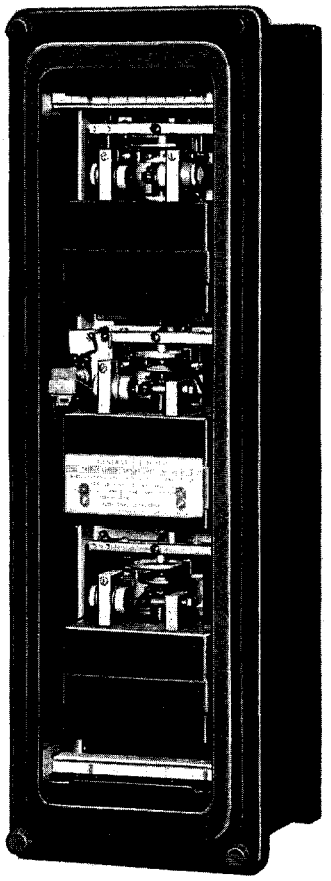
INSTRUCTIONS

GEI-31009C
SUPERSEDES GEI-31009B

CARRIER CURRENT GROUND RELAYS



Types
CKPC11A
CKPP11A

LOW VOLTAGE SWITCHGEAR DEPARTMENT

GENERAL ELECTRIC

PHILADELPHIA, PA.

CONTENTS

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.

