INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

TYPE MG-6 MULTI-CONTACT AUXILIARY RELAY

CAUTION Before putting relays into service, remove all blocking which may have been inserted for the purpose of securing the parts during shipment, make sure that all moving parts operate freely, inspect the contacts to see that they are clean and close properly, and operate the relay to check the settings and electrical connections.

APPLICATION

The type MG-6 relay is designed for applications where several independent circuits must be energized or de-energized upon the operation of a single primary relay contact, or where the capacity of the primary relay contact is inadequate for the energy required in a control circuit. In certain applications these relays may be used directly as primary relays. Since the stationary contacts can readily be reversed so as to be suitable for either circuit opening or circuit closing service (although a slight increase in spring * tension may be required on the dc MG-6 relay – see "ADJUSTMENTS AND MAINTENANCE") it is unnecessary to predetermine the arrangements of the circuits for which the relay is to be used.

In the usual application of the relay, the armature resets when the operating coil is de-energized. However, the relays may be supplied with a latching mechanism which holds the armature in the operated position until the latch is tripped, either by hand or electrically.

An operating coil cutoff contact can be supplied with the electric-reset type, where an intermittent duty coil is required for faster than normal operation, but where the operating coil circuit must be energized continuously. An operating coil, rated at 19% of supply rating may be applied, with a maximum duty of 10,000 operations. (e.g. 24 volt coil on 125 volt dc circuit.

CONSTRUCTION AND OPERATION

The operating electromagnet is at the lower end of the relay, as shown in Fig. 1. The stationary iron circuit is built up of U-shaped punchings. These are slotted at the outer end of the lower leg to receive the copper lag loops used to obtain quiet oper- * ation on ac. The operating coil is mounted on this leg of the punchings. In order to improve the per- * formance of the relay on dc, the pole face area is increased by means of an iron plate. This plate is assembled at the end of the coil and the corners of the lamination side plates are bent outward, serving to hold the plate in place. The inner end of the upper leg of the punching assembly is shaped so that the lower end of the armature restraining spring can be hooked over it.

The armature is made of high-silicon steel. Projecting sections on the sides, near the center, act as knife-edge bearings and rest on suitably shaped supports which are a part of the moulded base. A stud attached to the lower leg of the electromagnet extends through a hole in the lower end of the armature, and a stop-nut on the outer end of this stud is used to limit and adjust the travel of the armature in the de-energized direction. The special stop nut used will remain at any position in which it is placed without additional locking means.

The upper end of the armature carries an adjusting screw to which one end of the armature restraining spring is attached. In the hand or electrically reset relays, a latch screw is mounted at the extreme end of the armature. In the self-reset relays this screw is replaced by a set screw which serves to separate the locking plate (see Fig. 1) slightly from the armature. Between the spring adjusting screw and the latch screw (or set screw), there is a third screw which when tightened applies pressure to the threads of the former screws and effectively locks them against turning.

The moving contact fingers are mounted on moulded insulation which is fastened to the armature

All possible contingencies which may arise during installation, operation, or maintenance, and all details and variations of this equipment do not purport to be covered by these instructions. If further information is desired by purchaser regarding his particular installation, operation or maintenance of his equipment, the local Westinghouse Electric Corporation representative should be contacted.

SUPERSEDES I.L. 41-753.1H, dated February 1973
*Denotes change from superseded issue.
EFFECTIVE SEPTEMBER 1975

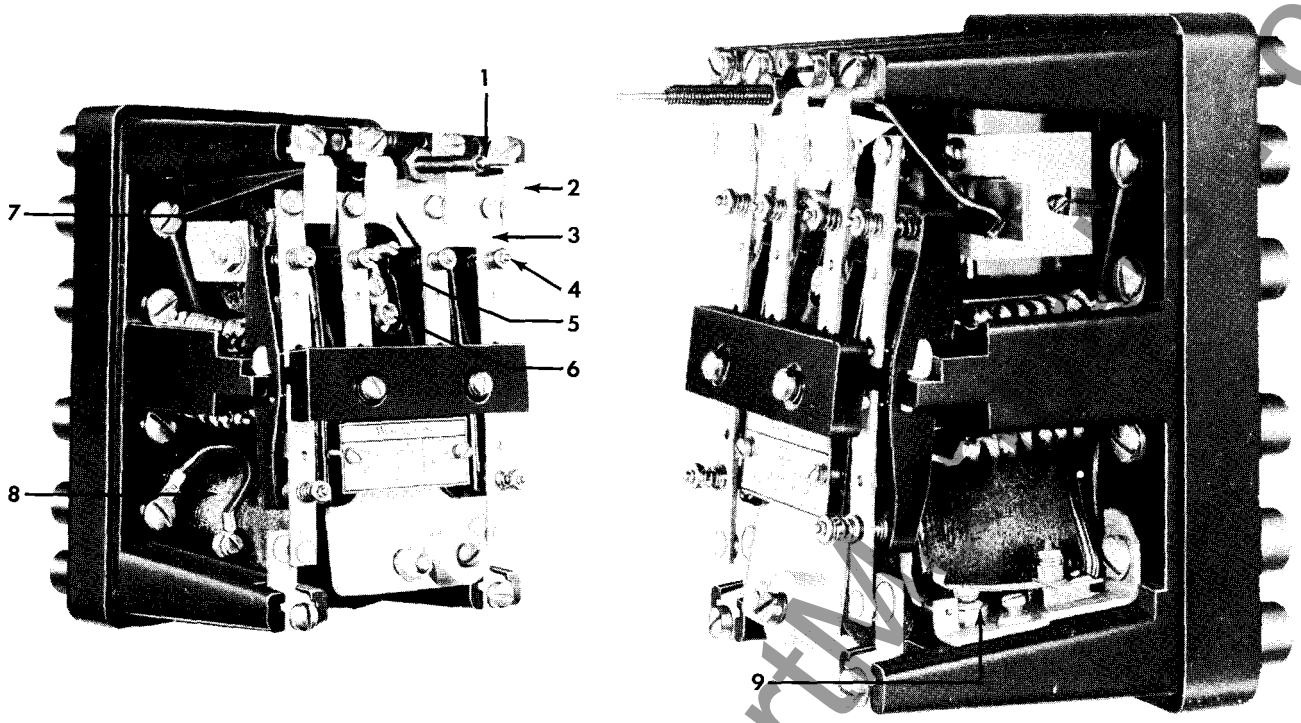


Fig. 1. Front View (Cover Omitted) and Side View of the MG-6 Electric & Hand Reset Relay in Molded Case. 1 – Reset push rod, 2 – stationary contact, 3 – moving contact, 4 – moving contact spring assembly, 5 – latch adjustment screw, 6 – adjusting screw for armature spring tension, 7 – reset coil, 8 – operating coil, 9 – optional operating coil cut-off contact.

by two screws. Silver contact buttons are on both sides of these fingers so that they can be used for either a circuit-opening or a circuit-closing contact. The fingers are assembled on guide pins, between two springs in such a way that definite spring compression and contact wipe is assured for either contact-closing or contact-opening service. Flexible leads assemblies are welded to the contact fingers. Since the armature assembly has contact fingers both above and below the bearing points, the armature weight is partially balanced about the bearings and there is less tendency for severe shocks to move the armature.

The stationary contacts consists of large silver buttons which can be assembled so that they close with the moving contacts when the armature is in either the energized or de-energized position. The stationary contact brackets are connected directly to the terminal inserts by means of long screws which pass through brass tubes. These tubes are of such length that the moulded material of the base is not under direct compression when the screws are tightened. Therefore, there is always a tight connection from contact to terminal regardless of possible shrinkage or other variation in the moulded base material. The contact bracket is held against its seat by means of a spring ring which is compressed between shoulders in the base and on the hexagonal terminal insert.

The construction of the latch and electrical reset is shown in Fig. 2, in which the lower portion is a partial front view of the relay in the moulded case, and the upper portion a top view. In the latter view, the latch screw (in the main armature) is in the energized position, and the reset armature is free to be moved to the right by the tension spring until the hardened latch plate on the reset armature rests against the tip of the latch screw. When the operating coil is de-energized, the latch screw will move slightly so that its shoulder rests on the edge of the latch plate. When the reset coil is energized its armature moves to the left, thus permitting the main armature to return to its open position. Pressing the reset push rod, which extends through the cover stud, will also release the latch through the medium of the reset lever shown in the figure.

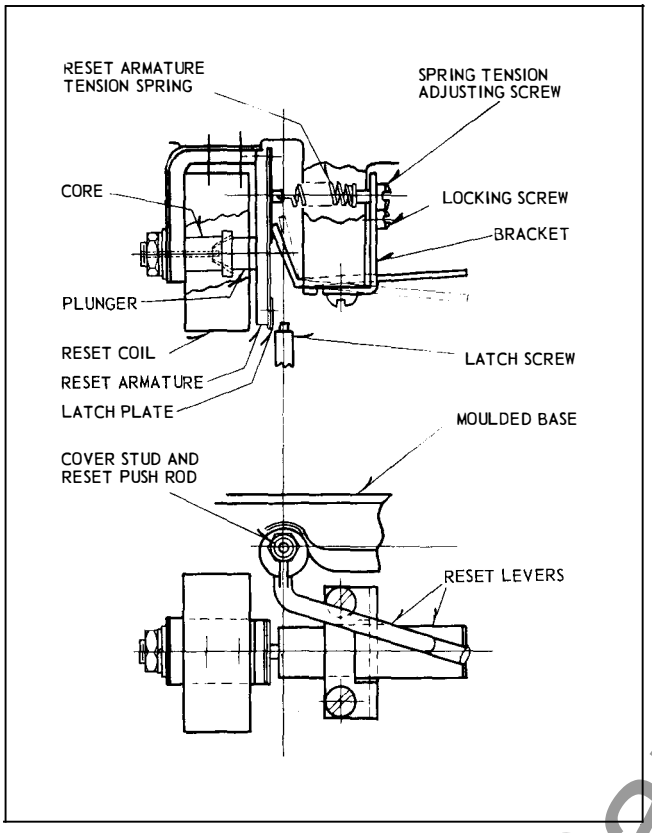
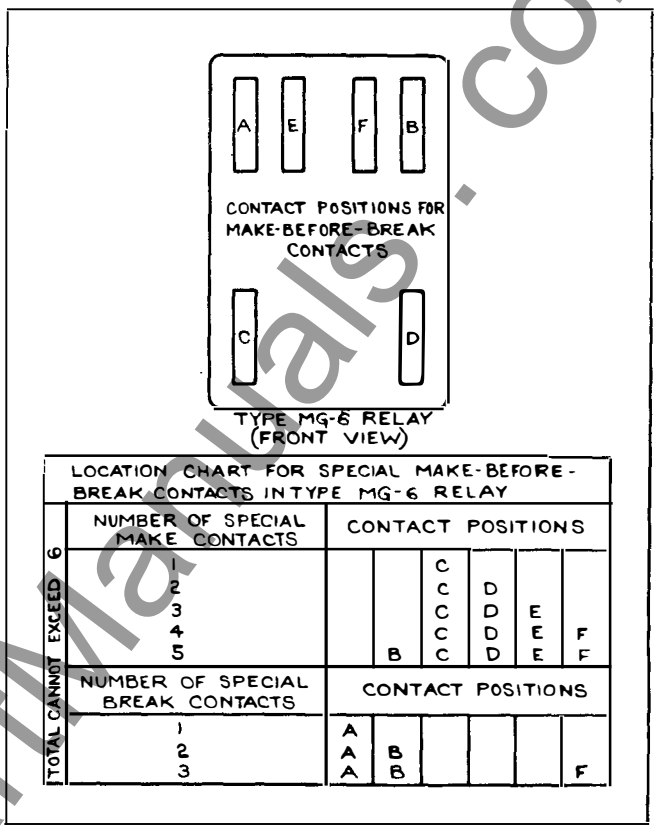


Fig. 2. Detail Views of the Latch and Electrical Reset of the Type MG-6 Relay.



LOCATION CHART FOR SPECIAL MAKE-BEFORE-BREAK CONTACTS IN TYPE MG-6 RELAY

TOTAL CANNOT EXCEED 6	NUMBER OF SPECIAL MAKE CONTACTS	CONTACT POSITIONS					
	1			C			
	2			C	D		
	3			C	D	E	
	4			C	D	E	F
	5		B	C	D	E	F
	NUMBER OF SPECIAL BREAK CONTACTS	CONTACT POSITIONS					
	1	A					
	2	A	B				
	3	A	B				F

Fig. 3. Contact Positions for Combinations of Make-Before-Break Contacts.

In some applications of the relay with latch and electrical reset, it may be desirable to have the operating and reset coils deenergized automatically as soon as they have performed their functions. In the case of the reset coil this can be accomplished by connecting the coil through one of the relay "make" contacts. An auxiliary contact is required to open the operating coil circuit. This contact, when provided, is assembled on the lower right-hand side of the relay, and is held in position by the terminal screw to which the right-hand coil lead ordinarily connects. The coil lead is connected to the moving contact of the auxiliary contact, and the end of the stationary contact bracket is in contact with the head of the terminal screw. The auxiliary contact is closed when the main armature is open. When the armature approaches the closed position, the spring on the molded insulation block snaps off the roller and causes the contacts to open and interrupt the operating coil current. When this auxiliary contact is used, a weight is screwed to the lower end of the armature to increase its mass and stabilize contact action. This contact will interrupt the coil current at up to five times rated coil voltage.

In certain applications of the type MG-6 relay, it may be desirable to have one or more of the contacts close before other contacts on the same relay open. A special armature assembly is required to obtain such operation, and the number of special make and break contacts desired must be known when the relay is built. The special moving contacts have longer follow than the standard contacts and greater armature spring tension is required for full deflection of the break contacts. Consequently, it is preferable to limit the number of special break contacts to two. A maximum of three may be used, although the increased armature spring tension needed may raise the minimum pick-up voltage above the standard value. As many as five contacts may be special make contacts, with the total of special make and break contacts limited to six, of course. The locations of the make and break contacts for any combination of these special contacts are shown in Fig. 3. This figure indicates the physical location of the contacts in the relay, and can be used in conjunction with the inter-

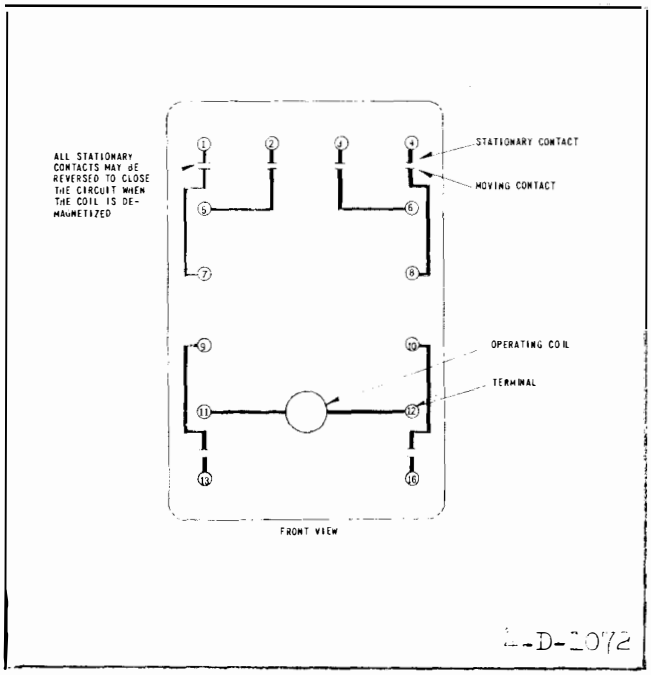


Fig. 4. Internal Schematic of the Type MG-6 Relay, Without Electrical Reset, in Molded Case.

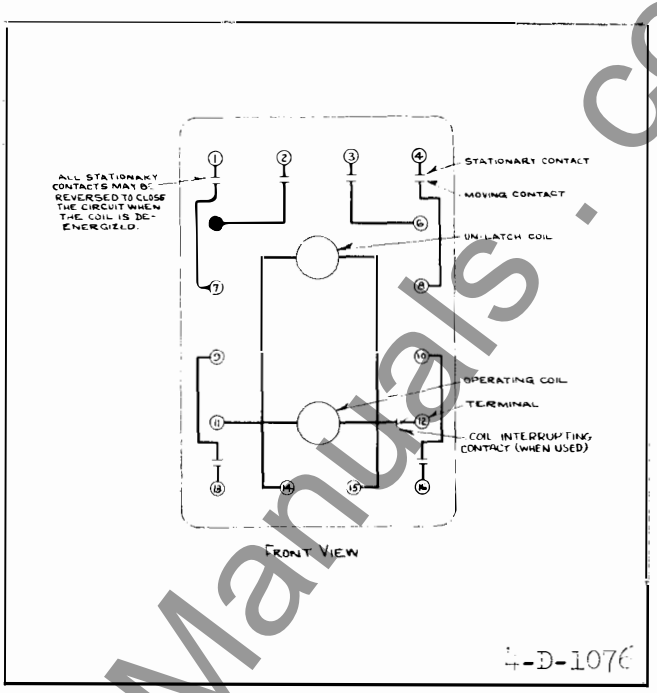


Fig. 5. Internal Schematic of the Type MG-6 Relay, With Electrical Reset, in Molded Case.

nal schematic diagram for the type of case involved to determine the corresponding terminal locations.

The type MG-6 relay may be provided without cover, for front connection, or in a variety of completely closed cases, for rear connection. The moulded base for rear connection is shown in Fig. 1. The base for front connection is similar except that there are no terminals projecting in the rear. This same base is also used as a sub-base when the relays are supplied in the FT22 case.

CHARACTERISTICS

The type MG-6 relay has an operating time of approximately 2 cycles on ac and 5 cycles on dc (on a 60 hertz basis) when energized at the rated voltage.

50 Hz relay. The operate and reset coils for 50 Hz MG-6 relay are different than the 60 Hz coils.

If faster operation is desired and if the application requires only intermittent energization of the relay, the operating coils may be energized at higher than rated voltage. (1) Twice rated voltage will give an operating time of approximately 1 cycle on ac, and the coil will stand this voltage safely for over two minutes if 60 hertz or 4 minutes if 25 hertz. (2) The time of the d-c relay can be reduced to slightly over 1 cycle if the coil is energized at five times rated voltage. The coil will stand this voltage for one minute. If faster time is desired on a dc relay which must be energized continuously, the use of a low voltage coil with a series resistor will reduce the time. With 10% of the line voltage across the relay coil and the balance across a series resistor, the reduced inductance of the circuit results in an operating time of approximately 2 cycles. The time of operation may be reduced to approximately one cycle by applying 4 or 5 times rated dc voltage to the coils through the coil interrupting contact.

Reset coils are for intermittent duty only and should not be energized longer than one-half minute.

The relay contacts will close circuits carrying 30 amperes. They will carry this current for 1 minute, and will carry 12 amperes continuously.

The contacts will interrupt the following currents, in non-inductive circuits, at the voltages listed:

Current	Volts ac
30	115
20	230
15	460
10	575

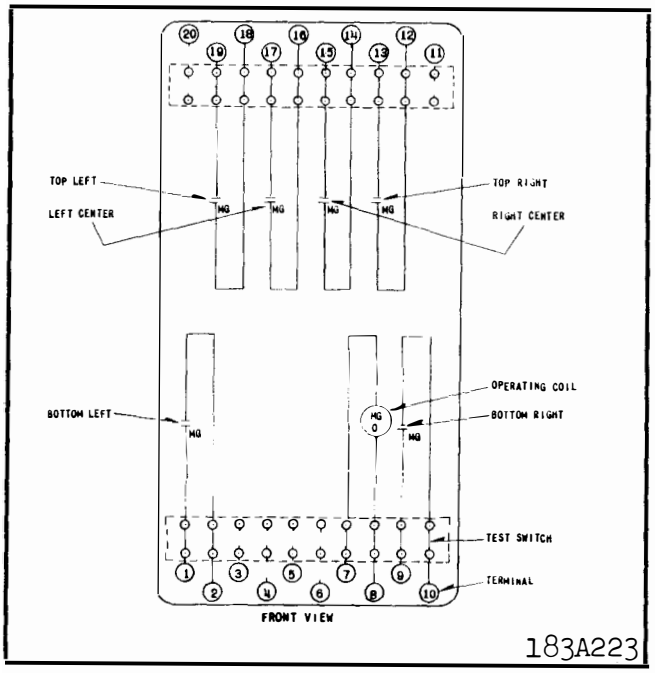


Fig. 6. Internal Schematic of the Type MG-6 Relay, Without Electrical Reset, in FT22 Case.

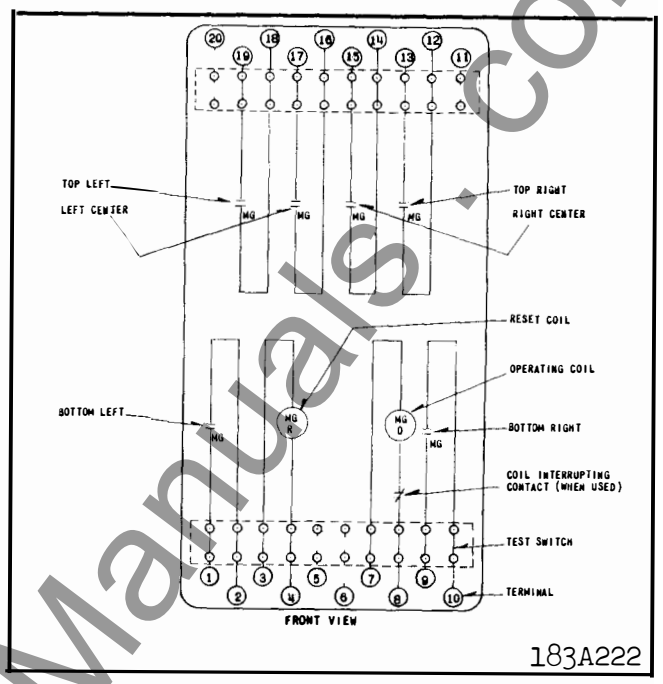


Fig. 7. Internal Schematic of the Type MG-6 Relay, With Electrical Reset, in FT22 Case.

Current	* Volts dc
30	12
15	24
10	32
8	48
3	125
1	250

* The type MG-6 relay for ac can be used with any combination of contacts, but the dc relay can have up to four circuit-opening contacts with the normal operating spring adjustment. With more than four the operating spring should be adjusted to give the correct back contact follow.

INSTALLATION

The relays should be mounted on switchboard panels or their equivalent in a location free from dirt, moisture, excessive vibration. and heat. Mount the relay vertically by means of the four mounting holes on the flange for semi-flush mounting or by means of the rear mounting stud or studs for projection mounting. Either a mounting stud or the mounting screws may be utilized for grounding the relay. The electrical connections may be made directly to the terminals by means of screws for steel panel mounting or to the terminal studs furnished with the relay for thick panel mounting. The terminal studs may be easily removed or inserted by locking two nuts on the stud and then turning the proper nut with a wrench.

For detailed FT case information refer to I.L. 41-076.

Coil Resistance (at 25°C) (± 10%)

* Rating	Operating Coil		Reset Coil
	dc Ohms	Closed Gap Impedance	dc 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, 50 Hertz	660	....	3550

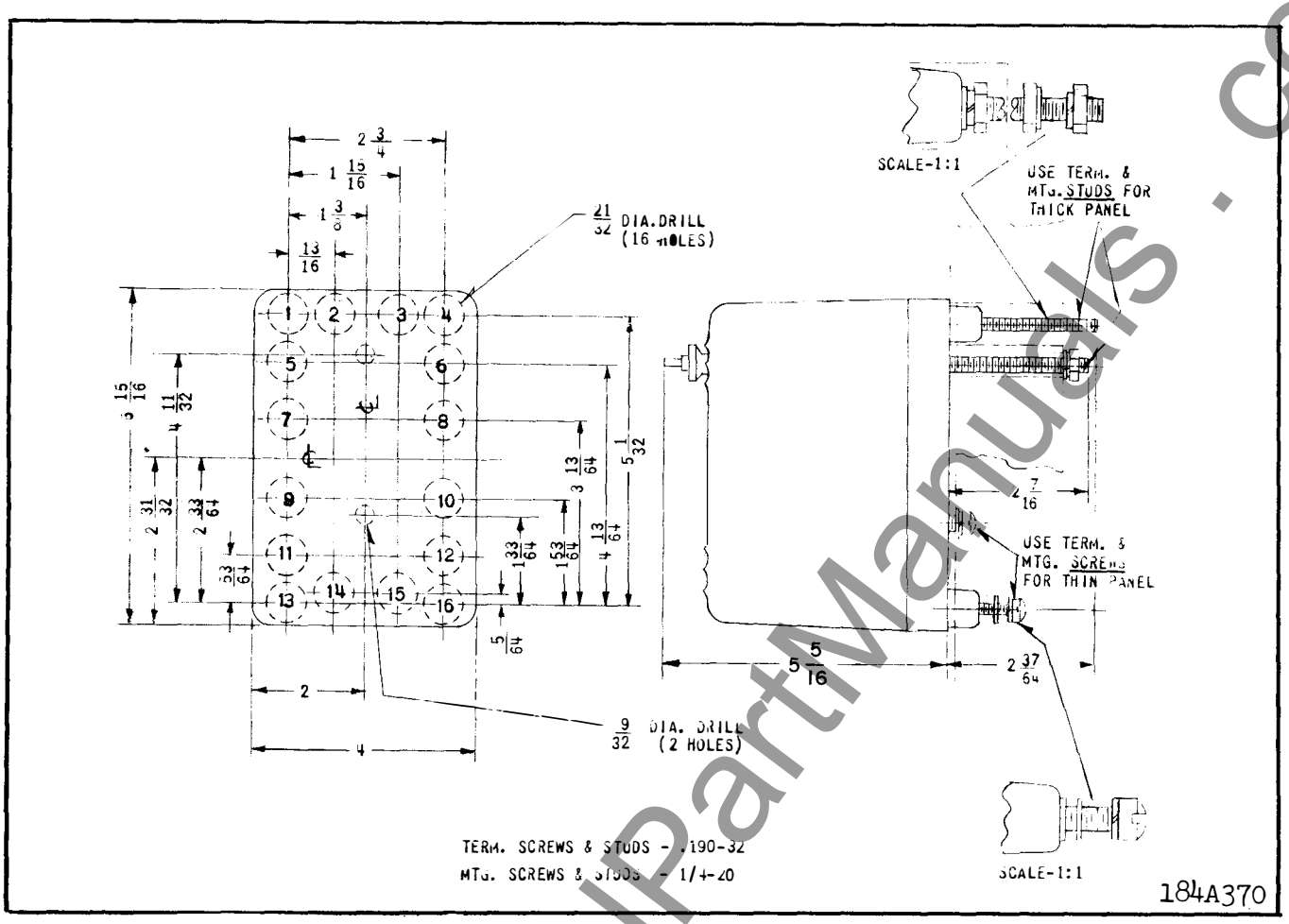


Fig. 8. Outline and Drilling Plan for the Type MG-6 Relay in the Rear Connected Molded Case. For Reference Only.

Relays in the rear-connected moulded cases should be mounted and electrically connected similar to the other projection cases. The lower mounting stud may be used to ground the electromagnet iron. The hexagon-shaped terminal inserts are slightly loose in the base but this does not affect the electrical connections. Only the two mounting studs should be used to secure the relay to the panel. Removal of terminal insert end-play (in the case of thick-panel mounting) by turning a nut on the terminal stud tightly against a large diameter washer (not supplied) at the rear of the panel should not be attempted as this may distort the relay base and affect the adjustments, or possibly damage the relay. Relays in the front-connected moulded cases should be mounted by four screws through the sides of the base as indicated in the drilling plan.

ADJUSTMENTS AND MAINTENANCE

The relays are shipped from the factory correctly adjusted for armature travel and for contact follow and pressure, and it should not be necessary to disturb these adjustments. The relays normally are shipped with all contacts assembled for circuit-closing operation. To convert them for circuit-opening operation, it is necessary merely to loosen the mounting screw for the stationary contact bracket, turn this bracket over, and tighten the screw. After reversing the position of the contact brackets, it may be necessary to bend them slightly to obtain contact follows approximately as stated in the fourth paragraph of this section. On a d-c relay not more than four contacts can be assembled in the circuit-opening position if normal contact pressure and travel are maintained. With more than four the operating spring should be adjusted to give the correct back contact follow.

If a relay has been dismantled and is being reassembled, the following adjustments should be made or checked. Reference should be made to Figs. 1 and 2 for identification of the parts mentioned in these instructions.

The armature stop nut should be adjusted so that

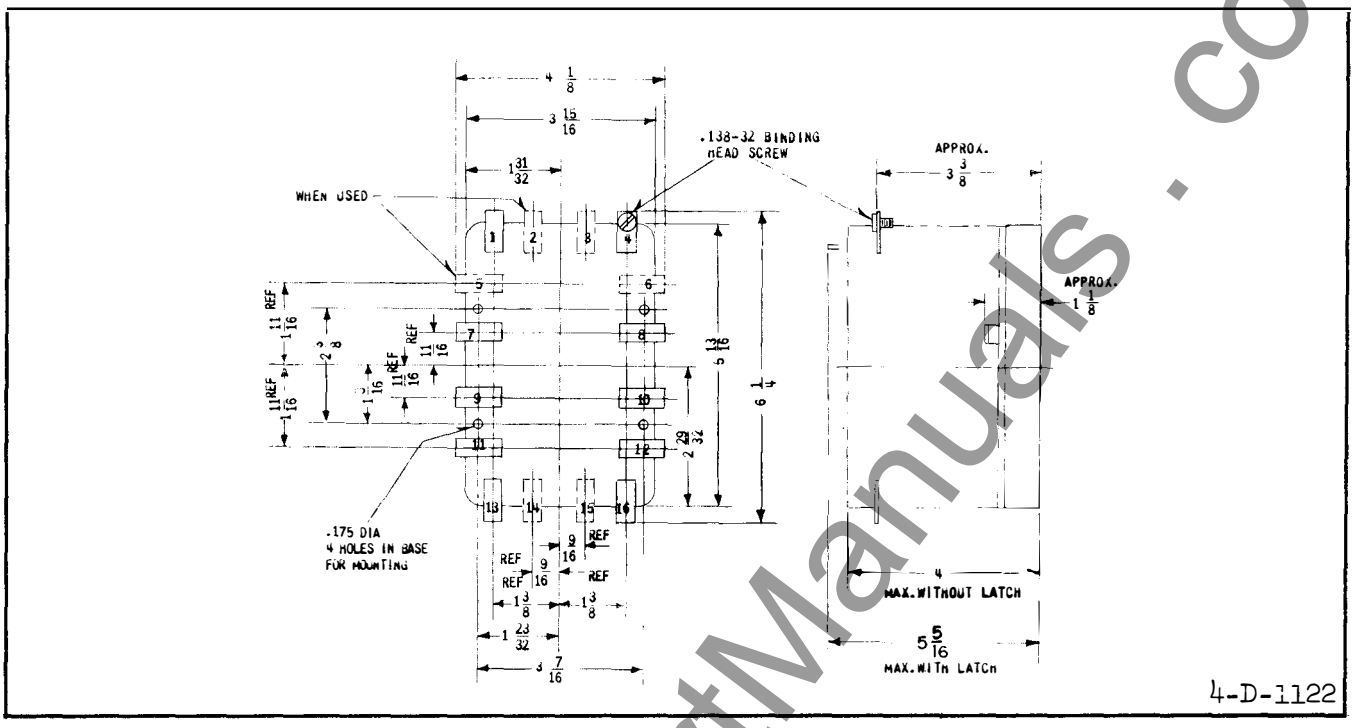


Fig. 9. Outline and Drilling Plan for the Type MG-6 Relay in the Front Connected Molded Case. See Internal Schematic for Terminals Supplied. For Reference Only.

when the armature is in contact with it, the lower edge of the armature is 7/16'' above the position which it assumes when the relay is energized. When adjusting the armature spring tension, the locking screw for the spring adjusting screw is loosened, and this adjusting screw is turned (inward, to reduce the spring tension) until the spring barely holds the armature against the stop nut. The relay must be in its normal vertical position when this adjustment is made, with all contacts assembled as circuit-closing. The armature spring should then be tightened by turning the adjusting screw 4 turns counter-clockwise for a-c relays or 2 turns for d-c relays, and the locking screws should be tightened. If the relay is being used with a number of break contacts, it may be necessary to increase the spring tension to obtain full follow on the break contacts. The adjusting screw should be turned just enough farther to obtain full follow with the armature against the stop nut.

The follow of the moving contact fingers should be 3/32" for the make contacts and 1/16" for the break contacts, measured at the contacts. This can be checked more conveniently by measuring the travel of the lower edge of the armature after the contacts touch. This should be approximately 1/8" for the make contacts and 3/32" for the break contacts. In case moving contact fingers have been removed from their guide pins, it is important that the coil springs on the two sides of the fingers be replaced correctly. The springs which are compressed by circuit-closing contacts are approximately three times as strong as the ones compressed by circuit-opening contacts and thus they can be readily distinguished. The positions of the two springs are reversed at the two ends of the relay.

When special contacts are supplied for make-before-break operation, the stationary members of the special contacts are bent equally toward their respective moving contacts to obtain "make" at the point where the "break" moving contact has approximately 1/16" follow before parting from its stationary contact.

If an a-c relay is to be used with a series resistor so that the relay can be dropped out by shorting the coil, either the resistance value must be such that the watt consumption with the coil shorted will be quite high or the relay armature spring tension must be reduced to about 1-1/2 turns and the follow of the stationary make contacts must be reduced (by bending) to about 1/16". With the reduced armature spring tension, not more than two of the contacts can be used as break contacts. Because of the low relay impedance with armature open as compared to the impedance with armature closed, it is not advantageous to use a resistor in series with a coil rated at less than line voltage, as in the case of d-c applications. For the contact and spring adjustments

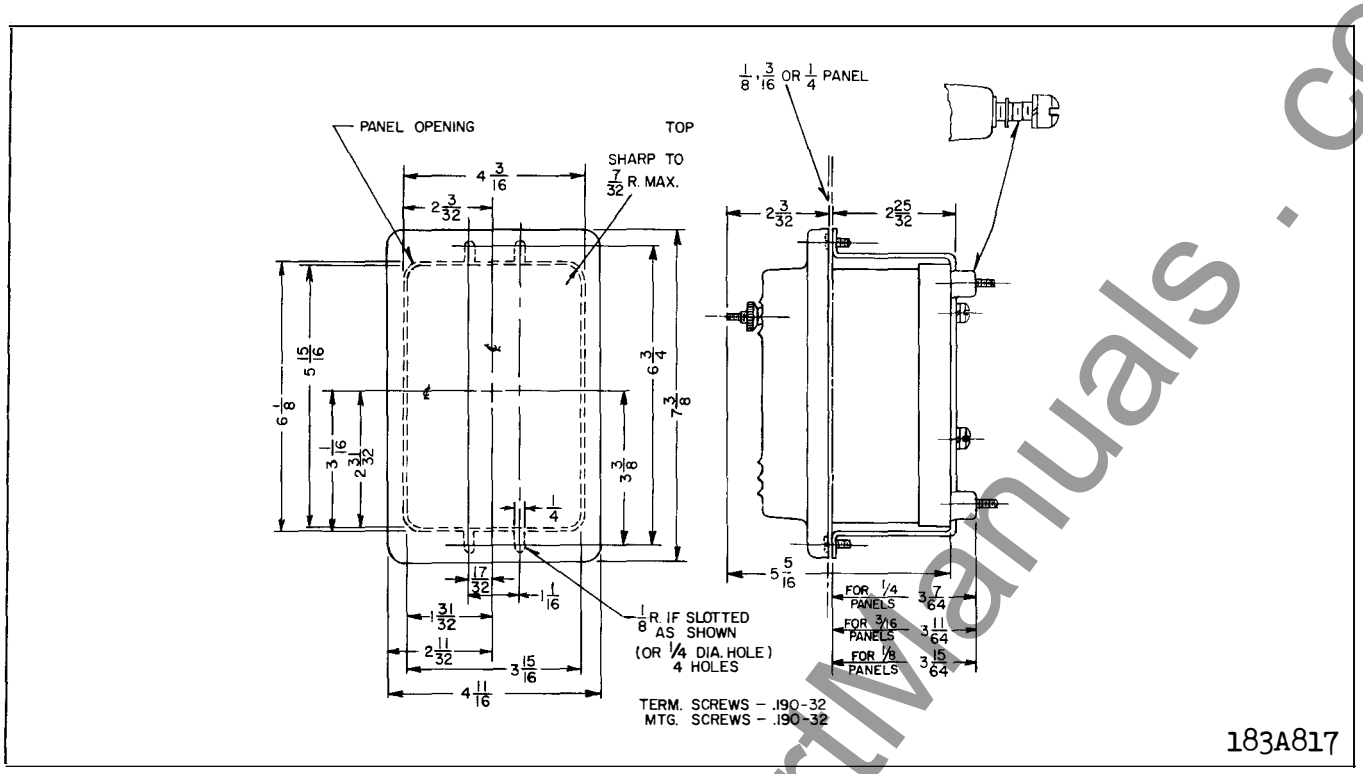


Fig. 10. Outline and Drilling Plan for the Molded Semi-Flush Case. For Reference Only.

specified above, a 60 cycle MG relay with voltage rating equal to the line voltage can be used with a series resistor which will take about 90 watts when directly across the line. Of course, if the coil will be shorted only momentarily or if a higher watt consumption is not objectionable, it may be unnecessary to reduce the spring tension or contact follow.

If the complete armature assembly is to be removed from the relay, the screws which fasten the lower ends of the moving contact leads to the terminals should be removed, the armature spring tension adjusting screw should be turned in as far as possible, and the armature stop nut should be removed. The upper end of the armature spring should then be slipped off of the grooved member at the lower end of the adjusting screw, and the armature should be lifted off of its bearing carefully so as to avoid distortion of the coiled leads. The leads to the upper center moving contacts are not coiled but the coiling of the four other moving contact leads should be such that when the relay base is horizontal and the armature is on its bearings and approximately at its mid-position, the lead terminals will just touch the base terminal inserts or be within about 1/8" of that position.

On latch-type relays the latch screw is adjusted so that with the armature latched and the operating coil de-energized, there will be a gap of between .005 and .015 inch between the electromagnet pole face and the raised section of the armature which strikes the pole face. The locking screw should be tightened securely after making this adjustment. There is a small amount of clearance between the armature and its supporting posts, and in order to insure proper operation allowance must be made for this in the following manner. With the armature held against its left-hand support and nearly closed, the latch spring or reset armature should be moved to the left as far as it will go by means of the hand reset. To assure that the latch will always release the armature the resulting space between the latch and the latch screw * should be at least .010 inch, and should not be more than about 1/64". This should also be checked electrically if electrical reset is provided. Some change of this gap can be made by loosening the mounting screws in the relay base and moving the latch support in the desired direction. The gap also can be changed by loosening the two screws which hold the moving contact insulation block to the armature and shifting the armature in the desired direction.

On electrical reset relays, the tension of the spring which draws the reset armature toward the

latch screw must be adjusted if these parts are being reassembled. The locking screw (Fig. 2) is screwed out until its head clears the head of the adjusting screw. The main armature is then held completely closed and against its right hand support, and the latch spring tension adjusting screw is turned until the latch barely touches the stop projecting from the center of the latch screw. Then the latch spring tension should be increased by turning the screw clockwise 9 turns, and the locking screw should be tightened.

If either the core nut of the electrical reset assembly or the screws which mount its armature have been loosened, the relative positions of the core and plunger may shift sufficiently to cause the plunger to strike on the side of the conical core opening. To assure correct alignment of these parts, .042 diameter holes are provided through the center of the core and about 1/16" deep in the center of the plunger. After tightening the core nut, a close fitting pin should be inserted through the core and into the plunger. With the pin in place, and plunger pressed firmly against the core, and the mounting end of the armature centrally located with respect to the electromagnet, the two armature mounting screws should be tightened. The pin then should be removed.

A small amount of silicone oil is supplied at the factory to the polished and hardened surfaces of the latch screw and the latch plate to minimize wear and as protection against corrosion. Oil should be reapplied after any cleaning and reassembling of these parts, and it is desirable also to renew this at the regular maintenance periods.

If the relay is provided with a coil interrupting contact, the following points must be observed to assure satisfactory operation. With the relay in its normal operating position and the armature shifted to the extreme right, align the armature "snap" spring so that it is at least 1/64 inch in from the right hand edge of the moving contact spring. With an .030 inch gap between the armature and the lower pole face of the electromagnet, adjust the bracket by means of the adjusting screw, until the snap spring just passes the roller. The latch screw should be adjusted so that with the armature in the latched position and the operating coil deenergized, the gap between the armature and the lower pole face of the electromagnet is .010 to .015 inch. With the armature in this position the coil interrupting contact should be open at least 3/64 inch.

All contacts should be periodically cleaned. A contact burnisher S#182A836H01 is recommended for this purpose. The use of abrasive material for cleaning contacts is not recommended, because of the danger of embedding small particles in the face of the soft silver and this impairing the contact.

REPAIRS AND RENEWAL PARTS

Repair work can be done most satisfactorily at the factory. However, interchangeable parts can be furnished to the customers who are equipped for doing repair work. When ordering parts, always give the complete nameplate data.

* ENERGY REQUIREMENTS

Operating Coil Burdens at rated Voltage

Frequency (Hertz)	Closed Gap		Open Gap	
	Watts	Volt-Amps	Watts	Volt-Amps
25	6.8	23	19.6	53
50	9.8	31	17.4	78
△60	12	37	17.6	92
dc	7.8 cold--		7.8 cold--	
dc	6.5 hot--		6.5 hot--	

△ Rated voltage is 115 volts or its multiples.

Reset Coil Burdens at Rated Voltage (Multiples)

Frequency (Hertz)	Closed Gap		Open Gap	
	Watts	Volt-Amps	Watts	Volt-Amps
25	48	51.6	52	54
50	46	58.2	57	63.8
60	84	104.5	96	112.8
dc	66 cold--		68 cold--	

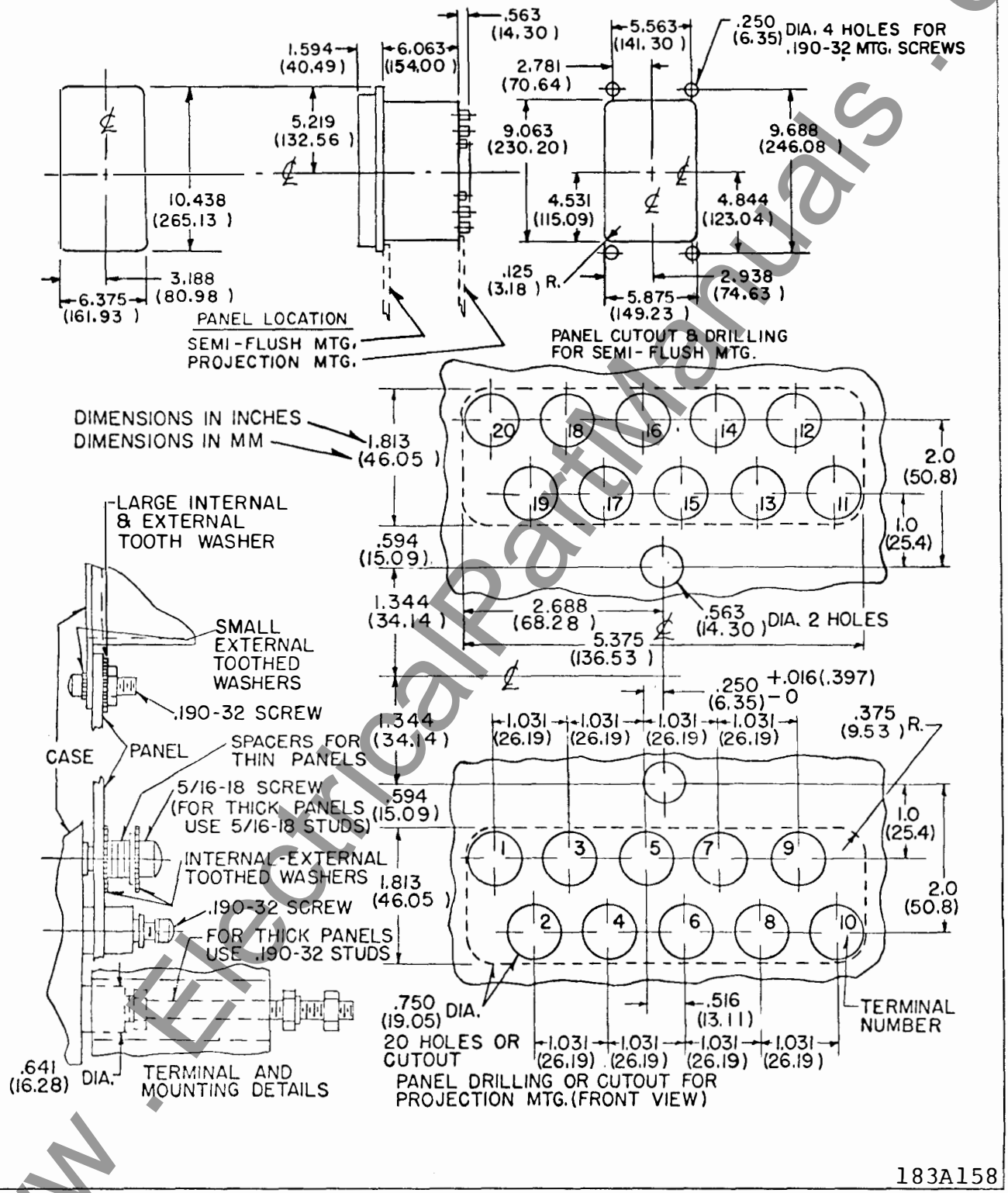


Fig. 11. Outline and Drilling Plan for the Type MG-6 Relay in Type FT22 Case.

WESTINGHOUSE ELECTRIC CORPORATION

RELAY-INSTRUMENT DIVISION **NEWARK, N. J.**

Printed in U.S.A.

INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

TYPE MG-6 MULTI-CONTACT AUXILIARY RELAY

CAUTION Before putting relays into service, remove all blocking which may have been inserted for the purpose of securing the parts during shipment, make sure that all moving parts operate freely, inspect the contacts to see that they are clean and close properly, and operate the relay to check the settings and electrical connections.

APPLICATION

The type MG-6 relay is designed for applications where several independent circuits must be energized or de-energized upon the operation of a single primary relay contact, or where the capacity of the primary relay contact is inadequate for the energy required in a control circuit. In certain applications these relays may be used directly as primary relays. Since the stationary contacts can readily be reversed so as to be suitable for either circuit opening or circuit closing service (although a slight increase in spring tension may be required on the D-C MG-6 relay — see "ADJUSTMENTS AND MAINTENANCE"), it is unnecessary to predetermine the arrangements of the circuits for which the relay is to be used.

In the usual application of the relay, the armature resets when the operating coil is de-energized. However, the relays may be supplied with a latching mechanism which holds the armature in the operated position until the latch is tripped, either by hand or electrically.

An operating coil cutoff contact can be supplied with the electric-reset type, where an intermittent duty coil is required for faster than normal operation, but where the operating coil circuit must be energized continuously. An operating coil, rated at 19% of supply rating may be applied, with a maximum duty of 10,000 operations. (e.g. 24 volt coil on 125 volt dc circuit.

CONSTRUCTION AND OPERATION

The operating electromagnet is at the lower end of the relay, as shown in Fig. 1. The stationary iron circuit is built up of U-shaped punchings. These are slotted at the outer end of the lower leg to receive the copper lag loops used to obtain quiet operation on A-C. The operating coil is mounted on this leg of the punchings. In order to improve the performance of the relay on D-C, the pole face area is increased by means of an iron plate. This plate is assembled at the end of the coil and the corners of the lamination side plates are bent outward, serving to hold the plate in place. The inner end of the upper leg of the punching assembly is shaped so that the lower end of the armature restraining spring can be hooked over it.

The armature is made of high-silicon steel. Projecting sections on the sides, near the center, act as knife-edge bearings and rest on suitably shaped supports which are a part of the moulded base. A stud attached to the lower leg of the electromagnet extends through a hole in the lower end of the armature, and a stop-nut on the outer end of this stud is used to limit and adjust the travel of the armature in the de-energized direction. The special stop nut used will remain at any position in which it is placed without additional locking means.

The upper end of the armature carries an adjusting screw to which one end of the armature restraining spring is attached. In the hand or electrically reset relays, a latch screw is mounted at the extreme end of the armature. In the self-reset relays this screw is replaced by a set screw which serves to separate the locking plate (see Fig. 1) slightly from the armature. Between the spring adjusting screw and the latch screw (or set screw), there is a third screw which when tightened applies pressure to the threads of the former screws and effectively locks them against turning.

The moving contact fingers are mounted on moulded insulation which is fastened to the armature

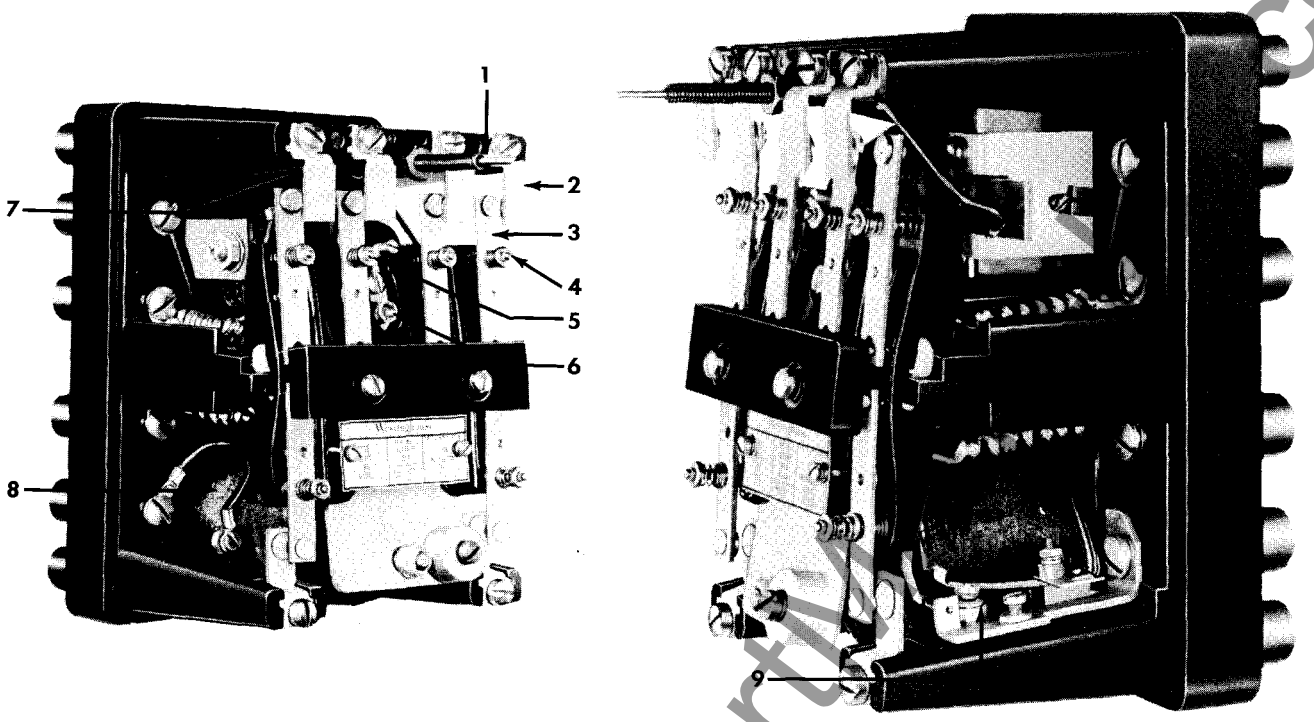


Fig. 1. Front View (Cover Omitted) and Side View of the MG-6 Electric & Hand Reset Relay in Molded Case. 1 – Reset push rod, 2 – stationary contact, 3 – moving contact, 4 – moving contact spring assembly, 5 – latch adjustment screw, 6 – adjusting screw for armature spring tension, 7 – reset coil, 8 – operating coil, 9 – optional operating coil cut-off contact.

by two screws. Silver contact buttons are on both sides of these fingers so that they can be used for either a circuit-opening or a circuit-closing contact. The fingers are assembled on guide pins, between two springs in such a way that definite spring compression and contact wipe is assured for either contact-closing or contact-opening service. Flexible leads assemblies are welded to the contact fingers. Since the armature assembly has contact fingers both above and below the bearing points, the armature weight is partially balanced about the bearings and there is less tendency for severe shocks to move the armature.

The stationary contacts consist of large silver buttons welded to brackets which can be assembled so that they close with the moving contacts when the armature is in either the energized or de-energized position. The stationary contact brackets are connected directly to the terminal inserts by means of long screws which pass through brass tubes. These tubes are of such length that the moulded material of the base is not under direct compression when the screws are tightened. Therefore, there is always a tight connection from contact to terminal regardless of possible shrinkage or other variation in the moulded base material. The contact bracket is held against its seat by means of a spring ring which is compressed between shoulders in the base and on the hexagonal terminal insert.

The construction of the latch and electrical reset is shown in Fig. 2, in which the lower portion is a partial front view of the relay in the moulded case, and the upper portion a top view. In the latter view, the latch screw (in the main armature) is in the energized position, and the reset armature is free to be moved to the right by the tension spring until the hardened latch plate on the reset armature rests against the tip of the latch screw. When the operating coil is de-energized, the latch screw will move slightly so that its shoulder rests on the edge of the latch plate. When the reset coil is energized its armature moves to the left, thus permitting the main armature to return to its open position. Pressing the reset push rod, which extends through the cover stud, will also release the latch through the medium of the reset lever shown in the figure.

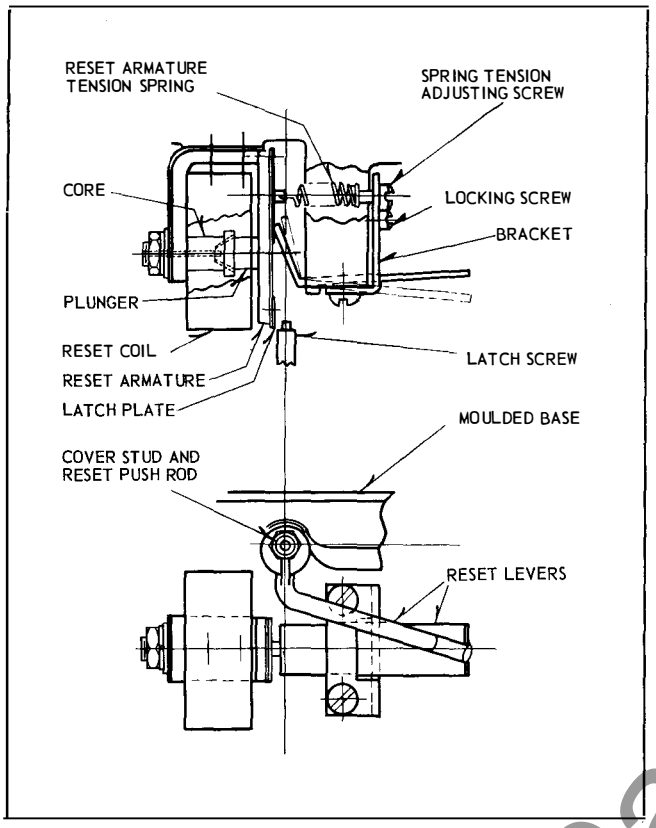
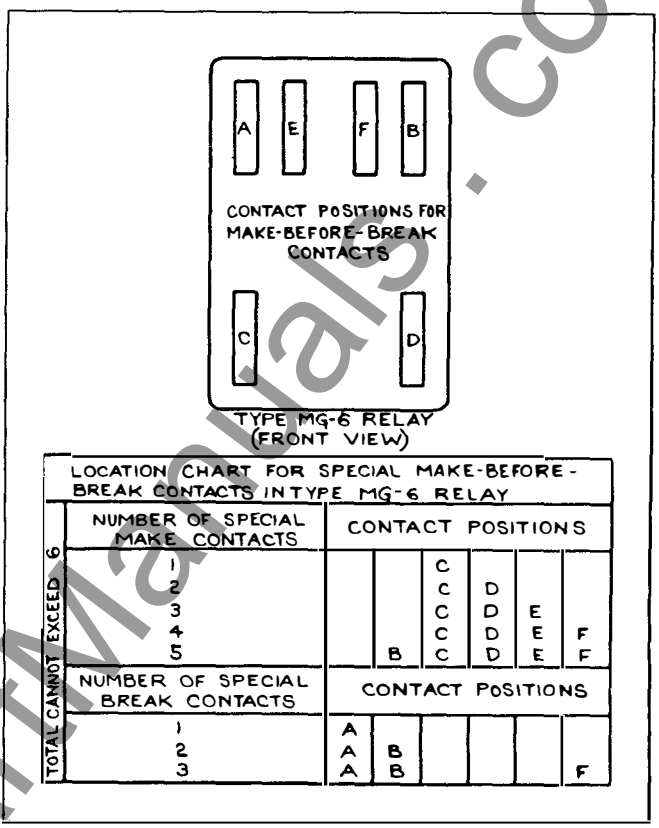


Fig. 2. Detail Views of the Latch and Electrical Reset of the Type MG-6 Relay.



LOCATION CHART FOR SPECIAL MAKE-BEFORE-BREAK CONTACTS IN TYPE MG-6 RELAY

TOTAL CANNOT EXCEED 6

NUMBER OF SPECIAL MAKE CONTACTS	CONTACT POSITIONS					
1			C	D		
2			C	D	E	
3			C	D	E	F
4		B	C	D	E	F
5		B	C	D	E	F
NUMBER OF SPECIAL BREAK CONTACTS	**CONTACT POSITIONS**					
1	A					
2	A	B				
3	A	B				F

Fig. 3. Contact Positions for Combinations of Make-Before-Break Contacts.

In some applications of the relay with latch and electrical reset, it may be desirable to have the operating and reset coils deenergized automatically as soon as they have performed their functions. In the case of the reset coil this can be accomplished by connecting the coil through one of the relay "make" contacts. An auxiliary contact is required to open the operating coil circuit. This contact, when provided, is assembled on the lower right-hand side of the relay, and is held in position by the terminal screw to which the right-hand coil lead ordinarily connects. The coil lead is connected to the moving contact of the auxiliary contact, and the end of the stationary contact bracket is in contact with the head of the terminal screw. The auxiliary contact is closed when the main armature is open. When the armature approaches the closed position, the spring on the molded insulation block snaps off the roller and causes the contacts to open and interrupt the operating coil current. When this auxiliary contact is used, a weight is screwed to the lower end of the armature to increase its mass and stabilize contact action. This contact will interrupt the coil current at up to five times rated coil voltage.

In certain applications of the type MG-6 relay, it may be desirable to have one or more of the contacts close before other contacts on the same relay open. A special armature assembly is required to obtain such operation, and the number of special make and break contacts desired must be known when the relay is built. The special moving contacts have longer follow than the standard contacts and greater armature spring tension is required for full deflection of the break contacts. Consequently, it is preferable to limit the number of special break contacts to two. A maximum of three may be used, although the increased armature spring tension needed may raise the minimum pick-up voltage above the standard value. As many as five contacts may be special make contacts, with the total of special make and break contacts limited to six, of course. The locations of the make and break contacts for any combination of these special contacts are shown in Fig. 3. This figure indicates the physical location of the contacts in the relay, and can be used in conjunction with the inter-

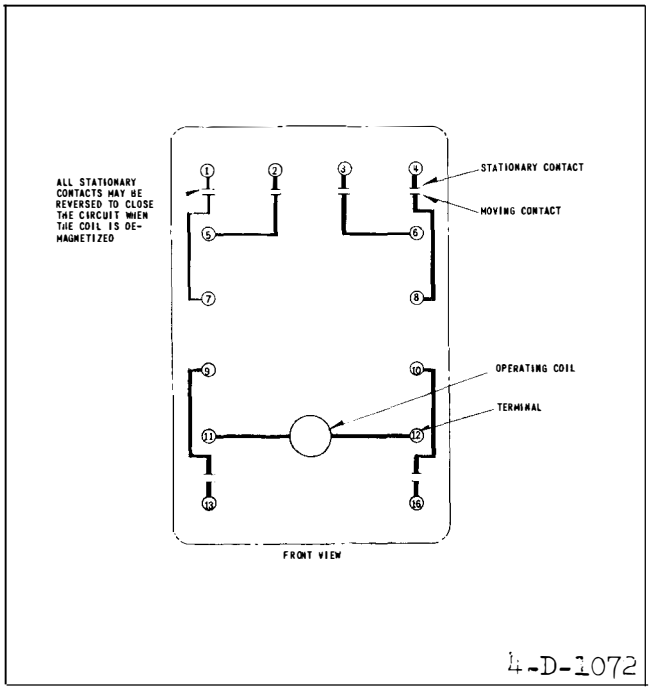


Fig. 4. Internal Schematic of the Type MG-6 Relay, Without Electrical Reset, in Molded Case.

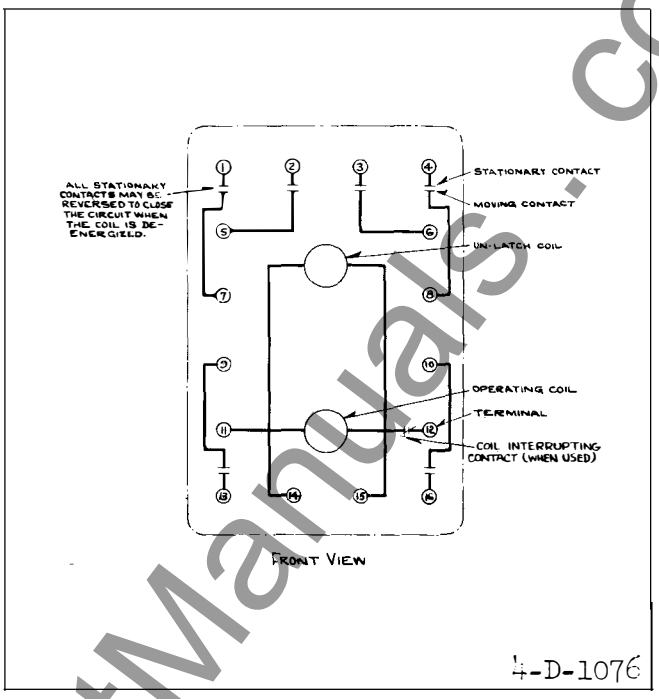


Fig. 5. Internal Schematic of the Type MG-6 Relay, With Electrical Reset, in Molded Case.

nal schematic diagram for the type of case involved to determine the corresponding terminal locations.

The type MG-6 relay may be provided without cover, for front connection, or in a variety of completely closed cases, for rear connection. The moulded base for rear connection is shown in Fig. 1. The base for front connection is similar except that there are no terminals projecting in the rear. This same base is also used as a sub-base when the relays are supplied in the FT22 case.

CHARACTERISTICS

The type MG-6 relay has an operating time of approximately 2 cycles on a-c and 5 cycles on d-c (on a 60 cycle basis) when energized at the rated voltage.

If faster operation is desired and if the application requires only intermittent energization of the relay, the operating coils may be energized at higher than rated voltage. (1) Twice rated voltage will give an operating time of approximately 1 cycle on a-c, and the coil will stand this voltage safely for over two minutes if 60 cycles or 4 minutes if 25 cycles. (2) The time of the d-c relay can be reduced to slightly over 1 cycle if the coil is energized at five times rated voltage. The coil will stand this voltage for one minute. If faster time is desired on a d-c relay which must be energized continuously, the use of a low voltage coil with a series resistor will reduce the time. With 10% of the line voltage across the relay coil and the balance across a series resistor, the reduced inductance of the circuit results in an operating time of approximately 2 cycles. The time of operation may be reduced to approximately one cycle by applying 4 or 5 times rated d-c voltage to the coils through the coil interrupting contact.

Reset coils are for intermittent duty only and should not be energized longer than one-half minute.

The relay contacts will close circuits carrying 30 amperes. They will carry this current for 1 minute, and will carry 12 amperes continuously.

The contacts will interrupt the following currents, in non-inductive circuits, at the voltages listed:

Current	Volts A-C
30	115
20	230
15	460
10	575

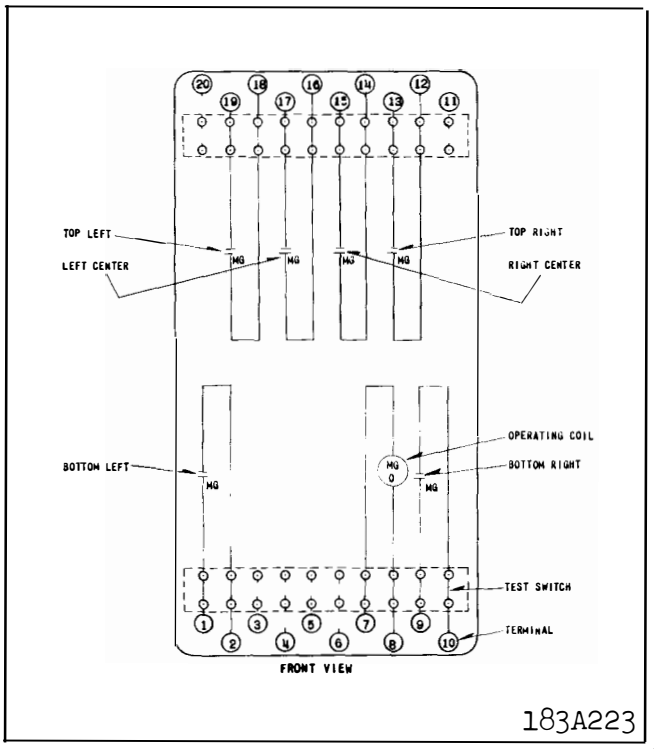


Fig. 6. Internal Schematic of the Type MG-6 Relay, Without Electrical Reset, in FT22 Case.

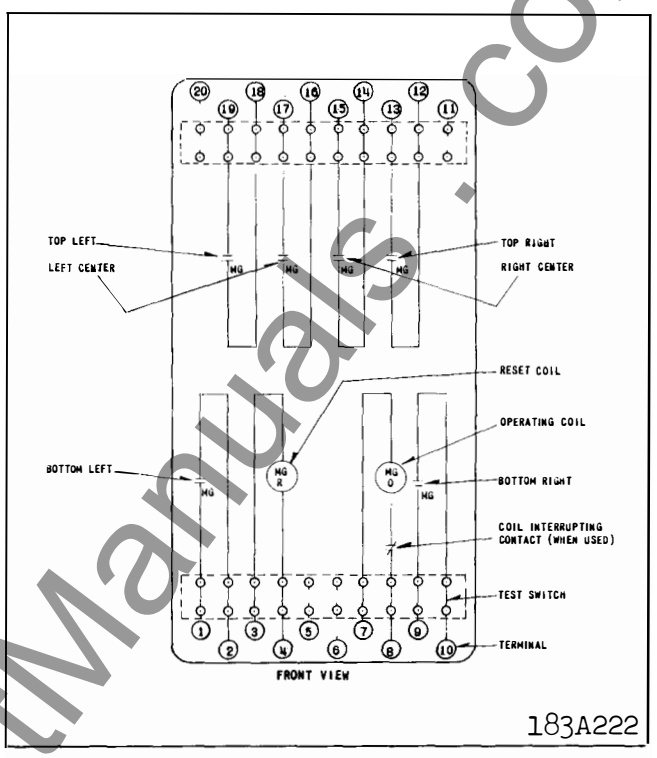


Fig. 7. Internal Schematic of the Type MG-6 Relay, With Electrical Reset, in FT22 Case.

Current	Volts D-C
30	12
15	24
10	32
8	48
3	125
1	250

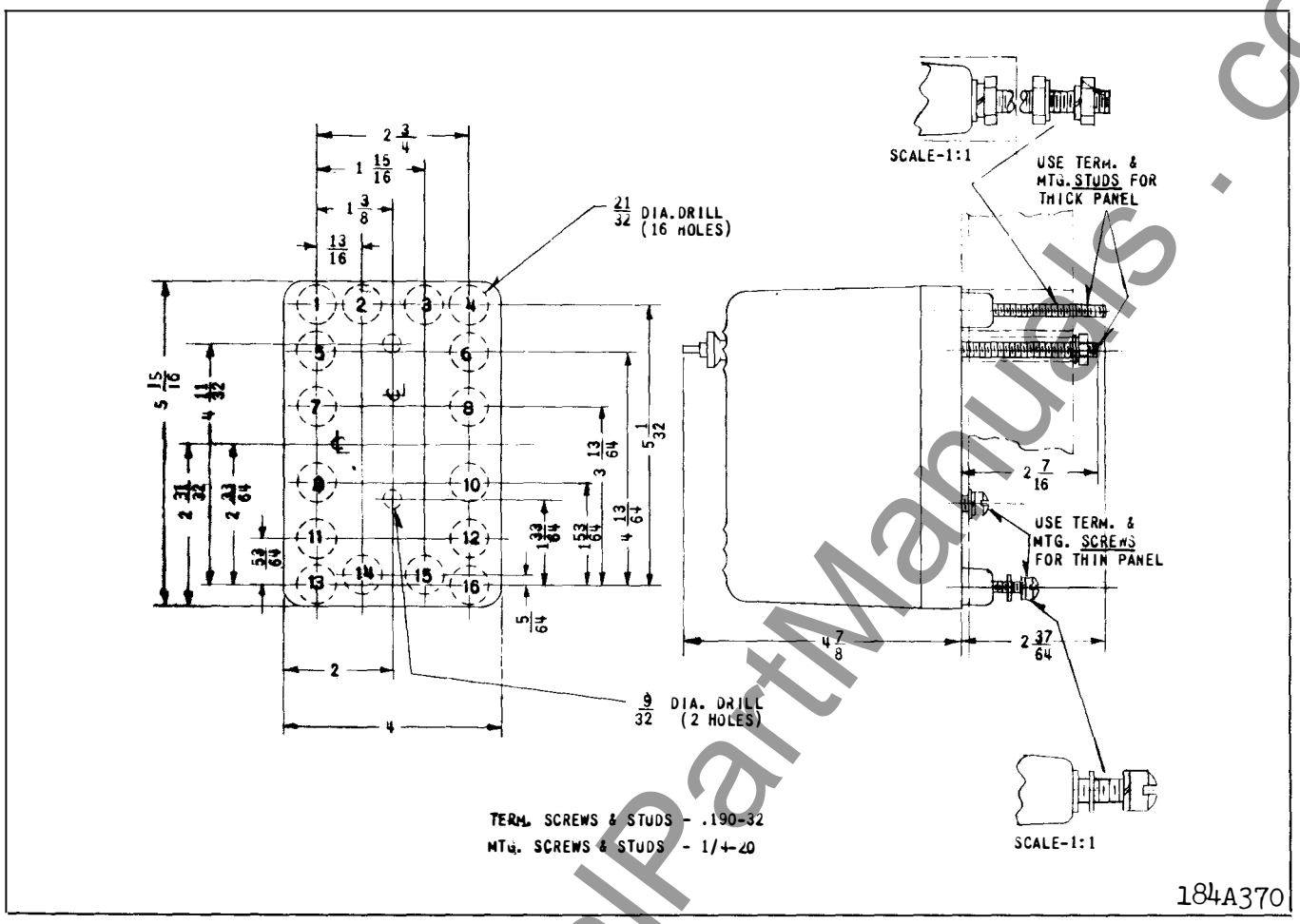
The type MG-6 relay for a-c can be used with any combination of contacts, but the d-c relay can have up to four circuit-opening contacts with the normal operating spring adjustment. With more than four the operating spring should be adjusted to give the correct back contact follow.

INSTALLATION

The relays should be mounted on switchboard panels or their equivalent in a location free from dirt, moisture, excessive vibration. and heat. Mount the relay vertically by means of the four mounting holes on the flange for semi-flush mounting or by means of the rear mounting stud or studs for projection mounting. Either a mounting stud or the mounting screws may be utilized for grounding the relay. The electrical connections may be made directly to the terminals by means of screws for steel panel mounting or to the terminal studs furnished with the relay for thick panel mounting. The terminal studs may be easily removed or inserted by locking two nuts on the stud and then turning the proper nut with a wrench.

For detailed FT case information refer to I.L. 41-076.

Relays in the rear-connected moulded cases should be mounted and electrically connected similar to the other projection cases. The lower mounting stud may be used to ground the electromagnet iron. The hexagon-shaped terminal inserts are slightly loose in the base but this does not affect the electrical connections. Only the two mounting studs should be used to secure the relay to the panel. Removal of terminal insert end-play (in the case of thick-panel mounting) by turning a nut on the terminal stud tightly against a large diameter washer (not supplied) at the rear of the panel should not be attempted as this may distort the relay base and affect the adjustments, or possibly damage the relay. Relays in the front-connected moulded cases should be



** Fig. 8. Outline and Drilling Plan for the Type MG-6 Relay in the Rear Connected Molded Case. For Reference Only.*

mounted by four screws through the sides of the base as indicated in the drilling plan.

ADJUSTMENTS AND MAINTENANCE

The relays are shipped from the factory correctly adjusted for armature travel and for contact follow and pressure, and it should not be necessary to disturb these adjustments. The relays normally are shipped with all contacts assembled for circuit-closing operation. To convert them for circuit-opening operation, it is necessary merely to loosen the mounting screw for the stationary contact bracket, turn this bracket over, and tighten the screw. After reversing the position of the contact brackets, it may be necessary to bend them slightly to obtain contact follows approximately as stated in the fourth paragraph of this section. On a d-c relay not more than four contacts can be assembled in the circuit-opening position if normal contact pressure and travel are maintained. With more than four the operating spring should be adjusted to give the correct back contact follow.

If a relay has been dismantled and is being reassembled, the following adjustments should be made or checked. Reference should be made to Figs. 1 and 2 for identification of the parts mentioned in these instructions.

