

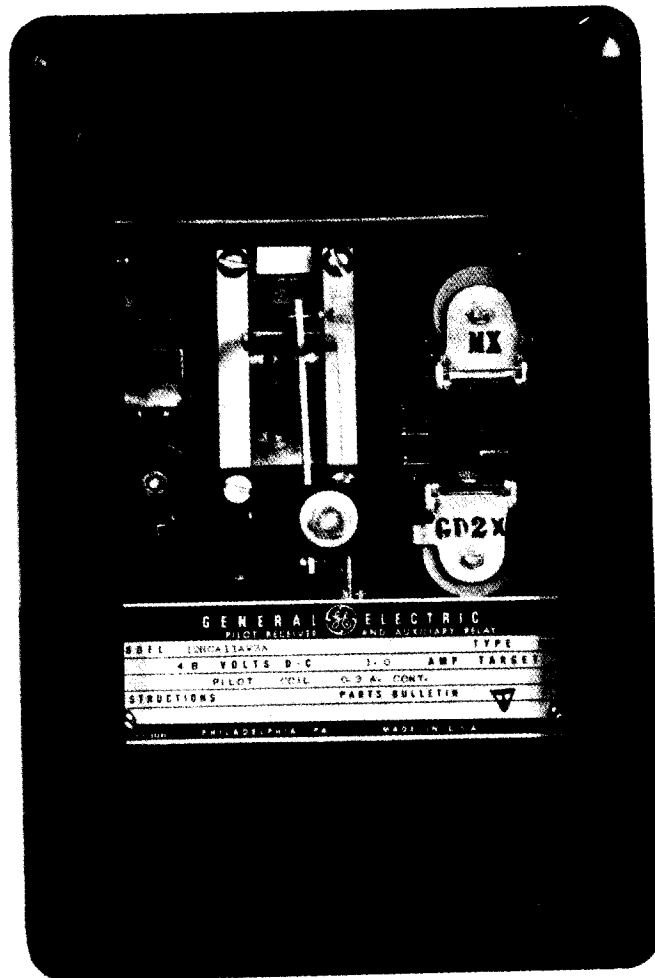


INSTRUCTIONS

GEI-83947B

SUPERSEDES GEI-83947A

CARRIER AUXILIARY RELAY TYPE BCA11AV



GENERAL  ELECTRIC

CONTENTS

	PAGE
DESCRIPTION.	3
APPLICATION.	3
RATINGS.	3
Contacts.	4
CHARACTERISTICS.	4
Operating Principles.	4
Pickup and Dropout.	4
Pickup, Dropout and Reset Time.	4
Burdens	4
CONSTRUCTION	4
RECEIVING, HANDLING AND STORAGE.	5
ACCEPTANCE TESTS	5
Visual Inspection	5
Mechanical Inspection	6
Electrical Tests.	6
INSTALLATION PROCEDURE	6
Electrical Tests.	6
SERVICING.	7
Mechanical Adjustments.	7
Electrical Adjustments.	7
REPAIR PARTS.	8

CARRIER AUXILIARY RELAY

TYPE BCA11AV

DESCRIPTION

The BCA11AV is an auxiliary relay for use in conjunction with carrier current or microwave and protective relaying equipment in directional comparison relaying schemes. It contains a receiver unit, the resistance of which is matched to the specific type of carrier or microwave equipment that is employed. The relay also contains two telephone type units for auxiliary relaying functions. The BCA11AV relay is supplied in a size S2 drawout case.

APPLICATION

Since the BCA11AV is employed only as an auxiliary relay in directional comparison relaying schemes, it has no general application. Complete elementary diagrams illustrating the use of these relays in directional comparison schemes are available and may be obtained on request from the local district office. The selection of a specific BCA11AV depends on the DC control voltage and the type of channel employed.

For special applications where the arrival of the blocking signal may be delayed, it is necessary to delay the dropout of the receiver relay. This may be done by means of a capacitor across the receiver relay holding coil 85/RH. The value of this capacitor can be chosen according to the curve in Figure 8.

RATINGS

The BCA relays covered by these instructions are available with potential circuits rated 48, 125, or 250 volts DC. The receiver coil (R) for use with CS-27 carrier sets has a continuous rating of 0.3 amps. The target coil rating is one ampere. The relay is suitable for operation at the listed ratings in a maximum ambient of 40 degrees C.

CONTACTS

The main contact of the receiver unit (R) will close and carry 30 amperes DC momentarily for tripping duty at control voltages of 250 V DC or less. The breaker trip coil circuit should, however, always be opened by a circuit breaker auxiliary switch or by other suitable means. If the tripping current exceeds 30 amperes, an auxiliary tripping relay should be used. On the normal application of the BCA relay in a directional comparison scheme the main contacts of the receiver unit (R) should be bypassed by the seal-in contacts of the protective relays after the trip circuit is completed.

The contacts of auxiliary units MX and GD2X which are associated with the trip circuit will carry 30 amperes momentarily for tripping duty. The remaining externally connected contacts of the MX and GD2X units will close 5 amperes non-inductive at control voltage of 250 V DC or less, and have interrupting ratings as shown in Table I.

TABLE I

INTERRUPTING RATINGS OF MX
AND GD2X CONTACTS

VOLTS D-C	INTERRUPT	
	INDUCTIVE	NON-INDUCTIVE
24	1 A	3 A
48	1	3
125	0.5	1.5
250	0.25	0.75

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the General Electric Company.

To the extent required the products described herein meet applicable ANSI, IEEE and NEMA standards; but no such assurance is given with respect to local codes and ordinances because they vary greatly.

