Installation

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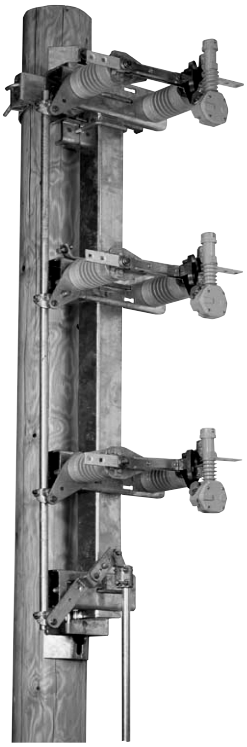
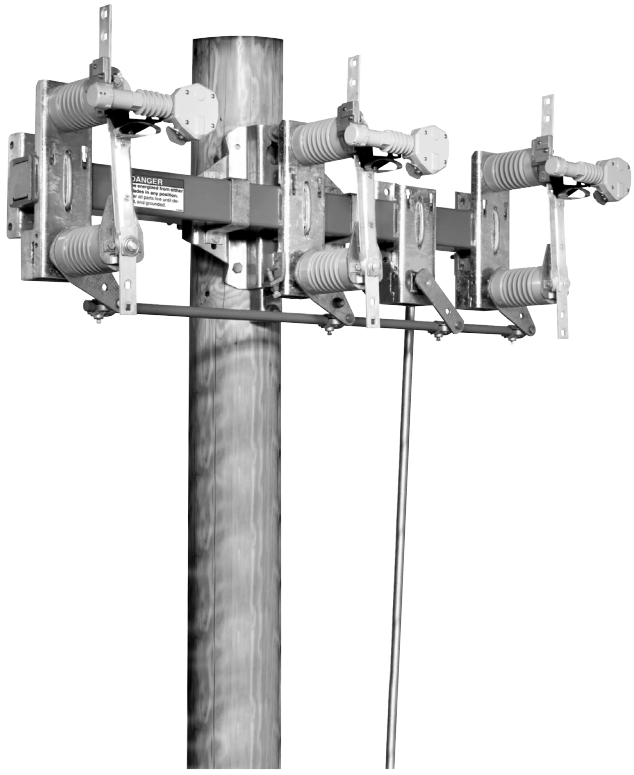
▼ For installation instructions for Omni-Rupter Switches with Catalog Number Supplement "R4," please refer to your local S&C Sales Office. These instructions are also available on **www.sandc.com.**





Operating Considerations

⚠ CAUTION

The equipment covered by this publication must be selected for a specific application and it must be installed, operated, and maintained by qualified persons who are thoroughly trained and who understand any hazards that may be involved. This publication is written only for such qualified persons and is not intended to be a substitute for adequate training and experience in safety procedures for this type of equipment.

In most applications, these interrupter switches are capable of switching rated continuous load currents at full voltage. Consequently, no interlocking with secondary protective equipment is required.

Circuit making and breaking is involved in the normal operation of these interrupter switches and, as a result, precautionary "partway" opening or closing is undesirable. To operate, swing the operating handle vigorously through its full stroke without hesitation. Do not assume that the operating-handle position necessarily indicates the open or closed position of the interrupter-switch blades. Upon completion of an opening or closing operation, visually check the position of the interrupter-switch blades to determine that the intended position has been attained. Then tag or padlock the operating handle in accordance with standard system operating procedures. In all cases make certain that the operating handle is locked before "walking away." **Note:** These interrupter switches are not intended for breaking fault currents.

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 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 voltage 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

Thoroughly and carefully read this instruction sheet before installing or operating your S&C Omni-Rupter Switch. Familiarize yourself with "SAFETY INFORMATION" on pages 4 and 5.

Retain this Instruction Sheet

NOTICE

These instructions are for Omni-Rupter Switches with Catalog Number Supplement "R3" and earlier. For installation instructions for Omni-Rupter Switches with Catalog Number Supplement "R4," please refer to your local S&C Sales Office. These instructions are also available on **www.sandc.com**.

This instruction sheet is a permanent part of your S&C Omni-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. Refer to S&C Specification Bulletin 765-31 for complete application information.

Warranty

The warranty and/or obligations described in S&C's standard conditions of sale, as set forth in Price Sheet 150, 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 immediate purchaser's or end user's exclusive remedy and a fulfillment of all seller's liability. In no event shall seller's liability to immediate purchaser or end user exceed the price of the specific product which gives rise to 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, and THERE ARE NO EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULR PURPOSE. ANY EXPRESS WARRANTY OR OTHER OBLIGATION PROVIDED IN PRICE SHEET 150 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.

The seller's warranties do not apply if the switch is power operated using a switch operator of other than S&C manufacture.

Understanding Safety-Alert Messages

There are several types of safety-alert messages which may appear throughout this instruction sheet as well as on labels and tags attached to the Omni-Rupter Switch. Familiarize yourself with these types of messages and the importance of the various signal words, as explained below.

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

"CAUTION" identifies hazards or unsafe practices which *can* result in minor personal injury or product or property damage if instructions, including recommended precautions, are not followed.

NOTICE

"NOTICE" identifies important procedures or requirements that, if not followed, *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 **www.sandc.com**. Or call S&C Headquarters at (773) 338-1000; in Canada, call S&C Electric Canada Ltd. at (416) 249-9171.

NOTICE

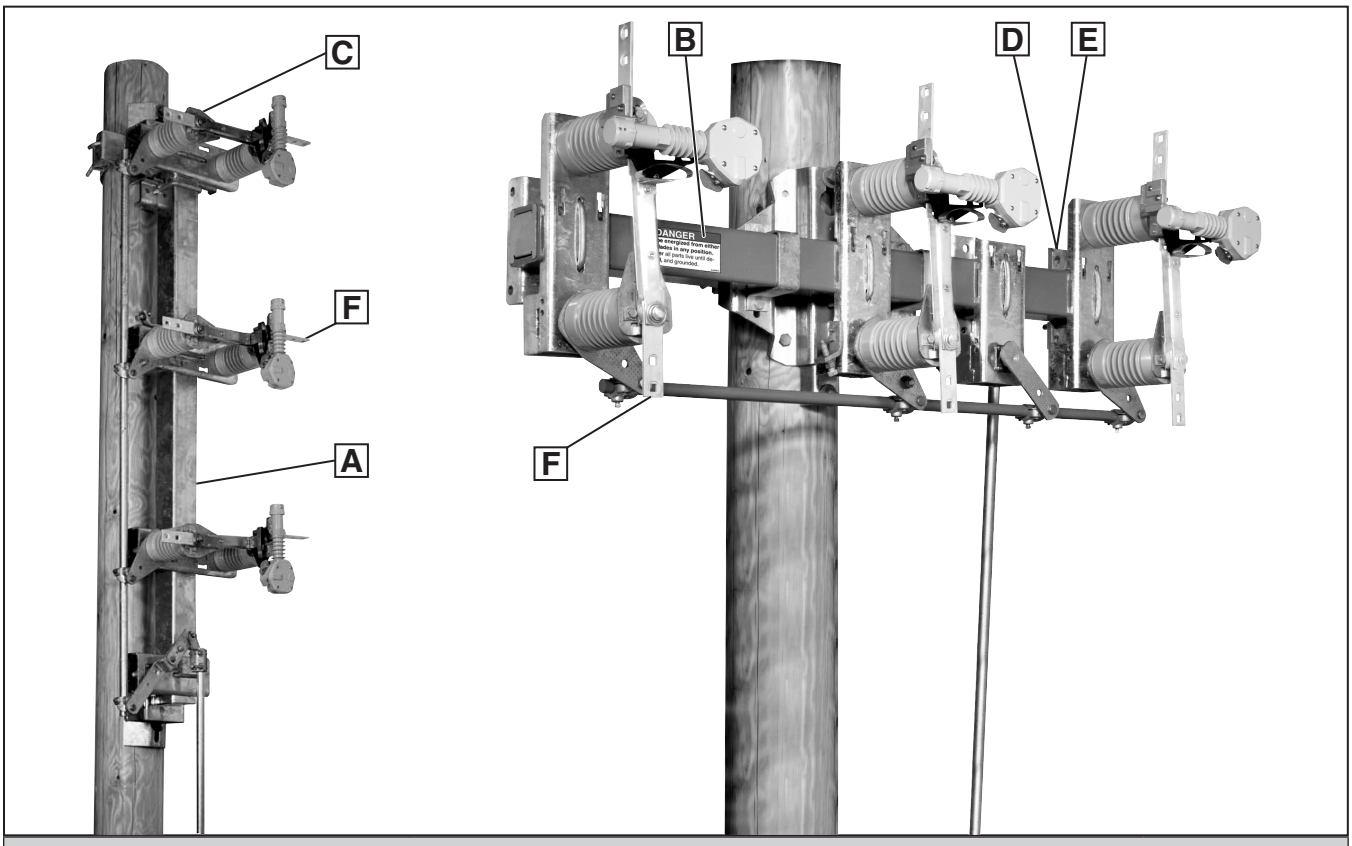
Thoroughly and carefully read this instruction sheet before operating your S&C Omni-Rupter Switch.

Replacement Instructions and Labels

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

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

Location of Safety Labels



Reorder Information for Safety Labels

Location	Safety Alert Message	Description	Number
A	⚠ DANGER	Switches may be energized from either side and with blades in any position . . .	G-6580-1★
B	⚠ DANGER	Switches may be energized from either side and with blades in any position . . .	G-6580-2★
C	⚠ WARNING	Lifting Instructions	G-10031▲
D	⚠ WARNING	Lifting Instructions	G-5928R3▲
E	*NOTICE*	Do not remove this lifting bracket until . . .	G-4776R1▲
F	*NOTICE*	To avoid overloading the terminal pads . . .	G-9094▲

★ This label is placed on both sides of switch base on opposite ends.

