



**INSTRUCTIONS**

**GEK-1272B**

*SUPERSEDES GEK-1272*

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# **TRANSFERRED TRIP AUXILIARY RELAYS**

**TYPE NAA27N**

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**GENERAL  ELECTRIC**



# TRANSFERRED TRIP AUXILIARY RELAY TYPE NAA27N

## INTRODUCTION

The NAA27N is a special purpose auxiliary relay that is employed in permissive overreaching transferred tripping schemes in conjunction with line relays and other auxiliary devices to provide line protection. This relay has no other general field of application. Figure 4 shows the internal connections for the NAA27N relay which comes in an S2 case.

### APPLICATION

The NAA27N relay finds application in permissive overreaching transferred tripping schemes for transmission line protection. Figs. 2 & 2A illustrate how the NAA27N is used in a typical protective scheme of this kind over a Type 20 frequency shift tone channel.

In the application of this relay, it is important to insure that the time delay pick up setting of

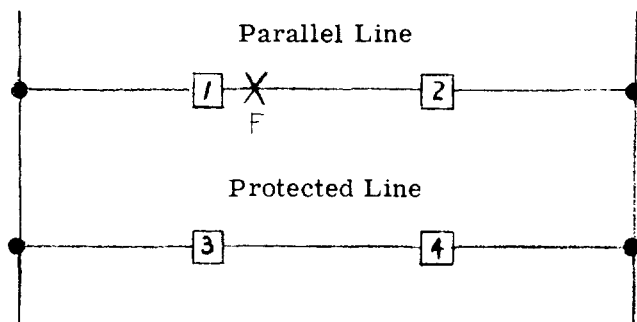


Fig. 1 Typical Protective Scheme

the TTZ unit meets the requirements of the system. The TTZ unit, as will be noted from the external connections of Fig. 2, introduces a small time delay in the operation of the scheme.

The need for the coordinating time delay auxiliary TTZ (on multi-terminal as well as on two-terminal lines) results from the possibility of fault current reversals after clearing an external fault. This may best be understood by referring to Figure 1. Assume a fault at F with system conditions such that the phase and/or ground relays on the protected line at terminal 4 see the fault and send a transferred trip signal which is received at terminal 3. The phase and ground relays at 3 do

not operate to trip. Some short time later, terminal 1 trips but terminal 2 does not until some still later time. At the instant that terminal 1 trips, the current in the protected line reverses and the phase and/or ground relays at terminal 4 open to release the keying circuit. At terminal 3 the phase or ground relays will operate and may trip breaker 3 because of the release time of the channel. That is, the transferred trip receiver at terminal 3 will continue to produce a trip output for a short time after the keying circuit at terminal 4 is released. If the phase or ground relays at terminal 3 operate within that time, breaker 3 will be tripped incorrectly. For this reason the time delay coordinating unit TTZ is used. The time delay pick up setting of TTZ should be set for approximately 3-4 milliseconds longer than the release time of the channel being used. The release time of the channel should be obtained from the manufacturer of the channel. It is defined as the time measured from the instant the transmitter is keyed off until the receiver trip output disappears.

If the circuit to be protected cannot be subjected to power reversals on clearing an external fault, the TTZ function is not needed and studs 1 and 2 in the NAA27N should be jumpered together.

It should be noted that when TTZ is used, it only increases the overall tripping time by a small amount. This is so because the TTZ unit is timing out while the trip signal is being sent. Because the channel operating and release times are approximately equal in frequency shift channels, if the protective relays at both ends of the line operate at the same time, the TTZ unit will only add 3-4 milliseconds to the overall tripping time.

### OPERATING CHARACTERISTICS

The operating characteristics of all units are shown in the tabulations accompanying the internal connection diagram (Fig. 4).

### RATINGS

The Type NAA relays covered by these instructions are suitable for continuous operation at the rated DC voltage shown on the nameplate and are available for 48, 125 and 250 volt applications. The resistance values of the telephone type relays and associated resistors are listed on the internal connection diagram (Fig. 4).

