



INSTRUCTIONS - File Copy -

GEI-33965C
SUPERSEDES GEI-33965B

CARRIER-CURRENT AUXILIARY RELAY

TYPE
BCA11AF

A

LOW VOLTAGE SWITCHGEAR DEPARTMENT

GENERAL  ELECTRIC

PHILADELPHIA, PA.

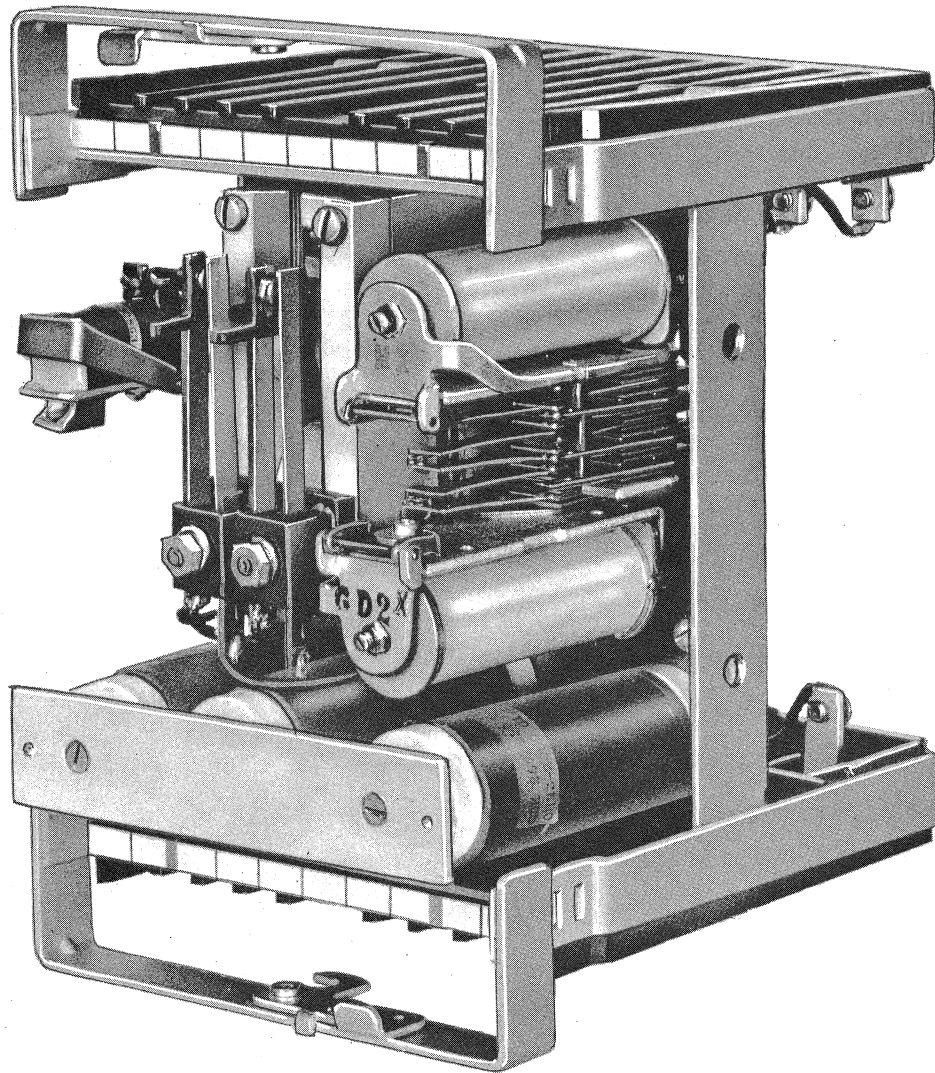


Fig. 1 (8007220)

Fig. 1 Carrier-Current Auxiliary Relay Typical Of The Type BCAll Relays

CARRIER-CURRENT AUXILIARY RELAYS

TYPE BCA11AF

INTRODUCTION

APPLICATION

The Type BCA relay is a carrier-current receiver and auxiliary relay designed for use in conjunction with the Type GCX, CFZ and other similar relays to provide carrier-current protection with distance relay backup.

RATINGS

These relays are available for use on 110, 125,

220 or 250 volt d-c control circuits. The targets have a rating of one ampere.

BURDENS

The resistance values of all coils and resistors are given on the internal connection diagram, Fig. 3. In the case where two values are shown, the smaller is for 110 or 125 volt relays and the larger for 220 or 250 volt relays.

