



**GE VERNOVA**

# **RELAYS**

## **D-C UNDERVOLTAGE RELAY**

### **TYPE NGV19A**

**GEI-98347E**

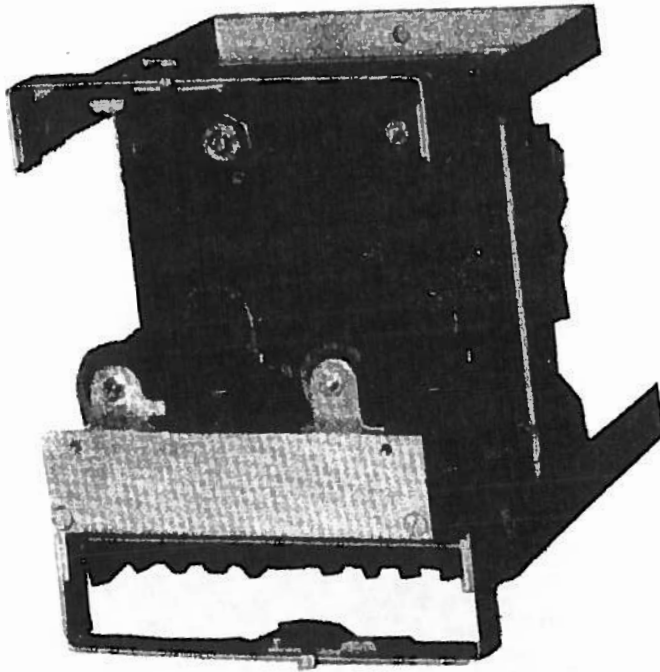


Fig. 1 (8035462) Type NGV19A Relay Removed from Case (Front View)

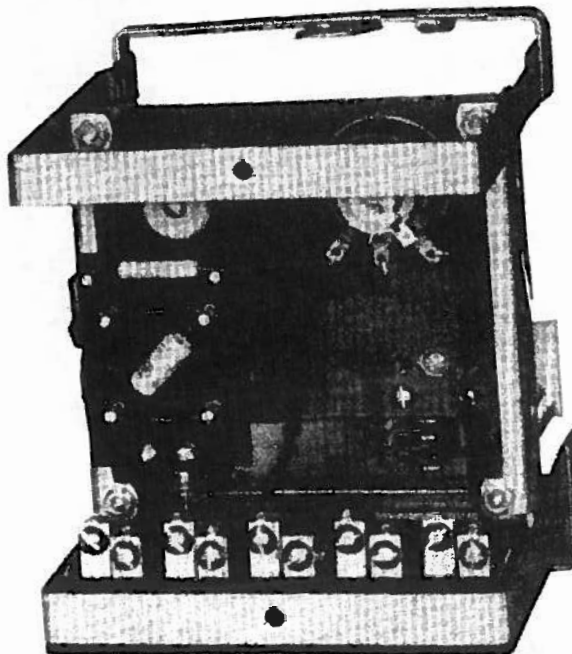


Fig. 2 (8035461) Type NGV19A Relay Removed from Case (Rear View)

D-C UNDERVOLTAGE RELAY  
TYPE NGV19ADESCRIPTION

The NGV19A relay is a time delay DC undervoltage relay with extra high dropout designed specifically to be used to monitor the DC charging supply for a station battery to sound an alarm if this supply fails. The relay contains an instantaneous undervoltage unit connected to the station battery and an auxiliary time delay unit connected to the AC battery charging power supply.

The relay undervoltage element consists of a telephone-type voltage unit with a zener regulator in series with the operating coil and both fixed and adjustable resistors. The auxiliary time-delay unit is a telephone-type unit whose coil is energized from the AC supply source through a bridge-type rectifier. The time-delay unit coil circuit is opened by the undervoltage unit and it drops out with the time delay since part of the coil has been replaced by a copper slug, which acts as a low resistance shorted turn. This relay contains no target. The components are mounted in an S-1 Case.

APPLICATION

Because the NGV19A picks up at 105 percent of drop-out voltage or less, it finds application wherever a time-delay, extra high drop-out, DC relay is required.

