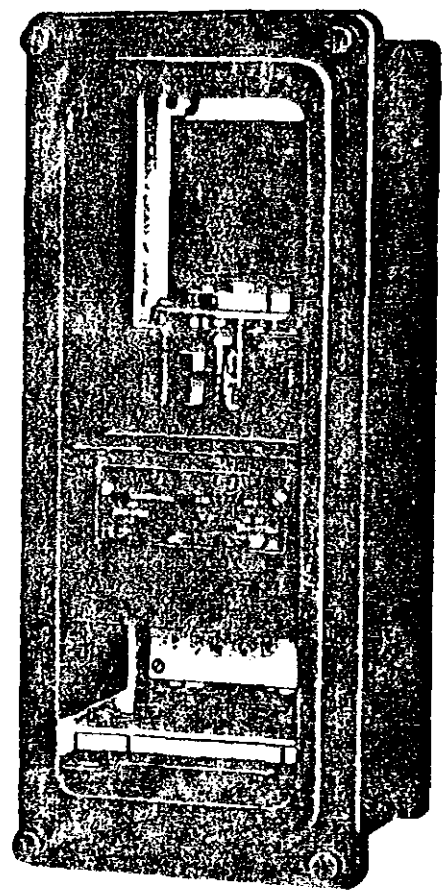
INSTRUCTIONS

GEI-31090A

SUPERSEDES GEI-3109

NETWORK RELAYS



Types

CAL16A CAN13A

A

POWER SYSTEMS MANAGEMENT DEPARTMENT

GENERAL ELECTRIC

PHILADELPHIA, PA.

NETWORK RELAY
TYPES CAL16A AND CAN13A

INTRODUCTION

With a few exceptions, the Type CAL16A and CAN13A relays are identical in construction and function to the standard secondary network relays shown in the included instruction book GEI-13580. The CAN13A will prevent reclosure if the source phase sequence is reversed and the network phase sequence is normal. The principal difference affecting both relays is that the glass cover and mounting bracket have been removed, and the relays have been mounted in the drawout case for mounting on a panel. Also, both relays have 2 ampere holding coils in the reclose circuits, instead of the 0.3 ampere coils as in the standard relay.

The Type CAN13A relay differs from the Type CAN11A relay in several points concerning physical construction and electrical connections. The only change in function is that it is designed to trip at approximately 0.005 ampere, current transformer secondary current, in phase with line-to-neutral voltage. It is intended to be used for tripping when the only reverse power flowing is the magnetizing current of the associated power transformer.

The principal differences between the Type CAN13A relay and the Type CAN11A relay are as follows:

1. The reclose contact is on the left and the trip contact on the right, facing the relay, on the Type CAN13A relay. This is the reverse of the Type CAN11A relay.
2. The main control spring is used to adjust trip value and the mechanical restraint is used to adjust reclose value on the Type CAN13A relay.
3. The electrical restraint element has been omitted on the Type CAN11A relay.
4. The potential coils, instead of being connected directly to the network side of the breaker are, connected to a resistor combination across each pole of the associated breaker.

This last feature allows the potential coils to be energized from the network side when the source side is de-energized; or from the source side when the network side is de-energized. When the breaker is closed, the two sections of the resistor combination on each phase are effectively in parallel and the net resistance is the same as that ordinarily used with the Type CAN11A relay (i.e., 340 ohms when 6054972 G8 is used as the phase-shifting transformer, and when the 900 ohm resistor is used in the phase circuit for 1.5 volt reclosure.) Therefore the tripping characteristic is the same except that the setting is 0.1% instead of 0.2% of the relay rating.

RECEIVING, HANDLING AND STORAGE

Cover (8009743)

The 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 damages sustained in transit. If injury or damage 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 in order that none of the parts are injured or the adjustments distrubed.

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

RELAY CASE

The case is suitable for either surface or semi-flush panel mounting and an assortment of hardware is provided for either mounting. The cover attaches to the case and also carries the reset mechanism when one is required. Each cover screw has provision for a sealing wire.

The case has studs or screw connections at both ends or at the bottom only for the external connections. The electrical connections between

the relay units and the case studs are made through spring backed contact fingers mounted in stationary molded inner and outer blocks between which nests a removable connecting plug which completes the circuits. The outer blocks, attached to the case, have the studs for the external connections, and the inner blocks have the terminals for the internal connections.

