GEK-65602B

INSTRUCTIONS

RECLOSING RELAYS

TYPES HGA18M, HGA18N

GE Protection and Control
205 Great Valley Parkway
Malvern, PA 19355-1337

APPLICATION

The Type HGA18M and HGA18N reclosing relays are usually applied with transmission line circuit breakers where a single high-speed reclosure is desired, and if this single reclosure attempt is unsuccessful, it is desired to lock out the breaker. The external connections for such an application of the HGA18M relay are shown in Figure 1 where two 52/b contacts are available, or in Figure 2, when only one 52/b contact is available. Note in Figure 2 that when only a single 52/b contact is used, an external blocking diode is required to avoid a sneak circuit.

Typical external connections for the AC relay, Type HGA18N, are shown in Figure 3. Operation of the reclosing relay is initiated by a 52/b contact when the breaker opens, and reclosing of the breaker is by means of the indicated circuit breaker control device.

A capacitor discharge resistor is provided between terminals 6 and 9 of the relay case to provide a means of disabling the reclosing relay by use of an external contact if desired. For example, the user may wish to permit a reclosure following a high-speed pilot trip, but cancel reclosing following a delayed backup trip. This external reclose-cancel contact should be an electrically separate contact (i.e., "dry" contact) to avoid the possibility of a sneak circuit introduced by protective relay circuits.

When making the connections, it is important to note that the operating and holding coils produce flux in the same magnetic circuit. Therefore, the polarity of the connections to these coils, as shown in Figures 1, 2 and 3, must be observed.

GENERAL CONSIDERATIONS

The following general points must be considered when applying automatic reclosing relays:

Interrupting Rating of the Power Circuit Breaker

The derating factor applicable to the interrupting rating of the power circuit breaker should be checked prior to the application of a reclosing relay or the selection of a reclosing cycle.

Closing Control Circuits

When automatic reclosing is used, it is essential that the closing circuits with solenoid mechanisms ensure complete closure of the breaker, even though the auxiliary switch on the breaker mechanism opens before the closure is complete.

Latch-checking Switches

In order to ensure successful operation of a breaker being reclosed by a Type HGA18 relay, the breaker mechanism must be equipped with a latch-checking switch if the mechanism is trip-free. This switch ensures that the mechanism latch is properly set for reclosure before the closing circuit is completed. Latch-checking switches are not required for non-trip-free mechanisms.

Control Switches

A control switch (typically model 16SB1B9) should be provided with automatic reclosing schemes using the Type HGA18 reclosing relays. This switch includes contacts to prevent the breaker from being automatically reclosed after it has been tripped by the control switch. The breaker must be reclosed by means of the switch before the automatic reclosing feature will be restored.

Undervoltage Devices

Where undervoltage devices are involved on the circuit fed by the breaker, it is usually necessary to coordinate the reclosing time and the trip time of the undervoltage device to ensure that the desired results are obtained. Where the undervoltage device is involved in a throw-over scheme, the initial reclosure usually should be faster. Where motor control is involved, it may or may not be desirable for the initial reclosure to be faster. Each application should be checked to determine the required coordination.

Associated Protective Relays

If high-speed reclosing is to be successful, the protective relays that tripped the breaker obviously must reopen their contacts before the breaker recloses. Some of the superseded types of induction time-overcurrent relays are not suitable for use with high-speed reclosing.

If distance relays are supplied from line-side potential, their contacts should be supervised by the contacts of instantaneous fault detectors to ensure that the trip circuit is open before the breaker recloses.

CONSTRUCTION

The components of each relay are mounted on a cradle assembly that can be easily removed from the relay case. The cradle is locked in the case by means of latches at the top and bottom. The electrical connection between the case and cradle blocks is completed through removable connection plugs (see Figure 9). Separate testing plugs can be inserted in place of the connection plugs to permit testing the relay in its case. The cover is attached to the front of the case and includes two interlock arms which prevent the cover from being replaced until the connection plugs have been inserted.

The case is suitable for semiflush mounting on panels. Hardware is available for all panel thicknesses up to two inches; however, panel thickness must be specified when ordering the relay to ensure that the proper hardware will be provided. Outline and panel drilling dimensions are shown in Figures 10 and 11.

Contact circuits of the Type HGA relays are closed or opened by moving contact arms controlled by a hinge-type armature, which in turn is actuated by the operating coil and restrained by an adjustable control spring. The lengths of contact and armature gaps are adjusted by means of screw contacts and locknuts in the front fixed contact positions. Armature gap (and back contact wipe) can also be controlled by the screws and locknuts located on the moving contact arms. The latter features make it possible to reduce the pickup energy and pickup time to relatively low values. Only one normally-closed contact (not electrically

CONTACT CLEANING

A flexible burnishing tool should be used for cleaning relay contacts. This is a flexible strip of metal with an etched-roughened surface, which in effect resembles a superfine file. The polishing action of this file is so delicate that no scratches are left on the contacts, yet it cleans off any corrosion thoroughly and rapidly. The flexibility of the tool ensures the cleaning of the actual points of contact. Knives, files, abrasive paper or cloth of any kind should never be used to clean relay contacts.

SERVICING

Although the relay has been adjusted at the factory, a check may show that adjustments have been disturbed. The following adjustments can be made to restore the desired operation.

The contact wipe, measured by the gap between the armature and pole piece when the normally-open contacts just make, should be 0.02 inch. This gap may be obtained by means of the adjusting screws in the moving contact arms. Locknuts on these screws should be tightened after any adjustment.

Minimum recommended contact gap is 1/16 inch. This can be set by turning the right-hand contact screw in until the normally-open contacts are just making, backing it off 3-3/4 turns, and then locking it securely in position by means of the locknut. If the contact gaps are made shorter, the interrupting ratings listed no longer apply.

The resetting time of the relay is the time required for the capacitor to store sufficient energy to operate or pick up the relay unit. Steady-state DC voltage required to pick up the relay unit is considerably less than the capacitor voltage required. Control spring tension of the relay may be changed for slight adjustments of the resetting time. This is done by changing the position of the spring in the notches on the armature tail, or by shifting it from one hole to the other of the anchor pin. If it is not possible to increase reset time to 15 seconds by adjusting the spring, it is permissible to increase the armature gap by means of the back contact until the required charging time is obtained. The contact gap in this case will be approximately 1/8 inch.

