



Instructions

GEK-49896C

SENSITIVE GROUND RELAY

(Formerly 0178A8900)

TYPE NGV29A

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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SENSITIVE GROUND RELAY

TYPE NGV29A
(Formerly 0178A8900)

DESCRIPTION

The Type NGV relay covered by these instructions is a sensitive DC relay for ground detection. It consists of two telephone-type relays, and a sensitive polarized relay, with associated diodes and resistors, mounted in a size S1 single-end drawout case.

APPLICATION

The 12NGV29A(-)A relay, is designed to provide sensitive ground protection for DC buses. Typical external connections for such an application are shown in Figure 6. The relay will indicate whether the ground is on the positive or negative bus, depending upon which of the polarized unit contacts close. Ground sensitivity for the available voltage ratings is listed in the section on **CHARACTERISTICS**.

RATINGS

The Model 12NGV29A(-)A relay is available in four voltage ratings: 24, 48, 125 or 250 VDC. The relays are continuously rated at these voltages.

The L and R telephone relay contacts are continuously rated at 3 amperes and are capable of momentarily carrying 30 amperes at 250 VDC for tripping duty, but should be interrupted by some other suitable means if the interrupting capability shown in Table I is exceeded.

TABLE I

CONTACT INTERRUPTING ABILITY

| Volts | Interruption Capability (Amps) Inductive** |
|-------|--|
| 24DC | 1.0 |
| 48DC | 1.0 |
| 125DC | 0.5 |
| 250DC | 0.25 |

** Inductance of average trip coil. The non-inductive interrupting ratings for repetitive protective duty are approximately 2 1/2 times the ratings shown in the table.

OPERATING PRINCIPLES

The Model 12NGV29A(-)A relay consists of two telephone relays, a sensitive polarized relay and two diode boards contained in an S1 single-ended drawout case. A typical telephone relay is shown in Figure 3.

The sensitive relay will detect a current leakage to ground from either the (+) or the (-) DC bus and operate to close its contact, which will energize either the L or

R relay, depending on the direction of ground-current flow. The L unit pickup indicates a (-) DC-to-ground leakage, and the R unit pickup will indicate a (+) DC-to-ground leakage. In either case the L or R output will close a contact to sound an alarm or trip a breaker.

CHARACTERISTICS

The Model 12NGV29A(-)A relay consists of a sensitive DC relay for use as ground-current detector. The two telephone relays (L and R) are the output relays, and when energized will close a contact that can be used for tripping or alarm. A seal-in circuit is available by connecting studs 3 and 8 to stud 7, if desired.

The relay has a maximum resistance-to-ground sensitivity as listed below.

| DC Voltage Rating | Maximum Resistance-to-Ground Sensitivity (Ohms) |
|-------------------|---|
| 24 | 1.25 K |
| 48 | 5 K |
| 125 | 15 K |
| 250 | 30 K |

BURDEN

The burden imposed by the relay on the DC bus under normal conditions will be the current drawn by R1 and R2 in series, divided into the DC voltage. Refer to the chart on the internal connection diagram of Figure 5 for the resistor and component resistance values.

CONSTRUCTION

The relay components are mounted in a cradle assembly that is latched into a drawout case when the relay is in operation but can be easily removed when desired. To do this, the relay is first disconnected by removing the connection plug that 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 relay case is suitable for either semi-flush or surface mounting on all panels up to two (2) inches thick, and appropriate hardware is available. However, panel thickness must be indicated on the relay order to be sure that proper hardware will be included. For outline and drilling dimensions, see Figure 4. Every circuit in the drawout case has an auxiliary brush, as shown in Figure 7, to provide adequate overlap when the connecting plug is withdrawn or inserted.

For the electrical circuits and the external-connection diagrams see Figures 5 and 6.

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 Sales Office.

Reasonable care should be exercised in unpacking the relay in order that none of the parts are injured nor 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.

ELECTRICAL TESTS

DRAWOUT RELAYS, GENERAL

Since all drawout relays in service operate in their cases, it is recommended that they be tested in their cases or an equivalent steel case. In this way any magnetic effects of the enclosure will be accurately duplicated during testing. A relay may be tested without removing it from the panel by using a 12XLA13A test plug. This plug makes connections only with the relay. Of course, the 12XLA12A test plug may also be used. Although this test plug allows greater testing flexibility, it also requires the exercise of greater care, since connections are made to both the relay and the external circuitry.

