

# Installation and Operation

## Table of Contents

Section	Page	Section	Page
<b>Introduction</b>		<b>Installation</b>	
Qualified Persons . . . . .	2	Operating Pipe Preparation . . . . .	9
Read this Instruction Sheet . . . . .	2	Mounting to Wood. . . . .	9
Retain this Instruction Sheet. . . . .	2	Uncrating the Switch. . . . .	9
Proper Application . . . . .	2	Lifting the Switch . . . . .	10
Operating Considerations. . . . .	3	Installing Pipe Couplings with	
Warranty . . . . .	3	Piercing Set Screws . . . . .	11
Warranty Qualifications . . . . .	3	Installing the Interphase Pipe . . . . .	11
<b>Safety Information</b>		Installing the Vertical Operating Pipe and	
Understanding Safety-Alert Messages. . . . .	4	Operating Handle (¾-inch IPS Pipe) . . . . .	12
Following Safety Instructions . . . . .	4	Installing the Vertical Operating Pipe and	
Replacement Instructions and Labels . . . . .	4	Operating Handle (1¼-inch IPS Pipe). . . . .	16
Location of Safety Labels . . . . .	5	Locking the Operating Handle . . . . .	19
<b>Safety Precautions</b> . . . . .	6	Checking Operation . . . . .	20
<b>Shipping and Handling</b>		Connecting the High-Voltage Conductors . . . . .	21
Inspection . . . . .	7	<b>Operation</b>	
Packing . . . . .	7	Opening and Closing the Switch . . . . .	22
Handling . . . . .	8		



# Introduction

## 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 instruction handbook before installing or operating an 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/](http://sandc.com/en/support/product-literature/).

## Retain this Instruction Sheet

This instruction sheet is a permanent part of your 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 are 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.

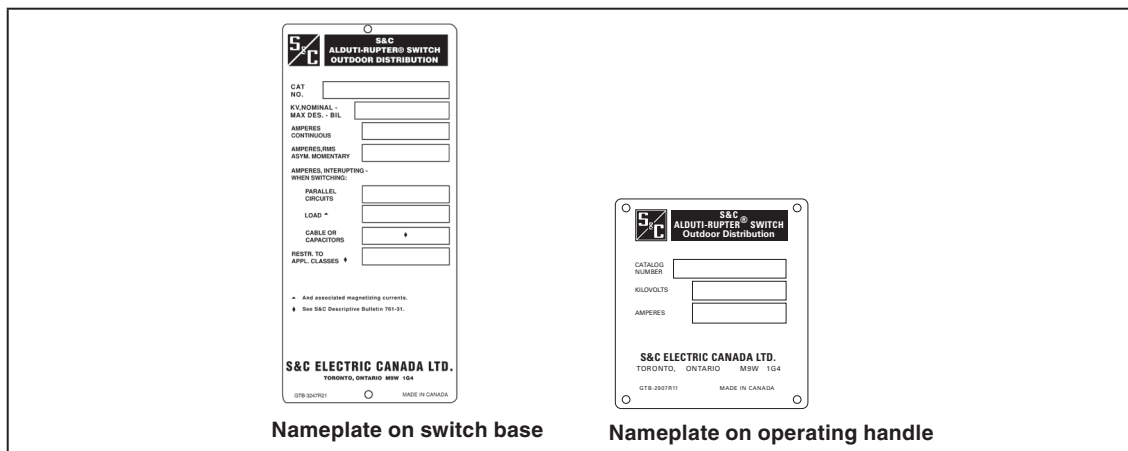


Figure 1. Switch nameplates with ratings.

These interrupter switches are not intended for breaking fault currents.

### Operating Considerations

Circuit-making and circuit-breaking are 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** positions 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** and **Closed** positions of the interrupter switch blades. After opening or closing the switch, always make a visual check of the blade position to determine whether 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 Alduti-Rupter Switch detailed in this instruction sheet except when it is power operated using a switch operator of other than S&C manufacture.

## Safety Information

---

### Understanding Safety-Alert Messages

Several types of safety-alert messages may appear throughout this instruction sheet and on labels and tags attached to your 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](http://sandc.com), or call the S&C Global Support and Monitoring Center at 1-888-762-1100.

