Operation

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★ S&C Type LS-1 Switch Operators were discontinued in 2024. For more information, contact your local S&C Sales Office.

February 17. 2025

Qualified Persons

⚠ WARNING

Only qualified persons 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 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 operating Type LS-2 Switch Operators. Become familiar with the Safety Information and Safety Precautions on pages 3 through 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 Type LS-2 Switch Operators. 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 applications. The application must be within the ratings furnished for the equipment. Ratings for Type LS-2 Switch Operators are listed in the ratings table in Specification Bulletin 753-31. The ratings are also on the nameplate affixed to the product.

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 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 Type LS-2 Switch Operators.

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 switch....	G-6251
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-4887R3
D	*NOTICE*	This contactor or relay has been blocked to prevent damage during shipment.	G-3684●

● This tag is to be removed and discarded after the switch operator is installed and adjusted.

⚠ DANGER

Type LS-2 Switch Operators 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 Line-Rupter™ Switches and Type LS-2 Switch Operators 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.** Line-Rupter Switches and Type LS-2 Switch Operators 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 Line-Rupter Switch 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. **GROUNDING.** Line-Rupter Switches and Type LS-2 Switch Operators must be connected to a suitable earth ground at the base of the utility pole, substation ground system, or to a suitable building ground for testing, before energizing the switch and at all times when energized. The vertical shaft above the Type LS-2 Switch Operator must also be connected to a suitable earth ground.

   The ground wire(s) must be bonded to a 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 LS-2 Switch Operator is a high-speed operator having an operating time of 2.2 seconds maximum. It is expressly designed for power operation of Line-Rupter Switches. Because of its high-speed operation, the Type LS-2 Switch Operator is not suitable for use with switches from other manufacturers.

Before operating the Type LS-2 Switch Operator, become familiar with the parts of the switch operator as shown in Figure 2 on page 7 and Figure 3 on page 8. Before operation, make sure the switch-operator output shaft has been connected to the high-voltage switch, electrical connections to the control source have been completed, and the switch operator has been correctly adjusted in accordance with S&C Instruction Sheet 753-500.

Do not assume the switch-operator position necessarily indicates the **Open** or **Closed** position of the high-voltage switch. At completion of an **Open** or **Close** operation (electrical or manual), make sure the following conditions exist:

- The switch-operator position indicator signals "Open" or "Closed" to indicate the switch operator has moved through a complete operation. Also note the POSITION INDICATING lamps, if furnished. See Figure 5 on page 11.
- The high-voltage switch-position indicator, located on the switch-operator output shaft is in agreement with the switch-operator position indicator. Both indicators should simultaneously show "Open" or "Closed." See Figure 2 on page 7.
- The blades on all three pole-units of the high-voltage switch are fully open or fully closed (by visual verification).

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 Line-Rupter Switch 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. See Figure 1.

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.

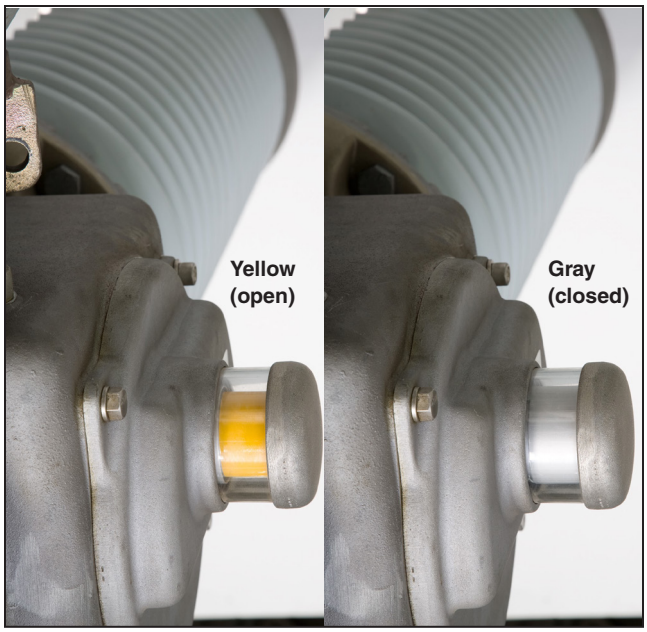

Figure 1. The interrupter target.

