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

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REVISION HISTORY

ISSUE	DATE	REASON FOR CHANGE
1st Edition, Issue 1	12/21995	Original
1st Edition, Issue 2	09/1996	Replaced photographs with new line drawings; updated frontispiece, added skeleton bay and 15-inch deep bay.
1st Edition, Issue 3	05/1998	Updated to current format standards and show new ADC corporate address.
Issue 4	01/2001	Non-technical updates.

LIST OF CHANGES

The technical changes incorporated into this issue are listed below.

SECTION	IDENTIFIER	DESCRIPTION OF CHANGE
All		Issue 4

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ABOUT THIS MANUAL

This User Manual describes ADC's DSX-3 (DSX-4F) 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 952-946-3000, extension 63475 (outside U.S.A. and Canada).

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

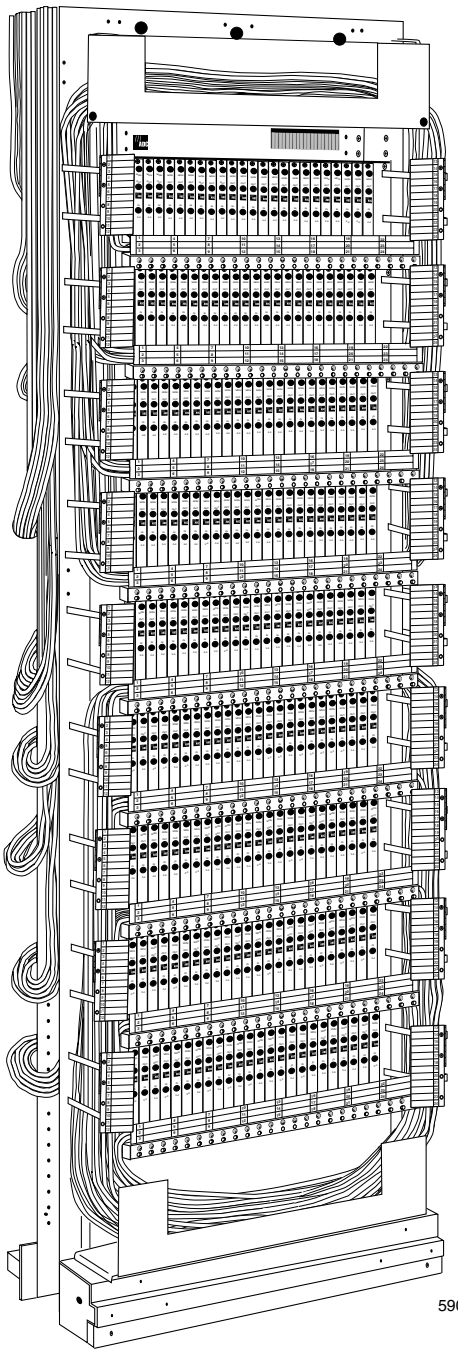
ADMONISHMENTS

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.*



DSX-3 (DSX-4F) FRONT CROSS-CONNECT SYSTEM

DESCRIPTION AND APPLICATION

SECTION 1: DESCRIPTION AND APPLICATION

1 GENERAL

This section describes ADC's DSX-3 (DSX-4F) 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-4F) 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 which 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 Modularity

The DSX-3 (DSX-4F) Front Cross-Connect System is modular for easy expansion at the user's site, and can provide any number of bidirectional cross-connects up to a maximum of 108 (up to 216 equipment terminations in a 7-foot bay). This allows for installation of a minimal system configuration to meet the immediate needs of a site, and then expanding it as necessary by adding individual DSX-4F circuit modules. Each cross-connect system consists of up to 216 DSX-4F circuit modules (two per cross-connect) plugged into a 7-foot high × 23-inch wide × 12-inch or 15-inch deep (2.13 m × 58.42 cm × 30.48 cm or 38.10 cm) equipment bay.

2.2 Module Types

The following paragraphs discuss the basic front cross-connect module and the 75-ohm auto-termination module. The 75-ohm impedance matching employed in this system maximizes power transfer and optimizes the length of cable runs.

2.2.1 Front Cross-Connect Modules

The DSX-4F front cross-connect modules have cross-connect interface jacks on the front of the module; equipment cable interface connections are located on the rear of the module.

2.2.2 Basic Module

The basic DSX-4F module provides IN and OUT switching jacks for direct access to the network element's input and output signal. A single MON (monitor) jack (bridged to the OUT jack through a high impedance resistance network) allows non-intrusive monitoring of each network element's output signal.

In addition to the basic DSX-4F module, other modules are available with added features such as the 75-ohm auto-termination option described below. Refer to the "Installation Drawing" shipped with each module for specific module features and schematic illustrations.

2.2.3 75-Ohm Auto-Termination Option

The auto-termination option provides an automatic 75-ohm termination of a network element's output (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 option reduces the need to have large quantities of 75-ohm termination plugs on site.

2.2.4 Connectors

The DSX-3 (DSX-4F) Front Cross-Connect System 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.

2.2.5 Cable Management

Unequal flange (duct type) racks and spacers provide space for routing of all equipment IN/OUT cables to and from the various chassis in the cross-connect system bay. Two cable tie-down bars are provided at the rear of each chassis for securing equipment IN/OUT cables in place. Vertical jumper rings are provided alongside each 23-inch chassis 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.

Note: ADC recommends that a 5.0-inch (12.7 cm) spacer be placed between adjacent DSX-3 (DSX-4F) Front Cross-Connect System bays that use 734A or equivalent cable. No spacer is necessary between unequal flange (duct type) equipment racks using 735A or equivalent cable.

3 FUNCTIONAL DESCRIPTION

The DSX-3 (DSX-4F) Front Cross-Connect System consists of up to 216 individual DSX-4F circuit modules in a 7-foot bay. Two modules are shown schematically in Figure 1-1. Each circuit module accommodates the input and output of one digital equipment unit, and 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-4F 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, or IN midsize coaxial patching jacks.

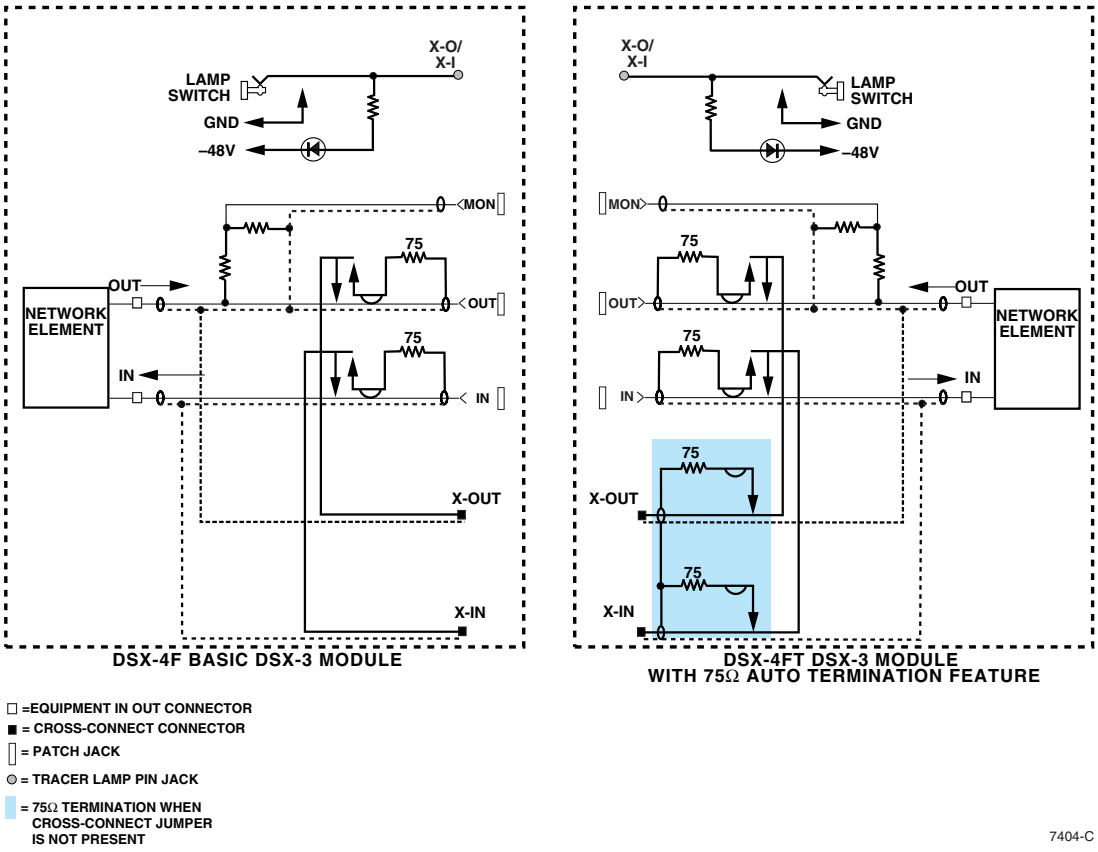


Figure 1-1. Two DSX-4F Circuits (DSX-4FT is on the Right)

A typical DSX-4F circuit arrangement is shown in Figure 1-2. Network elements A, B, and C are connected to the IN/OUT connectors of three different DSX-4F circuit modules. Network elements A and B are then connected together at the DSX-4F circuit modules by cross-connect jumpers. In the DSX-4F 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 corresponding chassis-mounted tracer lamp to flash for approximately 30 seconds and then remain lit until the 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 output signal without interrupting the signal.
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 1-2, equipment B is temporarily patched to equipment C.

As seen in Figure 1-2, 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.

