

DSX-1, DSX-1C, AND DSX-2 PATCH AND CROSS-CONNECT GENERAL DESCRIPTION DIGITAL TRANSMISSION SYSTEMS

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1. GENERAL

1.01 The term DSX, which is used throughout this practice, is the common term for digital system cross-connect bays. This practice contains a general description of the DSX for the DS1 (1.544 Mb/s),

DS1C (3.152 Mb/s), and DS2 (6.312 Mb/s) digital transmission systems. These bays are identified as the DSX when describing a feature common to all three bays and as the DSX-1, DSX-1C, or DSX-2 when describing exclusive features.

1.02 This practice is being reissued to:

- Add information on the clock test jack
- Add information on the intra-office repeater (IOR) shelf
- Add information on the 800 Series DSX
- Change Figures 8, 9, 10, 11, and 16
- Add Figure 18.

Revision arrows are used to emphasize the more significant changes. Equipment test lists are not affected.

1.03 ♦ Technical assistance for the DSX can be obtained by calling the Regional Technical Assistance Center at 1-800-225-RTAC. This telephone number is staffed 24 hours a day.♦

1.04 The DSX provides a connection point between two types of digital transmission equipment. The DSX also provides jack access to the transmission paths of the connected equipment. The jacks permit testing, looping, patching, and rerouting (rolling) transmission paths.

1.05 ♦ For large metropolitan exchange or toll offices, a more flexible application of back-to-back DSX-1 installations can be realized with the use of the J98725BA-1 IOR bay. The repeater allows the extension of the distance between DSX-1s, even to other buildings. Detailed information on the J98725BA-1 IOR is contained in AT&T 365-200-102.

1.06 A replacement for, or addition to, current DSX equipment is the 800 series DSX. The 800 series DSX with increased circuit termination density, and other circuit improvements is a more cost efficient application and is totally compatible with current DSX equipment. Detailed information on the 800 series DSX is contained in AT&T 365-301-102.¶

1.07 The following equipment may be associated with a DSX lineup:

- Bridging repeaters
- Special jacks
- Quasi-random signal source (QRSS) for DSX-1 or DSX-1C bays
- Auxiliary maintenance line (AML) panels
- Maintenance panels
- T1 line monitor for DSX-1 bays
- Interbay patch panel
- Maintenance line status indicator (MLSI) interface X-CONN terminal strip assembly
- Communications panels
- Writing shelf
- Conversion bays for DSX-1 and DSX-1C bays

1.08 This practice provides a:

- Physical description of bays, panels, and lineups
- Functional description of a basic cross-connection
- Brief description of associated equipment.

2. PHYSICAL DESCRIPTION

2.01 The DSX bays are 26 or 31 inches wide and 7, 9, or 11 feet 6 inches high. Code ED-1C543-10 includes all 31-inch wide bays. Code ED-2C543-10 includes all 26-inch wide bays. Both ED-coded bays provide space for running jumper wire horizontally to the top and bottom of the bay. Space for running cable vertically is outside the uprights on ED-1C543-10 bays

(Fig. 1) and inside and outside the uprights on ED-2C543-10 bays (Fig. 2).

2.02 All wire terminations in the DSX are hard wired (wire wrapped). *Solder connections are not allowed.* Cables are run through cable rings on the rear of ED-1C544-30 G() shelves or on the rear of the ED-2C543-10 uprights and in a cable duct at the bottom of the bay. To minimize congestion and to use the shortest path, they should be run over a planned path. Cables can be run within or between DSX bays; however, the length limits called for on SD-99503-01 must be followed. Typical cross-connect runs within and between bays are shown in Fig. 1 and 2.

2.03 Each bay has a 2-inch high fuse and alarm panel as the top panel in the bay. The ED codes for alarm panels are ED-1C642-30, G1 for 31-inch wide bays and ED-1C642-30, G2 for the 26-inch wide bays. The fuse and alarm panel contains the main fuse and the 70-type distribution fuses (Fig. 3) which provide power to the TL circuits (one fuse per jack panel), bridging repeaters, regenerators, QRSS, telephone set circuit, etc., in the bay. A missing or blown tracer lamp fuse on the fuse and alarm panel creates a leakage path which causes all the lamps on the panel to light when one lamp is activated. Also, the lamps on other panels associated with these lamps will light. A blown fuse activates the FA lamp on the panel and the office minor alarm circuit.

2.04 The DSX panels which can be 17 or 23 inches wide mount in 26- or 31-inch wide bays, respectively. The DSX panels measure 2, 3, or 4 inches high with 12, 16, or 25 jack sets, respectively. Each jack set consists of an IN jack, OUT jack, MON jack, and TL lamp. All 17-inch wide panels are coded ED-2C544-30. All 23-inch wide panels are coded ED-1C544-30. Group numbers are used to identify panels of different heights or special jack arrangements within each ED code. Figures 4 and 5 show typical jack arrangements for DSX panels.

2.05 Each DSX panel has a designation strip along its lower edge to hold a designation card. Designation strips are also mounted on the bay uprights to hold record cards (Fig. 4 and 5). Designation cards are white for DSX-1, orange for DSX-1C, and pink for DSX-2 cross-connect panels. Designation cards are used to identify the equipment connected to the DSX. Record cards are for route identification.

2.06 Except for small offices, DSX bays are typically arranged in groups of four. Bays are provided in

fours because it is convenient to put most of the associated equipment listed in paragraph 1.07 in every fourth bay. Figures 6 and 7 show four bay arrangements for 26- and 31-inch wide bays, respectively. The P3BH patch cords are recommended for DSX patching operations. These cords are available in 3-, 6-, and 12-foot lengths. The length limits on the cords are one of the reasons for putting associated equipment such as QRSS jacks and interbay panels in every fourth bay.

2.07 In large and very large offices, it is necessary to arrange the bays in parallel rows instead of one long row. The general rule for arrangement is:

- 1-23 bays - one row
- 24-46 bays - two rows
- 47-66 bays - three rows.

3. FUNCTIONAL DESCRIPTION

3.01 Figures 8, 9, and 10 show the equipment types that may connect to a DSX-1, DSX-1C, and DSX-2 bays, respectively. Each separate equipment type will usually connect to a separate DSX panel or group of panels. The twisted pair carrying the signal from the equipment to the DSX bay connects to the OUT jack at the DSX bay. The twisted pair carrying the signal to the equipment from the DSX bay connects to the IN jack at the DSX bay.

3.02 A cross-connection is completed by hard wiring the MON, OUT, and IN jacks of one jack set to the MON, IN, and OUT jacks, respectively, of the other jack set. The connection between the MON jacks is to facilitate lighting the associated lamps. Cross-connections should be made in the following manner:

- (1) Determine the jack circuit at each end of the cross-connection.
- (2) Insert 258-type dummy plugs into the MON jacks associated with the jack circuits. The lighted TL lamps can be seen from the rear to help determine the path the jumper should take.

Warning: *Do not use 165C plugs since they can bend the ring spring of the MON jacks.*

- (3) Connect the permanent jumper as shown in Fig. 11 (DSX-1 and DSX-1C) or Fig. 12 (DSX-2). The shield must be grounded only at

the IN jack having the BL-BLW pair on the DSX-2 bay. Figures 13 and 14 show connections at the rear of typical jack sets.

3.03 Figure 15 illustrates a typical cross-connection between jacks on different lineups using the cross-aisle terminal assembly. The crossover from the OUT jack of a jack set in one lineup to the IN jack in another lineup is accomplished through cross-aisle wiring. The terminal blocks are interconnected by 609B cable. Y1 cross-connect wire interconnects the terminal blocks with the jack sets.

3.04 Single pair Y1 wire is used for QRSS connections and maintenance line (ML) connections to the MLSI cross-connect assembly.

3.05 The IN and OUT jacks disconnect the cross-connection when a plug is inserted into the jack. The patch cord is then electrically connected to the equipment tied to the jack. This feature allows two pieces of equipment to be connected together or disconnected quickly by using patch cords. Dummy or termination plugs may also be used to disconnect equipment.

3.06 The MON jack is electrically connected to the OUT jack through isolating resistors. The resistors prevent a patch cord in the MON jack from unduly affecting the signal on the OUT jack. Therefore, IN-SERVICE checks can be made by testing the signal at the MON jacks. The signal at the MON jack is 20 dB below the signal level at the OUT jack for DSX-1/1C and 30 dB below the signal level at the OUT jack for DSX-2 because of the resistors.

3.07 The MON jack is designed to connect ground to the tracer lamp (TL) when a patch cord is inserted. When one TL lights, the TL on the other jack set cross-connected to the first also lights. This feature provides a method for quickly locating connected jack sets.

3.08 Patch cords should normally be used with bridging repeaters, and should only be used as temporary connections. Patching with bridging repeaters is described in AT&T 365-301-103. Uses of patch cords are as follows:

Restoration - A working system connected to a failed transmission path (line) may be bridged to a maintenance line.

Rerouting - A working system may be bridged to a new transmission path, while the permanent connections are changed at the back of the panels.

Looping - Connect with one patch cord the IN jack to the OUT jack. This causes the connected system to send to itself. It is used for loopback testing when new equipment is installed.

3.09 Although patching will cause digital errors and reframing, the disturbance is usually short enough, when using bridging repeaters, to avoid loss of customer service by dropping calls. Whenever patch cords are used as temporary cross-connections, the length of the patch cords must not exceed the length specified on SD-99503 for the permanent cross-connections.

Note 1: Use only 100- to 110-ohm patch cords having shielded, stranded twisted-pair wire such as P3BH. P3BH cords are available in 3-, 6-, and 12-foot lengths.

Note 2: When large numbers of circuits are to be patched, lighted TL lamps should be limited to 50 by removing fuses from the fuse and alarm panel to extinguish TL lamps.

Caution: *Patching in-service lines directly from an OUT jack of one set to an IN jack of another set will cause service outages.*

3.10 For large scale cutovers, such as No. 4 ESS™ switch, preplanned routing is recommended. Then alternate circuit paths are patched in parallel with the existing hard-wired ones. The existing cross-connections are then removed and new wire-wrapped cross-connections are installed. At cutover, the patch cords are removed and service is transferred to the new circuits. Pretesting circuits prior to cutover is recommended.

4. ASSOCIATED EQUIPMENT

BRIDGING REPEATERS

4.01 Each DSX bay should have at least one assembly containing two bridging repeaters. T1 or T1C (also used for T1D) bridging repeaters are plugged into an ED-2C497-30 DSX-1/DSX-1C bridging repeater panel assembly. This assembly may be mounted at the bottom of the DSX-1 or DSX-1C bay or

immediately above the topmost jack panel. The DSX-1/DSX-1C bridging repeater panel is described in AT&T 365-301-103. T2 bridging regenerators are plugged into an ED-2C341-30, G2 mounting assembly which is installed in a V189A5T20 mounting plate located at the bottom of the DSX-2 bay.

4.02 A bridging repeater accepts a low level signal and transmits it at the DSX level. This allows tapping into a signal through isolation resistors in special jacks or through MON jacks so the original signal is unaffected by the tap. Bridging repeaters are used for patching and for special jacks such as the maintenance span line (MTCE SP LINE) or MTCE LINE and the bridge for network clock synchronizing (BRDG FOR NET CLK SYNC) jack. Bridging repeaters may be mounted in the DSX bays, miscellaneously near the DSX bays, or in the office repeater bays (ORB).

SPECIAL JACKS

4.03 Some DSX panels, used for normal service paths as described in Part 3, have provisions for one or two special jacks. These jacks are labeled MTCE LINE, MTCE SP LINE, BRDG FOR NET CLK SYNC, and CLOCK TEST. The jacks labeled MTCE LINE and MTCE SP LINE perform the same function.

4.04 The MTCE (SP) LINE jacks are connected to maintenance lines through the bridging repeaters at the office repeater bays. These jacks appear at jack 1 or jack 25 on 4-inch panels. When the maintenance line ends in an office, one such jack set is used and its IN jack is connected to a MON level QRSS signal. When the maintenance line continues on to the next office, two MTCE (SP) LINE jacks are cross-connected to complete the signal path between ORBs. A schematic of a typical MTCE (SP) LINE jack is shown in Fig. 16. When additional maintenance lines are needed, auxiliary maintenance lines are used. (See paragraph 4.08.)

4.05 The BRDG FOR NET CLK SYNC jack set connects to a reference DS1 or DS1C rate signal for timing synchronization. This type of synchronization is used for the No. 4 ESS switch, 5ESS® switch, and Digital Access and Cross-Connect Systems (DACs). Not more than two BRDG FOR NET CLK SYNC jacks should be used in an office for each of the above applications. The BRDG FOR NET CLK SYNC jack is connected between the normal cross-connect jacks (Fig. 11) as shown in Fig. 17.

