

Operation

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★ For use with the Mark V Circuit-Switcher



Introduction

Qualified Persons

WARNING

Only qualified persons who are knowledgeable in the installation, operation, and maintenance of overhead and underground electric distribution and transmission 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 the Type CS-1A Switch Operator. Become familiar with the Safety Information and Safety Precautions on pages 3 through 5. The latest version of this publication is available online in PDF format at <https://www.sandc.com/en/contact-us/product-literature/>.

Retain this Instruction Sheet

This instruction sheet is a permanent part of the Type CS-1A Switch Operator. 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 power operation of the S&C Mark V Circuit-Switcher. The application must be within the ratings furnished for the equipment. Ratings and application information for the Type CS-1A Switch Operator are listed in the ratings table in Specification Bulletin 719-31. 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).

Safety Information

Understanding Safety-Alert Messages

Several types of safety-alert messages may appear throughout this instruction sheet and on labels and tags attached to the Type CS-1A Switch Operator. Become familiar with these types of messages and the importance of these 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 operating the Type CS-1A Switch Operator.

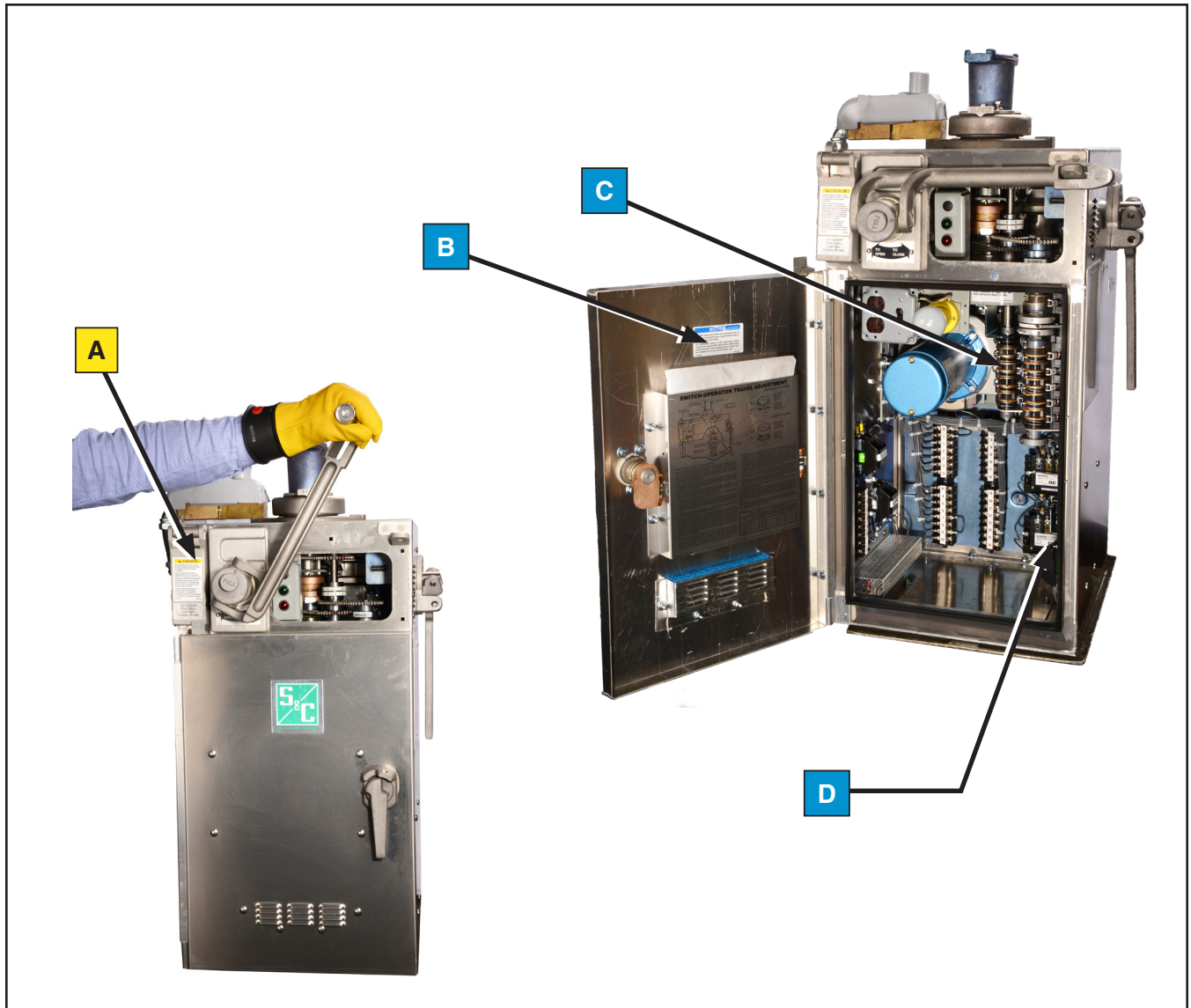


Replacement Instructions and Labels

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.

Location of Safety Labels



Reorder Information for Safety Labels

Location	Safety Alert Message	Description	Part Number
A	CAUTION	Use pushbuttons to open or close the circuit-switcher...	G-4527R3
B	NOTICE	The S&C Instruction Sheet is a permanent part of your S&C Equipment...	G-3733R2
C	NOTICE	Auxiliary switch cams are individually adjustable. Check the auxiliary switch cams...	G-4746R2
D	NOTICE	This contactor or relay has been blocked to prevent damage during shipment.	G-3684●

● One removable label per contactor or relay. Remove before operation.

DANGER



Mark V 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 company operating procedures and rules. Where a discrepancy exists, follow your company's operating procedures and rules.