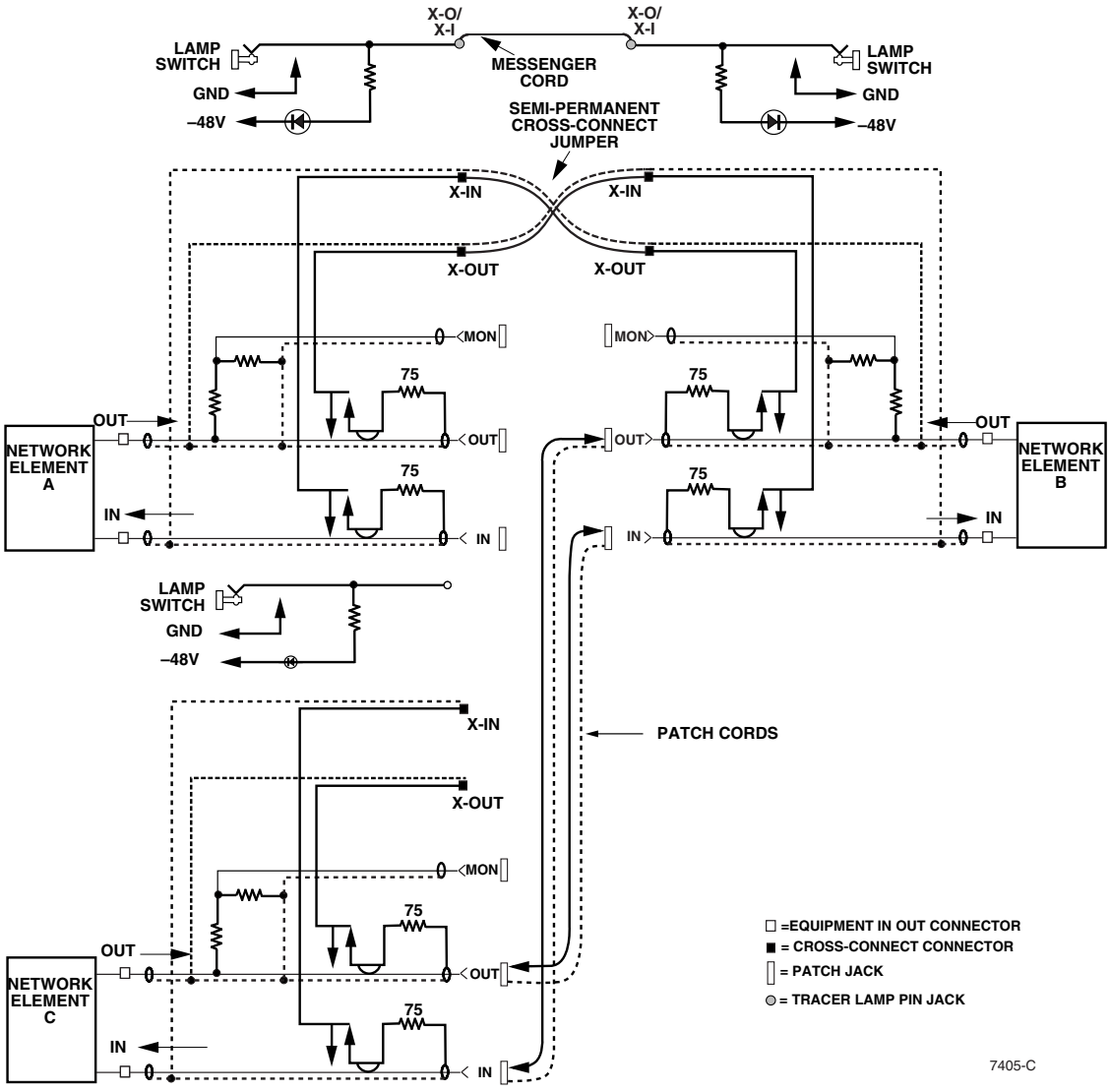


Figure 1-2. Typical DSX-3 (DSX-4F) Circuit Arrangement

4 APPLICATIONS

4.1 Testing and Fault Isolation

Terminating all digital operational and test equipment at the DSX-3 (DSX-4F) 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

The 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 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 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-4F) Front Cross-Connect System facilitates planning for future growth. The system can be grown from a minimal installation of one chassis with up to 24 circuit modules to any number of full bays.

4.5 Office Layout

The DSX-3 (DSX-4F) 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-4F) 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-4F) 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-connected at the cross-connect system.

5 PHYSICAL DESCRIPTION

The bay is comprised of up to nine chassis, each containing up to 24 DSX-4F 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 (23-inch, only) 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-4F Circuit Modules

Each DSX-4F circuit module, shown in Figure 1-3, provides access to the input and output of one digital office equipment unit. Each module is approximately 5.34 inches high × 0.70 inch wide × 5.14 inches deep (13.56 × 1.78 × 13.06 cm).

The DSX-4F module is designed for use with either DS3, STS-1, STS-3, or DS4NA 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.

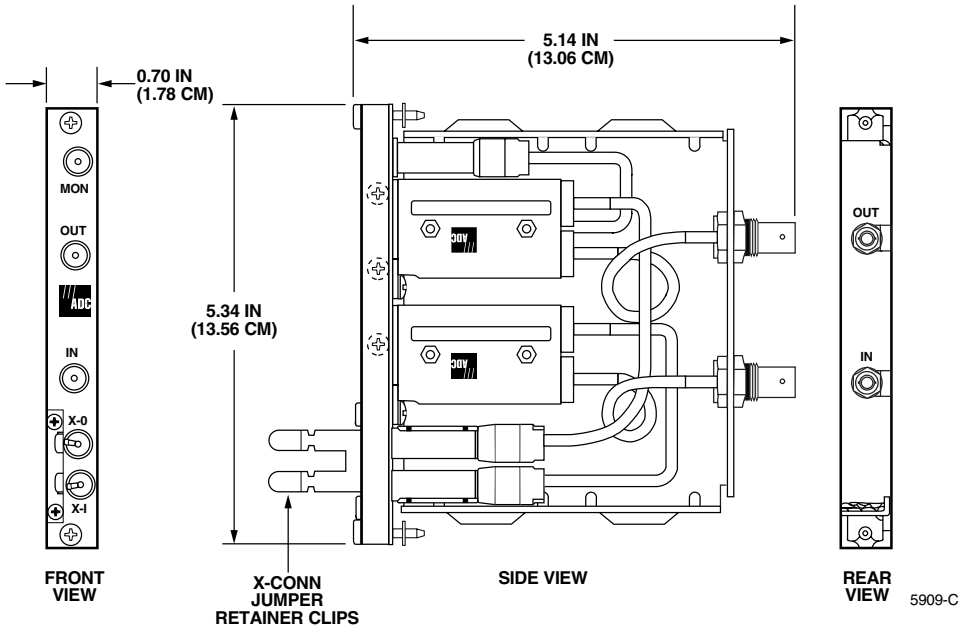


Figure 1-3. DSX-4F Circuit Module

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

NAME	TYPE	LOCATION	FUNCTION
MON (Monitor)	Midsize Coaxial Jack	**Front of Module**	Provides bridged access to the output signal of connected office equipment to allow monitoring without interruption.
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.
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.
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-4FT** 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.)

(continued)

Table 1-1. DSX-3 (DSX-4F) Circuit Module Components, continued

NAME	TYPE	LOCATION	FUNCTION
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-4FT** 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.)
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-4F chassis, shown in Figure 1-4, provides mounting for up to 24 circuit modules across the width of the bay. The chassis is 23 inches (58.4 cm) wide, 7 inches (17.78 cm) high, and is designed for installation in bays with mounting holes spaced at 1.0 inch (2.54 cm).

The jumper tray at the bottom front of the chassis holds the tracer lamps and tracer lamp switches, which function with corresponding circuit modules as described in Table 1-2. Pin jacks on the jumper tray provide for cross-connecting the tracer lamps as described in Table 1-2 and in the Installation Section of this manual.

Large capacity vertical jumper rings and removable jumper ring covers are provided with the chassis (23-inch mounting option only) for routing of cross-connect jumpers up and down either side of the bay. The 19-inch chassis mounting option has no rings.

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.

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

NAME	TYPE	LOCATION	FUNCTION
Tracer Lamp (TL)	Red LED Indicator	**Chassis Jumper Tray (Front)**	Used to identify the opposite end of a cross-connect. The tracer lamp flashes for approximately 30 seconds whenever the tracer lamp switch is activated, and then remains lit while the tracer lamp switch is on. If the module is cross-connected to another module, the tracer lamp indicator for that module will also flash for approximately 30 seconds and then remain lit.
Lamp Switch (LS)	Toggle Switch	**Chassis Jumper Tray (Front)**	When switched ON, causes the corresponding tracer lamp(s) to light as described above for tracer lamp. Extinguishes the indicators when switched OFF.