Electrical Operation

To open or close the switch electronically:

STEP 1. Unlock and lift the external pushbutton protective cover.●

STEP 2. Press the appropriate pushbutton.■ See Figure 2.

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.)

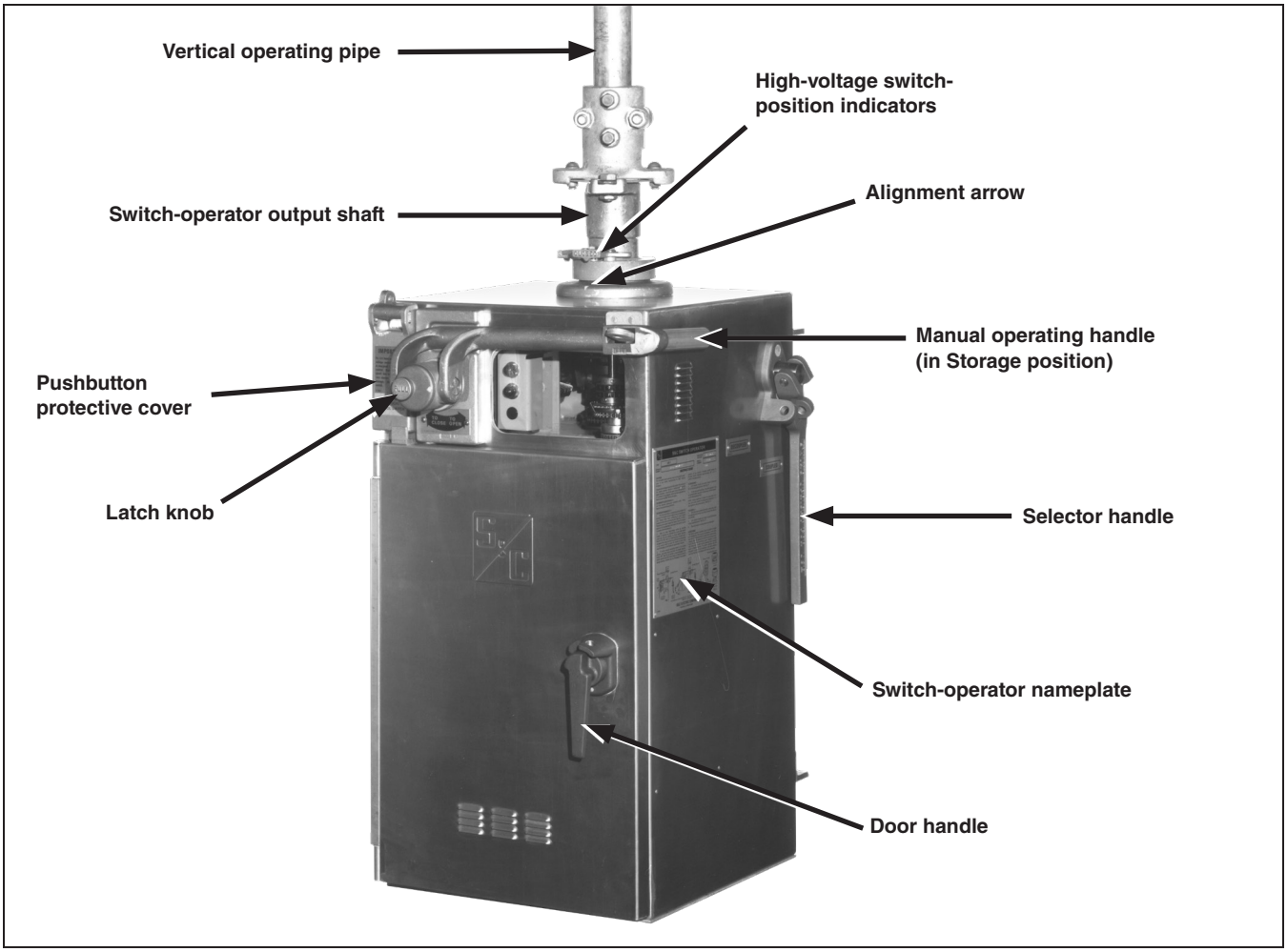

Figure 2. Exterior view of the switch operator.

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

■ OPEN/CLOSE pushbuttons are not included on switch operators specified with catalog number suffix "-J."

Manual Operation

⚠ WARNING

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

To open the switch manually, follow these steps:

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 3 on page 8.

Note: 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.

