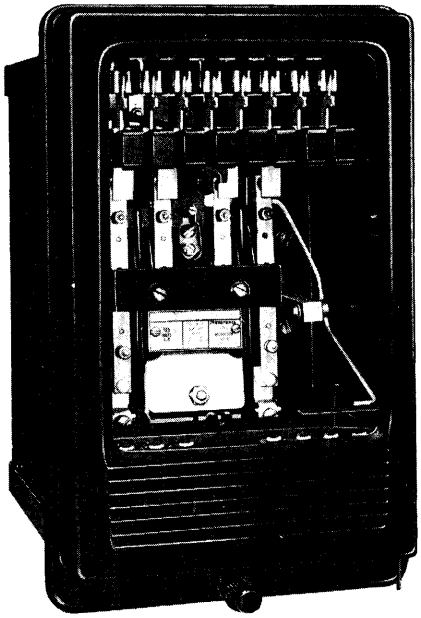
ABB Power T&D Company Inc.
Relay Division
Coral Springs, FL
Allentown, PA

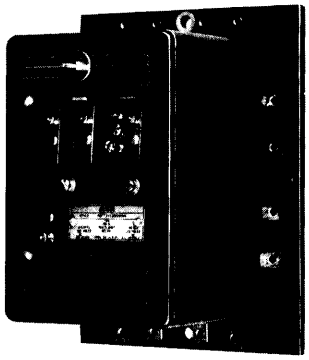
September, 1992
Supersedes DB 41-750B, pages 1-8,
dated March, 1983
Mailed to: E, D, C/41-900A

Multi-Contact Relays for Ac, Dc
Voltage or Dc Current Operation
Device Number: 94

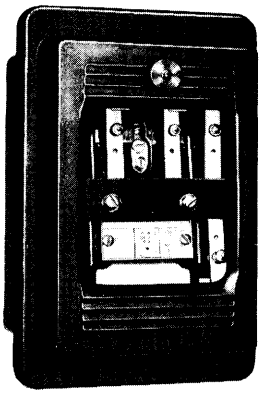
Type MG-6 Auxiliary Relays



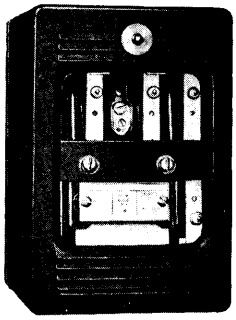
**Flexitest®
Semi-flush or
Projection
Mounting**



**Molded Base Front Connected
with Cover, Projection Mounting**



**Molded Base with Cover
Semi-Flush Mounting**



**Molded Base Rear Connected
with Cover Projection Mounting**

Application

Type MG-6 relays are for use in protective relaying or industrial control applications where electrically independent multiple contacts are required.

They have six contact circuits, each capable of carrying 12 amperes continuously or 30 amperes for one minute. The stationary contacts are readily reversible, providing make or break contact circuits as required.

Relays are available with either a self-reset armature (which resets when the operating coil is de-energized), or with a latch-type mechanism which holds the armature in closed position until the latch is tripped electrically or by hand.

In some MG-6 applications it is desirable to have the operating and/or reset coils de-energized automatically as soon as the relay has performed its function. When such is required, the operating coil circuit is interrupted by an additional cutoff contact contained in the relay. This contact is closed when the relay armature is open or unlatched. It opens when the armature is closed. The reset coil circuit can be interrupted by connecting the reset coil through one of the normally open contacts of the relay.

