

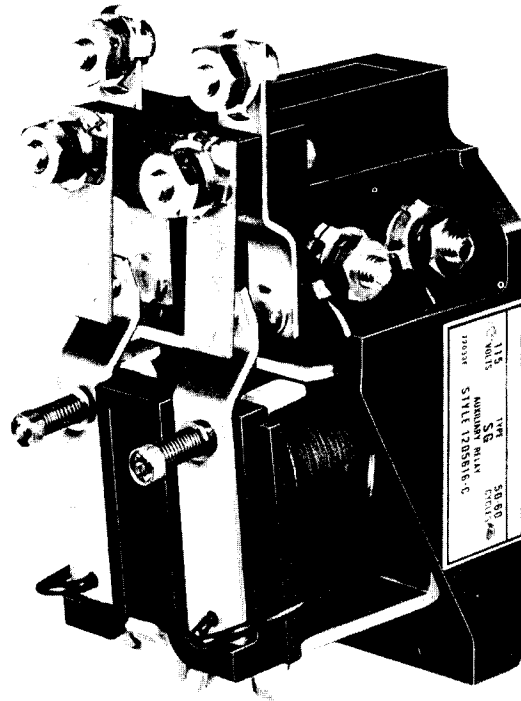
September, 1990  
 Supersedes Descriptive Bulletin 41-750A  
 pages 1-8, dated August, 1989  
 Mailed to: E, D, C/41-900A

For Ac or Dc Voltage or Dc Current  
 Operation  
**Device Number: 94X, Y, Z**

## Type SG Auxiliary Relays

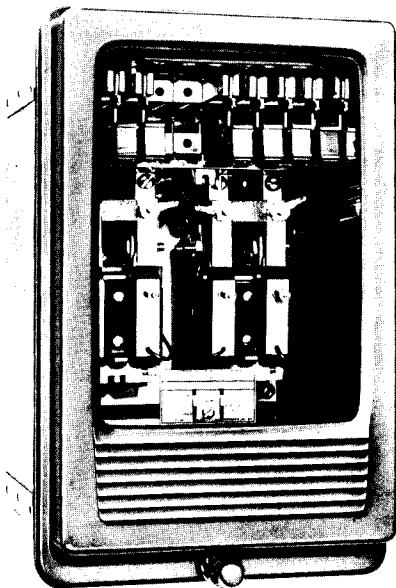
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**Molded Base,  
 Front Connected**



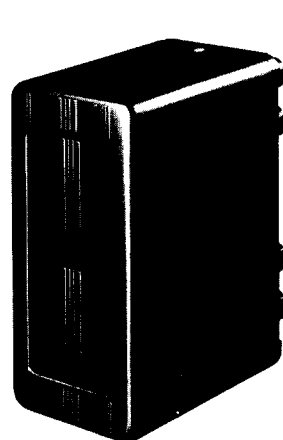
**SG Open Type**

**Flexitest®**



**Projection or  
 Semi-Flush Mounting**

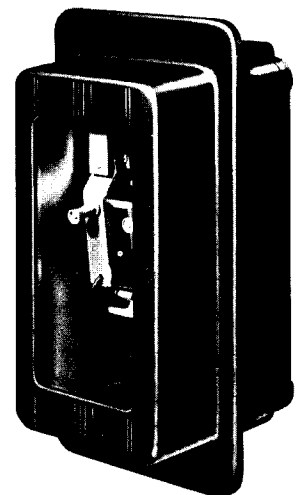
**Molded Base, Rear Connected**



**Projection Mounting  
 Solid Cover**



**Projection Mounting  
 Glass Window Cover**



**Semi-Flush Mounting  
 Glass Window Cover Only**

**Application**

The SG auxiliary relays are for use in miscellaneous automatic and remote control switching. It is suitable for many industrial applications. SG relays are supplied for use on the following voltages without an external resistor by the use of suitable coils. The standard coils are:

- 6, 12, 24, 48, 125, and 250 volts dc
- 115 and 230 volts, 25 hertz
- 115, 230, 440, and 575 volts, 50 and 60 hertz

External series resistors are used with the voltage rated dc relays, for higher control circuit voltages up to 600 volts dc. Relays having limited time-delay in operation are also available.

**Construction and Operation**

The SG relays are clapper-type devices designed to operate over a wide range of ac and dc voltages. When their coils are energized at or above pickup rating, the moving contacts on the armature block close and/or open with the two stationary contacts to complete the electrically independent contact circuits.

Closed types are supplied with two make and two break contacts. Open types (front connected) can be supplied with two make and two break contacts, or with only the two make contacts which can be reversed to provide one make, one break, or two break contact circuits.

Small coil springs on the moving contact arms provide adequate contact pressure, to assure positive contact action between the moving and stationary contacts.

Dc types have a bronze pin on the core which serves as a stop pin for the armature, and prevents magnetic seal-in of the armature due to residual magnetism. Ac types have a non-magnetic washer at the base of the core assembly to prevent the armature from sticking in the closed-gap position. Copper shading rings are also provided on the core face of the ac types to prevent chattering of the armature.

All standard SG relays will pickup on 80% of rating, and will withstand 110% of rating continuously.

**Contact Data**

Both the moving and stationary contacts are made of pure silver. Each will close and carry 12 amperes continuously, or will carry 30 amperes for one minute.

