INSTRUCTIONS

GEI-30970 A

INSERT GEH-1768

UNDERVOLTAGE RELAY

TYPE IAV54J

GENERAL ELECTRIC

UNDERVOLTAGE RELAY

TYPE IAV54J

INTRODUCTION

These instructions are a supplement to instruction book GEH-1768 which is included in this book. The combination of the two form complete instructions for the Type IAV54J relay.

The Type IAV54J relay is similar in construction and operation to the Type IAV54E relay described in the included instructions except that the seal-in unit has been omitted.

The outline and panel drilling dimensions are shown in Fig. 11 of the included instructions.

The internal connection diagram is shown in Fig. 1.

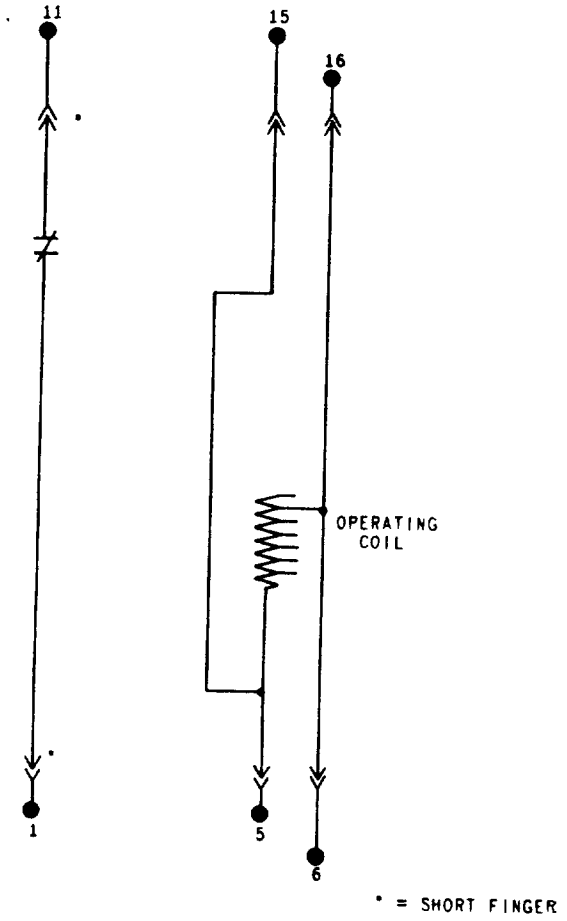


Fig. 1 Type IAV54J Relay, Internal Connections (Front View)

Fig. 1 K-6375788

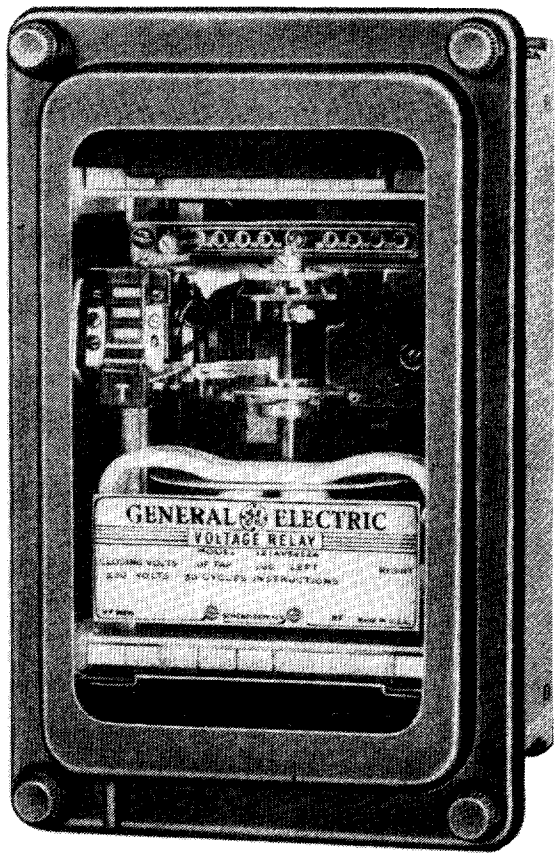
(9/92) (100) GENERAL ELECTRIC METER AND CONTROL BUSINESS DEPT., MALVERN, PA 19355

INSTRUCTIONS

UNDERVOLTAGE RELAYS

TYPES:

