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DSX-3 (DSX-4K) Front Cross-Connect System User Manual

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REVISION HISTORY

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ABOUT THIS MANUAL

This User Manual describes ADC's DSX-3 (DSX-4K) Front Cross-Connect System and its applications in large and small offices, digital loop carriers, and customer premises. The manual also provides all instructions necessary to install, operate, and maintain the system.

RELATED PUBLICATIONS

Listed below are related manuals and their publication numbers. Copies of these publications can be ordered by contacting the ADC Technical Assistance Center at 1-800-366-3891 (in U.S.A. or Canada) or 952-917-3000, extension 73475 (outside U.S.A. and Canada).

Title	ADCP Number
Application and Engineering Guide	61-500
Digital Signal Cross-Connect System (DSX-3)	80-301
Digital Signal Cross-Connect Applications Guide	80-303
DSX-3 Digital Signal Cross-Connect Front and Rear Cross-Connect Products	Catalog #274

ADMONISHMENTS

Important safety admonishments are used throughout this manual to warn of possible hazards to persons or equipment. An admonishment identifies a possible hazard and then explains what may happen if the hazard is not avoided. The admonishments — in the form of Dangers, Warnings, and Cautions — must be followed at all times. These warnings are flagged by use of the triangular alert icon (seen below), and are listed in descending order of severity of injury or damage and likelihood of occurrence.

Danger: *Danger is used to indicate the presence of a hazard that* ***will*** *cause severe personal injury, death, or substantial property damage if the hazard is not avoided.*

Warning: *Warning is used to indicate the presence of a hazard that* ***can*** *cause severe personal injury, death, or substantial property damage if the hazard is not avoided.*

Caution: *Caution is used to indicate the presence of a hazard that* ***will*** *or* ***can*** *cause minor personal injury or property damage if the hazard is not avoided.*

SECTION 1: DESCRIPTION AND APPLICATION

1 GENERAL

This section describes ADC's DSX-3 (DSX-4K) Front Cross-Connect System and its applications in large and small offices, digital loop carriers, and customer premises. The System provides for test access, patch, cross-connect, and monitor functions in 75-ohm digital transmission systems operating with a common signal format and bit rate. Bit rates of digital systems in which this cross-connect system can be used are:

- DS3 — 44.736 megabits per second
- DS4NA — 139.264 megabits per second
- STS-1 — 51.84 megabits per second
- STS-3 — 155.52 megabits per second

The DSX-3 (DSX-4K) Front Cross-Connect System is typically used between multiplexing/ demultiplexing or digital switch equipment and a transmission medium such as digital coaxial cable, microwave radio, or fiber optics. Signals from all digital equipment are maintained at an

equal level at the cross-connect system by means of office-provided pads and equalizers that compensate for the various cable lengths. This allows for testing, patching, and rearranging of compatible equipment at the cross-connect system without having to readjust signal levels.

2 FEATURES AND BENEFITS

2.1 Circuit Density

The DSX-4K Front Cross-Connect System provides greater circuit density than traditional DSX-3 systems. The capacity of each DSX-3 cross-connect bay is 324 DSX-4KT circuit modules. Additional bays up to a maximum of four may be added to the system.

2.2 Modularity

The DSX-3 (DSX-4K) Front Cross-Connect System is modular, allowing for installation of a minimal system configuration to meet the immediate needs of a site, with expansion as necessary through addition of components. The modular components in order of decreasing size are bay, chassis, and circuit module. Up to 36 circuit modules may be installed in each chassis. A maximum of nine chassis may be installed in a 7-foot high × 23-inch wide × 12-inch or 15-inch deep (2.13 m x 58.42 cm x 30.48 or 38.10 cm) equipment bay. The chassis mounting bracket holes are spaced to install in bays with a WECO mounting hole pattern.

2.3 Circuit Module

The DSX-4KT front cross-connect module has cross-connect interface jacks on the front of the circuit module; equipment cable interface connections are located on the rear of the module.

Each DSX-4KT circuit module provides IN and OUT jack access to the network element's input and output signal. Two MON (monitor) jacks (bridged to the IN and OUT jacks through individual high impedance resistance networks) allow non-intrusive monitoring of each network element's input and output signal.

In addition, the DSX-4KT circuit module is configured with a 75-ohm auto-termination feature that provides automatic termination of a network element's input (transmit) signal at the DSX when a cross-connect jumper is not present. This feature is convenient during initial installation when network elements are cabled to the DSX but cross-connects have not yet been assigned. Some network elements may not require a valid input signal when powered up; however, all elements must be terminated to 75 ohms in some manner to keep output signals from oscillating and affecting adjacent signals. Traditionally, this has been accomplished by placing a 75-ohm termination plug into the OUT jack at the DSX. The auto-termination feature reduces the need to have large quantities of 75-ohm termination plugs on site.

2.3.1 Connectors

Each DSX-4KT circuit module has BNC connectors at the rear for terminating equipment IN/OUT cabling. Cross-connecting and patching are accomplished through midsize jacks at the front of the module. The self-cleaning make, terminate, then break contacts used in this system minimize hits when patching.

2.4 Cable Management

Note: ADC strongly recommends the use of 735A or equivalent equipment cables on DSX-3 (DSX-4K) systems as a means of minimizing cable congestion and maximizing floor space utilization. As an alternate, 734A or equivalent cables may also be used provided the installer adheres carefully to the guidelines described in this manual.

ADC-provided 23-inch unequal flange (duct type) racks provide space for routing of all equipment IN/OUT cables to and from the various chassis in the cross-connect system bay. Skeleton bays ordered from ADC provide vertical jumper rings at all nine locations on the left and right vertical uprights for orderly routing of cross-connect jumpers between circuit modules on the bay, and horizontal jumper troughs at the top and bottom provide for orderly cross-connect cabling between bays. Refer to Section 2.5.

Two cable tie-down bars are provided with each chassis for securing equipment IN/OUT cables in place at the rear of the chassis.

ADC recommends that separately orderable 5.0-inch (12.7 cm) spacers be placed between adjacent DSX-3 bays and 2.5-inch (6.35 cm) spacers be placed at the end of each DSX-3 lineup. Optional end guards may also be installed at each end of a lineup. These components ensure sufficient vertical cable routing clearances and also provide a cosmetic appearance.

Figure 1-1 shows a sample lineup that includes a 5 inch (12.7 cm) spacer panel, a 2.5 inch (6.35 cm) end spacer panel, and an end guard.

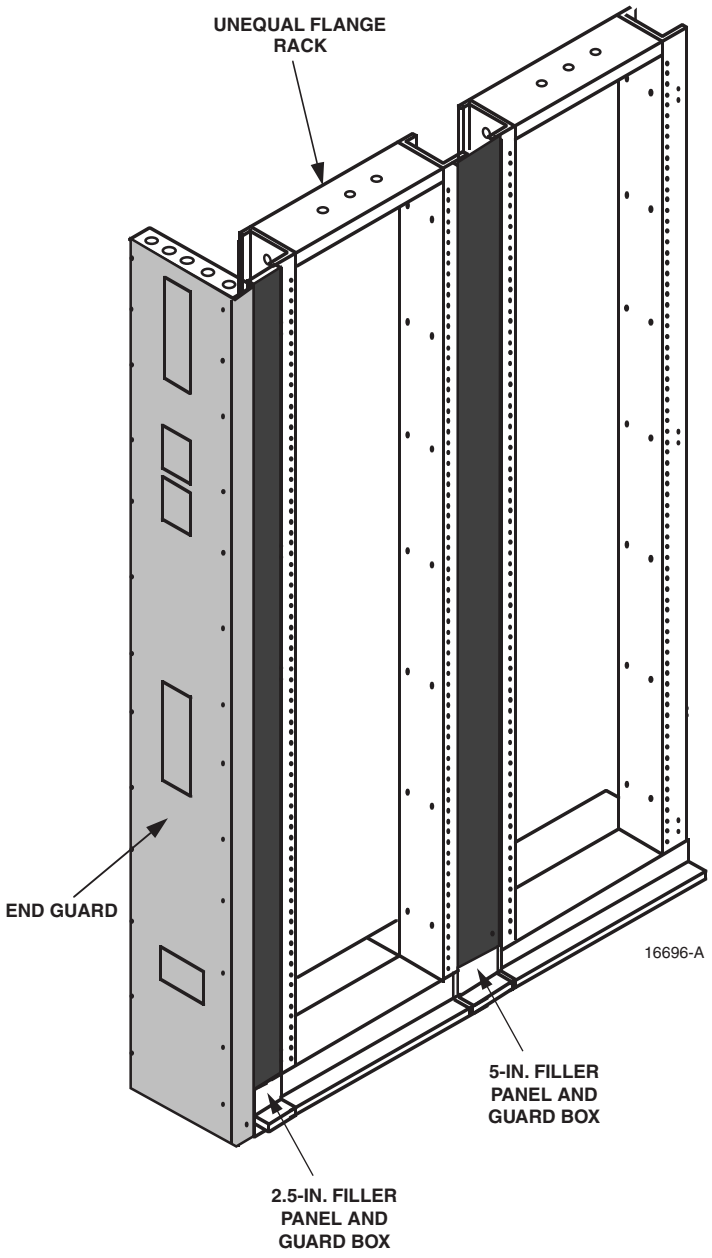


Figure 1-1. Sample Lineup with Spacer Panels and End Guard

2.4.1 Tracer Lamps

The DSX-3 (DSX-4K) Front Cross-Connect System provides tracer lamp identification of cross-connected circuit modules. Each circuit module has a tracer lamp and switch. Tripping the switch causes the tracer lamps at each end of the cross-connect to flash for approximately 30 seconds and then remain lit until the source switch is tripped off. The tracer lamps are red Light Emitting Diodes (LEDs) located on the front jumper tray of the DSX-4K chassis.

2.5 Bay Options

Two basic types of 23-inch equipment bays are available from ADC for the DSX-3 (DSX-4K) Cross-Connect System: skeleton bays and standard bays.

2.5.1 Skeleton Bay Options

One type of skeleton bay may be ordered with a fuse panel, upper and lower jumper troughs, and vertical jumper rings. A second type of skeleton bay may be ordered pre-assembled with upper and lower troughs and vertical jumper rings but without a fuse panel. A fuse panel may be ordered separately.

The ADC provided skeleton bay is an unequal flange network type, 84 inches high × 26 inches wide × 12 inches deep (213 × 66 × 30.48 cm). Chassis mounting holes are spaced at one inch (2.54 cm) intervals (i.e. WECO mounting hole pattern). An optional auxiliary duplex 110 Vac outlet kit is also available for installation at the bottom front or rear of the bay.

2.5.2 Standard Bay Option

A standard bay is shipped without fuse panel, upper and lower jumper troughs, or vertical jumper troughs.

The ADC provided standard bay is an unequal flange network type, 84 inches high × 26 inches wide × 12 inches deep (213 × 66 × 30.48 cm). Chassis mounting holes are spaced at one inch (2.54 cm) intervals (i.e. WECO mounting hole pattern). The fuse panel, upper and lower troughs and vertical jumper rings may be ordered separately as kits from ADC. An optional auxiliary duplex 110 Vac outlet kit is also available for installation at the bottom front or rear of the bay.

2.5.3 Chassis Options

Chassis may be ordered in four configurations: empty with vertical jumper rings, empty without vertical jumper rings, loaded with vertical jumper rings, and loaded without vertical jumper rings. Vertical jumper rings may be ordered separately

3 FUNCTIONAL DESCRIPTION

The DSX-3 (DSX-4K) Front Cross-Connect System consists of up to 324 individual DSX-4KT circuit modules in a 7-foot equipment bay. A schematic of the module is shown in Figure 1-2. Each circuit module accommodates the input and output of one digital equipment unit. Two circuit modules are required for each cross-connect.

Each circuit module has rear BNC connectors for terminating equipment IN/OUT cables and front midsize coaxial jacks for cross-connecting and patching the various equipment units together. Cabling from office equipment is connected to DSX-4K equipment IN/OUT BNC connectors, and any equipment input or output can then be connected to any other equipment input/output by means of cross-connect jumpers connected to the front X-O and X-I midsize coaxial jacks equipped with locking retainer clips. Equipment inputs and outputs can also be

tested or temporarily patched to other equipment inputs and outputs through patch cords plugged into the front panel MON OUT, OUT, MON IN, or IN midsize coaxial patching jacks.

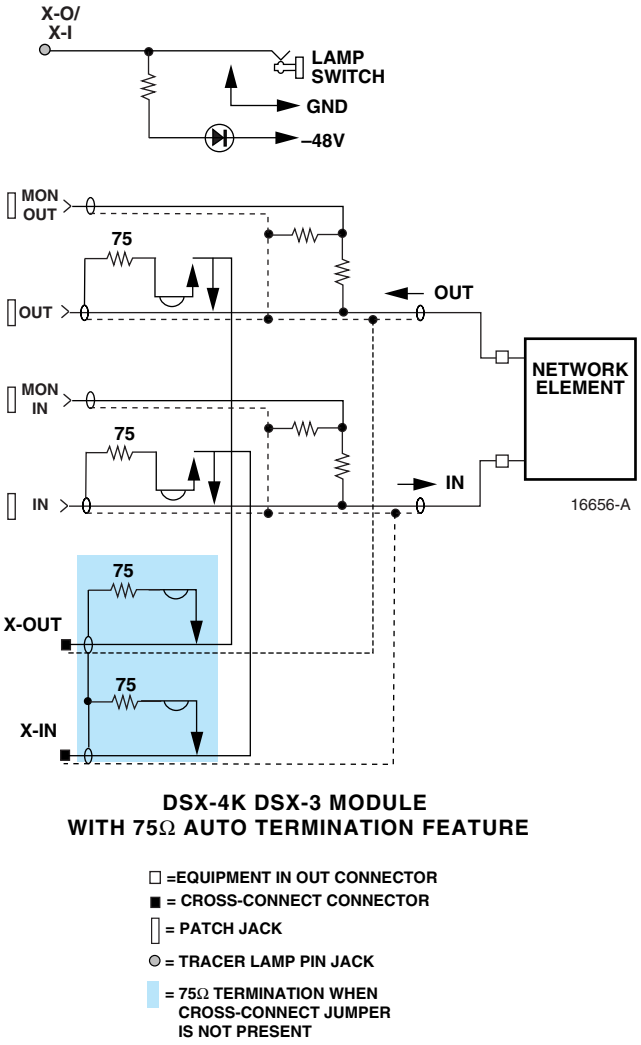


Figure 1-2. Typical DSX-4KT Circuit

A typical DSX-4KT circuit arrangement is shown in Figure 1-3. Network elements A, B, and C are connected to the IN/OUT connectors of three different DSX-4KT circuit modules. Network elements A and B are then connected together at the DSX-4KT circuit modules by cross-connect jumpers. In the DSX-4K system, the tracer lamps used for circuit identification are mounted on the chassis rather than on individual modules. Cross-connected network elements A and B can now be identified, monitored, and tested as follows:

1. *Circuit Identification* — Activating any LAMP SWITCH causes the cross-connected chassis-mounted tracer lamps to flash for approximately 30 seconds and then remain lit until the source LAMP SWITCH is switched off. This provides a visual indication of the equipment units that are jumpered together.

2. *Bridged Monitoring and Testing* — Monitor or test equipment patched into the MON jacks allows testing of the network element input and output signals without interrupting the signals.
3. *Split-Circuit Testing* — Test equipment patched into an IN or OUT jack splits the A-to-B equipment circuit for direct access testing of either equipment unit.

Note: This is an intrusive access to the signal flow between equipment A and equipment B.

In addition, patch cords can be used to split cross-connected equipment units, and connect either of the two units to a third unit. In Figure 1-3, equipment B is temporarily patched to equipment C.

