INSTRUCTIONS *Switchgear*

DIRECTIONAL-VOLTAGE DIFFERENTIAL RELAYS

Types
RCV11A and RCV11B

GENERAL ELECTRIC

A

DIRECTIONAL-VOLTAGE DIFFERENTIAL RELAYS

TYPES RCV11A AND RCV11B

INTRODUCTION

APPLICATION

The Type RCV relays covered by these instructions are instantaneous voltage differential relays and are used to protect three-wire (d-c) systems against unbalanced voltages. On this application, it is customary to use a time auxiliary relay in conjunction with the Type RCV relay, as shown in Fig. 5, to prevent tripping the breaker during momentary disturbances. These relays are also used as voltage directional relays to prevent a machine from being connected to the bus unless its polarity is correct and its voltage is slightly higher than the bus voltage. The relay is regularly used with a resistor in series with its field coil on circuits of 125 to 750 volts, d-c. When provided with current coils, the Type RCV relay can be used as a current-balance relay, either as a protective device or as a regulating relay to hold equal or proportional loads on two d-c generators.

RATINGS

The contacts will interrupt one ampere at 220 volts a-c, or 0.1 ampere at 275 volts d-c, but should not be used to open 600 volts d-c circuits.

BURDENS

The field coil draws about 0.2 ampere at rated voltage. The armature coil circuits without resistors each draw about 4 watts at rated voltage. The armature coil circuits with resistors each draw about 0.21 ampere at rated voltage.

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 RCV relay consists of a field coil, two armature coils (each consisting of two parts), a framework forming the magnetic structure, an armature, two sets of contacts and calibrating devices, and an enclosing case. The armature that operates the contacts is surrounded by the armature coils and is pivoted at its center between an upper and lower bearing so that it can rotate freely between the pole pieces of the magnetic structure. With the relay de-energized, the calibrating springs keep both sets of contacts in their normal position; open in the case of the Type RCV11A relay and closed in the case of the Type RCV11B relay.

CASE

The case is suitable for either surface or semiflush 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

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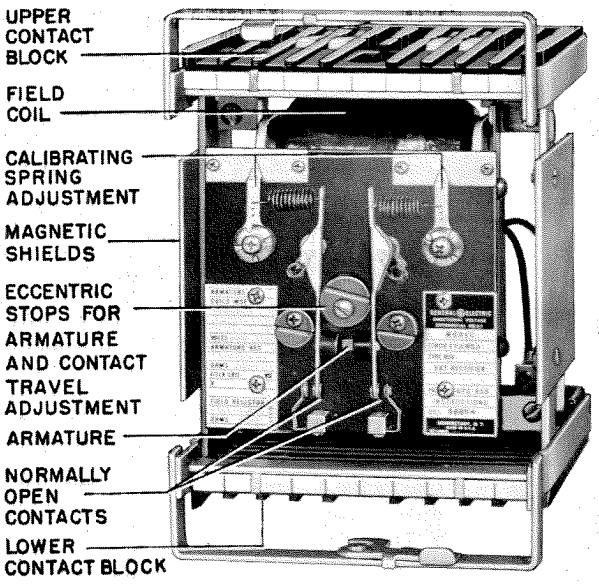

Fig. 1 Type RCVIIA Relay-Unit in Cradle (Front View)

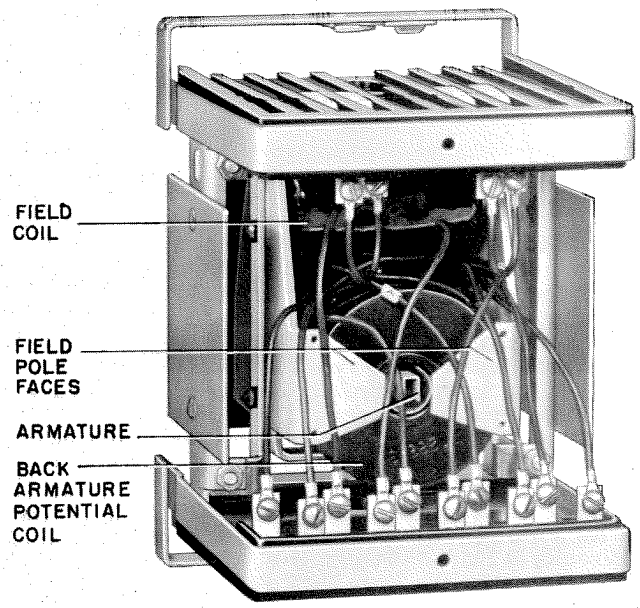

Fig. 2 Type RCVIIA Relay-Unit in Cradle (Rear View)

Fig. 1 8013925
Fig. 2 80.4

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

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 dimension are shown in Fig. 6.

