Selection and Application Guide for SB Control and Transfer Switches
INTRODUCTION To
Control and Transfer Switches

Multi stage / Versatile / Reliable

The SBM Switch
is a rotary, cam-operated, compact switch for panel mounting only. Two electrically separate and mechanically independent contacts per stage. These small, versatile switches mount close and wire easily on a switchboard. Common types are warehouse stock.

Instruction Book - GEH-2038
Renewal Parts - GEF-4167

The SB-1 Switch
is a rotary, cam-operated switch, slightly larger than the SBM switch and capable of more design flexibility. It can be independently mounted and housed. Many common types are warehoused.

Instruction Book - GEH-908
Renewal Parts - GEF-2357

The SB-9 Switch
is a heavier-duty switch than the SB-1 and is especially designed for applications requiring unusually high numbers of repetitive operations, but otherwise similar in optional features and design capability.

Instruction Book - GEH-908
Renewal Parts - GEF-3481

The SB-10 Switch
is similar to the rotary operation of the SB-1 Switch, but the SB-10 switch has the additional capability of opening and closing contacts with a lateral push or pull of the handle.

Instruction Book - GEH-908
Renewal Parts - GEF-3482

This publication provides descriptive, technical, selection and ordering information on Control and Transfer Switches manufactured by GE Power Management.

To aid in providing the selection and specification of customer requirements, General Arrangements and Contact Diagrams are included in this publication for the various models of standard switches described above. Several standard circuits are illustrated for the common applications such as circuit breaker control and ammeter-voltmeter transfer. Select the model which applies and order by model number only, using the appropriate ordering guide. If the standard switch is satisfactory, except for some minor exception, specify the exception along with the appropriate catalog number.

If a standard model does not meet your application follow the ordering instructions given in this publication to specify the functions required, or order by ‘similar to . . . except (state the exception). Use one of the following forms to place your order:

Form GED-3933 . . . for SBM switches only
Form GED-3934 . . . for SB-1, SB-9, and SB-10 switches: Part 1: Standard features
Part 2: Optional features

For your convenience, the above GED specification forms have been reproduced in this publication and can be copied in lieu of the forms (check Quick Reference - Page 1).
A compact cam operated, positive acting switch for control and transfer service on panels and switchboards, 600 volts and under.

**DESCRIPTION**

The SBM is a compact, positive acting switch for control and transfer service on panels and switchboards, 600 volts and under. Up to 10 stages, 2 contacts per stage can be provided, with independent action, both electrically and mechanically, through eight positions.

**IDEAL FOR SWITCHBOARDS**

The SBM switch is especially adaptable for switchboard applications where space is at a premium. The SBM switch is normally supplied for mounting on panels up to ¼ inch thick. If requested, it can also be supplied for mounting on panels of one or one and a half inches.

Compact design of the SBM switch permits close center-to-center line mounting distances and at the same time, easy access to the terminals for wiring. Also, since the switch is enclosed, there is no need for clearance at the back of the panel to remove a separate cover. This further reduces space requirements.

**RATINGS**

The SBM switch is rated for a mechanical life of 500,000 operations. The electrical ratings are 600 volts ac or dc, 20 amps continuous or 250 amps for three seconds. The interrupting rating depends upon the voltage and character of the circuit. The table below illustrates the interrupting duty of a single contact and contacts in series when various conditions exist on a circuit.

<table>
<thead>
<tr>
<th>Circuit Volts</th>
<th>Non-Inductive</th>
<th>Inductive</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of Contacts</td>
<td>1 in Series</td>
</tr>
<tr>
<td>24 dc</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>48 dc</td>
<td>8</td>
<td>25</td>
</tr>
<tr>
<td>125 dc</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>250 dc</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>600 dc</td>
<td>0.4</td>
<td>0.8</td>
</tr>
<tr>
<td>115 ac</td>
<td>40</td>
<td>75</td>
</tr>
<tr>
<td>230 ac</td>
<td>25</td>
<td>50</td>
</tr>
<tr>
<td>450 ac</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>600 ac</td>
<td>15</td>
<td>25</td>
</tr>
</tbody>
</table>

SBM is recognized under the component program of Underwriter's Laboratories, Inc.

**Table 1: Interrupting Rating in Amperes**
Escutcheons

Two basic types of escutcheons are available: the "Standard Type" shown on the top left is a molded black phenolic material with white lettering for clear reading of the positions. The "Target Type" escutcheon, shown on the top right, is normally furnished on breaker control switches. An aluminum front plate houses the target mechanism with a window in the center to show green for the trip position, red for the closed position, and black for the pull-to-lock position. The target has a slip action so that it will remain green when the handle returns to NORMAL from the TRIP position, and red when it returns from the CLOSE position. This indicates to the operator the last operation of the switch.

The "Keyed Type" shown at bottom center is a modified standard and is shown with keyways for use with the removable type handle.

Aluminum circuit designation plates are available for all three types.

Keyed Escutcheons and Removeable Handles

The removable handle commonly used in synchronizing switches can be made to be removed in any one of the eight positions. There are three keys set in front of the handle, so that they fit the designated keyways in the escutcheon in a desired position. The escutcheon can be keyed so that a handle is interchangeable or non-interchangeable with another switch. If this is desired, the catalog number of the other switch and the position in which the handle is to be removed must be given. The removable handle is not furnished with the switch, but as a separate item.

Handles

Four types of molded black phenolic handles shaped for easy gripping are available with the SBM switch: pistol grip, oval, knurled and lever. Any of the standard handles except the lever may be adapted for removable handle keying. A fixed handle may be easily removed for replacement by a screw in the front of the handle. A white pointer, furnished with the handles (except the lever) and mounted near the escutcheon, give a clear identification of the position that the handle is in. For match and line up with SB-1 switches, type SB-1 pistol grip, oval, knurled and round handles can be furnished for use with SBM switches.

Cams and Contacts

The silver to silver contacts of the SBM switch are of double-break design, as seen at left, which reduces arcing and subsequent pitting of contacts. Each contact is operated by a double surface cam, one surface for closing, the other surface for opening. This construction provides opening and closing action not dependent on springs.
**SBM Features**

**Slip Cams**
The slip cam is basically used on breaker control switches. The slip action enables a contact to remain closed or open after returning to the normal (12 o’clock) position from either the CW or CCW positions.

**Positioning**
Contacts of the SBM switch are positively positioned by a detent wheel mounted on a square shaft and acted upon by a spring-loaded roller arm. If the shaft of the 45° switch is not rotated more than one-half the distance between positions, it will snap back to its prior position. If rotated more than half the distance between positions, it will snap to the next position. The 90° switch has this same positive detent action when in position, but the snapping action is not as prominent. Up to eight positions are available with 45° or 90° between positions.

**Jumpers**
Jumpers are furnished assembled, where required, on all standard listed switches. For special switches or unlisted switches, separate jumpers can be ordered.

**Break-Before-Make Contacts**
Contacts on SBM switches are normally non-overlapping (break-before-make). This sequence is illustrated to the right, which shows that contact No. 1 opens before contact and No. 2 closes.

Another normal function is illustrated by contact No. 3, which is shown in two adjacent positions. When switching between these positions, this contact will always remain closed.

**Spring Action**
Torsion springs return the switch handle to or towards the 12 o'clock or No. 3 position. The travel of the handle is limited to 90° to either side of position 3. The switches may be furnished with spring return both ways, or only one way, with maintaining action in the opposite direction. You can also have spring return from position No. 1 (9 o’clock) to position No. 2 (10 o’clock) and/or spring return from position No. 5 (3 o’clock) to position No. 4 (2 o’clock) with maintained action in other positions. Torsion springs are housed in the rear half of the positioning chamber. There is no need to modify the chamber to accommodate the springs.
Add-A-Stage
A one-half inch extension is provided on the rear of all switches with one to eight stages. This extension enables a maximum of two additional stages to be easily and economically coupled to the existing switch in the event more contacts are required. Maximum number of stages, including Add-A-Stage unit is 10 (20 contacts).

Overlapping Contacts
Overlapping contacts (make-before-break) contribute to the versatility of the SBM switch. Typical overlapping contacts are shown on Switch Model No. 10AA009 see Fig. 9 - page 26. The asterisk (*) indicates an intermediate (non-feel) position and shows the contacts overlapping. In the 10AA009 when turning from the OFF position to reading position “1” (Phase 1), contact 2 closes at the intermediate position and before contact 1 which remained closed through the intermediate position, opens.

Pull-To-Lock
A pull-to-lock mechanism is designed for spring-return switches. When the handle is turned to the 9 o’clock position, it can be pulled and locked in that position. When the handle is pushed in, the handle spring returns to the normal position. This pull-to-lock feature does not actuate contacts, but merely prevents the spring return of the handle.

Terminal Connections
Terminal connections are brought to the corners of each stage, allowing screw connections to be made over a large angle. This angular displacement of connection points allows the switches to be mounted on three-inch centers or less. Typical terminal numbering is shown in figure at left.
The SB-1 Switch offers the following features . . .

- Circuit designation plate is marked for easy identification of switch functions
- Silver-to-silver contacts operate with positive wiping action
- Contacts numbered for easy identification
- Connections easily fastened with screwdriver
- Molded escutcheon plates of durable permanent finish and clear markings are neat in appearance and uniform in size
- Front support spaces body of switch ¾ inch from rear of the panel, allowing ample room for inserting leads into the switch
- Heavy-duty shunt connections
- Good selection of functional handles
- Barriers between adjacent contacts prevents arcing between circuits
- Removable covers (not shown) enclose all live parts

The SB-9 Switch adds these features . . .

- Heavy-duty positioning wheel is held in place by compression spring to assure positive positioning
- Connections easily fastened with screwdriver
- Lighter pistol grip handle is recommended
- Barriers between adjacent contacts prevents arcing between circuits

The SB-10 Switch adds these features . . .

- Lateral action contacts open and close with push or pull of handle
- Rotary action contacts open and close with rotation of handle left or right

SB-1 Flexible Control Switch
The SB-1 Switch is a rotary, cam-operated device for the flexible and dependable control of electrically operated circuit breakers, small motors, magnetic switches and similar devices, and for the transfer of meters, instruments and relays.

The SB-1 Switch has molded cams assembled on a square shaft to prevent slipping. Rotation of the shaft moves cams directly against contact arms so that positive high pressure results at the contact. Contact action is not dependent on springs.

SB-9 Highly Repetitive Control Switch
The SB-9 Control Switch is designed for heavy-duty service involving repetitive operations. The SB-9 switch features are similar to the SB-1 except it has a more positive positioning device, better insulation to ground, and more substantial bearings. The contact development diagrams for specific applications follow the same general form as for the SB-1.

SB-10 Lateral Action Switch
is similar to the SB-1 Switch features, except for the addition of lateral action contacts which provide two electrically separate and mechanically independent switches in one device and are located at the handle end of the switch. The lateral contacts operate independently of the rotary contacts. There may be as many as four stages of lateral contacts (two contacts per stage).

SB-1, SB-9 & SB-10 are recognized under the component program of Underwriter’s Laboratories, Inc.

GE Power Management
**SB-1 / SB-9 / SB-10 Features**

**SILVER-TO-SILVER CONTACTS**
Silver-to-silver contacts operate with a positive wiping action to provide low-resistance current flow. Contacts can be removed independently of other switch parts. Barriers between adjacent contacts prevent arcing between circuits. The switch, complete with cover, can be obtained with up to 16 stages, two electrically separate contacts per stage and for mounting on panels from 1/8" to 2" thick. The panel thickness should be specified when the switch is ordered; if it is not, the switch will be furnished for mounting on panels up to 3/16" thick. The SB-1 switch, which has a standard insulating cover, meets NEMA 1 requirements for panel mounting.

**STANDARD PARTS**
Flexibility and low initial cost are the results of standardizing a basically simple design. Standard SB-1 switches are available for most applications. For special applications, switches can be built from standard parts. The long-wearing cams, positive wiping action of silver-to-silver contacts, and positive contact opening and closing action all contribute to a switch which is high in quality and will give you many years of dependable service.

**LATERAL ACTION**
The lateral action capabilities of SB-10 switches are given in the table. The number of stages, including rotary contacts, is 12. Lateral contacts on the same stage must open and close together.

There are only two lateral positions: IN or OUT. Contacts may be closed in either position. A spring can be furnished so that one of the positions is momentary.

Rotary contacts may have a spring to return the switch to neutral rotary position. When a switch is furnished with both lateral and rotary spring return, the lateral spring can be loaded in the neutral rotary position only.

Interlocks may be provided so that the lateral action can be made in one or more rotary positions. Interlocks may also be provided to prevent rotary action in the IN or OUT positions, or to permit rotary action in both the IN or OUT positions.

The same types of fixed handles and escutcheons used in SB-1 switches may also be used with the SB-10 switches. Drilling dimensions are the same as the SB-1. (See Table 2 below)

**RATINGS**
Type SB-1, SB-9 and SB-10 switches are rated 600 volts, 20 amps continuous, or 250 amps for three seconds. The interrupting rating depends upon the voltage and character of the circuit, and the number of contacts connected in series. Contacts can be paralleled when the current exceeds 20 amps. (See Table 3 below)

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### Table 2: Lateral Action of SB-10 Switch

<table>
<thead>
<tr>
<th>Number of Contacts</th>
<th>Pull to open contacts 1-2</th>
<th>Pull to close contacts 1-2</th>
<th>Pull to open contacts 1-4</th>
<th>Pull to close contacts 1-4</th>
<th>Pull to open contacts 1-6</th>
<th>Pull to close contacts 1-6</th>
<th>Pull to open contacts 1-8</th>
<th>Pull to close contacts 1-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Maintaining or spring return in or out</td>
<td>Maintaining or spring return in or out</td>
<td>Maintaining or spring return in or out</td>
<td>Maintaining or spring return in or out</td>
<td>Maintaining or spring return in</td>
<td>Maintaining or spring return out</td>
<td>Maintaining or spring return in</td>
<td>Maintaining or spring return out</td>
</tr>
<tr>
<td>2</td>
<td>Maintaining or spring return in or out</td>
<td>Maintaining or spring return in or out</td>
<td>Maintaining or spring return in or out</td>
<td>Maintaining or spring return in or out</td>
<td>Maintaining or spring return in</td>
<td>Maintaining or spring return out</td>
<td>Maintaining or spring return in</td>
<td>Maintaining or spring return out</td>
</tr>
</tbody>
</table>

Pull to open denotes the same contact action as push to close.
Pull to close denotes the same contact action as push to open.

