Installation and Operation

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December 19, 2016

Qualified Persons

⚠ WARNING

The equipment covered by this publication must be installed, operated, and maintained by qualified persons who are knowledgeable in the installation, operation, and maintenance of overhead electric power distribution equipment along with the associated hazards. A qualified person is one 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 the special precautionary techniques, personal protective equipment, insulating 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

Read this instruction sheet thoroughly and carefully 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/Support/Product-Literature.asp.**

Retain this Instruction Sheet

This instruction 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

⚠ CAUTION

The equipment in this publication must be selected for a specific application. The application must be within the ratings furnished for the equipment.

Operating Considerations

Circuit making and 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** 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 whether the switch blades are in the intended position. 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.

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.

These interrupter switches are not intended for breaking fault currents.

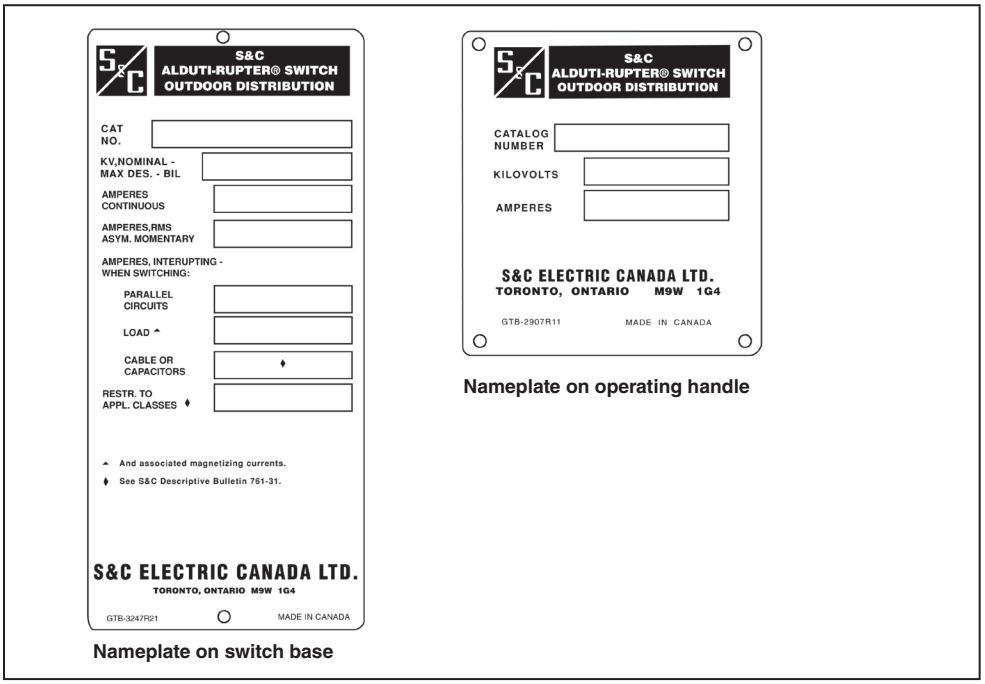


Figure 1. Switch nameplates with ratings.

Warranty

The warranty and/or obligations described in Price Sheet 150, S&C's "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 entire seller's 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 the 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 S&C Headquarters at (773) 338-1000; in Canada, call S&C Electric Canada Ltd. at (416) 249-9171.

NOTICE

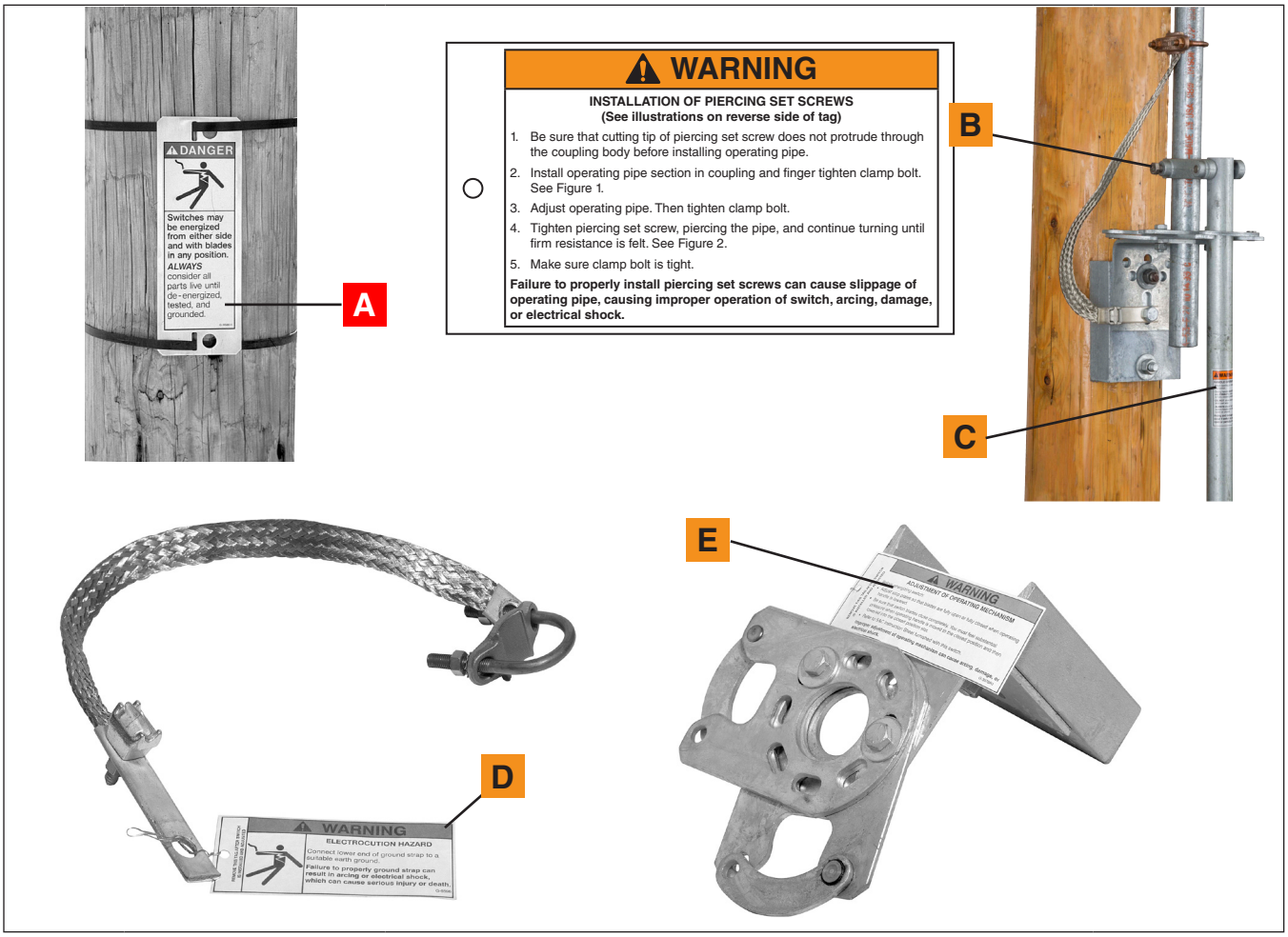
Read this instruction sheet thoroughly and carefully before installing or operating your S&C Alduti-Rupter Switch.

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 and Tags

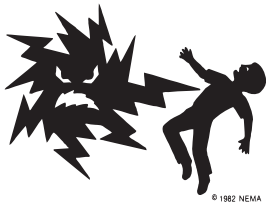


Reorder Information for Safety Labels

Location	Safety Alert Message	Description	Number
A	DANGER	Electrocution Hazard	G-6580-1
B	WARNING	Piercing Set Screws	G-10200▲
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.

⚠ DANGER



Alduti-Rupter Switches operate at high voltage. Failure to observe these precautions 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. **INTERRUPTER SWITCH POSITION.** Always confirm the open/close position of 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 "Operation" on page 30.

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 shipping skids, crates, and containers listed thereon are present:

If there is visible loss and/or damage:

1. Notify the delivering carrier immediately
2. Ask for a carrier inspection
3. Note the condition of the 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

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

Packing

Standard Mounting Arrangement

When a Standard Mounting Arrangement is specified, the shipment includes:

- Three switch poles
- Operating-pipe sections for interphase, horizontal-connecting, and vertical sections①②
- Operating-mechanism components, such as the handle, guide bearings, outboard bearing, and couplings, each tagged and keyed to the bill of material for ready identification

A detailed erection drawing is included with this instruction sheet, illustrating the applicable mounting arrangement.

The erection drawing shows minimum or suggested locating dimensions for the vertical operating-pipe guide bearings, the outboard bearings, and the operating handle assembly. The actual locations of these components are to be determined either by qualified persons at the site or by the user's engineering department.

① Not furnished with switches ordered "less operating pipe."

② If desired, the pipe can be cut to length (if not precut at the factory) before proceeding to the job site. Cutting dimensions are shown on the erection drawing.

Standard Minor Modifications

The erection drawing also 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 the vertical operating shaft
- -S2: One Cypoxy™ Insulator unit in the 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 sections
- -S6: Key interlock—single lock for "locked-open" application
- -S8: Provisions for power operation of pole-mounted switches by an S&C Switch Operator—Type AS-1A①
- -S9: Provisions for power operation of steel-structure or pedestal-mounted switches by an S&C Switch Operator—Type AS-1A①
- -S16: Provisions for power operation of pole-mounted switch by the S&C 6801M Automatic Switch Operator①

Drawing RD-10008, 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. Instruction Sheets 769-500 and 769-501 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 and should be used in conjunction with this instruction sheet where applicable.

① Not all mounting arrangements are suitable for power operation. Consult your nearest S&C Sales Office for availability.

Handling

The crate the switch pole-units is packed in is designed to be moved and lifted using a lift truck. Raised slots at 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 a 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 pole-units by the live parts will damage the switch. Rough handling may cause damage to the blades, contacts, and/or interrupters.

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

Mounting to Wood

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.

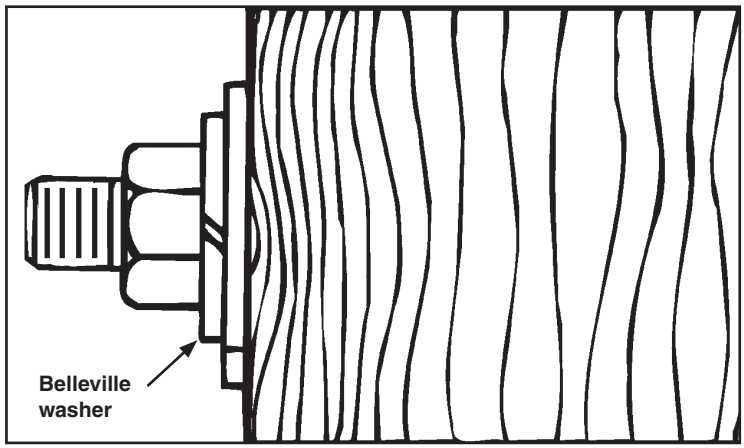


Figure 2. Install a Belleville washer between the nut and square washer.

Uncrating the Switch

STEP 1. Remove the switch poles and outboard bearing assembly (assemblies), if applicable, 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 off the ground.

