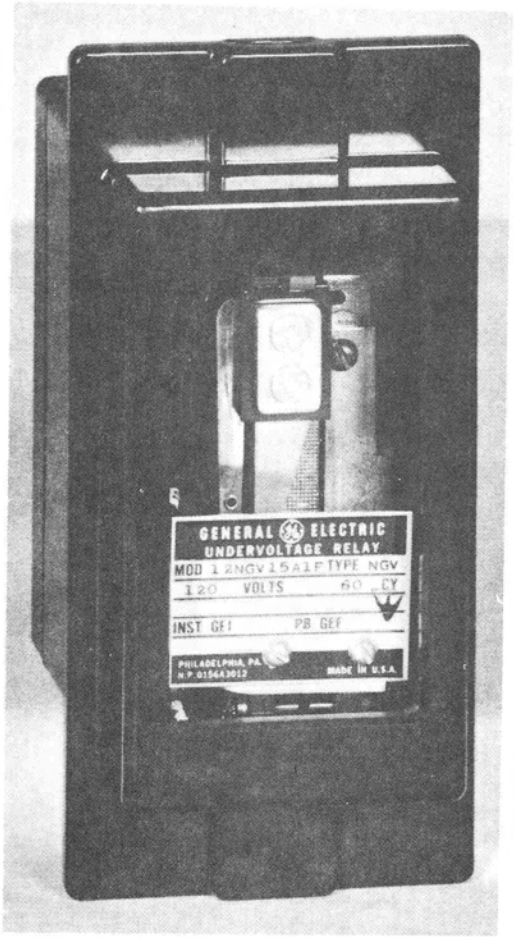
INSTRUCTIONS

GEI-90806A

UNDERVOLTAGE RELAY

NGV15A

NGV15B



GENERAL ELECTRIC

UNDERVOLTAGE RELAYS

TYPE NGV15A, NGV15B

DESCRIPTION

The Type NGA15 relays are high speed AC undervoltage relays. The relays are designed to be continuously operated in the picked-up position. They are calibrated on dropout voltage so as to accurately detect an undervoltage condition. The relays each have a single undervoltage element mounted in a small molded case. The NGV15A is a back-connected relay suitable for surface or semi-flush mounting as shown in Figures 5A and 5B respectively. The NGV15B is a front-connected relay relay suitable for surface mounting only as shown in Figure 6. The undervoltage element consists of a telephone type relay in series with a zener diode voltage regulator connected across a full wave diode bridge rectifier. The relay internal connections are shown in Figure 3 for the NGV15A and in Figure 3F for the NGV15B. Two transfer contact outputs are provided for each relay but no target is provided. Either one, two or three relays may be required depending upon the specific application.

APPLICATION

The NGV15 relays are intended for general applications wherever instantaneous undervoltage detection is required. Some specific applications are described as follows:

a. Instantaneous single-phase undervoltage detection for preferred emergency throwover control equipment; requires one relay usually connected to one of the phase-to-phase voltages.

b. Ground fault detection for faulted phase selection on ungrounded system; requires three relays connected to the three line-to-neutral voltages.

c. Phase fault detection for stopping all blocking carrier at a line terminal with weak backfeed; required three relays connected to the three line-to-line voltages.

RATINGS

The NGV15A (back connected) available atings are given in Table I.

TABLE I

Continuous Volts	Frequency Hz
69	50, 60
120	50, 60, 420
208	50, 60
240	50, 60
480	50, 60

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.

The NGV15B (front connected) available ratings are given in Table II.

TABLE II

Continuous Volts	Frequency Hz
69	60
120	50, 60
208	60
240	60

CONTACT RATING

The contacts will make and carry 30 amperes for tripping duty and carry three amperes continuously. The interrupting capabilities for each contact for repetitive protective duty is given in Table III.

TABLE III

Volts	Contact Interrupting Capability (Amps) Inductive*
48 DC	1.0
125 DC	0.5
250 DC	0.25
115 60 Hz	0.75
230 60 Hz	0.5
480 60 Hz	0.2

*The non-inductive interrupting ratings for repetitive protective duty are approximately 2-1/2 times ratings shown in Table III.

CHARACTERISTICS

The NGV voltage unit is a hinged armature unit which drops out when the magnetic pull created by the ampere turns in the operating coil is less than the force of the opening spring. The dropout voltage can be changed by adjusting the rheostat. This dropout voltage range is given in Table IV.

TABLE IV

Rated Volts	Range of Dropout Adjustment
69	40-58
120	70-100
208	121-173
240	140-200
480	280-400

On any dropout operation, there is a one percent of rated voltage decrease, from beginning to end due to the non-linearity of the zener diode.

PICKUP VOLTAGE

The pickup voltage is 110% or less of the dropout voltage.

TIME CHARACTERISTICS

The relay pickup time is approximately 2 cycles, 60 cycle basis. The dropout time characteristic (voltage versus time) is shown in Figure 2.

BURDENS

The burden of the voltage unit is at unity power factor and the values are given in Table V.

TABLE V

Volts	Maximum Burden Watts
69	4.0
120	4.2
208	4.75
240	4.5
480	4.7

CONSTRUCTION

The NGA15 is available in a moulded case, front or back connected. Figure 1 shows a NGV15A relay removed from case.

The telephone-type voltage unit, the fixed and variable resistors and the zener regulator are mounted on a compound base. The cover is attached to the front of this base.

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

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.

ACCEPTANCE TESTS

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. If the examination or test indicates that readjustment is necessary, refer to the section on SERVICING.

VISUAL INSPECTION

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

Remove the relay from its case and check that there are no broken or cracked molded parts or other signs of physical damage, and that all screws are tight.

MECHANICAL CHECK

Before installation, the relay should be checked mechanically to see that it operates smoothly and that the contacts are correctly adjusted.

With the relay deenergized each normally open contact should have a gap of .010" - .015". Observe the wipe on each normally closed contact by deflecting the stationary contact member towards the frame. Wipe should be approximately .005".

The wipe on each normally open contact should be approximately .005". This can be checked by inserting a .005" shim between the residual screw and the pole piece and operating the armature by hand. The normally open contacts should make before the residual screw strikes the shim.

ELECTRICAL TESTS

POWER REQUIREMENTS GENERAL

All alternating current operated devices are affected by frequency. Since non-sinusoidal waveforms can be analyzed as a fundamental frequency plus harmonics of the fundamental frequency, it follows that alternating current devices (relays) will be affected by the applied waveform.

Therefore, in order to properly test alternating current relays it is essentail to use a sine wave of current and/or voltage. The purity of the sine wave (i.e. its freedom from harmonics) cannot be expressed as a finite number for any particular relay, however, any relay using tuned circuits, R-L or RC networks, or saturating electromagnets (such as time overcurrent relays) would be essentailly affected by non-sinusoidal wave forms.

