INSTRUCTIONS

GEK-27878

STATIC AUXILIARY TRIPPING RELAY

TYPE SAA11B

POWER SYSTEMS MANAGEMENT DEPARTMENT

GENERAL ELECTRIC

PHILADELPHIA, PA.

NOTES

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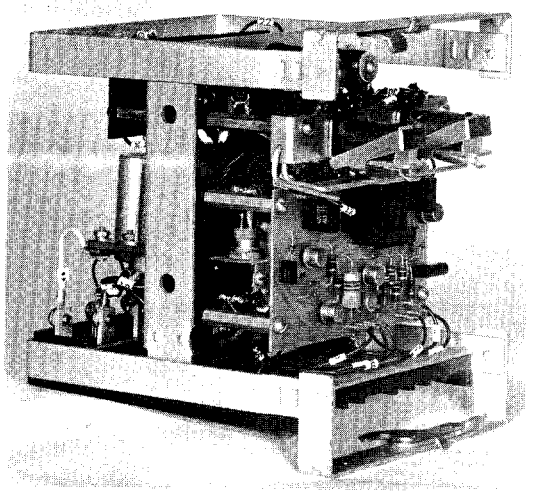

FIG. 1A (8040341) SAA11B Relay Out Of Case (Front View)

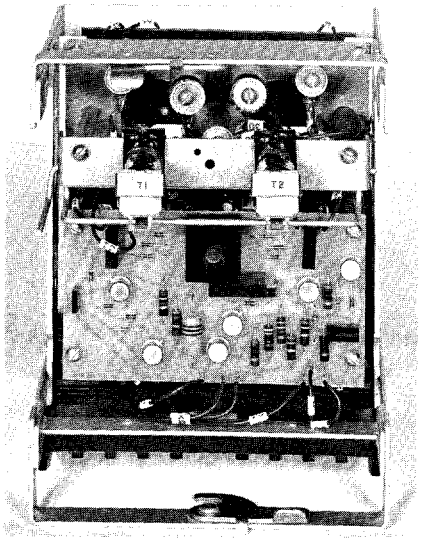

FIG. 1B (8040342) SAA11B Relay Out Of Case (3/4 Front View)

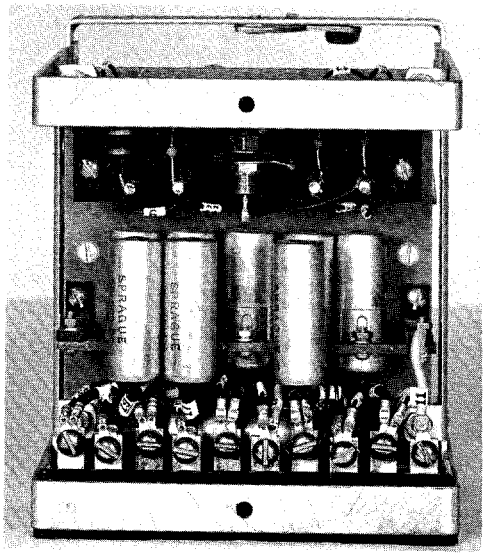

FIG. 1C (8040343) SAA11B Relay Out Of Case (Rear View)

TYPE SAA11B RELAY

INTRODUCTION

The SAA11B relay is a static auxiliary tripping relay which provides two electrically isolated static outputs when an external protective relay contact is closed. While the initiating contact remains closed an oscillator in the SAA relay produces two continuous D.C. signals which are impressed on the gates of the two silicon controlled rectifiers to insure that these SCR's stay turned on to maintain the output circuit and complete tripping. The solid state components used to make the oscillator and the SCR gating circuits are suitable for use on low voltage only. Therefore, a zener regulator is connected in series with two diodes and dropping resistors to provide a suitable power supply. An external capacitor is supplied with the SAA relay to operate the targets in protective relays associated with the SAA relay. When the protective relay contacts are made and turn on the SAA relay, the external capacitor is discharged thru the protective relay targets to cause the associated targets to operate.

The location of the relay components is shown in Figure 1.

APPLICATION

The SAA11B relay is applied as a static auxiliary tripping relay for tripping two circuit breakers. It is actuated by a normally open electromechanical contact from an external device. It also has provisions for operating the target of the external actuating device by means of a capacitor discharge. The external connections are shown in Figure 3.

