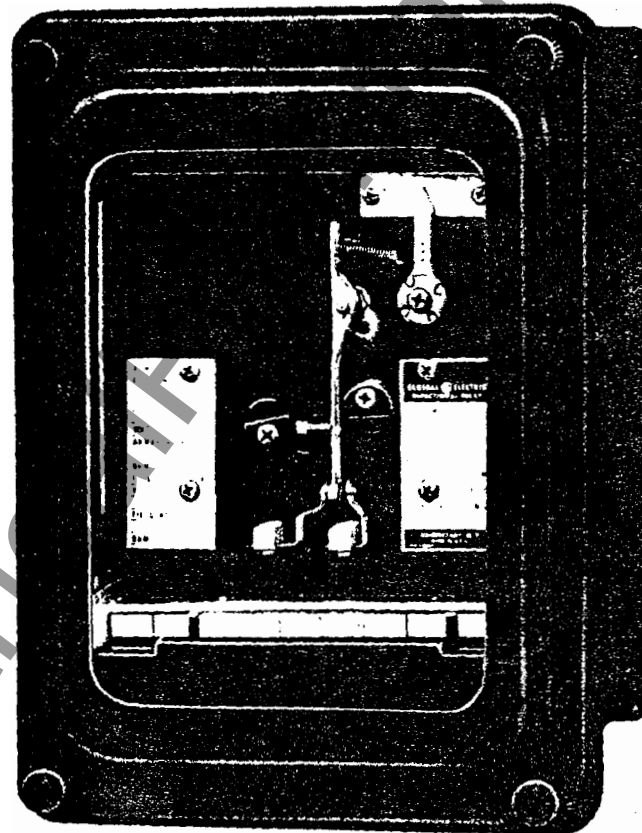




## INSTRUCTIONS

GEI-33829B  
SUPERSEDES GEI-33829A

# CURRENT DIRECTIONAL RELAYS



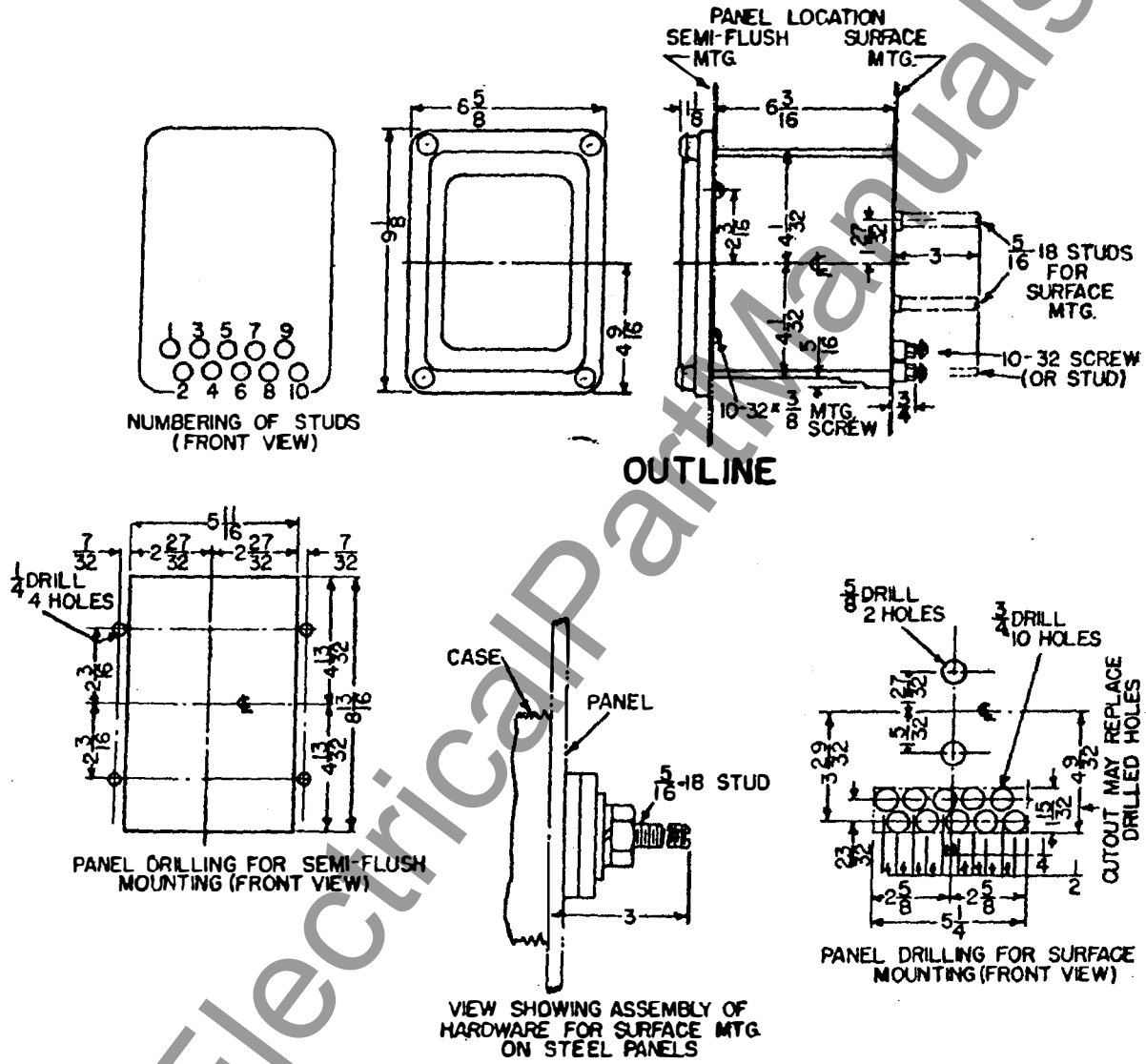
### Types

RBP11B  
RBP11F  
RBP11H  
RBP15A

LOW VOLTAGE SWITCHGEAR DEPARTMENT

GENERAL  ELECTRIC

**GEI-33829 Type RBP Current Directional Relays**



**Fig. 1 (K-6209271)**

**Fig. 1 Outline and Panel Drilling Dimensions for Relay Types RBP11B, RBP11F, RBP11H and RBP15A.**

# CURRENT DIRECTIONAL RELAYS TYPES RBP11B, RBP11F, RBP11H AND RBP15A

## INTRODUCTION

### APPLICATION

These relays are used primarily with automatic switching equipment to provide sensitive directional protection for d-c generators and synchronous converters operating in parallel with other sources of power in the same station or in other stations feeding the same system. They prevent the d-c machines from motoring on loss of a-c power to the driving motor. The Type RBP11F relay can also be used for undercurrent indication.

### RATINGS

#### CONTACTS

The contacts will carry 20 amperes for one minute or 5 amperes continuously. They will break 1 ampere at 220 volts, a-c, or 0.1 ampere at 275 volts, d-c.

#### FIELD COILS

With suitable external resistors, ratings are available for standard supply voltages from 24 to 600 volts, d-c. Operation on a-c current is permissible if a suitable full-wave rectifier is used.

## 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-

### ARMATURE COILS

The Type RBP11B relay is available in ratings from 0.46 to 600 volts, d-c. Refer to BURDENS for a specific listing of values.

The Type RBP11F relay has a 15 ampere, d-c, rating. The Type RBP11H relay has a 125 volt, d-c rating and the Type RBP15A relay has a 200 volt, d-c rating.

### BURDENS

Arm Rating Volts	Res. Ohms	Arm. Rating Volts	Resistance Ohms
0.46	0.026	50	250
0.6	0.04	75	640
1.1	0.124	125	680
1.9	0.32	200	3800
3.2	1.02	250	6600
30	102	600	7840
		‡ 125	1230

‡ RBP11H

The armature current coil of the Type RBP11F relay has a resistance of 0.031 ohms.

The field circuits take approximately 0.2 ampere at rated nameplate voltage.

