



INSTRUCTIONS

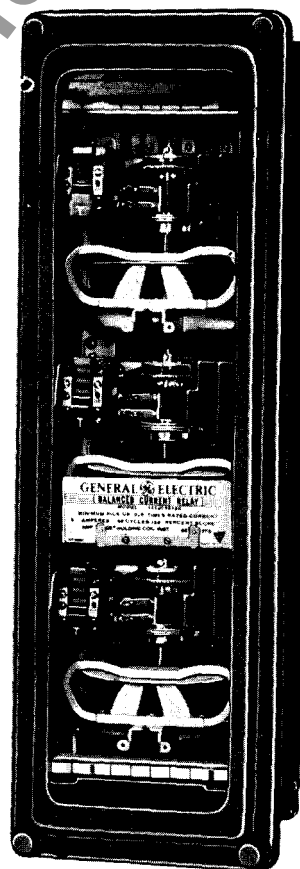
GEI-16375B

SUPERSEDES GEI-16375A

CURRENT BALANCE RELAYS

Types

IJC52A and IJC52B



POWER SYSTEMS MANAGEMENT DEPARTMENT

GENERAL  **ELECTRIC**

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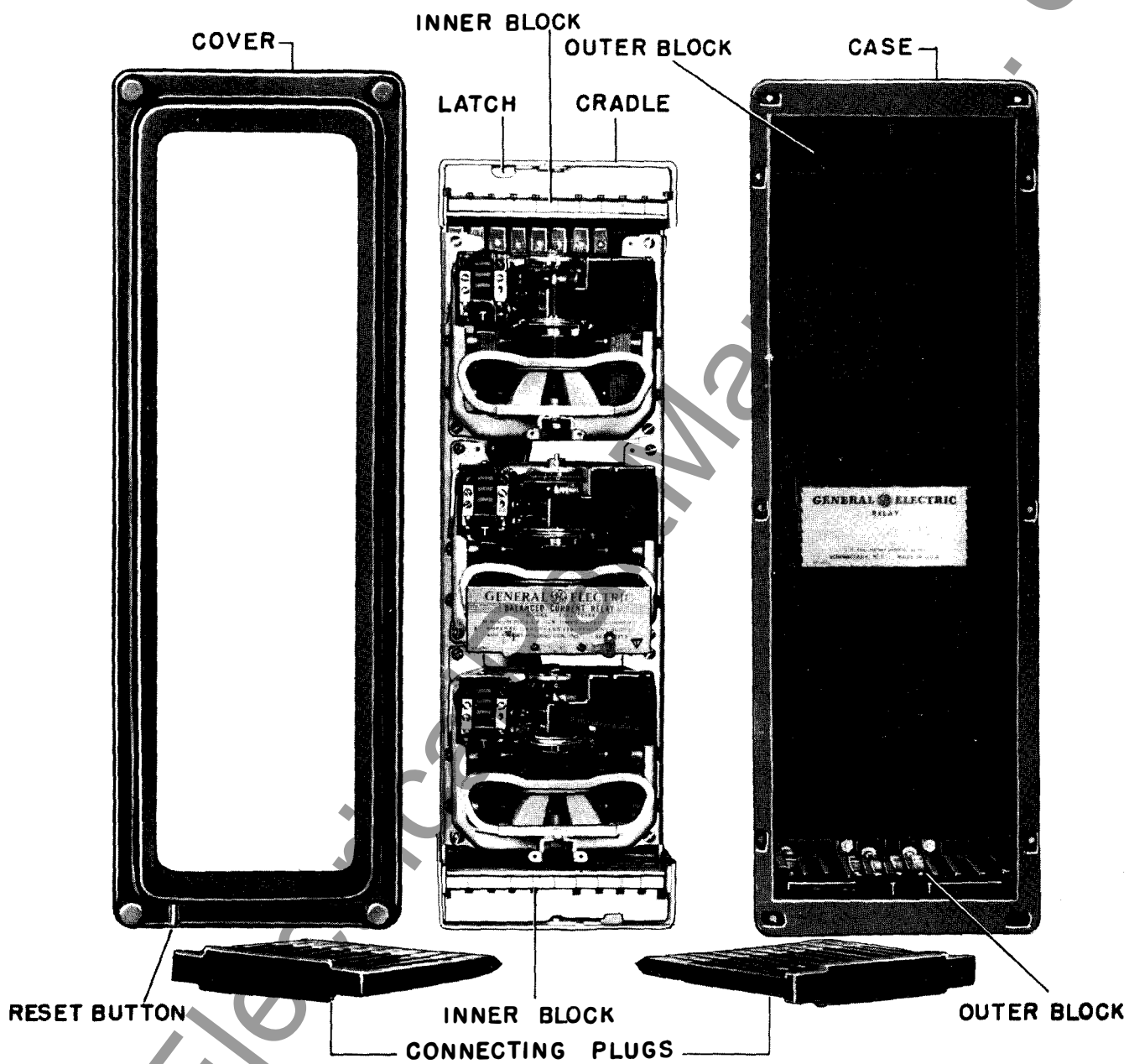