Usually the NGV19A relay is used to detect station battery undervoltage and to provide an alarm. Since some operating conditions may temporarily lower the DC voltage, the NGV19A contains a time-delay auxiliary unit to prevent false alarms.

The time-delay unit provides a minimum time delay of 0.3 second after the undervoltage unit operates. It is not sensitive to dips in the AC supply, since it will hold in down to 25 percent voltage. However, if the AC supply is lost, the time-delay unit will drop out and sound the alarm without waiting for the battery voltage to decay.

When the NGV19A relay is used to monitor either a lead-acid or a nickel-cadmium battery, it is suggested that the dropout be set about 98 percent of the fully charged open circuit voltage of the battery. For example, the fully charged open circuit voltage of a 60 cell lead acid battery will be 123 volts and the suggested NGV19A setting about 121 volts. Also the relay must pick up at the lowest acceptable battery charger output.

RATINGS

The NGV19A relay is available with AC ratings of 120, 208, and 240 volts, and DC ratings of 24, 48, 125, and 250 volts. Table A gives resistance values of the relay coils and the resistors are listed on Figs. 3 and 3A. The resistors are supplied as a part of the relay and mounted inside the relay case.

*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 not such assurance is given with respect to local codes and ordinances because they vary greatly.*

TABLE A

| DESIGNATION            | VOLTAGE RATING | CALIBRATION RANGE-VOLTS | COIL RESISTANCE |
|------------------------|----------------|-------------------------|-----------------|
| Undervoltage Unit<br>↓ | 250V DC        | 200-280                 | 2500            |
|                        | 125V DC        | 54-86                   | 2500            |
|                        | 125V DC        | 70-100                  | 2500            |
|                        | 125V DC        | 100-140                 | 2500            |
|                        | 48V DC         | 40-54                   | 200             |
| Time Delay Unit<br>↓   | 24V DC         | 20-27                   | 400             |
|                        | 120V AC        | -----                   | 2500            |
|                        | 208V AC        | -----                   | 2500            |
|                        | 240V AC        | -----                   | 2500            |
|                        |                |                         |                 |

TABLE B

## INTERRUPTING RATINGS

| AC VOLTS | AMPS        |               |
|----------|-------------|---------------|
|          | INDUCTIVE** | NON-INDUCTIVE |
| 115      | 0.75        | 2.0           |
| 230      | 0.5         | 1.5           |
| DC VOLTS |             |               |
| 48       | 1.0         | 3.0           |
| 125      | 0.5         | 1.5           |
| 250      | 0.25        | 1.0           |

\*\*The inductive rating is based on the inductance of an average tripping coil.

CHARACTERISTICSOPERATING PRINCIPLES

The NGV19A units are hinged armature-type relays which operate by electromagnetic attraction. The contacts are opened and closed by the movement of an armature which is restrained by an opening spring and operated by the DC solenoid. The high drop-out feature results from the characteristic of the zener diode regulator. Calibration ranges are given in Table A. See Fig. 5 for external connections.

The NGV19A relay dropout can be adjusted by means of the variable resistor R1. The relay will pick up at 105 percent or less of drop-out voltage.

BURDEN

The resistances of the DC windings are given in Table A.

CONSTRUCTION

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 disconnected 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 by a test plug. The cover, which is attached to front of the relay case, contains 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 two 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. For outline and drilling dimensions, see Fig. 6.

Every circuit in the drawout case has an auxiliary brush, as shown in Fig. 4, 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. 4 with adequate pressure to insure correct operation.

#### 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.

#### 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.

#### 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.

#### MECHANICAL INSPECTION

It is recommended that telephone-type units be given the following mechanical tests.

1. Operate the armature by hand. Allow it to reset to insure that all parts are free from friction or binds.
2. With the relay deenergized each normally open contact should have a gap of 0.015 inch or more. Observe the wipe on each normally closed contact be deflecting the stationary contact member towards the frame. Wipe should be approximately 0.005 inch.

The wipe on each normally open contact should be approximately 0.005 inch. This can be checked by inserting a 0.005 inch 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.