- 1. QUALIFIED PERSONS.** Access to Mark V Circuit-Switchers 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. OPERATING MECHANISM AND BASE.** Mark V Circuit-Switchers contain fast-moving parts that can severely injure fingers. Do not remove or disassemble operating mechanisms or remove access panels unless directed by S&C Electric Company.
- 6. ENERGIZED COMPONENTS.** Always consider all parts of the circuit-switcher 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 that have been energized or installed near energized lines should be considered live until tested and grounded.
- 7. GROUNDING.** The Mark V Circuit-Switcher must be connected to a suitable earth ground at the base of the utility pole, or to a suitable building ground for testing, before energizing the switch and at all times when energized. The vertical operating shaft above the Type CS-1A Switch Operator must also be connected to a suitable earth ground.

The ground wire(s) must be bonded to the system neutral, if present. If the system neutral is not present, proper precautions must be taken to ensure the local earth ground, or building ground, cannot be severed or removed.
- 8. SWITCH POSITION.** Always confirm the **Open/Close** position of each switch.
 - Switches and terminal pads may be energized from either side.
 - Switches and terminal pads may be energized with the switches in any position.
- 9. MAINTAINING PROPER CLEARANCE.** Always maintain proper clearance from energized components.

The Type CS-1A Switch Operator is a high-speed operator having an operating time of 1.5 seconds maximum. It is expressly designed for power operation of Mark V Circuit-Switchers.

High-speed, high-torque power operation of Mark V Circuit-Switchers, by means of the Type CS-1A Switch Operator, is essential to attain the two-time duty-cycle fault-closing ratings of 30,000 amperes RMS three-phase symmetrical, 76,500 amperes peak for vertical-break style and integer-style models; and two-time duty-cycle fault-closing ratings of 40,000 amperes RMS three-phase symmetrical, 102,000 amperes peak for center-break style models.

Power operation also provides opening and closing without hesitation under $\frac{3}{4}$ -inch (19-mm) ice formation for vertical-break style and integer-style models, $1\frac{1}{2}$ -inch (38-mm) ice formation for center-break style models; close interphase simultaneity; long life of fault-closing contacts under normal operating duties; and avoidance of excessive switching transients due to prolonged or unstable prestrike arcing.

Because of its high-speed operation, the Type CS-1A Switch Operator is not suitable for use with switches of other manufacture.

Before operating the Type CS-1A Switch Operator, become familiar with the parts of the switch operator and Mark V Circuit-Switcher, as shown in Figures 1 and 2 on pages 7 and 8.

