Installation

Table of Contents

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Qualified Persons

⚠ WARNING

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

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

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

Read this Instruction Sheet

NOTICE

Thoroughly and carefully read this instruction sheet and all materials included in the product's instruction handbook before installing or operating your Mini-Rupter Switch. Familiarize yourself with the Safety Information and Safety Precautions on pages 4 and 5. The latest version of this publication is available online in PDF format at **sandc.com/en/support/product-literature/**.

Retain this Instruction Sheet

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

Proper Application

⚠ WARNING

The equipment in this publication is only intended for a specific application. The application must be within the ratings furnished for the equipment. Ratings for the Mini-Rupter Switch are listed in the ratings table in Specification Bulletin 785-31. The ratings are also on the nameplate affixed to the product.

Warranty

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

Warranty Qualifications

For the standard warranty contained in the seller's standard conditions of sale (as set forth in Price Sheet 150) to apply to Mini-Rupter Switches with Power Fuses in indoor, outdoor, indoor/outdoor, or submersible enclosures of other than S&C manufacture, the enclosure must be constructed, and the switch, barriers, and operating handle and mechanism (as applicable) must be installed therein, in accordance with the applicable S&C Standard Mounting Arrangement erection drawing, information bulletin, and instruction sheet.

Understanding Safety-Alert Messages

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

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

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

NOTICE

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

Following Safety Instructions

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

NOTICE

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

Replacement Instructions and Labels

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

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

⚠ DANGE

The Mini-Rupter Switch operates at high voltage. Failure to observe the precautions below will result in serious personal injury or death.

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

1. **QUALIFIED PERSONS.** Access to the Mini-Rupter Switch must be restricted only to qualified persons. See the "Qualified Persons" section on page 2.
2. **SAFETY PROCEDURES.** Always follow safe operating procedures and rules.
3. **PERSONAL PROTECTIVE EQUIPMENT.** Always use suitable protective equipment, such as rubber gloves, rubber mats, hard hats, safety glasses, and flash clothing, in accordance with safe operating procedures and rules.
4. **SAFETY LABELS.** Do not remove or obscure any of the "DANGER," "WARNING," "CAUTION," or "NOTICE" labels.
5. **HIGH-VOLTAGE ISOLATION.** Switch operators and controls are isolated from high voltage in grounded, metal-enclosed compartments. Access to these components is controlled by padlockable covers, which incorporate a nonremovable manual handle. Other low-voltage components, such as meters, selector switches, toggle switches, etc., are similarly isolated.
6. **ENERGIZED COMPONENTS.** Always consider all parts live until de-energized, tested, and grounded. Voltage levels can be as high as the peak line-to-ground voltage last applied to the unit. Units energized or installed near energized lines should be considered live until tested and grounded.
7. **DO NOT APPLY UNDUE FORCE.** Avoid the use of undue force when attempting to operate a Mini-Rupter switch. The operating mechanism is designed properly for the switch, and any undue force applied, such as by use of an extension of the operating handle, may cause severe damage to the switch or mechanism. For example, an interlock mechanism can be jammed by an attempt to operate an associated switch while the switchgear door is unlatched. Verify the switching operation is in the sequence dictated by the key- or mechanical-interlock scheme provided.

General

Because Mini-Rupter Switches are capable of switching rated load currents at full voltage, no interlocking with secondary protective equipment is required.

Because circuit-making and circuit-breaking are is involved in the normal operation of these switches, each switch includes an integral quick-make, quick-break mechanism for swift, positive closing and opening, independent of the speed of the operating handle.

Note: These interrupter switches are not intended for interrupting fault currents. However, the quick-make, quick-break mechanism makes possible a two-time duty-cycle fault-closing rating, as indicated on the nameplate.

The integral quick-make, quick-break mechanism is a stored-energy device. Initial rotation of the drive shaft charges the mechanism. At a predetermined point in the drive-shaft travel the stored energy is released, with a snap action, to drive the switch blades at high speed. The speed of blade operation is not operator-dependent.

Because the switch blades are driven at high speed by a release of stored energy, make sure no one is near the mechanism or the blades when the switch is opened or closed by means of the quick-make, quick-break mechanism.

Construction and Performance

The Mini-Rupter Switch is a field-tested and proven, three-pole, group-operated interrupter switch. It is offered in either a top-supported frame style for installation in pad-mounted enclosures or in a back-supported frame style for use in metal-enclosed switchgear or in vaults.

In either style, Mini-Rupter Switches are available in a variety of voltage and current ratings for close matching to the economics and switching duties of specific applications over a wide range of system voltages, from 4.16 kV through 27.6 kV nominal.

Mini-Rupter Switches, with their compact construction and rugged steel mounting-frame weldment, are easy to install. The top-supported frame style switch is provided with two projecting support pads for two-point suspension mounting. The back-supported frame style switch is provided with projecting support pads and two adjustable brackets for four-point mounting. These methods of support help to compensate for uneven mounting surfaces. No supplemental bracing is needed to achieve the published momentary and fault-closing values. Unlike non-metallic switch frames, a Mini-Rupter Switch's grounded steel frame intercepts the leakage path that parallels the open gap for positive isolation of the load circuit.