Attaching Couplings to Switch Poles

STEP 2. Attach the pipe couplings to the operating lever of each switch pole. Each pipe coupling includes ¼-inch and ⅜-inch spacers. Position the spacers included with each coupling, as shown in the section views on the erection drawing. See Figures 3 and 4.

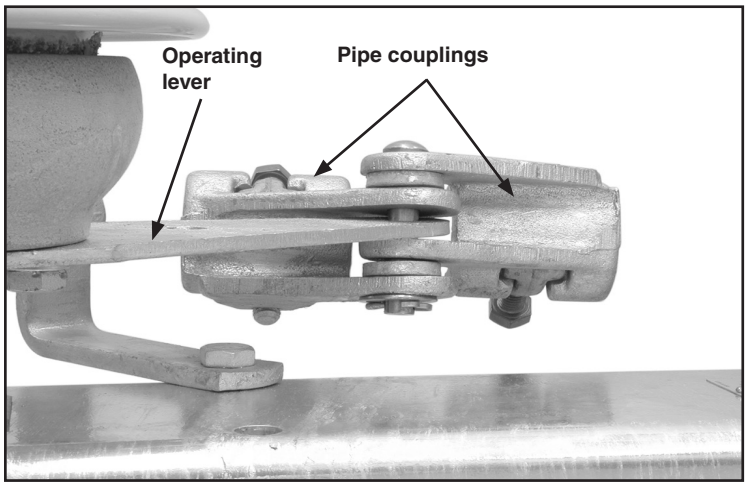


Figure 3. Assemble the pipe coupling to the operating lever—interphase pipe on both sides of operating lever.

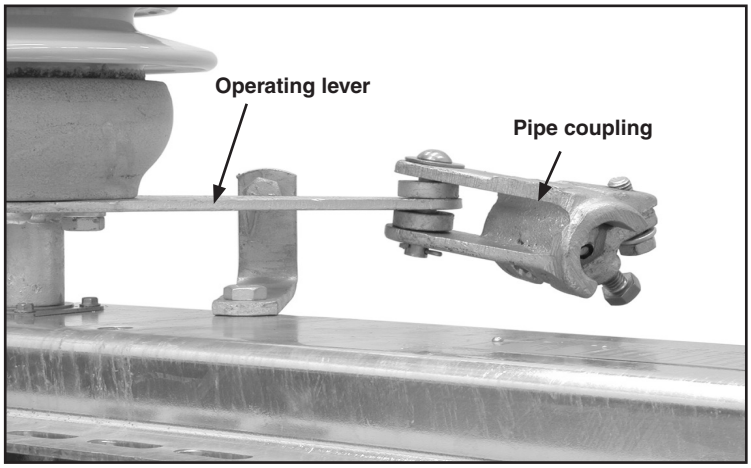


Figure 4. Assemble the pipe coupling to the operating lever—interphase pipe on one side of the operating lever.

STEP 3. For switches that are directly connected to the vertical operating pipe, attach a pipe-to-switch bearing-type universal coupling to the rotating shaft extending below the switch base. See Figure 5.

Attaching Couplings to Outboard Bearings

STEP 4. Attach the pipe couplings to the outboard bearing assembly.

Attach a pipe-to-hexagon type universal coupling to the hexagon shaft on the underside of the outboard bearing assembly. See Figure 6.

STEP 5. For mounting configurations that use an 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 Figure 7.

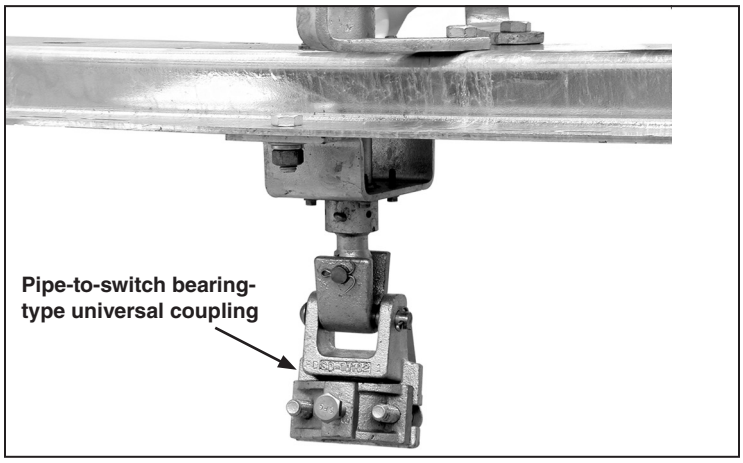


Figure 5. Attach the universal coupling to the switch pole rotating shaft.

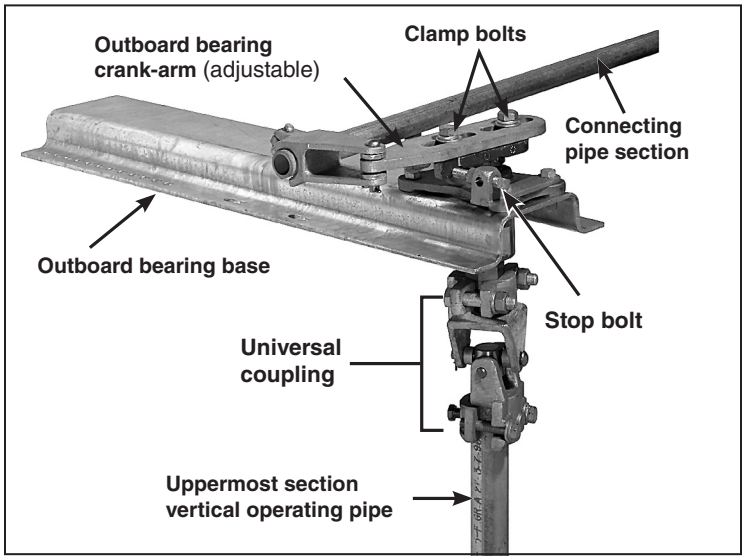


Figure 6. A typical outboard bearing configuration, upright mounted *outboard* of switch poles.

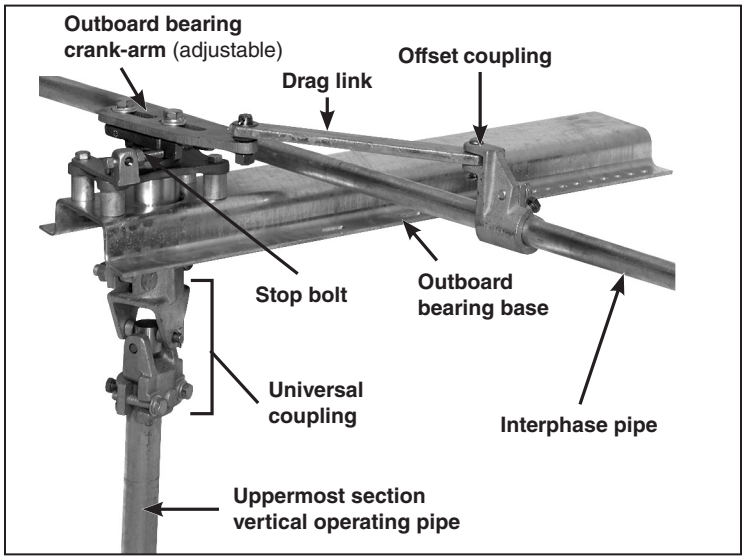


Figure 7. A typical outboard bearing configuration, upright mounted *between* switch poles.

STEP 6. Attach the open-stop bracket to the switch pole that will be connected to the vertical operating pipe or the outboard bearing. Adjust the stop bolt for 90-degree opening. See Figure 8 as well as Detail J on the erection drawing.

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 7. Hoist the switch poles and bolt them into position, as shown on the erection drawing. See Figure 9.

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.

STEP 8. Hoist the outboard bearing assembly, if applicable, and bolt it into position as shown on the erection drawing. See Figure 10.

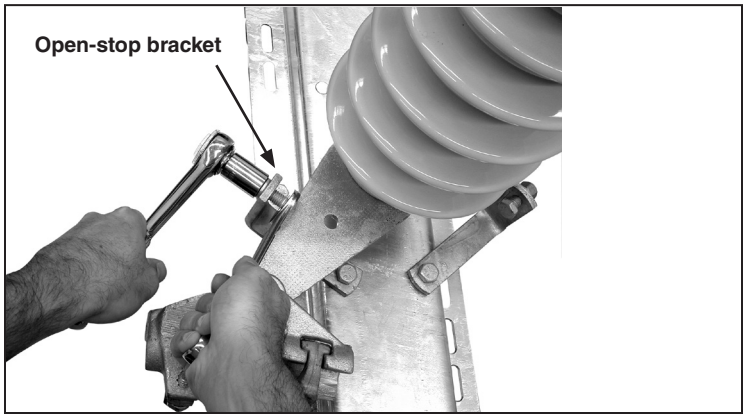


Figure 8. Attach the open-stop bracket to the switch pole.

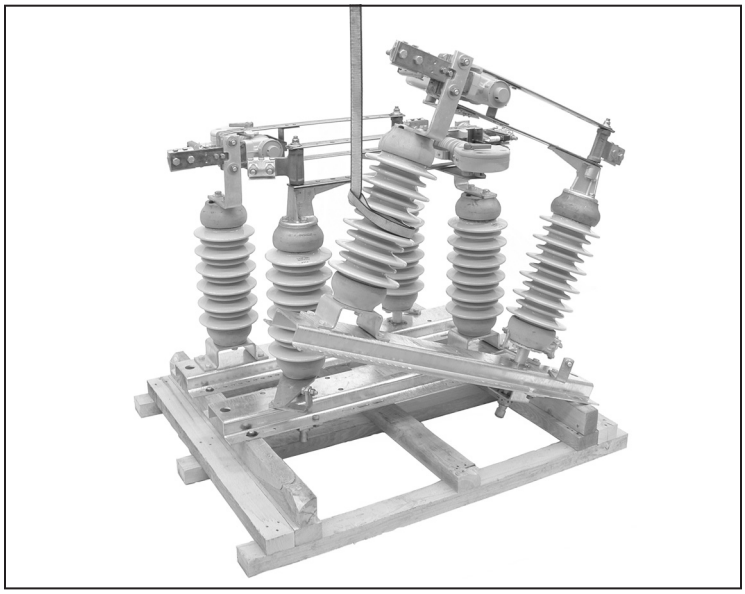


Figure 9. Hoist the switch pole into position.

Figure 10. Hoist the outboard bearing into position.

STEP 9. To minimize time-consuming final adjustments, make sure the switch is fully closed. Tie the switch blades to their stationary main contacts. See Figure 11.

STEP 10. Make sure the outboard bearing crank arm(s), if applicable, lies against its stop bolt. See Figure 12.

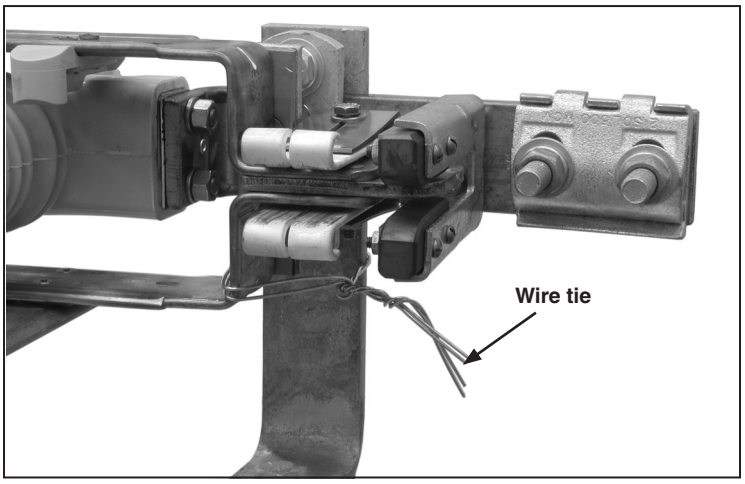


Figure 11. Tie the switch blade to the main contacts.