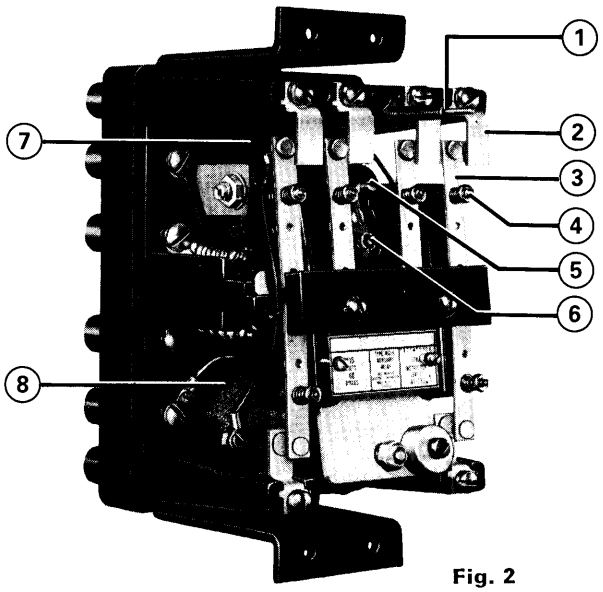


Fig. 2
Molded Base with Cover
Semi-Flush Mounting, Rear Connected

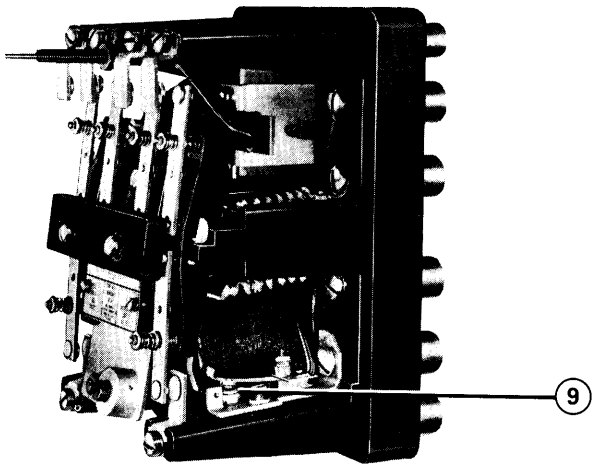
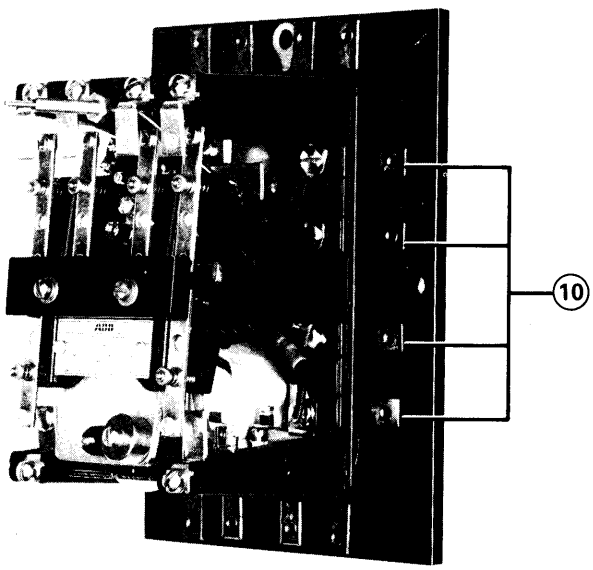


Fig. 1
Molded Base with Cover
Projection Mounting, Rear Connected



Molded Base with Cover
Projection Mounting, Front Connected

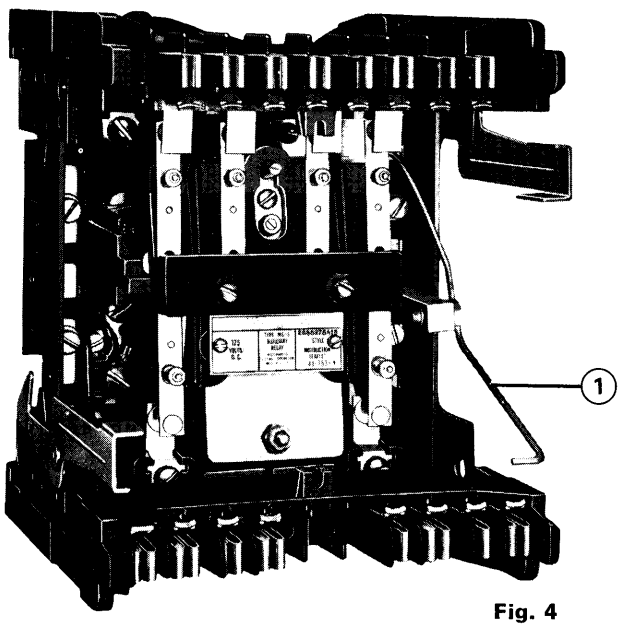


Fig. 4
Flexitest®
Semi-Flush or Projection Mounting

Construction

(1) Reset Push Rod

Provides for manual reset of the armature. Extends through the cover of molded projection and semi-flush types.

Flexitest manual reset lever is actuated by a push rod located outside, at the bottom of the case.

(2) Stationary Contacts

Six in number, and electrically independent. They are made of pure silver, and are easily reversible.

(3) Moving Contacts

Also made of silver. They are mounted on a contact arm which provides adequate wipe action to assure positive contact between the moving and stationary contacts.

(4) Moving Contact Spring Assembly

Consists of a bushing, pin, and spring. Guides motion of the moving contact arm.

(5) Latch Screw Adjustment

(6) Adjusting Screw for Armature Spring Tension

(7) Reset Coil

For intermittent duty only. When energized, the coil trips a latch to reset the armature.

(8) Operating Coil (Continuously Rated)

(9) Location of Optional Operating Coil Cutoff Contact

(10) External Wiring Connections

For molded base front connected with cover only.

Contact Arrangements

Standard

All MG-6 relays are shipped from the factory with six circuit closing contacts, unless otherwise specified.

Non-Standard

The stationary contacts are easily reversed (by removing their retaining screws and reversing their position on the base) to obtain circuit opening operation.

Ac Operated Relays: Ac operated relays can have any or all stationary contacts reversed to provide contact opening ("break" or normally closed) operation.

Dc Operated Relays: Dc operated relays cannot have more than four contacts reversed, if normal contact pressure and travel are to be maintained. All six contacts can be reversed if additional armature spring tension is applied by adjustment of the screw shown in figure 1, reference 6.

Operating Coil Cutoff Contact

As shown in figures 1 and 12, MG-6 relays can be supplied with an additional auxiliary snap action contact which cuts off the relay operating coil when the armature closes. This snap action contact is also provided with a small permanent magnet which acts as an arc extinguisher, and provides a clean, fast break in the operating coil circuit, with minimum of arcing.

With this arrangement, faster relay operation may be obtained on dc by applying overvoltage to the operating coil. The cutoff contact will interrupt operating coil current using up to 4 times rated dc voltage. 24-volt and 48-volt dc ratings can be operated at 5 times rated voltage if the total number of relay operations is limited to 10,000 or less.