The charging resistor, R1, and capacitor were selected to provide the normal resetting time at rated voltage; however, longer or shorter resetting time may be obtained by changing the values of these components. For longer times change the capacitor; for shorter times, change the resistor. The new value of resistance or capacitance may be selected using the following formulae:

$$R1A = \frac{T_2}{T_1} R1$$

and

$$C_2 = \frac{C1}{T_1} (T_2 - T_1)$$

where:

R1 = resistance (in ohms) in relay as shipped

R1A = resistance (in ohms) required for desired resetting time

T_1 = rated resetting time (in seconds) of relay

T_2 = desired resetting time (in seconds)

C_1 = capacitance in microfarads in relay as shipped

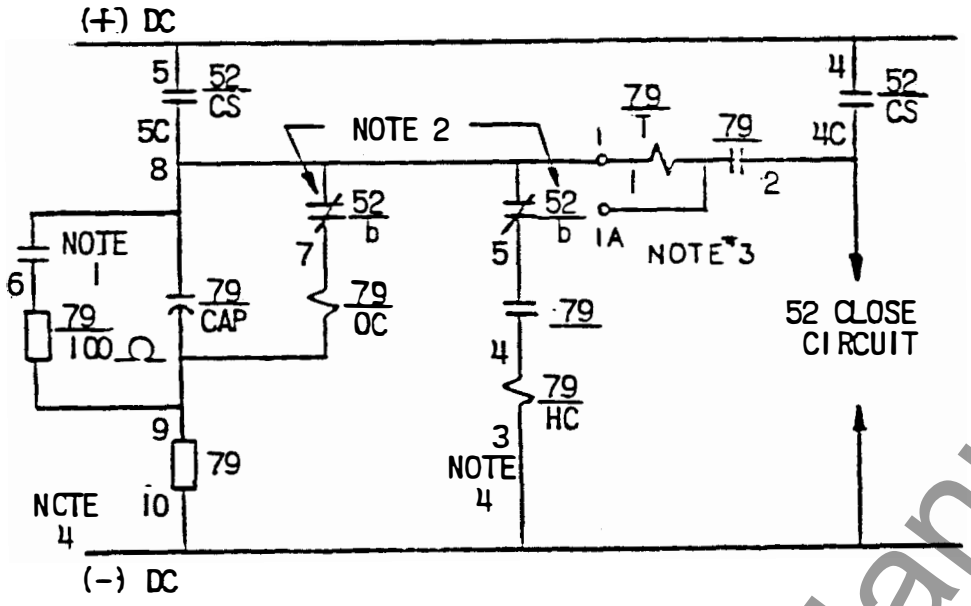
C_2 = added capacitance in microfarads across terminals 8 and 9.

RENEWAL PARTS

Sufficient quantities of renewal parts should be kept in stock for the prompt replacement of any that are worn, broken or damaged.

When ordering renewal parts, address the nearest Sales Office of the General Electric Company. Specify the name of the part wanted, quantity required, and complete nameplate data, including the model number of the relay.

Since the last edition, Figures 10 and 11 have been revised.



52/CS I6SBIB9		CLOSE	NOR AFT CLOSE	NCR AFT TRIP	TRIP
1 2	1				X
	2				X
3 4	3		X	X	
	4	X			
5 6	5	X	X		
	6	X	X		

INTERNAL

79 - HGAI8M 0285A5704

OC - OPERATE COIL

HC - HOLDING COIL

T - TARGET

CAP - CAPACITOR

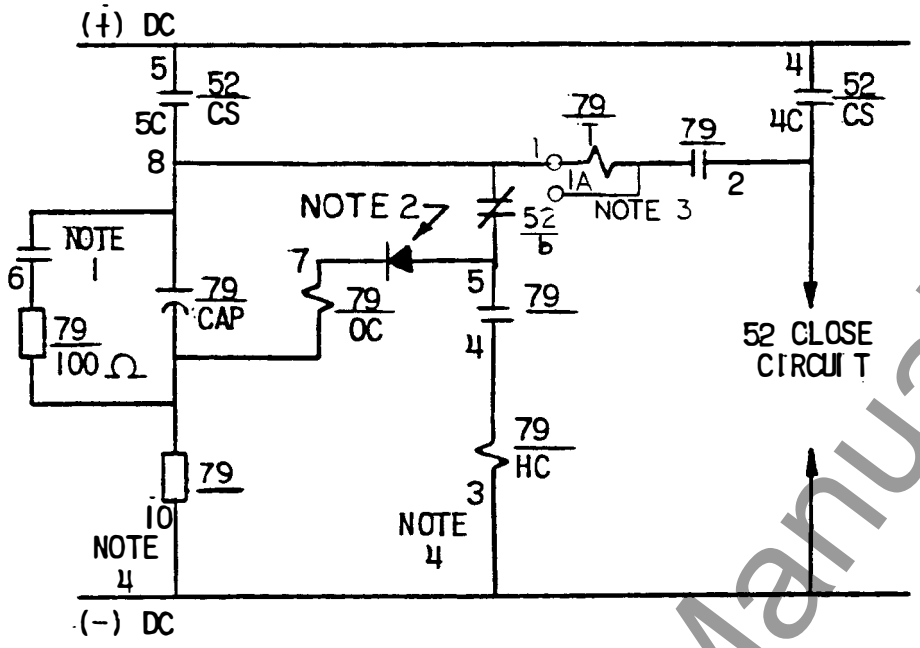
NOTE 1: DISABLING CONTACT, TO BE SUPPLIED BY USER.

NOTE 2: TWO BREAKER b SWITCHES ARE NECESSARY TO AVOID A SNEAK CIRCUIT. WHEN ONLY ONE b SWITCH IS AVAILABLE, SEE DRAWING 0285A6287

NOTE 3: IF TARGET OPERATION IS NOT DESIRED, SHIFT INT. JUMPER FROM IA TO 1.