### Table 3:

| Circuit Volts | Number of Contacts | Number of Contacts | Number of Contacts | Number of Contacts | Number of Contacts | Number of Contacts | Number of Contacts | Number of Contacts | Number of Contacts | Number of Contacts | Number of Contacts | Number of Contacts | Number of Contacts | Number of Contacts | Number of Contacts | Number of Contacts | Number of Contacts | Number of Contacts | Number of Contacts | Number of Contacts | Number of Contacts | Number of Contacts |
|---------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| 24 dc         | 6                  | 30                 | . . .              | 4                  | 20                 | 30                 | 1                  | 20                 | 40                 | 3                  | 15                 | 25                 | 1                  | 15                 | 25                 | 1                  | 15                 | 25                 | 1                  | 15                 | 25                 | 1                  | 15                 | 25                 |
| 48 dc         | 5                  | 25                 | 40                 | 3                  | 15                 | 25                 | 1                  | 15                 | 25                 | 1                  | 15                 | 25                 | 1                  | 15                 | 25                 | 1                  | 15                 | 25                 | 1                  | 15                 | 25                 | 1                  | 15                 | 25                 |
| 125 dc        | 2.5                | 11                 | 25                 | 2                  | 6.25               | 9.5                | 1                  | 6.25               | 9.5                | 1                  | 6.25               | 9.5                | 1                  | 6.25               | 9.5                | 1                  | 6.25               | 9.5                | 1                  | 6.25               | 9.5                | 1                  | 6.25               | 9.5                |
| 250 dc        | .75                | 2                  | 8                  | .7                 | 1.75               | 6.5                | .7                 | 1.75               | 6.5                | .7                 | 1.75               | 6.5                | .7                 | 1.75               | 6.5                | .7                 | 1.75               | 6.5                | .7                 | 1.75               | 6.5                | .7                 | 1.75               | 6.5                |
| 600 dc        | .25                | .45                | 1.35               | .15                | .35                | 1.25               | .15                | .35                | 1.25               | .15                | .35                | 1.25               | .15                | .35                | 1.25               | .15                | .35                | 1.25               | .15                | .35                | 1.25               | .15                | .35                | 1.25               |
| 115 ac        | 40                 | 75                 | . . .              | 24                 | 50                 | . . .              | 24                 | 50                 | . . .              | 24                 | 50                 | . . .              | 24                 | 50                 | . . .              | 24                 | 50                 | . . .              | 24                 | 50                 | . . .              | 24                 | 50                 | . . .              |
| 440 ac        | 12                 | 25                 | . . .              | 5                  | 12                 | 20                 | 5                  | 12                 | 20                 | 5                  | 12                 | 20                 | 5                  | 12                 | 20                 | 5                  | 12                 | 20                 | 5                  | 12                 | 20                 | 5                  | 12                 | 20                 |
| 550 ac        | 6                  | 12                 | . . .              | 4                  | 10                 | 15                 | 4                  | 10                 | 15                 | 4                  | 10                 | 15                 | 4                  | 10                 | 15                 | 4                  | 10                 | 15                 | 4                  | 10                 | 15                 | 4                  | 10                 | 15                 |

* Values of inductance equal to that of the average trip circuit. For circuits having high values of inductance, refer application to your GE representative for recommendations.

SB-1, SB-9 & SB-10 are recognized under the component program of Underwriter’s Laboratories, Inc.
**HANDES**

Seven different types of fixed handles are shown (A to G). The handles are designed for durability, comfortable grip, and pleasing appearance. An arrow is embedded in the oval and pistol-grip handles for visual aid in positioning. A white pointer is furnished with the knurled and round handles.

In addition to the seven above, a removable type oval handle (H) is available for the SB-1 or SB-9 switches, to prevent inadvertent operation of equipment by unauthorized persons. The removable handle is keyed to fit the escutcheon in a specific position. All but the radial and the lever type handles can be furnished with keyed shanks as removable type handles. The handle can be removed in any one or two positions, and such positions should be specified when the switch is ordered.

**ESCUTCHEONS**

The escutcheon is made of molded black phenolic material with white lettering for clear reading of position labels.

Types of escutcheons:

1. The standard type C, E, or F (See Fig. 8A), is used when all positions are at the horizontal or above.
2. The round type, A or D is used when there are positions below the horizontal.
3. A target-type escutcheon B & G are normally used on breaker control switches, has a red and green target to indicate the last position to which the switch was turned. Pull-to-lock target escutcheons (A to C) are shown to the right. (Note that maximum throw is 75° counter-clockwise and 45° clockwise).
4. Both the standard and the round type escutcheons can be furnished with keyways to interlock with the removable type handles, so that the handle is removable only in a specific position.

A separate circuit designation plate, when furnished, is mounted at the top of the escutcheon and is easily removable.

**POSITIONS**

The maximum number of positions is 12. Position locations and throws are available as shown.

**PULL-TO-LOCK TARGET ESCUTCHEONS**

- **A. Round** 6047044-1
- **B. Oval** 6046075-1
- **C. Radial** 6047043-1
- **D. Knurled** 6079120-1
- **E. Large Pistol Grip** 6208137-1
- **F. Lever** 6248034-1
- **G. Pistol Grip** 6046074-1
- **H. Removable Oval**
CONTACTS AND JUMPERS
Rotary contacts on SB-1, 9, and 10 switches are normally break-before-make. Overlapping contacts (make-before-break) are available and are used basically in ammeter switching applications. Slip contact operation is available for breaker control application. Moving contacts are cam operated for positive opening and closing (Fig. 9A). Stationary contacts are assembled on a common support, mounted at the top of the switch for easy replacement. Three types of stationary contacts are available (Fig. 9B).

A. Electrically common with center binding post, which affords single-break, single-pole, double-throw operation for two electrically common circuits.

B. Electrically separate. Each stage affords single-break, single-pole service for two electrically separate circuits.

C. Electrically common without a center binding post, affording two contacts for double-break action.

Greater switch flexibility can be achieved by use of jumpers (Fig. 9C). Four different types are illustrated. When jumpers are ordered with the switch, they are supplied unassembled without additional cost. They may also be purchased separately and assembled on existing switches.

SPRING RETURN ACTION
Spring return can be adapted to any SB-1, 9, and 10 switch providing these limitations are adhered to:
1. The handle must return to or toward the 12 o'clock position, but not pass it.
2. The maximum throw is 90° to either side of the 12 o'clock position.
3. You cannot have a maintained position past a spring return position. Example: if spring return from pos. 2 to pos. 3 is desired pos. 1 cannot be a maintained position. However, the functional equivalent can be obtained by specifying a pull-to-lock action in place of the maintained position. Spring return from both directions to NORMAL or spring return with maintained action can be provided on the same switch. Example (Fig. 9D):

A. Spring return from position 1 and 2 to 3 maintaining in positions 3, 4 and 5 or spring return from 5 to 4 to 3 maintaining in positions 1, 2 and 3.

B. A five position switch can be furnished with partial spring return from positions 1 to 2 and/or 5 to 4 with maintaining action in the remaining positions (SB-9 only).

PROTECTIVE COVER
A separate and removeable protective cover is standard with the SB-1, SB-9, and SB-10 switches. The cover’s insulative characteristics provide coverage of the exposed connections and contacts from any live parts making it an ideal spec for panel mounting. The four sided cover and metal face plate, slides over the entire staged area and is attached by a knurled type nut that can be attached by hand. An optional large cover (not shown) is available and has a deeper bottom section providing additional space for large capacity cable assemblies. The SB series protective cover meets all NEMA I requirements.
**TANDEM SWITCHES**
The SB-1 and SB-9 switches are limited in length to 16 stages. The SB-10 switch is limited to 12 stages. When more stages are required two or more switches can be assembled in tandem. The tandem arrangement is compact, and allows a large number of circuits to be controlled with a single handle from a small space on the switchboard. The tandem switch can be mounted vertically or horizontally. (See page 22 for dimensions)

**PALLADIUM CONTACTS**
Available for temperature meter switches. Palladium contacts have a constant resistance factor which is necessary because calibrated leads are normally used in temperature meter circuits. Silver contacts would result in a variable resistance factor and cause fluctuations in meter readings.

**LOCKS**
Two different types of locks are available. Each allows the switch to be locked in one or more positions. One lock is built into the operating handle. The other lock is separately mounted on the panel above the switch, and when necessary, can be coordinated with a Kirk Key-Interlock Scheme. (See page 23 for dimensions)

When it is necessary to lock switches in more than one position, a 45° space must be provided between adjacent locking positions. Therefore, eight is the maximum number of lock positions that can be furnished.

**PULL-TO-LOCK**
A pull-to-lock may be added to lock the switch against spring return action. Locking is accomplished by pulling the handle out in the pull-to-lock position to engage a latch which arrests the spring return. The switch will remain in the locked position until the handle is pushed in. *Note.* This pull-to-lock feature does not actuate contacts when pulled.

The following are standard pull-to-lock combinations available with a standard target type escutcheon:

A. Spring return from all positions to NORMAL except when locked, pull handle to lock at 75° CCW.
B. Spring return from 45° CW and CCW to NORMAL, pull to initiate locking at 45° CCW then turn to 75° CCW and pull-to-lock.
C. Spring return from 45° CW and CCW except when pulled-to-lock at 45° CCW. Special pull-to-lock switches can be furnished; however, spring return action from the pull-to-lock position is required.

**PULL-TO-TURN**
A pull-to-turn feature can be incorporated in a SB-1 or SB-9 switch to prevent accidental operation. The handle is locked against turning when it is in the “in” position and must be pulled out to unlock and turn to the selected positions; it is equipped with a lateral spring that pulls the handle to the “in” position. The handle can be locked against turning in one or more positions, or can be free to rotate between certain positions while in the “in” position. Rotary spring action is not recommended with “pull-to-turn” because the lateral spring may not always overcome the rotary spring and automatic return to neutral may not always occur.

**PUSH-TO-TURN**
The “push-to-turn” feature is almost the exact opposite of the above shown “pull-to-turn” feature, and the same restriction as to the use of rotary spring return applies.
Description of Cam Action & Limitations

The operating cam of SB-1, 9, and 10 switches is based on a 30° cut to each side of the center (Fig. 11A). A standard-profile cam will fully open or close a contact in 30°, making or breaking 15° from the fully open or fully closed position.

Fig. 11B is a composite view of contacts and cams assembled on a stage of a switch. This figure shows that odd-numbered contacts are on the right side of the switch (viewed from the front), and are closed by the “C” cam. Even-numbered contacts are on the left side, and are closed by action of the “A” cam. Both contacts are opened by the “6” cam.

Fig. 11D is the contact diagram for Fig. 11B, with Fig. 11C showing the individual arrangement of cams.

One cam limitation must be considered when the switch rotates 180° or more. Referring to Fig. 11C, when cam B is rotated 180°, the same relationship occurs between the periphery of Cam B and the contact mechanism of Contact No. 1 as occurred between the periphery and contact mechanism of Contact No. 2 before rotation; therefore, whatever happens to one contact at any point in the switch rotation must happen to its companion contact in the same stage when the switch is rotated 180°. Fig. 12A shows the diagram of an unworkable and a correct arrangement.

When contacts on the same stage cannot be arranged to avoid this 180° cam limitation, one contact per stage is used (See Fig. 12B). On five-position switches, 37½° can be used instead of 45°, to avoid this limitation.

**SLIP CAMS**

Slip cams increase the flexibility of the switch. They allow a contact to be closed in the NORMAL position after returning from either the CW or CCW position, and also to be open in the NORMAL position after returning from the opposite direction. This action is accomplished by allowing the cam to slip 45° as shown in Fig. 12C. Once the shaft actuates the cam, the shaft will then slip 45° in the opposite direction without actuating the cam.

This type of action is commonly used for circuit-breaker control applications. Fig. 12D shows a breaker control switch, Model 16SB1B2, which has slip action on Contacts 7 and 8. With this slip action, there are some limitations. Three of these limitations and how to avoid them are shown. Limitation No. 1 does not apply to the SBM switch because of the independent cams for each contact.
Limitation No. 1 (SB-1/SB-9/SB-10)
A slip contact and standard contact cannot be on the same stage, as shown in the top diagram.
A stage must be added and contacts split up, as shown is the bottom, one contact per stage. (Does not apply to SBM).

Limitation No. 2 (SBM/SB-1/SB-9/SB-10)
On a 4-position pull-to-lock switch the slip contact cannot be closed in the 2N and 2 positions (as shown in the top diagram) without closing in position 1. To accomplish this, a stage is added and the contacts are connected in series as shown in the bottom diagram.

Limitation No. 3 (SBM/SB-1/SB-9/SB-10)
A contact cannot be closed in the normal after position without also closing in the position itself, as shown in the top diagram. To accomplish this, a stage must be added and the contacts set up as shown in the bottom diagram, with the contacts placed in series by jumpers. Jumpers required are shipped loose with the switch.

Figure 12A:
Diagram of unworkable and correct arrangement

Figure 12B:
Contact arrangements to meet cam limitations

Figure 12C:
Diagram showing 45° slip action of cam

Figure 12D:
Breaker control switch model 16SB1B2
Overlapping Contacts

**GENERAL**

Contacts on Type SB switches are normally non-overlapping (break-before-make). This sequence is illustrated in Fig. 13A which shows that Contact No. 1 opens before Contact No. 2 closes, when turning from Position 1 to Position 2.

Another normal function is illustrated by Contact No. 3, which is shown closed in two adjacent positions (Positions 2 and 3). When switching between these positions, the contact will always remain closed. There are some circuits where this action is not desired, such as switching current transformers to an ammeter. Here, the contacts must overlap (make-before-break) to prevent damaging the meter.

**SBM SWITCH**

To get this overlapping action on the contacts, 90° between positions is required. Fig. 13B illustrates an ammeter switch (similar to Model No. IOAA009, see Fig. 9 - page 26) with overlapping contacts. The overlapping action takes place in the intermediate positions (Positions 2, 4, 6, and 8). The intermediate position is identified by an “X” in the block above this position in the operating requirement table. Contacts 1 and 2 are shown overlapping in the intermediate Positions 4 and 6. Contact 2 is shown making in intermediate Position 4 before Contact 1 breaks, when going from Position 3 (OFF) to Position 5 (PHASE I), and Contact 1 will make before Contact 2 breaks, when going from Position 5 to Position 7.

Fig. 13C illustrates an ammeter switch for three independent current transformers (similar to Model No. IOAA013, see Fig. 13 - page 27). This switch also has overlapping contacts and intermediates at Positions 2, 4, 6, and 8; however, the overlapping action takes place between the intermediate position and the actual position. The “X” on the line between the positions of the contacts identifies this action. When turning from Position 5 (PHASE I) to Position 7 (PHASE II), Contact 1 makes before Contacts 2 and 3 break. Also, Contact 2 and 3 break before Contacts 4 and 5 make, and Contacts 4 and 5 make before Contact 6 breaks. All this action takes place within the 90° between positions, by use of a special cam.

**SB-1, -9, AND -10 SWITCHES**

Basically, the overlapping action is the same as with the SBM switch, but it is not limited to positions which are 90° apart. To get a make-before-break action, as shown in Fig. 13D, a minimum of 37½° between positions is required. To get a make-before-break action, as shown in Fig. 14A, a minimum of 60° is required. The flexibility of the SB-1, -9, and -10 switch allows the combination of 37½° and 60° in the same switch to give you an ammeter switch which reads as many as six, independent, current transformers with either 1 or 2 OFF’s (See Fig. 14B).

A special contact sequence which requires a contact to close in adjacent positions, but to open momentarily between them, is shown by Contact 1 in Fig. 14C. A minimum of 60° between positions is required. When less than 60° is required, use two contacts in parallel, as shown in Fig. 14D.
**Fig. 14A**: Overlapping contacts for SB-1 ammeter-type switch, with three independent circuits.

**Fig. 14B**: Overlapping contacts for SB-1 switch, with six independent circuits.

**Fig. 14C**: Special contact sequence which requires one contact to be closed in every handle position, but to open momentarily when switching.

**Fig. 14D**: Special contact sequence which requires one contact to be closed in every handle position, but to open momentarily when switching; however, when less than 60° between positions is required, two contacts are connected in parallel.
Removable Handles

DESCRIPTION
To prevent operation of equipment by unauthorized persons, switches with removable handles are available. The handle is keyed to a specific escutcheon, to be inserted and removed in a designated position. Handles can also be mutually keyed to other escutcheons, so that they are either interchangeable or non-interchangeable with other switches.

This feature is available for SBM, SB-1, and SB-9 switches, but ordering procedures differ.

SBM SWITCHES
The keyed escutcheon on the SBM switch (Fig. 15A) has eight possible keyway locations. Three are normally used and are assigned by the factory. The choice is influenced by several factors:

a. If the handle is to be interchangeable with that of another switch, the position in which each handle is to be removable must be considered.
b. If the handle is to be non-interchangeable, the keyways assigned to other removable handles in the same panel must be considered.
c. If no special instruction is given by the customer when he orders, the factory will assign keyways at random; if more than one SBM switch has a removable handle, they will be keyed to be non-interchangeable.

A removable handle is furnished as a separate item, not with the switch it operates, because in some cases the single handle operates many switches. The handle is keyed so that it will fit through the keyways on the escutcheon in a specific position.

When ordering a removable handle, specify the type, the position in which it is to be removable, and the switch or switches it will be used with. The factory will assign the handle. To identify SBM removable handles, see Table 4 below.