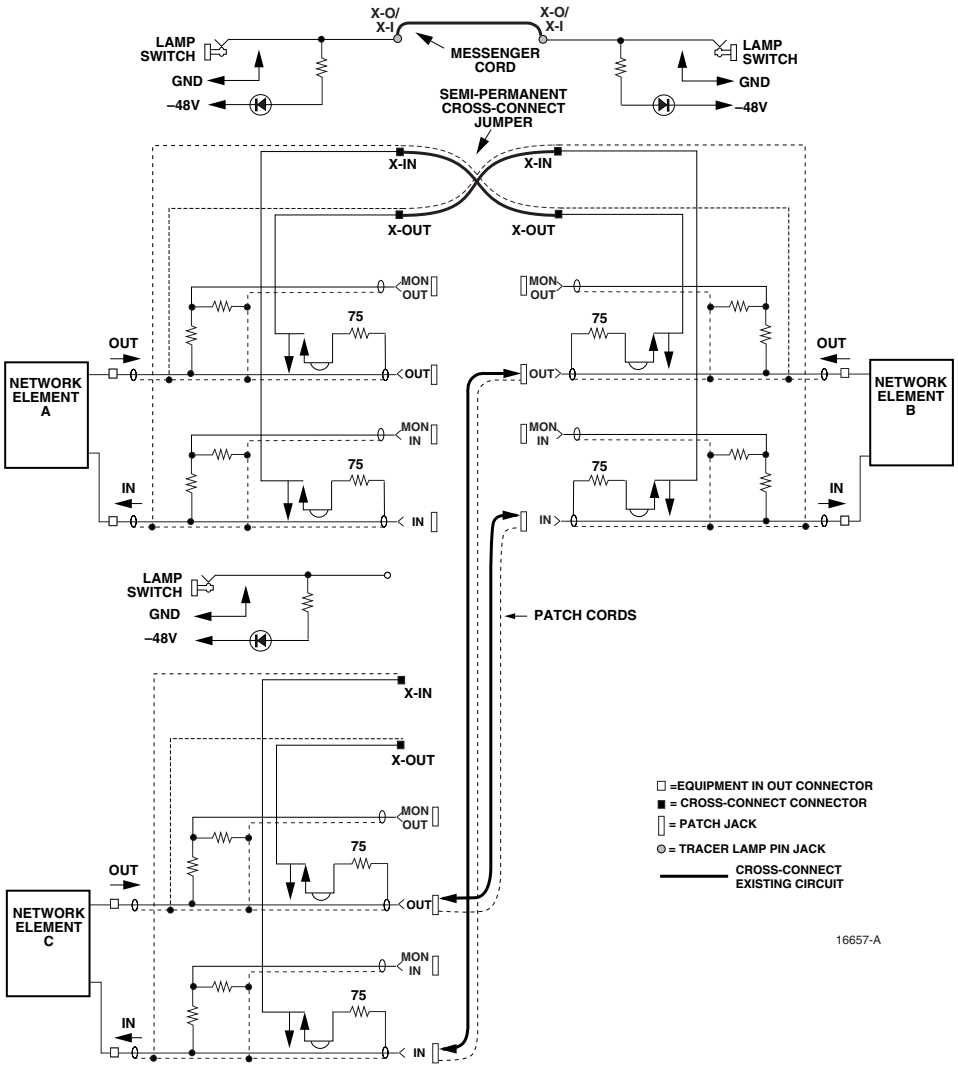


Figure 1-3. Typical DSX-3 (DSX-4KT) Circuit Arrangement

As seen in Figure 1-3, numerous testing and patch-around configurations are possible, all of which are established permanently or temporarily at the centrally located cross-connect system. As a result, many benefits can be immediately realized as described in the following applications.

Note: The Operation Section of this manual provides schematic diagrams and step-by-step procedures for most of the functions performed at the cross-connect system.

4 APPLICATIONS

4.1 Testing and Fault Isolation

Terminating all digital operational and test equipment at the DSX-3 (DSX-4K) Front Cross-Connect greatly reduces the amount of time and skilled personnel required for testing and isolation of troubles. Identification of existing or developing problems is readily accomplished by:

1. Testing at circuit module jacks connected directly to digital equipment inputs and outputs.
2. Patching in spare equipment for suspected faulty units.

4.2 Interoffice Service Restoration

Loss of a major facility between two locations may isolate or greatly reduce communication capability between the two sites. To temporarily restore partial communications between these two sites, several circuits can be rerouted through vacant facilities at a third site by simple patch arrangements at the cross-connect systems at the three sites. After the facility is repaired, these temporary patches are easily removed and normal service between the original two sites is restored.

4.3 Traffic Pattern Changes

Major changes in traffic patterns may be required on a regular basis (daily, weekly, etc.), or may be required on a long-term basis because of a large corporation relocating within the limits of the same office. Any of these long- or short-term traffic requirements can be satisfied by simply patching or reconfiguring cross-connect jumpers at the cross-connect system.

4.4 System Expansion

The DSX-3 (DSX-4K) Front Cross-Connect System facilitates planning for future growth. The system can be grown from a minimal installation of one partial or fully configured chassis in a single bay up to four fully configured bays.

4.5 Office Layout

The DSX-3 (DSX-4K) Front Cross-Connect System makes it possible to add equipment to an office without major changes in the office layout. Equipment is simply installed where space is

available and then cabled to the cross-connect system. Cross-connect jumpers on the cross-connect system connect the equipment into the desired office electrical configuration.

4.6 Cutover to New Network Elements

The DSX-3 (DSX-4K) Front Cross-Connect System simplifies the cutover to new network elements. When a network element is installed, it is terminated on the cross-connect system. The cross-connections serving the existing network elements are then replaced by temporary patch cords, and new cross-connect jumpers are installed for the new network elements. Cutover to the new network element is then completed by removing the temporary patch cords.

4.7 Office Record Keeping

The DSX-3 (DSX-4K) Front Cross-Connect System minimizes office record keeping by providing vertical and horizontal marking for identifying equipment locations and city terminations. In addition, red LED tracer lamps on the chassis allow for easy identification of equipment cross-connections.

5 PHYSICAL DESCRIPTION

A DSX-3 (DSX-4K) bay is comprised of up to nine chassis, each containing up to 36 DSX-4KT circuit modules. A fuse panel is located at the top of the bay, and provision for an AC outlet is located at the bottom. Jumper rings and troughs at the front of the bay allow for orderly routing of cross-connect jumpers, and brackets at the rear of each chassis allow for routing and securing all equipment IN/OUT cables.

Office cabling to the cross-connect system bay is by means of BNC coaxial connectors located on the rear of the circuit modules. Each circuit module also has midsize coaxial jacks with retaining clips at the front for insertion of cross-connect jumpers, and midsize coaxial jacks for insertion of patch cords.

5.1 DSX-4KT Circuit Modules

Each DSX-4KT circuit module, shown in Figure 1-4, provides access to the input and output of one digital office equipment unit. Each module is 5.29 inches high × 0.56 inch wide × 5.66 inches deep (13.44 × 1.42 × 14.38 cm).

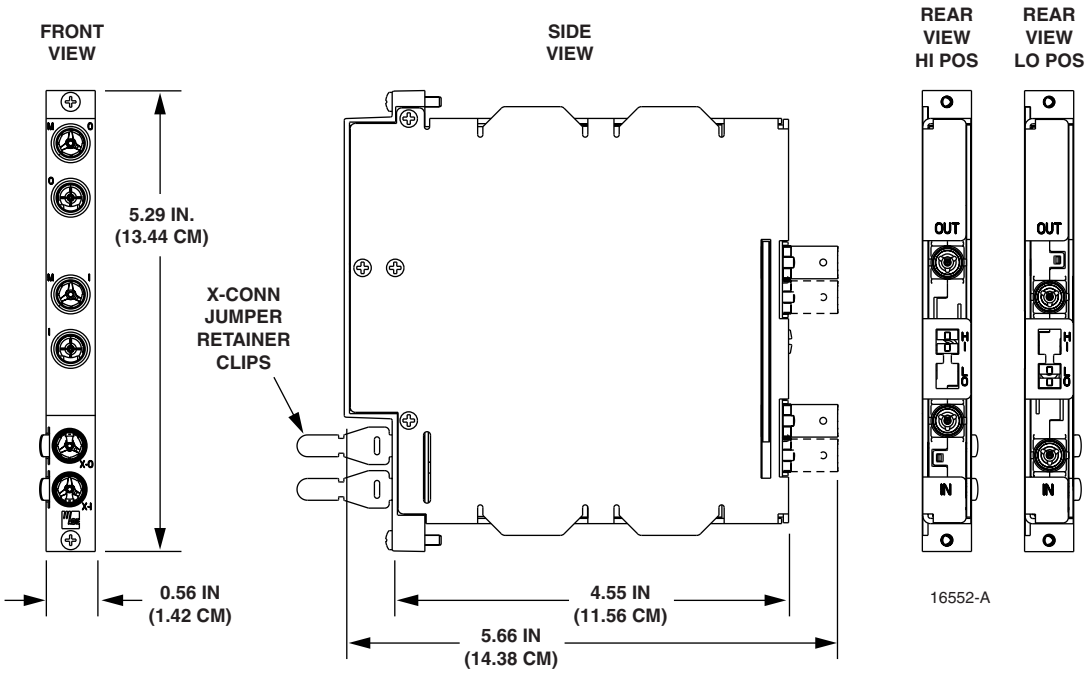


Figure 1-4. DSX-4KT Circuit Module

The DSX-4KT module is designed for use with either DS3, STS-1, or STS-3 interfaces; however, only signals of a common signal format and bit rate can be cross-connected together. The module has midsize coaxial jacks at the front for cross-connecting, testing and patching. BNC coaxial connectors at the rear of the module are used for connecting the input and output of office equipment. Specific functions of the front-panel components are defined in Table 1-1.

Table 1-1. DSX-3 (DSX-4KT) Circuit Module Components

NAME	TYPE	LOCATION	FUNCTION
M O (Monitor Out)	Midsize Coaxial Jack	Front of Module	Provides bridged access to the output signal of connected office equipment to allow monitoring without interruption.
O (Out)	Midsize Switching Coaxial Jack	Front of Module	Provides test or patch access to digital equipment output terminations. Whenever a plug is inserted in the OUT jack, any cross-connect to the X-O jack is disabled and terminated to 75-ohm ground.
M I (Monitor In)	Midsize Coaxial Jack	Front of Module	Provides bridged access to the input signal of connected office equipment to allow monitoring without interruption.
I (In)	Midsize Switching Coaxial Jack	Front of Module	Provides test or patch access to digital equipment input terminations. Whenever a plug is inserted in the IN jack, any cross-connect to the X-I jack is disabled and terminated to 75-ohm ground.

Table 1-1. DSX-3 (DSX-4KT) Circuit Module Components

NAME	TYPE	LOCATION	FUNCTION
X-O	Midsize Coaxial Jack with Locking Clip	Front of Module	Provides direct access to the digital equipment output termination for cross-connecting to any digital equipment input termination on the cross-connect system. (The DSX-4KT 75-ohm auto-termination module provides a 75-ohm to ground termination when a cross-connect jumper is ***not*** connected to the X-O and X-I ports.)
X-I	Midsize Coaxial Jack with Locking Clip	Front of Module	Provides direct access to the digital equipment input termination for cross-connecting to any digital equipment output termination the cross-connect system. The DSX-4KT 75-ohm auto-termination feature provides a 75-ohm to ground termination when a cross-connect jumper is ***not*** connected to the X-O and X-I ports.)
XO and XI	Pin Jacks	Chassis Tray (Front)	Provides for interconnecting of the tracer lamps for the corresponding cross-connects to allow tracer lamp operation as described above. The XO/XI connections between the circuit modules correspond exactly to the X-O/X-I cross-connect jumpers. Cross-connect jumpers are available with tracer wire to accommodate both the cross-connect and the corresponding lamp connections.

The DSX-4K chassis, shown in Figure 1-5, provides mounting for up to 36 circuit modules across the width of the bay. The chassis is 23 inches (58.4 cm) wide, 7 inches (17.78 cm) high, and 12-inches (30.48 cm) or 15-inches (38.10 cm) deep. It is designed for installation in bays with WECO hole spacing. Vertical jumper rings and removable jumper ring covers are used for routing cross-connect jumpers up and down either side of the 23-inch bay. White, adhesive-backed, designation labels are shipped with the chassis for application at the user's site. The labels are blank to allow customer designations to be added during installation.

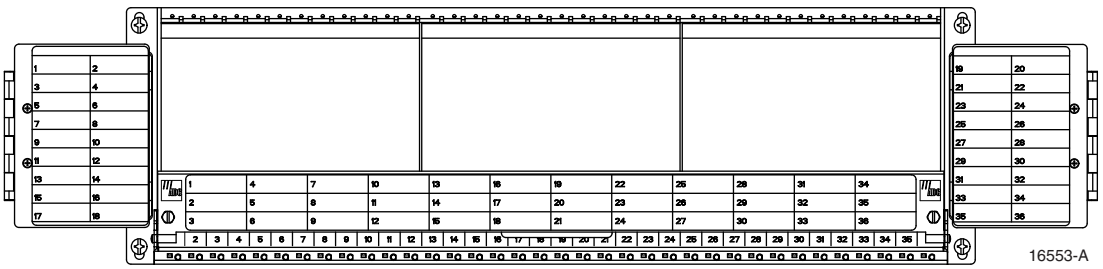


Figure 1-5. Empty DSX-4K Chassis

The jumper tray at the bottom front of the chassis holds the numbered tracer lamps and tracer lamp push/pull switches, that correspond to the circuit module positions. A functional description of the tracer lamps and push/pull switches is provided in Table 1-2.

Table 1-2. DSX-3 (DSX-4K) Chassis Components

NAME	TYPE	LOCATION	FUNCTION
Tracer Lamp (TL) 1-36	Red LED Indicator	Chassis Jumper Tray (Front)	Used to identify the opposite end of a cross-connect. When the tracer lamp switch at a known module location is switched on (pulled out), the tracer lamp at both ends of a cross-connect flash for approximately 30 seconds and then remain lit until the switch at the known lamp location is switched off (pushed in).
Lamp Switch (LS) 1-36	Push/Pull Switch	Chassis Jumper Tray (Front)	When pulled out, causes the corresponding cross-connected tracer lamps to light as described above for tracer lamp. Extinguishes the indicators when pushed in.

5.2 Fuse Panel

The fuse panel provides –48 Vdc power protection for all cross-connect system tracer lamp (LED) circuitry in the bay. Power for each DSX-4K chassis is supplied through a separate 0.5 Amp fuse. (Each LED draws 0.01 Amp; therefore, 36 LEDs in a chassis, equates to a 0.36 Amp load.) The GMT fuse has a colored tab that is displayed when the fuse is blown. The fuse panel also has a LED indicator that lights whenever any fuse on the panel is blown. The fuse panel can also be connected to an external alarm system.

5.3 Jumper Rings and Troughs

Large capacity vertical jumper rings and removable jumper ring covers with designation labels are installed at nine locations on the front of DSX-3 (DSX-4K) equipment bays to allow for routing of cross-connect jumpers up and down each side of the bay. Jumper troughs at the top and bottom of DSX-3 (DSX-4K) bays provide for the routing of cross-connect jumpers between bays. Dual cross-connect jumpers constructed of twin-shielded miniature coaxial cable with an 26 AWG center conducter are used in this system.

5.4 Cable Brackets

Cable tie-down bars are provided in the duct area of DSX-3 (DSX-4K) unequal flanged bays for securing the vertical equipment cable runs down the side of the rack. Two cable tie bars are provided with each DSX-4K chassis to secure equipment cables horizontally across the rear of the chassis.

5.5 Chassis

Up to nine DSX-4K chassis with adapters and jumper rings for central office application may be installed in a single 23-inch DSX-3 (DSX-4K) equipment bay.

6 SYSTEM SPECIFICATIONS

Specifications for the DSX-3 (DSX-4K) Front Cross-Connect System are shown in Table 1-3.

Table 1-3. System Specifications

PARAMETER	SPECIFICATION
PHYSICAL	
Bay	
Height	7.0 feet (2.13 m)
Width	26 inches (66 cm)
Depth	12 inches (30.48 cm) or 15 inches (38.10 cm)
Weight (unloaded)	200 lb (90.71 kg)
Weight (fully loaded-uncabled)	800 lb (362.87 kg)
Chassis	
Height	7 inches (17.78 cm)
Width	23.0 inches (58.88 cm)
Depth	12 inches (30.48 cm)
Weight (unloaded)	16 lb (7.26 kg)
Weight (fully loaded)	64 lb (29.03 kg)
POWER	
Voltage	–48 Vdc
Current	0.01 amp for each lit LED tracer lamp
Fusing	5.0 amps per bay; 0.5 amp per chassis
ENVIRONMENTAL	
Operating Temperature	–40° to +65° C (–40° to +149° F)
Storage Temperature	–55° to +85° C (–67° to +185° F)
Operating and Storage Humidity	0% to 95% without condensation
FUNCTIONAL	
Characteristic Impedance	75 ohms, unbalanced
DSX-4KT Module only	Cross-connect ports are internally terminated at 75 ohms; i.e., 75-ohm impedance on input and output
Insertion Loss	Less than 1.15 dB at 22.368 MHz with up to 20.6 feet (6.28 m) of 735A type or 22.2 feet (6.77 m) of 0222 type cross-connect jumper cable.
Crosstalk	Better than –60 dB
Return Loss	Greater than 20 dB (DC to 300 MHz)
Monitor Level	21.5 dB ±1.5 dB below signal level (DC to 300 MHz)

SECTION 2: INSTALLATION

1 DSX-4K SKELETON BAY

Figure 2-1 shows the DSX-4K Skeleton Bay, as shipped. Refer to ADCP-80-345 “Unequal Flange Rack Installation Guide” for instructions on installing the bay.

