

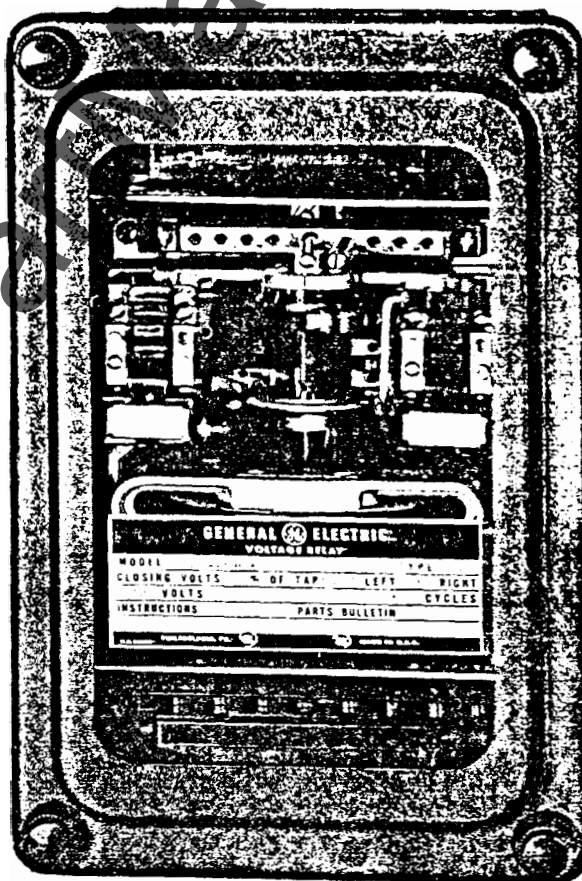


## INSTRUCTIONS

GEI-93824-B  
Supersedes GEI-93824-A

# VOLTAGE RELAY

TYPE  
IAV70A and IAV70B



GENERAL  ELECTRIC

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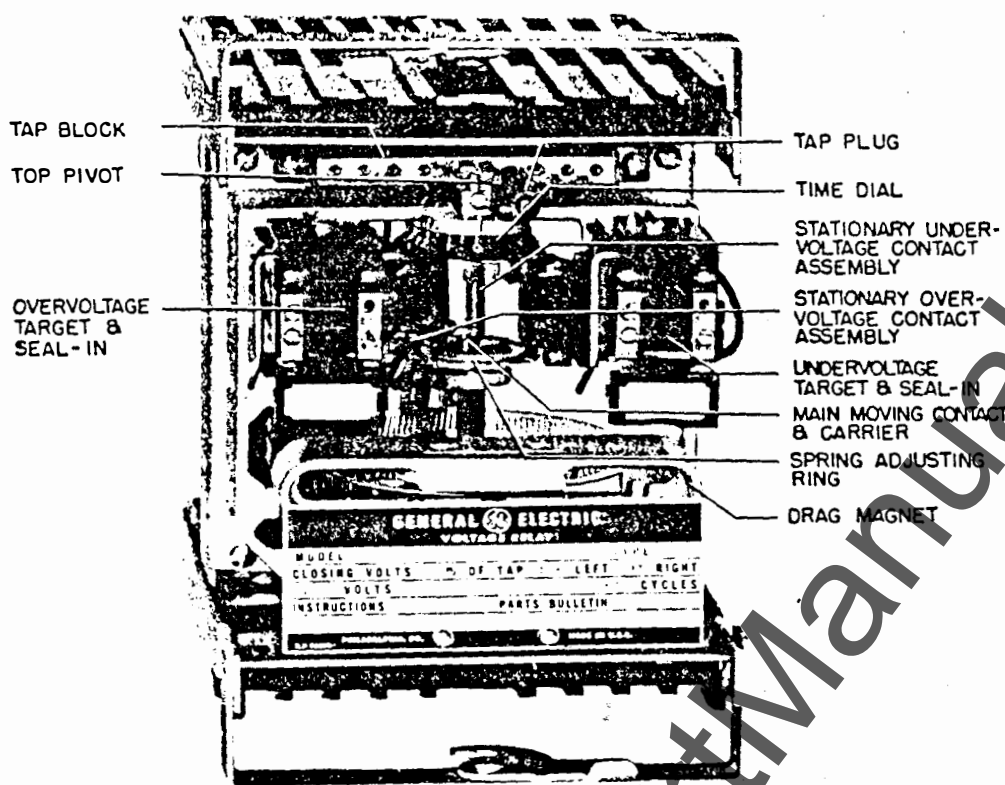


Fig. 1 (8031859) Front View of Relay Type IAV70 Withdrawn From Case.

