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DSX-3 (DSX-4H-24) Rear Cross-Connect System User Manual

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REVISION HISTORY

ISSUE	DATE	REASON FOR CHANGE
1st Edition, Issue 1	05/1991	Original
2nd Edition, Issue 1	08/1992	Provide additional operation procedures and clarification terminology.
2nd Edition, Issue 2	10/1992	Change equipment and cross-connect cabling limitations.
3rd Edition, Issue 1	09/1996	Reformatted to current standards and incorporated editorial and technical changes.
3rd Edition, Issue 2	03/1998	Updated to show new ADC corporate address.
Issue 6	01/2001	Non-technical update.

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ADC Telecommunications, Inc.
P.O. Box 1101, Minneapolis, Minnesota 55440-1101
In U.S.A. and Canada: 1-800-366-3891
Outside U.S.A. and Canada: (952) 938-8080
Fax: (952) 946-3292

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ABOUT THIS MANUAL

This user manual describes ADC's DSX-3 (DSX-4H-24) Rear 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	ADCP Number
DSX-3 (DSX-4H-24) Rear Cross-Connect Installation Guide	80-321
DS3 Digital Signal Cross-Connect (DSX-3) System Applications Guide	80-323

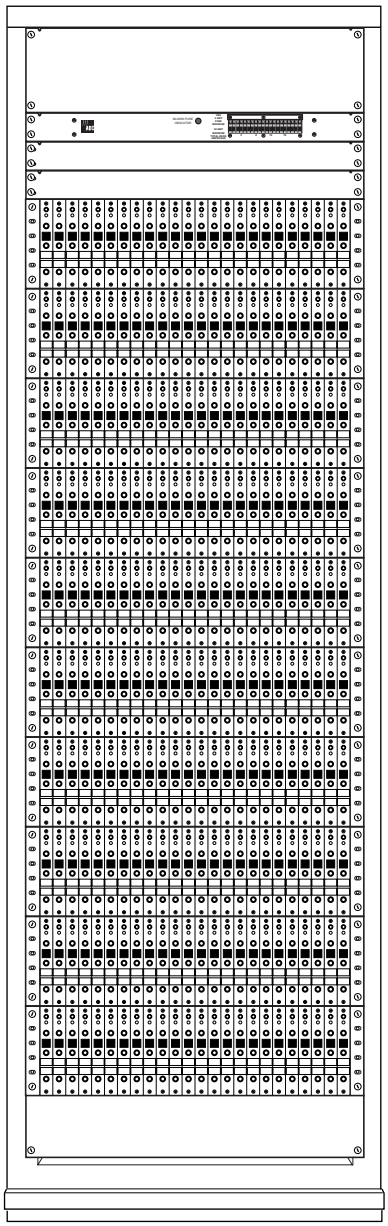
ADMONISHMENTS

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.*



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DSX-3 (DSX-4H-24) REAR CROSS-CONNECT SYSTEM

DESCRIPTION AND APPLICATION

SECTION 1: DESCRIPTION AND APPLICATION

1 GENERAL

This section describes ADC's DSX-3 (DSX-4H-24) Rear 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 may 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-4H-24) Rear 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-4H-24) Rear Cross-Connect System is modular for easy expansion at the user's site, and may provide any number of bi-directional cross-connects in multiples of 120 (up to 240 equipment terminations) per 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-4H circuit modules. Each cross-connect system consists of up to 240 DSX-4H circuit modules (two per cross-connect) plugged into a 7 foot × 23 inch × 12 inch (2.13 m × 58.42 cm × 30.48 cm) equipment bay.

2.2 Connectors

The DSX-3 (DSX-4H-24) Rear Cross-Connect System has BNC or TNC connectors for terminating coaxial cross-connect (XO and XI) and equipment IN/OUT (O and I) cabling, and pin jacks for interconnecting of tracer lamps. Patching and monitoring is accomplished by means of standard or midsize coaxial jacks located on the front of the module.

2.3 Tracer Lamps

A red flashing light emitting diode (LED) tracer lamp is located at the top of each DSX-4H circuit module for quick and easy identification of cross-connected circuits.

2.4 Cable Management

Unequal flange (duct type) racks and spacers provide space for routing office/equipment cables to and from the various shelves in the cross-connect system bay. Cable brackets are provided on each side at the rear for fastening of the cables to the bay. Vertical and horizontal rings are provided at the rear of the bay for orderly routing of cross-connect cables between circuit modules on the bay, and cable troughs at the top and bottom allow for orderly cross-connect cabling between bays.

➧ **Note**: ADC recommends spacing of 10.0 inches (25.4 cm) between bays to avoid the possibility of cable congestion.

3 FUNCTIONAL DESCRIPTION

The DSX-3 (DSX-4H-24) Rear Cross-Connect System consists of up to 240 individual DSX-4H circuit modules, two of which 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.

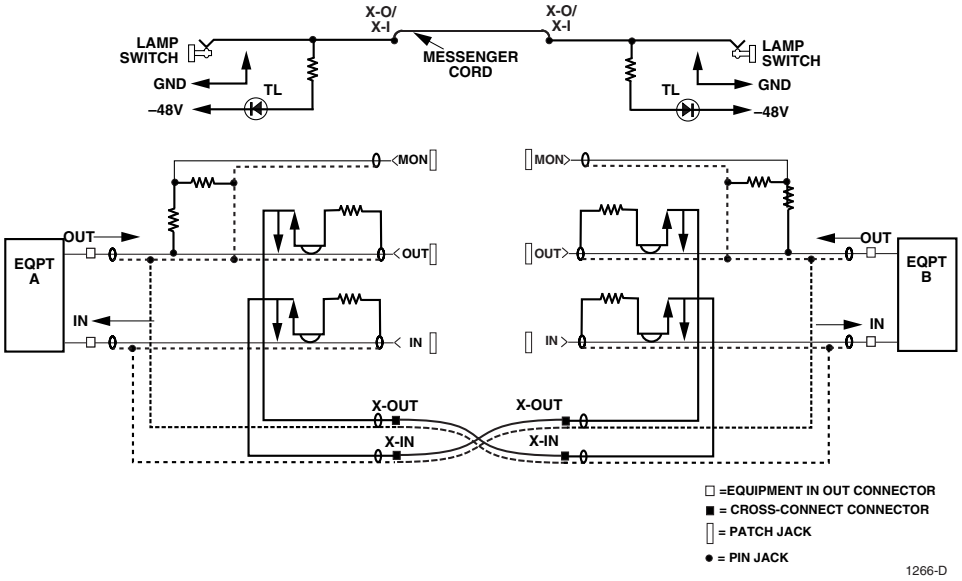

Figure 1-1. Two DSX-4H Circuits

Each circuit module has connectors and jacks for terminating office/equipment cables and for cross-connecting and patching the various office/equipment units together. Cabling from office equipment is connected to DSX-4H equipment IN/OUT connectors, and any equipment input or output may then be connected to any other equipment input/output by means of jumpers connected to the cross-connect connectors. Equipment inputs and outputs may also be tested or temporarily patched to other equipment inputs and outputs by means of patch cords plugged into the DSX-4H patch jacks.

A typical DSX-4H circuit arrangement is shown in Figure 1-2. Office equipments A, B, and C are connected to the IN/OUT connectors of three different DSX-4H circuit modules. Office equipments A and B are then connected together at the DSX-4H circuit modules by temporary patch cords. The corresponding tracer lamp (TL) terminals are also jumpered together by the messenger cord in the cross-connect cable. Cross-connected equipments A and B can now be identified, monitored, and tested as follows:

- Circuit Identification - Pulling any lamp switch (LS) outward causes the tracer lamp at each end of the corresponding cross-connect cable to flash for approximately 30 seconds and then remain lit until the lamp switch (LS) is pushed back in. This gives a visual indication of the equipment units that are cross-connected together.
- Bridged Monitoring and Testing - Monitor or test equipment patched into the MON jack of either circuit module allows testing without interrupting the signals between the A and B equipment.

- 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.

In addition, patch cables 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.

