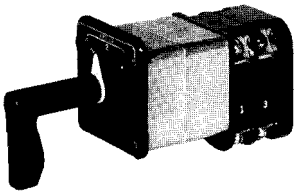
Control and Transfer Switches

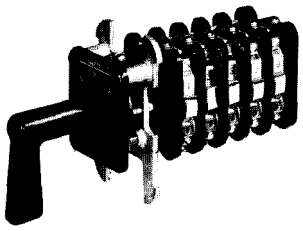
Multi-stage — versatile — reliable



The SBM Switch

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

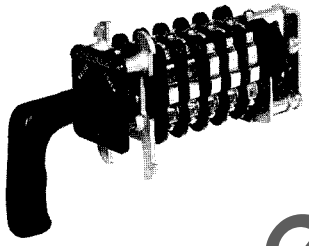
Application Information GET-6169
Prices — Handbook Sect. 7151
Instruction Book — GEH-2038
Renewal Parts — GEF-4167
Descriptive Literature — GEA-4746



The SB-1 Switch

—rotary, cam-operated, slightly larger than the SBM switch and capable of more design flexibility. Can be independently mounted and housed — Navy approved in relevant applications. Many common types warehoused.

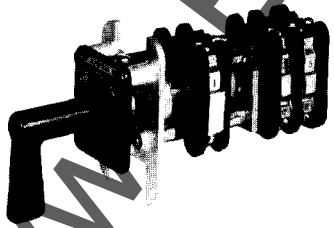
Application Information GET-6169
Prices — Handbook Sect. 7151
Instruction Book — GEH-908
Renewal Parts — GEF-2357
Descriptive Literature — GEA-4746



The SB-9 Switch

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

Application Information GET-6169
Prices — Handbook Sect. 7151
Instruction Book — GET-908
Renewal Parts — GEF-3481
Descriptive Literature — GEA-4746



The SB-10 Switch

—in addition to the rotary operation like the SB-1 switch, the SB-10 is capable of opening and closing contacts with a lateral push or pull of the handle.

Application Information GET-6169
Prices — Handbook Sect. 7151
Instruction Book — GEH-908
Renewal Parts — GEF-3482
Descriptive Literature — GEA-4746

Introduction

This bulletin supplements its companion, GEA-4746G, to furnish application and ordering information on both standard and non-standard control and transfer switches manufactured by General Electric.

Many common applications, such as circuit breaker control, ammeter transfer, and the like, occur again and again, and several standard circuits are illustrated for each. Select one which applies, and order the switch by number only. If the standard switch is satisfactory except for some minor exception, specify the exception along with the standard catalog number.

If a standard model is not available, follow the ordering instructions given in this publication to specify exactly the functions you need. Use one of the following forms:

Form GED-3933 — for SBM switches only.

Form GED-3934 — for SB-1, -9, -10 switches.

Part 1 — Standard features.
Part 2 — Optional features.

Pads of these forms are available to customers of the General Electric Co. through their local sales office. Where stock is temporarily exhausted, copies may be made of the forms printed at the back of this booklet.

Please note that this bulletin should be used with GEA-4746G, which contains descriptive information. Note also that all the earlier versions, GEA-4746-A through -F, contained combinations of the material now revised and divided between GEA-4746 and GET-6169. If you have been using a copy of one of the earlier issues for reference, please obtain copies of the latest bulletins.

Contents

Cam Action and Limitations

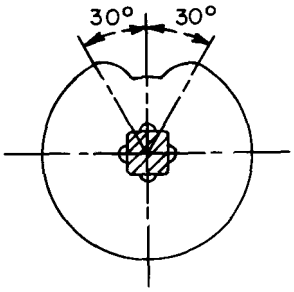


Fig. 1. Operating cam for SB-1, -9, and -10 switches

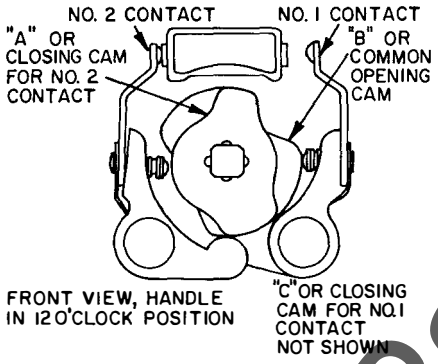


Fig. 2. Composite view of contacts and cams

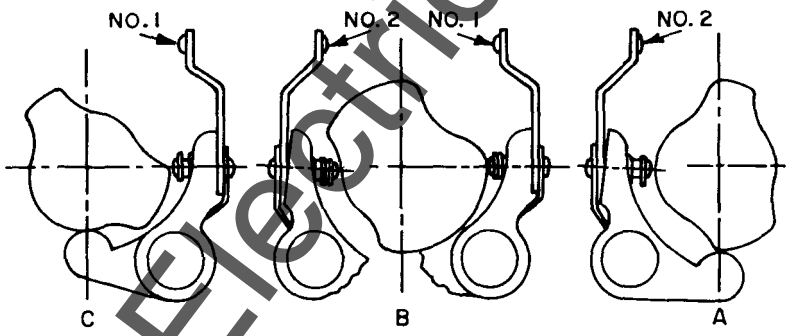
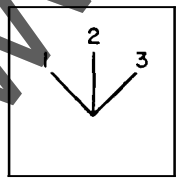


Fig. 3. Individual arrangements of cams in Fig. 2



CONTACTS HANDLE END		POSITION (BACK VIEW) 3	2	1
	1	X		
	2	X	X	

Fig. 4. Contact arrangement, back view

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

Fig. 2 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 "B" cam.

Fig. 4 is the contact diagram for Fig. 2, with Fig. 3 showing the individual arrangement of cams.

One cam limitation must be considered when the switch rotates 180 degrees or more. Referring to Fig. 3, you see that when cam B is rotated 180 degrees, 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 degrees. Fig. 5 shows the diagram of an unworkable and a correct arrangement.

When contacts on the same stage cannot be arranged to avoid this 180-degree cam limitation, one contact per stage is used (See Fig. 6). On five-position switches, 37-1/2 degrees can be used instead of 45 degrees, 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 degrees as shown in Fig. 7. Once the shaft actuates the cam, the shaft will then slip 45 degrees in the opposite direction without actuating the cam.

This type of action is commonly used for circuit-breaker control applications. Fig. 8 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 in Fig. 9. Limitation No. 1 does not apply to the SBM switch because of the independent cams for each contact.

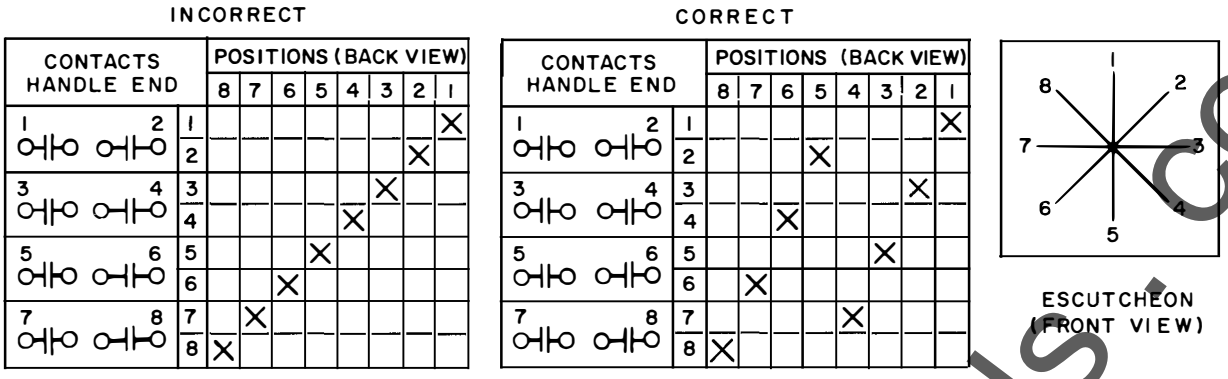


Fig. 5. Diagram of unworkable and correct arrangement

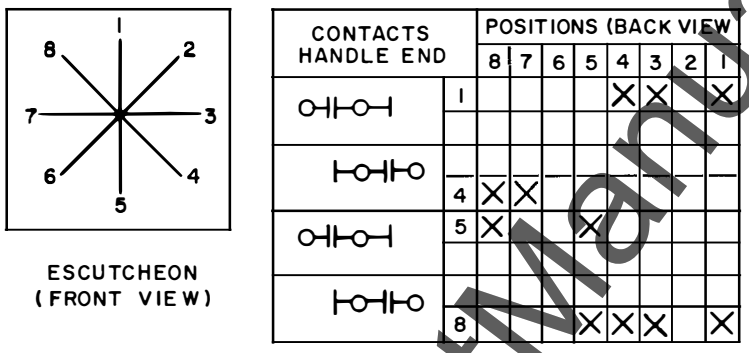


Fig. 6. Contact arrangement to meet cam limitations

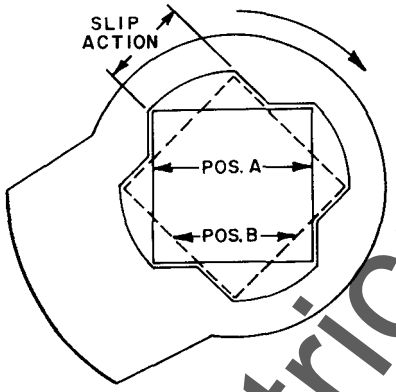
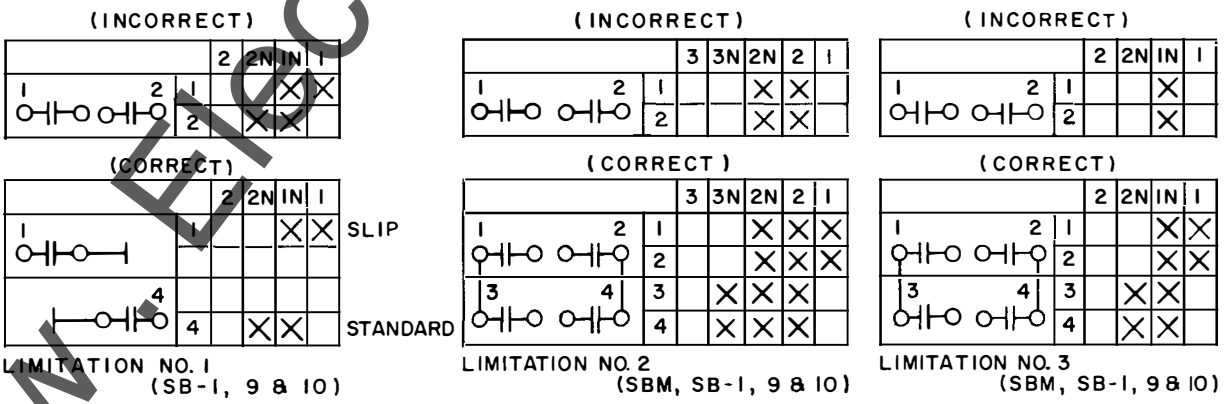


Fig. 7. Diagram showing 45-degree slip action of cam

CONTACTS HANDLE END		POSITIONS			
		Close	Norm after close	Norm after trip	Trip
1 2	1	X			
	2				X
3 4	3	X			X
	4	X			
5	5		X	X	
7 8	7	X	X		
	8	X	X		

Fig. 8. Breaker control switch model 16SB1B2



Limitation No. 1 (SB-1, -9 & -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 in the bottom diagram, one contact per stage. (Does not apply to SBM)

Limitation No. 2 (SBM, SB1, -9 & -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 connect in series as shown in the bottom diagram.

Limitation No. 3 (SBM, SB-1, -9 & -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.

Fig. 9. Slip-cam limitations

Overlapping Contacts

GENERAL

Contacts on Type SB switches are normally non-overlapping (break-before-make). This sequence is illustrated in Fig. 10 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 degrees between positions is required. Figure 11 illustrates an ammeter switch (similar to Model 10AA009) 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 1), and Contact 1 will make before Contact 2 breaks, when going from Position 5 to Position 7.

Figure 12 illustrates an ammeter switch for three independent current transformers (similar to Model 10AA013). 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 degrees 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-degrees apart.

To get a make-before-break action, as shown in Fig. 13, a minimum of 37½ degrees between positions is required. To get a make-before-break as shown in Fig. 14, a minimum of 60 degrees is required. The flexibility of the SB-1, -9, and -10 switch allows the combination of 37½ degrees and 60 degrees 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. 15).

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 Figure 16. A minimum of 60 degrees between positions is required. When less than 60 degrees is required, use two contacts in parallel, as shown in Fig. 17.

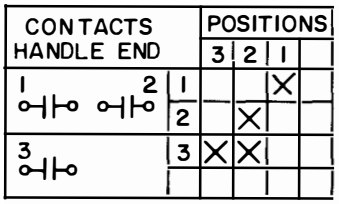
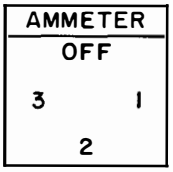


Fig. 10. Typical non-overlapping (break-before-make) sequence



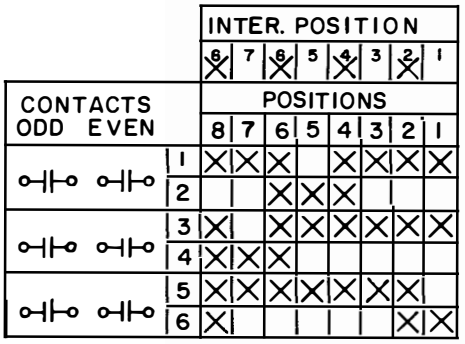
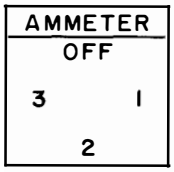


Fig. 11. Overlapping contacts for SBM ammeter-type switch connected at end of secondary



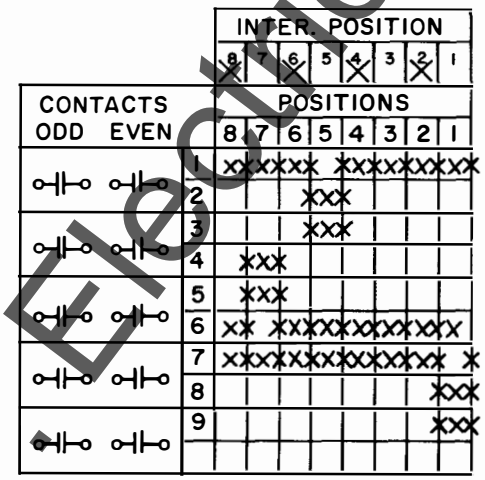
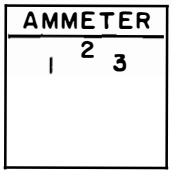


Fig. 12. Overlapping contacts for SBM ammeter-type switch, with three independent circuits



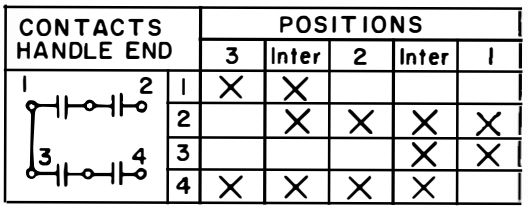
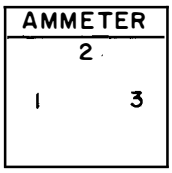


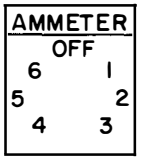
Fig. 13. Overlapping contacts for SB-1 ammeter-type switch connected at end of secondary (two current transformers)



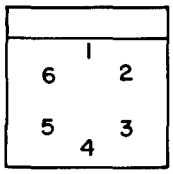
CONTACTS HANDLE END		POSITIONS								
		3	*	*	*	2	*	*	*	1
1–2	1	X	X	X	X	X	X	X	X	
	2								X	X
3	3								X	X
5–6	5	X	X	X	X		X	X	X	X
	6				X	X	X			
7	7				X	X	X			
9–10	9		X	X	X	X	X	X	X	X
	10	X	X							
11	11	X	X							

Fig. 14. Overlapping contacts for SB-1 ammeter-type switch, with three independent circuits

Fig. 15. Overlapping contacts for SB-1 ammeter-type switch, with six independent circuits



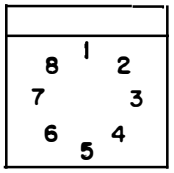
CONTACTS HANDLE END		POSITIONS – BACK VIEW																															
		*	6	*	*	*	5	*	*	*	4	*	*	*	3	*	*	*	2	*	*	*	1	*	OFF									
1–2	1																					X	X										
	2									X	X	X																					
3–4	3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X								
	4	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X									
5–6	5																					X	X	X									
	6									X	X	X																					
7–8	7																	X	X	X													
	8					X	X	X																									
9–10	9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X							
	10	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
11–12	11																	X	X	X													
	12				X	X	X																										
13–14	13													X	X	X																	
	14	X	X	X																													
15–16	15	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X								
	16	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
17–18	17													X	X	X																	
	18	X	X	X																													



CONTACTS HANDLE END		POSITIONS											
		*	6	*	5	*	4	*	3	*	2	*	1
1	1		X		X		X		X		X		X
3–4	3												X
	4						X						
5–6	5										X		
	6				X								
7–8	7								X				
	8		X										

Fig. 16. Special contact sequence which requires one contact to be closed in every handle position, but to open momentarily when switching

Fig. 17. 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 degrees between positions is required, two contacts are connected in parallel



CONTACTS HANDLE END		POSITION – BK.VIEW							
		8	7	6	5	4	3	2	1
	1	X		X		X		X	
	2	X		X		X		X	
	3		X		X		X		X
	4		X		X		X		X

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

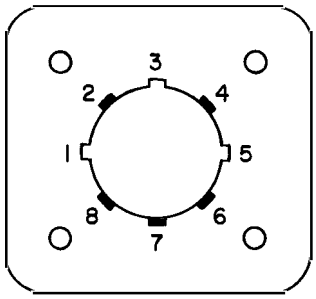


Fig. 18. SBM switch keyed escutcheon with eight available keyway locations. Keyways 1-3-5 are shown

The keyed escutcheon on the SBM switch (Fig. 18) 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 removeable must be considered.

b. If the handle is to be non-interchangeable, the keyways assigned to other removeable 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 1.

TABLE 1 Nomenclature guide for SBM removable handles

1st Number	2nd Number	1st Letter	2nd Letter	3rd No.	4th No.	5th No.
Handle Type	Removable in Position	Common Code	Action of Rotation	Escutcheon Keyways		
1 = Knurled	1	W	W = CW & CCW	1	1	1
2 = Oval	thru		L = CCW (special)	thru	thru	thru
3 = Pistol grip	8		R = CW (special)	8	8	8

Example 1: 21WW135

This oval handle has keys at positions which, when it is in position 1, or nine o'clock, will line up with escutcheon keyways 1, 3, and 5. It is therefore removable in position 1.

SB-1 & SB-9 SWITCH

The keyed escutcheon for the SB-1 & SB-9 switch is normally furnished with three keyways (see Fig. 19). The circumferential location of the 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 2 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 6016164P-2 thru P-14 are used on switches if the throw does not exceed 90° on either side of the vertical (12 o'clock) position, and P-23, 24 and 25 are used when the throw does exceed this limit.

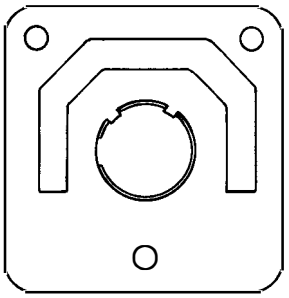


Fig. 19. SB-1 escutcheon for use with removable handle

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 6016164P-3.

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

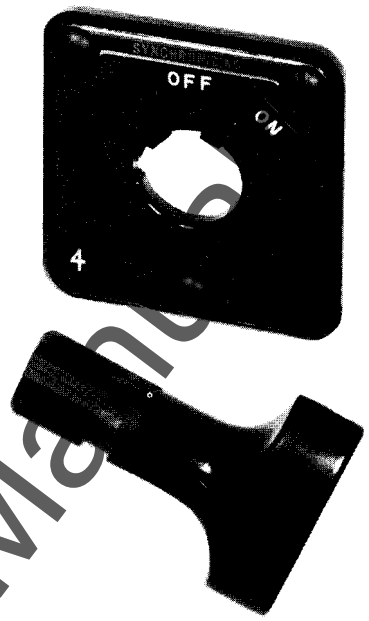
Example: 16SB1AB300SX34M2Y.

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 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 2

Code	Model Number		Throw
	Escutcheon*	Handle	
	Handle Removable in Vertical Position		
A	6016164-3	16SB1CC1	135° CW
A	-3	CC18	360°
B	-4	CC2	135° CW
B	-4	CC19	360°
C	-5	CC3	135° CW
C	-5	CC15	360°
D	-6	CC4	135° CW
D	-6	CC11	45° CW & CCW
D	-6	CC22	45° CCW
D	-6	CC27	360°
E	-7	CC5	45 CW
E	-7	CC12	75° CW
E	-7	CC13	45° CW & CCW
E	-7	C20	360°
E	-7	CC25	75° CCW
F	-8	CC6	45° CW
F	-8	CC14	45° CW & CCW
F	-8	CC24	360°
G	-9	CC7	45° CW "I" Eng.
G	-9	CC8	45° CCW "R" Eng.
G	-9	CC17	45° CCW
G	-9	CC26	135° CCW
G	-9	CC29	45° CW
G	-9	CC21	360°
H	-10	CC23	360°
H	-10	CC9	45° CW "I" Eng.
H	-10	CC10	45° CCW "R" Eng.
H	-10	CC31	45° CW
H	-10	CC32	45° CCW
J	-23	CC18	360°
Y	-24	CC19	360°
Z	-25	CC21	360°
	Handle Removable 90° CCW		
K	6016164-11	16SB1CC1	135° CW
K	-11	CC18	360°
L	-12	CC2	135° CW
L	-12	CC15	360°
M	-13	CC3	135° CW
M	-13	CC15	360°
N	-14	CC11	45° CW & CCW
N	-14	CC27	360°
N	-14	CC4	135° CW
N	-14	CC22	45° CCW
X	Special		

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



Type SB-1 and SB-9

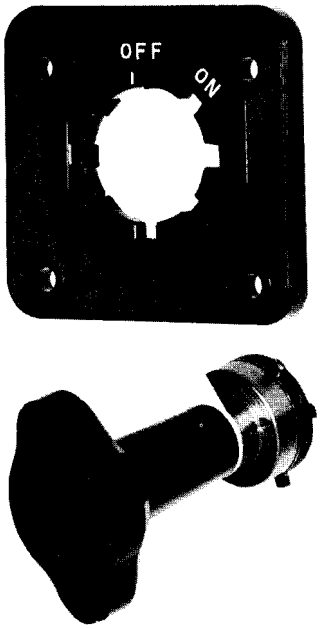


Fig. 20. Typical removable handles and escutcheons

Temperature-meter Switches

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.

Fig. 21 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.

Fig. 22 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.

NOTE: FOR ADDITIONAL CONTACT DIAGRAMS SEE PAGES 39 AND 40.

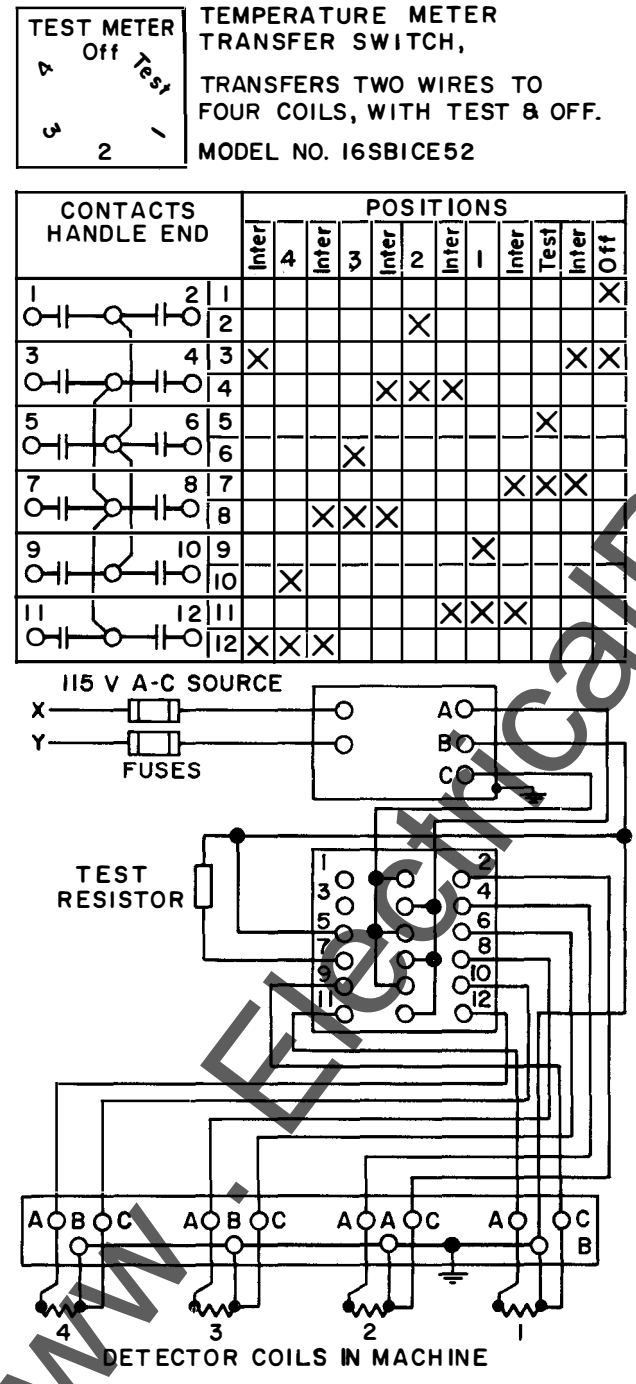


Fig. 21. Temperature meter switch, Model 16SB1CE52

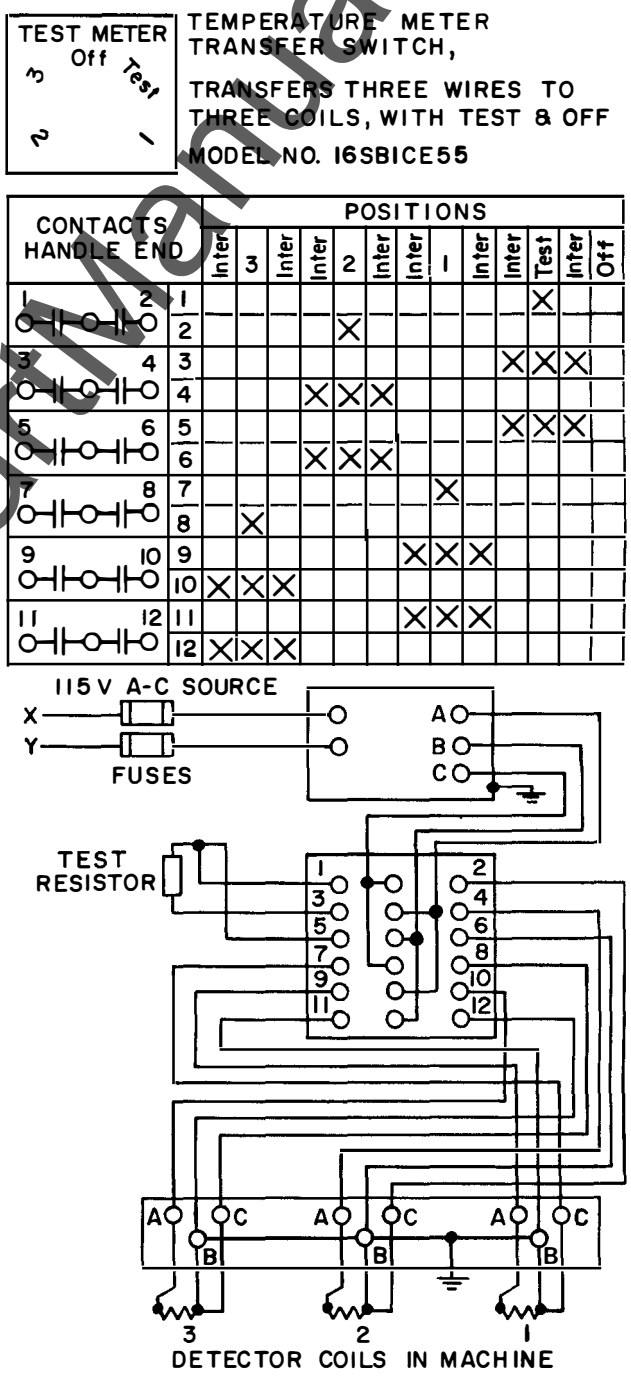
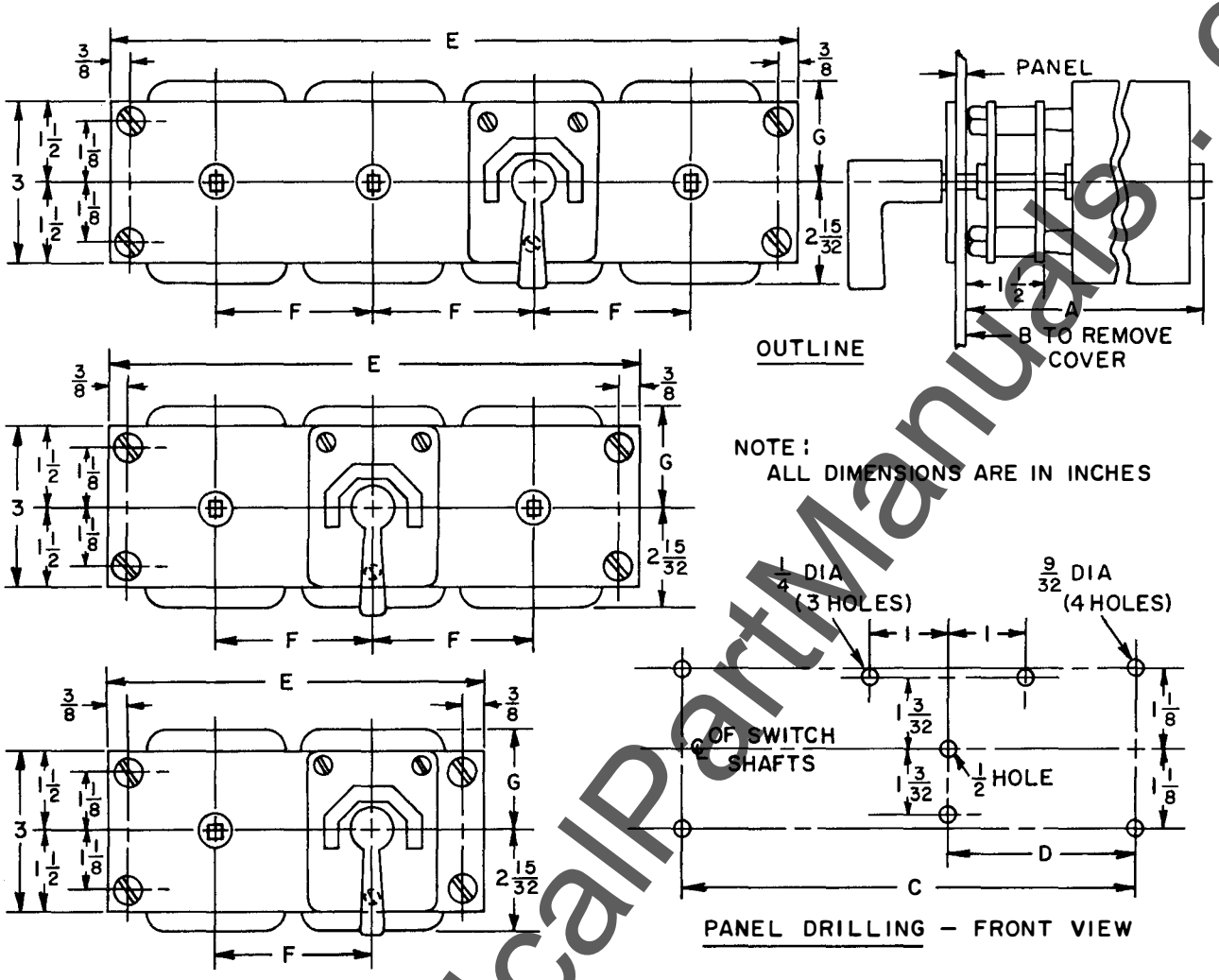


Fig. 22. Temperature meter switch, Model 16SB1CE55

Special Switch Outlines

Figure 23 and Figure 24 cover outlines of some special switches not included in GEA-4746G.