Mini-Rupter Switches incorporate a number of innovative features that make them especially suited to perform a wide range of switching duties. These features include:

- Multifinger, convex, silver-clad copper jaw contacts, independently sprung and backed up with flat stainless steel springs, providing equalized, four-point pressure on the blades' silver-nickel alloy inlays
- Stationary hinge contacts, using pure-silver buttons cold-headed into four independently sprung contact fingers, with equalized pressure applied by flat stainless steel loading springs, ensuring efficient current transfer at the heavily silver-clad blade-support contact
- Cypoxy™ Insulator resin system, used as an assembly medium, producing a unified insulated shaft with journals and blade supports permanently molded in place (The shaft thus positions the blades in "fixtured" alignment. There are no clamp-on crank and connecting-link assemblies to portend alignment or simultaneity problems. Mini-Rupter Switches are furnished with Cypoxy Insulators, which provide generous leakage distance.)
- S&C's unique arc compressor, providing controlled circuit interruption without external arc or flame and without the need for separate auxiliary blades (A unique lip-seal (600-ampere Mini-Rupter Switches) wipes the blade as it exits the arc compressor and keeps the arc under compression, directing controlled arc gases through the deionizing suppressor vent.)
- Multipurpose, one-piece, formed hard-drawn copper blades with coined, silver-nickel alloy inlays at contact areas, on both sides, used for circuit closing, continuous current carrying, and circuit interrupting. (Their simple, reliable, high-speed action is unlike the uncertain action of auxiliary interrupting blade-and-contact mechanisms that are dependent on retention of correct sequencing with the main blade and contact and on spring assistance to snap the interrupting blade open.)
- A factory-installed quick-make, quick-break mechanism that requires no adjustments (It closes and opens the switch swiftly, independent of speed of switch handle operation, and locks the blades in both the **Open** and **Closed** positions. Its positive action contributes to a Mini-Rupter Switch's ability to achieve fast circuit interruption and two-time duty-cycle fault-closing ratings.)

Mini-Rupter Switches provide maximum operating flexibly because of their exceptional fault-closing ability, expressed in terms of two-time duty-cycle fault-closing ratings. These ratings represent the available fault current into which the switch can be closed twice, remaining operable and able to carry and interrupt rated currents. This ability permits quick restoration of service following a fault, without the need for an extended outage for replacement of switch parts or for temporary restoration of service through an alternate switch until replacement parts can be obtained. It also permits use of a Mini-Rupter Switch in fault-sectionalizing (lockout) schemes where switches are closed and then opened sequentially until the fault is isolated. The ability to open following a fault-closing operation is of especial importance where remote or automatic control is utilized.

In marked contrast to Mini-Rupter Switches, with their duty-cycle fault-closing ratings, are switches with simple "fault-closing" or "make-and-latch" ratings which, following an initial fault-closing operation, offer no assurance of an ability to subsequently carry or interrupt rated current, much less any expectation of tolerating a second fault closing.

Mini-Rupter Switches are furnished for either handle-on-right or handle-on-left operation. Additionally, back-supported frame style switches are offered in either main-contact-at top or main-contact-at-bottom models.

S&C operating handles, complete with associated operating-mechanism components, are available as options. Three types of handles are offered: a removable side handle (which folds into a compact unit for storage), a nonremovable side handle, and a nonremovable front handle.

Top-supported frame style switches are designed to accommodate only the removable side handle. Back-supported frame style switches will accommodate any of the three handle types.

Nonremovable side handles and nonremovable front handles have provisions for locking the handle in the **Open** and **Closed** positions by means of padlocks or key interlocks. For key interlocking the S&C Nonremovable Side Handle, a Superior Key Interlock Type B-6003-1, catalog number S105821Y, or equivalent, with 1⅛-inch (29-mm) maximum bolt projection when extended, is required. For key interlocking the S&C Nonremovable Front Handle, a Superior Key Interlock Type B-4003-1, catalog number S105810Y, or equivalent, with ¾-inch (19-mm) maximum bolt projection when extended, is required.

Mini-Rupter Switches are suitable for these three-pole live-switching duties in three-phase circuits in distribution systems rated 4.16 kV through 27.6 kV:

Live Switching—Opening

The Mini-Rupter Switch live (open) switching capabilities include:

- **Transformer switching**. Transformer load currents up through 200 or 600 amperes at 14.4 kV and 400 amperes at 25 kV, as well as transformer magnetizing currents associated with the applicable loads
- **Line switching**. Load splitting (parallel or loop switching) up through 200 or 600 amperes at 14.4 kV and 600 amperes at 25 kV, as well as load dropping of currents up through 200 or 600 amperes at 14.4 kV and 400 amperes at 25 kV; also line dropping (charging currents typical for distribution systems of these voltage ratings)
- **Cable switching**. Load splitting (parallel or loop switching) up through 200 or 600 amperes at 14.4 kV and 600 amperes at 25 kV, as well as load dropping of currents up through 200 or 600 amperes at 14.4 kV and 400 amperes at 25 kV; also cable dropping (charging currents typical for distribution systems of these voltage ratings).

Live Switching—Closing

The Mini-Rupter Switch live (close) switching capabilities include:

- Circuit-closing inrush currents associated with the above opening duties
- Two-time duty-cycle fault-closing ratings of 22,400 or 40,000 amperes at 14.4 kV and 22,400 or 32,000 amperes at 25 kV

This instruction sheet is general in nature and is to be used to complement the applicable standard mounting arrangement erection drawing (ED) included with each Mini-Rupter Switch. Refer to the erection drawing for the specific dimensional details required for enclosure accommodation, such as minimum electrical clearances, operating mechanism location, barriers (as applicable), and mounting holes for switch and operating handle.

For special mounting arrangements, a custom erection drawing is provided. In that case, the instructions on the erection drawing should be followed if they differ from those noted in this document.

As indicated in the applicable standard mounting arrangement erection drawing number, certain Mini-Rupter Switches require interphase barriers or interphase barriers plus full end-barriers to achieve the published BIL ratings. These barriers are furnished only when so specified by the addition of the appropriate suffix to the erection drawing number.

When full end-barriers are not specified, a single small side-barrier is furnished to isolate the quick-make, quick-break mechanism from the adjacent outer-pole support insulator (except for back-supported frame style switches rated 25 kV nominal, which require interphase barriers plus full end-barriers to attain the 125-kV BIL rating).