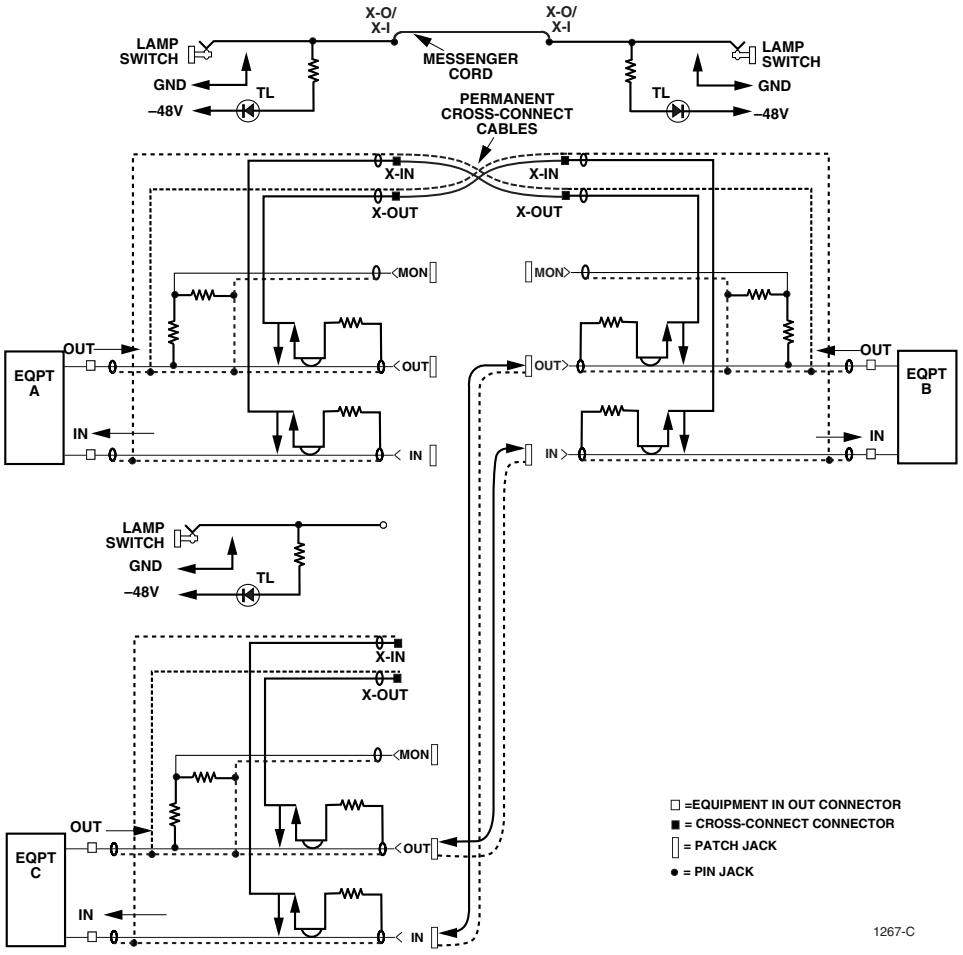

Figure 1-2. Typical DSX-3 (DSX-4H-24) Circuit Arrangement

4 APPLICATIONS

4.1 Testing and Fault Isolation

Terminating all digital operational and test equipment at the DSX-3 (DSX-4H-24) Rear 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:

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

4.2 Interoffice Service Restoration

The loss of a major facility may isolate or greatly reduce communication capability between the two locations. To temporarily restore partial communications, circuits can be rerouted through a third location. The reroute is established with simple patch arrangements at the cross-connect systems at three sites. After the facility is repaired, the reroute patches are easily removed and normal service is restored.

4.3 Traffic Pattern Changes

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

4.4 System Expansion

The DSX-4H-24 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-4H-24 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 centralized cross-connect system. Cross-connect cables on the cross-connect system connect the equipment into the desired office electrical configuration.

4.6 Cutover To New Digital Switch

The DSX-4H-24 simplifies the cutover to a new digital switch. When a digital switch is installed, it is terminated on the cross-connect system. The cross-connections serving the existing switch are then replaced by temporary patch cords, and new cross-connect jumpers are installed for the new digital switch. Cutover to the new switch is then completed by removing the temporary patch cords.

4.7 Office Record Keeping

The DSX-4H-24 minimizes office record keeping by providing vertical and horizontal marking for identifying equipment locations and city terminations. In addition, red LED tracer lamps allow for easy identification of equipment cross-connected at the cross-connect system.

5 PHYSICAL DESCRIPTION

Front and rear views of a typical fully configured DSX-3 (DSX-4H-24) Rear Cross-Connect System bay are shown in Figures 1-3 and 1-4. The bay is comprised of up to ten module chassis, each capable of holding up to 24 DSX-4H circuit modules. A fuse panel located near the top of the bay supplies power to each chassis. Provision for an AC outlet is located at the bottom of the bay. Rings and brackets at the back of the bay allow for routing and securing equipment in/out cables and cross-connect jumpers.

Equipment and cross-connect cabling to the cross-connect system bay is by means of BNC or TNC coaxial connectors located on the back of the circuit module. Each circuit module also has standard or midsize coaxial jacks on the front for patching and monitoring.

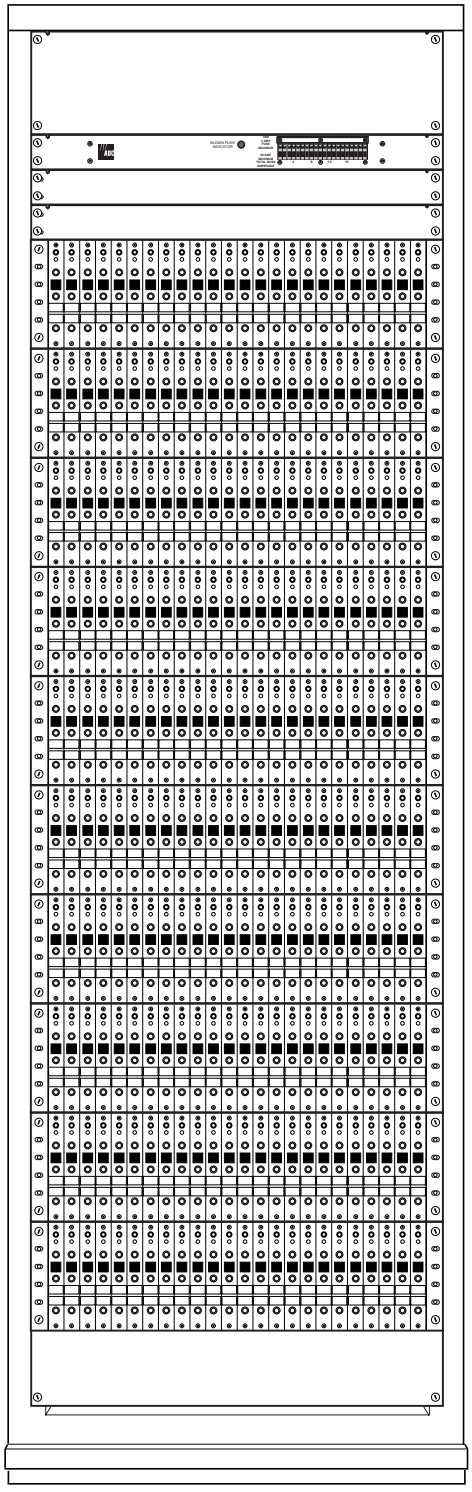

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Figure 1-3. DSX-3 (DSX-4H-24) Rear Cross-Connect System Bay (Front View)

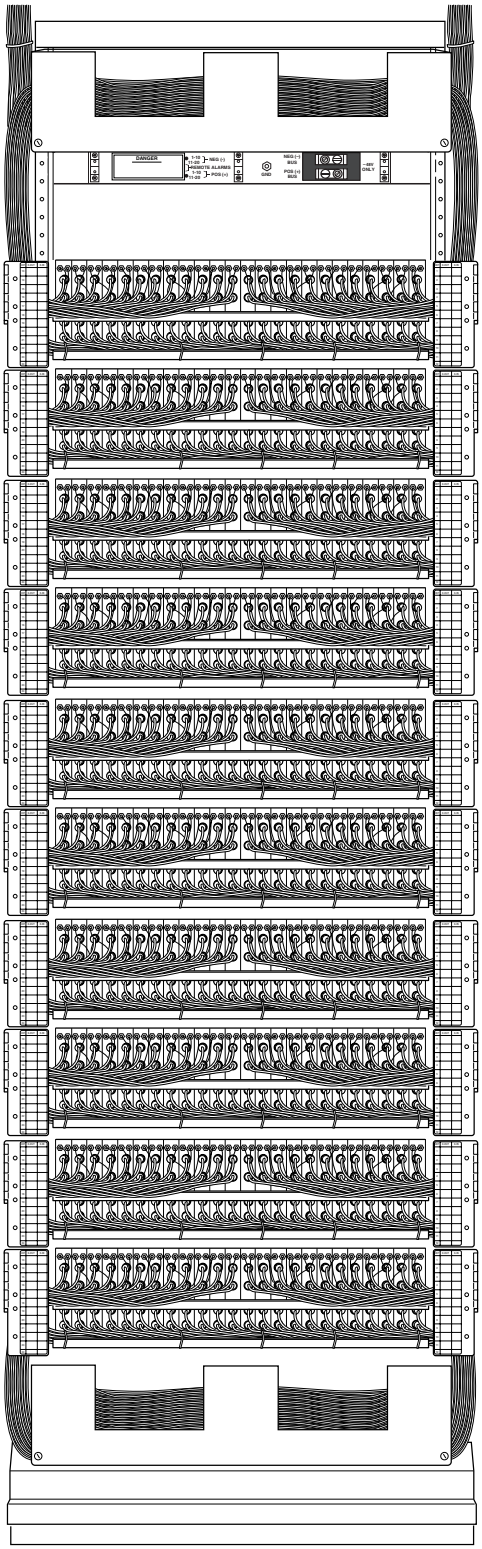


Figure 1-4. DSX-3 (DSX-4H-24) Rear Cross-Connect System Bay (Rear View)

5.1 DSX-4H Circuit Modules

Each DSX-4H circuit module, shown in Figure 1-5, provides access to the input and output of one digital office equipment unit. The unit dimensions are approximately 6.00 × 0.88 × 9.02 inches (15.02 × 2.02 × 23.04 cm).

