S&C Switch Operators
Types AS-1A and AS-10
Types AS-1A and AS-10 Switch Operators are high-speed operators expressly designed for power operation of S&C Alduti-Rupter Switches.

Type AS-1A Switch Operators are intended for use with S&C Alduti-Rupter Switches with rotating-type operating mechanisms and have a maximum operating time of .75 second. Type AS-10 Switch Operators are intended for use with S&C Alduti-Rupter Switches with reciprocating-type operating mechanisms and have a maximum operating time of 1.2 seconds. This high operating speed provides sufficient moving-contact velocity in the Alduti-Rupter Switch interrupters to ensure full interrupting capability and long operating life.

The operators' high operating speed also provides adequate closing velocity for 25/34.5-kv and 34.5-kv...
Three-Pole Side-Break Integer Style and Three-Pole Vertical-Break Integer Style switches such that the Side-Break Integer Style switches have a one-time duty-cycle fault-closing rating of 15,000 amperes rms asymmetrical, and the Vertical-Break Integer Style switches have one-time duty-cycle fault-closing ratings of 20,000 or 30,000 amperes rms asymmetrical for switches rated 600 amperes or 1200 amperes, respectively.

Type AS-1A and Type AS-10 Switch Operators may be furnished with optional Source-Transfer Control Compatibility. This accessory permits use of the switch operator along with a second switch operator and an S&C Type AT-2 Source-Transfer Control in Weatherproof Enclosure to provide automatic source transfer for primary-selective overhead distribution systems.

Shown below in Figure 1 are some of the important features of Type AS-1A Switch Operators. These features are discussed in detail in the “CONSTRUCTION AND OPERATION” section and apply to Type AS-10 Switch Operators as well. Type AS-10 Switch Operators,
however, utilize a gearbox housed in the upper portion of the enclosure, which transmits motion to an output shaft at the rear of the enclosure. A lever and clevis-fitting arrangement, attached to this output shaft, is used to drive the reciprocating-action vertical operating pipe. See Figure 2.
CONSTRUCTION AND OPERATION

The Enclosure
The switch operator is housed in a weatherproof, dustproof enclosure of sturdy, 3/32-inch sheet aluminum. All seams are welded and enclosure openings are sealed with gasketing or O-rings at all possible water-ingress points. A fused space heater is provided to maintain air circulation for condensation control. The space heater is factory-connected for 240-volt ac operation but can be readily field-reconnected for 120-volt ac operation. Access to the interior components is by door rather than by removal of the entire enclosure—an obvious advantage during foul weather. To ensure the utmost security against unauthorized entry, the enclosure includes such features as:

- Cam-action latch . . . seals door in compression against gasket
- Two concealed hinges
- Laminated safety-plate glass, gasket-mounted observation window
- Padlockable door handle, pushbutton protective cover, manual operating handle, and selector handle
- Key interlock (when specified).

Power Train
The power train consists essentially of a reversible motor coupled to the output shaft. Motor direction is controlled by a supervisory switch which actuates the open or closing contactor as appropriate to energize the motor and to release the electromagnetic brake. Fingertip precision adjustment of output-shaft rotation is provided on Type AS-1A Switch Operators by means of self-locking spring-biased cams. (On Type AS-10 Switch Operators the cams are permanently set at the factory and do not require field-adjustment). Antifriction bearings are used throughout; the gear-train shafts feature tapered roller bearings.

Manual Operation
A built-in nonremovable, foldaway manual operating handle, for manually opening and closing the Alduti-Rupter Switch, is located on the front of the switch-operator enclosure. See Figure 3. By pulling the latch knob on the hub of the manual operating handle, the handle can be pivoted from its storage position to the cranking position. 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.

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.

On Type AS-1A Switch Operators, the position of the Alduti-Rupter Switch is shown on an indicator located on the output-shaft collar. See Figure 3. The position of the switch operator is shown on an indicator visible through the observation window. See Figure 4. The manual operating handle may be disengaged from the switch-operator mechanism at any position of the handle and padlocked.