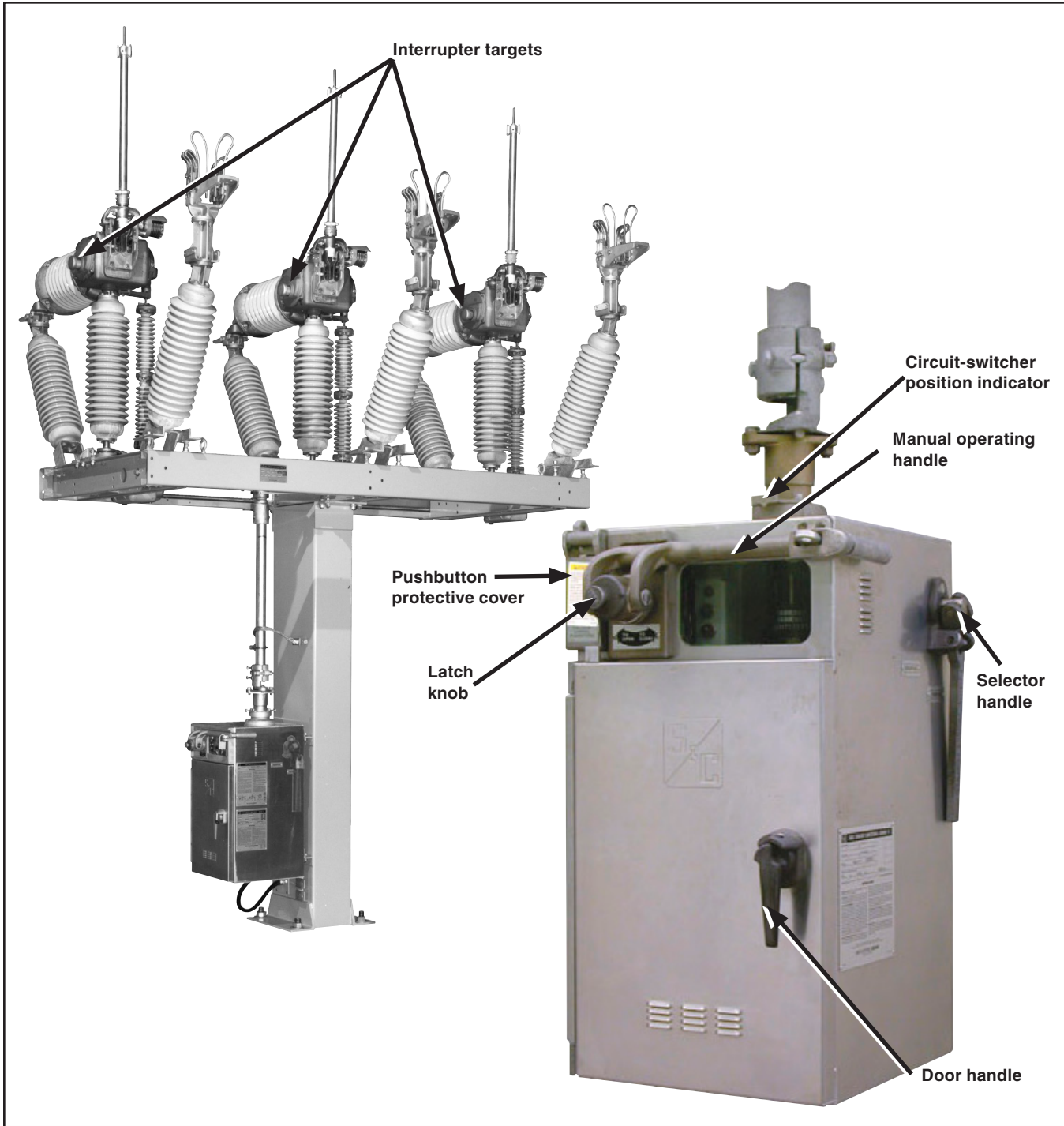


Figure 1. A 69-kV integer-style Mark V Circuit-Switcher connected to a Type CS-1A Switch Operator.

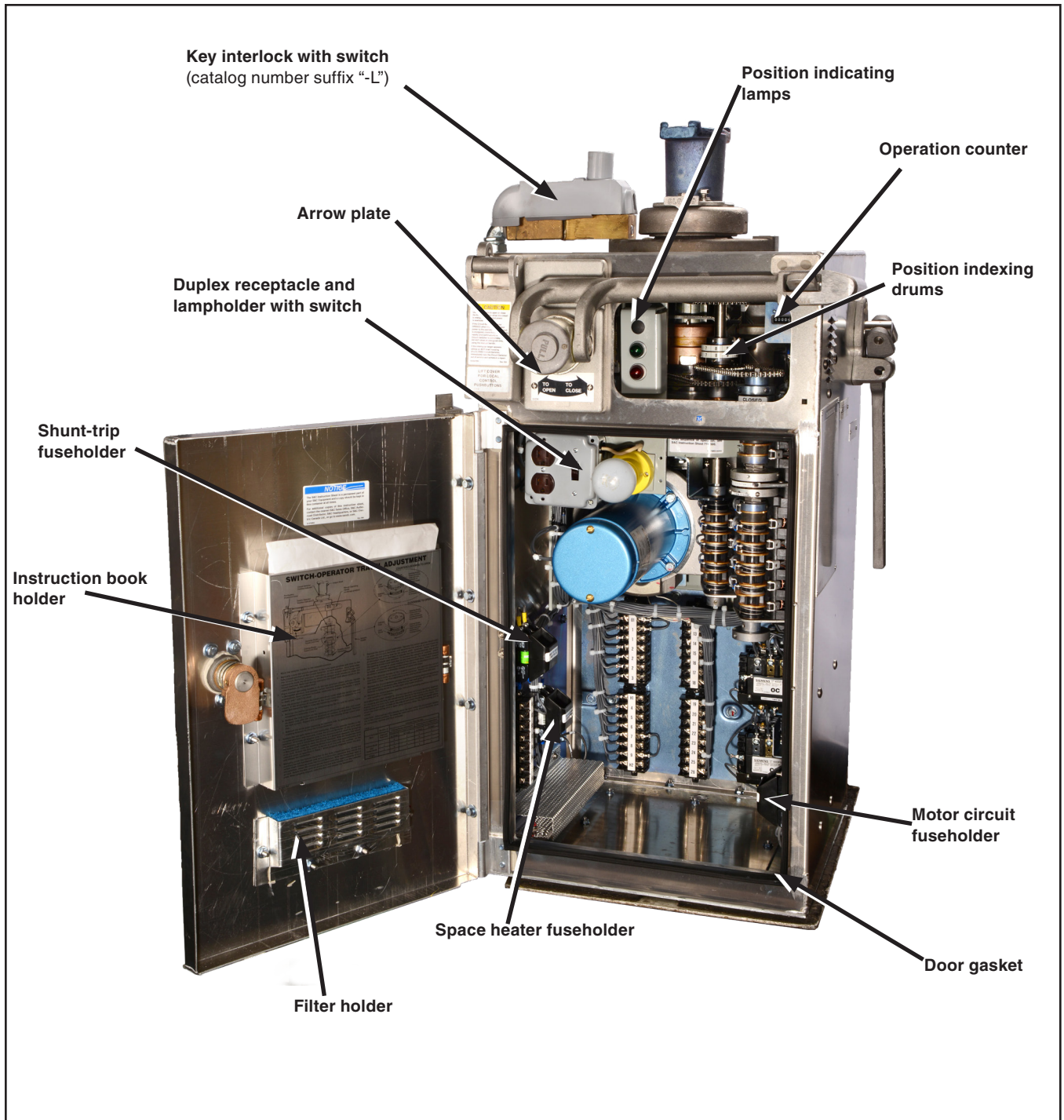


Figure 2. An interior view of a Type CS-1A Switch Operator with the door open.

Operation

The following operating instructions assume the switch-operator output shaft has been connected to the circuit-switcher power train, the electrical connections to the control source have been completed, and the switch operator has been correctly adjusted in accordance with S&C Instruction Sheet 719-500, “S&C Type CS-1A Switch Operators: *Installation*.” Figure 1 on page 7 illustrates a Type CS-1A Switch Operator connected to an integer-style Mark V Circuit-Switcher.

Do not assume the switch-operator position necessarily indicates the **Open** or **Closed** position of the circuit-switcher. Upon completion of an **Opening** or **Closing** operation (electrical or manual), make sure the following conditions exist:

- The switch-operator position indicator displays “Open” or “Closed” to indicate the switch operator has moved through a complete operation. See Figure 1 on page 7. Also, if furnished, note the position-indicating lamps. See Figure 2 on page 8.
- The circuit-switcher position indicator, located on the switch-operator output shaft, is in agreement with the switch-operator position indicator. See Figure 1. Both indicators should show “Open” or “Closed.”
- The circuit-switcher disconnect blade on each pole-unit is fully open or fully closed.

