



INSTRUCTIONS

GEK-26417

STATIC AUXILIARY TRIPPING RELAY

TYPE SAA11A

POWER SYSTEMS MANAGEMENT DEPARTMENT

GENERAL  ELECTRIC

PHILADELPHIA, PA.

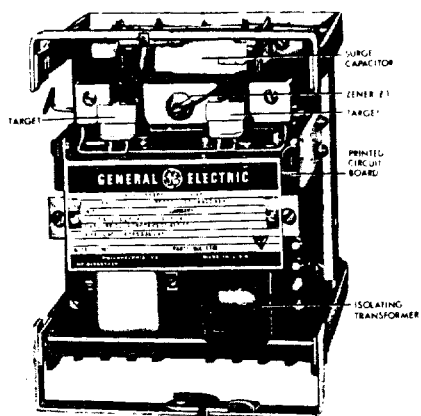


Fig. 1A (8039630) Front View

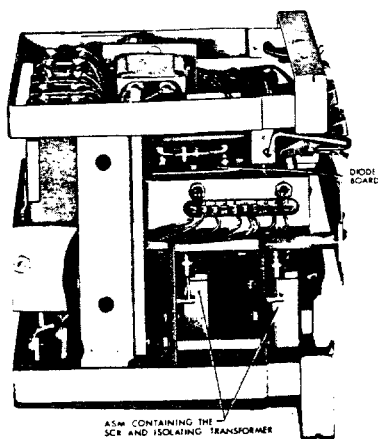


Fig. 1B (8039629) Side View

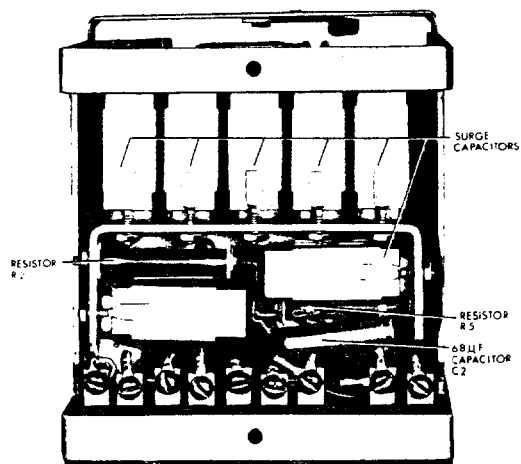


Fig. 1C (8038628) Rear View

Fig. 1 Type SAA11A Relay Removed From Case.

TYPE SAA11A RELAY

INTRODUCTION

The SAA11A 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 a series of pulses 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 three diodes and an external dropping resistor 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 SAA11A 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 SAA11A relay is a D.C. relay with standard ratings of 125 and 250 volts. The SCR's which provide the SAA11A 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 is approximately 10 watts on the 125 volt models and 20 watts on the 250 volt models. Almost all of the burden is dissipated in the dropping resistor R4 which is outside the SAA relay case.

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 circuits. The outer block, attached to the case, has the studs for the external connections.'

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.

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 all 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 lock the latch in place. The cover, which is fastened to the case by thumbscrews, hold 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 10.

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 SAA11A 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 thru the R4 resistor to stud 2 and minus directly to stud 4. The diode D1, D2 and D3 together with the zener regulator "Z1" establish a regulated low voltage power supply for the static component circuits.

When the initiating protective relay contact (or contacts) close, current flows thru R2 to turn on transistor Q1. This current is too low to pick up the target in the protective relay so the external capacitor "C1" is included to dump its charge thru the protective relay contact to provide sufficient current to operate these targets.

When Q1 turns on, it turns on the Q2 transistor which then turns on the Q3 and Q4 transistors. The Q3 and Q4 transistors discharge the two 5 microfarad capacitors thru the primaries of the two isolating transformers associated with the SCR's. This produces a momentary spike of voltage across the gate to cathode of SCR1 and SCR2 and these turn on. The total elapsed time from the protective relay contact closing to the turning on of the SCR's is only a few nanoseconds.

When Q2 turned on, the 0.22 microfarad capacitor will charge thru the 6.8K resistor and after about .65 milliseconds the unijunction will turn on. This will turn the Q2 transistor off and this allows the 0.22 microfarad capacitor to discharge thru the 6800 ohm and the 39,000 ohm resistors. After about 2.5 milliseconds the voltage on the unijunction emitter has been reduced to a value which permits the unijunction to turn off. Immediately the Q2 transistor turns on starting the cycle over again.

There is enough elapsed time between the turning off of Q2 and its turning on again to completely charge the two 5 microfarad capacitors each thru its own 1000 ohm resistor. Therefore, when Q2 turns on the second time, it turns on Q3 and Q4 again and they dump the two capacitors thru the primaries of the gating transformers to produce another gating pulse on the SCR's identical with the first pulse. The series of gating pulses is provided to insure that the SCR's will remain on until the two breakers are tripped.

Surge capacitors are connected between all relay studs and stud 1 which is to be connected to the station surge ground. This is to protect the relay components from surges generated in the external circuits connected to the SAA relay. The tripping SCR's are completely isolated from the SAA control voltage supply. This permits fusing each tripping circuit separately.