After the relay is mounted, the contacts should be operated and released manually a few times to make sure that the moving parts are free and in alignment.

CONNECTIONS

The internal connection diagrams are shown in Figs. 3 and 4. The external connection diagram is shown in Fig. 5.

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 AND INSPECTION

The relays were properly adjusted at the factory and should not be changed unless different operating values are required or a careful check shows that the adjustments must have changed in shipment or handling.

COIL CIRCUITS

If the relay operation appears incorrect make sure that current flows in both coil circuits,

Fig. 3 K-6154062

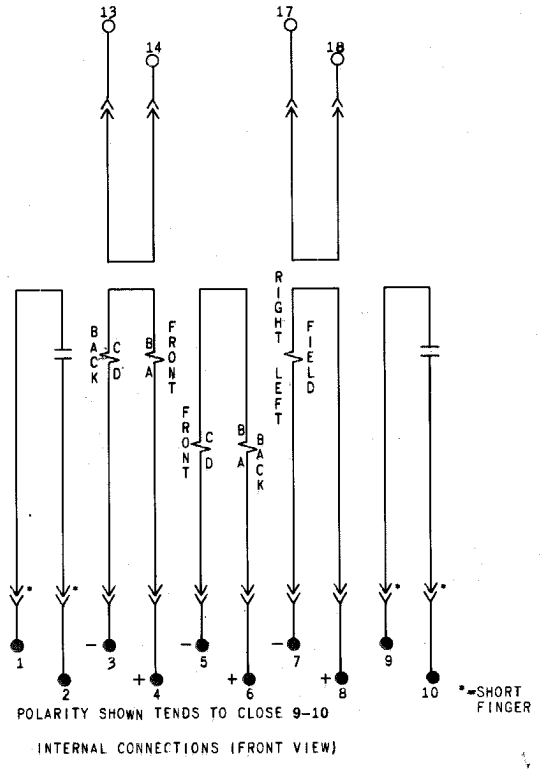

Fig. 3 Internal Connections For The Type RCV11A Relay (Front View)

Fig. 4 K-6154057

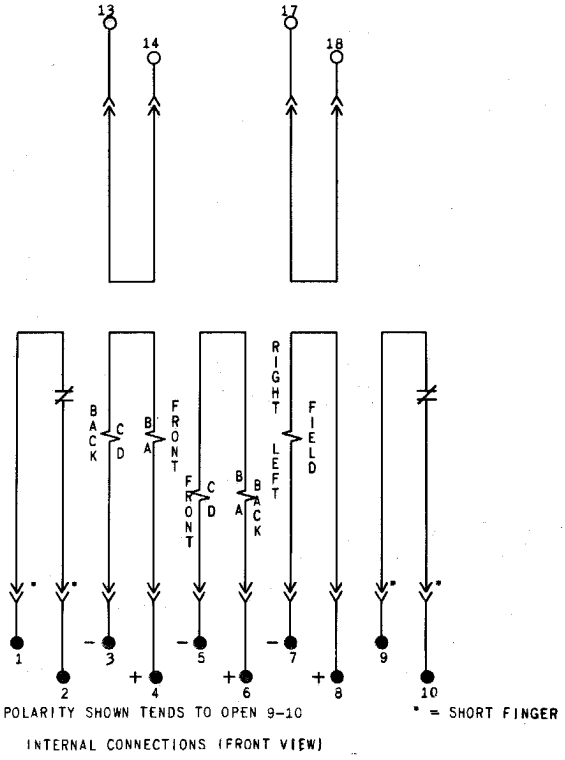

Fig. 4 Internal Connections For The Type RCV11B Relay (Front View)

and check the voltages across both coils under operating conditions. If the two coil circuits are connected together at one end, a low reading voltmeter connected across the other ends gives a much more accurate indication of the voltage difference existing across the relay.

Coils rated 10 volts or less are usually operated across the commutating field circuits of machines, and loose or dirty connections in the leads to the relay or in the commutating field circuit itself must be guarded against. If the voltage at the relay terminals at the one hour or two hour overload rating of the machine is much less than the relay rating, the leads to the relay are of too high resistance or the wrong relay has been applied. To determine which, check the commutating field circuit drop at the machine. If the relay does not balance the load properly, shift the connection to the commutating field of the machine taking the least load, so as to include the drop across one less pole (or vice versa). For finer adjustments decrease the length or increase the size of the leads from the machine taking the most load. No possible adjustment of the relay itself can compensate at all loads for a difference in voltage drop applied to the two armature coils at the desired load division.