#### **NOTICE**

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

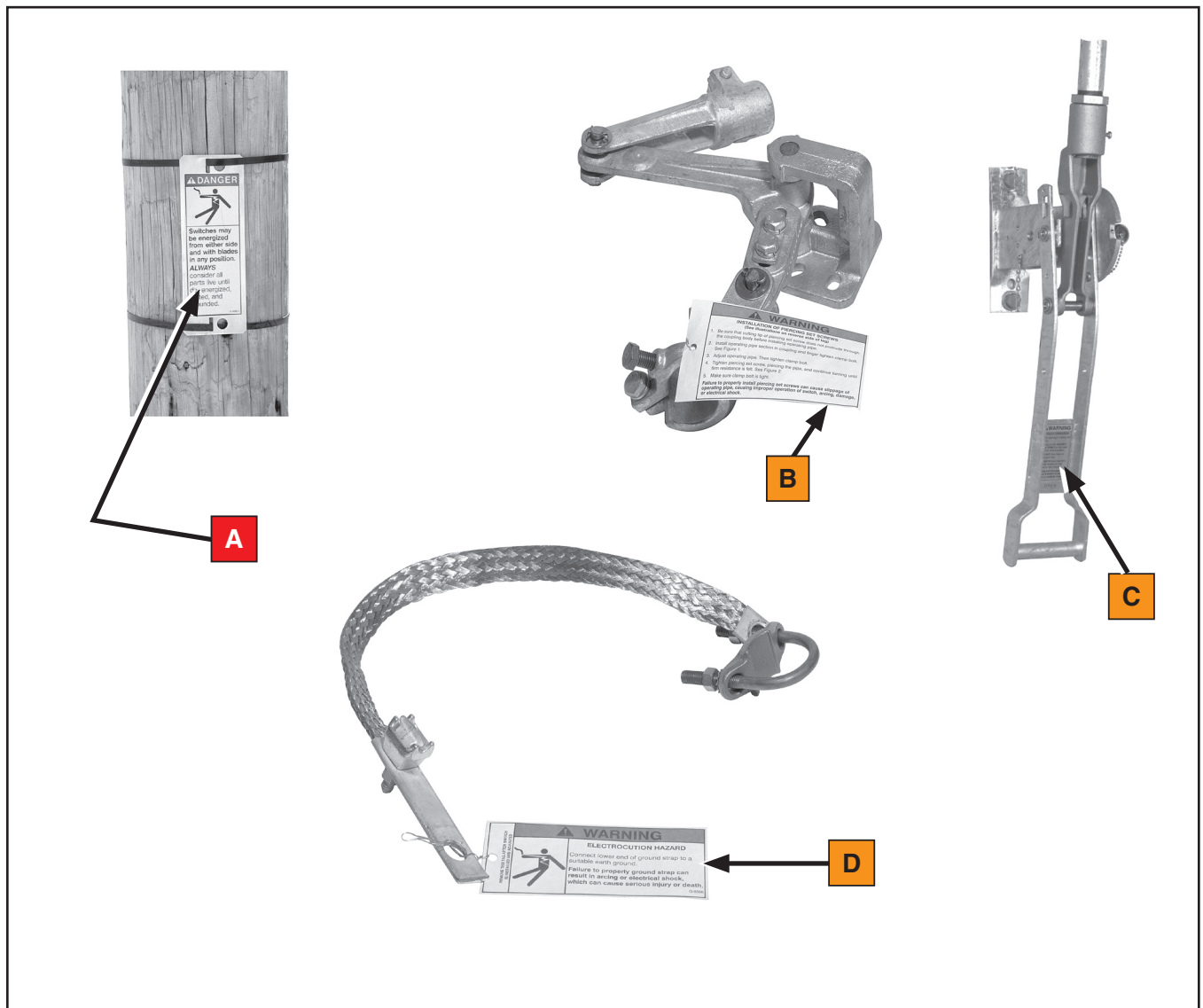


### Replacement Instructions and Labels

If additional copies of this instruction sheet are needed, 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	Part Number
A	<b>⚠ DANGER</b>	Electrocution Hazard	G-6580
B	<b>⚠ WARNING</b>	Piercing Set Screws	G-3176R1●
C	<b>⚠ WARNING</b>	Handle Operation	G-4400R5
D	<b>⚠ WARNING</b>	Electrocution Hazard—Grounding Strap	G-6596●

- This is a tag to be removed and discarded after the switch is installed and adjusted.

### 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 the "Qualified Persons" section 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 circuit-breaking are 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 22.

## 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 make 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. Specifically, the modifications designated by these suffixes are:

- S1 One tubular fiberglass insulating section in vertical operating shaft
- S2 One Cypoxy™ Insulator unit in vertical shaft
- S3 Insulated interphase sections and one fiberglass insulating section in vertical shaft
- S4 Insulated interphase sections and one Cypoxy Insulator unit in vertical shaft
- S6 Key interlock—single lock for "locked-open" application
- S7 Auxiliary contact switch with 4 N/O and 4 N/C contacts (600 Vac/20 A, 125 Vdc/1 A, 48 Vdc/1 A)
- S8 Provision for power operation of pole-mounted switches by a Type AS-10 Switch Operator
- S9 Provision for power operation of pedestal-mounted switches by a Type AS-10 Switch Operator
- S16 Provision for power operation by S&C 6801M Automatic Switch Operator

"-V1" or "-V2" adds (one or two respectively) extra 6-foot 10-inch (208-cm) lengths of pipe and includes the appropriate number of extra couplings and guides.

Drawing RD-10015, 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 769-510 and 769-511, "S&C Switch Operators—Type AS-10," are included with the switch shipment. Instruction Sheets 769-510 and 769-511 cover installation, operation, and adjustment of the 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 the nearest S&C Sales Office for details.

## Shipping and Handling

---

### 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.

**Note:** 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.**

### Operating Pipe Preparation

If desired, the operating pipes can be cut to length (if not pre-cut at the factory) before proceeding to the job site. Cutting dimensions are shown on the erection drawing. One of the pipe sections furnished is threaded at one end to accommodate the operating handle assembly.

Users supplying their own operating pipe should determine which section of operating pipe is to be the lowest and thread one end of it for installation of the operating handle. Provide sufficient thread to allow the pipe to extend approximately 1/4-inch (6 mm) below the handle coupling.

### Mounting to Wood

When mounting the switch and its operating mechanism to a wood structure or wood pole, S&C recommends suitably sized square washers be placed under the nuts. S&C also recommends using spring-type washers between the square washers and nuts to compensate for wood shrinkage and thus maintain fastener tightness. See Figure 2.

### Uncrating the Switch

- STEP 1.** Remove the switch poles from their crates and arrange them on the ground in the same order in which they will be mounted on the structure. Protect the bearings from contamination by dirt, mud, oil, etc. If necessary, use blocks to keep the bearings clear of the ground.
- STEP 2.** Assemble the bell-crank bracket to the channel bracket, as shown in Detail A on the erection drawing.

Attach an interphase-pipe clamp to each switch-pole operating lever.

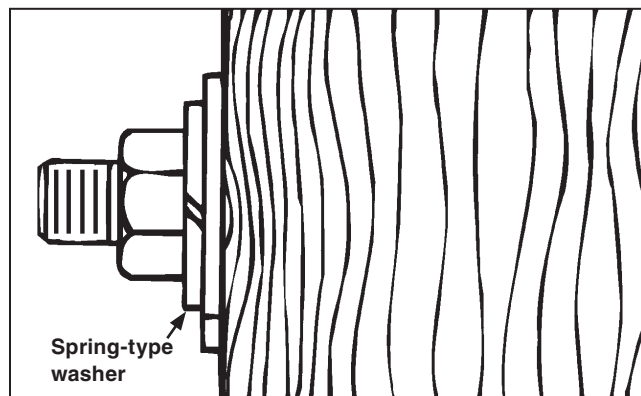


Figure 2. Applying the spring washer.

# Installation

## Lifting the Switch

### **⚠ 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.**

**STEP 3.** Hoist the individual switch poles and bolt them into position on the pole as shown on the erection drawing.

### **NOTICE**

Make sure the surfaces on which the switch pole bases are mounted are flat and true. 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.

**STEP 4.** Hoist the bell-crank assembly, including base or bracket, and bolt it into position as shown on the erection drawing. See Figure 3.

**STEP 5.** To minimize time-consuming final adjustments, make sure the switch is fully closed. Tie the switch blades to their stationary main contacts. See Figure 4.

**STEP 6.** Make sure the bell-crank is held in the 45-degree position. The bell-crank and bell-crank bearing have indexing ridges to facilitate alignment. See Figure 5.

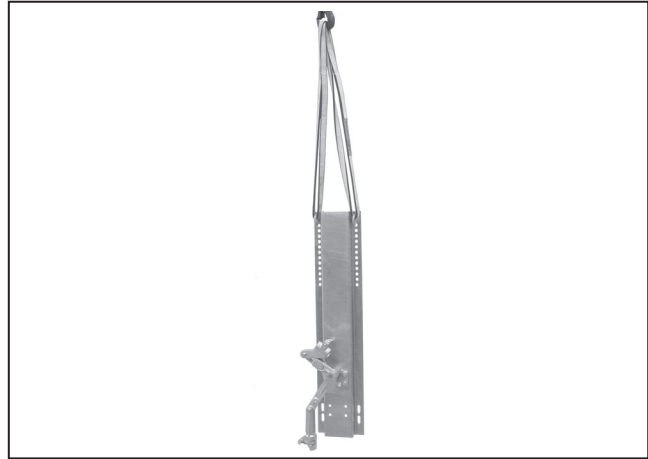


Figure 3. Hoisting the bell-crank into position.

