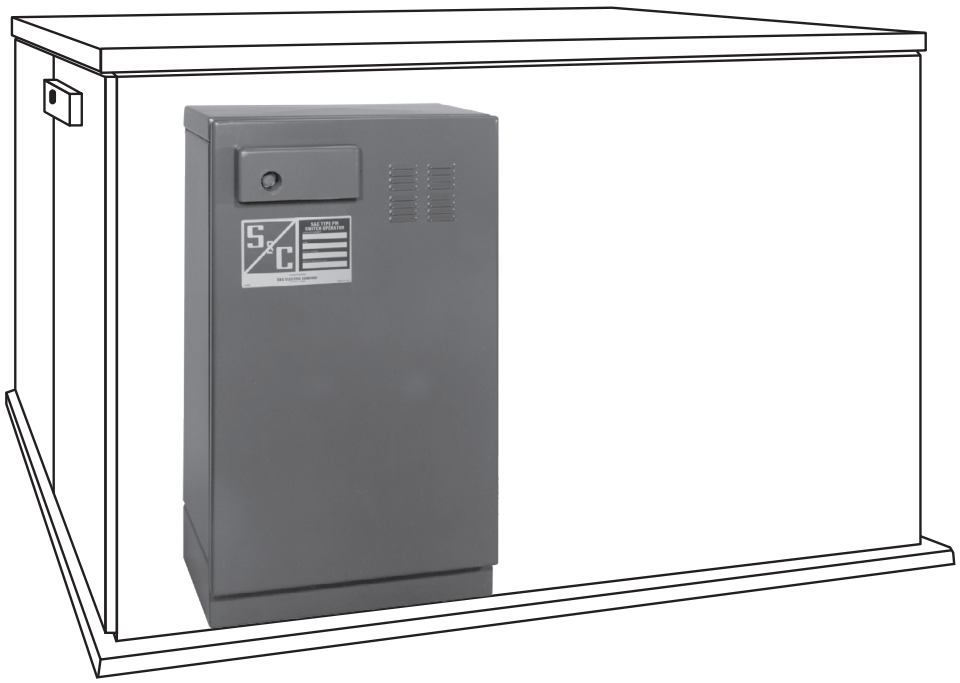
Operation

Table of Contents



★ Also applies to discontinued S&C PMS Pad-Mounted Gear.

July 15, 2024
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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 PM Switch Operators. Become familiar with the Safety Information and Safety Precautions on pages 4 through 5. Also read and understand the appropriate operation instruction sheet for the switchgear being operated. See S&C Instruction Sheet 664-510 for remote supervisory PMH Pad-Mounted Gear and S&C Instruction Sheet 666-510 for remote supervisory PME Pad-Mounted Gear 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 remote supervisory PMH and PME Pad-Mounted Gear. 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 the power operation of remote supervisory PMH and PME Pad-Mounted Gear. The application must be within the ratings furnished for the equipment. Ratings for Type PM Switch Operators are listed in the ratings table in S&C Specification Bulletin 669-31. 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).

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 operating Type PM 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.

⚠ DANGER

Type PM Switch Operators are used on pad-mounted gear that 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 pad-mounted gear 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 "CAUTION," "WARNING," "DANGER" 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. **ACCESS CONTROL.** Do not force doors open. Forcing a door open can damage the latching mechanism. Doors must be securely closed and latched, with padlocks in place at all times unless work is being performed inside the enclosure.
7. **SWITCH POSITION.** Type PM Switch Operators have a target that reflects the position of the switch. Before doing work inside the switchgear, always confirm the **Open/Close** position of Mini-Rupter Switches by visually observing the position of the switch blades. Switches may be energized by backfeed. Switches may be energized in any position.
8. **MAINTAINING PROPER CLEARANCE.** Always maintain proper clearance from energized components.
9. **ADDITIONAL SAFETY PRECAUTIONS.**
   - Refer to S&C Instruction Sheet 664-510 for operation of remote supervisory PMH Pad-Mounted Gear.
   - Refer to S&C Instruction Sheet remote supervisory 666-510 for operation of remote supervisory PME Pad-Mounted Gear.

S&C remote supervisory PMH or PME Pad-Mounted Gear with factory-installed Type PM Switch Operators and Type PM Switch Operators for field installation are provided with an "Installation and Operation Information Kit" containing instruction sheets, drawings, and wiring diagrams applicable to the equipment provided. All personnel involved with the installation and operation of the equipment should be thoroughly familiar with the contents of the information kit.