If the trouble is traced to the relay itself, the following instructions for adjustment should be followed:

ELECTRICAL NEUTRAL

The position of the eccentric stop determines the de-energized position of the armature. This should be at the electrical neutral of the relay with field energized, and this adjustment should not be disturbed unless a check indicates it to be incorrect. To check this point, de-energize the relay completely and make sure that the armature circuits remain open. Re-energize the field, move the armature to the right, and allow it to reset; then operate the left contact to the left and note whether the armature follows it. Then move the armature to the left, allow it to reset; operate the right contact and note whether the armature follows it. If the armature follows in both directions or in neither direction, the adjustment may be considered correct. If it follows in only one direction, the present "off position" is to that side of electrical neutral; the eccentric stop should be shifted slightly to the other side and the check repeated until the correct position is found. The calibrating plate marks do not apply when this stop has been moved.

PICKUP

To increase the pickup, tighten the spring by moving the calibrating arm toward the outside of the relay and vice versa. If the extreme position of the arm does not give sufficient adjustment, the pickup may be further increased by moving the spring to a higher hole in the contact arm,

7% ±1%

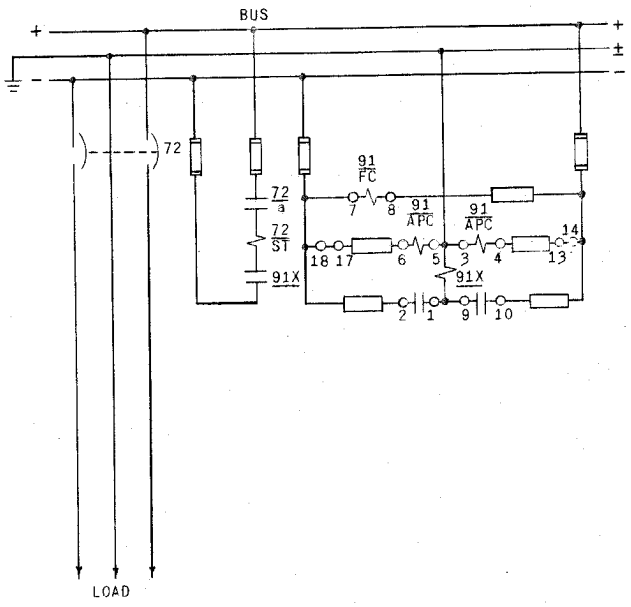

Fig. 5 Typical Elementary Diagram Of The Type RCV11A Relay Used For Protection Of A Three-Wire, D-C System Against Unbalanced Voltages

Fig. 5 376A913

or vice versa, but then the calibrating plate mark no longer applies. Both of these adjustments change the pickup in the same direction as the dropout.

If the pickup is made quite low, it may be necessary to de-energize the field as well as the armature in order to reset the contacts.

The pickup must not be made so low that operation at maximum armature circuit difference will cause the next pickup to occur as the relay is re-energized at maximum field with both armature coils de-energized; the minimum safe spring tension is a value sufficient to prevent this pickup at zero armature difference.

DROPOUT

The spring adjustment mentioned above may be used to change the dropout if the resulting change in pickup is permissible.

To increase the dropout without changing the pickup, decrease the contact travel and vice versa. The contact circuit should be checked to make sure that the contact will still open it at maximum voltage if this is required.

OPERATION

The polarity of the stationary magnetic circuit is established by the flow of current in the field coil, which should be energized with terminal polarity as indicated on the internal connection diagrams. This excitation will cause no movement of the armature. When current flows in the armature coils, the armature is magnetized and is then attracted by the pole pieces of the stationary magnetic structure. The two armature circuits are energized from the two potential sources to be balanced.

The field (upper) coil is connected through a series resistor to a source of relatively constant voltage. The armature (lower) coils are energized in opposition from the two sources to be balanced. Referring to Fig. 3, positive on terminals 8 and 6 or 8 and 4 tends to close the 9-10 contacts, but positive on 8 and 5 or 8 and 3 tends to close the 1-2 contacts. With positive on 8, 5 and 4, the 1-2 or 9-10 contacts will tend to close, depending on whether 5-6 or 3-4 is the more strongly energized. With normal adjustment, the contacts operate at a voltage difference of seven per cent of the rating of one armature circuit, and reset at three per cent of this rating. The operating values are adjustable over a small range above and below these values, and may be increased as desired by using armature circuits of higher voltage rating. The relay is instantaneous in all its operations.

