L3 AND L4 CARRIER
COMMON EQUIPMENT
J68820 AUTOMATIC LINE SWITCHING
REMOVAL AND REPLACEMENT OF COAXIAL SWITCHES

This section describes the method for removal and replacement of the 223-type (L3 and L4) coaxial switches. See SD-59634-01 for automatic line switching application.

This section is reissued to specify the maximum cable length to be used in Chart 2, Step 2 and Chart 4, Step 2. Since this section has been generally revised, arrows are not used to indicate changes. Equipment Test Lists are not affected.

The 223-type switches are used in the L3 and L4 carrier systems for switching the transmitting and receiving lines. The 223 switches are coaxial-type transfer switches which are operated electromagnetically. Switches 223B, 223C, and 223D are used in the L3 and L4 line switching circuits. The 223B switch (Fig. 1) can be used at the transmitting end of both L3 and L4 systems and the receiving end of L3 systems not provided with adjustable phase equalization. The 223C switch (Fig. 2) can only be used in the receive portion of the L4 system. The 223D switch (Fig. 3) can be used at the receiving end of all L4 systems and at the receiving end of all L3 systems provided with adjustable phase equalization.

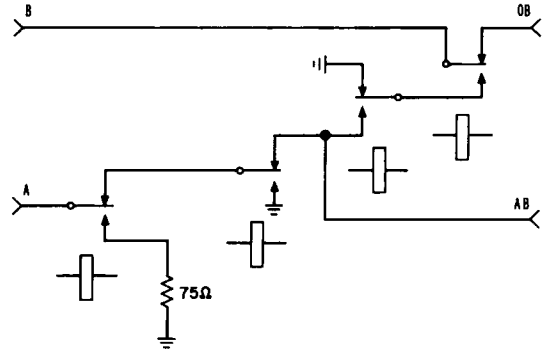

Fig. 1—223B Switch

If a transmitting or receiving switch is suspected of being defective, it is necessary to remove the switch from the circuit before testing. The procedure for testing a suspected defective switch is in Section 030-713-701.

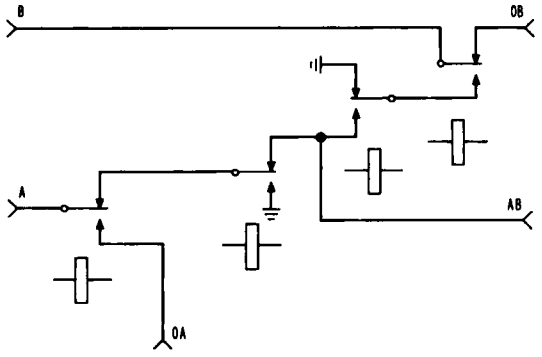

Fig. 2—223C Switch

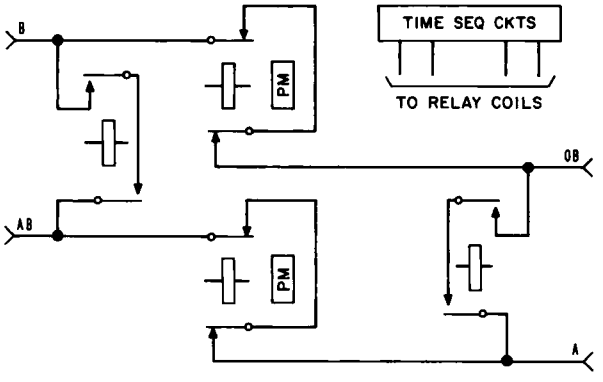

Fig. 3—223D Switch

Caution: Observe precautions in Section 030-713-701 before disassembling the switch.

CHART **PAGE**

1—L3 Carrier Transmit Switches 3

A. Multiline, Expanded Multiline, and Supermultiline Arrangement (Without Tandem Operation) 5

B. Multiline, Expanded Multiline, and Supermultiline Arrangement (With Tandem Operation) 6

C. Emergency Transmit Switch (Switching Main Station) 7

CHART	PAGE
2—L3 Carrier Receive Switches	8
A. Two-Line Arrangement	8
B. Multiline, Expanded Multiline, and Supermultiline Arrangement	9
3—L4 Carrier Transmit Switches (Multiline, Expanded Multiline, and Supermultiline)	11
A. Regular Transmit Switches	11
4—L4 Carrier Receive Switches (Multiline, Expanded Multiline, and Supermultiline)	13
A. Regular Receive Switches	13
B. Terminating Switch for a Regular Line (Multiline, Expanded Multiline, and Supermultiline)	15
5—Common Switch Removal (L3 or L4 Systems)	16