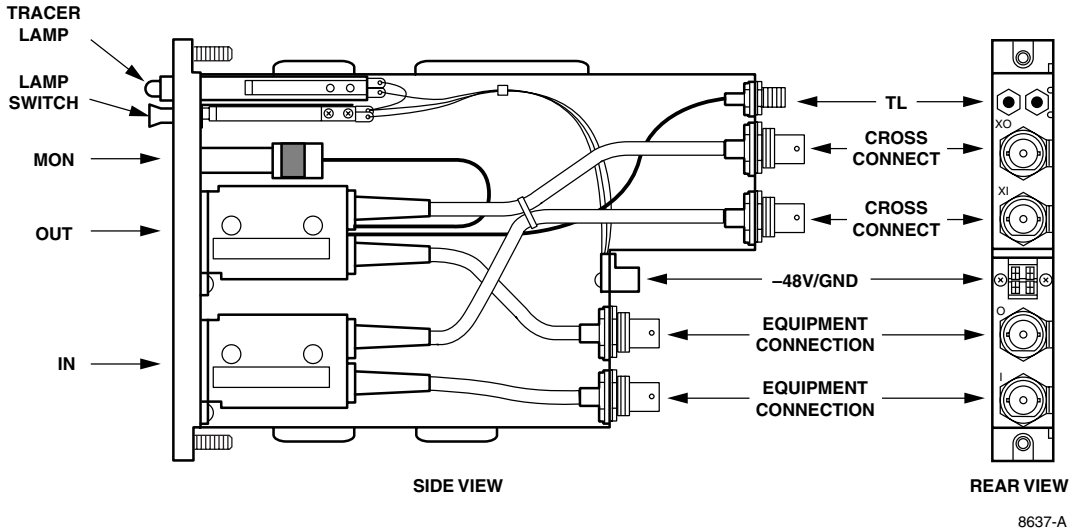


Figure 1-5. DSX-4H Circuit Module

The DSX-4H module is designed for use with either DS3, STS-1, STS-3, or DS4NA interfaces; however, only one type of interface should be terminated at any one cross-connect system bay. The module has standard or midsize coaxial jacks for testing and patching. BNC or TNC coaxial connectors at the back of the module are used for connecting the equipment in/out cables and cross-connect jumpers. Specific functions of the circuit module components are defined in Table 1-1.

Table 1-1. DSX-3 (DSX-4H-24) Circuit Module Components

NAME	TYPE	LOCATION	FUNCTION
Tracer Lamp (TL)	Red LED Indicator	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 pulled out, and remains lit while the tracer lamp switch is left pulled out. If the module is cross-connected to another module, the tracer lamp on that module will also flash approximately 30 seconds and then remain lit.
Lamp Switch (LS)	Push/Pull Switch	Front	Provides bridged access to the output signal of connected office equipment to allow monitoring without interruption.
MON (Monitor)	Standard or Midsize Coaxial Jack	Front	Provides bridged access to the output signal of connected office equipment to allow monitoring without interruption.

(continued)

Table 1-1. DSX-3 (DSX-4H-24) Circuit Module Components, continued

NAME	TYPE	LOCATION	FUNCTION
OUT	Standard or Midsize Switching Coaxial Jack	Front	Provides test or patch access to digital equipment output terminations. Any cross-connect to the X-O jack is disabled and terminated to 75 ohm ground whenever a plug is in the OUT jack.
IN	Standard or Midsize Switching Coaxial Jack	Front	Provides test or patch access to digital equipment input terminations. any cross-connect to the X-I jack is disabled and terminated to 75 ohm ground whenever a plug is in the IN jack.
XO and XI	BNC or TNC Connector	Rear	Provides direct access to the digital equipment output (XO) or input (XI) termination for cross-connecting to any digital equipment output or input termination via the cross-connect system.
O and I	BNC or TNC Connector	Bottom Rear	Provides for connection from the digital equipment output (O) or input (I) termination.
(Not marked)	Pin Jacks	Top Rear	Provides for interconnecting of the tracer lamps for the corresponding cross-connects to allow tracer lamp operation as described above. The connections between the circuit modules should correspond exactly to the XO or XI cross connect jumpers. Cross-connect jumpers are available with messenger cords which accommodate both the cross-connect and the corresponding lamp connection.

5.2 DSX-4H Chassis

The DSX-4H chassis, as shown in Figure 1-6, provides the mounting for up to 24 circuit modules. It is 6 inches (15.2 cm) high, 23 inches (58.4 cm) wide and is designed for installation in bays with mounting holes spaced at 1.0 inch (2.54 cm).

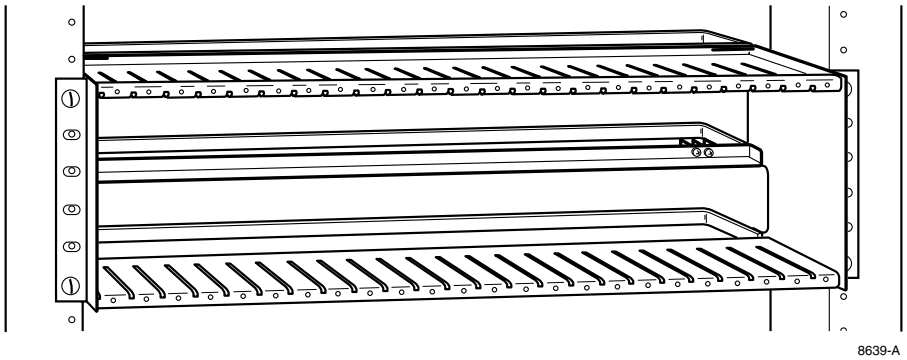


Figure 1-6. DSX-4H Chassis

White adhesive-backed designation labels are shipped with the chassis for application at the user's site. These labels may be pre-printed to customer request or they may be blank to allow designations to be added during installation.

5.3 Fuse Panel

The fuse panel, as shown in Figure 1-7, provides –48 Vdc power protection for all cross-connect system tracer lamp LED circuitry in the bay. Power for each DSX-4H chassis is supplied through a separate 0.5 Amp fuse. (Each LED draws 0.01 Amp, 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 may also be connected to an external alarm system.

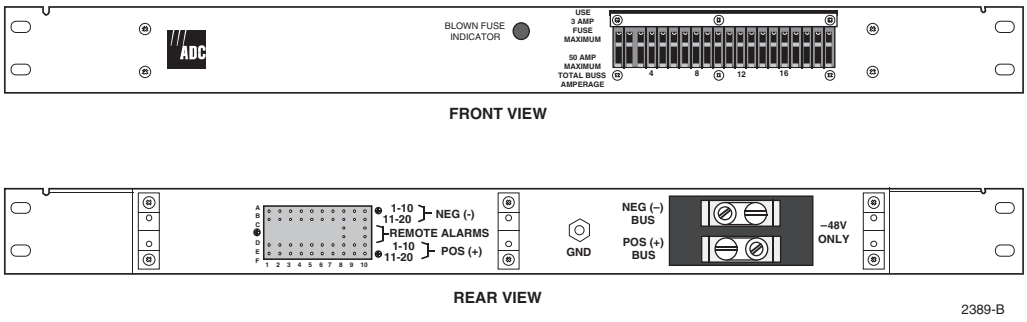


Figure 1-7. Fuse Panel

5.4 Cable Rings and Troughs

Vertical cable rings at the rear of the bay allow for routing of cross-connect jumpers up and down each side of the bay. Cable troughs at the top and bottom of the bay provide for the routing of cross-connect jumpers between bays.

5.5 Cable Brackets

The cables are brought in at the sides of the bay and tied to the cable brackets.

5.6 Cross-Connect System

The cross-connect system bay is an unequal flange type, 84 × 25.94 × 12 inches (213 × 65.88 × 30.48 cm). Shelf mounting holes are spaced at one inch (2.54 cm). An AC outlet may be provided at the bottom front of the bay as an auxiliary source of 110 Vac primary power.

6 SYSTEM SPECIFICATIONS

Specifications for the DSX-3 (DSX-4H-24) Front Cross-Connect System are shown in Table 1-2.