Then, tag and padlock the switch operator in accordance with standard system operating procedures. In all cases, make sure the switch operator is padlocked before “walking away.”

Correct operation of the circuit-switcher depends on charging and latching the stored-energy source within each brain as the disconnect blades move to the fully **Open** position and the interrupters close. The interrupter target located on the side of each brain housing appears yellow when the interrupter is open. The target appears gray (normal) when the interrupter is closed.

Because the interrupters are closed as the circuit-switcher blades move to the fully **Open** position, the target appears yellow only briefly during the **Opening** operation. The target should never appear yellow when the circuit-switcher is in the fully **Open** or fully **Closed** position. See Figure 1 on page 7 and Figure 3.

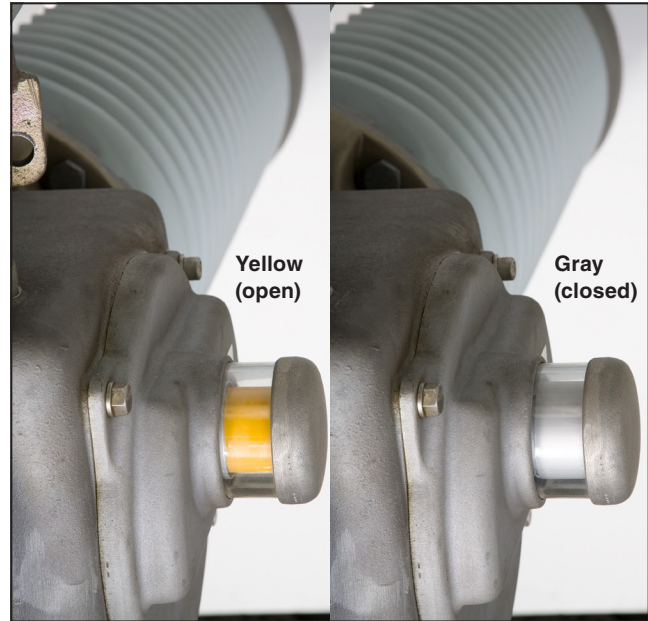


Figure 3. The interrupter target.

Electrical Operation

To open or close the circuit-switcher electrically:

STEP 1. Unlock and lift the external pushbutton protective cover. See Figure 4.

STEP 2. Press the appropriate pushbutton.

Note: The switch operator may be activated by operating associated, remotely located control switches. (No instructions are included for activating the switch operator by means of remotely located control switches because control schemes vary with different installations. With any given installation, however, it may be possible and desirable to effect such operation. Instructions presented in this document cover operation at the switch operator only.)

Note: For switch operators with an optional remote-control blocking switch (suffix “-Y”), opening the pushbutton protective cover prevents remote operation of the switch operator.

Note: OPEN/CLOSE pushbuttons are not included on switch operators specified with catalog number suffix “-J.”

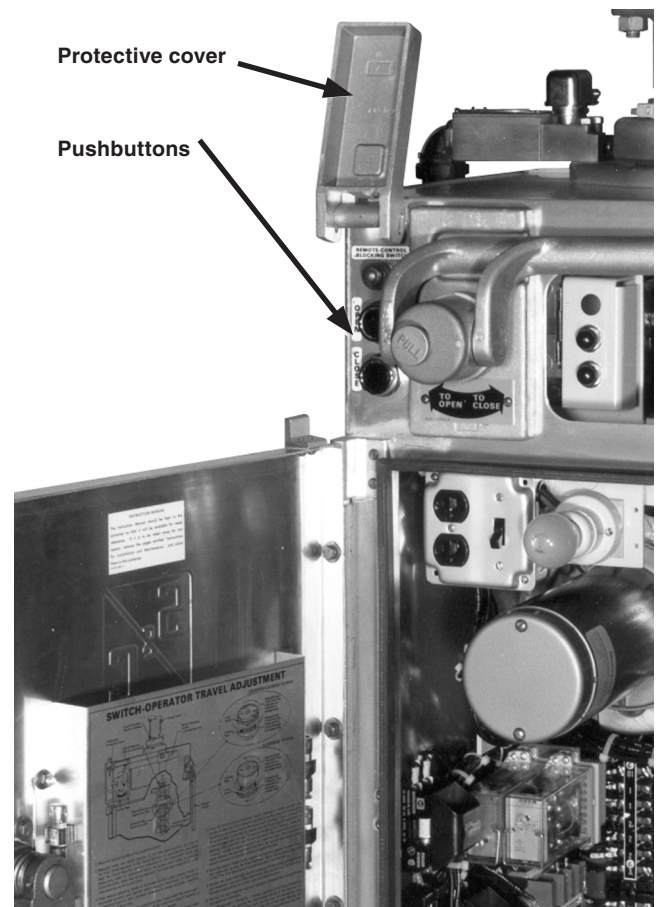


Figure 4. The pushbutton protective cover and pushbuttons.

Manual Operation

To open the circuit-switcher manually, follow these steps:

⚠ WARNING

Manually closing an energized circuit-switcher is not recommended because of the possibility of closing into a fault. Manually opening an energized circuit-switcher is permissible. When the opening operation has been initiated, however, it should be completed quickly and without hesitation. Cranking should continue until the circuit-switcher is fully open, as indicated by resistance felt as the circuit-switcher power train progresses to its stops. As the circuit-switcher moves toward the **Open** position, the interrupters will close and the stored-energy source within the brains will charge and latch. The circuit-switcher disconnect blades should never be in the **Closed** position when the interrupters are in the **Open** position. **Manually closing the circuit-switcher may cause arcing, equipment damage, and personal injury.**

STEP 1. Pull the latch knob on the hub of the manual operating handle and pivot the handle forward slightly from its **Storage** position.

