



INSTRUCTIONS

GEI-98318
SUPERSEDES GEI-50259

STRUCTURE GROUND RELAY

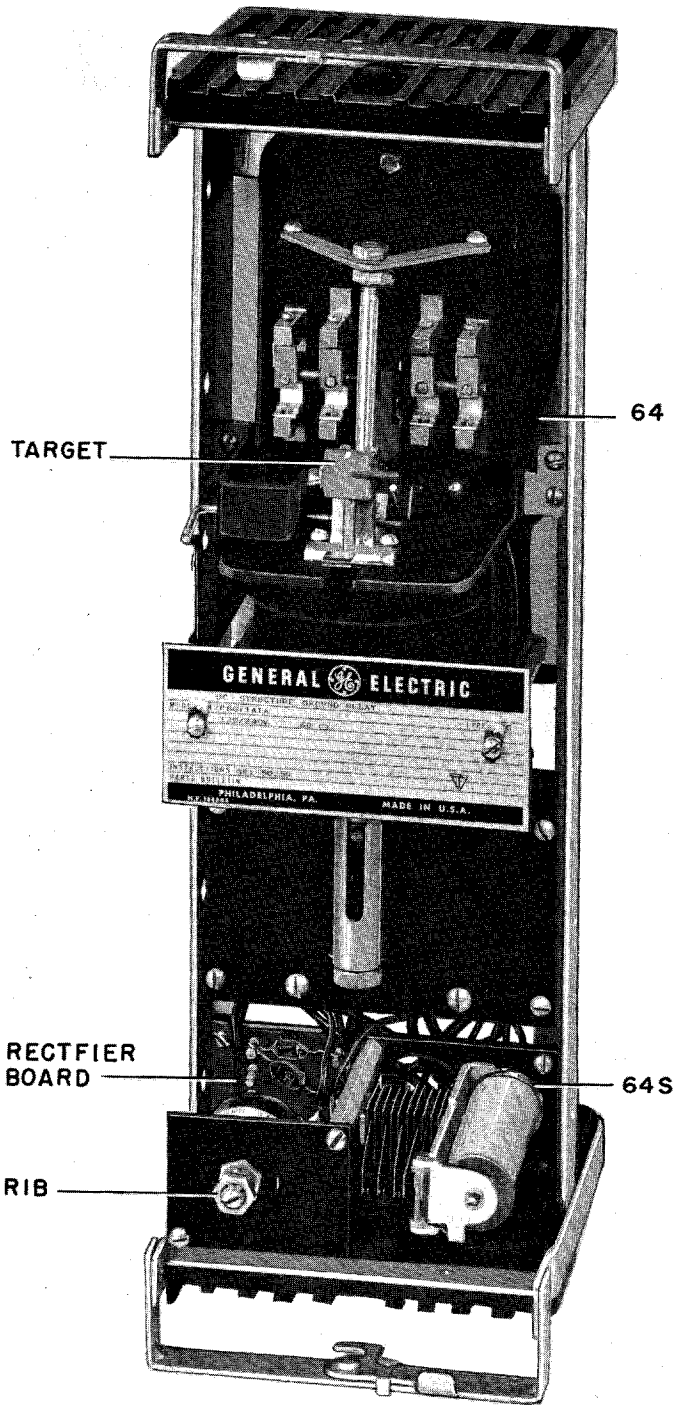


Type PBG11A

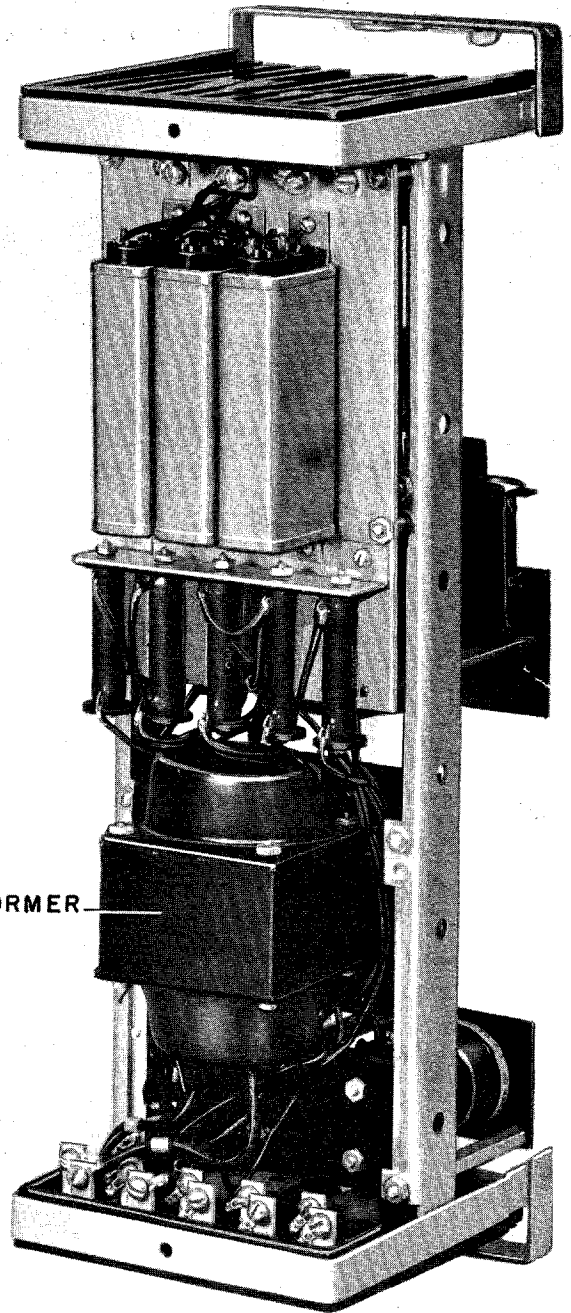
POWER SYSTEMS MANAGEMENT DEPARTMENT

GENERAL  **ELECTRIC**

PHILADELPHIA, PA.



FRONT VIEW



REAR VIEW

Fig. 1 (8024622 & 8024624) Type PBGL1A Relay Removed From Case

STRUCTURE GROUND RELAY

TYPE PBG11A

INTRODUCTION

The PBG11A relay consists of a dual rated transformer, a diode bridge rectifier, an instantaneous plunger relay, a telephone relay plus several resistors and capacitors.

The photographs in Fig. 1 show the principal parts of the relay and their relative positions in the assembly. All units and parts are identified by the nomenclature or device numbers used throughout the text.

APPLICATION

The PBG11A relay is designed to protect structures surrounding single polarity DC systems from contact with the ungrounded polarity of the system. The relay may be used on systems ranging from 250 to 750 volts DC where the DC system is supplied by DC generators or by rotary converters. Generally, systems of less than 250 volts DC are surrounded by solidly grounded structures. The PBG11C is recommended where the DC system is supplied by rectifiers and is rated for use on systems up to 900 volts DC.

OPERATING CHARACTERISTICS

PBG

With the relay adjusted as outlined in the adjustment section and connected as shown in Fig. 3 operation is as follows:-

The structure to be protected is ungrounded for paths DA and CB (Fig. 3). Should the ungrounded bus polarity come in contact with the structure, voltage is applied to the 64 coil. The 64 unit picks up and trips all the breakers feeding the bus thereby de-energizing the bus and clearing the fault. When the 64 unit operates, it lifts a target into view and latches in the operate position. The cover carries the reset mechanism which resets the target and unlatches the 64 unit. The fault current is limited to a maximum value of approximately 3 amperes depending on the system voltage and fault resistance. The d-c resistance of paths DA and CB is approximately 450 ohms each.