Table 4: Nomenclature Guide for SBM removable handles

<table>
<thead>
<tr>
<th>1st Number</th>
<th>2nd Number</th>
<th>1st Letter</th>
<th>2nd Letter</th>
<th>3rd No.</th>
<th>4th No.</th>
<th>5th No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handle Type</td>
<td>Removable in Position</td>
<td>Common Code</td>
<td>Action of Rotation</td>
<td>Escutcheon Keyways</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 = Knurled</td>
<td>1</td>
<td>W</td>
<td>W = CW &amp; CCW</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2 = Oval</td>
<td>thru</td>
<td>thru</td>
<td>thru</td>
<td>thru</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 = Pistol</td>
<td>8</td>
<td>R</td>
<td>R = CW (special)</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

Example 1: 21WW135
This oval handle has keys at positions which, when it is in position 1, or 9 o’clock, will line up with escutcheon keyways 1, 3 and 5. It is therefore removable in position 1.
Removable Handles

SB-1 & SB-9 Switch

The keyed escutcheon for the SB-1 & SB-9 switch is normally furnished with two keys and three keyways (See Fig. 15B). The circumferential location of the keys and keyways will vary, depending on the location, etc., in which the handle is to be removable. The location of the keyways is assigned by the factory.

Table 5 gives a list of standard keyed escutcheons and the proper removable handle for removing the handle in both the vertical (12 o’clock) position and 90° CCW (9 o’clock) position. Escutcheons 6016164P2 thru P14 are used on switches if the throw does not exceed 90° on either side of the vertical (12 o’clock) position, and P23, 24 and 25 are used when the throw does exceed this limit.

Oval handles 16SB1CC1 thru 32 are listed with direction and degree of throw from the positions in which they are removable. The code letters A thru Z in the left hand column identify the escutcheons used on the basic unlisted switches.

Example: 16SB1AB300SAM3Y, the 2nd form letter A identifies a keyed escutcheon 6016164P3.

When a special keyed escutcheon is required, different from any of those listed, the code letter “X” is used followed by the part number.

Example: 16SB1AB300SX34M2Y.

All keyed escutcheons will now have the part number stamped at the bottom left hand corner instead of the code letters previously stamped at the bottom righthand corner. If the code letter or other indentification is desired, it will be stamped at the bottom righthand corner by requisition only (three characters maximum). The 16SB1CC oval type removable handle will now have the form number only (suffix number following 16SB1CC in “handle” column in Table 5) stamped on the lower face of the handle. Those removable handles which have metal shanks (6119745G) will have the group number stamped on the shank. When a switch with a keyed escutcheon for a removable handle is ordered, be sure to specify the position in which the handle is to be removable. If an existing handle will be used, give the number of the existing handle.

Table 5: Listing for Escutcheons and Handles

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Code</th>
<th>Escutcheon*</th>
<th>Handle</th>
<th>Throw</th>
</tr>
</thead>
<tbody>
<tr>
<td>6016164P3</td>
<td>A</td>
<td>6016164P11</td>
<td>CC18</td>
<td>135° CW</td>
</tr>
<tr>
<td>16SB1CC1</td>
<td>A</td>
<td>16SB1CC1</td>
<td>CC18</td>
<td>135° CW</td>
</tr>
<tr>
<td>6016164P4</td>
<td>B</td>
<td>6016164P2</td>
<td>CC2</td>
<td>135° CW</td>
</tr>
<tr>
<td>6016164P5</td>
<td>B</td>
<td>6016164P2</td>
<td>CC9</td>
<td>135° CW</td>
</tr>
<tr>
<td>6016164P6</td>
<td>C</td>
<td>6016164P3</td>
<td>CC3</td>
<td>135° CW</td>
</tr>
<tr>
<td>6016164P7</td>
<td>C</td>
<td>6016164P3</td>
<td>CC15</td>
<td>360°</td>
</tr>
<tr>
<td>6016164P8</td>
<td>D</td>
<td>CC4</td>
<td>45° CW</td>
<td></td>
</tr>
<tr>
<td>6016164P9</td>
<td>D</td>
<td>CC11</td>
<td>45° CW &amp; 45° CCW</td>
<td></td>
</tr>
<tr>
<td>6016164P10</td>
<td>D</td>
<td>CC22</td>
<td>45° CCW</td>
<td></td>
</tr>
<tr>
<td>6016164P11</td>
<td>D</td>
<td>CC27</td>
<td>360°</td>
<td></td>
</tr>
<tr>
<td>6016164P12</td>
<td>E</td>
<td>CC6</td>
<td>45° CW</td>
<td></td>
</tr>
<tr>
<td>6016164P13</td>
<td>E</td>
<td>CC14</td>
<td>45° CW &amp; 45° CCW</td>
<td></td>
</tr>
<tr>
<td>6016164P14</td>
<td>E</td>
<td>CC24</td>
<td>360°</td>
<td></td>
</tr>
<tr>
<td>6016164P15</td>
<td>F</td>
<td>CC7</td>
<td>45° CW</td>
<td></td>
</tr>
<tr>
<td>6016164P16</td>
<td>G</td>
<td>CC17</td>
<td>45° CCW</td>
<td></td>
</tr>
<tr>
<td>6016164P17</td>
<td>G</td>
<td>CC26</td>
<td>135° CW</td>
<td></td>
</tr>
<tr>
<td>6016164P18</td>
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<td>CC29</td>
<td>45° CW</td>
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</tr>
<tr>
<td>6016164P19</td>
<td>G</td>
<td>CC21</td>
<td>360°</td>
<td></td>
</tr>
<tr>
<td>6016164P20</td>
<td>H</td>
<td>CC3</td>
<td>45° CW</td>
<td></td>
</tr>
<tr>
<td>6016164P21</td>
<td>H</td>
<td>CC9</td>
<td>45° CW &amp; 45° CCW</td>
<td></td>
</tr>
<tr>
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<td>H</td>
<td>CC31</td>
<td>45° CW</td>
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<td>6016164P23</td>
<td>H</td>
<td>CC32</td>
<td>45° CCW</td>
<td></td>
</tr>
<tr>
<td>6016164P24</td>
<td>J</td>
<td>CC18</td>
<td>360°</td>
<td></td>
</tr>
<tr>
<td>6016164P25</td>
<td>K</td>
<td>CC18</td>
<td>360°</td>
<td></td>
</tr>
<tr>
<td>6016164P26</td>
<td>L</td>
<td>CC15</td>
<td>360°</td>
<td></td>
</tr>
<tr>
<td>6016164P27</td>
<td>M</td>
<td>CC3</td>
<td>135° CW</td>
<td></td>
</tr>
<tr>
<td>6016164P28</td>
<td>M</td>
<td>CC15</td>
<td>360°</td>
<td></td>
</tr>
<tr>
<td>6016164P29</td>
<td>N</td>
<td>CC11</td>
<td>45° CW &amp; 45° CCW</td>
<td></td>
</tr>
<tr>
<td>6016164P30</td>
<td>N</td>
<td>CC27</td>
<td>360°</td>
<td></td>
</tr>
<tr>
<td>6016164P31</td>
<td>N</td>
<td>CC4</td>
<td>45° CW</td>
<td></td>
</tr>
<tr>
<td>6016164P32</td>
<td>N</td>
<td>CC22</td>
<td>45° CCW</td>
<td></td>
</tr>
<tr>
<td>6016164P33</td>
<td>X</td>
<td>Special</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* The P number (3, 4, etc.) is used as the part number in text.

Fig. 16A: Typical Removable Handles and Escutcheons
**Temperature-Meter Switches**

**DESCRIPTION**

Temperature-meter switches are furnished with palladium contacts, which have a constant resistance factor. This is necessary because calibrated leads are normally used in a temperature-meter circuit, and silver contacts would result in a variable resistance factor and cause fluctuation in meter readings.

Figure 17A shows a temperature-meter switch, Model 16SB1CE52, reading four RTD's, on a two-wire circuit with a TEST and an OFF position. On a two-wire circuit, you can transfer up to seven coils with an OFF position, or six coils with a TEST and an OFF position.

Figure 17B shows a Model 16SB1CE55 reading three RTD's, on a three-wire circuit with a TEST and an OFF position. On a three-wire circuit, you can transfer up to six coils with an OFF position, or five coils with a TEST and an OFF position. When it is required to transfer more RTD's than the maximum for a given switch, two switches with a removable handle may be used.
Outline Dimensions

(For estimating only)

SBM
CONTROL AND TRANSFER SWITCHES

Outline Dimensions

Shaft extension for 1 to 8 stage switches only.

When panel is 1” thick - - add 1/2” to A and B dimensions

<table>
<thead>
<tr>
<th>No. of Stages</th>
<th>Standard Switch</th>
<th>Pull-to-Lock Switch</th>
<th>Removable Handle Switch</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>“A”</td>
<td>B</td>
<td>“A”</td>
</tr>
<tr>
<td>1</td>
<td>3/8</td>
<td>2/8</td>
<td>4/8</td>
</tr>
<tr>
<td>2</td>
<td>4/8</td>
<td>2/8</td>
<td>5/8</td>
</tr>
<tr>
<td>3</td>
<td>5/8</td>
<td>2/8</td>
<td>5/8</td>
</tr>
<tr>
<td>4</td>
<td>5/8</td>
<td>2/8</td>
<td>6/8</td>
</tr>
<tr>
<td>5</td>
<td>6/8</td>
<td>2/8</td>
<td>7/8</td>
</tr>
<tr>
<td>6</td>
<td>7/8</td>
<td>2/8</td>
<td>7/8</td>
</tr>
<tr>
<td>7</td>
<td>7/8</td>
<td>2/8</td>
<td>7/8</td>
</tr>
<tr>
<td>8</td>
<td>8/8</td>
<td>2/8</td>
<td>8/8</td>
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<tr>
<td>9</td>
<td>8/8</td>
<td>2/8</td>
<td>8/8</td>
</tr>
<tr>
<td>10</td>
<td>9/8</td>
<td>2/8</td>
<td>9/8</td>
</tr>
</tbody>
</table>

1/2” hole-standard and pull-to-lock 1-3/8” hole-removable handle

SHIPPING WEIGHTS

Approx weights are listed below. All weights listed apply to SB switches consisting of one stage. Add 6 ounces for each additional stage.

SBM (1 Stage) @ 1 1/2 lbs

(This data is subject to change without notice)
**Outline Dimensions**

(For estimating only)

---

**SB-1 switch with fixed handles**

(Outline 116A130)

<table>
<thead>
<tr>
<th>No. of Stages*</th>
<th>Standard Cover 12 Wires Out Top and 24 Wires Out Bottom</th>
<th>Large Cover 24 Wires Out Top and Bottom</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dimension in Inches</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Standard Cover</td>
<td>Large Cover</td>
</tr>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>1</td>
<td>3/4</td>
<td>5/8</td>
</tr>
<tr>
<td>2</td>
<td>4 1/4</td>
<td>7 1/4</td>
</tr>
<tr>
<td>3</td>
<td>5 1/4</td>
<td>8 1/4</td>
</tr>
<tr>
<td>4</td>
<td>5 1/4</td>
<td>10 1/4</td>
</tr>
<tr>
<td>5</td>
<td>6 1/4</td>
<td>11 1/4</td>
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<tr>
<td>6</td>
<td>7 1/4</td>
<td>13 1/4</td>
</tr>
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<td>7</td>
<td>8 1/4</td>
<td>14 1/4</td>
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<tr>
<td>8</td>
<td>8 1/4</td>
<td>16 1/4</td>
</tr>
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<td>9</td>
<td>9 3/4</td>
<td>17 1/4</td>
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<td>10 1/4</td>
<td>19 1/4</td>
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<td>11</td>
<td>11 1/4</td>
<td>20 1/4</td>
</tr>
<tr>
<td>12</td>
<td>11 1/4</td>
<td>22 1/4</td>
</tr>
<tr>
<td>13</td>
<td>12 1/4</td>
<td>23 1/4</td>
</tr>
<tr>
<td>14</td>
<td>13 1/4</td>
<td>25 1/4</td>
</tr>
<tr>
<td>15</td>
<td>14 1/4</td>
<td>26 1/4</td>
</tr>
<tr>
<td>16</td>
<td>14 1/4</td>
<td>28 1/4</td>
</tr>
</tbody>
</table>

* For spring-return switches when more than three and less than seven contacts close in the normal handle position, add ¾" to “A”, and 1½" to “B”. When seven or more contacts close in the normal handle position, add 1½" to “A” and 3" to “B”.

**Note:** Removable handles are similar to fixed handles and available in all styles except radial and locked. They do not alter switch dimensions or drilling.

**SHIPPING WEIGHTS**

Approx weights are listed below. All weights listed apply to SB-1 switches consisting of one stage. Add 6 ounces for each additional stage.

- **SB-1 (1 Stage)** @ 2 lbs

(This data is subject to change without notice)
**Outline Dimensions**

*For estimating only*

Panel-mounted SB-9 switch  
(Outline 116A139)

<table>
<thead>
<tr>
<th>No. of Stages*</th>
<th>Dimension in Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Cover 12 Wires Out Top and 24 Wires Out Bottom</td>
<td>Large Cover 24 Wires Out Top and Bottom</td>
</tr>
<tr>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>1</td>
<td>4 ½</td>
</tr>
<tr>
<td>2</td>
<td>5 ½</td>
</tr>
<tr>
<td>3</td>
<td>6 ½</td>
</tr>
<tr>
<td>4</td>
<td>7 ½</td>
</tr>
<tr>
<td>5</td>
<td>8 ½</td>
</tr>
<tr>
<td>6</td>
<td>9 ½</td>
</tr>
<tr>
<td>7</td>
<td>10 ¼</td>
</tr>
<tr>
<td>8</td>
<td>10 ¼</td>
</tr>
<tr>
<td>9</td>
<td>11 ½</td>
</tr>
<tr>
<td>10</td>
<td>12 ½</td>
</tr>
<tr>
<td>11</td>
<td>13 ¼</td>
</tr>
<tr>
<td>12</td>
<td>13 ¼</td>
</tr>
<tr>
<td>13</td>
<td>14 ½</td>
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<td>15</td>
<td>16 ½</td>
</tr>
<tr>
<td>16</td>
<td>16 ½</td>
</tr>
</tbody>
</table>

*For spring-return switches when more than three and less than seven contacts close in the normal handle position, add ¾” to “A”, and 1½” to “B”. When seven or more contacts close in the normal handle position, add 1½” to “A” and 3” to “B”.

**Note:** Removable handles are similar to fixed handles and available in all styles except radial and locked. They do not alter switch dimensions or drilling.

**SHIPPING WEIGHTS**

Approx weights are listed below. All weights listed apply to SB-9 switches consisting of one stage. Add 6 ounces for each additional stage.  

SB-9  (1 Stage) @ 3 lbs

(This data is subject to change without notice)
Outline Dimensions

(For estimating only)

SB-10
CONTROL AND TRANSFER SWITCHES

Outline Dimensions

Panel-mounted SB-10 switch
(Outline 0165A6122)

<table>
<thead>
<tr>
<th>No. of Stages*</th>
<th>Dimension in Inches</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard Cover</td>
<td>Large Cover</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>1</td>
<td>6 ½</td>
<td>12 ½</td>
<td></td>
<td>7</td>
<td>12 ½</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>6 ½</td>
<td>12 ½</td>
<td></td>
<td>7</td>
<td>12 ½</td>
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<td>4</td>
<td>8 ½</td>
<td>15 ½</td>
<td></td>
<td>8 ¼</td>
<td>15 ¼</td>
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</tr>
<tr>
<td>5</td>
<td>9</td>
<td>17</td>
<td></td>
<td>9 ¼</td>
<td>17 ¼</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>9 ½</td>
<td>18 ½</td>
<td></td>
<td>10</td>
<td>18 ½</td>
<td></td>
</tr>
<tr>
<td>7</td>
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<td></td>
<td>10 ¼</td>
<td>20 ¼</td>
<td></td>
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<tr>
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<td>11 ½</td>
<td>21 ½</td>
<td></td>
<td>11 ¼</td>
<td>21 ¼</td>
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</tr>
<tr>
<td>9</td>
<td>12</td>
<td>23</td>
<td></td>
<td>12 ¼</td>
<td>23 ¼</td>
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<td>10</td>
<td>12 ¼</td>
<td>24 ¼</td>
<td></td>
<td>13</td>
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<tr>
<td>11</td>
<td>13 ¼</td>
<td>26</td>
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<td>13 ¼</td>
<td>26 ¼</td>
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<tr>
<td>12</td>
<td>14 ¼</td>
<td>27 ¼</td>
<td></td>
<td>14 ¼</td>
<td>27 ¼</td>
<td></td>
</tr>
</tbody>
</table>

SHIPPING WEIGHTS

Approx weights are listed below. All weights listed apply to SB-10 switches consisting of one stage. Add 6 ounces for each additional stage.