Similarly, relays requireing dc control power should be tested using dc and not full wave rectified power. Unless the rectified supply is well filtered, many relays will not operate properly due to the dips in the rectified power. Zener diodes, for example, can turn off during these dips. As a general rule the dc source should not contain more than 5% ripple.

The relay should be tested before installation and periodically thereafter by connecting a variable source of voltage at rated frequency to the coil studs and checking the pickup and dropout voltages. The relay should be adjusted by means of the variable rheostat and if necessary the residual screw to the values required at its final location. Adjustment of the ratio of pickup to dropout voltage is made if necessary by means of the residual screw; in most applications no adjustment of this ratio is required.

INSTALLATION PROCEDURE

LOCATION AND MOUNTING

The location should be clean and dry, free from dust and excessive vibration, and well lighted to facilitate inspection and testing.

The relay should be mounted on a vertical surface. The Outline and Panel Drilling dimensions are shown in Figures 5 and 6.

CONNECTIONS

The Internal Connections Diagram is shown in Figure 3.

ELECTRICAL TESTS

After the relay is properly mounted repeat the Acceptance Tests.

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 depending 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 points listed under INSTALLATION PROCEDURE be checked at an interval of from one to two years.

CONTACT CLEANING

For cleaning relay 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 it will clean off any corrosion thoroughly and rapidly. Its flexibility insures the cleaning of the actual points of contact. Do not use knives, files, abrasive paper or cloth of any kind to clean relay contacts.

SERVICING

If it is found during installation or periodic testing that the telephone relay is out of limits, the unit may be recalibrated as follows:

INSPECTION

Inspect the condition and finish of all parts; have wired, cracked down and broken parts replaced.

MECHANICAL

The telephone relays should be checked for contact gap, wipe and residual screw projection before any electrical adjustments are made. In the unexcited position, all normally open contacts should have a gap of 0.015" minimum. All normally closed contacts should make good contact at full wipe of 0.005". The armature should be operated by hand and the contacts checked again. Circuit closing contacts should make good contact at 0.005" wipe and circuit opening contacts should have 0.015" minimum gap. Check that the residual screw projection is 0.003" minimum.

WIRING

Make complete check of all wiring and resistance values referring to Internal Connections Diagram on Figure 3.

ELECTRICAL

VOLTAGE: To decrease the percentage of rated voltage at which the relay picks up, decrease the spacing of the armature from the pole face by bending the contact operating arm stop. After this adjustment it will be necessary to readjust the wipe of the "a" and "b" contact to 0.005" and the gaps to 0.015" minimum. Lessening "b" contact pressure also decreases percentage pickup. To increase the percentage of rated voltage at which the relay picks up reverse the above procedure.

PICKUP TIME: To decrease the pickup time reduce the pressure of the "b" contacts by bending the moving flexible contact arm. To increase pickup time reverse above procedure.

DROPOUT TIME: The dropout time may be adjusted by means of the residual screw in armature. The more the residual screw is turned in the shorter the dropout time. More pressure in the flexible contact arm also decreases drop out time. Note: Any change in the residual screw setting must be accompanied by readjustment for correct contact wipes. This can most easily be accomplished by bending the contact operating arm which extends from side of the armature.

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 the complete model number of the relay for which the part is required.

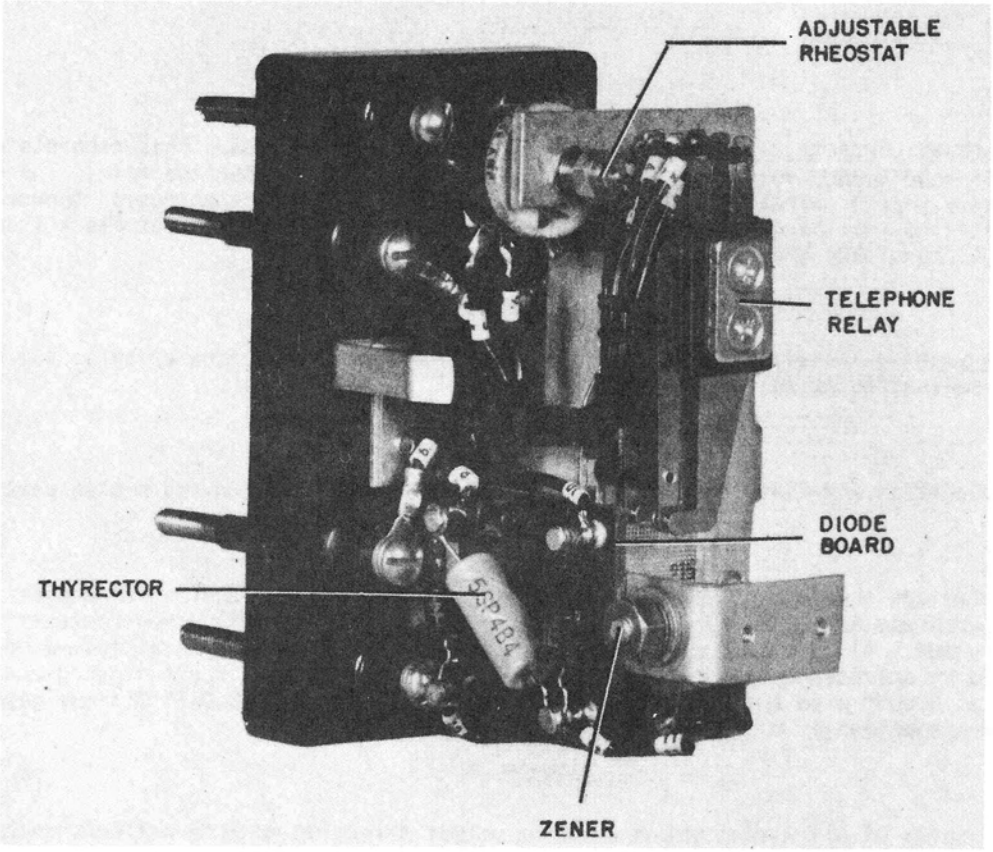


Fig. No. 1 (8031439) NGV15A Relay With Case Cover Removed.