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

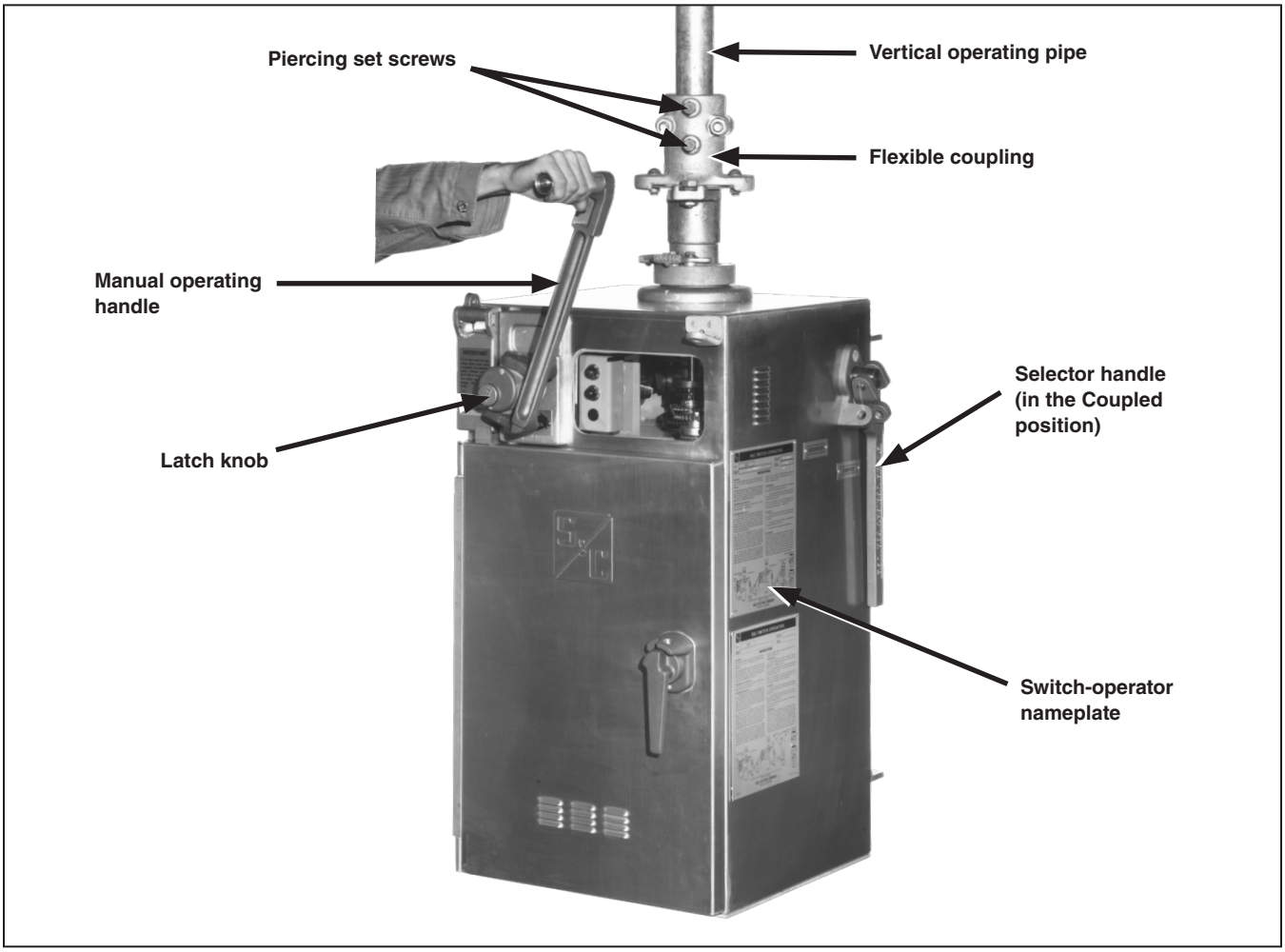

Figure 3. Manual Operation.

from the control power source by removing the motor-circuit two-pole pull-out fuseholder located on the right inside wall of the enclosure.

STEP 4. Return the manual operating handle to its **Storage** position by pulling the latch knob and pivoting the handle approximately 90 degrees. The handle will 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.

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

Post-Operation Inspection

Do not assume the switch-operator position necessarily indicates the **Open** or **Closed** position of the high-voltage switch. At completion of an **Open** or **Close** operation (electrical or manual), make sure the following conditions exist:

STEP 1. The switch-operator position indicator signals "Open" or "Closed" to indicate the switch operator has moved through a complete operation. See Figure 5 on page 11. Also check the position-indicating lamps, if furnished

STEP 2. The high-voltage switch-position indicator, located on the switch-operator output shaft is in agreement with the switch-operator position indicator. Both indicators should simultaneously show "Open" or "Closed." Figure 2 on page 7.

STEP 3. The blades on all three pole-units of the high-voltage switch are fully open or fully closed (by visual verification).

STEP 4. 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.

Restoring the Switch Operator and Switch to Normal Operation

So the switch operator is ready for normal power operation of the switch 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 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 external selector handle, for operation of the built-in internal decoupling mechanism, is located on the right side of the switch-operator enclosure.

To decouple the switch operator from the switch:

STEP 1. Swing the selector handle upright and slowly rotate it clockwise 50 degrees to the **Decoupled** position. See Figure 4. This decouples the switch-operator mechanism from the switch-operator output shaft.

STEP 2. Lower the selector handle to engage the locking tab. When decoupled, the switch operator may be operated either manually or electronically without operating the high-voltage switch.

When the selector handle is in the **Decoupled** position, the output shaft is prevented from moving by a mechanical locking device located in 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 4. The selector handle may be padlocked in either position.

