
**L3 AND L4 CARRIER
COMMON EQUIPMENT
J68820 AUTOMATIC LINE SWITCHING
TESTS
RECEIVING SWITCH OPERATION**

Caution: The tests in this section are operational tests which check the receive switching circuits on a terminal basis. In order to complete these tests, all switching in the switching section involved is disabled. However, patch plugs should be removed and replaced one at a time during test to ensure minimum delay in restoring service.

This section is reissued as a general revision to Charts 1, 2, 3, and 4. Included in this issue are additions and/or changes as listed below. Arrows are not used to indicate changes. Equipment Test Lists are not affected.

- Level check of the 223-type switch in the operated or nonoperated condition.
- Identify test locations.
- Correct bridged measurement of the 282-kHz signal to read -90 dBm.
- Correct technical reference.
- Correct equipment and operation requirements.

Special considerations of this group of tests are as follows:

- (a) The tests may be performed separately or collectively. A short synopsis precedes each test or group of tests.
- (b) Early installations of switching equipment in the L3 Carrier System may be affected adversely by an unfavorable signal-to-noise ratio in the switching signal band. Unmodified early installations of switching equipment (before August 8, 1966) are referred to as **Condition A**. Early installations of switching equipment modified for improved signal-to-noise ratio or newly manufactured switching equipment (including L4) are referred to as **Condition B**. The L3 switching equipment must be physically inspected to determine if the equipment under test is unmodified (**Condition A**) or modified (**Condition B**).

For a general description of the L3 and L4 automatic line switching, see Section 359-100-100.

NOTICE

Not for use or disclosure outside the
Bell System except under written agreement

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CHART 1

TESTING MECHANICAL OPERATION OF RECEIVE SWITCH

Operation of a receive line switch is tested by simulating a regular line failure and by injecting the 296-kHz verifier signal into the SW AMP IN jack to complete the switching operation. Associated alarm lamps and relays should operate when the receive switching action is complete. The protection line path through the receive switch is tested by connecting a signal into the input of the switch and measuring it at the output. Release of the receive switch is verified by observing the receiving test equipment (RTE) while restoring the simulated line failure. The 280-kHz release check signal is then used to return the switching section to normal.

APPARATUS:

The tests in this section require suitable transmission measuring equipment. Refer to Section 356-010-500 and select, from available equipment, sending and receiving units having the following capabilities:

CHART 1 (Contd)

APPARATUS(Contd):

Sending test equipment (STE) capable of delivering, to 75-ohm circuits, signals between 280 and 296 kHz at 0 to -85 dBm.

Receiving Test Equipment (RTE) with the following input characteristics:

Frequency Range: 280 to 296 kHz

Power: -50 to -100 dBm

Impedance: 75 ohms

11B Attenuator (30 dB)

75-ohm Termination Plug (368A)

P2BJ Cords

Adjustable Attenuator with the following characteristics:

75-ohm input and output

Loss from 0 to 85 dB

Adjustable in increments of 1.0 dB

STEP	PROCEDURE
1	Ensure that all lines under test are normal.
	<i>Requirement:</i> No lamp should be lighted in the L3 miscellaneous or L4 control connecting bay.
2	Notify the distant end of the switching section under test plus the succeeding switching section before beginning.
	<i>Note:</i> Local procedure may require notifying the Regional Facility Management Center.
3	L3: Perform Steps 5 through 42.
4	L4: Perform Steps 43 through 81.
	A. L3 Receive Switch Test
	Test Setup

CHART 1 (Contd)

STEP	PROCEDURE
5	At the miscellaneous bay, insert a 75-ohm patch cord between multiple A1 and multiple AB1 jacks of all receive switches under test (Fig. 1).
6	At the receive jack field, insert a 75-ohm termination plug in the multiple PIL HYB OUT A jack and immediately remove the patch plug between the PIL HYB OUT A and SW IN jacks (protection line only) (Fig. 2).
7	At the receive switch control bay, remove the patch plug from the SW FIL OUT and SW AMP IN jacks (Fig. 3).
	Remove Patch Plugs of Receive Switch Being Tested
	Caution: Patch plugs should be removed and replaced one-at-a-time to ensure minimum delay in restoring the switching system to service should it be needed.
8	At the receive switch shelf (L3 miscellaneous bay) of the associated line under test, remove the patch plug between jacks: • A and A1 • AB and AB1 • B and B1 • OB and B.
	Block-LO Relay Nonoperated
9	On the associated regular initiator of the line under test, block the LO relay in a nonoperated condition.
	Simulate Line Failure
10	At the receive repeater bay (pilot indicator panel), manually adjust the 7266-kHz ZERO potentiometer until the upper or lower meter relay contacts close.
	Requirement 1: Visual and audible office alarms operate (major and minor).
	Requirement 2: Relay REG or STBY operates on the SW SIG FLT panel.
	Requirement 3: INIT TEST lamp lights in the miscellaneous bay.
	Requirement 4: TOT FAIL lamp lights in the miscellaneous bay.
11	Depress the ACO pushbutton in the switch control bay to silence the audible alarm.

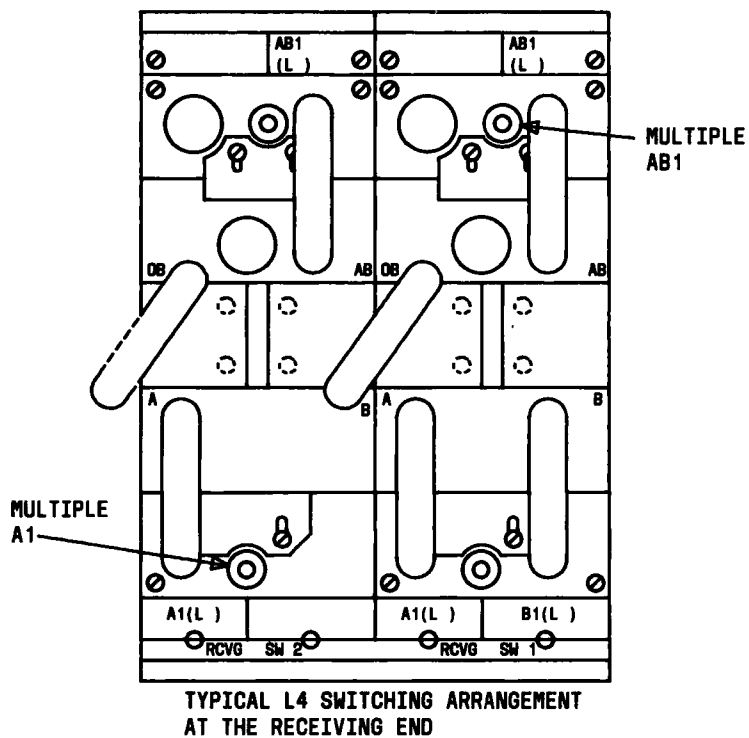
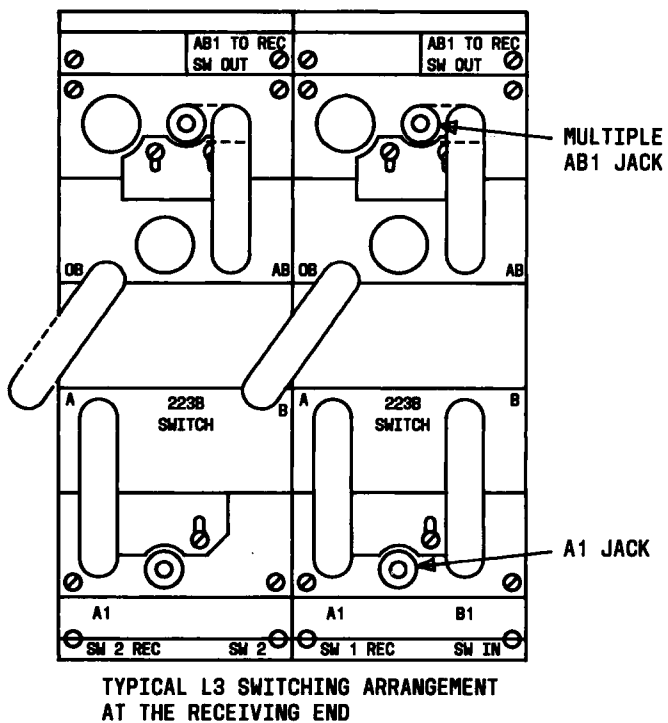


Fig. 1—Typical L3 and L4 Switching Shelf

CHART 1 (Contd)	
STEP	PROCEDURE

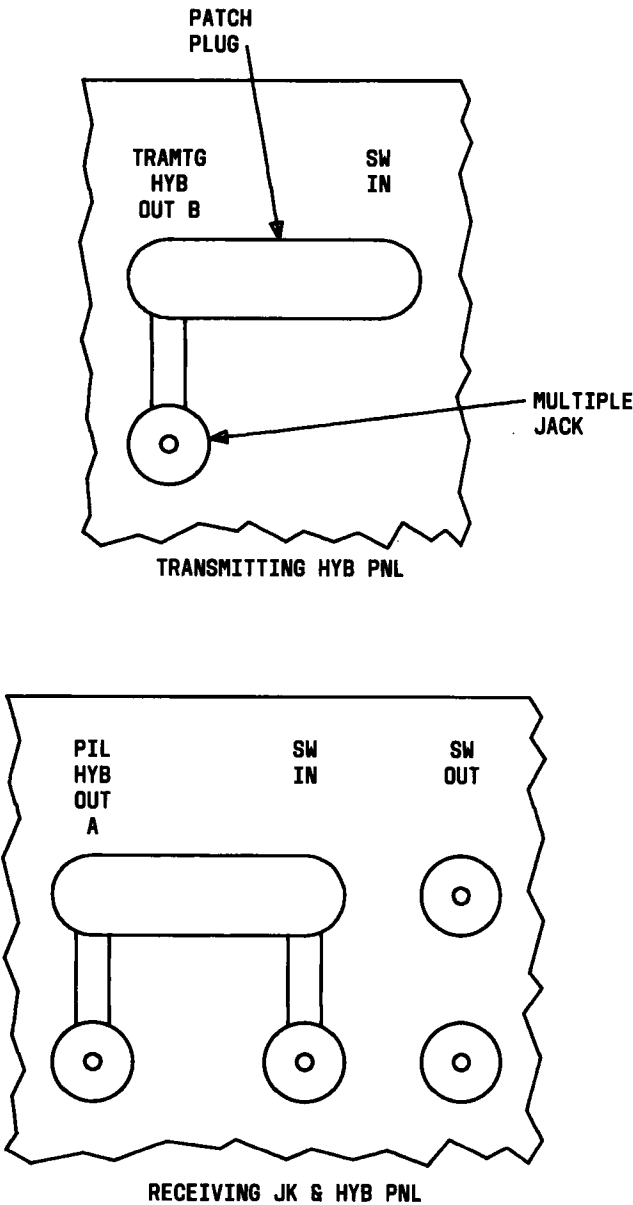


Fig. 2—Typical Transmitting and Receiving Jack and Hybrid Panel

CHART 1 (Contd)