STEP 2. Release the latch knob while continuing to pivot the handle forward to lock it into the **Cranking** position. See Figure 1 on page 7 and Figure 5. (As the handle is pivoted forward, the motor brake is mechanically released. Both leads of the control source are automatically disconnected, and both the “opening” and “closing” motor contactors are mechanically blocked in the **Open** position. However, when the shunt-trip device option is provided, it remains operative unless the switch operator is in the **Open** position.)

STEP 3. Crank the handle in the direction shown on the arrow plate for the **Open** position

If desired, during manual operation, the switch operator may also be disconnected from the control source by removing the motor-circuit two-pole pull-out fuseholder, located on the right-hand inside wall of the enclosure. See Figure 2 on page 8. Likewise, the shunt-trip device may be rendered inoperative by removing the shunt-trip circuit two-pole pull-out fuseholder, located on the left-hand inside wall of the enclosure.

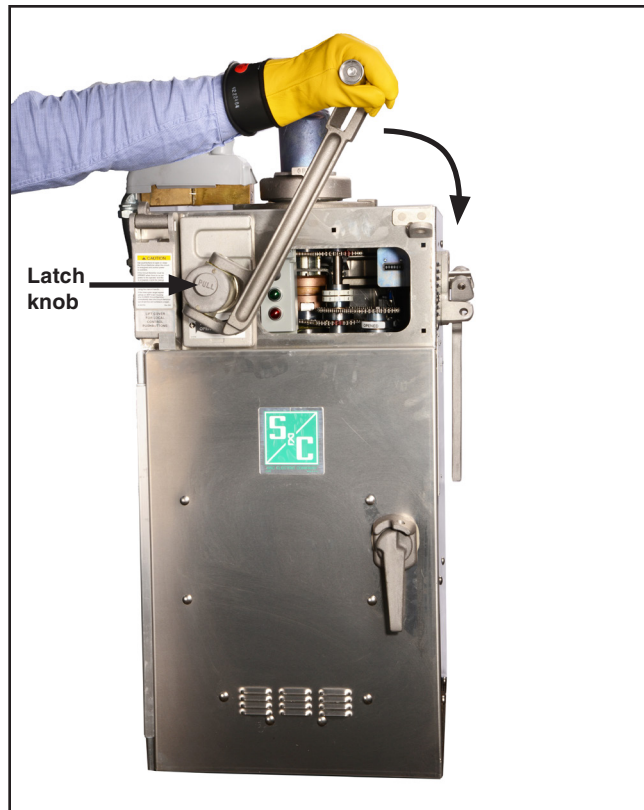


Figure 5. Manual operation.

STEP 4. To return the manual operating handle to its **Storage** position, pull the latch knob and pivot the handle approximately 90 degrees. The handle will then be disengaged from the switch operator and may be rotated freely in either direction to its **Storage** position. Complete the handle storage by pivoting the operating handle backward approximately 90 degrees until it latches in the **Storage** position.

Note: The manual operating handle may be disengaged from the switch operator mechanism at any position of the handle. However, if the switch operator and circuit-switcher are at any position between the fully **Open** and fully **Closed** position when the manual operating handle is placed in the **Storage** position, and the motor circuit fuseholder is inserted, the switch operator will automatically move to the **Open** position (because the switch operator control circuit is designed to allow an electrical closing only from the fully **Open** position of circuit-switcher).

Note: The handle may be padlocked in its **Storage** position.

Post Operating Inspection

Do not assume the switch operator position necessarily indicates the **Open** or **Closed** position of the circuit-switcher. Upon completion of an **Opening** or **Closing** operation (electrical or manual), make sure the following conditions exist:

- The switch-operator position indicator displays “Open” or “Closed” to indicate the switch operator has moved through a complete operation. See Figure 1 on page 7. Also, if furnished, note the position-indicating lamps. See Figure 2 on page 8.
- The circuit-switcher position indicator, located on the switch-operator output shaft, is in agreement with the switch-operator position indicator. See Figure 1. Both indicators should show “Open” or “Closed.”
- The circuit-switcher disconnect blade on each pole-unit is fully open or fully closed.

Then, tag and padlock the switch operator in accordance with standard system operating procedures. In all cases, make sure the switch operator is padlocked before “walking away.”

Correct operation of the circuit-switcher depends on charging and latching the stored-energy source within each brain as the disconnect blades move to the fully **Open** position and the interrupters close. The interrupter target located on the side of each brain housing appears yellow

when the interrupter is open. The target appears gray (normal) when the interrupter is closed.

Because the interrupters are closed as the circuit-switcher blades move to the fully **Open** position, the target appears yellow only briefly during the **Opening** operation. The target should never appear yellow when the circuit-switcher is in the fully **Open** or fully **Closed** position

Restoring the Switch Operator and Circuit-Switcher to Normal Operation

To ensure the switch operator is ready for normal power operation of the circuit-switcher by remote automatic or supervisory control, make sure the following conditions exist:

- The selector handle is in the **Coupled** position.
- The manual operating handle is in its **Storage** position.
- The two-pole pull-out fuseholders for the motor, space-heater, and (if applicable) shunt-trip circuits are inserted.
- The pushbutton protective cover is closed.
- The switch operator is tagged and padlocked in accordance with standard system operating procedures

Using the Selector Handle (Coupling and Decoupling)

The integral external selector handle used to operate the built-in internal decoupling mechanism is located on the right-hand side of the switch operator enclosure. Become familiar with the operation of the selector handle, as described on the switch operator nameplate on the right-hand side of the enclosure.

