N2 CARRIER TELEPHONE SYSTEM
PACKAGED TERMINAL EQUIPMENT (J99285)
CHECK OF ALARM OPERATION

This section covers the procedure for checking the over-all operation of the terminal alarm facilities of the packaged N2 carrier terminal frame. This terminal equipment operates and controls the office audible and visual alarms if any of the following conditions occur:

(a) Failure of fuses in the power leads or in the 20-cycle ringing circuit.

(b) Excessive output deviation from the −21 volt power supply.

(c) Low outputs from the signaling or restoral oscillators.

(d) Removal of the alarm and restoral unit or the restoral oscillator from the terminal.

(e) Failure of the received carrier.

If there is a carrier failure, the carrier group alarm circuits condition the affected trunk circuits to release subscribers, apply busy indications, and stop service charges.

The following is a list of the various tests covered by this section:

(A) Check of Alarm Operation for Fuse Failure

(B) Check of Alarm Operation for Failure of the 20-cycle Ringing Fuse Circuit

(C) Check of Alarm Operation for Removal of Alarm and Restoral Unit

(D) Check of Alarm Operation for Removal of Restoral Oscillator

(E) Check of Alarm Operation for Restoral Oscillator Failure

(F) Check of Alarm Operation for Deviation of −21 Volt Power Supply

(G) Check of Alarm Operation for Dual Signaling Oscillator Failure

(H) Check of Alarm Operation for Single Signaling Oscillator Failure

(I) Check of Alarm Operation for Carrier Failure

The terminals of the carrier system under test do not have to be removed from service except for the check of alarm operation for dual signaling oscillator and carrier failures. For checking a dual signaling oscillator failure, all terminals in the frame and the associated far terminals must be out of service. For checking the alarm operation for carrier failure, both near and far terminals of the system being tested must be removed from service.

The tests in this section are based on a 6-terminal packaged frame; however, the information given in these tests should also satisfy the requirements for 3- and 4-terminal packaged frames. The information given also satisfies requirements for these frames when they are not fully equipped.

Various alarm lamps and keys are located on a panel which this section refers to as the miscellaneous jack, key, and lamp panel. There are five types of miscellaneous jack, key, and lamp panels (see Fig. 1, 2, 3, 4, and 5). Use these figures to identify and locate the panel in the terminal frame under test.

Caution: When the alarm and restoral unit or the restoral oscillator is removed from the terminal mounting position for any reason, it should be replaced as quickly as possible. With the alarm and restoral unit or the restoral oscillator removed, the carrier failure indications, automatic trunk conditioning, and automatic restoral processing are disabled.

APPARATUS:

1 — J99272U N2 Switching Set

1 — J99272AH Terminal Test Stand

1 — KS-14510, List 1 Volt-Ohm-Milliammeter (VOM) or equivalent

1 — KS-14510, List 8 Pair of Leads

2 — 258C Dummy Plugs

1 — 265C Tool (contact burnisher)

1 — 266C Tool (steel music wire)

1 — P2DH Cord

2 — W1BC Cords

1 — W2DW Cord

1 — Hewlett-Packard 400-type Vacuum Tube Voltmeter (VTVM) or equivalent

1 — Stop Watch with 0.2-second accuracy in the range of 1 to 20 seconds

(A) CHECK OF ALARM OPERATION FOR FUSE FAILURE

In this test, the office alarms associated with the fuses on the alarm, power, and miscellaneous panel are to be tested by simulating fuse failures (see Fig. 6, 7, and 9).

STEP	PROCEDURE
1	Place the 266C tool in the 265C tool and the cap over the end of the 265C tool. Insert the wire through the opening of each fuse holder cap beside the alarm indicating plunger in such a manner that it will touch the side of the opening and the head of the fuse at the same time. This action simulates a blown fuse, in that the local office alarms associated with the particular fuse will operate, but the operation of the equipment in the terminal bay will not be affected. ***Note:*** Testing of the +130 and −130 volt fuses may not be necessary in some locations where these supplies are not required. Before testing these fuses, check to see if the feeders are connected.
2	Apply the 265C and 266C tools to the following fuses for the appropriate packaged bay being tested: ***For One-terminal Packaged Bay (See Fig. 6)*** (a) −48 volt 1-1/3 ampere PF (b) +130 volt 1-1/3 ampere (c) −130 volt 1-1/3 ampere

STEP	PROCEDURE
	For 3- to 6-terminal Packaged Bay (See Fig. 7) (a) −48 volt 1-1/3 ampere PFO (b) −48 volt 1-1/3 ampere PFE (c) +130 volt 1-1/3 ampere O (d) +130 volt 1-1/3 ampere E (e) −130 volt 1-1/3 ampere O (f) −130 volt 1-1/3 ampere E ***Requirement 1:*** The MJ relay shall operate and the ALM lamp shall light on the alarm, power, and miscellaneous panel. ***Requirement 2:*** The associated major office alarms shall operate. If these requirements cannot be met, check the MJ relay on the alarm, power, and miscellaneous panel.
3	Apply the 265C and 266C tools to the following fuses: ***For One-terminal Packaged Bay (See Fig. 6)*** (a) −48 volt 5 ampere F1 (b) −48 volt 5 ampere F2 (c) −48 volt 2 ampere PWR 1 (d) −48 volt 2 ampere PWR 2 (e) −48 volt 5 ampere ALM (fuses numbered 1 and 2) (f) −48 volt 3 ampere SIG UN (fuses numbered 1 and 2) (g) −48 volt 1/4 ampere L (h) −48 volt 1/4 ampere R (i) −48 volt 1-1/3 ampere T (j) −48 volt 1-1/3 ampere TC (k) +130 volt 1/4 ampere REP +130V 1 (*l*) +130 volt 1/4 ampere REP +130V 2 (m) +130 volt 1/4 ampere TC (n) −130 volt 1/4 ampere REP −130V 1 (o) −130 volt 1/4 ampere REP −130V 2 ***For 3- to 6-terminal Packaged Bay (See Fig. 7)*** (a) −48 volt 5 ampere FLT, OF1 (b) −48 volt 5 ampere FLT, OF2 (c) −48 volt 5 ampere FLT, EF1 (d) −48 volt 5 ampere FLT, EF2 (e) −48 volt 2 ampere PWR (fuses numbered 1 to 6) (f) −48 volt 5 ampere ALM (fuses numbered 1 to 6) (g) −48 volt 3 ampere SU (fuses numbered 1 to 6) (h) −48 volt 1/4 ampere L (i) −48 volt 1/4 ampere R (j) −48 volt 1/2 ampere B (k) −48 volt 1-1/3 ampere T (*l*) −48 volt 1-1/3 ampere TC (m) −48 volt 1-1/3 ampere TS (n) +130 volt 1/4 ampere REP +130V (fuses numbered 1 to 6) (o) −130 volt 1/4 ampere REP −130V (fuses numbered 1 to 6) (p) +130 volt 1/4 ampere TC

STEP	PROCEDURE
	Requirement 1: The MJN relay shall operate and the ALM lamp shall light on the alarm, power, and miscellaneous panel. ***Requirement 2:*** The associated major or minor office alarms shall operate. If these requirements cannot be met, check the MJN relay on the alarm, power, and miscellaneous panel.
4	Apply the 265C and 266C tools to the following fuses: ***For One-terminal Packaged Bay (See Fig. 6)*** (a) −48 volt 1/2 ampere M (b) −48 volt 1/4 ampere RO (c) −48 volt 1/4 ampere O1 (d) −48 volt 1/4 ampere O2 ***For 3- to 6-terminal Packaged Bay (See Fig. 7)*** (a) −48 volt 1/2 ampere M1 (b) −48 volt 1/2 ampere M2 (c) −48 volt 1/4 ampere O1 (d) −48 volt 1/4 ampere O2 (e) −48 volt 1/4 ampere SO1 (f) −48 volt 1/4 ampere SO2 (g) −48 volt 1/4 ampere RO1 (h) −48 volt 1/4 ampere RO2 ***Requirement 1:*** The MN relay shall operate and the ALM lamp shall light on the alarm, power, and miscellaneous panel. ***Requirement 2:*** The associated minor office alarms shall operate. If these requirements cannot be met, check the MN relay on the alarm, power, and miscellaneous panel.

(B) CHECK OF ALARM OPERATION FOR FAILURE OF THE 20-CYCLE RINGING FUSE CIRCUIT

STEP	PROCEDURE
1	Apply the 265C and 266C tools, as in Test (A), to each fuse on the 20-cycle fuse and lamp panel (see Fig. 6, 7, 8, and 9). ***Requirement 1:*** The FA lamp shall light on the 20-cycle fuse and lamp panel. ***Requirement 2:*** The MJN relay shall operate and the ALM lamp shall light on the alarm, power, and miscellaneous panel. ***Requirement 3:*** The associated office alarms shall operate. If these requirements cannot be met, check the FA relay on the 20-cycle fuse and lamp panel and the MJN relay on the alarm, power, and miscellaneous panel.

(C) CHECK OF ALARM OPERATION FOR REMOVAL OF ALARM AND RESTORAL UNIT	
STEP	**PROCEDURE**
1	Remove the N2 alarm and restoral unit J99272AW from its terminal mounting (see Fig. 1, 2, 3, 4, 5, 6, 7, and 10). ***Requirement 1:*** The RA relay shall release, the TFL and MN relays shall operate, and the ALM lamp shall light on the alarm, power, and miscellaneous panel. ***Requirement 2:*** The RMV ALM lamp shall light on the miscellaneous jack, key, and lamp panel. ***Requirement 3:*** The associated office alarms shall operate. If these requirements cannot be met, check the RA, TFL, and MN relays on the alarm, power, and miscellaneous panel.
2	Operate the RMV ALM RLS key on the miscellaneous jack, key, and lamp panel to the vertical position. ***Requirement 1:*** The RMV ALM lamp shall remain lighted. ***Requirement 2:*** The TFL and MN relays shall release and the ALM lamp shall extinguish. ***Requirement 3:*** The associated office alarms shall cease to operate. If these requirements cannot be met, check the RMV ALM RLS key on the miscellaneous jack, key, and lamp panel and the TFL and MN relays on the alarm, power, and miscellaneous panel.
3	Insert the alarm and restoral unit back into the terminal mounting. ***Requirement 1:*** The RMV ALM lamp shall remain lighted. ***Requirement 2:*** The RA, TFL, and MN relays shall operate and the ALM lamp shall light. ***Requirement 3:*** The associated office alarms shall operate. If these requirements cannot be met, check the RA, TFL, and MN relays on the alarm, power, and miscellaneous panel.
4	Return the RMV ALM RLS key on the miscellaneous jack, key, and lamp panel to its normal horizontal position. ***Requirement 1:*** The RMV ALM lamp shall extinguish. ***Requirement 2:*** The TFL and MN relays shall release and the ALM lamp shall extinguish. ***Requirement 3:*** The associated office alarms shall cease to operate. If these requirements cannot be met, check the RMV ALM RLS key on the miscellaneous jack, key, and lamp panel and the TFL and MN relays on the alarm, power, and miscellaneous panel.

(D) CHECK OF ALARM OPERATION FOR REMOVAL OF RESTORAL OSCILLATOR	
STEP	**PROCEDURE**
1	Remove the restoral oscillator from the alarm, power, and miscellaneous panel (see Fig. 1, 2, 3, 4, 5, 6, 7, and 11). ***Requirement 1:*** The RA relay shall release, the TFL and MN relays shall operate, and the ALM lamp shall light on the alarm, power, and miscellaneous panel. ***Requirement 2:*** The RSTL OSC FAIL and RMV ALM lamps shall light on the miscellaneous jack, key, and lamp panel. ***Requirement 3:*** The associated office alarms shall operate. If these requirements cannot be met, check the RA, TFL, and MN relays on the alarm, power, and miscellaneous panel.
2	Operate the RMV ALM RLS key on the miscellaneous jack, key, and lamp panel to the vertical position. ***Requirement 1:*** The RSTL OSC FAIL and RMV ALM lamps shall remain lighted. ***Requirement 2:*** The TFL and MN relays shall release and the ALM lamp shall extinguish. ***Requirement 3:*** The associated office alarms shall cease to operate. If these requirements cannot be met, check the RMV ALM RLS key on the miscellaneous jack, key, and lamp panel and the TFL and MN relays on the alarm, power, and miscellaneous panel.
3	Insert the restoral oscillator back into its position in the alarm, power, and miscellaneous panel. ***Requirement 1:*** The RMV ALM lamp shall remain lighted, the RA relay shall release, and the RSTL OSC FAIL lamp shall extinguish. ***Requirement 2:*** The TFL and MN relays shall operate and the ALM lamp shall light. ***Requirement 3:*** The associated office alarms shall operate. If these requirements cannot be met, check the RA, TFL, and MN relays on the alarm, power, and miscellaneous panel.
4	Return the RMV ALM RLS key on the miscellaneous jack, key, and lamp panel to its normal horizontal position. ***Requirement 1:*** The ALM and RMV ALM lamps shall extinguish and the TFL and MN relays shall release. ***Requirement 2:*** The associated office alarms shall cease to operate.