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 RBP relays consist essentially of a field coil, an armature coil, a framework forming the magnetic structure, an armature, contacts and a metal case. The armature that operates the contacts is surrounded by a two-section coil and is pivoted at its center on an upper and lower bearing. It can rotate freely between the pole faces of the magnetic structure. The field coil is mounted on a field core whose axis is perpendicular to the armature axis.

### RELAY TYPES

The Type RBP11B relay has single-pole, double throw contacts and wire-wound armature coils for use in potential circuits. The relay can be obtained with pick-up calibration ranges of 2 percent to 7 percent or 6 percent to 18 percent of the rated armature voltage.

*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.*

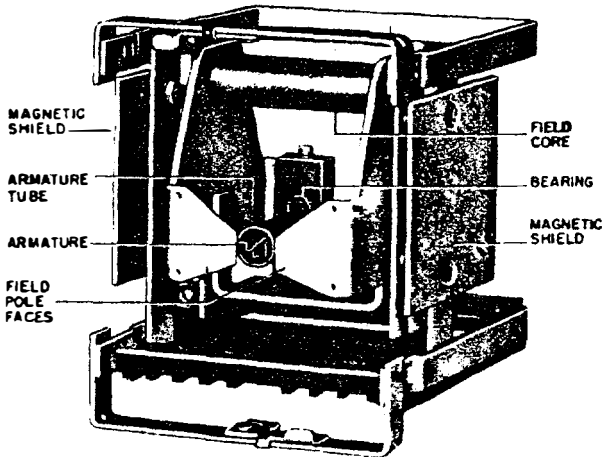


Fig. 2 Type RBP Relay Partially Assembled

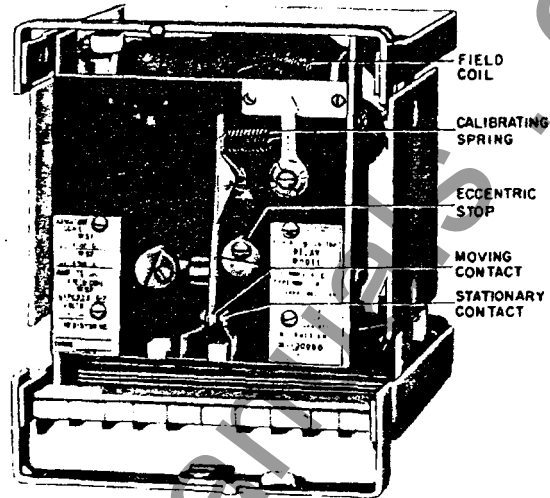


Fig. 3 Typical of the Type RBP11B Relay Removed from Case

The Type RBP11F relay is similar to the Type RBP11B relay except the armature coils have a 15 ampere current rating. The pick-up value is adjustable between 0.5 and 1 ampere.

The Type RBP11H relay is constructed the same as the RBP11B. It is used in applications where low voltage drop-out values are required.

The Type RBP15A relay has two normally-closed contacts and one normally-open contact. The moving member is common to all the contacts. The armature coils are wire wound and are for use in potential circuits. Normally the relays are set to operate with a current of 0.0055 ampere flowing in the armature with rated field voltage applied.

### 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 re-

movable 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 thumb-screws, 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

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 drilling dimensions are shown in Figs. 1 and 11.

### CONNECTIONS

The internal connection diagrams for the relay Types RBP11B and RBP11H are shown in Fig. 6. Fig. 7 shows the internal connection diagram for Type RBP11F relay. The internal connections for relay Types RBP11B31 and RBP11B32 are shown in Figs. 8 and 9, respectively. Extra terminals are provided on the relays to facilitate connections for additional external elements such as resistors and rectifiers. This makes it possible to isolate the

Fig. 2 (8002033)

Fig. 3 (8002661)

elements outside the case when the connection plug is removed. Fig. 10 shows the internal connections for the Type RBP15A relay. A typical external wiring diagram for the Type RBP11F relay is shown in Fig. 4. The external connections of the Type RBP11B relay for an a-c rectified field excitation source are shown in Fig. 5.

