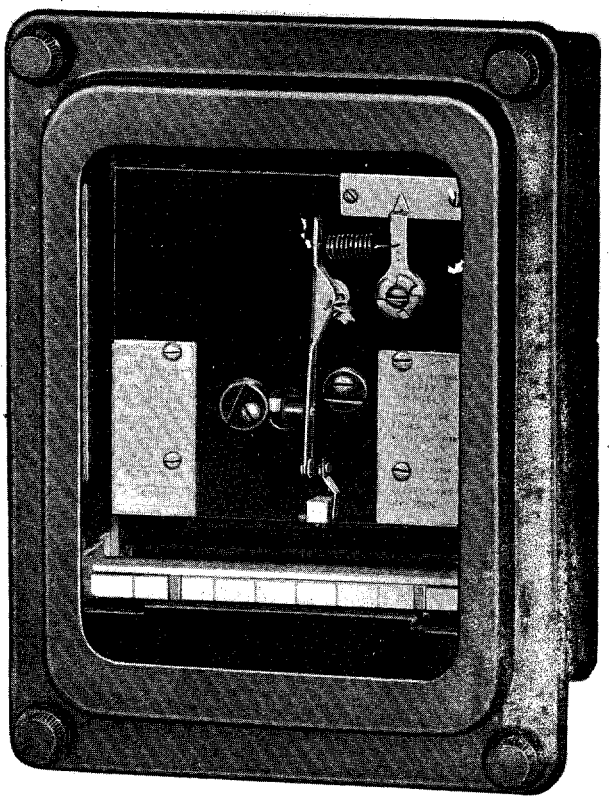
INSTRUCTIONS

GEI-30992C

SUPERSEDES GEI-30992B

VOLTAGE AND CURRENT DIRECTIONAL RELAYS



Types
RCP11A
RCP11B

POWER SYSTEMS MANAGEMENT DEPARTMENT

GENERAL ELECTRIC

PHILADELPHIA, PA.

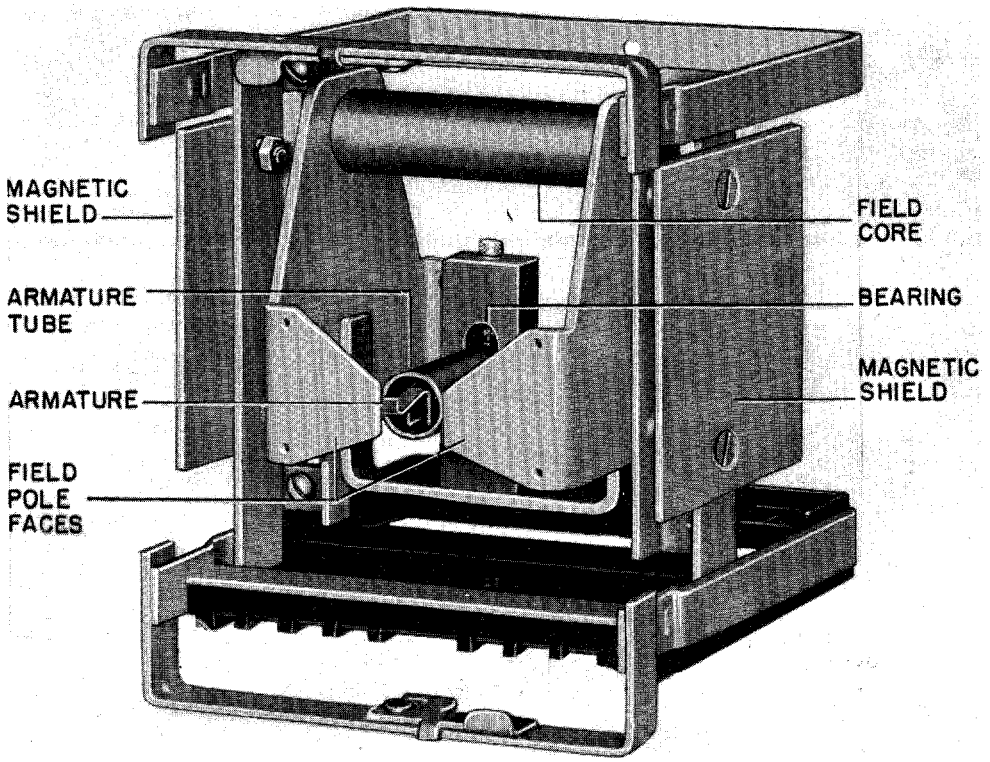


Fig. 1 Type RCP Relay Partially Assembled

Fig. 1 (8009033)