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 un-

packing the relay in order that none of the parts are injured or the adjustments disturbed.

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.

DESCRIPTION

The Type BCA11AF relay consists of one polarized-receiver unit, two auxiliary telephone-relay units, one electrical target, associated resistors and capacitors all mounted in a relay case. Fig. 1 shows a photograph typical of the Type BCA11 relays, with relay removed from the case.

The auxiliary units are designated as follows:

- MX - Directional auxiliary unit.
- GD2X - Ground directional auxiliary unit.

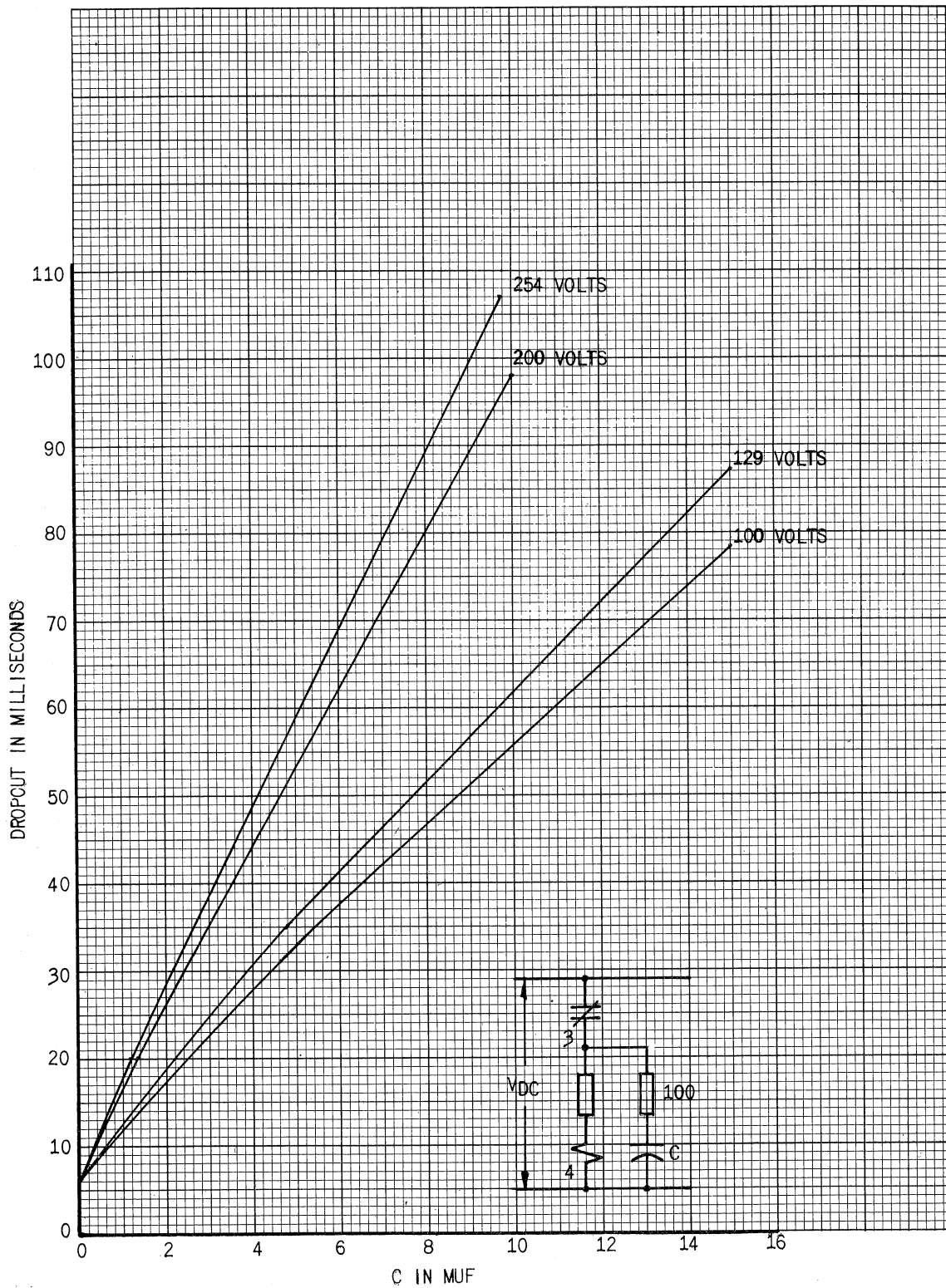
RECEIVER UNIT

This is polarized relay unit which consists of an alnico permanent magnet; two silicon steel side plates, fitted with fixed and movable pole pieces, a Mumetal 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 after the proper adjustment has been made. The armature travel is limited by the edges of a metal plate attached to the armature striking the inside surfaces of the side plates. This plate also serves to support the contact

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.