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

These relays have been adjusted at the factory for proper operation and it is assumed that these adjustments have not been disturbed. If the relay is to be adapted to the requirements of a particular installation the following points should be observed when making the adjustments.

#### PICKUP

The pick-up setting may be adjusted upwards from 2 percent of the continuous rating of the armature circuit. The proper setting will depend on local conditions, but if full protection against the results of reverse power is desired, the setting must be low enough to insure that the relay will operate when the a-c end of the protected synchronous converter or motor-generator is disconnected from its a-c source.

To increase the operating current, move the calibrating arm to the left of the scale or move

the calibrating spring to a lower hole in the calibrating arm and vice-versa. The spring pull must not be weakened to the point where the relay will not pickup at maximum field voltage and zero armature current after being energized at maximum current in the operating directions and then deenergized.

#### DROPOUT

The previous adjustments control the dropout in the same manner as the pickup. In addition, the dropout may be made more nearly equal to the pickup by moving the right-hand contact to the left, and vice-versa.

#### ELECTICAL NEUTRAL

The left-hand contact and stop should be adjusted so that, with the armature circuit de-energized, the field does not exert any perceptible pull on the armature in either direction when the field circuit is energized at rated voltage. For special application, it may be displaced to the left of this position in order to minimize the changes in the operating point which are caused by changes in voltage.

### OPERATION

When the relay is de-energized, the calibrating spring keeps the contacts in the non-operated position. Current through the field coil establishes the polarity of the stationary magnetic circuit. This

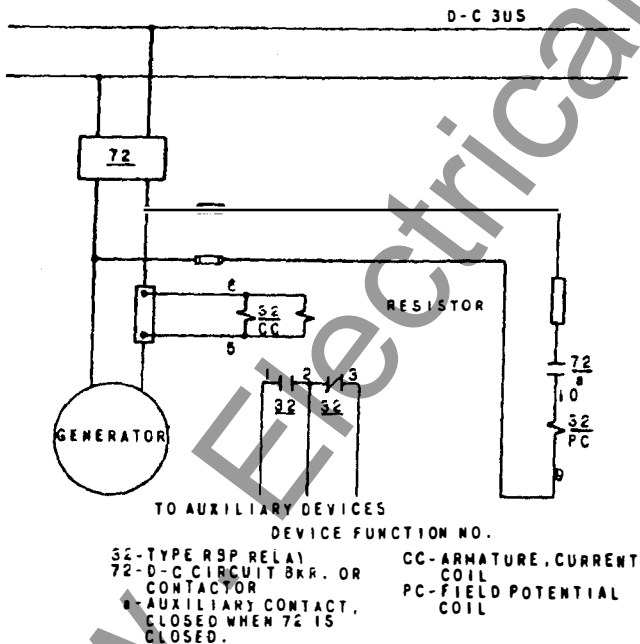


Fig. 4 External Connections of the Type RBP11F Relay for Reverse Current Protection of a D-C Generator

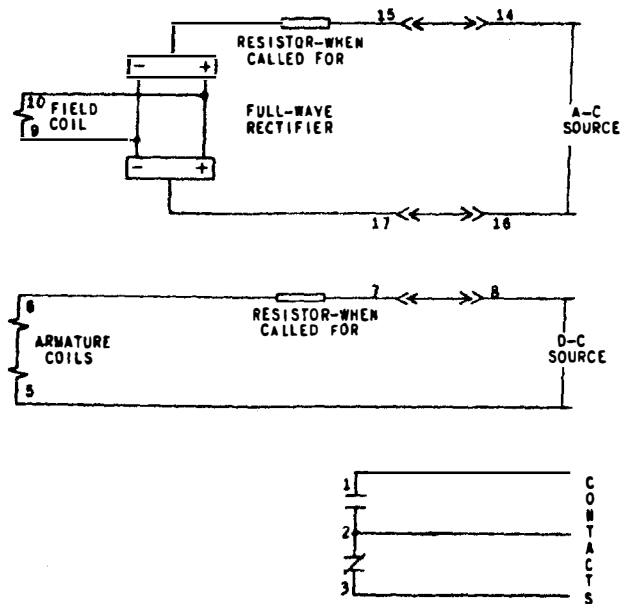


Fig. 5 Typical External Connections of the Type RBP11B Relay for an A-C Rectified Field Excitation Source