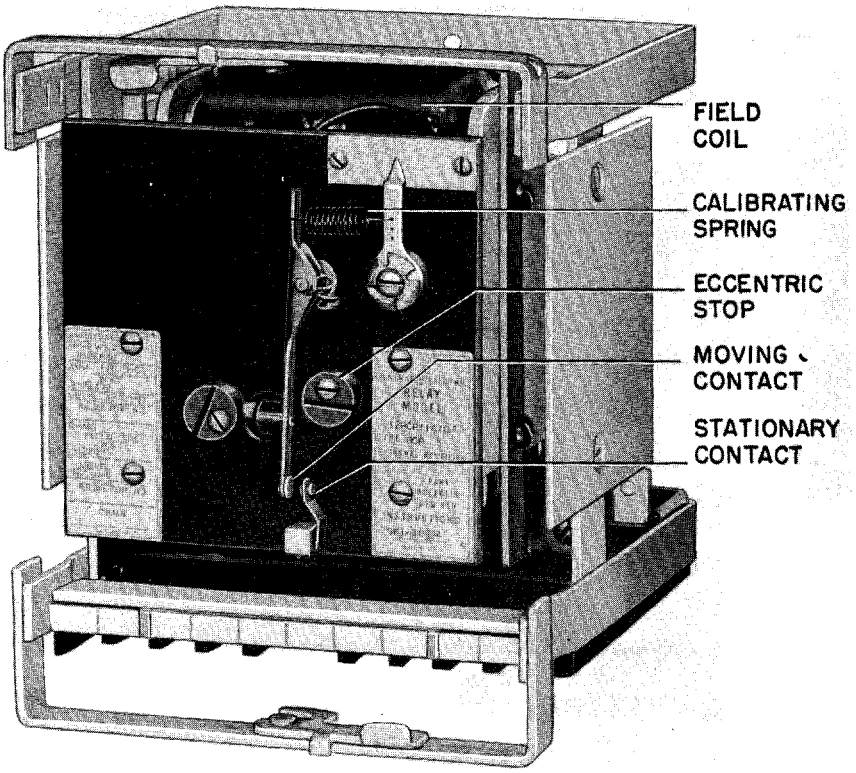


Fig. 2 Type RCP11A Relay Removed from Case

Fig. 2 (8009564)

Cover (8009563)

VOLTAGE AND CURRENT DIRECTIONAL RELAYS TYPE RCP

INTRODUCTION

The Type RCP relay consists of a polarizing field coil, two armature coils a framework forming part of the magnetic circuit, a contact mechanism and a calibrating attachment. The field coil, mounted on the upper part of the relay, is wound over an iron core which completes the magnetic circuit between both sides of the frame, while the armature coils are mounted end to end surrounding a brass tube which encloses the armature. These coils are located directly below the field coil and mounted at right angles to it. A magnetic shield, mounted on each side of the relay, minimizes changes occurring in the operating characteristics when the cover is removed.

APPLICATION

The Type RCP relays are used with d-c generators and synchronous convertors to prevent the machine from being connected to the bus, unless the machine voltage is slightly higher than the bus voltage. They also provide protection for these machines against motoring, upon loss of driving power, by disconnecting the machine from the source in advance of possible overspeed.

If the field is excited from a fixed polarity source such as a battery or rectifier, the relays will also provide reverse polarity protection.

