TYPE N2 CARRIER SYSTEM
CARRIER GROUP ALARM UNIT AND
CARRIER GROUP ALARM SIGNAL RECEIVER UNIT
DESCRIPTION

CONTENTS PAGE

1. GENERAL

1.01 This section describes the equipment and operating features of the J99272AP carrier group alarm unit (CGA) and J99272AR carrier group alarm signal receiver (CGA signal receiver).

1.02 The CGA and the CGA signal receiver are auxiliary equipments used in an N2 carrier system. These equipments, in conjunction with alarm equipment in the N2 carrier terminal, automatically perform the following functions:

a. Detect carrier failures.

b. Initiate bay and office alarms.

c. Condition the associated trunk circuits of electromechanical switching systems to disconnect busy message trunk circuits, stop charges, and prevent trunk seizures during the alarm interval.

d. Provide alarm indication to a No. 1 Electronic Switching System (ESS) to condition the trunks associated with the failed N2 carrier system to make busy trunks in the pulsing condition, prevent subsequent trunk seizures, stop charges, and disconnect busy message trunk circuits.

e. Test and monitor transmission over two test channels to determine when the system is normal.

f. Restore both terminals of the system to service simultaneously, after the tests indicate normal transmission.

1.03 A feature of the CGA allows certain predetermined trunks or lines to be returned to service during the alarmed interval by patching to spare channels of other facilities and by operating a key to control the removal of the supervisory signals from the control leads between the CGA and the trunk circuits.

2. EQUIPMENT DESCRIPTION

A. Carrier Group Alarm Unit

2.01 The CGA (see Fig. 1) consists of a fabricated chassis with 12 wire-spring relays and a delay circuit, consisting of a capacitor, a transistor, and various resistors. The relays and delay circuit provide the necessary circuitry required to process the associated trunk terminal during a carrier failure and to restore the system to service when the fault has been cleared and the system stabilized. Leads from the relay coils and contacts are terminated on a terminal strip mounted above the relay panel.

2.02 The specific circuit functions performed by the CGA for each message channel differ widely depending on the E-type signaling unit and trunk or line circuit assigned to the channel. They also differ widely between channels assigned to test channel 1, test channel 2, and the nontest channels. The CGA unit provides conditioning for all of the possible combinations of E-type signaling units and trunks or lines. Accordingly, the terminal strip is divided into separate positions on the terminal strip, referred to as blocks, one for each test and nontest channel. Optional interconnecting straps can be applied between the terminals of each block on an individual channel basis when signaling units and trunk circuits are assigned or reassigned. Each terminal block is wired to the distributing frame with universal wiring suitable for all trunk and signaling arrangements so that cross connections can be made to accommodate any E-type signaling unit and any type trunk terminal equipment.

2.03 Optional strapping on the terminal block is done with the aid of plastic templates. These templates are perforated for location on the CGA terminal blocks of the desired test or nontest channel after the installer wiring has been connected. The optional straps are applied, as indicated by heavy lines on the templates, with wire-wrapped connections. Each template is designated for the desired test or nontest channel, the type of supervision, the associated E-type signaling unit, and the trunk or line equipment. The templates for test channel 1 fit a 4 by 7 block with 28 terminals and have a beige background to distinguish them from the same size templates with a light blue background for test channel 2. The templates for nontest channels have a white background and are smaller, fitting 4 by 6 blocks with 24 terminals. Fig. 2 illustrates examples of templates for test channel 1, test channel 2, and a nontest channel.

2.04 The CGAs are mounted on a miscellaneous basis using 23-inch bays drilled for 1-3/4 inch or 2-inch mounting plates. The location of these units in relation to the associated E-type signaling units and trunk circuits or line finders requires consideration since the gauge

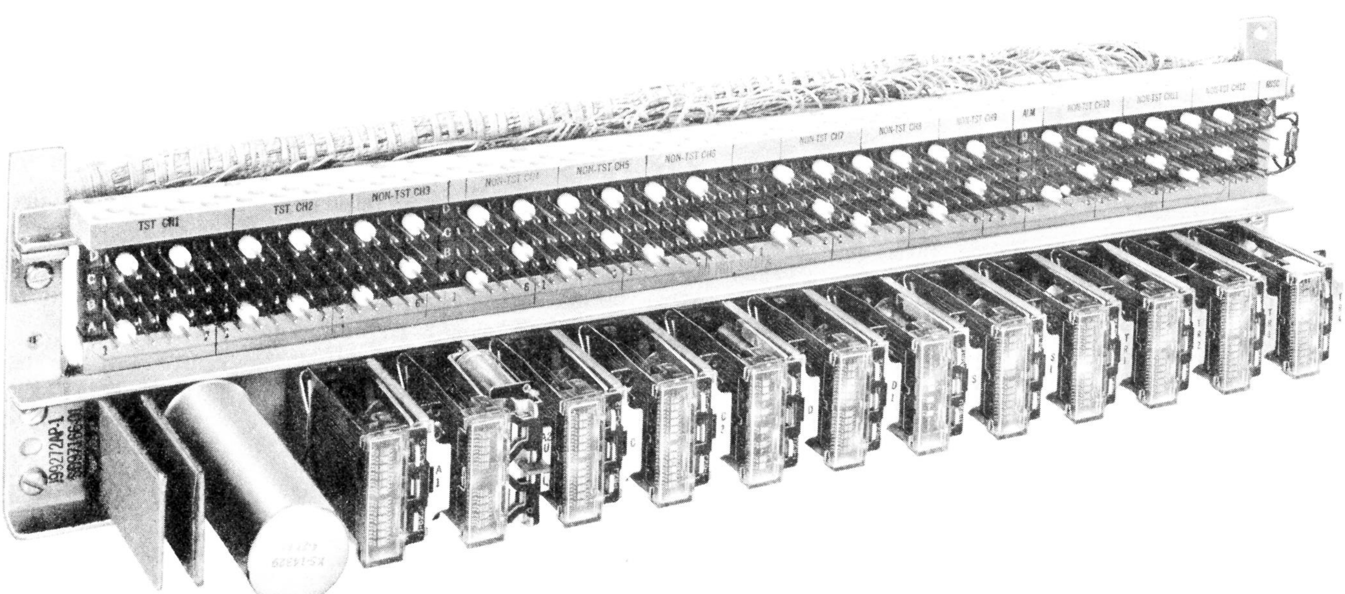
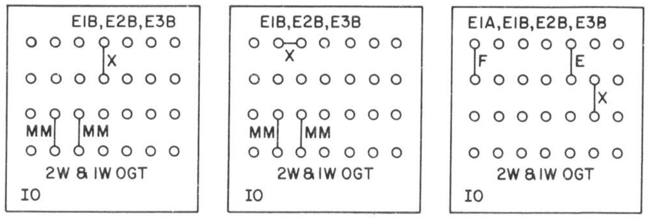


Fig. 1 — CGA Circuit



TEST CHANNEL 1 (BEIGE TEMPLATE) — TEST CHANNEL 2 (BLUE TEMPLATE) — NONTEST CHANNEL (WHITE TEMPLATE)

Fig. 2 — Typical Optional Strapping Templates

and length of the conductors between the signaling units and trunk circuits or step-by-step line finders (including connections to and from the CGA and distributing frame) must be engineered to meet the resistance, ground potential, and return loss requirements of the associated switching system.