Fig. 1 The Type IJC52A Relay Disassembled

CURRENT BALANCE RELAYS

TYPES IJC52A AND IJC52B

INTRODUCTION

The types IJC52A and IJC52B relays are used to protect the exciting winding of regulating transformers.

The type IJC52A relays consist of three mechanically separate but electrically interconnected induction disk units mounted in a three unit, single-end case. Each unit consists of a disk actuated by two U-magnet assemblies. The disk drives the moving contact. The disk shaft is restrained by a spiral spring the purpose of which is to hold the contacts open when the relay is de-energized.

The type IJC52B relay is similar to the type IJC52A relay except that it consists of one unit of the type IJC52A relay mounted in a one-unit, single-end case.

There is a seal-in element mounted on the front to the left of the shaft of these relays. This element has its coil in series and its contacts in parallel with the main contacts such that when the main contacts close the seal-in element picks up and seals in. When the seal-in element picks up, it raises a target into view which latches up and remains exposed until released by pressing a button beneath the lower left corner of the cover.

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.

APPLICATION

Regulating transformers, like all power transformers, should be provided with differential relays to protect against faults within the transformer. In addition to the differential relays, regulating transformers require IJC current-balance relays to protect against faults that might occur in the exciting winding. Regulating-transformer windings are usually 10 to 12 per-cent of the kva capacity of the main circuit, and therefore their reactance is such that a fault might occur in the exciting winding which would be several times its full-load current, but not in excess of the normal load current of the main circuit. Under such conditions the differential relays will not provide sensitive protection to the exciting windings. The IJC52A or the IJC52B relays should be used to protect these windings.

Fig. 5 illustrates the application of one IJC52A relay to this type of protection. Similar connections can be used when three of the IJC52B relays are used except that the relay stud numbers will be different.

OPERATING CHARACTERISTICS

The IJC52B relay and each of the three units of the IJC52A relay has two U-magnets. The left-hand U-magnet coil (front view) is called the operating coil as current in it produces torque tending to close the contacts. The right-hand U-magnet coil is called the restraint coil as current through it produces torque tending to hold the contacts open.

The percentage ratio of the current in the operating circuit to that in the restraint circuit for pick-up is referred to as percentage slope. The percentage slope is 120%.

The pick-up characteristics of the relay is shown in Fig. 2. The relay has a minimum pick-up setting of 3 amperes which is the operating current required to close the relay contacts when no restraint current flows.