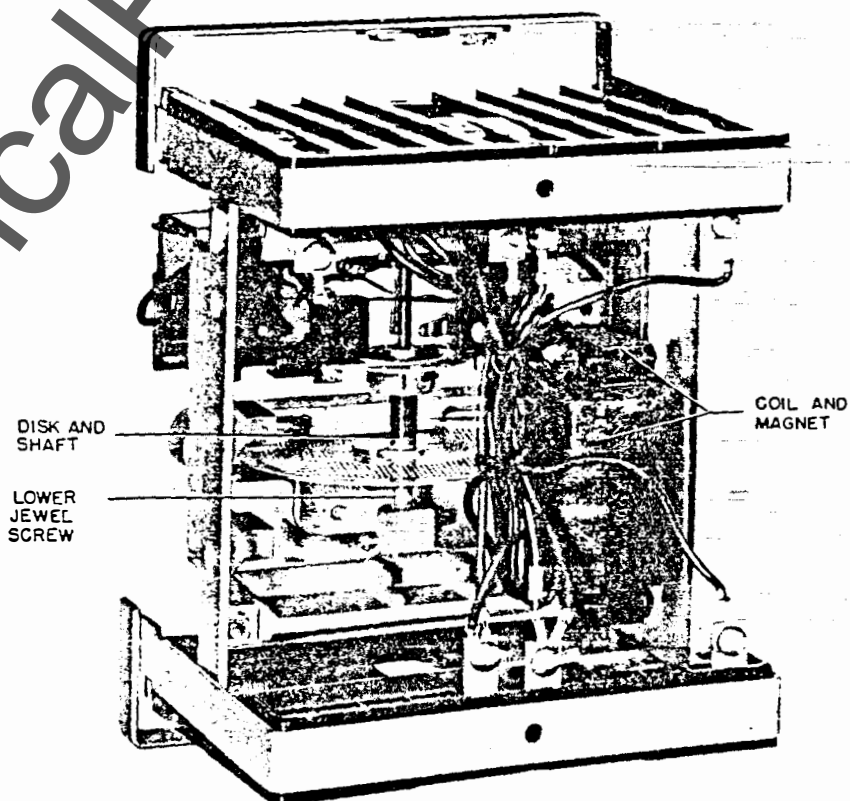


Fig. 1A (8031862) Back View of Relay Type IAV70 Withdrawn From Case.

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# VOLTAGE RELAY

## TYPE IAV70A & B

### DESCRIPTION

The IAV70 relay is a time delay undervoltage and overvoltage relay designed to be used wherever protection against an abnormal voltage condition is required. The relay consists of an induction disk operating element which closes its left hand contacts when the voltage increases to a predetermined value and its right hand contacts when the voltages decreased to 90% or more of that value. A time dial is provided to permit easy adjustment of the operating time. The IAV70A relay has two target and seal-in devices, as indicated in Fig. 2, while the IAV70B relay has none; otherwise these two models are identical. The IAV70 relay components are housed in an S2 double ended case with each contact connected between the upper and lower blocks while the operating coil is connected to both blocks. This permits the connection plugs to be removed or inserted with the operating coil always energized before the contacts are connected into their circuits. The normally open and normally closed contacts have a common point due to the use of a single control spring. The number of relays required to protect a circuit is determined by the application.

### APPLICATION

These relays are used for protection and/or control of a-c circuits in response to over and undervoltage conditions. A typical wiring diagram is shown in Fig. 7.