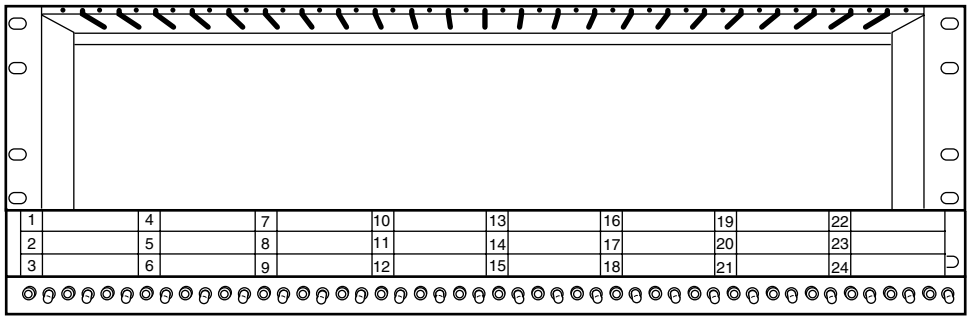


Figure 1-4. Empty DSX-4F Chassis

5.2 Fuse Panel

The fuse panel, shown in Figure 1-5, provides –48 Vdc power protection for all cross-connect system tracer lamp (LED) circuitry in the bay. Power for each DSX-4F chassis is supplied through a separate 0.5 Amp fuse. (Each LED draws 0.01 Amp; therefore, 24 LEDs in a chassis, equates to a 0.24 Amp load.) The GMT fuse has a colored tab which is displayed when the fuse is blown. The fuse panel also has a LED indicator which lights whenever any fuse on the panel is blown. The fuse panel can also be connected to an external alarm system.

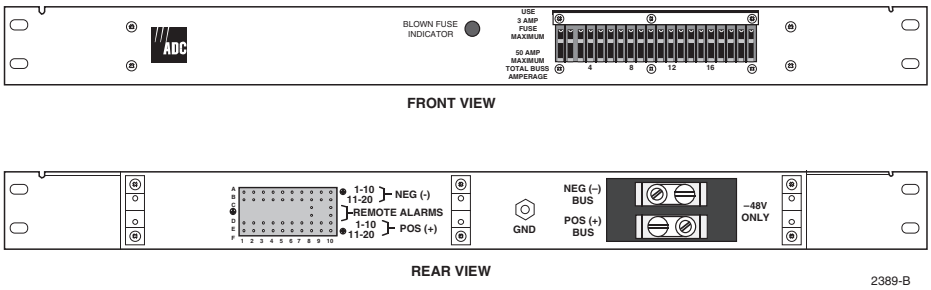


Figure 1-5. Fuse Panel

5.3 Jumper Rings and Troughs

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

5.4 Cable Brackets

Cable tie-down bars are provided in the duct area of unequal flanged bays for securing the vertical cable runs down the side of the rack. Cable tie bars at the rear of each chassis are used to secure cables horizontally across the rear of the chassis as the individual coaxial wires are fanned into the module's termination point.

5.5 Chassis

The DSX-4F chassis is capable of 23" mounting with adapters and jumper rings for central office application. It is also capable of 19" mounting without the adapters or vertical jumper rings for customer premise or cabinet applications when a maximum of one chassis is required and cross-connect jumpers are contained within a single chassis.

5.6 Skeleton Bay

A bare bones or “skeleton” bay is available pre-assembled with a fuse panel, upper and lower jumper troughs, chassis mounting adapters, and vertical jumper rings; this bay is ready for installation of chassis.

5.7 Cross-Connect System

The cross-connect system bay is an unequal flange network type, 84 inches high × 26 inches wide × 12 inches deep (213 × 66 × 30.48 cm). A 15-inch (38.10 cm) deep version is also available for large systems (long lineups). Chassis mounting holes are spaced at one inch (2.54 cm) intervals. An ac outlet can be provided at the bottom front and/or rear of the bay as an auxiliary source of 110 Vac primary power.

6 SYSTEM SPECIFICATIONS

Specifications for the DSX-3 (DSX-4F) 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) or 22 inches (55.88 cm)
Depth	12 inches (30.48 cm) or 15 inches (38.10 cm)
Weight	360 pounds (163 kg)
Chassis	
Height	7 inches (17.78 cm)
Width	23.0 inches (58.88 cm) with adapters and vertical jumper rings or 19.0 inches (48.26 cm) without adapters (no vertical jumper rings)
Depth	12 inches (30.48 cm)
Weight	Weight: 30 pounds (13.6 kg, fully loaded with modules)
POWER	
Voltage	–48 Vdc
Current	0.01 amps 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-4FT 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)

INSTALLATION

SECTION 2: INSTALLATION

1 GENERAL

This section provides complete instructions for installing the DSX-3 (DSX-4F) Front Cross-Connect System at the user's site. It is recommended that the entire section be read and understood before beginning installation.

2 OFFICE REQUIREMENTS

2.1 Space and Floor Loading

The DSX-4F Front Cross-Connect System consists of up to 216 circuit modules mounted in a standard 7-foot by 23-inch (2.13 m by 58.42 cm) unequal flange network style equipment bay. Maximum width of the bay is 26 inches (66 cm), and maximum depth is 12 inches (30.47 cm) or 15 inches (38.10 cm). A fully configured unwired/uncabled cross-connect system bay weighs approximately 360 pounds (163 kg).

⚠ **Warning:** *Never install telephone equipment in a wet location or during a lightning storm. When installing or modifying telephone lines, disconnect lines at the network interface before working with uninsulated lines or terminals to prevent electrical shock.*

3 ENVIRONMENT

3.1 Operational

The DSX-3 (DSX-4F) Front Cross-Connect System must be used in ambient temperatures and humidities which do not exceed the following:

1. Temperature: –40° to 65° C (–40 to +149 F).
2. Relative Humidity: 0% to 95% without condensation.

3.2 Shipping and Storage

The cross-connect system must be shipped and stored in ambient temperatures and humidities which do not exceed the following:

1. Temperature: –55° to +85 C (–67 to +185° F).
2. Relative Humidity: 0% to 95% without condensation.

3.2.1 Power

The cross-connect system operates on –48 Vdc filtered office battery, fused or breakered at the office distribution panel. Approximate current requirements can be calculated based on 10 milliamps for each lit LED tracer lamp. The number of tracer lamps lit at any one time will depend on local patching and testing procedures. The fuse panel at the top of the bay provides a 0.5 Amp. fuse for each DSX-4F chassis in the bay.

3.2.2 Signal Levels

Each cross-connect system bay serves as an equal level transmission point, and all digital signals crossing a cross-connect system bay must be maintained within a certain power level for each specific bit rate. Reference ANSI T1.102-199X Draft American National Standard for Telecommunications Digital Hierarchy Electrical Interfaces.

3.2.3 Cable Types

All coaxial cables should be 75 ohm coaxial with tinned copper shield (735A/734A or equivalent).

3.2.4 Cable Lengths

The digital equipment terminated at the cross-connect system bay must have equalizers and/or pads which are adjusted for the particular cable lengths to maintain the proper transmission levels. The maximum length between digital equipment and the bay is governed by the specific item of equipment and cable type.

MAXIMUM LENGTH OF IN/OUT EQUIPMENT CABLE

EQUIPMENT TYPE	734A OR EQUIVALENT CABLE	735A OR EQUIVALENT CABLE
DS3	450 feet (137.2 m)	225 feet (68.6 m)
DS4N-A	225 feet (68.6 m)	146 feet (44.5 m)
STS-1	439 feet (133.8 m)	215 feet (65.5 m)
STS-3	252 feet (77.1 m)	125 feet (31.8 m)

MAXIMUM LENGTH OF CROSS-CONNECT JUMPERS

EQUIPMENT TYPE	735A OR EQUIVALENT CABLE	0222 COAXIAL CABLE
DS3	20.6 feet (5.2 m)	22.20 feet (6.77 m)
DS4N-A	13.0 feet (3.3 m)	14.0 feet (4.27 m)
STS-1	18.0 feet (4.6 m)	20.0 feet (6.1 m)
STS-3	11.0 feet (2.8 m)	12.0 feet (3.66 m)

4 INSTALLATION

4.1 Bay Installation/Expansion

Installation of cross-connect system hardware may consist of installation of an entire new cross-connect system bay or expansion of an existing bay. Location of a new bay must take into consideration its distance to other equipment, other system bays, and cable type.

Note: The required spacing between bays varies when using 734A or equivalent and 735A or equivalent cables for cross-connect jumper and equipment IN/OUT cabling. The ADC recommended spacing is as follows:

APPLICATION		ADDITIONAL SPACING REQUIRED BETWEEN UNEQUAL FLANGE BAYS
EQUIP. I/O	X-CONN	
735A	735A or 0222	None
734A	735A or 0222	Two 2.5 Inch (6.4 cm) (One on each side of bay) = 5.0 inches between bays

4.2 Positioning and Mounting of New Bay

⚠ **Caution:** *A crated DSX-3 (DSX-4F) Front Cross-Connect System bay weighs approximately 585 pounds (265 kg). An adequately rated and secured block and tackle or overhead hoist must be used while uncrating, positioning, and securing the bay.*

Set the bay in its assigned position, and secure it to the floor and to adjacent bays using appropriate hardware. Also secure it to overhead support if required.