APPARATUS:

P2BJ Cords

368A Termination Plug (L3)

CHART 1

L3 CARRIER TRANSMIT SWITCHES

Some L3 systems may connect adjacent protection line sections together to form a protection line. This arrangement is referred to as tandem operation, and the combined protection lines can be used for emergency circuit restoration. For tandem operation, each switching main repeater station must be equipped with an emergency switch (223B), an emergency hybrid, and an emergency line connector. The 223B switch is mounted on the transmit side of the switching main repeater station in conjunction with the first regular line (Fig. 4). The emergency switching circuit features both automatic and manual control. Manual operations can be controlled either locally or remotely. The circuit also includes an override feature.

STEP	PROCEDURE
1	In the switching section under test, ensure that all switches (regular and protection) are normal.

CHART 1 (Contd)

STEP	PROCEDURE

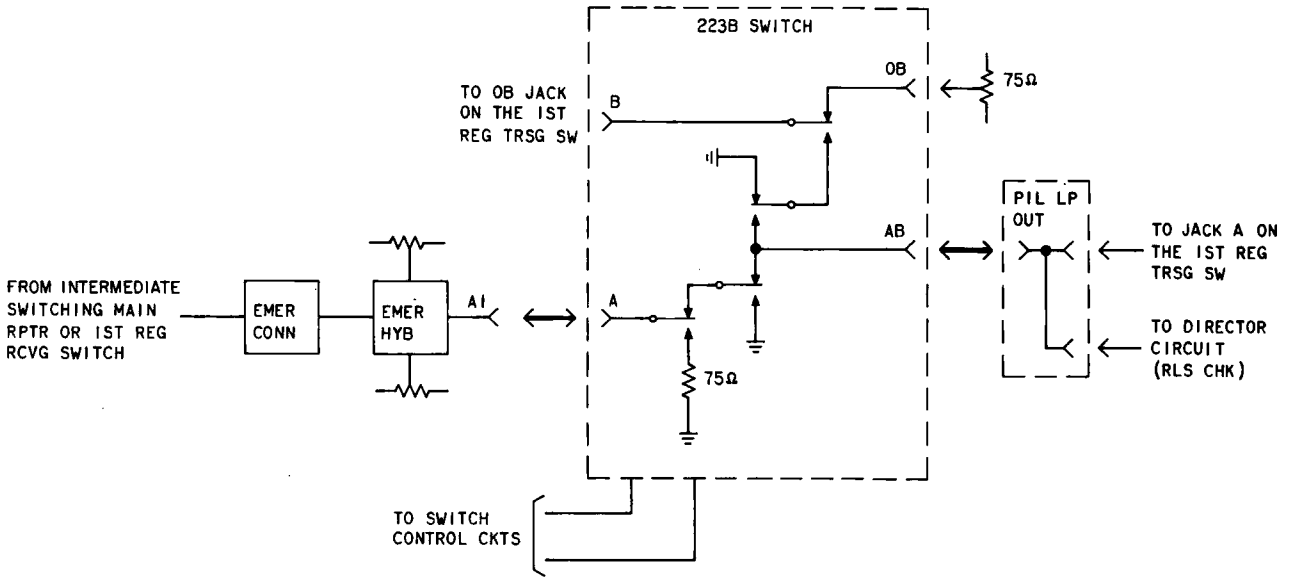

Fig. 4—Emergency Restoration Circuit at a Switching Main Station

Requirement: Lamps in the miscellaneous bay and the OUT SERV lamp (receive bay) are extinguished.

2 Coordinate test with each end of the switching section under test.

3 At the receive end of the switching section, lock normal the switching system for the switching section by simultaneously depressing the MSTR and LOCK NORM keys.

Requirement 1: LOCK NORM lamp lights (miscellaneous bay).

Requirement 2: OUT SERV lamp lights (protection line receiving bay).

4 Proceed to Step 5 for a switching main or terminal main station with multiline, expanded multiline, and supermultiline arrangement (without tandem operation). Proceed to Step 14 for a terminal main station with multiline, expanded multiline, and supermultiline arrangement (with tandem operation) or Step 24 for an emergency transmit switch at a switching main station.

A. Multiline, Expanded Multiline, and Supermultiline Arrangement (Without Tandem Operation)

5 At the transmit terminal (miscellaneous bay), insert a patch cord between the multiple B1 jack of the first regular line to the multiple AB1 jack of the last regular line.