The manual operating handle (and any associated operating-mechanism components) required for the standard mounting arrangement is furnished only when so specified by the addition of the appropriate suffix to the erection drawing number.

The handle and/or barrier options furnished are indicated by the addition of one of the following suffixes to the applicable standard mounting arrangement erection drawing number:

- S1 operating handle
- S2 interphase barriers
- S3 interphase barriers plus full end-barriers
- S4 operating handle and interphase barriers
- S5 operating handle and interphase barriers plus full end-barriers

S&C recommends this equipment be stored in an indoor, reasonably dry area prior to installation.

While in storage and when handling, Mini-Rupter Switches should be supported by their mounting frame. Do not allow a switch to rest on the live parts. Lift Mini-Rupter Switches by the mounting frame so no stress is placed on the insulators or live parts.

The quick-make, quick-break mechanism, together with its associated frame-mounted, switch-operating linkage and cushioned stops are factory-adjusted. Do not change these adjustments.

Switch-operating-shaft rotation must be limited to 140 degrees. The S&C Nonremovable Side Handle and the S&C Nonremovable Front Handle incorporate stops that ensure this travel limit. If the S&C Removable Side Handle is furnished or if any handle is furnished by the purchaser, suitable stops must be provided by the purchaser.

The enclosure must be provided with mounting holes for the switch as well as openings and mounting holes for the operating handle. Necessary locating dimensions are shown on the erection drawing.

Whether the switch is mounted in a metal enclosure, on a steel structure, or on a wall, the mounting surface must be reasonably flat and true to avoid twisting the switch frame when it is bolted down. Such distortion of the frame can affect the adjustment of switch live parts.

The mounting supports for the switch must be sufficiently rigid to withstand, without significant distortion, the torque exerted by the handle during operation. Additionally, for a mounting arrangement for use with the nonremovable front handle, a compression member (furnished when the S&C Nonremovable Front Handle is specified) must be installed between the switch operating shaft and the handle housing.

Use the following procedure to install a Mini-Rupter Switch:

STEP 1. Mini-Rupter Switches are shipped with the switch blades partially closed and with the quick-make, quick-break mechanism unlatched (not charged). Before installation, the switch must be placed in the fully **Closed** position as follows: Place a ¾-inch hex wrench (box-end or socket), preferably one with a 15-inch handle length, on the switch operating shaft. Move the blades to the fully **Open** position to pick up the latch on the quick-make, quick-break mechanism. Make sure no one is near the mechanism or the blades. Then, close the switch.

STEP 2. ***Top-Supported Frame Style:*** If full end-barriers are not required, install the small side-barrier at this time, positioned to isolate the quick-make, quick-break mechanism from the adjacent outer-pole support insulator. The side-barrier is furnished with a mounting angle attached.

For any interphase and end-barriers required, install (on the switch frame) only the mounting provisions at this time. For each such barrier, attach a mounting angle● at the top of the switch frame. The barriers themselves are to be installed later, in Step 9 on page 16.

Bolt the switch to the mounting surface, using ½-inch hardware. Insert bolts from the bottom, with the nuts at the top. Include also shake proof lockwashers between the switch frame and the mounting surface for grounding purposes. Use shims if necessary to avoid distortion of the switch frame. Do not operate the switch until so directed in the following steps.

Note: If an S&C Nonremovable Side Handle or S&C Nonremovable Front Handle is to be used, the operating-mechanism (and, if applicable, the cable interlock) components associated with the switch should be attached before the switch is installed. Refer to the instructions under the appropriate heading in Step 3 on page 12.

Back-Supported Frame Style: If full end-barriers are not required, install the small side-barrier at this time, positioned to isolate the quick-make, quick-break mechanism from the adjacent outer-pole support insulator. The side-barrier is furnished with a mounting angle attached. See Figure 2 on page 11.

For any interphase and end-barriers required, install (on the switch frame) only the mounting provisions at this time. (A supply of barrier fasteners is furnished when S&C barriers are ordered.) The barriers themselves are to be installed later, in Step 9 on page 16.

Loosen the bolts which fasten the adjustable mounting brackets to the lower portion of the switch frame. See Figure 2 on page 11. Bolt the switch to the mounting surface, using ½-inch hardware. Insert bolts from the front, with the bolt heads against the switch frame. Include also shake proof lockwashers between the switch frame (and adjustable brackets) and the mounting surface for grounding purposes.

Securely tighten the upper mounting bolts first, and then tighten the bolts used to secure the adjustable brackets to the lower mounting surface. Finally, at the adjustable brackets, space the switch frame ⅝-inch (16 mm) from the mounting surface (to correspond with the thickness of the upper mounting support pads) and retighten the bolts that fasten the adjustable brackets to the switch frame. The bolts then will be approximately centered in the slotted holes in the adjustable brackets. Do not operate the switch until so directed in the following steps.

● Supplied by S&C when barriers are ordered.