The armature stop nut should be adjusted so that when the armature is in contact with it the lower edge of the armature is 7/16" above the position which it assumes when the relay is energized. When adjusting the armature spring tension, the locking screw for the spring adjusting screw is loosened, and this adjusting screw is turned (inward, to reduce the spring tension) until the spring barely holds the armature against the stop nut. The relay must be in its normal vertical position when this adjustment is made, with

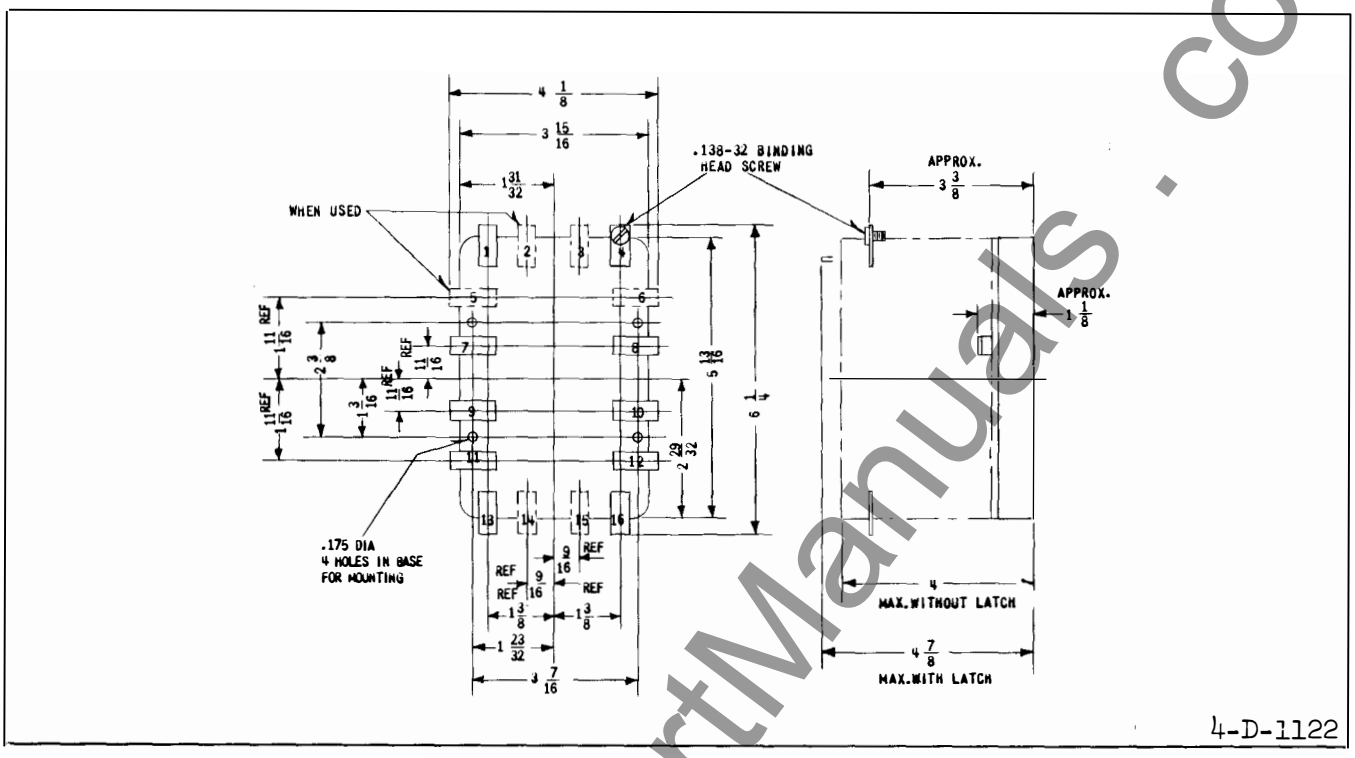


Fig. 9. Outline and Drilling Plan for the Type MG-6 Relay in the Front Connected Molded Case. See Internal Schematic for Terminals Supplied. For Reference Only.

all contacts assembled as circuit-closing. The armature spring should then be tightened by turning the adjusting screw 4 turns counter-clockwise for a-c relays or 2 turns for d-c relays, and the locking screws should be tightened. If the relay is being used with a number of break contacts, it may be necessary to increase the spring tension to obtain full follow on the break contacts. The adjusting screw should be turned just enough farther to obtain full follow with the armature against the stop nut.

The follow of the moving contact fingers should be 3/32" for the make contacts and 1/16" for the break contacts, measured at the contacts. This can be checked more conveniently by measuring the travel of the lower edge of the armature after the contacts touch. This should be approximately 1/8" for the make contacts and 3/32" for the break contacts. In case moving contact fingers have been removed from their guide pins, it is important that the coil springs on the two sides of the fingers be replaced correctly. The springs which are compressed by circuit-closing contacts are approximately three times as strong as the ones compressed by circuit-opening contacts and thus they can be readily distinguished. The positions of the two springs are reversed at the two ends of the relay.

When special contacts are supplied for make-before-break operation, the stationary members of the special contacts are bent equally toward their respective moving contacts to obtain "make" at the point where the "break" moving contact has approximately 1/16" follow before parting from its stationary contact.

If an a-c relay is to be used with a series resistor so that the relay can be dropped out by shorting the coil, either the resistance value must be such that the watt consumption with the coil shorted will be quite high or the relay armature spring tension must be reduced to about 1-1/2 turns and the follow of the stationary make contacts must be reduced (by bending) to about 1/16". With the reduced armature spring tension, not more than two of the contacts can be used as break contacts. Because of the low relay impedance with armature open as compared to the impedance with armature closed, it is not advantageous to use a resistor in series with a coil rated at less than line voltage, as in the case of d-c applications. For the contact and spring adjustments

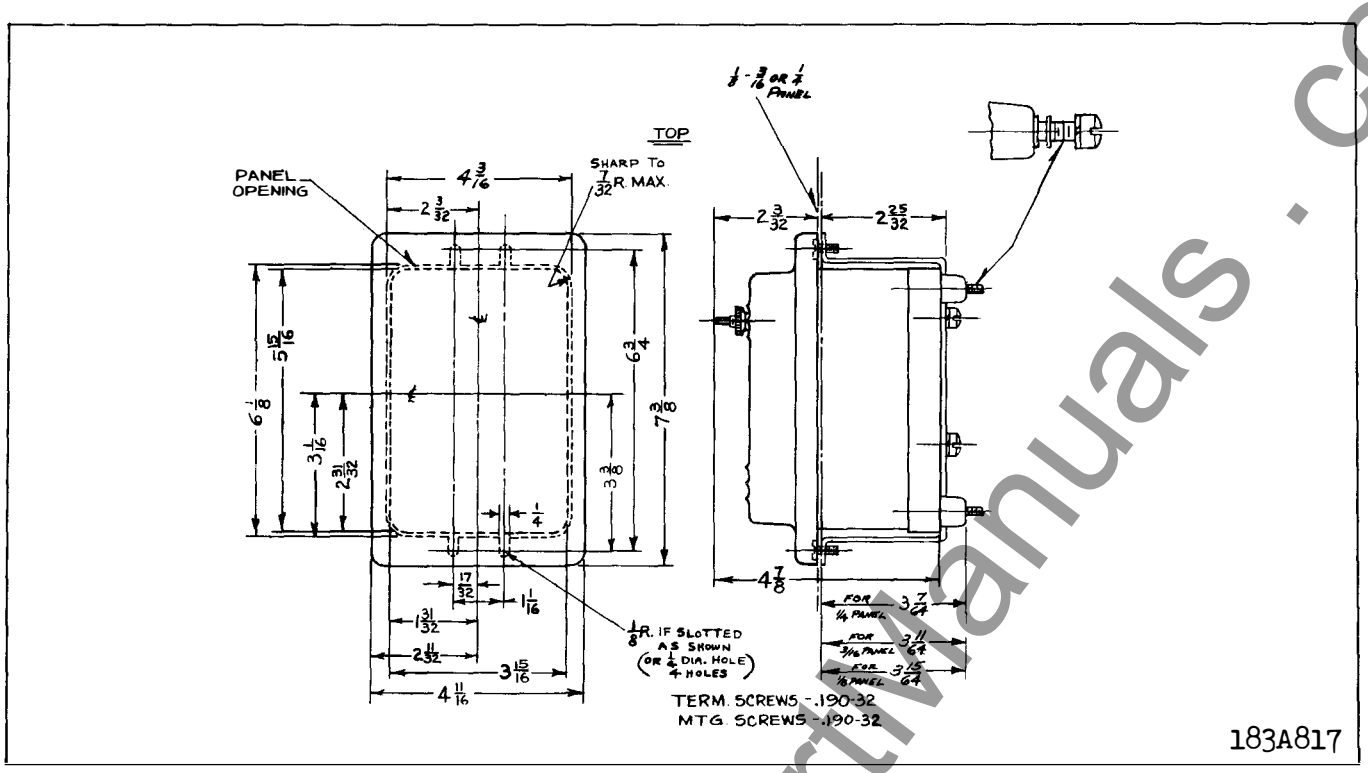


Fig. 10. Outline and Drilling Plan for the Molded Semi-Flush Case. For Reference Only.

specified above, a 60 cycle MG relay with voltage rating equal to the line voltage can be used with a series resistor which will take about 90 watts when directly across the line. Of course, if the coil will be shorted only momentarily or if a higher watt consumption is not objectionable, it may be unnecessary to reduce the spring tension or contact follow.

If the complete armature assembly is to be removed from the relay, the screws which fasten the lower ends of the moving contact leads to the terminals should be removed, the armature spring tension adjusting screw should be turned in as far as possible, and the armature stop nut should be removed. The upper end of the armature spring should then be slipped off of the grooved member at the lower end of the adjusting screw, and the armature should be lifted off of its bearing carefully so as to avoid distortion of the coiled leads. The leads to the upper center moving contacts are not coiled but the coiling of the four other moving contact leads should be such that when the relay base is horizontal and the armature is on its bearings and approximately at its mid-position, the lead terminals will just touch the base terminal inserts or be within about 1/8" of that position.

On latch-type relays the latch screw is adjusted so that with the armature latched and the operating coil de-energized, there will be a gap of between .005 and .010 inch between the electromagnet pole face and the raised section of the armature which strikes the pole face. The locking screw should be tightened securely after making this adjustment. There is a small amount of clearance between the armature and its supporting posts, and in order to insure proper operation allowance must be made for this in the following manner. With the armature held against its left-hand support and nearly closed, the latch spring or reset armature should be moved to the left as far as it will go by means of the hand reset. To assure that the latch will always release the armature the resulting space between the latch and the latch screw should be at least .005 inch, and should not be more than about 1/64". This should also be checked electrically if electrical reset is provided. Some change of this gap can be made by loosening the mounting screws in the relay base and moving the latch support in the desired direction. The gap also can be changed by loosening the two screws which hold the moving contact insulation block to the armature and shifting the armature in the desired direction.

On electrical reset relays, the tension of the spring which draws the reset armature toward the

latch screw must be adjusted if these parts are being reassembled. The locking screw (Fig. 2) is screwed out until its head clears the head of the adjusting screw. The main armature is then held completely closed and against its right hand support, and the latch spring tension adjusting screw is turned until the latch barely touches the stop projecting from the center of the latch screw. Then the latch spring tension should be increased by turning the screw clockwise 9 turns, and the locking screw should be tightened.

If either the core nut of the electrical reset assembly or the screws which mount its armature have been loosened, the relative positions of the core and plunger may shift sufficiently to cause the plunger to strike on the side of the conical core opening. To assure correct alignment of these parts, .042 diameter holes are provided through the center of the core and about 1/16" deep in the center of the plunger. After tightening the core nut, a close fitting pin should be inserted through the core and into the plunger. With the pin in place, and plunger pressed firmly against the core, and the mounting end of the armature centrally located with respect to the electromagnet, the two armature mounting screws should be tightened. The pin then should be removed.

A slight amount of medium viscosity slushing oil is supplied at the factory to the polished and hardened surfaces of the latch screw and the latch plate to minimize wear and as protection against corrosion. Oil should be reapplied after any cleaning and reassembling of these parts, and it is desirable also to renew this at the regular maintenance periods.

If the relay is provided with a coil interrupting contact, the following points must be observed to assure satisfactory operation. With the relay in its normal operating position and the armature shifted to the extreme right, align the armature "snap" spring so that it is at least 1/64 inch in from the right hand edge of the moving contact spring. With an .020 inch gap between the armature and the lower pole face of the electromagnet, adjust the bracket by means of the adjusting screw, until the snap spring just passes the roller. The latch screw should be adjusted so that with the armature in the latched position and the operating coil deenergized, the gap between the armature and the lower pole face of the electromagnet is .010 inch. With the armature in this position the coil interrupting contact should be open at least 3/64 inch.

All contacts should be periodically cleaned. A contact burnisher S#182A836H01 is recommended for this purpose. The use of abrasive material for cleaning contacts is not recommended, because of the danger of embedding small particles in the face of the soft silver and this impairing the contact.

REPAIRS AND RENEWAL PARTS

Repair work can be done most satisfactorily at the factory. However, interchangeable parts can be furnished to the customers who are equipped for doing repair work. When ordering parts, always give the complete nameplate data.

ENERGY REQUIREMENTS

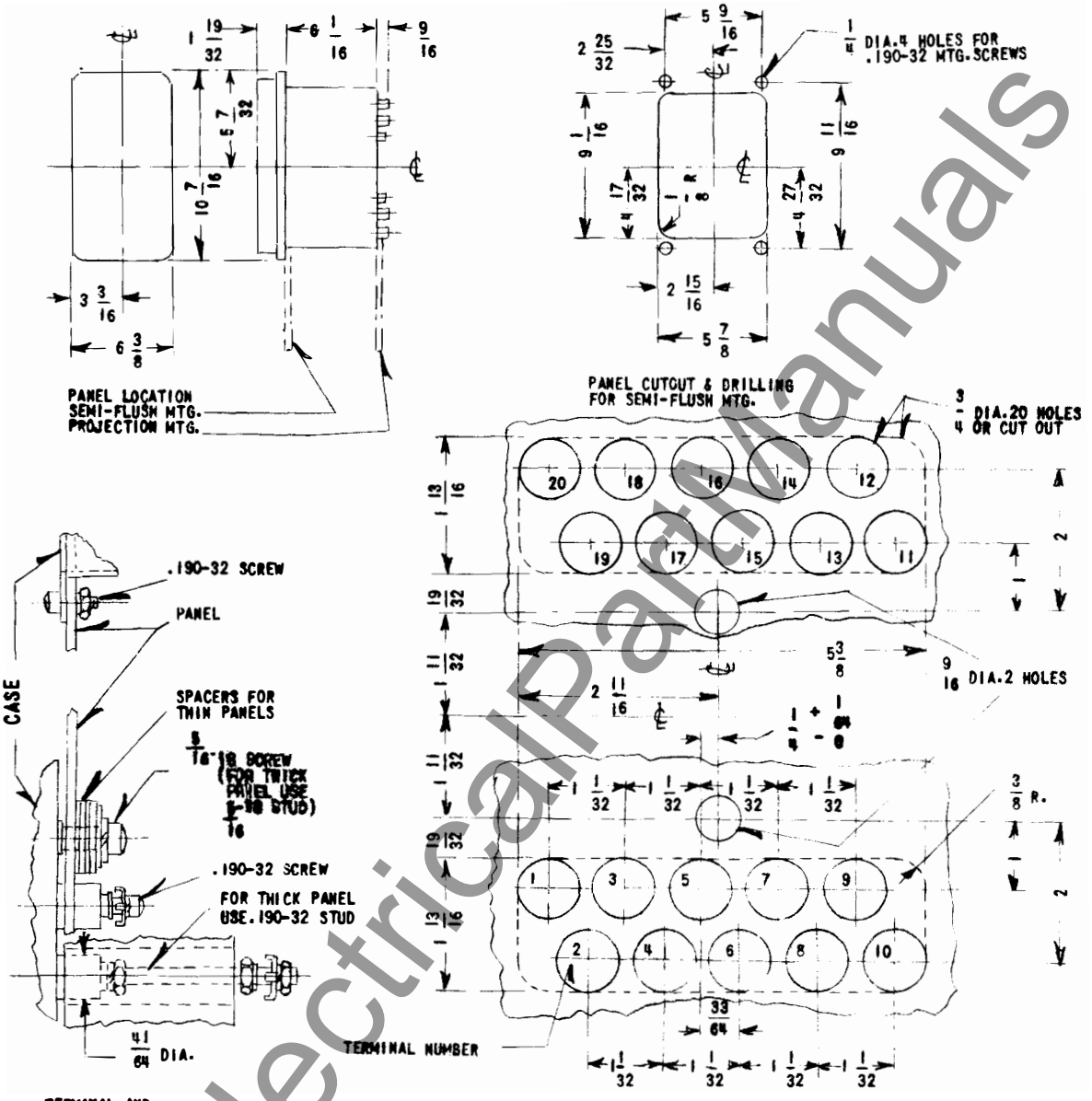
Operating Coil Burdens at rated Voltage

Frequency (cycles)	Closed Gap		Open Gap	
	Watts	Volt-Amps	Watts	Volt-Amps
25	6.8	23	19.6	53
50	9.8	31	17.4	78
△60	12	37	17.6	92
D-C	7.8 cold--		7.8 cold--	
D-C	6.5 hot--		6.5 hot--	

△Rated voltage is 115 volts or its multiples.

Reset Coil Burdens at Rated Voltage (Multiples)

Frequency (cycles)	Closed Gap		Open Gap	
	Watts	Volt-Amps	Watts	Volt-Amps
25	48	51.6	52	54
50	46	58.2	57	63.8
60	84	104.5	96	112.8
D-C	66 cold--		68 cold--	



183A158

* *Fig. 11. Outline and Drilling Plan for the Type MG-6 Relay in Type FT22 Case.*

WESTINGHOUSE ELECTRIC CORPORATION

RELAY-INSTRUMENT DIVISION **NEWARK, N. J.**

Printed in U.S.A.

INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

TYPE MG-6 MULTI-CONTACT AUXILIARY RELAY

CAUTION Before putting relays into service, remove all blocking which may have been inserted for the purpose of securing the parts during shipment, make sure that all moving parts operate freely, inspect the contacts to see that they are clean and close properly, and operate the relay to check the settings and electrical connections.

APPLICATION

The type MG-6 relay is designed for applications where several independent circuits must be energized or de-energized upon the operation of a single primary relay contact, or where the capacity of the primary relay contact is inadequate for the energy required in a control circuit. In certain applications these relays may be used directly as primary relays. Since the stationary contacts can readily be reversed so as to be suitable for either circuit opening or circuit closing service (although a slight increase in spring tension may be required on the D-C MG-6 relay — see "ADJUSTMENTS AND MAINTENANCE") it is unnecessary to predetermine the arrangements of the circuits for which the relay is to be used.

In the usual application of the relay, the armature resets when the operating coil is de-energized. However, the relays may be supplied with a latching mechanism which holds the armature in the operated position until the latch is tripped, either by hand or electrically.

An operating coil cutoff contact can be supplied with the electric-reset type, where an intermittent duty coil is required for faster than normal operation, but where the operating coil circuit must be energized continuously. An operating coil, rated at 19% of supply rating may be applied, with a maximum duty of 10,000 operations. (e.g. 24 volt coil on 125 volt dc circuit.

CONSTRUCTION AND OPERATION

The operating electromagnet is at the lower end of the relay, as shown in Fig. 1. The stationary iron circuit is built up of U-shaped punchings. These are slotted at the outer end of the lower leg to receive the copper lag loops used to obtain quiet operation on A-C. The operating coil is mounted on this leg of the punchings. In order to improve the performance of the relay on D-C, the pole face area is increased by means of an iron plate. This plate is assembled at the end of the coil and the corners of the lamination side plates are bent outward, serving to hold the plate in place. The inner end of the upper leg of the punching assembly is shaped so that the lower end of the armature restraining spring can be hooked over it.

The armature is made of high-silicon steel. Projecting sections on the sides, near the center, act as knife-edge bearings and rest on suitably shaped supports which are a part of the moulded base. A stud attached to the lower leg of the electromagnet extends through a hole in the lower end of the armature, and a stop-nut on the outer end of this stud is used to limit and adjust the travel of the armature in the de-energized direction. The special stop nut used will remain at any position in which it is placed without additional locking means.

The upper end of the armature carries an adjusting screw to which one end of the armature restraining spring is attached. In the hand or electrically reset relays, a latch screw is mounted at the extreme end of the armature. In the self-reset relays this screw is replaced by a set screw which serves to separate the locking plate (see Fig. 1) slightly from the armature. Between the spring adjusting screw and the latch screw (or set screw), there is a third screw which when tightened applies pressure to the threads of the former screws and effectively locks them against turning.

The moving contact fingers are mounted on moulded insulation which is fastened to the armature

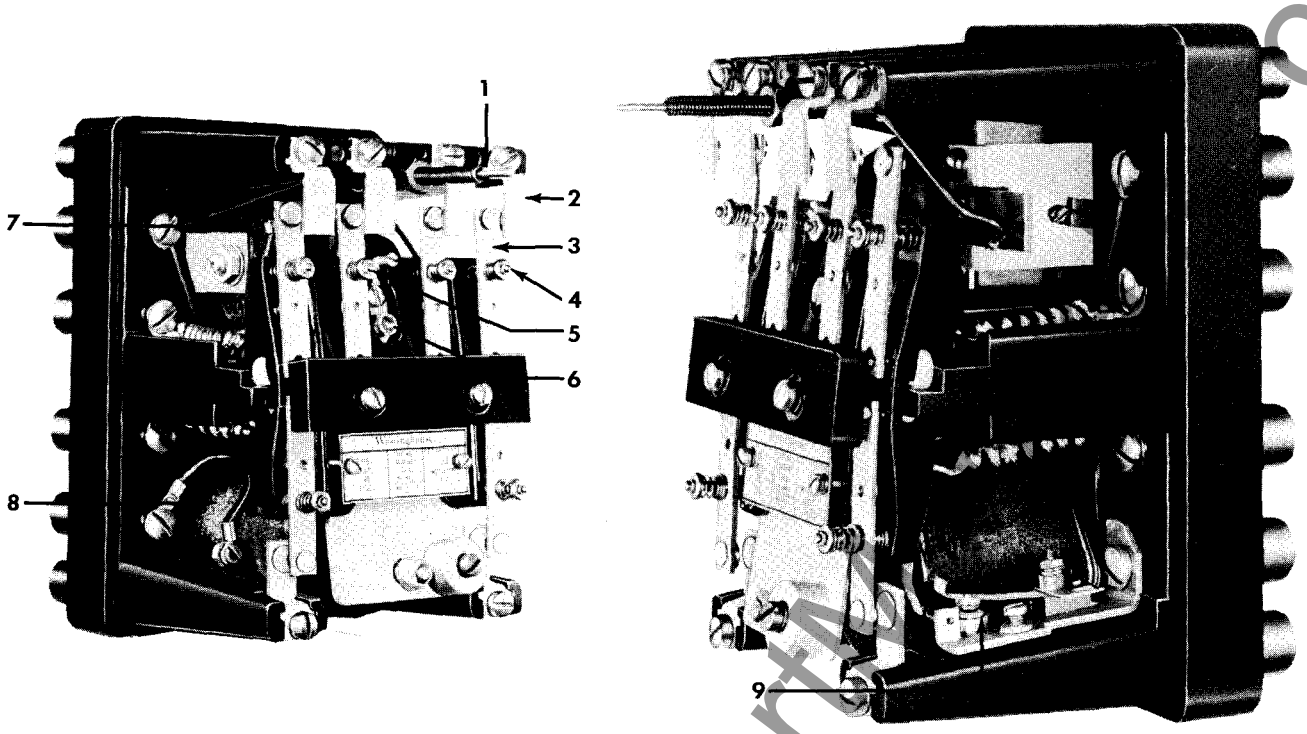


Fig. 1. Front View (Cover Omitted) and Side View of the MG-6 Electric & Hand Reset Relay in Molded Case. 1 – Reset push rod, 2 – stationary contact, 3 – moving contact, 4 – moving contact spring assembly, 5 – latch adjustment screw, 6 – adjusting screw for armature spring tension, 7 – reset coil, 8 – operating coil, 9 – optional operating coil cut-off contact.

by two screws. Silver contact buttons are on both sides of these fingers so that they can be used for either a circuit-opening or a circuit-closing contact. The fingers are assembled on guide pins, between two springs in such a way that definite spring compression and contact wipe is assured for either contact-closing or contact-opening service. Flexible leads assemblies are welded to the contact fingers. Since the armature assembly has contact fingers both above and below the bearing points, the armature weight is partially balanced about the bearings and there is less tendency for severe shocks to move the armature.

The stationary contacts consist of large silver buttons welded to brackets which can be assembled so that they close with the moving contacts when the armature is in either the energized or de-energized position. The stationary contact brackets are connected directly to the terminal inserts by means of long screws which pass through brass tubes. These tubes are of such length that the moulded material of the base is not under direct compression when the screws are tightened. Therefore, there is always a tight connection from contact to terminal regardless of possible shrinkage or other variation in the moulded base material. The contact bracket is held against its seat by means of a spring ring which is compressed between shoulders in the base and on the hexagonal terminal insert.

The construction of the latch and electrical reset is shown in Fig. 2, in which the lower portion is a partial front view of the relay in the moulded case, and the upper portion a top view. In the latter view, the latch screw (in the main armature) is in the energized position, and the reset armature is free to be moved to the right by the tension spring until the hardened latch plate on the reset armature rests against the tip of the latch screw. When the operating coil is de-energized, the latch screw will move slightly so that its shoulder rests on the edge of the latch plate. When the reset coil is energized its armature moves to the left, thus permitting the main armature to return to its open position. Pressing the reset push rod, which extends through the cover stud, will also release the latch through the medium of the reset lever shown in the figure.

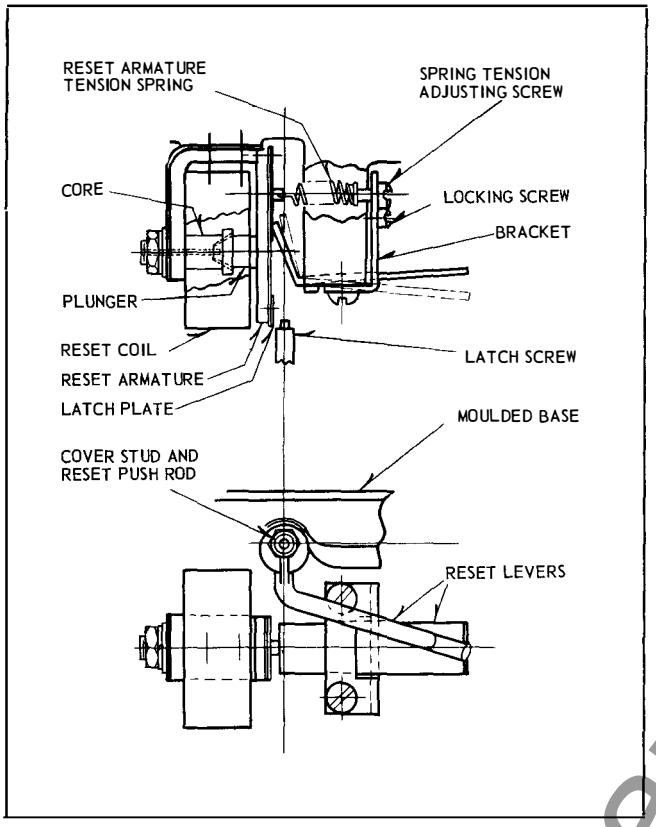
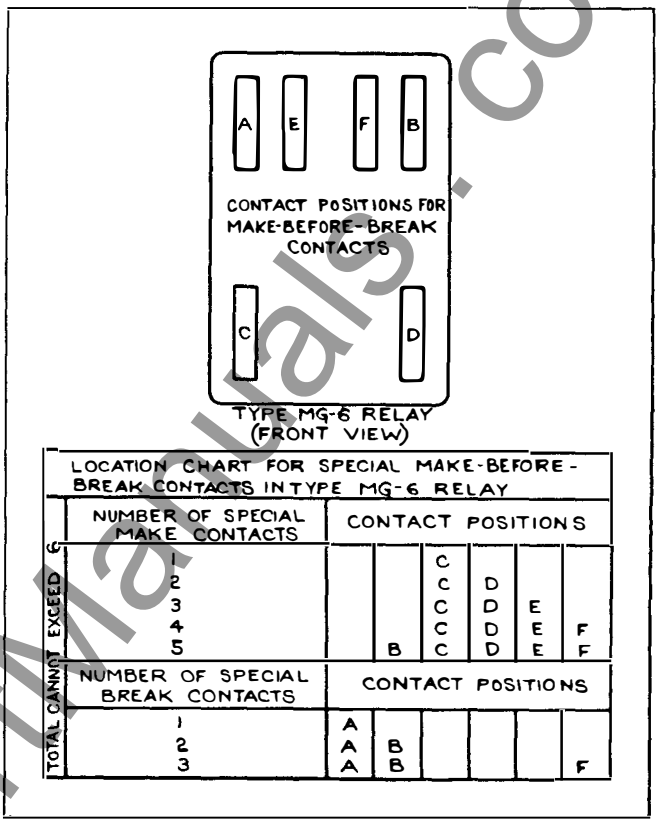


Fig. 2. Detail Views of the Latch and Electrical Reset of the Type MG-6 Relay.



LOCATION CHART FOR SPECIAL MAKE-BEFORE-BREAK CONTACTS IN TYPE MG-6 RELAY

TOTAL CANNOT EXCEED 6

NUMBER OF SPECIAL MAKE CONTACTS	CONTACT POSITIONS					
1			C	D		
2			C	D		
3			C	D	E	
4			C	D	E	F
5		B	C	D	E	F

NUMBER OF SPECIAL BREAK CONTACTS	CONTACT POSITIONS					
1	A					
2	A	B				
3	A	B				F

Fig. 3. Contact Positions for Combinations of Make-Before-Break Contacts.

In some applications of the relay with latch and electrical reset, it may be desirable to have the operating and reset coils deenergized automatically as soon as they have performed their functions. In the case of the reset coil this can be accomplished by connecting the coil through one of the relay "make" contacts. An auxiliary contact is required to open the operating coil circuit. This contact, when provided, is assembled on the lower right-hand side of the relay, and is held in position by the terminal screw to which the right-hand coil lead ordinarily connects. The coil lead is connected to the moving contact of the auxiliary contact, and the end of the stationary contact bracket is in contact with the head of the terminal screw. The auxiliary contact is closed when the main armature is open. When the armature approaches the closed position, the spring on the molded insulation block snaps off the roller and causes the contacts to open and interrupt the operating coil current. When this auxiliary contact is used, a weight is screwed to the lower end of the armature to increase its mass and stabilize contact action. This contact will interrupt the coil current at up to five times rated coil voltage.

In certain applications of the type MG-6 relay, it may be desirable to have one or more of the contacts close before other contacts on the same relay open. A special armature assembly is required to obtain such operation, and the number of special make and break contacts desired must be known when the relay is built. The special moving contacts have longer follow than the standard contacts and greater armature spring tension is required for full deflection of the break contacts. Consequently, it is preferable to limit the number of special break contacts to two. A maximum of three may be used, although the increased armature spring tension needed may raise the minimum pick-up voltage above the standard value. As many as five contacts may be special make contacts, with the total of special make and break contacts limited to six, of course. The locations of the make and break contacts for any combination of these special contacts are shown in Fig. 3. This figure indicates the physical location of the contacts in the relay, and can be used in conjunction with the inter-

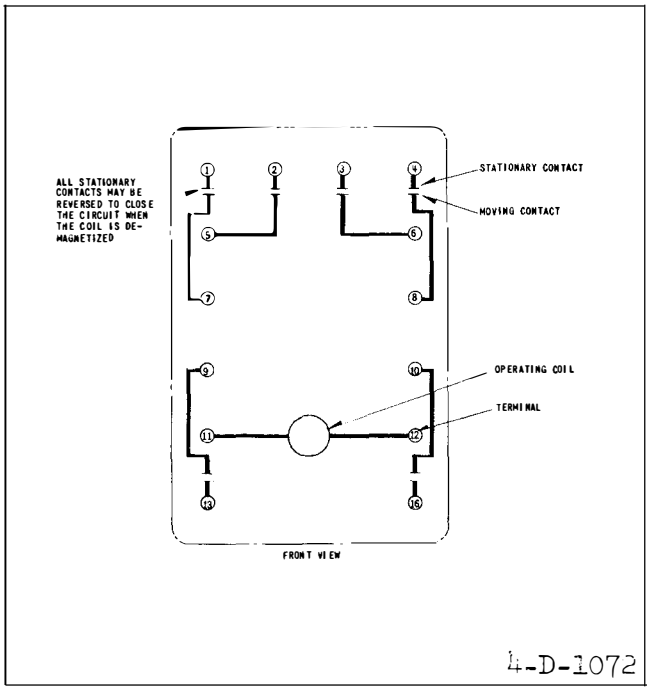


Fig. 4. Internal Schematic of the Type MG-6 Relay, Without Electrical Reset, in Molded Case.

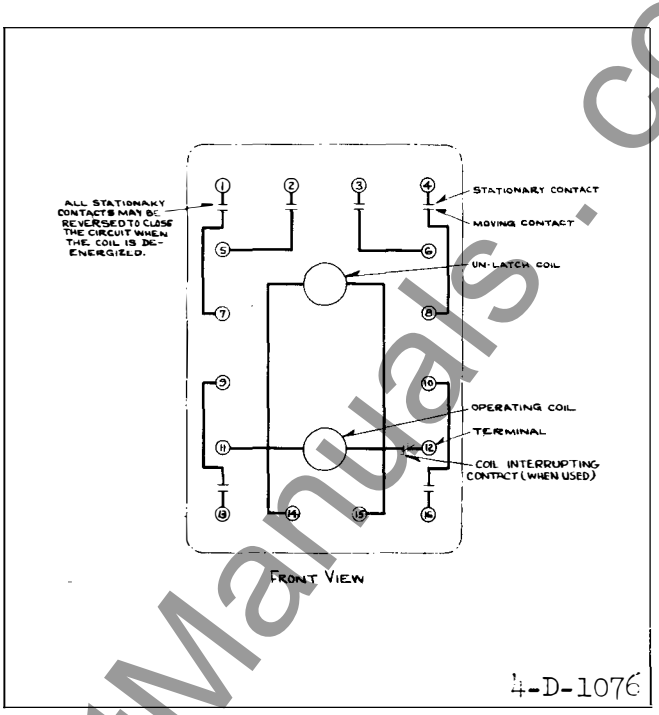


Fig. 5. Internal Schematic of the Type MG-6 Relay, With Electrical Reset, in Molded Case.

nal schematic diagram for the type of case involved to determine the corresponding terminal locations.

The type MG-6 relay may be provided without cover, for front connection, or in a variety of completely closed cases, for rear connection. The moulded base for rear connection is shown in Fig. 1. The base for front connection is similar except that there are no terminals projecting in the rear. This same base is also used as a sub-base when the relays are supplied in the FT22 case.

CHARACTERISTICS

The type MG-6 relay has an operating time of approximately 2 cycles on a-c and 5 cycles on d-c (on a 60 cycle basis) when energized at the rated voltage.

If faster operation is desired and if the application requires only intermittent energization of the relay, the operating coils may be energized at higher than rated voltage. (1) Twice rated voltage will give an operating time of approximately 1 cycle on a-c, and the coil will stand this voltage safely for over two minutes if 60 cycles or 4 minutes if 25 cycles. (2) The time of the d-c relay can be reduced to slightly over 1 cycle if the coil is energized at five times rated voltage. The coil will stand this voltage for one minute. If faster time is desired on a d-c relay which must be energized continuously, the use of a low voltage coil with a series resistor will reduce the time. With 10% of the line voltage across the relay coil and the balance across a series resistor, the reduced inductance of the circuit results in an operating time of approximately 2 cycles. The time of operation may be reduced to approximately one cycle by applying 4 or 5 times rated d-c voltage to the coils through the coil interrupting contact.

Reset coils are for intermittent duty only and should not be energized longer than one-half minute.

The relay contacts will close circuits carrying 30 amperes. They will carry this current for 1 minute, and will carry 12 amperes continuously.

The contacts will interrupt the following currents, in non-inductive circuits, at the voltages listed:

Current	Volts A-C
30	115
20	230
15	460
10	575

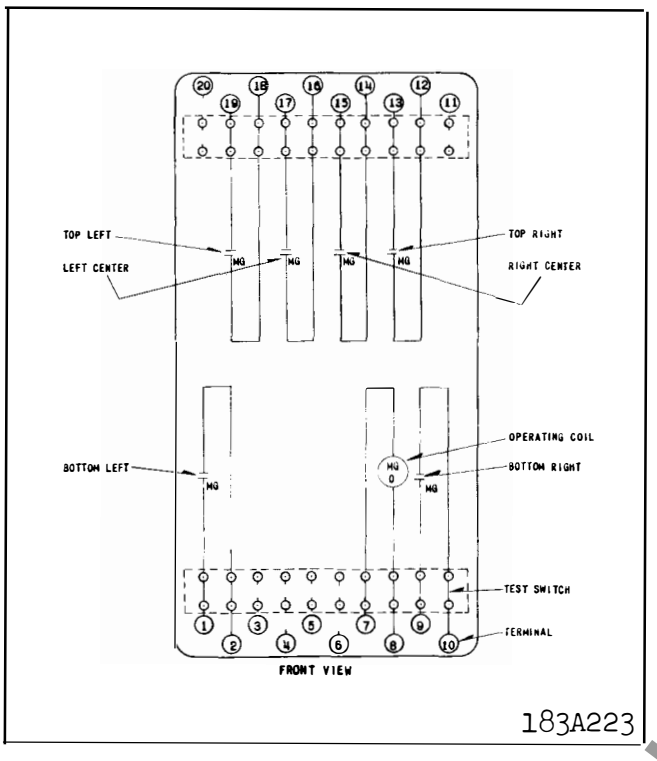


Fig. 6. Internal Schematic of the Type MG-6 Relay, Without Electrical Reset, in FT22 Case.

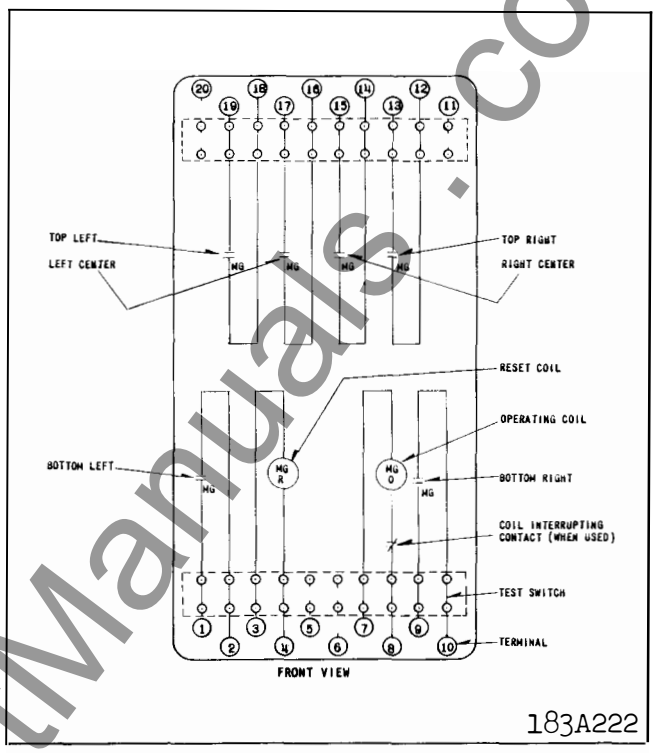


Fig. 7. Internal Schematic of the Type MG-6 Relay, With Electrical Reset, in FT22 Case.

Current	Volts D-C
30	12
15	24
10	32
8	48
3	125
1	250

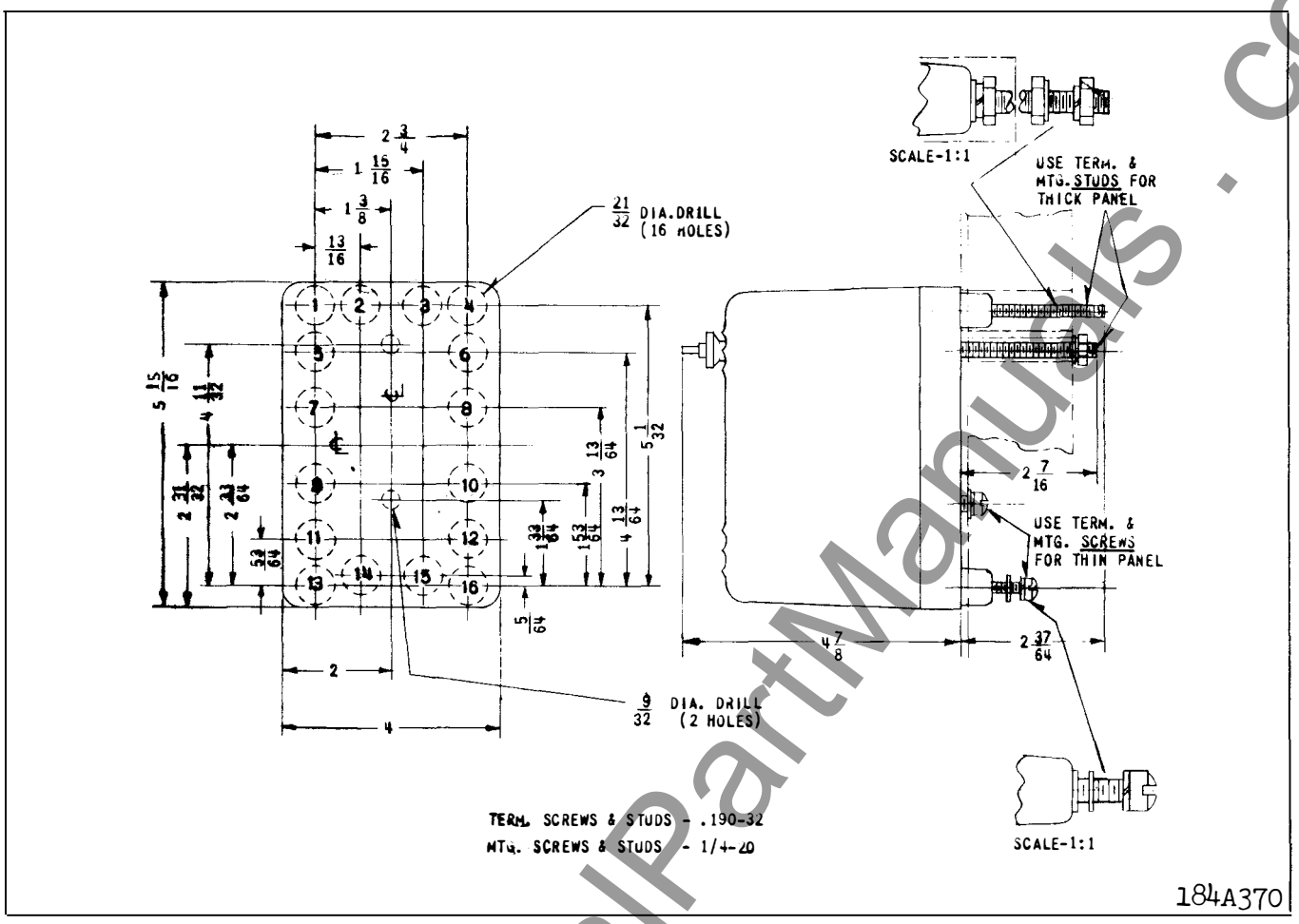
The type MG-6 relay for a-c can be used with any combination of contacts, but the d-c relay can have up to four circuit-opening contacts with the normal operating spring adjustment. With more than four the operating spring should be adjusted to give the correct back contact follow.

INSTALLATION

The relays should be mounted on switchboard panels or their equivalent in a location free from dirt, moisture, excessive vibration, and heat. Mount the relay vertically by means of the four mounting holes on the flange for semi-flush mounting or by means of the rear mounting stud or studs for projection mounting. Either a mounting stud or the mounting screws may be utilized for grounding the relay. The electrical connections may be made directly to the terminals by means of screws for steel panel mounting or to the terminal studs furnished with the relay for thick panel mounting. The terminal studs may be easily removed or inserted by locking two nuts on the stud and then turning the proper nut with a wrench.

For detailed FT case information refer to I.L. 41-076.

Relays in the rear-connected moulded cases should be mounted and electrically connected similar to the other projection cases. The lower mounting stud may be used to ground the electromagnet iron. The hexagon-shaped terminal inserts are slightly loose in the base but this does not affect the electrical connections. Only the two mounting studs should be used to secure the relay to the panel. Removal of terminal insert end-play (in the case of thick-panel mounting) by turning a nut on the terminal stud tightly against a large diameter washer (not supplied) at the rear of the panel should not be attempted as this may distort the relay base and affect the adjustments, or possibly damage the relay. Relays in the front-connected moulded cases should be



** Fig. 8. Outline and Drilling Plan for the Type MG-6 Relay in the Rear Connected Molded Case. For Reference Only.*

mounted by four screws through the sides of the base as indicated in the drilling plan.

ADJUSTMENTS AND MAINTENANCE

The relays are shipped from the factory correctly adjusted for armature travel and for contact follow and pressure, and it should not be necessary to disturb these adjustments. The relays normally are shipped with all contacts assembled for circuit-closing operation. To convert them for circuit-opening operation, it is necessary merely to loosen the mounting screw for the stationary contact bracket, turn this bracket over, and tighten the screw. After reversing the position of the contact brackets, it may be necessary to bend them slightly to obtain contact follows approximately as stated in the fourth paragraph of this section. On a d-c relay not more than four contacts can be assembled in the circuit-opening position if normal contact pressure and travel are maintained. With more than four the operating spring should be adjusted to give the correct back contact follow.

If a relay has been dismantled and is being reassembled, the following adjustments should be made or checked. Reference should be made to Figs. 1 and 2 for identification of the parts mentioned in these instructions.

The armature stop nut should be adjusted so that when the armature is in contact with it the lower edge of the armature is 7/16" above the position which it assumes when the relay is energized. When adjusting the armature spring tension, the locking screw for the spring adjusting screw is loosened, and this adjusting screw is turned (inward, to reduce the spring tension) until the spring barely holds the armature against the stop nut. The relay must be in its normal vertical position when this adjustment is made, with

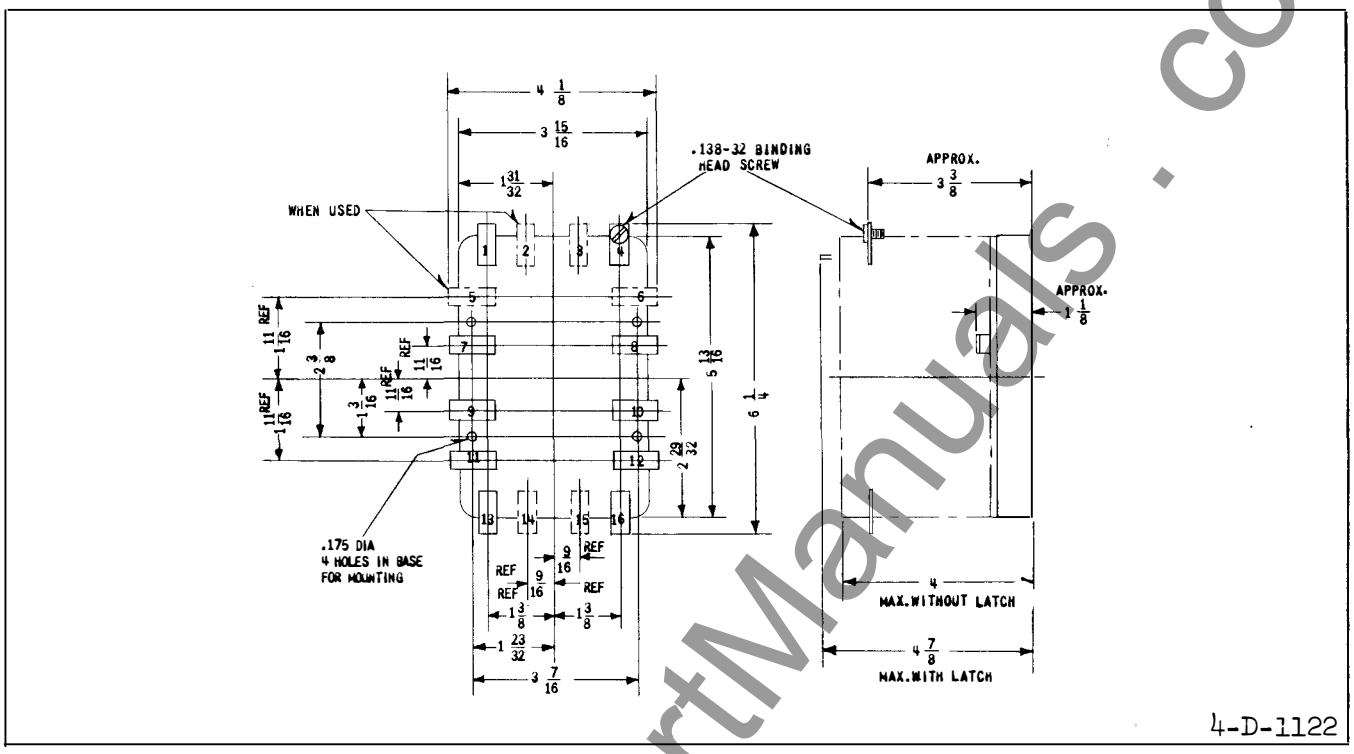


Fig. 9. Outline and Drilling Plan for the Type MG-6 Relay in the Front Connected Molded Case. See Internal Schematic for Terminals Supplied. For Reference Only.

all contacts assembled as circuit-closing. The armature spring should then be tightened by turning the adjusting screw 4 turns counter-clockwise for a-c relays or 2 turns for d-c relays, and the locking screws should be tightened. If the relay is being used with a number of break contacts, it may be necessary to increase the spring tension to obtain full follow on the break contacts. The adjusting screw should be turned just enough farther to obtain full follow with the armature against the stop nut.

The follow of the moving contact fingers should be 3/32" for the make contacts and 1/16" for the break contacts, measured at the contacts. This can be checked more conveniently by measuring the travel of the lower edge of the armature after the contacts touch. This should be approximately 1/8" for the make contacts and 3/32" for the break contacts. In case moving contact fingers have been removed from their guide pins, it is important that the coil springs on the two sides of the fingers be replaced correctly. The springs which are compressed by circuit-closing contacts are approximately three times as strong as the ones compressed by circuit-opening contacts and thus they can be readily distinguished. The positions of the two springs are reversed at the two ends of the relay.

When special contacts are supplied for make-before-break operation, the stationary members of the special contacts are bent equally toward their respective moving contacts to obtain "make" at the point where the "break" moving contact has approximately 1/16" follow before parting from its stationary contact.

If an a-c relay is to be used with a series resistor so that the relay can be dropped out by shorting the coil, either the resistance value must be such that the watt consumption with the coil shorted will be quite high or the relay armature spring tension must be reduced to about 1-1/2 turns and the follow of the stationary make contacts must be reduced (by bending) to about 1/16". With the reduced armature spring tension, not more than two of the contacts can be used as break contacts. Because of the low relay impedance with armature open as compared to the impedance with armature closed, it is not advantageous to use a resistor in series with a coil rated at less than line voltage, as in the case of d-c applications. For the contact and spring adjustments

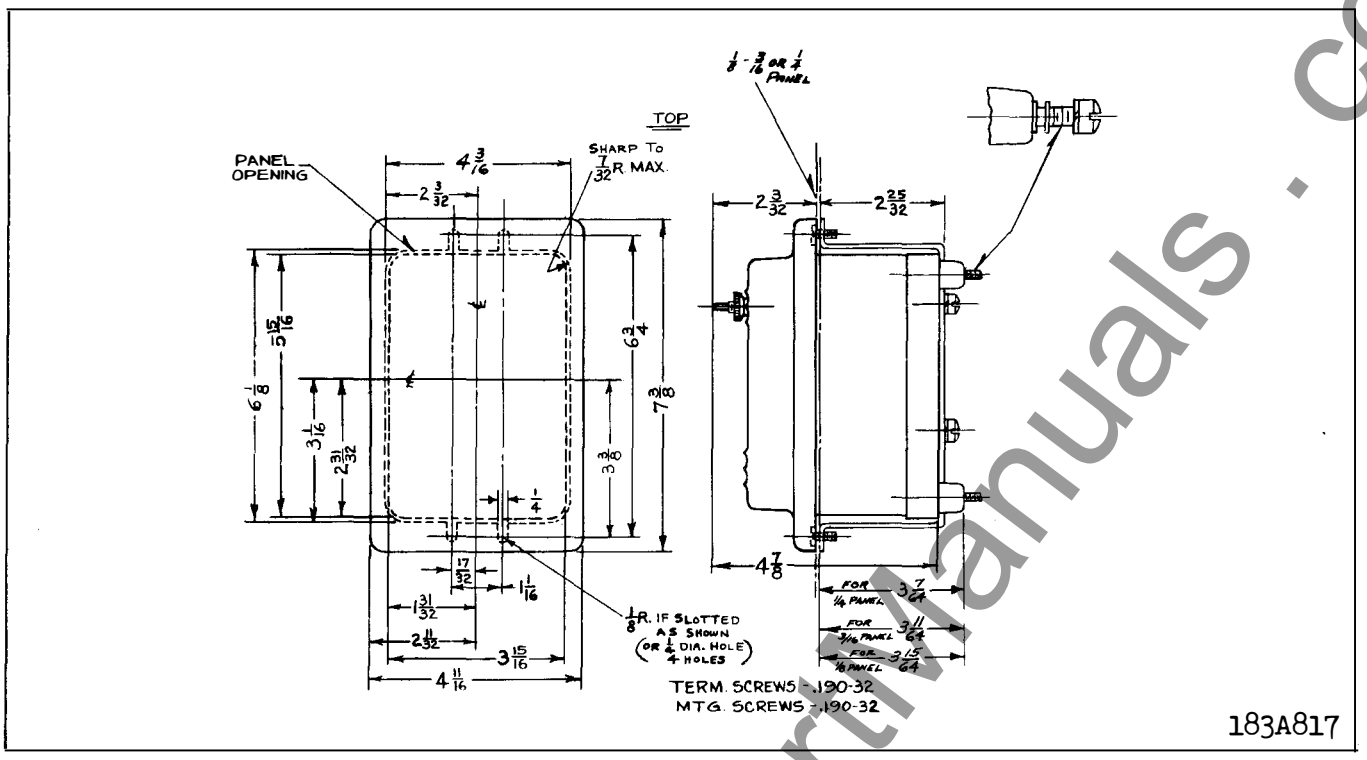


Fig. 10. Outline and Drilling Plan for the Molded Semi-Flush Case. For Reference Only.

specified above, a 60 cycle MG relay with voltage rating equal to the line voltage can be used with a series resistor which will take about 90 watts when directly across the line. Of course, if the coil will be shorted only momentarily or if a higher watt consumption is not objectionable, it may be unnecessary to reduce the spring tension or contact follow.

If the complete armature assembly is to be removed from the relay, the screws which fasten the lower ends of the moving contact leads to the terminals should be removed, the armature spring tension adjusting screw should be turned in as far as possible, and the armature stop nut should be removed. The upper end of the armature spring should then be slipped off of the grooved member at the lower end of the adjusting screw, and the armature should be lifted off of its bearing carefully so as to avoid distortion of the coiled leads. The leads to the upper center moving contacts are not coiled but the coiling of the four other moving contact leads should be such that when the relay base is horizontal and the armature is on its bearings and approximately at its mid-position, the lead terminals will just touch the base terminal inserts or be within about 1/8" of that position.

On latch-type relays the latch screw is adjusted so that with the armature latched and the operating coil de-energized, there will be a gap of between .005 and .010 inch between the electromagnet pole face and the raised section of the armature which strikes the pole face. The locking screw should be tightened securely after making this adjustment. There is a small amount of clearance between the armature and its supporting posts, and in order to insure proper operation allowance must be made for this in the following manner. With the armature held against its left-hand support and nearly closed, the latch spring or reset armature should be moved to the left as far as it will go by means of the hand reset. To assure that the latch will always release the armature the resulting space between the latch and the latch screw should be at least .005 inch, and should not be more than about 1/64". This should also be checked electrically if electrical reset is provided. Some change of this gap can be made by loosening the mounting screws in the relay base and moving the latch support in the desired direction. The gap also can be changed by loosening the two screws which hold the moving contact insulation block to the armature and shifting the armature in the desired direction.

On electrical reset relays, the tension of the spring which draws the reset armature toward the

latch screw must be adjusted if these parts are being reassembled. The locking screw (Fig. 2) is screwed out until its head clears the head of the adjusting screw. The main armature is then held completely closed and against its right hand support, and the latch spring tension adjusting screw is turned until the latch barely touches the stop projecting from the center of the latch screw. Then the latch spring tension should be increased by turning the screw clockwise 9 turns, and the locking screw should be tightened.

If either the core nut of the electrical reset assembly or the screws which mount its armature have been loosened, the relative positions of the core and plunger may shift sufficiently to cause the plunger to strike on the side of the conical core opening. To assure correct alignment of these parts, .042 diameter holes are provided through the center of the core and about 1/16" deep in the center of the plunger. After tightening the core nut, a close fitting pin should be inserted through the core and into the plunger. With the pin in place, and plunger pressed firmly against the core, and the mounting end of the armature centrally located with respect to the electromagnet, the two armature mounting screws should be tightened. The pin then should be removed.

A slight amount of medium viscosity slushing oil is supplied at the factory to the polished and hardened surfaces of the latch screw and the latch plate to minimize wear and as protection against corrosion. Oil should be reapplied after any cleaning and reassembling of these parts, and it is desirable also to renew this at the regular maintenance periods.

If the relay is provided with a coil interrupting contact, the following points must be observed to assure satisfactory operation. With the relay in its normal operating position and the armature shifted to the extreme right, align the armature "snap" spring so that it is at least 1/64 inch in from the right hand edge of the moving contact spring. With an .020 inch gap between the armature and the lower pole face of the electromagnet, adjust the bracket by means of the adjusting screw, until the snap spring just passes the roller. The latch screw should be adjusted so that with the armature in the latched position and the operating coil deenergized, the gap between the armature and the lower pole face of the electromagnet is .010 inch. With the armature in this position the coil interrupting contact should be open at least 3/64 inch.

All contacts should be periodically cleaned. A contact burnisher S#182A836H01 is recommended for this purpose. The use of abrasive material for cleaning contacts is not recommended, because of the danger of embedding small particles in the face of the soft silver and this impairing the contact.

REPAIRS AND RENEWAL PARTS

Repair work can be done most satisfactorily at the factory. However, interchangeable parts can be furnished to the customers who are equipped for doing repair work. When ordering parts, always give the complete nameplate data.

ENERGY REQUIREMENTS

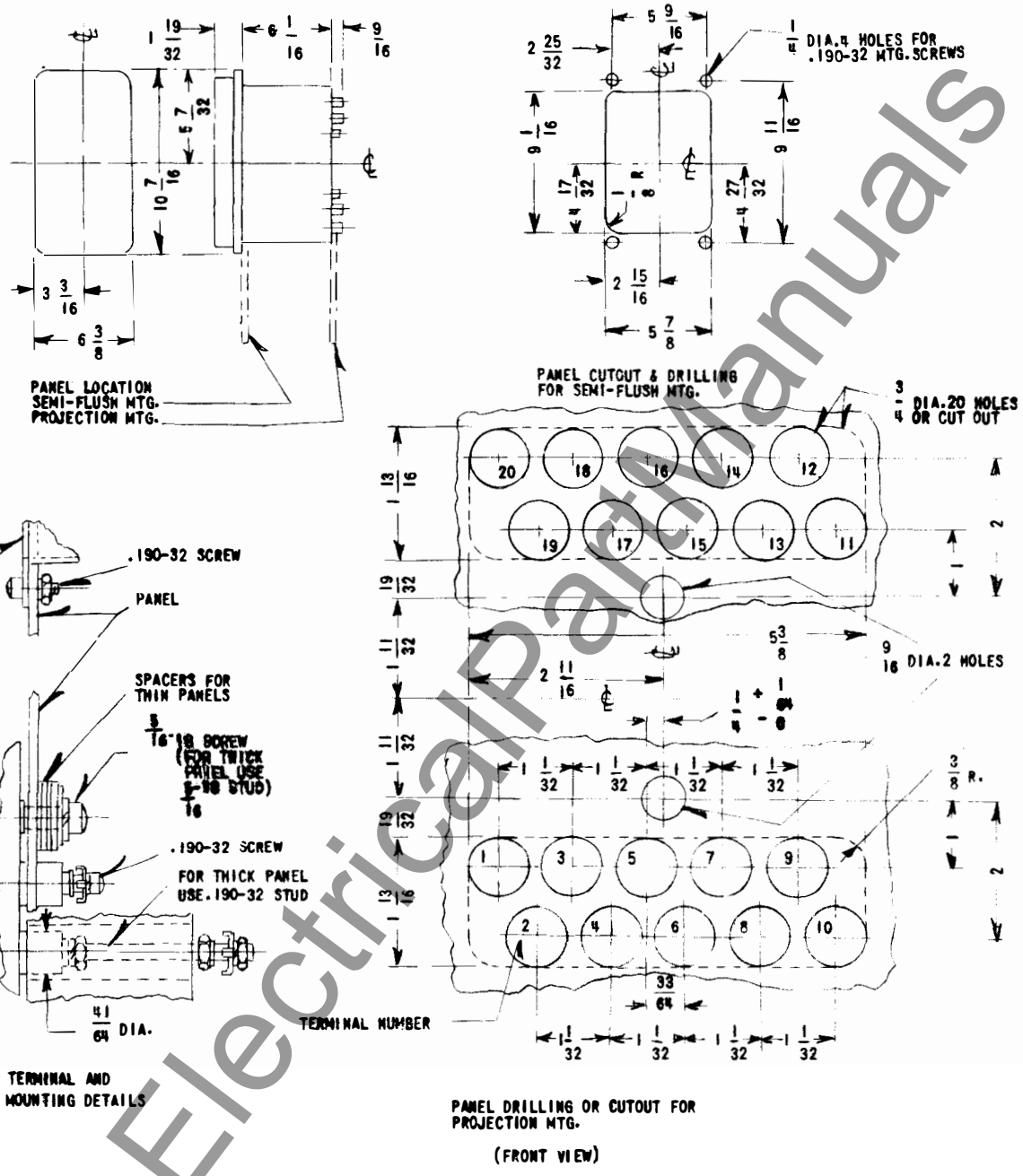
Operating Coil Burdens at rated Voltage

Frequency (cycles)	Closed Gap		Open Gap	
	Watts	Volt-Amps	Watts	Volt-Amps
25	6.8	23	19.6	53
50	9.8	31	17.4	78
△60	12	37	17.6	92
D-C	7.8 cold--		7.8 cold--	
D-C	6.5 hot--		6.5 hot--	

△Rated voltage is 115 volts or its multiples.

Reset Coil Burdens at Rated Voltage (Multiples)

Frequency (cycles)	Closed Gap		Open Gap	
	Watts	Volt-Amps	Watts	Volt-Amps
25	48	51.6	52	54
50	46	58.2	57	63.8
60	84	104.5	96	112.8
D-C	66 cold--		68 cold--	



183A158

* *Fig. 11. Outline and Drilling Plan for the Type MG-6 Relay in Type FT22 Case.*

WESTINGHOUSE ELECTRIC CORPORATION

RELAY-INSTRUMENT DIVISION **NEWARK, N. J.**

Printed in U.S.A.

INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

TYPE MG-6 MULTI-CONTACT AUXILIARY RELAY

CAUTION Before putting relays into service, remove all blocking which may have been inserted for the purpose of securing the parts during shipment, make sure that all moving parts operate freely, inspect the contacts to see that they are clean and close properly, and operate the relay to check the settings and electrical connections.

APPLICATION

The type MG-6 relay is designed for applications where several independent circuits must be energized or de-energized upon the operation of a single primary relay contact, or where the capacity of the primary relay contact is inadequate for the energy required in a control circuit. In certain applications these relays may be used directly as primary relays. Since the stationary contacts can readily be reversed so as to be suitable for either circuit opening or circuit closing service (although a slight increase in spring tension may be required on the D-C MG-6 relay — see "ADJUSTMENTS AND MAINTENANCE") it is unnecessary to predetermine the arrangements of the circuits for which the relay is to be used.

In the usual application of the relay, the armature resets when the operating coil is de-energized. However, the relays may be supplied with a latching mechanism which holds the armature in the operated position until the latch is tripped, either by hand or electrically.

An operating coil cutoff contact can be supplied with the electric-reset type, where an intermittent duty coil is required for faster than normal operation, but where the operating coil circuit must be continuously. An operating coil, rated at 19% of supply rating may be applied, with a maximum duty of 10,000 operations. (e.g. 24 volt coil on 125 volt dc circuit)

CONSTRUCTION AND OPERATION

The operating electromagnet is at the lower end of the relay, as shown in Fig. 1. The stationary iron circuit is built up of U-shaped punchings. These are slotted at the outer end of the lower leg to receive the copper lag loops used to obtain quiet operation on A-C. The operating coil is mounted on this leg of the punchings. In order to improve the performance of the relay on D-C, the pole face area is increased by means of an iron plate. This plate is assembled at the end of the coil and the corners of the lamination side plates are bent outward, serving to hold the plate in place. The inner end of the upper leg of the punching assembly is shaped so that the lower end of the armature restraining spring can be hooked over it.

The armature is made of high-silicon steel. Projecting sections on the sides, near the center, act as knife-edge bearings and rest on suitably shaped supports which are a part of the moulded base. A stud attached to the lower leg of the electromagnet extends through a hole in the lower end of the armature, and a stop-nut on the outer end of this stud is used to limit and adjust the travel of the armature in the de-energized direction. The special stop nut used will remain at any position in which it is placed without additional locking means.

The upper end of the armature carries an adjusting screw to which one end of the armature restraining spring is attached. In the hand or electrically reset relays, a latch screw is mounted at the extreme end of the armature. In the self-reset relays this screw is replaced by a set screw which serves to separate the locking plate (see Fig. 1) slightly from the armature. Between the spring adjusting screw and the latch screw (or set screw), there is a third screw which when tightened applies pressure to the threads of the former screws and effectively locks them against turning.

The moving contact fingers are mounted on moulded insulation which is fastened to the armature

SUPERSEDES I.L. 41-753.1C
*Denotes change from superseded issue.

EFFECTIVE MAY 1961

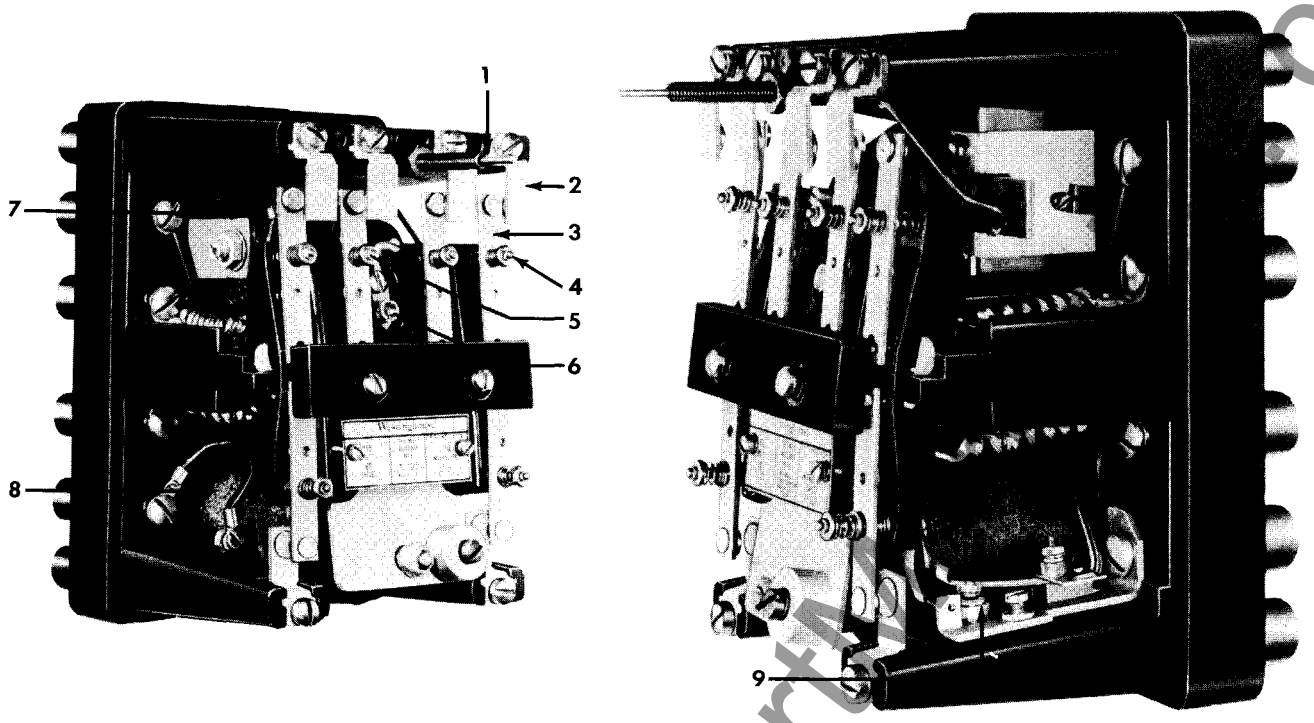


Fig. 1. Front View (Cover Omitted) and Side View of the MG-6 Electric & Hand Reset Relay in Molded Case. 1 – Reset push rod, 2 – stationary contact, 3 – moving contact, 4 – moving contact spring assembly, 5 – latch adjustment screw, 6 – adjusting screw for armature spring tension, 7 – reset coil, 8 – operating coil, 9 – optional operating coil cut-off contact.

by two screws. Silver contact buttons are on both sides of these fingers so that they can be used for either a circuit-opening or a circuit-closing contact. The fingers are assembled on guide pins, between two springs in such a way that definite spring compression and contact wipe is assured for either contact-closing or contact-opening service. Flexible leads assemblies are welded to the contact fingers. Since the armature assembly has contact fingers both above and below the bearing points, the armature weight is partially balanced about the bearings and there is less tendency for severe shocks to move the armature.

The stationary contacts consist of large silver buttons welded to brackets which can be assembled so that they close with the moving contacts when the armature is in either the energized or de-energized position. The stationary contact brackets are connected directly to the terminal inserts by means of long screws which pass through brass tubes. These tubes are of such length that the moulded material of the base is not under direct compression when the screws are tightened. Therefore, there is always a tight connection from contact to terminal regardless of possible shrinkage or other variation in the moulded base material. The contact bracket is held against its seat by means of a spring ring which is compressed between shoulders in the base and on the hexagonal terminal insert.

The construction of the latch and electrical reset is shown in Fig. 2, in which the lower portion is a partial front view of the relay in the moulded case, and the upper portion a top view. In the latter view, the latch screw (in the main armature) is in the energized position, and the reset armature is free to be moved to the right by the tension spring until the hardened latch plate on the reset armature rests against the tip of the latch screw. When the operating coil is de-energized, the latch screw will move slightly so that its shoulder rests on the edge of the latch plate. When the reset coil is energized its armature moves to the left, thus permitting the main armature to return to its open position. Pressing the reset push rod, which extends through the cover stud, will also release the latch through the medium of the reset lever shown in the figure.

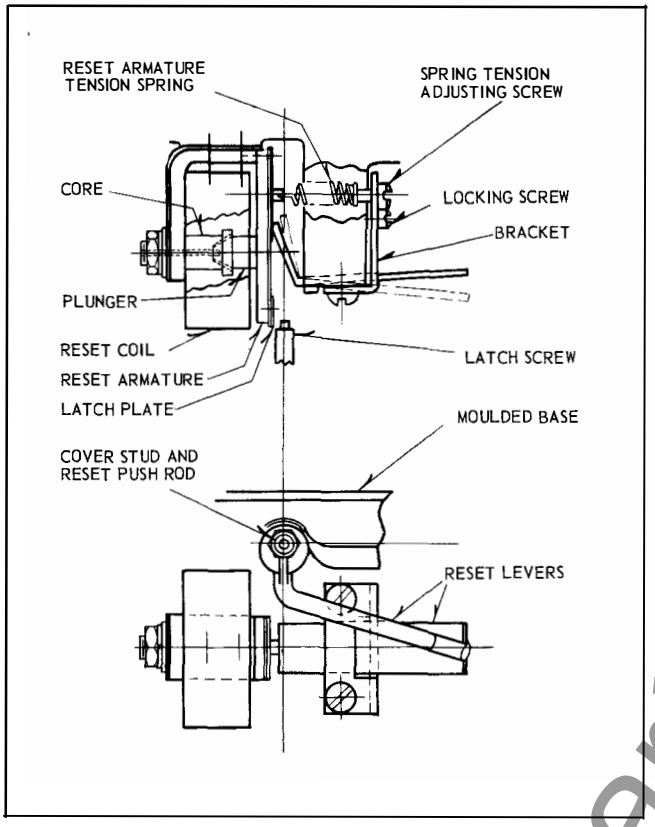
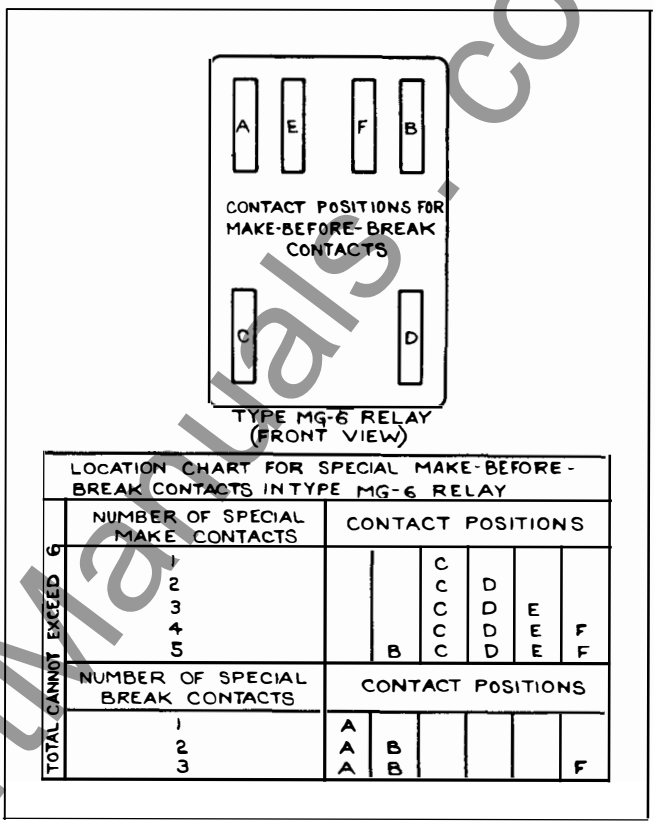


Fig. 2. Detail Views of the Latch and Electrical Reset of the Type MG-6 Relay.