(E) CHECK OF ALARM OPERATION FOR RESTORAL OSCILLATOR FAILURE	
STEP	**PROCEDURE**
1	Connect the VTVM to the LEV jacks on the restoral oscillator which is plugged into the alarm, power, and miscellaneous panel (see Fig. 1, 2, 3, 4, 5, 6, 7, and 12). ***Requirement:*** 2.05 $\pm$0.1 volts If this requirement cannot be met, check the restoral oscillator. ***Note:*** This test shall not be made if a SYS ALM lamp on the miscellaneous jack, key, and lamp panel is lighted indicating that an alarm and restoral unit is operated.

STEP	PROCEDURE
2	Turn the LEV ADJ control on the restoral oscillator until the VTVM indicates 1.5 volts. ***Requirement 1:*** The OSC ALM lamp shall light on the restoral oscillator. ***Requirement 2:*** The MN relay shall operate and the ALM lamp shall light on the alarm, power, and miscellaneous panel. ***Requirement 3:*** The RSTL OSC FAIL lamp shall light on the miscellaneous jack, key, and lamp panel. ***Requirement 4:*** The associated office alarms shall operate. If these requirements cannot be met, check the restoral oscillator and the MN relay on the alarm, power, and miscellaneous panel.
3	Operate the ACO key on the restoral oscillator to the vertical position. ***Requirement 1:*** The OSC ALM and RSTL OSC FAIL lamps shall remain lighted. ***Requirement 2:*** The MN relay shall release and the ALM shall extinguish. ***Requirement 3:*** The associated office alarm shall cease to operate. If these requirements cannot be met, check the ACO key on the restoral oscillator and the MN relay on the alarm, power, and miscellaneous panel.
4	Turn the LEV ADJ control on the restoral oscillator fully clockwise and then adjust for a VTVM reading of 2.05 volts. ***Requirement 1:*** The MN relay shall operate and the ALM lamp shall light. ***Requirement 2:*** The associated office alarms shall operate. If these requirements cannot be met, check the restoral oscillator and the TFL and MN relays on the alarm, power, and miscellaneous panel.
5	Return the ACO key on the restoral oscillator to its normal horizontal position. ***Requirement 1:*** The RSTL OSC FAIL and OSC ALM lamps shall extinguish. ***Requirement 2:*** The MN relay shall release and the ALM lamp shall extinguish. ***Requirement 3:*** The associated office alarms shall cease to operate. If these requirements cannot be met, check the ACO key on the restoral oscillator and the MN relay on the alarm, power, and miscellaneous panel.

(F) CHECK OF ALARM OPERATION FOR DEVIATION OF −21 VOLT POWER SUPPLY

STEP	PROCEDURE
1	This test requires the use of an N2 switching set. On the N2 switching set, set the VM & RIPPLE switch to the REG position and the LOAD switch to TRANSFER. Insert the P2 plug of the N2 switching set into the TST PWR jack on the alarm and restoral unit of the terminal being tested (see Fig. 1, 2, 3, 6, 7, and 13).
2	Read the dc voltmeter on the N2 switching set. ***Requirement:*** −21 ±1 volts If this requirement cannot be met, check the power supply.

STEP	PROCEDURE
3	Slowly turn the ADJ VOLTS control on the power supply unit clockwise for a meter reading of −22.0 volts. ***Caution: This adjustment must be made slowly and the −22.0 volts must not be exceeded.*** ***Requirement 1:*** The associated 21V ALM lamp shall light on the alarm and restoral unit. ***Requirement 2:*** The MN relay shall operate and the ALM lamp shall light on the alarm, power, and miscellaneous panel. ***Requirement 3:*** The associated office alarms shall operate. If these requirements cannot be met, check the alarm and restoral unit and the MN relay on the alarm, power, and miscellaneous panel.
4	Operate the 21V ALM RLS key on the alarm and restoral unit to the vertical position. ***Requirement 1:*** The 21V ALM lamp shall remain lighted. ***Requirement 2:*** The MN relay shall release and the ALM lamp shall extinguish. ***Requirement 3:*** The associated office alarms shall cease to operate. If these requirements cannot be met, check the 21V ALM RLS key on the alarm and restoral unit and the MN relay on the alarm, power, and miscellaneous panel.
5	Slowly turn the ADJ VOLTS control on the power supply unit counterclockwise for a meter reading of −21.0 volts. ***Caution: This adjustment must be made slowly.*** ***Requirement 1:*** The 21V ALM lamp shall remain lighted. ***Requirement 2:*** The MN relay shall operate and the ALM lamp shall light. ***Requirement 3:*** The associated office alarms shall operate. If these requirements cannot be met, check the 21V ALM RLS key on the alarm and restoral unit and the MN relay on the alarm, power, and miscellaneous panel.
6	Return the 21V ALM RLS key to its normal horizontal position. ***Requirement 1:*** The 21V ALM lamp shall extinguish. ***Requirement 2:*** The MN relay shall release and the ALM lamp shall extinguish. ***Requirement 3:*** The associated office alarms shall cease to operate. If these requirements cannot be met, check the alarm and restoral unit and the MN relay on the alarm, power, and miscellaneous panel.
7	Slowly turn the ADJ VOLTS control on the power supply unit counterclockwise for a meter reading of −20.0 volts. ***Caution: This adjustment must be made slowly and the −20.0 volts must not be exceeded.*** ***Requirement 1:*** The associated 21V ALM lamp shall light on the alarm and restoral unit. ***Requirement 2:*** The MN relay shall operate and the ALM lamp shall light. ***Requirement 3:*** The associated office alarms shall operate. If these requirements cannot be met, check the alarm, power, and miscellaneous panel.

STEP	PROCEDURE
8	Operate the 21V ALM RLS key on the alarm and restoral unit to the vertical position. ***Requirement 1:*** The 21V ALM lamp shall remain lighted. ***Requirement 2:*** The MN relay shall release and the ALM lamp shall extinguish. ***Requirement 3:*** The associated office alarms shall cease to operate. If these requirements cannot be met, check the 21V ALM RLS key on the alarm and restoral unit and the MN relay on the alarm, power, and miscellaneous panel.
9	Return the 21V ALM RLS key to its normal horizontal position. ***Requirement 1:*** The 21V ALM lamp shall extinguish. ***Requirement 2:*** The ALM lamp shall extinguish and the MN relay shall release. ***Requirement 3:*** The associated office alarms shall cease to operate. If these requirements cannot be met, check the alarm and restoral unit and the MN relay on the alarm, power, and miscellaneous panel.
10	Disconnect the N2 switching set from the alarm and restoral unit.

(G) CHECK OF ALARM OPERATION FOR DUAL SIGNALING OSCILLATOR FAILURE

Caution: This test must be performed with the terminals and associated systems of the bay under test removed from service.

In this test the failure of signaling oscillators (a dual failure) is simulated. Since the signaling oscillators of the bay supply all the terminals in that bay with signaling frequencies, it is necessary to remove from service all the terminals associated with the bay under test and the associated terminals at the far end of the carrier system.

STEP	PROCEDURE
1	Remove from service all terminals in the bay to be tested by operations at the secondary testboards at both terminal offices of the system.
2	Insert a 258C dummy plug into the even and odd TR CUR jacks on the oscillator and transfer panel to simulate a failure of both the even and odd oscillators. When the 258C dummy plugs are inserted into the even and odd TR CUR jacks, the even and odd loads remain connected to their respective oscillators (see Fig. 6, 7, 14, 15, and 16). ***Requirement 1:*** The ODD OSC, EVEN OSC, and LOAD lamps shall light on the oscillator and transfer panel. ***Requirement 2:*** The TFU and MJ relays shall operate and the ALM lamp shall light on the alarm, power, and miscellaneous panel. ***Requirement 3:*** The associated office alarms shall operate. If these requirements cannot be met, check the signaling load transfer circuit and the TFU and MN relays on the alarm, power, and miscellaneous panel.
3	Remove the 258C dummy plug from the odd (or even) TR CUR jack to restore the odd (or even) oscillator. When the 258C dummy plug is removed from the odd (or even) oscillator, the even (or odd) load is transferred automatically to the odd (or even) oscillator.

STEP	PROCEDURE
	Requirement 1: The ODD OSC (or EVEN OSC) and LOAD lamps shall extinguish. ***Requirement 2:*** The EVEN OSC (or ODD OSC) lamp shall remain lighted. ***Requirement 3:*** The TFU and MJ relays shall release, the TFL and MN relays shall operate, and the ALM lamp shall remain lighted. ***Requirement 4:*** The associated major office alarms shall cease to operate. ***Requirement 5:*** The associated minor office alarms shall operate. If these requirements cannot be met, check the oscillator and transfer panel and the TFL, TFU, MJ, and MN relays on the alarm, power, and miscellaneous panel.
4	Operate the nonlocking ACO key on the oscillator and transfer panel. ***Requirement 1:*** The EVEN OSC (or ODD OSC) lamp shall remain lighted and the GD lamp shall light on the oscillator and transfer panel. ***Requirement 2:*** The TFL and MN relays shall release and the ALM lamp shall extinguish. ***Requirement 3:*** The associated office alarms shall cease to operate. If these requirements cannot be met, check the oscillator and transfer panel and the TFL and MN relays on the alarm, power, and miscellaneous panel.
5	Remove the remaining dummy plug from the even (or odd) TR CUR jack. ***Requirement:*** The EVEN OSC (or ODD OSC) and GD lamps shall extinguish. If this requirement cannot be met, check the oscillator and transfer panel.

(H) CHECK OF ALARM OPERATION FOR SINGLE SIGNALING OSCILLATOR FAILURE

STEP	PROCEDURE
1	Insert the 258C dummy plug into the even (or odd) TR CUR jack (but not both) on the oscillator and transfer panel to simulate an even (or odd) oscillator failure. When the 258C dummy plug is inserted into the even (or odd) TR CUR jack, the even (or odd) load is transferred automatically to the odd (or even) oscillator. ***Requirement 1:*** The EVEN OSC (or ODD OSC) lamp on the oscillator and transfer panel shall light. ***Requirement 2:*** The TFL and MN relays shall operate and the ALM lamp shall light on the alarm, power, and miscellaneous panel. ***Requirement 3:*** The associated office alarms shall operate. If these requirements cannot be met, check the signaling load transfer circuit and the TFL and MN relays on the alarm, power, and miscellaneous panel.
2	Operate the nonlocking ACO key on the oscillator and transfer panel. ***Requirement 1:*** The GD lamp shall light and the EVEN OSC (or ODD OSC) lamp shall remain lighted.

STEP	PROCEDURE
	Requirement 2: The TFL and MN relays shall release and the ALM lamp shall extinguish. ***Requirement 3:*** The associated office alarms shall cease to operate. If these requirements cannot be met, check the oscillator and transfer panel and the TFL and MN relays on the alarm, power, and miscellaneous panel.
3	Remove the 258C dummy plug from the even (or odd) TR CUR jack. ***Requirement:*** The EVEN OSC (or ODD OSC) and GD lamps shall extinguish on the oscillator and transfer panel. If this requirement cannot be met, check the oscillator and transfer panel.

(I) CHECK OF ALARM OPERATION FOR CARRIER FAILURE

Caution: This test must be performed with the associated terminals at each end of the system removed from service.

Note: This test requires the coordinated action of personnel at both the near and far terminals.

In this test the relays in the alarm and restoral units at each end of the system will be checked for proper timing and sequential operation. The timing of these relays for both terminals will be performed at the near terminal. Also at the near terminal, the transmitted carrier will be purposely interrupted, and the various timing intervals will be measured as the alarm and restoral units (at each end of the system) progress through different steps in the alarming and restoral process. The alarm and restoral units used should be checked in accordance with Section 362-803-511. At the near terminal, the VTVM is used to monitor the received carrier from the far terminal. The VTVM, plus the lighting and extinguishing of the lamps associated with the terminal indicate the behavior of the relays in the alarm and restoral unit at the far terminal (see Fig. 17, 18, and 19).