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

⚠ DANGER

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

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

1. **QUALIFIED PERSONS.** Access to switches and controls must be restricted only to qualified persons. See "Qualified Persons" on page 2.
2. **SAFETY PROCEDURES.** Always follow safe operating procedures and rules.
3. **PERSONAL PROTECTIVE EQUIPMENT.** Always use suitable protective equipment such as rubber gloves, rubber mats, hard hats, safety glasses, and flash clothing in accordance with safe operating procedures and rules.
4. **SAFETY LABELS AND TAGS.** Do not remove or obscure any of the "DANGER," "WARNING," "CAUTION," or "NOTICE" labels and tags. Remove tags ONLY if instructed to do so.
5. **ENERGIZED COMPONENTS.** Always consider all parts live until de-energized, tested, and grounded.
6. **LOAD-INTERRUPTER SWITCH POSITION.** Always confirm the open/close position of load-interrupter switches by visually observing the position of the blades. Switches may be energized from either side and with the blades in any position. Do not assume that the operating handle position necessarily indicates the open or closed position of the interrupter-switch 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, pull the operating handle down through its full travel vigorously and without hesitation.

Packing

Study the erection drawing carefully and check the bill of material to be sure that all parts are at hand. When a Standard Mounting Arrangement is specified, the shipment will include:

1. A **three-pole interrupter switch**, complete with interphase drive, factory-assembled on a single base. (Tiered-outboard or vertical-mounted.)
2. Four six-foot ten-inch **vertical-operating pipe sections**, predrilled, where required, for attachment to the universal couplings.
3. Miscellaneous **mounting hardware** (less through-bolts) for securing the Omni-Rupter switch to the pole.
4. The appropriate set of **operating-mechanism components** for the vertical operating pipe; e.g. handle, rod guide and couplings—each tagged and keyed to the bill of material for ready identification.
5. If a **Standard Minor Modification** of a Standard Mounting Arrangement is specified, the appropriate parts, as identified in the bill of materials under suffix : "-S2," "-S6," "-S6L," "-S10," or "-S15," will be included with the operating-mechanism components. Specifically, the modifications designated by these suffixes are

   -S2 One Cypoxy® Insulator unit in vertical operating shaft.

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

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

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

   -S10 One one-inch diameter fiberglass insulating section in vertical operating shaft. (Not available for switches supplied with heavy-duty vertical operating shafts.)

   -S15 Heavy-duty vertical operating shafts—1¼-inch IPS pipe in lieu of ¾-IPS pipe.
6. A **detailed erection drawing** (ED) for the Omni-Rupter will be found in a water-resistant envelope shipped with the switch. If a Standard Mounting Arrangement is to be used, this erection drawing is a printed sheet. This same sheet is also furnished when a Standard Minor Modification of a Standard Mounting Arrangement is to be used. In the latter case, a copy of RD-3469 (Standard Minor Modifications, Rotating-Type and Reciprocating-Type Operating Mechanisms) is included.

Drawings for Standard Mounting Arrangements show only minimum or suggested locating dimensions for the vertical-operating-pipe guide bearings and the operating-handle assembly. Specific locations are to be determined either on the job or by the user's engineering department.

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 that 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 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.

Each integer style Omni-Rupter switch is factory-assembled on a common base. All switch adjustments, including those of the interphase drive, are made at the factory to ensure proper switch operation during opening and closing. Ease of installation is assured by following these step-by-step instructions.

Handling

⚠ CAUTION

DO NOT lift the switch by rigging on the "live parts," hookstick mechanism or pole-unit bases, or subject these parts to undue stress from slings or fall lines. Misalignment of the contacts and the interrupters may result. **Misaligned contacts or interrupters may cause arcing or premature degradation of the contacts.**

Operating Pipe Preparation

If desired, the vertical operating pipe can be cut to length (if not precut at the factory) before proceeding to the job site. The standard lengths of pipe supplied measure 6′-10″. Cutting dimensions are shown on the erection drawing.

Mounting to Wood

When mounting the switch and its operating mechanism to a wood pole, it is recommended that suitably sized square washers be placed against the wood pole, under the nuts that hold the through-bolt. The use of spring-type washers between the square washers and nuts is also recommended to compensate for wood-pole shrinkage and thus maintain fastener tightness.

Mounting the Switch Assembly

Step 1

Drill two 11⁄16-inch diameter holes in the utility pole at the desired height for mounting the switch. Refer to the erection drawing for details.

Step 2

Insert two 5⁄8-inch diameter through-bolts (not furnished) in the holes drilled in Step 1 and secure loosely with the necessary square washers, flat washers, and nuts in such a manner that the heads of the bolts project sufficiently from the face of the pole to engage the switch-base mounting bracket.

Step 3

Vertical Mounting Configuration

⚠ CAUTION

Do not lift the switch by rigging on the "live parts" or pole-unit bases, nor subject these parts to undue stress from slings or fall lines. Misalignment of the contacts and the interrupters may result, which may cause damage to the switch during operation.

⚠ WARNING

Lift the switch using the lifting brackets provided. Do not allow lifting slings to stress switch parts. Avoid allowing switch to swing while lifting.

Lifting the switch by the live parts or pole unit bases will damage the switch. Rough handling may cause misalignment of the blades and contacts.

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

Switches in the vertical mounting configuration are provided with two lifting brackets bolted to a 4″ × 4″ wood support member which is, in turn, attached to the switch base. Since the wood support member is also a part of the shipping skid, use care to avoid damage to it during unpacking.

Make sure that the switch is fully closed. Attach hoisting slings to the lifting brackets and take a light strain. Unbolt the wood support member from the skid. Then slowly and carefully hoist the switch as shown in Figure 1.

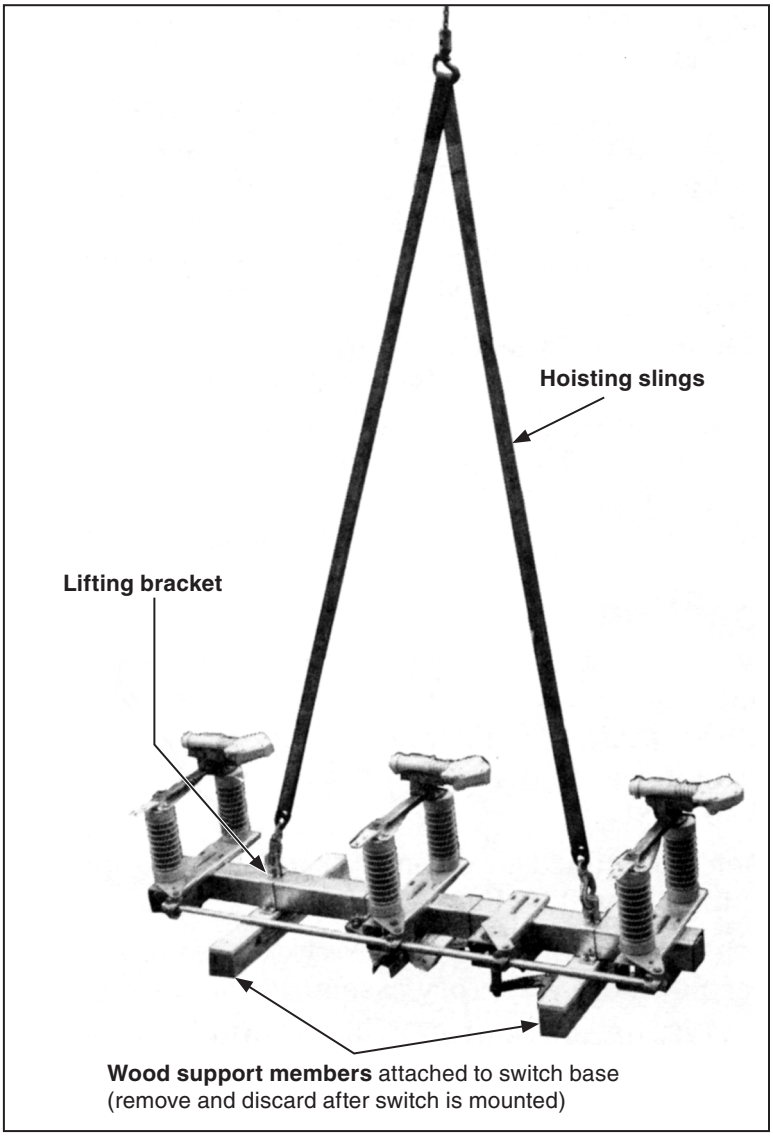


Figure 1. Hoisting vertical mounting configuration Omni-Rupter switch into position.

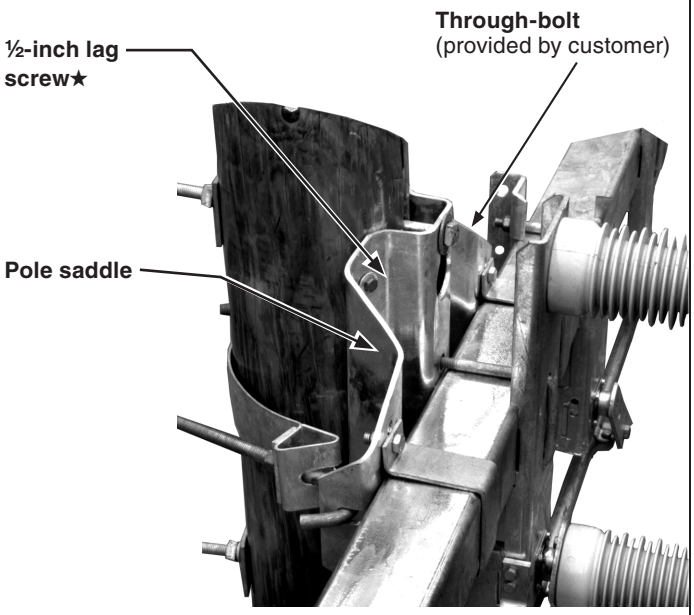
Step 4

When the switch assembly is hoisted to its mounting level, guide the assembly so that the through-bolts projecting from the utility pole slip into the holes in the switch's pole saddle. (The bracket is provided with a keyhole and an open slotted hole for this purpose; see Figure 2.) Lower the switch slightly so that it bears on the through-bolts. Fully tighten the through-bolts, making sure that the flat washer for each bolt is between the bolt head and the switch-base pole saddle. See Figure 2.