* Denotes change since superseded issue.



* Fig. 2 Dropout Time Characteristics of Type BC11AF

* Denotes change since superseded issue.

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 relay, these two effects are balanced against each other so that very little force is required to move the 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 and 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.

Fig. 3 (362A579)

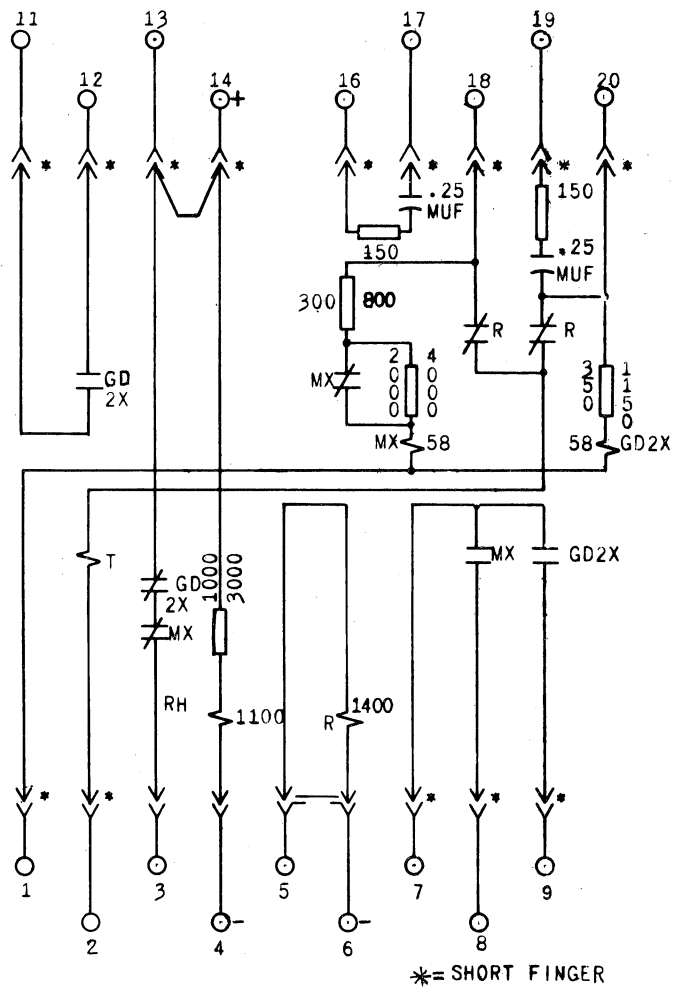


Fig. 3 Internal Connection Diagram of Type BCAlIAF Relay

INSTALLATION

LOCATION AND MOUNTING

The relay should be mounted on a vertical surface. The outline and panel diagram is shown in Fig. 4.

The location should be clean and dry, free from dust and excessive vibration, and well lighted to facilitate inspection and testing.

CONNECTIONS

The internal connection diagrams for the Type BCA relays is shown in Fig. 3.

One of the mounting studs or screws may be permanently grounded, if required, by a conductor not less than No. 12 B&S gage copper wire or its equivalent.

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:

MECHANICAL ADJUSTMENTS OF RECEIVER UNIT

The armature 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 metallic filings.