CHART 1 (Contd)

STEP	PROCEDURE
6	Remove the patch plugs from the defective transmit switch.
7	If the defective switch is in regular line 2 through 12, insert a 75-ohm termination plug into the B1 jack (Fig. 5). Otherwise, proceed to Step 8.
8	Replace the defective transmit switch (see Chart 5 for procedure).
9	If the defective switch has a 75-ohm termination plug in the OB jack, ensure that the plug is transferred to the new switch (Fig. 5).
10	If the defective transmit switch was removed from regular line 2 through 12, remove the 75-ohm termination plug from the B1 jack.
11	Restore the patch plugs to normal.
12	Remove the patch cord between the multiple B1 jack of the first regular line and the multiple AB1 jack of the last regular line.

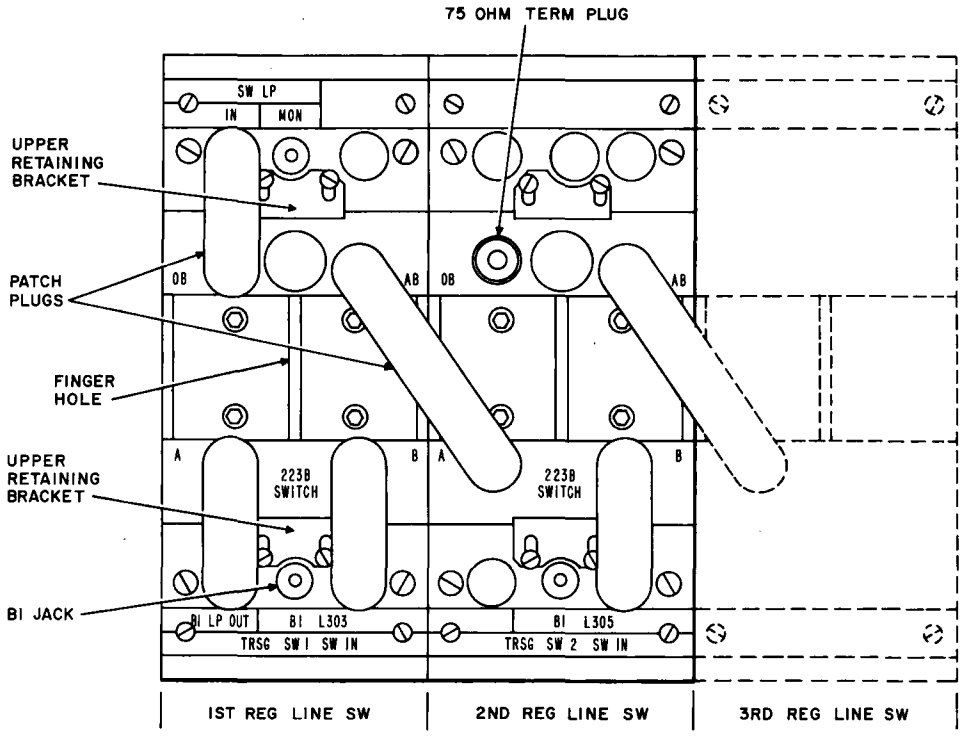

Fig. 5—Typical L3 Switch Arrangement at the Transmit End

CHART 1 (Contd)

STEP	PROCEDURE
13	At the receive terminal, simultaneously depress the MSTR and RLS keys. ***Requirement 1:*** LOCK NORM lamp extinguishes (miscellaneous bay). ***Requirement 2:*** OUT SERV lamp extinguishes (protection line receive bay).
	B. Multiline, Expanded Multiline, and Supermultiline Arrangement (With Tandem Operation)
14	At the receive terminal (miscellaneous bay), operate the PIL INS OVRD key to the OVRD position. ***Requirement:*** OVRD lamp lights (miscellaneous bay).
15	At the transmit terminal bay, associated with the line under test, insert a patch cord from the multiple EMER HYB NET jack to the multiple AB1 jack of the last regular line switch (miscellaneous bay).
16	Remove the patch plugs from the defective transmit switch.
17	If the defective switch is in regular line 1 through 12, insert a 75-ohm termination plug into the B1 jack (Fig. 5). Otherwise, proceed to Step 18.
18	Replace the defective transmit switch (see Chart 5 for procedure).
19	If the defective switch has a 75-ohm termination plug in the OB jack, ensure that the plug is transferred to the new switch (Fig. 5).
20	If the defective transmit switch was removed from regular line 1 through 12, remove the 75-ohm termination plug from the B1 jack.
21	Restore the patch plugs to normal.
22	At the transmit terminal bay, associated with the line under test, remove the patch cord from the multiple EMER HYB NET jack and the multiple AB1 jack of the last regular line switch (miscellaneous bay).
23	At the receive terminal, simultaneously depress the MSTR and RLS keys. ***Requirement 1:*** LOCK NORM lamp extinguishes (miscellaneous bay). ***Requirement 2:*** OUT SERV lamp extinguishes (protection line receive bay).