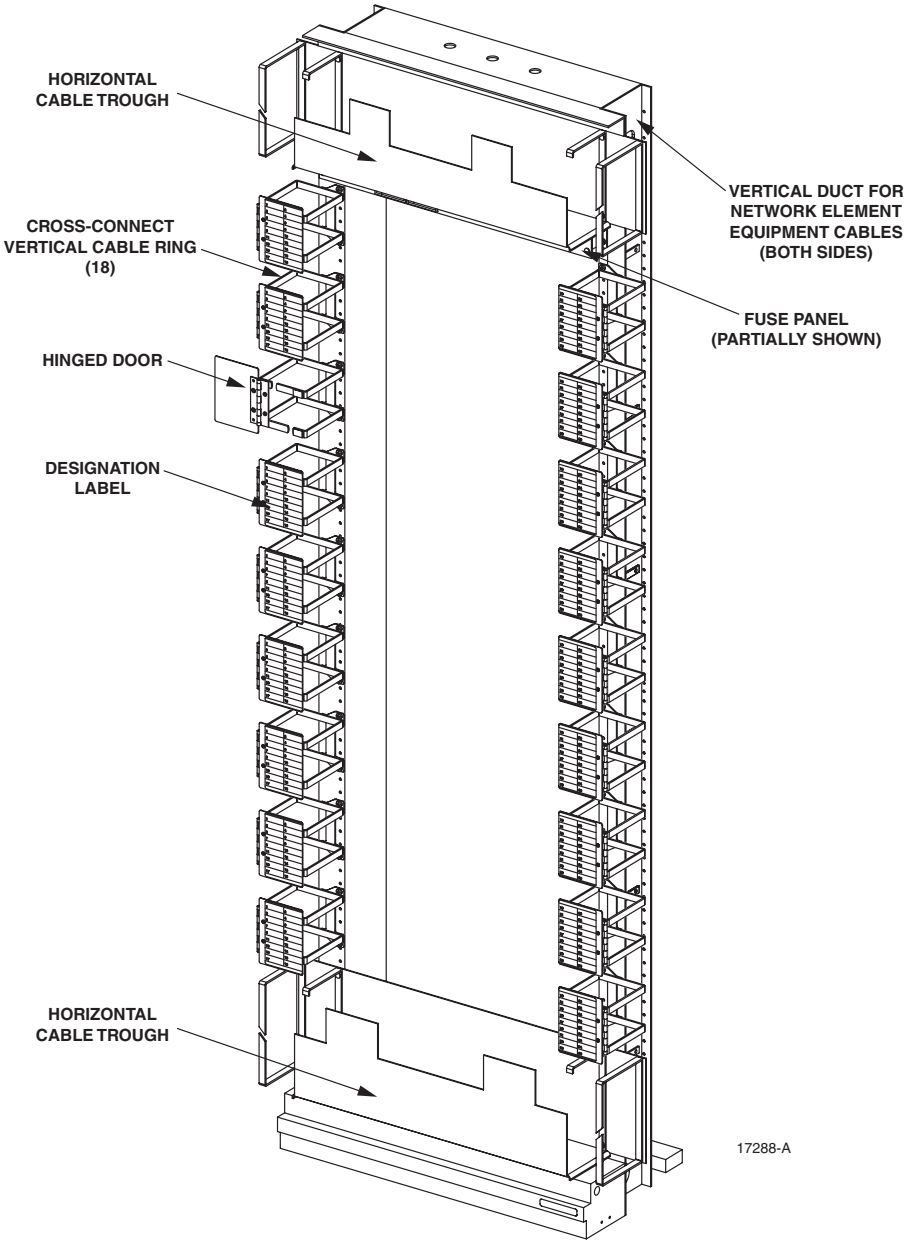


Figure 2-1. DSX-4K Skeleton Bay

2 FUSE PANEL

2.1 Install the Fuse Panel

Install the fuse panel (if required) in the mounting location directly under the top cable trough, as shown in Figure 2-2.

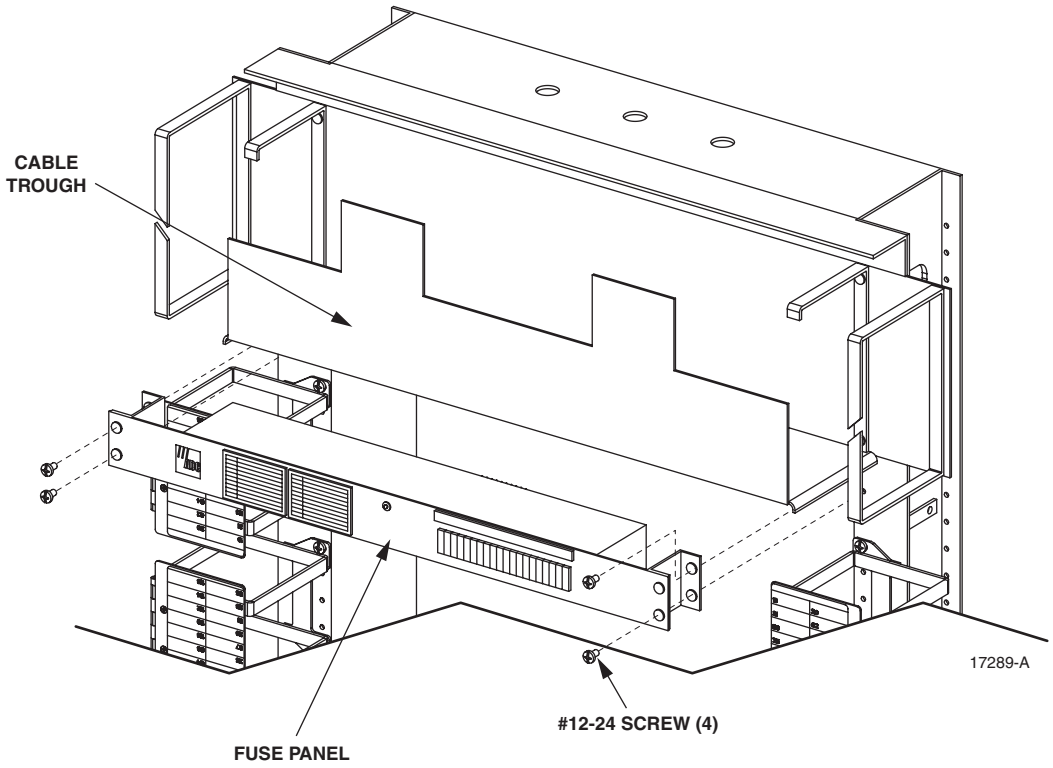


Figure 2-2. Fuse Panel Installation (Front View)

2.1.1 Connect Power and Ground Wire from BDFB to Fuse Panel

Connect power and ground wire (from BDFB) and ground the fuse panel to the bay as follows:

1. Determine the conductor length from the overhead power supply feeders to the fuse panel power terminals. The fuse panel accepts No. 6 feeder taps.
2. Using AWG No. 6 wire (2), connect the overhead supply feeders from BDFB to the NEG (–) BUS and the POS (+) BUS connectors on the rear of the fuse panel. Make sure to leave a service loop in each wire. See Figure 2-3.
3. Connect AWG No. 6 wire (Green) from the ground stud on the rear of the fuse panel to the grounding location at the top rear of the equipment bay. Make sure to leave service loop in wire.

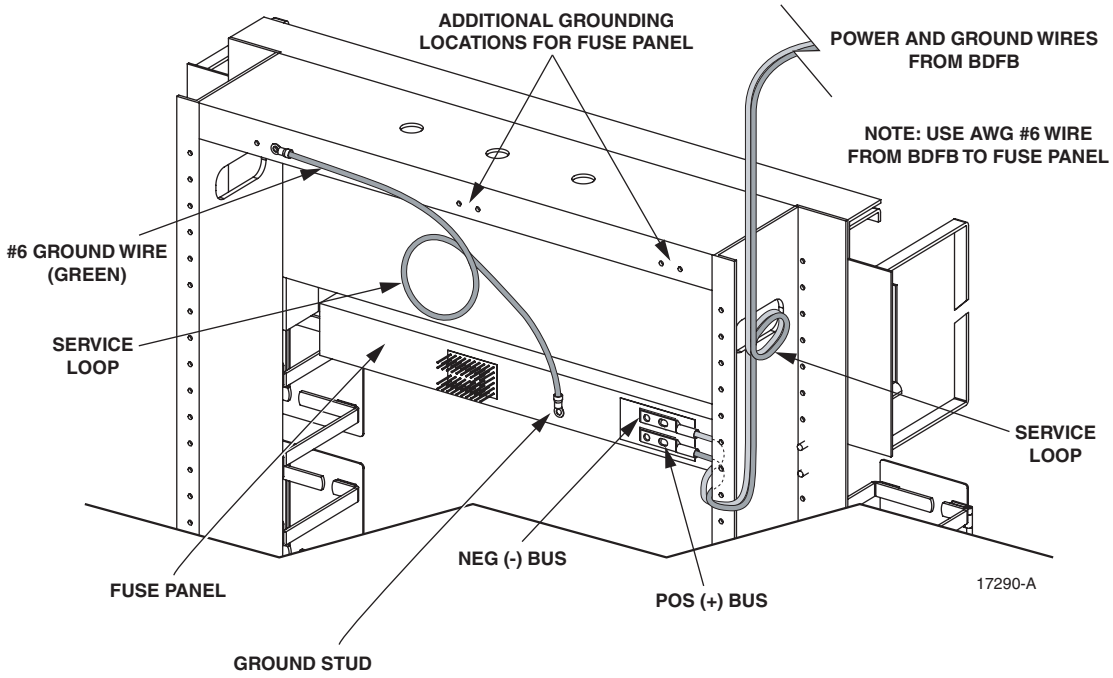


Figure 2-3. Power and Ground Connections to Fuse Panel (Rear View)

3 CHASSIS

Note: Chassis positions (i.e. 1 through 9) depend on equipment cable origin. For overhead cable entry, install the chassis starting at the lowermost mounting position (designated chassis 1) in the bay and working up. For under floor cable entry, install the chassis at the topmost mounting position (designated chassis 1) and working down.

3.1 Install the Chassis

Secure the chassis to the bay using six #12-24 by 0.375 inch (9.5 mm) machine screws (three on each side), as shown in Figure 2-4. (Screws are provided.)

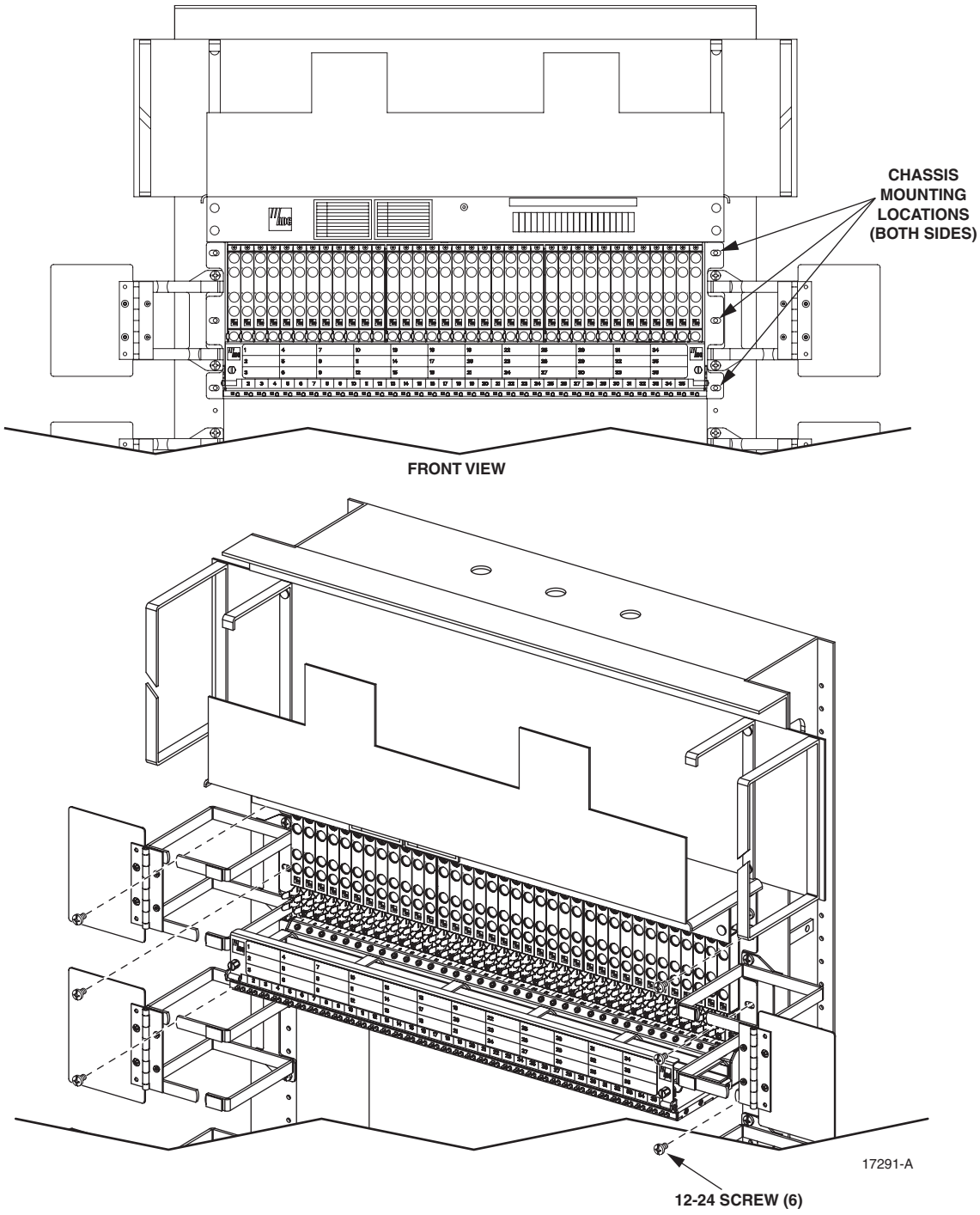


Figure 2-4. Chassis Installation

3.1.1 Connect Power and Ground Wires to Chassis

1. Connect and route a 22 AWG wire from the –48Vdc connector on the rear of the chassis to an unused NEG (–) wire wrap terminal pin on the rear of the fuse panel. (See Figure 2-5.)

2. Connect and route a 22 AWG wire from the RET connector on the rear of the chassis to an unused POS (+) wire wrap terminal pin on the fuse panel. (See Figure 2-5.)
3. Connect a 22 AWG wire from the chassis GND post to the frame as shown in Figure 2-5.

Note: Each chassis is fused separately. Fuses from left to right (as viewed from the front) correlate to chassis positions from either top to bottom (for under floor cable entry) or bottom to top (for overhead cable entry).

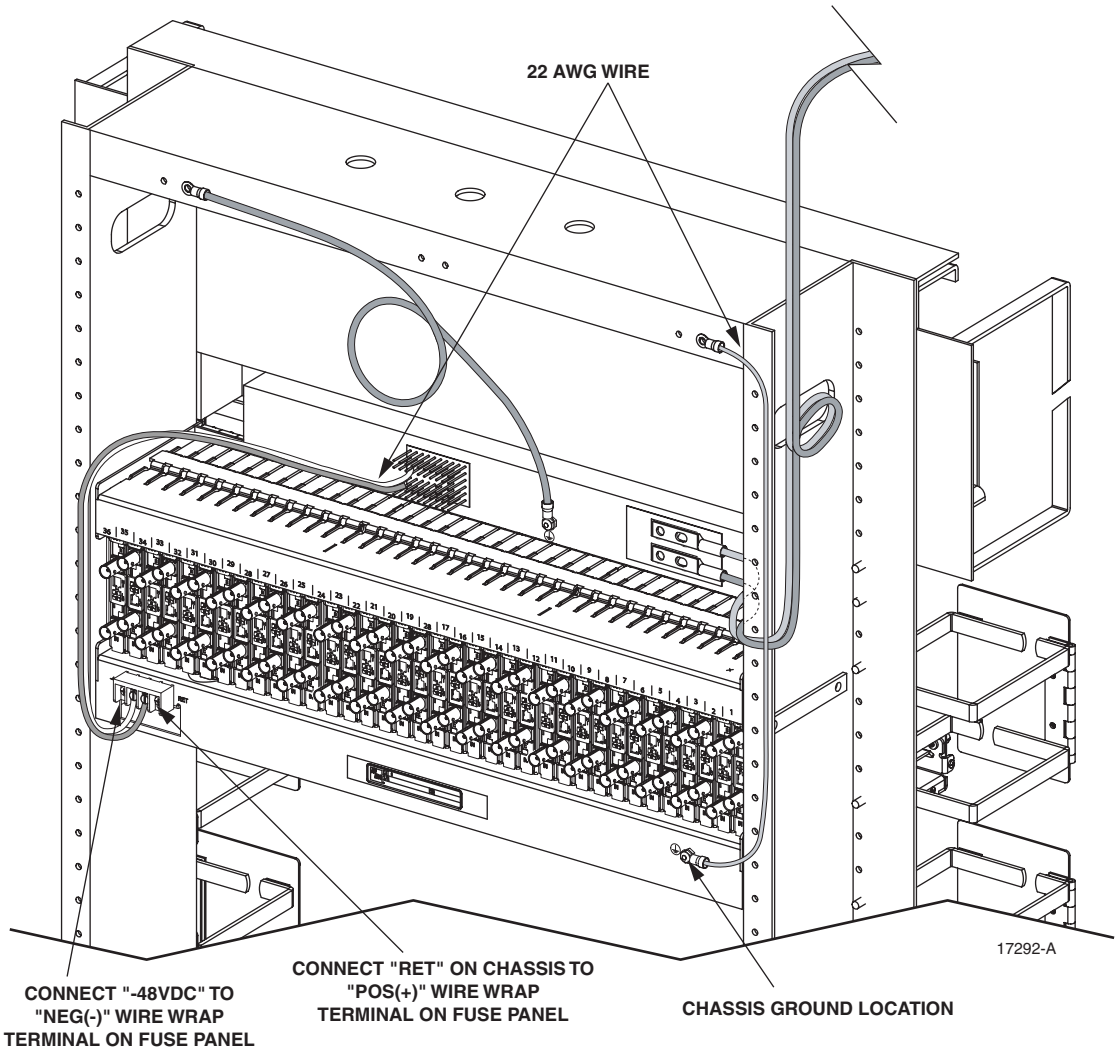


Figure 2-5. Connect Power and Ground Wires to Chassis

3.2 Install Cable Management Bars

Using 12-24 screws (two per cable bar), install the cable management bars as shown in Figure 2-7.