NOTE 4: TERMINALS 3 AND 10 MUST BE OF SAME D-C POLARITY.

Figure 1 (0285A6286-0) Typical External Connections of Type HGA18M Relay Where Two 52/b Contacts are Available



INTERNAL

52/CS 16SB1B9		CLOSE	NOR AFT CLOSE	NOR AFT TRIP	TRIP
1 2	1				X
	2				X
3 4	3		X	X	
	4	X			
5 6	5	X	X		
	6	X	X		

79 - HGA18M 0285A5704
OC - OPERATING COIL
HC - HOLDING COIL
T - TARGET
CAP - CAPACITOR
RECTIFIER 295B233
G12 48 OR 125V DC
G13 250V DC

NOTE 1: DISABLING CONTACT, TO BE SUPPLIED BY USER.

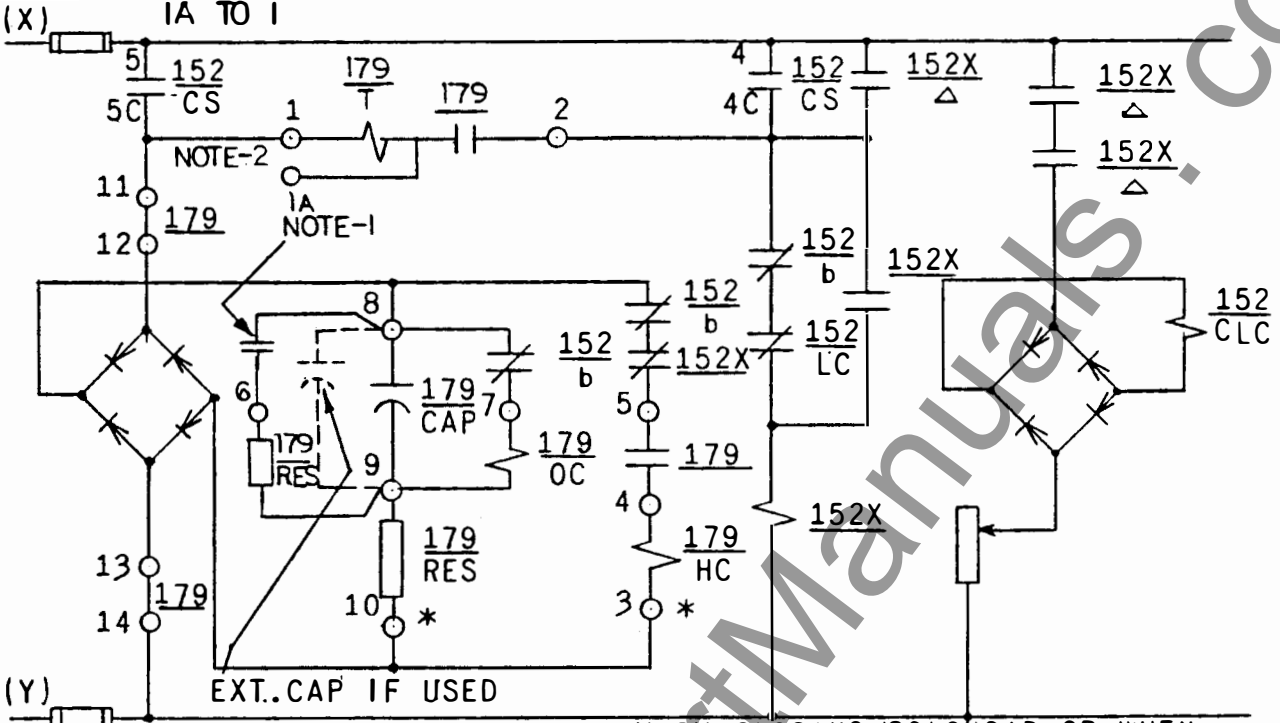
NOTE 2: RECTIFIER IS NECESSARY TO AVOID SNEAK CIRCUIT WHEN USING ONE BREAKER b SWITCH FOR INITIATION. SEE ALSO DRAWING 0285A6286

NOTE 3: IF TARGET OPERATION IS NOT DESIRED SHIFT INTERNAL JUMPER FROM 1A TO 1.

NOTE 4: TERMINALS 3 AND 10 MUST BE OF SAME D-C POLARITY.

Figure 2 (0285A6287-0) Typical External Connections of Type HGA18M Relay using One 52/b Contact and a Blocking Diode

NOTE 1: DISABLING CONTACT, TO BE SUPPLIED BY USER
NOTE 2: IF TARGET OPERATION IS NOT DESIRED SHIFT INTERNAL JUMPER FROM 1A TO 1



CONTACTS HANDLE END		CLOSE	NORM. AFTER CLOSE	NORM. AFTER TRIP	TRIP
1 2	1				X
	2				X
3 4	3		X		
	4	X		X	
5 6	5	X	X		
	6	X	X		

CONTROL SWITCH (152CS) MODEL 16SBIB9- SPRING RETURN TO NORMAL- X DENOTES CONTACT CLOSED- CONTACTS SHOWN IN NORMAL AFTER CLOSE POSITION.

LEGEND

SYMBOL	DEVICE	DESCRIPTION
152		CIRCUIT BREAKER
152CLC		CIRCUIT BREAKER CLOSING COIL
152b		CIRCUIT BREAKER AUXILIARY SWITCH
152CS	16SBIB9	CIRCUIT BREAKER CONTROL SWITCH
152LC		CIRCUIT BREAKER LATCH CHECKING SWITCH
152X	K-6375988	CIRCUIT BREAKER CONTROL DEVICE
179	HGA18N	RECLOSING RELAY
179 CAP		RECLOSING RELAY CAPACITOR
179HC		RECLOSING RELAY HOLDING COIL
179 OC		RECLOSING RELAY OPERATING COIL
179 RES		RECLOSING RELAY CHARGING RESISTOR
179T		RECLOSING RELAY TARGET

* = TERMINALS 3 AND 10 MUST BE OF THE SAME POLARITY.