4.06 **CLOCK TEST** jack provides jack access to the network clock circuit or the office clock circuit to synchronize portable test equipment. The schematic of the **CLOCK TEST** jack is shown in Fig. 18.4

QRSS

4.07 A J98710R, J98725AF, or J98725AK QRSS panel is mounted at the top of an ED-1C543-10 bay or the bottom of an ED-2C543-10 bay. The J98725AK QRSS panel may also be mounted at the top of an ED-2C543-10 bay. The J98710R QRSS panel is described in AT&T 103-493-104 while the other panels are described in AT&T 104-494-105. Output jacks are located on either communication or maintenance panels. A QRSS-to-ML interface assembly provides a bridge level signal for ten maintenance lines from each of eight QRSS outputs.

AUXILIARY MAINTENANCE LINE (AML) PANEL

4.08 The AML panel provides a method for converting any transmission line not being used for service into a maintenance line. These panels are 2 inches high. There are 10 AML jacks on 17-inch wide panels, and 12 AML jacks on 23-inch wide panels. Another configuration of these panels replaces the first two AML jacks with BRDG FOR NET CLK SYNC jacks.

4.09 The bridging repeater used with an AML jack will be mounted in the DSX lineup or mounted miscellaneous. Figure 19 shows a typical schematic diagram of an AML jack and how it connects on one side. The connection on the other side is IN to OUT and OUT to IN as in a normal maintenance line cross-connection. Signal plugs are installed in the IN and OUT jacks of the standard transmission set as a precaution against an unintentional interruption of the circuit.

MAINTENANCE PANELS

4.10 Maintenance panels, also called miscellaneous jack panels, have a variety of jack configurations. Figure 20 shows two possible maintenance panels. Any of the jacks shown may appear on a maintenance panel. A list of the jacks shown in Fig. 20 and a short description of each are as follows:

-48V TST or -48V TEST - Appearance of -48V office supply for test set use

DET - Detector lamp lights when remotely mounted T1 line monitor detects a failure

T1 MON - A jack used to connect a MON jack of a T1 line to a T1 line monitor test set using a P3BH patch cord

ASU RLS - Automatic standby unit release key for remotely releasing a T1 line monitor switch and **DET**

BR MON - A jack for testing the operation of the bridging repeater located in the ORB

FL - Fault-locating jacks including direction information T1-R1, T-R, TERMINATING, E, or W

QRSS - Provides a patch cord connection to a QRSS when equipped with a MON jack

BRDG RPTR - Jack access to a remotely mounted bridging repeater.

T1 LINE MONITOR

4.11 A T1 line monitor is a line monitor for long term monitoring of bipolar violations. The J98710T T1 line monitor may be mounted either miscellaneous or at the top of an ED-1C543-10 bay or at the bottom of an ED-2C543-10 bay. The T1 line monitor is described in AT&T 103-493-107.

INTERBAY PATCH PANEL

4.12 Interbay patch panels are used in DSX lineups to accommodate long patching distances. The cabling routes between these panels are shown in Fig. 21. The panels, faceplate, and schematic of one jack set are shown in Fig. 22.

4.13 To make a long distance patch, patch cords are plugged into OUT L and IN L on an interbay patch panel jack set. All normally connected jack sets to the right will be disconnected, and all normally connected jack sets to the left will have a lighted BSY lamp. Then patch cords are plugged into OUT R and IN R of a jack set with a lighted BSY lamp. The two sets of patch cords are now connected and all BSY lamps go out except those lamps on connected jacks between the patch cords, indicating that path is in use. Finally the patch cords connected to the interbay patch panels are connected to the regular DSX panel jack sets. Connections are made from MON to bridge IN,

then from bridge OUT to IN L or IN R, and from IN to OUT L or OUT R at each end of the patch.

MAINTENANCE LINE INTERFACE ASSEMBLY

4.14 An ED-2C503-31 ML interface assembly is a connection point between:

- ML jacks and QRSS input
- ML jacks and T-Carrier Administration System (TCAS) monitoring equipment.

One ML interface assembly is miscellaneously mounted at the end of each row of DSX bays. Each assembly is 18 inches wide by 2 inches high and contains four terminal strips.

COMMUNICATIONS PANELS

4.15 The communications panel is an auxiliary panel for the appearance of various voice communication circuits for maintenance purposes. Where a DSX extends for several bays in a line, a communication panel should appear in every fourth bay. The panel may be either a 4-inch 660 communications panel (ED-3C660-31, G11) (Fig. 23) or a 2-inch communications panel [(ED-2C544-30, G13) (Fig. 24) or (ED-1C544-30, G15) (Fig. 25)] with auxiliary circuits as required.

The ED-3C660-31 panel may connect to the order wire through a miscellaneously mounted relay panel or through an ED-2C544-30, G13 communications panel equipped with ED-2C544-30, G32 and G33 or G34 jacks. When the ED-3C660-31 communications panel is not used, the ED-2C544-30 communications panel may be used, with an ED-2C272-30, G2 TEL SET panel shown in Fig. 24, or the ED-1C544, G15 communication panel may be used with a miscellaneously mounted TEL SET, ED-2C272-30, G3.

(a) The 4-inch 660 communications panel (Fig. 23) is available with the following features:

- Rotary or touch-tone dialing
- On-hook
- Ringer
- Maintenance hold
- Remote jack-access (belt line)
- Office intercom access

- 2-wire order-wire access
- 4-wire key access for DS3 and DS4 communication via the SS3 System
- CMS rover connection or 4 ESS TTY connection
- Office battery to power portable test equipment.

(b) The ED-2C544-30, G12 (partially equipped) or ED-2C544-30, G13 (fully equipped, Fig. 24) or ED-1C544-30, G15 (equipped per local option, Fig. 25) communications panel is equipped with one or more of each of the following:

- Telephone set (with rotary dial mounted on the side of the bay) and telephone line jacks
- Dial line jacks
- Four-port conference bridge jacks
- Frame line [DSX-2 and ESS TEL (DSX-1)] jacks
- Order-wire jacks
- QRSS jacks
- QRSS MON jacks
- -48 volt test jacks to provide power for portable test equipment.

Note: If the DSX is equipped with the 4-inch 660-type communication panel, the QRSS jacks should be installed as part of the maintenance panel.

WRITING SHELF

4.16 A writing shelf may be installed in every fourth bay of a DSX lineup.

CONVERSION BAYS

4.17 In offices where T1 lines are converted to T1C or T1D lines, DSX jacks may also be converted from DSX-1 to DSX-1C jacks. Although panels should be all DSX-1 or DSX-1C, this is not always possible. The TL lamp for each jack set identifies the type of jack set. Unlabeled lamps are for T1 jacks; lamps labeled C are for T1C jacks; and lamps labeled D are for T1D

jacks. All lamps are white. Older blue lamps have been discontinued because they were not bright enough. Once a DSX-1 panel has been completely converted to a DSX-1C panel, an orange designation strip should replace the white one.

ISSUING ORGANIZATION

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BAY INSTALLATION FOR 25 IN. PANELS