* ADD 1/4 TO A & B DIM. FOR LARGE COVER

NO. OF STAGES	A *	B *
1	5-1/16	7-7/16
2	5-13/16	8-15/16
3	6-9/16	10-7/16
4	7-5/16	11-15/16
5	8-1/16	13-7/16
6	8-13/16	14-15/16
7	9-9/16	16-7/16
8	10-5/16	17-15/16
9	11-1/16	19-7/16
10	11-13/16	20-15/16
11	12-9/16	22-7/16
12	13-5/16	23-15/16
13	14-1/16	25-7/16
14	14-13/16	26-15/16
15	15-9/16	28-7/16
16	16-5/16	29-15/16

TWO SWITCH TANDEM SB-1

Crank oper. max. throw from vertical 45°
Crank oper. max. throw from vertical 75°
Gear-operated (360° rotation)

THREE SWITCH TANDEM SB-1

Crank oper. max. throw from vertical 45°
Crank oper. max. throw from vertical 75°
Gear-operated (360° rotation)

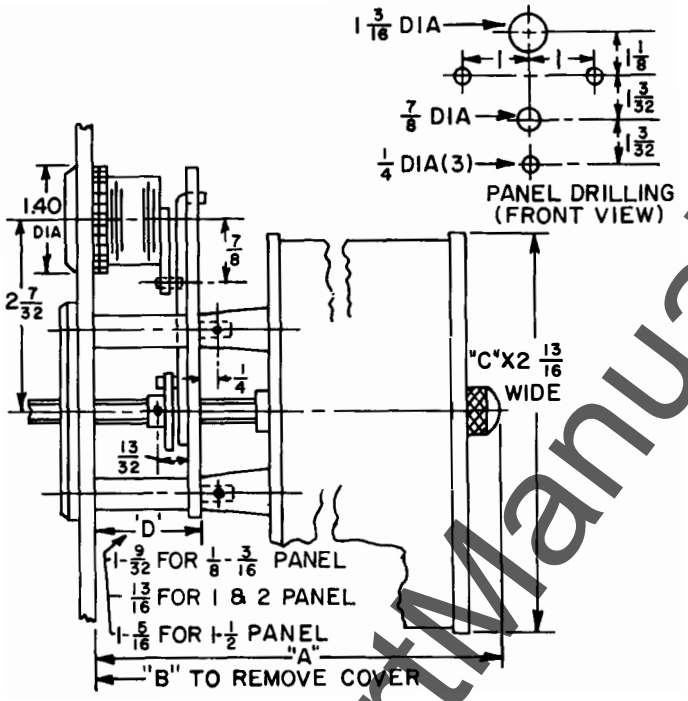
FOUR SWITCH TANDEM SB-1

Crank oper. max. throw from vertical 45°
Crank oper. max. throw from vertical 75°
Gear-operated (360° rotation)

C	D	E	F	G
6-3/4	1-3/4	7-1/2	3-1/4	2" FOR SMALL COVER 2-1/2" FOR LARGE COVER
8-1/4	2-1/2	9	3-1/4	
7-1/2	2	8-1/4	3-1/2	
10	5	10-3/4	3-1/4	
11-1/2	5-3/4	12-1/4	3-1/4	
11	5-1/2	11-3/4	3-1/2	
13-1/4	5	14	3-1/4	
14-3/4	5-3/4	15-1/2	3-1/4	
14-1/2	5-1/2	15-1/4	3-1/2	

(This data is subject to change without notice)

Fig. 23. Tandem-switch outline



SB-switch with Yale Lock above the switch. For "A" and "B", *use standard dimensions plus "D", depending on panel thickness.*

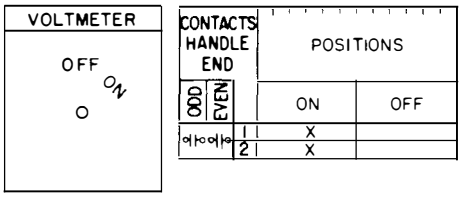
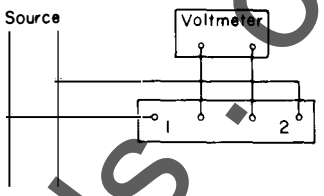
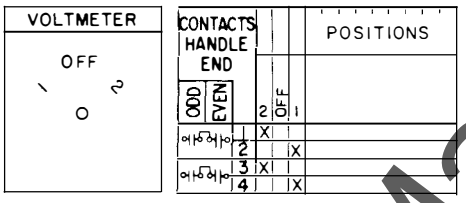
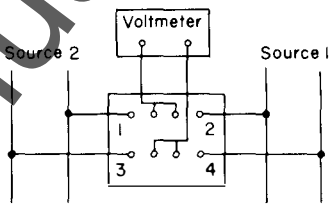
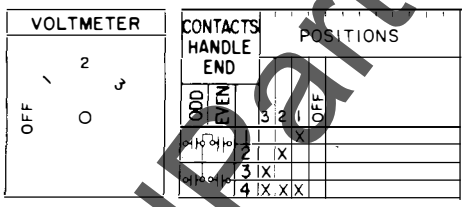
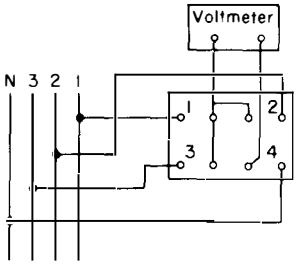
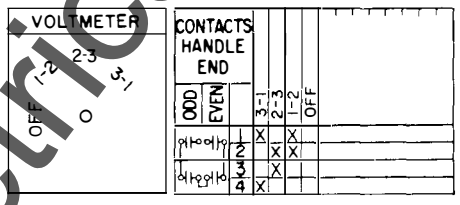
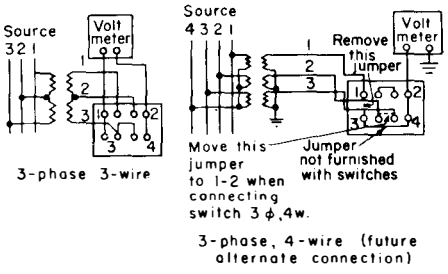
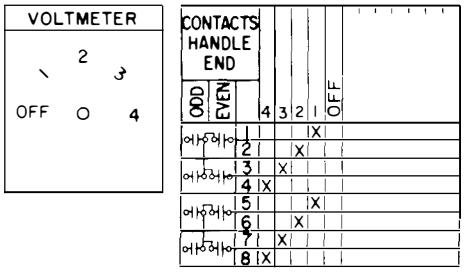
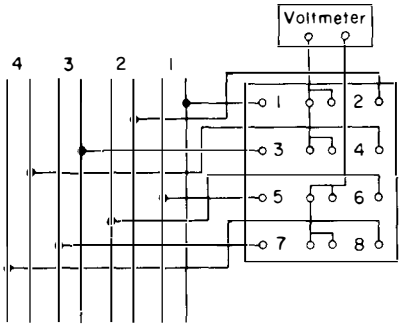
SB-9 SWITCHES
STANDARD DIMENSIONS IN INCHES

NO. OF STAGES	STANDARD COVER 12 WIRES OUT TOP AND 24 WIRES OUT BOTTOM			LARGE COVER 24 WIRES OUT TOP AND BOTTOM		
	A	B	C	A	B	C
1	4-7/8	8-3/8	4 1/2	5-1/8	8-5/8	4 15/16
2	5-5/8	9-7/8		5-7/8	10-1/8	
3	6-3/8	11-3/8		6-5/8	11-5/8	
4	7-1/8	12-7/8		7-3/8	13-1/8	
5	7-7/8	14-3/8		8-1/8	14-5/8	
6	8-3/8	15-7/8		8-7/8	16-1/8	
7	9-3/8	17-3/8		9-5/8	17-5/8	
8	10-1/8	18-7/8		10-3/8	19-1/8	
9	10-7/8	20-3/8		11-1/8	20-5/8	
10	11-5/8	21-7/8		11-7/8	22-1/8	
11	12-3/8	22-3/8		12-5/8	23-5/8	
12	13-1/8	24-7/8		13-3/8	25-1/8	
13	13-7/8	26-3/8		14-1/8	26-5/8	
14	14-5/8	27-7/8		14-7/8	28-1/8	
15	15-3/8	29-3/8		15-5/8	29-5/8	
16	16-1/8	30-7/8		16-3/8	31-1/8	

(This data is subject to change without notice)

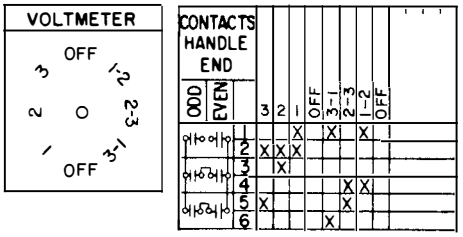
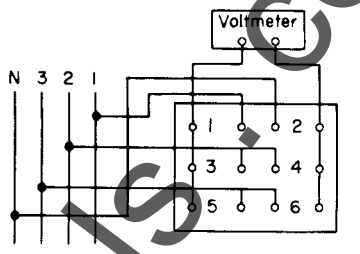
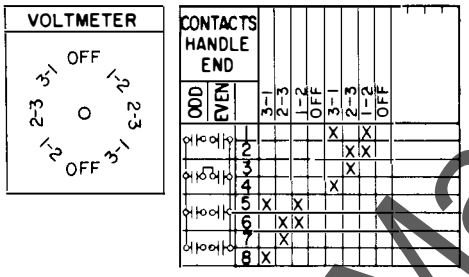
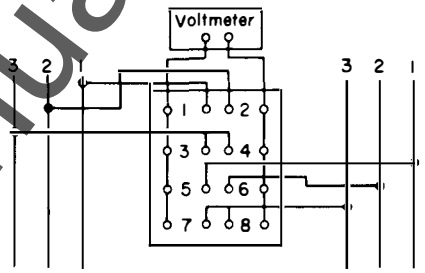
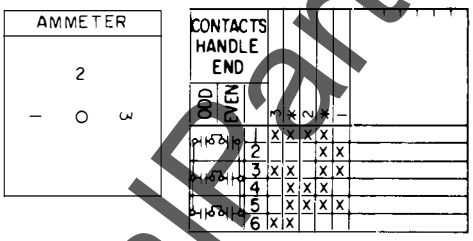
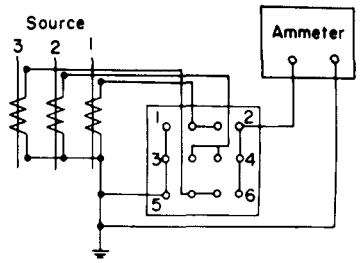
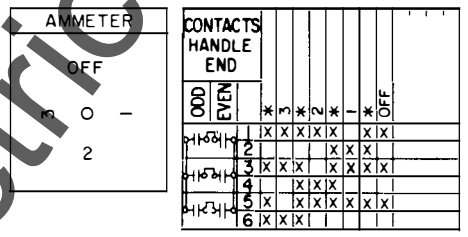
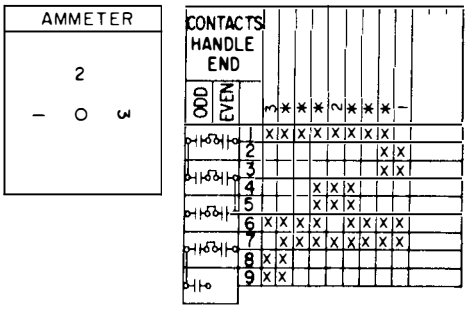
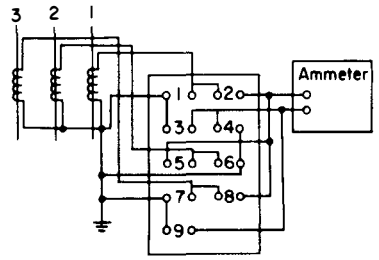
Fig. 24. Dimensions, control switches with Yale Lock

Contact Diagrams for SBM Switch

NO.	DESCRIPTION	ESCUTCHEON & CONTACT DIAGRAM	WIRING DIAGRAM
Fig. 25.	**VOLTMETER SWITCH,** double-pole, single-throw, *Model No. 10AA001.* Knurled handle.		
Fig. 26.	**VOLTMETER SWITCH,** double-pole, double-throw, *Model No. 10AA002.* Knurled handle.		
Fig. 27.	**VOLTMETER TRANSFER SWITCH,** three-phase, transfers four wires phase-to-neutral, *Model No. 10AA003.* Knurled handle.		
Fig. 28.	**VOLTMETER SWITCH,** Phase-to-phase, or phase-to-neutral, *Model No. 10AA004.* Knurled handle.		
Fig. 29.	**VOLTMETER SWITCH,** four circuits, two wires, *Model No. 10AA005.* Knurled handle.		

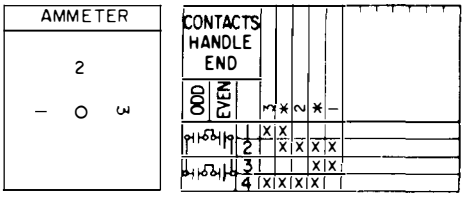
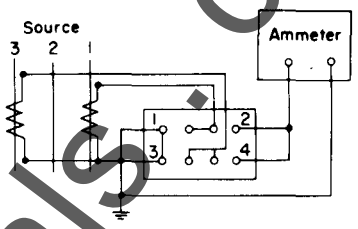
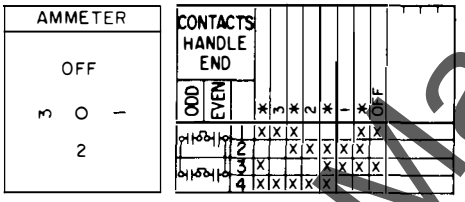
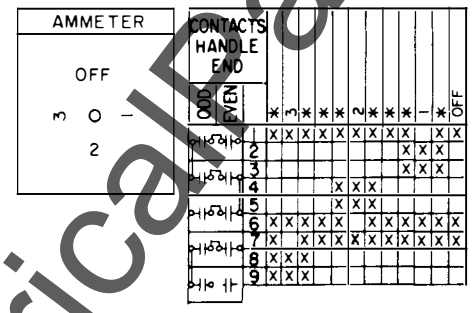
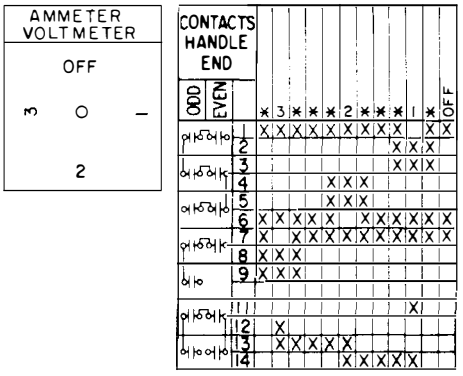
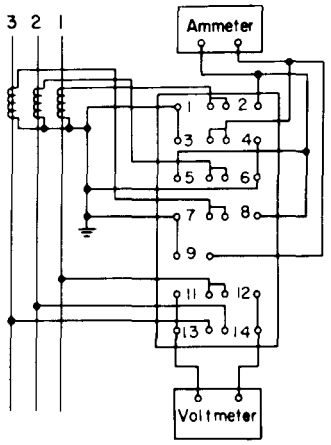
x in all contact diagrams denotes contacts closed

Contact Diagrams for SBM Switch

NO.	DESCRIPTION	ESCUTCHEON & CONTACT DIAGRAM	WIRING DIAGRAM
Fig. 30.	VOLTMETER TRANSFER SWITCH, three-phase, transfers four wires phase-to-phase and phase-to-neutral, *Model No. 10AA006.* Knurled handle.		
Fig. 31.	VOLTMETER SWITCH, two three-phase, three-wire circuits, *Model No. 10AA007.* Knurled handle.		
Fig. 32.	AMMETER TRANSFER SWITCH, three CT's (connect at end of secondary), *Model No. 10AA008.* Knurled handle.		
Fig. 33.	AMMETER TRANSFER SWITCH, three CT's with off (connect at end of secondary), *Model No. 10AA009.* For wiring, see Fig. 32. Knurled handle.		
Fig. 34.	AMMETER TRANSFER SWITCH, three independent circuits, *Model No. 10AA010.* Knurled handle.		

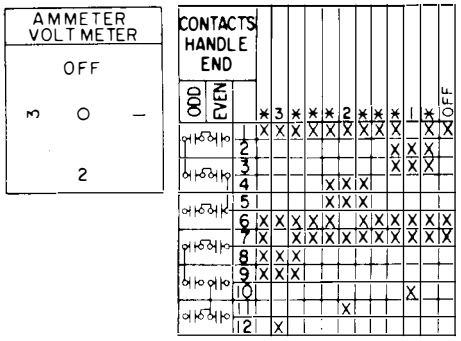
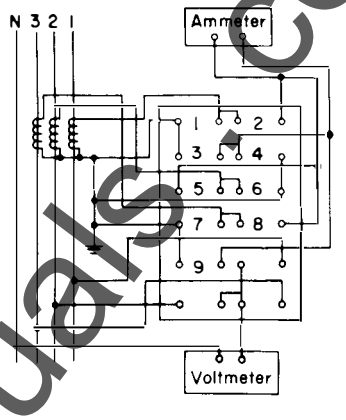
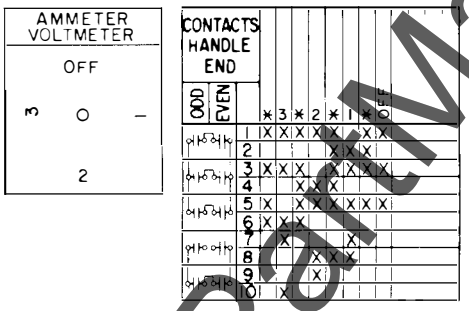
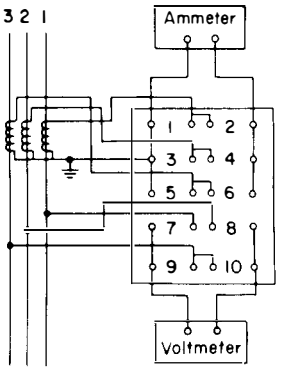
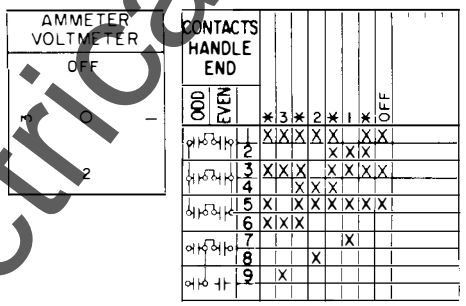
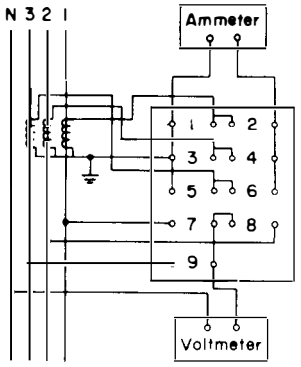
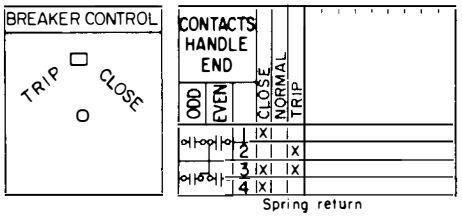
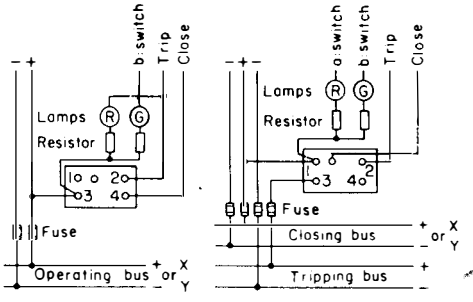
x in all contact diagrams denotes contacts closed

Contact Diagrams for SBM Switch

NO.	DESCRIPTION	ESCUTCHEON & CONTACT DIAGRAM	WIRING DIAGRAM
Fig. 35.	**AMMETER TRANSFER SWITCH,** two CT's (connect at end of secondary), *Model No. 10AA011.* Knurled handle.		
Fig. 36.	**AMMETER TRANSFER SWITCH,** two CT's with off (connect at end of secondary), *Model No. 10AA012.* For wiring, see Fig. 35. Knurled handle.		
Fig. 37.	**AMMETER TRANSFER SWITCH,** three independent circuits with off, *Model No. 10AA013.* For wiring, see Fig. 34. Knurled handle.		
Fig. 38.	**AMMETER-VOLTMETER TRANSFER SWITCH,** three-phase, three wires phase-to-phase, plus three independent current transformer circuits, *Model No. 10AA014.* Knurled handle.		

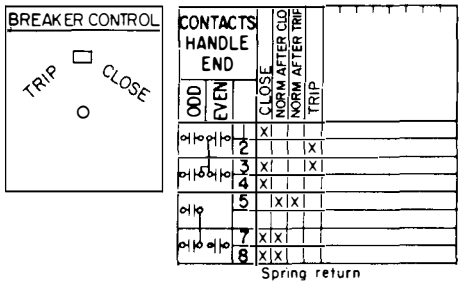
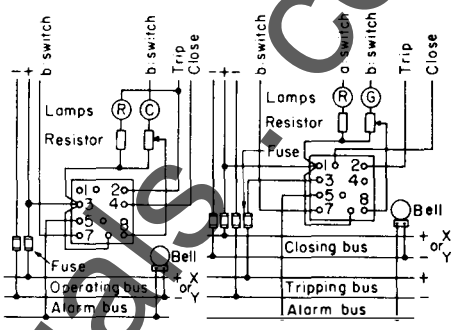
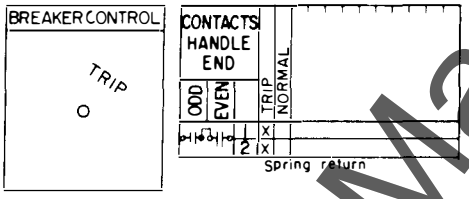
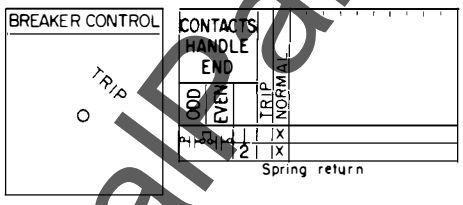
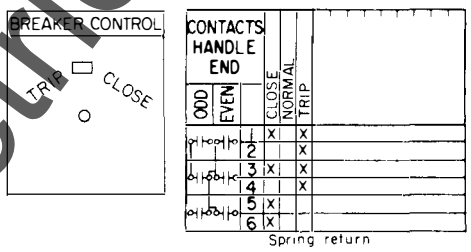
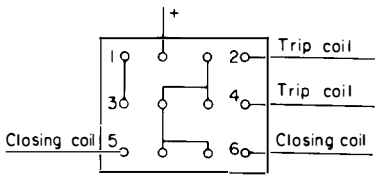
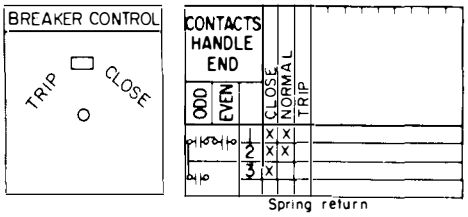
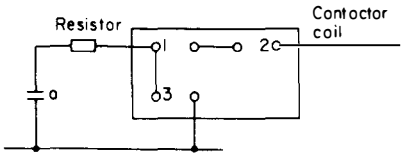
x in all contact diagrams denotes contacts closed

Contact Diagrams for SBM Switch

NO.	DESCRIPTION	ESCUTCHEON & CONTACT DIAGRAM	WIRING DIAGRAM
Fig. 39.	**AMMETER-VOLTMETER TRANSFER SWITCH,** three-phase, four wires phase-to-neutral, plus three independent current transformer circuits, *Model No. 10AA015.* Knurled handle.		
Fig. 40.	**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.		
Fig. 41.	**AMMETER-VOLTMETER TRANSFER SWITCH,** three-phase, four wires phase-to-neutral, plus three current transformers (connect at end of secondary), *Model No. 10AA017.* Knurled handle.		
Fig. 42.	**CIRCUIT-BREAKER CONTROL SWITCH,** *Model No. 10AA100.* *Pistol-grip handle.*		

x in all contact diagrams denotes contacts closed

Contact Diagrams for SBM Switch

NO.	DESCRIPTION	ESCUTCHEON & CONTACT DIAGRAM	WIRING DIAGRAM
Fig. 43.	CIRCUIT-BREAKER CONTROL SWITCH, *Model No. 10AA101.* Pistol-grip handle.		
Fig. 44.	TRIP SWITCH, contacts normally open, *Model No. 10AA102.* Pistol-grip handle.		
Fig. 45.	TRIP SWITCH, contacts normally closed, *Model No. 10AA103.* Pistol-grip handle.		
Fig. 46.	CIRCUIT-BREAKER CONTROL SWITCH for operating two breakers, *Model No. 10AA104.* Pistol-grip handle.		
Fig. 47.	SWITCH SUBSTITUTE for push-button station, *Model No. 10AA105.* Pistol-grip handle.		

x in all contact diagrams denotes contacts closed

Contact Diagrams for SBM Switch

NO. DESCRIPTION ESCUTCHEON & CONTACT DIAGRAM

Fig. 48. **CIRCUIT-BREAKER CONTROL SWITCH,**
Model No. 10AA106.
Pistol-grip handle.

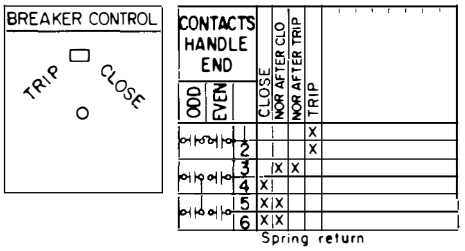


Fig. 49. **CIRCUIT-BREAKER CONTROL SWITCH,**
Model No. 10AA107.
Pistol-grip handle.

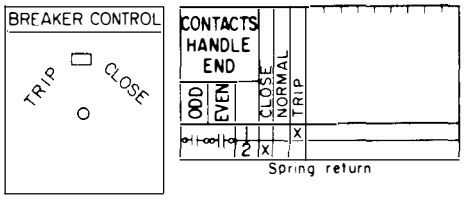


Fig. 50. **CIRCUIT-BREAKER CONTROL SWITCH,**
Model No. 10AA108.
Pistol-grip handle.