Operating time of relays with coil cutoff contact, with overvoltage applied, is as follows:

Multiples of Rated Dc Voltage Applied To Operating Coil	Time Required to Close "Make" Contact (60 Hertz Basis)
1	5.0 cycles
2	2.5 cycles
3	2.0 cycles
4	1.5 cycles

Special "Make-Before-Break" Arrangement

MG-6 contacts can also be arranged so that one or more contacts close before the others open, on the same relay.

Such arrangements necessitate a special armature assembly, and relays so ordered must specify the number of special "make-before-break" contacts desired.

To maintain the desirable amount of armature spring tension, it is preferable to limit these special contact arrangements to:

(1) two special "break" contacts
(2) five special "make" contacts

The total number of contacts on the relay is limited to six. Increased armature spring tension is required if the above arrangement limits are exceeded (a maximum of three special "break" contacts can be used). This increased spring tension, however, increases the minimum pickup voltage of the relay.

Figure 5 illustrates the location of the available special "make-before-break" contacts.

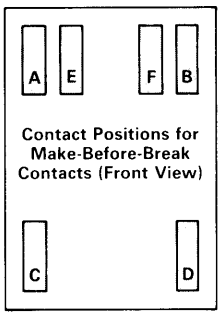


Fig. 5

Number of Special Contacts				
1	2	3	4	5
Special "Make" Positions				
C	C	C	C	B
..	D	D	D	C
..	..	E	E	D
..	..	..	F	E
..	..	..	..	F
Special "Break" Positions				
A	A	A	..	..
..	B	B	..	..
..	..	F	..	..

Example: If two special "make-before-break" contacts are required, the make contacts are at positions C and D, and the break contacts at A and B.

Contact Ratings
Close and Carry

Each of the six relay contacts will carry 12 amperes continuously, and will close and carry 30 amperes for one minute.

Interrupting Ability (Non-Inductive)

Control Circuit Voltage		Interrupting Rating In Amperes	
Dc	60 Hertz	Single Contact	Two Series Contacts
12	...	30	30
24	...	15	30
32	...	10	20
48	...	8	16
125	...	3	6
250	...	1	2
...	115	30	30
...	230	20	30
...	460	15	30
...	575	10	20

Operating Time: 60 Hertz Base

Standard MG-6 operating time values are:

Pickup①

5 cycles (83 ms.) at dc rating
2 cycles (33 ms.) at ac rating

Dropout or Reset②

1.5 cycles (24 ms.) at dc rating
1.2 cycles (20 ms.) at ac rating

① Pickup time is the time required for the relay to close its make (or front contacts).

② Reset time is the time required for the relay to close its back contacts after the operating coil is de-energized.

Reduced Operating Time

1. Intermittent Duty

If faster operating time is required and intermittent application of energy is permissible, the MG-6 operating coil can be energized in either of the two following ways:

(a) Two times rated ac voltage yields 1 cycle operating time. The coil will safely withstand this voltage for over 2 minutes on 60 Hertz.

(b) Five times rated dc voltage yields slightly over 1 cycle operating time if there is not more than 1 circuit opening contact on the relay. The coil will withstand this voltage for 1 minute.

Trip Circuit Voltage, Volts Dc	Operating Coil Rating, Volts Dc	Current in Operating Coil, Amps Dc	Recommended Target Rating, Amps Dc
24	6	5.0	2.0
32	6	6.7	2.0
48	12	2.5	2.0
125	24	1.7	0.2
250	48	0.8	0.2

2. Continuous Duty

If faster operating time and continuous duty are required on dc applications, a low voltage coil with a series dropping resistor is used. The reduced inductance (flux build-up time) of the resistor-coil circuit results in an operating time of about 2 cycles. 10% of the control circuit voltage is applied across the coil and 90% across the resistor.

Trip Circuit Voltage, Volts Dc	Operating Coil Rating, Volts Dc	Series Resistors①		
		Ohms	Watts	Size
48	6	33.5	50	8½"
125	12	180	71.4	8½"
250	24	710	72.7	8½"

① See Figure 9 for dimensions.

Because of the low ac impedance of the MG-6 relay with the armature open, as compared to the closed gap impedance, it is not advantageous to use a resistor in series with an ac coil of less than rated line voltage to obtain reduced operating time.

Positive Target Indication

Because MG-6 relays with rated control circuit voltage coils may draw insufficient current to operate protective relay targets, it is desirable to use a lower rated coil with a series resistor (see figure 6) to draw sufficient trip circuit current to assure positive target indication.

The table below indicates ratings of resistors used with a 24-volt MG-6 operating coil and an 0.2 amp dc target.

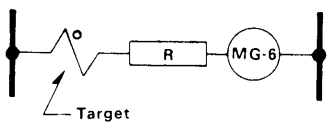


Fig. 6

Trip Circuit Voltage, Volts Dc	MG-6 Coil Rating, Volts Dc	Target Coil of Protective Relay, Amps Dc	Series Resistor②			Current in Target and MG-6 Coil Circuits, Amp Dc
			Ohms	Watts	Size	
48	24	0.2	67	6.5	3½"	.32
125	24	0.2	300	31	8½"	.32
250	24	0.2	710	71	8½"	.32

② See figures 8 and 9 for dimensions.

Electrical Characteristics

Pickup Ratio

Relays will pickup at 80% of rating (both ac and dc).

Dropout Ratio

Dc relays will not dropout above 30% of rating.

