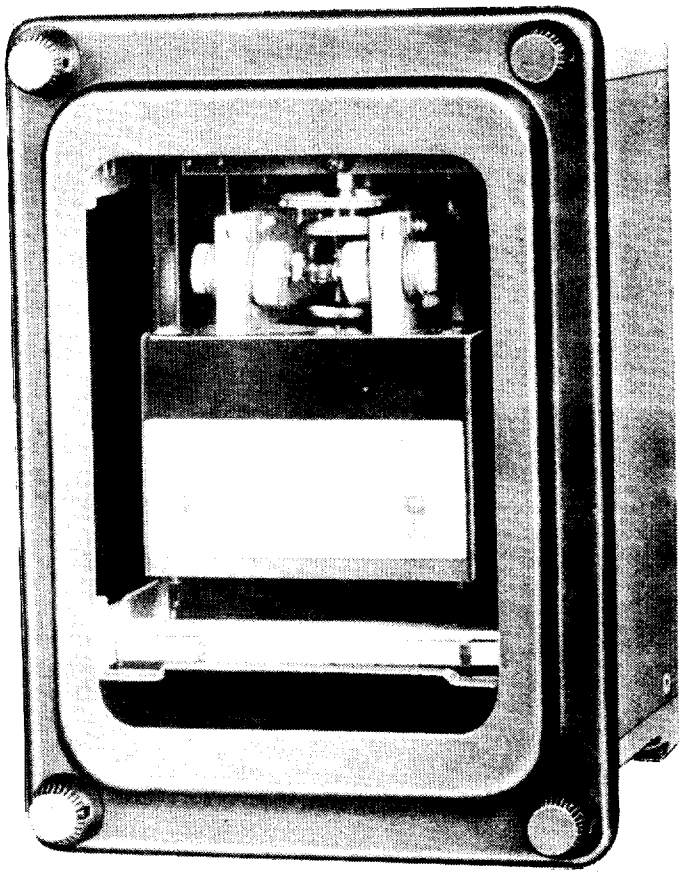
INSTRUCTIONS

GEI-15536G

SUPERSEDES GEI-15536F

and GEI-33934

UNDERVOLTAGE AND PHASE-SEQUENCE RELAYS



Types
CFV12A, CFV16A
