

INSTRUCTIONS

CARRIER-CURRENT AUXILIARY RELAYS

TYPES

BCA11A	BCA11M
BCA11B	BCA12A
BCA11C	BCA12C

IN

UNIVERSAL AND DRAWOUT CASES

*omit ref to special springs
on polarized units*

GENERAL  ELECTRIC
SCHENECTADY, N.Y.

11-19

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CARRIER CURRENT AUXILIARY RELAYS
TYPES

BCA11A	BCA11M
BCA11B	BCA12A
BCA11C	BCA12C

GENERAL INFORMATION

Application

The various types of BCA relays covered by this instruction book are designed for application, in conjunction with the GCX, GFC, and HDX relays, in a protective scheme using carrier current with distance relay backup.

Construction

The BCA relays covered by these instructions all include a receiver unit and a receiver alarm unit, and additional units, as described below, for such functions as out-of-step blocking and cut-off, phase directional auxiliary, and test auxiliary. A detailed description of each type is given later. All the relays, except the 12BCA11B7 & 8, and the BCA11M, are available in either the universal or drawout case. The 12BCA11B7 & 8 and BCA11M are available in universal case only.

Drawout Case

In the drawout case the electrical connections between the relay units and the case are made through stationary molded inner and outer blocks between which nests a removable connecting plug which completes the circuits. The outer block attached to the case has the studs for external connections and the inner block has terminals for the internal connections.

The relay units are mounted in a steel framework called the cradle with all leads being terminated at the inner block. This cradle is held firmly in the case with a latch at both top and bottom and by two guide pins at the back of the case. The connecting plug besides making the electrical connections between the respective blocks of the cradle and case also locks the latch in place. The cover, which is drawn to the cradle by thumbscrews, holds the connecting plug in place.

To drawout the cradle the cover must first be removed. Then the connecting plug can be withdrawn. After this the latch can be released and the cradle easily drawn out. To replace the cradle, the reverse order is followed.

A separate testing plug can be inserted in place of the connecting plug to test the relay in place on the panel either from its own source of voltage or from other sources. Or, the cradle can be drawn out and the relay replaced by another which has been tested in the laboratory.

Type BCA11A Relay

The BCA11A relay contains the following units: A polarized receiver unit, a polarized receiver alarm unit, out-of-step blocking and cut-off

units, a receiver blocking unit, a phase directional unit, and a test auxiliary unit.

Each of the two polarized units consists of an Alnico permanent magnet; two silicon steel side plates, fitted with fixed and movable pole pieces; a Mumetal strip armature; a silicon steel armature supporting bracket; an operating coil and a set of contacts. The Alnico magnet is clamped between the two side plates and sets up a strong magnetic field across the air gap between the pole pieces, which are arranged on the inner surfaces of the side plates above the magnet. The L-shaped armature support bracket has one end clamped between the upper ends of the side plates, above the pole pieces, and is centered between nonmagnetic shims which fix its magnetic potential midway between that of the pole pieces. The bracket extends backward and has the rear end bent down to support the rear end of the armature strip. The bent-down end is slotted and drilled to receive a slotted positioning cylinder in which the rear end of the armature strip is inserted. The armature strip extends forward and is centered in the air gap between the pole pieces by rotation of the positioning cylinder. A single clamping screw serves to secure both the armature and the cylinder after the proper adjustment has been made. The front end of the armature is free to move laterally under the influence of the operating coil and an insulating fork attached to it transmits the motion to the contacts which are mounted on the front of the relay. The armature travel is limited by the edges of a metal plate attached to the armature striking the inside surfaces of the side plates. The plate also serves to support the contact operating fork. The operating coil is supported around the armature at the rear.

Since the armature is held at the rear end only, it will behave like a cantilever beam. When the front end is deflected laterally the stiffness of the beam will tend to return it to the rest position midway between the poles. The magnetic field however, has the opposite effect. When the armature is midway between the poles it is in a position of magnetic equilibrium since it is attracted equally by both poles. If it is slightly displaced toward one pole, however, the pull of that pole is increased while that of the other is decreased and the armature will tend to move farther in the direction of the displacement. In the polarized unit these two effects are balanced against each other so that very little force is required to move the armature. This balance is adjusted by means of the movable pole pieces. If the pole pieces are both screwed out away from the armature the magnetic field will be weakened and the armature stiffness effect will predominate. If both pole pieces are screwed in close to the armature the magnetic field effect will predominate and the armature will snap over to one side or the other when it is displaced past midposition. The normal adjustment of the poles is one which requires the least force to move the armature without this snap over action.

When a direct current is passed through the operating coil the armature is magnetized and the interaction with the permanent magnet field in the air gap produces a force tending to displace the armature. This force is proportional to the product of the magnetic pole strength produced in the armature multiplied by the air gap flux density. Since the air gap field is very strong little armature magnetism, and hence little current in the operating coil, is required to deflect the armature with sufficient force to operate the contacts. This means that the polarized relay unit is a very sensitive low burden device.

In the BC11A relay, the two polarized units are used for carrier alarm and carrier receiving. The alarm unit and the restraining winding of the receiver unit are energized by the carrier signal. The receiver unit has been adjusted at the factory to pick up at .007 amperes and drop out at .004 ampere. The alarm unit has been adjusted to pick up at .010 ampere and drop out at .004 ampere.

The "A" and "B" units known as the out-of-step blocking units are standard telephone type auxiliary relays with copper slugs at the heel end of the armature to provide a time delay dropout. The two relays are cascaded to secure a total dropout time of approximately 1.2 secs. The contacts of "A" control unit "B" and the contacts of "B" block tripping during out-of-step conditions.

The "C", or block cut-off unit, is a standard telephone type relay instantaneous in operation. Its function is to cut off carrier-current and allow tripping in the event that an internal fault occurs during out-of-step conditions.

The test unit T is a standard instantaneous telephone relay used in conjunction with the carrier test circuit to give an indication of the carrier circuit operation and the condition of the carrier-current transmitter and receiver.

The receiver blocking unit RB is a telephone type relay with an armature end slug for time delay. It has been adjusted at the factory for three cycle pickup and four cycle drop-out. Its purpose is to prevent false tripping during transient line disturbances caused by the clearing of external faults.

The directional auxiliary unit SX is a telephone relay adjusted for a high speed pickup of less than 5 milli-seconds. Its coil is operated by the GCX directional starting units and its contacts stop carrier transmission and remove voltage from the holding winding of the receiver unit as dictated by the directional unit.

The other BCA relays covered by this instruction book are basically similar to the BC11A with the exceptions indicated in the following paragraphs:

Type BC11B:

This relay is the same as the BC11A except that the polarity of the receiver unit coil has been reversed to adapt the relay to pilot systems where the trip coils are connected to negative.

Type BC11C:

This relay is the same as BC11A except that the out-of-step blocking and block cut-off units have been omitted.

Type BC11M:

This relay is similar to the 12BC11B7 or 8 except that the series resistor for the receiver holding coil has been mounted externally.

Type BCAl2A:

This relay is similar to the BCAl1A and BCAl1B except that only the carrier receiver and carrier alarm units are furnished. The auxiliary relays are included in other cases.

Type BCAl2C:

This relay is similar to the BCAl2A except that the receiver unit is furnished with one circuit-opening and one circuit-closing contact.

Ratings

These relays are all available for either 125 volt or 250 volt d-c operation.

Burdens

The resistances of all unit coils and resistors are given on the internal connection diagrams at the back of this instruction book.

SHIPPING - UNPACKING

Immediately upon receipt of the relay, an examination should be made for any damage sustained during shipment. If injury or rough handling is evident a damage claim should be filed at once with the transportation company and the nearest General Electric Sales Office should be notified.

INSTALLATION

Location and Mounting

The relay should be mounted on a vertical surface in a location reasonably free from excessive heat, moisture, dust and vibration. The relay case may be grounded if desired, using at least No. 12B & S gauge copper wire or equivalent. The panel drilling references are given in the table under connections.

Connections

The internal connections, outlines, and panel drilling for the models covered by this instruction book are listed in the following table:

Models and Types	Universal		Drawout	
	Elementary Diagram	Outline & P.D.	Elementary Diagram	Outline & P.D.
12BCAl1A1 & 2, 5 & 6	Fig. 2	Fig. 1	Fig. 4	Fig. 3
12BCAl1A3 & 4	Fig. 6	Fig. 6	Fig. 5	Fig. 3
12BCAl1B1 & 2, 5 & 6	Fig. 2	Fig. 1	Fig. 4	Fig. 3
12BCAl1B3 & 4	Fig. 6	Fig. 6	Fig. 5	Fig. 3
12BCAl1B7 & 8	Fig. 14	Fig. 14		
BCAl1C	Fig. 10	Fig. 10	Fig. 11	Fig. 3
BCAl1M	Fig. 15	Fig. 15		
BCAl2A	Fig. 7	Fig. 7	Fig. 9	Fig. 8
BCAl2C	Fig. 12	Fig. 12	Fig. 13	Fig. 8

ADJUSTMENTS AND TESTS

The relay was adjusted at the factory to obtain the proper characteristics. It is advisable not to disturb these adjustments. If, for any reason, the adjustments have been disturbed the following points should be observed in restoring them:

(1) Mechanical Adjustment Polarized Units

The armatures should move freely from side to side. (Armature travel is limited by the edges of the wide metal piece on the armature, which supports the contact operating fork, striking the inside surfaces of the side plates.) Care should be taken to see that the armature air gaps are free of iron filings.

