



Broadband Systems  
D50 Documentation

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Volume 2  
Installation



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# VOLUME 2 INSTALLATION

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## Introduction to D50 Documentation

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**Introduction** D50 documentation provides complete detailed instructions on how to install, test, and commission a D50. This documentation complies with all requirements in Telcordia Technologies Technical Reference documents GR-454 *Generic Requirements for Supplier-Provided Documentation*, and IP-10260 *Standards for Task Oriented Practices (TOPS)*.

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**Target Audience** D50 documentation volumes are written at different levels of detail based on the reader's needs. Below is a list of the various volumes and the intended target audience for each.

Number	Title	Target Audience
Volume 1	General Information	Anyone with a need to understand more about the D50 System and planning requirements.
Volume 2	Installation	Installation and Testing Technicians, and Engineers (Detailed Level Procedures, or DLPs).
Volume 3	Commissioning	Testing Technicians and Engineers (DLPs).
Volume 4	Provisioning	Provisioning Technicians and Engineers (DLPs).
Volume 5	Maintenance and Testing	Maintenance and Testing Technicians and Engineers (DLPs).
Volume 6	Craft Terminal	Testing and Installation Technicians and Engineers (Reference manual for Craft Terminal).

**Information Mapping Style** All documents are written in Information Mapping style, which presents information in small units or blocks. Each information block is identified by a subject label in the left margin and is separated from the next information block by a horizontal line. Subject labels make it easy for the reader to scan the document and to find information on a specific subject.

Each DLP lists the required equipment and tools to perform the job, and provides step by step instructions (supported by graphics where appropriate) to help the reader perform each task.

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# SECTION 1    **HARDWARE INSTALLATION**

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# Chapter 1

## Master Control Shelf Installation

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**Introduction** The D50 multiplexer consists of the following components: Master Control Shelf (MCS), Line Card Shelves (LCS), Low Pass Filter Shelves (LPFS8), and Auxiliary Common Systems Interface Panels (ACSIP).

This procedure provides detailed instructions on how to install a D50 Master Control Shelf in a standard telco relay rack. These instructions may seem too detailed if you are experienced in the installation of Central Office equipment.

Use the labels in the left margin to scan this document for tasks you need to review, or to quickly find those tasks specific to the installation of the D50.

---

**D50 Configurations** The D50 multiplexer can be configured three different ways based on the needs of your network service provider. These configurations are:

**1 Configuration A**

Data and voice service, Low Pass Filter Shelf required. LPFS8s co-located with the D50 multiplexer (MCS and LCSs).

**2 Configuration B**

Data and voice service, Low Pass Filter Shelf required. LPFS8s located remotely, within 655 cable feet, from the D50 multiplexer (MCS and LCSs).

**3 Configuration C**

Data service only, no Low Pass Filter Shelf required.

Figure 1-1 shows a possible D50 multiplexer configuration (Configuration A) to support data plus voice service: a Master Control Shelf, Auxiliary Common Systems Interface Panels (3), the maximum number of Line Card Shelves (12), and Low Pass Filter Shelves (12):

**Note:** Figure 1-1 displays one configuration with LPFS8s. For additional configurations with LPFS8s, see Chapter 3—“Low Pass Filter Shelf Installation,” page 1-13.



Figure 1-1: Config. A: Data Plus Voice, LPFS8 Co-Located

Figure 1-2 shows a possible D50 multiplexer configuration (Configuration C) to support data service only; a Master Control Shelf, Auxiliary Common Systems Interface Panels (2), and the maximum number of Line Card Shelves (12). No Low Pass Filter Shelves are required in this configuration:

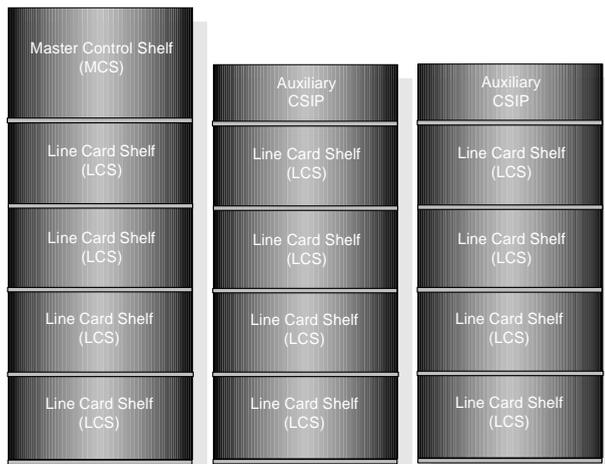


Figure 1-2: Config. C: Data Only, No LPFS8 Required

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**Required Equipment and Tools**

You must have the following equipment and tools to install the Master Control Shelf (refer to Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers”):

- Standard 23” wide, telco relay rack.
- Large Phillips head screwdriver.
- 2 ft. step ladder (optional).
- Master Control Shelf Assembly Kit.
- (4) 12-24 thread forming screws.
- A second person to help lift and position the Master Control Shelf assembly.  
Approximate weight of the MCS is 45 lbs. (assembly without cards), 74 lbs. (fully loaded).

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**Master Control Shelf Assembly**

The Master Control Shelf assembly is designed for placement in a standard 23” wide telco relay rack. Figure 1-3 diagrams the MCS.

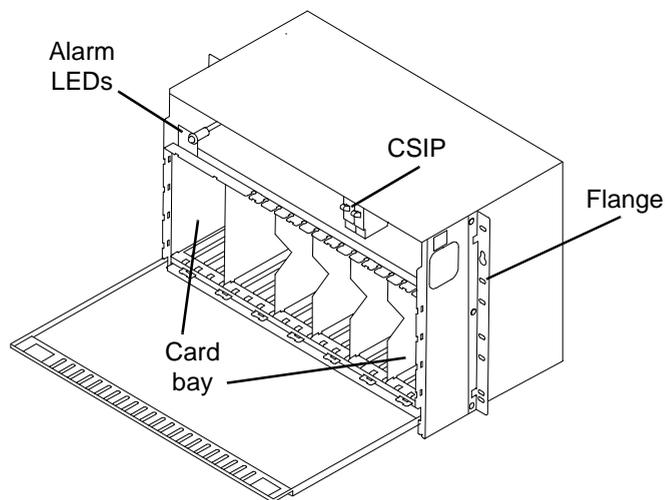


Figure 1-3: Master Control Shelf Assembly

A hinged front panel covers the front of the Master Control Shelf assembly. The panel is removable but it is intended to remain fastened to the MCS under normal conditions.

The MCS assembly includes a pre-installed Fan Tray. The Fan Tray is required for forced air cooling.

---

**Master Control Shelf Assembly Placement**

Install the Master Control Shelf assembly in the bay area, relay rack and mounting plates designated by the engineering work order. The Master Control Shelf assembly is installed using a minimum of four 12-24 thread forming screws (2 screws on each side).

Follow these steps to complete the placement procedure:

Table 1-1: Master Control Shelf Assembly Placement

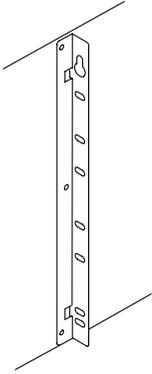
STEP	PROCEDURE
1	Lift the MCS assembly to its assigned position in the relay rack.
2	<p>To mount the MCS assembly in the rack:</p> <ul style="list-style-type: none"> <li>■ Line up flange holes with holes on both sides of the relay rack.</li> <li>■ Raise or lower the MCS until two flange holes line up with holes on both sides of the rack.</li> <li>■ Place four to six screws through the screw holes in the flange and the rack (minimum two on each side) and tighten to secure.</li> </ul> <div style="text-align: center;">  </div> <p style="text-align: center;">Figure 1-4: MCS Flange (right side)</p> <p><b>Note:</b> An optional method for Master Control Shelf assembly installation is provided on page 1-6.</p>

Table 1-1: Master Control Shelf Assembly Placement (continued)

STEP	PROCEDURE
3	<p>The MCS is shipped with the Fan Tray in place.</p> <p>Continue with the following procedures to make sure that the Fan Tray is properly locked into position.</p>
4	<p>To release the installed Fan Tray, slide both latches toward the center and pull the Fan Tray partially or completely out.</p> <div> </div> <p>Figure 1-5: MCS Assembly with Fan Tray Partially Removed</p>
5	<p>To return the Fan Tray to its proper position:</p> <ul style="list-style-type: none"> <li>■ Hold it level and slide it into the MCS assembly.</li> <li>■ Push the Fan Tray in until you feel a solid connection at the backplane. The Fan Tray connection is “keyed” so it plugs into its correct position on the backplane.</li> </ul> <p><b>Important! DO NOT force the Fan Tray into position. If it does not plug in easily, slide it back out and check for any obstructions or bent pins on the connector that might prevent it from sliding easily into place.</b></p>
6	<p>Lock the Fan Tray into position using the latches on either side. Slide both latches toward the center and release to lock into place. The front panel of the Fan Tray should be recessed with the front panel of the MCS.</p>
7	<p>The Master Control Shelf procedure is complete.</p>

**Note:** OPTIONAL METHOD. You can use the keyhole slots at the top of the mounting flange to hold the assembly unit in place while you place and tighten additional mounting screws. To do this, partially tighten a 12-24 thread forming mounting screw on each side of the relay rack, leaving about ¼ inch of space between the rack and the screw head. Position the assembly so keyhole slots are over the partially installed mounting screws. Lower the assembly until the top of both keyhole slots rest on the mounting screws. Place and tighten additional screws (minimum two on each side) to secure the assembly.

To use this option you must install D50 components from the bottom of the rack first (Low Pass Filter Shelves and Line Card Shelves first, Master Control Shelf last) to allow room to position the units.

**Important! Do not install Master Control Shelf cards until all procedures in the volume titled Installation are complete. The volume titled Commissioning, Section 2—*Card Placement*, Chapter 1—“MCS Card Installation” describes installation of cards in detail.**

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## Chapter 2

### Line Card Shelf Installation

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#### Introduction

The D50 multiplexer consists of the following components: Master Control Shelf (MCS), Line Card Shelves (LCS), Low Pass Filter Shelves (LPFS8), and Auxiliary Common Systems Interface Panels (CSIP).

This procedure provides detailed instructions on how to install a D50 Line Card Shelf in a standard telco relay rack. These instructions may seem too detailed if you are experienced in the installation of Central Office equipment.

Use the labels in the left margin to scan this document for tasks you need to review, or to quickly find those tasks specific to the installation of the D50.

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#### Required Equipment and Tools

To begin this task you must have the following equipment and tools (refer to Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers”):

- Standard 23” wide, telco relay rack.
  - Large Phillips head screwdriver.
  - 2 ft. step ladder (optional).
  - Line Card Shelf Assembly Kit (one for every LCS to be installed).
  - (4) 12-24 thread forming screws for each LCS.
  - A second person to help lift and position the Line Card Shelf assembly. Approximate weight of a LCS is 32 lbs. (assembly only, no Fan Tray or line cards), 65 lbs. (fully loaded).
-

**Line Card Shelf Assembly**

The Line Card Shelf assembly is designed for placement in a standard 23” wide telco relay rack. The following figure diagrams the LCS.

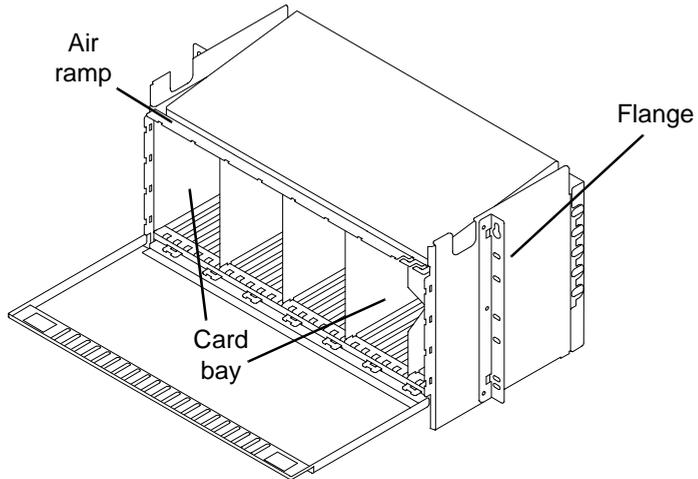


Figure 1-6: Line Card Shelf Assembly

A hinged front panel covers the front of the Line Card Shelf assembly. The panel is removable but it is intended to remain fastened to the LCS under normal conditions.

The LCS assembly includes a pre-installed Fan Tray. The Fan Tray is required for forced air cooling.

**Line Card Shelf  
 Assembly  
 Placement**

Install the Line Card Shelf assembly in the bay area, relay rack and mounting plates designated by the engineering work order. The Line Card Shelf assembly is installed using a minimum of four 12-24 thread forming screws (2 screws on each side).

Follow these steps to complete the placement procedure:

Table 1-2: Line Card Shelf Assembly Placement

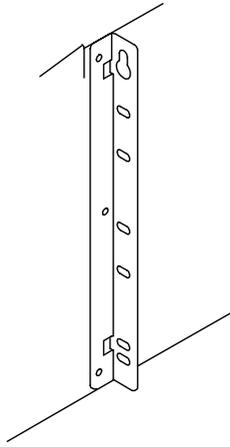
STEP	PROCEDURE
1	Lift the LCS assembly to its assigned position in the relay rack.
2	<p>To mount the LCS assembly in the rack:</p> <ul style="list-style-type: none"> <li>■ Line up flange holes with holes on both sides of the relay rack.</li> <li>■ Raise or lower the LCS until two flange holes line up with holes on both sides of the rack.</li> <li>■ Place four to six screws through the screw holes in the flange and the rack (minimum two on each side) and tighten to secure.</li> </ul> <div style="text-align: center;">  </div> <p style="text-align: center;">Figure 1-7: LCS Flange (right side)</p> <p><b>Note:</b> An optional method for Line Card Shelf assembly installation is provided on page 1-11.</p>
3	<p>The LCS is shipped with the Fan Tray in place.</p> <p>Continue with the following procedures to make sure that the Fan Tray is properly locked into position.</p>

Table 1-2: Line Card Shelf Assembly Placement (continued)

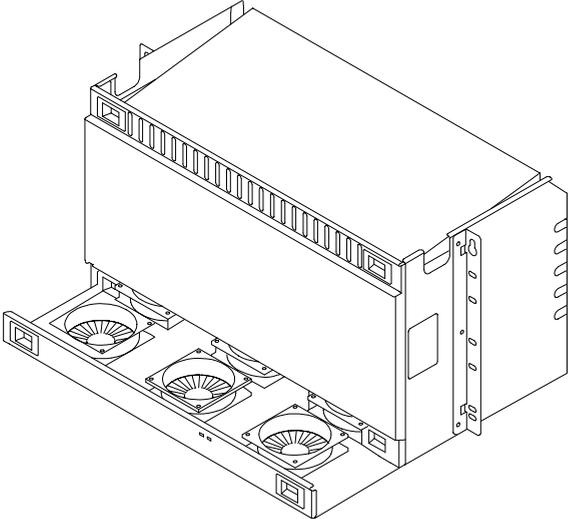
STEP	PROCEDURE
4	<p>To release the installed Fan Tray, slide both latches toward the center and pull the Fan Tray partially or completely out.</p>  <p>Figure 1-8: LCS Assembly with Fan Tray Partially Removed</p>
5	<p>To return the Fan Tray to its proper position:</p> <ul style="list-style-type: none"><li>■ Hold it level and slide it into the LCS assembly.</li><li>■ Push the Fan Tray in until you feel a solid connection at the backplane. The Fan Tray connection is “keyed” so it plugs into its correct position on the backplane.</li></ul> <p><b>Important! DO NOT force the Fan Tray into position. If it does not plug in easily, slide it back out and check for any obstructions or bent pins on the connector that might prevent it from sliding easily into place.</b></p>
6	<p>Lock the Fan Tray into position using the latches on either side. Slide both latches toward the center and release to lock into place. The front panel of the Fan Tray should be recessed with the front panel of the LCS.</p>

Table 1-2: Line Card Shelf Assembly Placement (continued)

STEP	PROCEDURE
7	<p>Does the engineering work order designate installation of a Low Pass Filter Shelf?</p> <ul style="list-style-type: none"> <li>■ If YES, proceed to Chapter 3—“Low Pass Filter Shelf Installation,” page 1-13.</li> <li>■ If NO, continue to Step 8.</li> </ul>
8	<p>Does the engineering work order designate additional Line Card Shelves?</p> <ul style="list-style-type: none"> <li>■ If YES, repeat Steps 1 through 6 to install each Line Card Shelf and Fan Tray assembly.</li> <li>■ If NO, the Line Card Shelf assembly and Fan Tray installation procedure is complete.</li> </ul>

**Note:** OPTIONAL METHOD. You can use the keyhole slots at the top of the mounting flange to hold the assembly unit in place while you place and tighten additional mounting screws. To do this, partially tighten a 12-24 thread forming mounting screw on each side of the relay rack, leaving about ¼ inch of space between the rack and the screw head. Position the assembly so keyhole slots are over the partially installed mounting screws. Lower the assembly until the top of both keyhole slots rest on the mounting screws. Place and tighten additional screws (minimum two on each side) to secure the assembly.

To use this option you must install D50 components from the bottom of the rack first (Low Pass Filter Shelves and Line Card Shelves first, Master Control Shelf last) to allow yourself room to position the units.

**Important! Do not install Line Card Shelf cards until all procedures in the volume titled Installation are complete. The volume titled Commissioning, Section 2—Card Placement, Chapter 2—“LCS Card Installation” describes installation of cards in detail.**



## Chapter 3

### Low Pass Filter Shelf Installation

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**Introduction** The D50 consists of the following components: Master Control Shelf (MCS), Line Card Shelves (LCS), Low Pass Filter Shelves (LPFS8), and Auxiliary Common Systems Interface Panels (Auxiliary CSIP).

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**D50 Configurations** A Low Pass Filter Shelf is required for each Line Card Shelf if the D50 is engineered for data plus voice applications. The D50 can be configured three different ways based on types of line cards installed and the needs of your network service provider. These configurations are:

**1 Configuration A**

Data plus voice service, Low Pass Filter Shelf required. LPFS8s co-located with the D50 multiplexer (MCS and LCSs).

**2 Configuration B**

Data plus voice service, Low Pass Filter Shelf required. LPFS8s located remotely, but within 655 cable feet from the D50 multiplexer (MCS and LCSs).

**3 Configuration C**

Data service only, no Low Pass Filter Shelf required.

Each LPFS8 supports up to 24 line cards. These line cards can be located in one LCS, or in two LCSs. When the LPFS8 supports line cards in two LCSs, it is placed between the two in the rack.

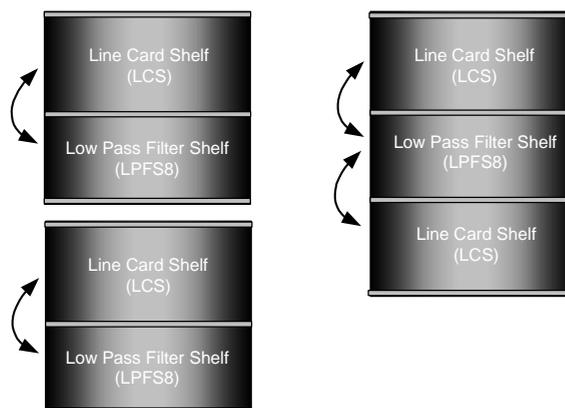
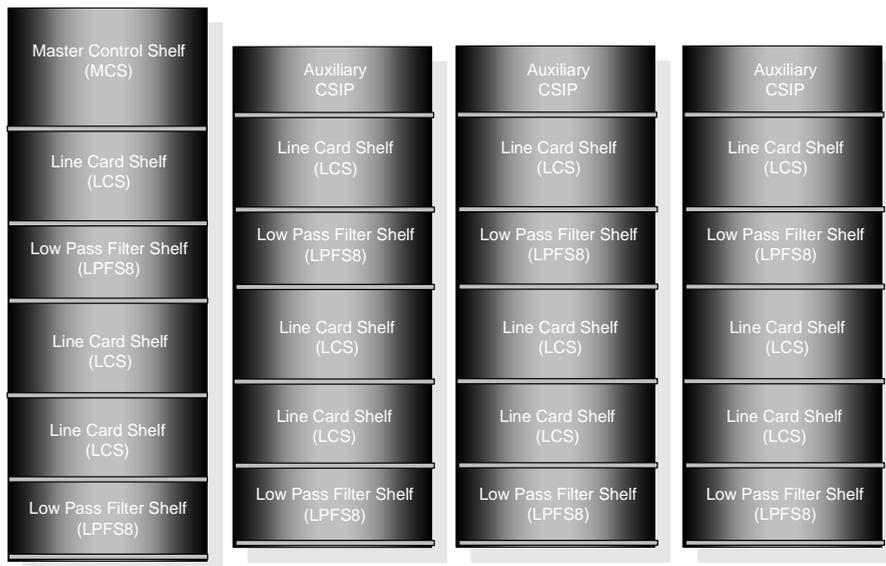


Figure 1-9: LPFS8 Supporting One and Two LCSs

The following two graphics show the two Configuration A models using an MCS, Auxiliary CSIPs (3), the maximum number of LCSs (12), and LPFS8s:



Figure 1-10: LPFS8 Co-located—One LCS per LPFS8



**NOTE:** The bottom LPFS8 in each rack is supporting only one LCS.

Figure 1-11: LPFS8 Co-located—Two LCSs per LPFS8

This procedure provides detailed instructions on how to install a Low Pass Filter Shelf (LPFS8) in a standard telco relay rack for Configuration A.

**Required Equipment and Tools**

To begin this task you must have the following equipment and tools (refer to Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers”):

- Low Pass Filter Shelf (LPFS8) Assembly(ies) Kit.
- (4) 12-24 thread forming screws for each LPFS8.
- Standard 23” wide, telco relay rack.
- Large Phillips head screwdriver.
- 2 ft. step ladder (optional).
- A second person to help you lift and position the Low Pass Filter Shelf assembly (optional). LPFS8 is 29 lbs. (assembly only, no cards), 48 lbs. (fully loaded).

---

**LPFS8 Assembly**

The Low Pass Filter Shelf assembly is designed for placement in a standard 23” wide telco relay rack. The following figure diagrams the LPFS8.

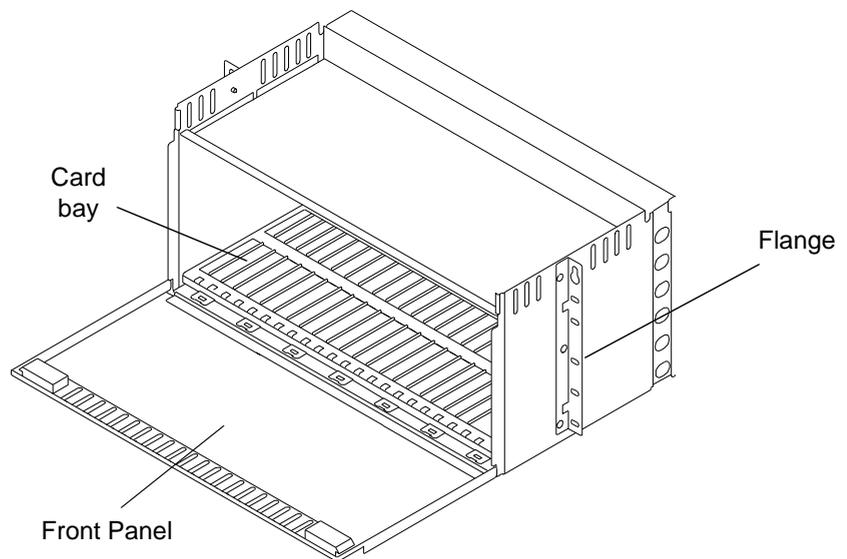


Figure 1-12: Low Pass Filter Shelf (LPFS8) Assembly

A hinged front panel covers the front of the LPFS8 assembly. The front panel is removable, but it must be replaced and closed after installation and commissioning procedures are completed to ensure proper air flow through the system.

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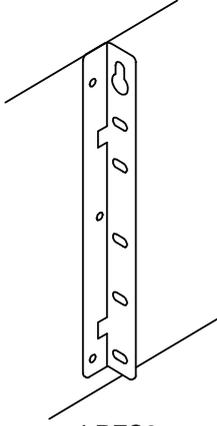
**LPFS8 Assembly Placement**

Install the Low Pass Filter Shelf assembly in the bay area, relay rack and mounting plate designated by the engineering work order. The Low Pass Filter Shelf assembly is installed using four 12-24 thread forming screws (2 screws on each side).

In Configuration A (LPFS8 co-located with the MCS and LCS), the Low Pass Filter Shelf is installed directly beneath its associated Line Card Shelf.

Follow these steps to complete the placement procedure:

Table 1-3: LPFS8 Assembly Placement

STEP	PROCEDURE
1	Lift the LPFS8 assembly to its assigned position in the relay rack.
2	<p>To mount the LPFS8 assembly in the rack:</p> <ul style="list-style-type: none"> <li>■ Line up flange holes with holes on both sides of the relay rack.</li> <li>■ Raise or lower the LPFS8 until two flange holes line up with holes on both sides of the rack.</li> <li>■ Place four to six screws through the screw holes in the flange and the rack (minimum two on each side) and tighten to secure.</li> </ul> <div style="text-align: center;">  <p>The diagram shows a vertical LPFS8 assembly with two flanges on opposite sides. Each flange has several circular holes for screws. Two of these holes on each side are aligned with the rack's structure, indicated by diagonal lines representing the rack's edges. The label 'LPFS8' is centered below the diagram.</p> </div> <p>Figure 1-13: Low Pass Filter Shelf Flanges (right side)</p> <p><b>Note:</b> An optional method for LPFS8 assembly installation is provided below.</p>
3	<p>Does the engineering work order designate additional Line Card Shelves and Low Pass Filter Shelves?</p> <ul style="list-style-type: none"> <li>■ If YES, repeat these steps and the steps in the previous chapter to install each Line Card Shelf and Low Pass Filter Shelf assembly.</li> <li>■ If NO, the Low Pass Filter Shelf installation procedure is complete.</li> </ul>

**Note:** OPTIONAL METHOD. You can use the keyhole slots at the top of the mounting flange to hold the assembly unit in place while you place and tighten additional mounting screws. To do this, partially tighten a 12-24 thread forming mounting screw on each side of the relay rack, leaving about ¼ inch of space between the rack and the screw head. Position the assembly so keyhole slots are over the partially installed mounting screws. Lower the assembly until the top of both keyhole slots rest on the mounting screws. Place and tighten additional screws (minimum two on each side) to secure the assembly.

To use this option you must install D50 components from the bottom of the rack first (Low Pass Filter Shelves and Line Card Shelves first, Master Control Shelf last) to allow yourself room to position the units.

**Important! Do not install Low Pass Filter Shelf cards until all procedures in the volume titled Installation are complete. The volume titled Commissioning, Section 2—Card Placement, Chapter 3—“LPFS8 Card Installation” describes installation of LPFS cards in detail.**

---



## Chapter 4 Auxiliary CSIP Installation

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### Introduction

The D50 multiplexer consists of the following components: Master Control Shelf (MCS), Line Card Shelves (LCS), Low Pass Filter Shelves (LPFS8), and Auxiliary Common Systems Interface Panel (CSIP).

These instructions may seem too detailed if you are experienced in the installation of Central Office equipment. Use the labels in the left margin to scan this document for tasks you need to review, or to quickly find those tasks specific to the installation of the D50.

---

### D50 Configurations

The Master Control Shelf Common Systems Interface Panel (CSIP) distributes Central Office battery (-48 volts DC) to Line Card Shelves 1 through 4. An Auxiliary CSIP is required to connect and distribute Central Office battery to additional Line Card Shelves. An Auxiliary CSIP can support up to five Line Card Shelves. The graphic below shows a possible D50 multiplexer configuration with two Auxiliary CSIP assemblies:

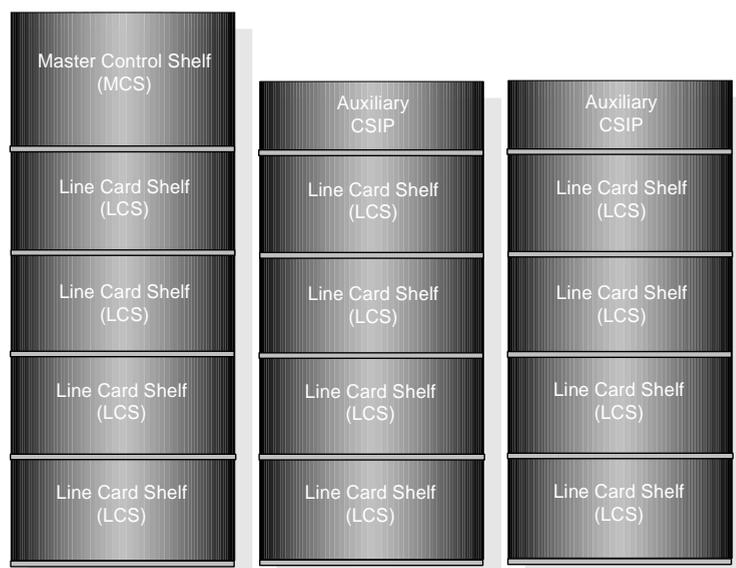


Figure 1-14: D50 with 12 LCSs and 2 Auxiliary CSIPs (Data Only)

---

**Required Equipment and Tools**

The following tools are required to install an Auxiliary CSIP (refer to Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers”):

- Standard 23” wide, telco relay rack.
- Auxiliary CSIP Assembly(ies) Kit.
- (4) 12-24 thread forming screws.
- Large Phillips head screwdriver.
- 2 ft. step ladder (optional).
- A second person to help you lift and position the Auxiliary CSIP assembly (optional). Approximate weight of the Auxiliary CSIP is 12 lbs.

---

**Auxiliary CSIP Assembly**

The Auxiliary CSIP assembly is designed for placement in a standard 23” wide telco relay rack. The figure below diagrams a fully installed unit with the front panel open.

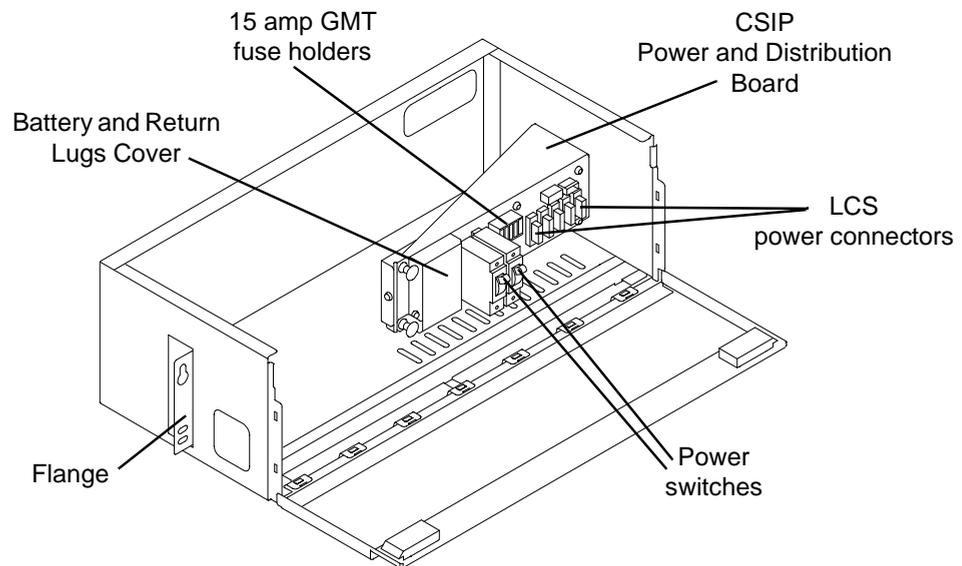


Figure 1-15: Auxiliary CSIP Assembly

The hinged front panel covers the front of the Auxiliary CSIP assembly. The panel is removable but it is intended to remain fastened to the assembly under normal conditions.

**Auxiliary CSIP  
 Assembly  
 Placement**

Install the Auxiliary CSIP assembly in the bay area, relay rack and mounting plates designated by the engineering work order. An Auxiliary CSIP assembly is installed using a minimum of four 12-24 thread forming screws (2 screws on each side). Follow these steps to complete the placement procedure:

Table 1-4: Auxiliary CSIP Assembly Placement

STEP	PROCEDURE
1	Lift the Auxiliary CSIP assembly to its assigned position in the relay rack.
2	<p>To mount the Auxiliary CSIP assembly in the rack:</p> <ul style="list-style-type: none"> <li>■ Line up flange holes with holes on both sides of the relay rack.</li> <li>■ Raise or lower the Auxiliary CSIP until two flange holes line up with holes on both sides of the rack.</li> <li>■ Place four screws through the screw holes in the flange and the rack (minimum two on each side) and tighten to secure.</li> </ul> <div style="text-align: center;"> </div> <p style="text-align: center;">Figure 1-16: Auxiliary CSIP Flange (left side)</p>
3	<p>Does the engineering work order designate an additional Auxiliary CSIP?</p> <ul style="list-style-type: none"> <li>■ If YES, repeat Steps 1 and 2 to install another Auxiliary CSIP.</li> <li>■ If NO, the Auxiliary CSIP installation is complete.</li> </ul>

**Note:** OPTIONAL METHOD. You can use the keyhole slots at the top of the mounting flange to hold the assembly unit in place while you place and tighten additional mounting screws. To do this, partially tighten a 12-24 thread forming mounting screw on each side of the relay rack, leaving about ¼ inch of space between the rack and the screw head. Position the assembly so keyhole slots are over the partially installed mounting screws. Lower the assembly until the top of both keyhole slots rest on the mounting screws. Place and tighten additional screws (minimum two on each side) to secure the assembly.

To use this option you must install D50 components from the bottom of the rack first (Low Pass Filter Shelves and Line Card Shelves first, Auxiliary CSIPs last) to allow yourself room to position the units.

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## SECTION 2 BASIC PROCEDURES

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# Chapter 1

## Basic Procedures

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### Introduction

The D50 multiplexer consists of the following components: Master Control Shelf (MCS), Line Card Shelves (LCS), Low Pass Filter Shelves (LPFS8), and Auxiliary Common Systems Interface Panels (ACSIP).

This chapter provides detailed instructions for the following procedures:

- **Remove and Replace Panels**, page 2-1.
- **Remove and Replace Top Screen**, page 2-3.
- **Connect ESD Strap**, page 2-4.
- **Insert or Remove Cards**, page 2-5.
- **MCS/LCS/LPFS8 Cable Ports**, page 2-7.

Refer to this chapter as necessary while completing procedures in the following chapters and in the volume titled Commissioning. Use the labels in the left margin to scan this document for the tasks you need to review, or to quickly find specific information.

---

### Remove and Replace Panels

Front and back panels can be removed from D50 assemblies to allow access for cabling and card placement:

- Remove front panels to access:
  - MCS card cage, backplane, CSIP Power and Distribution board, and Alarm board.
  - Auxiliary CSIP Power and Distribution board.
  - LCS and LPFS8 card cages.
- Remove back panels to access backplane connectors on the LCS and the LPFS8.

**Important! Front and back panels MUST be replaced after completion of all procedures in the volumes titled Installation and Commissioning, to ensure proper air flow through the D50.**

Follow these steps to open, remove, replace, and close front and back panels on the D50 assemblies:

Table 2-1: Remove and Replace Panels

STEP	PROCEDURE
1	<p>To <u>open</u> a panel, locate latches at the top of the panel. Slide both latches inward to release and lower the panel.</p> <div> <p>The diagram shows a perspective view of a rectangular panel. At the top edge, there are two latches, one on the left and one on the right. Lines with arrows point from the text 'Panel latches' to these two latches. The panel has a hinged top edge and a handle on the right side.</p> </div> <p>Figure 2-1: Panel Latches (MCS Front Panel)</p>
2	<p>To <u>remove</u> a panel after it is opened, hold it on both sides and slide it to the left about ¼ inch. Pull it towards you and release it from the holding clips.</p>
3	<p>To <u>replace</u> a panel, hold it on both sides so it is level with the bottom of the assembly (above the Fan Tray on the MCS and LCS). Insert the hinged portion of the panel between the tabs. Slide the panel straight in and then to the right about ¼ inch to lock in place.</p>
4	<p>To <u>close</u> a panel, raise it into position, then slide both latches toward the center and release to lock in place.</p> <div> </div> <p><b>Warning!</b> Be sure to keep fingers away from panel edges to prevent catching them between the panel edges and the assembly as you close the panel.</p>
5	<p>The Remove and Replace Panels procedure is complete.</p>

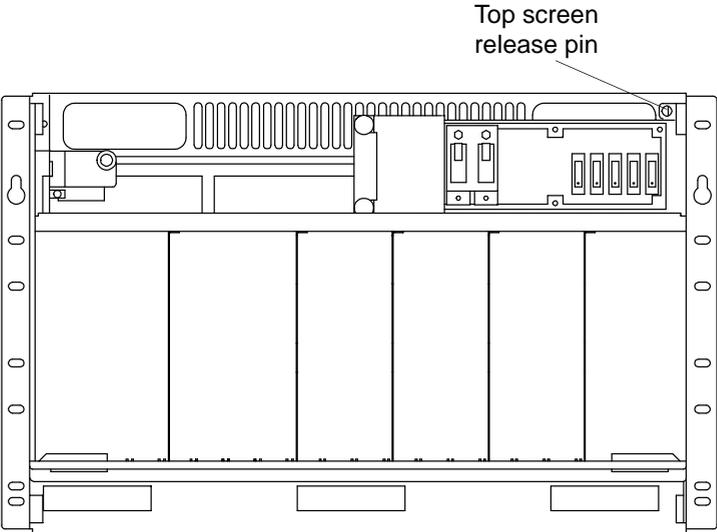
**Remove and Replace Top Screen**

The top screen can be removed from the MCS and the Auxiliary CSIP to access the backplane, the Power and Distribution Board, and the Alarm Board.

**Important! The top screen MUST be replaced after completion of all procedures in the volumes titled Installation and Commissioning, to ensure proper air flow through the D50.**

Follow these steps to remove and replace the top screen:

Table 2-2: Remove and Replace Top Screen

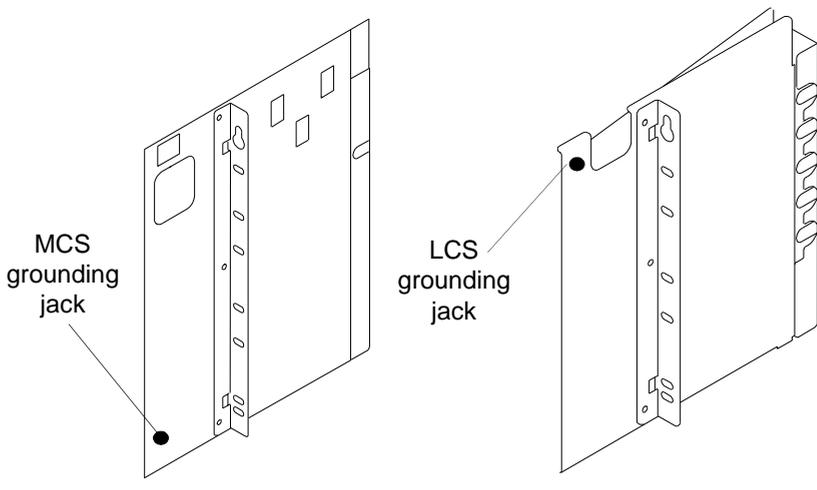
STEP	PROCEDURE
<p><b>1</b></p>	<p>To <u>remove</u> the top screen, pull out on the release pin and slide the top screen out.</p> <div style="text-align: right; margin-bottom: 10px;"> <p>Top screen release pin</p>  </div> <p style="text-align: center;">Figure 2-2: Top Screen Release Pin (MCS)</p>
<p><b>2</b></p>	<p>To <u>replace</u> the top screen, slide the screen back into position and push in on the release pin to secure.</p>
<p><b>3</b></p>	<p>The Remove and Replace Top Screen procedure is complete.</p>

**Connect ESD Strap**

**Important! A properly grounded Electrostatic Discharge (ESD) wrist strap<sup>1</sup> must be worn at all times to prevent damage to the cards and the MCS and LCS circuitry.**

Follow these steps to connect the ESD wrist strap to the MCS or LCS:

Table 2-3: Connect ESD Wrist Strap

STEP	PROCEDURE
1	Slide the ESD strap over your wrist.
2	<p>Plug the connector end into the grounding jack on the right side panel of the MCS or LCS. The grounding jack is located at the <u>bottom</u> of the panel on the <u>MCS</u>; it is located at the <u>top</u> of the panel on the <u>LCS</u>.</p> <div style="text-align: center;">  </div> <p style="text-align: center;">Figure 2-3: Grounding Jack Locations—MCS and LCS</p>
3	The Connect ESD Wrist Strap procedure is complete.

<sup>1</sup> An ESD wrist strap is shipped with each MCS and LCS Installation Kit. An ankle grounding strap can also be used.

**Insert or Remove Cards**

D50 cards are placed in the MCS, LCS, and LPFS8 assemblies.  
 Follow these steps to insert or remove cards:

Table 2-4: Insert or Remove Cards

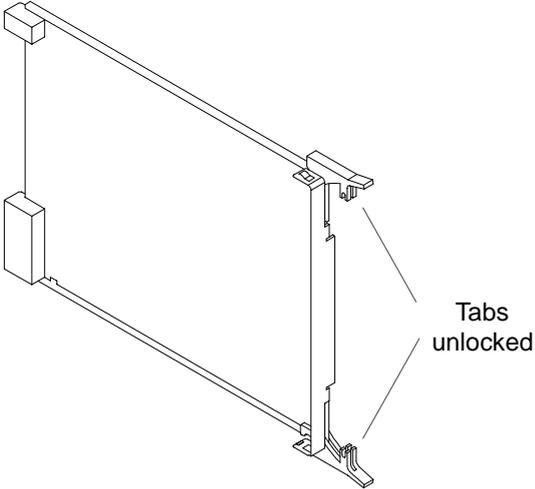
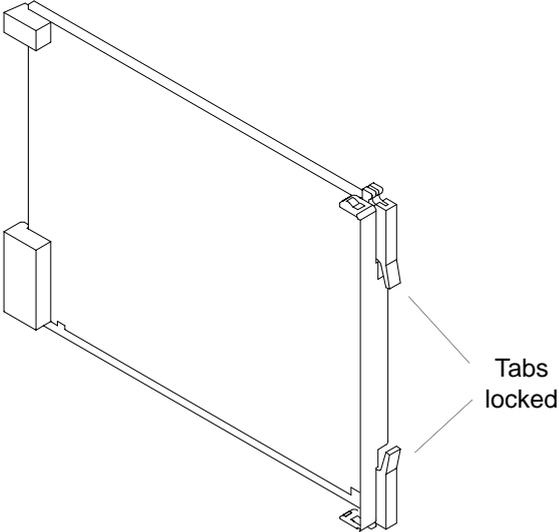
STEP	PROCEDURE
<p><b>1</b></p>	<p>To <u>insert</u> a card, unlock the locking tabs on the card by flipping the tabs out and away from the card to the unlocked position.</p> <p><b>Note:</b> LPFS8 cards have only one tab, located on the lower edge of the card. MCS and LCS cards have two tabs, on the upper and lower edges.</p>  <p style="text-align: center;">Figure 2-4: Card with Tabs in the Unlocked Position</p>
<p><b>2</b></p>	<p>Card slots in each assembly are designed with card guides, bottom and top, to properly align cards into position on the backplane. Slide the card into the slot until it plugs into the backplane connector.</p> <p><b>Important! DO NOT force the card into position. If it does not plug in easily, slide it back out and verify that you are placing it in the correct position and that the guides are aligned. Check for any obstructions or bent pins on the connectors that might prevent it from sliding easily into place.</b></p>

Table 2-4: Insert or Remove Cards (continued)

STEP	PROCEDURE
<p><b>3</b></p>	<p>Lock the locking tabs on the card by flipping the tabs down and in toward the card. Each tab must close around and into the square shaped hole in the assembly rails above and below the card. Press the tab into the locked position until you hear an audible “click.” The “click” indicates that the card is locked into position.</p>  <p>The diagram shows a card inserted into a slot between two vertical assembly rails. Two locking tabs are shown on the right side of the card, one on the top rail and one on the bottom rail. Both tabs are flipped down and inward, locking into square-shaped holes in the rails. A label 'Tabs locked' with two arrows points to these tabs.</p> <p>Figure 2-5: Card with Tabs in the Locked Position</p> <p>The card is now ready for use.</p>
<p><b>4</b></p>	<p>To <u>remove</u> a card:</p> <ul style="list-style-type: none"> <li>■ Unlock the locking tabs on the card by flipping the tabs out from the card to the unlocked position.</li> <li>■ Slide the card out of the slot.</li> </ul>
<p><b>5</b></p>	<p>The Insert or Remove Cards procedure is complete.</p>

**MCS/LCS/LPFS8  
Cable Ports**

MCS and Auxiliary CSIP cable ports are located on the back and sides of the assemblies:

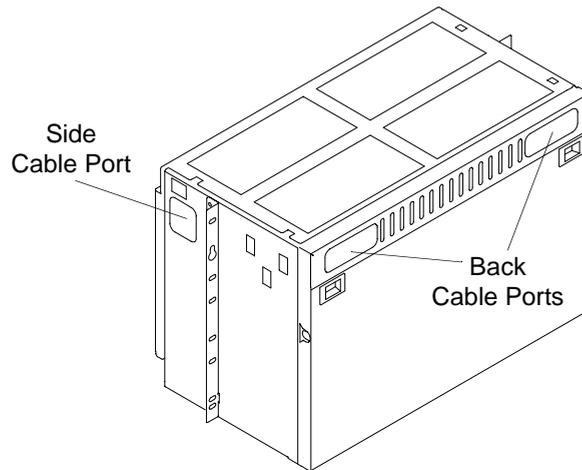


Figure 2-6: Cable Ports (MCS back view)

**Note:** The back cable port on the right side of the Auxiliary CSIP is at the bottom of the back panel.

**Note:** The MCS has a side cable port on the right side (from the front) only; the Auxiliary CSIP has a side cable port on both sides.

LCS and LPFS8 cable ports are located on both sides of the assemblies. Additional cable ports on the LCS are located on top of the assembly:

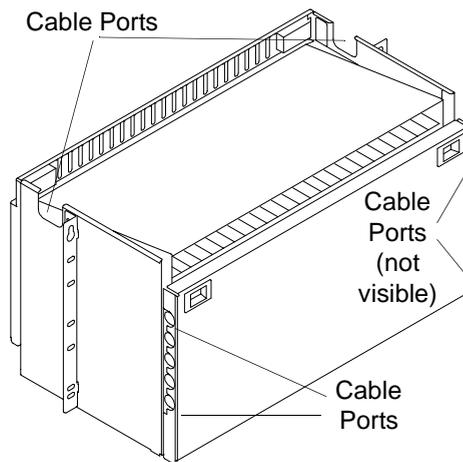


Figure 2-7: Cable Ports (LCS back view)



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## SECTION 3 POWER CABLING

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## Chapter 1

### Central Office Power to the D50

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#### Introduction

The D50 is powered by Central Office battery (-48 volts DC). Central Office battery is connected to the D50 at the Master Control Shelf Common Systems Interface Panel (CSIP) Power and Distribution Board<sup>1</sup> and distributed to Line Card Shelves one through four.

Auxiliary CSIPs are required to connect and distribute power to D50s with more than four Line Card Shelves (LCS). Each Auxiliary CSIP can distribute power to up to five Line Card Shelves.

**CAUTION:** This equipment has a connection between the earthed conductor of the d.c. supply circuit and the earthing conductor.

**Note:** Basic insulation is provided from the a.c. mains. Isolation is maintained even though a common ground is used.

This chapter provides detailed instructions on how to connect:

- Power cables from the Master Control Shelf (MCS) to four Line Card Shelves.
- Power cables from an Auxiliary CSIP to five Line Card Shelves.
- EMI filter ferrites to power cables.
- The D50 to Central Office battery and battery return.

---

#### Non-Central Office Environment

**Note:** These procedures are for supplying power to the D50 in a Central Office environment. To supply power to the D50 in a *non*-Central Office environment, CONTINUE TO AND COMPLETE THE FOLLOWING TWO PROCEDURES, **LCS Power Cable(s) Installation at the CSIP**, page 3-3 and **Power Cable Installation at the LCS Backplane**, page 3-6. You will then be directed to Section 10—*Appendices*, Appendix A—“Power to the D50 in a Non-Central Office Environment.” Do not go to Appendix A until you have completed these two procedures.

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<sup>1</sup> The CSIP Power and Distribution Board will be referred to as the CSIP throughout this procedure.

Common  
Systems  
Interface Panel  
(CSIP) Diagram

The drawing below diagrams the components of the CSIP inside the MCS.

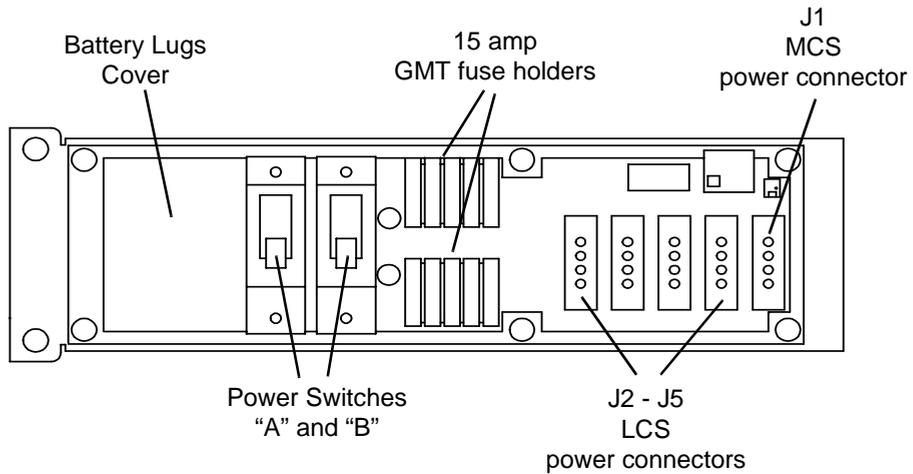


Figure 3-1: Common Systems Interface Panel (CSIP)

**Note:** On the Auxiliary CSIP, the J1 power connector can be used to power a fifth LCS.

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Required  
Equipment and  
Tools

To begin this task you must have the following equipment and tools (refer to Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers”):

- Electrostatic Discharge (ESD) strap.
- (1) LCS Power Cable Assembly (79-inch or 20-foot power cable) for each LCS. Power cables come with a 4-pin “pin” connector on one end, a 4-pin “socket” connector on the other end, and a vinyl rubber grommet. The 79-inch power cable is shipped with each LCS; the 20-foot cable can be ordered separately.
- (2) Battery “A” and Battery “B” Cables (8 AWG<sup>2</sup> red wire) for each MCS or Auxiliary CSIP.
- (2) Battery Return “A” and Battery Return “B” Cables (8 AWG<sup>2</sup> black wire) for each MCS or Auxiliary CSIP.
- Crimping Tool.
- Diagonal Cutters.
- (4) 2-hole copper barrel lugs for Battery and Battery Return cables for each MCS or Auxiliary CSIP.
- (4) lug nuts for each MCS or Auxiliary CSIP<sup>3</sup>.
- (2) EMI filter ferrites for each LCS power cable.
- Torque Wrench (rating: 18 to 20 inch pounds) with 3/8” nut socket.
- Volt OHM Meter.
- Step Ladder (optional).

---

<sup>2</sup> 8 AWG or better wire is required for a fully loaded D50, refer to local electrical code for requirements.

<sup>3</sup> Lug nuts are included in the MCS/ACSIP Installation Kit.

**Grounding the MCS, LCS, and Auxiliary CSIP**

Grounding of the MCS, LCS, and Auxiliary CSIP assemblies is facilitated by the thread-forming screws, when the assemblies are installed in a properly grounded telco rack; no additional grounding procedures are required. Refer to the installation chapters for each assembly in Section 1—*Hardware Installation*.

**MCS/Auxiliary CSIP and LCS Power Cables**

The MCS and Auxiliary CSIP power cables are pre-installed at the factory. The required power cables and connectors—to connect power from the CSIP to each Line Card Shelf—are shipped with the D50. The number of power cables shipped is based on the configuration of the system ordered. For example: if the system ordered was for one LCS, only one LCS power cable is shipped. A system ordered with four LCSs includes four LCS power cables.

**Note:** The 79-inch power cable is shipped with each LCS; the 20-foot cable can be ordered separately.

**LCS Power Cable(s) Installation at the CSIP**

Follow these steps to install the LCS power cables at the MCS Common Systems Interface Panel (CSIP) or at an Auxiliary CSIP:

Table 3-1: LCS Power Cable(s) Installation at the CSIP

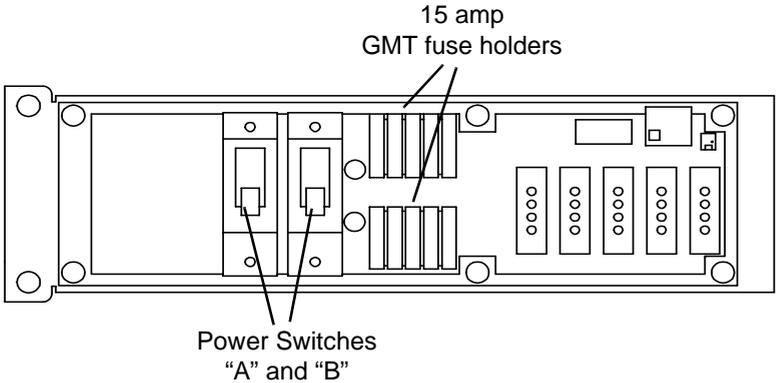
STEP	PROCEDURE
1	<p>Refer to Section 2—<i>Basic Procedures</i>, Chapter 1—“Basic Procedures,” page 2-1 to do the following:</p> <ul style="list-style-type: none"> <li>■ Remove and replace the front panel on the MCS or Auxiliary CSIP.</li> <li>■ Remove and replace the top screen on the MCS or Auxiliary CSIP.</li> <li>■ Attach a properly grounded ESD strap (important!).</li> <li>■ Locate MCS cable ports.</li> </ul>
2	<p>The CSIP is located in the upper right corner of the MCS and Auxiliary CSIP assemblies.</p> <p><b>Note:</b> Check to make sure “A” and “B” Power switches are set in the “OFF” or “Down” position.</p> <div style="text-align: center;">  <p>The diagram shows a top-down view of the CSIP power section. On the left side, there are two vertical power switches labeled 'A' and 'B'. To their right are two rows of 15 amp GMT fuse holders. The diagram is used to illustrate the correct position for the power switches during installation.</p> </div> <p>Figure 3-2: CSIP—Power Switches in the “OFF” Position</p>

Table 3-1: LCS Power Cable(s) Installation at the CSIP (continued)

STEP	PROCEDURE
3	<p><b>Note:</b> Check the fuse holders to ensure fuses are not installed. 15 amp fuses are shipped separately as part of the D50 installation kit. Fuses are installed during test and commissioning procedures (in the volume titled <u>Commissioning</u>).</p>
4	<p>Select the power cable for the first Line Card Shelf.</p> <p><b>Note:</b> The 79-inch power cable is used for LCSs located in the same rack (or an adjacent rack) as the MCS or Auxiliary CSIP; the 20-foot power cable is used for LCSs located in non-adjacent racks.</p> <p>There is a vinyl rubber grommet pre-installed on the power cable. Position the grommet approximately four inches from the end of the cable with the “socket” connector (for connecting to the LCS in the next procedure).</p> <div> </div> <p style="text-align: center;">Figure 3-3: LCS Power Cable</p>
5	<p>Connect the “pin” connector on the power cable to the first LCS power connector (labeled “J2” in the drawing below).</p> <div> </div> <p style="text-align: center;">Figure 3-4: CSIP Power Connector Locations</p>
6	<p>Repeat Steps 4 and 5 to connect power cables for Line Card Shelves 2 through 4 to LCS power connectors J3, J4, and J5 on the CSIP.</p>
7	<p>Bring the LCS power cables up and position them over the CSIP.</p>

Table 3-1: LCS Power Cable(s) Installation at the CSIP (continued)

STEP	PROCEDURE
8	Push the cables to the back of the MCS or Auxiliary CSIP assembly and through the large cable port at the back.
9	Go to the back of the MCS or Auxiliary CSIP and pull the cables through the cable port.
10	Continue to the next procedure: <b>Power Cable Installation at the LCS Backplane.</b>

---

**Power Cable Installation at the LCS Backplane**

Follow these steps to install the power cables to the Line Card Shelf backplane:

Table 3-2: Power Cable Installation at the LCS Backplane

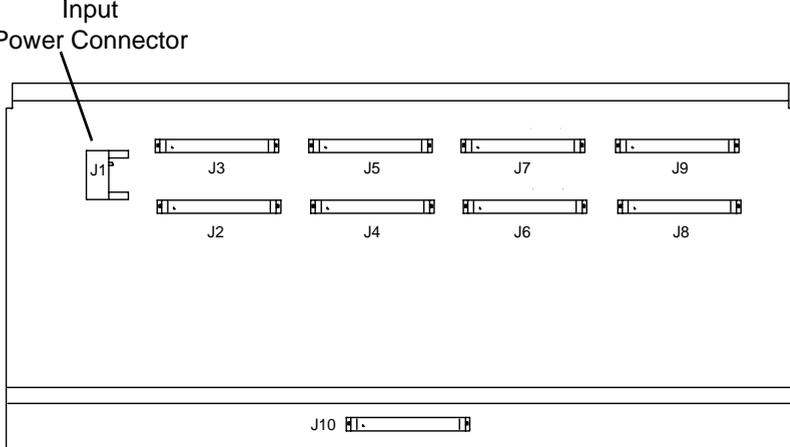
STEP	PROCEDURE
1	Route the power cables from the back of the MCS or Auxiliary CSIP down the left rails of the relay rack rails, or across the horizontal cable rack, to their corresponding LCSs, following local procedures.
2	Refer to Section 2— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures,” page 2-1 to do the following: <ul style="list-style-type: none"> <li>■ Open and remove the back panel on the LCS.</li> <li>■ Locate the LCS cable ports.</li> </ul>
3	Select the power cable for the first Line Card Shelf and bring it through the <u>second</u> cable slot on the <u>left</u> side of the LCS assembly. (This is the cable connected to LCS power connector J2 at the MCS CSIP.)
4	<p>Connect the “socket” connector on the power cable to the input power connector (J1) on the LCS backplane.</p>  <p>The diagram shows a rectangular backplane with ten connectors labeled J1 through J10. J1 is on the left side, labeled 'Input Power Connector'. The other connectors are arranged in two rows of four: J3, J5, J7, J9 in the top row and J2, J4, J6, J8 in the bottom row. J10 is located at the bottom center of the backplane.</p>
5	Reposition the grommet on the cable so it fits over the edge of the slot. Push the grommet into the slot as far as you can so it doesn't interfere with the back cover. The grommet helps hold the cable in position and also protects it from the metal edge.

Figure 3-5: LCS Backplane

Table 3-2: Power Cable Installation at the LCS Backplane (continued)

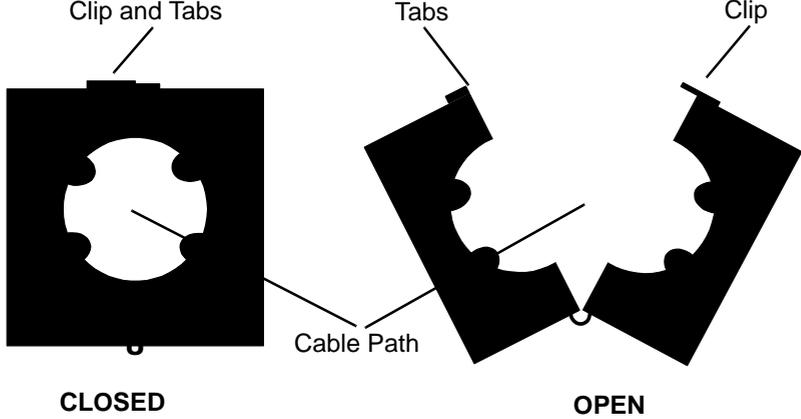
STEP	PROCEDURE
6	<p>EMI Filter Ferrites must be installed on both ends of each power cable. Ferrites are opened by lifting the double clip off the small tabs.</p>  <p><b>CLOSED</b> <b>OPEN</b></p>

Figure 3-6: EMI Filter Ferrite

Table 3-2: Power Cable Installation at the LCS Backplane (continued)

STEP	PROCEDURE
7	<p>Clip an EMI filter ferrite onto both ends of each power cable. Close the ferrite around the cable, until the clip locks in place over the tabs.</p> <p><b>Note:</b> Place ferrites as close to the supporting MCS/ACSIP cable ports and LCS cable slots as possible.</p> <div> </div> <p>Figure 3-7: D50 Power Cables with Ferrites—Rear View</p> <p><b>Note:</b> Ferrites must also be installed for LCSs that are not located with the MCS or Auxiliary CSIP.</p>
8	<p>Repeat Steps 3 through 7 to connect power cables from the CSIP to Line Card Shelves 2 through 4. Make sure you are connecting each LCS power cable to the correct LCS backplane.</p>
9	<p>Is your D50 located in a Central Office environment?</p> <ul style="list-style-type: none"> <li>■ If YES, continue to the next procedure, <b>Central Office Battery Cable Connection at the CSIP</b>.</li> <li>■ If NO (i.e., your D50 is in a <i>non</i>-Central Office environment), go to Section 10—<i>Appendices</i>, Appendix A—“Power to the D50 in a Non-Central Office Environment,” page 10-1.</li> </ul>

**Central Office  
Battery Cable  
Connection at  
the CSIP**

“A” and “B” battery cables are run from the Central Office Battery Distribution Fuse Bay (BDFB)—or other Central Office battery source—by the network service provider. “A” and “B” battery cables are connected to the D50 at the CSIP.

**Note:** Make sure the “A” and “B” battery cables are NOT connected at the Central Office battery supply before beginning these procedures.

Follow these steps to connect battery cables to the Battery “A” and “B” lugs on the front of the CSIP:

Table 3-3: Central Office Battery Cable Connection at the CSIP

STEP	PROCEDURE
1	Route “A” and “B” battery (red) cables from the BDFB across the horizontal cable rack and down the relay rack rails to the D50 MCS or Auxiliary CSIP following local procedures.
2	Push the battery cables through one of the large cable ports at the back of the MCS or Auxiliary CSIP. Refer to Section 2— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures,” page 2-1.
3	Go to the front of the MCS or Auxiliary CSIP. Pull the battery cables from the back of the assembly through to the front of the CSIP.
4	Cut the battery cables to the correct length using diagonal cutters.

Table 3-3: Central Office Battery Cable Connection at the CSIP (continued)

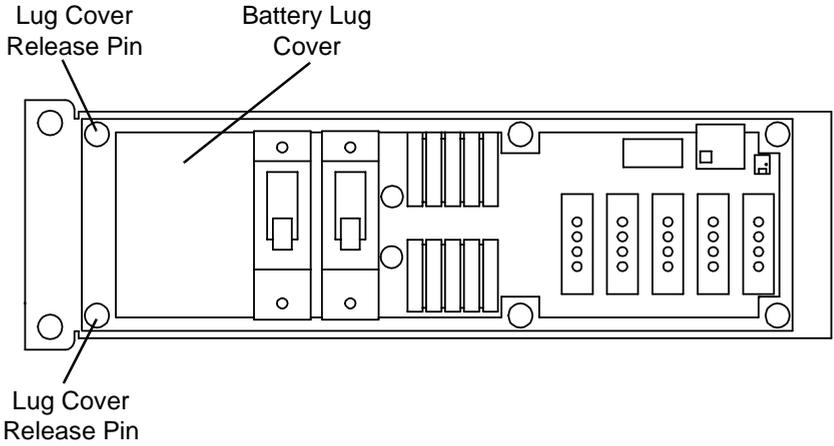
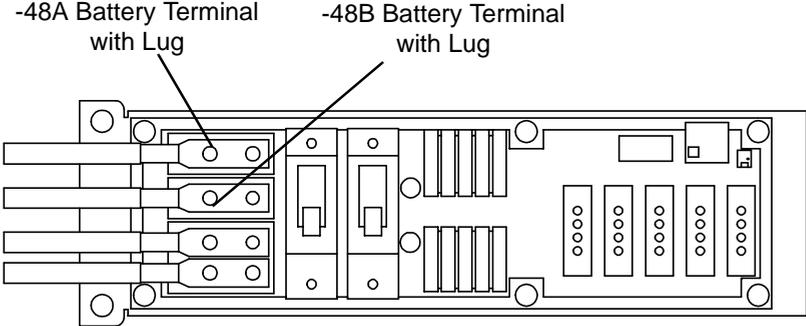
STEP	PROCEDURE
5	Using a crimping tool, attach a 2-hole barrel lug to each cable.
6	Check to make sure the Power switches are set in the “OFF” or “Down” position. Verify that all fuses are removed from the fuse holders. Refer to Figure 3-2: CSIP—Power Switches in the “OFF” Position, page 3-3.
7	<p>Remove the protective plastic lug cover over the battery and battery return lugs: pull out on the two release pins (located on the left side, top and bottom) and remove.</p> <p><b>Note:</b> Keep this cover accessible, so you can replace it later in this procedure.</p>  <p style="text-align: center;">Figure 3-8: Lug Cover and Release Pin Locations</p>
8	<p>Place the “A” cable lug on the -48A Battery terminal.</p>  <p style="text-align: center;">Figure 3-9: Battery Terminals with Lugs</p> <p><b>Note:</b> Tighten lug nuts to <u>18-20</u> inch pounds torque.</p>

Table 3-3: Central Office Battery Cable Connection at the CSIP (continued)

STEP	PROCEDURE
9	Place the “B” cable lug on the –48B Battery terminal.  <b>Note:</b> Tighten lug nuts to <u>18-20</u> inch pounds torque.
10	Continue to the next procedure: <b>Central Office Battery Return Cable Connection at the CSIP.</b>

**Central Office  
 Battery Return  
 Cable  
 Connection at  
 the CSIP**

“A” and “B” battery return cables are run from the Central Office bus bar—or other Central Office battery return—by the network service provider. “A” and “B” battery return cables are connected to the D50 at the CSIP.

Follow these steps to connect battery return cables to the Battery Return “A” and “B” lugs on the front of the CSIP:

Table 3-4: Central Office Battery Return Cable Connection at CSIP

STEP	PROCEDURE
1	Route “A” and “B” battery return (black) cables from Central Office battery return across the horizontal cable rack and along the relay rack rails to the D50 MCS or Auxiliary CSIP following local procedures.  <b>Note:</b> Both Battery Return “A” and Battery Return “B” must be connected to Central Office battery return if both Battery “A” and Battery “B” leads are connected.
2	Push the battery return cables through one of the large cable ports at the back of the MCS or Auxiliary CSIP. Refer to Section 2— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures,” page 2-1.
3	Go to the front of the MCS or Auxiliary CSIP. Pull the battery return cables from the back of the assembly through to the front of the CSIP.
4	Cut the battery return cables to the correct length using diagonal cutters.
5	Using a crimping tool, attach the 2-hole barrel lugs to the battery return cables.

Table 3-4: Central Office Battery Return Cable Connection at CSIP (continued)

STEP	PROCEDURE
<p><b>6</b></p>	<p>Place the “A” cable lug on the –48VA RTN Battery Return terminal.</p> <p><b>Note:</b> Tighten lug nuts to <u>18-20</u> inch pounds torque.</p> <div> </div> <p style="text-align: center;">Figure 3-10: Battery Return Terminals with Lugs</p>
<p><b>7</b></p>	<p>Place the “B” cable lug on the –48VB RTN Battery Return terminal.</p> <p><b>Note:</b> Tighten lug nuts to <u>18-20</u> inch pounds torque.</p>
<p><b>8</b></p>	<p>Replace the lug cover. Push in on the two release pins to secure.</p>
<p><b>9</b></p>	<p>Continue to the next procedure: <b>Connect Power and Return Cables to the Central Office.</b></p>

**Connect Power  
and Return  
Cables to the  
Central Office**

Follow these steps to connect battery and return cables to Central Office battery and return connectors:

Table 3-5: Connect Power and Return Cables to the Central Office

<b>STEP</b>	<b>PROCEDURE</b>
<b>1</b>	Check to make sure CSIP power switches are still in the “OFF” or “Down” position. Verify that fuses are not installed in the fuse holders.
<b>2</b>	Battery and battery return cables are ready for connection to the Central Office Battery Distribution Fuse Bay (BDFB) and Central Office battery return. Does the telecommunications company require that these connections be made by their own technicians? <ul style="list-style-type: none"><li>■ If YES, make arrangements with the telecommunications company for them to make Central Office battery and battery return connections.</li><li>■ If NO, connect battery cables to the Central Office BDFB and battery return cables to Central Office battery return, following standard procedures.</li></ul>
<b>3</b>	Continue to the next procedure: <b>Verify Continuity and Polarity.</b>

---

**Verify Continuity and Polarity** Follow these steps to verify continuity and polarity of cables:

Table 3-6: Verify Continuity and Polarity

<b>STEP</b>	<b>PROCEDURE</b>
<b>1</b>	Use a Volt Ohm Meter (VOM) to verify continuity of cables from the CSIP to the Central Office BDFB and battery return source.
<b>2</b>	Use a VOM to confirm polarity between the battery and battery return connections.
<b>3</b>	Continue to the next procedure: <b>Verify Voltage</b> .

---

**Verify Voltage** Follow these steps to verify voltage at the CSIP:

Table 3-7: Verify Voltage

<b>STEP</b>	<b>PROCEDURE</b>
<b>1</b>	Use a VOM to measure the voltage present at the -48A and -48VA RTN lugs, and at the -48B and -48VB RTN lugs.
<b>2</b>	Is the voltage between -42.75 and -56 Volts DC? <ul style="list-style-type: none"><li>■ If YES, continue to Step 3.</li><li>■ If NO, re-verify continuity of the battery and battery return cables from the CSIP to the Central Office BDFB and battery return source.</li></ul>
<b>3</b>	The Central Office Power to the D50 procedure is complete.

**Note:** Leave Power switches in the “OFF” or “Down” position. The volume titled Commissioning, Section 5—*Commissioning*, Chapter 1—“Power Up and Visual Status Check” provides instructions for Central Office power.

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## SECTION 4 ATM NETWORK CABLING

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## Chapter 1

### DS3 MCS to ATM Network Cabling

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#### Introduction

The interface between the ATM Network and the D50 is made at the Master Control Shelf (MCS) trunk interface card. The D50 supports two different ATM trunk interfaces:

- DS-3 – using DS3T, DS3T2, or DS3TQ cards (45 Mbps).
- OC-3 – using OC3T, OC3T2, OC3T2L, OC3T2M, OC3TQS, OC3TQM, and OC3TQL cards (155 Mbps).

This chapter provides detailed instructions on how to connect the ATM network trunk “transmit<sup>1</sup>” and “receive<sup>2</sup>” cables at the Master Control Shelf backplane for a D50 using DS3T, DS3T2, or DS3TQ trunk cards. To connect the ATM network trunk cables to a D50 using OC3T, OC3T2/OC3T2L/OC3T2M, or OC3TQS/OC3TQM/OC3TQL trunk cards, skip to Chapter 2—“OC3 MCS to ATM Network Cabling,” page 4-5.

To switch service between the active and standby trunk cards, refer to the volume titled Maintenance and Testing, Section 4—*Appendices*, Appendix A—“Trunk Card Service Switching.”

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#### Required Tools and Equipment

To begin this task you must have the following equipment and tools (refer to Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers”):

- WECO 728A equivalent coax cable.
- (4) “75 ohm” female BNC socket connectors.
- Diagonal Cutters.
- Coax Center Crimp Tool (for example: Trompeter TEI 010-0055).
- Coax Cable Stripping Tool (for example: Trompeter STI/STC-F w/tool crimp blade cassette).
- Coax Crimp Tool (for example: Trompeter CT3/CD3-2 BNC crimp tool and die).
- Step ladder (optional).

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<sup>1</sup> Transmit - data being sent to the ATM Network.

<sup>2</sup> Receive - data being received from the ATM Network.

**DS3 Trunk Cable Connection at the MCS**

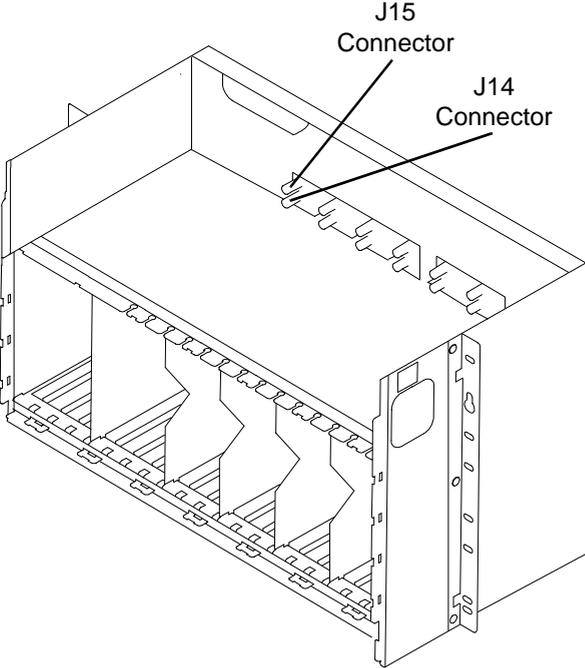
DS3 “transmit” and “receive” trunk cables are connected to and run from the Central Office DS3 (DSX-3) cross connect panel across the horizontal cable racks to the D50 by the network service provider or a D50 Technician. These trunk cables are connected to the D50 at the front of the MCS backplane.

Follow these steps to connect DS3 trunk cables at the MCS backplane:

Table 4-1: DS3 Trunk Cable Connection at the MCS

STEP	PROCEDURE
1	Terminate “75 ohm” female BNC socket connectors on the “transmit” and “receive” coax trunk cables using a coax (WECO 728A) crimp tool.
2	Connect the trunk cables to the DS3 (DSX-3) cross connect panel.
3	Route the trunk cables from the DS3 cross connect panel across the horizontal cable rack and down the relay rack rails to the D50 MCS, following local procedures.  <b>Important! The length of the DS3 coax cable from the DS3 cross connect panel to the D50 must not exceed 450 feet, to meet pulse template requirements.</b>
4	Refer to Section 2— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures” in this volume to: <ul style="list-style-type: none"> <li>■ Locate the MCS cable ports.</li> <li>■ Remove and replace the MCS front panel.</li> <li>■ Remove and replace the MCS top screen.</li> </ul>
5	Push the trunk cables through one of the large cable ports at the back of the MCS.
6	Pull the trunk cables from the back of the MCS through to the front and to the left of the CSIP.

Table 4-1: DS3 Trunk Cable Connection at the MCS (continued)

STEP	PROCEDURE
7	<p>Locate the “receive” J15 (top) and “transmit” J14 (bottom) BNC connectors mounted on the front of the MCS backplane.</p>  <p style="text-align: center;">Figure 4-1: MCS DS3 Trunk Connectors J14 and J15</p>
8	Cut the cables to the correct length using diagonal cutters.
9	Strip and terminate “75 ohm” female BNC socket connectors on the cables.
10	Connect the “receive” trunk cable to the “receive” top connector (J15). Push in on the coax connector and turn to the right to lock it into position.
11	Connect the “transmit” trunk cable to the “transmit” bottom connector (J14). Push in on the coax connector and turn to the right to lock it into position.
12	Verify continuity of cables following local procedures.
13	The DS3 MCS to ATM Network Cabling procedure is complete. Continue to Section 5— <i>MLA Cabling</i> .



## Chapter 2

### OC3 MCS to ATM Network Cabling

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#### Introduction

The interface between the ATM Network and the D50 is made at the Master Control Shelf (MCS) trunk interface card. The D50 supports two different ATM trunk interfaces:

- DS-3 – using DS3T, DS3T2, or DS3TQ cards (45 Mbps).
- OC-3 – using OC3T, OC3T2, OC3T2L, OC3T2M, OC3TQS, OC3TQM, or OC3TQL cards (155 Mbps).

This chapter provides detailed instructions on how to connect the ATM network trunk “transmit<sup>1</sup>” and “receive<sup>2</sup>” cables to a D50 with OC3T, OC3T2/OC3T2L/OC3T2M, or OC3TQS/OC3TQM/OC3TQL trunk cards. To connect the ATM network trunk cables to a D50 with DS3T, DS3T2, or DS3TQ trunk cards, refer to Chapter 1—“DS3 MCS to ATM Network Cabling,” page 4-1.

To switch service between the active and standby trunk cards, refer to the volume titled Maintenance and Testing, Section 4—*Appendices*, Appendix A—“Trunk Card Service Switching.”

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#### Required Tools and Equipment

To begin this task you must have the following equipment and tools (see Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers”):

- Single mode fiber optic cable(s) (9/125 μm diameter).
- (1) SC duplex connector for each trunk card<sup>3</sup>.
- (1) 3/4 inch or longer connector housing shell for each trunk card.
- Fiber optic SC connector termination kit.
- Step ladder (optional).

---

<sup>1</sup> Transmit - data being sent to the ATM Network.

<sup>2</sup> Receive - data being received from the ATM Network.

<sup>3</sup> A second trunk card can be installed for redundant protection.

**OC3 Trunk Cable Connection at the MCS**

OC3 “transmit” and “receive” trunk cables are connected to and run from the Central Office Optical Distribution Frame (ODF) across the horizontal cable racks to the D50 by the network service provider or a D50 Technician. These trunk cables are connected to the D50 at the faceplate of the trunk card.

Follow these steps to route the fiber optic cables to the trunk card location(s):

Table 4-2: OC3 Trunk Cable Connection at the MCS

STEP	PROCEDURE
1	Terminate SC duplex connectors on the “transmit” and “receive” fiber optic cables.
2	Connect the cables to the Optical Distribution Frame (ODF).
3	<p>Route the fiber optic cables from the ODF across the horizontal cable rack and down the relay rack rails to the D50 MCS, following local procedures.</p> <p><b>Important! Be careful when handling and routing fiber optic cable. Do not make any bends or coil the cable in less than a 2” diameter loop. The cable is fragile and kinks or sharp bends can cause signal distortion.</b></p> <p></p> <p><b>Warning! Follow all standard safety procedures when using fiber optic cable and equipment to prevent eye damage.</b></p>
4	<p>Refer to Section 2—<i>Basic Procedures</i>, Chapter 1—“Basic Procedures,” page 2-1 to:</p> <ul style="list-style-type: none"> <li>■ Locate the MCS cable ports.</li> <li>■ Remove and replace the MCS front panel.</li> <li>■ Remove and replace the MCS top screen.</li> </ul>
5	Push the trunk cables through one of the large cable ports at the back of the MCS.
6	Pull the fiber optic cables from the back of the MCS to the front.

Table 4-2: OC3 Trunk Cable Connection at the MCS (continued)

STEP	PROCEDURE
7	<p>Route the cables through the clip above slot 7 at the top of the MCS cage and down to slot 7<sup>1</sup>.</p> <div style="text-align: center;"> </div> <p style="text-align: center;">Figure 4-2: OC3 Trunk Card Slot 7 Location</p>
8	<p>Cut and strip the required length of the ends of the fiber optic cables, then terminate the SC duplex connectors on the cables, following local procedures.</p>
9	<p>The cables can be connected to the faceplate of the trunk card after the card is installed. If the cable connectors have protective caps, leave them on until the card is installed. The volume titled <u>Commissioning</u> provides instructions for installing all MCS cards and connecting cables to the cards.</p>
10	<p>Verify continuity of the cables following local procedures.</p>
11	<p>The OC3 MCS to ATM Network Cabling procedure is complete. Continue to Section 5—<i>MLA Cabling</i>.</p>

<sup>1</sup> Follow the same cabling procedures for a second redundant OC3T or OC3T2/OC3T2L/OC3T2M card in slot 8.



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## SECTION 5 MLA CABLING

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# Chapter 1

## MLA2 to LSM2 Fiber Optic Cabling

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### Introduction

In a Central Office installation, Line Card Shelves are connected to the Master Control Shelf via Line Card Shelf Multiplexer (LSM2) and Master Line Adapter (MLA2<sup>1</sup>) cards. The LSM2 and MLA2 cards exchange signals at OC-3c rate over multi-mode fiber optic cable. The LSM2 card receives the signal from its MLA2 card and then multiplexes and demultiplexes ATM cell streams for up to 24 line cards.

This chapter provides detailed instructions on how to set up the multi-mode fiber optic cables between the Master Control Shelf (MCS) and the Line Card Shelves (LCSs). Refer to the volume titled Commissioning, Section 2—*Card Placement*, Chapter 1—“MCS Card Installation” and Section 3—*Card Cabling*, Chapter 2—“MLA2 to LSM2 Card Cabling” for procedures for MLA2 card placement and cabling.

### Required Equipment and Tools

To begin this task you must have the following equipment and tools (refer to Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers”):

- (1) 3-meter multi-mode duplex fiber optic cable (62.5/125 μm diameter), with SC duplex connectors at both ends, for each LSM2 card.

A 3-meter multi-mode fiber optic cable with SC duplex connectors at both ends is provided for each LCS or LSM2 card shipped with the D50.