**Contact Legend**

- Dpst – double pole single throw
- Dpdt – double pole double throw
- cc – circuit closing
- co – circuit opening

Basic SG Unit

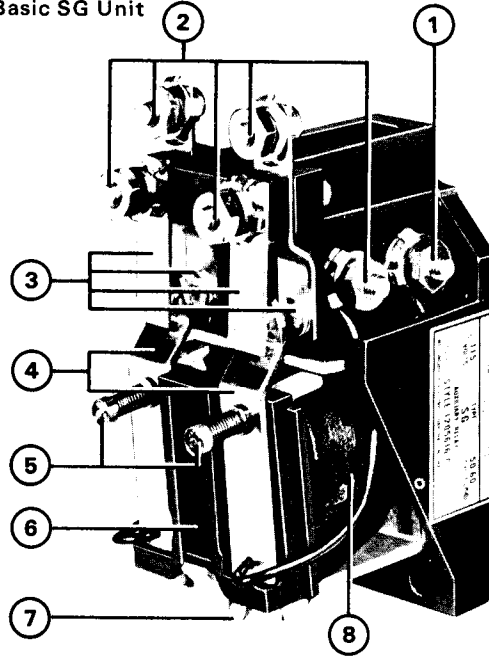


Fig. 1: Dpdt

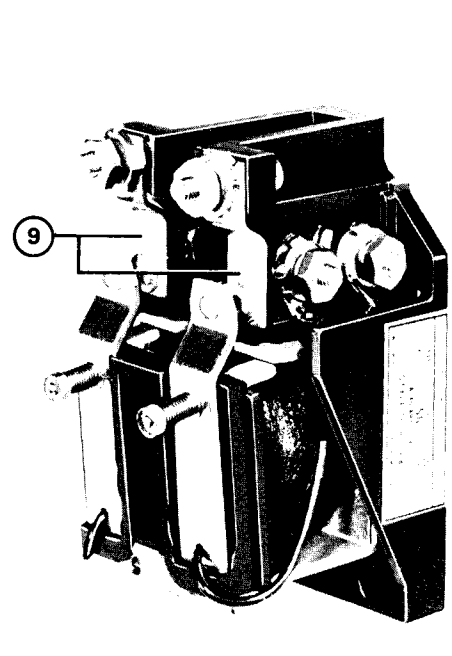


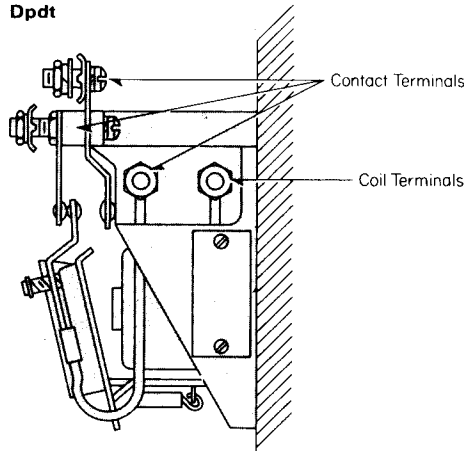
Fig. 2: Dpst Reversible

Dpdt Contacts (2 cc and 2 co) or Dpst Contacts (2 cc)

The design features illustrated in Figures 1 and 2 apply to all SG relays.

- |                                    |   |
|------------------------------------|---|
| ① Terminals to Coil                | ⑥ Armature Block  |
| ② Terminals to Contact Connections | ⑦ Armature Reset Spring                                 |
| ③ Stationary Contacts              | ⑧ Coil  |
| ④ Moving Contacts                  | ⑨ Reversible Stationary Contacts (Applies to Dpst only) |
| ⑤ Contact Wipe Armature Spring     |   |

Dpdt



Dpst Reversible

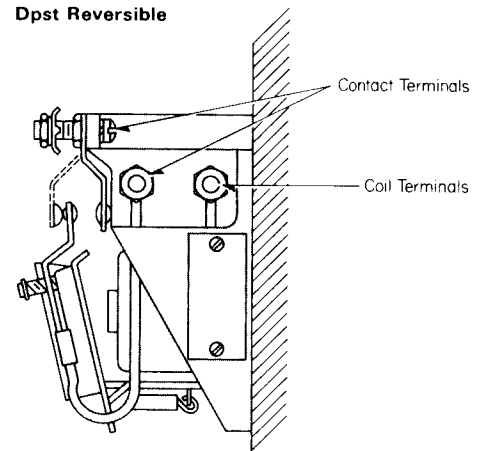


Figure 3: Contact Arrangements (Open Type)