B. Carrier Group Alarm Signal Receiver

2.05 The CGA signal receiver (see Fig. 3) consists of a high impedance input transformer, transistor amplifiers, 2600-cycle

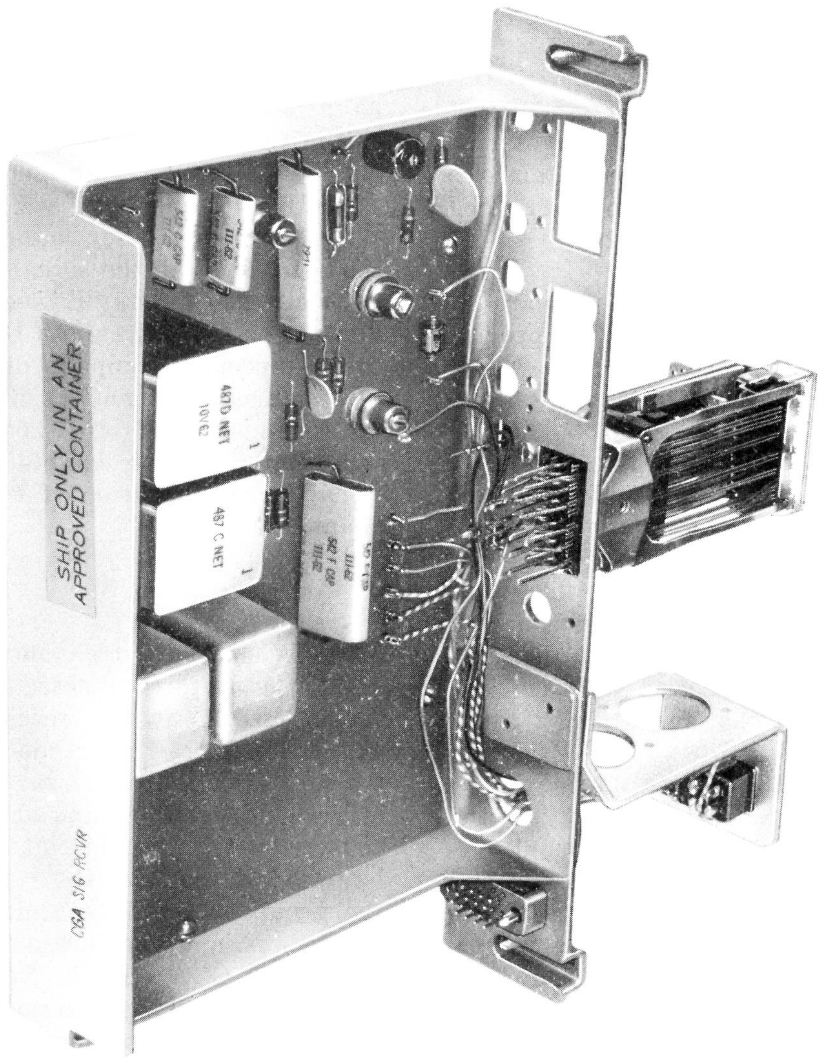


Fig. 3 — CGA Signal Receiver

bandpass and band rejection filters, rectifiers, receiving relay, and a test socket. It functions by monitoring the voice-frequency output of channel position A of its associated N2 carrier terminal during a system failure and signaling the CGA upon receipt of 2600-cycle tone with a satisfactory signal-to-noise ratio.

2.06 The CGA signal receiver is a plug-in unit similar in size to an E-signaling unit (approximately 8 by 2 by 12 inches). For maintenance convenience, the receiver may be mounted in the signaling unit shelf of the E-type signaling supply unit or bay containing the signaling units associated with the same N2 carrier system but it may be located elsewhere if necessary.

3. DESCRIPTION OF OPERATION

A. General

3.01 Fig. 4 shows the interconnection of carrier, signaling, CGA, and trunk circuits associated with a typical N2 terminal arranged for message service.

3.02 The CGA and CGA signal receiver are required with an N2 terminal to provide automatic trunk processing, testing, and restoral in the event of a carrier failure. A loss of carrier in either direction of transmission lasting 2.5 to 5.5 seconds will cause both terminals of the system to be alarmed and their associated trunks to be processed. Automatically, both terminals are simultaneously restored to service when the trouble condition is cleared. The CGA circuit and the CGA signal receiver, in conjunction with the N2 terminal alarm unit and the E-type signaling units associated with channel positions A and B (test channels 1 and 2), perform these functions.

3.03 The trunk processing circuitry of the CGA is interposed between the trunk terminal equipment and the E-type signaling units associated with the message channels. Under normal (nonalarm) conditions the trunk processing circuitry provides direct connections for the supervisory leads which are required between the E-type signaling unit and the trunk circuit assigned to the message channel. Under alarm conditions these leads are opened, grounded, or otherwise conditioned to release subscribers, stop charges, etc. Each CGA panel is capable of providing trunk conditioning for each of the 12 channels of the associated N2 carrier terminal. Since trunk conditioning is accomplished by changes in dc supervisory signals, channels not equipped with E-type signaling cannot be conditioned other than by being disconnected during the failure.

3.04 The CGA signal receiver is bridged across the input (on the line side) of the E-type signaling unit associated with channel position A. During system failure, the CGA signal receiver monitors test channel 1 (channel position A) for 2600-cycle tone. It has the ability to ignore high levels of signal and noise due to crosstalk or overload and will operate only when a tone of a predetermined signal-to-noise ratio is received. (It also operates when the N2 system is normal, but this does not disrupt normal signaling and message transmission.) The delay circuit of the CGA requires the minimum signal-to-noise ratio to be maintained (or usually exceeded) for a timed interval of about 45 seconds. When a proper 2600-cycle tone is received for the required interval, the signal receiver signals the CGA circuit over its "E" lead. This signal conditions the CGA circuit so that when 2600-cycle tone is received from the distant terminal over test channel 2 (channel position B), the terminal is restored to normal. A 2600-cycle tone is also transmitted on test channel 2 to the distant terminal as an indication of received tone on test channel 1.

B. Alarm Sequence

3.05 Whenever a transmission failure occurs, the failure is detected by the terminal alarm circuit at the receiving terminal (see Fig. 5). After a short delay of about 2.5 to 5.5 seconds, to distinguish between momentary service interruptions and actual carrier failure, the terminal alarm circuit activates office and bay alarms, removes the −21 volt power from the group transmitting unit for approximately 10 seconds, and provides a "system alarm" signal to the CGA circuit. Removal of −21 volt power from the group transmitting unit interrupts the transmitted carrier to force a carrier failure and subsequent alarm at the far terminal. Application of the "system alarm" to the CGA circuit starts the trunk processing and