IAV54E IAV55C
IAV54F IAV55F
IAV54H IAV55H
IAV55J



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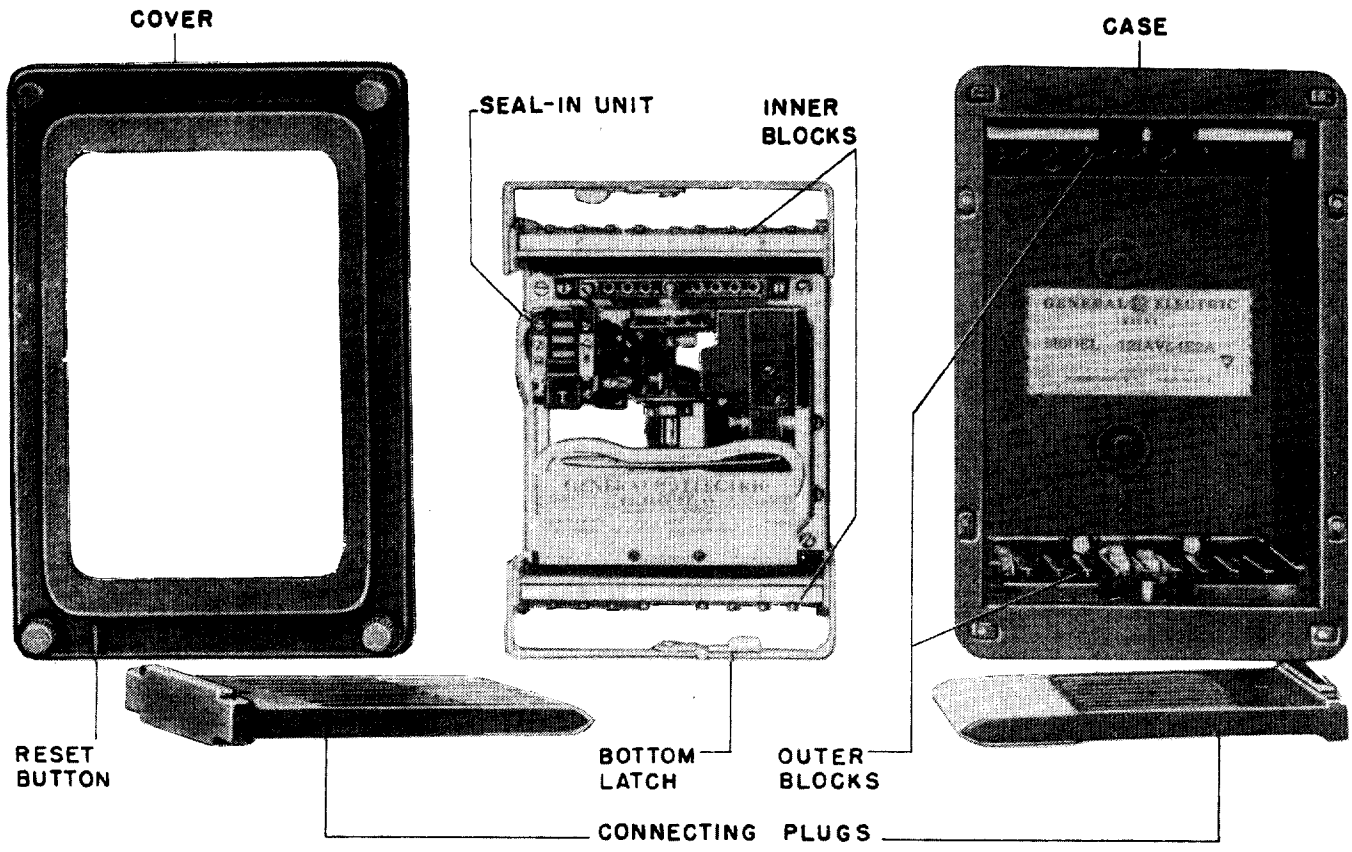

Figure 1 (8007477) Type IAV54E Relay, Disassembled

UNDERVOLTAGE RELAYS
TYPE IAV

INTRODUCTION

These induction-disk relays are actuated by a potential operating coil on a laminated U-magnet. The disk shaft carries the moving contact that completes the contact or contacts. The disk shaft is restrained by a spiral spring to give the proper contact-closing voltage, and its motion is retarded by permanent magnets acting on the disk to give the correct time delay.

The seal-in unit is mounted to the left of the shaft as shown in Figure 1. This unit has its coil in series and its contacts in parallel with the main contacts so that when the main contacts close, the seal-in unit picks up and seals in. When the seal-in unit picks up, it raises a target into view that latches up and remains exposed until released by pressing a button beneath the lower-left corner of the cover.

The relays are all mounted in single-unit double-end cases. The case has studs for external connections at both ends. The electrical connections between the relay and the case are made through stationary molded inner and outer blocks between which rest a pair of removable connecting plugs that complete the circuit. The molded outer blocks carry the studs for the external connections, while the inner blocks carry the terminals for the internal connections. The operating coil is connected in parallel with both the upper and the lower inner molded blocks, and the trip circuit is connected in series with these blocks. In this way, insertion of either the upper or lower connecting plug will energize the operating coil, but the trip circuit will not be completed until the second connecting plug is inserted. For relays that have contacts closed when the relay is de-energized but open under normal operating conditions, the double-connecting-plug feature allows the relay contacts to open before the trip circuit is completed, thus minimizing the possibility of incorrect tripping when returning the relay to service after tests and inspection.

APPLICATION

These relays are protective devices designed to close trip or alarm circuits whenever the voltage applied to their operating coils descends to some predetermined value. The functions are described in greater detail in the following paragraphs.

OPERATING CHARACTERISTICS

The Type IAV54E relay has a single circuit-closing contact that closes when the voltage is reduced to some predetermined value; thus, the contacts are closed at zero volts. This relay is a time undervoltage relay with inverse time characteristics, shown in Figure 2.

The Type IAV54F relay is similar to the Type IAV54E relay, except that it has a longer operating time. The time characteristics are shown in Figure 3.

The Type IAV54H relay is also similar to the Type IAV54F relay, except that it has a much longer operating time than either the Type IAV54E or the Type IAV54F relays. The time characteristics are shown in Figure 4.

The Type IAV55C relay is similar to the Type IAV54E relay, except that it has two circuit-closing contacts.

The Type IAV55F relay is similar to the Type IAV54F relay, except that it has two circuit-closing contacts.

The Type IAV55H relay is similar to the Type IAV54H relay, except that it has two circuit-closing contacts.

The Type IAV55J relay is similar to the Type IAV55H relay, except that it is provided with two separate seal-in units; one for each set of normally-closed contacts.

RATINGS

The operating-circuit ratings available are 115, 230 or 460 volts at 60, 50, or 25 cycles. The operating coil will stand rated voltage continuously on any tap and will stand tap voltage continuously on the taps above rated voltage.

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 seal-in coil, as indicated in the Table 1:

TABLE 1

Function	Amperes, AC or DC	
	2 Amp Tap	0.2 Amp Tap
Tripping Duty	30	3
Carry Continuously	3	0.3

The 2 ampere tap has a DC resistance of 0.13 ohms and a 60 cycle impedance of 0.53 ohms; the 0.2 ampere tap has a 7 ohm DC resistance and 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 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 should be used. The auxiliary relay should be connected so that the tripping current does not pass through the contacts or the target and seal-in coil of the protective relay.

BURDENS

The burdens for the various relay types at rated voltage are shown in Table 2.