*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-1272 Transferred Trip Auxiliary Relays Type NAA27N

| 0127A7154              |    |    |           |     |      |
|------------------------|----|----|-----------|-----|------|
| FSS-TEST SWITCH (SEND) |    |    | BACK VIEW |     |      |
| CONTACTS HANDLE END    |    |    | NORM.     | OFF | TRIP |
| 1                      | 1C | 2C | 2         | X   | X    |
| 3                      | 3C | 4C | 3         | X   | X    |
| 5                      | 5C | 6C | 5         | X   | X    |
| LOCKS IN ANY POSITION  |    |    |           |     |      |

| 16SB1C0845                |    |    |           |     |     |
|---------------------------|----|----|-----------|-----|-----|
| TSR-TEST SWITCH (RECEIVE) |    |    | BACK VIEW |     |     |
| CONTACTS HANDLE END       |    |    | NORM.     | OFF | YES |
| 1                         | 1C | 2C | 2         | X   | X   |
| 3                         | 3C | 4C | 3         | X   | X   |
| 5                         | 5C | 6C | 5         | X   | X   |
| 6                         |    |    | 6         | X   |     |

NOTE 2 - IF SEPARATE OUT OF STEP BLOCKING RELAYS ARE USED FOR PRIMARY & BACK UP RELAYS MAKE CONNECTIONS SHOWN. IF OUT OF STEP BLOCKING IS NOT USED MAKE DASH CONNECTIONS. SEE NOTE 6

NOTE 3 - WHEN TRIPPING TWO BREAKERS, USE AUXILIARY SWITCHES FROM EACH BREAKER IN SERIES.

| TABULATION OF DEVICES |             |           |
|-----------------------|-------------|-----------|
| TYPE OR DESCRIPTION   | INT. CONNS. | OUTLINE   |
| KEY16A                | 0127A8416   | K-6209276 |
| CLOCK16               | 0127A8416   | K-6209274 |
| PULSE16               | 0127A8416   | K-6209272 |
| NAA27N                | 0127A8416   | K-6209272 |
| HGALAM (BACK CONN.)   | K-6400533   | K-6400533 |
| HGALAM (FRONT CONN.)  | 0127A7194   | 0127A7194 |
| TEST SWITCH SEND      | SB1         | 116A130   |
| TEST SWITCH RECEIVE   | SB1         | 116A130   |
| RECT. Z (102A238 G3)  | 125V        | 104A8523  |
| RECT. Y (102A238 G1)  | 125V        | 104A8523  |
| RECT. X (102A238 G2)  | 125V        | 104A8523  |
| CEB12B                | 377A103     | K-6209274 |
| INDICATING LAMPS      | ET16        | 016A7859  |

NOTE 4 - RECTIFIER Y IS NOT REQUIRED IF OUT OF STEP BLOCKING RELAY IS NOT USED.

NOTE 5 - THIS CONTACT WILL OPEN & BLOCK TRANSFERRED TRIPPING IF LOSS OF GUARD PERSISTS FOR 0.4 SECONDS. IF THIS FEATURE IS NOT REQUIRED, ADD JUMPER BETWEEN STUDS 2 & 3 OF DEVICE 94A.

NOTE 6 - IF ONLY ONE OUT OF STEP BLOCKING RELAY IS USED FOR BOTH PRIMARY & BACK UP PROTECTION, IT SHOULD BE USED IN CONJUNCTION WITH THE BACK UP WHO UNIT WITH AN OB CONTACT TO BLOCK THE PRIMARY PROTECTION. IF NO OUT OF STEP BLOCKING IS USED, MAKE DASH CONNECTIONS.

NOTE 7 - ADJUST PICK-UP TIME OF TTX TO BE 4MS LONGER THAN THE CHANNEL RELEASE TIME.