The following instructions cover operation of Type PM Switch Operators factory- or field-installed on S&C PMH and PME Pad-Mounted Gear. These switch operators permit power operation of Mini-Rupter® Switches in response to opening and closing signals initiated from a remote location. Type PM Switch Operators include the following:

- An integral motor for power-operating the quick-make quick-break mechanism of the Mini-Rupter Switch (The switch operation is achieved in approximately 3 seconds with nominal control voltage.)
- **Open/Close** pushbuttons for local electrical operation and provisions for local manual operation
- A LOCAL/REMOTE selector switch that permits local operation when in the **Local** position and prevent **Remote** operation (A contact is provided for remote indication of the selector-switch position.)
- Auxiliary-switch contacts for remote indication of the switch position
- A decoupler to permit operation of the switch operator without affecting the switch position
- An **Operation** counter
- An S&C Penta-Latch® Mechanism on the enclosure door for access control to the interior of the switch operator (The Penta-Latch Mechanism provides automatic door latching and permits padlocking only when the door is securely latched. The door can be opened only with a pentahead socket wrench or tool.)
- A storage bracket in the enclosure for holding the manual operating handle furnished with the pad-mounted gear (The handle permits local manual charging and tripping of the quick-make quick-break mechanism should control power become unavailable.)

The number of switch operators furnished depends on the number of switches to be power-operated on the specific unit of pad-mounted gear. One switch operator is equipped to supply control power to all switch operators on that unit.

Control power may be derived from a user-supplied 24-Vdc power source or from an S&C Battery Charger with battery packs installed in one of the switch operators. The battery charger requires 120-Vac input, provided either by an external user-supplied power source or an internal S&C-supplied power source (voltage sensor). Alternately, the control power may be derived directly from a user-supplied 120-Vac power source through an ac power supply installed in one of the switch operators.

For remote supervisory pad-mounted gear with factory-installed Type PM Switch Operators, the control power source is determined by the control equipment group furnished with the pad-mounted gear. The catalog number stamped on the nameplate affixed to the outside of a high-voltage compartment door is suffixed with letter-number combinations.

These suffixes indicate the applicable control equipment group (catalog number suffixes “-Y2” through “-Y7”) and also designate the inclusion of optional features, such as key interlocks (catalog number suffix “-Cl,” “-C3,” or “-C4”). Refer to S&C Specification Bulletins 664-31 and 666-31, as applicable, for descriptions of the control equipment groups available for remote supervisory pad-mounted gear and for a complete listing of available options for the gear.

For field-installed Type PM Switch Operators, one of the switch operators on the retrofitted unit of pad-mounted gear is equipped to supply control power to all the switch operators. The source of control power is determined by the options specified for that switch operator.

The catalog number stamped on the nameplate affixed to the outside of the switch operator door is suffixed with letter-number combinations. These suffixes designate the inclusion of optional features, such as the S&C Battery Charger with battery packs (catalog number suffix “-Y6,” “-Y7,” or “-Y8”). If none of the switch operators on the retrofitted unit include catalog number suffix “-Y5,” “-Y6,” “-Y7,” or “-Y8,” then the source of control power for all switch operators on that unit is a user-supplied 24-Vdc power source. Refer to S&C Specification Bulletin 669-31 for a complete listing of available options for field-installed Type PM Switch Operators. For a complete listing of available options for the pad-mounted gear, refer to the applicable S&C specification bulletin.

Figure 1 illustrates the basic components of Type PM Switch Operators. Review this illustration to gain familiarity with the various components and their locations.

Also available, but not shown in Figure 1, are the S&C Ac Power Supply and Type ZSD Overcurrent Relay.

Refer to the applicable drawings, wiring diagrams, and instruction sheets included in the "Installation and Operation Information Kit" for more information on these components.