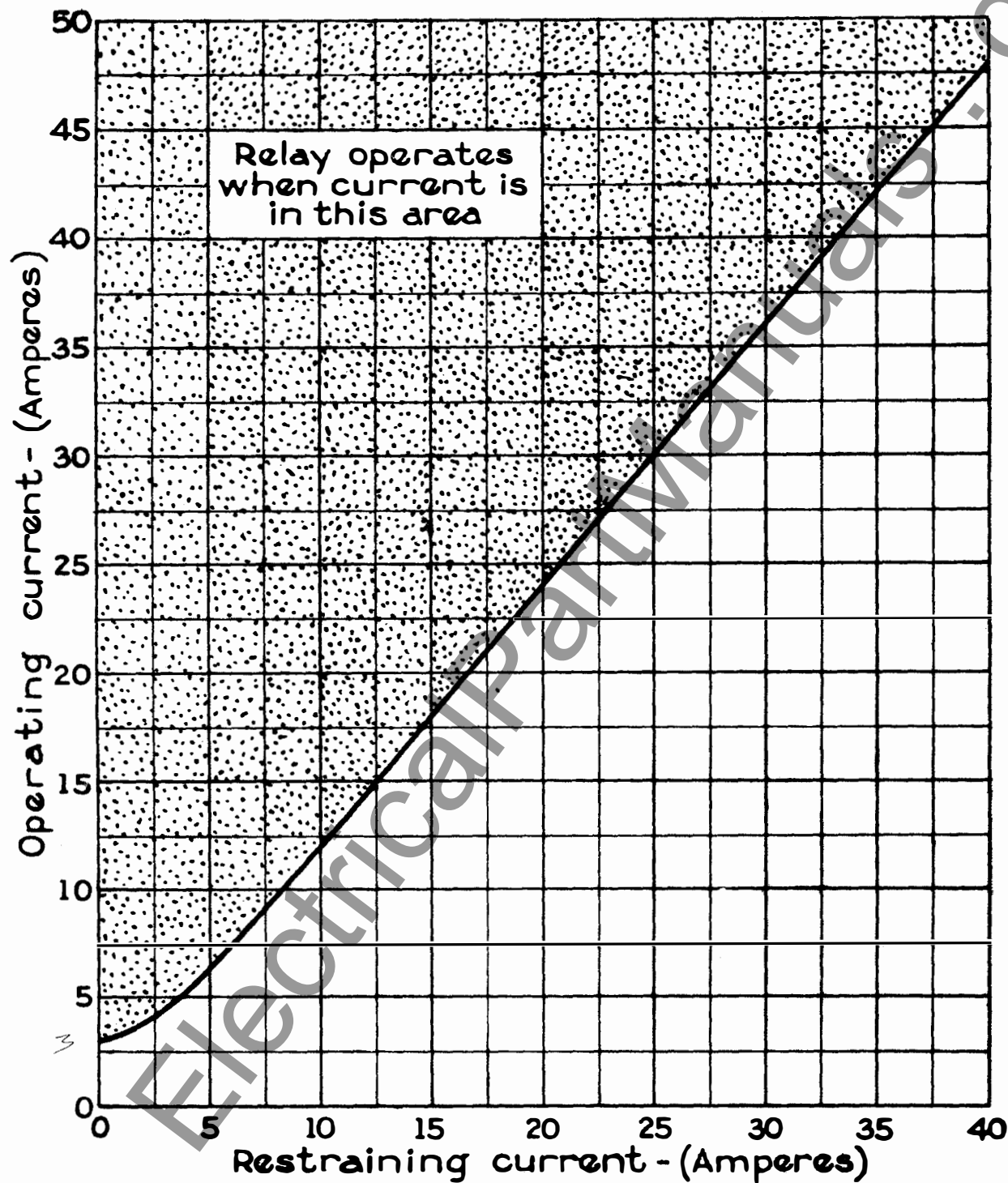


Fig. 2 Characteristic Curve of the IJC52A and IJC52B Relays With 120% Slope and 3 Amperes Minimum Pick-up

Each unit closes its contacts after a time delay which is dependent both on the ratio and the magnitudes of the currents and also on the time lever setting. The time decreases with an increase of both currents or an increase of the ratio of operating to restraint current. The time lever controls the contact travel. A lower time lever setting decreases the contact travel and the time.

RATINGS

Present available ratings are 5 amperes normal current, 25-60 cycles, 3 amp minimum pick-up, with 120% slope.

The current-closing rating of the contacts is 30 amperes for voltages not exceeding 250 volts. The current-carrying ratings are affected by the selection of the tap on the target and seal-in coil as indicated in the following table:

Function	Amperes AC or DC	
	2-Amp Tap	0.2 Amp Tap
Tripping Duty	30	5
Carry Continuously	4	0.8

The 2-ampere tap has a d-c resistance of 0.13 ohms and a 60 cycle impedance of 0.53 ohms while the 0.2-ampere tap has a 7 ohm d-c resistance and a 52 ohm 60 cycle impedance. The tap setting used

on the seal-in element is determined by the current drawn by the trip coil.