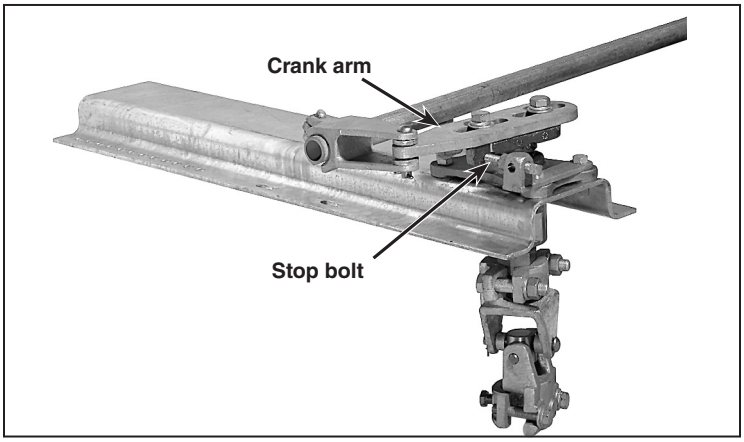


Figure 12. An outboard bearing crank arm lying against the stop bolt.

Installing Pipe Couplings with Piercing Set Screws

⚠ WARNING

Failure to properly install pipe couplings with piercing set screws can cause the operating pipe to slip, 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.

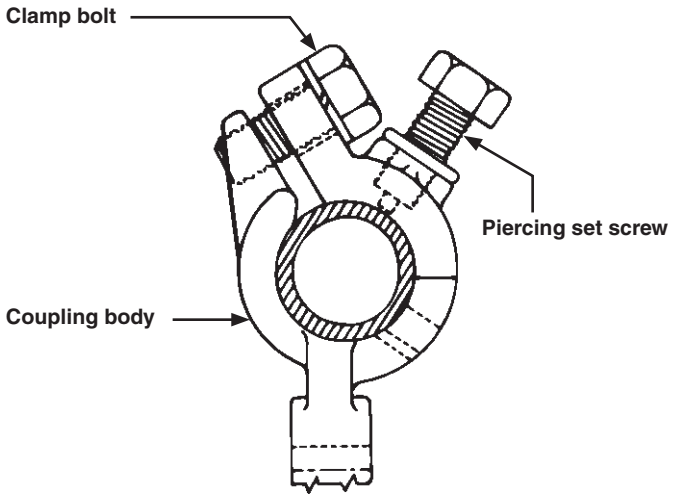
(b) Insert the operating pipe section into the coupling and finger-tighten the clamp bolt(s).

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

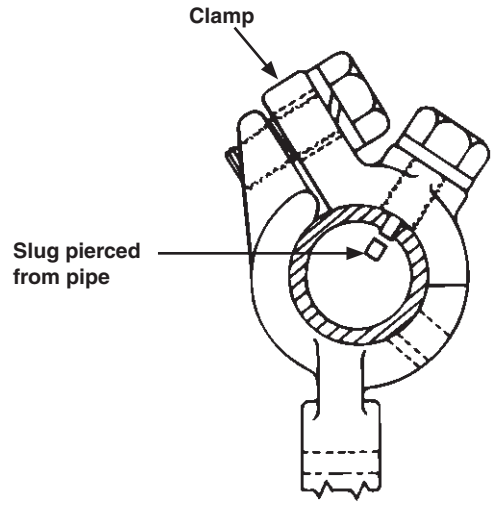
(d) Tighten the piercing set screw, piercing the pipe. Continue turning until a firm resistance is felt.

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

See Figure 13.



The piercing set screw in the shipping position (cutting tip does not protrude through the clamp body).



Install the operating pipe, fully tighten the clamp bolt, and place the piercing set screw in the final position.

Figure 13. Install the pipe couplings.

Installing the Interphase Pipe

STEP 11. Install the horizontal pipe sections connecting the switch poles and, if applicable, the outboard bearing assembly. See Figure 14. Follow the directions in "Installing Pipe Couplings with Piercing Set Screws" on page 13.

Torque the clamp bolt of each pipe-coupling clamp to final tightness, but do not tighten the associated piercing set screw until so directed in Step 31 beginning on page 24 and after the mechanism has been adjusted to attain full closure of all three poles.

STEP 12. *For triangular-upright mounting configuration switches:* Install the vertical interphase pipe section to connect the switch pole to the outboard bearing assembly. See Figure 15. Follow the directions in "Installing Pipe Couplings with Piercing Set Screws" on page 13.

Torque the clamp bolt of each pipe-coupling clamp to final tightness, but do not tighten the associated piercing set screw, until so directed in Step 31 beginning on page 24, after the mechanism has been adjusted to attain full closure of all three poles.

If two outboard bearings are used in a double-offset arrangement: Install the pipe section to connect these bearing assemblies. See Figure 16.

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

If two outboard bearings are used in a double-offset arrangement: Install the pipe section to connect these bearing assemblies. See Figure 17 on page 15. Follow the directions in "Installing Pipe Couplings with Piercing Set Screws" on page 13.

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

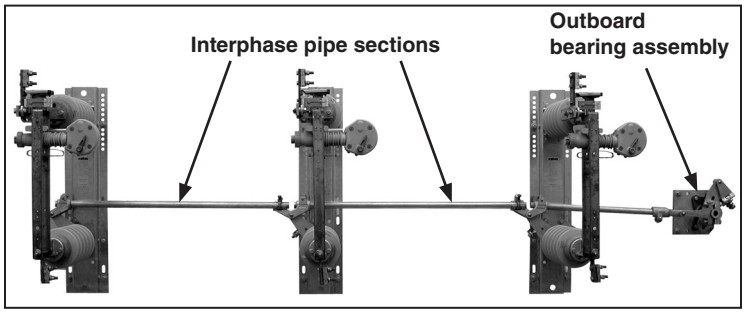


Figure 14. Use the horizontal pipe to connect the switch poles and outboard bearing.

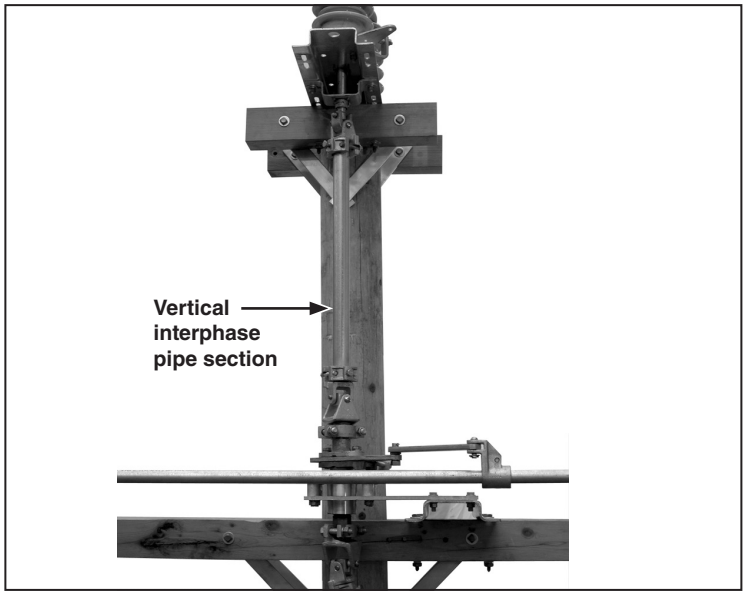


Figure 15. Use the vertical interphase pipe to connect the switch pole to the outboard bearing.

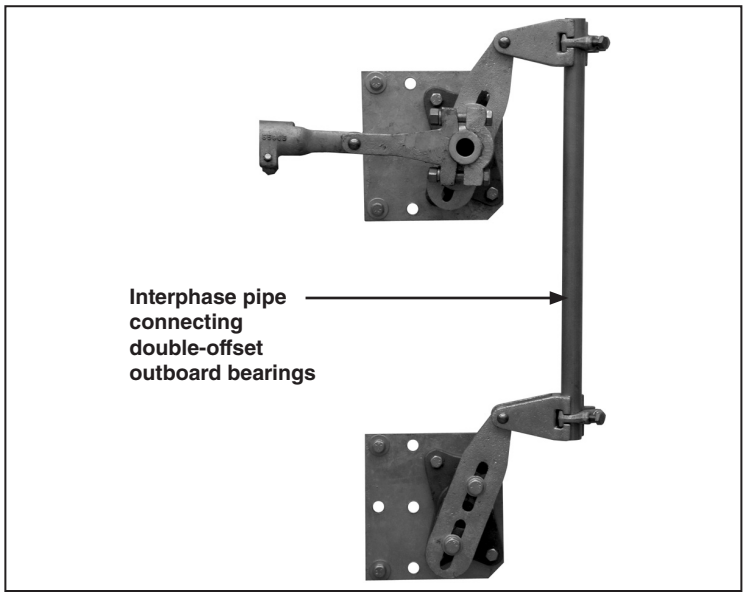


Figure 16. Use the interphase pipe to connect the outboard bearings.

Installing the Vertical Operating Pipe

STEP 13. Insert the uppermost section of the vertical operating pipe into the universal coupling attached to the underside of one of the switch poles or to the outboard bearing assembly, as described in Step 4 or Step 5 on page 10. See Figure 18. Make certain the cutting tip of the piercing set screw does not protrude through the body of the pipe-coupling clamp.

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

STEP 14. Attach a pipe-to-pipe type universal coupling to the lower end of the uppermost section of vertical operating pipe. See Figure 19. Back the piercing set screw out of the body of the pipe coupling before tightening the coupling clamp bolts.

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

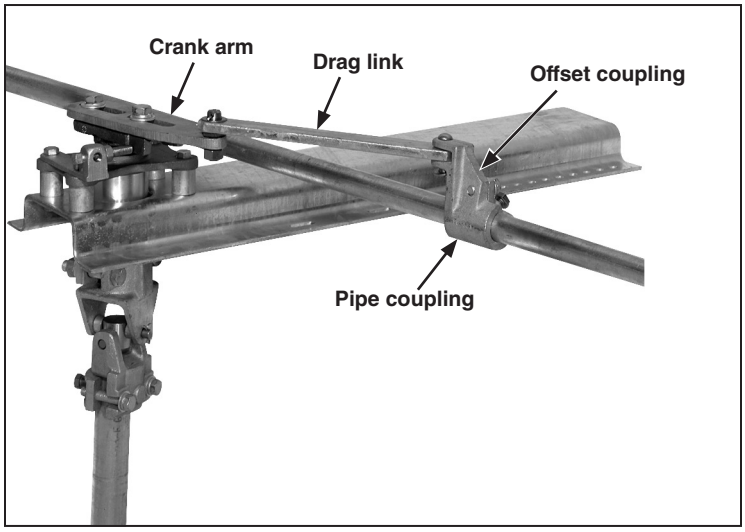


Figure 17. Connect the drag link to the interphase pipe.