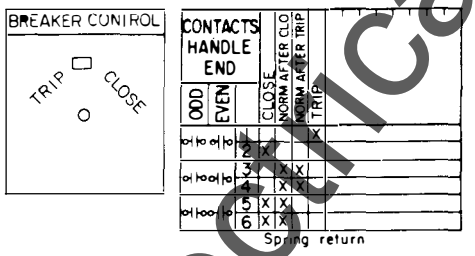
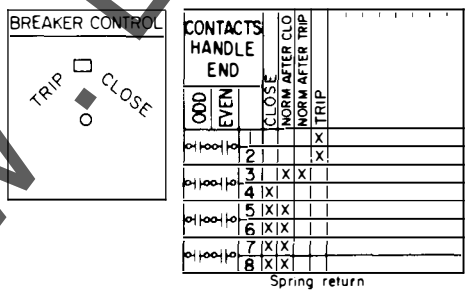


Fig. 51. **CIRCUIT-BREAKER CONTROL SWITCH,**
Model No. 10AA109.
Pistol-grip handle.



x in all contact diagrams denotes contacts closed

NO. DESCRIPTION ESCUTCHEON & CONTACT DIAGRAM

Fig. 52. **CIRCUIT-BREAKER CONTROL SWITCH,**
Model No. 10AA110.
Pistol-grip handle.

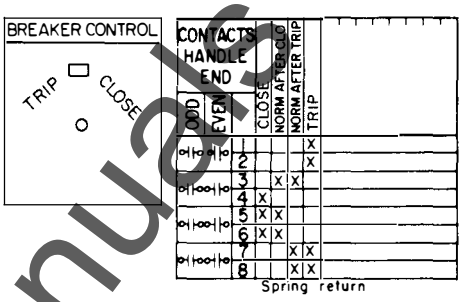


Fig. 53. **CIRCUIT-BREAKER CONTROL SWITCH,**
Model No. 10AA111.
Pistol-grip handle.

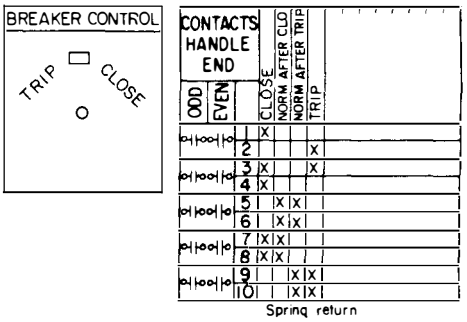
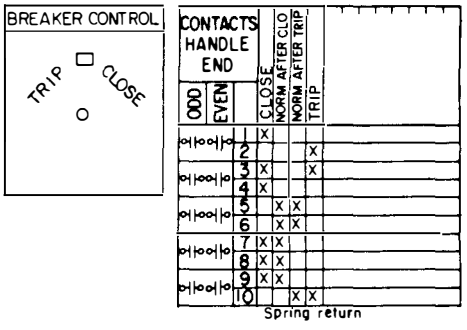


Fig. 54. **CIRCUIT-BREAKER CONTROL SWITCH,**
Model No. 10AA112.
Pistol-grip handle.



Contact Diagrams for SBM Switch

NO.	DESCRIPTION ESCUTCHEON & CONTACT DIAGRAM

Fig. 55.

CIRCUIT-BREAKER CONTROL SWITCH,
Model No. 10AA113.
Pistol-grip handle.

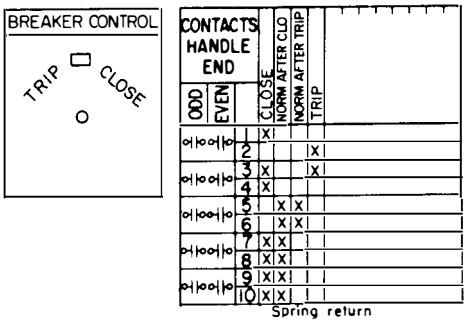


Fig. 56.

CIRCUIT-BREAKER CONTROL SWITCH,
Model No. 10AA114.
Pistol-grip handle.

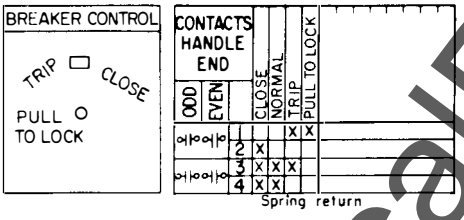
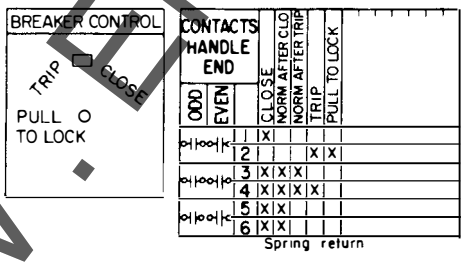


Fig. 57.

CIRCUIT-BREAKER CONTROL SWITCH,
Model No. 10AA115.
Pistol-grip handle.



NO.	DESCRIPTION ESCUTCHEON & CONTACT DIAGRAM

Fig. 58.

CIRCUIT-BREAKER CONTROL SWITCH,
Model No. 10AA116.
Pistol-grip handle.

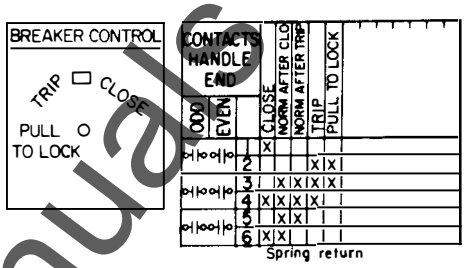


Fig. 59.

CIRCUIT-BREAKER CONTROL SWITCH,
Model No. 10AA117.
Pistol-grip handle.

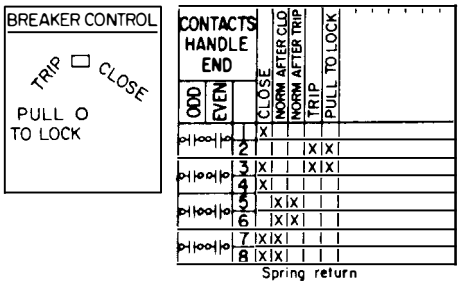
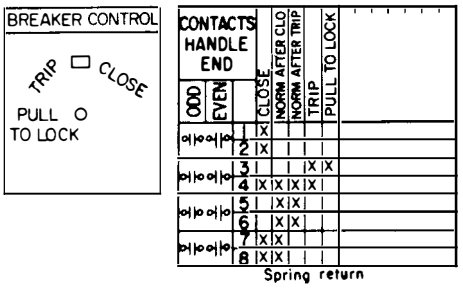


Fig. 60.

CIRCUIT-BREAKER CONTROL SWITCH,
Model No. 10AA118.
Pistol-grip handle.



x in all contact diagrams denotes contacts closed

Contact Diagrams for SBM Switch

NO.	DESCRIPTION ESCUTCHEON & CONTACT DIAGRAM

Fig. 61. **CIRCUIT-BREAKER CONTROL SWITCH,**
Model No. 10AA119.
Pistol-grip handle.

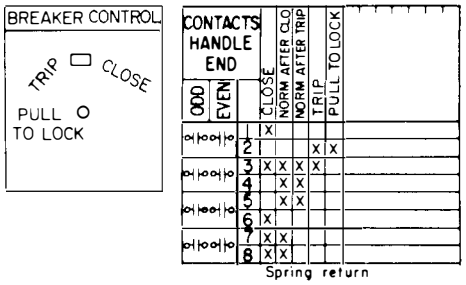


Fig. 62. **CIRCUIT-BREAKER CONTROL SWITCH,**
Model No. 10AA120.
Pistol-grip handle.

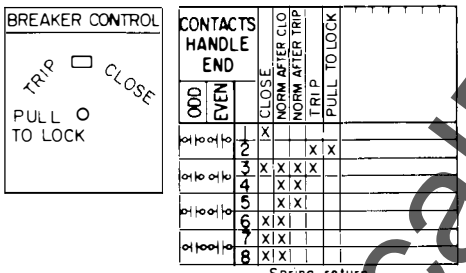
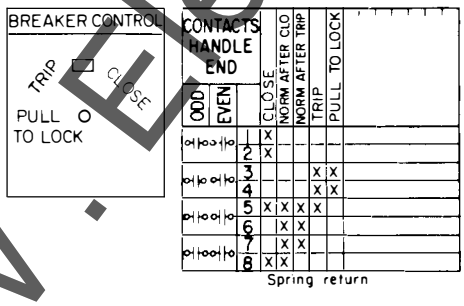


Fig. 63. **CIRCUIT-BREAKER CONTROL SWITCH,**
Model No. 10AA121.
Pistol-grip handle.



NO.	DESCRIPTION ESCUTCHEON & CONTACT DIAGRAM

Fig. 64. **CIRCUIT-BREAKER CONTROL SWITCH,**
Model No. 10AA122.
Pistol-grip handle.

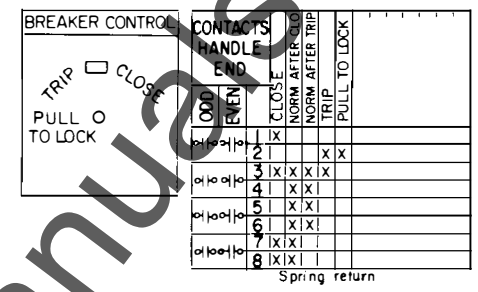


Fig. 65. **CIRCUIT-BREAKER CONTROL SWITCH,**
Model No. 10AA123.
Pistol-grip handle.

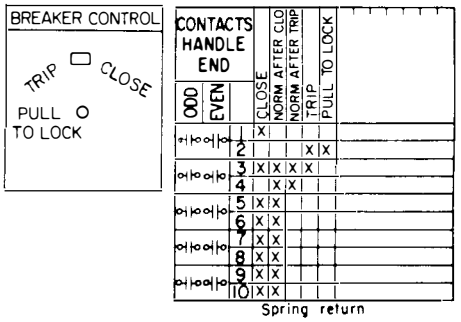
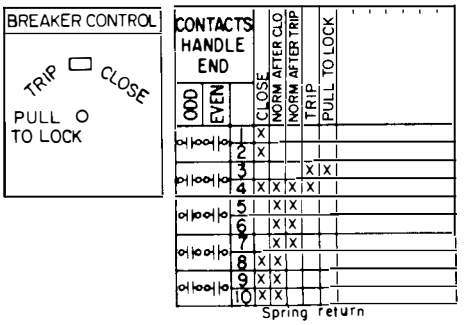
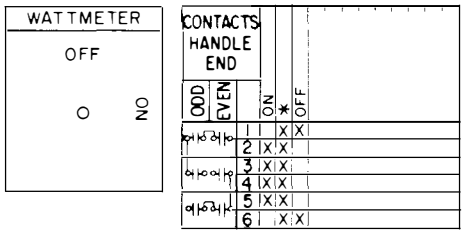
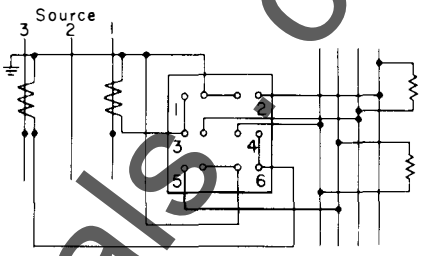
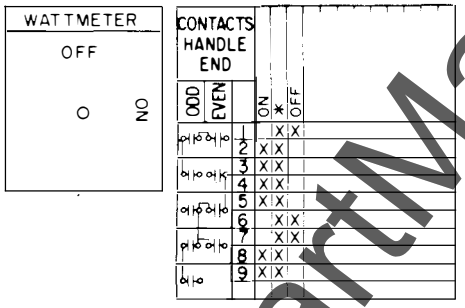
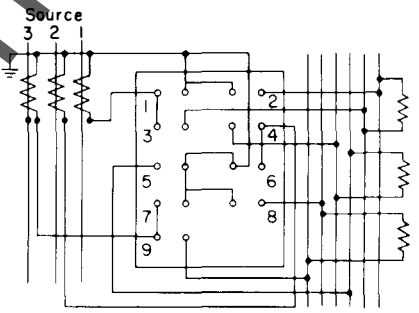
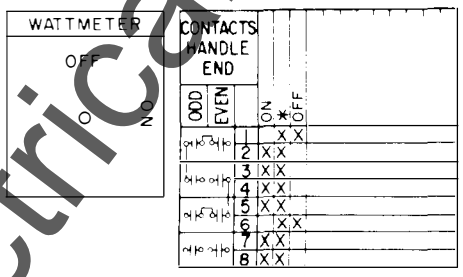
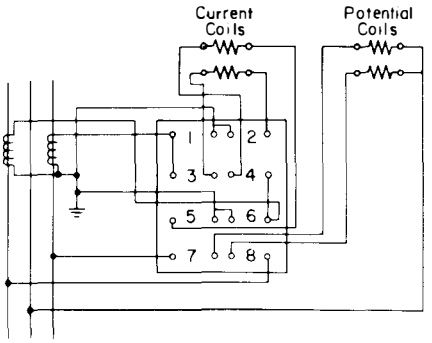
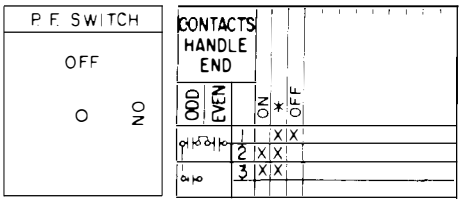
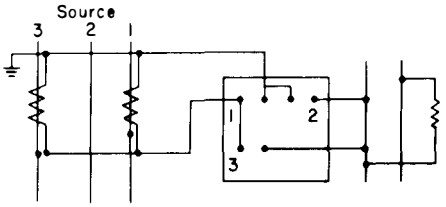


Fig. 66. **CIRCUIT-BREAKER CONTROL SWITCH,**
Model No. 10AA124.
Pistol-grip handle.



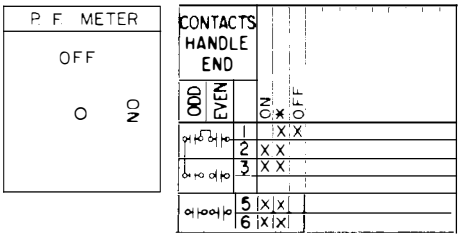
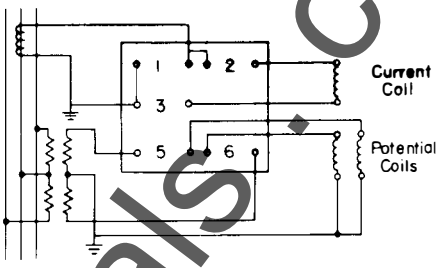
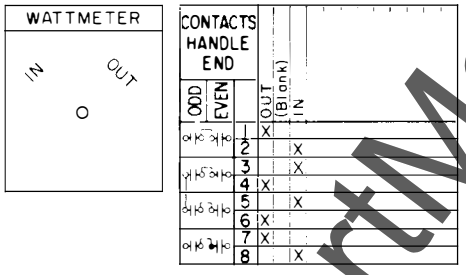
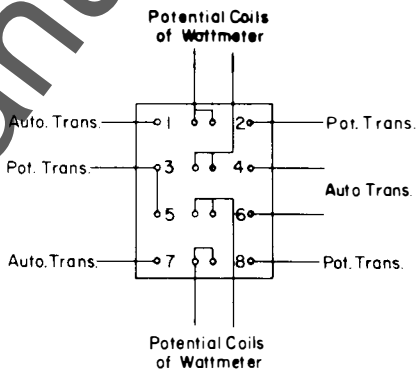
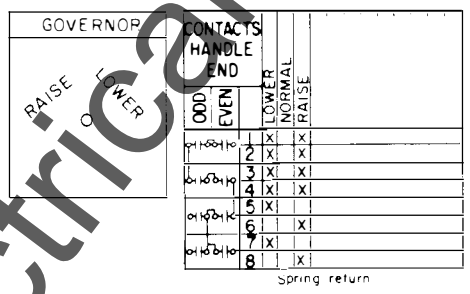
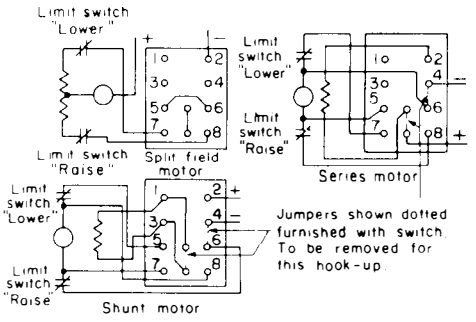
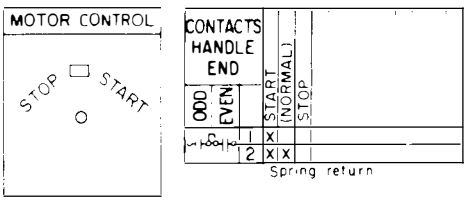
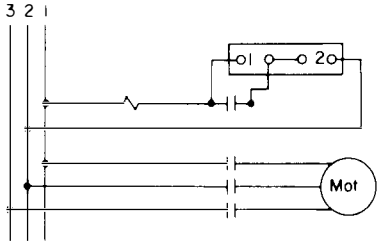
x in all contact diagrams denotes contacts closed

Contact Diagrams for SBM Switch

NO.	DESCRIPTION	ESCUTCHEON & CONTACT DIAGRAM	WIRING DIAGRAM
Fig. 67.	**WATTMETER TRANSFER SWITCH, two current coils, *Model No. 10AA018.* Knurled handle.**		
Fig. 68.	**WATTMETER TRANSFER SWITCH, three current coils, *Model No. 10AA019.* Knurled handle.**		
Fig. 69.	**WATTMETER TRANSFER SWITCH, two current and two potential coils, *Model No. 10AA020.* Knurled handle.**		
Fig. 70.	**POWER-FACTOR SWITCH, one or two current coils, *Model No. 10AA021.* Knurled handle.**		

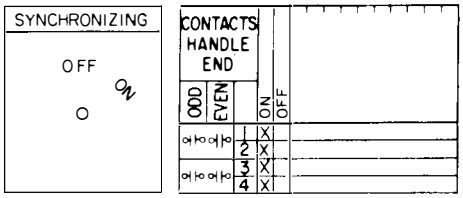
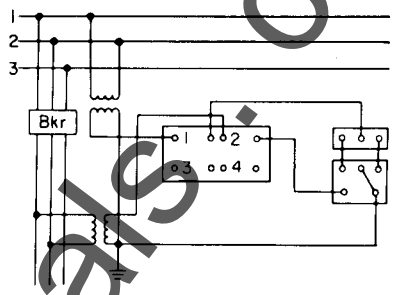
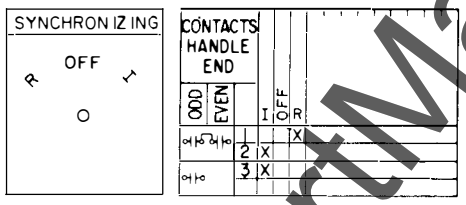
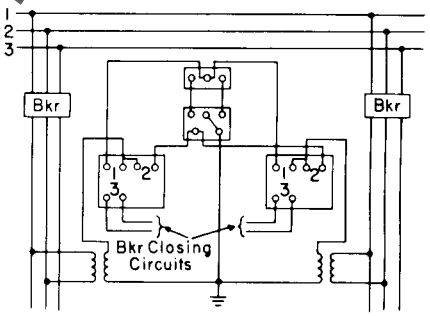
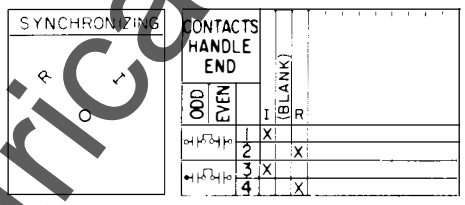
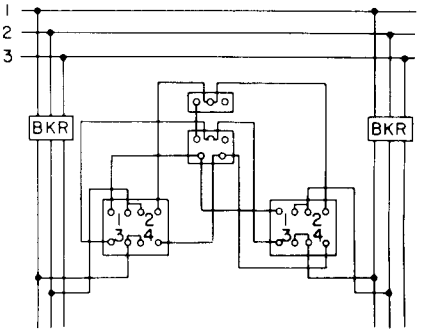
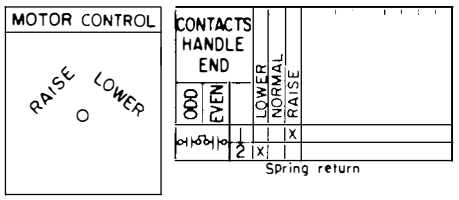
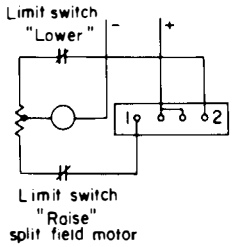
x in all contact diagrams denotes contacts closed

Contact Diagrams for SBM Switch

NO.	DESCRIPTION	ESCUTCHEON & CONTACT DIAGRAM	WIRING DIAGRAM
Fig. 71.	POWER-FACTOR SWITCH, one current and two potential coils, *Model No. 10AA022.* Knurled handle.		
Fig. 72.	POWER-FACTOR OR WATTMETER REVERSING SWITCH, *Model No. 10AA023.* Knurled handle.		
Fig. 73.	GOVERNOR OR RHEOSTAT MOTOR CONTROL SWITCH, *Model No. 10AA066.* Lever handle.		
Fig. 74.	MOTOR CONTROL SWITCH, *Model No. 10AA067.* Pistol-grip handle.		

x in all contact diagrams denotes contacts closed

Contact Diagrams for SBM Switch

NO.	DESCRIPTION	ESCUTCHEON & CONTACT DIAGRAM	APPLICATION DIAGRAM
Fig. 75.	SYNCHRONIZING SWITCH, machine-to-bus with interlocks, *Model No. 10AA024.* Removable oval handle, *Cat. No. 23WW145.*		
Fig. 76.	SYNCHRONIZING SWITCH, running and incoming, *Model No. 10AA025.* Removable oval handle, R = 23WL235, I = 23WR235.		
Fig. 77.	SYNCHRONIZING SWITCH between machines without potential transformers, *Model No. 10AA026.* Removable oval handle, *Cat. No. 23WW123.*		
Fig. 78.	MOTOR CONTROL SWITCH for split-field motors, *Model No. 10AA065.* Pistol-grip handle.		

x in all contact diagrams denotes contacts closed

Contact Diagrams for SBM Switch

NO.	DESCRIPTION ESCUTCHEON & CONTACT DIAGRAM

Fig. 79. SINGLE- OR DOUBLE-POLE
single-throw,
Model No. 10AA027.
With spring return,
Model No. 10AA028.
Oval handle.

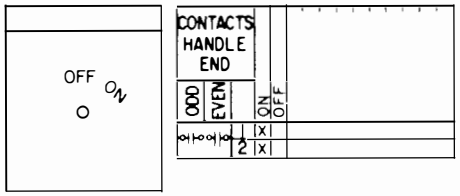


Fig. 80. THREE- OR FOUR-POLE,
single-throw,
Model No. 10AA029.
With spring return,
Model No. 10AA030.
Oval handle.

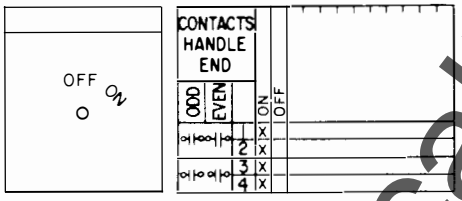
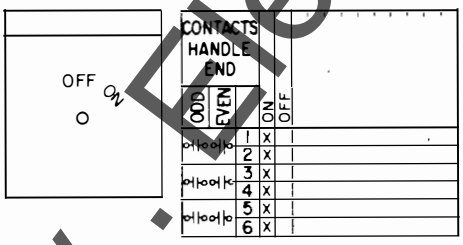


Fig. 81. FIVE- OR SIX-POLE,
single-throw,
Model No. 10AA031.
With spring return,
Model No. 10AA032.
Oval handle.



B.	C.	D.
SEVEN- OR EIGHT-POLE, single-throw, *Model No. 10AA033.* With spring return, *Model No. 10AA034.*	NINE- OR TEN-POLE, single-throw, *Model No. 10AA035.* With spring return, *Model No. 10AA036.*	ELEVEN- OR TWELVE-POLE, single-throw, *Model No. 10AA037.* With spring return, *Model No. 10AA038.*

NO.	DESCRIPTION ESCUTCHEON & CONTACT DIAGRAM

Fig. 82. SINGLE-POLE, double-
throw with off,
Model No. 10AA039.
With spring return,
Model No. 10AA040.
Oval handle.

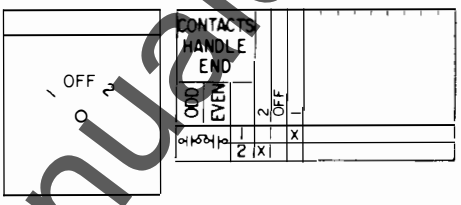


Fig. 83. DOUBLE-POLE, double-throw
with off,
Model No. 10AA041.
With spring return,
Model No. 10AA042.
Oval handle.

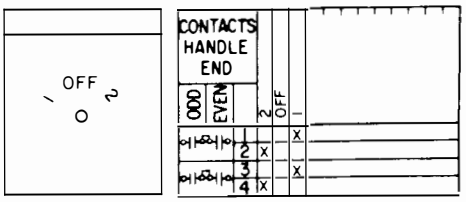
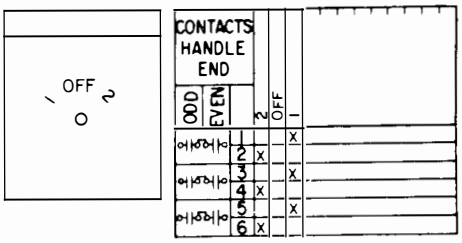


Fig. 84. THREE-POLE, double-throw
with off,
Model No. 10AA068.
With spring return,
Model No. 10AA043.
Oval handle.



B.	C.	D.
FOUR-POLE, double-throw with off, *Model No. 10AA044.* With spring return, *Model No. 10AA045.*	FIVE-POLE, double-throw with off, *Model No. 10AA046.* With spring return, *Model No. 10AA047.*	SIX-POLE, double-throw with off, *Model No. 10AA047.* With spring return, *Model No. 10AA04[illegible].*

x in all contact diagrams denotes contacts closed

Contact Diagrams for SBM Switch

NO.	DESCRIPTION ESCUTCHEON & CONTACT DIAGRAM

Fig. 85. SINGLE-POLE, double-throw,
Model No. 10AA050.
Oval handle.

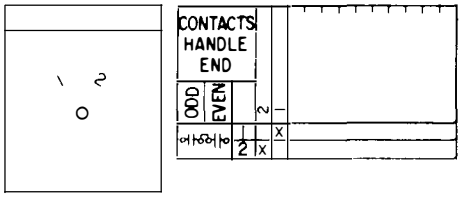


Fig. 86. DOUBLE-POLE, double-throw,
Model No. 10AA051.
Oval handle.

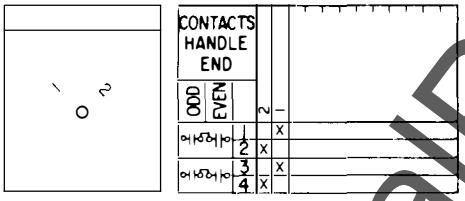
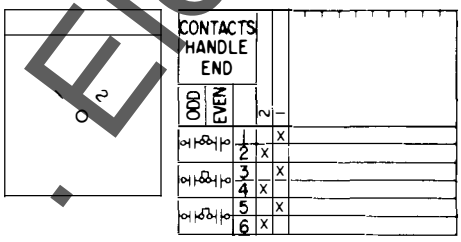


Fig. 87. THREE-POLE, double-throw,
Model No. 10AA052.
Oval handle.



B. FOUR-POLE, double-throw, *Model No. 10AA053.*	D. SIX-POLE, double-throw, *Model No. 10AA055.*
C. FIVE-POLE, double-throw, *Model No. 10AA054.*	E. SEVEN-POLE, double-throw, *Model No. 10AA056.*

NO.	DESCRIPTION ESCUTCHEON & CONTACT DIAGRAM

Fig. 88. SINGLE-POLE, three-throw,
Model No. 10AA057.
Oval handle.

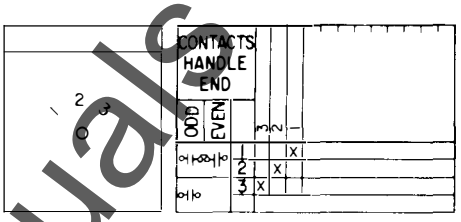


Fig. 89. SINGLE-POLE, four-throw,
Model No. 10AA058.
Oval handle.

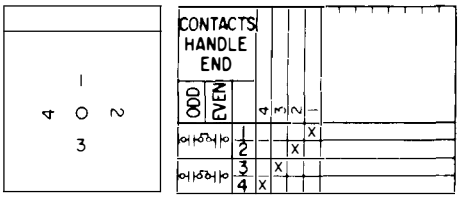
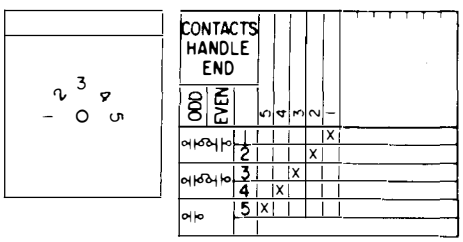


Fig. 90. SINGLE-POLE, five-throw,
Model No. 10AA059.
Oval handle.



x in all contact diagrams denotes contacts closed

Contact Diagrams for SBM Switch

NO. — DESCRIPTION ESCUTCHEON & CONTACT DIAGRAM

Fig. 91. SINGLE-POLE, six-throw,
Model No. 10AA060.
Oval handle.

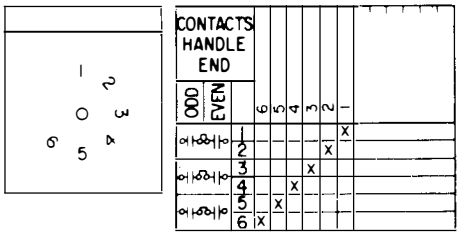


Fig. 92. SINGLE-POLE, seven-throw,
Model No. 10AA061.
Oval handle.