The 0.2-ampere tap is for use with trip coils that operate on currents ranging from 0.2 up to 2.0 amperes at the minimum control voltage. If this tap is used with trip coils requiring more than 2 amperes, there is a possibility that the 7-ohm resistance will reduce the current to so low a value that the breaker will not be tripped.

The 2-ampere tap should be used with trip coils that take 2 amperes or more at minimum control voltage, provided the tripping current does not exceed 30 amperes at the maximum control voltage. If the tripping current exceeds 30 amperes an auxiliary relay should be used, the connections being such that the tripping current does not pass through the contacts or the target and seal-in coils of the protective relay.

BURDENS

The burdens imposed on the current transformers by each operating and restraining coil at 5 amps are as follows:

Circuit	Impedance Ohms	Power Factor	Volt Amperes
Operating	.38	.38	9.5
Restraints	.54	.34	13.5

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 the relay, an examination should be made for any damage sustained during shipment. If injury or damage resulting from rough handling is evident, a claim should be filed at once with the transportation company and the nearest Sales Office of the General Electric Company notified promptly.

Reasonable care should be exercised in unpack-

ing 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.

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 diagrams are shown in Figs. 8 and 9.

CONNECTIONS

Internal connections are shown in Figs. 6 and 7.

Typical external connections for the IJC52A relay, are shown in Fig. 5.

When the exciting winding of the transformer is connected in grounded wye, the secondaries of the current transformers in series with this winding should be delta-connected to avoid tripping on external ground faults.

GROUND CONNECTIONS

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.

INSPECTION

At the time of installation, the relay should be inspected for tarnished contacts, loose screws, or other imperfections. If any trouble is found, it should be corrected in the manner described under "Maintenance".