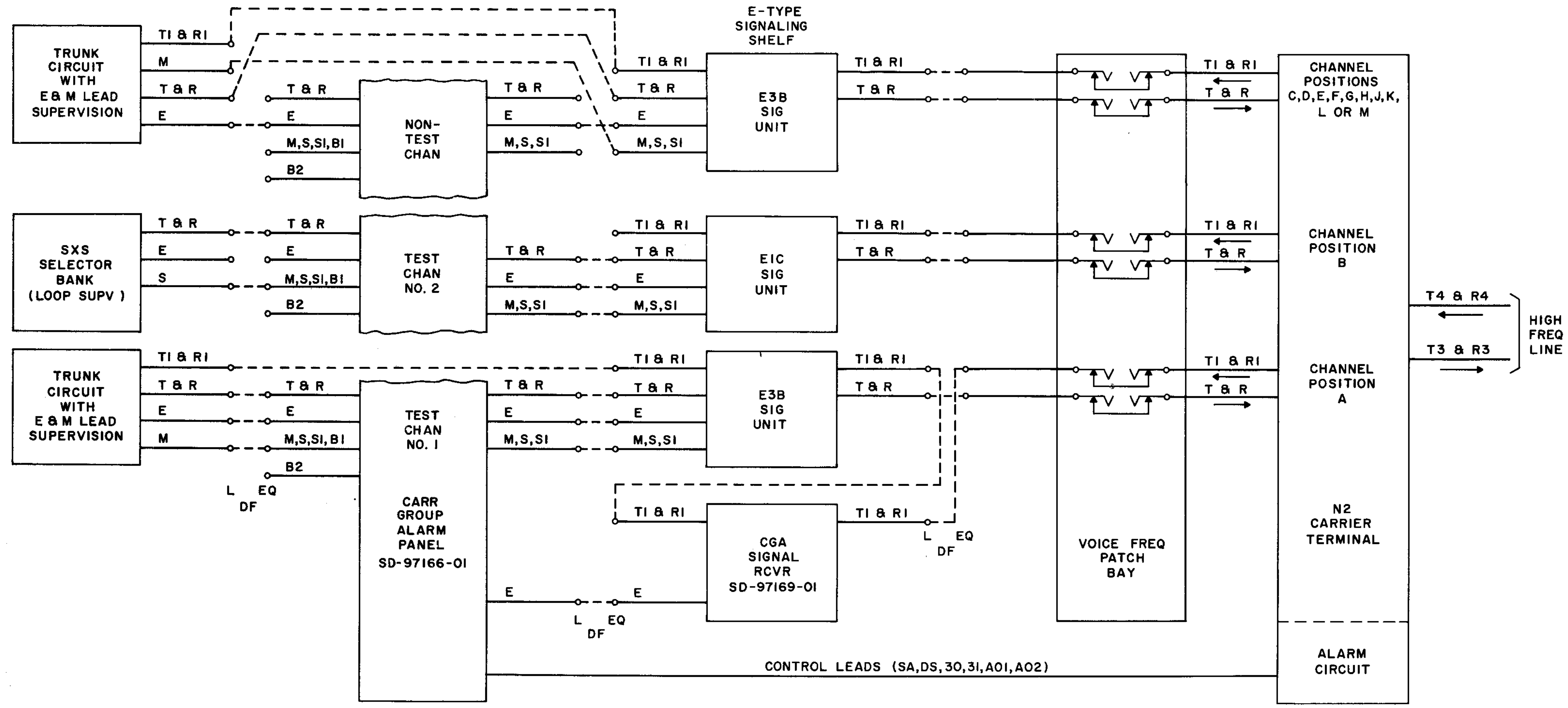


Fig. 4 — Typical N2 Carrier Terminal Equipment

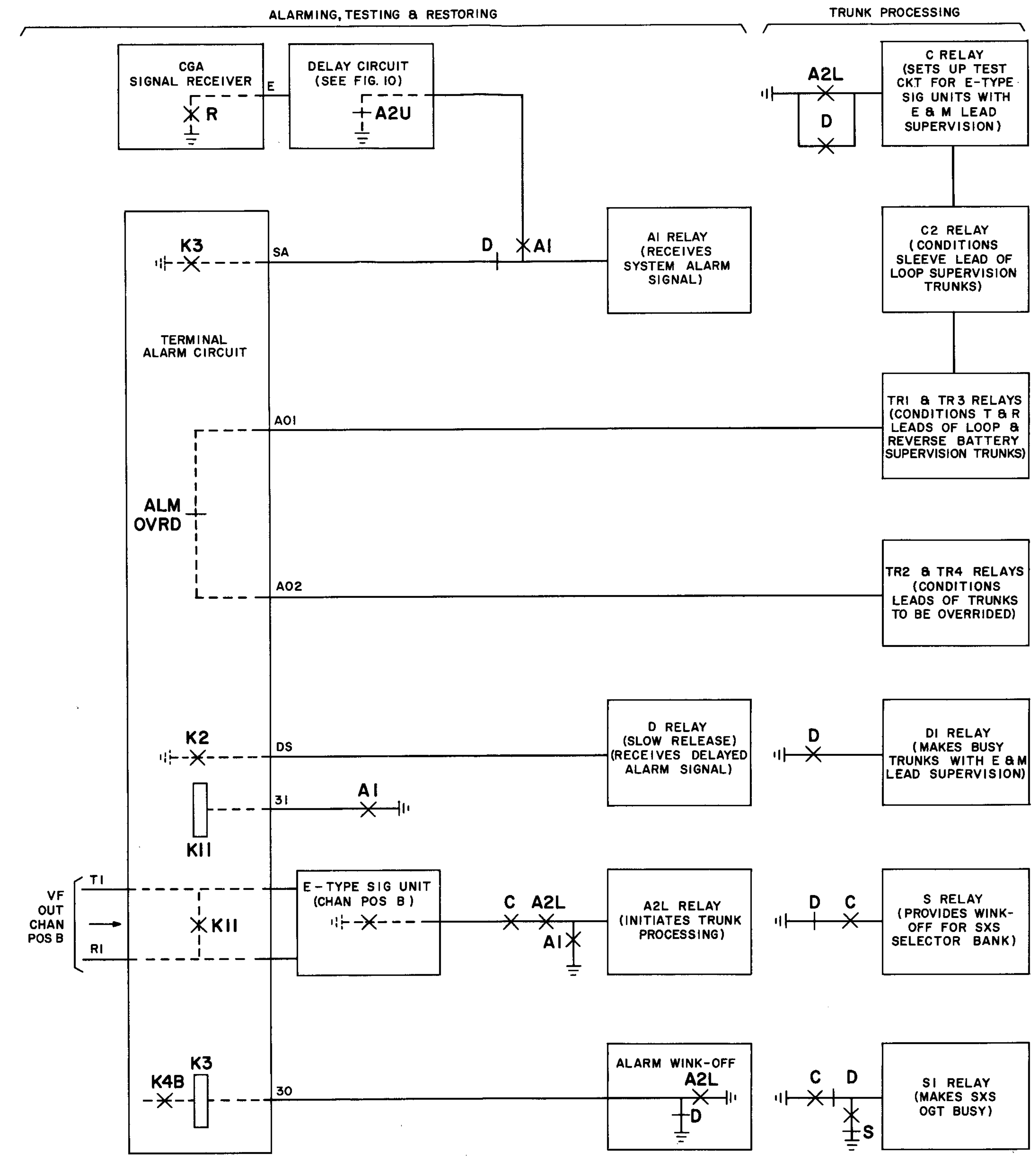


Fig. 5 — Block Diagram of CGA and CGA Signal Receiver Operation

also causes the terminal alarm unit to short the voice-frequency output leads between the channel equipment and E-type signaling circuit of test channel 2. The first step of trunk processing involves making all trunks idle to stop subscriber charges on calls in progress and is accomplished by the CGA through application of the appropriate idle (on-hook) signals on the dc supervisory leads. The "system alarm" signal from the terminal alarm unit is followed, after approximately 10 seconds, with a second alarm signal ("delayed signal") which causes the CGA to complete trunk processing. This second step of trunk processing involves making all trunks busy (off-hook), again through application of the appropriate dc supervisory signals to the trunk leads. The same alarm sequence occurs at the far terminal, but (due to the time required to register the forced carrier failure) with a time lag of about 2.5 to 5.5 seconds.