LOCATION CHART FOR SPECIAL MAKE-BEFORE-BREAK CONTACTS IN TYPE MG-6 RELAY

TOTAL CANNOT EXCEED 6

NUMBER OF SPECIAL MAKE CONTACTS	CONTACT POSITIONS					
1			C	D		
2			C	D	E	
3			C	D	E	F
4		B	C	D	E	F
5		B	C	D	E	F

NUMBER OF SPECIAL BREAK CONTACTS	CONTACT POSITIONS					
1	A					
2	A	B				
3	A	B				F

Fig. 3. Contact Positions for Combinations of Make-Before-Break Contacts.

In some applications of the relay with latch and electrical reset, it may be desirable to have the operating and reset coils deenergized automatically as soon as they have performed their functions. In the case of the reset coil this can be accomplished by connecting the coil through one of the relay "make" contacts. An auxiliary contact is required to open the operating coil circuit. This contact, when provided, is assembled on the lower right-hand side of the relay, and is held in position by the terminal screw to which the right-hand coil lead ordinarily connects. The coil lead is connected to the moving contact of the auxiliary contact, and the end of the stationary contact bracket is in contact with the head of the terminal screw. The auxiliary contact is closed when the main armature is open. When the armature approaches the closed position, the spring on the molded insulation block snaps off the roller and causes the contacts to open and interrupt the operating coil current. When this auxiliary contact is used, a weight is screwed to the lower end of the armature to increase its mass and stabilize contact action. This contact will interrupt the coil current at up to five times rated coil voltage.

In certain applications of the type MG-6 relay, it may be desirable to have one or more of the contacts close before other contacts on the same relay open. A special armature assembly is required to obtain such operation, and the number of special make and break contacts desired must be known when the relay is built. The special moving contacts have longer follow than the standard contacts and greater armature spring tension is required for full deflection of the break contacts. Consequently, it is preferable to limit the number of special break contacts to two. A maximum of three may be used, although the increased armature spring tension needed may raise the minimum pick-up voltage above the standard value. As many as five contacts may be special make contacts, with the total of special make and break contacts limited to six, of course. The locations of the make and break contacts for any combination of these special contacts are shown in Fig. 3. This figure indicates the physical location of the contacts in the relay, and can be used in conjunction with the inter-

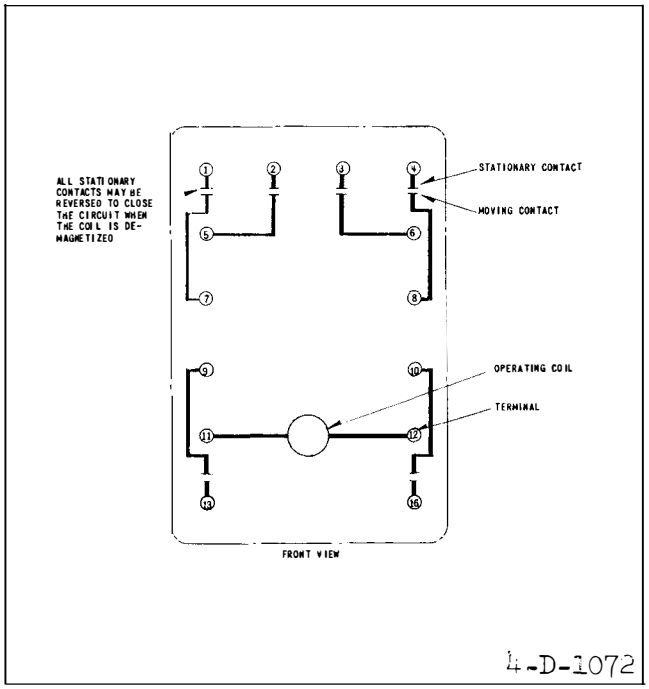


Fig. 4. Internal Schematic of the Type MG-6 Relay, Without Electrical Reset, in Molded Case.

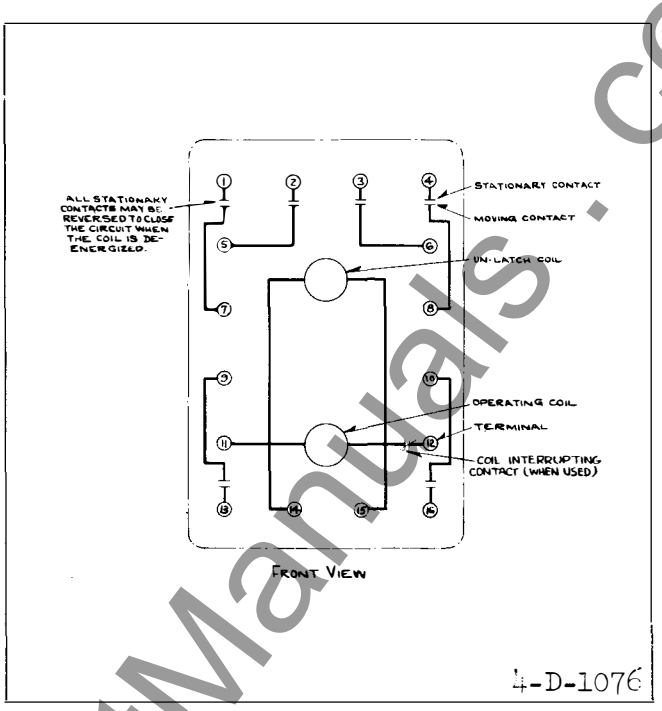


Fig. 5. Internal Schematic of the Type MG-6 Relay, With Electrical Reset, in Molded Case.

nal schematic diagram for the type of case involved to determine the corresponding terminal locations.

The type MG-6 relay may be provided without cover, for front connection, or in a variety of completely closed cases, for rear connection. The moulded base for rear connection is shown in Fig. 1. The base for front connection is similar except that there are no terminals projecting in the rear. This same base is also used as a sub-base when the relays are supplied in the FT22 case.

CHARACTERISTICS

The type MG-6 relay has an operating time of approximately 2 cycles on a-c and 5 cycles on d-c (on a 60 cycle basis) when energized at the rated voltage.

If faster operation is desired and if the application requires only intermittent energization of the relay, the operating coils may be energized at higher than rated voltage. (1) Twice rated voltage will give an operating time of approximately 1 cycle on a-c, and the coil will stand this voltage safely for over two minutes if 60 cycles of 4 minutes if 25 cycles. (2) The time of the d-c relay can be reduced to slightly over 1 cycle if the coil is energized at five times rated voltage. The coil will stand this voltage for one minute. If faster time is desired on a d-c relay which must be energized continuously, the use of a low voltage coil with a series resistor will reduce the time. With 10% of the line voltage across the relay coil and the balance across a series resistor, the reduced inductance of the circuit results in an operating time of approximately 2 cycles. The time of operation may be reduced to approximately one cycle by applying 4 or 5 times rated d-c voltage to the coils through the coil interrupting contact.

Reset coils are for intermittent duty only and should not be energized longer than one-half minute.

The relay contacts will close circuits carrying 30 amperes. They will carry this current for 1 minute, and will carry 12 amperes continuously.

The contacts will interrupt the following currents, in non-inductive circuits, at the voltages listed:

Current	Volts A-C
30	115
20	230
15	460
10	575

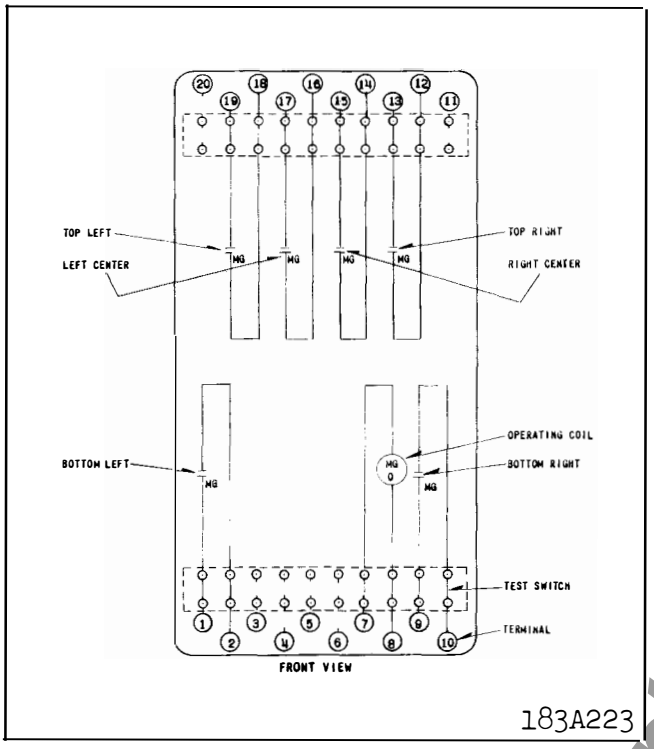


Fig. 6. Internal Schematic of the Type MG-6 Relay, Without Electrical Reset, in FT22 Case.

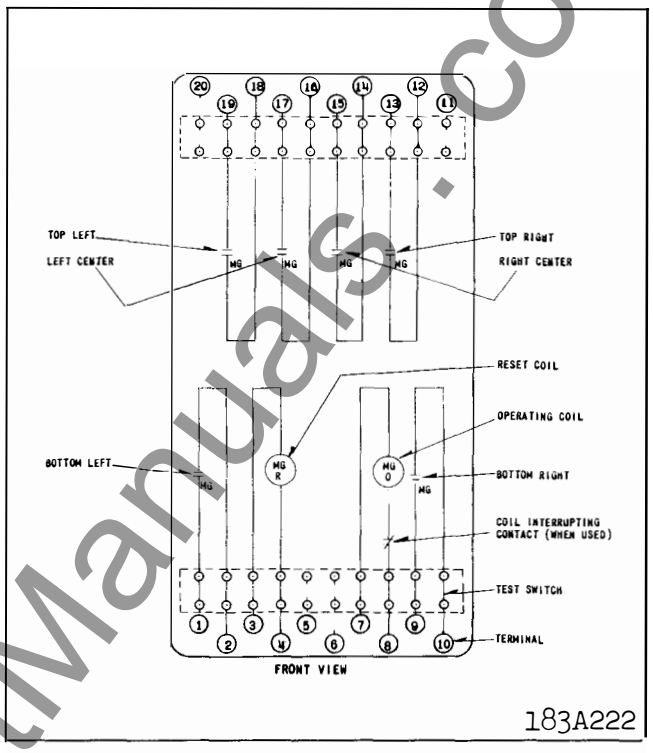


Fig. 7. Internal Schematic of the Type MG-6 Relay, With Electrical Reset, in FT22 Case.

Current	Volts D-C
30	12
15	24
10	32
8	48
3	125
1	250

The type MG-6 relay for a-c can be used with any combination of contacts, but the d-c relay can have up to four circuit-opening contacts with the normal operating spring adjustment. With more than four the operating spring should be adjusted to give the correct back contact follow.

INSTALLATION

The relays should be mounted on switchboard panels or their equivalent in a location free from dirt, moisture, excessive vibration, and heat. Mount the relay vertically by means of the four mounting holes on the flange for semi-flush mounting or by means of the rear mounting stud or studs for projection mounting. Either a mounting stud or the mounting screws may be utilized for grounding the relay. The electrical connections may be made directly to the terminals by means of screws for steel panel mounting or to the terminal studs furnished with the relay for thick panel mounting. The terminal studs may be easily removed or inserted by locking two nuts on the stud and then turning the proper nut with a wrench.

For detailed FT case information refer to I.L. 41-076.

Relays in the rear-connected moulded cases should be mounted and electrically connected similar to the other projection cases. The lower mounting stud may be used to ground the electromagnet iron. The hexagon-shaped terminal inserts are slightly loose in the base but this does not affect the electrical connections. Only the two mounting studs should be used to secure the relay to the panel. Removal of terminal insert end-play (in the case of thick-panel mounting) by turning a nut on the terminal stud tightly against a large diameter washer (not supplied) at the rear of the panel should not be attempted as this may distort the relay base and affect the adjustments, or possibly damage the relay. Relays in the front-connected moulded cases should be

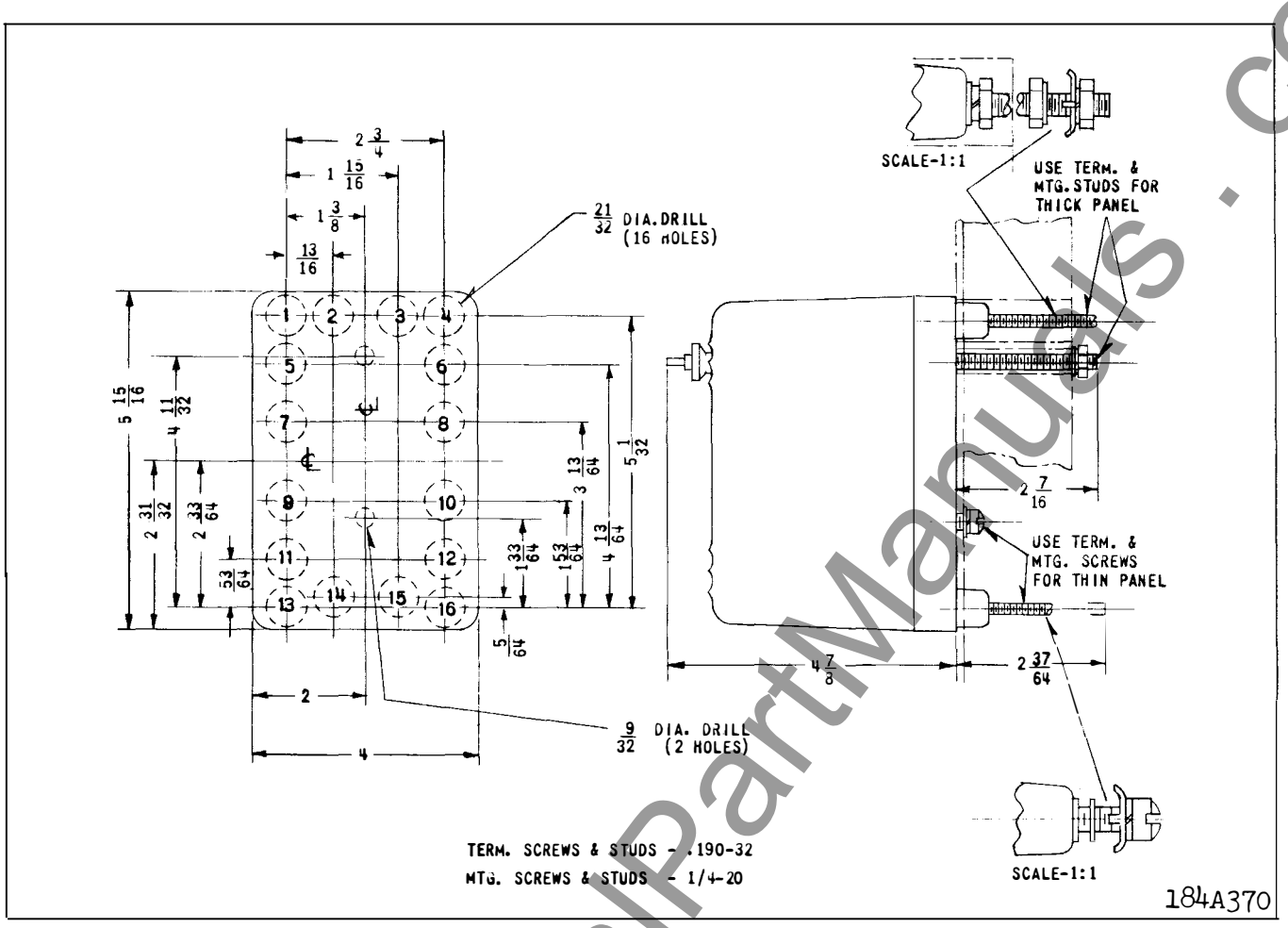


Fig. 8. Outline and Drilling Plan for the Type MG-6 Relay in the Rear Connected Molded Case. For Reference Only.

mounted by four screws through the sides of the base as indicated in the drilling plan.

ADJUSTMENTS AND MAINTENANCE

The relays are shipped from the factory correctly adjusted for armature travel and for contact follow and pressure, and it should not be necessary to disturb these adjustments. The relays normally are shipped with all contacts assembled for circuit-closing operation. To convert them for circuit-opening operation, it is necessary merely to loosen the mounting screw for the stationary contact bracket, turn this bracket over, and tighten the screw. After reversing the position of the contact brackets, it may be necessary to bend them slightly to obtain contact follows approximately as stated in the fourth paragraph of this section. On a d-c relay not more than four contacts can be assembled in the circuit-opening position if normal contact pressure and travel are * maintained. With more than four the operating spring should be adjusted to give the correct back contact follow.

If a relay has been dismantled and is being reassembled, the following adjustments should be made or checked. Reference should be made to Figs. 1 and 2 for identification of the parts mentioned in these instructions.

The armature stop nut should be adjusted so that when the armature is in contact with it the lower edge of the armature is 7/16" above the position which it assumes when the relay is energized. When adjusting the armature spring tension, the locking screw for the spring adjusting screw is loosened, and this adjusting screw is turned (inward, to reduce the spring tension) until the spring barely holds the armature against the stop nut. The relay must be in its normal vertical position when this adjustment is made, with

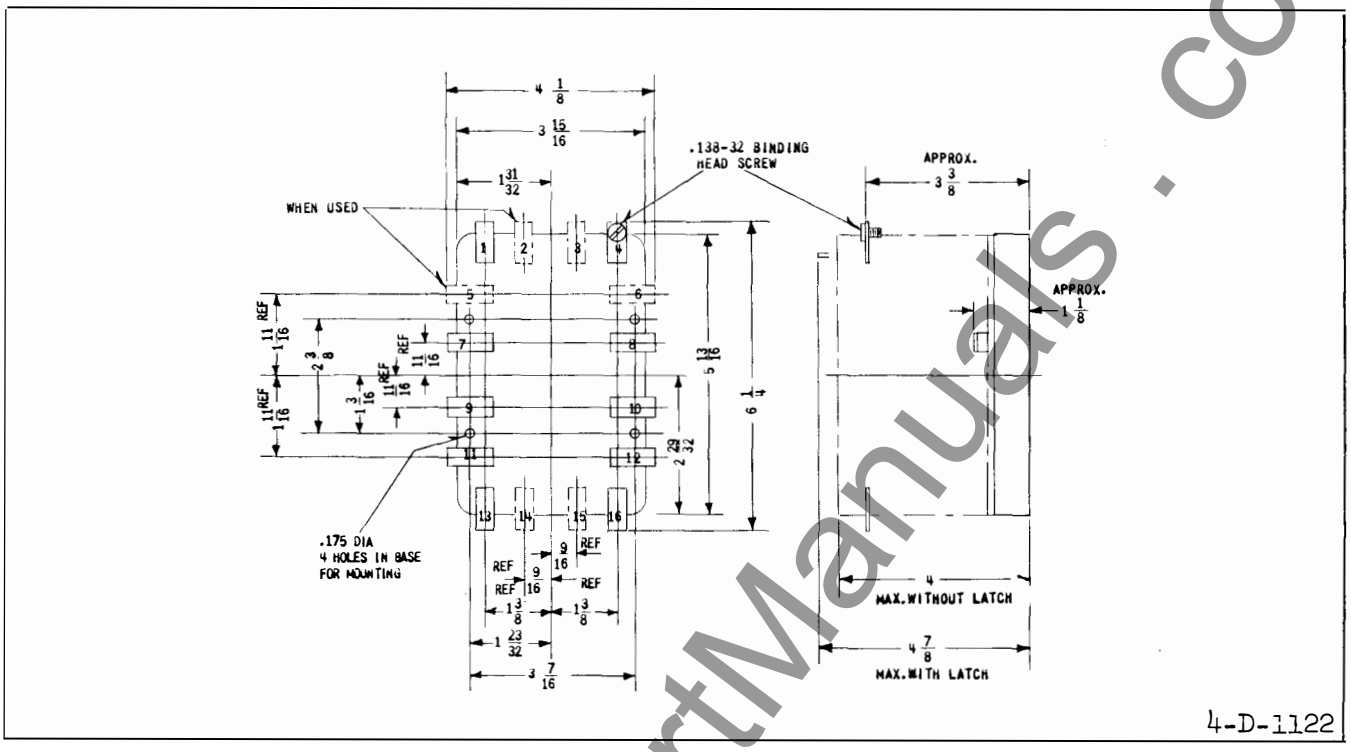


Fig. 9. Outline and Drilling Plan for the Type MG-6 Relay in the Front Connected Molded Case. See Internal Schematic for Terminals Supplied. For Reference Only.

all contacts assembled as circuit-closing. The armature spring should then be tightened by turning the adjusting screw 4 turns counter-clockwise for a-c relays or 2 turns for d-c relays, and the locking screws should be tightened. If the relay is being used with a number of break contacts, it may be necessary to increase the spring tension to obtain full follow on the break contacts. The adjusting screw should be turned just enough farther to obtain full follow with the armature against the stop nut.

The follow of the moving contact fingers should be 3/32" for the make contacts and 1/16" for the break contacts, measured at the contacts. This can be checked more conveniently by measuring the travel of the lower edge of the armature after the contacts touch. This should be approximately 1/8" for the make contacts and 3/32" for the break contacts. In case moving contact fingers have been removed from their guide pins, it is important that the coil springs on the two sides of the fingers be replaced correctly. The springs which are compressed by circuit-closing contacts are approximately three times as strong as the ones compressed by circuit-opening contacts and thus they can be readily distinguished. The positions of the two springs are reversed at the two ends of the relay.

When special contacts are supplied for make-before-break operation, the stationary members of the special contacts are bent equally toward their respective moving contacts to obtain "make" at the point where the "break" moving contact has approximately 1/16" follow before parting from its stationary contact.

If an a-c relay is to be used with a series resistor so that the relay can be dropped out by shorting the coil, either the resistance value must be such that the watt consumption with the coil shorted will be quite high or the relay armature spring tension must be reduced to about 1-1/2 turns and the follow of the stationary make contacts must be reduced (by bending) to about 1/16". With the reduced armature spring tension, not more than two of the contacts can be used as break contacts. Because of the low relay impedance with armature open as compared to the impedance with armature closed, it is not advantageous to use a resistor in series with a coil rated at less than line voltage, as in the case of d-c applications. For the contact and spring adjustments

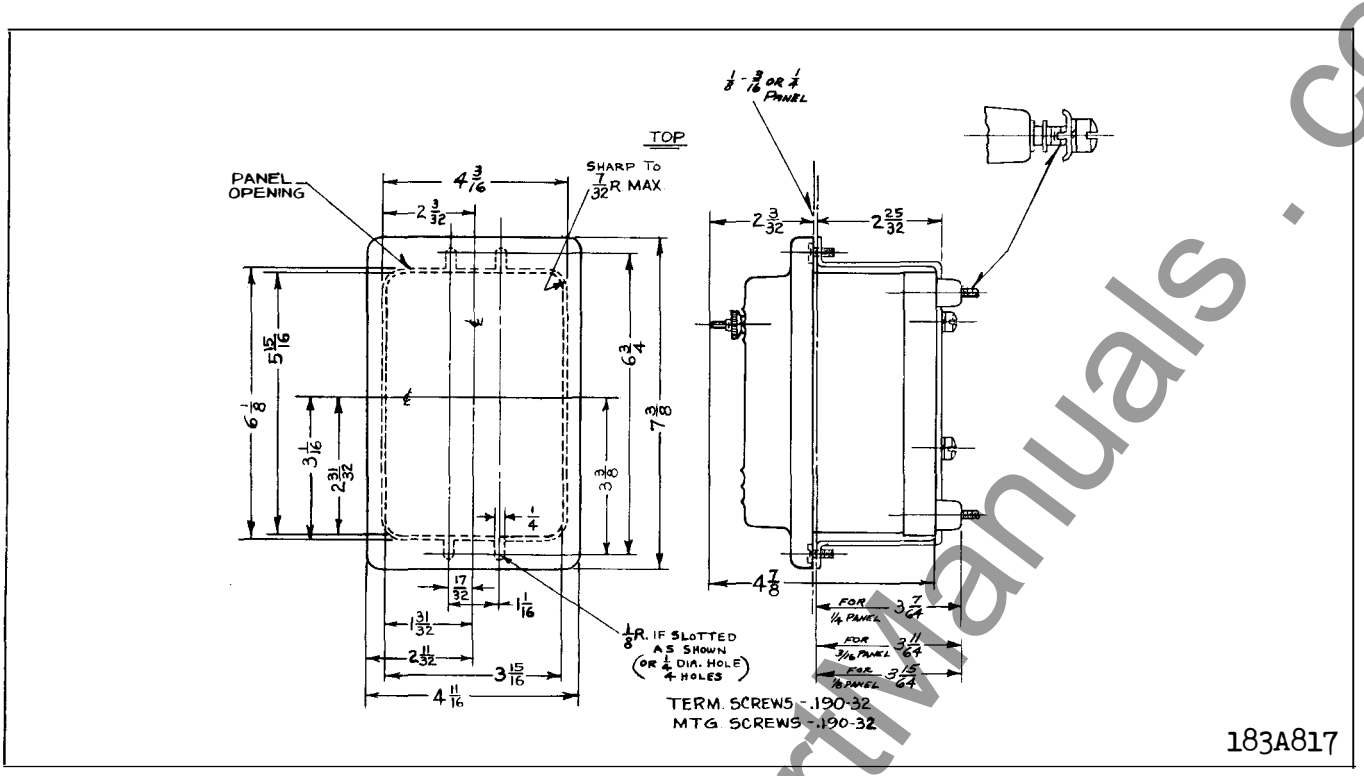


Fig. 10. Outline and Drilling Plan for the Molded Semi-Flush Case. For Reference Only.

specified above, a 60 cycle MG relay with voltage rating equal to the line voltage can be used with a series resistor which will take about 90 watts when directly across the line. Of course, if the coil will be shorted only momentarily or if a higher watt consumption is not objectionable, it may be unnecessary to reduce the spring tension or contact follow.

If the complete armature assembly is to be removed from the relay, the screws which fasten the lower ends of the moving contact leads to the terminals should be removed, the armature spring tension adjusting screw should be turned in as far as possible, and the armature stop nut should be removed. The upper end of the armature spring should then be slipped off of the grooved member at the lower end of the adjusting screw and the armature should be lifted off of its bearing carefully so as to avoid distortion of the coiled leads. The leads to the upper center moving contacts are not coiled but the coiling of the four other moving contact leads should be such that when the relay base is horizontal and the armature is on its bearings and approximately at its mid-position, the lead terminals will just touch the base terminal inserts or be within about 1/8" of that position.

On latch-type relays the latch screw is adjusted so that with the armature latched and the operating coil de-energized, there will be a gap of between .005 and .010 inch between the electromagnet pole face and the raised section of the armature which strikes the pole face. The locking screw should be tightened securely after making this adjustment. There is a small amount of clearance between the armature and its supporting posts, and in order to insure proper operation allowance must be made for this in the following manner. With the armature held against its left-hand support and nearly closed, the latch spring or reset armature should be moved to the left as far as it will go by means of the hand reset. To assure that the latch will always release the armature the resulting space between the latch and the latch screw should be at least .005 inch, and should not be more than about 1/64". This should also be checked electrically if electrical reset is provided. Some change of this gap can be made by loosening the mounting screws in the relay base and moving the latch support in the desired direction. The gap also can be changed by loosening the two screws which hold the moving contact insulation block to the armature and shifting the armature in the desired direction.

On electrical reset relays, the tension of the spring which draws the reset armature toward the

latch screw must be adjusted if these parts are being reassembled. The locking screw (Fig. 2) is screwed out until its head clears the head of the adjusting screw. The main armature is then held completely closed and against its right hand support, and the latch spring tension adjusting screw is turned until the latch barely touches the stop projecting from the center of the latch screw. Then the latch spring tension should be increased by turning the screw clockwise 5 turns, and the locking screw should be tightened.

If either the core nut of the electrical reset assembly or the screws which mount its armature have been loosened, the relative positions of the core and plunger may shift sufficiently to cause the plunger to strike on the side of the conical core opening. To assure correct alignment of these parts, .042 diameter holes are provided through the center of the core and about 1/16" deep in the center of the plunger. After tightening the core nut, a close fitting pin should be inserted through the core and into the plunger. With the pin in place, and plunger pressed firmly against the core, and the mounting end of the armature centrally located with respect to the electromagnet, the two armature mounting screws should be tightened. The pin then should be removed.

A slight amount of medium viscosity slushing oil is supplied at the factory to the polished and hardened surfaces of the latch screw and the latch plate to minimize wear and as protection against corrosion. Oil should be reapplied after any cleaning and reassembling of these parts, and it is desirable also to renew this at the regular maintenance periods.

If the relay is provided with a coil interrupting contact, the following points must be observed to assure satisfactory operation. With the relay in its normal operating position and the armature shifted to the extreme right, align the armature "snap" spring so that it is at least 1/64 inch in from the right hand edge of the moving contact spring. With an .020 inch gap between the armature and the lower pole face of the electromagnet, adjust the bracket by means of the adjusting screw, until the snap spring just passes the roller. The latch screw should be adjusted so that with the armature in the latched position and the operating coil deenergized, the gap between the armature and the lower pole face of the electromagnet is .010 inch. With the armature in this position the coil interrupting contact should be open at least 3/64 inch.

All contacts should be periodically cleaned. A contact burnisher S#182A836H01 is recommended for this purpose. The use of abrasive material for cleaning contacts is not recommended, because of the danger of embedding small particles in the face of the soft silver and this impairing the contact.

REPAIRS AND RENEWAL PARTS

Repair work can be done most satisfactorily at the factory. However, interchangeable parts can be furnished to the customers who are equipped for doing repair work. When ordering parts, always give the complete nameplate data.

ENERGY REQUIREMENTS

* Operating Coil Burdens at rated Voltage

Frequency (cycles)	Closed Gap Watts	Closed Gap Volt-Amps	Open Gap Watts	Open Gap Volt-Amps
25	6.8	23	19.6	53
50	9.8	31	17.4	78
△60	12	37	17.6	92
D-C	7.8 cold--		7.8 cold--	
D-C	6.5 hot--		6.5 hot--	

△Rated voltage is 115 volts or its multiples.

Reset Coil Burdens at Rated Voltage (Multiples)

Frequency (cycles)	Closed Gap Watts	Closed Gap Volt-Amps	Open Gap Watts	Open Gap Volt-Amps
25	48	51.6	52	54
50	46	58.2	57	63.8
60	84	104.5	96	112.8
D-C	66 cold--		68 cold--	

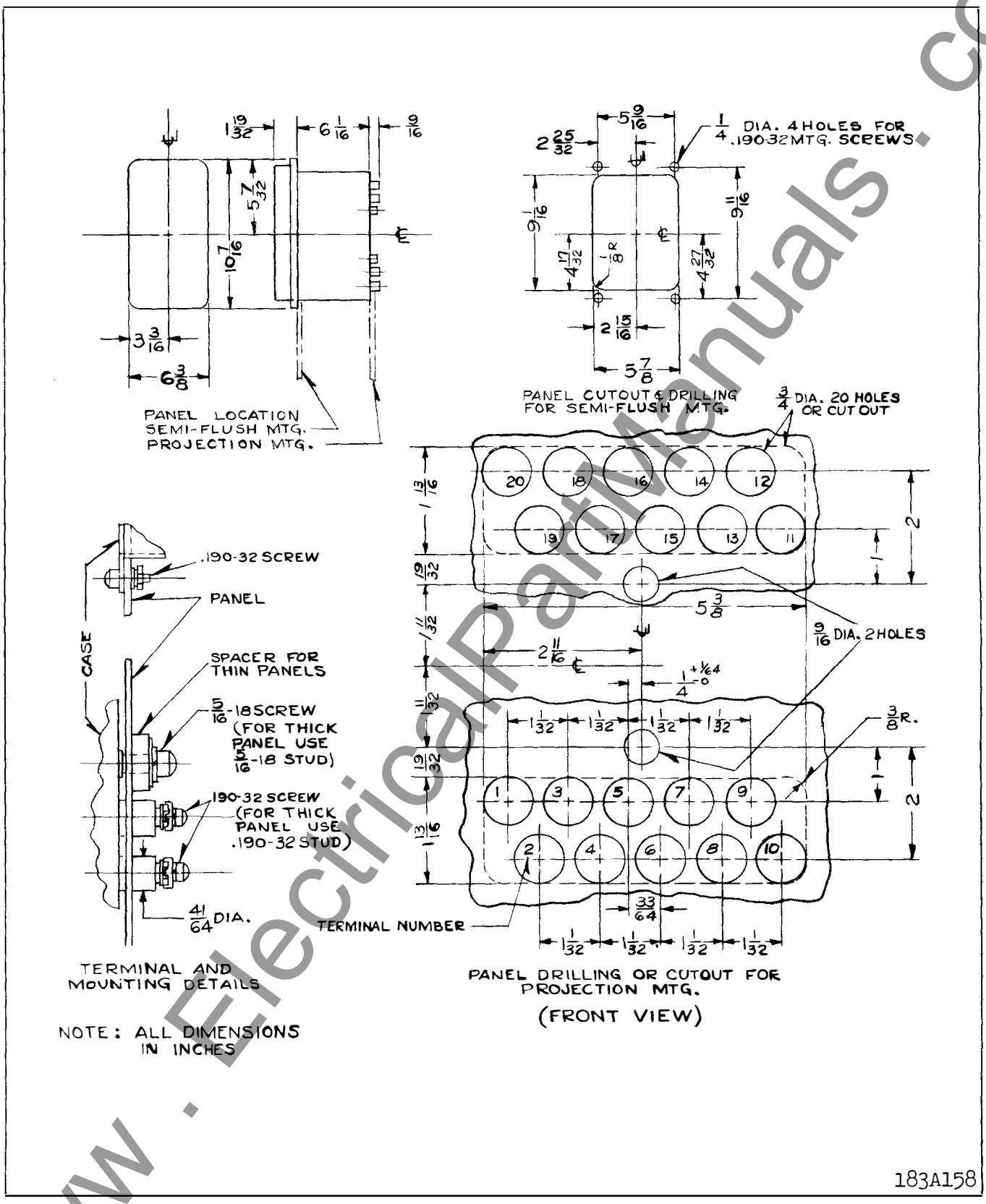


Fig. 11. Outline and Drilling Plan for the Type MG-6 Relay In Type FT22 Case.

WESTINGHOUSE ELECTRIC CORPORATION

RELAY DEPARTMENT **NEWARK, N. J.**

Printed in U. S. A.

INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

TYPE MG-6 MULTI-CONTACT AUXILIARY RELAY

CAUTION Before putting relays into service, remove all blocking which may have been inserted for the purpose of securing the parts during shipment, make sure that all moving parts operate freely, inspect the contacts to see that they are clean and close properly, and operate the relay to check the settings and electrical connections.

APPLICATION

The type MG-6 relay is designed for applications where several independent circuits must be energized or de-energized upon the operation of a single primary relay contact, or where the capacity of the primary relay contact is inadequate for the energy required in a control circuit. In certain applications these relays may be used directly as primary relays. Since the stationary contacts can readily be reversed so as to be suitable for either circuit opening or circuit closing service (although a slight increase in spring * tension may be required on the dc MG-6 relay – see "ADJUSTMENTS AND MAINTENANCE") it is unnecessary to predetermine the arrangements of the circuits for which the relay is to be used.

In the usual application of the relay, the armature resets when the operating coil is de-energized. However, the relays may be supplied with a latching mechanism which holds the armature in the operated position until the latch is tripped, either by hand or electrically.

An operating coil cutoff contact can be supplied with the electric-reset type, where an intermittent duty coil is required for faster than normal operation, but where the operating coil circuit must be energized continuously. An operating coil, rated at 19% of supply rating may be applied, with a maximum duty of 10,000 operations. (e.g. 24 volt coil on 125 volt dc circuit.

CONSTRUCTION AND OPERATION

The operating electromagnet is at the lower end of the relay, as shown in Fig. 1. The stationary iron circuit is built up of U-shaped punchings. These are slotted at the outer end of the lower leg to receive the copper lag loops used to obtain quiet oper- * ation on ac. The operating coil is mounted on this leg of the punchings. In order to improve the per- * formance of the relay on dc, the pole face area is increased by means of an iron plate. This plate is assembled at the end of the coil and the corners of the lamination side plates are bent outward, serving to hold the plate in place. The inner end of the upper leg of the punching assembly is shaped so that the lower end of the armature restraining spring can be hooked over it.

The armature is made of high-silicon steel. Projecting sections on the sides, near the center, act as knife-edge bearings and rest on suitably shaped supports which are a part of the moulded base. A stud attached to the lower leg of the electromagnet extends through a hole in the lower end of the armature, and a stop-nut on the outer end of this stud is used to limit and adjust the travel of the armature in the de-energized direction. The special stop nut used will remain at any position in which it is placed without additional locking means.

The upper end of the armature carries an adjusting screw to which one end of the armature restraining spring is attached. In the hand or electrically reset relays, a latch screw is mounted at the extreme end of the armature. In the self-reset relays this screw is replaced by a set screw which serves to separate the locking plate (see Fig. 1) slightly from the armature. Between the spring adjusting screw and the latch screw (or set screw), there is a third screw which when tightened applies pressure to the threads of the former screws and effectively locks them against turning.

The moving contact fingers are mounted on moulded insulation which is fastened to the armature

SUPERSEDES I.L. 41-753.1H, dated February 1973
*Denotes change from superseded issue.

EFFECTIVE SEPTEMBER 1975

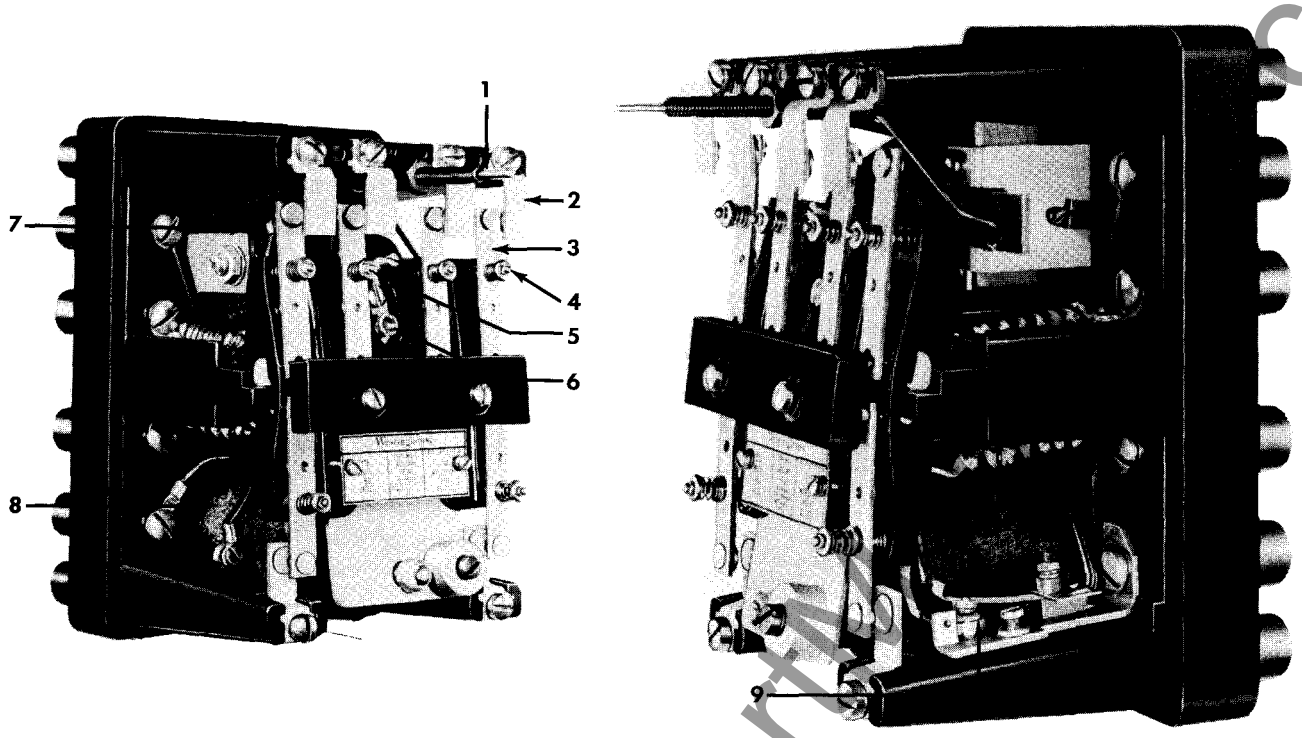


Fig. 1. Front View (Cover Omitted) and Side View of the MG-6 Electric & Hand Reset Relay in Molded Case. 1 – Reset push rod, 2 – stationary contact, 3 – moving contact, 4 – moving contact spring assembly, 5 – latch adjustment screw, 6 – adjusting screw for armature spring tension, 7 – reset coil, 8 – operating coil, 9 – optional operating coil cut-off contact.

by two screws. Silver contact buttons are on both sides of these fingers so that they can be used for either a circuit-opening or a circuit-closing contact. The fingers are assembled on guide pins, between two springs in such a way that definite spring compression and contact wipe is assured for either contact-closing or contact-opening service. Flexible leads assemblies are welded to the contact fingers. Since the armature assembly has contact fingers both above and below the bearing points, the armature weight is partially balanced about the bearings and there is less tendency for severe shocks to move the armature.

The stationary contacts consists of large silver buttons which can be assembled so that they close with the moving contacts when the armature is in either the energized or de-energized position. The stationary contact brackets are connected directly to the terminal inserts by means of long screws which pass through brass tubes. These tubes are of such length that the moulded material of the base is not under direct compression when the screws are tightened. Therefore, there is always a tight connection from contact to terminal regardless of possible shrinkage or other variation in the moulded base material. The contact bracket is held against its seat by means of a spring ring which is compressed between shoulders in the base and on the hexagonal terminal insert.

The construction of the latch and electrical reset is shown in Fig. 2, in which the lower portion is a partial front view of the relay in the moulded case, and the upper portion a top view. In the latter view, the latch screw (in the main armature) is in the energized position, and the reset armature is free to be moved to the right by the tension spring until the hardened latch plate on the reset armature rests against the tip of the latch screw. When the operating coil is de-energized, the latch screw will move slightly so that its shoulder rests on the edge of the latch plate. When the reset coil is energized its armature moves to the left, thus permitting the main armature to return to its open position. Pressing the reset push rod, which extends through the cover stud, will also release the latch through the medium of the reset lever shown in the figure.

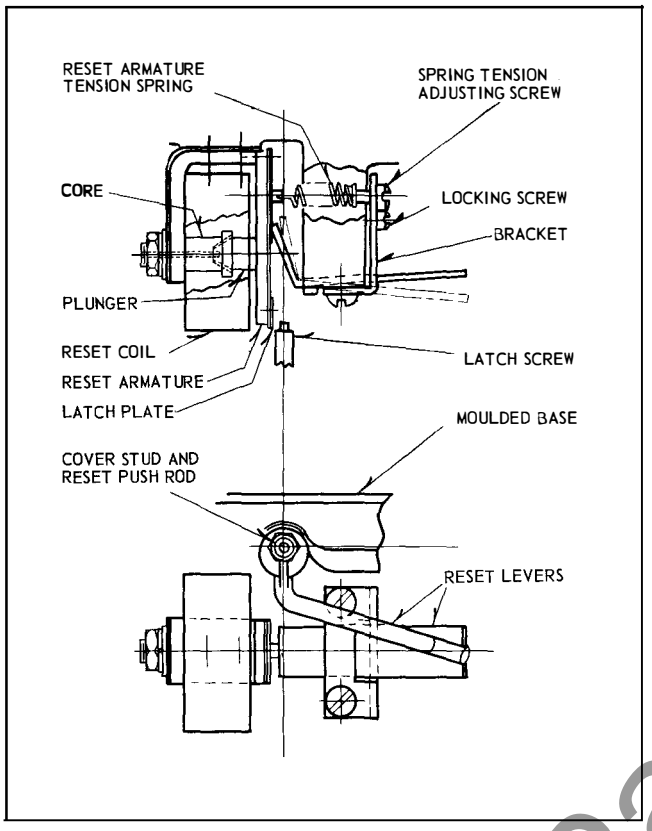
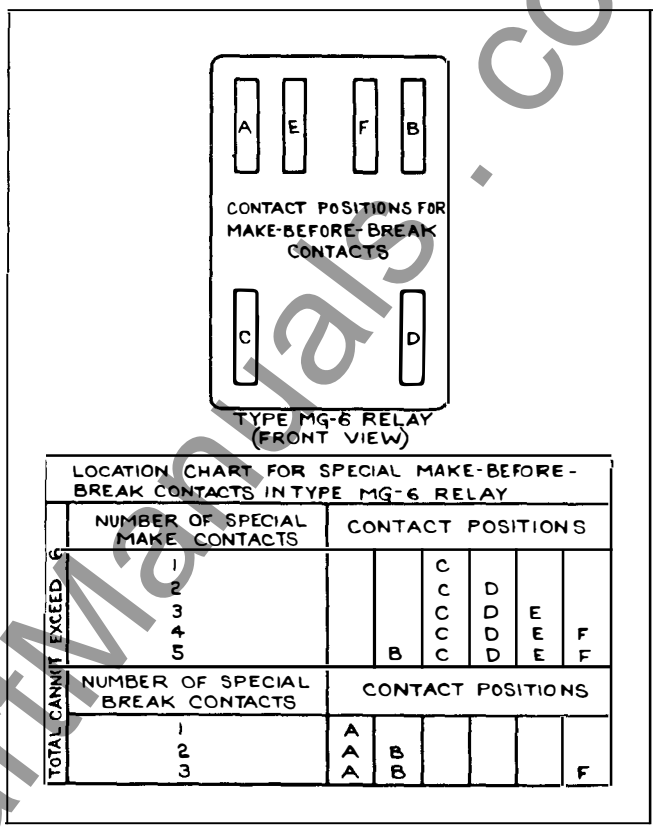


Fig. 2. Detail Views of the Latch and Electrical Reset of the Type MG-6 Relay.



LOCATION CHART FOR SPECIAL MAKE-BEFORE-BREAK CONTACTS IN TYPE MG-6 RELAY

TOTAL CANNOT EXCEED 6	NUMBER OF SPECIAL MAKE CONTACTS	CONTACT POSITIONS					
	1			C			
	2			C	D		
	3			C	D	E	
	4			C	D	E	F
	5		B	C	D	E	F
	NUMBER OF SPECIAL BREAK CONTACTS	CONTACT POSITIONS					
	1	A					
	2	A	B				
	3	A	B				F

Fig. 3. Contact Positions for Combinations of Make-Before-Break Contacts.

In some applications of the relay with latch and electrical reset, it may be desirable to have the operating and reset coils deenergized automatically as soon as they have performed their functions. In the case of the reset coil this can be accomplished by connecting the coil through one of the relay "make" contacts. An auxiliary contact is required to open the operating coil circuit. This contact, when provided, is assembled on the lower right-hand side of the relay, and is held in position by the terminal screw to which the right-hand coil lead ordinarily connects. The coil lead is connected to the moving contact of the auxiliary contact, and the end of the stationary contact bracket is in contact with the head of the terminal screw. The auxiliary contact is closed when the main armature is open. When the armature approaches the closed position, the spring on the molded insulation block snaps off the roller and causes the contacts to open and interrupt the operating coil current. When this auxiliary contact is used, a weight is screwed to the lower end of the armature to increase its mass and stabilize contact action. This contact will interrupt the coil current at up to five times rated coil voltage.

In certain applications of the type MG-6 relay, it may be desirable to have one or more of the contacts close before other contacts on the same relay open. A special armature assembly is required to obtain such operation, and the number of special make and break contacts desired must be known when the relay is built. The special moving contacts have longer follow than the standard contacts and greater armature spring tension is required for full deflection of the break contacts. Consequently, it is preferable to limit the number of special break contacts to two. A maximum of three may be used, although the increased armature spring tension needed may raise the minimum pick-up voltage above the standard value. As many as five contacts may be special make contacts, with the total of special make and break contacts limited to six, of course. The locations of the make and break contacts for any combination of these special contacts are shown in Fig. 3. This figure indicates the physical location of the contacts in the relay, and can be used in conjunction with the inter-

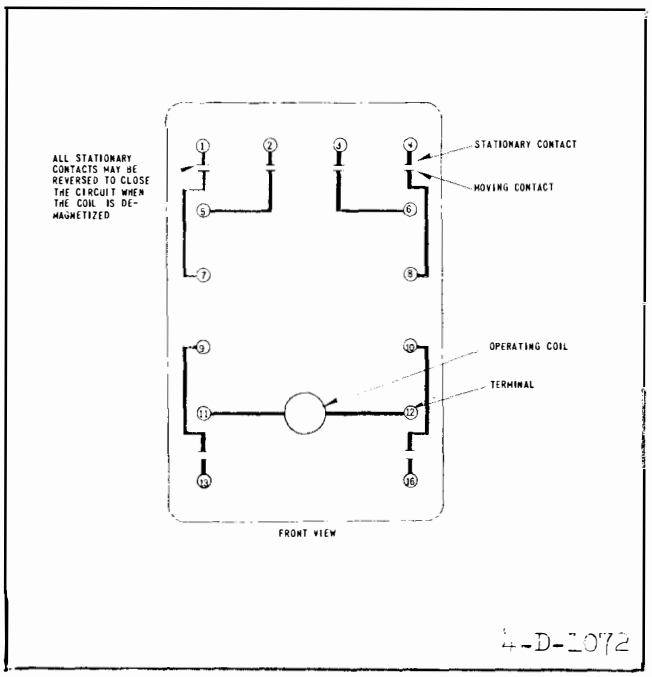


Fig. 4. Internal Schematic of the Type MG-6 Relay, Without Electrical Reset, in Molded Case.

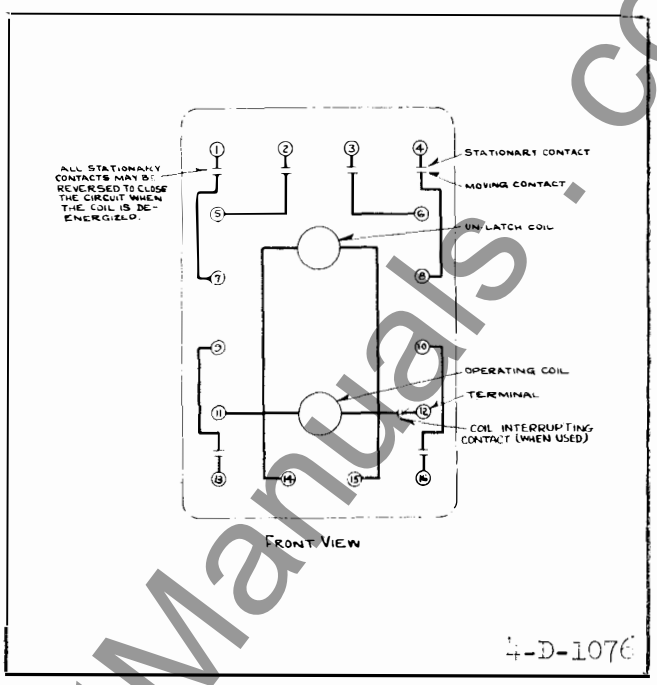


Fig. 5. Internal Schematic of the Type MG-6 Relay, With Electrical Reset, in Molded Case.

nal schematic diagram for the type of case involved to determine the corresponding terminal locations.

The type MG-6 relay may be provided without cover, for front connection, or in a variety of completely closed cases, for rear connection. The moulded base for rear connection is shown in Fig. 1. The base for front connection is similar except that there are no terminals projecting in the rear. This same base is also used as a sub-base when the relays are supplied in the FT22 case.

CHARACTERISTICS

The type MG-6 relay has an operating time of approximately 2 cycles on ac and 5 cycles on dc (on a 60 hertz basis) when energized at the rated voltage.

50 Hz relay. The operate and reset coils for 50 Hz MG-6 relay are different than the 60 Hz coils.

If faster operation is desired and if the application requires only intermittent energization of the relay, the operating coils may be energized at higher than rated voltage. (1) Twice rated voltage will give an operating time of approximately 1 cycle on ac, and the coil will stand this voltage safely for over two minutes if 60 hertz or 4 minutes if 25 hertz. (2) The time of the d-c relay can be reduced to slightly over 1 cycle if the coil is energized at five times rated voltage. The coil will stand this voltage for one minute. If faster time is desired on a dc relay which must be energized continuously, the use of a low voltage coil with a series resistor will reduce the time. With 10% of the line voltage across the relay coil and the balance across a series resistor, the reduced inductance of the circuit results in an operating time of approximately 2 cycles. The time of operation may be reduced to approximately one cycle by applying 4 or 5 times rated dc voltage to the coils through the coil interrupting contact.

Reset coils are for intermittent duty only and should not be energized longer than one-half minute.

The relay contacts will close circuits carrying 30 amperes. They will carry this current for 1 minute, and will carry 12 amperes continuously.

The contacts will interrupt the following currents, in non-inductive circuits, at the voltages listed:

Current	Volts ac
30	115
20	230
15	460
10	575

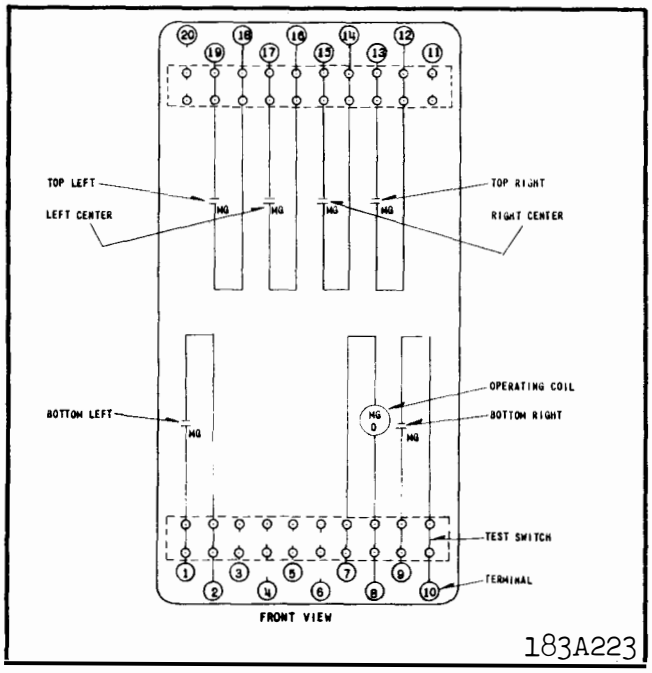


Fig. 6. Internal Schematic of the Type MG-6 Relay, Without Electrical Reset, in FT22 Case.

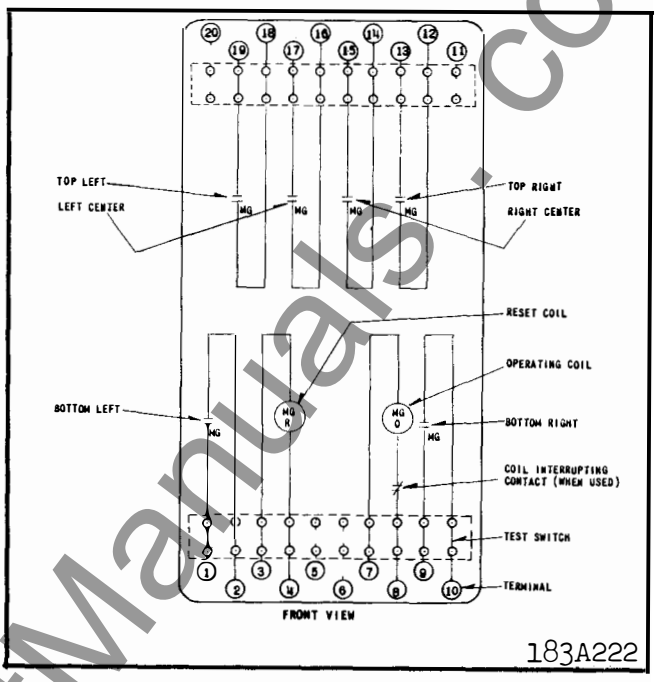


Fig. 7. Internal Schematic of the Type MG-6 Relay, With Electrical Reset, in FT22 Case.

Current	* Volts dc
30	12
15	24
10	32
8	48
3	125
1	250

* The type MG-6 relay for ac can be used with any combination of contacts, but the dc relay can have up to four circuit-opening contacts with the normal operating spring adjustment. With more than four the operating spring should be adjusted to give the correct back contact follow.

INSTALLATION

The relays should be mounted on switchboard panels or their equivalent in a location free from dirt, moisture, excessive vibration. and heat. Mount the relay vertically by means of the four mounting holes on the flange for semi-flush mounting or by means of the rear mounting stud or studs for projection mounting. Either a mounting stud or the mounting screws may be utilized for grounding the relay. The electrical connections may be made directly to the terminals by means of screws for steel panel mounting or to the terminal studs furnished with the relay for thick panel mounting. The terminal studs may be easily removed or inserted by locking two nuts on the stud and then turning the proper nut with a wrench.

For detailed FT case information refer to I.L. 41-076.

Coil Resistance (at 25° C) (± 10%)

* Rating	Operating Coil dc Ohms	Operating Coil Closed Gap Impedance	Reset Coil dc 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, 50 Hertz	660	....	3550

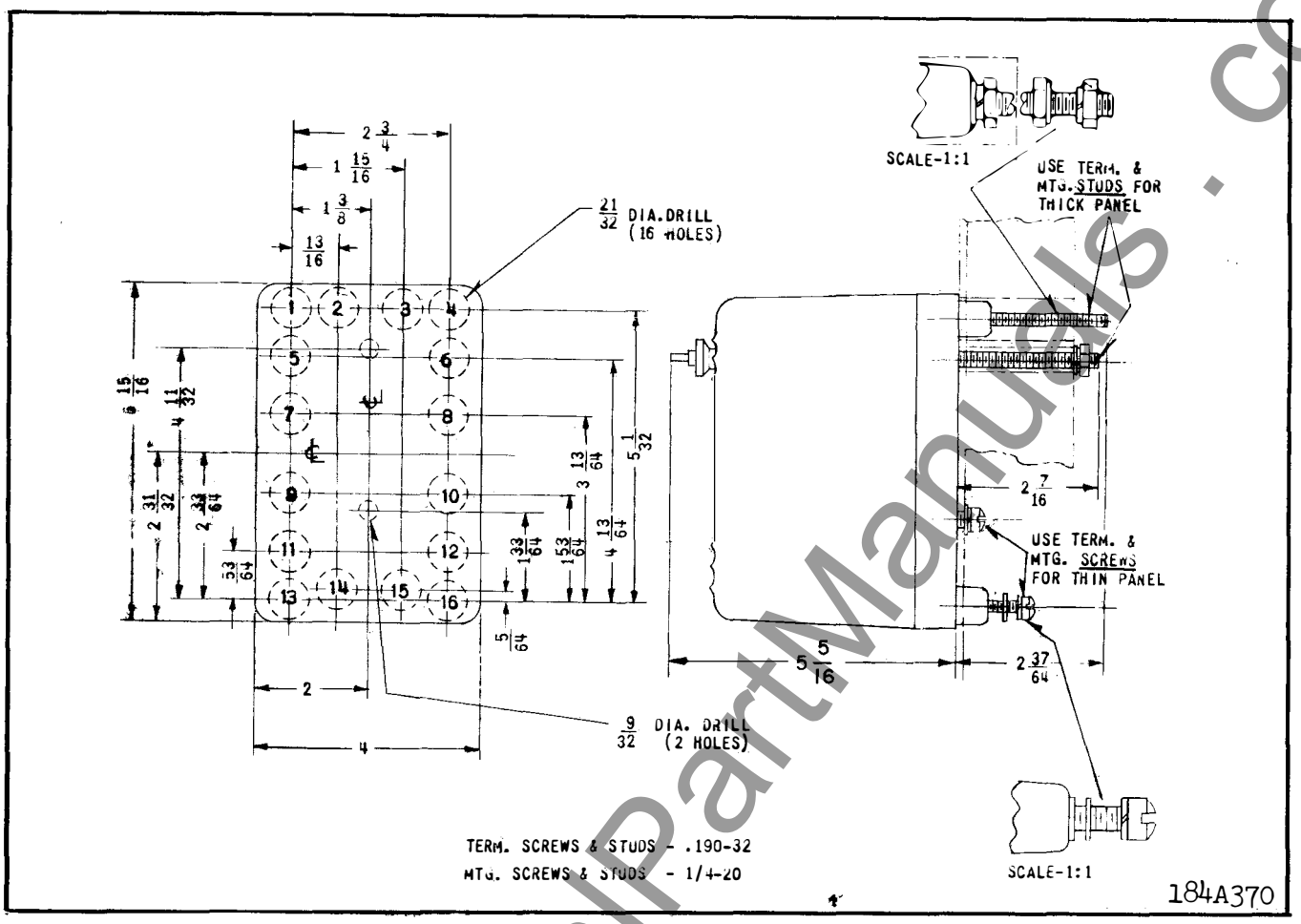


Fig. 8. Outline and Drilling Plan for the Type MG-6 Relay in the Rear Connected Molded Case. For Reference Only.

Relays in the rear-connected moulded cases should be mounted and electrically connected similar to the other projection cases. The lower mounting stud may be used to ground the electromagnet iron. The hexagon-shaped terminal inserts are slightly loose in the base but this does not affect the electrical connections. Only the two mounting studs should be used to secure the relay to the panel. Removal of terminal insert end-play (in the case of thick-panel mounting) by turning a nut on the terminal stud tightly against a large diameter washer (not supplied) at the rear of the panel should not be attempted as this may distort the relay base and affect the adjustments, or possibly damage the relay. Relays in the front-connected moulded cases should be mounted by four screws through the sides of the base as indicated in the drilling plan.

ADJUSTMENTS AND MAINTENANCE

The relays are shipped from the factory correctly adjusted for armature travel and for contact follow and pressure, and it should not be necessary to disturb these adjustments. The relays normally are shipped with all contacts assembled for circuit-closing operation. To convert them for circuit-opening operation, it is necessary merely to loosen the mounting screw for the stationary contact bracket, turn this bracket over, and tighten the screw. After reversing the position of the contact brackets, it may be necessary to bend them slightly to obtain contact follows approximately as stated in the fourth paragraph of this section. On a d-c relay not more than four contacts can be assembled in the circuit-opening position if normal contact pressure and travel are maintained. With more than four the operating spring should be adjusted to give the correct back contact follow.

If a relay has been dismantled and is being reassembled, the following adjustments should be made or checked. Reference should be made to Figs. 1 and 2 for identification of the parts mentioned in these instructions.

The armature stop nut should be adjusted so that

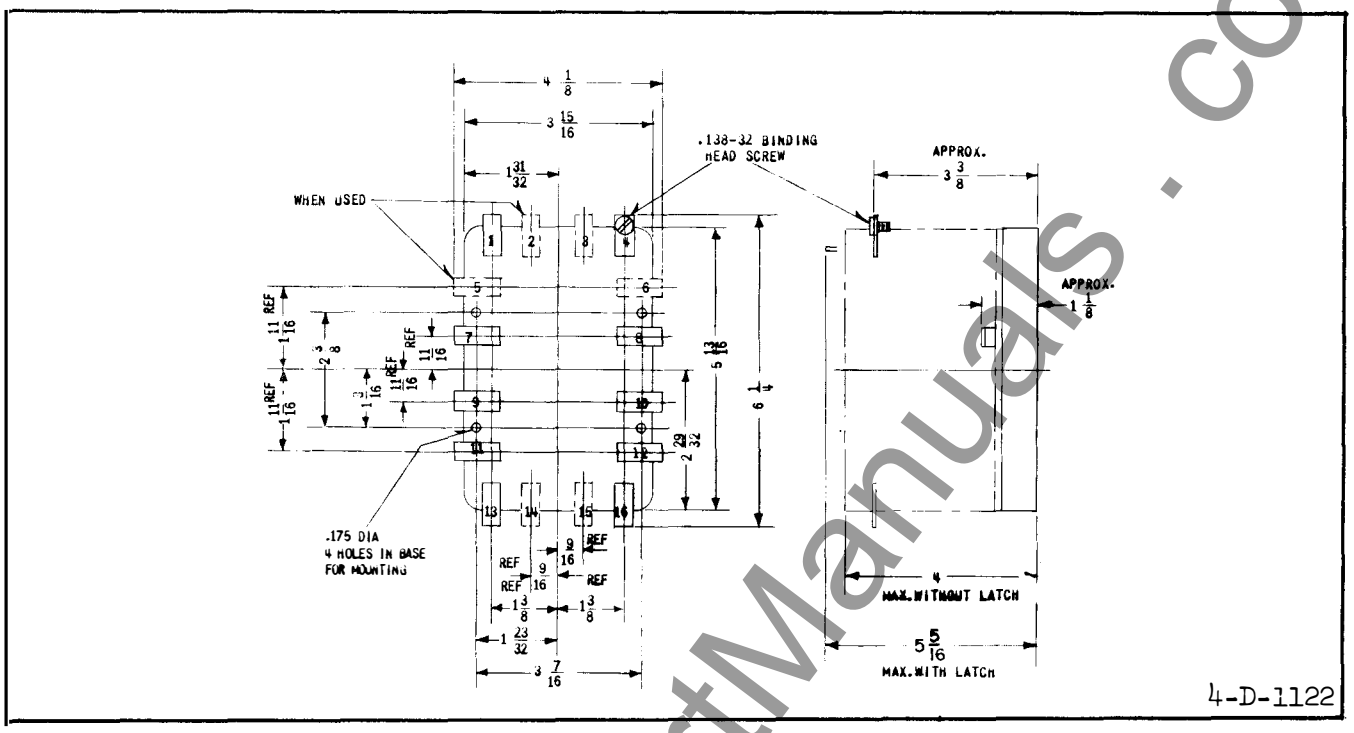


Fig. 9. Outline and Drilling Plan for the Type MG-6 Relay in the Front Connected Molded Case. See Internal Schematic for Terminals Supplied. For Reference Only.

when the armature is in contact with it, the lower edge of the armature is 7/16'' above the position which it assumes when the relay is energized. When adjusting the armature spring tension, the locking screw for the spring adjusting screw is loosened, and this adjusting screw is turned (inward, to reduce the spring tension) until the spring barely holds the armature against the stop nut. The relay must be in its normal vertical position when this adjustment is made, with all contacts assembled as circuit-closing. The armature spring should then be tightened by turning the adjusting screw 4 turns counter-clockwise for a-c relays or 2 turns for d-c relays, and the locking screws should be tightened. If the relay is being used with a number of break contacts, it may be necessary to increase the spring tension to obtain full follow on the break contacts. The adjusting screw should be turned just enough farther to obtain full follow with the armature against the stop nut.

The follow of the moving contact fingers should be 3/32" for the make contacts and 1/16" for the break contacts, measured at the contacts. This can be checked more conveniently by measuring the travel of the lower edge of the armature after the contacts touch. This should be approximately 1/8" for the make contacts and 3/32" for the break contacts. In case moving contact fingers have been removed from their guide pins, it is important that the coil springs on the two sides of the fingers be replaced correctly. The springs which are compressed by circuit-closing contacts are approximately three times as strong as the ones compressed by circuit-opening contacts and thus they can be readily distinguished. The positions of the two springs are reversed at the two ends of the relay.

When special contacts are supplied for make-before-break operation, the stationary members of the special contacts are bent equally toward their respective moving contacts to obtain "make" at the point where the "break" moving contact has approximately 1/16" follow before parting from its stationary contact.

If an a-c relay is to be used with a series resistor so that the relay can be dropped out by shorting the coil, either the resistance value must be such that the watt consumption with the coil shorted will be quite high or the relay armature spring tension must be reduced to about 1-1/2 turns and the follow of the stationary make contacts must be reduced (by bending) to about 1/16". With the reduced armature spring tension, not more than two of the contacts can be used as break contacts. Because of the low relay impedance with armature open as compared to the impedance with armature closed, it is not advantageous to use a resistor in series with a coil rated at less than line voltage, as in the case of d-c applications. For the contact and spring adjustments

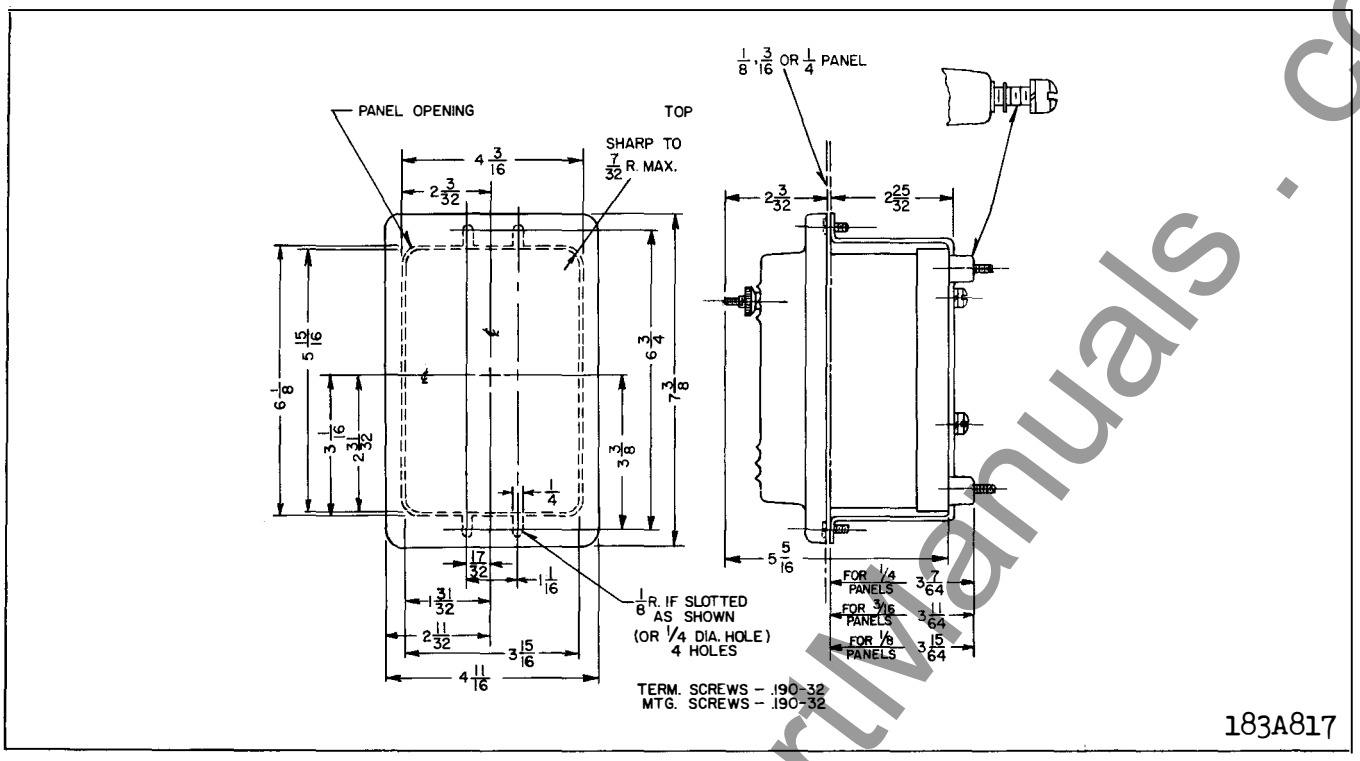


Fig. 10. Outline and Drilling Plan for the Molded Semi-Flush Case. For Reference Only.

specified above, a 60 cycle MG relay with voltage rating equal to the line voltage can be used with a series resistor which will take about 90 watts when directly across the line. Of course, if the coil will be shorted only momentarily or if a higher watt consumption is not objectionable, it may be unnecessary to reduce the spring tension or contact follow.

If the complete armature assembly is to be removed from the relay, the screws which fasten the lower ends of the moving contact leads to the terminals should be removed, the armature spring tension adjusting screw should be turned in as far as possible, and the armature stop nut should be removed. The upper end of the armature spring should then be slipped off of the grooved member at the lower end of the adjusting screw, and the armature should be lifted off of its bearing carefully so as to avoid distortion of the coiled leads. The leads to the upper center moving contacts are not coiled but the coiling of the four other moving contact leads should be such that when the relay base is horizontal and the armature is on its bearings and approximately at its mid-position, the lead terminals will just touch the base terminal inserts or be within about 1/8" of that position.

On latch-type relays the latch screw is adjusted so that with the armature latched and the operating coil de-energized, there will be a gap of between .005 and .015 inch between the electromagnet pole face and the raised section of the armature which strikes the pole face. The locking screw should be tightened securely after making this adjustment. There is a small amount of clearance between the armature and its supporting posts, and in order to insure proper operation allowance must be made for this in the following manner. With the armature held against its left-hand support and nearly closed, the latch spring or reset armature should be moved to the left as far as it will go by means of the hand reset. To assure that the latch will always release the armature the resulting space between the latch and the latch screw should be at least .010 inch, and should not be more than about 1/64". This should also be checked electrically if electrical reset is provided. Some change of this gap can be made by loosening the mounting screws in the relay base and moving the latch support in the desired direction. The gap also can be changed by loosening the two screws which hold the moving contact insulation block to the armature and shifting the armature in the desired direction.

On electrical reset relays, the tension of the spring which draws the reset armature toward the

latch screw must be adjusted if these parts are being reassembled. The locking screw (Fig. 2) is screwed out until its head clears the head of the adjusting screw. The main armature is then held completely closed and against its right hand support, and the latch spring tension adjusting screw is turned until the latch barely touches the stop projecting from the center of the latch screw. Then the latch spring tension should be increased by turning the screw clockwise 9 turns, and the locking screw should be tightened.

If either the core nut of the electrical reset assembly or the screws which mount its armature have been loosened, the relative positions of the core and plunger may shift sufficiently to cause the plunger to strike on the side of the conical core opening. To assure correct alignment of these parts, .042 diameter holes are provided through the center of the core and about 1/16" deep in the center of the plunger. After tightening the core nut, a close fitting pin should be inserted through the core and into the plunger. With the pin in place, and plunger pressed firmly against the core, and the mounting end of the armature centrally located with respect to the electromagnet, the two armature mounting screws should be tightened. The pin then should be removed.

A small amount of silicone oil is supplied at the factory to the polished and hardened surfaces of the latch screw and the latch plate to minimize wear and as protection against corrosion. Oil should be reapplied after any cleaning and reassembling of these parts, and it is desirable also to renew this at the regular maintenance periods.

