Field Assembly and Installation

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March 25, 2024

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 a Series 2000 Circuit-Switcher bypass accessory. Become familiar with the Safety Information on page 4 and Safety Precautions on page 5. The latest version of this publication is available online in PDF format at **sandc.com/en/contact-us/product-literature/**.

Retain this Instruction Sheet

This instruction sheet is a permanent part of the Series 2000 Circuit-Switcher bypass accessory. Designate a location where users 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 this circuit-switcher bypass accessory are listed on the nameplate on the front of the switch operator. Additional application information can be found in S&C Specification Bulletin 716-31.

Operating Considerations

Series 2000 Circuit-Switchers will perform as intended at temperatures within the range of -40°C (-40°F) to +40°C (104°F), or –35°C (-31°F) to +40°C (104°F) for 161-kV and 230-kV models, at altitudes of up to 5000 feet (1524 m) and at wind loadings of up to 90 miles per hour (145 kmph). Further, Series 2000 Circuit-Switchers, when installed with the recommended S&C anchor bolts and with flexible-conductor connections at all six terminal pads, are capable of withstanding seismic loading of 0.2 g ground acceleration in any direction as well as performing as intended during such loading and afterward. For applications at temperatures not within the specified range, at higher altitudes, at higher wind loadings, or where higher seismic withstand capabilities are required, refer to the nearest S&C Sales Office.

Special Warranty Provisions

The standard warranty contained in the seller's standard conditions of sale, as set forth in Price Sheet 150, applies to S&C Series 2000 Circuit-Switchers and associated options, except that the first paragraph of said warranty is replaced by the following: (1) General: The seller warrants to the purchaser for a period of five years from the date of shipment that the equipment delivered will be of the kind and quality specified in the contract description and will be free of defects of workmanship and material. Should any failure to conform to this warranty appear under proper and normal use within five years after the date of shipment, the seller agrees, upon prompt notification thereof and confirmation that the equipment has been stored, installed, operated, inspected, and maintained in accordance with recommendations of the seller and standard industry practice, to correct the nonconformity either by repairing any damaged or defective parts of the equipment or (at the seller's option) by shipment of necessary replacement parts. Replacement parts provided by the seller under the warranty for the original equipment will be covered by the original-equipment warranty for its duration. Replacement parts purchased separately will be covered by the warranty contained in the seller's standard conditions of sale, as set forth in Price Sheet 150.

Warranty Qualifications

Warranty of the Series 2000 Circuit-Switcher bypass accessory is contingent upon both of the following:

- Installation and adjustment of Series 2000 Circuit-Switchers in accordance with S&C's applicable instruction sheets
- Conformance with the inspection recommendations defined in S&C Instruction Sheet 716-590

Understanding Safety-Alert Messages

Several types of safety-alert messages may appear throughout this instruction sheet and on labels and tags attached to the product. Become familiar 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 any portion of this instruction sheet is unclear and assistance is needed, contact the 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 the Series 2000 Circuit-Switcher bypass accessory.

Replacement Instructions and Labels

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

⚠ DANGER

Series 2000 Circuit-Switchers 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 your company's operating procedures and rules. Where a discrepancy exists, follow your company's operating procedures and rules.

1. **QUALIFIED PERSONS.** Access to substation switching equipment 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 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. **CIRCUIT-SWITCHER POSITION.** Always confirm the circuit-switcher **Open/Close** position by visually observing the position of the switch position indicator located on the high-speed base. Switches may be energized from either side.
7. **MAINTAINING PROPER CLEARANCE.** Always maintain proper clearance from energized components.
8. **OPERATION.** Circuit-making and circuit-breaking are involved in the normal operation of this interrupter switch. To operate, follow the operating procedure as outlined in your model's instruction sheet.
9. **BYPASS ACCESSORY.** If the circuit is energized, a Series 2000 Circuit-Switcher must be closed before operating the bypass accessory to either the **Open** or **Closed** position.

Installation and Alignment of Bypass Accessory on Model 2010

These instructions are for field-assembly and installation of the bypass accessory for Model 2010 Series 2000 Circuit-Switchers in ratings of 69 kV through 230 kV. This accessory permits the interrupters and disconnect on the circuit-switcher to be opened and closed for inspection of the circuit-switcher and checkout of relaying equipment without opening the high-voltage circuit. See Figure 1.

The bypass accessory consists of a set of three single-pole, stick-operated devices rated 1200 amperes continuous, 61,000 amperes momentary. When furnished as original equipment with the circuit-switcher, inclusion of the accessory is designated by the addition of the suffix "-F" to the circuit-switcher catalog number.

Install the bypass accessory only after the circuit-switcher has been completely installed. See S&C Instruction Sheet 716-501 for installation instructions for 2010 models and S&C Instruction Sheet 716-502 for installation instructions for 2040 models.

⚠ WARNING

If the circuit is energized, a Series 2000 Circuit-Switcher must be closed before operating the bypass accessory to either the **Open** or **Closed** position. If the bypass accessory is opened or closed while the circuit-switcher is in the **Open** position, personal injury and property damage can result.