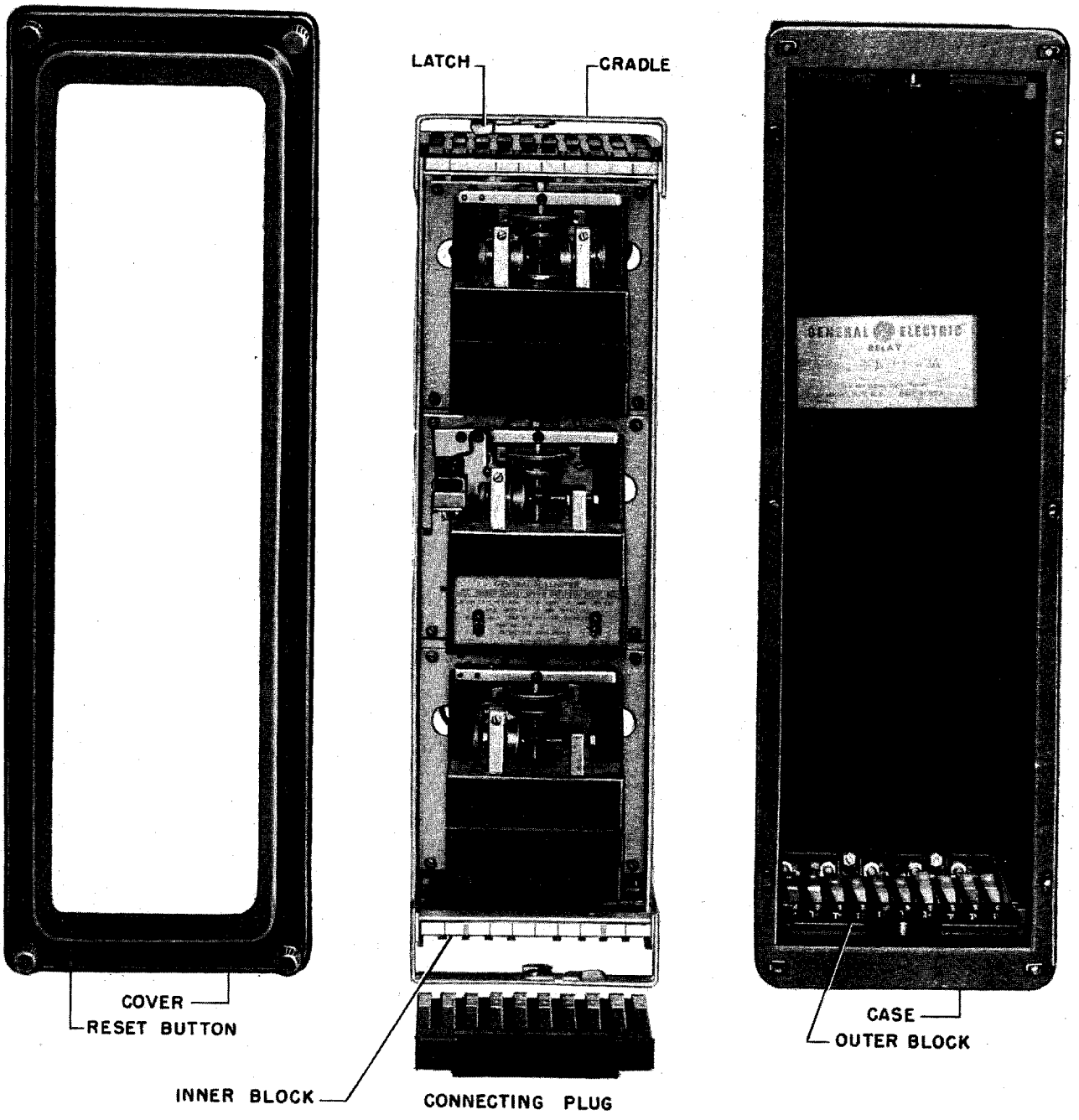


Fig. 1 The Type CKPP11A Relay Disassembled

CARRIER CURRENT GROUND RELAYS
TYPE CKP

INTRODUCTION

The Type CKPC11A and CKPP11A Carrier current ground relays contain two directional elements GD1 & GD2 with angles of maximum torque at 135 degrees lead and 45 degrees lag respectively, one overcurrent unit G2 and one telephone relay GD1X, auxiliary to GD1. GD1 is a blocking relay for faults external to the protected section and consequently should have a greater sensitivity than the GD2 unit on the other end of the line. For this reason the GD2 unit should always be set 25% higher than the GD1 unit. This adjustment is very important to prevent tripping on external faults. Refer to instruction book GEI-25363 for proper co-ordination considerations when making ground relay settings. The GD1X telephone relay has a 2 cycle pickup and a 5 cycle dropout. The five cycle dropout is used to keep carrier on to prevent false tripping owing to transient conditions which may exist after clearing an external fault.

The Type CKPC11A relay is the same as the type CKPP relay except that it uses current in a grounded transformer neutral for polarization where the Type CKPP relay uses the potential across the open corner of a broken delta transformer for polarization.

RATINGS

The current coils are rated at 5 amperes, 60 cycles a-c and the potential coils are rated at 115 volts a-c.

TARGET AND SEAL-IN COILS

The Type CKPC and CKPP relays are available with one ampere target and seal-in coil ratings. The single rating is necessary in order that the relays will work properly with other elements in the carrier current pilot relaying circuits. If tripping is to be performed through an auxiliary tripping relay, it is recommended that the auxiliary relay be shunted with a suitable resistance in order that sufficient trip current will flow to operate the target and seal-in units.

CONTACTS

The current closing rating of the contacts is 30 amperes. The current carrying rating is limited by the rating of the target and seal-in coils, which are connected in series in the circuit. These ratings are given in the following table.

FUNCTION	TARGET COIL AMPS	SEAL-IN COIL AMPS
Tripping Duty	30	30
Carry Continuously	2.5	2.5

PICKUP

The pickup ratings for the various units of the Type CKPC11A relay are given in the following table.

Unit	Pickup Current	
GD1	0.5-2.0 Amps	1.0-4.0 Amps
GD2	0.5-2.0 Amps	1.0-4.0 Amps
G2	0.5-2.0 Amps	1.0-4.0 Amps

The pickup ratings for the various units of the type CKPP11A relay are given in the following table. The pick-up of the GD units is at 115 volts.