Figure 3. Manual operation.
Externally Operable Internal Decoupling Mechanism

An integral external selector handle, for operation of the built-in internal decoupling mechanism, is located on the right-hand side of the switch-operator enclosure. See Figure 3. By swinging this handle upright and rotating it clockwise 50° – as shown in Figure 4 – the switch-operator mechanism is decoupled from the output shaft. When thus decoupled, the switch operator may be manually or electrically operated without operating the Alduti-Rupter Switch. Moreover, when decoupled, the switch-operator output shaft is prevented from moving by a mechanical locking device within the 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 (except for 12-volt dc models) 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.

Recoupling is foolproof. It is impossible to couple an “open” Alduti-Rupter Switch with the switch operator in the “closed” position, or vice-versa. Coupling is possible only if the switch-operator output shaft is mechanically synchronized with the switch-operator mechanism. This synchronization is readily achieved by manually or electrically operating the switch operator to bring it to the same position (open or closed) as the Alduti-Rupter Switch. The switch-operator position indicators, seen through the observation window, will show when the approximate open or closed position has been attained. See Figure 4. Then, to move the switch operator to the exact position for coupling, the manual operating handle is turned until the position-indexing drums are numerically aligned.
Travel-Limit Adjustment

On Type AS-1A Switch Operators, a travel-limit switch coupled to the motor governs the extent of output-shaft rotation in the opening and closing directions. It includes two contacts that are operated by cam-actuated rollers. See Figure 5.

Opening travel is precisely adjusted by raising and turning the opening-stroke travel-limit cam to the required position. Similarly, closing travel is adjusted by lowering and turning the closing-stroke travel-limit cam to the required position.

Actuating the opening-stroke travel-limit cam de-energizes the opening contactor, which then de-energizes the brake-release solenoid to halt motion of the mechanism. Actuating the closing-stroke travel-limit cam de-energizes the closing contactor, which then also de-energizes the brake-release solenoid to halt motion of the mechanism.

On Type AS-10 Switch Operators, a travel-limit switch coupled to the motor is also used to govern the extent of output-shaft rotation in the opening and closing directions. It too includes two contacts that are operated by cam-actuated rollers. However, these cams are permanently set at the factory to produce an output-shaft rotation of 180 degrees and cannot be field-adjusted. Thus, no travel-limit adjustments are necessary on Type AS-10 Switch Operators.

Figure 5. Adjustment of travel-limit cams on Type AS-1A Switch Operators—for Alduti-Rupter Switches rotating counterclockwise to open.
Auxiliary Switches
An eight-pole auxiliary switch coupled to the motor is furnished as a standard feature. It provides eight individually adjustable contacts pre-wired to terminal blocks (six contacts are available if the switch operator is furnished with optional position-indicating lamps, Catalog Number Suffix “-M”). These contacts are furnished so that external circuits can be established to monitor switching operations.

Like the travel-limit cams, each auxiliary switch contact has a self-locking spring-biased cam which permits precise adjustment of cam-roller engagement at the desired point in the operating cycle. Cam position is adjusted by raising (or lowering) the cam toward its adjacent spring and rotating it to the desired position. See Figure 6. An extra four-pole auxiliary switch coupled to the motor and utilizing the same construction is available as an option (Catalog Number suffix “-Q”).

An extra auxiliary switch coupled to the Alduti-Rupter Switch is also available as an option, and can be provided so that external contacts can be established to monitor Alduti-Rupter Switch operations. This auxiliary switch also utilizes self-locking spring-biased cams. It can be furnished in an eight-pole version (Catalog Number Suffix “-W”) or in a twelve-pole version (Catalog Number Suffix “-Z”).