STEP	PROCEDURE
	AT BOTH TERMINALS OF THE SYSTEM TO BE CHECKED (NEAR AND FAR)
1	Remove from service the terminal to be tested by applying make-busy conditions to the associated trunk circuits at the appropriate testboard, circuit patch bay, or test frame.
2	Using an N2 switching set and a VOM, measure the −21 and −48 volts of the terminal. On the switching set, set the VM & RIPPLE switch to the REG position and the LOAD switch to TRANSFER. Insert the P2 plug on the N2 switching set into the TST PWR jack on the alarm and restoral unit (see Fig. 13).
3	Read the dc voltmeter on the N2 switching set. This meter is highly accurate to 1 per cent and should always be used to measure the −21 volts. ***Requirement:*** −21 ±1 volts If this requirement cannot be met, check the power supply unit.

STEP	PROCEDURE
4	Using the KS-14510, List 8 leads, connect the VOM (use dc scale) to the −48V and G jacks on the N2 switching set. Insert the negative lead (black) of the VOM into the −48V jack on the switching set. ***Requirement:*** −43 to −52 volts as read on the VOM. If this requirement cannot be met, check the −48 volt power supply.
	AT THE NEAR TERMINAL
5	Connect the W1BC shorting straps to the MI and MG jacks on the associated channel modem units for channels located in channel positions A and B of the terminal being checked (see Fig. 13). This prevents the 2600-cycle test tone from being transmitted to the far terminal after a carrier failure has been simulated.
6	Remove a connector from either the J3 or J4 jack on the line terminating unit. Do not remove both.
7	Using a P2DH cord, connect a 400-type VTVM into the J3 or J4 jack. This will permit detection of the loss of received carrier signal. ***Requirement:*** −13 ±2.5 db
8	Connect the VOM (use dc scale) to the −21V jack on the group transmitting unit and to the MG or DG jack on any of the modem units in the terminal except those in channel positions A and B (see Fig. 13). ***Requirement:*** −21 ±1 volts
9	Remove the connectors from the transmitting J1 and J2 jacks on the line terminating unit. Using the stop watch, register the exact time that the second connector is removed. After requirement 1 is satisfied, replace the connectors in the J1 and J2 jacks and observe the following: ***Requirement 1:*** In 1.5 to 2.5 seconds, the VTVM reading shall drop to less than −21 db. ***Requirement 2:*** In approximately 4.0 seconds, the following shall occur: (a) The SYS ALM lamp shall light on the associated alarm and restoral unit at the near terminal. (b) The MJN relay shall operate and the ALM lamp shall light on the alarm, power, and miscellaneous panel. (c) The SYS ALM and FAIL REC lamps shall light on the miscellaneous jack, key, and lamp panel. (The SA relay in the associated alarm and restoral unit at the near terminal has operated.) (d) The VOM shall read 0 volt. (e) The A1L, A2L, A1U, TR1, TR2, TR3, TR4, E1, E2, C, S, and S1 relays of the associated carrier group alarm unit shall operate. If this requirement 2 cannot be met, check the associated alarm and restoral unit, the line terminating unit at the near terminal, and the MJN relay on the alarm, power, and miseellaneous panel.

STEP	PROCEDURE
	Requirement 3: In approximately 18 seconds the VTVM shall indicate −13 ±2.5 db. (The DS1 relay in the associated alarm and restoral unit of the far terminal has operated.) If this requirement 3 cannot be met, check the associated alarm and restoral unit at the far terminal. ***Requirement 4:*** In approximately 20 seconds the following shall occur: (a) The VOM shall read −21 ±1 volt (b) The D and D1 relays shall operate and the S relay shall release on the associated carrier group alarm panel. ***Note:*** Observe the "wink off" affect of the S1 relay. After the operation of the D relay, the S1 relay releases momentarily. If requirement 4 cannot be met, check the alarm and restoral unit and the line terminating unit at the near terminal. ***Requirement 5:*** In approximately 30 seconds the following shall occur: (a) Lamp FAIL REC in the miscellaneous lamp, jack, and key panel shall extinguish. (b) The A2U relay shall operate and the A1L relay shall release on the associated carrier group alarm panel. If these requirements are not met, check the carrier group alarm delay unit and the operation of the RR1 and RR2 bay relays at the near terminal. Also check the bay relays at the far terminal if the terminal is located in a packaged frame. If the far terminal is not located in a packaged frame check the associated carrier group alarm unit and the E-type signaling unit associated with test channel 1. ***Requirement 6:*** The MR1 message register shall operate approximately 0.3 second after the FAIL REC lamp has extinguished. ***Requirement 7:*** The REG ALM lamp on the miscellaneous lamp, jack, and key panel shall light. If these requirements cannot be met, check the carrier group alarm unit and the RG relay on the power, alarm, and miscellaneous panel.
10	Operate the SYS ALM RLS key on the alarm and restoral unit to the vertical position. ***Requirement 1:*** The MJN relay shall release and the ALM lamp shall extinguish on the alarm, power, and miscellaneous panel (see Fig. 2 and 3). ***Requirement 2:*** The SYS ALM lamp shall remain lighted on the alarm and restoral unit. ***Requirement 3:*** The SYS ALM lamp shall remain lighted on the miscellaneous jack, key, and lamp panel. ***Requirement 4:*** The associated office alarms shall cease to operate. If these requirements cannot be met, check the SYS ALM key on the alarm and restoral unit and the MJN relay on the alarm, power, and miscellaneous panel at the near terminal.

STEP	PROCEDURE
	AT THE FAR TERMINAL
11	Approximately 2.0 seconds after the near terminal has caused a simulated carrier failure towards this end (far terminal) the following shall occur: ***Requirement 1:*** The SYS ALM lamp shall light on the alarm and restoral unit. ***Requirement 2:*** The MJN relay shall operate and the ALM lamp shall light on the alarm, power, and miscellaneous panel. ***Requirement 3:*** The SYS ALM and FAIL REC lamps shall light on the miscellaneous jack, key, and lamp voice-frequency patching panel. ***Requirement 4:*** The associated office alarms shall operate. ***Requirement 5:*** The A1L, A2L, A1U, TR1, TR2, TR3, TR4, E1, E2, C, S, and S1 relays of the associated carrier group alarm unit shall operate. If these requirements cannot be met, check the associated alarm and restoral unit and the MJN relay on the alarm, power, and miscellaneous panel at the far terminal.
12	Operate the SYS ALM RLS key on the associated alarm and restoral unit to the vertical position. ***Requirement 1:*** The MJN relay shall release and the ALM lamp shall extinguish on the alarm, power, and miscellaneous panel. ***Requirement 2:*** The SYS ALM lamp on the alarm and restoral unit shall remain lighted. ***Requirement 3:*** The SYS ALM lamp shall remain lighted on the miscellaneous jack, key, and lamp panel. ***Requirement 4:*** The associated office alarms shall cease to operate. If these requirements cannot be met, check the SYS ALM RLS key on the associated alarm and restoral unit and the MJN relay on the alarm, power, and miscellaneous panel.
13	Approximately 15 seconds after the SYS ALM lamp has lighted the following shall occur: ***Requirement:*** The D and D1 relays shall operate and the S relay shall release on the carrier group alarm unit. If this requirement is not met, check the alarm and restoral unit and the carrier group alarm unit.
	AT THE NEAR AND FAR TERMINALS
14	At this point, the near terminal has timed out on test channel 1 and is waiting on test channel 2 for the 2600-cycle test tone from the far terminal. The far terminal has not yet timed out on test channel 1 because the 2600-cycle test tone is shorted at the near terminal by shorting straps W1BC at the MI and MG jacks on the channel modem units for test channels 1 and 2.
15	At both terminals, operate the ALM OVRD key associated with the terminal being checked on the miscellaneous jack, key, and lamp panel. ***Requirement 1:*** The associated ALM OVRD lamp shall light on the miscellaneous jack, key, and lamp panel.

STEP	PROCEDURE
	Requirement 2: The TR2, TR4, and E2 relays shall release on the associated carrier group alarm unit. If these requirements cannot be met, check the ALM OVRD key and the TR2, TR4, and E2 relays on the carrier group alarm unit.
16	Return the ALM OVRD key to its normal horizontal position. ***Requirement 1:*** The associated ALM OVRD lamp shall extinguish on the miscellaneous jack, key, and lamp panel. ***Requirement 2:*** The TR2, TR4, and E2 relays shall operate on the carrier group alarm unit. If these requirements cannot be met, check the ALM OVRD key and the TR2, TR4, and E2 relays on the carrier group alarm unit.
17	With the VOM set to 60 volts on the dc scale, measure at the terminal punchings between A1 and A2 and then between A1 and B2 on the MISC terminal block of the associated carrier group alarm. The carrier group alarm terminal block is located at the rear of the unit. (See Fig. 18.) ***Requirement:*** In both cases, the meter shall read 0 volt. [This measurement indicates that the first and second alarm indications have been sent to the No. 1 electronic switching system (ESS) office.] If this requirement cannot be met, check the CS relay in the associated alarm and restoral unit and the A1U relay on the carrier group alarm unit.
18	It may be desirable at this time to check the busy conditioning of individual trunks provided by the trunk release and make busy panel. If so, proceed to Step 19; if not, proceed to Step 20.
19	For each trunk, taking one trunk at a time, remove the out-of-service conditioning provided in Step 1 and observe that the one- and 2-way outgoing trunks remain busy as a result of the trunk release and make busy operation. Replace the out-of-service conditioning before proceeding to the next trunk.
	AT THE NEAR TERMINAL
20	Remove the shorting straps from the MI and MG jacks on the channel modem units for test channels 1 and 2. Remove the shorting strap from test channel 1 first. ***Requirement:*** In approximately 10.0 seconds, the SYS ALM lamp on the miscellaneous lamp, jack, and key panel shall extinguish. (The 2600-cycle test tone on channel 1 has been received at the far end, timed for 10 seconds, then, with tone received on channel 2 to cause restoral of the near terminal.) If this requirement cannot be met, check the associated alarm and restoral unit at the near terminal and check the RR1 and RR2 bay relays at both ends of the system. If the far terminal is not located in a packaged frame, check the associated carrier group alarm unit and the E-type signaling unit associated with channel positions A and B.

STEP	PROCEDURE
21	After the SYS ALM lamp has extinguished, check for the following: ***Requirement 1:*** The REG ALM lamp shall remain lighted on the miscellaneous lamp, jack, and key panel. ***Requirement 2:*** The MR1 message register on the carrier group alarm unit shall advance its count by one digit. If these requirements cannot be met, check the MR1 message register, the carrier group alarm unit and the RG relay on the power, alarm, and miscellaneous panel.
22	Operate the REG LP RLS key on the miscellaneous jack, key, and lamp panel. ***Requirement:*** The RG relay shall release on the alarm, power, and miscellaneous panel and the REG ALM lamp shall extinguish.
	AT THE FAR TERMINAL
23	Approximately 10.0 seconds after the W1BC near terminal straps have been removed from the channel modem units on test channels 1 and 2, the following shall occur: ***Requirement 1:*** The SYS ALM lamp shall extinguish on the miscellaneous lamp, jack, and key panel. If this requirement cannot be met, check the associated alarm and restoral unit. Also check the RR1 and RR2 bay relays at the far terminal.
	AT THE NEAR AND FAR TERMINALS
	Requirement 2: The MJN relay shall operate and the ALM lamp shall light on the alarm, power, and miscellaneous panel. ***Requirement 3:*** The associated office alarms shall operate. ***Requirement 4:*** All relays shall release on the associated carrier group alarm unit. If these requirements cannot be met, check the MJN relay on the alarm, power, and miscellaneous panel and the associated alarm and restoral unit.
24	Return the SYS ALM RLS key on the associated alarm and restoral unit to its normal horizontal position. ***Requirement 1:*** The SYS ALM lamp shall extinguish on the alarm and restoral unit. ***Requirement 2:*** The ALM lamp shall extinguish and the MJN relay shall release on the alarm, power, and miscellaneous panel. ***Requirement 3:*** The associated office alarms shall cease to operate. ***Requirement 4:*** Both terminals shall be completely restored.