Each contact should be adjusted to have approximately 0.015" gap when the armature is in the contact-opening position and the edge of the contact-operating fork should clear the contact brush by approximately 0.015" when the armature is in the contact closing position. This applies to both circuit-opening and circuit-closing contacts. Each contact should have a pressure of 5 grams when closed. The contacts may be roughly adjusted by rotating the contact assembly on its mounting stud and a fine adjustment obtained by turning the stationary contact screw.

(2) Electrical Tests Polarized Units

These tests should be checked with the cover on the relay, since the change in stray magnetic leakage flux caused by the presence of the steel cover affects the pick-up and drop-out values.

If the pick-up current is only a little off the desired value it can be adjusted by means of the spiral armature spring located at the front of the unit just in back of the contacts. This spring is adjusted by inserting a screw driver in the slot of its spindle and turning it to right or left until the desired pick-up is obtained.

If the pick-up or drop-out values are considerably different from the desired values it may be necessary to adjust the movable pole pieces. This is accomplished by loosening the clamp screws at the top front edge of the two side plates and turning the poles by means of a short piece of stiff brass wire (No. 42 gauge = 0.0935" diameter or smaller) inserted in the capstan holes drilled in the pole pieces. The effects of various pole adjustments are as follows:

a. - Moving both poles to the right biases the armature to the left, raising pick-up and lowering drop-out. Moving both poles to the left has the opposite effect.

b. - Moving both poles in toward the armature reduces the ratio of drop-out to pick-up and increases the snap action of the armature motion. Moving both poles out away from the armature has the opposite effect.

c. - In general, moving the left pole has more effect on pick-up and the right more effect on drop-out.

The clamping screws should be retightened after each pole adjustment.

(3) Adjustments on the telephone relay units

The telephone-type relay units included in the relays covered by this instruction book have been adjusted for 80 per cent pickup with time settings as given under the description of individual units. Normally these relay units should not require readjustment. If, however, it becomes necessary to change the pickup or time delay the following points must be observed:

In the unexcited position of the relay unit normally closed contacts should be making with a .005" wiper and all normally open contacts should have a gap of .015" minimum. When the relay unit is operated by hand the circuit closing contacts should make with .005" wiper and the circuit opening contacts should have a gap of .015" minimum.

The pickup time may be increased by increasing the armature gap; this is accomplished by bending the contact operating arm. This adjustment also increases the pickup value.

The dropout time may be adjusted by means of the brass residual screw in the armature. Turning the screw in decreases the dropout time. The dropout time may also be varied slightly by increasing the wiper of the circuit closing contacts.

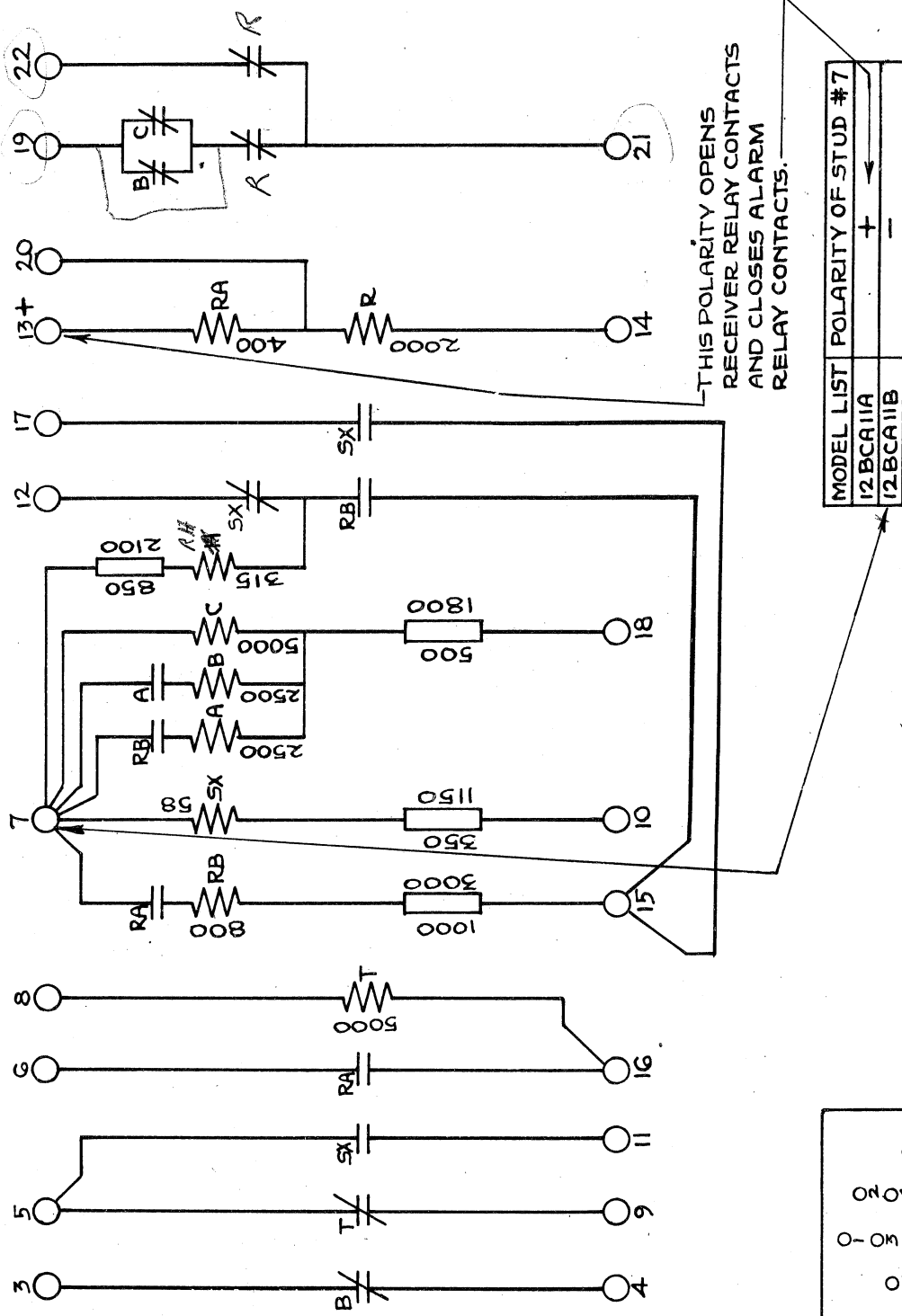
MAINTENANCE

An operation test and mechanical inspection of the relay and its connections should be made at least once every six months. The clamping screws in the side plates and tailpiece should be checked for tightness and the contacts inspected for pressure, wiper, gap and cleanliness.

If the contacts require cleaning, file lightly with a clean, fine, thin file. Do not use crocus or emery cloth as they tend to embed insulating particles in the contact surfaces.

RENEWAL PARTS

When ordering renewal parts, address the nearest sales office of the General Electric Company, specify the quantity required, the name of the part wanted and the complete nameplate data, including the serial number when used. If possible give the General Electric Company's requisition number on which the relay was furnished.



NOTE: FIGURES SHOWN ARE RESISTANCE VALUES; LEFT-125V; RIGHT-250 V.

08	02	02
01	04	06
03	05	07
04	08	09
05	10	15
10	60	10

(BACK VIEW)

FIG. 2 - ELEMENTARY DIAGRAM FOR MODELS 12BCA11A1, 2, 5, & 6 and 12BCA11B1, 2, 5 & 6 RELAYS IN THE UNIVERSAL CASE (K-6154819)