### Fiber Optic Cable—LCS to MCS

Follow these steps to run the fiber optic cable from the LCS to the MCS:

Table 5-1: Fiber Optic Cable—LCS to MCS

STEP	PROCEDURE
1	Refer to Section 2— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures,” page 2-1 to do the following: <ul style="list-style-type: none"> <li>■ Attach a properly grounded ESD strap (important!).</li> <li>■ Remove and replace the LCS front panel.</li> <li>■ Locate the MCS cable ports.</li> <li>■ Remove and replace the MCS front panel.</li> </ul>

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<sup>1</sup> The MLA2 card supports priority queuing Quality of Service Version 4.0 (QoS V4.0).

Table 5-1: Fiber Optic Cable—LCS to MCS (continued)

STEP	PROCEDURE
2	<p>Select a 3 meter duplex fiber optic cable for the first LCS (LCS1).</p> <p><b>Important! Be careful when handling and routing fiber optic cabling. Do not make any bends or coil the cabling in less than a 2” diameter loop. The cabling is fragile and kinks or sharp bends can cause signal distortion.</b></p> <p></p> <p><b>Warning! Follow all standard safety procedures when using fiber optic cabling and equipment to prevent eye damage.</b></p>
3	<p>Route the fiber optic cable up through slot 25 at the top of the LCS card cage, into the channel along the air ramp, and out to the back of the LCS.</p> <div> <p>The diagram illustrates the cable path through the LCS. A fiber optic cable is shown entering from the left, passing through a slot labeled 'Slot 25' at the top of the card cage. The cable then runs horizontally through a channel labeled 'Channel alongside Air Ramp' before exiting to the right. The card cage is shown in a perspective view, highlighting the top edge where the cable enters.</p> </div> <p>Figure 5-1: LSM2 Cable Path in the LCS</p>
4	<p>Go to the back of the LCS. Route the fiber optic cable up the relay rack rails to the back of the MCS. Push the cables through one of the large cable ports at the back of the MCS.</p>
5	<p>Pull the fiber optic cable through to the front of the MCS and to the left of the CSIP<sup>1</sup>.</p>

Table 5-1: Fiber Optic Cable—LCS to MCS (continued)

STEP	PROCEDURE
<p><b>6</b></p>	<p>Route the cable through the clip above slot 9 and down through the slot to the MCS card cage for the first MLA2 card.</p> <div> </div> <p style="text-align: center;">Figure 5-2: MLA2 Cable Path in the MCS</p>
<p><b>7</b></p>	<p>Loosely coil any slack in the fiber optic cable and lay it on top of the MCS card cage along side the CSIP. You may loop and tie fiber optic cable outside the MCS back panel if the area above the MCS card cage becomes too congested. Again, <u>do not</u> coil the cable in less than a 2" diameter loop.</p>
<p><b>8</b></p>	<p>Repeat Steps 2 through 7 for each LCS installed in the D50. The MCS supports a maximum of twelve LCSs.</p>
<p><b>9</b></p>	<p>The MLA2 to LSM2 Fiber Optic Cabling procedure is complete.</p>

<sup>1</sup> Route fiber optic cabling from LCSs 1-5 to the *left* of the CSIP Power Distribution Board. Route fiber optic cabling for LCSs 6-12 *under* the CSIP.



## Chapter 2

### MLA2L/MLA2S and OC3L Fiber Optic Cabling

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#### Introduction

The Master Control Shelf (MCS) can communicate with remote Line Card Shelves over an OC-3 signal. The Line Card Multiplexer (LSM2L or LSM2S) card, at the remote site, communicates via an OC-3 signal over single mode fiber optic cable to a Master Line Card Adapter (MLA2L or MLA2S) card in the MCS. The LSM2L card connects to the MLA2L card, and the LSM2S card connects to the MLA2S card.

The OC3L broadband UNI<sup>1</sup> tributary interface card allows the MCS to aggregate ATM cells from other standard ATM network equipment or other broadband tributary cards. ATM cells are then sent out to the ATM network via a DS3 or OC3 trunk card, or another broadband card. The OC3L card supports an OC-3 interface over single-mode fiber optic cable to other standard ATM network equipment and other broadband cards.

This chapter provides detailed instructions on how to set up “transmit” and “receive” single-mode fiber optic cables in the MCS for connection to the MLA2L, MLA2S, and OC3L card. Refer to the volume titled [Commissioning](#), Section 2—*Card Placement*, Chapter 1—“MCS Card Installation” and Section 3—*Card Cabling*, Chapter 3—“MLA2L/MLA2S/OC3L Card Cabling” for procedures for MLA2L/MLA2S and OC3L card placement and cabling.

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#### Required Tools and Equipment

To begin this task you must have the following equipment and tools (see Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers”):

- Single-mode duplex fiber optic cable, intermediate reach (short haul), for each MLA2S or OC3L card.
- Single-mode duplex fiber optic cable, long haul, for each MLA2L card.
- SC duplex connectors (or SC duplex adapters), and 3/4 inch or longer connector housing shells.
- Fiber optic duplex SC connector termination kit.

---

#### MLA2L/MLA2S/OC3L Cable Connection

The OC-3 “transmit” and “receive” single-mode fiber optic cables are connected to the faceplate of the MLA2L/MLA2S and OC3L cards as follows:

- MLA2L and MLA2S cards – cables are run from the Optical Cross-Connect Panel in the Central Office and across the horizontal cable racks to the D50, per local procedures.
- OC3L card – cables are run from the other standard ATM network equipment to the D50, or (if the other standard ATM network equipment is remotely located) from the Optical Cross-Connect Panel across the horizontal cable racks to the D50, per local procedures.

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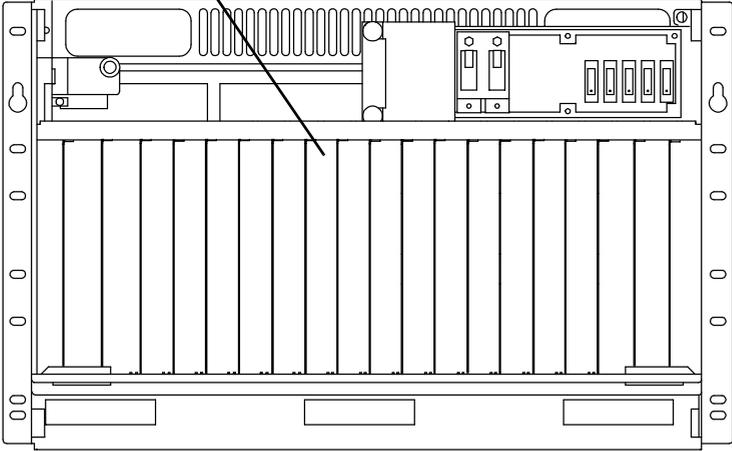
<sup>1</sup> UNI = User Network Interface.

Follow these steps to set up “transmit” and “receive” fiber optic cables at the MCS for the MLA2L, MLA2S, and OC3L cards:

Table 5-2: MLA2L/MLA2S/OC3L Fiber Optic Cabling

STEP	PROCEDURE
1	<p>Terminate OC-3 “transmit” and “receive” single-mode fiber optic cables at the Optical Cross-Connect Panel, or at the other standard ATM network equipment.</p> <p><b>Important! Be careful when handling and routing fiber optic cable. Do not make any bends or coil the cable in less than a 2 inch diameter loop. The cable is fragile, and kinks or sharp bends can cause signal distortion.</b></p>  <p><b>Warning! Follow all standard safety procedures when using fiber optic cable and equipment to prevent eye damage.</b></p>
2	Route the cables to the D50, per local procedures.
3	<p>Refer to Section 2—<i>Basic Procedures</i>, Chapter 1—“Basic Procedures,” page 2-1 to:</p> <ul style="list-style-type: none"> <li>■ Locate the MCS cable ports.</li> <li>■ Remove and replace the MCS front panel.</li> <li>■ Remove and replace the MCS top screen.</li> </ul>
4	Push the cables through one of the large cable ports at the back or on the side of the MCS, following local procedures.
5	Pull the cables from the back of the MCS to the front.
6	Cut the cables to the correct length. Terminate SC duplex connectors on the cables.

Table 5-2: MLA2L/MLA2S/OC3L Fiber Optic Cabling (continued)

STEP	PROCEDURE
7	<p>Route the SC connector ends of the cables through the clip above the assigned slot for the MLA2L/MLA2S or OC3L card at the top of the MCS cage, and down to the slot.</p> <p style="text-align: center;">MLA2L/MLA2S/OC3L Card Slot (Slot 9 as example)</p>  <p style="text-align: center;">Figure 5-3: MLA2L/MLA2S/OC3L Card Slot (Slot 9 as example)</p>
8	Dress, tie and label cables, per local procedures.
9	Repeat Steps 1 through 8 for each additional card.
10	The MLA2L/MLA2S and OC3L Fiber Optic Cabling procedure is complete.



## Chapter 3 MLAT1 Copper Cabling

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### Introduction

The Master Control Shelf (MCS) can communicate with remote Line Card Shelves and/or D50 RAMs over a 4xDS-1 signal. The Line Card Shelf Multiplexer (LSMT1) card, at the remote site, communicates via a 4xDS-1 signal to an MLAT1 card in the MCS.

This chapter provides detailed instructions on how to set up “transmit” and “receive” 4xDS-1 cables in the MCS for connection to the MLAT1 card. Refer to the volume titled *Commissioning*, Section 2—*Card Placement*, Chapter 1—“MCS Card Installation” and Section 3—*Card Cabling*, Chapter 4—“MLAT1 Card Cabling” for procedures for MLAT1 card placement and cabling.

---

### Required Tools and Equipment

To begin this task you must have the following equipment and tools (refer to Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers”):

- (2) 4-pair 4xDS-1 (transmit and receive) cables for each MLAT1 card.
- (2) RJ-45 plugs for each MLAT1 card.
- RJ-45 crimp tool and cutter.
- (4) T1 EMI filter ferrites.
- Grounding wire.

---

### MLAT1 Copper Cabling

The 4-pair 4xDS-1 “transmit” and “receive” cables are connected to the DSX cross connect panel or punch down block in the Central Office and run across the horizontal cable racks to the D50 multiplexer per local procedures. These cables connect to the faceplate of an MLAT1 card in the MCS.

Follow these steps to run the “transmit” and “receive” 4xDS-1 cables from the DSX cross connect panel or punch down block to the MCS:

Table 5-3: MLAT1 Copper Cabling

STEP	PROCEDURE
1	Terminate the “transmit” and “receive” 4xDS-1 cables at the DSX cross connect panel or punch down block, per local procedures.
2	Route the cables from the cross connect panel or punch down block across the horizontal cable racks and down the rack rails to the D50 multiplexer, per local procedures.

Table 5-3: MLAT1 Copper Cabling (continued)

STEP	PROCEDURE
3	Refer to Section 2— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures,” page 2-1 to: <ul style="list-style-type: none"> <li>■ Locate the MCS cable ports.</li> <li>■ Remove and replace the MCS front panel.</li> <li>■ Remove and replace the MCS top screen.</li> </ul>
4	Push the cables through one of the large cable ports at the back or on the side of the MCS, following local procedures.
5	Pull the cables from the back of the MCS to the front.
6	Cut the cables to the correct length.
7	Strip the cables and terminate RJ-45 plugs onto both cables using a crimp tool. RJ-45 pin outs are provided below.

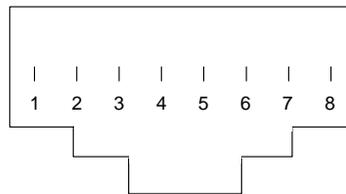
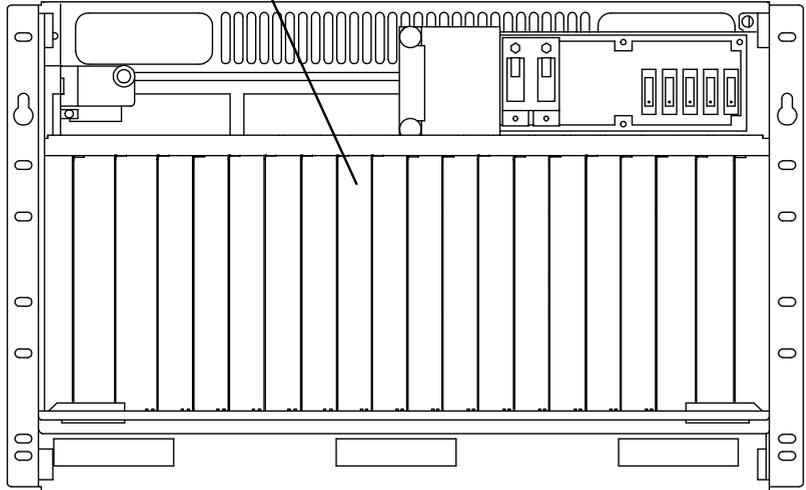


Figure 5-4: RJ-45 Plug (viewed from the open end of the plug)

MLAT1 TRANSMIT			MLAT1 RECEIVE		
RJ-45 Pin #	Cable Wire	Wire Color	RJ-45 Pin #	Cable Wire	Wire Color
1	Ring: Line 1	Blue/White	1	Ring: Line 1	Blue/White
2	Tip: Line 1	White/Blue	2	Tip: Line 1	White/Blue
3	Ring: Line 2	Orange/White	3	Ring: Line 2	Orange/White
4	Tip: Line 2	White/Orange	4	Tip: Line 2	White/Orange
5	Ring: Line 3	Green/White	5	Ring: Line 3	Green/White
6	Tip: Line 3	White/Green	6	Tip: Line 3	White/Green
7	Ring: Line 4	Brown/White	7	Ring: Line 4	Brown/White
8	Tip: Line 4	White/Brown	8	Tip: Line 4	White/Brown

Figure 5-5: RJ-45 T1 “Transmit” and “Receive” Pin Outs

Table 5-3: MLAT1 Copper Cabling (continued)

STEP	PROCEDURE
<p><b>8</b></p>	<p>Route the cables through the clip above the assigned slot for the MLAT1 card at the top of the MCS cage, and down to the slot.</p> <div style="text-align: center;"> <p>MLAT1 Card Slot (Slot 9 as example)</p>  </div> <p>Figure 5-6: MLAT1 Card Slot (Slot 9 as example)</p>
<p><b>9</b></p>	<p>Place EMI filter ferrites on the cables as required, per local procedures.</p>
<p><b>10</b></p>	<p>Dress, tie and label cables.</p>
<p><b>11</b></p>	<p>Properly ground the 4xDS-1 cables to the MCS, per local procedures.</p>
<p><b>12</b></p>	<p>Repeat Steps 1 through 11 for each additional MLAT1 card.</p>
<p><b>13</b></p>	<p>The MLAT1 Copper Cabling procedure is complete.</p>



## Chapter 4

### MLAT3 and DS3L Coax Cabling

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#### Introduction

The Master Control Shelf (MCS) can communicate with remote Line Card Shelves over a DS-3 signal. The Line Card Shelf Multiplexer (LSMT3) card, at the remote site, communicates via a DS-3 signal to an MLAT3 card in the MCS.

The DS3L broadband UNI<sup>1</sup> tributary interface card allows the MCS to aggregate ATM cells from other standard ATM network equipment or other broadband tributary cards. ATM cells are then sent out to the ATM network via a DS3 or OC3 trunk card or another broadband card. The DS3L card supports a DS-3 interface over coaxial cable to other standard ATM network equipment and other broadband cards.

This chapter provides detailed instructions on how to run “transmit” and “receive” DS-3 coaxial cables to the MCS for connection to the MLAT3 and DS3L cards. Refer to the volume titled *Commissioning*, Section 2—*Card Placement*, Chapter 1—“MCS Card Installation” and Section 3—*Card Cabling*, Chapter 5—“MLAT3/DS3L Card Cabling” for procedures for MLAT3 and DS3L card placement and cabling.

---

#### Required Tools and Equipment

To begin this task you must have the following equipment and tools (refer to Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers”):

- (1) T3 coax cable stub with ferrite and grounding board, and with SMB connectors on one end and 75 ohm female BNC connectors on the other end, for each MLAT3 or DS3L card.
- (1) coax cable stub grounding clip for each MLAT3 or DS3L card.
- WECO 728A equivalent coax cables (transmit and receive).
- (2) 75 ohm male BNC connectors for each MLAT3 or DS3L card.
- Coax cable cutters.
- Coax cable stripping tool.
- Coax crimp tool.
- Coax center crimp tool.

---

#### MLAT3/DS3L Coax Cabling

DS-3 “transmit” and “receive” coax cables are connected to the MLAT3 and DS3L cards as follows:

- MLAT3 card – cables are run from the DSX-3 cross connect panel in the Central Office and across the horizontal cable racks to the D50, per local procedures. These cables connect to a T3 coax cable stub, which connects to the faceplate of the MLAT3 card.

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<sup>1</sup> UNI = User Network Interface.

- DS3L card – cables are run from the other standard ATM network equipment to the D50, or (if the other standard ATM network equipment is more than 450 feet away or is remotely located) from the DSX-3 cross connect panel in the Central Office across the horizontal cable racks to the D50, per local procedures. These cables connect to a T3 coax cable stub, which connects to the faceplate of the DS3L card.

Follow these steps to run the “transmit” and “receive” coax cables to the MCS:

Table 5-4: MLAT3/DS3L Coax Cabling

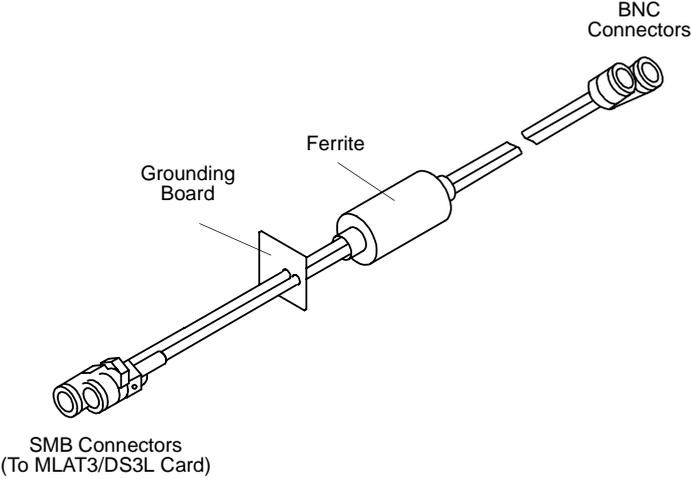
STEP	PROCEDURE
1	Terminate the “transmit” and “receive” coax cables at the DSX-3 cross connect panel, or at the other standard ATM network equipment, per local procedures.
2	Route the cables from the cross connect panel or other ATM equipment across the horizontal cable racks and down the rack rails to the D50, per local procedures.
3	Cut the cables to the correct length.
4	Strip and terminate the male BNC connectors onto the cables using the coax stripping tool and crimp tool.
5	<p>Connect the cables to the “transmit” and “receive” female BNC connectors on the T3 coax cable stub.</p>  <p style="text-align: center;">Figure 5-7: T3 Coax Cable Stub</p>
6	<p>Refer to Section 2—<i>Basic Procedures</i>, Chapter 1—“Basic Procedures,” page 2-1 to:</p> <ul style="list-style-type: none"> <li>■ Locate the MCS cable ports.</li> <li>■ Remove and replace the MCS front panel.</li> <li>■ Remove and replace the MCS top screen.</li> </ul>

Table 5-4: MLAT3/DS3L Coax Cabling (continued)

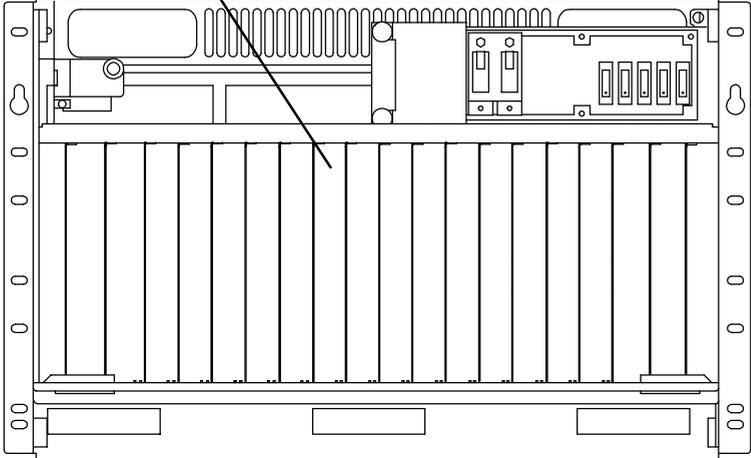
STEP	PROCEDURE
7	<p>Push the coax cable stub through one of the large cable ports at the back of the MCS, following local procedures.</p> <p><b>Important! Be sure the connectors do NOT touch the CSIP components in an active system; contact could result in a short circuit.</b></p>
8	<p>Pull the coax cable stub from the back of the MCS to the front.</p>
9	<p>Route the SMB connector ends of the coax cable stub through the clip above the assigned slot for the MLAT3 or DS3L card at the top of the MCS cage, and down to the slot. Lay the cable grounding board on top of the MCS guide plate over the slot.</p> <p><b>Note:</b> Lay the ferrite inside the top area of the MCS, above the card cage.</p> <p>MLAT3/DS3L Card Slot (Slot 9 as example)</p>  <p>The diagram shows a top-down view of a card slot within a cage. A label 'MLAT3/DS3L Card Slot (Slot 9 as example)' has an arrow pointing to a specific slot. Above this slot, there is a clip mechanism. The slot itself is a rectangular opening with a guide plate below it. The cage has vertical dividers and mounting holes on the sides.</p>

Figure 5-8: MLAT3/DS3L Card Slot (Slot 9 as example)

Table 5-4: MLAT3/DS3L Coax Cabling (continued)

STEP	PROCEDURE
10	<p>A grounding clip is required to properly ground the coax cable stub.</p> <div> </div> <p style="text-align: center;">Figure 5-9: Grounding Clip</p> <p>Slide the grounding clip onto the MCS upper guide plate over the cable grounding board, as shown.</p> <p><b>Note:</b> The grounding board must go between the MCS upper guide plate and the grounding clip.</p> <div> </div> <p style="text-align: center;">Figure 5-10: Grounding Clip on MCS Upper Guide Plate</p>

Table 5-4: MLAT3/DS3L Coax Cabling (continued)

<b>STEP</b>	<b>PROCEDURE</b>
<b>11</b>	Dress, tie and label cables, per local procedures.
<b>12</b>	Repeat Steps 1 through 11 for each additional card.
<b>13</b>	The MLAT3 and DS3L Coax Cabling procedure is complete.

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## SECTION 6 TELCO CABLING

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## Chapter 1

### LCS Cabling—Quad DS1 Line Cards

---

#### Introduction

Quad DS1 line cards support data and packetized voice service. The connection between the local exchange network and the D50 is made at the Line Card Shelf (LCS). Each LCS is designed for connection to a maximum of 192 cable pairs at the Digital Cross Connect (DSX) panel or the Main Distribution Frame (MDF). In certain configurations, some cable pairs will run from the DSX, and others from the MDF.

**Note:** The D50 supports ATM over DS1 data service, including packetized voice over T1 (DS1) lines. Packetized voice service using DS1 cards does not require a low pass filter at the D50 for splitting off voice traffic from data traffic.

Line card types can be mixed on a Line Card Shelf. LCS cabling is modular and connectorized. Line card types can be re-cabled for a different application, if required. The service capacity is 96 lines per shelf with quad line cards, and 192 lines per shelf with octal line cards. The D50 supports quad DS1, octal ADSL (DMT), octal SDSL, octal SHDSL, and octal IDSL line cards.

This chapter provides detailed instructions on how to connect one end of 25 pair cable stubs to the LCS backplane, and the other end to 25 pair cables from the distribution frame, for a Line Card Shelf configuration that includes:

- Quad DS1 line cards only.
- Quad DS1 line cards with other line card types (ADSL, IDSL, SDSL, or SHDSL).

For cable/pair assignment tables, refer to Section 10—*Appendices*, Appendix E—“Cable/Pair Assignment Tables: LCS with Quad DS1 Line Cards,” page 10-33.

To test and verify cable pair continuity between the LCS and the DSX, refer to Section 10—*Appendices*, Appendix C—“Testing Cable Pairs Continuity: Data Only.”

---

#### Required Tools and Equipment

To begin this task you must have the following equipment and tools (refer to Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers”):

- (8) 25 pair cable stub(s) with 50 pin female Amp Champ connectors on one end, ribbon connectors on the other end, and a vinyl rubber grommet on each cable.

**Note:** Two 25 pair cable stubs are required for each six-pack of DS1 line cards utilized.

- (8) 50 pin male Amp Champ connectors.

**Note:** Two 50 pin male Amp Champ connectors are required for each six-pack of DS1 line cards utilized.

- 25 pair cable (24 AWG).
- A small flat-blade screwdriver.

**DS1 Line Cards Only – Backplane Configuration**

In the figures below, note that:

- The 25 pair cabling line card slot assignments refer to the actual DS1 line card slots in the LCS.
- The 25 pair cabling port assignments do not refer to the actual ports on the DS1 line cards in the LCS. The DS1 line card has four physical ports, but the 25 pair cabling assignments refer to four **Transmit** ports and four **Receive** ports. For example, **Transmit** ports 1–4 for one DS1 line card refer to four cable pairs (four tip wires, four ring wires) that transmit signals to the DSX Cross Connect panel. **Receive** ports 1–4 for the same DS1 line card refer to four cable pairs (four tip wires, four ring wires) that receive signals from the DSX Cross Connect panel.

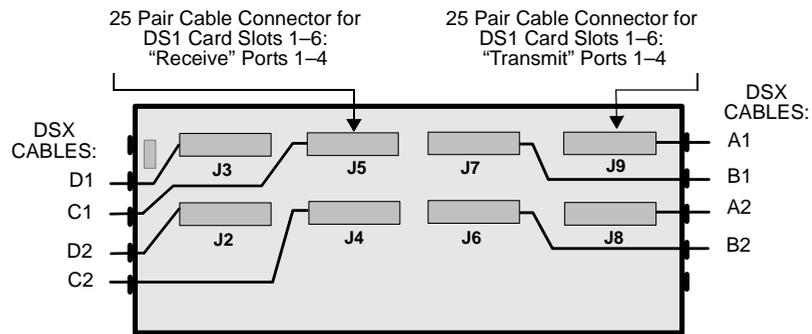


Figure 6-1: LCS Backplane—"Transmit" Ports 1–4 and "Receive" Ports 1–4

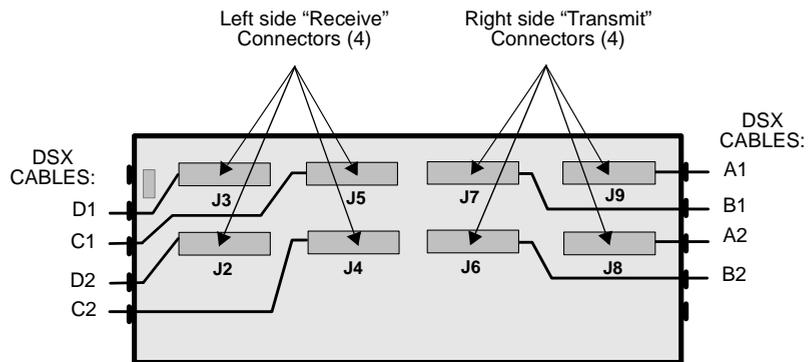


Figure 6-2: "Transmit" and "Receive" LCS Backplane Connectors

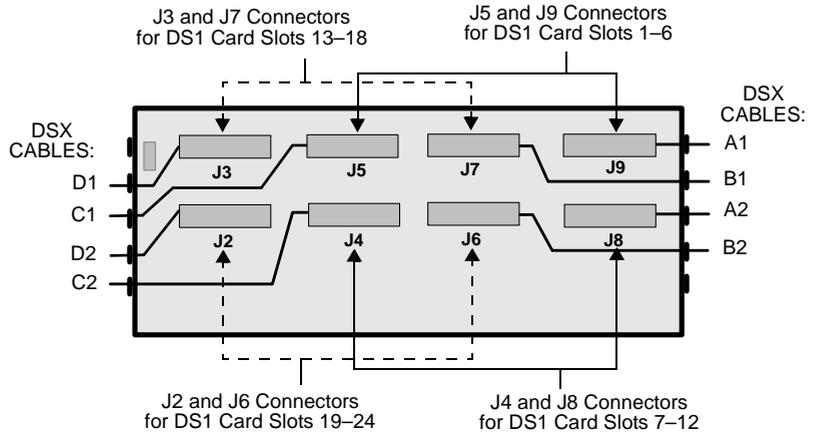


Figure 6-3: DS1 Card Slots 1—24 LCS Backplane Connectors

**LCS with Mixed Line Card Types**

Figure 6-4 illustrates the backplane configuration of an LCS with both quad DS1 line cards and other line card types (ADSL, IDSL, SDSL, or SHDSL).

**Important! ADSL, IDSL, SDSL, and SHDSL line card backplane cable stubs connect to cables coming from the Main Distribution Frame (MDF), while quad DS1 line card backplane cable stubs connect to cables coming from the Digital Cross Connect (DSX) panel.**

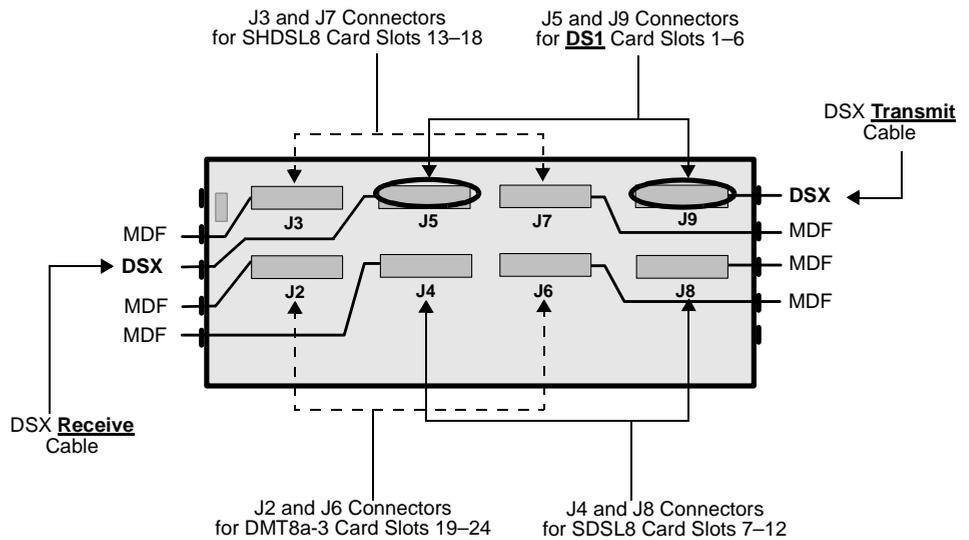


Figure 6-4: DSX and MDF Cables at the Same LCS

**Supported Line Card Types** The D50 supports the following line card types:

- DS1 (quad DS1).
- DMT8a-3 (octal ADSL).
- SDSL8 and SDSL8+ (octal SDSL).
- IDSL8 (octal IDSL).
- SHDSL8 (octal SHDSL).

LCS cabling must match the requirements of the line card layout.

Different line card types can be supported on the same LCS when each card type is placed within its own six-pack (e.g., all DS1 cards in one six-pack, all SHDSL8 cards in one six-pack, etc.). The LCS can be cabled to support both data only and data plus voice service simultaneously among the different six-packs.

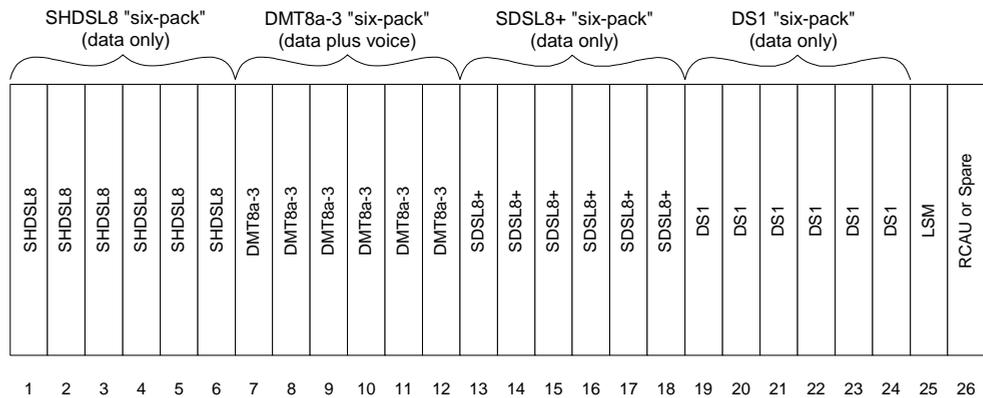


Figure 6-5: LCS with DS1, SHDSL8, DMT8a-3, and SDSL8+ Line Cards

**25 Pair  
 "Transmit" and  
 "Receive" Cable  
 Stubs**

Line Card Shelf (LCS) cabling is fully connectorized. The flat ribbon end of the 25 pair cable stub connects to the LCS backplane. The round end of the cable stub connects to the 25 pair cable which connects to subscriber lines at the distribution frame.

LCS line cards are organized into groups of six channel slots, called "six-packs." On an LCS with quad DS1 line cards, one **Transmit** 25 pair cable stub connects to six line cards, and a second **Receive** 25 pair cable stub connects to the same six line cards. A D50 with 1 LCS and 24 DS1 line cards requires 8 LCS to DSX cable stubs. For each group of six DS1 line cards, one cable stub transmits signals, while a second cable stub receives signals.

**25 Pair Stub Connections at the LCS**

Follow these steps to connect 25 pair **Transmit** and **Receive** cable stubs to the LCS backplane for quad DS1 Line Cards:

Table 6-1: 25 Pair Stub Connections at the LCS

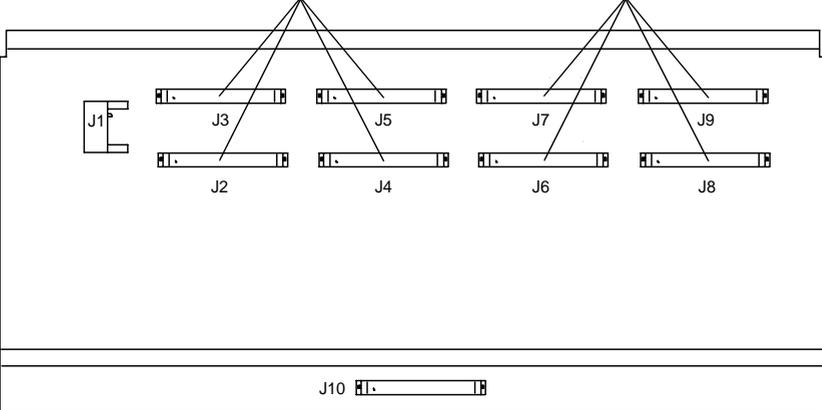
STEP	PROCEDURE
1	Refer to Section 2— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures,” page 2-1 to: <ul style="list-style-type: none"> <li>■ Remove and replace the LCS front panel.</li> <li>■ Locate the LCS cable ports.</li> </ul>
2	Connect the first 25 pair cable stub <sup>1</sup> to connector J9—this connects to line card slots 1–6, <b>Transmit</b> ports 1–4. Refer to Table 6-3: LCS Telco Connectors—Quad DS1 Line Cards, page 6-11, for slot and port assignments for connectors J2–J9. <div style="text-align: center; margin: 10px 0;"> <p>25 Cable/Pair “Receive” Connectors J2–J5 (ports 5–8)</p> <p>25 Cable/Pair “Transmit” Connectors J6–J9 (ports 1–4)</p> </div>  <p>The diagram shows a schematic of the LCS backplane connectors. On the left, connector J1 is shown. To its right are two rows of connectors. The top row contains J3, J5, J7, and J9. The bottom row contains J2, J4, J6, and J8. Above J2-J5 is the label '25 Cable/Pair "Receive" Connectors J2-J5 (ports 5-8)'. Above J6-J9 is the label '25 Cable/Pair "Transmit" Connectors J6-J9 (ports 1-4)'. At the bottom center, connector J10 is shown.</p>

Figure 6-6: LCS Backplane “Transmit” and “Receive” Connectors

Table 6-1: 25 Pair Stub Connections at the LCS (continued)

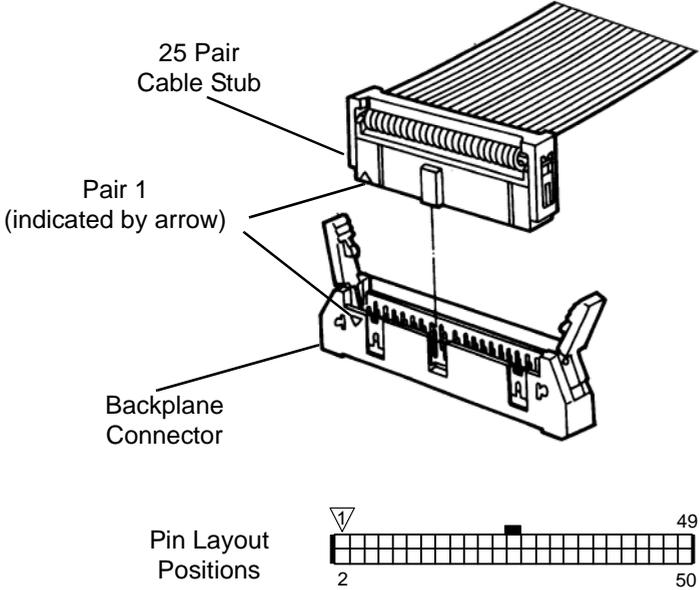
STEP	PROCEDURE
<p><b>3</b></p>	<p>Backplane connectors have latches on both sides. These latches snap down on the cable stub ribbon connector and lock in place.</p>  <p>Figure 6-7: Ribbon Connectors and Connector Pin Layout</p>
<p><b>4</b></p>	<p>The LCS assembly has 5 cable slots on both the left and right sides.</p> <p>Bring the 25 pair cable stub connected to the <u>J9</u> connector through the <u>top</u> cable slot on the <u>right</u> side of the LCS assembly. Refer to Figure 6-8: LCS to DSX Quad Cabling Diagram, page 6-7.</p>
<p><b>5</b></p>	<p>There is a rubber vinyl grommet pre-installed on the 25 pair cable stub.</p> <p>Position the grommet on the cable stub so it fits over the edge of the slot on the LCS assembly. Push the grommet into the slot as far as you can so it doesn't interfere with the back cover. The grommet helps hold the cable in position and also protects it from the metal edge.</p>

Table 6-1: 25 Pair Stub Connections at the LCS (continued)

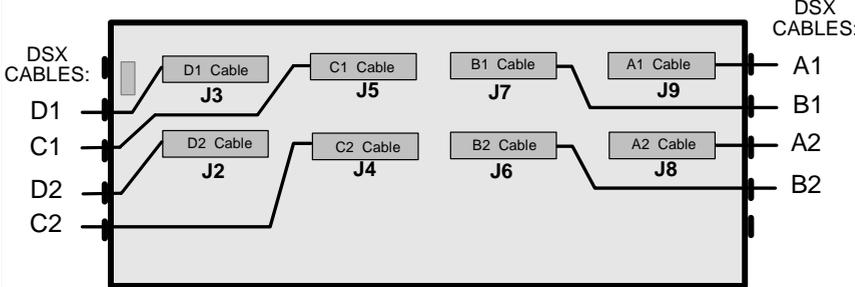
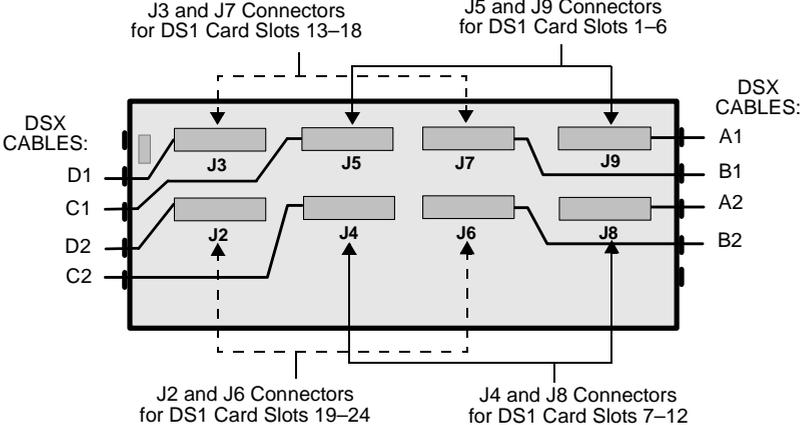
STEP	PROCEDURE
6	<p>Repeat Steps 2 through 5 for all cable stubs. Refer to Figure 6-8: LCS to DSX Quad Cabling Diagram below.</p> <ul style="list-style-type: none"> <li>■ On the <u>right</u> side of the LCS (<b>Transmit</b> connectors, for <b>Transmit</b> ports 1–4): <ul style="list-style-type: none"> <li>– For the <u>J8</u> connector (slots <u>7–12</u>, <b>Transmit</b> ports <u>1–4</u>), bring the cable through the <u>third</u> slot (from the top).</li> <li>– For the <u>J7</u> connector (slots <u>13–18</u>, <b>Transmit</b> ports <u>1–4</u>), bring the cable through the <u>second</u> slot (from the top).</li> <li>– For the <u>J6</u> connector (slots <u>19–24</u>, <b>Transmit</b> ports <u>1–4</u>), bring the cable through the <u>fourth</u> slot (from the top).</li> </ul> </li> <li>■ On the <u>left</u> side of the LCS (<b>Receive</b> connectors, for <b>Receive</b> ports 1–4): <ul style="list-style-type: none"> <li>– For the <u>J5</u> connector (slots <u>1–6</u>, <b>Receive</b> ports <u>1–4</u>), bring the cable through the <u>third</u> slot (from the top).</li> <li>– For the <u>J4</u> connector (slots <u>7–12</u>, <b>Receive</b> ports <u>1–4</u>), bring the cable through the <u>fifth</u> slot (from the top).</li> <li>– For the <u>J3</u> connector (slots <u>13–18</u>, <b>Receive</b> ports <u>1–4</u>), bring the cable through the <u>second</u> slot (from the top).</li> <li>– For the <u>J2</u> connector (slots <u>19–24</u>, <b>Receive</b> ports <u>1–4</u>), bring the cable through the <u>fourth</u> slot (from the top).</li> </ul> </li> </ul> <p>Position grommets on all cable stubs to fit over the edges of the slots.</p>  <p style="text-align: center;">Figure 6-8: LCS to DSX Quad Cabling Diagram</p>

Table 6-1: 25 Pair Stub Connections at the LCS (continued)

STEP	PROCEDURE
7	<p>The table below diagrams the eight cable stub connections necessary for installation of four six-packs of quad DS1 cards.</p>  <p style="text-align: center;">Figure 6-9: Quad DS1 Card Slots 1–24 Cable Stub Connectors</p>
8	<p>The D50 is designed for a maximum of twelve Line Card Shelves. Repeat Steps 1 through 6 for all LCSs supporting DS1 line cards <u>only</u>.</p> <p><b>Note:</b> If your are installing DS1 line cards as well as other line card types in the same LCS, refer to <b>LCS with Mixed Line Card Types</b>, page 6-3.</p>
9	<p>Continue to the next procedure: <b>25 Pair “Transmit” and “Receive” Cable–DSX to LCS</b>.</p>

<sup>1</sup> LCS to DSX cable stubs are equipped with right and left angle connectors.

**25 Pair “Transmit” and “Receive” Cable–DSX to LCS**

25 pair **Transmit** and **Receive** cables<sup>1</sup> are tied down and run from the Central Office Digital Cross Connect (DSX) panel across the horizontal cable racks to the D50. This work may be done by the network service provider or the D50 technician. These **Transmit** and **Receive** 25 pair cables are connected to **Transmit** and **Receive** 25 pair cable stubs installed at the Line Card Shelf.

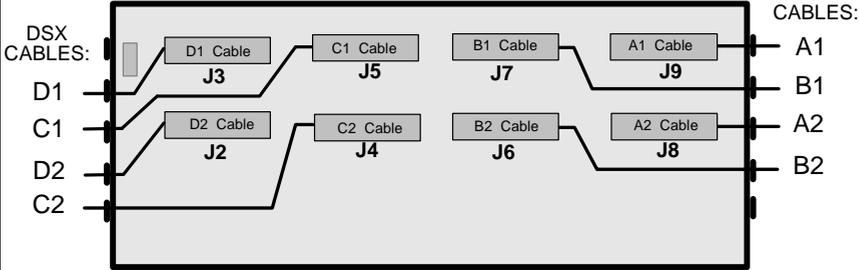
<sup>1</sup> The network service provider may choose to run 100 pair cables from the DSX to the D50. These 100 pair cables require four 25 pair Amp Champ male connectors to connect to the 25 pair cable stubs.

Follow these steps to connect **Transmit** and **Receive** 25 pair cables from the DSX to **Transmit** and **Receive** 25 pair cable stubs at the LCS.

Table 6-2: 25 Pair Cable—DSX to LCS

STEP	PROCEDURE
1	<p>Route the 25 pair cables from the DSX down from the horizontal cable rack and along the relay rack rails, following local procedures.</p> <p><b>Important! If you are installing DS1 line cards with other line card types, you will need to route 25 pair cables from two separate distribution frames. DS1 cables are routed from the Digital Cross Connect (DSX) panel. ADSL, IDSL, SDSL, or SHDSL cables are routed from the Main Distribution Frame (MDF).</b></p>
2	<p>Verify continuity of each 25 pair DSX cable, following local procedures.</p>
3	<p>Label the cables for connection to the LCS <b>Transmit</b> cable stubs as follows:</p> <ul style="list-style-type: none"> <li>■ <u>A1 Transmit</u>, connecting to the cable stub for line card slots <u>1–6</u>, <b>Transmit</b> ports <u>1–4</u>.</li> <li>■ <u>A2 Transmit</u>, connecting to the cable stub for line card slots <u>7–12</u>, <b>Transmit</b> ports <u>1–4</u>.</li> <li>■ <u>B1 Transmit</u>, connecting to the cable stub for line card slots <u>13–18</u>, <b>Transmit</b> ports <u>1–4</u>.</li> <li>■ <u>B2 Transmit</u>, connecting to the cable stub for line card slots <u>19–24</u>, <b>Transmit</b> ports <u>1–4</u>.</li> </ul> <p>Label the cables for connection to the LCS <b>Receive</b> cable stubs as follows:</p> <ul style="list-style-type: none"> <li>■ <u>C1 Receive</u>, connecting to the cable stub for line card slots <u>1–6</u>, <b>Receive</b> ports <u>1–4</u>.</li> <li>■ <u>C2 Receive</u>, connecting to the cable stub for line card slots <u>7–12</u>, <b>Receive</b> ports <u>1–4</u>.</li> <li>■ <u>D1 Receive</u>, connecting to the cable stub for line card slots <u>13–18</u>, <b>Receive</b> ports <u>1–4</u>.</li> <li>■ <u>D2 Receive</u>, connecting to the cable stub for line card slots <u>19–24</u>, <b>Receive</b> ports <u>1–4</u>.</li> </ul>
4	<p>Terminate the 25 pair cables on Amp Champ connectors. Refer to Section 10—<i>Appendices</i>, Appendix E—“Cable/Pair Assignment Tables: LCS with Quad DS1 Line Cards,” page 10-33.</p>

Table 6-2: 25 Pair Cable—DSX to LCS (continued)

STEP	PROCEDURE
<p><b>5</b></p>	<p>Connect the <b>Transmit</b> 25 pair cable, identified as the <u>A1</u> cable, to the <u>J9</u> LCS cable stub.</p>  <p style="text-align: center;">Figure 6-10: LCS to DSX Quad Cabling Diagram</p>
<p><b>6</b></p>	<p>Tighten the two screws on the male Amp Champ connector to secure.</p>
<p><b>7</b></p>	<p>Repeat Steps 2 through 6 for each 25 pair <b>Transmit</b> cable:</p> <ul style="list-style-type: none"> <li>■ Connect the <b>Transmit</b> <u>A2</u> cable to the <u>J8</u> LCS <b>Transmit</b> cable stub.</li> <li>■ Connect the <b>Transmit</b> <u>B1</u> cable to the <u>J7</u> LCS <b>Transmit</b> cable stub.</li> <li>■ Connect the <b>Transmit</b> <u>B2</u> cable to the <u>J6</u> LCS <b>Transmit</b> cable stub.</li> </ul>
<p><b>8</b></p>	<p>Repeat Steps 2 through 6 for each 25 pair <b>Receive</b> cable:</p> <ul style="list-style-type: none"> <li>■ Connect the <b>Receive</b> <u>C1</u> cable to the <u>J5</u> LCS <b>Receive</b> cable stub.</li> <li>■ Connect the <b>Receive</b> <u>C2</u> cable to the <u>J4</u> LCS <b>Receive</b> cable stub.</li> <li>■ Connect the <b>Receive</b> <u>D1</u> cable to the <u>J3</u> LCS <b>Receive</b> cable stub.</li> <li>■ Connect the <b>Receive</b> <u>D2</u> cable to the <u>J2</u> LCS <b>Receive</b> cable stub.</li> </ul>
<p><b>9</b></p>	<p>The D50 is designed for a maximum of twelve Line Card Shelves. Repeat the entire LCS to DSX cabling procedure for all LCSs with DS1 line cards <u>only</u>.</p> <p><b>Note:</b> If your are installing DS1 line cards as well as other line card types in the same LCS, refer to <b>LCS with Mixed Line Card Types</b>, page 6-3.</p>
<p><b>10</b></p>	<p>The Chapter 1—“LCS Cabling—Quad DS1 Line Cards” procedure is complete.</p>

**Quad DS1 Telco Connector Table**

The following table shows the LCS backplane telco connectors, their corresponding line card slots and ports, and the DSX cables, for quad DS1 line cards.

**Important!** The DS1 line card has four physical ports, but the 25 pair cabling assignments refer to Transmit ports 1–4 and Receive ports 1–4. Transmit ports 1–4 refer to the cable pairs that transmit signals from DS1 line cards to the DSX. Receive ports 1–4 refer to cable pairs that receive signals from the DSX and send them to the same DS1 line cards.

Table 6-3: LCS Telco Connectors—Quad DS1 Line Cards

<b>LCS Backplane Connector</b>	<b>DSX Cable</b>	<b>Line Card Slots</b>	<b>Transmit and Receive DS1 Line Card Ports</b>
J9	A1	1–6	<b>Transmit Ports 1–4</b>
J8	A2	7–12	<b>Transmit Ports 1–4</b>
J7	B1	13–18	<b>Transmit Ports 1–4</b>
J6	B2	19–24	<b>Transmit Ports 1–4</b>
J5	C1	1–6	<b>Receive Ports 1–4</b>
J4	C2	7–12	<b>Receive Ports 1–4</b>
J3	D1	13–18	<b>Receive Ports 1–4</b>
J2	D2	19–24	<b>Receive Ports 1–4</b>

For cable/pair assignment tables, refer to Section 10—*Appendices*, Appendix E—“Cable/Pair Assignment Tables: LCS with Quad DS1 Line Cards,” page 10-33.



## Chapter 2

### LCS Cabling—Octal Line Cards (Data Only)

---

**Introduction** This chapter provides detailed instructions on how to connect 25 pair cable stubs to the LCS backplane for an octal SDSL, SHDSL, IDSL, or ADSL (DMT) data service only configuration.

DS1, ADSL (DMT), SDSL, SHDSL, and IDSL line cards support data service only. The connection between the local exchange network and the D50 is made at the Line Card Shelf (LCS). Each Line Card Shelf is designed for connection to a maximum of 192 cable/pairs at the Main Distribution Frame (MDF).

Line card types can be mixed on a Line Card Shelf. LCS cabling is modular and connectorized; line card types can be re-cabled for a different application, if required. The service capacity is 96 lines per shelf with quad line cards, and 192 lines per shelf with octal line cards. The D50 supports quad DS1, octal ADSL (DMT), octal SDSL, octal SHDSL, and octal IDSL line cards.

For cable/pair assignment tables, refer to Section 10—*Appendices*, Appendix F—“Cable/Pair Assignment Tables: LCS with Octal Line Cards,” page 10-53. To test and verify the continuity of the cable pairs between the LCS and the MDF, refer to Section 10—*Appendices*, Appendix C—“Testing Cable Pairs Continuity: Data Only.”

---

**Required Tools and Equipment** To begin this task you must have the following equipment and tools (refer to Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers”):

- (8) 25 pair cable stub(s) with 50 pin female Amp Champ connectors on one end, ribbon connectors on the other end, and a vinyl rubber grommet on each cable.
- (8) 50 pin male Amp Champ connectors.
- 25 pair cable (24 AWG).
- A small flat-blade screwdriver.

---

**25 Pair Cable Stubs**

Line Card Shelf (LCS) cabling is fully connectorized. The flat ribbon end of the 25 pair cable stub connects to the LCS backplane. The round end of the cable stub connects to the 25 pair cable which connects to subscriber lines at the Main Distribution Frame (MDF).

LCS line cards are organized into groups of six channel slots, called “six-packs.” On an LCS with octal line cards, each 25 pair cable stub connects to a maximum of 4 ports on a maximum of 6 line cards. For example: a D50 with one LCS and 24 octal SDSL or IDSL line cards requires eight LCS to MDF cable stubs—one cable stub for ports 1–4 and one cable stub for ports 5–8, for each group of six line cards.

**LCS with Mixed Line Card Types**

The D50 supports the following line card types:

- DS1 (quad DS1).
- DMT8a-3 and DMT8a-4 (octal ADSL).
- SDSL8 and SDSL8+ (octal SDSL).
- IDSL8 (octal IDSL).
- SHDSL8 (octal SHDSL).

LCS cabling must match the requirements of the line card layout.

Different line card types can be supported on the same LCS when each card type is placed within its own six-pack (e.g., all DMT8a-3 cards in one six-pack, all IDSL8 cards in one six-pack, etc.). The LCS can be cabled to support both data only and data plus voice service simultaneously among the different six-packs.

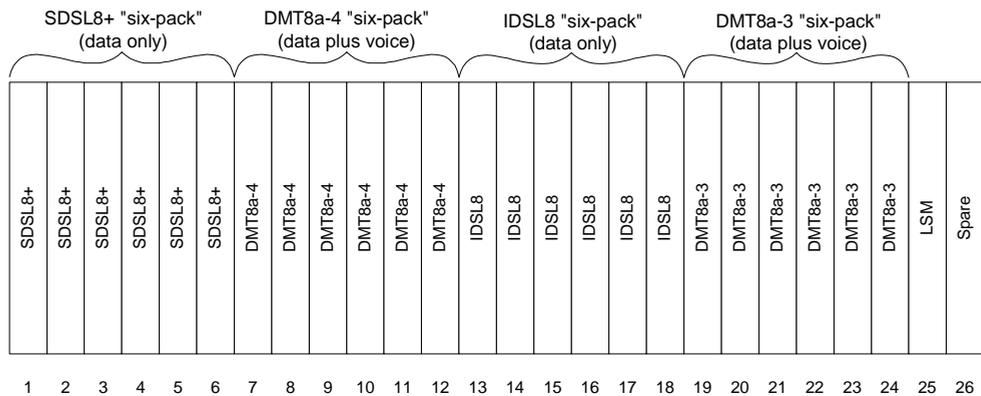


Figure 6-11: LCS with SDSL8+, DMT8a-3, DMT8a-4 and IDSL8 Line Cards

**25 Pair Stub Connection at the LCS**

Follow these steps to connect 25 pair cable stubs to the LCS backplane for octal ADSL/SDSL/SHDSL/IDSL Line Cards:

Table 6-4: 25 Pair Stub Connection at the LCS

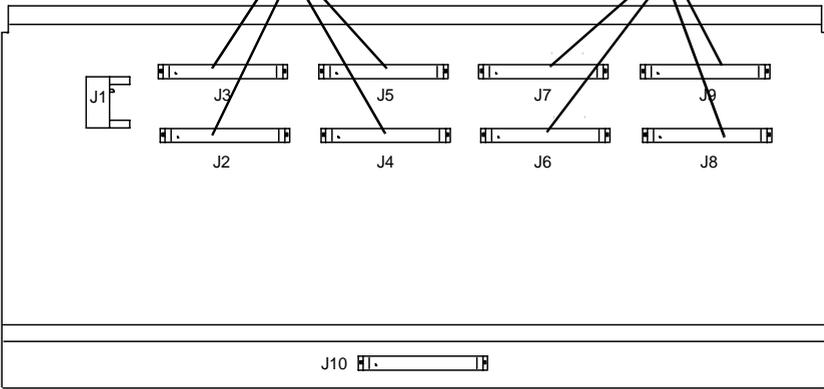
STEP	PROCEDURE
1	Refer to Section 2— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures,” page 2-1 to: <ul style="list-style-type: none"> <li>■ Remove and replace the LCS front panel.</li> <li>■ Locate the LCS cable ports.</li> </ul>
2	Connect the first 25 pair cable stub <sup>1</sup> to connector J9—this connects to line card slots 1–6, line card ports 1–4. <div style="text-align: center; margin: 10px 0;"> <p>25 Cable/Pair Connectors      25 Cable/Pair Connectors</p> <p>J2–J5                                  J6–J9</p> <p>(ports 5–8)                              (ports 1–4)</p> </div>  <p>The diagram shows a top-down view of the LCS backplane connectors. On the left is connector J1. In the center are two columns of four connectors each, labeled J2, J3, J4, J5 and J6, J7, J8, J9. Lines connect the labels above to the corresponding connectors. Below these is connector J10. The connectors are arranged in a grid-like pattern within a rectangular frame.</p>

Figure 6-12: LCS Backplane Connectors

Table 6-4: 25 Pair Stub Connection at the LCS (continued)

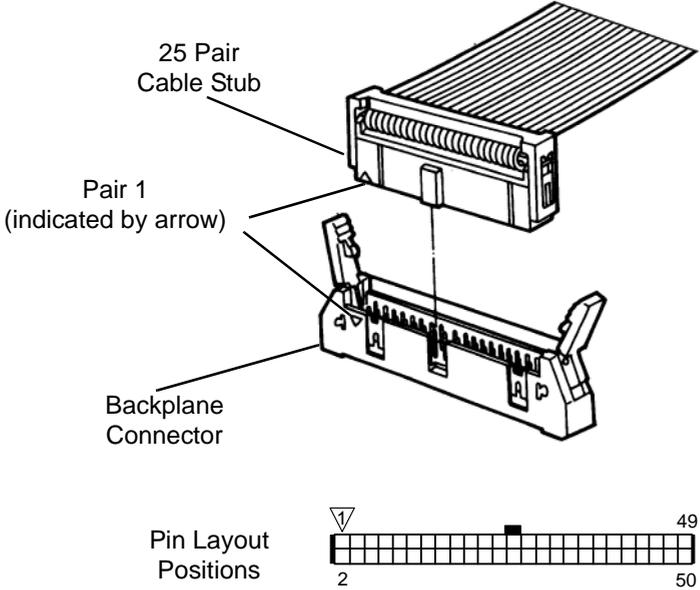
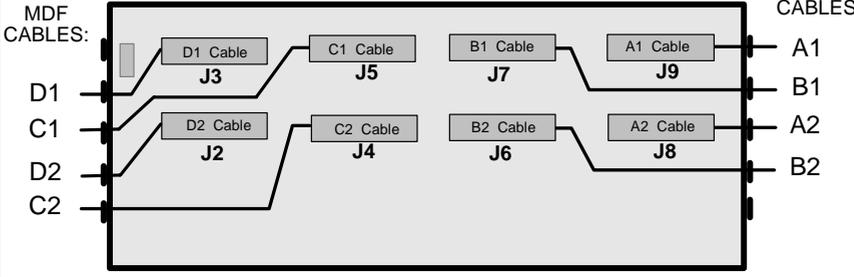
STEP	PROCEDURE
<p><b>3</b></p>	<p>Backplane connectors have latches on both sides. These latches snap down on the cable stub ribbon connector and lock in place.</p>  <p style="text-align: center;">Figure 6-13: Ribbon Connectors and Connector Pin Layout</p>
<p><b>4</b></p>	<p>The LCS assembly has 5 cable slots on both the left and right sides.</p> <p>Bring the 25 pair cable stub connected to the <u>J9</u> connector through the <u>top</u> cable slot on the <u>right</u> side of the LCS assembly. Refer to Figure 6-14: LCS to MDF Octal Cabling Diagram, page 6-17.</p>
<p><b>5</b></p>	<p>There is a rubber vinyl grommet pre-installed on the 25 pair cable stub.</p> <p>Position the grommet on the cable stub so it fits over the edge of the slot on the LCS assembly. Push the grommet into the slot as far as you can so it doesn't interfere with the back cover. The grommet helps hold the cable in position and also protects it from the metal edge.</p>

Table 6-4: 25 Pair Stub Connection at the LCS (continued)

STEP	PROCEDURE
<p><b>6</b></p>	<p>Repeat Steps 2 through 5 for all cable stubs. Refer to Figure 6-14: LCS to MDF Octal Cabling Diagram below.</p> <ul style="list-style-type: none"> <li>■ On the <u>right</u> side of the LCS:                             <ul style="list-style-type: none"> <li>– For the <u>J8</u> connector (slots <u>7–12</u>, ports <u>1–4</u>), bring the cable through the <u>third</u> slot (from the top).</li> <li>– For the <u>J7</u> connector (slots <u>13–18</u>, ports <u>1–4</u>), bring the cable through the <u>second</u> slot (from the top).</li> <li>– For the <u>J6</u> connector (slots <u>19–24</u>, ports <u>1–4</u>), bring the cable through the <u>fourth</u> slot (from the top).</li> </ul> </li> <li>■ On the <u>left</u> side of the LCS:                             <ul style="list-style-type: none"> <li>– For the <u>J5</u> connector (slots <u>1–6</u>, ports <u>5–8</u>), bring the cable through the <u>third</u> slot (from the top).</li> <li>– For the <u>J4</u> connector (slots <u>7–12</u>, ports <u>5–8</u>), bring the cable through the <u>fifth</u> slot (from the top).</li> <li>– For the <u>J3</u> connector (slots <u>13–18</u>, ports <u>5–8</u>), bring the cable through the <u>second</u> slot (from the top).</li> <li>– For the <u>J2</u> connector (slots <u>19–24</u>, ports <u>5–8</u>), bring the cable through the <u>fourth</u> slot (from the top).</li> </ul> </li> </ul> <p>Position grommets on all cable stubs to fit over the edges of the slots.</p>  <p>Figure 6-14: LCS to MDF Octal Cabling Diagram</p>
<p><b>7</b></p>	<p>The D50 is designed for a maximum of twelve Line Card Shelves. Repeat Steps 1 through 6 for all LCSs supporting octal line cards.</p>
<p><b>8</b></p>	<p>Continue to the next procedure: <b>25 Pair Cable—MDF to LCS.</b></p>

<sup>1</sup> LCS to MDF cable stubs are equipped with right and left angle connectors.

**25 Pair Cable—  
MDF to LCS**

25 pair cables<sup>1</sup> are tied down and run from the Central Office Main Distribution Frame (MDF) across the horizontal cable racks to the D50. This work may be done by the network service provider or the D50 technician. These 25 pair cable(s) are connected to the 25 pair cable stub(s) installed at the Line Card Shelf.

Follow these steps to connect 25 Pair Cables from the MDF to the LCS Cable Stubs.

Table 6-5: 25 Pair Cable MDF to LCS

STEP	PROCEDURE
1	Route the 25 pair cable(s) from the MDF down from the horizontal cable rack and along the relay rack rails, following local procedures.
2	Verify continuity of each 25 pair MDF cable, following local procedures.
3	Label the cables for connection to the LCS cable stubs as follows: <ul style="list-style-type: none"> <li>■ <u>A1</u>, connecting to the cable stub for line card slots <u>1–6</u>, ports <u>1–4</u>.</li> <li>■ <u>A2</u>, connecting to the cable stub for line card slots <u>7–12</u>, ports <u>1–4</u>.</li> <li>■ <u>B1</u>, connecting to the cable stub for line card slots <u>13–18</u>, ports <u>1–4</u>.</li> <li>■ <u>B2</u>, connecting to the cable stub for line card slots <u>19–24</u>, ports <u>1–4</u>.</li> <li>■ <u>C1</u>, connecting to the cable stub for line card slots <u>1–6</u>, ports <u>5–8</u>.</li> <li>■ <u>C2</u>, connecting to the cable stub for line card slots <u>7–12</u>, ports <u>5–8</u>.</li> <li>■ <u>D1</u>, connecting to the cable stub for line card slots <u>13–18</u>, ports <u>5–8</u>.</li> <li>■ <u>D2</u>, connecting to the cable stub for line card slots <u>19–24</u>, ports <u>5–8</u>.</li> </ul>
4	Terminate the 25 pair cable on an Amp Champ connector. Refer to Section 10— <i>Appendices</i> , Appendix F—“Cable/Pair Assignment Tables: LCS with Octal Line Cards,” page 10-53.
5	Connect the 25 pair cable, identified as the <u>A1</u> cable, to the <u>J9</u> LCS cable stub. <div style="text-align: center;"> </div>
6	Tighten the the screw and secure a tie strap on the male Amp Champ connector to secure.

Figure 6-15: LCS to MDF Octal Cabling Diagram

<sup>1</sup> The network service provider may choose to run 100 pair cables from the MDF to the D50. These 100 pair cables require four 25 pair Amp Champ male connectors to connect to the 25 pair cable stubs.

Table 6-5: 25 Pair Cable MDF to LCS (continued)

STEP	PROCEDURE
7	Repeat Steps 2 through 5 for each 25 pair cable: <ul style="list-style-type: none"> <li>■ Connect the <u>C1</u> cable to the <u>J5</u> LCS cable stub.</li> <li>■ Connect the <u>A2</u> cable to the <u>J8</u> LCS cable stub.</li> <li>■ Connect the <u>C2</u> cable to the <u>J4</u> LCS cable stub.</li> <li>■ Connect the <u>B1</u> cable to the <u>J7</u> LCS cable stub.</li> <li>■ Connect the <u>D1</u> cable to the <u>J3</u> LCS cable stub.</li> <li>■ Connect the <u>B2</u> cable to the <u>J6</u> LCS cable stub.</li> <li>■ Connect the <u>D2</u> cable to the <u>J2</u> LCS cable stub.</li> </ul>
8	The D50 is designed for a maximum of twelve Line Card Shelves. Repeat the entire LCS to MDF cabling procedure for all LCSs engineered for octal line cards.
9	The Chapter 2—“LCS Cabling—Octal Line Cards (Data Only)” procedure is complete.

**Telco Connector Table** The following table shows the LCS backplane telco connectors, their corresponding line card slots and ports, and the MDF cables, for ADSL, SDSL, SHDSL, and IDSL data only service, using octal line cards:

Table 6-6: LCS Telco Connectors—Octal Line Cards

<b>LCS Backplane Connector</b>	<b>MDF Cable</b>	<b>Line Card Slots</b>	<b>Line Card Ports</b>
J9	A1	1–6	1–4
J8	A2	7–12	1–4
J7	B1	13–18	1–4
J6	B2	19–24	1–4
J5	C1	1–6	5–8
J4	C2	7–12	5–8
J3	D1	13–18	5–8
J2	D2	19–24	5–8

For cable/pair assignment tables, refer to Section 10—*Appendices*, Appendix F—“Cable/Pair Assignment Tables: LCS with Octal Line Cards,” page 10-53.

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## Chapter 3

### LCS Cabling—Octal Line Cards (Data Only): Sequential Pair Cabling

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#### Introduction

This procedure provides detailed instructions on how to complete Line Card Shelf (LCS) to Main Distribution Frame (MDF) cabling for octal line cards (SDSL8/SDSL8+, SHDSL8, IDSL8, DMT8a-3, and DMT8a-4) for data service only, using a sequential pair cable assembly.

For cable/pair assignment tables, refer to Section 10—*Appendices*, Appendix G—“Cable/Pair Assignment Tables: LCS with Sequential Pair Cabling,” page 10-71.

To test and verify the continuity of the cable pairs between the LCS and the MDF, refer to Section 10—*Appendices*, Appendix C—“Testing Cable Pairs Continuity: Data Only.”

For other LCS cabling instructions, refer to the following chapters in this volume to set up:

- Data only service using quad line cards, see Chapter 1—“LCS Cabling—Quad DS1 Line Cards.”
- Data only service using octal line cards and standard 25 pair cable stubs, see Chapter 2—“LCS Cabling—Octal Line Cards (Data Only),” page 6-13.

The following diagram shows the LCS sequential pair cable assembly:

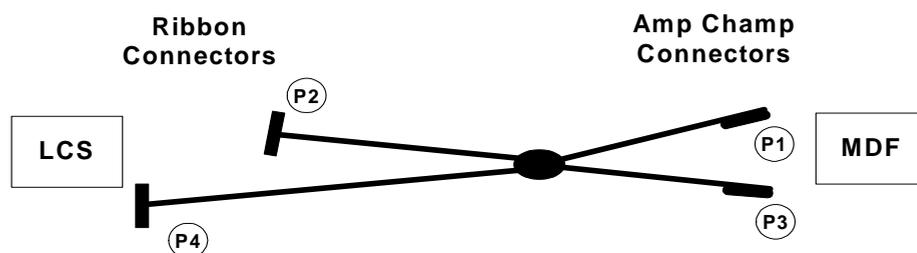


Figure 6-16: Sequential Pair Cable Assembly

LCS line cards are organized into groups of six channel slots, called “six-packs.” Each connector on the LCS backplane connects to four ports on all six line cards in a six-pack. For example:

- Connector **J9** connects to ports **1–4** on the first six-pack (line cards 1–6).
- Connector **J5** connects to ports **5–8** on the first six-pack (line cards 1–6).

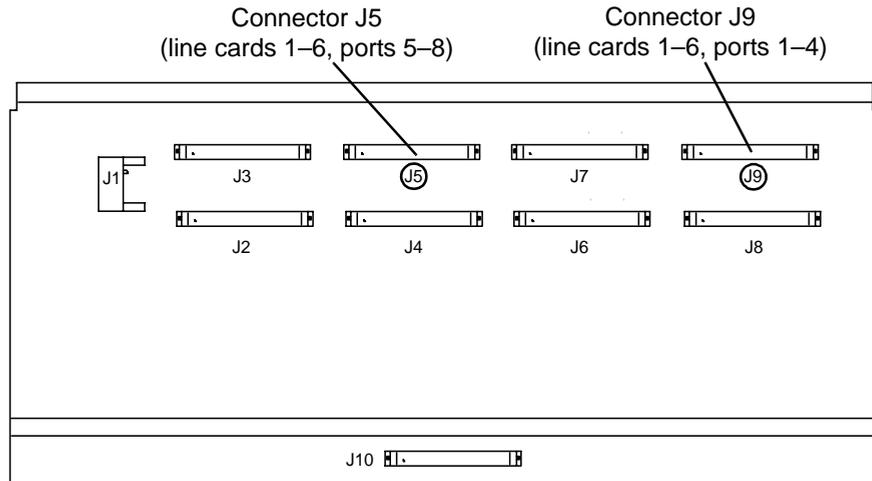


Figure 6-17: LCS Backplane Connectors

The sequential pair cable assembly connects all eight ports on a line card from the LCS to the MDF. The cable assembly has two cable “branches” on both ends. Cable assembly connectors connect the branches to the LCS backplane and the MDF as follows:

- The P2 and P4 connectors (ribbon connectors) connect to the LCS backplane.
- The P1 and P3 connectors (Amp Champ connectors) connect to the MDF.

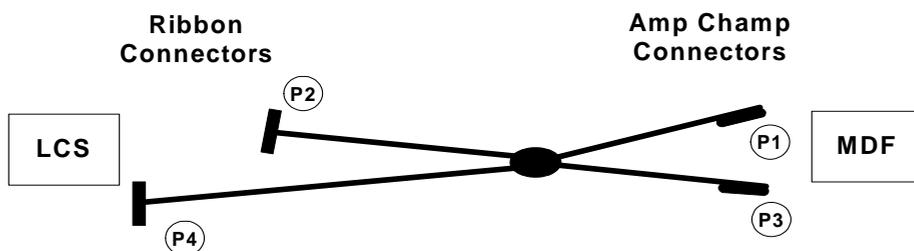


Figure 6-18: Sequential Pair Cable Assembly

The cable assembly works as follows:

- 1 Cable assembly connectors P2 and P4 connect to the LCS backplane connectors; each cable assembly connector “receives” four lines (ports) from all six line cards in a six-pack, as follows:
  - Connector P2 receives lines (ports) 1–4 from all six line cards.
  - Connector P4 receives lines (ports) 5–8 from all six line cards.
- 2 Inside the cable assembly, the lines from connectors P2 and P4 are split and recombined so that all eight ports from three line cards are kept together.
- 3 The recombined lines connect to the MDF through the P1 and P3 connectors as follows:
  - Connector P1 connects lines (ports) 1–8 from the first three line cards to the MDF.
  - Connector P3 connects lines (ports) 1–8 from the second three line cards to the MDF.

The following table shows the connections from the LCS, through the sequential pair cable assembly, to the MDF:

Table 6-7: LCS Sequential Pair Cabling Scheme

LCS Card Slots	LCS Card Ports	Sequential Pair Cable Connectors:		Card Slots	Card Ports
		at LCS	at MDF		
1 – 6	1 – 4	P2	P1, P3	P1 = 1 – 3 P3 = 4 – 6	1 – 8
	5 – 8	P4			1 – 8
7 – 12	1 – 4	P2	P1, P3	P1 = 7 – 9 P3 = 10 – 12	1 – 8
	5 – 8	P4			1 – 8
13 – 18	1 – 4	P2	P1, P3	P1 = 13 – 15 P3 = 16 – 18	1 – 8
	5 – 8	P4			1 – 8
19 – 24	1 – 4	P2	P1, P3	P1 = 19 – 21 P3 = 22 – 24	1 – 8
	5 – 8	P4			1 – 8

**Required Tools and Equipment**

To begin this task you must have the following equipment and tools (refer to Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers”):

- (4) 25 pair sequential pair cable assemblies with two 50 pin male Amp Champ connectors at one end, two 50 pin ribbon connectors on the other end, and a vinyl rubber grommet on the two ribbon connector “branches” of the cable.
- (8) female Amp Champ connectors.
- 25 pair cable.
- A small flat-blade screwdriver.

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**25 Pair Sequential Pair Cable Assemblies**

LCS cabling is fully connectorized. The flat ribbon ends of the cable assembly connect to two connectors on the LCS backplane; the round Amp Champ ends of the cable connect to two subscriber line cables from the MDF.

Each cable assembly supports up to 48 lines; with octal line cards, the LCS supports up to 192 lines. A D50 with one LCS and 24 octal line cards requires four sequential pair cable assemblies—one assembly for each six-pack.

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**LCS with Mixed Line Card Types**

The D50 supports the following line card types:

- DS1 (quad DS1).
- DMT8a-3 and DMT8a-4 (octal ADSL).
- SDSL8 and SDSL8+ (octal SDSL).
- IDSL8 (octal IDSL).
- SHDSL8 (octal SHDSL).

LCS cabling must match the requirements of the line card layout.

Different line card types can be supported on the same LCS when each card type is placed within its own six-pack (e.g., all DMT8a-4 cards in one six-pack, all IDSL8 cards in one six-pack, etc.). The LCS can be cabled to support both data only and data plus voice service simultaneously among the different six-packs.

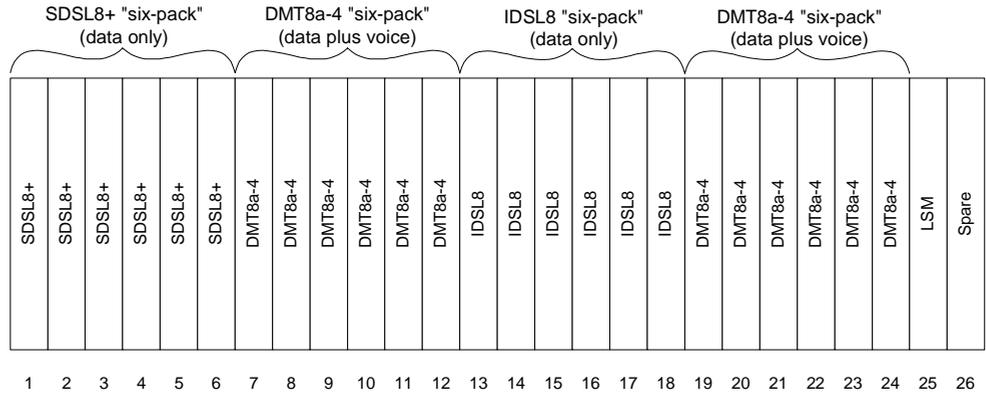


Figure 6-19: LCS with SDSL8+, DMT8a-4, and IDSL8 Line Cards

**Sequential Pair Cable Assembly at the LCS**

Follow these steps to connect the sequential pair cable assembly to the LCS backplane for octal line cards:

Table 6-8: Sequential Pair Cable Assembly Connection at LCS

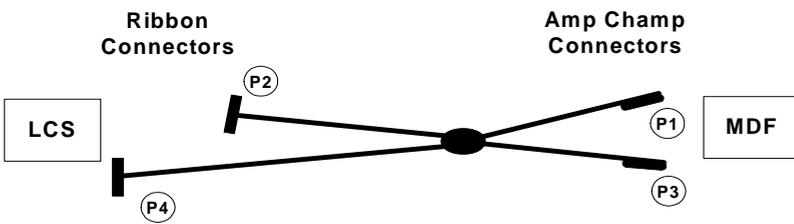
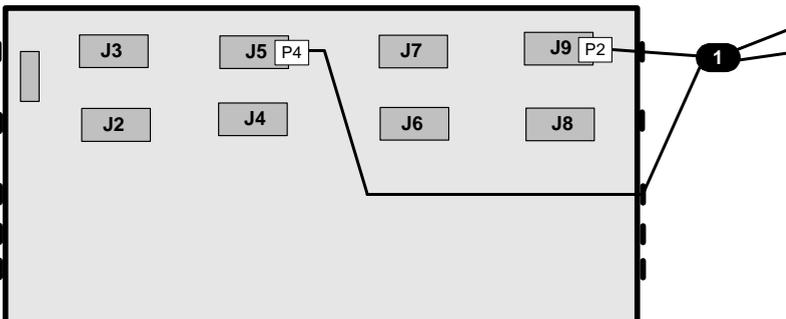
STEP	PROCEDURE
1	<p>Refer to Section 2—<i>Basic Procedures</i>, Chapter 1—“Basic Procedures,” page 2-1 to:</p> <ul style="list-style-type: none"> <li>■ Remove and replace the LCS back panel.</li> <li>■ Locate the LCS cable ports.</li> </ul>
2	<p>The following diagram shows the sequential pair cable assembly:</p> <div style="text-align: center;">  <p>Figure 6-20: Sequential Pair Cable Assembly</p> </div> <p>Connect the first sequential pair cable assembly (1) to the LCS backplane as follows:</p> <ul style="list-style-type: none"> <li>■ Connect the <u>P2</u> connector to LCS backplane connector <u>J9</u> (line card slots 1–6, ports 1–4).</li> <li>■ Connect the <u>P4</u> connector to LCS backplane connector <u>J5</u> (line card slots 1–6, ports 5–8).</li> </ul> <p>Refer to <b>Cable Connections Table</b>, page 6-33.</p> <div style="text-align: center;">  <p>NOTE: Cable lengths and cable slot locations are not drawn to scale.</p> <p>Figure 6-21: LCS Backplane Connectors</p> </div>

Table 6-8: Sequential Pair Cable Assembly Connection at LCS (continued)

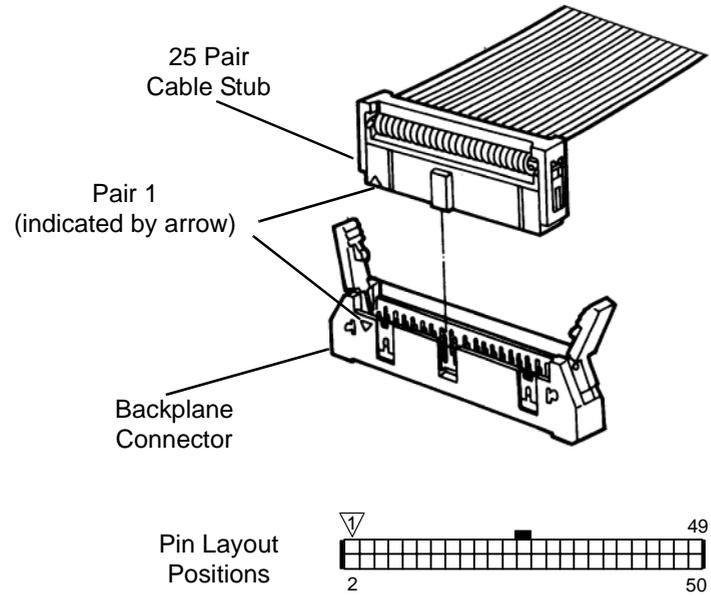
STEP	PROCEDURE
3	<p>Backplane connectors have latches on both sides. These latches snap down on the cable stub ribbon connector and lock in place.</p>  <p>25 Pair Cable Stub</p> <p>Pair 1 (indicated by arrow)</p> <p>Backplane Connector</p> <p>Pin Layout Positions</p> <p>2 49 50</p> <p>Figure 6-22: Ribbon Connectors and Connector Pin Layout</p>

Table 6-8: Sequential Pair Cable Assembly Connection at LCS (continued)

STEP	PROCEDURE
<p><b>4</b></p>	<p>The back of the LCS assembly has 5 cable slots on both the left and right sides. Bring the two “branches” of the sequential pair cable assembly, connected to the LCS connectors, through the cable slots as follows:</p> <ul style="list-style-type: none"> <li>■ Bring the <u>P2</u> connector branch (connected to the <u>J9</u> connector) through the <u>top</u> cable slot on the <u>right</u> side of the LCS.</li> <li>■ Bring the <u>P4</u> connector branch (connected to the <u>J5</u> connector) through the <u>third</u> cable slot (from the top) on the <u>right</u> side of the LCS.</li> </ul> <div> </div> <p style="text-align: center;">NOTE: Cable lengths and cable slot locations are not drawn to scale.</p> <p style="text-align: center;">Figure 6-23: LCS Backplane Cable Slots</p>
<p><b>5</b></p>	<p>There is a rubber vinyl grommet pre-installed on each of the ribbon connector branches of the sequential pair cable assembly.</p> <p>Position the grommets on the branches so they fit over the edges of the slots on the LCS. Push the grommets into the slots as far as you can so they don't interfere with the back cover. The grommets help hold the branches in position and also protect them from the metal edge.</p>

Table 6-8: Sequential Pair Cable Assembly Connection at LCS (continued)

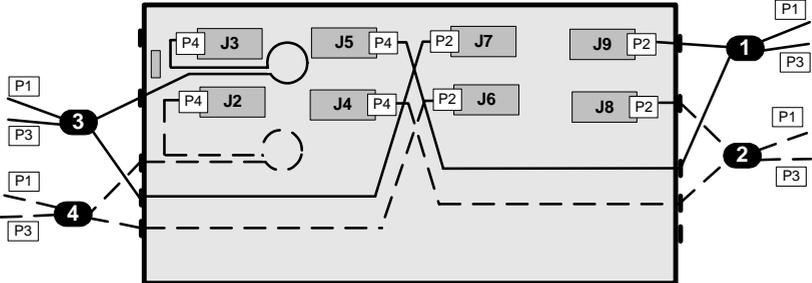
STEP	PROCEDURE
6	<p>Repeat Steps 3 through 5 for all cable assemblies. Refer to Figure 6-24: LCS Cabling Diagram, page 6-29, and to <b>Cable Connections Table</b>, page 6-33:</p> <p>For sequential cable pair assembly <b>2</b>:</p> <ul style="list-style-type: none"> <li>■ Connect the <b>P2</b> connector to LCS connector <b>J8</b> (slots 7–12, ports 1–4). <ul style="list-style-type: none"> <li>– Bring the <b>P2</b> cable branch through the <b>second</b> slot (from the top) on the <b>right</b> side of the LCS.</li> </ul> </li> <li>■ Connect the <b>P4</b> connector to LCS connector <b>J4</b> (slots 7–12, ports 5–8). <ul style="list-style-type: none"> <li>– Bring the <b>P4</b> cable branch through the <b>fourth</b> slot (from the top) on the <b>right</b> side of the LCS.</li> </ul> </li> </ul> <p>For sequential cable pair assembly <b>3</b>:</p> <ul style="list-style-type: none"> <li>■ Connect the <b>P2</b> connector to LCS connector <b>J7</b> (slots 13–18, ports 1–4). <ul style="list-style-type: none"> <li>– Bring the <b>P2</b> cable branch through the <b>fourth</b> cable slot (from the top) on the <b>left</b> side of the LCS.</li> </ul> </li> <li>■ Connect the <b>P4</b> connector to LCS connector <b>J3</b> (slots 13–18, ports 5–8). <ul style="list-style-type: none"> <li>– Bring the <b>P4</b> cable branch through the <b>second</b> cable slot (from the top) on the <b>left</b> side of the LCS. Loop the cable as necessary to enclose it against the backplane when the back panel is replaced.</li> </ul> </li> </ul> <p>For sequential cable pair assembly <b>4</b>:</p> <ul style="list-style-type: none"> <li>■ Connect the <b>P2</b> connector to LCS connector <b>J6</b> (slots 19–24, ports 1–4). <ul style="list-style-type: none"> <li>– Bring the <b>P2</b> cable branch through the <b>fifth</b> cable slot (from the top) on the <b>left</b> side of the LCS.</li> </ul> </li> <li>■ Connect the <b>P4</b> connector to LCS connector <b>J2</b> (slots 19–24, ports 5–8). <ul style="list-style-type: none"> <li>– Bring the <b>P4</b> cable branch through the <b>third</b> cable slot (from the top) on the <b>left</b> side of the LCS. Loop the cable as necessary to enclose it against the backplane when the back panel is replaced.</li> </ul> </li> </ul> <p>Position grommets on all cable branches to fit over the edges of the slots.</p>
7	 <p>NOTE: Cable lengths and cable slot locations are not drawn to scale. Dashed lines indicate Cables 2 and 4, for clarity.</p> <p>Figure 6-24: LCS Cabling Diagram</p>

Table 6-8: Sequential Pair Cable Assembly Connection at LCS (continued)

STEP	PROCEDURE
8	The D50 is designed for a maximum of twelve LCSs. Repeat Steps 1 through 8 for all LCSs supporting octal line cards.
9	Continue to the next procedure: <b>Sequential Pair Cable Assembly—MDF to LCS</b> .