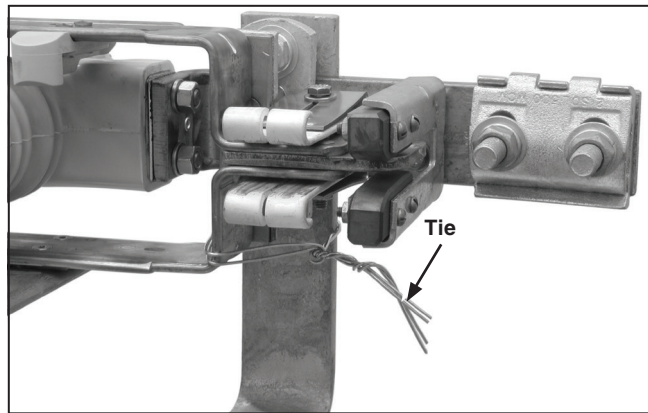


Figure 4. Tying the switch blade to the main contacts.

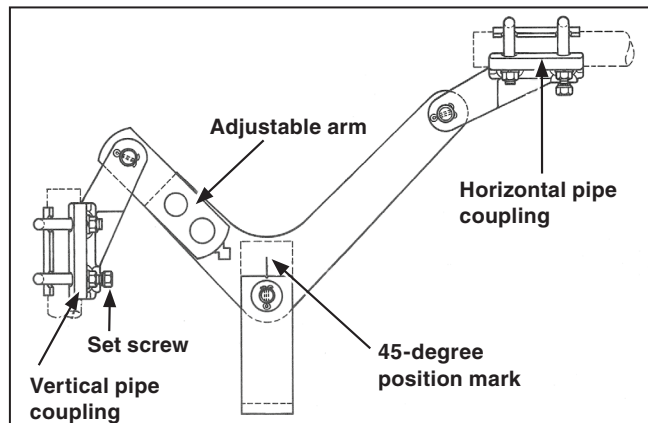


Figure 5. The bell-crank group.

## Installing Pipe Couplings with Piercing Set Screws

### **⚠ 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.

#### STEP 7. To properly install piercing set screws:

- Make sure the cutting tip of the piercing set screw does not protrude through the body of the clamp.
- Insert the operating pipe section into the coupling and finger-tighten the clamp bolt(s).
- Adjust the operating pipe to the correct length. Then, tighten the clamp bolt(s) to final tightness.
- Tighten the piercing set screw, piercing the pipe, and continue turning until a firm resistance is felt.
- Make sure the clamp bolt(s) are tight. See Figure 6.

## Installing the Interphase Pipe

**STEP 8.** Install the horizontal pipe sections connecting the switch poles and the bell-crank assembly. See Figure 5 on page 10. Follow the directions in the “Installing Pipe Couplings with Piercing Set Screws” section.

Torque the clamp bolt of each pipe-coupling clamp to final tightness, but do not tighten the associated set screw until the mechanism has been adjusted to attain full closure of all three poles.

**STEP 9.** Make sure the bell-crank is held in the 45-degree position. The bell-crank and bell-crank bearing have indexing ridges to facilitate this alignment. See Figure 5 on page 10.

### **NOTICE**

The bell-crank arms should be within 5 degrees of the 45-degree position for the most favorable mechanical advantage when the switch is in both the **Open** and **Closed** positions.

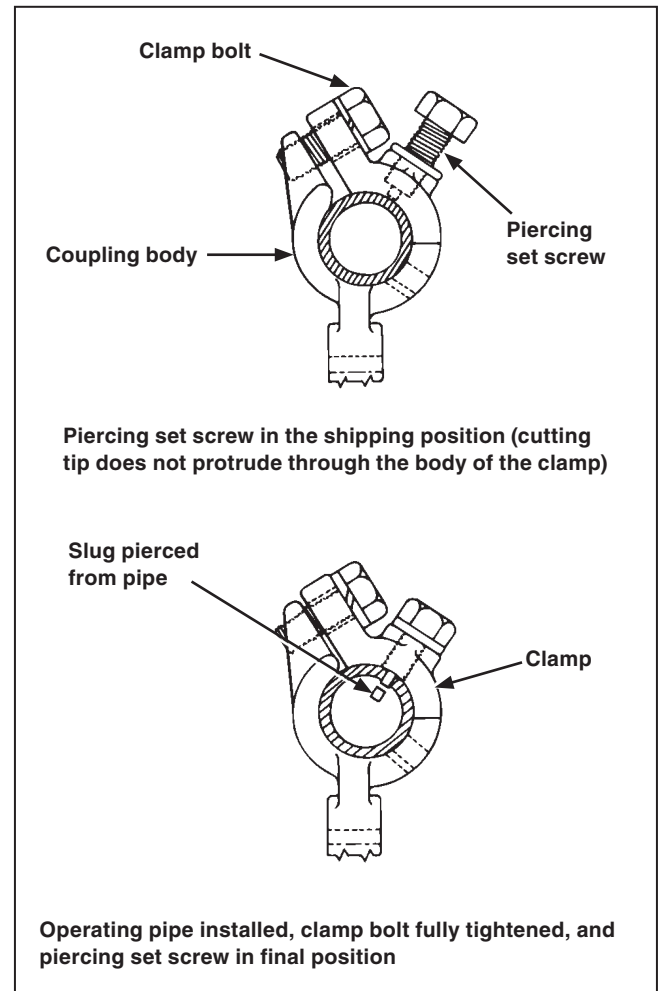


Figure 6. Installing the pipe couplings.

# Installation

## Installing the Vertical Operating Pipe and Operating Handle (3/4-inch IPS Pipe)

**Note:** Steps 10 through 23 are for a standard mounting arrangement that uses 3/4-inch IPS vertical operating pipe. If, instead, the shipment includes 1 1/4-inch IPS pipe, as signified by the addition of the standard minor modification suffix “-S15” to the erection drawing number, omit Steps 10 through 23 and proceed to Step 24 on page 16.

S&C recommends making up each coupling as work progresses from the top down.

**STEP 10.** One of the pipe sections furnished is threaded at one end to accommodate the operating-handle assembly. See Figure 7. Install this section of pipe last, with the threads at the lower end.

*If only one vertical operating-pipe section is required, proceed to Step 12 on page 13.*

**Note:** Do not tighten the set screw at the top of the lowest section of vertical operating pipe until satisfactory operating-handle adjustment is attained.

**STEP 11.** Attach a rigid coupling to one end of a 6-foot-10-inch (208-cm) section of vertical operating pipe. Next, slip a rod guide onto the pipe (the rigid coupling will retain the rod guide). Clamp the other end of the pipe section in the bell-crank coupling. At both ends of the pipe, securely tighten the clamp bolts. Then, securely tighten the set screws. See Figure 8.

Install additional vertical operating-pipe sections in the same manner.



Figure 7. A threaded vertical operating pipe.