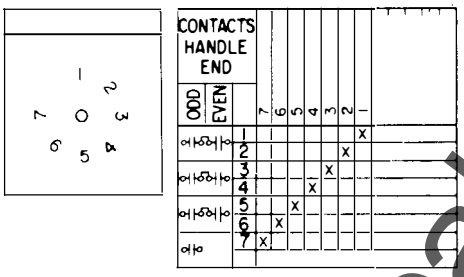
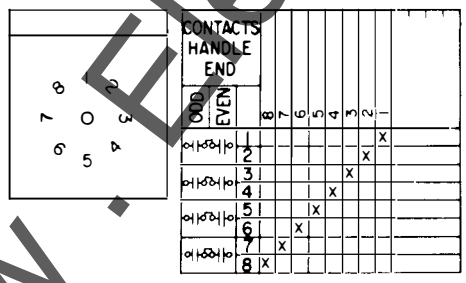


Fig. 93. SINGLE-POLE, eight-throw,
Model No. 10AA062.
Oval handle.



NO. — DESCRIPTION ESCUTCHEON & CONTACT DIAGRAM

Fig. 94. DOUBLE-POLE, four-throw,
Model No. 10AA063.
Oval handle.

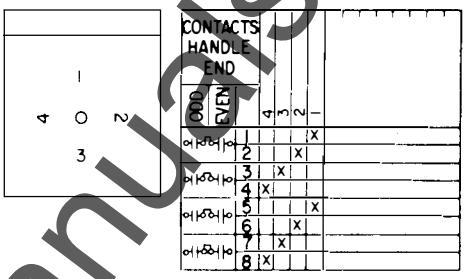
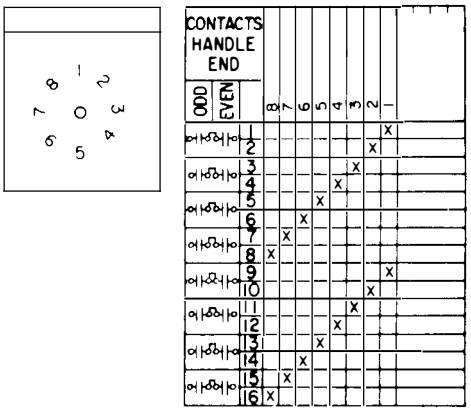
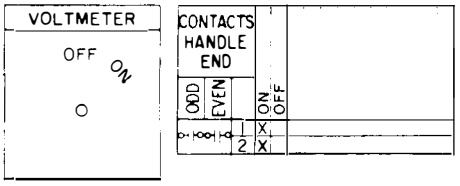
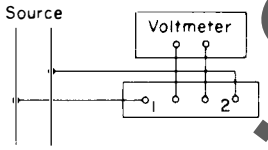
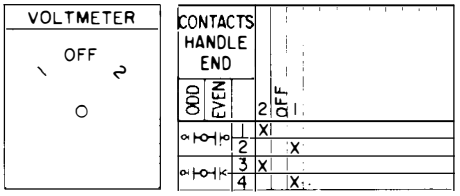
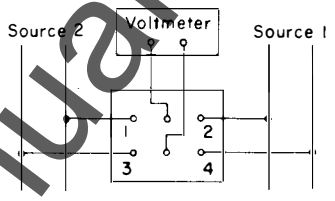
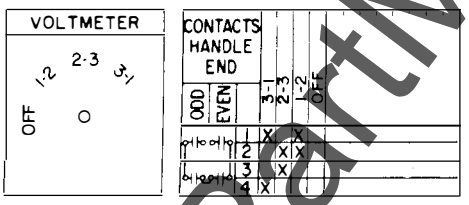
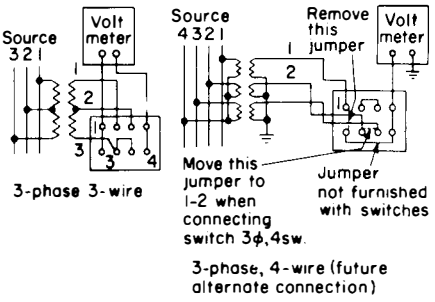
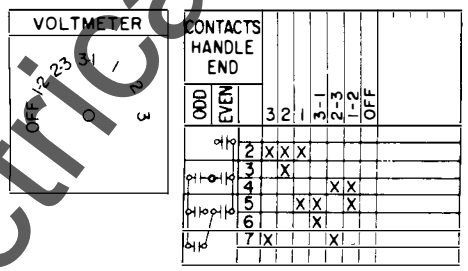
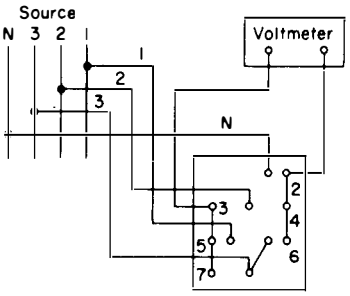
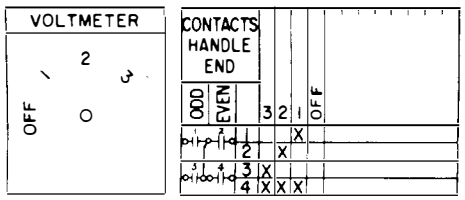
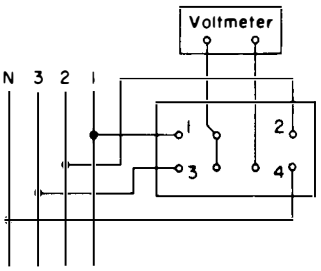


Fig. 95. DOUBLE-POLE, eight-throw,
Model No. 10AA064.
Oval handle.



X in all contact diagrams denotes contacts closed

Contact Diagrams for SB-1 Switches

NO.			
Fig. 96.	**VOLTMETER SWITCH,** double-pole, single-throw, *Model No. 16SB1CA1.* Knurled handle.		
Fig. 97.	**VOLTMETER SWITCH,** double-pole, double-throw, *Model No. 16SB1CE27.* Knurled handle.		
Fig. 98.	**VOLTMETER SWITCH,** phase-to-phase or phase-to-neutral, *Model No. 16SB1CF11.* Knurled handle.		
Fig. 99.	**VOLTMETER SWITCH,** three-phase, phase-to-phase, phase-to-neutral, *Model No. 16SB1CF16.* Knurled handle.		
Fig. 100.	**VOLTMETER TRANSFER SWITCH,** three-phase, four wires, phase-to-neutral, *Model No. 16SB1CF22.* Knurled handle.		

x in all contact diagrams denotes contacts closed

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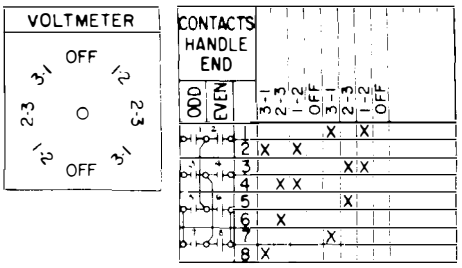
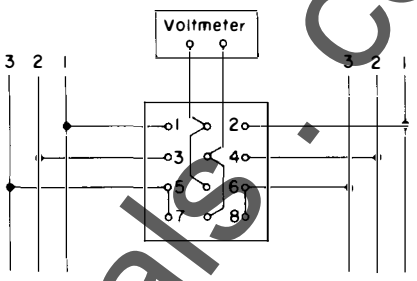
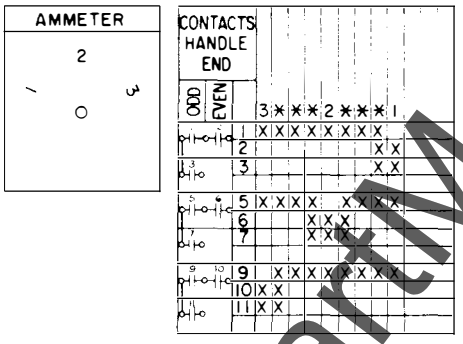
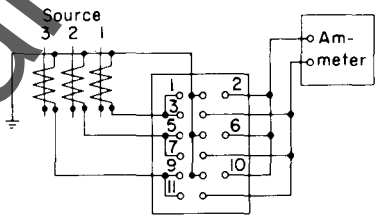
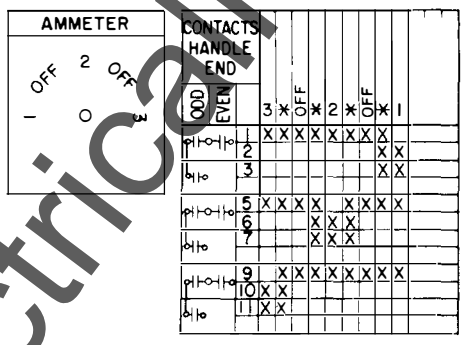
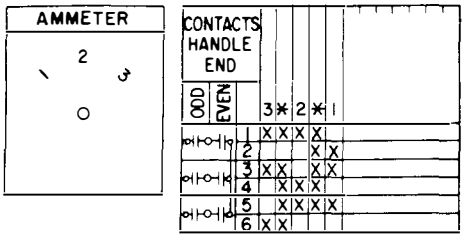
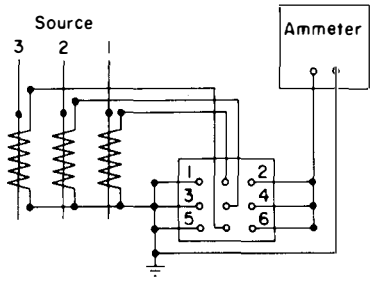
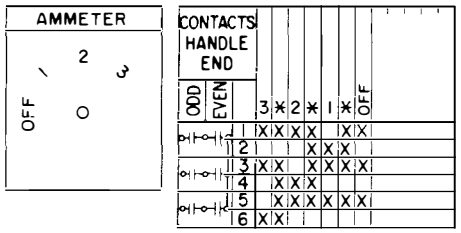
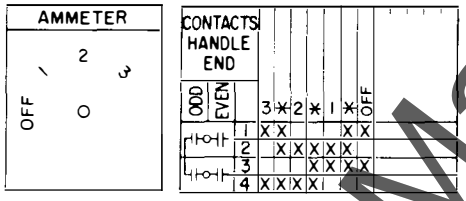
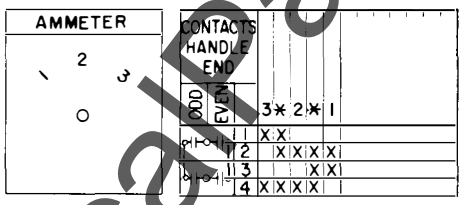
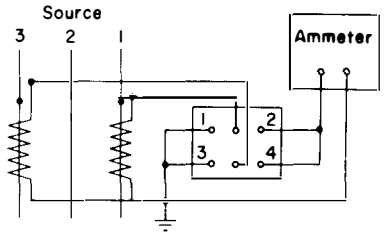
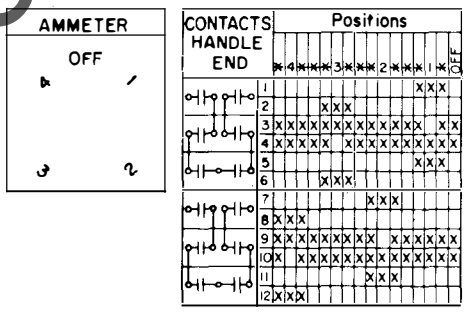
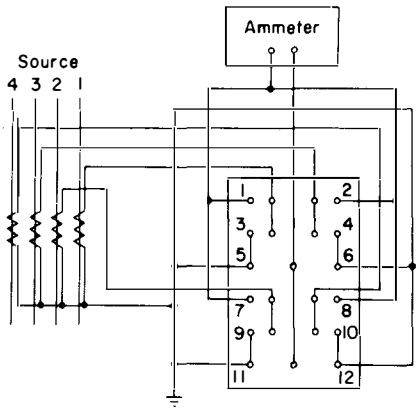
Contact Diagrams for SB-1 Switches

NO.	DESCRIPTION	SWITCH CONTACT DIAGRAM	WIRING DIAGRAM
Fig. 101.	**VOLTMETER TRANSFER SWITCH, two three-phase, three-wire circuits, *Model No. 16SB1CF23.* Knurled handle.**		
Fig. 102.	**AMMETER TRANSFER SWITCH, three independent circuits, *Model No. 16SB1CA7.* Knurled handle.**		
Fig. 103.	**AMMETER TRANSFER SWITCH, three independent circuits with off, *Model No. 16SB1CA15.*** For wiring, see Fig. 102. Knurled handle.		
Fig. 104.	**AMMETER TRANSFER SWITCH, (connect at end of secondary), *Model No. 16SB1CA18.* Knurled handle.**		

X in all contact diagrams denotes contacts closed

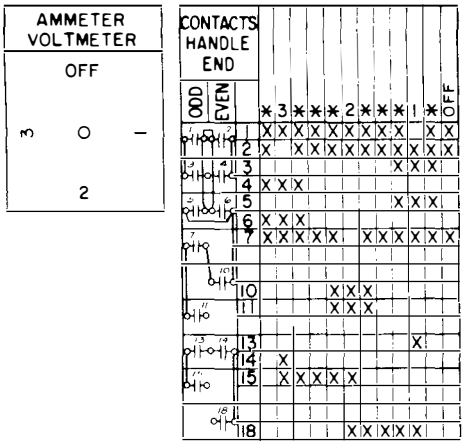
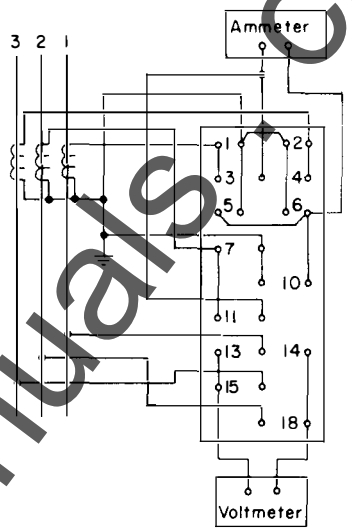
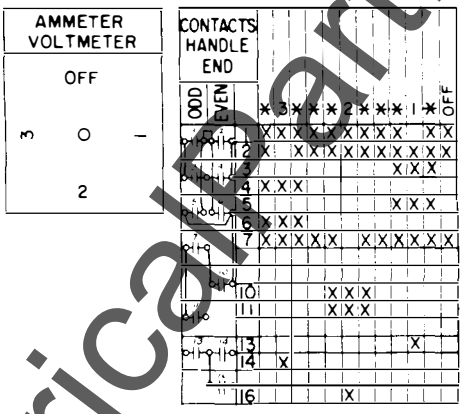
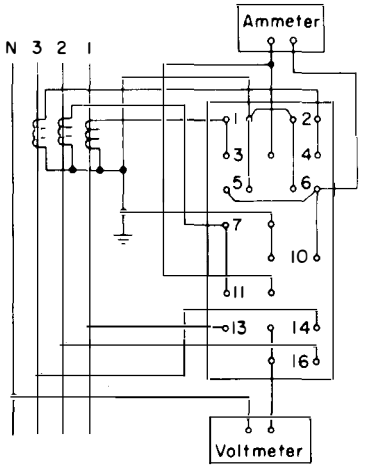
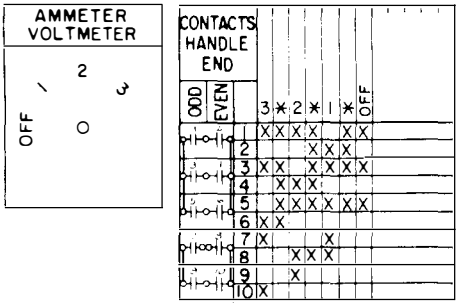
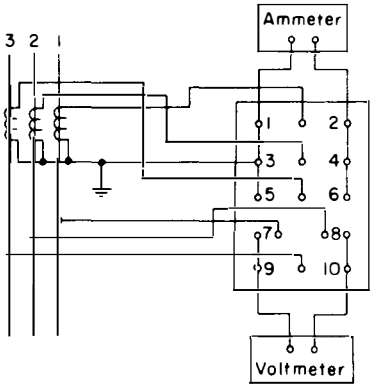
Contact Diagrams for SB-1 Switches

NO.	DESCRIPTION	ESCUTCHEON & CONTACT DIAGRAM	WIRING DIAGRAM
Fig. 105.	**AMMETER TRANSFER SWITCH,** three current transformers with off (connect at end of secondary), *Model No. 16SB1CA19.* For wiring, see Fig. 104. Knurled handle.		
Fig. 106.	**AMMETER TRANSFER SWITCH,** two current transformers with off (connect at end of secondary), *Model No. 16SB1CA20.* For wiring, see Fig. 107. Knurled handle.		
Fig. 107.	**AMMETER TRANSFER SWITCH,** two current transformers (connect at end of secondary), *Model No. 16SB1CE25.* Knurled handle.		
Fig. 108.	**AMMETER TRANSFER SWITCH,** four independent circuits plus off, *Model No. 16SB1CE17.* Knurled handle.		

x in all contact diagrams denotes contacts closed

OUTSIDE (BOTTOM)
INSIDE (TOP)

Contact Diagrams for SB-1 Switches

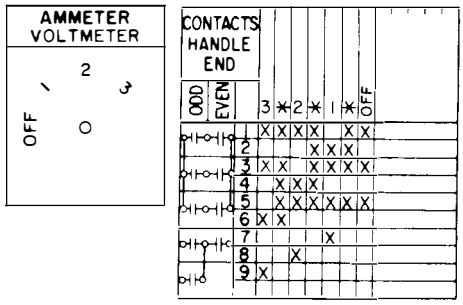
NO.	DESCRIPTION	ESCUTCHEON & CONTACT DIAGRAM	WIRING DIAGRAM
Fig. 109.	**AMMETER-VOLTMETER TRANSFER SWITCH, three-phase, three wire, phase-to-phase plus three independent current-transformer circuits, *Model No. 16SB1CA21.* Knurled handle.**		
Fig. 110.	**AMMETER-VOLTMETER TRANSFER SWITCH, three-phase, four-wire phase-to-neutral plus three independent current-transformer circuits, *Model No. 16SB1CA23.* Knurled handle.**		
Fig. 111.	**AMMETER-VOLTMETER TRANSFER SWITCH, three-phase, three-wire phase-to-phase plus three current transformers (connect at end of secondary), *Model No. 16SB1CA24.* Knurled handle.**		

x in all contact diagrams denotes contacts closed

Contact Diagrams for SB-1 Switches

NO.	DESCRIPTION	ESCUTCHEON & CONTACT DIAGRAM	WIRING DIAGRAM

Fig. 112. AMMETER-VOLTMETER TRANSFER SWITCH, three-phase, four-wire phase-to-neutral plus three current transformers (connect at end of secondary), *Model No. 16SB1CA25.* Knurled handle.



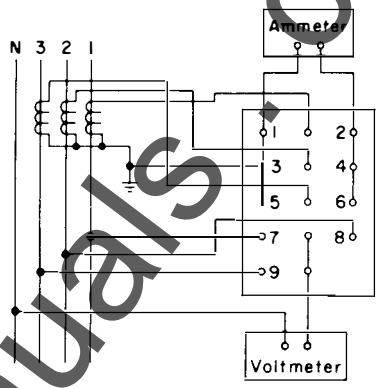
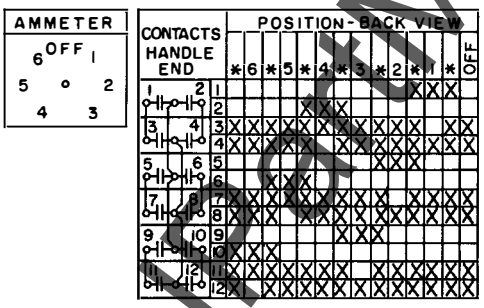


Fig. 113. AMMETER TRANSFER SWITCH, six current transformers with off.
(Connect at end of secondary)
Model No. 16SB1CA28, Knurled handle.



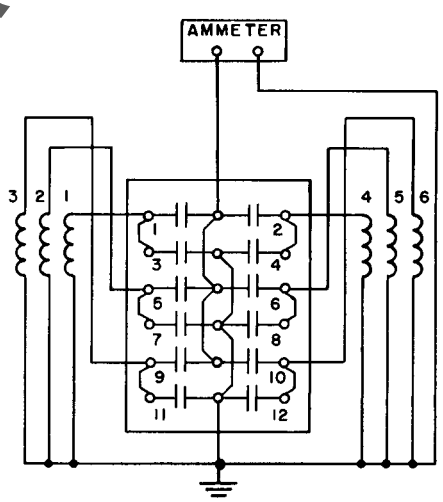
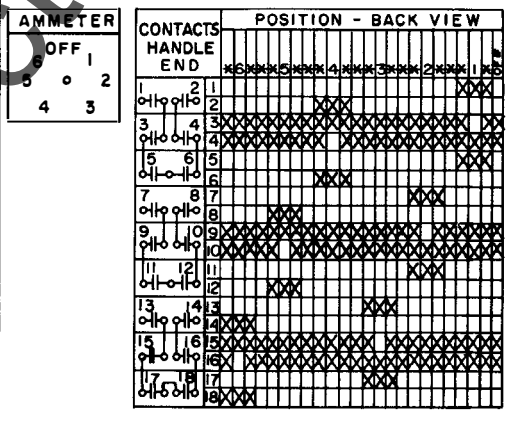
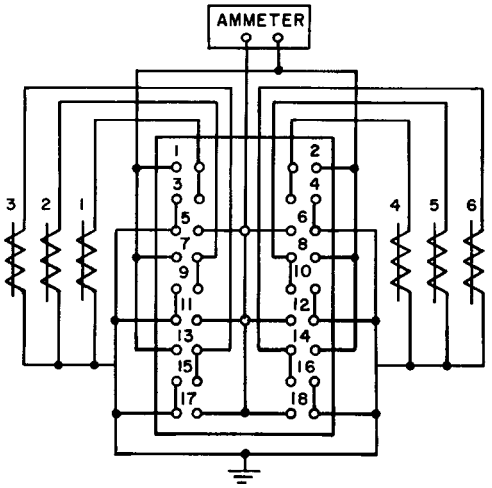


Fig. 114. AMMETER TRANSFER SWITCH, six independent circuits plus off.
Model No. 16SB1CA29, Knurled handle.





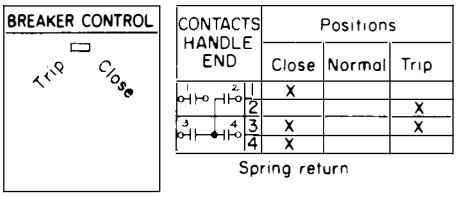
x in all contact diagrams denotes contacts closed

OUTSIDE (BOTTOM)
INSIDE (TOP)

Contact Diagrams for SB-1 Switches

NO.	DESCRIPTION	ESCUTCHEON & CONTACT DIAGRAM	WIRING DIAGRAM

Fig. 115. **CIRCUIT-BREAKER CONTROL SWITCH,**
Model No. 16SB1B1.
Pistol-grip handle.



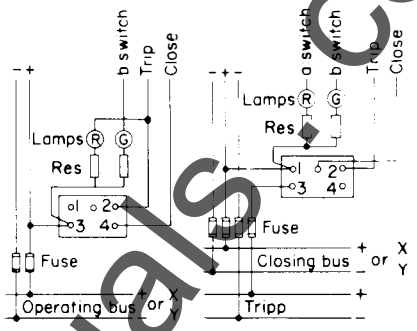
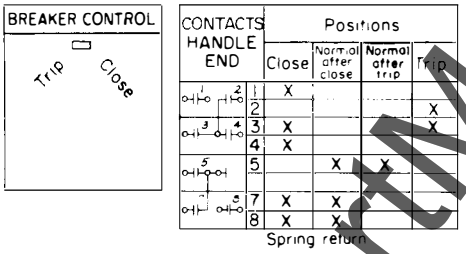


Fig. 116. **CIRCUIT-BREAKER CONTROL SWITCH,**
Model No. 16SB1B2.
Pistol-grip handle.



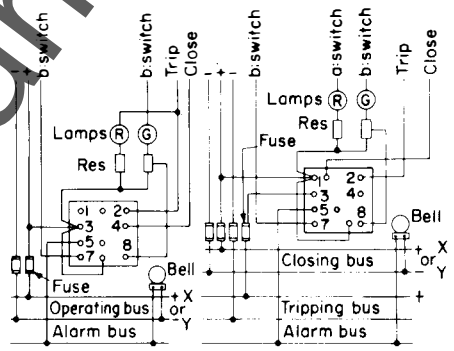


Fig. 117. **CIRCUIT-BREAKER TRIP SWITCH,**
contacts normally open,
Model No. 16SB1B3.
Pistol-grip handle.

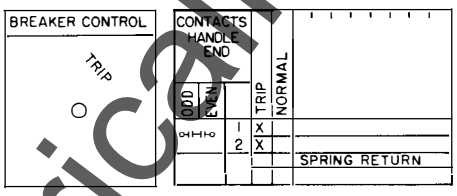
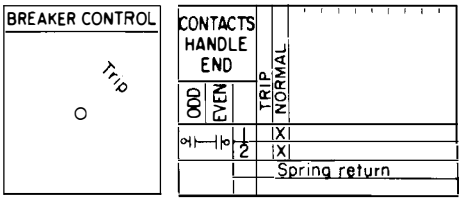
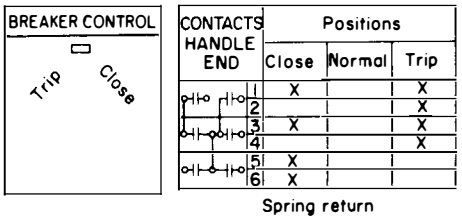
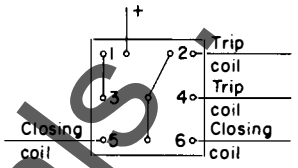
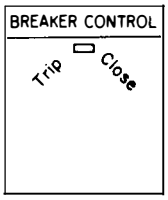
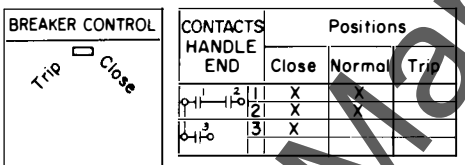
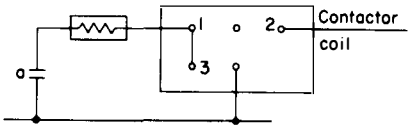
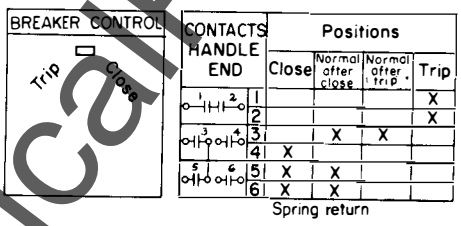
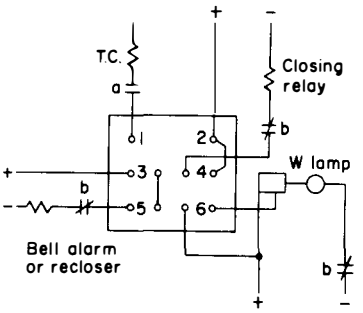
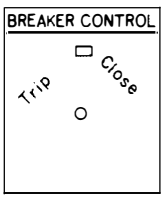
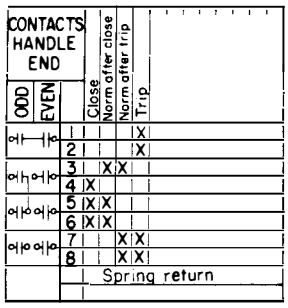


Fig. 118. **CIRCUIT-BREAKER TRIP SWITCH,**
contacts normally closed,
Model No. 16SB1B4.
Pistol-grip handle.



x in all contact diagrams denotes contacts closed

Contact Diagrams for SB-1 Switches

NO.	DESCRIPTION	EXTERNAL CONNECTIONS	INTERNAL CONNECTIONS
Fig. 119.	**CIRCUIT-BREAKER CONTROL SWITCH,** for operating two breakers, *Model No. 16SB1B6.* Pistol-grip handle.			
Fig. 120.	**CIRCUIT-BREAKER CONTROL SWITCH,** substitute for push-button station, *Model No. 16SB1B7.* Pistol-grip handle.			
Fig. 121.	**CIRCUIT-BREAKER CONTROL SWITCH,** *Model No. 16SB1B9.* Pistol-grip handle.			
Fig. 122.	**CIRCUIT-BREAKER CONTROL SWITCH,** *Model No. 16SB1B10.* Pistol-grip handle.			

x in all contact diagrams denotes contacts closed

Contact Diagrams for SB-1 Switches

NO. **DESCRIPTION ESCUTCHEON & CONTACT DIAGRAM**

Fig. 123. **CIRCUIT-BREAKER CONTROL SWITCH,**
Model No. 16SB1B11.
Pistol-grip handle.

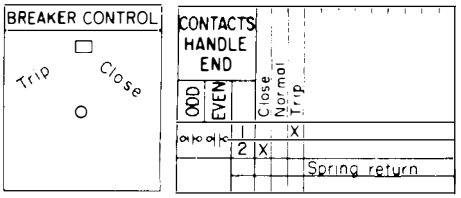


Fig. 124. **CIRCUIT-BREAKER CONTROL SWITCH,**
Model No. 16SB1B14.
Pistol-grip handle.

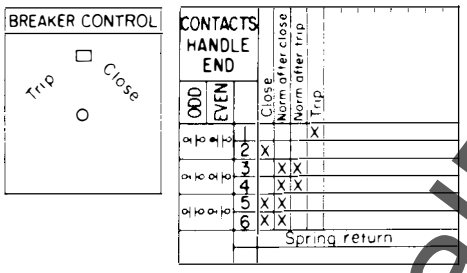


Fig. 125. **CIRCUIT-BREAKER CONTROL SWITCH,**
Model No. 16SB1B15.
Pistol-grip handle.