Table 1-2. System Specifications

PARAMETER	SPECIFICATION
Physical	
Height:	7.0 feet (2.13 m)
Width:	25.94 inches (65.88 cm)
Depth:	12 inches (30.48 cm)
Weight:	360 pounds (163 kg) (Fully equipped)
Power	
Voltage:	–48 Vdc
Current:	10 mA for each lit LED tracer lamp
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
Insertion Loss:	Less than 0.8 dB at 22.368 mHz and less than 1.9 dB at 137.088 mHz with up to 27 feet (8.23 m) of cross-connect 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-4H-24) Rear Cross-Connect System. It is recommended that the entire section be read and understood before beginning installation.

If additional installation information is required, refer to DSX-3 (DSX-4H-24) Rear Cross-Connect Installation Guide, ADCP-80-321.

2 OFFICE REQUIREMENTS

2.1 Space and Floor Loading

The cross-connect system consists of up to 240 circuit modules mounted in a standard 7-foot × 23-inch (2.13 m × 58.42 cm) unequal flange equipment bay. Maximum width of the bay is 25.94 inches (65.88 cm), and maximum depth is 12 inches (30.47 cm). A fully configured unwired/uncabled cross-connect system bay weighs approximately 360 pounds (163 kg.)

2.2 Environment

2.2.1 Shipping and Storage

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

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

2.2.2 Operational

The DSX-3 (DSX-4H-24) Rear Cross-Connect System must be operated in ambient temperatures and humidities which do not exceed the following:

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

2.3 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, just below the upper wire trough, at the top of the bay provides a 0.5 Amp. fuse for each DSX-4H chassis in the bay.

2.4 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.

2.5 Cable Types

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

2.6 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. Refer to Tables 2-1 and 2-2 for detailed cable length information.

Table 2-1. IN/OUT Equipment Cable

EQUIPMENT TYPE	734A OR EQUIVALENT CABLE	735A OR EQUIVALENT CABLE
DS3	450 ft. (137.2 m)	225 ft. (68.6 m)
DS4NA	225 ft (68.6 m)	146 ft. (44.5 m)
STS-1	439 ft. (133.8 m)	215 ft. (65.5 m)
STS-3	253 ft. (77.1 m)	125 ft. (31.8 m)

Table 2-2. Cross-Connect Jumpers

EQUIPMENT TYPE	RG59 CABLE	735A OR EQUIVALENT CABLE	TRIAX CABLE
DS3	29.0 ft. (7.4 m)	20.6 ft. (5.2 m)	13.5 ft. (3.4 m)
DS4NA	17.0 ft. (4.3 m)	13.0 ft (3.3 m)	7.6 ft. (1.9 m)
STS-1	27.0 ft. (6.9 m)	18.0 ft. (4.6 m)	12.5 ft. (3.2 m)
STS-3	16.0 ft. (4.1 m)	11.0 ft. (2.8 m)	7.0 ft. (1.8 m)

3 INSTALLATION

3.1 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 recommended spacing between bays is 10.0 inches (25.4 cm) when using 734A or equivalent and 735A or equivalent cables for cross-connect and equipment In/Out cabling.

3.1.1 Positioning and Mounting of New Bay

Caution: *A crated DSX-3 (DSX-4H-24) Rear 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. Refer to the Unequal Flange and Network Rack Installation Guide, ADCP-80-345.

3.1.2 Adding Chassis to Existing Bay

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:

1. Identify hole locations for mounting the chassis in a typical 7-foot × 23-inch (2.13 m × 58.42 cm) unequal flange 2-inch equipment bay.
2. Position chassis on bay in the selected location. Secure chassis to the bay using one #12-24 × 0.375 inch (9.5 mm) machine screw in the bottom hole on each side of the chassis.
3. Secure the vertical cable rings over the chassis mounting flanges with #12-24 × 0.375 inch (9.5 mm) machine screws in the top hole and the fourth hole down on the chassis.
4. Using 22 AWG wire, connect –48 V and GND from the fuse panel to the respective –48 V 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.

3.2 Circuit Module Installation

Install all DSX-4H circuit modules in the chassis as shown in Figure 2-1. Press each module into the chassis and install the two module retaining screws.

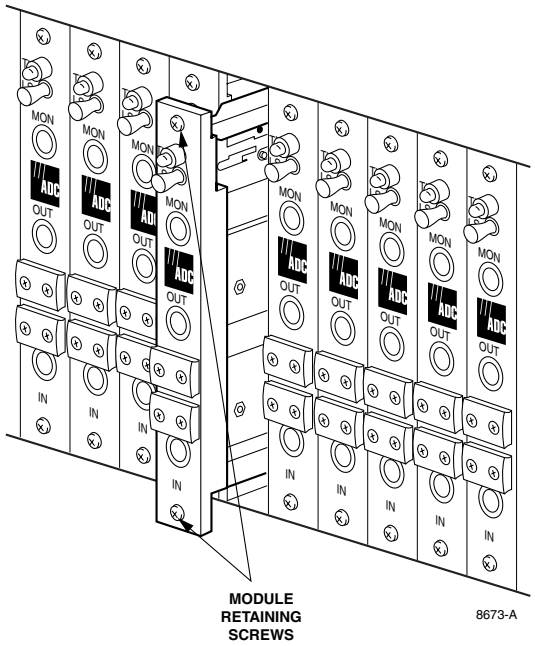


Figure 2-1. DSX-4H Circuit Module Installation

3.3 Installation of Office/Equipment Cabling

3.3.1 Cable Routing Guidelines

Office/equipment cabling to the cross-connect system are brought in at the sides of the bay either from above or below. Typical system cabling is shown in Figure 2-2.

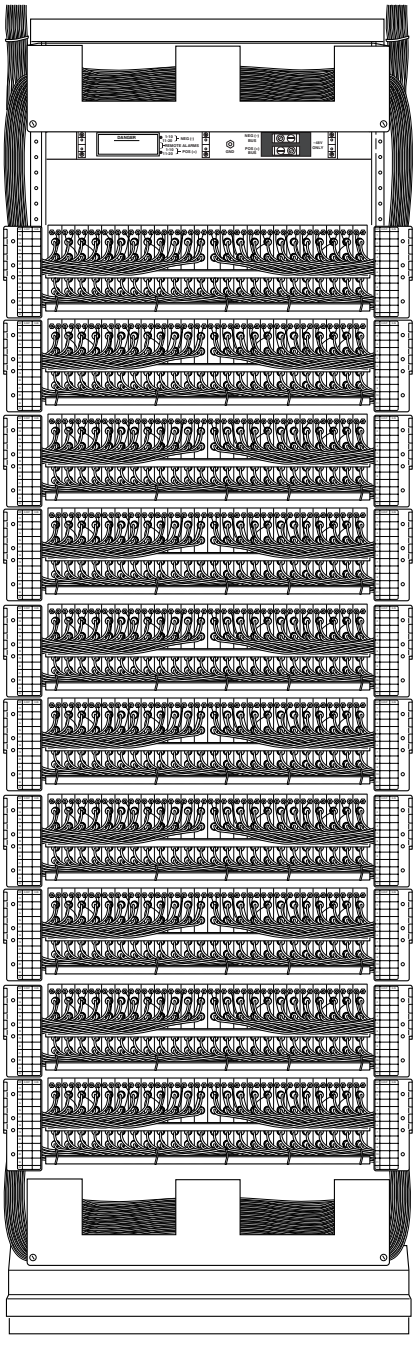


Figure 2-2. Typical Cross-Connect System Cabling

When bringing the cables into the bay, make sure that all cables carrying digital signals away from the bay are run vertically along the right side of the bay (as viewed from the front), and all cables carrying signals to the bay are run vertically along the left 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 cable lacing. Any cables not contained in the duct should be secured to the cable brackets on the rear of the bay. If the cables are coming into the bay from above, cable attachment should start at the bottom and work up (refer to Figure 2-3).