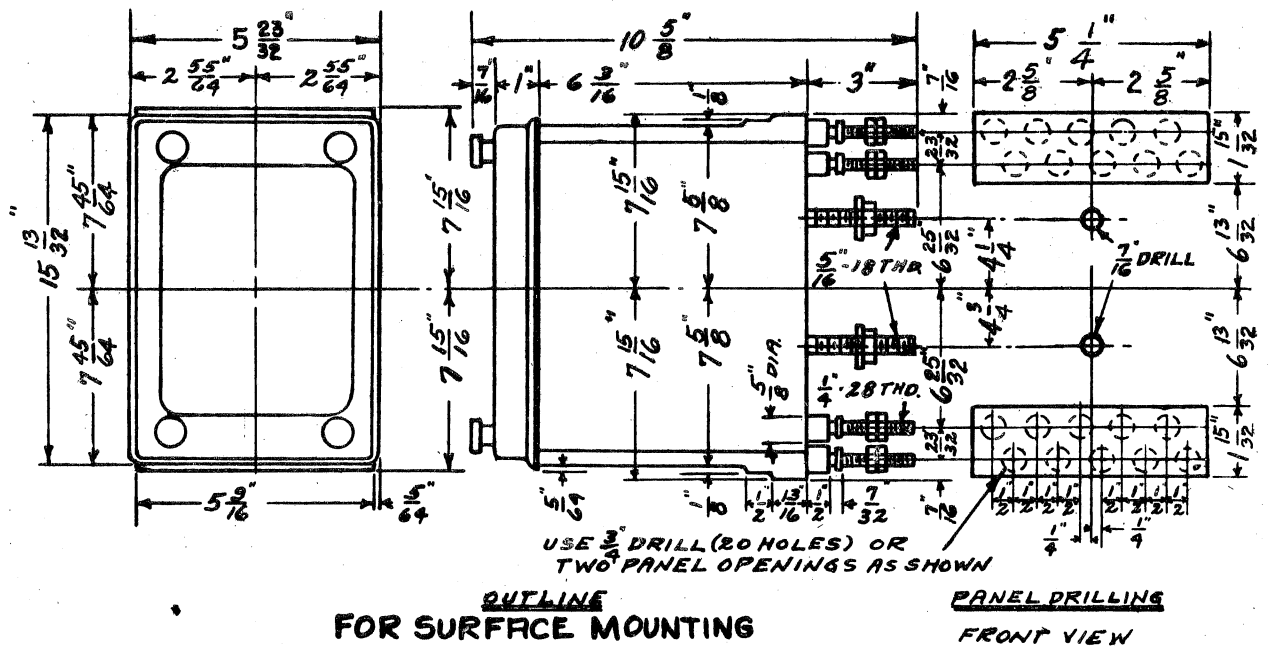
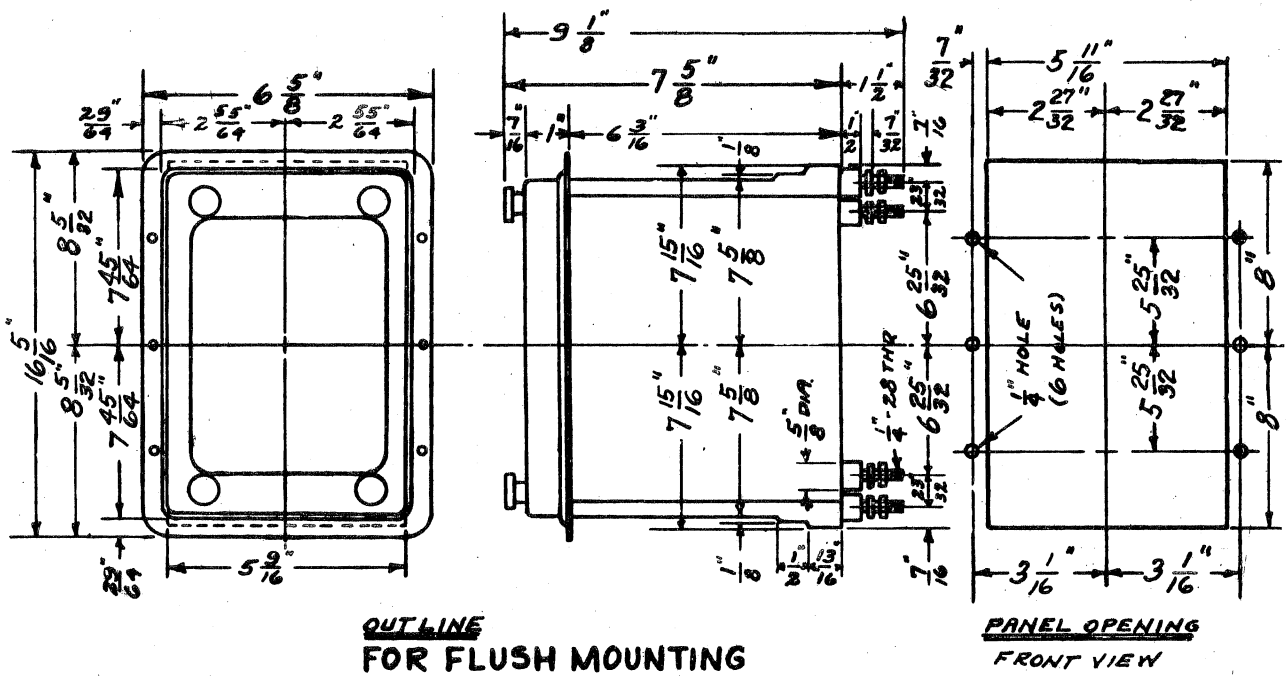


FIG. 3 - OUTLINE & PANEL DRILLING FOR DRAWOUT CASE, TWO UNIT - DOUBLE END. (K-6174674)

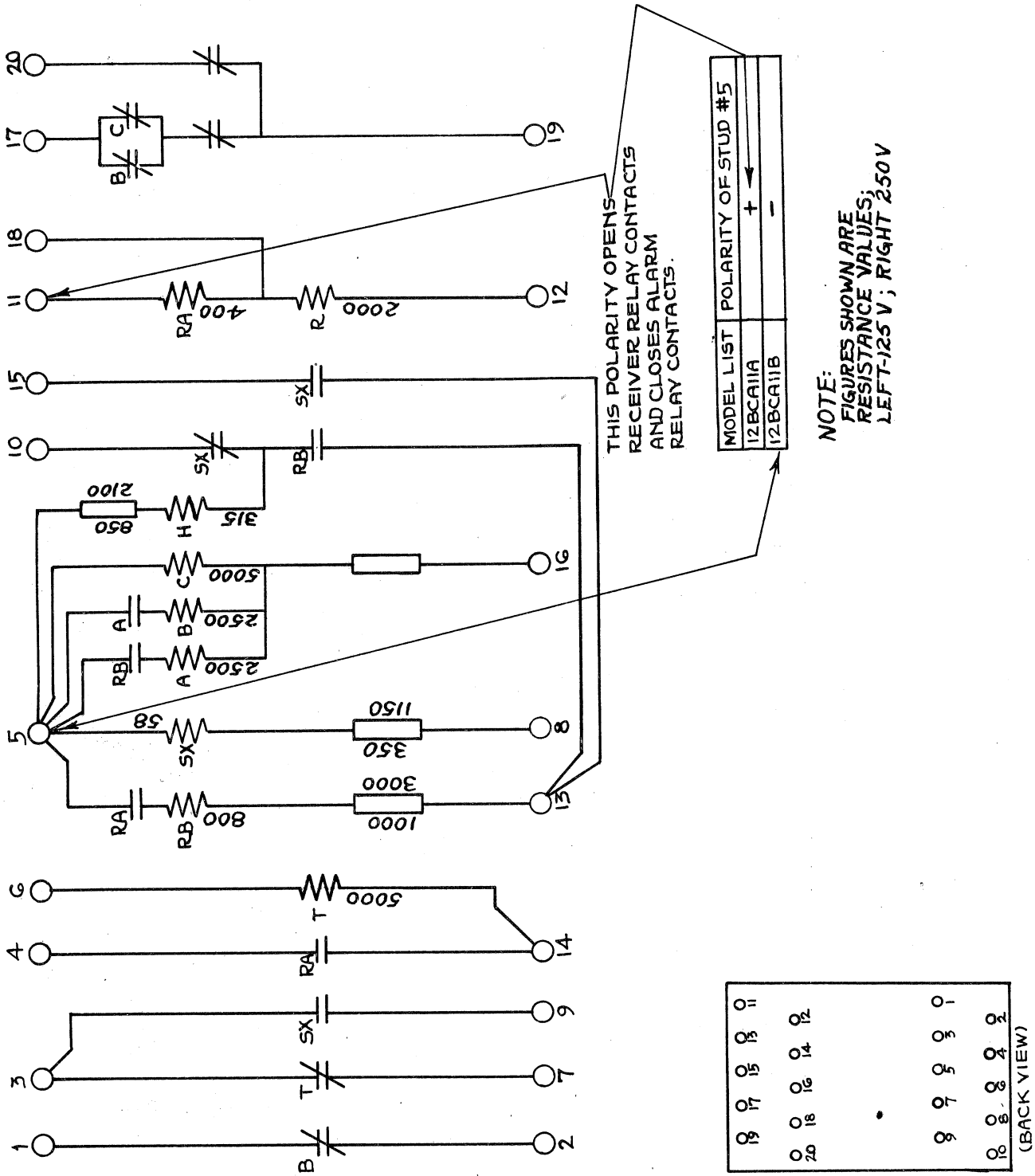
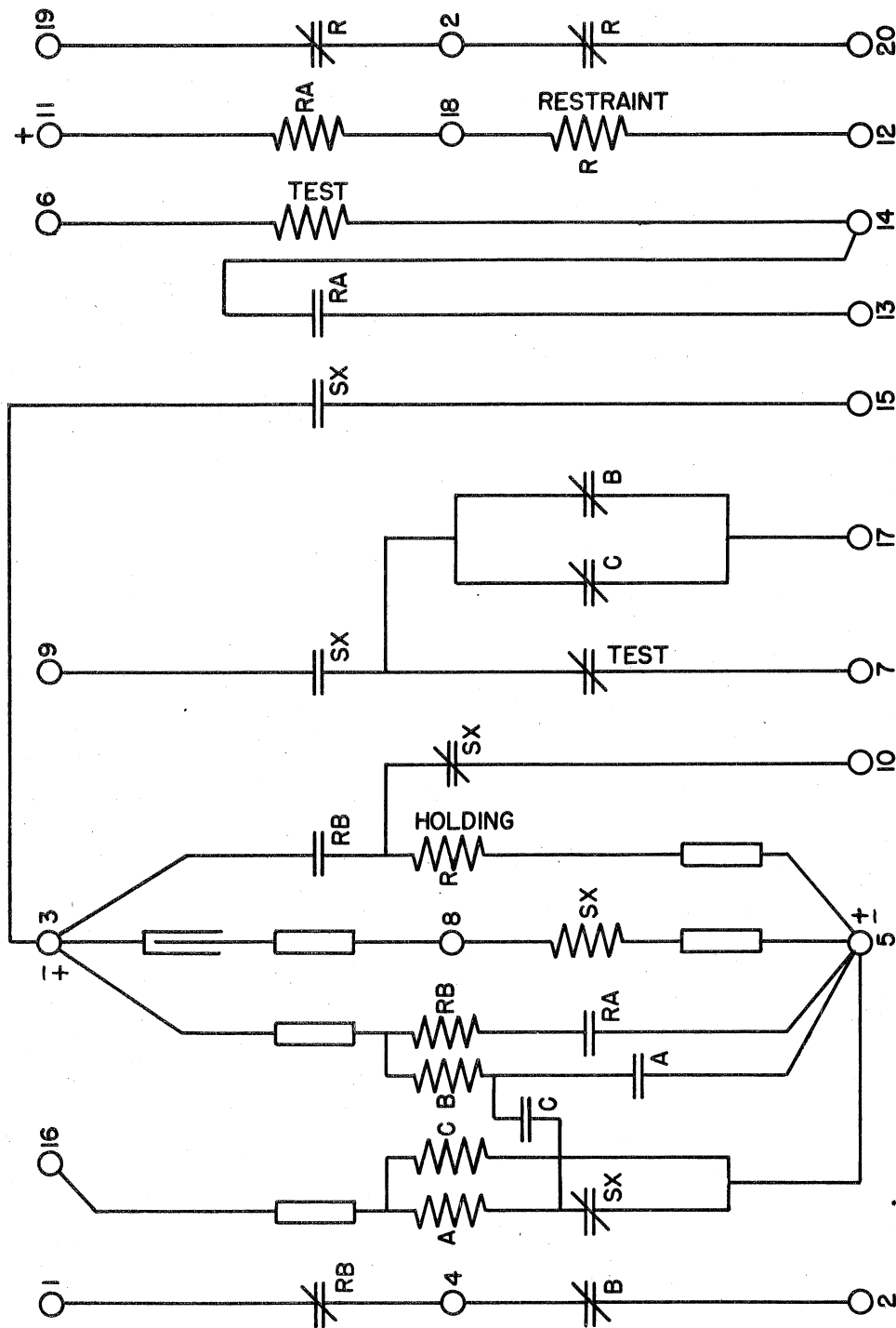