### RATING

The IAV70 relays covered by these instructions are available with 120 and 240 volt operating coils 50 or 60 cycles. The relay pickup can be adjusted to operate between 45 and 115 percent of rated voltage. The coil will stand rated voltage continuously on any tap and tap voltage on taps above rated voltage.

The current closing rating of the contacts is 30 amperes at 250 volts or below. The rating of the contacts is limited by the target and seal-in unit, where used, as indicated in Table A.

When not limited by the target and seal-in unit, the contacts of the IAV70 relay will continuously carry and interrupt 0.3 non-inductive amps at 125 volts DC and 0.15 non-inductive amperes at 250 volts DC.

TABLE "A"  
TARGET AND SEAL-IN UNIT

	2 AMP TAP	0.2 AMP TAP
DC Resistance	0.13 Ohms	7 Ohms
Minimum Operating	2.0 Amps	0.2 Amps
Carry Continuously	3.0 Amps	0.30 Amps
Carry 30 Amps For	4 Secs	-----
Carry 10 Amps For	30 Secs	0.2 Secs

### CHARACTERISTICS

#### Operating Principles

The induction disk operating unit consists of an aluminum disk which rotates between the pole faces of an electromagnet usually called a U-magnet. The operating coil produces the U-magnet's flux which tends to rotate the disk with a force proportional to the connected voltage. The disk is restrained by a spiral spring whose setting determines the relay pick up. The disk's motion is restrained by a permanent magnet drag magnet whose restraint is proportional to the disk speed. The disk is fastened to a shaft to which the contacts are connected. The time delay is adjusted by changing the distance the disk must travel to close its contacts and the time-voltage relay characteristics are shown in Fig. 4. Adjustment of the time delay is made by rotating the time dial upon which the normally closed undervoltage stationary contact is mounted. The overvoltage contact is calibrated to close at tap value. The normally closed undervoltage contact has been adjusted to close at 90% of tap voltage or more. When operating coil voltage is between pickup and dropout values both contacts are open.

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.

To the extent required the products described herein meet applicable ANSI, IEEE and NEMA standards; but no such assurance is given with respect to local codes and ordinances because they vary greatly.

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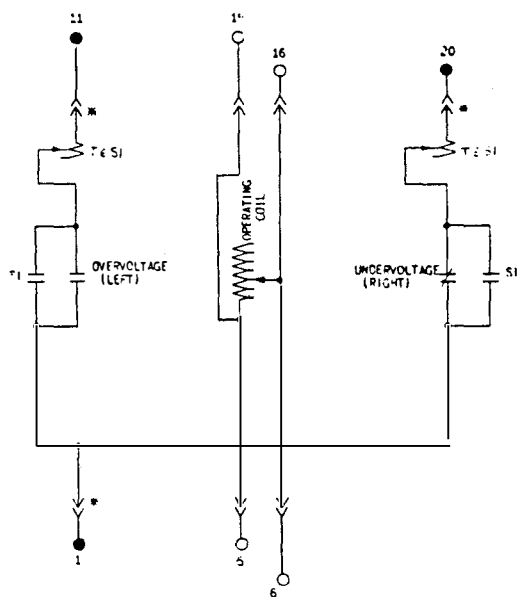


Fig. 2 (0165A7570-1) Internal Connections Of Relay Type IAV70A (Front View)

### Burden

The burden imposed on the potential transformer operating at rated voltage and frequency is given in Table B.

TABLE "B"

TAPS		60 HERTZ		50 HERTZ	
120V Relay	240V Relay	Watts	Volt Amp	Watts	Volt Amp
55	110	6.2	18.5	5.6	16.2
64	128	4.4	13.3	3.8	11.0
70	140	3.5	10.9	3.0	9.0
82	164	2.5	7.7	2.0	6.5
93	186	1.9	6.0	1.6	5.1
105	210	1.4	4.7	1.2	3.9
120	240	1.0	3.6	0.9	3.0
140	280	0.8	2.6	0.6	2.2

### CONSTRUCTION

The components of the IAV70 relay are mounted in a S2 case whose outline and drilling plan is shown in Fig. 8.

