



Static Overexcitation Relay

TYPE STV11A



Fig. 1A (8037497) Front View

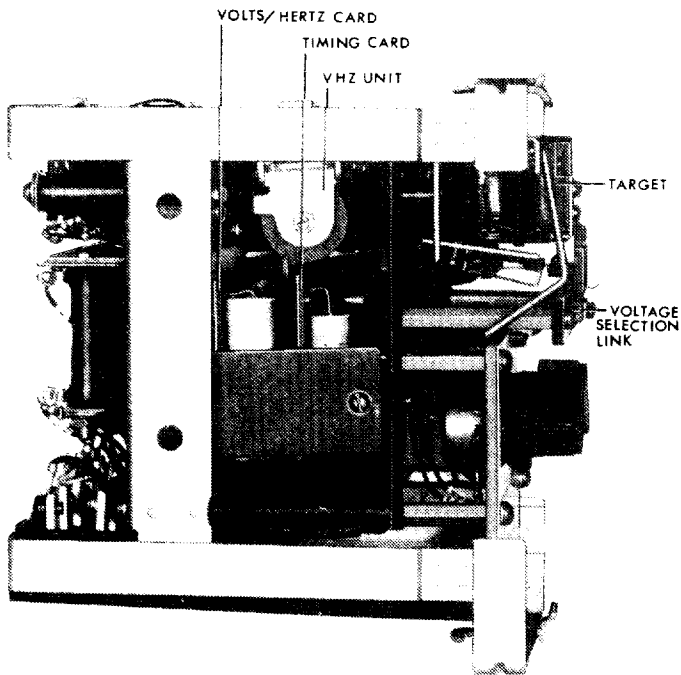
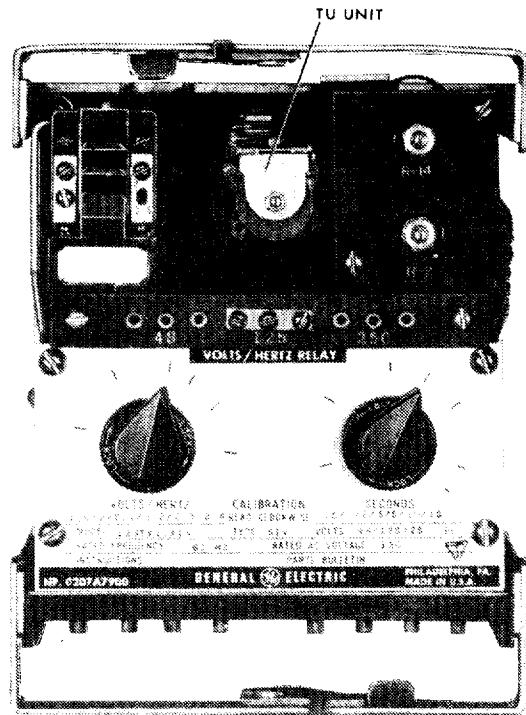


Fig. 1B (8037500) Left Side View

Fig. 1C (8037499) Rear View

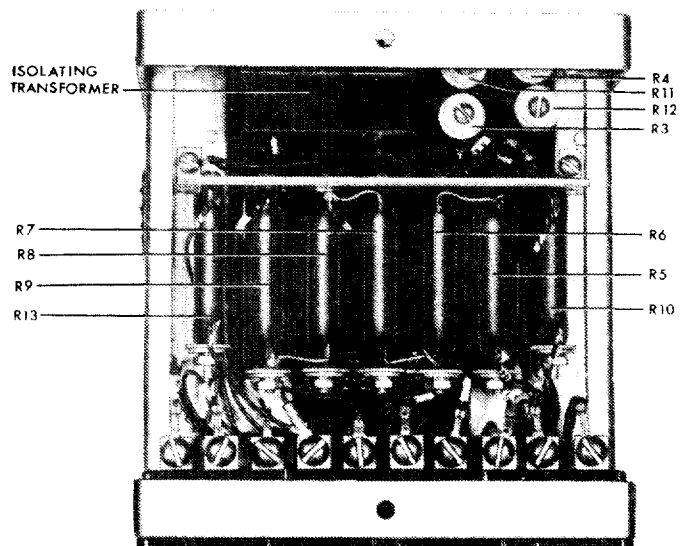


Fig. 1 Type STV11A Relay Removed From Case.