The relay mechanism is mounted in a steel framework called the cradle and is a complete unit with all leads being terminated at the inner block. This cradle is held firmly in the case with a latch at the top and the bottom and by a guide pin at the back of the case. The cases and cradles are so constructed that the relay cannot be inserted in the case upside down. 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 fastened to the case by thumbscrews, holds the connecting plug in place.

To draw out the relay unit the cover is first removed, and the plug drawn out. Shorting bars are provided in the case to short the current transformer circuits. The latches are then released, and the relay unit can be easily drawn out. To replace the relay unit, 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 current and voltage, or from other sources. Or, the relay unit can be drawn out and replaced by another which has been tested in the laboratory.

INSTALLATION

LOCATION AND MOUNTING

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

The relay should be mounted on a vertical surface. The outline and panel drilling dimensions for the Type CAL16A relay, in the size M1 case, is shown in Fig. 6. The outline and panel drilling dimensions for the Type CAN13A relay, in the size M2 case, is shown in Fig. 7.

CONNECTIONS

The internal connections for the Type CAL16A and CAN13A relays are shown in Figs. 1 and 2 respectively.

A typical external connection diagram for the Types CAL16A and CAN13A relays is shown in Fig. 3.

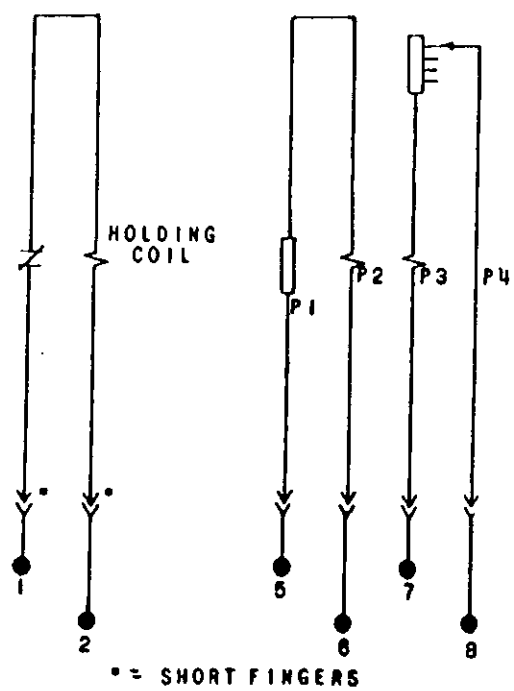


Fig. 1 Internal Connections For Relay Type CAL16A

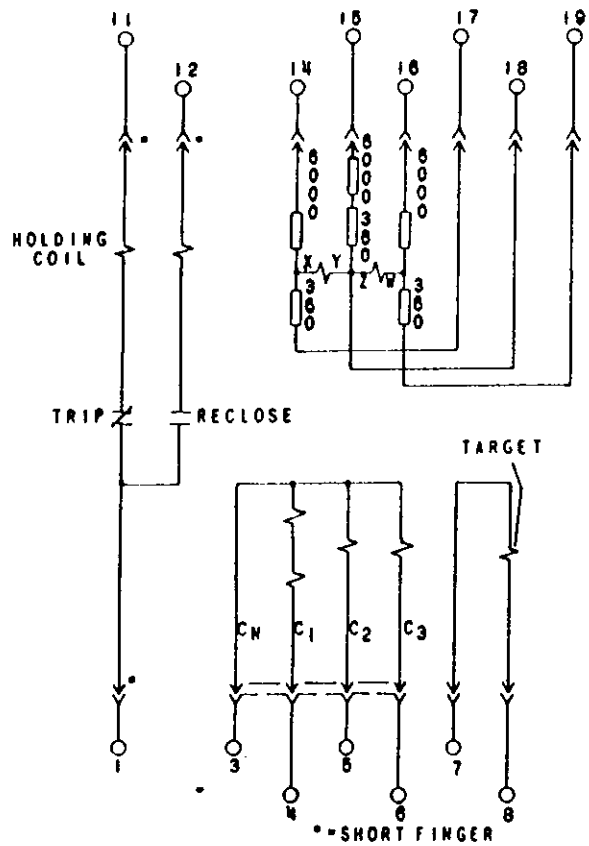


Fig. 2 (K-6507987)

Fig. 1 (K-6209845)