CHARACTERISTICS

OPERATING PRINCIPLES

The main receiver unit (R) is a polarized unit in which the polarizing field is produced by an Alnico permanent magnet. When a direct current is passed through either the operating coil (R) or holding coil (RH), the cantilever-type armature is magnetized and the resulting interaction with the permanent magnet field produces a force tending to displace the armature. If the polarities shown on the internal connection diagram are observed the force on the armature will be to the right and the receiver unit contacts will be held open.

In the typical application of the relay the holding coil is continuously energized from the station battery, while the operating or receiver coil (R) is energized by the rectified output of the carrier receiver.

PICKUP AND DROPOUT

Receiver Unit - The receiver unit has been adjusted at the factory to pick up with 80 percent or less * of rated voltage applied to the holding coil (RH) circuit.

* The pickup and dropout current for the receiver winding (R) is as given below:

Forms 6-11-12

Pickup amps. - 0.009 amps or less
 Dropout amps.- 0.004 amps. ± 10%

All other forms

Pickup amps. - 0.120 amps. or less
 Dropout amps. - 0.066 amps. ± 10%

MX Unit - The auxiliary unit MX has been set at the factory to pick up at 80 percent or less of rated voltage suddenly applied between terminals one and 18 of the relay.

GD2X Unit - The auxiliary unit GD2X has been set at the factory to pick up at 80 percent or less of rated voltage gradually applied between terminals one and 19 of the relay.

PICKUP, DROPOUT AND RESET TIMES

Receiver Unit - Reset time of the receiver unit, that is the time to close the normally closed contact when the RH coil circuit is de-energized from rated DC voltage, is 3.5 to 4.5 milliseconds.

MX Unit - With rated voltage suddenly applied across terminals one and 18, the MX unit will close the normally open contact between terminals 7-8 in four milliseconds or less. When the circuit is de-energized from rated voltage the same contact will reopen in less than four milliseconds.

GD2X Unit - With rated voltage suddenly applied between terminals one and 19 the GD2X unit will close its normally open contact between terminals 7-9 in five to ten milliseconds. When the circuit is de-energized from rated voltage the same contact will reopen in less than four milliseconds.

BURDENS

The resistance values of the coils and resistors for the various models are tabulated on the internal connection diagram in Fig. 5.

* CHARACTERISTICS OF TARGET UNITS

	Single Rated		
	0.2	1.0	2.0
Carry 30 Amps for (Sec)	0.08	2.2	8.9
Carry 10 Amps for (Sec)	0.75	20	80
Carry continuously (Amp)	0.37	1.9	4.0
Minimum Operating (Amp)	0.2	1.0	2.0
Minimum Dropout (Amp)	0.05	0.25	0.5
DC resistance (Ohms)	8.1	0.31	0.08
60 Hz impedance (Ohms)	50	2.6	0.65
50 Hz impedance (Ohms)	42	2.2	0.54

*Indicates revision

CONSTRUCTION

The BCA11AV relay consists of a polarized receiver unit, two auxiliary telephone-type relays (MX and GD2X), an electrically operated target, and associated resistors and capacitors all mounted on the removable cradle of the S2 drawout case.

The polarized relay unit consists of an Alnico permanent magnet, two silicon steel side plates fitted with fixed and movable pole pieces, a mu-metal 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 located at the desired position in the air gap between the pole pieces by rotation of the positioning cylinder. In the BCA11AV the positioning cylinder has been set so that, with the adjustable pole pieces backed off flush with the side plates, the armature will rest at the limit of travel to the left. That is, the armature is mechanically biased to the left. The armature travel is limited by the edges of a metal plate attached to the armature striking the inside of the side plates. This 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. The magnetic field has the opposite effect. When the armature is midway between the poles, it is in a positive magnetic equilibrium since it is attracted equally by both poles. If it is slightly displaced toward one pole 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 relay, these two effects are balanced against each other so that very little force is required to move the armature. 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 mid-position. 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 and the air gap flux density. Since the air gap field is very strong, little armature magnetism (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.

The auxiliary units MX and GD2X are telephone-type relays. The construction of a typical telephone-type relay is shown in Fig. 4.

The components of the BCA11AV relay are mounted on a cradle assembly which 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 connections between the case block and cradle block are completed through a removable connection plug. A separate testing plug can be inserted in place of the connection plug to permit testing the relay in its case. The cover attaches to the case from the front and includes the target reset mechanism, and an interlock arm to prevent the cover from being replaced until the connection plug has been inserted.

The case is suitable for either semi-flush or surface mounting on panels up to two inches thick. Hardware is available for all panel thickness up to two inches, but panel thickness must be specified on the order to insure that the proper hardware will be provided. Outline and panel drilling dimensions are shown in Fig. 9.

RECEIVING, HANDLING AND STORAGE

These relays, when not included as a part of a control panel will be shipped in cartons designed to protect them against damage. Immediately upon receipt of a relay, examine it for any damage sustained in transit. If injury or damage resulting from rough handling is evident, file a damage claim at once with the transportation company and promptly notify the nearest General Electric Apparatus Sales Office.

Reasonable care should be exercised in unpacking the relay. If the relays are not to be installed immediately, they should be stored in their original cartons in a place that is free from moisture, dust,

and metallic chips. Foreign matter collected on the outside of the case may find its way inside when the cover is removed and cause trouble in the operation of the relay.

ACCEPTANCE TESTS

Immediately upon receipt of the relay an inspection and acceptance test should be made to insure that no damage has been sustained in shipment and that the relay calibrations have not been disturbed.

VISUAL INSPECTION

Check the nameplate stamping to insure that the model number and rating of the relay agree with the requisition.

Remove the relay from its case and check by visual inspection that there are no broken or cracked molded parts, or other signs of physical damage and that all screws are tight. There must not be any metallic particles or other foreign matter in the air gaps of the polarized receiver unit.