Secure the pole band (optional) to the mounting bracket on the switch, using the J-bolts provided. See Figure 2. Two ¼″ × 1″ × 3″ stiffening blocks are furnished to be used behind the pole-band flanges, and underneath the J-bolt nuts. Lag the pole band to the back side of the pole through the hole in the center of the band, using one of the three ½-inch diameter lag screws provided. Then, lag the pole saddle to the pole using the two remaining ½-inch lag screws as shown in Figure 2.

Step 5

Remove and discard the wood support members and lifting brackets which were provided to facilitate hoisting of the switch. See Figure 1.



★ Second lag screw installed diagonally opposite on lower corner of mounting bracket.

Figure 2. Typical pole-band attachment detail (vertical mounting configuration illustrated).

Step 6

Tiered-Outboard Mounting Configuration

⚠ WARNING

Lift the switch using the lifting brackets provided. Do not allow lifting slings to stress switch parts. Avoid allowing switch to swing while lifting.

Lifting the switch by the live parts or pole unit bases will damage the switch. Rough handling may cause misalignment of the blades and contacts.

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

⚠ CAUTION

Do not lift the switch by rigging on the "live parts" or pole-unit bases, nor subject these parts to undue stress from slings or fall lines. Misalignment of the contacts and the interrupters may result from such handling, which may cause undue damage or wear to the switch during operation.

Make sure that the switch is fully closed. Attach hoisting slings to the switch base by looping around the dead-ending bracket of the uppermost switch pole and hoist the switch as shown in Figure 3.

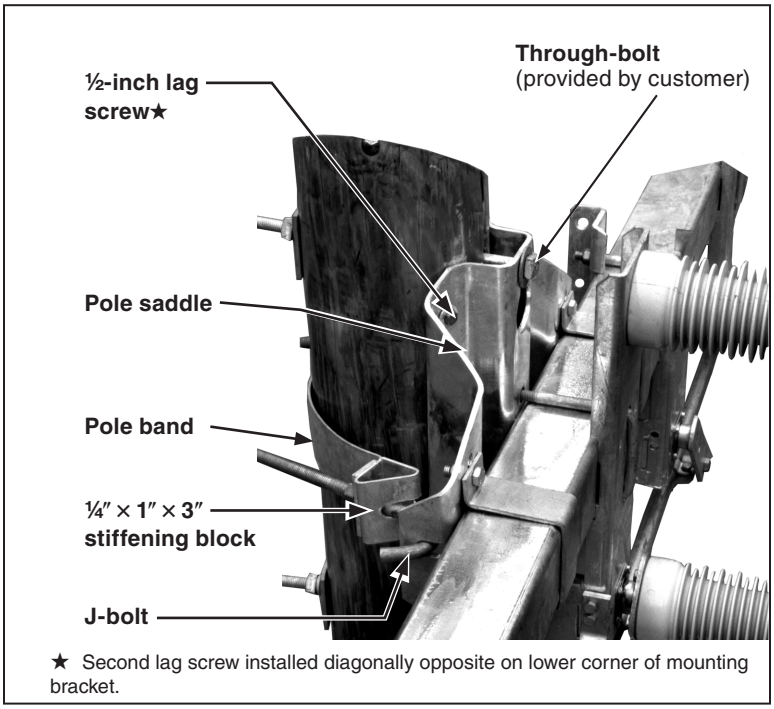
When the switch assembly is hoisted to its mounting level, guide the assembly so that the through-bolts projecting from the utility pole slip into the holes in the brackets on the switch base. (Each bracket is provided with a keyhole for this purpose; see Figure 3.) Lower the switch slightly so that it bears on the through-bolts. Fully tighten the through-bolts, making sure that the flat washer for each bolt is between the bolt head and the switch-base mounting bracket. See Figure 5.

Figure 3. Hoisting the tiered-outboard switch into position.

Installing the Optional Pole Band

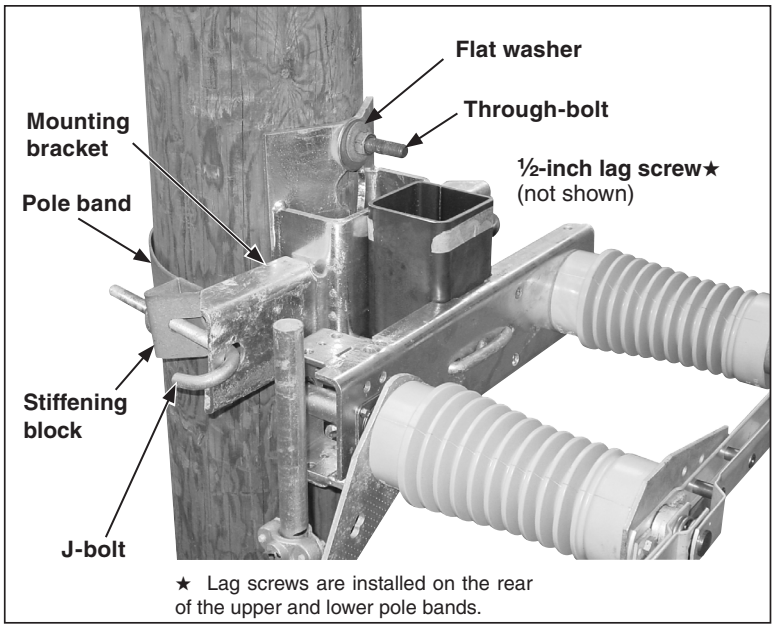
Step 7

Secure the pole band (optional) to the upper pole saddle on the switch using the J-bolts furnished. See Figures 4 and 5. Two ¼″×1″×3″ stiffening blocks are furnished to be used behind the pole-band flanges and underneath the J-bolt nuts. Lag the pole band to the back side of the pole through the hole in the center of the band, using the one of the three ½-inch lag screws provided. Then lag the pole saddle to the band using the two remaining ½-inch lag screws as shown in Figures 4 and 5.



★ Second lag screw installed diagonally opposite on lower corner of mounting bracket.

Figure 4. Typical pole-band attachment detail (vertical mounting configuration illustrated).



★ Lag screws are installed on the rear of the upper and lower pole bands.

Figure 5. Typical pole-band attachment detail. (Tiered-outboard mounting configuration illustrated).

Installing the Vertical Operating Pipe and Operating Handle (¾-inch IPS)

Step 8

NOTICE

Step 8 is for a Standard Mounting Arrangement for which ¾″ IPS vertical operating pipe is furnished. If, instead, the shipment includes 1¼″ IPS pipe, as signified by the addition of the Standard Minor Modification Suffix "-S15" to the erection drawing (ED) number, proceed to Step 9.

NOTICE

Installing Piercing Set Screws

This equipment uses piercing set screws to couple the operating mechanism to the operating pipe, and to provide stability to couplings joining one or more lengths of pipe.

Before assembling a coupling, back the piercing set screw out of the coupling so that the tip does not protrude into the body of the coupling. This ensures that the coupling's clamp screws can be fully tightened.

After tightening the clamp bolts to their final torque, tighten the set screws to pierce and/or crimp the pipe.

When installing the vertical operating pipe, it is advisable to completely make up each coupling as work progresses. When installing operating pipe in a rigid coupling, make certain that the set screw does not protrude through the body of the coupling. Back the set screw out of the coupling, if necessary. Torque the clamp bolt to final tightness. Then, securely tighten the set screw. If a one-inch diameter fiberglass insulating section is provided—furnished when the erection drawing (ED) includes the Standard Minor Modification Suffix "-S10"—do not torque the piercing set screw so tightly as to fracture the fiberglass. See Figure 6.

Proceed as follows:

a. Attach a rigid coupling to one end of an unthreaded 6′-10″ 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 coupling at the switch drive lever. Securely

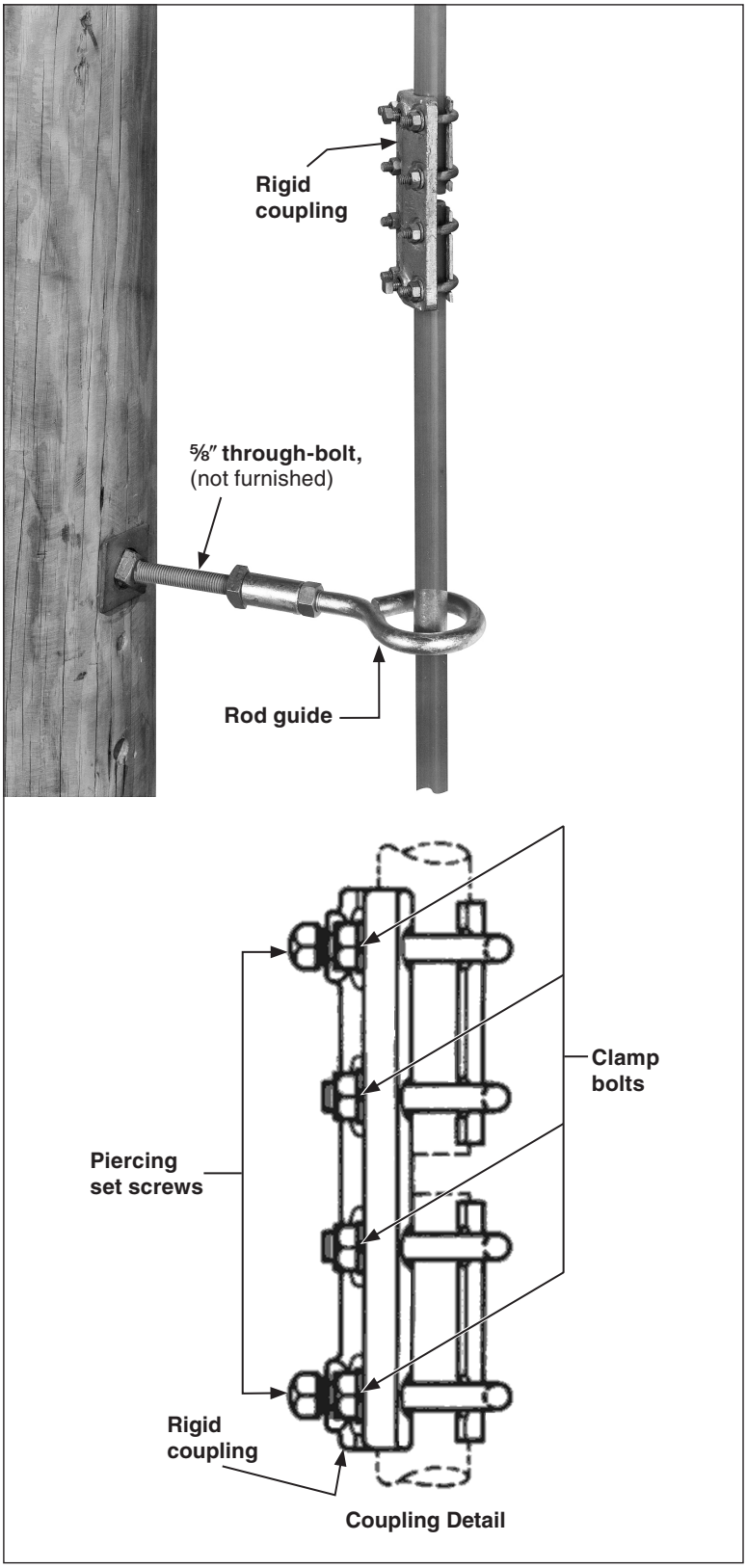


Figure 6. Rod guide and rigid coupling (detail) for use with ¾″ IPS vertical operating pipe.

tighten the clamp bolts at both ends of the pipe. Then, securely tighten the piercing set screws. See Figure 6.