Fig. 2 Internal Connections For Relay Type CAN13A

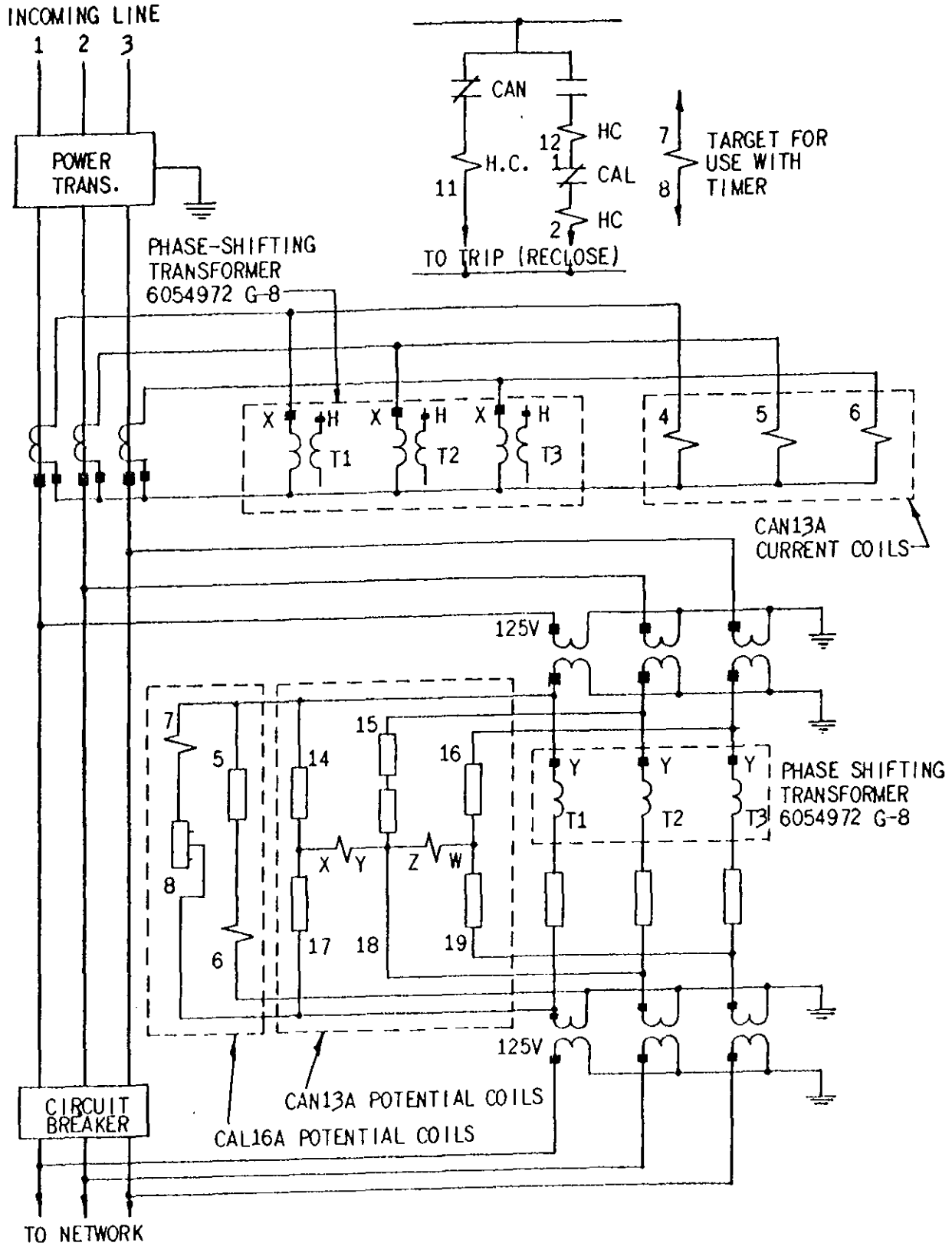


Fig. 3 (K-6556416)