ACCEPTANCE TESTS

Connect rated voltage to the relay plus thru the external dropping resistor "R4" (supplied with the relay) to stud 2 and 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 resistors as soon as the jumper is connected. If either SCR fails to fire, connect a scope to the SCR with the scope ground on the cathode and the scope input on the gate. Check that the pulses are in the correct direction to turn on the SCR.

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 component in the SAA relay that is vulnerable is 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.

GEK-26417 Static Auxiliary Tripping Relay - Type SAA11A

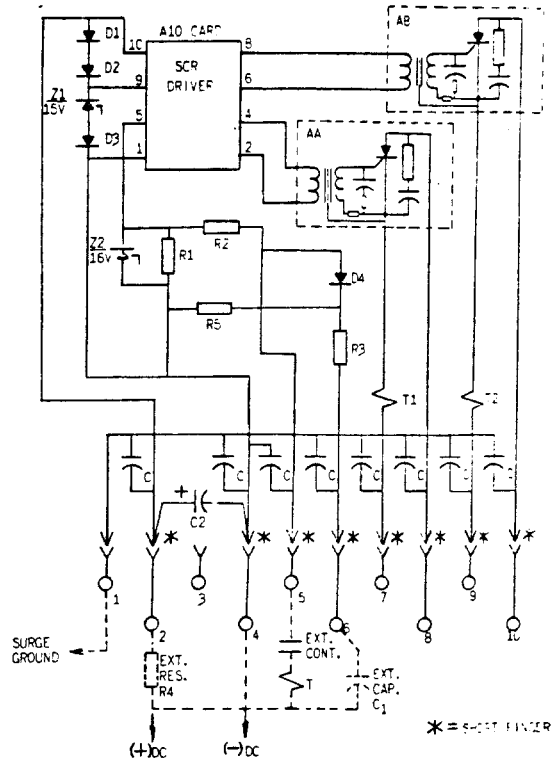


Fig. 2A (0195A4969-4) Sh. 1 Internal Connections Diagram For The SAA11A Relay.

COMPONENT	DC RATING	
	125V	250V
R1	5K	5K
R2	25 K	50K
R3	40 Ω	60 Ω
R4*	1.5K	3K
R5	10K	20K
C	0.5 uf	
C1*	470uf	250 uf
C2	68uf	68 uf

*R₄ & C₁ MOUNTED EXTERNALLY

Fig. (0195A4969-1) Sh. 2 Internal Connections Values For The SAA11A Relay.

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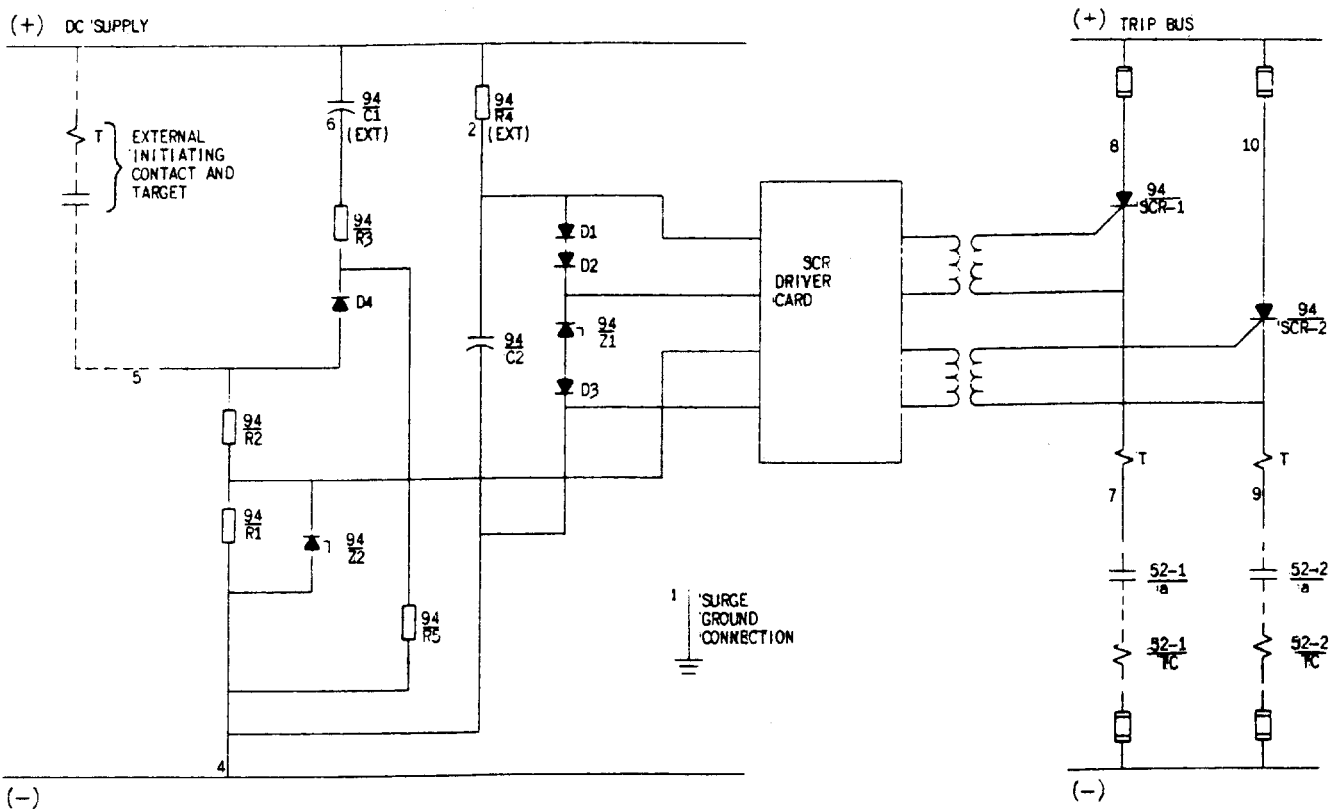