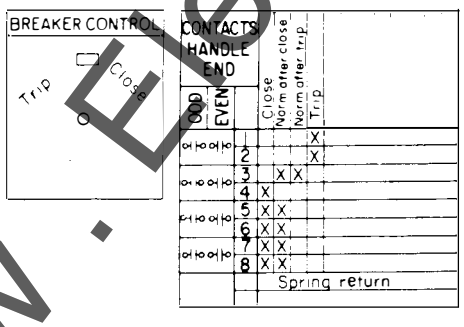


Fig. 126. **CIRCUIT-BREAKER CONTROL SWITCH,**
Model No. 16SB1B16.
Pistol-grip handle.

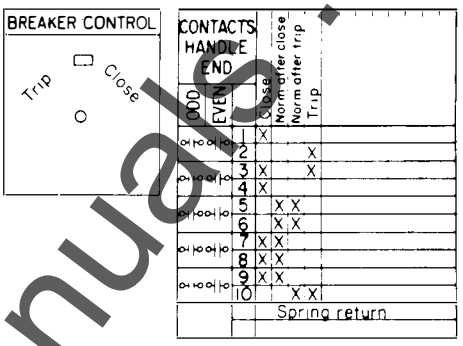


Fig. 127. **CIRCUIT-BREAKER CONTROL SWITCH,**
Model No. 16SB1B17.
Pistol-grip handle.

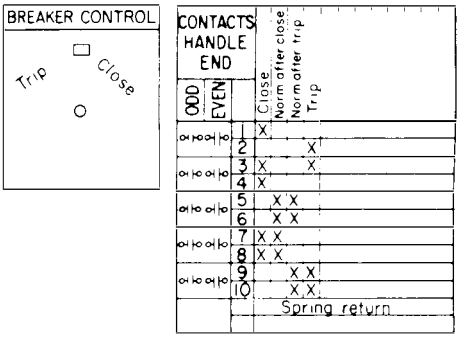
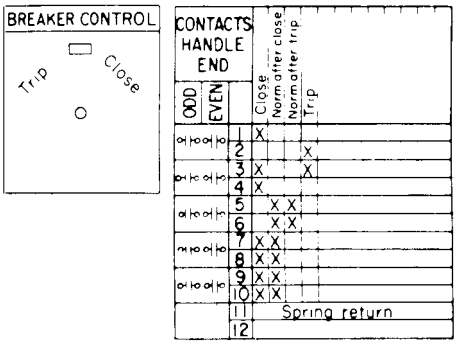


Fig. 128. **CIRCUIT-BREAKER CONTROL SWITCH,**
Model No. 16SB1B18.
Pistol-grip handle.



X in all contact diagrams denotes contacts closed

Contact Diagrams for SB-1 Switches

NO.	DESCRIPTION ESCUTCHEON & CONTACT DIAGRAM

Fig. 129. **CIRCUIT-BREAKER CONTROL SWITCH,**
Model No. 16SB1B19.
Pistol-grip handle.

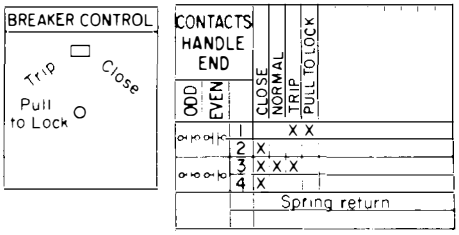


Fig. 130. **CIRCUIT-BREAKER CONTROL SWITCH,**
Model No. 16SB1B20.
Pistol-grip handle.

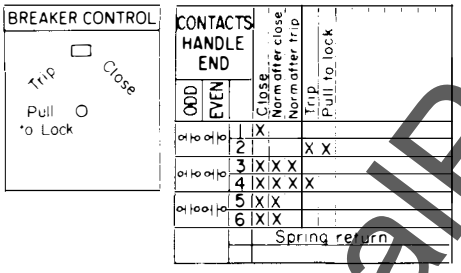
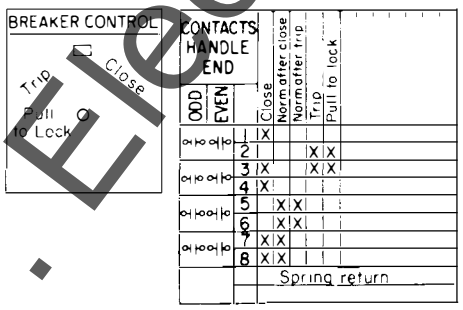


Fig. 131. **CIRCUIT-BREAKER CONTROL SWITCH,**
Model No. 16SB1B21.
Pistol-grip handle.



NO.	DESCRIPTION ESCUTCHEON & CONTACT DIAGRAM

Fig. 132. **CIRCUIT-BREAKER CONTROL**
Model No. 16SB1B22.
Pistol-grip handle.

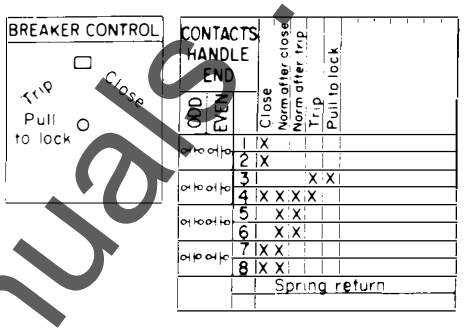


Fig. 133. **CIRCUIT-BREAKER CONTROL SWITCH,**
Model No. 16SB1B23.
Pistol-grip handle.

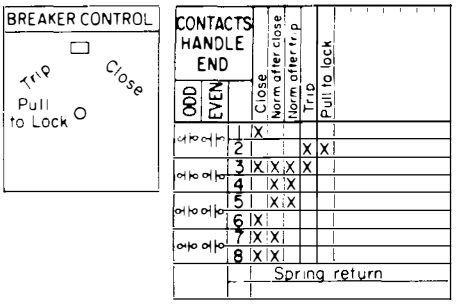
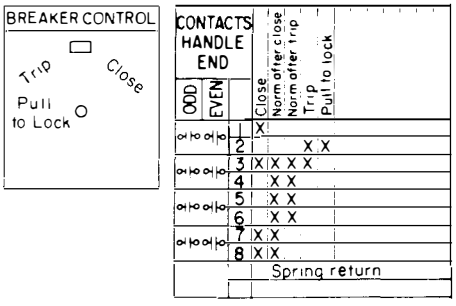


Fig. 134. **CIRCUIT-BREAKER CONTROL SWITCH,**
Model No. 16SB1B24.
Pistol-grip handle.



x in all contact diagrams denotes contacts closed

Contact Diagrams for SB-1 Switches

NO.	DESCRIPTION	ESCUTCHEON & CONTACT DIAGRAM	WIRING DIAGRAM

Fig. 135. **CIRCUIT-BREAKER CONTROL SWITCH,**
Model No. 16SB1B25.
Pistol-grip handle.

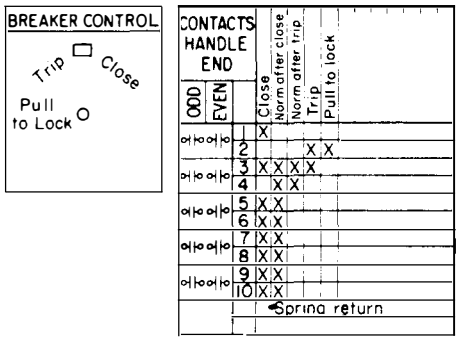


Fig. 136. **CIRCUIT-BREAKER CONTROL SWITCH,**
Model No. 16SB1B26.
Pistol-grip handle.

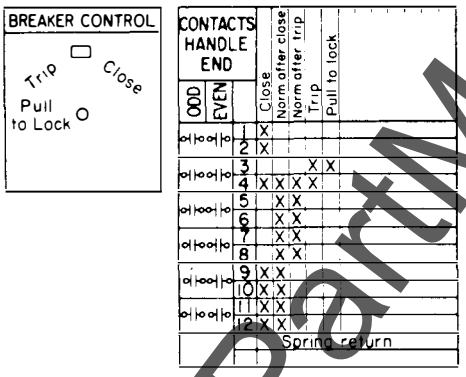
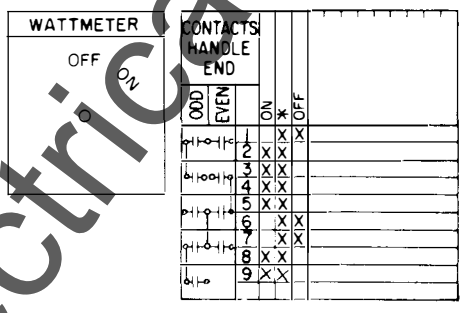


Fig. 137. **WATTMETER TRANSFER SWITCH, three current coils,**
Model No. 16SB1CB13.
Knurled handle,
Model No. 16SB1CF8.
Removable oval handle,
Model No. 16SB1CC6.



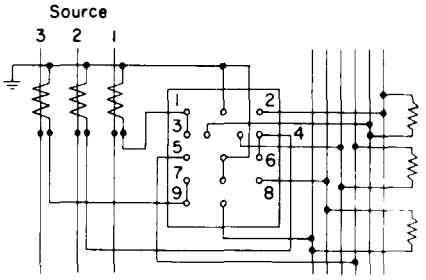
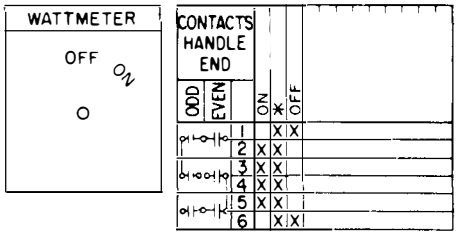
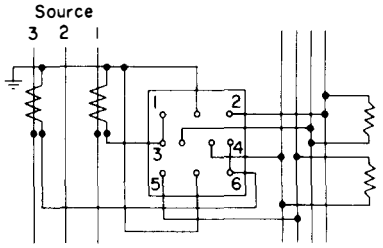


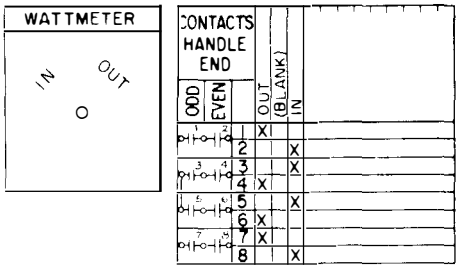
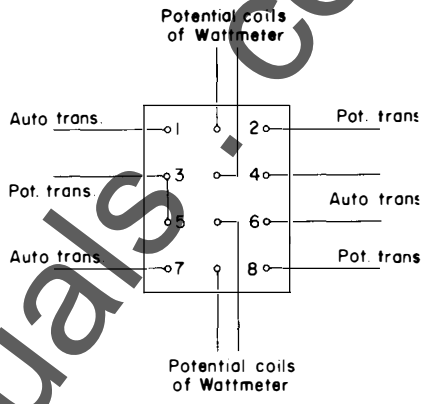
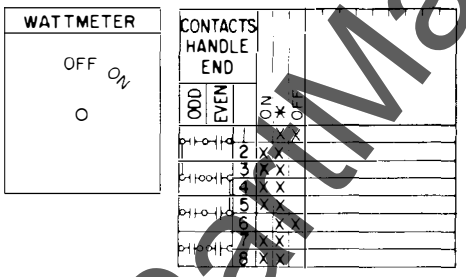
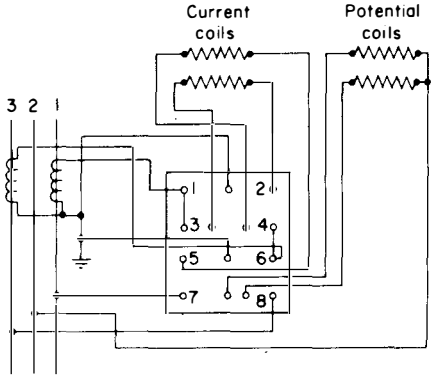
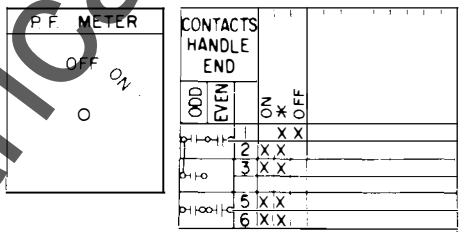
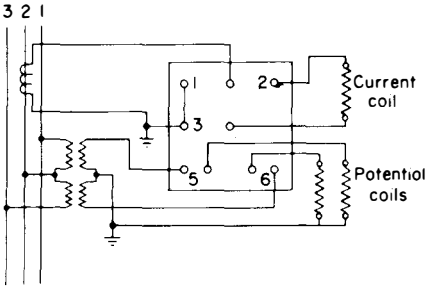
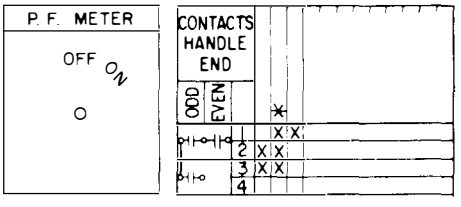
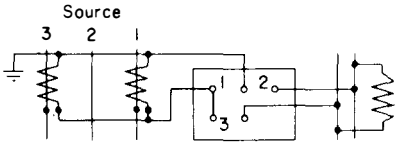
Fig. 138. **WATTMETER TRANSFER SWITCH, two current coils,**
Model No. 16SB1CB12.
Knurled handle,
Model No. 16SB1CF7.
Removable oval handle,
Model No. 16SB1CC6.





× in all contact diagrams denotes contacts closed

Contact Diagrams for SB-1 Switches

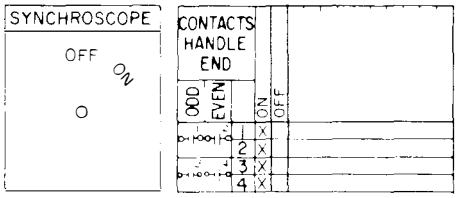
NO.	DESCRIPTION	ESCUTCHEON & CONTACT DIAGRAM	WIRING DIAGRAM
Fig. 139.	POWER-FACTOR OR WATTMETER REVERSING SWITCH, *Model No. 16SB1CA10.* Knurled handle, *Model No. 16SB1CB4.* Engraved W—off—RVA.		
Fig. 140.	WATTMETER TRANSFER SWITCH, two current and two potential coils, *Model No. 16SB1CB14.* Knurled handle.		
Fig. 141.	POWER-FACTOR SWITCH, one current and two potential coils, *Model No. 16SB1CA26.* Knurled handle, *Model No. 16SB1CF6.* Removable oval handle, *Model No. 16SB1CC5.*		
Fig. 142.	POWER-FACTOR SWITCH, one or two current coils, *Model No. 16SB1CA22.* Knurled handle, *Model No. 16SB1CA8.* Removable oval handle, *Model No. 16SB1CC5.*		

x in all contact diagrams denotes contacts closed

Contact Diagrams for SB-1 Switches

NO.	DESCRIPTION	ESCUTCHEON & CONTACT DIAGRAM	WIRING DIAGRAM

Fig. 143. **SYNCHRONIZING SWITCH,** machine-to-bus with interlocks, *Model No. 16SB1CF9.* Removable oval handle, *Model No. 16SB1CC7.*



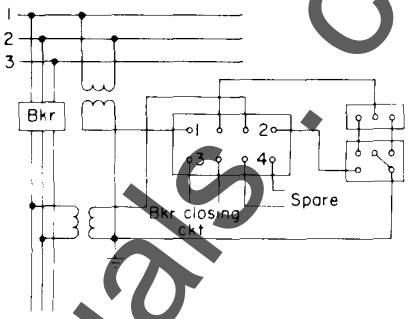
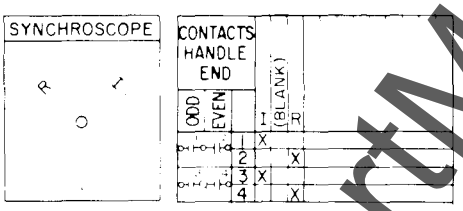


Fig. 144. **SYNCHRONIZING SWITCH** between machines without potential transformers, *Model No. 16SB1CB15.* Removable oval handles, R = 16SB1CC8, I = 16SB1CC7.



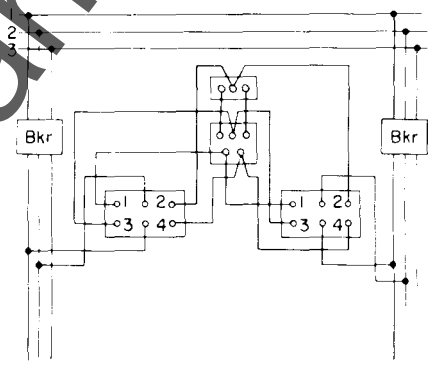
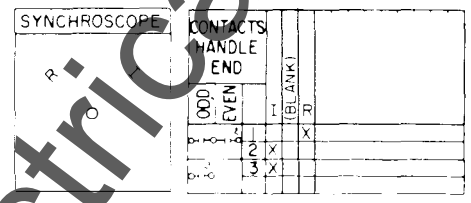


Fig. 145. **SYNCHRONIZING SWITCH** between machines with interlocks, *Model No. 16SB1CB5.* Removable oval handles, R = 16SB1CC8, I = 16SB1CC7.



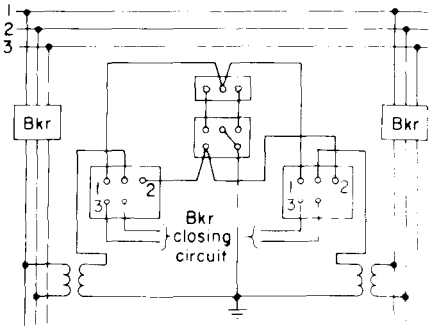
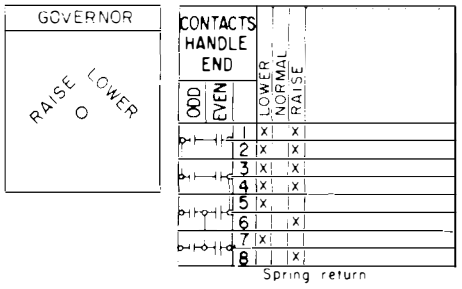
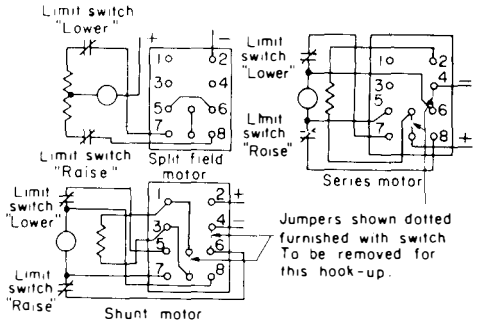


Fig. 146. **GOVERNOR OR RHEOSTAT MOTOR CONTROL SWITCH** (split-field motors are standard for most applications), *Model No. 16SB1A1.* Radial handle.





x in all contact diagrams denotes contacts closed

Contact Diagrams for SB-1 Switches

NO.	DESCRIPTION ESCUTCHEON & CONTACT DIAGRAM

Fig. 147. **MOTOR-CONTROL SWITCH** for split-field motors, *Model No. 16SB1AA1.* Pistol-grip handle.

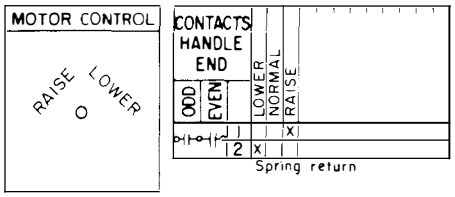


Fig. 148. **TEMPERATURE-METER TRANSFER SWITCH,** transfers two wires to five coils and test, *Model No. 16SB1CE33.* Knurled handle.

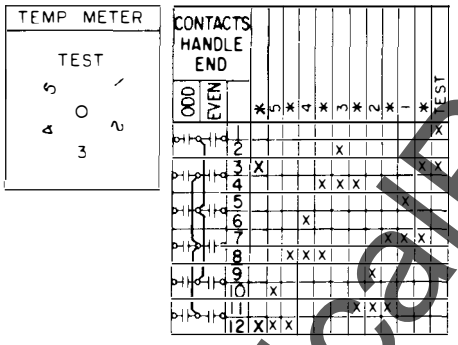
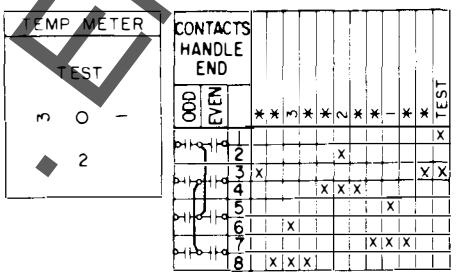


Fig. 149. **TEMPERATURE-METER TRANSFER SWITCH,** transfers two wires to three coils and test, *Model No. 16SB1CE28.* Knurled handle.



NO.	DESCRIPTION ESCUTCHEON & CONTACT DIAGRAM

Fig. 150. **TEMPERATURE-METER TRANSFER SWITCH,** transfers three wires to three coils and test, *Model No. 16SB1CE29.* Knurled handle.

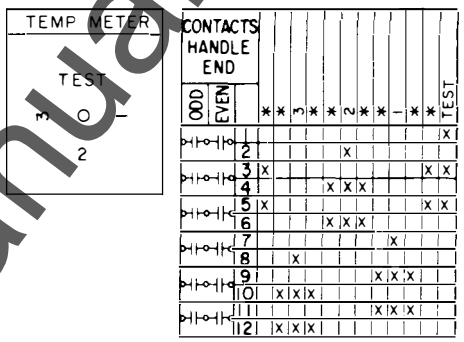
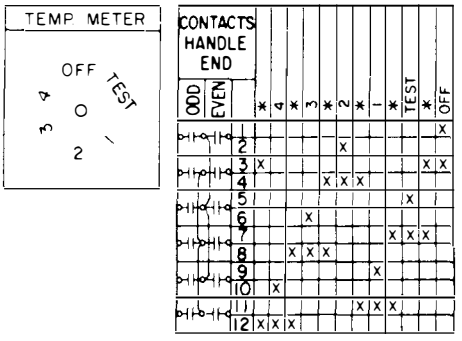


Fig. 151. **TEMPERATURE-METER TRANSFER SWITCH,** transfers two wires to four coils, with test and off, *Model No. 16SB1CE52.* With removable oval handle, *Model No. 16SB1CC19.* With fixed knurled handle, *Model No. 16SB1CE61.*



x in all contact diagrams denotes contacts closed

Contact Diagrams for SB-1 Switches

NO. | DESCRIPTION ESCUTCHEON & CONTACT DIAGRAM

Fig. 152. TEMPERATURE-METER TRANSFER SWITCH, transfers three wires to three coils, with test and off,
Model No. 16SB1CE55.
With removable oval handle,
Cat. No. 16SB1CC19.
For fixed knurled handle,
Model No. 16SB1CE63.

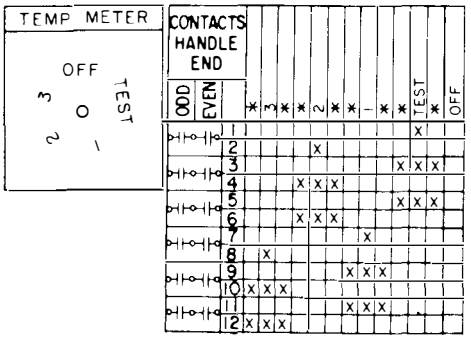


Fig. 153. TEMPERATURE-METER TRANSFER SWITCH, transfers two wires to three coils, with test and off,
Model No. 16SB1CE57.
With removable oval handle,
Cat. No. 16SB1CC19.
For fixed knurled handle,
Model No. 16SB1CE62.

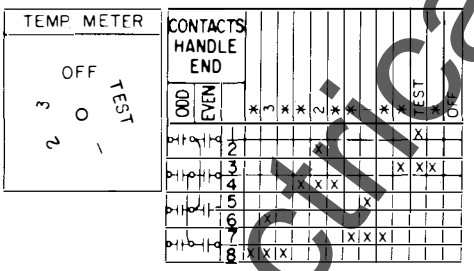
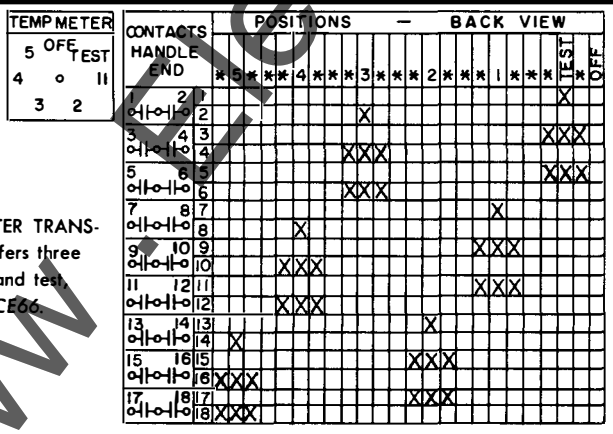


Fig. 154. TEMPERATURE METER TRANSFER SWITCH, transfers three wires to five coils and test,
Model No. 16SB1CE66.
Knurled handle.



NO. | DESCRIPTION ESCUTCHEON & CONTACT DIAGRAM

Fig. 155. TEMPERATURE METER TRANSFER SWITCH, transfers two wires to six coils and test,
Model No. 16SB1CE67.
Knurled handle.

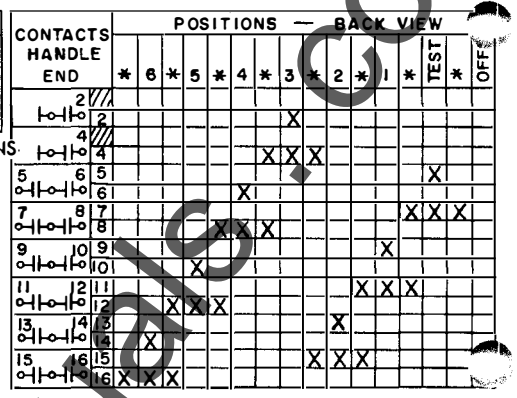


Fig. 156. SINGLE- OR DOUBLE-POLE, single-throw,
Model No. 16SB1CG1.
With spring return,
Model No. 16SB1CG2.
Oval handle.

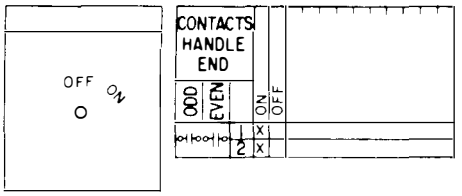


Fig. 157. THREE- OR FOUR-POLE, single throw,
Model No. 16SB1CG3.
With spring return,
Model No. 16SB1CG4.
Oval handle.

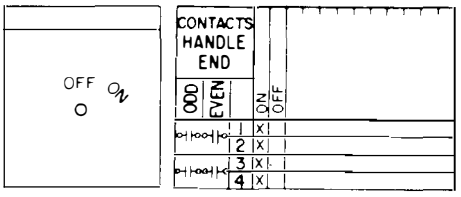
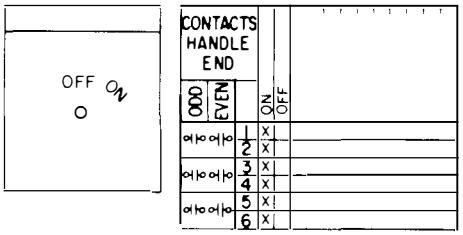


Fig. 158.

A.	B.	C.	D.
FIVE- OR SIX-POLE, single-throw, *Model No. 16SB1CG5.* With spring return, *Model No. 16SB1CG6.* Oval handle.	7- OR 8-POLE, single-throw, *16SB1CG7.* W/spr. ret., *16SB1CG8.*	9- OR 10-POLE, single-throw, *16SB1CG9.* W/spr. ret., *16SB1CG10.*	11- OR 12-POLE, 1 th..., *16SB1CG11.* W/spr. ret., *16SB1CG12.*



x in all contact diagrams denotes contacts closed

Contact Diagrams for SB-1 Switches

NO.	DESCRIPTION ESCUTCHEON & CONTACT DIAGRAM

Fig. 159. SINGLE-POLE, double-throw
with off,
Model No. 16SB1CG13.
With spring return,
Model No. 16SB1CG14.
Oval handle.

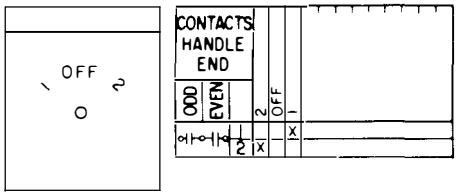


Fig. 160. DOUBLE-POLE, double-throw
with off,
Model No. 16SB1CG15.
With spring return,
Model No. 16SB1CG16.
Oval handle.

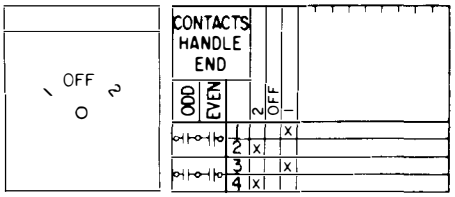


Fig. 161.

A.	B.	C.	D.
THREE-POLE,	4P-dt,	5P-dt,	6P-dt,
double-throw	w/off,	w/off,	w/off,
with off,	*16SB1GG19.*	*16SB1CG21.*	*16SB1CG23.*
Model No. 16SB1CG17.	W/spr. ret.,	W/spr. ret.,	W/spr. ret.,
With spring return,	*16SB1CG20.*	*16SB1CG22.*	*16SB1CG24.*
Model No. 16SB1CG18.			
Oval handle.			