3.06 As long as the CGA signaling receiver does not receive proper 2600-cycle signal from the far terminal, the automatic restoral sequence cannot begin. This insures that the CGA remains in the alarmed state and consequently that the trunk circuits continue to appear busy to offered traffic.

C. Testing and Monitoring the System

3.07 During the period of carrier failure, the CGA utilizes channel positions A and B, their associated E-signaling units, and the CGA signal receiver to test and monitor the system to establish when the system is ready for restoral.

3.08 The E-type signaling units associated with the test channels are conditioned by the CGA to transmit the test signals. Following receipt of the system alarm signal, at both terminals the CGA applies toward the line on-hook supervision and off-hook supervision (i.e. transmission of 2600-cycle tone and nontransmission of 2600-cycle tone, respectively) to the associated E-type signaling units used in test channels 1 and 2, respectively. Note that during the alarm interval, the dc supervisory signals to the E-type signaling units of the test channels are applied by the CGA instead of the trunk circuits. This is accomplished in various ways by the CGA depending on the type of E-signaling unit used in the test channel. Supervision on the E-type signaling unit of test channel 2 is changed by the CGA to transmit tone (on-hook supervision) after verification of received transmission by the CGA signal receiver and delay circuit.

3.09 For E-signaling units with E and M lead supervision (see Fig. 6A), on-hook supervision is applied on test channel 1 by opening the M lead between the trunk circuit and the E-signaling unit associated with test channel 1. Off-hook supervision on test channel 2 is applied by placing −48 volts on the M lead of the E-signaling unit associated with test channel 2. Removal of the −48 volts from the M lead of the associated E-signaling unit is required to place test channel 2 in the on-hook condition.

3.10 For E-signaling units with loop supervision (E1C, E1E, and E1S signaling units) (see Fig. 6B), on-hook supervision is applied on test channel 1 by opening the transmitting leads between the trunk and the E-signaling unit associated with test channel 1. Off-hook supervision is applied on test channel 2 by shorting the transmitting leads toward the E-signaling units associated with test channel 2.

3.11 For an E1D signaling unit (reverse battery supervision) (see Fig. 6C), on-hook supervision is applied on test channel 1 by applying −48 volts on the R lead and ground on the T lead toward the E1D signaling unit. Off-hook supervision on test channel 2 is applied by placing −48 volts on the T lead and ground on the R lead.

3.12 For an E1F signaling unit (reverse battery supervision) (see Fig. 6D), on-hook supervision is applied on test channel 1 by applying −48 volts on the T lead and ground on the R lead toward the E1F signaling unit. Off-hook supervision on test channel 2 is applied by placing −48 volts on the R lead and ground on the T lead.

3.13 For an E1L signaling unit (see Fig. 6E), on-hook supervision is applied on test channel by applying 20-cycle ringing tone on the R lead toward the E1L signaling unit. Off-hook supervision on test channel 2 is applied by opening the transmitter leads between the subscriber line circuit and the E1L signaling unit.

3.14 The CGA signal receiver at each terminal monitors test channel 1 for the presence of a 2600-cycle signal and a proper signal-to-noise ratio. If the proper 2600-cycle tone persists for the timed interval of 45 seconds, test channel 2 is changed from off-hook (no tone) to on-hook (tone transmitted). The E-signaling unit associated with test channel 2 monitors for the presence or absence of received 2600-cycle tone. For restoral of the system to occur, transmission in both directions must be normal. Receipt of a proper 2600-cycle signal over test channel 1 verifies that transmission ***from*** the far terminal is satisfactory; receipt of 2600-cycle tone on test channel 2 verifies that transmission ***toward*** the far terminal is normal. When both terminals receive verification of normal transmission toward and away from them, the system is automatically restored. The terminal receiving the forced failure will receive a test tone on test channel 1 soon after −21 volts is restored to the group transmitting unit of the distant terminal. This will cause the CGA to condition the terminal for transmitting a test tone on test channel 2 along with that already being transmitted on test channel 1. When the fault is cleared, the terminal which first received the failure indication will first receive tone on test channel 1. This causes the CGA to remove the short from the voice-frequency output leads of channel position B and simultaneously to condition the terminal to transmit test tone on test channel 2. Since tone is being received and transmitted over test channel 2, both terminals are restored almost simultaneously.

D. Trunk Processing

3.15 The CGA circuit contains relays for releasing and making busy the various type of trunks and lines found in the various type offices. The sequence of relay operation and the optional use of their contacts provide the logic required for processing the different trunks and lines. Fig. 7 shows a simplified schematic of the relay logic used.

3.16 The 2-way or 1-way outgoing trunk circuits with E and M lead supervision (see Fig. 7A) are released from their associated E-signaling units, after the "system alarm" signal, by disconnecting the "E" leads. This stops service charges and allows a calling subscriber to be released if he goes on-hook. After approximately 10 seconds, in response to the "delayed alarm" signal, the E lead toward the trunk circuit is grounded. This makes the trunk circuit appear busy to any new calls. The 10-second interval between the release and the make-busy indication allows time for the subscriber to go on-hook. In some E and M supervisory trunks it is possible for the subscriber to be hung-up if he fails to go on-hook before the trunk is made busy.

3.17 After receipt of the "system alarm" the one-way incoming trunk circuits with E and M lead supervision are released by disconnecting the E leads between the trunk circuits and the E-signaling units (see Fig. 7B).

3.18 After receipt of the "system alarm" the one-way incoming trunks with loop supervision, incoming step-by-step selectors, and the station end or office end of customer lines are released by disconnecting the transmitting leads (T and R) between the trunk, selector or line, and the E-signaling unit (see Fig. 7C).

3.19 The one-way outgoing trunks with loop supervision in a step-by-step office are processed after the "system alarm" by disconnecting the transmission leads (T and R) and the sleeve lead (S) between the selector bank multiple and the E-type signaling units. This stops charges and allows the step-by-step switching train to be released. After receipt of the "delayed alarm", the selector bank is made busy to any new calls by grounding the sleeve toward the selector band. (See Fig. 7D.)

3.20 The one-way outgoing trunk circuits with loop supervision in a step-by-step office are processed after the "system alarm" by disconnecting the transmission leads (T and R) between the outgoing trunk circuit and the E-signaling unit, and by disconnecting the sleeve lead (S) between the selector bank multiple and the outgoing trunk circuit. This stops charges and allows the step-by-step switching train to be released. After receipt of the "delayed alarm" the trunk circuit is made busy to any new calls by grounding the sleeve toward the selector bank. (See Fig. 7E.)