Figure 3 (0285A6288-0) Typical External Connections for Type HGA18N Relay

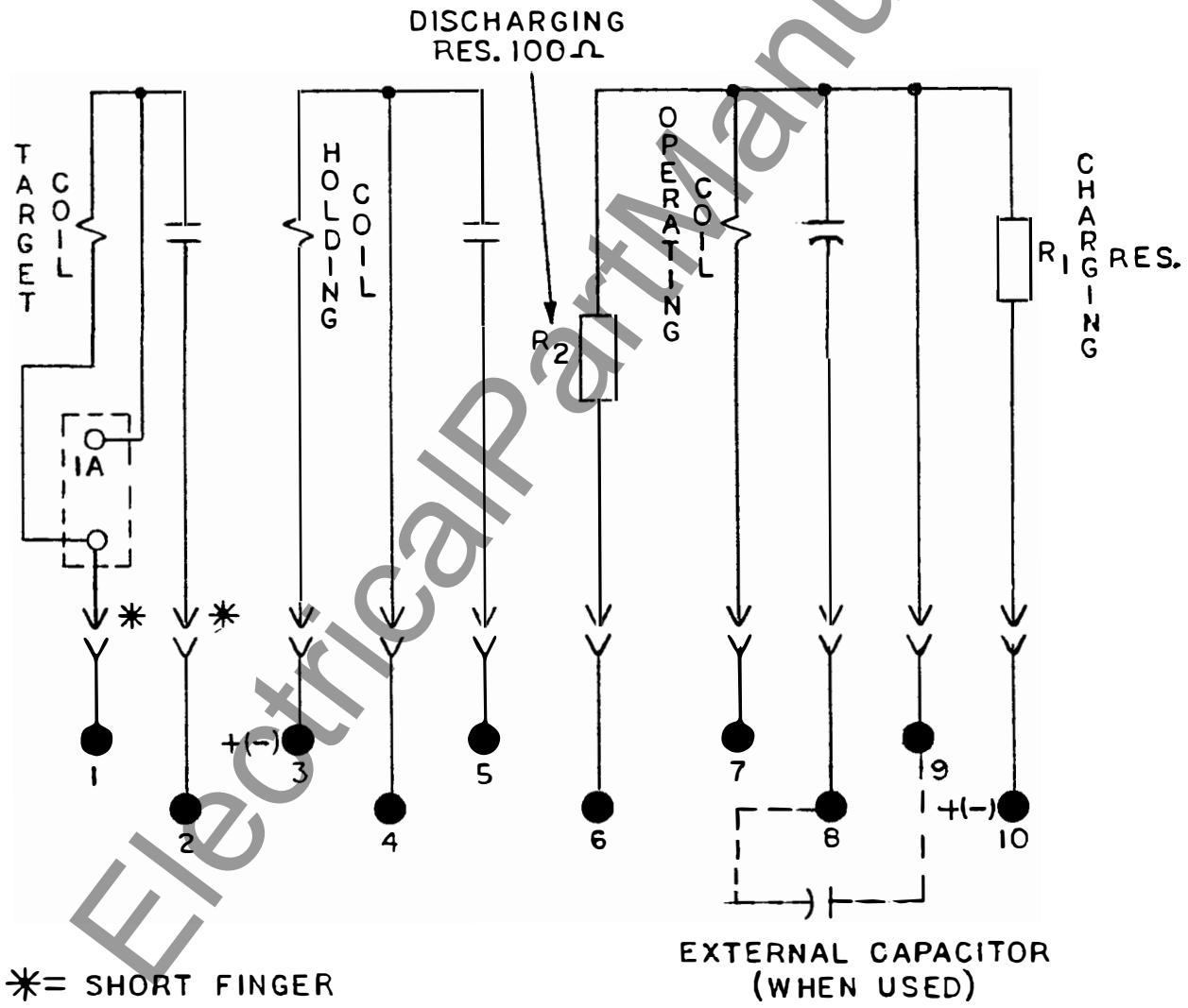


Figure 4 (0285A5704-0) Internal Connections Diagram for
Type HGA18M Relay (Front View)