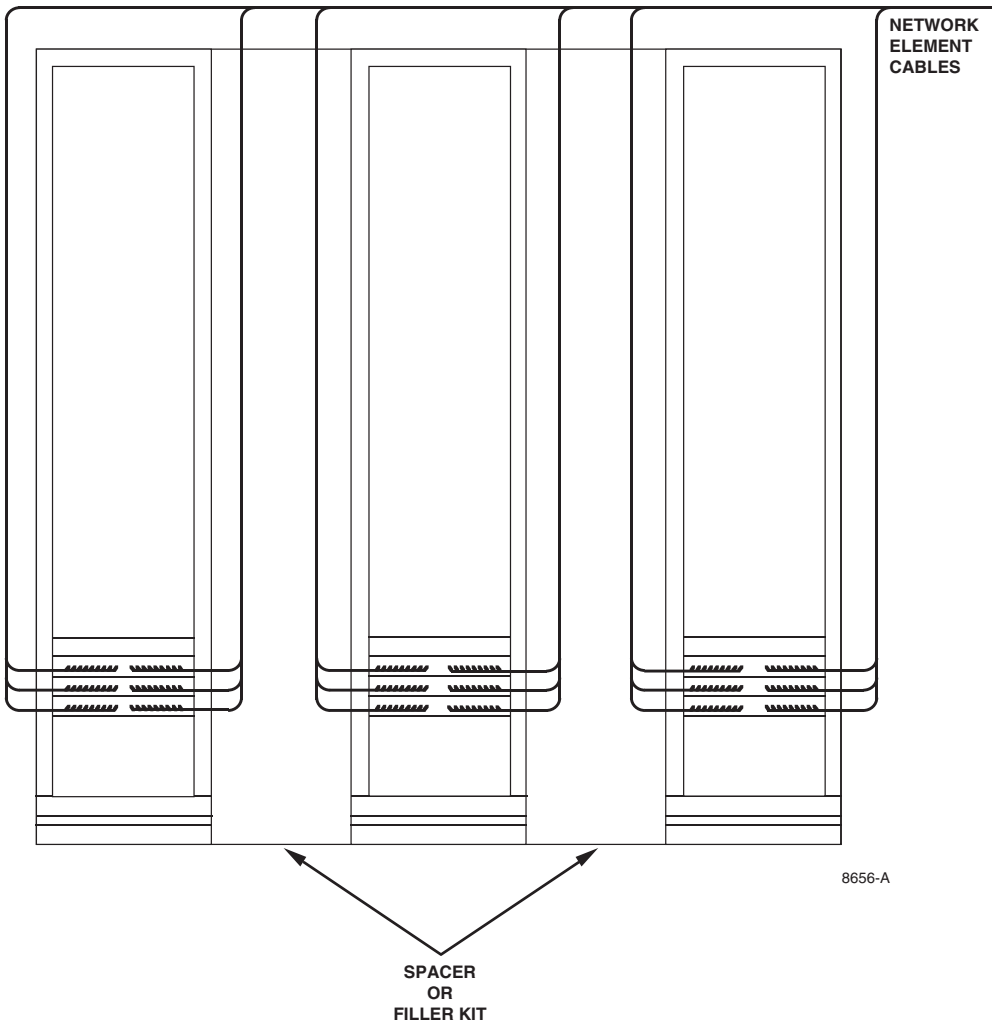


Figure 2-3. Cable Routing from Top to Bottom

If the cables are coming in from below, cable attachment should start at the top and work down (refer to Figure 2-4).

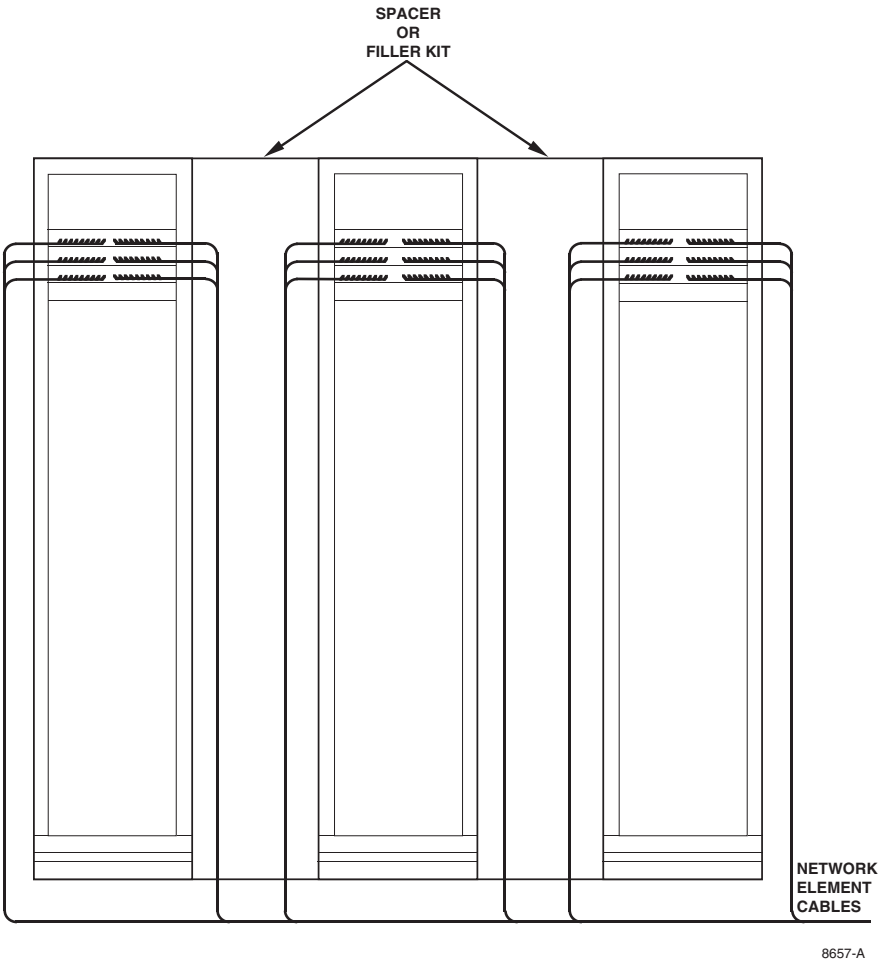


Figure 2-4. Cable Routing from Bottom to Top

3.3.2 Cable-to-Bay Termination

Office/equipment cables should be terminated to BNC/TNC connectors at the back of the DSX-4H circuit modules. A rear view of a DSX-4H chassis with all circuit modules in place is shown in Figure 2-5.

Terminate each pair of cables from any one office equipment unit to the IN and OUT connectors on any one circuit module. Terminate the cable carrying signals to the bay (left side of bay as viewed from front) to the OUT connector and the cable carrying signals away from the bay to the IN connector. Secure all cables to the cable bar on the rear of the chassis by use of tie-wraps. Record all equipment terminations on the labels provided on the front of each module. Record cross-connect terminations on the adhesive-backed designation labels provided on the back of the chassis.

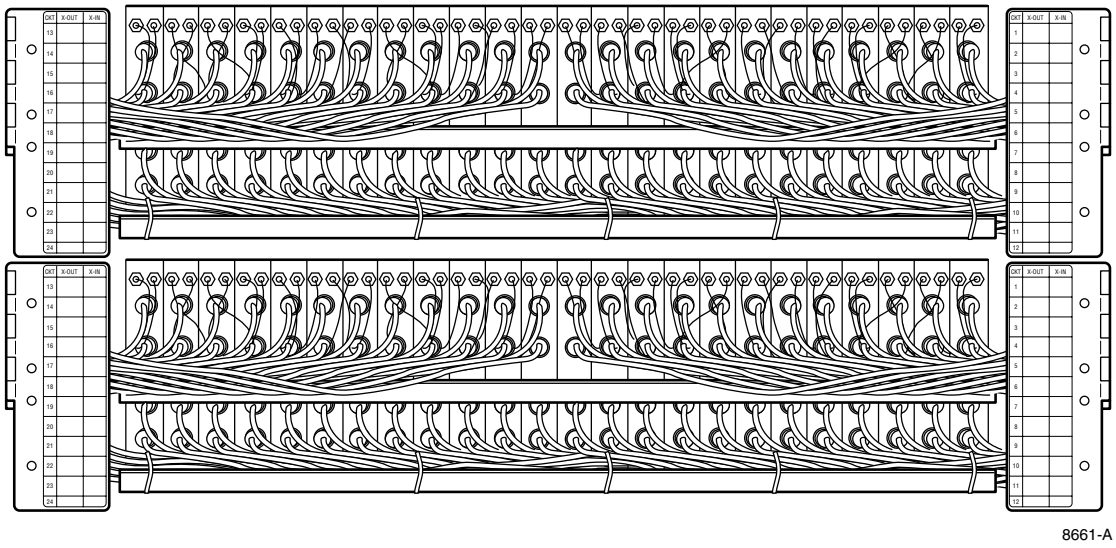


Figure 2-5. DSX-4H Chassis with Circuit Modules Installed (Rear View)

3.4 Office Power to Bay Wiring

The power to the bay fuse panel is supplied, through overhead power supply feeders, from the Battery 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.

- Local Electrical Codes
- Distance between the Battery Distribution Fuse Bay (BDFB) and the farthest bay powered.
- Maximum power load on each bay.
- Number of bays to be powered.
- Allowable voltage drop of power cables between BDFB and equipment bay.

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.
2. Using 14 AWG (minimum size) wire, make parallel connections at the overhead supply feeders for –48 Vdc and Ground. (Number 6 compression lug is provided with DSX-FP20F fuse panel.)
3. Complete the connection (Step 2) to the –48 V (NEG(–)BUS) and ground (POS(+)BUS) terminals on the fuse panel. See Figure 2-6.

The REMOTE ALARMS 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 GMT fuse also has a colored indicator 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.