MAINTENANCE

PERIODIC INSPECTION

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

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.

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.

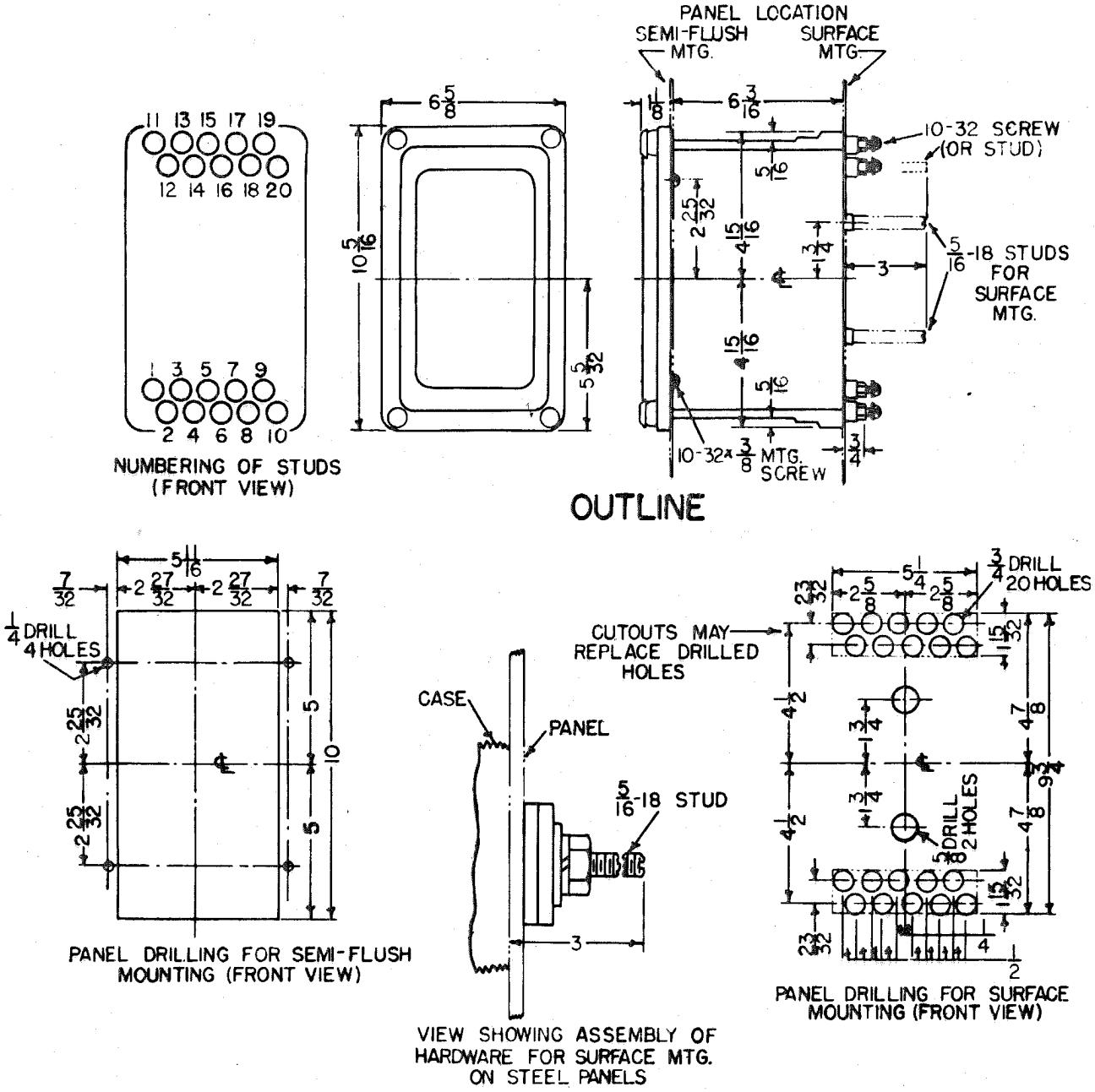

Fig. 6 Outline And Panel Drilling Dimensions For Relay Types RCV11A And RCV11B

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