FIG. 4 - ELEMENTARY DIAGRAM (BACK VIEW) FOR MODELS 12BCA11A1, 2, 5, & 6 and 12BCA11B1, 2, 5, & 6 RELAYS IN THE DRAWOUT CASE. (K-6154818)



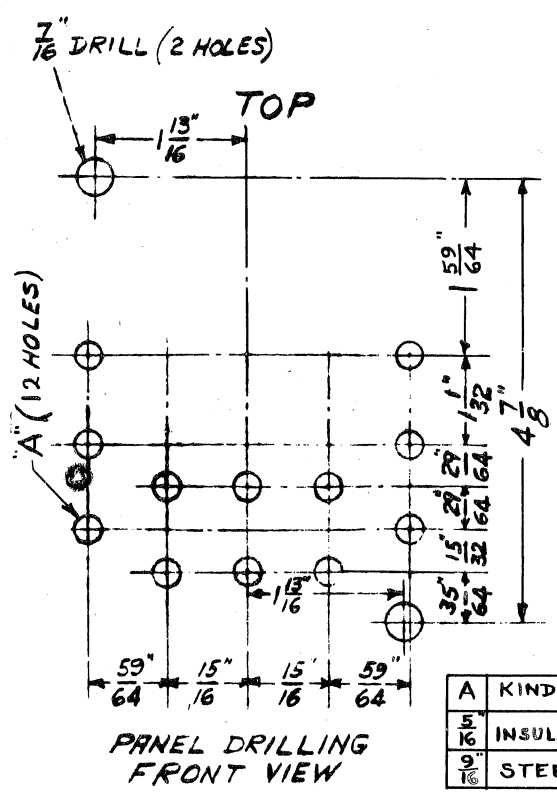
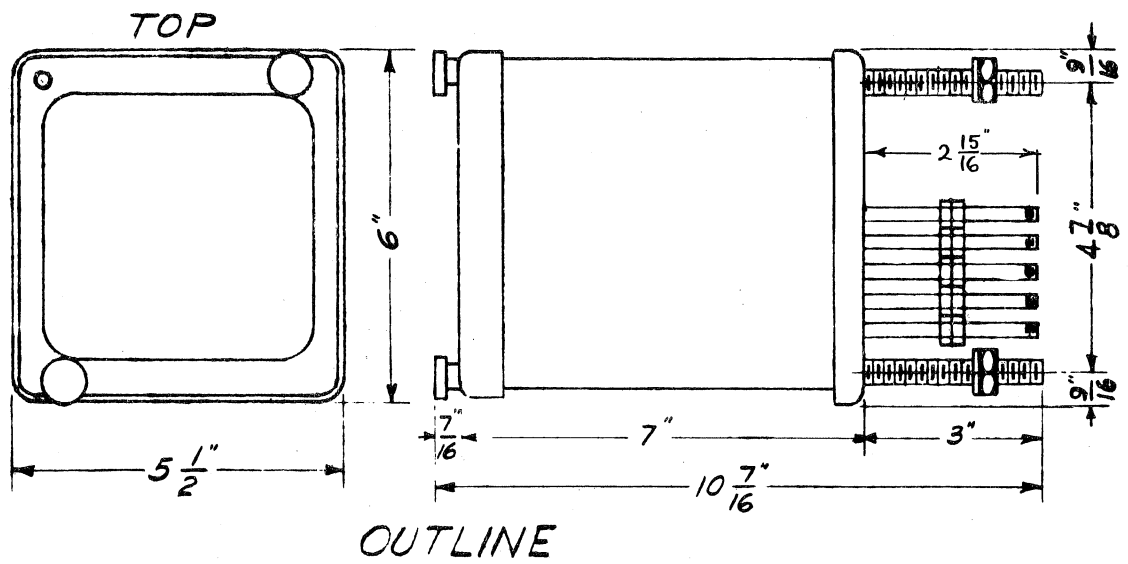
POLARITY SHOWN OPENS RECEIVER RELAY CONTACTS & CLOSES ALARM RELAY CONTACTS.

MODEL	POLARITY OF STUD 5
12BCA11A(-)	+
12BCA11B(-)	-

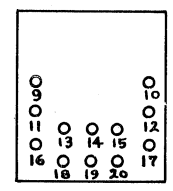
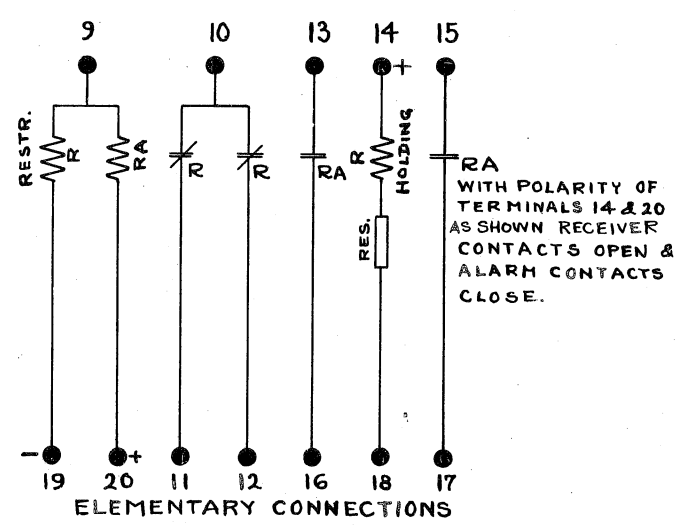
(BACK VIEW)

19	17	15	13	11
20	18	16	14	12
9	7	5	3	1
10	8	6	4	2

FIG. 5 - ELEMENTARY DIAGRAM FOR MODELS 12BCA11A3&4 AND 12BCA11B3&4 IN THE DRAWOUT CASE. (K-6154770)