Ac relays will not dropout above 50% of rating.

Coil Ratings

Operating Coil

Continuous: 110% of rated voltage
1 Minute on Dc: 500% of rated voltage
10 Minutes on Dc: 200% of rated voltage
2 Minutes on Ac: 200% of rated voltage

Reset Coil

5 Minute: 100% of rating

Coil Resistance (at 25°C) (±10%)

Rating	Operating Coil Ohms	Operating Coil Closed Gap Impedance	Reset Coil Ohms
1 amp dc	4.8	....	...
2 amps dc	1.0	....	...
3 amps dc	.4	....	...
4 amps dc	.24	....	...
5 amps dc	.15	....	...
6 volts dc	4.8	....	.53
12 volts dc	19	....	2.12
24 volts dc	75	....	8.5
32 volts dc	132	....	13.9
48 volts dc	310	....	34
62.5 volts dc	530	....	56
125 volts dc	2000	....	222
250 volts dc	8200	....	890
115 volts, 60 hertz	19	354	91
208 volts, 60 hertz	67	1160	322
230 volts, 60 hertz	75	1410	364
460 volts, 60 hertz	305	5680	1445
575 volts, 60 hertz	495	8860	2208
115 volts, 50 hertz	26	....	138
230 volts, 50 hertz	105	....	550
460 volts, 50 hertz	465	....	2200
575 volts, 60 hertz	660	....	3550

Burden Data (at 25°C and Rated Voltage)

Hertz	Closed Gap Watts	Closed Gap Volt-Amperes	Open Gap Watts	Open Gap Volt-Amperes
Operating Coil				
25	6.8	23	19.6	53
50	9.8	31	17.4	78
60①	12	37	17.6	92
dc	7.8 watts cold		7.8 watts cold	
dc	6.5 watts hot		6.5 watts hot	
Reset Coil				
25	48	51.6	52	54
50	46	58.2	57	63.8
60①	84	104.5	96	112.8
dc	66 watts cold		68 watts cold	

① Rated voltage is 115 volts or multiples thereof.

External Resistors (With Mounting Bracket)

Fig. 8: 3½ Inch

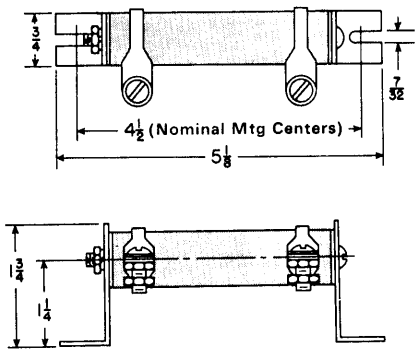
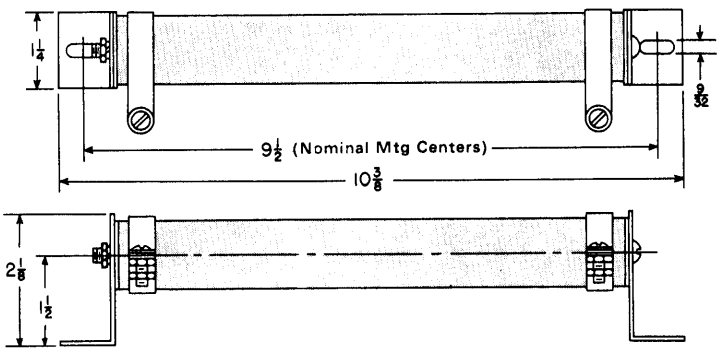
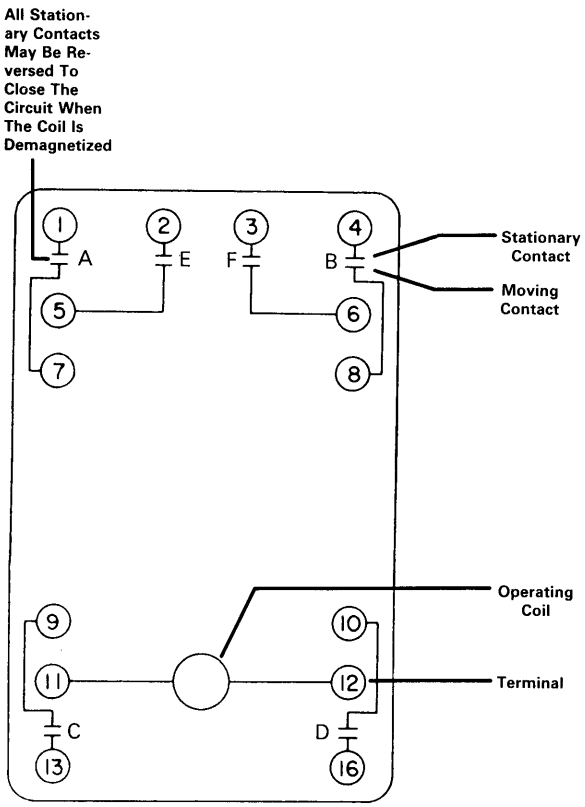


Fig. 9: 8½ Inch



Internal Wiring: Front View (All Relays with Reversible Contacts, Make or Break)