| LEGEND     |              |   |
|------------|--------------|---|
| DEVICE NO. | DEVICE TYPE  | DESCRIPTION   |
| 21         | CEY16A       | THREE PHASE WHO DISTANCE RELAY                                      |
|            |              | PHASE 1-2 UNIT ETC.   |
| 67GT       | CJCGSE       | DIRECTIONAL GROUND RELAY  |
|            |              | D   |
|            |              | TOC   |
|            |              | INSTANTANEOUS OVERCURRENT UNIT                                      |
| 50         | PJCGIC       | TIME OVERCURRENT UNIT   |
|            |              | TARGET & SEAL-IN  |
| 94A        | NAA27N       | TRANSFERRED TRIP AUXILIARY RELAY                                    |
|            |              | RECLOSE INITIATION & PROLONGED KEYING UNIT                          |
|            |              | TX  |
|            |              | GUARD ALARM UNIT  |
|            |              | Y   |
| 94B        | NAA27N       | TRANSFERRED TRIP AUXILIARY RELAY                                    |
|            |              | AUXILIARY TO KEY TRANSMITTER ON OPEN BREAKER                        |
|            |              | TTZ   |
|            |              | COORDINATING UNIT   |
|            |              | TTT   |
|            |              | AUXILIARY TO KEY TRANSMITTER & INITIATE RECLOSE FROM BACK UP RELAYS |
| 94T        | HGALAM of AL | AUXILIARY TRIPPING RELAY  |
| 68         | CEB12B       | OFFSET WHO OUT OF STEP BLOCKING RELAY                               |
|            |              | MB  |
|            |              | WHO BLOCKING UNIT   |
|            |              | TR  |
|            |              | TRANSACTOR  |
|            |              | OB  |
|            |              | AUXILIARY UNIT FOR MB   |