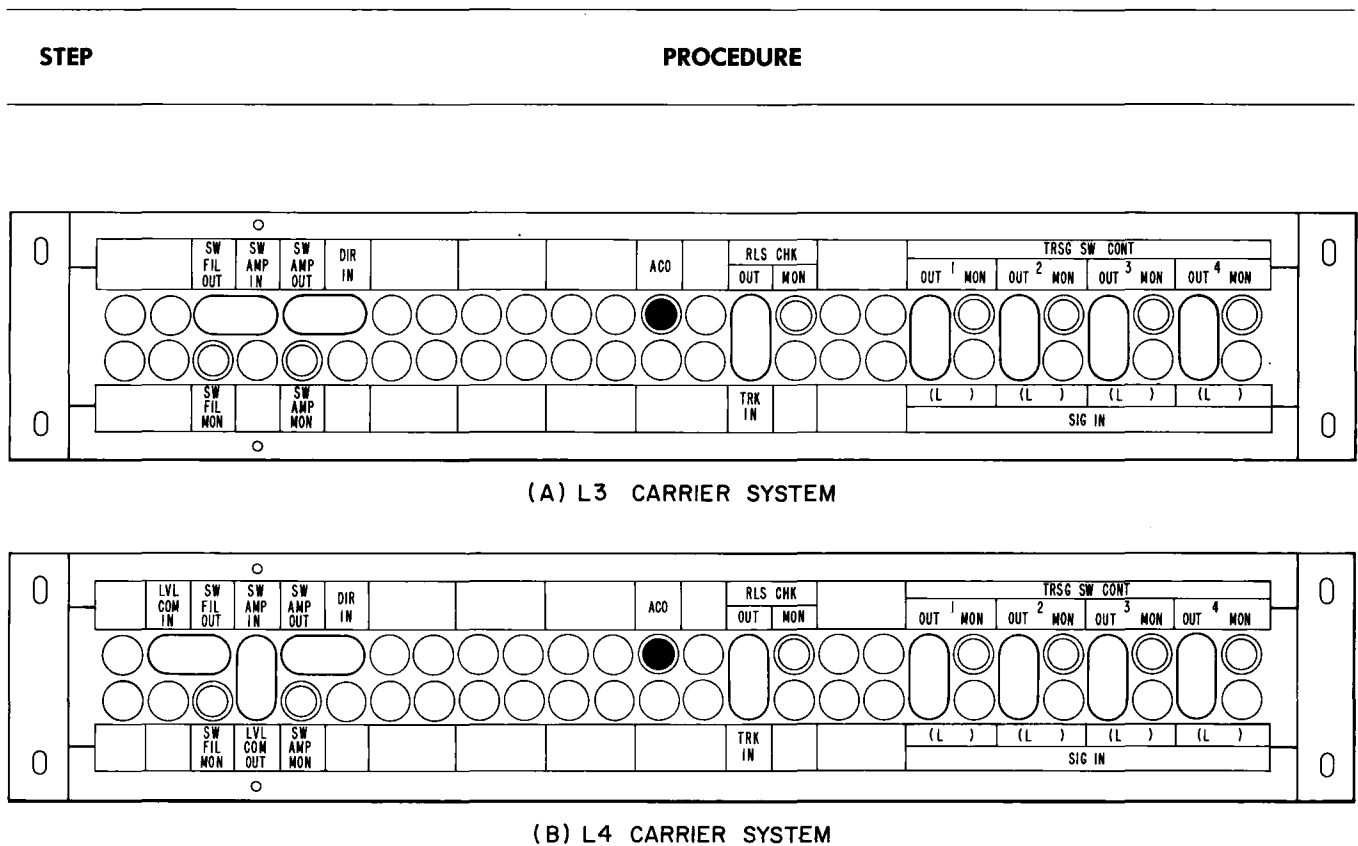


Fig. 3—Typical L3 and L4 Jack Strip

Check Line Identification Signal

- 12 Prepare the STE to send a 296-kHz signal at -71 dBm.
- 13 At the receive L3 miscellaneous bay, insert the 296-kHz signal (-71 dBm) into the SW AMP IN jack.

Requirement 1: OUT SERV AUTO lamp lights in the L3 miscellaneous bay.

Requirement 2: TSV relay (or relays) operates.

Requirement 3: D relay (on director panel) operates.
- 14 At the transmit bay of the associated line under test, make a **bridged** measurement of the line identification frequency and power level (Table A) at the multiple TRSG HYB OUT B and SW IN jacks.

Requirement: Table A.

CHART 1 (Contd)

STEP

PROCEDURE

TABLE A

REG LINE	GROUP (J68820 BAY)	SIGNAL FREQUENCY (KHZ)	SIGNAL POWER IN DBM* (TRSG HYB OUT B†)	
			CONDITION A	CONDITION B
1	A-AA-AB	290	-103	-90
2	A-AA-AB	288	-103	-90
3	A-AA-AB	286	-103	-90
4‡	A-AA-AB	284	-103	-90

* Includes 11B attenuator loss

† Jack in transmitting bay

‡ 11-foot 6-inch bay only

- 15 If the requirements in Steps 13 and 14 are met, proceed to Step 16. A measurement exceeding tolerance indicates the switching signal frequency is out of limits. Do not proceed until the trouble is cleared.
- 16 Remove the 296-kHz signal from the SW AMP IN jack.
- 17 Remove the RTE from the multiple TRSG HYB OUT B jack.

Ensure Receive Switch Operated

- 18 At the L3 miscellaneous bay, insert the 296-kHz signal (-71 dBm) into the B jack of the receive switch under test.
- 19 Connect the RTE to the AB jack and measure the 296-kHz signal power (-71 dBm).

Requirement: Approximately -71 dBm.

Note: Loss in switch is less than 0.5 dB.

- 20 Remove the RTE from the AB jack and connect into the OB jack.
- 21 Measure the 296-kHz signal power (-71 dBm).

Requirement: The 296-kHz signal is released.

CHART 1 (Contd)

STEP	PROCEDURE
22	If the requirements in Steps 19 and 21 are within limits, proceed to Step 23. Otherwise, the receive switch has not operated. Do not proceed until the trouble is cleared.
	System Reset Operation
23	On the pilot indicator panel, check the reset operation of the operated pilot indicator relay.
	Requirement: Failed system attempts to reset at approximately 40-second intervals.
24	At the receiving repeater bay, depress the RST pushbutton and manually adjust the ZERO potentiometer for a zero reading on the meter relay.
	Requirement 1: In approximately 20 seconds (after reset), the receive switch returns to normal.
	Requirement 2: D relay releases.
	Requirement 3: TS RLS FAIL alarm and lamp operate (expect a time delay).
	Requirement 4: The 296-kHz signal appears (-71 dBm) at the OB jack.
25	Remove the STE signal (296 kHz) from the B jack.
26	Remove the RTE from the OB jack.
	Restore Patch Plugs of Receive Switch Being Tested
27	At the receive switch shelf (L3 miscellaneous bay) of the associated line under test, restore the patch plugs as follows: ● A and A1 ● AB and AB1 ● B and B1 ● OB and B.
	Release Signal Check
28	Prepre the STE to send a 280-kHz signal at -71 dBm.
29	At the transmit bay of the associated line under test, make a bridged measurement of 282-kHz frequency and power level at the multiple TRSG HYB OUT B jack.
	Requirement: Approximately -90 dBm.

CHART 1 (Contd)

STEP	PROCEDURE
30	At the receive switch control bay, insert the STE signal (280 kHz at -71 dBm) into the SW AMP IN jack. Requirement 1: The 282-kHz signal is removed from the RTE (TRSG HYB OUT B jack). Requirement 2: TS RLS FAIL lamp extinguishes.
31	Remove the RTE from the multiple TRSG HYB OUT B jack.
32	Remove the STE (280-kHz signal) from the SW AMP IN jack. Release LO Relay
33	At the associated initiator of the line under test, release the block from the LO relay. Simulate Line Failure
34	At the receive repeater bay (pilot indicator panel), manually adjust the 7266-kHz ZERO potentiometer until the upper or lower meter relay contact closes. Requirement 1: Visual and audible office alarms operate (major and minor). Requirement 2: Relay REG or STBY operates on the SW SIG FLT panel. Requirement 3: INIT TEST lamp lights in the miscellaneous bay. Requirement 4: TOT FAIL lamp lights in the miscellaneous bay.
35	Depress the ACO pushbutton to silence the audible alarm. Pilot Sampling and Reset Check
36	Check the sampling and reset features of the failed system by observing the operation of the pilot indicator relay. Requirement: First reset occurs within 2 seconds and every 40 seconds thereafter.
37	At the receiving repeater bay, depress the RST pushbutton and manually adjust the ZERO potentiometer for a zero reading on the meter relay. Requirement 1: In approximately 20 seconds (after reset), the receive switch returns to normal. Requirement 2: TS RLS FAIL alarm and lamp operate after a short delay.

CHART 1 (Contd)

STEP	PROCEDURE
38	Repeat Steps 5 through 37 for each receive switch in the switching section under test.
	Restore Patch to Normal
39	At the receive switch control bay, reinsert the patch plug between the SW FIL OUT and SW AMP IN jacks.
40	At the receive jack field, reinsert the patch plug between PIL HYB OUT A and SW IN jacks and immediately remove the 75-ohm termination plug from the multiple PIL HYB OUT A jack (protection line only).
41	At the miscellaneous bay, remove the patch cords between multiple A1 and multiple AB1 jacks of all receive switches under test.
42	Go to Chart 2.
	Note: L4 begins at Step 43.
	B. L4 Receive Switch Test
	Patch Around Receive Switch
43	At the control connecting bay, insert a patch cord between the multiple A1 and multiple AB1 jacks of the receive switch under test.
44	At the receive jack field (protection line only), insert a patch cord from the multiple PIL HYB OUT A jack to the multiple SW OUT jack.
45	At the receive switch control bay, remove the patch plug from the SW FIL OUT or LVL COM OUT and SW AMP IN jacks.
	Remove Patch Plugs of Receive Switch Being Tested
	Caution: <i>Patch plugs should be removed and replaced one-at-a-time to ensure minimum delay in restoring the switching system to service should it be needed.</i>
46	At the control connecting bay of the associated line under test, remove the patch plugs between jacks: • A and A1 • AB and AB1 • B and B1

CHART 1 (Contd)

STEP	PROCEDURE
	● OB and B.
	Block-LO Relay Nonoperated
47	On the associated regular initiator of the line under test, block the LO relay in a nonoperated condition.
	Simulate Line Failure
48	At the right rear of the line receive bay, remove the 448A plug from J1 jack (J68877BF panel) or from the J2 jack (J68877EA panel).
	Requirement 1: Visual and audible office alarms operate (major and minor).
	Requirement 2: Relay REG or STBY operate on the SW SIG FLT panel.
	Requirement 3: INIT TEST lamp lights in the control connecting bay.
	Requirement 4: TOT FAIL lamp lights in the control connecting bay.
49	Depress the ACO pushbutton in the switch control bay to silence the audible alarm.
	Line Identification Signal Check
50	Prepare the STE to send a 296-kHz signal at -71 dBm.
51	At the receive switch control bay, insert the 296-kHz signal (-71 dBm) into the SW AMP IN jack.
	Requirement 1: OUT SVC AUTO lamp lights in the control connecting bay.
	Requirement 2: TSV relay (or relays) operates.
	Requirement 3: D relay (on the director panel) operates.
52	At the transmit bay of the associated line under test, make a bridged measurement of the line identification frequency and power level (Table A) at the multiple TRSG HYB OUT B and SW IN jacks.
	Requirement: Table A.
53	If the requirements in Steps 51 and 52 are met, proceed to Step 54. A measurement exceeding tolerance indicates the switching signal frequency is out of limits. Do not proceed until the trouble is cleared.
54	Remove the 296-kHz signal from the SW AMP IN jack.

CHART 1 (Contd)

STEP	PROCEDURE
	Requirement: TSV relay (or relays) releases.
55	Remove the RTE from the multiple TRSG HYB OUT B jack.
	Ensure Receive Switch Operated
56	At the control connecting bay, insert the 296-kHz signal (-71 dBm) into the B jack of the receive switch under test.
57	Connect the RTE to the AB jack and measure the 296-kHz signal power (-71 dBm).
	Requirement: Approximately -71 dBm.
	Note: Loss in switch is less than 0.5 dB.
58	Remove the RTE from the AB jack and connect to the OB jack.
59	Measure the 296-kHz signal power (-71 dBm).
	Requirement: The 296-kHz signal is released.
60	If the requirements in Steps 57 and 59 are within limits, proceed to Step 61. Otherwise, the receive switch has not operated. Do not proceed until the trouble is cleared.
	System Reset Operation
61	On the pilot indicator panel, observe the RESET pushbutton (lamp inside of pushbutton).
	Requirement: Failed system attempts to reset at approximately 40-second intervals.
62	At the right rear of the line receive bay, reinsert the 448A plug into J1 or J2 jack.
63	On the JK HYB & M PNL (ED-50711-32) or on the PIL IND panel (J68877EA), depress the RESET pushbutton.
	Requirement 1: In approximately 20 seconds (after reset), the receive switch returns to normal.
	Requirement 2: D relay releases.
	Requirement 3: TS RLS FAIL alarm and lamp operate (expect a time delay).
	Requirement 4: The 296-kHz signal appears (-71 dBm) at the OB jack.
64	Remove the STE signal (296 kHz) from the B jack.