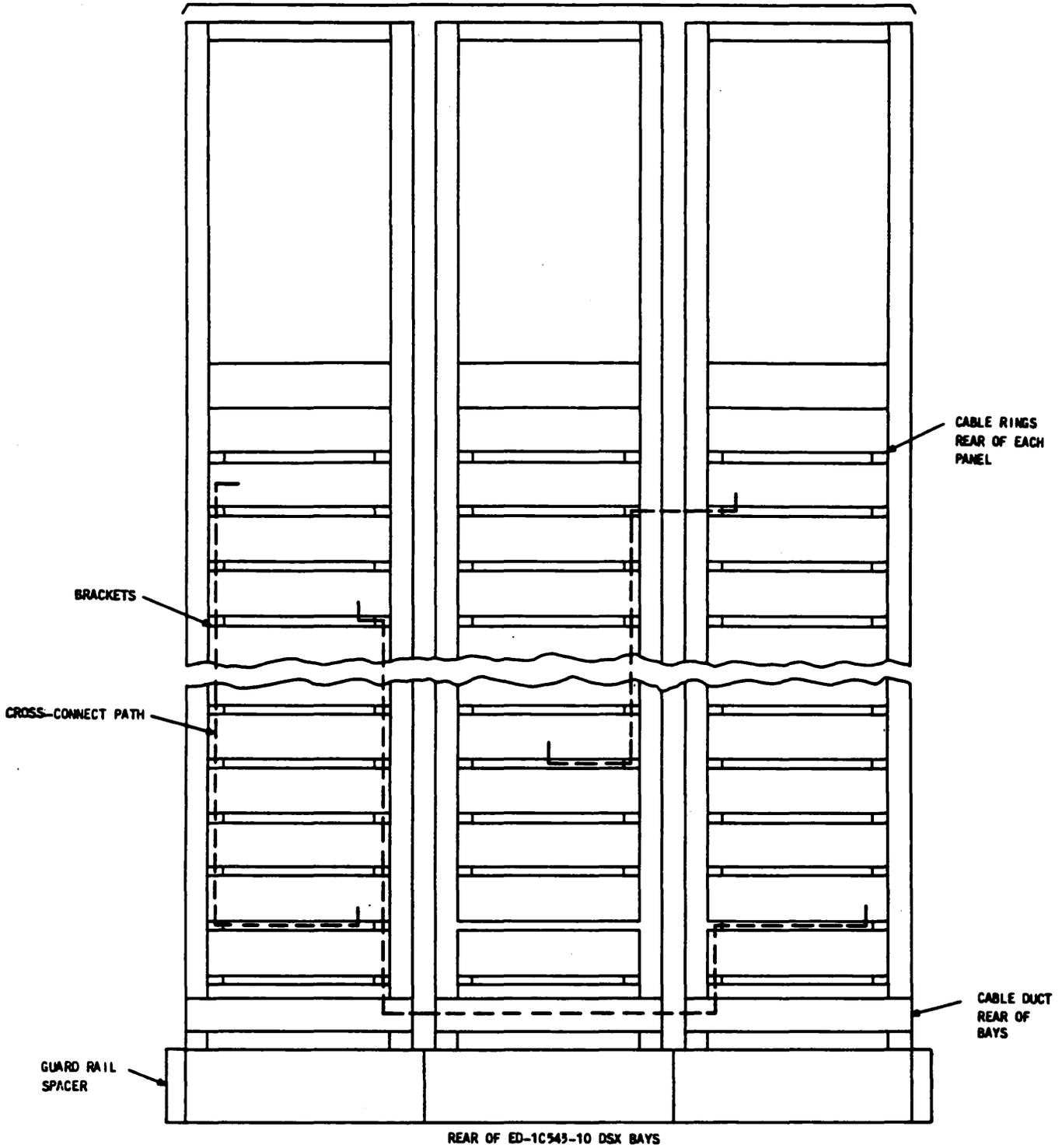


Figure 1—Typical Cross-Connect Runs for 31-Inch Bays

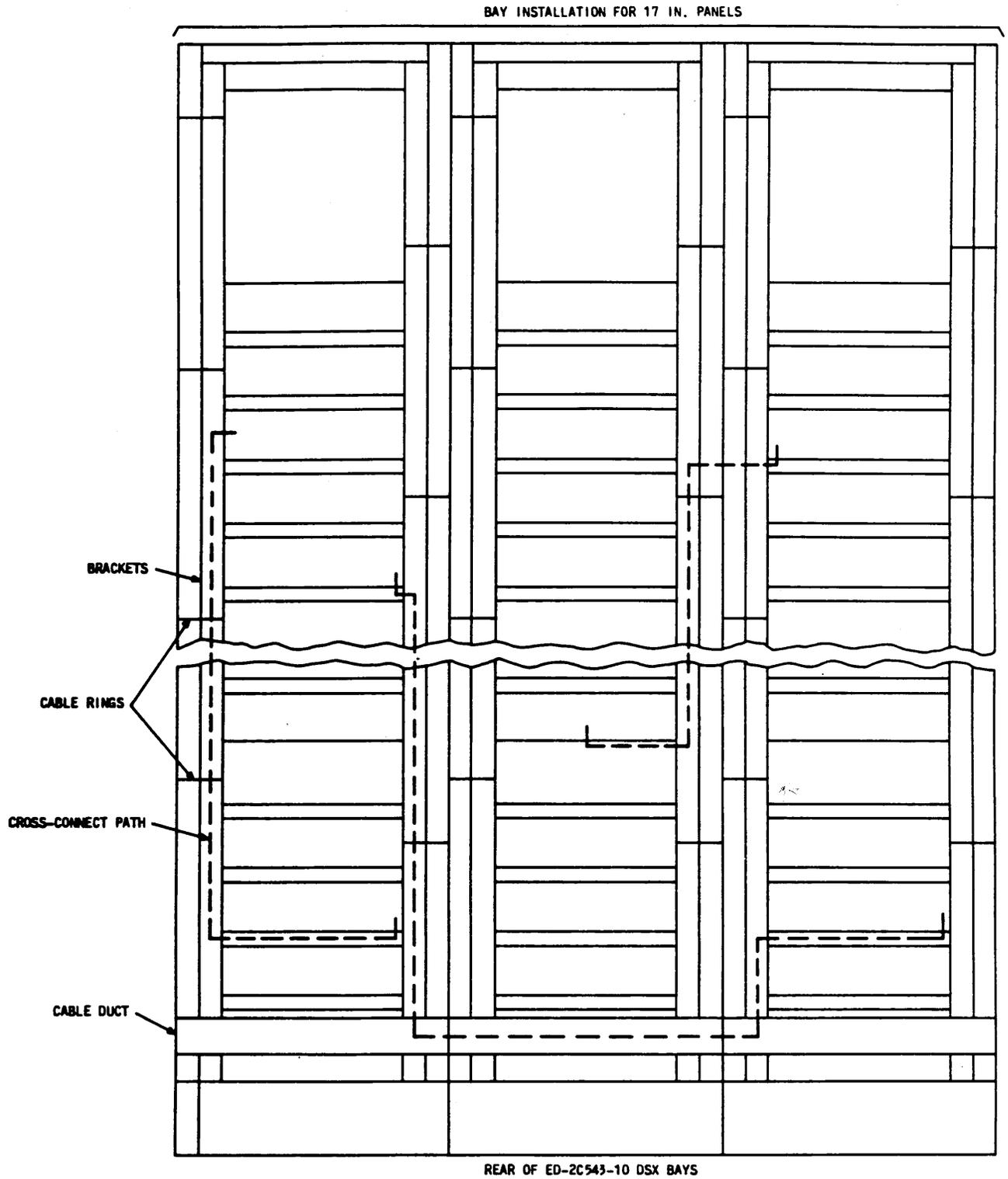


Figure 2—Typical Cross-Connect Runs for 26-Inch Bays

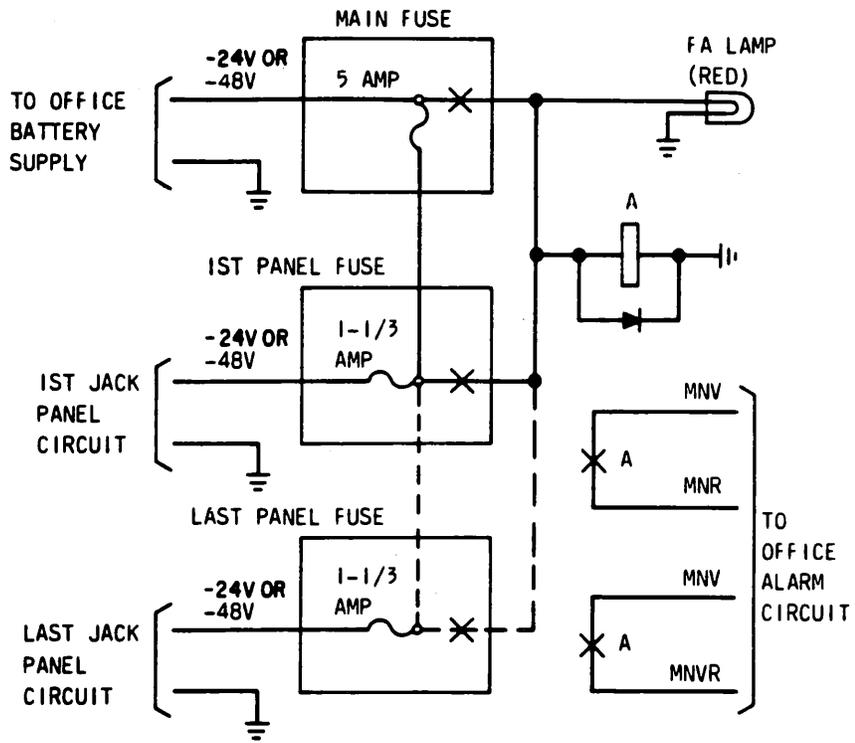


Figure 3—Fuse Circuit

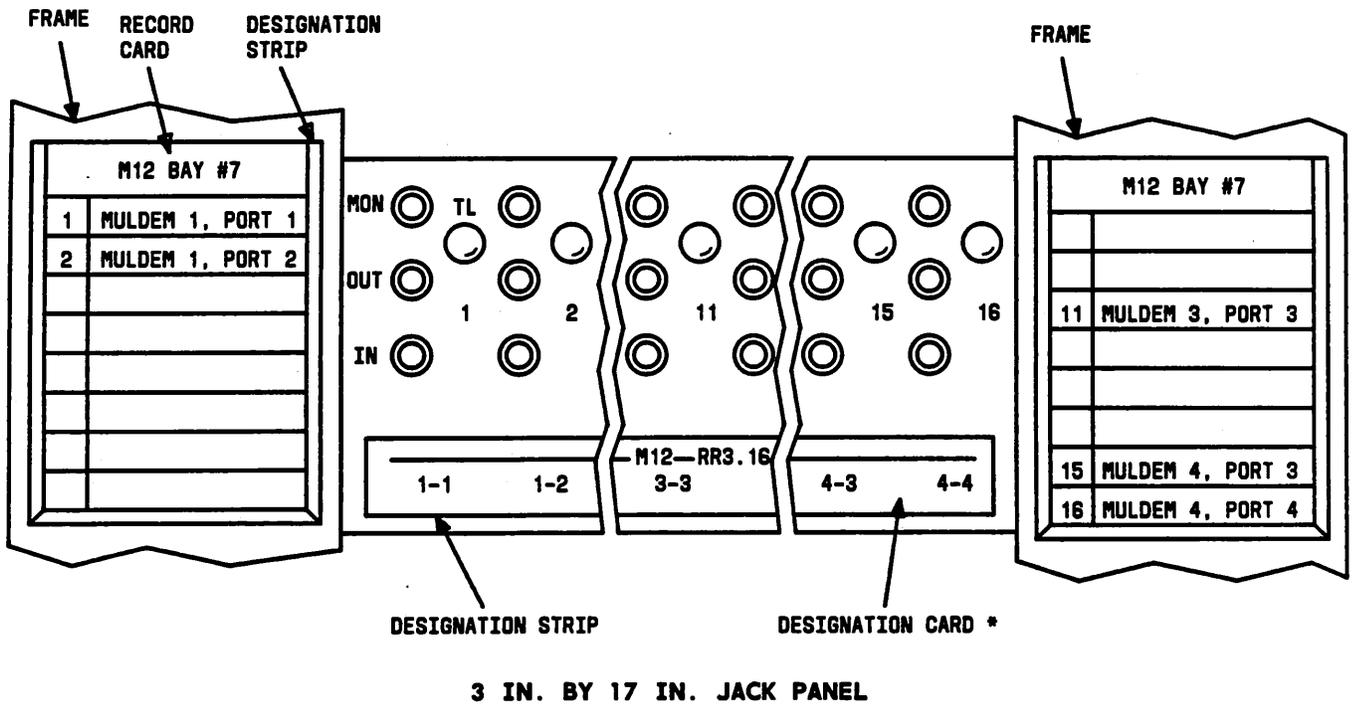
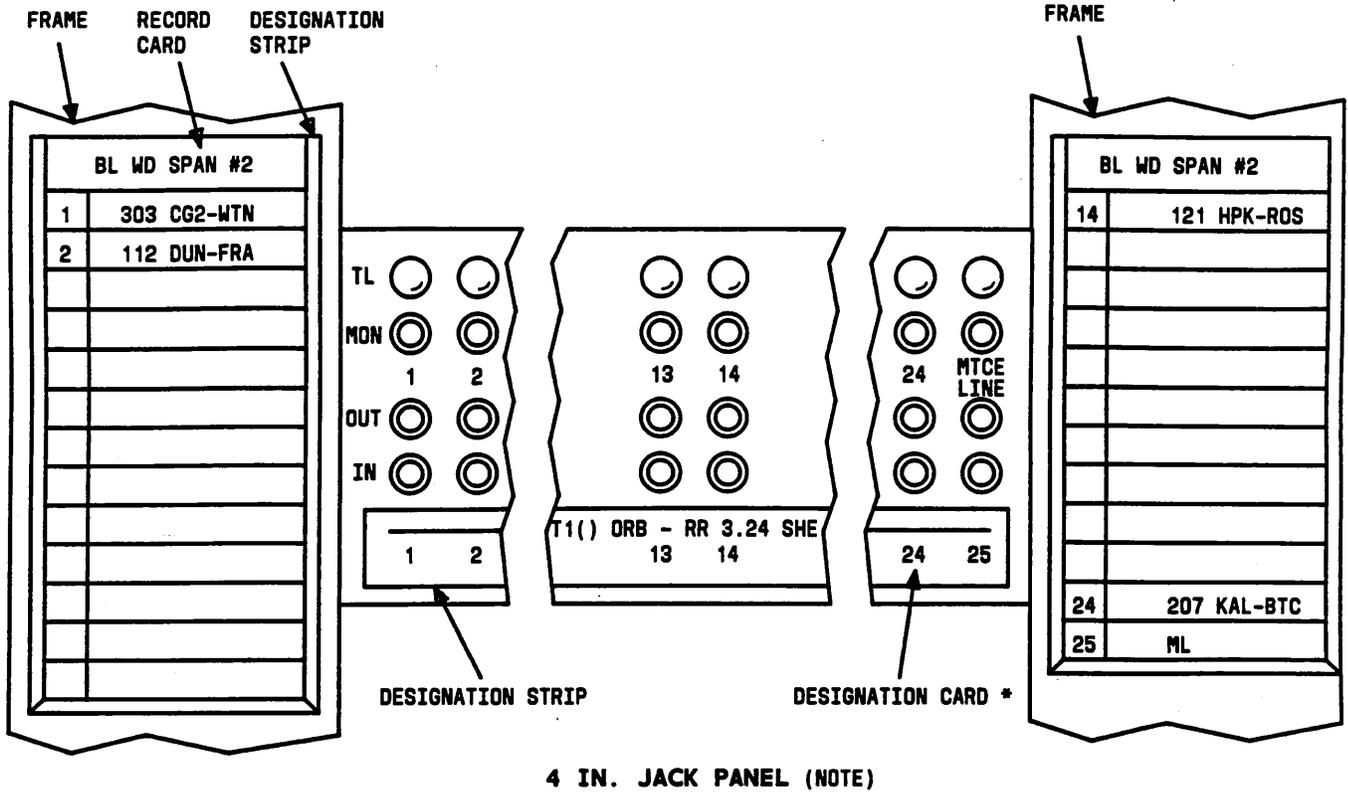
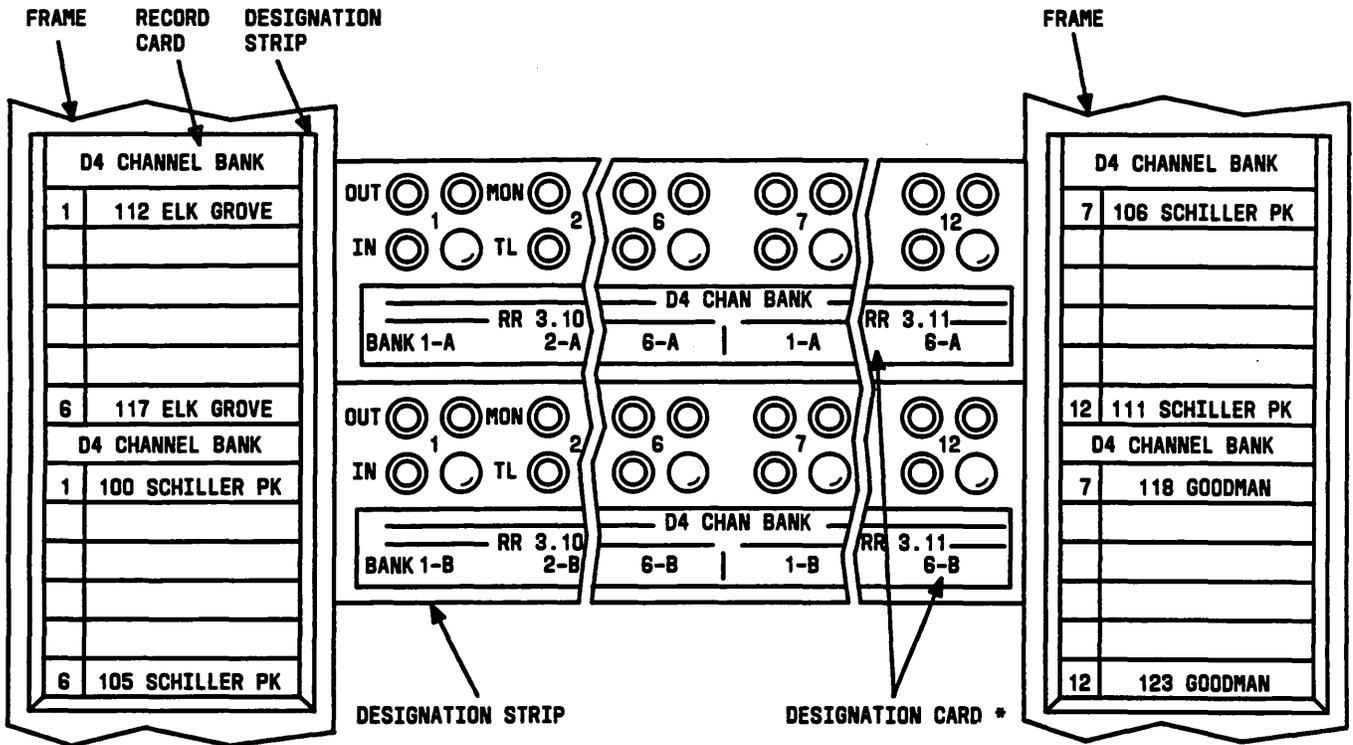
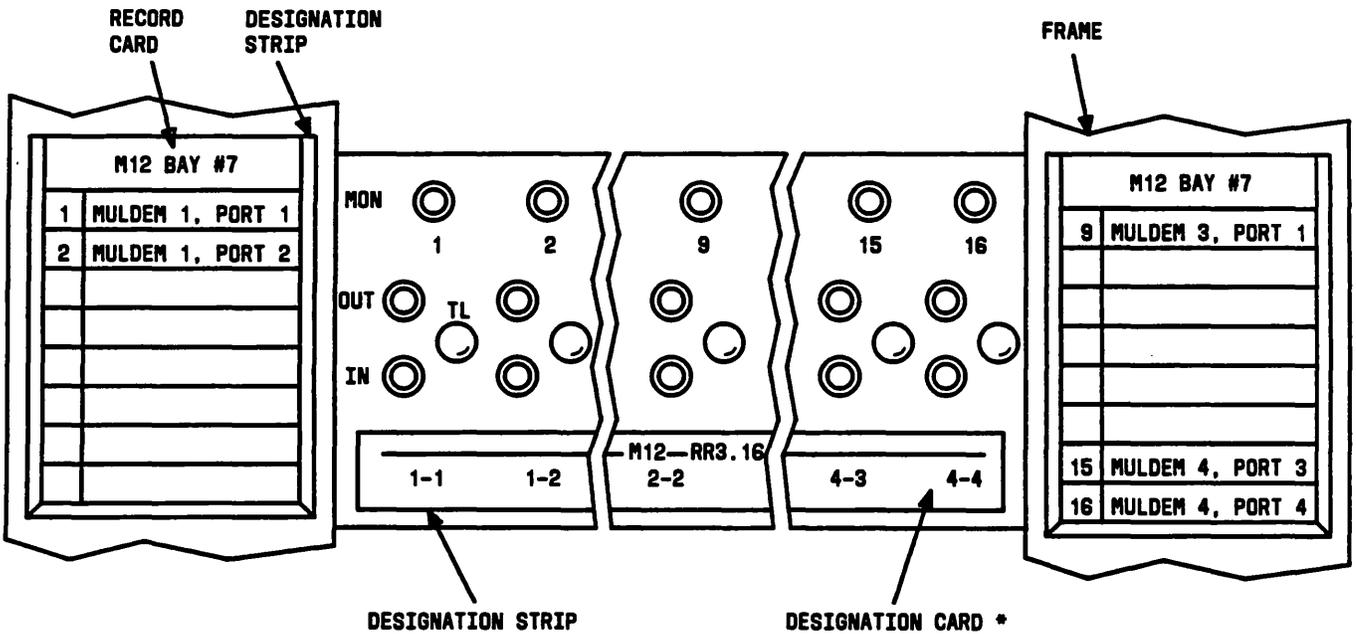