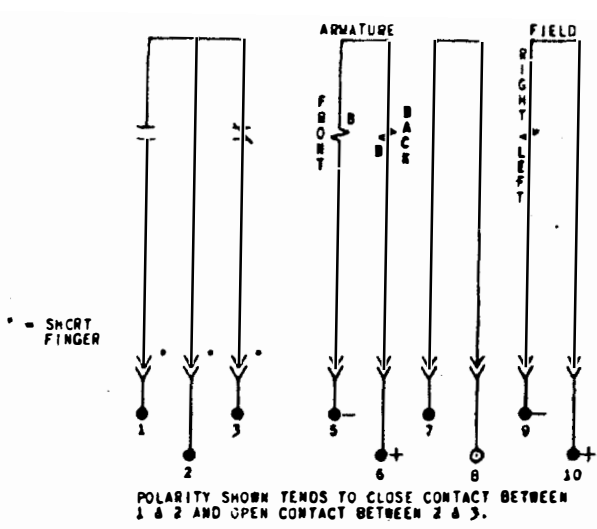


Fig. 6 Internal Connection Diagram for the Type RBPI1B and RBPI1M Relays (Front View)

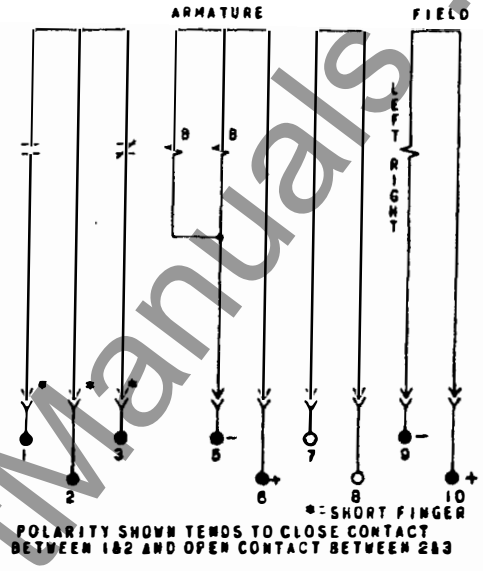


Fig. 7 Internal Connection Diagram for the Type RBPI1F Relay (Front View).

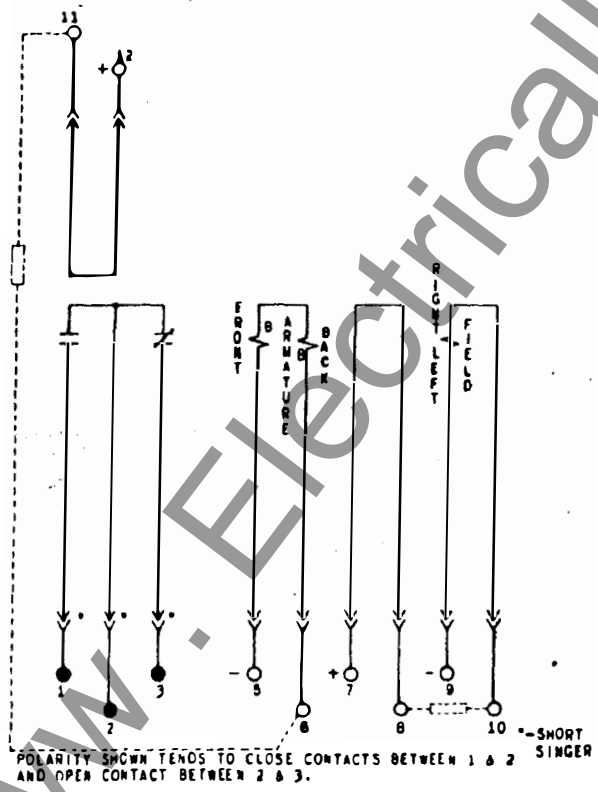


Fig. 8 Internal Connection Diagram for the Type RBPI1B31 Relay (Front View)