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

b. Install the lower vertical-operating-pipe section by threading one end of the pipe into the coupling on the operating handle. Approximately ¼-inch of thread should extend through the coupling. See Figure 7. 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.

c. Make sure that the switch poles are fully closed and that the operating handle is held in its closed position by means of the locking bar. See Figure 7.

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 two 11⁄16-inch diameter holes at the locations indicated on the erection drawing, and mount the handle using ⅝-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 7.

NOTICE

The grounding recommendations herein 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.

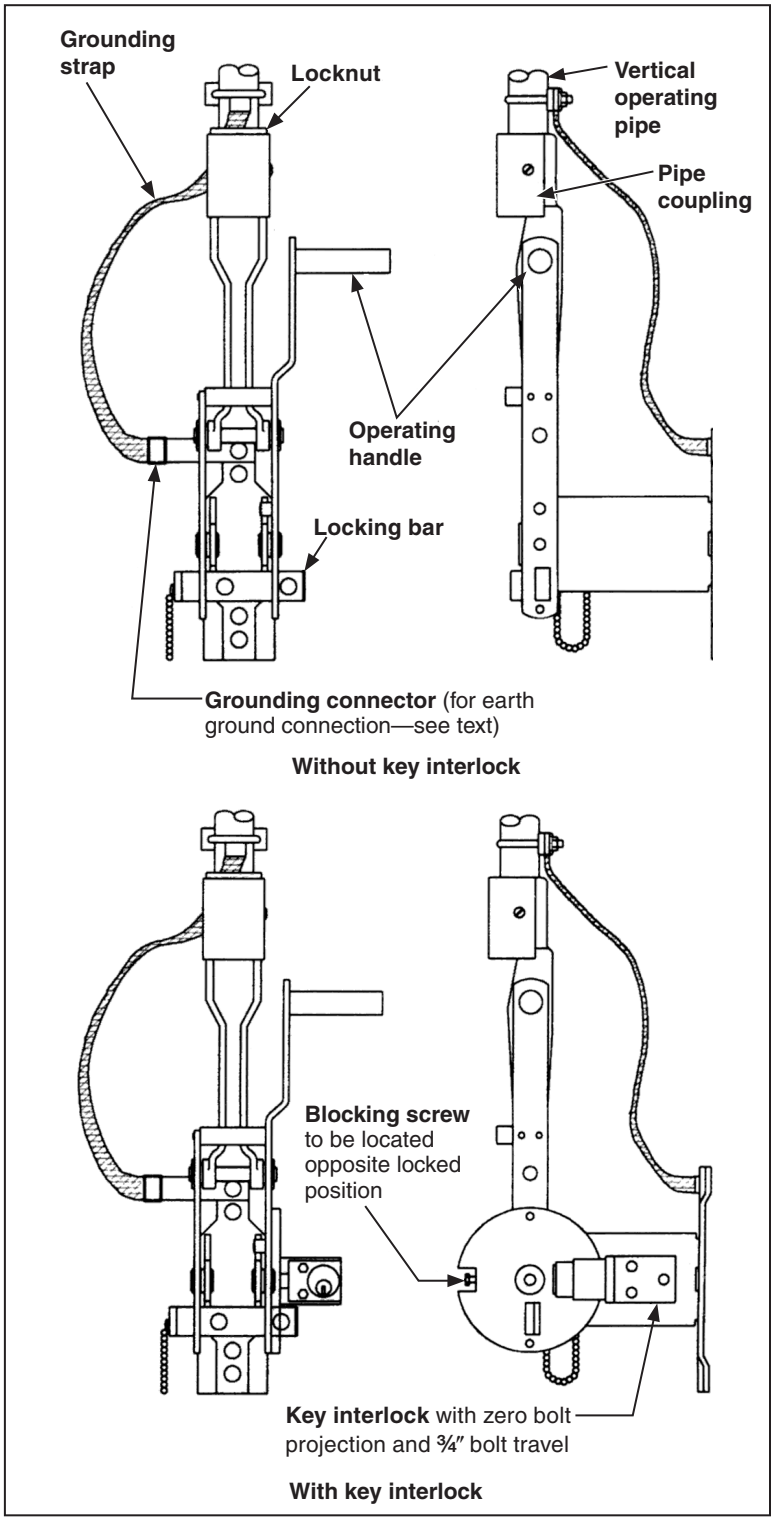


Figure 7. Operating handle assembly.

d. Drill an 11⁄16-inch diameter hole in the pole for each rod-guide mounting location, as indicated on the erection drawing. Position the hole so that it is in line with the vertical operating pipe. Also, where appropriate, position the hole to provide a 10-inch minimum clearance between the rod guide and the rigid coupling immediately above with the switch in the closed position. See Figure 8.

e. Move the operating handle to its mid-position and temporarily secure the handle in that position with the locking bar. Refer to the erection drawing.

⚠ WARNING

This applies only when checking for alignment and complete closure; when in service, the interrupter switch should be opened or closed vigorously through its full travel without hesitation at any point. Be prepared to apply additional force to maintain full speed when operating effort increases as the switch blades engage the interrupters.

⚠ WARNING

DO NOT operate the Omni-Rupter switch slowly, partway or use a chopping motion when operating the switch **after it is energized**.

When in service, the Omni-Rupter should always be opened or closed vigorously through its full travel without hesitation. Apply additional force to maintain full speed as the switch blades engage the interrupters.

Partial or slow-speed opening of an energized Omni-Rupter switch may cause arcing, which will damage the blade and interrupter contacts. Personal injury may result.

Install the rod guides using 5⁄8–11 threaded rods and nuts (not furnished), in the holes previously drilled. Each threaded rod must be of sufficient length to permit the vertical operating pipe to be centered, as near as practicable, in the rod-guide loop when the handle is in the mid-position.

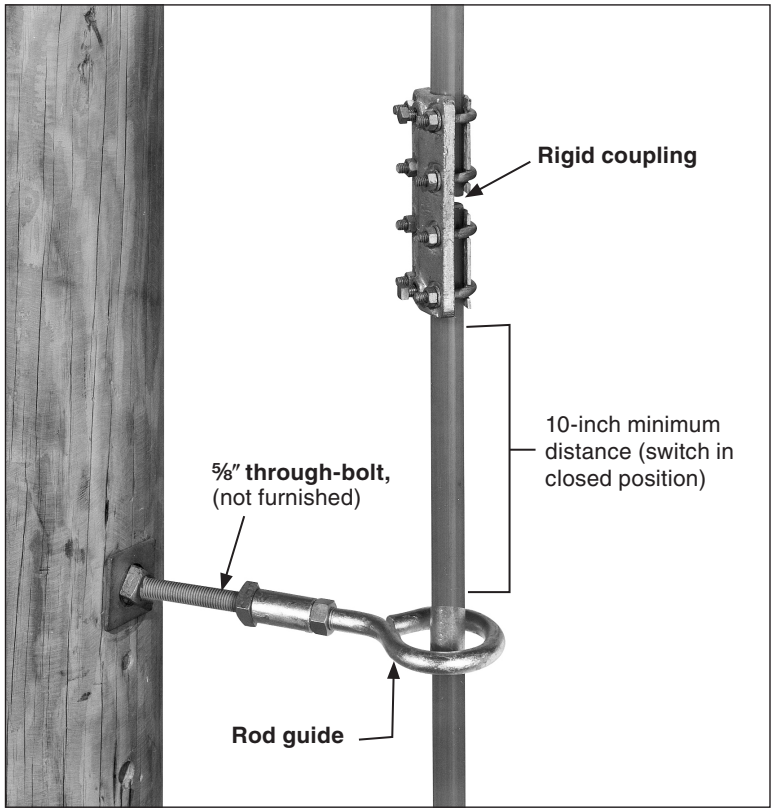


Figure 8. Rod guide for use with 3⁄4″ IPS vertical operating pipe. Maintain 10-inch distance between rod guide and rigid coupling.

f. Remove the locking bar and move the handle to the closed position. Make sure that 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.

   Then, while holding the handle approximately 20 degrees from the closed position, retighten the rigid-coupling clamp bolts. Do not tighten the associated set screw. Finally, 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 preceding procedure should be repeated except that the operating handle should be moved more than 20 degrees in the opening direction before tightening the clamp bolts. Conversely, if it is necessary to use considerable force to move the handle 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.

g. With the operating handle adjusted for full 180-degree travel as described above, open and close the interrupter switch slowly to see that no operational difficulties are encountered due to undetected damage in shipping.

Check to be sure that 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.