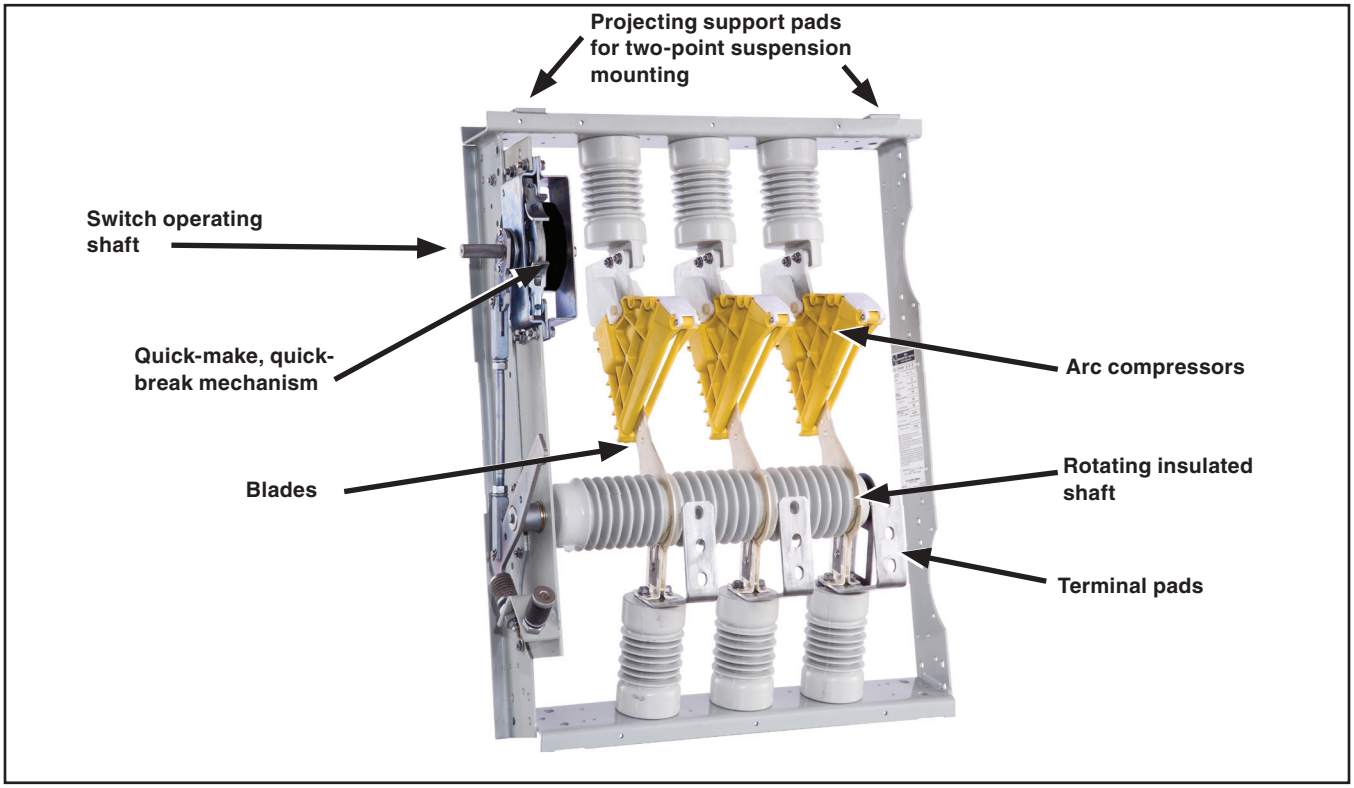

Figure 1. A Mini-Rupter Switch, top-supported frame style.

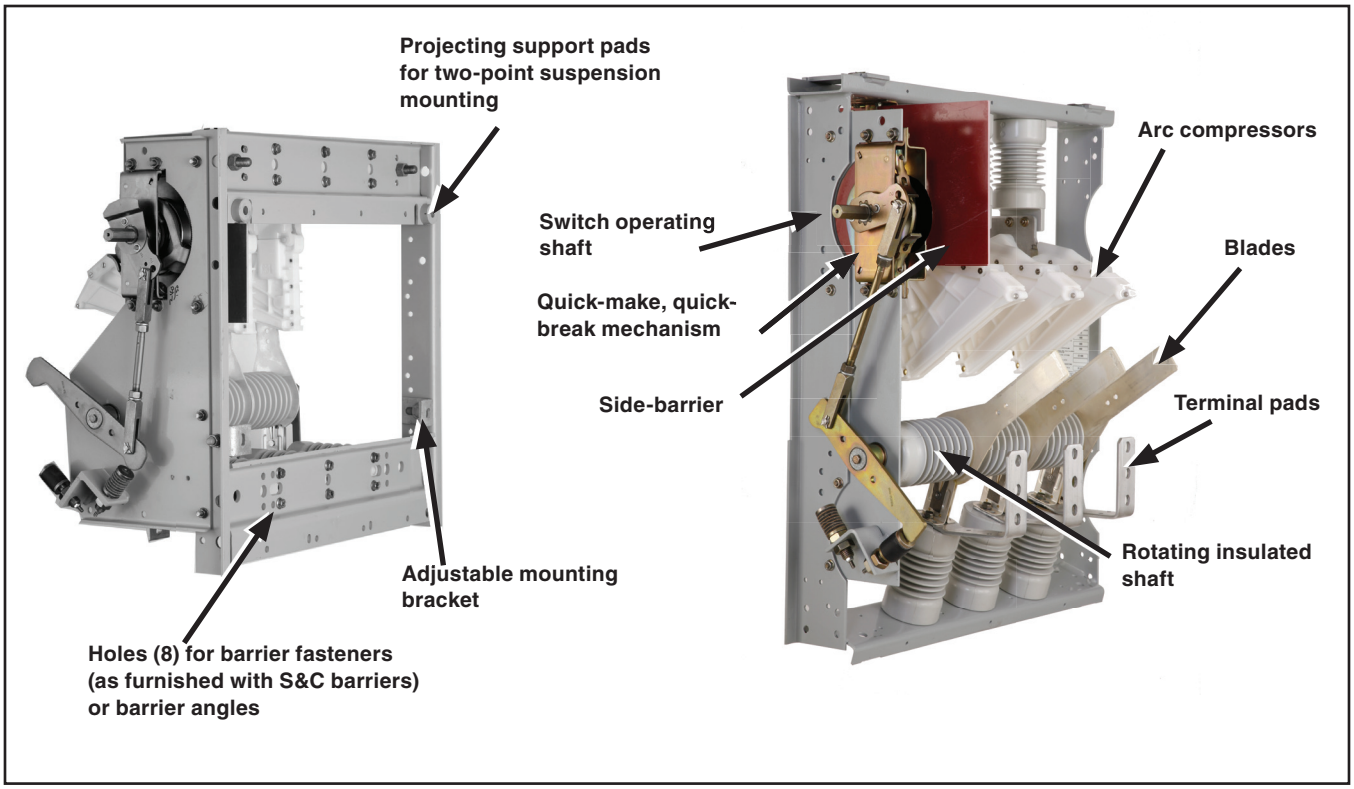

Figure 2. A Mini-Rupter Switch, back-supported frame style.