Figure 6. Adjustment of cams on auxiliary switch.
SWITCH OPERATORS – Types AS-1A and AS-10

<table>
<thead>
<tr>
<th>Application</th>
<th>Voltage Rating of High-Voltage Device</th>
<th>Switch Operator Type</th>
<th>Operating Lever Sector</th>
<th>Length, Inches</th>
<th>Maximum Operating Time, Seconds</th>
<th>Minimum Locked-Rotor Torque at Rated Control Voltage, Inch-lbm</th>
<th>Accelerating Current, Amperes</th>
<th>Catalog Number</th>
<th>Schematic Wiring Diagram Drawing Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>S&amp;C Alduti-Rupter Switches—Rotating Type Operating Mechanism</td>
<td>7.2 kv thru 46 kv</td>
<td>AS-1A</td>
<td>12v dc</td>
<td>1.2</td>
<td>18 500</td>
<td>80</td>
<td>38854R3</td>
<td>CDR-3127</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>46v dc</td>
<td>1.2</td>
<td>21 500</td>
<td>30</td>
<td>38847R4-A</td>
<td>CDR-3113R1</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>125v dc</td>
<td>1.2</td>
<td>21 500</td>
<td>30</td>
<td>38847R4-B</td>
<td>CDR-3113R1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>115v 60 Hz</td>
<td>1.2</td>
<td>18 000</td>
<td>46</td>
<td>38847R4-D</td>
<td>CDR-3128R1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>230v 60 Hz</td>
<td>1.2</td>
<td>18 000</td>
<td>23</td>
<td>38847R4-E</td>
<td>CDR-3128R1</td>
<td></td>
</tr>
<tr>
<td>S&amp;C Alduti-Rupter Switches—Reciprocating Type Operating Mechanism</td>
<td>7.2 kv thru 46 kv</td>
<td>AS-10</td>
<td>12v dc</td>
<td>RH</td>
<td>1.2</td>
<td>18 500</td>
<td>60</td>
<td>38856R3</td>
<td>CDR-3127</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>46v dc</td>
<td>RH</td>
<td>1.2</td>
<td>21 500</td>
<td>30</td>
<td>38853R4-A</td>
<td>CDR-3131R1</td>
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<td></td>
<td></td>
<td></td>
<td>125v dc</td>
<td>RH</td>
<td>1.2</td>
<td>21 500</td>
<td>30</td>
<td>38853R4-B</td>
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<td>115v 60 Hz</td>
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<td>230v 60 Hz</td>
<td>RH</td>
<td>1.2</td>
<td>18 000</td>
<td>23</td>
<td>38853R4-E</td>
<td>CDR-3128R1</td>
</tr>
</tbody>
</table>

1. Applicable for Type AS-10 Switch Operators, only. Operating lever travels in left-hand or right-hand sector as indicated, viewed from front (door side) of switch operator. Operating lever in the “Up” position corresponds to the “Closed” position of the Alduti-Rupter Switch.
2. Refer to the “-S8” or “-S9” Standard Minor Modification appearing on the applicable Alduti-Rupter Switch erection drawing bill of material when selecting an “RH” or “LH” switch operator. Where bracket SA-39154 or SA-39155 is indicated, specify an “RH” switch operator; where bracket SA-39868 is indicated, specify an “LH” switch operator. Consult the nearest S&C Sales Office.
3. Based on minimum battery and external control wire size requirements specified in S&C Data Bulletin 769-60; operating time will be less if larger-than-minimum battery size and/or external control wire size is utilized.
4. This switch operator has output characteristics equivalent to a linear actuator having a stalled-force rating of 4000 pounds (for 12-volt dc models), 4600 pounds (for 48-volt dc and 125-volt dc models), or 3800 pounds (for 115-volt 60-hertz and 230-volt 60-hertz models); a stroke length of 9 inches; and a typical operating speed of 12 inches per second at mid-stroke.
5. Applicable to Alduti-Rupter Switches with operating-mechanism rotation of 90 degrees; operating time will be greater if switch has increased operating-mechanism rotation. Typical running speed of switch-operator output shaft: 26 revolutions per minute.
6. Includes 12-volt dc battery and constant-burden battery charger for connection to an S&C 30-Volt-Ampere Potential Device or other 120-volt, 60-hertz source.
7. CDR-3205 for Catalog Numbers 38847R4-D, 38847R4-3, 38852R4-D, 38852R4-E, 38853R4-D, and 38853R4-3 when furnished with Source-Transfer Compatibility (Suffix “-U”).