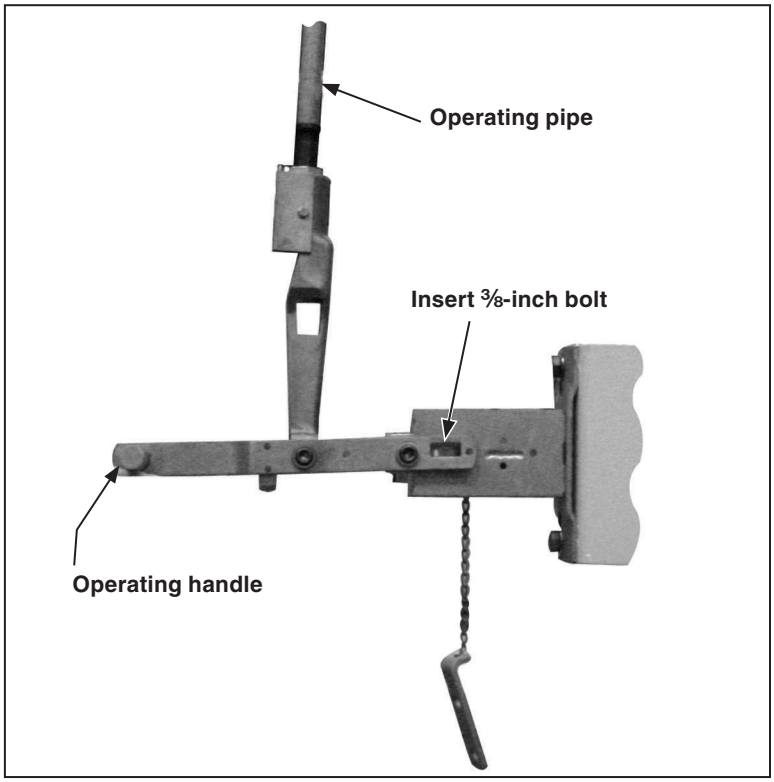


Figure 9. Operating handle in mid-position.

In the unlikely event that the conditions described above are not met, more switch-blade travel is required. Proceed as follows:

h. 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 ⅜-inch bolt or metal pin into the hole provided. See Figure 10.

i. Then, loosen the two clamp bolts on the adjustable switch drive lever. Shorten the drive lever one "step" (11⁄32 inch) and retighten the bolts. (Shortening the lever increases the amount of switch travel.) Remove the ⅜-inch bolt from the handle. Recheck the switch-blade travel as described in Step 5c on page 14. Repeat this procedure shortening the drive lever in one-step increments, until full switch-blade travel is attained. See Figure 10.

j. When satisfactory travel adjustment of handle and switch is attained, make sure that the clamp bolts at the coupling immediately above the handle are securely tightened. Then securely tighten the set screw. Refer to coupling photo on previous page.

k. 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 the end of the strap. See Figure 7 on page 15. Proceed to Step 10.

NOTICE

The grounding recommendations herein 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.

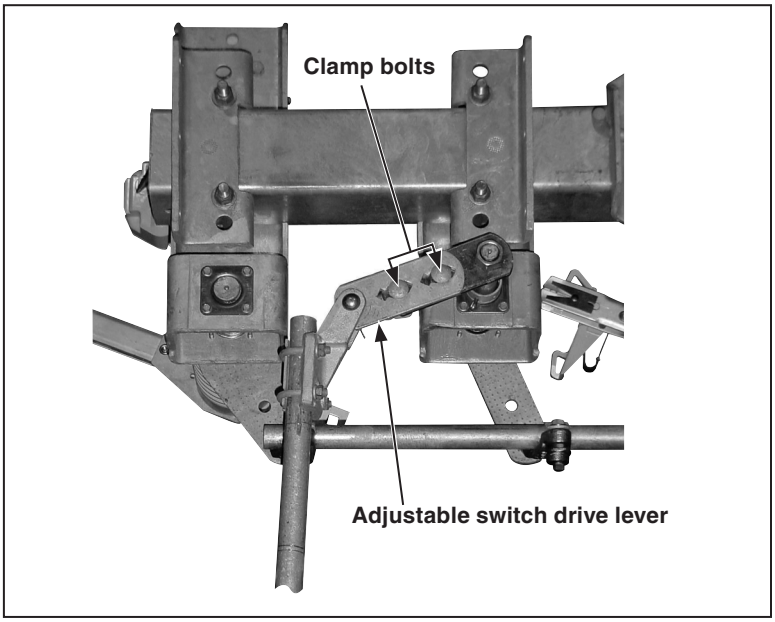


Figure 10. Adjusting the switch drive lever. (Vertical mounting configuration shown. Tiered-outboard mounting configuration similar.)

Installing the Vertical Operating Pipe and Operating Handle (Switches provided with 1¼-inch IPS Operating Pipe)

Step 9

NOTICE

Step 9 is a Standard Mounting Arrangement for which 1¼-inch IPS vertical operating pipe is furnished, as signified by the addition of the Standard Minor Modification Suffix "-S15" to the erection drawing (ED) number.

NOTICE

Installing Piercing Set Screws

This equipment uses piercing set screws to couple the operating mechanism to the operating pipe, and to provide stability to couplings joining one or more lengths of pipe.

Before assembling a coupling, back the piercing set screw out of the coupling so that the tip does not protrude into the body of the coupling. This ensures that the coupling's clamp screws can be fully tightened.

After tightening the clamp bolts to their final torque, tighten the set screws to pierce and/or crip the pipe.

When installing the vertical operating pipe, it is advisable to completely make up each coupling as work progresses. When installing operating pipe in a rod-guide coupling, make certain that the cutting tip of the piercing set screw does not protrude through the body of the coupling. Torque the clamp bolt to final tightness. Then, securely tighten the associated piercing set screw.

Proceed as follows:

a. Make sure that the switch poles are fully closed. Install the uppermost section of vertical operating pipe by clamping an unthreaded pipe section to the coupling at the switch drive lever.

b. Use the vertical operating pipe as a plumb line to locate the adjustable rod guide radially to the pole—see Section B-B of the erection drawing. Then, drill two 11/16-inch diameter holes at the locations indicated on the erection drawing, and mount the rod guide using 5/8-inch bolts (not furnished).

c. Slip the lower end of the vertical operating pipe into the coupling on the driven arm of the adjustable rod guide, with the rod-guide arm pointing upward at a 45-degree angle. See Figure 11. A positioning bolt holds the rod-guide arm at 45 degrees. Securely tighten the rod-guide clamp bolt. Then, securely tighten the associated piercing set screw.

d. If only one rod guide is used, proceed to (e). If more than one rod guide is used, install the next section of operating pipe onto the lower coupling of the adjustable rod guide. Securely tighten the rod-guide clamp bolt. Then, securely tighten the associated piercing set screw. Repeat (b) and (c) using a non-adjustable rod guide. Install additional operating-pipe sections and rod guides in the same manner.

NOTICE

When the last rod guide has been installed, proceed to (e) for instructions on installing the last section of operating pipe.

e. Install the lowest vertical-operating-pipe section by threading one end of the pipe into the coupling on the operating handle. Approximately ¼ inch of thread should extend through the coupling. See Figure 8 on page 16. Tighten the locknut. Attach the upper end of the pipe to the lowest rod-guide coupling. Then, tighten the coupling clamp bolts but do not tighten the associated set screw at this time.

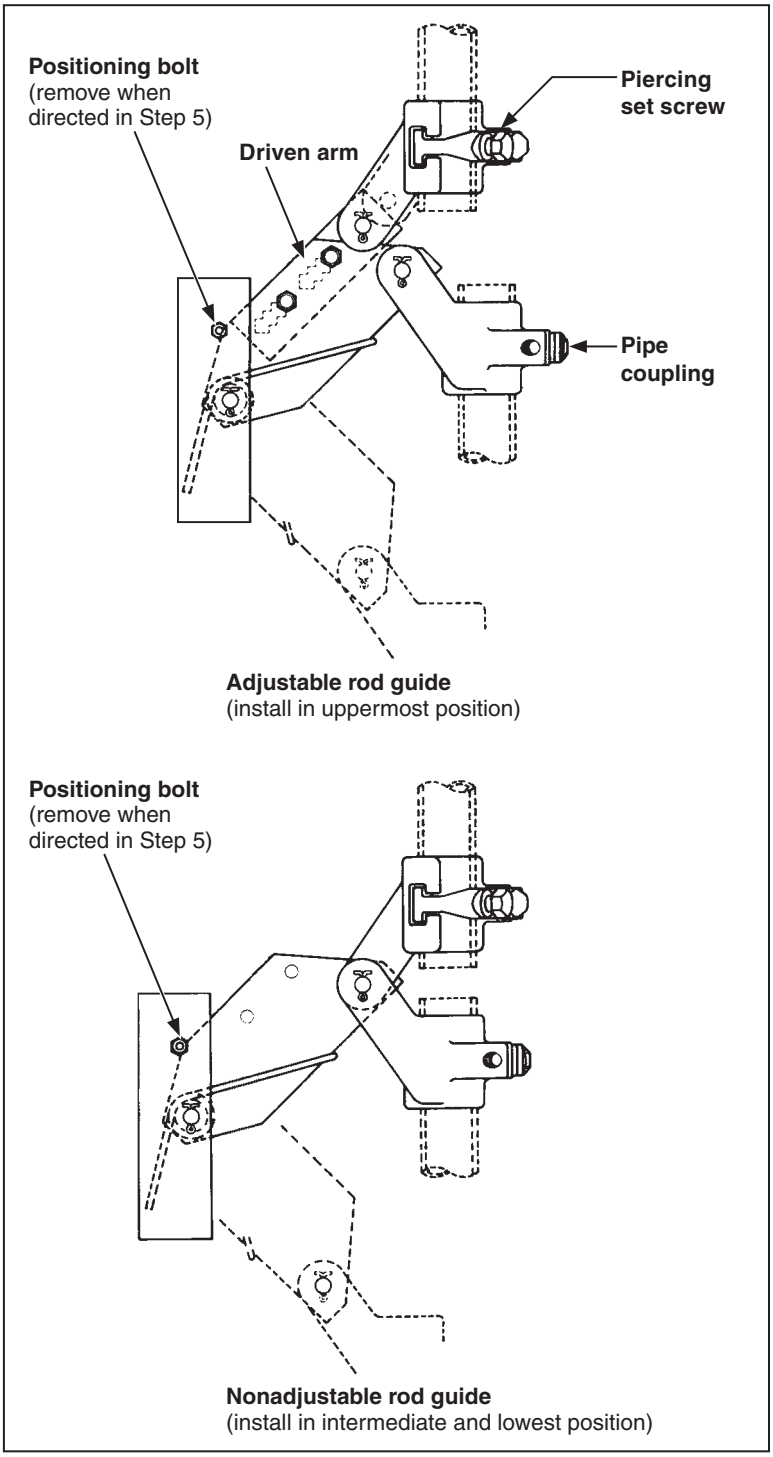


Figure 11. Rod-guide assemblies for use with 1¼″ IPS vertical operating pipe, furnished with Standard Minor Modification Suffix "-S15."

f. Make sure that the switch poles are fully closed and that the operating handle is held in its closed position by means of the locking bar. See Figure 12.