Note: Make sure wires from fuse panel and chassis ground wire are routed to the inside of the cable bars.
Note: Cable bars provide cable management for Network Element cables.

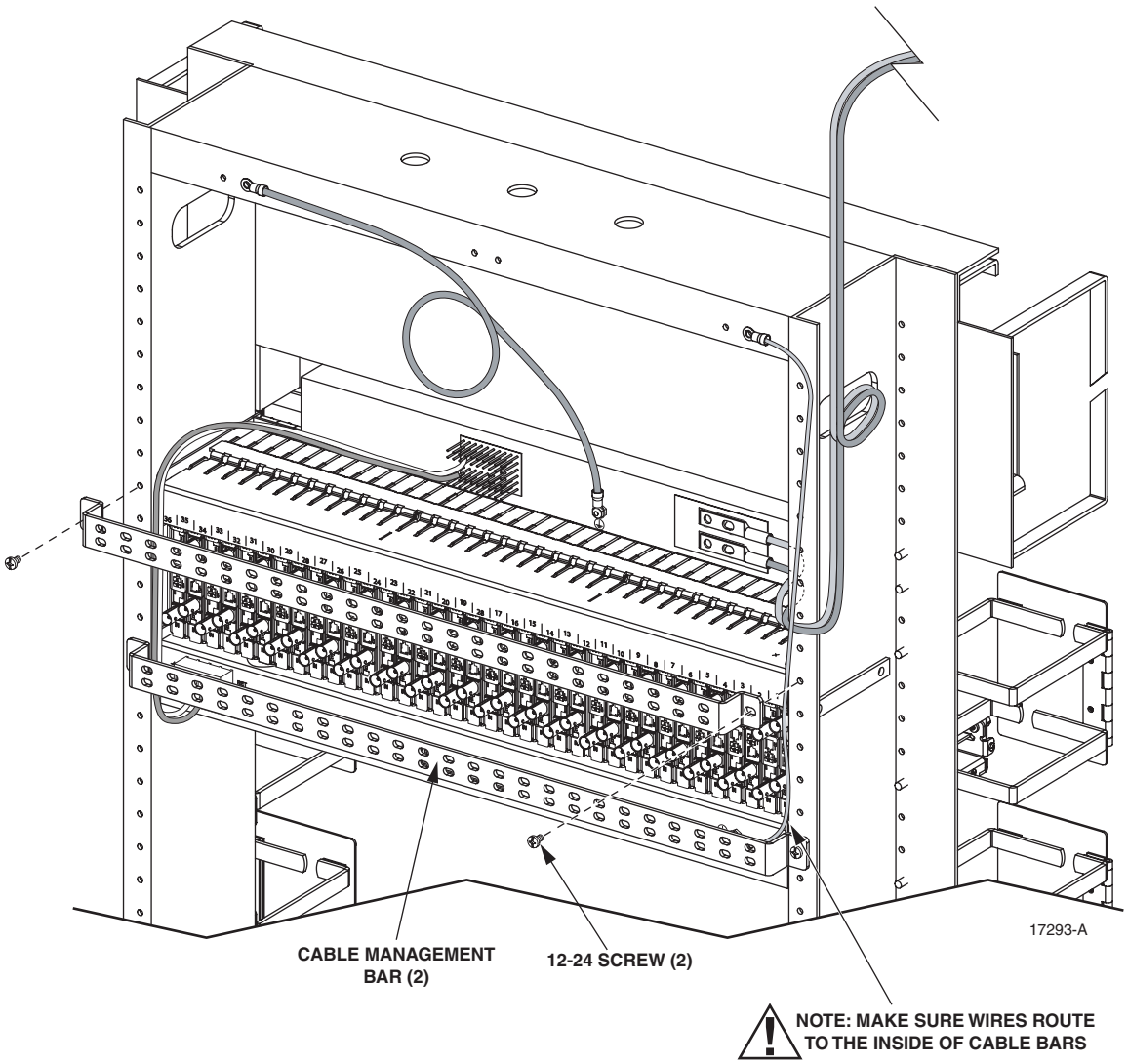


Figure 2-6. Cable Management Bar Installation

3.3 Install Circuit Modules (if Required)

Typically, chassis are shipped fully populated with 36, DSX-4KT circuit modules. If required, install each circuit module as follows:

Unscrew release knobs (2) and swing open cable tray door. Align each circuit module edge with respective mounting slot in chassis. Fully insert circuit module and tighten retaining screws (top and bottom). Close Cable tray door and tighten release knobs (2). See Figure 2-7.

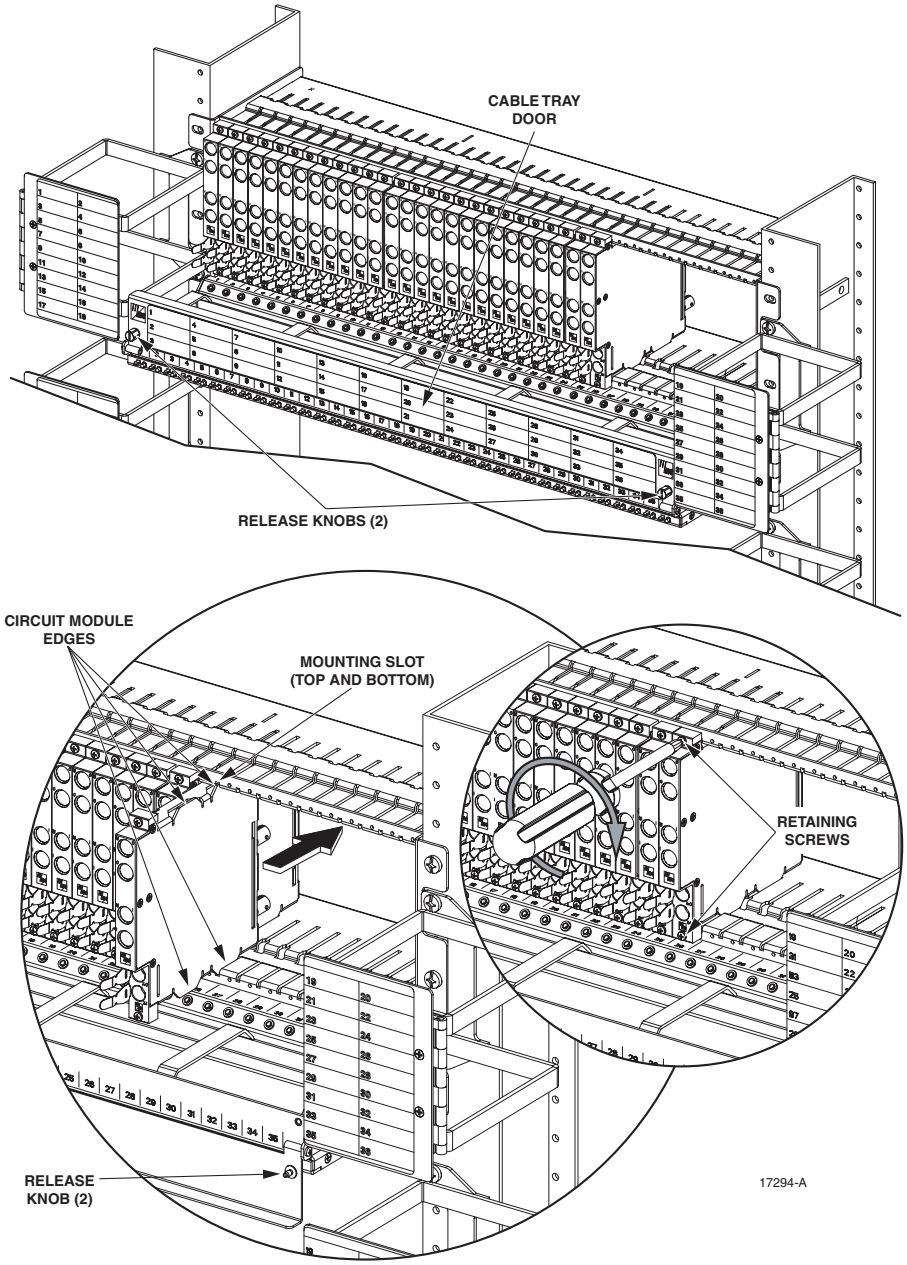


Figure 2-7. Circuit Module Installation

Note: Circuit modules must be installed from left to right (as viewed from front of chassis).

3.3.1 Re-Configure Circuit Module HI/LO Switch

All individually packed circuit modules are shipped with the HI/LO switch in the “HI” (up) position. Re-configure the HI/LO switch on all circuit modules installed in “EVEN” numbered mounting positions (i.e., 2, 4, 6, etc.) in the “LO” (down) position as shown in Figure 2-8.

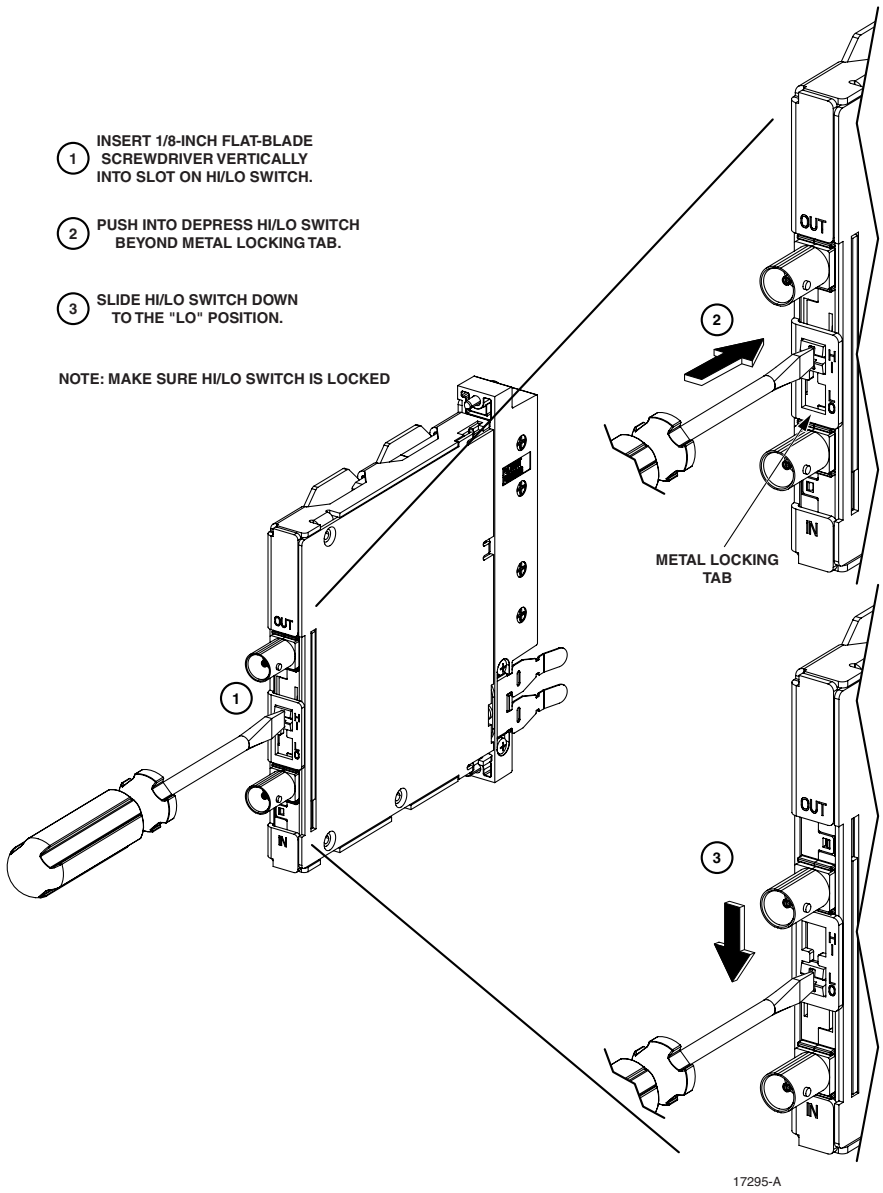


Figure 2-8. Re-Configure HI/LO Switch

4 CABLE ROUTING

4.1 Network Element (Equipment) Cable Routing

Equipment IN/OUT cabling to the DSX cross-connect bay is brought in at the rear of the bay either from above or below depending on overhead or under floor cable entry environments. For overhead cable entry environments, start at the lowermost chassis (designated chassis 1) and work up. For under floor cable entry environments, start at the topmost chassis (designated chassis 1) and work down. See Figure 2-9.

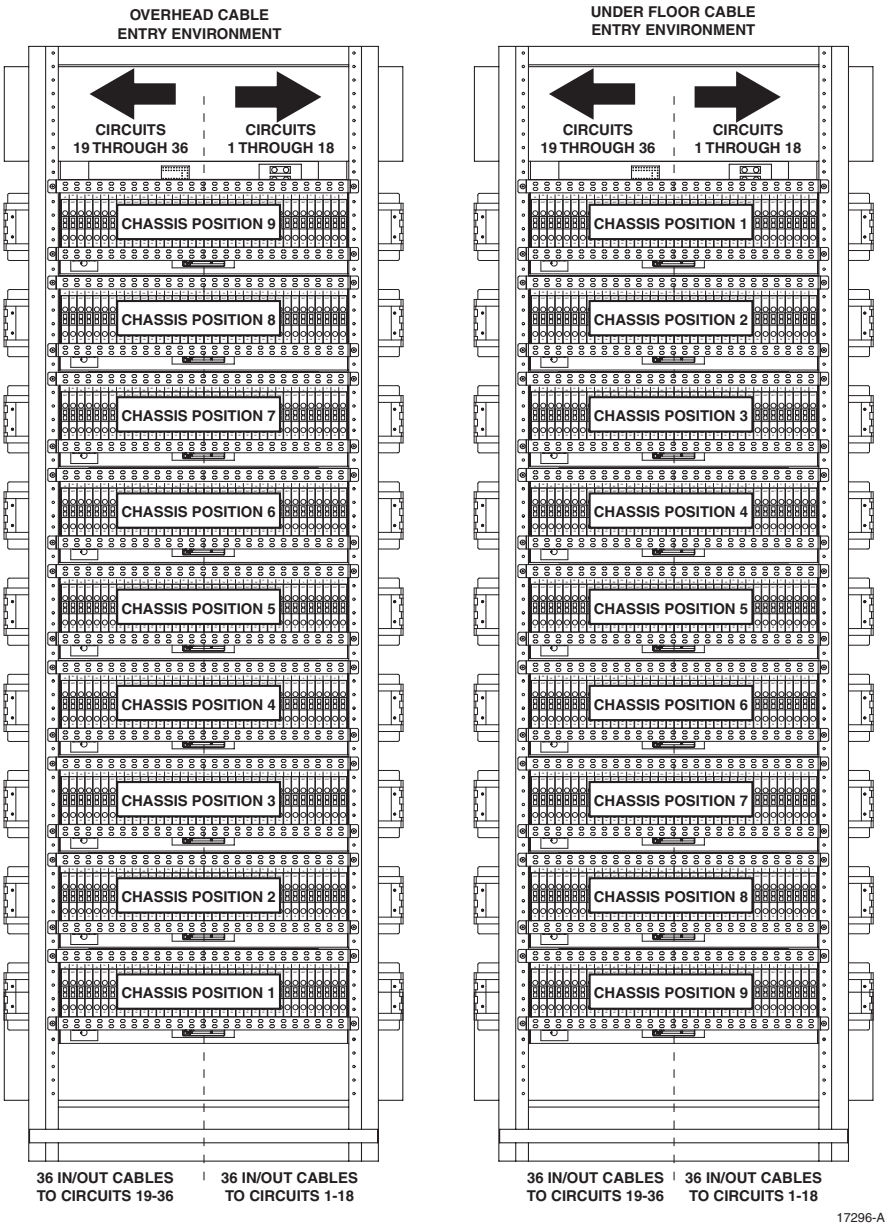


Figure 2-9. Chassis Designations (Rear View)

Figure 2-10 shows a network element (equipment) cable routing example for circuits 13 through 18. In this example, equipment cables are terminated starting at circuit module 18 and working toward the right (as viewed from the rear). Terminate the cable from the equipment's transmit "OUT" port to the OUT connector and the cable from the equipment's receive "IN" port to the IN connector. Cables are bundled in groups of six.