and CFV16B

GENERAL ELECTRIC

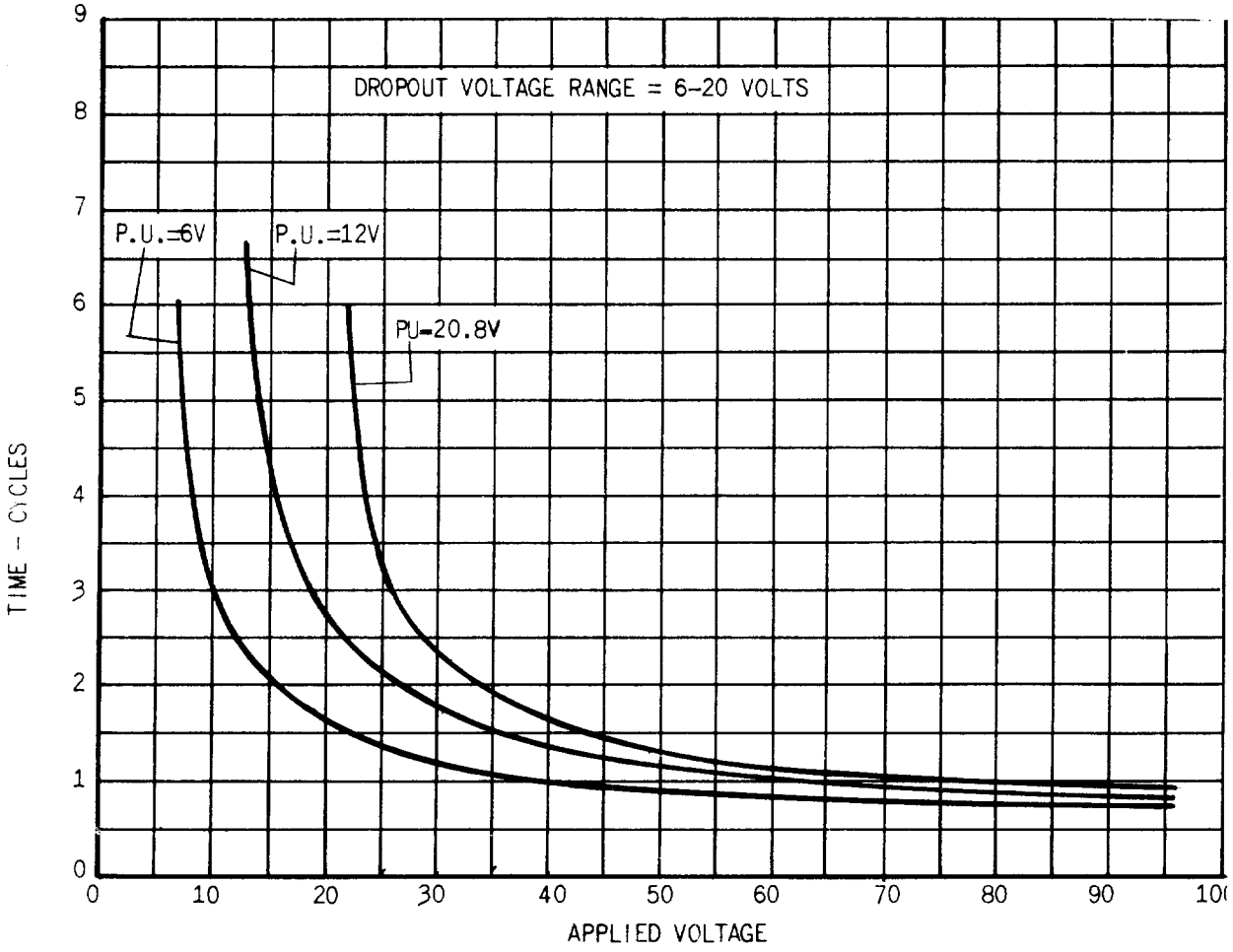


Figure 1. (418A892) Pickup Time Characteristics of Type CFV16A and CFV16B Relay.