**Sequential Pair Cable Assembly—MDF to LCS**

25 pair MDF cables<sup>1</sup> are tied down and run from the Central Office Main Distribution Frame (MDF) across the horizontal cable racks to the D50. This work may be done by the network service provider or the D50 technician. These 25 pair cables are connected to the sequential pair cable assemblies installed at the LCS.

Follow these steps to connect 25 pair cables from the MDF to the sequential pair cable assembly:

Table 6-9: Sequential Pair Cable Assembly—MDF to LCS

STEP	PROCEDURE
1	Route the 25 pair cables from the MDF down from the horizontal cable rack and along the relay rack rails to the D50, following local procedures.
2	Verify continuity of each 25 pair MDF cable, following local procedures.
3	Terminate each 25 pair cable on an Amp Champ connector. Refer to Section 10— <i>Appendices</i> , Appendix G—“Cable/Pair Assignment Tables: LCS with Sequential Pair Cabling,” page 10-71.
4	<p>Label the cables for connection to the sequential pair cable assembly as follows:</p> <ul style="list-style-type: none"> <li>■ <u>A1</u>, connecting to LCS slots <u>1–3</u>, ports <u>1–8</u>.</li> <li>■ <u>A2</u>, connecting to LCS slots <u>4–6</u>, ports <u>1–8</u>.</li> <li>■ <u>B1</u>, connecting to LCS slots <u>7–9</u>, ports <u>1–8</u>.</li> <li>■ <u>B2</u>, connecting to LCS slots <u>10–12</u>, ports <u>1–8</u>.</li> <li>■ <u>C1</u>, connecting to LCS slots <u>13–15</u>, ports <u>1–8</u>.</li> <li>■ <u>C2</u>, connecting to LCS slots <u>16–18</u>, ports <u>1–8</u>.</li> <li>■ <u>D1</u>, connecting to LCS slots <u>19–21</u>, ports <u>1–8</u>.</li> <li>■ <u>D2</u>, connecting to LCS slots <u>22–24</u>, ports <u>1–8</u>.</li> </ul>

<sup>1</sup> The network service provider may choose to run 100 pair cables from the MDF to the D50. These 100 pair cables require (4) 25 pair female Amp Champ connectors to connect to the sequential pair cable assembly.

Table 6-9: Sequential Pair Cable Assembly—MDF to LCS (continued)

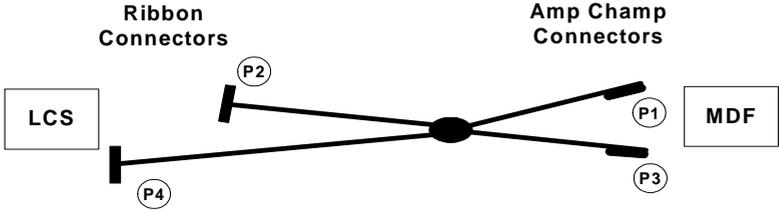
STEP	PROCEDURE
5	<p>The following diagram shows the sequential pair cable assembly:</p>  <p style="text-align: center;">Figure 6-25: Sequential Pair Cable Assembly</p> <p>The cable assembly connectors P1 and P3 connect lines from one six-pack on the LCS to the MDF. The cable assembly connectors support the slots and ports in a six-pack as follows:</p> <ul style="list-style-type: none"> <li>■ <u>P1</u> connector: supports slots <u>1–3</u>, ports <u>1–8</u>.</li> <li>■ <u>P3</u> connector: supports slots <u>4–6</u>, ports <u>1–8</u>.</li> </ul>

Table 6-9: Sequential Pair Cable Assembly—MDF to LCS (continued)

STEP	PROCEDURE
<p><b>6</b></p>	<p>Connect the LCS sequential pair cable connectors to the MDF cables, and tighten the screws on the Amp Champ connectors to secure, as follows (refer to Figure 6-26: LCS Cabling Diagram below, and to Section 10—<i>Appendices</i>, Appendix G—“Cable/Pair Assignment Tables: LCS with Sequential Pair Cabling,” page 10-71):</p> <ul style="list-style-type: none"> <li>■ For sequential pair cable assembly <b>1</b>: <ul style="list-style-type: none"> <li>– Connect the <b>P1</b> connector to the <b>A1</b> cable.</li> <li>– Connect the <b>P3</b> connector to the <b>A2</b> cable.</li> </ul> </li> <li>■ For sequential pair cable assembly <b>2</b>: <ul style="list-style-type: none"> <li>– Connect the <b>P1</b> connector to the <b>B1</b> cable.</li> <li>– Connect the <b>P3</b> connector to the <b>B2</b> cable.</li> </ul> </li> <li>■ For sequential pair cable assembly <b>3</b>: <ul style="list-style-type: none"> <li>– Connect the <b>P1</b> connector to the <b>C1</b> cable.</li> <li>– Connect the <b>P3</b> connector to the <b>C2</b> cable.</li> </ul> </li> <li>■ For sequential pair cable assembly <b>4</b>: <ul style="list-style-type: none"> <li>– Connect the <b>P1</b> connector to the <b>D1</b> cable.</li> <li>– Connect the <b>P3</b> connector to the <b>D2</b> cable.</li> </ul> </li> </ul> <div style="text-align: center;"> <p>NOTE: Cable lengths and cable slot locations are not drawn to scale. Dashed lines indicate Cables 2 and 4, for clarity.</p> <p>Figure 6-26: LCS Cabling Diagram</p> </div>
<p><b>7</b></p>	<p>The D50 is designed for a maximum of twelve LCSs. Repeat the entire sequential pair cable assembly procedure for all LCSs using octal line cards.</p>
<p><b>8</b></p>	<p>The Chapter 3—“LCS Cabling—Octal Line Cards (Data Only): Sequential Pair Cabling” procedure is complete.</p>

**Cable Connections Table**

The following table shows the connections and corresponding line card slots and ports for four sequential pair cable assemblies at the LCS backplane and the MDF cables:

Table 6-10: Sequential Pair Cable Assembly Connections

Seq. Pair Cable #	Cable Ribbon Connectors (at LCS)	LCS Backplane			Cable Amp Champ Connectors (at MDF)	MDF Cables	
		Connectors	Slots	Ports		Slots	Ports
1	P2	J9	1-6	1-4	P1, P3	1-3 (P1)	1-8
	P4	J5		5-8		4-6 (P3)	1-8
2	P2	J8	7-12	1-4	P1, P3	7-9 (P1)	1-8
	P4	J4		5-8		10-12 (P3)	1-8
3	P2	J7	13-18	1-4	P1, P3	13-15 (P1)	1-8
	P4	J3		5-8		16-18 (P3)	1-8
4	P2	J6	21-24	1-4	P1, P3	19-21 (P1)	1-8
	P4	J2		5-8		22-24 (P3)	1-8

For cable/pair assignment tables, refer to Section 10—*Appendices*, Appendix G—“Cable/Pair Assignment Tables: LCS with Sequential Pair Cabling,” page 10-71.



## Chapter 4

### LPFS8 Cabling—Octal Line Cards (Data Plus Voice)

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#### Introduction

The D50 can be configured three different ways based on the types of line cards installed and the needs of your network service provider. See Section 1—*Hardware Installation*, Chapter 1—“Master Control Shelf Installation,” page 1-1, for descriptions of each configuration.

This chapter provides detailed Low Pass Filter Shelf (LPFS8) cabling instructions for a D50 multiplexer supporting data plus voice service using octal line cards and standard 25 pair cable stubs.

For cable/pair assignment tables, refer to Section 10—*Appendices*, Appendix H—“Cable/Pair Assignment Tables: LPFS8 with Octal Cards,” page 10-91.

To test and verify the continuity of the cable pairs between the LCS and the Main Distribution Frame (MDF), and between the LPFS8 and the POTS switch, refer to Section 10—*Appendices*, Appendix D—“Testing Cable Pairs Continuity: Data Plus Voice.”

For cabling instructions for data plus voice service using a sequential pair cable assembly for a remotely located LPFS8, see Chapter 5—“LPFS8 Cabling—Octal Line Cards (Data + Voice): Sequential Pair Cabling,” page 6-61.

When the D50 is configured for data plus voice service, the connection between the local exchange network and the D50 is made at the LPFS8. Data plus voice frequency signals are received from the customer at the LPFS8. The LPF8-2<sup>1</sup> card “splits” the low frequency voice signal from the high frequency data signal.

The voice signal is sent onto the voice switch unimpeded; the data signal is received by the line card.

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<sup>1</sup> The LPF8-2 card is T1.413i2-compliant with DMT8a-3 line cards.

**LPFS8 Located Remotely from the LCS**

The LPFS8 may be located remotely from the D50 LCS and MCS. In this configuration, the cables carrying the “data only” signal from the LPFS8 to the LCS are connected to an Intermediate Distribution Frame (IDF), and not directly connected to the LCS; the sequential pair cable assembly is used for this connection.

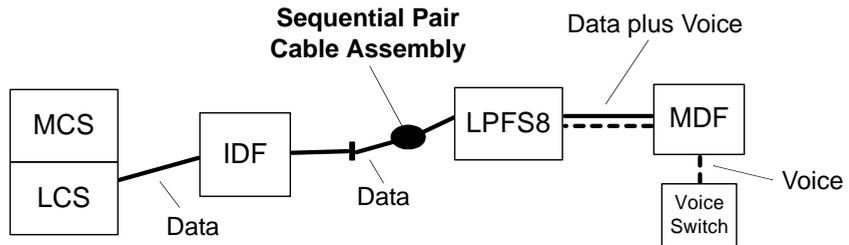


Figure 6-27: LPFS8 Remotely Located from LCS

For instructions for connecting the remotely located LPFS8 to the IDF using the sequential pair cable assembly, see Chapter 5—“LPFS8 Cabling—Octal Line Cards (Data + Voice): Sequential Pair Cabling,” page 6-61.

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**LPFS8 Cards**

The LPFS8 supports the following LPF8 cards:

- LPF8-2 cards for DMT8a-3 octal ADSL line cards (192 cable/pairs per LPFS8).

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**LPFS8 Backplane Connections**

LPF8-2 cards are organized into groups of six channel slots, called “six-packs.” Each group of six cards (six-pack) requires six connections on the LPFS8 backplane. This chapter provides detailed instructions on how to make these connections:

- Connections One and Two (LPFS8 to LCS):

Data signals are sent to and received from the line card. These connections are made at the LPFS8 backplane and the LCS backplane as follows:

- Connection One – ports 1–4 for all six line cards in a six-pack.
- Connection Two – ports 5–8 for all six line cards in a six-pack.

Refer to Table 6-11: LPFS8 Cabling Connections, page 6-37, and **LPFS8 to LCS Cabling**, page 6-38.

- Connections Three and Four (LPFS8 to MDF Subscriber):

Data plus voice signals are received from and sent to the subscriber. These connections between the LPFS8 and the local exchange network are made at the LPFS8 backplane and the Main Distribution Frame (MDF) as follows:

- Connection Three – ports 1–8 for the *first three* line cards in a six-pack.
- Connection Four – ports 1–8 for the *second three* line cards in a six-pack.

Refer to Table 6-11: LPFS8 Cabling Connections below, and **LPFS8 to MDF Subscriber Cabling**, page 6-46.

- Connections Five and Six (LPFS8 to MDF Switch):

Voice signals are sent to and received from the voice switch. These connections between the LPFS8 and the voice switch are made at the LPFS8 backplane and the MDF as follows:

- Connection Five – ports 1–8 for the *first three* line cards in a six-pack.
- Connection Six – ports 1–8 for the *second three* line cards in a six-pack.

Refer to Table 6-11: LPFS8 Cabling Connections below, and **LPFS8 to MDF Switch Cabling**, page 6-51.

Table 6-11: LPFS8 Cabling Connections

Connection	Cabling	Slots	Ports
1	LPFS8 to LCS	1 – 6	1 – 4
2	LPFS8 to LCS	1 – 6	5 – 8
3	LPFS8 to Subscriber	1 – 3	1 – 8
4	LPFS8 to Subscriber	4 – 6	1 – 8
5	LPFS8 to Voice Switch	1 – 3	1 – 8
6	LPFS8 to Voice Switch	4 – 6	1 – 8

**LPFS8 to LCS Cabling**

This procedure provides detailed instructions on how to make Connections One and Two—LPFS8 to LCS Cabling, with the LPFS8 located in the rack directly below the LCS.

**Note:** An LPFS8 connects to a total of 24 line cards, and can be shared by two LCSs. When the LPF8-2 cards connect to line cards located in two LCSs, the LPFS8 is placed between the two LCSs in the rack. See the diagram below, or see Section 1—*Hardware Installation*, Chapter 3—“Low Pass Filter Shelf Installation” for a diagram of a complete D50 with an LPFS8 supporting two LCSs.

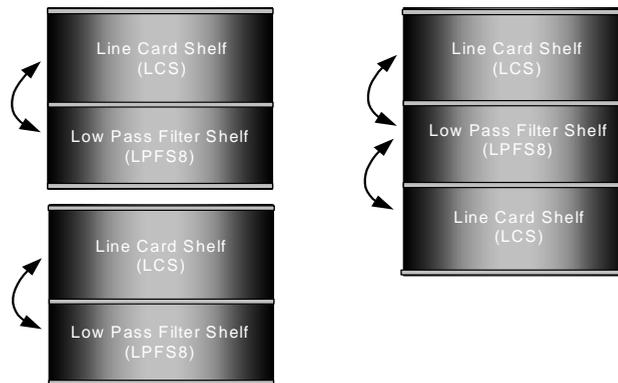


Figure 6-28: LPFS8 Supporting One or Two LCSs

Modify the following instructions as required for configurations with one LPFS8 supporting two LCSs.

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**Required Tools and Equipment**

To begin this task you must have the following equipment and tools (refer to Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers”):

- (8) 25 pair cables with flat “laminated” 50 position ribbon connectors at both ends, and two vinyl rubber grommets.

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**LPFS8 to LCS Cables**

LPFS8 to LCS cabling is fully connectorized. One end of the 25 pair cable connects to the LPFS8 backplane, the other end connects to its corresponding connector on the LCS backplane.

Each 25 pair cable connects four ports from up to six LPF8-2 cards to six line cards. For example: A system ordered with one LCS, one LPFS8, 24 octal line cards, and 24 LPF8-2 cards requires a total of eight LPFS8 to LCS cables—two cables for each group of six line cards (six-pack).

---

**LPFS8 to LCS—  
 25 Pair Cable  
 Connection at  
 the LPFS8**

Follow these steps to connect 25 pair cables to the LPFS8 backplane:

Table 6-12: LPFS8 to LCS—25 Pair Cable Connection at LPFS8

STEP	PROCEDURE
1	Refer to Section 2— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures,” page 2-1 to: <ul style="list-style-type: none"> <li>■ Open and close the LPFS8 back panel (do not remove it completely; this will make it easier to close after the cables are installed).</li> <li>■ Locate the LPFS8 cable ports.</li> </ul>

2 Connect a right angle 25 pair cable<sup>1</sup> to LPFS8 backplane connector J1, this connects to LPF8-2 card slots 1–6, ports 1–4. Refer to **Telco Connector Tables**, page 6-58.

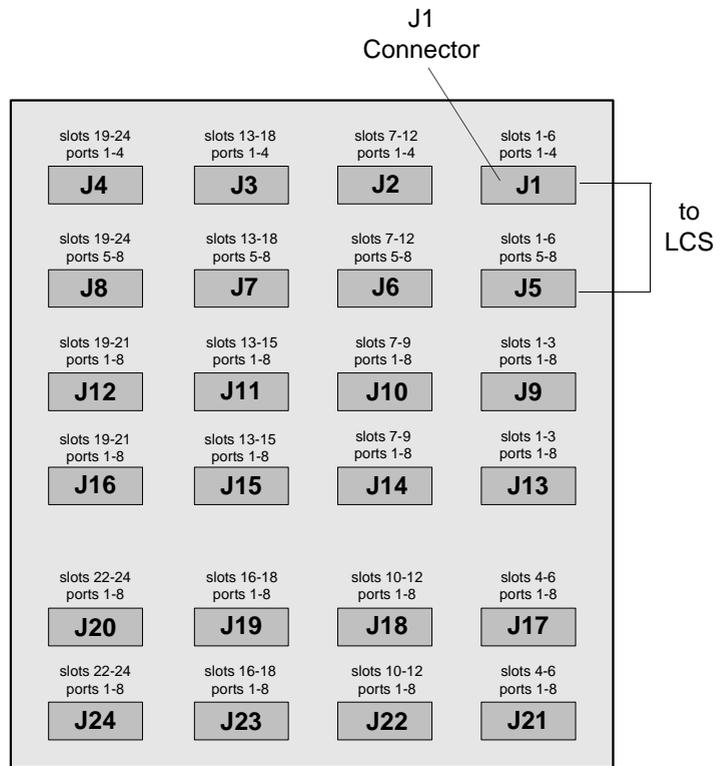


Figure 6-29: LPFS8 Backplane Connectors

Table 6-12: LPFS8 to LCS—25 Pair Cable Connection at LPFS8 (continued)

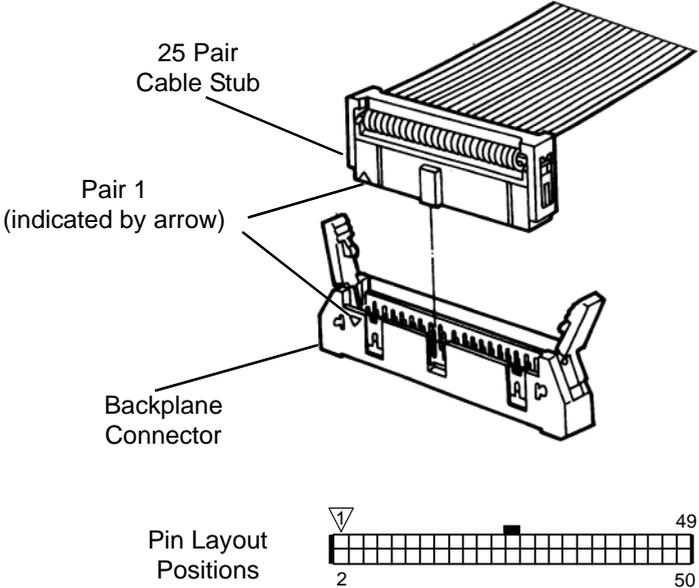
STEP	PROCEDURE
<p><b>3</b></p>	<p>Backplane connectors have latches on both sides. These latches snap down on the cable stub ribbon connector and lock in place.</p>  <p style="text-align: center;">Figure 6-30: Ribbon Connectors and Connector Pin Layout</p>
<p><b>4</b></p>	<p>The back of the LPFS8 assembly has 12 cable slots on both the left and right sides. Bring the 25 pair cable connected to the <b>J1</b> connector through the <u>second</u> cable slot (<u>from the top</u>) on the <u>right</u> side of the LPFS8 assembly. Refer to Figure 6-31: LPFS8 Cabling Diagram, page 6-42.</p>
<p><b>5</b></p>	<p>There are two rubber vinyl grommets pre-installed on the LPFS8 cable. Position one of the grommets on the cable so it fits over the edge of the slot on the LPFS8 assembly. Push the grommet into the slot as far as you can so it doesn't interfere with the back cover. The grommet helps hold the cable in position and also protects it from the metal edge.</p>

Table 6-12: LPFS8 to LCS—25 Pair Cable Connection at LPFS8 (continued)

STEP	PROCEDURE
6	<p>Repeat Steps 2 through 5 for all 25 pair LPFS8 to LCS cables. Refer to Figure 6-31: LPFS8 Cabling Diagram, page 6-42:</p> <p>Use <u>right angle</u> cables for:</p> <ul style="list-style-type: none"> <li>■ <u>J2</u> connector – LPFS8 slots <u>7–12</u>, ports <u>1–4</u>. <ul style="list-style-type: none"> <li>– Bring the cable through the <u>first</u> slot on the <u>right</u> side of the LPFS8.</li> </ul> </li> <li>■ <u>J5</u> connector – LPFS8 slots <u>1–6</u>, ports <u>5–8</u>. <ul style="list-style-type: none"> <li>– Bring the cable through the <u>fourth</u> slot on the <u>right</u> side of the LPFS8.</li> </ul> </li> <li>■ <u>J6</u> connector – LPFS8 slots <u>7–12</u>, ports <u>5–8</u>. <ul style="list-style-type: none"> <li>– Bring the cable through the <u>third</u> slot on the <u>right</u> side of the LPFS8.</li> </ul> </li> </ul> <p>Use <u>left angle</u> connectors for:</p> <ul style="list-style-type: none"> <li>■ <u>J3</u> connector – LPFS8 slots <u>13–18</u>, ports <u>1–4</u>. <ul style="list-style-type: none"> <li>– Bring the cable through the <u>first</u> slot on the <u>left</u> side of the LPFS8.</li> </ul> </li> <li>■ <u>J4</u> connector – LPFS8 slots <u>19–24</u>, ports <u>1–4</u>. <ul style="list-style-type: none"> <li>– Bring the cable through the <u>second</u> slot on the <u>left</u> side of the LPFS8.</li> </ul> </li> <li>■ <u>J7</u> connector – LPFS8 slots <u>13–18</u>, ports <u>5–8</u>. <ul style="list-style-type: none"> <li>– Bring the cable through the <u>third</u> slot on the <u>left</u> side of the LPFS8.</li> </ul> </li> <li>■ <u>J8</u> connector – LPFS8 slots <u>19–24</u>, ports <u>5–8</u>. <ul style="list-style-type: none"> <li>– Bring the cable through the <u>fourth</u> slot on the <u>left</u> side of the LPFS8.</li> </ul> </li> </ul> <p>Position grommets on all cables to fit over the edge of the slots.</p>

Table 6-12: LPFS8 to LCS—25 Pair Cable Connection at LPFS8 (continued)

STEP	PROCEDURE
<p style="text-align: center;"><b>7</b></p>	<p style="text-align: center;">To LCS <span style="float: right;">To LCS</span></p> <p style="text-align: center;">NOTE: Some cables are drawn with "dashed" lines, for easier viewing.</p> <p style="text-align: center;"><b>Figure 6-31: LPFS8 Cabling Diagram</b></p>
<p style="text-align: center;"><b>8</b></p>	<p>Continue to the next procedure: <b>LPFS8 to LCS—25 Pair Cable Connection at the LCS.</b></p>

<sup>1</sup> Use right angle LPFS8 to LCS cable connectors for LPFS8 J1, J2, J5, and J6 connectors. Use left angle LPFS8 to LCS cable connectors for LPFS8 J3, J4, J7, and J8 connectors.

**LPFS8 to  
 LCS—25 Pair  
 Cable  
 Connection at  
 the LCS**

Follow these steps to connect 25 Pair cables from the LPFS8 backplane to the LCS backplane:

Table 6-13: LPFS8 to LCS—25 Pair Cable Connection at the LCS

STEP	PROCEDURE
1	Refer to Section 2— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures,” page 2-1 to: <ul style="list-style-type: none"> <li>■ Remove and replace the LCS back panel.</li> <li>■ Locate LCS cable ports.</li> </ul>
2	The LCS assembly has 5 cable slots on the left and right sides. Bring the LPFS8 <b>J1</b> connector cable through the <u>top</u> cable slot on the <u>right</u> side of the LCS assembly. Refer to Figure 6-31: LPFS8 Cabling Diagram, page 6-42.
3	Connect the LPFS8 <b>J1</b> connector cable to LCS connector <b>J9</b> (line card slots 1–6, ports 1–4). Refer to <b>Telco Connector Tables</b> , page 6-58, and Section 10— <i>Appendices</i> , Appendix H—“Cable/Pair Assignment Tables: LPFS8 with Octal Cards,” page 10-91. <div style="text-align: center; margin: 10px 0;"> </div> <p style="text-align: center;">Figure 6-32: LCS Backplane Connectors J2–J9</p>
4	There is a second rubber vinyl grommet pre-installed on the LPFS8 cable. Position the grommet on the cable so it fits over the edge of the slot on the LCS assembly. Push the grommet into the slot as far as you can so it doesn't interfere with the back cover.

Table 6-13: LPFS8 to LCS—25 Pair Cable Connection at the LCS (continued)

STEP	PROCEDURE
5	<p>Repeat Steps 1 through 4 for all 25 pair LPFS8 to LCS cables as follows (refer to <b>Telco Connector Tables</b>, page 6-58, and Section 10—<i>Appendices</i>, Appendix H—“Cable/Pair Assignment Tables: LPFS8 with Octal Cards,” page 10-91):</p> <p>On the <u>right side</u> of the LPFS8 and LCS:</p> <ul style="list-style-type: none"> <li>■ Bring the LPFS8 <u>J2</u> connector cable through the <u>third</u> cable slot (from the top) on the LCS. <ul style="list-style-type: none"> <li>– Connect the LPFS8 <u>J2</u> connector cable to LCS connector <u>J8</u> (line card slots 7–12, ports 1–4).</li> </ul> </li> <li>■ Bring the LPFS8 <u>J5</u> connector cable through the <u>second</u> cable slot (from the top) on the LCS. <ul style="list-style-type: none"> <li>– Connect the LPFS8 <u>J5</u> connector cable to LCS connector <u>J5</u> (line card slots 1–6, ports 5–8).</li> </ul> </li> <li>■ Bring the LPFS8 <u>J6</u> connector cable through the <u>fourth</u> cable slot (from the top) on the LCS. <ul style="list-style-type: none"> <li>– Connect the LPFS8 <u>J6</u> connector cable to LCS connector <u>J4</u> (line card slots 7–12, ports 5–8).</li> </ul> </li> </ul> <p>On the <u>left side</u> of the LPFS8 and LCS:</p> <ul style="list-style-type: none"> <li>■ Bring the LPFS8 <u>J3</u> connector cable through the <u>second</u> cable slot (from the top) on the LCS. <ul style="list-style-type: none"> <li>– Connect the LPFS8 <u>J3</u> connector cable to LCS connector <u>J7</u> (line card slots 13–18, ports 1–4).</li> </ul> </li> <li>■ Bring the LPFS8 <u>J4</u> connector cable through the <u>fourth</u> cable slot (from the top) on the LCS. <ul style="list-style-type: none"> <li>– Connect the LPFS8 <u>J4</u> connector cable to LCS connector <u>J6</u> (line card slots 19–24, ports 1–4).</li> </ul> </li> <li>■ Bring the LPFS8 <u>J7</u> connector cable through the <u>third</u> cable slot (from the top) on the LCS. <ul style="list-style-type: none"> <li>– Connect the LPFS8 <u>J7</u> connector cable to LCS connector <u>J3</u> (line card slots 13–18, ports 5–8).</li> </ul> </li> <li>■ Bring the LPFS8 <u>J8</u> connector cable through the <u>fifth</u> cable slot (from the top) on the LCS. <ul style="list-style-type: none"> <li>– Connect the LPFS8 <u>J8</u> connector cable to LCS connector <u>J2</u> (line card slots 19–24, ports 5–8).</li> </ul> </li> </ul> <p>Position grommets on all cables to fit over the edge of the slots.</p>

Table 6-13: LPFS8 to LCS—25 Pair Cable Connection at the LCS (continued)

STEP	PROCEDURE
<p><b>6</b></p>	<p>NOTE: Some cables are drawn with "dashed" lines, for easier viewing.</p> <p>The diagram illustrates the cabling between the LCS Backplane and the LPFS8 Backplane. The LCS Backplane (top) features connectors J1 through J9. The LPFS8 Backplane (bottom) features connectors J1 through J24. Connections are shown between the two backplanes and to external MDF Subscriber and Switch ports. Solid lines represent physical cables, while dashed lines indicate connections for easier viewing.</p> <p><b>Figure 6-33: LPFS8 Cabling Diagram</b></p>
<p><b>7</b></p>	<p>The LPFS8 to LCS cabling procedure is complete. Continue to the next procedure: <b>LPFS8 to MDF Subscriber Cabling</b>.</p>

**LPFS8 to MDF Subscriber Cabling** This procedure provides detailed instructions on how to make Connections Three and Four—LPFS8 to MDF Subscriber Cabling.

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**Required Tools and Equipment** To begin this task you must have the following equipment and tools (refer to Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers”):

- (8) 25 pair cable stub(s) with 50 pin female Amp Champ connectors on one end, ribbon connectors on the other end, and a vinyl rubber grommet on each cable.
- (8) 50 pin male Amp Champ connectors for terminating MDF Subscriber cables.
- A small flat-blade screwdriver.
- 25 pair cable (24 AWG).

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**LPFS8 to MDF Subscriber Cable Stubs** LPFS8 cabling is fully connectorized. One end of the 25 pair cable stub connects to the LPFS8 backplane. The other end connects to the subscriber lines at the MDF.

Each 25 pair cable stub connects up to eight ports on up to three LPF8-2 cards to the MDF. For example: A system ordered with one LCS, one LPFS8, and 24 LPF8-2 cards requires a total of eight LPFS8 to MDF Subscriber cable stubs—two stubs for each group of six line cards (six-pack).

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**LPFS8 to MDF  
Subscriber—25  
Pair Stub  
Connection**

Follow these steps to connect 25 pair cable stubs to the LPFS8 backplane:

Table 6-14: LPFS8 to MDF Subscriber—25 Pair Stub Connection

STEP	PROCEDURE																																																
<p><b>1</b></p>	<p>Connect a <u>right</u> angle 25 pair cable stub to LPFS8 backplane connector <u>J9</u>, this connects to LPF8-2 card slots 1–3, ports 1–8. Refer to <b>Telco Connector Tables</b>, page 6-58.</p> <div style="text-align: center;"> <p>The diagram shows a 6x4 grid of connectors labeled J1 through J24. Each connector is associated with specific slots and ports. Connector J9 is located in the third row, fourth column. An arrow points from the text 'J9 Connector' to J9. Labels 'to MDF Subscriber' are placed to the right of J9 and J17.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>slots 19-24 ports 1-4</td> <td>slots 13-18 ports 1-4</td> <td>slots 7-12 ports 1-4</td> <td>slots 1-6 ports 1-4</td> </tr> <tr> <td><b>J4</b></td> <td><b>J3</b></td> <td><b>J2</b></td> <td><b>J1</b></td> </tr> <tr> <td>slots 19-24 ports 5-8</td> <td>slots 13-18 ports 5-8</td> <td>slots 7-12 ports 5-8</td> <td>slots 1-6 ports 5-8</td> </tr> <tr> <td><b>J8</b></td> <td><b>J7</b></td> <td><b>J6</b></td> <td><b>J5</b></td> </tr> <tr> <td>slots 19-21 ports 1-8</td> <td>slots 13-15 ports 1-8</td> <td>slots 7-9 ports 1-8</td> <td>slots 1-3 ports 1-8</td> </tr> <tr> <td><b>J12</b></td> <td><b>J11</b></td> <td><b>J10</b></td> <td><b>J9</b></td> </tr> <tr> <td>slots 19-21 ports 1-8</td> <td>slots 13-15 ports 1-8</td> <td>slots 7-9 ports 1-8</td> <td>slots 1-3 ports 1-8</td> </tr> <tr> <td><b>J16</b></td> <td><b>J15</b></td> <td><b>J14</b></td> <td><b>J13</b></td> </tr> <tr> <td>slots 22-24 ports 1-8</td> <td>slots 16-18 ports 1-8</td> <td>slots 10-12 ports 1-8</td> <td>slots 4-6 ports 1-8</td> </tr> <tr> <td><b>J20</b></td> <td><b>J19</b></td> <td><b>J18</b></td> <td><b>J17</b></td> </tr> <tr> <td>slots 22-24 ports 1-8</td> <td>slots 16-18 ports 1-8</td> <td>slots 10-12 ports 1-8</td> <td>slots 4-6 ports 1-8</td> </tr> <tr> <td><b>J24</b></td> <td><b>J23</b></td> <td><b>J22</b></td> <td><b>J21</b></td> </tr> </table> </div> <p style="text-align: center;">Figure 6-34: LPFS8 Backplane Connectors</p>	slots 19-24 ports 1-4	slots 13-18 ports 1-4	slots 7-12 ports 1-4	slots 1-6 ports 1-4	<b>J4</b>	<b>J3</b>	<b>J2</b>	<b>J1</b>	slots 19-24 ports 5-8	slots 13-18 ports 5-8	slots 7-12 ports 5-8	slots 1-6 ports 5-8	<b>J8</b>	<b>J7</b>	<b>J6</b>	<b>J5</b>	slots 19-21 ports 1-8	slots 13-15 ports 1-8	slots 7-9 ports 1-8	slots 1-3 ports 1-8	<b>J12</b>	<b>J11</b>	<b>J10</b>	<b>J9</b>	slots 19-21 ports 1-8	slots 13-15 ports 1-8	slots 7-9 ports 1-8	slots 1-3 ports 1-8	<b>J16</b>	<b>J15</b>	<b>J14</b>	<b>J13</b>	slots 22-24 ports 1-8	slots 16-18 ports 1-8	slots 10-12 ports 1-8	slots 4-6 ports 1-8	<b>J20</b>	<b>J19</b>	<b>J18</b>	<b>J17</b>	slots 22-24 ports 1-8	slots 16-18 ports 1-8	slots 10-12 ports 1-8	slots 4-6 ports 1-8	<b>J24</b>	<b>J23</b>	<b>J22</b>	<b>J21</b>
slots 19-24 ports 1-4	slots 13-18 ports 1-4	slots 7-12 ports 1-4	slots 1-6 ports 1-4																																														
<b>J4</b>	<b>J3</b>	<b>J2</b>	<b>J1</b>																																														
slots 19-24 ports 5-8	slots 13-18 ports 5-8	slots 7-12 ports 5-8	slots 1-6 ports 5-8																																														
<b>J8</b>	<b>J7</b>	<b>J6</b>	<b>J5</b>																																														
slots 19-21 ports 1-8	slots 13-15 ports 1-8	slots 7-9 ports 1-8	slots 1-3 ports 1-8																																														
<b>J12</b>	<b>J11</b>	<b>J10</b>	<b>J9</b>																																														
slots 19-21 ports 1-8	slots 13-15 ports 1-8	slots 7-9 ports 1-8	slots 1-3 ports 1-8																																														
<b>J16</b>	<b>J15</b>	<b>J14</b>	<b>J13</b>																																														
slots 22-24 ports 1-8	slots 16-18 ports 1-8	slots 10-12 ports 1-8	slots 4-6 ports 1-8																																														
<b>J20</b>	<b>J19</b>	<b>J18</b>	<b>J17</b>																																														
slots 22-24 ports 1-8	slots 16-18 ports 1-8	slots 10-12 ports 1-8	slots 4-6 ports 1-8																																														
<b>J24</b>	<b>J23</b>	<b>J22</b>	<b>J21</b>																																														
<p><b>2</b></p>	<p>Bring the 25 pair cable stub connected to the <u>J9</u> connector through the <u>sixth</u> cable slot (from the top) on the <u>right</u> side of the LPFS8 assembly. Refer to Figure 6-35: LPFS8 Cabling Diagram, page 6-49.</p>																																																
<p><b>3</b></p>	<p>Position the grommet on the cable stub so it fits over the edge of the slot on the LPFS8 assembly.</p>																																																

Table 6-14: LPFS8 to MDF Subscriber—25 Pair Stub Connection (continued)

STEP	PROCEDURE
4	<p>Repeat Steps 1 through 3 for all the 25 pair LPFS8 to MDF Subscriber cable stubs. Refer to Figure 6-35: LPFS8 Cabling Diagram, page 6-49.</p> <ul style="list-style-type: none"> <li>■ On the <u>right</u> side of the LPFS8: <ul style="list-style-type: none"> <li>– Connect a <u>right angle</u> cable stub to connector <u>J10</u> (LPF8-2 slots 7–9, ports 1–8). Bring the stub through the <u>fifth</u> cable slot (from the top).</li> <li>– Connect a <u>right angle</u> cable stub to connector <u>J17</u> (LPF8-2 slots 4–6, ports 1–8). Bring the stub through the <u>ninth</u> cable slot (from the top).</li> <li>– Connect a <u>right angle</u> cable stub to connector <u>J18</u> (LPF8-2 slots 10–12, ports 1–8). Bring the stub through the <u>tenth</u> cable slot (from the top).</li> </ul> </li> <li>■ On the <u>left</u> side of the LPFS8: <ul style="list-style-type: none"> <li>– Connect a <u>left angle</u> cable stub to connector <u>J12</u> (LPF8-2 slots 19–21, ports 1–8). Bring the stub through the <u>sixth</u> cable slot (from the top).</li> <li>– Connect a <u>left angle</u> cable stub to connector <u>J11</u> (LPF8-2 slots 13–15, ports 1–8). Bring the stub through the <u>fifth</u> cable slot (from the top).</li> <li>– Connect a <u>left angle</u> cable stub to connector <u>J20</u> (LPF8-2 slots 22–24, ports 1–8). Bring the stub through the <u>ninth</u> cable slot (from the top).</li> <li>– Connect a <u>left angle</u> cable stub to connector <u>J19</u> (LPF8-2 slots 16–18, ports 1–8). Bring the stub through the <u>tenth</u> cable slot (from the top).</li> </ul> </li> </ul> <p>Position grommets on all cables to fit over the edge of the slots.</p>

Table 6-14: LPFS8 to MDF Subscriber—25 Pair Stub Connection (continued)

STEP	PROCEDURE
5	<p>NOTE: Some cables are drawn with "dashed" lines, for easier viewing.</p> <p style="text-align: center;"><b>LCS BACKPLANE</b></p> <p style="text-align: center;"><b>LPFS8 BACKPLANE</b></p> <p style="text-align: center;">Figure 6-35: LPFS8 Cabling Diagram</p>
6	Continue to the next procedure: <b>LPFS8 to MDF Subscriber—25 Pair Cable Connection.</b>

**LPFS8 to MDF Subscriber—25 Pair Cable Connection**

25 pair cables<sup>2</sup> are run from the Central Office Main Distribution Frame (MDF) across the horizontal cable racks to the D50. This work may be done by the network service provider or the D50 technician. These 25 pair cables are connected to the LPFS8 to MDF Subscriber cable stubs installed at the LPFS8.

Follow these steps to connect 25 pair MDF cables to the LPFS8 cable stubs:

Table 6-15: LPFS8 to MDF Subscriber—25 Pair Cable Connection

STEP	PROCEDURE
1	Route the 25 pair cables (from the MDF) down from the horizontal cable rack, along the relay rack rails, following local procedures.
2	Verify continuity of each 25 pair MDF cable, following local procedures.
3	Terminate each 25 pair cable on an Amp Champ connector. Refer to Section 10— <i>Appendices</i> , Appendix H—“Cable/Pair Assignment Tables: LPFS8 with Octal Cards,” page 10-91.
4	<p>Label the cables for connection to the LPFS8 as follows:</p> <ul style="list-style-type: none"> <li>■ <u>A3</u>, connecting to LPFS8 slots <u>1–3</u>, ports <u>1–8</u>.</li> <li>■ <u>A5</u>, connecting to LPFS8 slots <u>4–6</u>, ports <u>1–8</u>.</li> <li>■ <u>B3</u>, connecting to LPFS8 slots <u>7–9</u>, ports <u>1–8</u>.</li> <li>■ <u>B5</u>, connecting to LPFS8 slots <u>10–12</u>, ports <u>1–8</u>.</li> <li>■ <u>C3</u>, connecting to LPFS8 slots <u>13–15</u>, ports <u>1–8</u>.</li> <li>■ <u>C5</u>, connecting to LPFS8 slots <u>16–18</u>, ports <u>1–8</u>.</li> <li>■ <u>D3</u>, connecting to LPFS8 slots <u>19–21</u>, ports <u>1–8</u>.</li> <li>■ <u>D5</u>, connecting to LPFS8 slots <u>22–24</u>, ports <u>1–8</u>.</li> </ul>
5	<p>Connect the cables to the LPFS8 cable stubs, and tighten the screws on the Amp Champ connectors to secure, as follows (refer to Figure 6-36: LPFS8 Cabling Diagram, page 6-51 and Section 10—<i>Appendices</i>, Appendix H—“Cable/Pair Assignment Tables: LPFS8 with Octal Cards,” page 10-91):</p> <ul style="list-style-type: none"> <li>■ On the <u>right side</u> of the LPFS8: <ul style="list-style-type: none"> <li>– Connect the <u>A3</u> cable to the <u>J9</u> cable stub.</li> <li>– Connect the <u>B3</u> cable to the <u>J10</u> cable stub.</li> <li>– Connect the <u>A5</u> cable to the <u>J17</u> cable stub.</li> <li>– Connect the <u>B5</u> cable to the <u>J18</u> cable stub.</li> </ul> </li> <li>■ On the <u>left side</u> of the LPFS8: <ul style="list-style-type: none"> <li>– Connect the <u>D3</u> cable to the <u>J12</u> cable stub.</li> <li>– Connect the <u>C3</u> cable to the <u>J11</u> cable stub.</li> <li>– Connect the <u>D5</u> cable to the <u>J20</u> cable stub.</li> <li>– Connect the <u>C5</u> cable to the <u>J19</u> cable stub.</li> </ul> </li> </ul>

<sup>2</sup> The network service provider may choose to run 100 pair cables from the MDF to the D50. These 100 pair cables require four - 25 pair Amp Champ male connectors to connect to four - 25 pair cable stubs.

Table 6-15: LPFS8 to MDF Subscriber—25 Pair Cable Connection (continued)

STEP	PROCEDURE
<p><b>6</b></p>	<p>NOTE: Some cables are drawn with "dashed" lines, for easier viewing.</p> <p style="text-align: center;"><b>LCS BACKPLANE</b></p> <p style="text-align: center;"><b>LPFS8 BACKPLANE</b></p> <p style="text-align: center;"><b>Figure 6-36: LPFS8 Cabling Diagram</b></p>
<p><b>7</b></p>	<p>Continue to the next procedure: <b>LPFS8 to MDF Switch Cabling</b>.</p>

**LPFS8 to MDF Switch Cabling**

This procedure provides detailed instructions on how to make Connections Five and Six—LPFS8 to MDF Switch Cabling.

**Required Tools and Equipment**

To begin this task you must have the following equipment and tools (refer to Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers”):

- A small flat-blade screwdriver.
- (8) 25 pair cable stub(s) with 50 pin female Amp Champ connectors on one end, ribbon connectors on the other end, and a vinyl rubber grommet on each cable.
- (8) 50 pin male Amp Champ connectors for terminating MDF Switch cables.
- 25 pair cable (24 AWG).

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**LPFS8 to MDF Switch Cable Stubs**

LPFS8 cabling is fully connectorized. One end of the 25 pair cable stub connects to the LPFS8 backplane. The other end connects to the switch lines at the MDF.

Each 25 pair cable stub connects up to eight ports on up to three LPF8-2 cards to the MDF. For example: A system ordered with one LCS, one LPFS8, and 24 LPF8-2 cards requires a total of eight LPFS8 to MDF Switch cable stubs—two stubs for each group of six line cards (six-pack).

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**LPFS8 to MDF  
 Switch—25 Pair  
 Stub Connection**

Follow these steps to connect 25 pair cable stubs to the LPFS8 backplane:

Table 6-16: LPFS8 to MDF Switch—25 Pair Stub Connection

STEP	PROCEDURE
1	<p>Connect a <u>right</u> angle 25 pair cable stub to connector <u>J13</u>, this connects to LPF8-2 card slots 1–3, ports 1–8. Refer to <b>Telco Connector Tables</b>, page 6-58.</p> <div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: fit-content;"> <p>The diagram shows a 6x4 grid of connectors labeled J1 through J24. Each connector is associated with specific slots and ports:</p> <ul style="list-style-type: none"> <li>J1: slots 1-6, ports 1-4</li> <li>J2: slots 7-12, ports 1-4</li> <li>J3: slots 13-18, ports 1-4</li> <li>J4: slots 19-24, ports 1-4</li> <li>J5: slots 1-6, ports 5-8</li> <li>J6: slots 7-12, ports 5-8</li> <li>J7: slots 13-18, ports 5-8</li> <li>J8: slots 19-24, ports 5-8</li> <li>J9: slots 1-3, ports 1-8</li> <li>J10: slots 7-9, ports 1-8</li> <li>J11: slots 13-15, ports 1-8</li> <li>J12: slots 19-21, ports 1-8</li> <li>J13: slots 1-3, ports 1-8 (highlighted)</li> <li>J14: slots 7-9, ports 1-8</li> <li>J15: slots 13-15, ports 1-8</li> <li>J16: slots 19-21, ports 1-8</li> <li>J17: slots 4-6, ports 1-8</li> <li>J18: slots 10-12, ports 1-8</li> <li>J19: slots 16-18, ports 1-8</li> <li>J20: slots 22-24, ports 1-8</li> <li>J21: slots 4-6, ports 1-8</li> <li>J22: slots 10-12, ports 1-8</li> <li>J23: slots 16-18, ports 1-8</li> <li>J24: slots 22-24, ports 1-8</li> </ul> <p>Labels on the right side of the diagram: 'J13 Connector' with a line pointing to J13, 'to MDF Switch' with a line pointing to J13, and 'to MDF Switch' with a line pointing to J21.</p> </div> <p style="text-align: center;">Figure 6-37: LPFS8 Backplane</p>
2	<p>Bring the 25 pair cable stub connected to the <u>J13</u> connector through the <u>seventh</u> cable slot (from the top) on the <u>right</u> side of the LPFS8 assembly. Refer to Figure 6-38: LPFS8 Cabling Diagram, page 6-55.</p>
3	<p>Position the grommet on the cable stub so it fits over the edge of the slot on the LPFS8.</p>

Table 6-16: LPFS8 to MDF Switch—25 Pair Stub Connection (continued)

STEP	PROCEDURE
4	<p>Repeat Steps 1 through 3 for all the LPFS8 to MDF Switch cable stub. Refer to Figure 6-38: LPFS8 Cabling Diagram, page 6-55.</p> <ul style="list-style-type: none"> <li>■ On the <u>right</u> side of the LPFS8: <ul style="list-style-type: none"> <li>– Connect a <u>right angle</u> cable stub to connector <u>J14</u> (LPF8-2 slots 7–9, ports 1–8). Bring the stub through the <u>eighth</u> cable slot (from the top).</li> <li>– Connect a <u>right angle</u> cable stub to connector <u>J21</u> (LPF8-2 slots 4–6, ports 1–8). Bring the stub through the <u>eleventh</u> cable slot (from the top).</li> <li>– Connect a <u>right angle</u> cable stub to connector <u>J22</u> (LPF8-2 slots 10–12, ports 1–8). Bring the stub through the <u>twelfth</u> cable slot (from the top).</li> </ul> </li> <li>■ On the <u>left</u> side of the LPFS8: <ul style="list-style-type: none"> <li>– Connect a <u>left angle</u> cable stub to connector <u>J16</u> (LPF8-2 slots 19–21, ports 1–8). Bring the stub through the <u>seventh</u> cable slot (from the top).</li> <li>– Connect a <u>left angle</u> cable stub to connector <u>J15</u> (LPF8-2 slots 13–15, ports 1–8). Bring the stub through the <u>eighth</u> cable slot (from the top).</li> <li>– Connect a <u>left angle</u> cable stub to connector <u>J24</u> (LPF8-2 slots 22–24, ports 1–8). Bring the stub through the <u>eleventh</u> cable slot (from the top).</li> <li>– Connect a <u>left angle</u> cable stub to connector <u>J23</u> (LPF8-2 slots 16–18, ports 1–8). Bring the stub through the <u>twelfth</u> cable slot (from the top).</li> </ul> </li> </ul> <p>Position grommets on all cables to fit over the edge of the slots.</p>

Table 6-16: LPFS8 to MDF Switch—25 Pair Stub Connection (continued)

STEP	PROCEDURE
5	<p>NOTE: Some cables are drawn with "dashed" lines, for easier viewing.</p> <p>The diagram illustrates the cabling between two backplanes. The top section, labeled 'LCS BACKPLANE', contains eight cable stubs: J1 (A1 Cable), J2 (B1 Cable), J3 (C1 Cable), J4 (D1 Cable), J5 (A2 Cable), J6 (B2 Cable), J7 (C2 Cable), and J8 (D2 Cable). The bottom section, labeled 'LPFS8 BACKPLANE', contains sixteen cable stubs: J9 (A3 Cable), J10 (B3 Cable), J11 (C3 Cable), J12 (D3 Cable), J13 (A4 Cable), J14 (B4 Cable), J15 (C4 Cable), J16 (D4 Cable), J17 (A5 Cable), J18 (B5 Cable), J19 (C5 Cable), J20 (D5 Cable), J21 (A6 Cable), J22 (B6 Cable), J23 (C6 Cable), and J24 (D6 Cable). Solid lines represent physical connections, while dashed lines indicate connections that are not shown or are for easier viewing. On the left and right sides of the LPFS8 BACKPLANE, there are ports labeled 'to MDF Subscriber' and 'to MDF Switch'.</p> <p style="text-align: center;">Figure 6-38: LPFS8 Cabling Diagram</p>
6	Continue to the next procedure: <b>LPFS8 to MDF Switch—25 Pair Cable Connection.</b>

**LPFS8 to MDF Switch—25 Pair Cable Connection**

25 pair cables<sup>3</sup> are run from the Central Office Main Distribution Frame (MDF) across the horizontal cable racks to the D50. This work may be done by the network service provider or the D50 technician. These 25 pair cables are connected to the LPFS8 to MDF Switch cable stubs installed at the LPFS8.

Follow these steps to connect 25 pair Switch cables to the LPFS8 cable stubs:

Table 6-17: LPFS8 to MDF Switch—25 Pair Cable Connection

STEP	PROCEDURE
1	Route the 25 pair cables (from the Switch) down from the horizontal cable rack, along the relay rack rails, following local procedures.
2	Verify continuity of each 25 pair MDF cable, following local procedures.
3	Terminate each 25 pair cable on an Amp Champ connector. Refer to Section 10— <i>Appendices</i> , Appendix H—“Cable/Pair Assignment Tables: LPFS8 with Octal Cards,” page 10-91.
4	<p>Label the cables for connection to the LPFS8 as follows:</p> <ul style="list-style-type: none"> <li>■ <u>A4</u>, connecting to LPFS8 slots <u>1–3</u>, ports <u>1–8</u>.</li> <li>■ <u>A6</u>, connecting to LPFS8 slots <u>4–6</u>, ports <u>1–8</u>.</li> <li>■ <u>B4</u>, connecting to LPFS8 slots <u>7–9</u>, ports <u>1–8</u>.</li> <li>■ <u>B6</u>, connecting to LPFS8 slots <u>10–12</u>, ports <u>1–8</u>.</li> <li>■ <u>C4</u>, connecting to LPFS8 slots <u>13–15</u>, ports <u>1–8</u>.</li> <li>■ <u>C6</u>, connecting to LPFS8 slots <u>16–18</u>, ports <u>1–8</u>.</li> <li>■ <u>D4</u>, connecting to LPFS8 slots <u>19–21</u>, ports <u>1–8</u>.</li> <li>■ <u>D6</u>, connecting to LPFS8 slots <u>22–24</u>, ports <u>1–8</u>.</li> </ul>
5	<p>Connect the cables to the LPFS8 cable stubs, and tighten the screws on the Amp Champ connectors to secure, as follows (refer to Figure 6-39: LPFS8 Cabling Diagram, page 6-57 and Section 10—<i>Appendices</i>, Appendix H—“Cable/Pair Assignment Tables: LPFS8 with Octal Cards,” page 10-91):</p> <ul style="list-style-type: none"> <li>■ On the <u>right side</u> of the LPFS8: <ul style="list-style-type: none"> <li>– Connect the <u>A4</u> cable to the <u>J13</u> cable stub.</li> <li>– Connect the <u>B4</u> cable to the <u>J14</u> cable stub.</li> <li>– Connect the <u>A6</u> cable to the <u>J21</u> cable stub.</li> <li>– Connect the <u>B6</u> cable to the <u>J22</u> cable stub.</li> </ul> </li> <li>■ On the <u>left side</u> of the LPFS8: <ul style="list-style-type: none"> <li>– Connect the <u>D4</u> cable to the <u>J16</u> cable stub.</li> <li>– Connect the <u>C4</u> cable to the <u>J15</u> cable stub.</li> <li>– Connect the <u>D6</u> cable to the <u>J24</u> cable stub.</li> <li>– Connect the <u>C6</u> cable to the <u>J23</u> cable stub.</li> </ul> </li> </ul>

<sup>3</sup> The network service provider may choose to run 100 pair cables from the MDF to the D50. These 100 pair cables require four - 25 pair Amp Champ male connectors to connect to four - 25 pair cable stubs.

Table 6-17: LPFS8 to MDF Switch—25 Pair Cable Connection (continued)

STEP	PROCEDURE
6	<p>NOTE: Some cables are drawn with "dashed" lines, for easier viewing.</p> <p style="text-align: center;"><b>Figure 6-39: LPFS8 Cabling Diagram</b></p>
7	<p>Are there additional LCSs and LPFS8s installed?</p> <ul style="list-style-type: none"> <li>■ If YES, repeat these procedures for each co-located LCS and LPFS8: <ul style="list-style-type: none"> <li>- <b>LPFS8 to LCS Cabling</b>, page 6-38.</li> <li>- <b>LPFS8 to MDF Subscriber Cabling</b>, page 6-46.</li> <li>- <b>LPFS8 to MDF Switch Cabling</b>, page 6-51.</li> </ul> </li> <li>■ If NO, the Chapter 4—“LPFS8 Cabling—Octal Line Cards (Data Plus Voice)” procedure is complete.</li> </ul>

**Telco Connector Tables**

The following tables show the LPFS8 backplane telco connectors, their corresponding card slots and ports, and their corresponding connections at the LCS backplane (Table 6-18) and the MDF cables (Table 6-19), for ADSL data plus voice service, using octal cards.

Table 6-18: LPFS8 to LCS Telco Connectors—Octal Cards

<b>LPFS8 Backplane Connector</b>	<b>Connects to:</b>	<b>Cable</b>	<b>Card Slots</b>	<b>Card Ports</b>
J1	LCS	A1	1–6	1–4
J2		B1	7–12	1–4
J3		C1	13–18	1–4
J4		D1	19–24	1–4
J5		A2	1–6	5–8
J6		B2	7–12	5–8
J7		C2	13–18	5–8
J8		D2	19–24	5–8

Table 6-19: LPFS8 to MDF Connections

<b>LPFS8 Backplane Connector</b>	<b>Connects to:</b>	<b>Cable</b>	<b>Card Slots</b>	<b>Card Ports</b>
J9	Subscriber	A3	1–3	1–8
J10		B3	7–9	1–8
J11		C3	13–15	1–8
J12		D3	19–21	1–8
J13	Voice Switch	A4	1–3	1–8
J14		B4	7–9	1–8
J15		C4	13–15	1–8
J16		D4	19–21	1–8

Table 6-19: LPFS8 to MDF Connections (continued)

<b>LPFS8 Backplane Connector</b>	<b>Connects to:</b>	<b>Cable</b>	<b>Card Slots</b>	<b>Card Ports</b>
J17	Subscriber	A5	4–6	1–8
J18		B5	10–12	1–8
J19		C5	16–18	1–8
J20		D5	22–24	1–8
J21	Voice Switch	A6	4–6	1–8
J22		B6	10–12	1–8
J23		C6	16–18	1–8
J24		D6	22–24	1–8

For cable/pair assignment tables, refer to Section 10—*Appendices*, Appendix H—“Cable/Pair Assignment Tables: LPFS8 with Octal Cards,” page 10-91.



## Chapter 5

# LPFS8 Cabling—Octal Line Cards (Data + Voice): Sequential Pair Cabling

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### Introduction

The D50 can be configured in three different ways based on the types of line cards installed and the needs of your network service provider. See the volume titled General Information for descriptions of each configuration.

This chapter provides detailed Low Pass Filter Shelf (LPFS8) cabling instructions for a D50 multiplexer supporting data plus voice service using octal line cards, and using a sequential pair cable assembly for a remotely located LPFS8.

For cable/pair assignment tables, refer to Section 10—*Appendices*, Appendix I—“Cable/Pair Assignment Tables: LPFS8 with Sequential Pair Cabling.”

To test and verify the continuity of the cable pairs between the LCS and the Main Distribution Frame (MDF), and between the LPFS8 and the POTS switch, refer to Section 10—*Appendices*, Appendix D—“Testing Cable Pairs Continuity: Data Plus Voice.”

For instructions to set up data plus voice using standard 25 pair cable stubs, see Chapter 4—“LPFS8 Cabling—Octal Line Cards (Data Plus Voice),” page 6-35.

When the D50 is configured for data plus voice service, the connection between the local exchange network and the D50 is made at the LPFS8. Data plus voice frequency signals are received from the customer at the LPFS8. The LPF8-2<sup>1</sup> card “splits” the low frequency voice signal from the high frequency data signal.

The voice signal is sent onto the switch unimpeded; the data signal is received by the line card.

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<sup>1</sup> The LPF8-2 card is T1.413i2-compliant with DMT8a-3 line cards.

**LPFS8 Located Remotely from the LCS**

The LPFS8 may be located remotely from the D50 LCS and MCS. In this configuration, the cables carrying the “data only” signal from the LPFS8 to the LCS are connected to an Intermediate Distribution Frame (IDF), and not directly connected to the LCS; the sequential pair cable Assembly is used for this connection.

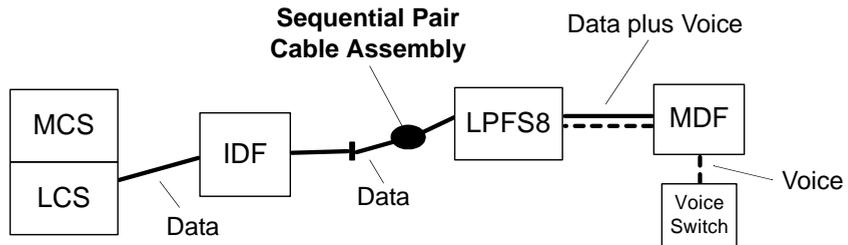


Figure 6-40: LPFS8 Remotely Located from LCS

This chapter provides instructions for connecting the remotely located LPFS8 to the IDF using the sequential pair cable Assembly.

**Note:** In configurations using a sequential pair cable Assembly from the LPFS8 to the IDF, the lines must be disassembled from the sequential arrangement before they reach the Line Card Shelf (LCS). One option for disassembling the sequential arrangement is to install a second sequential pair cable Assembly from the IDF to the LCS. Refer to Chapter 3—“LCS Cabling—Octal Line Cards (Data Only): Sequential Pair Cabling,” page 6-21.

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**LPFS8 Cards**

The LPFS8 supports the following LPF8 cards:

- LPF8-2 cards for DMT8a-3 and DMT8a-4 octal ADSL line cards (192 cable/pairs per LPFS8).

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**LPFS8 Backplane Connections**

LPF8-2 cards are organized into groups of six channel slots, called “six-packs.” Each group of six cards (six-pack) requires six connections on the LPFS8 backplane. This chapter provides detailed instructions on how to make these connections:

- Connections One and Two (LPFS8 to LCS via an IDF):

Data signals are sent to and received from the LCS via an Intermediate Distribution Frame (IDF). These connections are made at the LPFS8 backplane with a “sequential pair” cable assembly (two connectors on both ends) as follows:

- Connection One – ports 1–4 for all six line cards in a six-pack.
- Connection Two – ports 5–8 for all six line cards in a six-pack.

Refer to Table 6-20: LPFS8 Cabling Connections, page 6-63, and **LPFS8 to IDF Cabling**, page 6-64.

- Connections Three and Four (LPFS8 to MDF Subscriber):

Data plus voice signals are received from and sent to the subscriber. These connections between the LPFS8 and the local exchange network are made at the LPFS8 backplane and the Main Distribution Frame (MDF) as follows:

- Connection Three – ports 1–8 for the *first three* line cards in a six-pack.
- Connection Four – ports 1–8 for the *second three* line cards in a six-pack.

Refer to Table 6-20: LPFS8 Cabling Connections, below, and **LPFS8 to MDF Subscriber Cabling**, page 6-77.

- Connections Five and Six (LPFS8 to MDF Switch):

Voice signals are sent to and received from the voice switch. These connections between the LPFS8 and the switch are made at the LPFS8 backplane and the MDF as follows:

- Connection Five – ports 1–8 for the *first three* line cards in a six-pack.
- Connection Six – ports 1–8 for the *second three* line cards in a six-pack.

Refer to Table 6-20: LPFS8 Cabling Connections, below, and **LPFS8 to MDF Switch Cabling**, page 6-83.

Table 6-20: LPFS8 Cabling Connections

Conn- ection	Cabling	Slots	Ports
1	LPFS8 to IDF	1 – 6	1 – 4
2	LPFS8 to IDF	1 – 6	5 – 8
3	LPFS8 to Subscriber	1 – 3	1 – 8
4	LPFS8 to Subscriber	4 – 6	1 – 8
5	LPFS8 to Voice Switch	1 – 3	1 – 8
6	LPFS8 to Voice Switch	4 – 6	1 – 8

**LPFS8 to IDF Cabling** This procedure provides detailed instructions on how to make Connections One and Two—LPFS8 to IDF Cabling.

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**Required Tools and Equipment** To begin this task you must have the following equipment and tools (refer to Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers”):

- (4) 25 pair sequential pair cable assemblies with two 50 pin male Amp Champ connectors at one end, two 50 pin ribbon connectors on the other end, and a vinyl rubber grommet on the two ribbon connector “branches” of the cable.
- (8) 50 pin female Amp Champ connectors for terminating IDF cables.
- 25 pair cable (24 AWG).
- A small flat-blade screwdriver.

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**LPFS8 to IDF Cables** Sequential pair cabling is fully connectorized. The flat ribbon ends of the cable assembly connects to two connectors on the LPFS8 backplane; the round Amp Champ ends of the cable connect to two IDF cables.

Each sequential pair cable connects up to eight ports on up to six LPF8-2 cards to six line cards at the LCS (through the IDF). For example: A system ordered with one LCS, one LPFS8, 24 octal line cards, and 24 LPF8-2 cards requires a total of four sequential pair cable assemblies—one cable assembly (with two connectors on both ends) for each group of six line cards (six-pack).

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**Sequential Pair Cabling Scheme** The following diagram shows the LPFS8 sequential pair cable Assembly:

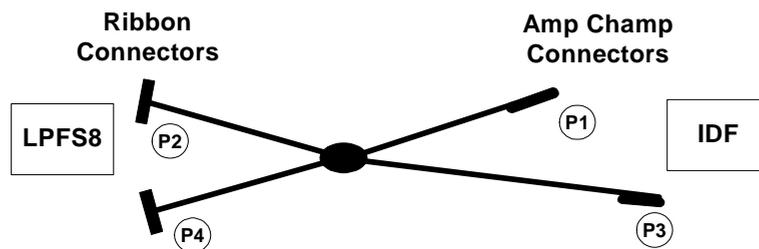


Figure 6-41: Sequential Pair Cable Assembly

LPFS8 line cards are organized into groups of six channel slots, called “six-packs.” Each connector on the LPFS8 backplane connects to four ports on all six line cards in a six-pack. For example:

- Connector **J1** connects to ports **1–4** on the first six-pack (line cards 1–6).
- Connector **J5** connects to ports **5–8** on the first six-pack (line cards 1–6).

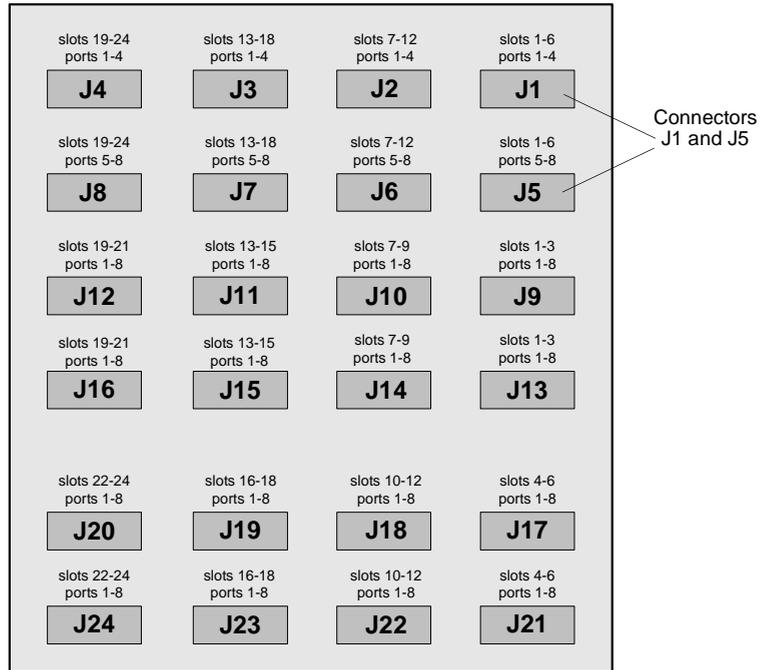


Figure 6-42: LPFS8 Backplane Connectors

The sequential pair cable Assembly connects all eight ports on an LPF8-2 card from the LPFS8 to the IDF. The cable assembly has two cable “branches” on both ends. Cable assembly connectors connect the branches to the LPFS8 backplane and the IDF as follows:

- P2 and P4 connectors (ribbon connectors) connect to the LPFS8 backplane.
- P1 and P3 connectors (Amp Champ connectors) connect to the IDF.

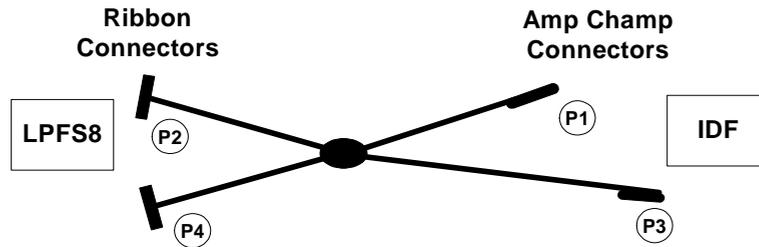


Figure 6-43: Sequential Pair Cable Assembly

The cable assembly works as follows:

- 1 Cable assembly connectors P2 and P4 connect to the LPFS8 backplane connectors; each cable assembly connector “receives” four lines (ports) from all six line cards in the same six-pack, as follows:
  - Connector P2 receives lines (ports) 1–4 from all six line cards.
  - Connector P4 receives lines (ports) 5–8 from all six line cards.
- 2 Inside the cable assembly, the lines from connectors P2 and P4 are split and recombined so that all eight ports from three line cards are kept together.
- 3 The recombined lines connect to the IDF through the P1 and P3 connectors as follows:
  - Connector P1 connects lines (ports) 1–8 from the first three line cards to the IDF.
  - Connector P3 connects lines (ports) 1–8 from the second three line cards to the IDF.