RATING

The SAA11B relay is a D.C. relay with standard ratings of 125 and 250 volts. The SCR's which provide the SAA11B output circuits are rated for 30 amperes for one second at 250 volts D.C. or less. The circuit must be opened by an external contact.

BURDENS

The burden of the SAA relay on standby duty is approximately 2.5 watts on the 125 volt models and 5.4 watts on the 250 volt models. When the SAA relay is actuated by its initiating contact the burden becomes approximately 30 watts at 125 volts and 73 watts at 250 volts. About one half of the 250 volt operating burden (35 watts) is in the external resistor R23.

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.

CASE

The case is suitable for either surface or semi-flush panel mounting and an assortment of hardware is available for either mounting. Each cover screw has provision for a sealing wire.

The case has studs or screw connections at the bottom end for the external connections. The electrical connections between the relay units and the case studs are made through spring backed contact fingers mounted in stationary molded inner and outer blocks between which nests a removable connecting plug which completes the circuit. The outer block, attached to the case, has the studs for the external connections,

and the inner block has the terminals for the internal connections.

The relay mechanism is mounted in a steel framework called the cradle and is a complete unit with al leads being terminated at the inner block. This cradle is held firmly in the case with a latch at the top and the bottom and by a guide pin at the back of the case. The cases and cradles are so constructed that the relay cannot be inserted in the case upside down. The connecting plug, besides making the electrical connections between the respective blocks of the cradle and case, also locks the latch in place. The cover, which is fastened to the case by thumbscrews, holds the connecting plug in place.

To draw out the relay unit, the cover is first removed, and the plug drawn out. The latches are then released, and the relay unit can be easily drawn out. To replace the relay unit, the reverse order is followed.

A separate testing plug can be inserted in place of the connecting plug to test the relay on the panel either from its normal source of power or from other sources. Or, the relay unit can be withdrawn for testing and replaced by a spare relay unit.

INSTALLATION

The relay should be mounted on a vertical surface in a location reasonably free from excessive heat, moisture and dust. The relay case should be grounded using at least No. 12 B & S gage copper wire as indicated on the internal connection diagram. The panel drilling for the SAA relays is shown in Figure 4.

The internal connections for the Type SAA relay is shown in Figure 2.

PRINCIPLES OF OPERATION

The typical external connections are shown in Figure 3. The basic operating principles of the SAA11B relay will be explained with the aid of this external connection diagram.

The D.C. control power is connected to studs 2 and 4; plus directly to stud 2 and minus directly to stud 4. The diode D17 together with the zener regulator "Z3" establish a regulated low voltage power supply to maintain the charge on the C1 capacitor when the SAA relay is not actuated. This decreases the SAA response time when the initiating contact is made. Then stud 5 is connected to positive power (thru the R23 external resistor on 250 volt models). Current now flows thru resistors R18 and R19 and diode D16 to supply an adequate power supply for the actuated relay. Also current flows thru resistors R22, R15 and R14 to impress a voltage on zener "Z2" and the base of transistor Q6. If the supply voltage is above 55 to 80 percent of rating, then Q6 is turned on. This drops the voltage on the base of transistor Q5 and this transistor is turned off. This permits the capacitor C4 to be charged and after 0.1 millisecond the voltage impressed on zener "Z1" becomes high enough to permit transistor Q4 to turn on. The 0.1 millisecond delay is to insure that the SAA relay will not be turned on by a random voltage spike. When Q4 turns on, Q3 is turned on and the current flows thru resistor R3, transistor Q2 and transistor Q3, to discharge C1 thru 1/2 of the transformer primary. The flux builds up in the transformer and produces a positive voltage at terminal #1. This produces current thru resistor R1, Q2 transistor base to emitter, and diode D1 to hold Q2 firmly on. In a short time, the transformer becomes saturated. Then the discharge current from C1 becomes less and the flux begins to decay which reverses the voltage across the transformer coil 1-2. This turns on transistor Q1 and turns off transistor Q2. The C1 capacitor now discharges thru the 4-3 transformer coil. This keeps terminal #2 positive and transistor Q1 is held firmly on by current which flows thru its base to emitter, thru diode D2 and resistor R1. In a short time, the transformer again saturates and the voltage at terminal #2 drops. This turns Q1 partly off and the flux in the transformer reduces. This reverses the voltage across the transformer coil 1-2 and now Q1 turns off and Q2 again turns on. The transformer produces a 30KC output on its two secondary coils, 6-7 and 8-9. These outputs are rectified and filtered to produce a solid D.C. voltage to provide a continuous gate voltage on the silicon controlled rectifiers, SCR1 and SCR2. This turns on SCR1 and SCR2 to provide two independent tripping circuits between studs 7-8 and 9-10. Targets T1 and T2 are included to provide breaker trip indication. A surge capacitor (.68 Mfd.) is connected between studs 4 and 5 and similar surge capacitors are connected from all studs to the surge ground (stud 1) to protect the AA relay from voltage spikes on the control bus.