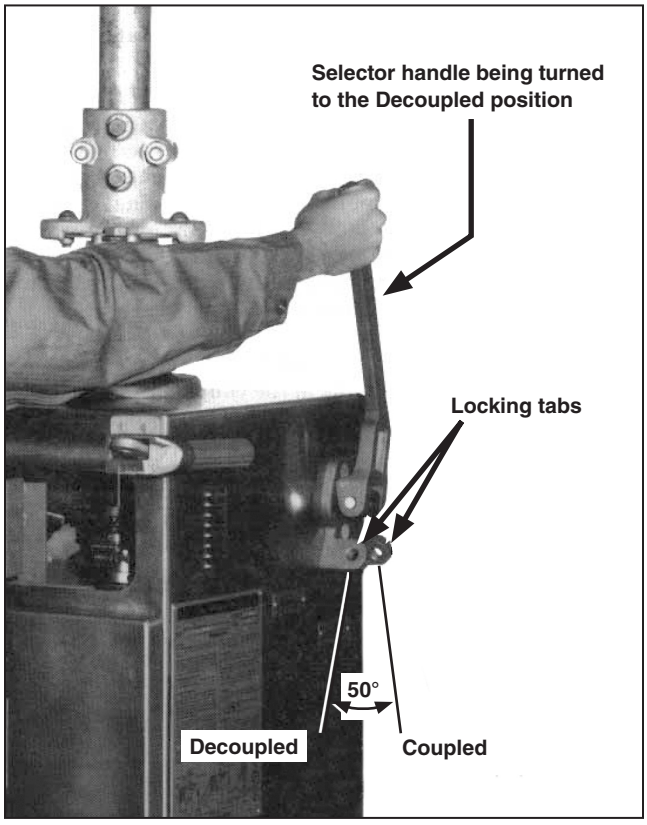

Figure 4. Selector handle operation.

To couple the switch operator to the switch:

STEP 1. Manually operate the switch operator to bring it to the same **Open** or **Closed** position as the high-voltage switch, as indicated by the switch-position indicator located on the output-shaft collar of the switch operator. The switch-operator position indicator, seen through the observation window, will show when the approximate **Open** or **Closed** position has been attained. See Figure 5.

STEP 2. Turn the manual operating handle slowly until the position-indexing drums are numerically aligned.

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.