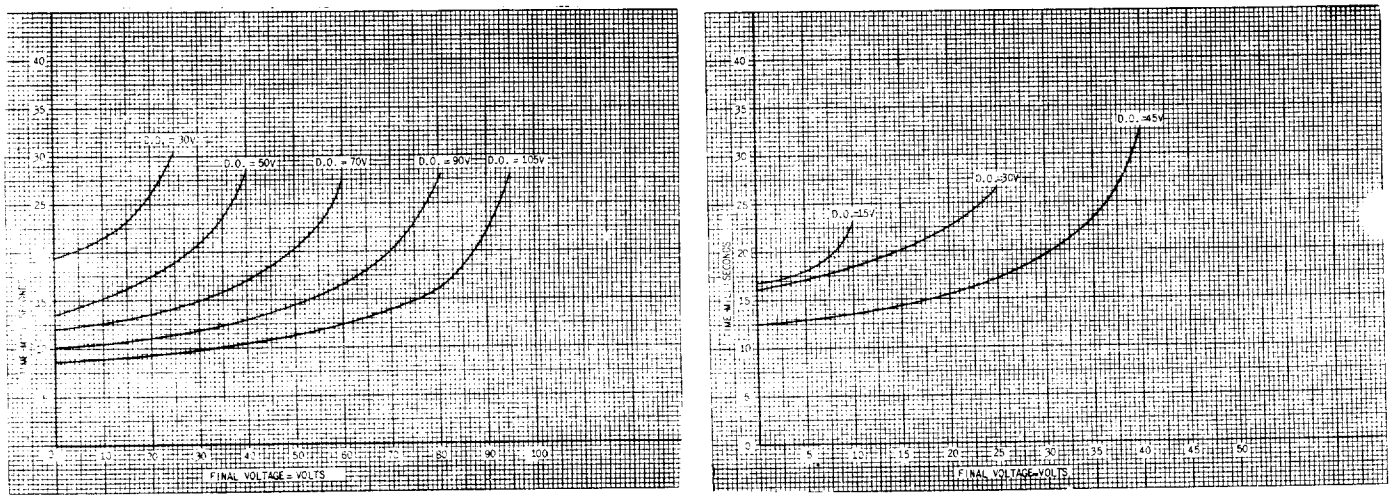


Figure 2. (104A8521 & 104A8520) Dropout Time Characteristics of Type CFV16A Relay.

UNDERVOLTAGE AND PHASE-SEQUENCE RELAY

TYPE CFV

INTRODUCTION

The Type CFV12A and CFV16A relays are induction cylinder devices for alternating current circuits. The principle by which torque is developed is the same as that employed in an induction disk relay with a watthour meter unit, 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. 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 the air 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.

APPLICATION

The Type CFV12A is an instantaneous polyphase undervoltage and phase sequence relay. One relay can be used as an undervoltage fault detector, but it will not have the same dropout values on phase-to-phase faults and three-phase faults. If the relay is calibrated to dropout at 80 per cent on a three-phase fault it will not dropout until the voltage drops to 64 per cent on the phase-to-phase fault. It can also be used to check the phase sequence of a three phase voltage.

The Type CFV16A is an instantaneous single phase undervoltage relay. Three relays can be used as undervoltage fault detectors and they will have the same dropout on single phase or three phase faults. The relay can also be used as overvoltage fault detectors connected to receive zero sequence voltages, to give an indication of a ground fault.

The Type CFV16B relay is an instantaneous overvoltage relay of the induction cylinder construction. It is similar to the Type CFV16A relay except that the normally open contact is connected to studs 1 and 2, and the normally closed contact is connected to studs 8, 9, and 10. This puts the shorting bar across the normally closed contact instead of the normally open contact. *

The relays should not be used to trip directly if the calibration is set at 15 percent of rating or less, because at these low levels of torque, the relays are sensitive to mechanical shock.

The pickup and dropout time characteristics of Types CFV16A and CFV16B relays are shown in Figs. 1 and 2 respectively.

RATINGS

The current-closing rating of the contacts is 30 amperes for voltages not exceeding 250 volts. The current-carrying ratings are limited by the two different ratings of the target and holding coil.

There are two ratings of these coils available. The choice between them depends on the current taken by the tripping circuit.

The 0.2-ampere coil is for use with trip coils that operate on currents ranging from 0.2 to 1.0 ampere at the minimum control voltage. If this coil is used with trip coils that take 1.0 ampere, or more, there is a possibility that the 7-ohm (or 14 ohm) resistance will reduce the tripping current to so low a value that the brakers will not be tripped.

The 1.0-ampere coil should be used with trip coils that take 1.0 ampere or more at the 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 must be used to control the trip coil circuit, the connections being such that the tripping current does not pass through the contacts of the target and holding coil of the Type CFV relays.

When it is desirable to adopt one type of relay as standard to be used anywhere on a system, relays with the 1.0-ampere target and holding coil should be chosen. These relays should also be used where it is impossible to obtain trip-coil data, but attention is called to the fact that the target may not operate if used in connection with trip coils taking less than 1.0 ampere.

The ratings of the two forms of target and holding coils are as follows:

Function		1 Amp Coil	0.2 Amp Coil
TARGET			
DC Resistance	- Ohms	0.31-0.36	6.7-7.4
Carry Continuously	- Amps	2.5	0.5
Carry for 1 Sec	- Amps	45	7.0
HOLDING COIL			
DC Resistance	- Ohms	0.24-0.29	7.3-8.9
Carry Continuously	- Amps	3.5	0.7
Carry for 1 Sec.	- Amps	100	14.0

* Indicates revision

The d-c resistance of the target coil and the holding coil is 0.25 ohms each for the 1.0 ampere rating and 7 ohms each for the 0.2 ampere rating.