Molded Base With Cover
Fig. 10: Self-Reset

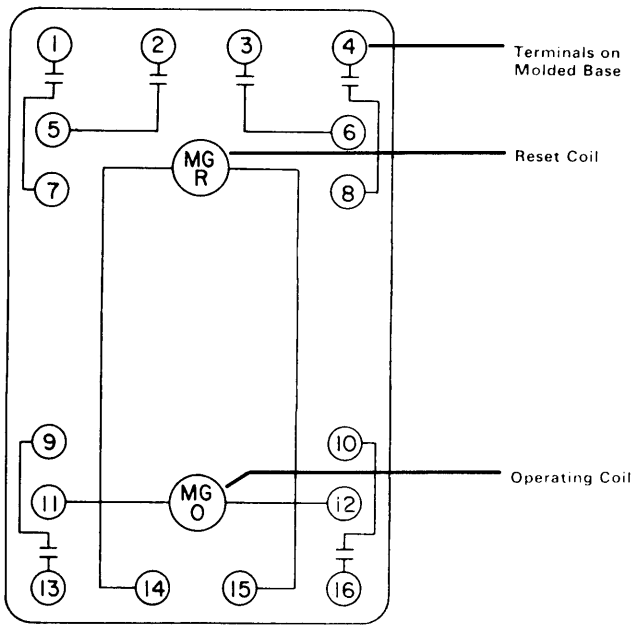


4-D-1072

NC Contacts

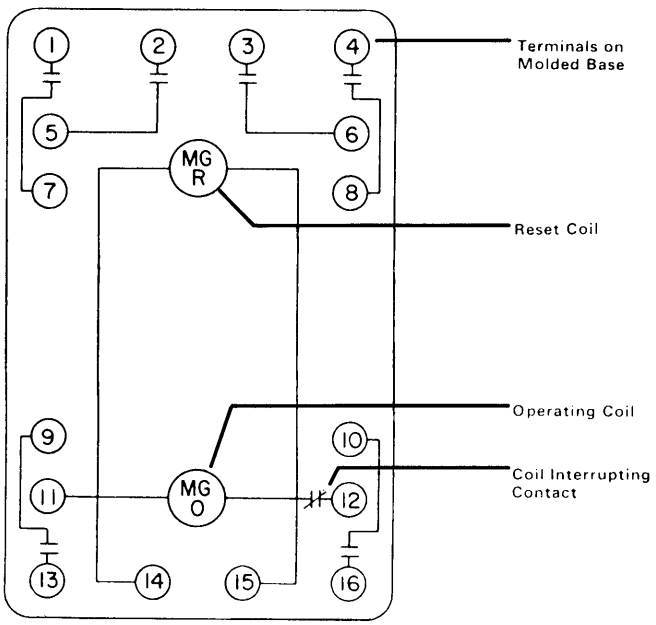
No.	Position			
1	A			
2	A	B		
3	A	B	E	
4	A	B	E	F

Electric and Hand Reset
Fig. 11: Without Coil Cutoff Contact



4-D-1076 Sub. 4

Fig. 12: With Coil Cutoff Contact

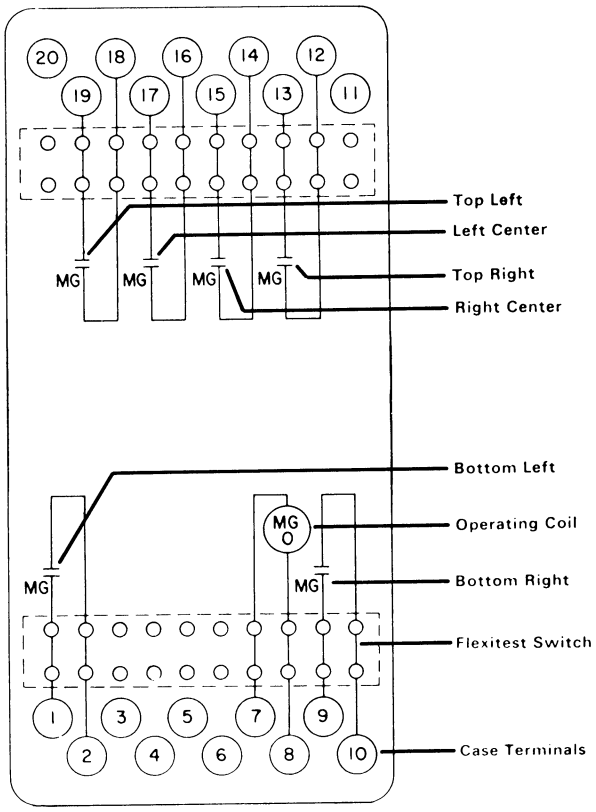


4-D-1076

Internal Wiring: Front View (All Relays with Reversible Contacts, Make or Break), Continued