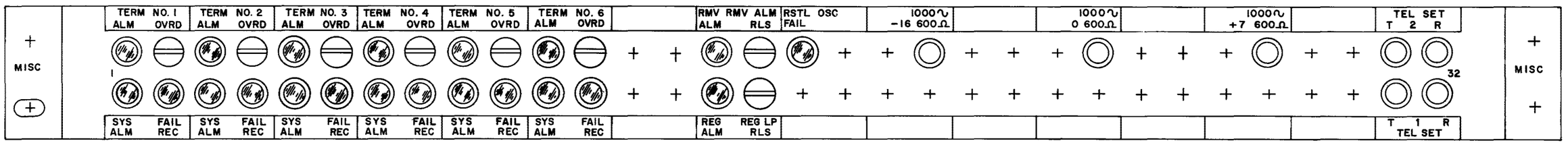


Fig. 1 – Miscellaneous Jack, Key, and Lamp Panel for a 6-terminal N2 Packaged Frame Arranged for Centralized Patching

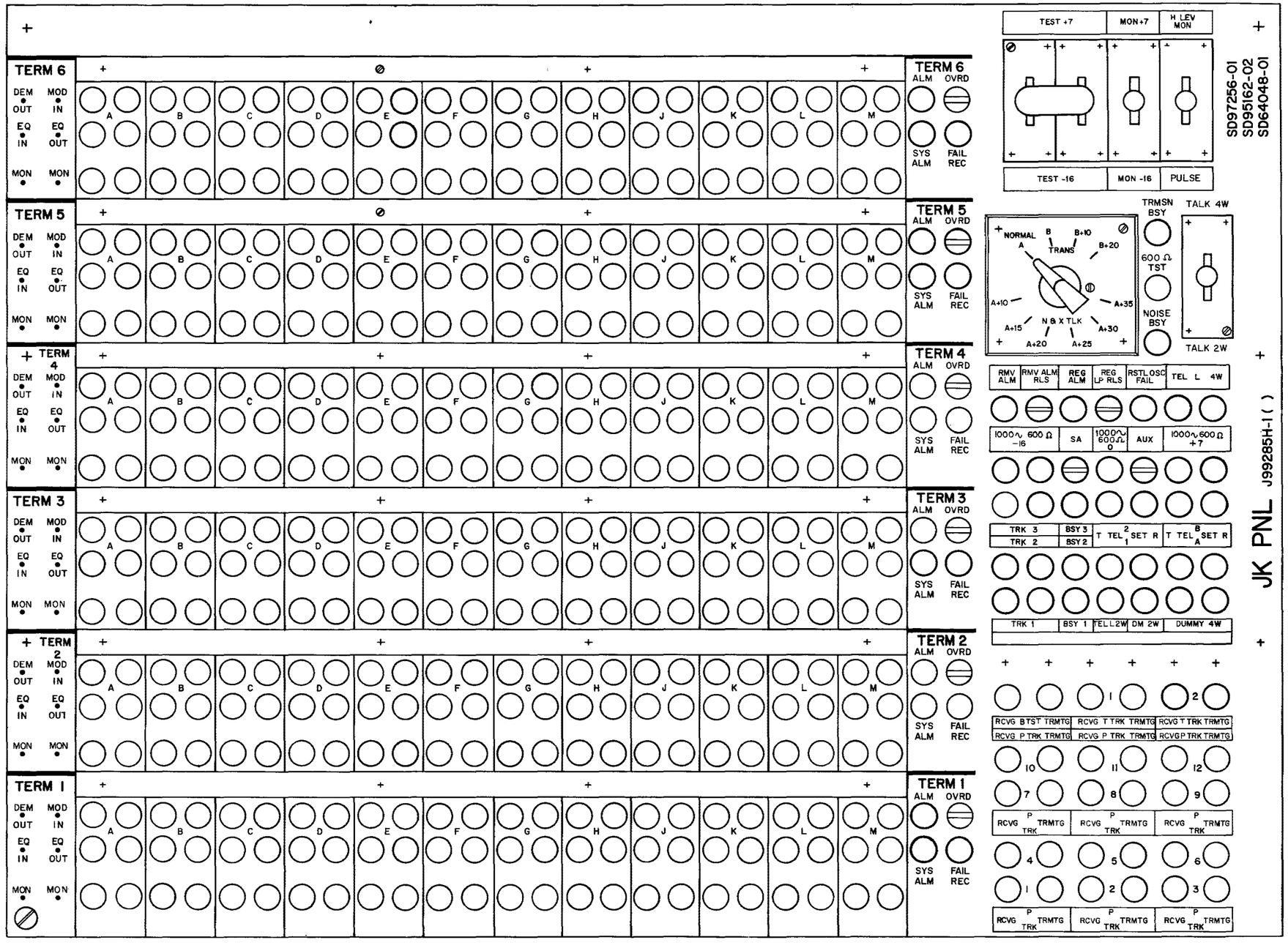


Fig. 2 – Miscellaneous Jack, Key, and Lamp Panel for a 5- or 6-terminal N2 Packaged Frame Arranged for Decentralized Patching

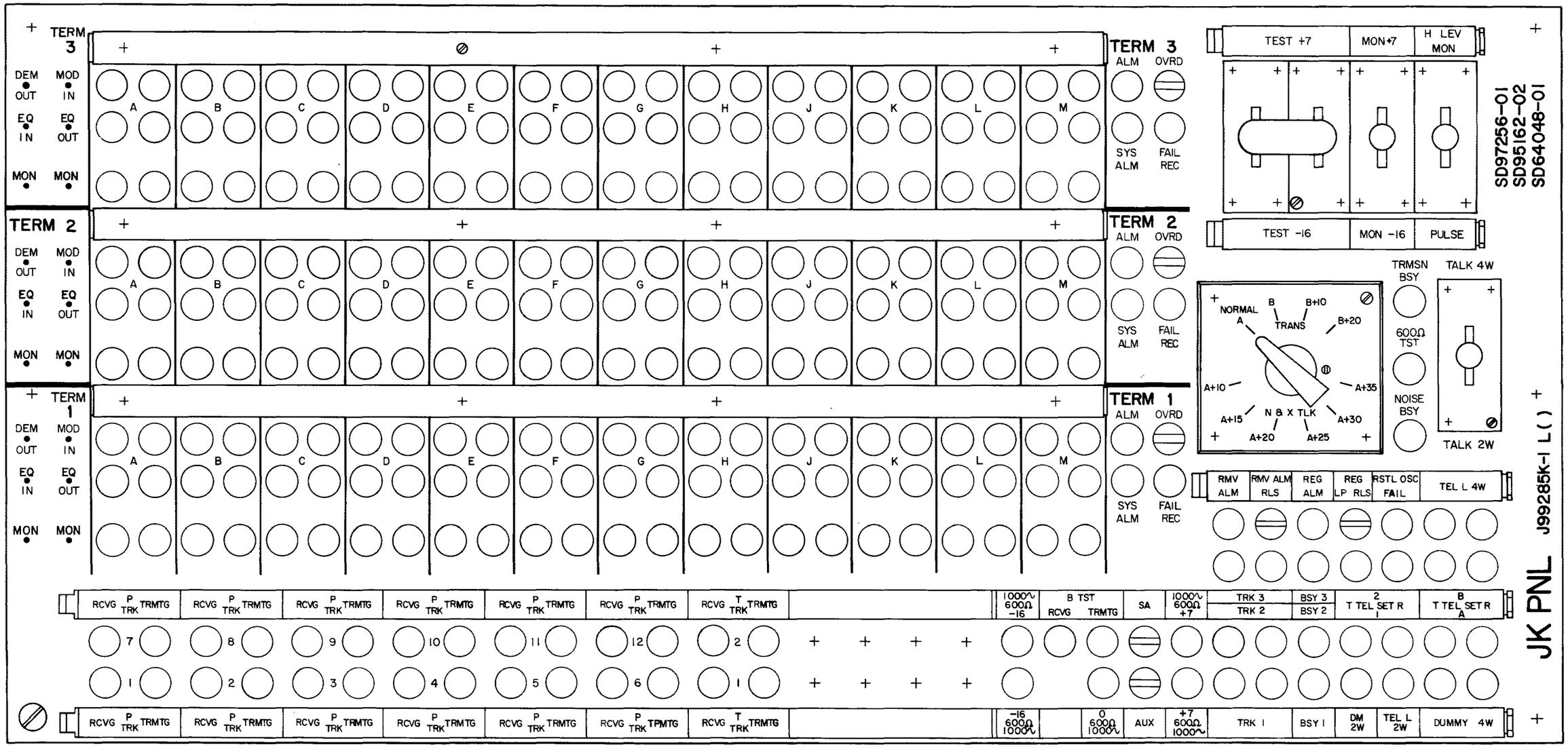


Fig. 3 – Miscellaneous Jack, Key, and Lamp Panel for a 3-terminal N2 Packaged Frame Arranged for Decentralized Patching

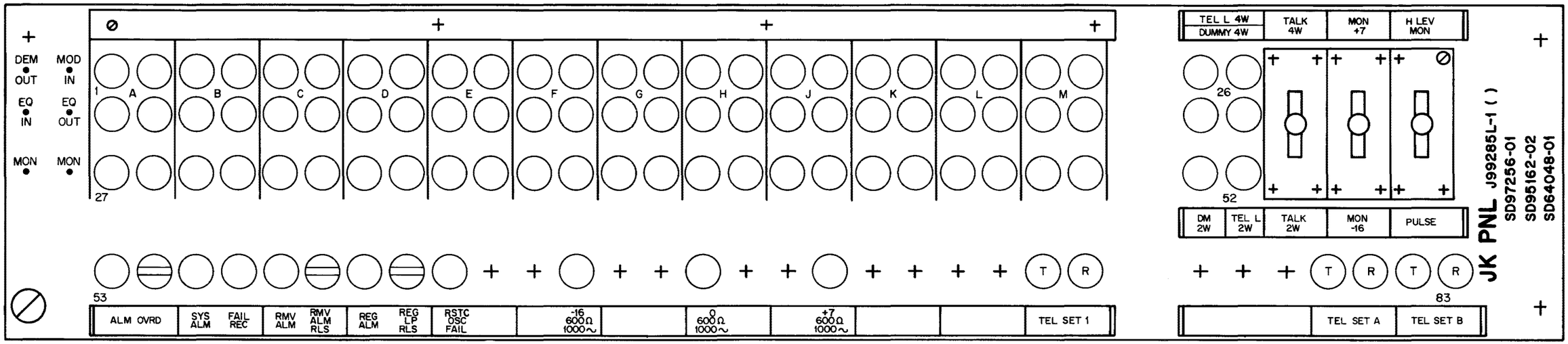


Fig. 4 – Miscellaneous Jack, Key, and Lamp Panel for a One-terminal N2 Packaged Frame Arranged for Decentralized Patching

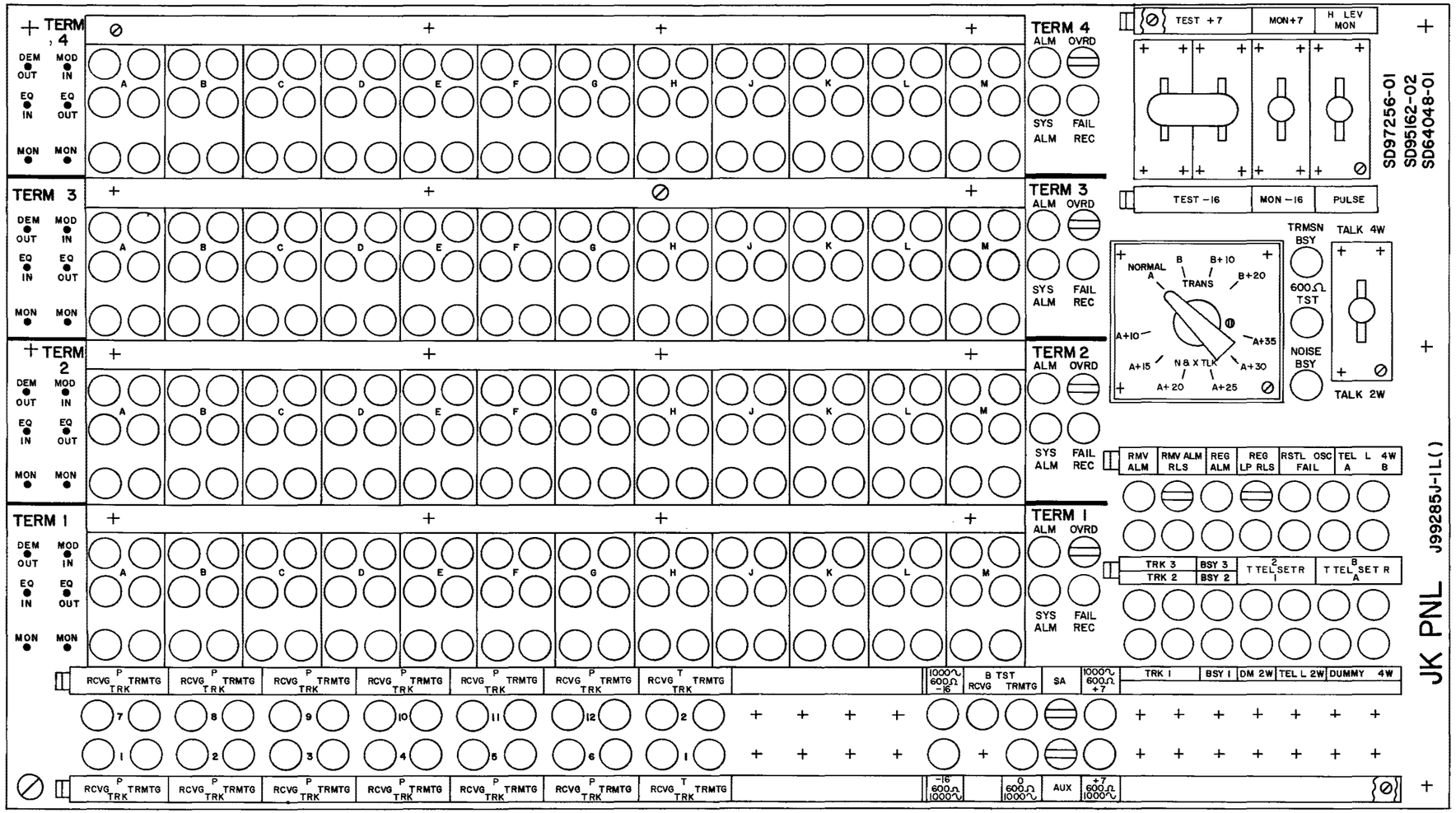


Fig. 5 – Miscellaneous Jack, Key, and Lamp Panel for a 4-terminal N2 Packaged Frame Arranged for Decentralized Patching