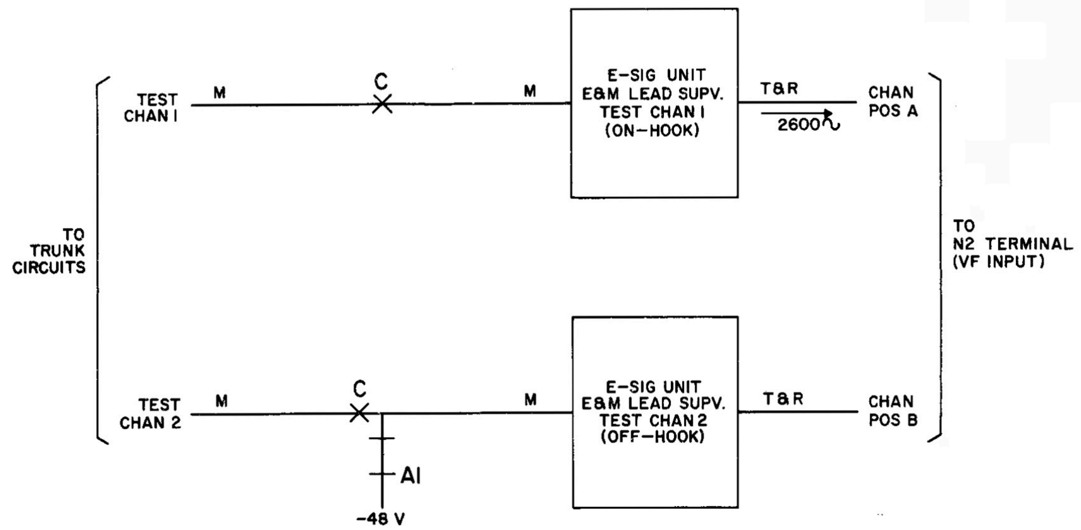


FIG. 6A–TEST CONTROL CIRCUIT–E&M LEAD SUPERVISION

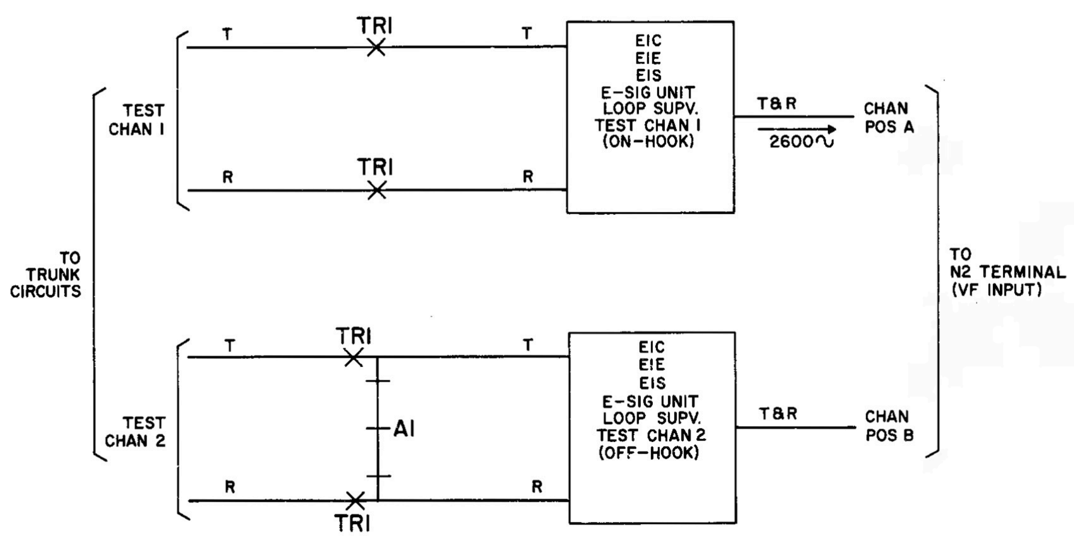


FIG. 6B–TEST CONTROL CIRCUIT–LOOP SUPERVISION

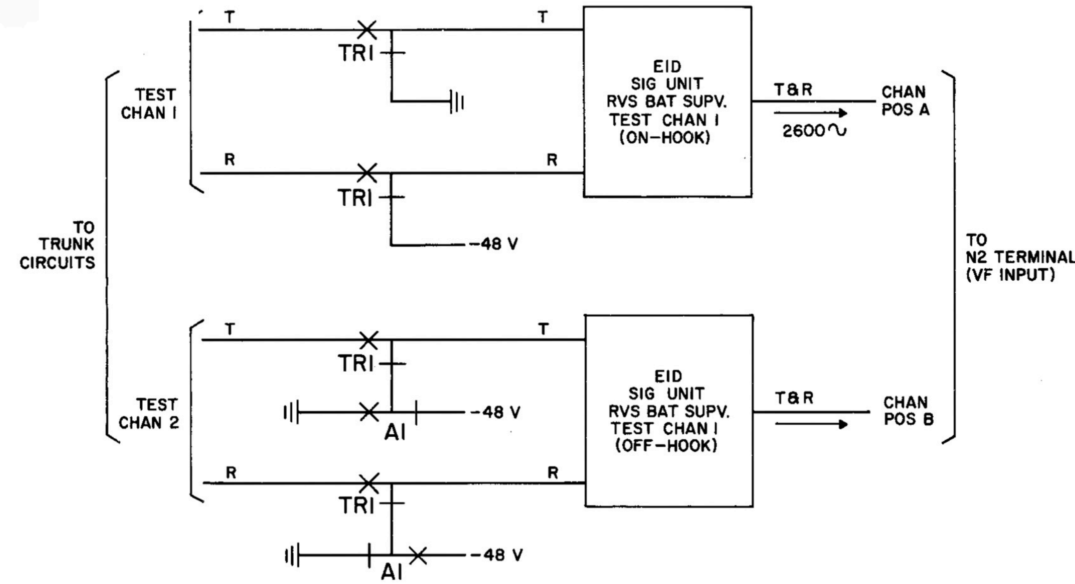


FIG. 6C–TEST CONTROL CIRCUIT–REVERSE BATTERY SUPERVISION (BATTERY ON TIP FOR OFF-HOOK)

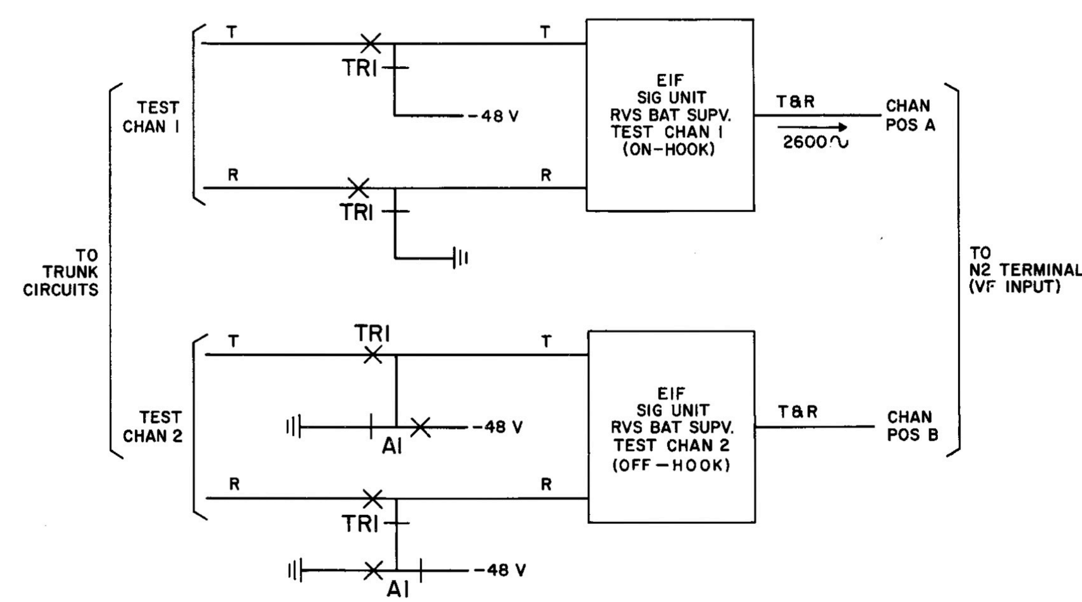


FIG. 6D–TEST CONTROL CIRCUIT–REVERSE BATTERY SUPERVISION (BATTERY ON TIP FOR ON-HOOK)