A	KIND OF PANEL
5/16	INSULATING
9/16	STEEL



BACK VIEW OF RELAY SHOWING LOCATION OF TERMINALS

FIG. 7 - OUTLINE, PANEL DRILLING, AND INTERNAL CONNECTIONS OF TYPES BCA12A AND BCA12B RELAYS IN THE UNIVERSAL CASE. (K-6154909)

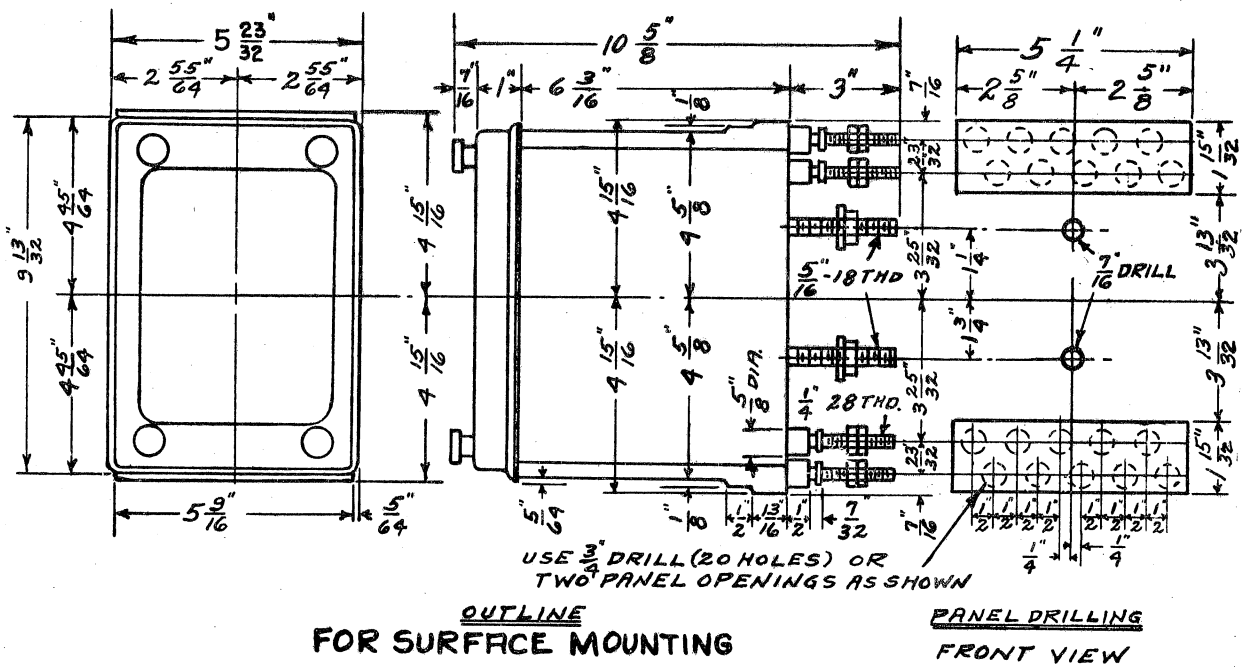
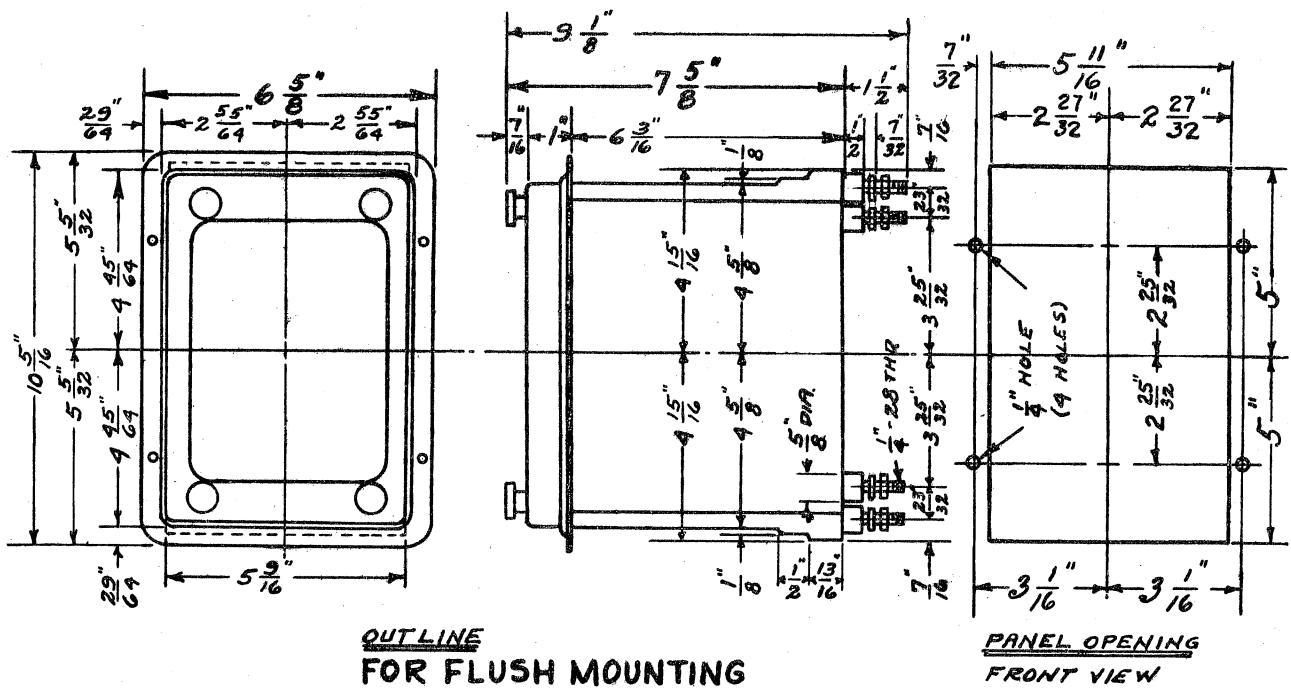
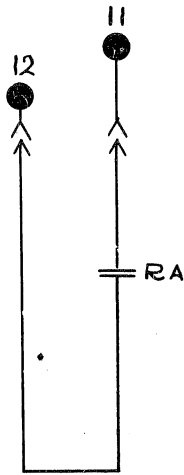
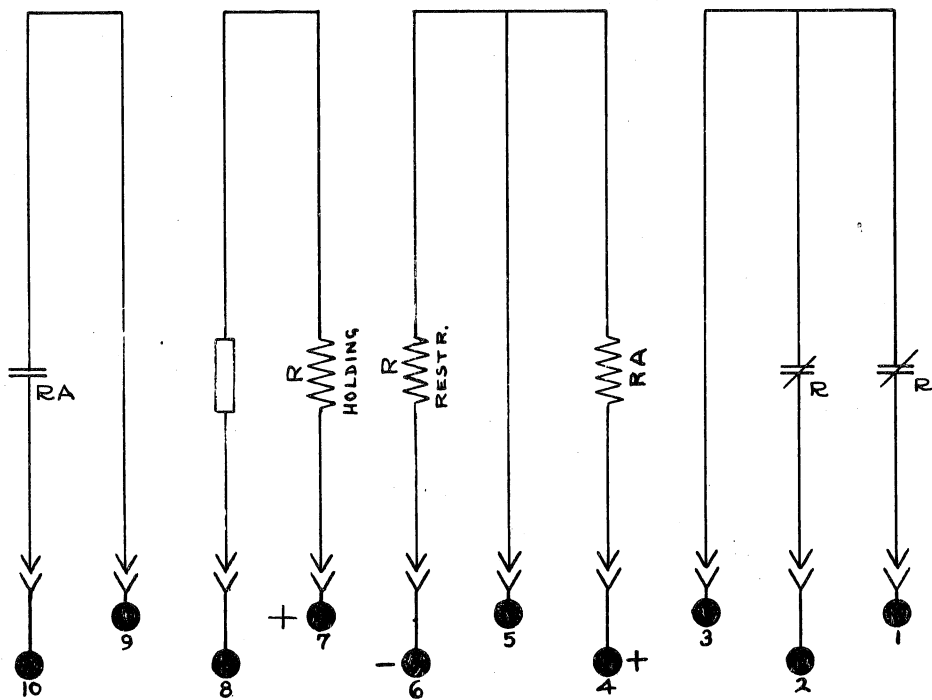


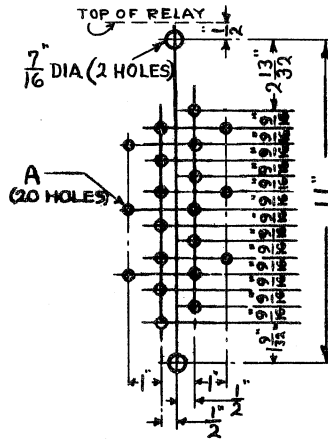
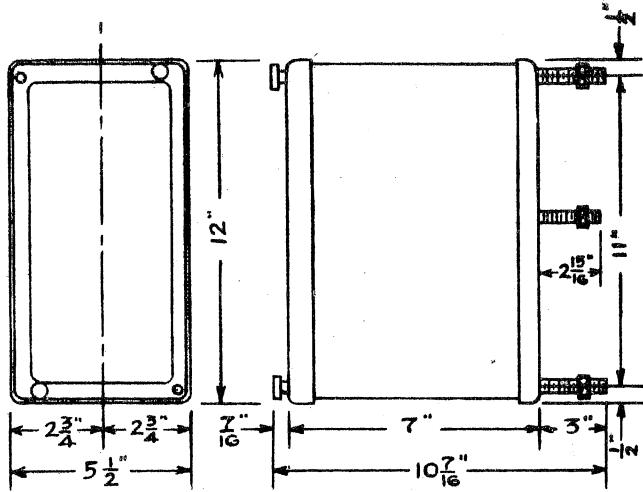
FIG. 8 - OUTLINE & PANEL DRILLING FOR DRAWOUT CASE,
ONE UNIT - DOUBLE END. (K-6174672)



NOTE
 WITH POLARITY OF TERMINALS
 4 & 7 AS SHOWN RECEIVER
 CONTACTS OPEN & ALARM
 CONTACTS CLOSE.



