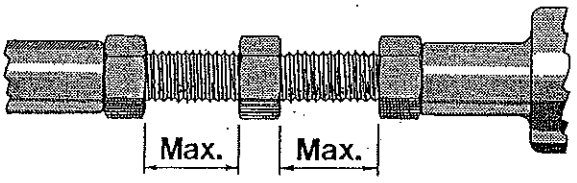
CAUTION! DANGER: Do not screw the stud out of the clevises. This could cause the pipe to fall, resulting in serious injury to personnel below.

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

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



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



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Phone: 770-946-4562
Fax: 770-946-8106
E-mail: support@southernstatesllc.com
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