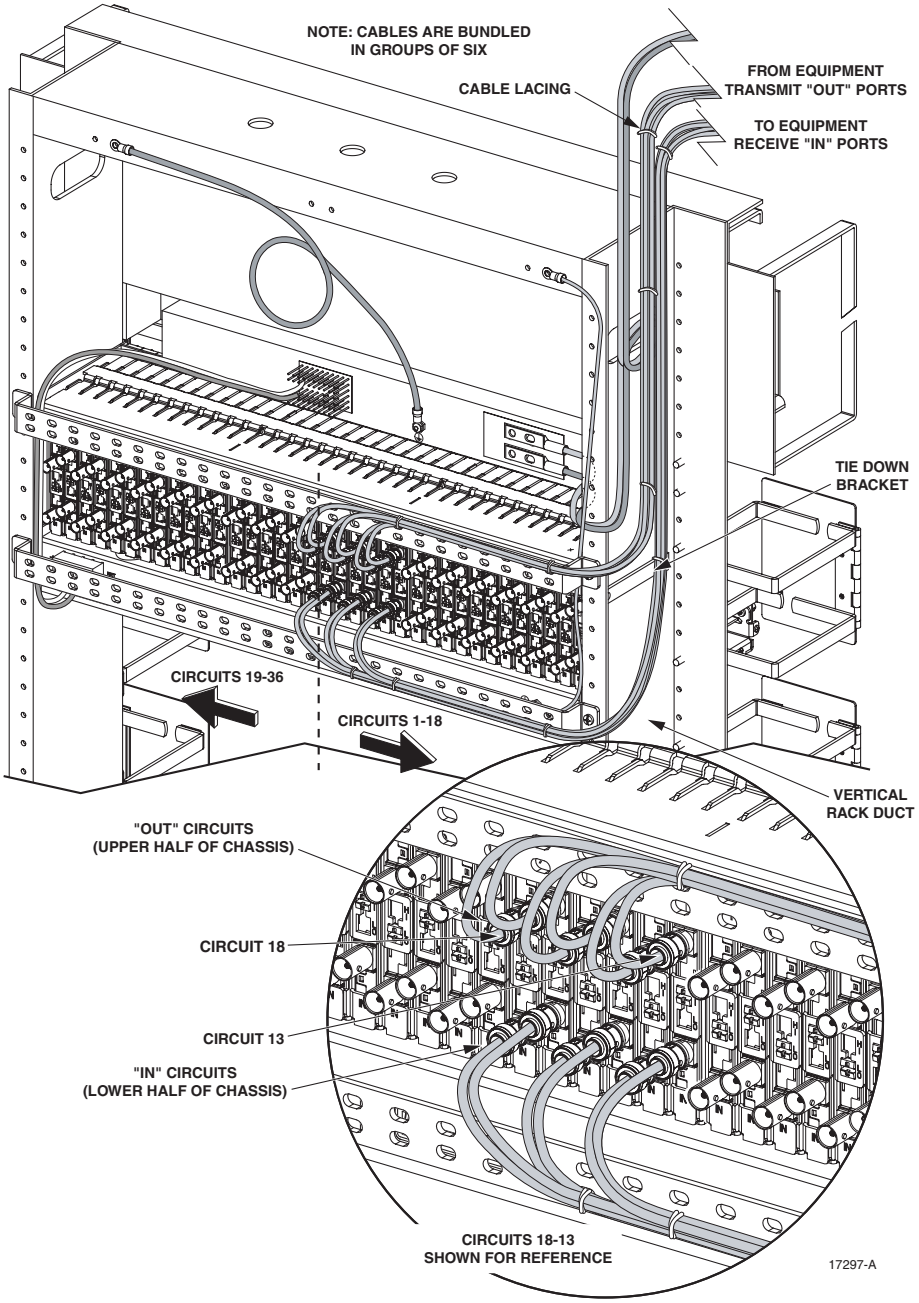


Figure 2-10. Network Element Cable Routing Example

Make sure that all IN/OUT cables for circuits 1 through 18 are run vertically along the right side of the bay (as viewed from the rear) and all IN/OUT cables for circuit 19 through 36 are run vertically along the left side. The cables should be routed in the vertical rack duct and attached to cable tie down brackets with cable lacing. Refer to Figure 2-10.

Record all terminations on designation labels located on cable ring doors at front of bay. See Figure 2-11.

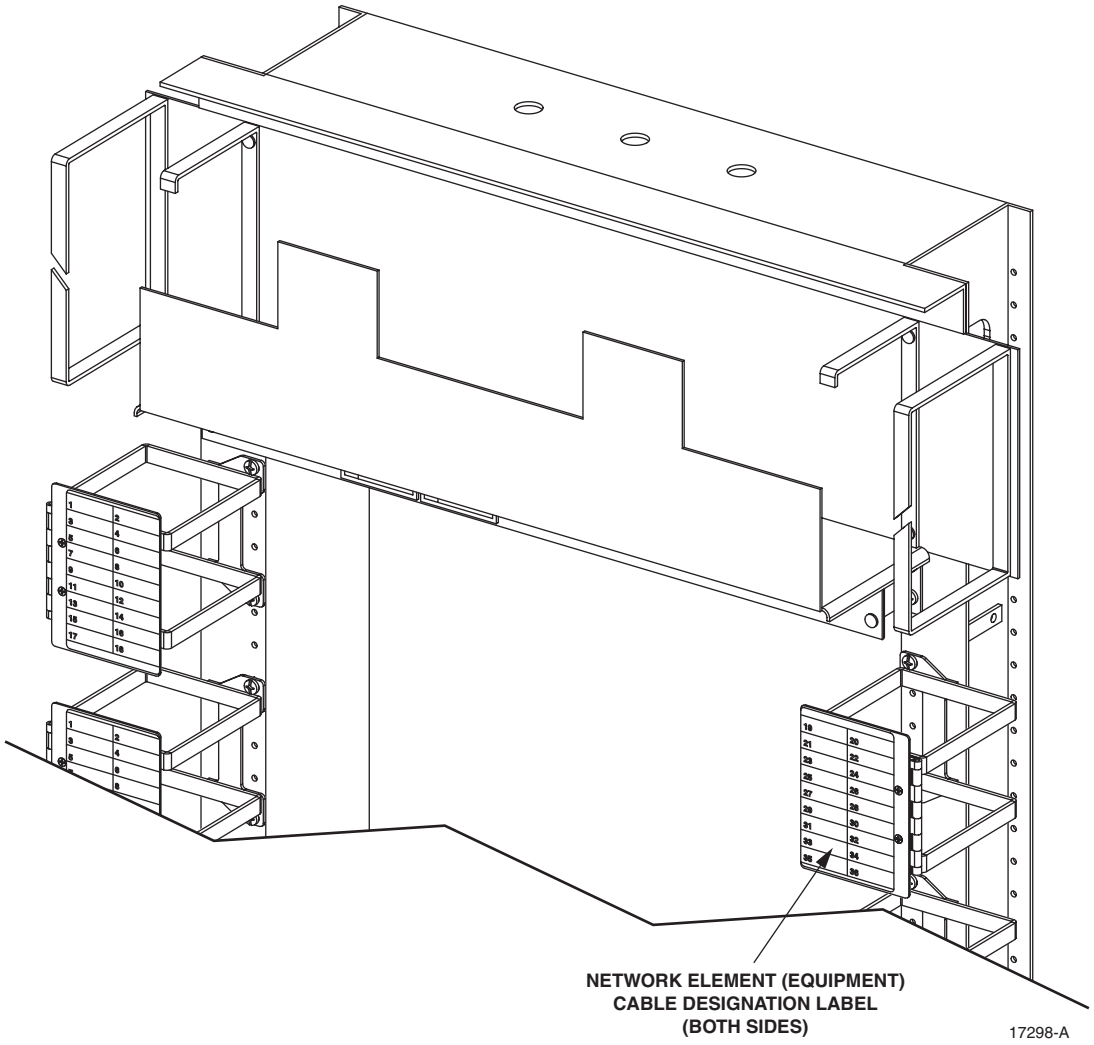


Figure 2-11. Designation Labels (Front View)

To minimize congestion in the inner-bay ducts, all cables routed to a particular chassis must be bundled together in groups of SIX using cable lacing. The bundles for each chassis must then be sequenced in the inter-bay ducts according to the type of cable (734A or 735A) as shown in Figure 2-12 and Figure 2-13, respectively. Table 2-1 lists the minimum bend ratios for 734A and 735A cables.