BURDENS

The burdens, at rated voltage and frequency, of the Type CFV relays are given in the following table:

*

RELAY	VOLTS	FREQ.	DROPOUT	STUDS	WATTS	VARS.	VOLT-AMP
CFV12A	115	60	6-25	5-6	3.8	3.9	5.4
	↓	↓	6-25	7-8	11.0	12.2	17.0
			30-120	5-6	3.8	3.9	5.4
			30-120	7-8	11.8	12.2	17.0
	230		40-160	5-6	5.1	5.4	7.4
	↓	↓	40-160	7-8	11.7	12.3	17.0
	115	50	6-25	5-6	4.3	4.5	6.4
	↓	↓	6-25	7-8	14.2	14.9	20.3
			30-120	5-6	4.3	4.5	6.4
			30-120	7-8	14.2	14.9	20.3
CF16A	115	60	6-20	5-6	14.4	3.2 †	14.8
or	↓	↓	15-45	↓	12.2	1.6 †	14.8
CFV16B			30-105		12.2	1.6 †	14.8
	208		25-100		10.8	2.5 †	11.1
	230	↓	60-210		13.1	3.0 †	13.4
	115	50	6-20		14.7	3.0 †	15.0
	↓	↓	15-45		10.8	2.2 †	11.0
			30-105		10.8	2.2 †	11.0
	110		30-105		9.0	1.8 †	9.2
	100	↓	25-95	↓	8.2	1.7 †	8.4

† Capacitive

RECEIVING, HANDLING AND STORAGE

The 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 CFV12A relay is a polyphase undervoltage relay of the induction cup construction having an instantaneous time characteristic. The contacts are single-circuit-closing with the right-hand contact normally closed when de-energized.

The Type CFV16A relay differs from the Type CFV12A only in that it is a single-phase undervoltage relay.

The Type CFV16B relay differs from the Type CFV16A relay only in that the normally open and normally closed contacts are interchanged.

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. 8.

* Indicates revision

CONNECTIONS

Internal connection diagrams for the various relay types are shown in Figs. 4, 5, and 6. A typical wiring diagram is given 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.

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:

CUP AND STATOR

Should it be necessary to remove the cup-type rotor the following points should be followed:

1. Disconnect the leads. (Be sure to tag them so they may be reconnected to the proper terminal).

2. Remove unit intact with its mounting plate.

3. Avoiding any disturbance to the top bearing plate, remove the entire top structure from the stator assembly by removable four corner screws. This will give access to the cup and stator assembly.

4. In this way all parts will again be aligned by the pins when replaced.

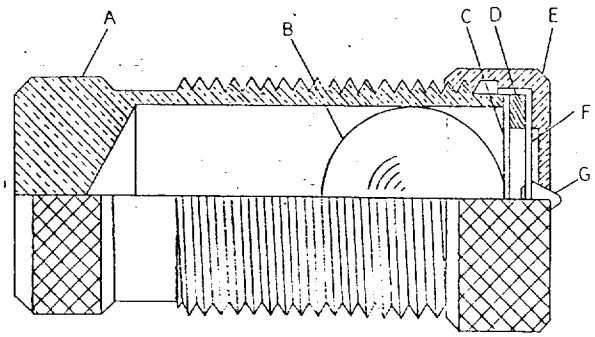
BEARINGS

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

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

CONTACTS

The contacts (See Fig. 3) are especially constructed to supress bouncing. The stationary contact (G) 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. 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



A-INCLINED TUBE
B-STAINLESS STEEL BALL
C-DIAPHRAM
D-SPACER
E-CAP
F-FLAT SPIRAL SPRING
G-CONTACT

Figure 3. (6077069-4) Cut-a-way View of Contact Assembly

(E). The contact and its flat spiral mounting spring may then be removed. The contact wipe should be between 0.004 and 0.009 inch.

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.

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.