The following table shows the connections from the LPFS8, through the sequential pair cable Assembly, to the IDF:

Table 6-21: LPFS8 Sequential Pair Cabling Scheme

LPFS8 Card Slots	LPFS8 Card Ports	Sequential Pair Cable Connectors:		Card Slots	Card Ports
		at LPFS8	at IDF		
1 – 6	1 – 4	P2	P1, P3	P1 = 1 – 3 P3 = 4 – 6	1 – 8
	5 – 8	P4			1 – 8
7 – 12	1 – 4	P2	P1, P3	P1 = 7 – 9 P3 = 10 – 12	1 – 8
	5 – 8	P4			1 – 8
13 – 18	1 – 4	P2	P1, P3	P1 = 13 – 15 P3 = 16 – 18	1 – 8
	5 – 8	P4			1 – 8
21 – 24	1 – 4	P2	P1, P3	P1 = 19 – 21 P3 = 22 – 24	1 – 8
	5 – 8	P4			1 – 8

The following diagram shows the internal layout of the sequential pair cable assembly:

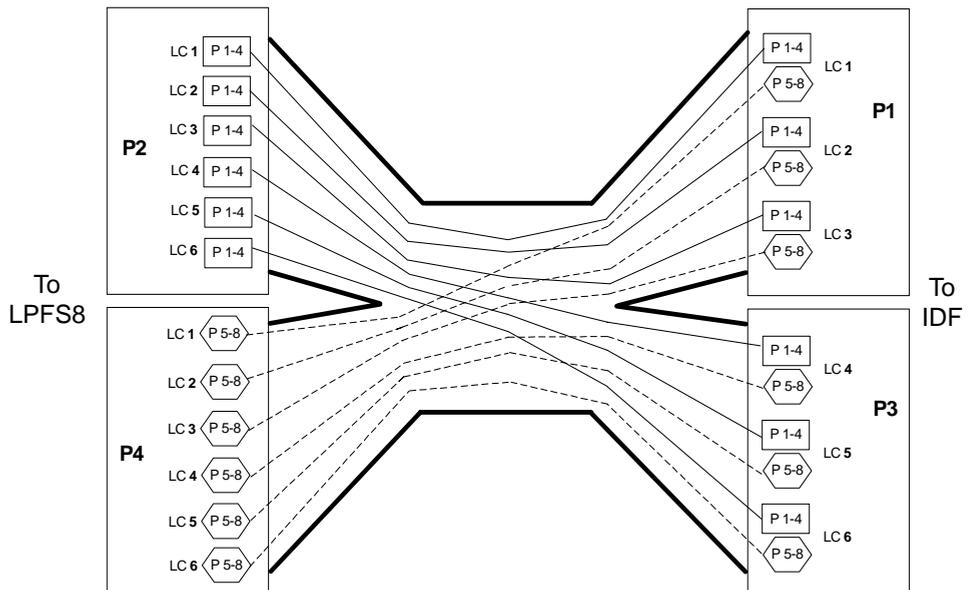


Figure 6-44: Sequential Pair Cable Assembly Internal Layout

**LPFS8 to  
 IDF—Cable  
 Assembly  
 Connection at  
 the LPFS8**

Follow these steps to connect sequential pair cable assemblies to the LPFS8 backplane:

Table 6-22: LPFS8 to IDF—Cable Assembly Connection at LPFS8

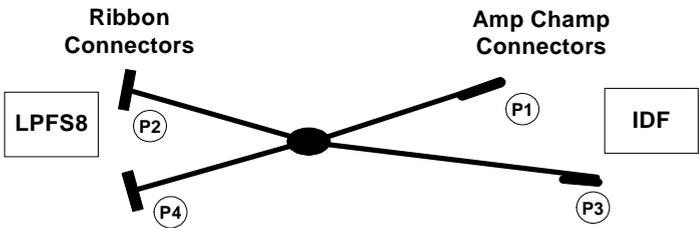
STEP	PROCEDURE
1	Refer to Section 2— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures,” page 2-1 to: <ul style="list-style-type: none"> <li>■ Open and close the LPFS8 back panel (do not remove it completely; this will make it easier to close after the cables are installed).</li> <li>■ Locate the LPFS8 cable ports.</li> </ul>
2	The following diagram shows the sequential pair cable Assembly: <div style="text-align: center; margin: 10px 0;">  <p>The diagram illustrates the sequential pair cable assembly. On the left, a box labeled 'LPFS8' is connected to two 'Ribbon Connectors' labeled P2 and P4. On the right, a box labeled 'IDF' is connected to two 'Amp Champ Connectors' labeled P1 and P3. Two cables cross in the center, connecting P2 to P3 and P4 to P1.</p> </div> <p style="text-align: center;">Figure 6-45: Sequential Pair Cable Assembly</p>

Table 6-22: LPFS8 to IDF—Cable Assembly Connection at LPFS8 (continued)

STEP	PROCEDURE																								
3	<p>Connect the first sequential pair cable Assembly (1) to the LPFS8 backplane as follows:</p> <ul style="list-style-type: none"> <li>■ Connect the P2 connector to LPFS8 backplane connector J1, this connects to LPF8-2 card slots 1–6, ports 1–4.</li> <li>■ Connect the P4 connector to LPFS8 backplane connector J5, this connects to LPF8-2 card slots 1–6, ports 5–8.</li> </ul> <p>Refer to <b>Telco Connector Tables</b>, page 6-90.</p> <div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: fit-content;"> <table border="1" style="width: 100%; text-align: center; border-collapse: collapse;"> <tr> <td>slots 19-24 ports 1-4 <b>J4</b></td> <td>slots 13-18 ports 1-4 <b>J3</b></td> <td>slots 7-12 ports 1-4 <b>J2</b></td> <td>slots 1-6 ports 1-4 <b>J1</b> P2</td> </tr> <tr> <td>slots 19-24 ports 5-8 <b>J8</b></td> <td>slots 13-18 ports 5-8 <b>J7</b></td> <td>slots 7-12 ports 5-8 <b>J6</b></td> <td>slots 1-6 ports 5-8 <b>J5</b> P4</td> </tr> <tr> <td>slots 19-21 ports 1-8 <b>J12</b></td> <td>slots 13-15 ports 1-8 <b>J11</b></td> <td>slots 7-9 ports 1-8 <b>J10</b></td> <td>slots 1-3 ports 1-8 <b>J9</b></td> </tr> <tr> <td>slots 19-21 ports 1-8 <b>J16</b></td> <td>slots 13-15 ports 1-8 <b>J15</b></td> <td>slots 7-9 ports 1-8 <b>J14</b></td> <td>slots 1-3 ports 1-8 <b>J13</b></td> </tr> <tr> <td>slots 22-24 ports 1-8 <b>J20</b></td> <td>slots 16-18 ports 1-8 <b>J19</b></td> <td>slots 10-12 ports 1-8 <b>J18</b></td> <td>slots 4-6 ports 1-8 <b>J17</b></td> </tr> <tr> <td>slots 22-24 ports 1-8 <b>J24</b></td> <td>slots 16-18 ports 1-8 <b>J23</b></td> <td>slots 10-12 ports 1-8 <b>J22</b></td> <td>slots 4-6 ports 1-8 <b>J21</b></td> </tr> </table> </div>	slots 19-24 ports 1-4 <b>J4</b>	slots 13-18 ports 1-4 <b>J3</b>	slots 7-12 ports 1-4 <b>J2</b>	slots 1-6 ports 1-4 <b>J1</b> P2	slots 19-24 ports 5-8 <b>J8</b>	slots 13-18 ports 5-8 <b>J7</b>	slots 7-12 ports 5-8 <b>J6</b>	slots 1-6 ports 5-8 <b>J5</b> P4	slots 19-21 ports 1-8 <b>J12</b>	slots 13-15 ports 1-8 <b>J11</b>	slots 7-9 ports 1-8 <b>J10</b>	slots 1-3 ports 1-8 <b>J9</b>	slots 19-21 ports 1-8 <b>J16</b>	slots 13-15 ports 1-8 <b>J15</b>	slots 7-9 ports 1-8 <b>J14</b>	slots 1-3 ports 1-8 <b>J13</b>	slots 22-24 ports 1-8 <b>J20</b>	slots 16-18 ports 1-8 <b>J19</b>	slots 10-12 ports 1-8 <b>J18</b>	slots 4-6 ports 1-8 <b>J17</b>	slots 22-24 ports 1-8 <b>J24</b>	slots 16-18 ports 1-8 <b>J23</b>	slots 10-12 ports 1-8 <b>J22</b>	slots 4-6 ports 1-8 <b>J21</b>
slots 19-24 ports 1-4 <b>J4</b>	slots 13-18 ports 1-4 <b>J3</b>	slots 7-12 ports 1-4 <b>J2</b>	slots 1-6 ports 1-4 <b>J1</b> P2																						
slots 19-24 ports 5-8 <b>J8</b>	slots 13-18 ports 5-8 <b>J7</b>	slots 7-12 ports 5-8 <b>J6</b>	slots 1-6 ports 5-8 <b>J5</b> P4																						
slots 19-21 ports 1-8 <b>J12</b>	slots 13-15 ports 1-8 <b>J11</b>	slots 7-9 ports 1-8 <b>J10</b>	slots 1-3 ports 1-8 <b>J9</b>																						
slots 19-21 ports 1-8 <b>J16</b>	slots 13-15 ports 1-8 <b>J15</b>	slots 7-9 ports 1-8 <b>J14</b>	slots 1-3 ports 1-8 <b>J13</b>																						
slots 22-24 ports 1-8 <b>J20</b>	slots 16-18 ports 1-8 <b>J19</b>	slots 10-12 ports 1-8 <b>J18</b>	slots 4-6 ports 1-8 <b>J17</b>																						
slots 22-24 ports 1-8 <b>J24</b>	slots 16-18 ports 1-8 <b>J23</b>	slots 10-12 ports 1-8 <b>J22</b>	slots 4-6 ports 1-8 <b>J21</b>																						

Figure 6-46: LPFS8 Backplane Connectors

Table 6-22: LPFS8 to IDF—Cable Assembly Connection at LPFS8 (continued)

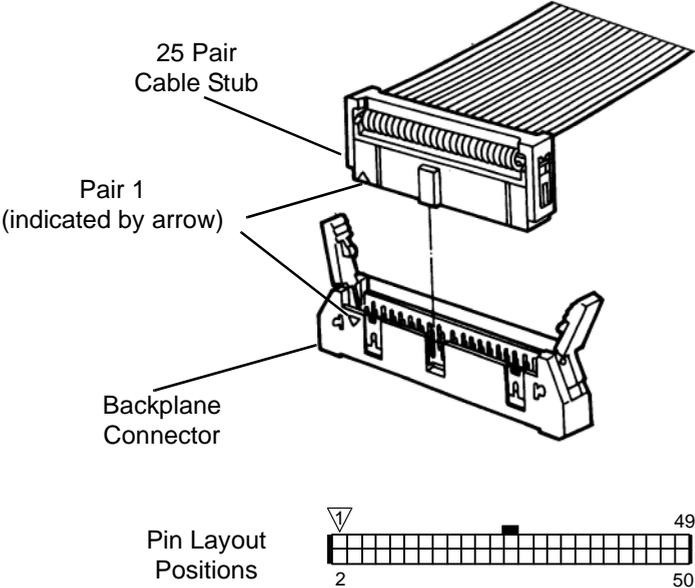
STEP	PROCEDURE
4	<p>Backplane connectors have latches on both sides. These latches snap down on the cable stub ribbon connector and lock in place.</p>  <p style="text-align: center;">Figure 6-47: Ribbon Connectors and Connector Pin Layout</p>
5	<p>The back of the LPFS8 assembly has 12 cable slots on both the left and right sides. Bring the two “branches” of the sequential pair cable Assembly, connected to the LPFS8 connectors, through the cable slots as follows:</p> <ul style="list-style-type: none"> <li>■ Bring the <u>P2</u> connector branch (connected to the <u>J1</u> connector) through the <u>second</u> slot (from the top) on the right side of the LPFS8.</li> <li>■ Bring the <u>P4</u> connector branch (connected to the <u>J5</u> connector) through the <u>fourth</u> slot (from the top) on the right side of the LPFS8.</li> </ul> <p>Refer to Figure 6-48: LPFS8 Cabling Diagram, page 6-71.</p>

Table 6-22: LPFS8 to IDF—Cable Assembly Connection at LPFS8 (continued)

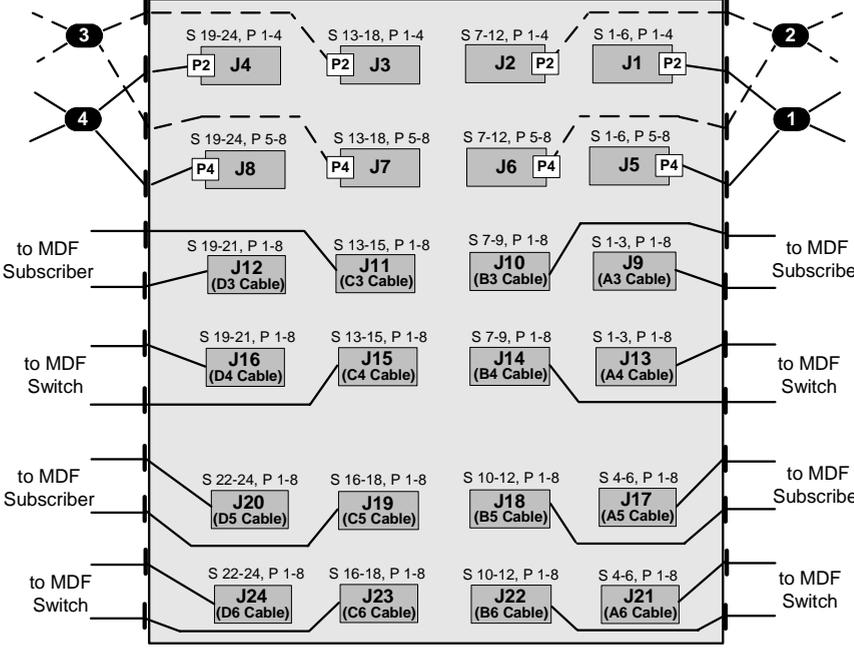
STEP	PROCEDURE
<p><b>6</b></p>	 <p><b>NOTE:</b> Some cables are drawn with "dashed" lines, for easier viewing. Cable lengths are not drawn to scale.</p> <p><b>Figure 6-48: LPFS8 Cabling Diagram</b></p>
<p><b>7</b></p>	<p>There are two vinyl rubber grommets pre-installed on the sequential pair cable Assembly, one on each branch that connects to the LPFS8 backplane. Position the grommets on the branches so they fit over the edges of the slots on the LPFS8. Push the grommets into the slots as far as you can so they don't interfere with the back cover. The grommets help hold the cable branches in position and protect them from the metal edges.</p>

Table 6-22: LPFS8 to IDF—Cable Assembly Connection at LPFS8 (continued)

STEP	PROCEDURE
8	<p>Repeat Steps 3 through 7 for all sequential pair cable assemblies (refer to Figure 6-49: LPFS8 Cabling Diagram, page 6-73):</p> <p>For sequential pair cable Assembly <b>2</b>:</p> <ul style="list-style-type: none"> <li>■ Connect the <b>P2</b> connector to LPFS8 connector <b>J2</b> (slots <u>7–12</u>, ports <u>1–4</u>). <ul style="list-style-type: none"> <li>– Bring the <b>P2</b> cable branch through the <u>first</u> slot (from the top) on the <u>right</u> side of the LPFS8.</li> </ul> </li> <li>■ Connect the <b>P4</b> connector to LPFS8 connector <b>J6</b> (slots <u>7–12</u>, ports <u>5–8</u>). <ul style="list-style-type: none"> <li>– Bring the <b>P4</b> cable branch through the <u>third</u> slot (from the top) on the <u>right</u> side of the LPFS8.</li> </ul> </li> </ul> <p>For sequential pair cable Assembly <b>3</b>:</p> <ul style="list-style-type: none"> <li>■ Connect the <b>P2</b> connector to LPFS8 connector <b>J3</b> (slots <u>13–18</u>, ports <u>1–4</u>). <ul style="list-style-type: none"> <li>– Bring the <b>P2</b> cable branch through the <u>first</u> slot (from the top) on the <u>left</u> side of the LPFS8.</li> </ul> </li> <li>■ Connect the <b>P4</b> connector to LPFS8 connector <b>J7</b> (slots <u>13–18</u>, ports <u>5–8</u>). <ul style="list-style-type: none"> <li>– Bring the <b>P4</b> cable branch through the <u>third</u> slot (from the top) on the <u>left</u> side of the LPFS8.</li> </ul> </li> </ul> <p>For sequential pair cable Assembly <b>4</b>:</p> <ul style="list-style-type: none"> <li>■ Connect the <b>P2</b> connector to LPFS8 connector <b>J4</b> (slots <u>19–24</u>, ports <u>1–4</u>). <ul style="list-style-type: none"> <li>– Bring the <b>P2</b> cable branch through the <u>second</u> slot (from the top) on the <u>left</u> side of the LPFS8.</li> </ul> </li> <li>■ Connect the <b>P4</b> connector to LPFS8 connector <b>J8</b> (slots <u>19–24</u>, ports <u>5–8</u>). <ul style="list-style-type: none"> <li>– Bring the <b>P4</b> cable branch through the <u>fourth</u> slot (from the top) on the <u>left</u> side of the LPFS8.</li> </ul> </li> </ul> <p>Position grommets on all cable branches to fit over the edges of the slots.</p>

Table 6-22: LPFS8 to IDF—Cable Assembly Connection at LPFS8 (continued)

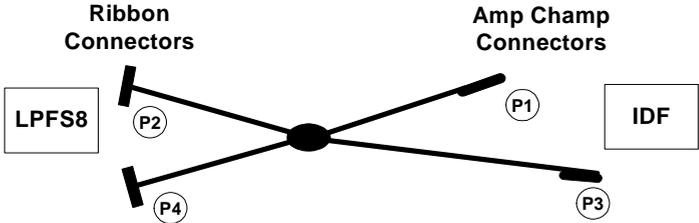
STEP	PROCEDURE
9	<p><b>NOTE:</b> Some cables are drawn with "dashed" lines, for easier viewing. Cable lengths are not drawn to scale.</p> <p style="text-align: center;">Figure 6-49: LPFS8 Cabling Diagram</p>
10	Continue to the next procedure: <b>LPFS8 to IDF—Cable Assembly Connection at the IDF</b> , page 6-74.

**LPFS8 to  
 IDF—Cable  
 Assembly  
 Connection at  
 the IDF**

25 pair cables<sup>2</sup> are run from the Central Office Intermediate Distribution Frame (IDF) across the horizontal cable racks to the LPFS8. This work may be done by the network service provider or the D50 technician. These 25 pair cables are connected to the sequential pair cable assemblies installed at the LPFS8.

Follow these steps to connect 25 pair IDF cables to the LPFS8 sequential pair cable assemblies:

Table 6-23: LPFS8 to IDF—Cable Connection at the IDF

STEP	PROCEDURE
1	Route the 25 pair cables from the IDF down from the horizontal cable rack, along the relay rack rails, following local procedures.
2	Verify continuity of each 25 pair IDF cable, following local procedures.
3	Terminate each 25 pair cable on an Amp Champ connector. Refer to Section 10— <i>Appendices</i> , Appendix I—“Cable/Pair Assignment Tables: LPFS8 with Sequential Pair Cabling,” page 10-129.
4	Label the cables for connection to the sequential pair cable Assembly as follows (refer to Figure 6-51: LPFS8 Cabling Diagram, page 6-76): <ul style="list-style-type: none"> <li>■ <u>A1</u>, connecting to LPFS8 slots <u>1–3</u>, ports <u>1–8</u>.</li> <li>■ <u>A2</u>, connecting to LPFS8 slots <u>4–6</u>, ports <u>1–8</u>.</li> <li>■ <u>B1</u>, connecting to LPFS8 slots <u>7–9</u>, ports <u>1–8</u>.</li> <li>■ <u>B2</u>, connecting to LPFS8 slots <u>10–12</u>, ports <u>1–8</u>.</li> <li>■ <u>C1</u>, connecting to LPFS8 slots <u>13–15</u>, ports <u>1–8</u>.</li> <li>■ <u>C2</u>, connecting to LPFS8 slots <u>16–18</u>, ports <u>1–8</u>.</li> <li>■ <u>D1</u>, connecting to LPFS8 slots <u>19–21</u>, ports <u>1–8</u>.</li> <li>■ <u>D2</u>, connecting to LPFS8 slots <u>22–24</u>, ports <u>1–8</u>.</li> </ul>
5	The following diagram shows the sequential pair cable Assembly: <div style="text-align: center;">  <p>The diagram illustrates the connection between an LPFS8 unit and an IDF unit. On the left, a box labeled 'LPFS8' is connected to two 'Ribbon Connectors' labeled P2 and P4. On the right, a box labeled 'IDF' is connected to two 'Amp Champ Connectors' labeled P1 and P3. Lines represent the cables connecting P2 to P1 and P4 to P3, crossing each other in the center.</p> </div> <p>Figure 6-50: Sequential Pair Cable Assembly</p>

<sup>2</sup> The network service provider may choose to run 100 pair cables from the MDF to the D50. These 100 pair cables require (8) 25 pair female Amp Champ connectors to connect to the sequential pair cable assembly.

Table 6-23: LPFS8 to IDF—Cable Connection at the IDF (continued)

STEP	PROCEDURE
6	<p>The cable assembly connectors P1 and P3 connect lines from one six-pack on the LPFS8 to the IDF. The cable assembly connectors support the slots and ports in a six-pack as follows (refer to <b>Telco Connector Tables</b>, page 6-90):</p> <ul style="list-style-type: none"> <li>■ <u>P1</u> connector: supports the <u>first three</u> slots, ports <u>1–8</u>.</li> <li>■ <u>P3</u> connector: supports the <u>second three</u> slots, ports <u>1–8</u>.</li> </ul>
7	<p>Connect the LPFS8 sequential pair cable connectors to the IDF cables, and tighten the screws on the Amp Champ connectors to secure, as follows:</p> <ul style="list-style-type: none"> <li>■ For sequential cable pair assembly <u>1</u>: <ul style="list-style-type: none"> <li>– Connect the <u>P1</u> connector to the <u>A1</u> cable.</li> <li>– Connect the <u>P3</u> connector to the <u>A2</u> cable.</li> </ul> </li> <li>■ For sequential cable pair assembly <u>2</u>: <ul style="list-style-type: none"> <li>– Connect the <u>P1</u> connector to the <u>B1</u> cable.</li> <li>– Connect the <u>P3</u> connector to the <u>B2</u> cable.</li> </ul> </li> <li>■ For sequential cable pair assembly <u>3</u>: <ul style="list-style-type: none"> <li>– Connect the <u>P1</u> connector to the <u>C1</u> cable.</li> <li>– Connect the <u>P3</u> connector to the <u>C2</u> cable.</li> </ul> </li> <li>■ For sequential cable pair assembly <u>4</u>: <ul style="list-style-type: none"> <li>– Connect the <u>P1</u> connector to the <u>D1</u> cable.</li> <li>– Connect the <u>P3</u> connector to the <u>D2</u> cable.</li> </ul> </li> </ul> <p>Refer to the following:</p> <ul style="list-style-type: none"> <li>– Figure 6-51: LPFS8 Cabling Diagram, page 6-76.</li> <li>– <b>Telco Connector Tables</b>, page 6-90.</li> <li>– Section 10—<i>Appendices</i>, Appendix I—“Cable/Pair Assignment Tables: LPFS8 with Sequential Pair Cabling,” page 10-129.</li> </ul>

Table 6-23: LPFS8 to IDF—Cable Connection at the IDF (continued)

STEP	PROCEDURE
8	<p>The diagram illustrates the LPFS8 cabling connections at the IDF. It shows two sets of IDF Cables on the left and right. On the left, cables C1, C2, D1, and D2 are connected to ports P1 and P3. On the right, cables B1, B2, A1, and A2 are connected to ports R1, P3, P1, and P3. The central area contains 24 patch panels (J1-J24) arranged in a 4x6 grid. Each patch panel is connected to specific ports on the IDF cables and to specific ports on the MDF Subscriber and Switch. The connections are as follows:</p> <ul style="list-style-type: none"> <li><b>Row 1:</b> J4 (P2) connects C1 (P1) to R1 (P3); J3 (P2) connects C2 (P3) to R1 (P3); J2 (P2) connects D1 (P1) to R1 (P3); J1 (P2) connects D2 (P3) to R1 (P3).</li> <li><b>Row 2:</b> J8 (P4) connects C1 (P1) to R1 (P3); J7 (P4) connects C2 (P3) to R1 (P3); J6 (P4) connects D1 (P1) to R1 (P3); J5 (P4) connects D2 (P3) to R1 (P3).</li> <li><b>Row 3:</b> J12 (D3 Cable) connects C1 (P1) to R1 (P3); J11 (C3 Cable) connects C2 (P3) to R1 (P3); J10 (B3 Cable) connects D1 (P1) to R1 (P3); J9 (A3 Cable) connects D2 (P3) to R1 (P3).</li> <li><b>Row 4:</b> J16 (D4 Cable) connects C1 (P1) to R1 (P3); J15 (C4 Cable) connects C2 (P3) to R1 (P3); J14 (B4 Cable) connects D1 (P1) to R1 (P3); J13 (A4 Cable) connects D2 (P3) to R1 (P3).</li> <li><b>Row 5:</b> J20 (D5 Cable) connects C1 (P1) to R1 (P3); J19 (C5 Cable) connects C2 (P3) to R1 (P3); J18 (B5 Cable) connects D1 (P1) to R1 (P3); J17 (A5 Cable) connects D2 (P3) to R1 (P3).</li> <li><b>Row 6:</b> J24 (D6 Cable) connects C1 (P1) to R1 (P3); J23 (C6 Cable) connects C2 (P3) to R1 (P3); J22 (B6 Cable) connects D1 (P1) to R1 (P3); J21 (A6 Cable) connects D2 (P3) to R1 (P3).</li> </ul> <p><b>NOTE:</b> Some cables are drawn with "dashed" lines, for easier viewing. Cable lengths are not drawn to scale.</p> <p style="text-align: center;">Figure 6-51: LPFS8 Cabling Diagram</p>
9	<p>The <b>LPFS8 to IDF Cabling</b> procedure is complete. Continue to the next procedure: <b>LPFS8 to MDF Subscriber Cabling</b>.</p>

**LPFS8 to MDF Subscriber Cabling** This procedure provides detailed instructions on how to make Connections Three and Four—LPFS8 to MDF Subscriber Cabling.

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**Required Tools and Equipment** To begin this task you must have the following equipment and tools (refer to Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers”):

- (8) 25 pair cable stub(s) with 50 pin female Amp Champ connectors on one end, ribbon connectors on the other end, and a vinyl rubber grommet on each cable.
- (8) 50 pin male Amp Champ connectors for terminating MDF Subscriber cables.
- A small flat-blade screwdriver.
- 25 pair cable (24 AWG).

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**LPFS8 to MDF Subscriber Cable Stubs** LPFS8 cabling is fully connectorized. One end of the 25 pair cable stub connects to the LPFS8 backplane. The other end connects to the subscriber lines at the MDF.

Each 25 pair cable stub connects up to eight ports on up to three LPF8-2 cards to the MDF. For example: A system ordered with one LCS, one LPFS8, and 24 LPF8-2 cards requires a total of eight LPFS8 to MDF Subscriber cable stubs—two stubs for each group of six line cards (six-pack).

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**LPFS8 to MDF  
Subscriber—25  
Pair Stub  
Connection**

Follow these steps to connect 25 pair cable stubs to the LPFS8 backplane:

Table 6-24: LPFS8 to MDF Subscriber—25 Pair Stub Connection

STEP	PROCEDURE
<p><b>1</b></p>	<p>Connect a <u>right</u> angle 25 pair cable stub to LPFS8 backplane connector <u>J9</u>, this connects to LPF8-2 card slots 1–3, ports 1–8. Refer to <b>Telco Connector Tables</b>, page 6-90.</p> <div style="text-align: center;"> <p>The diagram shows a 6x4 grid of connectors labeled J1 through J24. Each connector is associated with specific slot and port ranges. Connector J9 is specifically highlighted with a callout 'J9 Connector' and 'to MDF Subscriber'. Other callouts point to 'to MDF Subscriber' for connectors J10, J11, J12, J13, J14, J15, J16, J17, J18, J19, J20, J21, J22, J23, and J24.</p> </div> <p style="text-align: center;">Figure 6-52: LPFS8 Backplane Connectors</p>
<p><b>2</b></p>	<p>Bring the 25 pair cable stub connected to the <u>J9</u> connector through the <u>sixth</u> cable slot (from the top) on the <u>right</u> side of the LPFS8 assembly. Refer to Figure 6-53: LPFS8 Cabling Diagram, page 6-80.</p>
<p><b>3</b></p>	<p>Position the grommet on the cable stub so it fits over the edge of the slot on the LPFS8 assembly.</p>

Table 6-24: LPFS8 to MDF Subscriber—25 Pair Stub Connection (continued)

STEP	PROCEDURE
4	<p>Repeat Steps 1 through 3 for all the 25 pair LPFS8 to MDF Subscriber cables. Refer to Figure 6-53: LPFS8 Cabling Diagram, page 6-80.</p> <ul style="list-style-type: none"> <li>■ On the <u>right</u> side of the LPFS8: <ul style="list-style-type: none"> <li>– Connect a <u>right angle</u> cable stub to connector <u>J10</u> (LPF8-2 slots 7–9, ports 1–8). Bring the stub through the <u>fifth</u> cable slot (from the top).</li> <li>– Connect a <u>right angle</u> cable stub to connector <u>J17</u> (LPF8-2 slots 4–6, ports 1–8). Bring the stub through the <u>ninth</u> cable slot (from the top).</li> <li>– Connect a <u>right angle</u> cable stub to connector <u>J18</u> (LPF8-2 slots 10–12, ports 1–8). Bring the stub through the <u>tenth</u> cable slot (from the top).</li> </ul> </li> <li>■ On the <u>left</u> side of the LPFS8: <ul style="list-style-type: none"> <li>– Connect a <u>left angle</u> cable stub to connector <u>J12</u> (LPF8-2 slots 19–21, ports 1–8). Bring the stub through the <u>sixth</u> cable slot (from the top).</li> <li>– Connect a <u>left angle</u> cable stub to connector <u>J11</u> (LPF8-2 slots 13–15, ports 1–8). Bring the stub through the <u>fifth</u> cable slot (from the top).</li> <li>– Connect a <u>left angle</u> cable stub to connector <u>J20</u> (LPF8-2 slots 22–24, ports 1–8). Bring the stub through the <u>ninth</u> cable slot (from the top).</li> <li>– Connect a <u>left angle</u> cable stub to connector <u>J19</u> (LPF8-2 slots 16–18, ports 1–8). Bring the stub through the <u>tenth</u> cable slot (from the top).</li> </ul> </li> </ul> <p>Position grommets on all cables to fit over the edge of the slots.</p>

Table 6-24: LPFS8 to MDF Subscriber—25 Pair Stub Connection (continued)

STEP	PROCEDURE
5	<p>The diagram illustrates the LPFS8 cabling for a 25-pair stub connection. It is organized into four rows of cable pairs, each connected to external devices on both sides. The connections are as follows:</p> <ul style="list-style-type: none"> <li><b>Row 1:</b> Cables J4 (P2), J3 (P2), J2 (P2), and J1 (P2) are connected to external devices 3 and 2.</li> <li><b>Row 2:</b> Cables J8 (P4), J7 (P4), J6 (P4), and J5 (P4) are connected to external devices 4 and 1.</li> <li><b>Row 3:</b> Cables J12 (D3 Cable), J11 (C3 Cable), J10 (B3 Cable), and J9 (A3 Cable) connect to MDF Subscriber and MDF Switch.</li> <li><b>Row 4:</b> Cables J16 (D4 Cable), J15 (C4 Cable), J14 (B4 Cable), and J13 (A4 Cable) connect to MDF Subscriber and MDF Switch.</li> <li><b>Row 5:</b> Cables J20 (D5 Cable), J19 (C5 Cable), J18 (B5 Cable), and J17 (A5 Cable) connect to MDF Subscriber and MDF Switch.</li> <li><b>Row 6:</b> Cables J24 (D6 Cable), J23 (C6 Cable), J22 (B6 Cable), and J21 (A6 Cable) connect to MDF Subscriber and MDF Switch.</li> </ul> <p><b>NOTE:</b> Some cables are drawn with "dashed" lines, for easier viewing. Cable lengths are not drawn to scale.</p> <p style="text-align: center;">Figure 6-53: LPFS8 Cabling Diagram</p>
6	<p>Continue to the next procedure: <b>LPFS8 to MDF Subscriber—25 Pair Cable Connection.</b></p>

**LPFS8 to MDF Subscriber—25 Pair Cable Connection**

25 pair cables<sup>3</sup> are run from the Central Office Main Distribution Frame (MDF) across the horizontal cable racks to the D50. This work may be done by the network service provider or the D50 technician. These 25 pair cables are connected to the LPFS8 to MDF Subscriber cable stubs installed at the LPFS8.

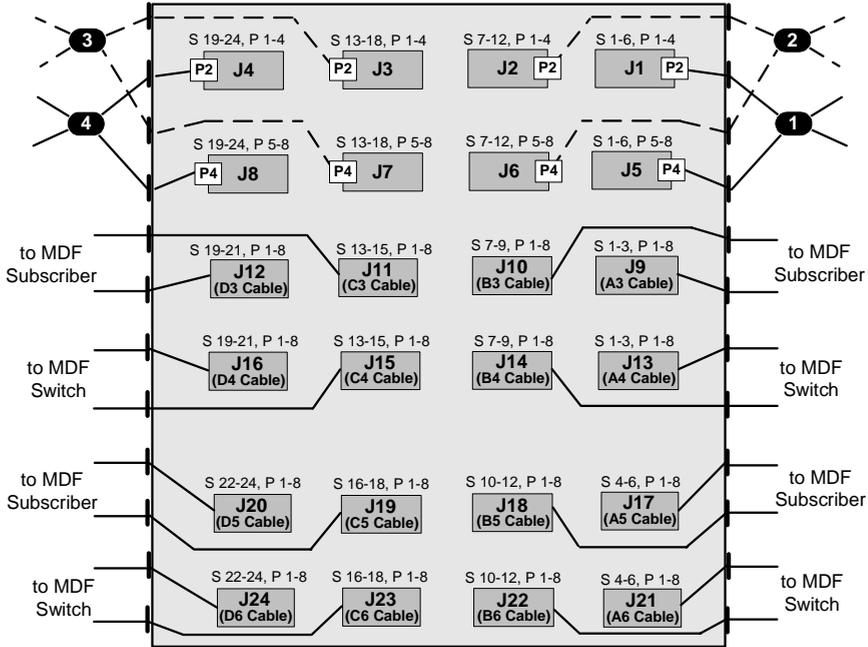
Follow these steps to connect 25 pair MDF cables to the LPFS8 cable stubs:

Table 6-25: LPFS8 to MDF Subscriber—25 Pair Cable Connection

STEP	PROCEDURE
1	Route the 25 pair cables (from the MDF) down from the horizontal cable rack, along the relay rack rails, following local procedures.
2	Verify continuity of each 25 pair MDF cable, following local procedures.
3	Terminate each 25 pair cable on an Amp Champ connector. Refer to Section 10— <i>Appendices</i> , Appendix I—“Cable/Pair Assignment Tables: LPFS8 with Sequential Pair Cabling,” page 10-129.
4	Label the cables for connection to the LPFS8 as follows: <ul style="list-style-type: none"> <li>■ <u>A3</u>, connecting to LPFS8 slots <u>1–3</u>, ports <u>1–8</u>.</li> <li>■ <u>A5</u>, connecting to LPFS8 slots <u>4–6</u>, ports <u>1–8</u>.</li> <li>■ <u>B3</u>, connecting to LPFS8 slots <u>7–9</u>, ports <u>1–8</u>.</li> <li>■ <u>B5</u>, connecting to LPFS8 slots <u>10–12</u>, ports <u>1–8</u>.</li> <li>■ <u>C3</u>, connecting to LPFS8 slots <u>13–15</u>, ports <u>1–8</u>.</li> <li>■ <u>C5</u>, connecting to LPFS8 slots <u>16–18</u>, ports <u>1–8</u>.</li> <li>■ <u>D3</u>, connecting to LPFS8 slots <u>19–21</u>, ports <u>1–8</u>.</li> <li>■ <u>D5</u>, connecting to LPFS8 slots <u>22–24</u>, ports <u>1–8</u>.</li> </ul>

<sup>3</sup> The network service provider may choose to run 100 pair cables from the MDF to the D50. These 100 pair cables require four 25 pair Amp Champ male connectors to connect to four 25 pair cable stubs.

Table 6-25: LPFS8 to MDF Subscriber—25 Pair Cable Connection (continued)

STEP	PROCEDURE
5	<p>Connect the cables to the LPFS8 cable stubs, and tighten the screws on the Amp Champ connectors to secure, as follows (refer to Figure 6-54: LPFS8 Cabling Diagram, page 6-82, and Section 10—<i>Appendices</i>, Appendix I—“Cable/Pair Assignment Tables: LPFS8 with Sequential Pair Cabling,” page 10-129):</p> <ul style="list-style-type: none"> <li>■ On the <u>right side</u> of the LPFS8:           <ul style="list-style-type: none"> <li>– Connect the <u>A3</u> cable to the <u>J9</u> cable stub.</li> <li>– Connect the <u>B3</u> cable to the <u>J10</u> cable stub.</li> <li>– Connect the <u>A5</u> cable to the <u>J17</u> cable stub.</li> <li>– Connect the <u>B5</u> cable to the <u>J18</u> cable stub.</li> </ul> </li> <li>■ On the <u>left side</u> of the LPFS8:           <ul style="list-style-type: none"> <li>– Connect the <u>D3</u> cable to the <u>J12</u> cable stub.</li> <li>– Connect the <u>C3</u> cable to the <u>J11</u> cable stub.</li> <li>– Connect the <u>D5</u> cable to the <u>J20</u> cable stub.</li> <li>– Connect the <u>C5</u> cable to the <u>J19</u> cable stub.</li> </ul> </li> </ul>
6	 <p style="text-align: center;">NOTE: Some cables are drawn with "dashed" lines, for easier viewing. Cable lengths are not drawn to scale.</p> <p style="text-align: center;">Figure 6-54: LPFS8 Cabling Diagram</p>
7	Continue to the next procedure: <b>LPFS8 to MDF Switch Cabling.</b>

**LPFS8 to MDF Switch Cabling** This procedure provides detailed instructions on how to make Connections Five and Six—LPFS8 to MDF Switch Cabling.

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**Required Tools and Equipment** To begin this task you must have the following equipment and tools (refer to Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers”):

- (8) 25 pair cable stub(s) with 50 pin female Amp Champ connectors on one end, ribbon connectors on the other end, and a vinyl rubber grommet on each cable.
- (8) 50 pin male Amp Champ connectors for terminating MDF Subscriber cables.
- A small flat-blade screwdriver.
- 25 pair cable (24 AWG).

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**LPFS8 to MDF Switch Cable Stubs** LPFS8 cabling is fully connectorized. One end of the 25 pair cable stub connects to the LPFS8 backplane. The other end connects to the switch lines at the MDF.

Each 25 pair cable stub connects up to eight ports on up to three LPF8-2 cards to the MDF. For example: A system ordered with one LCS, one LPFS8, and 24 LPF8-2 cards requires a total of eight LPFS8 to MDF Switch cable stubs—two stubs for each group of six line cards (six-pack).

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**LPFS8 to MDF Switch—25 Pair Stub Connection**

Follow these steps to connect 25 pair cable stubs to the LPFS8 backplane:

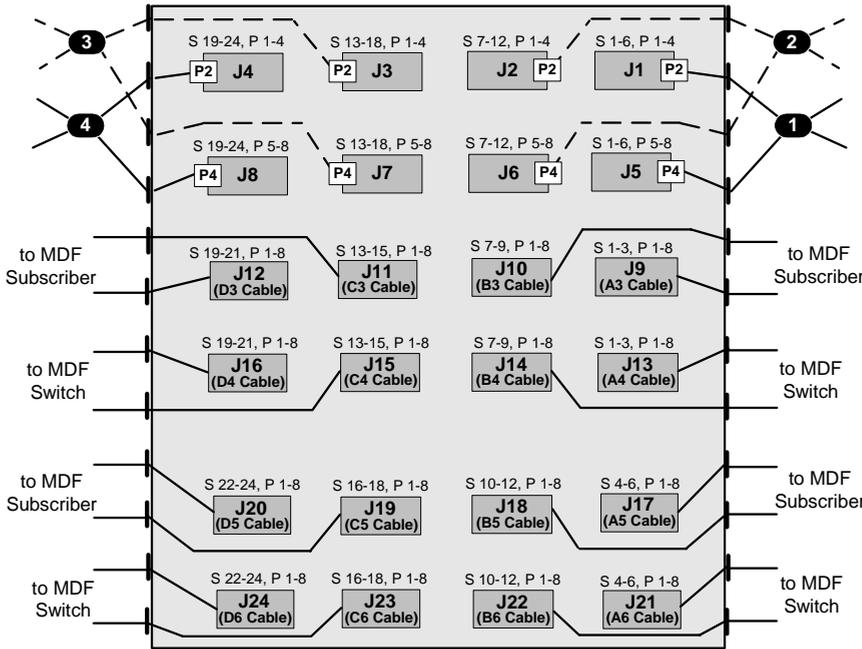
Table 6-26: LPFS8 to MDF Switch—25 Pair Stub Connection

STEP	PROCEDURE
<p><b>1</b></p>	<p>Connect a <u>right</u> angle 25 pair cable stub to connector <u>J13</u>, this connects to LPF8-2 card slots 1–3, ports 1–8. Refer to <b>Telco Connector Tables</b>, page 6-90.</p> <div> <p>The diagram shows a 6x4 grid of connectors labeled J1 through J24. Each connector is associated with specific card slots and ports:</p> <ul style="list-style-type: none"> <li>J1: slots 1-6, ports 1-4</li> <li>J2: slots 7-12, ports 1-4</li> <li>J3: slots 13-18, ports 1-4</li> <li>J4: slots 19-24, ports 1-4</li> <li>J5: slots 1-6, ports 5-8</li> <li>J6: slots 7-12, ports 5-8</li> <li>J7: slots 13-18, ports 5-8</li> <li>J8: slots 19-24, ports 5-8</li> <li>J9: slots 1-3, ports 1-8</li> <li>J10: slots 7-9, ports 1-8</li> <li>J11: slots 13-15, ports 1-8</li> <li>J12: slots 19-21, ports 1-8</li> <li>J13: slots 1-3, ports 1-8</li> <li>J14: slots 7-9, ports 1-8</li> <li>J15: slots 13-15, ports 1-8</li> <li>J16: slots 19-21, ports 1-8</li> <li>J17: slots 4-6, ports 1-8</li> <li>J18: slots 10-12, ports 1-8</li> <li>J19: slots 16-18, ports 1-8</li> <li>J20: slots 22-24, ports 1-8</li> <li>J21: slots 4-6, ports 1-8</li> <li>J22: slots 10-12, ports 1-8</li> <li>J23: slots 16-18, ports 1-8</li> <li>J24: slots 22-24, ports 1-8</li> </ul> </div> <p style="text-align: center;">Figure 6-55: LPFS8 Backplane</p>
<p><b>2</b></p>	<p>Bring the 25 pair cable stub connected to the <u>J13</u> connector through the <u>seventh</u> cable slot (from the top) on the <u>right</u> side of the LPFS8 assembly. Refer to Figure 6-56: LPFS8 Cabling Diagram, page 6-86.</p>
<p><b>3</b></p>	<p>Position the grommet on the cable stub so it fits over the edge of the slot on the LPFS8.</p>

Table 6-26: LPFS8 to MDF Switch—25 Pair Stub Connection (continued)

STEP	PROCEDURE
4	<p>Repeat Steps 1 through 3 for all the LPFS8 to MDF Switch cable stubs. Refer to Figure 6-56: LPFS8 Cabling Diagram, page 6-86.</p> <ul style="list-style-type: none"> <li>■ On the <u>right</u> side of the LPFS8: <ul style="list-style-type: none"> <li>– Connect a <u>right angle</u> cable stub to connector <u>J14</u> (LPF8-2 slots 7–9, ports 1–8). Bring the stub through the <u>eighth</u> cable slot (from the top).</li> <li>– Connect a <u>right angle</u> cable stub to connector <u>J21</u> (LPF8-2 slots 4–6, ports 1–8). Bring the stub through the <u>eleventh</u> cable slot (from the top).</li> <li>– Connect a <u>right angle</u> cable stub to connector <u>J22</u> (LPF8-2 slots 10–12, ports 1–8). Bring the stub through the <u>twelfth</u> cable slot (from the top).</li> </ul> </li> <li>■ On the <u>left</u> side of the LPFS8: <ul style="list-style-type: none"> <li>– Connect a <u>left angle</u> cable stub to connector <u>J16</u> (LPF8-2 slots 19–21, ports 1–8). Bring the stub through the <u>seventh</u> cable slot (from the top).</li> <li>– Connect a <u>left angle</u> cable stub to connector <u>J15</u> (LPF8-2 slots 13–15, ports 1–8). Bring the stub through the <u>eighth</u> cable slot (from the top).</li> <li>– Connect a <u>left angle</u> cable stub to connector <u>J24</u> (LPF8-2 slots 22–24, ports 1–8). Bring the stub through the <u>eleventh</u> cable slot (from the top).</li> <li>– Connect a <u>left angle</u> cable stub to connector <u>J23</u> (LPF8-2 slots 16–18, ports 1–8). Bring the stub through the <u>twelfth</u> cable slot (from the top).</li> </ul> </li> </ul> <p>Position grommets on all cables to fit over the edge of the slots.</p>

Table 6-26: LPFS8 to MDF Switch—25 Pair Stub Connection (continued)

STEP	PROCEDURE
5	 <p><b>NOTE:</b> Some cables are drawn with "dashed" lines, for easier viewing. Cable lengths are not drawn to scale.</p> <p style="text-align: center;">Figure 6-56: LPFS8 Cabling Diagram</p>
6	Continue to the next procedure: <b>LPFS8 to MDF Switch—25 Pair Cable Connection.</b>

**LPFS8 to MDF Switch—25 Pair Cable Connection**

25 pair cables<sup>4</sup> are run from the Central Office Main Distribution Frame (MDF) across the horizontal cable racks to the D50. This work may be done by the network service provider or the D50 technician. These 25 pair cables are connected to the LPFS8 to MDF Switch cable stubs installed at the LPFS8.

Follow these steps to connect 25 pair Switch cables to the LPFS8 cable stubs:

Table 6-27: LPFS8 to MDF Switch—25 Pair Cable Connection

STEP	PROCEDURE
1	Route the 25 pair cables (from the Switch) down from the horizontal cable rack, along the relay rack rails, following local procedures.
2	Verify continuity of each 25 pair MDF cable, following local procedures.
3	Terminate each 25 pair cable on an Amp Champ connector. Refer to Section 10— <i>Appendices</i> , Appendix I—“Cable/Pair Assignment Tables: LPFS8 with Sequential Pair Cabling,” page 10-129.
4	Label the cables for connection to the LPFS8 as follows: <ul style="list-style-type: none"> <li>■ <u>A4</u>, connecting to LPFS8 slots <u>1–3</u>, ports <u>1–8</u>.</li> <li>■ <u>A6</u>, connecting to LPFS8 slots <u>4–6</u>, ports <u>1–8</u>.</li> <li>■ <u>B4</u>, connecting to LPFS8 slots <u>7–9</u>, ports <u>1–8</u>.</li> <li>■ <u>B6</u>, connecting to LPFS8 slots <u>10–12</u>, ports <u>1–8</u>.</li> <li>■ <u>C4</u>, connecting to LPFS8 slots <u>13–15</u>, ports <u>1–8</u>.</li> <li>■ <u>C6</u>, connecting to LPFS8 slots <u>16–18</u>, ports <u>1–8</u>.</li> <li>■ <u>D4</u>, connecting to LPFS8 slots <u>19–21</u>, ports <u>1–8</u>.</li> <li>■ <u>D6</u>, connecting to LPFS8 slots <u>22–24</u>, ports <u>1–8</u>.</li> </ul>

<sup>4</sup> The network service provider may choose to run 100 pair cables from the MDF to the D50. These 100 pair cables require four 25 pair Amp Champ male connectors to connect to four 25 pair cable stubs.

Table 6-27: LPFS8 to MDF Switch—25 Pair Cable Connection (continued)

STEP	PROCEDURE
5	<p>Connect the cables to the LPFS8 cable stubs, and tighten the screws on the Amp Champ connectors to secure, as follows (refer to Figure 6-57: LPFS8 Cabling Diagram, page 6-89 and Section 10—<i>Appendices</i>, Appendix I—“Cable/Pair Assignment Tables: LPFS8 with Sequential Pair Cabling,” page 10-129):</p> <ul style="list-style-type: none"><li>■ On the <u>right side</u> of the LPFS8:<ul style="list-style-type: none"><li>– Connect the <u>A4</u> cable to the <u>J13</u> cable stub.</li><li>– Connect the <u>B4</u> cable to the <u>J14</u> cable stub.</li><li>– Connect the <u>A6</u> cable to the <u>J21</u> cable stub.</li><li>– Connect the <u>B6</u> cable to the <u>J22</u> cable stub.</li></ul></li><li>■ On the <u>left side</u> of the LPFS8:<ul style="list-style-type: none"><li>– Connect the <u>D4</u> cable to the <u>J16</u> cable stub.</li><li>– Connect the <u>C4</u> cable to the <u>J15</u> cable stub.</li><li>– Connect the <u>D6</u> cable to the <u>J24</u> cable stub.</li><li>– Connect the <u>C6</u> cable to the <u>J23</u> cable stub.</li></ul></li></ul>

Table 6-27: LPFS8 to MDF Switch—25 Pair Cable Connection (continued)

STEP	PROCEDURE
6	<p><b>NOTE:</b> Some cables are drawn with "dashed" lines, for easier viewing. Cable lengths are not drawn to scale.</p> <p>Figure 6-57: LPFS8 Cabling Diagram</p>
7	<p>Are there additional LCSs and LPFS8s installed?</p> <ul style="list-style-type: none"> <li>■ If YES, repeat these procedures for each co-located LCS and LPFS8: <ul style="list-style-type: none"> <li>- <b>LPFS8 to IDF Cabling</b>, page 6-64.</li> <li>- <b>LPFS8 to MDF Subscriber Cabling</b>, page 6-77.</li> <li>- <b>LPFS8 to MDF Switch Cabling</b>, page 6-83.</li> </ul> </li> <li>■ If NO, the Chapter 5—“LPFS8 Cabling—Octal Line Cards (Data + Voice): Sequential Pair Cabling” procedure is complete.</li> </ul>

**Telco Connector Tables**

The following table shows the connections for four sequential pair cable assemblies at the LPFS8 backplane and the IDF cables, and the corresponding card slots and ports, using octal cards.

Table 6-28: Sequential Pair Cable Assembly Connections

Seq. Pair Cable #	Cable Ribbon Connectors (at LPFS8)	LPFS8 Backplane			Cable Amp Champ Connectors (at IDF)	IDF Cables	
		Connectors	Slots	Ports		Slots	Ports
1	P2	J1	1-6	1-4	P1, P3	1-3 (P1) 4-6 (P3)	1-8
	P4	J5		5-8			1-8
2	P2	J2	7-12	1-4	P1, P3	7-9 (P1) 10-12 (P3)	1-8
	P4	J6		5-8			1-8
3	P2	J3	13-18	1-4	P1, P3	13-15 (P1) 16-18 (P3)	1-8
	P4	J7		5-8			1-8
4	P2	J4	19-24	1-4	P1, P3	19-21 (P1) 22-24 (P3)	1-8
	P4	J8		5-8			1-8

The following table shows the LPFS8 backplane telco connectors, their corresponding card slots and ports, and their corresponding connections at the MDF cables, for ADSL data plus voice service, using octal cards.

Table 6-29: LPFS8 to MDF Connections

LPFS8 Backplane Connector	Connects to:	Cable	Card Slots	Card Ports
J9	Subscriber	A3	1-3	1-8
J10		B3	7-9	1-8
J11		C3	13-15	1-8
J12		D3	19-21	1-8
J13	Voice Switch	A4	1-3	1-8
J14		B4	7-9	1-8
J15		C4	13-15	1-8
J16		D4	19-21	1-8

Table 6-29: LPFS8 to MDF Connections (continued)

<b>LPFS8 Backplane Connector</b>	<b>Connects to:</b>	<b>Cable</b>	<b>Card Slots</b>	<b>Card Ports</b>
J17	Subscriber	A5	4–6	1–8
J18		B5	10–12	1–8
J19		C5	16–18	1–8
J20		D5	22–24	1–8
J21	Voice Switch	A6	4–6	1–8
J22		B6	10–12	1–8
J23		C6	16–18	1–8
J24		D6	22–24	1–8

For cable/pair assignment tables, refer to Section 10—*Appendices*, Appendix I—“Cable/Pair Assignment Tables: LPFS8 with Sequential Pair Cabling,” page 10-129.



## Chapter 6

### MTU Card Installation and Telco Cabling

---

#### Introduction

The Master Timing Unit (MTU) card provides network synchronization for the D50. The MTU card receives a DS1 signal from a BITS clock that can be traced to a Stratum level clock within the timing hierarchy. The DS1 signal can be in either ESF (Extended Super Frame) or SF (Super Frame) formats. The MTU card converts the 1.544 Mbps DS1 input signal and outputs a frame-aligned 8 kHz reference signal to the D50 trunk cards. When there are two Central Office BITS clocks, two MTU cards can be installed in the D50 Master Control Shelf (MCS). This provides a redundant path that allows for two separate references (one primary and one secondary), ensuring that D50 transmissions have the same average frequency as the digital network.

The D50 will display an alarm in Craft Terminal if the MTU card loses its external timing input or the card fails.

MTU cards are designed to be installed in slots 1 and 2 in the MCS, and to be used with the DS3TQ, OC3TQS, OC3TQM, and OC3TQL trunk cards. MTU cards are not designed to work with any other trunk cards.

For information on DS3TQ trunk card MTU provisioning, refer to the volume titled [Provisioning](#), Section 1—*Provisioning Concepts*, Chapter 9—“DS3 Trunk Provisioning.”

For information on OC3TQS, OC3TQM, and OC3TQL trunk card MTU provisioning, refer to the volume titled [Provisioning](#), Section 1—*Provisioning Concepts*, Chapter 10—“OC3 Trunk Provisioning.”

For information on MTU card front panel LEDs, refer to the volume titled [Commissioning](#), Section 5—*Commissioning*, Chapter 1—“Power Up and Visual Status Check,” and Section 6—*Appendices*, Appendix C—“Card Front Panel LED Indicators.”

This chapter provides detailed instructions on how to:

- Install one MTU card in the MCS in a Central Office with one BITS clock.
- Install two MTU cards in the MCS in a Central Office with two BITS clocks.
- Make the cabling connections between the MCS and either one or two BITS clocks.

**Required Tools and Equipment**

To begin this task, you must have the following equipment and tools (refer to Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers”).

- Electrostatic Discharge (ESD) Strap<sup>1</sup>.
- (1–2) MTU cards.
- (1–2) Unshielded Twisted Pair (UTP) cables, 26–28 gauge.

---

**Installing One MTU Card in the MCS**

Follow these steps to install one MTU card in the MCS when there is one Central Office BITS clock:

Table 6-30: Installing One MTU Card in the MCS

STEP	PROCEDURE
1	Refer to Section 2— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures” in this volume to do the following: <ul style="list-style-type: none"><li>■ Open and close the front panel on the MCS.</li><li>■ Attach a properly grounded ESD strap (important!).</li><li>■ Unlock, remove, insert, and lock MCS cards.</li></ul>
2	<b>Important! MCS card packaging contains IMPORTANT WARNINGS and INSTRUCTIONS on how to correctly handle cards. Follow these warnings and procedures carefully to prevent any electrostatic damage during installation.</b>
3	Carefully remove the MTU card from its packaging.

---

<sup>1</sup> The ESD strap is included in the MCS/ACSIP Installation Kit.

Table 6-30: Installing One MTU Card in the MCS (continued)

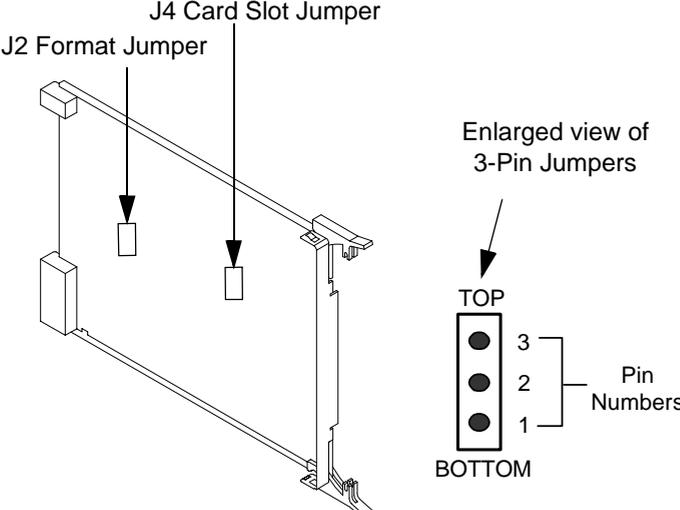
STEP	PROCEDURE
4	<p>Locate the two 3-pin jumpers on the side of each card.</p>  <p>The diagram shows an MTU card with two 3-pin jumpers. The J2 Format Jumper is located on the left side, and the J4 Card Slot Jumper is on the right side. An enlarged view of the 3-pin jumpers shows three pins labeled 1, 2, and 3, with 'TOP' and 'BOTTOM' labels. The pins are numbered 1, 2, and 3 from bottom to top.</p> <p><b>Figure 6-58: J2 and J4 3-Pin Jumpers on MTU Card</b></p> <ul style="list-style-type: none"> <li>■ <b>J4 Jumper</b>—This is the card slot jumper. A jumper shunt covers pins one and two, which is the jumper setting for card slot 1. Do not change this setting, as you will be inserting the MTU card into card slot 1.</li> <li>■ <b>J2 Jumper</b>—This is the format jumper. A jumper shunt covers pins one and two, which is the jumper setting for Super Frame format. If you prefer the Extended Super Frame format, take the following action:             <ul style="list-style-type: none"> <li>– Remove the J2 jumper shunt and place it over pins two and three.</li> </ul> </li> </ul>

Table 6-30: Installing One MTU Card in the MCS (continued)

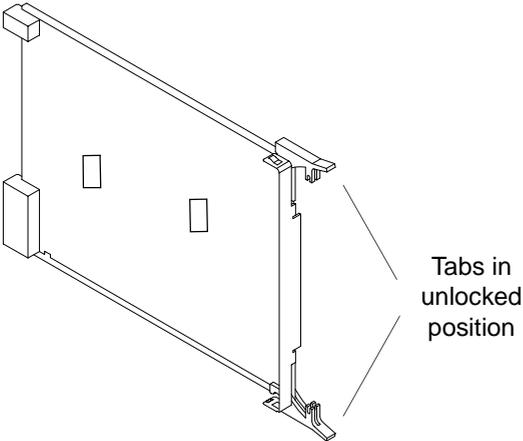
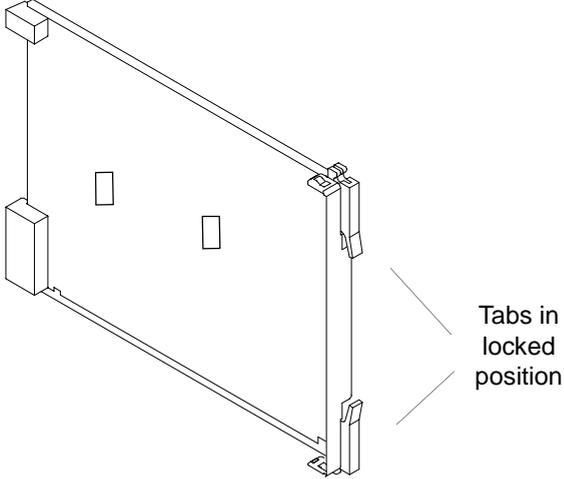
STEP	PROCEDURE
5	<p>Unlock the locking tabs on the MTU card by flipping the tabs out and away from the card to the unlocked position.</p>  <p>Figure 6-59: MTU Card with Tabs in the Unlocked Position</p>
6	<p>Slide the MTU card into slot #1 until it plugs into the backplane connector. Card slots in each assembly are designed with card guides, bottom and top, to properly align cards into position on the backplane.</p> <p><b>Important! DO NOT force the card into position. If it does not plug in easily, slide it back out and verify that you are placing it in the correct position and that the guides are aligned. Check for any obstructions or bent pins on the connectors that might prevent it from sliding easily into place.</b></p>

Table 6-30: Installing One MTU Card in the MCS (continued)

STEP	PROCEDURE
7	<p>Lock the locking tabs on the card by flipping the tabs down and in toward the card. Each tab must close around and into the square shaped hole in the assembly rails above and below the card. Press the tab into the locked position until you hear an audible “click.” The “click” indicates that the card is locked into position.</p>  <p style="text-align: center;">Figure 6-60: MTU Card with Tabs in the Locked Position</p>
8	<p>The Installing One MTU Card in the MCS procedure is complete.</p>

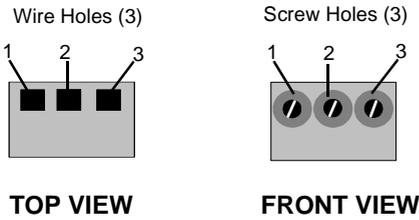
**MTU Cabling from the MCS to One BITS Clock**

Follow these steps to connect one Unshielded Twisted Pair (UTP) cable (Feed “1”) from the MCS to one BITS clock.:

Table 6-31: UTP Cabling from the MCS to One BITS Clock

STEP	PROCEDURE
1	<p>Refer to Section 2—<i>Basic Procedures</i>, Chapter 1—“Basic Procedures” in this volume to do the following:</p> <ul style="list-style-type: none"> <li>■ Open and close the front panel on the MCS.</li> <li>■ Remove and replace the top screen on the MCS.</li> <li>■ Attach a properly grounded ESD strap (important!).</li> </ul>
2	<p>There are three circuit boards above the MCS card cage:</p> <ul style="list-style-type: none"> <li>■ The CSIP Power and Distribution Board, located in the front right of the MCS.</li> <li>■ The CSIP Alarm Board, located on the left side of the MCS.</li> <li>■ The Backplane Circuit Board, located on the backplane of the MCS. A pair of <u>three-hole terminal blocks</u> (J19 and J18) are attached to the left side of the backplane. UTP Feed “1” cable is split and placed in wire holes on the <u>top</u> of the J19 block and tightened by screws on the <u>front</u> of the block. The J18 block is not used.</li> </ul> <div style="text-align: center;"> <p>The diagram shows a front view of the MCS hardware. At the top, there are three boards: the CSIP Alarm Board on the left side, the CSIP Power and Distribution Board on the front right, and the Backplane Circuit Board in the center. Below these is the Card Cage. On the left side of the Backplane Circuit Board, there are two 3-hole terminal blocks: J19 (used for Feed '1') and J18 (unused). Arrows point from the labels to the corresponding components in the diagram.</p> </div> <p>Figure 6-61: MCS Front View—Backplane 3-Hole Terminal Blocks</p>
3	<p>Cut one UTP cable (Feed “1”) to the correct length. It should be long enough to span the distance from the BITS clock to the J19 three-hole terminal block on the MCS Backplane Circuit Board.</p>
4	<p>Terminate the Feed “1” cable at the BITS clock, per local procedures.</p>

Table 6-31: UTP Cabling from the MCS to One BITS Clock (continued)

STEP	PROCEDURE
5	Route the cable across the horizontal cable racks and down the rack rails to the D50 MCS, per local procedures.
6	Using wire cutters, strip back insulation on the Feed “1” twisted pair by 1/4 inch (6 mm).
7	<p>Place the stripped ends of the two Feed “1” wires into wire hole Positions 2 and 3 on the top of the J19 terminal block (the block farthest to the <u>left</u> on the Backplane Circuit Board, facing the Board from the <u>front</u>).</p> <div style="text-align: center;">  <p>Figure 6-62: 3-Hole Terminal Block</p> </div> <p><b>Important! If you are using Shielded Twisted Pair cable, the shielding needs to be stripped back and inserted into the Position 1 wire hole. This wire is needed as a ground.</b></p>
8	Tighten the Position 2 and 3 screws (and the Position 1 screw, if necessary) on the front of the terminal block until a good connection is made with the wires. <u>Do not</u> exceed 4.5 inch pounds (0.5 N.m) torque.
9	The MTU Cabling from the MCS to One BITS Clock procedure is complete.

**Installing Two  
MTU Cards in  
the MCS**

Follow these steps to install two MTU cards in the MCS when there are two Central Office BITS clocks:

Table 6-32: Installing Two MTU Cards in the MCS

<b>STEP</b>	<b>PROCEDURE</b>
<b>1</b>	Refer to Section 2— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures” in this volume to do the following: <ul style="list-style-type: none"><li>■ Open and close the front panel on the MCS.</li><li>■ Attach a properly grounded ESD strap (important!).</li><li>■ Unlock, insert, and lock MCS cards.</li></ul>
<b>2</b>	<b>Important! MCS card packaging contains IMPORTANT WARNINGS and INSTRUCTIONS on how to correctly handle cards. Follow these warnings and procedures carefully to prevent any electrostatic damage during installation.</b>
<b>3</b>	Carefully remove the MTU cards from their packaging.

Table 6-32: Installing Two MTU Cards in the MCS (continued)

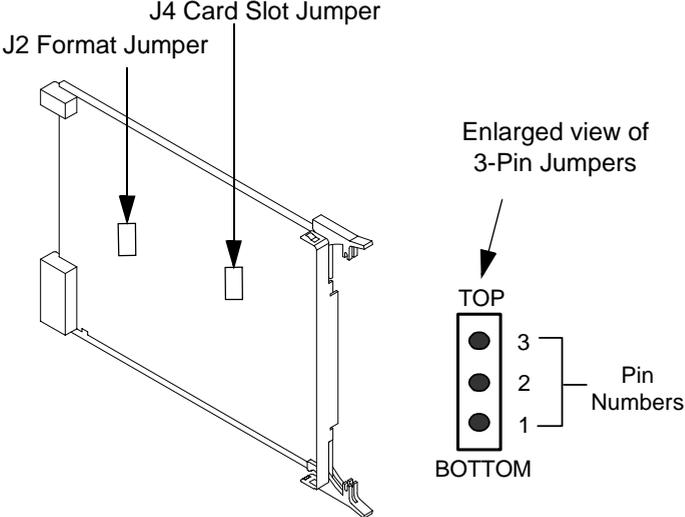
STEP	PROCEDURE
4	<p>Locate the two 3-pin jumpers on the side of each card.</p>  <p>Figure 6-63: J2 and J4 3-Pin Jumpers on MTU Card</p> <ul style="list-style-type: none"> <li> <p>■ <b>J4 Jumper</b>—This is the card slot jumper (corresponding to card slots 1 and 2). A jumper shunt covers pins one and two on both cards. This is the jumper setting for card slot 1. Take the following action:</p> <ul style="list-style-type: none"> <li>– Remove the J4 jumper shunt from <u>one</u> of the two MTU cards and place it over pins two and three. This is the jumper setting for card slot 2. Neither MTU card will function until this change has been made.</li> </ul> </li> <li> <p>■ <b>J2 Jumper</b>—This is the format jumper (corresponding to Super Frame [SF] and Extended Super Frame [ESF] formats). A jumper shunt covers pins one and two on both cards. Both jumpers are currently set to SF format. If you prefer the ESF format, take the following actions:</p> <ul style="list-style-type: none"> <li>– Remove the J2 jumper shunts from <u>both</u> MTU cards and place them over pins two and three. Note that neither MTU card will function if one jumper is set to one format, and the second is set to a different format.</li> </ul> </li> </ul>

Table 6-32: Installing Two MTU Cards in the MCS (continued)

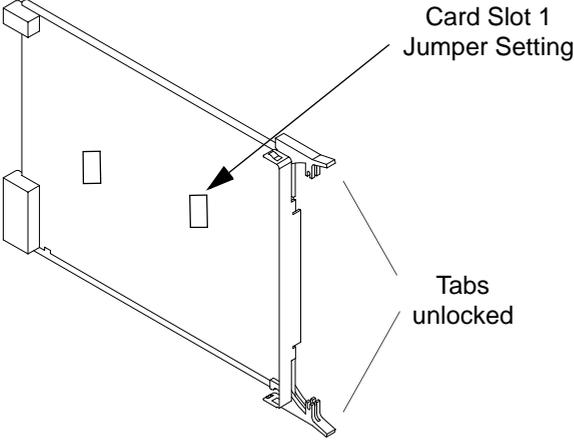
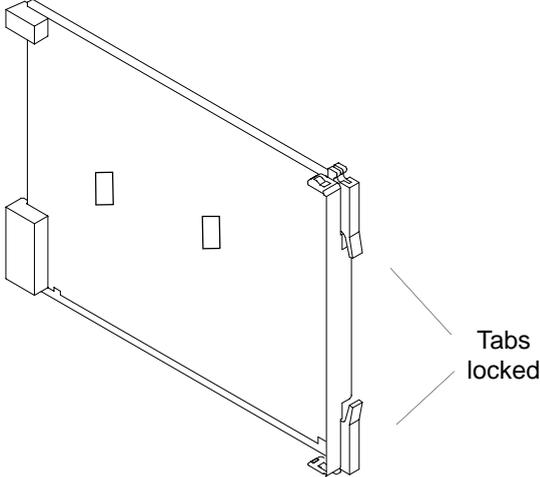
STEP	PROCEDURE
5	<p>Locate the MTU card with the card slot 1 jumper setting. Unlock the locking tabs on the card by flipping the tabs out and away from the card to the unlocked position.</p>  <p>Figure 6-64: MTU Card with Tabs in the Unlocked Position</p>
6	<p>Slide the MTU card into slot #1 until it plugs into the backplane connector. Card slots in each assembly are designed with card guides, bottom and top, to properly align cards into position on the backplane.</p> <p><b>Important! DO NOT force the card into position. If it does not plug in easily, slide it back out and verify that you are placing it in the correct position and that the guides are aligned. Check for any obstructions or bent pins on the connectors that might prevent it from sliding easily into place.</b></p>

Table 6-32: Installing Two MTU Cards in the MCS (continued)

STEP	PROCEDURE
7	<p>Lock the locking tabs on the card by flipping the tabs down and in toward the card. Each tab must close around and into the square shaped hole in the assembly rails above and below the card. Press the tab into the locked position until you hear an audible “click.” The “click” indicates that the card is locked into position.</p>  <p style="text-align: center;">Figure 6-65: MTU Card with Tabs in the Locked Position</p>
8	<p>Locate the MTU card with the card slot 2 jumper setting. Unlock the locking tabs on the card by flipping the tabs out and away from the card to the unlocked position.</p>
9	<p>Slide the MTU card into slot #2 until it plugs into the backplane connector. Card slots in each assembly are designed with card guides, bottom and top, to properly align cards into position on the backplane.</p> <p><b>Important! DO NOT force the card into position. If it does not plug in easily, slide it back out and verify that you are placing it in the correct position and that the guides are aligned. Check for any obstructions or bent pins on the connectors that might prevent it from sliding easily into place.</b></p>
10	<p>Lock the locking tabs as described in Step 7 above.</p> <p>The Installing Two MTU Cards in the MCS procedure is complete.</p>

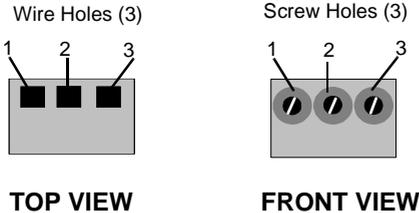
**MTU Cabling from the MCS to the Two BITS Clocks**

Follow these steps to connect two Unshielded Twisted Pair (UTP) cables (Feed “1” and Feed “2”) from the MCS to the two BITS clocks:

Table 6-33: UTP Cabling from the MCS to the Two BITS Clocks

STEP	PROCEDURE
1	<p>Refer to Section 2—<i>Basic Procedures</i>, Chapter 1—“Basic Procedures” in this volume to do the following:</p> <ul style="list-style-type: none"> <li>■ Open and close the front panel on the MCS.</li> <li>■ Remove and replace the top screen on the MCS.</li> <li>■ Attach a properly grounded ESD strap (important!).</li> </ul>
2	<p>There are three circuit boards above the MCS card cage:</p> <ul style="list-style-type: none"> <li>■ The CSIP Power and Distribution Board, located in the front right of the MCS.</li> <li>■ The CSIP Alarm Board, located on the left side of the MCS.</li> <li>■ The Backplane Circuit Board, located on the backplane of the MCS. A pair of <u>three-hole terminal blocks</u> (J19 and J18) are attached to the left side of the backplane. UTP cables (Feed “1” and Feed “2”) are placed in wire holes on the <u>top</u> of these blocks and are tightened by screws on the <u>front</u> of these blocks.</li> </ul> <div style="text-align: center;"> <p>The diagram shows a front view of the MCS hardware. At the top, there are three boards: the CSIP Alarm Board on the left, the CSIP Power and Distribution Board on the right, and the Backplane Circuit Board in the center. The Backplane Circuit Board is highlighted with a large oval. On its left side, two 3-hole terminal blocks are shown: J19 for Feed '1' and J18 for Feed '2'. Below the boards is the Card Cage. Arrows point from the labels to the corresponding components in the diagram.</p> </div> <p style="text-align: center;">Figure 6-66: MCS Front View—Backplane 3-Hole Terminal Blocks</p>
3	<p>Cut two UTP cables (Feeds “1” and “2”) to the correct length. They should be long enough to span the distance from the two BITS clocks to the three-hole terminal blocks on the MCS Backplane Circuit Board.</p>

Table 6-33: UTP Cabling from the MCS to the Two BITS Clocks (continued)

STEP	PROCEDURE
4	Terminate the Feed “1” cable at first BITS clock, and the Feed “2” cable at the second BITS clock, per local procedures.
5	Route the cables across the horizontal cable racks and down the rack rails to the D50 MCS, per local procedures.
6	Using wire cutters, strip back insulation on the Feed “1” and “2” twisted pairs by 1/4 inch (6 mm).
7	<p>Place the stripped ends of the two Feed “1” wires into wire hole Positions 2 and 3 on the top of the Feed “1” (J19) terminal block (the block farthest to the <u>left</u> on the Backplane Circuit Board, facing the Board from the <u>front</u>).</p> <div style="text-align: center;">  <p><b>TOP VIEW</b>                      <b>FRONT VIEW</b></p> </div> <p>Figure 6-67: 3-Hole Terminal Block</p> <p><b>Important! If you are using Shielded Twisted Pair cable, the shielding needs to be stripped back and inserted into the Position 1 wire hole. This wire is needed as a ground.</b></p>
8	Tighten the Position 2 and 3 screws (and the Position 1 screw, if necessary) on the front of the terminal block until a good connection is made with the wires. <u>Do not</u> exceed 4.5 inch pounds (0.5 N.m) torque.
9	<p>Place the stripped ends of the two Feed “2” wires into wire hole Positions 2 and 3 on the top of the Feed “2” (J18) terminal block (the block farthest to the <u>right</u> on the Backplane Circuit Board, facing the board from the <u>front</u>).</p> <p><b>Important! If you are using Shielded Twisted Pair cable, the shielding needs to be stripped back and inserted into the Position 1 wire hole. This wire is needed as a ground.</b></p>
10	Tighten the Position 2 and 3 screws (and the Position 1 screw, if necessary) on the front of the terminal block until a good connection is made with the wires. <u>Do not</u> exceed 4.5 inch pounds (0.5 N.m) torque.
11	The MTU Cabling from the MCS to the Two BITS Clocks procedure is complete.



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## SECTION 7 ETHERNET AND ALARM BOARD CABLING

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# Chapter 1

## Craft Terminal Ethernet Cabling

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**Introduction** This chapter provides descriptions of the Ethernet cabling options for Craft Terminal, and detailed instructions for making Ethernet cable connections at the D50.

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- Cabling Options** Craft Terminal can access the D50 over a WAN or ATM network using one of the following options:
- 1 Through an Ethernet 10Base-T connection to a WAN network. In this arrangement, Craft Terminal can access any D50 over a WAN network. Refer to Figure 7-1: Ethernet Connection to the Network, below.
  - 2 Through an In-Band Management connection. In this arrangement, Craft Terminal can access any D50 on the ATM network via a VPI/VCI connection. Refer to Figure 7-2: In-Band Management Connection to the D50, page 7-2.

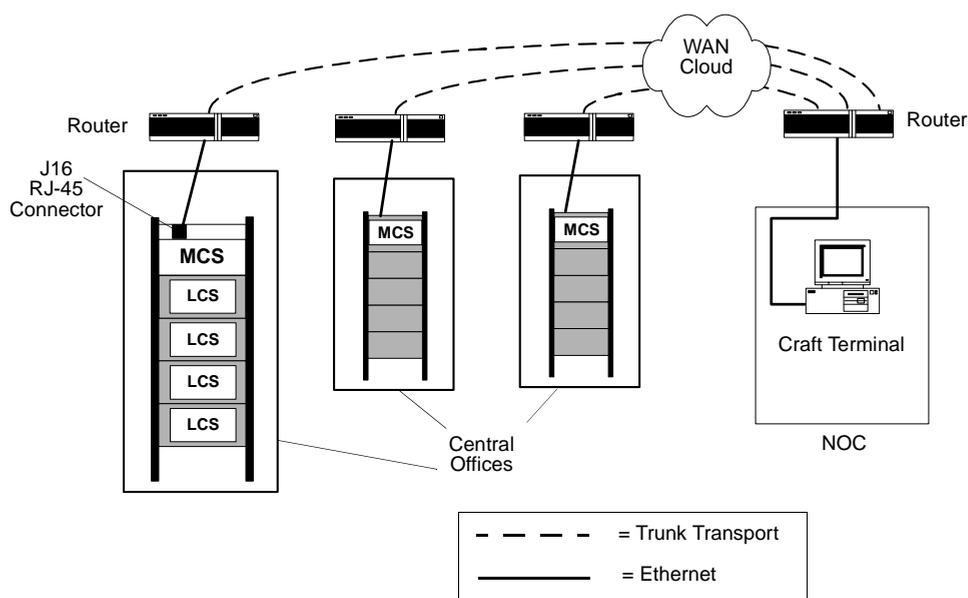


Figure 7-1: Ethernet Connection to the Network

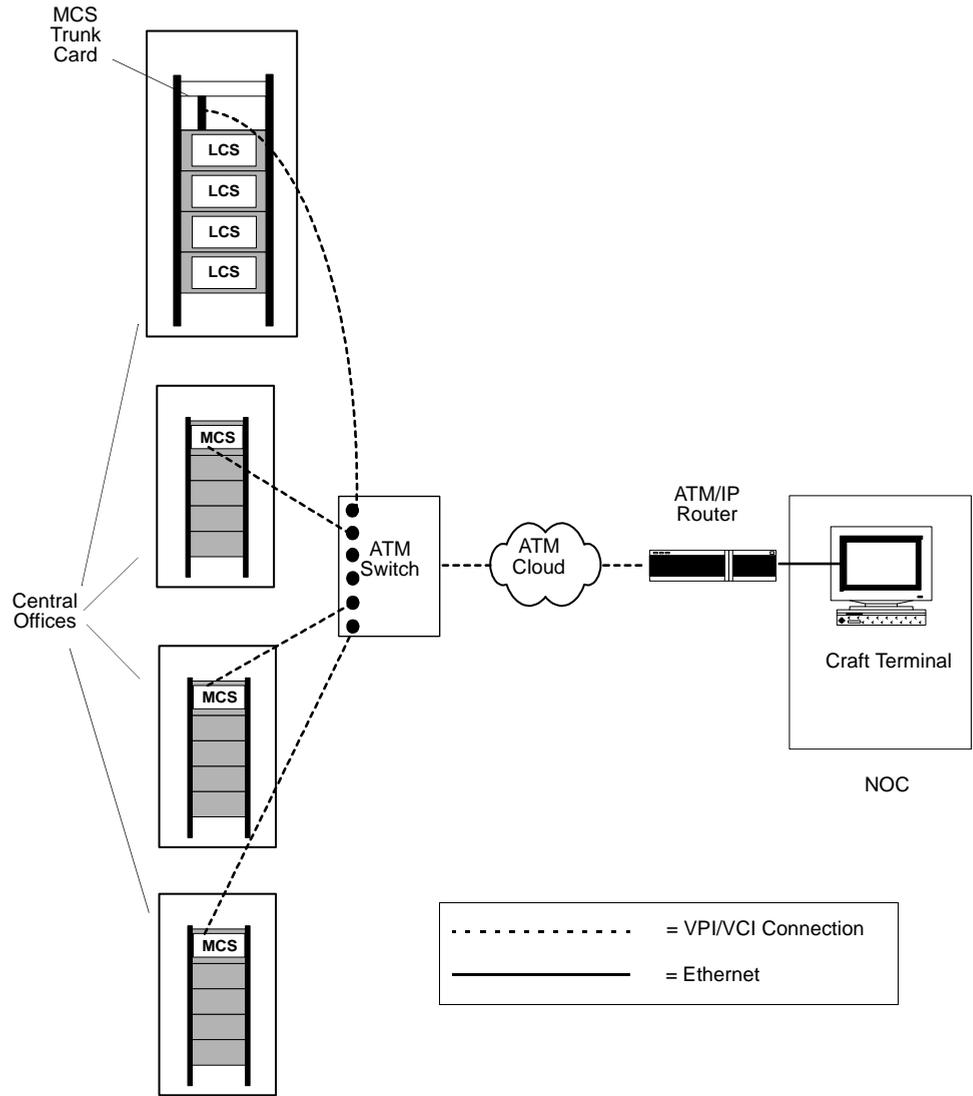


Figure 7-2: In-Band Management Connection to the D50

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**Required Equipment**

To set up a Craft Terminal Ethernet cable connection (Option 1) to the D50, you must have the following equipment (refer to Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers”):

- (1) Ethernet 10Base-T cable with RJ-45 male plugs on both ends for each D50 on the network.
- (1) EMI filter ferrite for each Ethernet cable connected to a D50.
- (1) open port on a router connected to the WAN network, for each Ethernet cable.

For the Ethernet network connection, refer to **Ethernet Connection Set-up**, below.

For the In-Band Management connection, refer to **In-Band Management Connection Set-up**, page 7-5.

**Ethernet Connection Set-up**

Follow these instructions to set up a Craft Terminal Ethernet cable connection Option 1):

Table 7-1: Ethernet Connection Set-up

STEP	PROCEDURE
1	Make the Ethernet cable connection at the router in the Central Office, and route the cable across the horizontal cable rack and down the relay rack rails to the D50 Master Control Shelf (MCS), following local procedures. Refer to the diagram on page 7-1.
2	Refer to Section 2— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures,” page 2-1 to do the following: <ul style="list-style-type: none"> <li>■ Locate the MCS cable ports.</li> <li>■ Remove and replace the MCS top screen.</li> </ul>
3	To connect an Ethernet cable to a D50, push the cable through one of the large cable ports at the back of the MCS.

Table 7-1: Ethernet Connection Set-up (continued)

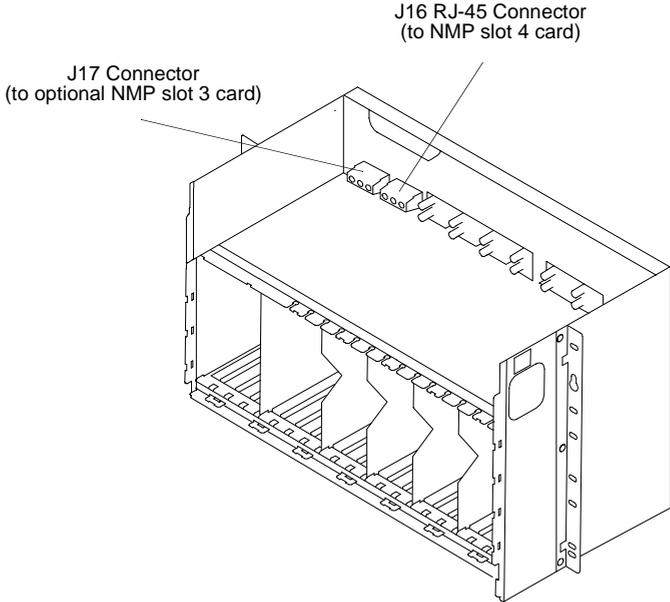
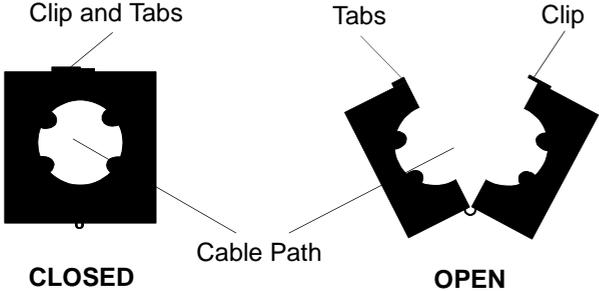
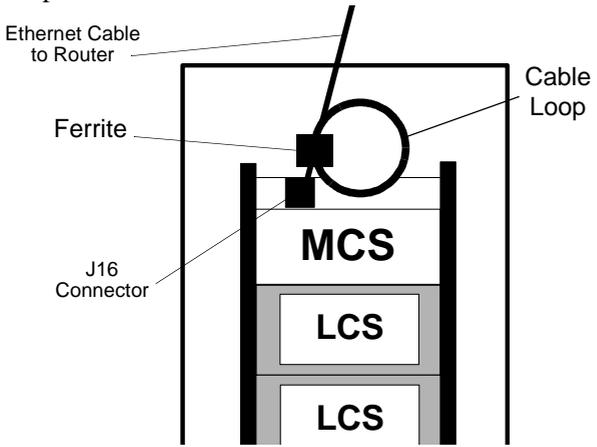
STEP	PROCEDURE
<p><b>4</b></p>	<p>From the front of the MCS, connect the cable to the J16 RJ-45 connector. This connects to the Network Management Processor (NMP) card in slot 4.</p>  <p>The diagram shows a perspective view of the MCS backplane. Two RJ-45 connectors are highlighted with callout lines. The one on the right is labeled 'J16 RJ-45 Connector (to NMP slot 4 card)' and the one on the left is labeled 'J17 Connector (to optional NMP slot 3 card)'. The backplane has several slots and a handle on the right side.</p> <p>Figure 7-3: Ethernet Connector Locations on the MCS Backplane</p>
<p><b>5</b></p>	<p>For a permanent connection, an EMI filter ferrite must be installed on the Ethernet cable. Open the ferrite by lifting the double clip off the small tabs.</p>  <p>The diagram shows two views of an EMI filter ferrite. The left view is labeled 'CLOSED' and shows a square ferrite with a central hole and four small tabs. A label 'Clip and Tabs' points to the top edge. The right view is labeled 'OPEN' and shows the ferrite split into two halves. Labels 'Tabs' and 'Clip' point to the top edges of the two halves. A label 'Cable Path' points to the central hole. The words 'CLOSED' and 'OPEN' are printed below their respective diagrams.</p> <p>Figure 7-4: EMI Filter Ferrite</p>

Table 7-1: Ethernet Connection Set-up (continued)

STEP	PROCEDURE
<p><b>6</b></p>	<p>The cable can be “looped” through the ferrite to hold the ferrite in place. Wrap the cable into a loop near the J16 connector, and clip the ferrite around the loop within 25 mm of the connector.</p>  <p style="text-align: center;">Figure 7-5: Ethernet Connection with Ferrite</p>
<p><b>7</b></p>	<p>Contact the Network Administrator to connect Craft Terminal to an Ethernet router at the Network Operations Center (NOC). Refer to Figure 7-1: Ethernet Connection to the Network, page 7-1.</p>
<p><b>8</b></p>	<p>The Ethernet Connection Set-up procedure is complete.</p>

**In-Band Management Connection Set-up**

In-Band Management does not require an additional physical connection at the D50. Craft Terminal can access the D50 through the trunk card via a VPI/VCI connection over the ATM network. (For ATM network cabling, refer to Section 4—*ATM Network Cabling* in this volume.)

Contact the Network Administrator to connect Craft Terminal to an ATM/IP router on the network at the NOC.



## Chapter 2

### Alarm Board Connections

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#### Introduction

D50 visual, audible, fuse and remote input alarm connections are made at the Master Control Shelf (MCS) Common Systems Interface Panel (CSIP) Alarm Board<sup>1</sup>. The Alarm Board is located inside the MCS above the card bays. The drawing below illustrates CSIP Alarm Board connections. This chapter provides detailed instructions on how to make D50 alarm connections.

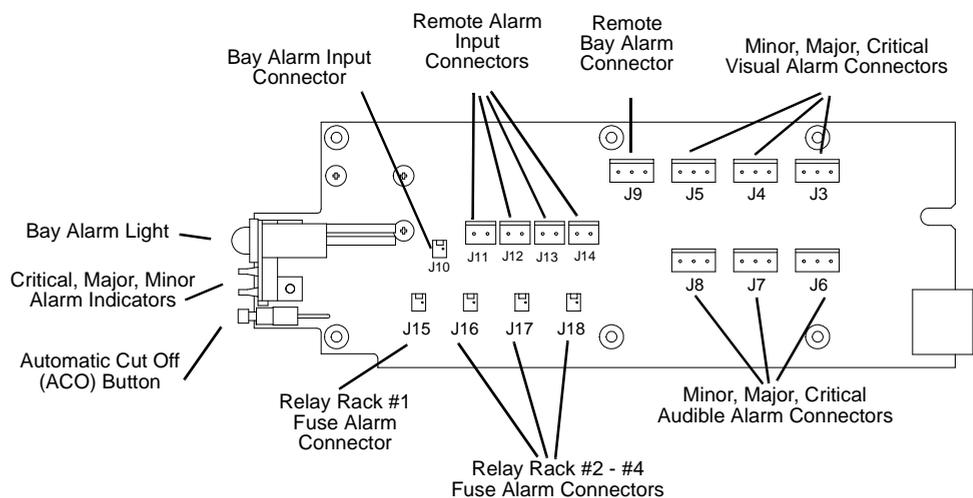


Figure 7-6: Alarm Board Connectors

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#### Required Tools and Equipment

To begin this task you must have the following equipment and tools (refer to Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers”):

- Small flat-blade screwdriver (for 5mm plugs).
- Flats or wire cutters.
- Electrostatic Discharge (ESD) Strap.
- (4) 2-position vertical (180°) 5mm pluggable terminal blocks.
- (7) 3-position vertical (180°) 5mm pluggable terminal blocks.
- (1) 84-inch fuse alarm wire with 2-position IDC socket connectors.
- (1) 110-inch fuse alarm wire with 2-position IDC socket connectors.
- (1) 136-inch fuse alarm wire with 2-position IDC socket connectors.