The relay components are mounted in a cradle assembly which is latched into a drawout case when the relay is in operation but it can be easily removed when desired. To do this, the relay is first connected by removing the connection plug which completes the electrical connections between the case block and the cradle block. To test the relay in its case this connection block can be replaced

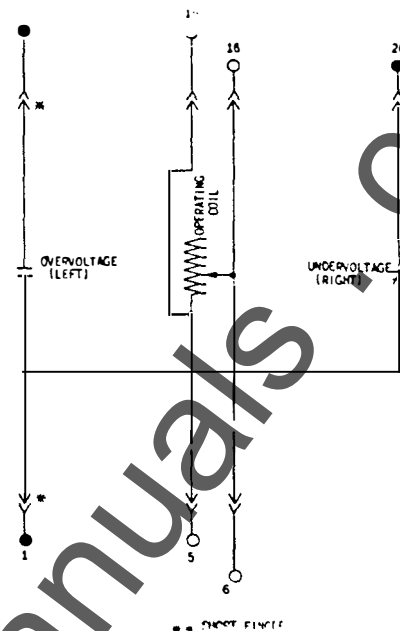


Fig. 3 (0165A7559-1) Internal Connections Of Relay Type IAV70B (Front View)

by a test plug. The cover, which is attached to the front of the relay case, contains the target reset mechanism and an interlock arm which prevents the cover from being replaced until the connection plugs have been inserted.

The relay case is suitable for either semi-flush or surface mounting on all panels up to 2 inches thick and appropriate hardware is available. However, panel thickness must be indicated on the relay order to insure that proper hardware will be included.

Every circuit in the drawout case has an auxiliary brush as shown in Fig. 5 to provide adequate overlap when the connecting plug is withdrawn or inserted. It is important that the auxiliary brush makes contact as indicated in Fig. 5 with adequate pressure.