The following instructions are applicable to the installation of operating handles furnished by S&C Electric Company. See the "Construction and Performance" section on page 7. If operating handles are furnished by the purchaser, the applicable erection drawing should be referred to for necessary locating dimensions. In either case, the directions for operation and alignment of the switch, as set forth in the following steps, should be followed.

STEP 3. ***S&C Removable Side Handle:*** Slide the switch operating handle onto the hex switch-operating shaft. (In the event the folding switch-operating handle is not included, a ¾-inch hex deep-socket wrench or a ¾-inch hex shallow-socket wrench with extension can be used.) Use the operating handle to open the switch. *Do not use the operating handle again until so directed in Step 6 on page 14, after the switch alignment checks and adjustments have been completed.*

S&C Nonremovable Side Handle: Refer to S&C Drawing RD-3255, packed with the handle components. The nonremovable side-handle assembly includes a shaft extension, furnished in a 12-inch (305-mm) length, to couple the handle shaft to the switch operating shaft. Cut the shaft extension to the required length.● Assemble the handle and mounting plate, and pin the shaft extension to the handle shaft. Bolt the handle-and-shaft-extension assembly to the enclosure as shown on the erection drawing, with the handle in the **Upward** position to correspond with the switch **Closed** position.

At suitable locations on the handle mounting plate, clean the surfaces to remove all traces of dirt and oils. Then, affix "Open" and "Closed" adhesive-backed labels, positioned as appropriate, pressing or rolling them onto the surface to develop the maximum bond strength.

Use the operating handle to open the switch. *Do not use the operating handle again until so directed in Step 6 on page 14, after the switch alignment checks and adjustments have been completed.*

S&C Nonremovable Front Handle:

(a) Install the operating-mechanism components associated with the switch operating shaft as shown on S&C Drawing RD-3256, which is furnished with the handle components.●

(b) Install the neoprene gasket included with the nonremovable front handle assembly around the 1½ x 19⅞-inch (38-mm x 505-mm) slot previously provided in the front of the enclosure. Pass the operating handle out through this slot. Bolt the handle housing to the inside wall of the enclosure, using eight 5⁄16 x 1-inch bolts (or, preferably, 5⁄16-inch (8-cm) studs welded to the inside wall).

(c) Cut to the required length and attach the appropriate compression member section to the one hole (of the three at the rear of the handle housing) that aligns the compression member as closely as possible between the switch operating shaft and the operating handle pivot point. Then, interconnect the two compression member sections.

● If an S&C Mechanical Cable Interlock, catalog number 5279 or 5299, is used, the interlock components associated with the switch should also be installed at this time. Refer to Step 10 on page 17 or Step 11 on page 18, as applicable.

(d) For this step only, temporarily secure the operating handle in the **Closed** (handle up) position by means of a ½-inch bolt through the padlocking tab. Then, attach the drive chain as follows:

- Couple a strip link and a turnbuckle to each chain section. Extend each turnbuckle to its maximum length. Cut strip links to required length and redrill cut end.
- Position chain sections on the sprockets so there will be sufficient chain (9½ inches (241 cm) is recommended) to rotate each sprocket to the switch **Open** position (chain travel is approximately 7 inches (178 cm).
- Interconnect the chain sections (remove chain links to make the chain about two links longer than required). Tighten the turnbuckles until the chain is taut but not under excessive tension. Then, tighten the turnbuckle locknuts.

(e) At suitable locations on the enclosure above and below the handle, clean the surfaces to remove all traces of dirt and oils. Then, affix "Closed" and "Open" labels, respectively, pressing or rolling them onto the surface to develop the maximum bond strength.

(f) If key interlocks are used, also affix the "Open-Position Interlock" label above the top interlock; and the "Closed-Position Interlock" label below the bottom interlock.

(g) Remove the ½-inch bolt used to temporarily secure the handle in the closed position. Use the handle to open the switch. Do not use the handle again until so directed in Step 6 on page 14, after the switch alignment checks and adjustments have been completed.

STEP 4. Check for blade alignment as follows: Release the latch on the quick-make, quick-break mechanism. See Figure 3. Then, move the blades by hand, or by means of the operating handle, toward the **Closed** position. Advance the blades only to the point where they begin to enter the arc compressors.

Visually check each pole to make sure the blade enters the arc compressor "on center" within 1/32-inch (0.8 cm) and the blade tip clears the inside top surface of the arc compressor by a minimum of 1/8-inch (3 mm). See Figure 4.

STEP 5. If the blades do not meet the conditions described in Step 4, the probable cause is distortion of the switch frame. To correct this condition, advance the switch blades to the point just short of entry into the arc compressors and proceed as follows:

Top-Supported Frame Style: Grasp the switch frame at one of the lower corners. Apply pressure (forward and backward) to determine the direction of movement required to bring the blades into alignment with the arc compressors. Then, shim at one of the mounting bolt locations to achieve the direction and degree of "twist" necessary for alignment.

Back-Supported Frame Style: At one of the two adjustable brackets used to mount the switch, loosen the bolt that fastens the bracket to the switch frame (do not loosen the bolt that fastens the bracket to the mounting surface). Grasp the switch frame at the loosened corner. Apply sufficient pressure (forward and backward) to determine the direction of movement required to bring the blades into alignment. While maintaining this required pressure, retighten the adjustable-bracket bolt previously loosened.

