Installation and Operation

Table of Contents

★ This instruction sheet applies to 34.5-kV and 46-kV switches with catalog number supplement "-R10," and to 69-kV switches with no catalog number supplement. For 34.5-kV and 46-kV switches with catalog number supplement "-R11," please refer to your local S&C Sales Office or to Instruction Sheet 761-510 on **sandc.com**.

Qualified Persons

⚠ WARNING

Only qualified persons who are knowledgeable in the installation, operation, and maintenance of overhead and underground electric distribution equipment, along with all associated hazards, may install, operate, and maintain the equipment covered by this publication. A qualified person is someone who is trained and competent in:

- The skills and techniques necessary to distinguish exposed live parts from nonlive parts of electrical equipment
- The skills and techniques necessary to determine the proper approach distances corresponding to the voltages to which the qualified person will be exposed
- The proper use of special precautionary techniques, personal protective equipment, insulated and shielding materials, and insulated tools for working on or near exposed energized parts of electrical equipment

These instructions are intended ONLY for such qualified persons. They are not intended to be a substitute for adequate training and experience in safety procedures for this type of equipment.

Read this Instruction Sheet

NOTICE

Thoroughly and carefully read this instruction sheet and all materials included in the product's S&C Instruction Handbook before installing or operating your S&C Alduti-Rupter Switch. Familiarize yourself with the Safety Information and Safety Precautions on pages 4 through 6. The latest version of this publication is available online in PDF format at **sandc.com/en/support/product-literature/.**

Retain this Instruction Sheet

This instruction sheet is a permanent part of your S&C Alduti-Rupter Switch. Designate a location where you can easily retrieve and refer to this publication.

Proper Application

⚠ WARNING

The equipment in this publication is only intended for a specific application. The application must be within the ratings furnished for the equipment. Ratings for the Alduti-Rupter Switch listed in the ratings table in Specification Bulletin 761-31. The ratings are also on the nameplate affixed to the product.

In most applications, Alduti-Rupter Switches are capable of switching rated continuous load currents at full voltage. The ratings for the particular switch are listed on nameplates attached to the operating handle and the switch. See Figure 1.

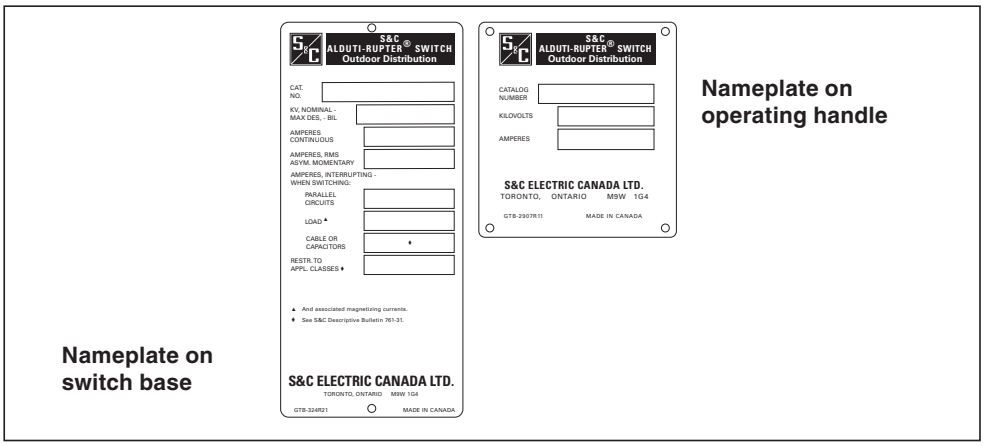


Figure 1. Switch nameplates with ratings.

These interrupter switches are not intended for breaking fault currents.

The installation procedure described in this document is also applicable to Three-Pole Double-Break Style Alduti-Rupter Switches with Power Fuses.

Operating Considerations

Circuit making and breaking is involved in the normal operation of these interrupter switches, and partial or precautionary opening or closing of the switch should not be attempted. If the switch is covered in ice or snow, do not "chop" the switch between the open and closed position to dislodge the ice.

To operate the switch, swing the handle through its full stroke without hesitation. Do not assume the operating handle position indicates the open or closed position of the interrupter switch blades. After opening or closing the switch, always make a visual check of the blade position to determine that the switch blades are in the intended position, then tag or padlock the operating handle in accordance with standard system operating practices. In all cases, make sure the operating handle is locked before "walking away" from the switch.

Warranty

The warranty and/or obligations described in S&C's Price Sheet 150 "Standard Conditions of Sale – Immediate Purchasers in the United States" (or Price Sheet 153, Standard Conditions of Sale – Immediate Purchasers Outside the United States) plus any special warranty provisions, as set forth in the applicable product-line specification bulletin, are exclusive. The remedies provided in the former for breach of these warranties shall constitute the immediate purchaser's or end user's exclusive remedy and a fulfillment of the seller's entire liability. In no event shall the seller's liability to the immediate purchaser or end user exceed the price of the specific product that gives rise to the immediate purchaser's or end user's claim. All other warranties, whether express or implied or arising by operation of law, course of dealing, usage of trade or otherwise, are excluded. The only warranties are those stated in Price Sheet 150 (or Price Sheet 153), and THERE ARE NO EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ANY EXPRESS WARRANTY OR OTHER OBLIGATION PROVIDED IN PRICE SHEET 150 (OR PRICE SHEET 153) IS GRANTED ONLY TO THE IMMEDIATE PURCHASER AND END USER, AS DEFINED THEREIN. OTHER THAN AN END USER, NO REMOTE PURCHASER MAY RELY ON ANY AFFIRMATION OF FACT OR PROMISE THAT RELATES TO THE GOODS DESCRIBED HEREIN, ANY DESCRIPTION THAT RELATES TO THE GOODS, OR ANY REMEDIAL PROMISE INCLUDED IN PRICE SHEET 150 (or PRICE SHEET 153.)

Warranty Qualifications

The standard warranty is applicable to the S&C Alduti-Rupter Switch detailed in this instruction sheet except when it is power operated using a switch operator of other than S&C manufacture.

Understanding Safety-Alert Messages

Several types of safety-alert messages may appear throughout this instruction sheet and on labels and tags attached to your S&C Alduti-Rupter Switch. Familiarize yourself with these types of messages and the importance of these various signal words:

⚠ DANGER

"DANGER" identifies the most serious and immediate hazards that will likely result in serious personal injury or death if instructions, including recommended precautions, are not followed.

⚠ WARNING

"WARNING" identifies hazards or unsafe practices that can result in serious personal injury or death if instructions, including recommended precautions, are not followed.

⚠ CAUTION

"CAUTION" identifies hazards or unsafe practices that can result in minor personal injury if instructions, including recommended precautions, are not followed.

NOTICE

"NOTICE" identifies important procedures or requirements that can result in product or property damage if instructions are not followed."

Following Safety Instructions

If you do not understand any portion of this instruction sheet and need assistance, contact your nearest S&C Sales Office or S&C Authorized Distributor. Their telephone numbers are listed on S&C's website **sandc.com**. Or call the S&C Global Monitoring and Support Center at 1-888-762-1100.

NOTICE

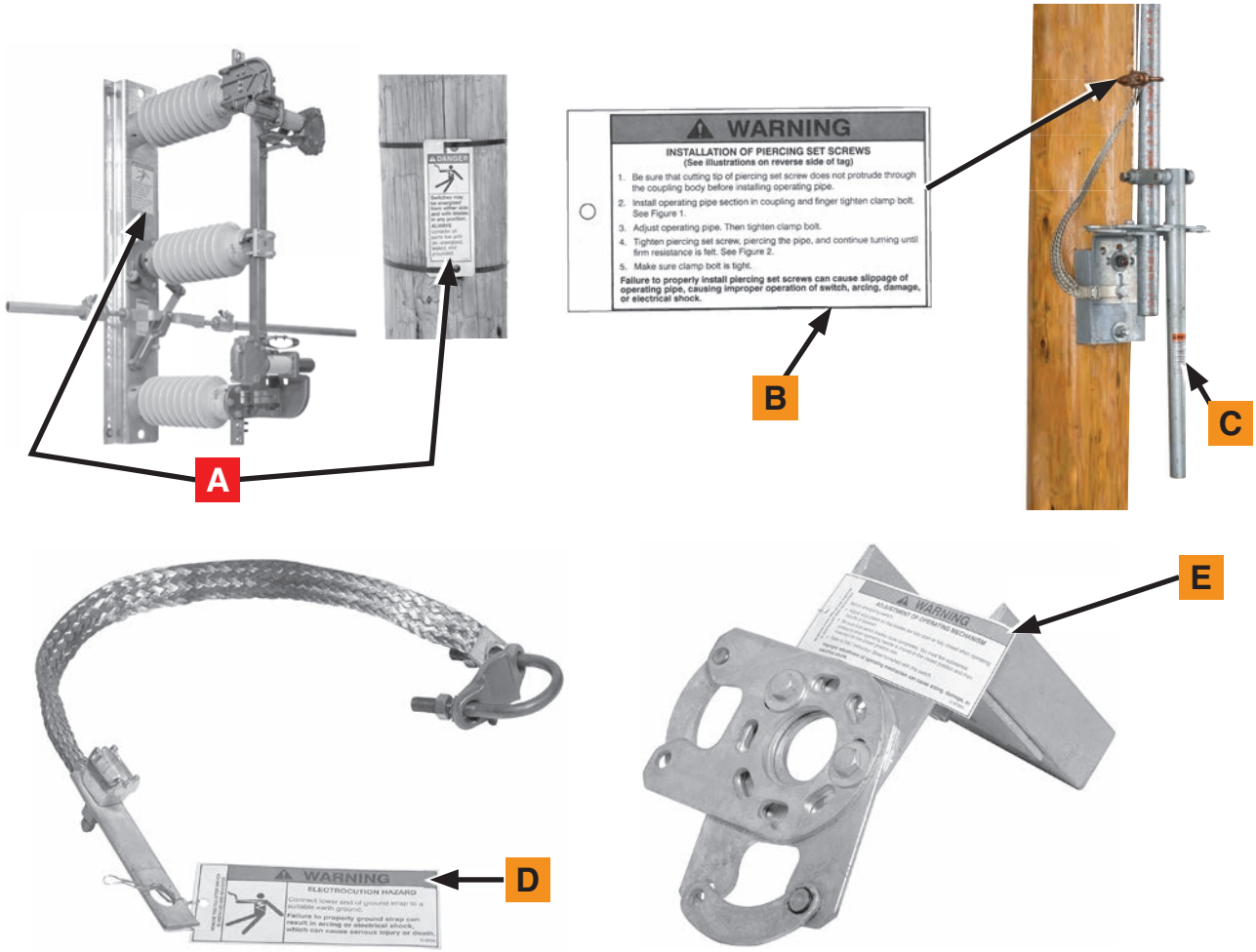
Read this instruction sheet thoroughly and carefully before installing your S&C Alduti-Rupter Switch.

Replacement Instructions and Labels

If you need additional copies of this instruction sheet, contact your nearest S&C Sales Office, S&C Authorized Distributor, S&C Headquarters, or S&C Electric Canada Ltd.

It is important that any missing, damaged, or faded labels on the equipment be replaced immediately. Replacement labels are available by contacting your nearest S&C Sales Office, S&C Authorized Distributor, S&C Headquarters, or S&C Electric Canada Ltd.

Location of Safety Labels



Reorder Information for Safety Labels

Location	Safety Alert Message	Description	Number
A	⚠ DANGER	Electrocution Hazard	G-6580-1
B	⚠ WARNING	Piercing Set Screws	G-3176R1●
C	⚠ WARNING	Handle Operation	G-4400R5
D	⚠ WARNING	Electrocution Hazard—Grounding Strap	G-6596●
E	⚠ WARNING	Adjustment of Operating Mechanism	G-5577R2

● This part is a tag that is to be removed and discarded after the switch is installed and adjusted.

Safety Precautions

⚠ DANGER

Alduti-Rupter Switches operate at high voltage. Failure to observe the precautions below will result in serious personal injury or death.

Some of these precautions may differ from company operating procedures and rules. Where a discrepancy exists, users should follow their company's operating procedures and rules.