#### INSTALLATION PROCEDURE

If after the performance of 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 in the section on ACCEPTANCE TESTS be repeated before installation.

Also the relay should be set at the dropout value to be used and it should be checked. When making this check, the relay should be installed in its permanent location and preheated. After the dropout is set, check that the relay will pick up at the lowest acceptable battery charger output voltage. Also check that the contact adjustment is correct (see section on 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 following points be checked at an interval of from one to two years.

### MECHANICAL CHECKS

Manually operate the armature and allow it to reset to make sure that there is no excessive friction or tendency to bind.

Check the contact gap and wipe; values should agree with those given in the section under ACCEPTANCE TESTS.

Examine the contact surfaces for signs of tarnishing or corrosion.

### ELECTRICAL TESTS

Set the battery charger at its lowest charging rate and check the pickup and dropout. The pickup voltage should be 105 percent or less of the dropout voltage. A voltmeter with at least 1000 ohms per volt should be used for making the test. If it is necessary to make adjustments refer to the section on SERVICING.

### SERVICING

If any of the mechanical or electrical check points described in the previous sections are found to be out of limits, the following points should be observed in restoring them.

The pickup voltage is adjusted by changing the setting of the variable resistor R1, see Fig. 3. The ratio of pickup to dropout can be changed by turning the residual screw. The minimum gap must be 0.002 inch between armature and pole face.

For cleaning relay 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 relay 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 part wanted, and give complete nameplate data. If possible, give the General Electric Company requisition number on which the relay was furnished.

Since the last edition, the minimum time delay of the time-delay unit has been changed, under APPLICATION, and Figure 3 has been changed

| MODEL              | FORM |      |      |       |      |      |      |      |       |  |  |  |
|--------------------|------|------|------|-------|------|------|------|------|-------|--|--|--|
| 12NGV19A(-)A       | 1    | 2    | 3    | 4     | 5    | 7    | 9    | 12   | 13    |  |  |  |
| VOLTS D.C.         | 125  | 125  | 125  | 250   | 48   | 125  | 125  | 125  | 250   |  |  |  |
| VOLTS A.C.         | 120  | 208  | 240  | 120   | 120  | 120  | 120  | 240  | 240   |  |  |  |
| RESISTANCE IN OHMS |      |      |      |       |      |      |      |      |       |  |  |  |
| R1                 | 5000 | 5000 | 5000 | 5000  | 1000 | 5000 | 5000 | 5000 | 5000  |  |  |  |
| R2                 | 1500 | 4000 | 6500 | 1500  | 1500 | 1500 | 1500 | 6500 | 6500  |  |  |  |
| R3                 | 7500 | 7500 | 7500 | 10000 | 2000 | 7500 | 7500 | 7500 | 10000 |  |  |  |
| R4                 |      |      |      | 5000  |      |      |      |      | 5000  |  |  |  |