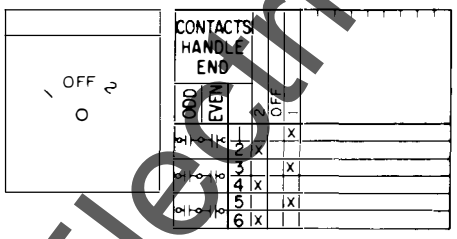
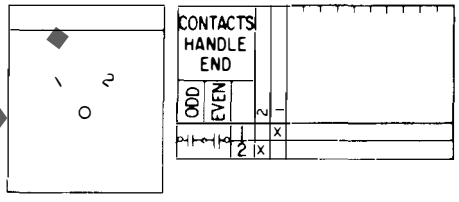


Fig. 162. SINGLE-POLE, double-throw,
Model No. 16SB1CG25.
Oval handle.



x in all contact diagrams denotes contacts closed

NO.	DESCRIPTION ESCUTCHEON & CONTACT DIAGRAM

Fig. 163. DOUBLE-POLE, double-throw,
Model No. 16SB1CG26.
Oval handle.

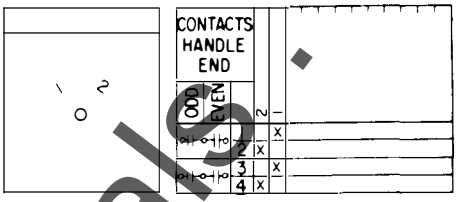


Fig. 164.

A.	B.	D.
THREE-POLE, double-throw,	4P-dt,	6P-dt,
Model No. 16SB1CG27.	*16SB1CG28.*	*16SB1CG30.*
Oval handle.	C.	E.
	5P-dt,	7P-dt,
	16SB1CG29.	*16SB1CG31.*

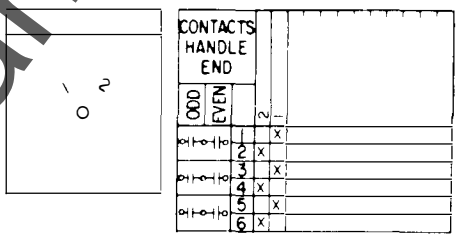


Fig. 165. SINGLE-POLE, triple-throw,
Model No. 16SB1CG32.
Oval handle.

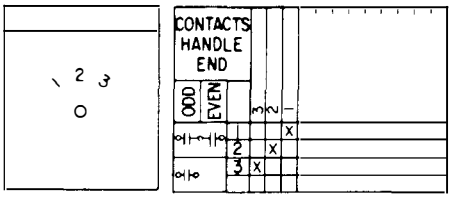


Fig. 166. SINGLE-POLE, four-throw,
Model No. 16B1CG33.
Oval handle.

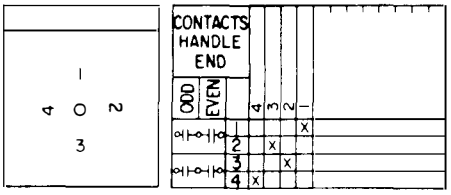
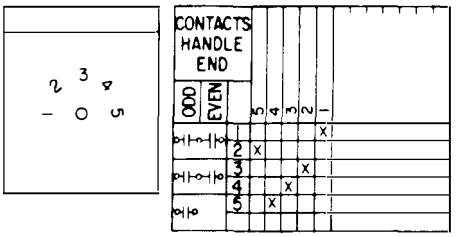


Fig. 167. SINGLE-POLE, five-throw,
Model No. 16SB1CG34.
Oval handle.



Contact Diagrams for SB-1 Switches

NO. DESCRIPTION ESCUTCHEON & CONTACT DIAGRAM

Fig. 168. SINGLE-POLE, six-throw,
Model No. 16SB1CG35.
Oval handle.

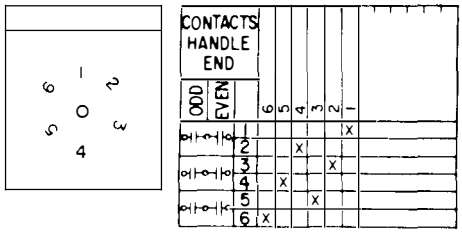


Fig. 169. SINGLE-POLE, seven-throw,
Model No. 16SB1CG36.
Oval handle.

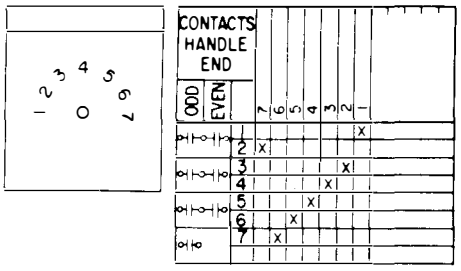


Fig. 170. SINGLE-POLE, eight-throw,
Model No. 16SB1CG37.
Oval handle.

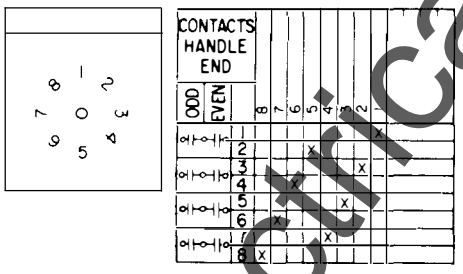
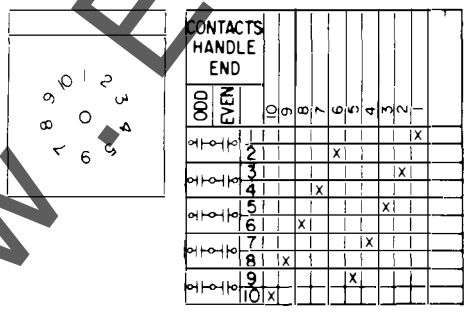


Fig. 171. SINGLE-POLE, 10-throw,
Model No. 16SB1CG38.
Oval handle.



NO. DESCRIPTION ESCUTCHEON & CONTACT DIAGRAM

Fig. 172. SINGLE-POLE, 12-throw,
Model No. 16SB1CG39.
Oval handle.

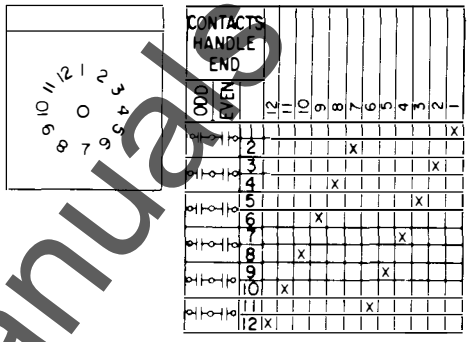


Fig. 173. DOUBLE-POLE, four-throw,
Model No. 16SB1CG40.
Oval handle.

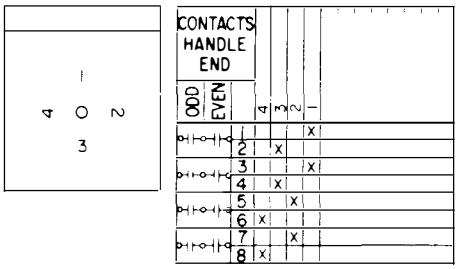
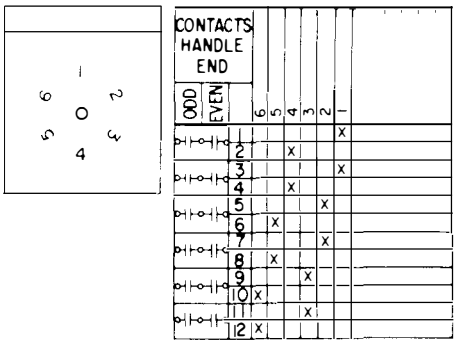
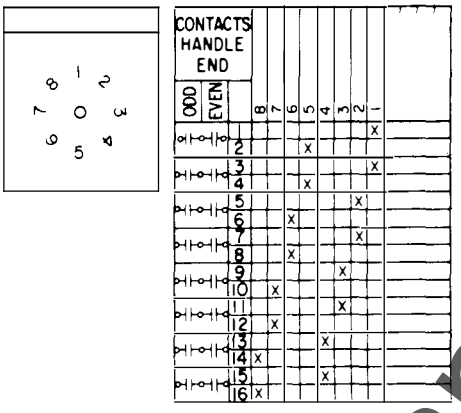
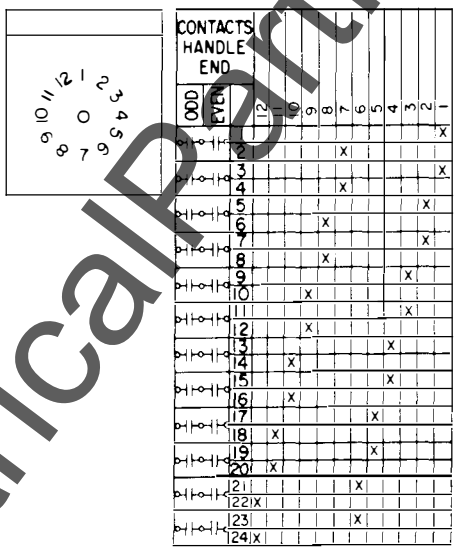
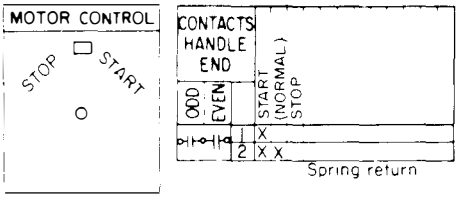
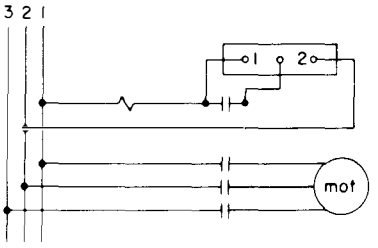


Fig. 174. DOUBLE-POLE, six-throw,
Model No. 16SB1CG41.
Oval handle.



x in all contact diagrams denotes contacts closed

Contact Diagrams for SB-1 Switches

NO. DESCRIPTION	ESCUTCHEON & CONTACT DIAGRAM	WIRING DIAGRAM
Fig. 175. DOUBLE-POLE, eight-throw, *Model No. 16SB1CG42.* Oval handle.		
Fig. 176. DOUBLE-POLE, 12-throw, *Model No. 16SB1CG43.* Oval handle.		
Fig. 177. MOTOR CONTROL SWITCH, *Model No. 16SB1CG44.* Pistol-grip handle.		

x 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 Fig. 178 and proceed as follows to fill out the form:

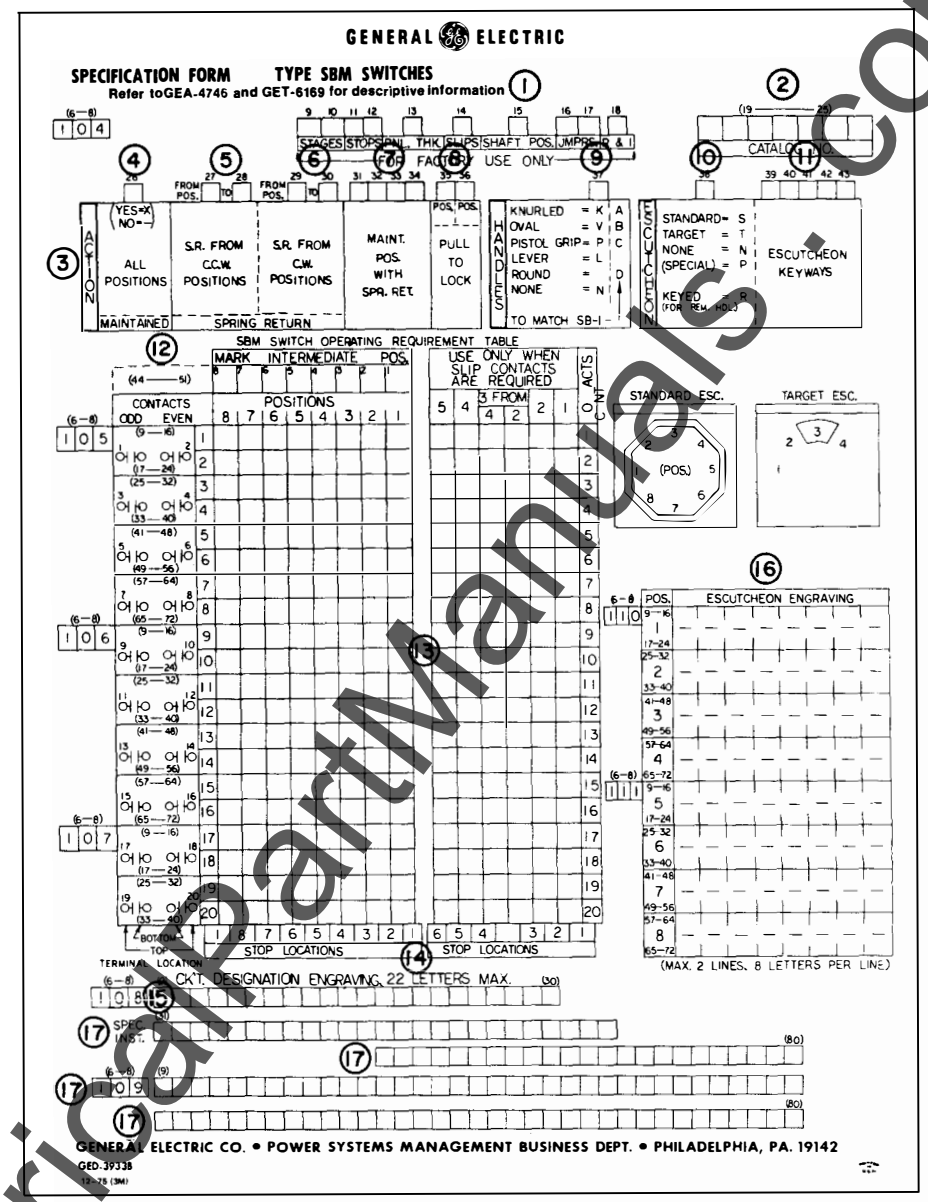


Fig. 178. Specification form, Type SBM switches

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 26)

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 Lamicoid escutcheons are required. The description "Lamicoid" 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 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 that contact to close. If that contact is to be open, leave the block blank. As the right of the table is sketch of a 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 Positon 4 and 5 (when used). Refer to "Slip Limitations" and how to overcome them before completing this part of the form.

If a contact is not a slip contact and you want it to close in Position 3, put an "X" in both columns under Position 3.

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 SPECIFICATION FORMS

Fig. 179. 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. 180. 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. 181. 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-degree rotation (no stops) using only Positions 1, 3, 5 and 7 (intermediates at Positions 2, 4, 6 and 8).

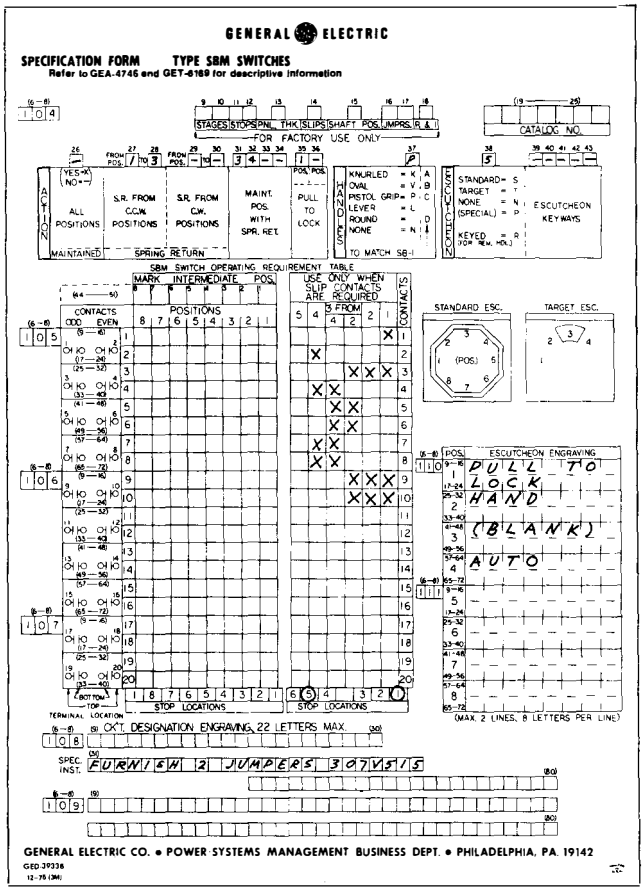


Fig. 179. Example of completed specification form

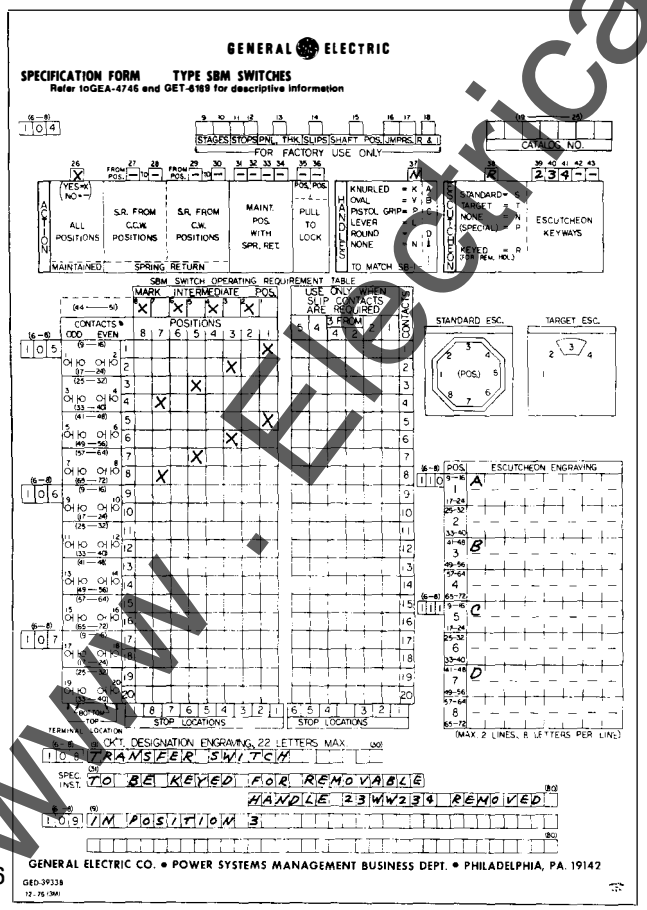


Fig. 180. Example of completed specification form

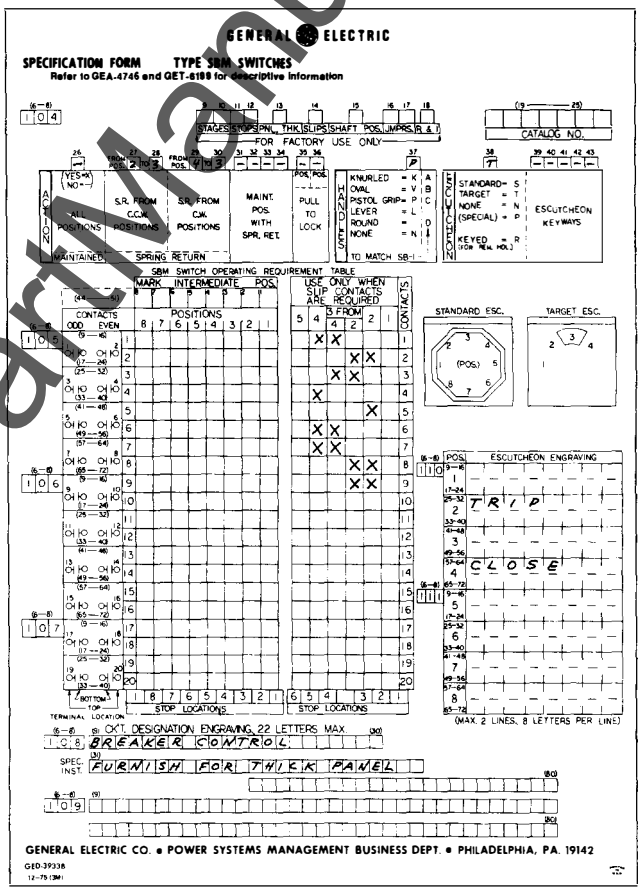


Fig. 181. Example of completed specification form

The specification form for SB-1, -9, and -10 switches, GED-3934, is in two parts, as described below. Part 1 (see Fig. 182) permits the easy specification of SB-1, -9, and -10 switch contact arrangements, escutcheons, handles, etc., including the lateral-action switching capabilities of the SB-10 switch. Part 2 (see Fig. 191) is for optional features, such as tandem mechanism, separately-mounted locks, etc.

(1.) POSITION LOCATION

It is important to select the proper position location to avoid certain limitations which could add to the cost of the switch. 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 (CCW) position. When 360-degree rotation is required, Position 1 starts at 12:00 o'clock.

(2.) CONTACT ARRANGEMENT

Note: If lateral action is required, consult instructions Numbers 11 and 12 before completing this section.

The vertical columns on the left (numberes 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.*

Refer to Fig. 183A. An "X" only under handle Position 1 and across from Contact 1 means that Contact 1 will only close when the handle is in Position 1. An "X" under handle Positions 2 and 3 and across from Contact 2 means Contact 2 will close when the handle is turned to Position 2 and remain closed when turned to Position 3 (see "Cam Action and Limitations" before proceeding).

Refer to Fig. 183B. An asterisk between the position numbers is used to indicate intermediate position to show the special contact action desired between the designated positions. (Refer to "Overlapping Contacts"). For specifying the contact arrangement with a slip action, see "Slip Action" under "Cam Action and Limitations".

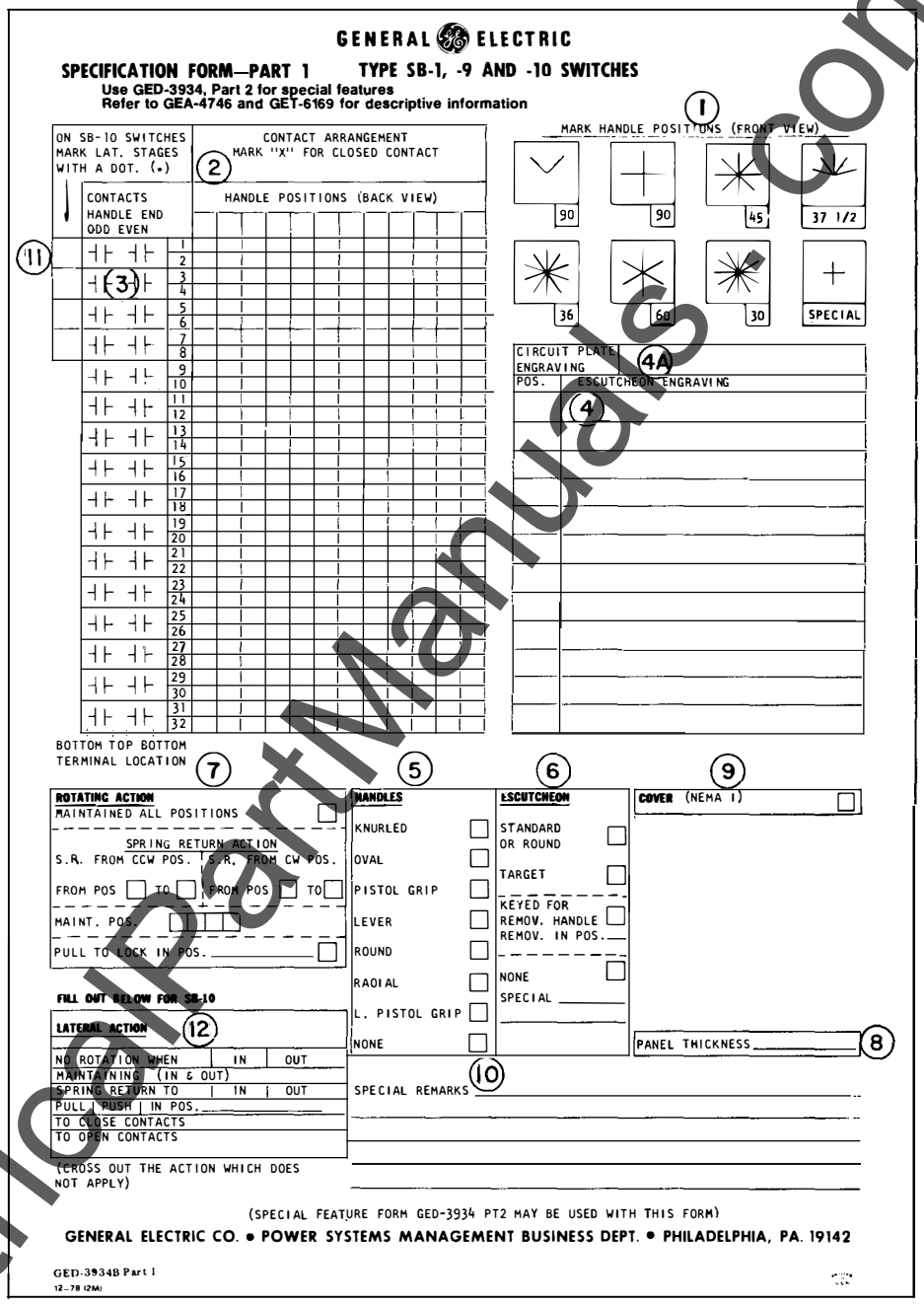


Fig. 182. Specification form, Type SB-1, SB-9, and SB-10 switches

(3.) CONTACT CONNECTIONS

Mark the contact connections desired for each stage in the manner shown in Fig. 183C.

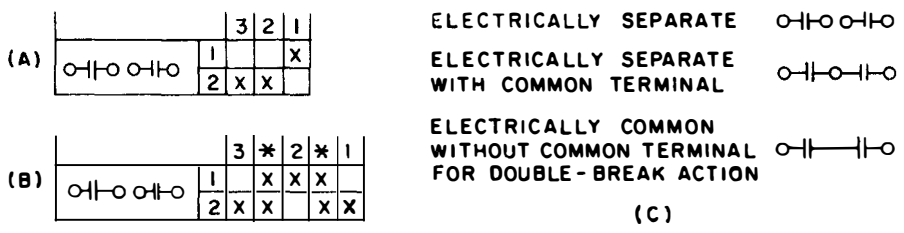


Fig. 183. Notations to show contact arrangement and connections

Some examples of correct and incorrect notation are shown in Fig. 184.

A common mistake is to show double-break contacts when they are not desired. (a) Here, the requirement is clearly 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 shown in (b).

If double-break action is required, use the notation shown in (c).

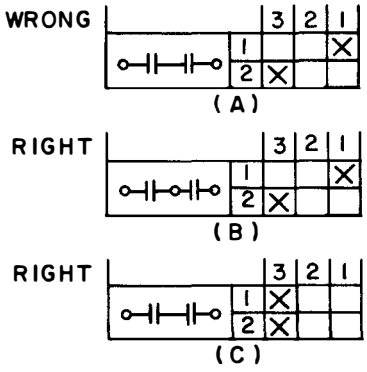


Fig. 184. Correct and incorrect notation of contact connections.

(4.) ESCUTCHEON ENGRAVING

Under "POS", indicate the position numbers which are marked in the handle-position blocks portion of the form. Indicate the desired engraving for the position next to it under "Escutcheon Engraving".

The circuit designation, if desired, is marked in the circuit plate engraving block above the escutcheon engraving.

(5.) HANDLES

Check the appropriate block to indicate the design of handles desired. Available handle types are shown in GEA-4746.

(6.) ESCUTCHEONS

For information and illustrations of the available escutcheons, refer to GEA-4746.

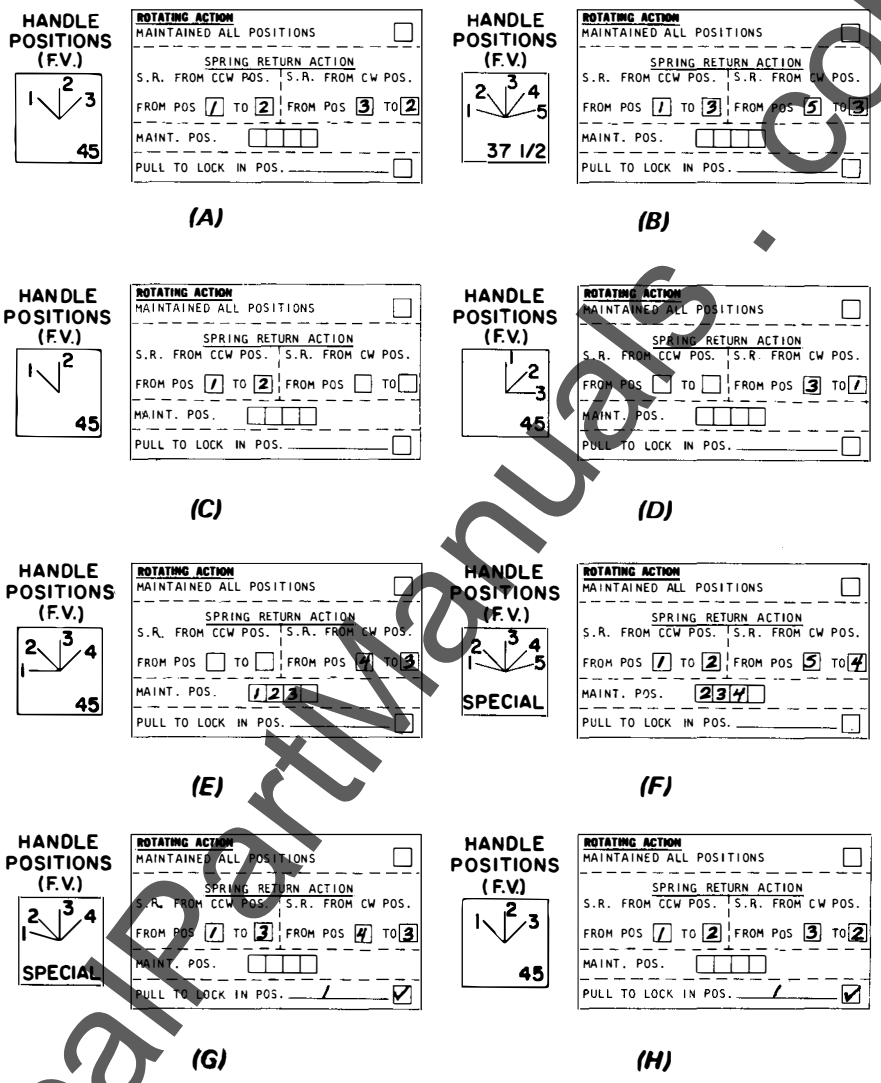


Fig. 185. Specification form, indicating rotating action.