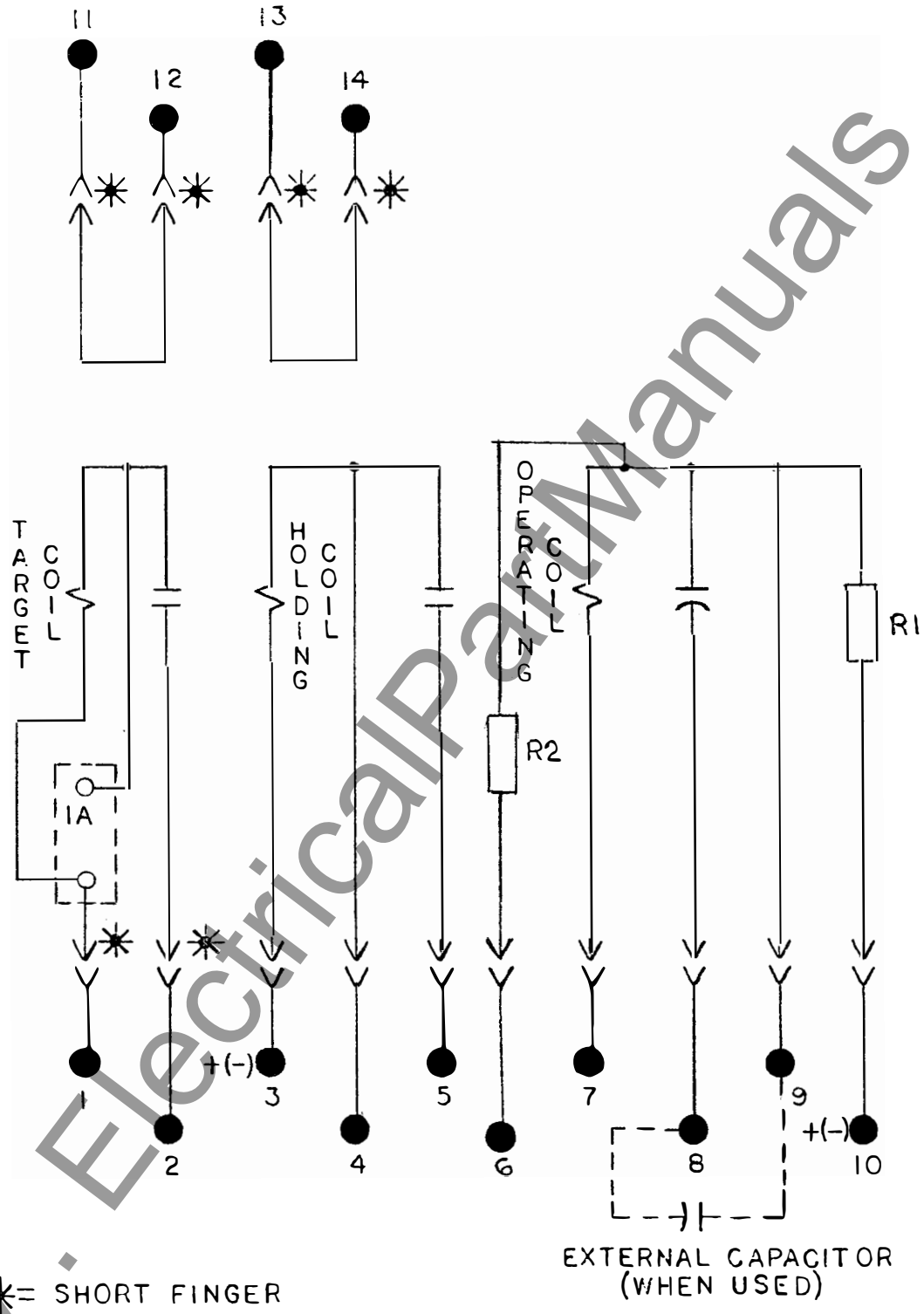
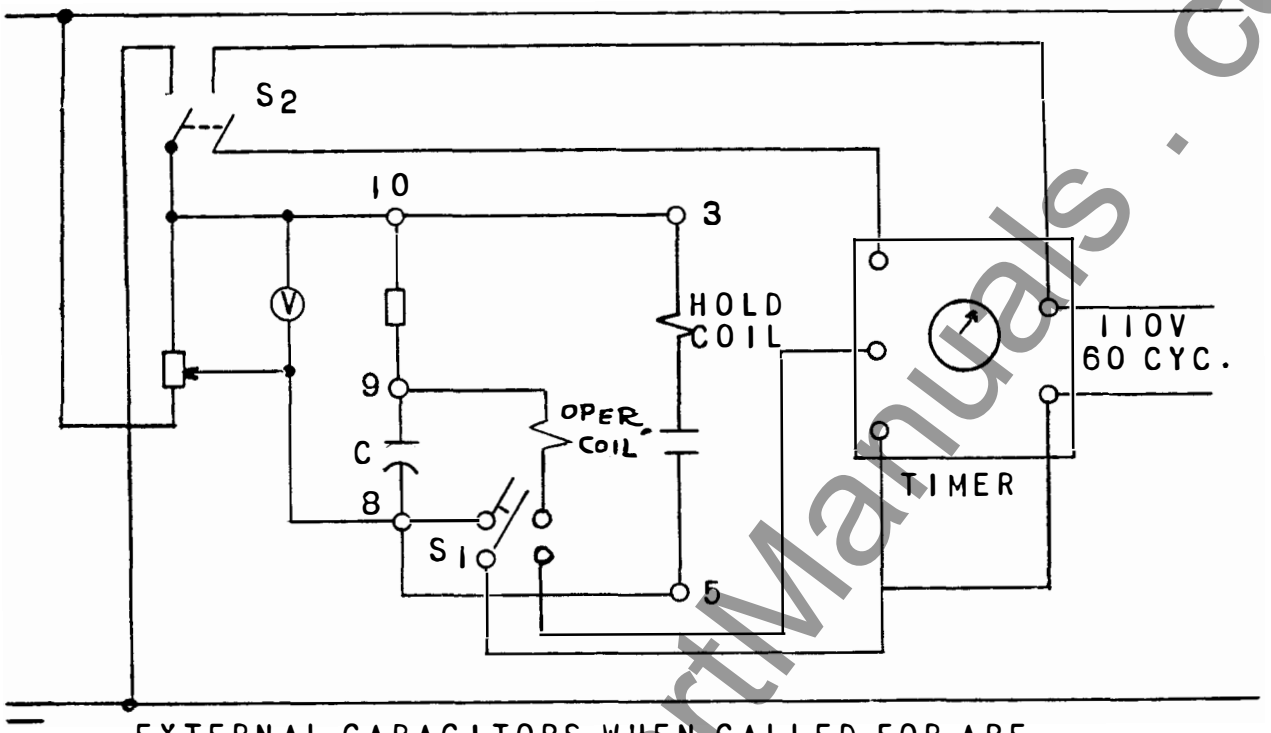
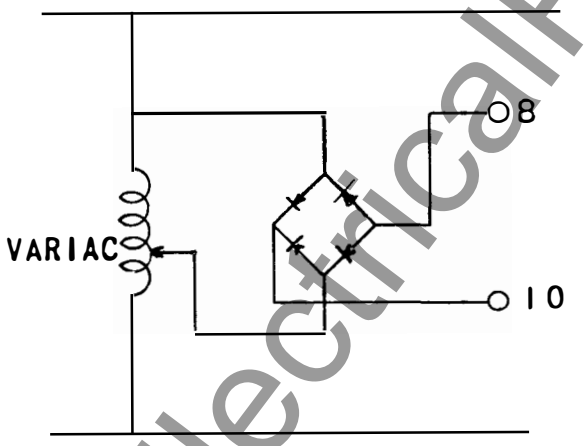


Figure 5 (0285A5705-1) Internal Connections Diagram for Type HGA18N Relay (Front View)



EXTERNAL CAPACITORS WHEN CALLED FOR ARE CONNECTED BETWEEN STUDS 8 AND 9.



FOR FULL WAVE RECTIFIED SOURCE OTHERWISE SAME AS ABOVE FIGURE.