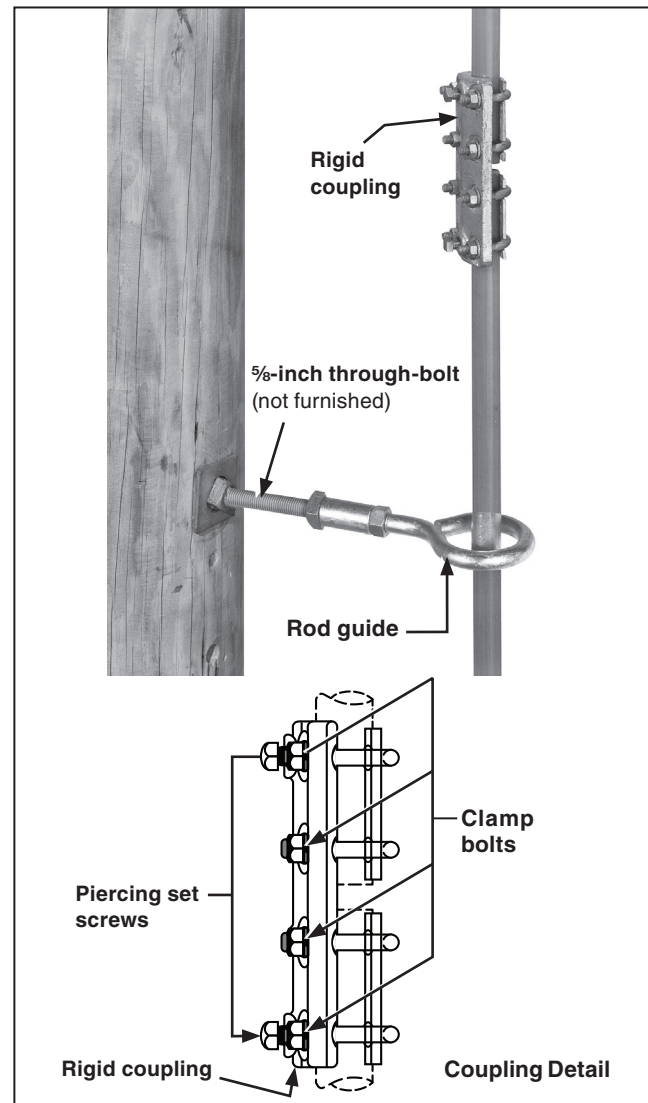
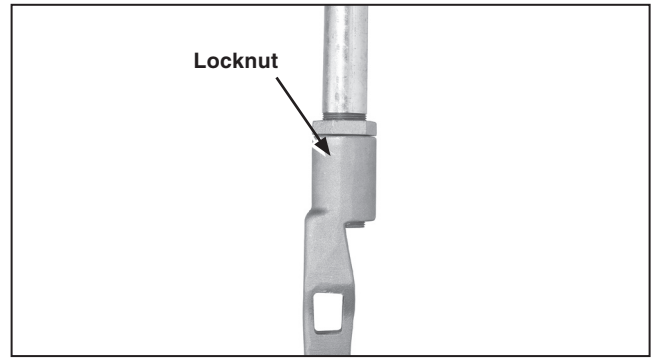


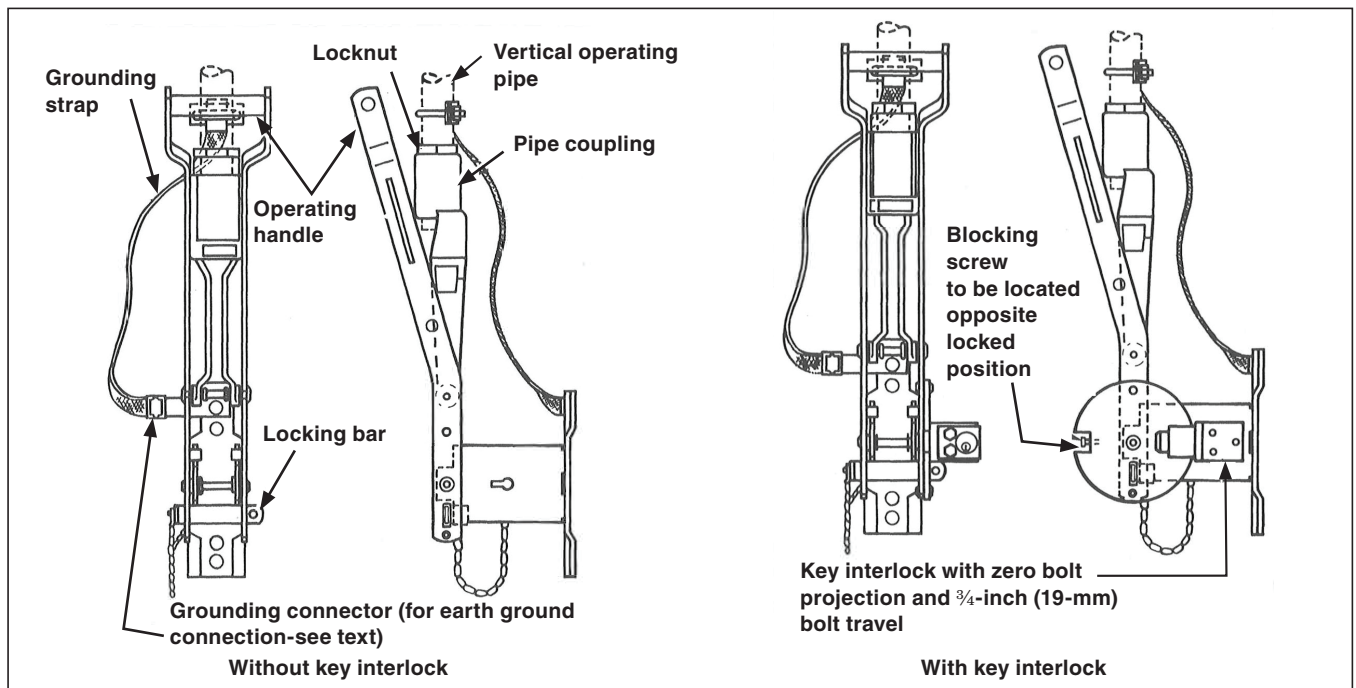
Figure 8. The rod guide and rigid coupling (detail) for use with 3/4-inch IPS vertical operating pipe.

- STEP 12.** Install the lowest operating-pipe section by threading one end of the pipe into the coupling on the operating handle. Approximately ¼-inch (6 mm) of thread should extend through the coupling. See Figure 9. Tighten the locknut. Slip a rod guide onto the pipe and attach the upper end of the pipe to the lowest rigid coupling. Tighten the coupling clamp bolts but do not tighten the associated set screw at this time.
- STEP 13.** Make sure the switch poles are fully closed and the operating handle is held in its **Closed** position by means of the locking bar.
- STEP 14.** Use the vertical operating pipe as a plumb line to locate the operating handle radially to the pole (see Section D-D on the erection drawing). Then, drill 1¼-inch (17-mm) diameter holes and mount the handle, using ¼-inch threaded rod or through-bolts (not furnished). At the same time, use one of the operating-handle mounting bolts to attach one end of the grounding strap (the end with the grounding connector attached) to the handle mounting plate. See Figure 10.●



**Figure 9.** Installing the lowest operating pipe section into the operating-handle assembly.

● 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.