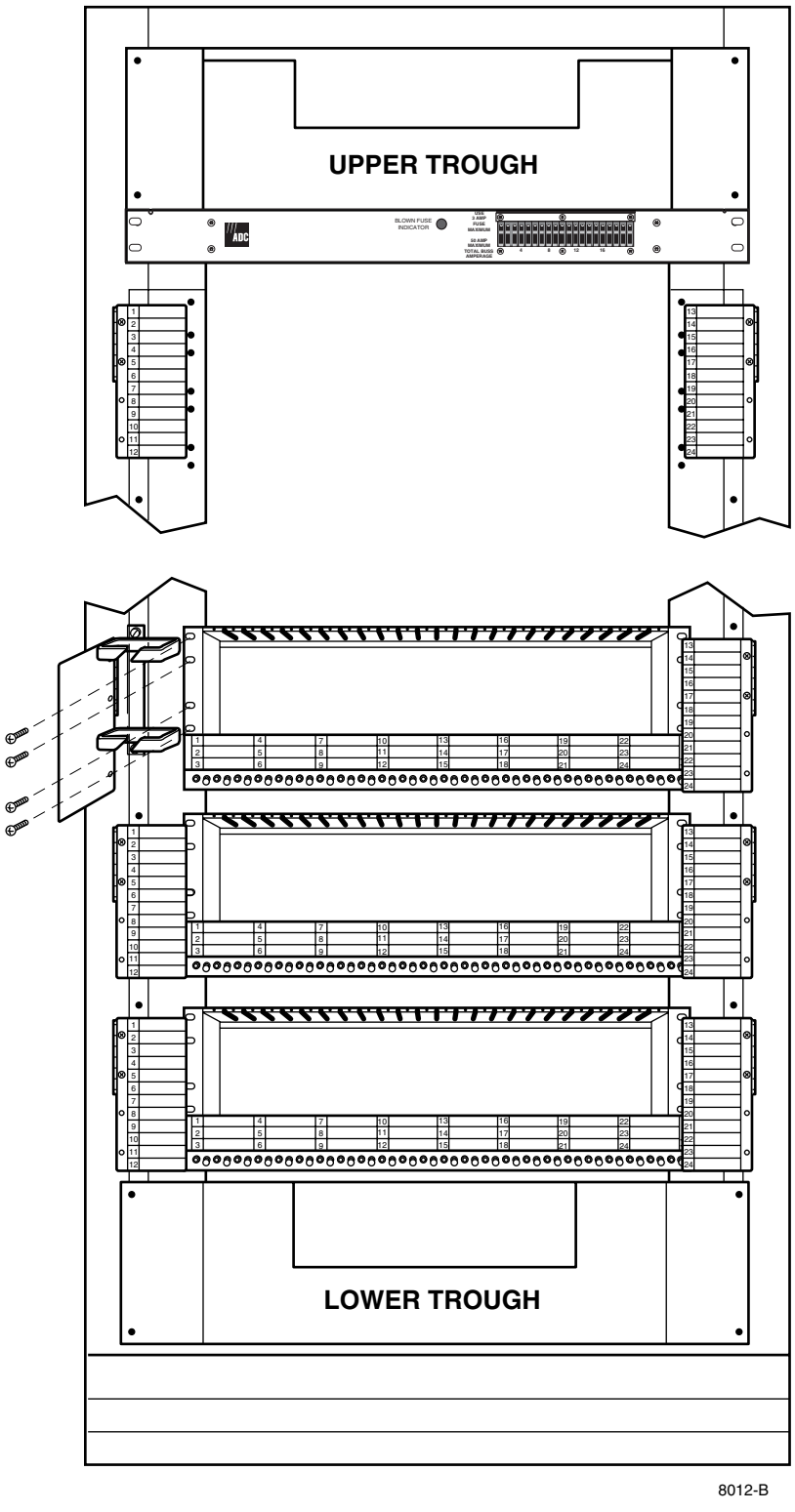
4.3 Adding Chassis to Existing Bay

For optimal cable management, existing bays should be expanded from the bottom up if office cables are brought into the bay from above, or from the top down if office cables are brought into the bay from below. Mount each chassis as follows:

➧ **Note:** Omit steps (a) and (b) if the mounting adapters and vertical jumper rings are already installed on your rack, as for example on a "skeleton" rack.

➧ **Note:** Each mounting adapter should be *butted against* the next lower or next higher mounting adapter, and each vertical jumper ring should be mounted at the *top* of the mounting adapter.

1. Find the next available chassis location on the bay. Loosely attach one chassis mounting adapter with one #12-24 by 0.375 inch (9.5 mm) machine screw through the bottom hole of the adapter into the rack vertical. Place a vertical jumper ring over the mounting adapter, then fasten both the ring and mounting adapter to the rack vertical with two #12-24 by 0.375 inch (9.5 mm) machine screws through the ring's top and bottom mounting holes. When done, tighten all three machine screws.
2. Repeat step 1 to install a chassis mounting adapter and vertical jumper ring on the other rack vertical.
3. Secure chassis to mounting adapters on the bay using eight #12-24 by 0.375 inch (9.5 mm) machine screws (four on each side), as shown in Figure 2-1.
4. Using 22 AWG wire, connect –48 Vdc and Ground from the fuse panel—fuse assignment to the respective –48 Vdc and GND terminals on the back of the chassis. Each chassis is fused separately. Fuses from left to right (as viewed from the front) correlate to chassis from bottom to top, with one fuse for each chassis.
5. Using 22 AWG wire, connect the chassis ground terminal to the bay ground wire or bay ground posts, whichever is provided in the grounding kit.
6. At rear of equipment rack, attach cable tie bar to rack behind each DSX chassis using #12-24 screws.



Note: Spaces between chassis are for clarity only.

Figure 2-1. Installing Chassis on Rack Mounting Flanges

4.4 Circuit Module Installation

Install all DSX-4F circuit modules in the chassis as shown in Figure 2-2. First, remove the removable designation plate from the front of the chassis, then press each module into the chassis and secure it with the two module-retaining screws. When finished, replace the designation plate.

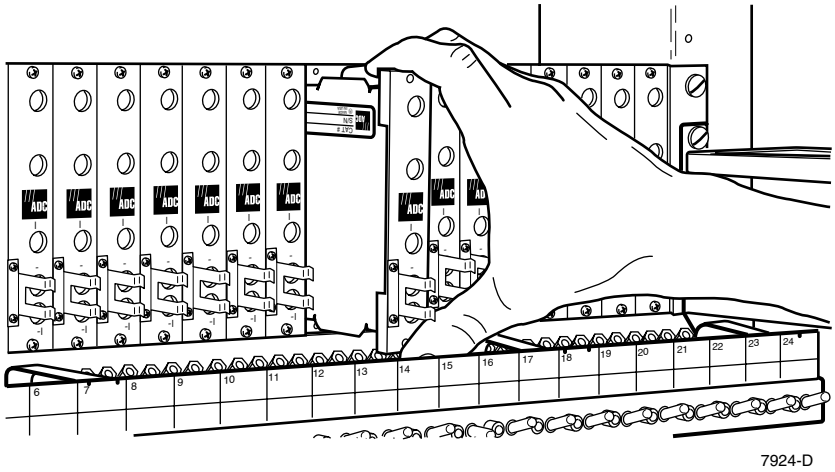


Figure 2-2. DSX-4F Circuit Module Installation

4.5 Installation of Equipment In/Out Cabling

4.5.1 Cable Routing Guidelines

Equipment IN/OUT cabling to the DSX cross-connect system is brought in at the rear of the bay either from above or below. Typical system cabling is shown in Figure 2-3.

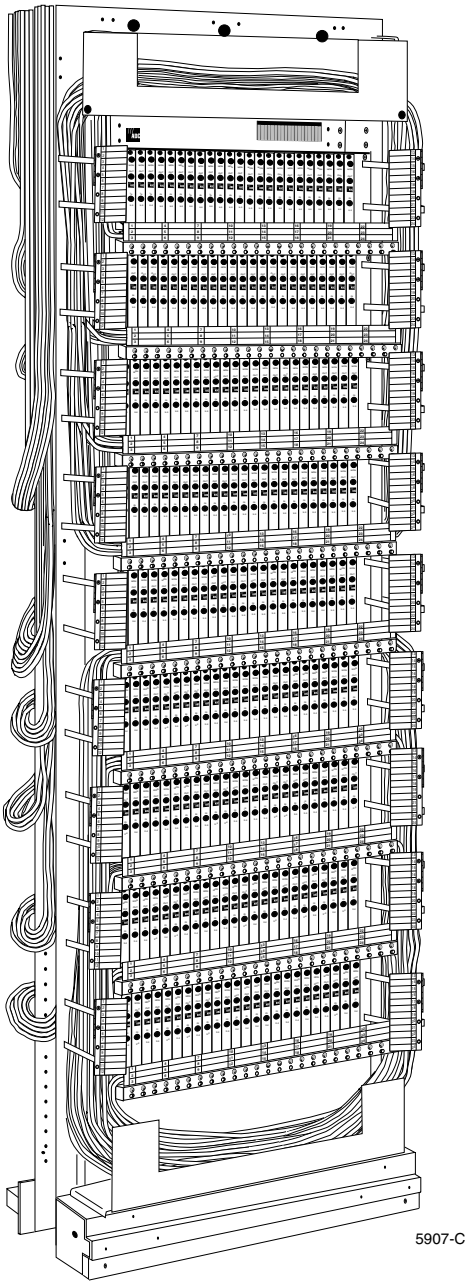


Figure 2-3. Typical Cross-Connect System Cabling

When bringing the cables into the bay, make sure that all IN/OUT cables for modules 1–12 are run vertically along the left side of the bay (as viewed from the front), and all IN/OUT cables for modules 13–24 are run vertically along the right side. The cables should be run in the rack duct and attached to appropriate cable tie brackets in the duct using nylon tie-wraps or lacing cord. If the cables are coming into the bay from above, cable attachment should start at the bottom and work up. If the cables are coming in from below, cable attachment should start at the top and work down.

4.6 Cable-to-Bay Termination

Equipment IN/OUT cables should be terminated to BNC connectors at the back of the DSX-4F circuit modules. A rear view of a DSX-4F chassis with all circuit modules in place is shown in Figure 2-4.