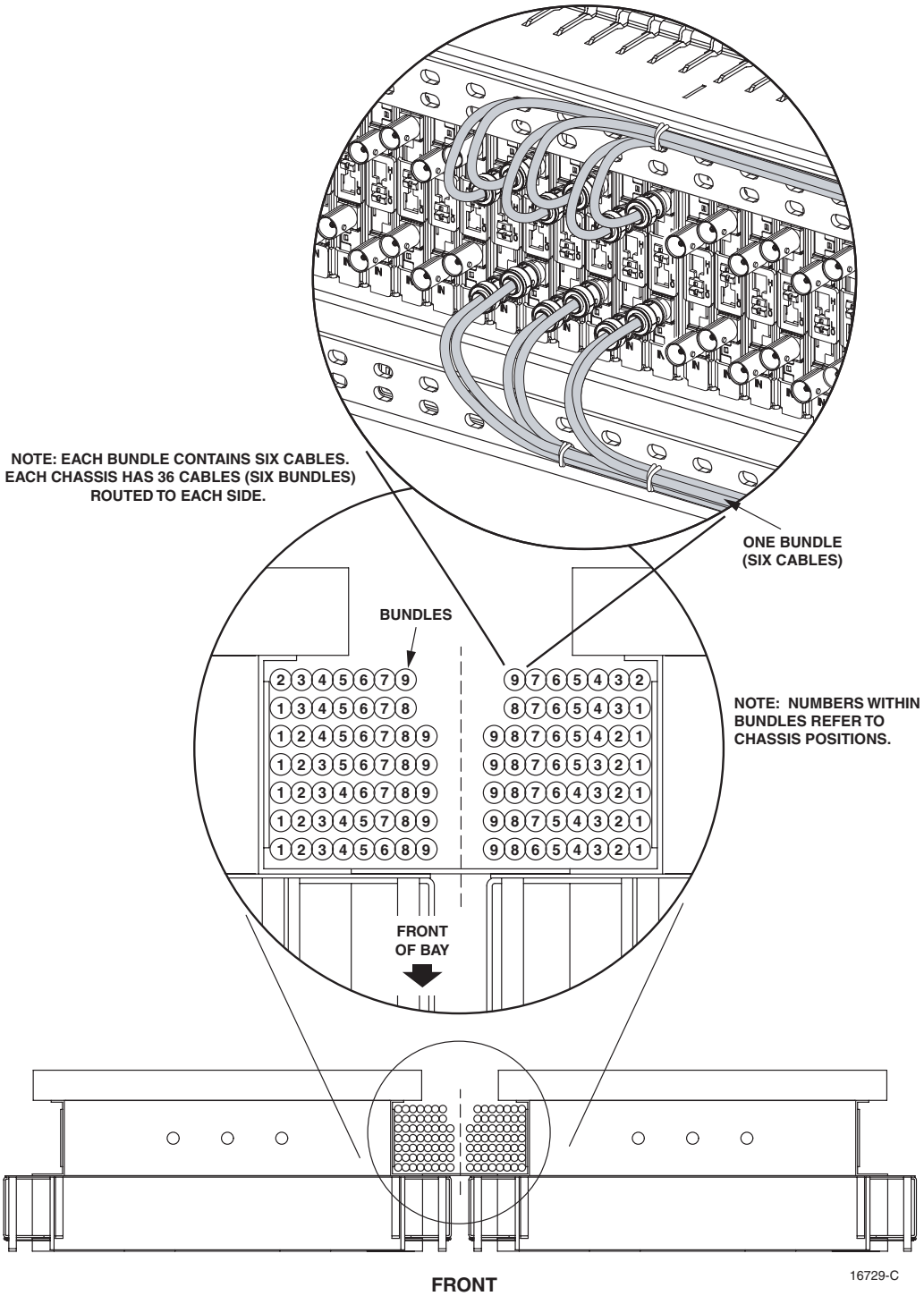


Figure 2-12. Inter-Bay 734A Type Equipment Cable Bundle Anchoring

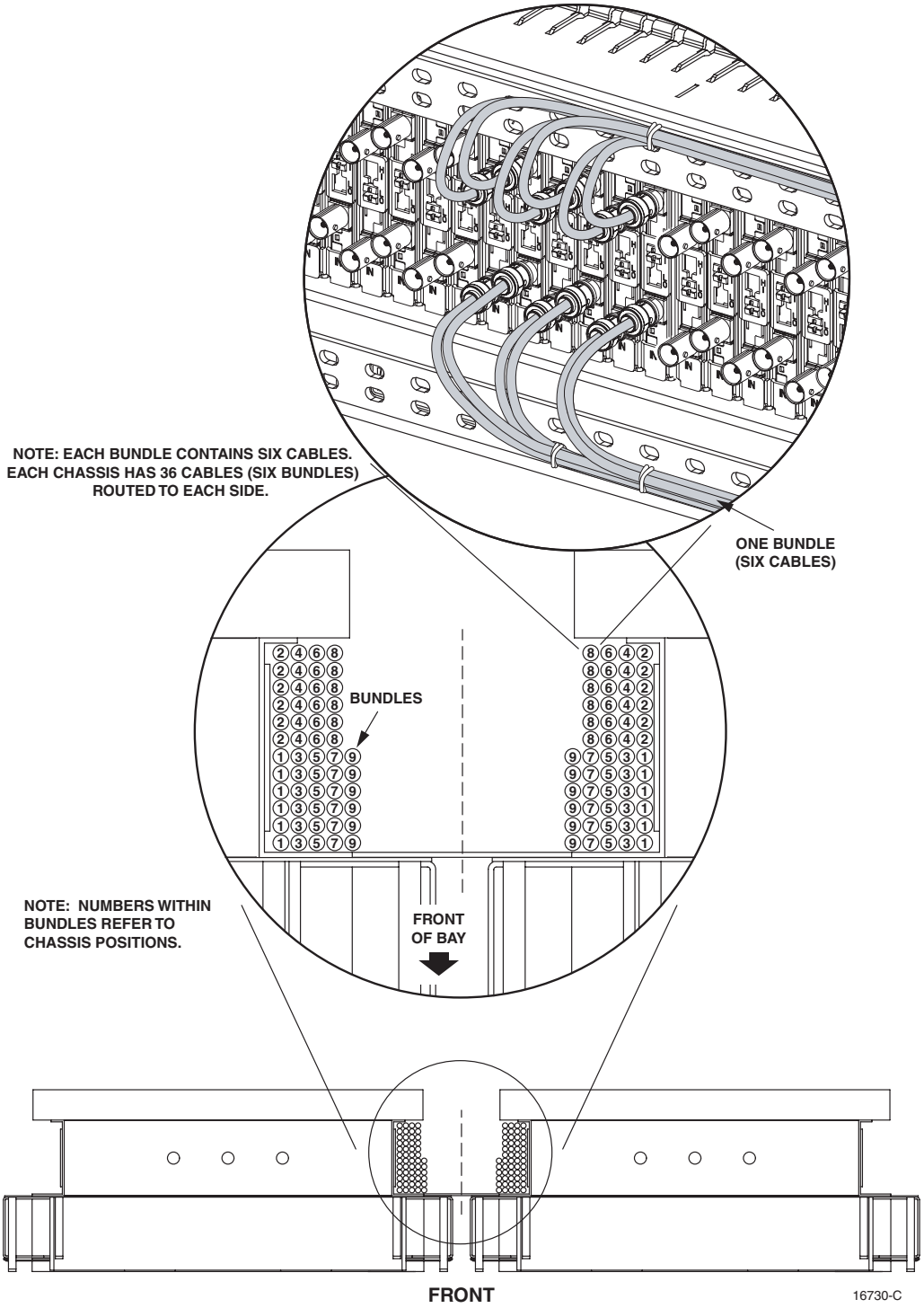


Figure 2-13. Inter-Bay 735A Type Equipment Cable Bundle Anchoring

Table 2-1. Cable Bend Radius

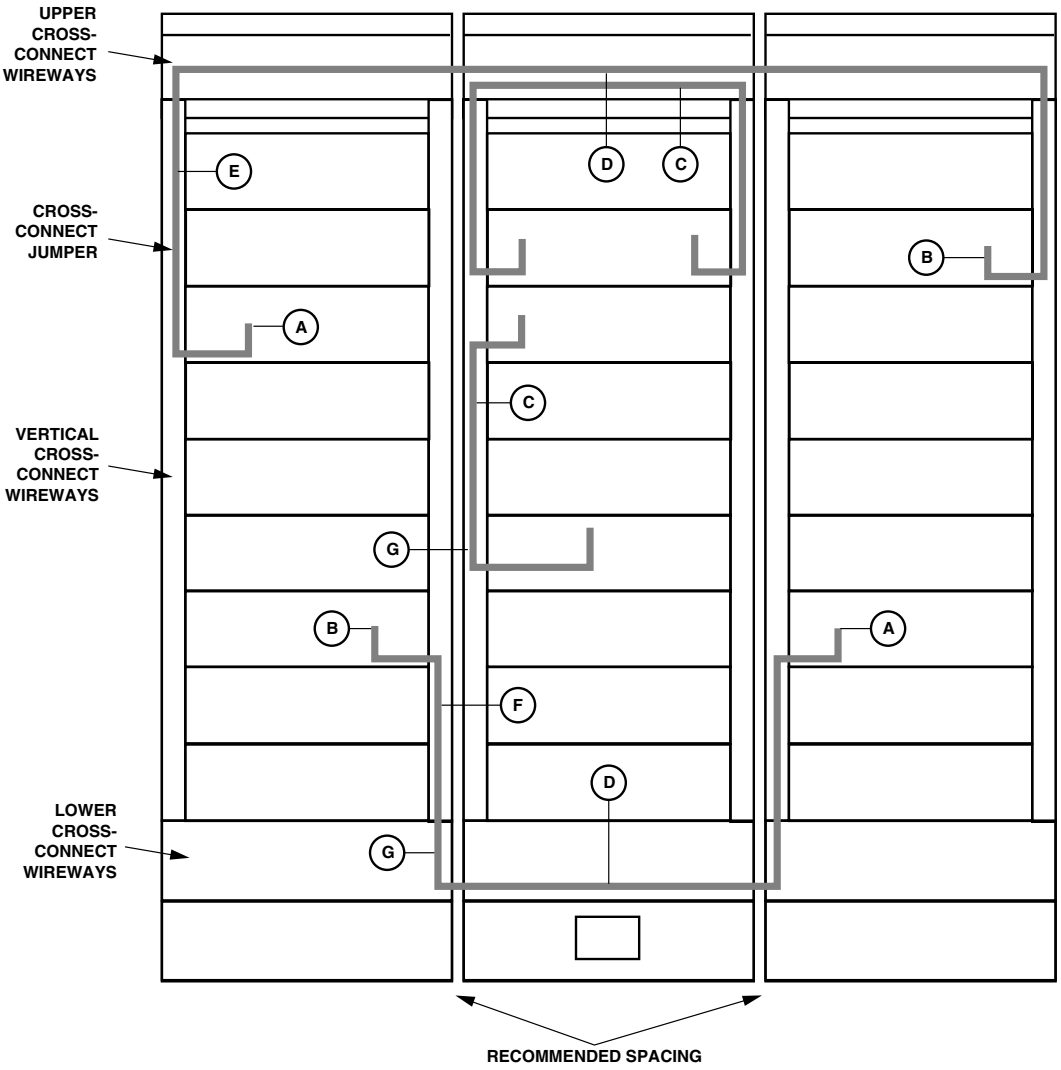
CABLE TYPE	MINIMUM BEND RADIUS
734A or Equivalent	0.5 inches
735A or Equivalent	0.25 inches

4.2 Cross-Connect Cable Routing

When installing cross-connect jumpers it is important that congestion be held to a minimum. This will not only simplify installation, but will also provide optimal jumper traceability and easier system expansion and maintenance.

The recommended rules of jumper routing are defined in Figure 2-14. The figure shows a three-bay system; however, the same basic rules apply for any number of bays. Cross-connect jumpers should not exceed specified lengths. To prevent unnecessary buildup and congestion, all discontinued cross-connects must be removed from the wireways.

Note: ADC recommends that cross-connect cables originating on the upper four chassis positions in the bay be routed through the upper horizontal cable trough. Conversely, cables originating on the lower five chassis positions be routed through the lower horizontal cable trough.



NOTE: BASED ON THE TYPE OF CABLE SELECTED FOR EQUIPMENT IN/OUT CABLING AND CROSS-CONNECT JUMPER, THE ADC RECOMMENDED SPACING IS AS FOLLOWS:

APPLICATION		
EQUIPMENT I/O	X-CONN	SPACERS REQUIRED FOR UEF BAYS
735A/734A	735A OR 0222	ONE 5-INCH (12.7 CM) BETWEEN BAYS WITH ONE 2.5-INCH (6.35 CM) ON THE ENDS

ROUTING RULES

A. All jumpers in the left-hand side of the cross-connect field should enter and leave the bay from the left vertical wireways.

B. All jumpers in the right-hand side of the cross-connect field should enter and leave the bay from the right vertical wireways.

C. All intrabay cross-connects should use the vertical rings.

D. All interbay cross-connects should use the horizontal wireways.

E. All jumpers originating in the upper half of the cross-connect field should route via the upper horizontal wireways.

F. All jumpers originating in the lower half of the cross-connect field should route via the lower horizontal wireways.

G. Whenever a jumper changes direction, it should do so at a ring or wireway.

16743-A

Figure 2-14. Recommended Cross-Connect Routing

Using cross-connect jumpers with accompanying tracer wires, cross connect all necessary DSX-4K circuits as shown in Figure 2-15.

Connect the cross-connect X-O (OUT) of the first termination to the cross-connect X-I (IN) of the second termination. Connect the tracer wire pins of this cross-connect to tracer lamp pin jacks on each termination. Tracer wire pins may be only one pin jack per slot.

Connect the cross-connect X-I (IN) of the first termination to the cross-connect X-O (OUT) of the second termination. Connect the tracer wire pins of this cross connect to the remaining tracer lamp pin jack on each termination.

Dual cross-connect jumpers are available in various lengths from 1 to 27 feet (0.3 to 8.23 m). It is important to select the proper cable length to prevent undesirable congestion. Cross-connect jumpers are also available with one connector factory terminated and one connector kit which is terminated on site. This method allows jumpers to be cut to the exact length required, eliminating excess jumper buildup.

Disconnect any discontinued cross-connect jumpers at each end and remove them from the wireways.

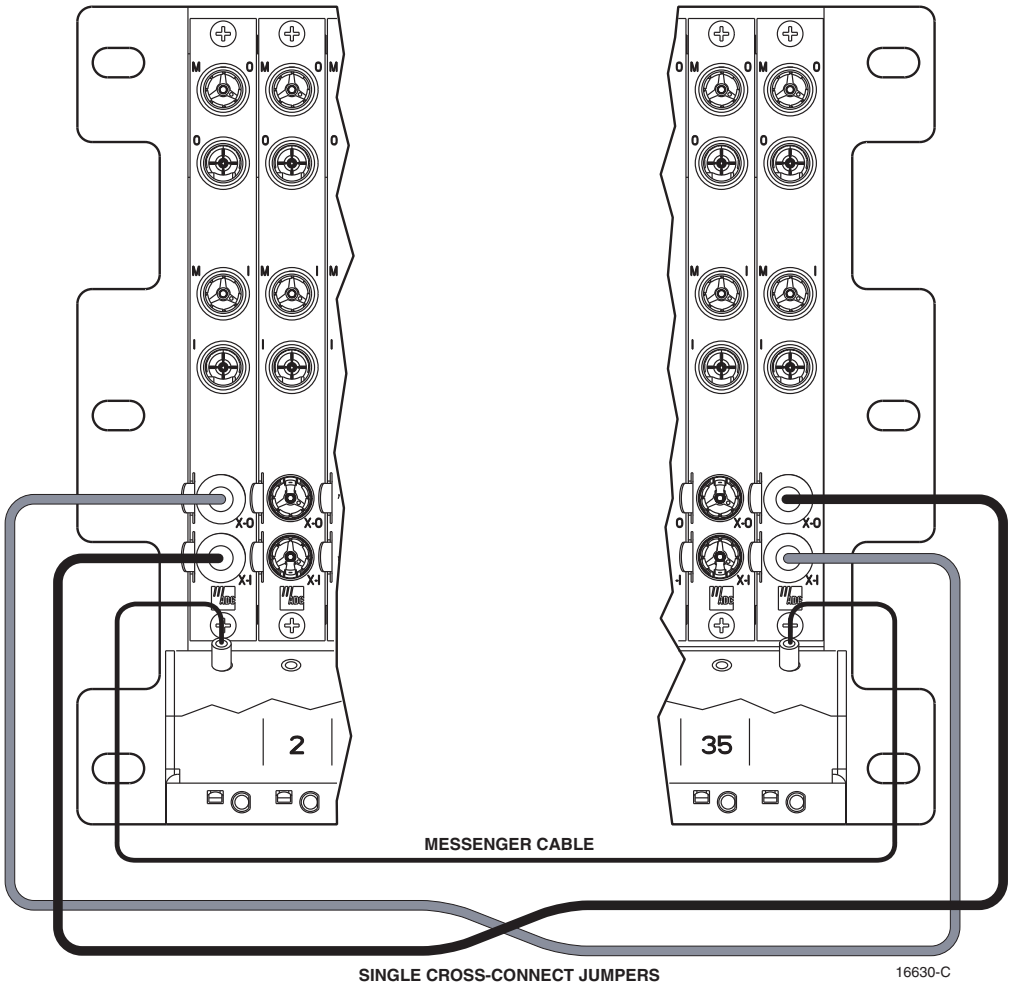


Figure 2-15. DSX-4KT Cross Connection

5 CROSS-CONNECTING ADC AND AVAYA CHASSIS

Table 2-2 describes the operating status of the tracer cross-connect LEDs when –48Vdc ADC chassis are intermixed with Avaya Corporation –24 Vdc and/or –48 Vdc chassis in the same system.

Table 2-2. Intermixed Chassis LED Operating Status

LOCATION OF ACTIVATED CROSS-CONNECT TRACER SWITCH	RESULT IN –48 VDC ADC CHASSIS	RESULT IN –24 VDC AVAYA CHASSIS	RESULT IN –48 VDC AVAYA CHASSIS
ADC Chassis	LED flashed and then lights steady	LED does not light	LED lights steady
Avaya –24 Vdc Chassis	LED does not light	LED flashes and then lights steady	
Avaya –48 Vdc Chassis	LED flashes and then lights steady		LED flashes and then lights steady

To overcome the problems associated with intermixing ADC –48 VDC and Avaya –24 Vdc chassis, the following procedure may be performed to change the output voltage level of the Avaya 32A1 Fuse Panel from –24 Vdc to –48 Vdc:

Disconnect the RED lead from the RTN lug on the internal power converter terminal block.

Reconnect the RED lead to the OFF lug on the internal power converter terminal block. Do NOT remove the existing GREEN lead attached to the OFF lug.

Loosen the front side power ON/OFF toggle switch nut. Rotate the switch 180 degrees and then re-tighten the nut.

Disconnect the BLACK lead from the +IN lug on the internal power converter terminal block. Cut the opposite end of this lead from the terminal to which it is soldered and discard the lead.

Disconnect the RED lead from the –IN lug on the internal power converter terminal block. Cut the opposite end of this lead from the terminal to which it is soldered and discard the lead.

Stencil “MODIFIED FOR –48 V OUTPUT” on the front side of the panel near the logo.

6 POWER APPLICATION AND SYSTEM CHECKOUT

Ensure that a 0.5 Amp fuse is in place in the fuse panel for each DSX-4K chassis in the bay. Fuses from left to right (as viewed from the front) correlate to chassis from either bottom to top (overhead cable entry environments) or top to bottom (under floor cable entry environments) with one fuse for each chassis. Apply –48 Vdc office battery at the office distribution panel.

Cross-connect jumpers can be checked as necessary by setting the tracer lamp toggle switch on the DSX-4K chassis to the pulled (ON) position. In the pulled position, this switch causes the corresponding tracer lamp and the tracer lamp at the other end of the cross connect to flash for approximately 30 seconds and then remain lit until the switch is returned to the pushed (OFF) position.

SECTION 3: OPERATION

1 GENERAL

This section presents step-by-step procedures for using the DSX-3 (DSX-4K) Front Cross-Connect System. Each procedure includes:

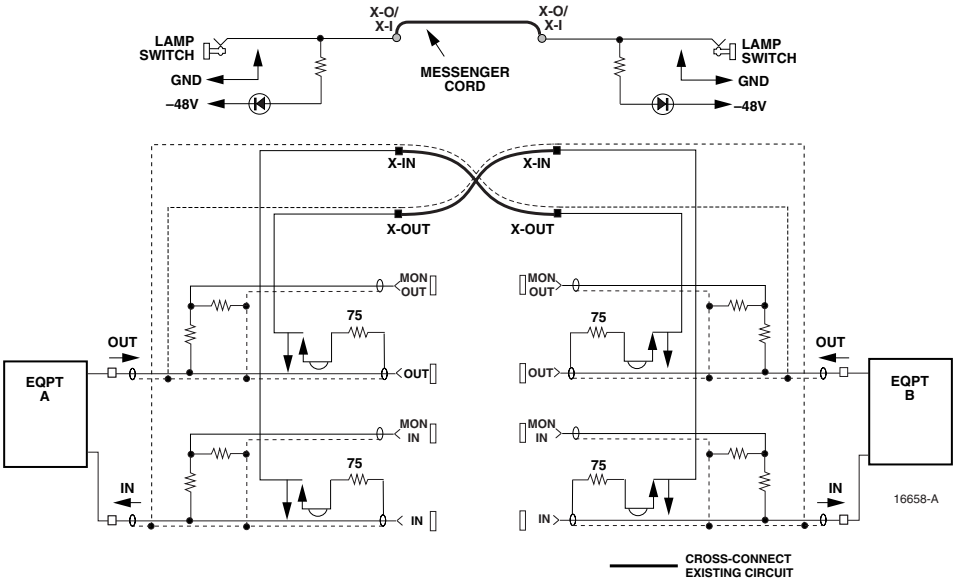
1. A brief description of the procedure and its purpose.
2. A general schematic illustration of the procedure.
3. Steps to perform the procedure.

If problems are encountered in performing any of these procedures contact ADC Telecommunications as described in SECTION 5: General Information.

PROCEDURE 1: CROSS-CONNECT CIRCUIT IDENTIFICATION

This procedure is used to identify the equipment terminated at the opposite end of a cross-connect jumper.

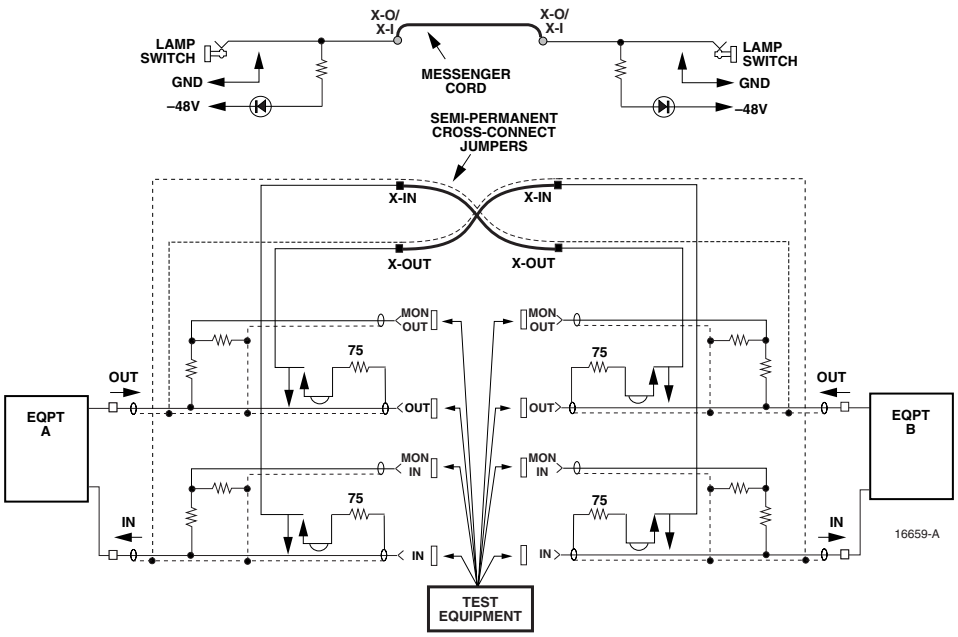
STEP	PROCEDURE
1	Switch on (pull out) the DSX-4KT lamp switch (LS) for the known equipment termination.
2	Observe all tracer lamps. The tracer lamp for the known equipment termination, and the tracer lamp for the unknown cross-connected equipment termination, will both flash for approximately 30 seconds and then remain lit.
3	Set tracer lamp toggle switch (push in) to extinguish tracer lamps after use.