Figure 4—Typical 4-inch by 17- or 23-inch and 3-inch by 23-inch Jack Panels



2 IN. JACK PANEL (NOTE)



3 IN. BY 17 IN. JACK PANEL

Figure 5—Typical 2-inch by 17- or 23-inch and 3-inch by 17-inch Jack Panels

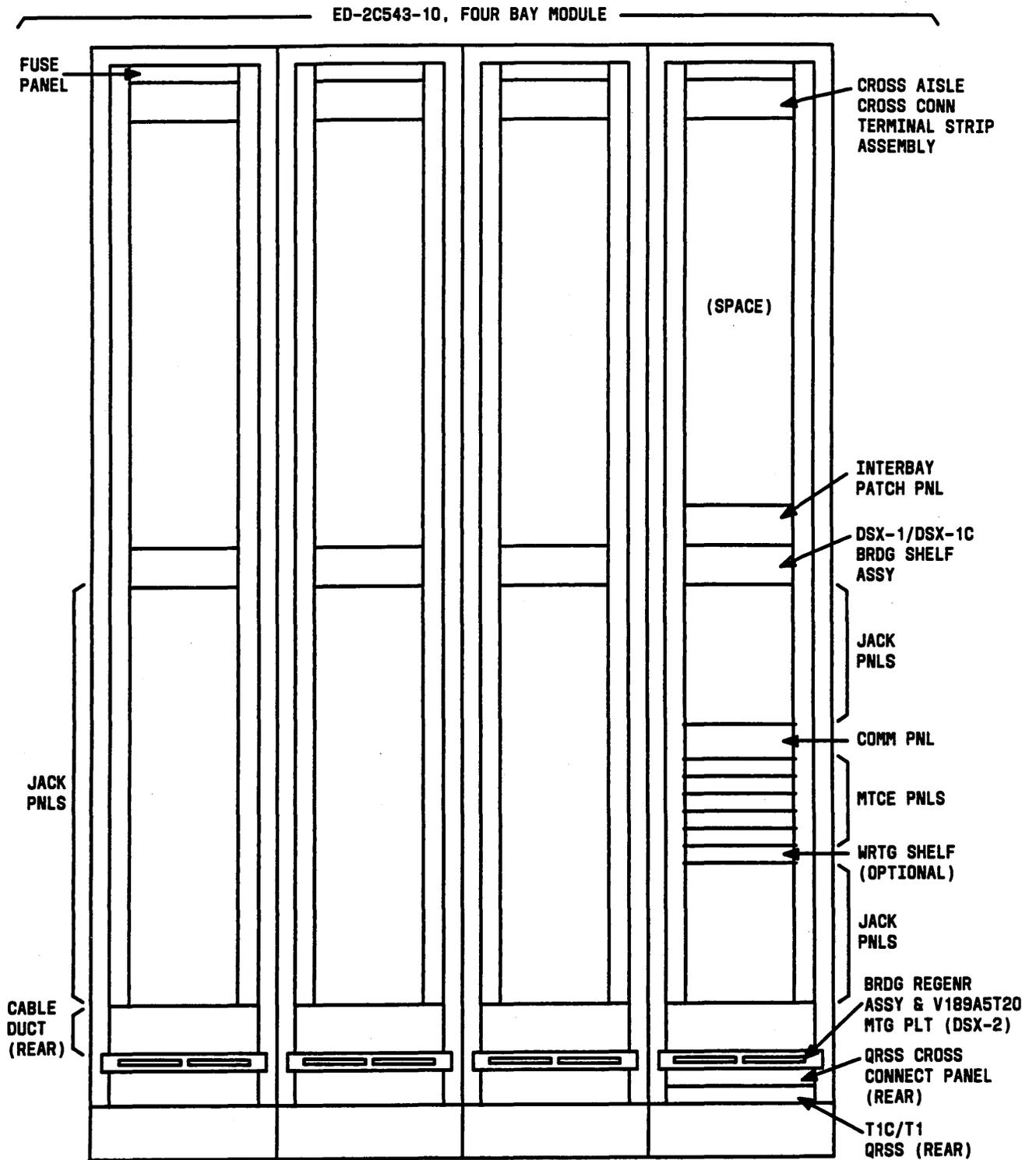


Figure 6—4-Bay DSX Module (11-Foot 6-Inch by 26-Inch Bays)

ED-1C543-10, FOUR BAY MODULE

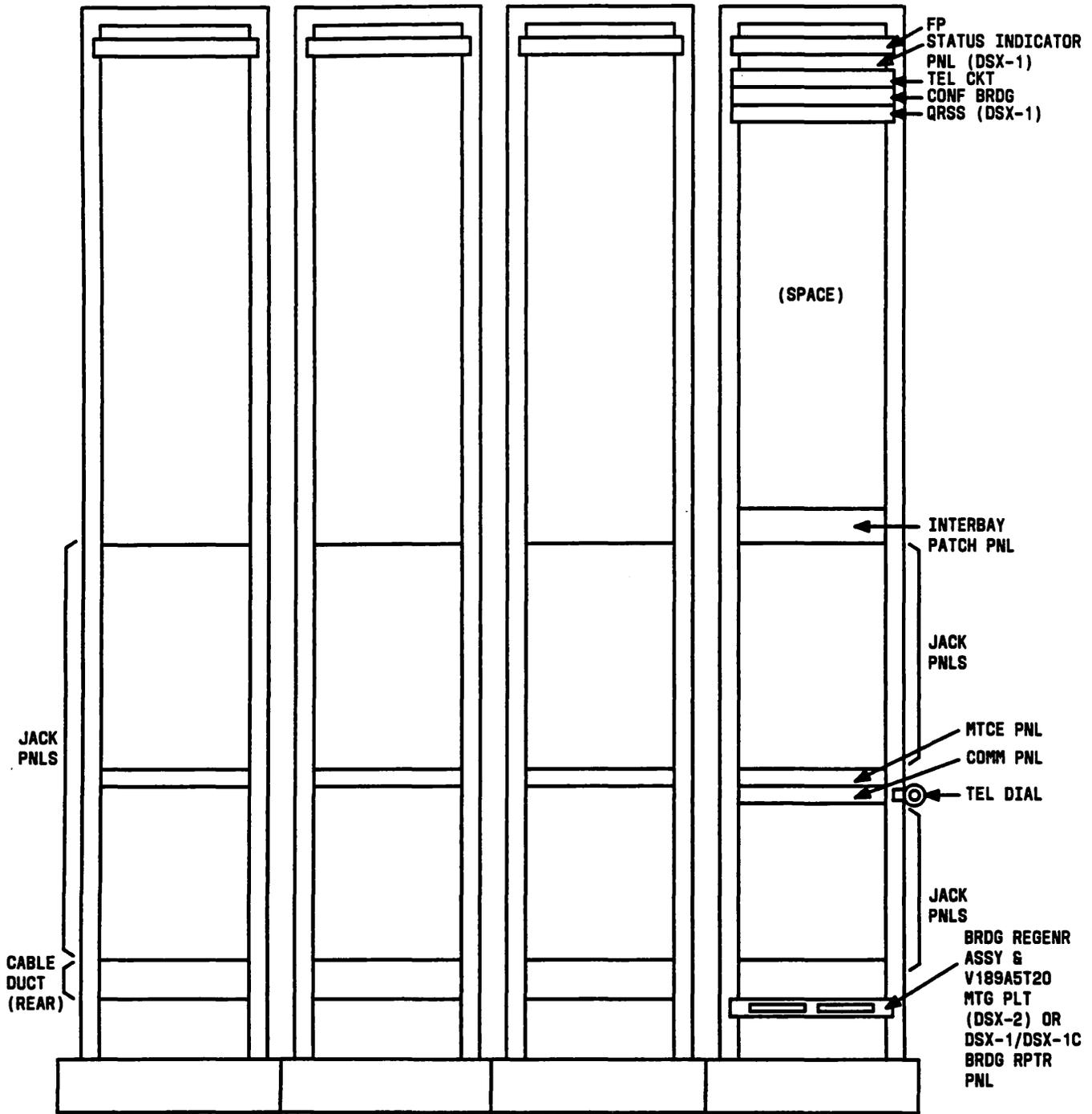


Figure 7—4-Bay DSX Module (11-Foot 6-Inch by 31-Inch Bays)