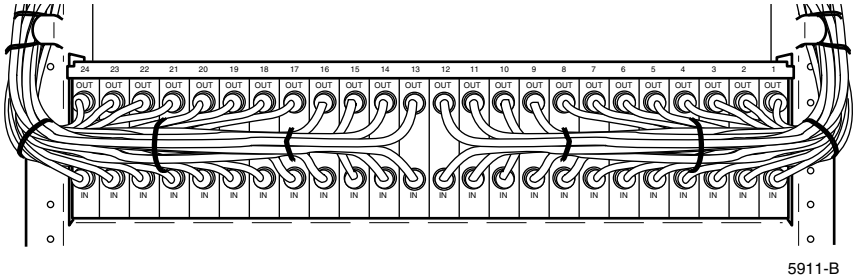


Figure 2-4. DSX-4F Chassis with All Circuit Modules Installed (Rear View)

Terminate each pair of coaxial cables from any one office equipment unit to the IN and OUT connectors on any one circuit module. 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. Secure all cables to the cable bars at the rear of equipment rack by use of tie-wraps or lacing cord. Record all terminations on the adhesive-backed designation labels provided on the front jumper tray.

4.6.1 Office Power to Bay Wiring

The power to the bay fuse panel is supplied, through power supply feeders, from the Building Distribution Fuse Bay (BDFB). The local Detail Power Engineer must specify the power feeder conductor size. Each site has many variables that must be considered when determining the size of power supply feeders.

- The local Electrical Codes.
- The distance between the Building Distribution Fuse Bay (BDFB) and the farthest bay powered.
- The maximum power load on each bay.
- Allowable voltage drop between BDFB and DSX bays.
- The number of bays to be powered.

Connect the office power to the bay fuse panel as follows:

⚠ **Warning:** *To avoid the danger of shock, burns or fire, REMOVE power from working power supply circuits before making any connections. If establishing a new power supply circuit do NOT install the fuse until all connections are completed and tested.*

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, make parallel connections at the overhead supply feeders for –48 Vdc battery and ground.
3. Complete the connection to the –48 Vdc (NEG(–)BUS) and ground (POS(+)BUS) terminals on the fuse panel. See Figure 2-5.

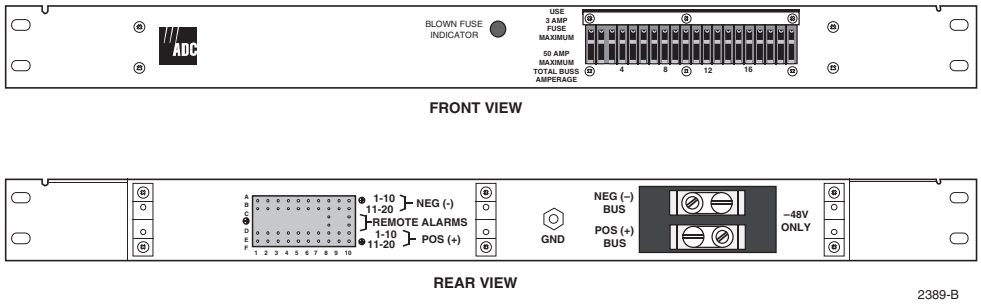


Figure 2-5. Fuse Panel

The REMOTE ALARM terminals at the back of the fuse panel provide a closed loop for connecting cross-connect system fuse failure alarm circuitry to an external alarm system. The alarm will be triggered upon failure of any fuse in the fuse panel. Each fuse also has a colored plastic tab which is displayed when the fuse is blown, and the fuse panel has an LED indicator which lights when any fuse on the panel is blown.

4.6.2 Installation of Cross-Connect Jumpers

Cross-connect jumpers are installed on the front of the DSX-4F circuit modules. Midsize coaxial jacks with locking retainer clips are provided on the front of the DSX-4F circuit modules as shown in Figure 1-3.

4.7 Cross-Connect Jumper 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 2-6. The figure shows a three-bay system; however, the same basic rules apply for any number of bays. Cross-connect jumpers should not exceed lengths as listed in the Cable Length section. To prevent unnecessary buildup and congestion, all discontinued cross-connects should be removed from the wireways.

4.8 Cross-Connect Jumpers

Using cross-connect jumpers with accompanying tracer wires, cross connect all necessary DSX-4F circuits as shown in Figure 2-7.

1. 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 inserted in either of the pin jacks. The two pin jacks associated with each module are internally connected together.
2. 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.

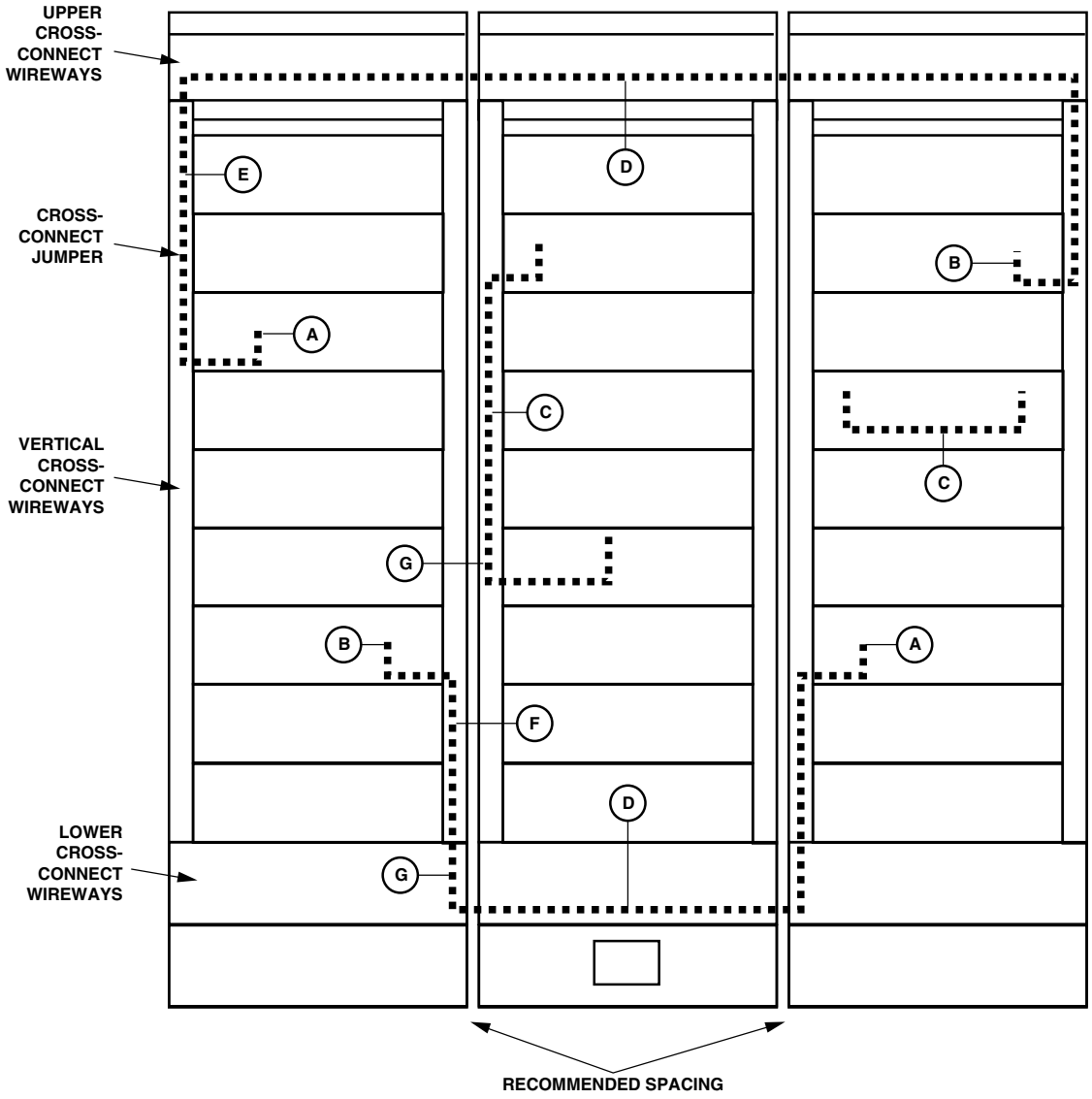
Dual cross-connect jumpers are available in various lengths from 1 to 27 feet (0.3 to 8.23 m). It is important to select the proper cable length to prevent undesirable congestion. Cross-connect jumpers are also available with one connector factory terminated and one connector kit which is terminated 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.

5 POWER APPLICATION AND SYSTEM CHECKOUT

Ensure that a 0.5 Amp fuse is in place in the fuse panel for each DSX-4F chassis in the bay. Fuses from left to right (as viewed from the front) correlate to chassis from bottom to top, 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-4F chassis to the up (on) position. In the up 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 down (off) position.



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 10-INCH (25.4 CM) BETWEEN BAYS WITH ONE 5-INCH (12.7 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 except when terminations are in the same panel.

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.