Unit	Pickup Current	
GD1	0.025-0.1 Amps	0.025-0.1 Amps
GD2	0.025-0.1 Amps	0.025-0.1 Amps
G2	0.5 -2.0 Amps	0.5 -2.0 Amps

BURDENS

Relay	Circuit Numbers	Volts	Amps.	Cycles	Volt Amps.	Watts.
CKPP	3-4	-	5	60	16.0	9.6
	5-6	-	5	60	26.0	10.0
	7-8	115	-	60	29.6*	20.6
CKPC	3-4	-	5	60	16.0	9.6
	5-6	-	5	60	9.4	9.2
	7-8	-	5	60	26.0	10.0

* A Capacitive burden

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 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.

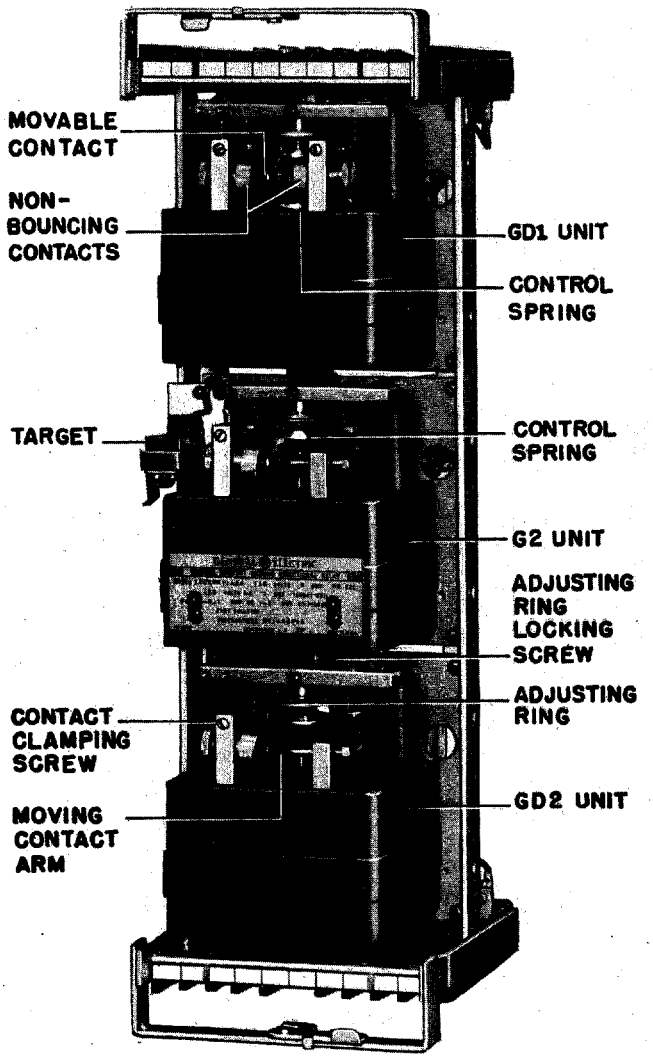


Fig. 2 The Type CKPP11A Relay Removed From Case (Front View)