SB-10  (1 Stage)  @ 3½ lbs

(This data is subject to change without notice)
Tandem Switches

Outline Dimensions

<table>
<thead>
<tr>
<th>No. of Stages</th>
<th>A*</th>
<th>B*</th>
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<tbody>
<tr>
<td>1</td>
<td>5 ½</td>
<td>7 ½</td>
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<tr>
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<td>5 ½</td>
<td>8 ½</td>
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<td>3</td>
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<td>7 ½</td>
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<tr>
<td>5</td>
<td>8 ½</td>
<td>13 ½</td>
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<tr>
<td>6</td>
<td>8 ½</td>
<td>14 ½</td>
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<tr>
<td>7</td>
<td>9 ½</td>
<td>16 ½</td>
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<td>8</td>
<td>10 ½</td>
<td>17 ½</td>
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<tr>
<td>9</td>
<td>11 ½</td>
<td>19 ½</td>
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<tr>
<td>10</td>
<td>11 ½</td>
<td>20 ½</td>
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<td>11</td>
<td>12 ½</td>
<td>22 ½</td>
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<td>12</td>
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<td>15</td>
<td>15 ½</td>
<td>28 ½</td>
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<tr>
<td>16</td>
<td>16 ½</td>
<td>29 ½</td>
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* Add ¼ to A & B Dimensions for Large Cover

TWO SWITCH TANDEM SB-1
Gear-operated (360° rotation)

THREE SWITCH TANDEM SB-1
Gear-operated (360° rotation)

FOUR SWITCH TANDEM SB-1
Gear-operated (360° rotation)

(This data is subject to change without notice)
SB-switch with Yale or Kirk Lock above the switch. For “A” and “B”, use standard dimensions plus “D”, depending on panel thickness.

SB-9 switches

Standard dimensions in inches

<table>
<thead>
<tr>
<th>No. of Stages</th>
<th>Standard Cover 12 Wires Out Top and 24 Wires Out Bottom</th>
<th>Large Cover 24 Wires Out Top and Bottom</th>
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<tbody>
<tr>
<td></td>
<td>A  B  C</td>
<td>A  B  C</td>
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<tr>
<td>1</td>
<td>4½  8½</td>
<td>5½  8½</td>
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<td>2</td>
<td>5½  9½</td>
<td>6½  10½</td>
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<td>7½  13½</td>
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<tr>
<td>4</td>
<td>7½  12½</td>
<td>8½  14½</td>
</tr>
<tr>
<td>5</td>
<td>7½  14½</td>
<td>8½  16½</td>
</tr>
<tr>
<td>6</td>
<td>9½  15½</td>
<td>9½  17½</td>
</tr>
<tr>
<td>7</td>
<td>9½  17½</td>
<td>10½ 19½</td>
</tr>
<tr>
<td>8</td>
<td>10½ 18½</td>
<td>11½ 20½</td>
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<tr>
<td>9</td>
<td>10½ 20½</td>
<td>11½ 22½</td>
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<tr>
<td>10</td>
<td>11½ 21½</td>
<td>12½ 23½</td>
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<td>11</td>
<td>12½ 22½</td>
<td>13½ 24½</td>
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<td>12</td>
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<td>16</td>
<td>16½ 30½</td>
<td>16½ 31½</td>
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(This data subject to change without notice)
<table>
<thead>
<tr>
<th>Fig #</th>
<th>DESCRIPTION</th>
<th>ESCUTCHEON &amp; CONTACT DIAGRAM</th>
<th>WIRING DIAGRAM</th>
</tr>
</thead>
</table>
| 1    | VOLTMETER SWITCH  
      Double-pole, single-throw  
      Model No. 10AA001  
      Knurled handle | ![Contact Diagram](image1) | ![Wiring Diagram](image2) |
| 2    | VOLTMETER SWITCH  
      Double-pole, double-throw  
      Model No. 10AA002  
      Knurled handle | ![Contact Diagram](image3) | ![Wiring Diagram](image4) |
| 3    | VOLTMETER SWITCH  
      Phase-to-phase or phase-to-neutral  
      Model No. 10AA004  
      Knurled handle | ![Contact Diagram](image5) | ![Wiring Diagram](image6) |
| 4    | VOLTMETER SWITCH  
      Four circuits, two wires  
      Model No. 10AA005  
      Knurled handle | ![Contact Diagram](image7) | ![Wiring Diagram](image8) |

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<table>
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<th>WIRING DIAGRAM</th>
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</thead>
</table>
| 5     | VOLTMETER SWITCH  
Two three-phase, three-wire circuits  
Model No. 10AA007  
Knurled handle | ![Contact Diagram](image) | ![Wiring Diagram](image) |
| 6     | VOLTMETER TRANSFER SWITCH  
Three-phase, transfers four wires phase-to-neutral  
Model No. 10AA003  
Knurled handle | ![Contact Diagram](image) | ![Wiring Diagram](image) |
| 7     | VOLTMETER TRANSFER SWITCH  
Three-phase, transfers four wires phase-to-phase and phase-to-neutral  
Model No. 10AA006  
Knurled handle | ![Contact Diagram](image) | ![Wiring Diagram](image) |
| 8     | AMMETER TRANSFER SWITCH  
Three CT’s (connect at end of secondary)  
Model No. 10AA008  
Knurled handle | ![Contact Diagram](image) | ![Wiring Diagram](image) |

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<th>WIRING DIAGRAM</th>
</tr>
</thead>
</table>
| 9    | AMMETER TRANSFER SWITCH  
Three CT’s with off  
(connect at end of secondary)  
Model No. 10AA009  
Knurled handle | ![Contact Diagram](image1) | ![Wiring Diagram](image2) |
| 10   | AMMETER TRANSFER SWITCH  
Three independent circuits  
Model No. 10AA010  
Knurled handle | ![Contact Diagram](image3) | ![Wiring Diagram](image4) |
| 11   | AMMETER TRANSFER SWITCH  
Two CT’s (connect at end of secondary)  
Model No. 10AA011  
Knurled handle | ![Contact Diagram](image5) | ![Wiring Diagram](image6) |
| 12   | AMMETER TRANSFER SWITCH  
Three independent circuits with off  
(connect at end of secondary)  
Model No. 10AA012  
Knurled handle | ![Contact Diagram](image7) | ![Wiring Diagram](image8) |

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<tr>
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<tbody>
<tr>
<td>13</td>
<td>AMMETER TRANSFER SWITCH&lt;br&gt;Three independent circuits with off&lt;br&gt;Model No. 10AA013&lt;br&gt;Knurled handle</td>
<td><img src="image1" alt="Contact Diagram" /></td>
<td><img src="image2" alt="Wiring Diagram" /></td>
</tr>
<tr>
<td>14</td>
<td>AMMETER-VOLTMETER TRANSFER SWITCH&lt;br&gt;Three-phase, four wires phase-to-neutral, plus three current transformers (connect at end of secondary)&lt;br&gt;Model No. 10AA017&lt;br&gt;Knurled handle</td>
<td><img src="image3" alt="Contact Diagram" /></td>
<td><img src="image4" alt="Wiring Diagram" /></td>
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<td>15</td>
<td>AMMETER-VOLTMETER TRANSFER SWITCH&lt;br&gt;Three-phase, three wires phase-to-phase, plus three independent current transformer circuits&lt;br&gt;Model No. 10AA014&lt;br&gt;Knurled handle</td>
<td><img src="image5" alt="Contact Diagram" /></td>
<td><img src="image6" alt="Wiring Diagram" /></td>
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<td>16</td>
<td>AMMETER-VOLTMETER TRANSFER SWITCH&lt;br&gt;Three-phase, four wires phase-to-neutral plus three independent current transformer circuits&lt;br&gt;Model No. 10AA015&lt;br&gt;Knurled handle</td>
<td><img src="image7" alt="Contact Diagram" /></td>
<td><img src="image8" alt="Wiring Diagram" /></td>
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X In all contact diagrams denotes contacts closed

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</tr>
</thead>
</table>
| 17   | AMMETER-VOLTMETER TRANSFER SWITCH | Three-phase, three wires phase-to-phase plus three current transformers (connect at end of secondary)  
Model No. 10AA016 Knurled handle | ![Contact Diagram](image)  
![Wiring Diagram](image) |
| 18   | WATTMETER TRANSFER SWITCH | Two current coils  
Model No. 10AA018 Knurled handle | ![Contact Diagram](image)  
![Wiring Diagram](image) |
| 19   | WATTMETER TRANSFER SWITCH | Three current coils  
Model No. 10AA019 Knurled handle | ![Contact Diagram](image)  
![Wiring Diagram](image) |
| 20   | WATTMETER TRANSFER SWITCH | Two current and two potential coils  
Model No. 10AA020 Knurled handle | ![Contact Diagram](image)  
![Wiring Diagram](image) |

*In all contact diagrams denotes contacts closed*
## Contact Diagrams SBM

<table>
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<tr>
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<tbody>
<tr>
<td>21</td>
<td>CIRCUIT-BREAKER CONTROL SWITCH&lt;br&gt;Model No. 10AA100&lt;br&gt;Pistol-grip handle</td>
<td><img src="image1.png" alt="Contact Diagram" /></td>
<td><img src="image2.png" alt="Wiring Diagram" /></td>
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<tr>
<td>22</td>
<td>CIRCUIT BREAKER CONTROL SWITCH&lt;br&gt;Model No. 10AA101&lt;br&gt;Pistol-grip handle</td>
<td><img src="image3.png" alt="Contact Diagram" /></td>
<td><img src="image4.png" alt="Wiring Diagram" /></td>
</tr>
<tr>
<td>23</td>
<td>CIRCUIT BREAKER CONTROL SWITCH&lt;br&gt;For operating two breakers&lt;br&gt;Model No. 10AA104&lt;br&gt;Pistol-grip handle</td>
<td><img src="image5.png" alt="Contact Diagram" /></td>
<td><img src="image6.png" alt="Wiring Diagram" /></td>
</tr>
<tr>
<td>24</td>
<td>GOVERNOR OR RHEOSTAT MOTOR CONTROL SWITCH&lt;br&gt;Model No. 10AA066&lt;br&gt;Lever handle</td>
<td><img src="image7.png" alt="Contact Diagram" /></td>
<td><img src="image8.png" alt="Wiring Diagram" /></td>
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<th>Fig #</th>
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<tbody>
<tr>
<td>25</td>
<td>Circuit-breaker Control Switch</td>
<td><img src="Diagram25.png" alt="Diagram" /></td>
</tr>
<tr>
<td></td>
<td>Model No. 10AA106 Pistol-grip handle</td>
<td></td>
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<tr>
<td>26</td>
<td>Circuit-breaker Control Switch</td>
<td><img src="Diagram26.png" alt="Diagram" /></td>
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<tr>
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<td>Model No. 10AA107 Pistol-grip handle</td>
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<td>Circuit-breaker Control Switch</td>
<td><img src="Diagram27.png" alt="Diagram" /></td>
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<tr>
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<td>Model No. 10AA108 Pistol-grip handle</td>
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<tr>
<td>28</td>
<td>Circuit-breaker Control Switch</td>
<td><img src="Diagram28.png" alt="Diagram" /></td>
</tr>
<tr>
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<td>Model No. 10AA109 Pistol-grip handle</td>
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<td>29</td>
<td>Circuit-breaker Control Switch</td>
<td><img src="Diagram29.png" alt="Diagram" /></td>
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<tr>
<td></td>
<td>Model No. 10AA110 Pistol-grip handle</td>
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<tr>
<td>30</td>
<td>Circuit-breaker Control Switch</td>
<td><img src="Diagram30.png" alt="Diagram" /></td>
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<tr>
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<td>Model No. 10AA111 Pistol-grip handle</td>
<td></td>
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<tr>
<td>31</td>
<td>Circuit-breaker Control Switch</td>
<td><img src="Diagram31.png" alt="Diagram" /></td>
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<tr>
<td></td>
<td>Model No. 10AA112 Pistol-grip handle</td>
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<tr>
<td>32</td>
<td>Circuit-breaker Control Switch</td>
<td><img src="Diagram32.png" alt="Diagram" /></td>
</tr>
<tr>
<td></td>
<td>Model No. 10AA113 Pistol-grip handle</td>
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<th>DESCRIPTION</th>
<th>ESCUTCHEON &amp; CONTACT DIAGRAM</th>
</tr>
</thead>
</table>
| 41    | CIRCUIT-BREAKER CONTROL SWITCH  
Model No. 10AA122  
Pistol-grip handle | ![Contact Diagram](image1) | 45    | TRIP SWITCH  
Contacts normally open  
Model No. 10AA102  
Pistol-grip handle | ![Contact Diagram](image2) |
| 42    | CIRCUIT-BREAKER CONTROL SWITCH  
Model No. 10AA123  
Pistol-grip handle | ![Contact Diagram](image3) | 46    | TRIP SWITCH  
Contacts normally closed  
Model No. 10AA103  
Pistol-grip handle | ![Contact Diagram](image4) |
| 43    | CIRCUIT-BREAKER CONTROL SWITCH  
Model No. 10AA124  
Pistol-grip handle | ![Contact Diagram](image5) |       |       |       |
| 44    | SWITCH SUBSTITUTE  
For push-button station  
Model No. 10AA105  
Pistol-grip handle | ![Contact Diagram](image6) |       |       |       |

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<tbody>
<tr>
<td>47</td>
<td><strong>POWER-FACTOR SWITCH</strong>&lt;br&gt;One or two current coils&lt;br&gt;Model No. 10AA021&lt;br&gt;Knurled handle</td>
<td><img src="image" alt="Contact Diagram" /></td>
<td><img src="image" alt="Wiring Diagram" /></td>
</tr>
<tr>
<td>48</td>
<td><strong>POWER-FACTOR SWITCH</strong>&lt;br&gt;One current and two potential coils&lt;br&gt;Model No. 10AA022&lt;br&gt;Knurled handle</td>
<td><img src="image" alt="Contact Diagram" /></td>
<td><img src="image" alt="Wiring Diagram" /></td>
</tr>
<tr>
<td>49</td>
<td><strong>POWER-FACTOR OR WATTMETER REVERSING SWITCH</strong>&lt;br&gt;Model No. 10AA023&lt;br&gt;Knurled handle</td>
<td><img src="image" alt="Contact Diagram" /></td>
<td><img src="image" alt="Wiring Diagram" /></td>
</tr>
<tr>
<td>50</td>
<td><strong>MOTOR CONTROL SWITCH</strong>&lt;br&gt;Model No. 10AA067&lt;br&gt;Pistol-grip handle</td>
<td><img src="image" alt="Contact Diagram" /></td>
<td><img src="image" alt="Wiring Diagram" /></td>
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<tbody>
<tr>
<td>51</td>
<td>MOTOR CONTROL SWITCH&lt;br&gt;For split-field motors&lt;br&gt;&lt;br&gt;Model No. 10AA065&lt;br&gt;Pistol-grip handle</td>
<td><img src="image1.png" alt="Contact Diagram SBM" /></td>
<td><img src="image2.png" alt="Wiring Diagram" /></td>
</tr>
<tr>
<td>52</td>
<td>SYNCHRONIZING SWITCH&lt;br&gt;Machine-to-bus with interlocks&lt;br&gt;&lt;br&gt;Model No. 10AA024&lt;br&gt;Uses removable oval handle, 23WW145*</td>
<td><img src="image3.png" alt="Contact Diagram SBM" /></td>
<td><img src="image4.png" alt="Wiring Diagram" /></td>
</tr>
<tr>
<td>53</td>
<td>SYNCHRONIZING SWITCH&lt;br&gt;Running and incoming&lt;br&gt;&lt;br&gt;Model No. 10AA025&lt;br&gt;Uses one each removable oval handle&lt;br&gt;R = 23WL235*&lt;br&gt;I = 23WR235*</td>
<td><img src="image5.png" alt="Contact Diagram SBM" /></td>
<td><img src="image6.png" alt="Wiring Diagram" /></td>
</tr>
<tr>
<td>54</td>
<td>SYNCHRONIZING SWITCH&lt;br&gt;Between machines without potential transformers&lt;br&gt;&lt;br&gt;Model No. 10AA026&lt;br&gt;Uses removable oval handle, 23WW123*</td>
<td><img src="image7.png" alt="Contact Diagram SBM" /></td>
<td><img src="image8.png" alt="Wiring Diagram" /></td>
</tr>
</tbody>
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X In all contact diagrams denotes contacts closed
* Removable handles must be ordered separately
**Contact Diagrams SBM**