STATIC OVEREXCITATION RELAY TYPE STV11A

DESCRIPTION

The Type STV relay is a single phase static overexcitation relay. It consists of an overexcitation sensing unit which has a linear constant volts per hertz pickup, and a timing unit to provide a definite time before initiating some protective action. A target seal-in unit is also provided to protect the timing unit contacts during tripping duty.

APPLICATION

The Type STV static overexcitation relay is designed for the specific application of protecting a power transformer from overexcitation. Overexcitation of a power transformer can occur either during the start-up or the shut-down of a unit generator transformer. It can also occur as a result of remote load rejection that unexpectedly unloads a unit generator transformer. The overexcitation on the transformer can cause damaging overheating due to core saturation within a very short time. The overexcitation relay having a constant volts per hertz pickup is applied to recognize this condition and to initiate some action to protect the transformer from damage.

Typical external connections for this relay are shown in Fig. 3. The initial sensing of an excess volts per hertz (VHZ) relay pickup can be applied to sound an alarm. If the excess volts per hertz condition persists for an adjustable time delay, then "TU" unit picks up. The "TU" unit should be connected to trip the main generator field breaker (41). An alternate connection can also be used to initiate runback of the field exciter rheostat to reduce excitation.

RATINGS

The STV relay is rated at 120 volts 60 hertz. The pickup calibration range is continuously adjustable from 1.8 to 2.5 volts per hertz and is set by means of the left hand calibration knob on the front of the relay. The timing unit range is continuously adjustable from 0.5 to 15 seconds and is set by means of the right hand calibration knob on the front of the relay. The DC voltage rating is 48, 125, or 250 volts and is selected by the link settings on the front of the relay. The target seal in unit is rated at 0.6/2.0 amperes.

INTERRUPTING RATING

Volts	Amp (Inductive)	Amp (Noninductive)
12 DC	1.0	3.0
24 DC	1.0	3.0
32 DC	1.0	3.0
48 DC	1.0	3.0
125 DC	0.5	1.5
250 DC	0.25	0.75
69 50/60 Hz	1.0	3.0
120 50/60 Hz	0.75	2.0
208 50/60 Hz	0.5	1.0
240 50/60 Hz	0.5	1.0
277 50/60 Hz	0.4	0.8
480 50/60 Hz	0.25	0.4

NOTE: The inductive rating is based on the inductance of an average trip coil.

TARGET AND SEAL-IN UNIT

	DUAL RATED			
	0.2/2.0		0.6/2.0	
	0.2	2.0	0.6	2.0
Carry 30 amps for (sec)	0.05	2.2	0.5	3.5
Carry 10 amps for (sec)	0.45	20	5.0	30
Carry continuously (amp)	0.37	2.3	1.2	2.6
Minimum operating (amp)	0.2	2.0	0.6	2.0
Minimum dropout (amp)	0.05	0.5	0.15	0.5
DC resistance (ohms)	8.3	0.24	0.78	0.18
60 hertz impedance (ohms)	50	0.65	6.2	0.65
50 hertz impedance (ohms)	42	0.54	5.1	0.54

If the tripping current exceeds 30 amperes, an auxiliary relay should be used, the connections being such that the tripping current does not pass through the contacts or the target and seal-in coils of the protective relay.

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.