CHART 1 (Contd)

STEP	PROCEDURE
	C. Emergency Transmit Switch (Switching Main Station)
24	At the transmit terminal bay, associated with the line under test, insert a patch cord from the multiple EMER HYB NET jack to the multiple AB1 jack of the last regular line switch (miscellaneous bay) (Fig. 4).
25	At the transmit terminal, operate the PIL INS OVRD key to the OVRD position.
	Requirement: OVRD lamp lights (miscellaneous bay).
26	Remove the patch plug from the defective transmit switch.
27	Insert a 75-ohm termination plug into the B1 jack.
28	Replace the defective switch (see Chart 5 for procedure).
29	If the defective switch has a 75-ohm termination plug in the OB jack, ensure that the plug is transferred to the new switch (Fig. 5).
30	Restore the patch plugs to normal.
31	At the transmit terminal bay, associated with the line under test, remove the patch cord from the multiple EMER HYB NET jack to the multiple AB1 jack of the last regular line switch (miscellaneous bay).
32	At the transmit terminal, operate the PIL INS OVRD key to the NORM position.
	Requirement: OVRD lamp extinguishes (miscellaneous bay).
33	At the receive terminal, simultaneously depress the MSTR and RLS keys.
	Requirement 1: LOCK NORM lamp extinguishes (miscellaneous bay).
	Requirement 2: OUT SERV lamp extinguishes (protection line receive bay).

CHART 2

L3 CARRIER RECEIVE SWITCHES

STEP	PROCEDURE

A. Two-Line Arrangement

Note: This test can be performed at a terminal main station or at a switching main station.

1 At the receive end, lock normal the receive switch by performing the following procedure:

(a) Ensure that the switch is normal.

Requirement: The lamps in the miscellaneous bay and the receiving bay are extinguished.

(b) Simultaneously press the MSTR and LOCK NORM keys.

Requirement 1: The LOCK NORM lamp lights (miscellaneous bay).

Requirement 2: The OUT SERV lamp lights (protection line receiving bay).

Caution: To prevent system failure, the patch cord between the multiple A1 and the multiple AB1 jacks must be 2 feet maximum.

2 At the receive end (miscellaneous bay), patch the multiple A1 jack to the multiple AB1 jack using a maximum 2-foot cord (Fig. 6).

3 Remove the patch plug between B and B1, and insert a 75-ohm termination plug into the B1 jack.

4 Remove the patch plug from the defective switch.

5 Replace the defective switch (see Chart 5 for procedure).

Note: If the defective switch has a 75-ohm termination plug in the OB jack, ensure that the plug is transferred to the new switch.

6 Remove the 75-ohm termination plug from the B1 jack.

7 Restore the patch plugs to normal (Fig. 7).

8 Remove the patch cord between the multiple A1 and the multiple AB1 jacks.

9 Unlock the receive switch by simultaneously pressing the MSTR and RLS keys.

Requirement 1: The LOCK NORM lamp extinguishes (miscellaneous bay).

Requirement 2: The OUT SERV lamp extinguishes (protection line receiving bay).

CHART 2 (Contd)

STEP	PROCEDURE

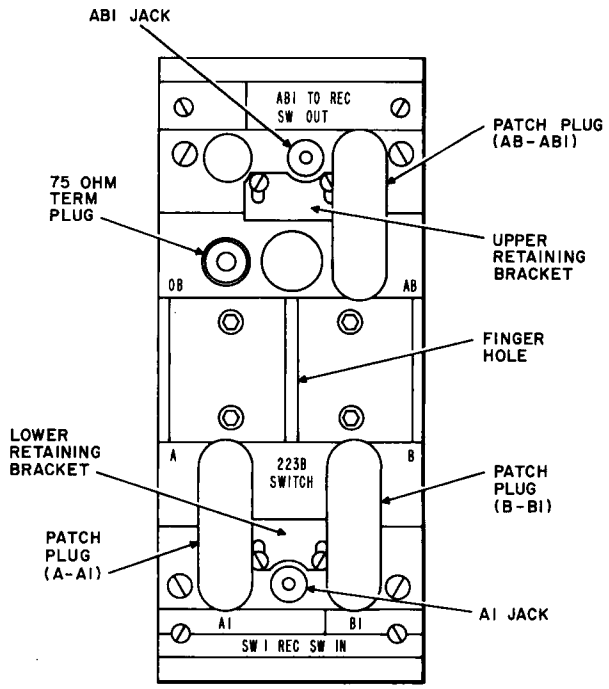

Fig. 6—Typical L3 Switch Arrangement at the Receive End (2-Line)

B. Multiline, Expanded Multiline, and Supermultiline Arrangement

Note 1: This test can be performed at a terminal main station or at a switching main station.