To decouple the switch operator from the circuit-switcher:

STEP 1. Swing the selector handle upright and slowly rotate it clockwise 50 degrees to the **Decoupled** position. See Figure 6. This decouples the switch operator mechanism from the switch operator output shaft.

STEP 2. Lower the selector handle to engage the locking tab. When thus decoupled, the switch operator may be operated either manually or electrically without operating the circuit-switcher.

When the selector handle is in the **Decoupled** position, the shunt-trip device (when this option is provided) is rendered inoperative.● Moreover, in the **Decoupled** position, the switch operator's output shaft is prevented from moving by a mechanical locking device located within the switch operator enclosure.

During the intermediate segment of the selector handle travel, which includes the position at which actual disengagement (or engagement) of the internal decoupling mechanism occurs, the motor-circuit source leads are momentarily disconnected and both the "opening" and "closing" motor contactors are mechanically blocked in the **Open** position. Visual inspection through the observation window will verify whether the internal decoupling mechanism is in the **Coupled** or **Decoupled** position. See Figure 8 on page 17. The selector handle may be padlocked in either position.

● Only the shunt-trip device is rendered inoperative. The switch operator can still be opened through the user's protective-relay circuit. As such, "elective" checkout of the system protective scheme is possible at any time.



Figure 6. Selector handle operation.

To couple the switch operator to the circuit-switcher:

- STEP 1.** Manually operate the switch operator to bring it to the same position (**Open** or **Closed**) as the circuit-switcher. The switch operator position indicator, seen through the observation window, will show when the approximate **Open** or **Closed** position has been attained.
- STEP 2.** Turn the manual operating handle slowly until the position indexing drums are numerically aligned to move the switch operator to the exact position for coupling. See Figure 7.
- STEP 3.** Swing the selector handle upright and rotate it counterclockwise to the **Coupled** position. Lower the handle to engage the locking tab. The selector handle is now in the **Coupled** position.

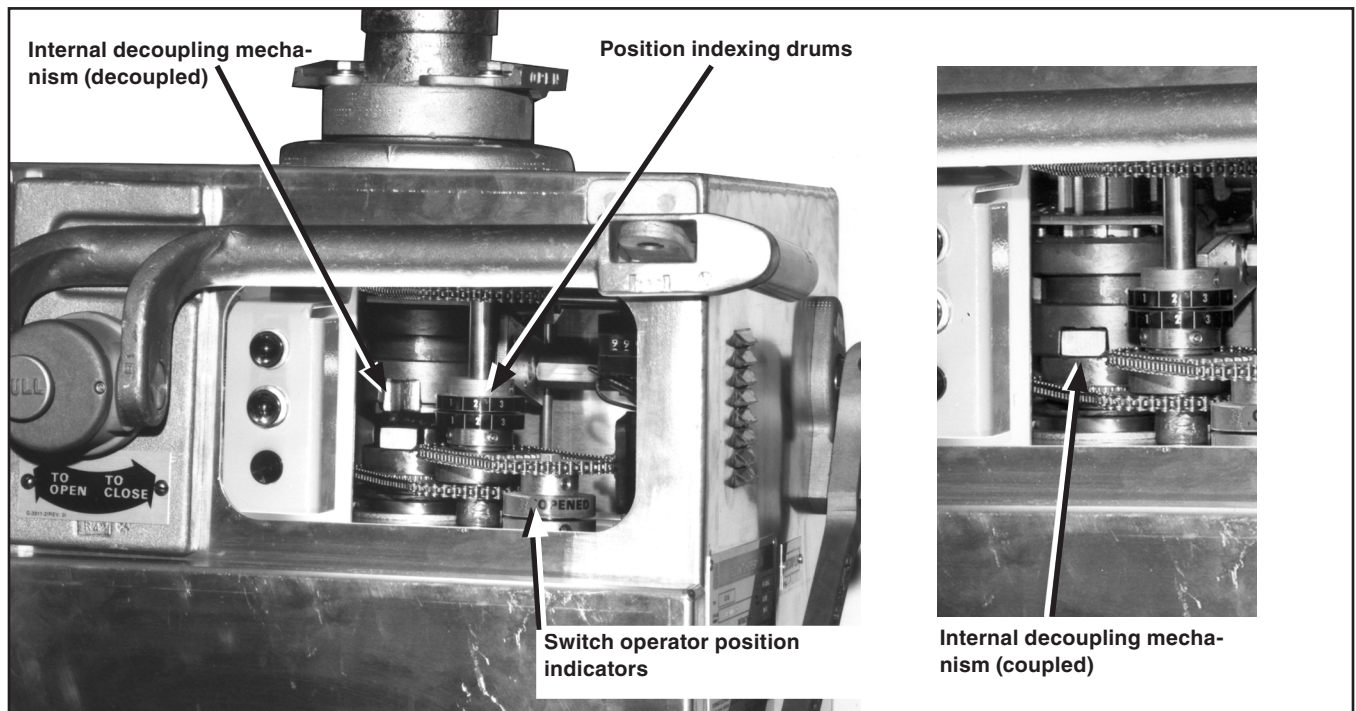


Figure 7. The internal decoupling mechanism viewed from the observation window.

Elective Exercising

To ensure continued proper performance of the Type CS-1A Switch Operator and the associated circuit-switcher, they should be inspected in accordance with S&C's recommended schedule and procedures contained in S&C Instruction Sheet 711-590.