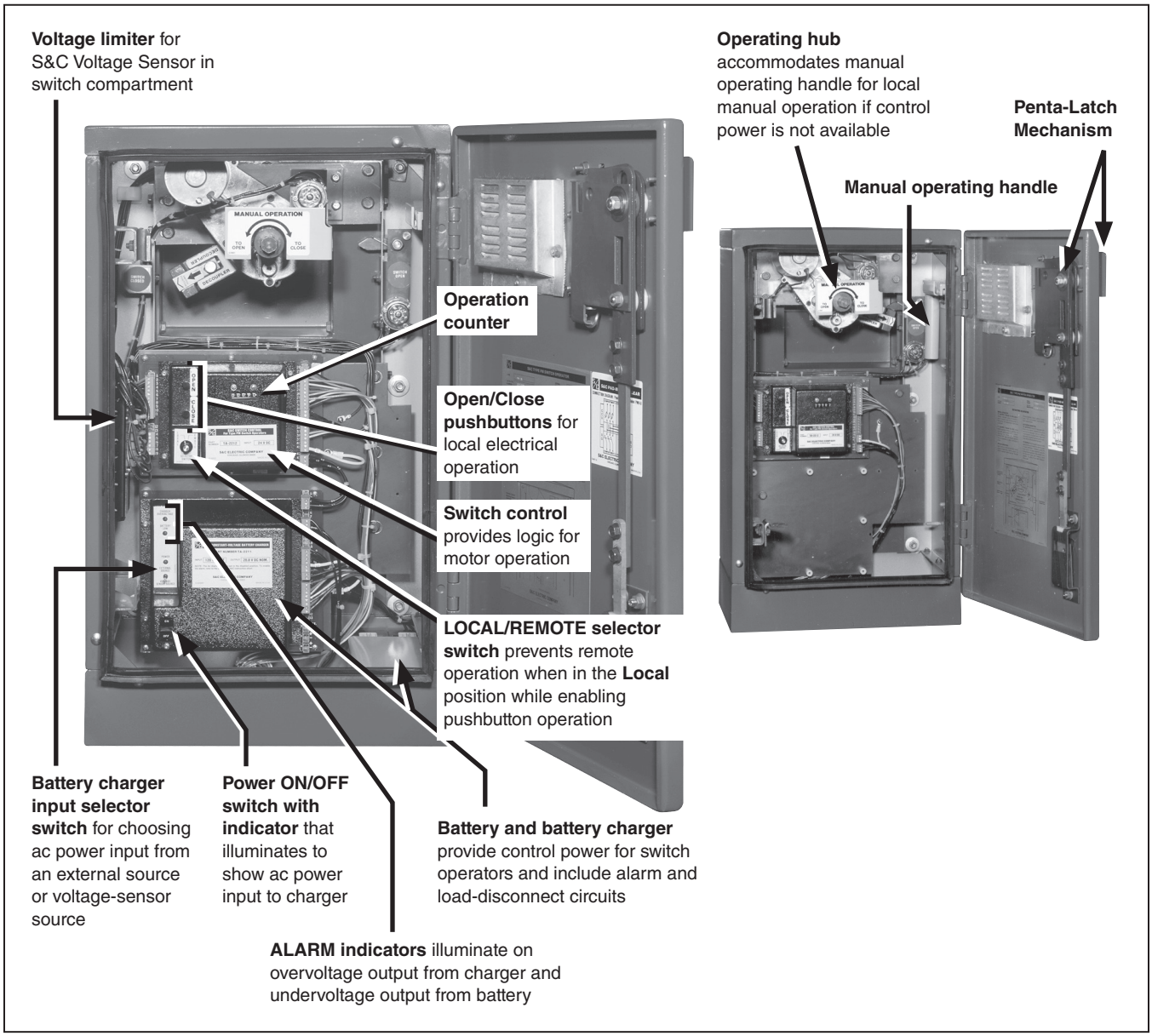

Figure 1. Interior view of a Type PM Switch Operator. Inset shows a Type PM Switch Operator not equipped with a control power source.

⚠ WARNING

To prevent remote operation of the Type PM Switch Operator during a local operation or when decoupling or coupling a switch operator to the Mini-Rupter Switch, place the LOCAL/REMOTE selector switch in the **Local** position. **Unexpected operation may result in serious injury.** Refer to Figure 1 on page 8.

NOTICE

To avoid temporary service interruptions when test-operating the switch operator with the pad-mounted gear energized, decouple the switch operator from its associated Mini-Rupter Switch. Refer to the "Decoupling" section on page 10.

NOTICE

Before closing the Mini-Rupter Switch, make sure the optional dual-purpose front barrier (pad-mounted gear catalog number suffix "G1"), if furnished, is not inserted into the open gap of the switch. If the switch is inadvertently closed into the barrier, refer to the "If Operator Stalls" section on page 13.

A LOCAL/REMOTE selector switch is provided on the switch control to select the operating mode. A contact is also provided for remote indication of selector switch position. During normal operation, the selector switch is set to "REMOTE," and the local **Open/Close** pushbuttons will not function. When the selector is set to "LOCAL," remote operation is blocked, and the **Open/Close** push-button or manual operating handle can be used.

Local Operation

If control power is available—Place the LOCAL/REMOTE selector switch in the **Local** position. If the Mini-Rupter Switch is coupled to the switch operator, the switch may be opened or closed by pressing the appropriate **Open/Close** pushbutton. If the Mini-Rupter Switch is decoupled from the switch operator, only the switch operator will move to the **Open** or **Closed** position.

If control power is not available—Place the LOCAL/REMOTE selector switch in the **Local** position. Then, place the manual operating handle on the operating hub and rotate the handle approximately 155° in the appropriate direction, as indicated by the arrows on the "MANUAL OPERATION" label (counterclockwise to open, clockwise to close). See Figure 2.