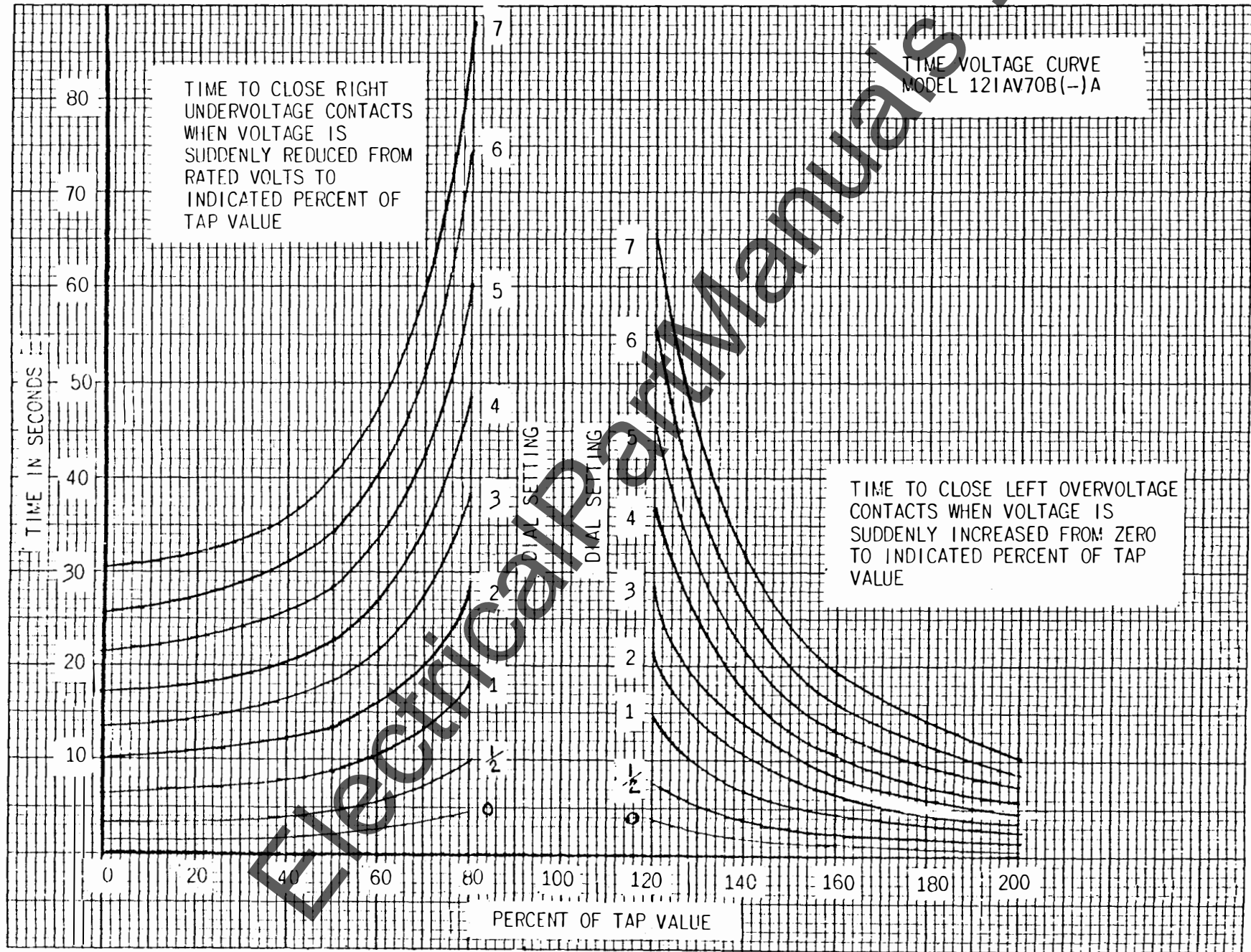
### RECEIVING, HANDLING AND STORAGE

These relays, when not included as 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. 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.

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\* Fig. 4 (0165A7571-1) Time-Voltage Curves For Relay Type IAV70

\* Indicates revision

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## INSTALLATION PROCEDURE

If after the acceptance tests the relay is held in storage before shipment to the job site, it is recommended that the visual and mechanical inspection described under the section on ACCEPTANCE TESTS be repeated before installation.

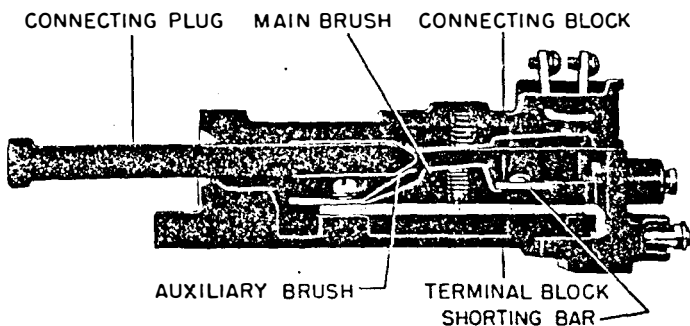
## Electrical Tests

The relay should be mounted in its final location if possible and should be allowed to warm up for 15 minutes with rated voltage connected to the operating coil.

Connect the relay as shown in Fig. 6 and set the relay to pick up at the desired voltage. Check that the pickup and dropout times agree approximately with times given in Fig. 4 for the setting used. Relay pickup settings between tap voltages can be made by control spring adjustment if desired by moving the spring adjusting ring. Check that the relay operates with one test plug removed.

When testing an IAV70A relay, connect a DC source of power as shown in Fig. 6 and check that the target seal-in units operate at or below the tap rating used.

If adjustments are necessary, check the section on SERVICING.



NOTE: AFTER ENGAGING AUXILIARY BRUSH, CONNECTING PLUG TRAVELS 1/4 INCH BEFORE ENGAGING THE MAIN BRUSH ON THE TERMINAL BLOCK

Fig. 5 (8025039) Cross Section Of Drawout Case Showing Position Of Auxiliary Brush And Shorting Bar

## ACCEPTANCE TEST

Immediately upon receipt of the relay, an inspection and acceptance test should be made to insure that no damage has been sustained in shipment and that the relay calibrations have not been disturbed.

## Visual Inspection

Check the nameplate stamping to insure that the model number, rating and calibration range of the relay received agree with the requisition.

Remove the relay from its case and check by visual inspection that there are no broken or cracked molded parts or other signs of physical damage, and that all screws are tight. The drag magnet should be fastened securely in position on its mounting shelf. There must not be any metallic particles or other foreign matter in the air gap of either the drive magnet or the drag magnet.