Figure 6 (6400546-4) Testing Connections for Type HGA18M and HGA18N Relays

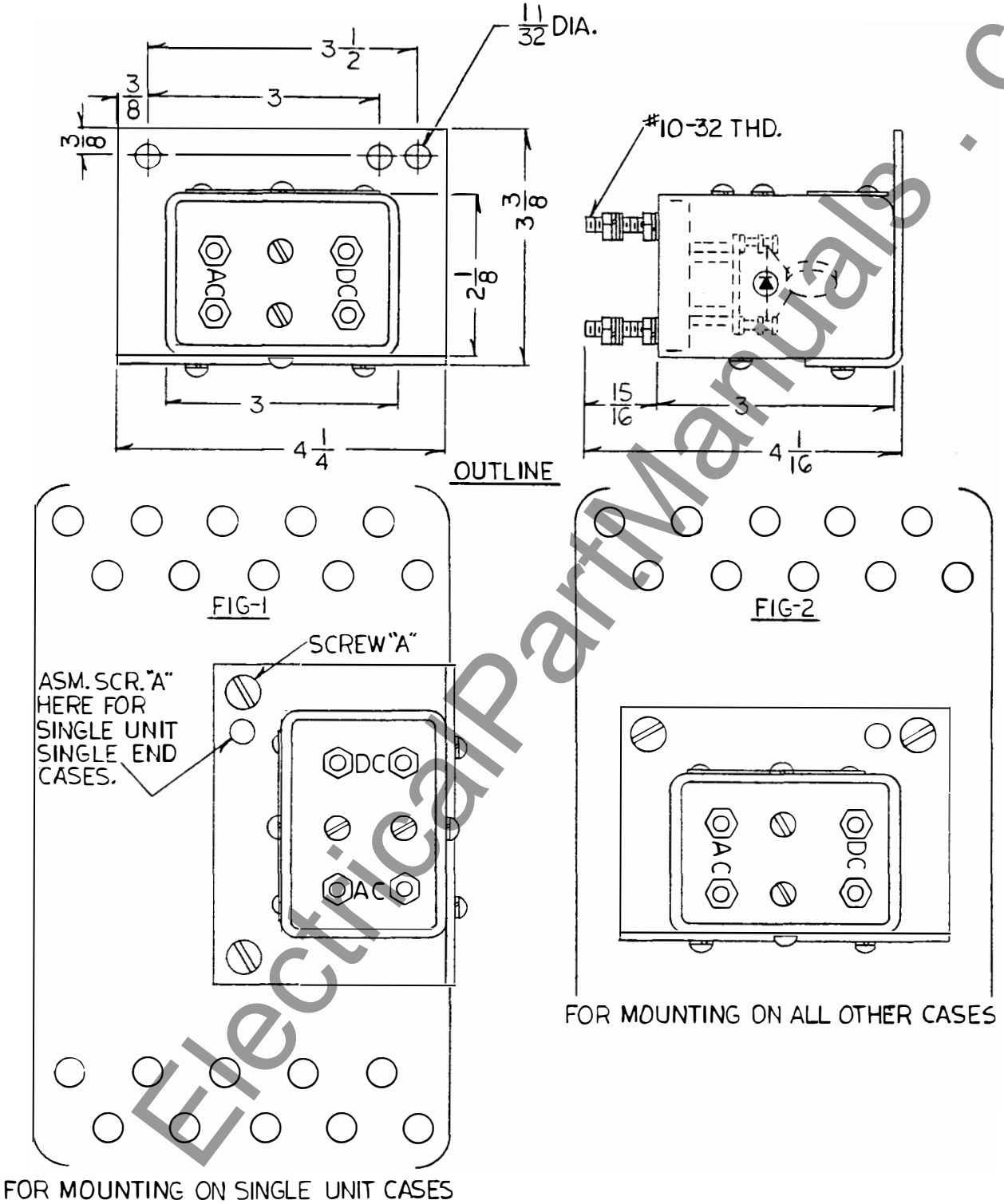
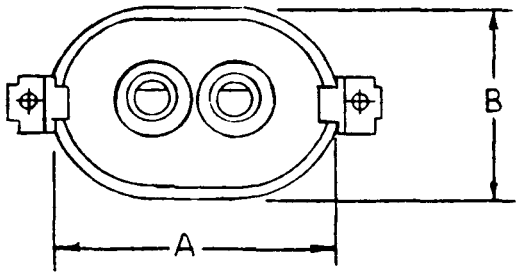
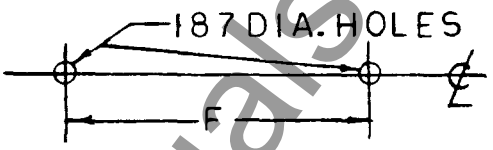


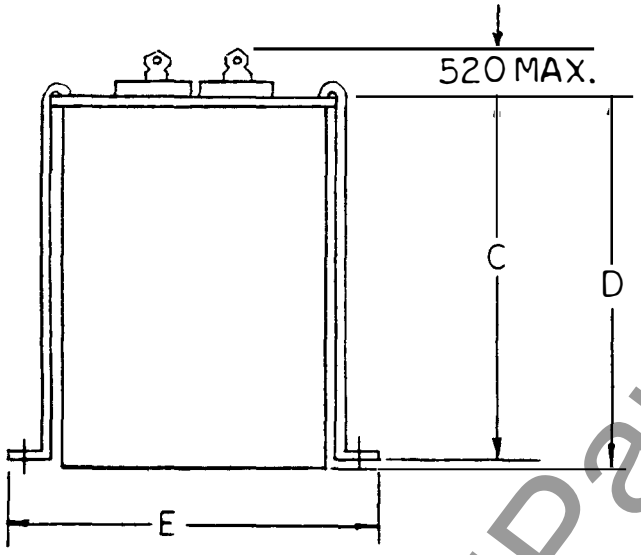
Figure 7 (0246A6996-0) External Rectifier Outline and Panel Drilling for Type HGA18N Relay