Note 2: If the switching section under test is equipped with tandem operation, manually operate the emergency switch which is located at the associated transmit end.

10 At the receive end, lock normal all switches associated with the switch to be removed by performing the following procedure:

(a) Ensure that all switches are normal.

Requirement: The lamps in the miscellaneous bay and the receiving bay are extinguished.

(b) Simultaneously press the MSTR and LOCK NORM keys.

Requirement 1: The LOCK NORM lamp lights (miscellaneous bay).

CHART 2 (Contd)

STEP	PROCEDURE

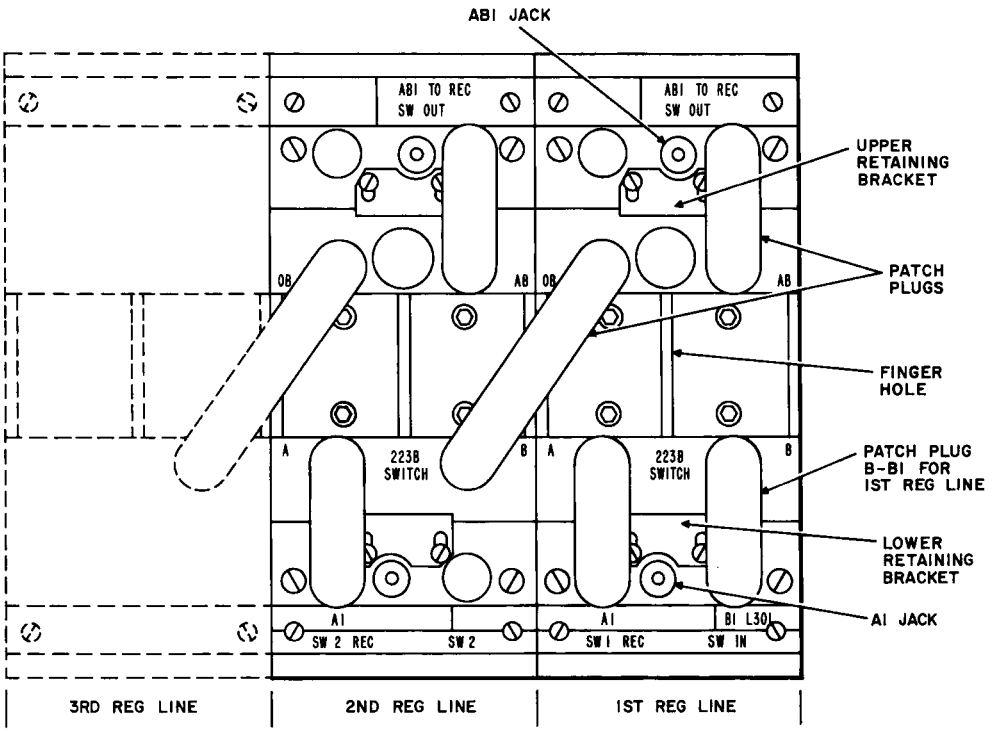

Fig. 7—Typical L3 Switch Arrangement at the Receive End

Requirement 2: The OUT SERV lamp lights (protection line receiving bay).

11 At the receive end (miscellaneous bay), insert a patch cord from the multiple A1 jack to the multiple AB1 jack of the defective switch (Fig. 7).

12 Remove the patch plug between the B and B1 jacks of the ***first regular line*** (Fig. 7), and insert a 75-ohm termination plug in the B1 jack.

13 Remove the patch plugs from the defective switch.

14 Replace the defective switch (see Chart 5 for procedure).

Note: If the defective switch has a 75-ohm termination plug in the OB jack, ensure that the plug is transferred to the new switch.

CHART 2 (Contd)

STEP	PROCEDURE
15	Restore the patch plugs to normal.
16	Remove the 75-ohm termination plug from the B1 jack of the ***first regular line,*** and ***immediately*** replace the patch plug between the B and B1 jacks.
17	Remove the patch cord between the multiple A1 and multiple AB1 jacks.
18	Unlock the receive switch by simultaneously pressing the MSTR and RLS keys. ***Requirement 1:*** The LOCK NORM lamp extinguishes (miscellaneous bay). ***Requirement 2:*** The OUT SERV lamp extinguishes (protection line receiving bay).