If the relay is provided with a coil interrupting contact, the following points must be observed to assure satisfactory operation. With the relay in its normal operating position and the armature shifted to the extreme right, align the armature "snap" spring so that it is at least 1/64 inch in from the right hand edge of the moving contact spring. With an .030 inch gap between the armature and the lower pole face of the electromagnet, adjust the bracket by means of the adjusting screw, until the snap spring just passes the roller. The latch screw should be adjusted so that with the armature in the latched position and the operating coil deenergized, the gap between the armature and the lower pole face of the electromagnet is .010 to .015 inch. With the armature in this position the coil interrupting contact should be open at least 3/64 inch.

All contacts should be periodically cleaned. A contact burnisher S#182A836H01 is recommended for this purpose. The use of abrasive material for cleaning contacts is not recommended, because of the danger of embedding small particles in the face of the soft silver and this impairing the contact.

REPAIRS AND RENEWAL PARTS

Repair work can be done most satisfactorily at the factory. However, interchangeable parts can be furnished to the customers who are equipped for doing repair work. When ordering parts, always give the complete nameplate data.

* ENERGY REQUIREMENTS

Operating Coil Burdens at rated Voltage

Frequency (Hertz)	Closed Gap		Open Gap	
	Watts	Volt-Amps	Watts	Volt-Amps
25	6.8	23	19.6	53
50	9.8	31	17.4	78
△60	12	37	17.6	92
dc	7.8 cold--		7.8 cold--	
dc	6.5 hot--		6.5 hot--	

△Rated voltage is 115 volts or its multiples.

Reset Coil Burdens at Rated Voltage (Multiples)

Frequency (Hertz)	Closed Gap		Open Gap	
	Watts	Volt-Amps	Watts	Volt-Amps
25	48	51.6	52	54
50	46	58.2	57	63.8
60	84	104.5	96	112.8
dc	66 cold--		68 cold--	

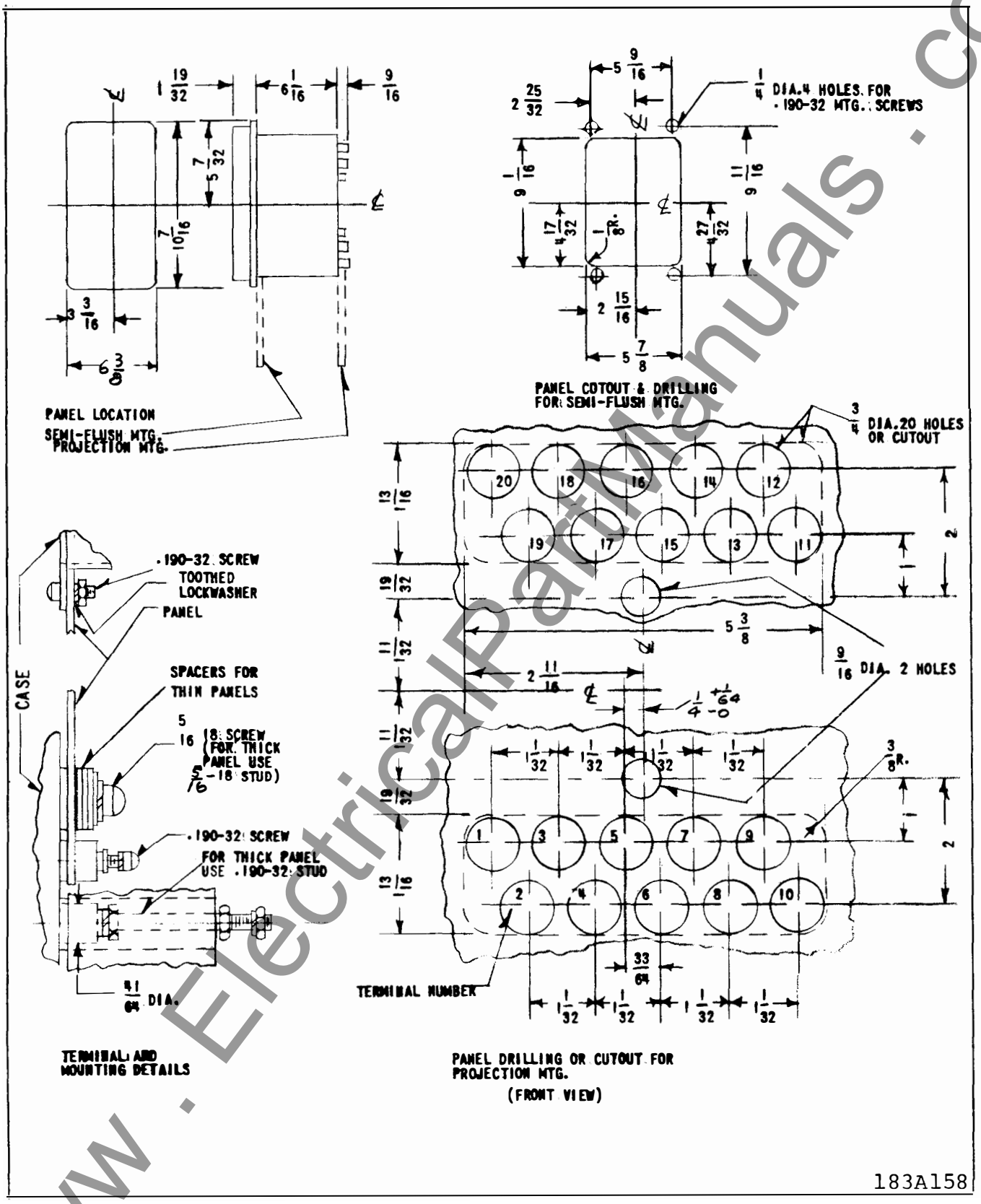


Fig. 11. Outline and Drilling Plan for the Type MG-6 Relay in Type FT22 Case.

WESTINGHOUSE ELECTRIC CORPORATION

RELAY-INSTRUMENT DIVISION **NEWARK, N. J.**

Printed in U.S.A.

INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

TYPE MG-6 MULTI-CONTACT AUXILIARY RELAY

CAUTION Before putting relays into service, remove all blocking which may have been inserted for the purpose of securing the parts during shipment, make sure that all moving parts operate freely, inspect the contacts to see that they are clean and close properly, and operate the relay to check the settings and electrical connections.

APPLICATION

The type MG-6 relay is designed for applications where several independent circuits must be energized or de-energized upon the operation of a single primary relay contact, or where the capacity of the primary relay contact is inadequate for the energy required in a control circuit. In certain applications these relays may be used directly as primary relays. Since the stationary contacts can readily be reversed so as to be suitable for either circuit opening or circuit closing service (although readjustment may be required on the D-C MG-6 relay – see "ADJUSTMENTS AND MAINTENANCE") it is unnecessary to predetermine the arrangements of the circuits for which the relay is to be used.

In the usual application of the relay, the armature resets when the operating coil is de-energized. However, the relays may be supplied with a latching mechanism which holds the armature in the operated position until the latch is tripped, either by hand or electrically.

CONSTRUCTION AND OPERATION

The operating electromagnet is at the lower end of the relay, as shown in Fig. 1. The stationary iron circuit is built up of U-shaped punchings. These are slotted at the outer end of the lower leg to receive the copper lag loops used to obtain quiet operation on A-C, The operating coil is mounted on this leg of the punchings. In order to improve the performance of the relay on D-C, the pole face area is increased by means of an iron plate. This plate is assembled at the end of the coil and the corners of the lamination side plates are bent outward, serving to hold the plate in place. The inner end of the upper leg of the punching assembly is shaped so that the lower end of the armature restraining spring can be hooked over it.

The armature is made of high-silicon steel. Projecting sections on the sides, near the center, act as knife-edge bearings and rest on suitably shaped supports which are a part of the moulded base. A stud attached to the lower leg of the electromagnet extends through a hole in the lower end of the armature, and a stop-nut on the outer end of this stud is used to limit and adjust the travel of the armature in the de-energized direction. The special stop nut used will remain at any position in which it is placed without additional locking means.

The upper end of the armature carries an adjusting screw to which one end of the armature restraining spring is attached. In the hand or electrically reset relays, a latch screw is mounted at the extreme end of the armature. In the self-reset relays this screw is replaced by a set screw which serves to separate the locking plate (see Fig. 1) slightly from the armature. Between the spring adjusting screw and the latch screw (or set screw), there is a third screw which when tightened applies pressure to the threads of the former screws and effectively locks them against turning.

The moving contact fingers are mounted on moulded insulation which is fastened to the armature by two screws. Silver contact buttons are welded on both sides of these fingers so that they can be used for either a circuit-opening or a circuit-closing contact. The fingers are assembled on guide pins, between two springs in such a way that definite spring compression and contact wipe is assured for either contact-closing or contact-opening service. Flexible leads are welded to the contact fingers. Since the armature assembly has contact fingers both above and below the bearing points, the armature weight is partially balanced about the bearings and there is

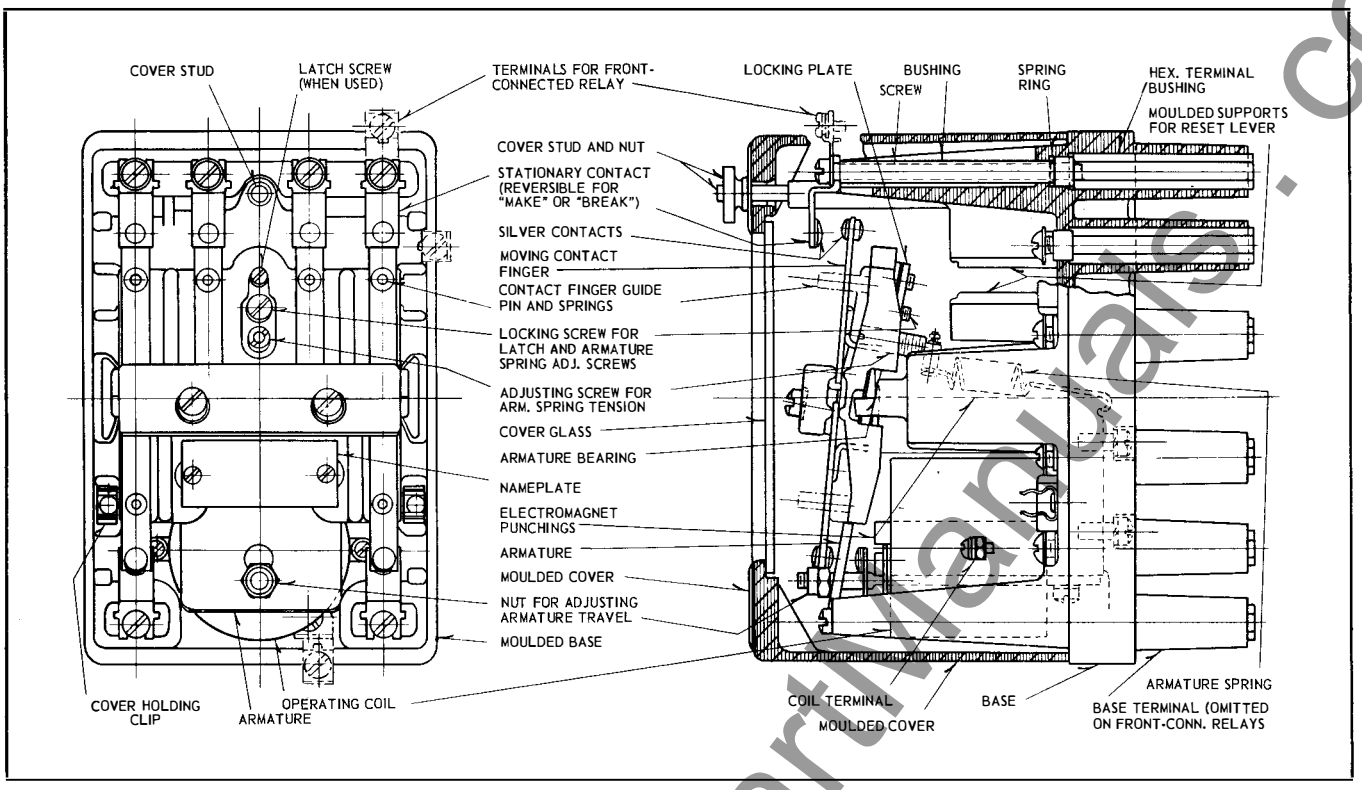


Fig. 1. Front View (Cover Omitted) and Side View of the Type MG-6 Self Reset Relay in Molded Case.

less tendency for severe shocks to move the armature.

The stationary contacts consist of large silver buttons welded to brackets which can be assembled so that they close with the moving contacts when the armature is in either the energized or de-energized position. The stationary contact brackets are connected directly to the terminal inserts by means of long screws which pass through brass tubes. These tubes are of such length that the moulded material of the base is not under direct compression when the screws are tightened. Therefore, there is always a tight connection from contact to terminal regardless of possible shrinkage or other variation in the moulded base material. The contact bracket is held against its seat by means of a spring ring which is compressed between shoulders in the base and on the hexagonal terminal insert.

The construction of the latch and electrical reset is shown in Fig. 2, in which the lower portion is a partial front view of the relay in the moulded case, and the upper portion a top view. In the latter view, the latch screw (in the main armature) is in the energized position, and the reset armature is free to be moved to the right by the tension spring until the hardened latch plate on the reset armature rests against the tip of the latch screw. When the operating coil is de-energized, the latch screw will move slightly so that its shoulder rests on the edge of the latch plate. When the reset coil is energized its armature moves to the left, thus permitting the main armature to return to its open position. Pressing the reset push rod, which extends through the cover stud, will also release the latch through the medium of the reset lever shown in the figure.

In some applications of the relay with latch and electrical reset, it may be desirable to have the operating and reset coils deenergized automatically as soon as they have performed their functions. In the case of the reset coil this can be accomplished by connecting the coil through one of the relay "make" contacts. An auxiliary contact is required to open the operating coil circuit. This contact, when provided, is assembled on the lower right-hand side of the relay, and is held in position by the terminal screw to which the right-hand coil lead ordinarily connects. The coil lead is connected to the stationary contact stud of the auxiliary contact, and the end of the moving contact spring is in contact with

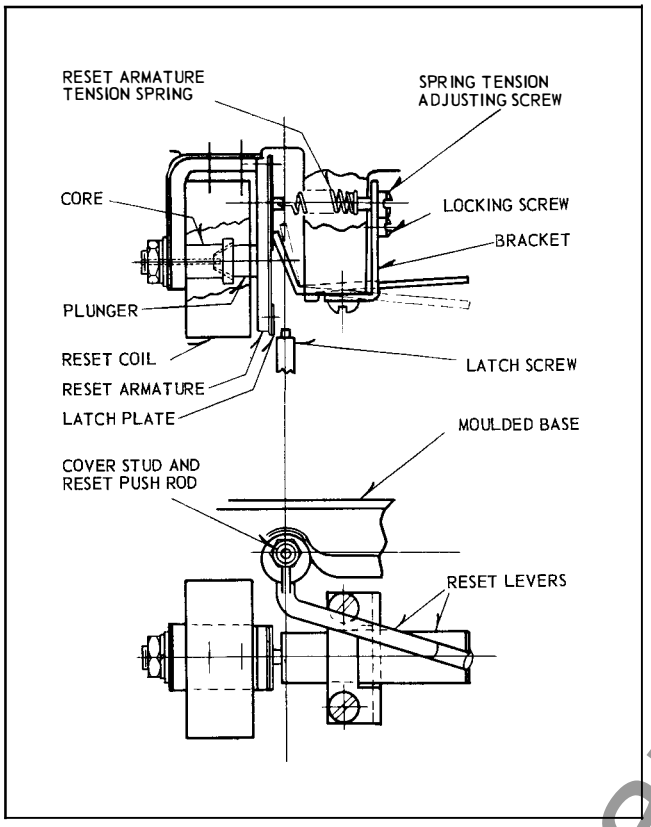
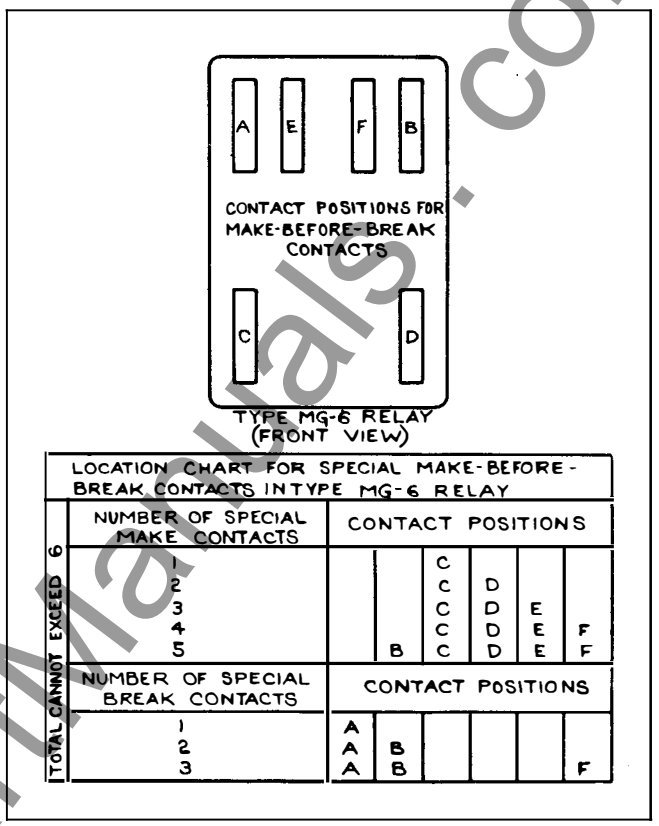


Fig. 2. Detail Views of the Latch and Electrical Reset of the Type MG-6 Relay.



LOCATION CHART FOR SPECIAL MAKE-BEFORE-BREAK CONTACTS IN TYPE MG-6 RELAY

TOTAL CANNOT EXCEED 6

NUMBER OF SPECIAL MAKE CONTACTS	CONTACT POSITIONS					
1			C			
2			C	D		
3			C	D	E	
4			C	D	E	F
5		B	C	D	E	F
NUMBER OF SPECIAL BREAK CONTACTS	**CONTACT POSITIONS**					
1	A					
2	A	B				
3	A	B				F

Fig. 3. Contact Positions for Combinations of Make-Before-Break Contacts.

the head of the terminal screw. The auxiliary contact is closed when the main armature is open. When the armature approaches the closed position, the moulded insulation block strikes the end of the auxiliary contact spring and causes the contacts to part with a gap which is appreciably greater than the travel of the armature block at the point where it strikes the spring. When this auxiliary contact is used, a weight is screwed to the lower end of the armature to increase its mass and stabilize contact action. This contact will interrupt the coil current at any rated coil voltage, but it is not intended for use in applications where several times rated voltage is applied to the operating coil in order to reduce the operating time.

In certain applications of the type MG-6 relay, it may be desirable to have one or more of the contacts close before other contacts on the same relay open. A special armature assembly is required to obtain such operation, and the number of special make and break contacts desired must be known when the relay is built. The special moving contacts have longer follow than the standard contacts and greater armature spring tension is required for full deflection of the break contacts. Consequently, it is preferable to limit the number of special break contacts to two. A maximum of three may be used, although the increased armature spring tension needed may raise the minimum pick-up voltage above the standard value. As many as five contacts may be special make contacts, with the total of special make and break contacts limited to six, of course. The locations of the make and break contacts for any combination of these special contacts are shown in Fig. 3. This figure indicates the physical location of the contacts in the relay, and can be used in conjunction with the internal schematic diagram for the type of case involved to determine the corresponding terminal locations.

The type MG-6 relay may be provided without cover, for front connection, or in a variety of completely closed cases, for rear connection. The moulded base for rear connection is shown in Fig. 1. The base for front connection is similar except that there are no terminals projecting in the rear. This same base is also used as a sub-base when the relays are supplied in the FT22 case.

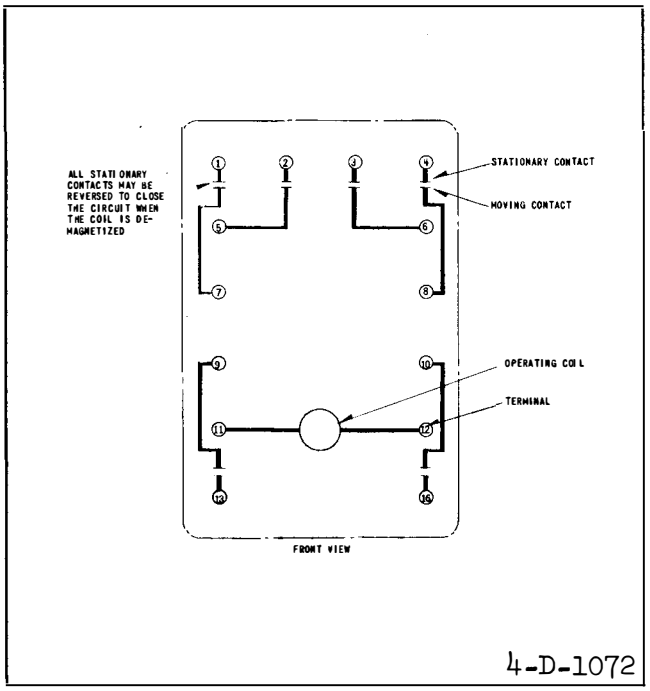


Fig. 4. Internal Schematic of the Type MG-6 Relay, Without Electrical Reset, In Molded Case.

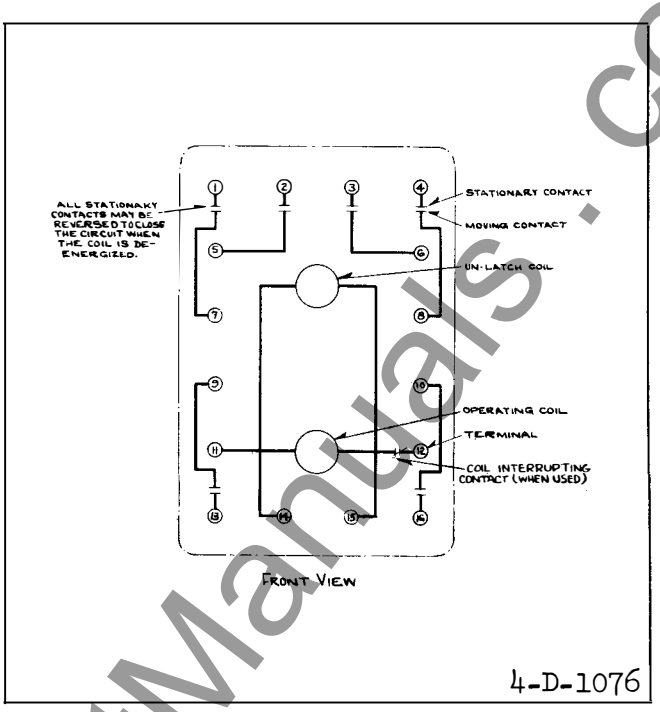


Fig. 5. Internal Schematic of the Type MG-6 Relay, With Electrical Reset, In Molded Case.

CHARACTERISTICS

The type MG-6 relay has an operating time of approximately 2 cycles on a-c and 5 cycles on d-c (on a 60 cycle basis) when energized at the rated voltage. If faster operation is desired and if the application requires only intermittent energization of the relay, the operating coils may be energized at higher than rated voltage. Twice rated voltage will give an operating time of approximately 1 cycle on a-c, and the coil will stand this voltage safely for over two minutes if 60 cycles or 4 minutes if 25 cycles. The time of the d-c relay can be reduced to slightly over 1 cycle if the coil is energized at five times rated voltage and there is not more than one back contact. The coil will stand this voltage for one minute. If faster time is desired on a d-c relay which must be energized continuously, the use of a low voltage coil with a series resistor will reduce the time. With 10% of the line voltage across the relay coil and the balance across a series resistor, the reduced inductance of the circuit results in an operating time of approximately 2 cycles.

Reset coils are for intermittent duty only and should not be energized longer than one minute.

The relay contacts will close circuits carrying 30 amperes. They will carry this current for 1 minute, and will carry 12 amperes continuously.

The contacts will interrupt the following currents, in non-inductive circuits, at the voltages listed:

Current	Volts A-C
30	115
20	230
15	460
10	575

Current	Volts D-C
30	12
15	24
10	32
8	48
3	125
1	250

The type MG-6 relay for a-c can be used with any combination of contacts, but the d-c relay cannot have more than four circuit-opening contacts if the normal contact pressures and armature travel are maintained.

INSTALLATION

The relays should be mounted on switchboard

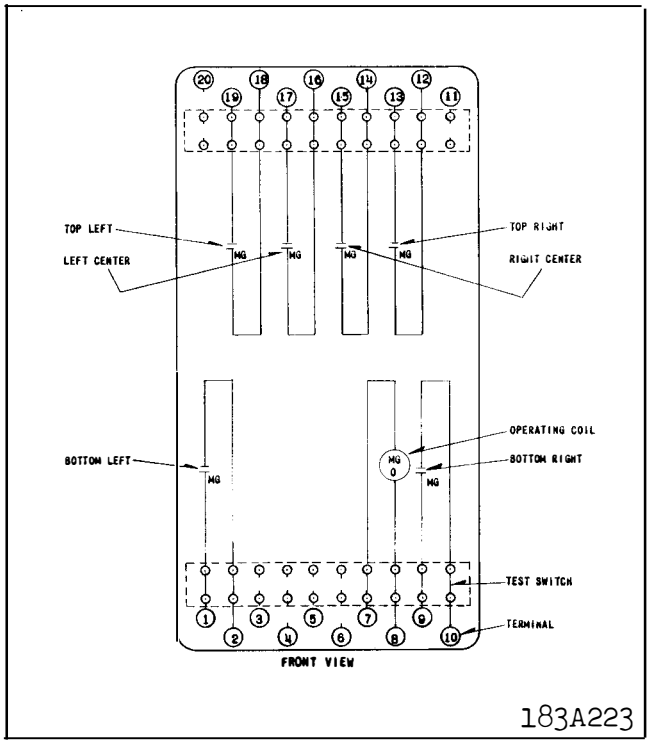


Fig. 6. Internal Schematic of the Type MG-6 Relay, Without Electrical Reset, in FT22 Case.

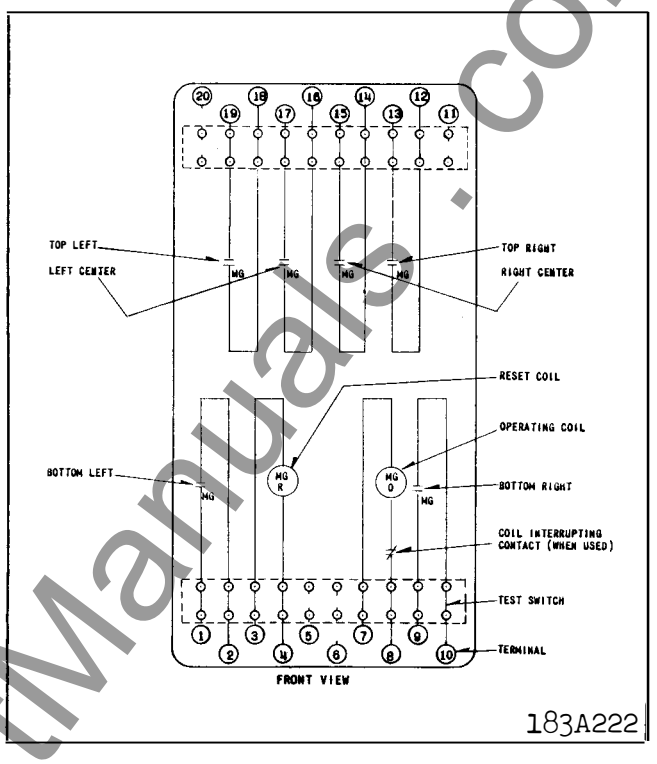


Fig. 7. Internal Schematic of the Type MG-6 Relay, With Electrical Reset, in FT22 Case.

panels or their equivalent in a location free from dirt, moisture, excessive vibration. and heat. Mount the relay vertically by means of the four mounting holes on the flange for semi-flush mounting or by means of the rear mounting stud or studs for projection mounting. Either a mounting stud or the mounting screws may be utilized for grounding the relay. The electrical connections may be made directly to the terminals by means of screws for steel panel mounting or to the terminal studs furnished with the relay for thick panel mounting. The terminal studs may be easily removed or inserted by locking two nuts on the stud and then turning the proper nut with a wrench.

For detailed FT case information refer to I.L. 41-076.

Relays in the rear-connected moulded cases should be mounted and electrically connected similar to the other projection cases. The lower mounting stud may be used to ground the electromagnet iron. The hexagon-shaped terminal inserts are slightly loose in the base but this does not affect the electrical connections. Only the two mounting studs should be used to secure the relay to the panel. Removal of terminal insert end-play (in the case of thick-panel mounting) by turning a nut on the terminal stud tightly against a large diameter washer (not supplied) at the rear of the panel should not be attempted as this may distort the relay base and affect the adjustments, or possibly damage the relay. Relays in the front-connected moulded cases should be mounted by four screws through the sides of the base as indicated in the drilling plan.

ADJUSTMENTS AND MAINTENANCE

The relays are shipped from the factory correctly adjusted for armature travel and for contact follow and pressure, and it should not be necessary to disturb these adjustments. The relays normally are shipped with all contacts assembled for circuit-closing operation. To convert them for circuit-opening operation, it is necessary merely to loosen the mounting screw for the stationary contact bracket, turn this bracket over, and tighten the screw. After reversing the position of the contact brackets, it may be necessary to bend them slightly to obtain contact follows approximately as stated in the fourth paragraph of this section. On a d-c relay not more than four contacts can be assembled in the circuit-opening position if normal contact pressure and travel are

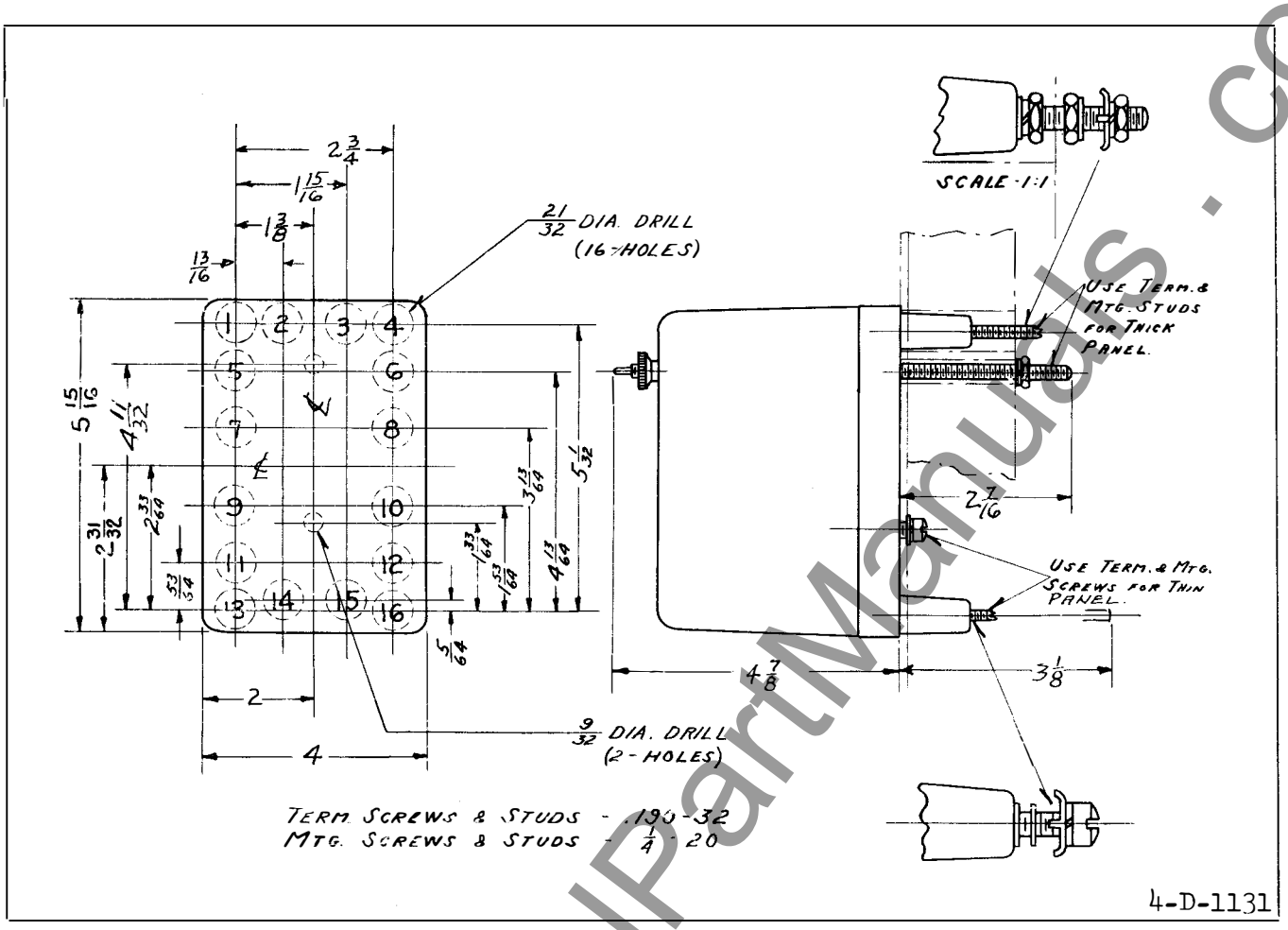


Fig. 8. Outline and Drilling Plan for the Type MG-6 Relay in the Rear Connected Molded Case. See Internal Schematic for Terminals Supplied. For Reference Only.

maintained.

If a relay has been dismantled and is being reassembled, the following adjustments should be made or checked. Reference should be made to Figs. 1 and 2 for identification of the parts mentioned in these instructions.

The armature stop nut should be adjusted so that when the armature is in contact with it the lower edge of the armature is 7/16" above the position which it assumes when the relay is energized. When adjusting the armature spring tension, the locking screw for the spring adjusting screw is loosened, and this adjusting screw is turned (inward, to reduce the spring tension) until the spring barely holds the armature against the stop nut. The relay must be in its normal vertical position when this adjustment is made, with all contacts assembled as circuit-closing. The armature spring should then be tightened by turning the adjusting screw 4 turns counter-clockwise for a-c relays or 2 turns for d-c relays, (except 4 turns for d-c relays with coil-interrupting contacts) and the locking screws should be tightened. If the relay is being used with a number of break contacts, it may be necessary to increase the spring tension to obtain full follow on the break contacts. The adjusting screw should be turned just enough farther to obtain full follow.

The follow of the moving contact fingers should be 3/32" for the make contacts and 1/16" for the break contacts, measured at the contacts. This can be checked more conveniently by measuring the travel of the lower edge of the armature after the contacts touch. This should be approximately 1/8" for the make contacts and 3/32" for the break contacts. In case moving contact fingers have been removed from their guide pins, it is important that the coil springs

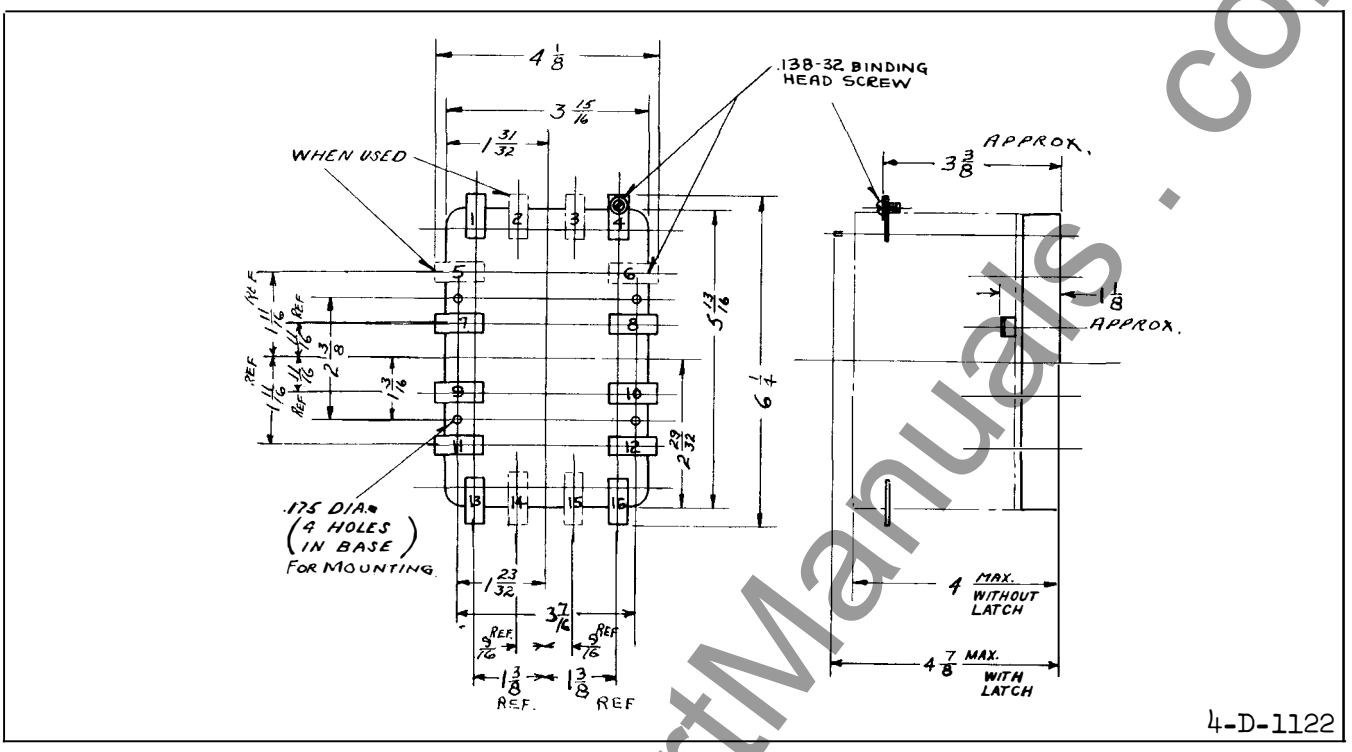


Fig. 9. Outline and Drilling Plan for the Type MG-6 Relay in the Front Connected Molded Case. See Internal Schematic for Terminals Supplied. For Reference Only.

on the two sides of the fingers be replaced correctly. The springs which are compressed by circuit-closing contacts are approximately three times as strong as the ones compressed by circuit-opening contacts and thus they can be readily distinguished. The positions of the two springs are reversed at the two ends of the relay.

When special contacts are supplied for make-before-break operation, the stationary members of the special contacts are bent equally toward their respective moving contacts to obtain "make" at the point where the "break" moving contact has approximately 1/16" follow before parting from its stationary contact.

If an a-c relay is to be used with a series resistor so that the relay can be dropped out by shorting the coil, either the resistance value must be such that the watt consumption with the coil shorted will be quite high or the relay armature spring tension must be reduced to about 1-1/2 turns and the follow of the stationary make contacts must be reduced (by bending) to about 1/16". With the reduced armature spring tension, not more than two of the contacts can be used as break contacts. Because of the low relay impedance with armature open as compared to the impedance with armature closed, it is not advantageous to use a resistor in series with a coil rated at less than line voltage, as in the case of d-c applications. For the contact and spring adjustments specified above, a 60 cycle MG relay with voltage rating equal to the line voltage can be used with a series resistor which will take about 90 watts when directly across the line. Of course, if the coil will be shorted only momentarily or if a higher watt consumption is not objectionable, it may be unnecessary to reduce the spring tension or contact follow.

If the complete armature assembly is to be removed from the relay, the screws which fasten the lower ends of the moving contact leads to the terminals should be removed, the armature spring tension adjusting screw should be turned in as far as possible, and the armature stop nut should be removed. The upper end of the armature spring should then be slipped off of the grooved member at the lower end of the adjusting screw, and the armature should be lifted off of its bearing carefully so as to avoid distortion of the coiled leads. The leads to the upper center moving contacts are not coiled but the coiling of the four other moving contact leads should be such that when the relay base is horizontal and the arma-

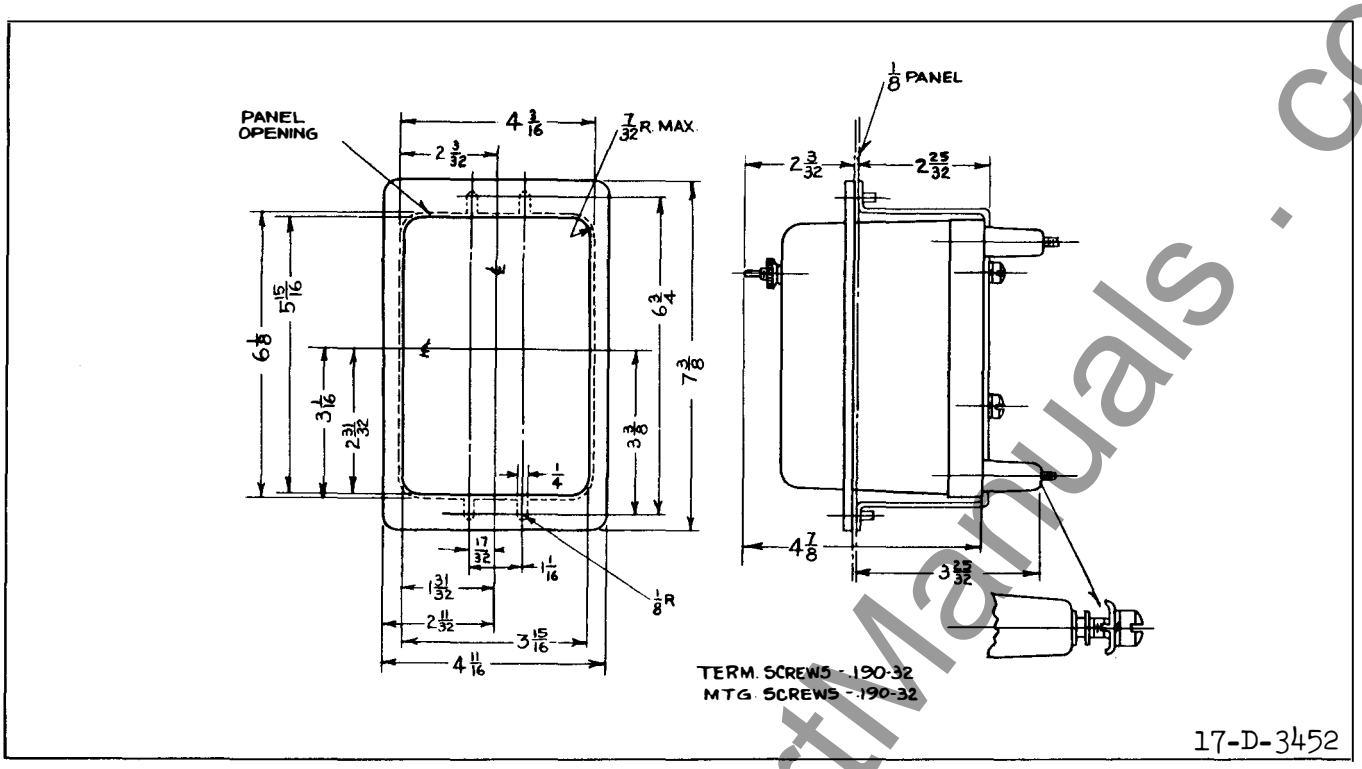


Fig. 10. Outline and Drilling Plan for the Molded Semi-Flush Case. For Reference Only.

ture is on its bearings and approximately at its mid-position, the lead terminals will just touch the base terminal inserts or be within about 1/8" of that position. A pair of tweezers on which the ends are bent at a right angle to the body, or a similar tool, is useful in replacing the upper end of the spring in the groove of the adjusting member. Such a tool is particularly helpful on relays which have an electrical reset assembly.

On latch-type relays the latch screw is adjusted so that with the armature latched and the operating coil de-energized, there will be a gap of between .005 and .010 inch between the electromagnet pole face and the raised section of the armature which strikes the pole face. The locking screw should be tightened securely after making this adjustment. There is a small amount of clearance between the armature and its supporting posts, and in order to insure proper operation allowance must be made for this in the following manner. With the armature held against its left-hand support and nearly closed, the latch spring or reset armature should be moved to the left as far as it will go by means of the hand reset. To assure that the latch will always release the armature the resulting space between the latch and the latch screw should be at least .005 inch, and should not be more than about 1/64". This should also be checked electrically if electrical reset is provided. Some change of this gap can be made by loosening the mounting screws in the relay base and moving the latch support in the desired direction. The gap also can be changed by loosening the two screws which hold the moving contact insulation block to the armature and shifting the armature in the desired direction.

On electrical reset relays, the tension of the spring which draws the reset armature toward the latch screw must be adjusted if these parts are being reassembled. The locking screw (Fig. 2) is screwed out until its head clears the head of the adjusting screw. The main armature is then held completely closed and against its right hand support, and the latch spring tension adjusting screw is turned until the latch barely touches the stop projecting from the center of the latch screw. Then the latch spring tension should be increased by turning the screw clockwise 5 turns, and the locking screw should be tightened.

If either the core nut of the electrical reset assembly or the screws which mount its armature have been loosened, the relative positions of the core and plunger may shift sufficiently to cause the plunger to

strike on the side of the conical core opening. To assure correct alignment of these parts, .042 diameter holes are provided through the center of the core and about 1/16" deep in the center of the plunger. After tightening the core nut, a close fitting pin should be inserted through the core and into the plunger. With the pin in place, and plunger pressed firmly against the core, and the mounting end of the armature centrally located with respect to the electromagnet, the two armature mounting screws should be tightened. The pin then should be removed.

A slight amount of medium viscosity slushing oil is supplied at the factory to the polished and hardened surfaces of the latch screw and the latch plate to minimize wear and as protection against corrosion. Oil should be reapplied after any cleaning and reassembling of these parts, and it is desirable also to renew this at the regular maintenance periods.

If the relay is provided with a coil-interrupting contact, the following points must be observed to assure satisfactory operation. The latch screw should be adjusted so that with the armature in the latched position and the operating coil deenergized, the gap between the armature and the lower pole face of the electromagnet is only .005 inch. With the armature in this position the coil interrupting contact should be open by about 1/16 inch. This gap is adjusted at the factory by varying the number of slotted shims used between the relay base and the contact supporting bracket. The two main contacts at the lower end of the base should be assembled as circuit-opening contacts, and the main armature restraining spring should have 4 turns tension (see 3rd paragraph of this section) for DC as well as for AC relays. It is necessary also that the L-shaped spring which carries the moving member of the coil-interrupting contact have its sides approximately straight before assembly with the supporting bracket, and that the angle between the sides be approximately 80^{o}.

All contacts should be periodically cleaned. A contact burnisher S#182A836H01 is recommended for this purpose. The use of abrasive material for cleaning contacts is not recommended, because of the danger of embedding small particles in the face of the soft silver and this impairing the contact.

REPAIRS AND RENEWAL PARTS

Repair work can be done most satisfactorily at the factory. However, interchangeable parts can be furnished to the customers who are equipped for doing repair work. When ordering parts, always give the complete nameplate data.

ENERGY REQUIREMENTS

Operating Coil Burdens at rated Voltage

Frequency (cycles)	Closed Gap		Open Gap	
	Watts	Volt-Amps	Watts	Volt-Amps
25	6.8	23	19.6	53
50	9.8	31	17.4	78
60	12.	37	17.6	92
D-C	7.8 cold--		7.8 cold--	
D-C	6.5 hot --		6.5 hot -	

Reset Coil Burdens at Rated Voltage

Frequency (cycles)	Closed Gap		Open Gap	
	Watts	Volt-Amps	Watts	Volt-Amps
25	23	26	24	27
50	18	23	20	25
60	23	32	26	36
D-C	31 cold--		31 cold--	

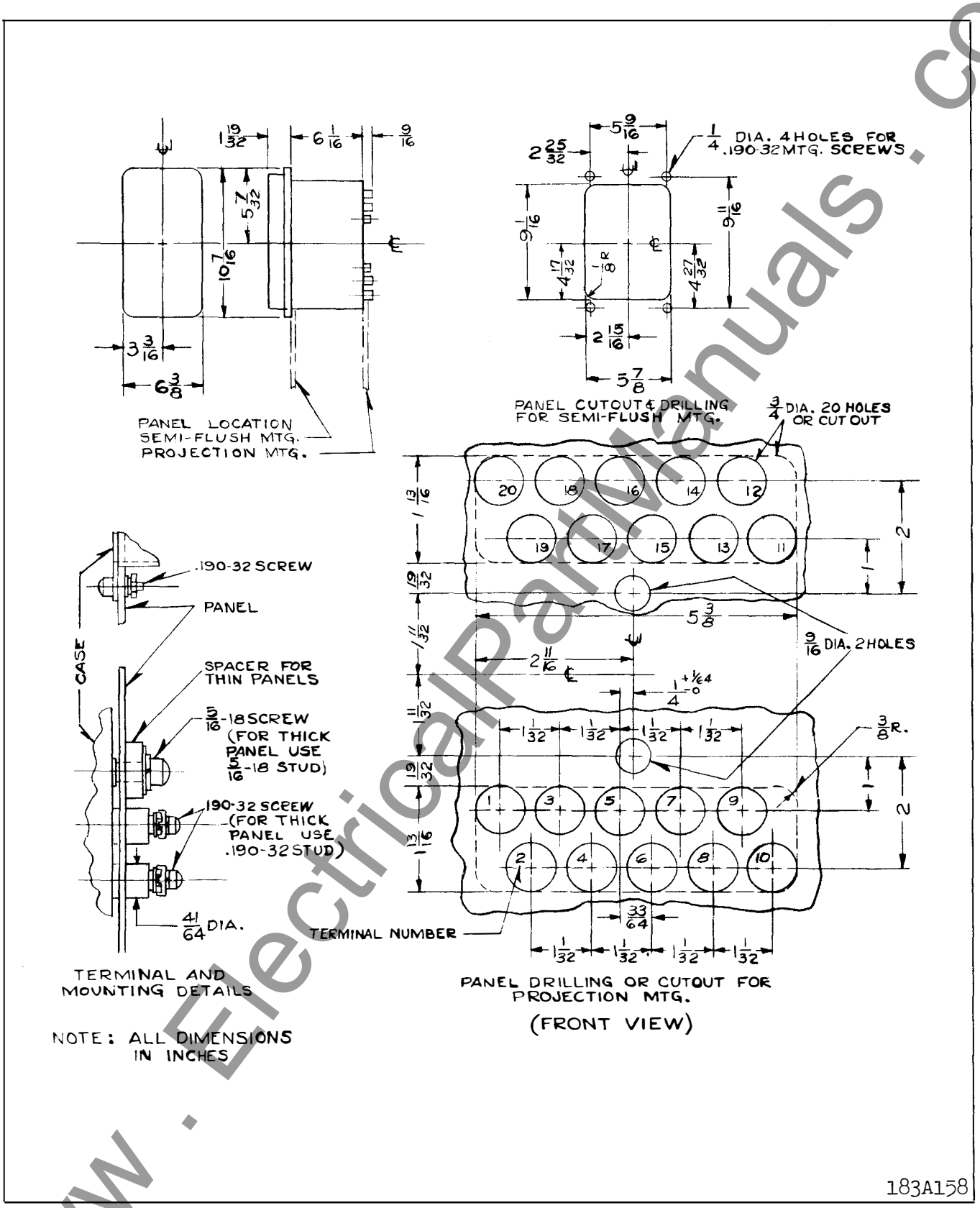


Fig. 11. Outline and Drilling Plan for the Type MG-6 Relay in Type FT22 Case.

WESTINGHOUSE ELECTRIC CORPORATION

METER DIVISION • **NEWARK, N.J.**

Printed in U.S.A.

INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

TYPE MG-6 MULTI-CONTACT AUXILIARY RELAY

CAUTION Before putting relays into service, remove all blocking which may have been inserted for the purpose of securing the parts during shipment, make sure that all moving parts operate freely, inspect the contacts to see that they are clean and close properly, and operate the relay to check the settings and electrical connections.

APPLICATION

The type MG-6 relay is designed for applications where several independent circuits must be energized or de-energized upon the operation of a single primary relay contact, or where the capacity of the primary relay contact is inadequate for the energy required in a control circuit. In certain applications these relays may be used directly as primary relays. Since the stationary contacts can readily be reversed so as to be suitable for either circuit opening or circuit closing service (although readjustment may be required on the D-C MG-6 relay — see "ADJUSTMENTS AND MAINTENANCE") it is unnecessary to predetermine the arrangements of the circuits for which the relay is to be used.

In the usual application of the relay, the armature resets when the operating coil is de-energized. However, the relays may be supplied with a latching mechanism which holds the armature in the operated position until the latch is tripped, either by hand or electrically.

CONSTRUCTION AND OPERATION

The operating electromagnet is at the lower end of the relay, as shown in Fig. 1. The stationary iron circuit is built up of U-shaped punchings. These are slotted at the outer end of the lower leg to receive the copper lag loops used to obtain quiet operation on A-C, The operating coil is mounted on this leg of the punchings. In order to improve the performance of the relay on D-C, the pole face area is increased by means of an iron plate. This plate is assembled at the end of the coil and the corners of the lamination side plates are bent outward, serving to hold the plate in place. The inner end of the upper leg of the punching assembly is shaped so that the lower end of the armature restraining spring can be hooked over it.

The armature is made of high-silicon steel. Projecting sections on the sides, near the center, act as knife-edge bearings and rest on suitably shaped supports which are a part of the moulded base. A stud attached to the lower leg of the electromagnet extends through a hole in the lower end of the armature, and a stop-nut on the outer end of this stud is used to limit and adjust the travel of the armature in the de-energized direction. The special stop nut used will remain at any position in which it is placed without additional locking means.

The upper end of the armature carries an adjusting screw to which one end of the armature restraining spring is attached. In the hand or electrically reset relays, a latch screw is mounted at the extreme end of the armature. In the self-reset relays this screw is replaced by a set screw which serves to separate the locking plate (see Fig. 1) slightly from the armature. Between the spring adjusting screw and the latch screw (or set screw), there is a third screw which when tightened applies pressure to the threads of the former screws and effectively locks them against turning.

The moving contact fingers are mounted on moulded insulation which is fastened to the armature by two screws. Silver contact buttons are welded on both sides of these fingers so that they can be used for either a circuit-opening or a circuit-closing contact. The fingers are assembled on guide pins, between two springs in such a way that definite spring compression and contact wipe is assured for either contact-closing or contact-opening service. Flexible leads are welded to the contact fingers. Since the armature assembly has contact fingers both above and below the bearing points, the armature weight is partially balanced about the bearings and there is

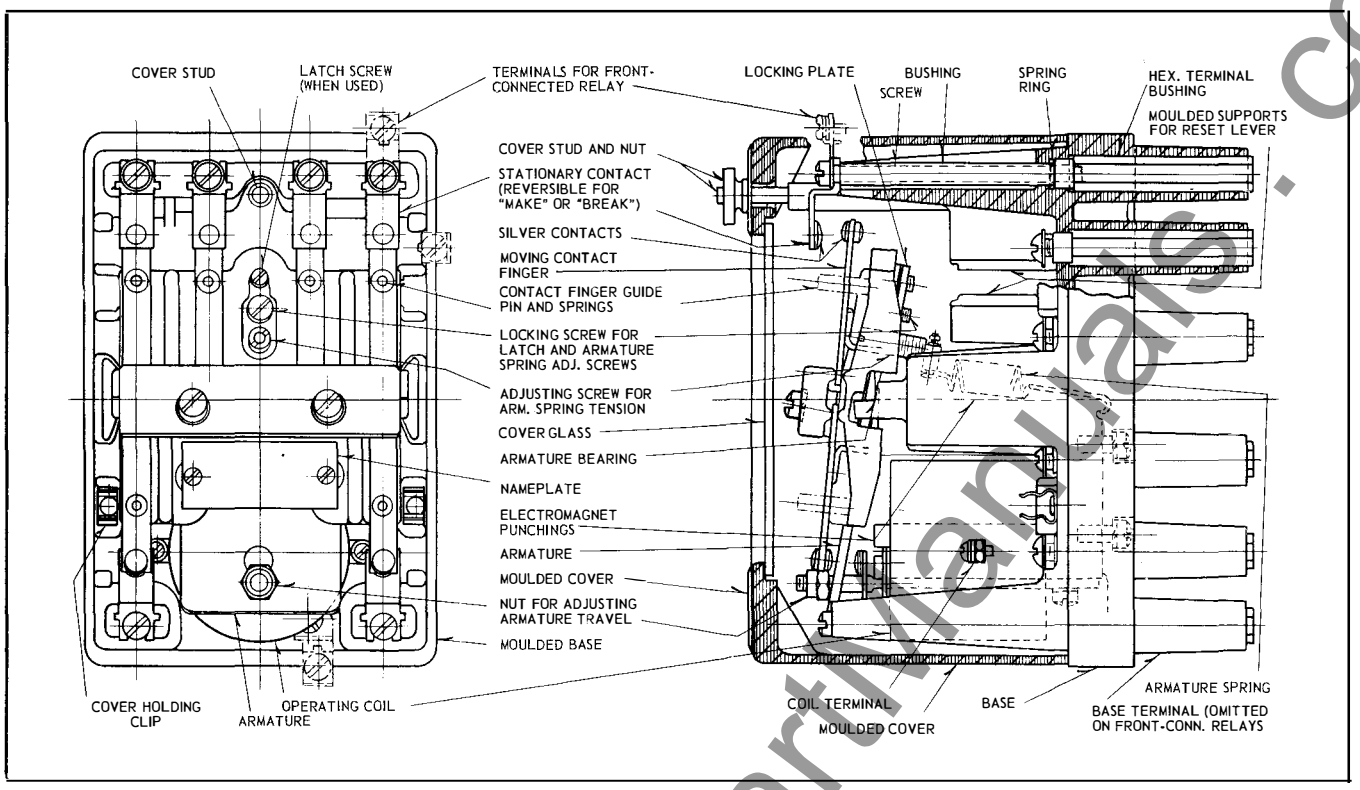


Fig. 1. Front View (Cover Omitted) and Side View of the Type MG-6 Self Reset Relay in Molded Case.

less tendency for severe shocks to move the armature.

The stationary contacts consist of large silver buttons welded to brackets which can be assembled so that they close with the moving contacts when the armature is in either the energized or de-energized position. The stationary contact brackets are connected directly to the terminal inserts by means of long screws which pass through brass tubes. These tubes are of such length that the moulded material of the base is not under direct compression when the screws are tightened. Therefore, there is always a tight connection from contact to terminal regardless of possible shrinkage or other variation in the moulded base material. The contact bracket is held against its seat by means of a spring ring which is compressed between shoulders in the base and on the hexagonal terminal insert.

The construction of the latch and electrical reset is shown in Fig. 2, in which the lower portion is a partial front view of the relay in the moulded case, and the upper portion a top view. In the latter view, the latch screw (in the main armature) is in the energized position, and the reset armature is free to be moved to the right by the tension spring until the hardened latch plate on the reset armature rests against the tip of the latch screw. When the operating coil is de-energized, the latch screw will move slightly so that its shoulder rests on the edge of the latch plate. When the reset coil is energized its armature moves to the left, thus permitting the main armature to return to its open position. Pressing the reset push rod, which extends through the cover stud, will also release the latch through the medium of the reset lever shown in the figure.

In some applications of the relay with latch and electrical reset, it may be desirable to have the operating and reset coils deenergized automatically as soon as they have performed their functions. In the case of the reset coil this can be accomplished by connecting the coil through one of the relay "make" contacts. An auxiliary contact is required to open the operating coil circuit. This contact, when provided, is assembled on the lower right-hand side of the relay, and is held in position by the terminal screw to which the right-hand coil lead ordinarily connects. The coil lead is connected to the stationary contact stud of the auxiliary contact, and the end of the moving contact spring is in contact with

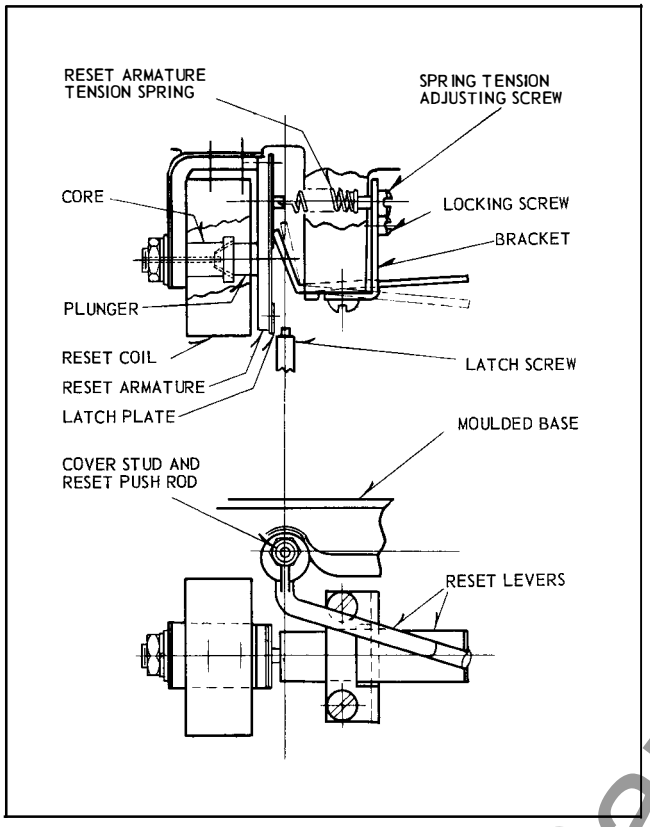
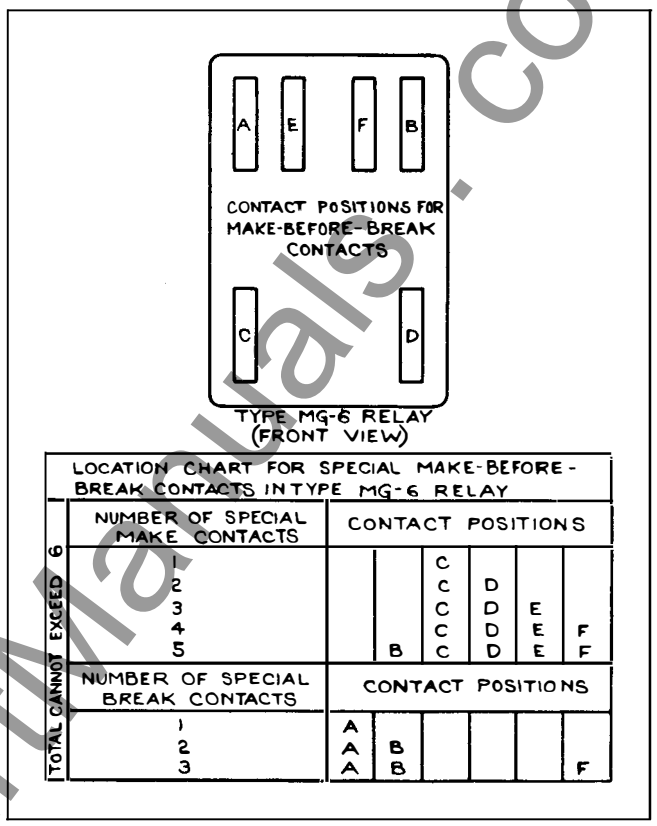


Fig. 2. Detail Views of the Latch and Electrical Reset of the Type MG-6 Relay.



LOCATION CHART FOR SPECIAL MAKE-BEFORE-BREAK CONTACTS IN TYPE MG-6 RELAY

TOTAL CANNOT EXCEED 6

NUMBER OF SPECIAL MAKE CONTACTS	CONTACT POSITIONS					
1			C	D		
2			C	D		
3			C	D	E	
4			C	D	E	F
5		B	C	D	E	F

NUMBER OF SPECIAL BREAK CONTACTS	CONTACT POSITIONS					
1	A					
2	A	B				
3	A	B				F

Fig. 3. Contact Positions for Combinations of Make-Before-Break Contacts.

the head of the terminal screw. The auxiliary contact is closed when the main armature is open. When the armature approaches the closed position, the moulded insulation block strikes the end of the auxiliary contact spring and causes the contacts to part with a gap which is appreciably greater than the travel of the armature block at the point where it strikes the spring. When this auxiliary contact is used, a weight is screwed to the lower end of the armature to increase its mass and stabilize contact action. This contact will interrupt the coil current at any rated coil voltage, but it is not intended for use in applications where several times rated voltage is applied to the operating coil in order to reduce the operating time.

In certain applications of the type MG-6 relay, it may be desirable to have one or more of the contacts close before other contacts on the same relay open. A special armature assembly is required to obtain such operation, and the number of special make and break contacts desired must be known when the relay is built. The special moving contacts have longer follow than the standard contacts and greater armature spring tension is required for full deflection of the break contacts. Consequently, it is preferable to limit the number of special break contacts to two. A maximum of three may be used, although the increased armature spring tension needed may raise the minimum pick-up voltage above the standard value. As many as five contacts may be special make contacts, with the total of special make and break contacts limited to six, of course. The locations of the make and break contacts for any combination of these special contacts are shown in Fig. 3. This figure indicates the physical location of the contacts in the relay, and can be used in conjunction with the internal schematic diagram for the type of case involved to determine the corresponding terminal locations.

The type MG-6 relay may be provided without cover, for front connection, or in a variety of completely closed cases, for rear connection. The moulded base for rear connection is shown in Fig. 1. The base for front connection is similar except that there are no terminals projecting in the rear. This same base is also used as a sub-base when the relays are supplied in the FT22 case.

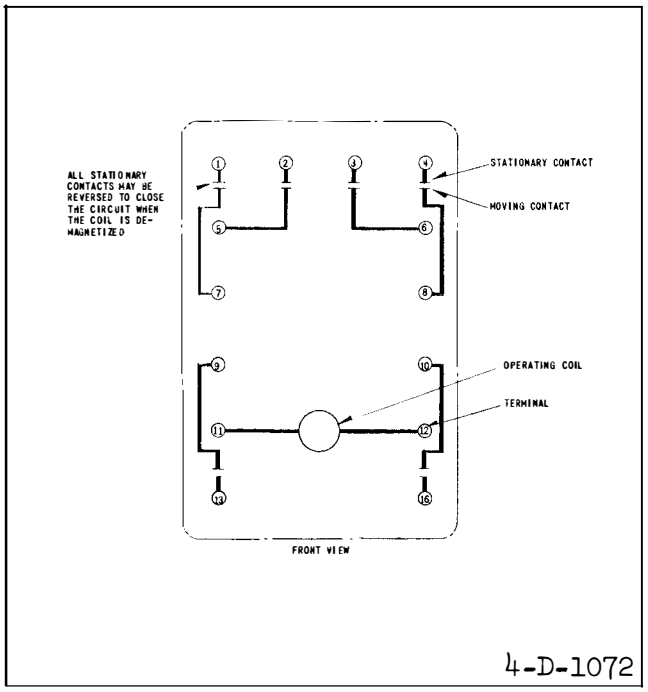


Fig. 4. Internal Schematic of the Type MG-6 Relay, Without Electrical Reset, In Molded Case.

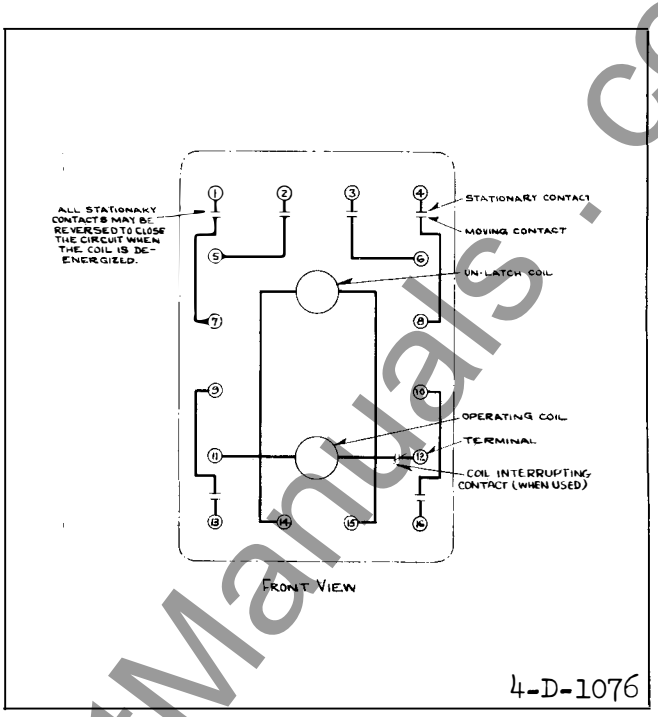


Fig. 5. Internal Schematic of the Type MG-6 Relay, With Electrical Reset, In Molded Case.

CHARACTERISTICS

The type MG-6 relay has an operating time of approximately 2 cycles on a-c and 5 cycles on d-c (on a 60 cycle basis) when energized at the rated voltage. If faster operation is desired and if the application requires only intermittent energization of the relay, the operating coils may be energized at higher than rated voltage. Twice rated voltage will give an operating time of approximately 1 cycle on a-c, and the coil will stand this voltage safely for over two minutes if 60 cycles or 4 minutes if 25 cycles. The time of the d-c relay can be reduced to slightly over 1 cycle if the coil is energized at five times rated voltage and there is not more than one back contact. The coil will stand this voltage for one minute. If faster time is desired on a d-c relay which must be energized continuously, the use of a low voltage coil with a series resistor will reduce the time. With 10% of the line voltage across the relay coil and the balance across a series resistor, the reduced inductance of the circuit results in an operating time of approximately 2 cycles.

* Reset coils are for intermittent duty only and should not be energized longer than one-half minute.

The relay contacts will close circuits carrying 30 amperes. They will carry this current for 1 minute, and will carry 12 amperes continuously.

The contacts will interrupt the following currents, in non-inductive circuits, at the voltages listed:

Current	Volts A-C
30	115
20	230
15	460
10	575

Current	Volts D-C
30	12
15	24
10	32
8	48
3	125
1	250

The type MG-6 relay for a-c can be used with any combination of contacts, but the d-c relay cannot have more than four circuit-opening contacts if the normal contact pressures and armature travel are maintained.

INSTALLATION

The relays should be mounted on switchboard

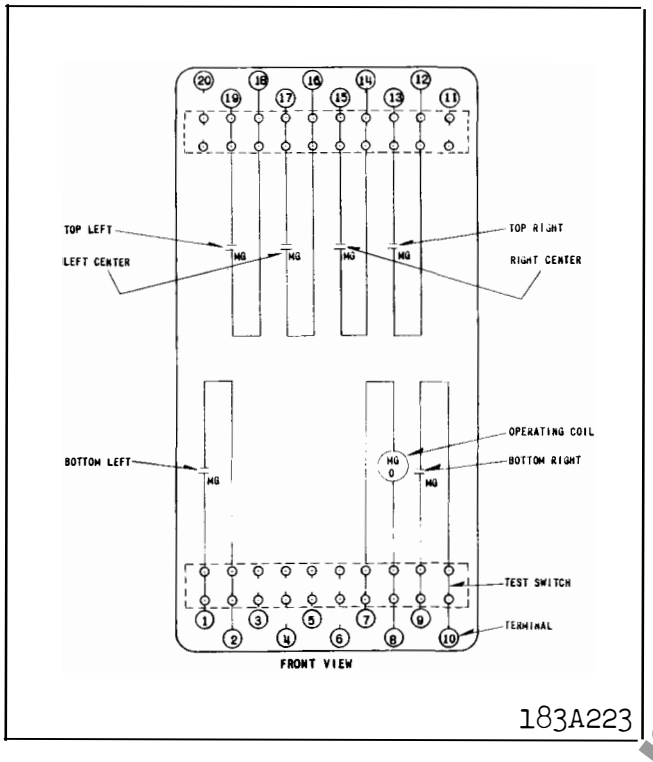


Fig. 6. Internal Schematic of the Type MG-6 Relay, Without Electrical Reset, in FT22 Case.

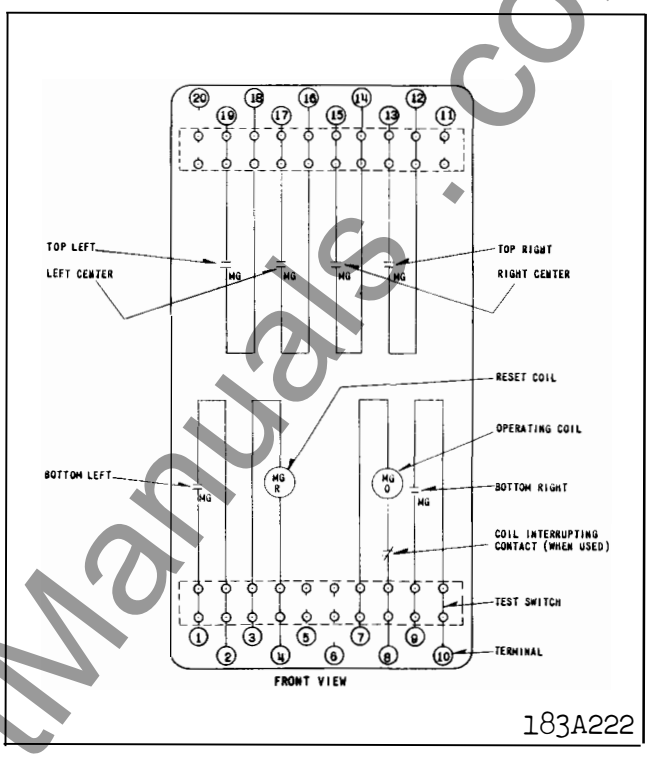


Fig. 7. Internal Schematic of the Type MG-6 Relay, With Electrical Reset, in FT22 Case.

panels or their equivalent in a location free from dirt, moisture, excessive vibration. and heat. Mount the relay vertically by means of the four mounting holes on the flange for semi-flush mounting or by means of the rear mounting stud or studs for projection mounting. Either a mounting stud or the mounting screws may be utilized for grounding the relay. The electrical connections may be made directly to the terminals by means of screws for steel panel mounting or to the terminal studs furnished with the relay for thick panel mounting. The terminal studs may be easily removed or inserted by locking two nuts on the stud and then turning the proper nut with a wrench.

For detailed FT case information refer to I.L. 41-076.

Relays in the rear-connected moulded cases should be mounted and electrically connected similar to the other projection cases. The lower mounting stud may be used to ground the electromagnet iron. The hexagon-shaped terminal inserts are slightly loose in the base but this does not affect the electrical connections. Only the two mounting studs should be used to secure the relay to the panel. Removal of terminal insert end-play (in the case of thick-panel mounting) by turning a nut on the terminal stud tightly against a large diameter washer (not supplied) at the rear of the panel should not be attempted as this may distort the relay base and affect the adjustments, or possibly damage the relay. Relays in the front-connected moulded cases should be mounted by four screws through the sides of the base as indicated in the drilling plan.