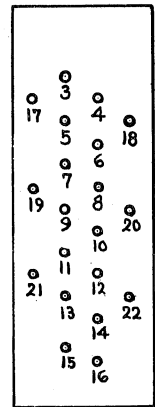
**FIG. 9 - INTERNAL CONNECTIONS (BACK VIEW) FOR TYPES
 BCA12A and BCA12B RELAYS IN THE DRAWOUT CASE.
 (K-6154910)**



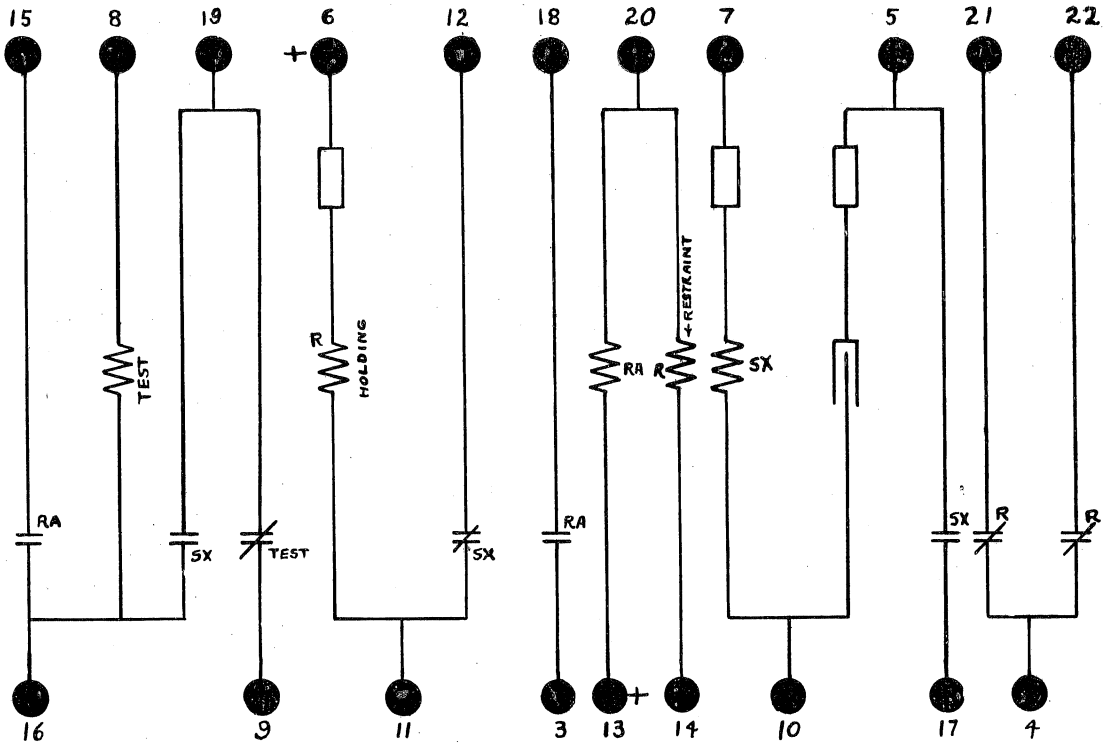
A	16	19
KIND OF PANEL	INSULATION	STEEL

OUTLINE

PANEL DRILLING (FRONT VIEW)

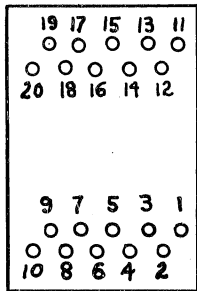
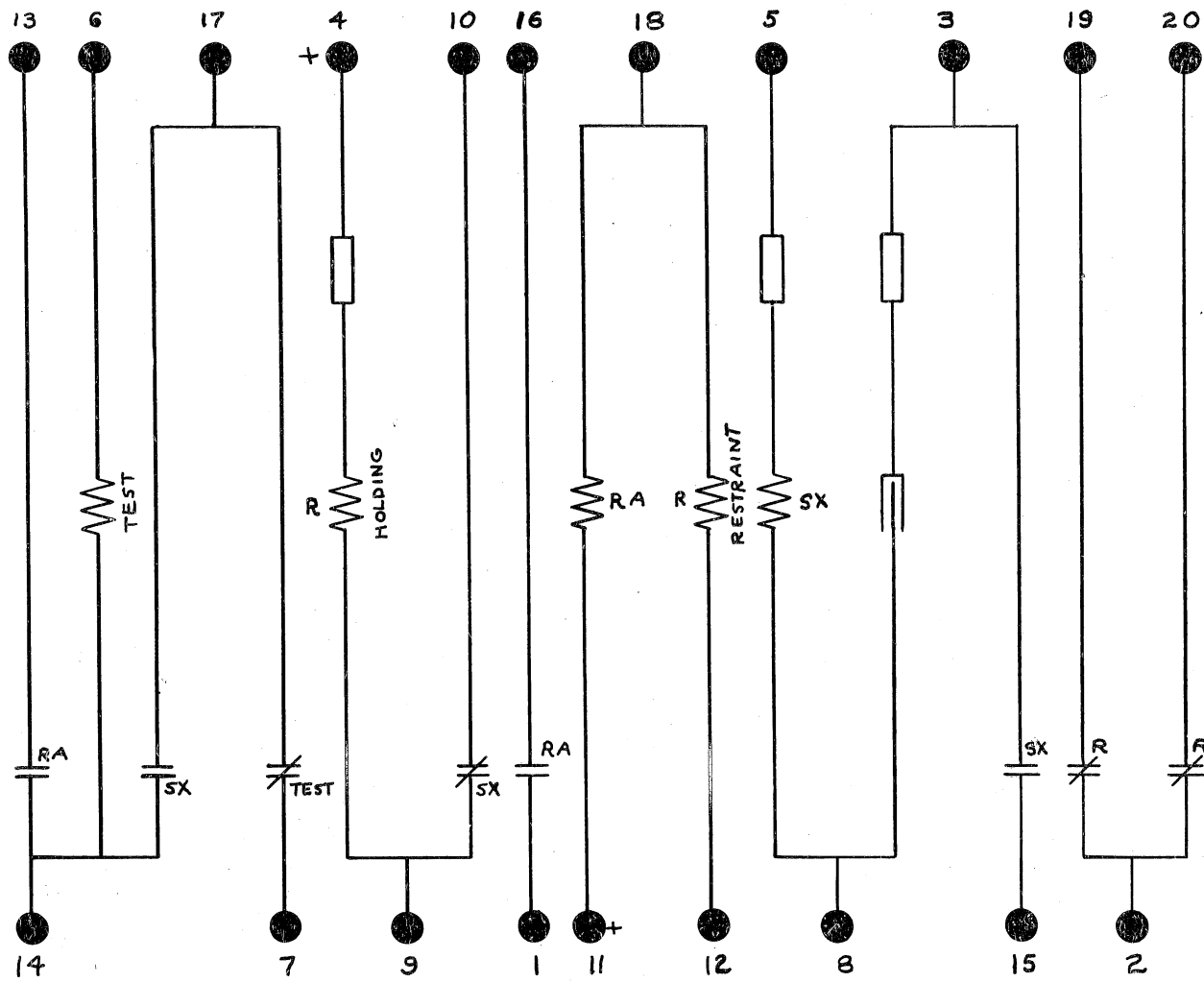


BACK VIEW SHOWING LOCATION OF TERMINALS.



POLARITY SHOWN TENDS TO OPEN RECEIVER RELAY CONTACTS.