## Mechanical Tests

1. Manually operate the relay and check that both contacts have approximately 1/32 inch wipe.
2. Rotate the time dial to the No. 7 setting and check that the disk rotates without binding or touching the drag magnet or U-magnet.
3. Operate the target seal-in units and check that they operate without binding.

## Electrical Tests

Connect a variable source of power at rated frequency to studs 5 and 6 or 15 and 16, and check that the relay picks up at tap value  $\pm 5\%$  on at least two taps.

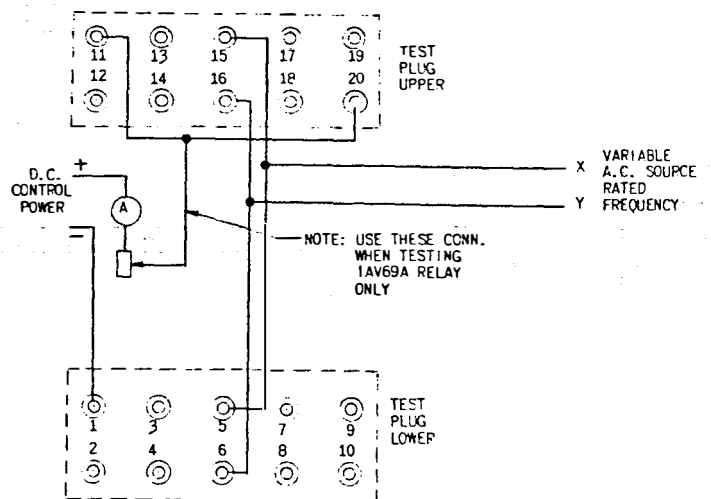


Fig. 6 (0165A6714-0) Field Test Connections For Relay Type IAV70

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Fig. 7 (U165A/639-2) Typical External Connections  
For Relay Type IAV70

### PERIODIC CHECKS AND ROUTINE MAINTENANCE

In view of the vital role of protective relays in the operation of a power system it is important that a periodic test program be followed. It is recognized that the interval between periodic checks will vary upon environment, type of relay, and the user's experience with periodic testing. Until the user has accumulated enough experience to select the test interval best suited to his individual requirements it is suggested that the following points be checked at an interval of from one to two years.

1. Repeat the visual and mechanical inspection described under section on **ACCEPTANCE TESTS**.
2. Repeat the electrical tests described under the section on **INSTALLATION PROCEDURE**.
3. Check that the contacts are untarnished and in good condition.

### SERVICING

If it is found that the relay calibrations are out of adjustment then proceed as follows:-

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1. Repeat the visual and mechanical inspection described under section on ACCEPTANCE TESTS.
2. Repeat the electrical tests described under the section on INSTALLATION PROCEDURE.
3. Check that the contacts are untarnished and in good condition.

## SERVICING

If it is found that the relay calibrations are out of adjustment then proceed as follows:-

1. Set the tap plug in the 93 volt tap for the 120 volt relay or 186 volt tap for the 240 volt relay. Set the time dial at zero and check that the relay picks up at tap voltage  $\pm 5$  percent. Rotate the control spring adjuster until correct pick up is obtained.
2. The relay operating time can be adjusted by moving the drag magnet on its mounting shelf in towards the back of the case to decrease the time and out to increase it. The outer edge of the drag magnet must always be at least  $1/8$ " from the edge of the disk. If relay time is out of adjustment by a considerable amount, check for friction causes such as particles in the air gaps or cracked jewel bearings.
3. To change target seal-in tap settings, proceed as follows:-

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 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.