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<th>Fig #</th>
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</table>
| 55    | SINGLE OR DOUBLE POLE  
Single-throw, maintain contact  
Model No. 10AA027  
With spring return  
Model No. 10AA028  
Oval handle | ![Diagram](image1.png) |
| 58    | SINGLE-POLE  
Double-throw with off, maintain contact  
Model No. 10AA039  
With spring return  
Model No. 10AA040  
Oval handle | ![Diagram](image2.png) |
| 56    | THREE OR FOUR POLE  
Single-throw, maintain contact  
Model No. 10AA029  
With spring return  
Model No. 10AA030  
Oval handle | ![Diagram](image3.png) |
| 59    | DOUBLE-THROW  
Double-throw with off, maintain contact  
Model No. 10AA041  
With spring return  
Model No. 10AA042  
Oval handle | ![Diagram](image4.png) |
| 57    | A. FIVE OR SIX POLE  
Single-throw, maintain contact  
Model No. 10AA031  
With spring return  
Model No. 10AA032  
Oval handle  
B. SEVEN OR EIGHT-POLE  
Single-throw, maintained  
Model No. 10AA033  
With spring return  
Model No. 10AA034  
C. NINE OR TEN-POLE  
Single-throw, maintained  
Model No. 10AA035  
With spring return  
Model No. 10AA036  
D. ELEVEN OR TWELVE-POLE  
Single-throw, maintained  
Model No. 10AA037  
With spring return  
Model No. 10AA038 | ![Diagram](image5.png) |
| 60    | A. THREE-POLE  
Double-throw, with off, maintain contact  
Model No. 10AA043  
Oval handle  
B. FOUR-POLE  
Double-throw with off, maintained  
Model No. 10AA044  
With spring return  
Model No. 10AA045  
C. FIVE-POLE  
Double-throw with off, maintained  
Model No. 10AA046  
With spring return  
Model No. 10AA047  
D. SIX-POLE  
Double-throw with off maintained  
Model No. 10AA048  
With spring return  
Model No. 10AA049 | ![Diagram](image6.png) |

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</tr>
</thead>
</table>
| 61   | SINGLE-POLE Double-throw  
  Model No. 10AA050  
  Oval handle | ![Contact Diagram](image) | 65   | SINGLE-POLE Four-throw  
  Model No. 10AA058  
  Oval handle | ![Contact Diagram](image) |
| 62   | DOUBLE-POLE Double-throw  
  Model No. 10AA051  
  Oval handle | ![Contact Diagram](image) | 66   | SINGLE-POLE Five-throw, maintain contact  
  Model No. 10AA059  
  Oval handle | ![Contact Diagram](image) |
| 63   | A. THREE-POLE Double-throw  
  Model No. 10AA052  
  Oval handle  
  B. FOUR-POLE Double-throw  
  Model no. 10AA053  
  C. FIVE-POLE Double-throw  
  Model No. 10AA054  
  D. SIX-POLE Double-throw  
  Model No. 10AA055  
  E. SEVEN-POLE Double-throw  
  Model No. 10AA056 | ![Contact Diagram](image) | 67   | SINGLE-POLE Six-throw  
  Model No. 10AA060  
  Oval handle | ![Contact Diagram](image) |
| 64   | SINGLE-POLE Three-throw, maintain contact  
  Model No. 10AA057  
  Oval handle | ![Contact Diagram](image) | 68   | SINGLE-POLE Seven-throw  
  Model No. 10AA061  
  Oval handle | ![Contact Diagram](image) |

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| 69   | SINGLE-POLE Eight-throw  
Model No. 10AA062  
Oval handle | ![Contact Diagram 69](image) |
| 70   | DOUBLE-POLE Four-throw  
Model No. 10AA063  
Oval handle | ![Contact Diagram 70](image) |
| 71   | DOUBLE-POLE Eight-throw  
Model No. 10AA064  
Oval handle | ![Contact Diagram 71](image) |

X In all contact diagrams denotes contacts closed
VOLTMETER SWITCH
Double-pole, single-throw
Model No. 16SB1CA1
Knurled handle

VOLTMETER SWITCH
Double-pole, double-throw
Model No. 16SB1CE27
Knurled handle

VOLTMETER SWITCH
Phase-to-phase or phase-to-neutral
Model No. 16SB1CF11
Knurled handle

VOLTMETER SWITCH
Three phase-to-phase, phase-to-neutral
Model No. 16SB1CF16
Knurled handle

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| 76   | VOLTMETER TRANSFER SWITCH Three-phase, four wires, phase-to-neutral  
Model No. 16SB1CF22 Knurled handle | ![Volmeter Diagram](image)  
Source  
N  
3  
2  
1  
2  
O  
1  
OFF  
23  
34  
41  
52  
53  
64  
63  
72  
73  
81  
82  
91  
92  
93  
94  
95  | ![Wiring Diagram](image)  
1  
2  
3  
4  
5  
6  
7  
8  
9  |
| 77   | VOLTMETER TRANSFER SWITCH Two three-phase, three-wire circuits  
Model No. 16SB1CF23 Knurled handle | ![Volmeter Diagram](image)  
Source  
N  
3  
2  
1  
2  
O  
1  
OFF  
23  
34  
41  
52  
53  
64  
63  
72  
73  
81  
82  
91  
92  
93  
94  
95  | ![Wiring Diagram](image)  
1  
2  
3  
4  
5  
6  
7  
8  
9  |
| 78   | AMMETER TRANSFER SWITCH Three independent circuits  
Model No. 16SB1CA17 Knurled handle | ![Ammeter Diagram](image)  
Source  
N  
3  
2  
1  
2  
O  
1  
OFF  
23  
34  
41  
52  
53  
64  
63  
72  
73  
81  
82  
91  
92  
93  
94  
95  | ![Wiring Diagram](image)  
1  
2  
3  
4  
5  
6  
7  
8  
9  |
| 79   | AMMETER TRANSFER SWITCH Three independent circuits with off  
Model No. 16SB1CA15 Knurled handle | ![Ammeter Diagram](image)  
Source  
N  
3  
2  
1  
2  
O  
1  
OFF  
23  
34  
41  
52  
53  
64  
63  
72  
73  
81  
82  
91  
92  
93  
94  
95  | ![Wiring Diagram](image)  
1  
2  
3  
4  
5  
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| 80    | AMMETER TRANSFER SWITCH (Connect at end of secondary)  
Model No. 16SB1CA18  
Knurled handle | ![Contact Diagram](image) | ![Wiring Diagram](image) |
| 81    | AMMETER TRANSFER SWITCH  
Three current transformers with off (connect at end of secondary)  
Model No. 16SB1CA19  
Knurled handle | ![Contact Diagram](image) | ![Wiring Diagram](image) |
| 82    | AMMETER TRANSFER SWITCH  
Two current transformers with off (connect at end of secondary)  
Model No. 16SB1CA20 | ![Contact Diagram](image) | ![Wiring Diagram](image) |
| 83    | AMMETER TRANSFER SWITCH  
Two current transformers (connect at end of secondary)  
Model No. 16SB1CE25  
Knurled handle | ![Contact Diagram](image) | ![Wiring Diagram](image) |

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| 84   | AMMETER TRANSFER SWITCH  
Four independent circuits plus off  
Model No. 16SB1CF17  
Knurled handle | ![Contact Diagram](image1) | ![Wiring Diagram](image2) |
| 85   | AMMETER-VOLTMETER TRANSFER SWITCH  
Three-phase, three wire, phase-to-phase plus three independent current transformer circuits  
Model No. 16SB1CA21  
Knurled handle | ![Contact Diagram](image3) | ![Wiring Diagram](image4) |
| 86   | AMMETER-VOLTMETER TRANSFER SWITCH  
Three-phase, four wire phase-to-neutral plus three independent current transformer circuits  
Model No. 16SB1CA23  
Knurled handle | ![Contact Diagram](image5) | ![Wiring Diagram](image6) |
| 87   | AMMETER-VOLTMETER TRANSFER SWITCH  
Three-phase, four wire phase-to-phase plus three current transformers (connect at end of secondary)  
Model No. 16SB1CA24  
Knurled handle | ![Contact Diagram](image7) | ![Wiring Diagram](image8) |

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<td>88</td>
<td>AMMETER-VOLTMMETER TRANSFER SWITCH</td>
<td><img src="image" alt="Contact Diagram" /></td>
<td><img src="image" alt="Wiring Diagram" /></td>
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<tr>
<td></td>
<td>Three-phase, four wire phase-to-neutral plus three current transformers (connect at end of secondary)</td>
<td></td>
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<tr>
<td></td>
<td>Model No. 16SB1CA25 Knurled handle</td>
<td></td>
<td></td>
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<tr>
<td>89</td>
<td>AMMETER TRANSFER SWITCH</td>
<td><img src="image" alt="Contact Diagram" /></td>
<td><img src="image" alt="Wiring Diagram" /></td>
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<tr>
<td></td>
<td>Six current transformers with off (connect at end of secondary)</td>
<td></td>
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<tr>
<td></td>
<td>Model No. 16SB1CA28 Knurled handle</td>
<td></td>
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<td>90</td>
<td>AMMETER TRANSFER SWITCH</td>
<td><img src="image" alt="Contact Diagram" /></td>
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<tr>
<td></td>
<td>Six independent circuits plus off</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Model No. 16SB1CA29 Knurled handle</td>
<td></td>
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<td>91</td>
<td>CIRCUIT-BREAKER CONTROL SWITCH</td>
<td><img src="image" alt="Contact Diagram" /></td>
<td><img src="image" alt="Wiring Diagram" /></td>
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<tr>
<td></td>
<td>Model No. 16SB1B1 Pistol-grip handle</td>
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<td>CIRCUIT-BREAKER CONTROL SWITCH</td>
<td>Model No. 16SB1B2</td>
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<td>Model No. 16SB1B9</td>
<td>Pistol-grip handle</td>
<td></td>
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<td>93</td>
<td>CIRCUIT-BREAKER CONTROL SWITCH</td>
<td>Model No. 16SB1B6</td>
<td></td>
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<tr>
<td></td>
<td>For operating two breakers</td>
<td>Pistol-grip handle</td>
<td></td>
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<tr>
<td>94</td>
<td>CIRCUIT-BREAKER CONTROL SWITCH</td>
<td>Model No. 16SB1B7</td>
<td></td>
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<tr>
<td></td>
<td>Substitute for push button station</td>
<td>Pistol-grip handle</td>
<td></td>
</tr>
<tr>
<td>95</td>
<td>CIRCUIT-BREAKER CONTROL SWITCH</td>
<td>Model No. 16SB1B9</td>
<td></td>
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<tr>
<td></td>
<td>Model No. 16SB1B9</td>
<td>Pistol-grip handle</td>
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| 96    | CIRCUIT-BREAKER TRIP SWITCH  
Contacts normally open  
Model No. 16SB1B3  
Pistol-grip handle | ![Diagram](image1) |
| 100   | CIRCUIT-BREAKER CONTROL SWITCH  
Model No. 16SB1B14  
Pistol-grip handle | ![Diagram](image2) |
| 97    | CIRCUIT-BREAKER TRIP SWITCH  
Contacts normally closed  
Model No. 16SB1B4  
Pistol-grip handle | ![Diagram](image3) |
| 101   | CIRCUIT-BREAKER CONTROL SWITCH  
Model No. 16SB1B15  
Pistol-grip handle | ![Diagram](image4) |
| 98    | CIRCUIT-BREAKER CONTROL SWITCH  
Model No. 16SB1B10  
Pistol-grip handle | ![Diagram](image5) |
| 102   | CIRCUIT-BREAKER CONTROL SWITCH  
Model No. 16SB1B16  
Pistol-grip handle | ![Diagram](image6) |
| 99    | CIRCUIT-BREAKER CONTROL SWITCH  
Model No. 16SB1B11  
Pistol-grip handle | ![Diagram](image7) |
| 103   | CIRCUIT-BREAKER CONTROL SWITCH  
Model No. 16SB1B17  
Pistol-grip handle | ![Diagram](image8) |

X In all contact diagrams denotes contacts closed
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| 104   | CIRCUIT-BREAKER CONTROL SWITCH  
Model No. 16SB1B18  
Pistol-grip handle | ![Diagram](image1) |
| 105   | CIRCUIT-BREAKER CONTROL SWITCH  
Model No. 16SB1B19  
Pistol-grip handle | ![Diagram](image2) |
| 106   | CIRCUIT-BREAKER CONTROL SWITCH  
Model No. 16SB1B20  
Pistol-grip handle | ![Diagram](image3) |
| 107   | CIRCUIT-BREAKER CONTROL SWITCH  
Model No. 16SB1B21  
Pistol-grip handle | ![Diagram](image4) |
| 108   | CIRCUIT-BREAKER CONTROL SWITCH  
Model No. 16SB1B22  
Pistol-grip handle | ![Diagram](image5) |
| 109   | CIRCUIT-BREAKER CONTROL SWITCH  
Model No. 16SB1B23  
Pistol-grip handle | ![Diagram](image6) |
| 110   | CIRCUIT-BREAKER CONTROL SWITCH  
Model No. 16SB1B23  
Pistol-grip handle | ![Diagram](image7) |
| 111   | CIRCUIT-BREAKER CONTROL SWITCH  
Model No. 16SB1B25  
Pistol-grip handle | ![Diagram](image8) |