CHART 3

L4 CARRIER TRANSMIT SWITCHES
(MULTILINE, EXPANDED MULTILINE, AND SUPERMULTILINE)

STEP	PROCEDURE
	A. Regular Transmit Switches ***Note:*** This test can be performed at a terminal repeater station or at a main station.
1	Set up a talk path with the receive end.
2	Request that the personnel at the receive end lock normal the associated receive switches by using the following procedure: (a) Ensure that all switches are normal. ***Requirement 1:*** The lamps in the control connecting bay are extinguished. ***Requirement 2:*** The OUT SERV lamp in the protection line receiving bay is extinguished (lamp is on the HYB & M PNL). (b) Simultaneously press the MSTR and LOCK NORM keys located in the control connecting bay. ***Requirement 1:*** The LOCK NORM lamp lights (control connecting bay). ***Requirement 2:*** The OUT SERV lamp lights (protection line receiving bay).

CHART 3 (Contd)

STEP	PROCEDURE
3	At the transmit end, patch the multiple (spare) TRMTG HYB OUT B jack to the multiple AB1 jack of the last regular line. ***Note:*** The TRMTG HYB OUT B jack is located in the transmitting bay; the AB1 jack is located in the control connecting bay.
4	Remove the patch plugs from the defective transmit switch.
5	At the defective transmit switch, insert the 75-ohm termination plug into the B1 jack (Fig. 8).
6	Replace the defective switch (see Chart 5 for procedure). ***Note:*** If the defective switch has a 75-ohm termination plug in the OB jack, ensure that the plug is transferred to the new switch.
7	Remove the 75-ohm termination plug from the B1 jack.
8	Restore the patch plugs to normal.

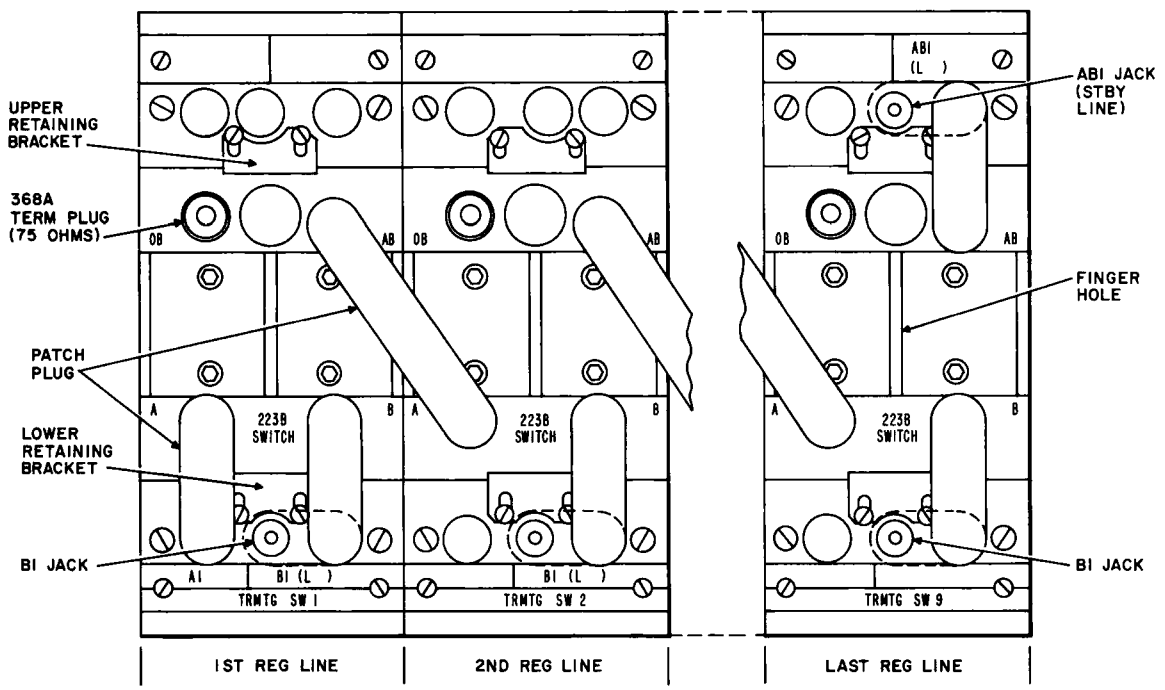

Fig. 8—Typical L4 Switch Arrangement at the Transmit End

CHART 3 (Contd)

STEP	PROCEDURE
9	At the transmit end, remove the patch cord between the multiple TRMTG HYB OUT B and AB1 jacks of the last regular line.
10	Request that the personnel at the receive end unlock all regular lines by simultaneously pressing the MSTR and RLS keys.
	Requirement 1: The LOCK NORM lamp extinguishes (control connecting bay).
	Requirement 2: The OUT SERV lamp extinguishes (HYB & M PNL in receiving bay).