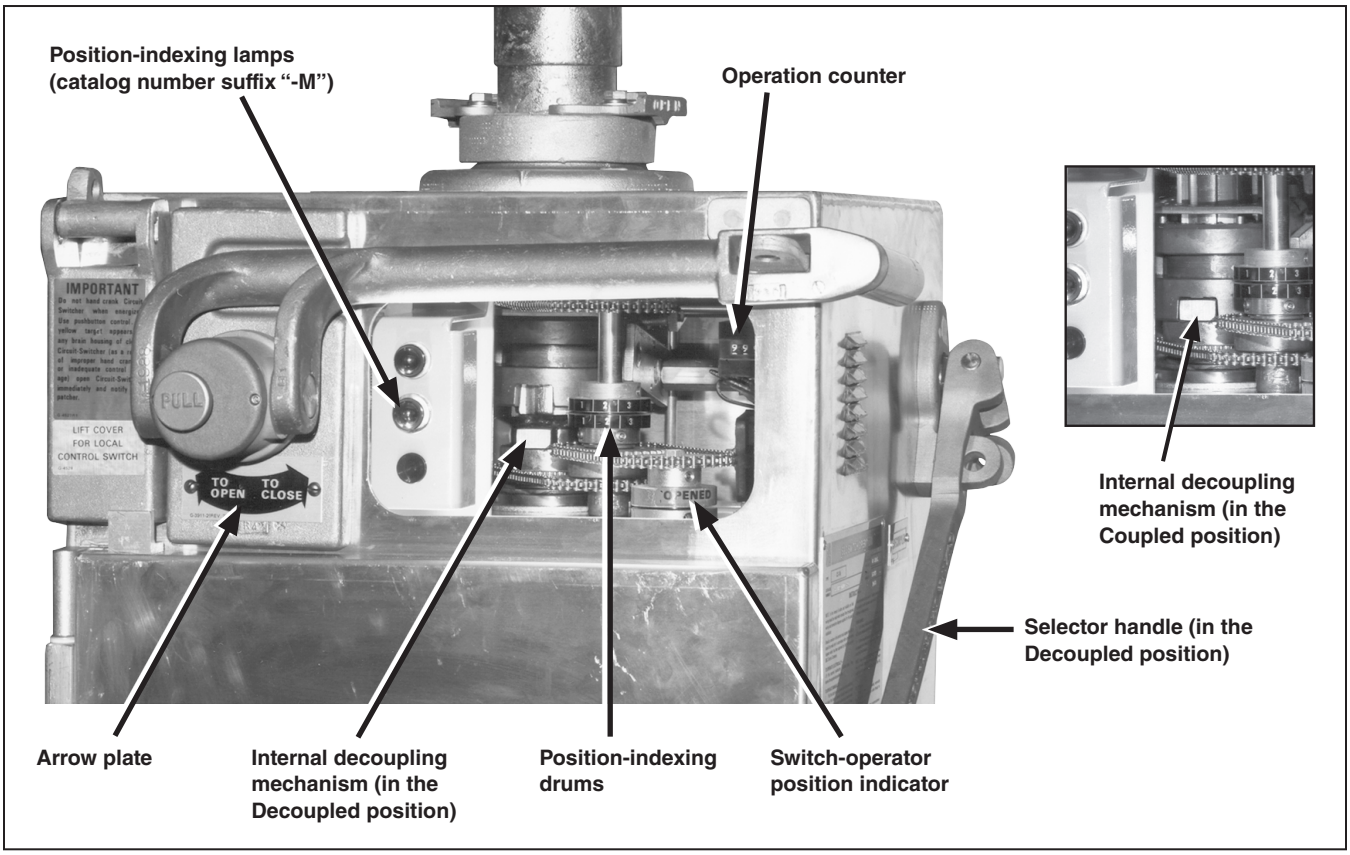

Figure 5. The internal decoupling mechanism viewed from the observation window.

Elective Exercising

Type LS-2 Switch Operators should be inspected every 2500 operations or 5 years, whichever occurs first, to ensure continued proper performance. De-energize the associated high-voltage switch and perform the following switch-operator inspection procedures:

STEP 1. Check for evidence of water ingress, damage, and excessive corrosion or wear.

STEP 2. Check ease of operation during slow, manual cranking using the switch-operator manual operating handle.

STEP 3. Check the coupled and decoupled electrical operation.

STEP 4. Check for loose wiring inside the enclosure and for proper functioning of the position-indicating lamps, **Operation** counter, CONVENIENCE lamp, etc.

Brake Inspection

Check brake operation and readjust if necessary. The procedure for doing this is as follows. See Figure 6 on page 13.

Because the switch operator may be conveniently decoupled from the high-voltage switch, elective exercising of the operator may be performed at any time without requiring an outage or switching to an alternate source.

STEP 1. Place the selector handle in the **Decoupled** position.

STEP 2. Remove the two-pole pull-out fuseholders for the motor circuit and space-heater circuit.

STEP 3. Disconnect the linkage rod by removing the ¼–20 × 1¼-inch hex-head screw, lockwasher, flat washer, and spacer-bushing from the end of the brake lever, as shown in Detail A in Figure 6 on page 13. Be careful not to lose these parts.