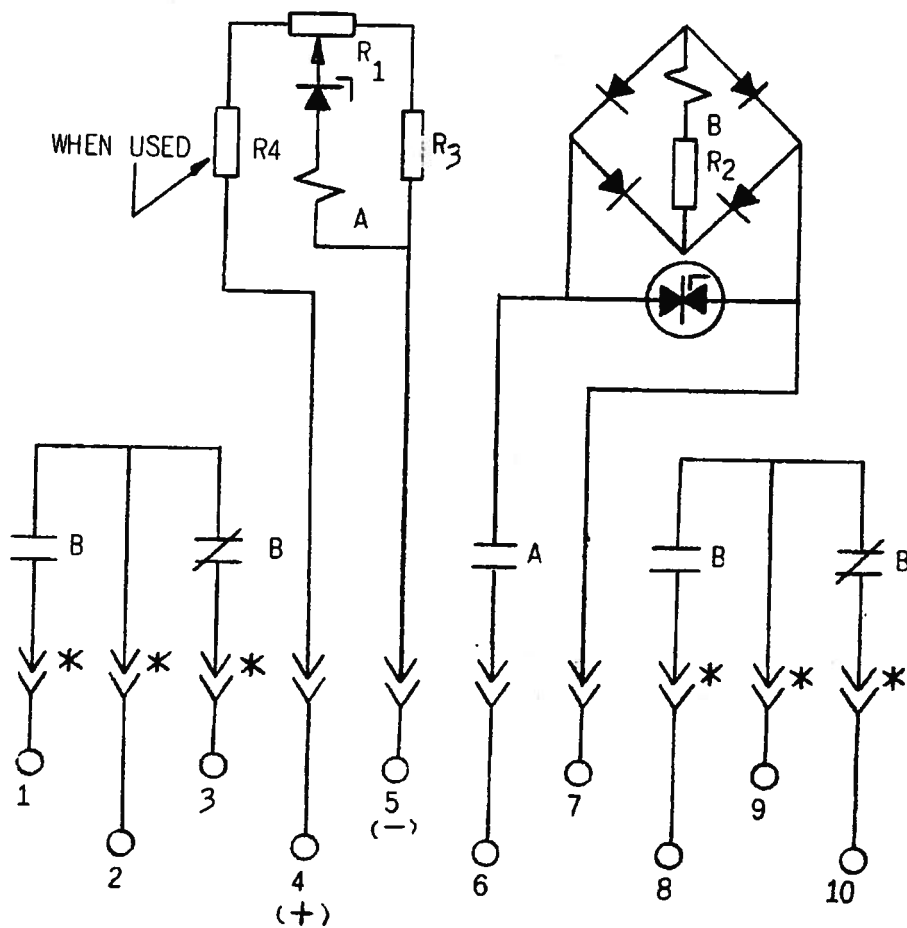
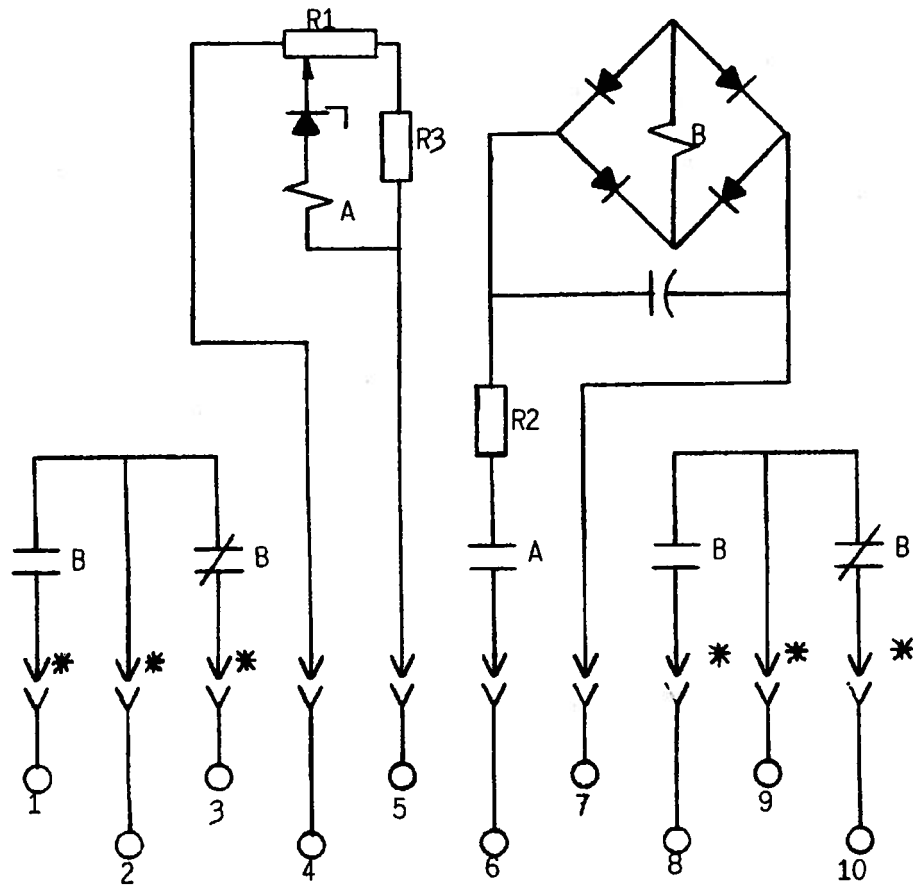