Fig. 3 External Connections For Types CAL16A And CAN13A Relays

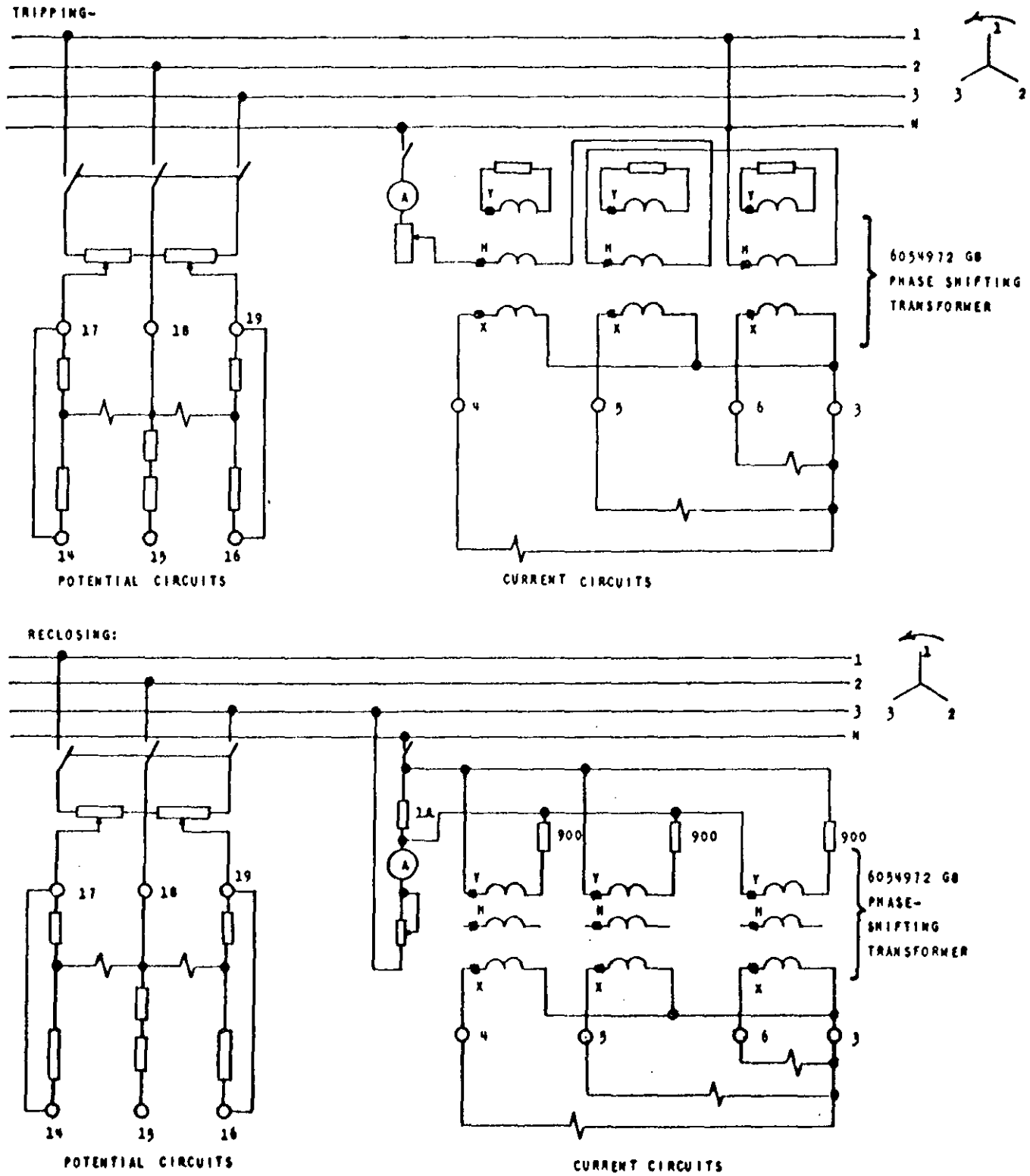


Fig. 4 (K-6556460)