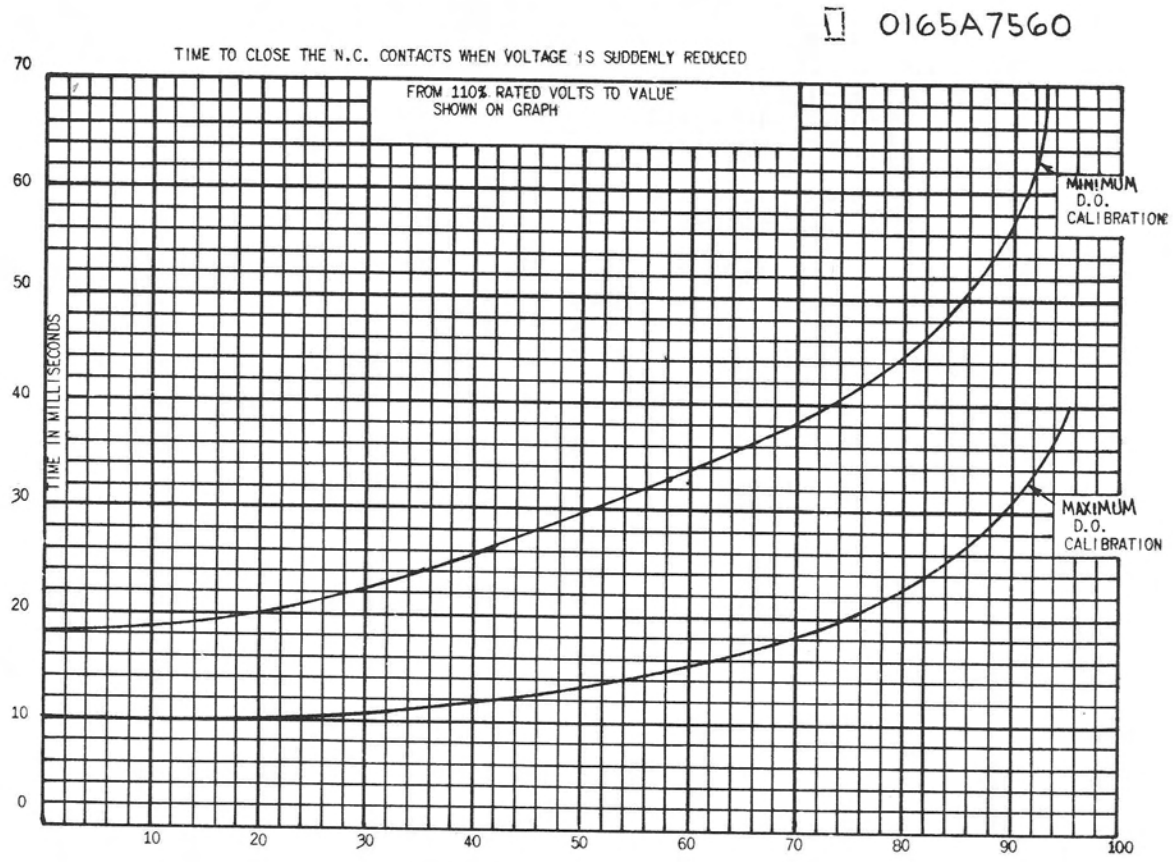
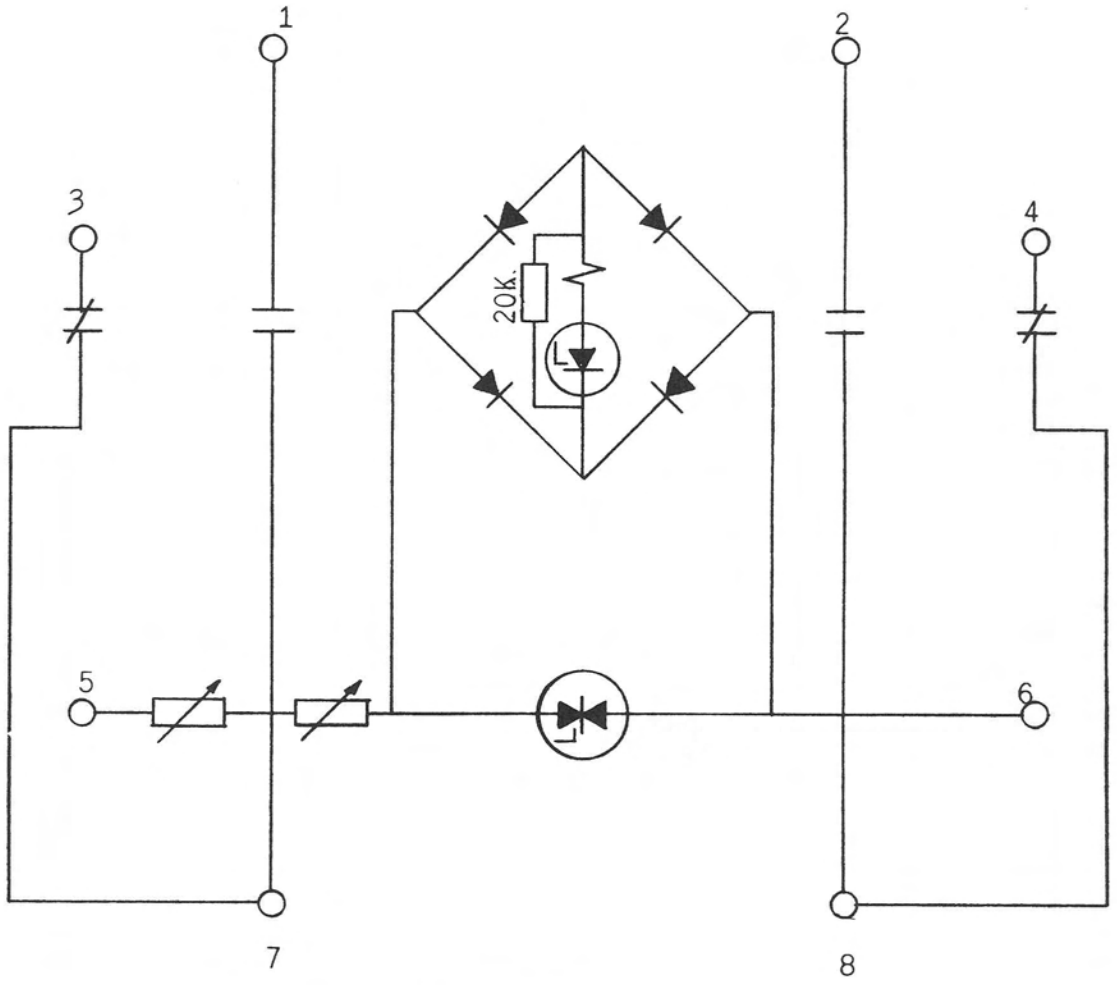