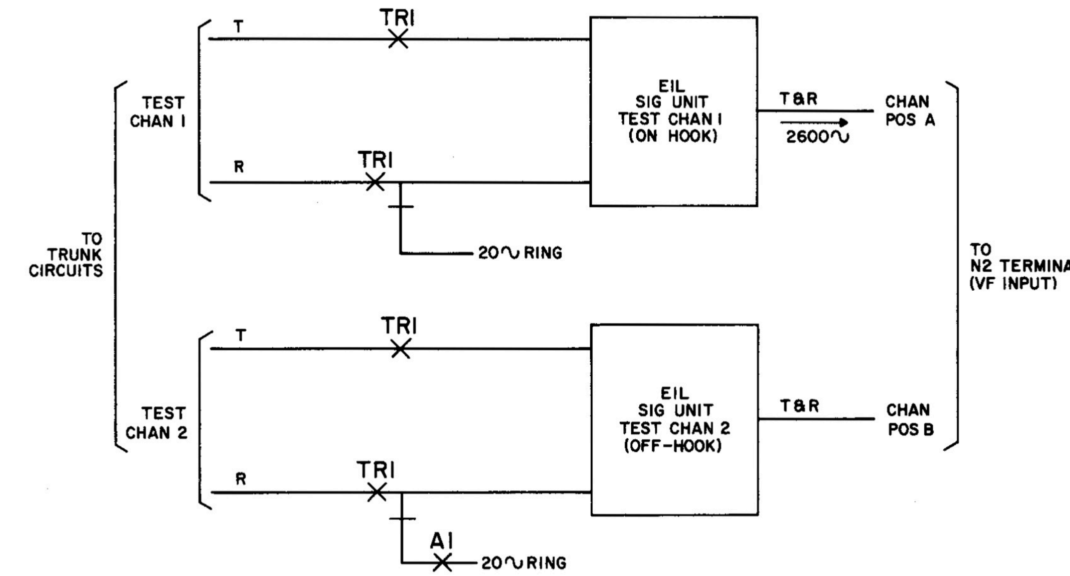


FIG 6E–TEST CONTROL CIRCUIT–OFFICE END OF A CUSTOMER LINE

NOTES:

1. ALL RELAY CONTACTS SHOWN IN OPERATED STATE.
2. RELAY AI RELEASES AFTER DELAY CIRCUIT HAS TIMED OUT AND CHANGES OFF-HOOK SUPERVISION TO ON-HOOK FOR TEST CHANNEL 2.

Fig. 6 — Supervisory Signals Applied to Test Channels for Initial Phase of Restoration

3.21 The one-way outgoing trunk circuits with loop supervision in a panel, No. 1 crossbar, or crossbar tandem office are processed after the "system alarm" by disconnecting the transmitting leads (T and R) and the sleeve lead (S) between the trunk circuit and the E-type signaling unit. The sleeve lead is simultaneously grounded toward the trunk circuit. This stops service charges on calls in progress, releases existing connections, and makes the trunk circuits appear busy to any new calls. (See Fig. 7F.)

3.22 The one-way outgoing trunk circuits with loop supervision in a No. 5 crossbar office are processed after the "system alarm" by disconnecting the transmitting leads (T and R) between the trunk circuits and the E-signaling

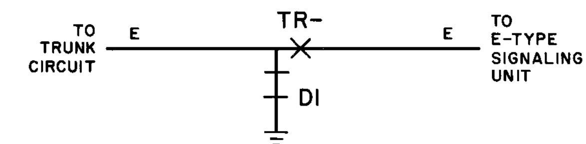


FIG. 7A- 2-WAY OR I-WAY OUTGOING TRUNK CIRCUITS WITH E & M LEAD SUPERVISION-NON-ESS OFFICES

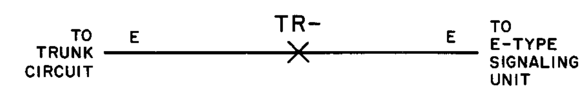


FIG. 7B-I-WAY INCOMING TRUNK CIRCUITS WITH E & M LEAD SUPERVISION-NON-ESS OFFICES

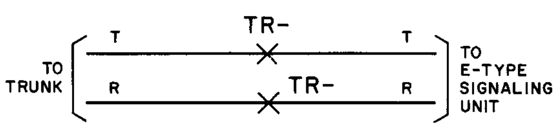


FIG. 7C-I-WAY INCOMING TRUNK CIRCUITS WITH REVERSE BATTERY SUPERVISION OR STATION END OR OFFICE END OF CUSTOMER LINES -NON-ESS OFFICES

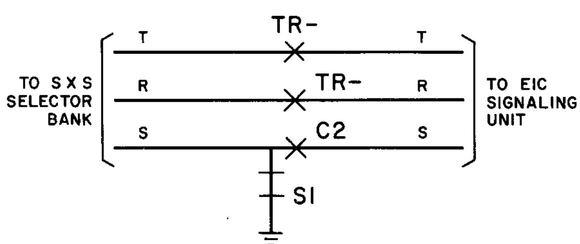


FIG. 7D- I-WAY OUTGOING TRUNKS WITH LOOP SUPERVISION- S X S OFFICE

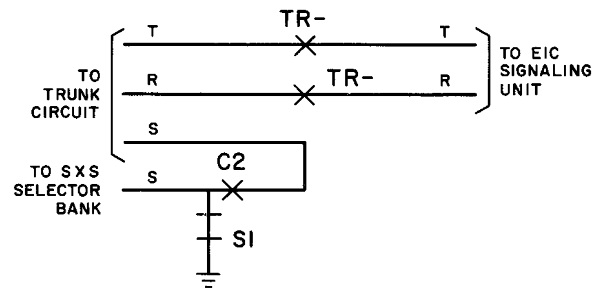


FIG. 7E-I-WAY OUTGOING TRUNK CIRCUITS WITH LOOP SUPERVISION S X S OFFICE

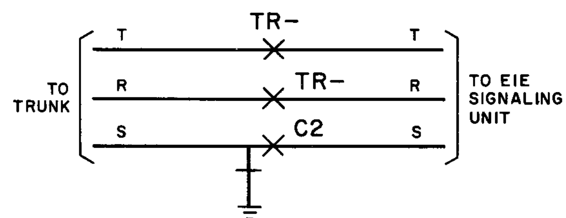


FIG. 7F-I-WAY OUTGOING TRUNK WITH LOOP SUPERVISION-PANEL, NO. I CROSSBAR OR CROSSBAR TANDEM OFFICE

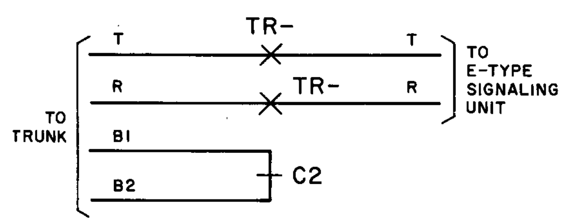


FIG. 7G- I-WAY OUTGOING TRUNK WITH LOOP SUPERVISION-NO. 5 CROSSBAR OFFICE

NOTE:
ALL RELAY CONTACTS SHOWN IN OPERATED STATE

Fig. 7 — Simplified Schematic of Trunk Release and Make-Busy Signals Applied by Carrier Group Alarm

unit and by closing a control loop to the trunk circuit. This stops charges on calls in progress, releases existing connections, and makes the trunk circuit appear busy to any new calls. (See Fig. 7G.)