CHART 1 (Contd)

STEP	PROCEDURE
65	Remove the RTE from the OB jack. Restore Patch Plugs of the Receive Switch Being Tested
66	At the control connecting bay of the associated switch under test, restore the patch plugs as follows: ● A and A1 ● AB and AB1 ● B and B1 ● OB and B. Release Signal Check
67	Prepare the STE to send a 280-kHz signal at -71 dBm.
68	At the transmit bay of the associated line under test, make a bridged measurement of 282-kHz frequency and power level at the multiple TRSG HYB OUT B jack. Requirement: Approximately -90 dBm.
69	At the switch control bay, insert the STE signal (280 kHz at -71 dBm) into the SW AMP IN jack. Requirement: The 282-kHz signal is removed from the RTE (TRSG HYB OUT B jack).
70	Remove the RTE from the multiple TRSG HYB OUT B jack.
71	Remove the STE (280-kHz signal) from the SW AMP IN jack. Release LO Relay
72	At the associated initiator of the line under test, release the block from the LO relay. Simulate Line Failure
73	At the right rear of the line receive bay, remove the 448A plug from the J1 jack (J68877BF panel) or from the J2 jack (J68877EA panel). Requirement 1: Visual and audible office alarms operate (major and minor). Requirement 2: Relay REG or STBY operates on the SW SIG FLT panel.

CHART 1 (Contd)

STEP	PROCEDURE
	Requirement 3: INIT TEST lamp lights in the control connecting bay.
	Requirement 4: TOT FAIL lamp lights in the control connecting bay.
74	Depress the ACO pushbutton to silence the audible alarm.
	Pilot Sampling Check and Reset
75	At the pilot indicator panel, observe the operation of the RESET pushbutton (lamp inside of pushbutton).
	Requirement: First reset occurs within 2 seconds and every 40 seconds thereafter.
76	Reinsert the 448A plug into the J1 or J2 jack.
77	Depress the RESET pushbutton on the JK HYB & M PNL (ED-50711-32) or on the PIL IND panel (J68877EA).
	Requirement 1: In approximately 20 seconds (after reset), the receive switch returns to normal.
	Requirement 2: TS RLS FAIL alarm and lamp operate after a short delay.
78	Repeat Steps 43 through 77 for each receive switch under test.
	Restore Patch to Normal
79	At the receive switch control bay, reinsert the patch plug between the SW FIL OUT or LVL COM OUT and SW AMP IN jacks.
80	At the receive jack field (protection line only), remove the patch cord between the multiple PIL HYB OUT A and SW OUT jacks.
81	At the control connecting bay, remove the patch cord between the multiple A1 and multiple AB1 jacks of the receive switch under test.

CHART 2

CHECK PRIORITY AND INHIBITING FEATURES
(MULTILINE, EXPANDED MULTILINE, AND SUPERMULTILINE)

The L3 and L4 switch control bays have switching facilities for 12 regular lines and one protection line. Group A provides equipment for four regular lines and the protection line. Groups AA and

CHART 2 (Contd)

AB each contain equipment for four additional regular lines. The regular lines are designated as follows:

- Group A:** 1A, 2A, 3A, and 4A
- Group AA:** 1AA, 2AA, 3AA, and 4AA
- Group AB:** 1AB, 2AB, 3AB, and 4AB.

If one or more of the regular lines fail, the first line to fail or the priority line will transfer to the protection line. However, if the protection line is out of service, the regular line or lines will be automatically terminated. This automatic terminating is due to the inhibiting feature of the switching system.

In a multiline arrangement (Group A), the order of priority is 1A, 2A, 3A, and 4A. If all four lines fail simultaneously, the first regular line (1A) will have priority over the other three regular lines. In an expanded multiline arrangement, Group A has priority over Group AA. In a supermultiline arrangement, Group A has priority over both Group AA and Group AB (Group AA has priority over Group AB). Thus, if all the regular lines fail simultaneously, the first regular line (1A) will switch to the protection line. If regular line 1A restores to normal, regular line 2A will switch to the protection line. When 2A restores, 3A will switch to the protection line. This action will continue until all regular lines are restored.

APPARATUS:

Receiving Test Equipment (RTE) with the following input characteristics:

Frequency Range: 280 to 296 kHz

Power: -40 to -60 dBm

Impedance: 75 ohms

11B Attenuator (30 dB)

75-ohm Termination Plug (368A)

P2BJ Cords

STEP	PROCEDURE
------	-----------

- | | |
|---|--|
| 1 | Ensure that all lines under test are normal. |
|---|--|

Requirement: No lamp should be lighted in the **L3** miscellaneous or **L4** control connecting bay.

CHART 2 (Contd)

STEP	PROCEDURE
2	Notify the distant end of the switching section under test and the succeeding switching section before beginning.
	Note: Local procedure may require notifying the Regional Facility Management Center.
3	L3—Perform Steps 5 through 36.
4	L4—Perform Steps 37 through 67.
	A. L3 Inhibiting Feature
	Test Setup
5	At the miscellaneous control bay, insert a 75-ohm patch between multiple A1 and multiple AB1 jacks of all receive switches under test (Fig. 1).
6	At the receive jack field, insert a 75-ohm termination plug in the multiple PIL HYB OUT A jack and immediately remove the patch plug between the PIL HYB OUT A and SW IN jacks (protection line only) (Fig. 2).
7	At the receive switch control bay, remove the patch plug from the SW FIL OUT and SW AMP IN jacks (Fig. 3).
	Caution: Before proceeding to Step 8, make sure a patch cord is connected from multiple jack A1 to multiple jack AB1 of the receive switch being tested.
8	At the receive switch shelf of the line under test, remove the patch plugs between jacks: • A and A1 • AB and AB1.
9	At the station performing the test, operate all line terminate switches to manual mode by setting the MODE key to the MAN position.
	Block LO Relay
10	On all regular initiators associated with this test, block the LO relay in a nonoperated condition.
	Simulate Protection Line Failure
11	At the receive repeater bay (pilot indicator panel), manually adjust the 7266 kHz ZERO potentiometer until the upper or lower meter relay contacts close (Fig. 4).

CHART 2 (Contd)

STEP	PROCEDURE
Requirement 1: STBY FAIL lamp lights.	
Requirement 2: Minor visual and audible office alarms operate.	
Note: Audible office alarms may be silenced by operating the ACO key in the switch control bay.	
Simulate Regular Line Failure	
12	Simulate a line failure on all regular lines under test by repeating Step 11. Simulate in the following order: • Line 1A, 2A, 3A, and 4A • Line 1AA, 2AA, 3AA, and 4AA • Line 1AB, 2AB, 3AB, and 4AB.

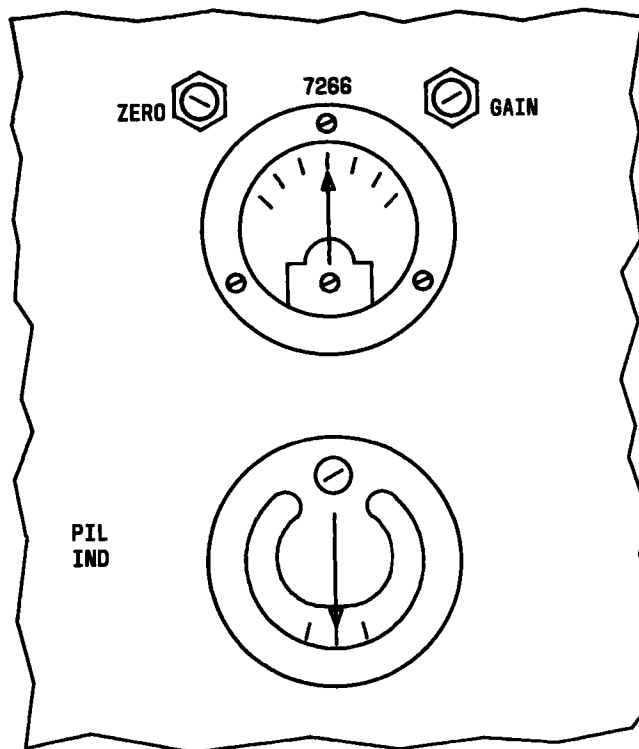


Fig. 4—Typical L3 Pilot Indicator Panel

CHART 2 (Contd)

STEP	PROCEDURE
	Requirement 1: TOT FAIL lamps for the failed regular lines light. Requirement 2: Major visual and audible office alarms operate. Note 1: A switch will not take place because the failed protection line inhibits the regular line initiator. Note 2: Audible office alarms may be silenced by operating the ACO key in the switch control bay. Restore Simulate Protection Line Failure
13	At the pilot indicator panel, restore the protection line by depressing the RST button and adjusting the ZERO potentiometer for a zero reading on the meter relay. Requirement 1: STBY FAIL lamp extinguishes. Requirement 2: The first regular initiator operates to initiate a switch. Line Identification Signal Check
14	At the transmit jack strip in the switch control bay, connect the RTE, via an 11B attenuator, to the TRSG SW CONT (1) MON jack.
15	Measure the frequency and signal power in accordance with Table B.
	Requirement: Table B. Note: In an expanded multiple or supermultiple system, the 290-kHz signal should not be greater than -50 dBm at the TRSG SW CONT (1) MON jack in Group AA or Group AB. Restore Simulated Failure on First Regular Line
16	At the pilot indicator panel, restore the first regular line by depressing the RST button, adjusting the ZERO potentiometer for a zero reading on the meter relay, and momentarily operating the RD1 relay on the protection initiator.
	Requirement 1: Associated TOT FAIL lamp extinguishes in the L3 miscellaneous bay. Requirement 2: Associated frequency is removed from the TRSG SW CONT (1) MON jack. Requirement 3: The second regular line initiator operates to initiate a switch.

CHART 2 (Contd)

STEP

PROCEDURE

TABLE B

LINE IDENTIFICATION SIGNALS FOR
GROUP A, AA, AND AB

GROUP	PRIORITY	IDENTIFICATION SIGNAL FREQUENCY (KHZ)*	APPROXIMATE SIGNAL POWER THROUGH 118 ATTENUATOR (DBM)
A	1A	290	-54
	2A	288	
	3A	286	
	4A	284*	
AA	1AA	290	-54
	2AA	288	
	3AA	286	
	4AA	284*	
AB	1AB	290	-54
	2AB	288	
	3AB	286	
	4AB	284*	

* In a 9-foot bay arrangement, the 284-kHz identification frequency is not used.

- 17 Remove the RTE and 11B attenuator from the TRSG SW CONT () MON jack under test and connect to the next higher TRSG SW CONT () MON jack.
- 18 Measure the frequency and signal power of the next switching signal frequency in accordance with Table B.

Requirement: Table B.

Restore Simulated Line Failure on Regular Line Under Test

- 19 At the pilot indicator panel, restore the regular line by depressing the RST button, adjusting the ZERO potentiometer for a zero reading on the meter relay, and momentarily operating the RD1 relay on the protection initiator.

Requirement 1: Associated TOT FAIL lamp extinguishes in the L3 miscellaneous bay.