GEK-6885 Static Overexcitation Relay Type STV11A

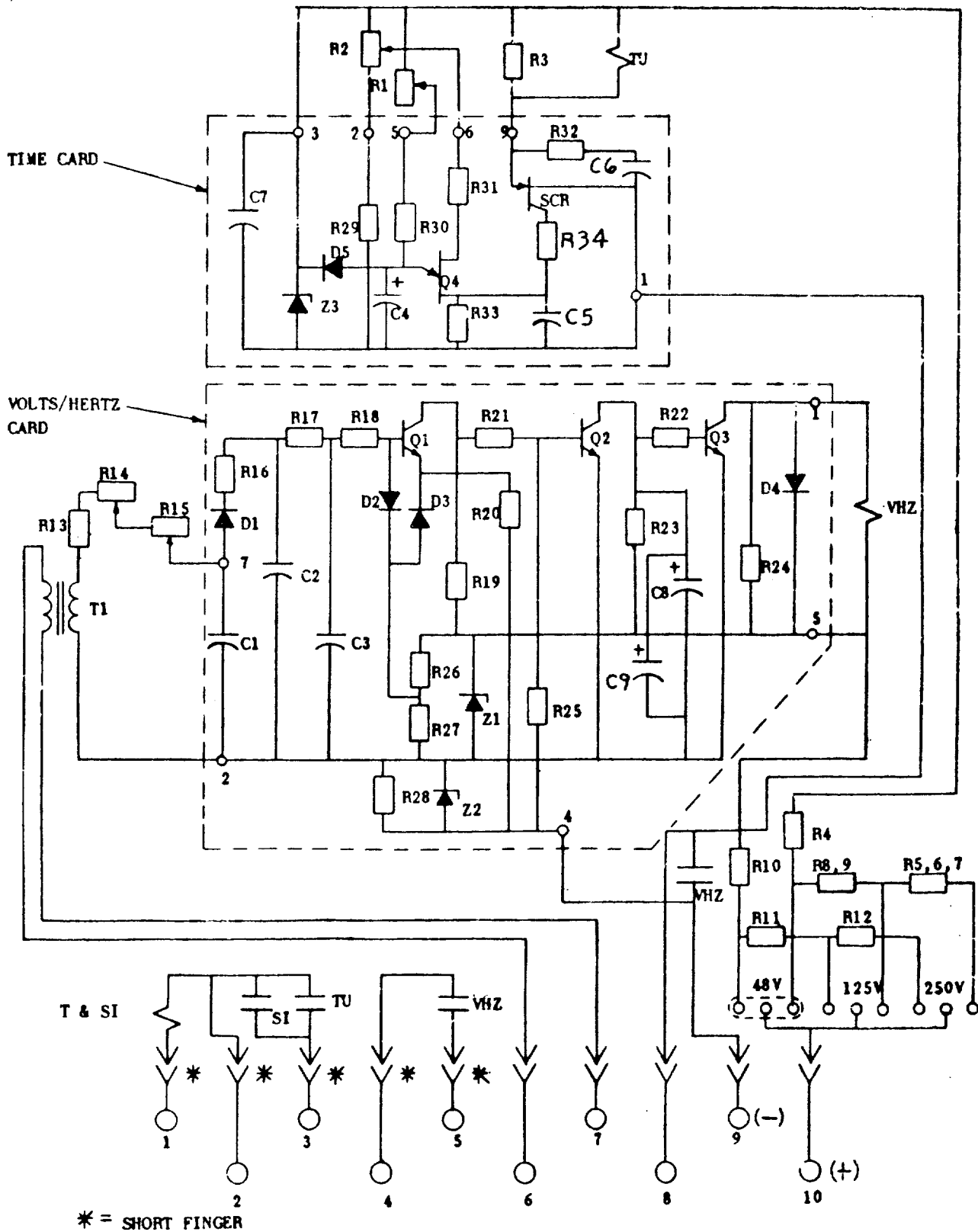


Fig. 2 (0203A8569-3) Internal Connection Diagram for Relay Type STV11A. (Front View)