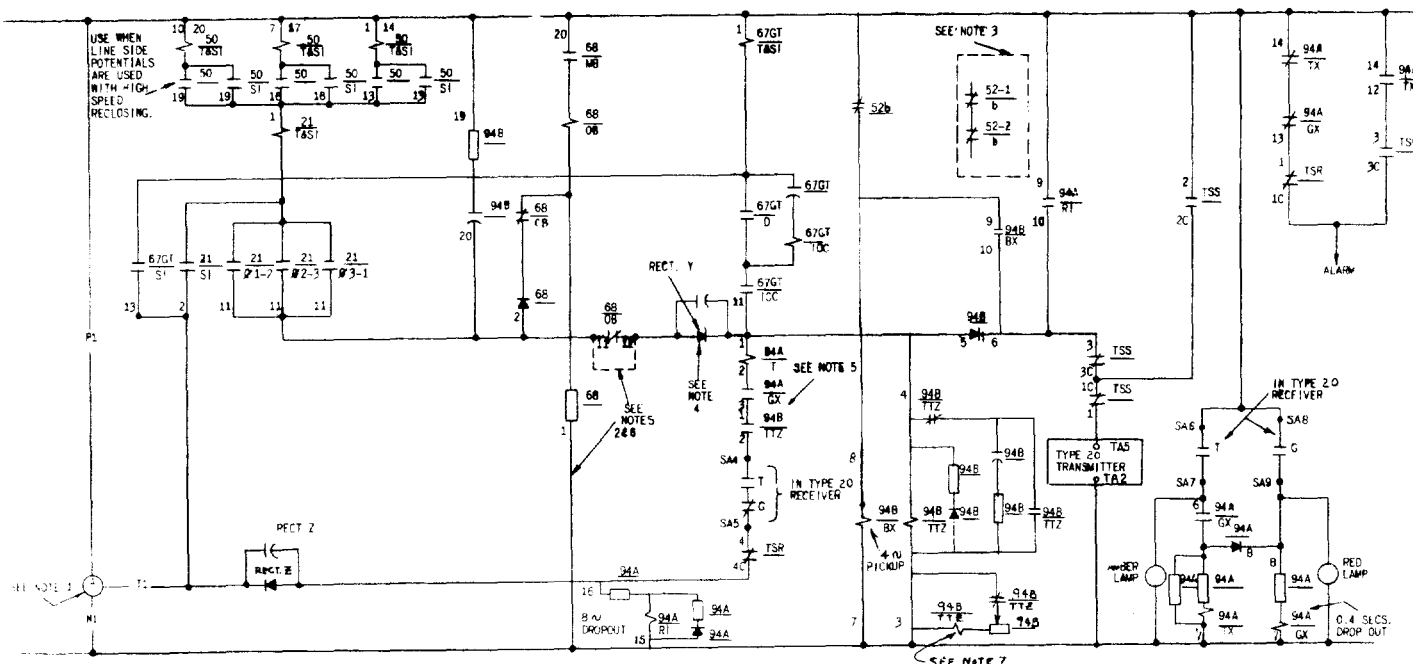
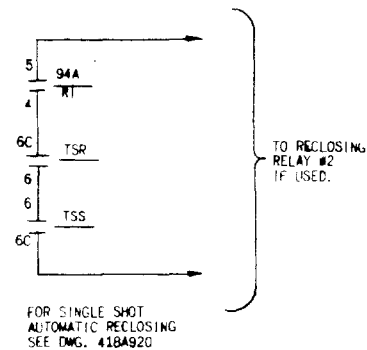
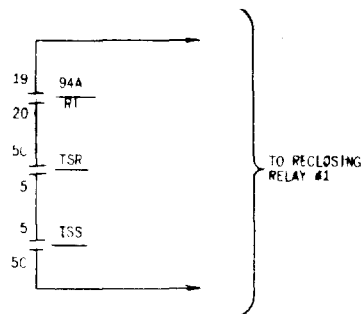
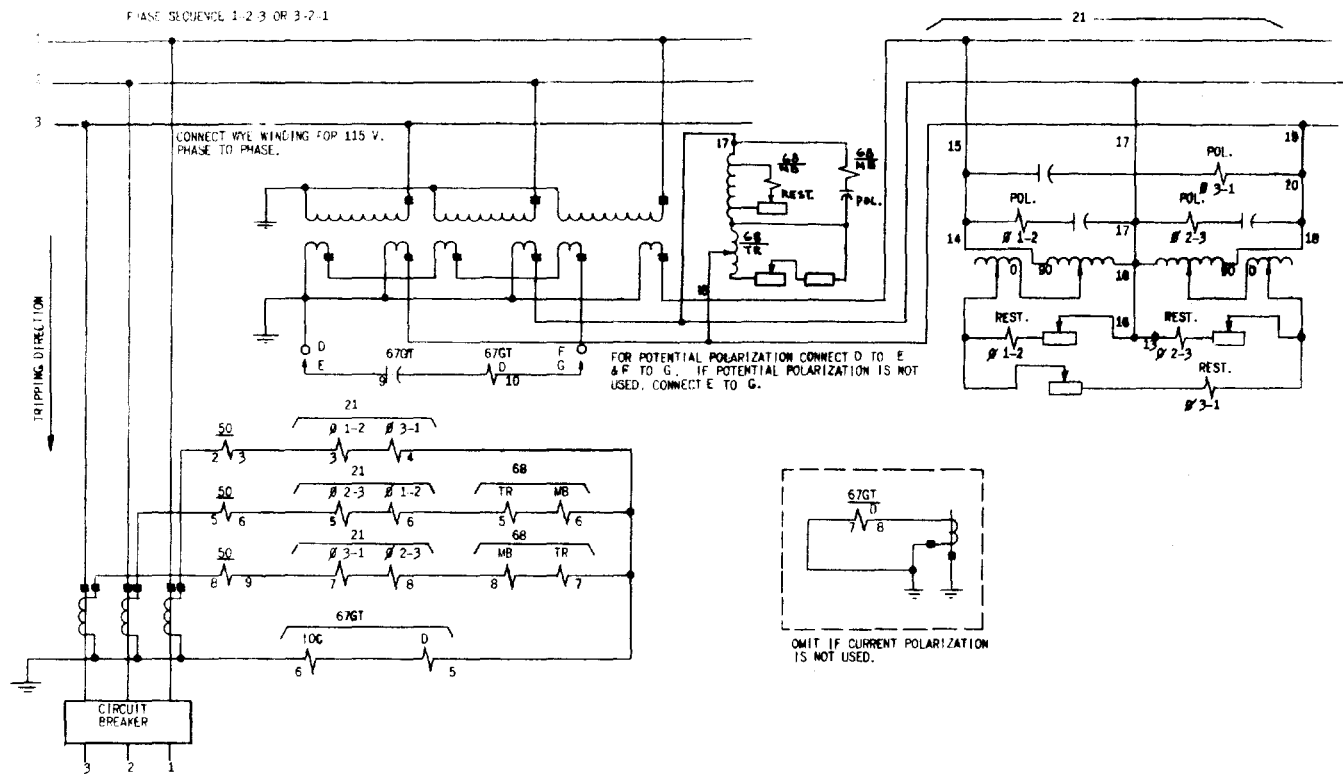


Fig. 2 (0116B9319-2 Sh. 1 & 2) Typical Permissive Overreaching Transferred Tripping Diagram Including Relay Type NAA27N Over Type 20 Tones



NOTE 1 - IF BREAKER FAILURE SCHEME IS USED, THIS IS CONTINUED ON  
DWG. 7021899DA SINGLE BREAKER SCHEME  
DWG. 7021899DB DOUBLE BUS, DOUBLE BREAKER SCHEME  
DWG. 7021899DC RING BUS SCHEME  
DWG. 7021899DD BREAKER & A HALF SCHEME

IF BREAKER FAILURE SCHEME IS NOT USED, THIS IS CONTINUED IN THE INSERT BELOW.