1278-G

Figure 2-6. Recommended Cross-Connect Routing

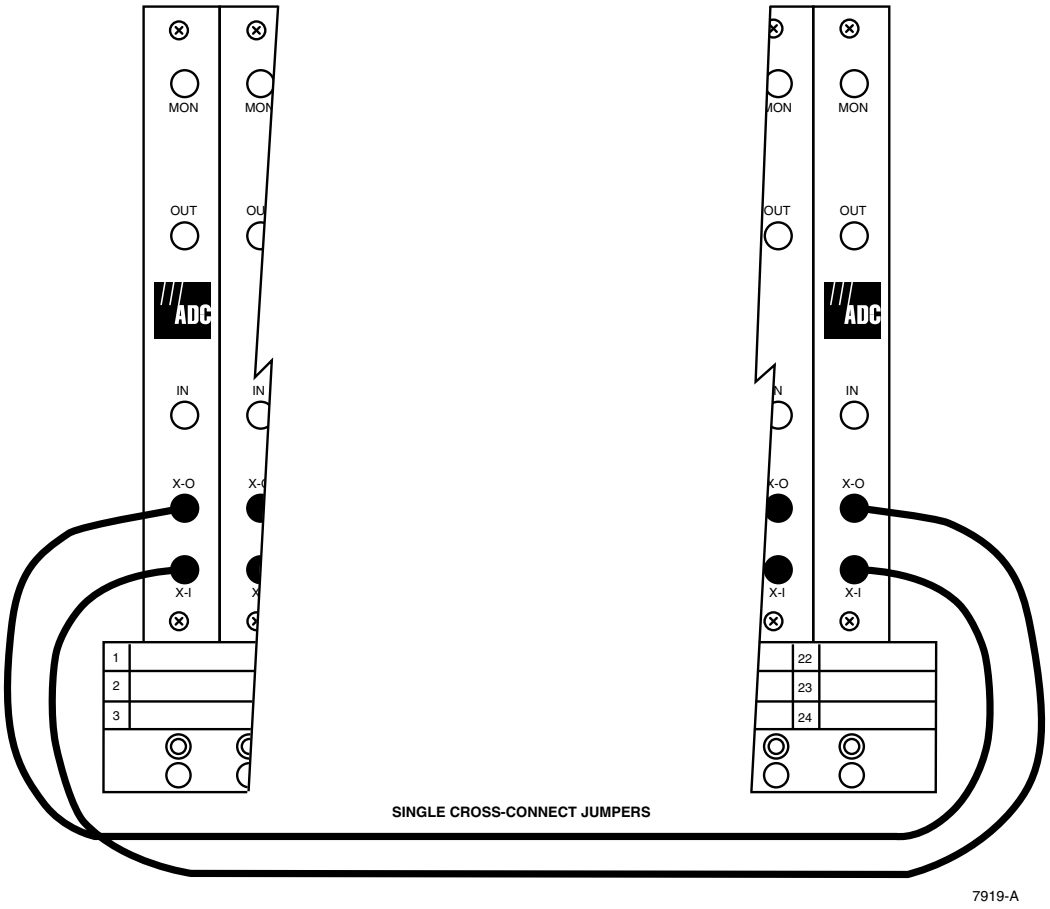


Figure 2-7. DSX-4F Cross Connection

OPERATION

SECTION 3: OPERATION

1 GENERAL

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

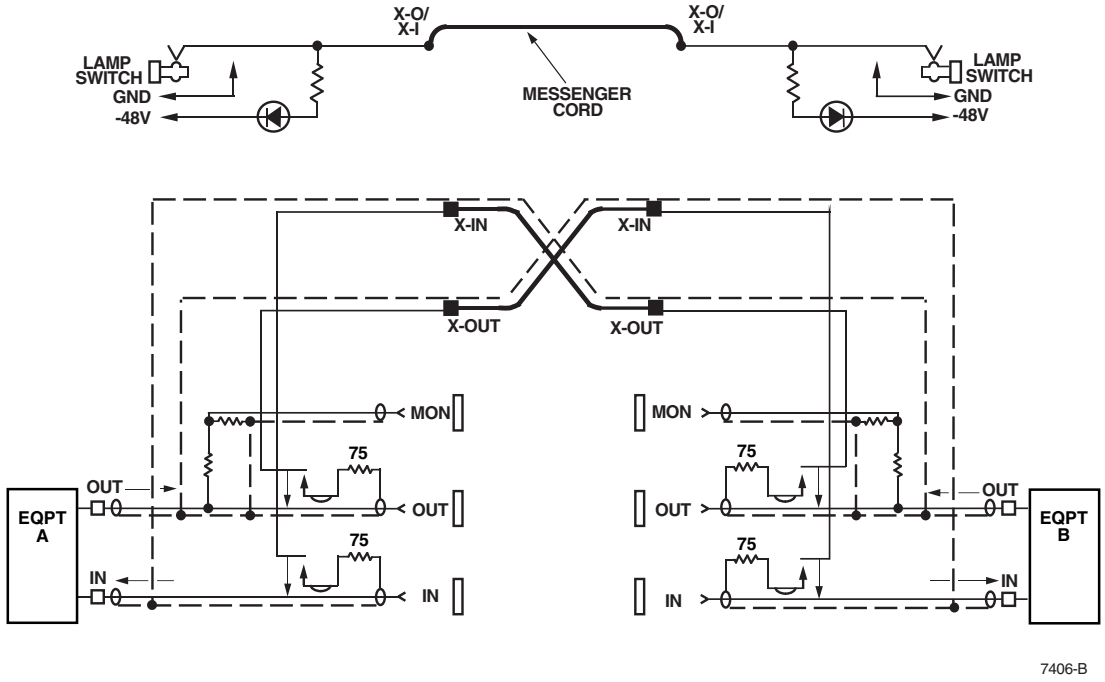
1. A brief description of the procedure and its purpose.
2. A general schematic illustration of the procedure.
3. Steps to perform the procedure.

If problems are encountered in performing any of these procedures contact ADC Telecommunications as described in Section 5, General Information — Customer Information and Assistance.

PROCEDURE 1
CROSS-CONNECT CIRCUIT IDENTIFICATION

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

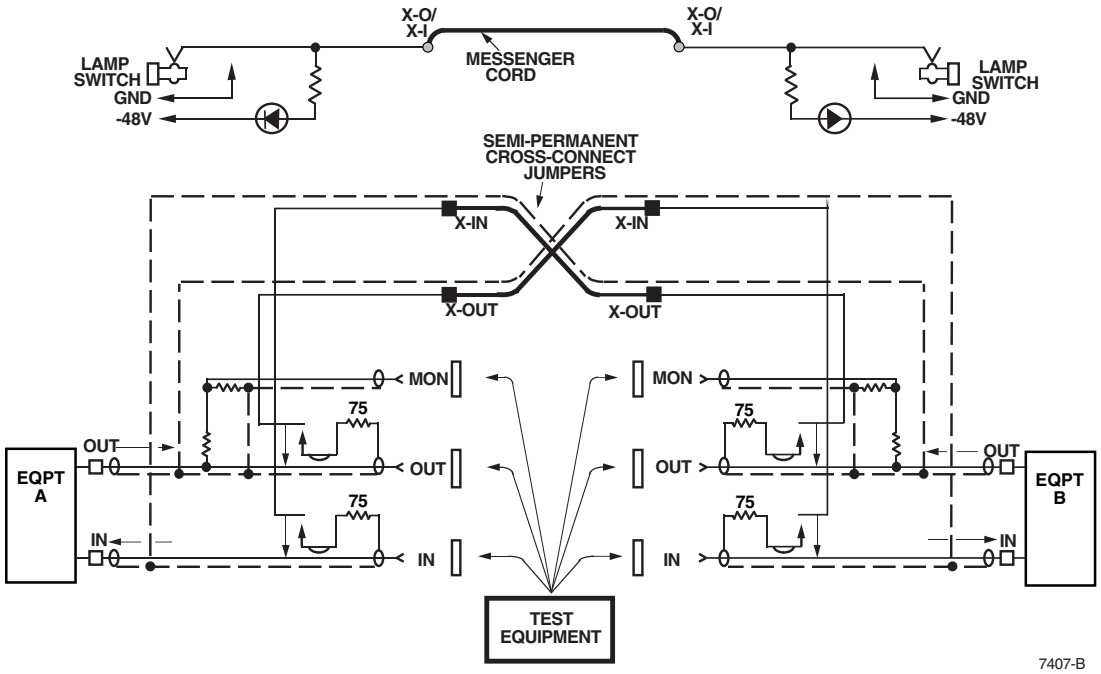
STEP	PROCEDURE
1	Switch on (up) the DSX-4F lamp switch (LS) for the known equipment termination.
2	Observe all tracer lamps. The tracer lamp for the known equipment termination, and the tracer lamp for the unknown cross-connected equipment termination, will both flash for approximately 30 seconds and then remain lit.
3	Set tracer lamp toggle switch back down 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.