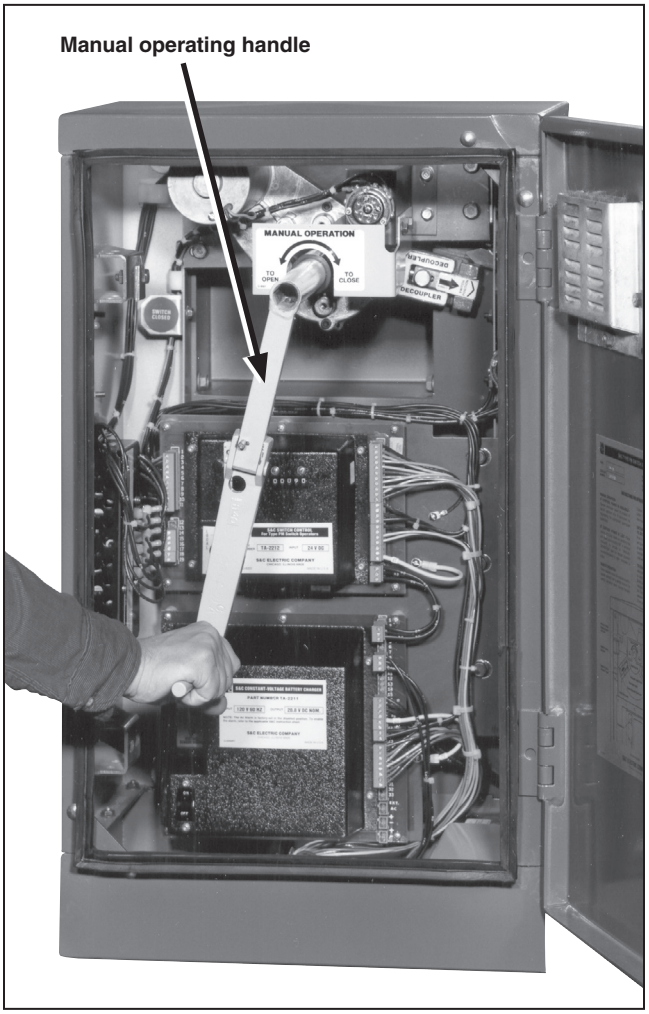

Figure 2. Manual operation using the manual operating handle.

Remote Operation

To permit remote operation of the switch operator, place the LOCAL/REMOTE selector switch in the **Remote** position. The switch operator will respond to opening and closing signals initiated from a remote location as long as control power is available. The **Open/Close** push-buttons cannot be operated.

Decoupling

To decouple the switch operator from the Mini-Rupter Switch, place the LOCAL/REMOTE selector switch in the **Local** position. Then, slide the decoupler-latch knob in the direction indicated by the arrow on the decoupler latch, and pivot the latch to a position perpendicular to the drive levers. See Figure 3. When decoupled, the switch operator can be exercised without affecting the position of the Mini-Rupter Switch.

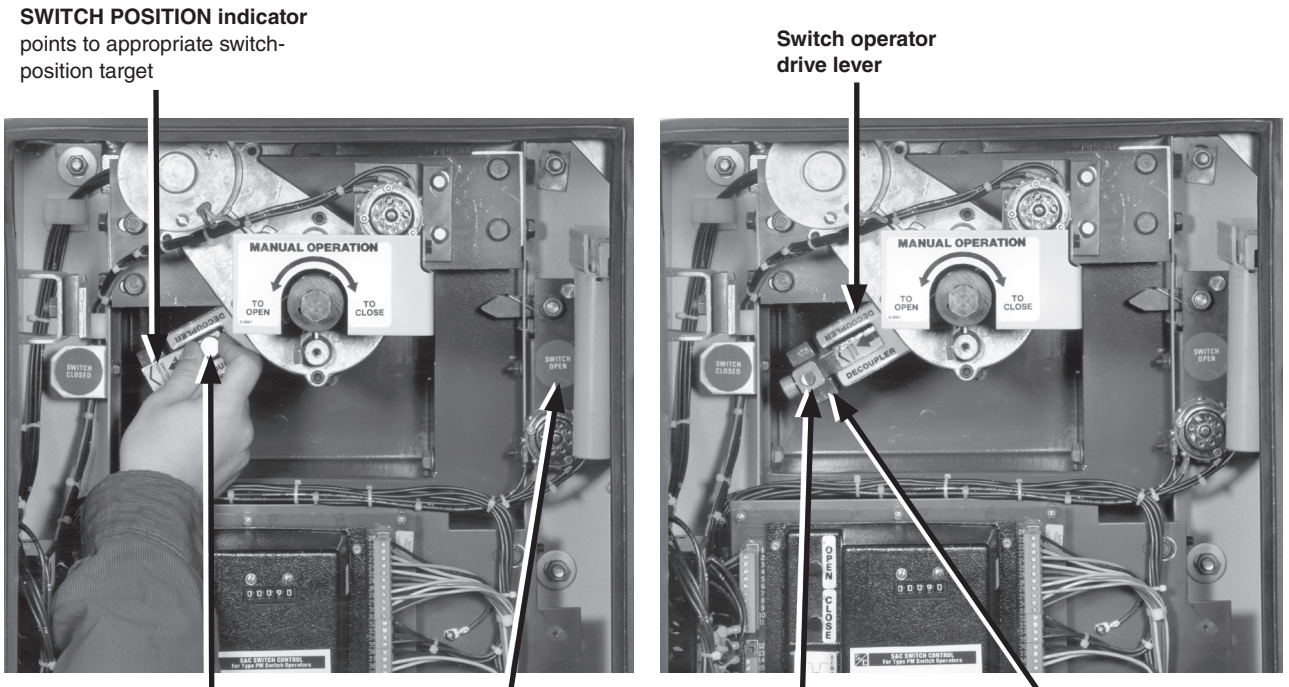

Figure 3. Decouple the switch operator by sliding the decoupler-latch knob in the direction of the arrow (left) and pivoting the decoupler latch to a position perpendicular to the drive levers (right).