An external capacitor, C11, is provided to produce sufficient current to operate the targets in the initiating relays. When the initiating contact is made, capacitor C11 is discharged thru the target in the initiating relay, diode D15 and resistor R21 turn on the target.

ACCEPTANCE TESTS

Connect rated voltage to the relay plus directly to stud 2 on 125 volt relays and thru the external resistor R23 for 250 volt relays. Connect minus to stud 4. Connect plus directly to stud 8 and 10 and two 400 ohm resistors from studs 7 and 9 to stud 4. Then jumper stud 2 to stud 5 and check that a voltage

equal to the control power voltage appears across the 400 ohm reisitors as soon as the jumper is connected. If either SCR fails to fire, connect a high resistance voltmeter to the SCR with minus on the cathode and plus on the gate. Check that the voltages are in the corrent direction to turn on the SCR's.

PERIODIC CHECKS AND ROUTINE MAINTENANCE

A periodic check should be made at an interval of from 1 to 2 years to be sure that the relay is in good working order. The operating test described under the section "Acceptance Tests" should be used to check the relay. The only components in the SAA relay that are vulnerable are the SCR's which can be turned on to carry a current beyond their rating.

RENEWAL PARTS

It is recommended that a sufficient quantity of renewal parts be carried in stock for the prompt replacement of any damaged parts.

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 first supplied.

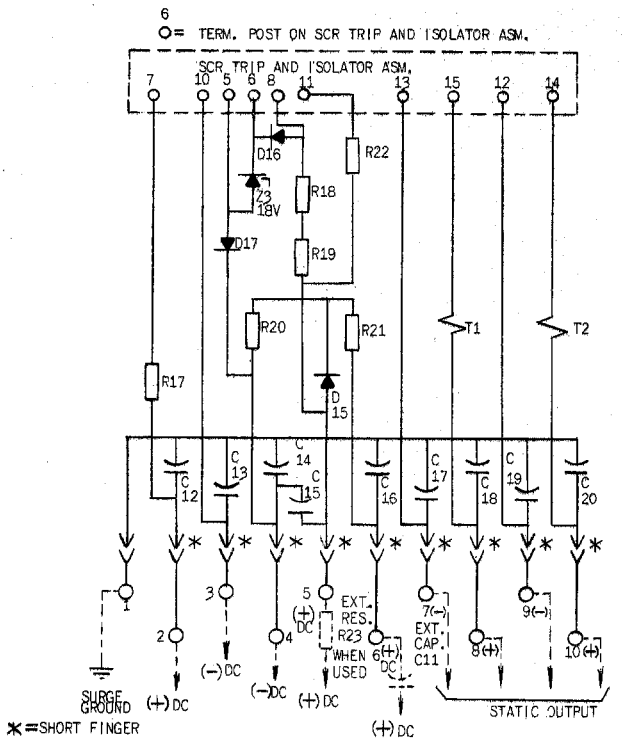

FIG. 2A (0226A6948-0) SH. 1 INTERNAL CONNECTIONS DIAGRAM FOR THE SAA11B RELAY (FRONT VIEW)

MODEL	FORM		
12SAA11B	1	2	
VOLTS D.C.	125	250	
RESISTANCE IN OHMS			
R17	5K	10K	
R18, R19	200	200	
R20	10K	20K	
R21	39Ω	68Ω	
R22	8K	10K	
R23		400	
CAPACITANCE VALUE			
C11	470 uF	250uF.	
C12 THRU C20	0.68uF	0.68uF	