**SG in Molded Base With Cover Removed**  
Projection Mounting

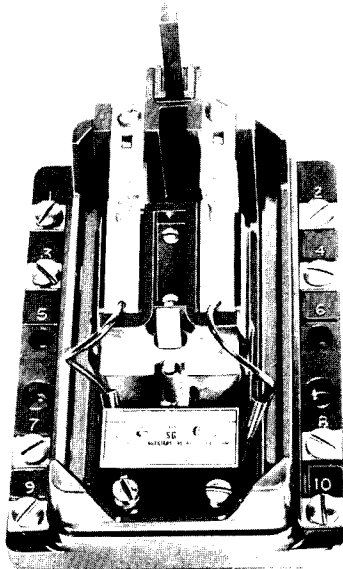


Fig. 4:  
Front  
Connected

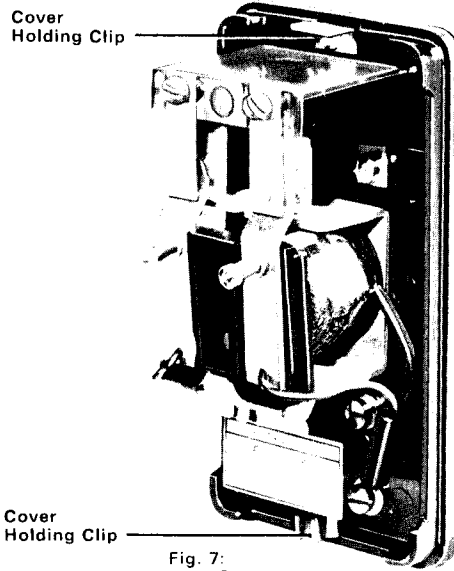


Fig. 7:  
Rear Connected

**SG in Molded Base With Cover**  
Semi-Flush Mounting

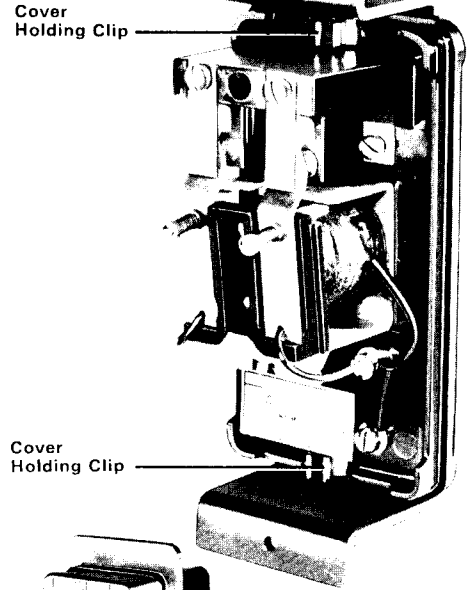


Fig. 10



Fig. 5:  
Glass  
Window  
Cover  
for Fig. 4

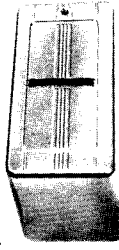


Fig. 6:  
Solid  
Front  
Cover  
for Fig. 4

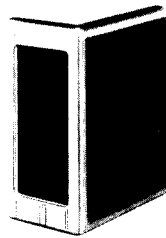


Fig. 8:  
Glass  
Window  
Cover  
for Fig. 7

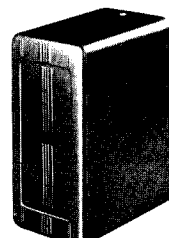


Fig. 9:  
Solid Front  
Cover for Fig. 7

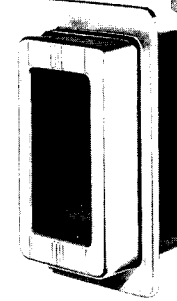


Fig. 11:  
Glass  
Window  
Cover  
for Fig. 10

**SG in Flexitest Case Dpdt Contacts**  
Projection or Semi-Flush Mounting

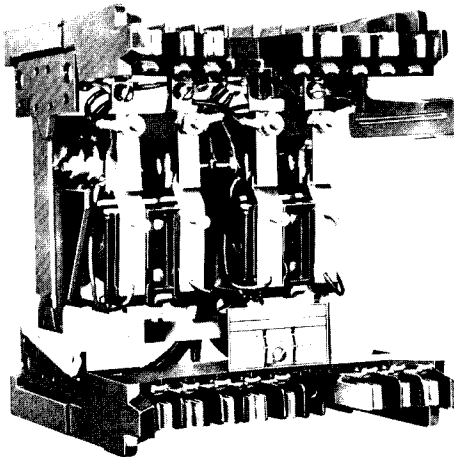


Fig. 12

Single Unit Type in FT-11 Case

Double Unit Type in FT-22 Case

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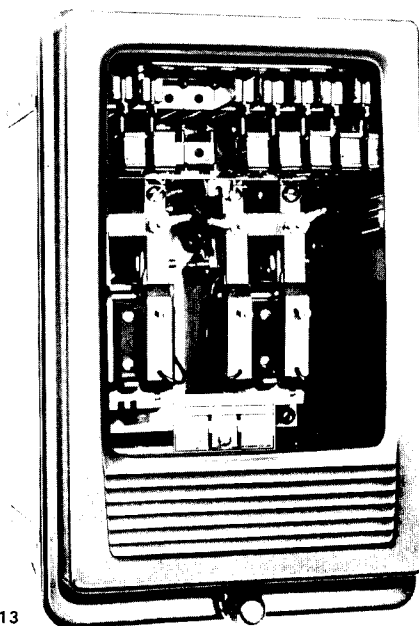


Fig. 13



**SG Relay Characteristics**  
**Relay Operating Time**

**Pickup**  
 2 to 3 cycles on a 60 Hz base (.033 to .05 second) at dc rating.

1 to 2 cycles on a 60 Hz base (.016 to .033 second) at ac rating.

**Dropout**  
 Less than 1 cycle on a 60 Hz base on ac or dc.

**Non-Adjustable Pickup and Dropout**  
 Both pickup and dropout time values are non-adjustable.

**Minimum Pickup**  
 80% of ac or dc rating.

**Maximum Dropout**  
 30% of dc rating.  
 60% of ac rating.

**Burden Data**  
**Dc**  
 Burden of dc operated SG relays is 3.5 watts at rated voltage or current.

**Ac**  
 Burden of ac, 50/60 hertz types is 10 volt-amperes at .55 power factor with the armature closed, or 16 volt-amperes at .45 power factor with the armature reset or open.

**Contact Interrupting Ratings**  
**Non-Inductive Circuits**

Contact Circuit Voltage		Non-Inductive Interrupting Rating in Amperes		
Dc	Ac	Single Contact		Two Contacts in Series
		Ac	Dc	Dc
12	...	..	30	...
24	24	50	15	50
48	48	45	8	35
125	115	30	2.4	20
250	230	20	.75	2.5
...	460	15	.50	1.5
...	575	10	.25	.5

**Inductive Circuits**

Contact Circuit Voltage		Inductive Interrupting Rating in Amperes			
Dc	Ac	Single Contact		Two Contacts in Series	
		Ac	Dc	Ac	Dc
48	...	...	5	...	30
125	...	...	1	...	5
250	...	...	.2	...	.4
...	115	20	...	30	...
...	230	15	...	20	...
...	460	7.5	...	10	...
...	575	4.0	...	7.5	...

**Coil Data**

Dc		Resistance:		1-Second Rating: Amps
Rating Amps	Volts	Ohms		
1	...	2.5		35
2	...	0.7		55
3	...	0.33		85
4	...	0.2		110
5	...	0.1		185
..	5	12		...
..	12	48		...
..	24	185		...
..	32	294		...
..	48	725		...
..	62.5	1152		...
..	125	4650		...
..	250	17000		...

**Ac, 50/60 Hertz**

Rating: Volts	Resistance: Ohms	Closed Gap Impedance: Ohms
12	1.7	12.5
24	7.3	55
90	112	875
115	185	1320
208	630	4250
230	725	5300
275	1042	7500
460	2770	21000
575	4650	33000

**SG Relays With Time Delay,  
Dc Operated**

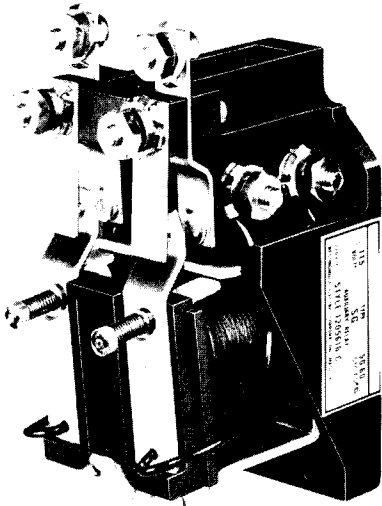


Fig. 14

**Slug Type, Intermittent Duty**

SG relays available with time delay have a **special core** and heavy copper ring (slug) which provide an additional time delay of 0.6 cycles (.01 second) on pickup, and 2½ cycles (.04 second) on dropout.