MECHANICAL INSPECTION

1. The armature of the receiver unit (R) should move freely from side to side when operated by hand. Travel of the armature in either direction should be limited when the metallic piece which supports the contact fork strikes the inside surfaces of the side plates.

2. Measure the contact gap by holding the armature assembly against the right side plate. The gap should be approximately .015". When the armature is released it should snap to the left.

3. Check the contact wipe with the armature assembly resting against the left side plate. There should be room for a .008" feeler gage between the leg of the contact fork and the contact brush which it operates.

4. With the auxiliary units MX and GD2X de-energized each normally open contact should have a gap of .010" - .015". Observe the wipe on each normally closed contact by deflecting the stationary contact member towards the frame. Wipe should be approximately .005".

The wipe on each normally open contact should be approximately .005". This can be checked by inserting a .003" shim between the residual screw and the pole piece and operating the armature by hand. The normally open contacts should make before the residual screw strikes the shim.

5. Check the location of the contact brushes on the cradle and case blocks against the internal connection diagram for the relay. Be sure that the shorting bars are in the proper locations on the case block and that the long and short brushes on the cradle block agree with the internal connection diagram. Figure 3 shows a sectional view of the case and cradle blocks with connection plug in place. Note that there is an auxiliary brush in each position on the case block. This brush should be formed high enough so that when the connection plug is inserted it engages the auxiliary brush before striking the main brush. This is especially important in current circuits and other circuits with shorting bars since an improper adjustment of the auxiliary brush could result in a momentary open circuit.

6. Operate the target armature by hand and be sure that the target cover drops freely to expose the target before the armature strikes the pole piece. With the cover fastened securely in place check that the target resets when the reset button at the bottom of the cover is operated.

ELECTRICAL TESTS

It is recommended that the following electrical checks be made immediately upon receipt of the relay. Note that the tests should be made with the relay in its case and in a level position.

Receiver Unit - Connect the operating (R) and holding (RH) circuits of the receiver unit as shown in Figure 6. With the holding coil (RH) de-energized increase the current slowly in the operating coil (R) and check that the unit operates to the right below the limit specified in the section on CHARACTERISTICS-PICKUP AND DROPOUT for the model involved. Reduce the current slowly and check that the unit resets to the left within the limits tabulated.

With the operating circuit de-energized apply 80 percent of rated DC voltage to the holding coil (RH) circuit and check that the unit picks up.

Auxiliary Units - With the MX and GD2X circuits connected as shown in Figure 6 check that MX picks up when 80 percent of rated voltage is suddenly applied across terminals 1-18. Then check that when the voltage across 1-19 is slowly increased GD2X picks up at less than 80 percent of rated voltage.

Target - Increase the current in the circuit to studs 2-20 and check that the target operates at less than 1 ampere.

INSTALLATION PROCEDURE

If after the ACCEPTANCE TESTS the relay is held in storage before shipment to the job site, it is recommended that the visual and mechanical inspection described under the section on ACCEPTANCE TESTS be repeated before installation.

ELECTRICAL TESTS

It is recommended that pickup and dropout points, initially checked in ACCEPTANCE TESTS, be rechecked after the relay is installed. The diagram in Figure 7 shows connections for front-of-panel testing using a test plug.

Receiver Unit - With the holding coil (RH) de-energized, increase the current gradually in the operating coil (R) and check that the unit operates to the right below the limit specified in the section on CHARACTERISTICS. Reduce the current gradually and check that the unit resets to the left within the limits specified.

With the operating circuit de-energized apply 80 percent of rated DC voltage to the holding coil (RH) circuit and check that the unit picks up to the right.

Auxiliary Units - Check that the MX unit picks up with 80 percent of rated voltage applied across terminals 1-18, and that GD2X operates at less than 80 percent of rated voltage, gradually increased across studs 1 and 19.

Note that the lead from the GD2X contact to stud 20 has red insulation. The BCA11AV can be made functionally equivalent to the BCA11AS by removing this red lead from stud 20 and connecting it to stud 19.

SERVICING

If any of the mechanical or electrical check points described in the previous sections are found to be out of limits, the following points should be observed in restoring them.

MECHANICAL ADJUSTMENTS

Contact Adjustments - (Receiver Unit) - A fine adjustment of contact gap is provided by the adjustable screw contact at the top of the stationary contact support. The screw contact provides sufficient range to accommodate the usual field adjustment. A coarser adjustment may be obtained by loosening the nut which holds the contact clamp tight and turning the entire contact assembly so that, with the armature held by hand against the right side plate, the contact gap is approximately 0.015". The clamping unit should then be securely re-tightened.

After the gap adjustment check wipe with the armature resting against the left side plate. There should be room for at least a .008" feeler gage between the contact fork and the contact brush. Note that contact gap and wipe are not independently adjustable since armature travel is fixed by the side plates of the unit. However, with a gap of approximately .015" the wipe should be greater than .008".

ELECTRICAL ADJUSTMENTS

Receiver Unit - Electrical tests on the receiver unit must be made with the relay in the case since the change in stray flux caused by the presence of the steel case affects the pickup and dropout values.

The pickup and dropout points can be adjusted by means of the movable pole pieces. First loosen the clamping screws at the top front edge of the two side plates. The poles can then be turned by means of a short piece of stiff brass wire (No. 11 gage, .0907" 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 pickup and lowering dropout. Moving both poles to the left has the opposite effect.
- (b) Moving both poles in toward the armature reduces the ratio of dropout to pickup and increases the snap-action of the armature motion. Moving both poles out away from the armature has the opposite effect.

The clamping screws should be re-tightened after each pole adjustment.