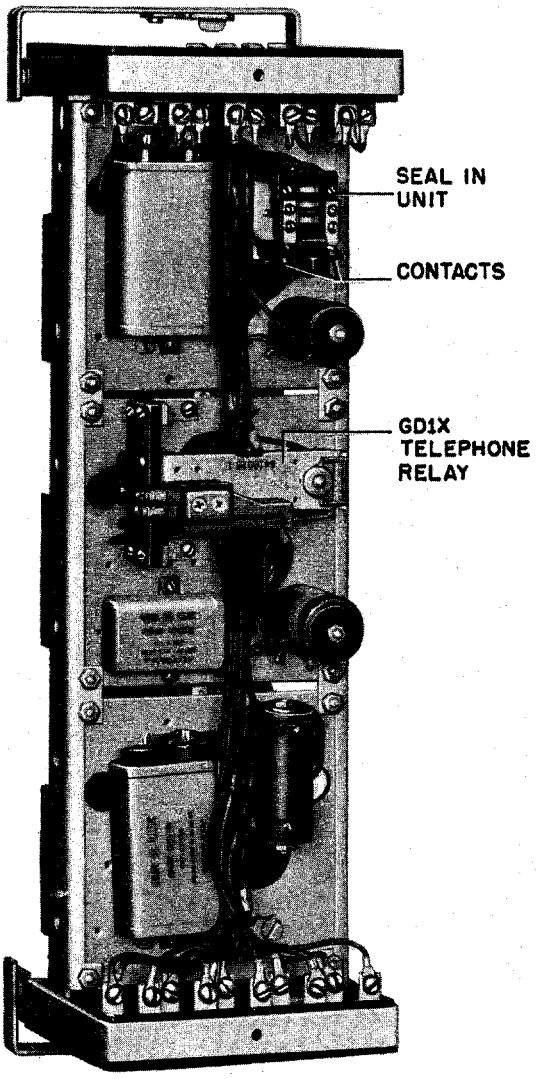


Fig. 3 The Type CKPP11A Relay Removed From Case (Rear View)

Fig. 3 (8009375)

Fig. 2 (8009376)

DESCRIPTION

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.

DIRECTIONAL UNIT (GD1 & GD2)

This unit is an induction cylinder device for alternating current circuits. The principle by which torque is developed in these induction cylinder relays is the same as that employed in an induction disk relay with a watthour meter element, though in arrangement of parts they are more like split phase induction motors.

The stator has eight laminated magnetic poles projecting inward and arranged symmetrically around a central magnetic core. The poles are fitted with current and potential coils; four potential coils which are internally connected forming a single circuit as well as four current coils similarly connected. In the annular air gap between the poles and central core is the cylindrical part of the cup-like aluminum rotor, which turns freely in gap. The central core is fixed to the stator frame; the rotor alone turns.

This construction provides higher torque and lower rotor inertia than the induction-disk construction, making these relays faster and more sensitive.

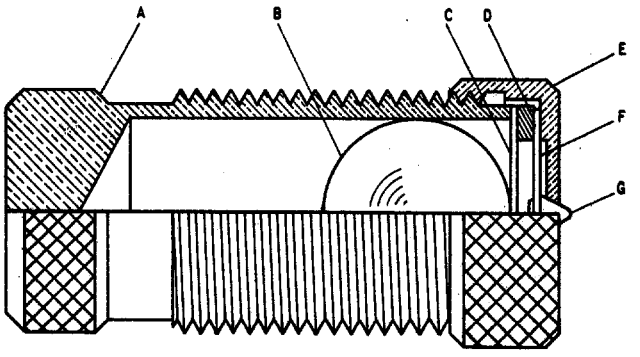
The current polarized unit differs from the above unit by using current coils instead of the potential coils.

OVERCURRENT UNIT (G2)

This unit is similar in construction to the directional unit described above. It differs only in coil turns and connections. The four corner coils consist of two windings. The inner winding has a large number of turns of fine wire and the outer layer has a few turns of heavy wire. The inner windings of the four corner coils are connected in series and are in series with a capacitor. This allows for low burdens and insensitivity to harmonics.

CONTACTS

The contacts are especially constructed to suppress bouncing. The stationary contact (G, Fig. 4) is mounted on a flat spiral spring (F) backed up by a thin diaphragm (C). These are both mounted in a slightly inclined tube (A). A stainless steel ball (B) is placed in the tube before the diaphragm is assembled. When the moving contact hits the stationary contact, the energy of the former is imparted to the latter and thence to the ball, which is free to roll up the inclined tube. Thus, the moving contact comes to rest with substantially no rebound or vibration.