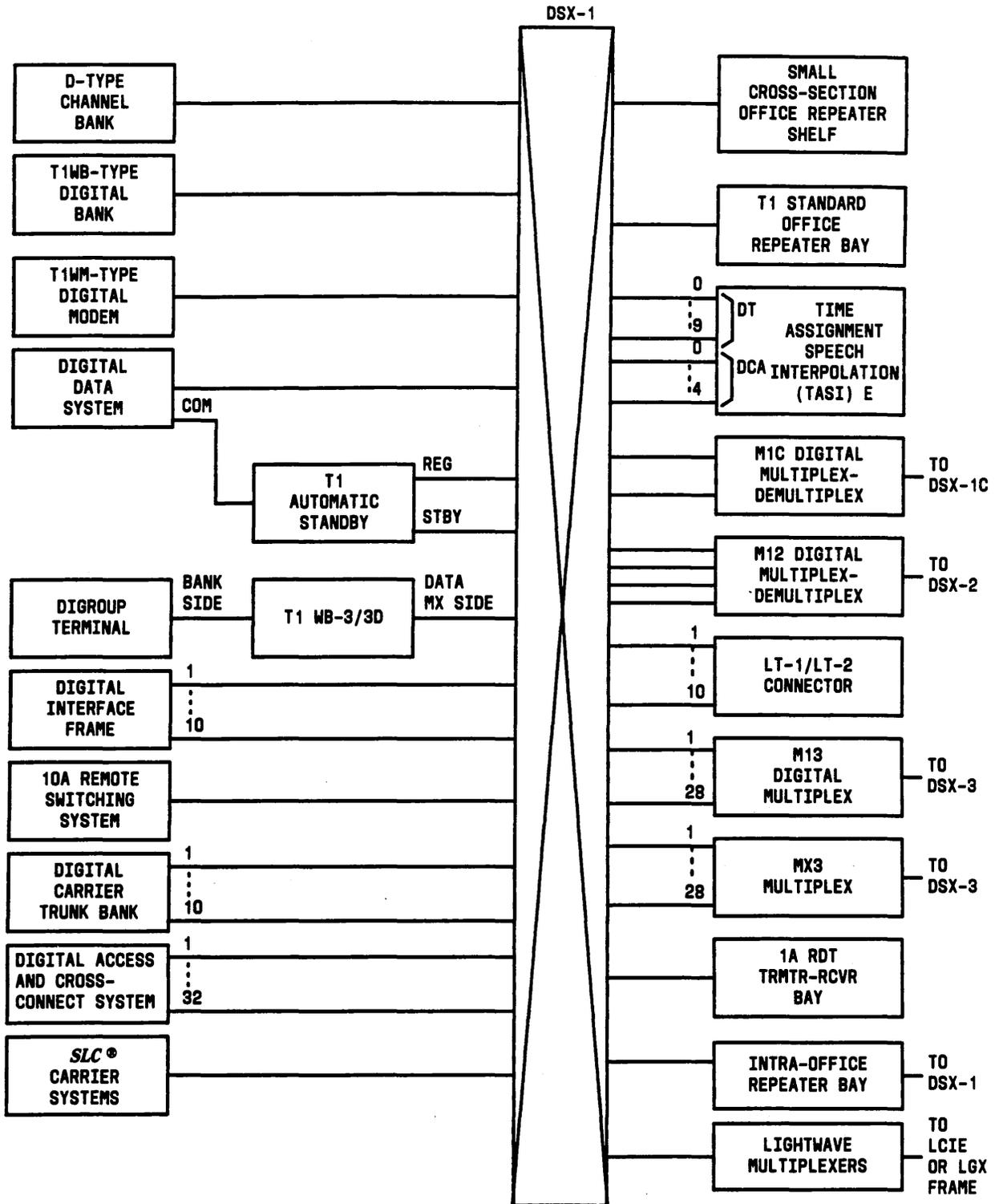


Figure 8—Transmission Equipment Compatible With DSX-1 Cross-Connect Panels

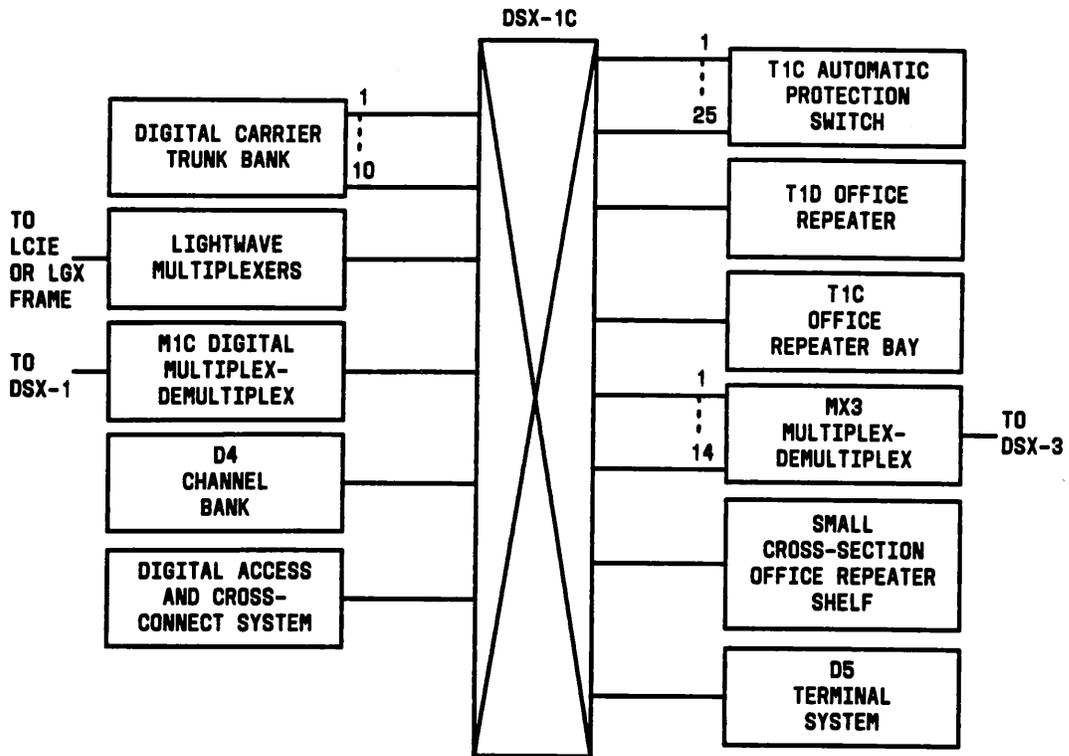


Figure 9—Transmission Equipment Compatible With DSX-1C Cross-Connect Panels

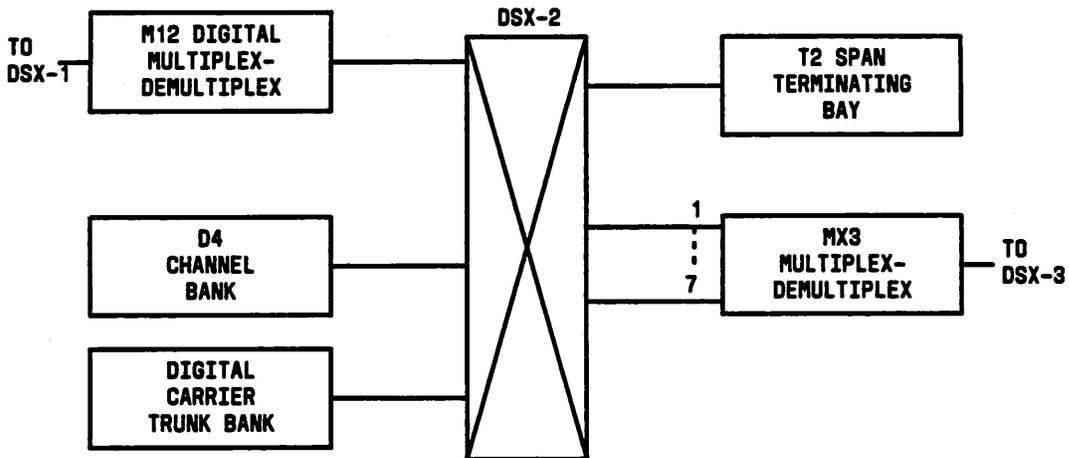


Figure 10—Transmission Equipment Compatible With DSX-2 Cross-Connect Panels

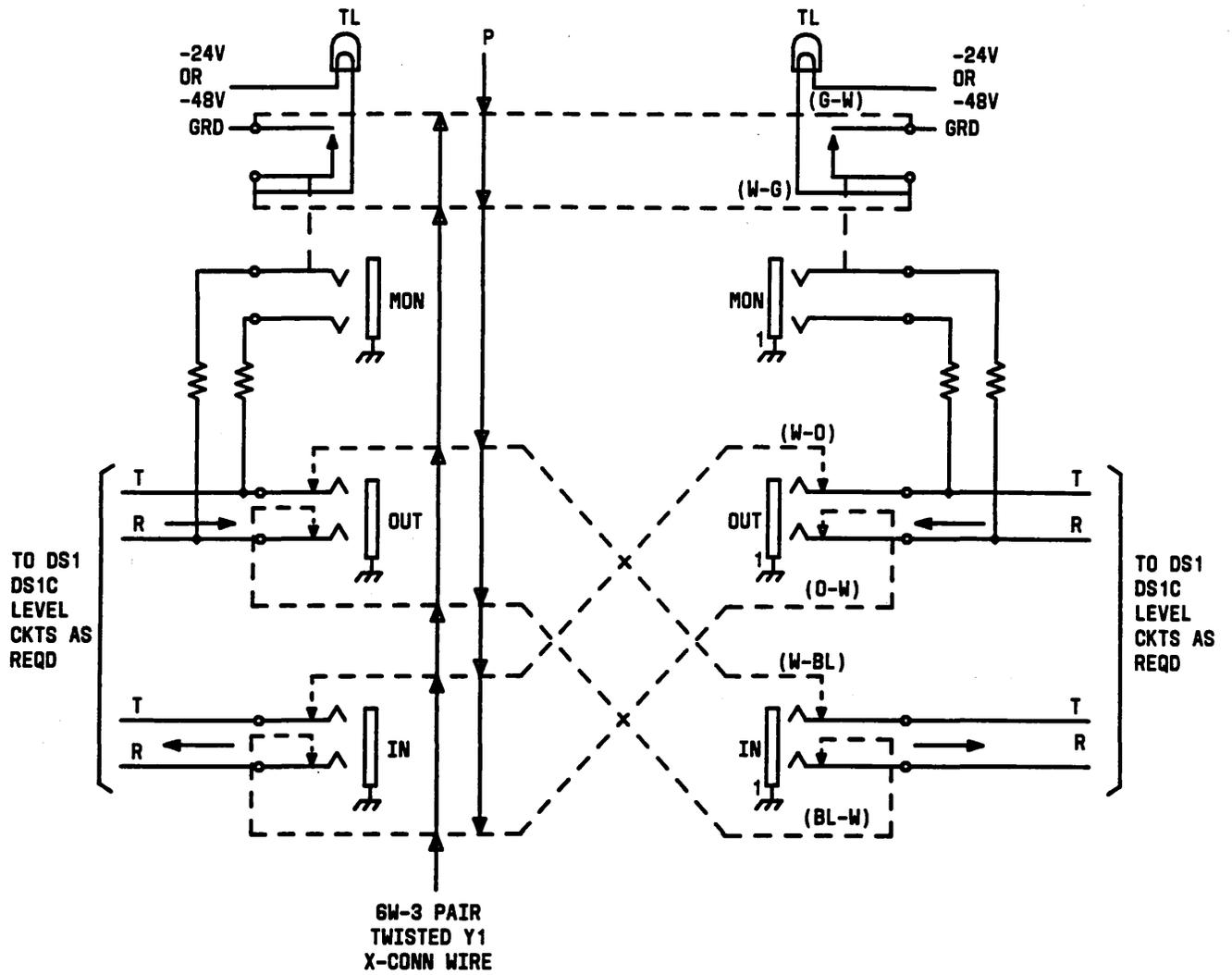


Figure 11—DSX-1 and DSX-1C Jack Circuit Schematic

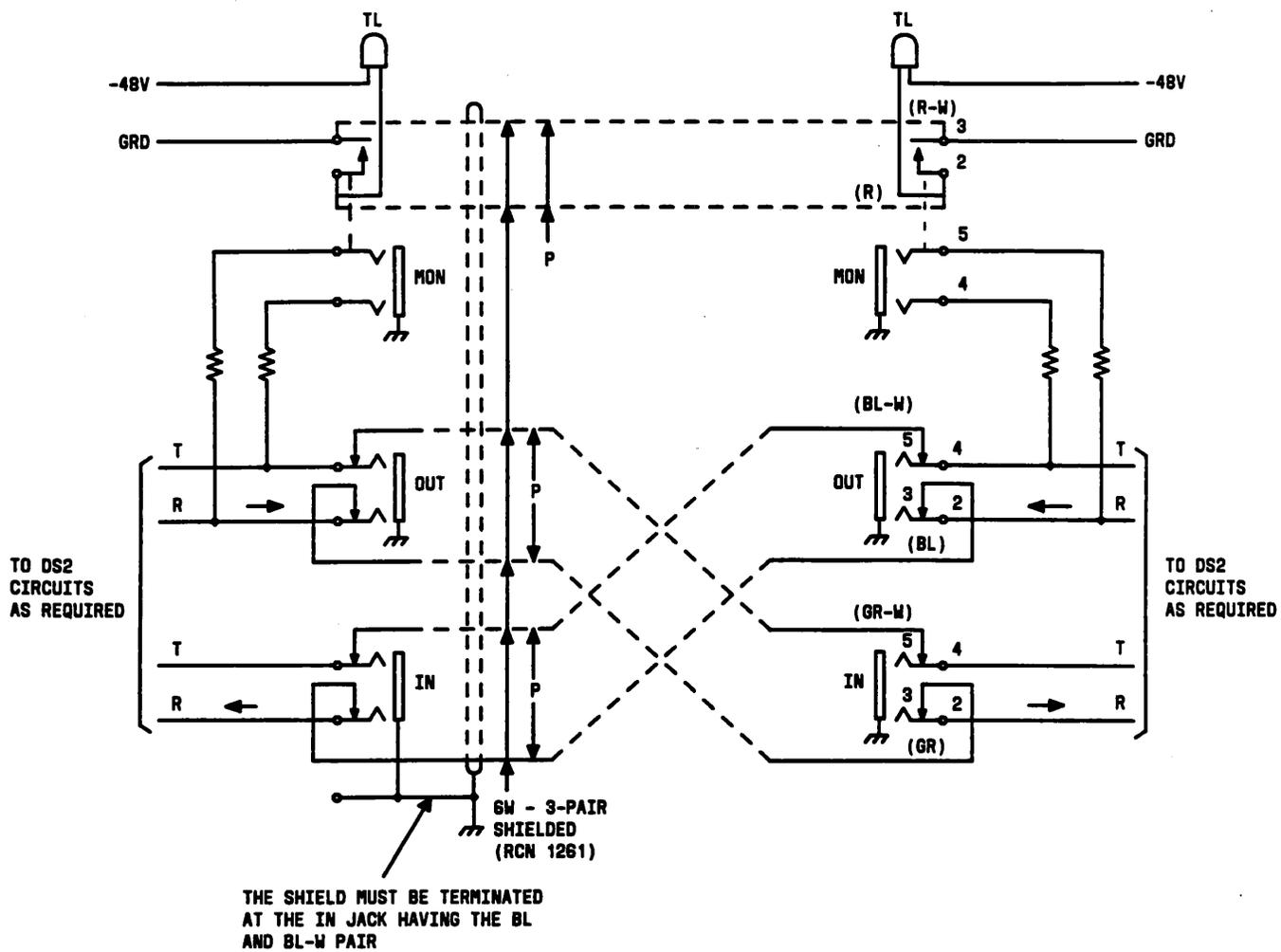
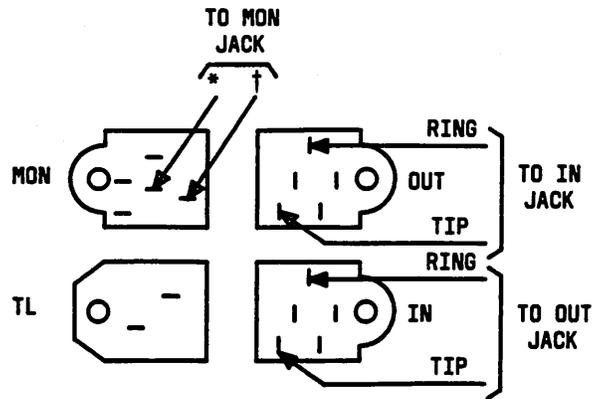


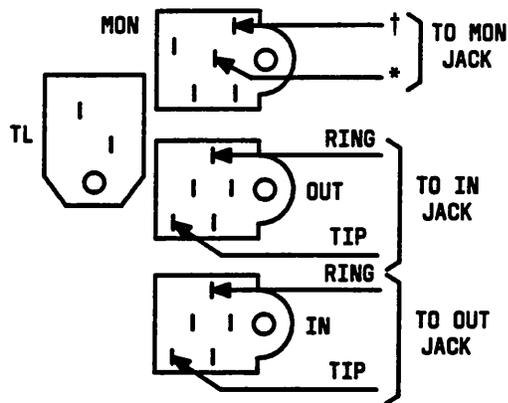
Figure 12—DSX-2 Jack Circuit Schematic



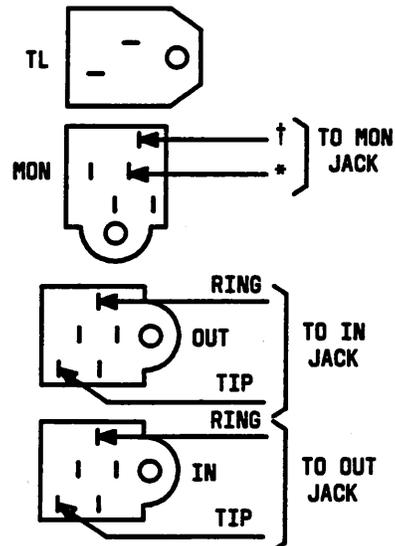
1C544-30 G2 OR G8

* COLOR CODE G-W FOR DSX-1 OR DSX-1C, AND R FOR DSX-2.