To check the continuity of the fault detecting circuit (64 unit), the relay has built into it a monitoring scheme. Referring to Fig. 3 during normal (unfaulted) conditions the diode bridge rectifier

circulates a d-c current through the 64 N.C. contact down stud 6 through the station groundmat to stud 17 then through the 64 and 64S coils to the d-c structure and back to the rectifier. This current is sufficient to pick up the 64S unit but not sufficient to pick up the 64 unit. Should any part of this circuit be opened such as a loose connection at A, B, C or D, the 64S unit will drop out and sound an alarm. If an accidental ground should develop from the d-c structure to ground, the 64S unit will be shunted and drop out. The relay will detect grounds of this type having a value of up to approximately 400 ohms. The monitoring circuit is a "fail safe" scheme, thus if the supply voltage to the rectifier is interrupted the 64S will drop out and sound an alarm.

It is noted here that the connections shown in Fig. 3 are for systems which have a negative ground. Thus, the polarity of the diode bridge is such that the diodes do not have to block the d-c system voltage, although they are capable of withstanding system voltage for a short time. If the system has a positive ground, it is suggested that the connections to studs 6 and 7 be reversed.

RATINGS

The PBG11A relay has a dual rating of 120 or 240 volts. When the voltage of the relay is not given on the requisition, the transformer (see Fig. 2) is wired for 240 volts.

INSTALLATION

RECEIVING

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

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.

outside of the case may find its way inside when the cover is removed and cause trouble in the operation of the relay.

LABORATORY TESTS

The relay has been set at the factory and the following points may be checked, although field tests will be required:-

1. The transformer primary will be connected for 240 volt operation unless otherwise specified when ordered. If 120 volt operation is desired, reconnect the transformer primary as shown in the insert of Fig. 2.
2. Apply a source of DC current to studs 16 and 17.
 - (a) The 64 unit should pick up at 0.066 amperes \pm 10%.
 - (b) The 64S unit should pick up at 0.050 amperes and drop out at 0.030 amperes.
3. Remove the DC current source and apply rated AC voltage to the transformer (studs 9 and 10) and use a high resistance DC voltmeter (1000 ohms/volt). The output voltage measured across studs 6 and 7 should be 54 volts \pm 5%.
4. Connect stud 6 to 17, and stud 7 to 16 and with rated AC voltage applied to studs 9 and 10, the 64S unit should pick up. Reducing the AC input

voltage to 80% of rating should not cause the 64S unit to drop out. Increasing the AC input voltage to 110% of rating should not cause the 64 unit to pick up.

LOCATION AND MOUNTING

The relay should be mounted on a vertical surface in a location reasonably free from excessive heat, moisture, dust and vibration. The relay case may be grounded using at least No. 12 B&S gage copper wire. The panel drilling for the Type PBG11A relay is shown in Fig. 5.

CONNECTIONS

Internal connections are shown in Fig. 2. Typical external connections are shown in Fig. 3.

Note that on the external connection diagram (Fig. 3) the ground connections (A & B) must be physically separate. The reason for this can be seen in Fig. 4.

Should a-g become open circuited the 64S unit will not detect this open circuit and the 64 unit would not operate for fault detection.

For this same reason, it is recommended that the connections to DC structure be made at separate locations.