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<sup>1</sup> The CSIP Alarm Board will be referred to as the Alarm Board throughout this procedure.

Visual, Audible and Bay Alarm wires are connected and run from the Central Office alarm terminal block across the horizontal cable racks to the D50 by the network service provider or by a D50 technician.

---

**Visual Alarm Connections**

Follow these steps to complete critical, major and minor Visual Alarm connections at connectors J3 through J5:

Table 7-2: Visual Alarm Connections

<b>STEP</b>	<b>PROCEDURE</b>
<b>1</b>	<b>Important! A properly grounded ESD strap must be worn at all times while making connections on the alarm board.</b>
<b>2</b>	Connect Visual, Audible and Remote Bay alarm wires to the Central Office terminal block as required following local procedures.
<b>3</b>	Route the 22 AWG alarm wires from the Central Office terminal block across the horizontal cable rack, and down the relay rack rails to the D50 Master Control Shelf following local procedures.
<b>4</b>	Refer to Section 2— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures,” page 2-1 to: <ul style="list-style-type: none"><li>■ Locate the MCS cable ports.</li><li>■ Attach a properly grounded ESD strap (important!).</li><li>■ Remove and replace the MCS front panel.</li><li>■ Remove and replace the MCS top screen.</li></ul>
<b>5</b>	Push the wires through one of the large cable ports at the back of the MCS.
<b>6</b>	Pull the alarm wires from the back of the Master Control Shelf through to the front and over to the Alarm Board.

Table 7-2: Visual Alarm Connections (continued)

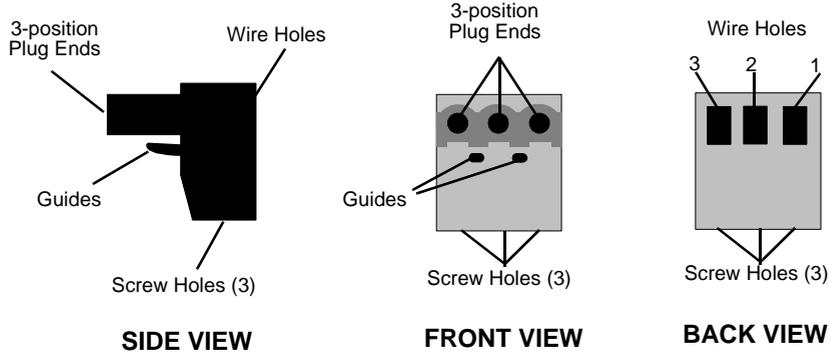
STEP	PROCEDURE
<p><b>7</b></p>	<p>Visual alarm connections are made with 3-position vertical (180°) 5mm pluggable terminal blocks.</p>  <p style="text-align: center;"><b>Figure 7-7: 3-Position Terminal Block</b></p> <p>Positions on each terminal block are identified as:</p> <ul style="list-style-type: none"> <li>■ Position 1 (right) – Normally Open (NO).</li> <li>■ Position 2 (center) – Common (COM).</li> <li>■ Position 3 (left) – Normally Closed (NC).</li> </ul> <p>Wiring for each terminal block requires two wires:</p> <ul style="list-style-type: none"> <li>■ One wire in Position 1 and one wire in Position 2 for “NO” relay contacts, or</li> <li>■ One wire in Position 2 and one wire in Position 3 for “NC” relay contacts.</li> </ul>
<p><b>8</b></p>	<p>Using wire cutters, strip back insulation on two visual alarm wires by ¼ inch.</p>
<p><b>9</b></p>	<p>Insert wires into Positions 1 and 2, or Positions 2 and 3 of the terminal block for connector J3 (Critical Visual Alarm connector), according to requirements of the network service provider, for a normally open or normally closed relay contact. Refer to Step 7.</p>
<p><b>10</b></p>	<p>Tighten the screws on the terminal block until a good connection is made, <u>do not</u> exceed 4.5 inch pounds torque.</p>

Table 7-2: Visual Alarm Connections (continued)

STEP	PROCEDURE
<p><b>11</b></p>	<p>Visual Alarm connectors are identified as J3 (Critical), J4 (Major), and J5 (Minor).</p> <div> <p>The diagram shows a rectangular alarm board with various connectors. At the top right, three connectors are labeled J9, J5, J4, and J3. Three arrows point from the text 'Minor, Major, Critical Visual Alarm Connectors' to these three connectors. Below them are connectors J8, J7, and J6. In the center, there are four connectors labeled J11, J12, J13, and J14. At the bottom left, there are four connectors labeled J15, J16, J17, and J18. On the left side, there is a larger connector labeled J10. There are also several circular symbols scattered across the board.</p> </div> <p>Figure 7-8: Alarm Board—Visual Alarm Connectors</p>
<p><b>12</b></p>	<p>Plug the wired Critical Visual Alarm terminal block into connector J3.</p>
<p><b>13</b></p>	<p>Repeat Steps 8 through 12 for Visual Alarm connectors J4 (major) and J5 (minor) as required.</p>
<p><b>14</b></p>	<p>Dress, tie and label wiring following local procedures after all Visual Alarm wire connections (J3, J4, and J5) are completed.</p>
<p><b>15</b></p>	<p>Continue to the next procedure: <b>Audible Alarm Connections.</b></p>

**Audible Alarm Connections**

Follow these steps to complete critical, major and minor Audible Alarm connections at connectors J6 through J8:

Table 7-3: Audible Alarm Connections

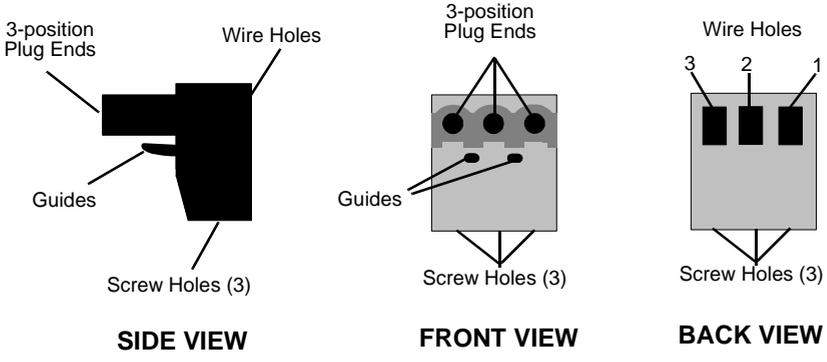
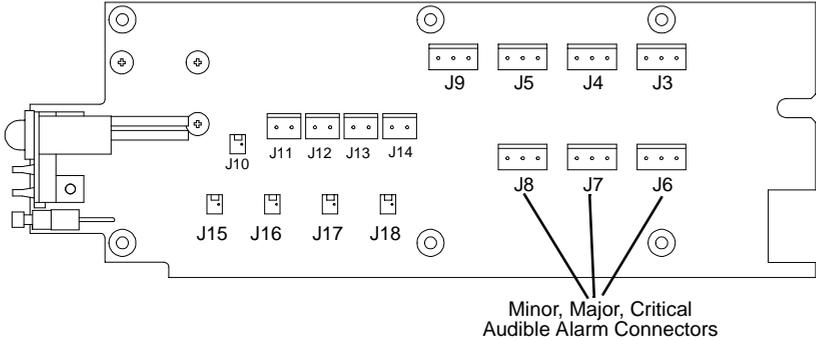
STEP	PROCEDURE
1	<b>Important! A properly grounded ESD strap must be worn at all times while making connections on the alarm board.</b>
2	<p>Audible Alarm connections are made with 3-position vertical (180°) 5mm pluggable terminal blocks.</p>  <p style="text-align: center;">Figure 7-9: 3-Position Terminal Block</p> <p>Positions on each terminal block are identified as:</p> <ul style="list-style-type: none"> <li>■ Position 1 (right) – Normally Open (NO).</li> <li>■ Position 2 (center) – Common (COM).</li> <li>■ Position 3 (left) – Normally Closed (NC).</li> </ul> <p>Wiring for each terminal block requires two wires:</p> <ul style="list-style-type: none"> <li>■ One wire in Position 1 and one wire in Position 2 for “NO” relay contacts, or</li> <li>■ One wire in Position 2 and one wire in Position 3 for “NC” relay contacts.</li> </ul>
3	Using wire cutters, strip back insulation on two audible alarm wires by ¼ inch.
4	Insert wires into Positions 1 and 2, or Positions 2 and 3 of the terminal block for connector J6 (Critical Audible Alarm connector), according to requirements of the network service provider, for a normally open or normally closed relay contact. Refer to Step 2.
5	Tighten the screws on the terminal block until a good connection is made. <u>Do not</u> exceed 4.5 inch pounds torque.

Table 7-3: Audible Alarm Connections (continued)

STEP	PROCEDURE
<p><b>6</b></p>	<p>Audible Alarm connectors are identified as J6 (Critical), J7 (Major), and J8 (Minor).</p>  <p style="text-align: center;">Minor, Major, Critical Audible Alarm Connectors</p> <p style="text-align: center;"><b>Figure 7-10: Alarm Board—Audible Alarm Connectors</b></p>
<p><b>7</b></p>	<p>Plug the wired Critical Audible Alarm terminal block into connector J6.</p>
<p><b>8</b></p>	<p>Repeat Steps 3 through 7 for Audible Alarm connectors J7 (major) and J8 (minor) as required.</p>
<p><b>9</b></p>	<p>Dress, tie and label wiring following local procedures after all Audible Alarm wire connections (J6, J7, and J8) are completed.</p>
<p><b>10</b></p>	<p>Continue to the next procedure: <b>Remote Bay Alarm Connection.</b></p>

**Remote Bay Alarm Connection**

The Remote Bay Alarm connection is used to wire the Bay Alarm to a remote site; for example, a Network Operations Center.

Follow these steps to complete the Remote Bay Alarm connection at connector J9:

Table 7-4: Remote Bay Alarm Connection

STEP	PROCEDURE
1	<p><b>Important! A properly grounded ESD strap must be worn at all times while making connections on the alarm board.</b></p>
2	<p>The Remote Bay Alarm connection is made with a 3-position vertical (180°) 5mm pluggable terminal block.</p> <div style="text-align: center;"> <p><b>SIDE VIEW                      FRONT VIEW                      BACK VIEW</b></p> </div> <p>Figure 7-11: 3-Position Terminal Block</p> <p>Positions on the terminal block are identified as:</p> <ul style="list-style-type: none"> <li>■ Position 1 (right) – Normally Open (NO).</li> <li>■ Position 2 (center) – Common (COM).</li> <li>■ Position 3 (left) – Normally Closed (NC).</li> <li>■ One wire in Position 1 and one wire in Position 2 for “NO” relay contacts, or</li> <li>■ One wire in Position 2 and one wire in Position 3 for “NC” relay contacts.</li> </ul>
3	<p>Using wire cutters, strip back insulation on two remote bay alarm wires by ¼ inch.</p>
4	<p>Insert wires into Positions 1 and 2, or Positions 2 and 3 of the terminal block for connector J9 (Remote Bay Alarm connector), according to requirements of the network service provider, for a normally open or normally closed relay contact. Refer to Step 2.</p>
5	<p>Tighten the screws on the terminal block until a good connection is made. <u>Do not</u> exceed 4.5 inch pounds torque.</p>

Table 7-4: Remote Bay Alarm Connection (continued)

STEP	PROCEDURE
<p><b>6</b></p>	<p>The Remote Bay Alarm connector is identified as J9.</p> <div> </div> <p>Figure 7-12: Alarm Board—Remote Bay Alarm Connector</p>
<p><b>7</b></p>	<p>Plug the wired Remote Bay Alarm terminal block into connector J9.</p>
<p><b>8</b></p>	<p>Dress, tie and label wiring following local procedures after the Bay Alarm wire connection is completed.</p>
<p><b>9</b></p>	<p>Does the D50 have more than three Line Card Shelves?</p> <ul style="list-style-type: none"> <li>■ If YES, skip to the next procedure: <b>Relay Rack Fuse Alarm Connections</b>, page 7-15.</li> <li>■ If NO, continue to Step 10.</li> </ul>
<p><b>10</b></p>	<p>Does the D50 require user defined Remote Alarm Inputs?</p> <ul style="list-style-type: none"> <li>■ If YES, skip to <b>Remote Alarm Input Connections</b>, page 7-18.</li> <li>■ If NO, continue to Step 11.</li> </ul>
<p><b>11</b></p>	<p>The Alarm Board Connections procedure is complete.</p>

**Relay Rack Fuse Alarm Connections**

Relay Rack Fuse Alarm connections are provided for a D50, with up to four relay racks:

- J15 = Relay Rack #1
- J16 = Relay Rack #2
- J17 = Relay Rack #3
- J18 = Relay Rack #4

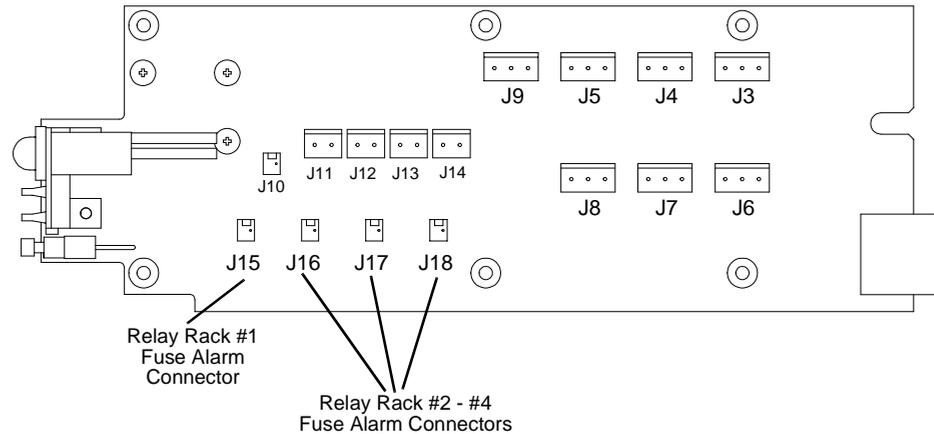


Figure 7-13: Alarm Board—Relay Rack Fuse Alarm Connectors

The Master Control Shelf (MCS) is shipped with the Relay Rack #1 Fuse Alarm pre-wired. There is no additional wiring required for the Relay Rack Fuse Alarm if you are installing a D50 made up of an MCS and up to three Line Card Shelves (LCS). The following instructions apply only if you are installing a D50 with more than three Line Card Shelves.

**Required Tools and Equipment**

The connector wires with IDC socket connectors and 22 AWG wire required to make Relay Rack #2, #3, and #4 Fuse Alarm connections are shipped with the Auxiliary Common Systems Interface Panel (CSIP) units. Auxiliary CSIPs are required to distribute power to an additional rack of Line Card Shelves and to provide the fuse alarm connection to the Master Control Shelf (MCS) Alarm Board. Refer to Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers.”

- (1) 84-inch fuse alarm wire with 2-position IDC socket connectors for Relay Rack #2.
- (1) 110-inch fuse alarm wire with 2-position IDC socket connectors for Relay Rack #3.
- (1) 136-inch fuse alarm wire with 2-position IDC socket connectors for Relay Rack #4.

**Relay Rack #2 through #4 Fuse Alarm Connections**

Follow these instructions to complete Relay Rack #2 through #4 Fuse Alarm connections at the MCS Alarm Board:

Table 7-5: Relay Rack #2 through #4 Fuse Alarm Connections

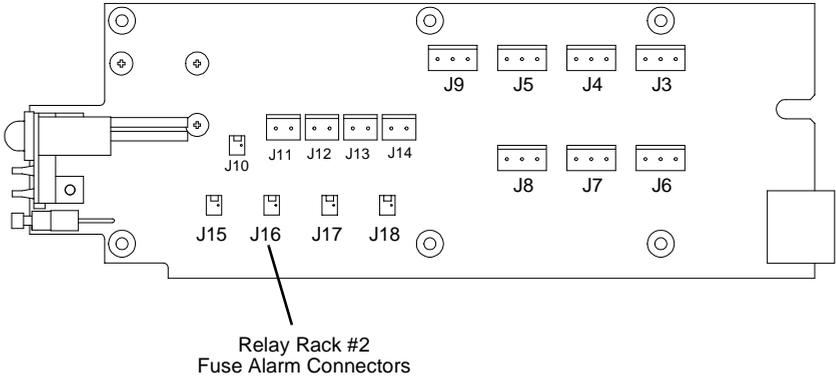
STEP	PROCEDURE
1	<b>Important! A properly grounded ESD strap must be worn at all times while making connections on the alarm board.</b>
2	<p>Terminate the <u>84 inch wire</u> with IDC connectors on the J16 Relay Rack #2 Fuse Alarm pin connector.</p>  <p>Figure 7-14: Alarm Board—Relay Rack Fuse Alarm Connectors</p>
3	<p>Are there additional relay racks that require fuse alarm connections?</p> <ul style="list-style-type: none"> <li>■ If YES, continue to Step 4.</li> <li>■ If NO, skip to Step 5.</li> </ul>
4	<p>Repeat Step 2 for each Relay Rack Fuse Alarm required:</p> <ul style="list-style-type: none"> <li>■ Relay Rack #3—terminate the <u>110 inch wire</u> with IDC connectors on the J17 Relay Rack #3 Fuse Alarm pin connector.</li> <li>■ Relay Rack #4—terminate the <u>136 inch wire</u> with IDC connectors on the J18 Relay Rack #4 Fuse Alarm pin connector.</li> </ul>
5	Dress, tie and label wiring following local procedures after all Relay Rack Fuse Alarm connections (J16, J17, J18) are completed.
6	Route the Fuse Alarm wire(s) through the large cable port at the back of the MCS.

Table 7-5: Relay Rack #2 through #4 Fuse Alarm Connections (continued)

STEP	PROCEDURE
7	Go to the back of the Master Control Shelf and pull Fuse Alarm wire(s) through the cable port.
8	Route the alarm wire(s) from the back of the MCS assembly along the relay rack rails up to the horizontal cable rack for connection to the Auxiliary CSIP(s).
9	Continue to the next procedure: <b>Fuse Alarm Connections at the Auxiliary CSIP.</b>

**Fuse Alarm Connections at the Auxiliary CSIP**

Follow these instructions to complete Relay Rack #2 through #4 Fuse Alarm connections at the Auxiliary CSIP(s):

Table 7-6: Fuse Alarm Connections at the Auxiliary CSIP

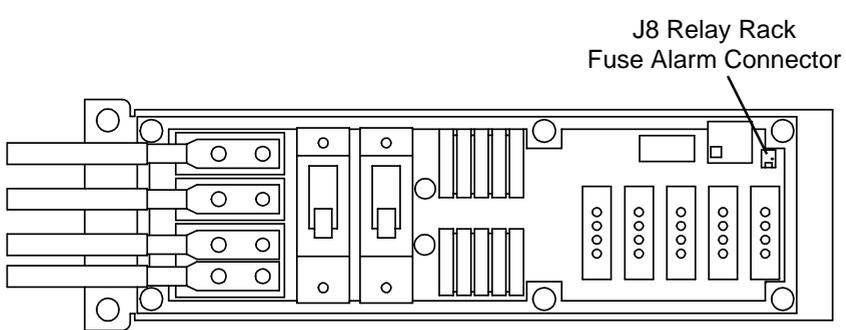
STEP	PROCEDURE
1	Bring the <u>84 inch</u> Fuse Alarm wire (connected to the MCS Alarm Board J16 connector) down from the horizontal cable rack along the relay rack rails to the Relay Rack #2 Auxiliary CSIP.
2	Route the wire through the cable opening at the back of the Auxiliary CSIP assembly.
3	Refer to Section 2— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures,” page 2-1 to do the following: <ul style="list-style-type: none"> <li>■ Remove and replace Auxiliary CSIP front panel.</li> <li>■ Remove and replace Auxiliary CSIP top screen.</li> </ul>
4	Bring the wire to the front of the CSIP board and terminate it on the Fuse Alarm connector (J8).
	
<p>Figure 7-15: CSIP—Relay Rack Fuse Alarm Connection</p>	
5	Replace the Auxiliary CSIP front panel. Refer to Section 2— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures,” page 2-1.

Table 7-6: Fuse Alarm Connections at the Auxiliary CSIP (continued)

STEP	PROCEDURE
6	Are there additional relay racks that require fuse alarm connections? <ul style="list-style-type: none"> <li>■ If YES, continue to Step 7.</li> <li>■ If NO, skip to Step 8.</li> </ul>
7	Repeat Steps 1 through 5 for each additional Relay Rack Fuse Alarm. <ul style="list-style-type: none"> <li>■ Relay Rack #3—terminate the <u>110 inch</u> Fuse Alarm wire (connected to the J17 connector) on the second Auxiliary CSIP Alarm connector (J8).</li> <li>■ Relay Rack #4—terminate the <u>136 inch</u> Fuse Alarm wire (connected to the J18 connector) on the third Auxiliary CSIP Alarm connector (J8).</li> </ul>
8	Does the D50 require user defined Remote Alarm Inputs? <ul style="list-style-type: none"> <li>■ If YES, skip to the next procedure: <b>Remote Alarm Input Connections</b>, page 7-18.</li> <li>■ If NO, continue to Step 9.</li> </ul>
9	The Alarm Board Connections procedure is complete.

**Remote Alarm Input Connections**

The Alarm Board has four connections for Remote Alarm Inputs. These alarm connections are defined by the user and can be used for any type of remote alarm, such as environmental alarms.

Follow these steps to complete Remote Alarm Input connections at connectors J11 through J14:

Table 7-7: Remote Alarm Input Connections

STEP	PROCEDURE
1	<b>Important! A properly grounded ESD strap must be worn at all times while making connections on the alarm board.</b>
2	Route the Remote Alarm Input wires from the Central Office termination point, across the horizontal cable racks, and down the relay rack rails to the D50 Master Control Shelf, following local procedures.
3	Push the alarm wires through one of the large cable ports at the back of the Master Control Shelf.
4	Go to the front of the MCS and pull the alarm wires from the back of the MCS to the front and over to the Alarm Board.

Table 7-7: Remote Alarm Input Connections (continued)

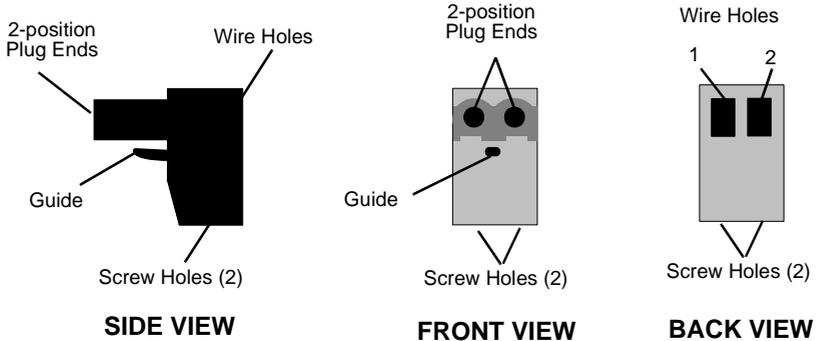
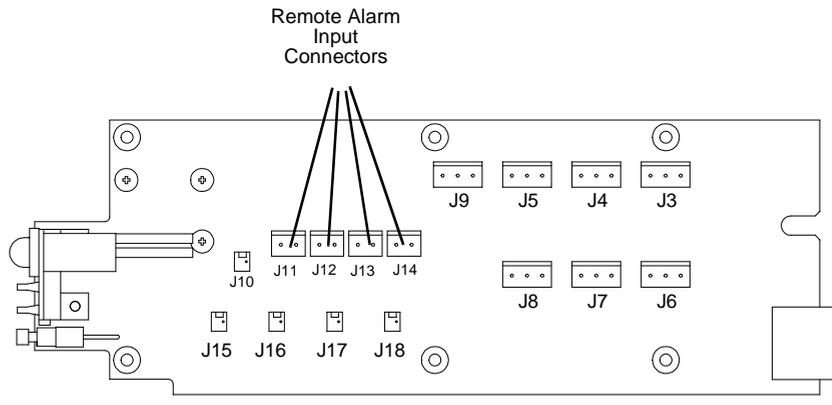
STEP	PROCEDURE
<p><b>5</b></p>	<p>Remote Alarm Input connections are made with 2-position vertical (180°) 5mm pluggable terminal blocks.</p>  <p style="text-align: center;"><b>Figure 7-16: 2-Position Terminal Block</b></p> <p>Wiring for each terminal block requires a wire in both wire holes.</p>
<p><b>6</b></p>	<p>Using wire cutters, strip back insulation on remote alarm input wires by ¼ inch.</p>
<p><b>7</b></p>	<p>Insert wires into both wire holes of the terminal block for connector J11 (Remote Alarm Input connector), according to requirements of the network service provider. Refer to Step 5.</p>
<p><b>8</b></p>	<p>Tighten the screws on the terminal block until a good connection is made, <u>do not</u> exceed 4.5 inch pounds torque.</p>
<p><b>9</b></p>	 <p style="text-align: center;"><b>Figure 7-17: Alarm Board—Remote Alarm Input Connectors</b></p>
<p><b>10</b></p>	<p>Plug the wired Remote Alarm Input terminal block into connector J11.</p>

Table 7-7: Remote Alarm Input Connections (continued)

<b>STEP</b>	<b>PROCEDURE</b>
<b>11</b>	Repeat Steps 6 through 10 for Remote Alarm Input connectors J12, J13, and J14 as required.
<b>12</b>	Dress, tie and label wiring following local procedures after all required Remote Alarm Input connections are completed.
<b>13</b>	The Alarm Board Connection procedure is complete.

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## SECTION 8 D50 RAM

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## Chapter 1

### D50 RAM Assembly Installation

---

**Introduction**      The D50 Remote Access Module (RAM) supports up to three D50 line cards, one LSMT1 card, and three low pass filter cards. It is a hardened unit which can be located in remote locations such as building equipment rooms, Controlled Environmental Vaults (CEVs), outdoor cabinets, and remote Central Offices. It can be installed in standard 23-inch Central Office racks, standard 19-inch computer racks, and wall mounts.

This procedure provides detailed instructions on how to install a D50 RAM.

---

**Required  
Equipment and  
Tools**

To begin this task you must have the following equipment and tools (refer to Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers”):

- D50 RAM Assembly Kit.
- (4) 12-24 thread forming screws.
- Large Phillips head screwdriver.

Approximate weight of the D50 RAM is 16 lbs. empty (assembly and Fan Tray, no line cards or low pass filter cards), 24 lbs. fully loaded.

---

**D50 RAM  
Assembly and  
Components**

The following figure diagrams the components of a fully installed unit:

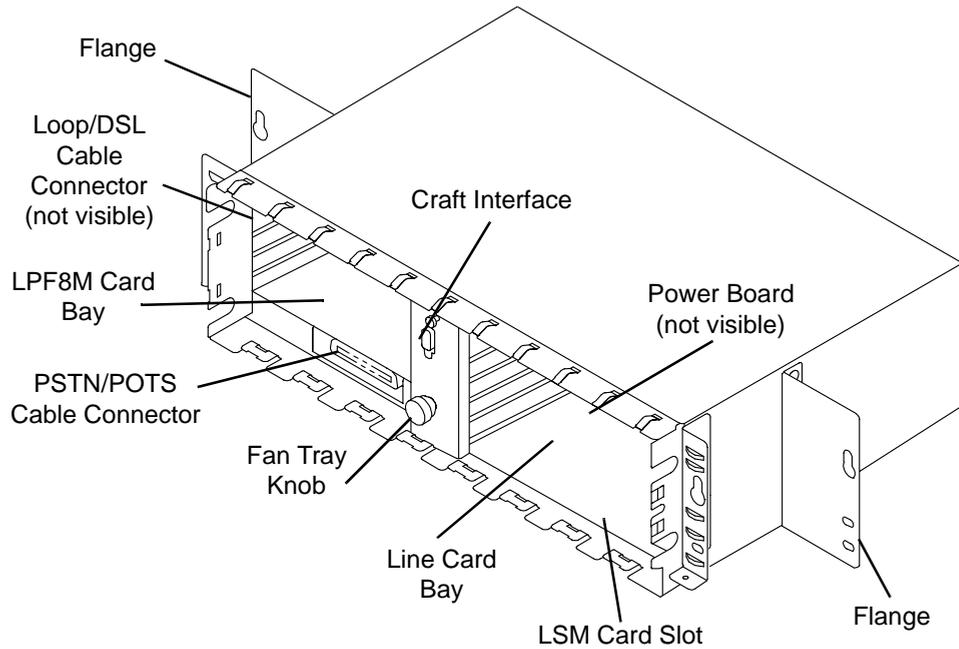


Figure 8-1: D50 RAM Assembly and Components

A hinged front panel (not shown above) covers the front of the D50 RAM assembly. The panel is removable but it is required to remain fastened to the D50 RAM under normal conditions.

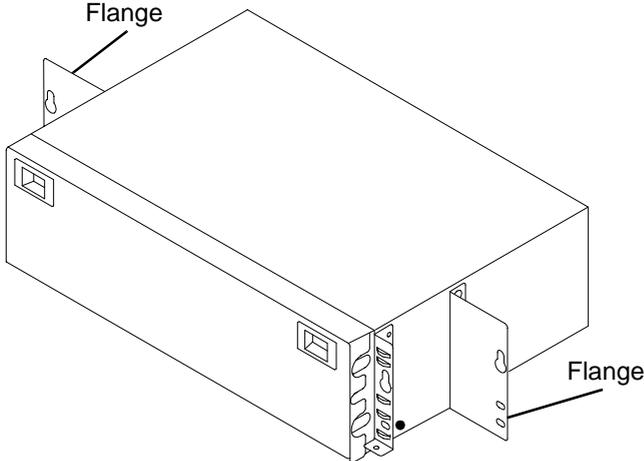
The D50 RAM assembly includes a pre-installed Fan Tray. The Fan Tray is required for forced air cooling.

The assembly is shipped for installation in a 23-inch rack, 19-inch flanges are included in the D50 RAM Assembly Kit.

**D50 RAM  
 Assembly  
 Installation**

Follow these steps to install the D50 RAM assembly:

Table 8-1: D50 RAM Assembly Installation

STEP	PROCEDURE
1	<p>The D50 RAM assembly is shipped for installation in a 23-inch rack. Remove the 23-inch mounting flanges and attach the 19-inch mounting flanges to the sides of the D50 RAM if you are installing in a 19-inch rack.</p>  <p style="text-align: center;">Figure 8-2: D50 RAM Mounting Flanges</p>
2	Lift the D50 RAM assembly to its assigned position in the rack.
3	<p>Place and tighten the four thread forming screws in the flanges (two on each side) to secure the assembly into position.</p> <p><b>Note:</b> An optional method for D50 RAM installation follows this procedure.</p>
4	The D50 RAM Assembly Placement procedure is complete. Refer to the chapters that follow for power, telco, alarm, and LSMT1 cabling and card placement procedures.

**Note:** OPTIONAL METHOD. You can use the keyhole slots at the top of the mounting flange to hold the assembly unit in place while you place and tighten additional mounting screws. To do this, partially tighten a 12-24 thread forming mounting screw on each side of the relay rack, leaving about 1/4 inch of space between the rack and the screw head. Position the assembly so keyhole slots are over the partially installed mounting screws. Lower the assembly until the top of both keyhole slots rest on the mounting screws. Place and tighten additional screws (minimum two on each side) to secure the assembly.

**Important! Do not install line cards or low pass filter cards until all cabling and card placement procedures are completed.**



## Chapter 2

### D50 RAM Power Cabling

---

**Introduction**      The D50 RAM is powered by -48 VDC. This procedure provides detailed instructions for connecting power cables to the D50 RAM.

---

**Required Equipment and Tools**      To begin this task you must have the following equipment and tools:

- (1) -48V battery cable (18 AWG red wire).
- (1) -48 V battery return cable (18 AWG black wire).
- (1) ground cable (18 AWG green wire).
- (2) EMI filter ferrites for placement on the battery/battery return cables.
- 6 AWG ground wire (for installation in an ungrounded rack per local procedures).
- Crimping tool.
- Vinyl rubber grommet.
- Wire cutters.
- Wire ties for securing cables.

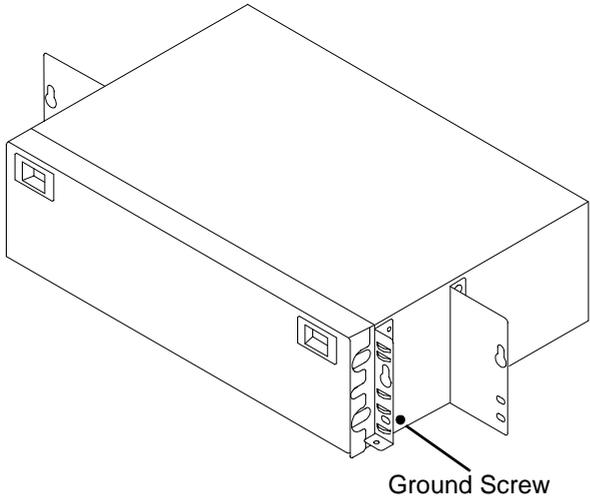
---

**Grounding the D50 RAM Assembly**

No grounding procedures are required if the D50 RAM assembly is installed in a grounded rack with the 12-24 mounting screws. If this is the case, continue to the next procedure, **D50 RAM Battery and Battery Return Cable Connections**.

If the D50 RAM assembly is NOT installed in a grounded rack with the 12-24 mounting screws, follow these steps to properly ground the D50 RAM:

Table 8-2: Grounding the D50 RAM

STEP	PROCEDURE
1	<p>Connect the 6 AWG ground wire to the ground screw on the right side of the D50 RAM.</p>  <p style="text-align: center;">Figure 8-3: D50 RAM Ground Screw Location</p>
2	<p>Connect the other end of the ground wire to a known good earth ground, following local procedures. Consult the local electrical code for instructions.</p>
3	<p>The Grounding the D50 RAM procedure is complete. Continue to the next procedure, <b>D50 RAM Battery and Battery Return Cable Connections</b>.</p>

**D50 RAM  
 Battery and  
 Battery Return  
 Cable  
 Connections**

Follow these steps to connect the battery and battery return cables to the D50 RAM:

Table 8-3: D50 RAM Power and Ground Cable Connection

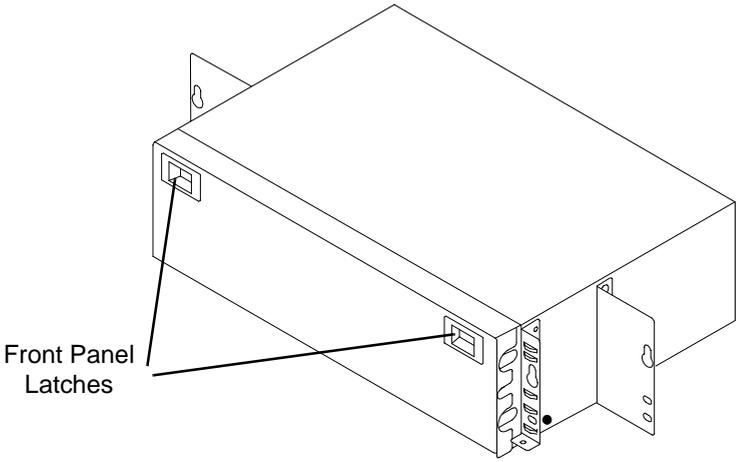
STEP	PROCEDURE
1	<p>Connect the -48V battery cable (red) and -48V battery return cable (black) to the power source for the D50 RAM. Route the battery and battery return cables from the power source to the D50 RAM.</p> <p style="text-align: center;">   <b>Warning! Follow local electrical safety procedures when making power source connections. Leave the power source turned off until ready to power up the D50 RAM.</b> </p>
2	<p>Connect the ground cable (green) to a known good earth ground, following local procedures. Consult the local electrical code for instructions.</p>
3	<p>Route the ground cable to the D50 RAM.</p>
4	<p>Unlatch and lower the front panel on the D50 RAM. The latches are located at the top of the panel. Slide both latches toward the center to release and lower the panel.</p> <div style="text-align: center;">  </div> <p style="text-align: center;">Figure 8-4: D50 RAM Front Panel Latches</p>

Table 8-3: D50 RAM Power and Ground Cable Connection (continued)

STEP	PROCEDURE										
<p><b>5</b></p>	<p>The front of the D50 RAM has two cable slots on the left and right sides. Bring the battery, battery return and ground cables through the top slot on the right side.</p> <div> <p>The diagram shows a top-down view of the D50 RAM front panel. A central vertical section is labeled 'Power Board'. On the right side of the panel, there are two rectangular openings labeled 'Power Cable Slot'. The left side of the panel features two horizontal slots, likely for connectors or screws.</p> </div> <p style="text-align: center;">Figure 8-5: D50 RAM Power Cable Slot Location</p>										
<p><b>6</b></p>	<p>Cut the battery, battery return and ground cables to the correct length using wire cutters.</p>										
<p><b>7</b></p>	<p>Place a vinyl rubber grommet onto the battery, battery return and ground cables.</p>										
<p><b>8</b></p>	<p>Terminate the battery, battery return and ground cables on the power connector, per the following figures, using a crimping tool.</p> <div> <table border="1"> <thead> <tr> <th colspan="2" style="text-align: center;">Power Connector Pin Outs</th> </tr> <tr> <th style="text-align: center;">Pin #</th> <th style="text-align: center;">Input</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">(-48V return)</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">(-48V)</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">ground</td> </tr> </tbody> </table> </div> <p style="text-align: center;">Figure 8-6: Power Connector Pin Outs</p> <div> <p>The diagram shows a rectangular box containing three circles arranged horizontally. The circles are labeled with the numbers 3, 2, and 1 from left to right, representing the pin mapping for the power connector.</p> </div> <p style="text-align: center;">Figure 8-7: Power Connector Pin Mapping (viewed from mating side)</p>	Power Connector Pin Outs		Pin #	Input	1	(-48V return)	2	(-48V)	3	ground
Power Connector Pin Outs											
Pin #	Input										
1	(-48V return)										
2	(-48V)										
3	ground										

Table 8-3: D50 RAM Power and Ground Cable Connection (continued)

STEP	PROCEDURE
<p><b>9</b></p>	<p>Insert the power connector into the power board.</p> <div> <p>The diagram shows a top-down view of the power board. A central vertical section is labeled 'Power Board'. To its right, a horizontal row of pins is labeled 'Power Connector Location'. The board is shown with various other components and slots.</p> </div> <p>Figure 8-8: D50 RAM Power Connector Location</p>
<p><b>10</b></p>	<p>Position the grommet on each cable so it fits over the edge of the slot on the D50 RAM assembly. Push the grommet into the slot as far as you can so it doesn't interfere with the front panel. The grommet helps hold the cable in position and protects it from the metal edge.</p>
<p><b>11</b></p>	<p>EMI filter ferrites should be installed on both ends of the power cable. Ferrites are opened by lifting the double clip off the small tabs.</p> <div> <p>The diagram illustrates the EMI filter ferrite in two states. On the left, the ferrite is 'CLOSED', showing a square shape with a central circular hole. A 'Clip and Tabs' are attached to the top edge. On the right, the ferrite is 'OPEN', showing the two halves separated. The 'Tabs' are on the top edge of each half, and the 'Clip' is on the bottom edge. A 'Cable Path' is indicated between the two halves.</p> </div> <p>Figure 8-9: EMI Filter Ferrite</p>
<p><b>12</b></p>	<p>Clip a ferrite onto the end of the power cable on the outside of the D50 RAM assembly. Close the ferrite around the cable, until the clip locks in place over the tabs.</p> <p><b>Note:</b> Place the ferrite as close to the D50 RAM power cable slot as possible, lock in place with wire tie.</p>
<p><b>13</b></p>	<p>Clip a second ferrite on the other end of the power cable, as close as possible to the power source. Close the ferrite around the cable, until the clip locks in place over the tabs.</p>

Table 8-3: D50 RAM Power and Ground Cable Connection (continued)

STEP	PROCEDURE
14	Dress, tie and label cables following local procedures.
15	The D50 RAM Power Cabling procedure is complete. Continue to Chapter 3—"D50 RAM Alarm Cabling."

**Important! Do not turn on power to the D50 RAM until all cabling is complete and the cards are placed.**

---

## Chapter 3

### D50 RAM Alarm Cabling

---

**Introduction** The D50 RAM power board has four remote alarm input connections. These alarm connections are defined by the user via Craft Terminal<sup>1</sup> and can be used for any type of remote environmental alarm. This procedure provides detailed instructions on how to connect remote alarm input wiring to the D50 RAM.

---

**Required Equipment and Tools** To begin this task you must have the following equipment and tools (refer to Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers”):

- Small flat-blade screwdriver.
- Wire cutters.
- (4) 2-position vertical (180°) 5mm pluggable terminal blocks.
- 22 AWG wire.

---

---

<sup>1</sup> Refer to the volumes titled Craft Terminal.

**D50 RAM  
Remote Alarm  
Input  
Connections**

Follow these steps to make remote alarm input connections at the D50 RAM:

Table 8-4: D50 RAM Remote Alarm Input Connections

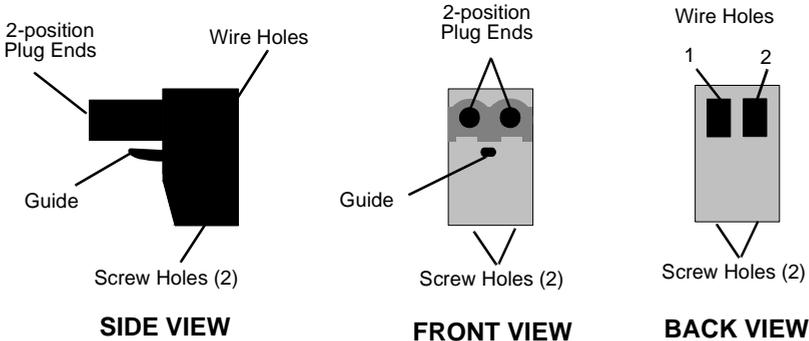
STEP	PROCEDURE
1	Connect 22 AWG remote alarm input wires to the alarm terminal block following local procedures.
2	Route the remote alarm input wires to the D50 RAM, following local procedures.
3	<p>Remote alarm input connections are made with 2-position vertical (180°) 5mm pluggable terminal blocks.</p>  <p style="text-align: center;"><b>Figure 8-10: Two-Position Alarm Terminal Block</b></p>
4	Cut the remote alarm input wires to the correct length and strip back insulation by ¼ inch.
5	Insert wires, from the alarm terminal block, into one or both holes of the terminal block for connector as required, depending on the type of alarm relay contact used. Refer to Step 3
6	Tighten the screws on the terminal block until a good connection is made; <u>do not</u> overtighten.

Table 8-4: D50 RAM Remote Alarm Input Connections (continued)

STEP	PROCEDURE
<p><b>7</b></p>	<p>D50 RAM alarm connectors are identified as 1, 2, 3, and 4. Plug the remote input wire into Alarm Connector 1.</p> <div style="text-align: center;"> <p>The diagram shows a top-down view of a rectangular panel. On the left side, there are two large, horizontal, multi-pin connectors. In the center, there is a vertical section labeled 'Power Board' with a circular port and several smaller ports. On the right side, there are four smaller, square alarm connectors labeled '1', '2', '3', and '4' from right to left. Lines connect the labels to their respective connectors.</p> </div> <p style="text-align: center;">Figure 8-11: D50 RAM Alarm Connectors</p>
<p><b>8</b></p>	<p>Repeat Steps 4 through 7 for additional remote alarm input connections as required.</p>
<p><b>9</b></p>	<p>Dress, tie and label wiring following local procedures after all required remote alarm input connections are completed.</p>
<p><b>10</b></p>	<p>Then D50 RAM Alarm Cabling procedure is complete. Continue to Chapter 4—“D50 RAM Telco Cabling.”</p>



## Chapter 4

### D50 RAM Telco Cabling

---

#### Introduction

The D50 RAM supports up to three D50 line cards. A D50 RAM equipped with 8-port D50 line cards (DMT8a-3, SDSL8/SDSL8+, SHDSL8, or IDSL8 cards) can provide service to twenty-four customers<sup>1</sup>. Both data only and data plus voice service are supported as follows:

#### Data Only Service

One telco cable is required, from the D50 RAM to the local loop (Loop/DSL).

#### Data Plus Voice Service

Two telco cables are required:

- One cable from the D50 RAM to the local loop (Loop/DSL).
- One cable from the D50 RAM to the Public Switched Network (PSTN/POTS).

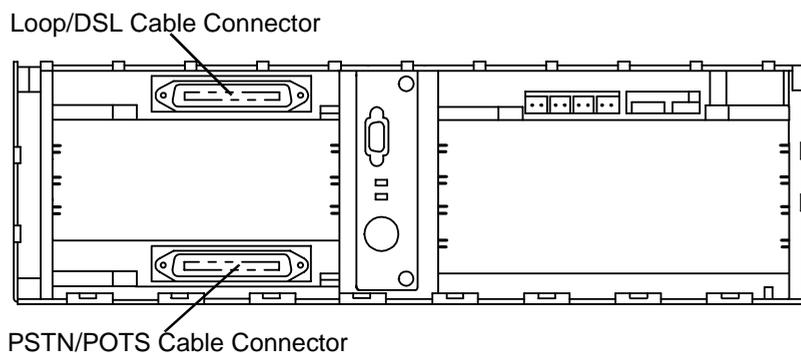


Figure 8-12: D50 RAM Telco Cable Connectors

To test and verify the continuity of the cable pairs between the D50 RAM and the local loop, refer to Section 10—*Appendices*, Appendix C—“Testing Cable Pairs Continuity: Data Only,” and Section 10—*Appendices*, Appendix D—“Testing Cable Pairs Continuity: Data Plus Voice.”

This chapter provides detailed instructions on how to connect telco cables to the D50 RAM.

---

<sup>1</sup> The 4-port DS1 line card design requires an alternative telco cabling configuration; it is not recommended for use in the D50 RAM.

**Required Equipment and Tools**

To begin this task you must have the following equipment and tools:

- Small flat-blade screwdriver.
- Vinyl rubber grommet(s).
- Wire cutters.

**Data Only Service:**

- (1) 25-pair cable (24 AWG), referred to as the Loop/DSL cable.
- (1) 50 pin male Amp Champ connector.

**Data Plus Voice Service:**

- (2) 25-pair cables (24 AWG), referred to as the Loop/DSL and PSTN/POTS cables.
- (2) 50 pin male Amp Champ connectors.

**D50 RAM Telco Cable Connection**

Follow these steps to connect 25-pair telco cables to the D50 RAM:

Table 8-5: D50 RAM Telco Cable Connection

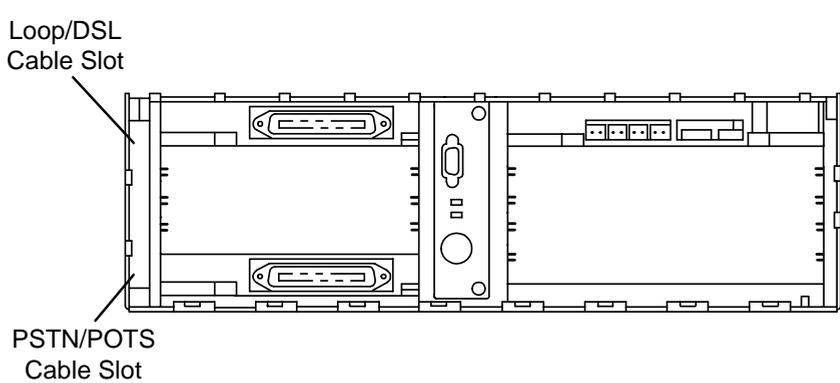
STEP	PROCEDURE
1	<p>For <u>data only</u> service, terminate the 25-pair Loop/DSL cable to the cross connect panel at the remote site, following local procedures.</p> <p>For <u>data plus voice</u> service, terminate the 25-pair Loop/DSL and PSTN/POTS cables to the cross connect panel at the remote site, following local procedures.</p>
2	Route the telco cable(s) to the D50 RAM following local procedures.
3	<p>The front of the D50 RAM has two cable slots on the left and right sides. Bring the telco cables through the slots as follows:</p> <ul style="list-style-type: none"> <li>■ Bring the <u>Loop/DSL</u> cable through the <u>top</u> slot on the left side.</li> <li>■ For data plus voice service, bring the <u>PSTN/POTS</u> cable through the <u>bottom</u> slot on the left side.</li> </ul> <div style="margin-top: 10px;">  <p style="text-align: center;">Figure 8-13: D50 RAM Telco Cable Slot Locations</p> </div>
4	Place a vinyl rubber grommet onto the cable(s).

Table 8-5: D50 RAM Telco Cable Connection (continued)

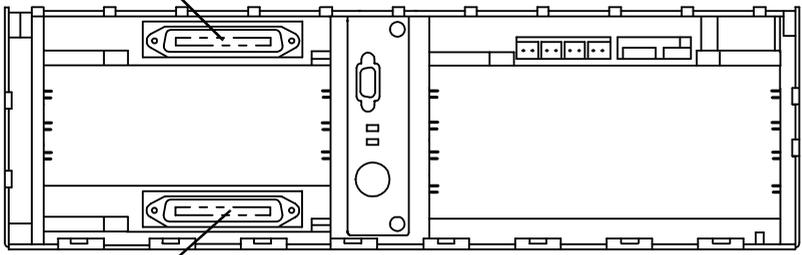
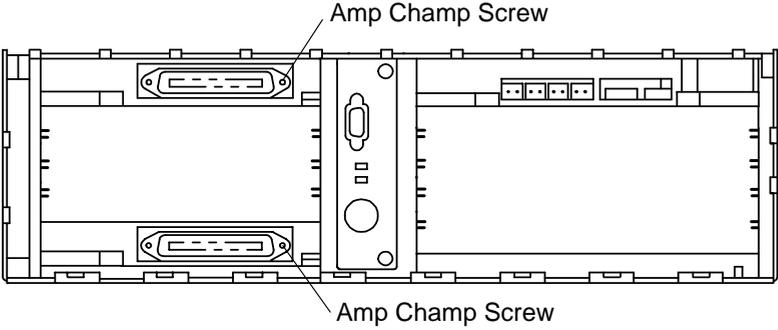
STEP	PROCEDURE
5	Cut the 25 pair cable(s) to the correct length. Terminate an Amp Champ connector onto the cable(s) as required. Refer to <b>Cable/Pair Assignments</b> , page 8-19.
6	Position the grommet on each cable so it fits over the edge of the slot on the D50 RAM assembly. Push the grommet into the slot as far as you can so it doesn't interfere with the front panel. The grommet helps hold the cable in position and protects it from the metal edge.
7	<p>Connect the 25-pair cable(s) as follows:</p> <ul style="list-style-type: none"> <li>■ Connect the <u>Loop/DSL</u> cable to the <u>top</u> Amp Champ connector.</li> <li>■ For data plus voice service, connect the <u>PSTN/POTS</u> cable to the <u>bottom</u> Amp Champ connector.</li> </ul> <p>Loop/DSL Cable Connector</p>  <p>PSTN/POTS Cable Connector</p> <p>Figure 8-14: D50 RAM Telco Cable Connectors</p>

Table 8-5: D50 RAM Telco Cable Connection (continued)

STEP	PROCEDURE
<p><b>8</b></p>	<p>To secure the Amp Champ connector(s), tighten the screw(s) that is furthest from the cable slot (the screw closest to the cable slot is inaccessible under the cable).</p>  <p style="text-align: center;">Figure 8-15: D50 RAM Amp Champ Screws</p>
<p><b>9</b></p>	<p>Dress, tie and label telco cabling following local procedures.</p>
<p><b>10</b></p>	<p>The D50 RAM Telco Cabling procedure is complete. Continue to Chapter 5—“D50 RAM Card Installation.”</p>

**Cable/Pair  
Assignments**

The following tables show the cable/pair assignments for the D50 RAM, for both the Loop/DSL cable and the PSTN/POTS cable:

Table 8-6: D50 RAM Cable/Pair Assignments—Pairs 1-13

Pair #	Connector Panel Pin #	Line Card Slot	Line Card Port	25 Pair Telco Cable	
				Color Code	Tip or Ring
1	1	1	1	Blue/White	Ring
	26	1	1	White/Blue	Tip
2	2	1	2	Orange/White	Ring
	27	1	2	White/Orange	Tip
3	3	1	3	Green/White	Ring
	28	1	3	White/Green	Tip
4	4	1	4	Brown/White	Ring
	29	1	4	White/Brown	Tip
5	5	1	5	Slate/White	Ring
	30	1	5	White/Slate	Tip
6	6	1	6	Blue/Red	Ring
	31	1	6	Red/Blue	Tip
7	7	1	7	Orange/Red	Ring
	32	1	7	Red/Orange	Tip
8	8	1	8	Green/Red	Ring
	33	1	8	Red/Green	Tip
9	9	2	1	Brown/Red	Ring
	34	2	1	Red/Brown	Tip
10	10	2	2	Slate/Red	Ring
	35	2	2	Red/Slate	Tip
11	11	2	3	Blue/Black	Ring
	36	2	3	Black/Blue	Tip
12	12	2	4	Orange/Black	Ring
	37	2	4	Black/Orange	Tip
13	13	2	5	Green/Black	Ring
	38	2	5	Black/Green	Tip

Table 8-7: D50 RAM Cable/Pair Assignments—Pairs 14-25

Pair #	Connector Panel Pin #	Line Card Slot	Line Card Port	25 Pair Telco Cable	
				Color Code	Tip or Ring
14	14	2	6	Brown/Black	Ring
	39	2	6	Black/Brown	Tip
15	15	2	7	Slate/Black	Ring
	40	2	7	Black/Slate	Tip
16	16	2	8	Blue/Yellow	Ring
	41	2	8	Yellow/Blue	Tip
17	17	3	1	Orange/Yellow	Ring
	42	3	1	Yellow/Orange	Tip
18	18	3	2	Green/Yellow	Ring
	43	3	2	Yellow/Green	Tip
19	19	3	3	Brown/Yellow	Ring
	44	3	3	Yellow/Brown	Tip
20	20	3	4	Slate/Yellow	Ring
	45	3	4	Yellow/Slate	Tip
21	21	3	5	Blue/Violet	Ring
	46	3	5	Violet/Blue	Tip
22	22	3	6	Orange/Violet	Ring
	47	3	6	Violet/Orange	Tip
23	23	3	7	Green/Violet	Ring
	48	3	7	Violet/Green	Tip
24	24	3	8	Brown/Violet	Ring
	49	3	8	Violet/Brown	Tip
25	25			Slate/Violet	
	50			Violet/Slate	

---

## Chapter 5

### D50 RAM Card Installation

---

#### Introduction

The D50 RAM is designed for placement of three D50 line cards and three low pass filter cards. The D50 RAM line card and low pass filter card bays are designed with six card guides to align cards into their correct position.

All cards used in the D50 RAM are designed with locking tabs on the outside edge of the card. These tabs lift out during placement and lock into place to secure the card in its D50 RAM slot.

Each D50 RAM card is “keyed” to its matching backplane connectors to prevent cards from being inserted into the wrong slot. Figure 8-16: D50 RAM Card Layout, page 8-22 diagrams D50 RAM card placement.

---

#### Required Equipment and Tools

To begin this task you must have the following equipment and tools (refer to Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers”):

- Electrostatic Discharge Strap (ESD).
- (1–3) line cards<sup>1</sup>:
  - DMT8a-3 or DMT8a-4 octal ADSL line card(s).
  - SDSL8 or SDSL8+ octal SDSL line card(s).
  - SHDSL8 octal SHDSL line card(s).
  - IDSL8 octal IDSL line card(s).
- (1–3) LPF8M card(s), used with DMT8a-3 or DMT8a-4 line cards, for data plus voice service.
- (1–3) D50 RAM Through Connect (MRTC) cards used for data only service with DMT8a-3, SDSL8/SDSL8+, SHDSL8, and IDSL8 line cards.
- (1) LSMT1 card, used with an MLAT1 card.

---

<sup>1</sup> The 4-port DS1 line card design requires an alternative telco cabling configuration; it is not recommended for use in the D50 RAM.

**D50 RAM Card Layout**

Place line cards and LPF8M or MRTC cards into the D50 RAM, according to the work order:

	Loop/DSL Connector		Power Board	
Slot <b>5</b>	<b>LPF8M or MRTC Card</b>	Fan Tray	<b>Line Card</b>	Slot <b>1</b>
Slot <b>6</b>	<b>LPF8M or MRTC Card</b>		<b>Line Card</b>	Slot <b>2</b>
Slot <b>7</b>	<b>LPF8M or MRTC Card</b>		<b>Line Card</b>	Slot <b>3</b>
	PSTN/POTS Connector		<b>LSMT1 Card</b>	Slot <b>4</b>

Figure 8-16: D50 RAM Card Layout

**Slot #**

- 1 through 3 Line cards (DMT8a-3, DMT8a-4, SDSL8/SDSL8+, SHDSL8, or IDSL8).
- 4 Line Card Shelf Multiplexer card (LSMT1).
- 5 through 7 Low Pass Filter cards (LPF8M) or MRTC cards.

A D50 RAM equipped with 8-port D50 line cards (DMT8a-3, DMT8a-4, SDSL8/SDSL8+, SHDSL8, or IDSL8 cards) can provide service to twenty-four customers (data only or data plus voice).

**Important! All line cards placed in the D50 RAM should be the same type. All power and telco cabling should be completed before proceeding to the D50 RAM Line Card Placement procedure. Refer to Chapter 4—“D50 RAM Telco Cabling,” page 8-15.**

**D50 RAM Card Placement**

Follow these steps to install line cards, LPF8M or MRTC cards, and an LSMT1 card into the D50 RAM:

Table 8-8: D50 RAM Card Placement

STEP	PROCEDURE
<b>1</b>	D50 RAM card packaging contains <b>IMPORTANT WARNINGS</b> and <b>INSTRUCTIONS</b> on how to correctly insert line and LSMT1 cards. Follow these warnings and procedures carefully to prevent any electrostatic damage during installation and adjustment.
<b>2</b>	<b>WEAR A PROPERLY GROUNDED ELECTROSTATIC DISCHARGE (ESD) STRAP at all times</b> during card installation to prevent possible damage to the cards. Attach the discharge strap wire to a properly grounded rack location, according to local procedures, before handling cards.
<b>3</b>	Carefully remove a line card from its packaging.

Table 8-8: D50 RAM Card Placement (continued)

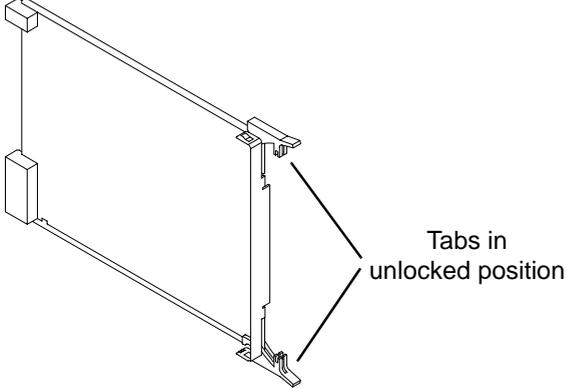
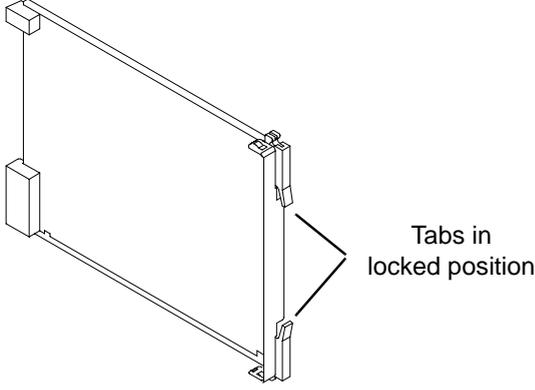
STEP	PROCEDURE
<p><b>4</b></p>	<p>Flip and hold the locking tabs (located on the outside edge of the card) into their up or unlocked position.</p>  <p>Figure 8-17: Card with Locking Tabs in the Unlocked Position</p>
<p><b>5</b></p>	<p>Turn the line card on its side with the top edge of the card to the right. Slide the line card in its guide (card slot #1) until it plugs into the backplane connector. Each card is “keyed” so it will only plug into its correct position on the backplane.</p> <p><b>Important! DO NOT force the card into position. If the card does not plug in easily, slide it back out and verify you are placing it in the correct position and that the guides are aligned. Check for any obstructions or bent pins on the connectors that might prevent the card from sliding easily into place.</b></p>
<p><b>6</b></p>	<p>Flip the locking tabs down until you hear an audible “click.” The “click” indicates the card is locked into position.</p>  <p>Figure 8-18: Card with Locking Tabs in the Locked Position</p>

Table 8-8: D50 RAM Card Placement (continued)

STEP	PROCEDURE																					
7	<p><b>Important! An LPF8M card (for data plus voice service) or MRTC card (for data only service) <u>MUST</u> be inserted for each line card, in order to facilitate the connection from the telco cable to the line card.</b></p> <p><b>Note:</b> An LPF8M or MRTC card is not required when the corresponding line card slot is empty.</p> <p>Place an LPF8M or MRTC card for each corresponding line card as follows:</p> <ul style="list-style-type: none"> <li>■ Line card in slot <u>1</u> requires LPF8M or MRTC card in slot <u>5</u>.</li> <li>■ Line card in slot <u>2</u> requires LPF8M or MRTC card in slot <u>6</u>.</li> <li>■ Line card in slot <u>3</u> requires LPF8M or MRTC card in slot <u>7</u>.</li> </ul> <div style="text-align: center; margin: 10px 0;"> <table border="1" style="border-collapse: collapse; width: 100%;"> <tr> <td style="width: 25%;"></td> <td style="width: 25%; text-align: center;">Loop/DSL Connector</td> <td style="width: 25%;"></td> <td style="width: 25%; text-align: center;">Power Board</td> </tr> <tr> <td style="text-align: center;">Slot <b>5</b></td> <td style="text-align: center;"><b>LPF8M or MRTC Card</b></td> <td rowspan="4" style="text-align: center; vertical-align: middle;">Fan Tray</td> <td style="text-align: center;"><b>Line Card</b></td> <td style="text-align: center;">Slot <b>1</b></td> </tr> <tr> <td style="text-align: center;">Slot <b>6</b></td> <td style="text-align: center;"><b>LPF8M or MRTC Card</b></td> <td style="text-align: center;"><b>Line Card</b></td> <td style="text-align: center;">Slot <b>2</b></td> </tr> <tr> <td style="text-align: center;">Slot <b>7</b></td> <td style="text-align: center;"><b>LPF8M or MRTC Card</b></td> <td style="text-align: center;"><b>Line Card</b></td> <td style="text-align: center;">Slot <b>3</b></td> </tr> <tr> <td></td> <td style="text-align: center;">PSTN/POTS Connector</td> <td style="text-align: center;"><b>LSMT1 Card</b></td> <td style="text-align: center;">Slot <b>4</b></td> </tr> </table> </div> <p style="text-align: center; margin-top: 10px;">Figure 8-19: D50 RAM Card Layout</p>		Loop/DSL Connector		Power Board	Slot <b>5</b>	<b>LPF8M or MRTC Card</b>	Fan Tray	<b>Line Card</b>	Slot <b>1</b>	Slot <b>6</b>	<b>LPF8M or MRTC Card</b>	<b>Line Card</b>	Slot <b>2</b>	Slot <b>7</b>	<b>LPF8M or MRTC Card</b>	<b>Line Card</b>	Slot <b>3</b>		PSTN/POTS Connector	<b>LSMT1 Card</b>	Slot <b>4</b>
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Slot <b>7</b>	<b>LPF8M or MRTC Card</b>		<b>Line Card</b>	Slot <b>3</b>																		
	PSTN/POTS Connector		<b>LSMT1 Card</b>	Slot <b>4</b>																		
8	Place an LSMT1 card in Slot 4.																					
9	The D50 RAM Card Placement procedure is complete. Continue to Chapter 6—“D50 RAM LSMT1 Cabling.”																					

## Chapter 6

### D50 RAM LSMT1 Cabling

---

**Introduction** This chapter provides procedures on how to terminate 4xDS-1 “transmit” and “receive” cables to an LSMT1 card. The D50 RAM requires only one LSMT1 card.

---

**Required Equipment and Tools** To begin this task you must have the following equipment and tools (refer to Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers”):

- (2) 4-pair 4xDS-1 (transmit and receive) cables.
- (2) RJ-45 plugs.
- RJ-45 crimp tool and cutter.
- (2) T1 EMI filter ferrites.
- (1) Vinyl rubber grommet.

---

**LSMT1 Cabling** 4xDS-1 “transmit” and “receive” 4-pair cables are connected to the DSX cross connect panel or DSX punch down block at the remote site and run to the D50 RAM per local procedures. The 4xDS-1 cables connect to the faceplate of the LSMT1 card.

Follow these steps to connect 4xDS-1 “transmit” and “receive” cables to the LSMT1 card:

Table 8-9: LSMT1 Cabling

STEP	PROCEDURE
1	Connect 4-pair “transmit” and “receive” 4xDS-1 cables at the DSX cross connect panel or punch down block, per local procedures.
2	Route the cables from the cross connect panel or punch down block to the D50 RAM, per local procedures.

Table 8-9: LSMT1 Cabling (continued)

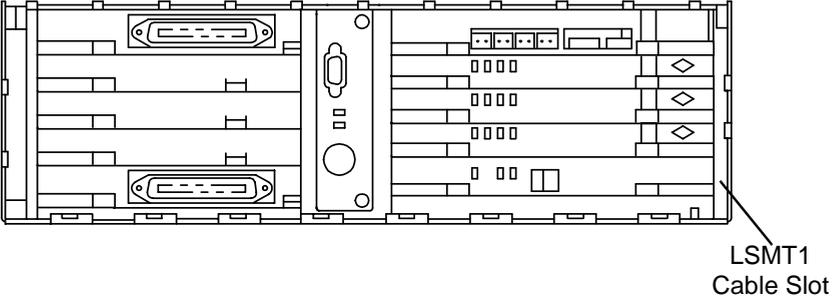
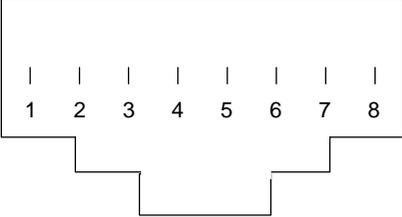
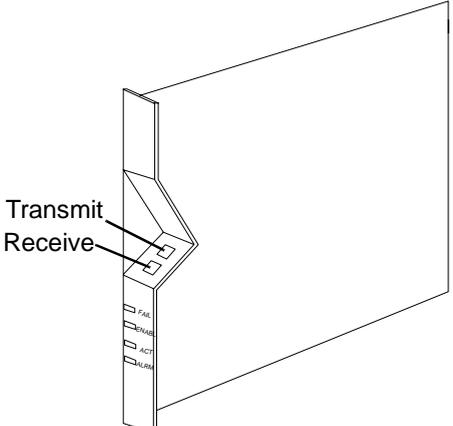
STEP	PROCEDURE																																																												
<p><b>3</b></p>	<p>Bring the cables through the bottom cable slot on the right side of the D50 RAM.</p>  <p style="text-align: right;">LSMT1 Cable Slot</p> <p style="text-align: center;">Figure 8-20: D50 RAM LSMT1 Slot Location</p>																																																												
<p><b>4</b></p>	<p>Place a vinyl rubber grommet on the cables.</p>																																																												
<p><b>5</b></p>	<p>Cut the cables to the correct length.</p>																																																												
<p><b>6</b></p>	<p>Strip the cables. Terminate RJ-45 plugs onto both cables using a crimp tool. RJ-45 pin outs are provided in the following tables.</p>  <p style="text-align: center;">Figure 8-21: RJ-45 Plug (viewed from the open end of the plug)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3" style="background-color: #cccccc;">LSMT1 TRANSMIT</th> <th colspan="3" style="background-color: #cccccc;">LSMT1 RECEIVE</th> </tr> <tr> <th style="background-color: #cccccc;">RJ-45 Pin #</th> <th style="background-color: #cccccc;">Cable Wire</th> <th style="background-color: #cccccc;">Wire Color</th> <th style="background-color: #cccccc;">RJ-45 Pin #</th> <th style="background-color: #cccccc;">Cable Wire</th> <th style="background-color: #cccccc;">Wire Color</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Ring: Line 1</td> <td>Blue/White</td> <td>1</td> <td>Ring: Line 1</td> <td>Blue/White</td> </tr> <tr> <td>2</td> <td>Tip: Line 1</td> <td>White/Blue</td> <td>2</td> <td>Tip: Line 1</td> <td>White/Blue</td> </tr> <tr> <td>3</td> <td>Ring: Line 2</td> <td>Orange/White</td> <td>3</td> <td>Ring: Line 2</td> <td>Orange/White</td> </tr> <tr> <td>4</td> <td>Tip: Line 2</td> <td>White/Orange</td> <td>4</td> <td>Tip: Line 2</td> <td>White/Orange</td> </tr> <tr> <td>5</td> <td>Ring: Line 3</td> <td>Green/White</td> <td>5</td> <td>Ring: Line 3</td> <td>Green/White</td> </tr> <tr> <td>6</td> <td>Tip: Line 3</td> <td>White/Green</td> <td>6</td> <td>Tip: Line 3</td> <td>White/Green</td> </tr> <tr> <td>7</td> <td>Ring: Line 4</td> <td>Brown/White</td> <td>7</td> <td>Ring: Line 4</td> <td>Brown/White</td> </tr> <tr> <td>8</td> <td>Tip: Line 4</td> <td>White/Brown</td> <td>8</td> <td>Tip: Line 4</td> <td>White/Brown</td> </tr> </tbody> </table> <p style="text-align: center;">Figure 8-22: RJ-45 T1 Transmit and Receive Pin Outs</p>	LSMT1 TRANSMIT			LSMT1 RECEIVE			RJ-45 Pin #	Cable Wire	Wire Color	RJ-45 Pin #	Cable Wire	Wire Color	1	Ring: Line 1	Blue/White	1	Ring: Line 1	Blue/White	2	Tip: Line 1	White/Blue	2	Tip: Line 1	White/Blue	3	Ring: Line 2	Orange/White	3	Ring: Line 2	Orange/White	4	Tip: Line 2	White/Orange	4	Tip: Line 2	White/Orange	5	Ring: Line 3	Green/White	5	Ring: Line 3	Green/White	6	Tip: Line 3	White/Green	6	Tip: Line 3	White/Green	7	Ring: Line 4	Brown/White	7	Ring: Line 4	Brown/White	8	Tip: Line 4	White/Brown	8	Tip: Line 4	White/Brown
LSMT1 TRANSMIT			LSMT1 RECEIVE																																																										
RJ-45 Pin #	Cable Wire	Wire Color	RJ-45 Pin #	Cable Wire	Wire Color																																																								
1	Ring: Line 1	Blue/White	1	Ring: Line 1	Blue/White																																																								
2	Tip: Line 1	White/Blue	2	Tip: Line 1	White/Blue																																																								
3	Ring: Line 2	Orange/White	3	Ring: Line 2	Orange/White																																																								
4	Tip: Line 2	White/Orange	4	Tip: Line 2	White/Orange																																																								
5	Ring: Line 3	Green/White	5	Ring: Line 3	Green/White																																																								
6	Tip: Line 3	White/Green	6	Tip: Line 3	White/Green																																																								
7	Ring: Line 4	Brown/White	7	Ring: Line 4	Brown/White																																																								
8	Tip: Line 4	White/Brown	8	Tip: Line 4	White/Brown																																																								

Table 8-9: LSMT1 Cabling (continued)

STEP	PROCEDURE
7	<p>Connect the cables to the front of the LSMT1 card; connect the “transmit” cable to the back connector, and the “receive” cable to the front connector.</p>  <p>Figure 8-23: LSMT1 Card “Transmit” and “Receive” RJ-45 Plugs</p>
8	<p>Position the grommet on the cables so it fits over the edge of the slot on the D50 RAM assembly. Push the grommet into the slot as far as you can so it doesn’t interfere with the front panel. The grommet helps hold the cables in position and protects them from the metal edge.</p>
9	<p>Place the EMI filter ferrites as required for 4xDS-1 cables, per local procedures.</p>
10	<p>Dress, tie and label the cables.</p>
11	<p>The LSMT1 Cabling procedure is complete. Continue to Chapter 7—“D50 RAM Commissioning.”</p>



## Chapter 7 D50 RAM Commissioning

---

### Introduction

The D50 RAM is powered up after all cabling and card placement procedures are complete. Refer to the volume titled Commissioning for complete test and commissioning procedures, including instructions on how to:

- Perform a visual status check.
- “Unlock” cards and ports.
- Determine the operational condition of each line card and the LSMT1 card using Craft Terminal.

### Required Equipment and Tools

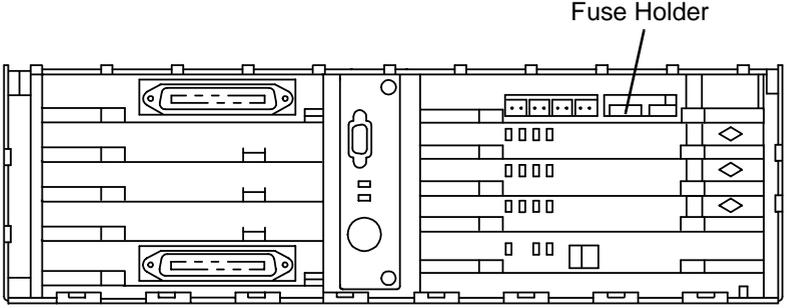
To begin this task you must have the following equipment and tools:

- 5 Amp GMT fuse<sup>1</sup>.

### D50 RAM Commissioning

Follow these procedures to power up the D50 RAM:

Table 8-10: D50 RAM Commissioning

STEP	PROCEDURE
1	<p>Install the 5 amp GMT fuse into the fuse holder, with the metal “tang” to the right.</p> <div style="text-align: center;">  <p>Figure 8-24: Fuse Holder</p> </div>
2	Power up the D50 RAM by turning on the power at the power source.
3	The D50 RAM will take several minutes to boot up.

<sup>1</sup> The fuse is included in the D50 RAM Installation Kit.

Table 8-10: D50 RAM Commissioning (continued)

STEP	PROCEDURE
4	<p>A number of different indicator lights will blink on and off on the line cards and the LSMT1 card while the D50 RAM is going through the boot-up process. Refer to the volume titled <u>Commissioning</u> for test and commissioning procedures on how to do a visual status check, unlock cards and ports, and verify the operational condition of the D50 RAM using Craft Terminal.</p>
5	<p>The D50 RAM supports Remote Craft Access (RCA), enabling a craft technician to connect a PC laptop directly the D50 RAM. A communication channel is set up between the D50 RAM's craft interface and the D50's NMP (Network Management Processor) card in the MCS to provide remote access to management functions.</p> <p>Refer to Chapter 8—"D50 RAM Remote Craft Access" to set up remote craft access to the D50 RAM.</p> <p><b>Note:</b> Communication with the D50 RAM can also be facilitated remotely via Craft Terminal over an Ethernet or In-Band Management connection at the MCS. Refer to Section 7—<i>Ethernet and Alarm Board Cabling</i>, Chapter 1—"Craft Terminal Ethernet Cabling," page 7-1.</p>
6	<p>Replace the D50 RAM front panel and lift it up into position. Slide both latches toward the center and release to lock in place.</p>
7	<p>The Chapter 7—"D50 RAM Commissioning" procedure is complete.</p>

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## Chapter 8

### D50 RAM Remote Craft Access

---

<b>Introduction</b>	<p>The D50 RAM supports Remote Craft Access (RCA), enabling a craft technician to connect a PC laptop directly to the D50 RAM. A communication channel is set up between the D50 RAM's craft interface and the D50's NMP (Network Management Processor) card in the MCS to provide remote access to management functions.</p> <p>This procedure provides detailed instructions on how to connect a PC laptop to the D50 RAM.</p>
<b>Craft Terminal Reference Documents</b>	<p>This procedure assumes you have reviewed the volume titled <a href="#">Craft Terminal</a>. Refer to this manual as necessary while completing this procedure.</p>
<b>Craft Terminal Online Help</b>	<p>Craft Terminal has Windows NT or Windows 2000 and Craft Terminal application help available via the Help menu.</p>
<b>Required Equipment and IP Information</b>	<p>To begin this task you must have the following equipment and tools:</p> <ul style="list-style-type: none"><li>■ A laptop PC to support Windows NT or Windows 2000, Simple Network Management Protocol (SNMP), Remote Access Service (RAS), and Craft Terminal software.</li><li>■ A standard straight through serial port cable with a 9-pin RS-232-C (DB-9) male connector on one end—to connect directly to the D50 RAM—and a 9-pin or 25-pin RS-232-C (DB-9) female connector on the other end—to match the serial port connector on your PC. Refer to Figure 8-25: DB-9 Connector Pin-outs, page 8-32.</li></ul>

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**Set up PC Interface with the D50 RAM**

Follow these steps to set up Craft Terminal on your PC and connect to the D50 RAM:

Table 8-11: Set up PC Interface with the D50 RAM

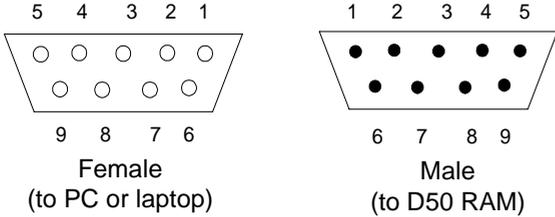
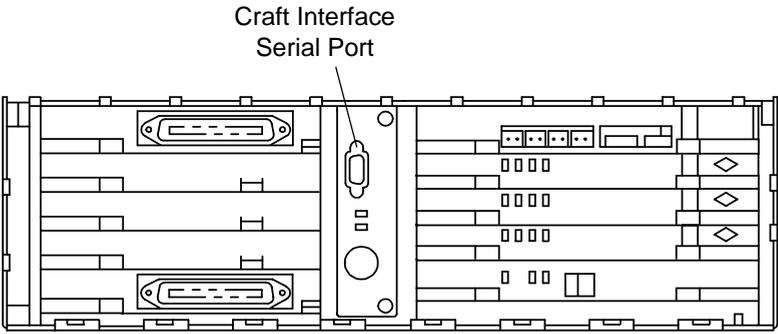
STEP	PROCEDURE
1	Install Windows NT or Windows 2000 according to the manufacturer's instructions.
2	Install and configure Windows support services: Serial Port, Modem, Remote Access Services (RAS), Simple Network Management Protocol (SNMP), and Dial-up Networking following the instructions in the volume titled <i>Craft Terminal</i> , Section 1— <i>Overview and Installation</i> , Chapter 1—“Craft Terminal Overview.”
3	Install Craft Terminal software following the instructions in the volume titled <i>Craft Terminal</i> , Section 1— <i>Overview and Installation</i> , Chapter 6—“Installing/Removing Craft Terminal Software.”  <b>Important! Windows NT service packs that were previously installed will need to be reinstalled at this point.</b>
4	Connect the serial port cable to your PC's 9-pin or 25-pin serial port connector.  <div style="text-align: center;">  <p>Figure 8-25: DB-9 Connector Pin-outs</p> </div>
5	Connect the other end of the serial port cable to the craft interface serial port connector on the D50 RAM.  <div style="text-align: center;">  <p>Figure 8-26: D50 RAM Craft Interface Serial Port</p> </div>

Table 8-11: Set up PC Interface with the D50 RAM (continued)

STEP	PROCEDURE
6	The Remote Craft feature must be enabled in the Master Control Shelf (MCS) using Craft Terminal. Refer to the volume titled <u>Commissioning</u> , Section 5— <i>Commissioning</i> , Chapter 2—“Using Craft Terminal for Commissioning,” <b>Establish Communication with the D50</b> , page 5-23.
7	The Chapter 8—“D50 RAM Remote Craft Access” procedure is complete.

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## SECTION 9 NETWORK INTERFACE DEVICE

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### Contents

#### Chapter 1

#### Network Interface Device (NID)

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## Chapter 1

### Network Interface Device (NID)

---

#### Introduction

The D50 Network Interface Device (NID) contains an external passive low pass filter “splitter” device. There are two types of NIDs available with the D50:

- Standalone NID, for new installations or for replacing existing voice only NIDs.
- Retrofit NID, for installation along side an existing voice only NID.