A - Inclined Tube
B - Stainless Steel Ball
C - Diaphram
D - Spacer
E - Cap
F - Flat Spiral Spring
G - Contact

Fig. 4 Non-Bounce Contact Assembly

Fig. 4 (K-6077069)

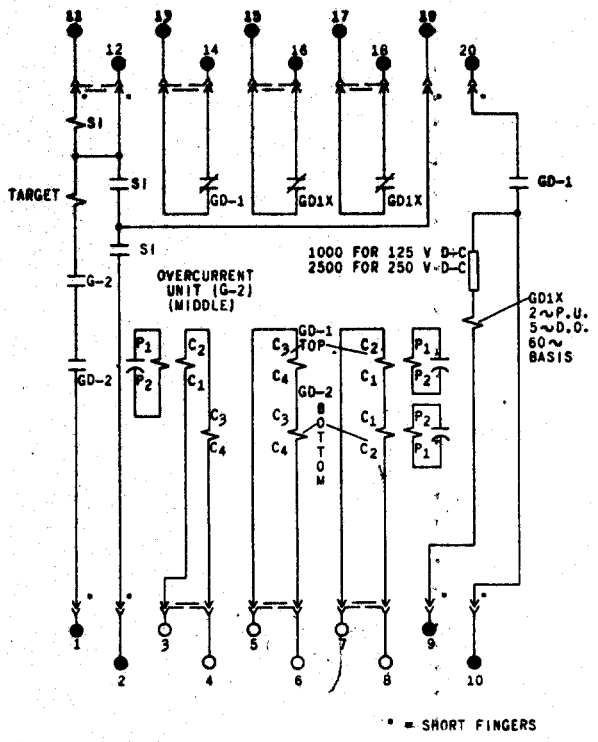


Fig. 5 Type CKPC11A Relay, Internal Connections (Front View)

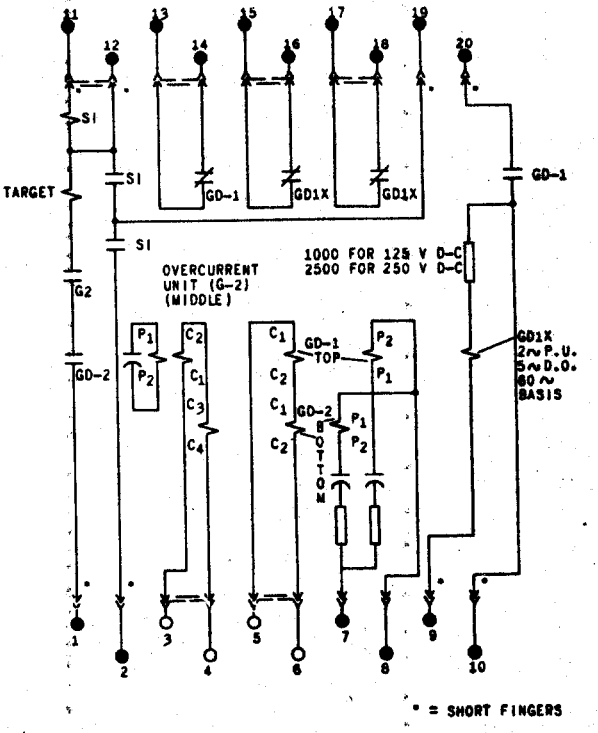


Fig. 6 Type CKPP11A Relay, Internal Connections (Front View)