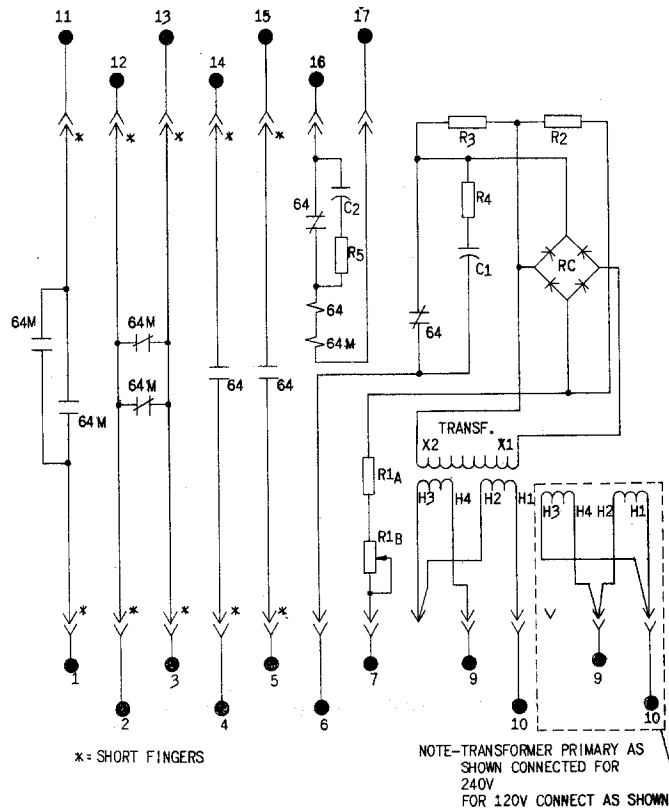


Fig. 2 (418A811-4) Connections For Type PBG11A Relay (Front View)