Induced current in the copper slug briefly retains the magnetic flux in the relay core, thereby creating the added 2½ cycles delay on dropout. Therefore, the total operating time of the relay on dc is 3 or 4 cycles for either pickup or dropout.

Use of the copper slug results in a reduction of available coil space, making the slug type SG suitable for intermittent duty only.

**Additional Time Delay,  
Voltage Operated Types**

Additional time delay on pickup or dropout can be obtained by the use of resistors and capacitors. When such are employed, the relays are continuously rated.

**Resistor-Capacitor Type,  
Continuous Duty**

Typical Time Delay Values Using 125-Volt Relay Coil (with 125 Volts Dc Applied)

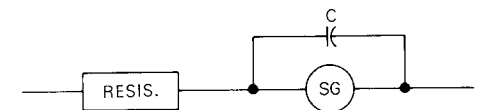


Figure 15: Pickup

Microfarads Across Coil (C)	Pickup Time Delay in Seconds Using Standard Core	
	500 Ohms (R)	1000 Ohms (R)
0	.045	.049
5	.047	.052
10	.049	.057
20	.054	.068

**Dropout**

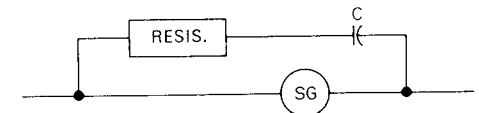


Figure 16: Dropout

Microfarads Across Coil (C)	Ohms (R)	Dropout Time Delay in Seconds, Standard Core
10	0	.081
10	1000	.080
10	3000	.075
10	5000	.070
10	7100	.054
20	0	.140
20	1000	.141
20	3000	.139
20	5000	.128
20	7100	.092

**Capacitors and Resistors for Use  
With Time Delay Relays**

Capacitors, Rated 1000 Vdc	
Description	Style Number <sup>①</sup>
5 mfd	289B492H02
10 mfd	289B493H01
20 mfd	use two 289B493H01 in parallel

Resistors <sup>②</sup>	
Description	Style Number <sup>①</sup>
500 ohms	184A369G19
1000 ohms	184A369G11
3000 ohms	184A369G12
5000 ohms	184A369G13
7100 ohms	184A369G14

<sup>①</sup> See figures 25 and 26 for dimensions.  
<sup>②</sup> Style numbers include 3¼-inch, two terminal resistor and mounting bracket.