FIG. 2B (0226A6948-1) SH. 3 INTERNAL CONNECTIONS COMPONENT VALUES FOR THE SAA11B RELAY

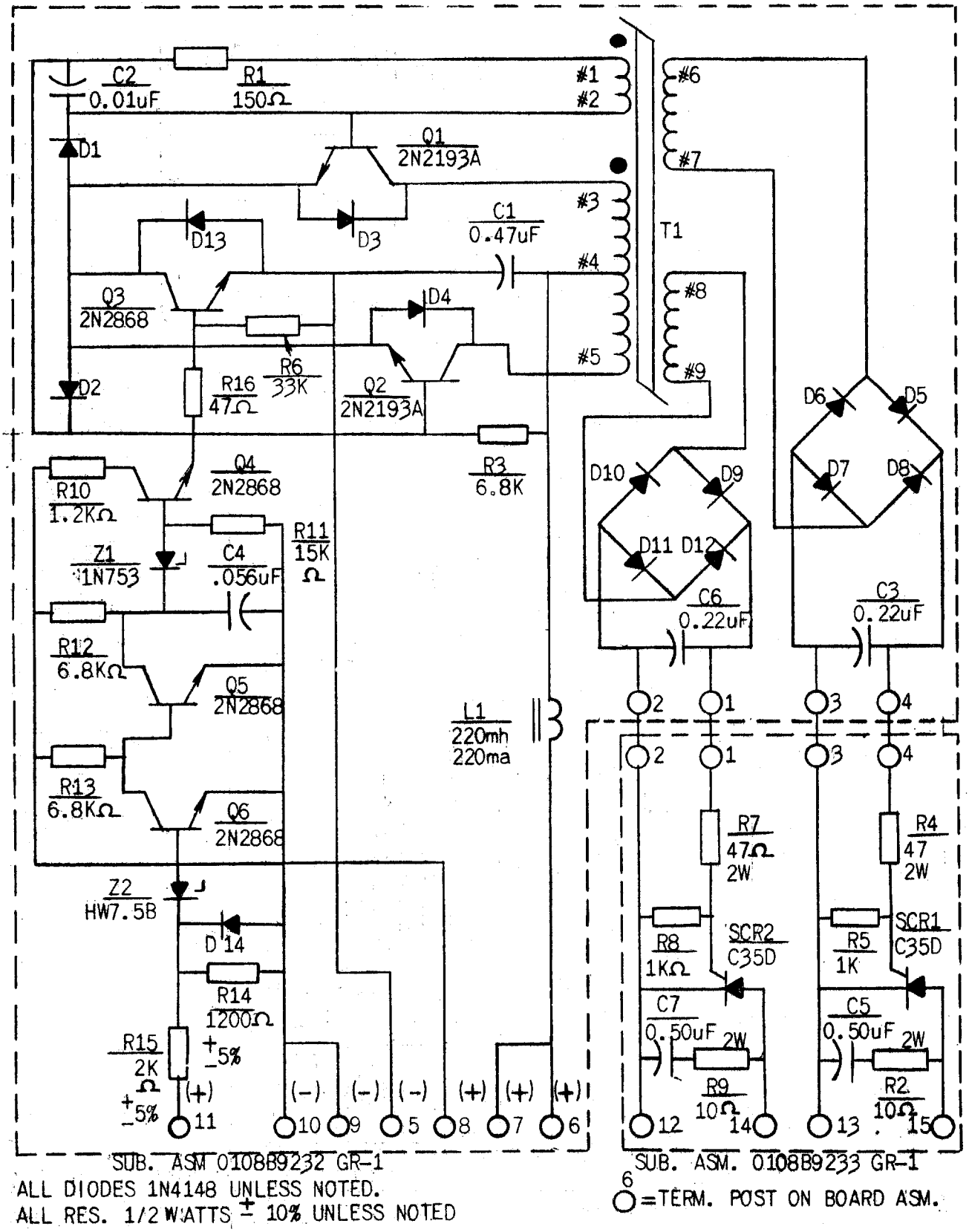

FIG. 2C (0226A6948-1) SH.2 INTERNAL