HOLDING COILS

The location of the holding coil may be adjusted by loosening the mounting screw and sliding the coil either to the left or right in a groove provided for that purpose. The holding coils are located at the factory so there is a gap of about 0.050-inch between the pole pieces and the armature. A gap of 0.040-inch is equivalent to 1 1/4 turns of the contact barrel. The holding coil gap must not be adjusted appreciably below 0.040-inch.

TESTS

Upon leaving the factory the relays are adjusted for the contacts to close at the value given on the nameplate. This can be re-adjusted readily by turning the upper-spring adjusting ring. To do this, loosen the hexagonal head-locking screw, 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.

* The relay calibration will be approximately 7 percent higher when the coils are hot after having been energized at rated voltage as compared to its calibration when the coils are at room temperature. Therefore if the relay is to be used in a ground circuit and will only have voltage on its coils during a fault, then the relay should be calibrated without preheating the coils. If the relay is to be used with rated voltage applied continuously except during a fault, then the relay should be preheated for at least one hour with rated voltage on its coils. The relay calibration should then be made while the coils are hot.

The clutch is adjusted at the factory not to slip at rated voltage. This adjustment is varied by means of the threaded sleeve with a screw driver slot located on the right-hand side of the moving contact arm near the shaft.

If a test of time is desired, the speed of the relay is such that a mechanical timer is unsatisfactory and it is necessary to use a oscillograph or an electronic timer.

PERIODIC TESTING

An operation test and inspection of the relay at least once every six months is recommended. Regarding tests, it is believed that a check of the contact closing voltage is sufficient.

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.

CUP 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.

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. If possible, give the General Electric Company requisition number on which the relay was furnished. Refer to publication GEF-3848 for a list of renewal parts.

* Indicates revision

Fig. 4 (6209338)

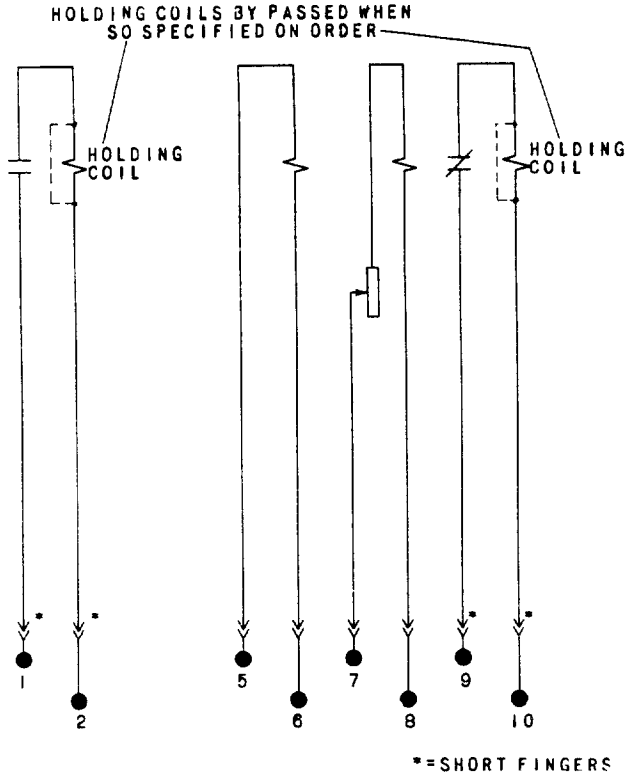


Figure 4. (6209338) Internal Connections for Type CFV12A Relay (Front View)

Fig. 5 (6375817)