RATINGS

The standard armature current coil has a rating of 110 amperes and is used with a suitable 100 m.v. shunt on all line currents above this value.

The armature potential coil is available in ratings from 125 to 750 volts. These ratings are for either one minute or continuous operation, depending on the value of the series resistor that is used.

The polarizing field coils are rated at 24, 85 and 125 volts d-c. The use of series resistors allows operation on voltages up to 750 volts.

The current closing rating of the contacts is 20 amperes. The current-carrying rating is 5 amperes continuously on 20 amperes for one minute the interrupting ratings are listed in Table I.

TABLE I

Volts		Amperes (Non-Inductive)
A-C	D-C	
--	125	0.2
--	250	0.1
115	--	2.0
130	--	1.0

BURDENS

The resistances of the various armature current coils at 25° C is given in Table II.

TABLE II

Ratings Amps	Resistance Ohms	Used In
40	0.00251	RCP11A
110	0.0007	RCP11A
110	0.0008	RCP11B

The total resistance of the shunt leads should not exceed 0.00025 ohms when it is desired to obtain maximum sensitivity of the relay.

The resistance of the armature potential coil is 315 ohms at 25°C. The total resistances of the circuit (at 25°C) is given in Table III.

TABLE III

Voltage	Resistance (Ohms)	
	Series R	Total
125	--	315
230/250	300	615
275/250	400	715
550/575	1100	1415
600/625	1200	1515
660	1300	1615
750	1500	1815
275/300 (Cont.)	2200	2515
550/575 (Cont.)	4500	4815
* 1200	10000	10350

* Type RCP11B relays only.

The resistance of the various field coils and also the total resistance of the circuit (at 25°C) is given in Table IV.

TABLE IV

Voltage	Resistance (Ohms)		
	Coil	Series	Total
48	140	75	215
85	1000	--	1000
125	2050	--	2050
125	140	500	640
230/250	140	1000	1140
275/300	140	1300	1440
550/575	140	2600	2740
600/625	140	3000	3140
660	140	3200	3340
750	140	3600	3740
* 1200	140	6000	6140

* Type RCP11B relay only.

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 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 RCP11A relay has one normally open contact and the armature current circuits have been insulated to withstand voltages up to 1500 volts d-c to ground.

The Type RCP11B relay is similar to the Type RCP11A relay except that both the armature current and potential coil circuits have been insulated to withstand voltages up to 1500 volts d-c to ground.

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. 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 studs for the high current connections are brought out directly from the current coils. This is done in order that the variation in contact resistance, that is inherent in a wiping contact, may be eliminated. (See Fig. 3.)

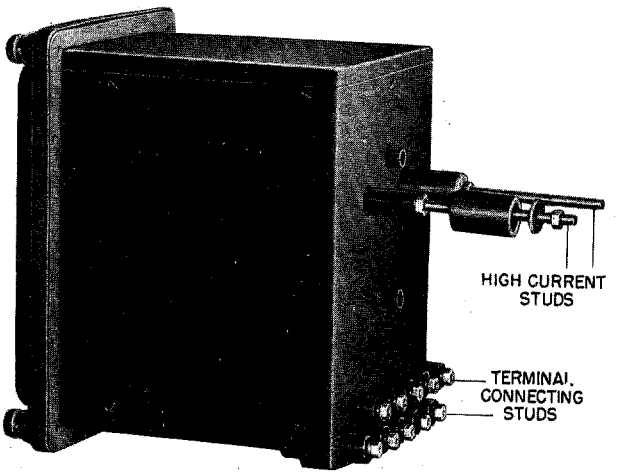


Fig. 3 (8009668)

Fig. 3 Rear View of Type RCP11A Relay Showing Stud Connections

INSTALLATION

LOCATION

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

MOUNTING

The relay should be mounted on a vertical surface. The outline and panel diagram are shown in Figs. 7 and 8.

CONNECTIONS

The internal connection diagrams are shown in Fig. 4 and 5. A typical wiring diagram is given in Fig. 6.