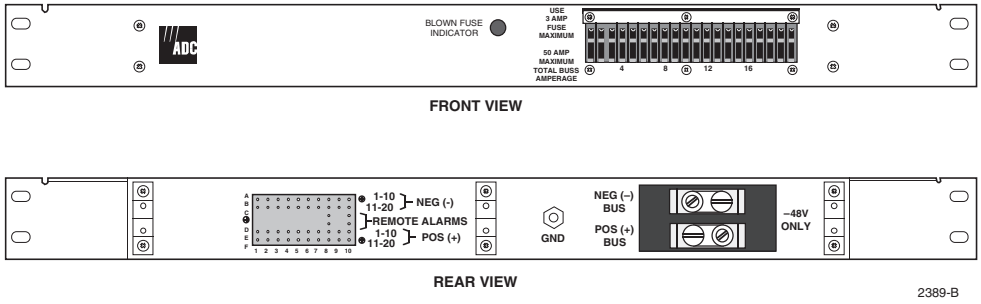


Figure 2-6. Fuse Panel

3.4.1 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 2-7. 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 described earlier in this section. To prevent unnecessary buildup and congestion, all discontinued cross-connects should be removed from the wireways.

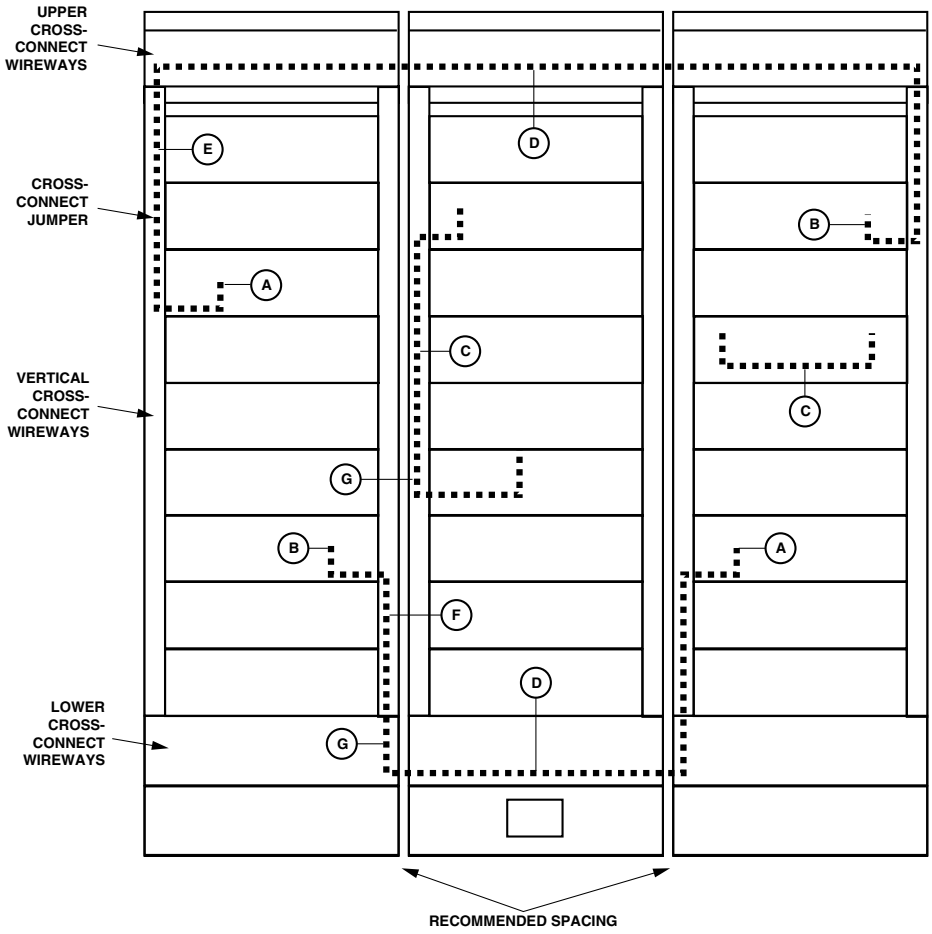
3.4.2 Cross-Connect Jumpers

Using cross-connect jumpers with accompanying messenger wires, cross-connect all necessary DSX-4H circuits as shown in Figure 2-8.

1. Connect the cross-connect OUT (XO) of the first termination to the cross-connect IN (XI) of the second termination. Connect the messenger wire pins of this cross-connect to tracer lamp pin jacks on each termination. Messenger wire pins may be inserted in either of the pin jacks. The two pin jacks on each module are internally connected together.
2. Connect the cross-connect IN (XI) of the first termination to the cross-connect OUT (XO) of the second termination. Connect the messenger wire pins of this cross connect to the remaining tracer lamp pin jack on each termination.

ADC DSX-4H 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 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.



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 2-7. Recommended Cross-Connect Routing

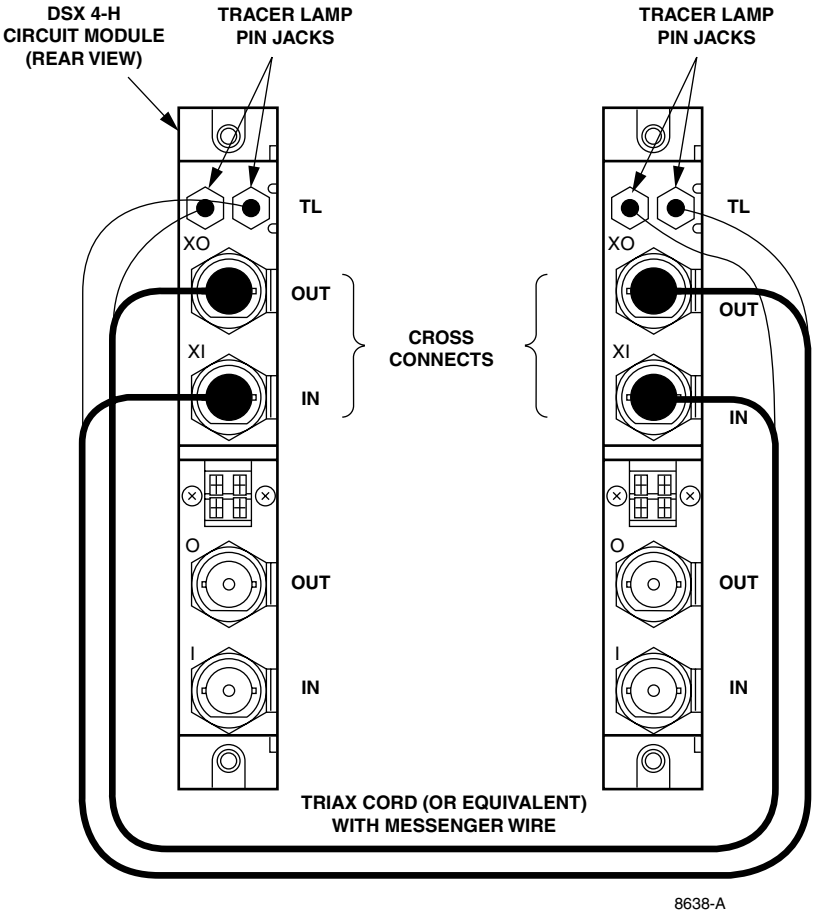


Figure 2-8. DSX-4H-24 Cross Connection

4 POWER APPLICATION AND SYSTEM CHECKOUT

Ensure that a 0.5 Amp fuse is in place in the fuse panel for each DSX-4H 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 wiring can be checked as necessary by pulling the tracer lamp switch button on any DSX-4H circuit module. Pulling of this button should cause 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 button is pushed back in.

OPERATION

SECTION 3: OPERATION

1 GENERAL

This section presents step-by-step procedures for using the DSX-3 (DSX-4H-24) Rear Cross-Connect System. Each procedure includes:

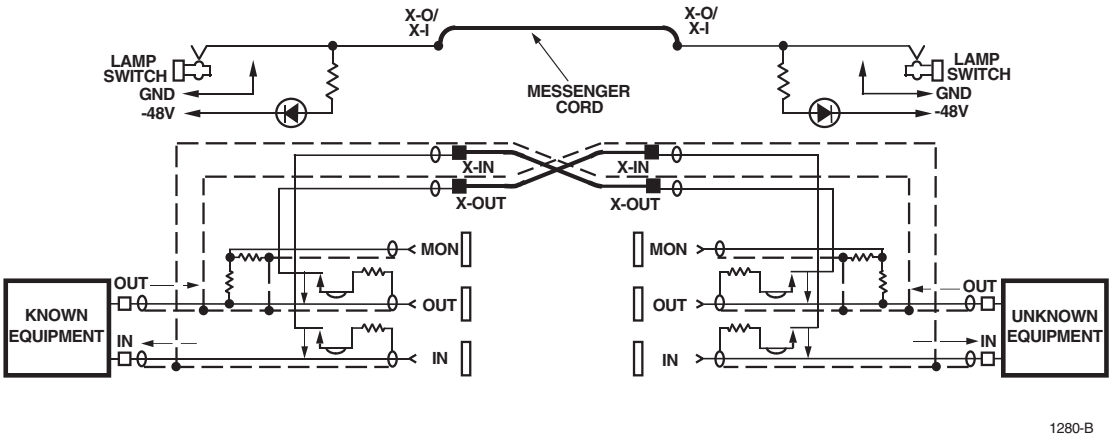
- A brief description of the procedure and its purpose.
- A general schematic illustration of the procedure.
- Steps to perform the procedure.