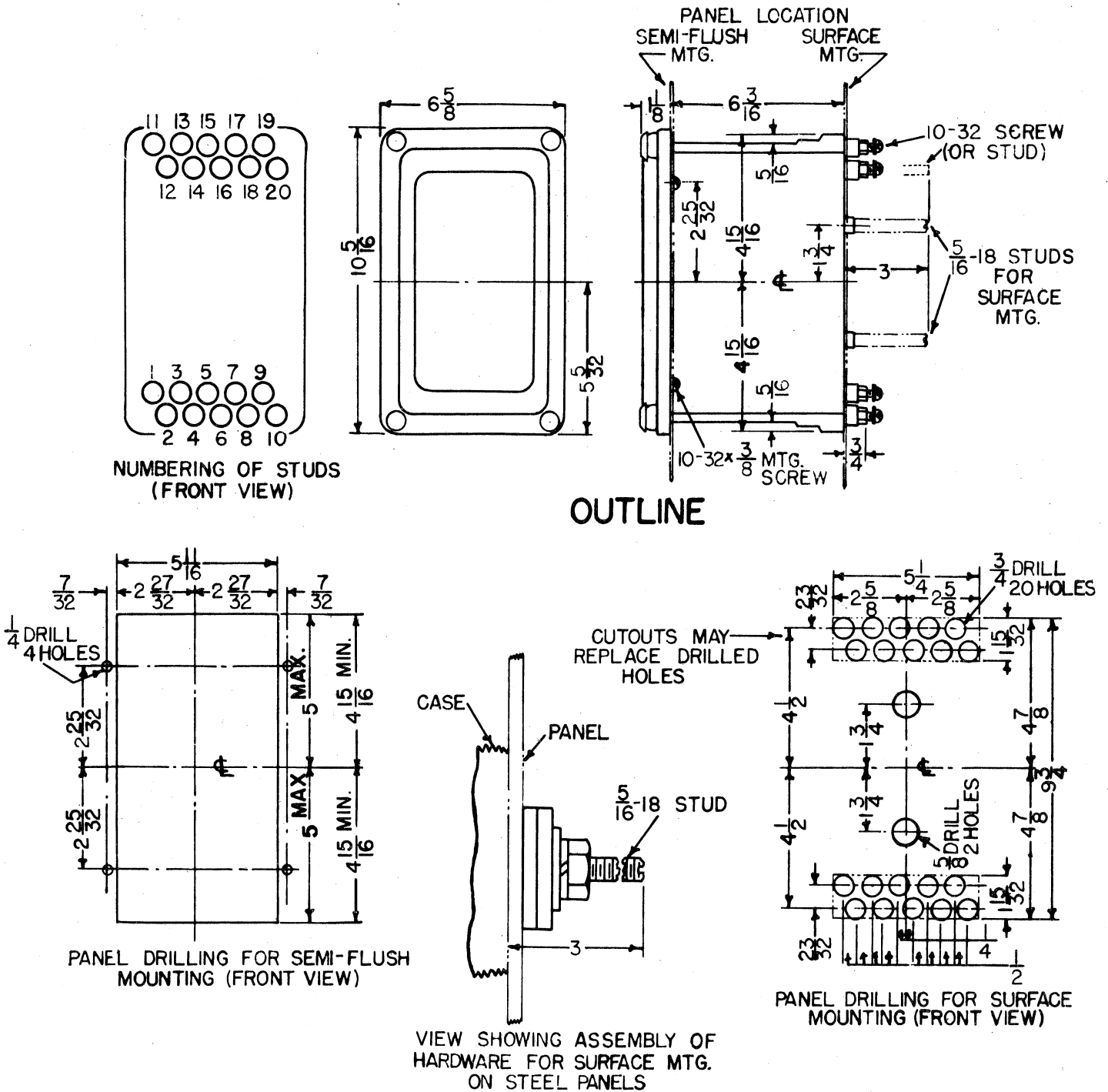


Fig. 4 Outline And Panel Drilling For Relay Types BC111AB, BC111AC, BC111AD And BC111AE

Each contact should be adjusted to have approximately 0.015 of an inch gap when the armature is in the contact-opening position. The edge of the contact operating fork should clear the contact brush by approximately 0.015 of an inch 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 8 to 10 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.

ELECTRICAL TESTS OF RECEIVER UNIT

These tests should be made with the relay in the case since the change in stray magnetic flux caused by the presence of the steel case affects the pickup and dropout values.

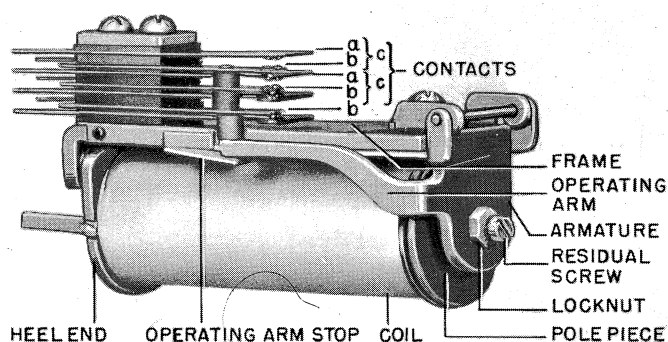
If the pick-up or drop-out values are considerably different from the desired values, it may be necessary to adjust the movable pole pieces. This is accomplished by loosening the clamp screws at the top front edge of the two side plates and turning the poles by means of a short piece of stiff brass wire (No. 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:

1. 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.

