INSTRUCTIONS GEK-34132B

TRANSFERRED TRIP AUXILIARY RELAY

TYPE NAA

MODEL 12NAA27S

GENERAL ELECTRIC

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DESCRIPTION

The Type NAA27S relay is a special purpose auxiliary relay that is employed in permissive overreaching transferred trip schemes for line protection, in conjunction with line relays and other auxiliary devices. The relay has no other general field of application. It includes three telephone-type auxiliary units identified as BX, RI and TTZ, mounted in an S2 size drawout case. Internal connections are shown in Figure 1. Refer to the section on APPLICATION for more specific information concerning the use of this relay.

APPLICATION

The Type NAA27S relay is designed specifically for application in permissive overreaching transferred trip schemes with General Electric Type 30 tone equipments.

The auxiliary units in the NAA27S perform the following functions:

RI UNIT - The RI unit is energized by all high-speed trip circuits, including the received transferred trip signal, and initiates high-speed reclosing. It has a pickup time of approximately one cycle and a dropout time of 7 - 10 cycles.

BX UNIT - The BX unit is operated by a "b" switch on the associated circuit breaker. Its purpose is to key the transmitter to send a continuous trip signal to the remote terminal when the local breaker is open. This permits high-speed tripping of the remote breaker should it be closed onto an internal fault beyond the reach of the first-zone protection. The BX unit has a time delay pickup of approximately 70 milliseconds. This is to allow time for the overreaching relays at the remote terminal to reset before BX sends a trip signal in the event that the local breaker is tripped by bus differential relaying.

TTZ UNIT - The TTZ unit is picked up by the local overreaching phase or ground relays which key the local transmitter. The unit has an adjustable pickup time of from 10 to 24 milliseconds. A contact of TTZ is connected in series with the trip contact (T) of the receiver and introduces a slight coordinating delay into the transferred trip scheme.

The need for the coordinating time delay results from the possibility of fault current reversals after clearing an external fault. This may be understood by referring to Figure 4 . 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 must be determined for the specific installation. Release time is defined as the time measured from the instant the transmitter is keyed off until the receiver trip contact (T) opens, and is an overall time including any delay introduced by associated microwave equipment.

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 NAA27S 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

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.

overall tripping time.

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 (Figure 1).

The combination target unit in the NAA27S relay is rated as shown in Table I.

TABLE I

RATINGS OF TARGET UNIT

FUNCTION	2 AMP TAP	0.6 AMP TAP
Operating Range	2-30	0.6-2
Carry for Tripping Duty	30	6
Carry Continuously	4	0.8
Resistance	0.3	0.6

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

Tripping diodes D1 and D2 will withstand a maximum of 600 volts in the reverse direction. They will carry 30 ampere for tripping duty or 10 amperes continuously. Diode D3 is also rated 600 volts in the reverse direction and will carry 1 ampere in the forward direction.

The TTZ unit pick-up time is variable by means of rheostat "D" over a range of 10 to 24 milliseconds. The relay will be set by the factory to any time within this range when it is specified on the requisition. If a time is not specified the unit will be set to pick-up in 10 milliseconds.

The contacts of RI, BX, and TTZ will make and carry 30 amperes for tripping duty at voltages less than 250. They will carry 3 amperes continuously. The interrupting rating of these contacts is given in Table II below:

TABLE II

INTERRUPTING RATINGS

A-C VOLTS	AMPS INDUCTIVE	AMPS NON-INDUCTIVE
115	0.75	2.0
230	0.5	1.5
D-C VOLTS		
48	1.0	3.0
125	0.5	1.5
250	0.25	1.0

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

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 sustained during shipment. If injury or 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

RI UNIT

The RI unit should pick up at 70% or less of rated voltage. Pick up time should be less than 16 milliseconds and drop out time from 115 to 116 milliseconds.

BX UNIT

The BX unit should pick up at 80% or less of rated voltage. Pick up time at rated voltage should be 70 to 80 milliseconds.

TTZ UNIT

The TTZ unit should pick up at 70% or less of rated voltage.

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

This unit will be set for 10 milliseconds pickup time unless otherwise specified on the requsition.