If problems are encountered in performing any of these procedures, contact ADC 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.

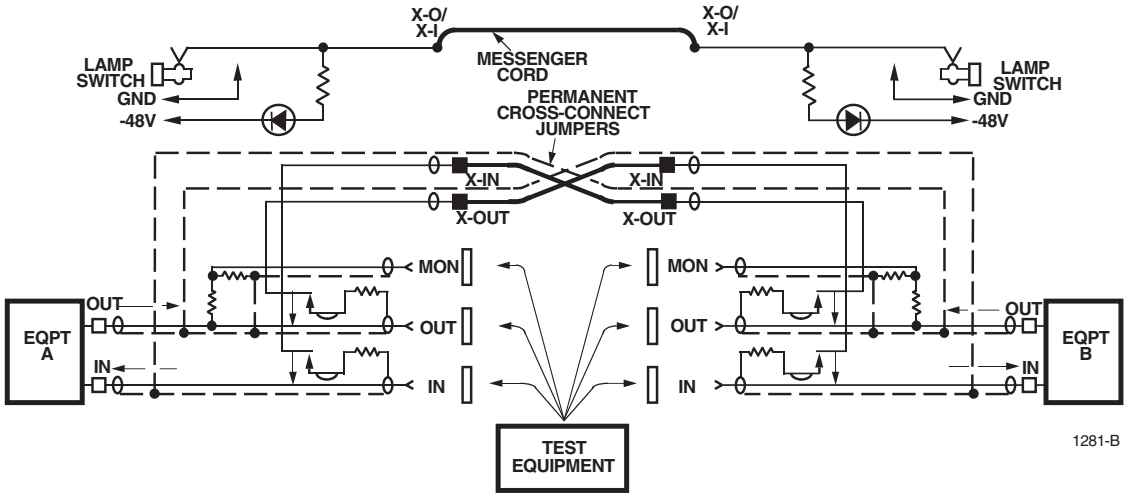
STEP	PROCEDURE
1	Pull the DSX-4H lamp switch (LS) button for the Known Equipment termination.
2	Observe all tracer lamps. The tracer lamp for the Known Equipment termination, and the tracer lamp for the cross-connected Unknown Equipment termination, will both flash for approximately 30 seconds and then remain lit.
3	Push lamp switch button back 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.

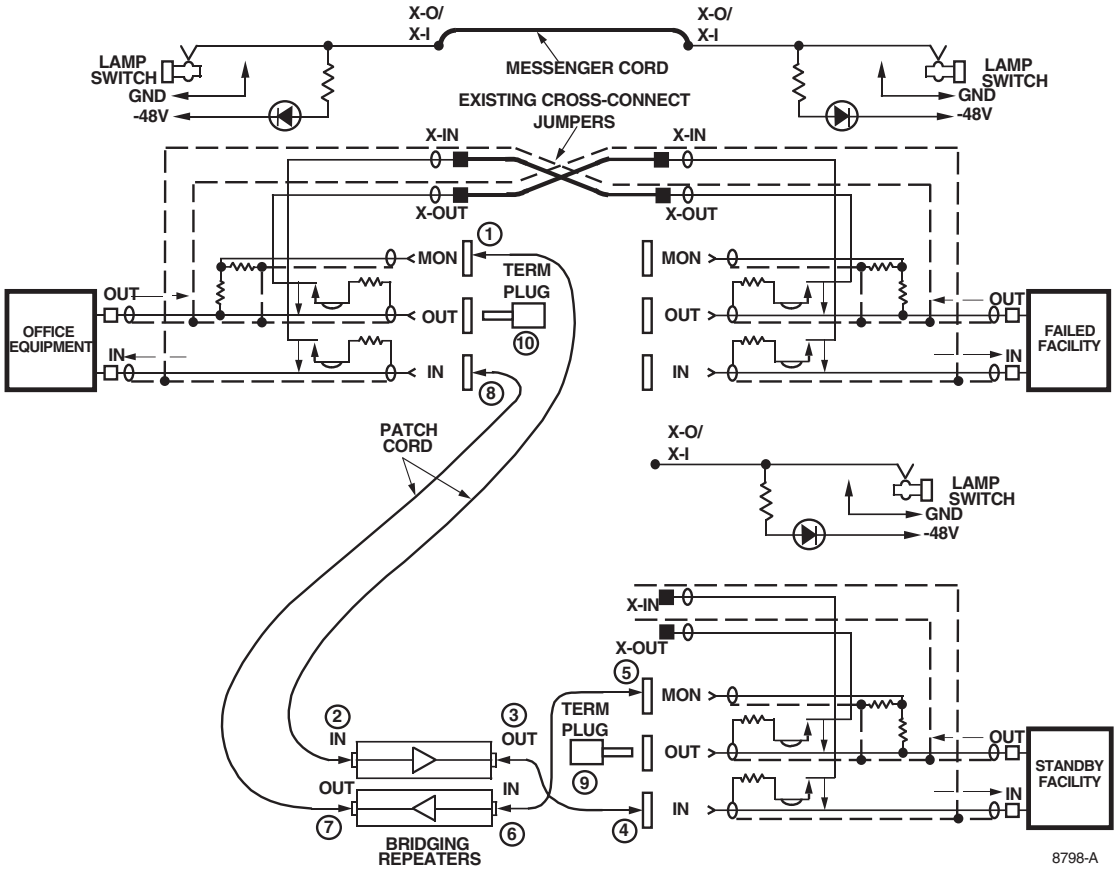
STEP	PROCEDURE
1	To test a circuit at the cross-connect point of the two equipment units without interrupting the cross-connect circuit, plug the appropriate test unit into the desired MON jack and perform the tests.
2	To open a cross-connect circuit (causes interruption of active circuits between Equipment (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 (causes interruption of active circuits between EQPT A and EQPT B) and test an equipment 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.

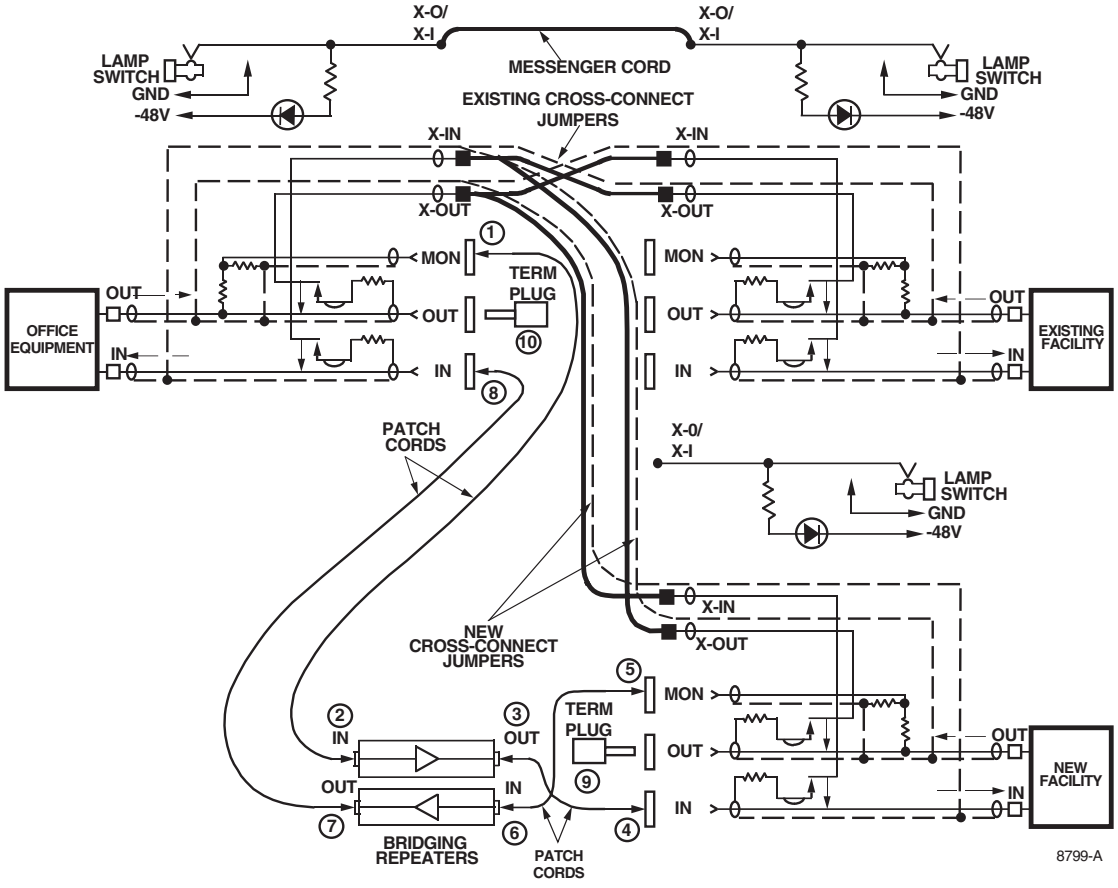
STEP	PROCEDURE
1	Select a standby facility where communication between the two interrupted sites will be temporarily routed to.
2	At both sites interrupted by the Failed Facility, patch the Office Equipment to Standby Facility using patch cords as follows: (a) Connect the Office Equipment MON jack ① 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 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 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 patch cords between Office Equipment and Standby Facility as follows: (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.