1. **QUALIFIED PERSONS.** Access to switches and controls must be restricted only to qualified persons. See "Qualified Persons" on page 2.
2. **SAFETY PROCEDURES**. Always follow safe operating procedures and rules.
3. **PERSONAL PROTECTIVE EQUIPMENT.** Always use suitable protective equipment such as rubber gloves, rubber mats, hard hats, safety glasses, and flash clothing in accordance with safe operating procedures and rules.
4. **SAFETY LABELS AND TAGS.** Do not remove or obscure any of the "DANGER," "WARNING," "CAUTION," or "*NOTICE*" labels and tags. Remove tags ONLY if instructed to do so.
5. **ENERGIZED COMPONENTS.** Always consider all parts live until de-energized, tested, and grounded.
6. **LOAD-INTERRUPTER SWITCH POSITION.** Always confirm the open/close position of load-interrupter switches by visually observing the position of the blades. Switches may be energized from either side and with the blades in any position.
7. **MAINTAINING PROPER CLEARANCE.** Always maintain proper clearance from energized components.
8. **OPERATION**. Circuit making and breaking is involved in the normal operation of this interrupter switch and, as a result, "partway" opening or closing is undesirable. To operate, swing the operating handle through its full travel vigorously and without hesitation. See the "Operation" section on page 32.

Inspection

Examine the shipment for external evidence of damage as soon after receipt as possible, preferably before removal from the carrier's conveyance. Check the bill of lading to make sure the listed shipping skids, crates, and containers are present:

If there is visible loss and/or damage:

1. Notify the delivering carrier immediately.
2. Ask for a carrier inspection.
3. Note condition of shipment on all copies of the delivery receipt.
4. File a claim with the carrier.

If concealed damage is discovered:

1. Notify the delivering carrier within 15 days of receipt of shipment.
2. Ask for a carrier inspection.
3. File a claim with the carrier.

Also notify S&C Electric Company in all instances of loss and/or damage.

Packing

Study the erection drawing carefully and check the bill of materials to be sure all parts are at hand. When a standard mounting arrangement is specified, the shipment includes:

- Three switch poles
- Operating-pipe sections for interphase, horizontal-connecting, and vertical sections (The switch may be furnished "less operating pipe," if specified)
- Operating-mechanism components, such as handle, guide bearings, outboard bearing,and couplings—each tagged and keyed to the bill of material for ready identification
- The erection drawing that indicates the standard minor modifications available for the standard mounting arrangement

The components included with these modifications are shown on the erection drawing bill of material under the specified "-SX" suffix. They include:

-S1 One tubular fiberglass insulating section in vertical operating shaft

-S2 One Cypoxy™ Insulator unit in vertical operating shaft

-S3 Insulated interphase sections and one tubular fiberglass insulating section in the vertical operating shaft

-S4 Insulated interphase sections and one Cypoxy Insulator unit in the vertical operating shaft

-S5 Two-inch IPS pipe—required for a rotating-type operating mechanism vertical shaft when the shaft exceeds three 10-foot–4-inch (315-cm) sections

-S6 Key interlock—single lock for a "locked-open" application

-S6L Provisions only for key interlocks—mounting bracket for interlock

-S7 Auxiliary contact switch with 4 N/O and 4 N/C contacts (600 Vac, 20 A)

-S8 Provision for power operation of pole-mounted switches by S&C Switch Operator—Type AS-1A

-S9 Provision for power operation of steel-structure or pedestal-mounted switches by S&C Switch Operator—Type AS-1A (for 34.5 kV and 46 kV switches) or Type LS-2 (for 69 kV switches)

-S16 Provision for power operation of pole-mounted switches by S&C 6801M Automatic Switch Operator (34.5 kV and 46 kV switches)

Drawing RD-10004 (for 34.5 kV and 46 kV switches) or RD-10012 (for 69 kV switches), detailing the various modifications, is included in addition to the erection drawing.

Power Operation: If suffix "-S8"or "-S9" is specified, S&C Instruction Sheets 769-500 and 769-501, "S&C Switch Operators—Type AS-1A," are included with the switch operator shipment for 34.5 kV and 46 kV switches. S&C Instruction Sheets 753-500 and 753-501, "S&C Switch Operators—Types LS-1 and LS-2," are included with the switch operator shipment for 69-kV switches. Instruction Sheets 769-500 and 769-501 (or 753-500 and 753-501 where applicable) cover installation, operation, and adjustment of the appropriate switch operator and should be used in conjunction with this instruction sheet where applicable. If suffix "-S16" is specified, associated S&C Instruction Sheets for the 6801M Automatic Switch Operator are included with the switch operator shipment. Not all mounting arrangements are suitable for power operation; consult your nearest S&C Sales Office for details.

Fused Interrupter Switches: The installation procedure described in this document is also applicable to Three-Pole Double-Break Style Alduti-Rupter Switches with Power Fuses.

Handling

The crate the switch pole-units are packed in is designed to be moved and lifted using a lift truck. Raised slots in the bottom of the crate are provided for a lift truck's forks.

NOTICE

To minimize time-consuming final adjustments after installation, make sure the switch poles are in their fully **Closed** position during installation of the interphase and vertical operating pipe sections. S&C recommends tying the switch blades to their jaw contacts with wire or a cable tie.

⚠ WARNING

DO NOT lift the switch pole-units by rigging on the "live parts" or subject these parts to undue stress from slings or fall lines.

Lifting the switch by the live parts will damage the switch. Rough handling may cause damage to the blades and contacts.

Failure to lift the switch properly can result in switch damage, causing improper operation, arcing or electrical shock.

Before Starting

NOTICE

When mounting to a wood structure, a Belleville washer must be used between the square washer and the nut to maintain fastener tightness in the event of wood shrinkage. See Figure 2.

NOTICE

Drawings for standard mounting arrangements show only the minimum or suggested locating dimensions for the outboard-bearing assembly, vertical-operating pipe guide bearings, and the operating handle assembly. Specific locations are to be determined either at the job site or by the user's engineering department.

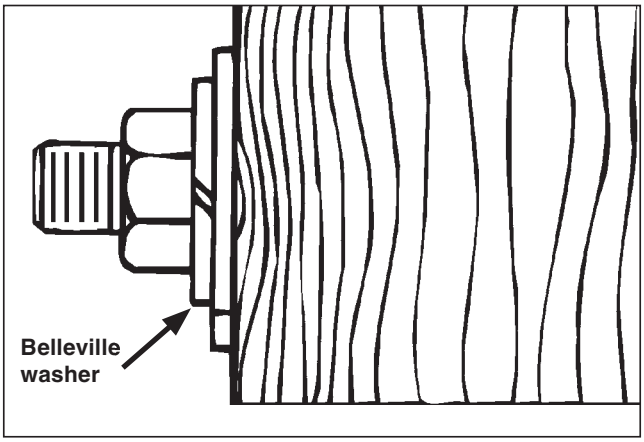


Figure 2. Install a Belleville washer between the nut and square washer.

Operating Pipe Preparation

Operating pipes can be cut to length (if not precut at the factory) before transporting the switch to the job site. Cutting dimensions are shown on the erection drawing.

Uncrating the Switch

STEP 1. Remove the switch poles and outboard bearing assembly (or assemblies) from their crates, and arrange them on the ground in the same order in which they will be mounted on the pole or structure. Protect the bearings from contamination by dirt, mud, oil, etc. If necessary, use blocks to keep the bearings clear of the ground.

Attaching Couplings to Switch Poles

STEP 2. Attach pipe couplings to the toggle mechanism of each switch pole. Each toggle mechanism includes a ¼-inch and a ¾-inch spacer. Use one or both spacers, depending on the number and type of coupling(s). See Figure 3 as well as the instruction tag attached to the toggle mechanism.

Be sure to attach the *adjustable* pipe couplings to the correct switch pole. See the erection drawing.

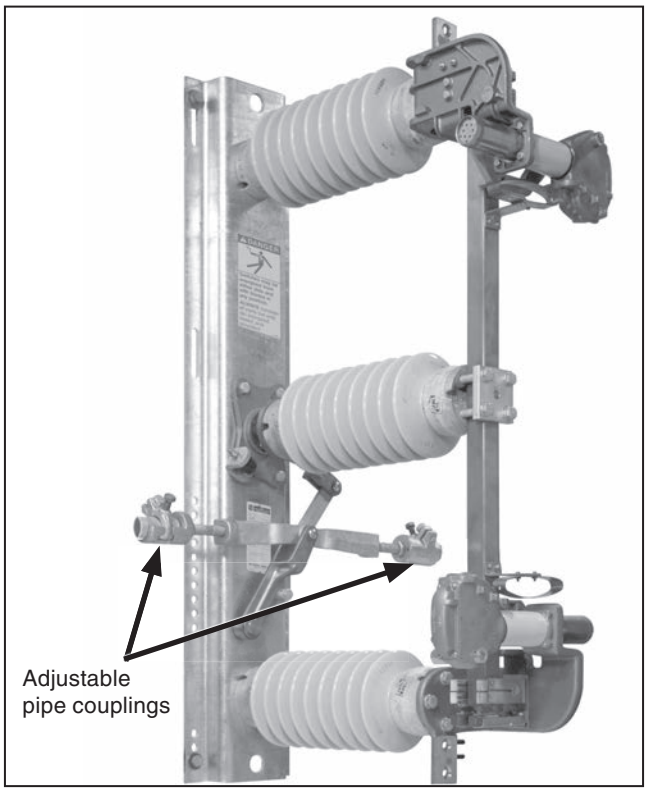


Figure 3. Attach the pipe couplings to the switch toggle mechanism.

Attaching Couplings to Outboard Bearings

STEP 3. Attach pipe coupling(s) to the outboard bearing assembly (assemblies).

Attach a pipe-to-hexagon type universal coupling to the hexagon shaft on the underside of the outboard bearing assembly. See Figure 4 as well as Detail A on the erection drawing.

For mounting configurations with the outboard bearing assembly mounted *between* switch poles, attach one end of the drag link to the crank arm. Attach the specified offset coupling to the other end of the drag link. See Figures 5 and 6.

For triangular-upright and tiered-upright mounting configuration switches, also attach pipe-to-hexagon type universal couplings for connecting the outboard bearing assemblies.

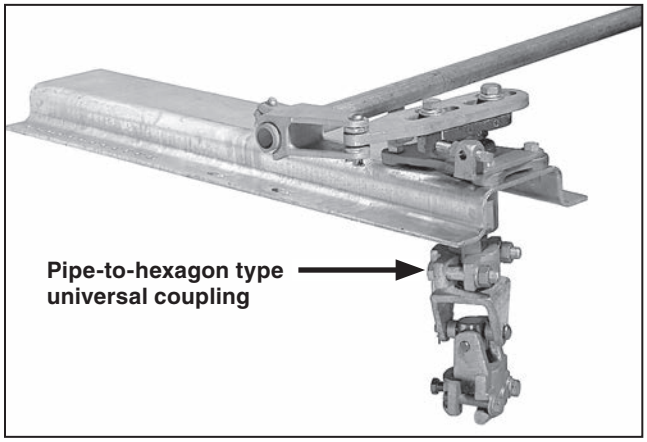


Figure 4. Typical outboard bearing configuration, upright mounted outboard of switch pole units.

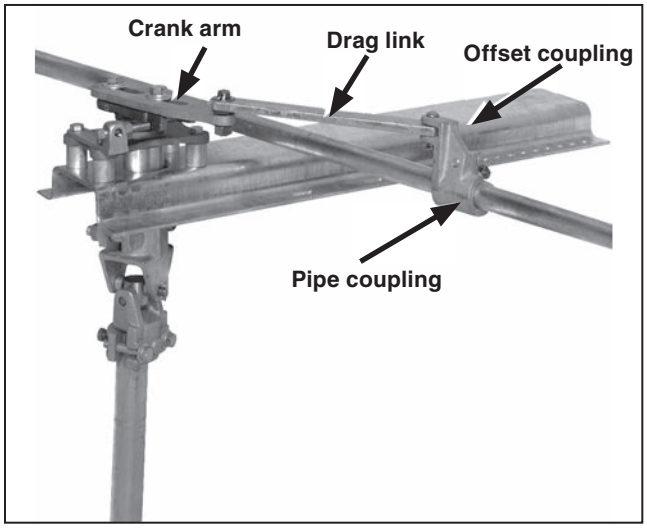


Figure 5. Typical outboard bearing configuration, upright mounted between pole-units, with drag link (flat-bar type).