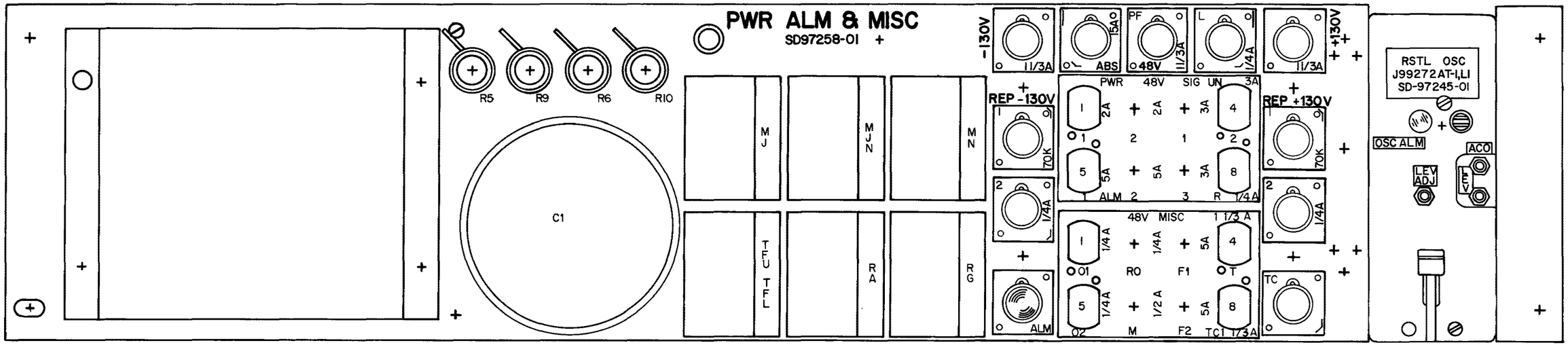


Fig. 6 – Alarm, Power, and Miscellaneous Panel for a One-terminal N2 Packaged Frame

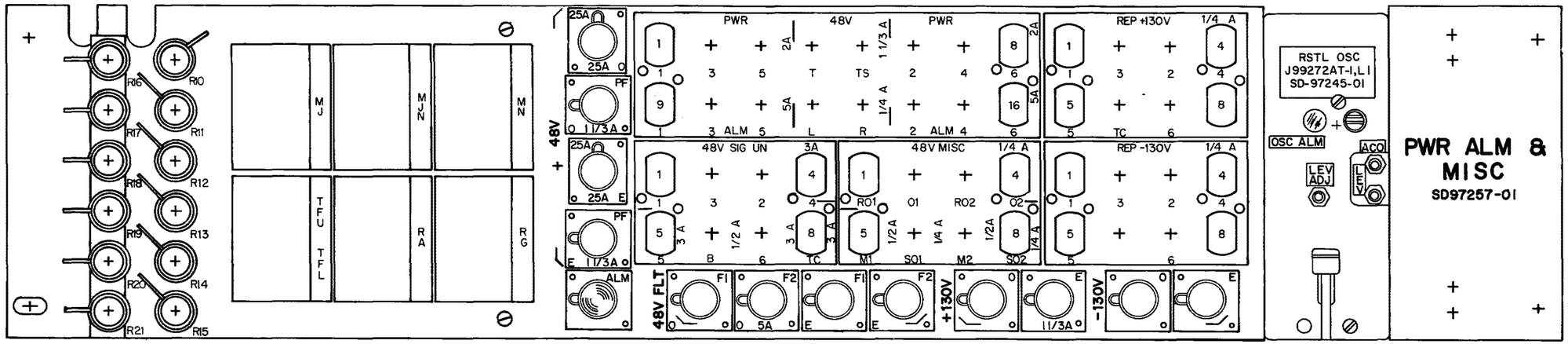


Fig. 7 – Alarm, Power, and Miscellaneous Panel for a 3- to 6-terminal N2 Packaged Frame