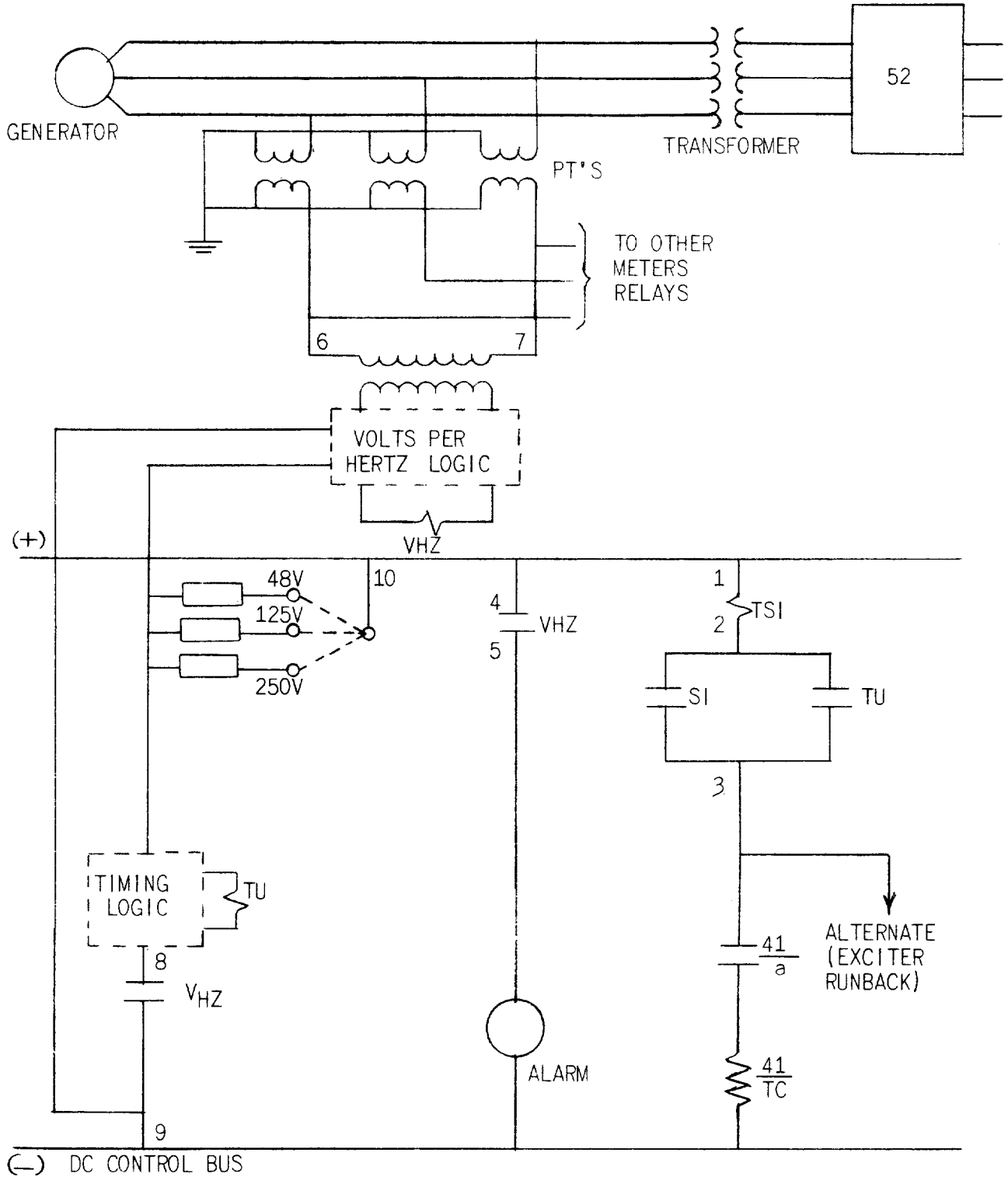


FIG. 3

Fig. 3 (0203A8685-1) External Connection Diagram for the Type STV11A Relay.

BURDENS

The AC burden is approximately 0.6 volt amp-eres.

The DC Burden (Timer not energized)

DC VOLTS	WATTS
48	1.10
110	2.75
125	3.00
220	5.40
250	6.00

DC Burden (Timer energized)

DC VOLTS	WATTS
48	5.8
110	13.1
125	16.0
220	27.9
250	34.5

CONSTRUCTION

The Type STV relays are assembled in the standard small size, single end (S1) drawout case having studs at the lower end in the rear for external connections. The electrical connections between the relay components and the case studs are made through 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, and the inner block has the terminals for the internal connections.

The relay components are mounted on the steel framework called the cradle forming a complete unit with all leads terminated at the inner block. This cradle is held firmly in the case by latches at both top and bottom and by a guide pin at the back of the case. The connecting plug, besides making the electrical connections between the 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 plugs in place. The target reset mechanism is a part of the cover assembly. The cover also contains an interlock mechanism which prevents the cover from being fastened to the case unless the connection plug is in place.

A separate testing plug can be inserted in place of the connecting plug to test the relay in place on the panel either from its own source of voltage, or from other sources. Or the relay can be drawn out and replaced by another which has been tested in the laboratory.

The relay case is suitable for either semi-flush or surface mounting on all panels up to 2 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.

The cradle assembly includes the printed circuit card assemblies for the volts/hertz function and timing function, the rheostats used in setting these functions, the voltage dropping resistors used in the DC voltage selection, the output relays (VHZ & TU) and a target seal in unit.

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.

Also check the nameplate stamping to insure that the model number and the rating of the relay received agree with the requisition. Check the operation manually and check that the contact gap and wipe agree with the values given under the section MECHANICAL CHECK.

MECHANICAL CHECK

Before installation, the relay should be checked mechanically to see that it operates smoothly and that the contacts are correctly adjusted.

With the relay de-energized each normally open contact should have a gap of .010" - .015". Observe the wipe on each normally closed contact by deflecting the stationary contact member towards the frame. Wipe should be approximately .005".