STEP 4. Raise the brake lever and measure the vertical free play, as shown in Detail B in Figure 6 on page 13. This dimension should be ⅝-inch (16 mm) to ¾-inch (19 mm). Should the measurement be outside this range, brake-wear compensation is required; proceed to Step 5.

If the measurement is within this range: Reattach the linkage rod and tighten the ¼–20 × 1¼-inch hex-head screw securely; proceed to Step 10.

STEP 5. Remove the four 5/10–18 × 1¼-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.

STEP 6. 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 6 on page 13.

STEP 7. Then, using a 5/16-inch Allen wrench, rotate the pad assembly clockwise until the free play at the end of the brake lever is 5/18-inch (16 mm) to ¾-inch (19 mm), as shown in Detail B in Figure 6 on page 13. Now, tighten the 3/32-inch pad assembly socket-head set screw.

STEP 8. Insert the spacer-bushing through the angle bracket and brake lever, and reattach the linkage rod using the ¼–20 × 1¼-inch hex-head screw, lockwasher, and flat washer. Tighten the screw securely.

STEP 9. Insert the square key in the keyway, as shown in See Detail A in Figure 6 on page 13. 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. Replace the four 5/16–18 × 1½-inch screws used to attach the motor and tighten them securely.

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 (which occurs when the handle locks into the **Cranking** position). This distance should be ⅛-inch (3 mm) to ¼-inch (6 mm). See Detail C in Figure 6 on page 13 Should the measurement be outside this range, refer to the nearest S&C Sales Office.