STEP 6. Make sure the blades are returned to the fully **Open** position and the quick-make, quick-break mechanism is latched. The Mini-Rupter Switch now may be closed or opened by means of the manual operating handle.

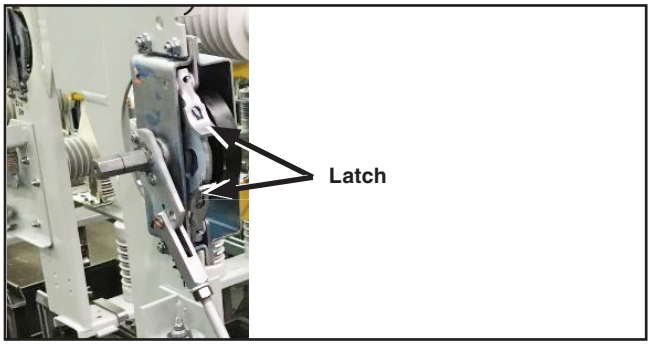

Figure 3. Quick-make, quick-break mechanism

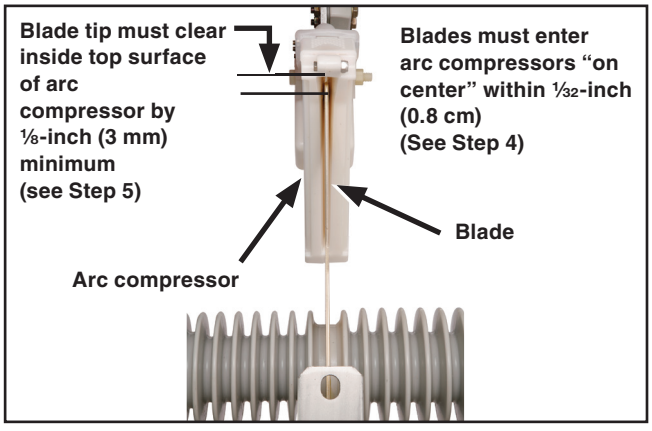

Figure 4. Blade-adjustment checkpoints.

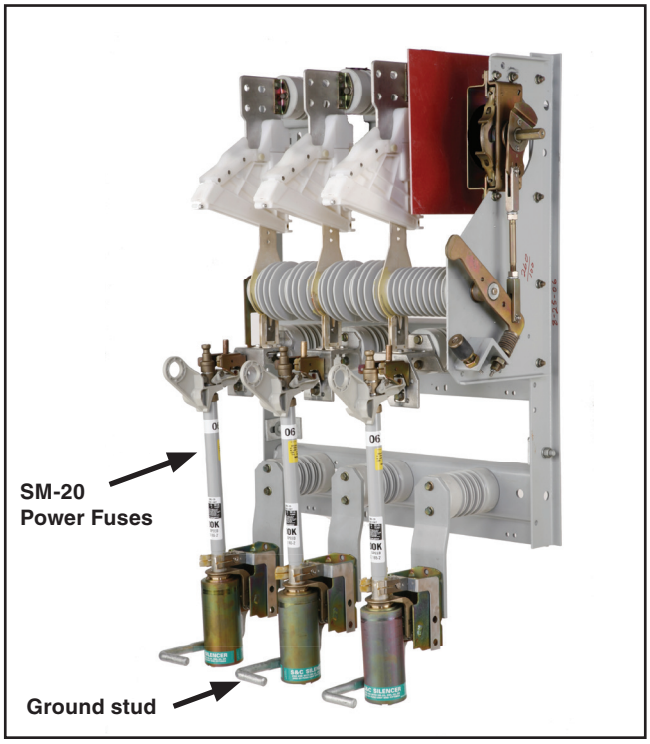

Figure 5. A Mini-Rupter Switch with Power Fuses, back-supported frame style.

STEP 7. If a Mini-Rupter Switch with Power Fuses is furnished, such as is the one illustrated in Figure 5, check each pole of the fuse live parts and make necessary adjustments as follows:

With Type SM-4Z or SM-5S Power Fuse: Insert a holder, complete with a silencer (Type SM-4Z Power Fuse) or snuffler (Type SM-5S Power Fuse) in the hinge. Make certain the cap of the holder's spring-and-cable assembly is tightened. Raise the holder toward the **Closed** position to check main-contact engagement. The holder must enter the contact on center, latch positively, and unlatch freely when opened with the pull-ring. If adjustment is required, loosen the bolts that fasten the hinge to the insulator. Reposition the hinge as required by tapping at its base. Then securely tighten the hinge bolts.

With Type SM-20 Power Fuse: Attach end fittings, complete with Silencer, to an SMU-20 Fuse Unit, following the instructions in the S&C instruction sheet which is included with each fuse unit. Insert the fuse assembly in the hinge. Check for main-contact engagement and make necessary adjustments using the same procedure described above for SM-4Z or SM-5S Power Fuses.

STEP 8. When making connections to the switch it is important that each connecting bus or cable connector be flat against the corresponding switch terminal pad, with the bolt holes in alignment. *Do not use the connecting bolts as a means of pulling the bus or cable into position.*

STEP 9. When all bus or cable connections are completed, install any insulating barriers required for the specific application, as indicated on the erection drawing. If full end-barriers are not used, make sure a side-barrier (side-barrier and mounting angle furnished by S&C) is installed, as was directed in Step 2 on page 10, to isolate the quick-make, quick-break mechanism from the adjacent outer-pole support insulator. Install interphase and end-barriers as follows:

Top-Supported Frame Style: With the bottom of each barrier positioned with a self-tapping fastener and an "L" bracket, bolt the barrier to the angle at the top of the frame. See Figure 1 on page 11.

Back-Supported Frame Style: Bolt the barriers to the angles at both top and bottom.