**Internal Wiring for SG Relay With:**

**Molded Base, Open Type (Front Connected)**  
Dpdt Contacts: 2 cc and 2 co  
(Top View)

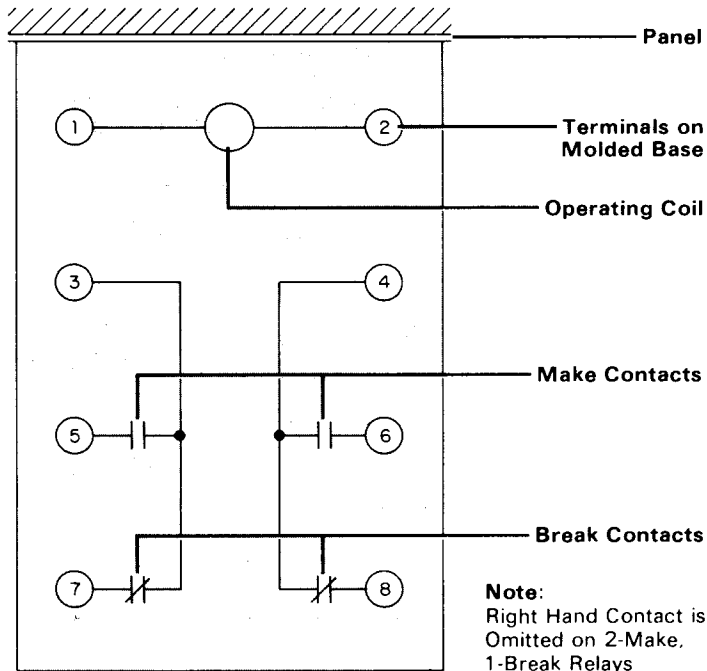


Figure 17

57D390

**Molded Base, Open Type (Front Connected)**  
Dpdt Contacts: 2 cc and 2 co  
(Top View)

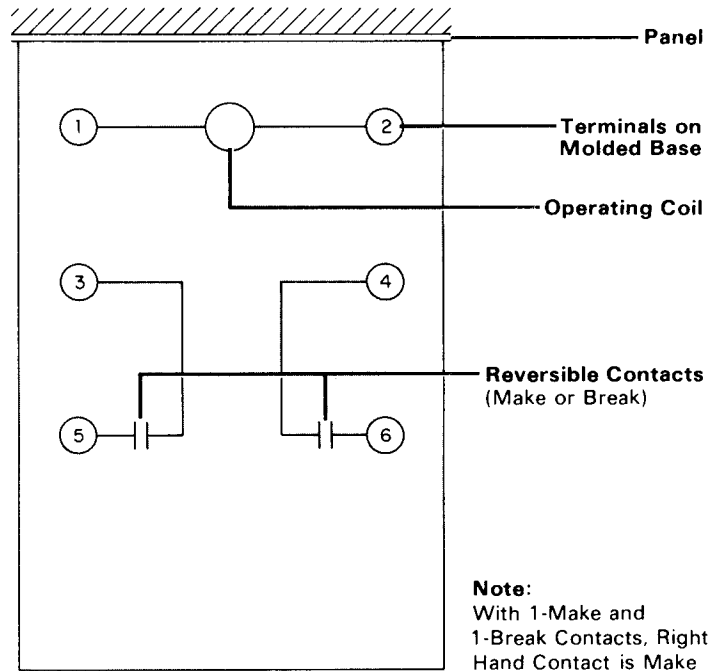


Figure 18

57D389

**Molded Base With Cover (Rear Connected)**  
Dpdt Contacts: 2 cc and 2 co  
(Rear View)

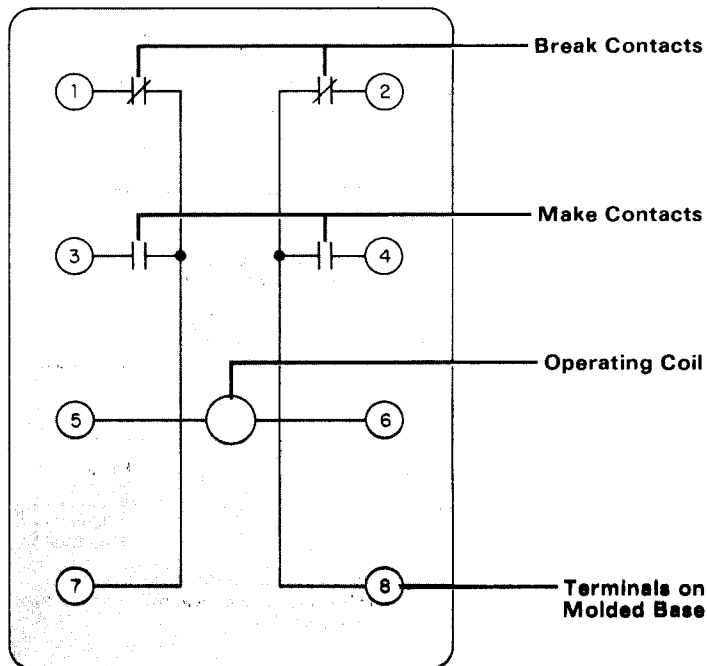


Figure 19

**Molded Base With Cover (Front Connected)**  
Dpdt Contacts: 2 cc and 2 co  
(Front View)

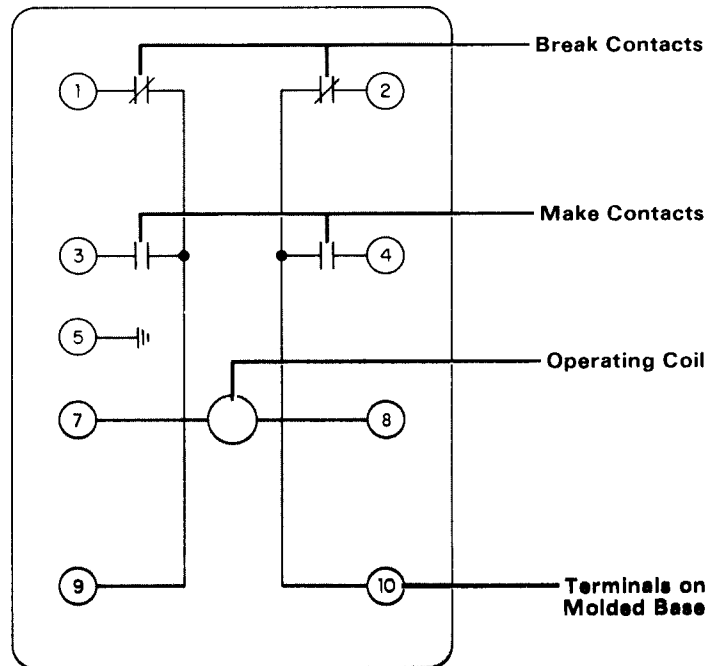


Figure 20

629A337

### Internal Wiring for SG Relay With:

**Flexitest Case (Front View)**

**Single Unit, 2 Make and 2 Break Contacts (FT-11 Case)**

**Current Operated**

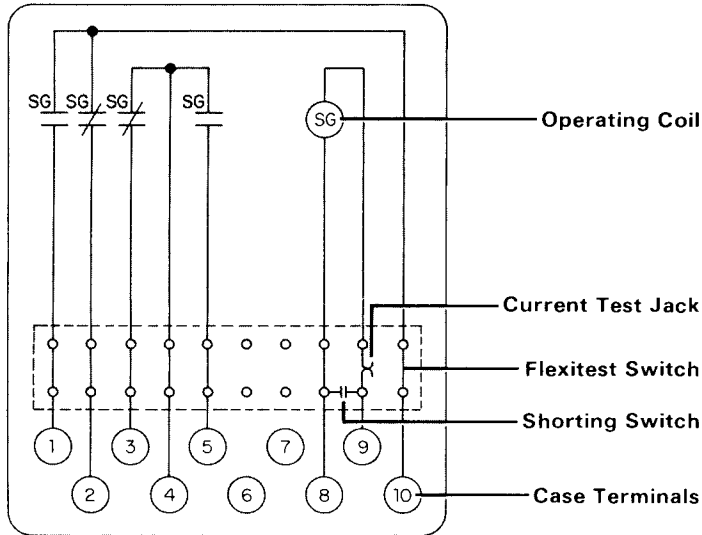


Figure 21

183A340

**Voltage Operated**

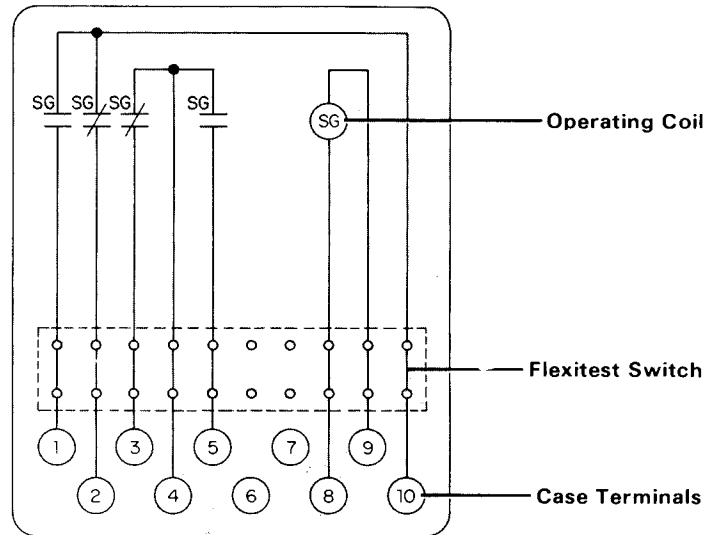


Figure 22

183A108