POWER REQUIREMENTS, GENERAL

Relays requiring 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.

ACCEPTANCE TESTS

Apply 60% of rated voltage (see Table II) to studs 5(+) and 6(-). Connect a test resistor across studs 4 and 6 and the left telephone relay should pick up. Connect a test resistor across studs 4 and 5 and the right telephone relay should pick up.

TABLE II

| Rated Bus Voltage | 60% Rated Bus Voltage | Test Resistor Ohms |
|-------------------|-----------------------|--------------------|
| 24 VDC | 14.4 VDC | 500K |
| 48 VDC | 28.8 VDC | 2K |
| 125 VDC | 75 VDC | 5K |
| 250 VDC | 140 VDC | 10K |

Note that the L or R relay will drop out whenever the test resistor is removed from the studs mentioned above.

SEAL-IN CIRCUIT TEST

Short studs 3 and 8 to stud 7 and repeat the above tests, and note that the L or R relay does not drop out when the test resistor is removed from the studs mentioned. In order to drop out L or R, the DC supply voltage must be removed.

For a more accurate test of the relay, refer to the section on **SERVICING**.

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 ELECTRICAL TESTS and ACCEPTANCE TESTS 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. The flexibility of the tool ensures 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

Connect an adjustable rheostat of the value listed in Table III to stud 4 and stud 6, with the rheostat set for maximum ohms.

Apply rated voltage to studs 5(+) and 6(-); neither the L nor the R relay should operate.

Reduce the resistance of the rheostat until the left "L" relay picks up. This should occur as listed below under "Sensitivity" in Table III. (Measure the resistance remaining on the rheostat.)

Put the rheostat (set at maximum resistance) to studs 4 and 5, and reduce the resistance; the right (R) relay should pick up. Measure the resistance of the rheostat; this should be between the values listed in Table III.

TABLE III

| Rated Bus Voltage | Related Maximum Resistance to Ground to Operate | Test Rheostat in Ohms | Sensitivity for Telephone Relay Pickup |
|-------------------|---|-----------------------|--|
| 24 VDC | 1.25 K | 5 K | 1.75 - 3 K |
| 48 VDC | 5 K | 15 K | 7 - 14 K |
| 125 VDC | 15 K | 50 K | 17 - 35 K |
| 250 VDC | 30 K | 75 K | 34 - 70 K |

RENEWAL PARTS

Sufficient quantities of renewal parts should be kept in stock for 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 name of the part wanted, quantity required, and complete nameplate data, including the serial number, of the relay.