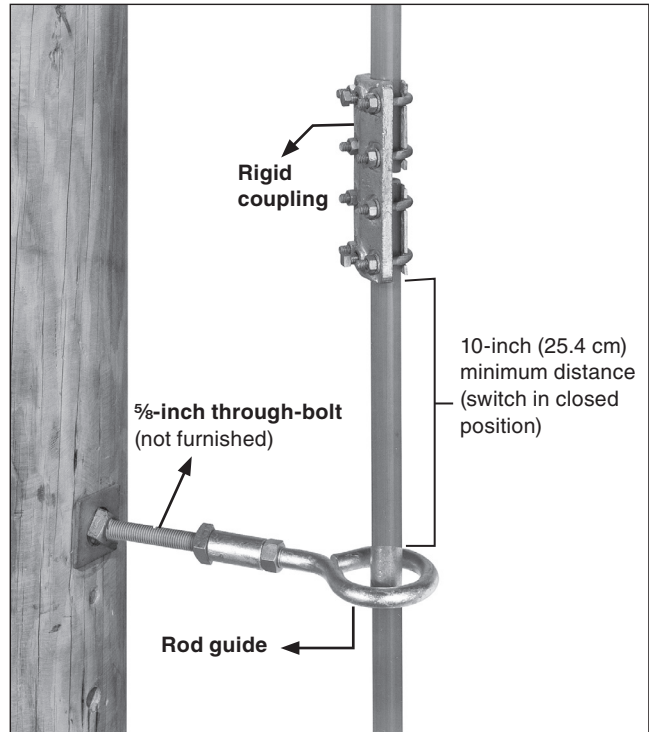


**Figure 10.** The operating-handle assembly.

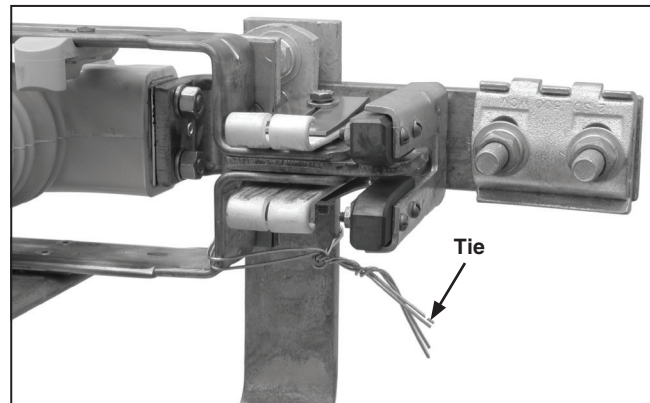
## Installation

- STEP 15.** Drill an  $\frac{1}{16}$ -inch (17-mm) diameter hole in the pole for each rod-guide mounting location, as indicated on the erection drawing. Position the hole so it is in line with the vertical operating pipe. Also, where appropriate, position the hole to provide for a 10-inch (25-cm) minimum clearance between the rod guide and the rigid coupling immediately above. See Figure 11.
- STEP 16.** Remove the ties holding the switch poles blades to their stationary main contact assemblies. See Figure 12.
- STEP 17.** Move the operating handle to its mid position to take the strain off the operating-pipe linkage. Secure the handle in that position by inserting a  $\frac{3}{8}$ -inch bolt or metal pin into the hole provided. Adjust the guide-ring distance from the face of the pole so the rod is centrally located in each loop. Refer to the erection drawing.
- STEP 18.** Remove the  $\frac{3}{8}$ -inch bolt and move the handle to the **Closed** position. Make sure the switch poles are fully closed. Loosen the clamp bolts on the lower portion of the rigid coupling attached to the lowest operating-pipe section.
- STEP 19.** While holding the handle approximately 20 degrees from the **Closed** position, retighten the rigid coupling clamp bolts. Do not tighten the associated set screw. Move the handle to the fully **Closed** position. A definite resistance should be felt at the end of the stroke, indicating that all slack in the operating linkage has been taken up.

If this is not the case, the above procedure should be repeated except the operating handle should be moved *more* than 20 degrees in the opening direction before tightening the coupling's clamp bolts. Conversely, if it is necessary to use considerable force to move the handle to the fully **Closed** position or if the operating handle does not swing 180 degrees to the fully **Open** position, loosen the clamp bolts at the lowest coupling and then retighten them with the operating handle at less than the 20-degree position.



**Figure 11.** A rod guide for use with  $\frac{3}{4}$ -inch IPS vertical operating pipe. Maintain a 10-inch (25.4-cm) distance between rod guide and rigid coupling.



**Figure 12.** Removing the tie at the stationary main contact assembly.

**STEP 20.** With the operating handle adjusted for full 180-degree travel as described in Step 19, open and close the interrupter switch slowly to verify no operational difficulties are encountered caused by undetected damage in shipping.

**⚠ WARNING**

Open and close the switch slowly **ONLY** when checking alignment 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 at any point.

**Failure to operate the switch properly can result in arcing, switch damage, serious injury, or death.**

Make sure the following conditions exist:

- When the operating handle is completely closed (and over center), all main contacts of the interrupter switch are in the fully **Closed** position.
- When the operating handle is completely open, the switch blades are 90 degrees from the **Closed** position.

**STEP 21.** In the unlikely event these conditions are not met, more switch-blade travel is required. Proceed as follows:

- (a) Move the operating handle to its mid position to take the strain off the operating-pipe linkage. Secure the handle in that position by inserting a  $\frac{3}{8}$ -inch bolt or metal pin into the hole provided. See Figure 10 on page 13.
- (b) Loosen the two clamp bolts that clamp the adjustable arm of the bell crank. Shorten the arm one “step,” or  $\frac{11}{32}$ -inch (9 mm), and retighten the bolts. (Shortening the arm increases the amount of switch travel.) Then, readjust for full operating handle and switch-blade travel as described in Steps 17 through 19. Repeat this procedure, shortening the bell-crank arm in one-step increments, until full switch-blade travel is attained.

**STEP 22.** When satisfactory travel adjustment of the handle and switch is attained, make sure the clamp bolts at the coupling immediately above the handle are securely tightened. Then, securely tighten the set screw.

**STEP 23.** Fasten the free end of the grounding strap to the lowest vertical operating-pipe section a few inches above the operating handle assembly with the U-bolt connector provided for this purpose. Then, connect the lower end of the strap to a suitable earth ground using the grounding connector provided at that end of the strap.●

Proceed to the “Locking the Operating Handle” section on page 19.

- 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.

## Installing the Vertical Operating Pipe and Operating Handle (1¼-inch IPS Pipe)

### NOTICE

This section is for a standard mounting arrangement using 1¼-inch IPS vertical operating pipe, as signified by the addition of standard minor modification suffix “-S15” to the ED number.

S&C recommends making up each coupling connection as work progresses from the top down.

**STEP 24.** One of the pipe sections is threaded at one end to accommodate the operating-handle assembly. See Figure 13. Install this section of pipe last, with the threads at the lower end.

*If only one vertical operating-pipe section is required, proceed to Step 27.*

**STEP 25.** Mount the rod guide(s) with the arm upward on the pole or structure in accordance with the dimension shown on the erection drawing. See Figure 14. A positioning stud is furnished that holds the rod guide arm at 45 degrees. When an adjustable rod guide is included, mount it nearest the switch.