ADJUSTMENTS AND MAINTENANCE

The relays are shipped from the factory correctly adjusted for armature travel and for contact follow and pressure, and it should not be necessary to disturb these adjustments. The relays normally are shipped with all contacts assembled for circuit-closing operation. To convert them for circuit-opening operation, it is necessary merely to loosen the mounting screw for the stationary contact bracket, turn this bracket over, and tighten the screw. After reversing the position of the contact brackets, it may be necessary to bend them slightly to obtain contact follows approximately as stated in the fourth paragraph of this section. On a d-c relay not more than four contacts can be assembled in the circuit-opening position if normal contact pressure and travel are

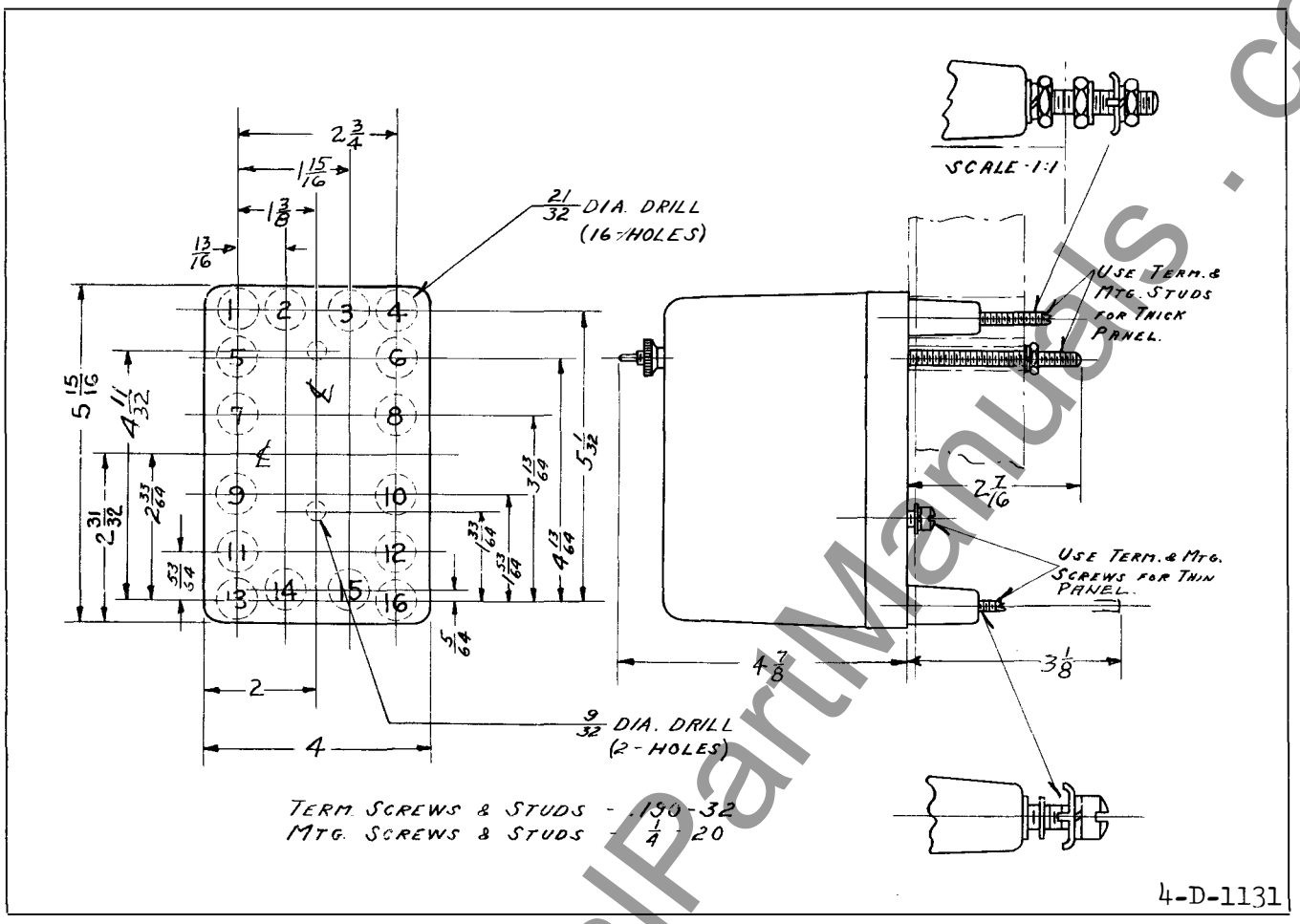


Fig. 8. Outline and Drilling Plan for the Type MG-6 Relay in the Rear Connected Molded Case. See Internal Schematic for Terminals Supplied. For Reference Only.

maintained.

If a relay has been dismantled and is being reassembled, the following adjustments should be made or checked. Reference should be made to Figs. 1 and 2 for identification of the parts mentioned in these instructions.

The armature stop nut should be adjusted so that when the armature is in contact with it the lower edge of the armature is 7/16" above the position which it assumes when the relay is energized. When adjusting the armature spring tension, the locking screw for the spring adjusting screw is loosened, and this adjusting screw is turned (inward, to reduce the spring tension) until the spring barely holds the armature against the stop nut. The relay must be in its normal vertical position when this adjustment is made, with all contacts assembled as circuit-closing. The armature spring should then be tightened by turning the adjusting screw 4 turns counter-clockwise for a-c relays or 2 turns for d-c relays, (except 4 turns for d-c relays with coil-interrupting contacts) and the locking screws should be tightened. If the relay is being used with a number of break contacts, it may be necessary to increase the spring tension to obtain full follow on the break contacts. The adjusting screw should be turned just enough farther to obtain full follow.

The follow of the moving contact fingers should be 3/32" for the make contacts and 1/16" for the break contacts, measured at the contacts. This can be checked more conveniently by measuring the travel of the lower edge of the armature after the contacts touch. This should be approximately 1/8" for the make contacts and 3/32" for the break contacts. In case moving contact fingers have been removed from their guide pins, it is important that the coil springs

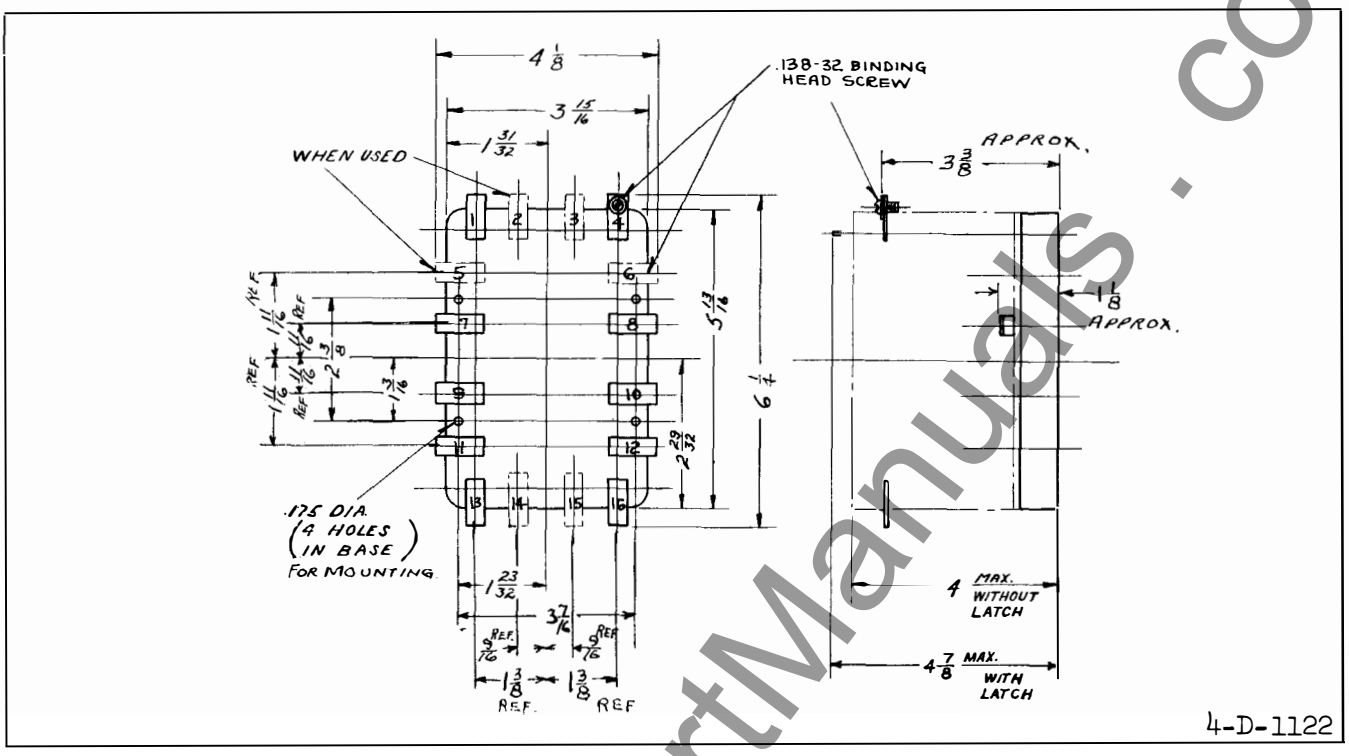


Fig. 9. Outline and Drilling Plan for the Type MG-6 Relay in the Front Connected Molded Case. See Internal Schematic for Terminals Supplied. For Reference Only.

on the two sides of the fingers be replaced correctly. The springs which are compressed by circuit-closing contacts are approximately three times as strong as the ones compressed by circuit-opening contacts and thus they can be readily distinguished. The positions of the two springs are reversed at the two ends of the relay.

When special contacts are supplied for make-before-break operation, the stationary members of the special contacts are bent equally toward their respective moving contacts to obtain "make" at the point where the "break" moving contact has approximately 1/16" follow before parting from its stationary contact.

If an a-c relay is to be used with a series resistor so that the relay can be dropped out by shorting the coil, either the resistance value must be such that the watt consumption with the coil shorted will be quite high or the relay armature spring tension must be reduced to about 1-1/2 turns and the follow of the stationary make contacts must be reduced (by bending) to about 1/16". With the reduced armature spring tension, not more than two of the contacts can be used as break contacts. Because of the low relay impedance with armature open as compared to the impedance with armature closed, it is not advantageous to use a resistor in series with a coil rated at less than line voltage, as in the case of d-c applications. For the contact and spring adjustments specified above, a 60 cycle MG relay with voltage rating equal to the line voltage can be used with a series resistor which will take about 90 watts when directly across the line. Of course, if the coil will be shorted only momentarily or if a higher watt consumption is not objectionable, it may be unnecessary to reduce the spring tension or contact follow.

If the complete armature assembly is to be removed from the relay, the screws which fasten the lower ends of the moving contact leads to the terminals should be removed, the armature spring tension adjusting screw should be turned in as far as possible, and the armature stop nut should be removed. The upper end of the armature spring should then be slipped off of the grooved member at the lower end of the adjusting screw, and the armature should be lifted off of its bearing carefully so as to avoid distortion of the coiled leads. The leads to the upper center moving contacts are not coiled but the coiling of the four other moving contact leads should be such that when the relay base is horizontal and the arma-

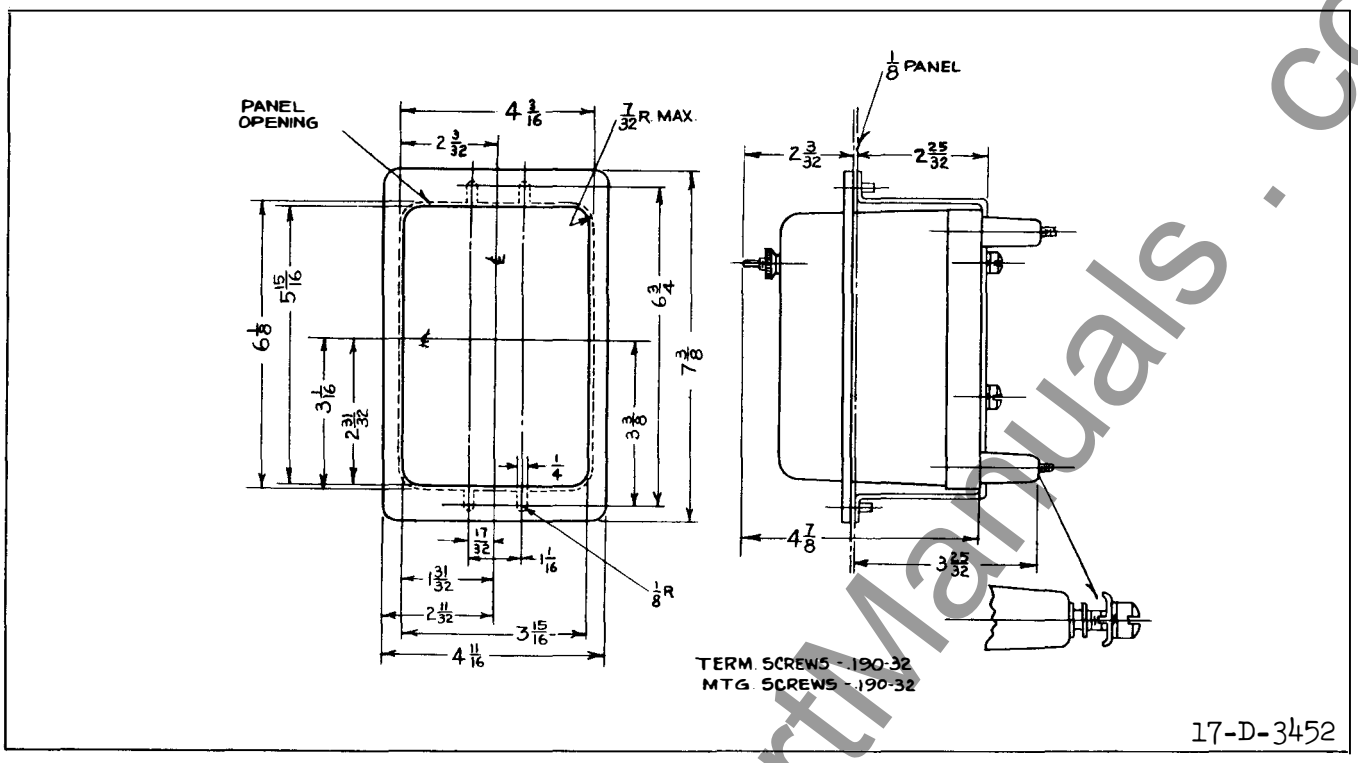


Fig. 10. Outline and Drilling Plan for the Molded Semi-Flush Case. For Reference Only.

ture is on its bearings and approximately at its mid-position, the lead terminals will just touch the base terminal inserts or be within about 1/8" of that position. A pair of tweezers on which the ends are bent at a right angle to the body, or a similar tool, is useful in replacing the upper end of the spring in the groove of the adjusting member. Such a tool is particularly helpful on relays which have an electrical reset assembly.

On latch-type relays the latch screw is adjusted so that with the armature latched and the operating coil de-energized, there will be a gap of between .005 and .010 inch between the electromagnet pole face and the raised section of the armature which strikes the pole face. The locking screw should be tightened securely after making this adjustment. There is a small amount of clearance between the armature and its supporting posts, and in order to insure proper operation allowance must be made for this in the following manner. With the armature held against its left-hand support and nearly closed, the latch spring or reset armature should be moved to the left as far as it will go by means of the hand reset. To assure that the latch will always release the armature the resulting space between the latch and the latch screw should be at least .005 inch, and should not be more than about 1/64". This should also be checked electrically if electrical reset is provided. Some change of this gap can be made by loosening the mounting screws in the relay base and moving the latch support in the desired direction. The gap also can be changed by loosening the two screws which hold the moving contact insulation block to the armature and shifting the armature in the desired direction.

On electrical reset relays, the tension of the spring which draws the reset armature toward the latch screw must be adjusted if these parts are being reassembled. The locking screw (Fig. 2) is screwed out until its head clears the head of the adjusting screw. The main armature is then held completely closed and against its right hand support, and the latch spring tension adjusting screw is turned until the latch barely touches the stop projecting from the center of the latch screw. Then the latch spring tension should be increased by turning the screw clockwise 5 turns, and the locking screw should be tightened.

If either the core nut of the electrical reset assembly or the screws which mount its armature have been loosened, the relative positions of the core and plunger may shift sufficiently to cause the plunger to

strike on the side of the conical core opening. To assure correct alignment of these parts, .042 diameter holes are provided through the center of the core and about 1/16" deep in the center of the plunger. After tightening the core nut, a close fitting pin should be inserted through the core and into the plunger. With the pin in place, and plunger pressed firmly against the core, and the mounting end of the armature centrally located with respect to the electromagnet, the two armature mounting screws should be tightened. The pin then should be removed.

A slight amount of medium viscosity slushing oil is supplied at the factory to the polished and hardened surfaces of the latch screw and the latch plate to minimize wear and as protection against corrosion. Oil should be reapplied after any cleaning and reassembling of these parts, and it is desirable also to renew this at the regular maintenance periods.

If the relay is provided with a coil-interrupting contact, the following points must be observed to assure satisfactory operation. The latch screw should be adjusted so that with the armature in the latched position and the operating coil deenergized, the gap between the armature and the lower pole face of the electromagnet is only .005 inch. With the armature in this position the coil interrupting contact should be open by about 1/16 inch. This gap is adjusted at the factory by varying the number of slotted shims used between the relay base and the contact supporting bracket. The two main contacts at the lower end of the base should be assembled as circuit-opening contacts, and the main armature restraining spring should have 4 turns tension (see 3rd paragraph of this section) for DC as well as for AC relays. It is necessary also that the L-shaped spring which carries the moving member of the coil-interrupting contact have its sides approximately straight before assembly with the supporting bracket, and that the angle between the sides be approximately 80^{o}.

All contacts should be periodically cleaned. A contact burnisher S#182A836H01 is recommended for this purpose. The use of abrasive material for cleaning contacts is not recommended, because of the danger of embedding small particles in the face of the soft silver and this impairing the contact.

REPAIRS AND RENEWAL PARTS

Repair work can be done most satisfactorily at the factory. However, interchangeable parts can be furnished to the customers who are equipped for doing repair work. When ordering parts, always give the complete nameplate data.

ENERGY REQUIREMENTS

Operating Coil Burdens at rated Voltage

Frequency (cycles)	Closed Gap		Open Gap	
	Watts	Volt-Amps	Watts	Volt-Amps
25	6.8	23	19.6	53
50	9.8	31	17.4	78
* △60	15	35.5	19	96.5
D-C	7.8 cold--		7.8 cold--	
D-C	6.5 hot --		6.5 hot --	

△ Rated voltage is 120 volts or its multiples.

Reset Coil Burdens at Rated Voltage (Multiples)

Frequency (cycles)	Closed Gap		Open Gap	
	Watts	Volt-Amps	Watts	Volt-Amps
25	48	51.6	52	54
50	46	58.2	57	63.8
60	84	104.5	96	112.8
D-C	66 cold--		68 cold--	

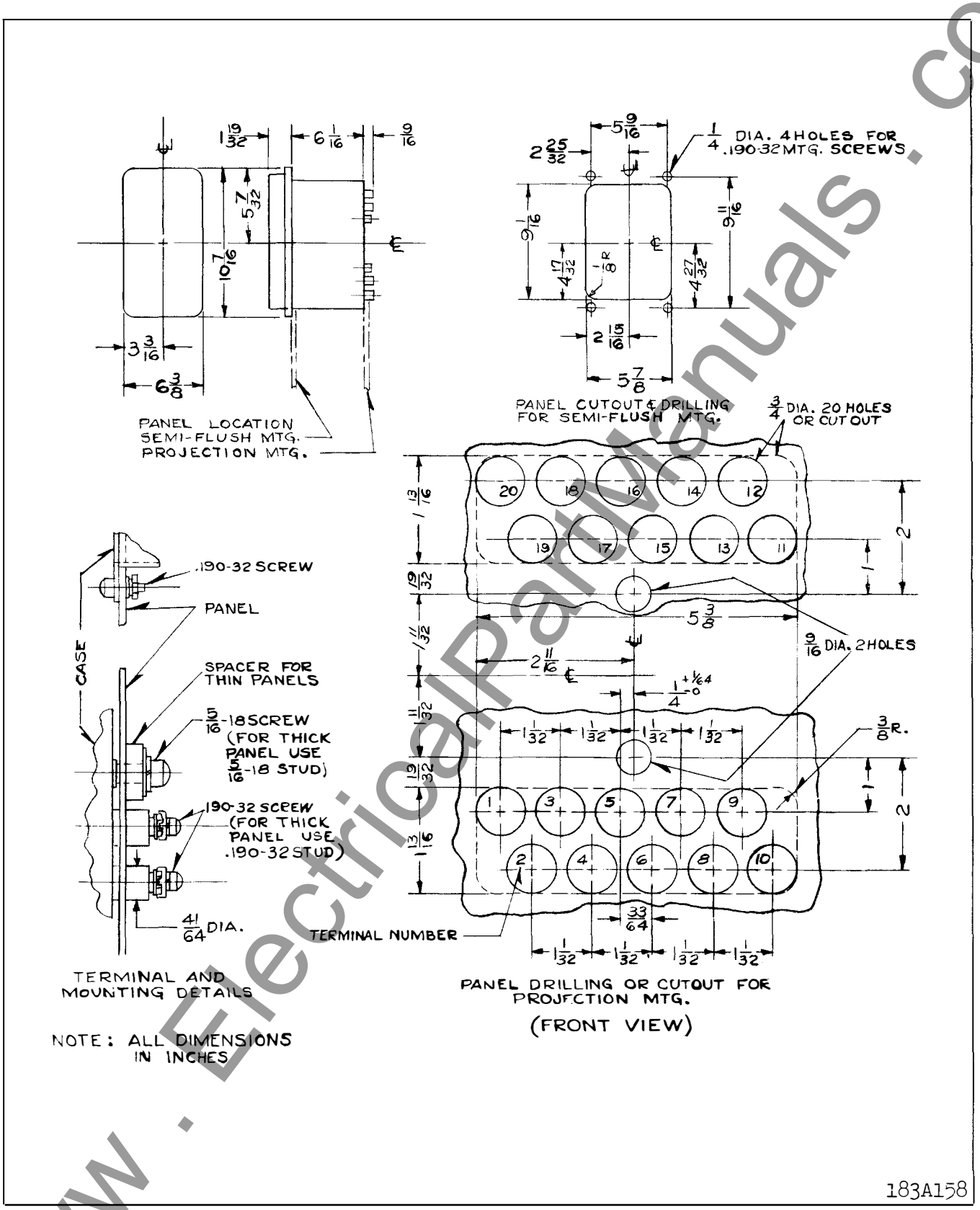


Fig. 11. Outline and Drilling Plan for the Type MG-6 Relay in Type FT22 Case.

WESTINGHOUSE ELECTRIC CORPORATION

METER DIVISION • **NEWARK, N.J.**

Printed in U. S. A.

INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

TYPE MG-6 MULTI-CONTACT AUXILIARY RELAY

CAUTION Before putting relays into service, remove all blocking which may have been inserted for the purpose of securing the parts during shipment, make sure that all moving parts operate freely, inspect the contacts to see that they are clean and close properly, and operate the relay to check the settings and electrical connections.

APPLICATION

The type MG-6 relay is designed for applications where several independent circuits must be energized or de-energized upon the operation of a single primary relay contact, or where the capacity of the primary relay contact is inadequate for the energy required in a control circuit. In certain applications these relays may be used directly as primary relays. Since the stationary contacts can readily be reversed so as to be suitable for either circuit opening or circuit closing service (although readjustment may be required on the D-C MG-6 relay — see "ADJUSTMENTS AND MAINTENANCE") it is unnecessary to predetermine the arrangements of the circuits for which the relay is to be used.

In the usual application of the relay, the armature resets when the operating coil is de-energized. However, the relays may be supplied with a latching mechanism which holds the armature in the operated position until the latch is tripped, either by hand or electrically.

CONSTRUCTION AND OPERATION

The operating electromagnet is at the lower end of the relay, as shown in Fig. 1. The stationary iron circuit is built up of U-shaped punchings. These are slotted at the outer end of the lower leg to receive the copper lag loops used to obtain quiet operation on A-C. The operating coil is mounted on this leg of the punchings. In order to improve the performance of the relay on D-C, the pole face area is increased by means of an iron plate. This plate is assembled at the end of the coil and the corners of the lamination side plates are bent outward, serving to hold the plate in place. The inner end of the upper leg of the punching assembly is shaped so that the lower end of the armature restraining spring can be hooked over it.

The armature is made of high-silicon steel. Projecting sections on the sides, near the center, act as knife-edge bearings and rest on suitably shaped supports which are a part of the moulded base. A stud attached to the lower leg of the electromagnet extends through a hole in the lower end of the armature, and a stop-nut on the outer end of this stud is used to limit and adjust the travel of the armature in the de-energized direction. The special stop nut used will remain at any position in which it is placed without additional locking means.

The upper end of the armature carries an adjusting screw to which one end of the armature restraining spring is attached. In the hand or electrically reset relays, a latch screw is mounted at the extreme end of the armature. In the self-reset relays this screw is replaced by a set screw which serves to separate the locking plate (see Fig. 1) slightly from the armature. Between the spring adjusting screw and the latch screw (or set screw), there is a third screw which when tightened applies pressure to the threads of the former screws and effectively locks them against turning.

The moving contact fingers are mounted on moulded insulation which is fastened to the armature by two screws. Silver contact buttons are welded on both sides of these fingers so that they can be used for either a circuit-opening or a circuit-closing contact. The fingers are assembled on guide pins, between two springs in such a way that definite spring compression and contact wipe is assured for either contact-closing or contact-opening service. Flexible leads are welded to the contact fingers. Since the armature assembly has contact fingers both above and below the bearing points, the armature weight is partially balanced about the bearings and there is

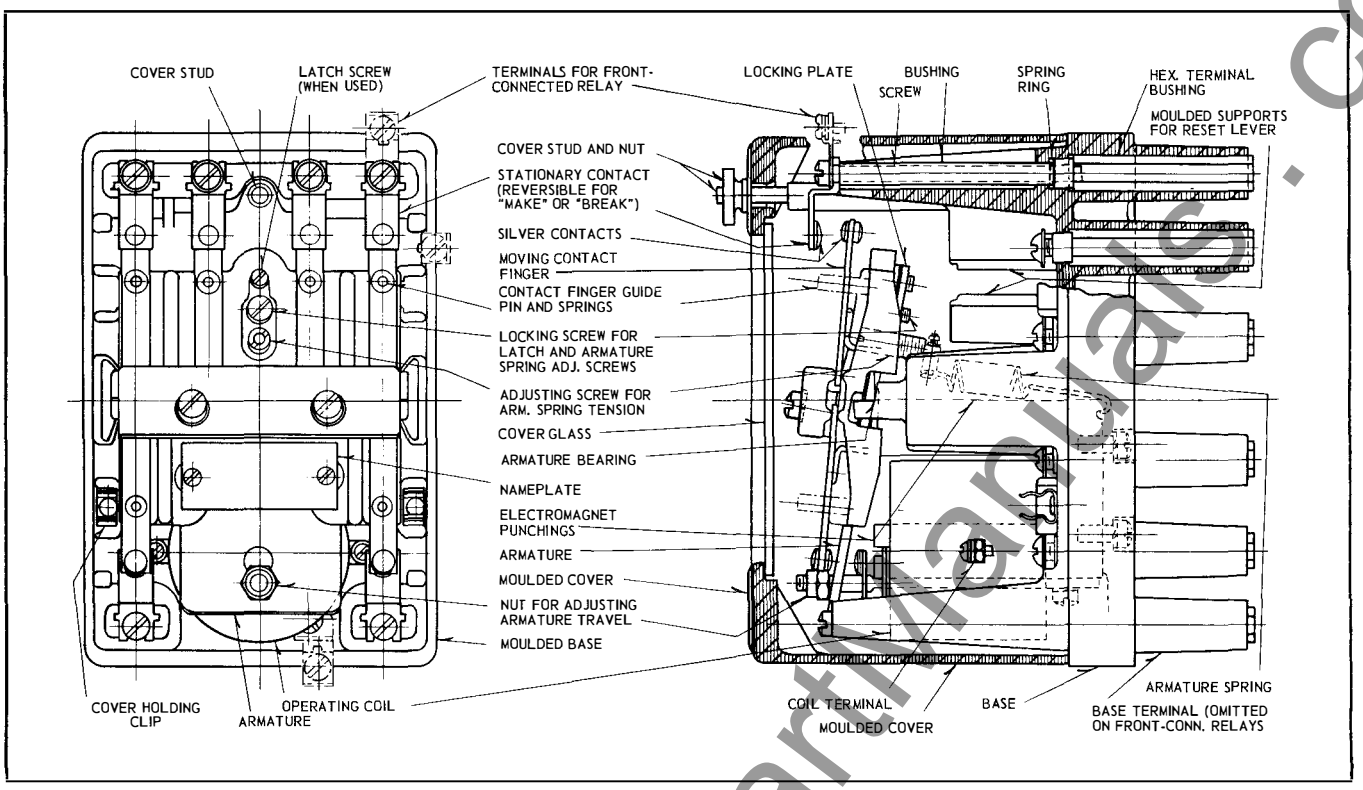


Fig. 1. Front View (Cover Omitted) and Side View of the Type MG-6 Self Reset Relay in Molded Case.

less tendency for severe shocks to move the armature.

The stationary contacts consist of large silver buttons welded to brackets which can be assembled so that they close with the moving contacts when the armature is in either the energized or de-energized position. The stationary contact brackets are connected directly to the terminal inserts by means of long screws which pass through brass tubes. These tubes are of such length that the moulded material of the base is not under direct compression when the screws are tightened. Therefore, there is always a tight connection from contact to terminal regardless of possible shrinkage or other variation in the moulded base material. The contact bracket is held against its seat by means of a spring ring which is compressed between shoulders in the base and on the hexagonal terminal insert.

The construction of the latch and electrical reset is shown in Fig. 2, in which the lower portion is a partial front view of the relay in the moulded case, and the upper portion a top view. In the latter view, the latch screw (in the main armature) is in the energized position, and the reset armature is free to be moved to the right by the tension spring until the hardened latch plate on the reset armature rests against the tip of the latch screw. When the operating coil is de-energized, the latch screw will move slightly so that its shoulder rests on the edge of the latch plate. When the reset coil is energized its armature moves to the left, thus permitting the main armature to return to its open position. Pressing the reset push rod, which extends through the cover stud, will also release the latch through the medium of the reset lever shown in the figure.

In some applications of the relay with latch and electrical reset, it may be desirable to have the operating and reset coils deenergized automatically as soon as they have performed their functions. In the case of the reset coil this can be accomplished by connecting the coil through one of the relay "make" contacts. An auxiliary contact is required to open the operating coil circuit. This contact, when provided, is assembled on the lower right-hand side of the relay, and is held in position by the terminal screw to which the right-hand coil lead ordinarily connects. The coil lead is connected to the stationary contact stud of the auxiliary contact, and the end of the moving contact spring is in contact with

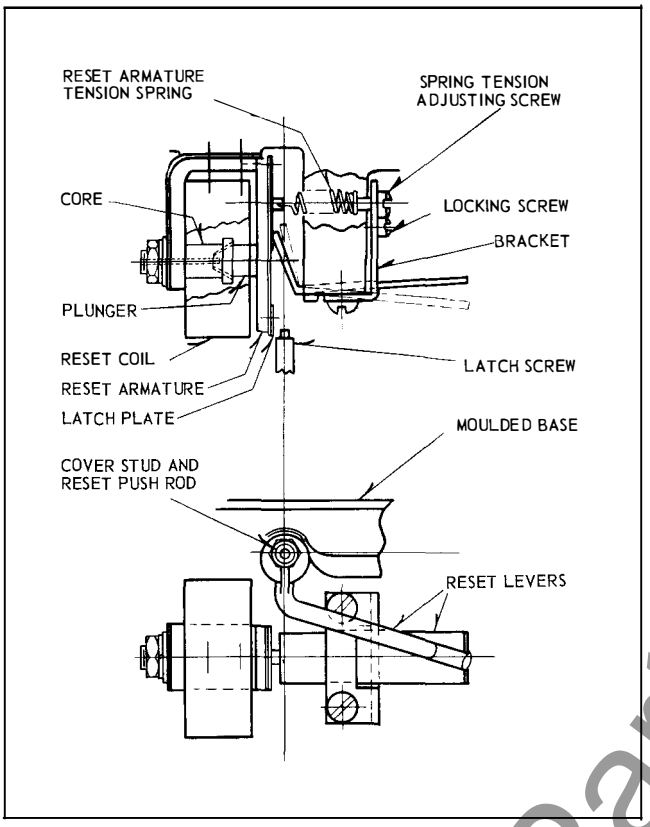
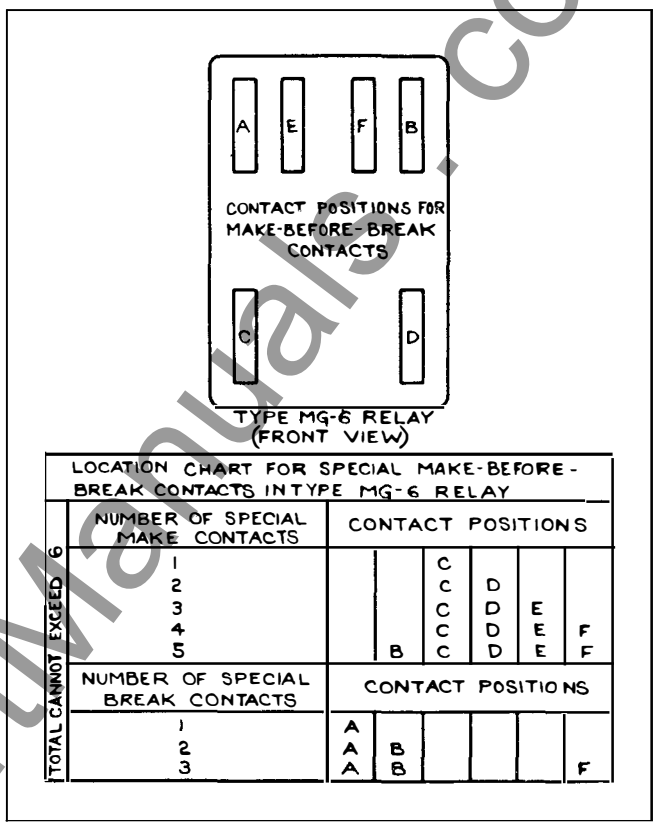


Fig. 2. Detail Views of the Latch and Electrical Reset of the Type MG-6 Relay.



LOCATION CHART FOR SPECIAL MAKE-BEFORE-BREAK CONTACTS IN TYPE MG-6 RELAY

TOTAL CANNOT EXCEED 6

NUMBER OF SPECIAL MAKE CONTACTS	CONTACT POSITIONS					
1			C			
2			C	D		
3			C	D	E	
4			C	D	E	F
5		B	C	D	E	F

NUMBER OF SPECIAL BREAK CONTACTS	CONTACT POSITIONS					
1	A					
2	A	B				
3	A	B				F

Fig. 3. Contact Positions for Combinations of Make-Before-Break Contacts.

the head of the terminal screw. The auxiliary contact is closed when the main armature is open. When the armature approaches the closed position, the moulded insulation block strikes the end of the auxiliary contact spring and causes the contacts to part with a gap which is appreciably greater than the travel of the armature block at the point where it strikes the spring. When this auxiliary contact is used, a weight is screwed to the lower end of the armature to increase its mass and stabilize contact action. This contact will interrupt the coil current at any rated coil voltage, but it is not intended for use in applications where several times rated voltage is applied to the operating coil in order to reduce the operating time.

In certain applications of the type MG-6 relay, it may be desirable to have one or more of the contacts close before other contacts on the same relay open. A special armature assembly is required to obtain such operation, and the number of special make and break contacts desired must be known when the relay is built. The special moving contacts have longer follow than the standard contacts and greater armature spring tension is required for full deflection of the break contacts. Consequently, it is preferable to limit the number of special break contacts to two. A maximum of three may be used, although the increased armature spring tension needed may raise the minimum pick-up voltage above the standard value. As many as five contacts may be special make contacts, with the total of special make and break contacts limited to six, of course. The locations of the make and break contacts for any combination of these special contacts are shown in Fig. 3. This figure indicates the physical location of the contacts in the relay, and can be used in conjunction with the internal schematic diagram for the type of case involved to determine the corresponding terminal locations.

The type MG-6 relay may be provided without cover, for front connection, or in a variety of completely closed cases, for rear connection. The moulded base for rear connection is shown in Fig. 1. The base for front connection is similar except that there are no terminals projecting in the rear. This same base is also used as a sub-base when the relays are supplied in the FT22 case.

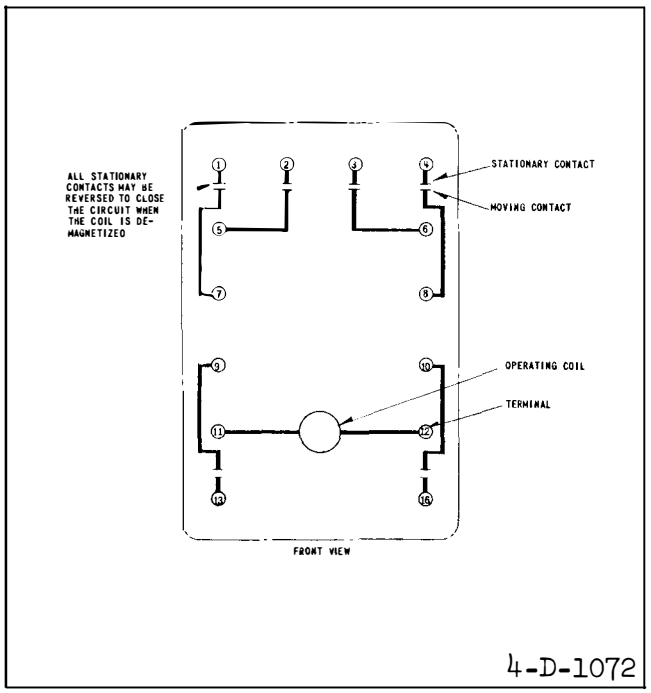


Fig. 4. Internal Schematic of the Type MG-6 Relay, Without Electrical Reset, in Molded Case.

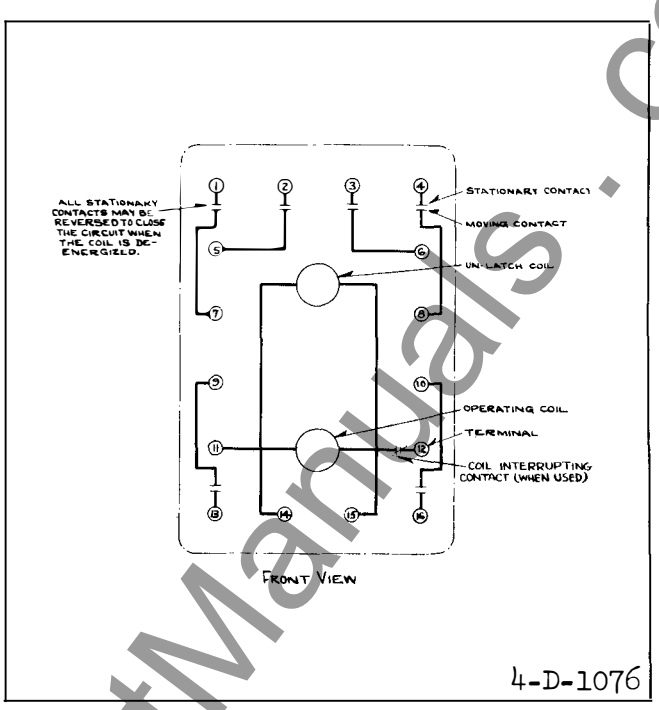


Fig. 5. Internal Schematic of the Type MG-6 Relay, With Electrical Reset, in Molded Case.

CHARACTERISTICS

The type MG-6 relay has an operating time of approximately 2 cycles on a-c and 5 cycles on d-c (on a 60 cycle basis) when energized at the rated voltage. If faster operation is desired and if the application requires only intermittent energization of the relay, the operating coils may be energized at higher than rated voltage. Twice rated voltage will give an operating time of approximately 1 cycle on a-c, and the coil will stand this voltage safely for over two minutes if 60 cycles or 4 minutes if 25 cycles. The time of the d-c relay can be reduced to slightly over 1 cycle if the coil is energized at five times rated voltage and there is not more than one back contact. The coil will stand this voltage for one minute. If faster time is desired on a d-c relay which must be energized continuously, the use of a low voltage coil with a series resistor will reduce the time. With 10% of the line voltage across the relay coil and the balance across a series resistor, the reduced inductance of the circuit results in an operating time of approximately 2 cycles.

Reset coils are for intermittent duty only and should not be energized longer than one-half minute.

The relay contacts will close circuits carrying 30 amperes. They will carry this current for 1 minute, and will carry 12 amperes continuously.

The contacts will interrupt the following currents, in non-inductive circuits, at the voltages listed:

Current	Volts A-C
30	115
20	230
15	460
10	575

Current	Volts D-C
30	12
15	24
10	32
8	48
3	125
1	250

The type MG-6 relay for a-c can be used with any combination of contacts, but the d-c relay cannot have more than four circuit-opening contacts if the normal contact pressures and armature travel are maintained.

INSTALLATION

The relays should be mounted on switchboard

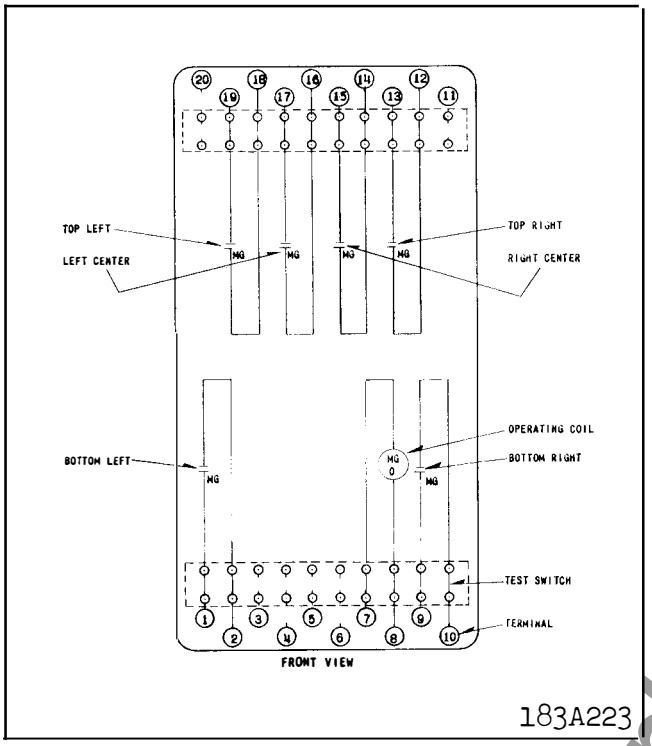


Fig. 6. Internal Schematic of the Type MG-6 Relay, Without Electrical Reset, in FT22 Case.

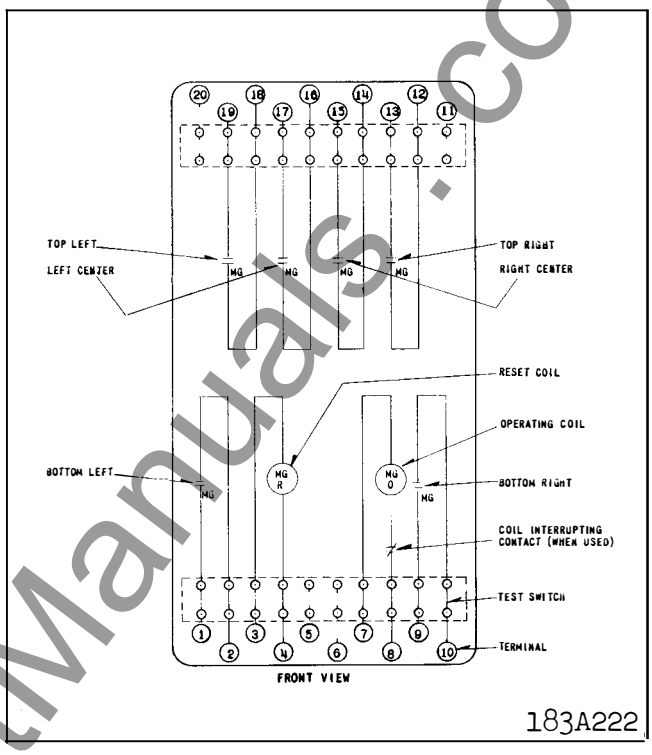


Fig. 7. Internal Schematic of the Type MG-6 Relay, With Electrical Reset, in FT22 Case.

panels or their equivalent in a location free from dirt, moisture, excessive vibration. and heat. Mount the relay vertically by means of the four mounting holes on the flange for semi-flush mounting or by means of the rear mounting stud or studs for projection mounting. Either a mounting stud or the mounting screws may be utilized for grounding the relay. The electrical connections may be made directly to the terminals by means of screws for steel panel mounting or to the terminal studs furnished with the relay for thick panel mounting. The terminal studs may be easily removed or inserted by locking two nuts on the stud and then turning the proper nut with a wrench.

For detailed FT case information refer to I.L. 41-076.

Relays in the rear-connected moulded cases should be mounted and electrically connected similar to the other projection cases. The lower mounting stud may be used to ground the electromagnet iron. The hexagon-shaped terminal inserts are slightly loose in the base but this does not affect the electrical connections. Only the two mounting studs should be used to secure the relay to the panel. Removal of terminal insert end-play (in the case of thick-panel mounting) by turning a nut on the terminal stud tightly against a large diameter washer (not supplied) at the rear of the panel should not be attempted as this may distort the relay base and affect the adjustments, or possibly damage the relay. Relays in the front-connected moulded cases should be mounted by four screws through the sides of the base as indicated in the drilling plan.

ADJUSTMENTS AND MAINTENANCE

The relays are shipped from the factory correctly adjusted for armature travel and for contact follow and pressure, and it should not be necessary to disturb these adjustments. The relays normally are shipped with all contacts assembled for circuit-closing operation. To convert them for circuit-opening operation, it is necessary merely to loosen the mounting screw for the stationary contact bracket, turn this bracket over, and tighten the screw. After reversing the position of the contact brackets, it may be necessary to bend them slightly to obtain contact follows approximately as stated in the fourth paragraph of this section. On a d-c relay not more than four contacts can be assembled in the circuit-opening position if normal contact pressure and travel are

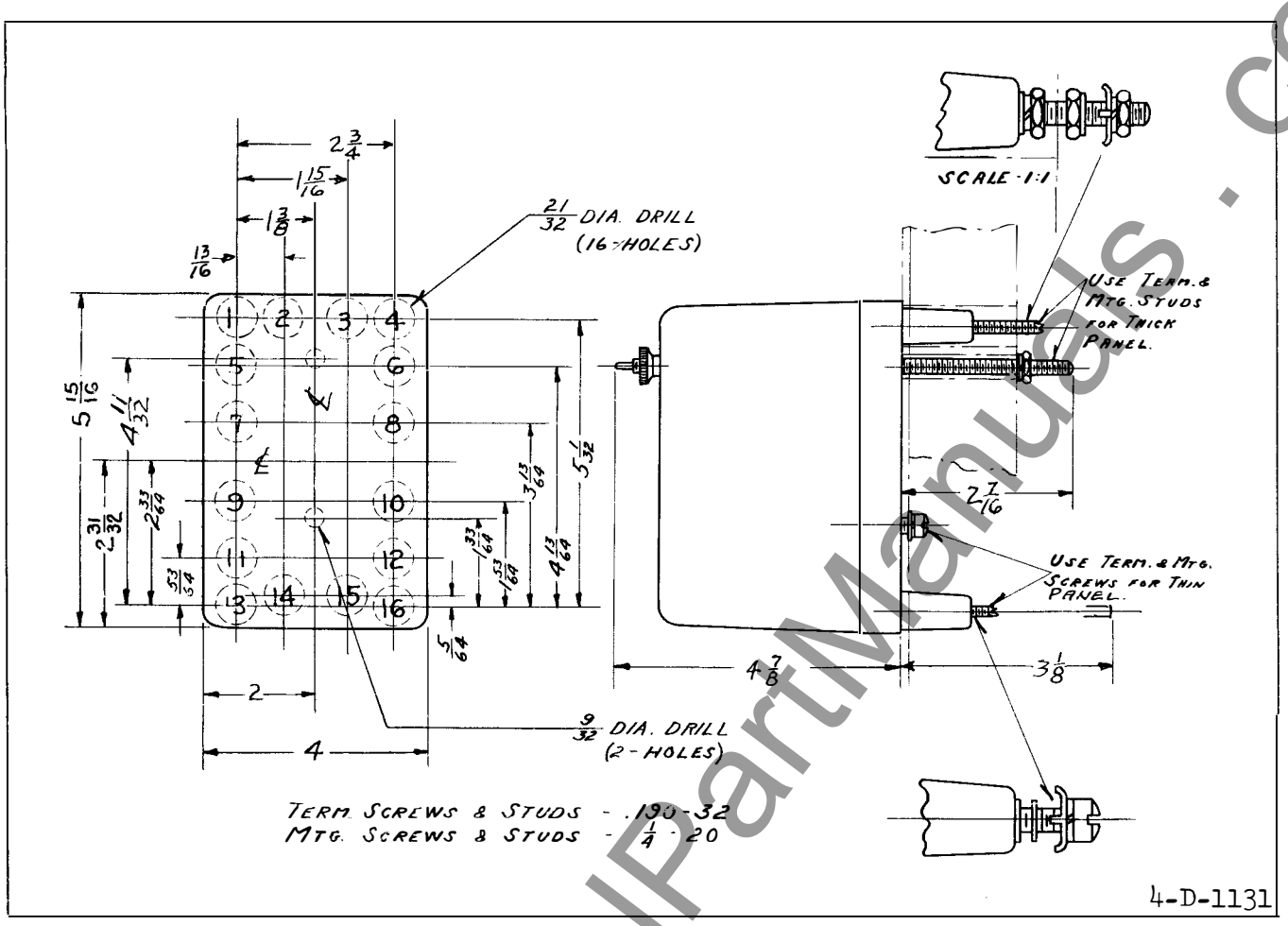


Fig. 8. Outline and Drilling Plan for the Type MG-6 Relay in the Rear Connected Molded Case. See Internal Schematic for Terminals Supplied. For Reference Only.

maintained.

If a relay has been dismantled and is being reassembled, the following adjustments should be made or checked. Reference should be made to Figs. 1 and 2 for identification of the parts mentioned in these instructions.

The armature stop nut should be adjusted so that when the armature is in contact with it the lower edge of the armature is 7/16" above the position which it assumes when the relay is energized. When adjusting the armature spring tension, the locking screw for the spring adjusting screw is loosened, and this adjusting screw is turned (inward, to reduce the spring tension) until the spring barely holds the armature against the stop nut. The relay must be in its normal vertical position when this adjustment is made, with all contacts assembled as circuit-closing. The armature spring should then be tightened by turning the adjusting screw 4 turns counter-clockwise for a-c relays or 2 turns for d-c relays, (except 4 turns for d-c relays with coil-interrupting contacts) and the locking screws should be tightened. If the relay is being used with a number of break contacts, it may be necessary to increase the spring tension to obtain full follow on the break contacts. The adjusting screw should be turned just enough farther to obtain full follow.

The follow of the moving contact fingers should be 3/32" for the make contacts and 1/16" for the break contacts, measured at the contacts. This can be checked more conveniently by measuring the travel of the lower edge of the armature after the contacts touch. This should be approximately 1/8" for the make contacts and 3/32" for the break contacts. In case moving contact fingers have been removed from their guide pins, it is important that the coil springs

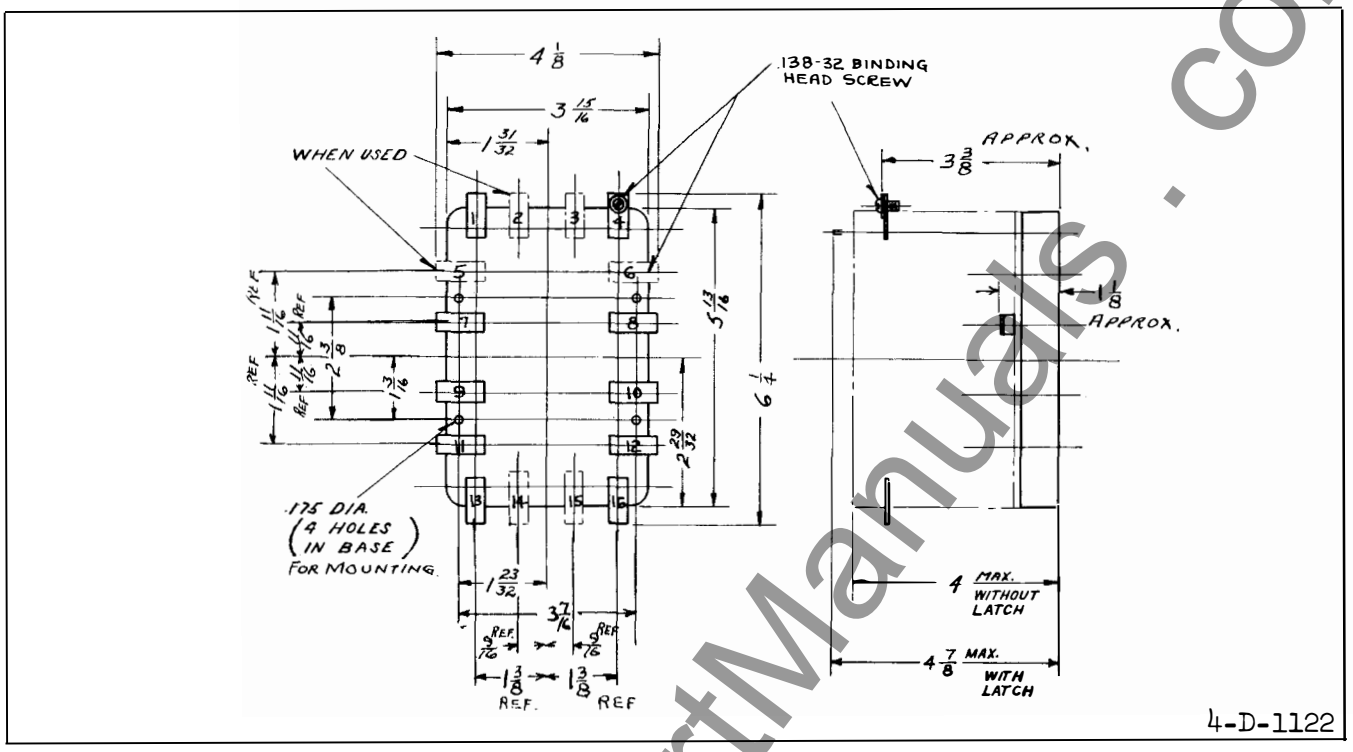


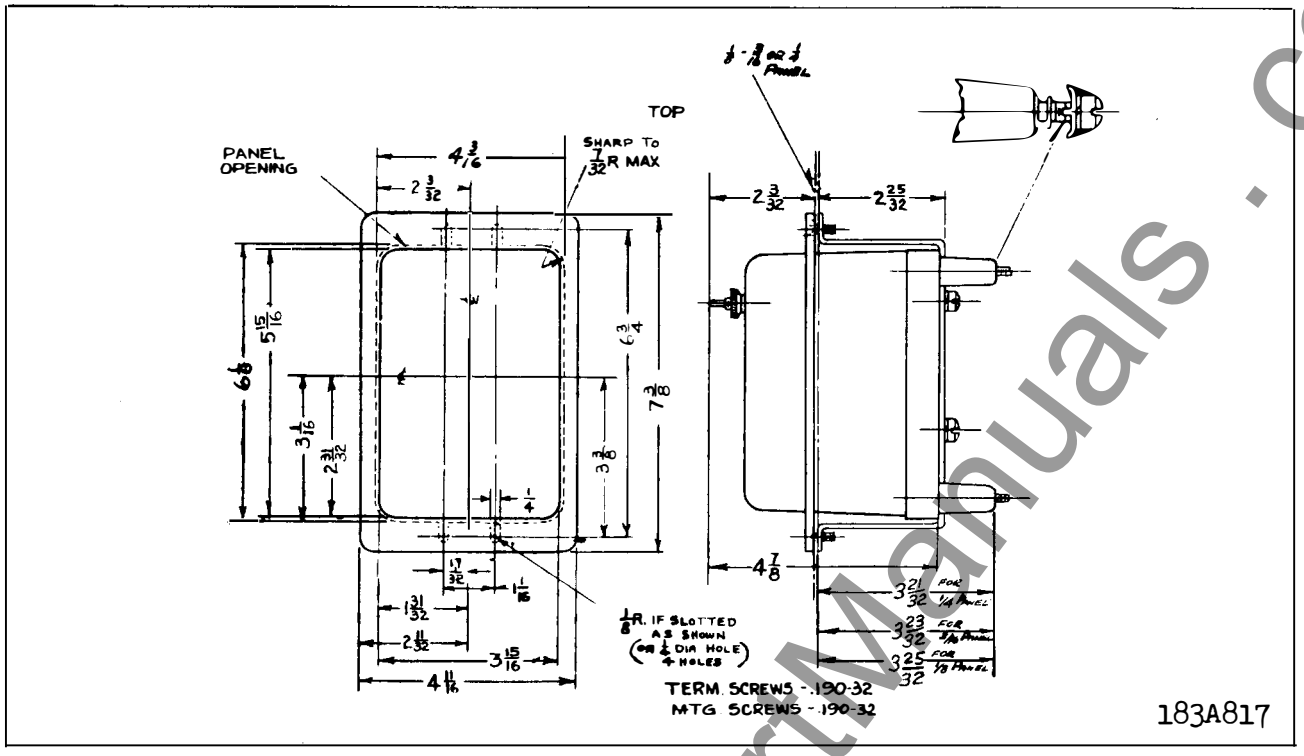
Fig. 9. Outline and Drilling Plan for the Type MG-6 Relay in the Front Connected Molded Case. See Internal Schematic for Terminals Supplied. For Reference Only.

on the two sides of the fingers be replaced correctly. The springs which are compressed by circuit-closing contacts are approximately three times as strong as the ones compressed by circuit-opening contacts and thus they can be readily distinguished. The positions of the two springs are reversed at the two ends of the relay.

When special contacts are supplied for make-before-break operation, the stationary members of the special contacts are bent equally toward their respective moving contacts to obtain "make" at the point where the "break" moving contact has approximately 1/16" follow before parting from its stationary contact.

If an a-c relay is to be used with a series resistor so that the relay can be dropped out by shorting the coil, either the resistance value must be such that the watt consumption with the coil shorted will be quite high or the relay armature spring tension must be reduced to about 1-1/2 turns and the follow of the stationary make contacts must be reduced (by bending) to about 1/16". With the reduced armature spring tension, not more than two of the contacts can be used as break contacts. Because of the low relay impedance with armature open as compared to the impedance with armature closed, it is not advantageous to use a resistor in series with a coil rated at less than line voltage, as in the case of d-c applications. For the contact and spring adjustments specified above, a 60 cycle MG relay with voltage rating equal to the line voltage can be used with a series resistor which will take about 90 watts when directly across the line. Of course, if the coil will be shorted only momentarily or if a higher watt consumption is not objectionable, it may be unnecessary to reduce the spring tension or contact follow.

If the complete armature assembly is to be removed from the relay, the screws which fasten the lower ends of the moving contact leads to the terminals should be removed, the armature spring tension adjusting screw should be turned in as far as possible, and the armature stop nut should be removed. The upper end of the armature spring should then be slipped off of the grooved member at the lower end of the adjusting screw, and the armature should be lifted off of its bearing carefully so as to avoid distortion of the coiled leads. The leads to the upper center moving contacts are not coiled but the coiling of the four other moving contact leads should be such that when the relay base is horizontal and the arma-



* *Fig. 10. Outline and Drilling Plan for the Molded Semi-Flush Case. For Reference Only.*

ture is on its bearings and approximately at its mid-position, the lead terminals will just touch the base terminal inserts or be within about 1/8" of that position. A pair of tweezers on which the ends are bent at a right angle to the body, or a similar tool, is useful in replacing the upper end of the spring in the groove of the adjusting member. Such a tool is particularly helpful on relays which have an electrical reset assembly.

On latch-type relays the latch screw is adjusted so that with the armature latched and the operating coil de-energized, there will be a gap of between .005 and .010 inch between the electromagnet pole face and the raised section of the armature which strikes the pole face. The locking screw should be tightened securely after making this adjustment. There is a small amount of clearance between the armature and its supporting posts, and in order to insure proper operation allowance must be made for this in the following manner. With the armature held against its left-hand support and nearly closed, the latch spring or reset armature should be moved to the left as far as it will go by means of the hand reset. To assure that the latch will always release the armature the resulting space between the latch and the latch screw should be at least .005 inch, and should not be more than about 1/64". This should also be checked electrically if electrical reset is provided. Some change of this gap can be made by loosening the mounting screws in the relay base and moving the latch support in the desired direction. The gap also can be changed by loosening the two screws which hold the moving contact insulation block to the armature and shifting the armature in the desired direction.

On electrical reset relays, the tension of the spring which draws the reset armature toward the latch screw must be adjusted if these parts are being reassembled. The locking screw (Fig. 2) is screwed out until its head clears the head of the adjusting screw. The main armature is then held completely closed and against its right hand support, and the latch spring tension adjusting screw is turned until the latch barely touches the stop projecting from the center of the latch screw. Then the latch spring tension should be increased by turning the screw clockwise 5 turns, and the locking screw should be tightened.

If either the core nut of the electrical reset assembly or the screws which mount its armature have been loosened, the relative positions of the core and plunger may shift sufficiently to cause the plunger to

strike on the side of the conical core opening. To assure correct alignment of these parts, .042 diameter holes are provided through the center of the core and about 1/16" deep in the center of the plunger. After tightening the core nut, a close fitting pin should be inserted through the core and into the plunger. With the pin in place, and plunger pressed firmly against the core, and the mounting end of the armature centrally located with respect to the electromagnet, the two armature mounting screws should be tightened. The pin then should be removed.

A slight amount of medium viscosity slushing oil is supplied at the factory to the polished and hardened surfaces of the latch screw and the latch plate to minimize wear and as protection against corrosion. Oil should be reapplied after any cleaning and reassembling of these parts, and it is desirable also to renew this at the regular maintenance periods.

If the relay is provided with a coil-interrupting contact, the following points must be observed to assure satisfactory operation. The latch screw should be adjusted so that with the armature in the latched position and the operating coil deenergized, the gap between the armature and the lower pole face of the electromagnet is only .005 inch. With the armature in this position the coil interrupting contact should be open by about 1/16 inch. This gap is adjusted at the factory by varying the number of slotted shims used between the relay base and the contact supporting bracket. The two main contacts at the lower end of the base should be assembled as circuit-opening contacts, and the main armature restraining spring should have 4 turns tension (see 3rd paragraph of this section) for DC as well as for AC relays. It is necessary also that the L-shaped spring which carries the moving member of the coil-interrupting contact have its sides approximately straight before assembly with the supporting bracket, and that the angle between the sides be approximately 80°.

All contacts should be periodically cleaned. A contact burnisher S#182A836H01 is recommended for this purpose. The use of abrasive material for cleaning contacts is not recommended, because of the danger of embedding small particles in the face of the soft silver and this impairing the contact.

REPAIRS AND RENEWAL PARTS

Repair work can be done most satisfactorily at the factory. However, interchangeable parts can be furnished to the customers who are equipped for doing repair work. When ordering parts, always give the complete nameplate data.

ENERGY REQUIREMENTS

Operating Coil Burdens at rated Voltage

Frequency (cycles)	Closed Gap		Open Gap	
	Watts	Volt-Amps	Watts	Volt-Amps
25	6.8	23	19.6	53
50	9.8	31	17.4	78
△60	15	35.5	19	96.5
D-C	7.8 cold--		7.8 cold--	
D-C	6.5 hot --		6.5 hot --	

△Rated voltage is 120 volts or its multiples.

Reset Coil Burdens at Rated Voltage (Multiples)

Frequency (cycles)	Closed Gap		Open Gap	
	Watts	Volt-Amps	Watts	Volt-Amps
25	48	51.6	52	54
50	46	58.2	57	63.8
60	84	104.5	96	112.8
D-C	66 cold--		68 cold--	

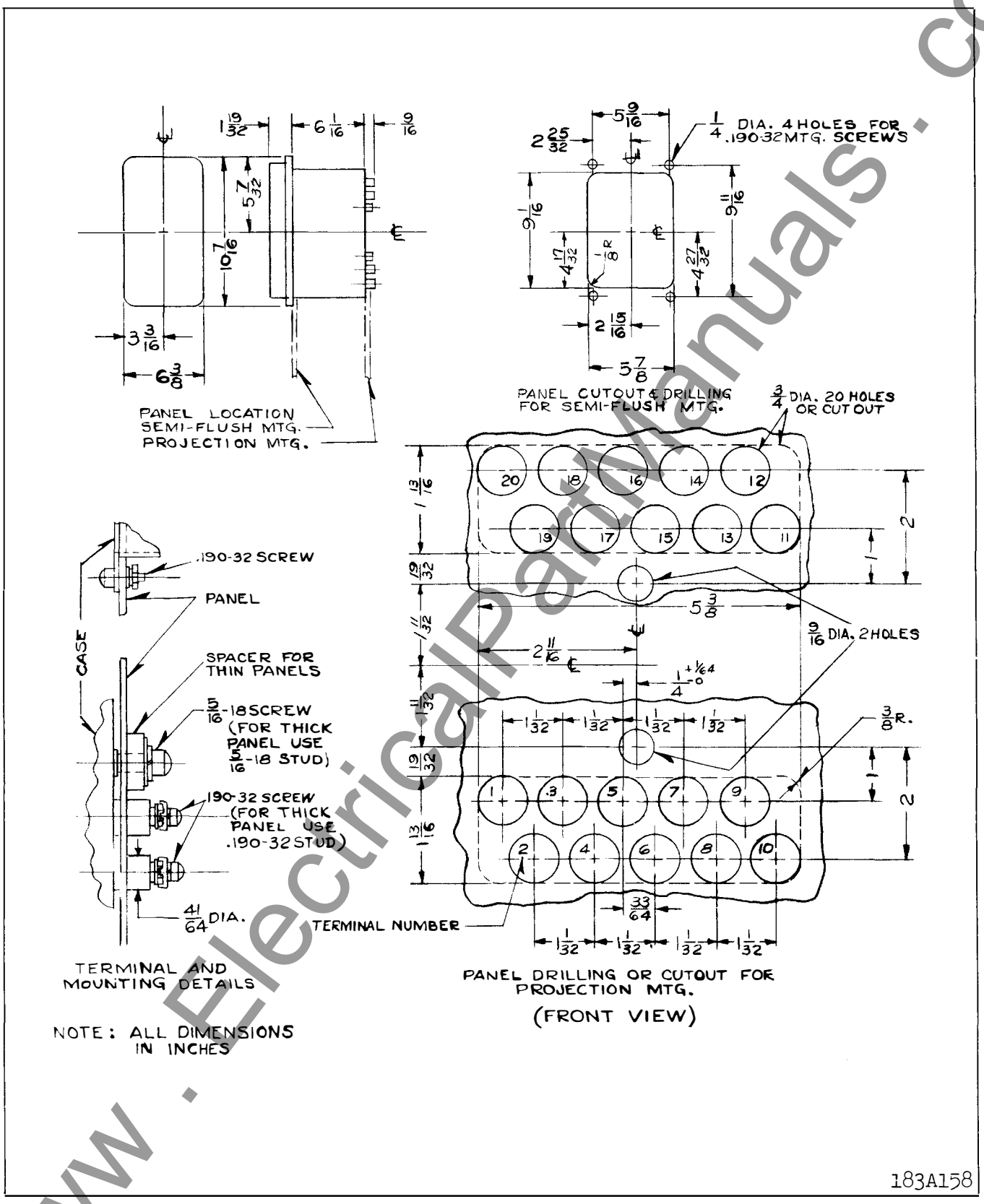


Fig. 11. Outline and Drilling Plan for the Type MG-6 Relay in Type FT22 Case.

WESTINGHOUSE ELECTRIC CORPORATION

RELAY DEPARTMENT **NEWARK, N. J.**

Printed in U. S. A.

INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

TYPE MG-6 MULTI-CONTACT AUXILIARY RELAY

CAUTION Before putting relays into service, remove all blocking which may have been inserted for the purpose of securing the parts during shipment, make sure that all moving parts operate freely, inspect the contacts to see that they are clean and close properly, and operate the relay to check the settings and electrical connections.

APPLICATION

The type MG-6 relay is designed for applications where several independent circuits must be energized or de-energized upon the operation of a single primary relay contact, or where the capacity of the primary relay contact is inadequate for the energy required in a control circuit. In certain applications these relays may be used directly as primary relays. Since the stationary contacts can readily be reversed so as to be suitable for either circuit opening or circuit closing service (although a slight increase in spring tension may be required on the D-C MG-6 relay — see "ADJUSTMENTS AND MAINTENANCE") it is unnecessary to predetermine the arrangements of the circuits for which the relay is to be used.

In the usual application of the relay, the armature resets when the operating coil is de-energized. However, the relays may be supplied with a latching mechanism which holds the armature in the operated position until the latch is tripped, either by hand or electrically.

An operating coil cutoff contact can be supplied with the electric-reset type, where an intermittent duty coil is required for faster than normal operation, but where the operating coil circuit must be continuously. An operating coil, rated at 19% of supply rating may be applied, with a maximum duty of 10,000 operations. (e.g. 24 volt coil on 125 volt dc circuit)

CONSTRUCTION AND OPERATION

The operating electromagnet is at the lower end of the relay, as shown in Fig. 1. The stationary iron circuit is built up of U-shaped punchings. These are slotted at the outer end of the lower leg to receive the copper lag loops used to obtain quiet operation on A-C. The operating coil is mounted on this leg of the punchings. In order to improve the performance of the relay on D-C, the pole face area is increased by means of an iron plate. This plate is assembled at the end of the coil and the corners of the lamination side plates are bent outward, serving to hold the plate in place. The inner end of the upper leg of the punching assembly is shaped so that the lower end of the armature restraining spring can be hooked over it.

The armature is made of high-silicon steel. Projecting sections on the sides, near the center, act as knife-edge bearings and rest on suitably shaped supports which are a part of the moulded base. A stud attached to the lower leg of the electromagnet extends through a hole in the lower end of the armature, and a stop-nut on the outer end of this stud is used to limit and adjust the travel of the armature in the de-energized direction. The special stop nut used will remain at any position in which it is placed without additional locking means.

The upper end of the armature carries an adjusting screw to which one end of the armature restraining spring is attached. In the hand or electrically reset relays, a latch screw is mounted at the extreme end of the armature. In the self-reset relays this screw is replaced by a set screw which serves to separate the locking plate (see Fig. 1) slightly from the armature. Between the spring adjusting screw and the latch screw (or set screw), there is a third screw which when tightened applies pressure to the threads of the former screws and effectively locks them against turning.

The moving contact fingers are mounted on moulded insulation which is fastened to the armature

SUPERSEDES I.L. 41-753.1C
*Denotes change from superseded issue.

EFFECTIVE MAY 1961

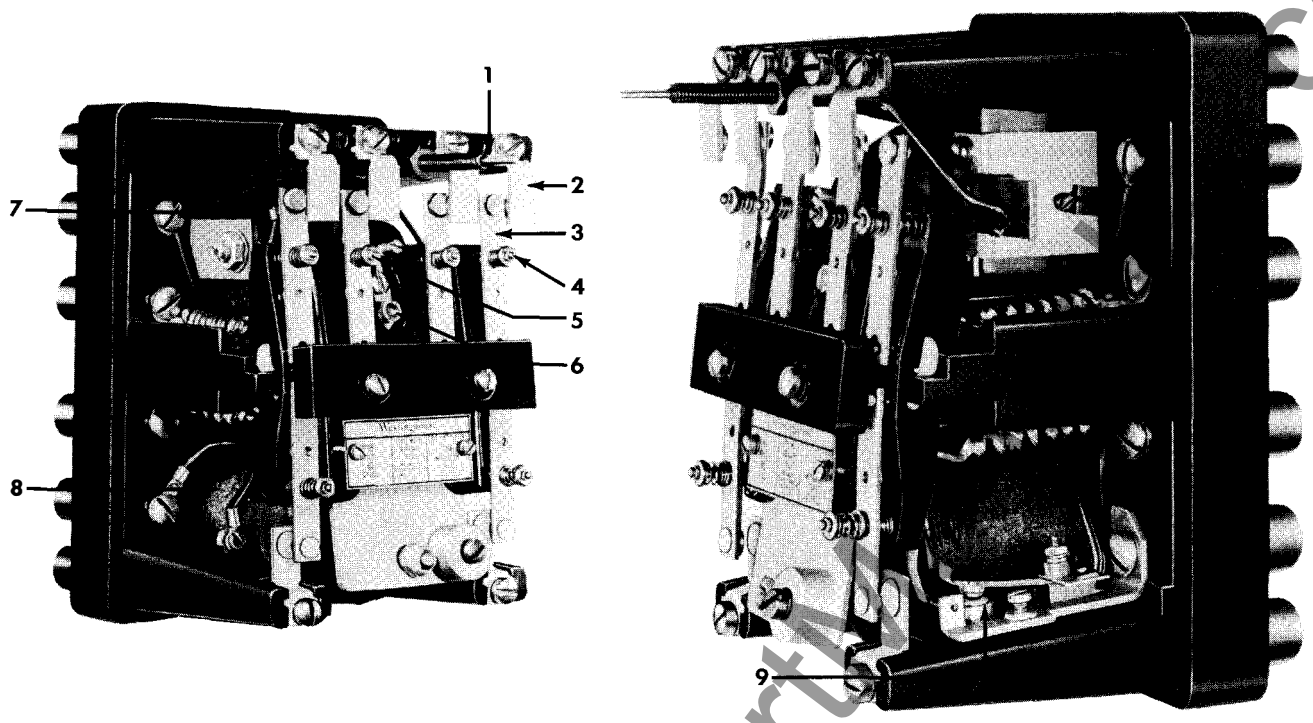


Fig. 1. Front View (Cover Omitted) and Side View of the MG-6 Electric & Hand Reset Relay in Molded Case. 1 – Reset push rod, 2 – stationary contact, 3 – moving contact, 4 – moving contact spring assembly, 5 – latch adjustment screw, 6 – adjusting screw for armature spring tension, 7 – reset coil, 8 – operating coil, 9 – optional operating coil cut-off contact.

by two screws. Silver contact buttons are on both sides of these fingers so that they can be used for either a circuit-opening or a circuit-closing contact. The fingers are assembled on guide pins, between two springs in such a way that definite spring compression and contact wipe is assured for either contact-closing or contact-opening service. Flexible leads assemblies are welded to the contact fingers. Since the armature assembly has contact fingers both above and below the bearing points, the armature weight is partially balanced about the bearings and there is less tendency for severe shocks to move the armature.