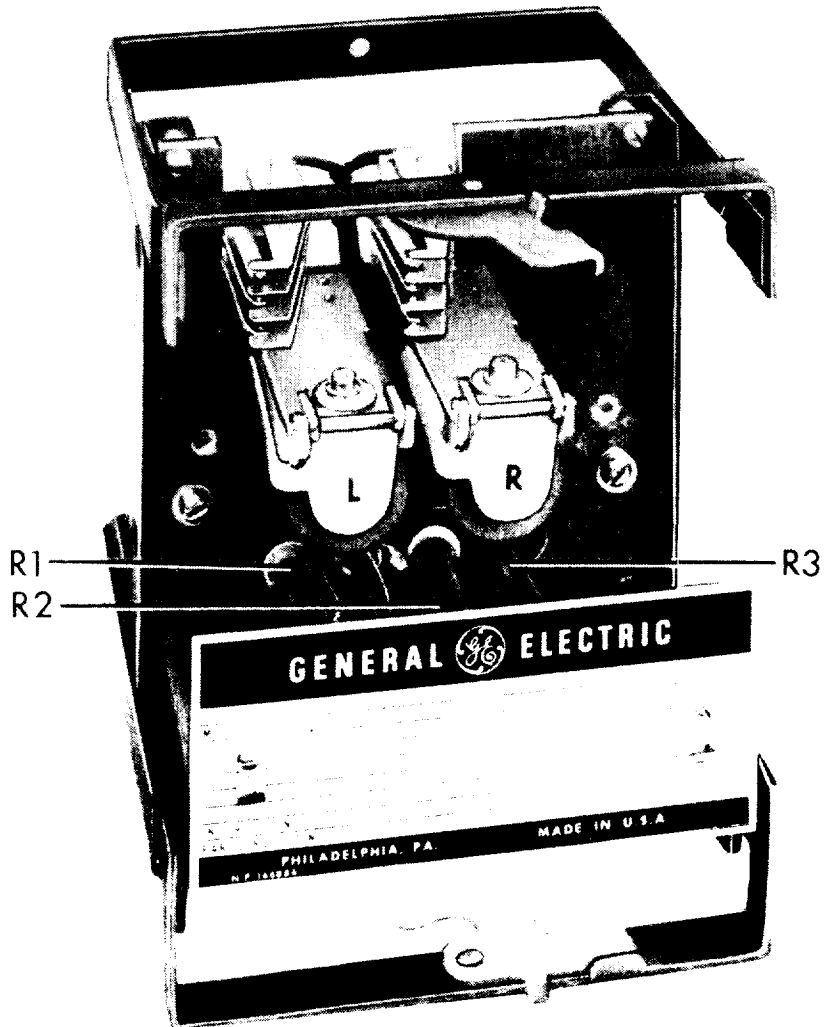


Figure 1 (8043268) NGV29A Relay. Front View, Out of Case

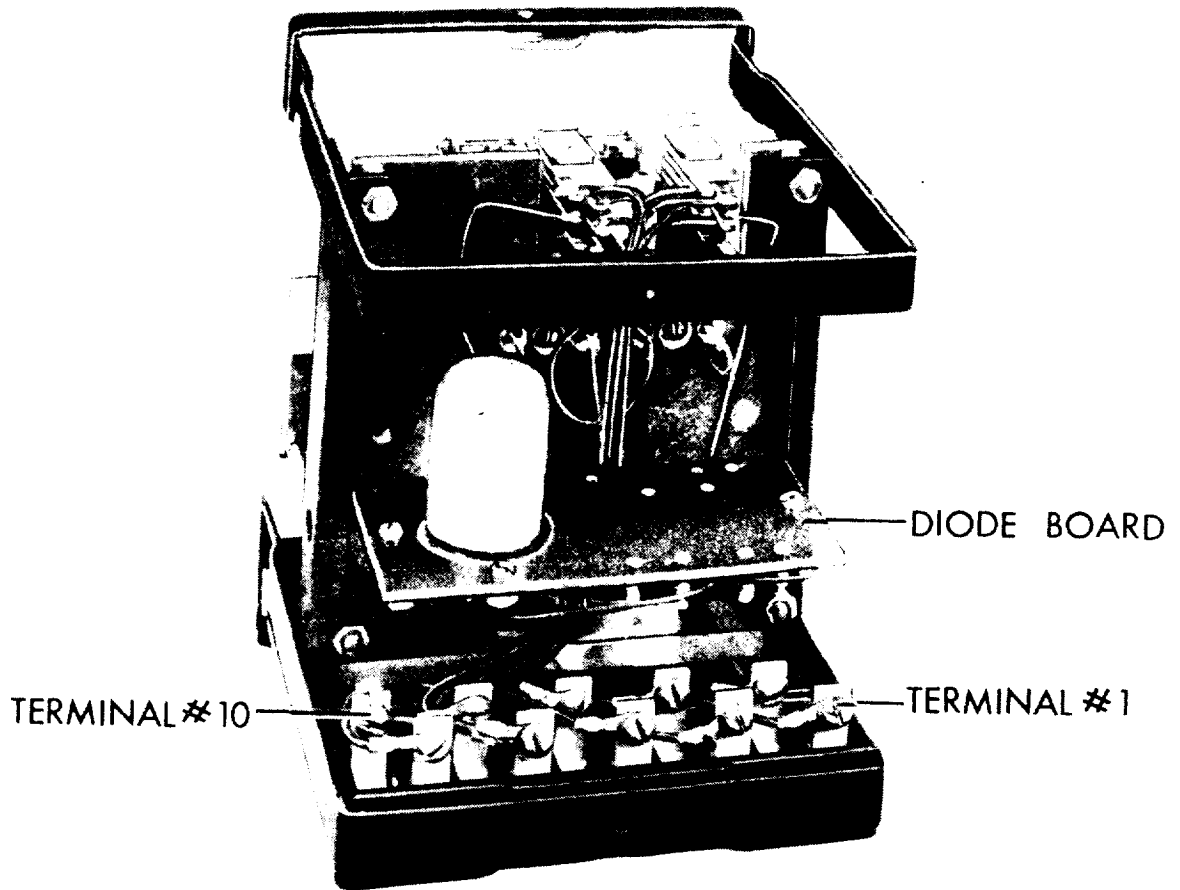