The wipe on each normally open contact should be approximately .005". This can be checked by inserting a .005" 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.

TARGET AND SEAL-IN UNIT

1. Make sure that the tap screw is in the desired tap.
2. Perform pickup and drop-out tests as outlined in the ACCEPTANCE TEST section.

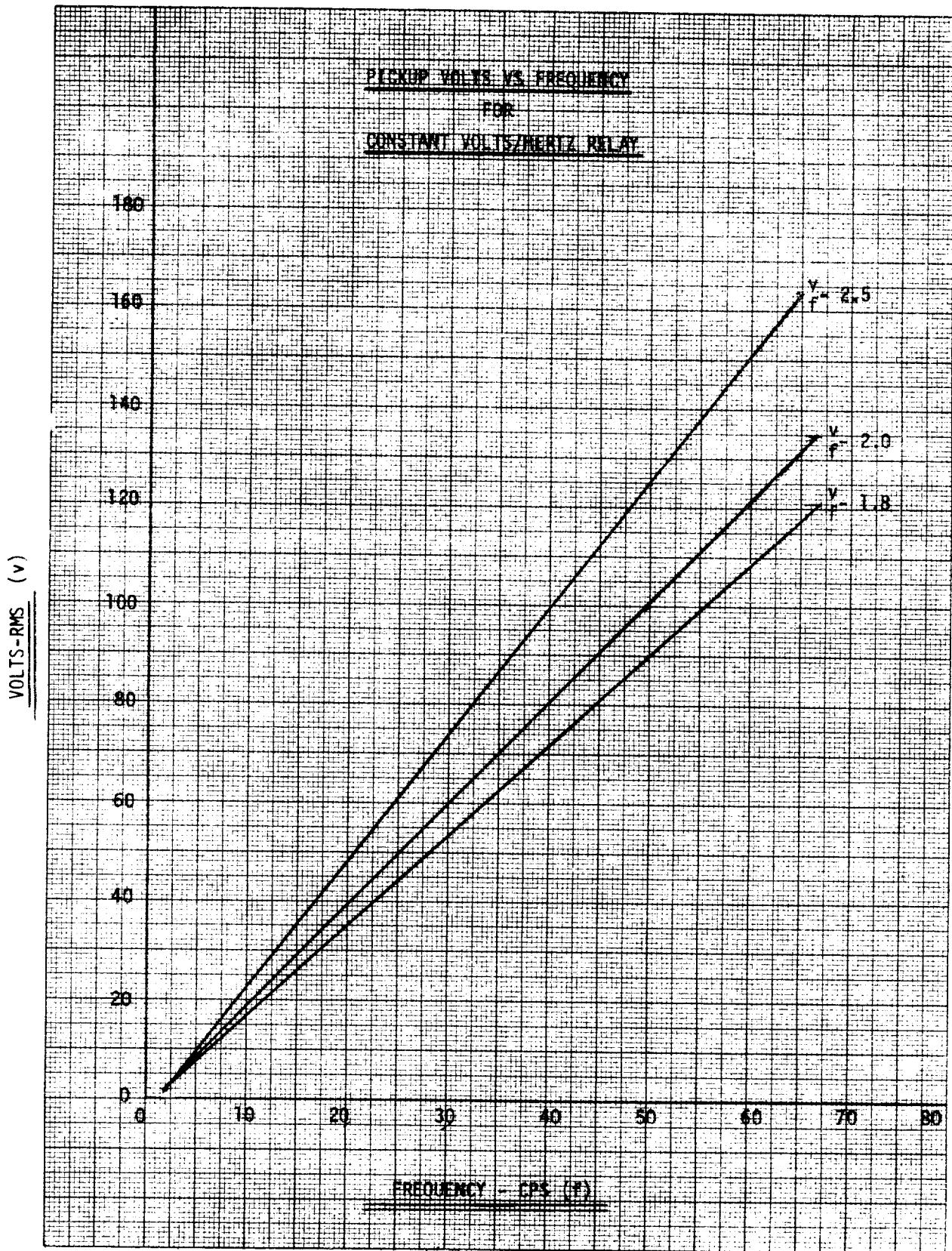


Fig. 4 (0207A7819-1) Diagram of Pickup Volts VS Frequency for Constant Volts/Hertz Relay.