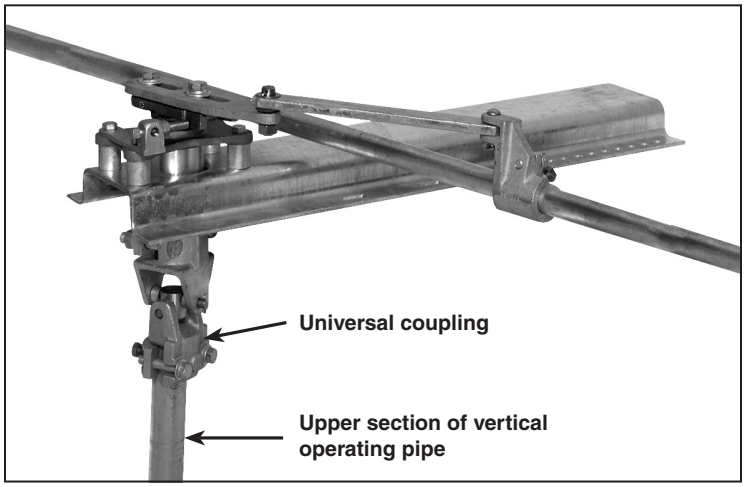


Figure 18. Install the uppermost section of the vertical operating pipe.

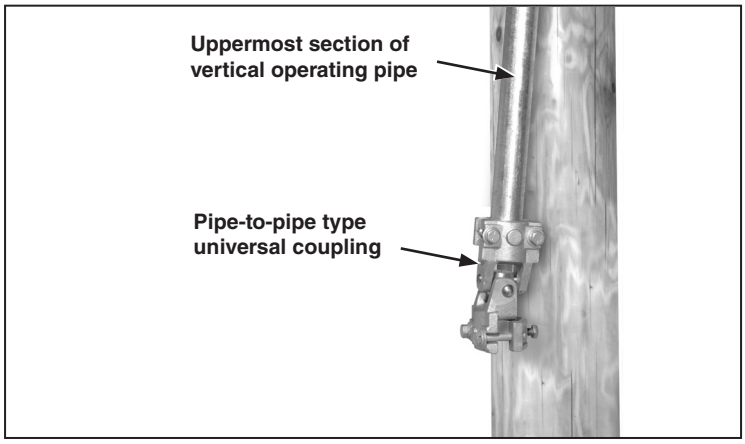


Figure 19. Attach the pipe-to-pipe type universal coupling to the lower end of the vertical operating pipe.

STEP 15. Position and install the guide bearing assembly on the pole in accordance with the dimension shown on the erection drawing. See Figure 20.

STEP 16. 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 21.

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, continue turning until a firm resistance is felt.

STEP 17. 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 22. Thrust bearings are not used with these additional guide bearing assemblies. Use rigid couplings to join these additional pipe sections. Make certain the cutting tips of the piercing set screws do not protrude through the body of the pipe-coupling clamp.

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

STEP 18. At the universal coupling immediately above the thrust bearing—torque the clamp bolts to final tightness. Tighten the piercing set screw, piercing the pipe, and continue turning until a firm resistance is felt.① See Figure 19 on page 15.

① 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 the standard minor modification suffix "-S16" to the erection drawing number, refer instead to S&C Instruction Sheet 1045M-510.

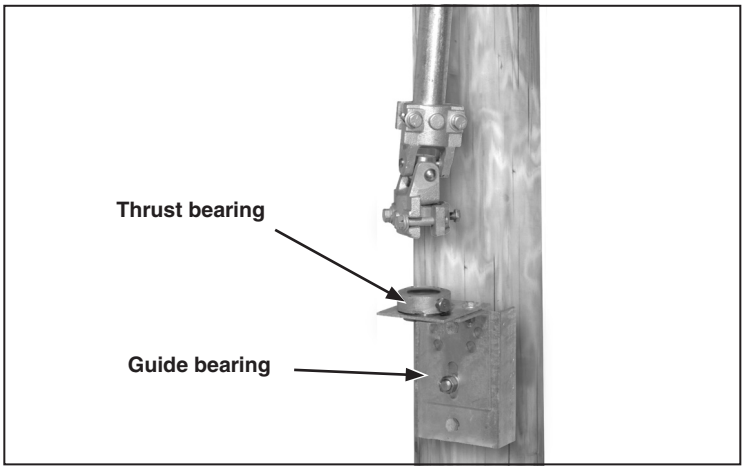


Figure 20. Install the guide bearing.

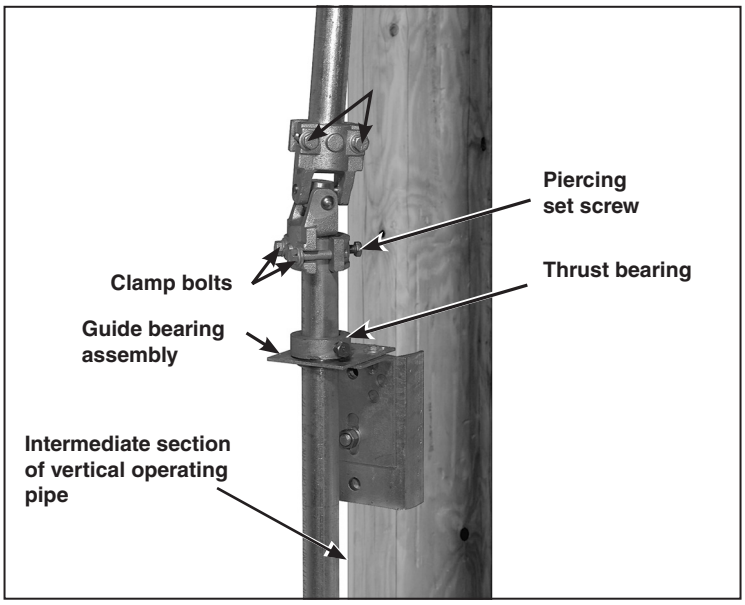


Figure 21. Install the intermediate section of the vertical operating pipe.

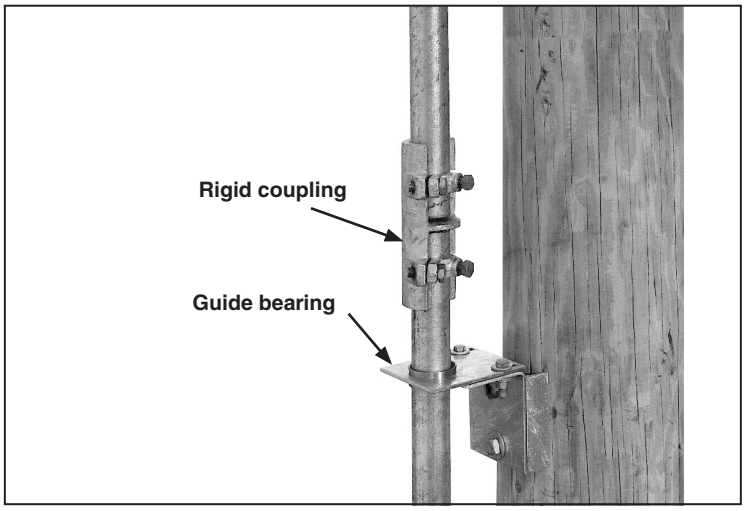


Figure 22. Install the guide bearing for each additional pipe section.

Installing the Operating Handle

STEP 19. When a key interlock is used (standard minor modification suffix "-S6"), refer to Step 22 on page 19.

If suffix "-S8" or "-S9" is specified, refer instead to S&C Instruction Sheet 769-500, "S&C Switch Operators—Type AS-1A."

If suffix "-S16" is specified, refer instead to S&C Instruction Sheet 1045M-510.

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 between 3 to 8 inches of operating pipe below the operating handle assembly. See Figures 23 and 24.

Tighten the piercing set screws on the operating handle assembly enough to hold the handle in place, but DO NOT pierce the vertical operating pipe.

STEP 20. Slide the foot-bearing onto the lowest section of pipe at the position shown on the erection drawing. See Figure 24. Adjust the operating handle assembly until it is 2 to 3 inches above the foot-bearing assembly. Tighten the piercing set screws, piercing the pipe. Continue turning until a firm resistance is felt. At the same time, use one of the mounting bolts to attach one end of the ground strap (the end with the grounding connector attached) to the foot-bearing assembly.

The grounding recommendations 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.

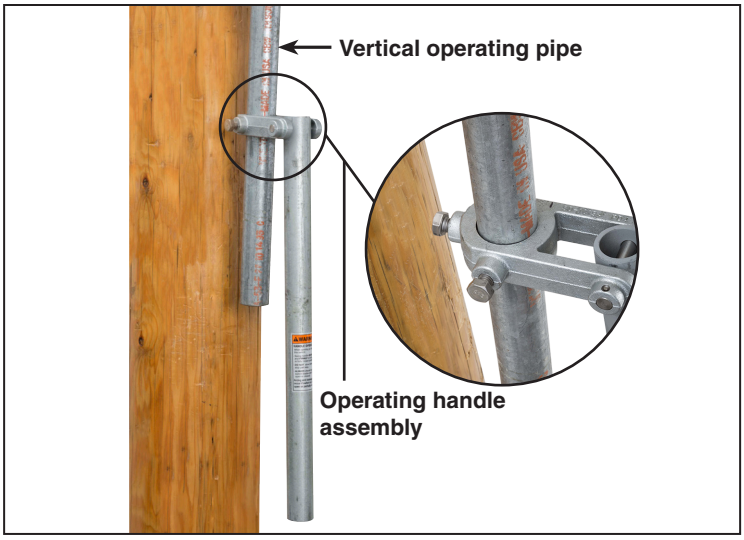


Figure 23. Install the operating handle assembly.

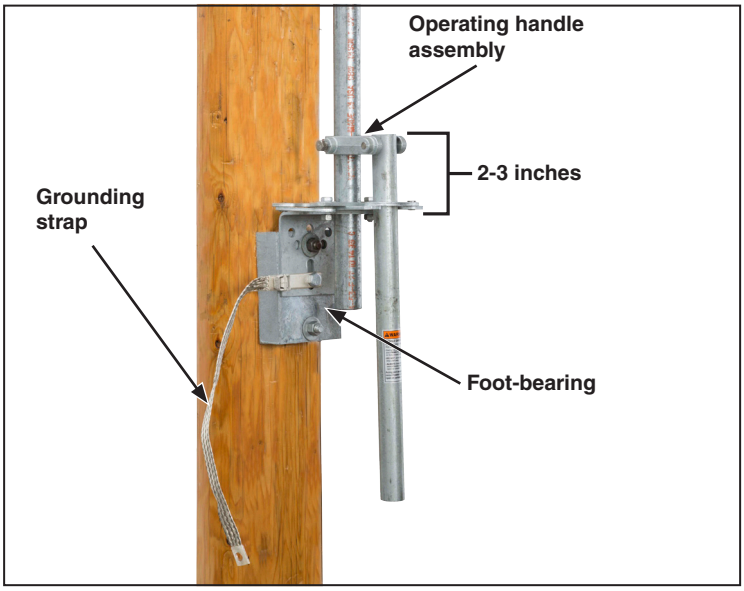


Figure 24. Install the foot-bearing assembly so the handle is 2 to 3 inches above the handle yoke.