TABLE 2

Relay	Tap Settings 115V Coil	230V Coil	460V Coil	Rated Frequency	At Rated Voltage Volt-amps	Power Factor	Watts
IAV54E &	140	280	560	60	3.0	0.26	0.78
IAV55C	120	240	480	60	4.0	0.26	1.0
	105	210	420	60	5.2	0.26	1.4
(Burdens for	93	186	372	60	6.8	0.28	1.9
IAV54F & IAV55F	82	164	328	60	8.9	0.28	2.5
are approxi-	70	140	280	60	12.4	0.29	3.6
mately 60% of	64	128	256	60	15.1	0.30	4.5
these values)	55	110	220	60	21.6	0.31	6.7
(Burdens for	140	280	560	50	2.5	0.28	0.70
IAV54H & IAV55H	120	240	480	50	3.3	0.28	0.92
& IAV55J							
are approxi-	105	210	420	50	4.3	0.28	1.2
mately 40% of	93	186	372	50	5.7	0.28	1.6
these values)	82	164	328	50	7.4	0.28	2.1
	70	140	280	50	10.3	0.29	3.0
	64	128	256	50	12.6	0.30	3.8
	55	110	220	50	18.0	0.31	5.6
	140	280	560	25	2.3	0.26	0.60
	120	240	480	25	3.1	0.26	0.81
	105	210	420	25	4.0	0.27	1.1
	93	186	372	25	5.2	0.28	1.5
	82	164	328	25	6.8	0.28	1.9
	70	140	280	25	9.5	0.30	2.8
	64	128	256	25	11.6	0.30	3.5
	55	110	220	25	16.5	0.31	5.1

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 damage resulting from

rough handling is evident, file a damage claim at once with the transportation company and promptly notify the nearest General Electric Sales Office.

Exercise reasonable care when unpacking the relay so that none of the parts are damaged nor the adjustments disturbed.

If the relays are not to be installed immediately, store them in their original cartons in a place that is free from moisture, dust and metallic chips. If foreign matter collects on the outside of the case it could find its way inside when the cover is removed, causing trouble when operating the relay.

CASE

The case can either be surface or semi-flush mounted on the panel, and an assortment of hardware is provided. The cover attaches to the case and 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 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. Two removable connecting plugs, which complete the circuits, are nested between the molded blocks. The outer blocks, attached to the case, have studs for external connections, and the inner blocks have terminals for internal connections.

The relay mechanism is mounted in a steel framework called the cradle. It is a complete unit with all leads terminated at the inner block. This cradle is held firmly in the case by a latch at the top and the bottom, and a guide pin at the back of the case. The case and cradle are so constructed that the relay cannot be inserted upside down in the case. Besides making the electrical connections between the respective blocks of the cradle and case, the connecting plugs also lock the latch in place. The cover, which is fastened to the case by thumbscrews, holds the connecting plugs in place.

To draw out the relay unit, first remove the cover, then draw out the plugs. Shorting bars are provided in the case to short the current-transformer circuits. Release the latches, and the relay unit can be easily drawn out. To restore the relay unit to its case follow the reverse order.

A separate testing plug can be inserted in place of one of the connecting plugs to test the relay in place on the panel, either from its own source of current and voltage, or from another source. Or, the relay unit can be drawn out of its case, and replaced by another relay that has already been tested in the laboratory.

INSTALLATION

LOCATION

Install the relay in a location that is clean and dry, free from dust and excessive vibration, and is 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 Figure 12.

CONNECTIONS

The internal connection diagrams are shown in Figures 5, 6 and 7. Typical external connections are shown in Figure 8.

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

Target and Seal-in Unit

For trip coils that operate on currents ranging from 0.2 up to 2 amperes at the minimum control voltage, set the target and seal-in tap plug in the 0.2 ampere tap.

The tap plug is the screw holding the right-hand stationary contact of the seal-in unit. To change the tap setting, first remove the connecting plugs. Then take a screw from the left-hand stationary contact and place it in the desired tap. Next, remove the screw from the other (right hand) tap, and place it in the left-hand contact. Following this procedure prevents the right-hand stationary contact from getting out of adjustment. Screws should **never** be left in **both** taps at the same time.

Voltage Settings

The contact-operating voltage may be changed by the position of the tap plug in the tap block at the top of the relay. The range of this adjustment is from 55 to 140 volts on the 115 volt ratings, from 110 to 280 volts on the 230 volt rating, and from 220 to 560 on the 460 volt ratings. Screw the tap plug firmly into the tap marked for the desired voltage (i.e., above which the relay is not to operate).

The tap settings indicate voltage values at which the contacts will close. A spring-adjusting ring is provided for a sensitive adjustment of relay operation. If the factory adjustment has been disturbed, the desired operating value may be obtained by inserting a tool in the notches around the edge of the ring (see Figure 10) and turning the ring to the desired position. This adjustment also permits any desired setting between the taps. The relay has been adjusted at the factory to close its contacts from any time-dial position at a voltage within 5% of the tap-plug setting. For example: If the tap-plug setting is 55 volts, the contacts will close when the voltage is reduced from a higher value down to 55 volts. The relay contacts will open again at no more than 110% of the tap setting. For the 55 volt tap setting, the contacts will open when the voltage is increased to a value greater than 55 but less than 61 volts.

Time Settings

The setting of the time dial is what primarily determines the time of the relay operation. Further adjustment is obtained by moving the permanent magnet along its supporting shelf. Moving the magnet in towards the back of the relay decreases the operating time; moving it out increases the operating time.

Figures 2, 3, and 4 show the time-voltage characteristics of the various relays with the time-dial settings for obtaining each characteristic. To make time settings, set the time dial to the number required (to give the desired characteristics) by turning it until the number lines up with the notch in the adjacent frame. The time indicated by the curves is the time required to close the relay contacts when the voltage is suddenly decreased, from operating value or above, to the value on the curve.

The time-voltage curves are plotted in percent, making them applicable for all tap settings.

INSPECTION

At the time of installation, the relay should be inspected for tarnished contacts, loose screws, or other imperfections. Corrections to the relay should be made in the manner described in the section on maintenance.

OPERATION

Before putting the relay into service, a check should be made to determine that factory adjustments have not been disturbed. On relays that have time dials, the dials will be set at zero before the relay leaves the factory. This setting should be changed so that the relay contacts may be opened.