Electively doing a complete circuit-switcher installation, including the shunt-trip device, when this option is furnished, may be accomplished without the need to open the high-voltage circuit by equipping the circuit-switcher with the optional stick-operated bypass accessory (catalog number suffix "-B1" or "-B2").

Even without the bypass accessory, the Type CS-1A Switch Operator may be decoupled from the circuit-switcher, thereby permitting elective exercising of the operator at any time without requiring an outage or switching to an alternate source. When the switch operator is in the **Decoupled** position, the shunt-trip device, when furnished, is rendered inoperative, thereby enabling the system protective scheme to be disabled.

Brake Inspection

As indicated in S&C Instruction Sheet 711-590, "S&C Mark V Circuit-Switcher: *Inspection Recommendations*," the brake in the Type CS-1A Switch Operator should be inspected every 2,500 operations or five years, whichever occurs more often. The inspection procedure is as follows. See Figure 8 on page 17.

- STEP 1.** Place the selector handle in the **Decoupled** position.
- STEP 2.** Remove the two-pole pull-out fuseholders for the motor, space-heater, and (if applicable) shunt-trip circuits.
- STEP 3.** Disconnect the linkage rod by removing the 1/4-20 x 1 1/4-inch hex-head screw, lockwasher, flat washer, and spacer-bushing from the end of the brake lever, as shown in Detail A in Figure 8 on page 17. Be careful not to lose these parts. Then, raise the brake lever and measure the vertical free play, as shown in Detail B in Figure 8 on page 17. This dimension should be 5/8-inch (16 mm) to 3/4-inch (19 mm). Should the measurement be outside this range, brake-wear compensation is

required; proceed to Step 4. If the measurement is within this range, reattach the linkage rod and tighten the 1/4-20 x 1 1/4-inch hex-head screw securely, and proceed to Step 9.

- STEP 4.** Remove the four 5/16-18 x 1 1/4-inch screws used to attach the motor, withdraw the motor, and carefully rest its shaft on the floor of the enclosure. Be careful not to lose the square key or tubular spacer (if furnished), which may remain on the motor shaft.
Note: 115-Vac and 230-Vac motors use a 1/4-20 socket head-set screw on the side of the brake disc hub, as shown in Detail C in Figure 8 on page 17. Loosen this set screw approximately one-half turn using a 1/8-inch Allen wrench before removing the motor.
- STEP 5.** Using a 3/32-inch Allen wrench, loosen the pad assembly socket head-set screw on the side of the caliper assembly approximately one-half turn. See Detail A in Figure 8 on page 17.
- STEP 6.** Using a 5/16-inch Allen wrench, rotate the pad assembly clockwise until the free play at the end of the brake lever is 5/8-inch (16 mm) to 3/4-inch (19 mm), as shown in Detail B in Figure 8 on page 17. Now, tighten the 3/32-inch pad assembly socket-head set screw.
- STEP 7.** Insert the spacer-bushing through the angle bracket and brake lever, and reattach the linkage rod using the 1/4-20 x 1 1/4-inch hex-head screw, lockwasher, and flat washer. Tighten the screw securely.
- STEP 8.** Insert the square key in the keyway, as shown in Detail A in Figure 8 on page 17. Slip the tubular spacer (if furnished) over the motor shaft and reinstall the motor. Position the motor so the two weep holes on the side of the housing face downward.
- STEP 9.** Replace the four 5/16-18 x 1 1/4-inch screws used to attach the motor and tighten them securely. On 115-Vac and 230-Vac motors, retighten the 1/4-20 socket-head set screw on the side of the brake disc hub.

STEP 10. Check the operation of the brake linkage as follows:

- (a) Pull the latch knob on the hub of the manual operating handle and slowly pivot the handle forward from its **Storage** position toward its **Cranking** position until the brake disc can be rotated by hand. Be careful not to get grease on the brake disc.
- (b) Measure the distance the end of the brake lever travels from the point of initial brake release to the bottom of its stroke. (This occurs when the handle locks into the **Cranking** position). This dimension should be $\frac{1}{8}$ -inch (3 mm) to $\frac{1}{4}$ -inch (6 mm). See Detail D in Figure 8 on page 17. If the measurement is outside this range, contact the nearest S&C Sales Office.

STEP 11. Finally, to check the functioning of the brake, decouple the operator and then open and close the operator electrically. After each operation, check the position of the indicator on the appropriate travel-limit disc. It should stop between indicator plate numbers 2 and 8. See the switch-operator travel-limit adjustment instructions on enclosure door. If the indicator on the travel-limit disc stop is outside this range, contact the nearest S&C Sales Office.