Coupling

Complete these steps to couple the switch operator to the Mini-Rupter Switch:

STEP 1. Place the LOCAL/REMOTE selector switch in the **Local** position.

STEP 2. Move the switch operator drive lever into alignment with the switch drive lever using the appropriate **Open/Close** pushbutton. See Figure 4.

Note: If necessary, bring the drive levers into exact alignment by placing the manual operating handle on the operating hub and slowly turning the handle until the drive levers are aligned.

STEP 3. Latch the switch drive lever to the switch operator drive lever by pivoting the decoupler latch until it snaps into place between the arms of the switch operator drive lever.

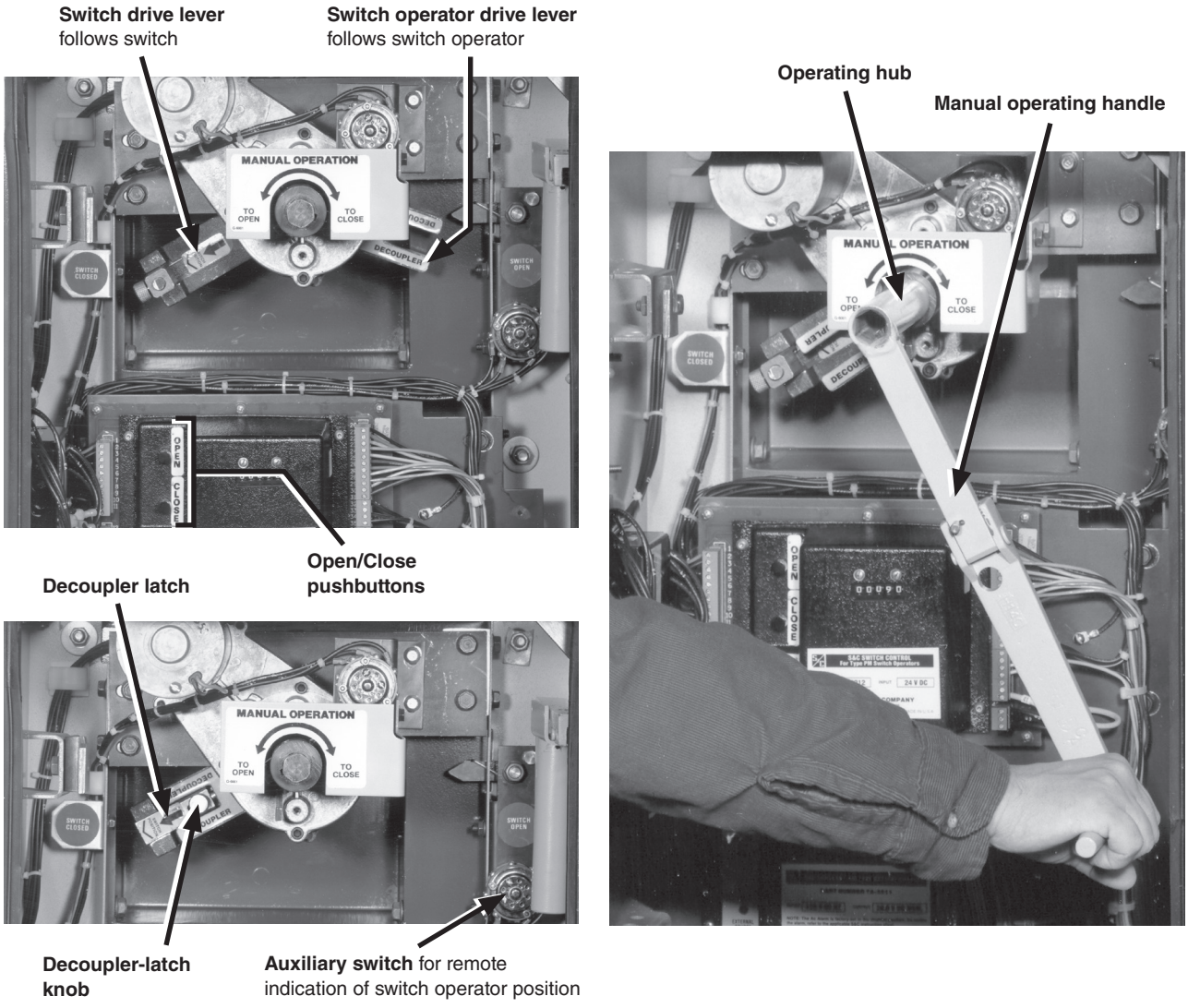

Figure 4. Couple the switch operator by using the Open/Close pushbuttons and the manual operating handle to bring the drive levers into alignment (upper left and right), then snap the decoupler latch into place (bottom left).