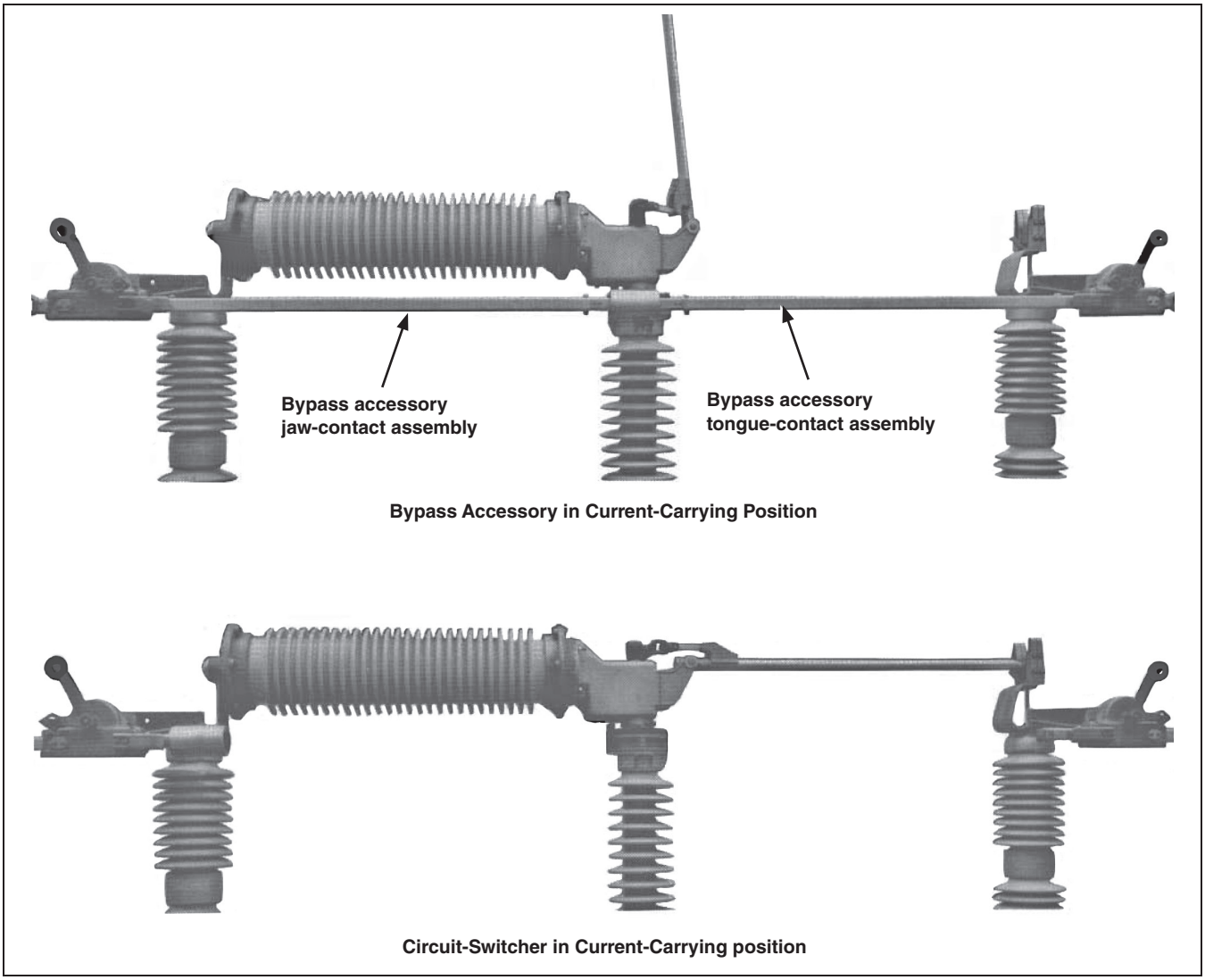

Figure 1. A bypass accessory installed on one pole-unit of a Model 2010 Series 2000 Circuit-Switcher rated 138 kV. The bypass accessory for Model 2040 is similar but the tongue-contact assembly does not traverse; the tongue contact is directly connected to the transition-box-end terminal pad.

⚠ DANGER

Before installing the bypass accessory, conductors must be de-energized and grounded at all six terminals in accordance with standard system operating practice. **Failure to do so will result in serious injury or death.**

STEP 1. The S&C Bypass Accessory, when furnished as original equipment with a Series 2000 Circuit-Switcher, is already installed and adjusted at the factory and, under normal circumstances, readjustment should not be necessary.

If a bypass accessory is to be added to an existing Model 2010 Series 2000 Circuit-Switcher and/or if adjustment is required, complete the following steps:

STEP 2. Place the circuit-switcher disconnect in the fully **Closed** position.

Before installing the bypass accessory, thoroughly wire-brush the aluminum mating surfaces. Immediately coat these surfaces, as well as the mounting-bolt threads, with Penetrox® A or other suitable aluminum connector compound.

Then, for each pole-unit, install the bypass accessory as follows:

For circuit-switchers rated 69 kV:

(a) Remove and discard the three existing ½–13×1¼-inch hex-head galvanized steel cap screws and flat washers indicated in Detail A in Figure 2 on page 8 used to attach the circuit-switcher interrupter-end terminal pad to its insulator. Remove only the three cap screws indicated; do not loosen the fourth cap screw at the interrupter-end terminal pad.

(b) Attach the bypass accessory jaw-contact assembly mounting angle to the circuit-switcher interrupter end terminal pad using three ½–13x1½-inch hex-head galvanized steel cap screws and flat washers furnished. Securely tighten the cap screws.

(c) Similarly, remove and discard the three existing ½–13×1¼-inch hex-head galvanized steel cap screws and flat washers used to attach the circuit-switcher jaw-contact terminal pad to its insulator. Remove only the three cap screws indicated; do not loosen the fourth cap screw at the jaw-contact terminal pad.

(d) Attach the bypass accessory tongue-contact assembly mounting angle to the circuit-switcher jaw-contact terminal pad using three ½–13×1½-inch hex-head galvanized steel cap screws and flat washers furnished. Securely tighten the cap screws.

For circuit-switchers rated 115 kV and 138 kV:

(a) Remove and discard the two existing ⅝–11×1¼-inch hex-head galvanized steel cap screws and flat washers indicated in Detail A in Figure 2 that are used to attach the circuit-switcher interrupter-end terminal pad to its insulator. Remove only the two cap screws indicated; do not loosen the other two cap screws at the interrupter-end terminal pad.

(b) Attach the bypass accessory jaw-contact assembly mounting angle to the circuit-switcher interrupter end terminal pad using two ⅝–11×1½-inch hex-head galvanized steel cap screws and flat washers furnished. Securely tighten the cap screws.