Fig. No.2 (0165A7560-001) Operating Time Curves for the NGV Relays



BACK VIEW

Fig. No.3A (0178A9050-000) Internal Connections Diagram for the NGV15A10A Relay

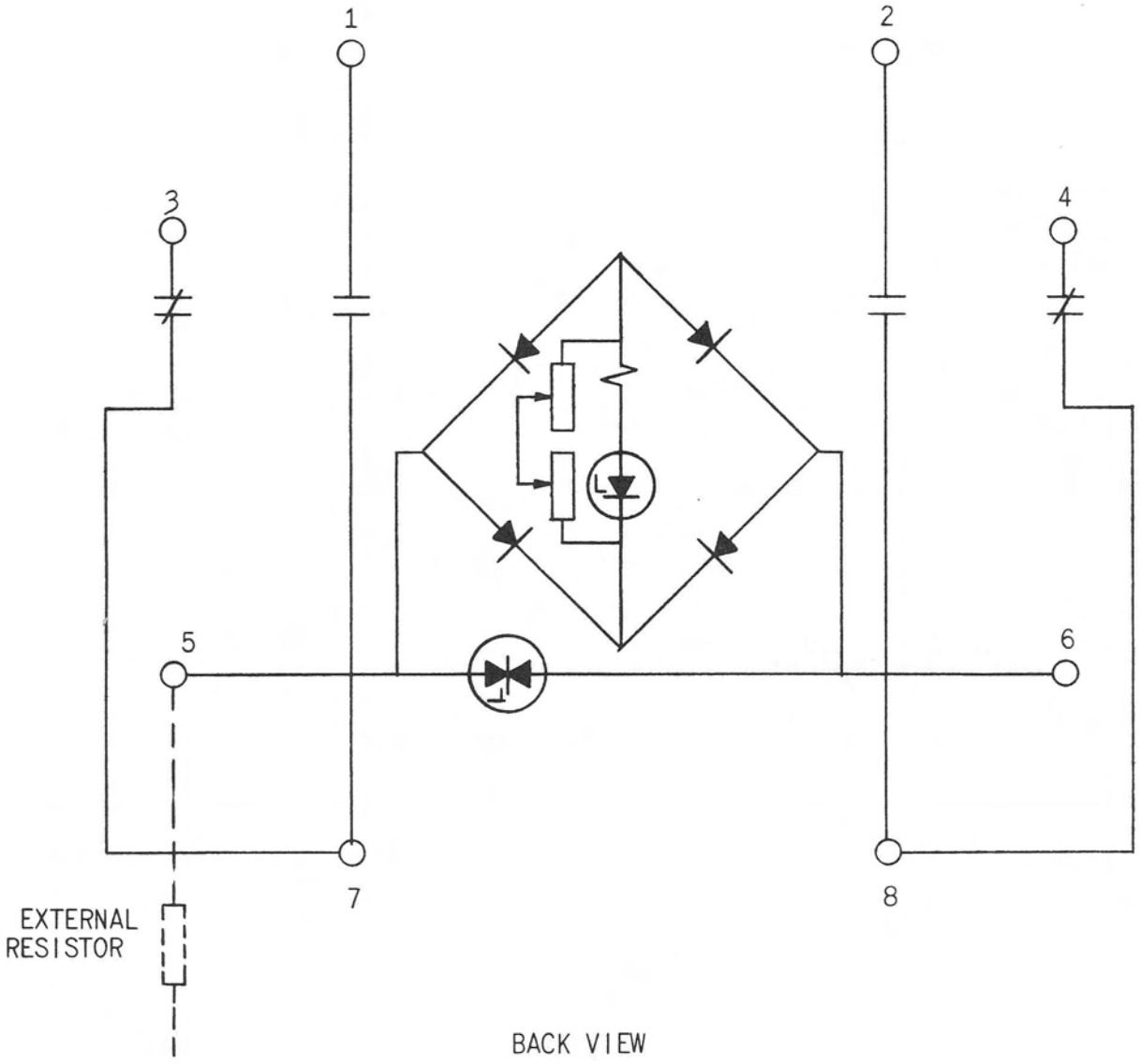
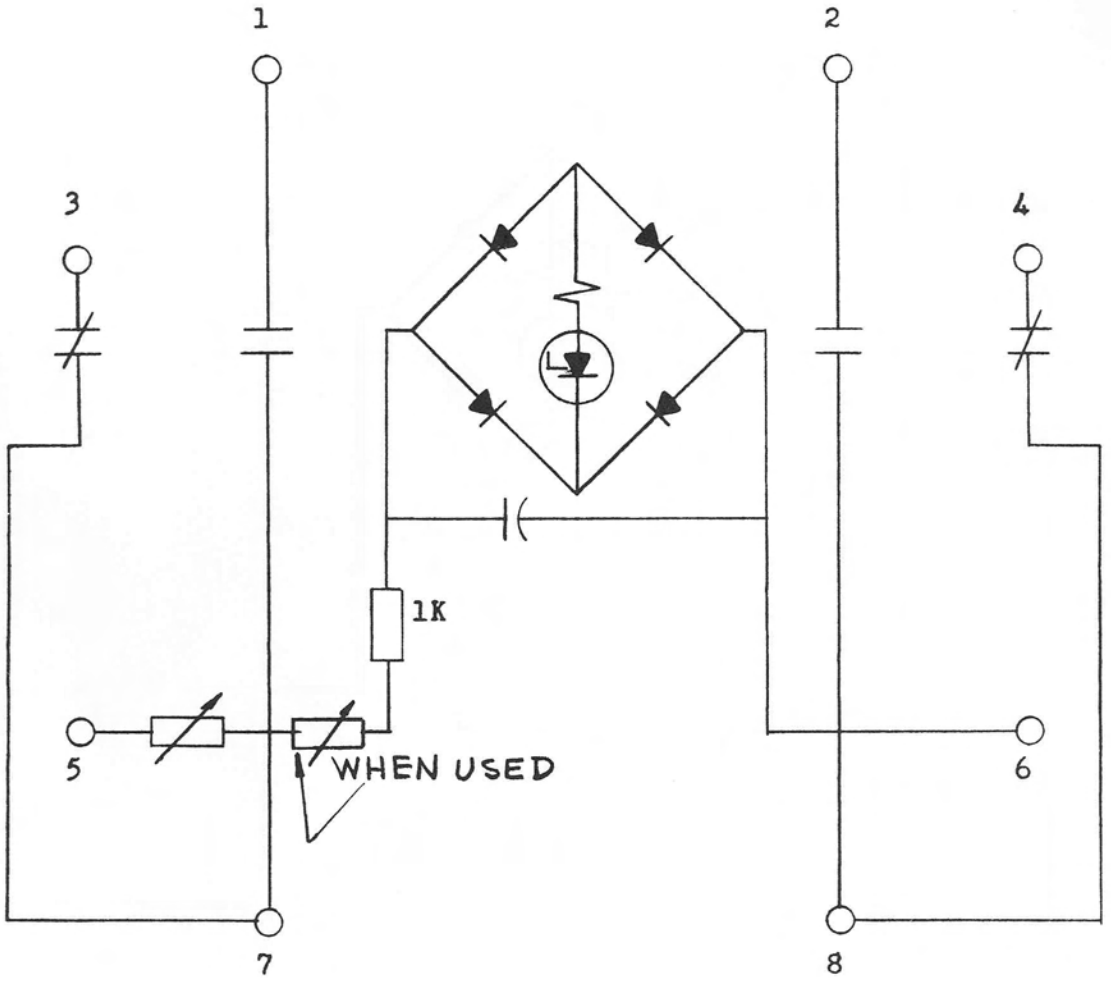
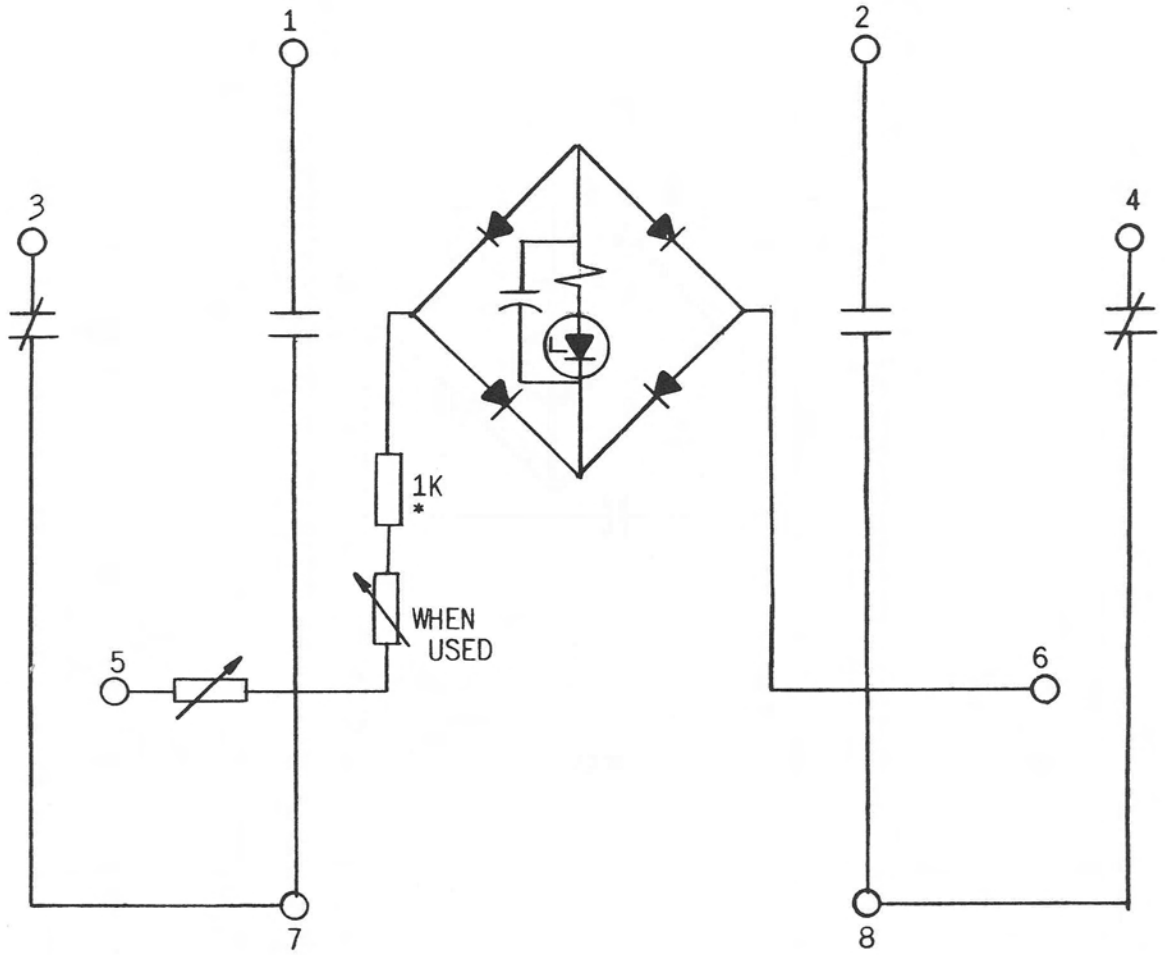