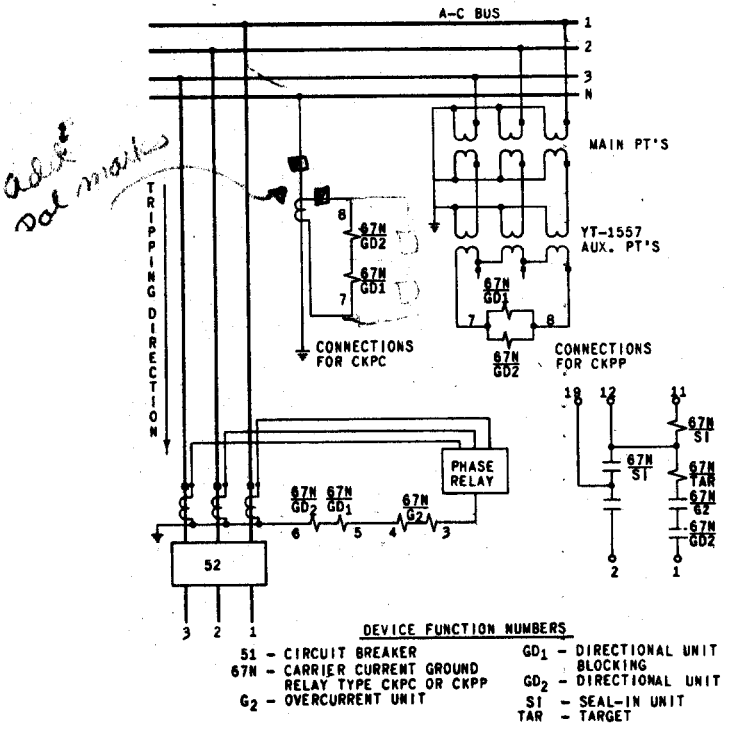
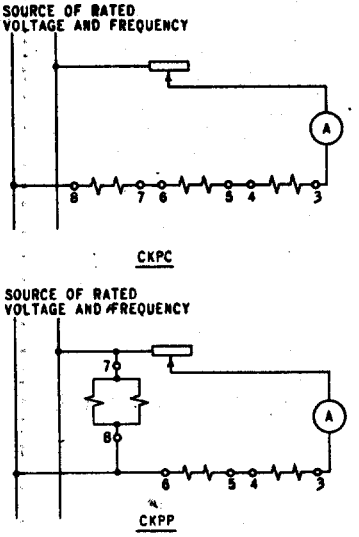


Fig. 7 Typical Elementary Connections for Type CKP Relays



THESE CONNECTIONS PRODUCE TORQUE WHICH SHOULD CLOSE THE GD-2 CONTACT AND OPEN THE GD-1 CONTACT. REVERSING THE CONNECTIONS TO STUDS 7 AND 8 WILL REVERSE THE TORQUE AND CLOSE THE GD-1 CONTACT AND OPEN THE GD-2 CONTACT.

Fig. 8 Test Connections for Type CKP Relays

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 is shown in Fig. 11.

CONNECTIONS

Internal connection diagrams for the various relay types are shown in Figs. 5 and 6. A typical wiring diagram is shown in Fig. 7.

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.

TESTS

The pickup of the directional units and of the overcurrent unit may be checked by using the connections shown in Fig. 8. Set the current at the pickup value for the unit in question and adjust the unit to just close its left contacts.

ADJUSTMENTS

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.

PICKUP

The pickup of the G2 and GD units is adjusted by means of the upper control spring only. To accomplish this, loosen the hexagonal-head locking screw, located toward the rear of the adjusting ring guide at the top of the relay. The spring adjusting ring must be locked after the proper pickup is obtained.

If a test of the pickup time is desired, the speed of the relay is such that a mechanical timer is unsatisfactory and it is necessary to use an oscillograph or an electronic timer. Typical characteristic curves are shown in Figs. 9 and 10.

CONTACTS

To change the stationary contact mounting spring, remove the contact barrel and sleeve as a complete unit after loosening the screw at the front of the contact block. Unscrew the cap (E, Fig. 4). The contact and its flat spiral mounting spring may then be removed.

The contact gap may be adjusted by loosening slightly the same screw at the front of the contact block. The screw should be loose enough only to allow the contact barrel to rotate in its sleeve.

The stop screw fastened with a locknut should hold the moving contact arm in a neutral position, i.e., with it pointing directly forward. Then bring the stationary contact up until it just touches the moving contact by rotating the contact barrel. Next, back it away 2/3 turn to obtain approximately 0.020 inch contact gap. Last, tighten the screw which secures the barrel.