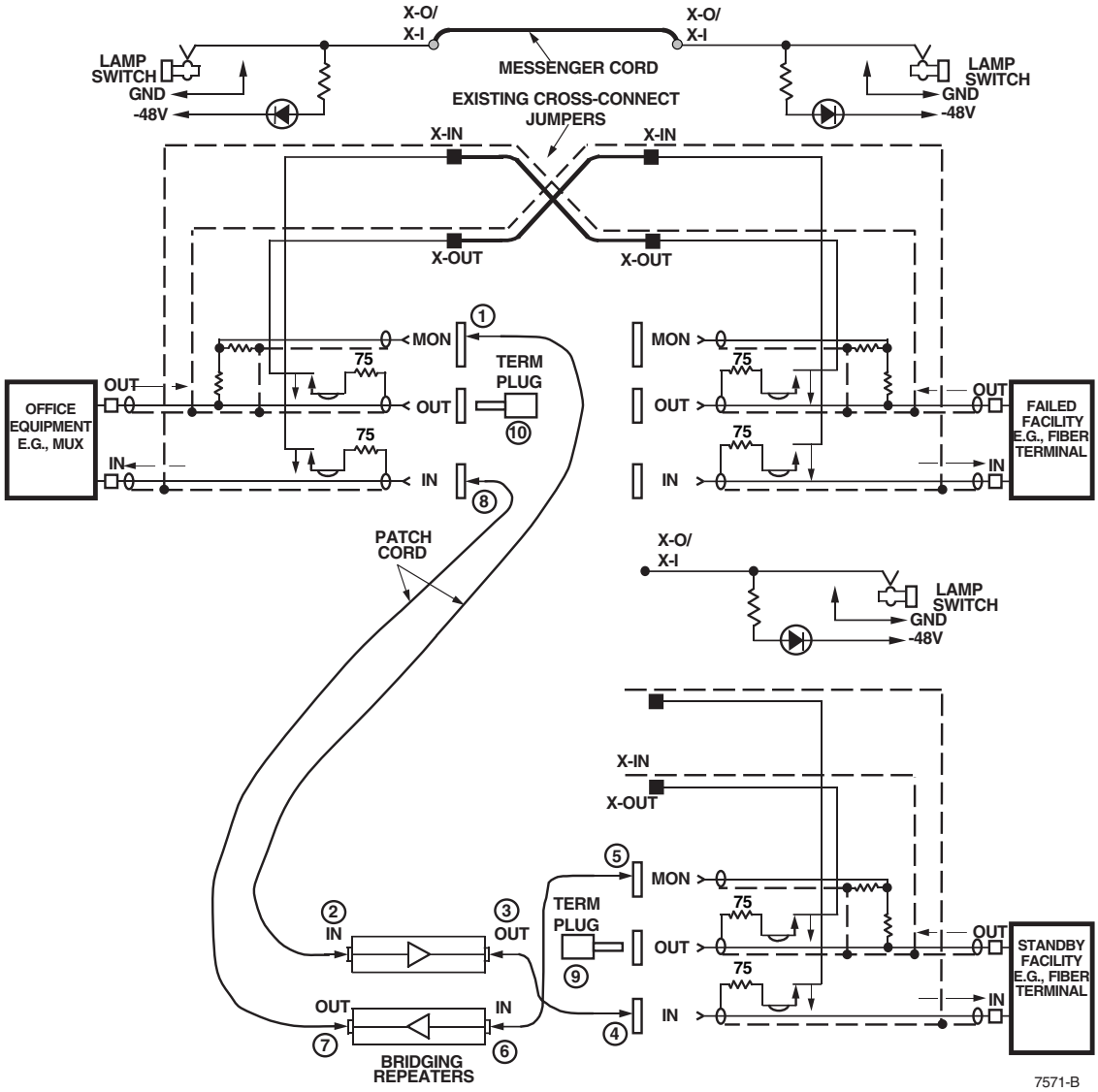
STEP	PROCEDURE
1	To test a circuit at the cross-connect point of the two equipment units without interrupting the cross-connect circuit, plug the appropriate test unit into the desired MON jack and perform the test.
2	To open a cross-connect circuit (this will interrupt any active circuits between EQPT 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 without interrupting service 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.

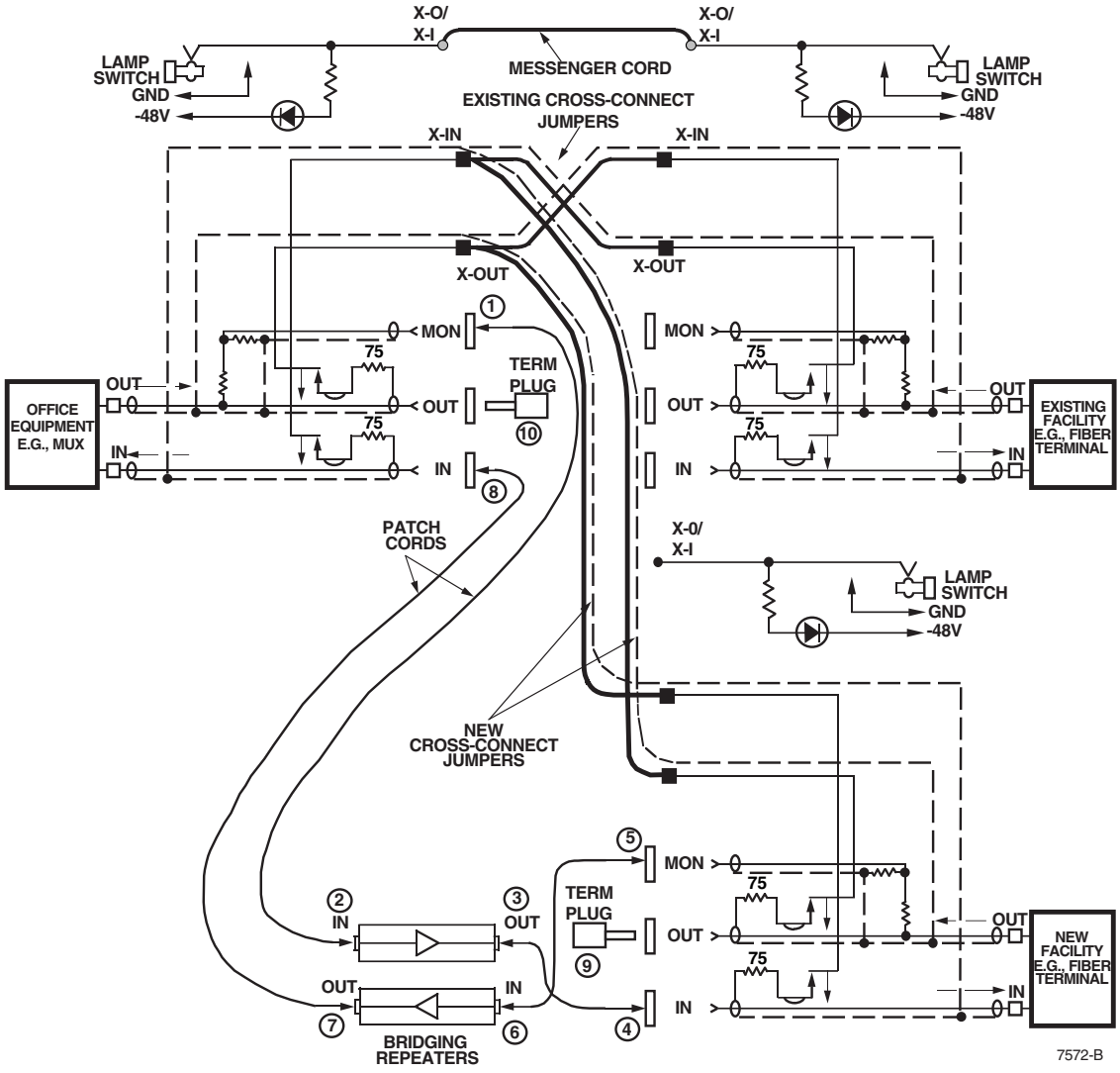
STEP	PROCEDURE
1	Select a standby facility to which communication between the two interrupted sites will be rerouted.
2	At both sites interrupted by the damaged facility, patch the office equipment to standby facility using patch cords as follows: (a) Connect the office equipment MON jack ① to a bridging 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 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	(a) Remove office equipment IN jack ⑧ to bridging repeater OUT jack ⑦. (b) Remove bridging repeater IN jack ⑥ to standby facility MON 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 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.

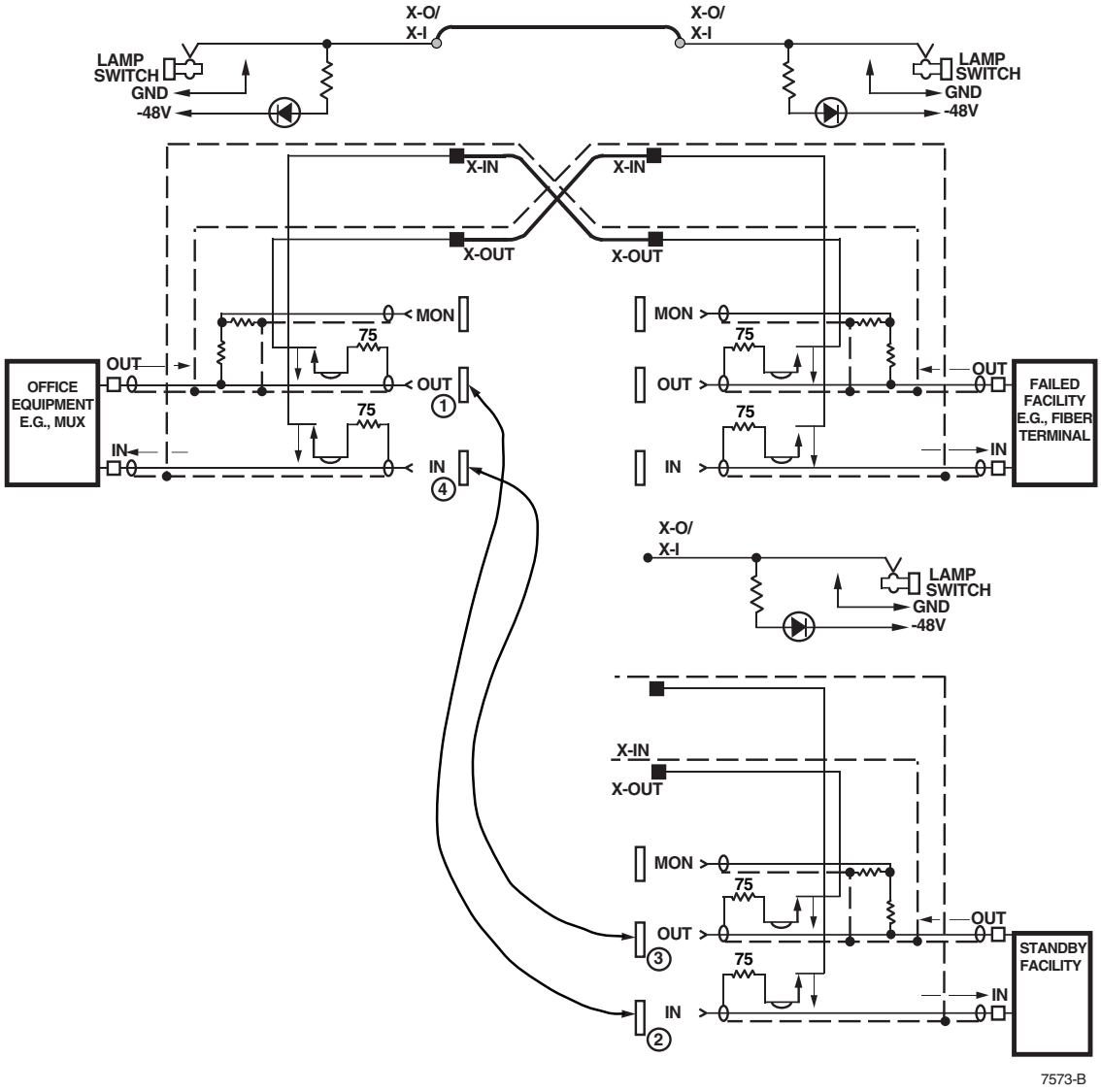
STEP	PROCEDURE
1	Select the equipment that is to be rolled over to new facility.
2	At both sites patch the office equipment to the new facility using patch cords as follows: (a) Connect the office equipment MON jack ① to a bridging repeater IN jack ②. (b) Connect the bridging repeater OUT ③ jack to the 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 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 an 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 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 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" 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.