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<td>112</td>
<td>CIRCUIT-BREAKER CONTROL SWITCH&lt;br&gt;Model No. 16SB1B26&lt;br&gt;Pistol-grip handle</td>
<td><img src="image1" alt="Contact Diagram" /></td>
<td><img src="image2" alt="Wiring Diagram" /></td>
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<td>113</td>
<td>WATTMETER TRANSFER SWITCH&lt;br&gt;Three current coils&lt;br&gt;Model No. 16SB1CF13&lt;br&gt;Fixed knurled handle&lt;br&gt;Model No. 16SB1CF8&lt;br&gt;Uses removable oval handle, 16SB1CC6*</td>
<td><img src="image3" alt="Contact Diagram" /></td>
<td><img src="image4" alt="Wiring Diagram" /></td>
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<td>114</td>
<td>WATTMETER TRANSFER SWITCH&lt;br&gt;Two current coils&lt;br&gt;Model No. 16SB1CB12&lt;br&gt;Fixed knurled handle&lt;br&gt;Model No. 16SB1CF7&lt;br&gt;Uses removable oval handle, 16SB1CC6*</td>
<td><img src="image5" alt="Contact Diagram" /></td>
<td><img src="image6" alt="Wiring Diagram" /></td>
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<td>139</td>
<td>POWER-FACTOR OR WATTMETER REVERSING SWITCH&lt;br&gt;Model No. 16SB1CA10&lt;br&gt;Two position&lt;br&gt;Knurled handle&lt;br&gt;Model No. 16SB1CB4&lt;br&gt;Three position&lt;br&gt;Engraved W - off - RVA</td>
<td><img src="image7" alt="Contact Diagram" /></td>
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* Removable handles must be ordered separately
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<td>WATTMETER TRANSFER SWITCH</td>
<td>Two current and two potential coils&lt;br&gt;&lt;br&gt;Model No. 16SB1CB14&lt;br&gt;Knurled handle</td>
<td><img src="image" alt="Wattmeter Diagram" /></td>
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<td>117</td>
<td>POWER-FACTOR SWITCH</td>
<td>One current and two potential coils&lt;br&gt;&lt;br&gt;Model No. 16SB1CA26&lt;br&gt;Fixed knurled handle&lt;br&gt;&lt;br&gt;Model No. 16SB1CF6&lt;br&gt;Uses removable oval handle 16SB1CC5</td>
<td><img src="image" alt="Power-Factor Switch Diagram" /></td>
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<td>118</td>
<td>POWER-FACTOR SWITCH</td>
<td>One or two current coils&lt;br&gt;&lt;br&gt;Model No. 16SB1CA22&lt;br&gt;Knurled handle&lt;br&gt;&lt;br&gt;Model No. 16SB1CA8&lt;br&gt;Uses removable oval handle 16SB1CC5</td>
<td><img src="image" alt="Power-Factor Switch Diagram" /></td>
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<td>SYNCHRONIZING SWITCH</td>
<td>Machine-to-bus with interlocks&lt;br&gt;&lt;br&gt;Model No. 16SB1CF9&lt;br&gt;Uses removable oval handle 16SB1CC7</td>
<td><img src="image" alt="Synchronizing Switch Diagram" /></td>
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| 120   | SYNCHRONIZING SWITCH  
Between machines without potential transformers  
*Model No. 16SB1CB15  
Uses one each removable oval handles  
R = 16SB1CC8 *  
I = 16SB1CC7 * | ![Contact Diagram](image) | ![Wiring Diagram](image) |
| 121   | SYNCHRONIZING SWITCH  
Between machines with interlocks  
*Model No. 16SB1CBS  
Uses one each removable oval handles  
R = 16SB1CC8 *  
I = 16SB1CC7 * | ![Contact Diagram](image) | ![Wiring Diagram](image) |
| 122   | GOVERNOR OR RHEOSTAT MOTOR CONTROL SWITCH  
Split-field motors are standard for most applications  
*Model No. 16SB1A1  
Radial handle | ![Contact Diagram](image) | ![Wiring Diagram](image) |
| 123   | MOTOR CONTROL SWITCH  
*Model No. 16SB1CG44  
Pistol-grip handle | ![Contact Diagram](image) | ![Wiring Diagram](image) |

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| 124  | MOTOR CONTROL SWITCH  
For split-field motors  
Model No. 16SB1AA1  
Pistol-grip handle | ![Contact Diagram](image1) |
| 125  | TEMPERATURE-METER TRANSFER SWITCH  
Transfers two wires to five coils and test  
Palladium contacts  
Model No. 16SB1CE33  
Knurled handle | ![Contact Diagram](image2) |
| 126  | TEMPERATURE-METER TRANSFER SWITCH  
Transfers two wires to three coils and test  
Palladium contacts  
Model No. 16SB1CE28  
Knurled handle | ![Contact Diagram](image3) |
| 127  | TEMPERATURE-METER TRANSFER SWITCH  
Transfers three wires to three coils and test  
Palladium contacts  
Model No. 16SB1CE29  
Knurled handle | ![Contact Diagram](image4) |

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| 145 | TEMPERATURE-METER TRANSFER SWITCH  
Transfers two wires to four coils and test  
Palladium contacts  
Model No. 16SB1CE52  
Uses removable oval handle, 16SB1CC19"  
Model No. 16SB1CE61  
Fixed knurled handle | ![Contact Diagram](image1) |
| 146 | TEMPERATURE-METER TRANSFER SWITCH  
Transfers three wires to three coils with test and off  
Palladium contacts  
Model No. 16SB1CE55  
Uses removable oval handle, 16SB1CC19"  
Model No. 16SB1CE63  
Fixed knurled handle | ![Contact Diagram](image2) |
| 147 | TEMPERATURE-METER TRANSFER SWITCH  
Transfers two wires to three coils with test and off  
Palladium contacts  
Model No. 16SB1CE57  
Uses removable oval handle, 16SB1CC19"  
Model No. 16SB1CE62  
Fixed knurled handle | ![Contact Diagram](image3) |
| 148 | TEMPERATURE-METER TRANSFER SWITCH  
Transfers three wires to five coils and test  
Palladium contacts  
Model No. 16SB1CE66  
Knurled handle | ![Contact Diagram](image4) |

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<td>TEMPERATURE-METER TRANSFER SWITCH Transfers two wires to six coils and test Palladium contacts Model No. 16SB1CE67 Knurled handle</td>
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<td>SINGLE OR DOUBLE-POLE Single-throw maintain contact Model No. 16SB1CG1 With spring return Model No. 16SB1CG2 Oval handle</td>
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<td>THREE OR FOUR-POLE Single-throw maintain contact Model No. 16SB1CG3 With spring return Model No. 16SB1CG4 Oval handle</td>
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<td>A. FIVE OR SIX-POLE Single-throw, maintained Model No. 16SB1CG5 With spring return Model No. 16SB1CG6 Oval handle B. SEVEN OR EIGHT-POLE Single-throw, maintained Model No. 16SB1CG7 With spring return Model No. 16SB1CG8 Oval handle C. NINE OR TEN-POLE Single-throw, maintained Model No. 16SB1CG9 With spring return Model No. 16SB1CG10</td>
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<td>SINGLE-POLE Double-throw with off maintain contact Model No. 16SB1CG13 With spring return Model No. 16SB1CG14 Oval handle</td>
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<td>DOUBLE-POLE Double-throw with off maintain contact Model No. 16SB1CG15 With spring return Model No. 16SB1CG16 Oval handle</td>
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<td>A. THREE-POLE Double-throw with off, maintain Model No. 16SB1CG17 With spring return Model No. 16SB1CG18 Oval handle B. 4P-dt With off, maintain Model No. 16SB1CG19 With spring return Model No. 16SB1CG20 Oval handle C. 5P-dt With off, maintain Model No. 16SB1CG21 With spring return Model No. 16SB1CG22 Oval handle D. 6P-dt With off, maintain Model No. 16SB1CG23 With spring return Model No. 16SB1CG24 Oval handle</td>
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<td>Double-throw</td>
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<td></td>
<td>Model No. 16SB1CG25</td>
<td>Oval handle</td>
<td>143</td>
<td>SINGLE-POLE</td>
<td>Four-throw</td>
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<td>Model No. 16SB1CG33</td>
<td>Oval handle</td>
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<tr>
<td>140</td>
<td>DOUBLE-POLE</td>
<td>Double-throw</td>
<td>144</td>
<td>SINGLE-POLE</td>
<td>Five-throw</td>
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<td></td>
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<td></td>
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<tr>
<td>141</td>
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<td>Model No. 16SB1CG29</td>
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<td></td>
<td>Model No. 16SB1CG36</td>
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<td>C. 5P-dt</td>
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<td></td>
<td>E. 7P-dt</td>
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X In all contact diagrams denotes contacts closed
### Contact Diagrams SB-1

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<th>ESCUTCHEON &amp; CONTACT DIAGRAM</th>
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<tr>
<td>147</td>
<td>SINGLE-POLE Eight-throw Model No. 16SB1CG37 Oval handle</td>
<td>![Contact Diagram 147]</td>
</tr>
<tr>
<td>148</td>
<td>SINGLE-POLE Ten-throw Model No. 16SB1CG38 Oval handle</td>
<td>![Contact Diagram 148]</td>
</tr>
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<td>149</td>
<td>SINGLE-POLE Twelve-throw Model No. 16SB1CG39 Oval handle</td>
<td>![Contact Diagram 149]</td>
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<td>150</td>
<td>DOUBLE-POLE Four-throw Model No. 16SB1CG40 Oval handle</td>
<td>![Contact Diagram 150]</td>
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*In all contact diagrams denotes contacts closed*
Contact Diagrams SB-1

<table>
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<th>Fig #</th>
<th>DESCRIPTION</th>
<th>ESCUTCHEON &amp; CONTACT DIAGRAM</th>
</tr>
</thead>
</table>
| 151   | DOUBLE-POLE Six-throw  
       | Model No. 16SB1CG41 Oval handle | ![Diagram 151] |
| 152   | DOUBLE-POLE Eight-throw  
       | Model No. 16SB1CG42 Oval handle | ![Diagram 152] |
| 153   | DOUBLE-POLE Twelve-throw  
       | Model No. 16SB1CG43 Oval handle | ![Diagram 153] |

* In all contact diagrams denotes contacts closed
Specification Form GED-3933 has been designed for data-processing equipment and also to make it easier to fill out. Refer to page 64 and proceed as follows to fill out the form.

1 **FOR FACTORY USE ONLY (BLOCKS 9 THROUGH 18)**
   These blocks are for factory use only, and should be left blank.

2 **CATALOG NUMBER (BLOCKS 19 THROUGH 25)**
   This number is assigned at the factory and these blocks should be left blank.

3 **ACTION**
   This part of the form is broken into five sections, detailed under the five following points (4-8).

4 **MAINTAINED ALL POSITIONS (BLOCK 29)**
   Put an “X” in this block if all the positions are maintained, and put in a dash (-) if they are not maintained.

5 **SPRING RETURN FROM COUNTER-CLOCKWISE POSITIONS (BLOCKS 27 AND 28)**
   Put the number of the position the spring return action is from in Block 27 and the position the spring return is to in Block 28. Put in a dash when this action does not apply.

6 **SPRING RETURN FROM CLOCKWISE POSITIONS (BLOCKS 29 AND 30)**
   Put the number of the position the spring return action is from in Block 29 and the position the spring return is to in Block 30. Put in a dash when this action does not apply.

7 **MAINTAINED POSITION WITH SPRING RETURN (BLOCKS 31 THROUGH 34)**
   When you have the combination of maintained spring return action, the maintained positions are put in these blocks, starting with Block 31 and the lowest position number. Put a dash in the blocks that remain.

   **NOTE:** With maintained and spring-return action, if Position 3 is being used, Position 3 is always a maintained position.

8 **PULL-TO-LOCK (BLOCKS 35 AND 36)**
   When Pull-to-Lock is desired, the positions in which the handle is to be pulled and locked are indicated in these blocks. A dash is indicated in both blocks when Pull-to-Lock is not desired.

9 **HANDLES (BLOCK 37)**
   Select the proper code letter (K, V, P, L or N) to identify the type of handle desired. Indicate the appropriate letter in this block. The code letters A, B, C & D are used when a matching Type SB-1 handle is requested.

   **NOTE:** For removable-type handle switches, the code “N” for none is used, since removable handles are furnished as a separate item and are not furnished with the switch. See “Removable-Handles” Section.

10 **ESCUTCHEONS (BLOCK 38)**
   Select the proper code letter (S, T, N, P or R) for the desired escutcheon, and put it in this block. When a keyed escutcheon is required for a removable handle, use the letter “R” and refer to Point 11, “Escutcheon Keyways.” It should be noted that code “P” is a special escutcheon. This code is used when Laminoid escutcheons are required. The description “Laminoid” must also be specified in “Special Instructions” on the form as described in Point 17.

11 **ESCUTCHEON KEYWAYS (BLOCKS 39 THROUGH 43)**
   These blocks are used only when a keyed escutcheon (Code R) is specified. Three keyways are normally used, and information in these blocks is generally assigned at the factory. See “Removable Handles” Section.

12 **INTERMEDIATE POSITIONS (BLOCKS 44 THROUGH 51)**
   The SBM switch has eight position locations, with 45 degrees between positions. When 90 degree positioning is required, the 45-degree position location becomes an intermediate (non-feel) position. An “X” in one of the eight blocks above the positions indicates this position to be an intermediate position. See the section on “Overlapping (make-before-break) Contacts”.

13 **OPERATING REQUIREMENT**
   See the Table - The vertical numbers 1 to 20 are the contact numbers. The horizontal numbers, 1 through 8, are the position locations.

   Put an “X” in the block under the position in which you want the contact to close. If that contact is to be open, leave the block blank. To the right of the table is a sketch of the standard escutcheon to aid in identifying the position locations on the switch.

   When slip contacts are required, use the table on the right showing Position locations 1 through 5 only (as indicated). Under Position 3, there are two columns (2 and 4) to show if a contact is to be closed in Position 3 only when coming from Position 2 or when coming from Position 4. Whatever contact action occurs in only Position 3 from 2 will also occur in Position 2 and 1 (when used), and whatever contact action occurs in only 3 from 4 will also occur in Position 4 and 5 (when used). Refer to “Slip Limitations” and how to overcome them before completing this part of the form.

14 **STOP LOCATIONS**
   At the bottom of the switch operating tables are Blocks number 1 through 8 and 1 through 6 which identify the stop locations. The stop locations are under the vertical lines between the positions. Example: When using Positions 2, 3 and 4, circle stop location Number 2 to show that the handle is not to go to Position 1 from Position 2, and circle stop location Number 5 to show that the handle is not to go to Position 5 from Position 4. For 360 degree rotation, do not circle any stops.

15 **CIRCUIT DESIGNATION ENGRAVING**
   Specify the circuit designation desired in the 22 blocks following the blocks marked 108. A maximum of 22 characters can be specified.

16 **ESCUTCHEON ENGRAVING**
   There are two lines of engraving available for each position (1 through 8), and a maximum of eight characters per line. If only one line is required, use the top line. If a Position is to be blank, write (“BLANK”) for that Position. When a target escutcheon is specified, leave Position 3 blank. If the entire escutcheon is to be blank write “BLANK ESCUTCHEON” under “Special Instructions” (Point 17) at the bottom of the form.

17 **SPECIAL INSTRUCTIONS**
   There are four rows of blocks to be used for any special instructions, such as the handle painted red, Lamicoid escutcheon for thick panel, blank escutcheon, jumpers, etc.

   There are two types of Jumpers available for the SBM switch: Jumper 307V515 for contacts on the same stage, and Jumper 307V512 for jumpering contacts on adjacent stages.

   **NOTE:** Jumpers are only furnished assembled, where required, on all standard listed switches. For unlisted switches, separate jumpers can be ordered.

   Examples of Filled-Out Forms on Pages 574 & 58
Fig. 65A A specification form for SBM switches, four-position, pull-to-lock switch with pistol-grip handle, and standard escutcheon. Action is spring return from Positions 1 and 2 to Position 3, maintained action in Positions 3 and 4, with handle locked against turning when it is pulled out in Position 1. The handle will stay in position till it is pushed back to the “IN” position. Contacts 3, 4, 7, 8, 9 and 10 are slip contacts. Note: Contacts in Position 1 do not change when the handle is pulled out. Under “Special Instructions,” 2 jumpers (307V515) are to be furnished loose with the switch.
**Fig. 65B** A specification form for a three-position, breaker-control switch with spring return from Position 2 to Position 3, and from Position 4 to Position 3, pistol-grip handle, and target escutcheon required for thick panel (1-inch or 1-1/2 inch) slip contacts 1, 2, 7, 8, and 9. Note that Position 3 is not engraved when a target escutcheon is used.

**Fig. 65C** A specification form for a four-position switch with maintained action, no handle, keyed escutcheon for removable handle with keys at Positions 2, 3, and 4, and 360° rotation (no stops) using only Positions 1, 3, 5, and 7 (intermediates at Positions 2, 4, 6, and 8).
Select either the SB-1/SB-9/SB-10 at the top of the order form and then follow the steps below.

1. **Handle Position**
The handle position location areas are shown front view, facing the handle. Select the desired degrees between positions and mark the position numbers. Going in a clockwise direction, Position 1 starts in the extreme counter-clockwise (CW) position. When 360-degree rotation is required, Position 1 starts at 12 o’clock. Examples of notations see pg. 63-64.