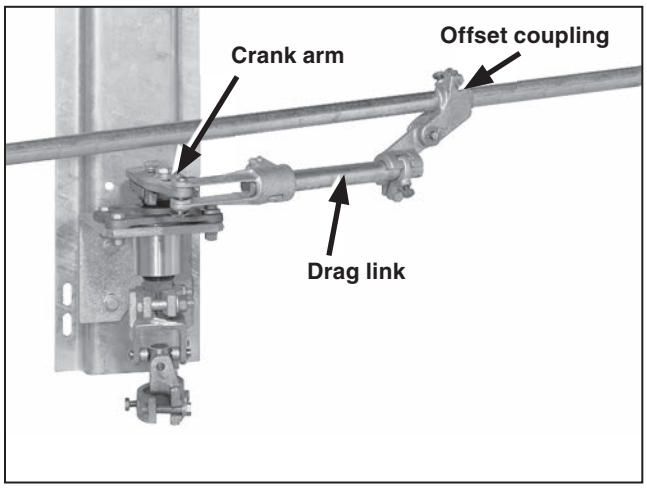


Figure 6. Typical outboard bearing configuration, vertically mounted between pole-units, with drag link (pipe type).

Lifting the Switch

⚠ WARNING

DO NOT lift the switch poles by rigging to the live parts. Avoid allowing the switch poles to swing while lifting.

Lifting the switch by the live parts will damage the switch. Rough handling may cause damage to the blades and ≠contacts.

Failure to lift the switch properly can result in switch damage, causing improper operation, arcing or electrical shock.

STEP 4. To minimize time-consuming final adjustments, make sure each switch pole-unit is fully closed and its toggle mechanism is against the closed stop. Tie the switch blades to their stationary main contact assemblies and the toggle mechanisms to their stops. See Figure 7.

STEP 5. Hoist the outboard bearing assembly (assemblies) and bolt them into position as shown on the erection drawing See Figure 8.

NOTICE

Make sure the surfaces on which the switch pole bases are mounted are flat and level. Mounting to an uneven surface can cause the bases to twist, placing undue strain on the insulators and throwing the blades out of alignment, resulting in difficulties operating the switch. Use shims as required.

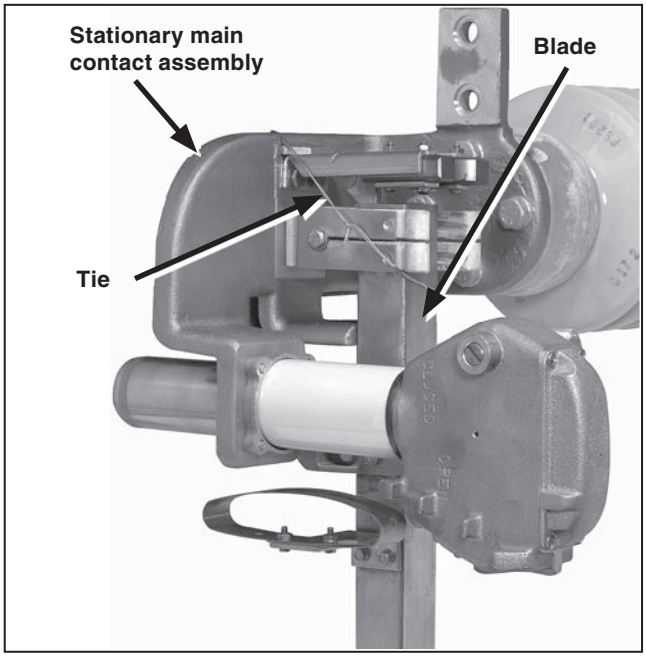


Figure 7. Tie the switch blade to the stationary contact assembly.

Figure 8. Hoist the outboard-bearing assembly into position.

STEP 6. Hoist the switch pole-units and bolt them into position, as shown on the erection drawing. See Figure 9.

STEP 7. Make sure the outboard bearing crank-arm(s) touches its stop bolt. See Figure 10.

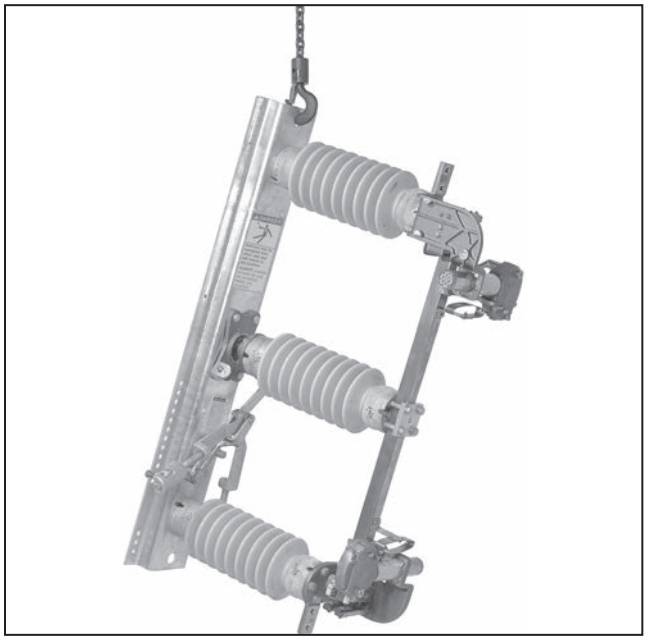


Figure 9. Hoist the switch pole-units into position.

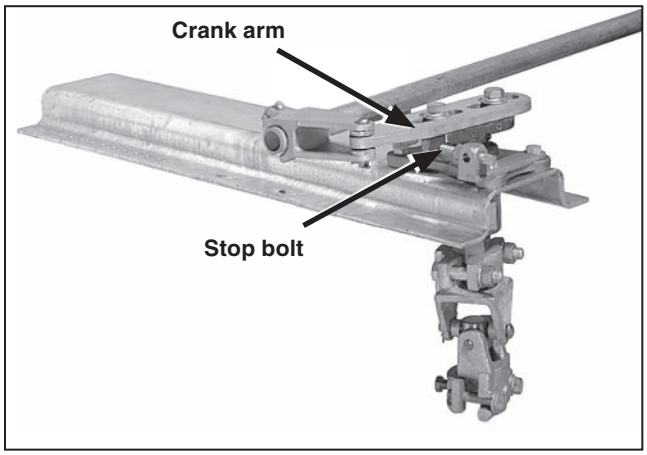


Figure 10. Outboard bearing crank-arm against stop bolt.

Installing Pipe Couplings

STEP 8. The interphase operating pipe, vertical operating pipe, and rotating operating handle use piercing set screws to couple to the operating pipe. See Figure 11. Before installing the interphase pipe sections, check that the cutting tip of each piercing set screw does not protrude into the body of the coupling.

⚠ WARNING

Failure to properly install pipe couplings with piercing set screws can cause slippage of operating pipe, resulting in improper operation of the switch, arcing, equipment damage, or electrical shock.

To properly install piercing set screws:

(a) Back the piercing set screw out of the coupling so the tip does not protrude into the body of the coupling.

(b) Insert the operating pipe section into the coupling and finger-tighten the clamp bolt(s).

(c) Adjust the operating pipe to the correct length, then tighten the clamp bolt(s) to final tightness.

(d) Tighten the piercing set screw, piercing the pipe. Continue turning until a firm resistance is felt.

(e) Make sure the clamp bolt(s) are tight.

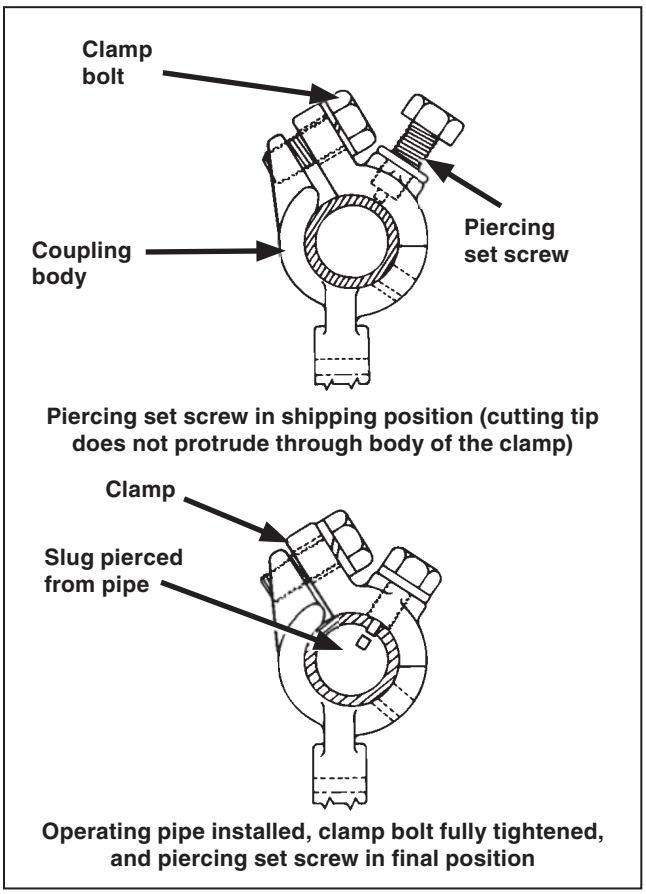


Figure 11. Install the pipe couplings with piercing set screws.

Installing Interphase Pipe

STEP 9. Install the pipe sections connecting the switch poles and the outboard bearing assembly (or assemblies). See Figure 12. Follow the directions in the "Install Pipe Couplings" section on page 13.

Torque the clamp bolt of each pipe-coupling clamp to final tightness. Then, tighten the associated piercing set screw, piercing the pipe. Continue turning until a firm resistance is felt.

For triangular-upright and tiered-upright mounting configuration switches, install the vertical interphase pipe sections to connect the outboard bearing assembles. See Figure 13. Follow the directions in the "Install Pipe Couplings" section on page 13.

Torque the clamp bolt of each pipe-coupling clamp to final tightness. Then, tighten the associated piercing set screw, piercing the pipe, and continue turning until a firm resistance is felt.

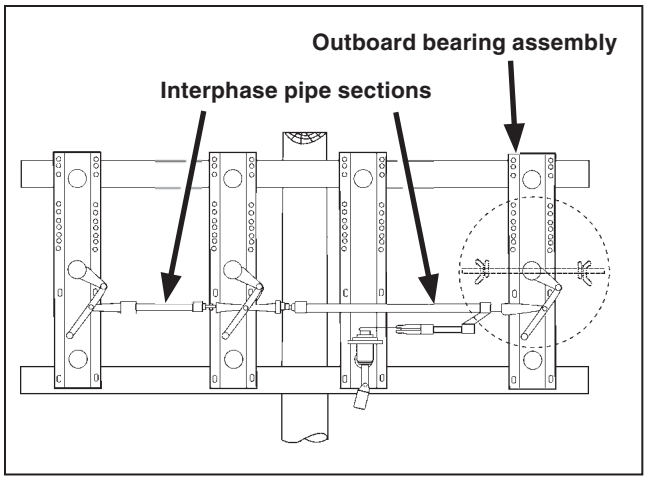


Figure 12. Interphase pipe connecting the switch poles and outboard bearing.

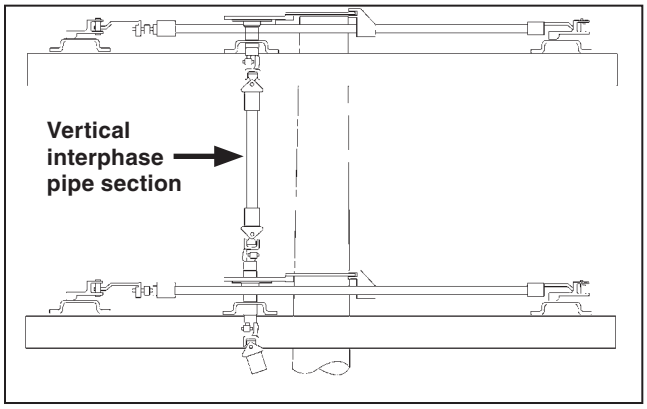


Figure 13. Interphase pipe connecting the outboard bearing assemblies.

If two outboard bearings are used in a double-offset arrangement, install the pipe section to connect these bearing assembles. See Figure 14. Follow the directions in the "Install Pipe Couplings" section on page 13.

Torque the clamp bolt of each pipe-coupling clamp to final tightness. Then, tighten the associated piercing set screw, piercing the pipe, and continue turning until a firm resistance is felt.