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

ADJUSTMENTS

The relays have been adjusted at the factory for proper operation and it is assumed that these adjustments have not been disturbed. Should it become necessary to alter those adjustments for any reason the following procedure should be followed.

PICKUP VOLTAGE

The pickup is set at the factory to close the contact at 4 percent of the lower continuous rating or 1 percent of the lower minute rating of the armature potential coil. This may be adjusted by moving the eccentric stop which is at the left of the armature. To increase the pickup, turn the stop so that the armature resets further to the left and vice versa. When decreasing the pickup, do not move the stop so far that the maximum field voltage will close the contacts without voltage on the armature coil.

If pickup is being checked, the field should be removed and re-applied before each check of voltage pickup. This is done to reduce the effect of residual magnetism.

A decrease in pickup voltage tends to cause the controlled machine to be reconnected to the bus in response to a smaller load demand. An increase in pickup tends to reduce the number of operations of the relay and any devices which it controls.

ZERO CURRENT DROPOUT

The contacts are set to open at zero current in the armature coil when the field voltage is less than 70 percent of normal.

REVERSE CURRENT DROPOUT

* The reverse current setting is normally adjusted to operate at 2 percent of the armature coil rating. The reverse current setting decreases toward zero as the field voltage decreases.

The dropout may be adjusted by moving the stationary contact to increase the dropout, move the contact to the right and vice versa. When decreasing the dropout, be sure that the contact gap remains large enough to break the circuit at maximum control voltage, and that the armature is not brought so near the center that it will drop-out above minimum field voltage at zero armature current.

The drop-out should ordinarily be made low enough to insure disconnection of the controlled machine from the bus when its driving power fails. An increase in drop-out current tends to reduce the number of operations of the relay and any devices which it controls.

BEARINGS

The lower bearing should be adjusted for barely perceptible end play, and the armature and moving contact should operate without perceptible friction.

PERIODIC TESTING

It is recommended that an operation test and mechanical inspection of the relay be made at least once every six months.

Watching the station motors while the relay performs both its functions may give a sufficient check, otherwise the power supply to the controlled machine may be interrupted to see that the relay drops out on reverse current, and then restored to check the pick-up voltage. The machine must be operating in parallel with some other source, preferably lightly loaded, at the time of the test.

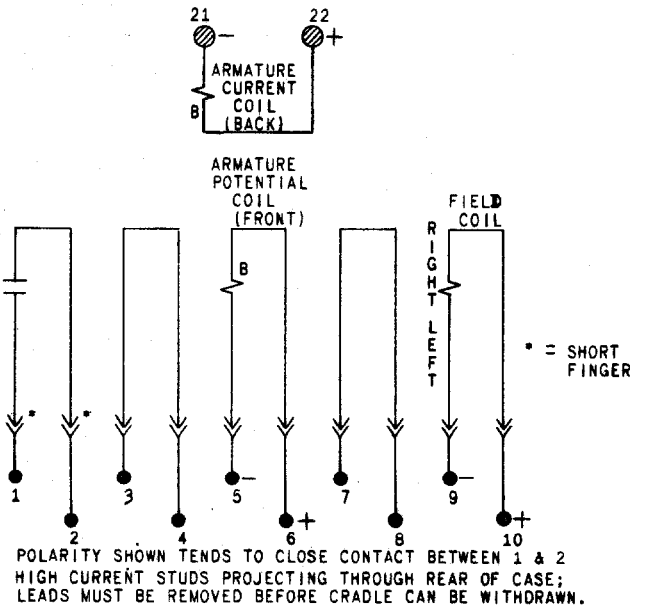


Fig. 4 Internal Connections for Type RCP11A Relay (Front View)