Final Checks Before Walking Away

To ensure the Type PM Switch Operator is ready for power operation of the Mini-Rupter Switch by remote supervisory control, make sure the following conditions exist:

- The optional dual-purpose front barrier, if furnished, is in its normal hanging position.
- The switch operator is coupled to the switch with the drive levers latched together.
- The LOCAL/REMOTE selector switch is in the **Remote** position.
- For switch operators using an external, user-supplied 24-Vdc power source●, the power source is connected to the switch control. If necessary, refer to the wiring diagrams in the "Installation and Operation Information Kit."
- For a switch operator with a battery and battery charger●:
  - The power ON/OFF switch on the battery charger is in the **On** position and the POWER indicator is illuminated.
  - The CHARGER OVERVOLTAGE and BATTERY LOW indicators are not illuminated.
  - The battery-charger input selector switch is in the External Source position if ac power input to the battery charger is provided by external, user-supplied 120-Vac power source and the power source is connected to the battery charger. If necessary, refer to the wiring diagrams in the "Installation and Operation Information Kit."
  - The battery-charger input selector switch is in the **Voltage Sensor Source** position if ac power input to the battery charger is provided by an internal S&C-supplied (voltage sensor) power source.
- For a switch operator with an ac power supply●:
  - The power ON/OFF switch for ac power supply is in the **On** position and the POWER indicator is illuminated.
  - The external, user-supplied 120-Vac power source is connected to the ac power supply. If necessary, refer to the wiring diagrams in the "Installation and Operation Information Kit."
  - The input fuse is installed in the fuse receptacle on the ac power supply.
- For a field-installed Type PM Switch Operator with optional Type ZSD Overcurrent Relay (switch operator catalog number suffix "-Z1" or "-Z2"), refer to S&C Instruction Sheet 551-500 for applicable instructions.
- The switch operator door is latched and secured with a padlock.

● For a factory-installed switch operator, refer to the pad-mounted gear catalog number suffixes on the nameplate affixed to the outside of a high-voltage compartment door. For field-installed switch operators, refer to the switch operator catalog number suffixes on the nameplate affixed to the outside of the switch operator door.

The quick-make quick-break mechanism of the Mini-Rupter Switch will stall in an **Unlatched** state if the switch operator is inadvertently closed while the switch blades are blocked by an optional dual-purpose front barrier (pad-mounted gear catalog number suffix "-G1") inserted into the open gap of the switch. To determine whether the mechanism has stalled, observe the position of the SWITCH POSITION indicator. The arrow will point to a position below the "SWITCH OPEN" target. See Figure 5.

NOTICE

If the operator stalls, do not remove the optional dual-purpose front barrier from the open gap of the Mini-Rupter Switch, do not press the **Close** pushbutton of the switch operator, and do not manually close the switch until instructed to do so in Step 5 on page 14. **Failure to follow these instructions may result in incomplete switch closure, which may damage the switch.**

If one of the switch operators on the pad-mounted gear is equipped with an S&C Battery Charger and battery packs, make sure the power ON/OFF switch of the battery charger is returned to the **On** position when finished so the batteries will be charged.