STEP 10. Tighten the take-up screws of the adjustable pipe couplings to remove all play in the interconnecting linkage. See Figure 15. Make sure the switch-pole toggle mechanisms remain against their closed stops.

Then, tighten the locknut on each adjustable pipe-coupling take-up screw.

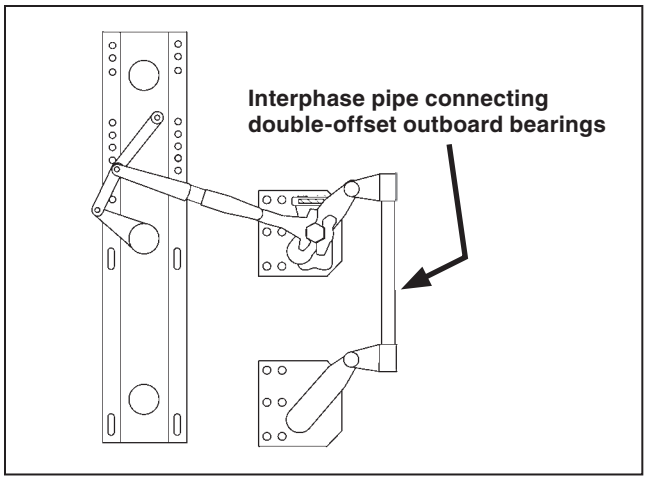


Figure 14. Pipe connecting two outboard bearings.

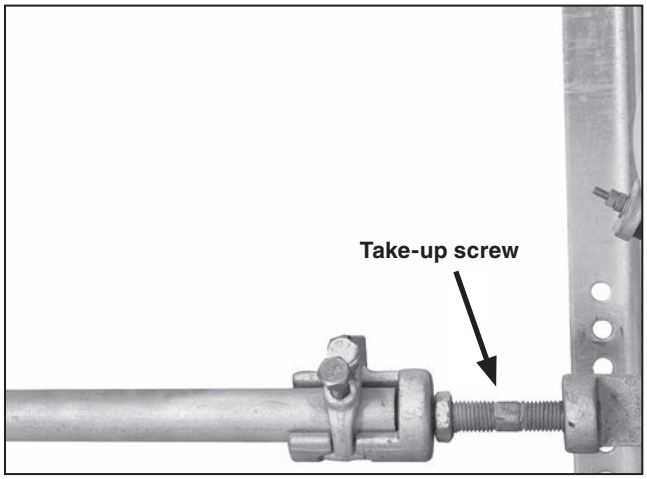


Figure 15. Take-up screw of adjustable pipe-coupling.

Installing Vertical Operating Pipe

STEP 11. Insert the uppermost section of vertical operating pipe into the universal coupling attached to the underside of the outboard bearing assembly. (For triangular-upright and tiered-upright switch mounting configurations, this is the lowest outboard bearing assembly.) See Figure 16. Back the piercing set screw out of the body of the pipe coupling clamp before tightening the clamp bolts.

Torque the clamp bolts to final tightness. Then, tighten the piercing set screw, piercing the pipe, and continue turning until a firm resistance is felt.

STEP 12. Attach a pipe-to-pipe type universal coupling to the lower end of the uppermost section of vertical operating pipe. See Figure 17. Back the piercing set screws out of the coupling so the tip does not protrude into the body of the coupling.

Torque the clamp bolts to final tightness. Then, tighten the piercing set screw, piercing the pipe, and continue turning until a firm resistance is felt.

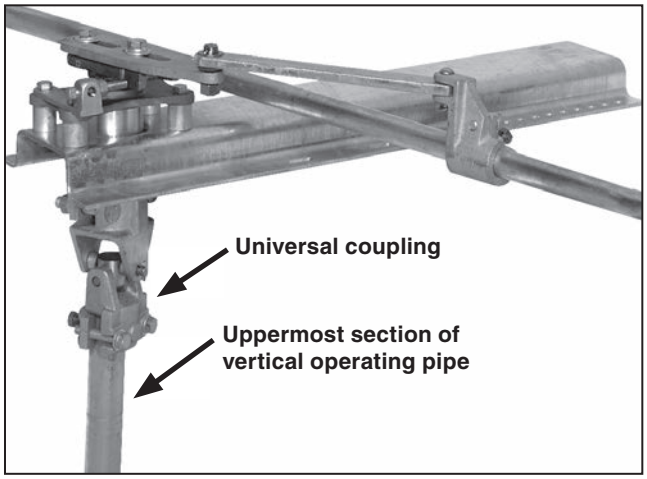


Figure 16. Install the uppermost section of the vertical operating pipe.

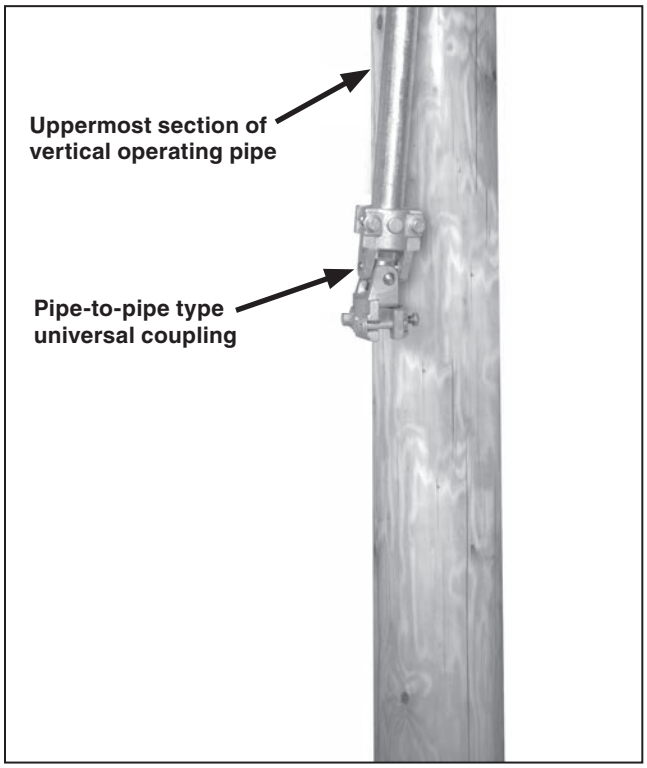


Figure 17. Attach the pipe-to-pipe type universal coupling to the lower end of vertical operating pipe.

STEP 13. Position and install the guide-bearing assembly on the pole or structure in accordance with the dimension shown on the erection drawing. See Figure 18.

STEP 14. Pass the next section of vertical operating pipe up through the guide bearing and then through the thrust bearing. The thrust bearing will rest on the guide bearing and support the operating pipe. See Figure 19 and also Detail G on the erection drawing.

Insert the pipe section into the universal coupling previously attached to the lower end of the uppermost operating-pipe section. *Do not tighten the coupling clamp at this time.*

While holding the pipe in this position— and with the thrust bearing resting on the guide bearing—tighten the piercing set screw in the thrust bearing, piercing the pipe, and continue turning until a firm resistance is felt.

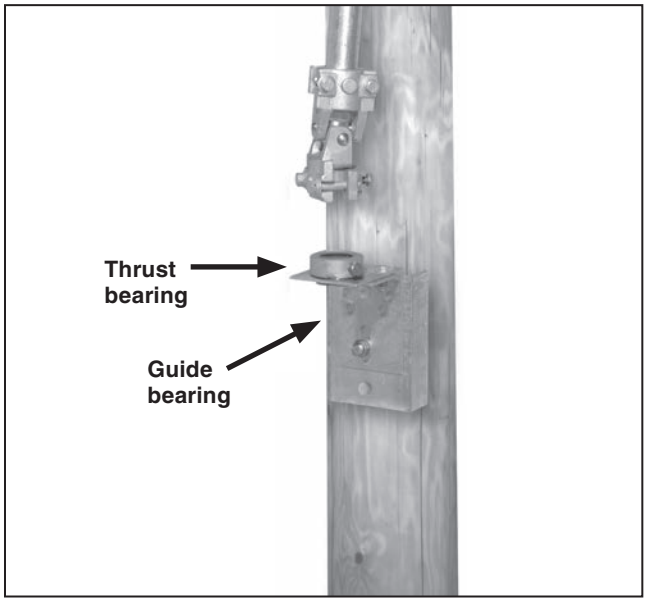


Figure 18. Installing the guide bearing.

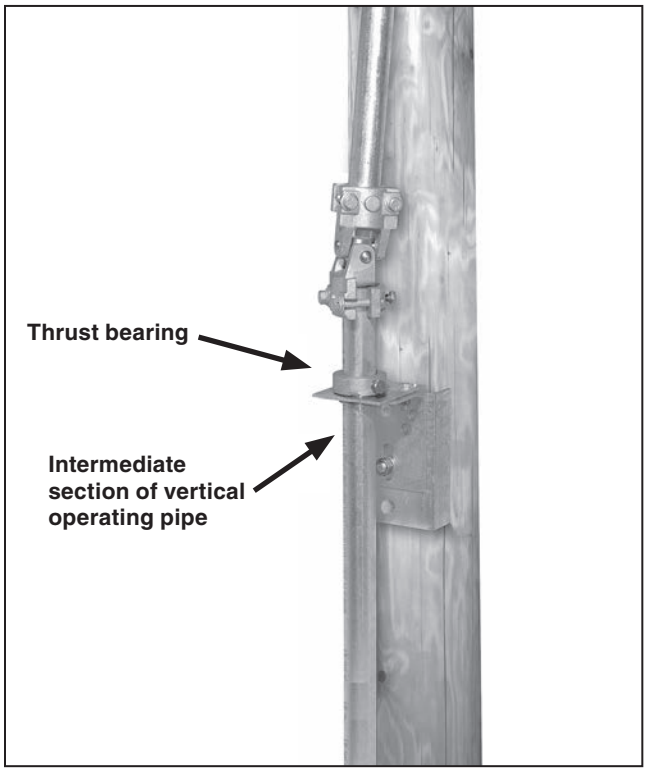


Figure 19. Install the intermediate section of the vertical operating pipe.

STEP 15. Install a guide-bearing assembly with each additional vertical operating-pipe section, positioned in accordance with the dimension shown on the erection drawing. See Figure 20. The thrust bearing is only necessary on the uppermost guide bearing. Use rigid couplings to join these additional pipe sections. Before installing the coupling, back the piercing set screws out of the coupling body so they do not protrude into the coupling.

Torque the clamp bolts to final tightness. Then tighten the piercing set screws, piercing the pipe, and continue turning until a firm resistance is felt.

STEP 16. Tighten the piercing set screw of the thrust bearing immediately above the last section of pipe to final tightness, piercing the pipe, and continue tightening until a firm resistance is felt. See Figures 20.●

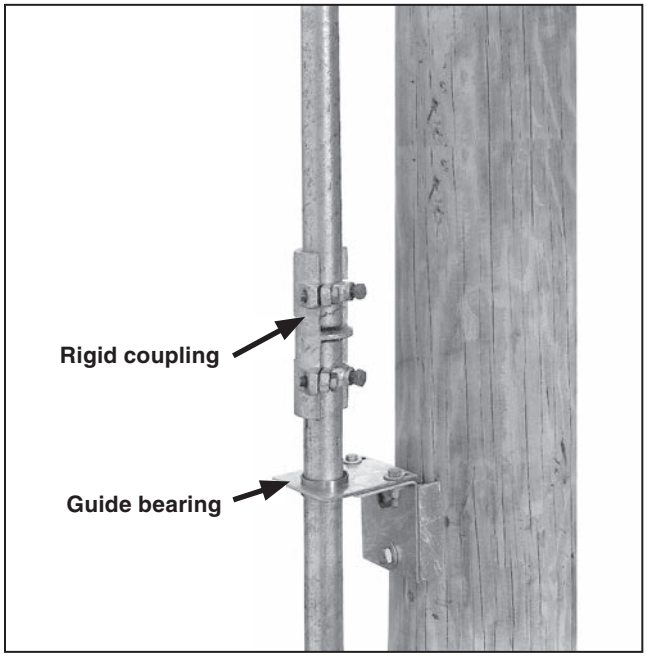


Figure 20. Install the guide bearing for additional pipe section(s).