CONNECTIONS, SCR TRIP AND ISOLATOR ASSEMBLY FOR THE SAA11B RELAY

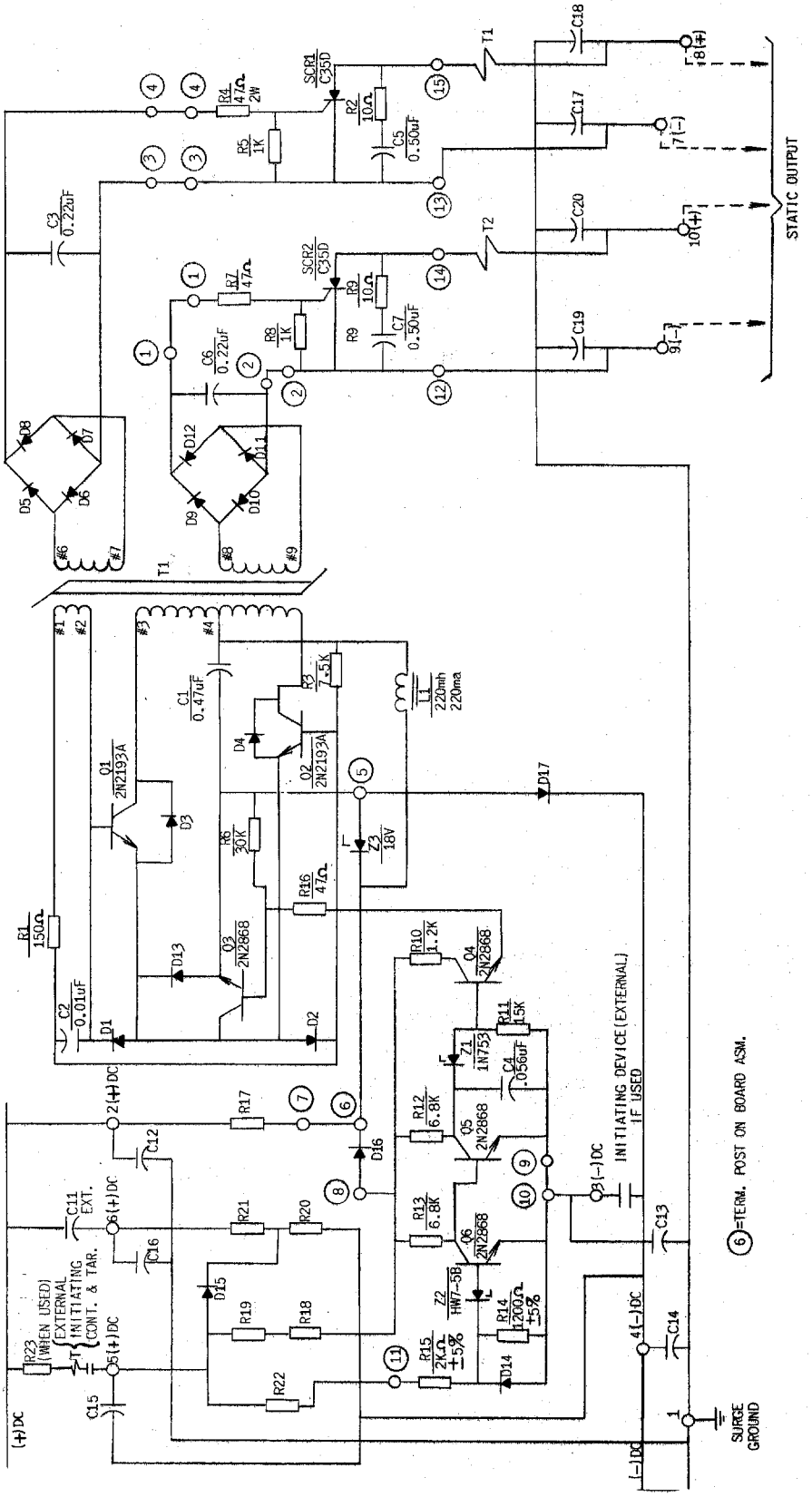

FIG. 3 (0165B2334-1) EXTERNAL CONNECTIONS DIAGRAM FOR THE SAA11B RELAY