PLAN VIEW



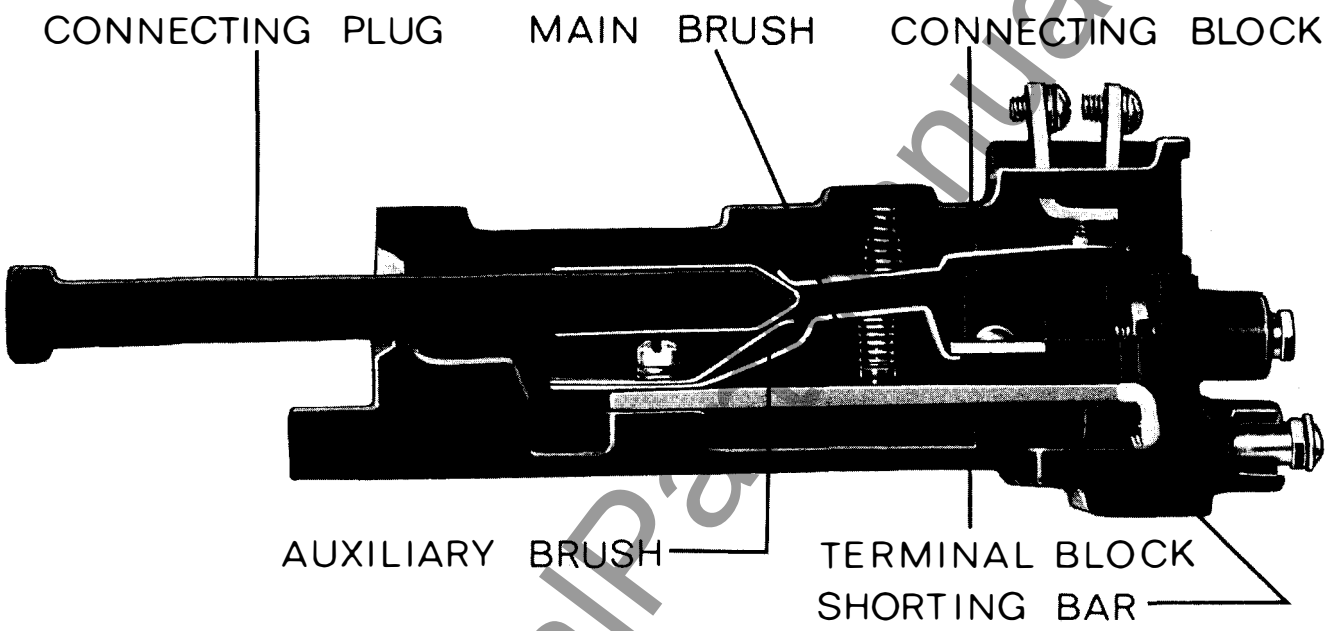
DRILLING PLAN



FRONT VIEW

CAPACITOR 0246A9024		BRACKET 0302C0920	DIMENSIONS					
PART NO.	µf	PART NO.	A	B	C	D	E	F
0250A	2.5	210	2.16	1.31	2.016	2.12	3.000	2.562
0300A	3.0	210	2.16	1.31	2.016	2.12	3.000	2.562
0400A	4.0	205	2.16	1.31	3.391	3.50	3.000	2.562
0500A	5.0	178	2.16	1.31	2.672	2.88	3.000	2.562
0600A	6.0	115	2.91	1.91	3.750	3.88	3.812	3.375
0750A	7.5	178	2.91	1.91	2.672	2.88	3.812	3.375
0800A	8.0	179	2.91	1.91	3.016	3.12	3.812	3.375
1000A	10	115	2.91	1.91	3.750	3.88	3.812	3.375
1200A	12	122	2.91	1.91	4.125	4.25	3.812	3.375
1500A	15	122	3.66	1.97	4.125	4.25	4.562	4.125
2500A	25	213	3.66	1.97	6.641	6.75	4.562	4.125

Figure 8 (0285A6143-0) External Capacitor for Type HGA18 Relays



NOTE: AFTER ENGAGING AUXILIARY BRUSH CONNECTING PLUG TRAVELS 1/4 INCH BEFORE ENGAGING THE MAIN BRUSH ON THE TERMINAL BLOCK