● If the shipment includes an S&C Type AS-1A Switch Operator, as signified by the addition of the Standard Minor Modification suffix "-S8" or "-S9" to the erection drawing number, refer instead to S&C Instruction Sheet 769-500, "S&C Switch Operators— Type AS-1A, "Instructions for Installation." If the shipment includes an S&C 6801M Automatic Switch Operator, as signified by the addition of Standard Minor Modification suffix "-S16" to the erection drawing number, refer instead to S&C Instruction Sheet 1045M-510, "S&C 6801M Automatic Switch Operators, Reciprocating and Rotating Switch Operation: Installation."

Installing Operating Handle

If suffix "-S8" or "-S9" are specified for 34.5 kV or 46 kV switches, refer instead to S&C Instruction Sheet 769-500, "S&C Switch Operators—Type AS-1A." If suffix "-S8" or "-S9" is specified for 69-kV switches, refer instead to S&C Instruction Sheet 753-500, "S&C Switch Operators—Types LS-1 and LS-2." If suffix "-S16" is specified, refer instead to S&C Instruction Sheet 1045M-510.

When a key interlock is used (Standard Minor Modification suffix "-S6"), refer instead to Step 20 on page 20.

STEP 17. Back the piercing set screws out of the handle yoke and slide the handle assembly up the pipe until it is in the location indicated on the erection drawing. There should be from 3 and 8 inches (8 to 20 cm) of operating pipe below the operating handle assembly. See Figure 21.

Tighten the piercing set screws on the operating handle assembly, but do not pierce the pipe.

STEP 18. Slide the foot-bearing assembly onto the lowest section of pipe at the position shown on the erection drawing. See Figure 22. Adjust the operating handle assembly until it is 2 to 3 inches (5 to 8 cm) above the foot-bearing assembly. Tighten the piercing set screws, piercing the pipe. Continue turning until a firm resistance is felt. See Figure 21. At the same time, use one of the mounting bolts to attach one end of the grounding strap (the end with the grounding connector attached) to the foot-bearing assembly.

The grounding recommendations in this document may differ from the standard operating and safety procedures of certain electric utility companies. Where a discrepancy exists, the operating procedures of the electric utility apply.

If necessary to compensate for the taper of the wood pole, and to keep the vertical operating pipe aligned and plumb, shift the guide bearings toward or away from the pole. Alignment slots are provided for this purpose.

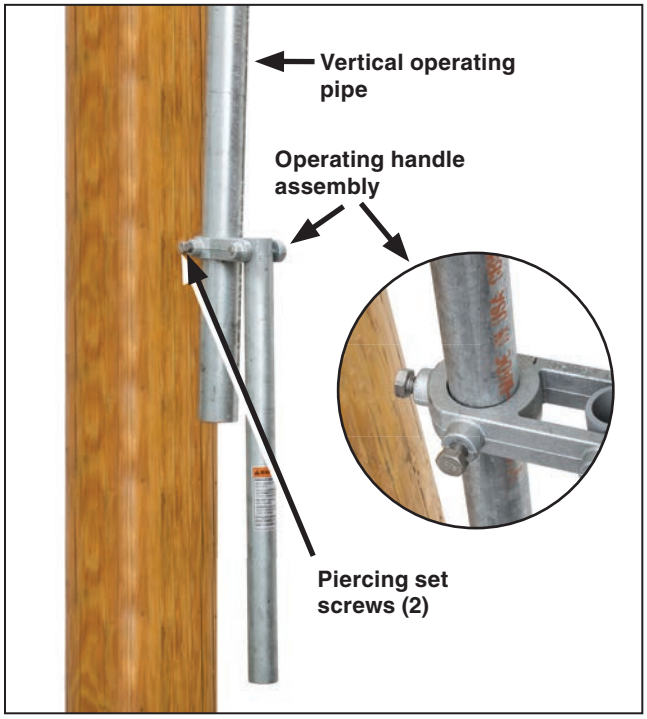


Figure 21. Install the operating handle assembly.

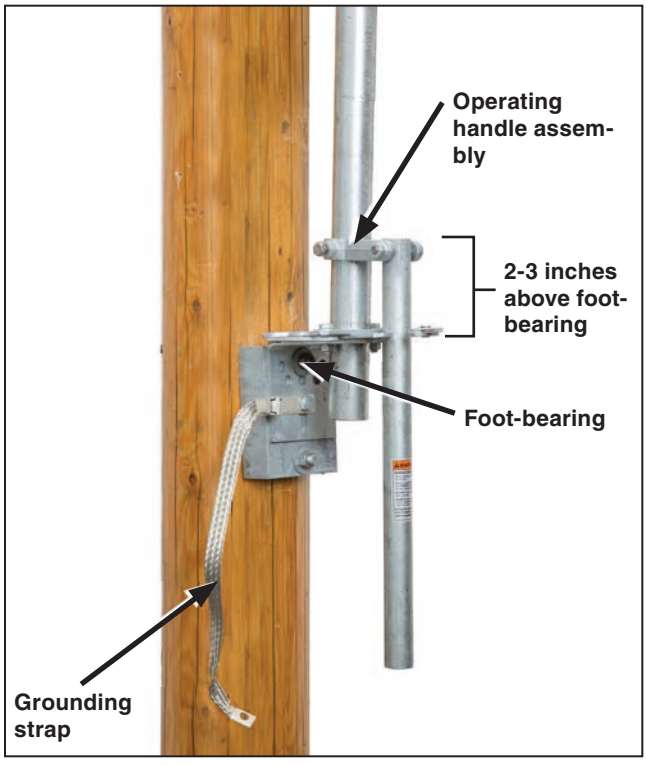


Figure 22. Install the foot-bearing assembly so the operating handle assembly is two to three inches above the foot-bearing assembly.

STEP 19. Fasten the free end of the grounding strap to the lowest pipe section a few inches above the operating handle assembly (or key interlock) with the U-bolt connector provided for this purpose. See Figure 23. Connect the lower end of the strap to a suitable earth ground, using the grounding connector provided at that end of the strap.

The grounding recommendations described in this document may differ from the standard operating and safety procedures of certain electric utility companies. Where a discrepancy exists, the operating procedures of the electric utility apply.

If a key interlock is used (suffix "-S6"), proceed to Step 20. Otherwise, proceed to the "Check Alignment and Adjust the Stop Plates" section on page 23.

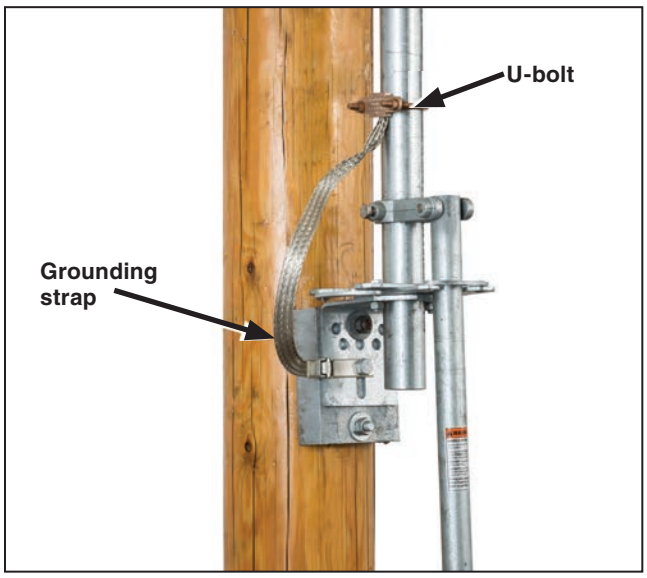


Figure 23. Attach the grounding strap.

Installing Operating Handle with Key Interlock

NOTICE

The key interlock must be installed after the operating handle is installed and the stop plates are fully adjusted.

STEP 20. The interlock group includes a Superior Type B6003-1 Mk II single- or multiple-key interlock (or equivalent), with a ⅜-inch bolt projection and a ¾-inch bolt travel, locking disc, and interlock bracket. If "provision only" is specified, the interlock is not included.

Slide the interlock bracket, locking disc, operating handle assembly, and foot-bearing assembly onto the lowest vertical operating pipe section, with the locking disc and operating handle assembly between the interlock bracket and the foot-bearing assembly. See Figure 24.

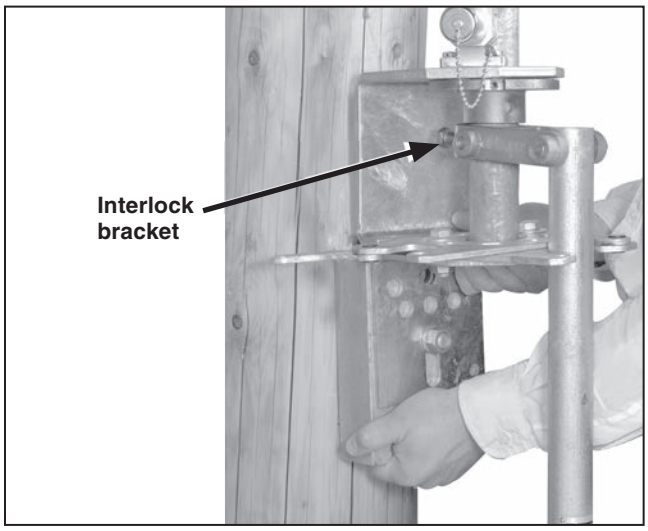


Figure 24. Position the interlock bracket, locking disc, operating handle assembly, and foot-bearing assembly onto the lowest vertical operating-pipe section.

STEP 21. Bolt the foot-bearing assembly to the pole at the position shown on the erection drawing. Use one of the mounting bolts to attach one end of the grounding strap (the end with the grounding connector attached) to the foot bearing assembly.See Figure 25.

The grounding recommendations described in this document may differ from the standard operating and safety procedures of certain electric utility companies. Where a discrepancy exists, the operating procedures of the electric utility apply.

If necessary to compensate for the taper of the wood pole and to keep the vertical operating-pipe aligned and plumb, shift the guide bearing toward or away from the pole. Alignment slots are provided for this purpose.

STEP 22. Fasten the operating handle assembly to the lowest vertical operating-pipe section using the piercing set screws furnished.

Tighten the piercing set screw on the operating handle assembly piercing the pipe. Continue turning until a firm resistance is felt. See Figure 25.

Attach the interlock bracket to the foot bearing assembly, using the ½–13 × 1½-inch cap screws, spacers, and ½-inch lockwashers furnished.

With the switch in the closed position, use the interlock bolt to position the locking disc so the bolt enters the closed-position slot in the disc (and will enter the open-position slot when the switch is in the open position).

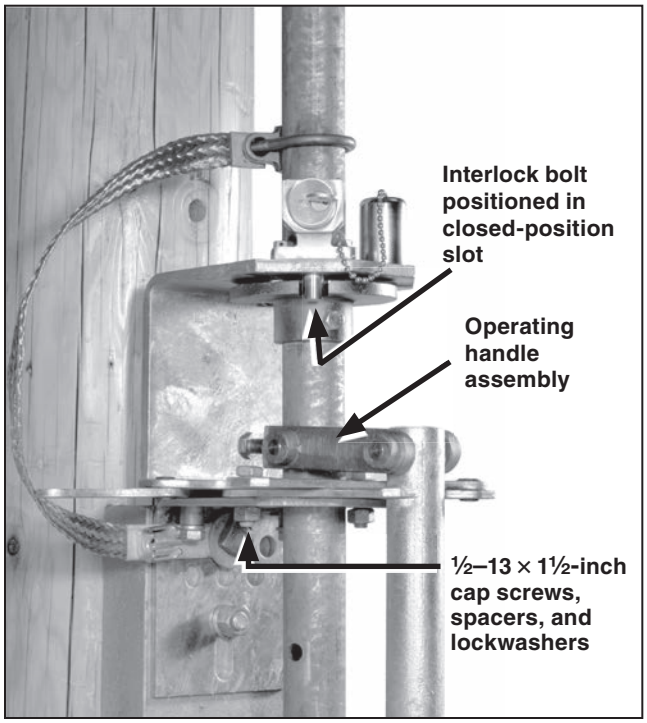


Figure 25. Attach the foot-bearing assembly.

STEP 23. Hold the locking disc ⅜-inch (10 mm) below the interlock bracket and drill 7⁄16-inch diameter holes through the vertical operating-pipe section using the holes in the locking disc collar as pilots. Attach the locking disc to the pipe using the ⅜–16 × 3-inch cap screw, lockwasher, and nut furnished. See Figure 26.