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 two 11⁄16-inch diameter holes at the locations indicated on the erection drawing, and mount the handle using 5⁄8-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 12.

NOTICE

The grounding recommendations herein 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.

g. Now remove the temporary 45-degree positioning bolt from each rod guide. See Figure 11. Remove the locking bar and loosen the clamp bolt on the lowest rod-guide coupling. Then, while holding the handle approximately 20 degrees from the closed position, retighten the rod-guide clamp bolts. Do not tighten the associated set screw. Finally, 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 that the operating handle should be moved more than 20 degrees in the opening direction before tightening the clamp bolt on the lowest rod-guide coupling. 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.

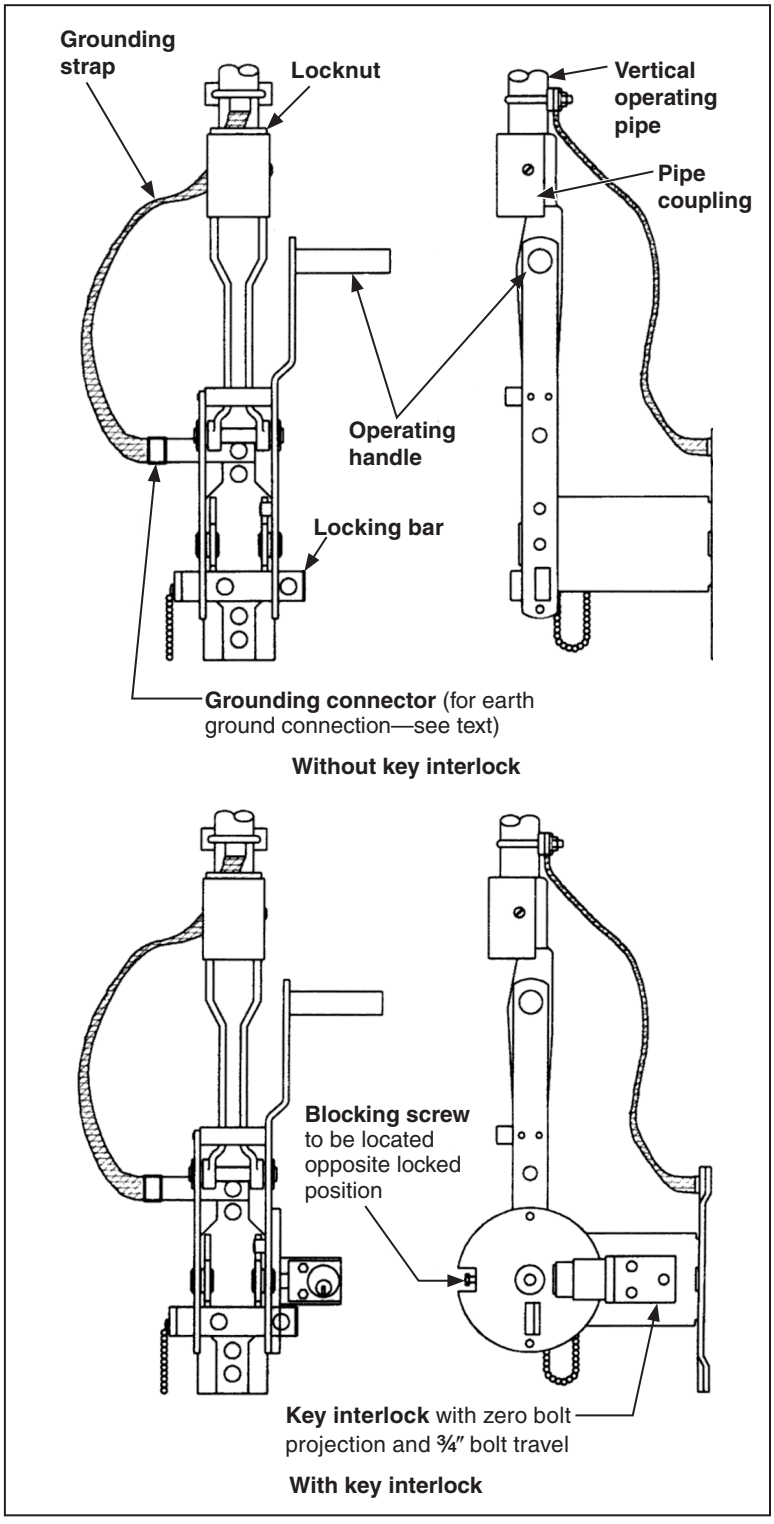


Figure 12. Operating handle assembly.

h. With the operating handle adjusted for full 180-degree travel as described in (g), open and close the interrupter switch slowly to see that no operational difficulties are encountered due to undetected damage in shipping.

⚠ WARNING

This applies only when checking for alignment and complete closure; when in service, the interrupter switch should be opened or closed vigorously through its full travel without hesitation at any point. Be prepared to apply additional force to maintain full speed when operating effort increases as the switch blades engage the interrupters.

Check to be sure that 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.

In the unlikely event that the conditions described in (h) above are not met, more switch-blade travel is required. Proceed as follows:

i. 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 ⅜-inch bolt or metal pin into the hole provided. See Figure 9 on page 17.

j. Then, loosen the two clamp bolts on the adjustable switch drive lever. Shorten the drive lever one "step" (11⁄32 inch) and retighten the bolts. (Shortening the lever increases the amount of switch travel.) Remove the bolt. Then readjust for full operating-handle and switch-blade travel as described above. Repeat this procedure, shortening the drive lever in one-step increments, until full switch-blade travel is attained. See Figure 10 on page 18.

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

1. 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 the end of the strap.

NOTICE

The grounding recommendations herein 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.

Dead-Ending Conductors

Dead-ending provisions are standard on Omni-Rupter switches *having tiered-outboard mounting configurations*.▲ When dead-ending to these brackets, extension-link assemblies and pole bands◆ are required. See Figure 13.

Maximum dead-end loading for S&C dead-ending brackets on switches with *steel* bases:

a. 2000 pounds per conductor where pull-off forces are applied to only one side of the switch.

b. 8000 pounds per conductor where equal pull-off forces are applied to both sides of the switch.

Maximum dead-end loading for S&C dead-ending brackets on switches with *insulated* bases:

a. 750 pounds or 500 pounds per conductor, 14.4-kV and 25-kV respectively, where pull-off forces are applied to both sides of the switch.

b. 8000 pounds per conductor for 14.4-kV and 25-kV switches, where equal pull-off forces are applied to both sides of the switch.

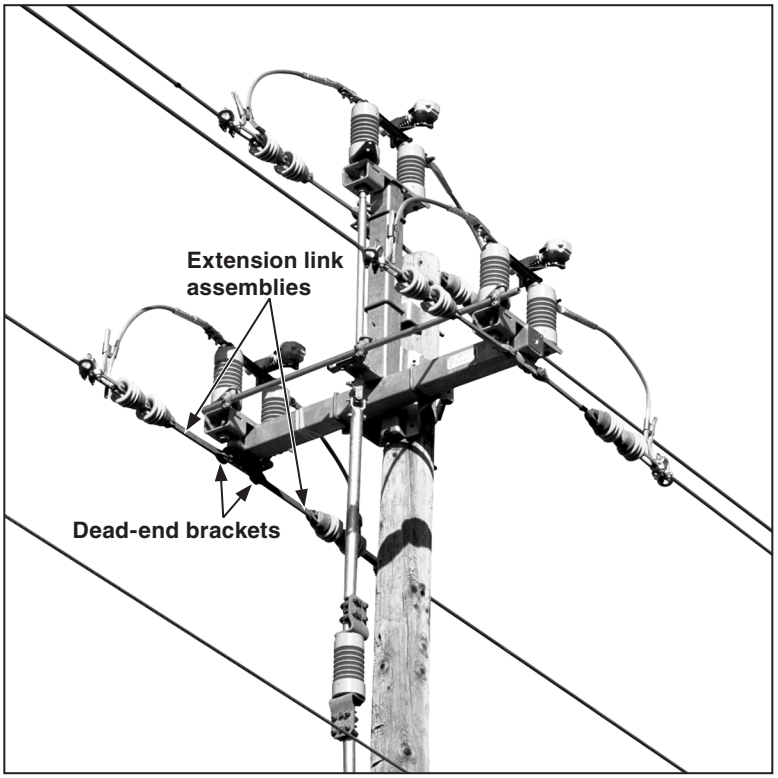


Figure 13. Dead-ending bracket (triangular mounting configuration shown).

▲ Dead ending not available for switches in the vertical mounting configuration.

◆ Pole band can be specified by adding suffix "-P1" to the catalog number. Extension-link assemblies can be provided by adding suffix "-D" to the catalog number of the switch, or equivalent user-furnished extension means may be used.

Connecting High-Voltage Conductors

Step 10

⚠ DANGER

Conductors must be de-energized and grounded in accordance with standard system operating practice.

Failure to do so can can result in serious injury or death.

The Omni-Rupter terminal pads are silver plated and do not require abrasive cleaning as a part of their preparation. Wipe any dirt or grease from the surface, and apply a thick coating of Penetrox A or other appropriate conductor preparation compound. **DO NOT** wire-brush the terminal pads.

Step 11

⚠ CAUTION

DO NOT apply excessive load to the terminal pads.