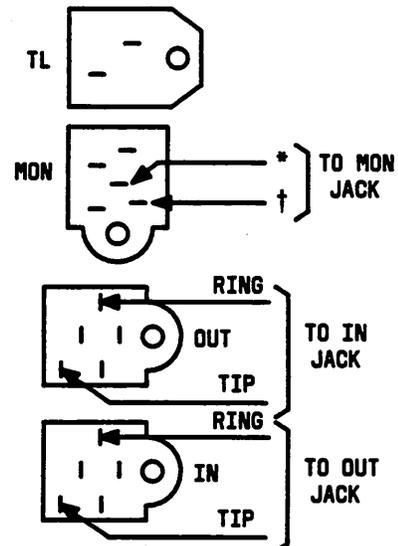
† COLOR CODE W-G FOR DSX-1 OR DSX-1C, AND R-W FOR DSX-2.



1C544-30 G6 OR G12

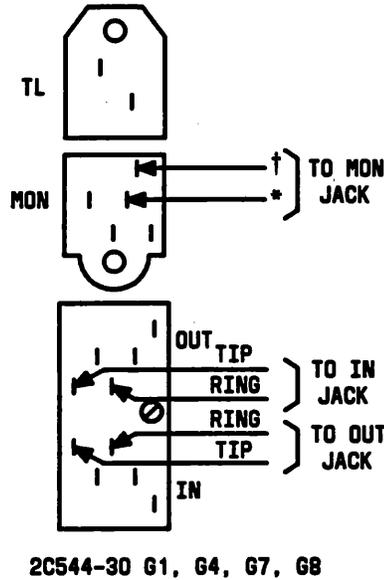
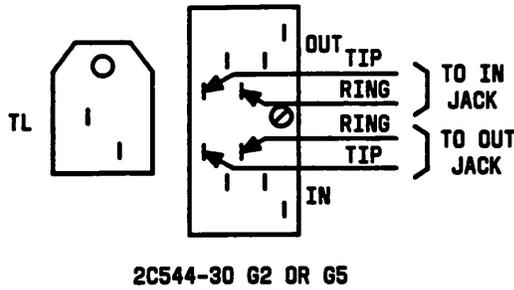
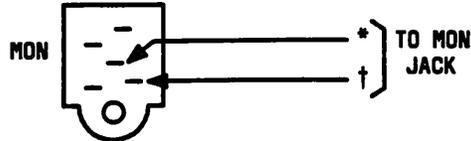
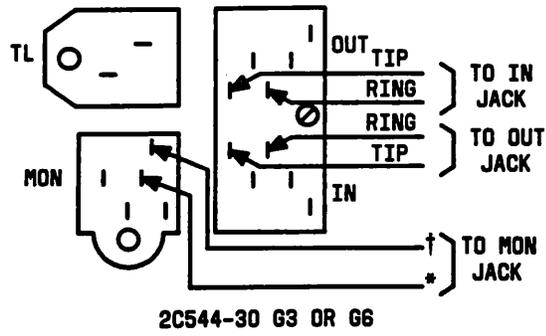


1C544-30 G4, 13, 14, 28 OR 29



1C544-30 G10

Figure 13—Typical Permanent Cross-Connections on 23-Inch Panels



* COLOR CODE G-W FOR DSX-1 OR DSX-1C, AND R FOR DSX-2

† COLOR CODE W-G FOR DSX-1 OR DSX-1C, AND R-W FOR DSX-2.

Figure 14—Typical Permanent Cross-Connections on 17-Inch Panels

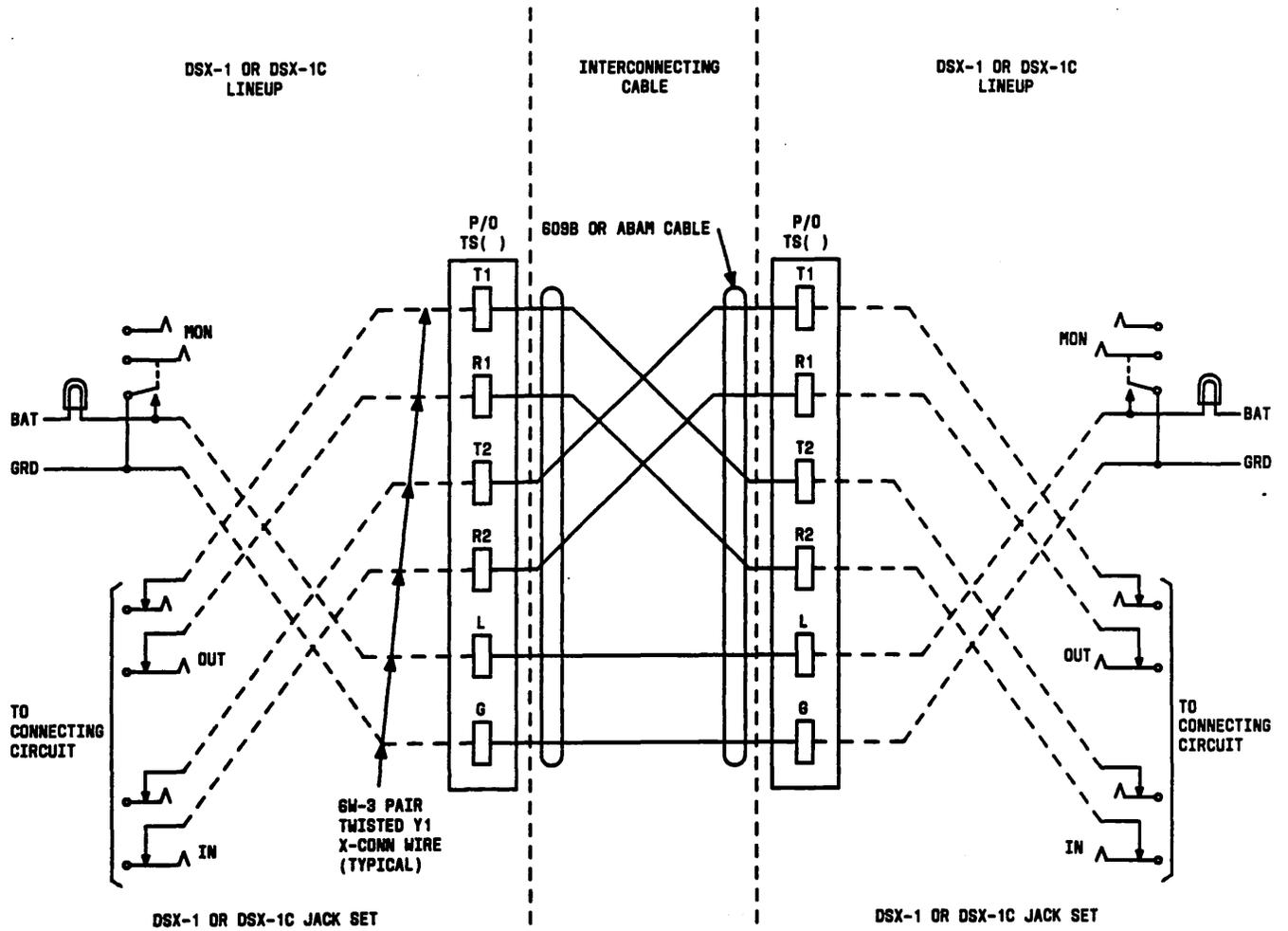


Figure 15—Typical Interconnection of Lineups With Cross-Aisle Terminal Strip Assembly