STEP 21. 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 25. 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 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.

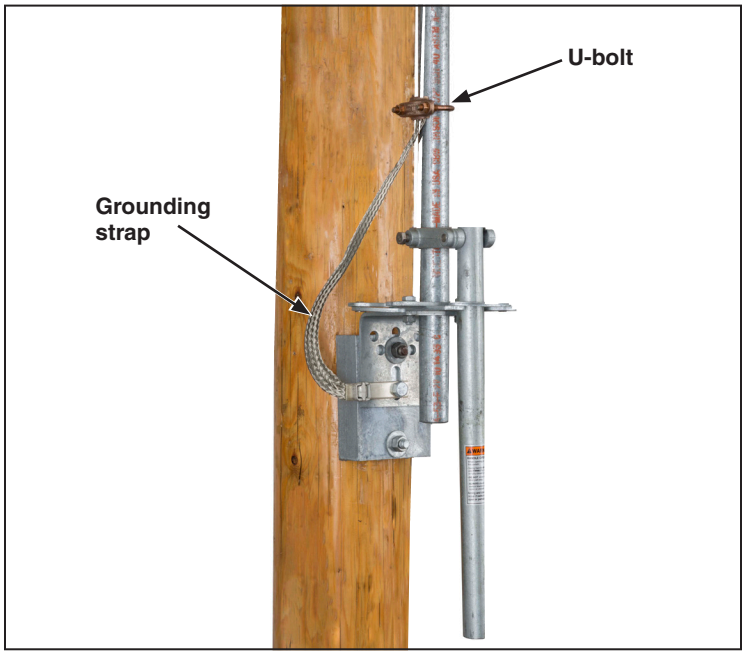


Figure 25. Attach the grounding strap.

Installing the Operating Handle with Key Interlock

STEP 22. The interlock group includes a Superior Type B6003-1 Mk II single- or multiple-key interlock (or equivalent), with ⅜-inch bolt projection and 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 26.

STEP 23. 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. The grounding recommendations 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. See Figure 27.

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.

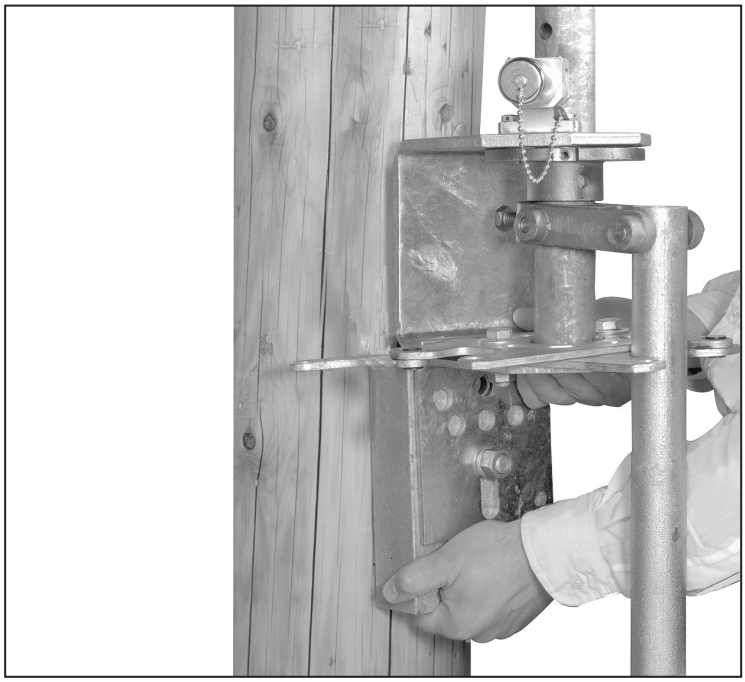


Figure 26. Position the interlock bracket, locking disc, operating handle assembly, and foot-bearing assembly onto the lowest vertical operating-pipe section.

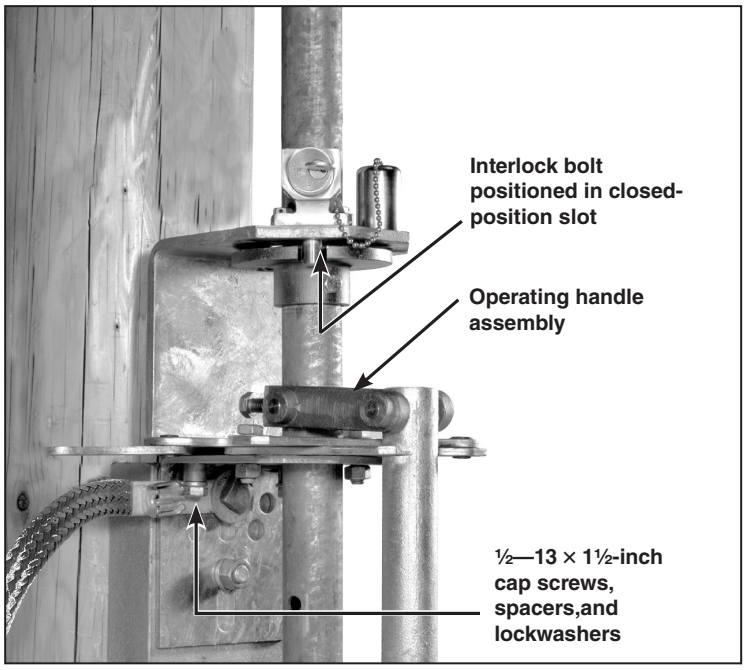


Figure 27. Attach the foot-bearing assembly.

STEP 24. Fasten the operating handle assembly to the lowest vertical operating-pipe section using the piercing set screws furnished. The handle yoke should attach to the vertical operating-pipe nearest the position shown on the erection drawing. See Figure 28.

Tighten the piercing set screws on the operating handle assembly, piercing the pipe. Continue turning until a firm resistance is felt.

Attach the interlock bracket to the foot-bearing assembly, using the 1½–13 × 1½-inch cap screws, spacers, and 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 the open-position slot when the switch is in the **Open** position).

STEP 25. Hold the locking disc ⅜-inch 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 29.

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.

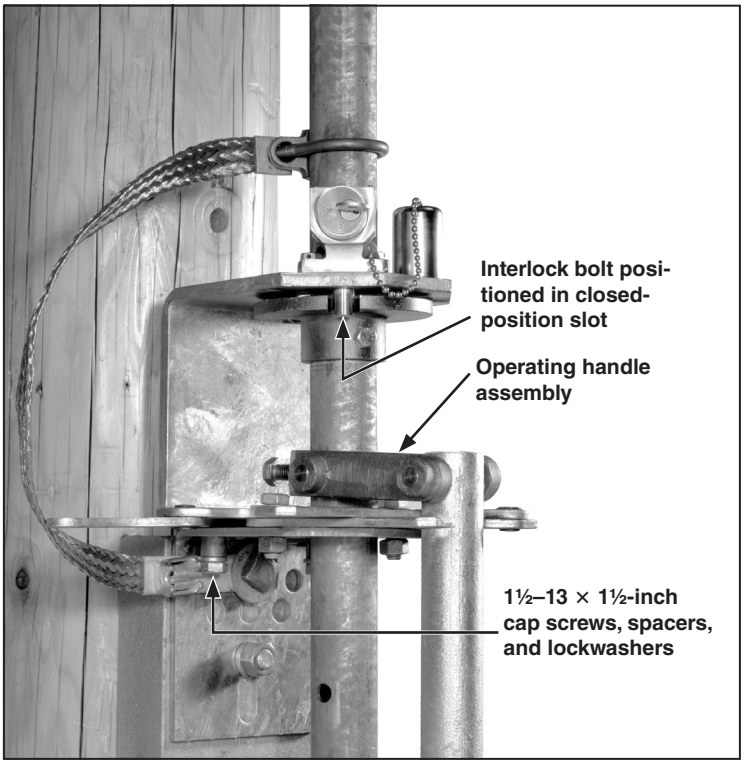


Figure 28. Fasten the operating handle assembly.

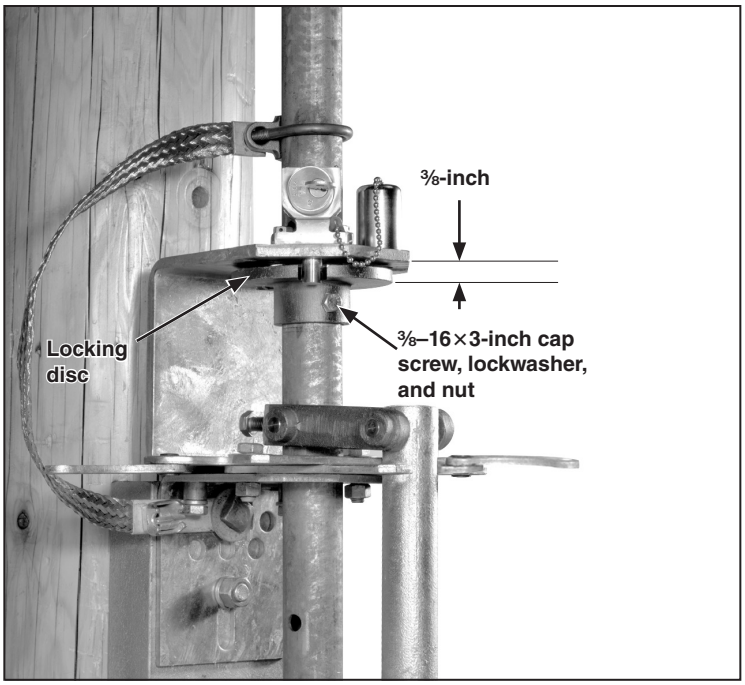


Figure 29. Attach the locking disc.

STEP 26. 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 30.

Checking Alignment and Adjusting the Stop Plates

STEP 27. Remove the ties holding the switch blades to their stationary main contact assemblies. See Figure 31.

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 will occur if the switch is partially open or partially closed.