CHART 2 (Contd)

STEP	PROCEDURE
	Requirement 2: Associated frequency is removed from the TRSG SW CONT () MON jack.
	Requirement 3: The third regular initiator operates to initiate a switch.
20	Repeat Steps 17, 18, and 19 for each regular line which was failed (Step 12).
	B. L3 Priority Check
	Simulate Regular Line Failure
21	At the receiving repeater bay, simulate a line failure in the applicable regular lines in Table C by manually adjusting the 7266-kHz ZERO potentiometer until the upper or lower meter relay contacts close.
	Requirement 1: TOT FAIL lamp for the failed regular line lights.
	Requirement 2: Major visual and audible office alarms operate.
	Note: Audible office alarm may be silenced by operating the ACO key in the switch control bay.

TABLE C

ORDER IN WHICH TO SIMULATE A FAILURE TO TEST THE PRIORITY
FEATURE OF THE THREE SWITCHING ARRANGEMENTS

FAIL IN THIS ORDER	MULTILINE (GROUP A)	EXPANDED MULTILINE (GROUPS A AND AA)	SUPERMULTILINE (GROUPS A, AA, AND AB)
1	3A	2AA	2AB
2	2A	1AA	1AB
3	1A	2A	2AA
4	—	1A	1AA
5			2A
6			1A

CHART 2 (Contd)

STEP	PROCEDURE
Check Identification Signal Frequency	
22	At the transmit jack strip in the switch control bay, connect the RTE, via an 11B attenuator, for a bridged measurement as follows: • Multiline Arrangement: TRSG SW CONT (3) MON (Group A) 286 kHz at -54 dBm. • Expanded Multiline Arrangement: TRSG SW CONT (2) MON (Group AA) 288 kHz at -54 dBm. • Supermultiline Arrangement: TRSG SW CONT (2) MON (Group AB) 288 kHz at -54 dBm.
23	Observe the meter indication. Requirement: -54 dBm.
Restore Simulated Regular Line Failure	
24	At the pilot indicator panel, restore the simulated failed line by depressing the RST button, adjusting the ZERO potentiometer for a zero reading on the meter relay, and momentarily operating the RD1 relay on the protection initiator. Requirement 1: Associated TOT FAIL lamp extinguishes in the L3 miscellaneous bay. Requirement 2: Associated frequency is removed from the TRSG SW CONT () MON jack. Requirement 3: The line initiator associated with 1A (Group A) operates to initiate a switch.
25	Remove the 11B attenuator and RTE from the TRSG SW CONT () MON jack used in Step 22.
26	Insert the RTE, via the 11B attenuator, to TRSG SW CONT (1) MON jack of Group A.
27	Adjust the RTE for a measurement of 290 kHz. Requirement: -54 dBm.
Restore All Simulated Failed Lines	
28	Repeat Step 24 to restore all simulated failed lines.

CHART 2 (Contd)

STEP	PROCEDURE
29	At the transmit jack strip in the switch control bay, remove the 11B attenuator and the RTE from the TRSG SW CONT (1) MON jack.
	Release LO Relay
30	On all regular initiators associated with this test, remove blocks from the LO relays (Step 10).
	Release Test Setup
31	At the receive switch control bay, reinsert the patch plug between the SW FIL OUT and SW AMP IN jacks.
32	At the receive switch shelf, reinsert the patch plugs between jacks: • A and A1 • AB and AB1.
33	At the station performing the test, remove all line terminal switches from the manual mode by simultaneously operating the MAN key to the AUTO position and the MSTR key.
34	At the miscellaneous control bay, remove all patch cords between the multiple A1 and AB1 jacks of each switch under test.
35	At the receive jack field, replace the patch plug between PIL HYB OUT A jack and immediately remove the 75-ohm termination plug from the multiple PIL HYB OUT A jack (protection line).
36	Go to Chart 3.
	C. L4 Inhibiting Feature
	Test Setup
37	At the control connecting bay, insert a 75-ohm patch cord between the multiple A1 and multiple AB1 jacks of all received switches under test (Fig. 1).
38	At the receive jack field, insert a 75-ohm cord from the PIL HYB OUT A multiple jack to the SW OUT multiple jack (protection line only) (Fig. 2).
39	At the jack strip in the switch control bay, remove the patch plug between SW FIL OUT or LVL COM OUT and SW AMP IN jacks (Fig. 3).

CHART 2 (Contd)

STEP	PROCEDURE
	Caution: Before proceeding to Step 40, make sure a patch cord is connected from multiple jack A1 to multiple jack AB1 of the receive switch being tested.
40	At the control connecting bay of the line under test, remove the patch plugs between jacks: • A and A1 • AB and AB1.
41	At the station performing the test, operate all line terminate switches to manual mode by setting the MODE key to the MAN position. Block LO Relay
42	On the regular initiator associated with this test, block the LO relay in a nonoperated condition. Simulate Protection Line Failure
43	At the right rear of the line receiving bay, remove the 448A plug from J1 jack (J68877BF panel) or J2 jack (J68877EA panel). Requirement 1: STBY FAIL lamp lights. Requirement 2: Minor visual and audible office alarms operate. Note: Audible office alarms may be silenced by operating the ACO key in the switch control bay. Simulate Regular Line Failure
44	Simulate a line failure on all regular lines under test by repeating Step 43. Simulate in the following order: • Line 1A, 2A, 3A, and 4A • Line 1AA, 2AA, 3AA, and 4AA • Line 1AB, 2AB, 3AB, and 4AB. Requirement 1: TOT FAIL lamps for the failed regular lines light. Requirement 2: Major visual and audible office alarms operate.

CHART 2 (Contd)

STEP	PROCEDURE
	Requirement 3: A switch will not take place because the failed protection line inhibits the regular line initiator. Note: Audible office alarms may be silenced by operating the ACO key in the switch control bay. Restore Simulated Protection Line Failure 45 At the right rear of the line receiving bay, restore the protection line by reinserting the 448A plug into J1 or J2 jack and depressing the RESET button on the JK HYB & M PNL (ED-50711-32) or on the PIL IND panel (J68877EA). Requirement 1: STBY FAIL lamp extinguishes. Requirement 2: The first regular initiator operates to initiate a switch. Check Line Identification Signal 46 At the transmit jack strip in the switch control bay, connect the RTE, via an 11B attenuator, to the TRSG SW CONT (1) MON jack. 47 Measure the frequency and signal power in accordance with Table B. Requirement: Table B. Note: In an expanded multiple or supermultiple system, the 290-kHz signal should not be greater than -50 dBm at the TRSG SW CONT (1) MON jack in Group AA or Group AB. Restore Simulated Failure on the First Regular Line 48 At the right rear of the line receive bay, restore the first regular line by reinserting the 448A plug into J1 or J2 jack and depressing the RESET button on the JK HYB & M PNL (ED-50711-32) or on the PIL IND panel (J68877EA); momentarily operate the RD1 relay on the protection initiator. Requirement 1: Associated TOT FAIL lamp extinguishes. Requirement 2: Associated frequency is removed from the TRSG SW CONT (1) MON jack. Requirement 3: The second regular initiator operates to initiate a switch. 49 Remove the RTE and 11B attenuator from the TRSG SW CONT () MON jack under test and connect it to the next higher TRSG SW CONT () MON jack.

CHART 2 (Contd)

STEP	PROCEDURE
50	Measure the frequency and signal power of the next switching signal in accordance with Table B. Requirement: Table B. Restore Simulated Line Failure on Regular Line Under Test
51	At the right rear of the line receive bay, restore the regular line under test by reinserting the 448A plug into J1 or J2 jack and depressing the RESET button on the JK HYB & M PNL (ED-50711-32) or on the PIL IND panel (J68877EA); momentarily operate the RD1 relay on the protection initiator. Requirement 1: Associated TOT FAIL lamp extinguishes. Requirement 2: Associated frequency is removed from the TRSG SW CONT () MON jack. Requirement 3: The third regular initiator operates to initiate a switch.
52	Repeat Steps 49, 50, and 51 for each regular line which was failed (Step 44). D. L4 Priority Check Simulate Regular Line Failure
53	At the rear of the line receive bay, simulate a line failure on the applicable regular lines in Table C by removing the 448A plug from the J1 jack (J68877BF panel) or from the J2 jack (J68873EA panel). Requirement 1: TOT FAIL lamp for the failed regular line lights. Requirement 2: Major visual and audible office alarms operate. Note: Audible office alarm may be silenced by operating the ACO key in the switch control bay. Check Identification Signal Frequency
54	At the transmit jack strip in the switch control bay, connect RTE, via an 11B attenuator, for a bridged measurement as follows: • Multiline Arrangement: TRSG SW CONT (3) MON (Group A) 286 kHz at -54 dBm. • Expanded Multiline Arrangement: TRSG SW CONT (2) MON (Group AA) 288 kHz at -54 dBm.

CHART 2 (Contd)

STEP	PROCEDURE
	• Supermultiline Arrangement: TRSG SW CONT (2) MON (Group AB) 288 kHz at -54 dBm.
55	Observe the RTE indication. Requirement: -54 dBm. Restore Simulated Regular Line Failure
56	At the right rear of the line receive bay, restore the simulated failed line (Step 53) by reinserting the 448A plug into the J1 jack or J2 jack and depressing the RESET button on the JK HYB & M PNL (ED-50711-32) or on the PIL IND panel (J68877EA); momentarily operate the RD1 relay on the protection initiator. Requirement 1: Associated TOT FAIL lamp extinguishes. Requirement 2: Associated frequency is removed from the TRSG SW CONT () MON jack. Requirement 3: The third initiator associated with 1A (Group A) operates to indicate a switch.
57	Remove the 11B attenuator and RTE from the TRSG SW CONT () MON jack used in Step 54.
58	Insert the RTE, via the 11B attenuator, into the TRSG SW CONT (1) MON jack of Group A.
59	Adjust the RTE for a measurement of 290 kHz. Requirement: -54 dBm. Restore All Simulated Failed Lines
60	Repeat Step 56 for restoring all simulated failed lines.
61	At the transmit jack strip in the switch control bay, remove the 11B attenuator and RTE from TRSG SW CONT (1) MON jack. Release LO Relay
62	On all regular initiators associated with this test, remove blocks from the LO relays.

CHART 2 (Contd)

STEP	PROCEDURE
Release Test Setup	
63	At the jack strip in the switch control bay, reinsert the patch plug between SW FIL OUT or LVL COM OUT and SW AMP IN jacks.
64	At the control connecting bay, reinsert the patch plugs between jacks: • A and A1 • AB and AB1.
65	At the station performing the test, remove all line terminate switches from the manual mode by simultaneously operating the MAN key to the AUTO position and the MSTR key.
66	At the control connecting bay, remove all patch cords between multiple A1 and AB1 jacks of each switch under test.
67	At the receive jack field, remove the 75-ohm patch cord between multiple PIL HYB OUT A jack and multiple SW OUT jack (protection line).

CHART 3**CHECK BLOCKING FUNCTIONS**

A blocking ground lead (BL) is provided to block operation in the following switching section of the transmitting switch control circuit associated with the failed line. The blocking action is provided to prevent undesired operation of the switching circuit in the **succeeding** section. There are two types of blocks: a 2-second temporary block and a permanent block.

The 2-second temporary block is initiated when service is being transferred from or restored to a regular line. If the switch cannot be completed within approximately 2 seconds, the block is referred to as a permanent block. This permanent block will not release until the switching operation is completed.

APPARATUS:

Receiving test equipment capable of detecting, from 75-ohm circuits, signals between 280 kHz and 296 kHz at powers between -20 and -100 dBm

KS-14510, Volt-Ohm-Milliammeter (VOM)

P2BJ Cords

CHART 3 (Contd)

APPARATUS(Contd):

Adjustable Attenuator with the following characteristics:

75-ohm input and output

Loss from zero to 85 dB

Adjustable in increments of at least 1.0 dB

STEP	PROCEDURE
1	Ensure that all lines under test are normal. Requirement: No lamp should be lighted in the L3 miscellaneous or L4 control connecting bay.
2	Notify the distant end of the switching section under test plus the succeeding switching section before beginning. Note: Local procedure may require notifying the Regional Facility Management Center.
3	L4—Perform Steps 5 through 33.
4	L4—Perform Steps 34 through 61. A. L3 Check of Blocking Function Test Setup
5	At the miscellaneous control bay, insert a 75-ohm patch cord between multiple A1 and multiple AB1 jacks of all receive switches under test (Fig. 1).
6	At the receive bay jack field, insert a 75-ohm termination plug in the multiple PIL HYB OUT A jack and immediately remove the patch plug between multiple PIL HYB OUT A and multiple SW IN jacks (protection line) (Fig. 2).
7	At the receive switch control bay (Group A), remove the patch plug from SW FIL OUT and SW AMP IN jacks (Fig. 3). VOM Measurement
8	On the VOM, set the range selector switch to the 60 DC VOLTS position.
9	Under the right rear panel cover of the transmitting switch control unit (TSC), connect the VOM (+) lead to ground and the (-) lead to terminal 2 of diode CR1.