ELECTRICAL TESTS

DRAWOUT RELAYS GENERAL

Since all drawout relays in service operate in their case, it is recommended that they be tested in their case or an equivalent steel case. In this way any magnetic effects of the enclosure will be accurately duplicated during testing. A relay may be tested without removing it from the panel by using a 12XLA13A test plug. This plug makes connections only with the relay and does not disturb any shorting bars in the case. Of course, the 12XLA12A test plug may also be used. Although this test plug allows greater testing flexibility, it also requires C.T. shorting jumpers and the exercise of greater care since connections are made to both the relay and the external circuitry.

POWER REQUIREMENTS GENERAL

All alternating current operated devices are affected by frequency. Since non-sinusoidal waveforms can be analyzed as a fundamental frequency plus harmonics of the fundamental frequency, it follows that alternating current devices (relays) will be affected by the applied waveform.

Therefore, in order to properly test alternating current relays it is essential to use a sine wave of current and/or voltage. The purity of the sine wave (i.e. its freedom from harmonics) cannot be expressed as a finite number for any particular relay, however, any relay using tuned circuits, R-L or RC networks, or saturating electromagnets (such as time overcurrent relays) would be essentially affected by non-sinusoidal wave forms.

Similarly, relays requiring dc control power should be tested using dc and not full wave rectified power. Unless the rectified supply is well filtered, many relays will not operate properly due to the dips in the rectified power. Zener diodes, for example, can turn off during these dips. As a general rule the dc source should not contain more than 5% ripple.

PERIODIC CHECKS AND ROUTINE MAINTENANCE

In view of the vital role of protective relays in the operation of a power system it is important that a periodic test program be followed. It is recognized that the interval between periodic checks will vary depending upon environment, type of relay and the user's experience with periodic testing. Until the user has accumulated enough experience to select the test interval best suited to his individual requirements it is suggested that the points listed under INSTALLATION PROCEDURE be checked at an interval of from one to two years.

CONTACT CLEANING

For cleaning relay 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 it will clean off any corrosion throughly and rapidly. Its flexibility insures the cleaning of the actual points of contact. Do not use knives, files, abrasive paper or cloth of any kind to clean relay contacts.

LOCATION AND MOUNTING

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

The relays should be mounted on a vertical surface. The outline and panel drilling diagrams are shown in Figure 2.

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.

SERVICING

PICKUP

If it is found that the pickup 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 readjusted to have a 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.

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.

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 the complete model number of the relay for which the part is required.