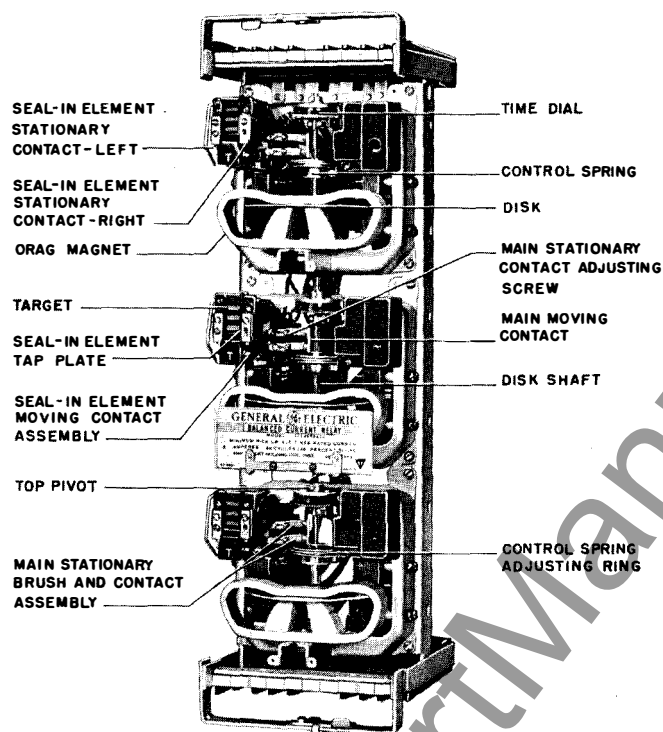


Fig. 3 The Type IJC52A Relay Removed from the Case, Front View

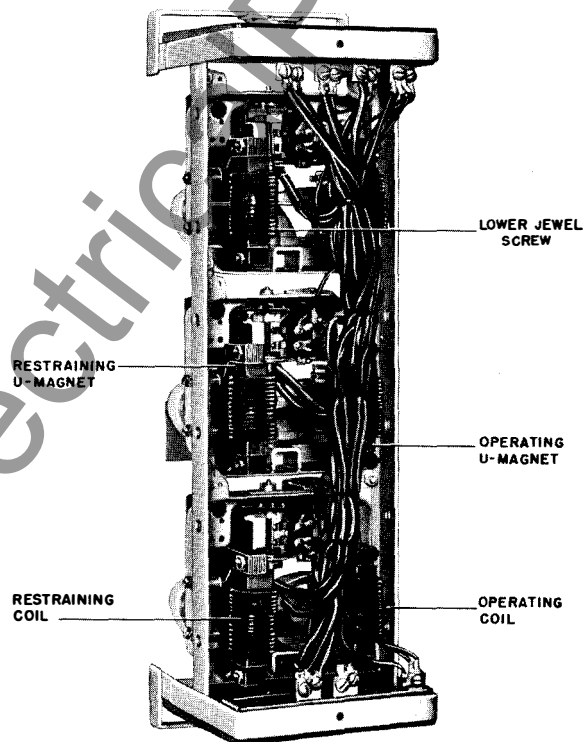


Fig. 4 The Type IJC52A Relay Removed from the Case, Back View

ADJUSTMENTS

TARGET AND SEAL-IN ELEMENT

For trip coils operating on currents ranging from 0.2 up to 2.0 amperes at the minimum control voltage, set the target and seal-in tap plug in the 0.2-ampere tap.

For trip coils operating on currents ranging from 2 to 30 amperes at the minimum control voltage, place the tap plug in the 2-ampere tap.

The tap plug is the screw holding the right-hand stationary contact of the seal-in element. To change the tap setting, first remove the connecting plug. Then, take a screw from the left-hand stationary contact and place it in the desired tap. Next remove the screw from the other tap, and place it in the left-hand contact. This procedure is necessary to prevent the right-hand stationary contact from getting out of adjustment. Screws should not be in both taps at the same time as pickup for d-c will be the higher tap value and a-c pickup will be increased.

PICK-UP SETTING

Pick-up of the relay is adjusted before it leaves

the factory. Pick-up, current required to close the contacts with zero restraint, can be adjusted by turning the control spring adjusting ring. This ring has slots the proper size to fit most screw driver blades. By inserting the blade of a screw driver into one of the slots, the ring can be turned. If the ring is turned in the contact opening direction, the pick-up will be raised. If the ring is turned in the contact closing direction, the pick-up will be lowered.

TIME SETTING

For a given condition, time may be adjusted in two ways. The time lever setting controls the contact travel, hence the time. The drag magnet may be moved on its shelf away from the disk shaft for increased time and toward the disk shaft for decreased time. The time lever gives the greater range of adjustment and is more convenient.

To set the time of a particular unit it is necessary to impose the desired conditions on the unit and measure the time required to close the contacts with a standard timer. Adjust the time lever and drag magnet until the desired time is obtained.

OPERATION

Before leaving the factory, the relays were tested and adjusted for correct operation. The only adjustment which should be necessary is setting the time lever, and if necessary, adjusting the drag magnet, for the correct time.

It may be that the control spring will not reset

the contacts all the way back to the time lever. This condition will cause no difficulty, however, because as soon as the relay is energized with balanced currents of applicable magnitude the torque of the restraint U-magnet will reset the contacts. As noted before, the chief function of the spring is to open the contacts when the relay is de-energized.

MAINTENANCE

The relays are adjusted at the factory and it is advisable not to disturb the adjustments. If for any reason, they have been disturbed, the following points should be observed in restoring them:

DISK AND BEARINGS

The lower jewel may be tested for cracks by exploring its surface with the point of a fine needle. If it is necessary to replace the jewel a new pivot should be screwed into the bottom of the shaft at the same time. A very small drop of General Electric meter-jewel oil, or fine watch oil, should be placed on the new jewel before it is inserted. The jewel should be turned up until the disk is centered in the air gaps, after which it should be locked in this position by the set screw provided for this purpose.

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. Sometimes an ordinary file cannot reach the actual points of contact because of some obstruction from some other part of the relay.

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 above can be obtained from the factory.

CONTACT ADJUSTMENTS

With the contacts open the stationary contact should be engaged with the adjusting screw and should deflect about $1/32$ " before it is stopped by the back stop.