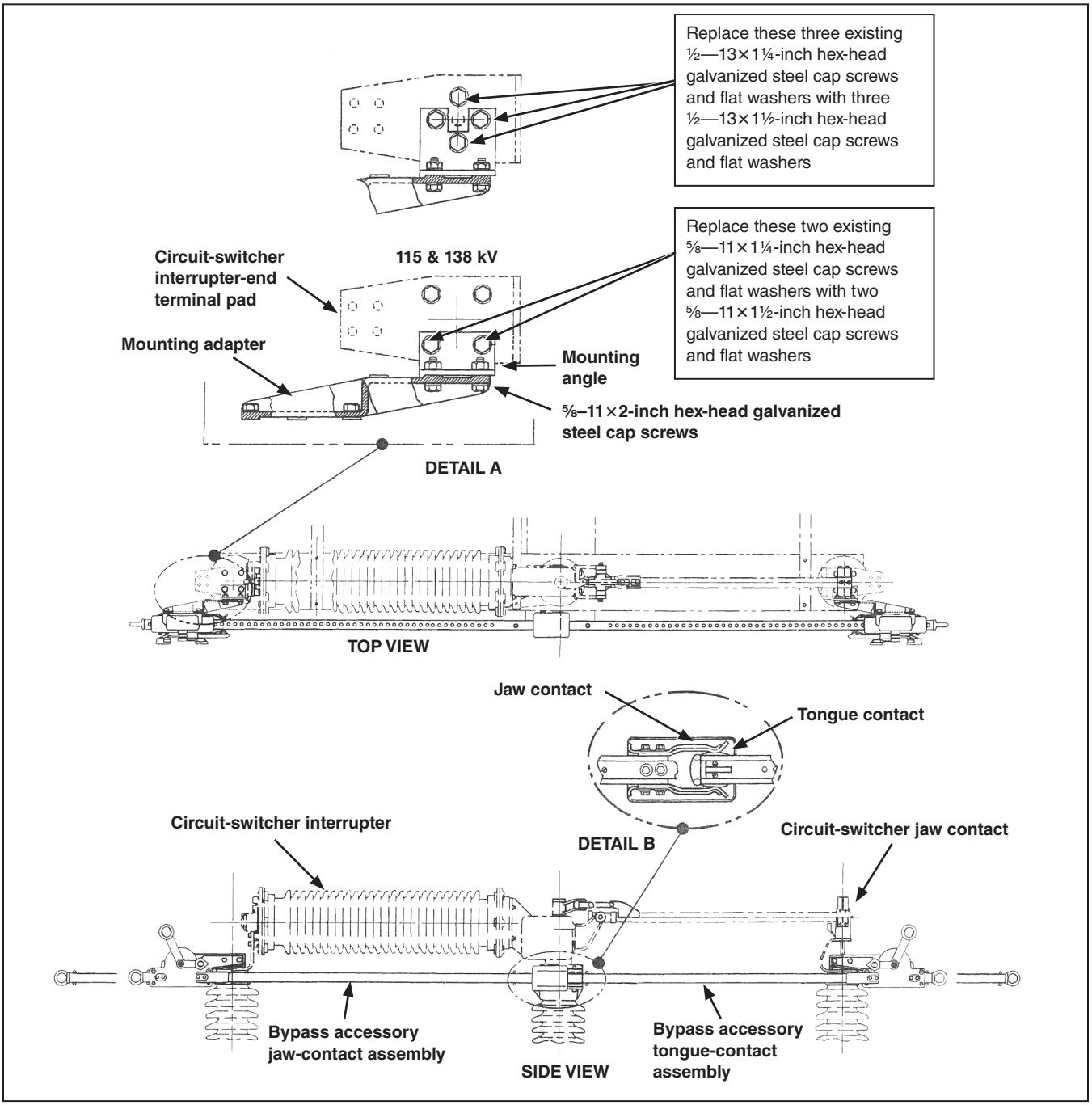

Figure 2. A bypass accessory installed on one pole-unit of a Model 2010 Series 2000 Circuit-Switcher rated 138 kV. The bypass accessory for Model 2040 is similar but the tongue-contact assembly does not traverse; the tongue contact is directly connected to the transition-box-end terminal pad.

(c) Similarly, remove and discard the two existing ⅝–11×1¼-inch hex-head galvanized steel cap screws and flat washers used to attach the circuit-switcher jaw-contact terminal pad to its insulator. Remove only the two cap screws indicated; do not loosen the other two cap screws at the jaw contact terminal pad.

(d) Attach the bypass accessory tongue-contact assembly mounting angle to the circuit-switcher jaw-contact terminal pad using two ⅝–11×1½-inch hex-head galvanized steel cap screws and flat washers furnished. Securely tighten the cap screws.

For circuit-switchers rated 161 kV and 230 kV:

(a) Remove and discard the two existing ⅝–11×1¼-inch hex-head galvanized steel cap screws and flat washers indicated in Detail A in Figure 3 used to attach the circuit-switcher jaw-contact terminal pad to its insulator. Remove only the two cap screws indicated; do not loosen the other two cap screws at the jaw-contact terminal pad.

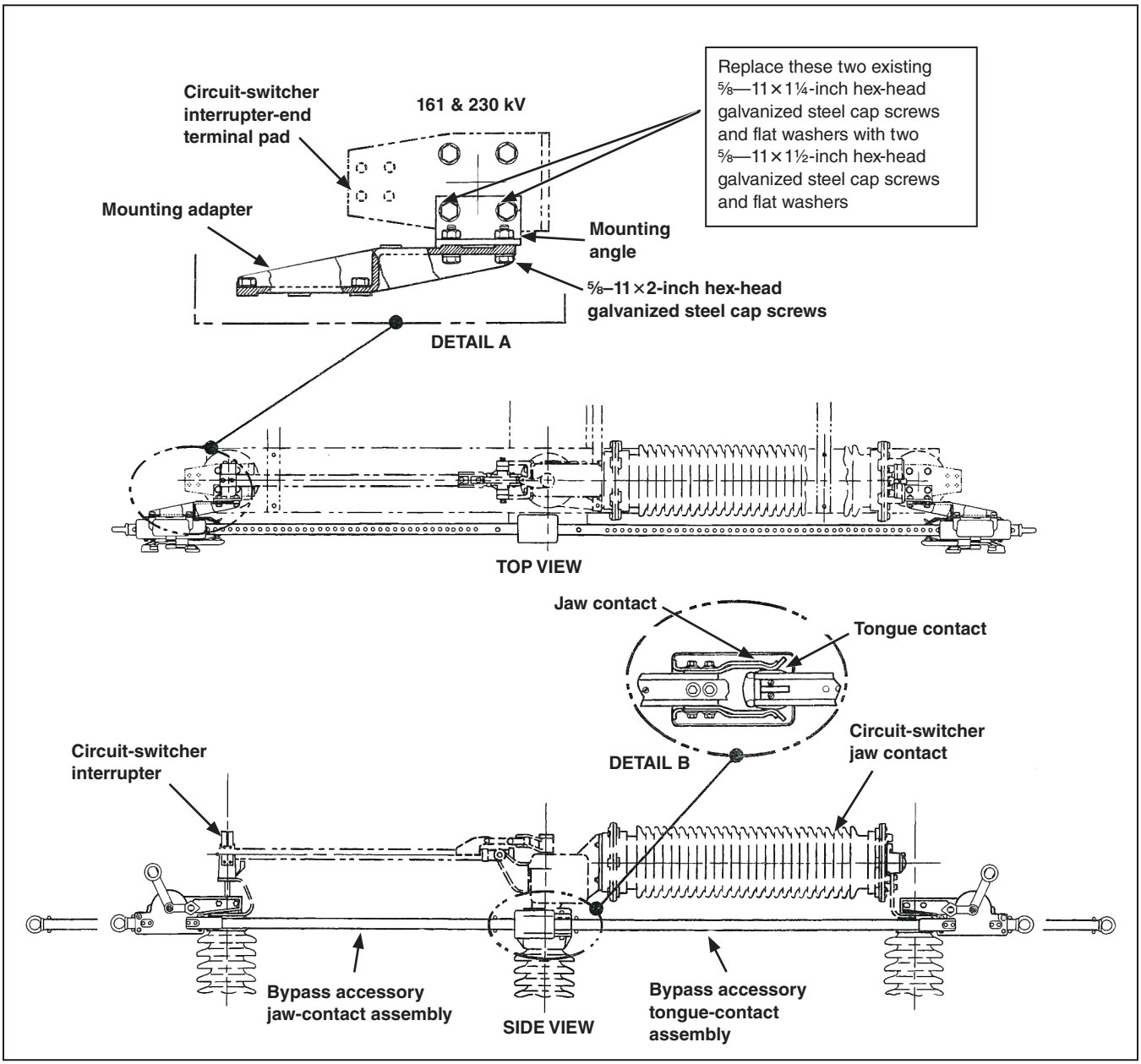

Figure 3. Installing a bypass accessory on a pole-unit of a Model 2010 Series 2000 Circuit-Switcher rated 161 kV or 230 kV.

(b) Attach the bypass accessory jaw-contact assembly mounting angle to the circuit-switcher jaw-contact terminal pad using two ⅝–11×1½-inch hex-head galvanized steel cap screws and flat washers furnished. Securely tighten the cap screws.