If barrier fasteners are used instead (as with S&C furnished barriers), install each barrier as follows:

(a) Refer to the erection drawing for specific barrier component locations. Note there are slots at one edge of each barrier leading into 1-inch (25-mm) diameter holes. (This same edge is also notched to conform to the switch mounting frame and to clear the rotating insulated shaft.) Slide each barrier onto the barrier fasteners so the dished part of each fastener disc seats into its corresponding 1-inch (25-mm) diameter barrier hole. Tighten each fastener bolt to pull the dished portion of the disc into the hole.

(b) To ensure proper barrier positioning, attach the insulated interbarrier stiffeners by interlocking their notches with matching notches in the barriers. The stiffener section, which has ⅜ x 1-inch (10 x 25 mm) slotted holes in it, should be attached to the barrier farthest from the quick-make, quick-break mechanism. Fasten this stiffener section to the enclosure side wall or other surface using the angle bracket furnished for this purpose.

(c) Plastic barrier retainers and nylon drive rivets are furnished for holding the stiffeners in place. Because the user may wish to temporarily remove the barriers to facilitate cable terminations, the drive rivets may be shipped loose, with instructions on how they are to be used.

Note: S&C Mechanical Cable Interlocks are offered for use in conjunction with Mini-Rupter Switches equipped with S&C Nonremovable Side Handles or Nonremovable Front Handles. They are not offered for use with Mini-Rupter Switches equipped with S&C Removable Side Handles. Two cable interlock models are offered: catalog number 5279, which does not include door-end interlock components (these components must be furnished by the user); and catalog number 5299, which is furnished complete with door-end interlock components. Follow the installation instructions in Step 10 on page 17 for catalog number 5279 or Step 11 on page 18 for catalog number 5299.

STEP 10. ***The instructions in this step are applicable only to the installation of the S&C Mechanical Cable Interlock, catalog number 5279:***

(a) For switches with the main contact at top, handle on right and the main contact at bottom, handle on left, assemble the switch locking lever and cable anchor bracket to the interlock mounting bracket as shown on S&C Drawing RD-3257, which is furnished with the interlock components. For switches with main contact at top, handle at left; and main contact at bottom, handle at right, assemble the switch locking lever and cable anchor bracket opposite-hand to that shown. Use the 2⅛-inch (54-mm) long stainless steel pin and a 3⁄32 x ¾-inch (2 x 19-mm) cotter pin to attach the switch locking lever. Use two each ¼-20 x ⅞-inch hex-head screws and Tensilock nuts to attach the cable anchor bracket. Then, attach the wire clamp to the switch locking lever using a 3⁄32 x ¾-inch (2 x 19-mm) cotter pin. Loosely attach the ¼-20 x ⅜-inch hex-head screw into the wire clamp.

(b) Remove two of the bolts that fasten the quick-make, quick-break mechanism to the switch frame (those farthest from the operating linkage). Discard the bolts but retain the ⅜-inch-16 Tensilock nuts. Use the holes to attach the interlock mounting plate as shown on the S&C Drawing RD-3257, using two each ⅜-16 x 2 ¼-inch hex-head stainless steel bolts and 11⁄16-inch thick spacers, and the ⅜-inch-16 Tensilock nuts previously removed. Refer also to the erection drawing to make sure the interlock mounting plate is oriented so the cable will be directed toward the front of the switch.

(c) Assemble on the switch operating shaft, in order, the following interlock components. Refer to S&C Drawing RD-3257.

S&C Nonremovable Front Handle:

- Spacer, ¾-inch hex ID, ⅜-inch (10 mm) thick
- Switch the locking cam positioned on the hex drive shaft so that, with the switch in the **Open** position, the straight portion of the indented side of the cam is 50 degrees from the horizontal, as indicated.

Note: For ease of opening or closing the switch, release the appropriate latch on the quick-make, quick-break mechanism. See Figure 3 on page 14.

- Assemble the balance of the operating-mechanism components associated with the Mini-Rupter Switch drive shaft, as directed in S&C Drawing RD-3256 furnished with the S&C Nonremovable Front Handle.

S&C Nonremovable Side Handle:

- Spacer, ¾-inch hex ID ⅜-inch (10-mm) thick
- Switch locking cam, positioned on the hex drive shaft so that, with the switch in the **Open** position, the straight portion of the indented side of the cam is 50 degrees from the horizontal, as indicated (For ease of opening or closing the switch, release the appropriate latch on the quick-make, quick-break mechanism. See Figure 3 on page 14.)
- Spacer, ¾-inch hex ID, ⅝-inch 16-mm thick (Pin the spacer to the shaft, using the 5⁄32-inch x 1⅛-inch stainless steel Spirol pin furnished.)
- Complete the operating handle installation, as directed in S&C Drawing RD-3255 furnished with the S&C Nonremovable Side Handle.

(d) After the switch is installed in its enclosure, train the control cable from the interlocking latching mechanism at the door (door fittings are not furnished) to the interlock mounting plate at the switch. Avoid sharp bends. Support the cable at appropriate points along its length with suitable clamps.

(e) Anchor the control cable at the switch end as follows:

- Cut control-cable sheath to required length, allowing sufficient inner wire to extend beyond the sheath.
- Strip from the sheath a ¾-inch (19-mm) length of the outer rubber shroud. See Detail A on S&C Drawing RD-3257.
- Slip the 13⁄4-inch (45-mm)-long threaded cable-housing sleeve, hex head first, over the cable sheath. Follow this with a 1⁄2-inch-20 hex nut, a lockwasher, and a flat washer. Pass the cable through the hole in the cable anchor bracket. Refer to the enlarged section view on RD-3257. Push the tapered end of the 5⁄16-inch OD stainless steel retaining plug between the shielding-wire strands and the inner sleeve of the cable sheath. Screw the compression nut onto the cable-housing sleeve and tighten firmly, to 35 foot-pounds.
- At the switch locking lever, insert the inner wire of the control cable through the hole in the wire clamp. Use the ¼-inch-20 x ⅜-inch hex-head screw to secure the locking lever in the position (as dimensioned on S&C Drawing RD-3257) that corresponds with the position of the inter-locking latching mechanism at the door. Refer to the notes included on the drawing regarding cable-travel and latching requirements.
- Check for satisfactory cable travel as illustrated on S&C Drawing RD-3257. After switch operation, door latching, and interlocking are also determined to be satisfactory, bend the ends of the inner wire against the holes of the wire clamps to prevent slippage during operation.