Check the block next to the desired escutcheon. 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. (Refer to "Removable Handles").

(7.) ROTATING ACTION

This portion of the form is broken into four separate sections. Please refer to Fig. 185.

Maintained All Positions — When the handle is maintained in *all* positions, check this block.

Spring Return Action — Can be provided from both directions to NORMAL (see examples A and B, Fig. 185), or from one direction to NORMAL (see examples C and D, Fig. 185).

Maintaining Position — When spring-return and maintained action is desired, both the spring-return positions, as per above, and the maintained positions are marked (see examples E and F, Fig. 185).

Pull-to-Lock-In Position — When a pull-to-lock action is desired (see GEA-4746), fill-in the position in which the handle is to be pulled and latch (see examples G and H, Fig. 185).

(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 thick.

(9.) COVER (NEMA I)

The switch will be furnished with an extruded vinyl cover which meets NEMA I requirements. Switches with one to twelve top terminals on the fixed-contact support assembly will be furnished with a standard cover. Switches with 13 to 32 top terminals will be furnished with larger covers to allow more room for the additional wires.

(10.) SPECIAL REMARKS

This space is provided for any additional information which may be required in the design of the switch. When GED-3934, Part 2, is used with Part 1, a notation should be made to indicate that both parts of the specification form have been used.

(11-12.) LATERAL CONTACT ACTION (SB-10 Switches only)

Complete this section only when ordering a Type SB-10 Switch which has both lateral and rotary contacts. To identify the lateral stages, mark a dot in the designated blocks to the far left of the contact arrangement. (Maximum four lateral stages, two contacts per stage). Note: Do not put an "X" under the handle positions for these contacts. An "X" is used only for the rotary contacts. (Fig. 186A).

The action of the lateral contacts is described in the "Lateral Action" blocks. Refer to Fig. 186B.

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 in the contact number with the desired contact action. Refer to Fig. 186C for the lateral action available. Refer to Fig. 187 for examples.

(11)

ON SB-10 SWITCHES MARK LAT. STAGES WITH A DOT. (•)	CONTACT ARRANGEMENT MARK "X" FOR CLOSED CONTACT
CONTACTS HANDLE END ODD EVEN	HANDLE POSITIONS (BACK VIEW)
⊣⊢ ⊣⊢ 1 2	
⊣⊢ ⊣⊢ 3 4	
⊣⊢ ⊣⊢ 5 6	
⊣⊢ ⊣⊢ 7 8	
⊣⊢ ⊣⊢ 9 10	

(A)

(12)

FILL OUT BELOW FOR SB-10

LATERAL ACTION		
NO ROTATION WHEN MAINTAINING (IN & OUT)	IN	OUT
SPRING RETURN TO PULL | PUSH | IN POS.	IN	OUT
TO CLOSE CONTACTS		
TO OPEN CONTACTS		

(CROSS OUT THE ACTION WHICH DOES NOT APPLY)

(B)

OPERATIONS OF SB-10 SWITCHES

One Lateral Stage
- Pull to open contacts 1-2 . . . . . Maintaining or spring return in or out
- Pull to close contacts 1-2 . . . . . Maintaining or spring return in or out

Two Lateral Stages
- Pull to open contacts 1-4 . . . . . Maintaining or spring return in or out
- Pull to close contacts 1-4 . . . . . Maintaining or spring return in or out
- Pull to open contacts 1-2 and close 3-4 . . . . . Maintaining or spring return in or out

Three Lateral Stages
- Pull to open contacts 1-6 . . . . . Maintaining or spring return in
- Pull to close contacts 1-6 . . . . . Maintaining or spring return out
- Pull to open contacts 1-4 and close 5-6 . . . . . Maintaining or spring return in
- Pull to open contacts 1-2 and close 3-6 . . . . . Maintaining or spring return out

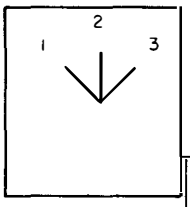
Four Lateral Stages
- Pull to open contacts 1-8 . . . . . Maintaining or spring return in
- Pull to close contacts 1-8 . . . . . Maintaining or spring return out
- Pull to open contacts 1-6 and close 7-8 . . . . . Maintaining or spring return in
- Pull to open contacts 1-2 and close 3-8 . . . . . Maintaining or spring return out
- Pull to open contacts 1-4 and close 5-8 . . . . . Maintaining or spring return in or out

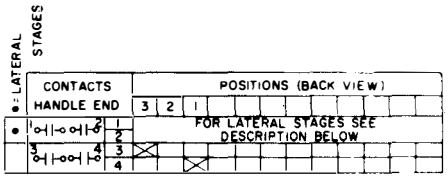
Pull to open denotes the same contact action as push to close.
Pull to close denotes the same contact action as push to open.

(C)

Fig. 186. Notation for specifying Type SB-10 switch action

Ordering Guide for SB-1, -9 and -10 Switches (Cont'd.)



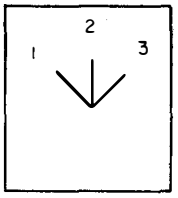


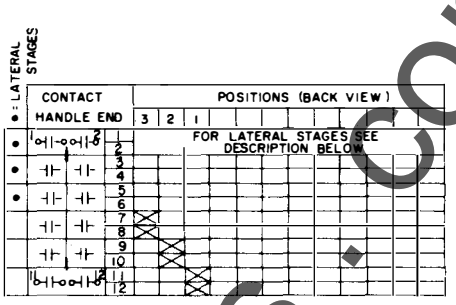
FILL OUT BELOW FOR SB-10

LATERAL ACTION

NO ROTATION WHEN MAINTAINING (IN & OUT)	~~IN~~	OUT
~~SPRING RETURN TO~~	~~IN~~	~~OUT~~
PULL | ~~PUSH~~	IN POS. 2	
TO CLOSE CONTACTS	1-2	
~~TO OPEN CONTACTS~~		

(CROSS OUT THE ACTION WHICH DOES NOT APPLY)



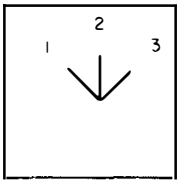


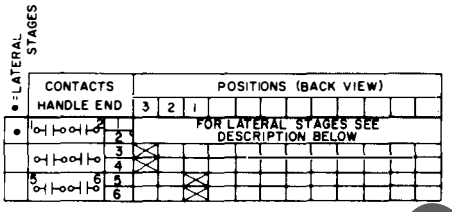
FILL OUT BELOW FOR SB-10

LATERAL ACTION

NO ROTATION WHEN MAINTAINING (IN & OUT)	~~IN~~	OUT
~~SPRING RETURN TO~~	~~IN~~	~~OUT~~
PULL | ~~PUSH~~	IN POS. 2	
TO CLOSE CONTACTS	3-4, 5-6	
TO OPEN CONTACTS	1-2	

(CROSS OUT THE ACTION WHICH DOES NOT APPLY)



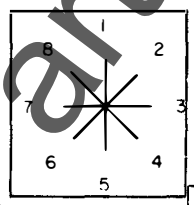


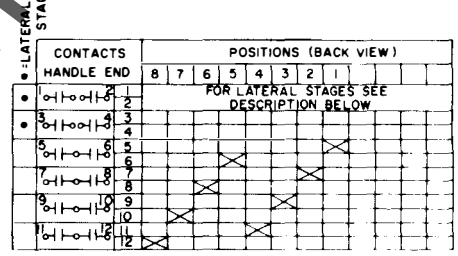
FILL OUT BELOW FOR SB-10

LATERAL ACTION

NO ROTATION WHEN MAINTAINING (IN & OUT)	~~IN~~	OUT
~~SPRING RETURN TO~~	~~IN~~	~~OUT~~
PULL | ~~PUSH~~	IN POS. 2	
~~TO CLOSE CONTACTS~~		
TO OPEN CONTACTS	1-2	

(CROSS OUT THE ACTION WHICH DOES NOT APPLY)



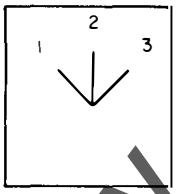


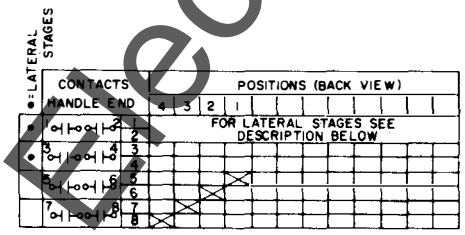
FILL OUT BELOW FOR SB-10

LATERAL ACTION

NO ROTATION WHEN	~~IN~~	OUT
~~MAINTAINING (IN & OUT)~~		
SPRING RETURN TO	IN	~~OUT~~
PULL | ~~PUSH~~	IN POS. ALL	
TO CLOSE CONTACTS	1-2, 3-4	
~~TO OPEN CONTACTS~~		

(CROSS OUT THE ACTION WHICH DOES NOT APPLY)



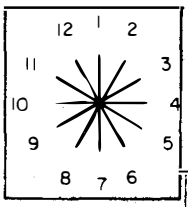


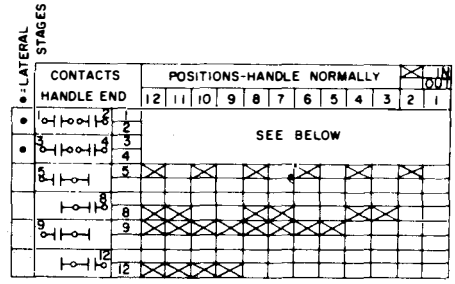
FILL OUT BELOW FOR SB-10

LATERAL ACTION

NO ROTATION WHEN MAINTAINING (IN & OUT)	IN	~~OUT~~
~~SPRING RETURN TO~~	~~IN~~	~~OUT~~
~~PULL~~ | PUSH	IN POS. ALL	
TO CLOSE CONTACTS	1-2	
TO OPEN CONTACTS	3-4	

(CROSS OUT THE ACTION WHICH DOES NOT APPLY)





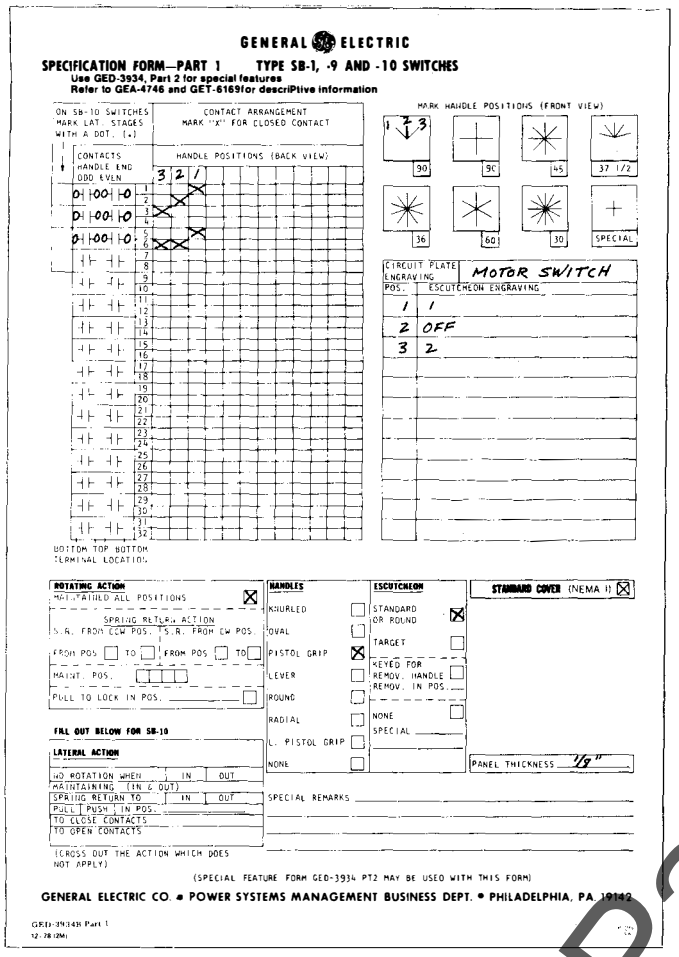
FILL OUT BELOW FOR SB-10

LATERAL ACTION

NO ROTATION WHEN MAINTAINING (IN & OUT)	IN	~~OUT~~
~~MAINTAINING (IN & OUT)~~		
SPRING RETURN TO	IN	~~OUT~~
PULL | PUSH	IN POS. ALL	
TO CLOSE CONTACTS	3-4	
TO OPEN CONTACTS	1-2	

(CROSS OUT THE ACTION WHICH DOES NOT APPLY)

Fig. 187. Specification form, indicating lateral action. (SB-10 switches only).



GENERAL ELECTRIC

SPECIFICATION FORM—PART 1 TYPE SB-1, -9 AND -10 SWITCHES

Use GED-3934, Part 2 for special features
Refer to GEA-4746 and GET-6169for descriptive information

ON SB-10 SWITCHES MARK LAT. STAGES WITH A DOT. (•)

CONTACT ARRANGEMENT MARK "X" FOR CLOSED CONTACT

CONTACTS HANDLE END ODD EVEN

HANDLE POSITIONS (BACK VIEW) 3 2 1

MARK HANDLE POSITIONS (FRONT VIEW) 1 2 3 — 90 — 90 — 45 — 37 1/2 — 36 — 60 — 30 — SPECIAL

CIRCUIT PLATE ENGRAVING: MOTOR SWITCH

POS.	ESCUTCHEON ENGRAVING
1	1
2	OFF
3	2

BOTTOM TOP BOTTOM TERMINAL LOCATION

ROTATING ACTION — MAINTAINED ALL POSITIONS ☒

SPRING RETURN ACTION — S.R. FROM CCW POS. | S.R. FROM CW POS.

FROM POS ☐ TO ☐ | FROM POS ☐ TO ☐

MAINT. POS. ☐☐☐

PULL TO LOCK IN POS. ☐

HANDLES: KNURLED ☐ | OVAL ☐ | PISTOL GRIP ☒ | LEVER ☐ | ROUND ☐ | RADIAL ☐ | L. PISTOL GRIP ☐ | NONE ☐

ESCUTCHEON: STANDARD OR ROUND ☒ | TARGET ☐ | KEYED FOR REMOV. HANDLE REMOV. IN POS. ☐ | NONE ☐ | SPECIAL ☐

STANDARD COVER (NEMA 1) ☒

PANEL THICKNESS 1/8"

FILL OUT BELOW FOR SB-10

LATERAL ACTION

	IN	OUT
NO ROTATION WHEN MAINTAINING (IN & OUT)		
SPRING RETURN TO	IN	OUT
PULL | PUSH IN POS.		
TO CLOSE CONTACTS		
TO OPEN CONTACTS		

(CROSS OUT THE ACTION WHICH DOES NOT APPLY)

SPECIAL REMARKS

(SPECIAL FEATURE FORM GED-3934 PT2 MAY BE USED WITH THIS FORM)

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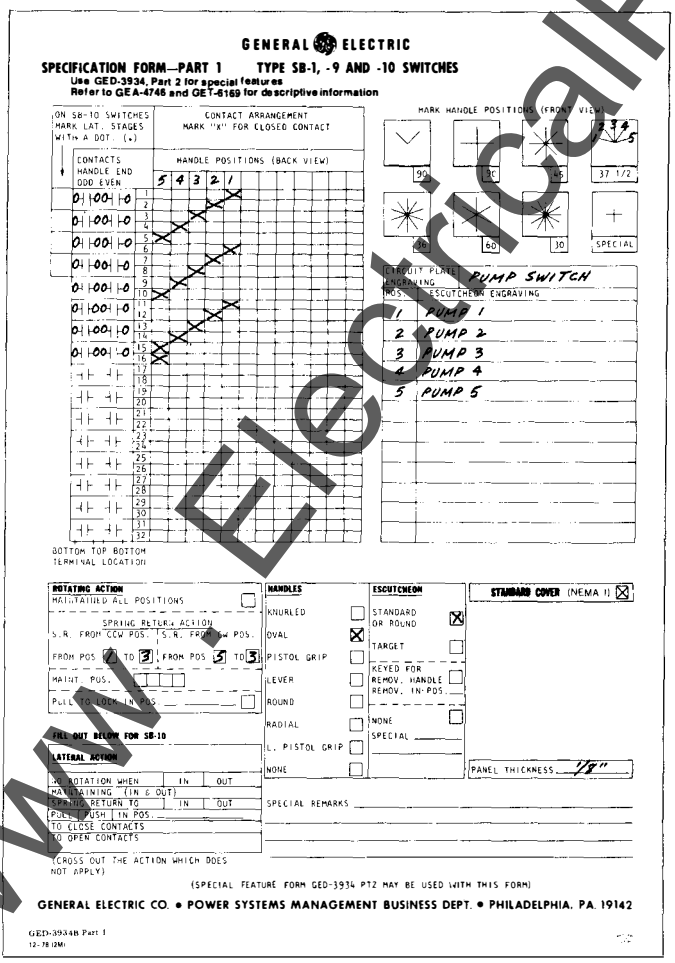
GED-3934B Part 1
12-78 (2M)

Fig. 188. Example of completed specification form, calling for a 3-stage SB-1 switch, 3-position, maintained action, pistol grip handle, standard cover, and panel thickness of 1/8 inch



GENERAL ELECTRIC

SPECIFICATION FORM—PART 1 TYPE SB-1, -9 AND -10 SWITCHES

Use GED-3934, Part 2 for special features
Refer to GEA-4746 and GET-6169 for descriptive information

ON SB-10 SWITCHES MARK LAT. STAGES WITH A DOT. (•)

CONTACT ARRANGEMENT MARK "X" FOR CLOSED CONTACT

CONTACTS HANDLE END ODD EVEN

HANDLE POSITIONS (BACK VIEW) 5 4 3 2 1

MARK HANDLE POSITIONS (FRONT VIEW) 1 2 3 4 5 — 90 — 90 — 45 — 37 1/2 — 36 — 60 — 30 — SPECIAL

CIRCUIT PLATE ENGRAVING: PUMP SWITCH

POS.	ESCUTCHEON ENGRAVING
1	PUMP 1
2	PUMP 2
3	PUMP 3
4	PUMP 4
5	PUMP 5

BOTTOM TOP BOTTOM TERMINAL LOCATION

ROTATING ACTION — MAINTAINED ALL POSITIONS ☐

SPRING RETURN ACTION — S.R. FROM CCW POS. 1 | S.R. FROM CW POS. 5

FROM POS 1 TO 3 | FROM POS 5 TO 3

MAINT. POS. ☐☐☐

PULL TO LOCK IN POS. ☐

HANDLES: KNURLED ☐ | OVAL ☒ | PISTOL GRIP ☐ | LEVER ☐ | ROUND ☐ | RADIAL ☐ | L. PISTOL GRIP ☐ | NONE ☐

ESCUTCHEON: STANDARD OR ROUND ☒ | TARGET ☐ | KEYED FOR REMOV. HANDLE REMOV. IN-POS. ☐ | NONE ☐ | SPECIAL ☐

STANDARD COVER (NEMA 1) ☒

PANEL THICKNESS 1/8"

FILL OUT BELOW FOR SB-10

LATERAL ACTION

	IN	OUT
NO ROTATION WHEN MAINTAINING (IN & OUT)		
SPRING RETURN TO	IN	OUT
PULL | PUSH IN POS.		
TO CLOSE CONTACTS		
TO OPEN CONTACTS		

(CROSS OUT THE ACTION WHICH DOES NOT APPLY)

SPECIAL REMARKS

(SPECIAL FEATURE FORM GED-3934 PT2 MAY BE USED WITH THIS FORM)

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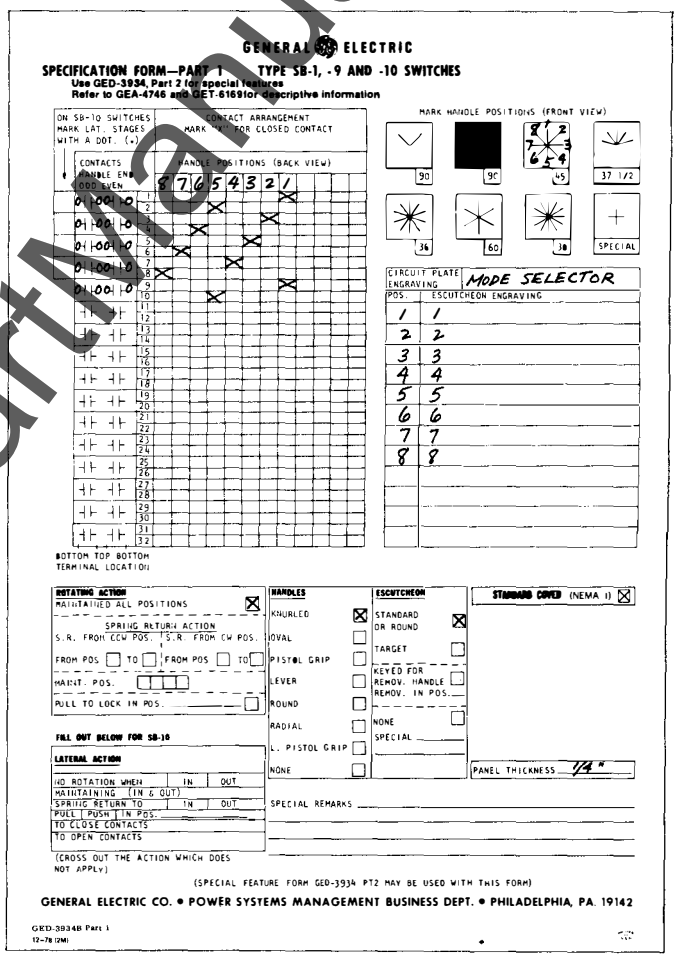
GED-3934B Part 1
12-78 (2M)

Fig. 189. Example of completed specification form calling for an 8-stage SB-1 switch, 5-position, spring return action (both directions), oval handle, standard cover, and panel thickness of 1/8 inch



GENERAL ELECTRIC

SPECIFICATION FORM—PART 1 TYPE SB-1, -9 AND -10 SWITCHES

Use GED-3934, Part 2 for special features
Refer to GEA-4746 and GET-6169for descriptive information

ON SB-10 SWITCHES MARK LAT. STAGES WITH A DOT. (•)

CONTACT ARRANGEMENT MARK "X" FOR CLOSED CONTACT

CONTACTS HANDLE END ODD EVEN

HANDLE POSITIONS (BACK VIEW) 8 7 6 5 4 3 2 1

MARK HANDLE POSITIONS (FRONT VIEW) — 90 — 90 — 45 — 37 1/2 — 36 — 60 — 30 — SPECIAL

CIRCUIT PLATE ENGRAVING: MODE SELECTOR

POS.	ESCUTCHEON ENGRAVING
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8

BOTTOM TOP BOTTOM TERMINAL LOCATION

ROTATING ACTION — MAINTAINED ALL POSITIONS ☒

SPRING RETURN ACTION — S.R. FROM CCW POS. | S.R. FROM CW POS.

FROM POS ☐ TO ☐ | FROM POS ☐ TO ☐

MAINT. POS. ☐☐☐

PULL TO LOCK IN POS. ☐

HANDLES: KNURLED ☒ | OVAL ☐ | PISTOL GRIP ☐ | LEVER ☐ | ROUND ☐ | RADIAL ☐ | L. PISTOL GRIP ☐ | NONE ☐

ESCUTCHEON: STANDARD OR ROUND ☒ | TARGET ☐ | KEYED FOR REMOV. HANDLE REMOV. IN POS. ☐ | NONE ☐ | SPECIAL ☐

STANDARD COVER (NEMA 1) ☒

PANEL THICKNESS 1/4"

FILL OUT BELOW FOR SB-10

LATERAL ACTION

	IN	OUT
NO ROTATION WHEN MAINTAINING (IN & OUT)		
SPRING RETURN TO	IN	OUT
PULL | PUSH IN POS.		
TO CLOSE CONTACTS		
TO OPEN CONTACTS		

(CROSS OUT THE ACTION WHICH DOES NOT APPLY)

SPECIAL REMARKS

(SPECIAL FEATURE FORM GED-3934 PT2 MAY BE USED WITH THIS FORM)

GENERAL ELECTRIC CO. • POWER SYSTEMS MANAGEMENT BUSINESS DEPT. • PHILADELPHIA, PA. 19142

GED-3934B Part 1
12-78 (2M)

Fig. 190. Example of completed specification form, calling for a 5-stage, 8-position SB-1 switch with maintained action, knurled handle, and 1/4 inch panel thickness

(13.) SPECIFYING OPTIONAL FEATURES (GED-3934, Part 2)

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 require is available with the type of switch you are specifying, and check the appropriate block as described below. Information on these optional features is contained in GEA-4746.

(14.) LOCK-IN HANDLE

Specify the position or positions in which the handle is to lock. All locks will be furnished with two GE-75 keys, unless otherwise specified.

(15.) SEPARATELY MOUNTED LOCK

SB switches are available with a standard lock and key, or with a Kirk key-interlock system. Two keys are furnished with each lock. Check the proper block. If Kirk key interlock is checked, fill out the co-ordination 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 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.

Coordination Information Required for Kirk Interlock Scheme

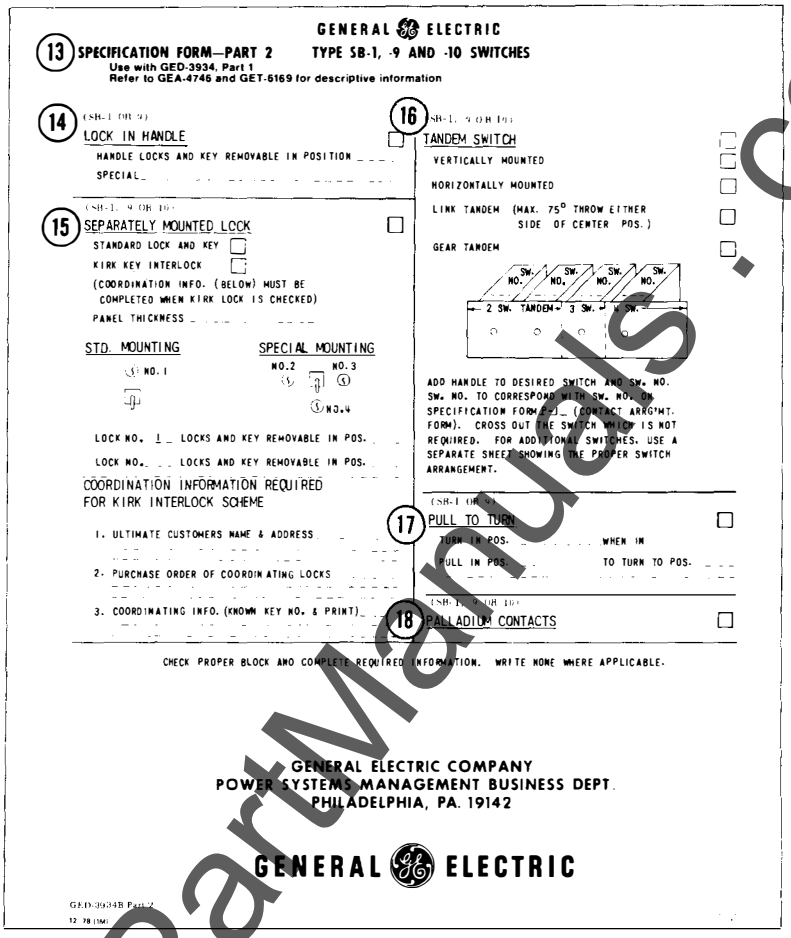
To ensure a designated key change is furnished only to the customer and equipment assigned, the following information is required:

1. Ultimate customer's name and address. Also the substation or building when required.

2. Purchase order of coordinating locks already placed. If we are the first to place the order, so state and we will so advise on the purchase order that we will place for the locks.

3. 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.


GENERAL ELECTRIC

(13) SPECIFICATION FORM—PART 2 TYPE SB-1, -9 AND -10 SWITCHES

Use with GED-3934, Part 1

Refer to GEA-4745 and GET-6169 for descriptive information

(14) (SB-1 OR 9) LOCK IN HANDLE

HANDLE LOCKS AND KEY REMOVABLE IN POSITION _ _ _

SPECIAL _

(15) (SB-1, 9 OR 10) SEPARATELY MOUNTED LOCK

STANDARD LOCK AND KEY

KIRK KEY INTERLOCK

(COORDINATION INFO. (BELOW) MUST BE COMPLETED WHEN KIRK LOCK IS CHECKED)

PANEL THICKNESS _ _ _

STD. MOUNTING

NO. 1

SPECIAL MOUNTING

NO. 2 NO. 3

NO. 4

LOCK NO. 1 _ LOCKS AND KEY REMOVABLE IN POS. _ _ _

LOCK NO. _ _ LOCKS AND KEY REMOVABLE IN POS. _ _ _

COORDINATION INFORMATION REQUIRED FOR KIRK INTERLOCK SCHEME

1. ULTIMATE CUSTOMERS NAME & ADDRESS _ _ _

2. PURCHASE ORDER OF COORDINATING LOCKS _ _ _

3. COORDINATING INFO. (KNOWN KEY NO. & PRINT) _ _ _

(16) (SB-1, 9 OR 10) TANDEM SWITCH

VERTICALLY MOUNTED

HORIZONTALLY MOUNTED

LINK TANDEM (MAX. 75° THROW EITHER SIDE OF CENTER POS.)