**STEP 26.** Install the upper section of operating pipe between the bell crank and the uppermost rod guide with the rod guide arm pointing upward at a 45-degree angle. See Figure 15. Follow the directions in “Installing Pipe Couplings with Piercing Set Screws” section on page 11.

**Note:** Do not tighten the piercing set screw at the top of the lowest section of vertical operating pipe until satisfactory operating-handle adjustment is attained.



Figure 13. A threaded vertical operating pipe.

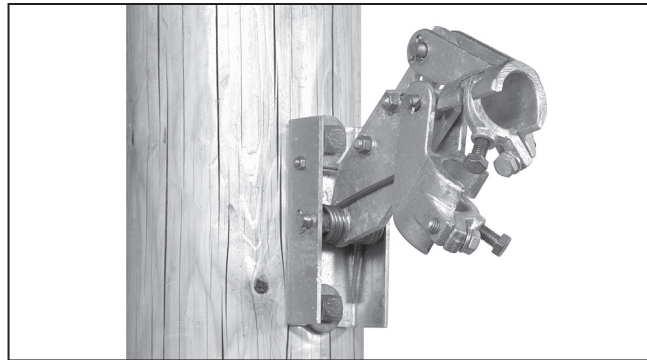


Figure 14. Attaching the rod guide.

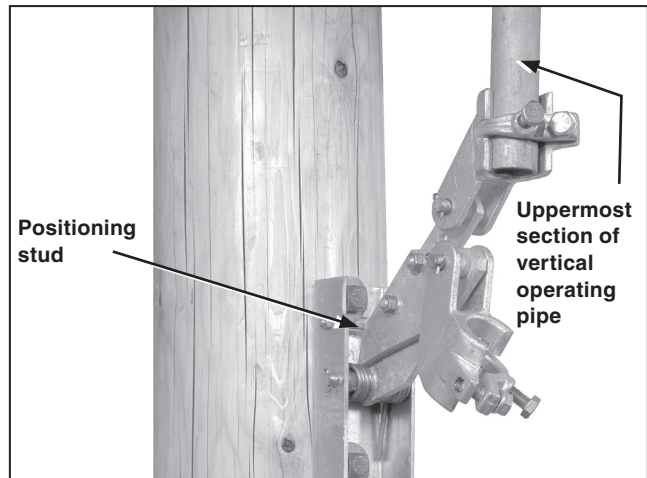


Figure 15. Installing the upper operating pipe section into the rod guide.

**STEP 27.** Mount the operating handle as shown on the erection drawing. At the same time, use one of the operating handle mounting bolts to attach one end of the grounding strap (the end with the grounding connector attached) to the handle mounting plate. See Figure 16.●■

**STEP 28.** Install the lowest operating-pipe section by threading one end of the pipe into the coupling on the operating handle. Approximately ¼-inch (6 mm) of thread should extend through the coupling. Tighten the locknut. See Figure 17.

**STEP 29.** Insert the upper end of this vertical pipe section in the lowest rod-guide coupling and, while holding the operating handle approximately 20 degrees from the **Closed** position, tighten the rod-guide clamp bolt. See Figure 18.

● 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 suffix "-S8" or "-S9" is specified, refer instead to S&C Instruction Sheet 769-510, "Switch Operators—Type AS-10." If suffix "-S16" is specified, refer instead to S&C Instruction Sheet 1045M-510, "6801M Automatic Switch Operators, Reciprocating and Rotating Switch Operation: Installation."

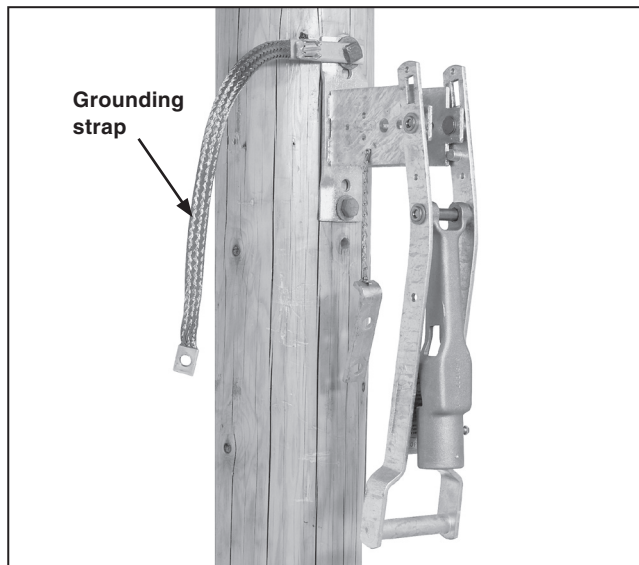


Figure 16. Mounting the operating handle.

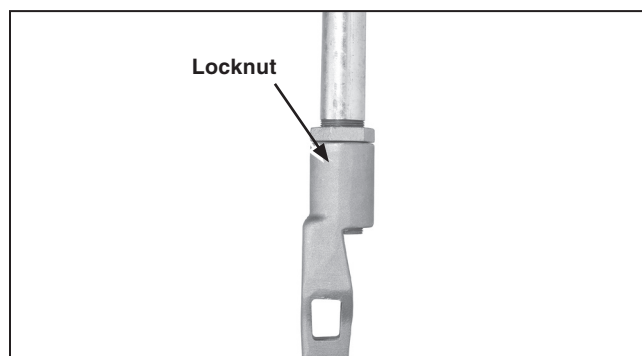


Figure 17. Installing the lowest operating pipe section into the operating handle assembly.

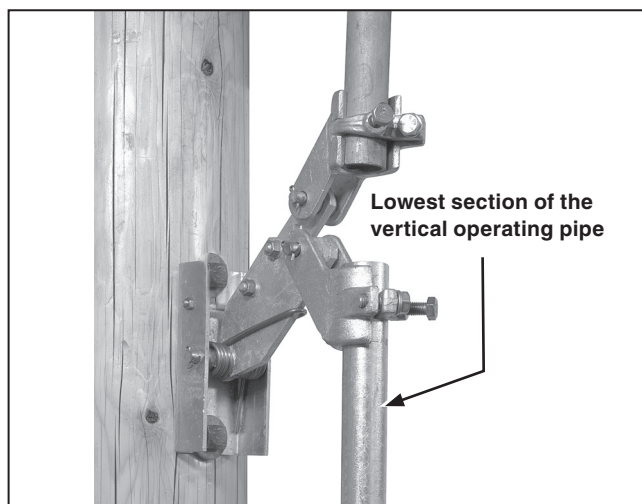


Figure 18. Installing the lowest operating pipe section into the rod guide.

## Installation

- STEP 30.** Fasten the free end of the grounding strap to the lowest vertical operating-pipe section a few inches above the operating-handle assembly with the U-bolt connector provided for this purpose. See Figure 19. Then, connect the lower end of the strap to a suitable earth ground, using the grounding connector provided at that end of the strap.●
- STEP 31.** Remove the ties holding the blades to their stationary main contact assemblies. See Figure 12 on page 14.
- STEP 32.** Remove the 45-degree positioning stud from each rod guide. See Figure 15 on page 16.
- STEP 33.** Move the operating handle slowly to the **Closed** position. See Figure 20. A definite resistance should be felt at the end of the stroke, indicating all slack in the operating linkage has been taken up.
- STEP 34.** If there is still slack, repeat the procedure in Step 29 but move the operating handle more than 20 degrees in the opening direction before torquing the clamp bolt on the lowest rod-guide (or bell-crank) coupling. See Figure 21.