**Two Units, Each With 2 Make and 2 Break Contacts (FT-22 Case)**

**Current Operated**

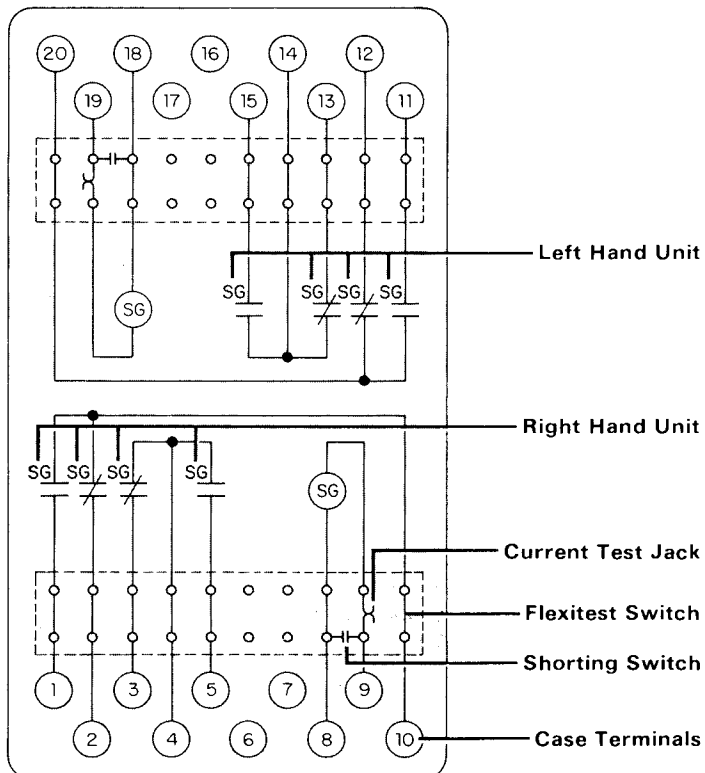


Figure 23

3512A58

**Voltage Operated**

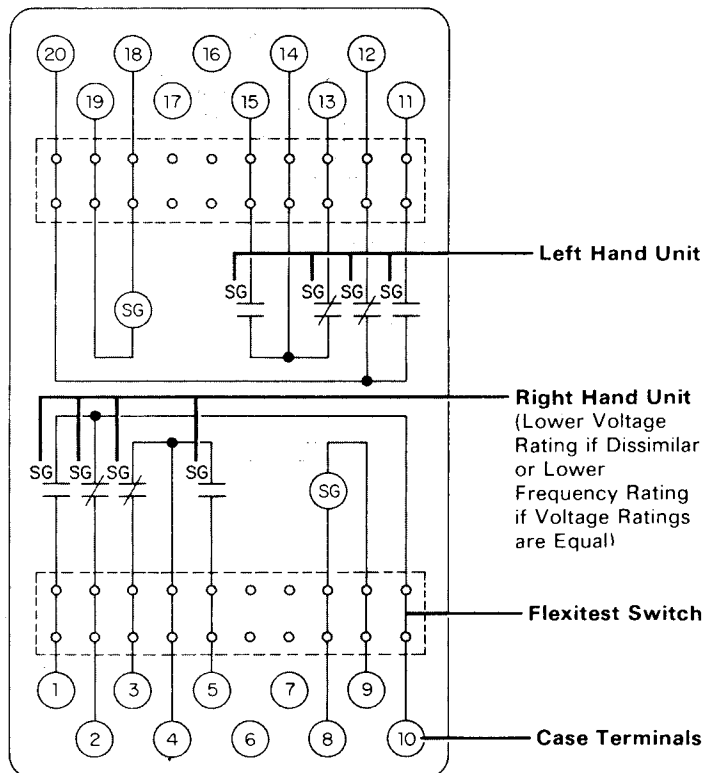


Figure 24

183A457

**Shipping Weights and Carton Dimensions**

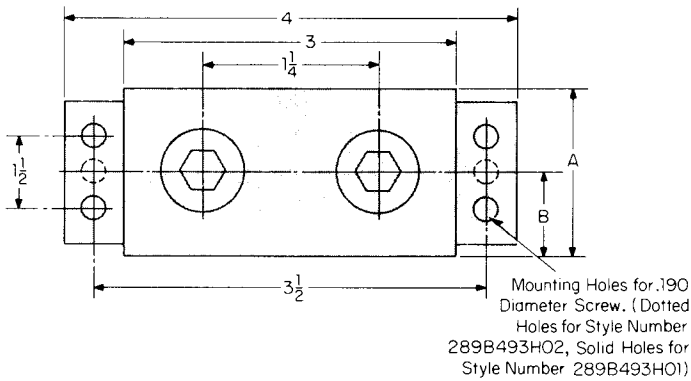
Relay Case Type	Weight, Lbs: Approx.		Domestic Shipping Carton Dimension: Inches
	Net	Shipping	
<b>Molded Base</b>			
Without Cover.....	1/2	1	8 1/2 x 9 1/2 x 10
With Cover.....	3/4	2	8 1/2 x 9 1/2 x 10
<b>Flexitest Case</b>			
FT-11 (Single Unit).....	6	9	9 x 9 x 10
FT-22 (Double Unit).....	7	10	9 x 9 x 10

**Further Information**

List Prices: PL 41-020  
 Technical Data: TD 41-025  
 Instructions:  
 Type SG, IL 41-751  
 Flexitest, IL 41-751.1  
 Renewal Parts: RPD 41-989  
 Flexitest Case Dimensions: DB 41-076  
 Contactor Switches: DB 41-081  
 Other Protective Relays:  
 Application Selector Guide, TD 41-016