3.23 Trunks associated with a No. 1 electronic switching system which are assigned to an N2 carrier system are processed by the ESS equipment in case of a carrier failure. To process the trunk, the ESS requires two dc signals from the carrier alarm equipment. The first signal is delivered when the alarm control circuit detects the loss of carrier. On receipt of this signal the ESS will make busy idle trunks, disconnect and make busy trunks in the pulsing condition, and refuse any further seizure signals. If the alarm signal was due to a momentary interruption in carrier, the alarm signal will be removed and the trunks restored to normal. The second alarm signal to the ESS occurs after the system alarm signal activates the CGA circuit. Receipt of this signal causes the ESS to stop charges on calls in progress, release calling and called subscribers, and busy the trunks to prevent subsequent seizures. Fig. 8 shows a simplified schematic of how the two signals to the ESS are derived.

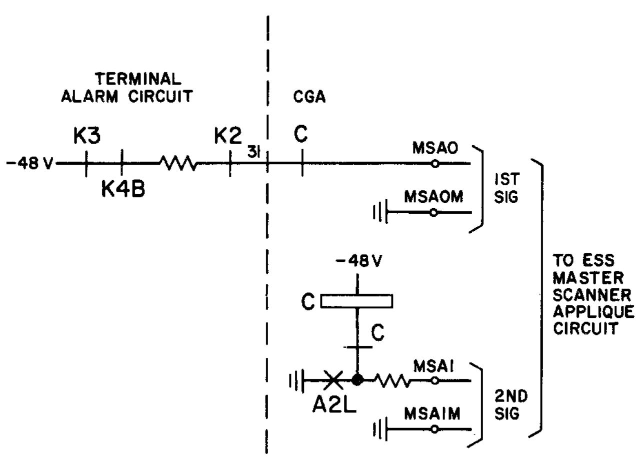


Fig. 8 — ESS Alarm Signals

E. Alarm Override

3.24 To return certain preselected trunks or lines to service during the alarm period, they are patched to alternate facilities at the voice-frequency patch jacks. The make-busy condition is removed by operating the ALM OVRD key located in the terminal alarm unit. This feature enables trunks and lines that are used for special service applications to be returned to service after a short interval of interruption. The reverse procedure is followed when the N2 carrier system is normal and the trunks are to be returned to their regular channel assignments.

3.25 Only trunks with E and M lead supervision and office end or subscriber end of a customer line may be made good by the above process. This alarm override feature is also restricted to trunks and lines associated with channel positions C to M only. Channel positions A and B cannot be patched since 2600-cycle tone is required on both channels during the testing sequence.

F. Restoral Sequence

3.26 Refer to Fig. 9 and assume a fault has occurred in the transmitting direction from terminal B to terminal A. After the alarm sequence has occurred and transmission has been restored from terminal A to terminal B the condition of the system is as follows:

At Terminal A

a. Trunks released and made busy.

b. Carriers not being received.

c. Proper 2600-cycle signal not being received by CGA signal receiver and E-signaling unit of test channel 2.

d. E-signaling unit of test channel 1 in on-hook condition (2600-cycle signal being transmitted toward terminal B).

e. E-signaling unit of test channel 2 in off-hook condition (no signal being transmitted toward terminal B).

f. Voice-frequency output leads of channel 2 are shorted.

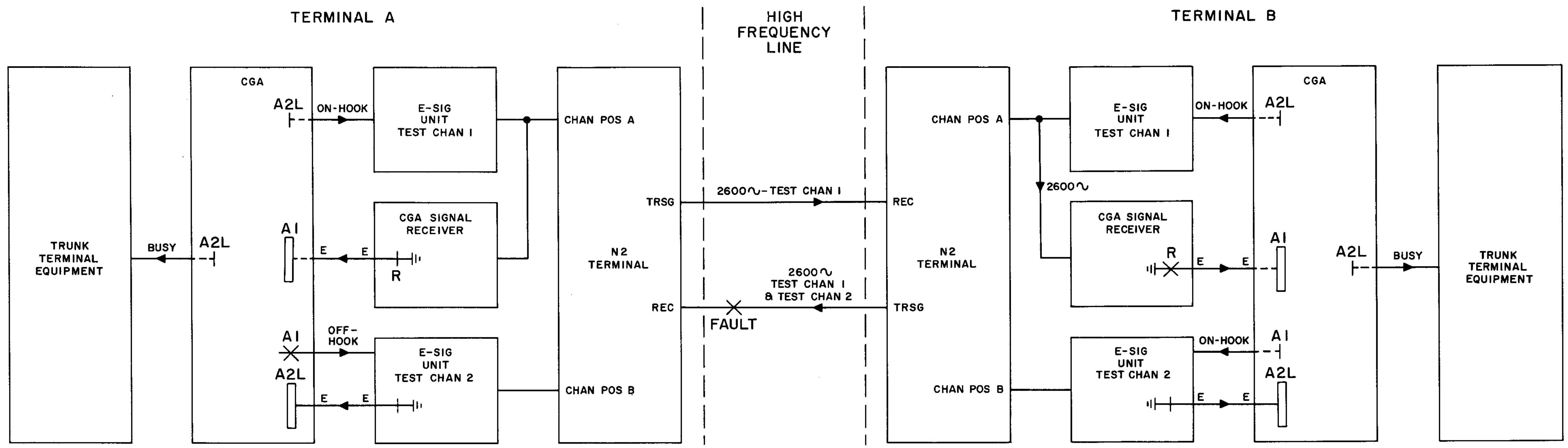


Fig. 9 — Restoral Sequence Theory Schematic

At Terminal B

a. Trunks released and made busy.

b. Carrier being received.

c. Proper 2600-cycle signal, having been received by the CGA receiver for the timed interval of 45 seconds, has advanced the restoral sequence.

d. 2600-cycle signal not being received by the E-signaling unit of test channel 2.

e. E-signaling units of test channels 1 and 2 in on-hook condition (2600-cycle tone being transmitted toward terminal A over test channels 1 and 2).

The system will remain in this condition as long as the fault exists.