GEAR TANDEM

SW. NO. SW. NO. SW. NO. SW. NO.

2 SW. TANDEM 3 SW. 4 SW.

ADD HANDLE TO DESIRED SWITCH AND SW. NO. SW. NO. TO CORRESPOND WITH SW. NO. ON SPECIFICATION FORM GEA-_ (CONTACT ARRG'MT. FORM). CROSS OUT THE SWITCH WHICH IS NOT REQUIRED. FOR ADDITIONAL SWITCHES, USE A SEPARATE SHEET SHOWING THE PROPER SWITCH ARRANGEMENT.

(17) (SB-1 OR 10) PULL TO TURN

TURN IN POS. _ _ _ WHEN IN

PULL IN POS. _ _ _ TO TURN TO POS. _ _ _

(18) (SB-1, 9 OR 10) PALLADIUM CONTACTS

CHECK PROPER BLOCK AND COMPLETE REQUIRED INFORMATION. WRITE NONE WHERE APPLICABLE.

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POWER SYSTEMS MANAGEMENT BUSINESS DEPT.
PHILADELPHIA, PA. 19142

GENERAL ELECTRIC

GED-3934B Part 2
12 78 (5M)

Fig. 191. Specification form, optional features

(16.) 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. A link mechanism is normally furnished when the throw on either side of the center position does not exceed 75 degrees. A gear me chanism is used when the throw exceeds 75 degrees. 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.

(17.) PULL-TO-TURN

If the handle is to turn in the IN position, indicate what positions or positions; if it is not to turn in the IN posítion, write "none". Fill in the position the handle will be pulled in, and state to what position or positions you will be turning to.

(18.) PALLADIUM CONTACTS

Check this block if required. Palladium contacts are available for temperature-meter switches (see "Temperature-meter Switches"). 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.

GENERAL ELECTRIC

SPECIFICATION FORM TYPE SBM SWITCHES

Refer to GEA-4746 and GET-6169 for descriptive information

(6—8) 1 0 4

9 10 11 12 13 14 15 16 17 18

STAGES | STOPS | PNL. THK. | SLIPS | SHAFT POS. | JMPRS. | R & I

FOR FACTORY USE ONLY

(19 ——— 25)

CATALOG NO.

26 | FROM 27 TO 28 | FROM 29 TO 30 | 31 32 33 34 | 35 36

ACTION

(YES=X NO=—)

ALL POSITIONS	S.R. FROM C.C.W. POSITIONS	S.R. FROM C.W. POSITIONS	MAINT. POS. WITH SPR. RET.	POS. POS. PULL TO LOCK
MAINTAINED	SPRING RETURN			

37

HANDLES

KNURLED	= K	A
OVAL	= V	B
PISTOL GRIP	= P	C
LEVER	= L	
ROUND	=	D
NONE	= N	

TO MATCH SB-1

38 | 39 40 41 42 43

ESCUTCHEON

STANDARD	= S
TARGET	= T
NONE	= N
(SPECIAL)	= P
KEYED (FOR REM. HDL.)	= R

ESCUTCHEON KEYWAYS

SBM SWITCH OPERATING REQUIREMENT TABLE

(44 ——— 51)

MARK INTERMEDIATE POS.

CONTACTS ODD EVEN — POSITIONS 8 7 6 5 4 3 2 1

USE ONLY WHEN SLIP CONTACTS ARE REQUIRED — 5 4 3 FROM 4 2 1 CONTACTS

(6—8) 1 0 5

(6—8) 1 0 6

(6—8) 1 0 7

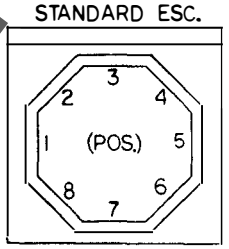
	CONTACTS	POSITIONS 8 7 6 5 4 3 2 1	5 4 3 FROM 4 2 1 CONTACTS
	(9—16) 1 2 (17—24)	1	1
		2	2
	(25—32) 3 4 (33—40)	3	3
		4	4
	(41—48) 5 6 (49—56)	5	5
		6	6
	(57—64) 7 8 (65—72)	7	7
		8	8
	(9—16) 9 10 (17—24)	9	9
		10	10
	(25—32) 11 12 (33—40)	11	11
		12	12
	(41—48) 13 14 (49—56)	13	13
		14	14
	(57—64) 15 16 (65—72)	15	15
		16	16
	(9—16) 17 18 (17—24)	17	17
		18	18
	(25—32) 19 20 (33—40)	19	19
		20	20

BOTTOM — TOP — TERMINAL LOCATION

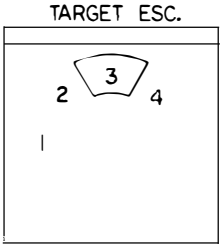
8 7 6 5 4 3 2 1 — STOP LOCATIONS

6 5 4 — 3 2 1 — STOP LOCATIONS

STANDARD ESC.



TARGET ESC.



(6—8) 1 1 0

POS.	ESCUTCHEON ENGRAVING
1 (9—16, 17—24)	
2 (25—32, 33—40)	
3 (41—48, 49—56)	
4 (57—64, 65—72)	

(6—8) 1 1 1

5 (9—16, 17—24)	
6 (25—32, 33—40)	
7 (41—48, 49—56)	
8 (57—64, 65—72)	

(MAX. 2 LINES, 8 LETTERS PER LINE)

(6—8) 1 0 8 (9) CKT. DESIGNATION ENGRAVING, 22 LETTERS MAX. (30)

SPEC. INST. (31) (80)

(6—8) 1 0 9 (9) (80)

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GENERAL ELECTRIC

SPECIFICATION FORM—PART 1 TYPE SB-1, -9 AND -10 SWITCHES

Use GED-3934, Part 2 for special features
Refer to GEA-4746 and GET-6169 for descriptive information

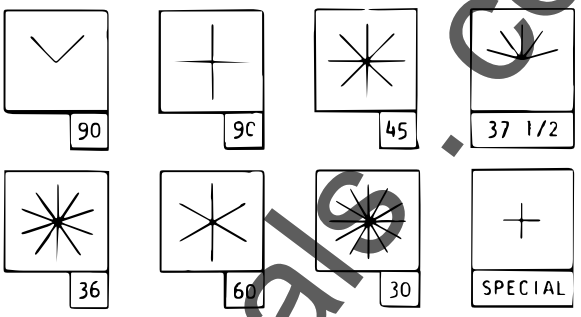
ON SB-10 SWITCHES MARK LAT. STAGES WITH A DOT. (•)

CONTACT ARRANGEMENT
MARK "X" FOR CLOSED CONTACT

CONTACTS HANDLE END ODD	EVEN	HANDLE POSITIONS (BACK VIEW)
	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
	12	
	13	
	14	
	15	
	16	
	17	
	18	
	19	
	20	
	21	
	22	
	23	
	24	
	25	
	26	
	27	
	28	
	29	
	30	
	31	
	32	

BOTTOM TOP BOTTOM
TERMINAL LOCATION

MARK HANDLE POSITIONS (FRONT VIEW)



CIRCUIT PLATE ENGRAVING	
POS.	ESCUTCHEON ENGRAVING

ROTATING ACTION

MAINTAINED ALL POSITIONS ☐

SPRING RETURN ACTION

S.R. FROM CCW POS. ☐ FROM POS ☐ TO ☐

S.R. FROM CW POS. ☐ FROM POS ☐ TO ☐

MAINT. POS. ☐ ☐ ☐

PULL TO LOCK IN POS. _____ ☐

HANDLES

KNURLED ☐
OVAL ☐
PISTOL GRIP ☐
LEVER ☐
ROUND ☐
RADIAL ☐
L. PISTOL GRIP ☐
NONE ☐

ESCUTCHEON

STANDARD OR ROUND ☐
TARGET ☐
KEYED FOR REMOV. HANDLE REMOV. IN POS. ___ ☐
NONE ☐
SPECIAL _____

STANDARD COVER (NEMA 1) ☒

PANEL THICKNESS _____

FILL OUT BELOW FOR SB-10

LATERAL ACTION

NO ROTATION WHEN MAINTAINING (IN & OUT)	IN	OUT
SPRING RETURN TO	IN	OUT
PULL \ PUSH IN POS. _____		
TO CLOSE CONTACTS		
TO OPEN CONTACTS		

(CROSS OUT THE ACTION WHICH DOES NOT APPLY)

SPECIAL REMARKS _____

(SPECIAL FEATURE FORM GED-3934 PT2 MAY BE USED WITH THIS FORM)

GENERAL ELECTRIC

SPECIFICATION FORM—PART 2 TYPE SB-1, -9 AND -10 SWITCHES

Use with GED-3934, Part 1
Refer to GEA-4746 and GET-6169 for descriptive information

(SB-1 OR 9)

LOCK IN HANDLE ☐

HANDLE LOCKS AND KEY REMOVABLE IN POSITION _____

SPECIAL _____

(SB-1, 9 OR 10)

SEPARATELY MOUNTED LOCK ☐

STANDARD LOCK AND KEY ☐

KIRK KEY INTERLOCK ☐

(COORDINATION INFO. (BELOW) MUST BE COMPLETED WHEN KIRK LOCK IS CHECKED)

PANEL THICKNESS _____

STD. MOUNTING

NO. 1

SPECIAL MOUNTING

NO. 2 NO. 3

NO. 4

LOCK NO. 1 LOCKS AND KEY REMOVABLE IN POS. _____

LOCK NO. _____ LOCKS AND KEY REMOVABLE IN POS. _____

COORDINATION INFORMATION REQUIRED FOR KIRK INTERLOCK SCHEME

1. ULTIMATE CUSTOMERS NAME & ADDRESS _____
2. PURCHASE ORDER OF COORDINATING LOCKS _____
3. COORDINATING INFO. (KNOWN KEY NO. & PRINT) _____

(SB-1, 9 OR 10)

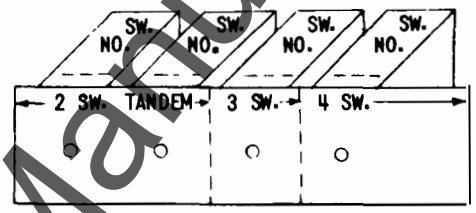
TANDEM SWITCH ☐

VERTICALLY MOUNTED ☐

HORIZONTALLY MOUNTED ☐

LINK TANDEM (MAX. 75° THROW EITHER SIDE OF CENTER POS.) ☐

GEAR TANDEM ☐



ADD HANDLE TO DESIRED SWITCH AND SW. NO. SW. NO. TO CORRESPOND WITH SW. NO. ON SPECIFICATION FORM P-J_ (CONTACT ARRG'MT. FORM). CROSS OUT THE SWITCH WHICH IS NOT REQUIRED. FOR ADDITIONAL SWITCHES, USE A SEPARATE SHEET SHOWING THE PROPER SWITCH ARRANGEMENT.

(SB-1 OR 9)

PULL TO TURN ☐

TURN IN POS. _____ WHEN IN

PULL IN POS. _____ TO TURN TO POS. _____

(SB-1, 9 OR 10)

PALLADIUM CONTACTS ☐

CHECK PROPER BLOCK AND COMPLETE REQUIRED INFORMATION. WRITE NONE WHERE APPLICABLE.

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FIELD MODIFICATION INSTRUCTIONS FOR THE TYPE SBM CONTROL SWITCH

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° ccw 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 cover.
10. Read the following before removing cams.

    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.

    With this number the following letters appear in 45° intervals B-C-D-E-F-G-H. On the reverse side of the cam there are eight letters in 45° intervals as follows: J-K-L-M-N-P-R-S.

11. Note the *number* of the cams as they are removed, jotting down the letter on the cam which passes over the punch mark on the operating shaft.
    The cam must be reassembled on the operating shaft with respect to this letter and punch mark in order to obtain the same contact sequence.
12. The balance of parts in any stage may be removed in any sequence.
13. Unless the operating shaft is to be changed there is no need to remove the tie bolts when following any of the above steps. These bolts should be kept snug against the rear barrier to insure proper reassembly of the switch.
14. When reassembling follow all steps in reverse order.

**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 sequence. The following are instructions necessary to select the new cams.

SET UP THE FOLLOWING TABLE

IBM CODE	1	2	4	1	2	4	1	2	CAM
POSITIONS	8	7	6	5	4	3	2	1	CODE
CONTACT #1	X	X		X	X	X		X	273
#2					X	X			060
#3	X		X				X	X	305
#4							X		100

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 1B. 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 4	3 FROM 2	2	WHEN USED 1	
1			X	X		22K
2			X	X	X	22K
3	X	X				22D

SBM SWITCH CAM CODE (ODD NUMBER CONTACTS)

Contact Sequence Number	Cam & Position	Contact Sequence Number	Cam & Position	Contact Sequence Number	Cam & Position	Contact Sequence Number	Cam & Position	Contact Sequence Number	Cam & Position	Contact Sequence Number	Cam & Position	Contact Sequence Number	Cam & Position
000		040	1L	100	1K	140	2L	200	1J	240	3L	300	2K	340	6L
001	1S	041	4L	101	3K	141	7L	201	2J	241	10J	301	6K	341	13H
002	1R	042	5L	102	4K	142	8L	202	3J	242	11L	302	7K	342	14H
003	2S	043	9S	103	10S	143	15H	203	6J	243	21H	303	13G	343	6H
004	1P	044	4P	104	5K	144	9L	204	4J	244	12L	304	8K	344	15L
005	3S	045	12S	105	11K	145	20E	205	7J	245	16F	305	14G	345	7H
006	2R	046	8R	106	9R	146	18E	206	10R	246	17F	306	15G	346	8H
007	6S	047	15S	107	21G	147	9H	207	13F	247	10H	307	6G	347	2H
010	1N	050	3N	110	4N	150	10L	210	5J	250	11N	310	9K	350	21B
011	4S	051	12N	111	12K	151	16H	211	8J	251	17H	311	15K	351	10B
012	3R	052	11R	112	12R	152	17B	212	11J	252	19F	312	20D	352	11H
013	7S	053	20B	113	16E	153	12H	213	14F	253	11F	313	7G	353	3H
014	2P	054	7P	114	8P	154	15C	214	9P	254	20H	314	18H	354	9C
015	10P	055	16C	115	17E	155	12C	215	15F	255	12F	315	8G	355	4H
016	6R	056	14D	116	15R	156	8D	216	21F	256	11D	316	9G	356	5H
017	13E	057	7E	117	10G	157	4E	217	6F	257	3F	317	2G	357	1H
020	1M	060	2M	120	3M	160	6M	220	4M	260	7M	320	10K	360	13A
021	5M	061	8M	121	11M	161	14A	221	9J	261	15A	321	21A	361	6A
022	4R	062	9M	122	12M	162	15M	222	12J	262	20F	322	16G	362	7A
023	8S	063	18F	123	17G	163	8A	223	15J	263	9A	323	10A	363	2A
024	3P	064	10M	124	11P	164	21C	224	12P	264	16A	324	17A	364	10C
025	11S	065	17C	125	19E	165	11A	225	20C	265	12A	325	11G	365	3A
026	7R	066	15D	126	20A	166	9D	226	16D	266	12D	326	12G	366	4A
027	14E	067	8E	127	11E	167	5E	227	7F	267	4F	327	3G	367	1A
030	2N	070	6N	130	7N	170	13B	230	8N	270	14B	330	15B	370	6B
031	9N	071	15N	131	20G	171	7B	231	18G	271	8B	331	9B	371	2B
032	10N	072	21D	132	16B	172	10D	232	17D	272	11B	332	12B	372	3B
033	15E	073	9E	133	12E	173	4B	233	8F	273	5F	333	4G	373	1B
034	6P	074	13C	134	14C	174	6C	234	15P	274	7C	334	8C	374	2C
035	21E	075	10E	135	11C	175	3C	235	9F	275	4C	335	5G	375	1C
036	13D	076	6D	136	7D	176	2D	236	10F	276	3D	336	4D	376	1D
037	6E	077	2E	137	3E	177	1E	237	2F	277	1F	337	1G	377	

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)

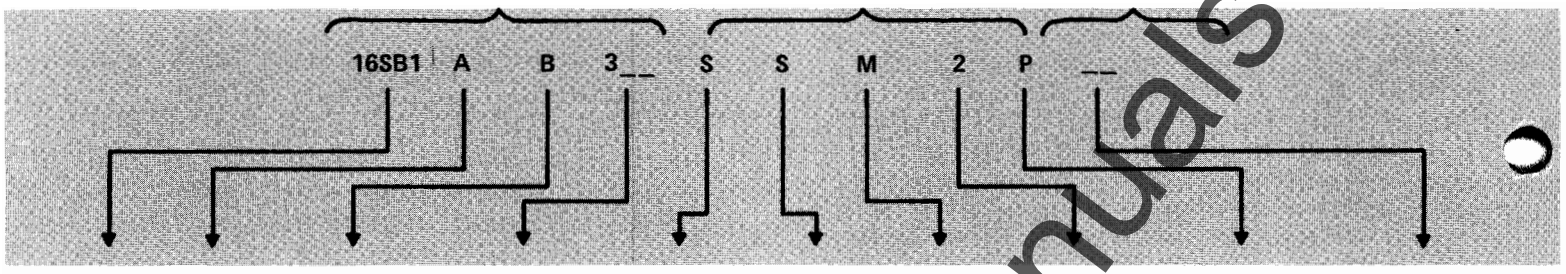
Contact Sequence Number	Cam Position	Contact Sequence Number	Cam & Position	Contact Sequence Number	Cam & Position	Contact Sequence Number	Cam & Position	Contact Sequence Number	Cam & Position	Contact Sequence Number	Cam & Position	Contact Sequence Number	Cam & Position
000		040	1C	100	1B	140	2B	200	1A	240	3A	300	2A	340	6A
001	1H	041	4H	101	3H	141	10B	201	2H	241	7H	301	6H	341	13H
002	1G	042	5C	102	4G	142	9B	202	3G	242	11G	302	10A	342	21A
003	2G	043	8G	103	7G	143	15K	203	6G	243	14G	303	13G	343	6K
004	1F	044	4C	104	5B	144	8B	204	4F	244	12A	304	9A	344	15A
005	3F	045	12F	105	11F	145	17H	205	10H	245	16F	305	21H	345	10J
006	2F	046	9F	106	8F	146	18C	206	7F	246	20C	306	15J	346	9J
007	6F	047	15F	107	14F	147	8J	207	13F	247	7J	307	6J	347	2J
010	1E	050	3C	110	4B	150	7B	210	5A	250	11A	310	8A	350	14A
011	4E	051	12C	111	12H	151	16H	211	9H	251	20E	311	15H	351	7L
012	3E	052	11C	112	12E	152	20G	212	11E	252	19A	312	17G	352	11M
013	10G	053	17E	113	16E	153	12K	213	21G	253	11K	313	10S	353	3K
014	2E	054	10E	114	9E	154	15N	214	8E	254	17C	314	18B	354	8M
015	7E	055	16C	115	20B	155	12N	215	15S	255	12S	315	9S	355	4L
016	6E	056	21E	116	15E	156	9N	216	14E	256	11S	316	8S	356	5S
017	13E	057	10P	117	7S	157	4S	217	6S	257	3S	317	2S	357	1S
020	1D	060	2C	120	3B	160	6B	220	4A	260	10C	320	7A	360	13A
021	5D	061	9C	121	11H	161	21B	221	8H	261	15L	321	14H	361	6L
022	4D	062	8C	122	12B	162	15B	222	12G	262	17A	322	16G	362	10K
023	9G	063	18D	123	20D	163	9K	223	15G	263	8K	323	7K	363	2K
024	3D	064	7C	124	11B	164	14B	224	12D	264	16A	324	20F	364	7M
025	11D	065	20H	125	19B	165	11N	225	17F	265	12L	325	11L	365	3L
026	10F	066	15P	126	17D	166	8N	226	16D	266	12P	326	12S	366	4M
027	21F	067	9P	127	11J	167	5N	227	10R	267	4J	327	3J	367	1J
030	2D	070	6C	130	10D	170	13B	230	9D	270	21C	330	15M	370	6M
031	8D	071	15C	131	17B	171	10L	231	18A	271	9L	331	8L	371	2L
032	7D	072	14C	132	16B	172	7N	232	20A	272	11P	332	12M	372	3M
033	15R	073	8P	133	12R	173	4N	233	9R	273	5P	333	4K	373	1K
034	6D	074	13C	134	21D	174	6N	234	15D	274	10M	334	9M	374	2M
035	14D	075	7P	135	11R	175	3N	235	8R	275	4P	335	5R	375	1L
036	13D	076	6P	136	10N	176	2N	236	7R	276	3P	336	4R	376	1M
037	6R	077	2P	137	3R	177	1N	237	2R	277	1P	337	1R	377	

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.

THE GUIDE BELOW IS FOR UNLISTED SWITCHES WHICH ARE NUMBERED AT THE FACTORY.
USE IT ONLY AS A GUIDE TO IDENTIFY CATALOG NUMBERS ASSIGNED BY THE FACTORY.

16SB1 or 9 Nomenclature Guide to Unlisted Switches

BASIC SWITCH* | CODE LETTERS** | SPECIFIED ONLY WHERE SPECIAL FEATURES ARE REQUIRED.**



16SB1 or 16SB9 Design Type Common To All SB-1 &9 Switches

1st Basic Letter— No. of Stages

A = 1
B = 2
C = 3
D = 4
E = 5
F = 6
G = 7
H = 8
K = 9
L = 10
M = 11
N = 12
P = 13
R = 14
T = 15
U = 16

2nd Basic Letter Type of Stationary Contacts

A & E — All Fixed Contacts Thus:

B, K & F — All Fixed Contacts Thus:

C & G — All Fixed Contacts Thus:

D, H & M — Misc. Combinations of A, B, C, E, F & G and Single Contacts Example:

3 or 4 Digit No. Cont. Development. Factory Assign. No. of Pos.

100 = 9, 10, 11 & 12 Pos.
200 = 2 Pos.
300 & 900 = 3 Pos.
400 = 4 Pos.
500 = 5 Pos.
600 = 6 Pos.
700 = 7 Pos.
800 = 8 Pos.
0A00 = Special

1st Code Letter Enclosure

A = Explosion Proof♦
W = Watertight♦ & Dusttight
P = Oil-Filled♦
S = Standard Cover
L = Large Cover
M = Fabricated Metal♦ (Large)
D—Slotted End Cover♦
V1 = Vert. Split (Std.)♦
V2 = Vert. Split (Lg.)♦
H1 = Horiz Split (Std.)♦
H2 = Horiz Split (Lg.)♦

2nd Code Letter Style Escutcheon Specify Engraving

3rd Code Letter Spring Ret. or Maint. Contacts

See Table, Page 63

1st Code Number Panel Thickness

2 = 1/8
3 = 3/16
4 = 1/4
Etc.
Numbers Indicate Number of One-Sixteenths of an Inch
99 = No Panel Thickness Involved

4th Code Letter Style Handle

D = Round
V-6047044-1
K = Knurled
K-6079120-1
L = Large Pistol Grip
K-6208137-1
P = Small Pistol Grip
K-6046074-1
R = Radial
V-6047043-1
V = Oval
K-6046075-1
Y = Omit Handle
E = Lever
V-6248034-1
W = Watertight♦
M-6411824G-2 (1/8)
M-6411824G-3 (1/4)
C = Corbin Lock

5th Code Letter

S1, S2, S3 } Sequence Latch▲♦
A1, A2, A3, A4 } Right▲▲♦ Angle Drive
R1 = Ratchet Mech. for CW Rot. Only♦
R2 = Ratchet Mech. for CCW Rot. Only♦
P1—P12 = Pull-to-Lock
H1 to H16†

*Basic number assigned by factory engineers only to identify a special contact arrangement

**Suffix added by factory engineers to complete switch to customer's specifications

♦This feature is no longer available (obsolete).

▲ S1 = Latching in CW & CCW positions
S2 = Will prevent repeated CCW throw
S3 = Will prevent repeated CW throw

▲▲ A1 = Switch mounted to the left
A2 = Switch mounted to the right
A3 = Switch mounted up
A4 = Switch mounted down

†Palladium contacts are available; H1 designates a single-stage switch, H2 a two-stage, up to H16 for a 16-stage switch.

SB-1 or SB-9
2nd Form Letter

ESCUTCHEON

Code	Escutcheon Number	Typical Model Handle No.	Throw
	Handle Removable in Vertical Position		
A	6016164-3	16SB1CC1	135° CW
A	-3	CC18	360°
B	-4	CC2	135° CW
B	-4	CC19	360°
C	-5	CC3	135° CW
C	-5	CC15	360°
D	-6	CC4	135° CW
D	-6	CC11	45° CW & CCW
D	-6	CC22	45° CCW
D	-6	CC27	360°
E	-7	CC5	45° CW
E	-7	CC12	75° CW
E	-7	CC13	45° CW & CCW
E	-7	CC20	360°
E	-7	CC25	75° CCW
F	-8	CC6	45° CW
F	-8	CC14	45° CW & CCW
F	-8	CC24	360°
G	-9	CC7	45° CW "I" Eng.
G	-9	CC8	45° CCW "R" Eng.
G	-9	CC17	45° CCW
G	-9	CC26	135° CCW
G	-9	CC29	45° CW
G	-9	CC21	360°
H	-10	CC23	360°
H	-10	CC9	45° CW "I" Eng.
H	-10	CC10	45° CCW "R" Eng.
H	-10	CC31	45° CW
H	-10	CC32	45° CCW
J	-23	CC18	360°
Y	-24	CC19	360°
Z	-25	CC21	360°
	Handle Removable—90° CCW		
K	6016164-11	16SB1CC1	135° CW
K	-11	CC18	360°
L	-12	CC2	135° CW
L	-12	CC19	360°
M	-13	CC3	135° CW
M	-13	CC15	360°
N	-14	CC11	45° CW & CCW
N	-14	CC27	360°
N	-14	CC4	135° CW
N	-14	CC22	45° CCW
	Fixed Handle		
P	6016164-60	**Pull to Lock (Target)**	
R	6016164-15	**Round**	
S	6016164-1	**Standard**	
T	6402670G*	**Target**	
U	**Omit Escutcheon**		
V	**Special Escutcheon**		
	Removable Handle		
W	Omit Escutcheon		
(00)	Special Escutcheon		

SB-1
3rd Form Letter

SPRING RETURN AND MAINTAINING

Code	Description
	Combination of Spring Return and Maintaining Contact
A	S.R. from 45° CW to Normal
B	S.R. from 45° CCW to Normal
C	S.R. from 45° CW to Normal (One Extra Stage) △
D	S.R. from 45° CCW to Normal (One Extra Stage) △
E	S.R. from 90° CW to Normal
F	S.R. from 90° CCW to Normal
G	S.R. from 90° CW to Normal (One Extra Stage) △
H	S.R. from 90° CCW to Normal (One Extra Stage) △
K	S.R. from 45° CW to Normal (Two Extra Stages) 2△
L	S.R. from 45° CCW to Normal (Two Extra Stages) 2△
M	Maintaining Contacts
	Pull To Lock
P	S.R. from 45° CW & CCW to Normal, Pull to Lock in 45° CCW, Then Turn to 75° CCW & Pull to Lock
R	S.R. all Positions Except When Locked, Pull to Lock at 75° CCW
	Spring Return Only
S	S.R. from all Positions to Normal
T	S.R. from all Positions to Normal (One Extra Stage) △
U	S.R. from all Positions to Normal (Two Extra Stages) 2△

Abbreviations

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

Symbols

△ = One Extra Stage for Torsion Spring.

2△ = Two Extra Stages for Additional Torsion Springs.

SB-9
3rd Form Letter

SPRING RETURN AND MAINTAINING

Code	Description
	Maintaining Except
A	S.R. from 45° CW to Normal
B	S.R. from 45° CCW to Normal
C	Same as A—See *
D	Same as B—See *
J	S.R. from 75° CW to 45° CW & from 75° CCW to 45° CCW
	*Has 1 Extra Stage for Extra Spring
	Maintaining
M	Maintaining Contact for all 45° Positions
N	Maintaining Contact for all 30° Positions
K	Maintaining Contact for 60° Positions
V	Maintaining Contact for all 37½° Positions
L	Maintaining Contact for all 75° Positions
E	Maintaining Contact for Two Positions 90° Apart Arranged V
F	Maintaining Contact for Four Positions 90° Apart Arranged +
X	Special
	Spring Return
S	S.R. far all Combinations of 30°, 37½°, 45°, 60°, 75°, 90° CW & CCW
T	Same as S—See * *Has 1 Extra Stage for Extra Spring
	Spring Return with Provision far Intermediate Temporary Contact Position at the Half Way Point.
U	**S.R.—90° CW & CCW Temp. Feel 30° & 60°**
W	S.R. from 90° CW or CCW or both
Y	S.R. from 60° CW or CCW or both
Z	S.R. from 75° CW or CCW or both

Abbreviations

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

* [Number to be assigned.]