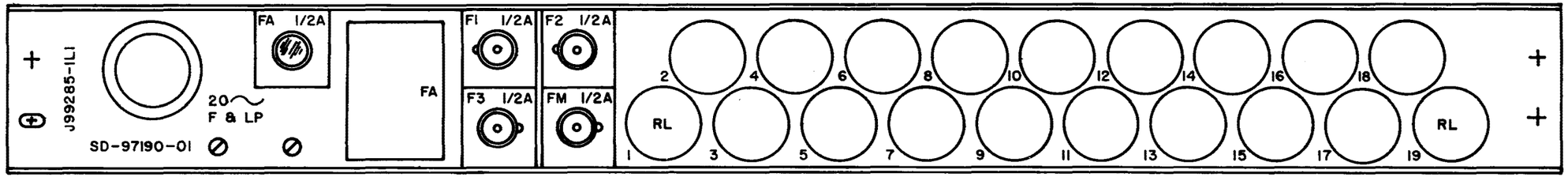


Fig. 8 – 20-cycle Ringing Fuse and Lamp Panel

Fig. 7 and 8

FIG. 9A
MAJOR FUSE FAILURE

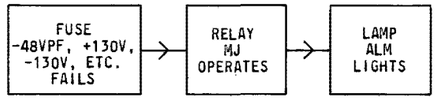


FIG. 9B
MAJOR OR MINOR FUSE FAILURE

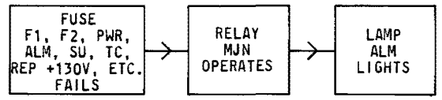


FIG. 9C
MINOR FUSE ALARM

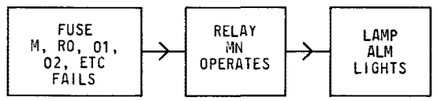


FIG. 9D
20-CYCLE FUSE FAILURE

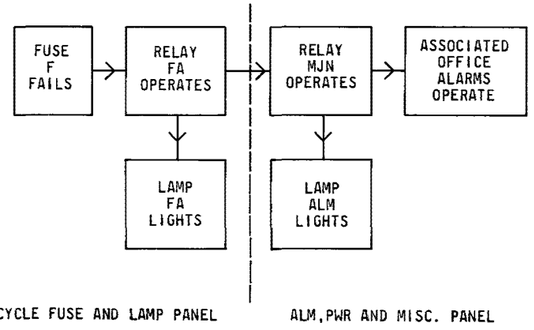


Fig. 9 – Sequential Operation of Relays for Fuse Failures in N2 Packaged Bay

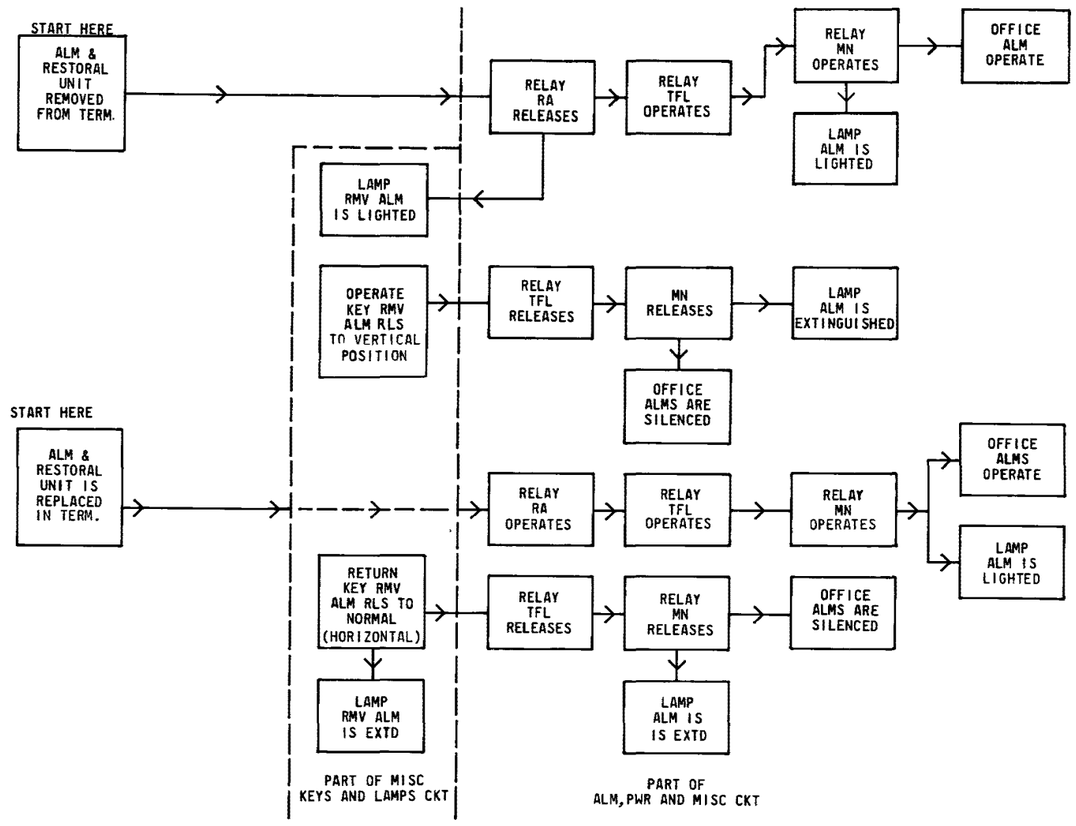


Fig. 10 – Sequential Operation of Relays for Removal of Alarm and Restoral Unit

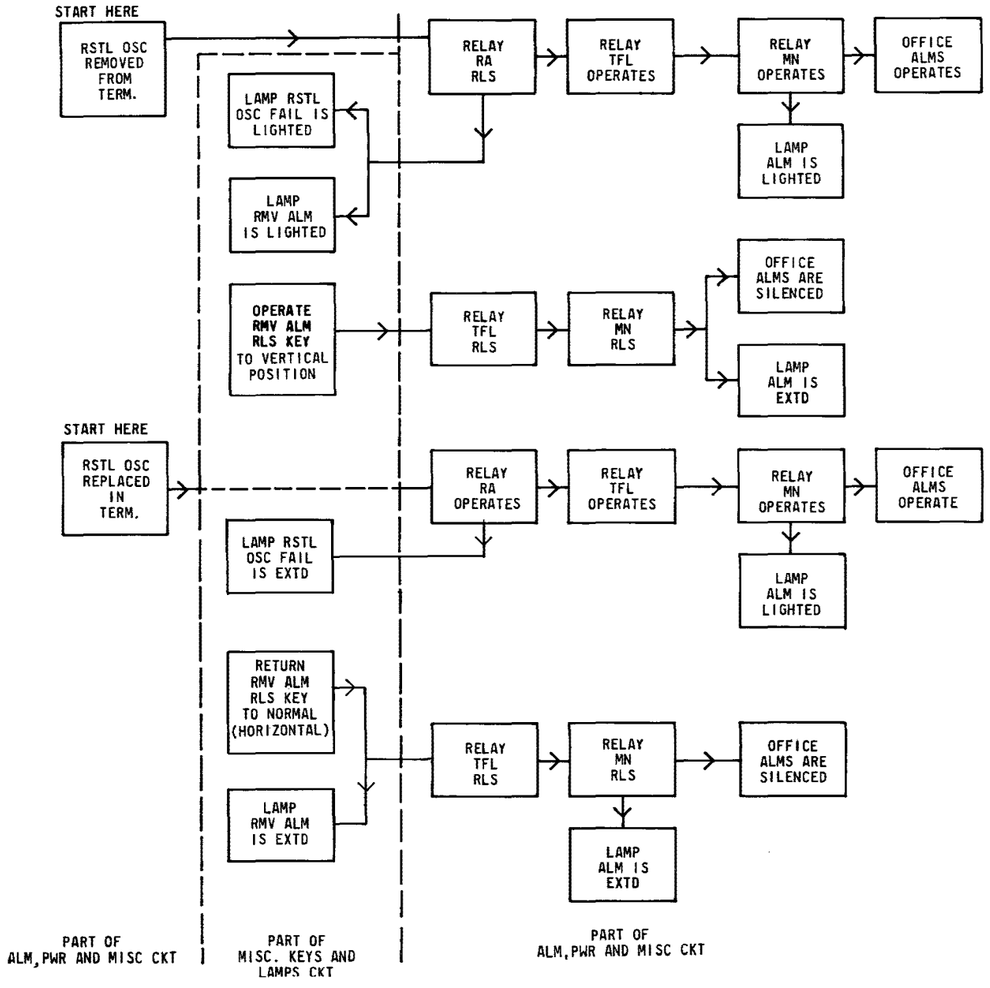


Fig. 11 – Sequential Operation of Relays for Removal of Restoral Oscillator

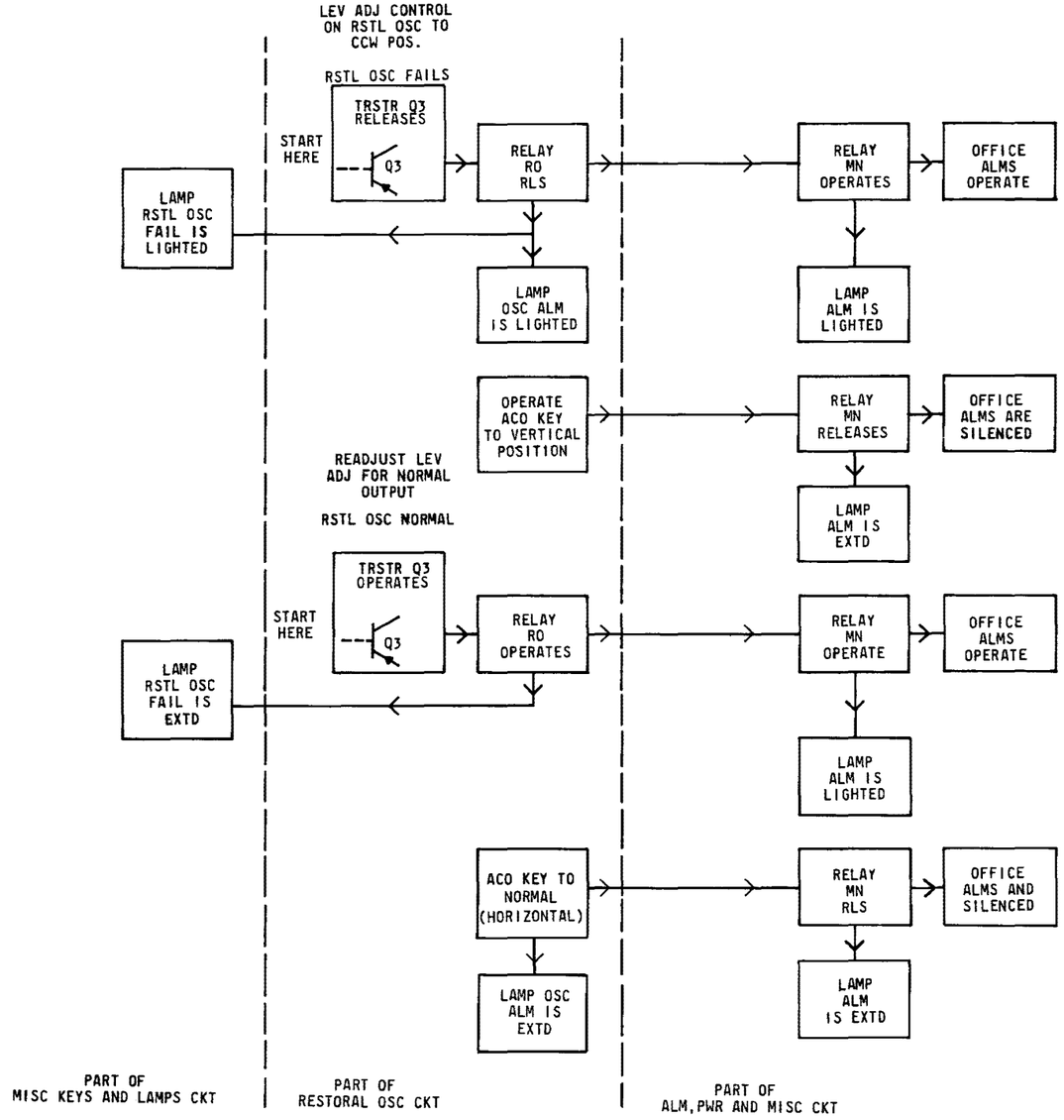


Fig. 12 – Sequential Operation of Relays for Restoral Oscillator Failure

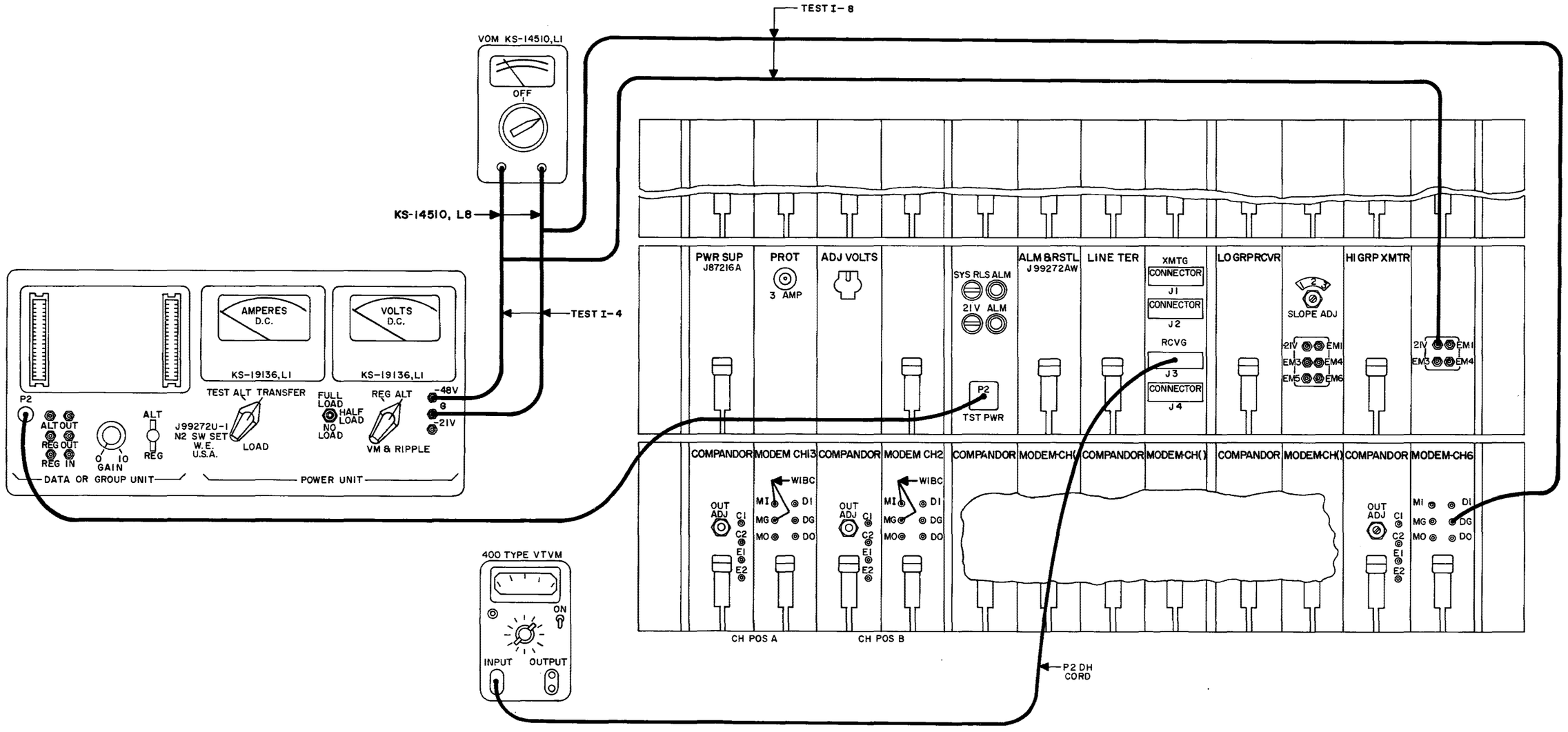


Fig. 13 – Test Arrangement for Checking the −21 Volt Deviation and Carrier Failure Alarm Operation

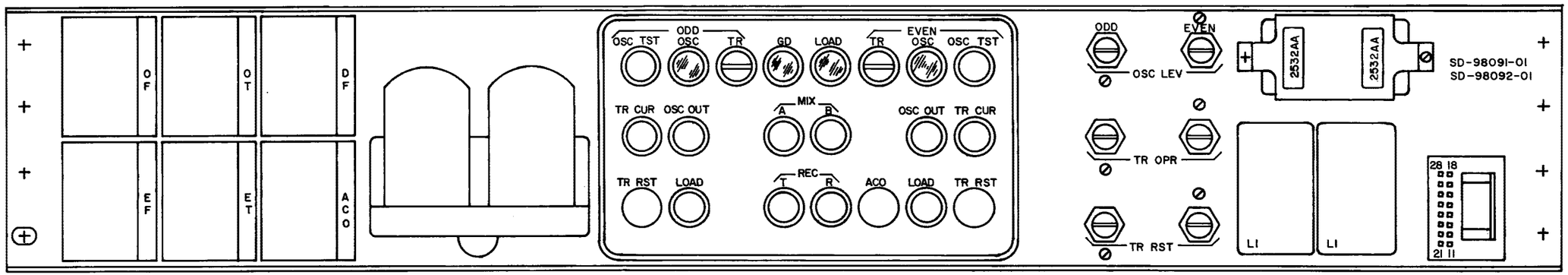


Fig. 14 – 2000-, 2400-, or 2600-cycle Oscillator and Transfer Panel (J98613BU or J98613BW)