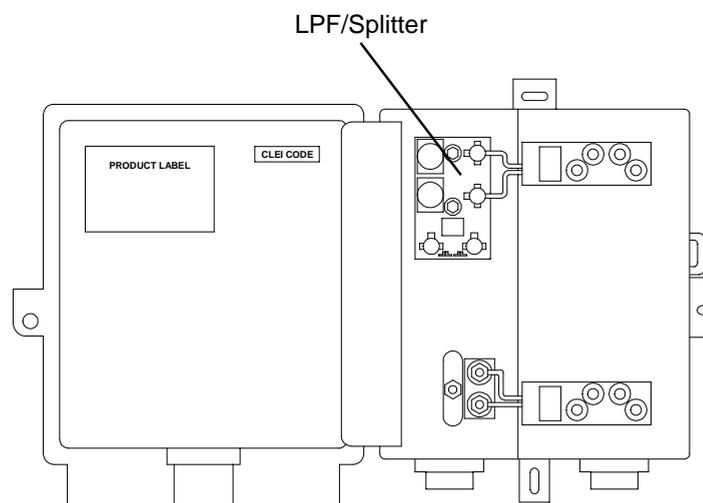


Figure 9-1: Standalone Network Interface Device (NID)

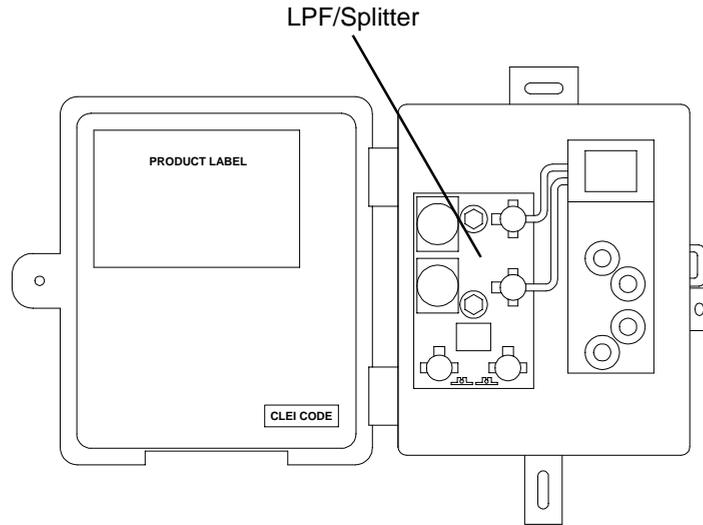


Figure 9-2: Retrofit Network Interface Device (NID)

The NID serves two filtering purposes:

- Prevents transients associated with POTS signaling from interfering with ADSL transmissions. Transients include:
  - Off hook loop current – ringing signal.
  - Ring trip – pulse dialing.
  - DTMF (Dual Tone Multi-Frequency) – tone dialing.
- Prevents ADSL signals from causing noise or tones in POTS transmissions.

---

**Required  
Equipment and  
Tools**

You must have the following equipment and tools to install the NID (refer to Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers”):

- Standalone or Retrofit Network Interface Device.
- Straight blade screwdriver.
- Standard telco Allen wrench (used to open the telco side of the NID).
- 3/8 inch nut driver (for older pre-existing NIDs).
- Appropriate screws for mounting the NID housing; e.g., wood screws, molley bolts, or other.
- Twisted pair telephone wire.
- Category 5 wire.
- Ground wire (14 AWG or according to local electrical standards).

To install the Standalone Network Interface Device, continue to the next procedure, **Standalone NID Installation**.

To install the Retrofit Network Interface Device, skip to **Retrofit NID Installation**, page 9-5.

---

**Standalone NID Installation**

The drawing below shows the wiring required to install a Standalone NID. The internal cabling is pre-installed:

- Primary protection terminal block to ADSL data service terminal block.
- LPF/Splitter (output) to voice service terminal block.

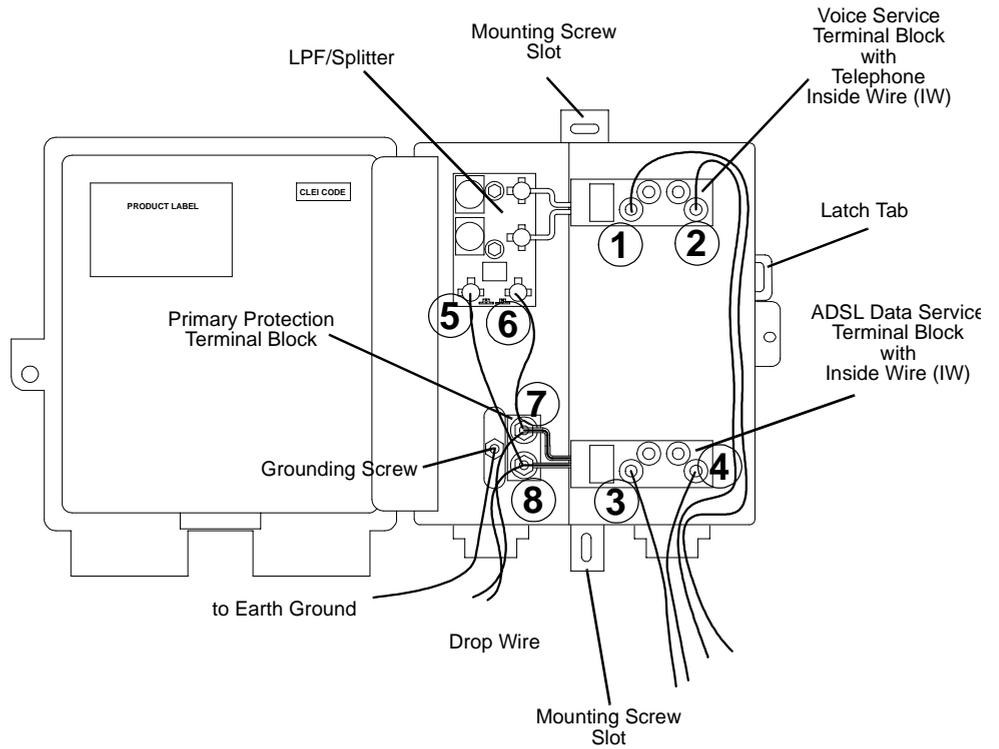


Figure 9-3: Standalone NID Wiring

Follow these steps and refer to the diagram above to install the Standalone NID:

Table 9-1: Standalone NID Installation

STEP	PROCEDURE
1	Mount the Standalone NID according to local standards, using the appropriate screws.
2	Open the NID housing by unscrewing the bolt and pressing in on the latch tab, located on the right side of the NID.

Table 9-1: Standalone NID Installation (continued)

STEP	PROCEDURE
3	<p>Ground the NID by connecting the ground wire to the grounding screw and running it through the rubber grommet on the bottom left of the NID to a known good earth ground, according to local electrical standards.</p>
<p style="text-align: center;">Figure 9-4: Standalone NID Wiring</p>	
4	<p>Bring the telephone inside wire (IW) up through the rubber grommet at the bottom right of the NID, and connect it to lugs 1 and 2 of the voice service terminal block. Tighten the screws so that the wires are held firmly in place.</p>
5	<p>Bring the ADSL modem inside wire (IW) up through the rubber grommet at the bottom right of the NID, and connect it to lugs 3 and 4 of the data service terminal block. Tighten the screws so that the wires are held firmly in place.</p>
6	<p>Connect twisted pair telephone wire to the bottom lugs on the LPF/Splitter (input), lugs 5 and 6.</p>
7	<p>Connect the other end of the twisted pair wire to the primary protection terminal block, lugs 7 and 8. Do not tighten the screws before completing the next step.</p>

Table 9-1: Standalone NID Installation (continued)

STEP	PROCEDURE
8	Bring the drop wire up through the rubber grommet at the bottom left of the NID, and connect it to the primary protection terminal block, lugs 7 and 8. Tighten the screws so that all wires are held firmly in place.
9	Close the NID housing, and tighten the bolt.
10	The Standalone NID Installation procedure is complete.

**Retrofit NID Installation**

The following diagram shows the location of the Retrofit NID with an existing voice only NID, and the termination points of the telephone and ADSL lines:

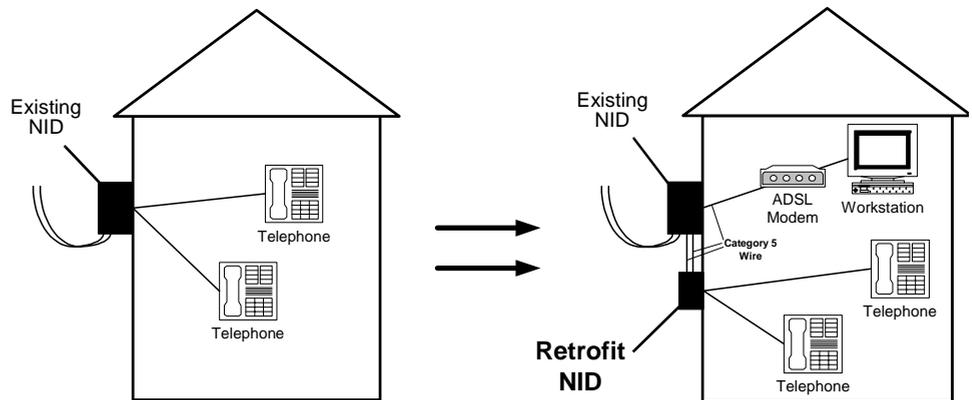


Figure 9-5: Retrofit NID Location with Existing NID

The drawing below shows the wiring required to install a Retrofit NID:

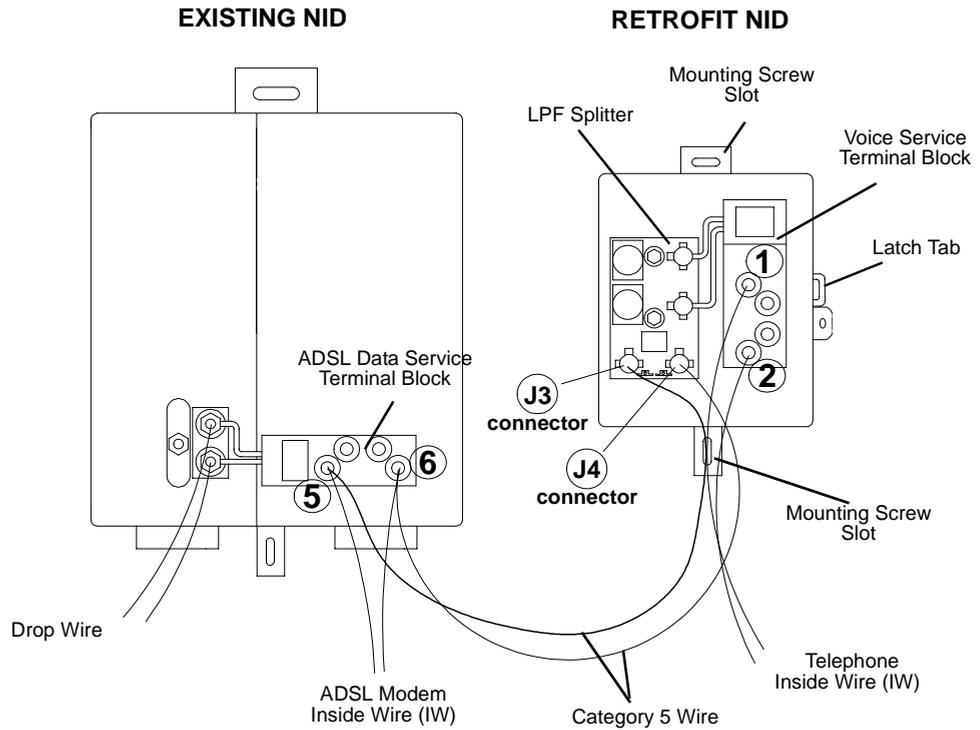


Figure 9-6: Retrofit NID Wiring, Adjacent to Existing Voice Only NID

Follow these steps and refer to the diagram above to install the Retrofit NID:

Table 9-2: Retrofit NID Installation

STEP	PROCEDURE
1	Mount the Retrofit NID near the existing NID, using the appropriate screws.  <b>Note:</b> Allow enough room between the Retrofit NID and the existing NID to open both NIDs.  <b>Note:</b> Be sure that the Retrofit NID is connected between the existing voice only NID and all voice equipment (telephones, fax machines, answering machines, etc.).
2	Open both NIDs. The Retrofit NID is opened by unscrewing the bolt and pressing in on the latch tab, located on the right side of the NID.
3	Disconnect the telephone inside wire (IW) from the data service terminal block on the existing NID.

Table 9-2: Retrofit NID Installation (continued)

STEP	PROCEDURE
4	<p>Run the telephone IW through the rubber grommet at the bottom of the Retrofit NID, and connect it to lugs 1 and 2 of the voice service terminal block.</p> <p><b>Note:</b> Splice additional wire to the telephone IW to lengthen it if necessary, according to local practices.</p> <p>Tighten the screws so that the wires are held firmly in place.</p>
5	<p>Run the ADSL modem inside wire (IW) through the rubber grommet at the bottom of the existing NID, and connect it to lugs 5 and 6 of the data service terminal block on the existing NID. Do not tighten the screws before completing the next step.</p>
6	<p>Connect Category 5 wires to lugs 5 and 6 of the data service terminal block on the existing NID, and run them down through the rubber grommet. Tighten the screws so that these wires and the ADSL modem IW are held firmly in place.</p>
7	<p>Run the other ends of the Category 5 wires up through the rubber grommet at the bottom of the Retrofit NID, and connect them to the J3 and J4 connectors on the Retrofit NID (left lug wire to J3, right lug wire to J4). Tighten the screws so that the wires are held firmly in place.</p>
8	<p>Close both NIDS and tighten bolts.</p>
9	<p>The Retrofit NID Installation procedure is complete.</p>



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## Appendix A

### Power to the D50 in a Non-Central Office Environment

---

#### Introduction

This section provides instructions on how to supply power to the D50 in a non-Central Office environment.

**Important! Be sure that the first two procedures in Section 3—*Power Cabling, Chapter 1—“Central Office Power to the D50”* have been completed *before* continuing with this section. The two procedures are **LCS Power Cable(s) Installation at the CSIP, page 3-3** and **Power Cable Installation at the LCS Backplane, page 3-6**.**

The D50 is powered by –48 Volts DC. Power is connected to the D50 at the Master Control Shelf Common Systems Interface Panel (CSIP) Power and Distribution Board. The CSIP Power and Distribution Board will be referred to as the CSIP throughout this procedure.

**Note:** The following procedures describe the set-up of the D50 for lab tests or demonstrations only. A D50 installed according to these procedures will not meet the requirements and specifications necessary for commercial use of any kind.

This Appendix is divided into the following sub-sections:

- **Grounding the MCS CSIP and the Power Supply**, page 10-2.
- **Power Supply Connection at the CSIP**, page 10-4.
- **Return (BLACK) Cable Connection at the CSIP**, page 10-6.
- **Power (RED) Cable Connection at the CSIP**, page 10-9.
- **Connect Power and Return Cables to the Power Supply**, page 10-11.
- **Verify Continuity and Polarity**, page 10-11.
- **Verify Voltage**, page 10-12.

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#### Required Equipment and Tools

To begin this task you must have the following equipment and tools (refer to Appendix J—“D50 Component Part Numbers”):

- Electrostatic Discharge (ESD) strap.
- (1) standard 23-inch, 7-foot telco relay rack.
- (1) -48 Volts power supply, properly grounded.
- (1) 8 AWG<sup>1</sup> Black (“positive” or “+”) return cable.
- (1) 8 AWG Red (“negative” or “-”) power cable.
- (1) 6 AWG ground wire (for rack to earth ground).
- (1) 6 AWG ground wire (for redundant power connection “strap” connecting the -48A and -48B battery power terminals—optional).

---

<sup>1</sup> 8 AWG or better wire is required for a fully loaded D50; refer to local electrical code for requirements.

- (1) 8 AWG ground wire (for return [BLACK] cable to earth ground).
- (2) 2-hole copper barrel lugs per cable.
- (2) lug nuts per cable.
- Crimping Tool.
- Diagonal Cutters.
- Torque Wrench (rating: 18 to 20 pounds) with 3/8-inch nut socket.
- Volt OHM Meter (VOM).
- Step Ladder (optional).

**Grounding the MCS CSIP and the Power Supply**

Follow these steps to properly ground the MCS CSIP and the power supply:

Table 10-1: Grounding the MCS CSIP and the Power Supply

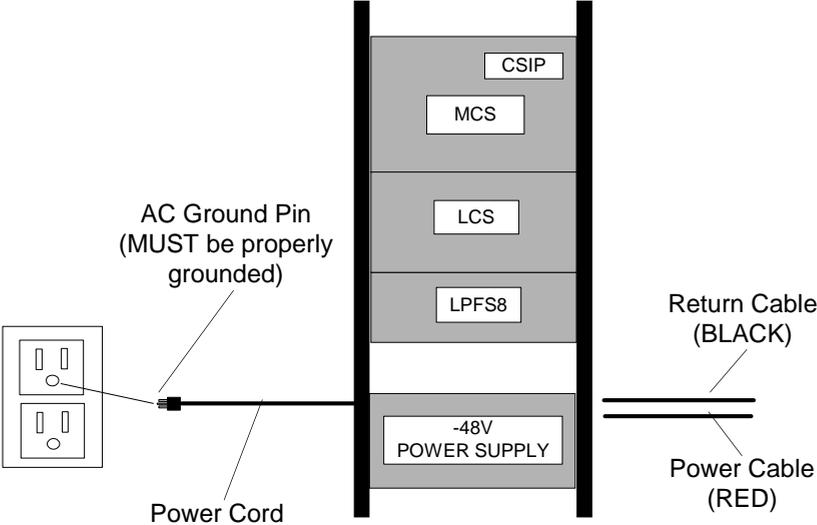
STEP	PROCEDURE
1	<p>For maximum efficiency and safety, install all D50 components and the power supply into a standard 23-inch, 7-foot telco relay rack.</p> <p><b>Important! Do not plug in the power supply at this point.</b></p>  <p>The diagram illustrates a front view of a rack with five slots. From top to bottom, the slots contain: CSIP, MCS, LCS, LPFS8, and a -48V POWER SUPPLY. To the left of the rack, a power cord is plugged into a wall outlet. A line points from the ground pin of the outlet to the text 'AC Ground Pin (MUST be properly grounded)'. To the right of the rack, two cables are shown: a 'Return Cable (BLACK)' and a 'Power Cable (RED)'. Lines connect these labels to the respective cables.</p> <p>Figure 10-1: Non-Central Office Rack Mount Setup (Front View)</p>

Table 10-1: Grounding the MCS CSIP and the Power Supply (continued)

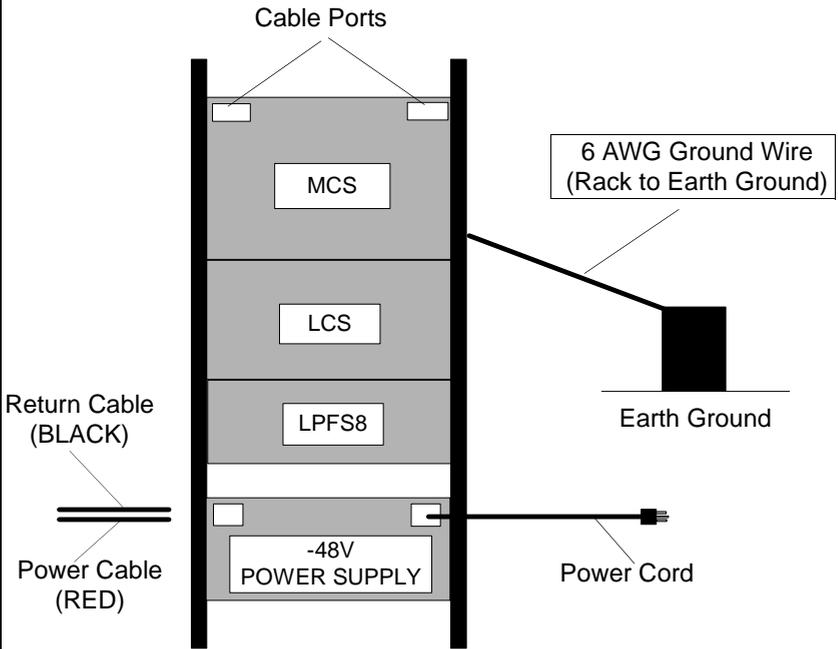
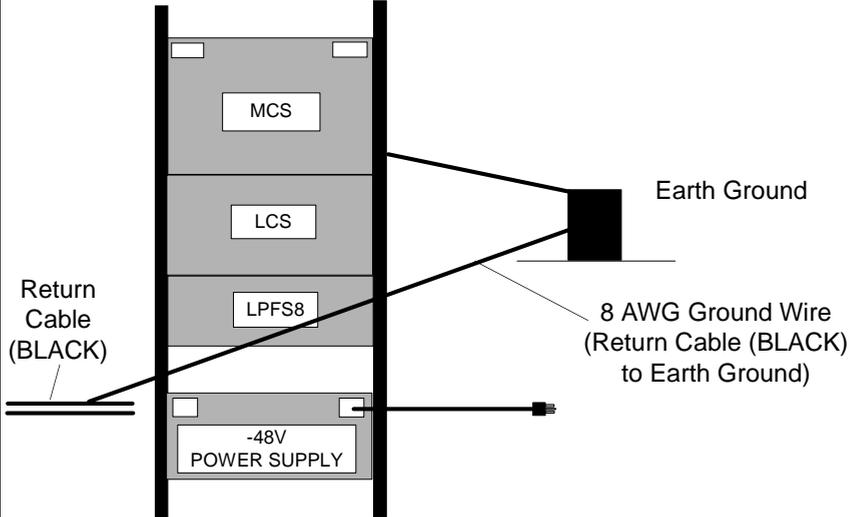
STEP	PROCEDURE
2	<p>Run the 6 AWG ground wire from the rack to a known good earth ground, following local procedures.</p>  <p>The diagram shows a vertical rack with four main sections: MCS, LCS, LPFS8, and -48V POWER SUPPLY. At the top are Cable Ports. A 6 AWG Ground Wire is connected from the rack to an Earth Ground. On the left, a Return Cable (BLACK) and a Power Cable (RED) are shown. On the right, a Power Cord is connected to the -48V POWER SUPPLY section.</p> <p>Figure 10-2: Rack to Earth Ground (Back View)</p>

Table 10-1: Grounding the MCS CSIP and the Power Supply (continued)

STEP	PROCEDURE
<p><b>3</b></p>	<p>Run the 8 AWG ground wire from the return (BLACK) cable to a known good earth ground, following local procedures.</p> <p><b>Important! Do NOT run the 8 AWG ground wire from the return cable to the rack, this does not provide an earth ground.</b></p>  <p style="text-align: center;">Figure 10-3: Return Cable to Earth Ground (Back View)</p>
<p><b>4</b></p>	<p>Confirm that grounding procedures meet local requirements. Consult your local electrical code for instructions.</p>
<p><b>5</b></p>	<p>Continue to the next procedure: <b>Power Supply Connection at the CSIP.</b></p>

**Power Supply Connection at the CSIP**

Power is supplied to the D50 at the CSIP, located inside the MCS assembly, as follows:

- -48A terminal on the CSIP connects to the negative (“ - ”) terminal on the power supply with the power (RED) cable.
- -48VA RTN terminal on the CSIP connects to the positive (“ + ”) terminal on the power supply with the return (BLACK) cable.

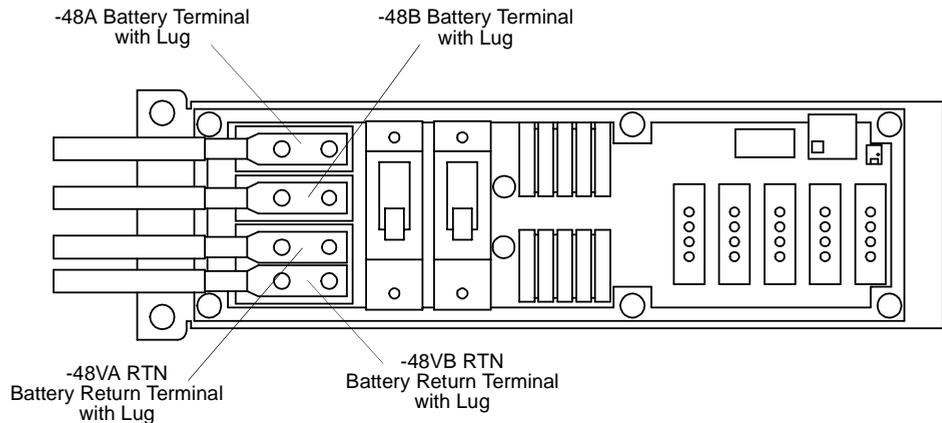


Figure 10-4: CSIP Power & Return Battery Terminals (Lug Cover removed)

The D50 will operate with a single power connection and a single return connection to the power supply. The -48B terminal and -48VB RTN terminal on the CSIP are for *optional* redundant power and return connections.

**Important! If you are using both the -48A terminal and the -48B terminal for redundant power connections, you must also use both the -48VA RTN terminal and the -48VB RTN terminal for redundant return terminal connections in order to have a properly balanced system.**

For installations using a single power connection, an optional redundant power connection “strap” can be installed between the two battery power terminals (-48A Battery Terminal and -48B Battery Terminal) using 6 AWG wire, to utilize the redundant capabilities of the D50 power system. The VA RTN and VB RTN return terminals have built-in redundancy.



**Warning! Before continuing with installation procedures, make sure that the power supply is unplugged and that the power and return cables are NOT attached. Do not connect the power and return cables to the power supply before beginning the following procedure.**

**Return (BLACK) Cable Connection at the CSIP**

Return (BLACK) cables are connected to the D50 at the CSIP. The following steps provide instructions for installing one return cable; a second redundant cable can be installed in the same way.

Follow these steps to connect the return cable to the CSIP:

Table 10-2: Return (BLACK) Cable Connection at the CSIP

STEP	PROCEDURE
1	Refer to Section 2— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures,” page 2-1 to attach a properly grounded ESD strap before proceeding.
2	Route the return cable (BLACK) through one of the large cable ports on the MCS. <div> <p>The diagram illustrates the back view of a CSIP assembly. It consists of four main components stacked vertically: MCS (top), LCS, LPFS8, and -48V POWER SUPPLY (bottom). A Return Cable (BLACK) enters from the left side, passes through a large cable port on the MCS, and connects to the back of the assembly. An Earth Ground connection is shown on the right side, connected to the back of the assembly. The diagram is labeled 'Figure 10-5: Return Cable to CSIP (Back View)'.</p> </div>
3	Go to the front of the MCS cabinet. Pull the return cable from the back of the assembly to the front of the CSIP.
4	Cut the return cable to the correct length using diagonal cutters.
5	Using a crimping tool, attach the 2-hole barrel lug to the return cable.

Table 10-2: Return (BLACK) Cable Connection at the CSIP (continued)

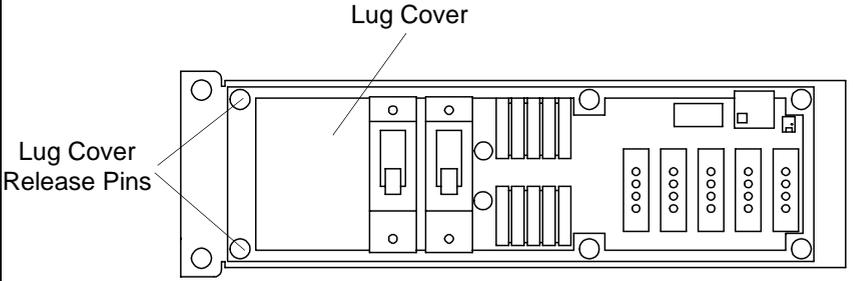
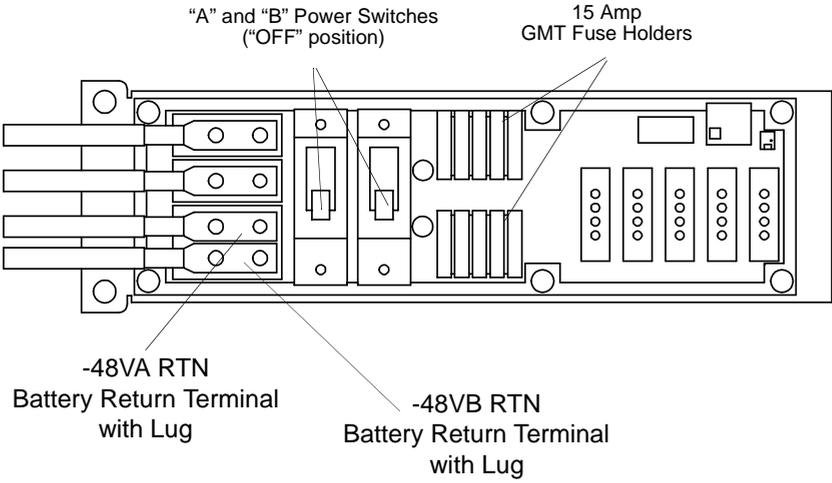
STEP	PROCEDURE
6	<p>Remove the protective plastic cover over the battery and battery return terminals on the CSIP. Pull on the two release pins (located on the left side, top and bottom) and remove.</p> <p><b>Important! Do not lose this cover, place it where you can find it again.</b></p>  <p>The diagram shows a rectangular component with various electrical terminals. On the left side, there are two circular release pins, one at the top and one at the bottom. A plastic cover is shown partially covering the top-left corner of the component. Labels with leader lines point to the 'Lug Cover' and the 'Release Pins'.</p> <p style="text-align: center;">Figure 10-6: CSIP Lug Cover and Release Pins</p>

Table 10-2: Return (BLACK) Cable Connection at the CSIP (continued)

STEP	PROCEDURE
7	<p><b>Important! Check to make sure that the power switches are set in the “OFF” or “Down” position. Verify that all fuses are removed from the fuse holders. See the diagram in the following step for an illustration of power switch and fuse holder locations.</b></p>
8	<p>Place the return cable lug on the battery return terminal labeled “-48VA RTN.” If you are using a second redundant return cable, repeat Steps 2 through 7 for the redundant cable, and place the redundant cable lug on the battery return terminal labeled “-48VB RTN.”</p> <p><b>Important! Tighten lug nuts to 18-20 inch pounds torque.</b></p>  <p>The diagram shows a top-down view of the CSIP battery return terminal block. On the left side, there are two main terminal columns. The leftmost column is labeled '-48VA RTN Battery Return Terminal with Lug' and has four horizontal lugs. The second column from the left is labeled '-48VB RTN Battery Return Terminal with Lug' and also has four horizontal lugs. In the center of the block, there are two vertical power switches labeled '"A" and "B" Power Switches ("OFF" position)'. To the right of the switches are several vertical fuse holders labeled '15 Amp GMT Fuse Holders'. On the far right, there are several vertical terminal strips with multiple pins.</p> <p>Figure 10-7: CSIP Battery Return Terminals</p>
9	<p>Continue to the next procedure: <b>Power (RED) Cable Connection at the CSIP.</b></p>

**Power (RED) Cable Connection at the CSIP**

Power (RED) cables are connected to the D50 at the CSIP. The following steps provide instructions for installing one power cable; a second redundant cable can be installed in the same way.

Follow these steps to connect the power cable to the CSIP:

Table 10-3: Power (RED) Cable Connection at the CSIP

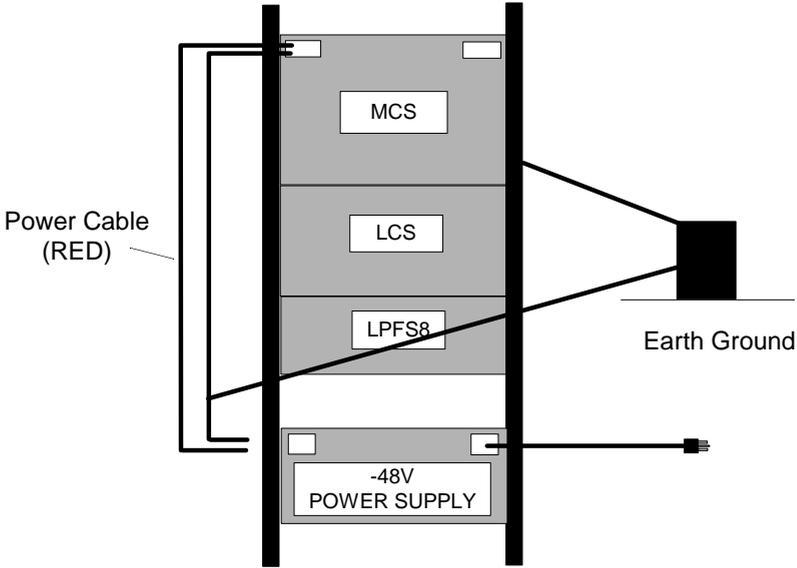
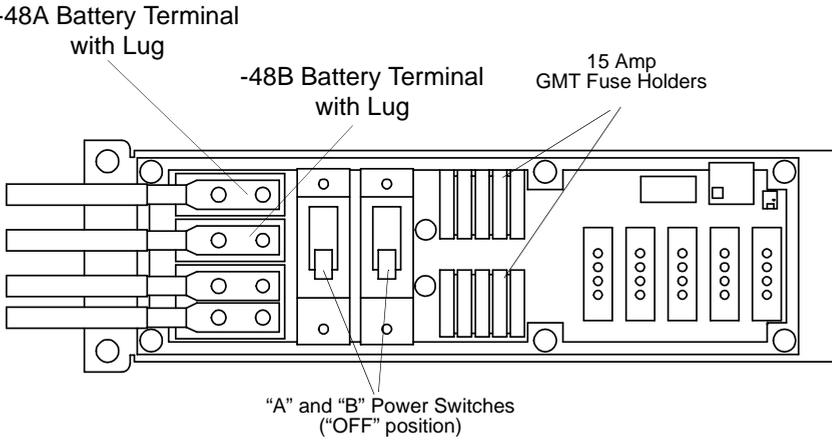
STEP	PROCEDURE
1	Refer to Section 2— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures,” page 2-1 to attach a properly grounded ESD strap before proceeding.
2	<p>Route the power cable (RED) through one of the large cable ports on the MCS.</p>  <p style="text-align: center;">Figure 10-8: Power Cable to CSIP (Back View)</p>
3	Push the power cable through one of the large cable ports at the back of the CSIP.
4	Go to the front of the MCS cabinet. Pull the power cable from the back of the assembly to the front of the CSIP.
5	Cut the power cable to the correct length using diagonal cutters.
6	Using a crimping tool, attach the 2-hole barrel lug to the power cable.
7	<p><b>Important! Check to make sure that the power switches are set in the “OFF” or “Down” position. Verify that all fuses are removed from the fuse holders. See the diagram in the following step for an illustration of power switch and fuse holder locations.</b></p>

Table 10-3: Power (RED) Cable Connection at the CSIP (continued)

STEP	PROCEDURE
<p><b>8</b></p>	<p>Place the power cable lug on the battery terminal labeled “-48A.” If you are using a second redundant power cable, repeat Steps 2 through 7 for the redundant cable, and place the redundant cable lug on the battery terminal labeled “-48B.”</p> <p><b>Important! Tighten lug nuts to 18-20 inch pounds torque.</b></p>  <p>The diagram shows a top-down view of the battery terminal assembly. On the left, there are two main terminal blocks. The top one is labeled '-48A Battery Terminal with Lug' and the bottom one is labeled '-48B Battery Terminal with Lug'. To the right of these are two vertical columns of '15 Amp GMT Fuse Holders'. Further right are two rows of 'A' and 'B' Power Switches, with a label indicating they are in the 'OFF' position. The entire assembly is housed in a rectangular metal enclosure with mounting holes at the corners.</p> <p><b>Figure 10-9: CSIP Battery Terminals</b></p>
<p><b>9</b></p>	<p>If you are NOT using a redundant power cable on the -48B battery terminal, do you want a redundant power connection “strap” connecting the -48B terminal to the -48A terminal (optional)?</p> <ul style="list-style-type: none"> <li>■ If YES, continue to Step 10.</li> <li>■ If NO, skip to Step 11.</li> </ul>
<p><b>10</b></p>	<p>To install the redundant power connection strap:</p> <ul style="list-style-type: none"> <li>■ Cut a piece of 6 AWG wire to the correct length to connect the -48B Battery terminal to the -48A Battery terminal.</li> <li>■ Attach a 2-hole barrel lug to each end of the wire.</li> <li>■ Place one of the lugs on the -48A Battery terminal (over the power cable lug), and the other lug on the -48B Battery terminal.</li> </ul> <p>Continue to Step 11.</p>
<p><b>11</b></p>	<p>Replace the protective plastic lug cover. Push in on the two release pins to secure.</p>
<p><b>12</b></p>	<p>Continue to the next procedure: <b>Connect Power and Return Cables to the Power Supply.</b></p>

**Connect Power and Return Cables to the Power Supply**

Follow these steps to connect the power and return cables to the power supply:

Table 10-4: Connect Power and Return Cables to the Power Supply

STEP	PROCEDURE
1	Check to make sure CSIP power switches are still in the “OFF” or “Down” position. Verify that fuses are not installed in the fuse holders.
2	Connect the BLACK <i>return</i> cable (first) to the power supply according to power supply specifications.
3	Connect the RED <i>power</i> cable (second) to the power supply according to power supply specifications.
4	Plug in and turn on the power supply.
5	Continue to the next procedure: <b>Verify Continuity and Polarity</b> .

**Verify Continuity and Polarity**

Follow these steps to verify continuity and polarity of cables:

Table 10-5: Verify Continuity and Polarity

STEP	PROCEDURE
1	Use a Volt OHM Meter (VOM) to verify continuity of cables from the CSIP to the power supply.
2	Use a VOM to confirm polarity between the power supply and the CSIP.
3	Continue to the next procedure: <b>Verify Voltage</b> .

**Verify Voltage** Follow these steps to verify voltage at the CSIP:

Table 10-6: Verify Voltage

STEP	PROCEDURE
1	Use a VOM to measure the voltage present at the “-48A” and “-48VA RTN” terminals on the CSIP. If you are also using the “-48B” and “-48VB RTN” terminals, measure the voltage present on the “-48B” and “-48VB RTN” terminals.
2	Is the voltage between -42.75 and -56 Volts DC? <ul style="list-style-type: none"><li>■ If YES, continue to Step 3.</li><li>■ If NO, re-verify continuity of the power and return cables from the CSIP to the power supply.</li></ul>
3	The Supplying Power to the D50 in a Non-Central Office Environment procedure is complete.  Continue to Section 4— <i>ATM Network Cabling</i> , Chapter 1—“DS3 MCS to ATM Network Cabling,” page 4-1, or Section 4— <i>ATM Network Cabling</i> , Chapter 2—“OC3 MCS to ATM Network Cabling,” page 4-5.

**Important!** Leave power switches in the “OFF” or “Down” position. The volume titled **Commissioning**, Section 5—*Commissioning*, Chapter 2—“Using Craft Terminal for Commissioning” provides instructions for “powering up” the D50.

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## Appendix B

### D50 Installation Checklist

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#### Hardware Installation and Cabling

Complete the following steps to install the D50 Master Control Shelf (MCS), Line Card Shelves (LCSs), Low Pass Filter Shelves (LPFS8s), and Auxiliary CSIPs, and complete power, ATM network, MLA, telco, Ethernet, and alarm board cabling, and set up the D50 RAM and the Network Interface Device (NID) as required:

Table 10-7: Hardware and Cabling Checklist

STEP	PROCEDURE	✓
1	<p>Mount MCS (or Auxiliary CSIPs), LCSs, and LPFS8s in 23" relay rack(s) as indicated on work order.</p> <p><b>Reference:</b> The volume titled <u>Installation</u>:</p> <ul style="list-style-type: none"> <li>■ Section 1—<i>Hardware Installation</i>, Chapter 1—“Master Control Shelf Installation.”</li> <li>■ Section 1—<i>Hardware Installation</i>, Chapter 2—“Line Card Shelf Installation.”</li> <li>■ Section 1—<i>Hardware Installation</i>, Chapter 3—“Low Pass Filter Shelf Installation.”</li> <li>■ Section 1—<i>Hardware Installation</i>, Chapter 4—“Auxiliary CSIP Installation.”</li> </ul>	
2	<p>Connect power distribution cables from the MCS CSIP to up to 4 LCSs (from an ACSIP to up to 5 LCSs).</p> <p><b>Reference:</b> The volume titled <u>Installation</u>, Section 3—<i>Power Cabling</i>, Chapter 1—“Central Office Power to the D50.”</p>	
3	<p>Terminate Battery and Battery Return cables at the BDFB and route to the MCS. Connect Battery (-48VDC) and Battery Return cables to the MCS Common Systems Interface Panel (CSIP) in the first relay rack (or ACSIP in adjoining relay racks) as indicated on the work order.</p> <p><b>Reference:</b> The volume titled <u>Installation</u>:</p> <ul style="list-style-type: none"> <li>■ Section 3—<i>Power Cabling</i>, Chapter 1—“Central Office Power to the D50.”</li> <li>■ Section 10—<i>Appendices</i>, Appendix A—“Power to the D50 in a Non-Central Office Environment.”</li> </ul>	

Table 10-7: Hardware and Cabling Checklist (continued)

STEP	PROCEDURE	✓
4	<p>Terminate ATM network cabling (DS-3 or OC-3) at the DSX-3 cross connect panel or Optical Distribution Frame (ODF) and route to the MCS as indicated on the work order.</p> <p><b>Reference:</b> The volume titled <u>Installation</u>:</p> <ul style="list-style-type: none"> <li>■ Section 4—<i>ATM Network Cabling</i>, Chapter 1—“DS3 MCS to ATM Network Cabling.”</li> <li>■ Section 4—<i>ATM Network Cabling</i>, Chapter 2—“OC3 MCS to ATM Network Cabling.”</li> </ul>	
5	<p>Route the ATM network cabling through one of the large cable ports at the back of the MCS.</p> <ul style="list-style-type: none"> <li>■ Terminate DS3 coax cabling on the BNC connectors at the front of the MCS backplane.</li> <li>■ Route the OC-3 fiber optic cables through the clips above slots 7 and 8 at the top of the MCS card cage.</li> </ul> <p><b>Reference:</b> The volume titled <u>Installation</u>:</p> <ul style="list-style-type: none"> <li>■ Section 4—<i>ATM Network Cabling</i>, Chapter 1—“DS3 MCS to ATM Network Cabling.”</li> <li>■ Section 4—<i>ATM Network Cabling</i>, Chapter 2—“OC3 MCS to ATM Network Cabling.”</li> </ul>	
6	<p>Run MLA cabling as indicated on the work order:</p> <ul style="list-style-type: none"> <li>■ MLA2 OC-3 (multi-mode) fiber optic cables from the MCS to LCS for collocated installations.</li> <li>■ MLA2L/MLA2S/OC3L OC-3 (single-mode) fiber optic cables from the ODF cross connect panel to the MCS for Remote LCS (MLA2L/MLA2S) or standard ATM network equipment applications (OC3L).</li> <li>■ MLAT1 (DS1) copper cabling from the DSX cross connect panel to the MCS for Remote LCS or D50 RAM applications.</li> <li>■ MLAT3/DS3L (DS-3) coax cabling from the DSX-3 cross connect panel to the MCS for Remote LCS (MLAT3) or standard ATM network equipment applications (DS3L).</li> </ul> <p><b>Reference:</b> The volume titled <u>Installation</u>:</p> <ul style="list-style-type: none"> <li>■ Section 5—<i>MLA Cabling</i>, Chapter 1—“MLA2 to LSM2 Fiber Optic Cabling.”</li> <li>■ Section 5—<i>MLA Cabling</i>, Chapter 2—“MLA2L/MLA2S and OC3L Fiber Optic Cabling.”</li> <li>■ Section 5—<i>MLA Cabling</i>, Chapter 3—“MLAT1 Copper Cabling.”</li> <li>■ Section 5—<i>MLA Cabling</i>, Chapter 4—“MLAT3 and DS3L Coax Cabling.”</li> </ul>	

Table 10-7: Hardware and Cabling Checklist (continued)

STEP	PROCEDURE	✓
7	<p>Connect telco cables from the LPFS8s to the LCSs (for data plus voice service).</p> <p>Connect 25 pair cable stubs to the LCSs and LPFS8s, for connection to the MDF and voice switch.</p> <p>Route telco cables from the MDF and voice switch to the LCSs and LPFS8s.</p> <p>Connect the telco cables from the MDF and voice switch to the 25 pair cable stubs on the LCSs and LPFS8s.</p> <p><b>Reference:</b> The volume titled <u>Installation</u>:</p> <ul style="list-style-type: none"> <li>■ Section 6—<i>Telco Cabling</i>, Chapter 1—“LCS Cabling—Quad DS1 Line Cards.”</li> <li>■ Section 6—<i>Telco Cabling</i>, Chapter 2—“LCS Cabling—Octal Line Cards (Data Only).”</li> <li>■ Section 6—<i>Telco Cabling</i>, Chapter 3—“LCS Cabling—Octal Line Cards (Data Only): Sequential Pair Cabling.”</li> <li>■ Section 6—<i>Telco Cabling</i>, Chapter 4—“LPFS8 Cabling—Octal Line Cards (Data Plus Voice).”</li> <li>■ Section 6—<i>Telco Cabling</i>, Chapter 5—“LPFS8 Cabling—Octal Line Cards (Data + Voice): Sequential Pair Cabling.”</li> </ul>	
8	<p>For Craft Terminal <u>Ethernet</u> or <u>In-Band Management</u> network cabling:</p> <ul style="list-style-type: none"> <li>■ Ethernet: <ul style="list-style-type: none"> <li>– Connect a 10Base-T cable to the router.</li> <li>– Connect the 10Base-T cable to the MCS J16 connector.</li> </ul> </li> <li>■ In-Band: <ul style="list-style-type: none"> <li>– Contact the Network Administrator to connect Craft Terminal to an ATM/IP router on the network at the NOC.</li> </ul> </li> </ul> <p><b>Reference:</b> The volume titled <u>Installation</u>, Section 7—<i>Ethernet and Alarm Board Cabling</i>, Chapter 1—“Craft Terminal Ethernet Cabling.”</p>	
9	<p>Make Alarm Board connections as indicated on the work order for Visual, Audible, Remote Bay, and Relay Rack Fuse Alarms.</p> <p><b>Reference:</b> The volume titled <u>Installation</u>, Section 7—<i>Ethernet and Alarm Board Cabling</i>, Chapter 2—“Alarm Board Connections.”</p>	

Table 10-7: Hardware and Cabling Checklist (continued)

STEP	PROCEDURE	✓
10	<p>Be sure the D50 RAM is set up properly, if required.</p> <p><b>Reference:</b> The volume titled <u>Installation</u>:</p> <ul style="list-style-type: none"> <li>■ Section 8—<i>D50 RAM</i>, Chapter 1—“D50 RAM Assembly Installation.”</li> <li>■ Section 8—<i>D50 RAM</i>, Chapter 2—“D50 RAM Power Cabling.”</li> <li>■ Section 8—<i>D50 RAM</i>, Chapter 3—“D50 RAM Alarm Cabling.”</li> <li>■ Section 8—<i>D50 RAM</i>, Chapter 4—“D50 RAM Telco Cabling.”</li> <li>■ Section 8—<i>D50 RAM</i>, Chapter 5—“D50 RAM Card Installation.”</li> <li>■ Section 8—<i>D50 RAM</i>, Chapter 6—“D50 RAM LSMT1 Cabling.”</li> <li>■ Section 8—<i>D50 RAM</i>, Chapter 7—“D50 RAM Commissioning.”</li> <li>■ Section 8—<i>D50 RAM</i>, Chapter 8—“D50 RAM Remote Craft Access.”</li> </ul>	
11	<p>Be sure the Network Interface Device (NID) is set up properly, as required.</p> <p><b>Reference:</b> The volume titled <u>Installation</u>, Section 9—<i>Network Interface Device</i>, Chapter 1—“Network Interface Device (NID).”</p>	

## Appendix C

### Testing Cable Pairs Continuity: Data Only

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**Introduction** All D50 line card cable pairs from the LCS that terminate at the Main Distribution Frame (MDF) should be tested for continuity. A Pair Analysis Module (PAM8) card is available to complete this testing.

**Note:** These procedures refer to using eight-port (octal) cards. They can also be used for testing four-port (quad) cards.

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**Required Equipment and Tools** To begin this task you must have the following equipment and tools (refer to Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers”):

- Electrostatic Discharge (ESD) Strap.
- PAM8 card with eight AAA Batteries.
- Extra AAA Batteries.
- Second person to isolate tip and ring wires at the MDF.

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**PAM8 Card**

The PAM8 card is used to test continuity of cable pairs (tip/ring) from the LCS to the MDF. It plugs into the LCS backplane just like a line card. The PAM8 card is powered by AAA batteries or -48V central office battery. The D50 does not have to be powered up to use the PAM8 card.

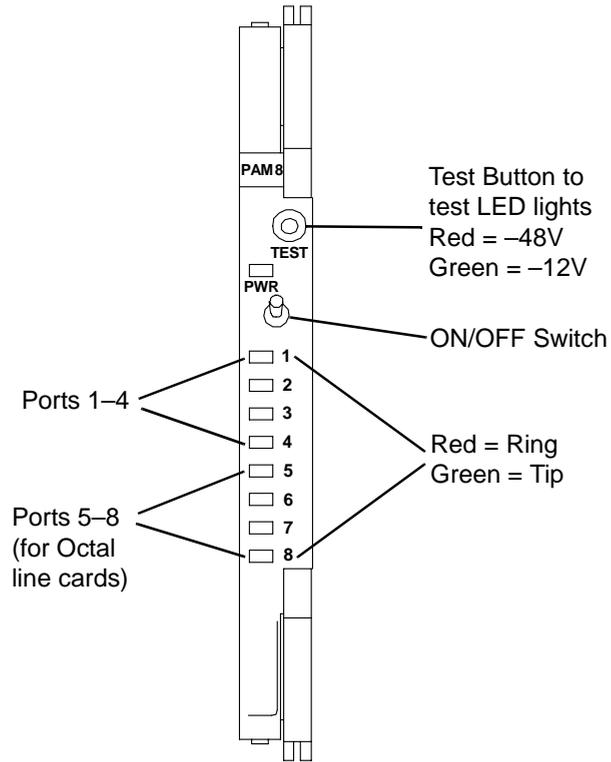


Figure 10-10: PAM8 Card

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Table 10-8: Verify Continuity of Cable Pairs (continued)

STEP	PROCEDURE																																																																																																																																																																																														
<b>4</b>	<p>The PAM8 card is now connected to LCS slot 1, ports 1 through 8 (ports 1 through 4 for quad cards).</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2">LPFS8 Conn- ector #</th> <th rowspan="2">LCS Conn- ector #</th> <th colspan="2">LPFS8/LCS</th> <th rowspan="2">Cable #</th> <th rowspan="2">Pair #</th> <th rowspan="2">Wire #</th> <th colspan="2">Backplane Pin Connectors</th> <th rowspan="2">STANDARD Color Code</th> <th rowspan="2">Tip (T) or Ring (R)</th> </tr> <tr> <th>Slot #</th> <th>Port #</th> <th>LPFS8</th> <th>LCS</th> </tr> </thead> <tbody> <tr> <td>J1</td> <td>J9</td> <td rowspan="8">1</td> <td rowspan="8">1</td> <td rowspan="2">A1</td> <td rowspan="2">1</td> <td>1</td> <td>1</td> <td>1</td> <td>Blue/White</td> <td>R</td> </tr> <tr> <td></td> <td></td> <td>2</td> <td>2</td> <td>2</td> <td>White/Blue</td> <td>T</td> </tr> <tr> <td></td> <td></td> <td rowspan="2">2</td> <td rowspan="2">2</td> <td>3</td> <td>3</td> <td>3</td> <td>Orange/White</td> <td>R</td> </tr> <tr> <td></td> <td></td> <td>4</td> <td>4</td> <td>4</td> <td>White/Orange</td> <td>T</td> </tr> <tr> <td></td> <td></td> <td rowspan="2">3</td> <td rowspan="2">3</td> <td>5</td> <td>5</td> <td>5</td> <td>Green/White</td> <td>R</td> </tr> <tr> <td></td> <td></td> <td>6</td> <td>6</td> <td>6</td> <td>White/Green</td> <td>T</td> </tr> <tr> <td></td> <td></td> <td rowspan="2">4</td> <td rowspan="2">4</td> <td>7</td> <td>7</td> <td>7</td> <td>Brown/White</td> <td>R</td> </tr> <tr> <td></td> <td></td> <td>8</td> <td>8</td> <td>8</td> <td>White/Brown</td> <td>T</td> </tr> <tr> <td>↓</td> <td>↓</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2">J5</th> <th rowspan="2">J5</th> <th rowspan="2">Slot #</th> <th rowspan="2">Port #</th> <th rowspan="2">Cable #</th> <th rowspan="2">Pair #</th> <th rowspan="2">Wire #</th> <th rowspan="2">LPFS8</th> <th rowspan="2">LCS</th> <th rowspan="2">STANDARD Color Code</th> <th rowspan="2">Tip (T) or Ring (R)</th> </tr> </thead> <tbody> <tr> <td></td> </tr> <tr> <td></td> <td></td> <td rowspan="8">1</td> <td rowspan="8">5</td> <td rowspan="2">A2</td> <td rowspan="2">1</td> <td>1</td> <td>1</td> <td>1</td> <td>Blue/White</td> <td>R</td> </tr> <tr> <td></td> <td></td> <td>2</td> <td>2</td> <td>2</td> <td>White/Blue</td> <td>T</td> </tr> <tr> <td></td> <td></td> <td rowspan="2">6</td> <td rowspan="2">2</td> <td>3</td> <td>3</td> <td>3</td> <td>Orange/White</td> <td>R</td> </tr> <tr> <td></td> <td></td> <td>4</td> <td>4</td> <td>4</td> <td>White/Orange</td> <td>T</td> </tr> <tr> <td></td> <td></td> <td rowspan="2">7</td> <td rowspan="2">3</td> <td>5</td> <td>5</td> <td>5</td> <td>Green/White</td> <td>R</td> </tr> <tr> <td></td> <td></td> <td>6</td> <td>6</td> <td>6</td> <td>White/Green</td> <td>T</td> </tr> <tr> <td></td> <td></td> <td rowspan="2">8</td> <td rowspan="2">4</td> <td>7</td> <td>7</td> <td>7</td> <td>Brown/White</td> <td>R</td> </tr> <tr> <td></td> <td></td> <td>8</td> <td>8</td> <td>8</td> <td>White/Brown</td> <td>T</td> </tr> <tr> <td>↓</td> <td>↓</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	LPFS8 Conn- ector #	LCS Conn- ector #	LPFS8/LCS		Cable #	Pair #	Wire #	Backplane Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)	Slot #	Port #	LPFS8	LCS	J1	J9	1	1	A1	1	1	1	1	Blue/White	R			2	2	2	White/Blue	T			2	2	3	3	3	Orange/White	R			4	4	4	White/Orange	T			3	3	5	5	5	Green/White	R			6	6	6	White/Green	T			4	4	7	7	7	Brown/White	R			8	8	8	White/Brown	T	↓	↓										J5	J5	Slot #	Port #	Cable #	Pair #	Wire #	LPFS8	LCS	STANDARD Color Code	Tip (T) or Ring (R)													1	5	A2	1	1	1	1	Blue/White	R			2	2	2	White/Blue	T			6	2	3	3	3	Orange/White	R			4	4	4	White/Orange	T			7	3	5	5	5	Green/White	R			6	6	6	White/Green	T			8	4	7	7	7	Brown/White	R			8	8	8	White/Brown	T	↓	↓									
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<b>8</b>	<p>Complete PAM8 testing on all cable pairs for line card slot 1.</p>																																																																																																																																																																																														

Table 10-8: Verify Continuity of Cable Pairs (continued)

<b>STEP</b>	<b>PROCEDURE</b>
<b>9</b>	Remove the PAM8 card.
<b>10</b>	Repeat Steps 2 through 9 for each line card slot, 2 through 24.
<b>11</b>	Are additional Line Card Shelves installed? <ul style="list-style-type: none"><li>■ If Yes, repeat Steps 2 through 9 for each Line Card Shelf.</li><li>■ If No, the <b>Verify Continuity of Cable Pairs</b> procedure is complete.</li></ul>

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## Appendix D

### Testing Cable Pairs Continuity: Data Plus Voice

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**Introduction** All D50 line card cable pairs from the LPFS8 that terminate at the Main Distribution Frame (MDF) should be tested for continuity. Complimentary Analysis Module (CAM8) and Pair Analysis Module (PAM8) cards are used to complete this testing.

**Note:** These procedures refer to using eight-port (octal) cards. They can also be used for testing four-port (quad) cards.

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**Required Equipment and Tools** To begin this task, you must have the following equipment and tools (refer to Section 10—*Appendices*, Appendix J—“D50 Component Part Numbers,” page 10-167):

- Electrostatic Discharge (ESD) Strap.
  - CAM8 card.
  - PAM8 card with eight AAA Batteries.
  - Extra AAA Batteries.
  - A second person to isolate tip and ring wires at the MDF.
-

**CAM8 Card**

The CAM8 card provides the pathway to do the continuity testing from the LCS to the Subscriber Main Distribution Frame (MDF) and from the LPFS8 to the POTS switch. It plugs into the LPFS8 backplane just like an LPF8-2<sup>1</sup> card. The D50 does not have to be powered up to use the CAM8 card.

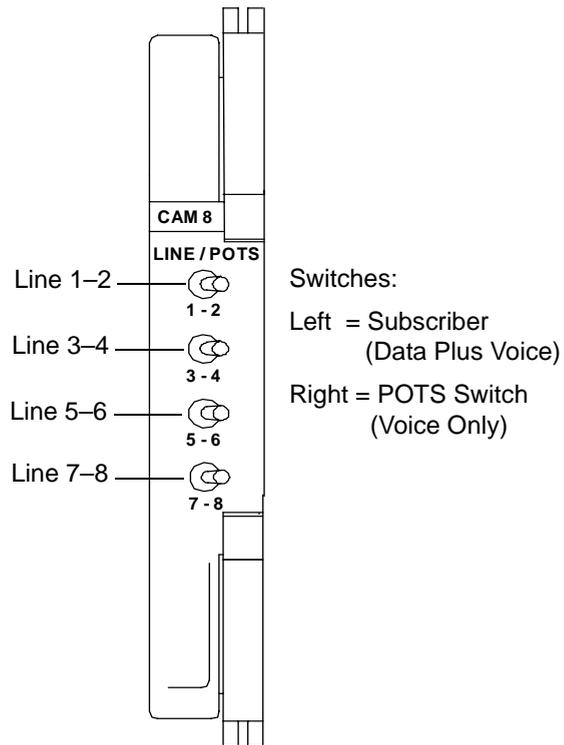


Figure 10-13: CAM8 Card

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<sup>1</sup> The LPF8-2 card is T1.413i2 compliant with DMT8a-3 and DMT8a-4 line cards.

**PAM8 Card**

The PAM8 card is used to test continuity of cable pairs (tip/ring) from the LCS to the Subscriber MDF. It plugs into the LCS backplane just like a line card. The PAM8 card is powered by AAA batteries or -48V central office battery. The D50 does not have to be powered up to use the PAM8 card.

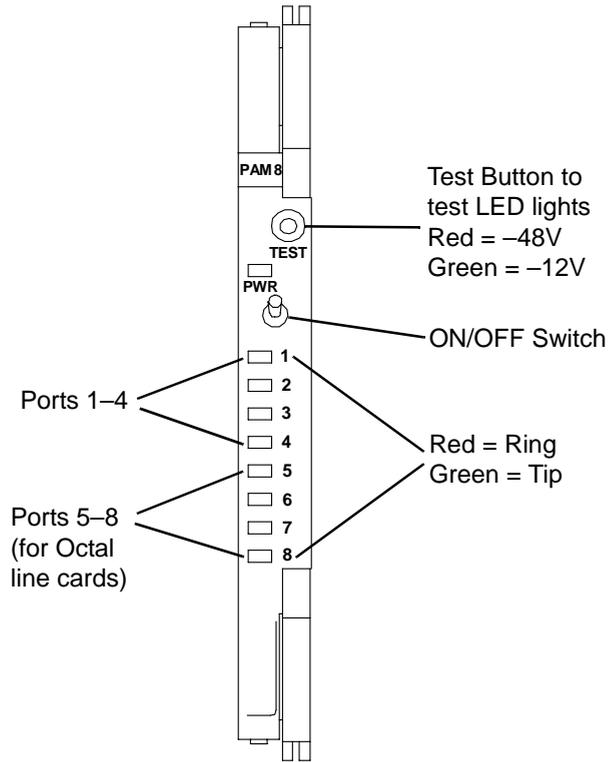


Figure 10-14: PAM8 Card





Table 10-9: Verify Continuity Cable Pairs: LCS to Subscriber (continued)

STEP	PROCEDURE																																																																																																																																																																															
<b>6</b>	<p>The PAM8 card is connected to LCS slot 1, ports 1 through 8 (ports 1 through 4 for quad cards):</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2">LPFS8 Conn- ector #</th> <th rowspan="2">LCS Conn- ector #</th> <th colspan="2">LPFS8/LCS</th> <th rowspan="2">Cable #</th> <th rowspan="2">Pair #</th> <th rowspan="2">Wire #</th> <th colspan="2">Backplane Pin Connectors</th> <th rowspan="2">STANDARD Color Code</th> <th rowspan="2">Tip (T) or Ring (R)</th> </tr> <tr> <th>Slot #</th> <th>Port #</th> <th>LPFS8</th> <th>LCS</th> </tr> </thead> <tbody> <tr> <td>J1</td> <td>J9</td> <td rowspan="8">1</td> <td rowspan="2">1</td> <td>A1</td> <td rowspan="2">1</td> <td>1</td> <td>1</td> <td>1</td> <td>Blue/White</td> <td>R</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>2</td> <td>2</td> <td>2</td> <td>White/Blue</td> <td>T</td> </tr> <tr> <td></td> <td></td> <td rowspan="2">2</td> <td rowspan="2"></td> <td rowspan="2"></td> <td rowspan="2">2</td> <td>3</td> <td>3</td> <td>3</td> <td>Orange/White</td> <td>R</td> </tr> <tr> <td></td> <td></td> <td>4</td> <td>4</td> <td>4</td> <td>White/Orange</td> <td>T</td> </tr> <tr> <td></td> <td></td> <td rowspan="2">3</td> <td rowspan="2"></td> <td rowspan="2"></td> <td rowspan="2">3</td> <td>5</td> <td>5</td> <td>5</td> <td>Green/White</td> <td>R</td> </tr> <tr> <td></td> <td></td> <td>6</td> <td>6</td> <td>6</td> <td>White/Green</td> <td>T</td> </tr> <tr> <td></td> <td></td> <td rowspan="2">4</td> <td rowspan="2"></td> <td rowspan="2"></td> <td rowspan="2">4</td> <td>7</td> <td>7</td> <td>7</td> <td>Brown/White</td> <td>R</td> </tr> <tr> <td>↓</td> <td>↓</td> <td>8</td> <td>8</td> <td>8</td> <td>White/Brown</td> <td>T</td> </tr> <tr> <td>J5</td> <td>J5</td> <td rowspan="8">1</td> <td rowspan="2">5</td> <td>A2</td> <td rowspan="2">1</td> <td>1</td> <td>1</td> <td>1</td> <td>Blue/White</td> <td>R</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>2</td> <td>2</td> <td>2</td> <td>White/Blue</td> <td>T</td> </tr> <tr> <td></td> <td></td> <td rowspan="2">6</td> <td rowspan="2"></td> <td rowspan="2"></td> <td rowspan="2">2</td> <td>3</td> <td>3</td> <td>3</td> <td>Orange/White</td> <td>R</td> </tr> <tr> <td></td> <td></td> <td>4</td> <td>4</td> <td>4</td> <td>White/Orange</td> <td>T</td> </tr> <tr> <td></td> <td></td> <td rowspan="2">7</td> <td rowspan="2"></td> <td rowspan="2"></td> <td rowspan="2">3</td> <td>5</td> <td>5</td> <td>5</td> <td>Green/White</td> <td>R</td> </tr> <tr> <td></td> <td></td> <td>6</td> <td>6</td> <td>6</td> <td>White/Green</td> <td>T</td> </tr> <tr> <td></td> <td></td> <td rowspan="2">8</td> <td rowspan="2"></td> <td rowspan="2"></td> <td rowspan="2">4</td> <td>7</td> <td>7</td> <td>7</td> <td>Brown/White</td> <td>R</td> </tr> <tr> <td>↓</td> <td>↓</td> <td>8</td> <td>8</td> <td>8</td> <td>White/Brown</td> <td>T</td> </tr> </tbody> </table> <p style="text-align: center;">Figure 10-17: PAM8 Card Connectors on the LCS</p> <p>For complete cable pair assignment tables, refer to Section 10—<i>Appendices</i>, Appendix E—“Cable/Pair Assignment Tables: LCS with Quad DS1 Line Cards.”</p>											LPFS8 Conn- ector #	LCS Conn- ector #	LPFS8/LCS		Cable #	Pair #	Wire #	Backplane Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)	Slot #	Port #	LPFS8	LCS	J1	J9	1	1	A1	1	1	1	1	Blue/White	R						2	2	2	White/Blue	T			2			2	3	3	3	Orange/White	R			4	4	4	White/Orange	T			3			3	5	5	5	Green/White	R			6	6	6	White/Green	T			4			4	7	7	7	Brown/White	R	↓	↓	8	8	8	White/Brown	T	J5	J5	1	5	A2	1	1	1	1	Blue/White	R						2	2	2	White/Blue	T			6			2	3	3	3	Orange/White	R			4	4	4	White/Orange	T			7			3	5	5	5	Green/White	R			6	6	6	White/Green	T			8			4	7	7	7	Brown/White	R	↓	↓	8	8	8	White/Brown	T
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Table 10-9: Verify Continuity Cable Pairs: LCS to Subscriber (continued)

STEP	PROCEDURE
10	Complete continuity testing on all LCS slot 1 cable pairs.
11	Remove the CAM8 and PAM8 cards.
12	Repeat Steps 2 through 11 for each LPFS8 and LCS slot.
13	Are additional LCSs and LPFS8s installed? <ul style="list-style-type: none"> <li>■ If YES, repeat Steps 2 through 11 for each LCS and LPFS8.</li> <li>■ If NO, continue to the next procedure: <b>Verify Continuity of Cable Pairs—LPFS8 to POTS Switch.</b></li> </ul>

**Verify Continuity of Cable Pairs—LPFS8 to POTS Switch**

Follow these steps to verify continuity of all cable pairs from the LPFS8 to the POTS switch using the CAM8 and PAM8 cards.

Table 10-10: Verify Continuity Cable Pairs: LPFS8 to POTS Switch

STEP	PROCEDURE
1	Slide the unlocked CAM8 card into LPFS8 card slot 1 until it plugs into the backplane connector, and lock it into place.  <b>Important! DO NOT force the card into position. If the card does not plug in easily, slide the card back out and verify you are placing it in the correct position and that the guides are aligned. Check for any obstructions or bent pins on the connectors that might prevent the card from sliding easily into place.</b>
2	The CAM8 card is connected to LPFS8 slot 1, ports 1 through 8 (ports 1 through 4 for quad cards).  Flip Line 1, 2, 3, and 4 switches in the <u>RIGHT</u> (POTS) position to establish the pathway to test cable pair continuity from the LPFS8 to the POTS switch.
3	The PAM8 card must be placed in the LCS, in the same slot number as the CAM8 card. For example: The CAM8 card is in LPFS8 slot 1, so the PAM8 card must be placed in LCS slot 1.
4	Slide the (unlocked) PAM8 card into LCS slot 1 until it plugs into the backplane connector, and lock it into place.  <b>Important! DO NOT force the card into position. If the card does not plug in easily, slide the card back out and verify you are placing it in the correct position and that the guides are aligned. Check for any obstructions or bent pins on the connectors that might prevent the card from sliding easily into place.</b>



Table 10-10: Verify Continuity Cable Pairs: LPFS8 to POTS Switch (continued)

<b>STEP</b>	<b>PROCEDURE</b>
<b>10</b>	Remove the CAM8 and PAM8 cards.
<b>11</b>	Repeat Steps 1 through 10 for all LPFS8 slots 2 through 24.
<b>12</b>	Are additional LPFS8s installed? <ul style="list-style-type: none"><li>■ If YES, repeat Steps 1 through 10 for each LPFS8.</li><li>■ If NO, the <b>Verify Continuity of Cable Pairs—LPFS8 to POTS Switch</b> procedure is complete.</li></ul>

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## Appendix E

### Cable/Pair Assignment Tables: LCS with Quad DS1 Line Cards

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**Telco Connector Table** The following table shows the LCS backplane **Transmit** and **Receive** telco connectors, their corresponding line card slots and ports, and the DSX (Digital Cross Connect) cables, for DS1 data only service<sup>1</sup>, using quad DS1 line cards.

For instruction on how to make Telco cable connections, refer to Section 6—*Telco Cabling*, Chapter 1—“LCS Cabling—Quad DS1 Line Cards,” page 6-1.

Table 10-11: LCS Telco Connectors—Quad DS1 Line Cards

<b>Tx and Rx LCS Backplane Connector</b>	<b>DSX Tx and Rx Cables</b>	<b>Line Card Slots</b>	<b>Transmit and Receive DS1 Line Card Ports</b>
J9 (Tx)	A1 (Tx)	1–6	<b>Transmit Ports 1–4</b>
J8 (Tx)	A2 (Tx)	7–12	<b>Transmit Ports 1–4</b>
J7 (Tx)	B1 (Tx)	13–18	<b>Transmit Ports 1–4</b>
J6 (Tx)	B2 (Tx)	19–24	<b>Transmit Ports 1–4</b>
J5 (Rx)	C1 (Rx)	1–6	<b>Receive Ports 1–4</b>
J4 (Rx)	C2 (Rx)	7–12	<b>Receive Ports 1–4</b>
J3 (Rx)	D1 (Rx)	13–18	<b>Receive Ports 1–4</b>
J2 (Rx)	D2 (Rx)	19–24	<b>Receive Ports 1–4</b>

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<sup>1</sup> The D50 supports ATM over DS1 service, including packetized voice over T1 (DS1) lines.