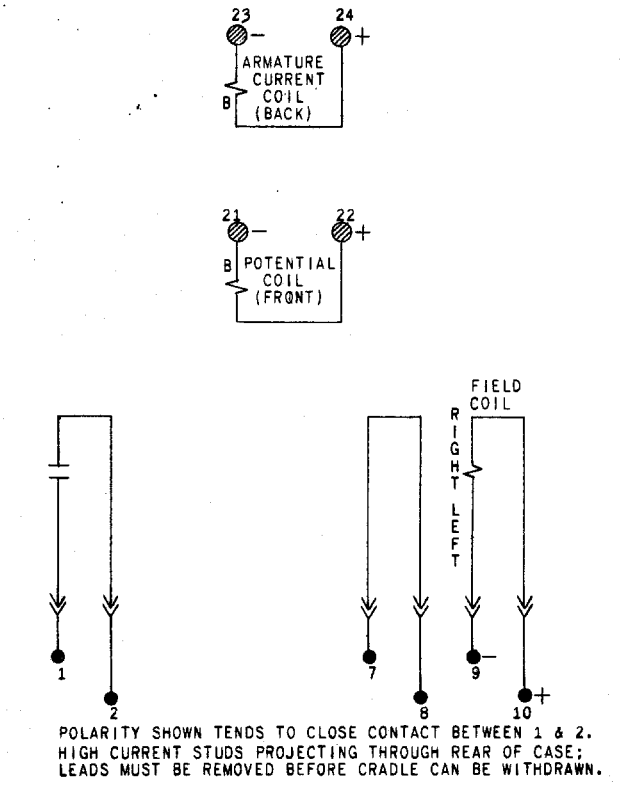


Fig. 5 Internal Connections for Type RCP11B Relay (Front View)

* Denotes change since superseded issue.

PRINCIPLES OF OPERATION

The upper (field) coil is intended to be connected through a resistor to a source of constant potential. This excitation does not cause any movement of the armature but serves to establish the polarity of the stationary magnetic circuit. When the generator voltage is slightly greater than the bus voltage the armature will be polarized, by the armature potential coil, so as to move to the right and close the contacts. A load current in the normal direction assists in holding the contacts closed. When the machine breaker or contact closes the armature potential coil is short circuited (See Fig. 6), but the relay contacts will remain closed even though no current flows through the armature current coil. This is because the armature has moved to a position where the pull of the field magnet is strong enough to hold the contacts closed against the force of the calibrating spring. If the current decreases to zero and reverses to a predetermined value, indicating that the machine is about to be driven from the d-c end, the relay contacts will open and trip the machine breaker. The relay will reclose or permit the reclosure of this breaker when the machine voltage is again slightly higher than the bus voltage.

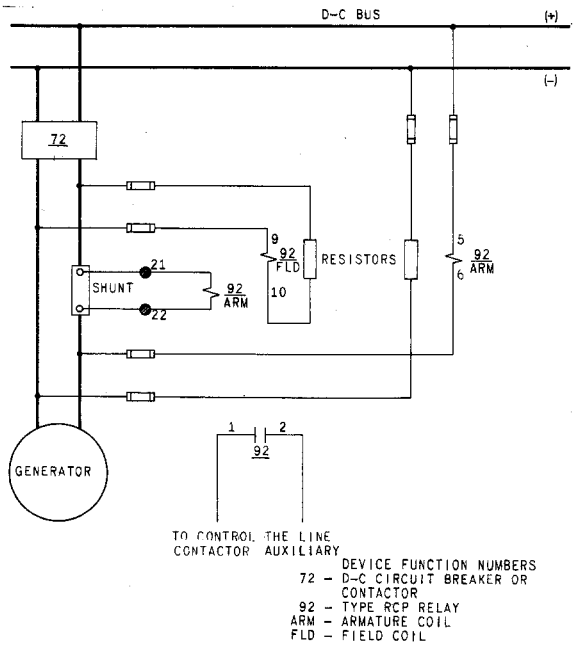


Fig. 6 (K-6154700-4)

Fig. 6 External Connections for Type RCP11A Relay

MAINTENANCE

CONTACT CLEANING

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

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, specifying the quantity required and describing the parts by catalogue numbers as shown in Renewal Parts Bulletin No. GEG-859.