(c) Similarly, remove and discard the two existing ⅝–11×1¼-inch hex-head galvanized steel cap screws and flat washers used to attach the circuit-switcher interrupter-end terminal pad to its insulator. Remove only the two cap screws indicated; do not loosen the other two cap screws at the interrupter-end terminal pad.

(d) Attach the bypass accessory tongue-contact assembly mounting angle to the circuit-switcher interrupter-end terminal pad using two ⅝–11×1½-inch hex-head galvanized steel cap screws and flat washers furnished. Securely tighten the cap screws.

STEP 3. Refer to the instructions for bypass-accessory operation in the "Operation" section on pages 15 through 17. Move the blades toward their **Closed** positions to check blade-contact entry. The blades should be in line in both the horizontal and vertical planes, and the tongue contact assembly should enter the contact fingers of the jaw-contact assembly smoothly and on-center as shown in Detail B in Figure 2 on page 8 or in Detail B in Figure 3 on page 9, as appropriate. If readjustment is necessary, sight along the blades to determine whether repositioning of the jaw-contact assembly and/or the tongue-contact assembly is required. Make the adjustments directed in Step 4. (Any minor horizontal misalignment is somewhat simpler to correct at the tongue-contact assembly end.) Do not use shims to attain alignment.

STEP 4. To reposition the bypass accessory tongue-contact assembly:

(a) ***For upward or downward adjustments:*** Loosen the two ⅝–11×2-inch hex-head galvanized steel cap screws that fasten the tongue-contact assembly mounting adapter to its mounting angle. Shift the assembly upward or downward as required and securely retighten the cap screws.

(b) ***For horizontal adjustments:*** Loosen the three ½–13×1½-inch hex -head galvanized steel cap screws (for circuit-switchers rated 69 kV) or the two ⅝–11×1½-inch hex-head galvanized steel cap screws (for circuit-switchers rated 115 kV through 230 kV) fastening the tongue-contact assembly mounting angle to the circuit-switcher terminal pad. Swivel the assembly as required and securely retighten the cap screws.

Should increased contact engagement be required, loosen the two ⅝–11×2-inch hex-head galvanized steel cap screws fastening the tongue contact assembly mounting adapter to its mounting angle. Slide the assembly inward as required, toward the jaw-contact assembly, and securely tighten the cap screws.

To reposition the bypass accessory jaw-contact assembly:

(c) ***For upward or downward adjustments:*** Loosen the two ⅝–11×2-inch hex-head galvanized steel cap screws fastening the jaw-contact assembly mounting adapter to its mounting angle. Shift the assembly upward or downward as required and securely retighten the cap screws.

(d) ***For horizontal adjustments:*** Loosen the three ½–13×1½-inch hex-head galvanized steel cap screws (for circuit-switchers rated 69 kV) or the two ⅝–11×1½-inch hex-head galvanized steel cap screws (for circuit-switchers rated 115 kV through 230 kV) fastening the jaw-contact assembly mounting angle to the circuit-switcher terminal pad. Swivel the assembly as required and securely retighten the cap screws.

Should increased contact engagement be required, loosen the two ⅝–11×2-inch hex-head galvanized steel cap screws fastening the jaw-contact assembly mounting adapter to its mounting angle. Slide the assembly inward as required, toward the tongue-contact assembly, and securely tighten the cap screws.

⚠ DANGER

Conductors must be de-energized and grounded at all six terminals in accordance with standard system operating practice **Failure to do so will result in serious injury or death.**

The S&C Bypass Accessory, when furnished as original equipment with a Series 2000 Circuit-Switcher, is already installed and adjusted at the factory and, under normal circumstances, readjustment should not be necessary.

If a bypass accessory is to be added to an existing Model 2040 Series 2000 Circuit-Switcher, and/or if adjustment is required, complete the following steps:

STEP 1. Before installing the bypass accessory, thoroughly wire-brush the aluminum mating surfaces. Immediately coat these surfaces, as well as the mounting-bolt threads, with Penetrox A. Then, for each pole-unit, install the bypass accessory as follows:

For circuit-switchers rated 69 kV:

(a) Remove and discard the three existing ½–13×1¼-inch hex-head galvanized steel cap screws and flat washers indicated in Detail A in Figure 4 on page 12 (for a circuit-switchers with 48-inch [122-cm] phase spacing) or in Detail A in Figure 5 on page 13 (for a circuit-switchers with 84-inch [213-mm] phase spacing) used to attach the circuit-switcher interrupter-end terminal pad to its insulator. Remove only the three cap screws indicated; do not loosen the fourth cap screw at the interrupter-end terminal pad.

(b) Attach the bypass accessory jaw-contact assembly mounting angle to the circuit-switcher interrupter end terminal pad using three ½–13×1½-inch hex-head galvanized steel cap screws and flat washers furnished. Securely tighten the cap screws.

(c) Attach the bypass accessory tongue-contact support to the circuit-switcher transition-box-end terminal pad as indicated in Detail B in Figure 4 on page 12 (for circuit-switchers with 48-inch [122-cm] phase spacing) or in Detail B in Figure 5 on page 13 (for circuit-switchers with 84-inch [213-mm] phase spacing) using two ⅝–11×1¾-inch hex-head galvanized steel cap screws, flat washers, and self-locking hex nuts furnished. Securely tighten the cap screws.

For circuit-switchers rated 115 kV and 138 kV:

(a) Remove and discard the two existing ⅝–11×1¼-inch hex-head galvanized steel cap screws and flat washers indicated in Detail A in Figure 5 on page 13 used to attach the circuit-switcher interrupter-end terminal pad to its insulator. Remove only the two cap screws indicated; do not loosen the other two cap screws at the interrupter-end terminal pad.

(b) Attach the bypass accessory jaw-contact assembly mounting angle to the circuit-switcher interrupter-end terminal pad using two ⅝–11×1½-inch hex-head galvanized steel cap screws and flat washers furnished. Securely tighten the cap screws.

(c) Attach the bypass accessory tongue-contact support to the circuit-switcher transition-box-end terminal pad as indicated in Detail B in Figure 5 on page 13 using two ⅝–11×1¾-inch hex-head galvanized steel cap screws, flat washers, and self-locking hex nuts furnished. Securely tighten the cap screws.

For circuit-switchers rated 161 kV and 230 kV:

(a) Remove and discard the two existing ⅝–11×1¼-inch hex-head galvanized steel cap screws and flat washers indicated in Detail A in Figure 4 on page 12 used to attach the circuit-switcher interrupter-end terminal pad to its insulator. Remove only the two cap screws indicated; do not loosen the other two cap screws at the interrupter-end terminal pad.

(b) Attach the bypass accessory jaw-contact assembly mounting angle to the circuit-switcher interrupter-end terminal pad using two ⅝–11×1½-inch hex-head galvanized steel cap screws and flat washers furnished. Securely tighten the cap screws.

(c) Attach the bypass accessory tongue-contact support to the circuit-switcher transition-box-end terminal pad as indicated in Detail B in Figure 4 using two $\frac{5}{8}$–11×1¾-inch hex-head galvanized steel cap screws, flat washers, and self-locking hex nuts furnished. Securely tighten the cap screws.