STEP 24. Block one of the two slots in the locking disc with the blocking screw provided. (The slot to be blocked depends on whether a locked-open or locked-closed arrangement is required.) See Figure 27.

NOTICE

Key interlocks are intended for proper sequencing of switch operations; they are not intended to provide security. The operating handle assembly includes swing-away hasps for padlocking the switch in either the open or closed position.

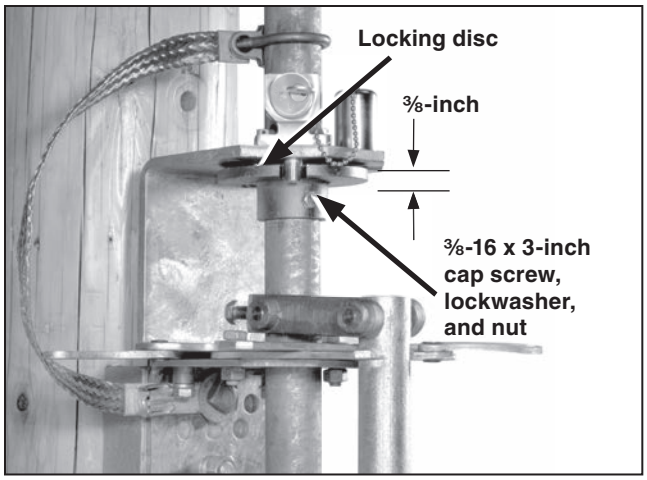


Figure 26. Interphase pipe connecting the switch poles and outboard bearing.

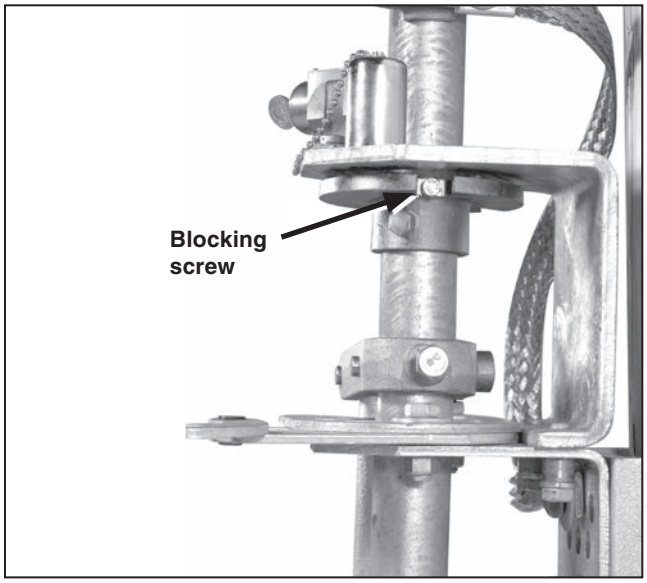


Figure 27. Blocking slot in interlock disc.

Checking Alignment and Adjusting Stop Plates

STEP 25. Remove the ties holding the switch blades to their stationary main contact assemblies and the ties holding the toggle mechanisms to their stops. See Figure 28.

Open and close the switch slowly to ensure no operational difficulties are encountered caused by undetected damage in shipping.

NOTICE

The switch should be opened and closed slowly only when checking for alignment and complete closure.

When opening or closing the switch in service, *do not* slow down or stop part way. Arcing can occur if the switch is partially open or partially closed.

STEP 26. The stop-plate holes are slotted to allow room for adjustment. Loosen the bolts that secure the adjustable stop plates to the two-piece foot bearing support plate. See Figure 29. Place the switch in the fully **Open** position and adjust the open position stop plate so the handle, when lowered, fits into the open-position slot. Mark on the support plate the location of the open-position stop plate. See Figure 31 on page 24.

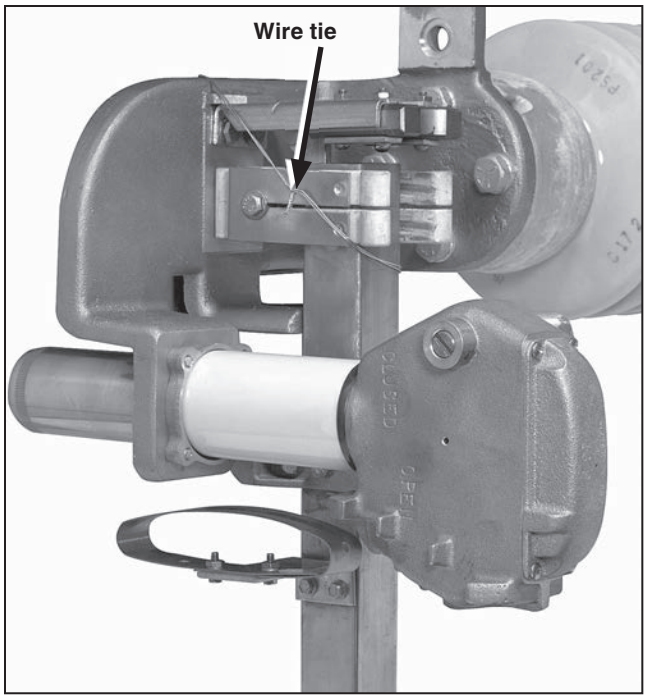


Figure 28. Remove the tie at the stationary main contact assembly.

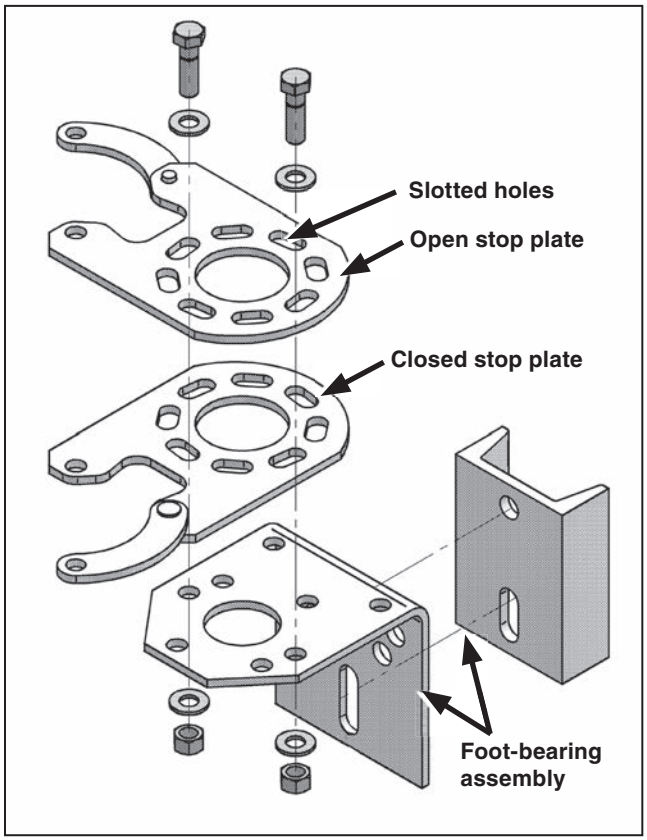


Figure 29. Stop plates and foot-bearing assembly—exploded view.

STEP 27. The most common cause of contact overheating and damage is not putting enough "wind up" torque in the vertical operating pipe when the switch is in the closed position. Wind up is the torque left in the pipe after the handle is secured in the closed stop plate. This windup prevents the pipe from vibrating in high winds and creates strong positive blade-to-contact pressure, ensuring the switch is securely held in the closed position.

NOTICE

DO NOT skip this important step! Loose or improperly installed vertical operating pipe is the primary cause of incomplete blade contact. Over time, this condition can cause heating and eventually arcing of the blade contacts.

To adjust the closed stop plate:

(a) Loosen the hardware securing the closed stop plate. See Figure 29 on page 23.

(b) The stop-plate holes are slotted to allow room for adjustment. Position the operating handle in the stop plate and turn the operating handle as far as it will go in the closed position Counterclockwise is standard on switches using the rotating operating mechanism.) The handle should be tight against the edge of the stop plate as shown in Figure 30. Mark the position of the closed stop plate. See Figure 31 (left).

(c) Lift the handle out of the way and rotate the stop plate an additional 15 degrees counterclockwise from the mark. Make sure the open stop plate lines up with the mark made in Step 26. Tighten the stop plate hardware to 40 ft-lbs. See Figure 31 (right).

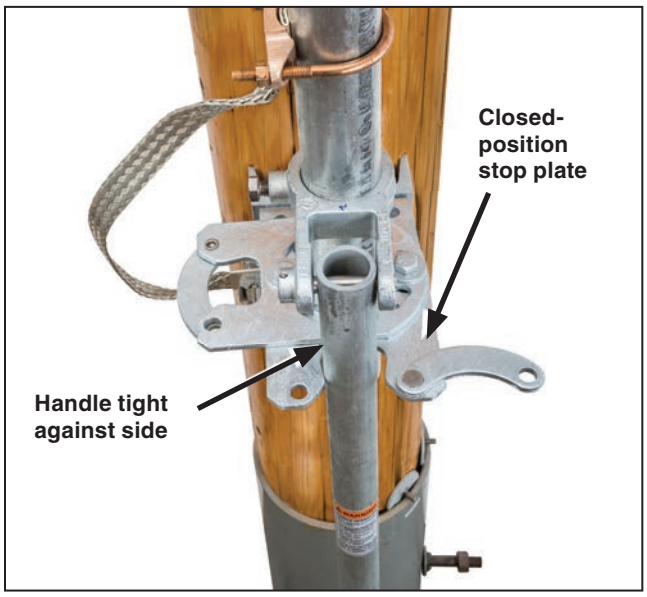


Figure 30. Adjust the closed-position stop plate.

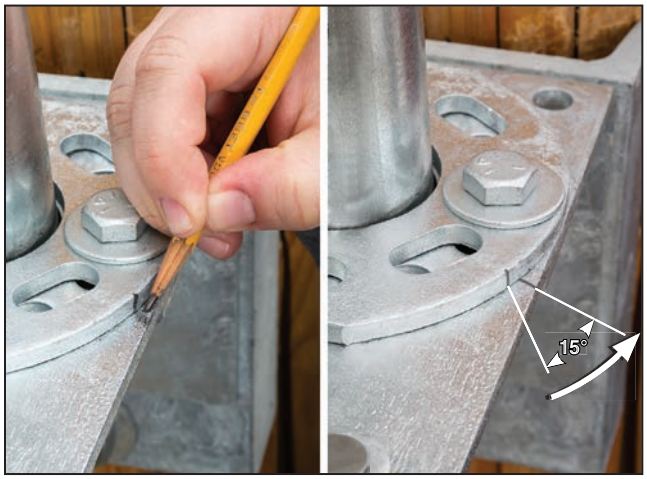


Figure 31. Mark position of the closed stop plate. Rotate 15 degrees.

⚠ WARNING

Open and close the switch slowly ONLY when checking the operation or making adjustments to the de-energized switch.

When opening or closing an energized switch, swing the operating handle vigorously through its full travel without hesitation.

Arcing and damage to the switch will occur if the energized switch is operated slowly or left in the partially **Open** or **Closed** position.

(d) Push the handle into the closed stop position. It should take significant force to secure the handle into the closed stop. The handle will be firmly pressed against the left side of the closed stop plate. This pressure will hold the torque in the pipe, creating the desired windup. Move the handle into the **Open** position to verify it fits into the open stop plate. See Figure 32.

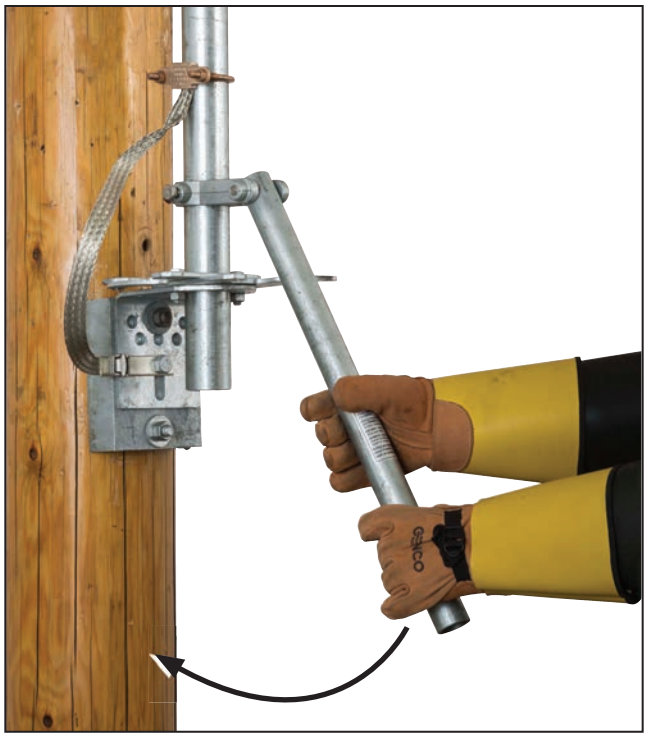


Figure 32. Move the handle between open and closed stop plates. The handle should fit tightly in the closed plate.