FIG. 10 - OUTLINE, PANEL DRILLING, AND ELEMENTARY INTERNAL CONNECTIONS FOR TYPE BCA11C RELAY IN THE UNIVERSAL CASE. (K-6209053)



BACK VIEW SHOWING LOCATION OF TERMINALS

NOTE
POLARITY SHOWN TENDS TO
OPEN RECEIVER RELAY
CONTACTS

FIG. 11 - ELEMENTARY INTERNAL CONNECTIONS OF THE TYPE BCallic RELAY IN THE DRAWOUT CASE. (K-6209054)

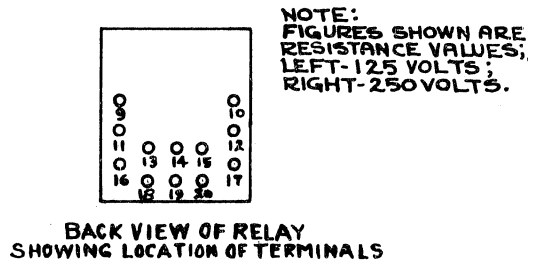
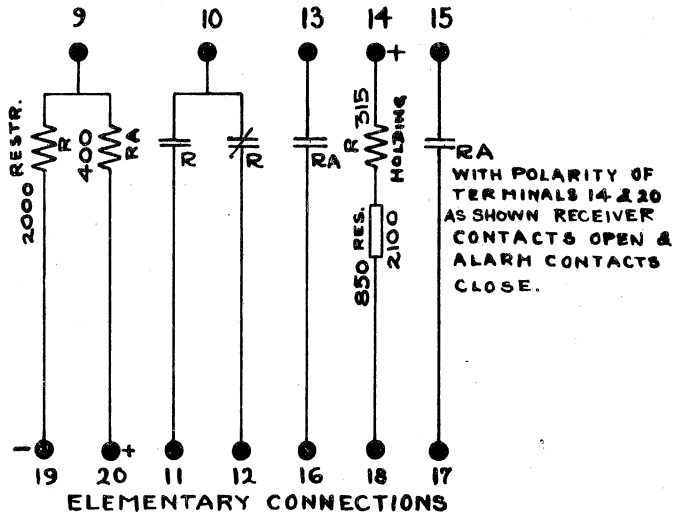
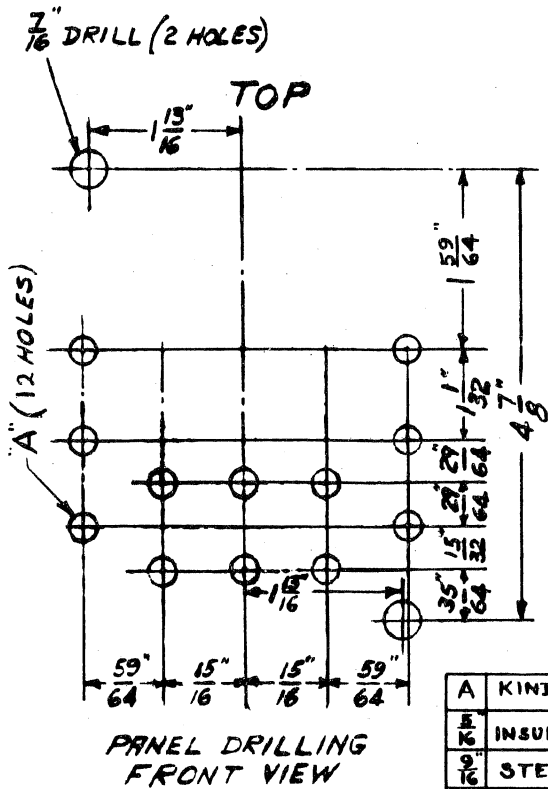
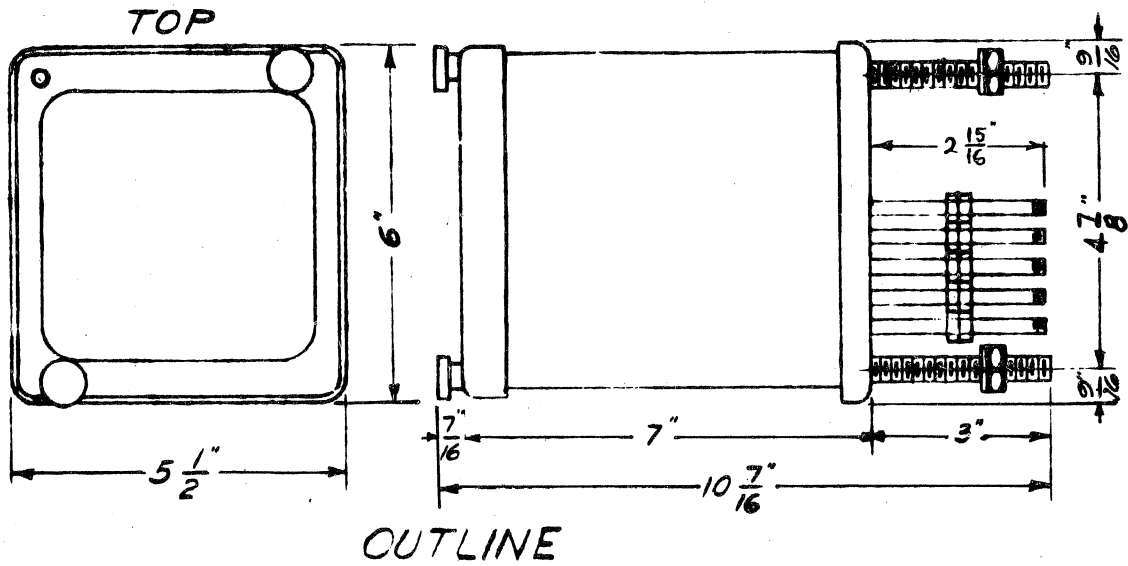
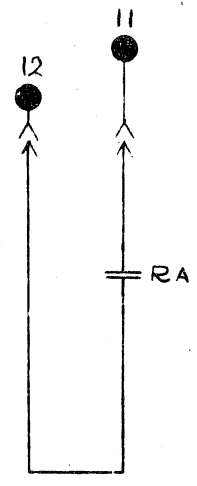


FIG. 12 - OUTLINE, PANEL DRILLING, AND ELEMENTARY DIAGRAM FOR THE TYPE BCA12C RELAY IN THE UNIVERSAL CASE. (K-6209168)



NOTE
 WITH POLARITY OF TERMINALS
 4 & 7 AS SHOWN RECEIVER
 CONTACTS OPEN & ALARM
 CONTACTS CLOSE.

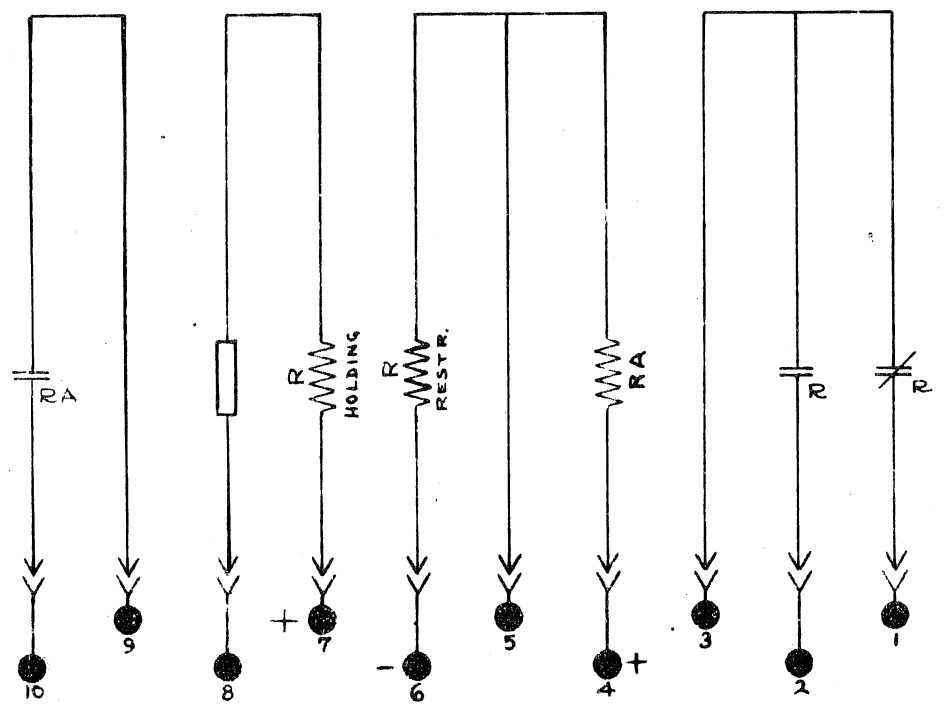
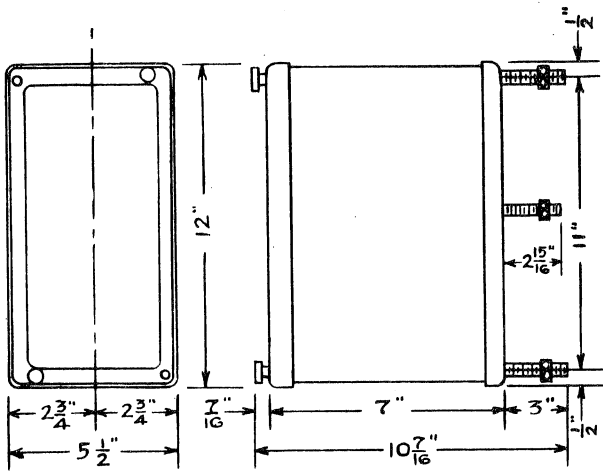
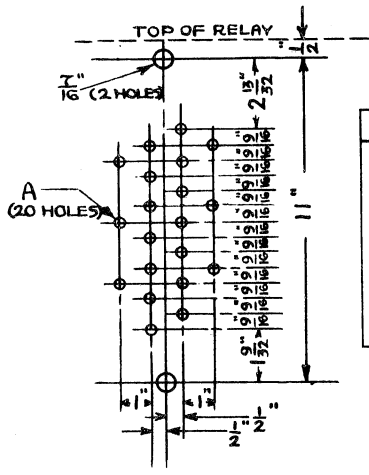