3.27 After the fault is cleared, the 2600-cycle signal being transmitted over test channel 1 from terminal B to terminal A is detected by the CGA signal receiver at terminal A. If the 2600-cycle tone has the proper signal-to-noise ratio, the E lead from the CGA signal receiver to the CGA is opened. This allows the delay circuit of the CGA to start to time out. The delay circuit prevents the system from restoring in the face of a high level of noise and crosstalk that may occur on a line where the repeaters have regulated to high gain. After the timeout is complete (approximately 45 seconds) the CGA changes the supervision on the E-signaling unit of test channel 2 to on-hook. Tone is transmitted over test channel 2 from terminal A to terminal B. At terminal A, simultaneously with the change in supervision, the CGA signals the terminal alarm unit to remove the short from the voice-frequency output leads of test channel 2. This allows 2600-cycle tone to be received. Detection of a 2600-cycle tone by the E-signaling units of test channel 2 at both terminals restores the CGA and terminal alarm circuits to normal and returns trunk supervision control to the E-signaling units. The system is now restored.

4. DELAY CIRCUIT OPERATION

4.01 The delay circuit, Fig. 10, which is part of the CGA, supplements the guard action of the CGA signal receiver circuit by delaying restoral for approximately 45 seconds to insure that 2600-cycle tone of satisfactory signal-to-noise is available on test channel 1. It would be undesirable to restore service in the face of the high level of noise and crosstalk that could be present on the carrier line after a failure of long duration.

4.02 The delay circuit consists of an RC timer, network, a switching transistor, and a receiving relay. During normal system operation, a 24-volt forming voltage is applied to the electrolytic capacitor of the RC network to keep the electrolyte from deteriorating.

4.03 After receipt of the "system alarm" signal, relays in the CGA apply power to the delay circuit, remove the forming voltage and discharge the capacitor, and connect the RC timer control lead to the base of the switching transistor. The grounded "E" lead from the CGA signal receiver shunts the RC timer to prevent charging. The operation of the signal receiver removes the shunt, allowing the capacitor to charge exponentially from ground potential to about −16 volts in approximately 45 seconds. At this point the dc amplifier is turned on and the receiving relay (A2U) operates. This activates the supervisory control relays of the CGA to change supervision on the E-signaling unit of test channel 2 from off-hook to on-hook and signals the terminal alarm unit to remove the short across the receiving leads of test channel 2. Momentary grounding of the E lead (caused by deterioration of the signal-to-voice ratio) discharges the capacitor and returns the timing cycle to time zero.

5. CARRIER GROUP ALARM SIGNAL RECEIVER OPERATION

5.01 The carrier group alarm signal receiver is provided as part of the carrier alarm equipment in order to insure proper restoral after a carrier failure. It is designed to ignore signals containing high levels of noise and crosstalk and to operate upon the receipt of a signaling tone with a signal-to-noise ratio of 3.5 to 12.0 db, depending on the E-signaling unit it is bridging. Upon detection of a proper signal it starts the time-out process in the delay circuit of the CGA.

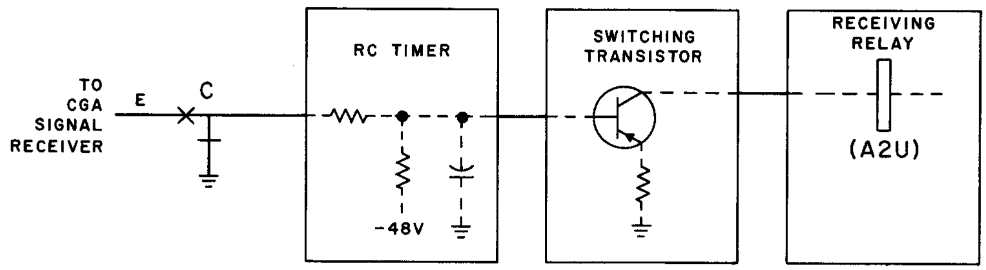


Fig. 10 — CGA Delay Circuit

5.02 The CGA signal receiver (See Fig. 11) includes an amplifier-limiter input stage, a signal and guard detector, a dc amplifier and a receiving relay (R).

5.03 The amplifier-limiter stage receives the signal from the voice frequency output of the channel unit through a high impedance (bridging) transformer. A potentiometer at the input to this stage permits setting the sensitivity of the receiver. At low input levels the amplifier-limiter produces maximum gain, while at higher input levels limiting takes place and the gain is reduced. An output transformer and capacitor form a low-pass filter to sharply attenuate harmonics of the signal frequency that might be generated as a result of limiting. These harmonics, if not suppressed, would produce an excessive amount of guard voltage which might prevent proper receiver operation.

5.04 The output signals from the amplifier-limiter stage is then applied to the signal-guard detector where two networks separate them into signal and guard components. The signal network develops an ac voltage proportional to the incoming 2600-cycle frequency energy. The guard network develops an ac voltage proportional to all frequencies except 2600 cycles. These ac components are then individually rectified, combined in opposing polarity, and are then fed to the dc amplifier for control of the receiving relay (R).

5.05 When the output of the signal circuit is high and the output of the guard circuit is low then conditions are such that the dc amplifier will conduct and relay R will operate. Operation of relay R removes ground from the E lead allowing the time-out in the CGA to occur.

6. DRAWINGS

6.01 The following schematic and equipment drawings (not attached) provide detailed information.

SD-97166-01 N2 Carrier Telephone — Carrier Group Alarm Circuit

SD-97169-01 N2 Carrier Telephone — Carrier Group Alarm Signal Receiver

SD-97116-01 N2 Carrier Telephone — Alarm Circuit

SD-97117-01 N2 Carrier Telephone — Line Terminating Circuit

J99272AR-1 N2 Carrier Telephone — Carrier Group Alarm Signal Receiver Equipment

J99272AP-1 N2 Carrier Telephone — Carrier Group Alarm Unit — Framework, Assembly, Equipment and Wiring

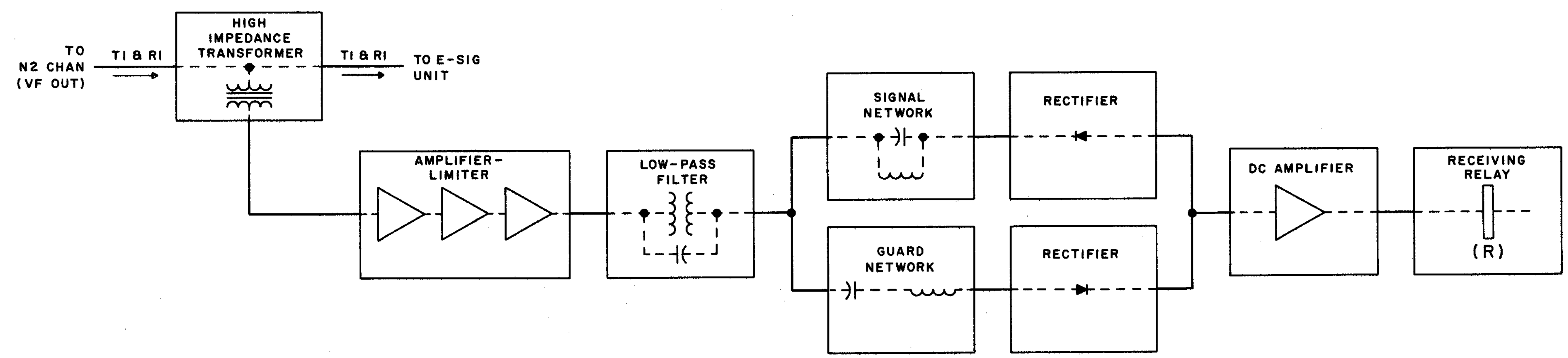


Fig. 11 — CGA Signal Receiver