Conversely, if it is necessary to use considerable force to move the handle to the fully **Closed** position or if the operating handle does not swing 180 degrees to the fully **Open** position, loosen the clamp bolt on the lowest rod-guide coupling and then retighten it with the operating handle at less than the 20-degree position.

● 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.

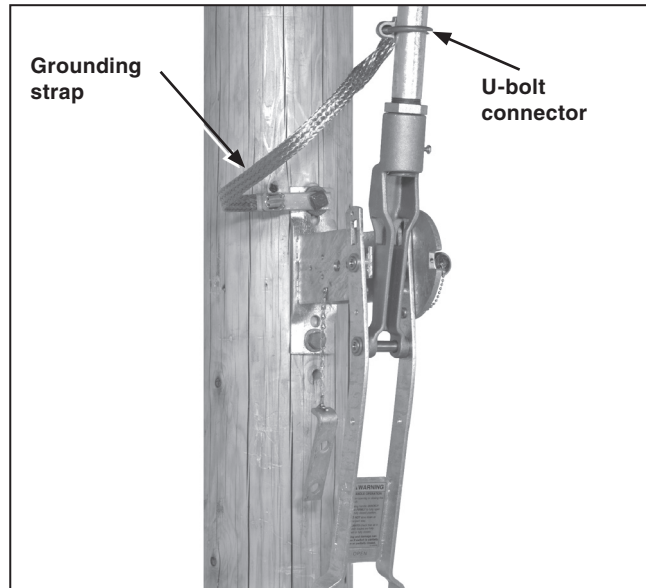


Figure 19. Attaching the grounding strap.



Figure 20. Verifying the stack has been taken up in the operating linkage.

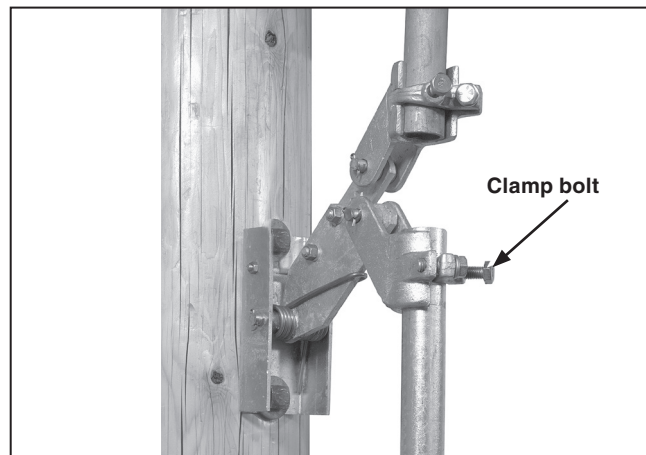


Figure 21. Torquing the clamp bolt at the lowest rod guide (or bell-crank) coupling.

**STEP 35.** With the operating handle adjusted for full 180-degree travel, as described in Steps 33 and 34, open and close the switch slowly to ensure no operational difficulties are encountered because of undetected damage in shipping.

**⚠ WARNING**

Open and close the switch slowly **ONLY** when checking alignment 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 at any point.

**Failure to operate the switch properly can result in arcing, switch damage, serious injury, or death.**

Make sure the following conditions exist:

- When the operating handle is completely closed (and over center), all main contacts of the interrupter switch are in the fully **Closed** position.
- When the operating handle is completely open, the switch blades are 90 degrees from the **Closed** position.

**STEP 36.** In the event these conditions are not met, more switch-blade travel is required. Proceed as follows:

- (a) Move the operating handle to its mid-position to take the strain off the operating-pipe linkage. Secure the handle in that position by inserting a  $\frac{3}{8}$ -inch bolt or metal pin into the hole provided. See Figure 10 on page 13.
- (b) Loosen the two clamp bolts that clamp the driven arm of the adjustable rod guide. Lengthen the driven arm one “step,” or  $\frac{1}{32}$ -inch (9 mm), and retighten the bolts. (Lengthening the arm increases the amount of switch travel.) Then readjust for full operating-handle and switch-blade travel as described in Steps 33 and 34. Repeat this procedure, lengthening the driven arm in one-step increments until full switch-blade travel is attained.

**STEP 37.** When satisfactory travel adjustment of handle and switch is attained, make sure the clamp bolt on the pipe coupling at the rod guide (or bell-crank arm) immediately above the handle has been securely tightened. Then, tighten the associated piercing set screw, piercing the pipe, and continue turning until a firm resistance is felt.

### Locking the Operating Handle

**STEP 38. With a padlock:** The operating handle assembly includes provisions for padlocking the interrupter switch in either the **Open** or **Closed** position.

**With a key interlock:** A Superior Key Interlock (or equivalent), if supplied with the interrupter switch, will be mounted on the operating handle (see Figure 10 on page 13). One of the two slots in the operating handle will be blocked to provide either a locked-open or locked-closed arrangement.

If the interrupter switch is supplied with provision for the addition of a key interlock, the operating handle will have an interlock-mounting plate attached to the base. Install interlock as follows:

- (a) Attach the interlock to the mounting plate so the interlock bolt, when extended, will engage a slot in the operating handle. A Superior (Type B4003-1) Key Interlock with zero bolt projection and  $\frac{3}{4}$ -inch (19-mm) bolt travel is required.
- (b) Block one of the two slots in the operating handle with the blocking screw provided. The slot to be blocked will be determined by whether a locked-open or locked-closed arrangement is required.

**Note:** Key interlocks are intended for proper sequencing of switching operations; they are not intended to provide security. The operating handle assembly includes provisions for padlocking the interrupter switch in either the **Open** or **Closed** position.

## Checking Operation

**STEP 39.** Open and close the switch slowly through its full travel.

### ⚠ WARNING

Open and close the switch slowly **ONLY** when checking 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 at any point.

**Failure to operate the switch properly can result in arcing, switch damage, serious injury, or death.**

Make sure the following conditions exist:

- The interrupter must lie in a plane parallel to the sweep of the blades, and the blades must pass over the interrupter with approximately equal clearance on both sides as shown in Figure 22.
- As the blade moves in the *closing* direction, clearance between the blade-opening cam and the interrupter-opening lever must be within the limit shown in Figure 22, View A-A.
- In the fully **Closed** position, clearance between the blade-closing cam and the interrupter-closing lever must be within the limit shown in Figure 22. Also, the clearance between the blade shunt contact and the interrupter housing must be as shown in Figure 22.