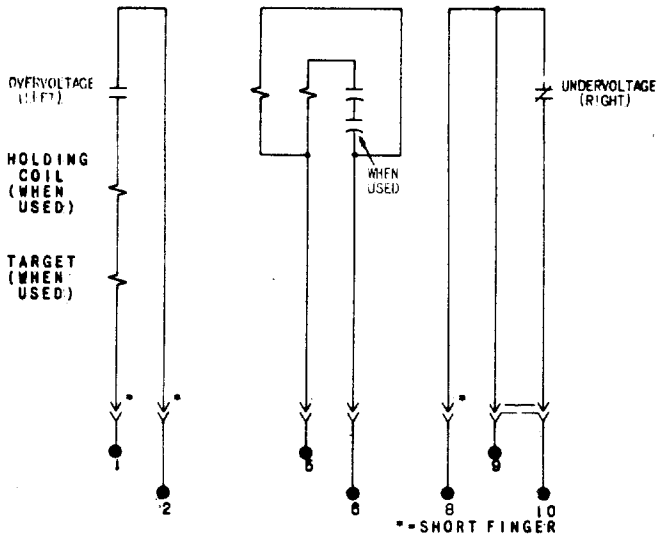


*Figure 6. (6556541-3) Internal Connections for Type CFV16B Relay (Front View)

Fig. 6 (6556541)

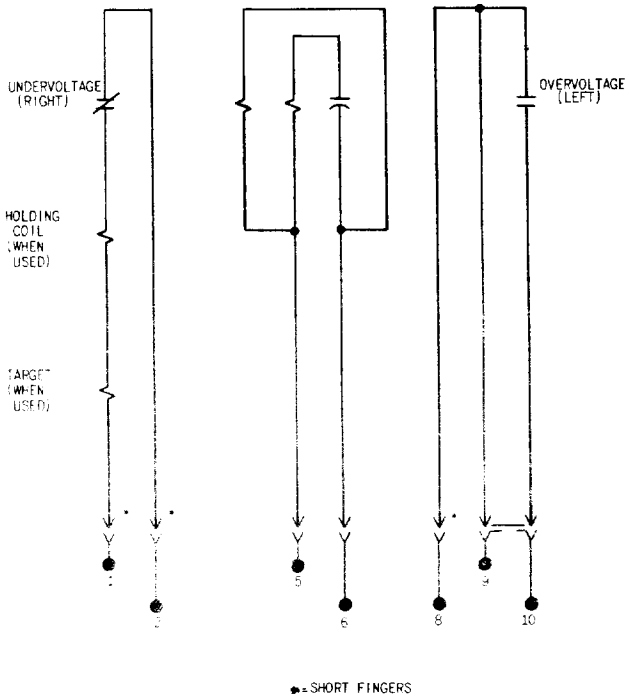


*Figure 5. (6375817-5) Internal Connections for Type CFV16A Relay (Front View)

Fig. 7 (6209364)

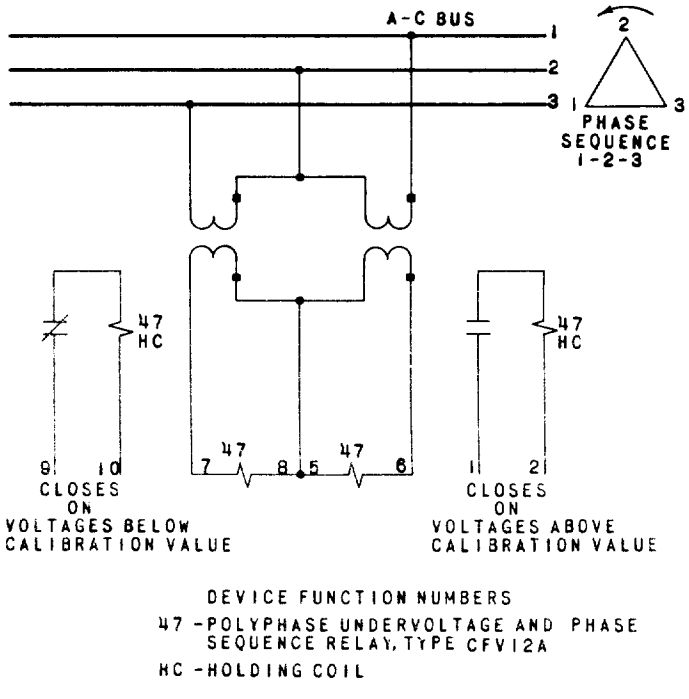


Figure 7. (6209364) Typical External Wiring Diagram Showing Connections for Type CFV12A Relay