Auxiliary Units - The MX and GD2X units have been carefully adjusted at the factory to obtain the pickup voltages and operating times mentioned in the section on CHARACTERISTICS. Experience has shown that these settings are quite permanent and normally do not require readjustment. If a readjustment is attempted note that pickup, dropout, and time settings on these units are interdependent. The following general rules can be given:

(a) The percentage of rated voltage at which the unit will pick up can be controlled by adjusting armature gap. Increasing the gap raises pickup while decreasing the gap lowers it. Gap can be set by bending the contact operating arm. Changing contact gaps, of course, also changes the pickup time. After any adjustment of contact gap it will be necessary to readjust the wipe of the N.O. and N.C. contacts.

Changing the initial tension of the flexible contact brushes will also change the pickup voltage, and in addition, will change the dropout time.

(b) Pickup time can be changed by adjusting the initial tension or back pressure, of the moving flexible contact brush. This is done by bending the brush using the special tool available from the factory. Changing the initial tension will also effect the pickup voltage and dropout time.

(c) Dropout time may be adjusted by means of the residual screw in the armature. Turning the screw in reduces dropout time. Any change in the residual screw setting must be accompanied by a readjustment of contact wipe, which can be accomplished by bending the contact operating arm. Since this adjustment changes the armature gap, pickup will also be affected.

RENEWAL PARTS

It is recommended that sufficient quantities of renewal parts be carried in stock to enable 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 quantity required, name of part wanted, and give complete nameplate data, including serial number. If possible, give the General Electric requisition number on which the relay was furnished.

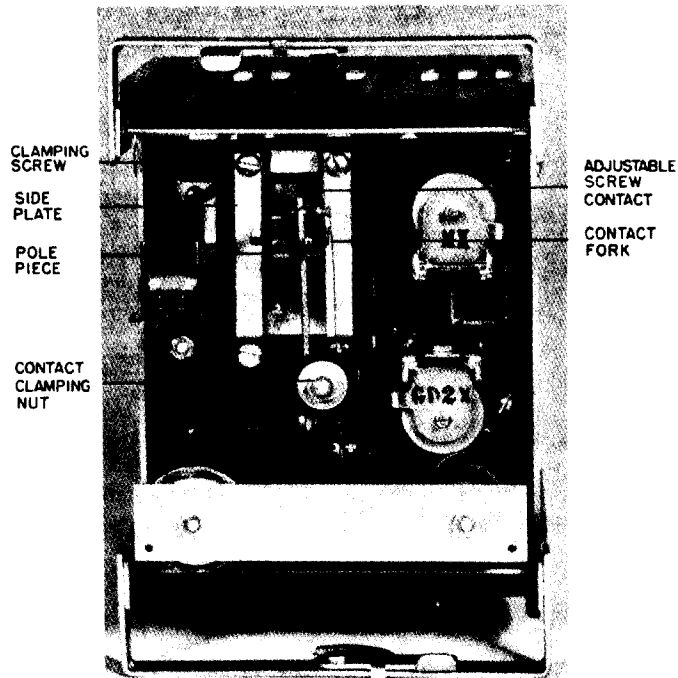


FIG. 1 (8030277) BCA11AV RELAY REMOVED FROM CASE WITH NAMEPLATE REMOVED (FRONT VIEW)

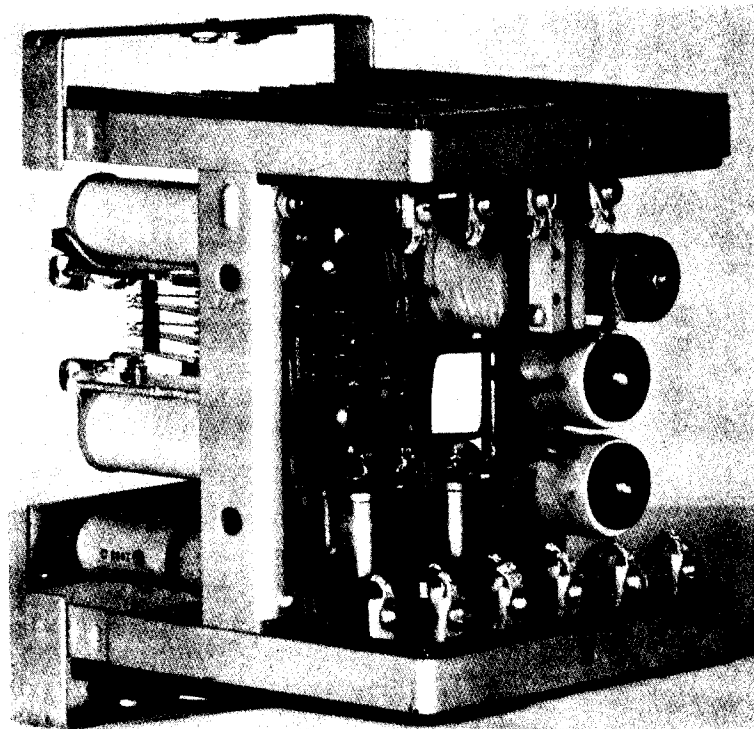
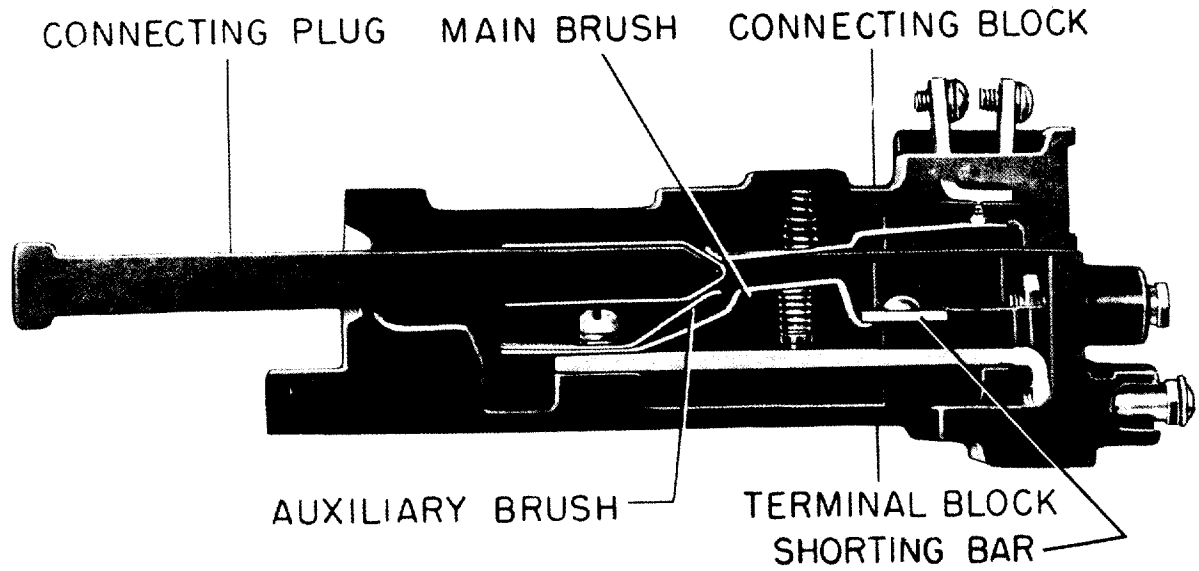