Fig. 3 (0178A8165 [5]) Internal Connection Diagram for Forms 1-2-3-4-5-7-9-12.

| MODEL        | FORM |     |     |     |
|--------------|------|-----|-----|-----|
| 12NGV19A(-)A | 6    | 8   | 10  | 11  |
| VOLTS DC.    | 48   | 125 | 24  | 24  |
| VOLTS AC.    | 208  | 120 | 120 | 208 |

| RESISTANCE IN OHMS |    |      |      |      |
|--------------------|----|------|------|------|
| R1                 | 1K | 5K   | 1K   | 1000 |
| R2                 | 4K | 1.5K | 1.5K | 4000 |
| R3                 | 2K | 7.5K | 2K   | 2K   |



\*=SHORT FINGER

Fig. 3A (0195A9150-3) Internal Connection Diagram for Forms 6-8-10-11

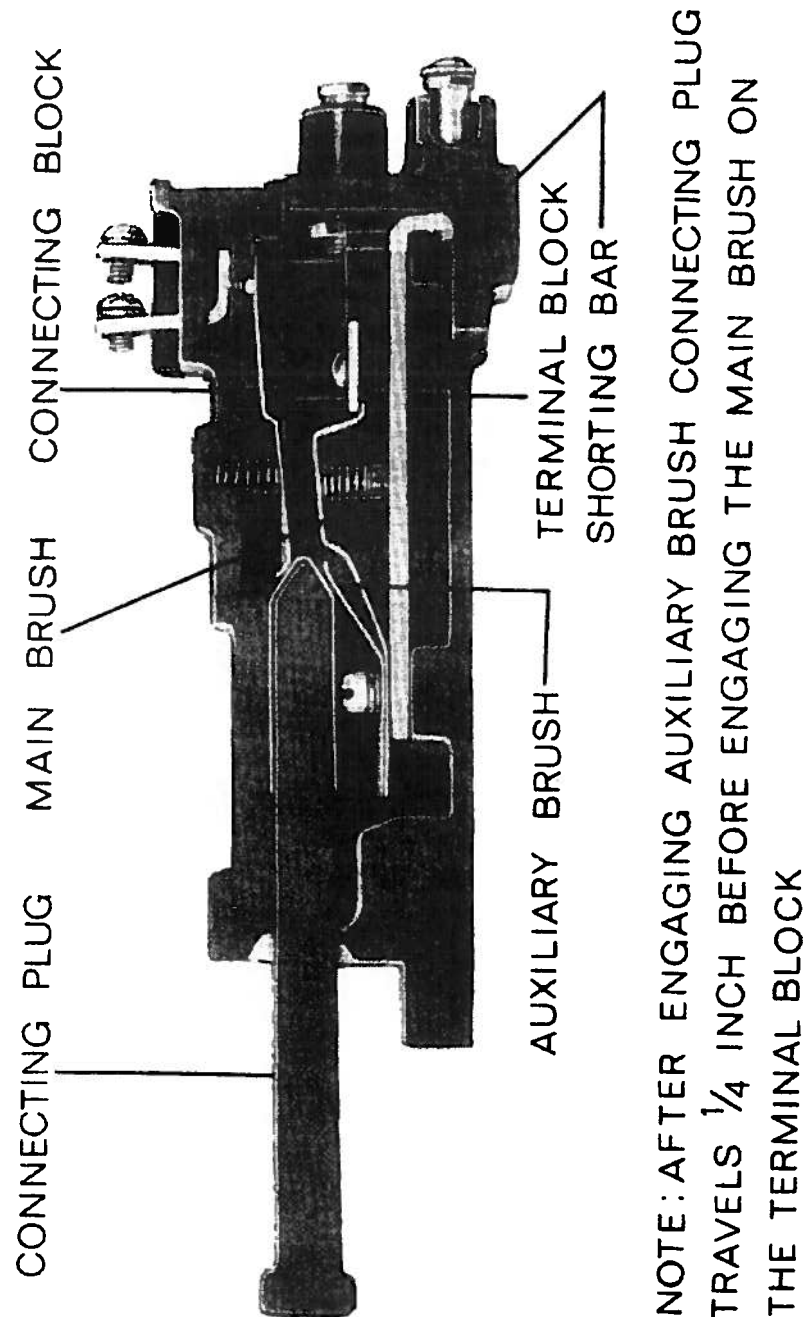


Fig. 4 (8025039) Cross Section of Drawout Case Showing Position of Auxiliary Brush and Shorting Bar.