INSERT - SEE NOTE 1

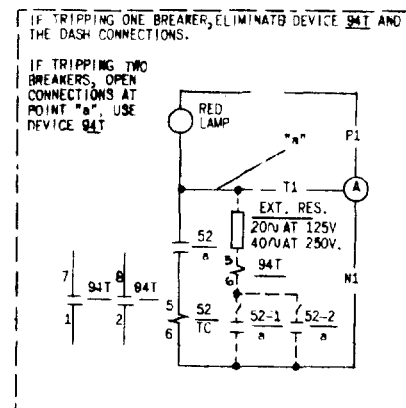


Fig. 2 (Continued)

If the tripping current should exceed thirty (30) amperes, it is recommended that an auxiliary tripping relay be used.

## 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 the relay, an examination should be made for any damage resulting from rough handling is evident, a claim should be filed at once with the transportation company and the nearest Sales Office of the General Electric Company notified promptly.

Reasonable care should be exercised in unpacking the relay in order that none of the parts are injured or 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.

### INSPECTION

The relay should be inspected at the time of installation and the following points checked: —

1. Contacts should not be tarnished.
2. The normally open contacts of both telephone relays should have a gap of 0.015 inch.
3. The normally closed contacts should have a 0.005 inch wipe.
4. When the telephone relays are operated by hand, the open contacts should have a 0.015 inch gap and the closed contacts should have a 0.005 inch wipe.

### CHECK TESTS

#### BX UNIT

The BX unit should pick up at 80% or less of rated voltage. Pick up time at rated voltage should be 60 to 100 milliseconds.

#### TTY UNIT

The TTY unit should pick up at 80% or less of rated voltage. Pick up time is 2 milliseconds or less. Drop out time of the TTY unit is less than 2 milliseconds.

#### TTZ UNIT

The TTZ unit should pick up at 80% or less of rated voltage. Pick up time of units intended for application with type 10 or type 20 tone channels is 12-25 milliseconds. The pick up time of units intended for application with Type 50 or Type 51 carrier channels is 20-40 milliseconds.

Note that in many instances polarity marks are shown on the internal connection diagrams. These polarities should be observed when making check tests.

### LOCATION AND MOUNTING

The location should be clean and dry, free from dust and excessive vibration and well lighted to facilitate inspection and testing.

The relays should be mounted on a vertical surface. The outline and panel drilling diagrams are shown in Fig. 5.

### CONNECTIONS

The internal wiring diagrams for the various relays covered by these instructions are shown in Fig. 3.

Unless mounted on a steel panel which adequately grounds the relay case, it is recommended that the case be grounded through a mounting stud or screw with a conductor not less than #12 B & S gauge copper wire or its equivalent.

## MAINTENANCE

The Type NAA relays covered by these instructions are shipped from the factory completely calibrated, but in the event that it is found that any of the units are out of calibration, the adjustment under the SERVICING SECTION may be followed. When performing these adjustments, refer to Fig. 3.

## SERVICING

### CONTACTS

For cleaning the contacts of the telephone type units a flexible burnishing tool should be used. This consists of a flexible strip of metal with an etched, roughened surface, resembling 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 the contact.

The contacts should not be cleaned with knives, files or abrasive paper or cloth. Knife or files may leave scratches which increase arcing or deterioration of the contacts. Abrasive paper or cloth may leave minute particles of insulating abrasive material in the contacts thus preventing good contact action.

### PICKUP

If it is found that the pick up of any of the telephone type units is too high, it may be restored by changing the spacing between the armature and the pole face by bending the contact operating arm. After this adjustment all contacts must be re-adjusted to have 0.005 inch wipe and a gap of 0.015 inch.