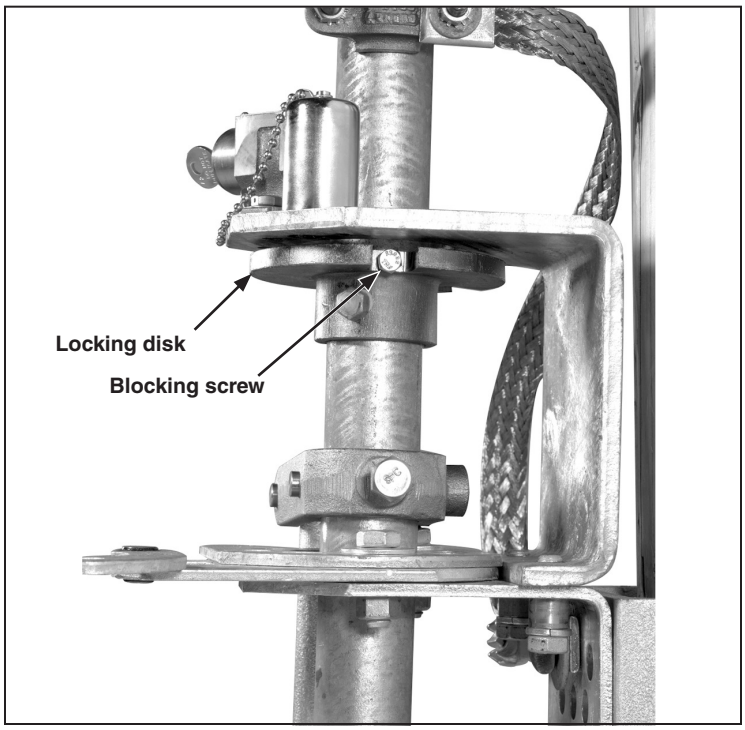


Figure 30. Use the blocking screw to block one of the slots in the interlock disc

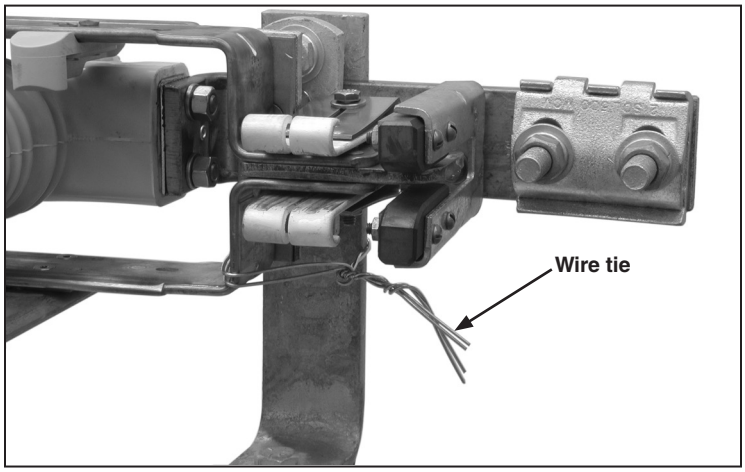


Figure 31. Remove the tie at the stationary main contact assembly.

STEP 28. The stop plate holes are slotted to allow room for adjustment. Loosen the bolts that secure the adjustable stop plates to the foot-bearing support plate. See Figure 32. 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 the location of the open-position stop plate on the support plate.

STEP 29. 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 and jaw 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 32.

(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 33.

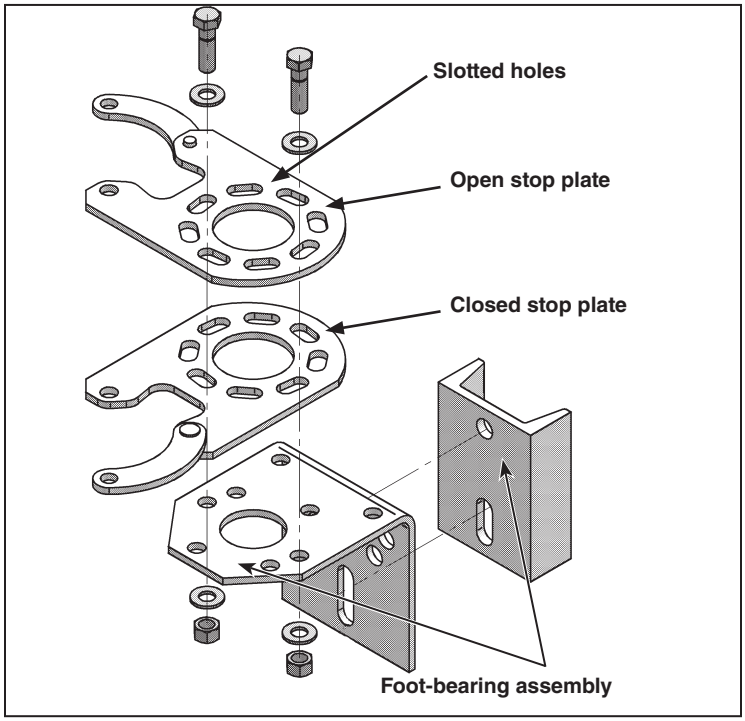


Figure 32. An exploded view of the stop plates and foot-bearing assembly.

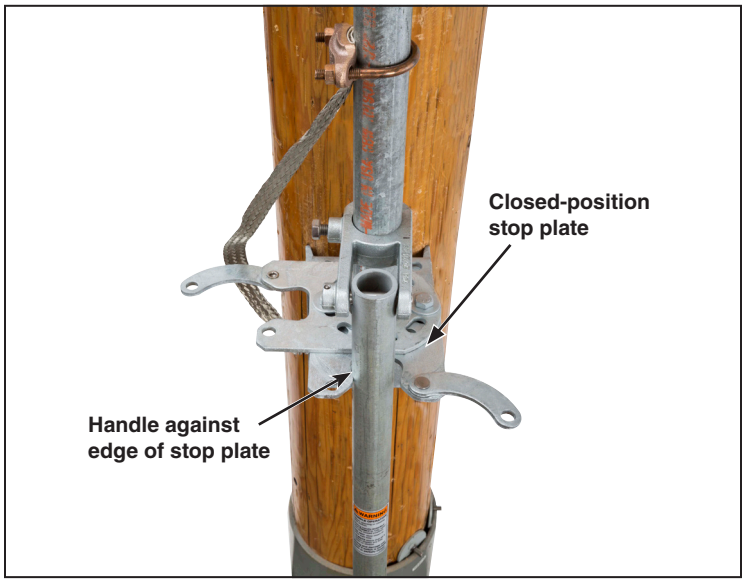


Figure 33. Adjust the closed-position stop plate.

Mark the position of the closed stop plate. See Figure 34 (left).

(c) Lift the handle out of the way and rotate the closed stop plate an additional 15 degrees counterclockwise from the mark. See Figure 34 (right). Make sure the open stop plate lines up with the mark made previously in Step 28. Tighten the stop plate hardware to 40 ft-lbs.

(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 35.

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 30. Recheck to be sure all clamp bolts and piercing set screws have been torqued to final tightness.

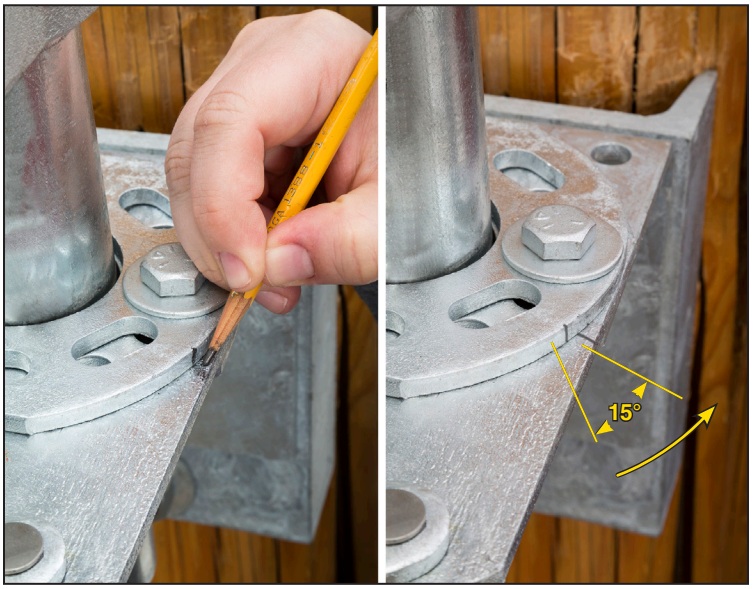


Figure 34. Mark the stop plate, and then loosen the hardware and rotate the closed stop-plate backward approximately 15 degrees.

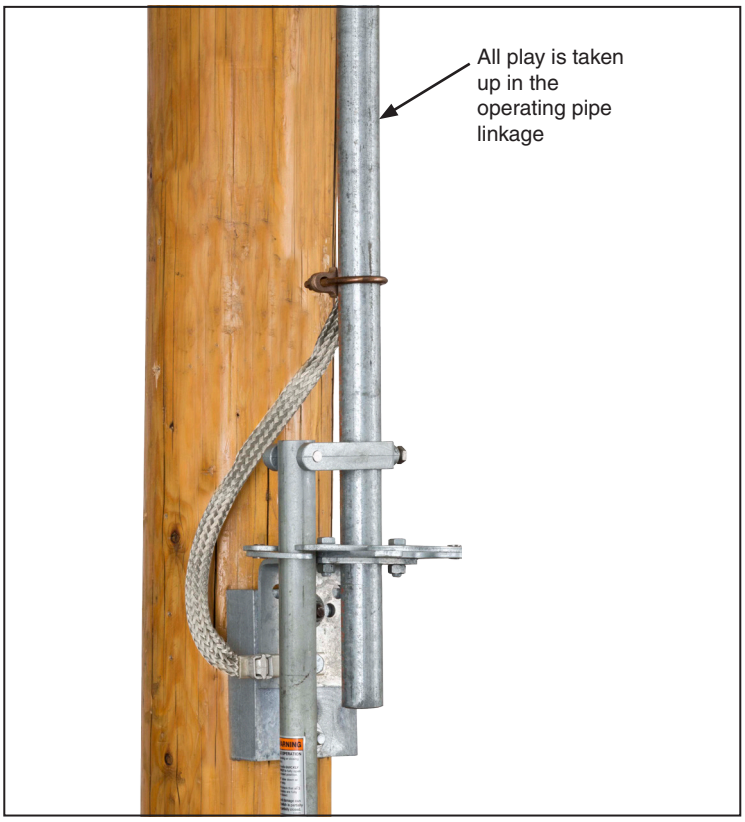


Figure 35. Verify the wind-up.

Checking the 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 31. Open and close the switch *slowly* through its full travel.

Check to make sure the following conditions exist:

(a) With the operating handle as far as it will go in the closing direction, make sure all main contacts of the interrupter switch are fully closed with the blades against their blade stops. See Figure 36.

(b) Each switch-pole operating lever should lie against its closed stop. The outboard bearing crank-arm(s) should be in the overtoggle position and lie against the stop bolt(s), if applicable. See Figure 37.

(c) If none of the switch poles is 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 fully home 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 regarding the amount of toggle to be obtained.

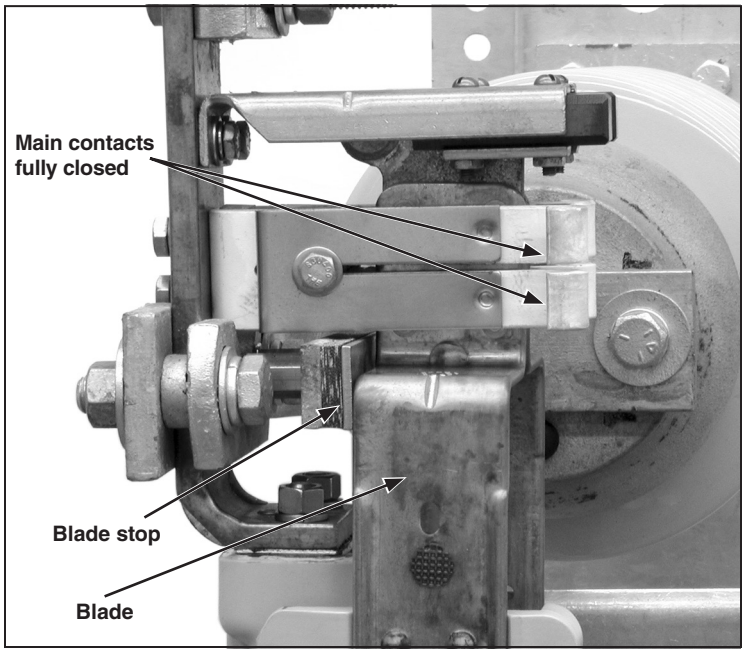


Figure 36. Check that the blade is fully closed.