The stationary contacts consist of large silver buttons welded to brackets which can be assembled so that they close with the moving contacts when the armature is in either the energized or de-energized position. The stationary contact brackets are connected directly to the terminal inserts by means of long screws which pass through brass tubes. These tubes are of such length that the moulded material of the base is not under direct compression when the screws are tightened. Therefore, there is always a tight connection from contact to terminal regardless of possible shrinkage or other variation in the moulded base material. The contact bracket is held against its seat by means of a spring ring which is compressed between shoulders in the base and on the hexagonal terminal insert.

The construction of the latch and electrical reset is shown in Fig. 2, in which the lower portion is a partial front view of the relay in the moulded case, and the upper portion a top view. In the latter view, the latch screw (in the main armature) is in the energized position, and the reset armature is free to be moved to the right by the tension spring until the hardened latch plate on the reset armature rests against the tip of the latch screw. When the operating coil is de-energized, the latch screw will move slightly so that its shoulder rests on the edge of the latch plate. When the reset coil is energized its armature moves to the left, thus permitting the main armature to return to its open position. Pressing the reset push rod, which extends through the cover stud, will also release the latch through the medium of the reset lever shown in the figure.

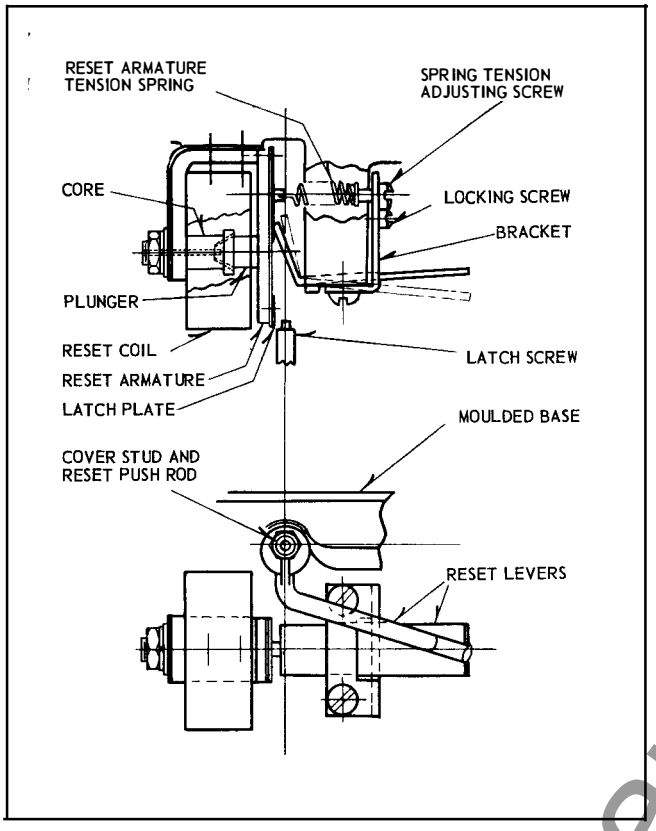
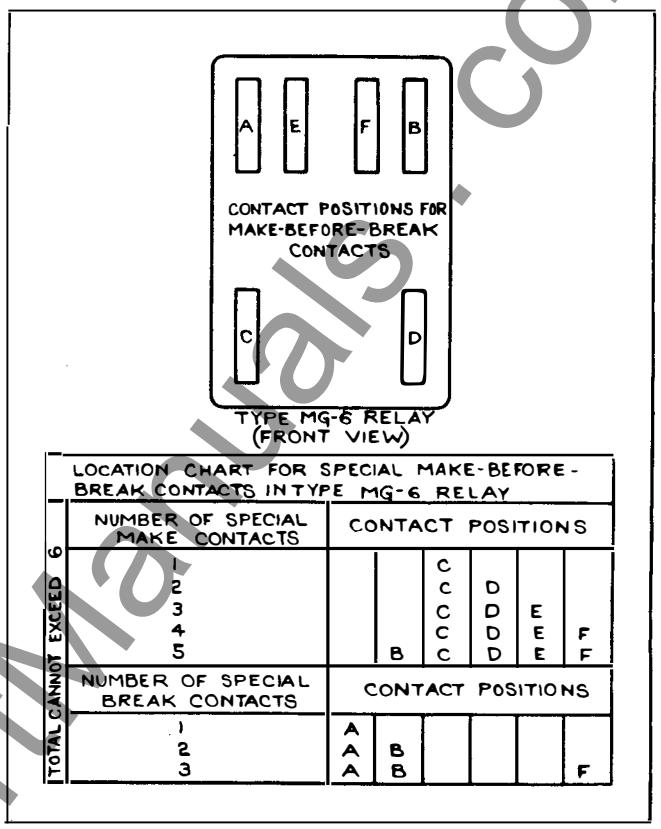


Fig. 2. Detail Views of the Latch and Electrical Reset of the Type MG-6 Relay.



LOCATION CHART FOR SPECIAL MAKE-BEFORE-BREAK CONTACTS IN TYPE MG-6 RELAY

TOTAL CANNOT EXCEED 6

NUMBER OF SPECIAL MAKE CONTACTS	CONTACT POSITIONS					
1			C			
2			C	D		
3			C	D	E	
4			C	D	E	F
5		B	C	D	E	F
NUMBER OF SPECIAL BREAK CONTACTS	**CONTACT POSITIONS**					
1	A					
2	A	B				
3	A	B				F

Fig. 3. Contact Positions for Combinations of Make-Before-Break Contacts.

In some applications of the relay with latch and electrical reset, it may be desirable to have the operating and reset coils deenergized automatically as soon as they have performed their functions. In the case of the reset coil this can be accomplished by connecting the coil through one of the relay "make" contacts. An auxiliary contact is required to open the operating coil circuit. This contact, when provided, is assembled on the lower right-hand side of the relay, and is held in position by the terminal screw to which the right-hand coil lead ordinarily connects. The coil lead is connected to the moving contact of the auxiliary contact, and the end of the stationary contact bracket is in contact with the head of the terminal screw. The auxiliary contact is closed when the main armature is open. When the armature approaches the closed position, the spring on the molded insulation block snaps off the roller and causes the contacts to open and interrupt the operating coil current. When this auxiliary contact is used, a weight is screwed to the lower end of the armature to increase its mass and stabilize contact action. This contact will interrupt the coil current at up to five times rated coil voltage.

In certain applications of the type MG-6 relay, it may be desirable to have one or more of the contacts close before other contacts on the same relay open. A special armature assembly is required to obtain such operation, and the number of special make and break contacts desired must be known when the relay is built. The special moving contacts have longer follow than the standard contacts and greater armature spring tension is required for full deflection of the break contacts. Consequently, it is preferable to limit the number of special break contacts to two. A maximum of three may be used, although the increased armature spring tension needed may raise the minimum pick-up voltage above the standard value. As many as five contacts may be special make contacts, with the total of special make and break contacts limited to six, of course. The locations of the make and break contacts for any combination of these special contacts are shown in Fig. 3. This figure indicates the physical location of the contacts in the relay, and can be used in conjunction with the inter-

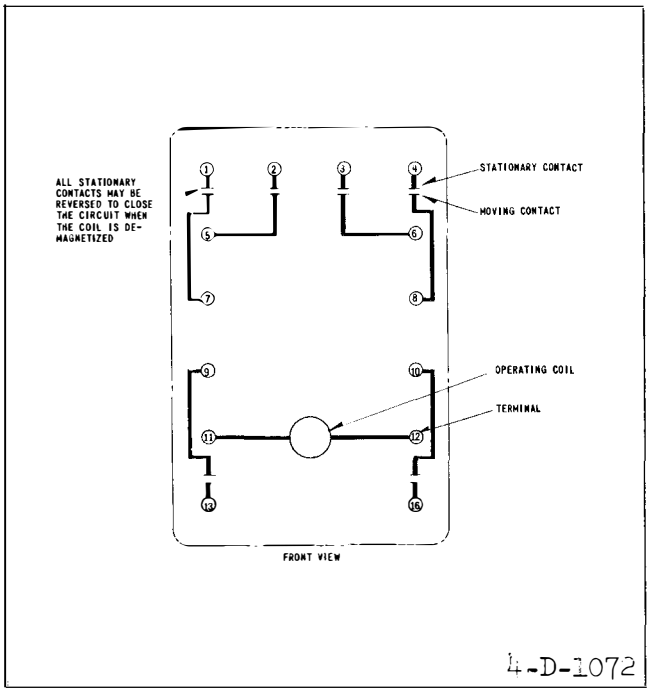


Fig. 4. Internal Schematic of the Type MG-6 Relay, Without Electrical Reset, in Molded Case.

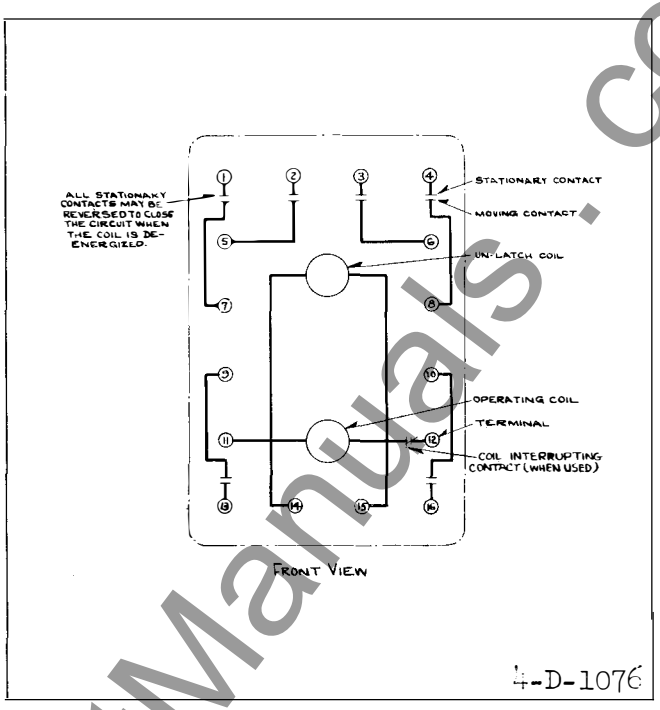


Fig. 5. Internal Schematic of the Type MG-6 Relay, With Electrical Reset, in Molded Case.

nal schematic diagram for the type of case involved to determine the corresponding terminal locations.

The type MG-6 relay may be provided without cover, for front connection, or in a variety of completely closed cases, for rear connection. The moulded base for rear connection is shown in Fig. 1. The base for front connection is similar except that there are no terminals projecting in the rear. This same base is also used as a sub-base when the relays are supplied in the FT22 case.

CHARACTERISTICS

The type MG-6 relay has an operating time of approximately 2 cycles on a-c and 5 cycles on d-c (on a 60 cycle basis) when energized at the rated voltage.

If faster operation is desired and if the application requires only intermittent energization of the relay, the operating coils may be energized at higher than rated voltage. (1) Twice rated voltage will give an operating time of approximately 1 cycle on a-c, and the coil will stand this voltage safely for over two minutes if 60 cycles of 4 minutes if 25 cycles. (2) The time of the d-c relay can be reduced to slightly over 1 cycle if the coil is energized at five times rated voltage. The coil will stand this voltage for one minute. If faster time is desired on a d-c relay which must be energized continuously, the use of a low voltage coil with a series resistor will reduce the time. With 10% of the line voltage across the relay coil and the balance across a series resistor, the reduced inductance of the circuit results in an operating time of approximately 2 cycles. The time of operation may be reduced to approximately one cycle by applying 4 or 5 times rated d-c voltage to the coils through the coil interrupting contact.

Reset coils are for intermittent duty only and should not be energized longer than one-half minute.

The relay contacts will close circuits carrying 30 amperes. They will carry this current for 1 minute, and will carry 12 amperes continuously.

The contacts will interrupt the following currents, in non-inductive circuits, at the voltages listed:

Current	Volts A-C
30	115
20	230
15	460
10	575

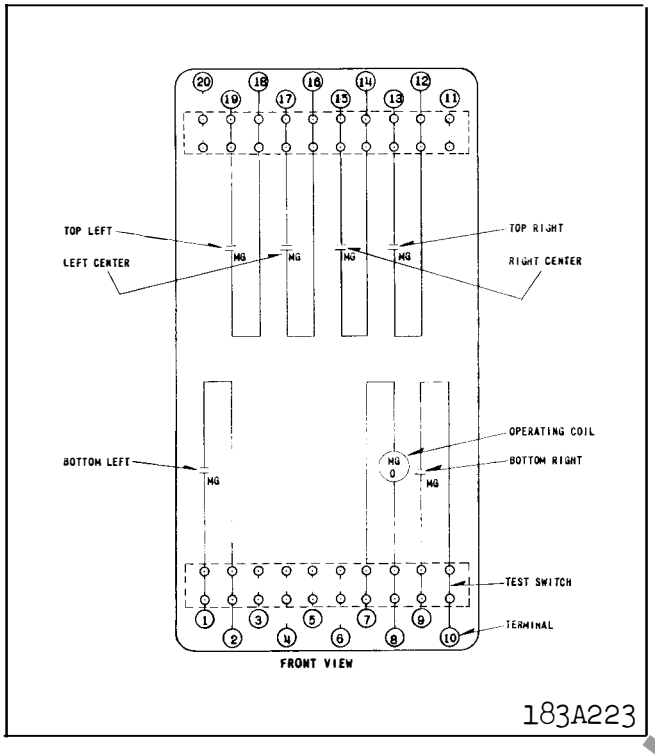


Fig. 6. Internal Schematic of the Type MG-6 Relay, Without Electrical Reset, in FT22 Case.

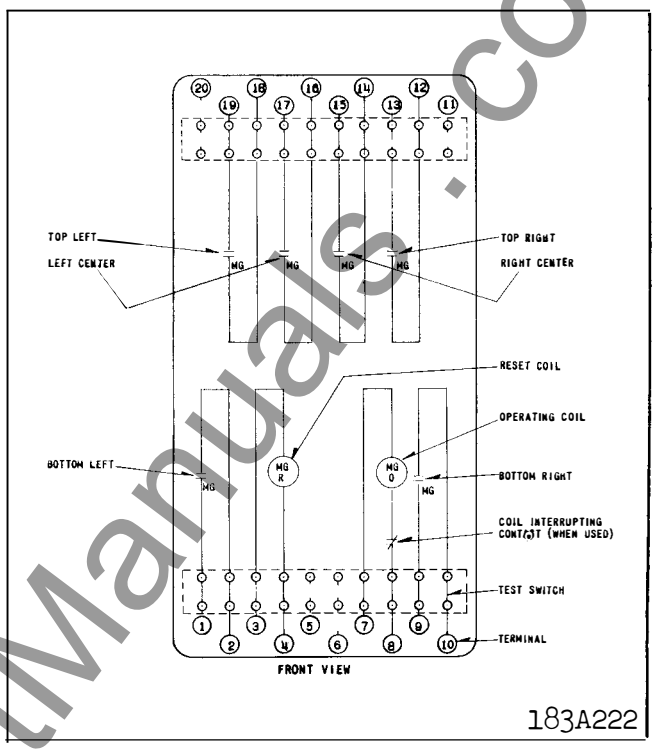


Fig. 7. Internal Schematic of the Type MG-6 Relay, With Electrical Reset, in FT22 Case.

Current	Volts D-C
30	12
15	24
10	32
8	48
3	125
1	250

The type MG-6 relay for a-c can be used with any combination of contacts, but the d-c relay can have up to four circuit-opening contacts with the normal operating spring adjustment. With more than four the operating spring should be adjusted to give the correct back contact follow.

INSTALLATION

The relays should be mounted on switchboard panels or their equivalent in a location free from dirt, moisture, excessive vibration. and heat. Mount the relay vertically by means of the four mounting holes on the flange for semi-flush mounting or by means of the rear mounting stud or studs for projection mounting. Either a mounting stud or the mounting screws may be utilized for grounding the relay. The electrical connections may be made directly to the terminals by means of screws for steel panel mounting or to the terminal studs furnished with the relay for thick panel mounting. The terminal studs may be easily removed or inserted by locking two nuts on the stud and then turning the proper nut with a wrench.

For detailed FT case information refer to I.L. 41-076.

Relays in the rear-connected moulded cases should be mounted and electrically connected similar to the other projection cases. The lower mounting stud may be used to ground the electromagnet iron. The hexagon-shaped terminal inserts are slightly loose in the base but this does not affect the electrical connections. Only the two mounting studs should be used to secure the relay to the panel. Removal of terminal insert end-play (in the case of thick-panel mounting) by turning a nut on the terminal stud tightly against a large diameter washer (not supplied) at the rear of the panel should not be attempted as this may distort the relay base and affect the adjustments, or possibly damage the relay. Relays in the front-connected moulded cases should be

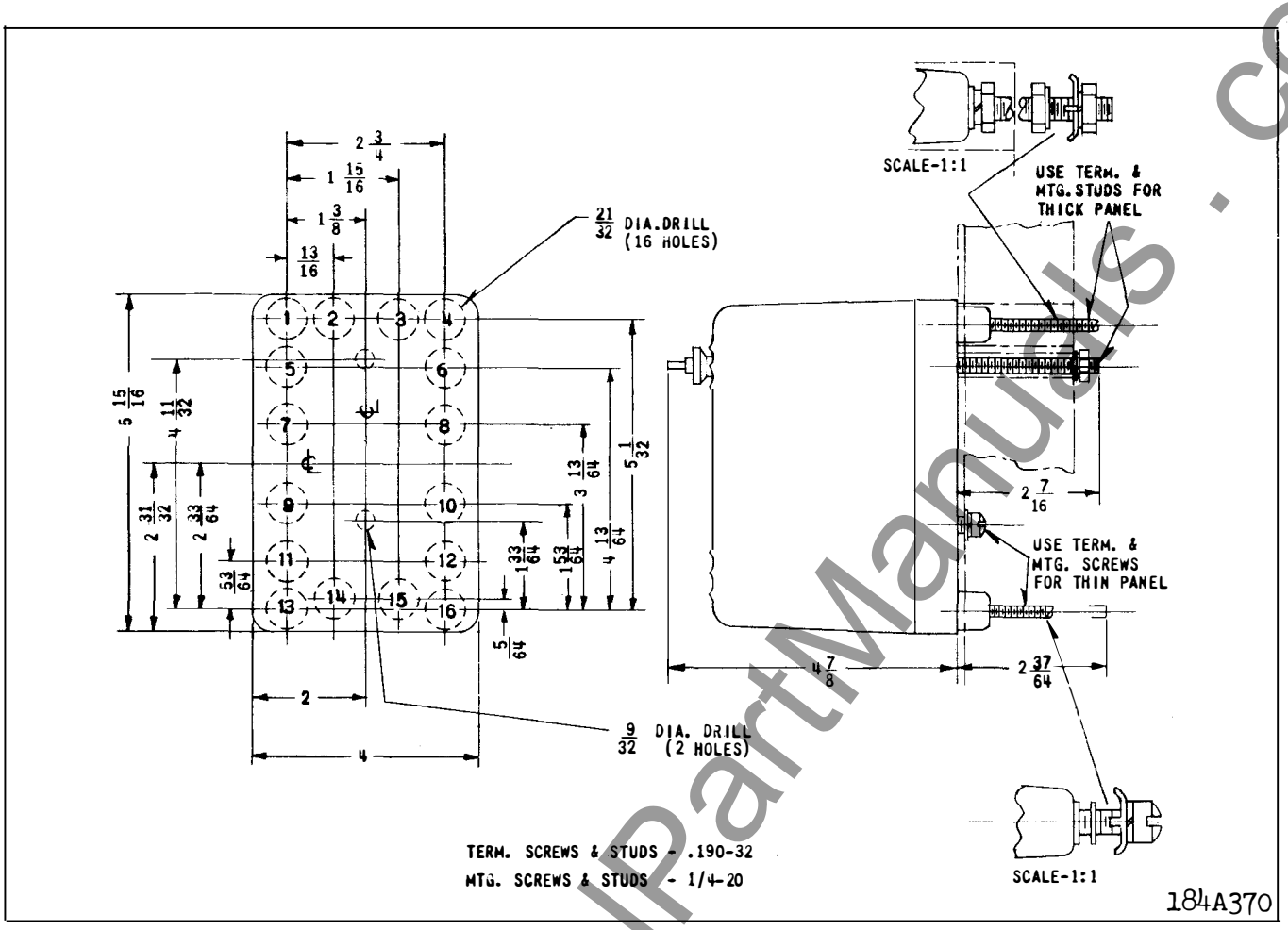


Fig. 8. Outline and Drilling Plan for the Type MG-6 Relay in the Rear Connected Molded Case. For Reference Only.

mounted by four screws through the sides of the base as indicated in the drilling plan.

ADJUSTMENTS AND MAINTENANCE

The relays are shipped from the factory correctly adjusted for armature travel and for contact follow and pressure, and it should not be necessary to disturb these adjustments. The relays normally are shipped with all contacts assembled for circuit-closing operation. To convert them for circuit-opening operation, it is necessary merely to loosen the mounting screw for the stationary contact bracket, turn this bracket over, and tighten the screw. After reversing the position of the contact brackets, it may be necessary to bend them slightly to obtain contact follows approximately as stated in the fourth paragraph of this section. On a d-c relay not more than four contacts can be assembled in the circuit-opening position if normal contact pressure and travel are * maintained. With more than four the operating spring should be adjusted to give the correct back contact follow.

If a relay has been dismantled and is being reassembled, the following adjustments should be made or checked. Reference should be made to Figs. 1 and 2 for identification of the parts mentioned in these instructions.

The armature stop nut should be adjusted so that when the armature is in contact with it the lower edge of the armature is 7/16" above the position which it assumes when the relay is energized. When adjusting the armature spring tension, the locking screw for the spring adjusting screw is loosened, and this adjusting screw is turned (inward, to reduce the spring tension) until the spring barely holds the armature against the stop nut. The relay must be in its normal vertical position when this adjustment is made, with

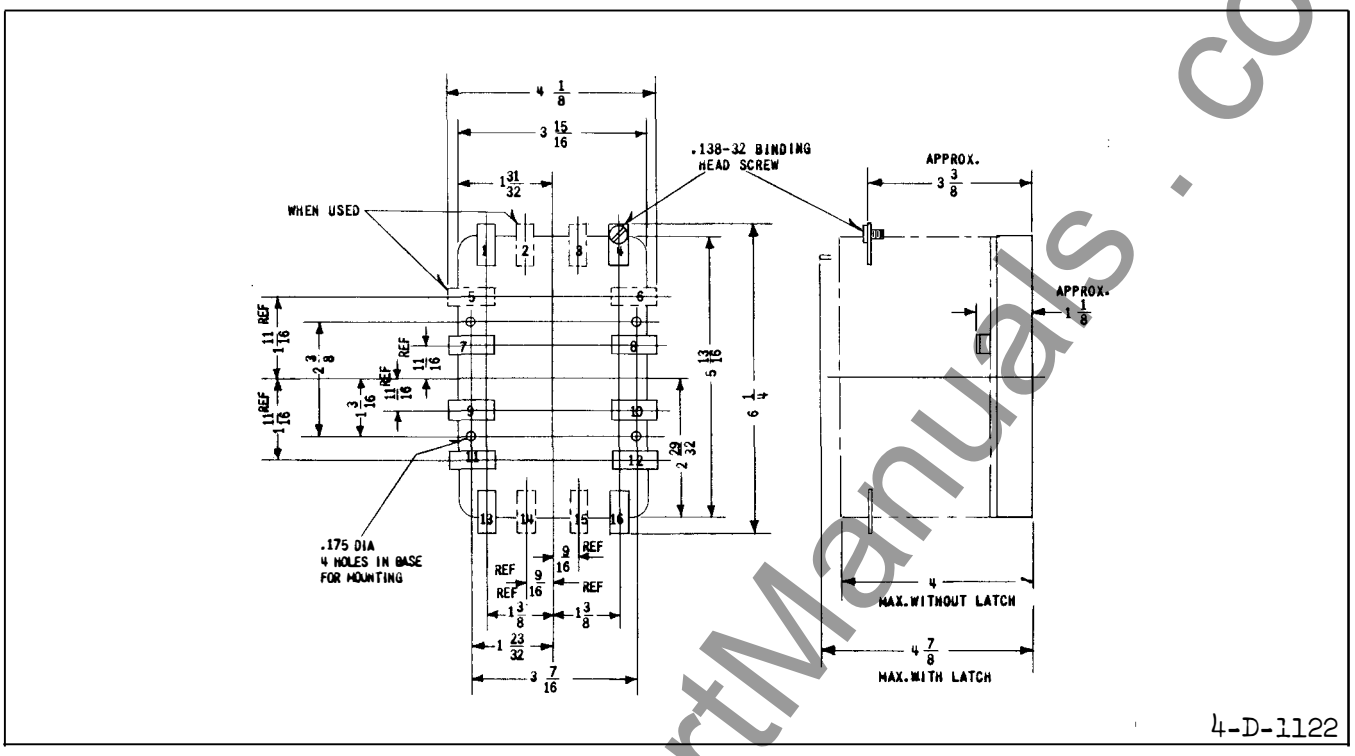


Fig. 9. Outline and Drilling Plan for the Type MG-6 Relay in the Front Connected Molded Case. See Internal Schematic for Terminals Supplied. For Reference Only.

all contacts assembled as circuit-closing. The armature spring should then be tightened by turning the adjusting screw 4 turns counter-clockwise for a-c relays or 2 turns for d-c relays, and the locking screws should be tightened. If the relay is being used with a number of break contacts, it may be necessary to increase the spring tension to obtain full follow on the break contacts. The adjusting screw should be turned just enough farther to obtain full follow with the armature against the stop nut.

The follow of the moving contact fingers should be 3/32" for the make contacts and 1/16" for the break contacts, measured at the contacts. This can be checked more conveniently by measuring the travel of the lower edge of the armature after the contacts touch. This should be approximately 1/8" for the make contacts and 3/32" for the break contacts. In case moving contact fingers have been removed from their guide pins, it is important that the coil springs on the two sides of the fingers be replaced correctly. The springs which are compressed by circuit-closing contacts are approximately three times as strong as the ones compressed by circuit-opening contacts and thus they can be readily distinguished. The positions of the two springs are reversed at the two ends of the relay.

When special contacts are supplied for make-before-break operation, the stationary members of the special contacts are bent equally toward their respective moving contacts to obtain "make" at the point where the "break" moving contact has approximately 1/16" follow before parting from its stationary contact.

If an a-c relay is to be used with a series resistor so that the relay can be dropped out by shorting the coil, either the resistance value must be such that the watt consumption with the coil shorted will be quite high or the relay armature spring tension must be reduced to about 1-1/2 turns and the follow of the stationary make contacts must be reduced (by bending) to about 1/16". With the reduced armature spring tension, not more than two of the contacts can be used as break contacts. Because of the low relay impedance with armature open as compared to the impedance with armature closed, it is not advantageous to use a resistor in series with a coil rated at less than line voltage, as in the case of d-c applications. For the contact and spring adjustments

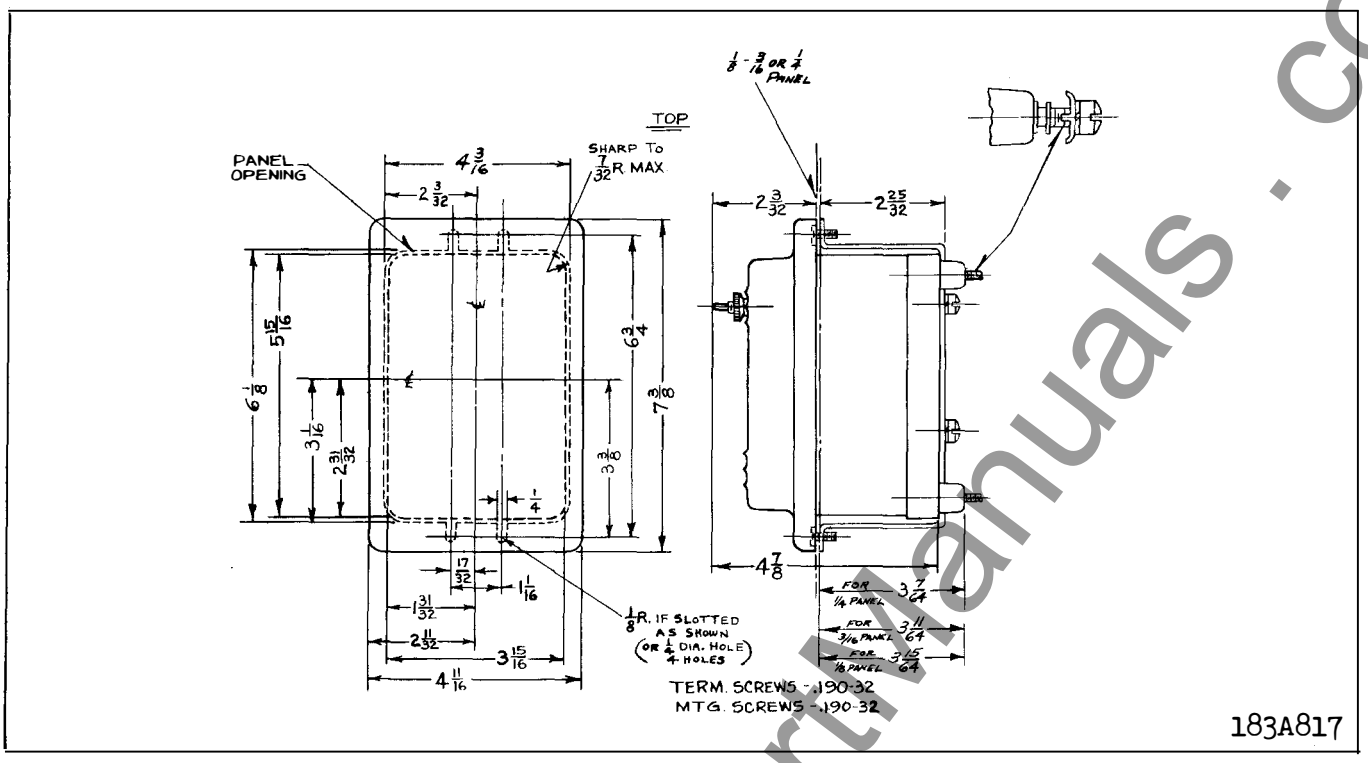


Fig. 10. Outline and Drilling Plan for the Molded Semi-Flush Case. For Reference Only.

specified above, a 60 cycle MG relay with voltage rating equal to the line voltage can be used with a series resistor which will take about 90 watts when directly across the line. Of course, if the coil will be shorted only momentarily or if a higher watt consumption is not objectionable, it may be unnecessary to reduce the spring tension or contact follow.

If the complete armature assembly is to be removed from the relay, the screws which fasten the lower ends of the moving contact leads to the terminals should be removed, the armature spring tension adjusting screw should be turned in as far as possible, and the armature stop nut should be removed. The upper end of the armature spring should then be slipped off of the grooved member at the lower end of the adjusting screw, and the armature should be lifted off of its bearing carefully so as to avoid distortion of the coiled leads. The leads to the upper center moving contacts are not coiled but the coiling of the four other moving contact leads should be such that when the relay base is horizontal and the armature is on its bearings and approximately at its mid-position, the lead terminals will just touch the base terminal inserts or be within about 1/8" of that position.

On latch-type relays the latch screw is adjusted so that with the armature latched and the operating coil de-energized, there will be a gap of between .005 and .010 inch between the electromagnet pole face and the raised section of the armature which strikes the pole face. The locking screw should be tightened securely after making this adjustment. There is a small amount of clearance between the armature and its supporting posts, and in order to insure proper operation allowance must be made for this in the following manner. With the armature held against its left-hand support and nearly closed, the latch spring or reset armature should be moved to the left as far as it will go by means of the hand reset. To assure that the latch will always release the armature the resulting space between the latch and the latch screw should be at least .005 inch, and should not be more than about 1/64". This should also be checked electrically if electrical reset is provided. Some change of this gap can be made by loosening the mounting screws in the relay base and moving the latch support in the desired direction. The gap also can be changed by loosening the two screws which hold the moving contact insulation block to the armature and shifting the armature in the desired direction.

On electrical reset relays, the tension of the spring which draws the reset armature toward the

latch screw must be adjusted if these parts are being reassembled. The locking screw (Fig. 2) is screwed out until its head clears the head of the adjusting screw. The main armature is then held completely closed and against its right hand support, and the latch spring tension adjusting screw is turned until the latch barely touches the stop projecting from the center of the latch screw. Then the latch spring tension should be increased by turning the screw clockwise 5 turns, and the locking screw should be tightened.

If either the core nut of the electrical reset assembly or the screws which mount its armature have been loosened, the relative positions of the core and plunger may shift sufficiently to cause the plunger to strike on the side of the conical core opening. To assure correct alignment of these parts, .042 diameter holes are provided through the center of the core and about 1/16" deep in the center of the plunger. After tightening the core nut, a close fitting pin should be inserted through the core and into the plunger. With the pin in place, and plunger pressed firmly against the core, and the mounting end of the armature centrally located with respect to the electromagnet, the two armature mounting screws should be tightened. The pin then should be removed.

A slight amount of medium viscosity slushing oil is supplied at the factory to the polished and hardened surfaces of the latch screw and the latch plate to minimize wear and as protection against corrosion. Oil should be reapplied after any cleaning and reassembling of these parts, and it is desirable also to renew this at the regular maintenance periods.

If the relay is provided with a coil interrupting contact, the following points must be observed to assure satisfactory operation. With the relay in its normal operating position and the armature shifted to the extreme right, align the armature "snap" spring so that it is at least 1/64 inch in from the right hand edge of the moving contact spring. With an .020 inch gap between the armature and the lower pole face of the electromagnet, adjust the bracket by means of the adjusting screw, until the snap spring just passes the roller. The latch screw should be adjusted so that with the armature in the latched position and the operating coil deenergized, the gap between the armature and the lower pole face of the electromagnet is .010 inch. With the armature in this position the coil interrupting contact should be open at least 3/64 inch.

All contacts should be periodically cleaned. A contact burnisher S#182A836H01 is recommended for this purpose. The use of abrasive material for cleaning contacts is not recommended, because of the danger of embedding small particles in the face of the soft silver and this impairing the contact.

REPAIRS AND RENEWAL PARTS

Repair work can be done most satisfactorily at the factory. However, interchangeable parts can be furnished to the customers who are equipped for doing repair work. When ordering parts, always give the complete nameplate data.

ENERGY REQUIREMENTS

* Operating Coil Burdens at rated Voltage

Frequency (cycles)	Closed Gap		Open Gap	
	Watts	Volt-Amps	Watts	Volt-Amps
25	6.8	23	19.6	53
50	9.8	31	17.4	78
△60	12	37	17.6	92
D-C	7.8 cold--		7.8 cold--	
D-C	6.5 hot--		6.5 hot--	

△Rated voltage is 115 volts or its multiples.

Reset Coil Burdens at Rated Voltage (Multiples)

Frequency (cycles)	Closed Gap		Open Gap	
	Watts	Volt-Amps	Watts	Volt-Amps
25	48	51.6	52	54
50	46	58.2	57	63.8
60	84	104.5	96	112.8
D-C	66 cold--		68 cold--	

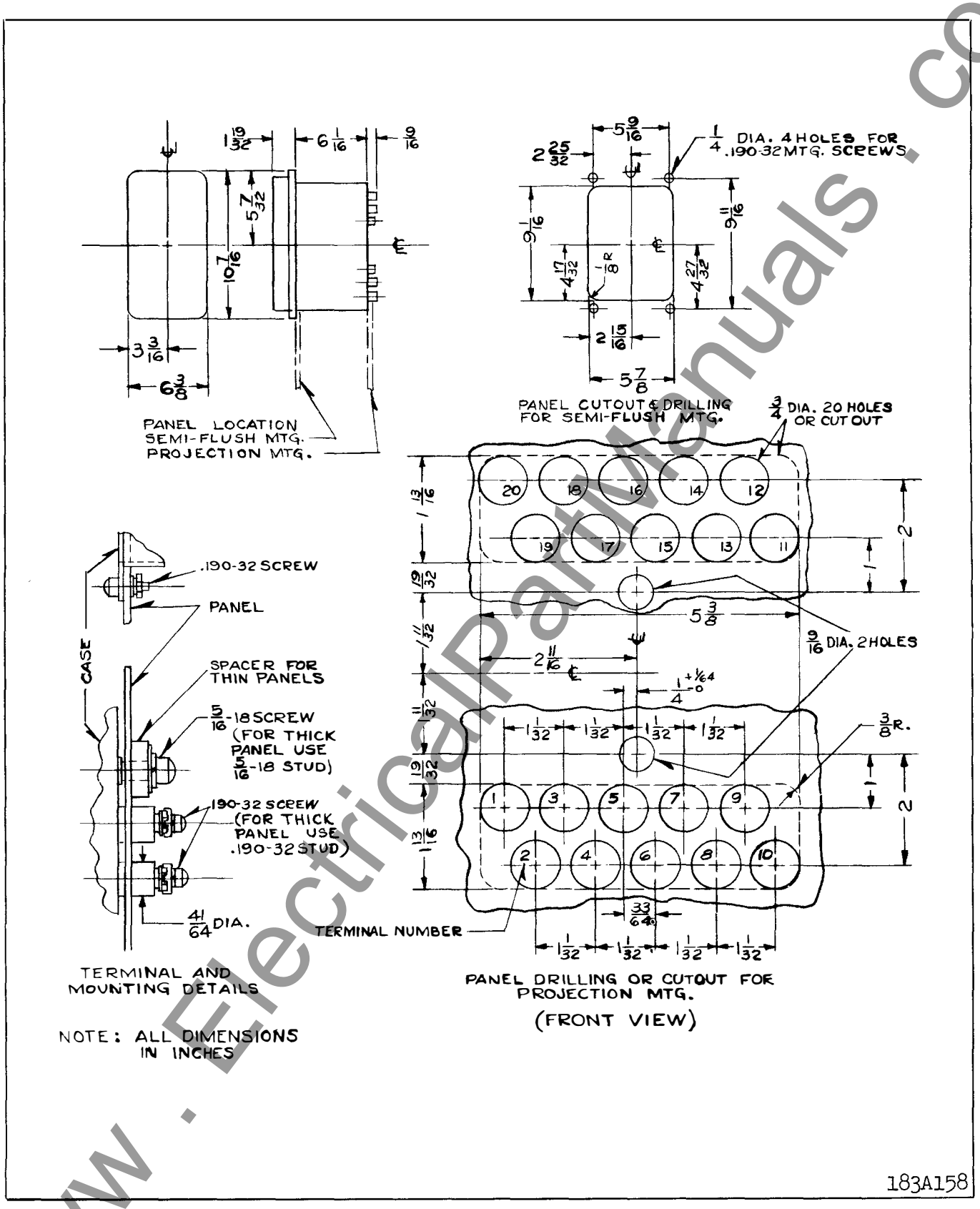


Fig. 11. Outline and Drilling Plan for the Type MG-6 Relay In Type FT22 Case.

WESTINGHOUSE ELECTRIC CORPORATION

RELAY DEPARTMENT **NEWARK, N. J.**

Printed in U. S. A.

INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

TYPE MG-6 MULTI-CONTACT AUXILIARY RELAY

CAUTION Before putting relays into service, remove all blocking which may have been inserted for the purpose of securing the parts during shipment, make sure that all moving parts operate freely, inspect the contacts to see that they are clean and close properly, and operate the relay to check the settings and electrical connections.

APPLICATION

The type MG-6 relay is designed for applications where several independent circuits must be energized or de-energized upon the operation of a single primary relay contact, or where the capacity of the primary relay contact is inadequate for the energy required in a control circuit. In certain applications these relays may be used directly as primary relays. Since the stationary contacts can readily be reversed so as to be suitable for either circuit opening or circuit closing service (although a slight increase in spring tension may be required on the D-C MG-6 relay — see "ADJUSTMENTS AND MAINTENANCE") it is unnecessary to predetermine the arrangements of the circuits for which the relay is to be used.

In the usual application of the relay, the armature resets when the operating coil is de-energized. However, the relays may be supplied with a latching mechanism which holds the armature in the operated position until the latch is tripped, either by hand or electrically.

An operating coil cutoff contact can be supplied with the electric-reset type, where an intermittent duty coil is required for faster than normal operation, but where the operating coil circuit must be energized continuously. An operating coil, rated at 19% of supply rating may be applied, with a maximum duty of 10,000 operations. (e.g. 24 volt coil on 125 volt dc circuit.

CONSTRUCTION AND OPERATION

The operating electromagnet is at the lower end of the relay, as shown in Fig. 1. The stationary iron circuit is built up of U-shaped punchings. These are slotted at the outer end of the lower leg to receive the copper lag loops used to obtain quiet operation on A-C. The operating coil is mounted on this leg of the punchings. In order to improve the performance of the relay on D-C, the pole face area is increased by means of an iron plate. This plate is assembled at the end of the coil and the corners of the lamination side plates are bent outward, serving to hold the plate in place. The inner end of the upper leg of the punching assembly is shaped so that the lower end of the armature restraining spring can be hooked over it.

The armature is made of high-silicon steel. Projecting sections on the sides, near the center, act as knife-edge bearings and rest on suitably shaped supports which are a part of the moulded base. A stud attached to the lower leg of the electromagnet extends through a hole in the lower end of the armature, and a stop-nut on the outer end of this stud is used to limit and adjust the travel of the armature in the de-energized direction. The special stop nut used will remain at any position in which it is placed without additional locking means.

The upper end of the armature carries an adjusting screw to which one end of the armature restraining spring is attached. In the hand or electrically reset relays, a latch screw is mounted at the extreme end of the armature. In the self-reset relays this screw is replaced by a set screw which serves to separate the locking plate (see Fig. 1) slightly from the armature. Between the spring adjusting screw and the latch screw (or set screw), there is a third screw which when tightened applies pressure to the threads of the former screws and effectively locks them against turning.

The moving contact fingers are mounted on moulded insulation which is fastened to the armature

SUPERSEDES I.L. 41-753.1D
*Denotes change from superseded issue.

EFFECTIVE OCTOBER 1964

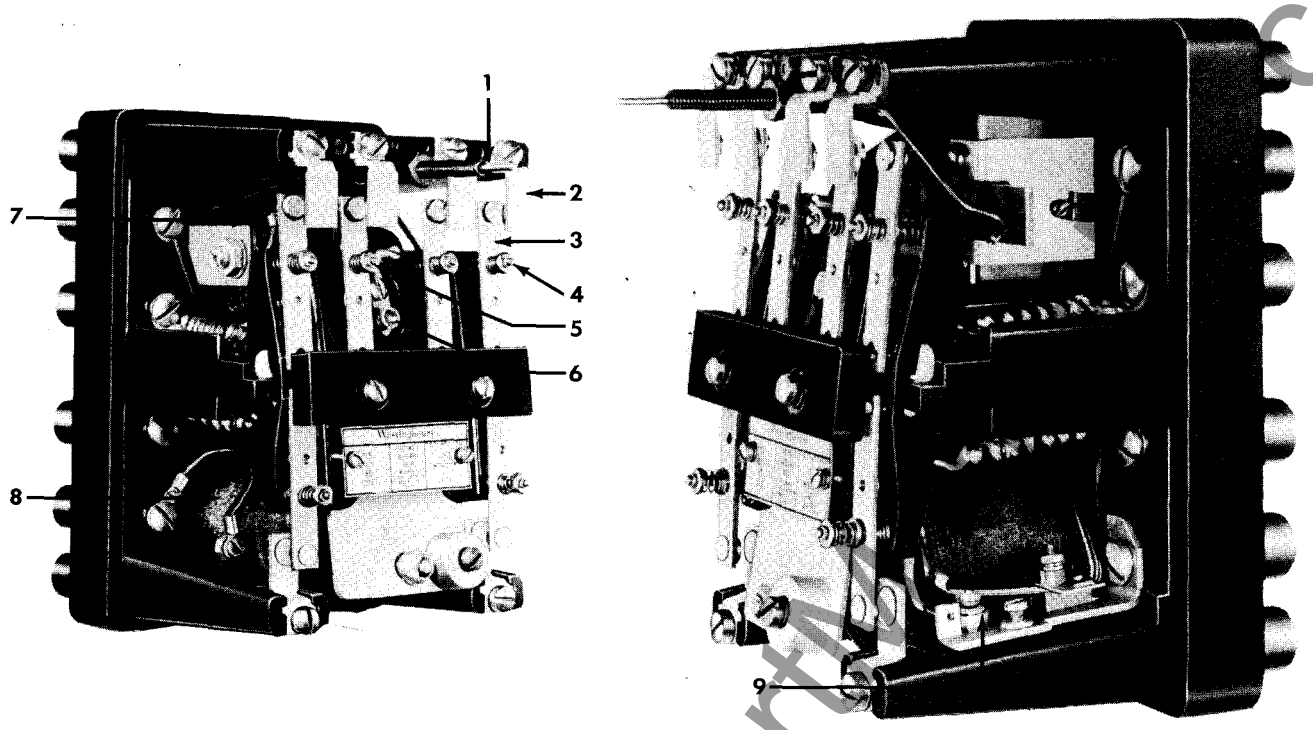


Fig. 1. Front View (Cover Omitted) and Side View of the MG-6 Electric & Hand Reset Relay in Molded Case. 1 – Reset push rod, 2 – stationary contact, 3 – moving contact, 4 – moving contact spring assembly, 5 – latch adjustment screw, 6 – adjusting screw for armature spring tension, 7 – reset coil, 8 – operating coil, 9 – optional operating coil cut-off contact.

by two screws. Silver contact buttons are on both sides of these fingers so that they can be used for either a circuit-opening or a circuit-closing contact. The fingers are assembled on guide pins, between two springs in such a way that definite spring compression and contact wipe is assured for either contact-closing or contact-opening service. Flexible leads assemblies are welded to the contact fingers. Since the armature assembly has contact fingers both above and below the bearing points, the armature weight is partially balanced about the bearings and there is less tendency for severe shocks to move the armature.

The stationary contacts consist of large silver buttons welded to brackets which can be assembled so that they close with the moving contacts when the armature is in either the energized or de-energized position. The stationary contact brackets are connected directly to the terminal inserts by means of long screws which pass through brass tubes. These tubes are of such length that the moulded material of the base is not under direct compression when the screws are tightened. Therefore, there is always a tight connection from contact to terminal regardless of possible shrinkage or other variation in the moulded base material. The contact bracket is held against its seat by means of a spring ring which is compressed between shoulders in the base and on the hexagonal terminal insert.

The construction of the latch and electrical reset is shown in Fig. 2, in which the lower portion is a partial front view of the relay in the moulded case, and the upper portion a top view. In the latter view, the latch screw (in the main armature) is in the energized position, and the reset armature is free to be moved to the right by the tension spring until the hardened latch plate on the reset armature rests against the tip of the latch screw. When the operating coil is de-energized, the latch screw will move slightly so that its shoulder rests on the edge of the latch plate. When the reset coil is energized its armature moves to the left, thus permitting the main armature to return to its open position. Pressing the reset push rod, which extends through the cover stud, will also release the latch through the medium of the reset lever shown in the figure.

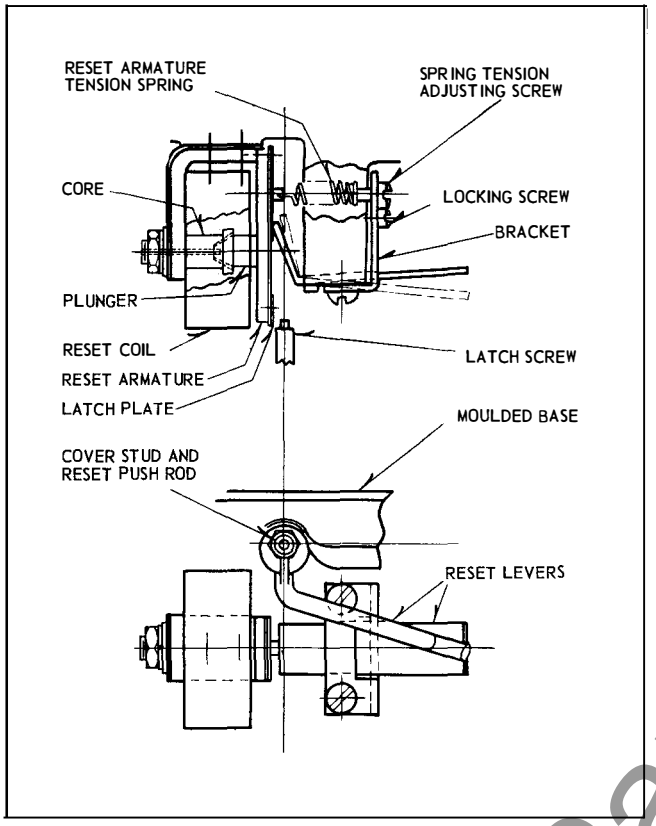
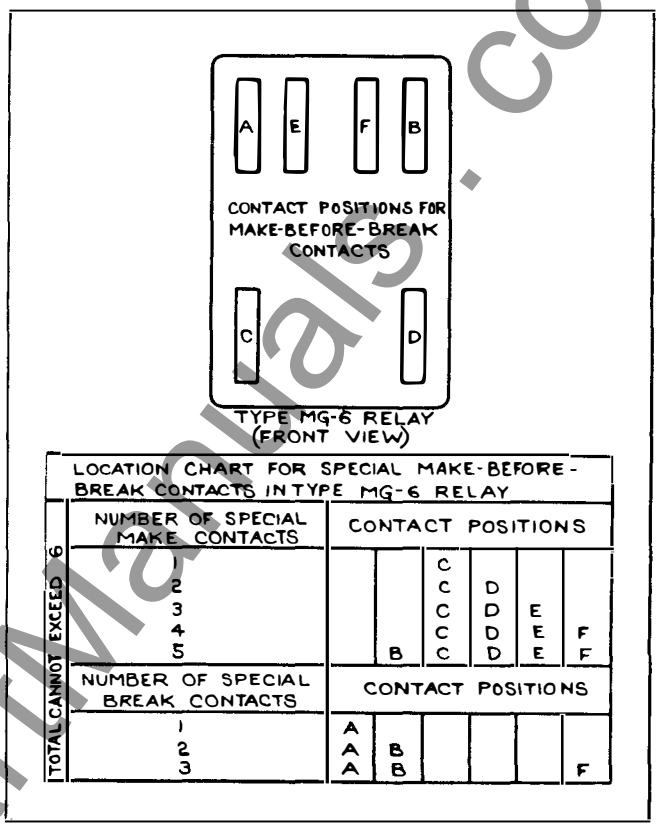


Fig. 2. Detail Views of the Latch and Electrical Reset of the Type MG-6 Relay.



LOCATION CHART FOR SPECIAL MAKE-BEFORE-BREAK CONTACTS IN TYPE MG-6 RELAY

TOTAL CANNOT EXCEED 6

NUMBER OF SPECIAL MAKE CONTACTS	CONTACT POSITIONS					
2			C	D	E	F
3			C	D	E	F
4		B	C	D	E	F
5		B	C	D	E	F
NUMBER OF SPECIAL BREAK CONTACTS	**CONTACT POSITIONS**					
1	A					
2	A	B				
3	A	B				F

Fig. 3. Contact Positions for Combinations of Make-Before-Break Contacts.

In some applications of the relay with latch and electrical reset, it may be desirable to have the operating and reset coils deenergized automatically as soon as they have performed their functions. In the case of the reset coil this can be accomplished by connecting the coil through one of the relay "make" contacts. An auxiliary contact is required to open the operating coil circuit. This contact, when provided, is assembled on the lower right-hand side of the relay, and is held in position by the terminal screw to which the right-hand coil lead ordinarily connects. The coil lead is connected to the moving contact of the auxiliary contact, and the end of the stationary contact bracket is in contact with the head of the terminal screw. The auxiliary contact is closed when the main armature is open. When the armature approaches the closed position, the spring on the molded insulation block snaps off the roller and causes the contacts to open and interrupt the operating coil current. When this auxiliary contact is used, a weight is screwed to the lower end of the armature to increase its mass and stabilize contact action. This contact will interrupt the coil current at up to five times rated coil voltage.

In certain applications of the type MG-6 relay, it may be desirable to have one or more of the contacts close before other contacts on the same relay open. A special armature assembly is required to obtain such operation, and the number of special make and break contacts desired must be known when the relay is built. The special moving contacts have longer follow than the standard contacts and greater armature spring tension is required for full deflection of the break contacts. Consequently, it is preferable to limit the number of special break contacts to two. A maximum of three may be used, although the increased armature spring tension needed may raise the minimum pick-up voltage above the standard value. As many as five contacts may be special make contacts, with the total of special make and break contacts limited to six, of course. The locations of the make and break contacts for any combination of these special contacts are shown in Fig. 3. This figure indicates the physical location of the contacts in the relay, and can be used in conjunction with the inter-

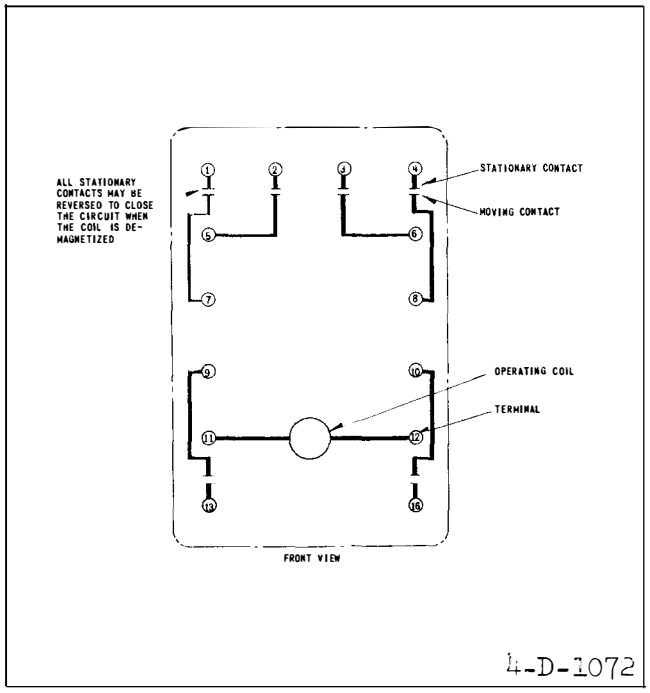


Fig. 4. Internal Schematic of the Type MG-6 Relay, Without Electrical Reset, in Molded Case.

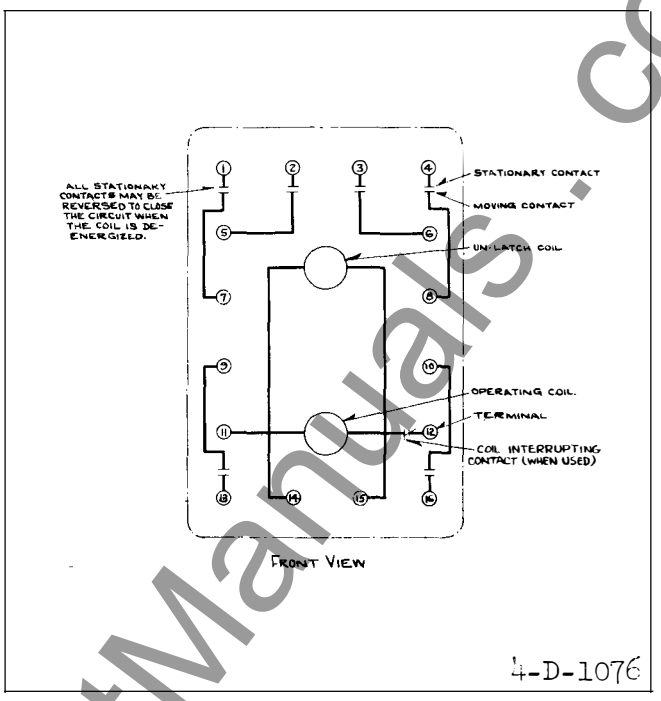


Fig. 5. Internal Schematic of the Type MG-6 Relay, With Electrical Reset, in Molded Case.

nal schematic diagram for the type of case involved to determine the corresponding terminal locations.

The type MG-6 relay may be provided without cover, for front connection, or in a variety of completely closed cases, for rear connection. The moulded base for rear connection is shown in Fig. 1. The base for front connection is similar except that there are no terminals projecting in the rear. This same base is also used as a sub-base when the relays are supplied in the FT22 case.

CHARACTERISTICS

The type MG-6 relay has an operating time of approximately 2 cycles on a-c and 5 cycles on d-c (on a 60 cycle basis) when energized at the rated voltage.

If faster operation is desired and if the application requires only intermittent energization of the relay, the operating coils may be energized at higher than rated voltage. (1) Twice rated voltage will give an operating time of approximately 1 cycle on a-c, and the coil will stand this voltage safely for over two minutes if 60 cycles or 4 minutes if 25 cycles. (2) The time of the d-c relay can be reduced to slightly over 1 cycle if the coil is energized at five times rated voltage. The coil will stand this voltage for one minute. If faster time is desired on a d-c relay which must be energized continuously, the use of a low voltage coil with a series resistor will reduce the time. With 10% of the line voltage across the relay coil and the balance across a series resistor, the reduced inductance of the circuit results in an operating time of approximately 2 cycles. The time of operation may be reduced to approximately one cycle by applying 4 or 5 times rated d-c voltage to the coils through the coil interrupting contact.

Reset coils are for intermittent duty only and should not be energized longer than one-half minute.

The relay contacts will close circuits carrying 30 amperes. They will carry this current for 1 minute, and will carry 12 amperes continuously.

The contacts will interrupt the following currents, in non-inductive circuits, at the voltages listed:

Current	Volts A-C
30	115
20	230
15	460
10	575

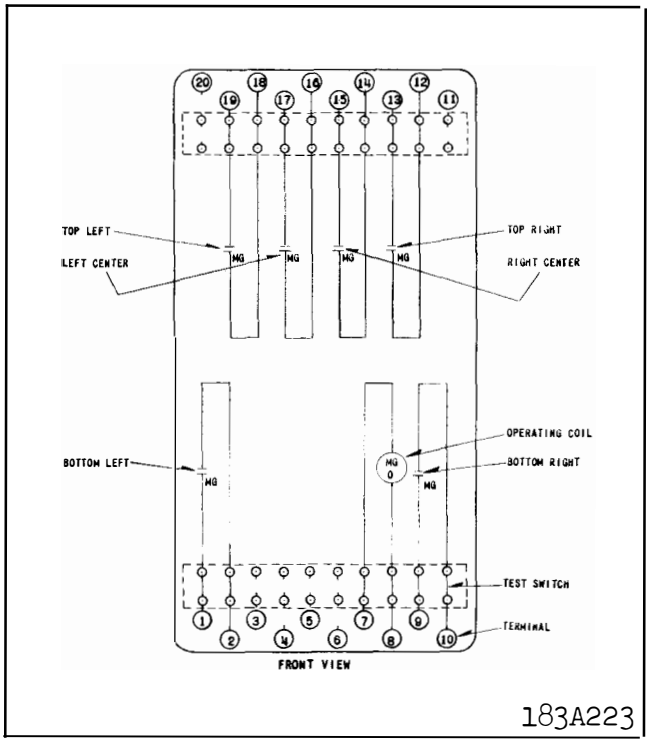


Fig. 6. Internal Schematic of the Type MG-6 Relay, Without Electrical Reset, in FT22 Case.

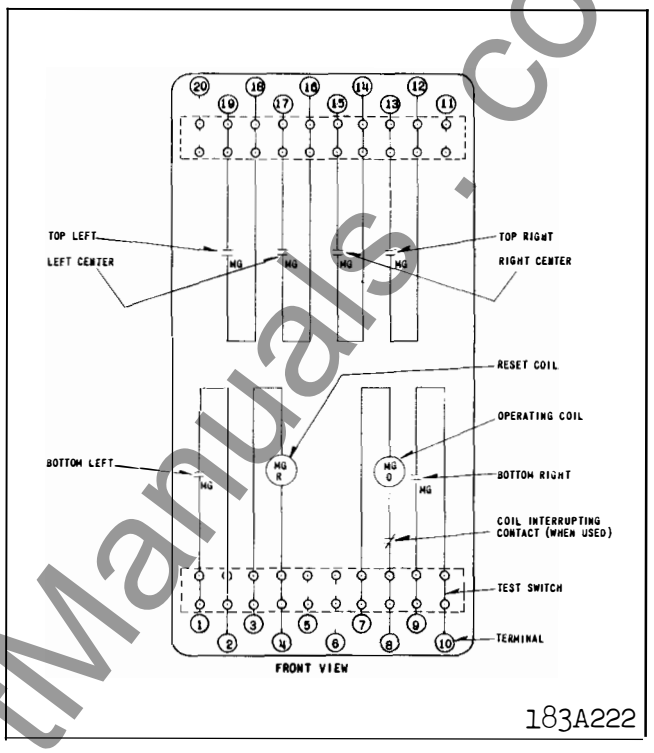


Fig. 7. Internal Schematic of the Type MG-6 Relay, With Electrical Reset, in FT22 Case.

Current	Volts D-C
30	12
15	24
10	32
8	48
3	125
1	250

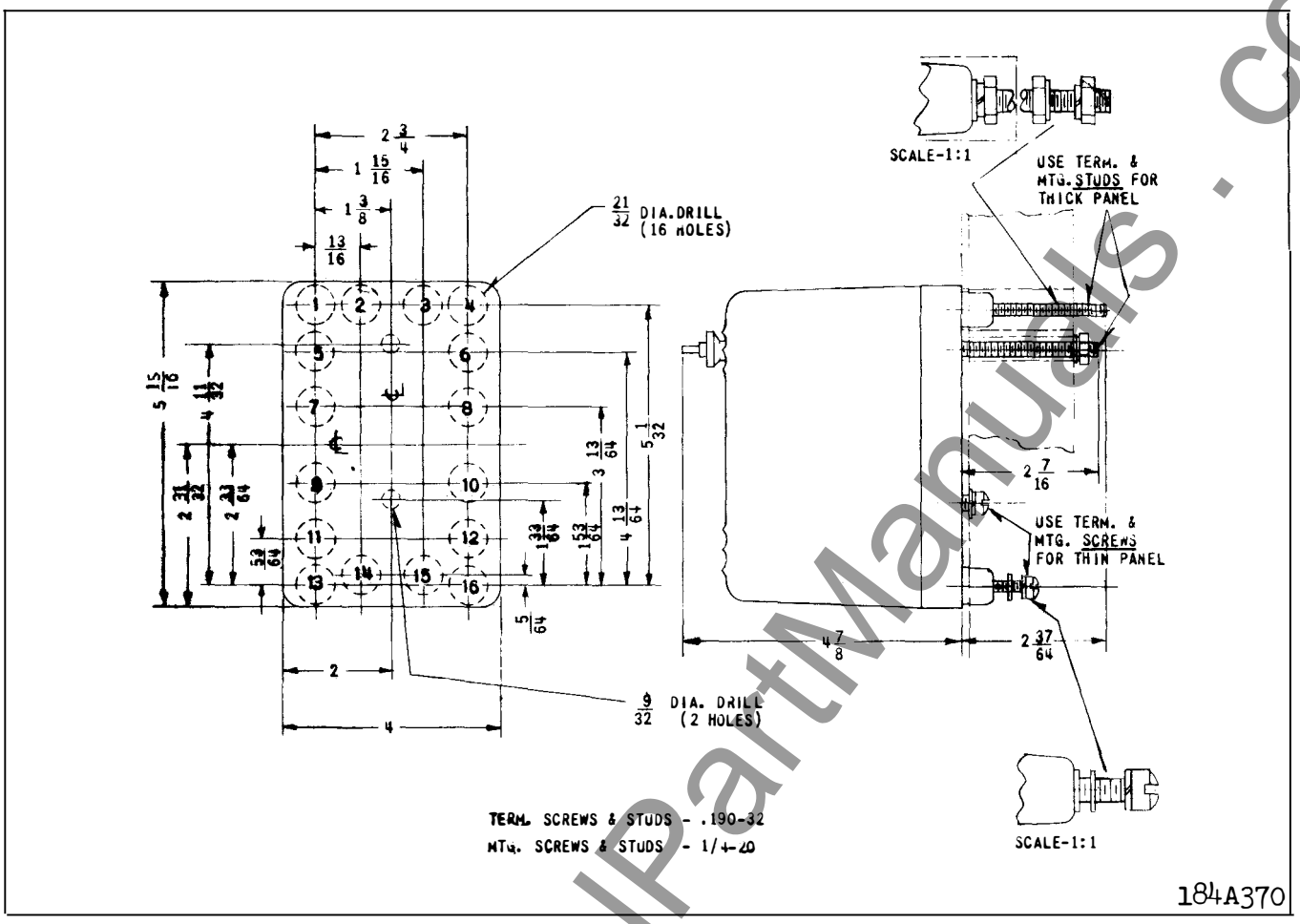
The type MG-6 relay for a-c can be used with any combination of contacts, but the d-c relay can have up to four circuit-opening contacts with the normal operating spring adjustment. With more than four the operating spring should be adjusted to give the correct back contact follow.

INSTALLATION

The relays should be mounted on switchboard panels or their equivalent in a location free from dirt, moisture, excessive vibration, and heat. Mount the relay vertically by means of the four mounting holes on the flange for semi-flush mounting or by means of the rear mounting stud or studs for projection mounting. Either a mounting stud or the mounting screws may be utilized for grounding the relay. The electrical connections may be made directly to the terminals by means of screws for steel panel mounting or to the terminal studs furnished with the relay for thick panel mounting. The terminal studs may be easily removed or inserted by locking two nuts on the stud and then turning the proper nut with a wrench.

For detailed FT case information refer to I.L. 41-076.

Relays in the rear-connected moulded cases should be mounted and electrically connected similar to the other projection cases. The lower mounting stud may be used to ground the electromagnet iron. The hexagon-shaped terminal inserts are slightly loose in the base but this does not affect the electrical connections. Only the two mounting studs should be used to secure the relay to the panel. Removal of terminal insert end-play (in the case of thick-panel mounting) by turning a nut on the terminal stud tightly against a large diameter washer (not supplied) at the rear of the panel should not be attempted as this may distort the relay base and affect the adjustments, or possibly damage the relay. Relays in the front-connected moulded cases should be



** Fig. 8. Outline and Drilling Plan for the Type MG-6 Relay in the Rear Connected Molded Case. For Reference Only.*

mounted by four screws through the sides of the base as indicated in the drilling plan.

ADJUSTMENTS AND MAINTENANCE

The relays are shipped from the factory correctly adjusted for armature travel and for contact follow and pressure, and it should not be necessary to disturb these adjustments. The relays normally are shipped with all contacts assembled for circuit-closing operation. To convert them for circuit-opening operation, it is necessary merely to loosen the mounting screw for the stationary contact bracket, turn this bracket over, and tighten the screw. After reversing the position of the contact brackets, it may be necessary to bend them slightly to obtain contact follows approximately as stated in the fourth paragraph of this section. On a d-c relay not more than four contacts can be assembled in the circuit-opening position if normal contact pressure and travel are maintained. With more than four the operating spring should be adjusted to give the correct back contact follow.

If a relay has been dismantled and is being reassembled, the following adjustments should be made or checked. Reference should be made to Figs. 1 and 2 for identification of the parts mentioned in these instructions.

The armature stop nut should be adjusted so that when the armature is in contact with it the lower edge of the armature is 7/16" above the position which it assumes when the relay is energized. When adjusting the armature spring tension, the locking screw for the spring adjusting screw is loosened, and this adjusting screw is turned (inward, to reduce the spring tension) until the spring barely holds the armature against the stop nut. The relay must be in its normal vertical position when this adjustment is made, with

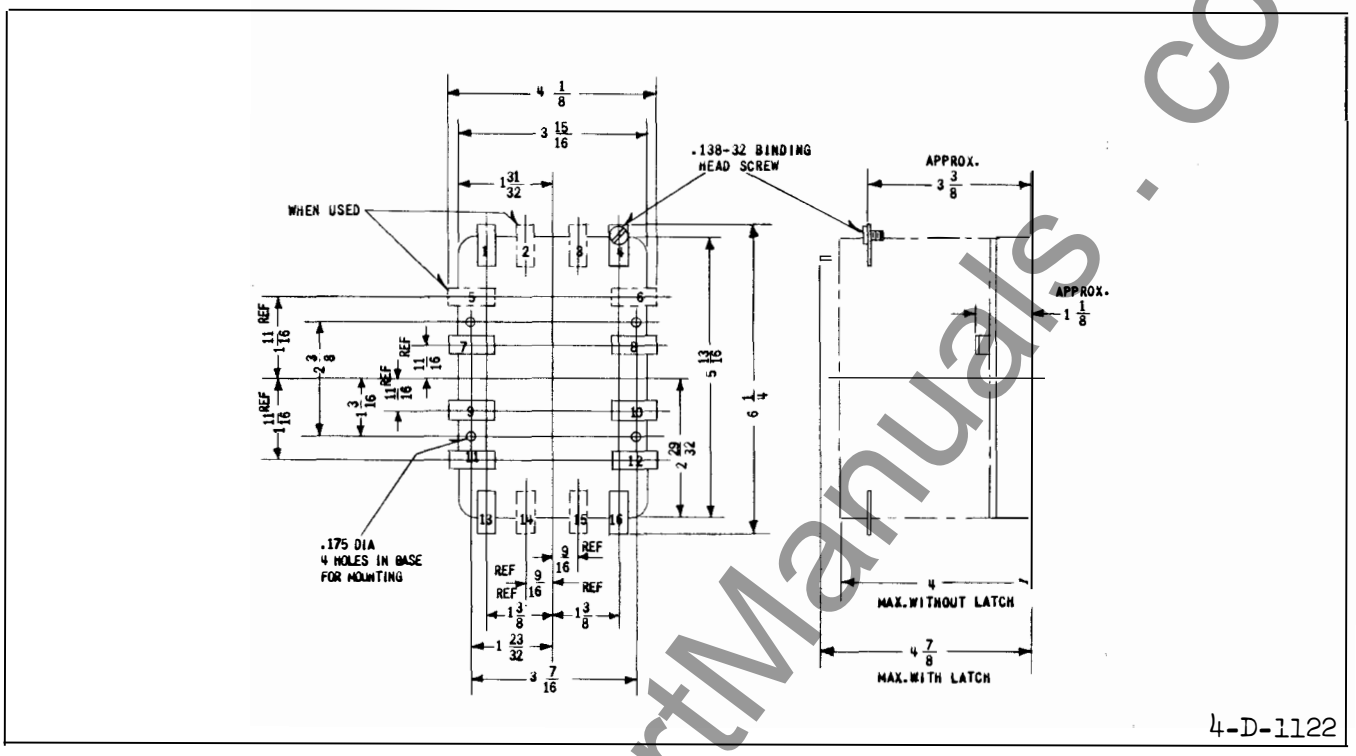


Fig. 9. Outline and Drilling Plan for the Type MG-6 Relay in the Front Connected Molded Case. See Internal Schematic for Terminals Supplied. For Reference Only.

all contacts assembled as circuit-closing. The armature spring should then be tightened by turning the adjusting screw 4 turns counter-clockwise for a-c relays or 2 turns for d-c relays, and the locking screws should be tightened. If the relay is being used with a number of break contacts, it may be necessary to increase the spring tension to obtain full follow on the break contacts. The adjusting screw should be turned just enough farther to obtain full follow with the armature against the stop nut.

The follow of the moving contact fingers should be 3/32" for the make contacts and 1/16" for the break contacts, measured at the contacts. This can be checked more conveniently by measuring the travel of the lower edge of the armature after the contacts touch. This should be approximately 1/8" for the make contacts and 3/32" for the break contacts. In case moving contact fingers have been removed from their guide pins, it is important that the coil springs on the two sides of the fingers be replaced correctly. The springs which are compressed by circuit-closing contacts are approximately three times as strong as the ones compressed by circuit-opening contacts and thus they can be readily distinguished. The positions of the two springs are reversed at the two ends of the relay.

When special contacts are supplied for make-before-break operation, the stationary members of the special contacts are bent equally toward their respective moving contacts to obtain "make" at the point where the "break" moving contact has approximately 1/16" follow before parting from its stationary contact.