Fig. 4 Schematic Diagram Of Test Connections For Relay Type CAN13A

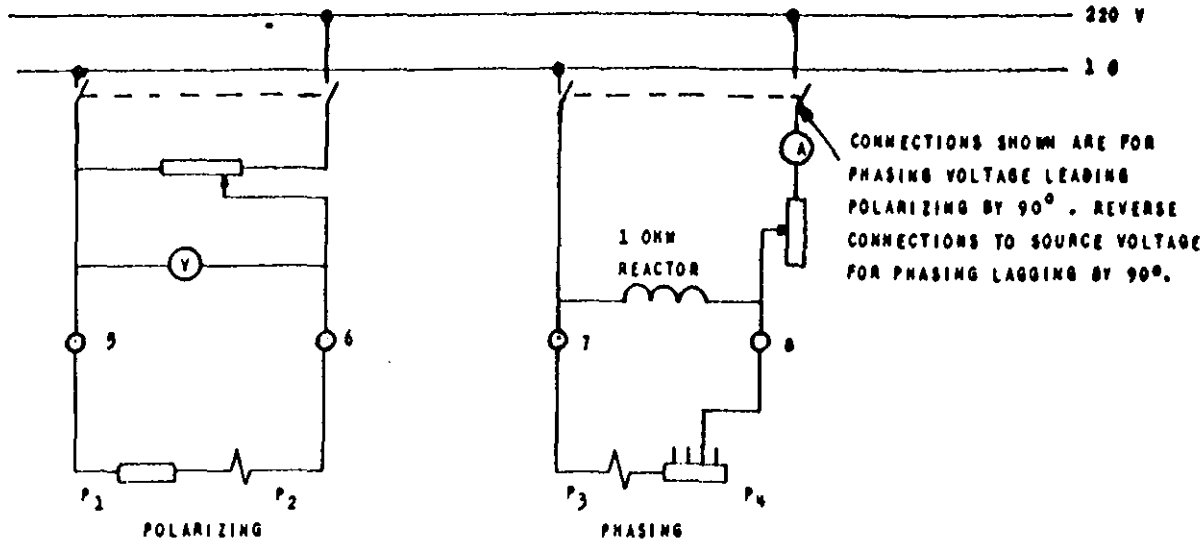


Fig. 5 (K-6556456)

Fig. 5 Schematic Diagram Of Test Connections For Relay Type CAL16A

MAINTENANCE

TYPE CAN13A RELAYS

INSPECTION AND MECHANICAL ADJUSTMENT

1. The main control spring of the Type CAN13A relay is adjusted so that the trip contacts are open with zero windup on the control spring adjusting shaft, and are just made when there are 3 half-turns windup (counterclockwise) on the adjusting shaft. The normal position of the spring is such that the right-hand (trip) contacts just make with the relay de-energized. This can be checked by deflecting the right-hand stationary contact to the right and noting that the moving contacts do not move to the right.

2. Items 1 to 9 under INSPECTION AND MECHANICAL ADJUSTMENT in GEI-13580 apply to the Type CAN13A relay. Item 10 under the same heading, covering the electrical restraint element, does not apply.

CALIBRATION TESTS AND ADJUSTMENTS

Fig. 4 shows the test connections for checking and adjusting both the tripping and reclosing calibration. The trip setting should be checked first because any adjustment of the trip setting also affects the reclose setting; whereas, the reclose setting can be adjusted independently of the trip setting and should therefore be made last.

Tripping

Connect the relay as shown in Fig. 4. With the relay de-energized, the right-hand contact should be just made. With only the potential coils energized, the moving contacts should pull away from the trip contact. Closing the switch in the current circuit to pass current through the H winding, with the connections shown, should produce a torque in the direction to close the trip contact. With the tes. connections shown, a single-phase current is use and the required single-phase current is equal to 1.5 times the desired three-phase trip setting. For example, if it is desired to trip at 0.005 amperes balanced three-phase current, the ammeter A should read 0.0075 amperes because of the single-phase current.

The trip calibration can be adjusted above or below the factory setting, or the factory setting can be restored, by adjusting the main control spring adjusting shaft (see photographs of CAN relay, Fig. 19 in GEI-13580). Turning this shaft clockwise increases the amount of reverse current required for tripping, and turning the shaft counterclockwise decreases the amount of reverse current required.

Reclosing

To check the voltage necessary for reclosing connect as shown in the lower diagram of Fig. 4. The one ohm resistor in parallel with the phasing (Y) winding of the phase shifting transformers has such a low impedance compared to the phasing windings that practically all of the current read by ammeter A passes through the resistor, and the ammeter reading is equal to the voltage across the resistor. Since this is a "single-phase" test, the voltage applied must be 1.5 times the desired three-phase reclose setting. For example, for a three-phase 1.5 volt reclose setting, the ammeter A should read 2.25 amperes.

The reclose calibration of the relay can be changed by adjusting the mechanical restraint element. Turning the cap of the restraint clockwise increases the restraint and therefore the reclose calibration.

Holding Coils

Both holding-coils of the Type CAN13A relay are rated 2 amperes. These holding coils can be checked as part of the trip and reclose adjustments above by connecting an adjustable resistor in the contact circuit and adjusting the holding coil circuit to 2 amperes. As soon as the trip or reclose contacts make, the sealing armature should definitely seal them closed, and there should be no sparking except at the instant the contacts touch. Interrupt the holding current by an external switch in the contact circuit, never at the contacts.