CHART 3 (Contd)

STEP	PROCEDURE
	Note: Terminal 2 of CR1 is connected to the junction of C2, R3, and R4.
10	Measure the voltage. Requirement: Approximately -24 volts. Simulate Line Failure for Line Under Test
11	At the receive repeater bay (pilot indicator panel), manually adjust the 7266-kHz ZERO potentiometer until the upper or lower meter relay contact closes. Requirement 1: VOM negative dc voltage is lost (Step 10). Requirement 2: Visual and audible office alarms operate. Note: The audible alarm may be silenced by depressing the ACO key in the switch control bay. Block LO Relay
12	At the associated initiator of the line under test, block the LO relay in a nonoperated condition. Check Line Verification Signal (-71 dBm)
13	Prepare the RTE for a terminated measurement of 296 kHz at -71 dBm.
14	At the top right side of the director unit (Fig. 5), insert a patch cord from the TST jack of the 296-kHz oscillator, via an adjustable attenuator, into the RTE.
15	Adjust the attenuator for an RTE meter reading of -71 dBm.
16	Remove the patch cord from the RTE.
17	At the switch control bay, insert the 296-kHz signal (-71 dBm) into the SW AMP IN jack while observing the VOM. Requirement 1: VOM indicates approximately -10 volts. Requirement 2: OUT SERV AUTO lamp is lighted.
18	Remove the VOM from the TSC unit (Step 9).

CHART 3 (Contd)

STEP

PROCEDURE

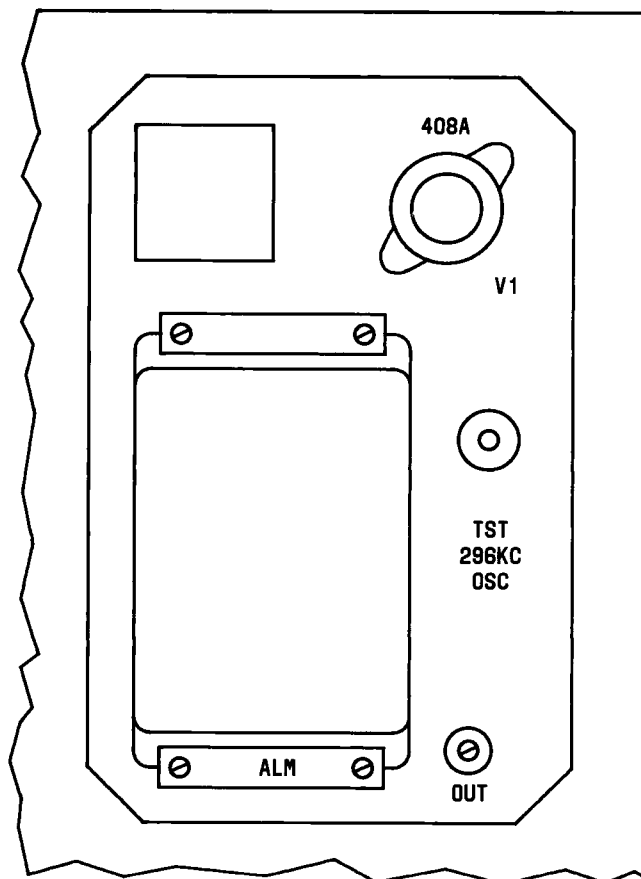


Fig. 5—Oscillator (Part of the DIR Unit)

Restore Simulated Failed Line

- 19 At the receive repeater bay (pilot indicator panel), restore the simulated failed line by depressing the RST button and adjusting the ZERO potentiometer for a zero reading on the meter relay.

Requirement 1: OUT SERV AUTO lamps extinguish.

Requirement 2: Visual office alarms extinguish.

Requirement 3: TS RLS FAIL alarm and lamps operate.

CHART 3 (Contd)

STEP	PROCEDURE
Release Line Verification Signal	
20	At the receive switch control bay, remove the 296-kHz signal from the SW AMP IN jack.
21	At the top right side of the director unit, remove the patch cord from the TST jack of the 296-kHz oscillator.
Line Release Signal Check (-71 dBm)	
22	Prepare the RTE for a terminated measurement of 280 kHz at -71 dBm.
23	At the director unit, insert a patch cord from the TST jack of the 280-kHz oscillator, via an adjustable attenuator, into the RTE.
24	Adjust the attenuator for an RTE meter reading of -71 dBm.
25	Remove the patch cord from the RTE.
26	At the receive switch control bay (Group A), insert the 280-kHz signal (-71 dBm) into the SW AMP IN jack.
Requirement: TS RLS FAIL lamps are extinguished.	
Release LO Relay	
27	At the associated initiator of the line under test, remove the block from the LO relay.
Release Line Release Signal	
28	At the receive switch control bay, remove the 280-kHz signal from the SW AMP IN jack.
29	Repeat Steps 5 through 28 for each regular line.
Release Test Setup	
30	At the receive switch control bay, reinsert a patch plug between SW FIL-OUT and SW AMP IN jacks.
31	At the miscellaneous control bay, remove the patch cord between the multiple A1 and the multiple AB1 jacks of all receive switches under test.
32	At the receive jack field, reinsert the patch plug between the PIL HYB OUT A jack and the SW IN jacks and immediately remove the 75-ohm termination plug from the multiple PIL HYB OUT A jack.
33	Go to Chart 4.

CHART 3 (Contd)

STEP	PROCEDURE
	Note: L4 begins at Step 34. B. L4 Check of Blocking Function Test Setup 34 At the control connecting bay, insert a 75-ohm patch cord between the multiple A1 and multiple AB1 jacks of all receive switches under test (Fig. 1). 35 At the receive bay jack field, insert a 75-ohm cord from the multiple PIL HYB OUT A jack to the multiple SW OUT jack (protection line) (Fig. 2). 36 At the receive switch control bay (Group A), remove the patch plug from the SW FIL OUT or LVL COM OUT and SW AMP IN jacks (Fig. 3). VOM Measurement 37 On the VOM, set the range selector switch to the 60 DC VOLTS position. 38 Under the right rear panel cover of the transmitting switch control unit (TSC), connect the VOM (+) lead to ground and the (-) lead to terminal 2 of diode CR1. Note: Terminal 2 of CR1 is connected to the junctions of C2, R3, and R4. 39 Measure the voltage. Requirement: -24 volts. Simulate Line Failure for Line Under Test 40 At the right rear of the line receive bay, remove the 448A plug from the J1 jack (J68877BF panel) or from the J2 jack (J68877EA panel). Requirement 1: VOM negative dc voltage is lost (Step 39). Requirement 2: Visual and audible office alarms operate. Note: The audible alarm may be silenced by depressing the ACO key in the switch control bay. Block LO Relay 41 At the associated initiator of the line under test, block the LO relay in a nonoperated condition.

CHART 3 (Contd)

STEP	PROCEDURE
Check Line Verification Signal (-71 dBm)	
42	Prepare the RTE for a terminated measurement of 296 kHz at -71 dBm.
43	At the top right side of the director unit, insert a patch cord from the TST jack of the 296-kHz oscillator (Fig. 5), via an adjustable attenuator, into the RTE.
44	Adjust the attenuator for an RTE meter reading of -71 dBm.
45	Remove the patch cord from the RTE.
46	At the switch control bay, insert the 296-kHz signal (-71 dBm) into the SW AMP IN jack while observing the VOM.
	Requirement 1: VOM indicates approximately -10 volts.
	Requirement 2: OUT SERV AUTO lamp lights.
47	Remove the VOM from the TSC unit.
Restore Simulated Failed Line	
48	At the right rear of the line receive bay, restore the simulated failed line by reinserting the 448A plug into J1 or J2 jack and depressing the RESET button on the JK HYB & M PNL (ED-50711-32) or on the PIL IND panel (J68877EA).
	Requirement 1: OUT SERV AUTO lamps extinguish.
	Requirement 2: Visual office alarms extinguish.
	Requirement 3: TS RLS FAIL alarm and lamps operate.
Release Line Verification Signal	
49	At the receive switch control bay, remove the 296-kHz signal from the SW AMP IN jack.
50	At the top right side of the director unit, remove the patch cord from the TST jack of the 296-kHz oscillator.
Check Line Release Signal (-71 dBm)	
51	Prepare the RTE for a terminated measurement of 280 kHz at -71 dBm.
52	At the director unit, insert a patch cord from the TST jack of the 280-kHz oscillator, via an adjustable attenuator, into the RTE.

CHART 3 (Contd)

STEP	PROCEDURE
53	Adjust the attenuator for an RTE meter reading of -71 dBm.
54	Remove the patch cord from the RTE.
55	At the received switch control bay (Group A), insert the 280-kHz signal (-71 dBm) into the SW AMP IN jack.
	Requirement: TS RLS FAIL lamp is extinguished.
	Restore Block LO Relay
56	At the associated initiator of the line under test, remove the block from the LO relay.
	Release Line Release Signal
57	At the receive switch control bay, remove the 280-kHz signal from the SW AMP IN jack.
58	Repeat Steps 34 through 57 for each regular line.
	Release Test Setup
59	At the receive switch control bay, reinsert a patch plug between SW FIL OUT or LVL COM OUT and SW AMP IN jacks.
60	At the control connecting bay, remove the patch between multiple A1 and multiple AB1 jacks of all receive switches under test.
61	At the receive jack field, remove the patch cord from between the multiple PIL HYB OUT A and the SW OUT jacks.

CHART 4**LINE TERMINATION AND PILOT REINSERTION TESTS (L4 ONLY)**

In a particular switching section when the protection line is not available for service and a regular line fails, automatic or manual termination arrangements for the failed regular line are provided at the receiving end of the switching section. A 223C switch at the receiving end provides for termination of the failed line and termination of this line's normal input to the succeeding section. (The input to the succeeding section may be connected to restoration lines instead of a termination.) In addition, if line pilots were being fed to the succeeding section by the regular line that failed, the line termination equipment, upon failure of the line, causes pilots to be supplied by pilot sources at the input of the succeeding section.

CHART 4 (Contd)

APPARATUS:

Sending Test Equipment (STE) with the following output characteristics:

Frequency: 2 MHz

Power: 0 dBm

Impedance: 75 ohms

Receiving Test Equipment (RTE) with the following input characteristics:

Frequency Range: 280 to 296 kHz

Power: -50 to -80 dBm

Impedance: 75 ohms

KS-14510 Volt-Ohm-Milliammeter (VOM)

P2BJ Cords

A. Regular Line Test

The purpose of this test is to verify:

- (a) That the automatic or manual termination controls and associated lamps are functioning properly.
- (b) That the 223C switch in the regular line operates and releases by automatic or manual control.
- (c) That the automatic or manual termination equipment causes pilots to be inserted into the succeeding section when required.
- (d) That the regular line initiator is providing the necessary signals to cause line termination and pilot reinsertion.

STEP	PROCEDURE
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- 1 Ensure that the switching section under test is released.

Requirement: No lamps should be lighted in the control connecting bay.

Note: Local procedures may require notifying the Regional Facility Management Center.