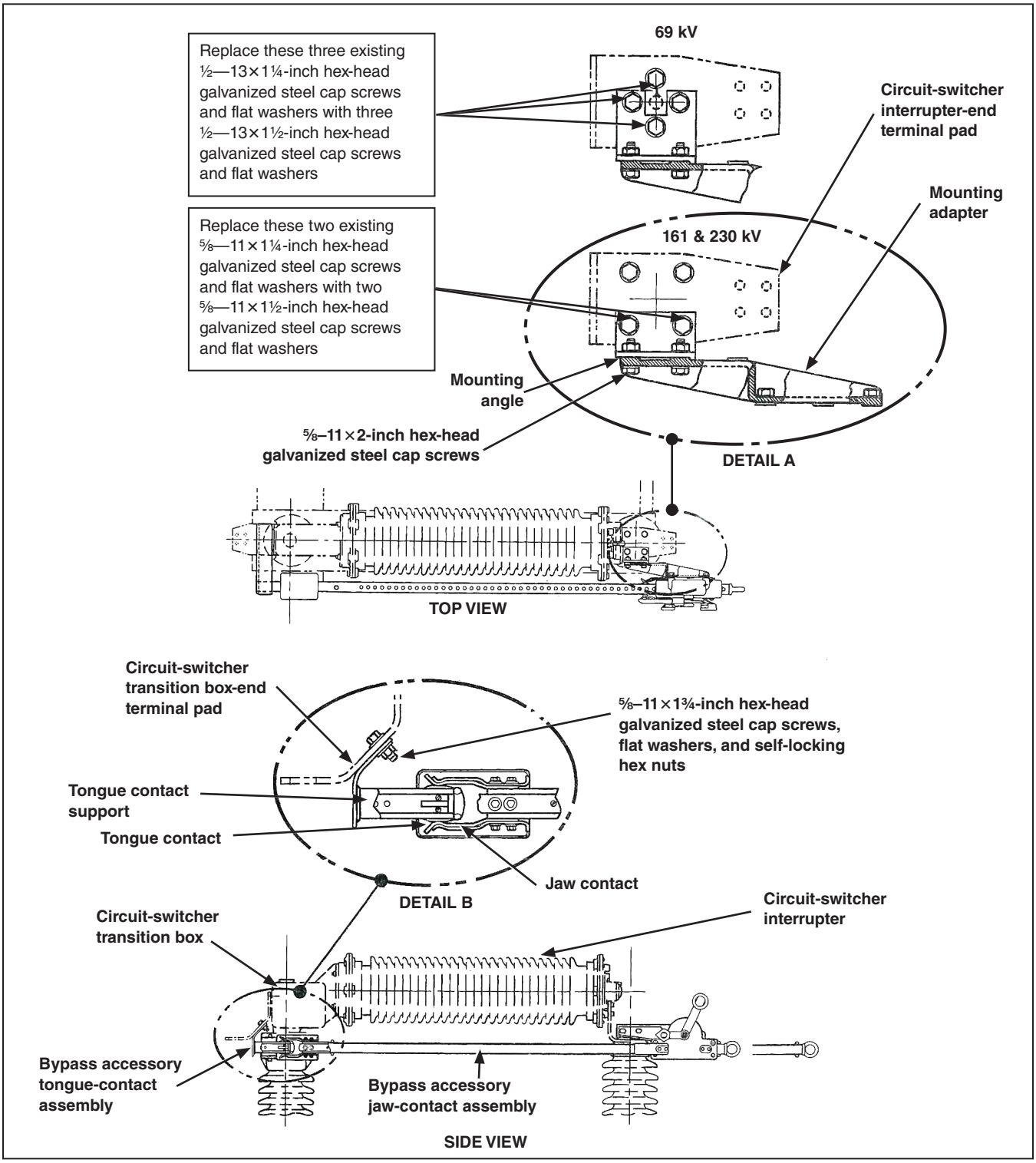

Figure 4. Installing a bypass accessory on a pole-unit of a Model 2040 Series 2000 Circuit-Switcher rated 69 kV (with 48-inch [122-cm] phase spacing), 161 kV, or 230 kV.