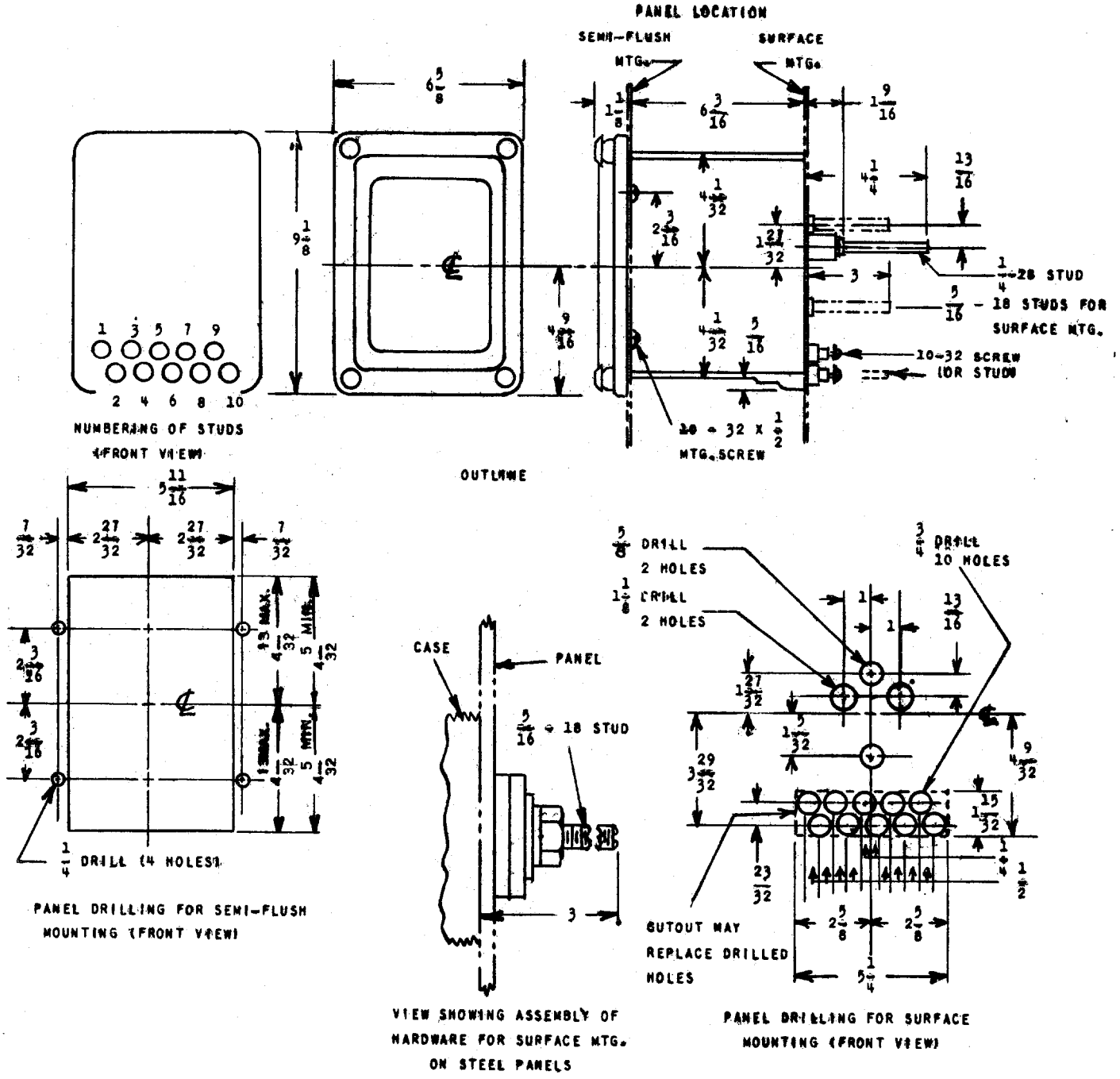


Fig. 7 Outline and Panel Drilling for Type RCP11A Relay