PROCEDURE 2: DIGITAL OFFICE EQUIPMENT TEST

This procedure is used to test two digital office equipment units cabled together at the cross-connect system. The units can be tested either with or without interruption of the circuit cross-connect.

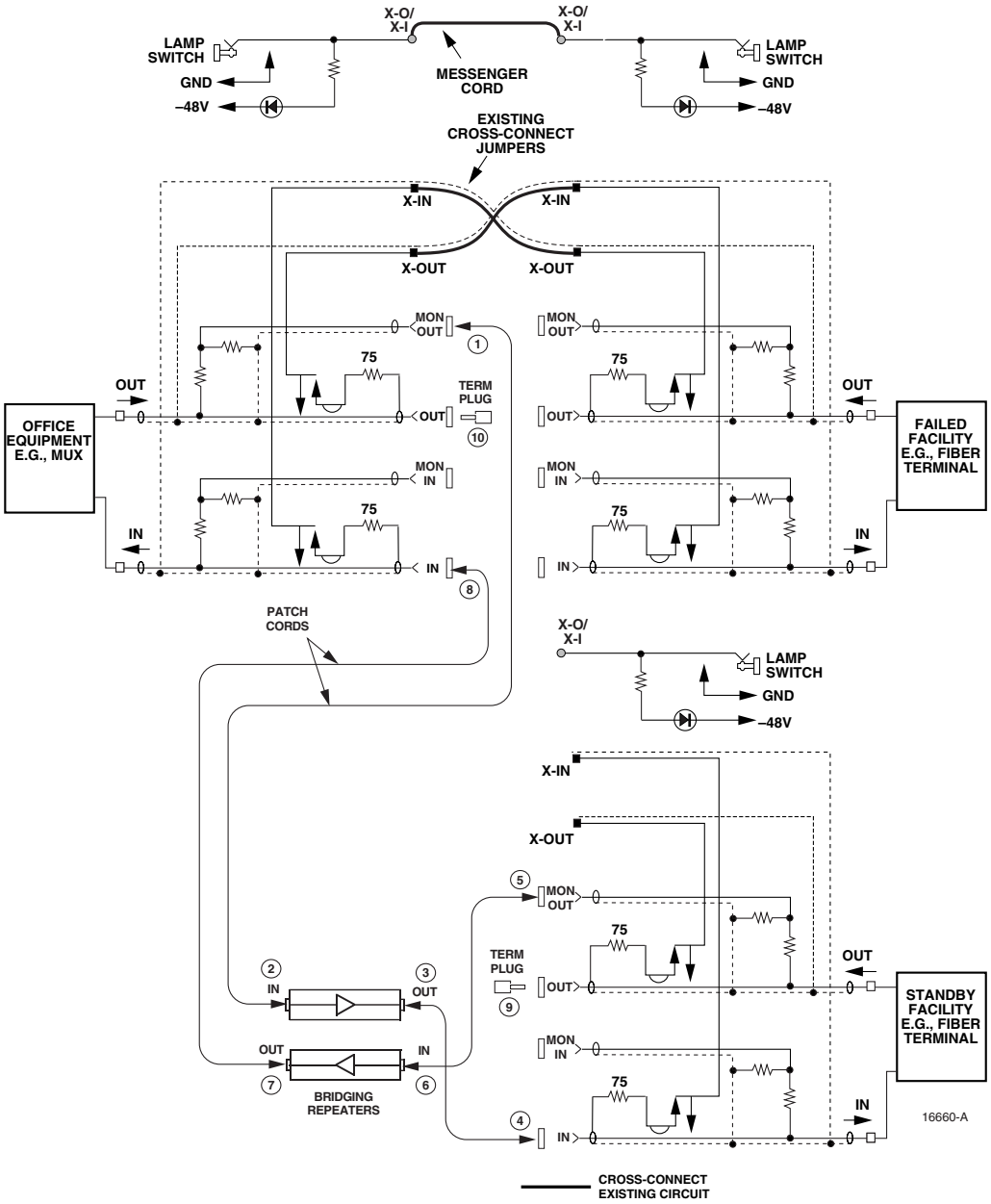
STEP	PROCEDURE
1	To test a circuit at the cross-connect point of the two equipment units without interrupting the cross-connect circuit, plug the appropriate test unit into the desired MON jack and perform the test.
2	To open a cross-connect circuit (this will interrupt any active circuits between EQPT A and EQPT B) and test an equipment unit output which is cabled to the cross-connect system, plug the appropriate test unit into the OUT jack of the circuit to be tested.
3	To open a cross-connect circuit (this will interrupt any active circuits between EQPT A and EQPT B) and test an equipment unit input which is cabled to the cross-connect system, plug the appropriate test unit into the IN jack of the circuit to be tested.
4	Remove test equipment patch cords after testing is complete.



PROCEDURE 3: IN-SERVICE PATCHING TO BYPASS A FAILED FACILITY

This procedure is used to restore service on a failed circuit when patches are installed and removed. This illustration represents the near end office. A similar corresponding far end office patch must also be performed, but is not shown.

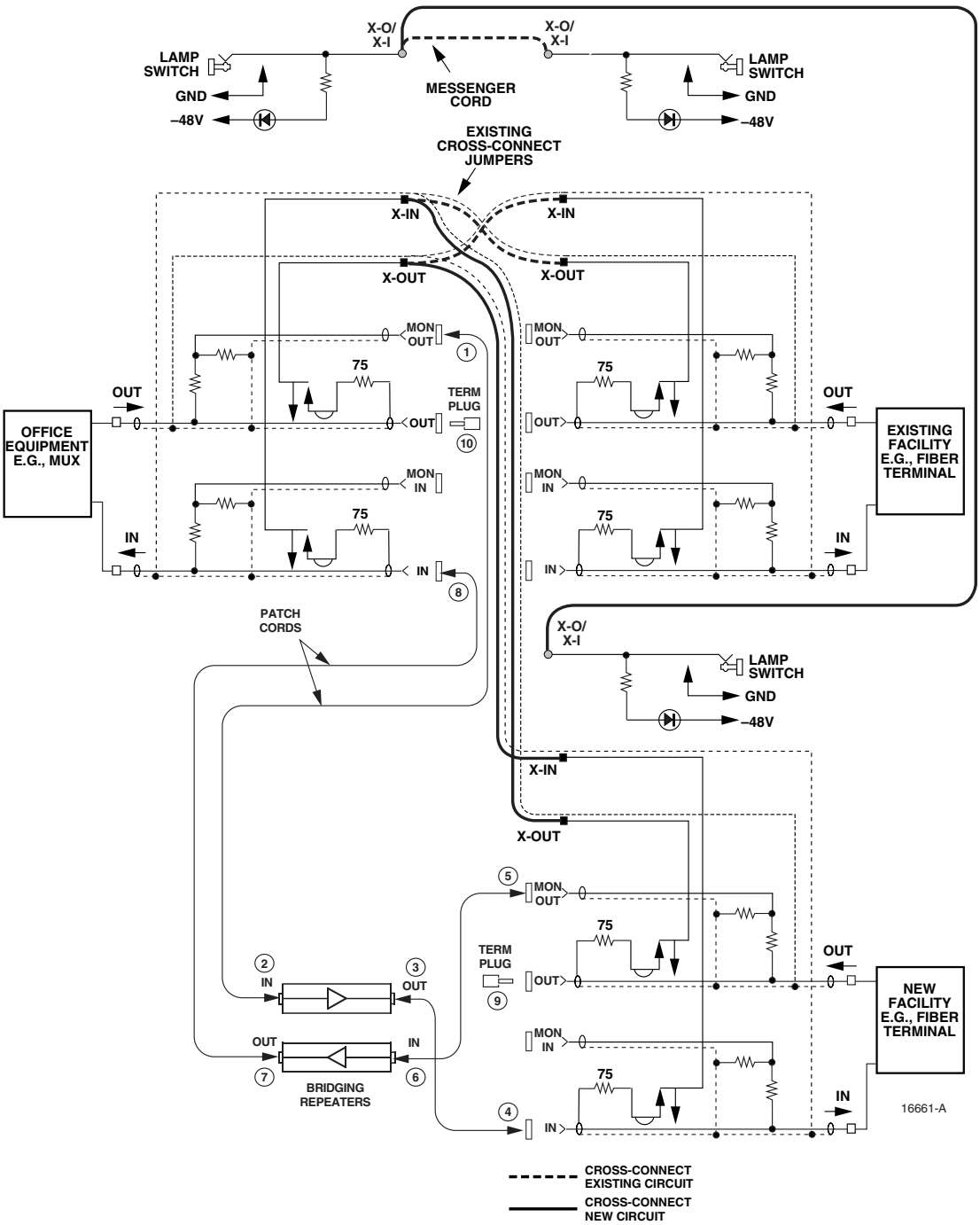
STEP	PROCEDURE
1	Select a standby facility to which communication between the two interrupted sites will be rerouted.
2	At both sites interrupted by the damaged facility, patch the office equipment to standby facility using patch cords as follows: (a) Connect the office equipment MON OUT jack ① to a bridging repeater IN jack ②. (b) Connect the bridging repeater OUT ③ jack to the standby facility IN jack ④. **Perform steps 2(a) and 2(b) at corresponding far end office before proceeding.** (c) Connect the standby facility MON OUT jack ⑤ to a bridging repeater IN jack ⑥. (d) Connect the bridging repeater OUT ⑦ jack to the office equipment IN jack ⑧. **Perform steps 2(c) and 2(d) at corresponding far end office before proceeding.**
3	Insert a 75 ohm terminating plug into the standby facility OUT jack ⑨.
4	Insert a 75 ohm terminating plug into the office equipment OUT jack ⑩. **Perform steps 3 and 4 at corresponding far end office.**
5	Service is now temporarily restored between the interrupted sites.
6	After the failed facility is repaired, remove patch cords in reverse order as follows: ⚠ **Warning:** *Reverse order must be followed exactly to avoid another interruption when removing in-service patch!*
7	Remove the 75 ohm termination plug from the office equipment OUT jack ⑩.
8	Remove the 75 ohm termination plug from the standby facility OUT jack ⑨. **Perform steps 7 and 8 at corresponding far end office before proceeding**.
9	Remove office equipment IN jack ⑧ to bridging repeater OUT jack ⑨. (b) Remove bridging repeater IN jack ⑥ to standby facility MON OUT jack ⑤. **Perform steps 9(a) and 9(b) at corresponding far end office before proceeding.** (c) Remove standby facility IN jack ④ to bridging repeater OUT jack ③. (d) Remove bridging repeater IN jack ② to office equipment MON OUT jack ①. **Perform steps 9(c) and 9(d) at corresponding far end office.**



PROCEDURE 4: IN-SERVICE ROLL OVER TO NEW FACILITY

This procedure is used to rearrange working circuits without interrupting service when patches are installed and removed.

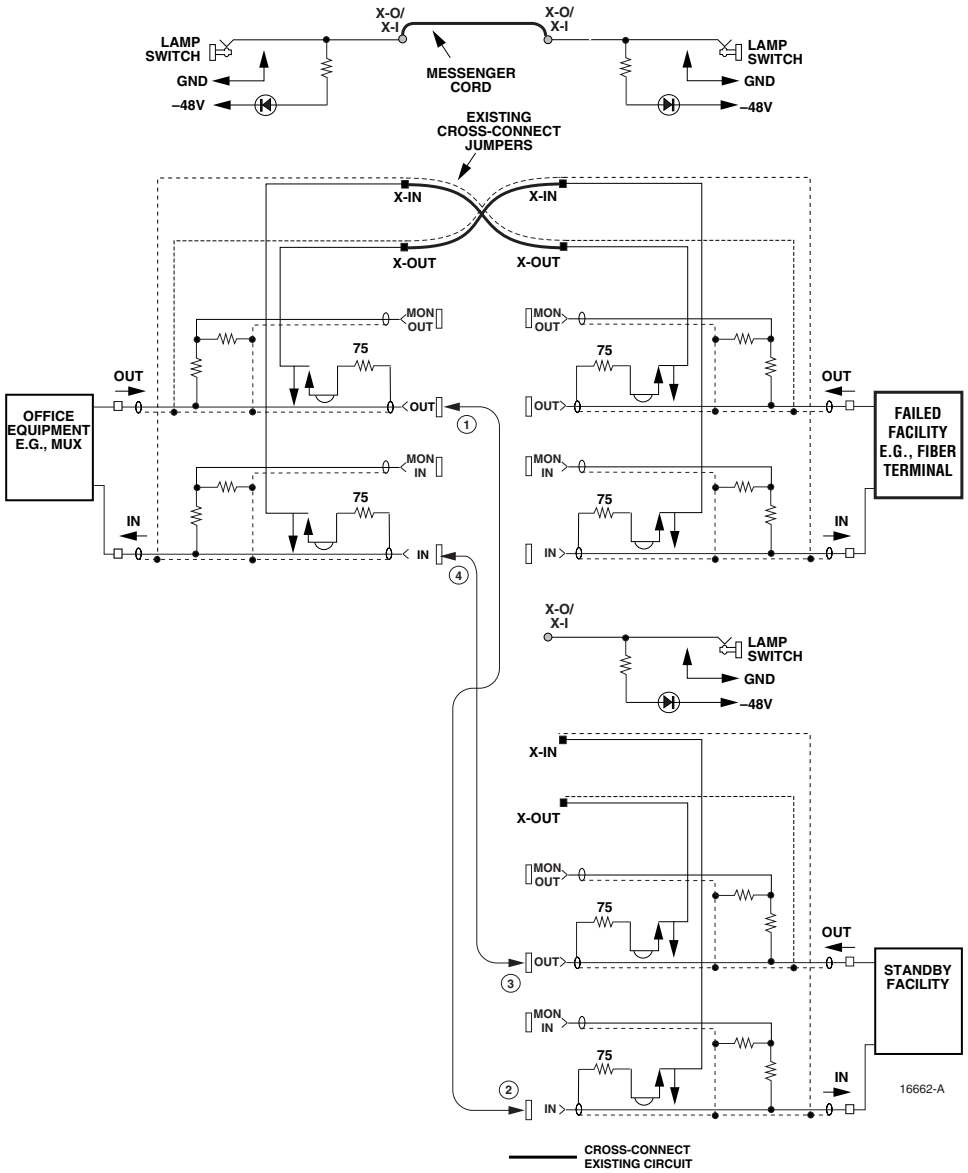
STEP	PROCEDURE
1	Select the equipment that is to be rolled over to new facility.
2	At both sites patch the office equipment to the new facility using patch cords as follows: (a) Connect the office equipment MON OUT jack ① to a bridging repeater IN jack ②. (b) Connect the bridging repeater OUT ③ jack to the new facility IN jack ④. **Perform steps 2(a) and 2(b) at corresponding far end office before proceeding.** (c) Connect the new facility MON OUT jack ⑤ to a bridging repeater IN jack ⑥. (d) Connect the bridging repeater OUT jack ⑦ to the office equipment IN jack ⑧. **Perform steps 2(c) and 2(d) at corresponding far end office before proceeding.**
3	Insert a 75 ohm terminating plug into the new facility OUT jack ⑨.
4	Insert a 75 ohm terminating plug into the office equipment OUT jack ⑩. **Perform steps 3 and 4 at corresponding far end office.**
5	Service is now temporarily patched between the office equipment and new facility.
6	Remove existing cross-connect jumpers between the office equipment and existing facility.
7	Run new cross-connect jumpers between the office equipment and new facility. **Perform steps 6 and 7 at corresponding far end office before proceeding.**
8	Remove the rollover patch cords in reverse order. ⚠ **Warning:** *Reverse order must be followed exactly to avoid another interruption when removing in-service patch!*
9	Remove the 75 ohm termination plug from the office equipment OUT jack ⑩.
10	Remove the 75 ohm termination plug from the new facility OUT jack ⑨. **Perform steps 9 and 10 at corresponding far end office before proceeding.**
11	(a) Remove office equipment IN jack ⑧ to bridging repeater OUT jack ⑦. (b) Remove bridging repeater IN jack ⑥ to new facility MON OUT jack ⑤. **Perform steps 11(a) and 11(b) at corresponding far end office before proceeding.** (c) Remove new facility IN jack ④ to bridging repeater OUT jack ③. (d) Remove bridging repeater IN jack ② to office equipment MON OUT jack ①. **Perform steps 11(c) and 11(d) at corresponding far end office.**



PROCEDURE 5: OUT-OF-SERVICE PATCH

This procedure is used to bypass a failed facility without the use of bridging office repeaters. It is recommended to use Procedure 3: In-Service Patching to Bypass a Failed Facility whenever possible to ensure service is not interrupted when removing patch cords while restoring the circuit. This illustration represents the near end office. A similar corresponding far end office patch must also be performed, but is not shown.