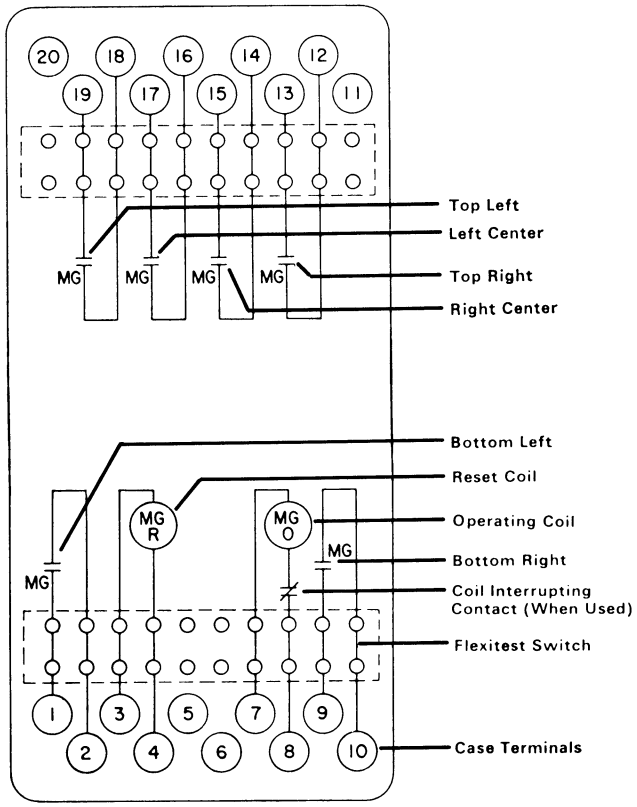
Flexitest: FT-22 Case

Fig. 13: Self-Reset



183A223 Sub. 1

Fig. 14: Electric and Hand Reset



183A222 Sub. 1

Shipping Weights and Carton Dimensions

Case Type	Weight, Lbs(kg.)		Domestic Shipping Carton Dimensions, Inches (cm.)
	Net	Shipping	
Molded Base With Cover	5 (2.3)	8 (3.6)	8½ x 9½ x 10 (21.6) x (24.1) x (25.4)
Flexitest FT-22	8 (3.6)	11 (5)	9 x 12 x 13 (22.9) x (30.5) x (33.0)

Further Information

List Prices: PL 41-020
Technical Data: TD 41-025
Instructions: IL 41-753.1
Renewal Parts: RPD 41-966
Flexitest Case Dimensions: DB 41-076
Other Protective Relays:
Application Selector Guide, TD 41-016

September, 1992
New Information
Mailed to: E, D, C/41-900A

Multi-Contact Relays for Ac, Dc Voltage or Dc Current Operation

Type MG-6 Auxiliary Relays

Auxiliary Relays, Ac or Dc Voltage or Dc Current Operation

Flexitest Case Type, 6-Pole, Non-Adjustable Pickup (Device Number: 94X, Y, Z)

Type	Reset	Contacts	Frequency: Hertz	Rating Volts	Rating Amps	Relay Data Internal Schematic	Relay Data Style Number	Relay Data Case Size
MG-6 ①⑤ Current or voltage	Self	Six cc	Dc	...	1	183A223	288B977A09	**FT-22**
				...	2		288B977A10	
				...	3		288B977A11	
				...	4		288B977A31	
				...	5		288B977A12	
				6	...		288B977A13	
				12	...		288B977A14	
				24	...		288B977A15	
				32	...		288B977A16	
				48	...		288B977A17	
				62.5	...		288B977A18	
				125	...		288B977A19⓪	
				250	...		288B977A20	
			60	115	...		288B977A21	
				208	...		288B977A22	
				230	...		288B977A23	
				460	...		288B977A24	
				575	...		288B977A25	
	Electric and hand ④⑥ ⑦	Six cc	Dc	6	...	183A222	288B978A09	**FT-22**
				12	...		288B978A10	
				24	...		288B978A11	
				32	...		288B978A12	
				48	...		288B978A13	
				62.5	...		288B978A14	
				125	...		288B978A15	
				250	...		288B978A16	
			60	115	...		288B978A17	
				208	...		288B978A18	
				230	...		288B978A19	
				460	...		288B978A20	
				575	...		288B978A21	
		Six cc with operating coil cutoff contact	Dc	24	...		289B364A09	**FT-22**
				48	...		289B364A10	
				125	...		289B364A11⓪	
				250	...		289B364A12	
			60	115	...		289B364A13	
				208	...		289B364A14	
				230	...		289B364A15	
				460	...		289B364A16	
				575	...		289B364A17	

⓪ Denotes item is "Qwik Ship" style. Qwik Ship is being phased in. Check for availability.

① 50-Hertz relays and auxiliaries can be supplied at same price. Order "Similar to Style Number....., except 50 Hertz."

④ For extremely fast pickup on 125 volt dc control circuits, MG-6 relays are available using 24 volt dc operating and 125 volt dc reset coils, with or without operating coil cutoff contact.

Relay with operating coil cutoff contact – style number 1962 113.
Relay without operating coil cutoff contact – style number 1961 333.
Relay with operating coil cutoff contact (molded base, glass window, semi-flush mtg. – style number 1961 640).

⑤ See page 10 for external series resistors and sheet metal cabinets.

⑥ Different combinations of the operating coil and reset coil ratings can be supplied. Choose from the standard ratings listed. Use standard price. Order similar to style number of relay with identical operating coil ratings, except with reset coil rating.

⑦ Reset coil voltage rating is for 30 second energization.