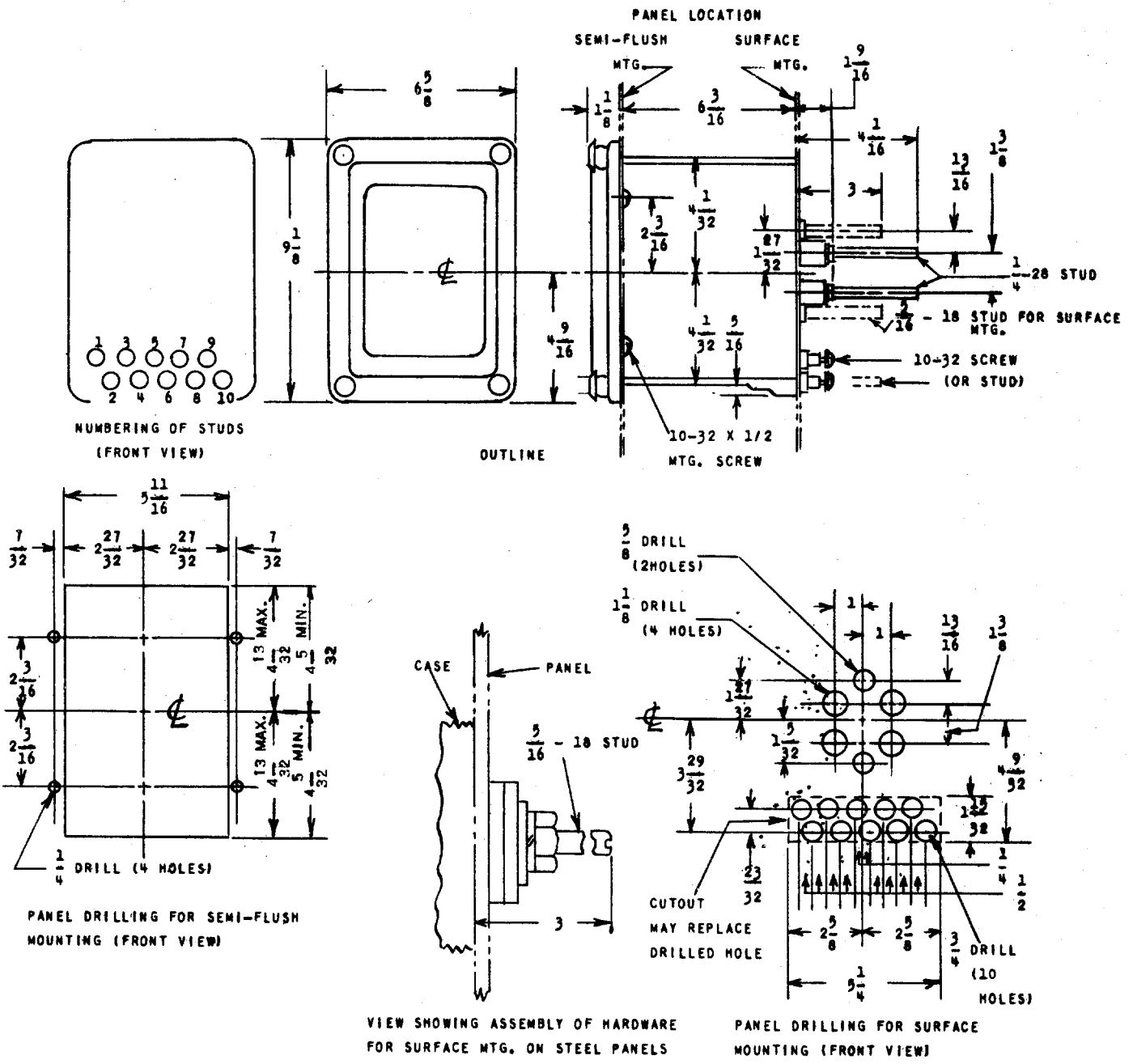


Fig. 8 (K-6375771-2)

Fig. 8 Outline and Panel Drilling for Type RCP11B Relay