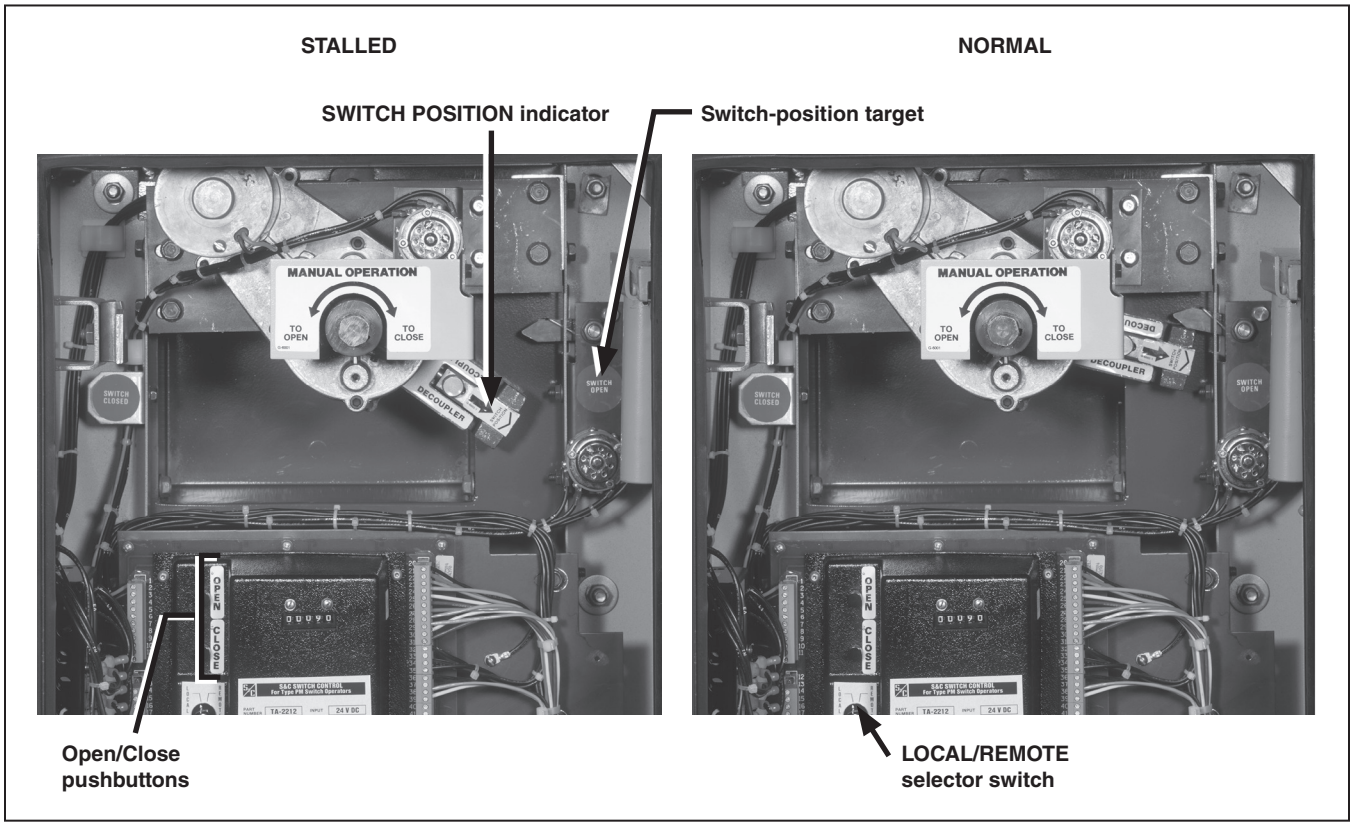

Figure 5. An arrow on the SWITCH POSITION indicator appears below "OPEN" switch-position target if the mechanism stalls in an Unlatched condition.

If Operator Stalls

If an operator stalls, complete the following steps:

STEP 1. Place the LOCAL/REMOTE selector switch in the **Local** position to prevent remote operation.

STEP 2. To ensure the other power-operated Mini-Rupter Switches in the gear cannot be operated remotely, either place the LOCAL/REMOTE selector switches of the other switch operators in the **Local** position or place the power ON/OFF switch of the RTU (if applicable) in the **Off** position.

As an alternate, all of the switch operators can be prevented from being operated remotely or locally by placing the power ON/OFF switch of the battery charger or ac power supply (if furnished) in the **Off** position, but this must be done after performing Step 3(a).

STEP 3. Re-latch the quick-make quick-break mechanism of the stalled Mini-Rupter Switch as follows:

(a) ***If control power is available:*** Press the **Open** pushbutton. The SWITCH POSITION indicator will point to the "SWITCH OPEN" target. If desired, the power ON/OFF switch of the battery charger or ac power supply (if furnished) can now be placed in the **Off** position.

(b) ***If control power is not available:*** Place the manual operating handle on the operating hub. Refer to Figure 2 on page 9. Then, rotate the handle in the "TO OPEN" (counterclockwise) direction until a distinct "click" is heard, indicating the quick-make quick-break mechanism of the switch has latched. The SWITCH POSITION indicator will point to the "SWITCH OPEN" target.

STEP 4. Open the appropriate high-voltage compartment doors, remove the dual-purpose front barrier from the open gap of the Mini-Rupter Switch, and place the barrier in its **Hanging** position. Then, close and secure the high-voltage compartment doors with a padlock.

STEP 5. Reclose the Mini-Rupter Switch as follows:

(a) ***If control power is available:*** Press the **Close** pushbutton of the switch operator. The SWITCH POSITION indicator will point to the "SWITCH CLOSED" target.

(b) ***If control power is not available:*** Place the manual operating handle on the operating hub. Then, rotate the handle approximately 155° in the "TO CLOSE" (clockwise) direction, as indicated by the arrows on the "MANUAL OPERATION" label. The SWITCH POSITION indicator will point to the "SWITCH CLOSED" target.

STEP 6. Return the LOCAL/REMOTE selector switch to the **Remote** position.

STEP 7. ***If the LOCAL/REMOTE selector switches of the other switch operators were placed in the Local position:*** Return these selector switches to the **Remote** position. Also, return the power ON/OFF switch of the RTU to the **On** position if the RTU was previously turned off.

STEP 8. Return the power ON/OFF switch of the battery charger or ac power supply to the **On** position if it was previously turned off.

STEP 9. Close and secure the switch operator doors with padlocks.

⚠ WARNING

Before inspecting, exercising, or performing any maintenance on a Type PM Switch Operator, place the LOCAL/REMOTE selector switch in the **Local** position to ensure the operator cannot be operated remotely. Also, decouple the switch operator to ensure the Mini-Rupter Switch does not change position. Refer to the "Decoupling" section on page 10. **Unexpected remote operation of the switchgear may cause severe injury.**

Exercising

S&C recommends occasionally exercising the Mini-Rupter Switch. In addition, the Type PM Switch Operator should be given an exercising consisting of five or more operations at least once every year, unless normal operating duty provides equal or greater exercise.