The dropout voltage should be checked on one or more taps to make certain that the contacts close. The time voltage curves should be checked for one or more settings. Recommended test connections for the above tests are shown in Figure 9.

The relay may be tested while mounted on the panel, either from its own or another source of power, by inserting separate testing plugs in place of the connecting plugs. Or, the cradle can be drawn out and replaced by another that has been laboratory tested.

MAINTENANCE

These relays are adjusted at the factory and the adjustments should not be disturbed. If they are, the following points should be observed in restoring the original settings.

DISK AND BEARINGS

The lower jewel may be tested for cracks by exploring its surface with the point of a fine needle. The jewel should be turned up until the disk is centered in the air gap, after which it should be locked in position by the set screw provided for this purpose.

CONTACT CLEANING

A flexible burnishing tool should be used to clean fine silver contacts. This is a flexible strip of metal with an etch-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 ensures cleaning 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 between the contacts, preventing them from closing completely.

The burnishing tool described above can be obtained from the factory.

RENEWAL PARTS

Sufficient quantities of renewal parts should 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 the quantity required, and describe the parts by catalog number, as shown in Renewal Parts Bulletin No. GEF-3897.

Since the last edition, Table 2 has been corrected.

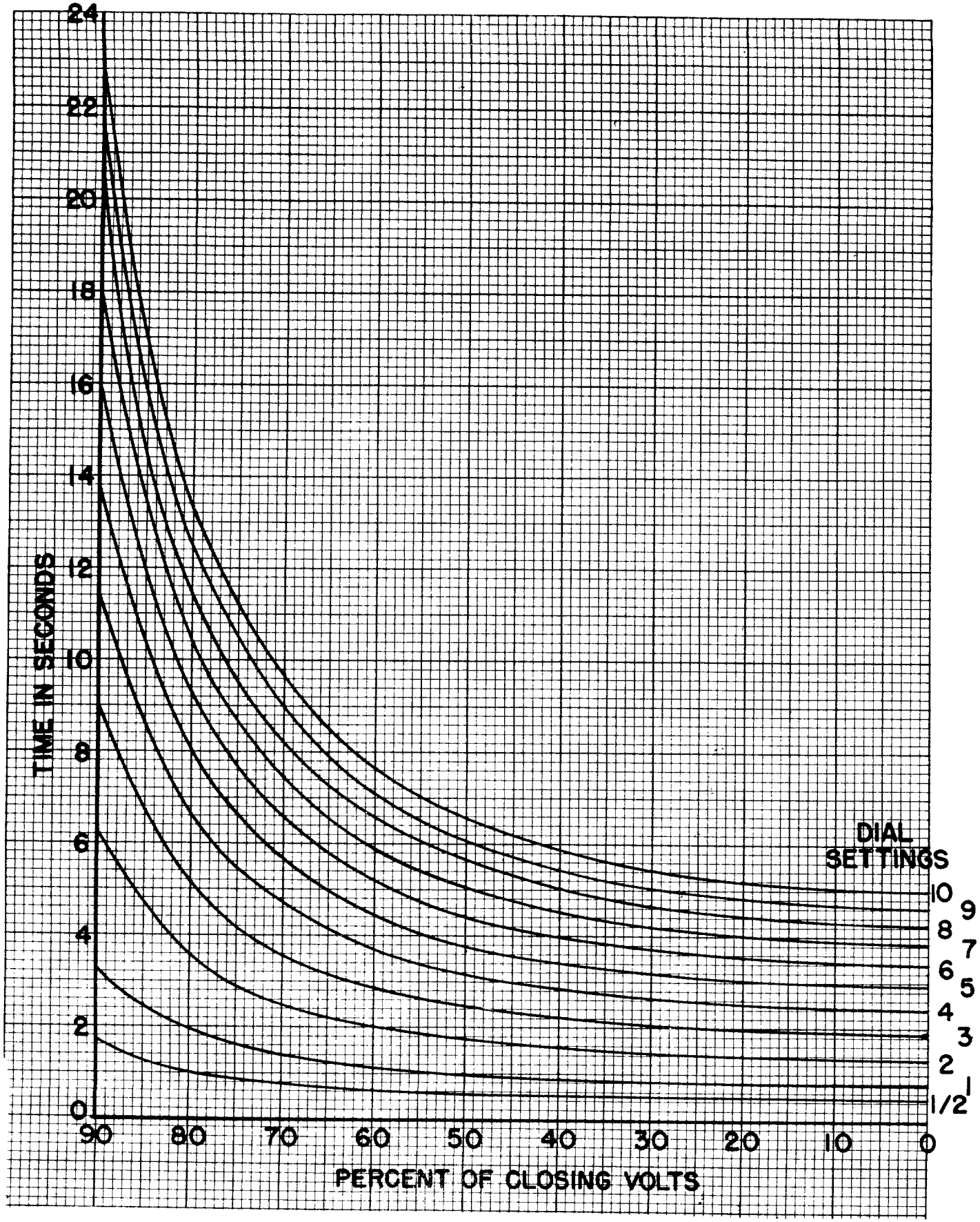

Figure 2 (0362A0648-2) Time-Voltage Curves for Type IAV54E and IAV55C Relays

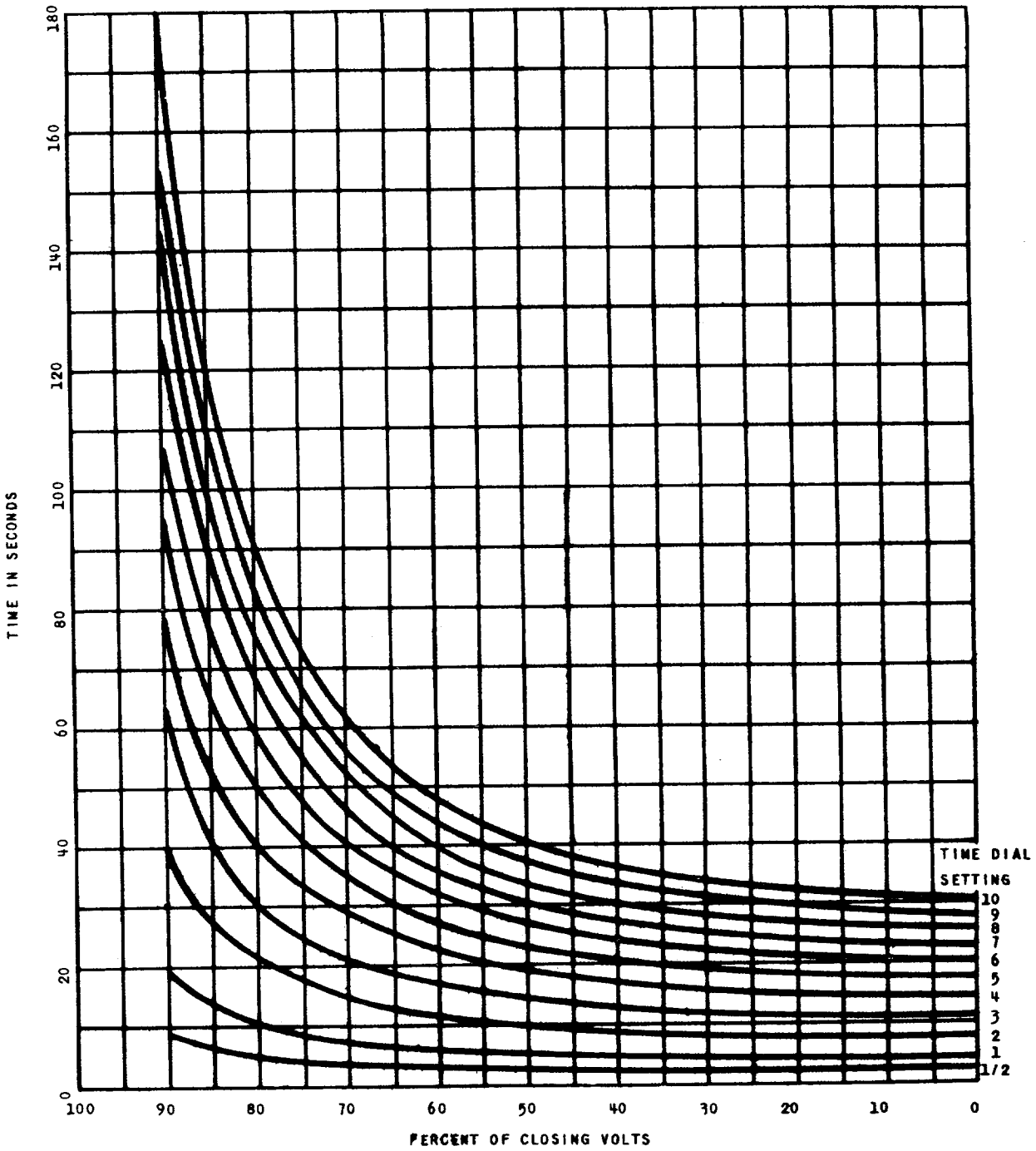

Figure 3 (0362A0668) Time-Voltage Curves for Type IAV54F and IAV55F Relays

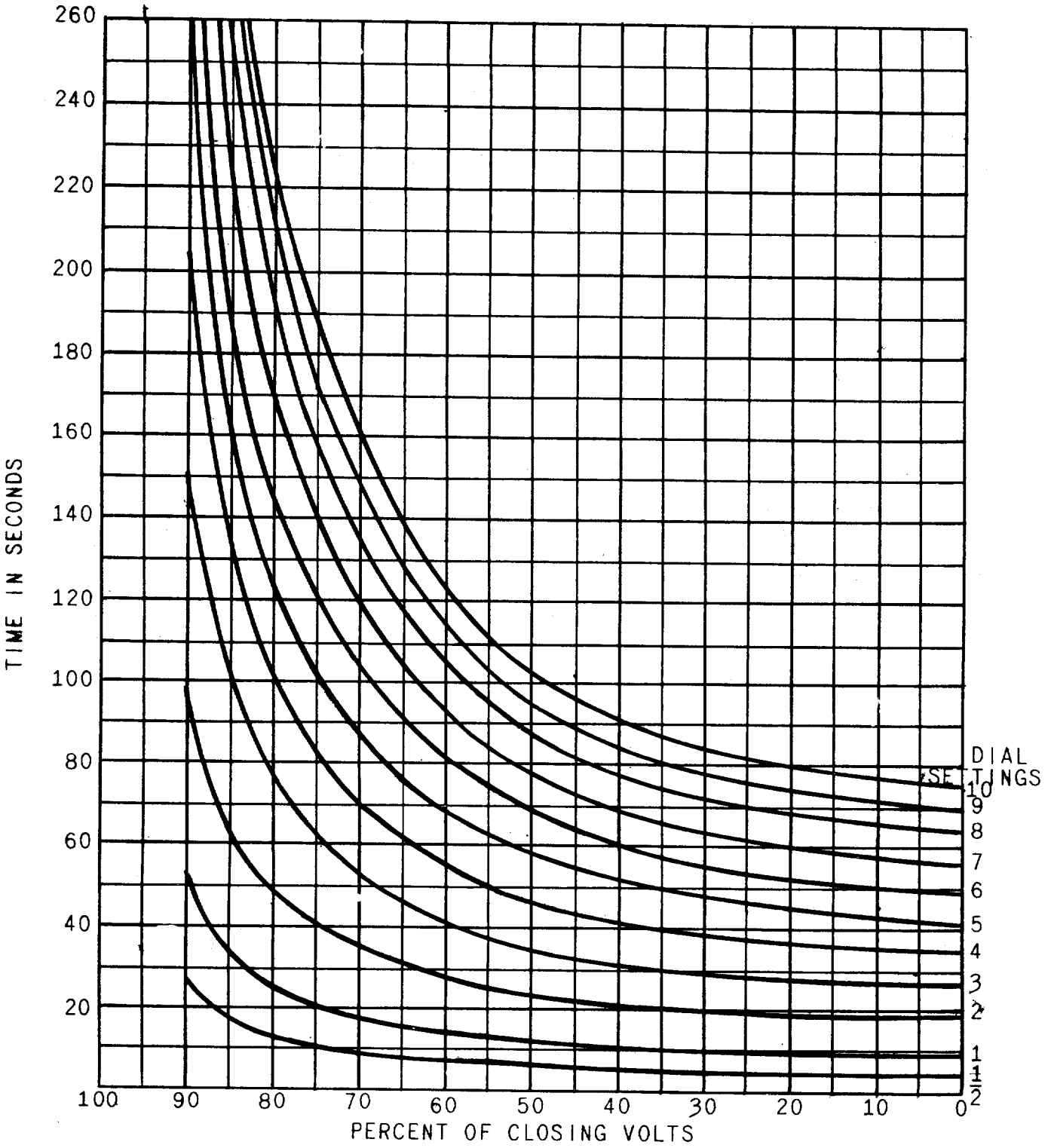

Figure 4 (0362A0650-1) Time-Voltage Curves For Type IAV54H, IAV55H and IAV55J Relays

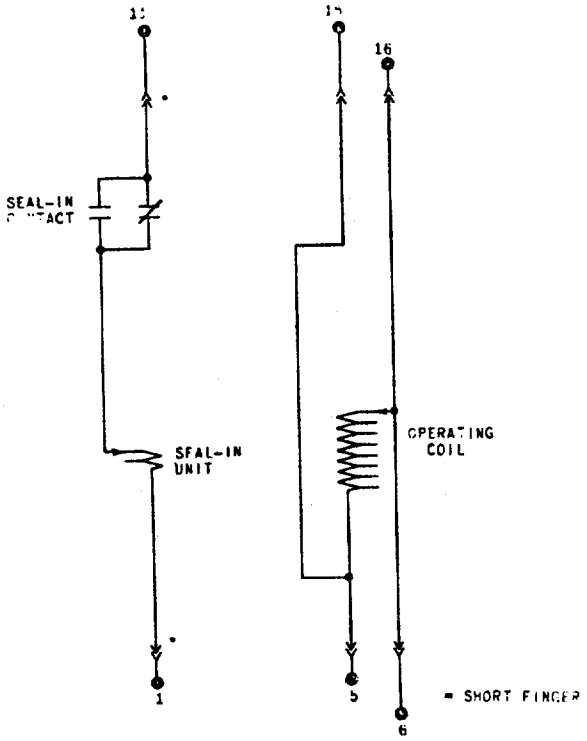

Figure 5 (K-6209253-3) Internal Connections for Type IAV54E, IAV54F, IAV54H Relays (Front View)

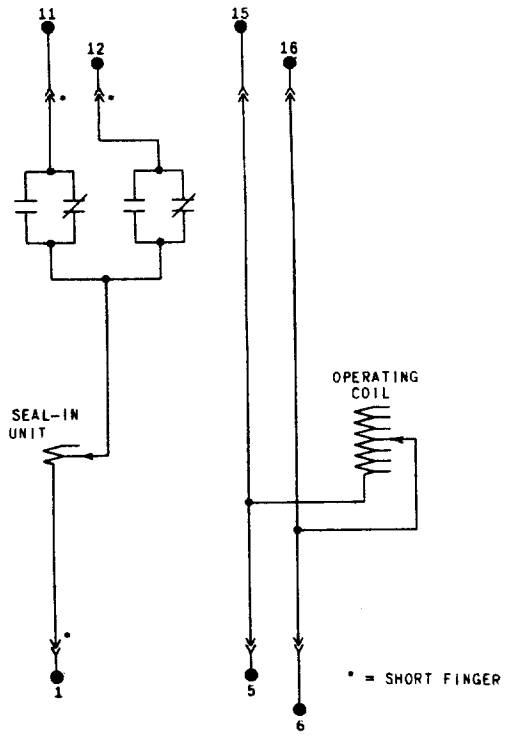

Figure 6 (6400515-3) Internal Connections for Type IAV55C, IAV55F, IAV55H Relays (Front View)

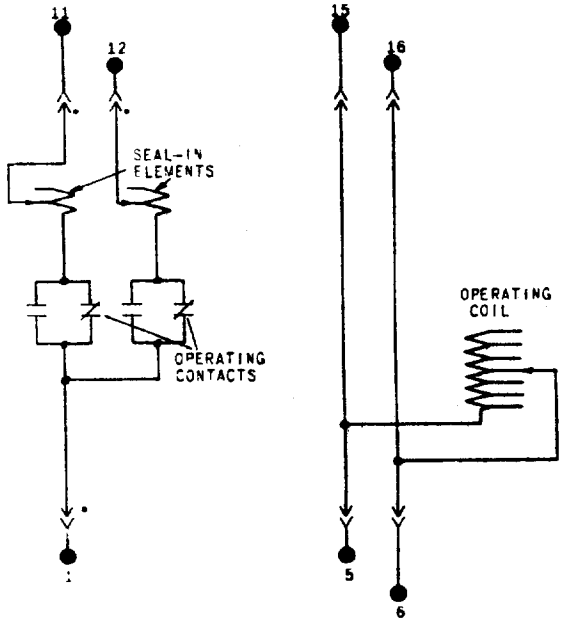

Figure 7 (K-6375840) Internal Connections for Type IAV55J Relay (Front View)