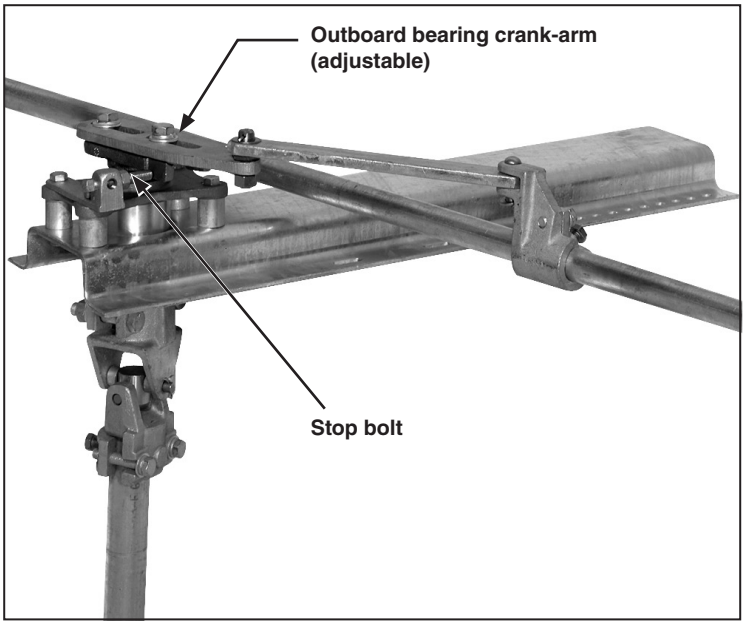


Figure 37. Verify the crank-arm is in the over-center toggle position and against the stop bolt.

(e) In the unlikely event only one or two switch poles are fully closed, loosen the clamp bolt(s) on the interphase pipe coupling(s) at the switch-pole operating lever, and reposition the pipe coupling to increase or decrease the effective length of the interphase operating pipe. Torque the clamp bolt of each pipe-coupling clamp to final tightness, and then tighten the associated piercing set screws, piercing the pipe. Continue turning until a firm resistance is felt. See Figure 38.

NOTICE

After readjusting, retighten the clamp bolt and piercing set screw on the interphase pipe coupling(s), the locknut on the stop bolt(s), and the clamping bolts on the outboard bearing and crank arm.

(f) When an S&C Type AS-1A Switch Operator or an S&C 6801M Automatic Switch Operator is used, verify—with the switch fully closed—there is a clearance of approximately ⅛-inch between the outboard bearing crank-arm and its stop bolt. See Figure 39. (This clearance is essential to prevent 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. Retighten the locknut when adjustment is complete.

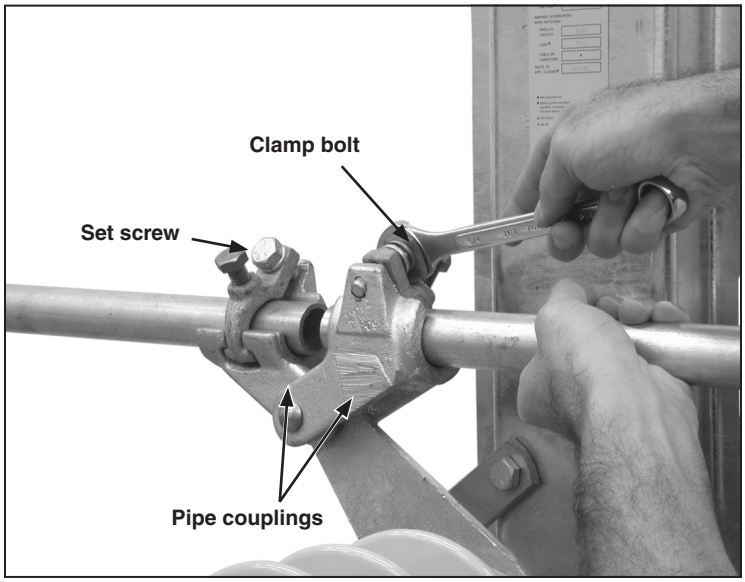


Figure 38. Readjust the interphase pipe.

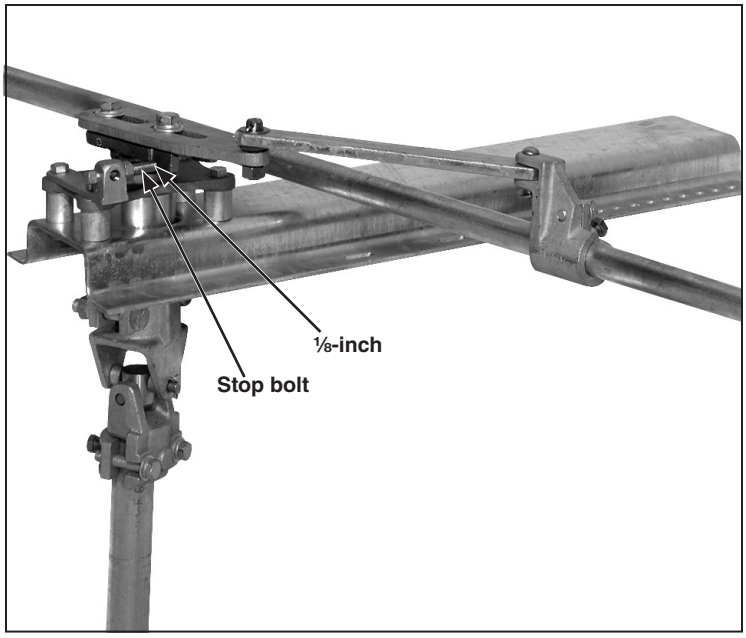


Figure 39. Adjust the outboard bearing crank-arm stop bolt for power operation.

STEP 32. With the operating handle as far as it will go in the opening direction, the switch-pole operating lever should lie snugly against its open stop. See Figure 40. If necessary, readjust the **Open** position stop plate on the foot-bearing support plate.

STEP 33. Open and close the switch *slowly* several times.

⚠ CAUTION

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.

Check the operation of each switch pole. The following conditions must be met:

(a) As the blade moves in the closing direction, the clearance between the blade-opening cam and the interrupter opening lever must be within the limit shown. See Figure 41.

(b) 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 42.

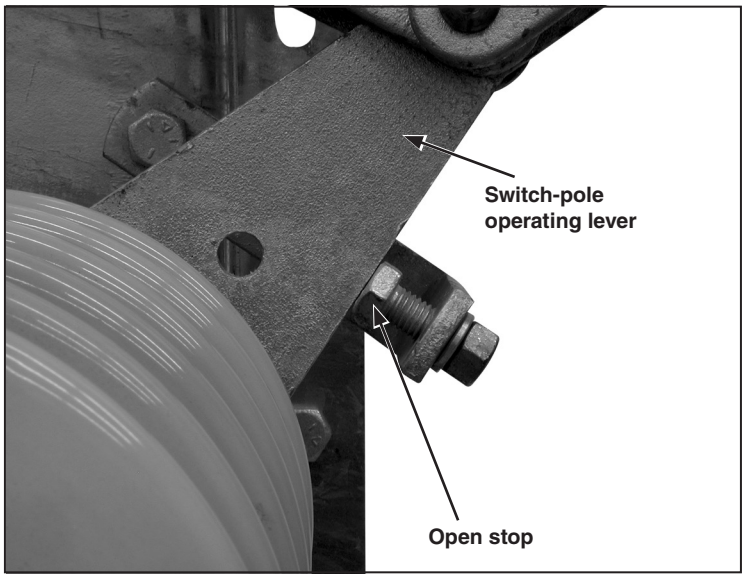


Figure 40. Verify the switch-pole operating lever is against the open stop.

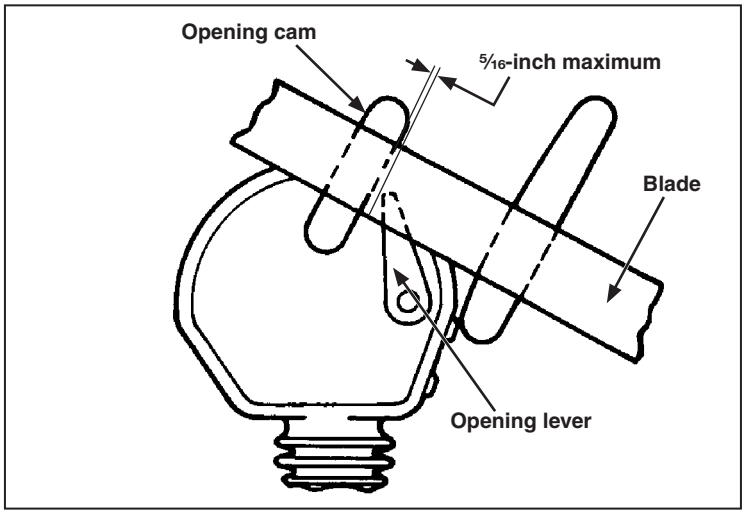


Figure 41. The blade assembly moving in the closing direction.

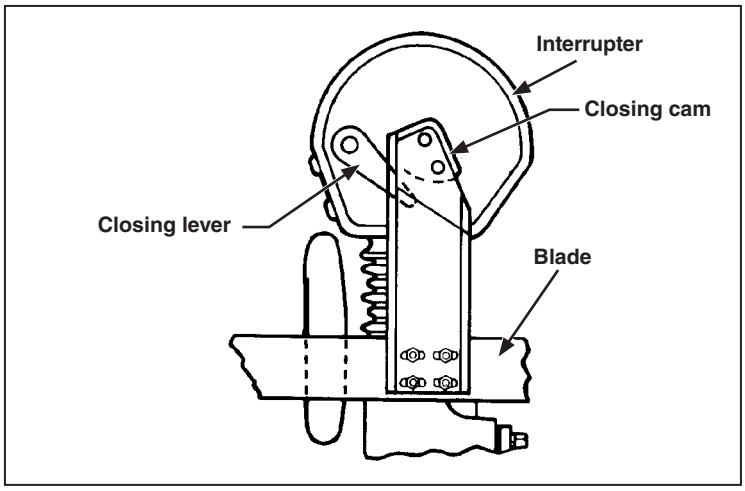


Figure 42. The blade assembly moving in the closing direction.

(c) 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. The clearance between the blade closing cam and its respective interrupter closing lever must be within the limit shown. See Figure 43.

(d) 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. The clearance between the blade closing cam and its respective interrupter closing lever must be within the limit shown. See Figure 43.

STEP 34. 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. See Figure 44.

If adjustment is required:

(a) Loosen the nuts that fasten the interrupter to the jaw-contact assembly and shift the interrupter, within the confines of the mounting holes, to achieve the necessary clearances. Retighten the nuts.

(b) With the switch in the fully closed position, verify the minimum clearances between the blade shunt contact and the interrupter, measured to the interrupter housing as well as the interrupter skirts. See Figure 45.

(c) Move the blade in the *opening* direction and verify each blade shunt contact firmly engages its respective interrupter contact rivets before the blade contacts disengage from the stationary main contact assemblies. See Figure 46. The shunt contacts may be bent, as required to conform to these conditions.

If any of the conditions described in this step cannot be achieved, contact the nearest S&C Sales Office because damage likely occurred during shipment.