CHARACTERISTICS

The isolating transformer keeps the DC voltage separate from the AC system. The voltage across the capacitor "C1" is adjusted by means of the rheostats R14 and R15. This voltage is connected through a diode (and a filter to reduce the AC ripple) to the base of the Q1 transistor. This applies a DC voltage proportional to the AC voltage across the C1 capacitor to the base of the Q1 transistor. When this voltage is higher than the voltage at the Q1 emitter then Q1 turns on. This in turn turns off the Q2 transistor which permits Q3 to turn on with some time delay to pickup the VHZ unit. The pickup voltage of the VHZ unit divided by the frequency is a constant or

$$* \frac{VPU}{F} = C \pm 2\%$$

This holds over a frequency range of 15 to 72 hertz.

The relay is continuously adjustable for values of C equal to 1.8 to 2.5 inclusive. Curves showing pick up voltage versus frequency are given in Fig. 4.

The VHZ unit picks up in 0.8 seconds approximately. The pick up voltage at 60 cycles will not vary more than ± 4 percent if the relay ambient temperature is dropped to -20°C or raised to 65°C .

The operating principles of the timing circuit can best be described with the aid of the simplified schematic diagram of Fig. 5 which shows the TU timing circuit. The timing sequence is initiated by contact of the VHZ auxiliary unit, which is picked up by the volts per cycle network. Basically the circuit measures the time it takes to charge a capacitor (C4) to a definite voltage through an adjustable resistor (R1). A zener regulator (Z3) holds the voltage across the resistor-capacitor combination at a constant value so that charging time will vary directly with the setting of R1 and will be practically independent of fluctuations in the DC voltage supply. When the charge on capacitor C4 reaches a definite value, unijunction transistor Q4 will be turned on. This in turn triggers a controlled rectifier SCR which picks up the auxiliary unit TU. If the initiating network drops out VHZ prior to the completion of the timing cycle, diode D5 provides a low-resistance discharge path for the capacitor so that the timing circuit will completely reset in a very short time.

ACCEPTANCE TESTS

Select the proper DC voltage tap according to voltage rating of DC supply. Connect the DC to the relay having (+) on stud 10 and (-) on stud 9. Connect a source of variable AC voltage to studs 6 and 7. To determine the operation of the volts/hertz function connect an indicating lamp and suitable source to studs 4 and 5. These connections may be made to the relay by means of a test plug which is used in place of the normal connecting plug.

Select a setting of the volts/hertz rheostat. With rated DC voltage applied to the relay gradually increase the AC voltage until a volts/hertz output

occurs as shown by the VHZ relay picking up and closing the contact between studs 4 and 5. The value of AC voltage at any dial position should be equal to the frequency times the setting $\pm 1\%$ ($V = \text{frequency} \times \text{setting} \pm 1\%$). Gradually reduce the applied AC voltage. The VC relay should dropout at a value above 96% of pickup.

To check the timing function adjust the AC supply to values at which the VC relay picks up. Connect the contact of VC between studs 4 and 5 to start a suitable timer and the contact between 2 and 3 ("TU" contact) to stop the timer. The time setting can be adjusted as desired by the R1 rheostat (and if necessary also by the R2 rheostat).

TARGET AND SEAL-IN UNIT

The target and seal-in unit has an operating coil tapped at 0.2 and 2.0 amperes or 0.6 and 2.0 amperes. The relay is shipped from the factory with the tap screw in the higher ampere position. The tap screw is the screw holding the right hand stationary contact. To change the tap setting, first remove one screw from the left hand stationary contact and place it in the desired tap. Next remove the screw from the undesired tap and place it on the left hand stationary contact where the first screw was removed. See Figure 1 A. This procedure is necessary to prevent the right hand stationary contact from getting out of adjustment. Screws should never be left in both taps at the same time.

Pickup And Dropout Test

1. Connect relay studs 1 and 2 to a DC source, ammeter and load box so that the current can be controlled over a range of 0.1 to 2.0 amperes.
2. Increase the current slowly until the seal-in unit picks up.
3. Decrease the current slowly until the seal-in unit drops out.

TABLE II

TAP	PICKUP CURRENT	DROP-OUT CURRENT
0.2 2.0	0.12 - 0.20 1.2 - 2.0	0.05 or more 0.50 or more
0.6 2.0	0.36 - 0.60 1.2 - 2.0	0.15 or more 0.50 or more

SERVICING

CAUTION

Remove ALL power from the relay before removing or inserting any of the printed-circuit boards.