FIG. 2 (8029633) BCA11AV RELAY REMOVED FROM CASE (REAR VIEW)



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

FIG. 3 (8025039) CROSS SECTION OF DRAWOUT CASE SHOWING POSITION OF AUXILIARY BRUSH

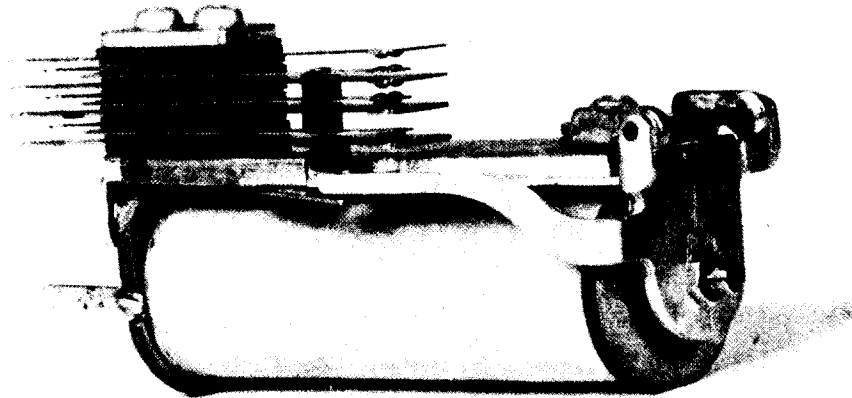
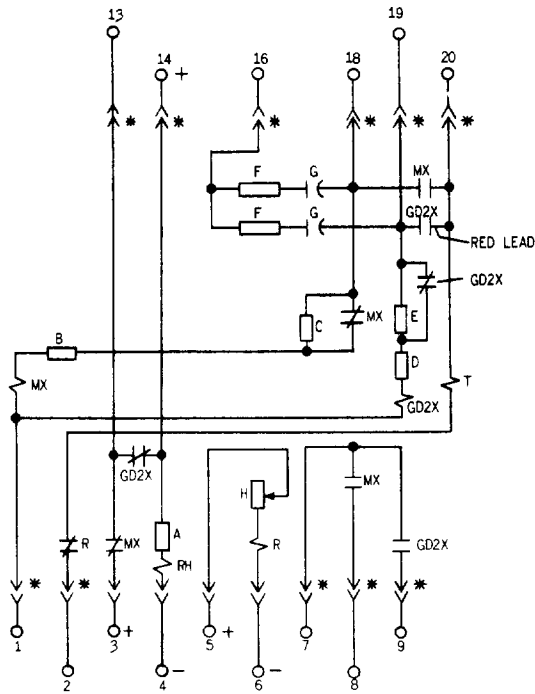


FIG. 4 (8012106) TYPICAL TELEPHONE RELAY UNIT USED IN BCA RELAYS



* = SHORT FINGER

FIG. 5A (0148A4083-3) SH. 1 INTERNAL CONNECTIONS DIAGRAM FOR THE BCA11AV RELAY (FRONT VIEW)

MODEL	RATED	RESISTANCE VALUE IN OHMS											CAP.	RES.OHMS
		RH	R	A	MX	B	C	GD2X	D	E	F	G		
12BCA11AV1A	250	1050	6	7000	58	800	3400	400	5000	5000	150		.25	25 *
2A	125	1050	6	3000	58	300	1700	400	2000	1000	150		.25	25 *
3A	48	1050	6	500	10	50	350	10	200	125	50	1.0		25 *
4A	250	1050	6	7000	58	800	3400	400	5000	5000	150		.25	25 *
6A	125	1050	1400	3000	58	300	1700	400	2000	1000	150		.25	325 **
7A	110	1050	6	2500	58	250	1500	400	1800	850	150		.25	25 *
8A	125	1050	6	3000	58	300	1700	400	2000	1000	150		.25	75 *
9A	220	1050	6	7000	58	700	3400	400	4000	4000	150		.25	25 *
10A	125	1050	6	3000	58	300	1700	400	2000	1000	150		.25	25 *
11A	48	48	1400	500	10	50	350	10	200	125	50	1.0		325 **
12A	125	1050	1400	3000	58	300	1700	400	2000	1000	150		.25	325 **
13A	220	1050	6	7000	58	700	3400	400	4000	4000	150		.25	25 *

* H RESISTOR IS SET SO RESISTANCE BETWEEN STUDS 5 & 6 IS 27 OHMS AT 25 ° C.
 ** H RESISTOR IS SET SO RESISTANCE BETWEEN STUDS 5 & 6 IS 1600 OHMS AT 25 ° C.