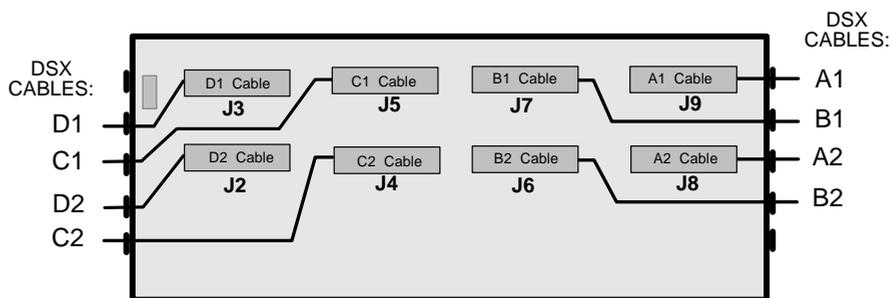


Figure 10-19: LCS to DSX Cabling Diagram—Quad DS1 Line Cards

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**Cable/Pair  
Assignment  
Tables**

The following tables show the cable/pair assignments for the LCS for data only service, using quad DS1 line cards. Each pair of tables represents cable/pair assignments for one of the eight LCS backplane connectors (J2–J9) supporting four **Transmit** ports (1–4) or **Receive** ports (1–4) on one six-pack of line cards (the first table shows the first three line cards, the second table show the second three line cards), as follows:

Table 10-12: Transmit and Receive Cable/Pair Tables and Page Numbers

Table	LCS			Transmit DSX Cables	Page #
	Transmit Connectors	Slots	Transmit Ports		
Table 10-13	J9	1–3	1–4	A1	page 10-36
Table 10-14		4–6	1–4		page 10-37
Table 10-15	J8	7–9	1–4	A2	page 10-38
Table 10-16		10–12	1–4		page 10-39
Table 10-17	J7	13–15	1–4	B1	page 10-40
Table 10-18		16–18	1–4		page 10-41
Table 10-19	J6	19–21	1–4	B2	page 10-42
Table 10-20		22–24	1–4		page 10-43
Table	LCS			Receive DSX Cables	Page #
	Receive Connectors	Slots	Receive Ports		
Table 10-21	J5	1–3	1–4	C1	page 10-44
Table 10-22		4–6	1–4		page 10-45
Table 10-23	J4	7–9	1–4	C2	page 10-46
Table 10-24		10–12	1–4		page 10-47
Table 10-25	J3	13–15	1–4	D1	page 10-48
Table 10-26		16–18	1–4		page 10-49
Table 10-27	J2	19–21	1–4	D2	page 10-50
Table 10-28		22–24	1–4		page 10-51

Table 10-13: Connector J9 (1 of 2), Line Card Slots 1–3, Tx Ports 1–4

Transmit Connector #	Slot #	Transmit Port #	Transmit Cable #	Transmit Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tx Tip (T) or Ring (R)
						Back-plane	Amp Champ		
J9	1	1	A1	1	1	1	1	Blue/White	R
					2	2	26	White/Blue	T
		2	2	3	3	2	Orange/White	R	
				4	4	27	White/Orange	T	
		3	3	5	5	3	Green/White	R	
				6	6	28	White/Green	T	
		4	4	7	7	4	Brown/White	R	
				8	8	29	White/Brown	T	
	2	1		5	9	9	5	Gray/White	R
					10	10	30	White/Gray	T
		2		6	11	11	6	Blue/Red	R
					12	12	31	Red/Blue	T
		3		7	13	13	7	Orange/Red	R
					14	14	32	Red/Orange	T
		4		8	15	15	8	Green/Red	R
					16	16	33	Red/Green	T
	3	1		9	10	17	9	Brown/Red	R
					11	18	34	Red/Brown	T
		2		10	12	19	10	Gray/Red	R
					20	20	35	Red/Gray	T
		3		11	21	21	11	Blue/Black	R
					22	22	36	Black/Blue	T
		4		12	23	23	12	Orange/Black	R
					24	24	37	Black/Orange	T

Table 10-14: Connector J9 (2 of 2), Line Card Slots 4–6, Tx Ports 1–4

Transmit Connector #	Slot #	Transmit Port #	Transmit Cable #	Transmit Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tx Tip (T) or Ring (R)
						Back-plane	Amp Champ		
J9	4	1	A1	13	25	25	13	Green/Black	R
					26	26	38	Black/Green	T
		2	14	27	27	14	Brown/Black	R	
				28	28	39	Black/Brown	T	
		3	15	29	29	15	Gray/Black	R	
				30	30	40	Black/Gray	T	
		4	16	31	31	16	Blue/Yellow	R	
				32	32	41	Yellow/Blue	T	
	5	1	17	33	33	17	Orange/Yellow	R	
				34	34	42	Yellow/Orange	T	
		2	18	35	35	18	Green/Yellow	R	
				36	36	43	Yellow/Green	T	
		3	19	37	37	19	Brown/Yellow	R	
				38	38	44	Yellow/Brown	T	
		4	20	39	39	20	Gray/Yellow	R	
				40	40	45	Yellow/Gray	T	
	6	1	21	41	41	21	Blue/Violet	R	
				42	42	46	Violet/Blue	T	
		2	22	43	43	22	Orange/Violet	R	
				44	44	47	Violet/Orange	T	
3		23	45	45	23	Green/Violet	R		
			46	46	48	Violet/Green	T		
4		24	47	47	24	Brown/Violet	R		
			48	48	49	Violet/Brown	T		
25	25	49	49	25	Gray/Violet	R			
		50	50	50	Violet/Gray	T			

Table 10-15: Connector J8 (1 of 2), Line Card Slots 7–9, Tx Ports 1–4

Transmit Connector #	Slot #	Transmit Port #	Transmit Cable #	Transmit Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tx Tip (T) or Ring (R)
						Back-plane	Amp Champ		
J8	7	1	A2	1	1	1	1	Blue/White	R
					2	2	26	White/Blue	T
		2	2	3	3	2	Orange/White	R	
				4	4	27	White/Orange	T	
		3	3	5	5	3	Green/White	R	
				6	6	28	White/Green	T	
		4	4	7	7	4	Brown/White	R	
				8	8	29	White/Brown	T	
	8	1	5	9	9	5	Gray/White	R	
				10	10	30	White/Gray	T	
		2	6	11	11	6	Blue/Red	R	
				12	12	31	Red/Blue	T	
		3	7	13	13	7	Orange/Red	R	
				14	14	32	Red/Orange	T	
		4	8	15	15	8	Green/Red	R	
				16	16	33	Red/Green	T	
9	1	9	10	17	9	Brown/Red	R		
			11	18	34	Red/Brown	T		
	2	10	12	19	10	Gray/Red	R		
			20	20	35	Red/Gray	T		
	3	11	21	21	11	Blue/Black	R		
			22	22	36	Black/Blue	T		
	4	12	23	23	12	Orange/Black	R		
			24	24	37	Black/Orange	T		

Table 10-16: Connector J8 (2 of 2), Line Card Slots 10–12, Tx Ports 1–4

Transmit Connector #	Slot #	Transmit Port #	Transmit Cable #	Transmit Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tx Tip (T) or Ring (R)		
						Back-plane	Amp Champ				
J8	10	1	A2	13	25	25	13	Green/Black	R		
					26	26	38	Black/Green	T		
		2			14	27	27	14	Brown/Black	R	
						28	28	39	Black/Brown	T	
		3			15	29	29	15	Gray/Black	R	
						30	30	40	Black/Gray	T	
		4			16	31	31	16	Blue/Yellow	R	
						32	32	41	Yellow/Blue	T	
		11	1		17	33	33	17	Orange/Yellow	R	
						34	34	42	Yellow/Orange	T	
			2			18	35	35	18	Green/Yellow	R
							36	36	43	Yellow/Green	T
	3				19	37	37	19	Brown/Yellow	R	
						38	38	44	Yellow/Brown	T	
	4				20	39	39	20	Gray/Yellow	R	
						40	40	45	Yellow/Gray	T	
	12		1		21	41	41	21	Blue/Violet	R	
						42	42	46	Violet/Blue	T	
			2			22	43	43	22	Orange/Violet	R
							44	44	47	Violet/Orange	T
		3			23	45	45	23	Green/Violet	R	
						46	46	48	Violet/Green	T	
		4			24	47	47	24	Brown/Violet	R	
						48	48	49	Violet/Brown	T	
↓				↓	25	49	49	25	Gray/Violet	R	
						50	50	50	Violet/Gray	T	

Table 10-17: Connector J7 (1 of 2), Line Card Slots 13–15, Tx Ports 1–4

Transmit Connector #	Slot #	Transmit Port #	Transmit Cable #	Transmit Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tx Tip (T) or Ring (R)
						Back-plane	Amp Champ		
J7	13	1	B1	1	1	1	1	Blue/White	R
					2	2	26	White/Blue	T
		2	2	3	3	2	Orange/White	R	
				4	4	27	White/Orange	T	
		3	3	5	5	3	Green/White	R	
				6	6	28	White/Green	T	
		4	4	7	7	4	Brown/White	R	
				8	8	29	White/Brown	T	
	14	1	5	9	9	5	Gray/White	R	
				10	10	30	White/Gray	T	
		2	6	11	11	6	Blue/Red	R	
				12	12	31	Red/Blue	T	
		3	7	13	13	7	Orange/Red	R	
				14	14	32	Red/Orange	T	
		4	8	15	15	8	Green/Red	R	
				16	16	33	Red/Green	T	
	15	1	9	10	17	9	Brown/Red	R	
				11	18	34	Red/Brown	T	
		2	10	12	19	10	Gray/Red	R	
				20	20	35	Red/Gray	T	
		3	11	21	21	11	Blue/Black	R	
				22	22	36	Black/Blue	T	
		4	12	23	23	12	Orange/Black	R	
				24	24	37	Black/Orange	T	

Table 10-18: Connector J7 (2 of 2), Line Card Slots 16–18, Tx Ports 1–4

Transmit Connector #	Slot #	Transmit Port #	Transmit Cable #	Transmit Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tx Tip (T) or Ring (R)	
						Back-plane	Amp Champ			
J7	16	1	B1	13	25	25	13	Green/Black	R	
					26	26	38	Black/Green	T	
		2			14	27	27	14	Brown/Black	R
						28	28	39	Black/Brown	T
		3			15	29	29	15	Gray/Black	R
						30	30	40	Black/Gray	T
		4			16	31	31	16	Blue/Yellow	R
						32	32	41	Yellow/Blue	T
		17	1		17	33	33	17	Orange/Yellow	R
						34	34	42	Yellow/Orange	T
2				18	35	35	18	Green/Yellow	R	
					36	36	43	Yellow/Green	T	
3			19	37	37	19	Brown/Yellow	R		
				38	38	44	Yellow/Brown	T		
4			20	39	39	20	Gray/Yellow	R		
				40	40	45	Yellow/Gray	T		
	18	1		21	41	41	21	Blue/Violet	R	
					42	42	46	Violet/Blue	T	
2			22	43	43	22	Orange/Violet	R		
				44	44	47	Violet/Orange	T		
3			23	45	45	23	Green/Violet	R		
				46	46	48	Violet/Green	T		
4			24	47	47	24	Brown/Violet	R		
				48	48	49	Violet/Brown	T		
				25	49	49	25	Gray/Violet	R	
					50	50	50	Violet/Gray	T	

Table 10-19: Connector J6 (1 of 2), Line Card Slots 19–21, Tx Ports 1–4

Transmit Connector #	Slot #	Transmit Port #	Transmit Cable #	Transmit Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tx Tip (T) or Ring (R)	
						Back-plane	Amp Champ			
J6	19	1	B2	1	1	1	1	Blue/White	R	
					2	2	26	White/Blue	T	
2		2	3	3	2	Orange/White	R			
			4	4	27	White/Orange	T			
3		3	5	5	3	Green/White	R			
			6	6	28	White/Green	T			
4		4	7	7	4	Brown/White	R			
			8	8	29	White/Brown	T			
						9	9	5	Gray/White	R
						10	10	30	White/Gray	T
						11	11	6	Blue/Red	R
						12	12	31	Red/Blue	T
						13	13	7	Orange/Red	R
						14	14	32	Red/Orange	T
						15	15	8	Green/Red	R
						16	16	33	Red/Green	T
						17	17	9	Brown/Red	R
						18	18	34	Red/Brown	T
						19	19	10	Gray/Red	R
						20	20	35	Red/Gray	T
						21	21	11	Blue/Black	R
						22	22	36	Black/Blue	T
						23	23	12	Orange/Black	R
						24	24	37	Black/Orange	T

Table 10-20: Connector J6 (2 of 2), Line Card Slots 22–24, Tx Ports 1–4

Transmit Connector #	Slot #	Transmit Port #	Transmit Cable #	Transmit Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tx Tip (T) or Ring (R)	
						Back-plane	Amp Champ			
J6	22	1	B2	13	25	25	13	Green/Black	R	
					26	26	38	Black/Green	T	
		2			14	27	27	14	Brown/Black	R
						28	28	39	Black/Brown	T
		3			15	29	29	15	Gray/Black	R
						30	30	40	Black/Gray	T
		4			16	31	31	16	Blue/Yellow	R
						32	32	41	Yellow/Blue	T
		23	1		17	33	33	17	Orange/Yellow	R
						34	34	42	Yellow/Orange	T
2				18	35	35	18	Green/Yellow	R	
					36	36	43	Yellow/Green	T	
3			19	37	37	19	Brown/Yellow	R		
				38	38	44	Yellow/Brown	T		
4			20	39	39	20	Gray/Yellow	R		
				40	40	45	Yellow/Gray	T		
	24	1		21	41	41	21	Blue/Violet	R	
					42	42	46	Violet/Blue	T	
2			22	43	43	22	Orange/Violet	R		
				44	44	47	Violet/Orange	T		
3			23	45	45	23	Green/Violet	R		
				46	46	48	Violet/Green	T		
4			24	47	47	24	Brown/Violet	R		
				48	48	49	Violet/Brown	T		
				25	49	49	25	Gray/Violet	R	
					50	50	50	Violet/Gray	T	

Table 10-21: Connector J5 (1 of 2), Line Card Slots 1–3, Rx Ports 1–4

Receive Connector #	Slot #	Receive Port #	Receive Cable #	Receive Pair #	Wire #	Pin Connectors		STANDARD Color Code	Rx Tip (T) or Ring (R)
						Back-plane	Amp Champ		
J5	1	1	C1	1	1	1	1	Blue/White	R
					2	2	26	White/Blue	T
		2	2	3	3	2	Orange/White	R	
				4	4	27	White/Orange	T	
		3	3	5	5	3	Green/White	R	
				6	6	28	White/Green	T	
		4	4	7	7	4	Brown/White	R	
				8	8	29	White/Brown	T	
	2	1		5	9	9	5	Gray/White	R
					10	10	30	White/Gray	T
		2		6	11	11	6	Blue/Red	R
					12	12	31	Red/Blue	T
		3		7	13	13	7	Orange/Red	R
					14	14	32	Red/Orange	T
		4		8	15	15	8	Green/Red	R
					16	16	33	Red/Green	T
	3	1		9	10	17	9	Brown/Red	R
					11	18	34	Red/Brown	T
		2		10	12	19	10	Gray/Red	R
					20	20	35	Red/Gray	T
		3		11	21	21	11	Blue/Black	R
					22	22	36	Black/Blue	T
		4		12	23	23	12	Orange/Black	R
					24	24	37	Black/Orange	T

Table 10-22: Connector J5 (2 of 2), Line Card Slots 4–6, Rx Ports 1–4

Receive Connector #	Slot #	Receive Port #	Receive Cable #	Receive Pair #	Wire #	Pin Connectors		STANDARD Color Code	Rx Tip (T) or Ring (R)
						Back-plane	Amp Champ		
J5	4	1	C1	13	25	25	13	Green/Black	R
					26	26	38	Black/Green	T
2		14	27	27	14	Brown/Black	R		
			28	28	39	Black/Brown	T		
3		15	29	29	15	Gray/Black	R		
			30	30	40	Black/Gray	T		
4		16	31	31	16	Blue/Yellow	R		
			32	32	41	Yellow/Blue	T		
1		5	17	33	33	17	Orange/Yellow	R	
				34	34	42	Yellow/Orange	T	
2			18	35	35	18	Green/Yellow	R	
				36	36	43	Yellow/Green	T	
3	19		37	37	19	Brown/Yellow	R		
			38	38	44	Yellow/Brown	T		
4	20		39	39	20	Gray/Yellow	R		
			40	40	45	Yellow/Gray	T		
1	6		21	41	41	21	Blue/Violet	R	
				42	42	46	Violet/Blue	T	
2			22	43	43	22	Orange/Violet	R	
				44	44	47	Violet/Orange	T	
3		23	45	45	23	Green/Violet	R		
			46	46	48	Violet/Green	T		
4		24	47	47	24	Brown/Violet	R		
			48	48	49	Violet/Brown	T		
25		25	49	49	25	Gray/Violet	R		
			50	50	50	Violet/Gray	T		

Table 10-23: Connector J4 (1 of 2), Line Card Slots 7–9, Rx Ports 1–4

Receive Connector #	Slot #	Receive Port #	Receive Cable #	Receive Pair #	Wire #	Pin Connectors		STANDARD Color Code	Rx Tip (T) or Ring (R)
						Back-plane	Amp Champ		
J4	7	1	C2	1	1	1	1	Blue/White	R
					2	2	26	White/Blue	T
		2	2	3	3	2	Orange/White	R	
				4	4	27	White/Orange	T	
		3	3	5	5	3	Green/White	R	
				6	6	28	White/Green	T	
		4	4	7	7	4	Brown/White	R	
				8	8	29	White/Brown	T	
	8	1		5	9	9	5	Gray/White	R
					10	10	30	White/Gray	T
		2		6	11	11	6	Blue/Red	R
					12	12	31	Red/Blue	T
		3		7	13	13	7	Orange/Red	R
					14	14	32	Red/Orange	T
		4		8	15	15	8	Green/Red	R
					16	16	33	Red/Green	T
	9	1		9	10	17	9	Brown/Red	R
					11	18	34	Red/Brown	T
		2		10	12	19	10	Gray/Red	R
					20	20	35	Red/Gray	T
		3		11	21	21	11	Blue/Black	R
					22	22	36	Black/Blue	T
		4		12	23	23	12	Orange/Black	R
					24	24	37	Black/Orange	T

Table 10-24: Connector J4 (2 of 2), Line Card Slots 10–12, Rx Ports 1–4

Receive Connector #	Slot #	Receive Port #	Receive Cable #	Receive Pair #	Wire #	Pin Connectors		STANDARD Color Code	Rx Tip (T) or Ring (R)
						Back-plane	Amp Champ		
J4	10	1	C2	13	25	25	13	Green/Black	R
					26	26	38	Black/Green	T
		2	14	27	27	14	Brown/Black	R	
				28	28	39	Black/Brown	T	
		3	15	29	29	15	Gray/Black	R	
				30	30	40	Black/Gray	T	
		4	16	31	31	16	Blue/Yellow	R	
				32	32	41	Yellow/Blue	T	
	11	1	17	33	33	17	Orange/Yellow	R	
				34	34	42	Yellow/Orange	T	
		2	18	35	35	18	Green/Yellow	R	
				36	36	43	Yellow/Green	T	
		3	19	37	37	19	Brown/Yellow	R	
				38	38	44	Yellow/Brown	T	
		4	20	39	39	20	Gray/Yellow	R	
				40	40	45	Yellow/Gray	T	
	12	1	21	41	41	21	Blue/Violet	R	
				42	42	46	Violet/Blue	T	
		2	22	43	43	22	Orange/Violet	R	
				44	44	47	Violet/Orange	T	
3		23	45	45	23	Green/Violet	R		
			46	46	48	Violet/Green	T		
4		24	47	47	24	Brown/Violet	R		
			48	48	49	Violet/Brown	T		
25	25	49	49	25	Gray/Violet	R			
		50	50	50	Violet/Gray	T			

Table 10-25: Connector J3 (1 of 2), Line Card Slots 13–15, Rx Ports 1–4

Receive Connector #	Slot #	Receive Port #	Receive Cable #	Receive Pair #	Wire #	Pin Connectors		STANDARD Color Code	Rx Tip (T) or Ring (R)
						Back-plane	Amp Champ		
J3	13	1	D1	1	1	1	1	Blue/White	R
					2	2	26	White/Blue	T
		2	2	3	3	2	Orange/White	R	
				4	4	27	White/Orange	T	
		3	3	5	5	3	Green/White	R	
				6	6	28	White/Green	T	
		4	4	7	7	4	Brown/White	R	
				8	8	29	White/Brown	T	
	14	1	5	9	9	5	Gray/White	R	
				10	10	30	White/Gray	T	
		2	6	11	11	6	Blue/Red	R	
				12	12	31	Red/Blue	T	
		3	7	13	13	7	Orange/Red	R	
				14	14	32	Red/Orange	T	
		4	8	15	15	8	Green/Red	R	
				16	16	33	Red/Green	T	
	15	1	9	10	17	9	Brown/Red	R	
				11	18	34	Red/Brown	T	
		2	10	12	19	10	Gray/Red	R	
				20	20	35	Red/Gray	T	
3		11	21	21	11	Blue/Black	R		
			22	22	36	Black/Blue	T		
4		12	23	23	12	Orange/Black	R		
			24	24	37	Black/Orange	T		

Table 10-26: Connector J3 (2 of 2), Line Card Slots 16–18, Rx Ports 1–4

Receive Connector #	Slot #	Receive Port #	Receive Cable #	Receive Pair #	Wire #	Pin Connectors		STANDARD Color Code	Rx Tip (T) or Ring (R)
						Back-plane	Amp Champ		
J3	16	1	D1	13	25	25	13	Green/Black	R
					26	26	38	Black/Green	T
		2	14	27	27	14	Brown/Black	R	
				28	28	39	Black/Brown	T	
		3	15	29	29	15	Gray/Black	R	
				30	30	40	Black/Gray	T	
		4	16	31	31	16	Blue/Yellow	R	
				32	32	41	Yellow/Blue	T	
	17	1	17	33	33	17	Orange/Yellow	R	
				34	34	42	Yellow/Orange	T	
		2	18	35	35	18	Green/Yellow	R	
				36	36	43	Yellow/Green	T	
		3	19	37	37	19	Brown/Yellow	R	
				38	38	44	Yellow/Brown	T	
		4	20	39	39	20	Gray/Yellow	R	
				40	40	45	Yellow/Gray	T	
	18	1	21	41	41	21	Blue/Violet	R	
				42	42	46	Violet/Blue	T	
		2	22	43	43	22	Orange/Violet	R	
				44	44	47	Violet/Orange	T	
3		23	45	45	23	Green/Violet	R		
			46	46	48	Violet/Green	T		
4		24	47	47	24	Brown/Violet	R		
			48	48	49	Violet/Brown	T		
25	25	49	49	25	Gray/Violet	R			
		50	50	50	Violet/Gray	T			

Table 10-27: Connector J2 (1 of 2), Line Card Slots 19–21, Rx Ports 1–4

Receive Connector #	Slot #	Receive Port #	Receive Cable #	Receive Pair #	Wire #	Pin Connectors		STANDARD Color Code	Rx Tip (T) or Ring (R)
						Back-plane	Amp Champ		
J2	19	1	D2	1	1	1	1	Blue/White	R
					2	2	26	White/Blue	T
		2	2	3	3	2	Orange/White	R	
				4	4	27	White/Orange	T	
		3	3	5	5	3	Green/White	R	
				6	6	28	White/Green	T	
		4	4	7	7	4	Brown/White	R	
				8	8	29	White/Brown	T	
	20	1		5	9	9	5	Gray/White	R
					10	10	30	White/Gray	T
		2		6	11	11	6	Blue/Red	R
					12	12	31	Red/Blue	T
		3		7	13	13	7	Orange/Red	R
					14	14	32	Red/Orange	T
		4		8	15	15	8	Green/Red	R
					16	16	33	Red/Green	T
	21	1		9	10	17	9	Brown/Red	R
					11	18	34	Red/Brown	T
		2		10	12	19	10	Gray/Red	R
					20	20	35	Red/Gray	T
		3		11	21	21	11	Blue/Black	R
					22	22	36	Black/Blue	T
		4		12	23	23	12	Orange/Black	R
					24	24	37	Black/Orange	T

Table 10-28: Connector J2 (2 of 2), Line Card Slots 22–24, Rx Ports 1–4

Receive Connector #	Slot #	Receive Port #	Receive Cable #	Receive Pair #	Wire #	Pin Connectors		STANDARD Color Code	Rx Tip (T) or Ring (R)	
						Back-plane	Amp Champ			
J2	22	1	D2	13	25	25	13	Green/Black	R	
					26	26	38	Black/Green	T	
2		14	27	27	14	Brown/Black	R			
			28	28	39	Black/Brown	T			
3		15	29	29	15	Gray/Black	R			
			30	30	40	Black/Gray	T			
4		16	31	31	16	Blue/Yellow	R			
			32	32	41	Yellow/Blue	T			
		23	1		17	33	33	17	Orange/Yellow	R
						34	34	42	Yellow/Orange	T
2			18	35	35	18	Green/Yellow	R		
				36	36	43	Yellow/Green	T		
3	19		37	37	19	Brown/Yellow	R			
			38	38	44	Yellow/Brown	T			
4	20		39	39	20	Gray/Yellow	R			
			40	40	45	Yellow/Gray	T			
	24		1		21	41	41	21	Blue/Violet	R
						42	42	46	Violet/Blue	T
2			22	43	43	22	Orange/Violet	R		
				44	44	47	Violet/Orange	T		
3		23	45	45	23	Green/Violet	R			
			46	46	48	Violet/Green	T			
4		24	47	47	24	Brown/Violet	R			
			48	48	49	Violet/Brown	T			
					25	49	49	25	Gray/Violet	R
						50	50	50	Violet/Gray	T



## Appendix F

### Cable/Pair Assignment Tables: LCS with Octal Line Cards

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**Telco Connector Table** The following table shows the LCS backplane telco connectors, their corresponding line card slots and ports, and the MDF cables, for ADSL data only service, using octal line cards. Refer to Section 6—*Telco Cabling*, Chapter 2—“LCS Cabling—Octal Line Cards (Data Only).”

Table 10-29: LCS Telco Connectors—Octal Line Cards

LCS Backplane Connector	MDF Cable	Line Card Slots	Line Card Ports
J9	A1	1–6	1–4
J8	A2	7–12	1–4
J7	B1	13–18	1–4
J6	B2	19–24	1–4
J5	C1	1–6	5–8
J4	C2	7–12	5–8
J3	D1	13–18	5–8
J2	D2	19–24	5–8

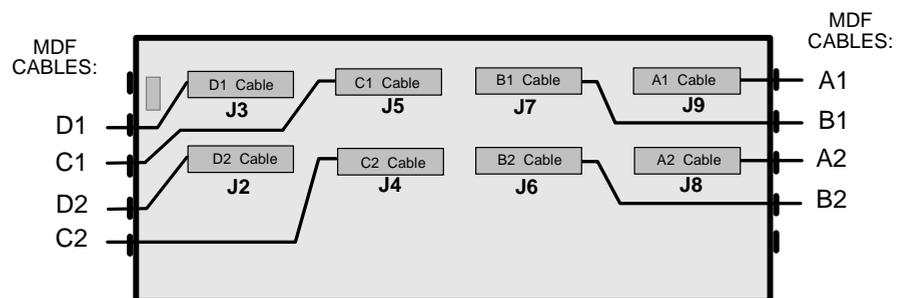


Figure 10-20: LCS to MDF Cabling Diagram—Octal Line Cards

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**Cable/Pair  
Assignment  
Tables**

The following tables show the cable/pair assignments for the LCS for data only service, using octal line cards. Each pair of tables represents cable/pair assignments for one LCS backplane connector (J2–J9) supporting four ports (1–4 or 5–8) on one six pack of line cards (the first table shows the first three line cards, the second table show the second three line cards), as follows:

Table 10-30: Cable/Pair Tables and Page Numbers

Table	LCS			MDF Cable	Page #
	Conn-ector	Slots	Ports		
Table 10-31	J9	1–3	1–4	A1	page 10-55
Table 10-32		4–6	1–4		page 10-56
Table 10-33	J8	7–9	1–4	A2	page 10-57
Table 10-34		10–12	1–4		page 10-58
Table 10-35	J7	13–15	1–4	B1	page 10-59
Table 10-36		16–18	1–4		page 10-60
Table 10-37	J6	19–21	1–4	B2	page 10-61
Table 10-38		22–24	1–4		page 10-62
Table 10-39	J5	1–3	5–8	C1	page 10-63
Table 10-40		4–6	5–8		page 10-64
Table 10-41	J4	7–9	5–8	C2	page 10-65
Table 10-42		10–12	5–8		page 10-66
Table 10-43	J3	13–15	5–8	D1	page 10-67
Table 10-44		16–18	5–8		page 10-68
Table 10-45	J2	19–21	5–8	D2	page 10-69
Table 10-46		22–24	5–8		page 10-70

Table 10-31: Connector J9 (1 of 2), Line Card Slots 1–3, Ports 1–4

Conn-ector #	Slot #	Port #	Cable #	Pair #	Wire #	NOKIA Stub Color Code	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
							Back-plane	Amp Champ		
J9	1	1	A1	1	1	White/Tan	1	1	Blue/White	R
					2	Tan/White	2	26	White/Blue	T
		2	2	3	White/Brown	3	2	Orange/White	R	
				4	Brown/White	4	27	White/Orange	T	
		3	3	5	White/Pink	5	3	Green/White	R	
				6	Pink/White	6	28	White/Green	T	
		4	4	7	White/Orange	7	4	Brown/White	R	
				8	Orange/White	8	29	White/Brown	T	
		2	1	5	9	White/Yellow	9	5	Gray/White	R
					10	Yellow/White	10	30	White/Gray	T
			2	6	11	White/Green	11	6	Blue/Red	R
					12	Green/White	12	31	Red/Blue	T
	3		7	13	White/Blue	13	7	Orange/Red	R	
				14	Blue/White	14	32	Red/Orange	T	
	4		8	15	White/Violet	15	8	Green/Red	R	
				16	Violet/White	16	33	Red/Green	T	
	3	1	9	10	White/Gray	17	9	Brown/Red	R	
				11	Gray/White	18	34	Red/Brown	T	
		2	10	12	Tan/Brown	19	10	Gray/Red	R	
				20	Brown/Tan	20	35	Red/Gray	T	
		3	11	21	Tan/Pink	21	11	Blue/Black	R	
				22	Pink/Tan	22	36	Black/Blue	T	
		4	12	23	Tan/Orange	23	12	Orange/Black	R	
				24	Orange/Tan	24	37	Black/Orange	T	

Table 10-32: Connector J9 (2 of 2), Line Card Slots 4–6, Ports 1–4

Connector #	Slot #	Port #	Cable #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)	
						Back-plane	Amp Champ			
J9	4	1	A1	13	25	25	13	Green/Black	R	
					26	26	38	Black/Green	T	
2		14	27	27	14	Brown/Black	R			
			28	28	39	Black/Brown	T			
3		15	29	29	15	Gray/Black	R			
			30	30	40	Black/Gray	T			
4		16	31	31	16	Blue/Yellow	R			
			32	32	41	Yellow/Blue	T			
1		5	1		17	33	33	17	Orange/Yellow	R
						34	34	42	Yellow/Orange	T
2			18	35	35	18	Green/Yellow	R		
				36	36	43	Yellow/Green	T		
3	19		37	37	19	Brown/Yellow	R			
			38	38	44	Yellow/Brown	T			
4	20		39	39	20	Gray/Yellow	R			
			40	40	45	Yellow/Gray	T			
1	6		1		21	41	41	21	Blue/Violet	R
						42	42	46	Violet/Blue	T
2			22	43	43	22	Orange/Violet	R		
				44	44	47	Violet/Orange	T		
3		23	45	45	23	Green/Violet	R			
			46	46	48	Violet/Green	T			
4		24	47	47	24	Brown/Violet	R			
			48	48	49	Violet/Brown	T			
1		25			25	49	49	25	Gray/Violet	R
						50	50	50	Violet/Gray	T

Table 10-33: Connector J8 (1 of 2), Line Card Slots 7–9, Ports 1–4

Conn-ector #	Slot #	Port #	Cable #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
						Back-plane	Amp Champ		
J8	7	1	A2	1	1	1	1	Blue/White	R
					2	2	26	White/Blue	T
		2		2	3	3	2	Orange/White	R
					4	4	27	White/Orange	T
		3		3	5	5	3	Green/White	R
					6	6	28	White/Green	T
		4		4	7	7	4	Brown/White	R
					8	8	29	White/Brown	T
	8	1		5	9	9	5	Gray/White	R
					10	10	30	White/Gray	T
		2		6	11	11	6	Blue/Red	R
					12	12	31	Red/Blue	T
		3		7	13	13	7	Orange/Red	R
					14	14	32	Red/Orange	T
		4		8	15	15	8	Green/Red	R
					16	16	33	Red/Green	T
9	1		9	10	17	9	Brown/Red	R	
				11	18	34	Red/Brown	T	
	2		10	12	19	10	Gray/Red	R	
				20	20	35	Red/Gray	T	
	3		11	21	21	11	Blue/Black	R	
				22	22	36	Black/Blue	T	
	4		12	23	23	12	Orange/Black	R	
				24	24	37	Black/Orange	T	

Table 10-34: Connector J8 (2 of 2), Line Card Slots 10–12, Ports 1–4

Conn-ector #	Slot #	Port #	Cable #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
						Back-plane	Amp Champ		
J8	10	1	A2	13	25	25	13	Green/Black	R
					26	26	38	Black/Green	T
2		14	27	27	14	Brown/Black	R		
			28	28	39	Black/Brown	T		
3		15	29	29	15	Gray/Black	R		
			30	30	40	Black/Gray	T		
4		16	31	31	16	Blue/Yellow	R		
			32	32	41	Yellow/Blue	T		
1		11	17	33	33	17	Orange/Yellow	R	
				34	34	42	Yellow/Orange	T	
2			18	35	35	18	Green/Yellow	R	
				36	36	43	Yellow/Green	T	
3	19		37	37	19	Brown/Yellow	R		
			38	38	44	Yellow/Brown	T		
4	20		39	39	20	Gray/Yellow	R		
			40	40	45	Yellow/Gray	T		
1	12		21	41	41	21	Blue/Violet	R	
				42	42	46	Violet/Blue	T	
2			22	43	43	22	Orange/Violet	R	
				44	44	47	Violet/Orange	T	
3		23	45	45	23	Green/Violet	R		
			46	46	48	Violet/Green	T		
4		24	47	47	24	Brown/Violet	R		
			48	48	49	Violet/Brown	T		
25		25	49	49	25	Gray/Violet	R		
			50	50	50	Violet/Gray	T		

Table 10-35: Connector J7 (1 of 2), Line Card Slots 13–15, Ports 1–4

Conn-ector #	Slot #	Port #	Cable #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
						Back-plane	Amp Champ		
J7	13	1	B1	1	1	1	1	Blue/White	R
					2	2	26	White/Blue	T
		2		2	3	3	2	Orange/White	R
					4	4	27	White/Orange	T
		3		3	5	5	3	Green/White	R
					6	6	28	White/Green	T
		4		4	7	7	4	Brown/White	R
					8	8	29	White/Brown	T
	14	1		5	9	9	5	Gray/White	R
					10	10	30	White/Gray	T
		2		6	11	11	6	Blue/Red	R
					12	12	31	Red/Blue	T
		3		7	13	13	7	Orange/Red	R
					14	14	32	Red/Orange	T
		4		8	15	15	8	Green/Red	R
					16	16	33	Red/Green	T
15	1		9	10	17	9	Brown/Red	R	
				11	18	34	Red/Brown	T	
	2		10	12	19	10	Gray/Red	R	
				20	20	35	Red/Gray	T	
	3		11	21	21	11	Blue/Black	R	
				22	22	36	Black/Blue	T	
	4		12	23	23	12	Orange/Black	R	
				24	24	37	Black/Orange	T	

Table 10-36: Connector J7 (2 of 2), Line Card Slots 16–18, Ports 1–4

Conn-ector #	Slot #	Port #	Cable #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)		
						Back-plane	Amp Champ				
J7	16	1	B1	13	25	25	13	Green/Black	R		
					26	26	38	Black/Green	T		
		2		14	27	27	14	Brown/Black	R		
					28	28	39	Black/Brown	T		
		3		15	29	29	15	Gray/Black	R		
					30	30	40	Black/Gray	T		
		4		16	31	31	16	Blue/Yellow	R		
					32	32	41	Yellow/Blue	T		
			17	1		17	33	33	17	Orange/Yellow	R
							34	34	42	Yellow/Orange	T
				2		18	35	35	18	Green/Yellow	R
							36	36	43	Yellow/Green	T
3				19	37	37	19	Brown/Yellow	R		
					38	38	44	Yellow/Brown	T		
4				20	39	39	20	Gray/Yellow	R		
					40	40	45	Yellow/Gray	T		
	18	1		21	41	41	21	Blue/Violet	R		
					42	42	46	Violet/Blue	T		
		2		22	43	43	22	Orange/Violet	R		
					44	44	47	Violet/Orange	T		
		3		23	45	45	23	Green/Violet	R		
					46	46	48	Violet/Green	T		
		4		24	47	47	24	Brown/Violet	R		
					48	48	49	Violet/Brown	T		
						25	49	49	25	Gray/Violet	R
							50	50	50	Violet/Gray	T

Table 10-37: Connector J6 (1 of 2), Line Card Slots 19–21, Ports 1–4

Conn-ector #	Slot #	Port #	Cable #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)	
						Back-plane	Amp Champ			
J6	19	1	B2	1	1	1	1	Blue/White	R	
					2	2	26	White/Blue	T	
		2		2	3	3	2	Orange/White	R	
					4	4	27	White/Orange	T	
		3		3	5	5	3	Green/White	R	
					6	6	28	White/Green	T	
		4		4	7	7	4	Brown/White	R	
					8	8	29	White/Brown	T	
		20	1		5	9	9	5	Gray/White	R
						10	10	30	White/Gray	T
			2		6	11	11	6	Blue/Red	R
						12	12	31	Red/Blue	T
	3			7	13	13	7	Orange/Red	R	
					14	14	32	Red/Orange	T	
	4			8	15	15	8	Green/Red	R	
					16	16	33	Red/Green	T	
	21	1		9	10	17	9	Brown/Red	R	
					11	18	34	Red/Brown	T	
		2		10	12	19	10	Gray/Red	R	
					20	20	35	Red/Gray	T	
		3		11	21	21	11	Blue/Black	R	
					22	22	36	Black/Blue	T	
		4		12	23	23	12	Orange/Black	R	
					24	24	37	Black/Orange	T	

Table 10-38: Connector J6 (2 of 2), Line Card Slots 22–24, Ports 1–4

Conn-ector #	Slot #	Port #	Cable #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
						Back-plane	Amp Champ		
J6		1	B2	13	25	25	13	Green/Black	R
					26	26	38	Black/Green	T
	22	2		14	27	27	14	Brown/Black	R
					28	28	39	Black/Brown	T
		3		15	29	29	15	Gray/Black	R
					30	30	40	Black/Gray	T
		4		16	31	31	16	Blue/Yellow	R
					32	32	41	Yellow/Blue	T
	23	1		17	33	33	17	Orange/Yellow	R
					34	34	42	Yellow/Orange	T
		2		18	35	35	18	Green/Yellow	R
					36	36	43	Yellow/Green	T
		3		19	37	37	19	Brown/Yellow	R
					38	38	44	Yellow/Brown	T
		4		20	39	39	20	Gray/Yellow	R
					40	40	45	Yellow/Gray	T
	24	1		21	41	41	21	Blue/Violet	R
					42	42	46	Violet/Blue	T
		2		22	43	43	22	Orange/Violet	R
					44	44	47	Violet/Orange	T
		3		23	45	45	23	Green/Violet	R
					46	46	48	Violet/Green	T
		4		24	47	47	24	Brown/Violet	R
					48	48	49	Violet/Brown	T
				25	49	49	25	Gray/Violet	R
					50	50	50	Violet/Gray	T

Table 10-39: Connector J5 (1 of 2), Line Card Slots 1–3, Ports 5–8

Conn-ector #	Slot #	Port #	Cable #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
						Back-plane	Ann Champ		
J5	1	5	C1	1	1	1	1	Blue/White	R
					2	2	26	White/Blue	T
		6	2	3	3	2	Orange/White	R	
				4	4	27	White/Orange	T	
		7	3	5	5	3	Green/White	R	
				6	6	28	White/Green	T	
		8	4	7	7	4	Brown/White	R	
				8	8	29	White/Brown	T	
	2	5	5	9	9	5	Gray/White	R	
				10	10	30	White/Gray	T	
		6	6	11	11	6	Blue/Red	R	
				12	12	31	Red/Blue	T	
		7	7	13	13	7	Orange/Red	R	
				14	14	32	Red/Orange	T	
		8	8	15	15	8	Green/Red	R	
				16	16	33	Red/Green	T	
3	5	9	10	17	9	Brown/Red	R		
			11	18	34	Red/Brown	T		
	6	10	12	19	10	Gray/Red	R		
			20	20	35	Red/Gray	T		
	7	11	21	21	11	Blue/Black	R		
			22	22	36	Black/Blue	T		
	8	12	23	23	12	Orange/Black	R		
			24	24	37	Black/Orange	T		

Table 10-40: Connector J5 (2 of 2), Line Card Slots 4–6, Ports 5–8

Conn-ector #	Slot #	Port #	Cable #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)	
						Back-plane	Amp Champ			
J5	4	5	C1	13	25	25	13	Green/Black	R	
					26	26	38	Black/Green	T	
6		14	27	27	14	Brown/Black	R			
			28	28	39	Black/Brown	T			
7		15	29	29	15	Gray/Black	R			
			30	30	40	Black/Gray	T			
8		16	31	31	16	Blue/Yellow	R			
			32	32	41	Yellow/Blue	T			
						33	33	17	Orange/Yellow	R
						34	34	42	Yellow/Orange	T
						35	35	18	Green/Yellow	R
						36	36	43	Yellow/Green	T
						37	37	19	Brown/Yellow	R
						38	38	44	Yellow/Brown	T
						39	39	20	Gray/Yellow	R
						40	40	45	Yellow/Gray	T
						41	41	21	Blue/Violet	R
						42	42	46	Violet/Blue	T
						43	43	22	Orange/Violet	R
						44	44	47	Violet/Orange	T
						45	45	23	Green/Violet	R
						46	46	48	Violet/Green	T
▼				▼	24	47	47	24	Brown/Violet	R
						48	48	49	Violet/Brown	T
				25	49	49	25	Gray/Violet	R	
					50	50	50	Violet/Gray	T	

Table 10-41: Connector J4 (1 of 2), Line Card Slots 7–9, Ports 5–8

Conn-ector #	Slot #	Port #	Cable #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
						Back-plane	Amp Champ		
J4	7	5	C2	1	1	1	1	Blue/White	R
					2	2	26	White/Blue	T
		6	2	3	3	2	Orange/White	R	
				4	4	27	White/Orange	T	
		7	3	5	5	3	Green/White	R	
				6	6	28	White/Green	T	
		8	4	7	7	4	Brown/White	R	
				8	8	29	White/Brown	T	
	8	5	5	9	9	5	Gray/White	R	
				10	10	30	White/Gray	T	
		6	6	11	11	6	Blue/Red	R	
				12	12	31	Red/Blue	T	
		7	7	13	13	7	Orange/Red	R	
				14	14	32	Red/Orange	T	
		8	8	15	15	8	Green/Red	R	
				16	16	33	Red/Green	T	
	9	5	9	10	17	9	Brown/Red	R	
				11	18	34	Red/Brown	T	
		6	10	12	19	10	Gray/Red	R	
				20	20	35	Red/Gray	T	
		7	11	21	21	11	Blue/Black	R	
				22	22	36	Black/Blue	T	
		8	12	23	23	12	Orange/Black	R	
				24	24	37	Black/Orange	T	

Table 10-42: Connector J4 (2 of 2), Line Card Slots 10–12, Ports 5–8

Conn-ector #	Slot #	Port #	Cable #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)		
						Back-plane	Amp Champ				
J4	10	5	C2	13	25	25	13	Green/Black	R		
					26	26	38	Black/Green	T		
6		14	27	27	14	Brown/Black	R				
			28	28	39	Black/Brown	T				
7		15	29	29	15	Gray/Black	R				
			30	30	40	Black/Gray	T				
8		16	31	31	16	Blue/Yellow	R				
			32	32	41	Yellow/Blue	T				
		11	5		17	33	33	17	Orange/Yellow	R	
						34	34	42	Yellow/Orange	T	
6			18	35	35	18	Green/Yellow	R			
				36	36	43	Yellow/Green	T			
7			19	37	37	19	Brown/Yellow	R			
				38	38	44	Yellow/Brown	T			
8			20	39	39	20	Gray/Yellow	R			
				40	40	45	Yellow/Gray	T			
			12	5		21	41	41	21	Blue/Violet	R
							42	42	46	Violet/Blue	T
6				22	43	43	22	Orange/Violet	R		
					44	44	47	Violet/Orange	T		
7		23		45	45	23	Green/Violet	R			
				46	46	48	Violet/Green	T			
8		24		47	47	24	Brown/Violet	R			
				48	48	49	Violet/Brown	T			
	25				49	49	25	Gray/Violet	R		
		50		50	50	Violet/Gray	T				

Table 10-43: Connector J3 (1 of 2), Line Card Slots 13–15, Ports 5–8

Conn-ector #	Slot #	Port #	Cable #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
						Back-plane	Amp Champ		
J3	13	5	D1	1	1	1	1	Blue/White	R
					2	2	26	White/Blue	T
		6		2	3	3	2	Orange/White	R
					4	4	27	White/Orange	T
		7		3	5	5	3	Green/White	R
					6	6	28	White/Green	T
		8		4	7	7	4	Brown/White	R
					8	8	29	White/Brown	T
	14	5		5	9	9	5	Gray/White	R
					10	10	30	White/Gray	T
		6		6	11	11	6	Blue/Red	R
					12	12	31	Red/Blue	T
		7		7	13	13	7	Orange/Red	R
					14	14	32	Red/Orange	T
		8		8	15	15	8	Green/Red	R
					16	16	33	Red/Green	T
	15	5		9	10	17	9	Brown/Red	R
					11	18	34	Red/Brown	T
		6		10	12	19	10	Gray/Red	R
					20	20	35	Red/Gray	T
		7		11	21	21	11	Blue/Black	R
					22	22	36	Black/Blue	T
		8		12	23	23	12	Orange/Black	R
					24	24	37	Black/Orange	T

Table 10-44: Connector J3 (2 of 2), Line Card Slots 16–18, Ports 5–8

Conn-ector #	Slot #	Port #	Cable #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
						Back-plane	Amp Champ		
J3	16	5	D1	13	25	25	13	Green/Black	R
					26	26	38	Black/Green	T
		6	14	27	27	14	Brown/Black	R	
				28	28	39	Black/Brown	T	
		7	15	29	29	15	Gray/Black	R	
				30	30	40	Black/Gray	T	
		8	16	31	31	16	Blue/Yellow	R	
				32	32	41	Yellow/Blue	T	
	17	5		17	33	33	17	Orange/Yellow	R
					34	34	42	Yellow/Orange	T
		6		18	35	35	18	Green/Yellow	R
					36	36	43	Yellow/Green	T
		7		19	37	37	19	Brown/Yellow	R
					38	38	44	Yellow/Brown	T
		8		20	39	39	20	Gray/Yellow	R
					40	40	45	Yellow/Gray	T
18	5		21	41	41	21	Blue/Violet	R	
				42	42	46	Violet/Blue	T	
	6		22	43	43	22	Orange/Violet	R	
				44	44	47	Violet/Orange	T	
	7		23	45	45	23	Green/Violet	R	
				46	46	48	Violet/Green	T	
	8		24	47	47	24	Brown/Violet	R	
				48	48	49	Violet/Brown	T	
	25			49	49	25	Gray/Violet	R	
				50	50	50	Violet/Gray	T	

Table 10-45: Connector J2 (1 of 2), Line Card Slots 19–21, Ports 5–8

Conn-ector #	Slot #	Port #	Cable #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
						Back-plane	Amp Champ		
J2	19	5	D2	1	1	1	1	Blue/White	R
					2	2	26	White/Blue	T
		6	2	3	3	2	Orange/White	R	
				4	4	27	White/Orange	T	
		7	3	5	5	3	Green/White	R	
				6	6	28	White/Green	T	
		8	4	7	7	4	Brown/White	R	
				8	8	29	White/Brown	T	
	20	5	5	9	9	5	Gray/White	R	
				10	10	30	White/Gray	T	
		6	6	11	11	6	Blue/Red	R	
				12	12	31	Red/Blue	T	
		7	7	13	13	7	Orange/Red	R	
				14	14	32	Red/Orange	T	
		8	8	15	15	8	Green/Red	R	
				16	16	33	Red/Green	T	
	21	5	9	10	17	9	Brown/Red	R	
				11	18	34	Red/Brown	T	
		6	10	12	19	10	Gray/Red	R	
				20	20	35	Red/Gray	T	
		7	11	21	21	11	Blue/Black	R	
				22	22	36	Black/Blue	T	
		8	12	23	23	12	Orange/Black	R	
				24	24	37	Black/Orange	T	

Table 10-46: Connector J2 (2 of 2), Line Card Slots 22–24, Ports 5–8

Conn-ector #	Slot #	Port #	Cable #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)	
						Back-plane	Amp Champ			
J2	22	5	D2	13	25	25	13	Green/Black	R	
					26	26	38	Black/Green	T	
		6			14	27	27	14	Brown/Black	R
						28	28	39	Black/Brown	T
		7			15	29	29	15	Gray/Black	R
						30	30	40	Black/Gray	T
		8			16	31	31	16	Blue/Yellow	R
						32	32	41	Yellow/Blue	T
		23	5		17	33	33	17	Orange/Yellow	R
						34	34	42	Yellow/Orange	T
			6		18	35	35	18	Green/Yellow	R
						36	36	43	Yellow/Green	T
			7		19	37	37	19	Brown/Yellow	R
						38	38	44	Yellow/Brown	T
			8		20	39	39	20	Gray/Yellow	R
						40	40	45	Yellow/Gray	T
	24	5		21	41	41	21	Blue/Violet	R	
					42	42	46	Violet/Blue	T	
		6		22	43	43	22	Orange/Violet	R	
					44	44	47	Violet/Orange	T	
		7		23	45	45	23	Green/Violet	R	
					46	46	48	Violet/Green	T	
▼		8	▼		24	47	47	24	Brown/Violet	R
						48	48	49	Violet/Brown	T
				25	49	49	25	Gray/Violet	R	
					50	50	50	Violet/Gray	T	

## Appendix G

### Cable/Pair Assignment Tables: LCS with Sequential Pair Cabling

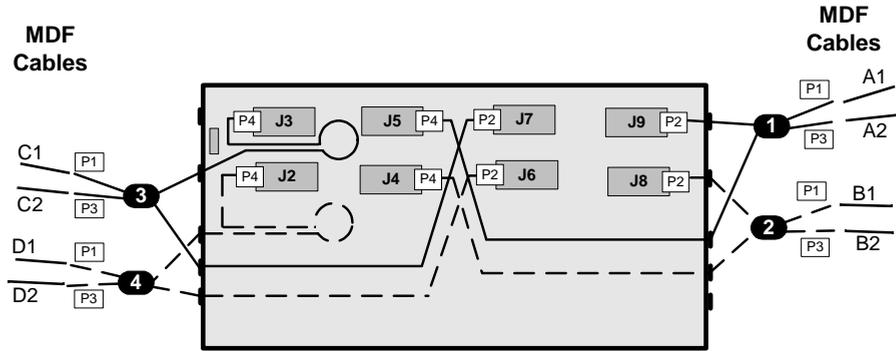
#### Cable Connections Table

The following table shows the connections for four sequential pair cable assemblies at the LCS backplane and the MDF cables, and the corresponding line card slots and ports, using octal line cards. Refer to Section 6—*Telco Cabling*, Chapter 3—“LCS Cabling—Octal Line Cards (Data Only): Sequential Pair Cabling.”

Table 10-47: Sequential Pair Cable Assembly Connections

Seq. Pair Cable #	Cable Ribbon Connectors (at LCS)	LCS Backplane			Cable Amp Champ Connectors (at MDF)	MDF Cables	
		Connectors	Slots	Ports		Slots	Ports
1	P2	J9	1-6	1-4	P1, P3	1-3 (P1)	1-8
	P4	J5		5-8		4-6 (P3)	1-8
2	P2	J8	7-12	1-4	P1, P3	7-9 (P1)	1-8
	P4	J4		5-8		10-12 (P3)	1-8
3	P2	J7	13-18	1-4	P1, P3	13-15 (P1)	1-8
	P4	J3		5-8		16-18 (P3)	1-8
4	P2	J6	21-24	1-4	P1, P3	19-21 (P1)	1-8
	P4	J2		5-8		22-24 (P3)	1-8

Refer to Figure 10-21: LCS with Sequential Pair Cable Assembly, page 10-72.



NOTE: Cable lengths and cable slot locations are not drawn to scale.  
Dashed lines indicate Cables 2 and 4, for clarity.

Figure 10-21: LCS with Sequential Pair Cable Assembly

**Cable/Pair  
Assignment  
Tables**

The following tables show the cable/pair assignments for four sequential pair cable assemblies supporting 24 octal line cards on an LCS. Each pair of tables represents cable/pair assignments for one LCS backplane connector (J2–J9) supporting four ports (1–4 or 5–8) on one six-pack of line cards (the first table shows the first three line cards, the second table show the second three line cards), as follows:

**Table 10-48: Cable/Pair Tables and Page Numbers**

Table	Sequential Pair Cable	LCS			Page #
		Backplane Connector	Slots	Ports	
Table 10-49	1	J9	1–3	1–4	page 10-74
Table 10-50			4–6		page 10-75
Table 10-51		J5	1–3	5–8	page 10-76
Table 10-52			4–6		page 10-77
Table 10-53	2	J8	7–9	1–4	page 10-78
Table 10-54			10–12		page 10-79
Table 10-55		J4	7–9	5–8	page 10-80
Table 10-56			10–12		page 10-81
Table 10-57	3	J7	13–15	1–4	page 10-82
Table 10-58			16–18		page 10-83
Table 10-59		J3	13–15	5–8	page 10-84
Table 10-60			16–18		page 10-85
Table 10-61	4	J6	19–21	1–4	page 10-86
Table 10-62			22–24		page 10-87
Table 10-63		J2	19–21	5–8	page 10-88
Table 10-64			22–24		page 10-89

Table 10-49: LCS Connector J9 (1 of 2): Slots 1–3, Ports 1–4

LCS			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)	
Conn.	Slot	Port	Cable #	Conn.			FROM: P2 Conn. At LCS	TO: P1 Conn. At MDF			
J9	1	1	1	P2	1	1	P2 - Pin 1	P1 - Pin 1	Blue/White	R	
						2	P2 - Pin 2	P1 - Pin 26	White/Blue	T	
		2			2	3	P2 - Pin 3	P1 - Pin 2	Orange/White	R	
						4	P2 - Pin 4	P1 - Pin 27	White/Orange	T	
	3	3			5	P2 - Pin 5	P1 - Pin 3	Green/White	R		
					6	P2 - Pin 6	P1 - Pin 28	White/Green	T		
	4	4			7	P2 - Pin 7	P1 - Pin 4	Brown/White	R		
					8	P2 - Pin 8	P1 - Pin 29	White/Brown	T		
	2	1			5	9	P2 - Pin 9	P1 - Pin 9	Gray/White	R	
						10	P2 - Pin 10	P1 - Pin 34	White/Gray	T	
		2				6	11	P2 - Pin 11	P1 - Pin 10	Blue/Red	R
							12	P2 - Pin 12	P1 - Pin 35	Red/Blue	T
		3				7	13	P2 - Pin 13	P1 - Pin 11	Orange/Red	R
							14	P2 - Pin 14	P1 - Pin 36	Red/Orange	T
		4				8	15	P2 - Pin 15	P1 - Pin 12	Green/Red	R
							16	P2 - Pin 16	P1 - Pin 37	Red/Green	T
	3	1			9	10	P2 - Pin 17	P1 - Pin 17	Brown/Red	R	
						11	P2 - Pin 18	P1 - Pin 42	Red/Brown	T	
		2			10	12	P2 - Pin 19	P1 - Pin 18	Gray/Red	R	
						20	P2 - Pin 20	P1 - Pin 43	Red/Gray	T	
		3			11	21	P2 - Pin 21	P1 - Pin 19	Blue/Black	R	
						22	P2 - Pin 22	P1 - Pin 44	Black/Blue	T	
		4			12	23	P2 - Pin 23	P1 - Pin 20	Orange/Black	R	
						24	P2 - Pin 24	P1 - Pin 45	Black/Orange	T	

Table 10-50: LCS Connector J9 (2 of 2): Slots 4–6, Ports 1–4

LCS			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)			
Conn.	Slot	Port	Cable #	Conn.			FROM: P2 Conn. At LCS	TO: P3 Conn. At MDF					
J9	4	1	1	P2	13	25	P2 - Pin 25	P3 - Pin 1	Green/Black	R			
						26	P2 - Pin 26	P3 - Pin 26	Black/Green	T			
		2			14	27	P2 - Pin 27	P3 - Pin 2	Brown/Black	R			
						28	P2 - Pin 28	P3 - Pin 27	Black/Brown	T			
	3	15			29	P2 - Pin 29	P3 - Pin 3	Gray/Black	R				
					30	P2 - Pin 30	P3 - Pin 28	Black/Gray	T				
	4	16			31	P2 - Pin 31	P3 - Pin 4	Blue/Yellow	R				
					32	P2 - Pin 32	P3 - Pin 29	Yellow/Blue	T				
	5	1			17	33	P2 - Pin 33	P3 - Pin 9	Orange/Yellow	R			
						34	P2 - Pin 34	P3 - Pin 34	Yellow/Orange	T			
		2			18	35	P2 - Pin 35	P3 - Pin 10	Green/Yellow	R			
						36	P2 - Pin 36	P3 - Pin 35	Yellow/Green	T			
	3	19			37	P2 - Pin 37	P3 - Pin 11	Brown/Yellow	R				
					38	P2 - Pin 38	P3 - Pin 36	Yellow/Brown	T				
	4	20			39	P2 - Pin 39	P3 - Pin 12	Gray/Yellow	R				
					40	P2 - Pin 40	P3 - Pin 37	Yellow/Gray	T				
	6	1			21	41	P2 - Pin 41	P3 - Pin 17	Blue/Violet	R			
						42	P2 - Pin 42	P3 - Pin 42	Violet/Blue	T			
		2			22	43	P2 - Pin 43	P3 - Pin 18	Orange/Violet	R			
						44	P2 - Pin 44	P3 - Pin 43	Violet/Orange	T			
	3	23			45	P2 - Pin 45	P3 - Pin 19	Green/Violet	R				
					46	P2 - Pin 46	P3 - Pin 44	Violet/Green	T				
	4	24			47	P2 - Pin 47	P3 - Pin 20	Brown/Violet	R				
					48	P2 - Pin 48	P3 - Pin 45	Violet/Brown	T				
								25	49	P2 - Pin 49	P1 - Pin 25	Gray/Violet	
									50	P2 - Pin 50	P1 - Pin 50	Violet/Gray	

Table 10-51: LCS Connector J5 (1 of 2): Slots 1–3, Ports 5–8

LCS			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)
Conn.	Slot	Port	Cable #	Conn.			FROM: P4 Conn. At LCS	TO: P1 Conn. At MDF		
J5	1	5	1	P4	1	1	P4 - Pin 1	P1 - Pin 5	Blue/White	R
		6				2	P4 - Pin 2	P1 - Pin 30	White/Blue	T
					7	2	3	P4 - Pin 3	P1 - Pin 6	Orange/White
		4					P4 - Pin 4	P1 - Pin 31	White/Orange	T
		8			3	5	P4 - Pin 5	P1 - Pin 7	Green/White	R
						6	P4 - Pin 6	P1 - Pin 32	White/Green	T
		5			4	7	P4 - Pin 7	P1 - Pin 8	Brown/White	R
						8	P4 - Pin 8	P1 - Pin 33	White/Brown	T
	2	5			5	9	P4 - Pin 9	P1 - Pin 13	Gray/White	R
						10	P4 - Pin 10	P1 - Pin 38	White/Gray	T
		6			6	11	P4 - Pin 11	P1 - Pin 14	Blue/Red	R
						12	P4 - Pin 12	P1 - Pin 39	Red/Blue	T
		7			7	13	P4 - Pin 13	P1 - Pin 15	Orange/Red	R
						14	P4 - Pin 14	P1 - Pin 40	Red/Orange	T
		8			8	15	P4 - Pin 15	P1 - Pin 16	Green/Red	R
						16	P4 - Pin 16	P1 - Pin 41	Red/Green	T
	3	5			9	10	P4 - Pin 17	P1 - Pin 21	Brown/Red	R
						11	P4 - Pin 18	P1 - Pin 46	Red/Brown	T
		6			10	12	P4 - Pin 19	P1 - Pin 22	Gray/Red	R
						20	P4 - Pin 20	P1 - Pin 47	Red/Gray	T
		7			11	21	P4 - Pin 21	P1 - Pin 23	Blue/Black	R
						22	P4 - Pin 22	P1 - Pin 48	Black/Blue	T
		8			12	23	P4 - Pin 23	P1 - Pin 24	Orange/Black	R
						24	P4 - Pin 24	P1 - Pin 49	Black/Orange	T

Table 10-52: LCS Connector J5 (2 of 2): Slots 4–6, Ports 5–8

LCS			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)
Conn.	Slot	Port	Cable #	Conn.			FROM: P4 Conn. At LCS	TO: P3 Conn. At MDF		
J5	4	5	1	P4	13	25	P4 - Pin 25	P3 - Pin 5	Green/Black	R
		6				26	P4 - Pin 26	P3 - Pin 30	Black/Green	T
		7			14	27	P4 - Pin 27	P3 - Pin 6	Brown/Black	R
						28	P4 - Pin 28	P3 - Pin 31	Black/Brown	T
		8			15	29	P4 - Pin 29	P3 - Pin 7	Gray/Black	R
						30	P4 - Pin 30	P3 - Pin 32	Black/Gray	T
		5			16	31	P4 - Pin 31	P3 - Pin 8	Blue/Yellow	R
						32	P4 - Pin 32	P3 - Pin 33	Yellow/Blue	T
	6	17			33	P4 - Pin 33	P3 - Pin 13	Orange/Yellow	R	
					34	P4 - Pin 34	P3 - Pin 38	Yellow/Orange	T	
	7	18			35	P4 - Pin 35	P3 - Pin 14	Green/Yellow	R	
					36	P4 - Pin 36	P3 - Pin 39	Yellow/Green	T	
	8	19			37	P4 - Pin 37	P3 - Pin 15	Brown/Yellow	R	
					38	P4 - Pin 38	P3 - Pin 40	Yellow/Brown	T	
	6	5			20	39	P4 - Pin 39	P3 - Pin 16	Gray/Yellow	R
						40	P4 - Pin 40	P3 - Pin 41	Yellow/Gray	T
		6			21	41	P4 - Pin 41	P3 - Pin 21	Blue/Violet	R
						42	P4 - Pin 42	P3 - Pin 46	Violet/Blue	T
		7			22	43	P4 - Pin 43	P3 - Pin 22	Orange/Violet	R
						44	P4 - Pin 44	P3 - Pin 47	Violet/Orange	T
		8			23	45	P4 - Pin 45	P3 - Pin 23	Green/Violet	R
						46	P4 - Pin 46	P3 - Pin 48	Violet/Green	T
	6	24			47	P4 - Pin 47	P3 - Pin 24	Brown/Violet	R	
					48	P4 - Pin 48	P3 - Pin 49	Violet/Brown	T	
					25	49	P4 - Pin 49	P3 - Pin 25	Gray/Violet	
						50	P4 - Pin 50	P3 - Pin 50	Violet/Gray	

Table 10-53: LCS Connector J8 (1 of 2): Slots 7–9, Ports 1–4

LCS			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)		
Conn.	Slot	Port	Cable #	Conn.			FROM: P2 Conn. At LCS	TO: P1 Conn. At MDF				
J8	7	1	2	P2	1	1	P2 - Pin 1	P1 - Pin 1	Blue/White	R		
		2				2	P2 - Pin 2	P1 - Pin 26	White/Blue	T		
		3			2	3	P2 - Pin 3	P1 - Pin 2	Orange/White	R		
						4	P2 - Pin 4	P1 - Pin 27	White/Orange	T		
	4	3			3	5	P2 - Pin 5	P1 - Pin 3	Green/White	R		
						6	P2 - Pin 6	P1 - Pin 28	White/Green	T		
	1	4			4	4	7	P2 - Pin 7	P1 - Pin 4	Brown/White	R	
							8	P2 - Pin 8	P1 - Pin 29	White/Brown	T	
	8	1			5	5	9	P2 - Pin 9	P1 - Pin 9	Gray/White	R	
							10	P2 - Pin 10	P1 - Pin 34	White/Gray	T	
							6	11	P2 - Pin 11	P1 - Pin 10	Blue/Red	R
								12	P2 - Pin 12	P1 - Pin 35	Red/Blue	T
	2	7			7	13	P2 - Pin 13	P1 - Pin 11	Orange/Red	R		
						14	P2 - Pin 14	P1 - Pin 36	Red/Orange	T		
	3	8			8	8	15	P2 - Pin 15	P1 - Pin 12	Green/Red	R	
							16	P2 - Pin 16	P1 - Pin 37	Red/Green	T	
	9	1			9	9	9	10	P2 - Pin 17	P1 - Pin 17	Brown/Red	R
								11	P2 - Pin 18	P1 - Pin 42	Red/Brown	T
							10	12	P2 - Pin 19	P1 - Pin 18	Gray/Red	R
								20	P2 - Pin 20	P1 - Pin 43	Red/Gray	T
	2	11			11	11	21	P2 - Pin 21	P1 - Pin 19	Blue/Black	R	
							22	P2 - Pin 22	P1 - Pin 44	Black/Blue	T	
	3	12			12	12	12	23	P2 - Pin 23	P1 - Pin 20	Orange/Black	R
								24	P2 - Pin 24	P1 - Pin 45	Black/Orange	T

Table 10-54: LCS Connector J8 (2 of 2): Slots 10–12, Ports 1–4

LCS			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)
Conn.	Slot	Port	Cable #	Conn.			FROM: P2 Conn. At LCS	TO: P3 Conn. At MDF		
J8	10	1	2	P2	13	25	P2 - Pin 25	P3 - Pin 1	Green/Black	R
						26	P2 - Pin 26	P3 - Pin 26	Black/Green	T
		2			14	27	P2 - Pin 27	P3 - Pin 2	Brown/Black	R
						28	P2 - Pin 28	P3 - Pin 27	Black/Brown	T
		3			15	29	P2 - Pin 29	P3 - Pin 3	Gray/Black	R
						30	P2 - Pin 30	P3 - Pin 28	Black/Gray	T
		4			16	31	P2 - Pin 31	P3 - Pin 4	Blue/Yellow	R
						32	P2 - Pin 32	P3 - Pin 29	Yellow/Blue	T
	11	1			17	33	P2 - Pin 33	P3 - Pin 9	Orange/Yellow	R
						34	P2 - Pin 34	P3 - Pin 34	Yellow/Orange	T
		2			18	35	P2 - Pin 35	P3 - Pin 10	Green/Yellow	R
						36	P2 - Pin 36	P3 - Pin 35	Yellow/Green	T
		3			19	37	P2 - Pin 37	P3 - Pin 11	Brown/Yellow	R
						38	P2 - Pin 38	P3 - Pin 36	Yellow/Brown	T
		4			20	39	P2 - Pin 39	P3 - Pin 12	Gray/Yellow	R
						40	P2 - Pin 40	P3 - Pin 37	Yellow/Gray	T
	12	1			21	41	P2 - Pin 41	P3 - Pin 17	Blue/Violet	R
						42	P2 - Pin 42	P3 - Pin 42	Violet/Blue	T
		2			22	43	P2 - Pin 43	P3 - Pin 18	Orange/Violet	R
						44	P2 - Pin 44	P3 - Pin 43	Violet/Orange	T
3		23	45	P2 - Pin 45	P3 - Pin 19	Green/Violet	R			
			46	P2 - Pin 46	P3 - Pin 44	Violet/Green	T			
4		24	47	P2 - Pin 47	P3 - Pin 20	Brown/Violet	R			
			48	P2 - Pin 48	P3 - Pin 45	Violet/Brown	T			
		25	49	P2 - Pin 49	P1 - Pin 25	Gray/Violet				
			50	P2 - Pin 50	P1 - Pin 50	Violet/Gray				

Table 10-55: LCS Connector J4 (1 of 2): Slots 7–9, Ports 5–8

LCS			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)
Conn.	Slot	Port	Cable #	Conn.			FROM: P4 Conn. At LCS	TO: P1 Conn. At MDF		
J4	7	5	2	P4	1	1	P4 - Pin 1	P1 - Pin 5	Blue/White	R
		6				2	P4 - Pin 2	P1 - Pin 30	White/Blue	T
		7			2	3	P4 - Pin 3	P1 - Pin 6	Orange/White	R
						4	P4 - Pin 4	P1 - Pin 31	White/Orange	T
	8	5			3	5	P4 - Pin 5	P1 - Pin 7	Green/White	R
						6	P4 - Pin 6	P1 - Pin 32	White/Green	T
		6			4	7	P4 - Pin 7	P1 - Pin 8	Brown/White	R
						8	P4 - Pin 8	P1 - Pin 33	White/Brown	T
	8	5			5	9	P4 - Pin 9	P1 - Pin 13	Gray/White	R
						10	P4 - Pin 10	P1 - Pin 38	White/Gray	T
		7			6	11	P4 - Pin 11	P1 - Pin 14	Blue/Red	R
						12	P4 - Pin 12	P1 - Pin 39	Red/Blue	T
	9	5			7	13	P4 - Pin 13	P1 - Pin 15	Orange/Red	R
						14	P4 - Pin 14	P1 - Pin 40	Red/Orange	T
		6			8	15	P4 - Pin 15	P1 - Pin 16	Green/Red	R
						16	P4 - Pin 16	P1 - Pin 41	Red/Green	T
	9	5			9	10	P4 - Pin 17	P1 - Pin 21	Brown/Red	R
						11	P4 - Pin 18	P1 - Pin 46	Red/Brown	T
		7			10	12	P4 - Pin 19	P1 - Pin 22	Gray/Red	R
						20	P4 - Pin 20	P1 - Pin 47	Red/Gray	T
	9	5			11	21	P4 - Pin 21	P1 - Pin 23	Blue/Black	R
						22	P4 - Pin 22	P1 - Pin 48	Black/Blue	T
		6			12	23	P4 - Pin 23	P1 - Pin 24	Orange/Black	R
						24	P4 - Pin 24	P1 - Pin 49	Black/Orange	T

Table 10-56: LCS Connector J4 (2 of 2): Slots 10–12, Ports 5–8

LCS			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)
Conn.	Slot	Port	Cable #	Conn.			FROM: P4 Conn. At LCS	TO: P3 Conn. At MDF		
J4	10	5	2	P4	13	25	P4 - Pin 25	P3 - Pin 5	Green/Black	R
		6				26	P4 - Pin 26	P3 - Pin 30	Black/Green	T
		7			14	27	P4 - Pin 27	P3 - Pin 6	Brown/Black	R
						28	P4 - Pin 28	P3 - Pin 31	Black/Brown	T
		8			15	29	P4 - Pin 29	P3 - Pin 7	Gray/Black	R
						30	P4 - Pin 30	P3 - Pin 32	Black/Gray	T
		5			16	31	P4 - Pin 31	P3 - Pin 8	Blue/Yellow	R
						32	P4 - Pin 32	P3 - Pin 33	Yellow/Blue	T
	11	5			17	33	P4 - Pin 33	P3 - Pin 13	Orange/Yellow	R
						34	P4 - Pin 34	P3 - Pin 38	Yellow/Orange	T
		6			18	35	P4 - Pin 35	P3 - Pin 14	Green/Yellow	R
						36	P4 - Pin 36	P3 - Pin 39	Yellow/Green	T
		7			19	37	P4 - Pin 37	P3 - Pin 15	Brown/Yellow	R
						38	P4 - Pin 38	P3 - Pin 40	Yellow/Brown	T
		8			20	39	P4 - Pin 39	P3 - Pin 16	Gray/Yellow	R
						40	P4 - Pin 40	P3 - Pin 41	Yellow/Gray	T
	12	5			21	41	P4 - Pin 41	P3 - Pin 21	Blue/Violet	R
						42	P4 - Pin 42	P3 - Pin 46	Violet/Blue	T
		6			22	43	P4 - Pin 43	P3 - Pin 22	Orange/Violet	R
						44	P4 - Pin 44	P3 - Pin 47	Violet/Orange	T
		7			23	45	P4 - Pin 45	P3 - Pin 23	Green/Violet	R
						46	P4 - Pin 46	P3 - Pin 48	Violet/Green	T
		8			24	47	P4 - Pin 47	P3 - Pin 24	Brown/Violet	R
						48	P4 - Pin 48	P3 - Pin 49	Violet/Brown	T
					25	49	P4 - Pin 49	P3 - Pin 25	Gray/Violet	
						50	P4 - Pin 50	P3 - Pin 50	Violet/Gray	

Table 10-57: LCS Connector J7 (1 of 2): Slots 13–15, Ports 1–4

LCS			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)		
Conn.	Slot	Port	Cable #	Conn.			FROM: P2 Conn. At LCS	TO: P1 Conn. At MDF				
J7	13	1	3	P2	1	1	P2 - Pin 1	P1 - Pin 1	Blue/White	R		
		2				2	P2 - Pin 2	P1 - Pin 26	White/Blue	T		
					3	2	3	P2 - Pin 3	P1 - Pin 2	Orange/White	R	
		4					P2 - Pin 4	P1 - Pin 27	White/Orange	T		
	14	1			3	4	3	5	P2 - Pin 5	P1 - Pin 3	Green/White	R
								6	P2 - Pin 6	P1 - Pin 28	White/Green	T
		2			4	5	4	7	P2 - Pin 7	P1 - Pin 4	Brown/White	R
								8	P2 - Pin 8	P1 - Pin 29	White/Brown	T
		3			1	5	6	9	P2 - Pin 9	P1 - Pin 9	Gray/White	R
								10	P2 - Pin 10	P1 - Pin 34	White/Gray	T
		4			2	6	7	11	P2 - Pin 11	P1 - Pin 10	Blue/Red	R
								12	P2 - Pin 12	P1 - Pin 35	Red/Blue	T
	15	1			3	7	8	13	P2 - Pin 13	P1 - Pin 11	Orange/Red	R
								14	P2 - Pin 14	P1 - Pin 36	Red/Orange	T
		2			4	8	9	15	P2 - Pin 15	P1 - Pin 12	Green/Red	R
								16	P2 - Pin 16	P1 - Pin 37	Red/Green	T
		3			1	9	10	10	P2 - Pin 17	P1 - Pin 17	Brown/Red	R
								11	P2 - Pin 18	P1 - Pin 42	Red/Brown	T
		4			2	10	11	12	P2 - Pin 19	P1 - Pin 18	Gray/Red	R
								20	P2 - Pin 20	P1 - Pin 43	Red/Gray	T
	11	3			11	12	21	P2 - Pin 21	P1 - Pin 19	Blue/Black	R	
							22	P2 - Pin 22	P1 - Pin 44	Black/Blue	T	
	12	4			12	12	23	P2 - Pin 23	P1 - Pin 20	Orange/Black	R	
							24	P2 - Pin 24	P1 - Pin 45	Black/Orange	T	

Table 10-58: LCS Connector J7 (2 of 2): Slots 16–18, Ports 1–4

LCS			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)
Conn.	Slot	Port	Cable #	Conn.			FROM: P2 Conn. At LCS	TO: P3 Conn. At MDF		
J7	16	1	3	P2	13	25	P2 - Pin 25	P3 - Pin 1	Green/Black	R
						26	P2 - Pin 26	P3 - Pin 26	Black/Green	T
		2			14	27	P2 - Pin 27	P3 - Pin 2	Brown/Black	R
						28	P2 - Pin 28	P3 - Pin 27	Black/Brown	T
	3	15			29	P2 - Pin 29	P3 - Pin 3	Gray/Black	R	
					30	P2 - Pin 30	P3 - Pin 28	Black/Gray	T	
	4	16			31	P2 - Pin 31	P3 - Pin 4	Blue/Yellow	R	
					32	P2 - Pin 32	P3 - Pin 29	Yellow/Blue	T	
	17	1			17	33	P2 - Pin 33	P3 - Pin 9	Orange/Yellow	R
						34	P2 - Pin 34	P3 - Pin 34	Yellow/Orange	T
		2			18	35	P2 - Pin 35	P3 - Pin 10	Green/Yellow	R
						36	P2 - Pin 36	P3 - Pin 35	Yellow/Green	T
	3	19			37	P2 - Pin 37	P3 - Pin 11	Brown/Yellow	R	
					38	P2 - Pin 38	P3 - Pin 36	Yellow/Brown	T	
	4	20			39	P2 - Pin 39	P3 - Pin 12	Gray/Yellow	R	
					40	P2 - Pin 40	P3 - Pin 37	Yellow/Gray	T	
	18	1			21	41	P2 - Pin 41	P3 - Pin 17	Blue/Violet	R
						42	P2 - Pin 42	P3 - Pin 42	Violet/Blue	T
		2			22	43	P2 - Pin 43	P3 - Pin 18	Orange/Violet	R
						44	P2 - Pin 44	P3 - Pin 43	Violet/Orange	T
3	23	45	P2 - Pin 45	P3 - Pin 19	Green/Violet	R				
		46	P2 - Pin 46	P3 - Pin 44	Violet/Green	T				
4	24	47	P2 - Pin 47	P3 - Pin 20	Brown/Violet	R				
		48	P2 - Pin 48	P3 - Pin 45	Violet/Brown	T				
					25	49	P2 - Pin 49	P1 - Pin 25	Gray/Violet	
						50	P2 - Pin 50	P1 - Pin 50	Violet/Gray	

Table 10-59: LCS Connector J3 (1 of 2): Slots 13–15, Ports 5–8

LCS			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)
Conn.	Slot	Port	Cable #	Conn.			FROM: P4 Conn. At LCS	TO: P1 Conn. At MDF		
J3	13	5	3	P4	1	1	P4 - Pin 1	P1 - Pin 5	Blue/White	R
		6				2	P4 - Pin 2	P1 - Pin 30	White/Blue	T
		7			2	3	P4 - Pin 3	P1 - Pin 6	Orange/White	R
						4	P4 - Pin 4	P1 - Pin 31	White/Orange	T
	8	3			5	P4 - Pin 5	P1 - Pin 7	Green/White	R	
					6	P4 - Pin 6	P1 - Pin 32	White/Green	T	
	5	4			7	P4 - Pin 7	P1 - Pin 8	Brown/White	R	
					8	P4 - Pin 8	P1 - Pin 33	White/Brown	T	
	14	5			5	9	P4 - Pin 9	P1 - Pin 13	Gray/White	R
						10	P4 - Pin 10	P1 - Pin 38	White/Gray	T
		6			6	11	P4 - Pin 11	P1 - Pin 14	Blue/Red	R
						12	P4 - Pin 12	P1 - Pin 39	Red/Blue	T
	7	7			13	P4 - Pin 13	P1 - Pin 15	Orange/Red	R	
					14	P4 - Pin 14	P1 - Pin 40	Red/Orange	T	
	8	8			15	P4 - Pin 15	P1 - Pin 16	Green/Red	R	
					16	P4 - Pin 16	P1 - Pin 41	Red/Green	T	
	15	5			9	10	P4 - Pin 17	P1 - Pin 21	Brown/Red	R
						11	P4 - Pin 18	P1 - Pin 46	Red/Brown	T
		6			10	12	P4 - Pin 19	P1 - Pin 22	Gray/Red	R
						20	P4 - Pin 20	P1 - Pin 47	Red/Gray	T
		7			11	21	P4 - Pin 21	P1 - Pin 23	Blue/Black	R
						22	P4 - Pin 22	P1 - Pin 48	Black/Blue	T
		8			12	23	P4 - Pin 23	P1 - Pin 24	Orange/Black	R
						24	P4 - Pin 24	P1 - Pin 49	Black/Orange	T

Table 10-60: LCS Connector J3 (2 of 2): Slots 16–18, Ports 5–8

LCS			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)
Conn.	Slot	Port	Cable #	Conn.			FROM: P4 Conn. At LCS	TO: P3 Conn. At MDF		
J3	16	5	3	P4	13	25	P4 - Pin 25	P3 - Pin 5	Green/Black	R
		6				26	P4 - Pin 26	P3 - Pin 30	Black/Green	T
		7			14	27	P4 - Pin 27	P3 - Pin 6	Brown/Black	R
						28	P4 - Pin 28	P3 - Pin 31	Black/Brown	T
		8			15	29	P4 - Pin 29	P3 - Pin 7	Gray/Black	R
						30	P4 - Pin 30	P3 - Pin 32	Black/Gray	T
		5			16	31	P4 - Pin 31	P3 - Pin 8	Blue/Yellow	R
						32	P4 - Pin 32	P3 - Pin 33	Yellow/Blue	T
	17	6			17	33	P4 - Pin 33	P3 - Pin 13	Orange/Yellow	R
		7				34	P4 - Pin 34	P3 - Pin 38	Yellow/Orange	T
		8			18	35	P4 - Pin 35	P3 - Pin 14	Green/Yellow	R
						36	P4 - Pin 36	P3 - Pin 39	Yellow/Green	T
		5			19	37	P4 - Pin 37	P3 - Pin 15	Brown/Yellow	R
						38	P4 - Pin 38	P3 - Pin 40	Yellow/Brown	T
		6			20	39	P4 - Pin 39	P3 - Pin 16	Gray/Yellow	R
						40	P4 - Pin 40	P3 - Pin 41	Yellow/Gray	T
	18	7			21	41	P4 - Pin 41	P3 - Pin 21	Blue/Violet	R
		8				42	P4 - Pin 42	P3 - Pin 46	Violet/Blue	T
		5			22	43	P4 - Pin 43	P3 - Pin 22	Orange/Violet	R
						44	P4 - Pin 44	P3 - Pin 47	Violet/Orange	T
		6			23	45	P4 - Pin 45	P3 - Pin 23	Green/Violet	R
						46	P4 - Pin 46	P3 - Pin 48	Violet/Green	T
		7			24	47	P4 - Pin 47	P3 - Pin 24	Brown/Violet	R
						48	P4 - Pin 48	P3 - Pin 49	Violet/Brown	T
8	25	49	P4 - Pin 49	P3 - Pin 25	Gray/Violet	R				
		50	P4 - Pin 50	P3 - Pin 50	Violet/Gray	T				

Table 10-61: LCS Connector J6 (1 of 2): Slots 19–21, Ports 1–4

LCS			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)	
Conn.	Slot	Port	Cable #	Conn.			FROM: P2 Conn. At LCS	TO: P1 Conn. At MDF			
J6	19	1	4	P2	1	1	P2 - Pin 1	P1 - Pin 1	Blue/White	R	
						2	P2 - Pin 2	P1 - Pin 26	White/Blue	T	
		2			2	3	P2 - Pin 3	P1 - Pin 2	Orange/White	R	
						4	P2 - Pin 4	P1 - Pin 27	White/Orange	T	
		3			3	3	5	P2 - Pin 5	P1 - Pin 3	Green/White	R
							6	P2 - Pin 6	P1 - Pin 28	White/Green	T
		4			4	4	7	P2 - Pin 7	P1 - Pin 4	Brown/White	R
							8	P2 - Pin 8	P1 - Pin 29	White/Brown	T
	20	1			5	9	P2 - Pin 9	P1 - Pin 9	Gray/White	R	
						10	P2 - Pin 10	P1 - Pin 34	White/Gray	T	
		2			6	11	P2 - Pin 11	P1 - Pin 10	Blue/Red	R	
						12	P2 - Pin 12	P1 - Pin 35	Red/Blue	T	
		3			7	13	P2 - Pin 13	P1 - Pin 11	Orange/Red	R	
						14	P2 - Pin 14	P1 - Pin 36	Red/Orange	T	
		4			8	15	P2 - Pin 15	P1 - Pin 12	Green/Red	R	
						16	P2 - Pin 16	P1 - Pin 37	Red/Green	T	
	21	1			9	10	P2 - Pin 17	P1 - Pin 17	Brown/Red	R	
						11	P2 - Pin 18	P1 - Pin 42	Red/Brown	T	
		2			10	12	P2 - Pin 19	P1 - Pin 18	Gray/Red	R	
						20	P2 - Pin 20	P1 - Pin 43	Red/Gray	T	
		3			11	21	P2 - Pin 21	P1 - Pin 19	Blue/Black	R	
						22	P2 - Pin 22	P1 - Pin 44	Black/Blue	T	
		4			12	23	P2 - Pin 23	P1 - Pin 20	Orange/Black	R	
						24	P2 - Pin 24	P1 - Pin 45	Black/Orange	T	

Table 10-62: LCS Connector J6 (2 of 2): Slots 22–24, Ports 1–4

LCS			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)
Conn.	Slot	Port	Cable #	Conn.			FROM: P2 Conn. At LCS	TO: P3 Conn. At MDF		
J6	22	1	4	P2	13	25	P2 - Pin 25	P3 - Pin 1	Green/Black	R
						26	P2 - Pin 26	P3 - Pin 26	Black/Green	T
		2			14	27	P2 - Pin 27	P3 - Pin 2	Brown/Black	R
						28	P2 - Pin 28	P3 - Pin 27	Black/Brown	T
		3			15	29	P2 - Pin 29	P3 - Pin 3	Gray/Black	R
						30	P2 - Pin 30	P3 - Pin 28	Black/Gray	T
		4			16	31	P2 - Pin 31	P3 - Pin 4	Blue/Yellow	R
						32	P2 - Pin 32	P3 - Pin 29	Yellow/Blue	T
	23	1			17	33	P2 - Pin 33	P3 - Pin 9	Orange/Yellow	R
						34	P2 - Pin 34	P3 - Pin 34	Yellow/Orange	T
		2			18	35	P2 - Pin 35	P3 - Pin 10	Green/Yellow	R
						36	P2 - Pin 36	P3 - Pin 35	Yellow/Green	T
		3			19	37	P2 - Pin 37	P3 - Pin 11	Brown/Yellow	R
						38	P2 - Pin 38	P3 - Pin 36	Yellow/Brown	T
		4			20	39	P2 - Pin 39	P3 - Pin 12	Gray/Yellow	R
						40	P2 - Pin 40	P3 - Pin 37	Yellow/Gray	T
	24	1			21	41	P2 - Pin 41	P3 - Pin 17	Blue/Violet	R
						42	P2 - Pin 42	P3 - Pin 42	Violet/Blue	T
		2			22	43	P2 - Pin 43	P3 - Pin 18	Orange/Violet	R
						44	P2 - Pin 44	P3 - Pin 43	Violet/Orange	T
		3			23	45	P2 - Pin 45	P3 - Pin 19	Green/Violet	R
						46	P2 - Pin 46	P3 - Pin 44	Violet/Green	T
		4			24	47	P2 - Pin 47	P3 - Pin 20	Brown/Violet	R
						48	P2 - Pin 48	P3 - Pin 45	Violet/Brown	T
					25	49	P2 - Pin 49	P1 - Pin 25	Gray/Violet	
						50	P2 - Pin 50	P1 - Pin 50	Violet/Gray	

Table 10-63: LCS Connector J2 (1 of 2): Slots 19–21, Ports 5–8

LCS			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)		
Conn.	Slot	Port	Cable #	Conn.			FROM: P4 Conn. At LCS	TO: P1 Conn. At MDF				
J2	19	5	4	P4	1	1	P4 - Pin 1	P1 - Pin 5	Blue/White	R		
		6				2	P4 - Pin 2	P1 - Pin 30	White/Blue	T		
					7	2	3	P4 - Pin 3	P1 - Pin 6	Orange/White	R	
		4					P4 - Pin 4	P1 - Pin 31	White/Orange	T		
		8			3	5	P4 - Pin 5	P1 - Pin 7	Green/White	R		
						6	P4 - Pin 6	P1 - Pin 32	White/Green	T		
		20			5	4	7	7	P4 - Pin 7	P1 - Pin 8	Brown/White	R
								8	P4 - Pin 8	P1 - Pin 33	White/Brown	T
	6				5	9	9	P4 - Pin 9	P1 - Pin 13	Gray/White	R	
							10	P4 - Pin 10	P1 - Pin 38	White/Gray	T	
	7				6	11	11	P4 - Pin 11	P1 - Pin 14	Blue/Red	R	
							12	P4 - Pin 12	P1 - Pin 39	Red/Blue	T	
	8				7	13	13	P4 - Pin 13	P1 - Pin 15	Orange/Red	R	
							14	P4 - Pin 14	P1 - Pin 40	Red/Orange	T	
	21	5			8	15	15	P4 - Pin 15	P1 - Pin 16	Green/Red	R	
							16	P4 - Pin 16	P1 - Pin 41	Red/Green	T	
		6			9	10	10	P4 - Pin 17	P1 - Pin 21	Brown/Red	R	
							11	P4 - Pin 18	P1 - Pin 46	Red/Brown	T	
		7			10	12	12	P4 - Pin 19	P1 - Pin 22	Gray/Red	R	
							20	P4 - Pin 20	P1 - Pin 47	Red/Gray	T	
		8			11	21	21	P4 - Pin 21	P1 - Pin 23	Blue/Black	R	
							22	P4 - Pin 22	P1 - Pin 48	Black/Blue	T	
	8	12			23	23	P4 - Pin 23	P1 - Pin 24	Orange/Black	R		
						24	P4 - Pin 24	P1 - Pin 49	Black/Orange	T		

Table 10-64: LCS Connector J2 (2 of 2): Slots 22–24, Ports 5–8

LCS			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)
Conn.	Slot	Port	Cable #	Conn.			FROM: P4 Conn. At LCS	TO: P3 Conn. At MDF		
J2	22	5	4	P4	13	25	P4 - Pin 25	P3 - Pin 5	Green/Black	R
		6				26	P4 - Pin 26	P3 - Pin 30	Black/Green	T
		7			14	27	P4 - Pin 27	P3 - Pin 6	Brown/Black	R
						28	P4 - Pin 28	P3 - Pin 31	Black/Brown	T
		8			15	29	P4 - Pin 29	P3 - Pin 7	Gray/Black	R
						30	P4 - Pin 30	P3 - Pin 32	Black/Gray	T
		5			16	31	P4 - Pin 31	P3 - Pin 8	Blue/Yellow	R
						32	P4 - Pin 32	P3 - Pin 33	Yellow/Blue	T
	23	6			17	33	P4 - Pin 33	P3 - Pin 13	Orange/Yellow	R
		7				34	P4 - Pin 34	P3 - Pin 38	Yellow/Orange	T
		8			18	35	P4 - Pin 35	P3 - Pin 14	Green/Yellow	R
						36	P4 - Pin 36	P3 - Pin 39	Yellow/Green	T
		5			19	37	P4 - Pin 37	P3 - Pin 15	Brown/Yellow	R
						38	P4 - Pin 38	P3 - Pin 40	Yellow/Brown	T
		6			20	39	P4 - Pin 39	P3 - Pin 16	Gray/Yellow	R
						40	P4 - Pin 40	P3 - Pin 41	Yellow/Gray	T
	24	7			21	41	P4 - Pin 41	P3 - Pin 21	Blue/Violet	R
		8				42	P4 - Pin 42	P3 - Pin 46	Violet/Blue	T
		5			22	43	P4 - Pin 43	P3 - Pin 22	Orange/Violet	R
						44	P4 - Pin 44	P3 - Pin 47	Violet/Orange	T
		6			23	45	P4 - Pin 45	P3 - Pin 23	Green/Violet	R
						46	P4 - Pin 46	P3 - Pin 48	Violet/Green	T
		7			24	47	P4 - Pin 47	P3 - Pin 24	Brown/Violet	R
						48	P4 - Pin 48	P3 - Pin 49	Violet/Brown	T
8	25	49	P4 - Pin 49	P3 - Pin 25	Gray/Violet	R				
		50	P4 - Pin 50	P3 - Pin 50	Violet/Gray	T				



## Appendix H

### Cable/Pair Assignment Tables: LPFS8 with Octal Cards

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**Telco Connector Tables** The following tables show the LPFS8 backplane telco connectors, their corresponding card slots and ports, and their corresponding connections at the LCS backplane (Table 10-65, below) and the MDF cables (Table 10-66, page 10-93), for ADSL data plus voice service, using octal cards. Refer to Section 6—*Telco Cabling*, Chapter 4—“LPFS8 Cabling—Octal Line Cards (Data Plus Voice).”