Fig. No.3B (0178A9051-000) Internal Connections Diagram for the NGV15(-)A Relay, Forms 11 & 12.



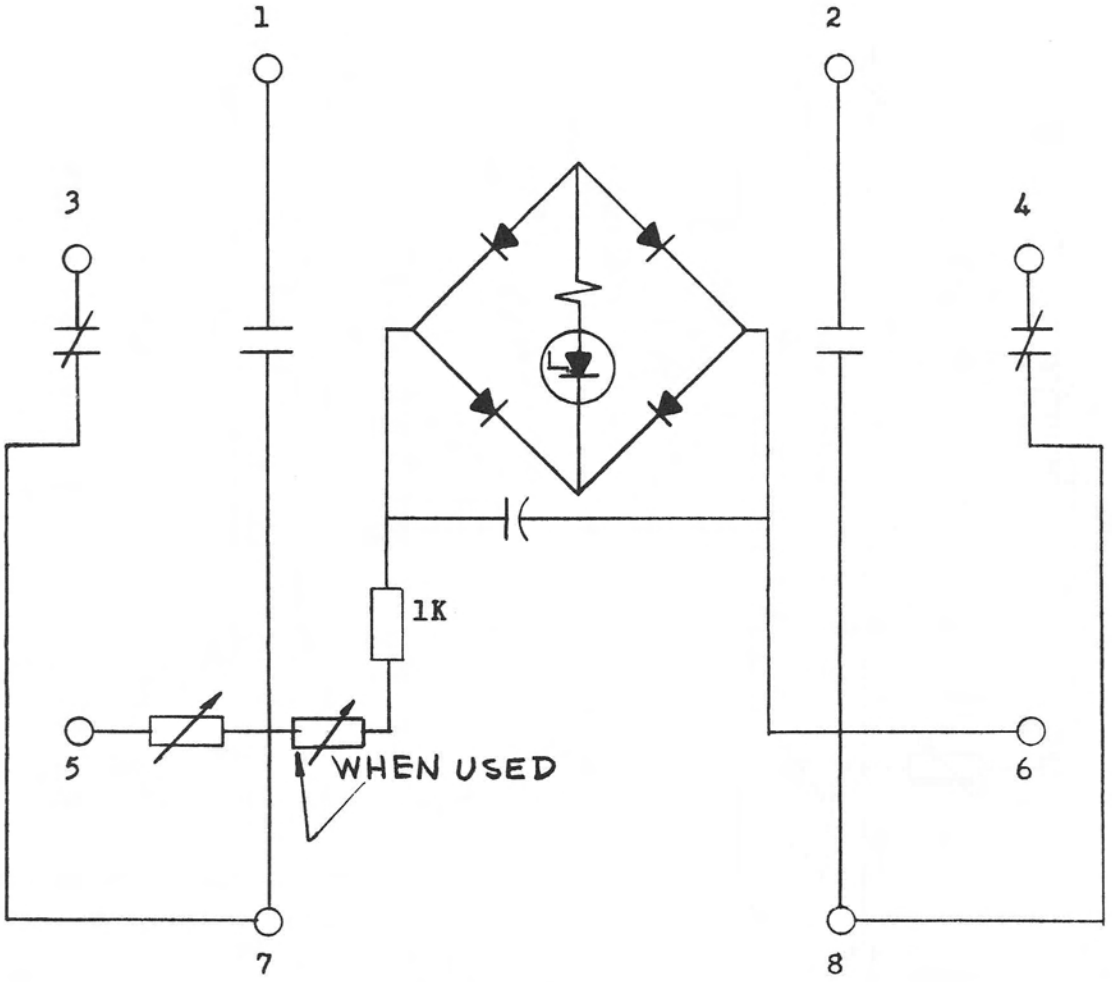
BACK VIEW

Fig. No3C (0195A4944-000) Internal Connections Diagram for the NGV15A(-)A Relay, Forms 21 thru 29.



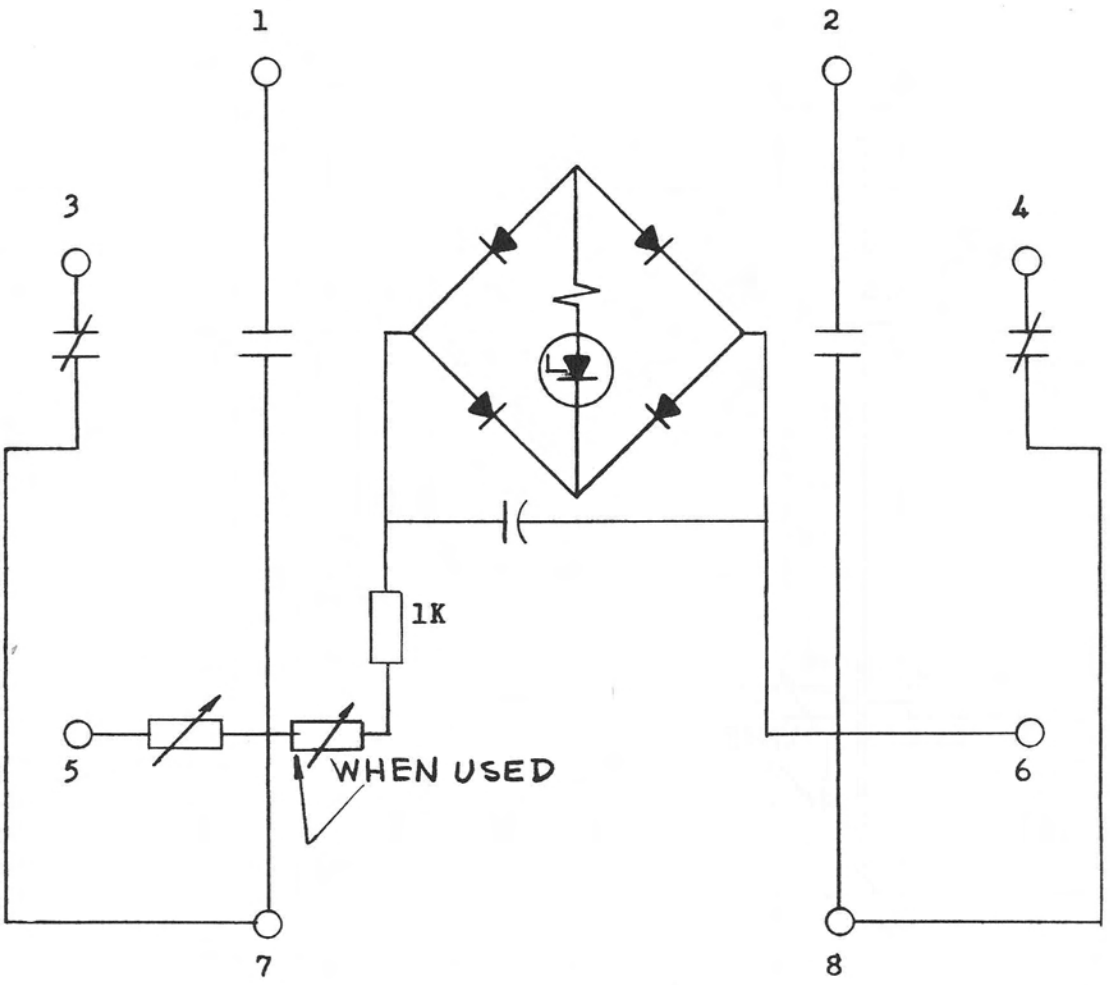
*500 OHMS ON 69 VOLT MODELS

Fig. No.3D (0203A8599-000) Internal Connections Diagram for the NGV15A(-)A Relay, Forms 30 & 31.



BACK VIEW

Fig.No.3E (0195A4944-000) Internal Connections Diagram for the NGV15A35A Relay.



BACK VIEW

Fig. No. 3F (0195A4944-000) Internal Connections Diagram for the NGV15B(-)A Relay.