CHART 4 (Contd)

STEP	PROCEDURE
2	Notify personnel at the distant end of the switching section under test and at the distant end of the succeeding switching section before proceeding.
3	At the control connecting bay, place a patch cord between the multiple A1 and multiple AB1 jacks of the associated 223C switch under test (Fig. 10).
4	Remove the plugs from the terminating switch as follows: • Between jacks A1 and A • Between jacks AB1 and AB • Termination plug in jack OA • Termination plug in jack B.
5	At the jack and hybrid panel in the line transmitting bay (Fig. 10), remove the patch plug(s) as follows: Caution: Before removing either or both patch plugs be certain the 0.512- and 11.648-MHz pilots are not blocked. If both pilots are blocked, do not remove either plug. • If the receiving line being tested normally supplies both line pilots, remove the patch between jacks LOW EDGE PIL and COMB PAD IN (ED-50710-31) or LOW PIL OUT and LOW COMB IN (ED-51423-30) and between jacks TEMP PIL and COMB PAD IN (ED-50710-31) or TEMP PIL OUT and TEMP COMB IN (ED-51423-01). • If the receiving line being tested normally blocks the 11.648-MHz pilot and passes the 0.512-MHz pilot, remove the patch between jacks LOW EDGE PIL and COMB PAD IN (ED-50710-31) or LOW PIL OUT and LOW COMB IN (ED-51423-30). • If the receiving line being tested normally blocks the 0.512-MHz pilot and passes the 11.648-MHz pilot, remove the patch between jacks TEMP PIL and COMB PAD IN (ED-50710-31) or TEMP PIL OUT and TEMP COMB IN (ED-51423-30).
6	At the switch control bay on the switch initiator associated with the line under test, operate the INIT key to the TST position and the REC L SW key to the DISC position.
7	At the control connecting bay, momentarily operate the MODE key to the MAN position. Requirement: The MODE lamp (white) lights.
8	Operate the MODE key to the AUTO position. Requirement: The MODE lamp remains lighted.

CHART 4 (Contd)

STEP	PROCEDURE
9	Turn the MODE key to the AUTO position and immediately depress the MSTR key. Requirement: The MODE lamp extinguishes.
10	Again operate the MODE key to the MAN position. Requirement: The MODE lamp lights.
11	Turn the LT key to the OPR position and then to the RLS position. Requirement: The LT lamp (red) does not light in either key position and the MODE lamp remains lighted.
12	At the rear of ED-50500-31 panel in the switch control bay (Fig 11), simulate a total failure of the regular line under test by connecting a clip lead between the terminals specified as follows: • First regular line: Strap from TSE 2 to TSE 30. • Second regular line: Strap from TSE 42 to TSE 30. • Third regular line: Strap from TSE 82 to TSE 30. • Fourth regular line: Strap from TSE 122 to TSE 130. Requirement: The TOT FAIL and LT lamps in the control connecting bay associated with the line under test do not light.
13	Prepare the STE to provide a 2-MHz signal at 0 dBm.
14	Prepare the RTE for a 75-ohm terminated measurement of 2 MHz at 0 dBm.
15	Connect the STE to the A jack of the line termination switch under test (Fig. 10).
16	Measure the 2-MHz signal by connecting the RTE to the following jacks: • OA • OB • B • AB Requirement 1: -85 dBm or greater (OA jack).

CHART 4 (Contd)

STEP**PROCEDURE**

Requirement 2: -85 dBm or greater (OB jack).

Requirement 3: -85 dBm or greater (B jack).

Requirement 4: Approximately 0.0 dBm (AB jack) (loss of the switch is less than 0.5 dB).

17 Remove the RTE from the AB jack.

18 Remove the 2-MHz signal (0 dBm) from the A jack and connect it to the B jack.

19 Measure the 2-MHz signal by connecting the RTE to the following jacks:

- OB

- AB

Requirement 1: Approximately 0.0 dBm (loss of the switch is less than 0.5 dB) (OB jack).

Requirement 2: -85 dBm or greater (AB jack).

20 Remove the RTE from the AB jack.

21 Remove the 2-MHz signal (0.0 dBm) from the B jack and input into the A jack (Fig. 10).

22 Operate the LT key to the OPR position.

Requirement: The LT lamp lights.

23 Measure the 2-MHz signal (0.0 dBm) by connecting the RTE to the following jacks:

- OA

- OB

- B

- AB

Requirement 1: Approximately 0.0 dBm (OA jack) (loss of the switch is less than 0.5 dB).

Requirement 2: -85 dBm or greater (OB jack).

Requirement 3: -85 dBm or greater (B jack).

CHART 4 (Contd)

STEP	PROCEDURE
	Requirement 4: -85 dBm or greater (AB jack).
24	Remove the RTE from the AB jack.
25	Remove the 2-MHz signal (0.0 dBm) from the A jack and input into the B jack (Fig. 10).
26	Measure the 2-MHz signal (0.0 dBm) by connecting the RTE to the following jacks: • OB • AB
	Requirement 1: -85 dBm or greater (OB jack).
	Requirement 2: Approximately 0.0 dBm (loss of the switch is less than 0.5 dB) (AB jack).
27	Remove the test cords from the B and AB jacks.
	Note: Steps 13 through 27 ensure signal continuity of the 223C switch.
28	If the plugs were removed in Step 5, proceed to Step 29; if not, proceed to Step 30.
29	At the line transmitting bay, prepare the RTE for a 75-ohm terminated measurement at the frequency and level shown in Table D.
30	Operate the LT key to the RLS position and immediately depress the MSTR key.
	Requirement 1: The LT lamp extinguishes.
	Requirement 2: The level of the line pilots measured in Step 29 is below -80 dBm.
31	Operate the MODE key to the AUTO position.

TABLE D

FREQUENCY	JACK	POWER	LEVEL ADJUSTMENT (IF NEEDED)
512 kHz	LOW EDGE PIL OR LOW PIL OUT	-32.0 dBm	ADJ 512 kHz
11.648 MHz	TEMP PIL OR TEMP PIL OUT	-22.7	ADJ 11.648 MHz

CHART 4 (Contd)

STEP

PROCEDURE

Requirement: The MODE lamp remains lighted and the LT lamp does not light.

- 32 Operate the MODE key to the AUTO position and immediately depress the MSTR key.

Requirement: The MODE lamp extinguishes.

- 33 Operate the LT key to the OPR position.

Requirement: The MODE and LT lamps do not light.

- 34 Remove the clip lead connected in Step 12.

- 35 Remove the RTE from the LOW EDGE PIL or LOW PIL OUT jack or from the TEMP PIL or TEMP PIL OUT jack.

- 36 Operate the MODE key to the MAN position.

Requirement: The MODE lamp lights.

Note: The automatic line terminating (ALT) circuit is now in the manual control mode.

- 37 Set the selector switch on the VOM to the scale indicated in Table E.

Note: Connections are made on the ED-51071-30 trigger and timer circuit board mounted on the rear of the initiator under test (Fig. 6).

- 38 Remove VOM leads from circuit board after final measurement.

- 39 Prepare the RTE for a 75-ohm terminated measurement of 11.648 MHz at -41.4 dBm.

- 40 Connect the RTE to the RCVG TST jack in the associated line receiving bay (Fig. 10) and measure the 11.648-MHz signal power.

Requirement: -41.4 dBm.

TABLE E

CONNECT		METER SCALE	REQUIREMENT
(-) LEAD TO	(+) LEAD TO		
E4	GRD	12 Vdc	Less than 5 volts
E1	E5	12 Vdc	5 to 8 volts
TP2()	TP1()	3 Vdc	Less than 1 volt

CHART 4 (Contd)	
STEP	PROCEDURE

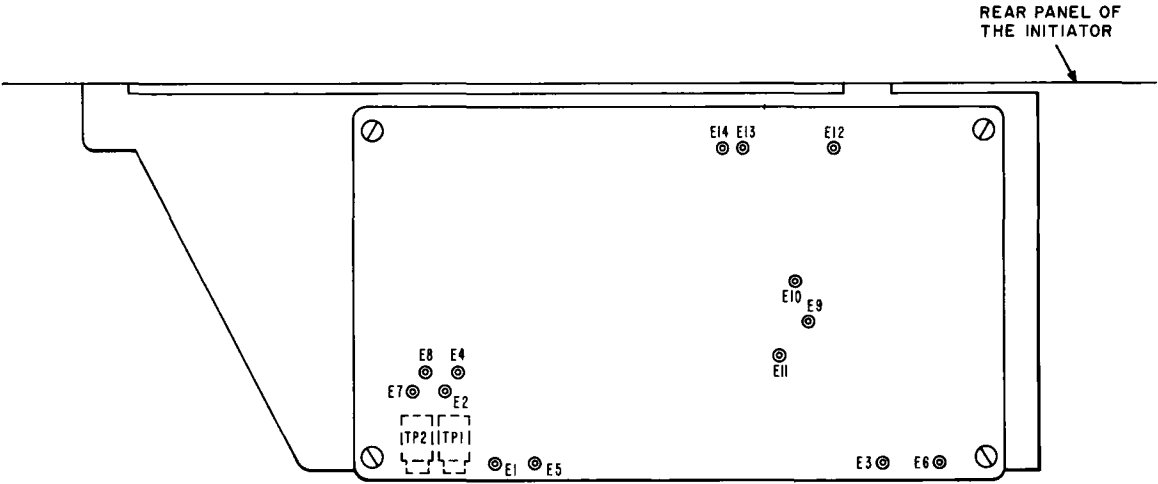


Fig. 6—Trigger and Timer Circuit Board (ED-51071-30)

CHART 4 (Contd)

STEP	PROCEDURE
	Note: This level shall remain constant on the RTE through Step 52.
41	At the rear of the associated regular line receiving bay, locate either the ED-50711-32 JK HYB & M PNL or the J68877EA-1 PIL IND panel and simulate a line failure on the associated regular line as follows: • ED-50711-32 panel: Connect a short clip lead between terminals 2 and 4 of the AT1 pad (Fig. 7). Requirement 1: The LT lamp does not light. Requirement 2: The 11.648-MHz LOW lamp lights and the 11.648-MHz meter indicates low. Note 1: Short circuiting is the preferred method of simulating a line failure; however, it may not always cause a positive failure indication. In such a case, remove the clip lead between terminals 2 and 4 and carefully pull the input coaxial plug from AR1 which is also located at the rear of the hybrid and meter panel (Fig. 7). Note 2: The ED-50711-32 JK HYB & M PNL has been manufacture discontinued. • J68877EA-1 panel: Carefully pull the coaxial plug (P6) from the input jack of AT1 (Fig. 8). Requirement 1: The LT lamp does not light. Requirement 2: The 11.648-MHz LOW lamp lights and the 11.648-MHz meter indicates low.
42	At the rear of the initiator under test (Fig. 6), set the selector switch on the VOM to the scale indicated in Table F. Note: Connections are made on ED-51071-30 trigger and timer circuit board.
43	Remove VOM leads from the circuit board after final measurement. Caution: Perform Step 44 only if the protection line is not in use.
44	Simultaneously operate the MSTR and LOCK NORM keys.
45	Release the INIT and REC L SW keys. Requirement: The LT lamp does not light.
46	Operate the MODE key to the AUTO position and immediately depress the MSTR key.