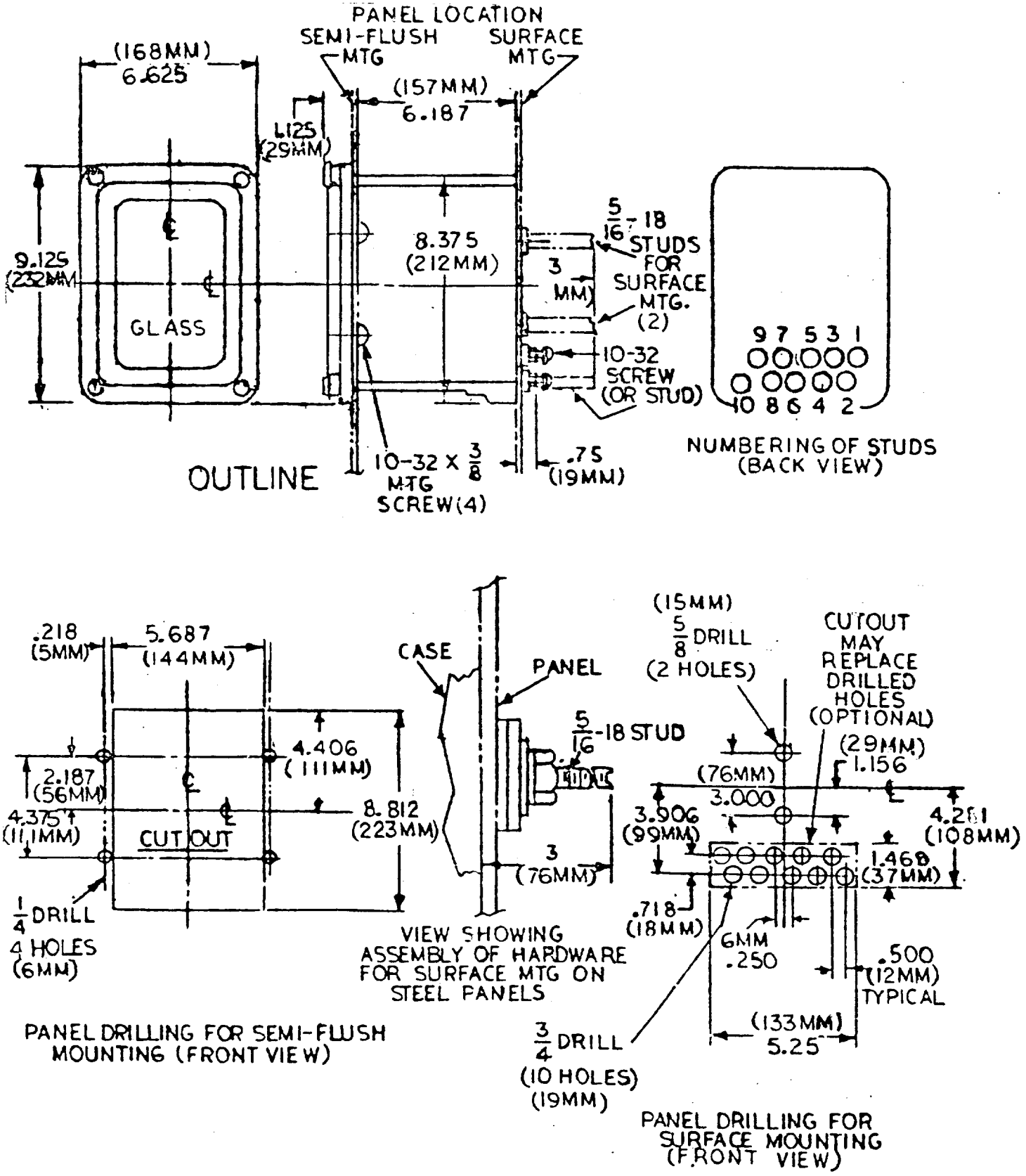


Fig. 8 (6209271-7) Outline and Panel Drilling for Type CFV12A, CFV16A and CFV16B Relays