With the switch operator decoupled from the Mini-Rupter Switch, exercising of the operator can be performed at any convenient time without operating the switch itself, thus eliminating an interruption of service.

Battery Replacement

No routine maintenance is required for the battery packs. Refer to S&C Data Bulletin 669-97 (included when the battery and charger are furnished) for information concerning the life expectancy of the battery packs. Evidence the batteries are reaching their end of life include illumination of the BATTERY LOW indicator and remote alarm indication from the battery charger. A measured open-circuit voltage across either battery pack of 10 Volts or less indicates both battery packs should be replaced.

To replace the battery:

STEP 1. Place the power ON/OFF switch on the battery charger in the **Off** position and the LOCAL/REMOTE selector switch in the **Local** position.

STEP 2. Remove the nuts securing the bracket over the battery packs. Remove the bracket. See Figure 6.

STEP 3. Remove the connectors from the terminals of the battery packs, and remove the old battery packs.

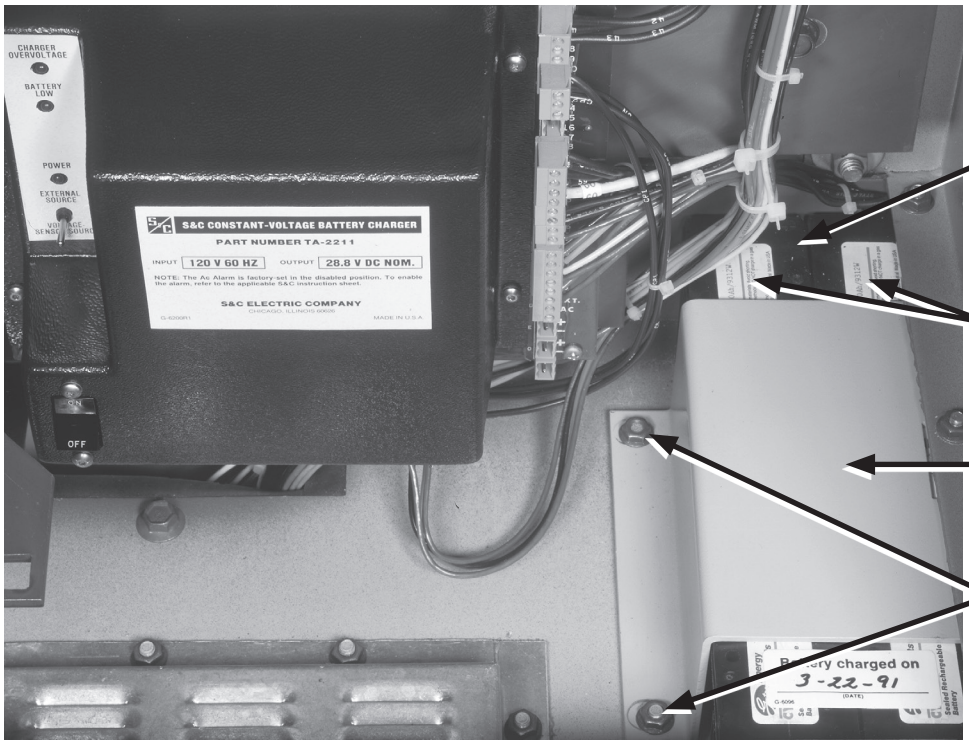

Figure 6. For battery replacement, remove the nuts that securely hold the bracket down over the battery.

STEP 4. Attach the connectors to the terminals of the new battery packs, making sure the positive and negative terminals are connected according to the wiring diagram provided for the switch operator.

STEP 5. Replace the bracket and tighten the two nuts.

STEP 6. Properly dispose of the old battery packs.

Enclosure Finish

Maintaining a finish that protects the enclosure is the responsibility of both the manufacturer and the user. S&C Remote Supervisory PMH and PME Pad-Mounted Gear and S&C Type PM Switch Operators are finished with the Ultradur® II Outdoor Finish, which provides lasting protection for the enclosure. To retain this protection, the user should take periodic corrective action as follows:

STEP 1. Touch up any penetration of the finish to bare metal, such as scratches and abrasions caused by shipping or vandalism, to maintain the original finish integrity. S&C primer and touch-up finish are available in aerosol spray cans. See S&C Specification Bulletin 664-31 or 666-31 for ordering information. No other primer or finish is approved.

The area to be touched up should be cleaned to remove all oil and grease. Sand the area, removing any traces of rust that may be present, and make sure all edges are feathered before applying primer.

STEP 2. Provide an occasional simple washdown, such as an automobile would be given, to remove surface contaminants. Use any ordinary mild household detergent solution.

In instances where the user must refinish the enclosure before the finish has weathered—for example, to match other equipment—the entire surface must be sanded to provide a tooth to bond the new coat to the unusually tough and smooth Ultradur II Outdoor Finish.