* FIG. 5B (0148A4083-7 SH. 2) INTERNAL CONNECTIONS (FRONT VIEW) CONT'D

* Indicates revision

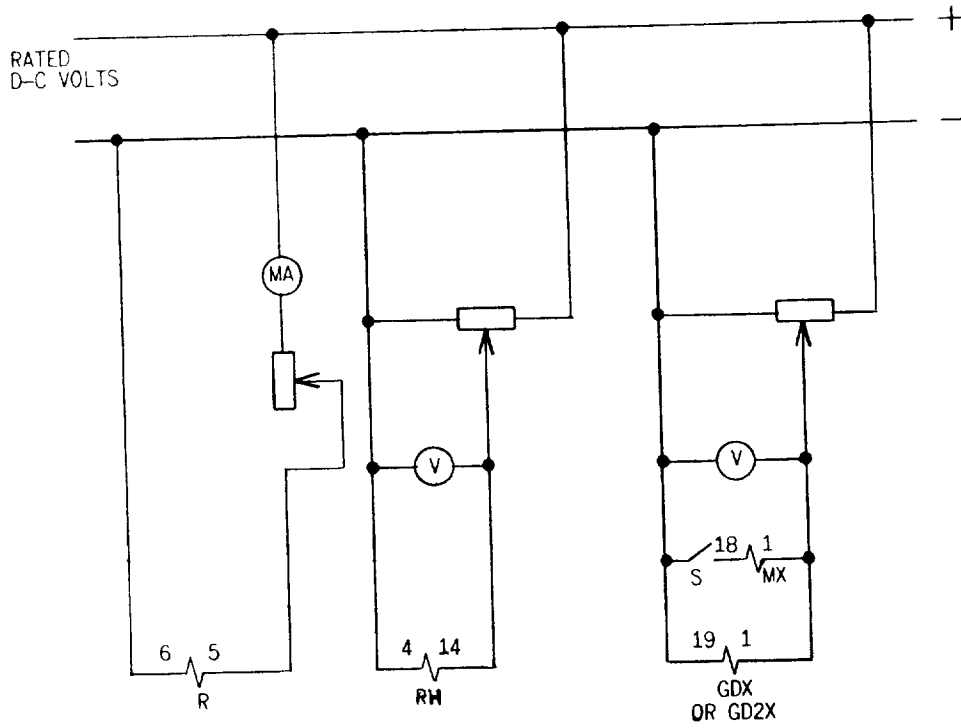


FIG. 6 (0148A4003-1) LABORATORY TEST CONNECTIONS DIAGRAM FOR THE BCA11AV RELAY

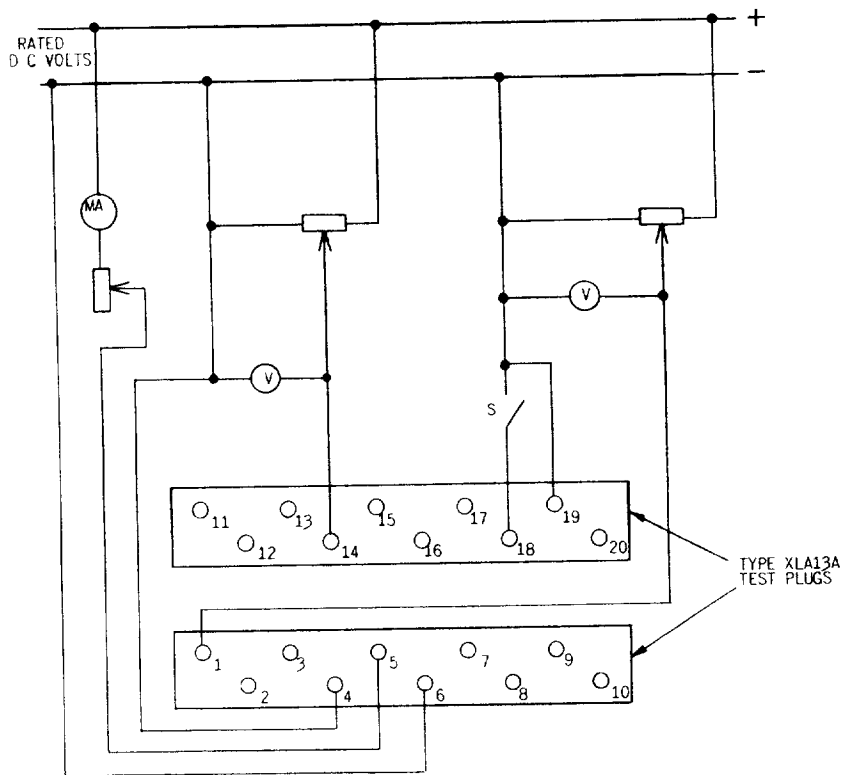