2. **Contact Arrangement**
The vertical columns on the left (numbers 1 to 32) are the contacts. The position numbers should be marked in the top column under “Handle Positions (Back View)”. The term “Back View” means that the positions are read from right-to-left for the contact arrangement only.

An asterisk between the position number is used to indicate intermediate position to show the special contact action desired between the designated positions. Intermediate positions can be supplied on switches with 45° or more between positions (some types: 37-1/2°).

For information on Lateral Contacts see Section 9 & 10 on Specification Form - Part 1. For information on SLIP-CAMS see examples on Specification Ordering Guide - Part 2 Examples of notations see Fig. 61A, 65-A and 65A.

3. **Contact Connections**
Mark the contact connections desired for each stage in the manner shown.

- ELECTRICALLY SEPARATE
  (Supplied if connection type not specified)

- ELECTRICALLY SEPARATE WITH COMMON TERMINAL

- ELECTRICALLY COMMON WITHOUT COMMON TERMINAL FOR DOUBLE-BREAK ACTION
Examples of notations see pg. 63.

4. **Engraving**
Under “Position”, indicate the position numbers which are marked in the handle-position portion 1 of the form. Indicate the desired engraving for the position next to it under “Escutcheon Engraving”. Maximum of 8 characters per space. The circuit designation, if desired, is marked in the circuit plate engraving block above the escutcheon engraving. Maximum of 22 character spaces.

5. **Handles**
Check the appropriate block to indicate the design of the handles desired. Available handle types are shown on page 3. Examples of notations see pg. 63.

6. **Escutcheons**
Check the block next to the desired escutcheon. For information and illustrations on the available escutcheons, refer to the Special Features Section in this publication. Target escutcheon is available only with spring return actions of 45° CW, 45° CCW, 75° CCW.

When a keyed escutcheon is checked, the position in which the handle is to be removable must be given, along with any other necessary information.

7. **Rotating Action**
1. Maintaining All Positions - When the handle is maintained in all positions, check this block.
2. Spring Return Action - Can be provided from both directions to NORMAL, or from one direction to NORMAL. Maintaining Position - When spring-return and maintained action is desired, both the spring-return positions, as per above, and the maintained positions should be marked.
3. Pull-to-Lock In Position - When a pull-to-lock action is desired fill-in the position number in which the handle is to be pulled and latched. Examples of notations see Fig. 63D-63K.

8. **Panel Thickness**
Give the panel thickness in inches. This information is very important in selecting the proper shaft and spacers, however, it is frequently not specified. If the panel thickness is not given, the switch will be furnished for mounting on panels up to 3/16-inch thick. Most switches can be furnished for mounting in panels up to two-inches (32/16”) thick.

9. **Lateral Contact Stages**
For SB-10 Switches Only:

To identify the lateral stages, mark a dot(s) to the far left outside of the contact connection diagram 3. (Maximum: four lateral stages, two contacts per stage). Add “X” for each desired stage. For each lateral stage used, avoid that stage in Contact Arrangement Table (in 2).

Note: Do not put an “X” under the handle positions for these contacts. An “X” is used only for the rotary contacts.

10. **Lateral Contact Action**
If you want to prevent rotary action in one of the lateral positions (either IN or OUT), cross out the other position. If you want rotary action in both the IN and OUT positions, cross out the word “NO” and add the designation “&” on the line between the words “IN” and “OUT”.

If the handle is to be maintained in both the IN and OUT positions, cross out “Spring Return to IN/OUT”.

If the handle is to spring return to either the IN or OUT position, cross out the undesired position and Maintaining “IN” “OUT”.

When rotary action is spring return, you can only have lateral spring return action when the lateral action is in the “NORMAL” (rotary spring released) position. The maximum number of lateral contacts that can be provided to open with the lateral spring action is four.

First select the proper action (“Pull” or “Push”) and write in the position in which this action is to take place, then, write the action numbers for the contact action desired. Refer to Table 2 - page 7 for the lateral action available. Refer to Fig. 65A for examples of notations.

For Options - See GED-3934 Form - Part 2
Select the Type of Switch Required:
- SB-1
- SB-9
- SB-10

**HANDLE POSITIONS (Front View)** Mark Position Numbers

<table>
<thead>
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<th>Bottom</th>
<th>Top</th>
<th>Bottom</th>
</tr>
</thead>
<tbody>
<tr>
<td>90°</td>
<td>+</td>
<td>90°</td>
</tr>
<tr>
<td></td>
<td>+</td>
<td>45°</td>
</tr>
<tr>
<td></td>
<td>+</td>
<td>37-1/2°</td>
</tr>
<tr>
<td></td>
<td>+</td>
<td>60°</td>
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<td></td>
<td>+</td>
<td>75°</td>
</tr>
<tr>
<td>SPECIAL</td>
<td>+</td>
<td>60°</td>
</tr>
</tbody>
</table>

LATERAL CONTACT STAGES
- Add “X” for Each Desired Lateral Stage.
- For Each Lateral Stage marked here, leave that stage blank in the Contact Arrangement Table.

**CONTACT ARRANGEMENT** Mark “X” for Closed Contact

**CONTACT CONNECTIONS** Mark “X” for Closed Contact

**HANDLE POSITIONS (Back View)**

**CONTACT ARRANGEMENT**

<table>
<thead>
<tr>
<th>Handle Positions</th>
<th>Contact Connections</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**4 ENGRAVING**

- Circuit Plate Engraving:
  - Pos. Escutcheon Engraving

**5 HANDLES**
- Knurled
- Oval
- Pistol Grip
- Lever
- Round
- Radial
- L. Pistal Grip
- None

**6 ESCUTCHEON**
- Standard or Round
- Target
- Removable Handle
- Keyed for Removable in Position

**7 ROTATING ACTION**
- Maintaining All Positions
- Spring Return Action
  - S.R. from CCW Position From Pos ( ) To ( )
  - S.R. from CW Position From Pos ( ) To ( )
  - Maintaining Position ( )
- Pull to Lock in Position ( )

**8 PANEL THICKNESS**
- Specify Only in increments of 16th of an Inch

**9 LATERAL CONTACT STAGES**

<table>
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<td>+</td>
<td>+</td>
</tr>
<tr>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

**10 LATERAL CONTACT ACTION**
- Cross Out the Action which does not apply
  - No Rotation when IN OUT
  - Maintaining IN OUT
  - Spring return to IN OUT
  - To Close Contacts ( )
  - To Open Contacts ( )

*No Spring Return Lateral & Rotary Unless Locked in “N” Position.*
11 SPECIFYING OPTIONAL FEATURES
Certain optional features are available with the SB-1, -9, and -10 switches, but not necessarily to all of them. Determine whether the option you required is available with the type of switch you are specifying, and check the appropriate block as described below.

12 LOCK-IN HANDLE
Specify the position or positions in which the handle is to lock. All locks will be furnished with two keys, unless otherwise specified. (Not available with "Push or Pull to Lock"; nor "Push or Pull to Turn")

13 SEPARATELY MOUNTED LOCK
SB switches are available with a standard lock and key, or with a Kirk Key-Interlock System. Only one key "cut" is available with the standard lock. Two keys are furnished with each lock. Check the proper block. If Kirk Key-Interlock is checked, fill out the coordination information. Be sure the panel thickness is given.

The switch is furnished with the lock for mounting above the switch, as shown under standard mountings, and identified as Lock No. 1. Complete the description "Lock No. 1; locks and the key is removable in Pos.(    )." If mounting the lock above the switch is not feasible, or when two locks (each locking in a different position) are required, the locks can be mounted to the right, to the left, or below the switch.

To identify the location, the locks are numbers 2, 3 and 4 under "Special Mounting". Fill in the lock number in the description below and the position in which each lock is to lock.

The following Coordination Information is required for utilizing the Kirk Key-Interlock Scheme

To ensure a designated key change is furnished only to the customer and equipment assigned, the following information is required:

1. Fill-in the "Ultimate Customer's Name and Address", plus the name of the substation or building if applicable.

2. Provide the "Initial Purchase Order Number" of the coordinated Kirk locks presently installed to match the present key / lock scheme. If this is a new placement and a new key change is required, state it on your purchase order and we will document the new designated key change.

3. Provide the "Drawings of any Kirk Scheme Already Submitted" or a copy of the drawing. If the key change has already been assigned, as on reorders, specify the key change number.

Be sure this information is complete and correct when placing the order.

14 TANDEM SWITCHES
When a switch with more than 16 stages is required, two or more switches can be assembled in tandem, operating with one handle. The switches are normally mounted horizontally, but can also be furnished vertically mounted. Show the location of the switches and handle on the sketch provided for up to four switches in tandem. The corresponding switch numbers on the sketch should also be on the contact arrangement specification form. Draw in the handle to show its location, or specify the switch number on which the handle will be mounted. When more than four switches, or a different arrangement is required, use a separate sheet showing the proper switch arrangement.

Only the switch with handle can be provided as a "Pull to Lock" or SB-10.

15 PULL-TO-TURN/PUSH-TO-TURN
If the handle is to rotate in the "IN" position, indicate what position or positions; if it is not to rotate in the "IN" position, write "none". Fill in the position number in which the handle is to be pulled and state to what position, or positions, you will be rotating. Cross-out unwanted selections. For Push-to-Turn action fill-in a similar manner.

16 PALLADIUM CONTACTS
Check this block if required. Palladium contacts are available for temperature-meter switches. (see "Temperature-meter Switches" - Page 17). If for a special application where some of the contacts are palladium, but not all, specify requirement in this block or on the contact arrangement.
11 "OPTIONAL FEATURES"

12 LOCK-IN-HANDLE - [SB-1 or SB-9]
   Corbin Lock Replacement
   Handle Locks and Key Removable in Position ( )
   Special ( )

13 SEPARATELY MOUNTED LOCK - [SB-1, SB-9 or SB-10]
   Standard Lock and Key ...........................................
   Kirk Key-Interlock Scheme ....................................
   Coordination Information must be completed below when Kirk Lock is checked
   Panel Thickness ...................................................

STANDARD MOUNTING SPECIAL MOUNTING
No. 1 ( ) No. 2 ( ) No. 3 ( ) No. 4 ( )

Lock No. ( ); Locks and Key is Removable in Pos. ( )
Lock No. ( ); Locks and Key is Removable in Pos. ( )

The following coordination information is required for Kirk Key-Interlock Scheme
1. Ultimate Customer's Name & Address

   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________

   2. Purchase Order of Coordinating Locks
      P.O. No.

   3. Coordinating Information (KNOWN KEY No. & PRINT)

      ________________________________________________________________
      ________________________________________________________________
      ________________________________________________________________

14 TANDEM SWITCH (Geared) - [SB-1, SB-9 or SB-10]
   Vertically Mounted ................................................
   Horizontally Mounted ...........................................

   2 Switch No. TANDEM 3rd Switch No. 4th Switch No.
   A B C D

1. Indicate the Switch No. required and cross-out the switch(es) not required.
2. Use a separate form showing the proper switch arrangement for each switch above and write Switch No. on Specification Form - Part 1 . . .
3. Indicate Handle at location A, B, C, or D above.
4. Indicate the type of handle on Specification Form (See Step 5).

A LARGE PISTOL GRIP HANDLE IS RECOMMENDED TO EASE IN TURNING TO VARIOUS POSITIONS

15 PULL-TO-TURN/PUSH-TO-TURN - [SB-1 or SB-9]
   Rotates in Positions ( ) when Handle is "IN"/"OUT"
   PULL "OUT" / PUSH "IN" in Position ( ) to Rotate to Position ( )

16 PALLADIUM CONTACTS - [SB-1, SB-9 or SB-10]
   Check this block if Required

CHECK PROPER BLOCKS AND COMPLETE REQUIRED INFORMATION.

See Separate "Ordering Guide" for this "Specification Form" on Page 59
Examples of Filled-Out SB-1/SB-9/SB-10 Specification Forms

Some examples of correct and incorrect notations are shown here.

A common mistake is to show double-break contacts when they are not desired. Fig. 63A.

Here the requirement is clear that Contact 1 is closed in Position 1, that Contacts 1 and 2 are open in Position 2, and that Contact 2 closes in Position 3. However, with no common terminal, neither Position 1 nor Position 3 will make a circuit closure. There must be a common terminal as indicated in Fig. 63B.

When a double-break action is required, use the notation as indicated in Fig. 63C.

SOME EXAMPLES OF INDICATING ROTATION ACTION

Fig. 63A: Examples of Completed Connections

INCORRECT

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CORRECT

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Fig. 63B

CORRECT

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Fig. 63C

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Fig. 63D

HANDLE POSITIONS (F.V.)

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</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td>2</td>
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<tr>
<td>3</td>
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<td>4</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ROTATING ACTION

MAINTAINED ALL POSITIONS

SPRING RETURN ACTION

S. R. FROM CCW POS.       S. R. FROM CW POS.
FROM POS 1 TO 2           FROM POS 3 TO 2
MAINT. POS.               

PULL-TO-LOCK IN POS.

Fig. 63E

HANDLE POSITIONS (F.V.)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ROTATING ACTION

MAINTAINED ALL POSITIONS

SPRING RETURN ACTION

S. R. FROM CCW POS.       S. R. FROM CW POS.
FROM POS 1 TO 3           FROM POS 5 TO 3
MAINT. POS.               

PULL-TO-LOCK IN POS.

Fig. 63F

HANDLE POSITIONS (F.V.)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>

ROTATING ACTION

MAINTAINED ALL POSITIONS

SPRING RETURN ACTION

S. R. FROM CCW POS.       S. R. FROM CW POS.
FROM POS 1 TO 2           FROM POS 4 TO 2
MAINT. POS.               

PULL-TO-LOCK IN POS.
**LATERAL CONTACTS FOR SB-10 SWITCHES ONLY**

<table>
<thead>
<tr>
<th>HANDLE POSITION</th>
<th>CONTACT ARRANGEMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Image" /></td>
<td><img src="image2" alt="Image" /></td>
</tr>
</tbody>
</table>

**LATERAL CONTACT STAGES**

<table>
<thead>
<tr>
<th>CONTACT STAGES</th>
<th>LATERAL CONTACT ACTION*</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3" alt="Image" /></td>
<td><img src="image4" alt="Image" /></td>
</tr>
</tbody>
</table>

*Cross Out the Action which does not apply

**Examples of completed Lateral Action Forms for completing Specification Form for SB-10 Switches ONLY**

*Figure 65A:*

Examples of completed Lateral Action Forms for completing Specification Form for SB-10 Switches ONLY
**Fig. 66A:** Example of a completed specification form, calling for a 3-stage SB-9 Switch, 3-position, maintained action, pistol grip handle, standard cover, and a panel thickness of 1/8 inch.

**Fig. 66B:** Example of a completed specification form, calling for a 5-stage, 8-position SB-1 Switch with maintained action, knurled handle, standard cover and a panel thickness of 1/4 inch.

**Fig. 66C:** Example of a completed specification form, calling for an 8-stage SB-1 Switch, 5-position, spring return action (both directions), oval handle, standard cover, and a panel thickness of 1/8 inch.
CASE I-INSPECTING SWITCH ONLY

When the SBM switch is taken apart for inspection purposes only and is to be reassembled without modifications, follow this sequence:

1. Turn handle to vertical (12 o'clock position).
2. Remove handle and mounting screws.
3. Remove screws holding the front plate of positioning chamber.
4. Remove adjustable stops, noting relation of the punch mark on the operating shaft. This punch mark should be pointing towards the 90° cow position (9 o'clock location).
5. Remove the stop spacers and positioning wheel. The balance of the parts in the front part of the chamber should be left intact*.
6. Use a 5/16" wrench to loosen the tie bolts in the rear of the switch. Back off the bolts only as far as necessary to loosen the positioning chamber from the balance of the assembly and remove chamber.
7. Push tie bolts back up against the rear barrier to keep the stages intact.
8. Turn operating shaft so that punch mark is not facing the bottom vertical (6 o'clock) position.
9. Remove the first stage front barrier plate (6 o'clock) position.
10. Read the following before removing cover.