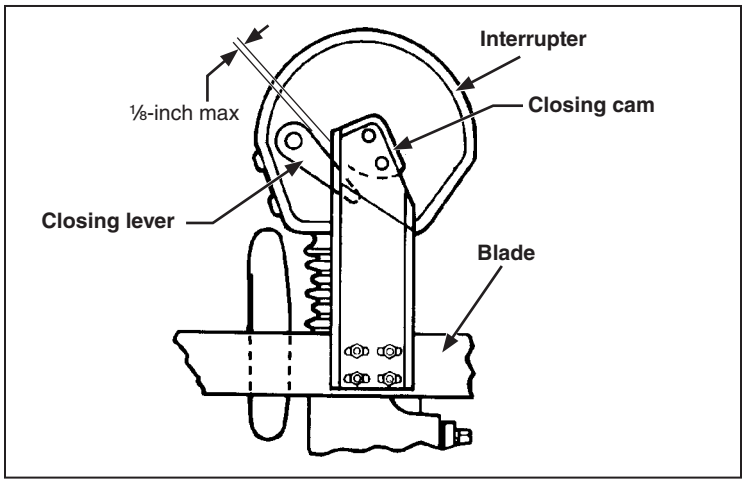


Figure 43. The blade assembly in the fully closed position.

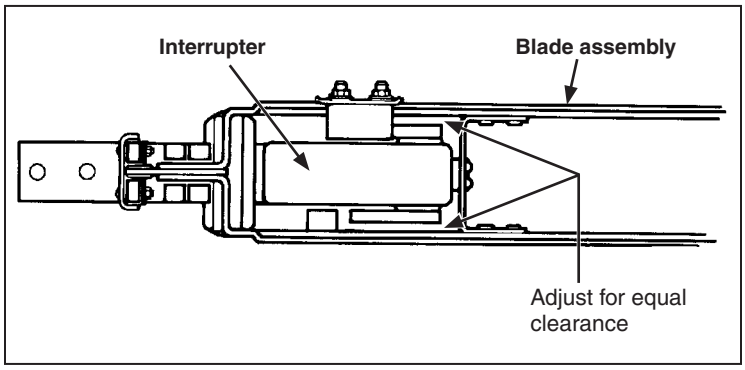


Figure 44. The blade assembly in the fully closed position.

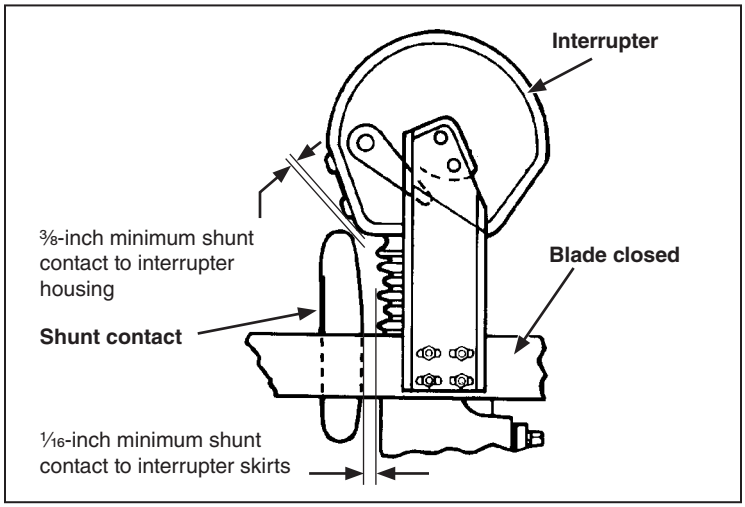


Figure 45. The blade assembly in the fully closed position.

STEP 35. Attach the danger label to the pole or structure using two straps or bolts (furnished by others). See Figure 47.

Position the danger label within 3 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.

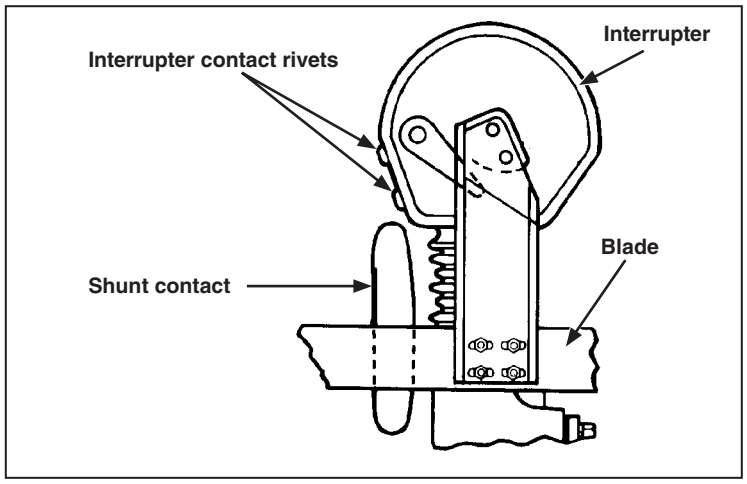


Figure 46. The blade assembly moving in the opening direction.

Figure 47. Attaching the danger label to the pole or structure.

Connecting the High-Voltage Conductors

STEP 36. When high-voltage conductors are to be connected using aluminum-alloy body connectors①, use the following procedure:

(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.

① These are "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.

Opening and Closing the Switch

⚠ DANGER

The interrupters and terminal pads of the Alduti-Rupter Switch may be energized from either side of the switch 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, and then install suitable grounding equipment at all six terminals. Failure to observe these precautions may result in serious injury or death.

NOTICE

This interrupter switch is not intended for breaking fault currents.

STEP 37.

(a) Remove the padlock(s) from the hasps on the operating handle assembly. See Figure 48.

(b) If the operating handle assembly is furnished with a key interlock, disengage the interlock bolt. See Figure 49.

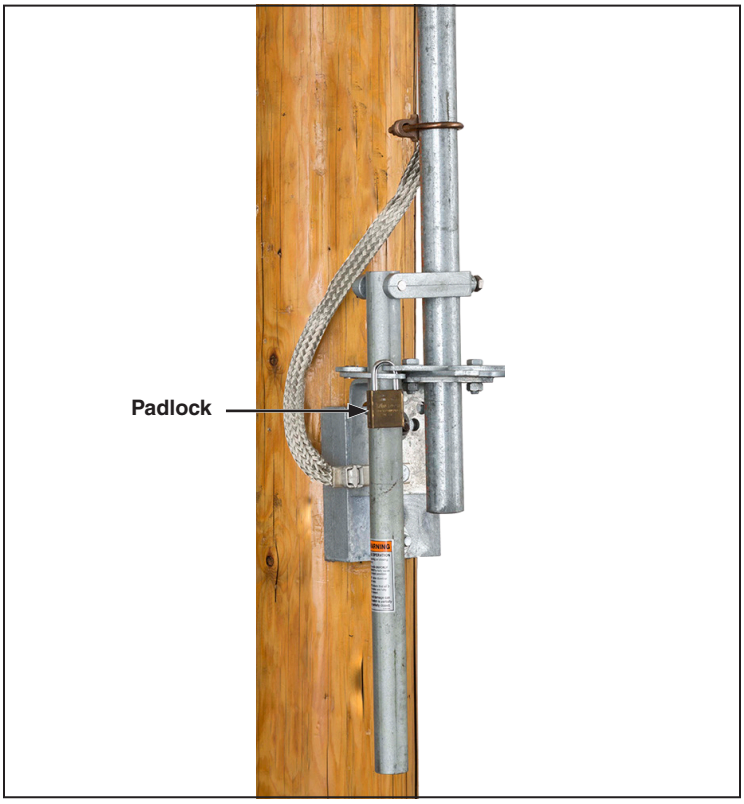


Figure 48. Remove the padlock(s).

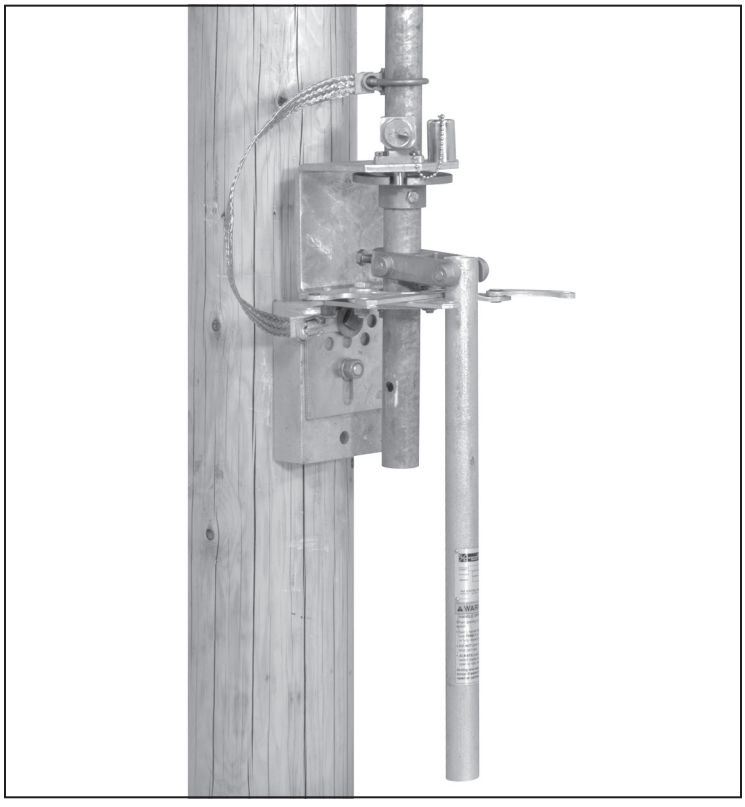


Figure 49. Disengage the key interlock bolt.

⚠ CAUTION

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.

(c) *Rapidly* swing the handle to the fully open or fully closed position. See Figure 50.

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

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

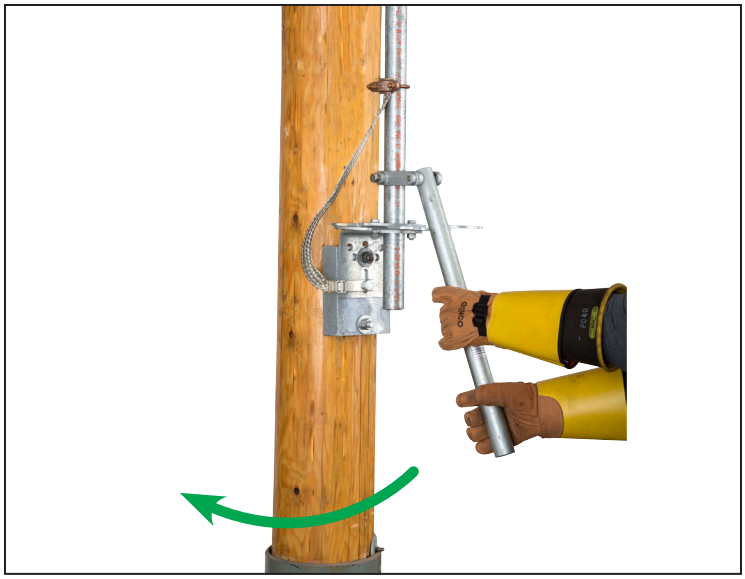


Figure 50. *Rapidly* swing the operating handle.