**Accessory Dimensions (In Inches)**

**Capacitors**



Style Number	Dimension	
	A	B
289B493H02	1 1/4	3/8
289B493H01	2 1/2	1 1/2

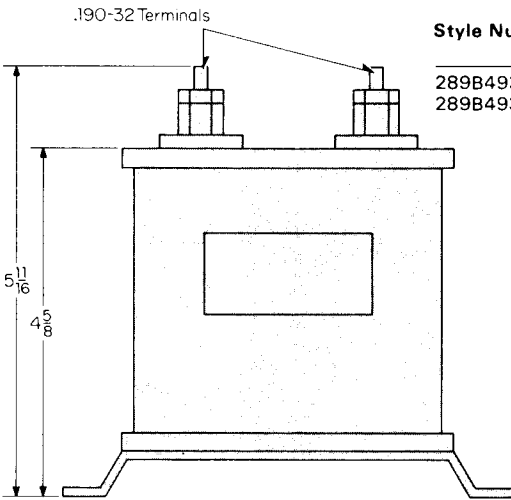


Figure 25

**External Resistors**

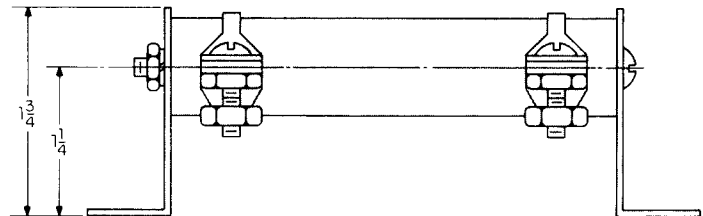
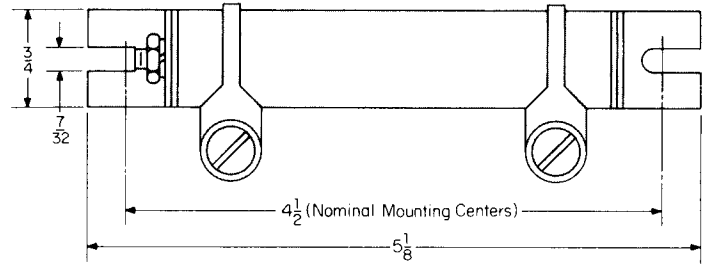


Figure 26





December, 1990  
Supersedes TD 41-020, Type SG on  
pages 130 and 131, dated November, 1987  
Mailed to: E, D, C/41-900A

For Ac or Dc Voltage or Dc Current Operation

# Type SG Auxiliary Relays

## Auxiliary, Ac Voltage, or Dc Voltage or Current

Non-Adjustable Pickup, Double Pole, Flexitest Case (Device Number: 94X, Y, Z)

Type	Contacts	Frequency: Hertz	Rating	Relay Data						
				Single Unit			Double Unit			
				Internal Schematic	Style Number	Case Size	Internal Schematic	Style Number	Case Size	
SG Current or voltage Self-reset	Dpdt-2 cc and 2 co	Dc	1 amp dc	183A340	1878 755	FT-11	3514A07	1955 556	FT-22	
			2 amps dc		1878 756			1955 557		
			3 amps dc		1878 757			1955 558		
			4 amps dc		1878 758			1956 447		
			5 amps dc		1878 759			1955 449		
			6 volts dc	183A108	1878 760			183A457		1955 560
			12 volts dc		1878 761			1955 561		
			24 volts dc		1878 762			1955 562		
			32 volts dc		1878 763			1955 563		
			48 volts dc		1878 764			1955 564		
			62.5 volts dc		1878 765			1955 565		
			125 volts dc		1878 766 <sup>Ⓢ</sup>			1955 566		
			250 volts dc		1878 767			1955 567		
			12 volts ac	183A108	1878 768			183A457		1955 568
			24 volts ac		1878 769			1955 569		
			90 volts ac		1878 770			1955 570		
			115 volts ac		1878 771			1955 571		
			208 volts ac		1878 772			1955 572		
			230 volts ac		1878 773			1955 573		
			275 volts ac		1878 774			1955 574		
			460 volts ac		1878 775			1955 575		
			575 volts ac		1878 776			1955 576		

Non-Adjustable Pickup, Double Pole, Molded Case (Device Number: 94X, Y, Z)

Type	Contacts	Frequency: Hertz	Rating	Relay Data			
				Internal Schematic	Solid Projection Cover Style Number	Projection Glass Window Cover Style Number	Semi-Flush Glass Window Cover Style Number
Rear Connected							
SG Current or voltage Self-reset	Dpdt: 2 cc and 2 co	Dc	1 amp dc	1D2102	1157 848	1162 959	1342 932
			2 amps dc		1729 023	1729 024	1729 025
			3 amps dc		1157 849	1162 960	1342 933
			4 amps dc		1956 249	1956 253	1956 257
			5 amps dc		1157 850	1162 961	1342 934
			6 volts dc		1343 116	1340 082	1343 117
			12 volts dc		1155 686	1162 949	1343 118
			24 volts dc		1155 687	1162 950	1342 923
			32 volts dc		1729 011	1729 012	1729 013
			48 volts dc		1155 688	1162 951	1342 924 <sup>Ⓢ</sup>
			62.5 volts dc		1729 017	1729 018	1729 019
			125 volts dc		1155 689 <sup>Ⓢ</sup>	1162 952	1342 925 <sup>Ⓢ</sup>
			250 volts dc		1343 088	1343 089	1343 090
			12 volts ac	50/60	1956 250	1956 254	1956 258
			24 volts ac		1878 284	1878 285	1878 286
			90 volts ac		1956 251	1956 255	1956 259
			115 volts ac		1155 693	1162 956	1342 929 <sup>Ⓢ</sup>
			208 volts ac		1726 053	1726 054	1726 005
			230 volts ac		1155 694	1162 957	1342 930
			275 volts ac		1956 252	1956 256	1956 260
			460 volts ac		1155 695	1162 958	1342 931
			575 volts ac		1725 778	1725 799	1725 780

Ⓢ Denotes item available from stock.