CHART 4

L4 CARRIER RECEIVE SWITCHES
(MULTILINE, EXPANDED MULTILINE, AND SUPERMULTILINE)

STEP	PROCEDURE
	Note: This test can be used at a terminal repeater station or at a main station.
	A. Regular Receive Switches
1	At the receive end, lock all switches associated with the switch to be removed by performing the following procedure:
	(a) Ensure that all switches are normal.
	Requirement 1: The lamps in the control connecting bay are extinguished.
	Requirement 2: The OUT SERV lamp in the protection line receiving bay is extinguished (the lamp is on the HYB & M PNL).
	(b) Simultaneously press the MSTR and LOCK NORM keys located in the control connecting bay.
	Requirement 1: The LOCK NORM lamp lights (control connecting bay).
	Requirement 2: The OUT SERV lamp lights (protection line receiving bay).
	Caution: To prevent system failure, the patch cord between the multiple A1 and the multiple AB1 jacks must be 2 feet maximum.

CHART 4 (Contd)

STEP	PROCEDURE
2	At the receiving end, patch the multiple A1 jack to the multiple AB1 jack of the defective switch using a maximum 2-foot cord (Fig. 9).
	Note: These jacks and switches are located in the control connecting bay.
3	Remove the patch plug between the B and B1 jacks of the ***first regular line.***
4	Place a 75-ohm termination plug in the B1 jack (Fig. 9).
5	Remove the patch plugs from the defective switch.
6	Replace the defective switch (see Chart 5 for procedures).
7	Remove the 75-ohm termination plug from the B1 jack of the ***first regular line,*** and ***immediately*** replace the patch plug between the B and B1 jacks.
8	Restore the patch plugs to normal.
9	Remove the patch cord between the multiple A1 and AB1 jacks.
10	Unlock the receive switch by simultaneously pressing the MSTR and RLS keys.

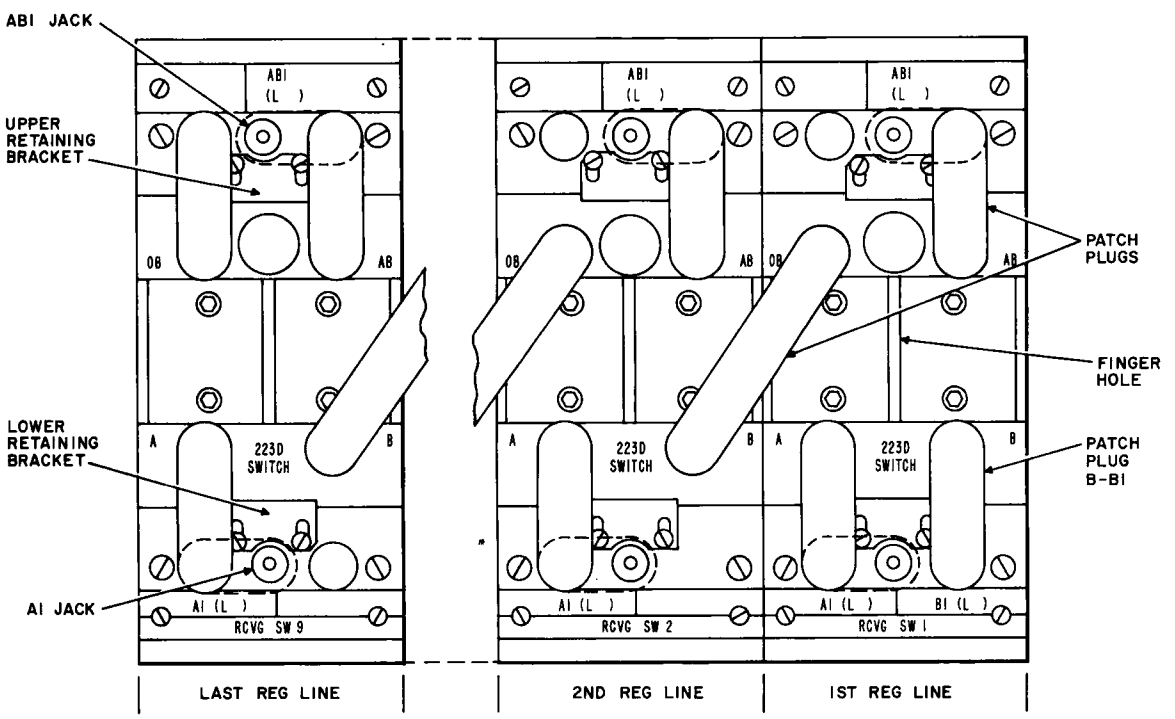

Fig. 9—Typical L4 Switch Arrangement at the Receive End

CHART 4 (Contd)