Failure to observe this caution may result in damage to and/or misoperation of the relay.

The relay should be tested before installation and once a year thereafter as indicated under ACCEPTANCE TESTS.

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.

If for any reasons the STV11A relay is out of calibration set the volts/cycle rheostat on the 2.2 position and adjust R14 (top rheostat, right corner front view) until the VC contact closes at 131.4 - 132.6 volts. A 60 cycle source is used in making this adjustment.

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

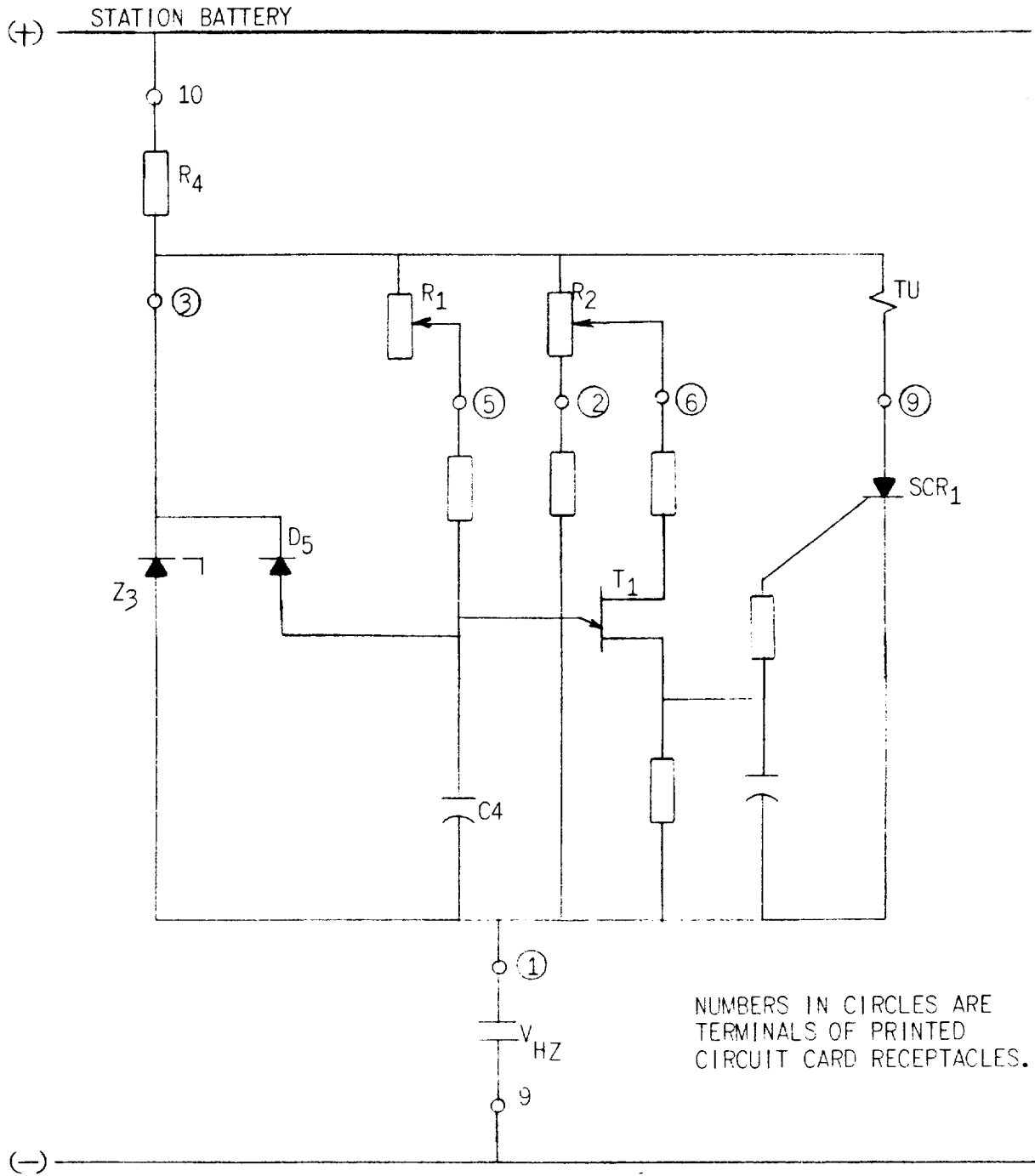


Fig. 5 (0203A8684-2) Simplified Schematic Diagram of Timing Circuit Used in the STV11 Relay.