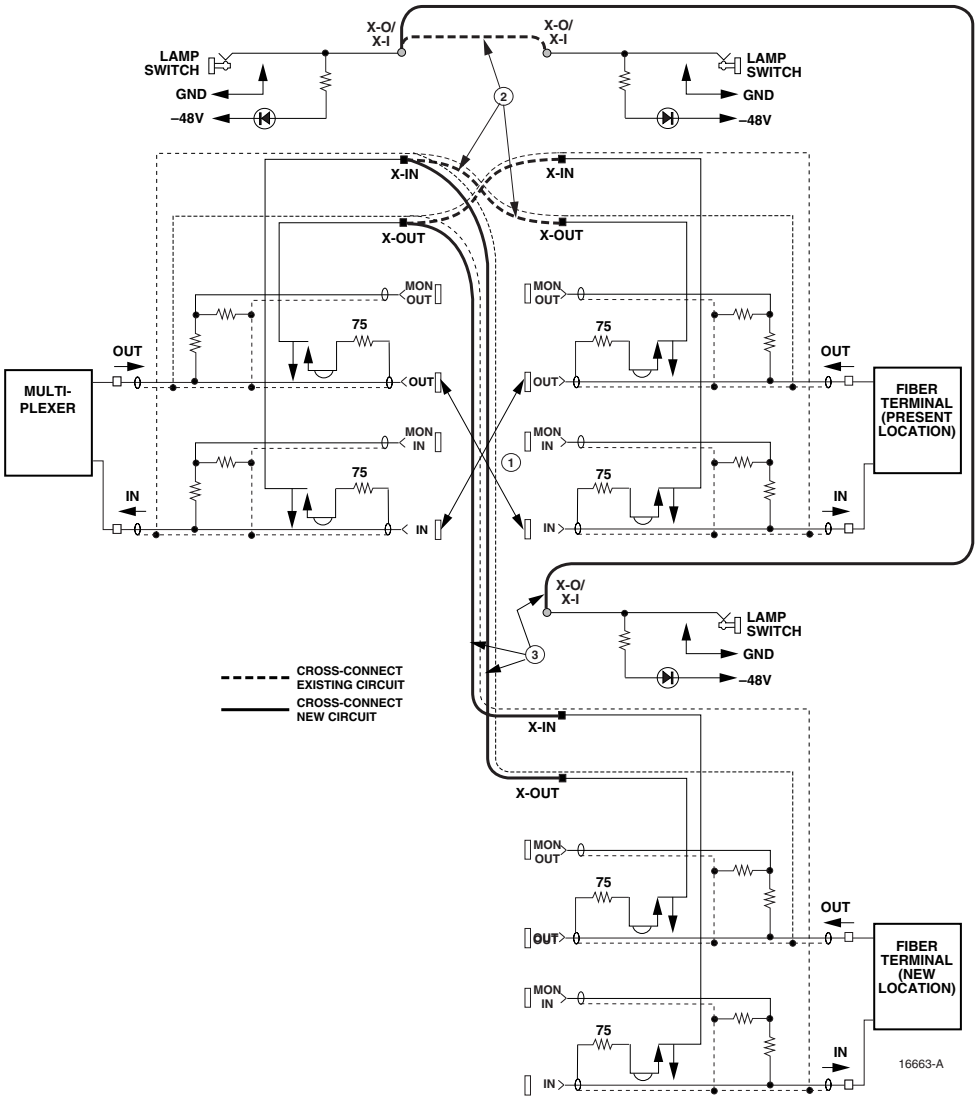
STEP	PROCEDURE
1	Select a standby facility to which communication between the two interrupted sites will be routed.
2	At both sites interrupted by the damaged facility, patch the office equipment to standby facility using patch cords as follows: (a) Connect the office equipment OUT jack ① to standby facility IN jack ②. (b) Connect the standby facility OUT jack ③ to office equipment IN jack ④.
3	Service is now temporarily restored between the interrupted sites. ⚠ **Warning:** *RService may again be momentarily interrupted when removing patch cords.*
4	After the failed facility is repaired, remove all patch cords at the same time to restore service between the interrupted sites.



PROCEDURE 6: OUT-OF-SERVICE TRAFFIC PATTERN CHANGES

This procedure is used to make traffic pattern changes such as those caused by a large corporation relocating within the limits of the same office. It is recommended to use Procedure 3: In-Service Patching to Bypass a Failed Facility whenever possible to ensure service is not interrupted when removing patch cords while restoring the circuit. This illustration represents the near end office. A similar far end patch must also be performed but is not shown.

STEP	PROCEDURE
1	Place temporary patch cords in the OUT and IN jacks of existing circuit.
2	Remove the cross-connect jumpers and tracer wires between the multiplexer and fiber terminal for the present location.
3	Install cross-connect jumpers and tracer wires between the multiplexer and fiber terminal for the new location.
4	Remove temporary patch cords.
5	Record the new office cross-connect arrangement on the DSX-3 designation strips/cards.



SECTION 4: MAINTENANCE

1 GENERAL

This section provides information necessary to maintain the DSX-3 (DSX-4K) Front Cross-Connect System. Maintenance requirements are minimal, consisting for the most part of periodic cleaning and tracer lamp replacement.

2 PREVENTIVE MAINTENANCE

The cross-connect system should be cleaned during routine office equipment maintenance. Accumulated dust and film should be removed using a vacuum cleaner and clean soft brushes and cloths. Care must be taken to prevent dust and dirt from getting into jacks and connectors.

3 CORRECTIVE MAINTENANCE

Cross-connect system corrective maintenance tasks may consist of:

1. Replacement of burned-out tracer lamps and fuses.
2. Replacement of circuit modules.
3. Inspection and repair of cabling and connections.

For any repairs other than described in this section, contact the BCG Technical Assistance Center at 1-800-366-3891. If a call is placed after hours or on a holiday or weekend, an answering device will take the message and alert service personnel for callback the following business day.

3.1 Troubleshooting

Service problems on DS3/DS4 lines are identified and isolated by performing the appropriate procedure(s) in the Operation Section of this manual.

3.2 Tracer Lamp Replacement

Burned out tracer lamps (LEDs) are replaced on the cable trays at the front of the DSX-4K chassis. Lamps are removed by pulling them from the panel sockets, noting the polarity (long and short leads), and inserting the new LED with the same orientation. Pliers may be used.

3.3 Fuse Replacement

Burned out fuses are replaced at the front of the fuse panel. Fuses are removed by pulling them from the panel sockets and installed by pushing them into the panel sockets. No special tools are required.

⚠ **Caution:** *A replacement fuse must have exactly the same current rating as the fuse being replaced.*

3.4 Circuit Module Replacement

To replace a DSX-4KT circuit module:

1. Record or label all cross-connect, patch and office cables connected to the circuit module.
2. Open jumper tray door and disconnect all cables from the module.
3. Remove the two module retaining screws and carefully pull the module straight away from the bay. See Figure 4-1.
4. Grasp the replacement circuit module in the same manner and slide it into the bay. Install the two module retaining screws.
5. Connect all cables to the replacement circuit module as shown on previously prepared records or labels (see Step 1).
6. Close jumper tray door.

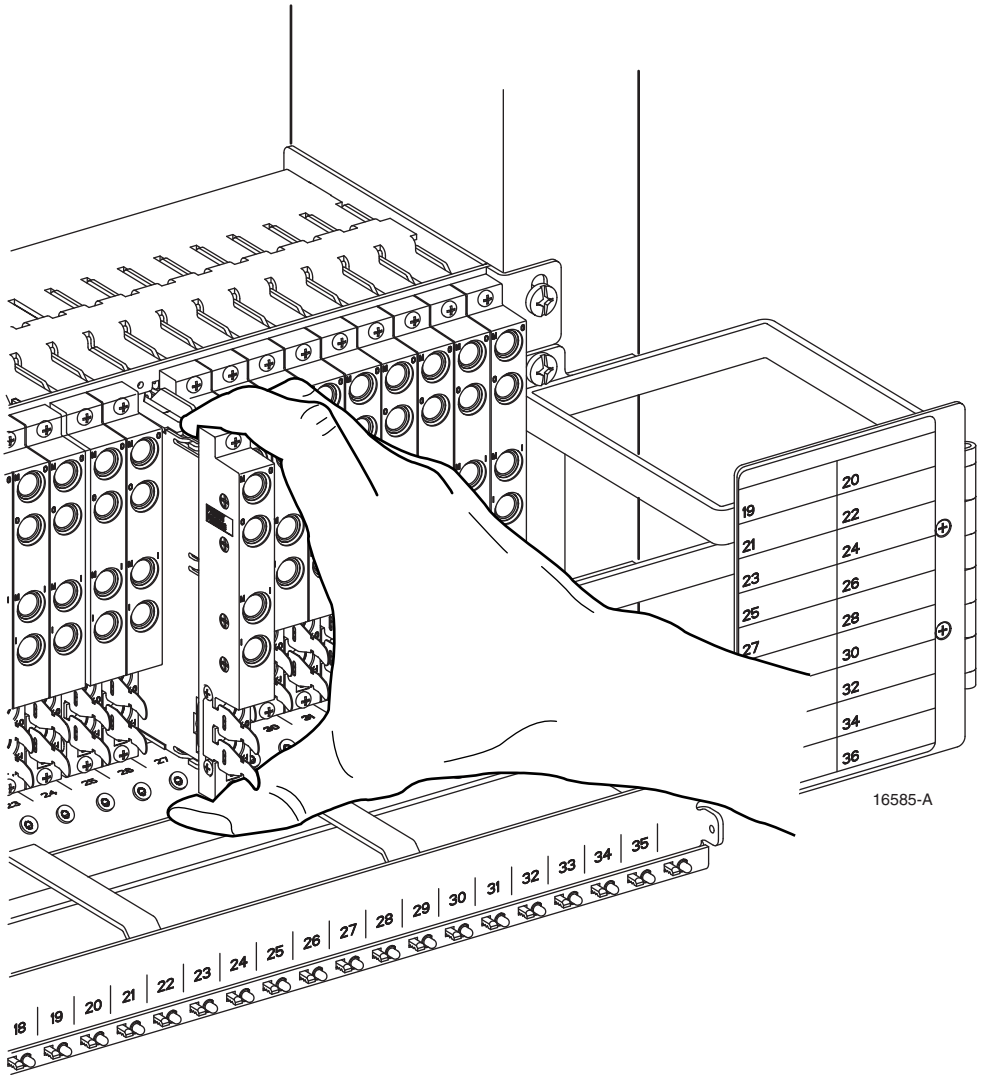


Figure 4-1. DSX-4K Circuit Module Removal/Installation (Jumper Tray Door not shown, for Clarity)

SECTION 5: GENERAL INFORMATION

Content Page

1 WARRANTY/SOFTWARE

The Product and Software warranty policy and warranty period for all ADC Products is published in ADC's Warranty/Software Handbook. Contact the Broadband Connectivity Group (BCG) Technical Assistance Center at 1-800-366-3891, extension 73475 (in U.S.A. or Canada) or 952-917-3475 (outside U.S.A. and Canada) for warranty or software information or for a copy of the Warranty/Software Handbook.

2 SOFTWARE SERVICE AGREEMENT

ADC software service agreements for some ADC Products are available at a nominal fee. Contact the BCG Technical Assistance Center at 1-800-366-3891, extension 73475 (in U.S.A. or Canada) or 952-917-3475 (outside U.S.A. and Canada) for software service agreement information.

3 REPAIR/EXCHANGE POLICY

All repairs of ADC Products must be done by ADC or an authorized representative. Any attempt to repair or modify ADC Products without written authorization from ADC voids the warranty.

If a malfunction cannot be resolved by the normal troubleshooting procedures, call the BCG Technical Assistance Center at 1-800-366-3891, extension 73475 (in U.S.A. or Canada) or 952-917-3475 (outside U.S.A. and Canada). A telephone consultation can sometimes resolve a problem without the need to repair or replace the ADC Product.

If, during a telephone consultation, ADC determines the ADC Product needs repair, ADC will authorize the return of the affected Product for repair and provide a Return Material Authorization number and complete return shipping instructions. If time is critical, ADC can arrange to ship the replacement Product immediately. In all cases, the defective Product must be carefully packaged and returned to ADC.

4 REPAIR CHARGES

If the defect and the necessary repairs are covered by the warranty, and the applicable warranty period has not expired, the Buyer's only payment obligation is to pay the shipping cost to return the defective Product. ADC will repair or replace the Product at no charge and pay the return shipping charges.

Otherwise, ADC will charge a percentage of the current Customer Product price for the repair or NTF (No Trouble Found). If an advance replacement is requested, the full price of a new unit will be charged initially. Upon receipt of the defective Product, ADC will credit Buyer with 20 percent of full price charged for any Product to be Out-of-Warranty. Products must be returned within thirty (30) days to be eligible for any advance replacement credit. If repairs necessitate a visit by an ADC representative, ADC will charge the current price of a field visit plus round trip transportation charges from Minneapolis to the Buyer's site.

5 REPLACEMENT/SPARE PRODUCTS

Replacement parts, including, but not limited to, button caps and lenses, lamps, fuses, and patch cords, are available from ADC on a special order basis. Contact the BCG Technical Assistance Center at 1-800-366-3891, extension 73475 (in U.S.A. or Canada) or 952-917-3475 (outside U.S.A. and Canada) for additional information.

Spare Products and accessories can be purchased from ADC. Contact Sales Administration at 1-800-366-3891, extension 73000 (in U.S.A. or Canada) or 952-917-3000 (outside U.S.A. and Canada) for a price quote and to place your order.

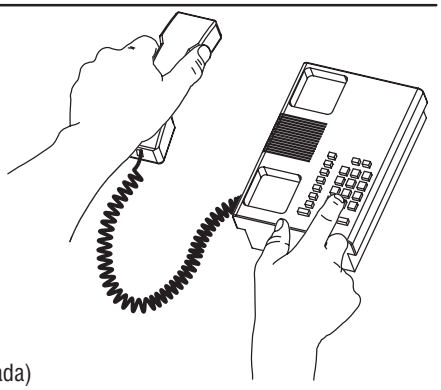
6 RETURNED MATERIAL

Contact the ADC Product Return Department at 1-800-366-3891, extension 73748 (in U.S.A. or Canada) or 952-917-3748 (outside U.S.A. and Canada) to obtain a Return Material Authorization number prior to returning an ADC Product.

All returned Products must have a Return Material Authorization (RMA) number clearly marked on the outside of the package. The Return Material Authorization number is valid for 90 days from authorization.

7 CUSTOMER INFORMATION AND ASSISTANCE

PHONE:



EUROPE
Sales Administration: +32-2-712-65 00
Technical Assistance: +32-2-712-65 42

U.S.A. OR CANADA
Sales: 1-800-366-3891 Extension 73000
Technical Assistance: 1-800-366-3891 Extension 73475

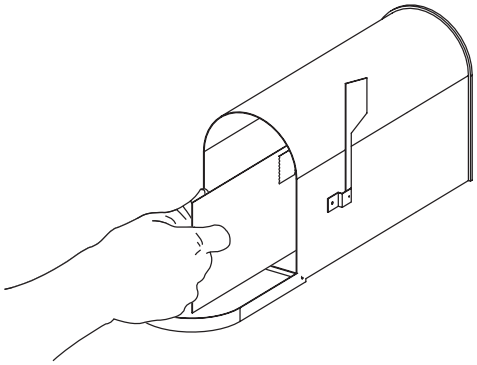
ELSEWHERE
Sales Administration: +1-952-938-8080
Technical Assistance: +1-952-917-3475

SYSTEM INTEGRATION DIVISION (SID)
800.366.3891 (press star and choose option 4) (US & Canada)
+1-952.917.3000 Ask for Systems Integration (Direct Dial)

WRITE:

ADC TELECOMMUNICATIONS, INC
PO BOX 1101,
MINNEAPOLIS, MN 55440-1101, USA

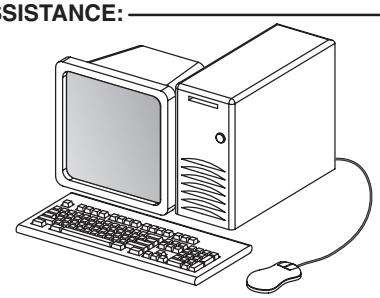
ADC EUROPEAN CUSTOMER SERVICE, INC
BELGICASTRAAT 2,
1930 ZAVENTEM, BRUSSELS, BELGIUM



PRODUCT INFORMATION AND TECHNICAL ASSISTANCE:

WWW.ADC.COM

technical@adc.com



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