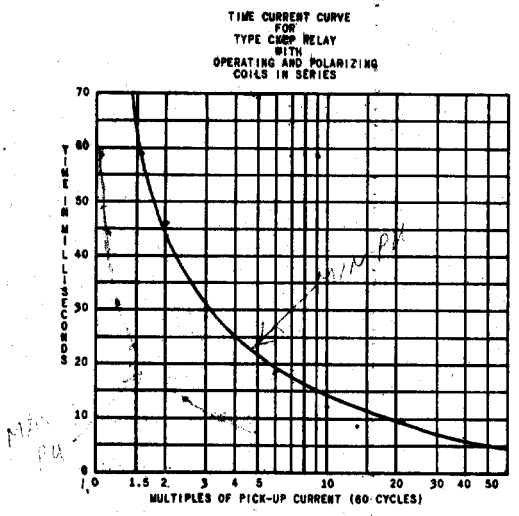


Fig. 9 Characteristic Curve for Type CKPC11A Relay

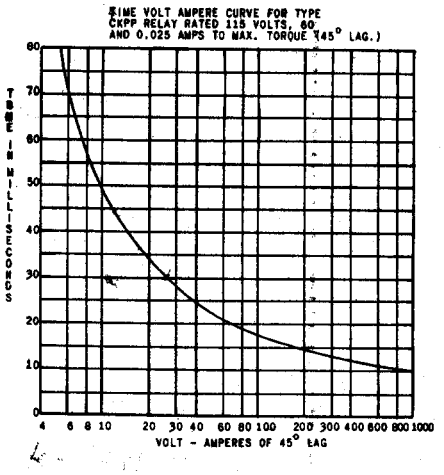


Fig. 10 Characteristic Curve for Type CKPP11A Relay

The moving contact may be removed by loosening the screw which secures it to the contact arm and sliding it from under the screw head.

CLUTCH

The clutch adjustment is made by means of the screw on the right side of the moving contact arm. To change the clutch adjustment, loosen the locknut and turn the screw in to increase the current at which the clutch slips on, back the screw out to decrease the current at which the clutch slips. Be sure to tighten the locknut after the adjustment is made. The clutch should be adjusted to slip at the ampere values given in the following table.

RELAY TYPE	UNIT	RATING	CLUTCH SLIPS AT	REMARKS
CKPC11A	GD1&GD2	0.5-2 1 -4	~~10~~ 5 ~~14~~ 7	Operating and Polarizing circuits in series.
CKPP11A	GD1&GD2	0.025-0.1	~~9.8~~ 4	Rated voltage Polarization.
CKPC11A CKPP11A	G2	0.5-2 1-4	~~10~~ 5 ~~14~~ 7	

MAINTENANCE

If for any reason it becomes necessary to disassemble the induction unit the following procedure should be followed:

(a) Disconnect the leads to the unit at the terminal in the base.

(b) Remove the unit intact with its mounting plate from the base.

(c) Remove the upper screw supporting the unit on the mounting plate.

(d) Avoiding any disturbance to the top bearing plate, remove the entire top molded structure and rotor assembly from the stator assembly by removing the four corner screws. This will give access to both the rotor and stator assemblies and all parts will be aligned by the dowel pins when replaced.

(e) To remove the rotor assembly from the top molded structure, remove the small pin from the groove at the upper end of the shaft and back off on the clutch screw located on the right side of the movable contact arm.

Use care in handling the rotor while it is out of the relay, and see that the air gap and rotor are kept clean.

In reassembly, the rotor will go into the air gap easily without forcing if the parts are held in line properly.

BEARINGS

The lower jewel screw can be removed from the unit by means of an offset screw driver or an end wrench. The 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 on the new jewel before it is inserted.

The lower jewel bearing should be screwed all the way in until its head engages the end of the threaded core. The upper bearing should be adjusted to allow about 1/64" inch end play of the shaft.

Press down on the contact arm near the shaft to check the clearance between the iron core and the inside of the rotor cup and thus depress the spring-mounted jewel until the cup strikes the iron--the shaft should move about 1/16".

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 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, 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.