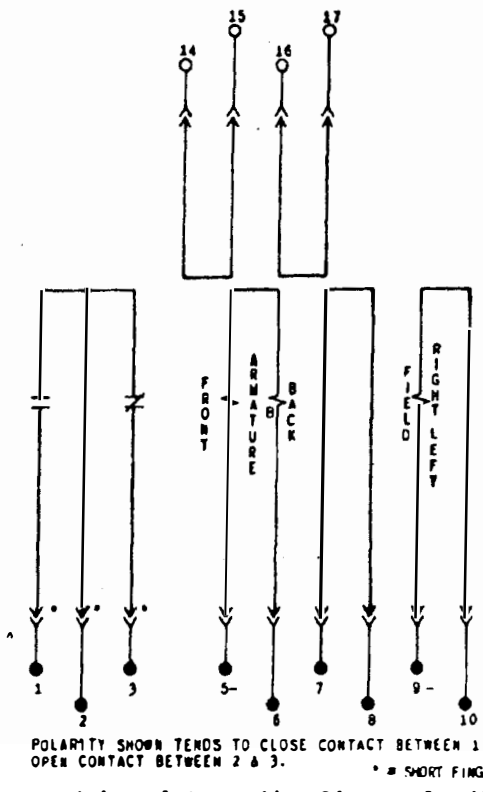


Fig. 9 Internal Connection Diagram for the Type RBPI1B32 Relay (Front View)

Fig. 6 (R-6600507)

Fig. 7 (362A551)

Fig. 8 (K-6A00800)

Fig. 9 (K-6A00801)

## Type RBP Current Directional Relays GEI-33829

excitation does not cause any movement of the armature. When current flows in the armature it becomes magnetized and is attracted by the field pole pieces.

When the relay is connected for reverse current protection, a load current in the normal direction assists in holding the armature and contacts in the non-operated position. When sufficient current flows in the armature coil in the reverse direction, the front end of the armature will move to the right and operate the contacts.

For applications where the relay is connected for undercurrent indication, a load current of sufficient magnitude in the normal direction operates the contacts. When the load reverses or decreases below the relay setting, the contacts will return to their de-energized position.

Fig. 10 (K-6400727)

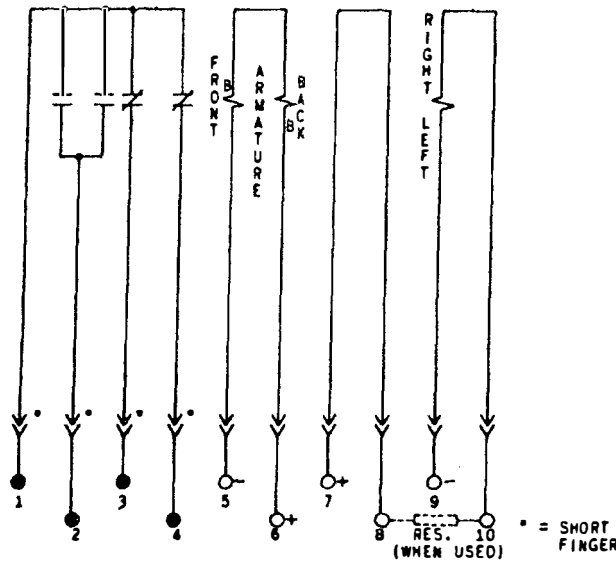


Fig. 10 Internal Connection Diagram for the Type RBPI5A Relay (Front View)

## MAINTENANCE

### CONTACT ADJUSTMENT

The left-hand contact and stop should be adjusted so that rated voltage on the field circuit (with the armature circuit de-energized) does not pull the armature enough to open the contacts.

The right and left eccentric stops should be adjusted to permit 1/64 inch to 1/32 inch wipe on the contacts.

### 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 and 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.

### BEARINGS

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

### PERIODIC TESTING

An operational test and mechanical inspection of the relay and its connections should be made every six months.