Note: Each stage houses two double surface cams. The first controls the action of the even number contact while the second cam controls the odd number contact. One cam is distinguished from another by a number (1 to 22) on one surface of the cam.

*On a control switch with a spring return feature there are no parts in the front half of the positioning chamber except the stop cams and a thick spacer. The rear half of this chamber houses the torsion spring. When the chamber is removed from the assembly the spring actuator, torsion spring and spacer will be up against the front barrier plate of the first stage of contacts. These parts should be removed and replaced in order. The balance of the steps for dismantling and reassembly remain the same.

CASE II-CHANGING CONTACT SEQUENCE

If the SBM switch is to be taken apart and the contact sequence modified, follow the steps outlined in Case I. Omit step #11 since the cam locations in most cases will have to be changed to obtain the necessary position. The following are instructions necessary to select the new cams.

**SET UP THE FOLLOWING TABLE**

<table>
<thead>
<tr>
<th>IBM CODE</th>
<th>1</th>
<th>2</th>
<th>4</th>
<th>1</th>
<th>2</th>
<th>4</th>
<th>1</th>
<th>2</th>
<th>12 CAM CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>POSITIONS</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>CODE</td>
</tr>
<tr>
<td>CONTACT #1</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>#2</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>#3</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>#4</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>0</td>
<td>6</td>
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<tr>
<td>X</td>
<td>X</td>
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<td>X</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

The first line indicates the SBM coding system. The second line corresponds to the eight handle positions of the switch with position #1 at the 9 o'clock location and the balance of the positions in 45° intervals moving in a clockwise rotation. The contact diagram shown above indicates a sequence for a two-stage four-contact switch. Referring to the segment on the right, contact #1 is shown closed in position #1. Directly above position #1 is the IBM Code 2. Place this number in the extreme left column of the section marked Cam Code. In the next segment contact #1 is closed in positions 3, 4, 5; directly above these positions are the code number 1, 2 and 4. Their sum is the second digit of the cam code. In the third segment contact #1 is closed in positions 7 & 8. The code numbers above these two positions are 1 & 2. Their sum is the third digit of the code number. It can be seen that contact #2 is only closed in the second segment under positions 3 & 4 whose code is 2 & 4. There is no contact sequence in segments one and three so the first and last digit of the contact's code number will be zero. The middle digit will be 6, the sum of codes 2 & 4. The same method is used to find the cam code for contact 3 & 4.

Now that the cam codes have been derived, refer to the attached cam code sheets. One of these sheets is for the left-hand even number contacts and the other for the right-hand odd number contacts.

The cam code for contact #3 is 305. Refer to the Cam Code sheet for odd number contacts. Beside number 305 on cam and position is the listing 14G. This means cam #14 should be placed on the switch operating shaft so that the letter "G" passes over the punch mark. This will provide the sequence for contact #3 as shown in the diagram.

For contact #4 the cam code is 100. Beside this number on the sheet for left-hand even number contacts is the listing 14E. Cam #1 should be placed on the operating shaft so that the letter "B" passes over the punch mark on the shaft. This will provide the sequence for contact #4 as shown in the diagram. The same procedure should be followed for contacts #1 and 2 whose codes are 273 and 060 and whose listings are 5F and 2C.

The switch can be now be reassembled by reversing the steps listed in Case I. Care must be exercised to make sure that the punch mark is returned to 9 o'clock position before placing the stop cams. This automatically places the handles in the 12 o'clock position and insures a correct sequence for the contacts.

SLIP CAMS

One cam not covered by this sequence is the slip cam for breaker control switches.

This cam is number 22 and can only be mounted on the operating shaft in two locations for proper contact sequence. When a slip cam is required to actuate a sequence as contact #1 or #2 in the table below, 22k is the cam code. When the sequence is to be as shown for contact #3, the cam code is 22D.

Switches which require a make-before-break (overlapping) sequence require special cams, only when three intermediate steps are required between each handle position. They cannot be modified therefore by using the code sheets. Requests for changes of this type should be referred back to the factory.

```
4 | 3 | FROM | 2 | WHEN USED |
---|---|------|---|------------|
1 | X | X | 22K | 1 |
2 | X | X | X | 22K |
3 | X | X | 22D |
```
### SBM SWITCH CAM CODE (ODD NUMBER CONTACTS)

<table>
<thead>
<tr>
<th>Contact Cam Position</th>
<th>Contact Cam Sequence Position</th>
<th>Contact Cam Sequence Position</th>
<th>Contact Cam Sequence Position</th>
<th>Contact Cam Sequence Position</th>
<th>Contact Cam Sequence Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>040</td>
<td>040</td>
<td>040</td>
<td>040</td>
<td>040</td>
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<td>002</td>
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<tr>
<td>006</td>
<td>046</td>
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<td>046</td>
<td>046</td>
<td>046</td>
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<tr>
<td>007</td>
<td>047</td>
<td>047</td>
<td>047</td>
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</tr>
</tbody>
</table>

**Note:** When cam code specifies the use of cam 1A, 2A, 3A, etc., the number on the cam should pass over the punch mark on the operation shaft since the letter “A” does not appear on the cams.

---

### SBM SWITCH CAM CODE (EVEN NUMBER CONTACTS)

<table>
<thead>
<tr>
<th>Contact Cam Position</th>
<th>Contact Cam Sequence Position</th>
<th>Contact Cam Sequence Position</th>
<th>Contact Cam Sequence Position</th>
<th>Contact Cam Sequence Position</th>
<th>Contact Cam Sequence Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
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<td>047</td>
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</table>

---

**Note:** When cam code specifies the use of cam 1A, 2A, 3A, etc., the number on the cam should pass over the punch mark on the operation shaft since the letter “A” does not appear on the cams.
SBM SWITCH NOMENCLATURE EXPLANATION

<table>
<thead>
<tr>
<th>16SBM</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>K</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Stages</td>
<td>No. of Positions</td>
<td>Seq No.</td>
<td>Escutcheon</td>
<td>Action</td>
<td>1st Stop Position</td>
<td>Handle</td>
<td>Panel Thickness</td>
<td>Escutcheon Keyways</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A = 1</td>
<td>2 = 2</td>
<td>F A</td>
<td>S = STANDARD</td>
<td>S</td>
<td></td>
<td></td>
<td>K = KNURLED</td>
<td>1 = 0 - 1/4&quot; FACTORY ASSIGNED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B = 2</td>
<td>3 = 3</td>
<td>A S</td>
<td>T = TARGET</td>
<td>E</td>
<td></td>
<td></td>
<td>V = OVAL</td>
<td>2 = 1&quot;, 1.5&quot; (Used with Escutcheon R only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C = 3</td>
<td>4 = 4</td>
<td>C S</td>
<td>P = TARGET</td>
<td>E</td>
<td></td>
<td></td>
<td>P = PISTOL GRIP</td>
<td>L = LEVER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D = 4</td>
<td>5 = 5</td>
<td>T L</td>
<td>(PULL TO LOCK)</td>
<td></td>
<td></td>
<td></td>
<td>A = SB1 KNURLED</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E = 5</td>
<td>6 = 6</td>
<td>O G</td>
<td>N = NONE</td>
<td>B</td>
<td></td>
<td></td>
<td>B = SB1 OVAL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F = 6</td>
<td>7 = 7</td>
<td>R N</td>
<td>R = REMOVABLE</td>
<td>E</td>
<td></td>
<td></td>
<td>C = SB1 PISTOL GRIP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G = 7</td>
<td>8 = 8</td>
<td>Y E</td>
<td>HANDLE</td>
<td>L</td>
<td></td>
<td></td>
<td>D = SB1 ROUND</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H = 8</td>
<td></td>
<td>D</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td>N = NONE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K = 9</td>
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<td></td>
<td>W</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>L = 10</td>
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<td></td>
</tr>
</tbody>
</table>

DESCRIPTION OF ACTION

MAINTAINED BOTH DIRECTIONS
- 1A - Positions 1, 2, 3, 4, 5, 6, 7, 8
- 2A - Positions 1, 3, 5, 7
- 3A - Positions 2, 4, 6, 8

SPRING RETURN TO POSITION 3 FROM BOTH DIRECTIONS
- 1S - Positions 2, 4
- 2S - Positions 1, 5
- 3S - Positions 1, 5 (feel position 2)
- 4S - Positions 1, 5 (feel position 4)
- 5S - Positions 1, 5 (feel positions 2 & 4)
- 1F - Pull to lock in position 1 (feel position 2)
- 2F - Pull to lock in position 2

SPRING RETURN TO POSITION 3 FROM CW ONLY
- 1C - From position 4
- 2C - From position 5
- 3C - From position 5, (feel position 4)

SPRING RETURN TO POSITION 3 - CCW ONLY
- 1W - From position 2
- 2W - From position 1
- 3W - From position 1, (feel position 2)

SPRING RETURN TO POSITION 3 FROM CW
- MAINTAIN POSITION AT CCW
- 1H - From position 4, maintain position 1, 2
- 2H - From position 4, maintain position 1
- 3H - From position 5, maintain position 2
- 4H - From position 5, (feel pos. 4), maintain pos. 2
- 5H - From position 5, maintain position 1
- 6H - From position 5, (feel pos. 4), maintain pos. 1

SPRING RETURN TO POSITION 3 FROM CCW
- MAINTAIN POSITION AT CW
- 1K - From position 2, maintain position 4, 5
- 2K - From position 2, maintain position 5
- 3K - From position 1, maintain position 4
- 4K - From position 1, (feel pos. 2), maintain pos. 4
- 5K - From position 1, maintain position 5
- 6K - From position 1, (feel pos. 2), maintain pos. 5
**S1** = Latching in CW & CCW positions  
**S2** = Will prevent repeated CCW throws  
**S3** = Will prevent repeated CW throws

**GE Power Management • Technology Center • 205 Great Valley Parkway • Malvern, PA 19355, USA • Phone:(610) 251-7000**
**Nomenclature Guide for 2nd and 3rd Code Letters**

### SB-1 or SB-9 2nd Code Letter

<table>
<thead>
<tr>
<th>Code</th>
<th>Escutcheon Number</th>
<th>Typical Model</th>
<th>Throw</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>6016164-3</td>
<td>16SB1CC1</td>
<td>135°</td>
</tr>
<tr>
<td>B</td>
<td>-5</td>
<td>CC3</td>
<td>135°</td>
</tr>
<tr>
<td>C</td>
<td>-11</td>
<td>CC18</td>
<td>360°</td>
</tr>
<tr>
<td>D</td>
<td>-6</td>
<td>CC9</td>
<td>360°</td>
</tr>
<tr>
<td>E</td>
<td>-7</td>
<td>CC5</td>
<td>45°</td>
</tr>
<tr>
<td>F</td>
<td>-8</td>
<td>CC6</td>
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</tr>
<tr>
<td>G</td>
<td>-9</td>
<td>CC7</td>
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</tr>
<tr>
<td>H</td>
<td>-10</td>
<td>CC12</td>
<td>75°</td>
</tr>
<tr>
<td>I</td>
<td>-11</td>
<td>CC17</td>
<td>360°</td>
</tr>
<tr>
<td>J</td>
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<td>CC18</td>
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</tr>
<tr>
<td>K</td>
<td>-24</td>
<td>CC2</td>
<td>135°</td>
</tr>
<tr>
<td>L</td>
<td>-25</td>
<td>CC18</td>
<td>135°</td>
</tr>
<tr>
<td>M</td>
<td>6016164-11</td>
<td>16SB1CC1</td>
<td>135°</td>
</tr>
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<td>N</td>
<td>-13</td>
<td>CC18</td>
<td>360°</td>
</tr>
<tr>
<td>O</td>
<td>-12</td>
<td>CC2</td>
<td>135°</td>
</tr>
<tr>
<td>P</td>
<td>6016164-60</td>
<td>Pull to Lock (Target)</td>
<td></td>
</tr>
<tr>
<td>Q</td>
<td>-11</td>
<td>CC18</td>
<td>360°</td>
</tr>
<tr>
<td>R</td>
<td>6016164-15</td>
<td>Round</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>6016164-1</td>
<td>Standard</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>6016164-1</td>
<td>Target</td>
<td></td>
</tr>
<tr>
<td>U</td>
<td>6016164-1</td>
<td>Omit Escutcheon</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>6016164-1</td>
<td>Special Escutcheon</td>
<td></td>
</tr>
</tbody>
</table>

# Fixed Handle

### SB-1 3rd Code Letter

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>S.R. from 45°CW to Normal</td>
</tr>
<tr>
<td>B</td>
<td>S.R from 45°CCW to Normal</td>
</tr>
<tr>
<td>C</td>
<td>S.R. from 45° to Normal (One Extra Stage)</td>
</tr>
<tr>
<td>D</td>
<td>S.R. from 45°CCW to Normal (One Extra Stage)</td>
</tr>
<tr>
<td>E</td>
<td>S.R. from 90°CCW to Normal</td>
</tr>
<tr>
<td>F</td>
<td>S.R. from 90°CCW to Normal</td>
</tr>
<tr>
<td>G</td>
<td>S.R. from 90°CCW to Normal (One Extra Stage)</td>
</tr>
<tr>
<td>H</td>
<td>S.R. from 90°CCW to Normal</td>
</tr>
<tr>
<td>I</td>
<td>S.R. from 45°CCW to Normal (Two Extra Stages)</td>
</tr>
<tr>
<td>J</td>
<td>S.R. from 45°CCW to Normal (Two Extra Stages)</td>
</tr>
<tr>
<td>K</td>
<td>Maintaining Contacts</td>
</tr>
<tr>
<td>L</td>
<td>Pull to Lock</td>
</tr>
<tr>
<td>M</td>
<td>S.R. from 45°CCW &amp; CCW to Normal</td>
</tr>
<tr>
<td>N</td>
<td>S.R. from all Positions to Normal</td>
</tr>
<tr>
<td>O</td>
<td>S.R. from all Positions to Normal (Two Extra Stages)</td>
</tr>
<tr>
<td>P</td>
<td>S.R. all Positions Except When Locked, Pull to Lock at 75°CCW</td>
</tr>
<tr>
<td>Q</td>
<td>S.R. - 0°CW &amp; CCW Temp. Feel 30° &amp; 60°</td>
</tr>
<tr>
<td>R</td>
<td>S.R. from 90°CCW or CCW</td>
</tr>
<tr>
<td>S</td>
<td>S.R. from 90°CW or CCW</td>
</tr>
<tr>
<td>T</td>
<td>S.R. from 90°CCW or CCW</td>
</tr>
<tr>
<td>U</td>
<td>S.R. from 90°CCW or CCW</td>
</tr>
<tr>
<td>V</td>
<td>S.R. from 90°CCW or CCW</td>
</tr>
</tbody>
</table>

# Spring Return

### SB-9 3rd Code Letter

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>S.R. from 45°CW to Normal</td>
</tr>
<tr>
<td>B</td>
<td>S.R. from 45°CCW to Normal</td>
</tr>
<tr>
<td>C</td>
<td>Same as A - See *</td>
</tr>
<tr>
<td>D</td>
<td>Same as B - See *</td>
</tr>
<tr>
<td>E</td>
<td>S.R. from 90°CCW to Normal</td>
</tr>
<tr>
<td>F</td>
<td>+ 90°</td>
</tr>
<tr>
<td>G</td>
<td>Special</td>
</tr>
</tbody>
</table>

*Has 1 Extra Stage for Extra Spring

### Abbreviations

- **S.R.** = Spring Return
- **CW** = Clockwise
- **CCW** = Counterclockwise

### Symbols

- **Δ** = One Extra Stage for Additional Torsion Springs
- **⊕** = Two Extra Stages for Additional Torsion Springs

**16SB1 OR 16SB9**

NAMING TECHNOLOGY CENTER • 205 GREAT VALLEY PARKWAY • MALVERN, PA 19355, USA • PHONE: (610) 251-7000