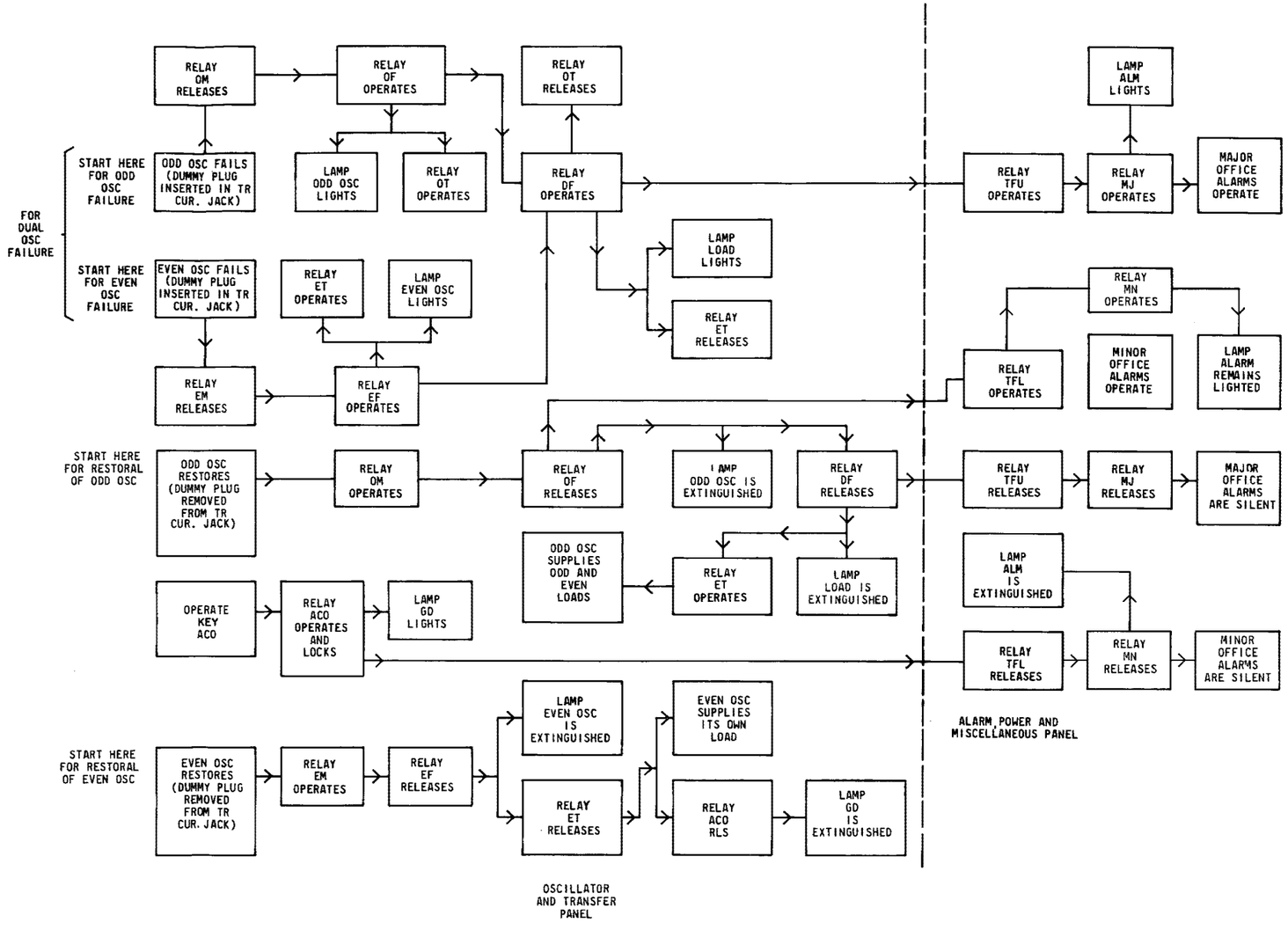


Fig. 15 – Sequential Operation of Relays for Dual Failure of Signaling Oscillators

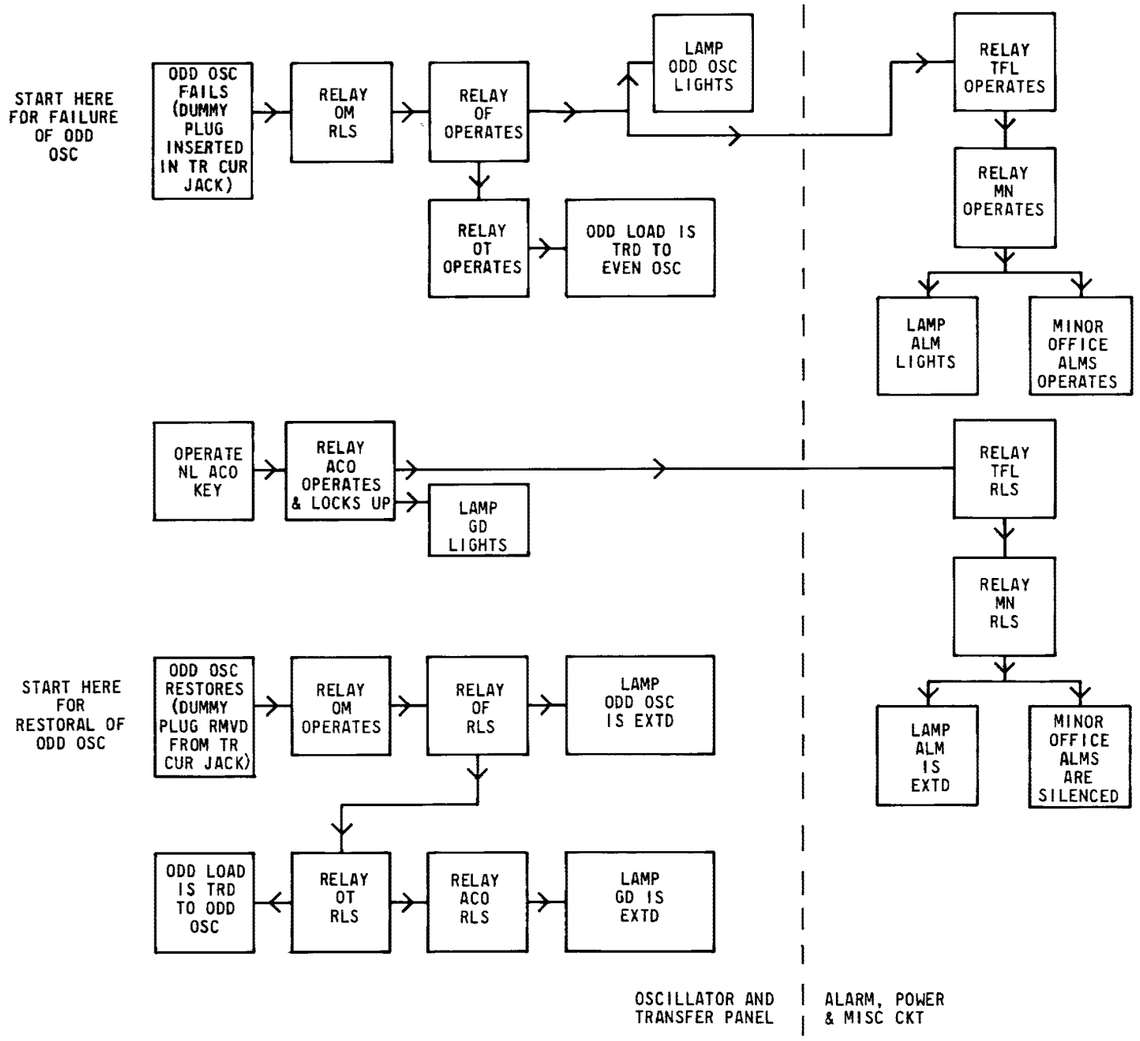


Fig. 16 – Sequential Operation of Relays for Single Failure of Signaling Oscillator

AT THE FAR TERMINAL
(DIRECTION OF SIMULATED CARRIER FAULT)

NOTES:

1. UPON LOSS OF RECEIVED CARRIER, THE ALARM AND RESTORAL UNIT OPERATES AND THE FOLLOWING OCCURS:
   (A) ESS OFFICE RECEIVES FIRST INDICATION OF TROUBLE.

2. AFTER A TIME DELAY OF APPROXIMATELY TWO SECONDS (FIRST TIME-OUT), THE FOLLOWING OCCURS:
   (A) LAMP SYS ALM ON THE ALARM AND RESTORAL UNIT LIGHTS.
   (B) LAMPS SYS ALM AND FAIL REC ON THE MISC JK, KEY AND LAMP PANEL LIGHTS.
   (C) THE -21V IS REMOVED FROM THE GROUP TRANSMITTING UNIT TO FORCE A CARRIER FAILURE TOWARD THE NEAR END.
   (D) FIRST GROUND SIGNAL IS SENT TO THE CARRIER GROUP ALARM CIRCUIT.
   (E) ESS OFFICE RECEIVES SECOND INDICATION OF TROUBLE.
   (F) BAY RELAYS OPERATE.
   (G) LAMP ALM ON THE ALARM POWER AND MISCELLANEOUS PANEL LIGHTS.
   (H) OFFICE ALARMS OPERATE.
   (THE OFFICE ALARMS CAN BE SILENCED BY OPERATING KEY SYS ALM RLS ON THE ALARM AND RESTORAL UNIT)

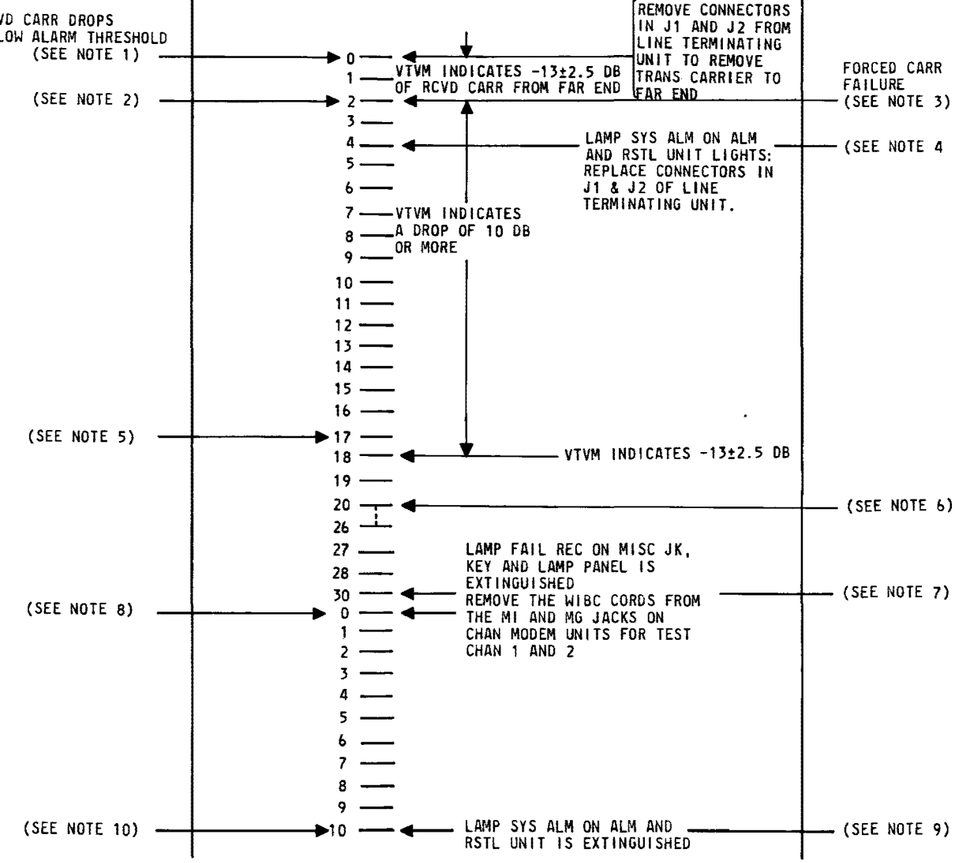
5. AFTER A TIME DELAY OF APPROXIMATELY FIFTEEN SECONDS (SECOND TIME-OUT), THE FOLLOWING OCCURS:
   (A) -21V POWER IS RESTORED TO GROUP TRANSMITTING UNIT, RESTORING TRANSMISSION TOWARDS THE NEAR TERMINAL.
   (B) SECOND GROUND SIGNAL IS SENT TO THE CARRIER GROUP ALARM AND CIRCUIT.
   (C) THE 2600 CYCLE TONE IS TRANSMITTED ON THE FIRST TEST CHANNEL IN THE DIRECTION OF GOOD TRANSMISSION (NEAR END).
   (D) THE ALARM AND RESTORAL UNIT IS MADE AVAILABLE TO RECEIVE THE 2600 CYCLE TEST TONE ON THE FIRST TEST CHANNEL, HOWEVER, SINCE THE SIMULATED CARRIER FAULT IS IN THIS DIRECTION, NO TEST TONE IS RECEIVED AT THIS TIME.

8. THE ALARM CIRCUIT MONITORS THE 2600 CYCLE TEST TONE ON THE FIRST TEST CHANNEL SENT FROM THE NEAR END AND THE FOLLOWING OCCURS:
   (A) THE ALARM AND RESTORAL CIRCUIT REMOVES FIRST GROUND SIGNAL TO THE CARRIER GROUP ALARM CIRCUIT
   (B) THE DELAY CIRCUIT OF THE CGA TIMES OUT IN APPROXIMATELY 10 SECONDS, RELEASING RELAY AIL OF THE CARRIER GROUP ALARM CIRCUIT.

10. (A) THE 2600 CYCLE TEST TONE ON THE SECOND TEST CHANNEL IS TRANSMITTED TO THE NEAR END.
    (B) THE 2600 CYCLE TEST TONE FROM THE NEAR END IS RECEIVED.
    (C) ALL LAMPS ARE EXTINGUISHED AND ALL RELAYS ARE RELEASED IN THE ALARM AND RESTORAL UNIT.
    (D) THE SECOND GRD SIGNAL IS REMOVED FROM THE CARRIER GRP ALARM CIRCUIT, RELEASING ALL RELAYS.
    (E) TERMINAL RESTORED TO NORMAL.