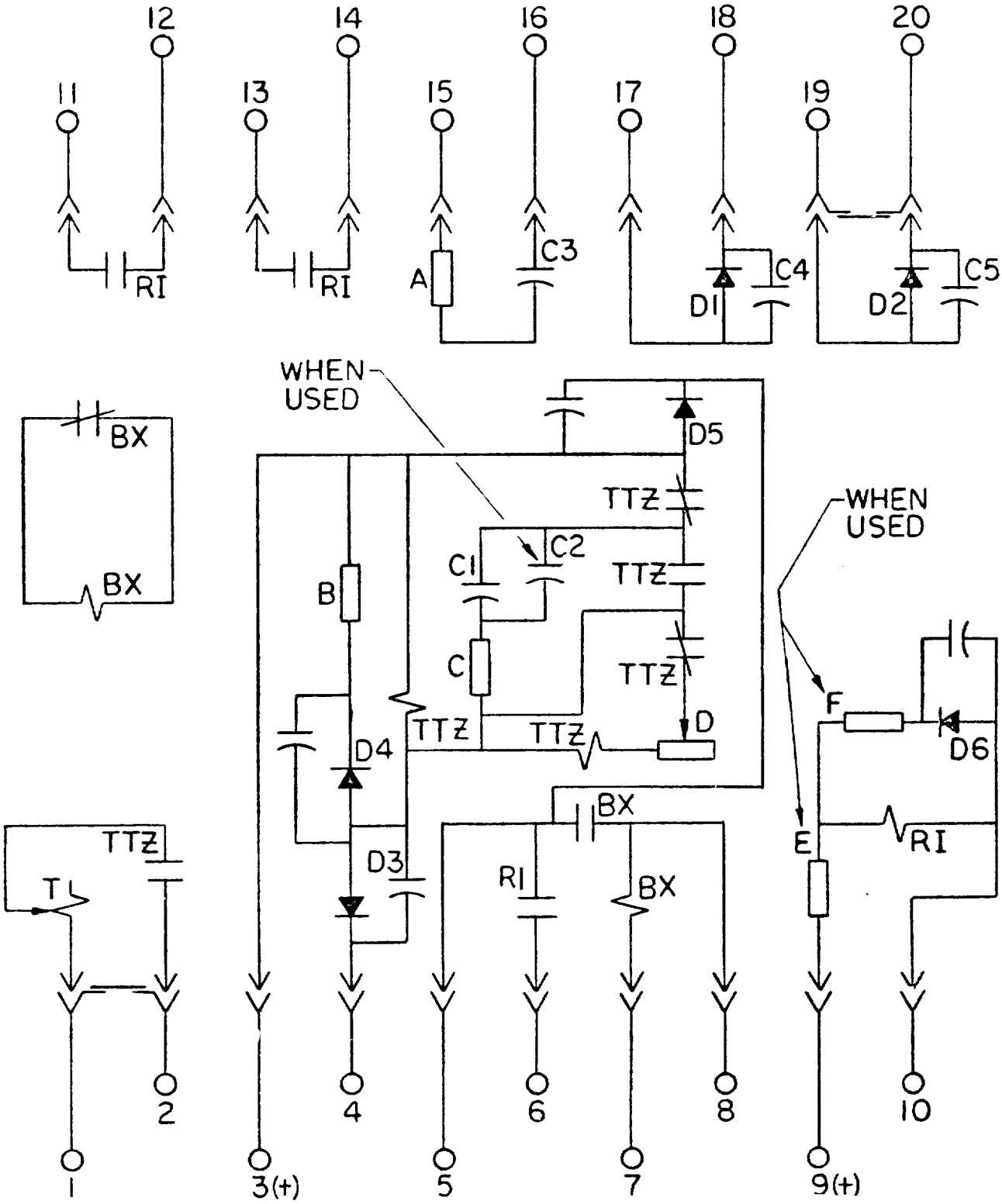

FIG. 1 (0246A3319 SH. 1-0) Internal Connections For NAA27S

NAA27S FORM #	DC VOLTS	RESISTANCE IN OHMS									MICROFARADS				
		A	B	C	D	E	F	RI	BX	TTZ	C1	C2	C3	C4	C5
1	125	150	10K	100	25K	1K	—	1K	12.6K	2.5K	1	1	.25	.50	.50