Auxiliary Relays, Ac or Dc Voltage or Dc Current Operation, Continued

Molded Base Type, 6-Pole, Non-Adjustable Pickup (Device Number: 94X, Y, Z)

Type	Reset	Contacts	Frequency: Hertz	Rating Volts	Rating Amps	Relay Data Internal Schematic	Molded Base with Glass Window Cover (Rear Connected) Style Number Projection	Molded Base with Glass Window Cover (Rear Connected) Style Number Semi-Flush	Molded Base without Cover (Front Connected) Style Number
MG-6 ①	Self	Six cc	Dc	...	1	4D1072	289B359A09	289B360A09	1163 792
				...	2		289B359A10	289B360A10	1956 264
				...	3		289B359A11	289B360A11	1163 793
Current				...	4		289B359A12	289B360A12	1956 992
or				...	5		289B359A13	289B360A13	1163 794
voltage				6	...		289B359A14	289B360A14	1163 795
				12	...		289B359A15	289B360A15	1163 796
				24	...		289B359A16	289B360A16Ⓠ	1163 797Ⓠ
				32	...		289B359A17	289B360A17	1163 798
				48	...		289B359A18	289B360A18Ⓠ	1163 799
				62.5	...		289B359A19	289B360A19	1163 800
				125	...		289B359A20Ⓠ	289B360A20Ⓢ	1163 801Ⓢ
				250	...		289B359A21	289B360A21	1163 802
			60	115	...		289B359A22	289B360A22Ⓠ	1163 803Ⓢ
				208	...		289B359A23	289B360A23	1544 277
				230	...		289B359A24	289B360A24	1163 804
				460	...		289B359A25	289B360A25	1163 805
				575	...		289B359A26	289B360A26	1163 806
	Electric and hand	Six cc	Dc	6	...	4D1076	289B361A09	289B362A09	1163 822
				12	...		289B361A10	289B362A10	1163 823
				24	...		289B361A11	289B362A11	1163 824
	Operating and reset coils have same rating ②			32	...		289B361A12	289B362A12	1163 825
				48	...		289B361A13	289B362A13Ⓠ	1163 826
				62.5	...		289B361A14	289B362A14	1163 827
				125	...		289B361A15Ⓠ	289B362A15Ⓢ	1163 828Ⓠ
				250	...		289B361A16	289B362A16	1163 829
			60	115	...		289B361A17	289B362A17	1163 830
				208	...		289B361A18	289B362A18	1544 278
				230	...		289B361A19	289B362A19	1163 831
				460	...		289B361A20	289B362A20	1163 832
				575	...		289B361A21	289B362A21	1163 833
		Six cc with operating coil cutoff contact	Dc	24	...		289B473A09	289B473A20	289B363A09
				48	...		289B473A10	289B473A21	289B363A10
				125	...		289B473A11	289B473A22Ⓢ	289B363A11Ⓢ
				250	...		289B473A12	289B473A23	289B363A12
			60	115	...		289B473A13	289B473A24	289B363A13
				208	...		289B473A14	289B473A25	289B363A14
				230	...		289B473A15	289B473A26	289B363A15
				460	...		289B473A16	289B473A27	289B363A16
				575	...		289B473A17	289B473A28	289B363A17

External Series Resistors For MG-6 Relays

(See DB 41-750B for Application)

Size	Ohms	Style Number④
3½″	67	184A369G20
8½″	33.5	07B4865G16
	180	07B4865G15
	300	1875 692
	710	07B4865G14

Ⓢ Denotes item available from stock.
Ⓠ Denotes item is "Qwik Ship" style. Qwik Ship is being phased in. Check for availability.
① 50-Hertz relays and auxiliaries can be supplied at same price. Order "Similar to Style Number....., except 50 Hertz."
② Different combinations of the operating coil and reset coil ratings can be supplied. Choose from the standard ratings listed. Use standard price. Order similar to style number of relay with identical operating coil ratings, except with reset coil rating.
④ Includes mounting brackets.

Type MG-6 Auxiliary Relay Front Connected With Glass Window Cover

Standard "Make" or "Break" Contacts

Each of the six MG-6 relay contacts can be ordered as either "Make" (circuit closing) or "Break" (circuit opening) within the following guidelines:

AC Operated Relays: Ac operated relays can have any combination of "Make" or "Break" contacts.

DC Operated Relays: In dc operated relays the number of "Break" contacts is limited to four, if normal contact pressure and travel are to be maintained. If more than four "Break" contacts are required, please consult with the factory.

The stationary contacts are easily field reversed by removing their retaining screws and reversing their positions on the base.

Special "Make-Before-Break" Arrangement
MG-6 relay contacts can also be arranged so that one or more contacts close before the other contacts on the same relay open.

To maintain the desirable amount of armature spring tension, it is preferable to limit these special contact arrangements to:

(1) two special "break" contacts
(2) five special "make" contacts

The total number of contacts on the relay is limited to six. Increased armature spring tension is required if the above arrangement limits are exceeded (a maximum of three special "break" contacts can be used). The increased armature spring tension may raise the minimum pick-up voltage above the standard value.

Figure 1 on page 12 illustrates the location of the MG-6 relay contacts.
Table 1 on page 12 illustrates the possible locations for the special "make-before-break" contacts.

Contact Positions (See Figure 1)

Typical Catalog Number: A B C D E F

MGF 73 N 73 M M M M M M

Type MG-6
Front Connected, Projection Mounted with Glass Window Cover Enclosure.

Operate Coil ..... See coil rating table for code

Coil Interrupting Contact①
Yes ..... Y
No ..... N

Reset Coil ..... See coil rating table for code

Contact Arrangement
Standard Break ..... B
Standard Make ..... M
Special Break (Make Before Break) ... 1
Special Make (Make Before Break) ... 2

① Only MG-6 relays with reset coils can be supplied with a coil interrupting contact.