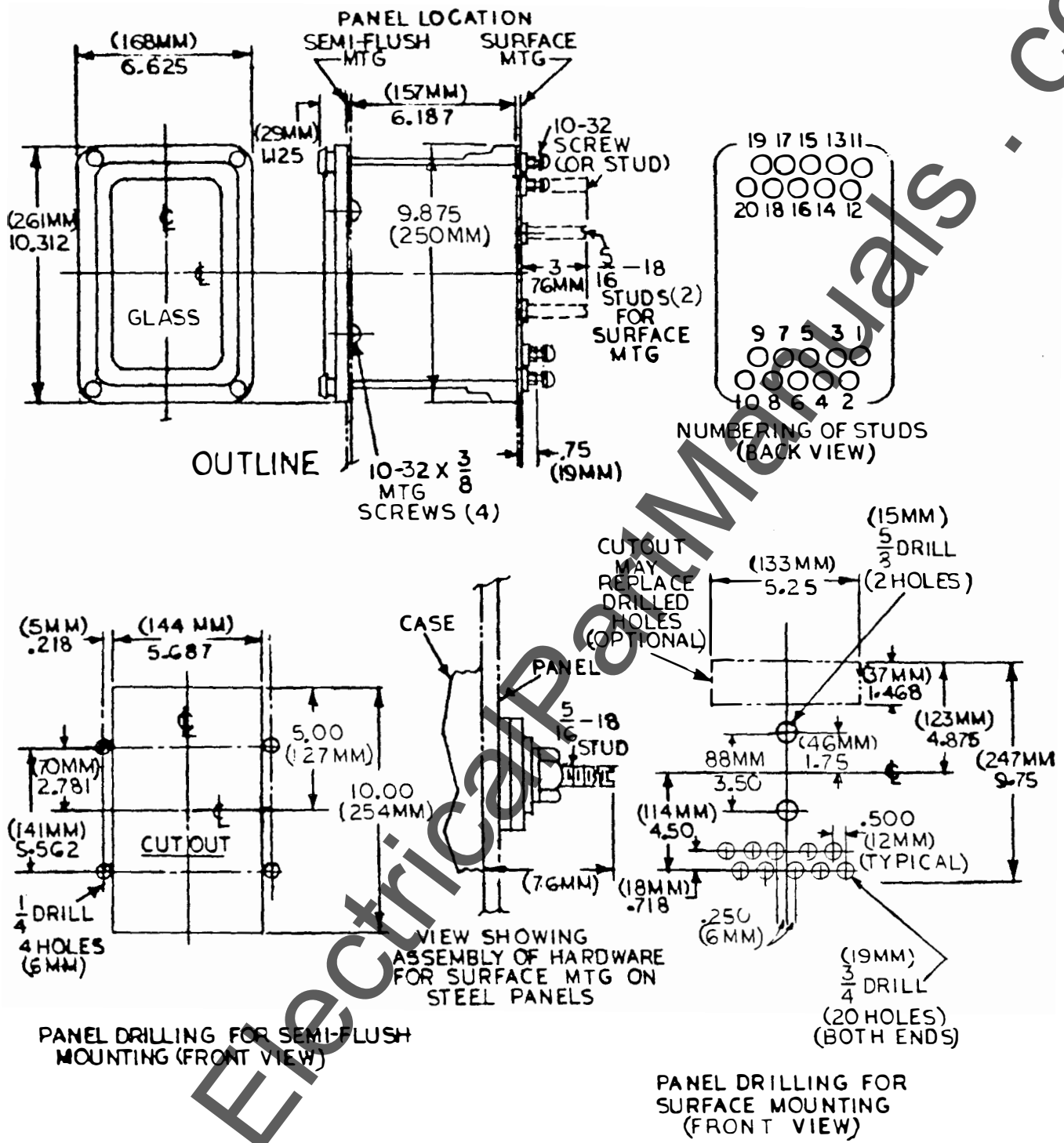
4. For cleaning fine silver contacts a flexible burnishing tool should be used. This consists of an etched roughened strip of flexible metal resembling a superfine file which removes corroded material quickly without scratching the surface. The flexibility of the tool insures the cleaning of the actual points of contact. Never use knives, files, abrasive paper or cloth to clean fine silver contacts. A burnishing tool as 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, specify quantity required, name of the part wanted, and give complete nameplate data. If possible, give the General Electric requisition number on which the relay was furnished.

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\*Fig. 8 (K-6209272-5) Outline and Drilling Dimensions for Relay Type IAV70

\* Indicates revision

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