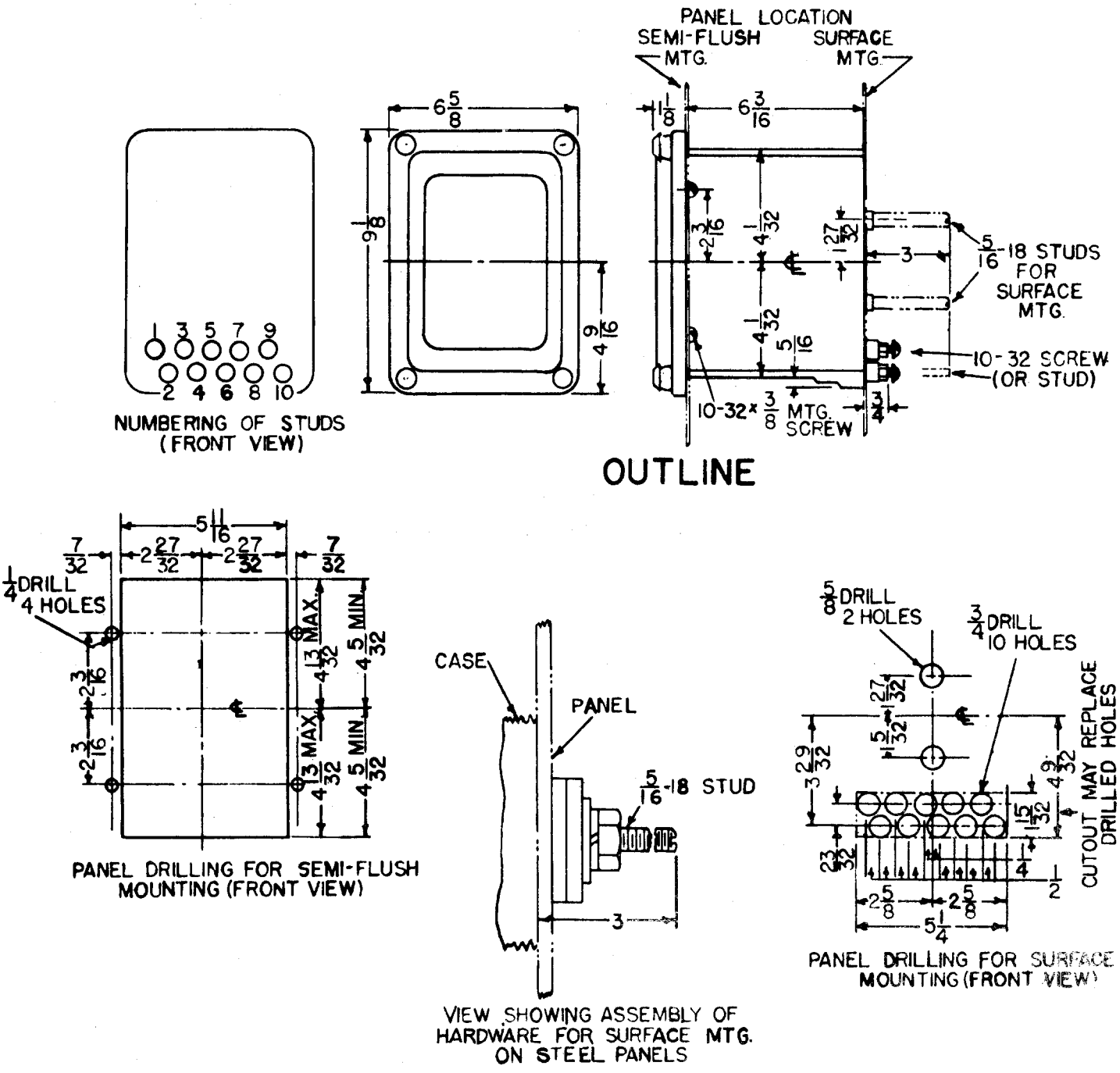

FIG. 4 (6209271-3) OUTLINE AND PANEL DRILLING DIMENSIONS FOR THE SAA11B RELAY

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