CHART 4 (Contd)

STEP

PROCEDURE

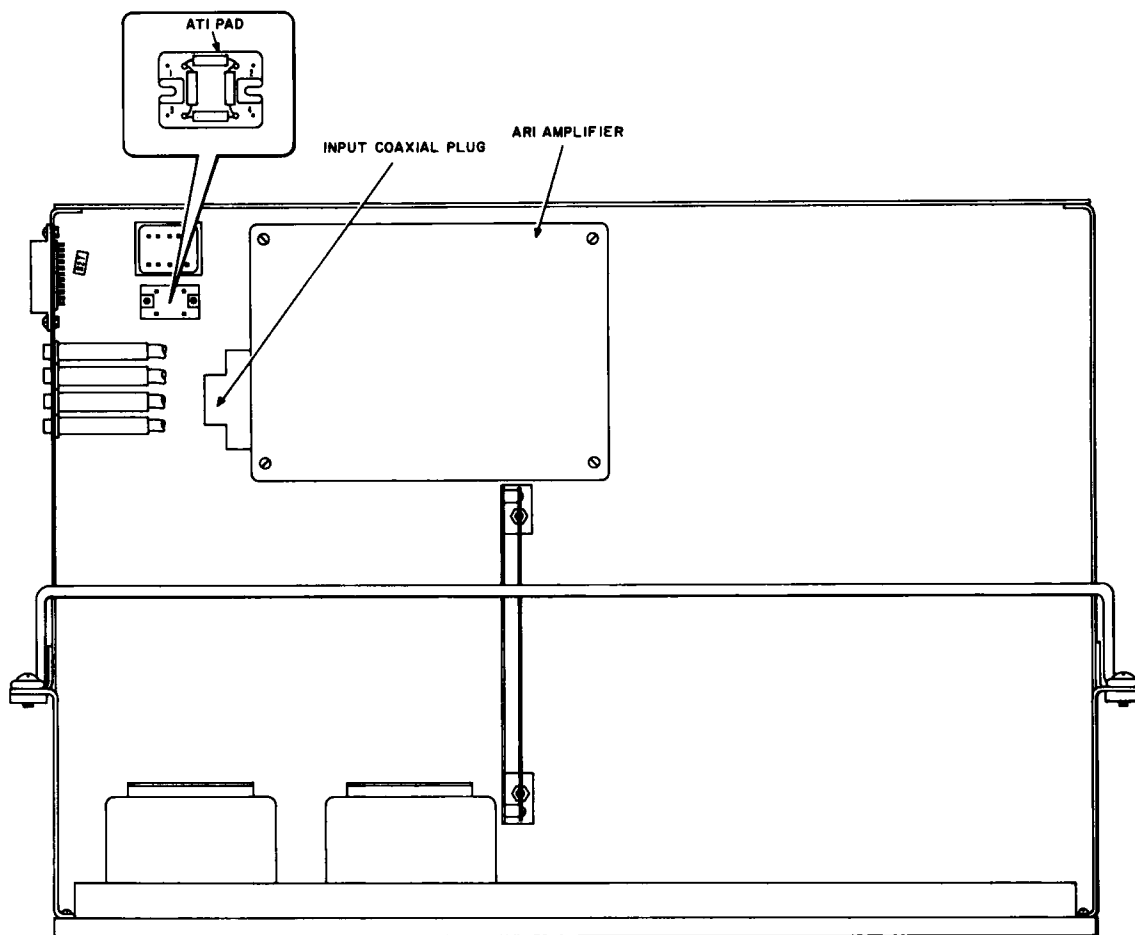


Fig. 7—Top View of JK HYB & M PNL (ED-50711-32)

CHART 4 (Contd)

STEP

PROCEDURE

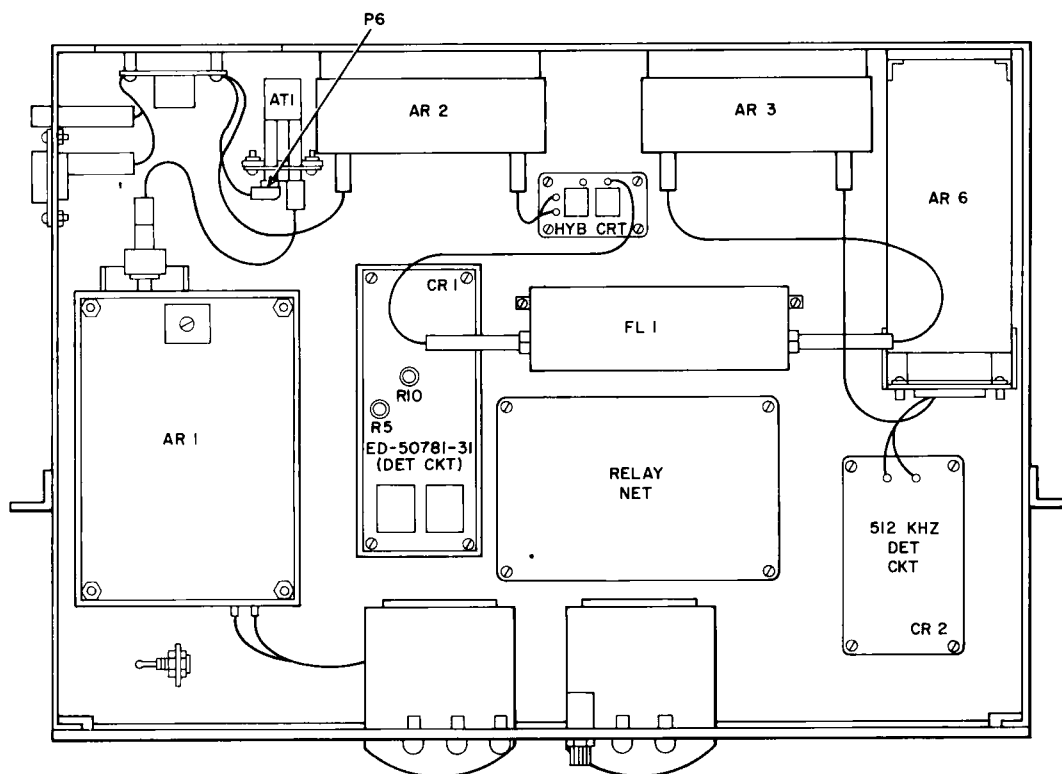


Fig. 8—Pilot Indicator Panel (J68877EA-1)

TABLE F

CONNECT		METER SCALE	REQUIREMENT
(-) LEAD TO	(+) LEAD TO		
E4	GRD	60 Vdc	Greater than 17 volts
E1	E5	3 Vdc	Less than 1 volt
TP2()	TP1()	60 Vdc	Greater than 18 volts

CHART 4 (Contd)

STEP	PROCEDURE
	Requirement 1: The MODE lamp extinguishes. Requirement 2: The LT lamp lights. Note: With the line terminating switch operated, the 512-kHz and 11.648-MHz pilots should be present at the LOW EDGE PIL and TEMP PIL (ED-50710-31) or LOW PIL OUT and TEMP PIL OUT (ED-51423-30) jacks.
47	Operate the MODE key to the MAN position. Requirement 1: The MODE lamp lights. Requirement 2: The LT lamp remains lighted.
48	Operate the LT key to the RLS position and immediately depress the MSTR key. Requirement 1: The LT lamp extinguishes. Requirement 2: The pilots should be removed from the LOW EDGE PIL and TEMP PIL jacks.
49	Operate the MODE key to the AUTO position and immediately depress the MSTR key. Requirement: The LT lamp lights.
50	Restore the simulated failed line as follows: • ED-50711-31 panel: Remove the shorting clip lead between terminals 2 and 4 of the AT1 pad or replace the AR1 input plug. • J68877EA-1 panel: Replace the plug (P6) into the input jack of AT1. Requirement: The LT lamp extinguishes in less than 1 second.
51	Simulate a failed line again by using the procedure given in Step 41. Requirement: The LT lamp lights in less than 1 second.
52	Restore the simulated failed line by using the procedure given in Step 50. Requirement: The LT lamp extinguishes.
53	Disconnect the RTE from the RCVG TST jack.
54	Simultaneously depress the MSTR and RLS keys.

CHART 4 (Contd)

STEP	PROCEDURE
Note: The protection line is now available for service.	
55	Replace the patch plugs (if removed) as follows: • Between jacks LOW EDGE PIL and COMB PAD IN (ED-50710-31) or LOW PIL OUT and LOW COMB IN (ED-51423-30) • Between jacks TEMP PIL and COMB PAD IN (ED-50710-31) or TEMP PIL OUT and TEMP COMB IN (ED-51423-30).
56	Replace patch plugs in the terminating switch as follows: • Between jacks A1 and A • Between jacks AB1 and AB • Termination plug in jack OA • Termination plug in jack B.
57	Remove the patch cord between multiple A1 and multiple AB1 jacks of the line termination switch associated with the line under test.

B. Protection Line Test

The purpose of this test is to verify that when a protection line is not available for service or fails in service, the associated switching equipment will be placed in a condition to terminate a regular line if the regular line should fail.

STEP	PROCEDURE
58	Ensure that the switching section under test is released. Requirement: No lamps should be lighted in the control connecting bay.
59	Notify personnel at the distant end of the switching section under test and at the distant end of the succeeding switching section. Note: Local procedure may require notifying the Regional Facility Management Center.
60	At the control connecting bay, depress the MSTR and LOCK NORM keys.

CHART 4 (Contd)

STEP	PROCEDURE
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Requirement: LOCK NORM lamp lights.

61 On the switch initiator associated with the first regular line, operate the INIT key to TST and the REC L SW key to DISC.

62 Operate the MODE key for the first regular line to the MAN position.

Requirement: The associated MODE lamp lights.

63 On the switch initiator associated with the protection line, operate the INIT key to TST.

64 Block operated the RC2 relay in the first regular line initiator.

Requirement: The LT lamp (red) does not light.

65 At the rear of the protection initiator, set the selector switch on the VOM to the scale indicated in Table G.

Note: Connections are made on the ED-51072-30 automatic line terminating board (Fig. 9) mounted on the rear of the **protection** initiator.

66 Remove VOM leads from the circuit board after final measurement.

67 Set the selector switch on the VOM to the 3 DC VOLTS scale.

68 At the rear of the **regular** switch initiator, connect the VOM leads as follows:

- Red lead (+) to TP(1)
- Black lead (-) to TP(2).

Note: The test points are located on the ED-51071-30 trigger and timer circuit board on the rear of the **regular** switch initiator.

69 Read the meter indication.

TABLE G

CONNECT		METER SCALE	REQUIREMENT
(-) LEAD TO	(+) LEAD TO		
E4	GRD	3 Vdc	Less than 3 volts
E1	E5	60 Vdc	Greater than 15 volts

CHART 4 (Contd)

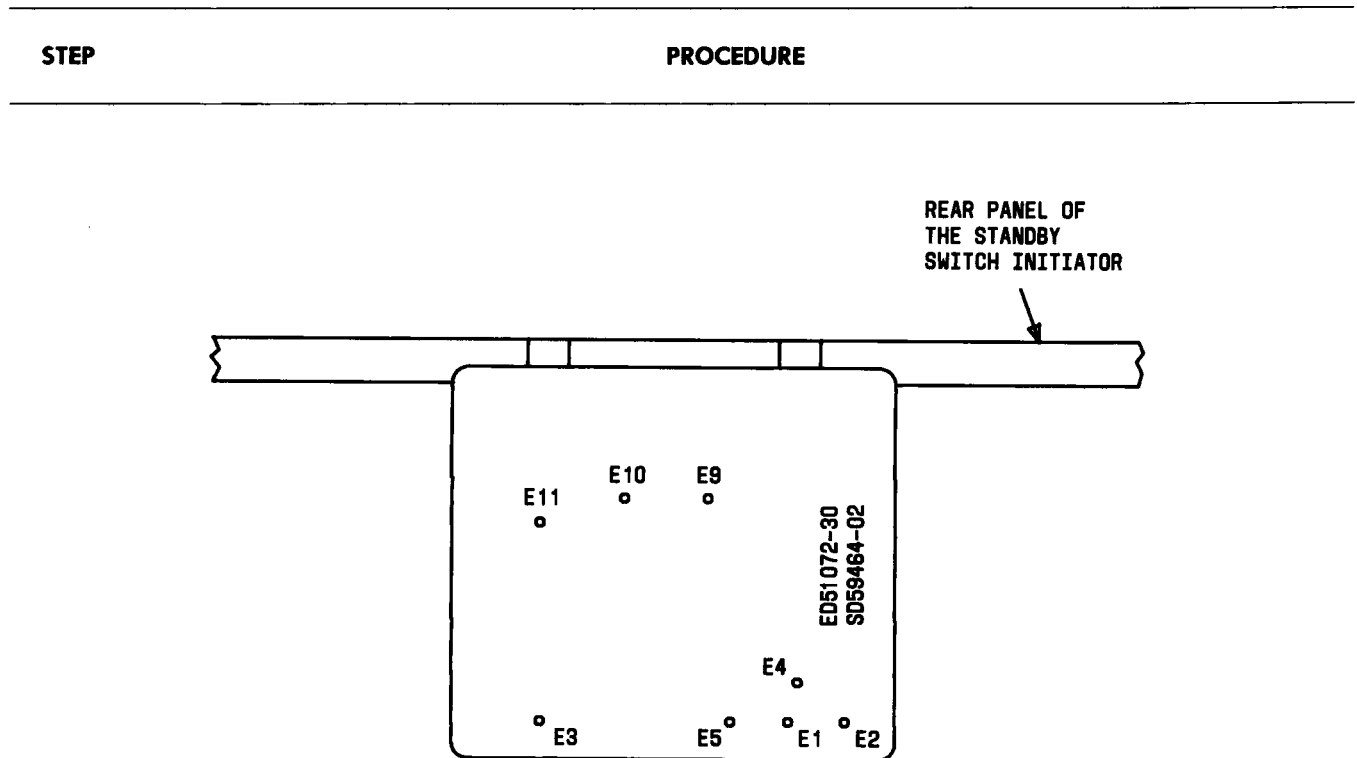


Fig. 9—Automatic Line Terminal Board (ED-51072-30)

Requirement: Less than 1 volt.