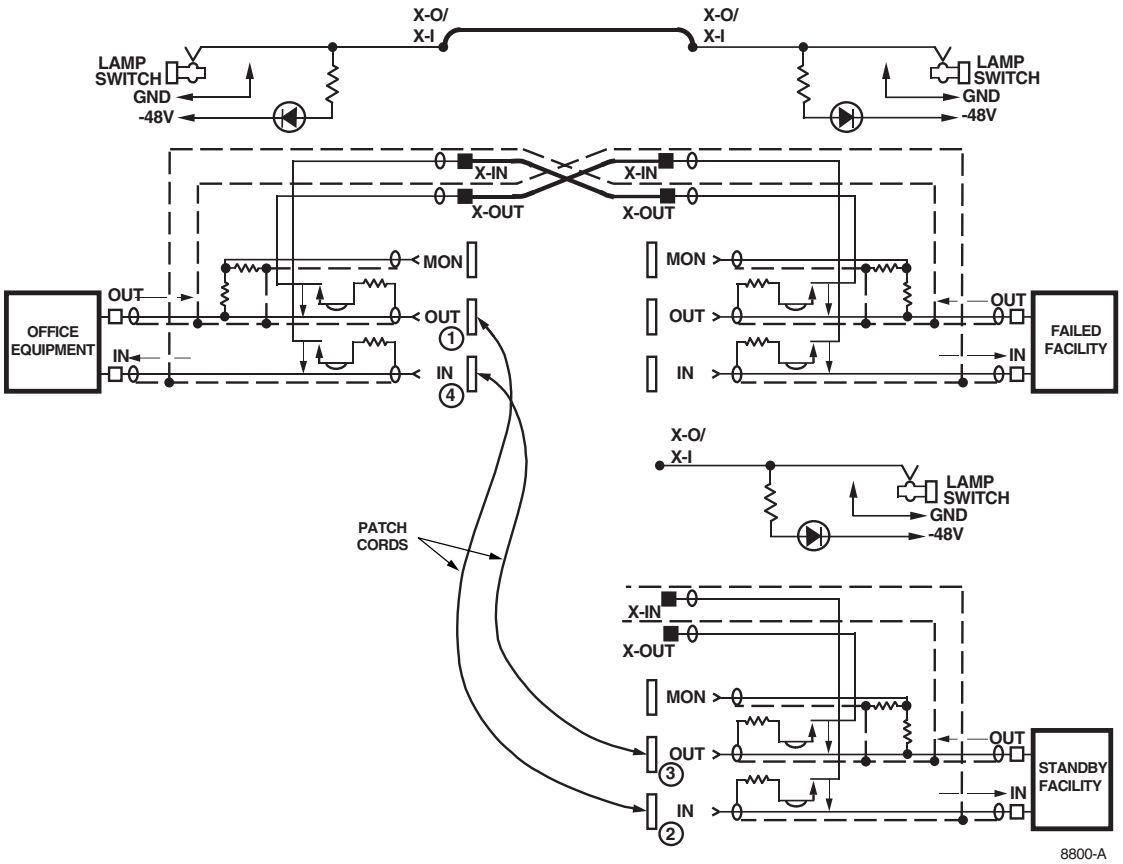
STEP	PROCEDURE
1	Select the equipment that is to be rolled over to new facility.
2	At both sites patch the Office Equipment to the new facility using patch cords as follows: (a) Connect the Office Equipment MON jack ① to a bridging repeater IN jack ②. (b) Connect the bridging repeater OUT ③ jack to the 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 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 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 existing cross-connect jumpers between the Office Equipment and Existing Facility. ⚠ **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	Remove patch cords between Office Equipment and New Facility as follows: (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 To Bypass A Failed Facility" whenever possible to ensure service is not interrupted when removing patch cords. This illustration represents the near end office. A similar corresponding far end office patch must also be performed, but is not shown.

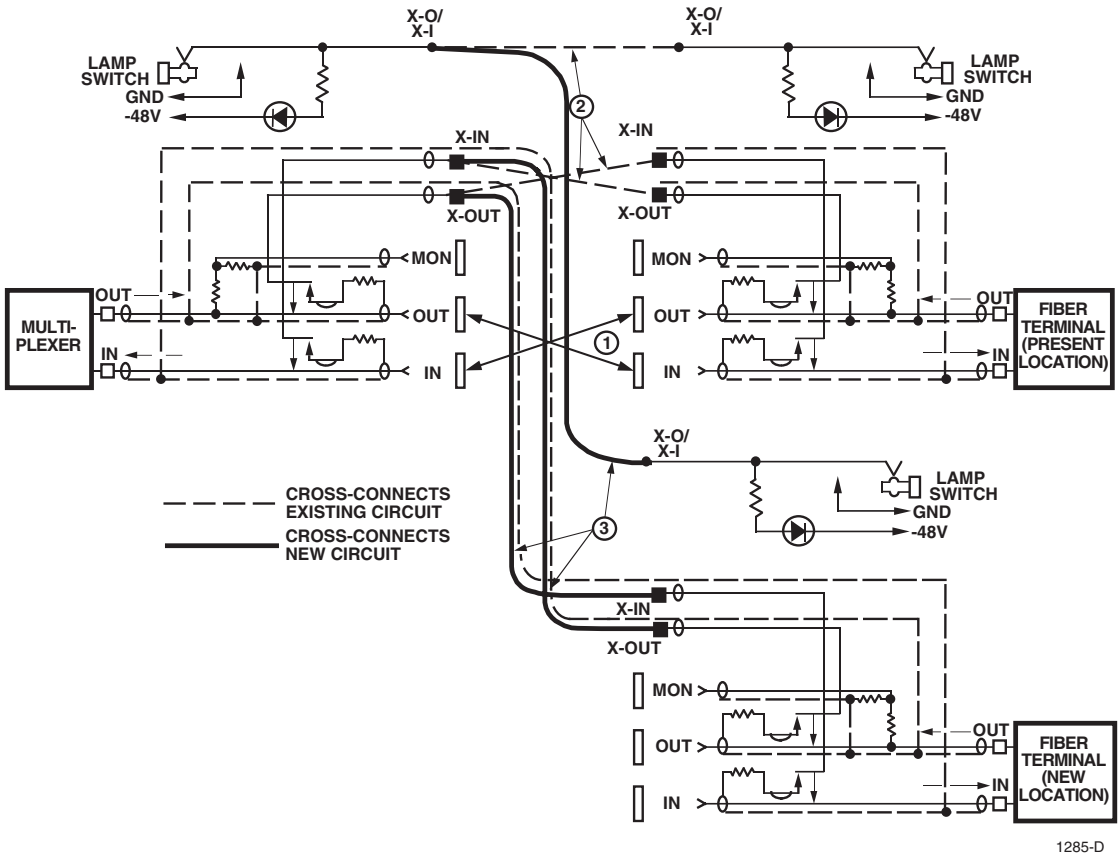
STEP	PROCEDURE
1	Select a Standby Facility where communication between the two interrupted sites will be temporarily routed to.
2	At both sites interrupted by the Failed Facility, patch the Office Equipment to Standby Facility using patch cords as follows: (a) Connect the Office Equipment OUT jack ① 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 To Bypass A Failed Facility” whenever possible to ensure service is not interrupted when removing patch cords. 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 ① in the OUT and IN jacks of existing circuit.
2	Remove the cross-connect jumpers and messenger wires between the ② Multiplexer and Fiber Terminal for the present location.
3	Install cross-connect jumpers and messenger wires ③ between the multiplexer and fiber terminal for the new location.
4	Remove temporary patch cords ①.
5	Record the new office cross-connect arrangement on the DSX-3 designation strips/cards.



MAINTENANCE

SECTION 4: MAINTENANCE

1 GENERAL

This section provides information necessary to maintain the DSX-3 (DSX-4H-24) Rear 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:

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

For any repairs other than described in this section, contact ADC Field Service at the telephone numbers listed in the General Information section of this manual. 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 network elements 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 are replaced on the DSX modules at the front of the DSX-4H chassis. Lamps are removed by pulling them from the sockets and installed by pushing them into the sockets. (Note the polarity of the LED.) No special tools are required.

3.3 Fuse Replacement

⚠ **Caution**: *To avoid equipment damage, a replacement fuse must have exactly the same current rating as the fuse being replaced.*

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.

3.4 Circuit Module Replacement

To replace a DSX-4H 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.
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).

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