FIG. 13 - INTERNAL CONNECTIONS FOR THE BCA12C RELAY IN THE DRAWOUT CASE.
 (K-6209169)



OUTLINE

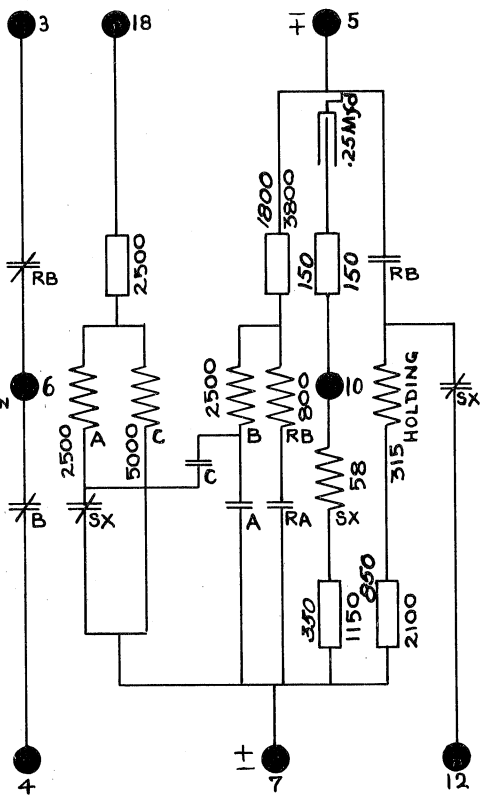


PANEL DRILLING (FRONT VIEW)

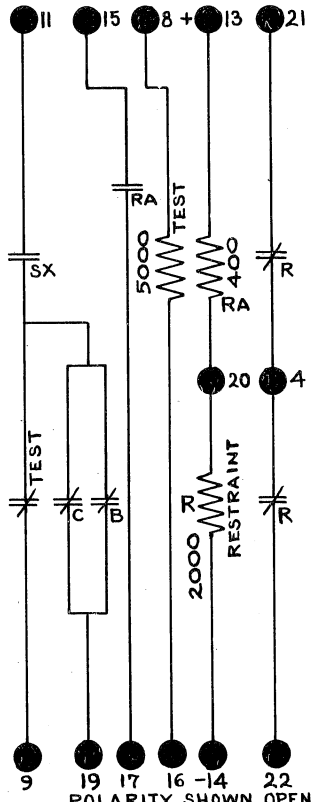
KIND OF PANEL	A
INSULATION	2"
STEEL	1/8"

0	17	30
1	18	31
2	19	32
3	20	33
4	21	34
5	22	35
6	23	36
7	24	37
8	25	38
9	26	39
10	27	40
11	28	41
12	29	42
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15	32	45
16	33	46
17	34	47
18	35	48
19	36	49
20	37	50
21	38	51
22	39	52
23	40	53
24	41	54
25	42	55
26	43	56
27	44	57
28	45	58
29	46	59
30	47	60
31	48	61
32	49	62
33	50	63
34	51	64
35	52	65
36	53	66
37	54	67
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39	56	69
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41	58	71
42	59	72
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44	61	74
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240	257	270
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242	259	272
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255	272	285
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259	276	289
260	277	290
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262	279	292
263	280	293
264	281	294
265	282	295
266	283	296
267	284	297
268	285	298
269	286	299
270	287	300

BACK VIEW OF RELAY SHOWING TERMINAL LOCATION



ELEMENTARY DIAGRAM



POLARITY SHOWN OPENS RECEIVER RELAY CONTACTS & CLOSES ALARM RELAY CONTACTS.

NOTE: FIGURES GIVEN ARE RESISTANCE VALUES. LOWER VALUES FOR 125V.

MODEL	POLARITY OF STUD 7
12BCA11B7	+
12BCA11B8	-

FIG. 14 - OUTLINE, PANEL DRILLING, AND ELEMENTARY DIAGRAM OF MODELS 12BCA11B7 & 8 RELAY IN THE UNIVERSAL CASE. (K-6209046)

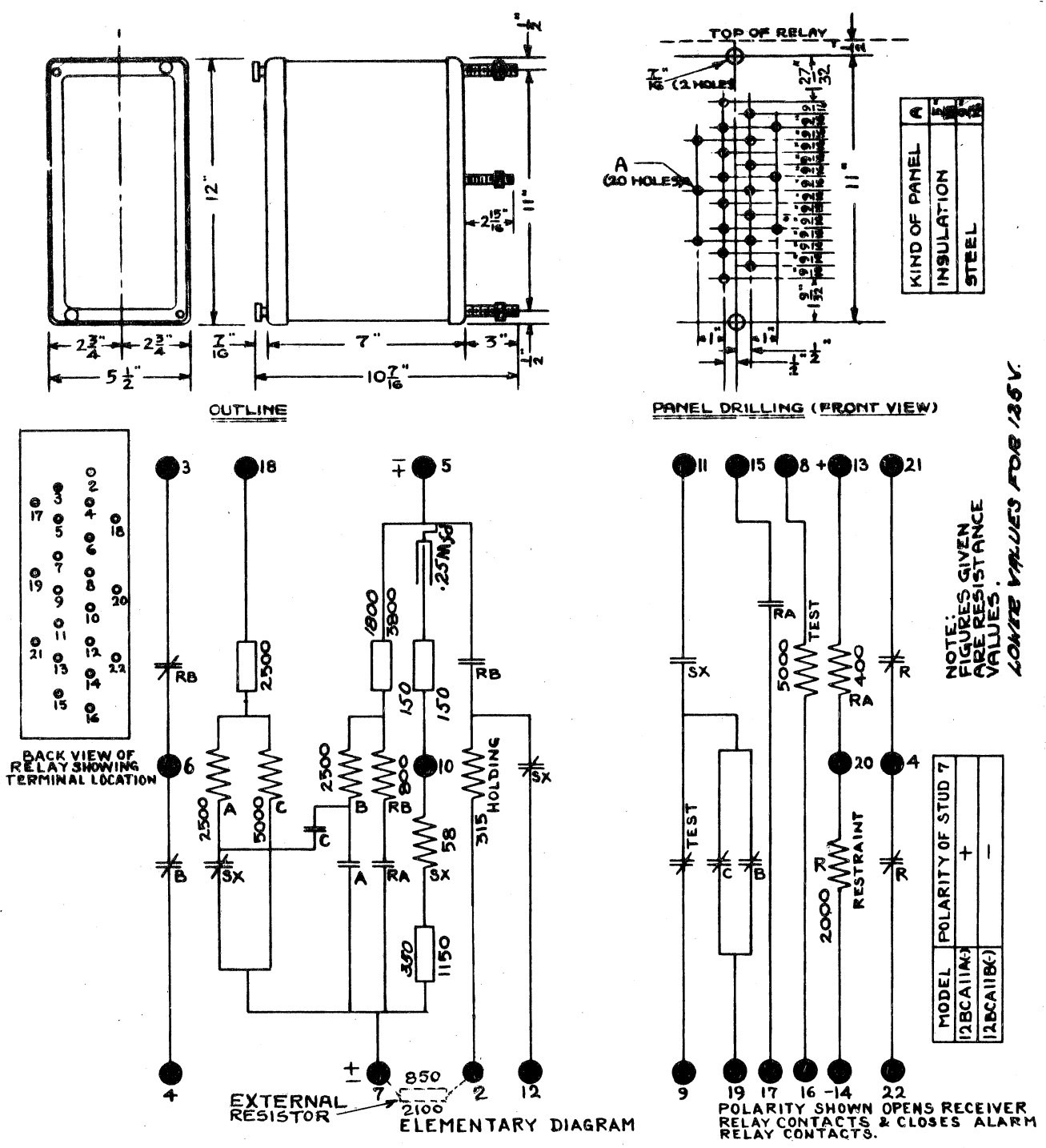


FIG. 15 - OUTLINE, PANEL DRILLING, AND ELEMENTARY DIAGRAM OF THE TYPE BCA11M RELAY IN UNIVERSAL CASE. (K-6306644)

WHEN SERVICE IS REQUIRED

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Los Angeles, Calif.	733 Banning Street		

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Des Moines, Iowa	418 West Sixth Avenue	Salt Lake City, Utah	200 South Main Street
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