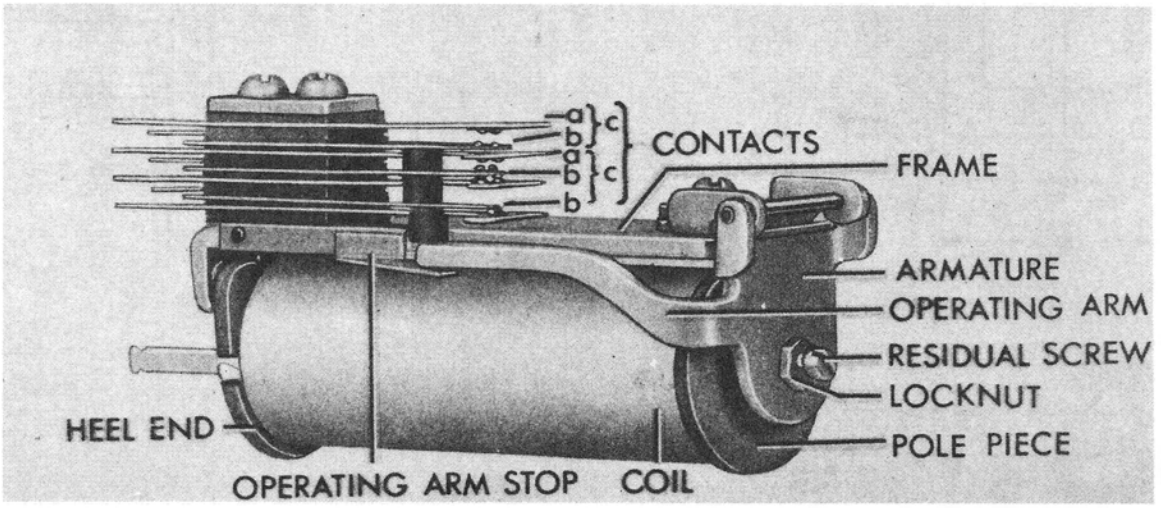
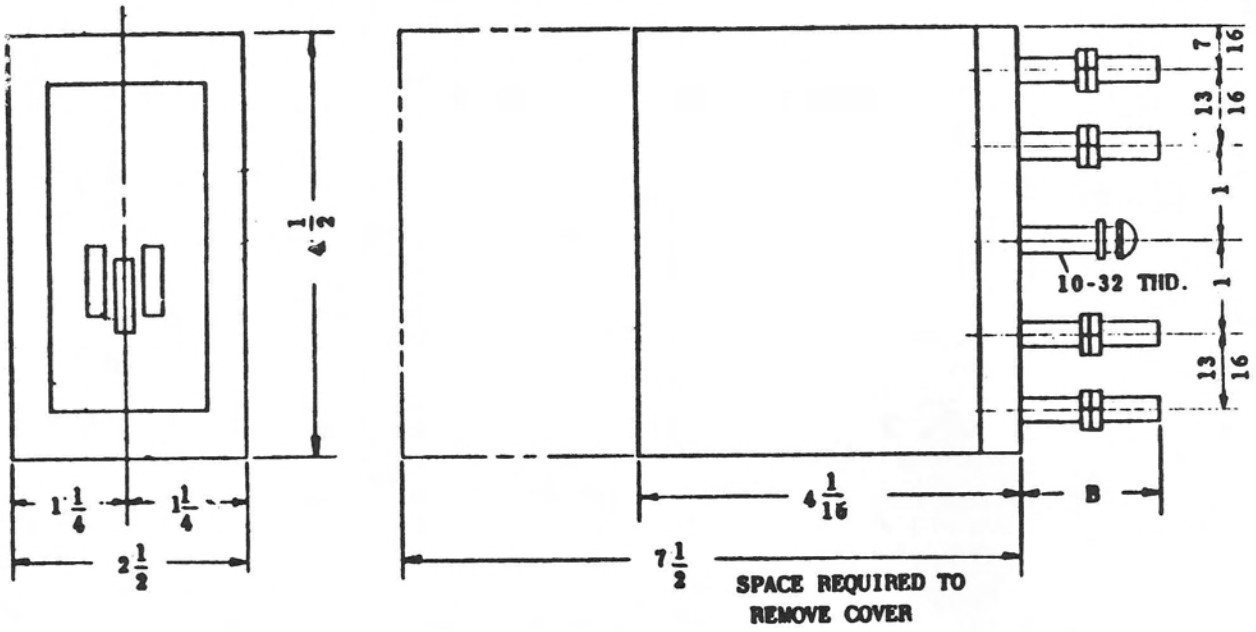
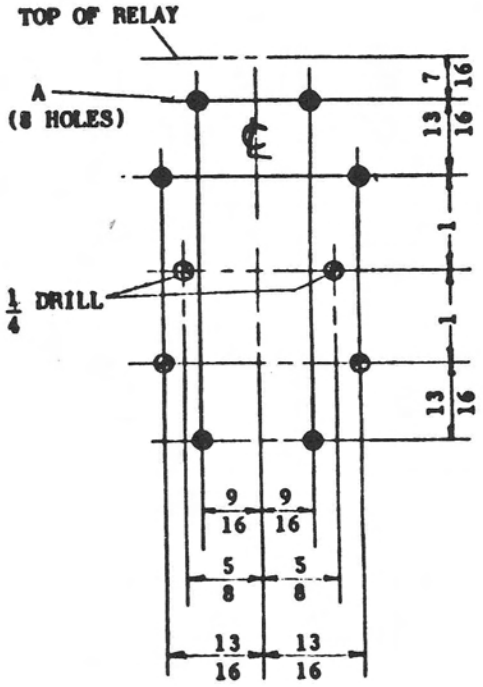


Fig. No.4 (8012106) Typical Telephone - Relay Unit Used in the NGV15A and 15B Relay.





TYPE OF PANEL	A	B
INSULATIN G	7/16	2 -13/16
STEEL	9/16	1- 3/8

PANEL DRILLING (FRONT VIEW)

Fig. No.5A (0148A3979-005) Outline & Panel Drilling Dimensions for the Surface Mounted NGV15A Relay