The jumper connections should be in-line with and level to the terminal pad bolt holes before securing the jumper fasteners to the terminal pad. Large pull-off forces may misalign the blades with the stationary contacts or prevent proper closing.

Misaligned contacts may overheat causing arcing and damage to the switch. Injury to operating personal may result.

When high-voltage conductors are to be connected using aluminum-alloy connectors★, the following procedures should be employed:

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

b. Prepare the conductors using established procedures and clamp them in their respective connectors.

For other types of connector, follow the manufacturer's recommended preparation procedure before connecting to Omni-Rupter terminal pads.

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

Step 12

Attach the jumper connectors to their respective terminal pads using flexible-conductor connections. When attaching connectors to the Omni-Rupter terminal pads, the connectors should be parallel to the terminal pad. Attach and form the conductors so that no significant loading pressure is applied to the terminal pads. See Figure 14.

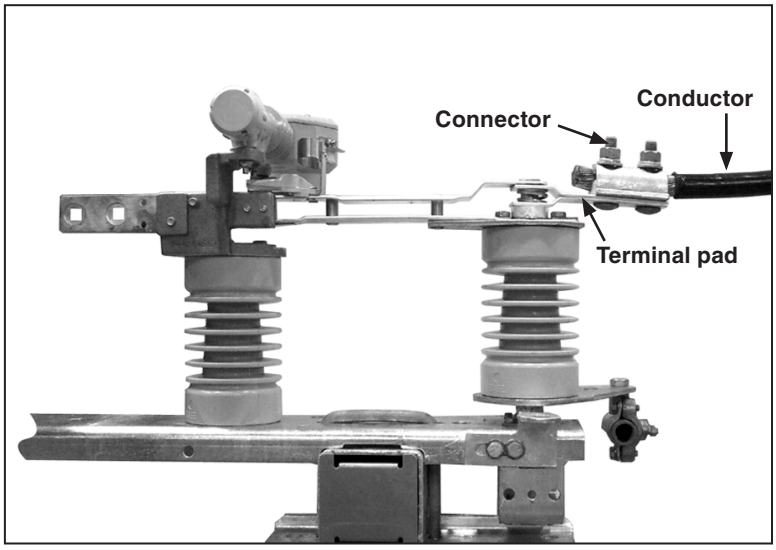


Figure 14. Connect jumper connector parallel to terminal pad.

Locking the Operating Handle

Step 13

With Padlock:

The operating-handle assembly includes provisions for padlocking the interrupter switch in either the open or closed position.

With Key Interlock:

A key interlock (Superior or equivalent), supplied with the interrupter switch when the erection drawing (ED) number includes Standard Minor Modification Suffix "-S6," will be mounted on the operating handle (see Figure 15). 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, (Standard Minor Modification Suffix "-S6L") the operating handle will have an interlock-mounting plate attached to the base. Install interlock as follows:

a. Attach interlock to mounting plate so that interlock bolt, when extended, will engage a slot in the operating handle. A Superior (Type B4003-1) key interlock with zero bolt projection and ¾-inch 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.

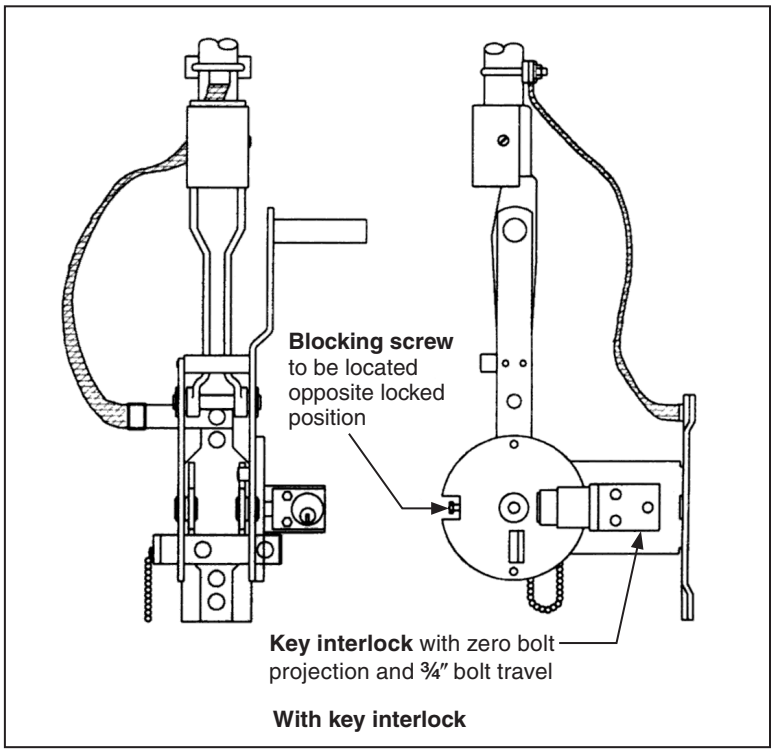


Figure 15. Key interlocks.

NOTICE

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 14

Open and close the interrupter switch by swinging the handle *slowly* through its full travel. *Check to be sure that the following conditions exist:*

a. With the operating handle as far as it will go in the closing direction, all main contacts of the interrupter switch are in the fully-closed position.

b. With the operating handle as far as it will go in the opening direction, the switch blades are 90° from the closed position.

If adjustment is required, loosen the hinge-end bolts that fasten the blade assembly to its insulator and move the switch blade until it is in the fully-closed position with the blade against the bumper stop; then re-tighten the bolts making sure the blade remains in the fully closed position. (Cypoxy insulators—torque the ⅜–16 hardware to 22 ft-lbs; Porcelain insulators—torque the ½–13 hardware 55 ft-lbs.) See Figures 16 and 17.

If adjustment is required *beyond* that provided by moving the switch-blade assembly, loosen the two clamping bolts and set screw that fasten the coupling to the interphase rod and rotate the switch blade until it is in the fully closed position. Re-tighten the clamping bolts and set screw, making sure the interrupter switch remains in the fully-closed position.

Step 15

For 14.4-kV switches. Check the following on each phase.

a. Open and close the switch and examine the interrupter and blade alignment. The interrupter must be parallel to the sweep of the blade.

b. Partially open the switch. The following conditions should be met:

- A 1/32″ minimum clearance between the **top** of the opening cam and the **bottom** of the closing lever, at their closest point.
- A 1/32″ minimum clearance between the **top** of the opening lever and the **bottom** of the closing cam.

c. Open the switch and place the blade in the position shown in Figure 18, View A. The following conditions should be met:

- A 1/64″ minimum clearance between the opening cam and the opening lever.

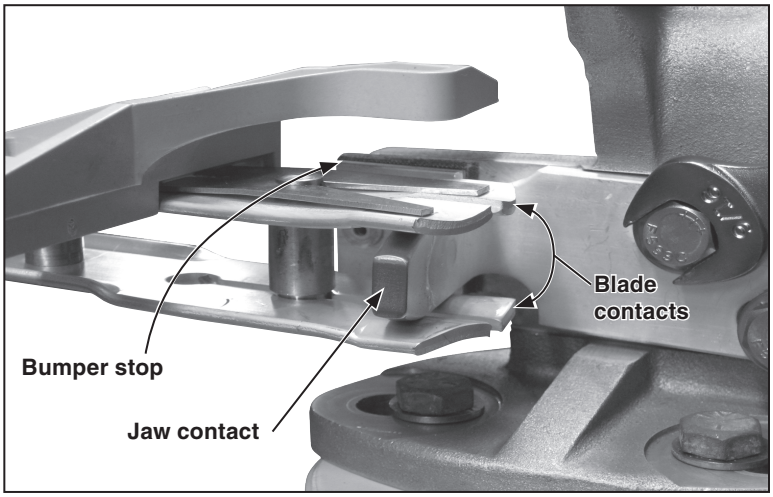


Figure 16. Make sure the jaw contact is fully-centered between the blade contacts and that the blade contacts are against the bumper stop.

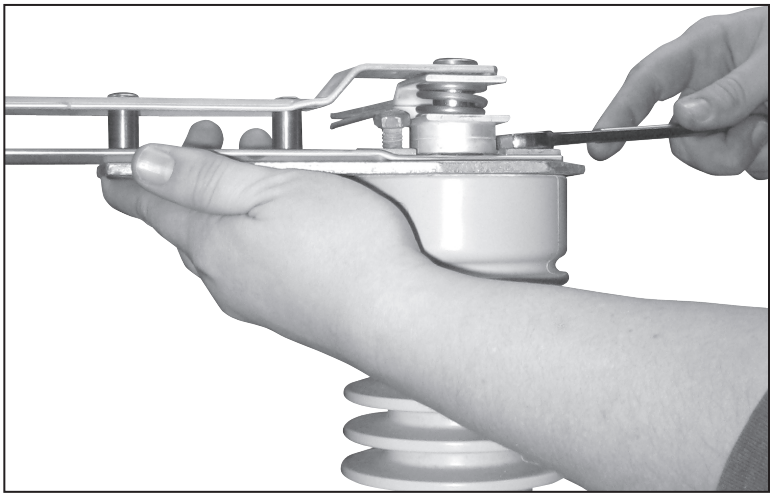


Figure 17. Loosen the blade hardware if necessary and move blade to the fully-closed position against the bumper stop.

- A clearance between 3⁄32″ and 7⁄32″ between the shunt contact and the interrupter housing at the beginning of the closing sweep.

d. Place the switch in the fully-closed position. The following conditions should be met:
   - A clearance of 1⁄16″– 9⁄32″ between the closing cam and the closing lever.
   - A 1⁄2″ minimum clearance between the blade shunt contact and the interrupter housing contact.

e. Slowly open the switch. As the blade moves in the opening direction, the blade shunt contact must firmly engage the interrupter housing contact before the blade disengages from the jaw contact. Bend and reform the shunt contact if necessary to attain the proper contact.

f. Slowly close the switch. At the start of the closing stroke, the interrupter housing should be at the distance checked in STEP 12c and should continue to make contact with the shunt contact during the duration of the closing stroke. This will ensure that the shunt contact and interrupter housing contact stay in the circuit long enough for the interrupter to break the circuit during the opening stroke. See Figure 18, View B.

g. If adjustment is required, loosen the bolts that fasten the jaw-contact casting to its insulator and slightly rotate the casting in order to achieve the necessary clearances. Re-tighten the bolts, making sure that the blade engages the stationary contact on-center.