STEP	PROCEDURE

Requirement 1: The LOCK NORM lamp extinguishes (control connecting bay).

Requirement 2: The OUT SERV lamp extinguishes (protection line receiving bay).

B. Terminating Switch for a Regular Line (Multiline, Expanded Multiline, and Supermultiline)

Note: The following test can be used at a terminal repeater station or at a main station.

11 At the receive end, lock normal all switches associated with the switch to be removed by performing the following procedure:

(a) Ensure that all switches are normal.

Requirement 1: The lamps in the control connecting bay are extinguished.

Requirement 2: The OUT SERV lamp in the protection line receiving bay is extinguished (the lamp is on the HYB & M PNL).

(b) Simultaneously press the MSTR and LOCK NORM keys located in the control connecting bay.

Requirement 1: The LOCK NORM lamp lights (control connecting bay).

Requirement 2: The OUT SERV lamp lights (protection line receiving bay).

12 At the receive end (control connecting bay), insert a patch cord from the multiple A1 jack to the multiple AB1 jack of the defective switch (Fig. 10).

13 Remove the patch plugs from the defective switch.

14 Replace the defective switch (see Chart 5 for procedure).

15 Remove the 75-ohm termination plugs from the defective switch (OA and B jacks) and insert into the new switch (OA and B jacks).

16 Restore the patch plugs to normal.

17 Remove the patch cord between the multiple A1 and AB1 jacks.

18 Unlock the receive switch by simultaneously pressing the MSTR and RLS keys.

Requirement 1: The LOCK NORM lamp extinguishes (control connecting bay).

Requirement 2: The OUT SERV lamp extinguishes (protection line receiving bay).

STEP	PROCEDURE

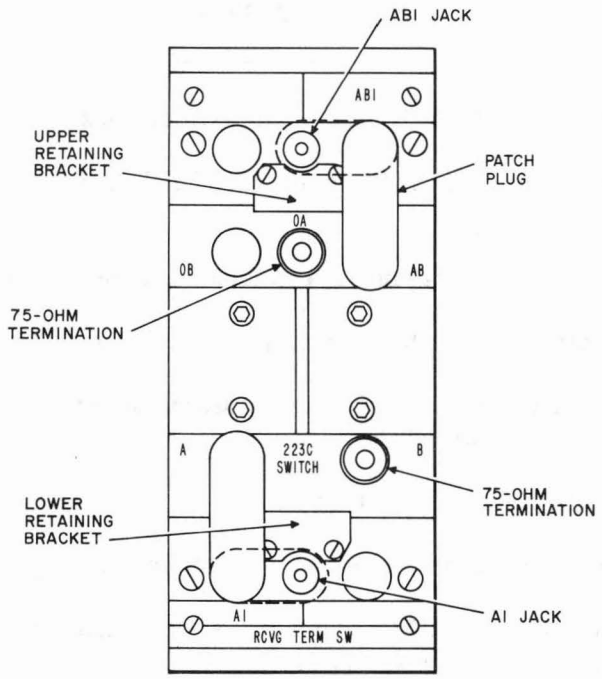

Fig. 10—Receiving Line Terminating Switch

CHART 5

COMMON SWITCH REMOVAL (L3 OR L4 SYSTEMS)

STEP	PROCEDURE

Caution: Before performing the following procedure, patch around the switch to be removed as described in Charts 1, 2, 3, and 4.

1 Loosen the two screws which hold the upper retaining bracket.

2 Slide the bracket up and retighten one of the screws to hold the bracket in place.

3 Loosen the two screws which hold the lower retaining bracket and slide the bracket down.

4 Pull the switch forward by using the fingerhole in the center of the switch.

5 Place the new switch in the vacant position.

CHART 5 (Contd)

STEP	PROCEDURE
6	Loosen the screw holding the upper retaining bracket and slide the bracket over the edge of the new switch.
7	Secure the bracket by tightening the screws.
8	Slide the lower bracket over the edge of the switch and tighten the screws.
9	Replace the patch plugs.