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Fig. 6 Internal Connections for the Type IJC52A Relay. Front View



Fig. 7 Internal Connections for the Type IJC52B Relay, Front View

RENEWAL PARTS

It is recommended that sufficient quantity 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 near-

est 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 Company requisition number on which the relay was furnished.

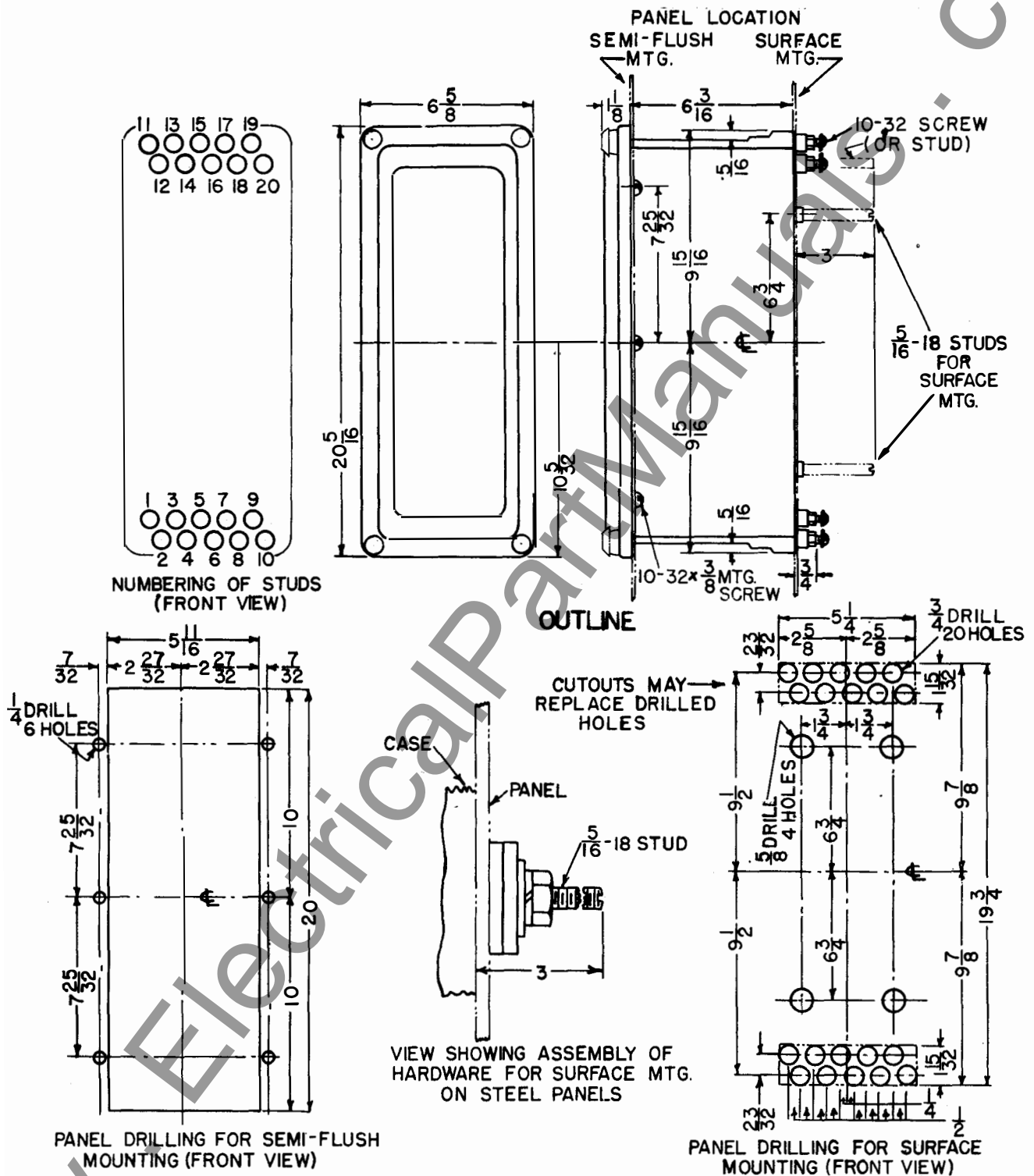


Fig. 8 Outline and Panel Drilling for the Type IJC52A Relay

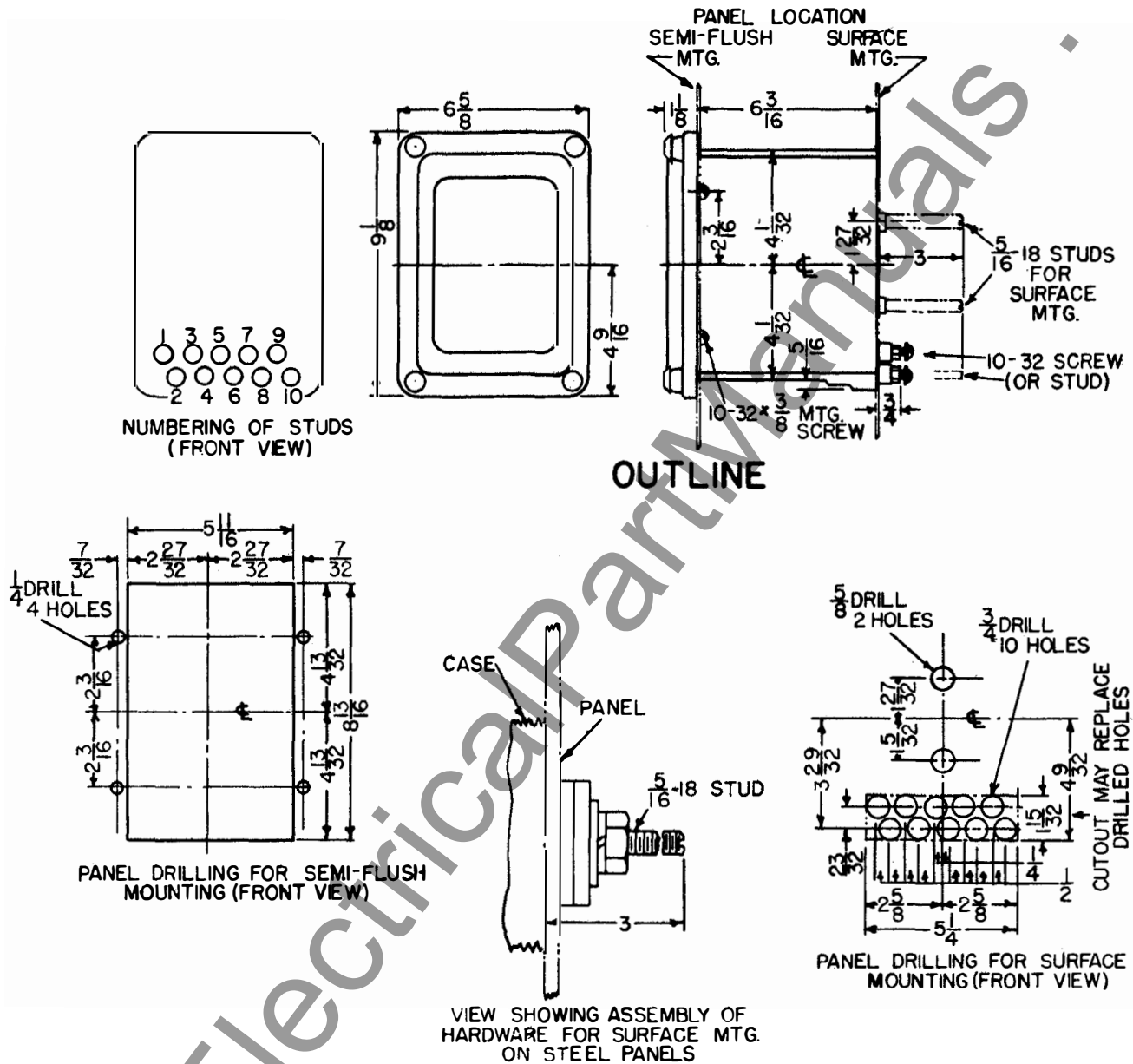


Fig. 9 Outline and Panel Drilling for the Type IJC52B Relay

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