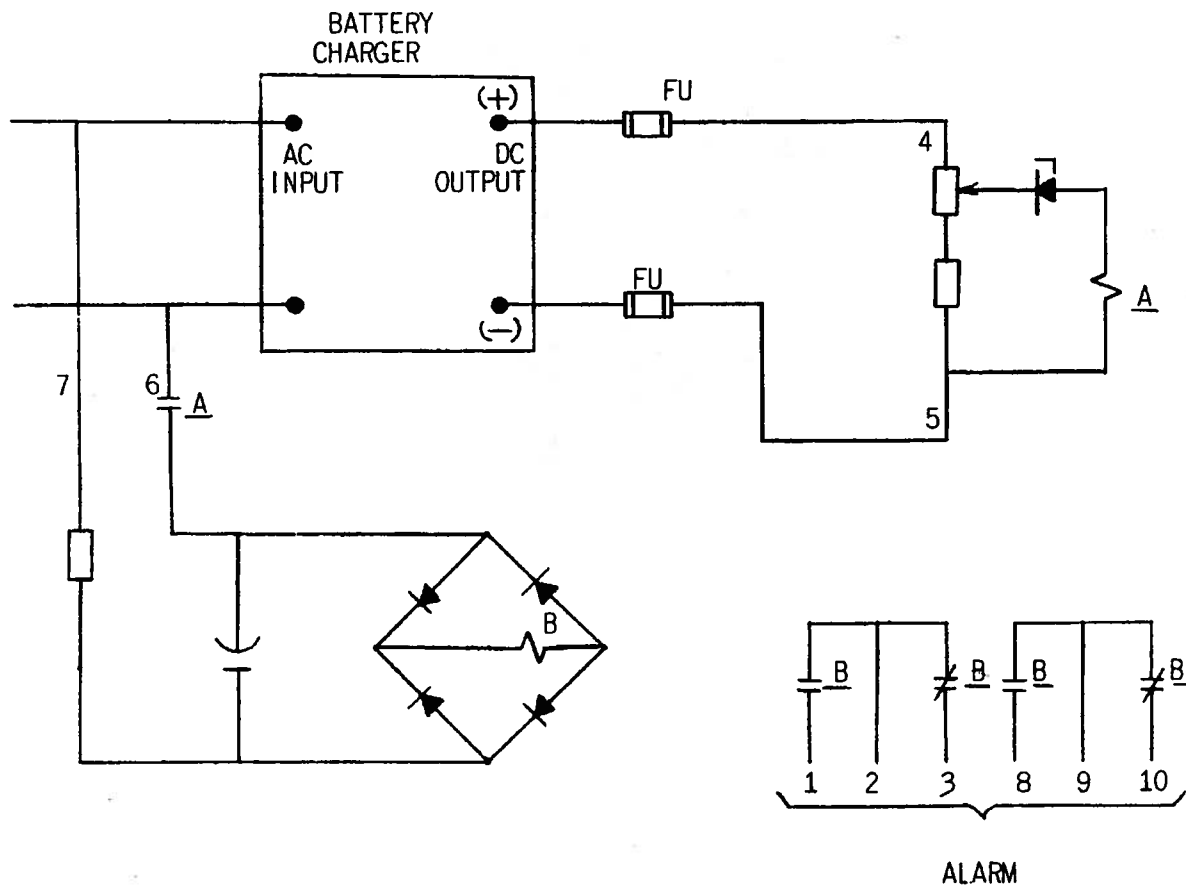


Fig. 5 (0178A9094-1) External Connection Diagram for Low Battery Voltage Alarm Using Relay Type NGV19A.