- 70 Remove VOM leads from circuit board.
- 71 Prepare the RTE for a 75-ohm terminated measurement of 11.648 MHz at -41.4 dBm.
- 72 Connect the RTE to the RCVG TST jack in the protection receiving bay.

Requirement: -41.4 dBm.

Note: This level shall remain constant on the RTE through Step 81.

- 73 At the rear of the protection line receiving bay, locate either the ED-50711-32 JK HYB & M PNL or the J68877EA-1 PIL IND panel and simulate a line failure on the protection line as follows:

- **ED-50711-32 panel:** Connect a short clip lead between terminals 2 and 4 of the AT1 pad (Fig. 7).

Requirement: The 11.648-MHz LOW lamp lights and the 11.648-MHz meter indicates low.

CHART 4 (Contd)

STEP

PROCEDURE

Note 1: Short circuiting is the preferred method of simulating a line failure; however, it may not always cause a positive failure indication. In such a case, remove the clip lead between terminals 2 and 4 and **carefully** pull the input coaxial plug from AR1 which is also located at the rear of the hybrid and meter panel (Fig. 7).

Note 2: The ED-50711-32 JK HYB & M PNL has been manufacture discontinued.

- **J68877EA-1 panel:** Carefully pull the coaxial plug (P6) from the input jack of AT1 (Fig. 8).

Requirement: The 11.648-MHz LOW lamp remains lighted and the 11.648-MHz meter indicates low.

- 74 At the rear of the protection initiator, set the selector switch on the VOM to the scale indicated in Table H.

Note: Connections are made on the ED-51072-30 automatic line terminating board (Fig. 9) mounted on the rear of the **protection** initiator.

- 75 Remove VOM leads from the circuit board after final measurement.

- 76 Set the selector switch on the VOM to the 60 DC VOLTS scale.

- 77 At the rear of the **regular** switch initiator, connect the VOM leads as follows:

- Red lead (+) to TP(1)
- Black lead (-) to TP(2).

Note: The test points are located in the ED-51071-30 trigger and timer circuit board (Fig. 6) on the rear of the **regular** switching initiator.

- 78 Read the meter indication.

Requirement: Greater than 18 volts.

TABLE H

CONNECT		METER SCALE	REQUIREMENT
(-) LEAD TO	(+) LEAD TO		
E4	GRD	60 Vdc	Greater than 17 volts
E1	E5	3 Vdc	0 to 1 volt

CHART 4 (Contd)

STEP	PROCEDURE
79	Remove VOM leads from circuit board.
80	Restore the simulated failed line as follows: • ED-50711-32 panel: Remove the shorting clip lead between terminals 2 and 4 of the AT1 pad or replace the AR1 input plug. • J68877EA-1 panel: Replace the plug (P6) into the input jack of AT1. Requirement 1: 11.648-MHz LOW lamp extinguishes. Requirement 2: 11.648-MHz meter returns to zero.
81	Remove the block from the RC2 relay in the first regular line initiator.
82	Disconnect the RTE from the RCVG TST jack.
83	Release the regular and protection INIT keys.
84	Release the regular REC L SW key.
85	Operate the MODE key for the first regular line to the AUTO position and immediately depress MSTR key. Requirement: The MODE lamp extinguishes.
86	Simultaneously depress the MSTR and RLS keys. Requirement: LOCK NORM lamp extinguishes.

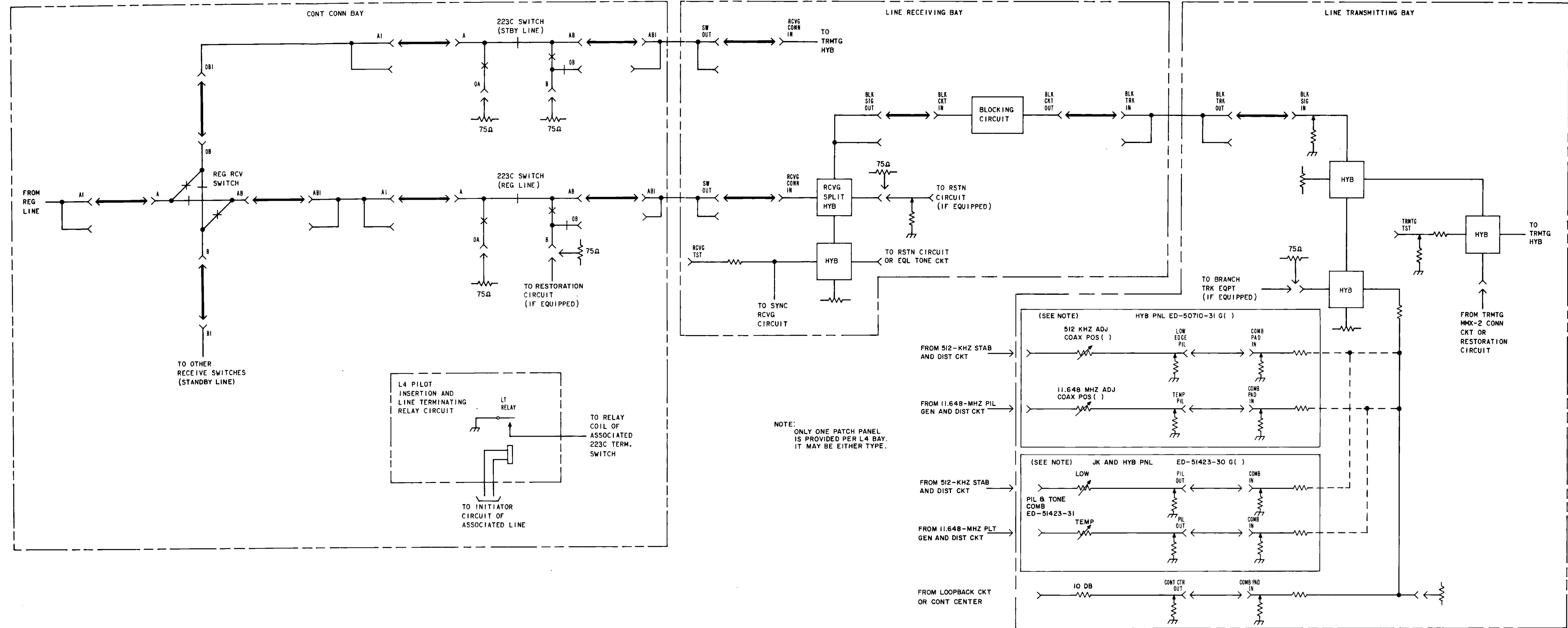


Fig. 10—L4 Switching and Pilot Insertion Arrangement

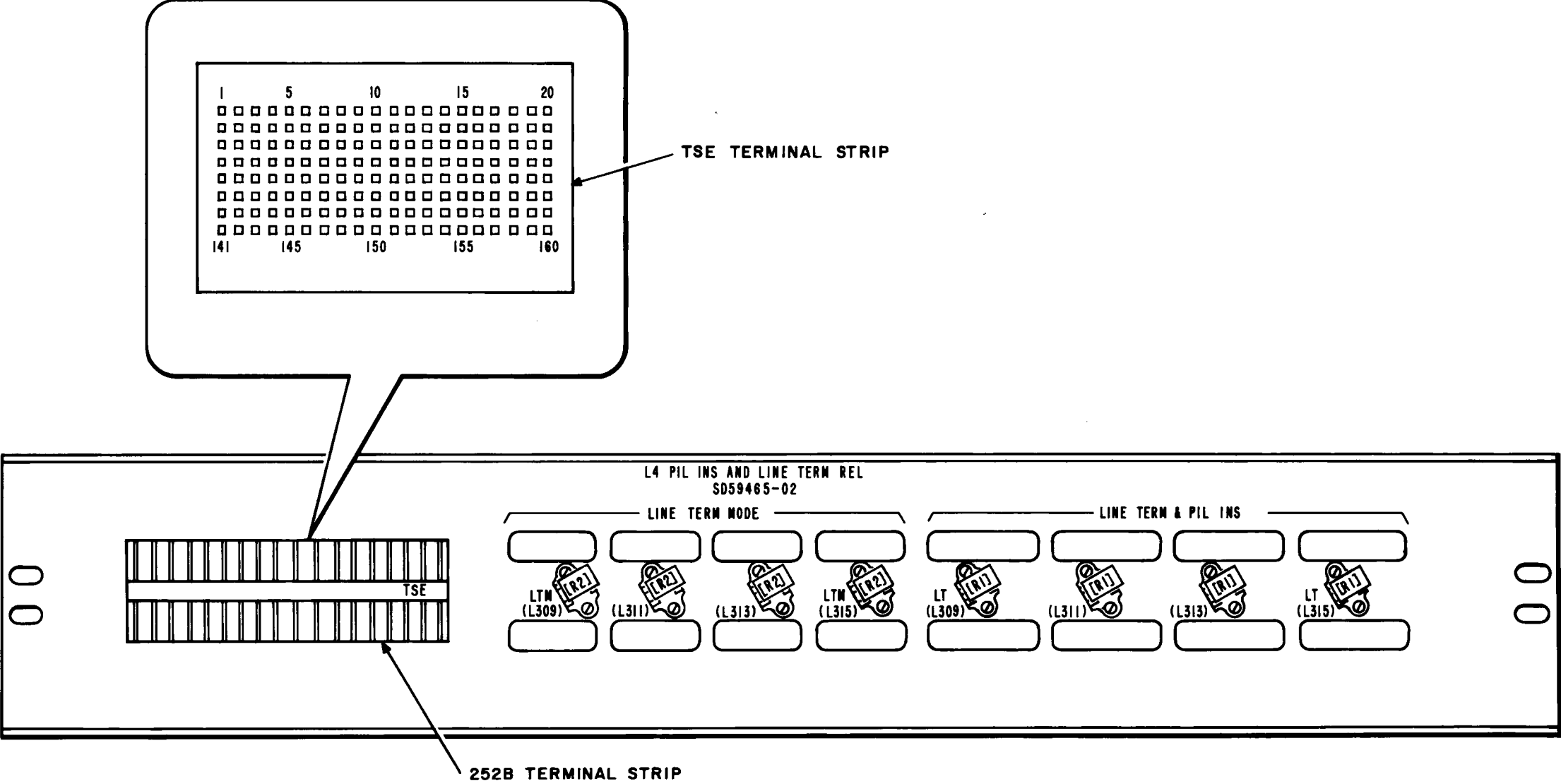


Fig. 11—Rear View of ED-505001-31 Panel and Top View of TSE Terminal Strip