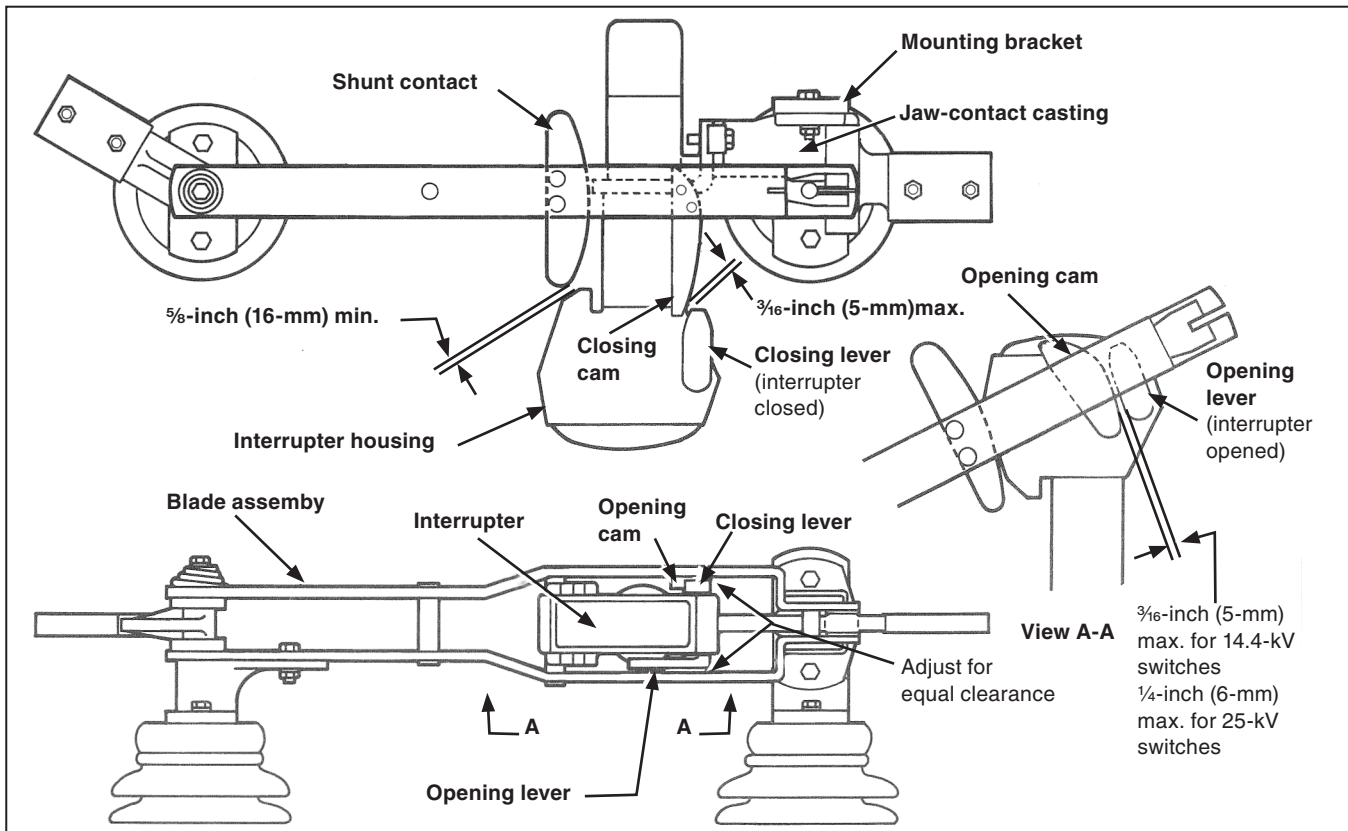


Figure 22. Operating checkpoints.

- As the blade moves in the *opening* direction, the shunt contact must firmly engage the interrupter housing before the blade disengages from the jaw contact. (The shunt contact may be bent as required to conform to these conditions.)

If adjustment is required, loosen the bolts that fasten the interrupter to the jaw-contact casting and reposition the interrupter. If adjustment is required, loosen the bolts that fasten the interrupter to the jaw-contact casting and reposition the interrupter. It also may be necessary to loosen the bolts that fasten the jaw-contact casting to its mounting bracket and slightly rotate the casting to achieve the necessary clearances. Retighten the bolts, making sure the blade engages the stationary contact on-center.

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 shipping.

### Connecting High-Voltage Conductors

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

- STEP 40.** 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.
- STEP 41.** Wire-brush each terminal pad of the interrupter switch and apply a coating of Penetrox A. Then, bolt the connectors to the terminal pads.
- STEP 42.** 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, designated by the connector manufacturer as being suitable for direct attachment to copper bearing alloy terminal pads.

### 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**

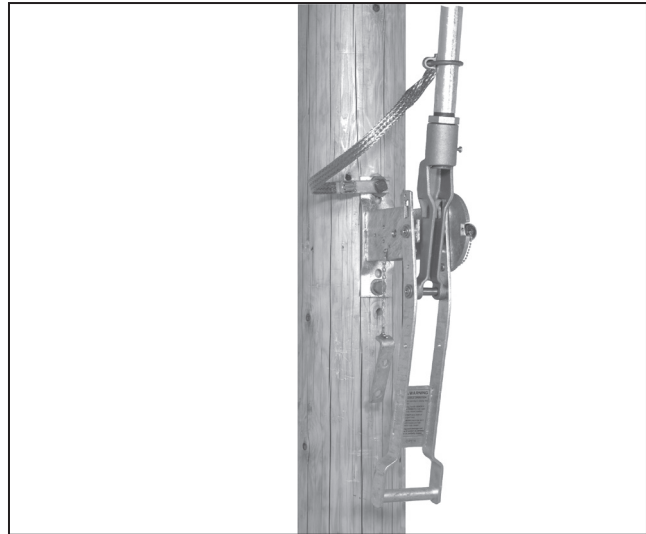
This interrupter switch is not intended for breaking fault currents.

**STEP 43.** Remove the padlock from the locking bar on the operating handle assembly. Withdraw the locking bar. See Figure 23.

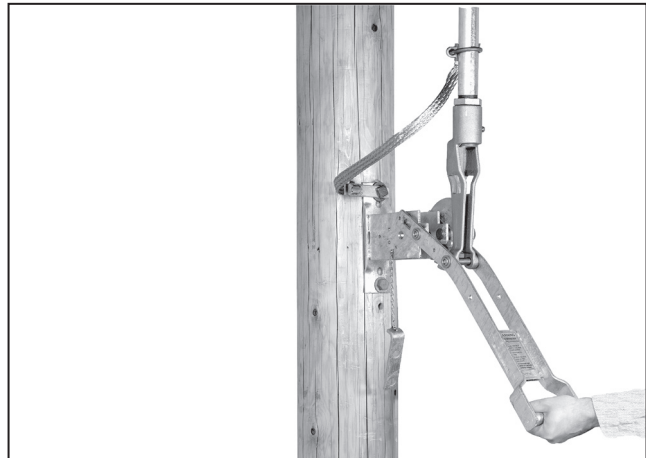
- (a) If the operating handle assembly is furnished with a key interlock, disengage the interlock bolt.
- (b) Rapidly swing the handle to the fully **Open** or fully **Closed** position. See Figure 24.
- (c) Always check that all three poles are fully open or fully closed.
- (d) Replace the locking bar and the padlock. 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 23.** Withdrawing the locking bar and disengaging the key interlock bolt.



**Figure 24.** Swing the operating handle rapidly.