Inspection and Maintenance

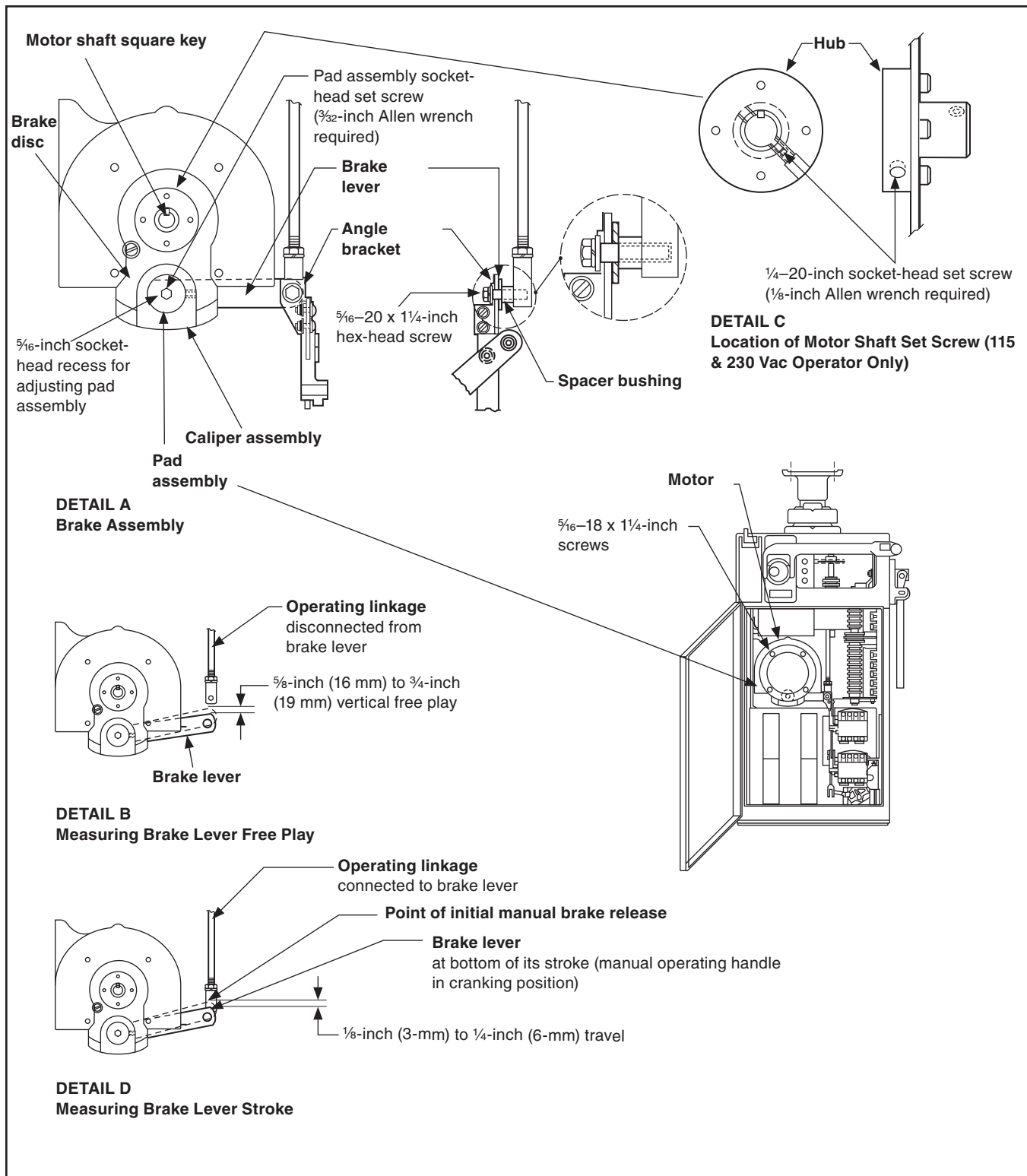


Figure 8. Brake inspection procedure.

Recommended Exercising Procedure for Superseded-Design Switch Operators

(catalog numbers 38846 through 38846R3, equipped with optional shunt-trip solenoid switch and redundant relay [catalog number suffix “-HP”])

With these superseded-design switch operators, a shunt-trip solenoid switch (94) and redundant relay (62) are used to minimize control-current inrush by energizing the shunt-trip device and switch-operator motor in sequence. The redundant relay provides a backup function, ensuring circuit-switcher actuation independent of shunt-trip operation.

To verify their proper functioning, S&C recommends the shunt-trip solenoid switch and redundant relay each be exercised separately (preferably through the protective-relay circuit to check out the external control wiring as well) while the other component is temporarily disabled.

The following annual exercising procedure is recommended.

Note: The wire and terminal designations referenced apply to the standard wiring diagrams for superseded models CDR-3116R3-1 and CDR-3116R3-2 and may differ on special wiring diagrams.

To exercise the shunt-trip solenoid (94) switch:

- STEP 1.** Open the control-source disconnect switch and then place the switch-operator selector handle in the **Decoupled** position. (When the switch operator is thus decoupled, the shunt-trip solenoids at the circuit-switcher pole-units are rendered inoperative.)
- STEP 2.** Disable the opening contactor (OC) by removing wires numbered 8C and 8D from the OC coil terminal C7. This will allow the **Opening** operation of the switch operator to be totally controlled by the contacts of the solenoid (94) switch.
- STEP 3.** Close the control-source disconnect switch and energize the solenoid (94) switch (to move the switch operator to the **Open** position) by a simulated **Shunt Trip** operation. Return the switch operator to the **Closed** position using the pushbutton control. Repeat four times for exercising purposes.
- STEP 4.** Open the control-source disconnect switch and reconnect wires numbered 8C and 8D to the OC coil terminal C7.

To exercise the redundant (62) relay:

- STEP 1.** Make sure the control-source disconnect switch is opened and the switch-operator selector handle is in the **Decoupled** position.
- STEP 2.** Disable the solenoid (94) switch by removing wire number 2I from terminal L1 on the redundant (62) relay. This will allow an **Opening** operation of the switch operator to be initiated by the contacts of the redundant (62) relay.
- STEP 3.** Close the control-source disconnect switch and energize the redundant (62) relay (to move the switch operator to the **Open** position) by a simulated **Shunt Trip** operation. Energization should be for a duration of more than ¼-second to allow time for closing of the (62) relay contact. Return the switch operator to the **Closed** position using the pushbutton control. Repeat four times for exercising purposes.
- STEP 4.** Open the control-source disconnect switch and reconnect wire number 2I to the redundant (62) relay terminal L1.
- STEP 5.** To return the switch operator to service, bring the switch operator to the same position as the circuit-switcher. Place the selector handle in the **Coupled** position and close the control-source disconnect switch.