NOTICE

If any of the conditions described above cannot be achieved, it is likely that damage was sustained during shipping or storage. Contact the nearest S&C Sales Office for assistance.

NOTICE

Omni-Rupter switches specified with the optional harsh environment contacts (Catalog Number Suffix "-C") have graphite impregnated blades which are greaseless and self-lubricating. **DO NOT** apply grease to the blade contacts.

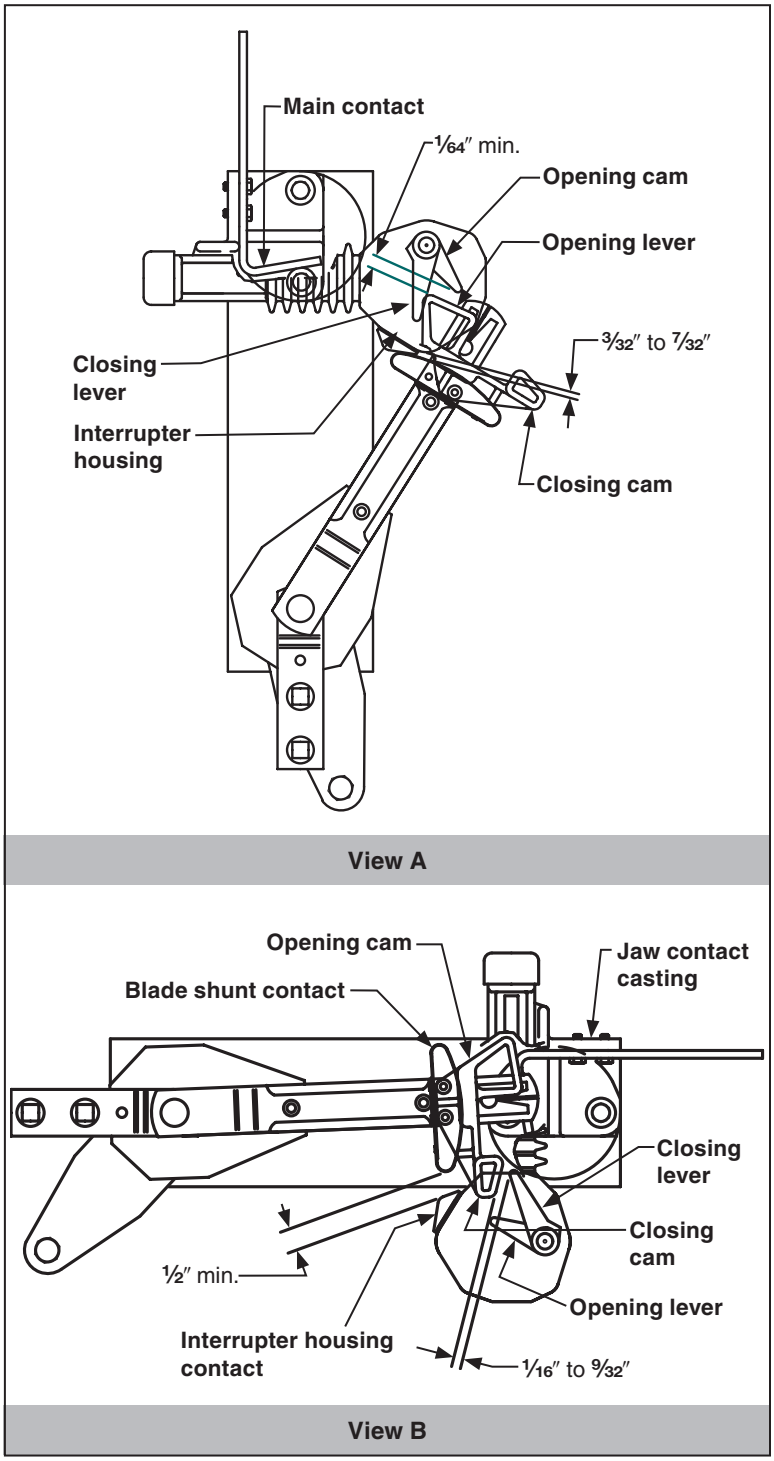


Figure 18. Operating checkpoints for switches rated 14.4 kV.

If any of the conditions described in this step cannot be achieved, it is likely that damage was sustained during shipping. Contact the nearest S&C Sales Office for assistance.for 14.4-kV switch. There should also be 1/32″ minimum clearance between the top of the opening lever and the bottom of the closing cam.

Step 16

For 25 kV switches. Check the following on each phase:

a. Examine the interrupter and blade alignment. The interrupter must be parallel to the sweep of the blade.

b. Partially open the switch. The following conditions should be met:

- A 1/32″ clearance between the **bottom** of the opening cam and the **top** of the closing lever.
- A 1/32″ minimum clearance between the bottom of the closing lever and the top of the blade.

c. Open the switch and place the blade in the position shown in Figure 19, View A. The following conditions should be met:

- A 1/64″ minimum clearance between the opening cam and the opening lever.
- A clearance between 5/32″ and 7/32″ between the shunt contact and the interrupter housing at the beginning of the closing sweep.

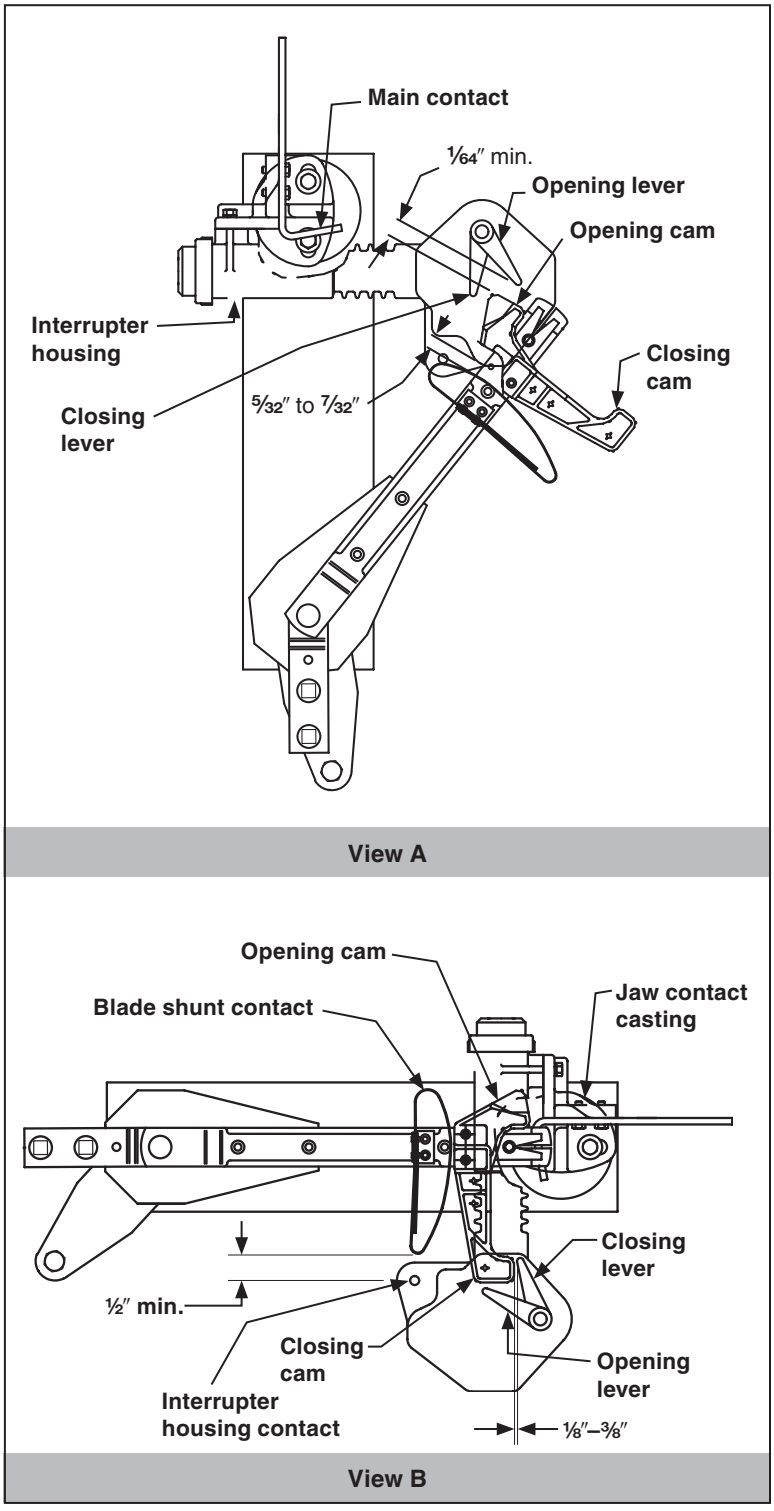


Figure 19. Operating checkpoints for switches rated 25 kV.

d. Place the switch in the fully-closed position. The following conditions should be met:
   - A clearance of ⅛″ – ⅜″ between the closing cam and the closing.
   - A ½″ minimum clearance between the blade shunt contact and the interrupter housing contact.

e. Slowly open the switch. As the blade moves in the opening direction, the blade shunt contact must firmly engage the interrupter housing contact before the blade disengages from the jaw contact. Bend and reform the shunt contact if necessary to attain the proper contact.

f. Slowly close the switch. At the start of the closing stroke, the interrupter housing should be at the distance checked in Step 13c and should continue to make contact with the shunt contact during the duration of the closing stroke. This will ensure that the shunt contact and interrupter housing contact stay in the circuit long enough for the interrupter to break the circuit during the opening stroke. See Figure 19, View B.

g. If adjustment is required, loosen the bolts that fasten the jaw-contact casting to its insulator and slightly rotate the casting in order to achieve the necessary clearances. Re-tighten the bolts, making sure that the blade engages the stationary contact on-center.

NOTICE

If any of the conditions described above cannot be achieved, it is likely that damage was sustained during shipping. Contact the nearest S&C Sales Office for assistance.

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