FIG. 7 (0148A4002-0) FIELD TEST CONNECTIONS DIAGRAM FOR THE BCA11AV RELAY

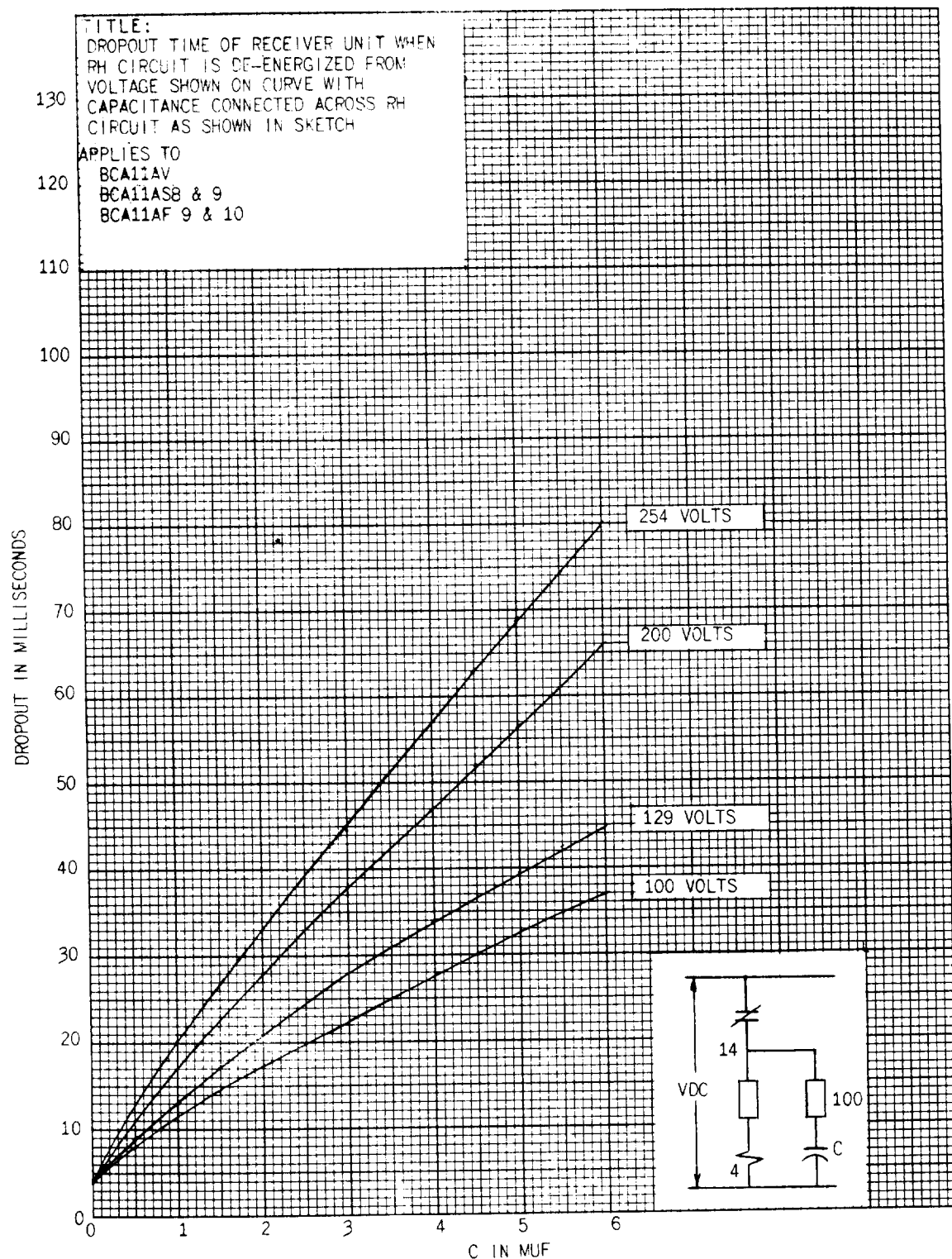


FIG. 8A (0165A6001-1) SH. 1 ADDED CAPACITANCE VERSUS DELAYED DROPOUT TIME FOR SPECIAL APPLICATIONS OF THE BCA11AV RELAY

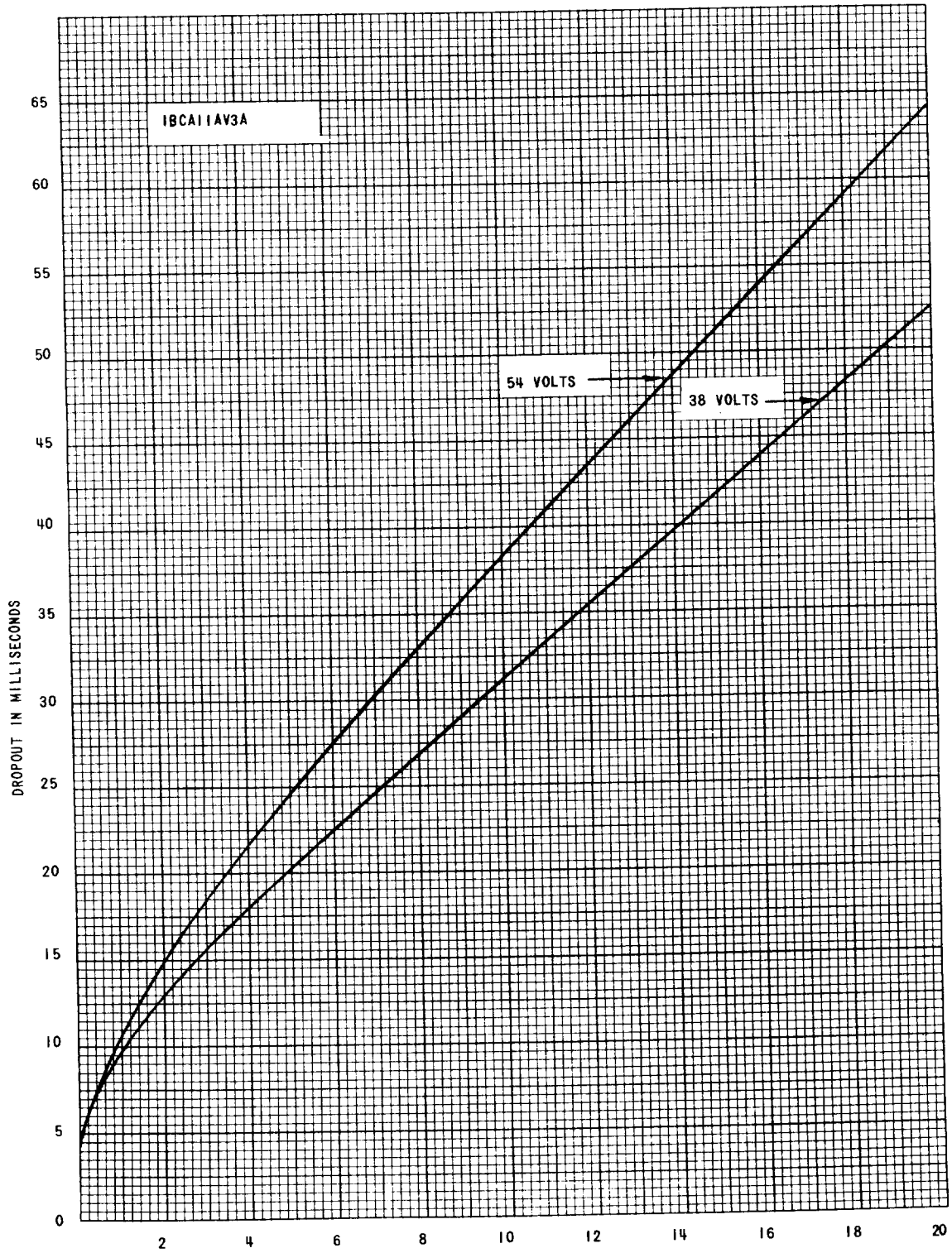