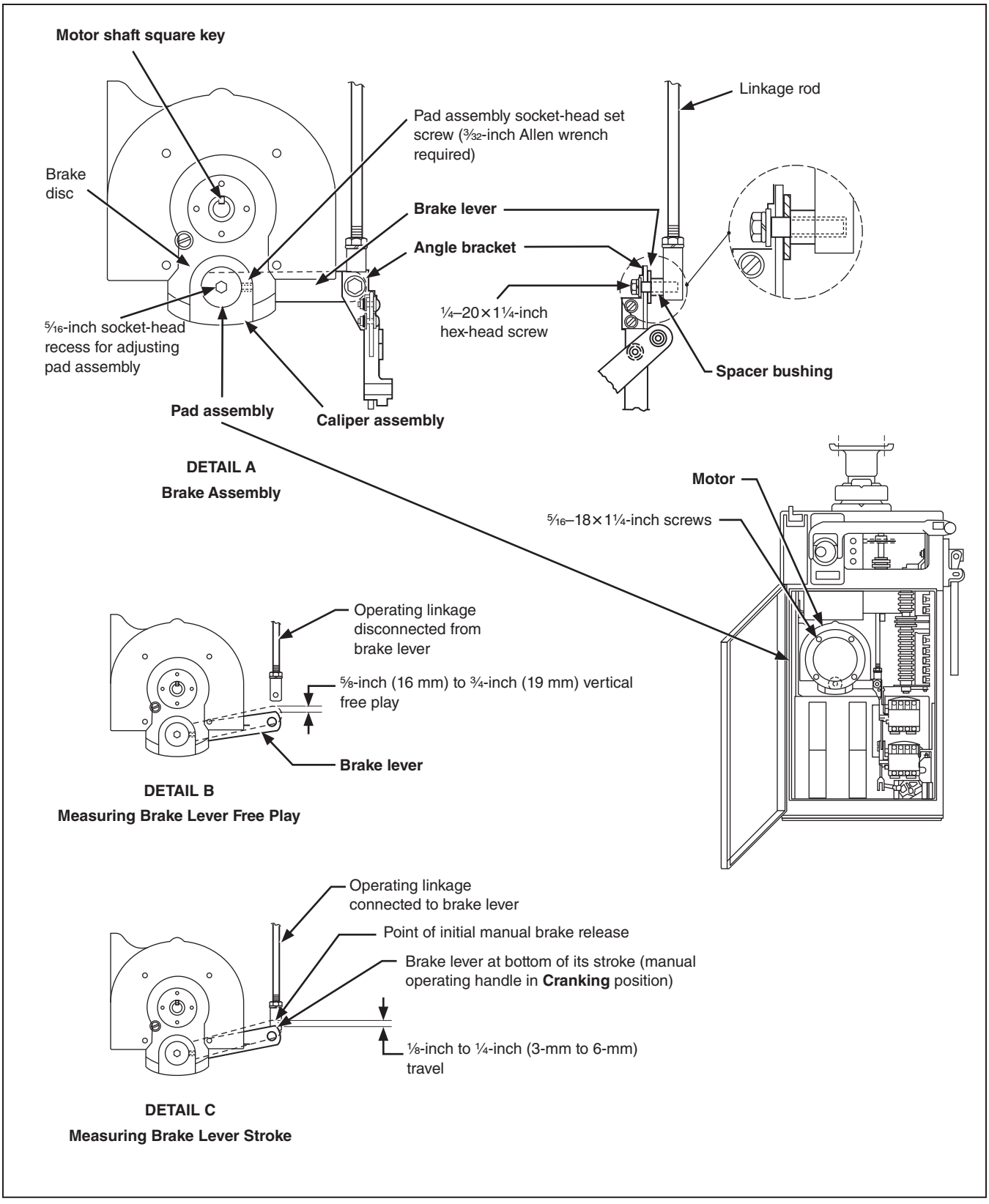

Figure 6. Brake inspection procedure.