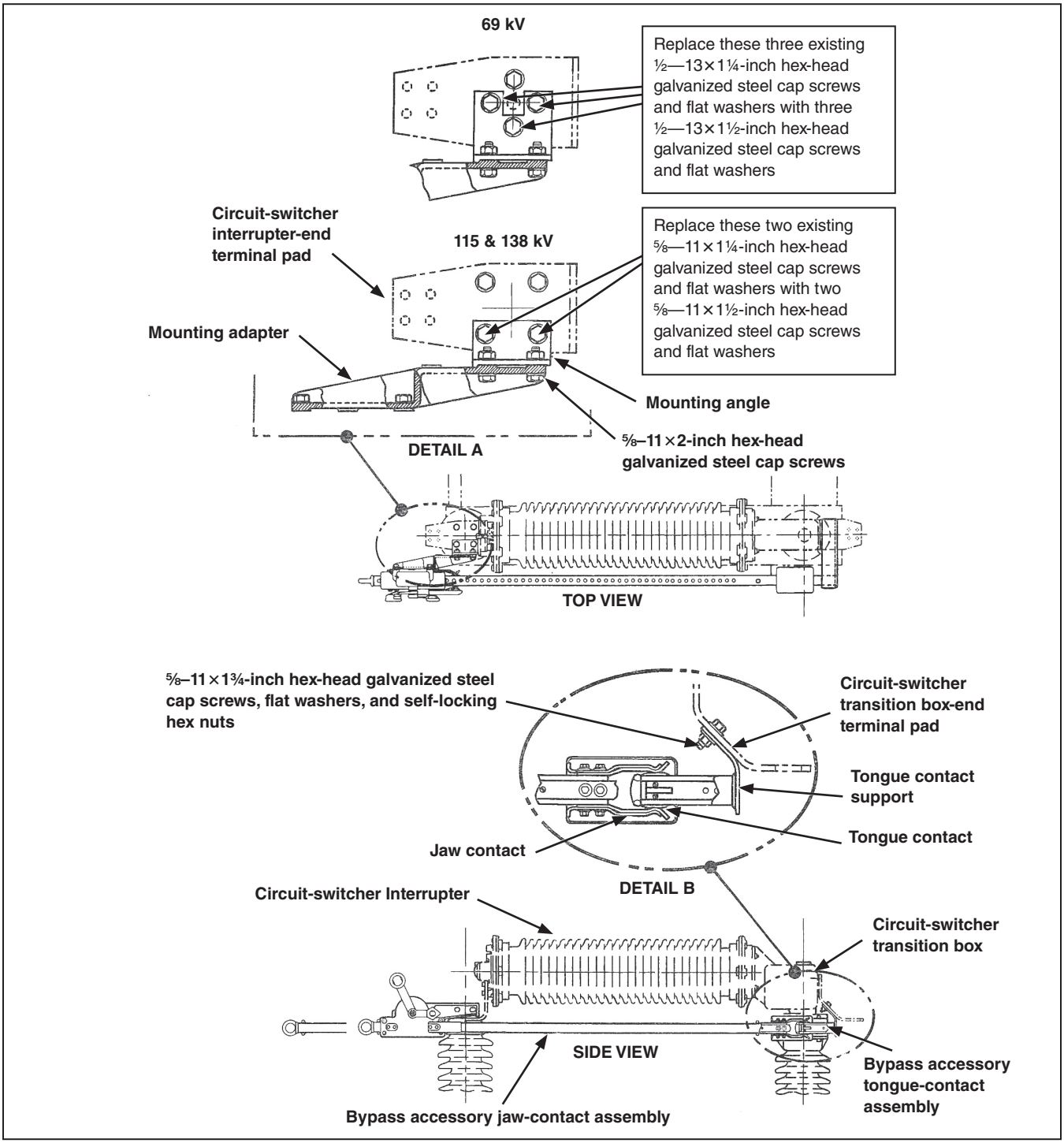

Figure 5. Installing a bypass accessory on a pole-unit of a Model 2040 Series 2000 Circuit-Switcher rated 69 kV (with 84-inch [213-mm] phase spacing), 115 kV, or 138 kV.

STEP 2. Refer to the instructions for bypass-accessory operation in the "Operation" section on pages 15 through 17. Move the jaw-contact assembly blade toward its **Closed** position to check blade-contact entry. The contact fingers of the jaw-contact assembly should enter the tongue-contact assembly smoothly and on-center as shown in Detail B in Figure 4 on page 12 or in Detail B in Figure 5 on page 13, as appropriate.

If readjustment is necessary, sight along the blade to determine whether repositioning of the jaw-contact assembly and/or the tongue-contact assembly is required. Make the adjustment as directed in Step 3. Do not use shims to attain alignment.

STEP 3. ***To reposition the bypass accessory tongue-contact assembly:*** Loosen the two ⅝–11×1¾-inch hex-head galvanized steel cap screws fastening the tongue contact support to the circuit-switcher transition-box end terminal pad. Shift the assembly upward or downward, or left or right, as required. Then, securely retighten the cap screws.

To reposition the bypass accessory jaw-contact assembly:

(a) ***For upward or downward adjustments:*** Loosen the two ⅝–11×2-inch hex-head galvanized steel cap screws fastening the jaw-contact assembly mounting adapter to its mounting angle. Shift the assembly upward or downward as required and securely retighten the cap screws.

(b) ***For horizontal adjustments****:* Loosen the three ½–3×1½-inch hex-head galvanized steel cap screws (for circuit-switchers rated 69 kV) or the two ⅝–11×1½-inch hex-head galvanized steel cap screws (for circuit-switchers rated 115 kV through 230 kV) fastening the jaw-contact assembly mounting angle to the circuit-switcher terminal pad. Swivel the assembly as required and securely retighten the cap screws.

Should increased contact engagement be required, loosen the two ⅝–11×2-inch hex-head galvanized steel cap screws fastening the jaw-contact assembly mounting adapter to its mounting angle. Slide the assembly inward as required, toward the tongue-contact assembly, and securely tighten the cap screws.

⚠ WARNING

If the circuit is energized, a Series 2000 Circuit Switcher must be closed before operating the bypass accessory to either the **Open** or **Closed** position. If the bypass accessory is opened or closed while the circuit-switcher is in the **Open** position, personal injury and property damage may result.

A stick-operated ratchet mechanism controls the opening and closing movements of each bypass blade. See Figure 6. The direction of movement is determined by the position of the arrow-shaped direction-control arm, which can be rotated through 180 degrees.

The arm points in the direction the blade will travel when the ratchet-mechanism operating lever is moved up and down. The blade(s) on each pole-unit are operated individually. When fully open or fully closed, each blade will remain locked in position until its associated direction-control arm position is reversed.

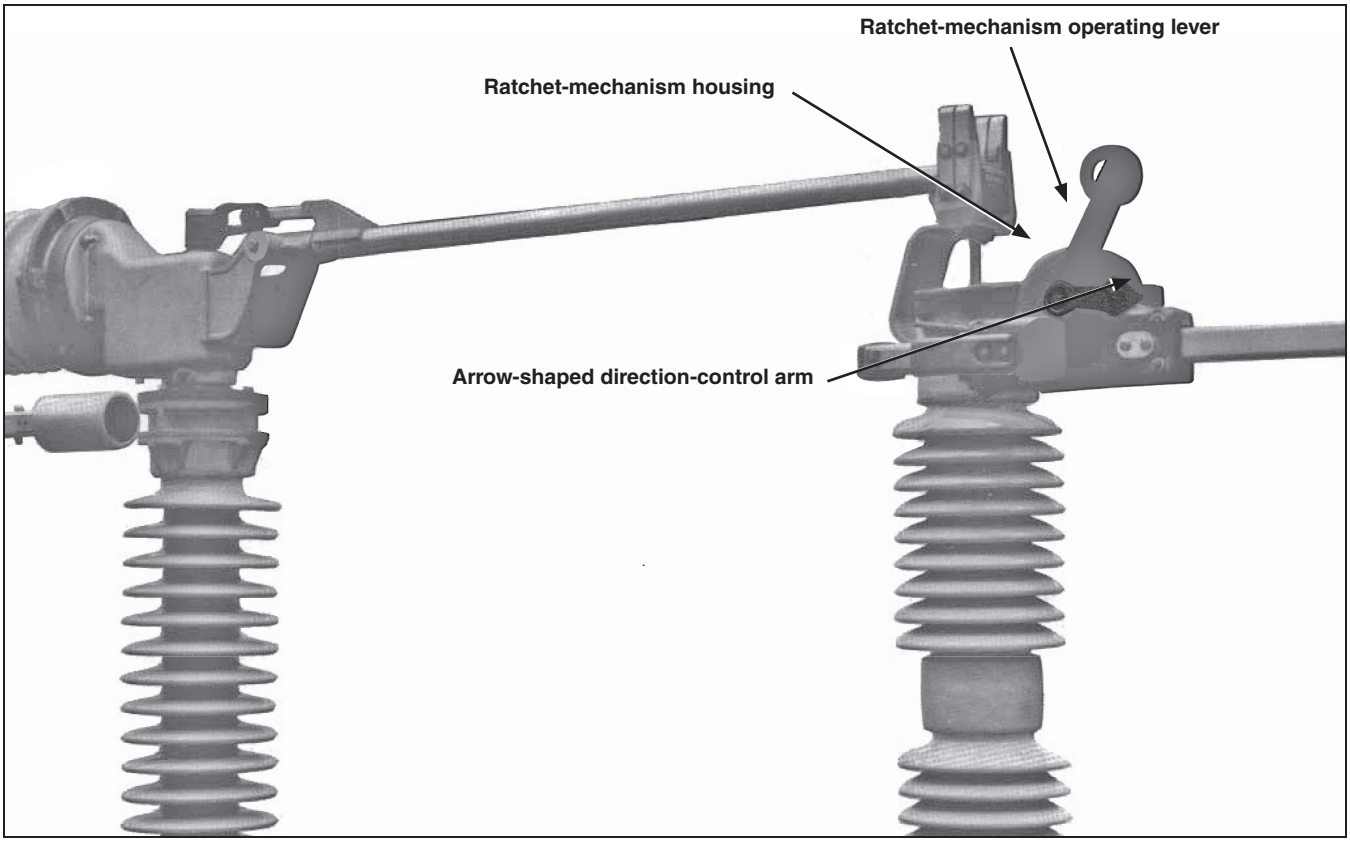

Figure 6. Close-up showing a jaw-contact blade of a bypass accessory (at left) fully closed and a tongue-contact blade (at right) fully open on a Model 2010 Series 2000 Circuit-Switcher. The tongue contact does not traverse on the Model 2040 Series 2000 Circuit-Switcher.