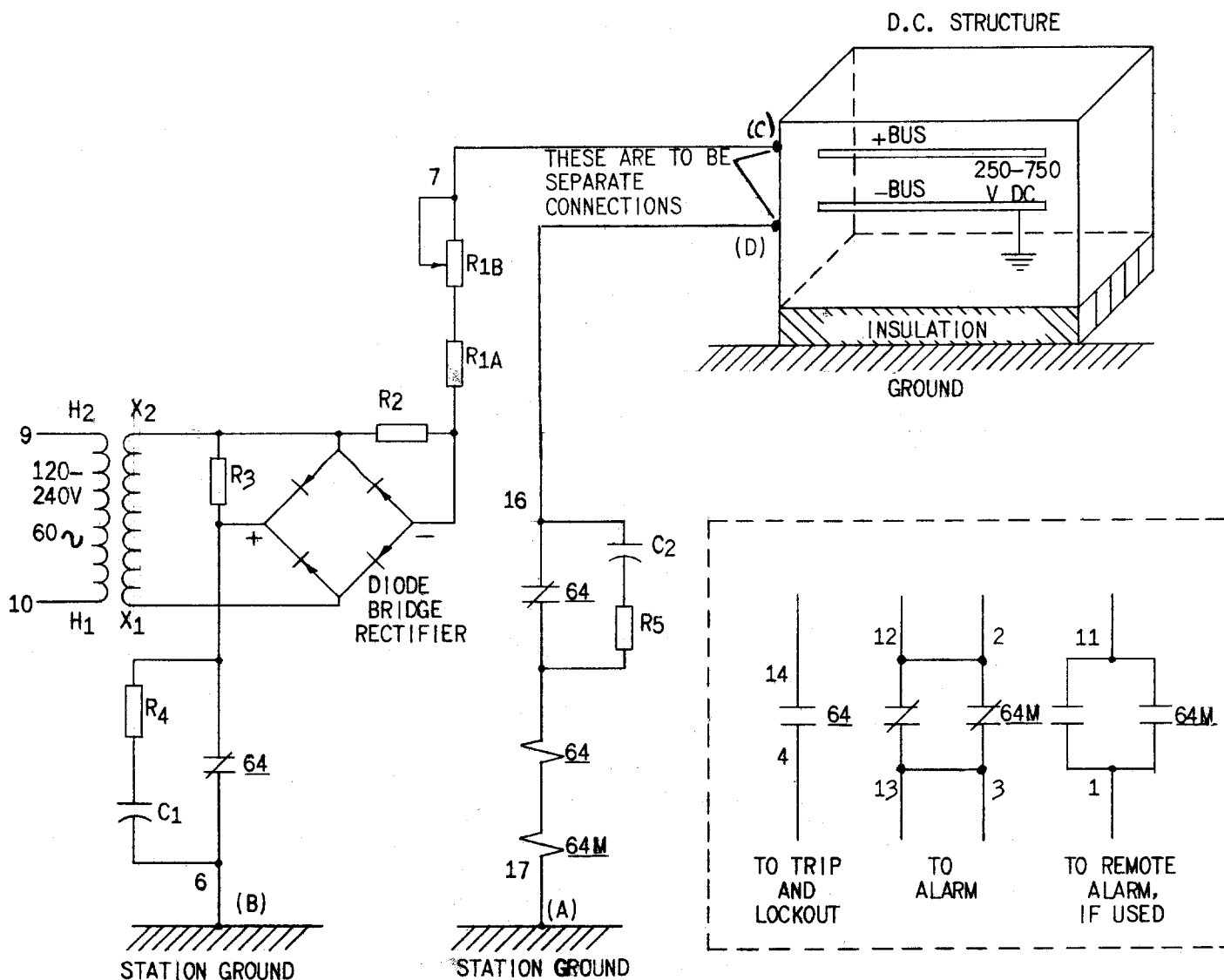


Fig. 3 (459A288-3) External Connections For Type PBG11A Relay

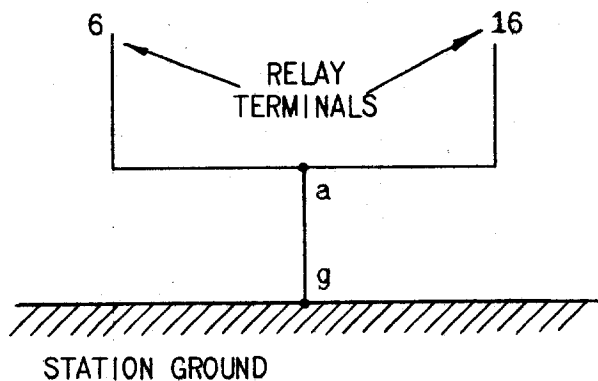


Fig. 4 (459A286-1) Non-recommended Connections (SEE TEXT)

MAINTENANCE

PERIODIC AND INSTALLATION TESTS

FIELD TESTS

Although as previously described under the laboratory tests section, the relay has been set at the factory, it must be checked in the field for several reasons:-

1. Although the DC structure is normally ungrounded (except for the ground connection through the relay) there always exists a high resistance path to ground such as leakage across the insulators.
2. The same is true of the ungrounded bus in relation to the DC structure.
3. The system AC voltage may be somewhat more or less than 120 or 240 volts.

The existence of the above conditions may make it desirable to readjust the sensitivity of the 64S unit to structure grounds. To do this, the relay should be connected as shown in Fig. 3 with the DC bus energized. Connect a source of variable AC voltage to studs 9 and 10 (after removing normal supply). Vary the input voltage as in Step 4 of the Laboratory Tests Section, noting that the operation of the 64 and 64S units should be as indicated. If, when the test voltage is reduced to 80% of rating, the 64S unit drops out, this indicates that either the output of the diode bridge is being shunted by the leakage path pointed out in (1) above or that as pointed out in (2) above, there is some current flow from the bus to the structure. In either case, to prevent the 64S unit from dropping out when the AC voltage is reduced to 80% of rating resistor R_{1B} can be readjusted. Decreasing R_{1B} causes more current output from the diode bridge for a given input voltage and thus lowers the dropout of the 64S relay. If R_{1B} is decreased, it will be necessary to check that the 64 unit does not pick up when the AC voltage is increased to 110% of rating. Should the 64 unit pick up, it will be necessary to readjust its pickup level. To increase the pickup, turn the knurled screw in the calibrating tube so as to lower the pointer below the calibration mark. Since increasing the pickup of the 64 unit desensitizes it to faults involving the DC bus and the DC structure the pickup should be increased to a level no more than necessary to prevent its operating when the supply voltage is increased to 110% of rating. After the above tests have been completed, remove the test voltage and reconnect the supply voltage to studs 9 and 10.

The following tests are not necessary to insure the operation of the relay and are listed here only if the user wishes to have these values for future references:-

To determine the sensitivity of the relay to DC structure grounds, connect variable resistor from the station groundmat to the structure. Decrease this resistor until the 64S drops out. This value may be recorded for future reference.

To determine the sensitivity of the relay to faults involving the DC structure and the DC bus connect a variable resistor from the DC structure to the bus and proceed as above.

CAUTION: Since the bus voltage may be 250 to 750 volts, safety precautions must be exercised if this value is to be determined.

SERVICING

CONTACTS

For cleaning fine silver 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 corroded material will be removed rapidly and thoroughly. The flexibility of the tool insures the cleaning of 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 in the contacts, thus preventing closing.