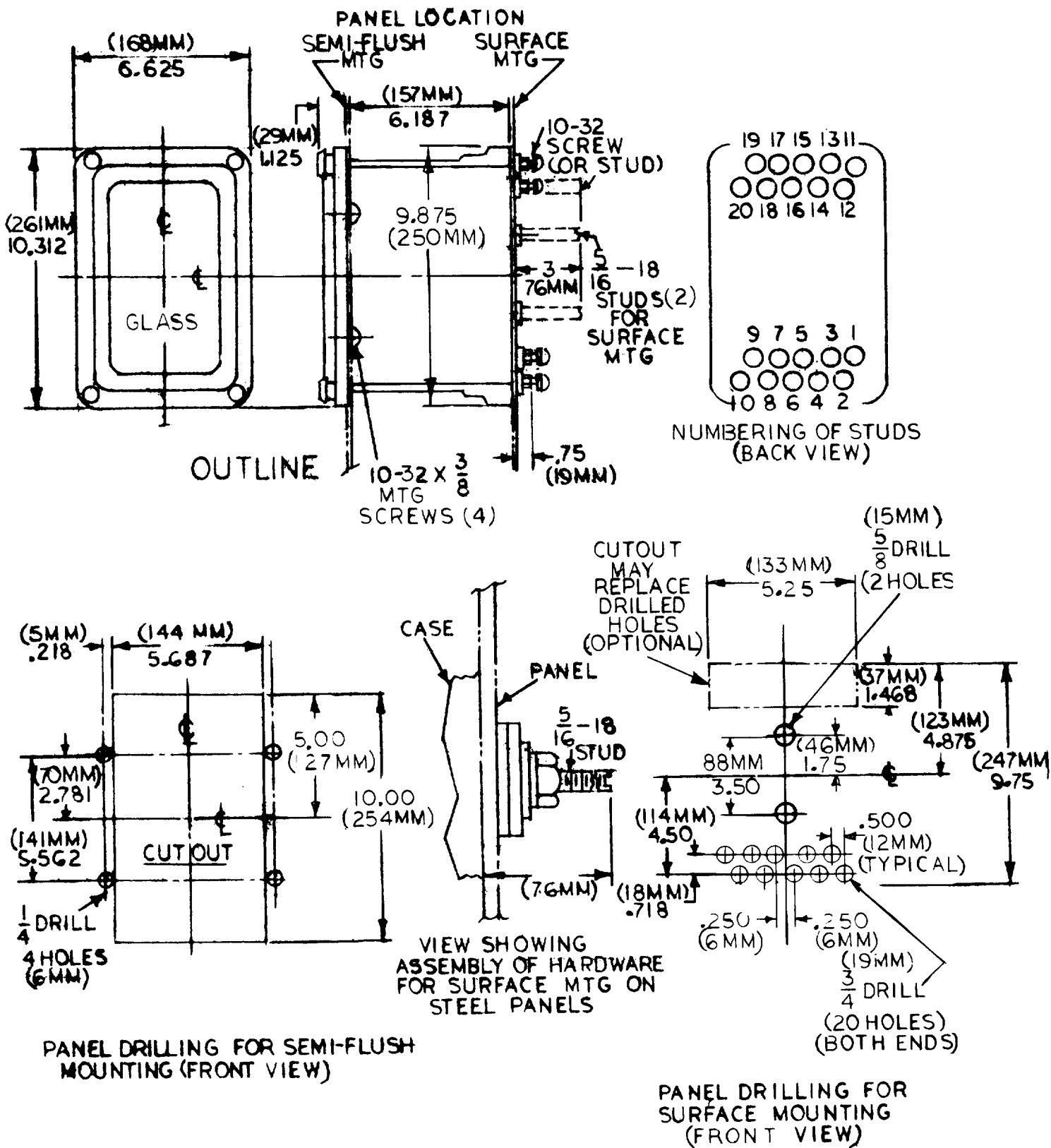


FIG. 8B (0165A6001-1) SH. 2 ADDED CAPACITANCE VERSUS DROPOUT TIME CONT'D



* FIG. 9 (6209272-4) OUTLINE AND PANEL DRILLING DIMENSIONS FOR THE BC11AV RELAY

* Indicates revision



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