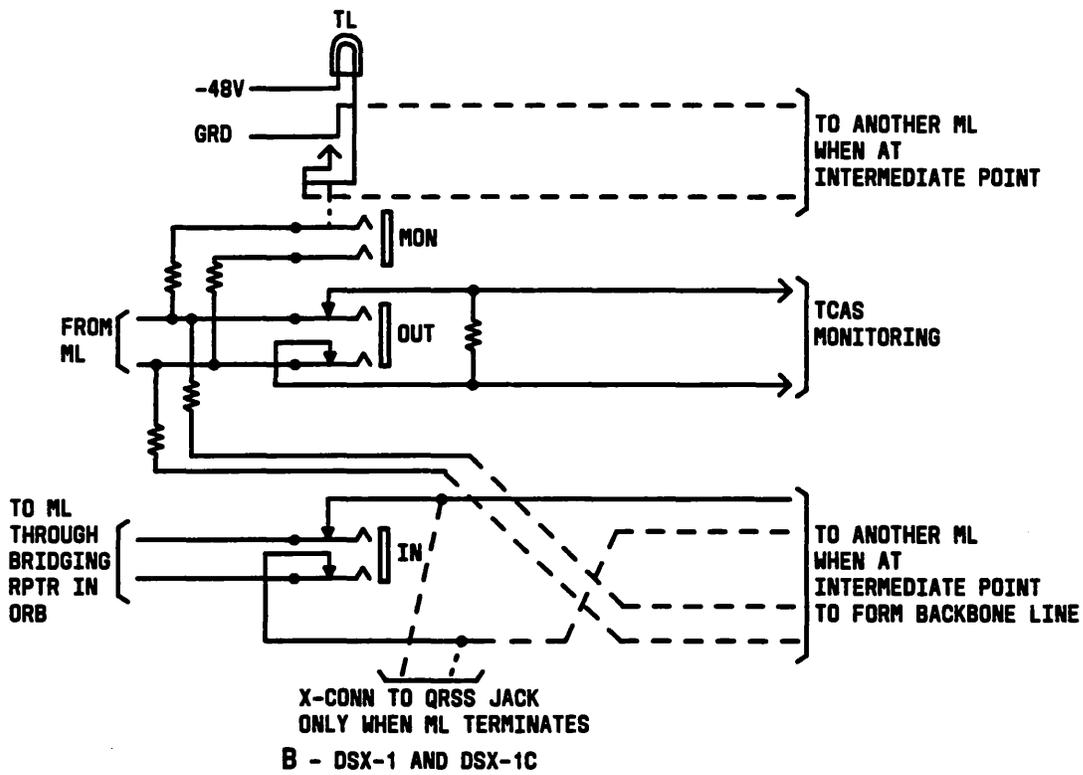
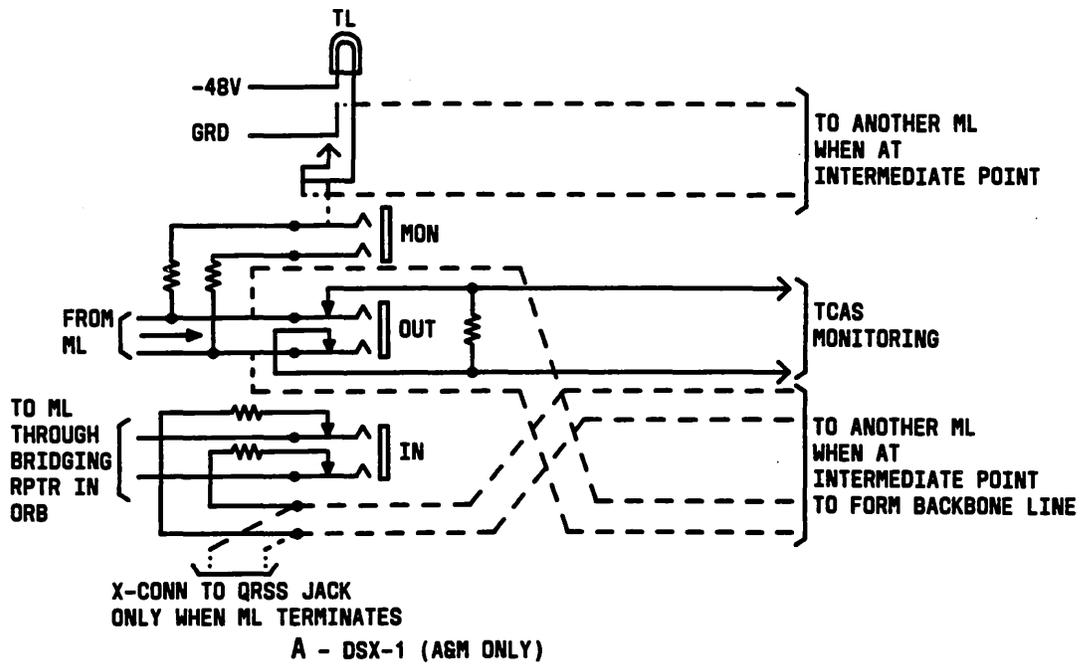


Figure 16—Maintenance Line (ML) Jack Circuit Schematic

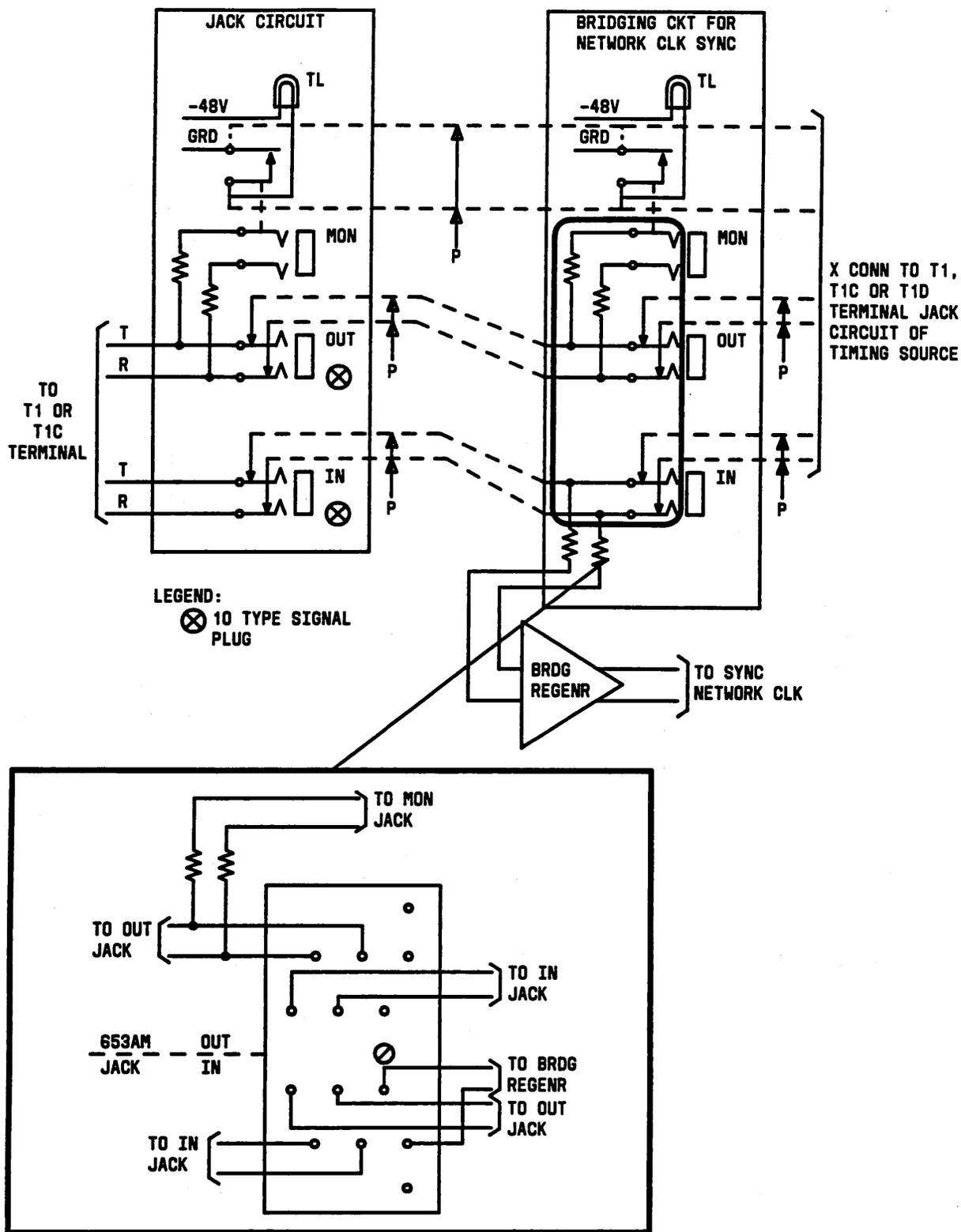


Figure 17—Bridging Repeater Connection for NTWK CLK SYNC Circuit

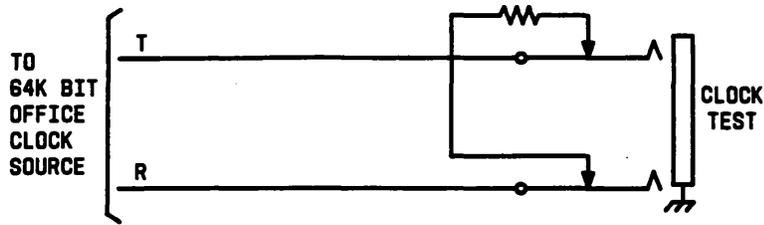


Figure 18—Jack Circuit for Synchronizing Portable Test Equipment

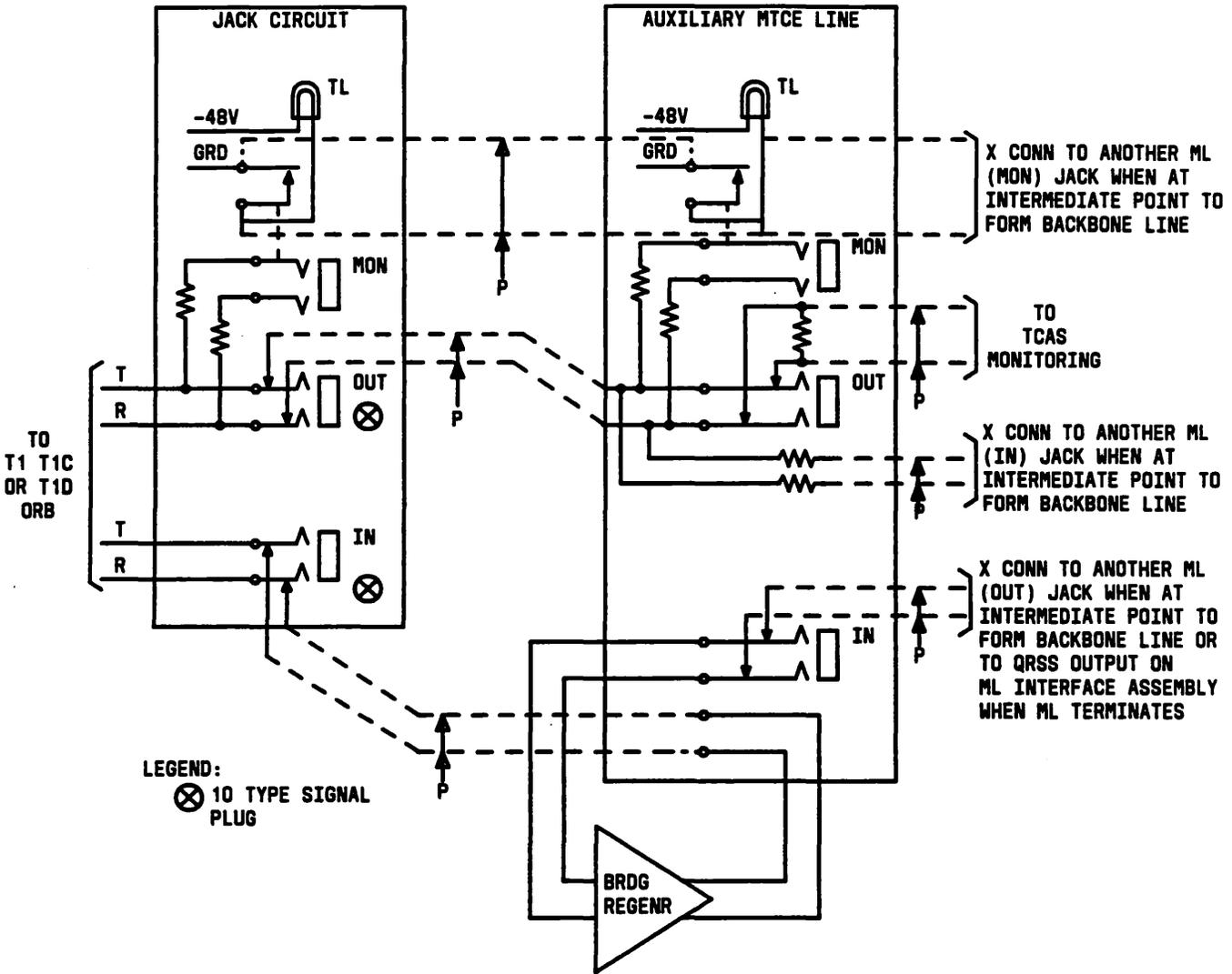
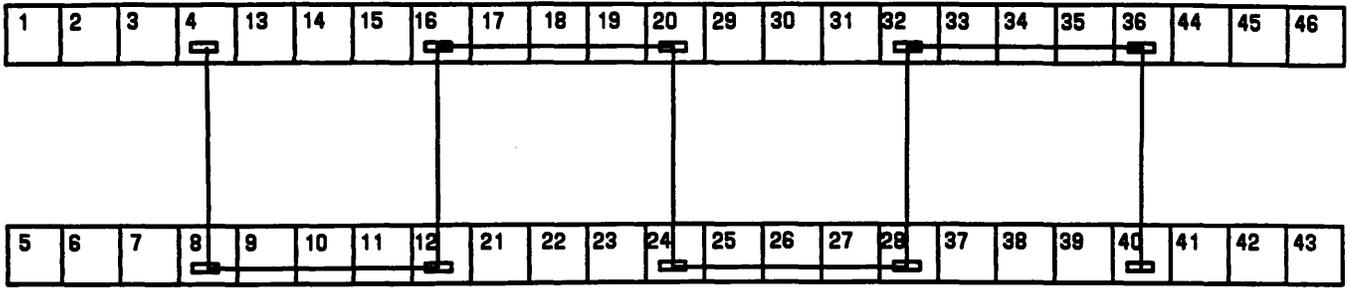