Figure 2 (8043269) NGV29A Relay, Rear View, Out of Case

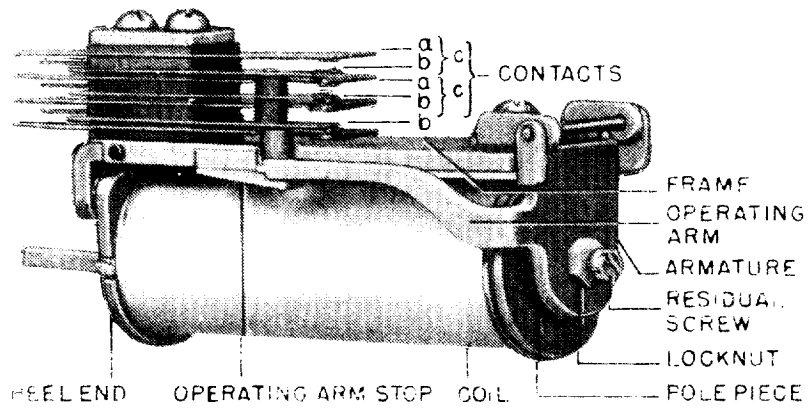
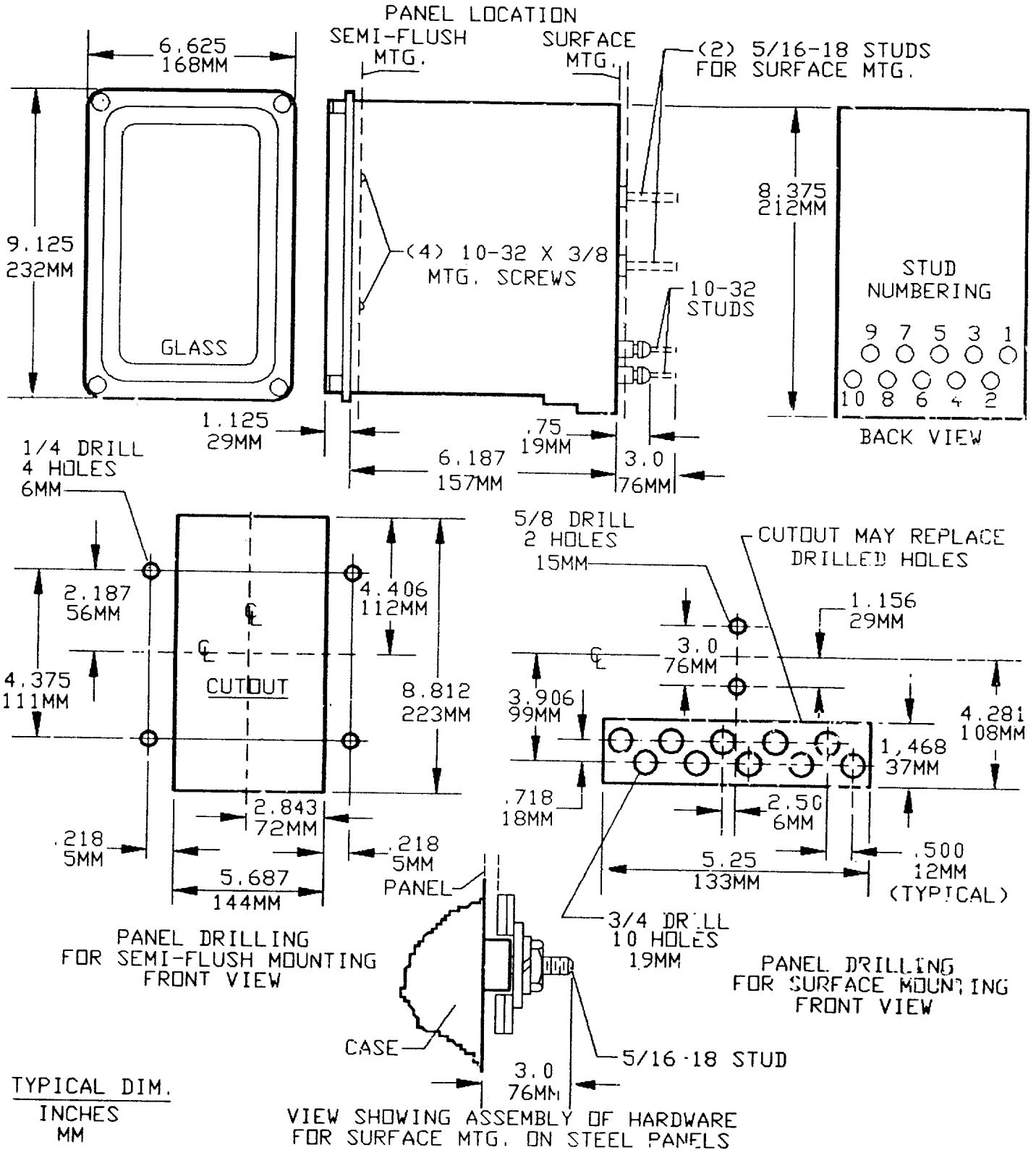