FUNCTIONS PERFORMED AT THE NEAR TERMINAL
TIME IN SECONDS

WITH WIBC CORDS CONNECT THE MI JACK TO THE MG JACK ON CHAN MODEM UNITS FOR TEST CHAN 1 AND 2 TO PREVENT TRANSMISSION OF 2600 CYCLE TEST TONE TO FAR END



AT THE NEAR TERMINAL
(DIRECTION OF GOOD TRANSMISSION)

NOTES:

3. A FORCED RECEIVED CARRIER FAILURE FROM THE FAR END RESULTS. THE ALARM & RESTORAL UNIT OPERATES AND THE FOLLOWING OCCURS:
   (A) ESS OFFICE RECEIVES FIRST INDICATION OF TROUBLE.

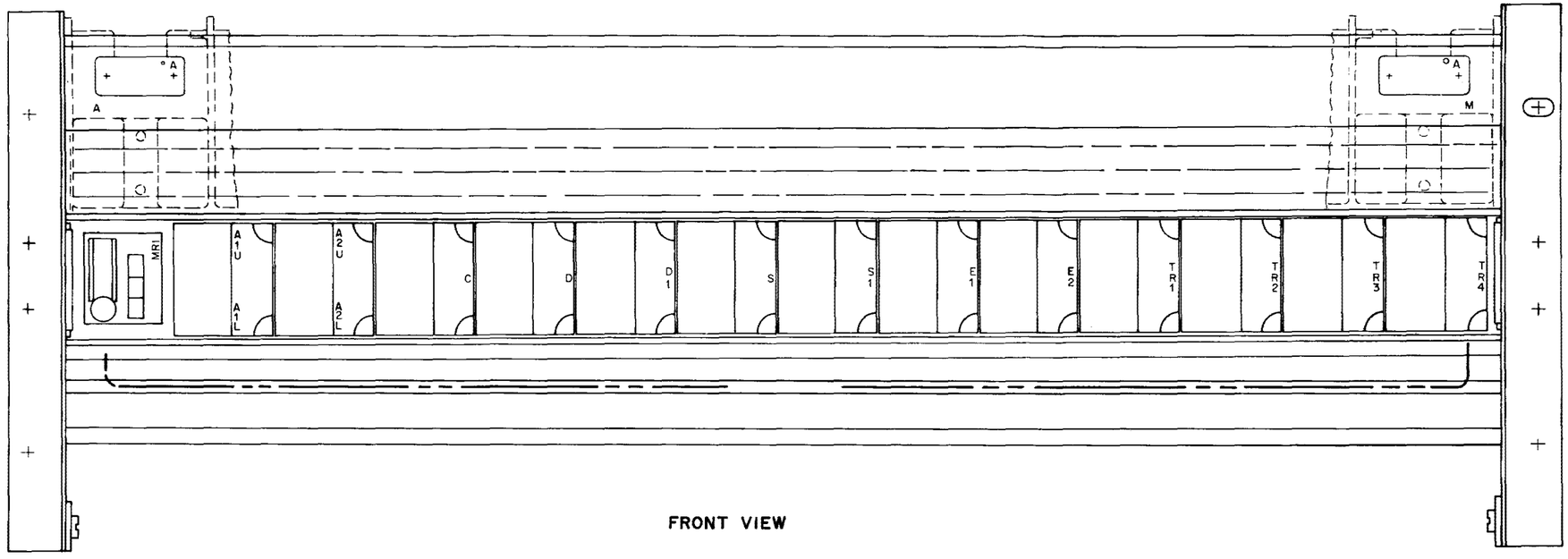
4. AFTER A TIME DELAY OF APPROXIMATELY TWO SECONDS (FIRST TIME-OUT), THE FOLLOWING OCCURS:
   (A) LAMP SYS ALM ON THE ALARM AND RESTORAL UNIT LIGHTS.
   (B) LAMPS SYS ALM AND FAIL REC ON THE MISC JK, KEY AND LAMP PANEL LIGHTS.
   (C) FIRST GROUND SIGNAL IS SENT TO THE CARRIER GROUP ALARM CIRCUIT.
   (D) ESS OFFICE RECEIVES SECOND INDICATION OF TROUBLE.
   (E) BAY RELAYS OPERATE.
   (F) LAMP ALM ON THE ALARM POWER AND MISCELLANEOUS PANEL LIGHTS.
   (G) OFFICE ALARMS OPERATE.
   (THE OFFICE ALARMS CAN BE SILENCED BY OPERATING KEY SYS ALM RLS ON THE ALARM UNIT).

6. AFTER A TIME DELAY OF APPROXIMATELY FIFTEEN SECONDS (SECOND TIME-OUT), THE FOLLOWING OCCURS:
   (A) SECOND GROUND SIGNAL OVER LEAD DS IS SENT TO THE CARRIER GROUP ALARM CIRCUIT.
   (B) THE 2600 CYCLE TONE CAN NOT BE TRANSMITTED ON THE FIRST TEST CHANNEL BECAUSE THE SIMULATE CARRIER FAULT IS TOWARDS THE FAR END.
   (C) THE ALARM AND RESTORAL UNIT IS READY TO RECEIVE THE 2600 CYCLE TEST TONE ON THE FIRST TEST CHANNEL.

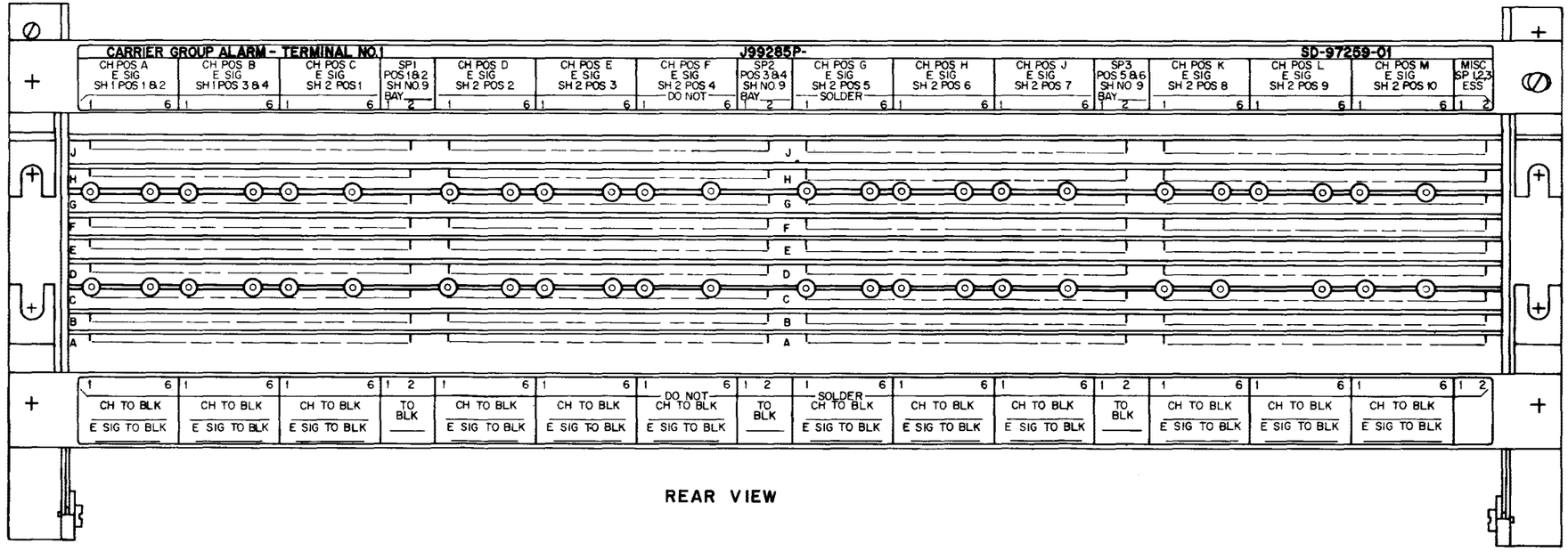
7. SINCE THIS TERMINAL (NEAR TERMINAL) IS IN THE DIRECTION OF GOOD TRANSMISSION, THE 2600 CYCLE TEST TONE IS RECEIVED FROM THE FAR TERMINAL AND MONITORED BY THE ALARM AND RESTORAL UNIT. THE FOLLOWING OCCURS:
   (A) THE ALARM AND RESTORAL CIRCUIT REMOVES FIRST GROUND SIGNAL TO THE CARRIER GROUP ALARM CIRCUIT.
   (B) THE DELAY CIRCUIT OF THE CGA TIMES OUT IN APPROXIMATELY 10 SECONDS RELEASING RELAY AIL OF THE CARRIER GROUP ALARM CIRCUIT.
   (C) LAMP FAIL REC IS EXTINGUISHED. (WHEN THIS LAMP EXTINGUISHES, IT INDICATES THAT THE CARRIER FAULT IS TOWARDS THE FAR TERMINAL).
   (D) REGISTER MRI OPERATES.
   (E) THE ALARM AND RESTORAL UNIT IS PREPARED TO MONITOR THE 2600 CYCLE TEST ON TEST CHANNEL 2.

9. THE ALARM AND RESTORAL UNIT MONITORS THE 2600 CYCLE TEST TONE ON THE SECOND TEST CHANNEL SENT FROM THE FAR END AND THE FOLLOWING OCCURS:
   (A) ALL LAMPS ARE EXTINGUISHED AND ALL RELAYS IN THE ALARM AND RESTORAL UNIT ARE RELEASED.
   (B) THE SECOND GROUND SIGNAL IS REMOVED FROM THE CARRIER GROUP ALARM CIRCUIT, RELEASING ALL RELAYS.
   (C) TERMINAL RESTORED TO NORMAL.

Fig. 17 – Time Check for Alarm Operation Due to Loss of Carrier



FRONT VIEW



REAR VIEW

Fig. 18 – Carrier Group Alarm Unit

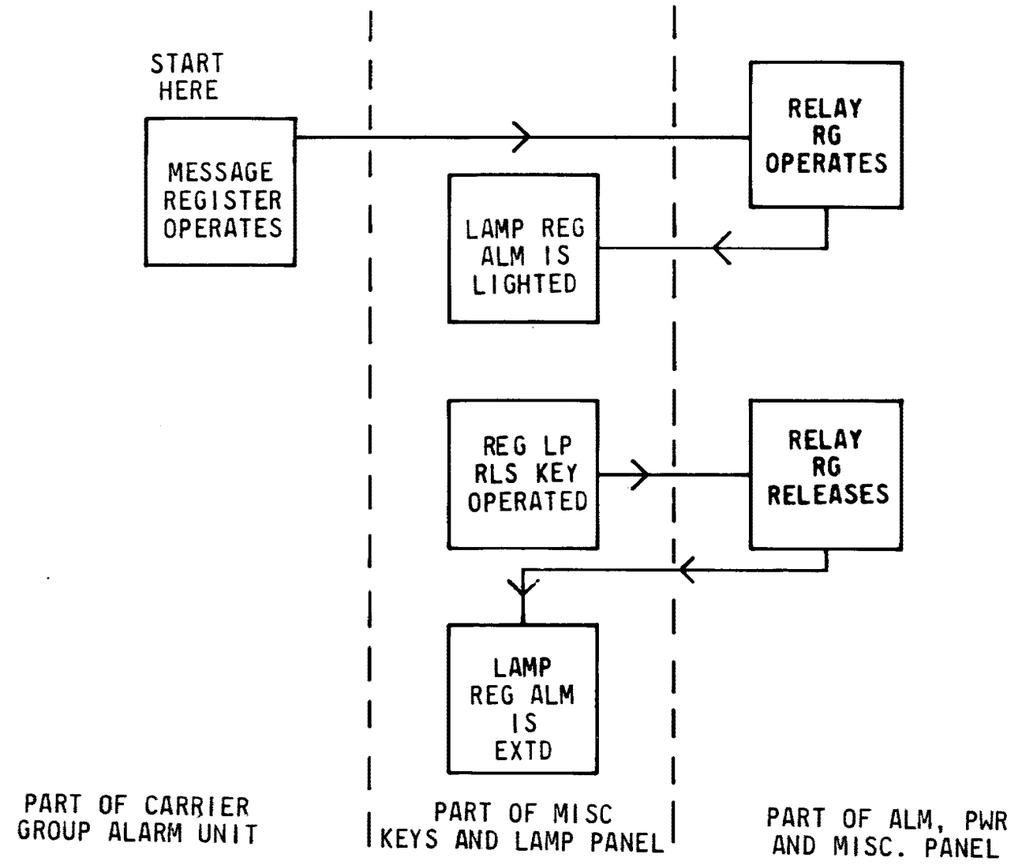


Fig. 19 – Sequential Operation of Relays for Message Register at Nonfailed End