If an a-c relay is to be used with a series resistor so that the relay can be dropped out by shorting the coil, either the resistance value must be such that the watt consumption with the coil shorted will be quite high or the relay armature spring tension must be reduced to about 1-1/2 turns and the follow of the stationary make contacts must be reduced (by bending) to about 1/16". With the reduced armature spring tension, not more than two of the contacts can be used as break contacts. Because of the low relay impedance with armature open as compared to the impedance with armature closed, it is not advantageous to use a resistor in series with a coil rated at less than line voltage, as in the case of d-c applications. For the contact and spring adjustments

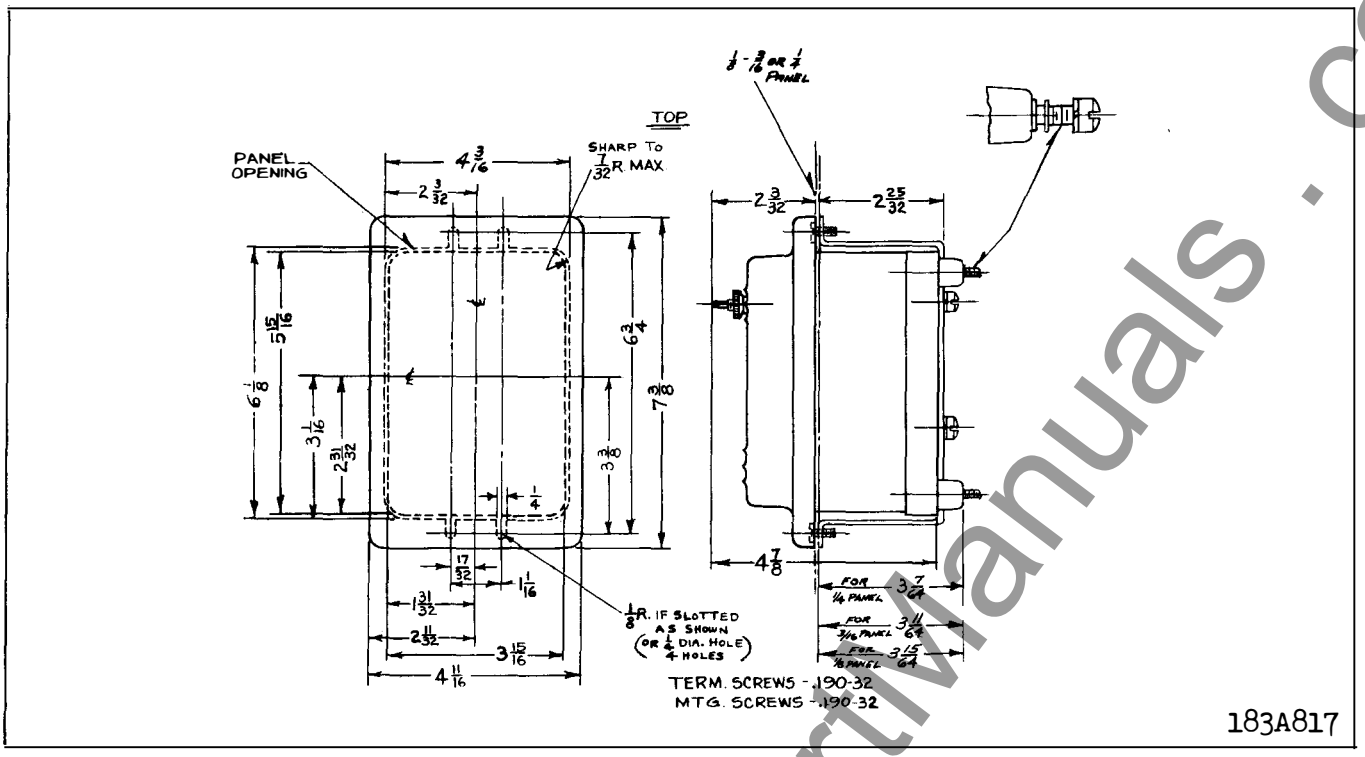


Fig. 10. Outline and Drilling Plan for the Molded Semi-Flush Case. For Reference Only.

specified above, a 60 cycle MG relay with voltage rating equal to the line voltage can be used with a series resistor which will take about 90 watts when directly across the line. Of course, if the coil will be shorted only momentarily or if a higher watt consumption is not objectionable, it may be unnecessary to reduce the spring tension or contact follow.

If the complete armature assembly is to be removed from the relay, the screws which fasten the lower ends of the moving contact leads to the terminals should be removed, the armature spring tension adjusting screw should be turned in as far as possible, and the armature stop nut should be removed. The upper end of the armature spring should then be slipped off of the grooved member at the lower end of the adjusting screw, and the armature should be lifted off of its bearing carefully so as to avoid distortion of the coiled leads. The leads to the upper center moving contacts are not coiled but the coiling of the four other moving contact leads should be such that when the relay base is horizontal and the armature is on its bearings and approximately at its mid-position, the lead terminals will just touch the base terminal inserts or be within about 1/8" of that position.

On latch-type relays the latch screw is adjusted so that with the armature latched and the operating coil de-energized, there will be a gap of between .005 and .010 inch between the electromagnet pole face and the raised section of the armature which strikes the pole face. The locking screw should be tightened securely after making this adjustment. There is a small amount of clearance between the armature and its supporting posts, and in order to insure proper operation allowance must be made for this in the following manner. With the armature held against its left-hand support and nearly closed, the latch spring or reset armature should be moved to the left as far as it will go by means of the hand reset. To assure that the latch will always release the armature the resulting space between the latch and the latch screw should be at least .005 inch, and should not be more than about 1/64". This should also be checked electrically if electrical reset is provided. Some change of this gap can be made by loosening the mounting screws in the relay base and moving the latch support in the desired direction. The gap also can be changed by loosening the two screws which hold the moving contact insulation block to the armature and shifting the armature in the desired direction.

On electrical reset relays, the tension of the spring which draws the reset armature toward the

latch screw must be adjusted if these parts are being reassembled. The locking screw (Fig. 2) is screwed out until its head clears the head of the adjusting screw. The main armature is then held completely closed and against its right hand support, and the latch spring tension adjusting screw is turned until the latch barely touches the stop projecting from the center of the latch screw. Then the latch spring tension should be increased by turning the screw clockwise 9 turns, and the locking screw should be tightened.

If either the core nut of the electrical reset assembly or the screws which mount its armature have been loosened, the relative positions of the core and plunger may shift sufficiently to cause the plunger to strike on the side of the conical core opening. To assure correct alignment of these parts, .042 diameter holes are provided through the center of the core and about 1/16" deep in the center of the plunger. After tightening the core nut, a close fitting pin should be inserted through the core and into the plunger. With the pin in place, and plunger pressed firmly against the core, and the mounting end of the armature centrally located with respect to the electromagnet, the two armature mounting screws should be tightened. The pin then should be removed.

A slight amount of medium viscosity slushing oil is supplied at the factory to the polished and hardened surfaces of the latch screw and the latch plate to minimize wear and as protection against corrosion. Oil should be reapplied after any cleaning and reassembling of these parts, and it is desirable also to renew this at the regular maintenance periods.

If the relay is provided with a coil interrupting contact, the following points must be observed to assure satisfactory operation. With the relay in its normal operating position and the armature shifted to the extreme right, align the armature "snap" spring so that it is at least 1/64 inch in from the right hand edge of the moving contact spring. With an .020 inch gap between the armature and the lower pole face of the electromagnet, adjust the bracket by means of the adjusting screw, until the snap spring just passes the roller. The latch screw should be adjusted so that with the armature in the latched position and the operating coil deenergized, the gap between the armature and the lower pole face of the electromagnet is .010 inch. With the armature in this position the coil interrupting contact should be open at least 3/64 inch.

All contacts should be periodically cleaned. A contact burnisher S#182A836H01 is recommended for this purpose. The use of abrasive material for cleaning contacts is not recommended, because of the danger of embedding small particles in the face of the soft silver and this impairing the contact.

REPAIRS AND RENEWAL PARTS

Repair work can be done most satisfactorily at the factory. However, interchangeable parts can be furnished to the customers who are equipped for doing repair work. When ordering parts, always give the complete nameplate data.

ENERGY REQUIREMENTS

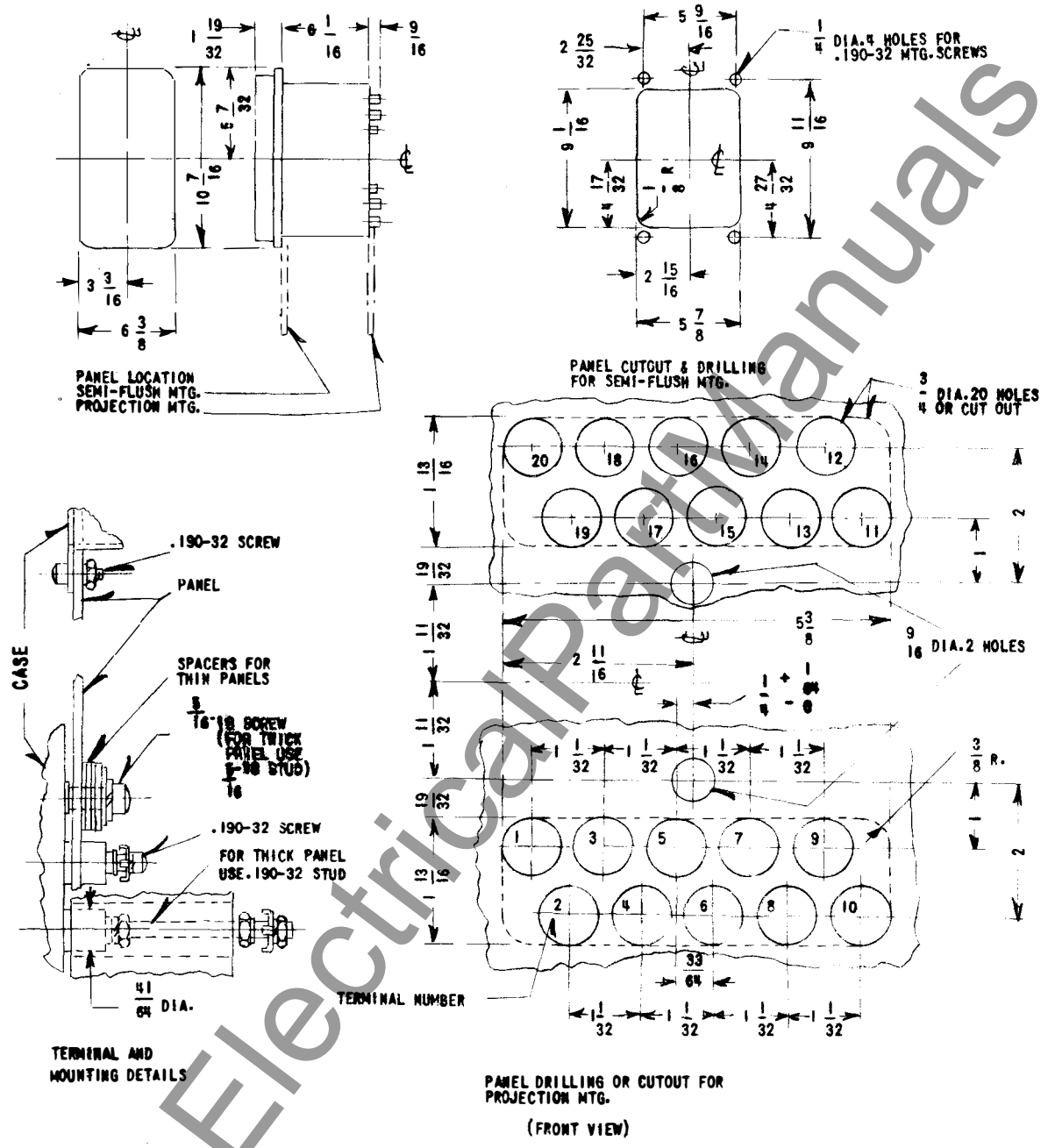
Operating Coil Burdens at rated Voltage

Frequency (cycles)	Closed Gap		Open Gap	
	Watts	Volt-Amps	Watts	Volt-Amps
25	6.8	23	19.6	53
50	9.8	31	17.4	78
△60	12	37	17.6	92
D-C	7.8 cold--		7.8 cold--	
D-C	6.5 hot--		6.5 hot--	

△Rated voltage is 115 volts or its multiples.

Reset Coil Burdens at Rated Voltage (Multiples)

Frequency (cycles)	Closed Gap		Open Gap	
	Watts	Volt-Amps	Watts	Volt-Amps
25	48	51.6	52	54
50	46	58.2	57	63.8
60	84	104.5	96	112.8
D-C	66 cold--		68 cold--	



183A158

* *Fig. 11. Outline and Drilling Plan for the Type MG-6 Relay in Type FT22 Case.*

WESTINGHOUSE ELECTRIC CORPORATION
RELAY-INSTRUMENT DIVISION **NEWARK, N. J.**
Printed in U.S.A.

INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

TYPE MG-6 MULTI-CONTACT AUXILIARY RELAY

CAUTION Before putting relays into service, remove all blocking which may have been inserted for the purpose of securing the parts during shipment, make sure that all moving parts operate freely, inspect the contacts to see that they are clean and close properly, and operate the relay to check the settings and electrical connections.

APPLICATION

The type MG-6 relay is designed for applications where several independent circuits must be energized or de-energized upon the operation of a single primary relay contact, or where the capacity of the primary relay contact is inadequate for the energy required in a control circuit. In certain applications these relays may be used directly as primary relays. Since the stationary contacts can readily be reversed so as to be suitable for either circuit opening or circuit * closing service (although a slight increase in spring tension may be required on the D-C MG-6 relay — see "ADJUSTMENTS AND MAINTENANCE") it is unnecessary to predetermine the arrangements of the circuits for which the relay is to be used.

In the usual application of the relay, the armature resets when the operating coil is de-energized. However, the relays may be supplied with a latching mechanism which holds the armature in the operated position until the latch is tripped, either by hand or electrically.

* An operating coil cutoff contact can be supplied with the electronic-reset type, where an intermittent duty coil is required for faster than normal operation, but where the operating coil circuit must be continuously. An operating coil, rated at 19% of supply rating may be applied, with a maximum duty of 10,000 operations. (e.g. 24 volt coil on 125 volt dc circuit)

CONSTRUCTION AND OPERATION

The operating electromagnet is at the lower end of the relay, as shown in Fig. 1. The stationary iron circuit is built up of U-shaped punchings. These are slotted at the outer end of the lower leg to receive the copper lag loops used to obtain quiet operation on A-C. The operating coil is mounted on this leg of the punchings. In order to improve the performance of the relay on D-C, the pole face area is increased by means of an iron plate. This plate is assembled at the end of the coil and the corners of the lamination side plates are bent outward, serving to hold the plate in place. The inner end of the upper leg of the punching assembly is shaped so that the lower end of the armature restraining spring can be hooked over it.

The armature is made of high-silicon steel. Projecting sections on the sides, near the center, act as knife-edge bearings and rest on suitably shaped supports which are a part of the moulded base. A stud attached to the lower leg of the electromagnet extends through a hole in the lower end of the armature, and a stop-nut on the outer end of this stud is used to limit and adjust the travel of the armature in the de-energized direction. The special stop nut used will remain at any position in which it is placed without additional locking means.

The upper end of the armature carries an adjusting screw to which one end of the armature restraining spring is attached. In the hand or electrically reset relays, a latch screw is mounted at the extreme end of the armature. In the self-reset relays this screw is replaced by a set screw which serves to separate the locking plate (see Fig. 1) slightly from the armature. Between the spring adjusting screw and the latch screw (or set screw), there is a third screw which when tightened applies pressure to the threads of the former screws and effectively locks them against turning.

The moving contact fingers are mounted on moulded insulation which is fastened to the armature

SUPERSEDES I.L. 41-753.1B
*Denotes change from superseded issue.

EFFECTIVE OCTOBER 1959

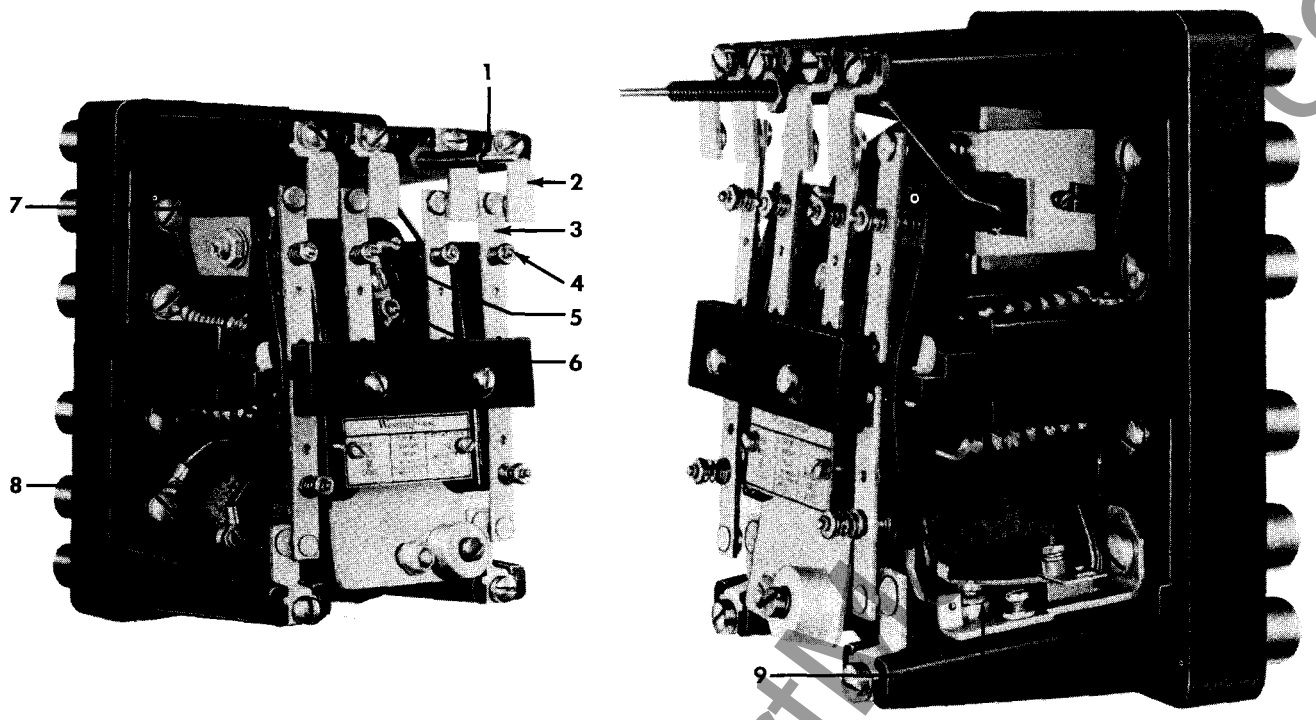


Fig. 1. Front View (Cover Omitted) and Side View of the MG-6 Electric & Hand Reset Relay in Molded Case. 1 – Reset push rod, 2 – stationary contact, 3 – moving contact, 4 – moving contact spring assembly, 5 – latch adjustment screw, 6 – adjusting screw for armature spring tension, 7 – reset coil, 8 – operating coil, 9 – optional operating coil cut-off contact.

by two screws. Silver contact buttons are on both sides of these fingers so that they can be used for either a circuit-opening or a circuit-closing contact. The fingers are assembled on guide pins, between two springs in such a way that definite spring compression and contact wipe is assured for either contact-closing or contact-opening service. Flexible leads assemblies are welded to the contact fingers. Since the armature assembly has contact fingers both above and below the bearing points, the armature weight is partially balanced about the bearings and there is less tendency for severe shocks to move the armature.

The stationary contacts consist of large silver buttons welded to brackets which can be assembled so that they close with the moving contacts when the armature is in either the energized or de-energized position. The stationary contact brackets are connected directly to the terminal inserts by means of long screws which pass through brass tubes. These tubes are of such length that the moulded material of the base is not under direct compression when the screws are tightened. Therefore, there is always a tight connection from contact to terminal regardless of possible shrinkage or other variation in the moulded base material. The contact bracket is held against its seat by means of a spring ring which is compressed between shoulders in the base and on the hexagonal terminal insert.

The construction of the latch and electrical reset is shown in Fig. 2, in which the lower portion is a partial front view of the relay in the moulded case, and the upper portion a top view. In the latter view, the latch screw (in the main armature) is in the energized position, and the reset armature is free to be moved to the right by the tension spring until the hardened latch plate on the reset armature rests against the tip of the latch screw. When the operating coil is de-energized, the latch screw will move slightly so that its shoulder rests on the edge of the latch plate. When the reset coil is energized its armature moves to the left, thus permitting the main armature to return to its open position. Pressing the reset push rod, which extends through the cover stud, will also release the latch through the medium of the reset lever shown in the figure.

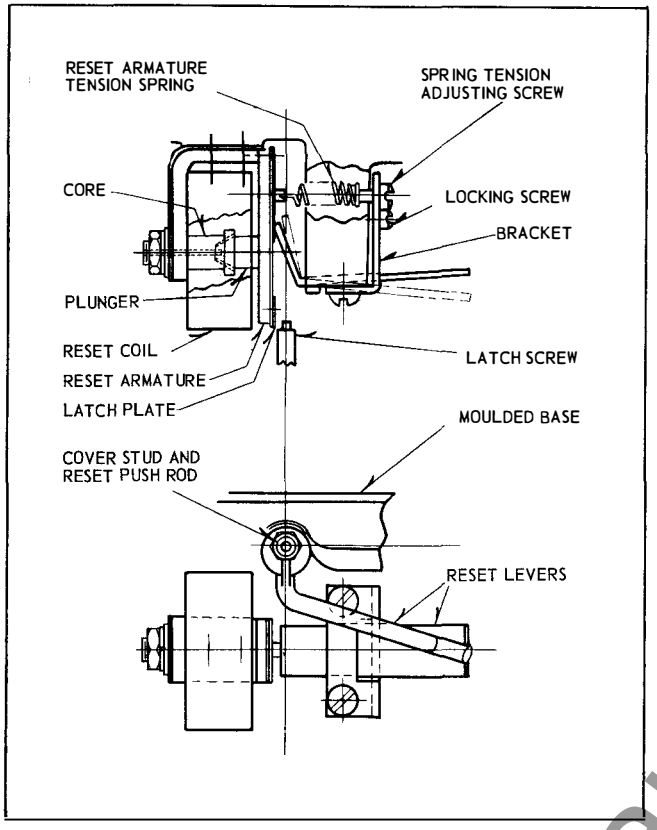
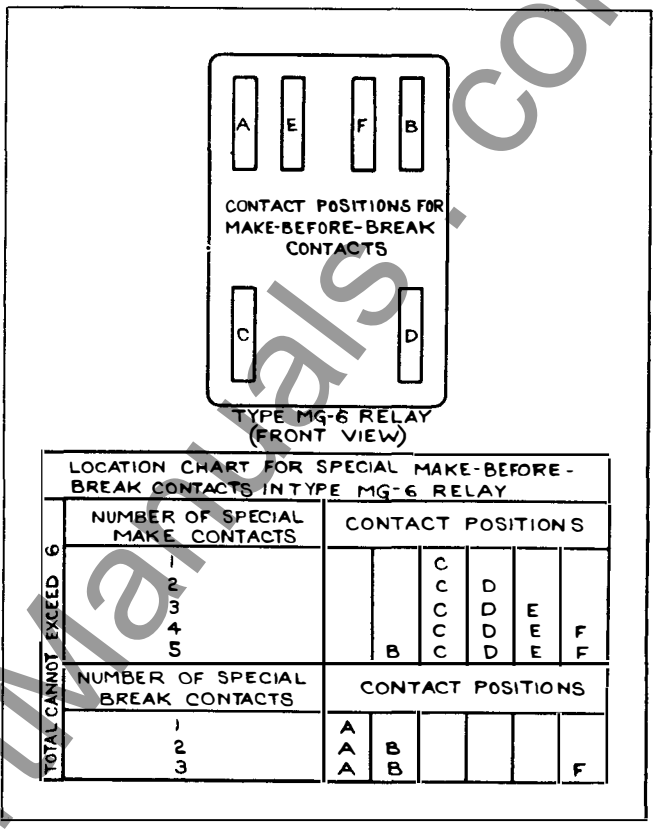


Fig. 2. Detail Views of the Latch and Electrical Reset of the Type MG-6 Relay.



LOCATION CHART FOR SPECIAL MAKE-BEFORE-BREAK CONTACTS IN TYPE MG-6 RELAY

TOTAL CANNOT EXCEED 6

NUMBER OF SPECIAL MAKE CONTACTS	CONTACT POSITIONS					
1			C			
2			C	D		
3			C	D	E	
4			C	D	E	F
5		B	C	D	E	F

NUMBER OF SPECIAL BREAK CONTACTS	CONTACT POSITIONS					
1	A					
2	A	B				
3	A	B				F

Fig. 3. Contact Positions for Combinations of Make-Before-Break Contacts.

In some applications of the relay with latch and electrical reset, it may be desirable to have the operating and reset coils deenergized automatically as soon as they have performed their functions. In the case of the reset coil this can be accomplished by connecting the coil through one of the relay "make" contacts. An auxiliary contact is required to open the operating coil circuit. This contact, when provided, is assembled on the lower right-hand side of the relay, and is held in position by the terminal screw to which the right-hand coil lead ordinarily
* connects. The coil lead is connected to the moving contact of the auxiliary contact, and the end of the stationary contact bracket is in contact with the head of the terminal screw. The auxiliary contact is closed when the main armature is open. When the armature approaches the closed position, the spring on the molded insulation block snaps off the roller and causes the contacts to open and interrupt the operating coil current. When this auxiliary contact is used, a weight is screwed to the lower end of the armature to increase its mass and stabilize contact action. This contact will interrupt the coil current at up to five times rated coil voltage.

In certain applications of the type MG-6 relay, it may be desirable to have one or more of the contacts close before other contacts on the same relay open. A special armature assembly is required to obtain such operation, and the number of special make and break contacts desired must be known when the relay is built. The special moving contacts have longer follow than the standard contacts and greater armature spring tension is required for full deflection of the break contacts. Consequently, it is preferable to limit the number of special break contacts to two. A maximum of three may be used, although the increased armature spring tension needed may raise the minimum pick-up voltage above the standard value. As many as five contacts may be special make contacts, with the total of special make and break contacts limited to six, of course. The locations of the make and break contacts for any combination of these special contacts are shown in Fig. 3. This figure indicates the physical location of the contacts in the relay, and can be used in conjunction with the inter-

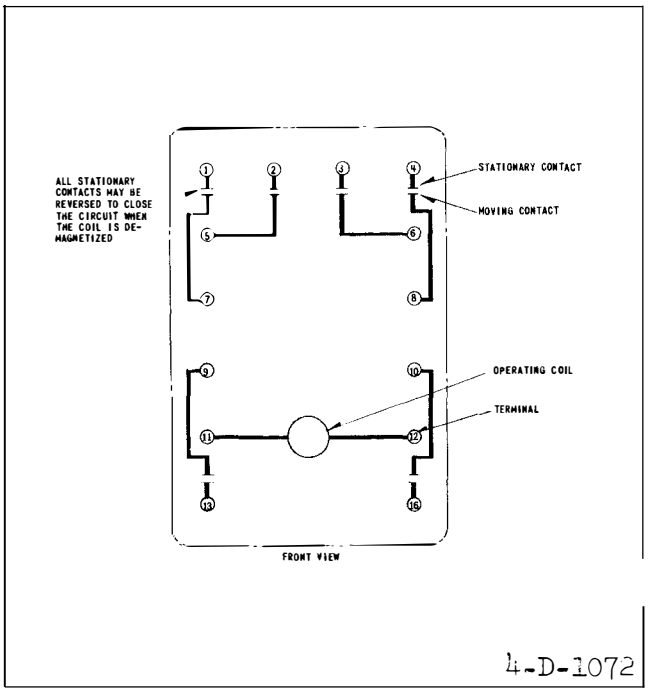


Fig. 4. Internal Schematic of the Type MG-6 Relay, Without Electrical Reset, in Molded Case.

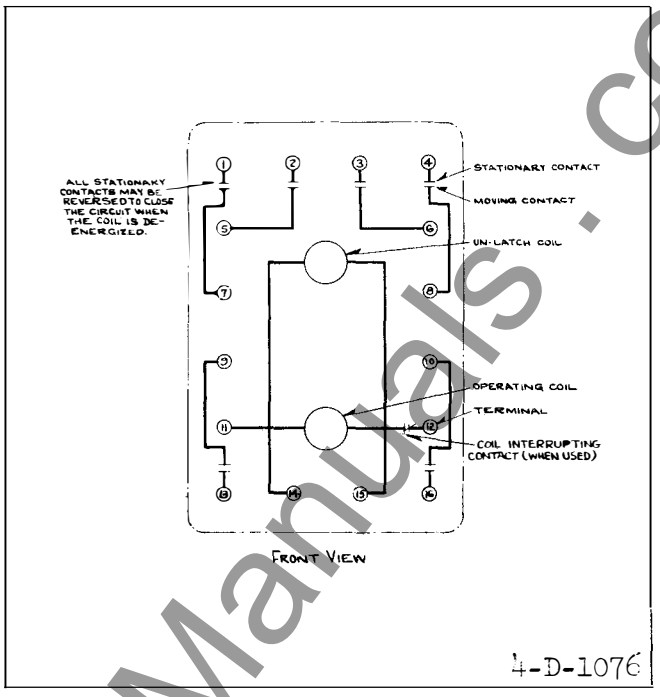


Fig. 5. Internal Schematic of the Type MG-6 Relay, With Electrical Reset, in Molded Case.

nal schematic diagram for the type of case involved to determine the corresponding terminal locations.

The type MG-6 relay may be provided without cover, for front connection, or in a variety of completely closed cases, for rear connection. The moulded base for rear connection is shown in Fig. 1. The base for front connection is similar except that there are no terminals projecting in the rear. This same base is also used as a sub-base when the relays are supplied in the FT22 case.

CHARACTERISTICS

The type MG-6 relay has an operating time of approximately 2 cycles on a-c and 5 cycles on d-c (on a 60 cycle basis) when energized at the rated voltage.

If faster operation is desired and if the application requires only intermittent energization of the relay, the operating coils may be energized at higher than rated voltage. (1) Twice rated voltage will give an operating time of approximately 1 cycle on a-c, and the coil will stand this voltage safely for over two minutes if 60 cycles of 4 minutes if 25 cycles. (2) The time of the d-c relay can be reduced to slightly over 1 cycle if the coil is energized at five times rated voltage. The coil will stand this voltage for one minute. If faster time is desired on a d-c relay which must be energized continuously, the use of a low voltage coil with a series resistor will reduce the time. With 10% of the line voltage across the relay coil and the balance across a series resistor, the reduced inductance of the circuit results in an operating time of approximately 2 cycles. The time of operation may be reduced to approximately one cycle by applying 4 or 5 times rated d-c voltage to the coils through the coil interrupting contact.

Reset coils are for intermittent duty only and should not be energized longer than one-half minute.

The relay contacts will close circuits carrying 30 amperes. They will carry this current for 1 minute, and will carry 12 amperes continuously.

The contacts will interrupt the following currents, in non-inductive circuits, at the voltages listed:

Current	Volts A-C
30	115
20	230
15	460
10	575

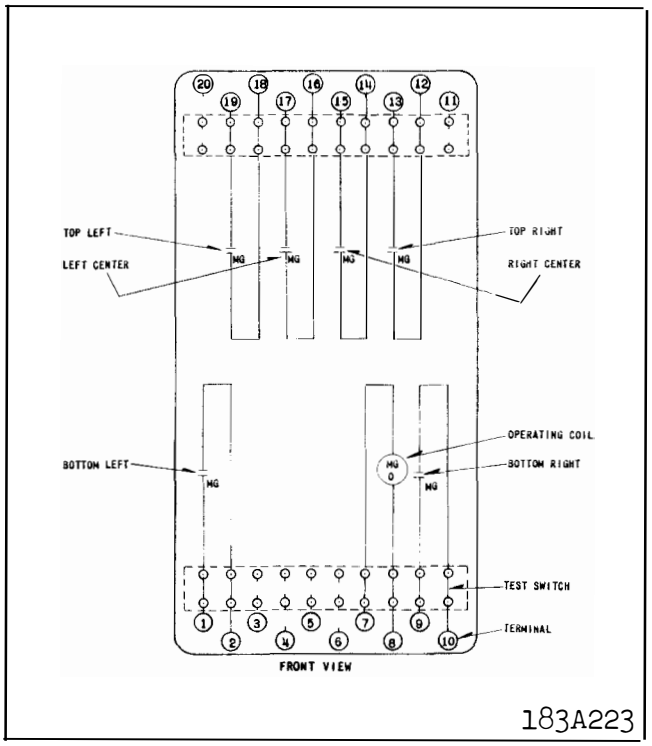


Fig. 6. Internal Schematic of the Type MG-6 Relay, Without Electrical Reset, in FT22 Case.

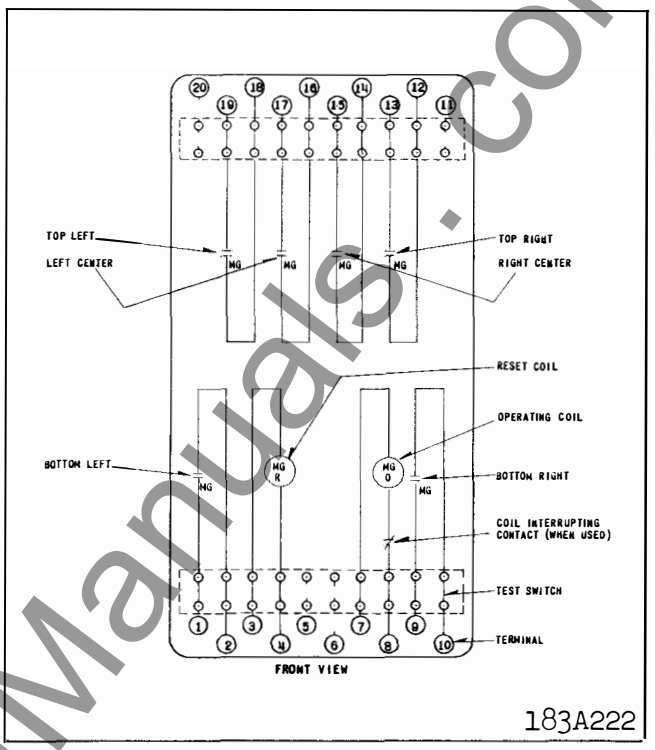


Fig. 7. Internal Schematic of the Type MG-6 Relay, With Electrical Reset, in FT22 Case.

Current	Volts D-C
30	12
15	24
10	32
8	48
3	125
1	250

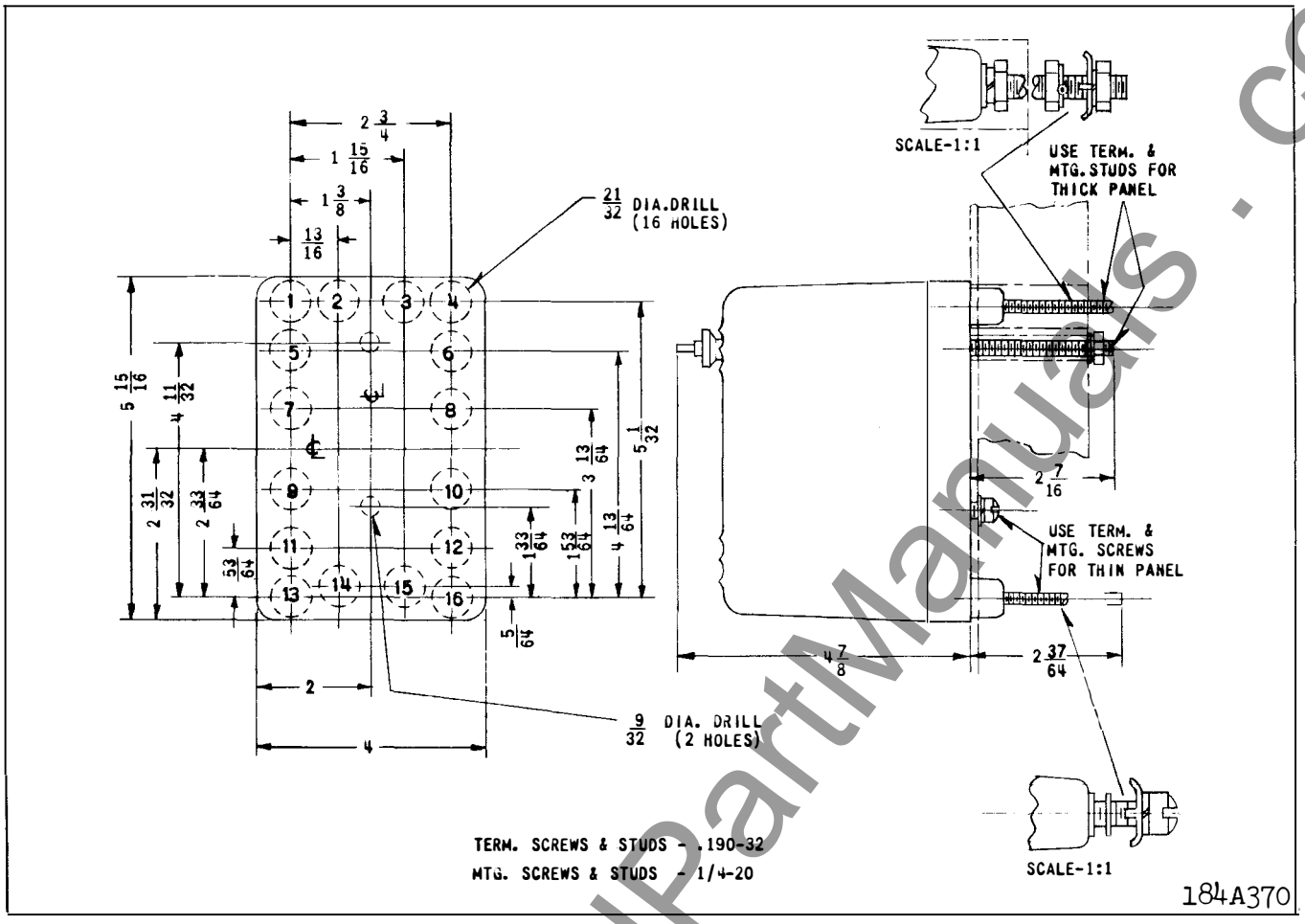
The type MG-6 relay for a-c can be used with any * combination of contacts, but the d-c relay can have up to four circuit-opening contacts with the normal operating spring adjustment. With more than four the operating spring should be adjusted to give the correct back contact follow.

INSTALLATION

The relays should be mounted on switchboard panels or their equivalent in a location free from dirt, moisture, excessive vibration, and heat. Mount the relay vertically by means of the four mounting holes on the flange for semi-flush mounting or by means of the rear mounting stud or studs for projection mounting. Either a mounting stud or the mounting screws may be utilized for grounding the relay. The electrical connections may be made directly to the terminals by means of screws for steel panel mounting or to the terminal studs furnished with the relay for thick panel mounting. The terminal studs may be easily removed or inserted by locking two nuts on the stud and then turning the proper nut with a wrench.

For detailed FT case information refer to I.L. 41-076.

Relays in the rear-connected moulded cases should be mounted and electrically connected similar to the other projection cases. The lower mounting stud may be used to ground the electromagnet iron. The hexagon-shaped terminal inserts are slightly loose in the base but this does not affect the electrical connections. Only the two mounting studs should be used to secure the relay to the panel. Removal of terminal insert end-play (in the case of thick-panel mounting) by turning a nut on the terminal stud tightly against a large diameter washer (not supplied) at the rear of the panel should not be attempted as this may distort the relay base and affect the adjustments, or possibly damage the relay. Relays in the front-connected moulded cases should be



* *Fig. 8. Outline and Drilling Plan for the Type MG-6 Relay in the Rear Connected Molded Case. For Reference Only.*

mounted by four screws through the sides of the base as indicated in the drilling plan.

ADJUSTMENTS AND MAINTENANCE

The relays are shipped from the factory correctly adjusted for armature travel and for contact follow and pressure, and it should not be necessary to disturb these adjustments. The relays normally are shipped with all contacts assembled for circuit-closing operation. To convert them for circuit-opening operation, it is necessary merely to loosen the mounting screw for the stationary contact bracket, turn this bracket over, and tighten the screw. After reversing the position of the contact brackets, it may be necessary to bend them slightly to obtain contact follows approximately as stated in the fourth paragraph of this section. On a d-c relay not more than four contacts can be assembled in the circuit-opening position if normal contact pressure and travel are

* maintained. With more than four the operating spring should be adjusted to give the correct back contact follow.

If a relay has been dismantled and is being reassembled, the following adjustments should be made or checked. Reference should be made to Figs. 1 and 2 for identification of the parts mentioned in these instructions.

The armature stop nut should be adjusted so that when the armature is in contact with it the lower edge of the armature is 7/16" above the position which it assumes when the relay is energized. When adjusting the armature spring tension, the locking screw for the spring adjusting screw is loosened, and this adjusting screw is turned (inward, to reduce the spring tension) until the spring barely holds the armature against the stop nut. The relay must be in its normal vertical position when this adjustment is made, with

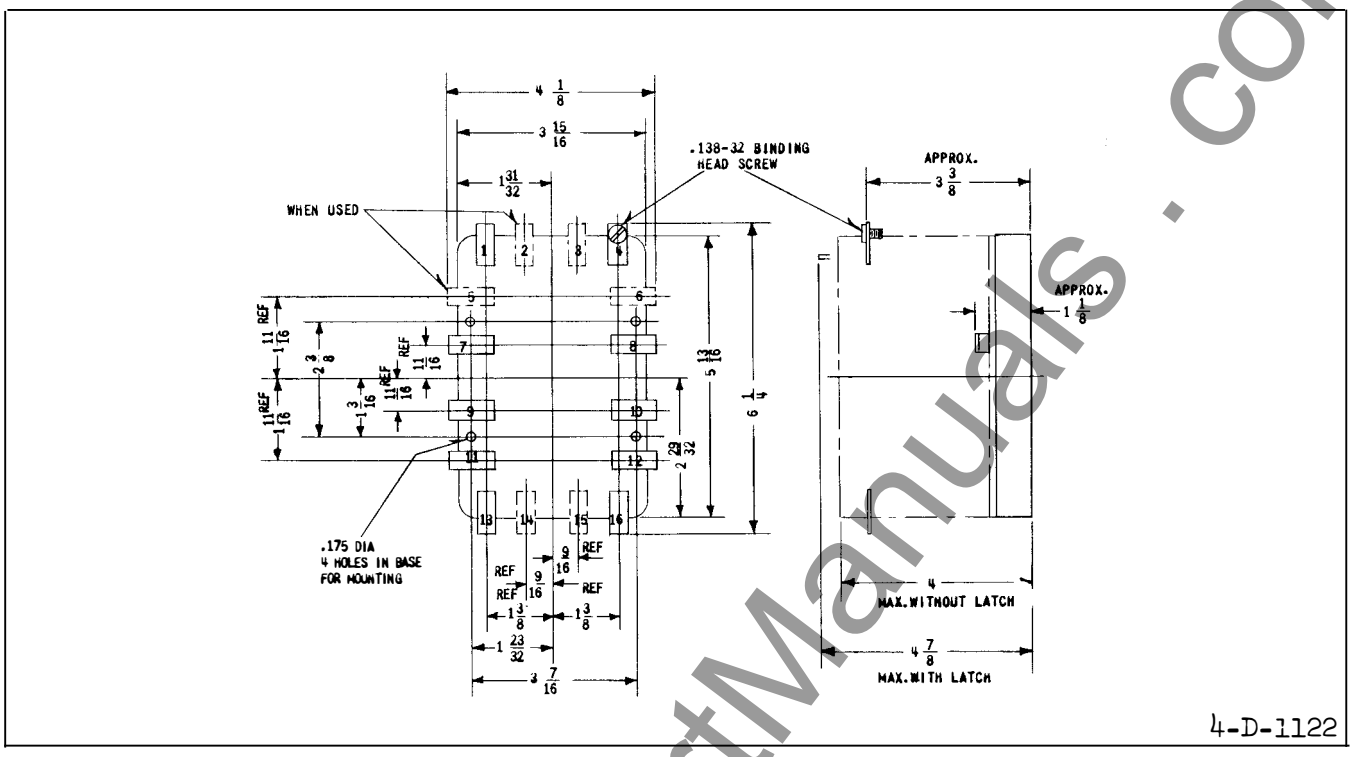


Fig. 9. Outline and Drilling Plan for the Type MG-6 Relay in the Front Connected Molded Case. See Internal Schematic for Terminals Supplied. For Reference Only.

all contacts assembled as circuit-closing. The armature spring should then be tightened by turning the * adjusting screw 4 turns counter-clockwise for a-c relays or 2 turns for d-c relays, and the locking screws should be tightened. If the relay is being used with a number of break contacts, it may be necessary to increase the spring tension to obtain full follow on the break contacts. The adjusting screw should be turned just enough farther to obtain full follow with the armature against the stop nut.

The follow of the moving contact fingers should be 3/32" for the make contacts and 1/16" for the break contacts, measured at the contacts. This can be checked more conveniently by measuring the travel of the lower edge of the armature after the contacts touch. This should be approximately 1/8" for the make contacts and 3/32" for the break contacts. In case moving contact fingers have been removed from their guide pins, it is important that the coil springs on the two sides of the fingers be replaced correctly. The springs which are compressed by circuit-closing contacts are approximately three times as strong as the ones compressed by circuit-opening contacts and thus they can be readily distinguished. The positions of the two springs are reversed at the two ends of the relay.

When special contacts are supplied for make-before-break operation, the stationary members of the special contacts are bent equally toward their respective moving contacts to obtain "make" at the point where the "break" moving contact has approximately 1/16" follow before parting from its stationary contact.

If an a-c relay is to be used with a series resistor so that the relay can be dropped out by shorting the coil, either the resistance value must be such that the watt consumption with the coil shorted will be quite high or the relay armature spring tension must be reduced to about 1-1/2 turns and the follow of the stationary make contacts must be reduced (by bending) to about 1/16". With the reduced armature spring tension, not more than two of the contacts can be used as break contacts. Because of the low relay impedance with armature open as compared to the impedance with armature closed, it is not advantageous to use a resistor in series with a coil rated at less than line voltage, as in the case of d-c applications. For the contact and spring adjustments

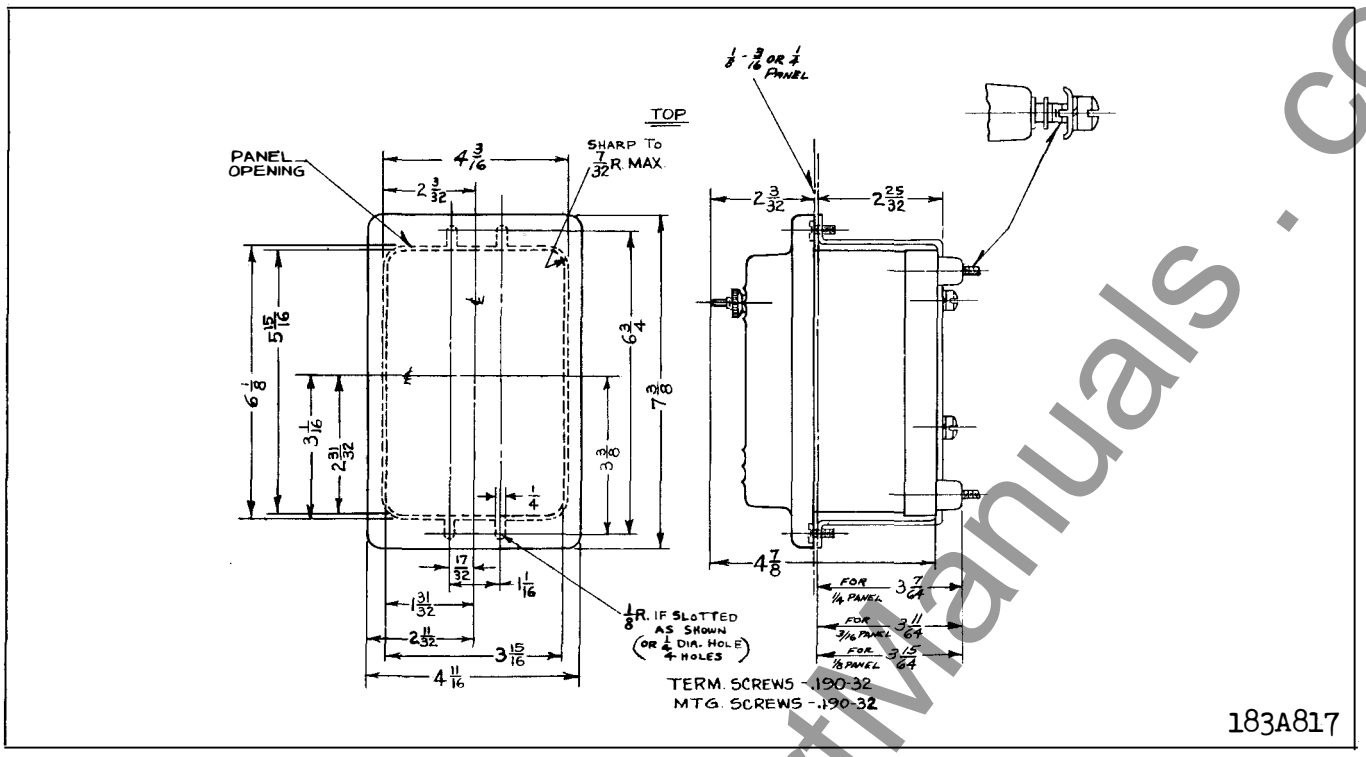


Fig. 10. Outline and Drilling Plan for the Molded Semi-Flush Case. For Reference Only.

specified above, a 60 cycle MG relay with voltage rating equal to the line voltage can be used with a series resistor which will take about 90 watts when directly across the line. Of course, if the coil will be shorted only momentarily or if a higher watt consumption is not objectionable, it may be unnecessary to reduce the spring tension or contact follow.

If the complete armature assembly is to be removed from the relay, the screws which fasten the lower ends of the moving contact leads to the terminals should be removed, the armature spring tension adjusting screw should be turned in as far as possible, and the armature stop nut should be removed. The upper end of the armature spring should then be slipped off of the grooved member at the lower end of the adjusting screw, and the armature should be lifted off of its bearing carefully so as to avoid distortion of the coiled leads. The leads to the upper center moving contacts are not coiled but the coiling of the four other moving contact leads should be such that when the relay base is horizontal and the armature is on its bearings and approximately at its mid-position, the lead terminals will just touch the base terminal inserts or be within about 1/8" of that position.

On latch-type relays the latch screw is adjusted so that with the armature latched and the operating coil de-energized, there will be a gap of between .005 and .010 inch between the electromagnet pole face and the raised section of the armature which strikes the pole face. The locking screw should be tightened securely after making this adjustment. There is a small amount of clearance between the armature and its supporting posts, and in order to insure proper operation allowance must be made for this in the following manner. With the armature held against its left-hand support and nearly closed, the latch spring or reset armature should be moved to the left as far as it will go by means of the hand reset. To assure that the latch will always release the armature the resulting space between the latch and the latch screw should be at least .005 inch, and should not be more than about 1/64". This should also be checked electrically if electrical reset is provided. Some change of this gap can be made by loosening the mounting screws in the relay base and moving the latch support in the desired direction. The gap also can be changed by loosening the two screws which hold the moving contact insulation block to the armature and shifting the armature in the desired direction.

On electrical reset relays, the tension of the spring which draws the reset armature toward the

latch screw must be adjusted if these parts are being reassembled. The locking screw (Fig. 2) is screwed out until its head clears the head of the adjusting screw. The main armature is then held completely closed and against its right hand support, and the latch spring tension adjusting screw is turned until the latch barely touches the stop projecting from the center of the latch screw. Then the latch spring tension should be increased by turning the screw clockwise 5 turns, and the locking screw should be tightened.

If either the core nut of the electrical reset assembly or the screws which mount its armature have been loosened, the relative positions of the core and plunger may shift sufficiently to cause the plunger to strike on the side of the conical core opening. To assure correct alignment of these parts, .042 diameter holes are provided through the center of the core and about 1/16" deep in the center of the plunger. After tightening the core nut, a close fitting pin should be inserted through the core and into the plunger. With the pin in place, and plunger pressed firmly against the core, and the mounting end of the armature centrally located with respect to the electromagnet, the two armature mounting screws should be tightened. The pin then should be removed.

A slight amount of medium viscosity slushing oil is supplied at the factory to the polished and hardened surfaces of the latch screw and the latch plate to minimize wear and as protection against corrosion. Oil should be reapplied after any cleaning and reassembling of these parts, and it is desirable also to renew this at the regular maintenance periods.

★ If the relay is provided with a coil interrupting contact, the following points must be observed to assure satisfactory operation. With the relay in its normal operating position and the armature shifted to the extreme right, align the armature "snap" spring so that it is at least 1/64 inch in from the right hand edge of the moving contact spring. With an .020 inch gap between the armature and the lower pole face of the electromagnet, adjust the bracket by means of the adjusting screw, until the snap spring just passes the roller. The latch screw should be adjusted so that with the armature in the latched position and the operating coil deenergized, the gap between the armature and the lower pole face of the electromagnet is .005 inch. With the armature in this position the coil interrupting contact should be open at least 3/64 inch.

All contacts should be periodically cleaned. A contact burnisher S#182A836H01 is recommended for this purpose. The use of abrasive material for cleaning contacts is not recommended, because of the danger of embedding small particles in the face of the soft silver and this impairing the contact.

REPAIRS AND RENEWAL PARTS

Repair work can be done most satisfactorily at the factory. However, interchangeable parts can be furnished to the customers who are equipped for doing repair work. When ordering parts, always give the complete nameplate data.

ENERGY REQUIREMENTS

Operating Coil Burdens at rated Voltage

Frequency (cycles)	Closed Gap		Open Gap	
	Watts	Volt-Amps	Watts	Volt-Amps
25	6.8	23	19.6	53
50	9.8	31	17.4	78
△60	15	35.5	19	96.5
D-C	7.8 cold--		7.8 cold--	
D-C	6.5 hot --		6.5 hot --	

△Rated voltage is 120 volts or its multiples.

Reset Coil Burdens at Rated Voltage (Multiples)

Frequency (cycles)	Closed Gap		Open Gap	
	Watts	Volt-Amps	Watts	Volt-Amps
25	48	51.6	52	54
50	46	58.2	57	63.8
60	84	104.5	96	112.8
D-C	66 cold--		68 cold--	

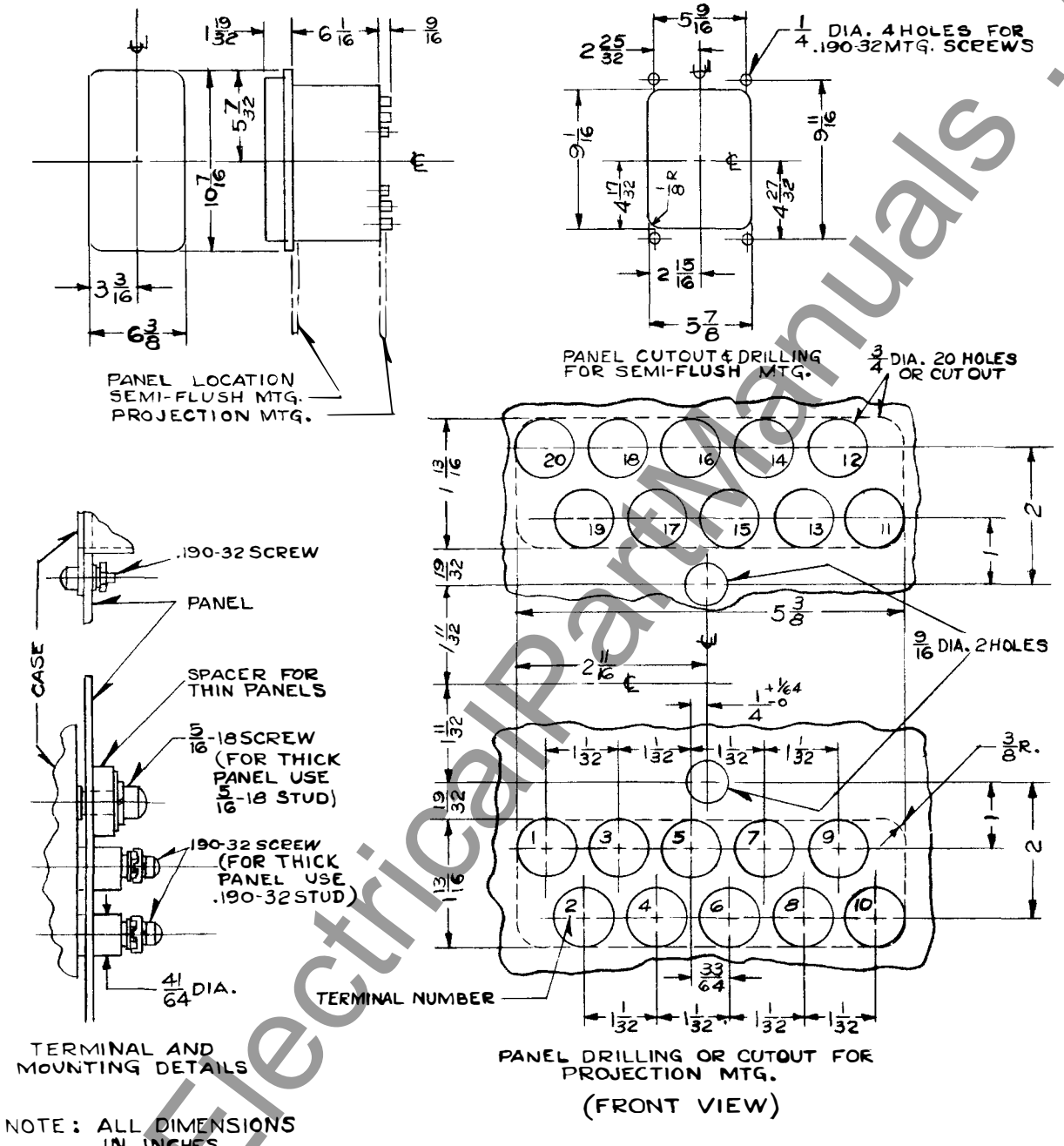


Fig. 11. Outline and Drilling Plan for the Type MG-6 Relay in Type FT22 Case.

WESTINGHOUSE ELECTRIC CORPORATION

RELAY DEPARTMENT **NEWARK, N. J.**

Printed in U. S. A.

INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

TYPE MG-6 MULTI-CONTACT AUXILIARY RELAY

CAUTION Before putting relays into service, remove all blocking which may have been inserted for the purpose of securing the parts during shipment, make sure that all moving parts operate freely, inspect the contacts to see that they are clean and close properly, and operate the relay to check the settings and electrical connections.

APPLICATION

The type MG-6 relay is designed for applications where several independent circuits must be energized or de-energized upon the operation of a single primary relay contact, or where the capacity of the primary relay contact is inadequate for the energy required in a control circuit. In certain applications these relays may be used directly as primary relays. Since the stationary contacts can readily be reversed so as to be suitable for either circuit opening or circuit closing service (although a slight increase in spring tension may be required on the D-C MG-6 relay — see "ADJUSTMENTS AND MAINTENANCE") it is unnecessary to predetermine the arrangements of the circuits for which the relay is to be used.

In the usual application of the relay, the armature resets when the operating coil is de-energized. However, the relays may be supplied with a latching mechanism which holds the armature in the operated position until the latch is tripped, either by hand or electrically.

An operating coil cutoff contact can be supplied with the electric-reset type, where an intermittent duty coil is required for faster than normal operation, but where the operating coil circuit must be energized continuously. An operating coil, rated at 19% of supply rating may be applied, with a maximum duty of 10,000 operations. (e.g. 24 volt coil on 125 volt dc circuit.

CONSTRUCTION AND OPERATION

The operating electromagnet is at the lower end of the relay, as shown in Fig. 1. The stationary iron circuit is built up of U-shaped punchings. These are slotted at the outer end of the lower leg to receive the copper lag loops used to obtain quiet operation on A-C. The operating coil is mounted on this leg of the punchings. In order to improve the performance of the relay on D-C, the pole face area is increased by means of an iron plate. This plate is assembled at the end of the coil and the corners of the lamination side plates are bent outward, serving to hold the plate in place. The inner end of the upper leg of the punching assembly is shaped so that the lower end of the armature restraining spring can be hooked over it.

The armature is made of high-silicon steel. Projecting sections on the sides, near the center, act as knife-edge bearings and rest on suitably shaped supports which are a part of the moulded base. A stud attached to the lower leg of the electromagnet extends through a hole in the lower end of the armature, and a stop-nut on the outer end of this stud is used to limit and adjust the travel of the armature in the de-energized direction. The special stop nut used will remain at any position in which it is placed without additional locking means.

The upper end of the armature carries an adjusting screw to which one end of the armature restraining spring is attached. In the hand or electrically reset relays, a latch screw is mounted at the extreme end of the armature. In the self-reset relays this screw is replaced by a set screw which serves to separate the locking plate (see Fig. 1) slightly from the armature. Between the spring adjusting screw and the latch screw (or set screw), there is a third screw which when tightened applies pressure to the threads of the former screws and effectively locks them against turning.

The moving contact fingers are mounted on moulded insulation which is fastened to the armature

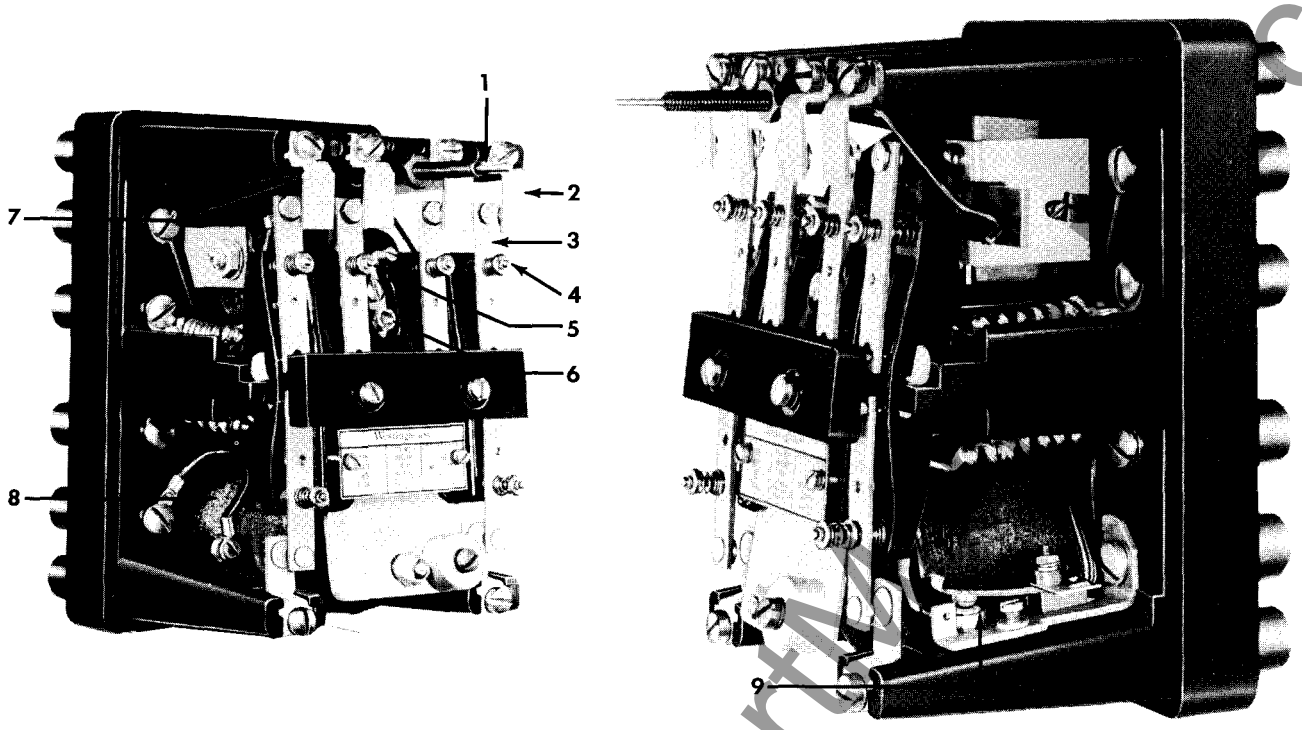


Fig. 1. Front View (Cover Omitted) and Side View of the MG-6 Electric & Hand Reset Relay in Molded Case. 1 – Reset push rod, 2 – stationary contact, 3 – moving contact, 4 – moving contact spring assembly, 5 – latch adjustment screw, 6 – adjusting screw for armature spring tension, 7 – reset coil, 8 – operating coil, 9 – optional operating coil cut-off contact.

by two screws. Silver contact buttons are on both sides of these fingers so that they can be used for either a circuit-opening or a circuit-closing contact. The fingers are assembled on guide pins, between two springs in such a way that definite spring compression and contact wipe is assured for either contact-closing or contact-opening service. Flexible leads assemblies are welded to the contact fingers. Since the armature assembly has contact fingers both above and below the bearing points, the armature weight is partially balanced about the bearings and there is less tendency for severe shocks to move the armature.

The stationary contacts consist of large silver buttons welded to brackets which can be assembled so that they close with the moving contacts when the armature is in either the energized or de-energized position. The stationary contact brackets are connected directly to the terminal inserts by means of long screws which pass through brass tubes. These tubes are of such length that the moulded material of the base is not under direct compression when the screws are tightened. Therefore, there is always a tight connection from contact to terminal regardless of possible shrinkage or other variation in the moulded base material. The contact bracket is held against its seat by means of a spring ring which is compressed between shoulders in the base and on the hexagonal terminal insert.

The construction of the latch and electrical reset is shown in Fig. 2, in which the lower portion is a partial front view of the relay in the moulded case, and the upper portion a top view. In the latter view, the latch screw (in the main armature) is in the energized position, and the reset armature is free to be moved to the right by the tension spring until the hardened latch plate on the reset armature rests against the tip of the latch screw. When the operating coil is de-energized, the latch screw will move slightly so that its shoulder rests on the edge of the latch plate. When the reset coil is energized its armature moves to the left, thus permitting the main armature to return to its open position. Pressing the reset push rod, which extends through the cover stud, will also release the latch through the medium of the reset lever shown in the figure.

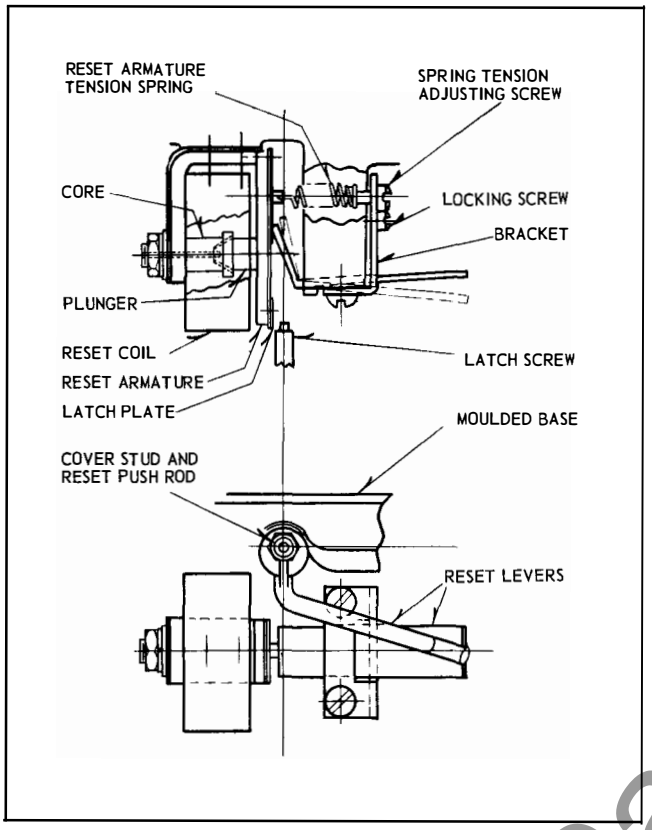
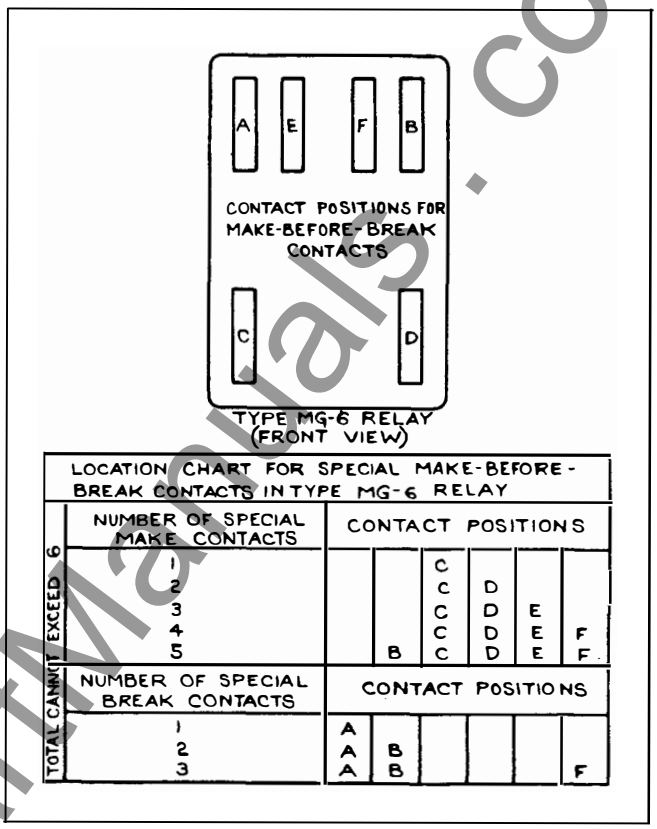


Fig. 2. Detail Views of the Latch and Electrical Reset of the Type MG-6 Relay.



LOCATION CHART FOR SPECIAL MAKE-BEFORE-BREAK CONTACTS IN TYPE MG-6 RELAY

TOTAL CANNOT EXCEED 6

NUMBER OF SPECIAL MAKE CONTACTS	CONTACT POSITIONS					
1			C	D		
2			C	D	E	
3			C	D	E	F
4		B	C	D	E	F
5		B	C	D	E	F

NUMBER OF SPECIAL BREAK CONTACTS	CONTACT POSITIONS					
1	A					
2	A	B				
3	A	B				F

Fig. 3. Contact Positions for Combinations of Make-Before-Break Contacts.

In some applications of the relay with latch and electrical reset, it may be desirable to have the operating and reset coils deenergized automatically as soon as they have performed their functions. In the case of the reset coil this can be accomplished by connecting the coil through one of the relay "make" contacts. An auxiliary contact is required to open the operating coil circuit. This contact, when provided, is assembled on the lower right-hand side of the relay, and is held in position by the terminal screw to which the right-hand coil lead ordinarily connects. The coil lead is connected to the moving contact of the auxiliary contact, and the end of the stationary contact bracket is in contact with the head of the terminal screw. The auxiliary contact is closed when the main armature is open. When the armature approaches the closed position, the spring on the molded insulation block snaps off the roller and causes the contacts to open and interrupt the operating coil current. When this auxiliary contact is used, a weight is screwed to the lower end of the armature to increase its mass and stabilize contact action. This contact will interrupt the coil current at up to five times rated coil voltage.

In certain applications of the type MG-6 relay, it may be desirable to have one or more of the contacts close before other contacts on the same relay open. A special armature assembly is required to obtain such operation, and the number of special make and break contacts desired must be known when the relay is built. The special moving contacts have longer follow than the standard contacts and greater armature spring tension is required for full deflection of the break contacts. Consequently, it is preferable to limit the number of special break contacts to two. A maximum of three may be used, although the increased armature spring tension needed may raise the minimum pick-up voltage above the standard value. As many as five contacts may be special make contacts, with the total of special make and break contacts limited to six, of course. The locations of the make and break contacts for any combination of these special contacts are shown in Fig. 3. This figure indicates the physical location of the contacts in the relay, and can be used in conjunction with the inter-

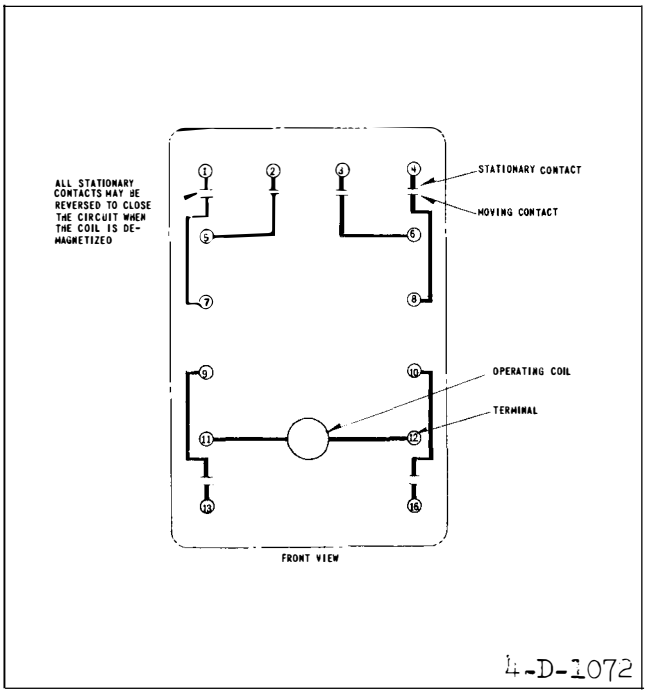


Fig. 4. Internal Schematic of the Type MG-6 Relay, With-out Electrical Reset, in Molded Case.

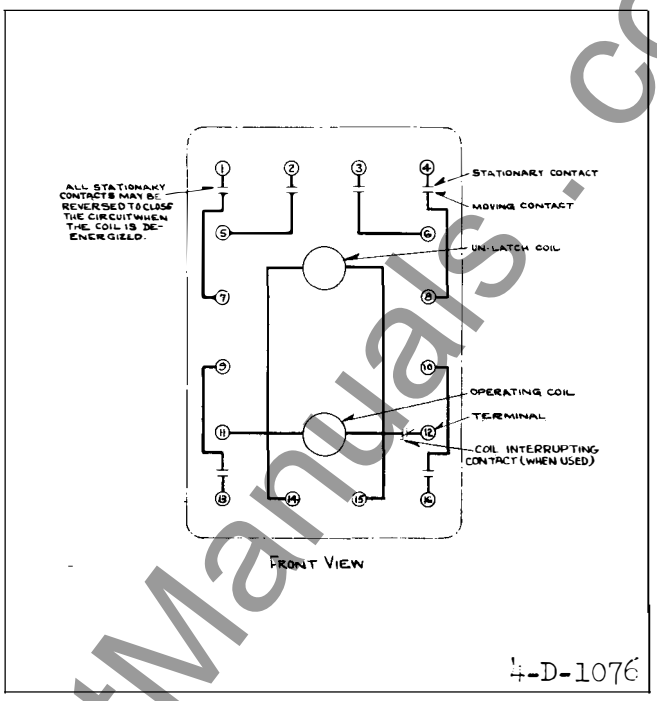


Fig. 5. Internal Schematic of the Type MG-6 Relay, With Electrical Reset, in Molded Case.

nal schematic diagram for the type of case involved to determine the corresponding terminal locations.

The type MG-6 relay may be provided without cover, for front connection, or in a variety of completely closed cases, for rear connection. The moulded base for rear connection is shown in Fig. 1. The base for front connection is similar except that there are no terminals projecting in the rear. This same base is also used as a sub-base when the relays are supplied in the FT22 case.

CHARACTERISTICS

The type MG-6 relay has an operating time of approximately 2 cycles on a-c and 5 cycles on d-c (on a 60 cycle basis) when energized at the rated voltage.