Fig. 3 (0165B2287-0) External Connections Diagram For The SAA11A Relay.

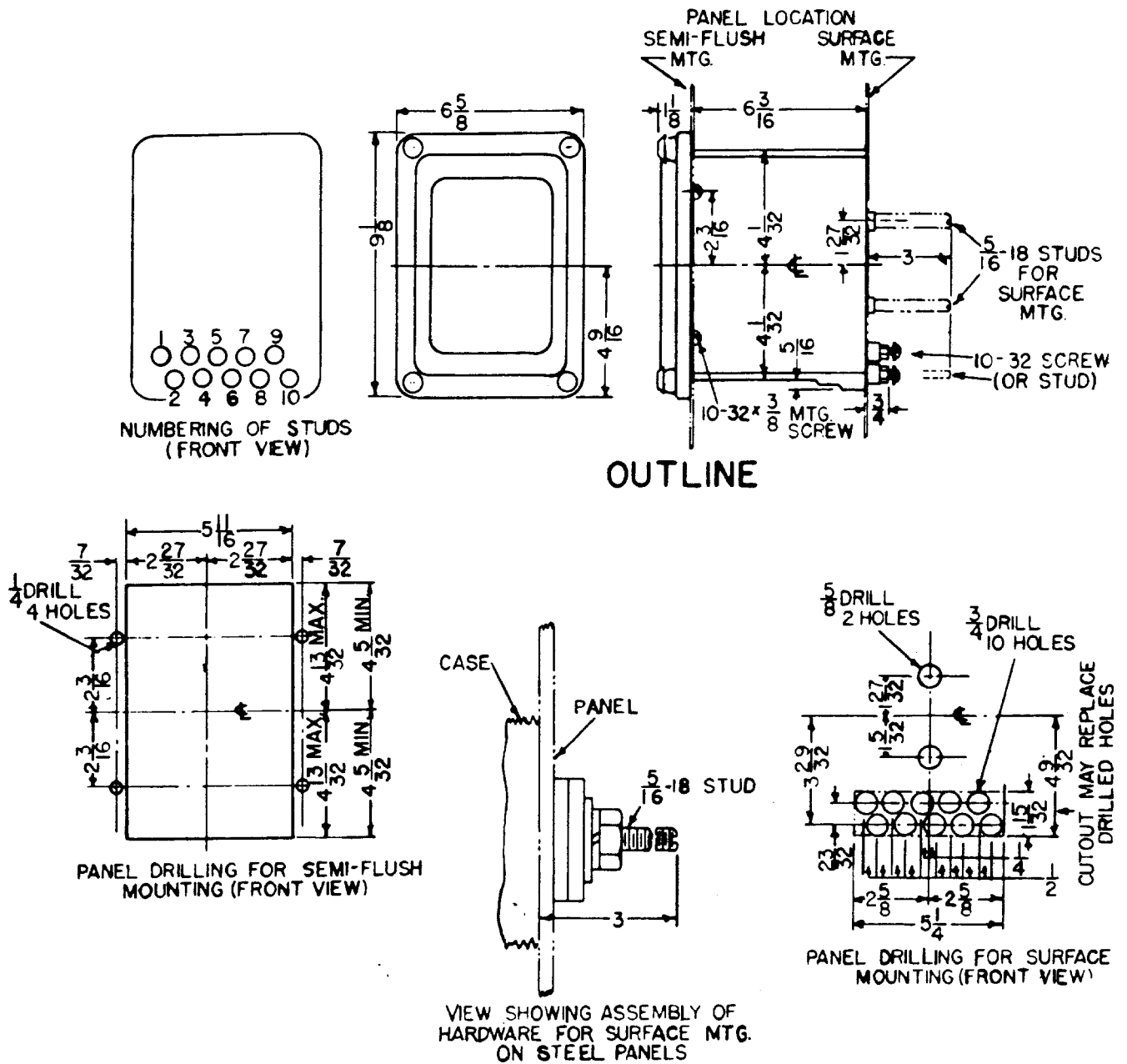


Fig. 4 (K-6209271-3) Outline & Panel Drilling For Drawout Relays - Size S1