The burnishing tool 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.

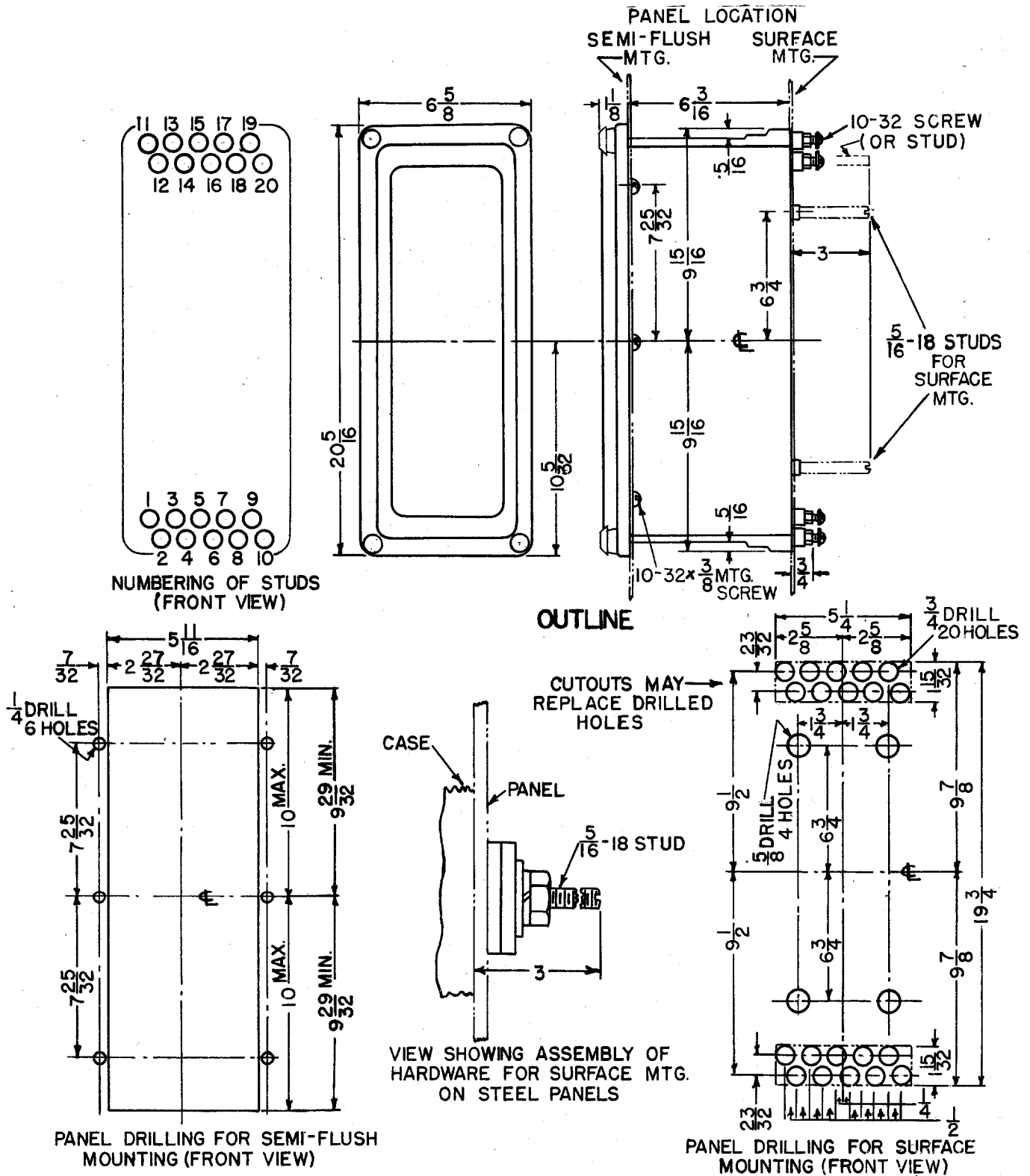


Fig. 5 (6209276-1) Outline And Panel Drilling Dimensions For Type PBG11A Relay



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