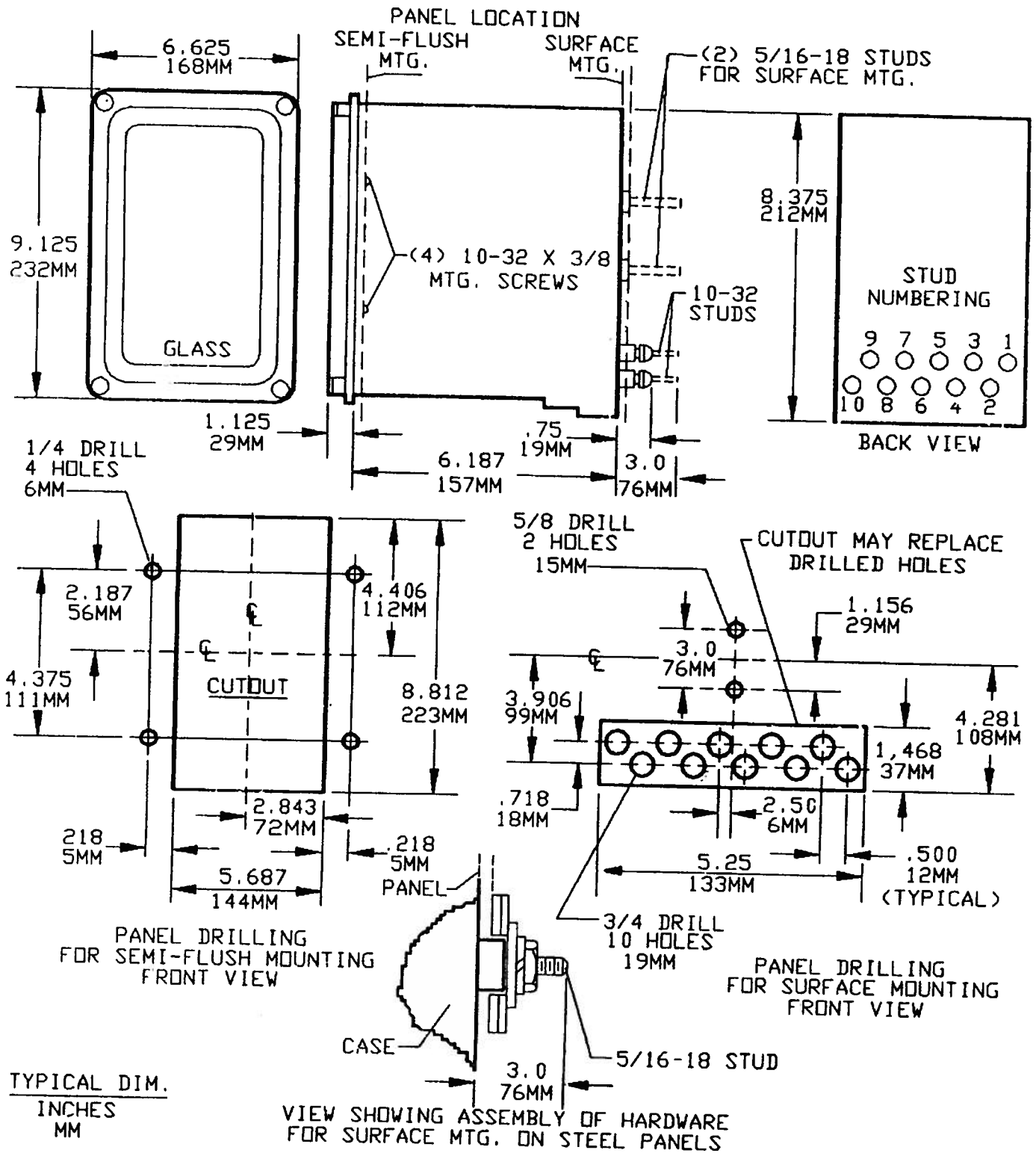


Fig. 6 (6209271 (8)) Outline and Panel Drilling Dimensions for Type NGV19A Relay.



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