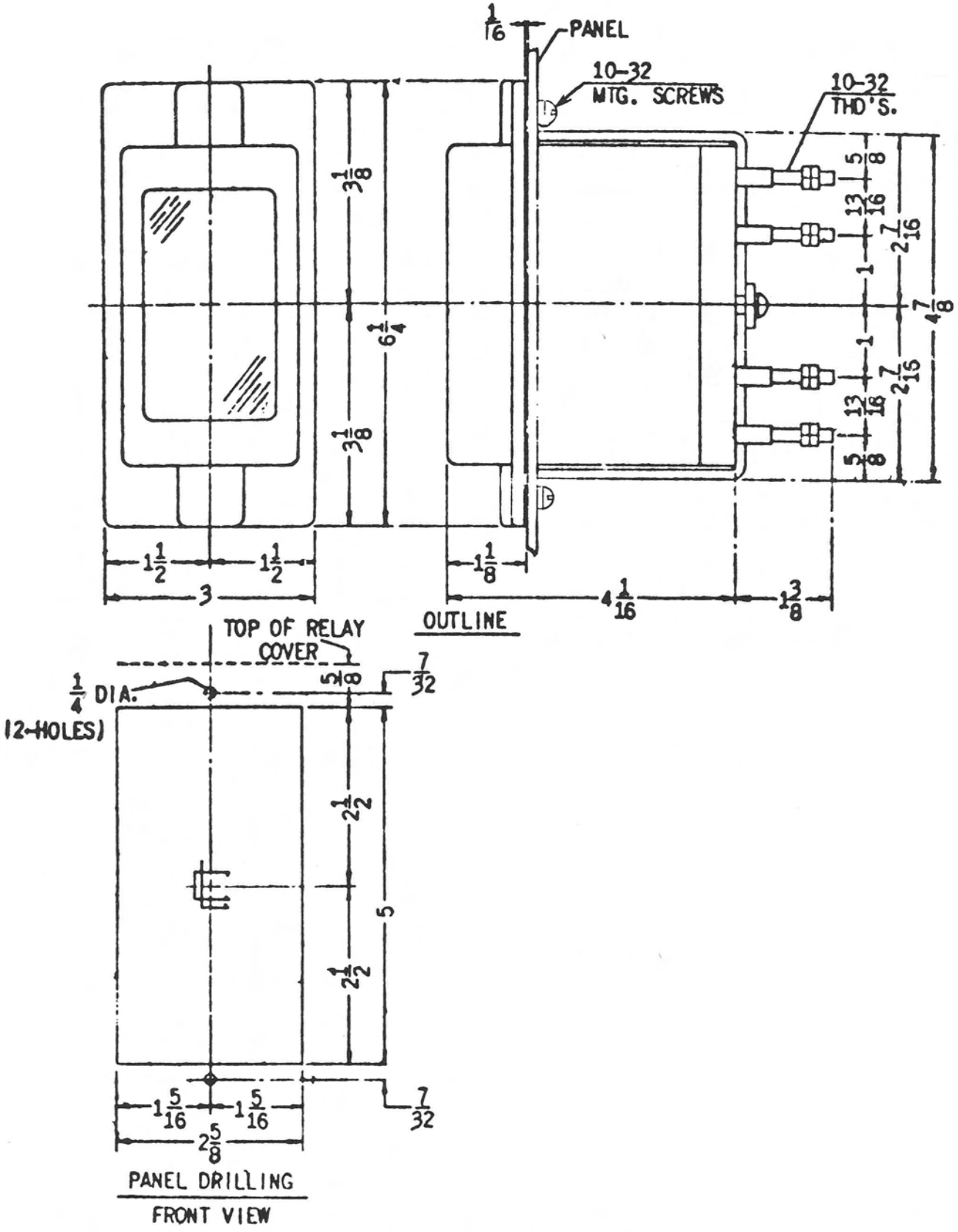


Fig. No. 5B (0149A3978-006) Outline & Panel Drilling Dimensions for the Semi-Flush Mounted NGV15A Relay.

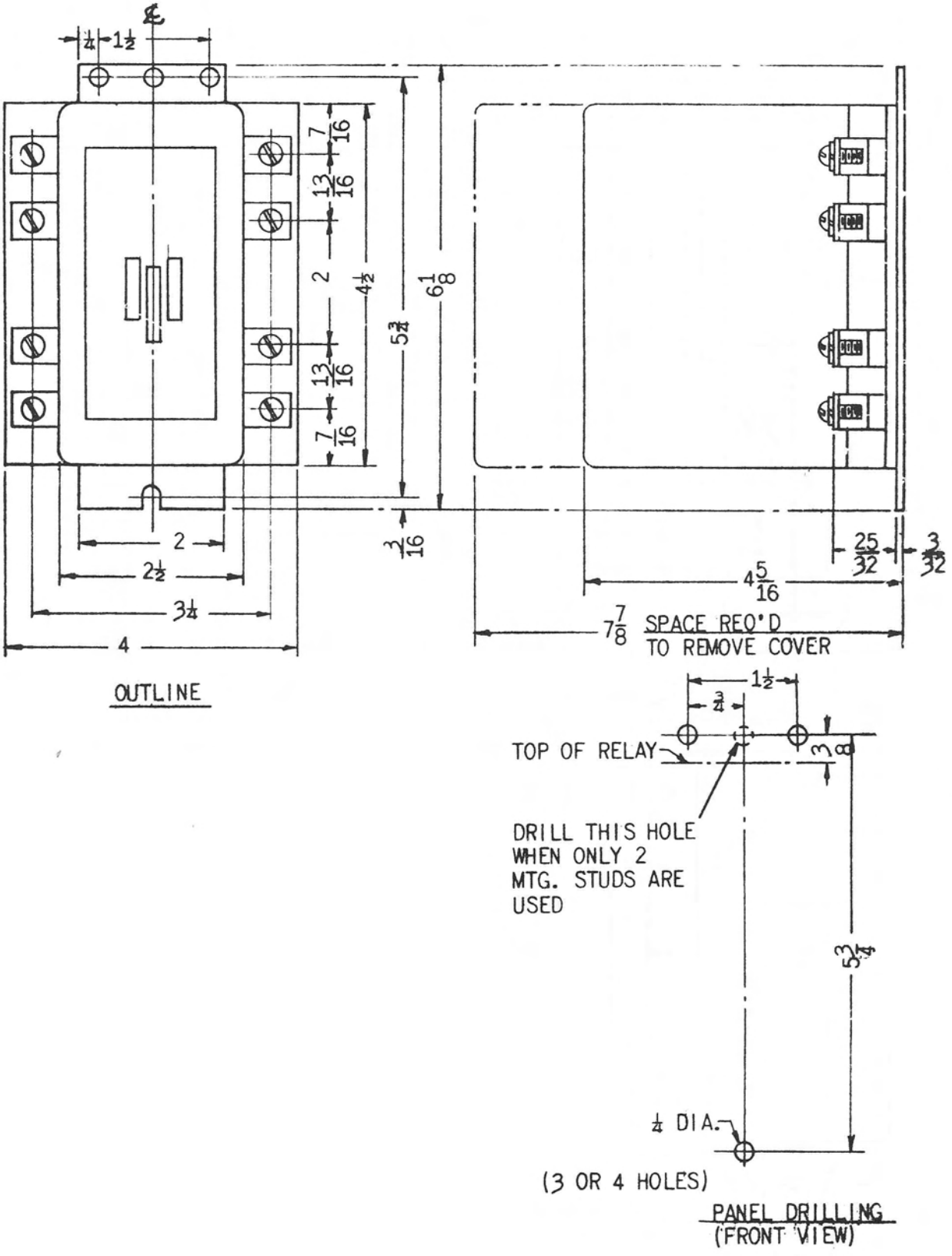


Fig. No.6 (0208A3642-000) Outline & Panel Drilling Dimensions for the Surface Mounted NGV15B Relay.

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