If faster operation is desired and if the application requires only intermittent energization of the relay, the operating coils may be energized at higher than rated voltage. (1) Twice rated voltage will give an operating time of approximately 1 cycle on a-c, and the coil will stand this voltage safely for over two minutes if 60 cycles or 4 minutes if 25 cycles. (2) The time of the d-c relay can be reduced to slightly over 1 cycle if the coil is energized at five times rated voltage. The coil will stand this voltage for one minute. If faster time is desired on a d-c relay which must be energized continuously, the use of a low voltage coil with a series resistor will reduce the time. With 10% of the line voltage across the relay coil and the balance across a series resistor, the reduced inductance of the circuit results in an operating time of approximately 2 cycles. The time of operation may be reduced to approximately one cycle by applying 4 or 5 times rated d-c voltage to the coils through the coil interrupting contact.

Reset coils are for intermittent duty only and should not be energized longer than one-half minute.

The relay contacts will close circuits carrying 30 amperes. They will carry this current for 1 minute, and will carry 12 amperes continuously.

The contacts will interrupt the following currents, in non-inductive circuits, at the voltages listed:

Current	Volts A-C
30	115
20	230
15	460
10	575

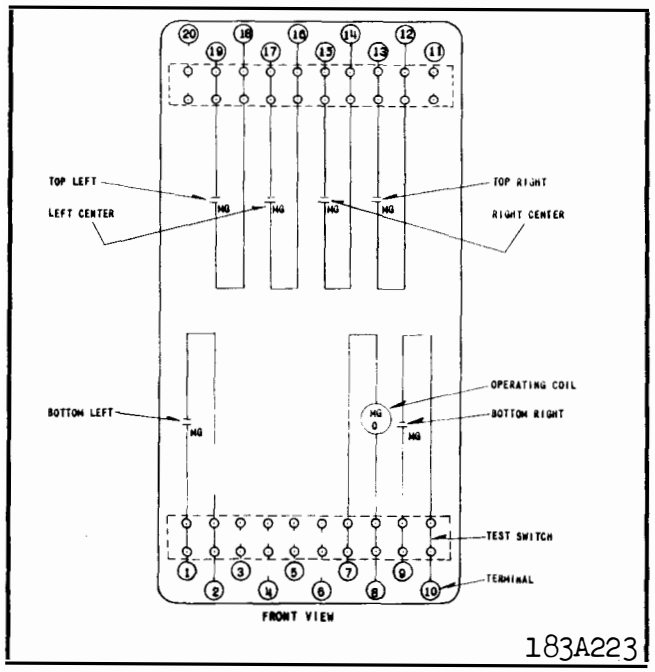


Fig. 6. Internal Schematic of the Type MG-6 Relay, Without Electrical Reset, in FT22 Case.

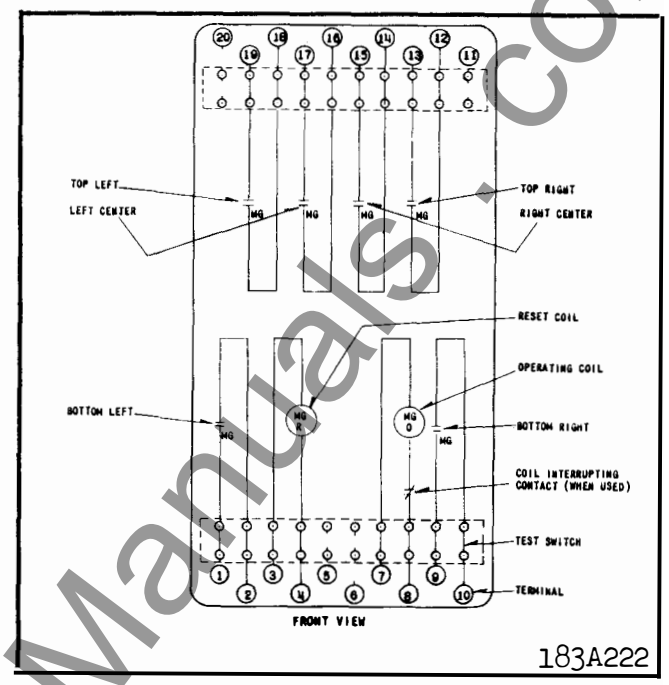


Fig. 7. Internal Schematic of the Type MG-6 Relay, With Electrical Reset, in FT22 Case.

Current	Volts D-C
30	12
15	24
10	32
8	48
3	125
1	250

The type MG-6 relay for a-c can be used with any combination of contacts, but the d-c relay can have up to four circuit-opening contacts with the normal operating spring adjustment. With more than four the operating spring should be adjusted to give the correct back contact follow.

INSTALLATION

The relays should be mounted on switchboard panels or their equivalent in a location free from dirt, moisture, excessive vibration. and heat. Mount the relay vertically by means of the four mounting holes on the flange for semi-flush mounting or by means of the rear mounting stud or studs for projection mounting. Either a mounting stud or the mounting screws may be utilized for grounding the relay. The electrical connections may be made directly to the terminals by means of screws for steel panel mounting or to the terminal studs furnished with the relay for thick panel mounting. The terminal studs may be easily removed or inserted by locking two nuts on the stud and then turning the proper nut with a wrench.

For detailed FT case information refer to I.L. 41-076.

*

Coil Resistance (at 25° C) (± 10%)

Rating	Operating Coil		Reset Coil
	Ohms	Closed Gap Impedance	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 cycle	19	354	91
208 volts, 60 cycle	67	1160	322
230 volts, 60 cycle	75	1410	364
460 volts, 60 cycle	305	5680	1445
575 volts, 60 cycle	495	8860	2208

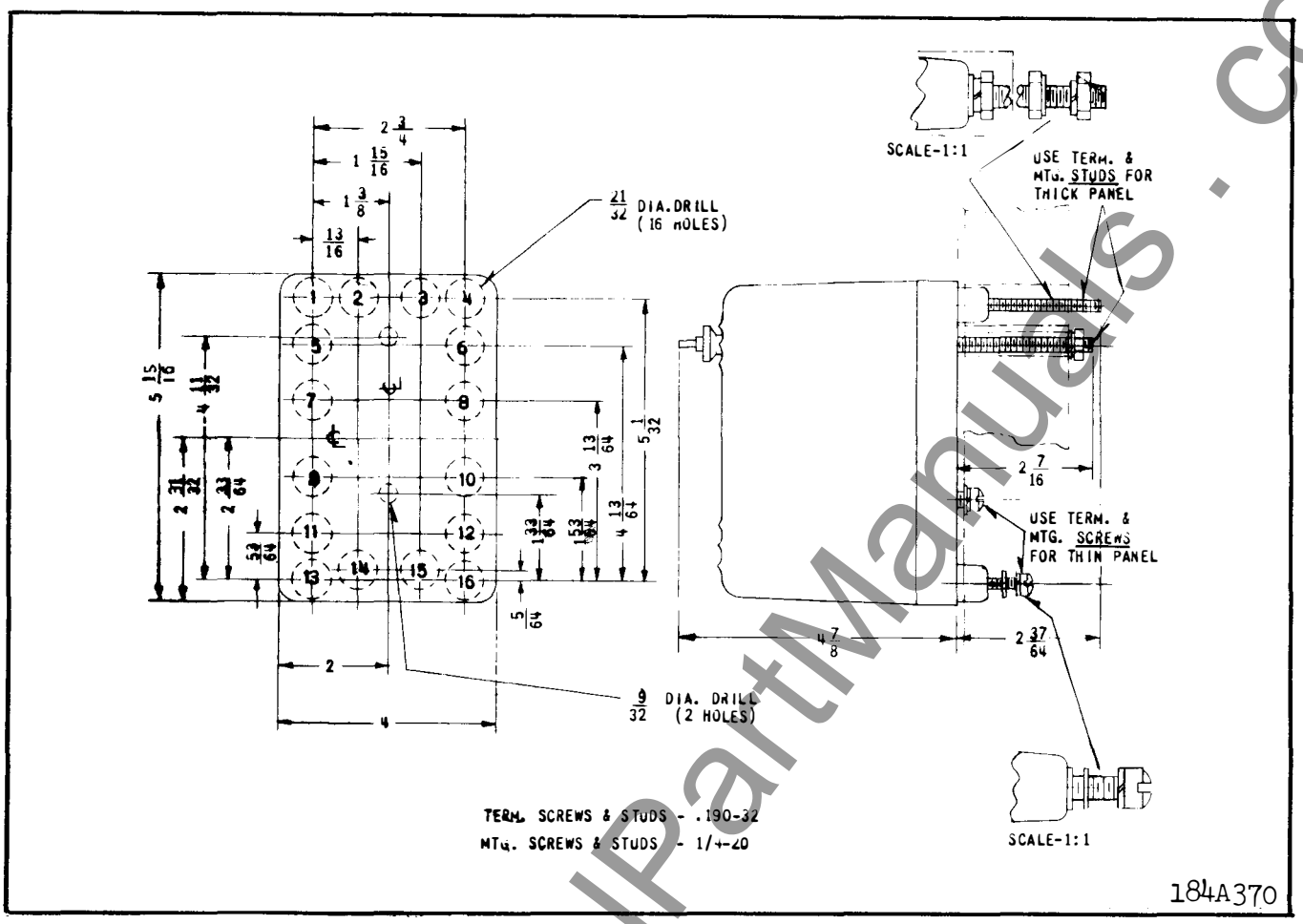


Fig. 8. Outline and Drilling Plan for the Type MG-6 Relay in the Rear Connected Molded Case. For Reference Only.

Relays in the rear-connected moulded cases should be mounted and electrically connected similar to the other projection cases. The lower mounting stud may be used to ground the electromagnet iron. The hexagon-shaped terminal inserts are slightly loose in the base but this does not affect the electrical connections. Only the two mounting studs should be used to secure the relay to the panel. Removal of terminal insert end-play (in the case of thick-panel mounting) by turning a nut on the terminal stud tightly against a large diameter washer (not supplied) at the rear of the panel should not be attempted as this may distort the relay base and affect the adjustments, or possibly damage the relay. Relays in the front-connected moulded cases should be mounted by four screws through the sides of the base as indicated in the drilling plan.

ADJUSTMENTS AND MAINTENANCE

The relays are shipped from the factory correctly adjusted for armature travel and for contact follow and pressure, and it should not be necessary to disturb these adjustments. The relays normally are shipped with all contacts assembled for circuit-closing operation. To convert them for circuit-opening operation, it is necessary merely to loosen the mounting screw for the stationary contact bracket, turn this bracket over, and tighten the screw. After reversing the position of the contact brackets, it may be necessary to bend them slightly to obtain contact follows approximately as stated in the fourth paragraph of this section. On a d-c relay not more than four contacts can be assembled in the circuit-opening position if normal contact pressure and travel are maintained. With more than four the operating spring should be adjusted to give the correct back contact follow.

If a relay has been dismantled and is being reassembled, the following adjustments should be made or checked. Reference should be made to Figs. 1 and 2 for identification of the parts mentioned in these instructions.

The armature stop nut should be adjusted so that

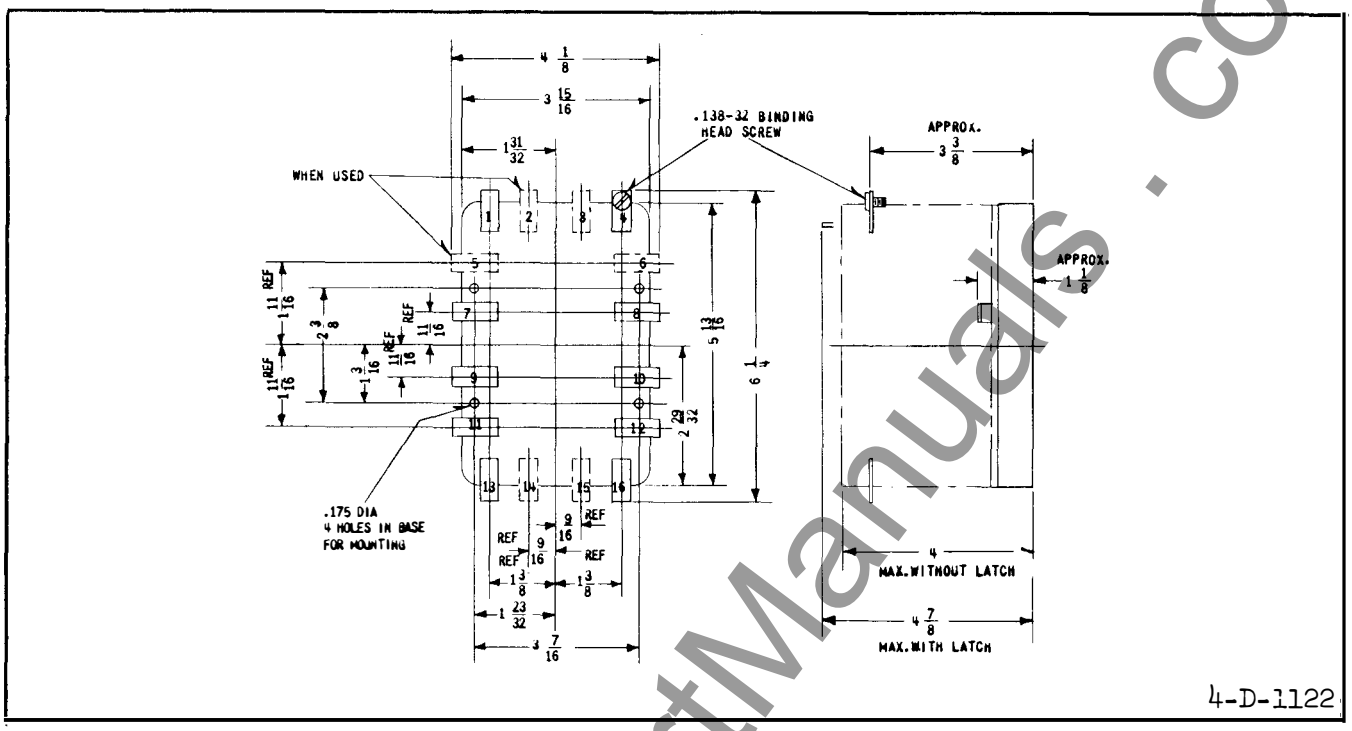


Fig. 9. Outline and Drilling Plan for the Type MG-6 Relay in the Front Connected Molded Case. See Internal Schematic for Terminals Supplied. For Reference Only.

when the armature is in contact with it the lower edge of the armature is 7/16" above the position which it assumes when the relay is energized. When adjusting the armature spring tension, the locking screw for the spring adjusting screw is loosened, and this adjusting screw is turned (inward, to reduce the spring tension) until the spring barely holds the armature against the stop nut. The relay must be in its normal vertical position when this adjustment is made, with all contacts assembled as circuit-closing. The armature spring should then be tightened by turning the adjusting screw 4 turns counter-clockwise for a-c relays or 2 turns for d-c relays, and the locking screws should be tightened. If the relay is being used with a number of break contacts, it may be necessary to increase the spring tension to obtain full follow on the break contacts. The adjusting screw should be turned just enough farther to obtain full follow with the armature against the stop nut.

The follow of the moving contact fingers should be 3/32" for the make contacts and 1/16" for the break contacts, measured at the contacts. This can be checked more conveniently by measuring the travel of the lower edge of the armature after the contacts touch. This should be approximately 1/8" for the make contacts and 3/32" for the break contacts. In case moving contact fingers have been removed from their guide pins, it is important that the coil springs on the two sides of the fingers be replaced correctly. The springs which are compressed by circuit-closing contacts are approximately three times as strong as the ones compressed by circuit-opening contacts and thus they can be readily distinguished. The positions of the two springs are reversed at the two ends of the relay.

When special contacts are supplied for make-before-break operation, the stationary members of the special contacts are bent equally toward their respective moving contacts to obtain "make" at the point where the "break" moving contact has approximately 1/16" follow before parting from its stationary contact.

If an a-c relay is to be used with a series resistor so that the relay can be dropped out by shorting the coil, either the resistance value must be such that the watt consumption with the coil shorted will be quite high or the relay armature spring tension must be reduced to about 1-1/2 turns and the follow of the stationary make contacts must be reduced (by bending) to about 1/16". With the reduced armature spring tension, not more than two of the contacts can be used as break contacts. Because of the low relay impedance with armature open as compared to the impedance with armature closed, it is not advantageous to use a resistor in series with a coil rated at less than line voltage, as in the case of d-c applications. For the contact and spring adjustments

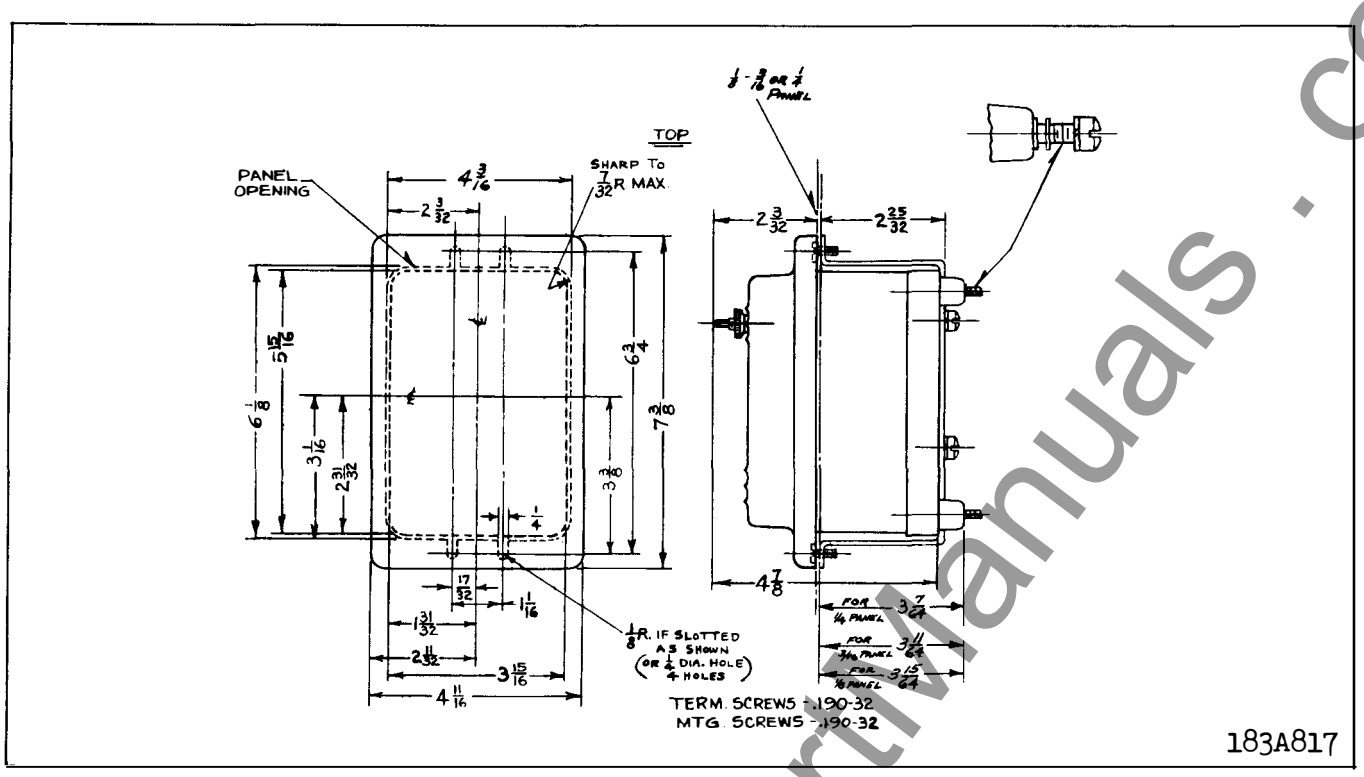


Fig. 10. Outline and Drilling Plan for the Molded Semi-Flush Case. For Reference Only.

specified above, a 60 cycle MG relay with voltage rating equal to the line voltage can be used with a series resistor which will take about 90 watts when directly across the line. Of course, if the coil will be shorted only momentarily or if a higher watt consumption is not objectionable, it may be unnecessary to reduce the spring tension or contact follow.

If the complete armature assembly is to be removed from the relay, the screws which fasten the lower ends of the moving contact leads to the terminals should be removed, the armature spring tension adjusting screw should be turned in as far as possible, and the armature stop nut should be removed. The upper end of the armature spring should then be slipped off of the grooved member at the lower end of the adjusting screw, and the armature should be lifted off of its bearing carefully so as to avoid distortion of the coiled leads. The leads to the upper center moving contacts are not coiled but the coiling of the four other moving contact leads should be such that when the relay base is horizontal and the armature is on its bearings and approximately at its mid-position, the lead terminals will just touch the base terminal inserts or be within about 1/8" of that position.

On latch-type relays the latch screw is adjusted so that with the armature latched and the operating coil de-energized, there will be a gap of between .005 * and .015 inch between the electromagnet pole face and the raised section of the armature which strikes the pole face. The locking screw should be tightened securely after making this adjustment. There is a small amount of clearance between the armature and its supporting posts, and in order to insure proper operation allowance must be made for this in the following manner. With the armature held against its left-hand support and nearly closed, the latch spring or reset armature should be moved to the left as far as it will go by means of the hand reset. To assure that the latch will always release the armature the resulting space between the latch and the latch screw * should be at least .010 inch, and should not be more than about 1/64". This should also be checked electrically if electrical reset is provided. Some change of this gap can be made by loosening the mounting screws in the relay base and moving the latch support in the desired direction. The gap also can be changed by loosening the two screws which hold the moving contact insulation block to the armature and shifting the armature in the desired direction.

On electrical reset relays, the tension of the spring which draws the reset armature toward the

latch screw must be adjusted if these parts are being reassembled. The locking screw (Fig. 2) is screwed out until its head clears the head of the adjusting screw. The main armature is then held completely closed and against its right hand support, and the latch spring tension adjusting screw is turned until the latch barely touches the stop projecting from the center of the latch screw. Then the latch spring tension should be increased by turning the screw clockwise 9 turns, and the locking screw should be tightened.

If either the core nut of the electrical reset assembly or the screws which mount its armature have been loosened, the relative positions of the core and plunger may shift sufficiently to cause the plunger to strike on the side of the conical core opening. To assure correct alignment of these parts, .042 diameter holes are provided through the center of the core and about 1/16" deep in the center of the plunger. After tightening the core nut, a close fitting pin should be inserted through the core and into the plunger. With the pin in place, and plunger pressed firmly against the core, and the mounting end of the armature centrally located with respect to the electromagnet, the two armature mounting screws should be tightened. The pin then should be removed.

A slight amount of medium viscosity slushing oil is supplied at the factory to the polished and hardened surfaces of the latch screw and the latch plate to minimize wear and as protection against corrosion. Oil should be reapplied after any cleaning and reassembling of these parts, and it is desirable also to renew this at the regular maintenance periods.

If the relay is provided with a coil interrupting contact, the following points must be observed to assure satisfactory operation. With the relay in its normal operating position and the armature shifted to the extreme right, align the armature "snap" spring so that it is at least 1/64 inch in from the right hand * edge of the moving contact spring. With an .030 inch gap between the armature and the lower pole face of the electromagnet, adjust the bracket by means of the adjusting screw, until the snap spring just passes the roller. The latch screw should be adjusted so that with the armature in the latched position and the operating coil deenergized, the gap between the armature and the lower pole face of the * electromagnet is .010 to .015 inch. With the armature in this position the coil interrupting contact should be open at least 3/64 inch.

All contacts should be periodically cleaned. A contact burnisher S#182A836H01 is recommended for this purpose. The use of abrasive material for cleaning contacts is not recommended, because of the danger of embedding small particles in the face of the soft silver and this impairing the contact.

REPAIRS AND RENEWAL PARTS

Repair work can be done most satisfactorily at the factory. However, interchangeable parts can be furnished to the customers who are equipped for doing repair work. When ordering parts, always give the complete nameplate data.

ENERGY REQUIREMENTS

Operating Coil Burdens at rated Voltage

Frequency (cycles)	Closed Gap		Open Gap	
	Watts	Volt-Amps	Watts	Volt-Amps
25	6.8	23	19.6	53
50	9.8	31	17.4	78
△60	12	37	17.6	92
D-C	7.8 cold--		7.8 cold--	
D-C	6.5 hot--		6.5 hot--	

△Rated voltage is 115 volts or its multiples.

Reset Coil Burdens at Rated Voltage (Multiples)

Frequency (cycles)	Closed Gap		Open Gap	
	Watts	Volt-Amps	Watts	Volt-Amps
25	48	51.6	52	54
50	46	58.2	57	63.8
60	84	104.5	96	112.8
D-C	66 cold--		68 cold--	

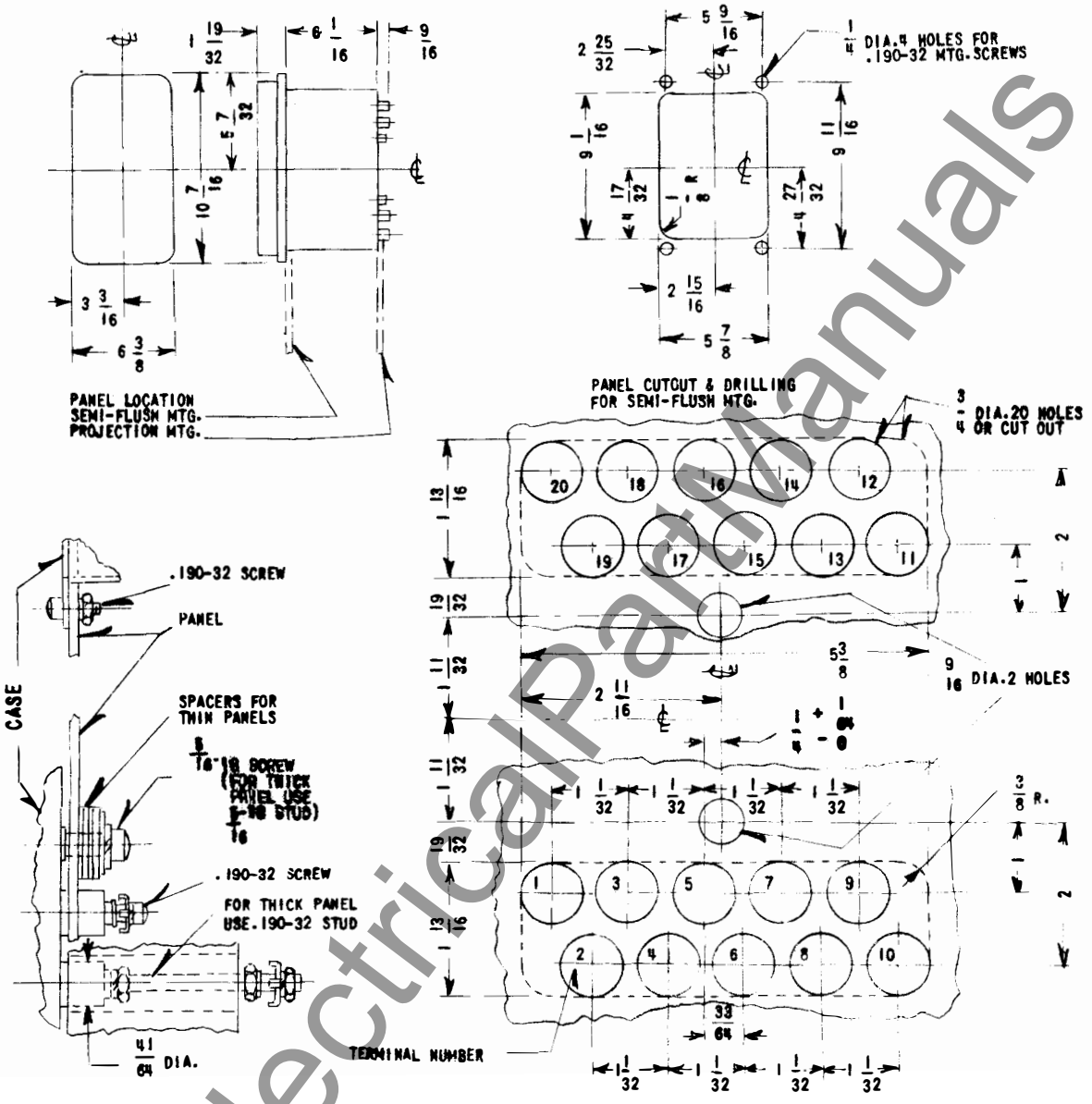


Fig. 11. Outline and Drilling Plan for the Type MG-6 Relay in Type FT22 Case.

WESTINGHOUSE ELECTRIC CORPORATION

RELAY-INSTRUMENT DIVISION **NEWARK, N. J.**

Printed in U.S.A.

INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

TYPE MG-6 MULTI-CONTACT AUXILIARY RELAY

CAUTION Before putting relays into service, remove all blocking which may have been inserted for the purpose of securing the parts during shipment, make sure that all moving parts operate freely, inspect the contacts to see that they are clean and close properly, and operate the relay to check the settings and electrical connections.

APPLICATION

The type MG-6 relay is designed for applications where several independent circuits must be energized or de-energized upon the operation of a single primary relay contact, or where the capacity of the primary relay contact is inadequate for the energy required in a control circuit. In certain applications these relays may be used directly as primary relays. Since the stationary contacts can readily be reversed so as to be suitable for either circuit opening or circuit closing service (although readjustment may be required on the D-C MG-6 relay - see "ADJUSTMENTS AND MAINTENANCE") it is unnecessary to predetermine the arrangements of the circuits for which the relay is to be used.

In the usual application of the relay, the armature resets when the operating coil is de-energized. However, the relays may be supplied with a latching mechanism which holds the armature in the operated position until the latch is tripped, either by hand or electrically.

CONSTRUCTION AND OPERATION

The operating electromagnet is at the lower end of the relay, as shown in Fig. 1. The stationary iron circuit is built up of U-shaped punchings, These are slotted at the outer end of the lower leg to receive the copper lag loops used to obtain quiet operation on A-C. The operating coil is mounted on this leg of the punchings. In order to improve the performance of the relay on D-C, the pole face area is increased by means of an iron plate. This plate is assembled at the end of the coil and the corners of the lamination side plates are bent outward, serving to hold the plate in place. The inner end of the upper leg of the punching assembly is shaped so that the lower end of the armature restraining spring can be hooked over it.

The armature is made of high-silicon steel. Projecting sections on the sides, near the center, act as knife-edge bearings and rest on suitably shaped supports which are a part of the moulded base. A stud attached to the lower leg of the electromagnet extends through a hole in the lower end of the armature, and a stop-nut on the outer end of this stud is used to limit and adjust the travel of the armature in the de-energized direction. The special stop nut used will remain at any position in which it is placed without additional locking means.

The upper end of the armature carries an adjusting screw to which one end of the armature restraining spring is attached. In the hand or electrically reset relays, a latch screw is mounted at the extreme end of the armature. In the self-reset relays this screw is replaced by a set screw which serves to separate the locking plate (see Fig. 1) slightly from the armature. Between the spring adjusting screw and the latch screw (or set screw), there is a third screw which when tightened applies pressure to the threads of the former screws and effectively locks them against turning.

The moving contact fingers are mounted on moulded insulation which is fastened to the armature by two screws. Silver contact buttons are welded on both sides of these fingers so that they can be used for either a circuit-opening or a circuit-closing contact.

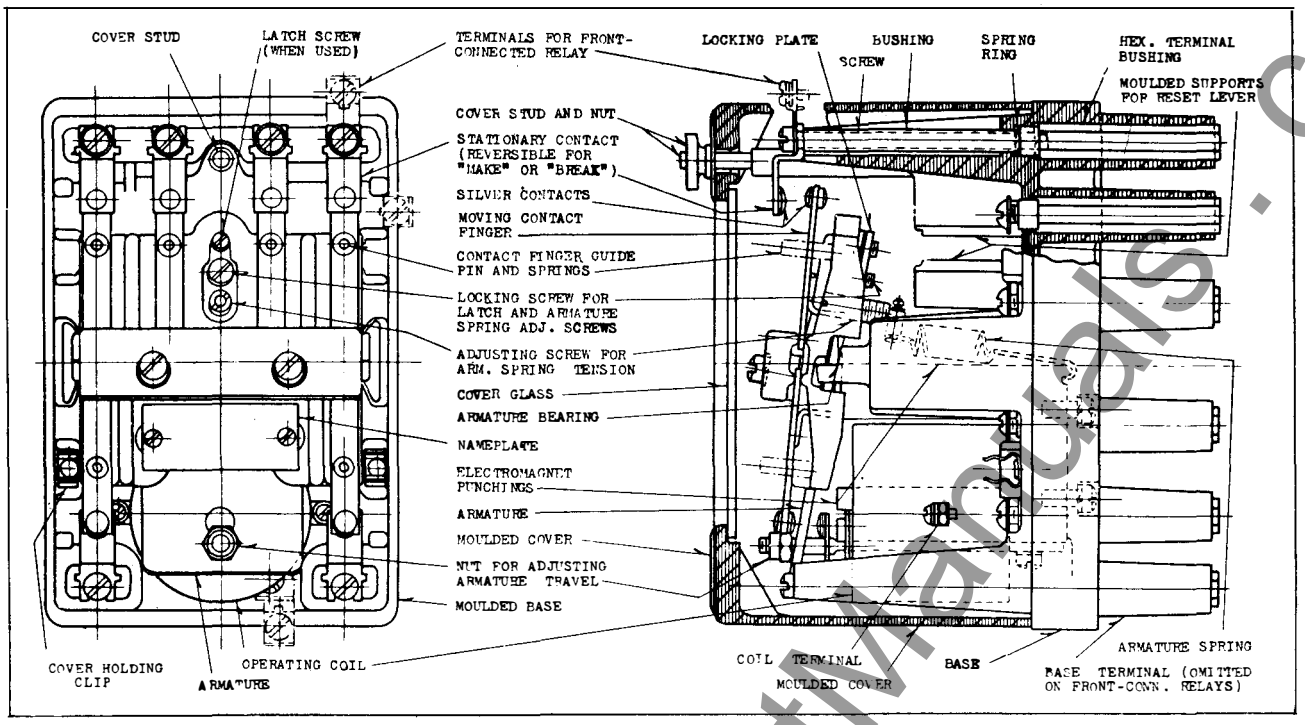


Fig. 1—Front View (Cover Omitted) and Side View of the Type MG-6 Relay in the Molded Case, Without Latch or Reset.

The fingers are assembled on guide pins, between two springs in such a way that definite spring compression and contact wipe is assured for either contact-closing or contact-opening service. Flexible leads are welded to the contact fingers. Since the armature assembly has contact fingers both above and below the bearing points, the armature weight is partially balanced about the bearings and there is less tendency for severe shocks to move the armature.

The stationary contacts consist of large silver buttons welded to brackets which can be assembled so that they close with the moving contacts when the armature is in either the energized or de-energized position. The stationary contact brackets are connected directly to the terminal inserts by means of long screws which pass through brass tubes. These tubes are of such length that the moulded material of the base is not under direct compression when the screws are tightened. Therefore, there is always a tight connection from contact to terminal regardless of possible shrinkage or other variation in the moulded base material. The contact bracket is held against its seat by means of a spring ring which is compressed between shoulders in the base and on the hexagonal terminal insert.

The construction of the latch and electrical reset is shown in Fig. 2, in which the lower portion is a partial front view of the relay in the moulded case, and the upper portion a top view. In the latter view, the latch screw (in the main armature) is in the energized position, and the reset armature is free to be moved to the right by the tension spring until the hardened latch plate on the reset armature rests against the tip of the latch screw. When the operating coil is de-energized, the latch screw will move slightly so that its shoulder rests on the edge of the latch plate. When the reset coil is energized its armature moves to the left, thus permitting the main armature to return to its open position. Pressing the reset push rod, which extends through the cover stud, will also release the latch through the medium of the reset lever shown in the figure.

In some applications of the relay with latch and electrical reset, it may be desirable to have the operating and reset coils deenergized automatically as soon as they have performed

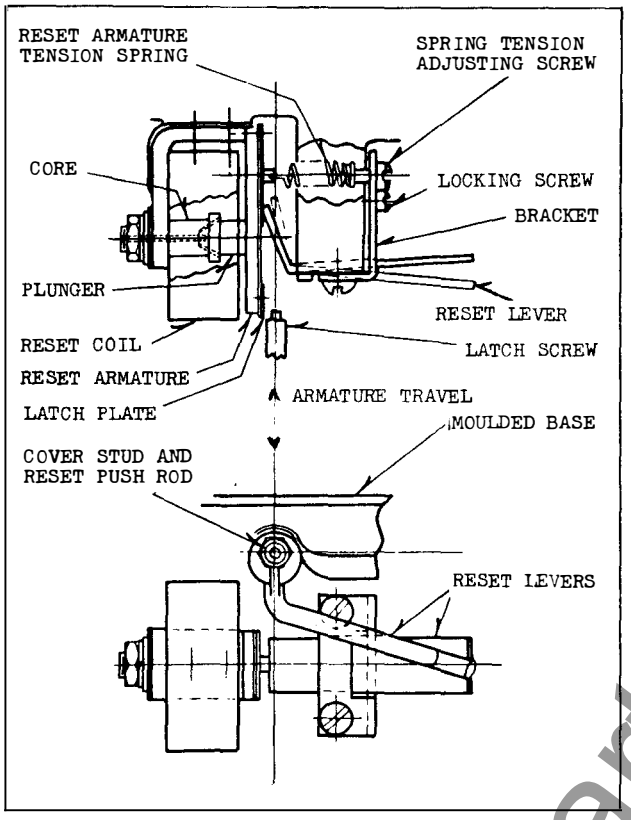
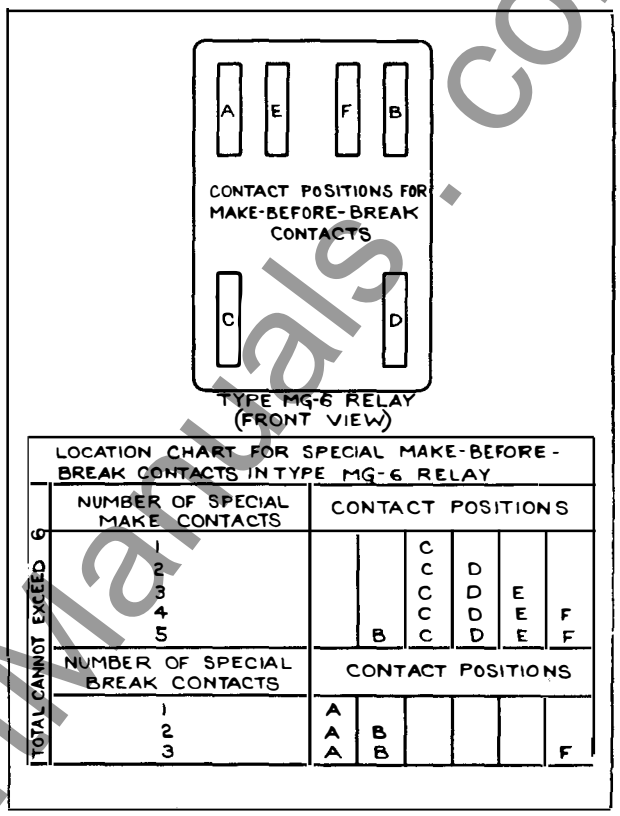


Fig. 2—Front and Top Detail Views of the Latch and Electrical Reset for Type MG-6 Relay.



LOCATION CHART FOR SPECIAL MAKE-BEFORE-BREAK CONTACTS IN TYPE MG-6 RELAY

TOTAL CANNOT EXCEED 6

NUMBER OF SPECIAL MAKE CONTACTS	CONTACT POSITIONS					
1			C	D		
2			C	D	E	
3			C	D	E	F
4		B	C	D	E	F
5		B	C	D	E	F

NUMBER OF SPECIAL BREAK CONTACTS	CONTACT POSITIONS					
1	A					
2	A	B				
3	A	B				F

Fig. 3—Physical Contact Positions for Combinations of Make-Before-Break Contacts in the Type MG Relay.

their functions. In the case of the reset coil this can be accomplished by connecting the coil through one of the relay "make" contacts. An auxiliary contact is required to open the operating coil circuit. This contact, when provided, is assembled on the lower right-hand side of the relay, and is held in position by the terminal screw to which the right-hand coil lead ordinarily connects. The coil lead is connected to the stationary contact stud of the auxiliary contact, and the end of the moving contact spring is in contact with the head of the terminal screw. The auxiliary contact is closed when the main armature is open. When the armature approaches the closed position, the moulded insulation block strikes the end of the auxiliary contact spring and causes the contacts to part with a gap which is appreciably greater than the travel of the armature block at the point where it strikes the spring. When this auxiliary contact is used, a weight is screwed to the lower end of the armature to increase its mass and stabilize contact action. This contact will interrupt the coil current at any rated coil voltage, but it is not intended for use in applications where several times rated voltage is applied to the operating coil in order to reduce the operating time.

In certain applications of the type MG-6 relay, it may be desirable to have one or more of the contacts close before other contacts on the same relay open. A special armature assembly is required to obtain such operation, and the number of special make and break contacts desired must be known when the relay is built. The special moving contacts have longer follow than the standard contacts and greater armature spring tension is required for full deflection of the break contacts. Consequently, it is preferable to limit the number of special break contacts to two. A maximum of three may be used, although the increased armature spring tension needed may raise the minimum pick-up voltage above the standard value. As many as five contacts may be special make contacts, with the total of

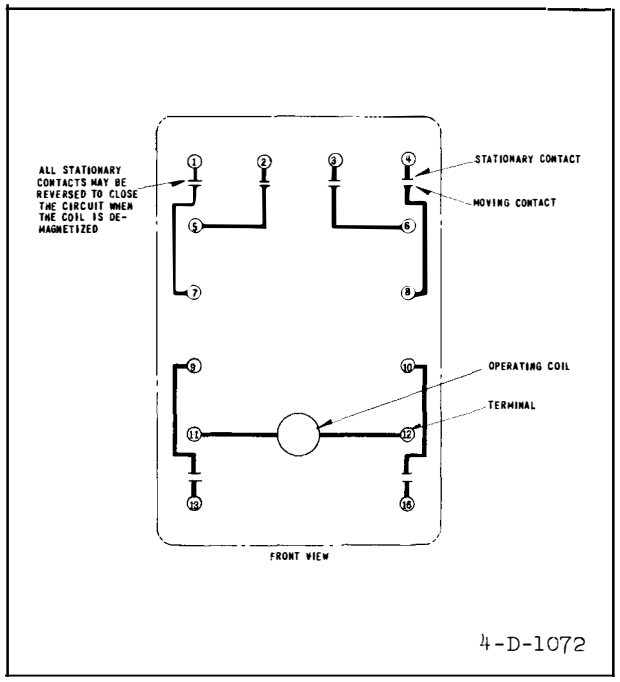


Fig. 4—Internal Schematic of the Type MG-6 Relay Without Electrical Reset in the Molded Case.

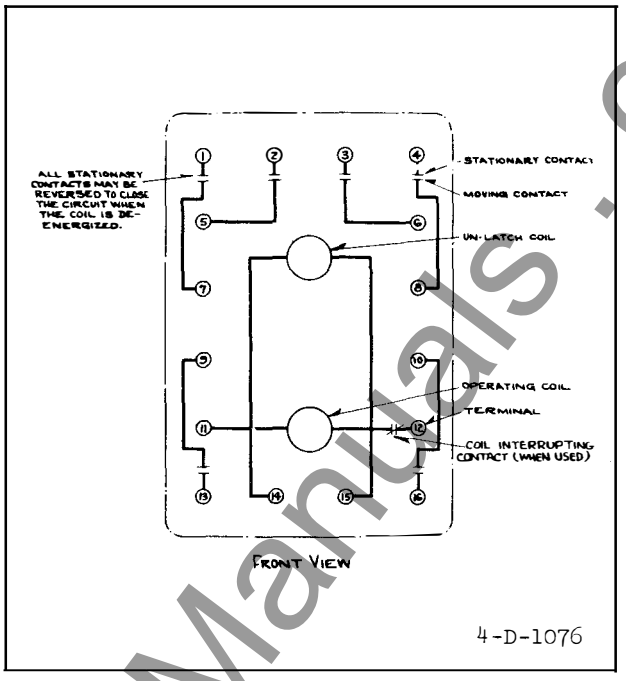


Fig. 5—Internal Schematic of the Type MG-6 Relay with Electrical Reset in the Molded Case.

special make and break contacts limited to six, of course. The locations of the make and break contacts for any combination of these special contacts are shown in Fig. 3. This figure indicates the physical location of the contacts in the relay, and can be used in conjunction with the internal schematic diagram for the type of case involved to determine the corresponding terminal locations.

The type MG-6 relay may be provided without cover, for front connection, or in a variety of completely closed cases, for rear connection. The moulded base for rear connection is shown in Fig. 1. The base for front connection is similar except that there are no terminals projecting in the rear. This same base is also used as a sub-base when the relays are supplied in standard or FT relay cases for projection or semi-flush mountings.

CHARACTERISTICS

The type MG-6 relay has an operating time of approximately 2 cycles on a-c and 5 cycles on d-c (on a 60 cycle basis) when energized at the rated voltage. If faster operation is desired and if the application requires only intermittent energization of the relay, the operating coils may be energized at higher than rated voltage. Twice rated voltage will give an operating time of approximately 1 cycle on a-c, and the coil will stand this voltage safely for over two minutes if 60 cycles or 4 minutes if 25 cycles. The time of the d-c relay can be reduced to slightly over 1 cycle if the coil is energized at five times rated voltage and there is not more than one back contact. The coil will stand this voltage for one minute. If faster time is desired on a d-c relay which must be energized continuously, the use of a low voltage coil with a series resistor will reduce the time. With 10% of the line voltage across the relay coil and the balance across a series resistor, the reduced inductance of the circuit results in an operating time of approximately 2 cycles.

Reset coils are for intermittent duty only and should not be energized longer than one minute.

The relay contacts will close circuits carrying 30 amperes. They will carry this current for 1 minute, and will carry 12 amperes continuously.

The contacts will interrupt the following currents, in non-inductive circuits, at the voltages listed:

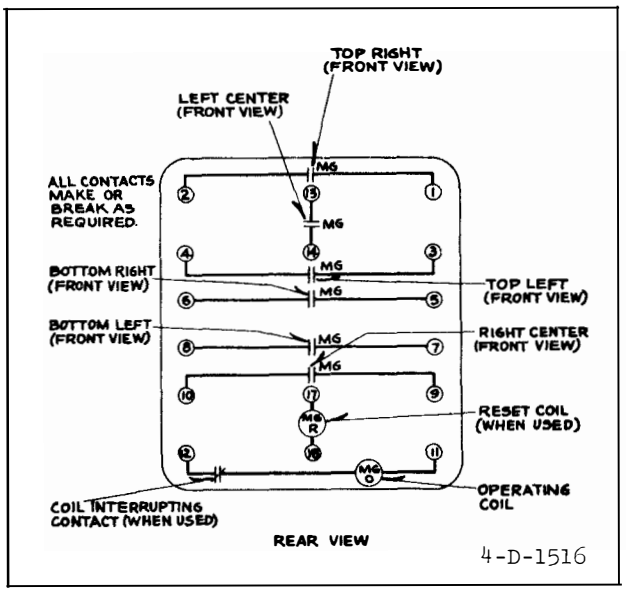


Fig. 6—Internal Schematic of the Type MG-6 Relay in the Standard Case.

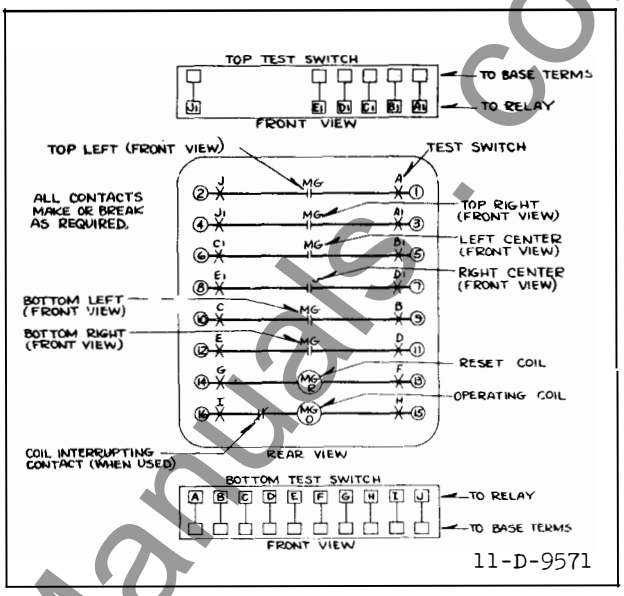


Fig. 7—Internal Schematic of the Type MG-6 Relay in the Type FT Case.

Current	Volts A-C
30	115
20	230
15	460
10	575
Current	**Volts D-C**
30	12
15	24
10	32
8	48
3	125
1	250

The type MG-6 relay for a-c can be used with any combination of contacts, but the d-c relay cannot have more than four circuit-opening contacts if the normal contact pressures and armature travel are maintained.

* INSTALLATION

The relays should be mounted on switchboard panels or their equivalent in a location free from dirt, moisture, excessive vibration and heat. Mount the relay vertically by means of the two mounting studs for the standard cases and the type FT projection case or by means of the four mounting holes on the flange for the semi-flush type FT case. Either of the studs or the mounting screws may be utilized for grounding the relay. The electrical connections may be made direct to the terminals by means of screws for steel panel mounting or to terminal studs furnished with the relay for ebony-asbestos or slate panel mounting. The terminal studs may be easily removed or inserted by locking the two nuts on the studs and then turning the proper nut with a wrench.

Relays in the rear-connected moulded cases should be mounted and electrically connected similar to the other projection cases. The lower mounting stud may be used to ground the electromagnet iron. The hexagon-shaped terminal inserts are slightly loose in the base but this does not affect the electrical connections. Only the two mounting studs should be used to secure the relay to the panel. Removal of terminal insert end-play (in the case of thick-panel mounting) by turning a nut on the terminal stud tightly against a large diameter washer (not supplied) at the rear of the panel should not be attempted as this may distort the relay base and affect the adjustments, or possibly damage the relay. Relays in the front-connected moulded cases should be mounted by four screws through the sides of the base as indicated in the drilling plan.

ADJUSTMENTS AND MAINTENANCE

The relays are shipped from the factory correctly adjusted for armature travel and for

contact follow and pressure, and it should not be necessary to disturb these adjustments. The relays normally are shipped with all contacts assembled for circuit-closing operation. To convert them for circuit-opening operation, it is necessary merely to loosen the mounting screw for the stationary contact bracket, turn this bracket over, and tighten the screw. After reversing the position of the contact brackets, it may be necessary to bend them slightly to obtain contact follows approximately as stated in the fourth paragraph of this section. On a d-c relay not more than four contacts can be assembled in the circuit-opening position if normal contact pressure and travel are maintained.

If a relay has been dismantled and is being reassembled, the following adjustments should be made or checked. Reference should be made to Figs. 1 and 2 for identification of the parts mentioned in these instructions.

The armature stop nut should be adjusted so that when the armature is in contact with it the lower edge of the armature is 7/16" above the position which it assumes when the relay is energized. When adjusting the armature spring tension, the locking screw for the spring adjusting screw is loosened, and this adjusting screw is turned (inward, to reduce the spring tension) until the spring barely holds the armature against the stop nut. The relay must be in its normal vertical position when this adjustment is made, with all contacts assembled as circuit-closing. The armature spring should then be tightened by turning the adjusting screw 4 turns counter-clockwise for a-c relays or 2 turns for d-c relays, (except 4 turns for d-c relays with coil-interrupting contacts) and the locking screws should be tightened. If the relay is being used with a number of break contacts, it may be necessary to increase the spring tension to obtain full follow on the break contacts. The adjusting screw should be turned just enough farther to obtain full follow.

The follow of the moving contact fingers should be 3/32" for the make contacts and 1/16" for the break contacts, measured at the contacts. This can be checked more conveniently by measuring the travel of the lower edge of the armature after the contacts touch. This should be approximately 1/8" for the make contacts and 3/32" for the break contacts. In case moving contact fingers have been removed from their guide pins, it is important that the coil springs on the two sides of the fingers be replaced correctly. The springs which are compressed by circuit-closing contacts are approximately three times as strong as the ones compressed by circuit-opening contacts and thus they can be readily distinguished. The positions of the two springs are reversed at the two ends of the relay.

When special contacts are supplied for make-before-break operation, the stationary members of the special contacts are bent equally toward their respective moving contacts to obtain "make" at the point where the "break" moving contact has approximately 1/16" follow before parting from its stationary contact.

If an a-c relay is to be used with a series resistor so that the relay can be dropped out by shorting the coil, either the resistance value must be such that the watt consumption with the coil shorted will be quite high or the relay armature spring tension must be reduced to about 1-1/2 turns and the follow of the stationary make contacts must be reduced (by bending) to about 1/16". With the reduced armature spring tension, not more than two of the contacts can be used as break contacts. Because of the low relay impedance with armature open as compared to the impedance with armature closed, it is not advantageous to use a resistor in series with a coil rated at less than line voltage, as in the case of d-c applications. For the contact and spring adjustments specified above, a 60 cycle MG relay with voltage rating equal to the line voltage can be used with a series resistor which will take about 90 watts when directly across the line. Of course, if the coil will be shorted only momentarily or if a higher watt consumption is not objectionable, it may be unnecessary to reduce the spring tension or contact follow.

If the complete armature assembly is to be removed from the relay, the screws which

fasten the lower ends of the moving contact leads to the terminals should be removed, the armature spring tension adjusting screw should be turned in as far as possible, and the armature stop nut should be removed. The upper end of the armature spring should then be slipped off of the grooved member at the lower end of the adjusting screw, and the armature should be lifted off of its bearing carefully so as to avoid distortion of the coiled leads. The leads to the upper center moving contacts are not coiled but the coiling of the four other moving contact leads should be such that when the relay base is horizontal and the armature is on its bearings and approximately at its mid-position, the lead terminals will just touch the base terminal inserts or be within about 1/8" of that position. A pair of tweezers on which the ends are bent at a right angle to the body, or a similar tool, is useful in replacing the upper end of the spring in the groove of the adjusting member. Such a tool is particularly helpful on relays which have an electrical reset assembly.

On latch-type relays the latch screw is adjusted so that with the armature latched and the operating coil de-energized, there will be a gap of between .005 and .010 inch between the electromagnet pole face and the raised section of the armature which strikes the pole face. The locking screw should be tightened securely after making this adjustment. There is a small amount of clearance between the armature and its supporting posts, and in order to insure proper operation allowance must be made for this in the following manner. With the armature held against its left-hand support and nearly closed, the latch spring or reset armature should be moved to the left as far as it will go by means of the hand reset. To assure that the latch will always release the armature the resulting space between the latch and the latch screw should be at least .005 inch, and should not be more than about 1/64". This should also be checked electrically if electrical reset is provided. Some change of this gap can be made by loosening the mounting screws in the relay base and moving the latch support in the desired direction. The gap also can be changed by loosening the two screws which hold the moving contact insulation block to the armature and shifting the armature in the desired direction.

On electrical reset relays, the tension of the spring which draws the reset armature toward the latch screw must be adjusted if these parts are being reassembled. The locking screw (Fig. 2) is screwed out until its head clears the head of the adjusting screw. The main armature is then held completely closed and against its right hand support, and the latch spring tension adjusting screw is turned until the latch barely touches the stop projecting from the center of the latch screw. Then the latch spring tension should be increased by turning the screw clockwise 5 turns, and the locking screw should be tightened.

If either the core nut of the electrical reset assembly or the screws which mount its armature have been loosened, the relative positions of the core and plunger may shift sufficiently to cause the plunger to strike on the side of the conical core opening. To assure correct alignment of these parts, .042 diameter holes are provided through the center of the core and about 1/16" deep in the center of the plunger. After tightening the core nut, a close fitting pin should be inserted through the core and into the plunger. With the pin in place, and plunger pressed firmly against the core, and the mounting end of the armature centrally located with respect to the electromagnet, the two armature mounting screws should be tightened. The pin then should be removed.

A slight amount of medium viscosity slushing oil is supplied at the factory to the polished and hardened surfaces of the latch screw and the latch plate to minimize wear and as protection against corrosion. Oil should be reapplied after any cleaning and reassembling of these parts, and it is desirable also to renew this at the regular maintenance periods.

If the relay is provided with a coil-interrupting contact, the following points must be observed to assure satisfactory operation. The latch screw should be adjusted so that with the armature in the latched position and the operating coil deenergized, the gap

between the armature and the lower pole face of the electromagnet is only .005 inch. With the armature in this position the coil interrupting contact should be open by about 1/16 inch. This gap is adjusted at the factory by varying the number of slotted shims used between the relay base and the contact supporting bracket. The two main contacts at the lower end of the base should be assembled as circuit-opening contacts, and the main armature restraining spring should have 4 turns tension (see 3rd paragraph of this section) for DC as well as for AC relays. It is necessary also that the L-shaped spring which carries the moving member of the coil-interrupting contact have its sides approximately straight before assembly with the supporting bracket, and that the angle between the sides be approximately 80°.

All contacts should be periodically cleaned with a fine file. S#1002110 file is recommended for this purpose. The use of abrasive material for cleaning contacts is not recommended, because of the danger of embedding small particles in the face of the soft silver and thus impairing the contact.

REPAIRS AND RENEWAL PARTS

Repair work can be done most satisfactorily at the factory. However, interchangeable parts can be furnished to the customers who are equipped for doing repair work. When ordering parts, always give the complete nameplate data.

ENERGY REQUIREMENTS

Operating Coil Burdens at Rated Voltage

Frequency (cycles)	Closed Gap Watts	Closed Gap Volt-Amps	Open Gap Watts	Open Gap Volt-Amps
25	6.8	23	19.6	53
50	9.8	31	17.4	78
60	12.	37	17.6	92
D-C	7.8 cold--		7.8 cold-	
D-C	6.5 hot --		6.5 hot -	

Reset Coil Burdens at Rated Voltage

Frequency (Cycles)	Closed Gap Watts	Closed Gap Volt-Amps	Open Gap Watts	Open Gap Volt-Amps
25	23	26	24	27
50	18	23	20	25
60	23	32	26	36
D-C	31 cold --		31 cold --	

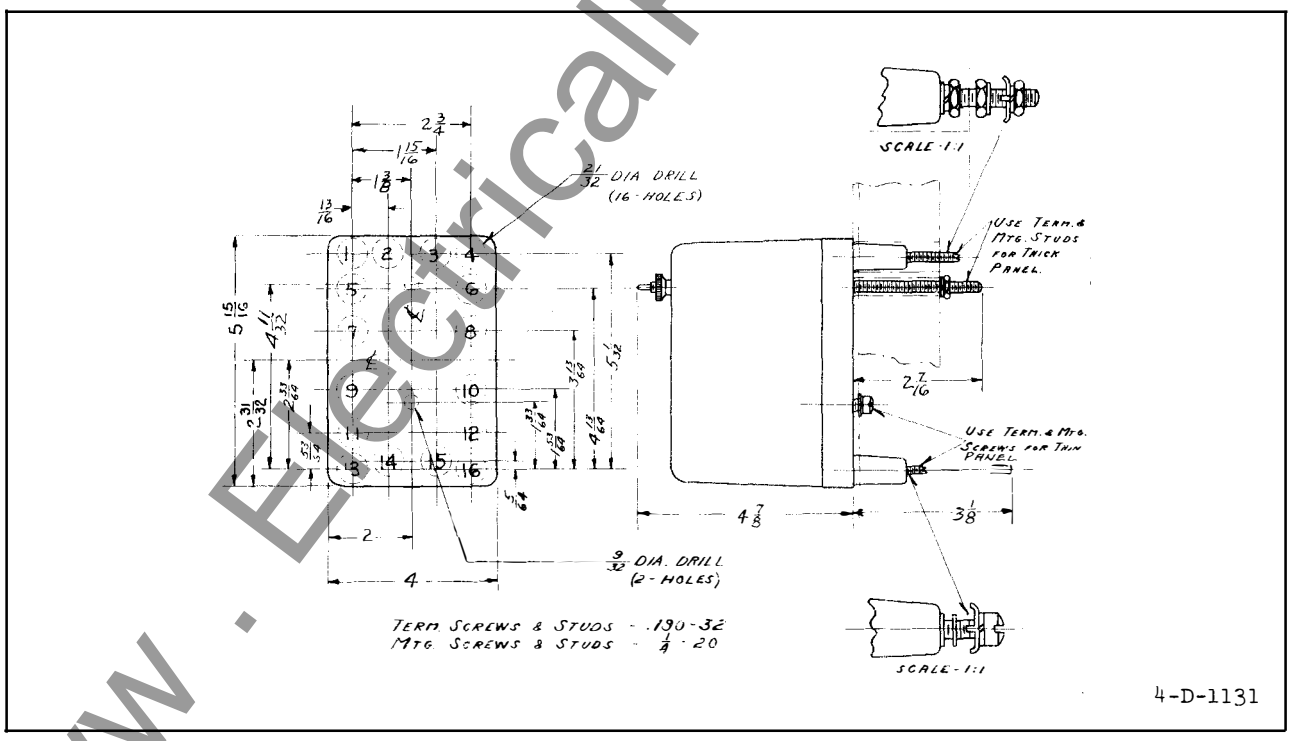


Fig. 8—Outline and Drilling Plan for the Type MG-6 Relay in the Rear Connected Molded Case. See the Internal Schematic for the Terminals Supplied. For Reference Only.

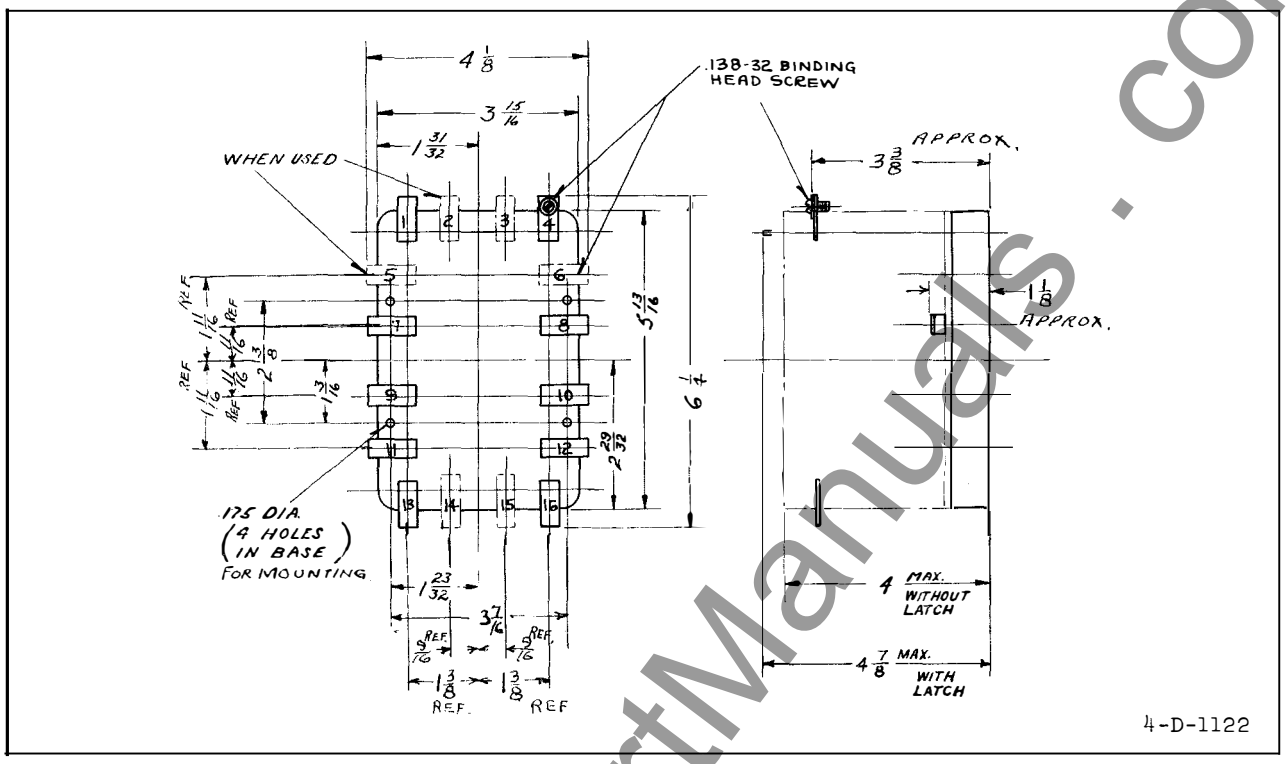


Fig. 9—Outline and Drilling Plan for the Type MG-6 Relay in the Front Connected Molded Case. See the Internal Schematic for the Terminals Supplied. For Reference Only.

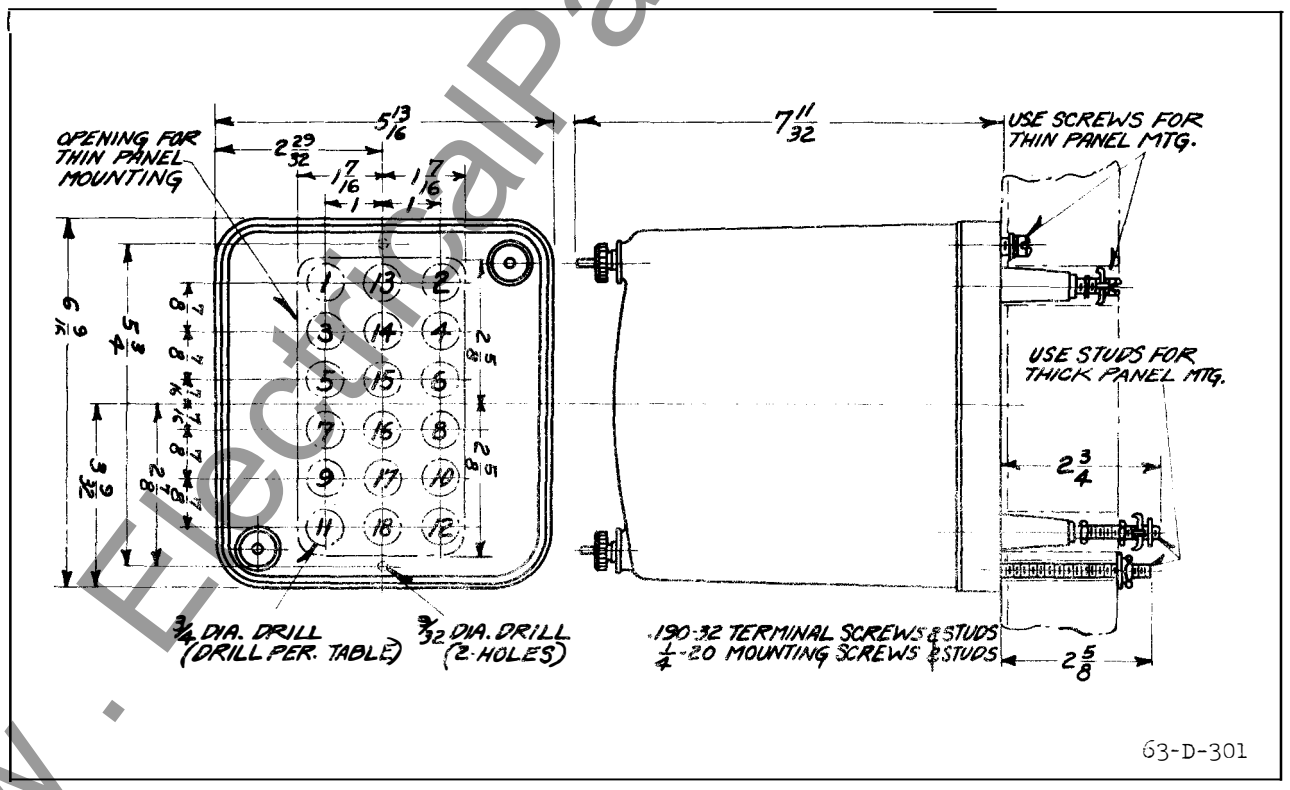


Fig. 10—Outline and Drilling Plan for the Type MG-6 Relay in the Standard Projection Case. See the Internal Schematics for the Terminals Supplied. For Reference Only.

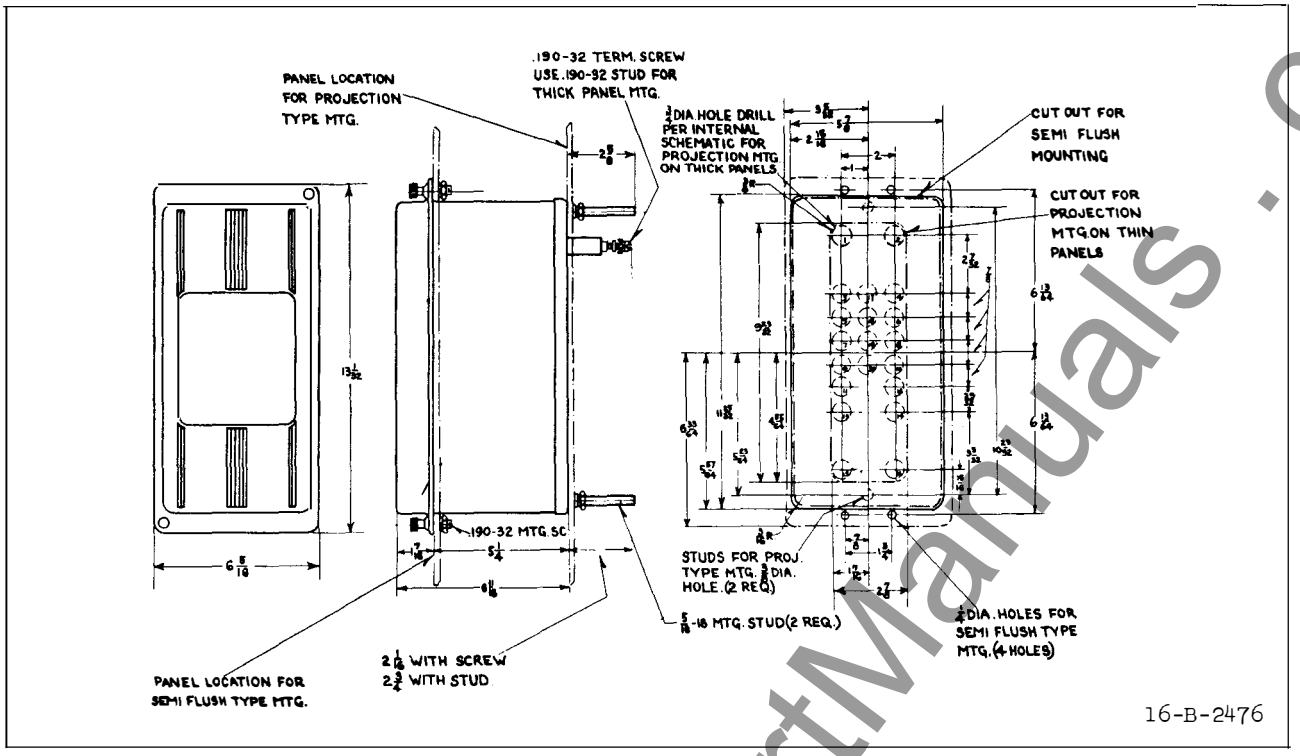


Fig. 11—Outline and Drilling Plan of the S20 Projection or Semi-Flush Type FT Flexitest Case. See the Internal Schematics for the Terminals Supplied. For Reference Only.

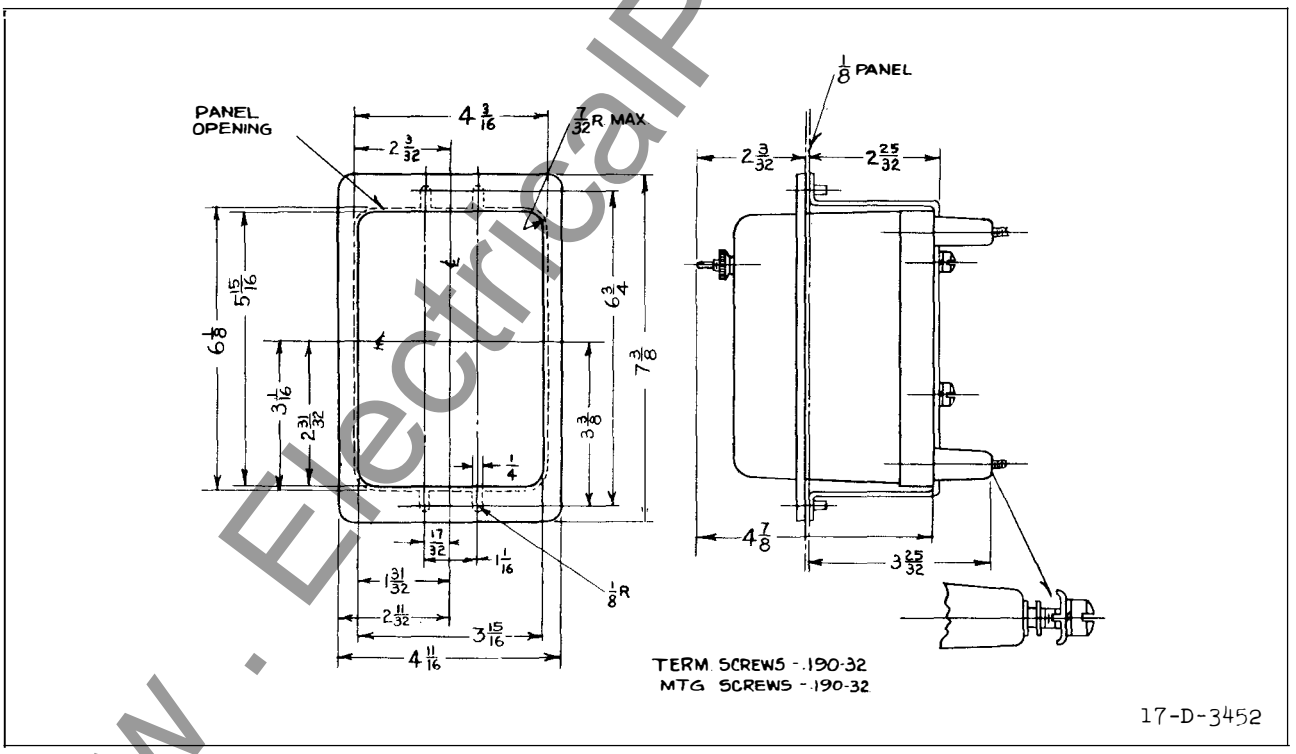


Fig 12—Outline & Drilling Plan for the Moulded Semi-flush Type Case. For Reference Only.

WESTINGHOUSE ELECTRIC CORPORATION

METER DIVISION • **NEWARK, N.J.**

Printed in U. S. A.