PICK-UP TIME

In order to decrease the pick up time of any of the telephone type units reduce the pressure of the normally closed contacts by bending the flexible movable contact arm slightly. Pick up time may be increased by reversing this procedure. The TTZ unit pick-up time can be changed by adjusting the A resistor. Increasing the value of A decreases the time; decreasing the value of A increases the time.

DROP OUT TIME

The drop out time of any of the telephone type units may be adjusted by means of the residual screw in the armature. The more the residual screw is turned in the shorter the drop out time. Be sure to tighten the locknut after adjusting the residual screw.

Any change in the residual screw setting must be accompanied by a readjustment of the contact

gap and wipe. This can be readily accomplished by bending the contact operating arm.

NOTE: The residual screw must not be backed off completely but should always project at least 0.002 inch beyond the face of the armature.

All the adjustments described may be easily made with the tools supplied in the relay tool kit XRT11A1.

**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.

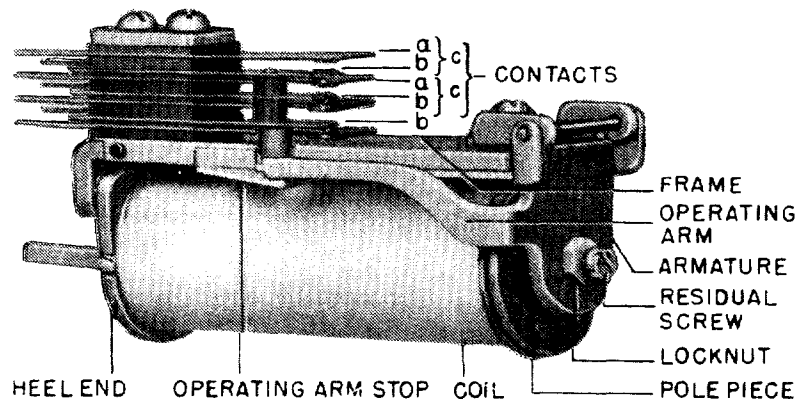
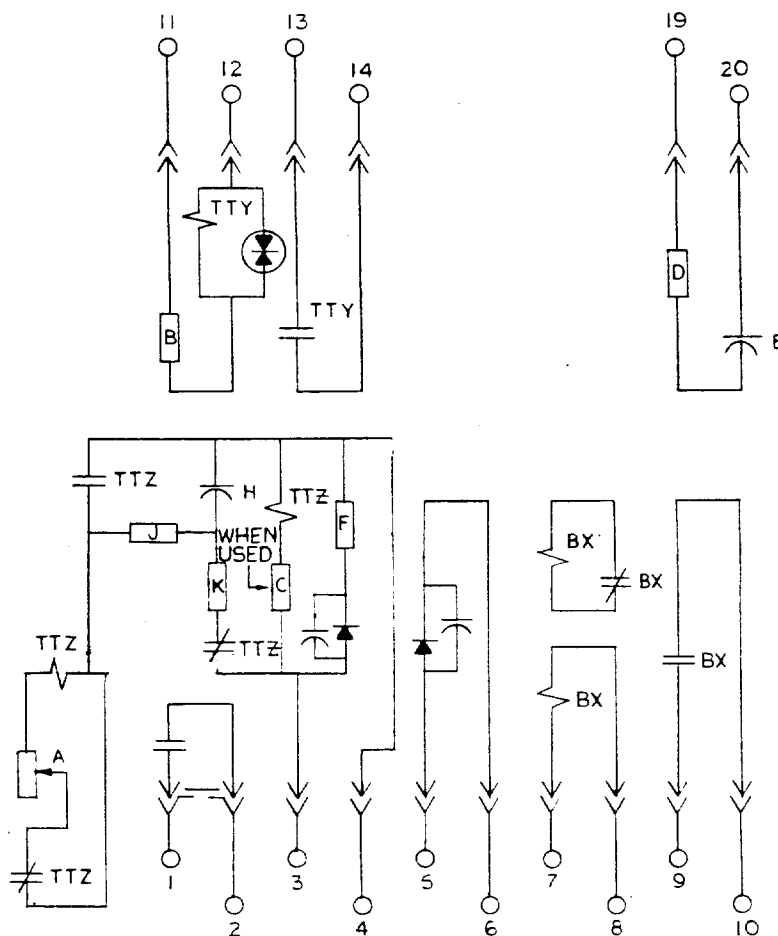
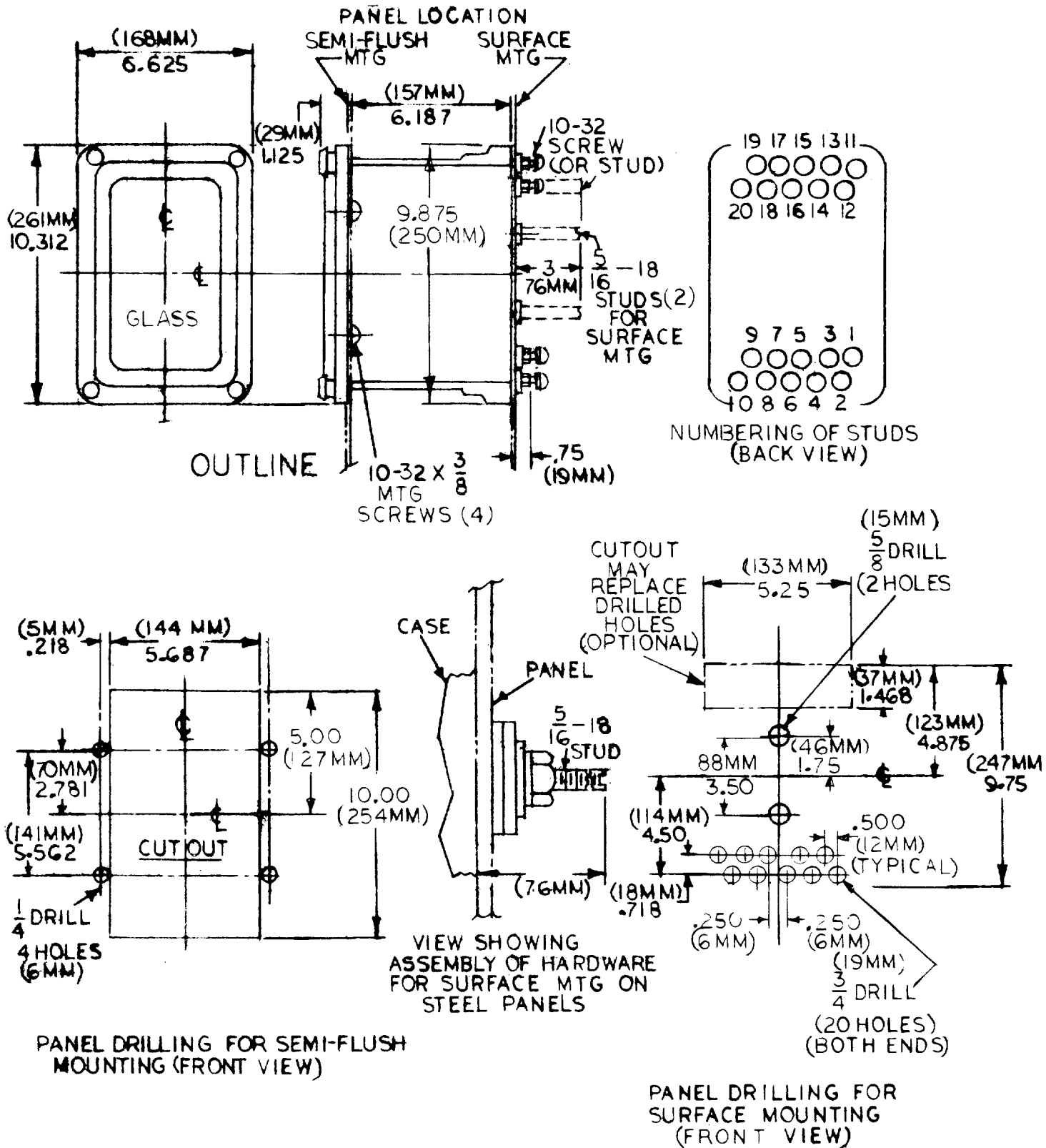


Fig. 3 (8012106) Typical Telephone-Relay Unit  
Used In Type NAA relays

[illegible]

\* Fig. 4 ( 0275A4348 Sh. 1 and Sh. 2) Internal Connection Diagram for Relay Type NAA27N (Front View)





\* Fig. 5 (6209272-4) Outline and Panel Drilling Dimensions for the Type NAA27N Relay



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