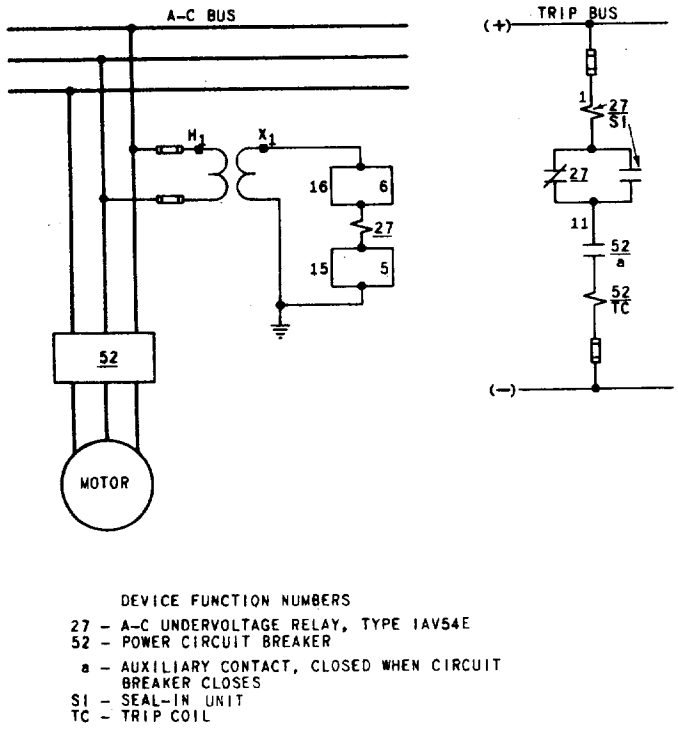

Figure 8 (6209277-2) Typical External Connections using an IAV54E Relay for Undervoltage Protection of an AC Motor

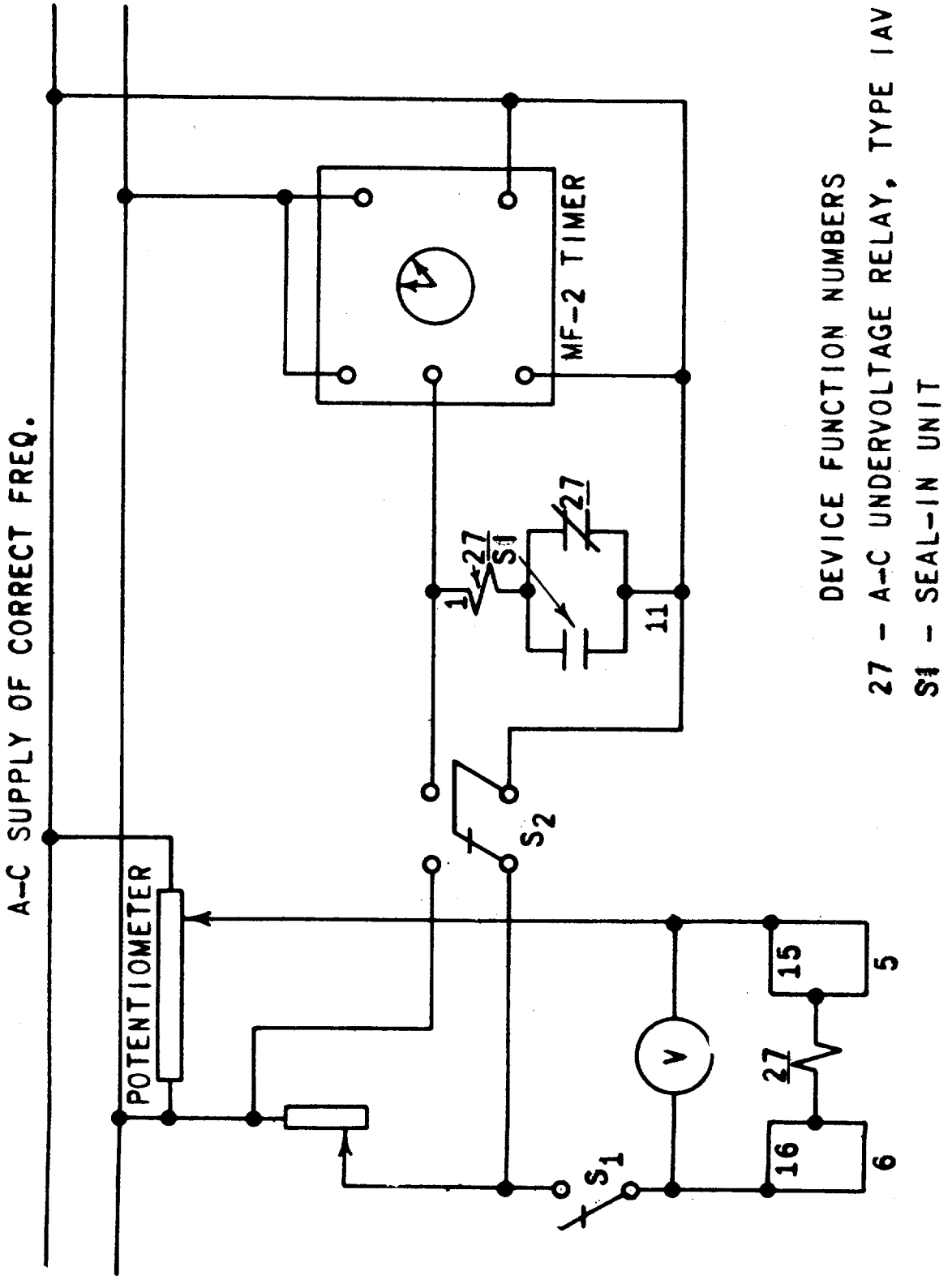

Figure 9 (6154392-5) Connections for Testing Types IAV54 and IAV55 Relays

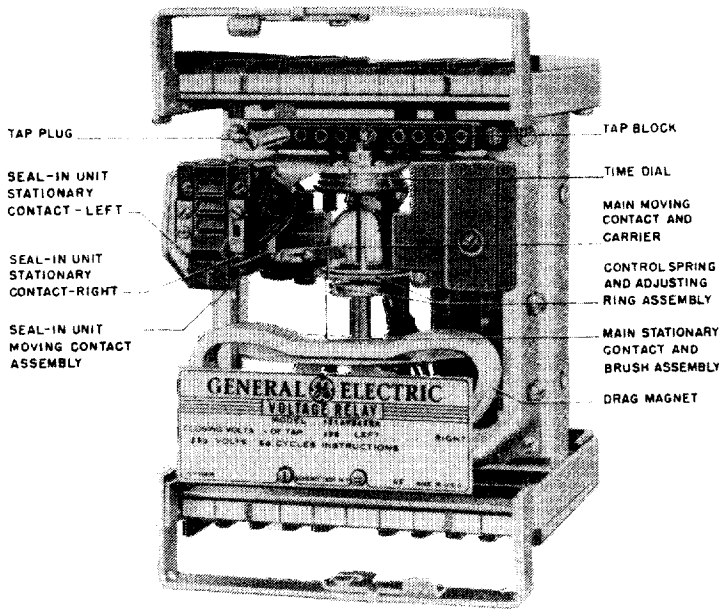

Figure 10 (8007475) Type IAV54E Relay Removed from Case (Front View)