2. 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.

3. In general, moving the left pole has more effect on pickup and the right more effect on dropout.

The clamping screws should be retightened after each pole adjustment.



* Fig. 5 Typical Telephone-Relay Unit

ADJUSTMENTS ON TELEPHONE-RELAY UNITS

In the unexcited position of the telephone-relay units (see Fig. 5), the closed contacts should be making with a 0.005 of an inch wipe and all normally open contacts should have a gap of 0.015 of an inch, minimum. The wipe on circuit-closing contacts, with the unit in the picked up position, should be checked as follows:

Insert a 0.006 inch shim between the residual screw and the pole piece; with the telephone-relay unit operated by hand, the circuit-closing contacts should just make when the residual screw strikes the shim.

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

The drop-out time may be adjusted by means of the residual screw in the armature. Turning the screw in decreases the drop-out time. The dropout time may also be varied slightly by increasing the * wipe of the circuit closing contacts. The dropout time characteristics are shown in Fig. 2.

OPERATION

RECEIVER UNIT

In the Type BCA11 relays, the polarized unit is used for carrier receiving. Its coil consists of two windings; the receiver winding which is energized by the carrier signal, and the holding winding which is energized from the station battery. Either one of the windings is capable of operating the armature of the polarized unit to the picked up position. The unit has been adjusted at the factory to pick up with 0.007 amperes flowing in the receiving winding, and dropout with 0.004 amperes in the same winding. The holding coil will operate the armature at approximately 60 percent of rated voltage. A closed contact of the receiver unit is connected in

* Denotes change since superseded issue.

the carrier-trip circuit. With either winding of the receiver energized, this contact is held open, thus preventing tripping on faults external to the protected zone.

DIRECTIONAL AUXILIARY UNIT- MX

The directional auxiliary unit is a telephone-relay unit operated by the GCX directional starting units. Its function is to stop carrier transmission and remove voltage from the holding coil of the receiver unit as dictated by the directional unit. It has been adjusted to pickup in less than 5 milliseconds and drop-out in less than 10 milliseconds.

The unit has one open contact which is connected to the carrier stop circuit and thus cuts off carrier current upon closing. It also has two closed contacts that perform the following functions.

One closed contact de-energizes the holding coil of the receiver unit and the other closed contact is used to shunt its own resistor. With this additional resistance inserted into the circuit when the unit has picked up, the dropout value is 60 per cent or more of rated voltage.

The open contact of the GD2X unit is connected in parallel with an open contact of the MX

unit so that the operation of either will stop carrier-current transmission.

GROUND DIRECTIONAL AUXILIARY

The ground-directional auxiliary is a telephone-relay unit and is instantaneous in operation. The unit has one open and one closed contact in the control circuit.

The closed contact of the GD2X unit is connected in series with the holding coil circuit of the receiver unit and a closed contact of the directional auxiliary (MX) unit. The operation of either auxiliary will therefore remove voltage from the holding coil.

MAINTENANCE

PERIODIC INSPECTION

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, wipe, gap and cleanliness.

CONTACT CLEANING

For cleaning fine silver contacts, a flexible burnishing tool should be used. This consists of a flexible strip of metal with an etched roughened surface, resembling in effect a superfine file. The

polishing action is so delicate that no scratches are left, yet corroded material will be removed rapidly and thoroughly. The flexibility of the tool insures the cleaning of the actual points of contact.

Fine silver contacts should not be cleaned with knives, files, or abrasive paper or cloth. Knives or files may leave scratches which increase arcing and deterioration of the contacts. Abrasive paper or cloth may leave minute particles of insulating abrasive material in the contacts and thus prevent closing.

The burnishing tool described is included in the standard relay tool kit obtainable from the factory.

RENEWAL PARTS

It is recommended that two spare receiver alarm units be kept on hand for each relay. Orders for receiver alarm replacements or for any other renewal parts, should be addressed to the nearest Sales Office of the General Electric Company. Specify the quantity required, name of the part

wanted and the complete data as given on the nameplate. If possible, give the General Electric Company's requisition number on which the relay was furnished. For a list of renewal parts refer to GEF-3794.