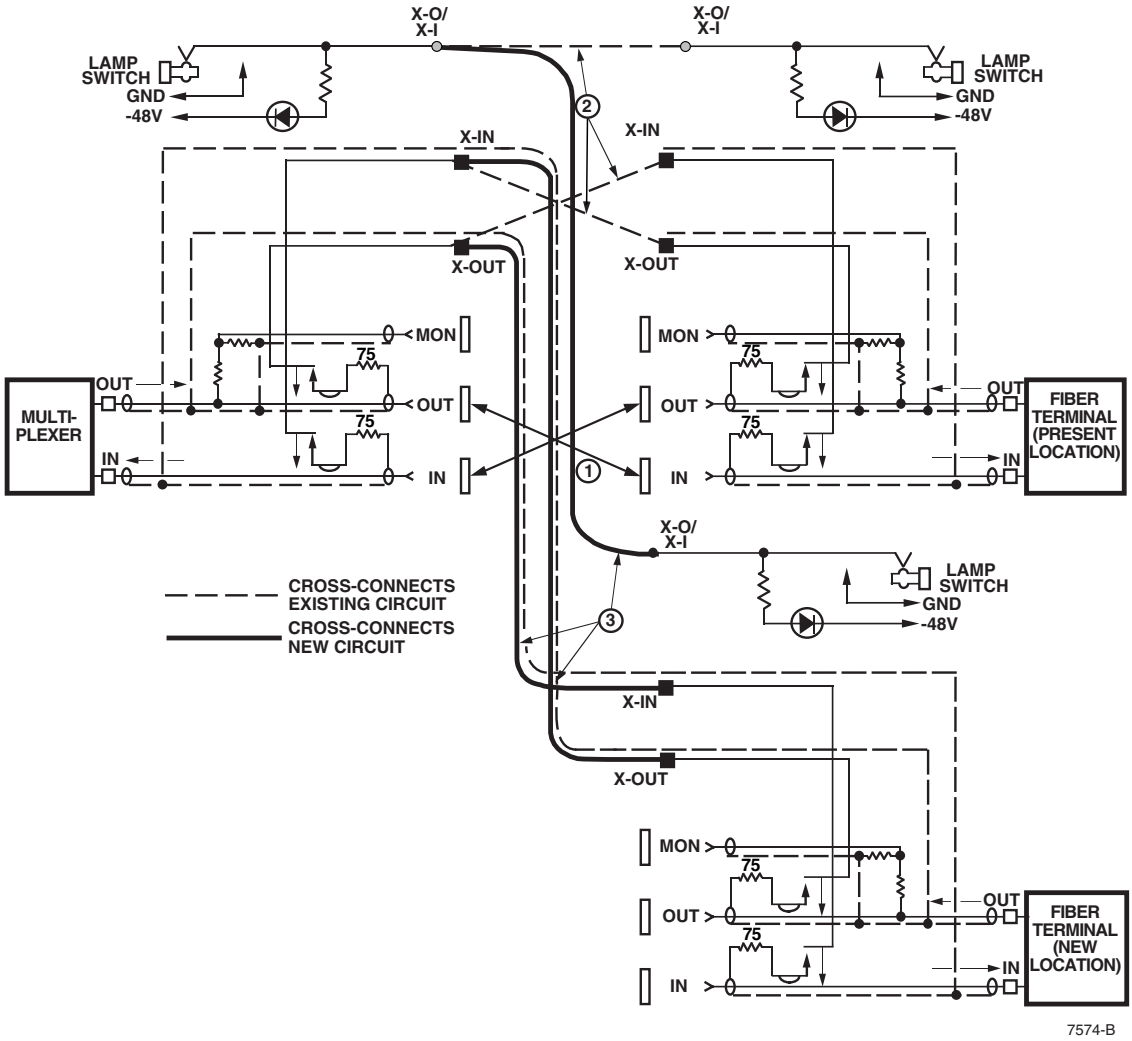
STEP	PROCEDURE
1	Select a standby facility to which communication between the two interrupted sites will be routed.
2	At both sites interrupted by the damaged facility, patch the office equipment to standby facility using patch cords as follows: (a) Connect the office equipment OUT jack ① to standby 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:** *Service may again be momentarily interrupted when removing patch cords.*
4	After the failed facility is repaired, remove all patch cords 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” 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-4F) 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-4F 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. No special tools are required.

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-4F circuit module:

1. Record or label all cross-connect, patch and office cables connected to the circuit module.
2. 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).

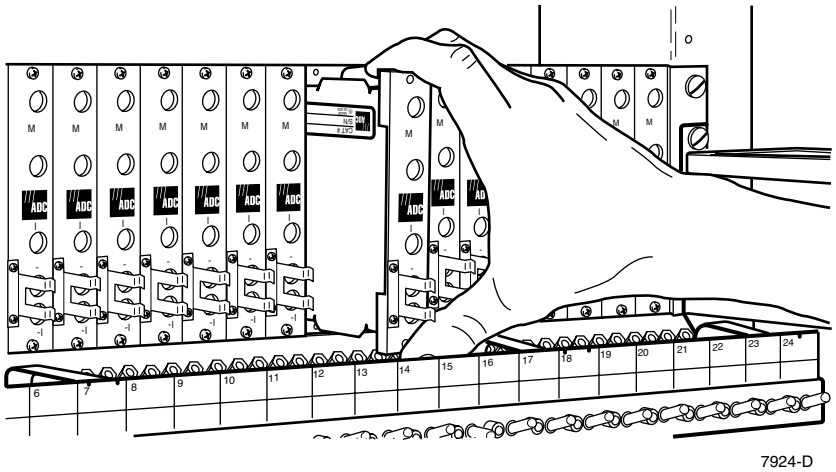


Figure 4-1. DSX-4F Circuit Module Removal/Installation

SECTION 5: GENERAL INFORMATION

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 Connections Group (BCG) Technical Assistance Center at 1-800-366-3891, extension 63475 (in U.S.A. or Canada) or 952-946-3475 (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 63475 (in U.S.A. or Canada) or 952-946-3475 (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 authorization from ADC voids the warranty.

If a malfunction cannot be resolved by the normal troubleshooting procedures, BCG Technical Assistance Center at 1-800-366-3891, extension 63475 (in U.S.A. or Canada) or 952-946-3475 (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 shipping instructions. If time is critical, ADC can arrange to ship the replacement Product immediately. In all cases, the defective Product must be carefully packed 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 (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 BCG Technical Assistance Center at 1-800-366-3891, extension 63475 (in U.S.A. or Canada) or 952-946-3475 (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 63000 (in U.S.A. or Canada) or 952-946-3000 (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 63748 (in U.S.A. or Canada) or 952-946-3748 (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

For customers wanting information on ADC products or help in using them, ADC offers the services listed below. To obtain any of these services by telephone, first dial the central ADC telephone number, then dial the extension provided below.

The central number for calls originating in the U.S.A. or Canada is **1-800-366-3891**. For calls originating outside the U.S.A. or Canada, dial country code "1" then dial **952-946-3000**.

Sales Assistance **Extension 63000**	• Quotation Proposals • Ordering and Delivery • General Product Information
Systems Integration **Extension 63000**	• Complete Solutions (from Concept to Installation) • Network Design and Integration Testing • System Turn-Up and Testing • Network Monitoring (Upstream or Downstream) • Power Monitoring and Remote Surveillance • Service/Maintenance Agreements • Systems Operation
BCG Technical Assistance Center **Extension 63475** **E-Mail: bcg_tac@adc.com**	• Technical Information • System/Network Configuration • Product Specification and Application • Training (Product-Specific) • Installation and Operation Assistance • Troubleshooting and Repair
Product Return Department **Extension 63748** **E-Mail: repair&return@adc.com**	• ADC Return Authorization number and instructions must be obtained before returning products.

Product information may also be obtained using the ADC web site at **www.adc.com** or by writing ADC Telecommunications, Inc., P.O. Box 1101, Minneapolis, MN 55440-1101, U.S.A.

www.adc.com