Coil Rating Table②

Coil Rating	Code
No reset coil	00
115 volts ac, 60 Hz	08
115 volts ac, 50 Hz	09
208 volts ac, 60 Hz	10
230 volts ac, 60 Hz	11
230 volts ac, 50 Hz	12*
460 volts ac, 60 Hz	13
460 volts ac, 50 Hz	22
575 volts ac, 60 Hz	14
575 volts ac, 50 Hz	15
6 volts dc	77
12 volts dc	64
24 volts dc	65
32 volts dc	67
48 volts dc	70
62 volts dc	71
125 volts dc	73
250 volts dc	76
5 amps dc	59*
4 amps dc	60*
3 amps dc	61*
2 amps dc	62*
1 amps dc	63*

* Not Available for Reset Coil
② Other ratings are available, contact the factory for codes.

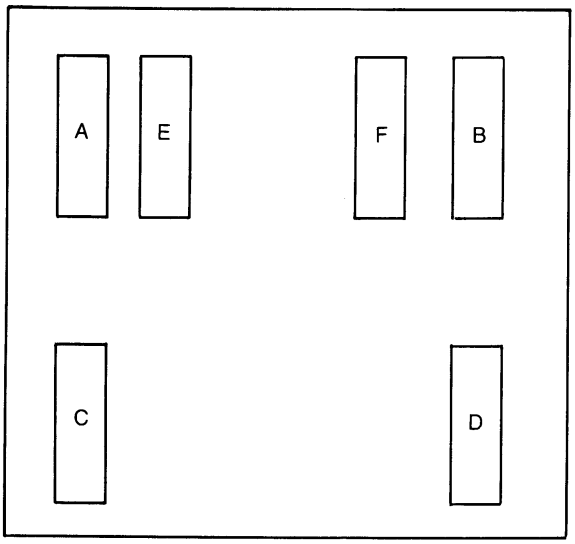


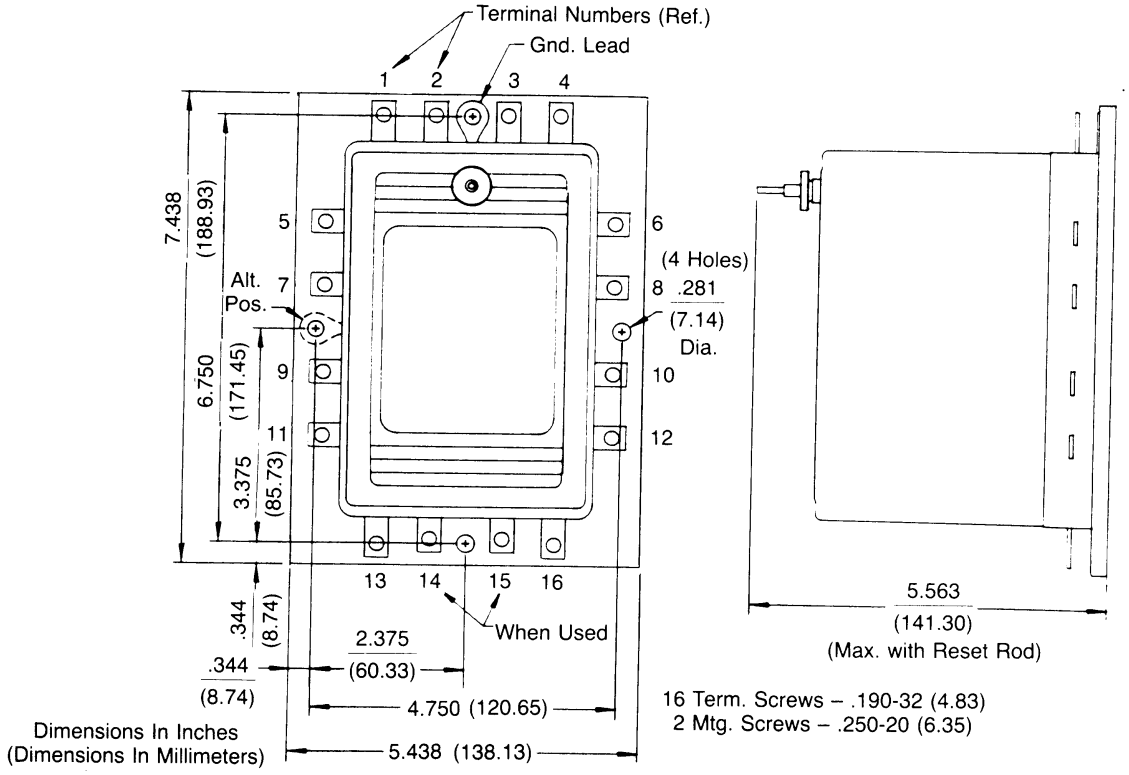
Figure 1 – Location of Contact Positions

Number of Special Make Contacts	Contact Positions						
		A	B	C	D	E	F
	1			X			
	2			X	X		
	3			X	X	X	
	4			X	X	X	X
	5		X	X	X	X	X

Number of Special Break Contacts	Contact Positions						
		A	B	C	D	E	F
	1	X					
	2	X	X				
	3	X	X				X

Table 1 – Location Chart for Special Make-Before-Break Contacts

Outline and Drilling Plan
Type MG-6 Relay
Front Connected with Cover



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