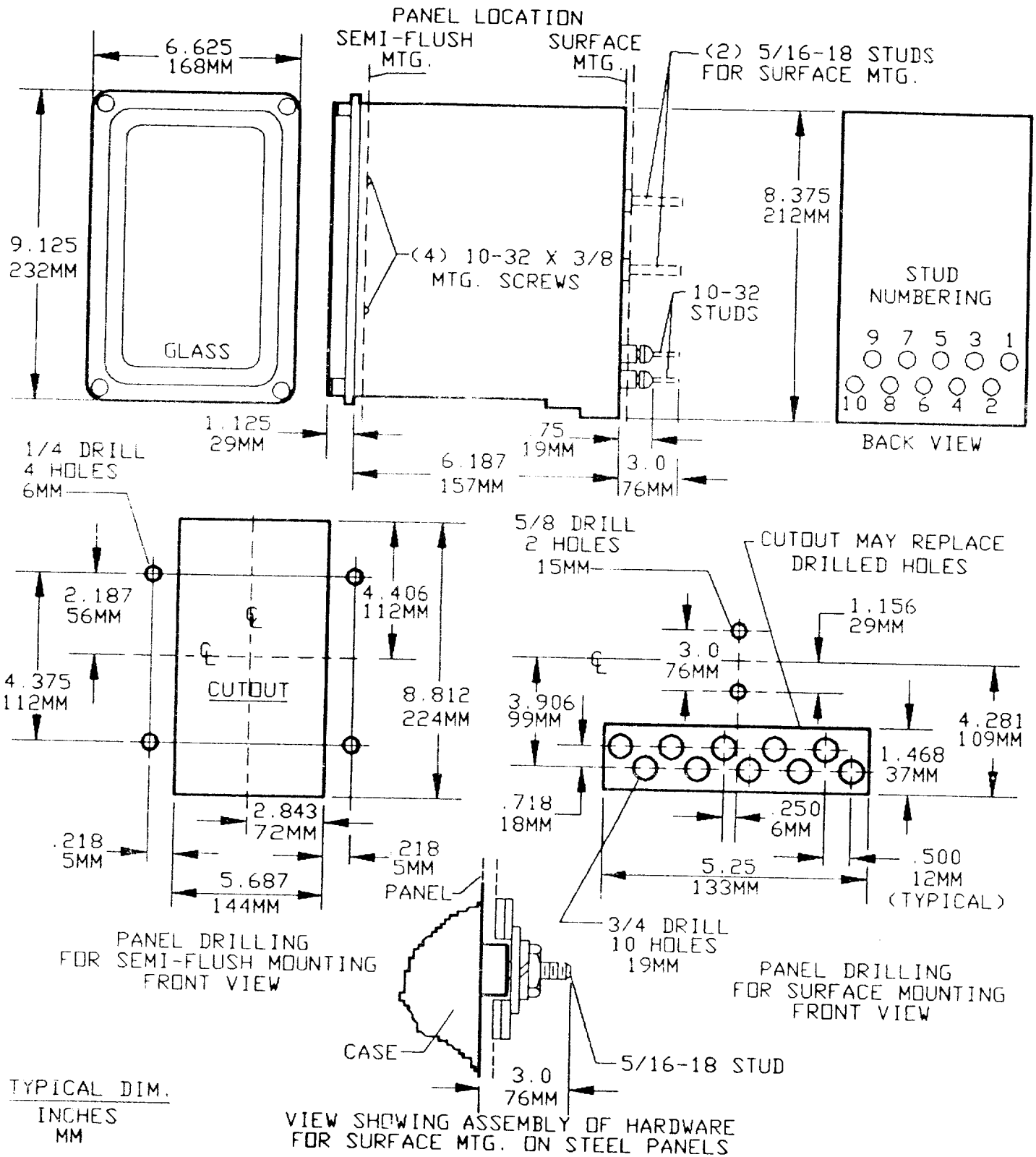


Fig. 6 (6209271 [8]) Outline and Panel Drilling Dimensions for the STVIIA Relay.

Since the last edition, a changes have been made in the **SERVICING** section, and in Figure 6.



GE Power Management

**215 Anderson Avenue
Markham, Ontario
Canada L6E 1B3
Tel: (905) 294-6222
Fax: (905) 201-2098
www.ge.com/indsys/pm**