FIG. 1A (0246A3319 SH. 2-0) Component Values For NAA27S

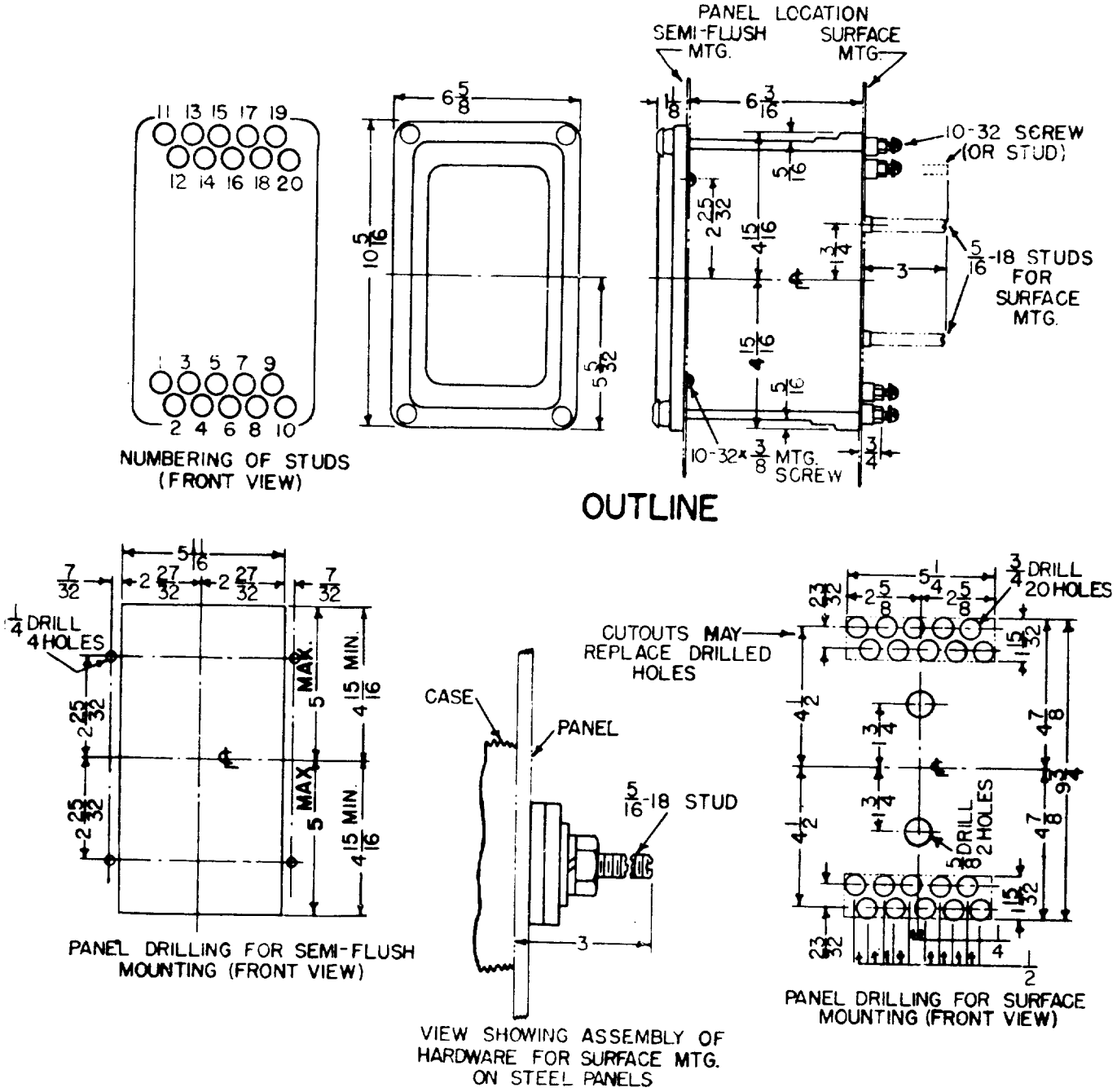

FIG. 2 (K-6209272-2) Outline And Panel Drilling Dimensions For NAA27S

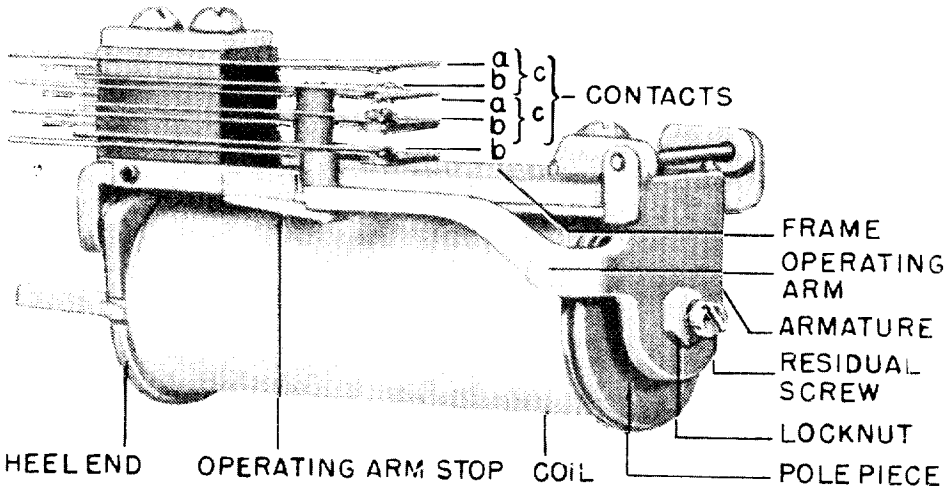

FIG. 3 (8012106) Typical Telephone Relay Used In NAA Relays

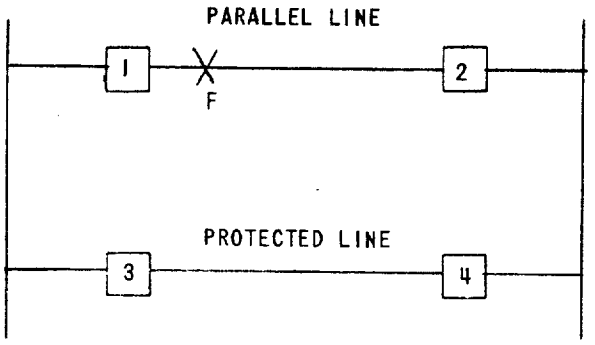

FIG. 4 (0246A3661-0) Typical Situation Leading To A Power Reversal In The Protected Line

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