ACCESSORIES

<table>
<thead>
<tr>
<th>Item</th>
<th>Suffix to be Added to Switch Operator Catalog Number</th>
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<tbody>
<tr>
<td>Deletion ofExternally OperableOpen–Close Pushbuttons</td>
<td>-J</td>
</tr>
<tr>
<td>Space Heater Thermostat</td>
<td>-K</td>
</tr>
<tr>
<td>Key Interlock with Switch, locks Alduti-Rupter Switch open and disconnects motor-control circuit</td>
<td>-L</td>
</tr>
<tr>
<td>Position-Indicating Lamps (one red, one green), mounted inside the enclosure</td>
<td>-M</td>
</tr>
<tr>
<td>Extra Auxiliary Switch (individually adjustable contacts), 4-PST (coupled to motor)</td>
<td>-Q</td>
</tr>
<tr>
<td>Source-Transfer Control Compatibility. Permits use of Type AS-1A or Type AS-10 Switch Operator with S&amp;C Source-Transfer Control—Type AT-2 in Weatherproof Enclosure</td>
<td>-U</td>
</tr>
<tr>
<td>Duplex Receptacle and Convenience-Light Lampholder with Switch</td>
<td>-V</td>
</tr>
<tr>
<td>Extra Auxiliary Switch (individually adjustable contacts), 8-PST (coupled to Alduti-Rupter Switch)</td>
<td>-W</td>
</tr>
<tr>
<td>Remote-Control Blocking Switch, prevents remote operation of switch operator when the protective cover for the externally mounted open-close pushbuttons is open</td>
<td>-Y</td>
</tr>
<tr>
<td>Extra Auxiliary Switch (individually adjustable contacts), 12-PST (coupled to Alduti-Rupter Switch)</td>
<td>-Z</td>
</tr>
</tbody>
</table>

1. Type AS-1A and Type AS-10 Switch Operators specified with Source-Transfer Control Compatibility (Suffix “-U”) cannot be furnished with Key Interlock with Switch (Suffix “-L”) or Remote-Control Blocking Switch (Suffix “-Y”).
2. Required for some automatic-transfer and sectionalizing schemes.
3. Available as an optional accessory only with Type AS-1A and Type AS-10 Switch Operator Catalog Numbers 38847R4-D, 38847R4-3, 38852R4-D, 38852R4-E, 38853R4-D, and 38853R4-3 when furnished with Source-Transfer Compatibility (Suffix “-U”).
4. The 8-PST Extra Auxiliary Switch (Suffix “-W”) cannot be furnished if the 12-PST version (Suffix “-Z”) is specified, and vice versa.
Type AS-1 A Switch Operators

SELECTOR HANDLE (IN OPERATING POSITION)

SELECTOR HANDLE (IN DECOUPLED STORAGE POSITION)

MANUAL OPERATING HANDLE (IN CRANKING POSITION)

5 x 5 AREA FOR CONDUIT ENTRANCE (LOCATED ON FAR SIDE FOR 12-VOLT DC SWITCH OPERATOR*)

12 x 12 x ⅜ REMOVABLE CONDUIT PLATE*

1⅛ DIA. HOLES (ONE SET TO BE SELECTED FOR MOUNTING)

* 12-volt dc switch operator includes battery compartment with separate access door, and with conduit-entrance area located on the left side.
Type AS-10 Switch Operators

12-volt dc switch operator includes battery compartment with separate access door, and with conduit-entrance area located on the left side.

* 12-volt dc switch operator includes battery compartment with separate access door, and with conduit-entrance area located on the left side.