## 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.

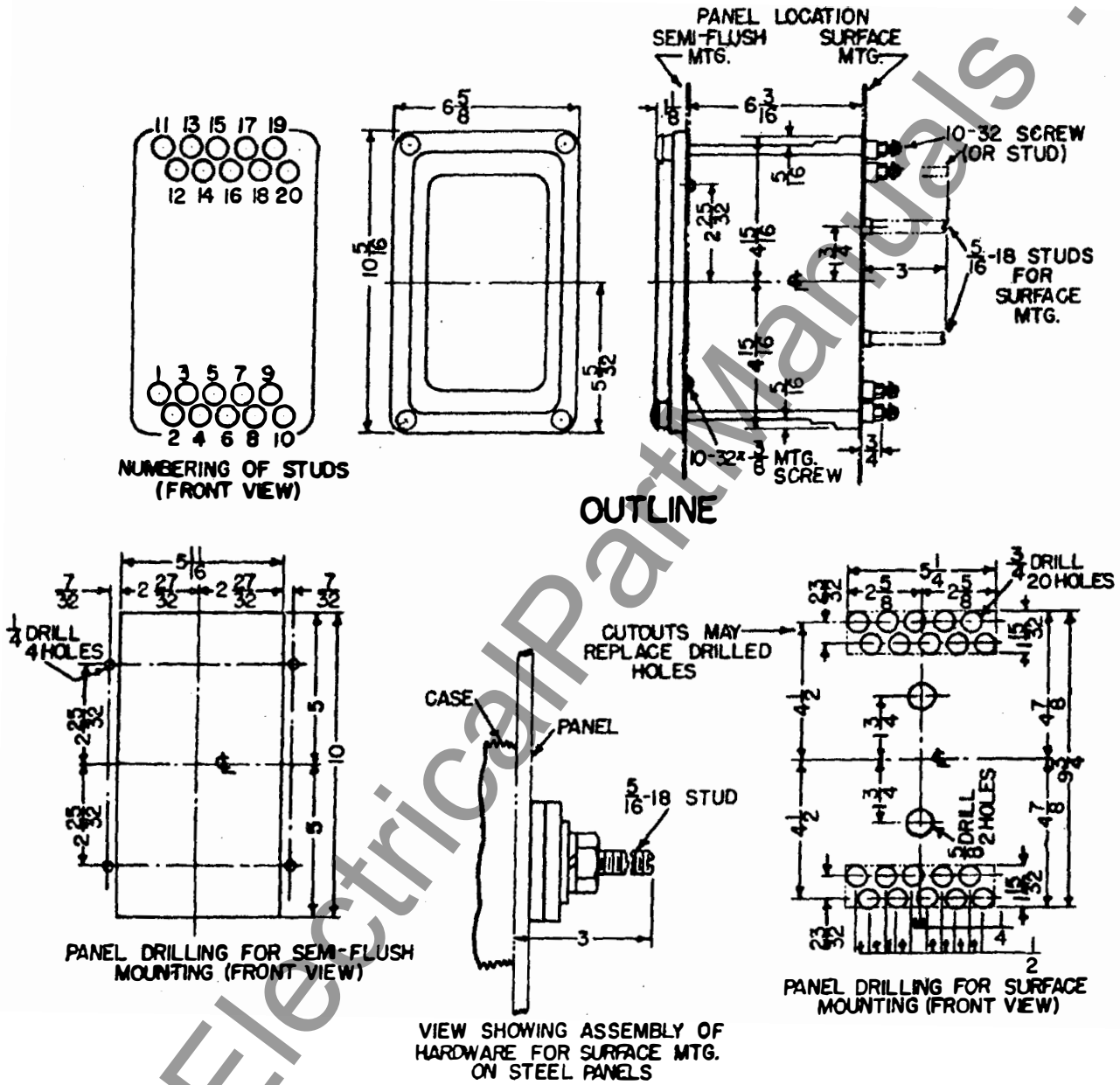


Fig. 11 (K-6209272)

Fig. 11 Outline and Panel Drilling Dimensions for Relay Types RBP11B30, RBP11B31, and RBP11B32.