To operate, use a hookstick to position the direction control arm so its arrow points in the desired direction of travel. See Figure 7. Use the ratchet-mechanism operating lever as shown in Figure 8 to move the blade to its fully **Open** or fully **Closed** position, with the blade stop-pin bearing against the mechanism housing as shown in Figure 10 on page 17.

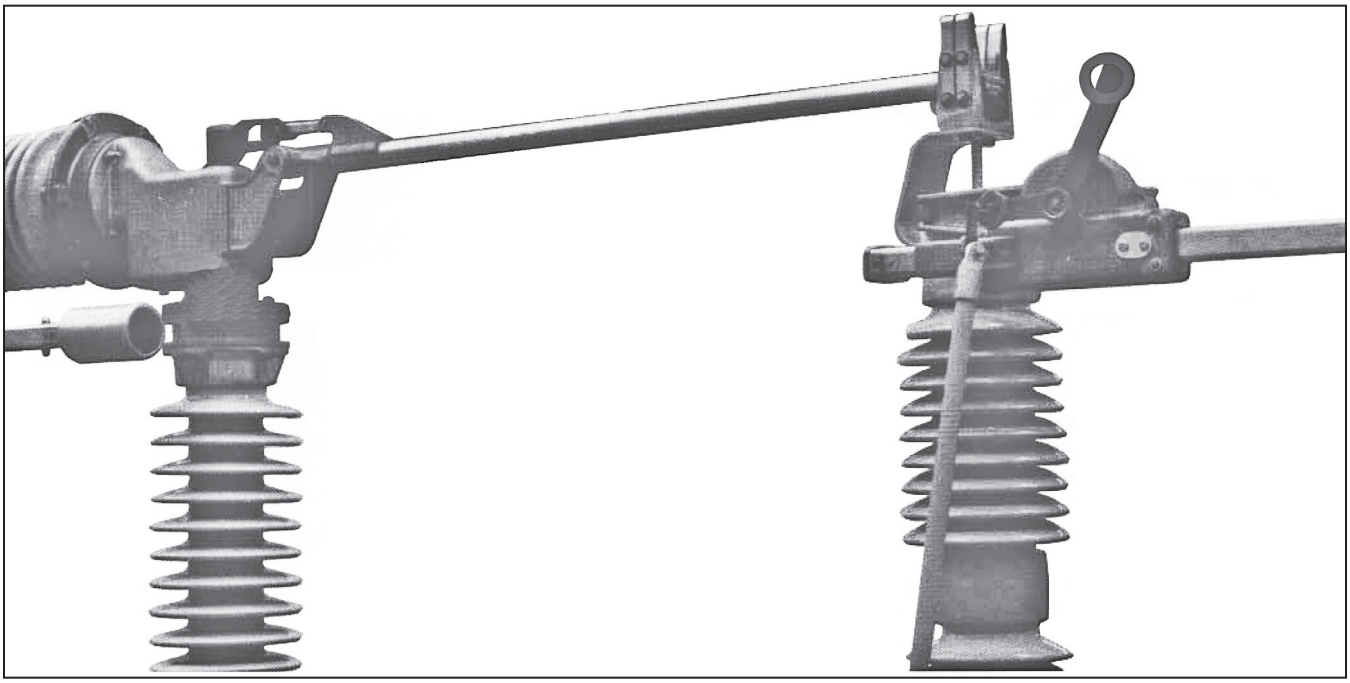

Figure 7. Placing the arrow-shaped direction-control arm in position for closing the tongue-contact blade of the bypass accessory.

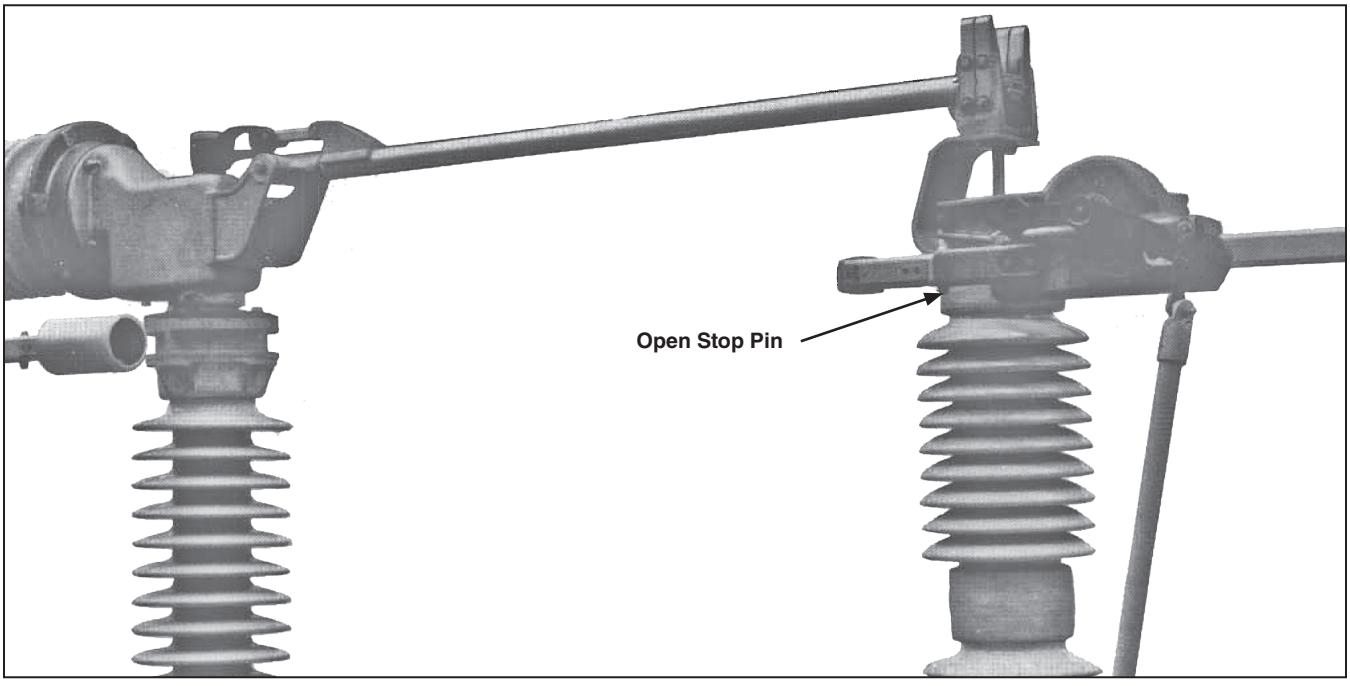

Figure 8. Using the ratchet-mechanism operating lever to close the bypass blade.