Figure 9 (8025039) Drawout Case Contact Assembly Cut-away

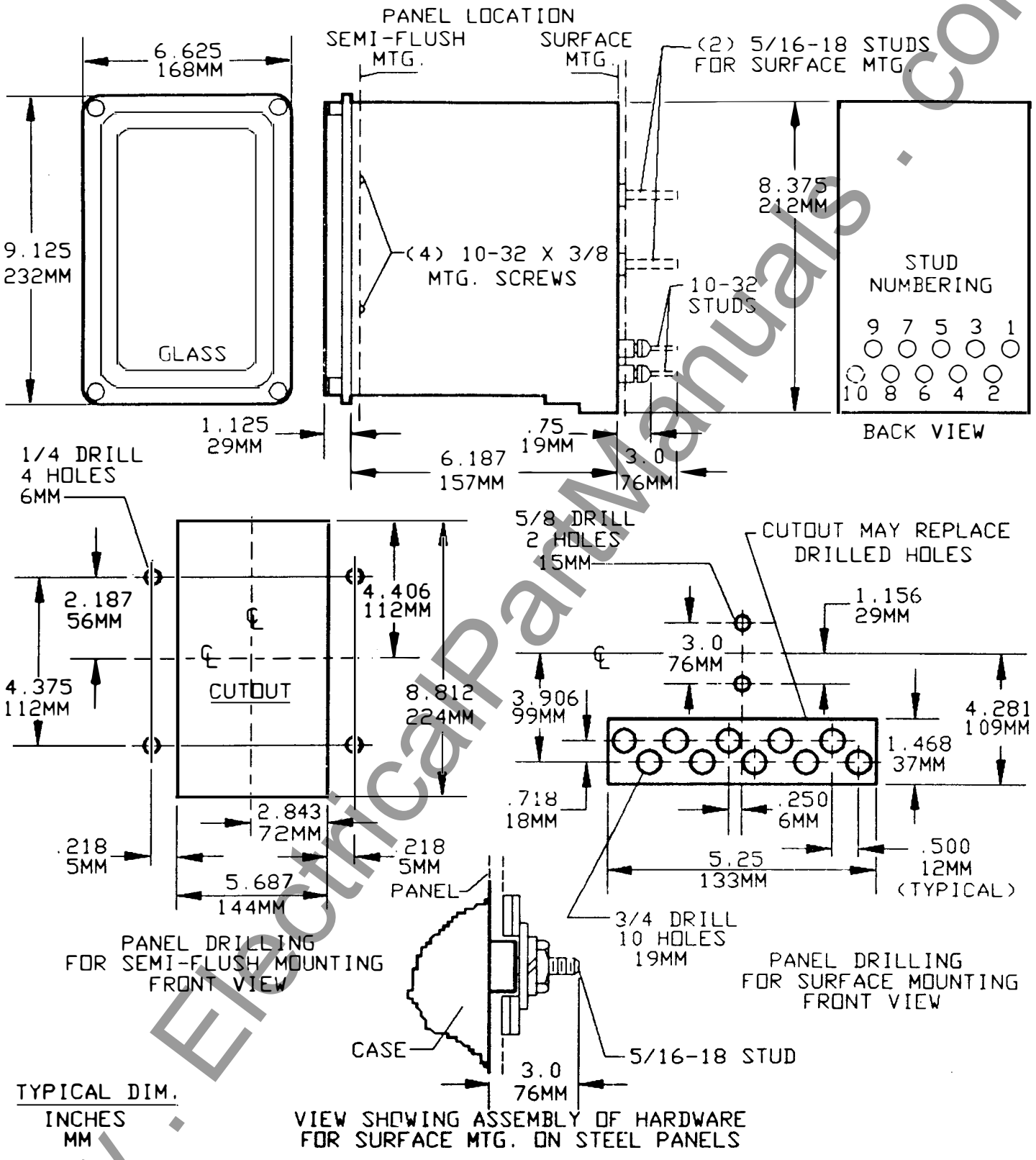


Figure 10 (6209271 [8]) Outline and Panel Drilling Dimensions for Type HGA18M Relay

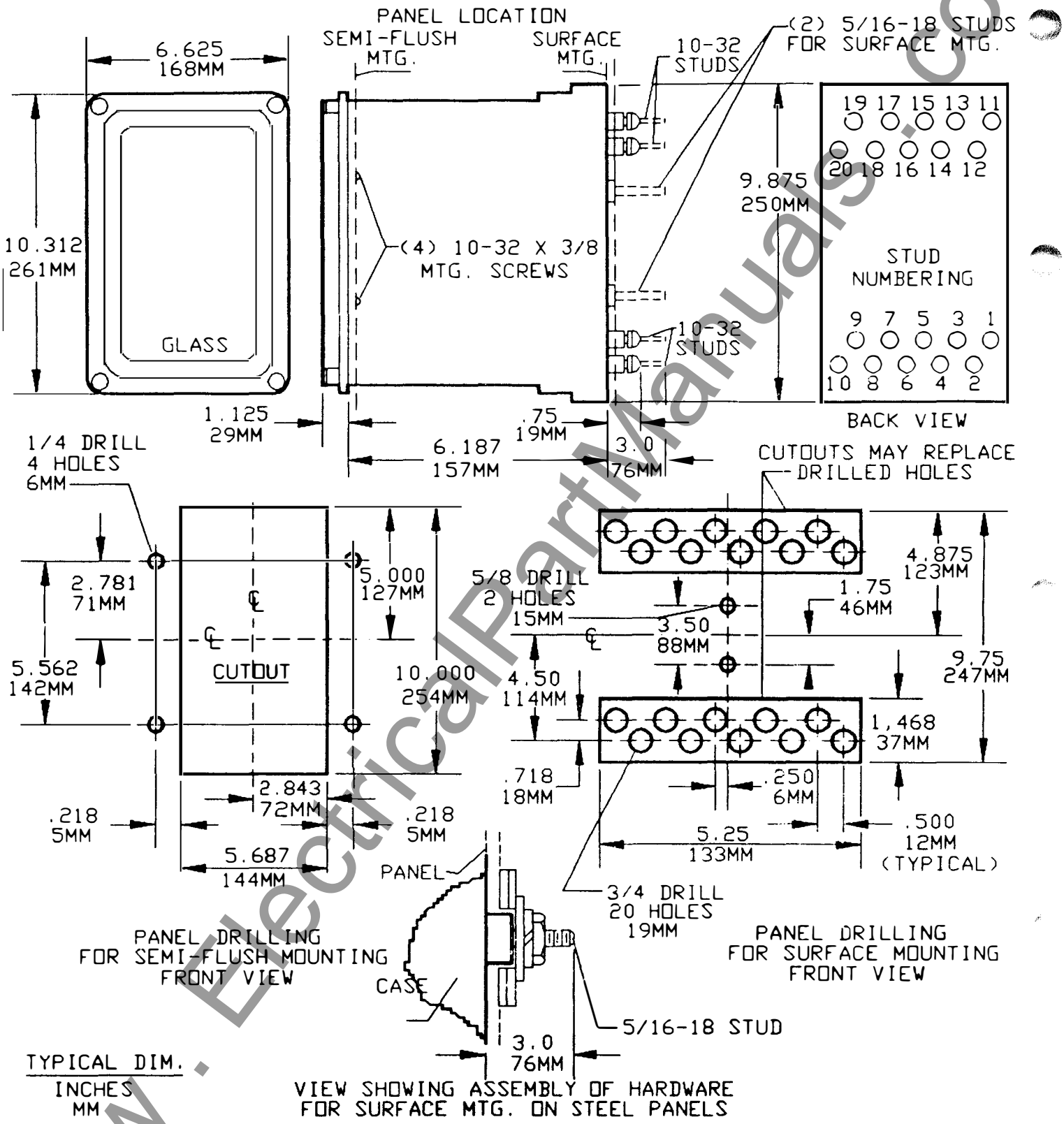


Figure 11 (6209272 [7]) Outline and Panel Drilling Dimensions for Type HGA18N Relay

Protection and Control

(8/94) (400)

GE Technology Center
205 Great Valley Parkway
Malvern, Pennsylvania 19355-1337