TYPE CAL16A RELAY

The Type CAL16A relay is identical to the Type CAL15A relay, described in the included instruction book GEI-13580, except that it is mounted in a drawout case. For calibration, the relay should be connected as shown in Fig. 5. The normal calibration of the Type CAL16A relay is to close its contacts when the phasing voltage (on studs 7-8) is gradually increased to 0.5 volt, leading the potential voltage (studs 5-6) by 90 degrees. Adjustments can be made as described in GEI-13580.

Fig. 6 (K-6209273)

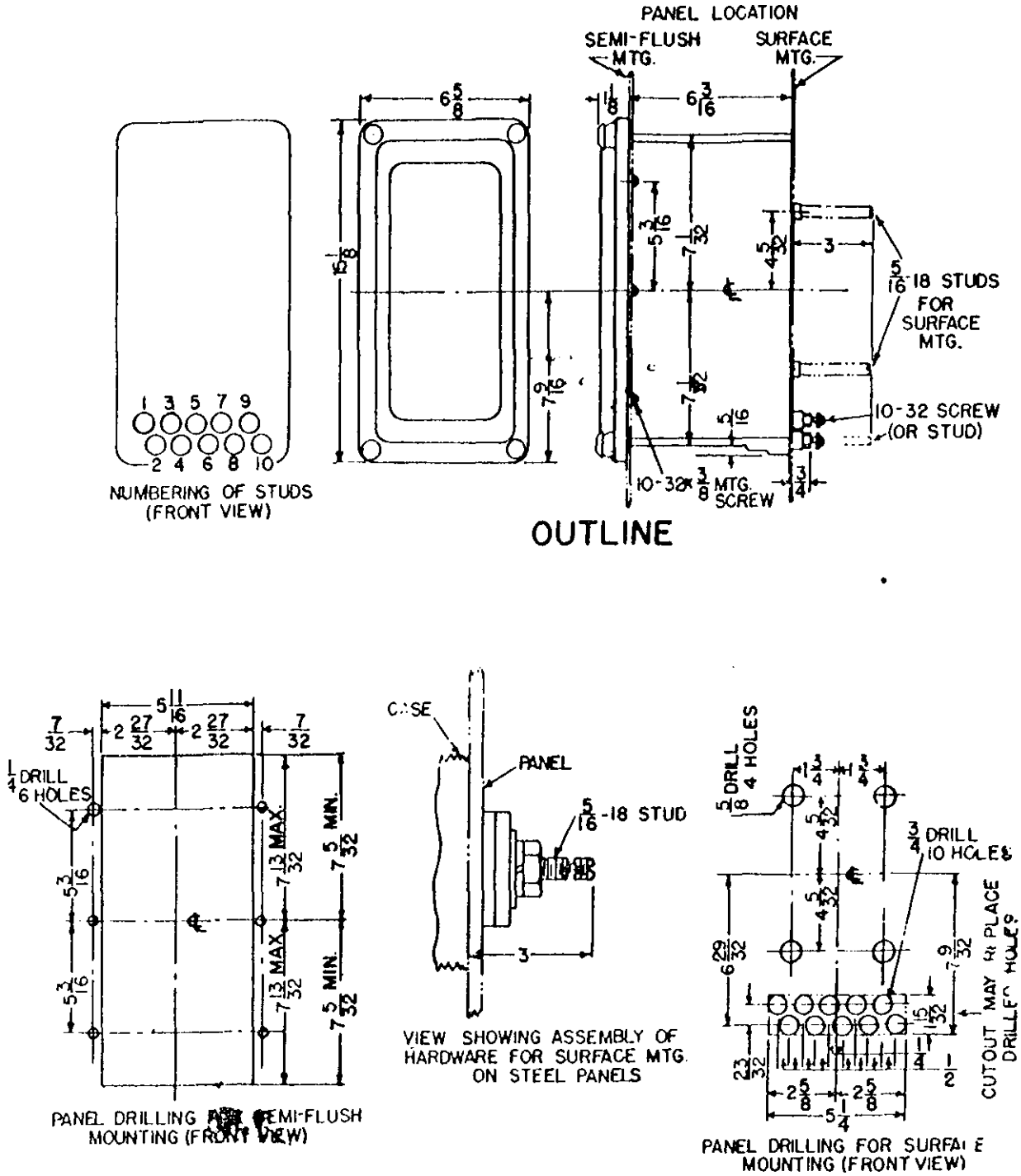


Fig. 6 Outline And Panel Drilling Dimensions For Relay Type CAL16A

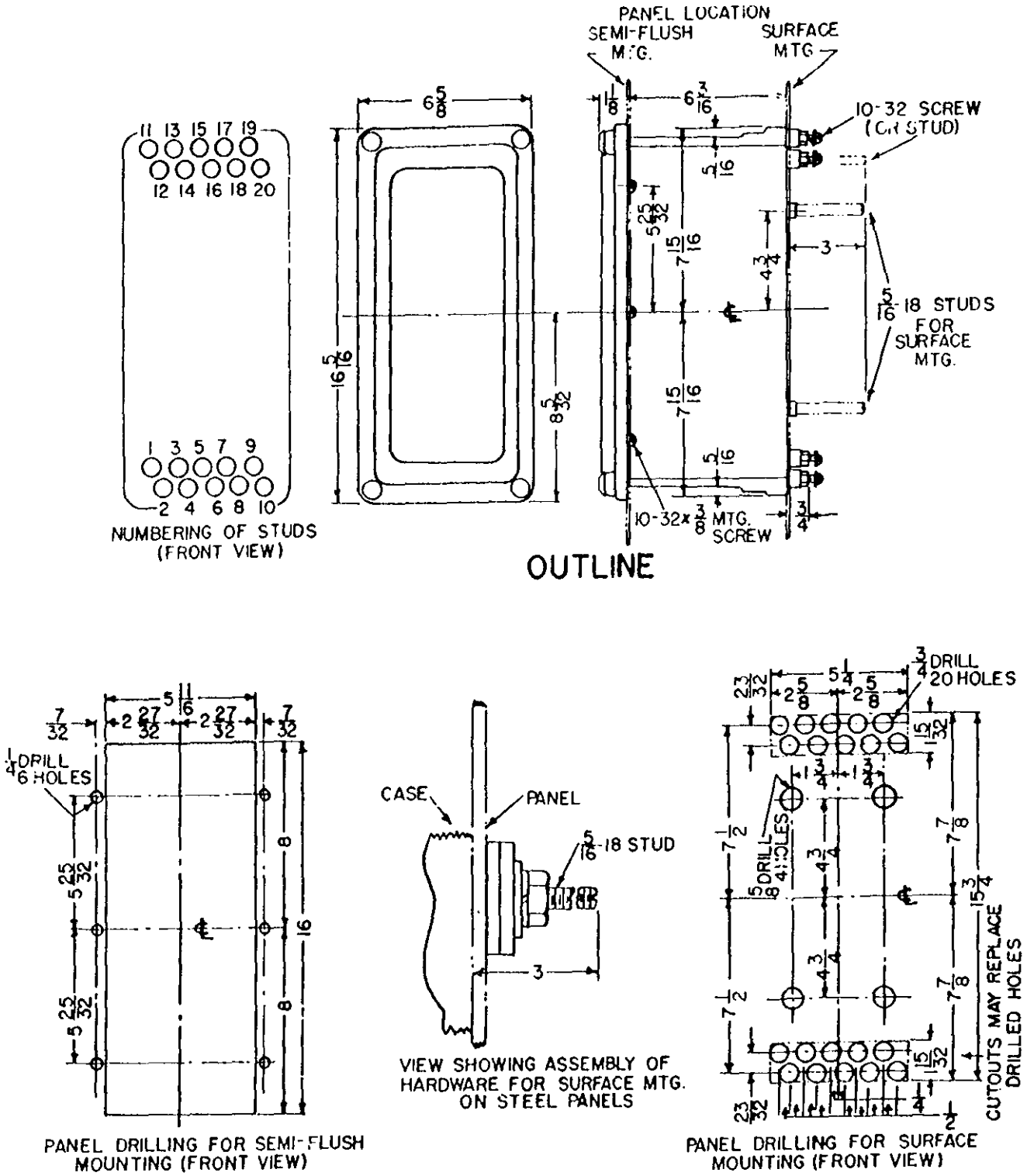


Fig. 7 (K-6209274)

Fig. 7 Outline And Panel Drilling Dimensions For Relay Type CAN13A