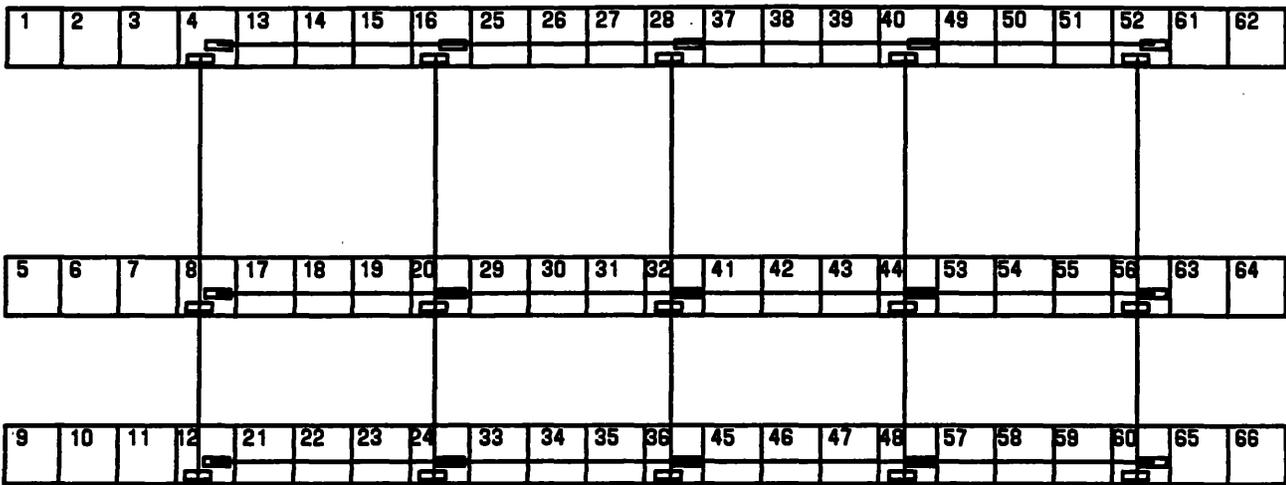
Figure 19—Bridging Repeater Connection for Auxiliary Maintenance



SINGLE LINEUP



DOUBLE LINEUP



TRIPLE LINEUP

☐ - INTERBAY PATCH PANEL

Figure 21—Typical Interbay Patch Panel Cabling

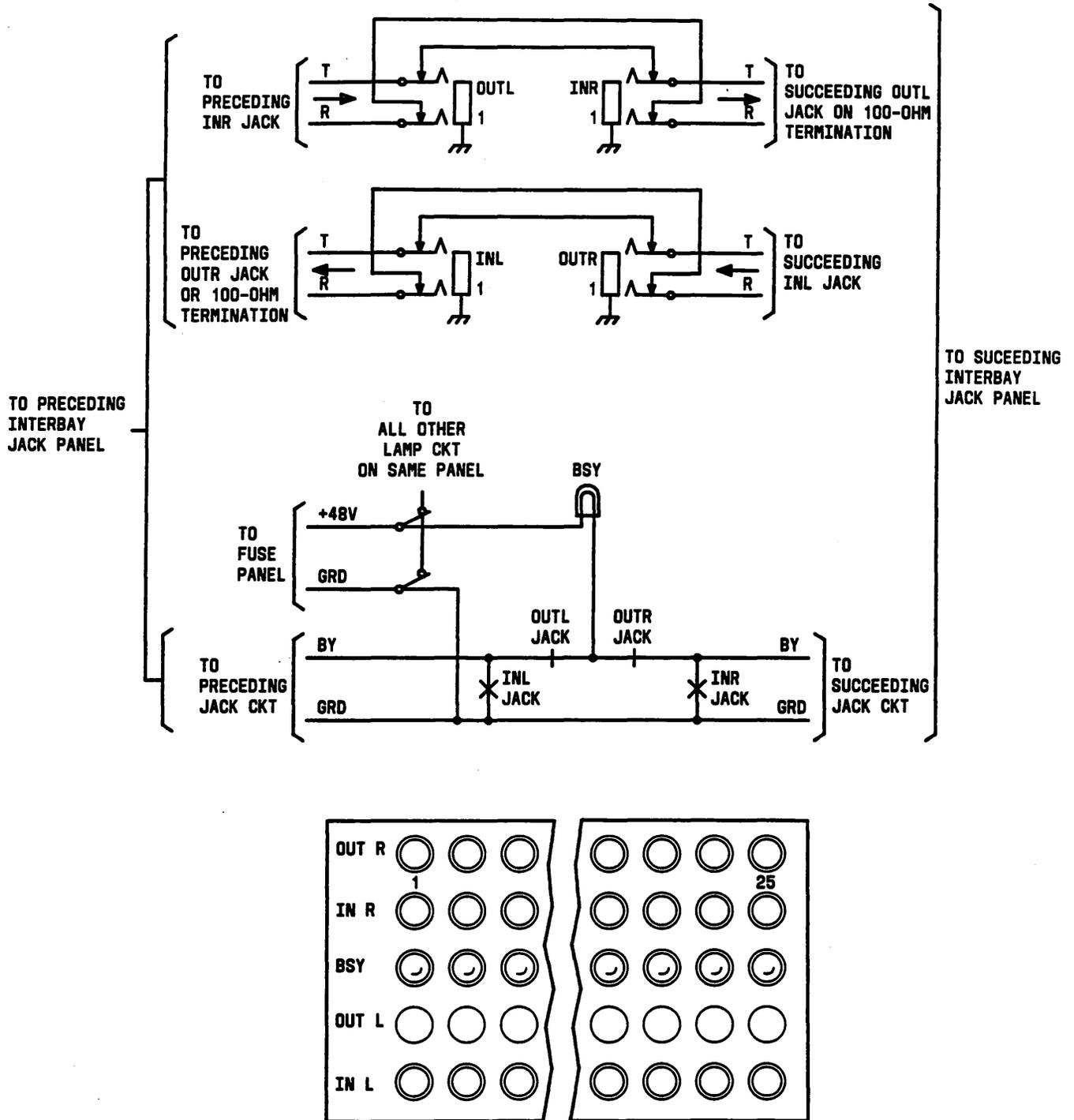
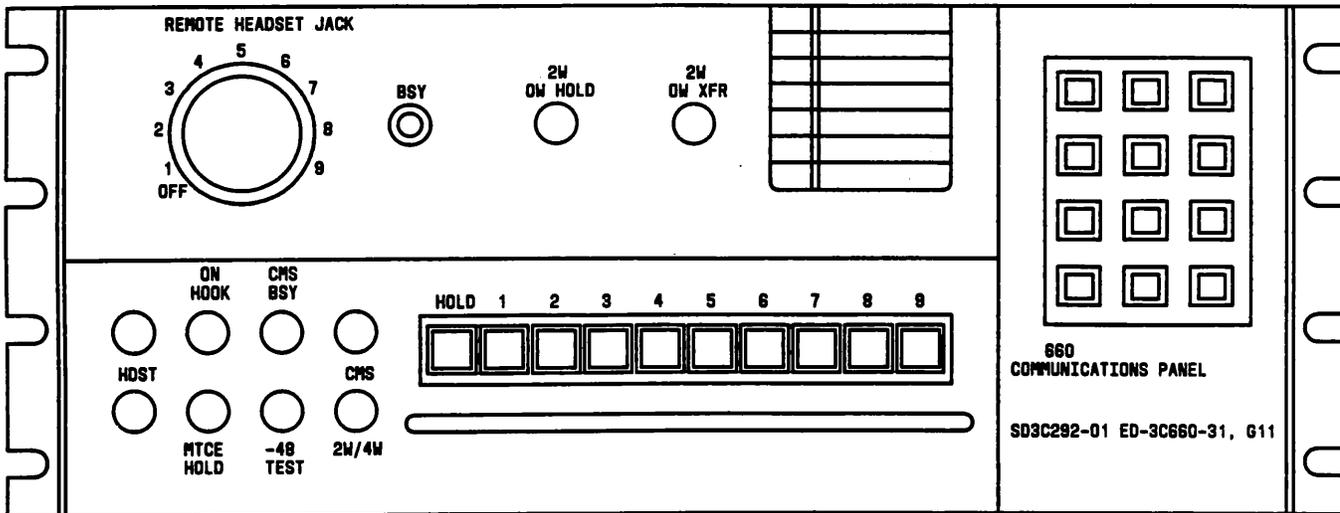


Figure 22—Interbay Patching Panel and Jack Circuit



660-TYPE COMMUNICATION PANEL

Figure 23—660-Type Communication Panel

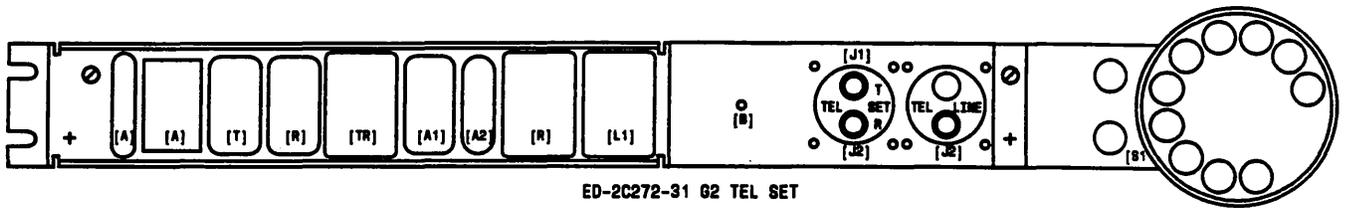
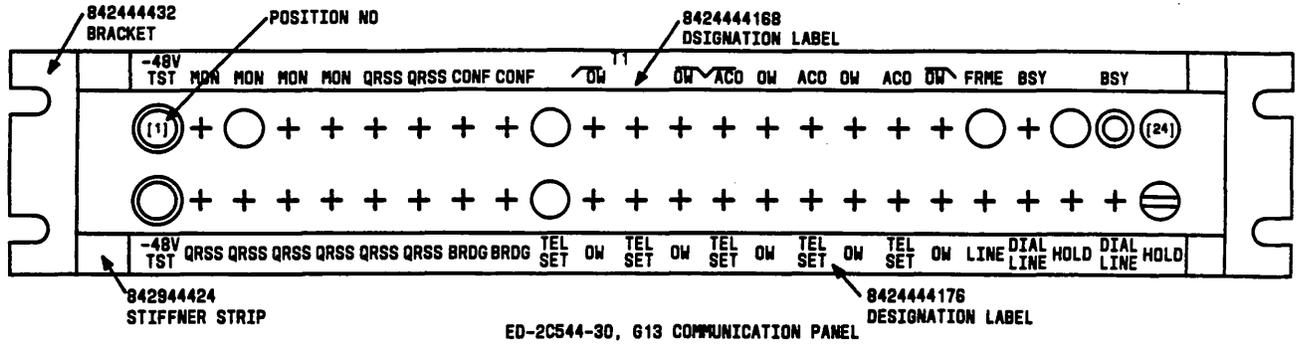


Figure 24—Communication Panels for 26-Inch Bays

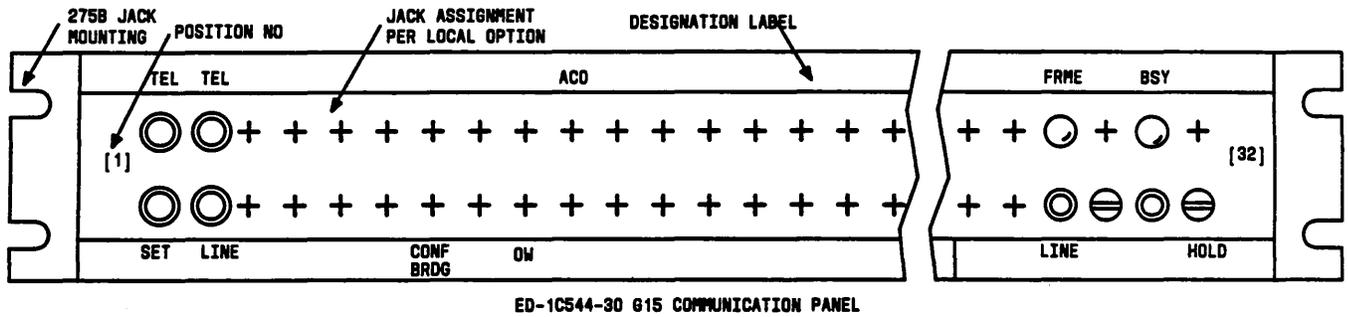


Figure 25—Communication Panel for 31-Inch Bay