STEP 11. ***The instructions in this step are applicable only to the installation of the S&C Mechanical Cable Interlock, catalog number 5299***:

(a) For switches with main contact at top, handle on right, and main contact at bottom, handle on left, assemble the switch locking lever and cable anchor bracket to the interlock mounting plate as shown on S&C Drawing RD-3307, which is furnished with the interlock components. For switches with main contact at top, handle on left, and main contact at bottom, handle on right, assemble opposite-hand to that shown. Use the 2⅛- inch (54-mm) stainless steel pin and a 3⁄32 x ¾-inch cotter pin to attach the switch locking lever. Use two each ¼-inch-20 x ⅞-inch hex-head screws and Tensilock nuts to attach the cable anchor bracket. Then, attach the wire clamp to the switch locking lever using a 3⁄32-inch x ¾-inch cotter pin. Loosely attach the ¼-inch-20 x ⅜-inch hex-head screw into the wire clamp.

(b) Remove two of the bolts that fasten the quick-make, quick-break mechanism to the switch frame (those farthest from the operating linkage). Discard the bolts but retain the ⅜-inch-16 Tensilock nuts. Use the holes to attach the interlock mounting plate, as shown on S&C Drawing RD-3307, using two each ⅜-inch-16 x 2¼-inch hex-head stainless steel bolts and 11⁄16-inch (1-mm)-thick spacers, and the ⅜-inch-16 Tensilock nuts previously removed. Refer also to the erection drawing to make sure the interlock mounting plate is oriented such that the cable will be directed toward the front of the switch.

(c) Assemble on the switch operating shaft, in order, the following interlock components. Refer to S&C Drawing RD-3307.

S&C Nonremovable Front Handle*:*

- Spacer, ¾-inch hex ID, ⅜-inch (10-mm) thick.
- Switch locking cam, positioned on the hex drive shaft so that, with the switch in the **Open** position, the straight portion of the indented side of the cam is 50 degrees from the horizontal, as indicated.

Note: For ease of opening or closing the switch, release the appropriate latch on the quick-make, quick-break mechanism. See Figure 3 on page 14.

- Assemble the balance of the operating-mechanism components associated with the Mini-Rupter Switch drive shaft, as directed in S&C Drawing RD-3256 furnished with the S&C Nonremovable Front Handle.

***S&C Nonremovable Side Handle**:*

- Spacer, ¾-inch hex ID, ⅜-inch (10-mm) thick.
- Switch locking cam, positioned on the hex drive shaft so that, with the switch in the **Open** position, the straight portion of the indented side of the cam is 50 degrees from the horizontal, as indicated.

Note: For ease of opening or closing the switch, release the appropriate latch on the quick-make, quick-break mechanism. See Figure 3 on page 14.

- Spacer, ¾-inch hex ID, ⅝-inch (16 mm) thick. Pin the spacer to the shaft, using the 5⁄32-inch x 1 ⅛-inch stainless steel Spirol pin furnished.
- Complete the operating handle installation, as directed in S&C Drawing RD-3255 furnished with the S&C Nonremovable Side Handle.

(d) At the enclosure door and stile, install the door-end interlock components, positioned as shown on S&C Drawing RD-3307.

(e) After the switch is installed in its enclosure, train the control cable from the door-end interlock components to the interlock mounting plate at the switch. Avoid sharp bends. Support the cable at appropriate points along its length with suitable clamps.

(f) Anchor the control cable at each end as follows:

- Cut control-cable sheath to required length, allowing sufficient inner wire to extend beyond the sheath.
- Strip from the sheath a ¾-inch (19-mm) length of the outer rubber shroud. See Detail A on S&C Drawing RD-3307.
- Slip the 1¾-inch (44-mm)-long threaded cable-housing sleeve, hex head first, over the cable sheath. Follow this with a ½-inch-20 hex nut, a lockwasher, and a flat washer. Pass the cable through the hole in the cable anchor bracket. Refer to the enlarged section view on S&C Drawing RD-3307. Push the tapered end of the 5⁄16-inch OD stainless steel retaining plug between the shielding-wire strands and the inner sleeve of the cable sheath. Screw the compression nut onto the cable-housing sleeve and tighten firmly (to 35 foot-pounds).
- At the enclosure stile, insert the inner wire of the control cable into the wire clamp on the door interlock cam and tighten the ¼-20 x ½-inch hex-head screw into the wire clamp.
- At the switch locking lever, insert the inner wire of the control cable through the hole in the wire clamp. Do not tighten the ¼-20 x ⅜-inch hex-head screw at this time.
- With the door interlock cam in its fully down position (door locking lever disengaged), hold the switch locking lever in the position shown in Detail E of RD-3307 and, at the same time, move the switch operating handle in the closing direction to bring the switch locking cam against the switch locking lever. While maintaining the 5⁄16-inch dimension referenced in Detail E, securely tighten the ¼-20 x ⅜-inch set screw into the wire clamp on the switch locking lever.
- Check for satisfactory cable travel, as illustrated on S&C Drawing RD-3307. After determining switch operation, door latching, and interlocking are determined to be satisfactory, bend the ends of the inner wire against the holes of the wire clamps to prevent slippage during operation.