Checking Operation

NOTICE

Open and close the switch slowly ONLY when checking the operation or making adjustments to the de-energized switch.

When opening or closing an energized switch, swing the operating handle vigorously through its full travel without hesitation.

Arcing and damage to the switch will occur if the energized switch is operated slowly or left in the partially open or closed position.

STEP 28. Open and close the switch *slowly* through its full travel. Check to be sure the following conditions exist:

(a) With the operating handle as far as it will go in the closing direction, both main contacts of each switch pole are fully closed with the blade within ⅛-inch of the stop on the terminal base casting. See Figure 33.

(b) Each switch-pole toggle mechanism should lie against its closed stop. The outboard bearing crank-arm(s) should be in the over-center toggle position and abut the stop bolt(s). See Figure 35 on page 27.

(c) If *none* of the switch poles are fully closed, the outboard bearing crank-arm length and the stop bolt may require readjustment to provide the correct amount of stroke and toggle action. If more stroke is required, lengthen the outboard bearing crank-arm (in increments of ⅛-inch) until the blades are in the closed-position. Conversely, shorten the outboard bearing crank-arm to provide less stroke.

(d) The outboard bearing crank-arm should be set to overstroke slightly to provide positive drive closure and a definite feel of a locking action at the operating handle. See the note on the erection drawing with regard to the amount of toggle to be obtained.

(e) In the unlikely event only one or two switch poles are fully closed, readjust the take-up screw(s) on the adjustable pipe coupling(s) at the switch pole to increase or decrease the effective length(s) of the interphase operating pipe(s). See Figure 34.

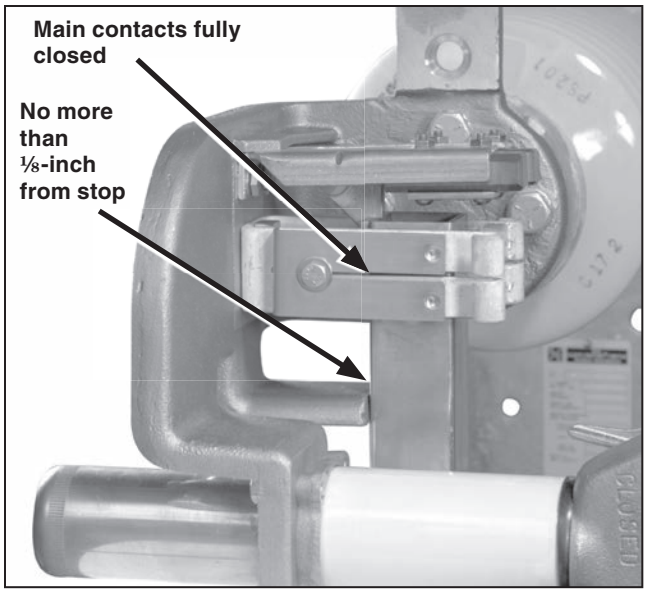


Figure 33. Check that the blade is fully closed and within ⅛-inch of the stop on the terminal base casting.

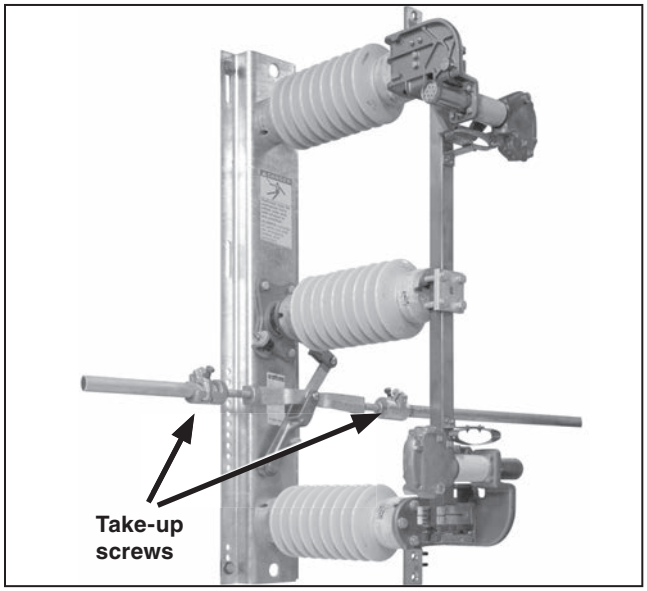


Figure 34. Readjusting the take-up screw(s) on the adjustable pipe coupling(s).

NOTICE

After readjusting the take-up screw(s), be sure to retighten the locknut on the stop bolt(s), the locknut on each adjustable pipe coupling take-up screw, and the clamping bolts on the outboard bearing crank-arm.

(f) When an S&C Type AS-1A Switch Operator, S&C Type LS-2 Switch Operator, or an S&C 6801M Automatic Switch Operator is used, verify there is a clearance of approximately ⅛-inch. See Figure 35. This clearance prevents bending of the stop bolt during power operation. Adjust the stop bolt to provide this clearance after any other adjustments are made to achieve full closure, stroke, or toggle action. Be sure to retighten the locknut when adjustment is complete.

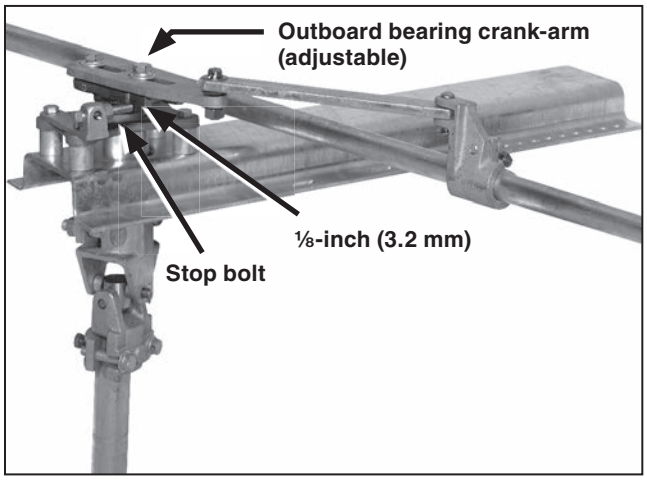


Figure 35. Verify the crank-arm is in the overtoggle position and against the stop bolt.

NOTICE

The switch should be opened and closed slowly only when checking for alignment and complete closure.

When opening or closing the switch in service, *do not* slow down or stop part way. Arcing can occur if the switch is partially open or partially closed.

STEP 29. Open and close the switch *slowly* several times. Check the operation of each switch pole. The following conditions must be met:

(a) As the blade assembly moves in the closing direction, each blade-closing cam must make positive engagement with its respective interrupter closing lever. See Figure 36.

(b) With the blade assembly in the fully closed position, verify the minimum clearance between each blade shunt contact and its respective interrupter housing. See Figure 37. The shunt contacts may be bent as required to provide this clearance.

(c) Also, when the blade is in the fully closed position, each blade-closing cam must overlap its respective interrupter closing lever to prevent inadvertent opening of the interrupter, and clearance between the blade closing cam and its respective interrupter closing lever must be within the limit shown.

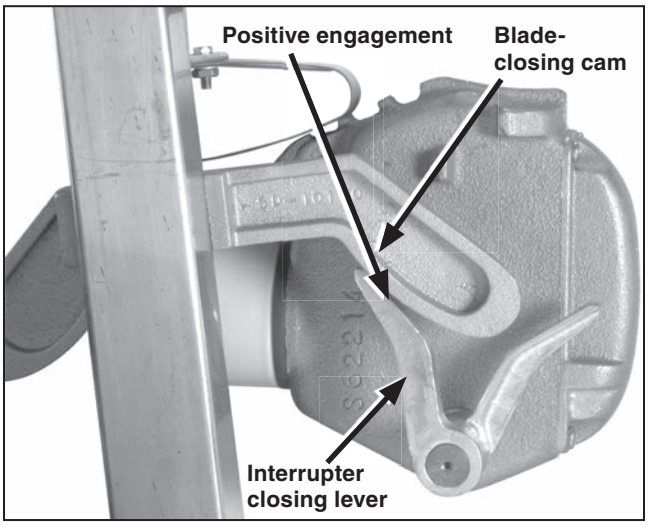


Figure 36. Blade assembly moving in closing direction.

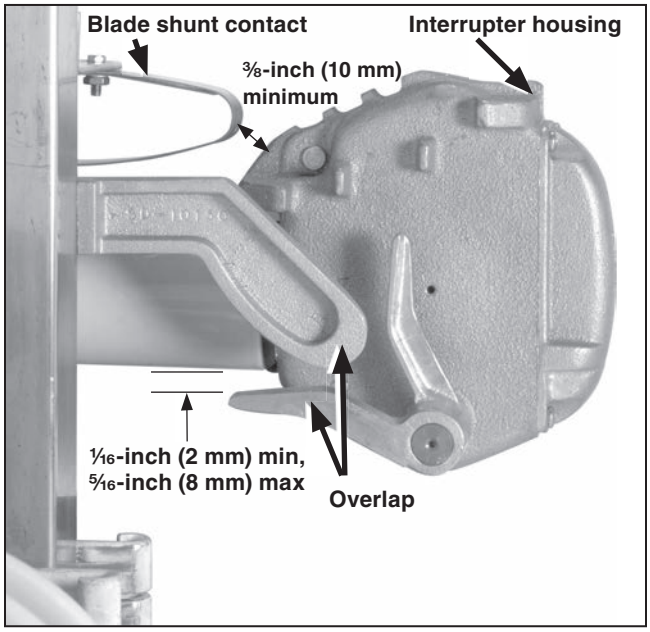


Figure 37. Blade assembly in fully closed position.

(d) Move the blade in the *opening* direction and verify that each blade shunt contact firmly engages its respective interrupter housing before the blade contacts disengage from the stationary main contact assemblies. See Figure 38. The shunt contacts may be bent as required to conform to these conditions.

(e) Also, as the blade assembly moves in the *opening* direction, the two blade-opening cams must simultaneously make positive engagement with their respective interrupter opening levers as shown. Simultaneity is essential to ensure that both interrupters of each switch pole share the interrupting duty. The opening lever on one or both interrupters may be bent slightly to attain opening simultaneity.

(f) After opening the blade fully, slowly close the blade and verify that the two opening cams do not hit the interrupter opening levers. See Figure 39.

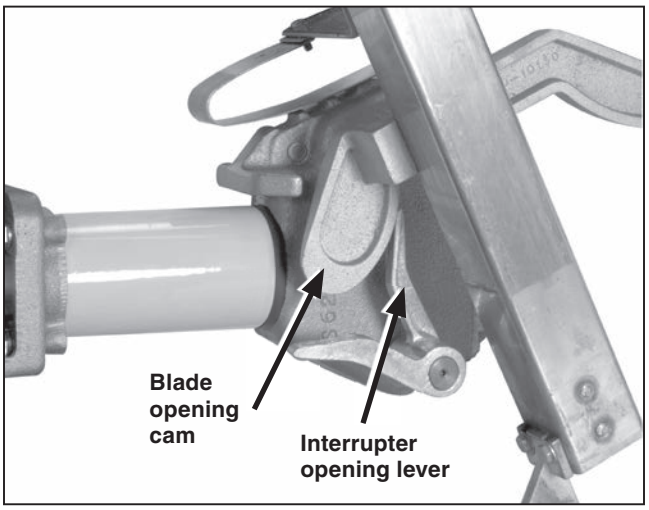


Figure 38. Blade assembly moving in the opening direction.