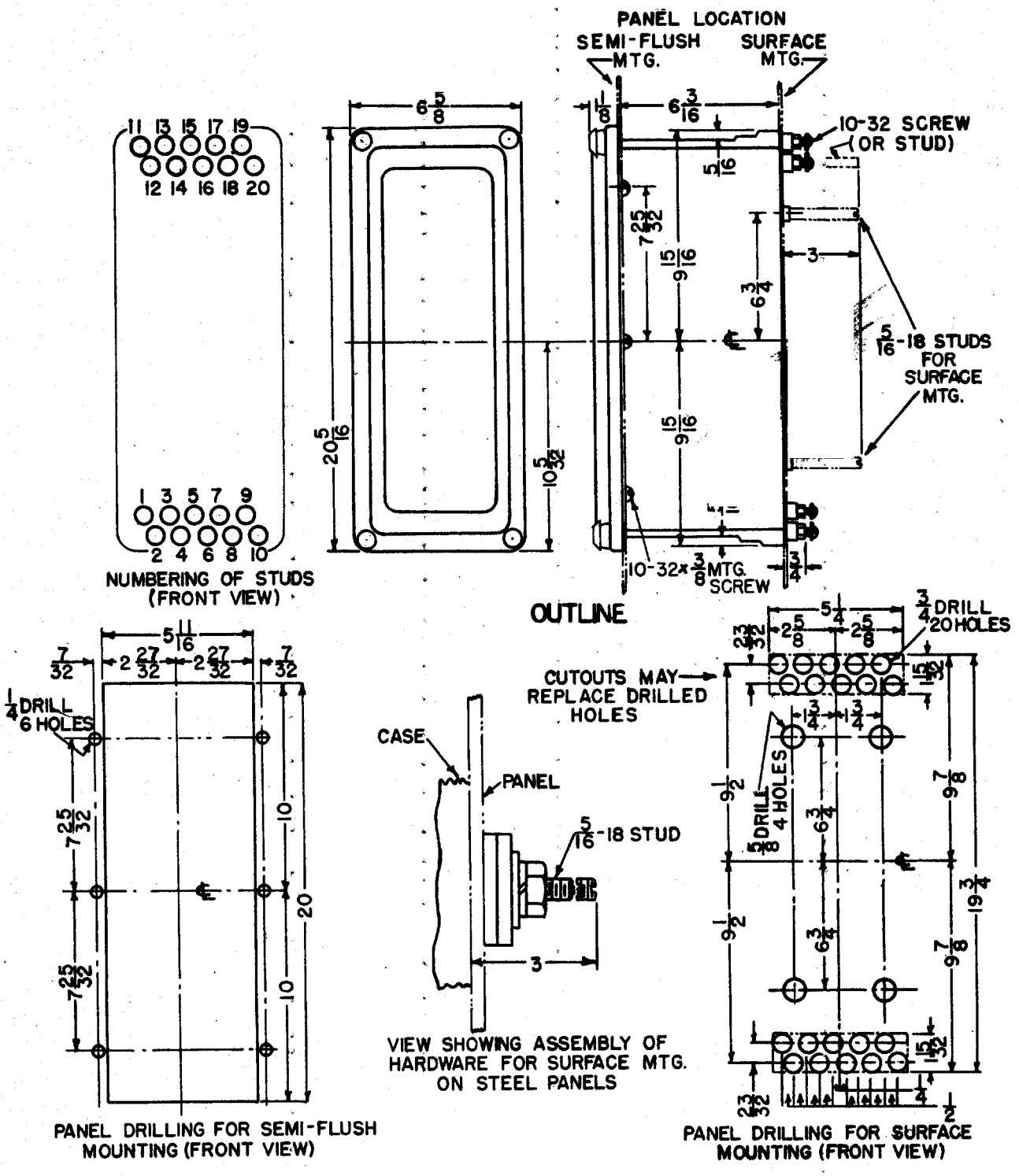


Fig. 11 Outline and Panel Drilling Dimensions for Size L-2 Case