Figure 3 (8012106) Typical Telephone Relay Used in the NGV29A Relay



* Figure 4 (K-6209271 [8]) Outline and Panel-Drilling for the 0178A8900 Relay

| FORMER MODEL NUMBERS | R1 OHMS | R2 OHMS | R3 OHMS | C1 uF | NEW MODEL NUMBERS |
|----------------------|---------|---------|---------|-------|-------------------|
| 0178A890CG-1 | 10K | 10K | 15K | .47 | NGV29A1A |
| 0178A890CG-2 | 5K | 5K | 7.5K | .47 | NGV29A2A |
| 0178A890CG-3 | 2K | 2K | 2.5K | .47 | NGV29A3A |
| 0178A890CG-4 | 1K | 1K | 1K | .47 | NGV29A4A |

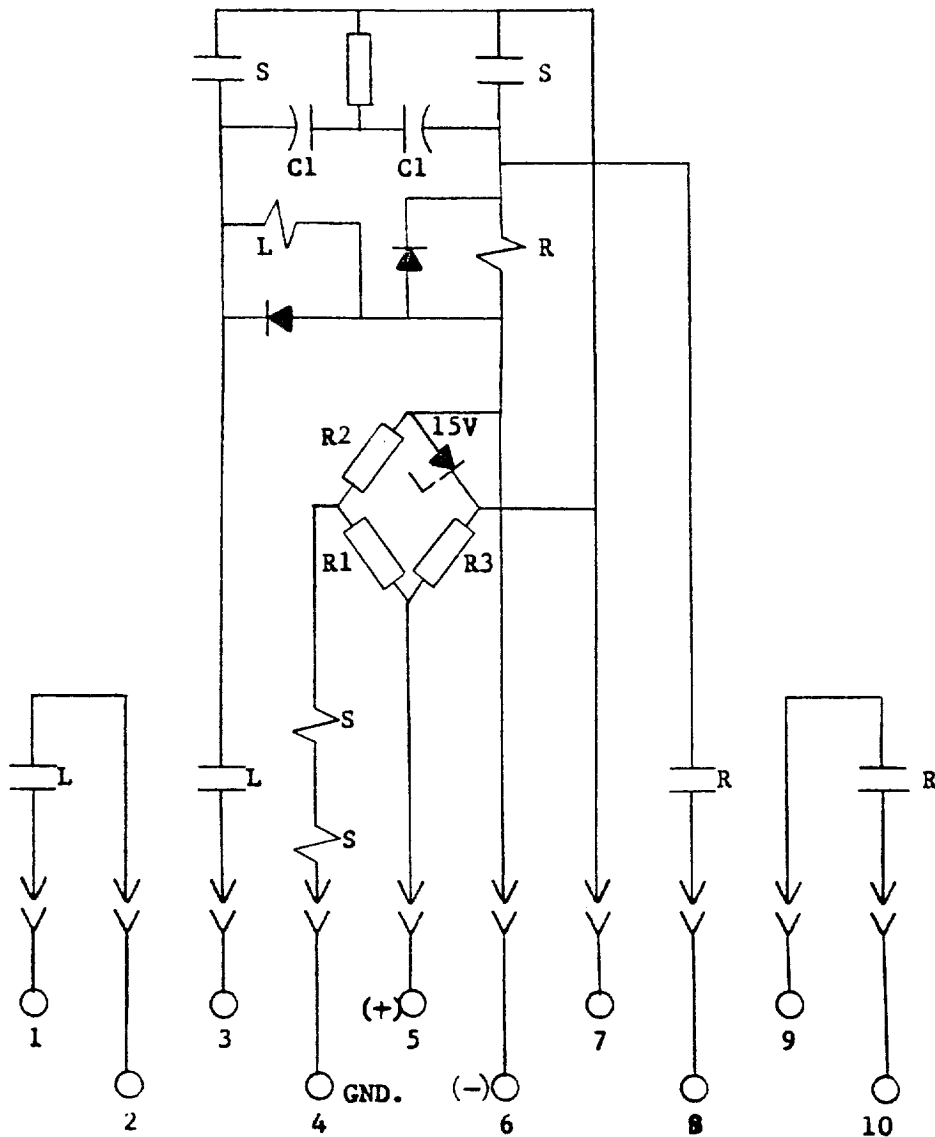
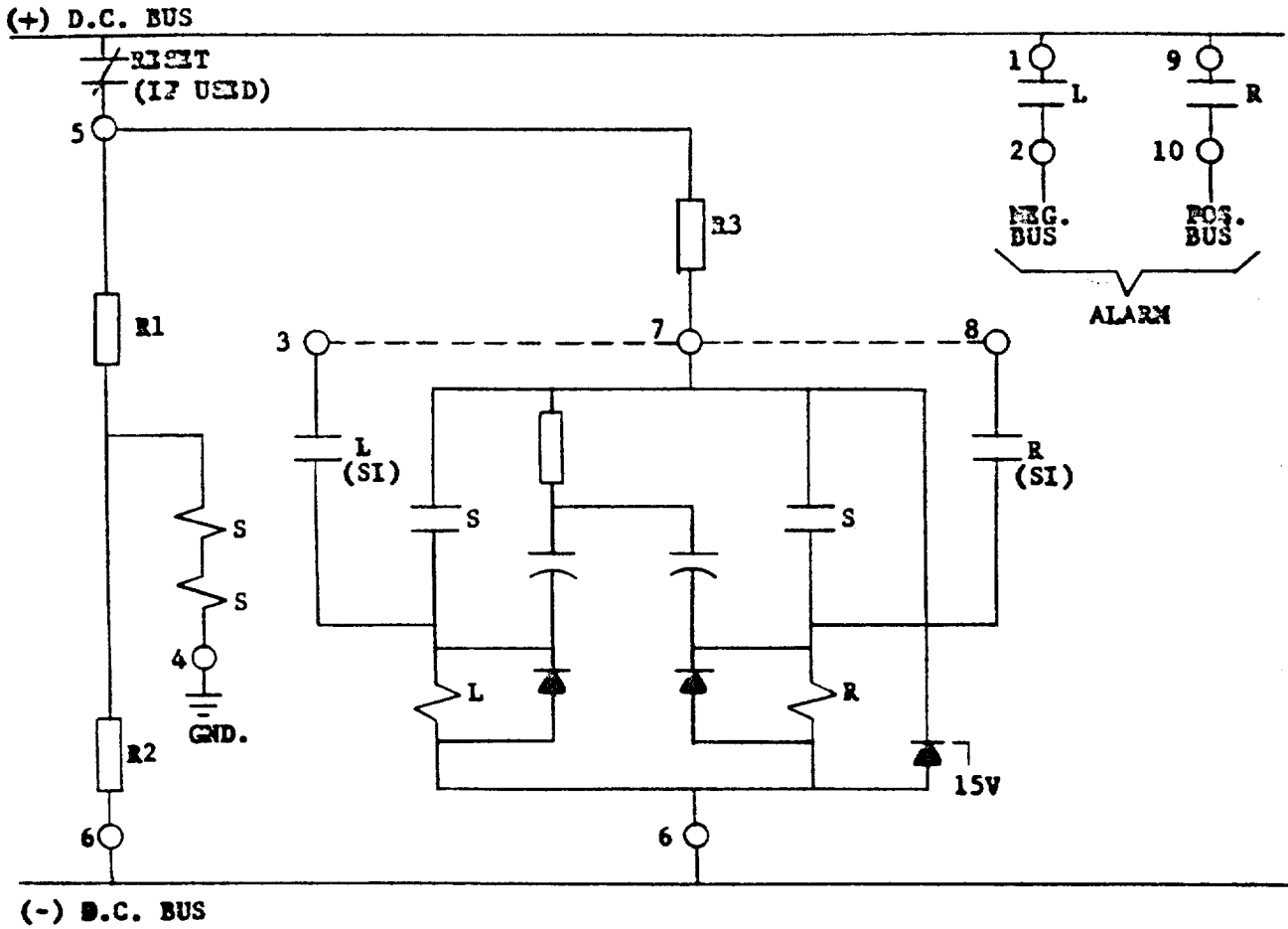