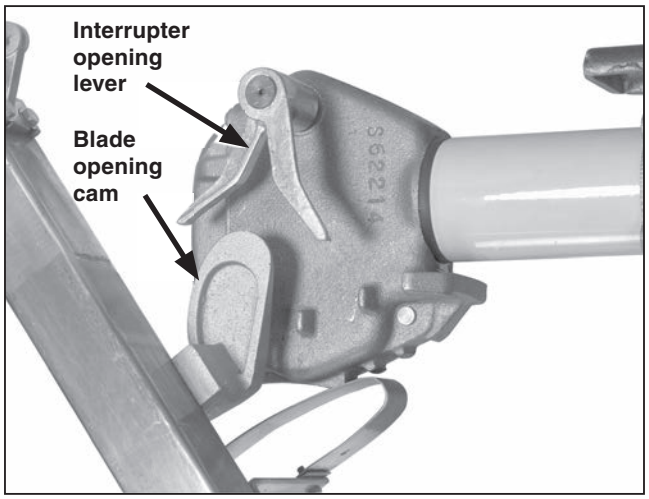


Figure 39. Verifying blade opening cams do not hit the interrupter opening levers on closing.

(g) Move the blade assembly *slowly* toward the closed position until the blade assembly is under the interrupter lever shaft. Verify the gap between the end of the interrupter lever shaft and the blade assembly is between 3⁄16-inch (5 mm) and 9⁄32-inch (7 mm) . See Figure 40.

STEP 30. If adjustment is required, loosen the four ½–13 × 1½-inch hex head galvanized steel cap screws that fasten the terminal base castings to the stationary insulators. See Figure 41. Shift the terminal base castings as required. Tighten the cap screws and recheck for conformance to the conditions outlined above. Readjust if required. Make certain the cap screws are tightened to final tightness, 55 ft-lbs. (75 Nm).

If any of the conditions described in this step cannot be achieved, contact the nearest S&C Sales Office since it is likely that damage was sustained during shipment.

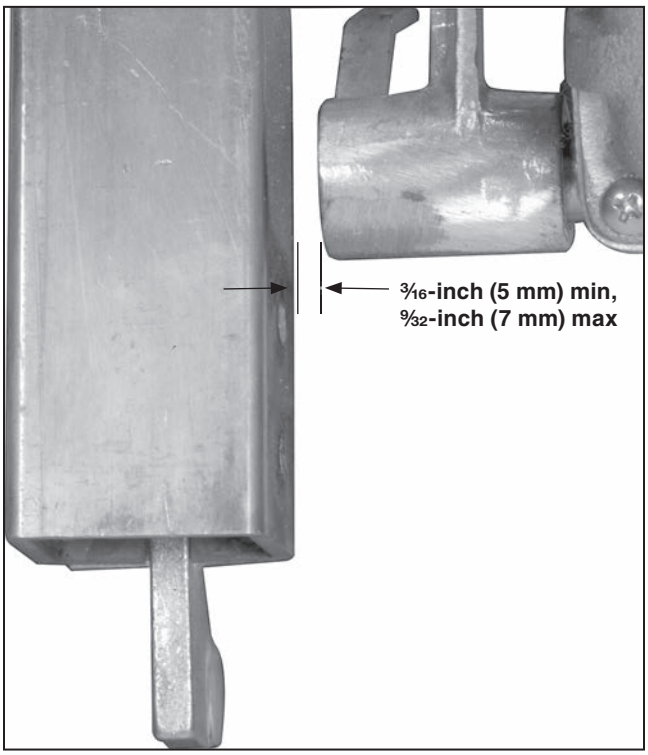


Figure 40. There should be a gap between the end of the interrupter lever shaft and the blade assembly.

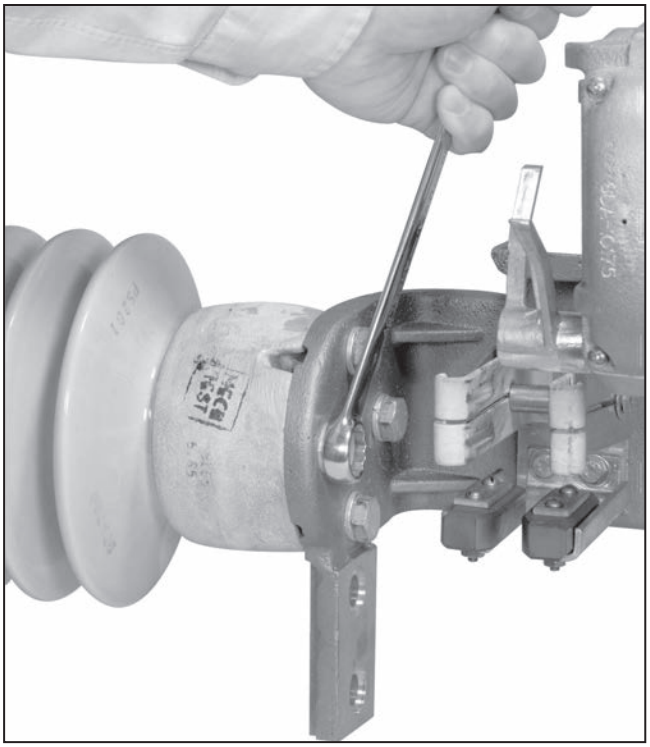


Figure 41. Adjust the position of the terminal base casting.

STEP 31. Attach the danger label to the pole or structure using two straps or bolts (furnished by end users). See Figure 42.

Position the danger label within three feet of the switch pole-units and in full view of line crews when viewed from the front of the switch.

For switches that mount on two poles, attach another danger label to the second pole in the same manner.

NOTICE

Stationary contacts are greaseless and self-lubricating. **DO NOT** apply lubricant to the stationary contacts.

Connecting High-Voltage Conductors

STEP 32. When high-voltage conductors are to be connected using aluminum-alloy body connectors●, the following procedures should be employed:

(a) Thoroughly wire-brush the current-transfer surfaces of each connector and immediately apply a liberal coating of Penetrox® A (available from Burndy Corporation) to the brushed surfaces.

(b) Wire-brush each terminal pad of the switch and apply a coating of Penetrox® A, and then bolt the connectors to the terminal pads.

(c) Prepare the conductors using established procedures, and clamp them in their respective connectors.

● "Mass anode" type connectors, such as the Catalog Number 5300 series offered by S&C, that have been designated by the connector manufacturer as being suitable for direct attachment to copper-bearing alloy terminal pads.

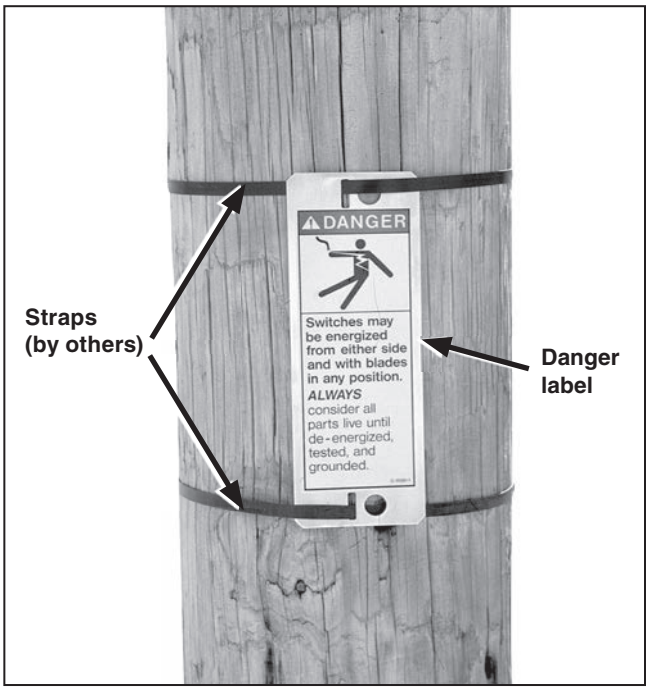


Figure 42. Attaching the danger label to the pole or structure.

Opening And Closing The Switch

⚠ DANGER

The interrupters and terminal pads of the Alduti-Rupter Switch may be energized with the interrupters in any position. Before inspecting, servicing, or repairing this switch or working on the conductors on either side of the switch, test for voltage using proper high-voltage test equipment. Then install suitable grounding equipment.

Failure to observe these precautions may result in serious injury or death.

NOTICE

This interrupter switch is not intended for breaking fault currents.

STEP 33. To operate the Alduti-Rupter Switch:

(a) Remove the padlock(s) from the hasps on the operating-handle assembly. See Figure 43.

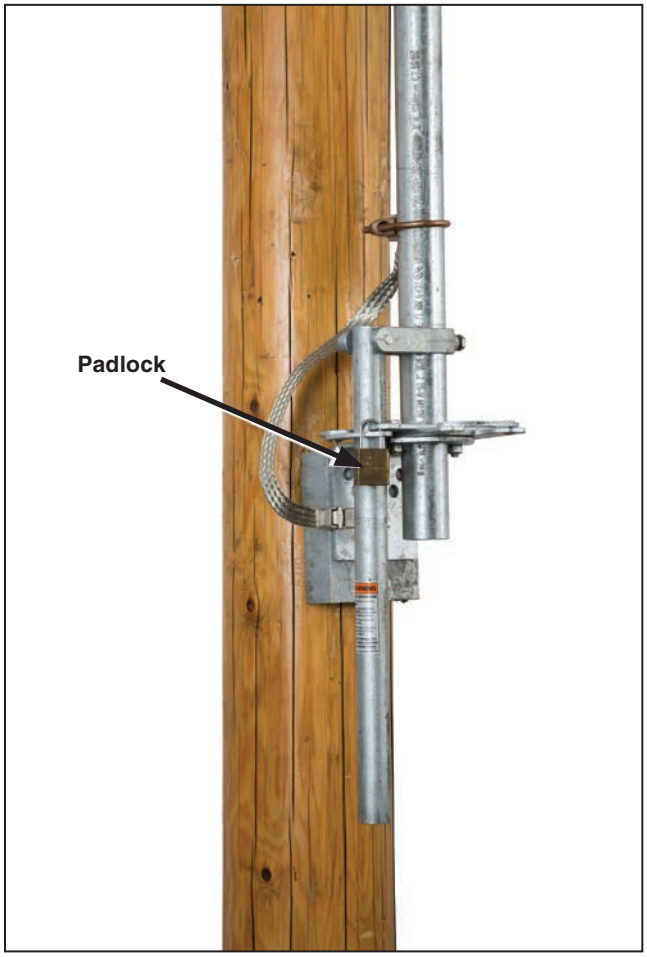


Figure 43. Remove the padlock(s).

(b) If the operating handle assembly is furnished with a key interlock, disengage the interlock bolt. See Figure 44.

(c) Swing the handle *rapidly* to the fully **Open** or fully **Closed** position. See Figure 45.

(d) Check that all three poles are fully open or fully closed.

(e) Replace the padlock(s). Engage the key interlock, if applicable.

⚠ WARNING

When opening or closing the switch, do not slow down or stop part way. Arcing can occur if the switch is partially open or partially closed.

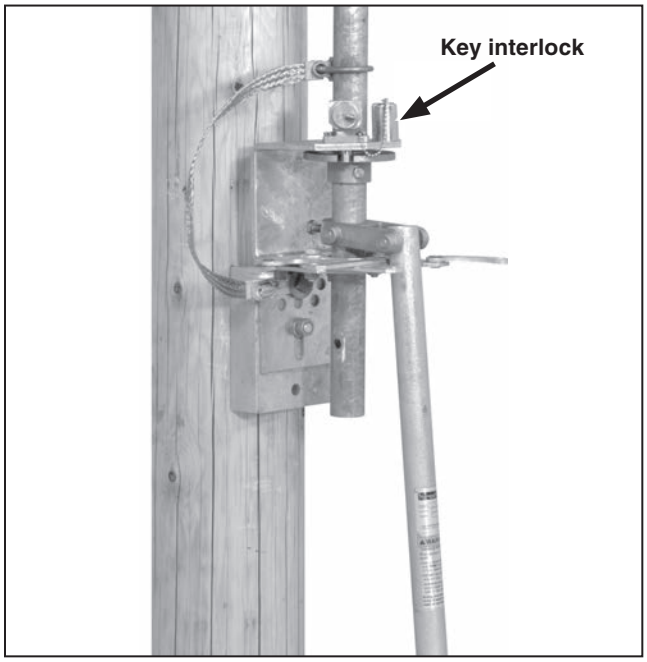


Figure 44. Disengage the key interlock bolt.

Figure 45. Swing the operating handle rapidly.