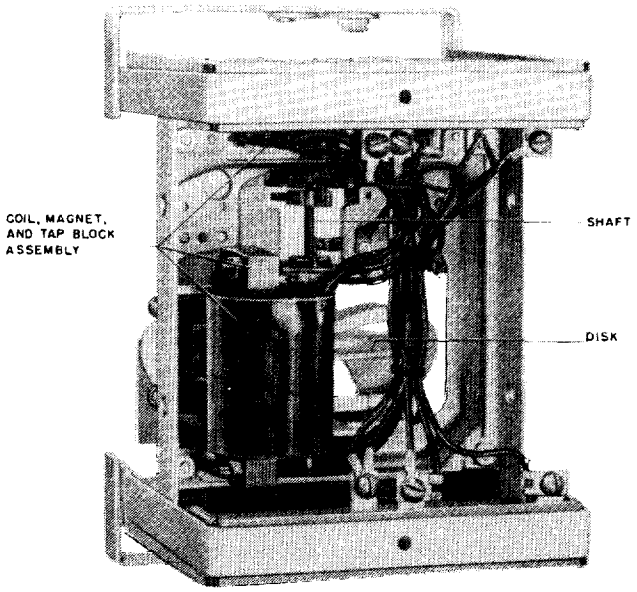

Figure 11 (8007478) Type IAV54E Relay Removed from Case (Rear View)

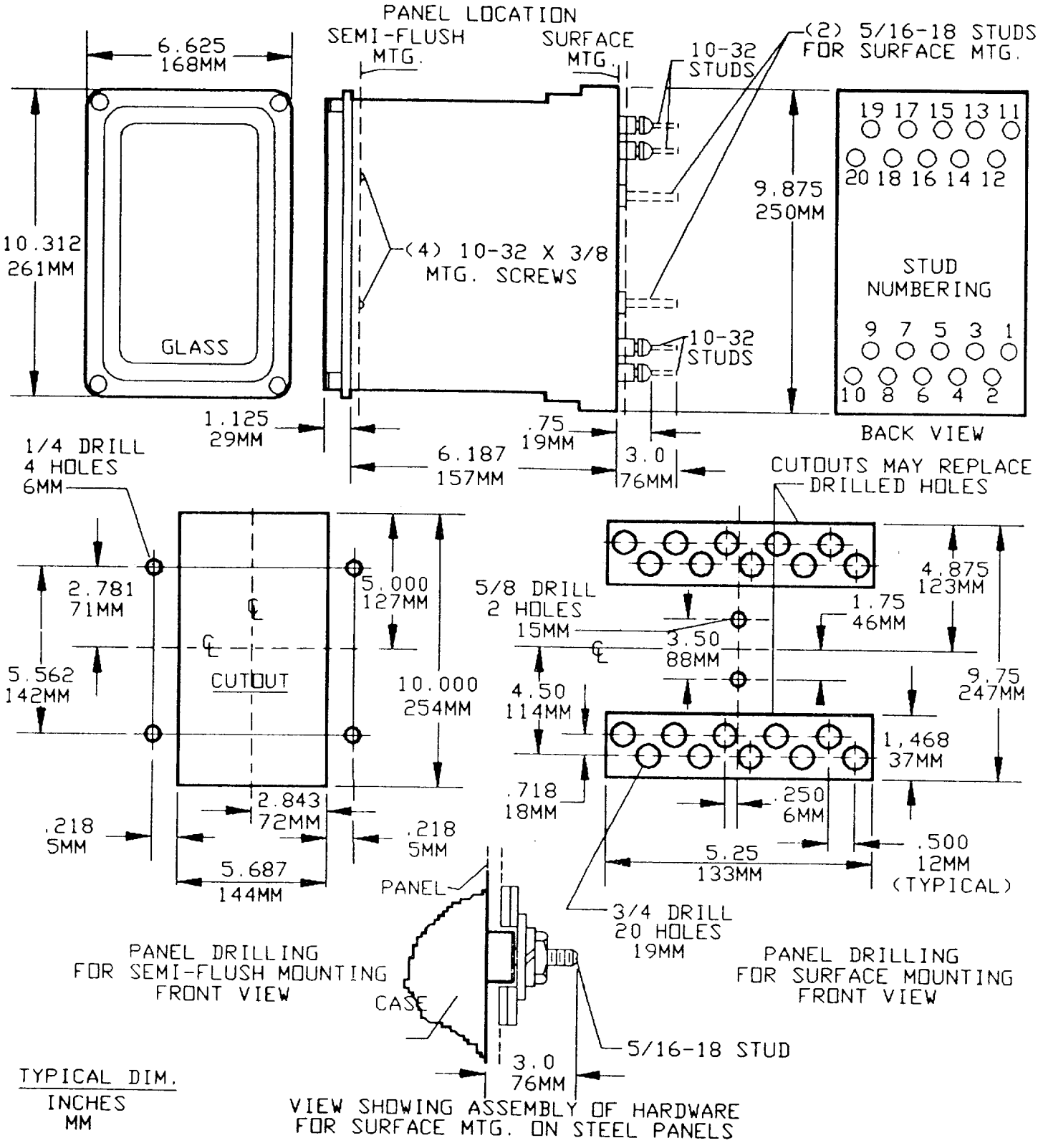

Figure 12 (K-6209272-7) Outline and Panel-Drilling Dimensions for Type IAV54 and IAV55 Relays