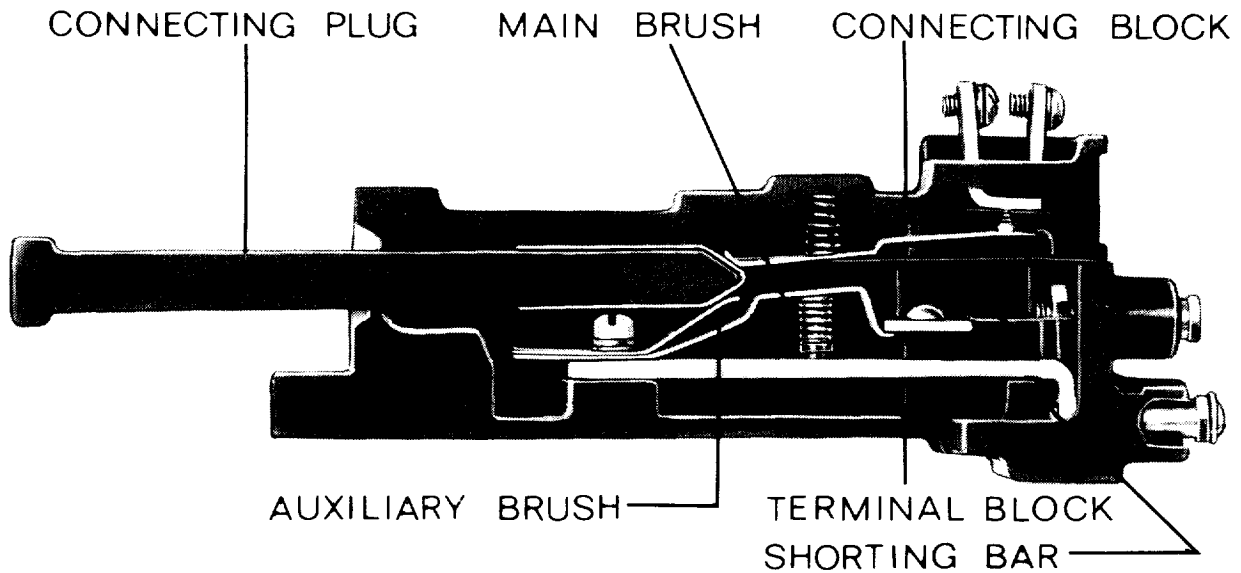
Figure 5 (0207A7880-3) Internal Connection Diagram for the NGV29A Relay



| D.C. VOLTS | R1 OHMS | R2 OHMS | R3 OHMS | MAX. GROUND FAULT SENSITIVITY OHMS |
|------------|---------|---------|---------|------------------------------------|
| 24 | 1K | 1K | 1K | 1.25K |
| 48 | 2K | 2K | 2.5K | 5K |
| 125 | 5K | 5K | 7.5K | 15K |
| 250 | 10K | 10K | 15K | 30K |

S = RELAY PICKUP 1.87 TO 2.50 MA RESISTANCE 7,60HMS TWO COILS IN SERIES.
 NOTE: USE OF SEAL-IN CONTACT OF L AND R IS OPTIONAL, IF SEAL-IN CONTACTS ARE USED IT IS NECESSARY TO USE RESET SWITCH CONTACT SHOWN TO RESET RELAY AFTER GROUND FAULT HAS BEEN CLEARED.

Figure 6 (0207A7879-3) External Connection Diagram for the NGV29A Relay



NOTE: AFTER ENGAGING AUXILIARY BRUSH CONNECTING PLUG TRAVELS $\frac{1}{4}$ INCH BEFORE ENGAGING THE MAIN BRUSH ON THE TERMINAL BLOCK

Figure 7 (8025039) Cross Section of Drawout Case, Showing Position of the Auxiliary Brush



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