**Auxiliary, Ac Voltage, or Dc Voltage or Current**

Non-Adjustable Pickup, Double Pole, Molded Base Without Cover, Open Type  
(Device Number: 94X, Y, Z)

Type	Contacts	Frequency: Hertz	Rating	Relay Data		
				Without Cover Internal Schematic	Style Number	
Front Connected						
SG  Current or voltage  Self- reset	Dpst-2 cc	Dc	1 amp dc	57D389	1157 852	
			2 amps dc		1729 026	
			3 amps dc		1157 853	
			4 amps dc		1956 261	
			5 amps dc		1157 854	
			6 volts dc		1338 226	
			12 volts dc		1059 230	
			24 volts dc		1059 231	
			32 volts dc		1729 014	
			48 volts dc		1008 534	
			62.5 volts dc		1729 020	
			125 volts dc		1008 535 <sup>Ⓢ</sup>	
			250 volts dc		1337 424 <sup>Ⓢ</sup>	
			50/60		12 volts ac	1163 654
			24 volts ac		1337 364	
			90 volts ac		1537 212	
			115 volts ac		1008 539 <sup>Ⓢ</sup>	
			208 volts ac		1726 056	
			230 volts ac		1008 540	
			275 volts ac		1003 884	
460 volts ac	1008 541					
575 volts ac	1544 302					

Non-Adjustable Pickup, Double Pole, Molded Base, With and Without Cover (Device Number: 94X, Y, Z)

Type	Contacts	Frequency: Hertz	Rating	Relay Data				
				Without Cover (Open Type)		Solid Cover & Base (Front Conn.)		
				Internal Schematic	Style Number	Internal Schematic	Style Number	
Front Connected								
SG  Current or voltage  Self- reset	Dpdt-2 cc and 2 co	Dc	1 amp dc	57D390	1875 946	629A337	293B254A09	
			2 amps dc		1729 027		293B254A10	
			3 amps dc		1875 947		293B254A11	
			4 amps dc		1956 245		293B254A12	
			5 amps dc		1875 948		293B254A13	
			6 volts dc		1340 727		293B254A14	
			12 volts dc		1205 619		293B254A15	
			24 volts dc		1205 620 <sup>Ⓢ</sup>		293B254A16	
			32 volts dc		1729 015		293B254A17	
			48 volts dc		1205 612 <sup>Ⓢ</sup>		293B254A18 <sup>Ⓢ</sup>	
			62.5 volts dc		1729 021		293B254A19	
			125 volts dc		1161 540 <sup>Ⓢ</sup>		293B254A20 <sup>Ⓢ</sup>	
			250 volts dc		1210 936 <sup>Ⓢ</sup>		293B254A21 <sup>Ⓢ</sup>	
			50/60		12 volts ac		1956 246	293B254A22
			24 volts ac		1878 282		293B254A23	
			90 volts ac		1956 247		293B254A25	
			115 volts ac		1205 616 <sup>Ⓢ</sup>		293B254A26 <sup>Ⓢ</sup>	
			208 volts ac		1726 057		293B254A27	
			230 volts ac		1205 617 <sup>Ⓢ</sup>		293B254A28	
			275 volts ac		1956 248		293B254A29	
460 volts ac	1205 618 <sup>Ⓢ</sup>	293B254A30						
575 volts ac	1725 781	293B254A31						

<sup>Ⓢ</sup> Denotes item available from stock.



**Auxiliary, Ac Voltage, or Dc Voltage or Current**  
Non-Adjustable Pickup, Double Pole, Molded Base, With Glass Window Cover  
(Device Number: 94X, Y, Z)

Type	Contacts	Frequency: Hertz	Rating	Relay Data		
				With Glass Window Cover		
				Internal Schematic	Style Number	
Front Connected						
SG Current or voltage Self-reset	Dpdt-2 cc and 2 co	Dc	1 amp dc	629A337	293B255A09	
			2 amps dc			293B255A10
			3 amps dc			293B255A11
			4 amps dc			293B255A12
			5 amps dc			293B255A13
			6 volts dc	293B255A14		
			12 volts dc	293B255A15		
			24 volts dc	293B255A16		
			32 volts dc	293B255A17		
			48 volts dc	293B255A18 <sup>Ⓢ</sup>		
			62.5 volts dc	293B255A19		
			125 volts dc	293B255A20 <sup>Ⓢ</sup>		
			250 volts dc	293B255A21		
			50/60	12 volts ac	293B255A22	
			24 volts ac	293B255A23		
			90 volts ac	293B255A25		
			115 volts ac	293B255A26 <sup>Ⓢ</sup>		
			208 volts ac	293B255A27		
			230 volts ac	293B255A28		
275 volts ac	293B255A29					
460 volts ac	293B255A30					
575 volts ac	293B255A31					

**Auxiliary Dc Voltage or Current, Non-Adjustable Pickup, With Copper Slug**  
For Time Delay Dropout, Intermittent Duty, Dc Operated (Device Number: 94X, Y, Z)

Type	Contacts	Rating	Relay Data				
			Molded Base With Solid Cover Projection Mounting		Molded Base With Glass Window Cover: Semi-Flush Mounting		
			Internal Schematic	Style Number	Internal Schematic	Style Number	
Rear Connected							
SG Self-reset	Dpdt: 2 cc and 2 co	1 amp dc	182A903	1961 590	1D2102	1961 593	
		3 amps dc					1961 591
		5 amps dc					1961 592
		24 volts dc	1961 578	1961 582			
		48 volts dc	1961 579	1961 583			
		125 volts dc	1961 580	1961 584 <sup>Ⓢ</sup>			
		250 volts dc	1961 581	1961 585			

Type	Contacts	Rating	Relay Data								
			Molded Base Without Cover		Molded Base With Solid Cover		Molded Base With Glass Window Cover				
			Internal Schematic	Style Number	Internal Schematic	Style Number	Internal Schematic	Style Number			
Front Connected											
SG Self-reset	Dpdt: 2 cc and 2 co	1 amp dc	57D390	1961 596	629A337	293B257A09	629A337	293B256A09			
		3 amps dc							1961 597	293B257A11	293B256A11
		5 amps dc							1961 598	293B257A12	293B256A12
		24 volts dc	1961 586	293B257A17	293B256A17						
		48 volts dc	1961 587	293B257A18	293B256A18						
		125 volts dc	1961 588	293B257A19	293B256A19						
		250 volts dc	1961 589	293B257A20	293B256A20						

<sup>Ⓢ</sup> Denotes item available from stock.