For a quick traverse, each blade can be moved freely (in the direction determined by the position of the direction-control arm) by applying force on the pull-ring at the end of the blade. See Figure 9. The ratchet-mechanism operating lever is required to initiate opening and closing operations, however, and should be used to complete contact engagement during a closing operation as well as to ensure positive-stop positioning in each direction. See Figure 10.

After the blades have been moved to the desired fully **Open** or fully **Closed** position, make sure the arrow of each direction-control arm remains pointed in the corresponding direction to ensure positive locking of the blades. Do not reverse the direction-control arms until ready to move the blades to their alternate position.

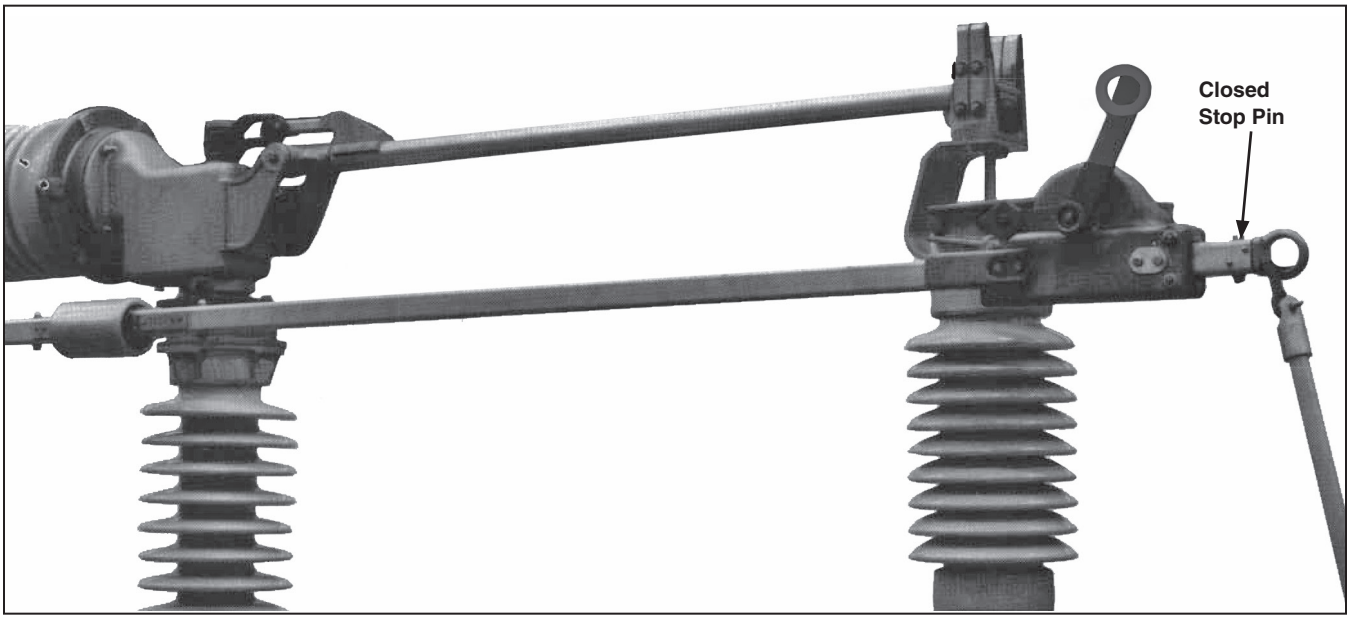

Figure 9. Using the blade pull-ring for a quick-traverse closing operation. Note: The closed stop-pin is not against the mechanism housing, indicating use of the ratchet-mechanism operating lever is necessary to complete the contact engagement.

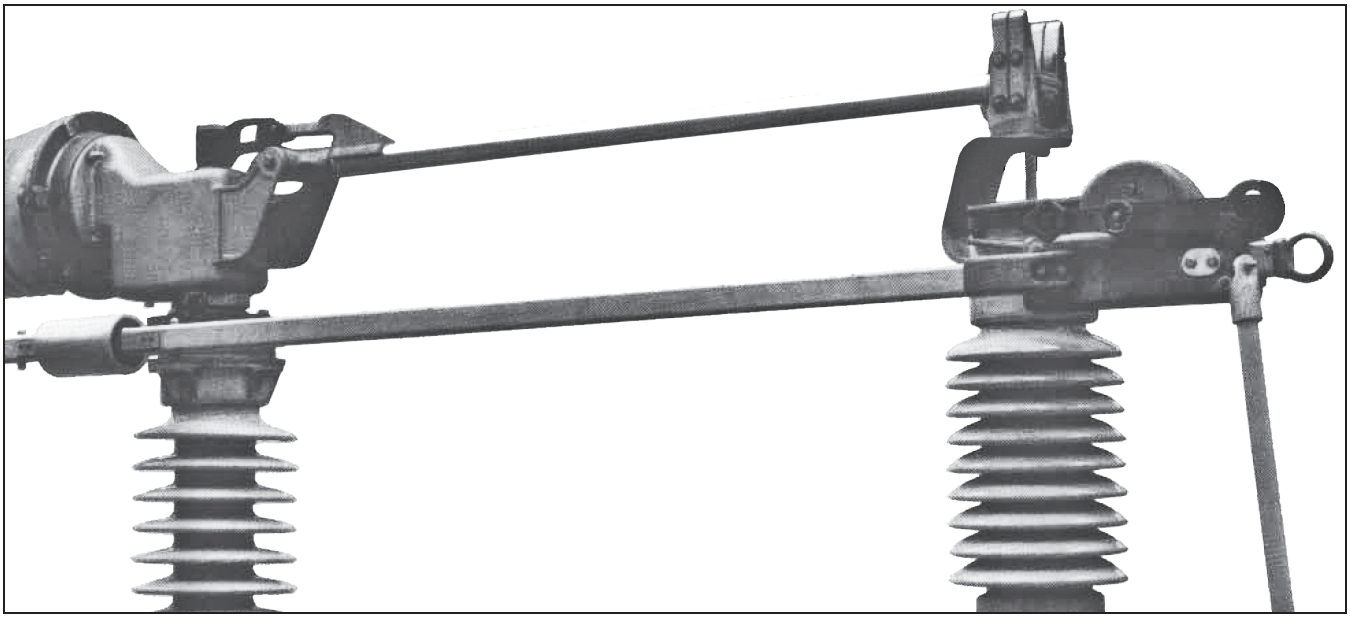

Figure 10. Using the ratchet-mechanism operating lever to complete the contact engagement.

Inspection Schedule and Procedures

To ensure continued proper performance of the bypass accessory, it should be inspected in accordance with S&C's recommended schedule and procedures contained in S&C Instruction Sheet 716-590.