Table 10-65: LPFS8 to LCS Telco Connectors—Octal Cards

LPFS8 Backplane Connector	Connects to:	Cable	Card Slots	Card Ports
J1	LCS	A1	1–6	1–4
J2		B1	7–12	1–4
J3		C1	13–18	1–4
J4		D1	19–24	1–4
J5		A2	1–6	5–8
J6		B2	7–12	5–8
J7		C2	13–18	5–8
J8		D2	19–24	5–8

See the diagram on the following page.

NOTE: Some cables are drawn with "dashed" lines, for easier viewing.

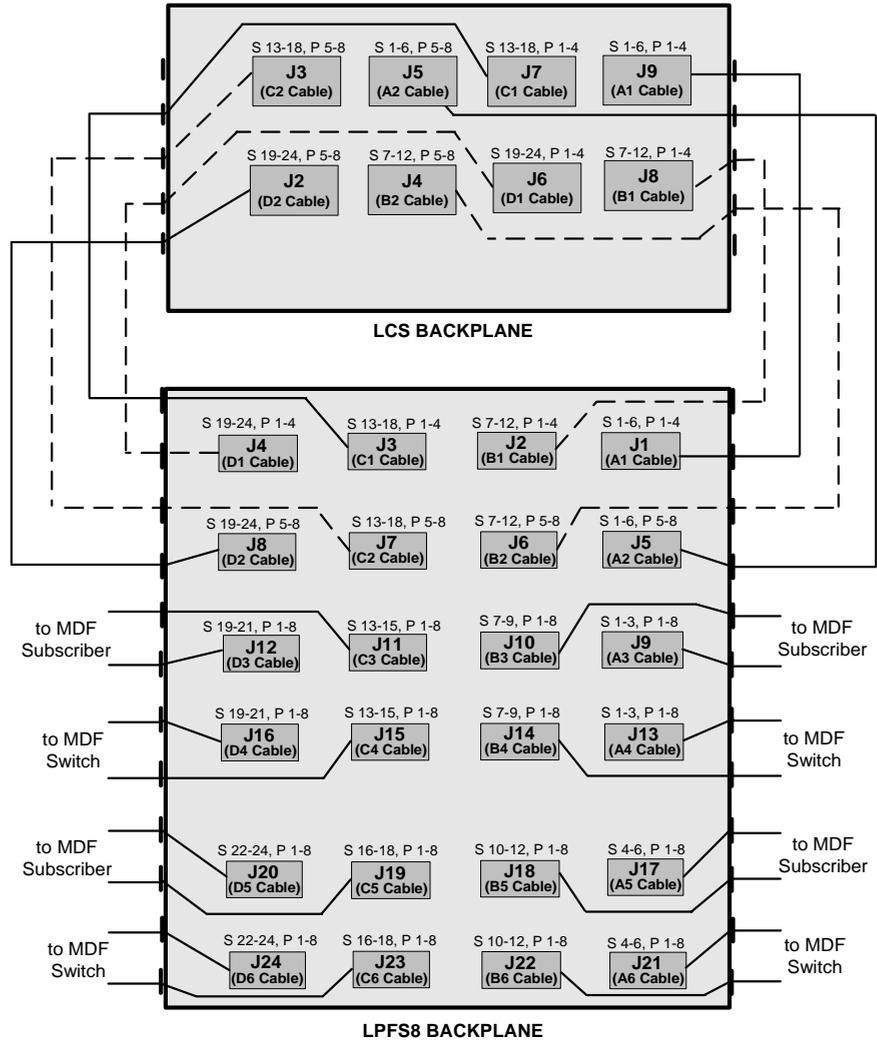


Figure 10-22: LPFS8 Cabling Diagram—Octal Cards

Table 10-66: LPFS8 to MDF Connections

<b>LPFS8 Backplane Connector</b>	<b>Connects to:</b>	<b>Cable</b>	<b>Card Slots</b>	<b>Card Ports</b>
J9	Subscriber	A3	1-3	1-8
J10		B3	7-9	1-8
J11		C3	13-15	1-8
J12		D3	19-21	1-8
J13	Voice Switch	A4	1-3	1-8
J14		B4	7-9	1-8
J15		C4	13-15	1-8
J16		D4	19-21	1-8
J17	Subscriber	A5	4-6	1-8
J18		B5	10-12	1-8
J19		C5	16-18	1-8
J20		D5	22-24	1-8
J21	Voice Switch	A6	4-6	1-8
J22		B6	10-12	1-8
J23		C6	16-18	1-8
J24		D6	22-24	1-8

**Cable/Pair  
Assignment  
Tables: LPFS8 to  
LCS**

The following tables show the cable/pair assignments for the LPFS8 to LCS connections, for data plus voice service, using octal cards. Each pair of tables represents cable/pair assignments for one LPFS8 backplane connector (J1–J8) supporting four ports (1–4 or 5–8) on one six-pack of cards (the first table is for the first three cards, the second table is for the second three cards):

Table 10-67: Cable/Pair Tables and Page Numbers

Table	LPFS8 Conn-Ector	LCS Conn-Ector	Slots	Ports	Cable	Page #
Table 10-68	J1	J9	1–3	1–4	A1	page 10-95
Table 10-69			4–6	1–4		page 10-96
Table 10-70	J2	J8	7–9	1–4	B1	page 10-97
Table 10-71			10–12	1–4		page 10-98
Table 10-72	J5	J5	1–3	5–8	A2	page 10-99
Table 10-73			4–6	5–8		page 10-100
Table 10-74	J6	J4	7–9	5–8	B2	page 10-101
Table 10-75			10–12	5–8		page 10-102
Table 10-76	J3	J7	13–15	1–4	C1	page 10-103
Table 10-77			16–18	1–4		page 10-104
Table 10-78	J4	J6	19–21	1–4	D1	page 10-105
Table 10-79			22–24	1–4		page 10-106
Table 10-80	J7	J3	13–15	5–8	C2	page 10-107
Table 10-81			16–18	5–8		page 10-108
Table 10-82	J8	J2	19–21	5–8	D2	page 10-109
Table 10-83			22–24	5–8		page 10-110

For cable/pair assignment tables for the LPFS8 to MDF cable connections, see **Cable/Pair Assignment Tables: LPFS8 to MDF**, page 10-111.

Table 10-68: LPFS8 J1 to LCS J9—Slots 1–3, Ports 1–4

LPFS8 Conn- ector #	LCS Conn- ector #	LPFS8/LCS		Cable #	Pair #	Wire #	Backplane Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)	
		Slot #	Port #				LPFS8	LCS			
J1	J9	1	1	A1	1	1	1	1	Blue/White	R	
								2	2	2	White/Blue
			2	2		2	3	3	3	Orange/White	R
									4	4	4
			3	3		3	5	5	5	Green/White	R
									6	6	6
			4	4		4	7	7	7	Brown/White	R
									8	8	8
		2	1		5	9	9	9	Gray/White	R	
								10	10	10	White/Gray
			2	2		6	11	11	11	Blue/Red	R
									12	12	12
			3	3		7	13	13	13	Orange/Red	R
									14	14	14
			4	4		8	15	15	15	Green/Red	R
									16	16	16
		3	1		9	17	17	17	Brown/Red	R	
								18	18	18	Red/Brown
			2	2		10	19	19	19	Gray/Red	R
									20	20	20
			3	3		11	21	21	21	Blue/Black	R
									22	22	22
			4	4		12	23	23	23	Orange/Black	R
▼	▼							▼	24	24	24

Table 10-69: LPFS8 J1 to LCS J9—Slots 4–6, Ports 1–4

LPFS8 Conn- ector #	LCS Conn- ector #	LPFS8/LCS		Cable #	Pair #	Wire #	Backplane Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)		
		Slot #	Port #				LPFS8	LCS				
J1	J9	4	1	A1	13	25	25	25	Green/Black	R		
								26	26	26	Black/Green	T
			2			14	27	27	27	Brown/Black	R	
									28	28	28	Black/Brown
			3			15	29	29	29	Gray/Black	R	
									30	30	30	Black/Gray
			4			16	31	31	31	Blue/Yellow	R	
									32	32	32	Yellow/Blue
			5	1		17	33	33	33	Orange/Yellow	R	
									34	34	34	Yellow/Orange
				2			18	35	35	35	Green/Yellow	R
										36	36	36
		3				19	37	37	37	Brown/Yellow	R	
									38	38	38	Yellow/Brown
		4				20	39	39	39	Gray/Yellow	R	
									40	40	40	Yellow/Gray
		6	1		21	41	41	41	Blue/Violet	R		
								42	42	42	Violet/Blue	T
			2			22	43	43	43	Orange/Violet	R	
									44	44	44	Violet/Orange
			3			23	45	45	45	Green/Violet	R	
									46	46	46	Violet/Green
			4			24	47	47	47	Brown/Violet	R	
▼	▼							▼	48	48	48	Violet/Brown
					25	49	49	49	Gray/Violet	R		
						50	50	50	Violet/Gray	T		

Table 10-70: LPFS8 J2 to LCS J8—Slots 7–9, Ports 1–4

LPFS8 Conn- ector #	LCS Conn- ector #	LPFS8/LCS		Cable #	Pair #	Wire #	Backplane Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)		
		Slot #	Port #				LPFS8	LCS				
J2	J8	7	1	B1	1	1	1	1	Blue/White	R		
						2	2	2	White/Blue	T		
			2			2	3	3	3	Orange/White	R	
							4	4	4	White/Orange	T	
			3			3	5	5	5	Green/White	R	
							6	6	6	White/Green	T	
			4			4	7	7	7	Brown/White	R	
							8	8	8	White/Brown	T	
			8	1		5	9	9	9	Gray/White	R	
							10	10	10	White/Gray	T	
				2			6	11	11	11	Blue/Red	R
								12	12	12	Red/Blue	T
				3			7	13	13	13	Orange/Red	R
								14	14	14	Red/Orange	T
				4			8	15	15	15	Green/Red	R
								16	16	16	Red/Green	T
		9	1		9	17	17	17	Brown/Red	R		
						18	18	18	Red/Brown	T		
			2			10	19	19	19	Gray/Red	R	
							20	20	20	Red/Gray	T	
			3			11	21	21	21	Blue/Black	R	
							22	22	22	Black/Blue	T	
			4			12	23	23	23	Orange/Black	R	
							24	24	24	Black/Orange	T	

Table 10-71: LPFS8 J2 to LCS J8—Slots 10–12, Ports 1–4

LPFS8 Conn- ector #	LCS Conn- ector #	LPFS8/LCS		Cable #	Pair #	Wire #	Backplane Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)		
		Slot #	Port #				LPFS8	LCS				
J2	J8	10	1	B1	13	25	25	25	Green/Black	R		
						26	26	26	Black/Green	T		
			2			14	27	27	27	Brown/Black	R	
							28	28	28	Black/Brown	T	
			3			15	29	29	29	Gray/Black	R	
							30	30	30	Black/Gray	T	
			4			16	31	31	31	Blue/Yellow	R	
							32	32	32	Yellow/Blue	T	
			11	1		17	33	33	33	Orange/Yellow	R	
							34	34	34	Yellow/Orange	T	
				2			18	35	35	35	Green/Yellow	R
								36	36	36	Yellow/Green	T
		3				19	37	37	37	Brown/Yellow	R	
							38	38	38	Yellow/Brown	T	
		4				20	39	39	39	Gray/Yellow	R	
							40	40	40	Yellow/Gray	T	
		12	1		21	41	41	41	Blue/Violet	R		
						42	42	42	Violet/Blue	T		
			2			22	43	43	43	Orange/Violet	R	
							44	44	44	Violet/Orange	T	
			3			23	45	45	45	Green/Violet	R	
							46	46	46	Violet/Green	T	
			4			24	47	47	47	Brown/Violet	R	
▼	▼						48	48	48	Violet/Brown	T	
		25				49	49	49	Gray/Violet	R		
						50	50	50	Violet/Gray	T		

Table 10-72: LPFS8 J5 to LCS J5—Slots 1–3, Ports 5–8

LPFS8 Conn- ector #	LCS Conn- ector #	LPFS8/LCS		Cable #	Pair #	Wire #	Backplane Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)	
		Slot #	Port #				LPFS8	LCS	Tip/Ring		
J5	J5	1	5	A2	1	1	1	1	Blue/White	R	
								2	2	2	White/Blue
			6	6		2	3	3	3	Orange/White	R
										4	4
			7	7		3	5	5	5	Green/White	R
										6	6
			8	8		4	7	7	7	Brown/White	R
										8	8
		2	5		5	9	9	9	Gray/White	R	
									10	10	10
			6	6		6	11	11	11	Blue/Red	R
										12	12
			7	7		7	13	13	13	Orange/Red	R
										14	14
			8	8		8	15	15	15	Green/Red	R
										16	16
		3	5		9	17	17	17	Brown/Red	R	
									18	18	18
			6	6		10	19	19	19	Gray/Red	R
										20	20
			7	7		11	21	21	21	Blue/Black	R
										22	22
			8	8		12	23	23	23	Orange/Black	R
										24	24

Table 10-73: LPFS8 J5 to LCS J5—Slots 4–6, Ports 5–8

LPFS8 Conn- ector #	LCS Conn- ector #	LPFS8/LCS		Cable #	Pair #	Wire #	Backplane Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)	
		Slot #	Port #				LPFS8	LCS			
J5	J5	4	5	A2	13	25	25	25	Green/Black	R	
						26	26	26	Black/Green	T	
			6			14	27	27	27	Brown/Black	R
							28	28	28	Black/Brown	T
			7			15	29	29	29	Gray/Black	R
							30	30	30	Black/Gray	T
			8			16	31	31	31	Blue/Yellow	R
							32	32	32	Yellow/Blue	T
		5	5		17	33	33	33	Orange/Yellow	R	
						34	34	34	Yellow/Orange	T	
			6			18	35	35	35	Green/Yellow	R
							36	36	36	Yellow/Green	T
			7			19	37	37	37	Brown/Yellow	R
							38	38	38	Yellow/Brown	T
			8			20	39	39	39	Gray/Yellow	R
							40	40	40	Yellow/Gray	T
		6	5		21	41	41	41	Blue/Violet	R	
						42	42	42	Violet/Blue	T	
			6			22	43	43	43	Orange/Violet	R
							44	44	44	Violet/Orange	T
			7			23	45	45	45	Green/Violet	R
							46	46	46	Violet/Green	T
			8			24	47	47	47	Brown/Violet	R
							48	48	48	Violet/Brown	T
					25	49	49	49	Gray/Violet	R	
						50	50	50	Violet/Gray	T	

Table 10-74: LPFS8 J6 to LCS J4—Slots 7–9, Ports 5–8

LPFS8 Conn- ector #	LCS Conn- ector #	LPFS8/LCS		Cable #	Pair #	Wire #	Backplane Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)		
		Slot #	Port #				LPFS8	LCS				
J6	J4	7	5	B2	1	1	1	1	Blue/White	R		
						2	2	2	White/Blue	T		
			6			2	3	3	3	Orange/White	R	
							4	4	4	White/Orange	T	
			7			3	5	5	5	Green/White	R	
							6	6	6	White/Green	T	
			8			4	7	7	7	Brown/White	R	
							8	8	8	White/Brown	T	
			8	5		5	9	9	9	Gray/White	R	
							10	10	10	White/Gray	T	
				6			6	11	11	11	Blue/Red	R
								12	12	12	Red/Blue	T
				7			7	13	13	13	Orange/Red	R
								14	14	14	Red/Orange	T
				8			8	15	15	15	Green/Red	R
								16	16	16	Red/Green	T
		9	5		9	17	17	17	Brown/Red	R		
						18	18	18	Red/Brown	T		
			6			10	19	19	19	Gray/Red	R	
							20	20	20	Red/Gray	T	
			7			11	21	21	21	Blue/Black	R	
							22	22	22	Black/Blue	T	
			8			12	23	23	23	Orange/Black	R	
							24	24	24	Black/Orange	T	

Table 10-75: LPFS8 J6 to LCS J4—Slots 10–12, Ports 5–8

LPFS8 Conn- ector #	LCS Conn- ector #	LPFS8/LCS		Cable #	Pair #	Wire #	Backplane Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)	
		Slot #	Port #				LPFS8	LCS			
J6	J4	10	5	B2	13	25	25	25	Green/Black	R	
								26	26	26	Black/Green
			6			14	27	27	27	Brown/Black	R
								28	28	28	Black/Brown
			7			15	29	29	29	Gray/Black	R
								30	30	30	Black/Gray
			8			16	31	31	31	Blue/Yellow	R
								32	32	32	Yellow/Blue
		11	5		17	33	33	33	Orange/Yellow	R	
								34	34	34	Yellow/Orange
			6			18	35	35	35	Green/Yellow	R
								36	36	36	Yellow/Green
			7			19	37	37	37	Brown/Yellow	R
								38	38	38	Yellow/Brown
			8			20	39	39	39	Gray/Yellow	R
								40	40	40	Yellow/Gray
		12	5		21	41	41	41	Blue/Violet	R	
								42	42	42	Violet/Blue
			6			22	43	43	43	Orange/Violet	R
								44	44	44	Violet/Orange
			7			23	45	45	45	Green/Violet	R
								46	46	46	Violet/Green
			8			24	47	47	47	Brown/Violet	R
								48	48	48	Violet/Brown
					25	49	49	49	Gray/Violet	R	
						50	50	50	Violet/Gray	T	

Table 10-76: LPFS8 J3 to LCS J7—Slots 13–15, Ports 1–4

LPFS8 Conn- ector #	LCS Conn- ector #	LPFS8/LCS		Cable #	Pair #	Wire #	Backplane Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)	
		Slot #	Port #				LPFS8	LCS			
J3	J7	13	1	C1	1	1	1	1	Blue/White	R	
								2	2	2	White/Blue
			2			2	3	3	3	Orange/White	R
									4	4	4
			3			3	5	5	5	Green/White	R
									6	6	6
			4			4	7	7	7	Brown/White	R
									8	8	8
		14	1		5	9	9	9	Gray/White	R	
								10	10	10	White/Gray
			2			6	11	11	11	Blue/Red	R
									12	12	12
			3			7	13	13	13	Orange/Red	R
									14	14	14
			4			8	15	15	15	Green/Red	R
									16	16	16
		15	1		9	17	17	17	Brown/Red	R	
								18	18	18	Red/Brown
			2			10	19	19	19	Gray/Red	R
									20	20	20
			3			11	21	21	21	Blue/Black	R
									22	22	22
			4			12	23	23	23	Orange/Black	R
▼	▼						▼		24	24	24

Table 10-77: LPFS8 J3 to LCS J7—Slots 16–18, Ports 1–4

LPFS8 Conn- ector #	LCS Conn- ector #	LPFS8/LCS		Cable #	Pair #	Wire #	Backplane Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
		Slot #	Port #				LPFS8	LCS		
J3	J7	16	1	C1	13	25	25	25	Green/Black	R
						26	26	26	Black/Green	T
2	14		27	27	27	Brown/Black	R			
			28	28	28	Black/Brown	T			
3	15		29	29	29	Gray/Black	R			
			30	30	30	Black/Gray	T			
4	16		31	31	31	Blue/Yellow	R			
			32	32	32	Yellow/Blue	T			
▼	▼	17	1		17	33	33	33	Orange/Yellow	R
						34	34	34	Yellow/Orange	T
			2	18	35	35	35	Green/Yellow	R	
					36	36	36	Yellow/Green	T	
			3	19	37	37	37	Brown/Yellow	R	
					38	38	38	Yellow/Brown	T	
			4	20	39	39	39	Gray/Yellow	R	
					40	40	40	Yellow/Gray	T	
▼	▼	18	1		21	41	41	41	Blue/Violet	R
						42	42	42	Violet/Blue	T
			2	22	43	43	43	Orange/Violet	R	
					44	44	44	Violet/Orange	T	
			3	23	45	45	45	Green/Violet	R	
					46	46	46	Violet/Green	T	
			4	24	47	47	47	Brown/Violet	R	
					48	48	48	Violet/Brown	T	
▼	▼				25	49	49	49	Gray/Violet	R
						50	50	50	Violet/Gray	T

Table 10-78: LPFS8 J4 to LCS J6—Slots 19–21, Ports 1–4

LPFS8 Conn- ector #	LCS Conn- ector #	LPFS8/LCS		Cable #	Pair #	Wire #	Backplane Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)	
		Slot #	Port #				LPFS8	LCS			
J4	J6	19	1	D1	1	1	1	1	Blue/White	R	
						2	2	2	White/Blue	T	
			2			2	3	3	3	Orange/White	R
							4	4	4	White/Orange	T
			3			3	5	5	5	Green/White	R
							6	6	6	White/Green	T
			4			4	7	7	7	Brown/White	R
							8	8	8	White/Brown	T
		20	1		5	9	9	9	Gray/White	R	
						10	10	10	White/Gray	T	
			2			6	11	11	11	Blue/Red	R
							12	12	12	Red/Blue	T
			3			7	13	13	13	Orange/Red	R
							14	14	14	Red/Orange	T
			4			8	15	15	15	Green/Red	R
							16	16	16	Red/Green	T
		21	1		9	17	17	17	Brown/Red	R	
						18	18	18	Red/Brown	T	
			2			10	19	19	19	Gray/Red	R
							20	20	20	Red/Gray	T
			3			11	21	21	21	Blue/Black	R
							22	22	22	Black/Blue	T
			4			12	23	23	23	Orange/Black	R
							24	24	24	Black/Orange	T

Table 10-79: LPFS8 J4 to LCS J6—Slots 22–24, Ports 1–4

LPFS8 Conn- ector #	LCS Conn- ector #	LPFS8/LCS		Cable #	Pair #	Wire #	Backplane Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)		
		Slot #	Port #				LPFS8	LCS				
J4	J6	22	1	D1	13	25	25	25	Green/Black	R		
						26	26	26	Black/Green	T		
			2			14	27	27	27	Brown/Black	R	
							28	28	28	Black/Brown	T	
			3			15	29	29	29	Gray/Black	R	
							30	30	30	Black/Gray	T	
			4			16	31	31	31	Blue/Yellow	R	
							32	32	32	Yellow/Blue	T	
			23	1		17	33	33	33	Orange/Yellow	R	
							34	34	34	Yellow/Orange	T	
				2			18	35	35	35	Green/Yellow	R
								36	36	36	Yellow/Green	T
		3				19	37	37	37	Brown/Yellow	R	
							38	38	38	Yellow/Brown	T	
		4				20	39	39	39	Gray/Yellow	R	
							40	40	40	Yellow/Gray	T	
		24	1		21	41	41	41	Blue/Violet	R		
						42	42	42	Violet/Blue	T		
			2			22	43	43	43	Orange/Violet	R	
							44	44	44	Violet/Orange	T	
			3			23	45	45	45	Green/Violet	R	
							46	46	46	Violet/Green	T	
			4			24	47	47	47	Brown/Violet	R	
							48	48	48	Violet/Brown	T	
▼	▼					49	49	49	Gray/Violet	R		
						50	50	50	Violet/Gray	T		

Table 10-80: LPFS8 J7 to LCS J3—Slots 13–15, Ports 5–8

LPFS8 Conn- ector #	LCS Conn- ector #	LPFS8/LCS		Cable #	Pair #	Wire #	Backplane Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)	
		Slot #	Port #				LPFS8	LCS			
J7	J3	13	5	C2	1	1	1	1	Blue/White	R	
						2	2	2	White/Blue	T	
			6			2	3	3	3	Orange/White	R
							4	4	4	White/Orange	T
			7			3	5	5	5	Green/White	R
							6	6	6	White/Green	T
			8			4	7	7	7	Brown/White	R
							8	8	8	White/Brown	T
		14	5		5	9	9	9	Gray/White	R	
						10	10	10	White/Gray	T	
			6			6	11	11	11	Blue/Red	R
							12	12	12	Red/Blue	T
			7			7	13	13	13	Orange/Red	R
							14	14	14	Red/Orange	T
			8			8	15	15	15	Green/Red	R
							16	16	16	Red/Green	T
		15	5		9	17	17	17	Brown/Red	R	
						18	18	18	Red/Brown	T	
			6			10	19	19	19	Gray/Red	R
							20	20	20	Red/Gray	T
			7			11	21	21	21	Blue/Black	R
							22	22	22	Black/Blue	T
			8			12	23	23	23	Orange/Black	R
							24	24	24	Black/Orange	T

Table 10-81: LPFS8 J7 to LCS J3—Slots 16–18, Ports 5–8

LPFS8 Conn- ector #	LCS Conn- ector #	LPFS8/LCS		Cable #	Pair #	Wire #	Backplane Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)	
		Slot #	Port #				LPFS8	LCS			
J7	J3	16	5	C2	13	25	25	25	Green/Black	R	
								26	26	26	Black/Green
			6			14	27	27	27	Brown/Black	R
								28	28	28	Black/Brown
			7			15	29	29	29	Gray/Black	R
								30	30	30	Black/Gray
			8			16	31	31	31	Blue/Yellow	R
								32	32	32	Yellow/Blue
		17	5		17	33	33	33	Orange/Yellow	R	
								34	34	34	Yellow/Orange
			6			18	35	35	35	Green/Yellow	R
								36	36	36	Yellow/Green
			7			19	37	37	37	Brown/Yellow	R
								38	38	38	Yellow/Brown
			8			20	39	39	39	Gray/Yellow	R
								40	40	40	Yellow/Gray
		18	5		21	41	41	41	Blue/Violet	R	
								42	42	42	Violet/Blue
			6			22	43	43	43	Orange/Violet	R
								44	44	44	Violet/Orange
			7			23	45	45	45	Green/Violet	R
								46	46	46	Violet/Green
			8			24	47	47	47	Brown/Violet	R
▼	▼				▼			48	48	48	Violet/Brown
					25	49	49	49	Gray/Violet	R	
						50	50	50	Violet/Gray	T	

Table 10-82: LPFS8 J8 to LCS J2—Slots 19–21, Ports 5–8

LPFS8 Conn- ector #	LCS Conn- ector #	LPFS8/LCS		Cable #	Pair #	Wire #	Backplane Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)	
		Slot #	Port #				LPFS8	LCS			
J8	J2	19	5	D2	1	1	1	1	Blue/White	R	
						2	2	2	White/Blue	T	
			6			2	3	3	3	Orange/White	R
							4	4	4	White/Orange	T
			7			3	5	5	5	Green/White	R
							6	6	6	White/Green	T
			8			4	7	7	7	Brown/White	R
							8	8	8	White/Brown	T
		20	5		5	9	9	9	Gray/White	R	
						10	10	10	White/Gray	T	
			6			6	11	11	11	Blue/Red	R
							12	12	12	Red/Blue	T
			7			7	13	13	13	Orange/Red	R
							14	14	14	Red/Orange	T
			8			8	15	15	15	Green/Red	R
							16	16	16	Red/Green	T
		21	5		9	17	17	17	Brown/Red	R	
						18	18	18	Red/Brown	T	
			6			10	19	19	19	Gray/Red	R
							20	20	20	Red/Gray	T
			7			11	21	21	21	Blue/Black	R
							22	22	22	Black/Blue	T
			8			12	23	23	23	Orange/Black	R
							24	24	24	Black/Orange	T

Table 10-83: LPFS8 J8 to LCS J2—Slots 22–24, Ports 5–8

LPFS8 Conn- ector #	LCS Conn- ector #	LPFS8/LCS		Cable #	Pair #	Wire #	Backplane Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)	
		Slot #	Port #				LPFS8	LCS			
J8	J2	22	5	D2	13	25	25	25	Green/Black	R	
								26	26	26	Black/Green
			6			14	27	27	27	Brown/Black	R
								28	28	28	Black/Brown
			7			15	29	29	29	Gray/Black	R
								30	30	30	Black/Gray
			8			16	31	31	31	Blue/Yellow	R
								32	32	32	Yellow/Blue
		23	5		17	33	33	33	Orange/Yellow	R	
								34	34	34	Yellow/Orange
			6			18	35	35	35	Green/Yellow	R
								36	36	36	Yellow/Green
			7			19	37	37	37	Brown/Yellow	R
								38	38	38	Yellow/Brown
			8			20	39	39	39	Gray/Yellow	R
								40	40	40	Yellow/Gray
		24	5		21	41	41	41	Blue/Violet	R	
								42	42	42	Violet/Blue
			6			22	43	43	43	Orange/Violet	R
								44	44	44	Violet/Orange
			7			23	45	45	45	Green/Violet	R
								46	46	46	Violet/Green
			8			24	47	47	47	Brown/Violet	R
▼	▼						▼	48	48	48	Violet/Brown
					25	49	49	49	Gray/Violet	R	
						50	50	50	Violet/Gray	T	

**Cable/Pair  
Assignment  
Tables: LPFS8 to  
MDF**

The following tables show the cable/pair assignments for the LPFS8 to MDF cable connections (subscriber and switch), for data plus voice service, using octal cards. Each pair of tables represents cable/pair assignments for one LPFS8 backplane connector to the subscriber and one to the voice switch, supporting eight ports on three cards, as follows:

Table 10-84: Cable/Pair Tables and Page Numbers

Table	LPFS8 Connectors to MDF:		Slots	Ports	Page #
	Subscriber	Voice Switch			
Table 10-85	J9	J13	1 & 2	1-8	page 10-112
Table 10-86			3	1-8	page 10-113
Table 10-87	J17	J21	4 & 5	1-8	page 10-114
Table 10-88			6	1-8	page 10-115
Table 10-89	J10	J14	7 & 8	1-8	page 10-116
Table 10-90			9	1-8	page 10-117
Table 10-91	J18	J22	10 & 11	1-8	page 10-118
Table 10-92			12	1-8	page 10-119
Table 10-93	J11	J15	13 & 14	1-8	page 10-120
Table 10-94			15	1-8	page 10-121
Table 10-95	J19	J23	16 & 17	1-8	page 10-122
Table 10-96			18	1-8	page 10-123
Table 10-97	J12	J16	19 & 20	1-8	page 10-124
Table 10-98			21	1-8	page 10-125
Table 10-99	J20	J24	22 & 23	1-8	page 10-126
Table 10-100			24	1-8	page 10-127

For cable/pair assignment tables for the LPFS8 to LCS connections, see **Cable/Pair Assignment Tables: LPFS8 to LCS**, page 10-94.

Table 10-85: LPFS8 to MDF Connectors J9 & J13—Slots 1 & 2, Ports 1–8

LPFS8 to MDF SUBSCRIBER Connector #	Cable #	LPFS8 to MDF SWITCH Connector #	Cable #	Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back-plane	Amp Champ		
J9	A3	J13	A4	1	1	1	1	1	1	Blue/White	R
							2	2	26	White/Blue	T
					2	2	3	3	2	Orange/White	R
							4	4	27	White/Orange	T
					3	3	5	5	3	Green/White	R
							6	6	28	White/Green	T
					4	4	7	7	4	Brown/White	R
							8	8	29	White/Brown	T
					5	5	9	9	5	Gray/White	R
							10	10	30	White/Gray	T
					6	6	11	11	6	Blue/Red	R
							12	12	31	Red/Blue	T
					7	7	13	13	7	Orange/Red	R
							14	14	32	Red/Orange	T
					8	8	15	15	8	Green/Red	R
							16	16	33	Red/Green	T
J13	A3	J13	A4	2	1	9	17	17	9	Brown/Red	R
							18	18	34	Red/Brown	T
					2	10	19	19	10	Gray/Red	R
							20	20	35	Red/Gray	T
					3	11	21	21	11	Blue/Black	R
							22	22	36	Black/Blue	T
					4	12	23	23	12	Orange/Black	R
							24	24	37	Black/Orange	T
					5	13	25	25	13	Green/Black	R
							26	26	38	Black/Green	T
					6	14	27	27	14	Brown/Black	R
							28	28	39	Black/Brown	T
					7	15	29	29	15	Gray/Black	R
							30	30	40	Black/Gray	T
					8	16	31	31	16	Blue/Yellow	R
							32	32	41	Yellow/Blue	T

Table 10-86: LPFS8 to MDF Connectors J9 & J13—Slot 3, Ports 1–8

LPFS8 to MDF SUBSCRI- BER Conn- ector #	Cable #	LPFS8 to MDF SWITCH Conn- ector #	Cable #	LPFS8 Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back- plane	Amp Champ		
J9	A3	J13	A4	3	1	17	33	33	17	Orange/Yellow	R
							34	34	42	Yellow/Orange	T
					2	18	35	35	18	Green/Yellow	R
							36	36	43	Yellow/Green	T
					3	19	37	37	19	Brown/Yellow	R
							38	38	44	Yellow/Brown	T
					4	20	39	39	20	Gray/Yellow	R
							40	40	45	Yellow/Gray	T
					5	21	41	41	21	Blue/Violet	R
							42	42	46	Violet/Blue	T
					6	22	43	43	22	Orange/Violet	R
							44	44	47	Violet/Orange	T
					7	23	45	45	23	Green/Violet	R
							46	46	48	Violet/Green	T
					8	24	47	47	24	Brown/Violet	R
							48	48	49	Violet/Brown	T
						25	49	49	25	Gray/Violet	R
					50		50	50	Violet/Gray	T	

Table 10-87: LPFS8 to MDF Connectors J17 & J21—Slots 4 & 5, Ports 1–8

LPFS8 to MDF SUBSCRIBER Connector #	Cable #	LPFS8 to MDF SWITCH Connector #	Cable #	Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back-plane	Amp Champ		
J17	A5	J21	A6	4	1	1	1	1	1	Blue/White	R
							2	2	26	White/Blue	T
					2	2	3	3	2	Orange/White	R
							4	4	27	White/Orange	T
					3	3	5	5	3	Green/White	R
							6	6	28	White/Green	T
					4	4	7	7	4	Brown/White	R
							8	8	29	White/Brown	T
					5	5	9	9	5	Gray/White	R
							10	10	30	White/Gray	T
					6	6	11	11	6	Blue/Red	R
							12	12	31	Red/Blue	T
					7	7	13	13	7	Orange/Red	R
							14	14	32	Red/Orange	T
					8	8	15	15	8	Green/Red	R
							16	16	33	Red/Green	T
J21	A5	J21	A6	5	1	9	17	17	9	Brown/Red	R
							18	18	34	Red/Brown	T
					2	10	19	19	10	Gray/Red	R
							20	20	35	Red/Gray	T
					3	11	21	21	11	Blue/Black	R
							22	22	36	Black/Blue	T
					4	12	23	23	12	Orange/Black	R
							24	24	37	Black/Orange	T
					5	13	25	25	13	Green/Black	R
							26	26	38	Black/Green	T
					6	14	27	27	14	Brown/Black	R
							28	28	39	Black/Brown	T
					7	15	29	29	15	Gray/Black	R
							30	30	40	Black/Gray	T
					8	16	31	31	16	Blue/Yellow	R
							32	32	41	Yellow/Blue	T

Table 10-88: LPFS8 to MDF Connectors J17 & J21—Slot 6, Ports 1–8

LPFS8 to MDF SUBSCRIBER Connector #	Cable #	LPFS8 to MDF SWITCH Connector #	Cable #	LPFS8 Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back- plane	Amp Champ		
J17	A5	J21	A6	6	1	17	33	33	17	Orange/Yellow	R
							34	34	42	Yellow/Orange	T
					2	18	35	35	18	Green/Yellow	R
							36	36	43	Yellow/Green	T
					3	19	37	37	19	Brown/Yellow	R
							38	38	44	Yellow/Brown	T
					4	20	39	39	20	Gray/Yellow	R
							40	40	45	Yellow/Gray	T
					5	21	41	41	21	Blue/Violet	R
							42	42	46	Violet/Blue	T
					6	22	43	43	22	Orange/Violet	R
							44	44	47	Violet/Orange	T
					7	23	45	45	23	Green/Violet	R
							46	46	48	Violet/Green	T
					8	24	47	47	24	Brown/Violet	R
▼	▼	▼	▼				48	48	49	Violet/Brown	T
						25	49	49	25	Gray/Violet	R
					50		50	50	Violet/Gray	T	

Table 10-89: LPFS8 to MDF Connectors J10 & J14—Slots 7 & 8, Ports 1–8

LPFS8 to MDF SUBSCRIBER Connector #	Cable #	LPFS8 to MDF SWITCH Connector #	Cable #	Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back-plane	Amp Champ		
J10	B3	J14	B4	7	1	1	1	1	1	Blue/White	R
							2	2	26	White/Blue	T
					2	2	3	3	2	Orange/White	R
							4	4	27	White/Orange	T
					3	3	5	5	3	Green/White	R
							6	6	28	White/Green	T
					4	4	7	7	4	Brown/White	R
							8	8	29	White/Brown	T
					5	5	9	9	5	Gray/White	R
							10	10	30	White/Gray	T
					6	6	11	11	6	Blue/Red	R
							12	12	31	Red/Blue	T
					7	7	13	13	7	Orange/Red	R
							14	14	32	Red/Orange	T
					8	8	15	15	8	Green/Red	R
							16	16	33	Red/Green	T
				8	1	9	17	17	9	Brown/Red	R
							18	18	34	Red/Brown	T
					2	10	19	19	10	Gray/Red	R
							20	20	35	Red/Gray	T
					3	11	21	21	11	Blue/Black	R
							22	22	36	Black/Blue	T
					4	12	23	23	12	Orange/Black	R
							24	24	37	Black/Orange	T
					5	13	25	25	13	Green/Black	R
							26	26	38	Black/Green	T
					6	14	27	27	14	Brown/Black	R
							28	28	39	Black/Brown	T
					7	15	29	29	15	Gray/Black	R
							30	30	40	Black/Gray	T
					8	16	31	31	16	Blue/Yellow	R
							32	32	41	Yellow/Blue	T

Table 10-90: LPFS8 to MDF Connectors J10 & J14—Slot 9, Ports 1–8

LPFS8 to MDF SUBSCRIBER Connector #	Cable #	LPFS8 to MDF SWITCH Connector #	Cable #	LPFS8 Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back- plane	Amp Champ		
J10	B3	J14	B4	9	1	17	33	33	17	Orange/Yellow	R
							34	34	42	Yellow/Orange	T
				9	2	18	35	35	18	Green/Yellow	R
							36	36	43	Yellow/Green	T
				9	3	19	37	37	19	Brown/Yellow	R
							38	38	44	Yellow/Brown	T
				9	4	20	39	39	20	Gray/Yellow	R
							40	40	45	Yellow/Gray	T
				9	5	21	41	41	21	Blue/Violet	R
							42	42	46	Violet/Blue	T
				9	6	22	43	43	22	Orange/Violet	R
							44	44	47	Violet/Orange	T
				9	7	23	45	45	23	Green/Violet	R
							46	46	48	Violet/Green	T
				9	8	24	47	47	24	Brown/Violet	R
							48	48	49	Violet/Brown	T
						25	49	49	25	Gray/Violet	R
							50	50	50	Violet/Gray	T

Table 10-91: LPFS8 to MDF Connectors J18 & J22—Slots 10 & 11, Ports 1–8

LPFS8 to MDF SUBSCRIBER Connector #	Cable #	LPFS8 to MDF SWITCH Connector #	Cable #	Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back-plane	Amp Champ		
J18	B5	J22	B6	10	1	1	1	1	1	Blue/White	R
							2	2	26	White/Blue	T
					2	2	3	3	2	Orange/White	R
							4	4	27	White/Orange	T
					3	3	5	5	3	Green/White	R
							6	6	28	White/Green	T
					4	4	7	7	4	Brown/White	R
							8	8	29	White/Brown	T
					5	5	9	9	5	Gray/White	R
							10	10	30	White/Gray	T
					6	6	11	11	6	Blue/Red	R
							12	12	31	Red/Blue	T
					7	7	13	13	7	Orange/Red	R
							14	14	32	Red/Orange	T
					8	8	15	15	8	Green/Red	R
							16	16	33	Red/Green	T
				11	1	9	17	17	9	Brown/Red	R
							18	18	34	Red/Brown	T
					2	10	19	19	10	Gray/Red	R
							20	20	35	Red/Gray	T
					3	11	21	21	11	Blue/Black	R
							22	22	36	Black/Blue	T
					4	12	23	23	12	Orange/Black	R
							24	24	37	Black/Orange	T
					5	13	25	25	13	Green/Black	R
							26	26	38	Black/Green	T
					6	14	27	27	14	Brown/Black	R
							28	28	39	Black/Brown	T
					7	15	29	29	15	Gray/Black	R
							30	30	40	Black/Gray	T
					8	16	31	31	16	Blue/Yellow	R
							32	32	41	Yellow/Blue	T

Table 10-92: LPFS8 to MDF Connectors J18 & J22—Slot 12, Ports 1–8

LPFS8 to MDF SUBSCRIBER Connector #	Cable #	LPFS8 to MDF SWITCH Connector #	Cable #	LPFS8 Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back- plane	Amp Champ		
J18	B5	J22	B6	12	1	17	33	33	17	Orange/Yellow	R
							34	34	42	Yellow/Orange	T
					2	18	35	35	18	Green/Yellow	R
							36	36	43	Yellow/Green	T
					3	19	37	37	19	Brown/Yellow	R
							38	38	44	Yellow/Brown	T
					4	20	39	39	20	Gray/Yellow	R
							40	40	45	Yellow/Gray	T
					5	21	41	41	21	Blue/Violet	R
							42	42	46	Violet/Blue	T
					6	22	43	43	22	Orange/Violet	R
							44	44	47	Violet/Orange	T
					7	23	45	45	23	Green/Violet	R
							46	46	48	Violet/Green	T
					8	24	47	47	24	Brown/Violet	R
							48	48	49	Violet/Brown	T
						25	49	49	25	Gray/Violet	R
					50		50	50	Violet/Gray	T	

Table 10-93: LPFS8 to MDF Connectors J11 & J15—Slots 13 & 14, Ports 1–8

LPFS8 to MDF SUBSCRIBER Connector #	Cable #	LPFS8 to MDF SWITCH Connector #	Cable #	Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back-plane	Amp Champ		
J11	C3	J15	C4	13	1	1	1	1	1	Blue/White	R
							2	2	26	White/Blue	T
					2	2	3	3	2	Orange/White	R
							4	4	27	White/Orange	T
					3	3	5	5	3	Green/White	R
							6	6	28	White/Green	T
					4	4	7	7	4	Brown/White	R
							8	8	29	White/Brown	T
					5	5	9	9	5	Gray/White	R
							10	10	30	White/Gray	T
					6	6	11	11	6	Blue/Red	R
							12	12	31	Red/Blue	T
					7	7	13	13	7	Orange/Red	R
							14	14	32	Red/Orange	T
					8	8	15	15	8	Green/Red	R
							16	16	33	Red/Green	T
J15	C3	J15	C4	14	1	9	17	17	9	Brown/Red	R
							18	18	34	Red/Brown	T
					2	10	19	19	10	Gray/Red	R
							20	20	35	Red/Gray	T
					3	11	21	21	11	Blue/Black	R
							22	22	36	Black/Blue	T
					4	12	23	23	12	Orange/Black	R
							24	24	37	Black/Orange	T
					5	13	25	25	13	Green/Black	R
							26	26	38	Black/Green	T
					6	14	27	27	14	Brown/Black	R
							28	28	39	Black/Brown	T
					7	15	29	29	15	Gray/Black	R
							30	30	40	Black/Gray	T
					8	16	31	31	16	Blue/Yellow	R
							32	32	41	Yellow/Blue	T

Table 10-94: LPFS8 to MDF Connectors J11 & J15—Slot 15, Ports 1–8

LPFS8 to MDF SUBSCRIBER Connector #	Cable #	LPFS8 to MDF SWITCH Connector #	Cable #	LPFS8 Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back- plane	Amp Champ		
J11	C3	J15	C4	15	1	17	33	33	17	Orange/Yellow	R
							34	34	42	Yellow/Orange	T
					2	18	35	35	18	Green/Yellow	R
							36	36	43	Yellow/Green	T
					3	19	37	37	19	Brown/Yellow	R
							38	38	44	Yellow/Brown	T
					4	20	39	39	20	Gray/Yellow	R
							40	40	45	Yellow/Gray	T
					5	21	41	41	21	Blue/Violet	R
							42	42	46	Violet/Blue	T
					6	22	43	43	22	Orange/Violet	R
							44	44	47	Violet/Orange	T
					7	23	45	45	23	Green/Violet	R
							46	46	48	Violet/Green	T
					8	24	47	47	24	Brown/Violet	R
							48	48	49	Violet/Brown	T
						25	49	49	25	Gray/Violet	R
					50		50	50	Violet/Gray	T	

Table 10-95: LPFS8 to MDF Connectors J19 & J23—Slots 16 & 17, Ports 1–8

LPFS8 to MDF SUBSCRIBER Connector #	Cable #	LPFS8 to MDF SWITCH Connector #	Cable #	Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back-plane	Amp Champ		
J19	C5	J23	C6	16	1	1	1	1	1	Blue/White	R
							2	2	26	White/Blue	T
					2	2	3	3	2	Orange/White	R
							4	4	27	White/Orange	T
					3	3	5	5	3	Green/White	R
							6	6	28	White/Green	T
					4	4	7	7	4	Brown/White	R
							8	8	29	White/Brown	T
					5	5	9	9	5	Gray/White	R
							10	10	30	White/Gray	T
					6	6	11	11	6	Blue/Red	R
							12	12	31	Red/Blue	T
					7	7	13	13	7	Orange/Red	R
							14	14	32	Red/Orange	T
					8	8	15	15	8	Green/Red	R
							16	16	33	Red/Green	T
J23	C6	J19	C5	17	1	9	17	17	9	Brown/Red	R
							18	18	34	Red/Brown	T
					2	10	19	19	10	Gray/Red	R
							20	20	35	Red/Gray	T
					3	11	21	21	11	Blue/Black	R
							22	22	36	Black/Blue	T
					4	12	23	23	12	Orange/Black	R
							24	24	37	Black/Orange	T
					5	13	25	25	13	Green/Black	R
							26	26	38	Black/Green	T
					6	14	27	27	14	Brown/Black	R
							28	28	39	Black/Brown	T
					7	15	29	29	15	Gray/Black	R
							30	30	40	Black/Gray	T
					8	16	31	31	16	Blue/Yellow	R
							32	32	41	Yellow/Blue	T

Table 10-96: LPFS8 to MDF Connectors J19 & J23—Slot 18, Ports 1–8

LPFS8 to MDF SUBSCRIBER Connector #	Cable #	LPFS8 to MDF SWITCH Connector #	Cable #	LPFS8 Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back-plane	Amp Champ		
J19	C5	J23	C6	18	1	17	33	33	17	Orange/Yellow	R
							34	34	42	Yellow/Orange	T
					2	18	35	35	18	Green/Yellow	R
							36	36	43	Yellow/Green	T
					3	19	37	37	19	Brown/Yellow	R
							38	38	44	Yellow/Brown	T
					4	20	39	39	20	Gray/Yellow	R
							40	40	45	Yellow/Gray	T
					5	21	41	41	21	Blue/Violet	R
							42	42	46	Violet/Blue	T
					6	22	43	43	22	Orange/Violet	R
							44	44	47	Violet/Orange	T
					7	23	45	45	23	Green/Violet	R
							46	46	48	Violet/Green	T
					8	24	47	47	24	Brown/Violet	R
							48	48	49	Violet/Brown	T
						25	49	49	25	Gray/Violet	R
					50		50	50	Violet/Gray	T	

Table 10-97: LPFS8 to MDF Connectors J12 & J16—Slots 19 & 20, Ports 1–8

LPFS8 to MDF SUBSCRIBER Connector #	Cable #	LPFS8 to MDF SWITCH Connector #	Cable #	Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back-plane	Amp Champ		
J12	D3	J16	D4	19	1	1	1	1	1	Blue/White	R
							2	2	26	White/Blue	T
					2	2	3	3	2	Orange/White	R
							4	4	27	White/Orange	T
					3	3	5	5	3	Green/White	R
							6	6	28	White/Green	T
					4	4	7	7	4	Brown/White	R
							8	8	29	White/Brown	T
					5	5	9	9	5	Gray/White	R
							10	10	30	White/Gray	T
					6	6	11	11	6	Blue/Red	R
							12	12	31	Red/Blue	T
					7	7	13	13	7	Orange/Red	R
							14	14	32	Red/Orange	T
					8	8	15	15	8	Green/Red	R
							16	16	33	Red/Green	T
				20	1	9	17	17	9	Brown/Red	R
							18	18	34	Red/Brown	T
					2	10	19	19	10	Gray/Red	R
							20	20	35	Red/Gray	T
					3	11	21	21	11	Blue/Black	R
							22	22	36	Black/Blue	T
					4	12	23	23	12	Orange/Black	R
							24	24	37	Black/Orange	T
					5	13	25	25	13	Green/Black	R
							26	26	38	Black/Green	T
					6	14	27	27	14	Brown/Black	R
							28	28	39	Black/Brown	T
					7	15	29	29	15	Gray/Black	R
							30	30	40	Black/Gray	T
					8	16	31	31	16	Blue/Yellow	R
							32	32	41	Yellow/Blue	T

Table 10-98: LPFS8 to MDF Connectors J12 & J16—Slot 21, Ports 1–8

LPFS8 to MDF SUBSCRIBER Connector #	Cable #	LPFS8 to MDF SWITCH Connector #	Cable #	LPFS8 Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back- plane	Amp Champ		
J12	D3	J16	D4	21	1	17	33	33	17	Orange/Yellow	R
							34	34	42	Yellow/Orange	T
					2	18	35	35	18	Green/Yellow	R
							36	36	43	Yellow/Green	T
					3	19	37	37	19	Brown/Yellow	R
							38	38	44	Yellow/Brown	T
					4	20	39	39	20	Gray/Yellow	R
							40	40	45	Yellow/Gray	T
					5	21	41	41	21	Blue/Violet	R
							42	42	46	Violet/Blue	T
					6	22	43	43	22	Orange/Violet	R
							44	44	47	Violet/Orange	T
					7	23	45	45	23	Green/Violet	R
							46	46	48	Violet/Green	T
					8	24	47	47	24	Brown/Violet	R
							48	48	49	Violet/Brown	T
						25	49	49	25	Gray/Violet	R
					50		50	50	Violet/Gray	T	

Table 10-99: LPFS8 to MDF Connectors J20 & J24—Slots 22 & 23, Ports 1–8

LPFS8 to MDF SUBSCRIBER Connector #	Cable #	LPFS8 to MDF SWITCH Connector #	Cable #	Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back-plane	Amp Champ		
J20	D5	J24	D6	22	1	1	1	1	1	Blue/White	R
							2	2	26	White/Blue	T
					2	2	3	3	2	Orange/White	R
							4	4	27	White/Orange	T
					3	3	5	5	3	Green/White	R
							6	6	28	White/Green	T
					4	4	7	7	4	Brown/White	R
							8	8	29	White/Brown	T
					5	5	9	9	5	Gray/White	R
							10	10	30	White/Gray	T
					6	6	11	11	6	Blue/Red	R
							12	12	31	Red/Blue	T
					7	7	13	13	7	Orange/Red	R
							14	14	32	Red/Orange	T
					8	8	15	15	8	Green/Red	R
							16	16	33	Red/Green	T
				23	1	9	17	17	9	Brown/Red	R
							18	18	34	Red/Brown	T
					2	10	19	19	10	Gray/Red	R
							20	20	35	Red/Gray	T
					3	11	21	21	11	Blue/Black	R
							22	22	36	Black/Blue	T
					4	12	23	23	12	Orange/Black	R
							24	24	37	Black/Orange	T
					5	13	25	25	13	Green/Black	R
							26	26	38	Black/Green	T
					6	14	27	27	14	Brown/Black	R
							28	28	39	Black/Brown	T
					7	15	29	29	15	Gray/Black	R
							30	30	40	Black/Gray	T
					8	16	31	31	16	Blue/Yellow	R
							32	32	41	Yellow/Blue	T

Table 10-100: LPFS8 to MDF Connectors J20 & J24—Slot 24, Ports 1–8

LPFS8 to MDF SUBSCRIBER Connector #	Cable #	LPFS8 to MDF SWITCH Connector #	Cable #	LPFS8 Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back- plane	Amp Champ		
J20	D5	J24	D6	24	1	17	33	33	17	Orange/Yellow	R
							34	34	42	Yellow/Orange	T
					2	18	35	35	18	Green/Yellow	R
							36	36	43	Yellow/Green	T
					3	19	37	37	19	Brown/Yellow	R
							38	38	44	Yellow/Brown	T
					4	20	39	39	20	Gray/Yellow	R
							40	40	45	Yellow/Gray	T
					5	21	41	41	21	Blue/Violet	R
							42	42	46	Violet/Blue	T
					6	22	43	43	22	Orange/Violet	R
							44	44	47	Violet/Orange	T
					7	23	45	45	23	Green/Violet	R
							46	46	48	Violet/Green	T
					8	24	47	47	24	Brown/Violet	R
▼	▼	▼	▼				48	48	49	Violet/Brown	T
						25	49	49	25	Gray/Violet	R
					50		50	50	Violet/Gray	T	



## Appendix I

### Cable/Pair Assignment Tables: LPFS8 with Sequential Pair Cabling

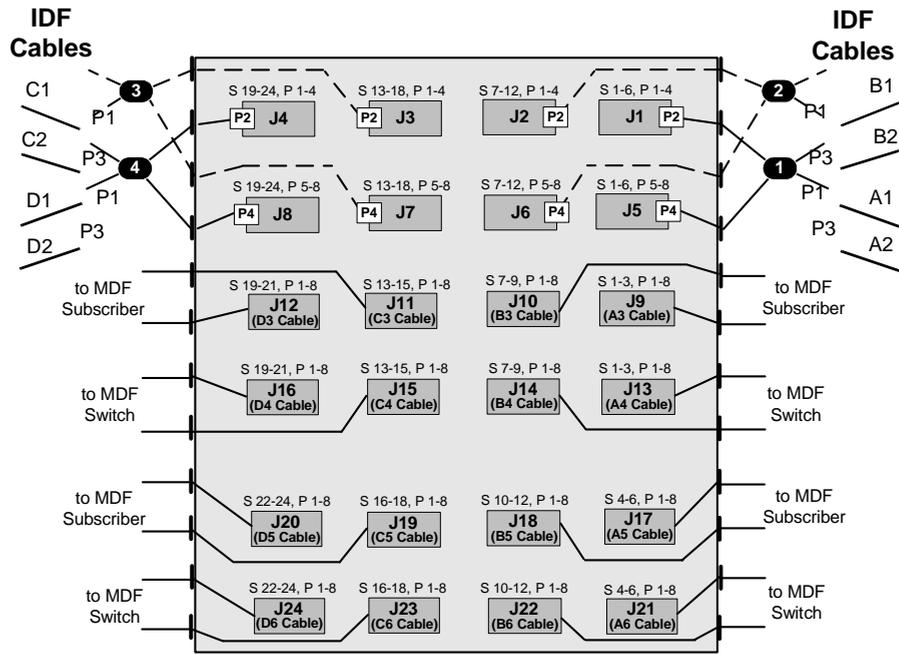
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**Telco Connector Table** The following table shows the connections for four Sequential Pair Cable assemblies at the LPFS8 backplane and the IDF cables (Table 10-101, below) and MDF cables (Table 10-102, page 10-131), and the corresponding card slots and ports, using octal cards. Refer to Section 6—*Telco Cabling*, Chapter 5—“LPFS8 Cabling—Octal Line Cards (Data + Voice): Sequential Pair Cabling.”

Table 10-101: Sequential Pair Cable Assembly Connections

Seq. Pair Cable #	Cable Ribbon Connectors (at LPFS8)	LPFS8 Backplane			Cable Amp Champ Connectors (at IDF)	IDF Cables	
		Connectors	Slots	Ports		Slots	Ports
1	P2	J1	1-6	1-4	P1, P3	1-3 (P1)	1-8
	P4	J5		5-8		4-6 (P3)	1-8
2	P2	J2	7-12	1-4	P1, P3	7-9 (P1)	1-8
	P4	J6		5-8		10-12 (P3)	1-8
3	P2	J3	13-18	1-4	P1, P3	13-15 (P1)	1-8
	P4	J7		5-8		16-18 (P3)	1-8
4	P2	J4	19-24	1-4	P1, P3	19-21 (P1)	1-8
	P4	J8		5-8		22-24 (P3)	1-8

See the diagram on the following page.



**NOTE:** Some cables are drawn with "dashed" lines, for easier viewing.  
 Cable lengths are not drawn to scale.

Figure 10-23: LPFS8 with Sequential Pair Cable Assembly

Table 10-102: LPFS8 to MDF Connections

<b>LPFS8 Backplane Connector</b>	<b>Connects to:</b>	<b>Cable</b>	<b>Card Slots</b>	<b>Card Ports</b>
J9	Subscriber	A3	1-3	1-8
J10		B3	7-9	1-8
J11		C3	13-15	1-8
J12		D3	19-21	1-8
J13	Voice Switch	A4	1-3	1-8
J14		B4	7-9	1-8
J15		C4	13-15	1-8
J16		D4	19-21	1-8
J17	Subscriber	A5	4-6	1-8
J18		B5	10-12	1-8
J19		C5	16-18	1-8
J20		D5	22-24	1-8
J21	Voice Switch	A6	4-6	1-8
J22		B6	10-12	1-8
J23		C6	16-18	1-8
J24		D6	22-24	1-8

**Cable/Pair Assignment Tables: LPFS8 to IDF**

The following tables show the cable/pair assignments for the LPFS8 to IDF cable connections using four Sequential Pair Cable assemblies supporting 24 octal cards. Each pair of tables represents cable/pair assignments for one LPFS8 backplane connector (J1–J8) supporting four ports (1–4 or 5–8) on one six-pack of cards (the first table shows the first three cards, the second table shows the second three cards) as follows:

Table 10-103: Cable/Pair Tables and Page Numbers

Table	Sequential Pair Cable	LPFS8			Page #
		Backplane Connector	Slots	Ports	
Table 10-104	1	J1	1–3	1–4	page 10-133
Table 10-105			4–6		page 10-134
Table 10-106		J5	1–3	5–8	page 10-135
Table 10-107			4–6		page 10-136
Table 10-108	2	J2	7–9	1–4	page 10-137
Table 10-109			10–12		page 10-138
Table 10-110		J6	7–9	5–8	page 10-139
Table 10-111			10–12		page 10-140
Table 10-112	3	J3	13–15	1–4	page 10-141
Table 10-113			16–18		page 10-142
Table 10-114		J7	13–15	5–8	page 10-143
Table 10-115			16–18		page 10-144
Table 10-116	4	J4	19–21	1–4	page 10-145
Table 10-117			22–24		page 10-146
Table 10-118		J8	19–21	5–8	page 10-147
Table 10-119			22–24		page 10-148

For cable/pair assignment tables for the LPFS8 to MDF cable connections using Sequential Pair Cable assemblies, see **Cable/Pair Assignment Tables: LPFS8 to MDF**, page 10-149.

Table 10-104: LPFS8 Connector J1: Slots 1–3, Ports 1–4

LPFS8			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)
Conn.	Slot	Port	Cable #	Conn.			FROM: P2 Conn. At LCS	TO: P1 Conn. At MDF		
J1	1	1	1	P2	1	1	P2 - Pin 1	P1 - Pin 1	Blue/White	R
						2	P2 - Pin 2	P1 - Pin 26	White/Blue	T
		2			2	3	P2 - Pin 3	P1 - Pin 2	Orange/White	R
						4	P2 - Pin 4	P1 - Pin 27	White/Orange	T
	3	3			5	P2 - Pin 5	P1 - Pin 3	Green/White	R	
					6	P2 - Pin 6	P1 - Pin 28	White/Green	T	
	4	4			7	P2 - Pin 7	P1 - Pin 4	Brown/White	R	
					8	P2 - Pin 8	P1 - Pin 29	White/Brown	T	
	2	1			5	9	P2 - Pin 9	P1 - Pin 9	Gray/White	R
						10	P2 - Pin 10	P1 - Pin 34	White/Gray	T
		2			6	11	P2 - Pin 11	P1 - Pin 10	Blue/Red	R
						12	P2 - Pin 12	P1 - Pin 35	Red/Blue	T
	3	7			13	P2 - Pin 13	P1 - Pin 11	Orange/Red	R	
					14	P2 - Pin 14	P1 - Pin 36	Red/Orange	T	
	4	8			15	P2 - Pin 15	P1 - Pin 12	Green/Red	R	
					16	P2 - Pin 16	P1 - Pin 37	Red/Green	T	
	3	1			9	10	P2 - Pin 17	P1 - Pin 17	Brown/Red	R
						11	P2 - Pin 18	P1 - Pin 42	Red/Brown	T
		2			10	12	P2 - Pin 19	P1 - Pin 18	Gray/Red	R
						20	P2 - Pin 20	P1 - Pin 43	Red/Gray	T
		3			11	21	P2 - Pin 21	P1 - Pin 19	Blue/Black	R
						22	P2 - Pin 22	P1 - Pin 44	Black/Blue	T
		4			12	23	P2 - Pin 23	P1 - Pin 20	Orange/Black	R
						24	P2 - Pin 24	P1 - Pin 45	Black/Orange	T

Table 10-105: LPFS8 Connector J1: Slots 4–6, Ports 1–4

LPFS8			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)
Conn.	Slot	Port	Cable #	Conn.			FROM: P2 Conn. At LCS	TO: P3 Conn. At MDF		
J1	4	1	1	P2	13	25	P2 - Pin 25	P3 - Pin 1	Green/Black	R
						26	P2 - Pin 26	P3 - Pin 26	Black/Green	T
		2			14	27	P2 - Pin 27	P3 - Pin 2	Brown/Black	R
						28	P2 - Pin 28	P3 - Pin 27	Black/Brown	T
	3	15			29	P2 - Pin 29	P3 - Pin 3	Gray/Black	R	
					30	P2 - Pin 30	P3 - Pin 28	Black/Gray	T	
	4	16			31	P2 - Pin 31	P3 - Pin 4	Blue/Yellow	R	
					32	P2 - Pin 32	P3 - Pin 29	Yellow/Blue	T	
	5	1			17	33	P2 - Pin 33	P3 - Pin 9	Orange/Yellow	R
						34	P2 - Pin 34	P3 - Pin 34	Yellow/Orange	T
		2			18	35	P2 - Pin 35	P3 - Pin 10	Green/Yellow	R
						36	P2 - Pin 36	P3 - Pin 35	Yellow/Green	T
		3			19	37	P2 - Pin 37	P3 - Pin 11	Brown/Yellow	R
						38	P2 - Pin 38	P3 - Pin 36	Yellow/Brown	T
		4			20	39	P2 - Pin 39	P3 - Pin 12	Gray/Yellow	R
						40	P2 - Pin 40	P3 - Pin 37	Yellow/Gray	T
	6	1			21	41	P2 - Pin 41	P3 - Pin 17	Blue/Violet	R
						42	P2 - Pin 42	P3 - Pin 42	Violet/Blue	T
		2			22	43	P2 - Pin 43	P3 - Pin 18	Orange/Violet	R
						44	P2 - Pin 44	P3 - Pin 43	Violet/Orange	T
		3			23	45	P2 - Pin 45	P3 - Pin 19	Green/Violet	R
						46	P2 - Pin 46	P3 - Pin 44	Violet/Green	T
		4			24	47	P2 - Pin 47	P3 - Pin 20	Brown/Violet	R
						48	P2 - Pin 48	P3 - Pin 45	Violet/Brown	T
		25	49	P2 - Pin 49	P1 - Pin 25	Gray/Violet				
			50	P2 - Pin 50	P1 - Pin 50	Violet/Gray				

Table 10-106: LPFS8 Connector J5: Slots 1–3, Ports 5–8

LPFS8			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)	
Conn.	Slot	Port	Cable #	Conn.			FROM: P4 Conn. At LCS	TO: P1 Conn. At MDF			
J5	1	5	1	P4	1	1	P4 - Pin 1	P1 - Pin 5	Blue/White	R	
		6				2	P4 - Pin 2	P1 - Pin 30	White/Blue	T	
					7	2	3	P4 - Pin 3	P1 - Pin 6	Orange/White	R
		4					P4 - Pin 4	P1 - Pin 31	White/Orange	T	
		8			3	5	P4 - Pin 5	P1 - Pin 7	Green/White	R	
						6	P4 - Pin 6	P1 - Pin 32	White/Green	T	
		2			5	4	7	P4 - Pin 7	P1 - Pin 8	Brown/White	R
							8	P4 - Pin 8	P1 - Pin 33	White/Brown	T
	6				5	9	P4 - Pin 9	P1 - Pin 13	Gray/White	R	
						10	P4 - Pin 10	P1 - Pin 38	White/Gray	T	
	7				6	11	P4 - Pin 11	P1 - Pin 14	Blue/Red	R	
						12	P4 - Pin 12	P1 - Pin 39	Red/Blue	T	
	8				7	13	P4 - Pin 13	P1 - Pin 15	Orange/Red	R	
						14	P4 - Pin 14	P1 - Pin 40	Red/Orange	T	
	3	5			8	15	P4 - Pin 15	P1 - Pin 16	Green/Red	R	
						16	P4 - Pin 16	P1 - Pin 41	Red/Green	T	
		6			9	10	P4 - Pin 17	P1 - Pin 21	Brown/Red	R	
						11	P4 - Pin 18	P1 - Pin 46	Red/Brown	T	
		7			10	12	P4 - Pin 19	P1 - Pin 22	Gray/Red	R	
						20	P4 - Pin 20	P1 - Pin 47	Red/Gray	T	
		8			11	21	P4 - Pin 21	P1 - Pin 23	Blue/Black	R	
						22	P4 - Pin 22	P1 - Pin 48	Black/Blue	T	
	8	12			23	P4 - Pin 23	P1 - Pin 24	Orange/Black	R		
					24	P4 - Pin 24	P1 - Pin 49	Black/Orange	T		

Table 10-107: LPFS8 Connector J5: Slots 4–6, Ports 5–8

LPFS8			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)
Conn.	Slot	Port	Cable #	Conn.			FROM: P4 Conn. At LCS	TO: P3 Conn. At MDF		
J5	4	5	1	P4	13	25	P4 - Pin 25	P3 - Pin 5	Green/Black	R
						26	P4 - Pin 26	P3 - Pin 30	Black/Green	T
		6			14	27	P4 - Pin 27	P3 - Pin 6	Brown/Black	R
						28	P4 - Pin 28	P3 - Pin 31	Black/Brown	T
		7			15	29	P4 - Pin 29	P3 - Pin 7	Gray/Black	R
						30	P4 - Pin 30	P3 - Pin 32	Black/Gray	T
		8			16	31	P4 - Pin 31	P3 - Pin 8	Blue/Yellow	R
						32	P4 - Pin 32	P3 - Pin 33	Yellow/Blue	T
	5	5			17	33	P4 - Pin 33	P3 - Pin 13	Orange/Yellow	R
						34	P4 - Pin 34	P3 - Pin 38	Yellow/Orange	T
		6			18	35	P4 - Pin 35	P3 - Pin 14	Green/Yellow	R
						36	P4 - Pin 36	P3 - Pin 39	Yellow/Green	T
		7			19	37	P4 - Pin 37	P3 - Pin 15	Brown/Yellow	R
						38	P4 - Pin 38	P3 - Pin 40	Yellow/Brown	T
		8			20	39	P4 - Pin 39	P3 - Pin 16	Gray/Yellow	R
						40	P4 - Pin 40	P3 - Pin 41	Yellow/Gray	T
	6	5			21	41	P4 - Pin 41	P3 - Pin 21	Blue/Violet	R
						42	P4 - Pin 42	P3 - Pin 46	Violet/Blue	T
		6			22	43	P4 - Pin 43	P3 - Pin 22	Orange/Violet	R
						44	P4 - Pin 44	P3 - Pin 47	Violet/Orange	T
		7			23	45	P4 - Pin 45	P3 - Pin 23	Green/Violet	R
						46	P4 - Pin 46	P3 - Pin 48	Violet/Green	T
		8			24	47	P4 - Pin 47	P3 - Pin 24	Brown/Violet	R
						48	P4 - Pin 48	P3 - Pin 49	Violet/Brown	T
			25	49	P4 - Pin 49	P3 - Pin 25	Gray/Violet			
				50	P4 - Pin 50	P3 - Pin 50	Violet/Gray			

Table 10-108: LPFS8 Connector J2: Slots 7–9, Ports 1–4

LPFS8			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)
Conn.	Slot	Port	Cable #	Conn.			FROM: P2 Conn. At LCS	TO: P1 Conn. At MDF		
J2	7	1	2	P2	1	1	P2 - Pin 1	P1 - Pin 1	Blue/White	R
						2	P2 - Pin 2	P1 - Pin 26	White/Blue	T
		2			2	3	P2 - Pin 3	P1 - Pin 2	Orange/White	R
						4	P2 - Pin 4	P1 - Pin 27	White/Orange	T
	3	3			5	P2 - Pin 5	P1 - Pin 3	Green/White	R	
					6	P2 - Pin 6	P1 - Pin 28	White/Green	T	
	4	4			7	P2 - Pin 7	P1 - Pin 4	Brown/White	R	
					8	P2 - Pin 8	P1 - Pin 29	White/Brown	T	
	8	1			5	9	P2 - Pin 9	P1 - Pin 9	Gray/White	R
						10	P2 - Pin 10	P1 - Pin 34	White/Gray	T
		2			6	11	P2 - Pin 11	P1 - Pin 10	Blue/Red	R
						12	P2 - Pin 12	P1 - Pin 35	Red/Blue	T
	3	7			13	P2 - Pin 13	P1 - Pin 11	Orange/Red	R	
					14	P2 - Pin 14	P1 - Pin 36	Red/Orange	T	
	4	8			15	P2 - Pin 15	P1 - Pin 12	Green/Red	R	
					16	P2 - Pin 16	P1 - Pin 37	Red/Green	T	
	9	1			9	10	P2 - Pin 17	P1 - Pin 17	Brown/Red	R
						11	P2 - Pin 18	P1 - Pin 42	Red/Brown	T
		2			10	12	P2 - Pin 19	P1 - Pin 18	Gray/Red	R
						20	P2 - Pin 20	P1 - Pin 43	Red/Gray	T
	3	11			21	P2 - Pin 21	P1 - Pin 19	Blue/Black	R	
					22	P2 - Pin 22	P1 - Pin 44	Black/Blue	T	
	4	12			23	P2 - Pin 23	P1 - Pin 20	Orange/Black	R	
					24	P2 - Pin 24	P1 - Pin 45	Black/Orange	T	

Table 10-109: LPFS8 Connector J2: Slots 10–12, Ports 1–4

LPFS8			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)
Conn.	Slot	Port	Cable #	Conn.			FROM: P2 Conn. At LCS	TO: P3 Conn. At MDF		
J2	10	1	2	P2	13	25	P2 - Pin 25	P3 - Pin 1	Green/Black	R
						26	P2 - Pin 26	P3 - Pin 26	Black/Green	T
		2			14	27	P2 - Pin 27	P3 - Pin 2	Brown/Black	R
						28	P2 - Pin 28	P3 - Pin 27	Black/Brown	T
	3	15			29	P2 - Pin 29	P3 - Pin 3	Gray/Black	R	
					30	P2 - Pin 30	P3 - Pin 28	Black/Gray	T	
	4	16			31	P2 - Pin 31	P3 - Pin 4	Blue/Yellow	R	
					32	P2 - Pin 32	P3 - Pin 29	Yellow/Blue	T	
	11	1			17	33	P2 - Pin 33	P3 - Pin 9	Orange/Yellow	R
						34	P2 - Pin 34	P3 - Pin 34	Yellow/Orange	T
		2			18	35	P2 - Pin 35	P3 - Pin 10	Green/Yellow	R
						36	P2 - Pin 36	P3 - Pin 35	Yellow/Green	T
	3	19			37	P2 - Pin 37	P3 - Pin 11	Brown/Yellow	R	
					38	P2 - Pin 38	P3 - Pin 36	Yellow/Brown	T	
	4	20			39	P2 - Pin 39	P3 - Pin 12	Gray/Yellow	R	
					40	P2 - Pin 40	P3 - Pin 37	Yellow/Gray	T	
	12	1			21	41	P2 - Pin 41	P3 - Pin 17	Blue/Violet	R
						42	P2 - Pin 42	P3 - Pin 42	Violet/Blue	T
		2			22	43	P2 - Pin 43	P3 - Pin 18	Orange/Violet	R
						44	P2 - Pin 44	P3 - Pin 43	Violet/Orange	T
	3	23			45	P2 - Pin 45	P3 - Pin 19	Green/Violet	R	
					46	P2 - Pin 46	P3 - Pin 44	Violet/Green	T	
	4	24			47	P2 - Pin 47	P3 - Pin 20	Brown/Violet	R	
					48	P2 - Pin 48	P3 - Pin 45	Violet/Brown	T	
			25	49	P2 - Pin 49	P1 - Pin 25	Gray/Violet			
				50	P2 - Pin 50	P1 - Pin 50	Violet/Gray			

Table 10-110: LPFS8 Connector J6: Slots 7–9, Ports 5–8

LPFS8			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)
Conn.	Slot	Port	Cable #	Conn.			FROM: P4 Conn. At LCS	TO: P1 Conn. At MDF		
J6	7	5	2	P4	1	1	P4 - Pin 1	P1 - Pin 5	Blue/White	R
		6				2	P4 - Pin 2	P1 - Pin 30	White/Blue	T
					7	2	3	P4 - Pin 3	P1 - Pin 6	Orange/White
		4					P4 - Pin 4	P1 - Pin 31	White/Orange	T
	8	3			5	P4 - Pin 5	P1 - Pin 7	Green/White	R	
					6	P4 - Pin 6	P1 - Pin 32	White/Green	T	
	8	5			4	7	P4 - Pin 7	P1 - Pin 8	Brown/White	R
						8	P4 - Pin 8	P1 - Pin 33	White/Brown	T
		6			5	9	P4 - Pin 9	P1 - Pin 13	Gray/White	R
						10	P4 - Pin 10	P1 - Pin 38	White/Gray	T
		7			6	11	P4 - Pin 11	P1 - Pin 14	Blue/Red	R
						12	P4 - Pin 12	P1 - Pin 39	Red/Blue	T
		8			7	13	P4 - Pin 13	P1 - Pin 15	Orange/Red	R
						14	P4 - Pin 14	P1 - Pin 40	Red/Orange	T
	9	5			8	15	P4 - Pin 15	P1 - Pin 16	Green/Red	R
						16	P4 - Pin 16	P1 - Pin 41	Red/Green	T
		6			9	10	P4 - Pin 17	P1 - Pin 21	Brown/Red	R
						11	P4 - Pin 18	P1 - Pin 46	Red/Brown	T
		7			10	12	P4 - Pin 19	P1 - Pin 22	Gray/Red	R
						20	P4 - Pin 20	P1 - Pin 47	Red/Gray	T
		8			11	21	P4 - Pin 21	P1 - Pin 23	Blue/Black	R
						22	P4 - Pin 22	P1 - Pin 48	Black/Blue	T
	8	12			23	P4 - Pin 23	P1 - Pin 24	Orange/Black	R	
					24	P4 - Pin 24	P1 - Pin 49	Black/Orange	T	

Table 10-111: LPFS8 Connector J6: Slots 10–12, Ports 5–8

LPFS8			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)
Conn.	Slot	Port	Cable #	Conn.			FROM: P4 Conn. At LCS	TO: P3 Conn. At MDF		
J6	10	5	2	P4	13	25	P4 - Pin 25	P3 - Pin 5	Green/Black	R
		6				26	P4 - Pin 26	P3 - Pin 30	Black/Green	T
		7			14	27	P4 - Pin 27	P3 - Pin 6	Brown/Black	R
						28	P4 - Pin 28	P3 - Pin 31	Black/Brown	T
		8			15	29	P4 - Pin 29	P3 - Pin 7	Gray/Black	R
						30	P4 - Pin 30	P3 - Pin 32	Black/Gray	T
		11			16	31	P4 - Pin 31	P3 - Pin 8	Blue/Yellow	R
						32	P4 - Pin 32	P3 - Pin 33	Yellow/Blue	T
	5				17	33	P4 - Pin 33	P3 - Pin 13	Orange/Yellow	R
						34	P4 - Pin 34	P3 - Pin 38	Yellow/Orange	T
	6				18	35	P4 - Pin 35	P3 - Pin 14	Green/Yellow	R
						36	P4 - Pin 36	P3 - Pin 39	Yellow/Green	T
	7				19	37	P4 - Pin 37	P3 - Pin 15	Brown/Yellow	R
						38	P4 - Pin 38	P3 - Pin 40	Yellow/Brown	T
	8	20			39	P4 - Pin 39	P3 - Pin 16	Gray/Yellow	R	
					40	P4 - Pin 40	P3 - Pin 41	Yellow/Gray	T	
	12	5			21	41	P4 - Pin 41	P3 - Pin 21	Blue/Violet	R
						42	P4 - Pin 42	P3 - Pin 46	Violet/Blue	T
		6			22	43	P4 - Pin 43	P3 - Pin 22	Orange/Violet	R
						44	P4 - Pin 44	P3 - Pin 47	Violet/Orange	T
		7			23	45	P4 - Pin 45	P3 - Pin 23	Green/Violet	R
						46	P4 - Pin 46	P3 - Pin 48	Violet/Green	T
		8			24	47	P4 - Pin 47	P3 - Pin 24	Brown/Violet	R
						48	P4 - Pin 48	P3 - Pin 49	Violet/Brown	T
					25	49	P4 - Pin 49	P3 - Pin 25	Gray/Violet	
						50	P4 - Pin 50	P3 - Pin 50	Violet/Gray	

Table 10-112: LPFS8 Connector J3: Slots 13–15, Ports 1–4

LPFS8			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)		
Conn.	Slot	Port	Cable #	Conn.			FROM: P2 Conn. At LCS	TO: P1 Conn. At MDF				
J3	13	1	3	P2	1	1	P2 - Pin 1	P1 - Pin 1	Blue/White	R		
		2				2	P2 - Pin 2	P1 - Pin 26	White/Blue	T		
					3	2	3	P2 - Pin 3	P1 - Pin 2	Orange/White	R	
		4					P2 - Pin 4	P1 - Pin 27	White/Orange	T		
	14	1			3	4	3	5	P2 - Pin 5	P1 - Pin 3	Green/White	R
								6	P2 - Pin 6	P1 - Pin 28	White/Green	T
		2			4	5	4	7	P2 - Pin 7	P1 - Pin 4	Brown/White	R
								8	P2 - Pin 8	P1 - Pin 29	White/Brown	T
		3			5	6	8	9	P2 - Pin 9	P1 - Pin 9	Gray/White	R
								10	P2 - Pin 10	P1 - Pin 34	White/Gray	T
		4			6	7	8	11	P2 - Pin 11	P1 - Pin 10	Blue/Red	R
								12	P2 - Pin 12	P1 - Pin 35	Red/Blue	T
	15	1			7	8	9	13	P2 - Pin 13	P1 - Pin 11	Orange/Red	R
								14	P2 - Pin 14	P1 - Pin 36	Red/Orange	T
		2			8	9	10	15	P2 - Pin 15	P1 - Pin 12	Green/Red	R
								16	P2 - Pin 16	P1 - Pin 37	Red/Green	T
		3			9	10	11	10	P2 - Pin 17	P1 - Pin 17	Brown/Red	R
								11	P2 - Pin 18	P1 - Pin 42	Red/Brown	T
		4			10	11	12	12	P2 - Pin 19	P1 - Pin 18	Gray/Red	R
								20	P2 - Pin 20	P1 - Pin 43	Red/Gray	T
	11	11			12	13	12	21	P2 - Pin 21	P1 - Pin 19	Blue/Black	R
								22	P2 - Pin 22	P1 - Pin 44	Black/Blue	T
	12	12			13	14	13	23	P2 - Pin 23	P1 - Pin 20	Orange/Black	R
								24	P2 - Pin 24	P1 - Pin 45	Black/Orange	T

Table 10-113: LPFS8 Connector J3: Slots 16–18, Ports 1–4

LPFS8			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)
Conn.	Slot	Port	Cable #	Conn.			FROM: P2 Conn. At LCS	TO: P3 Conn. At MDF		
J3	16	1	3	P2	13	25	P2 - Pin 25	P3 - Pin 1	Green/Black	R
						26	P2 - Pin 26	P3 - Pin 26	Black/Green	T
		2			14	27	P2 - Pin 27	P3 - Pin 2	Brown/Black	R
						28	P2 - Pin 28	P3 - Pin 27	Black/Brown	T
	3	15			29	P2 - Pin 29	P3 - Pin 3	Gray/Black	R	
					30	P2 - Pin 30	P3 - Pin 28	Black/Gray	T	
	4	16			31	P2 - Pin 31	P3 - Pin 4	Blue/Yellow	R	
					32	P2 - Pin 32	P3 - Pin 29	Yellow/Blue	T	
	17	1			17	33	P2 - Pin 33	P3 - Pin 9	Orange/Yellow	R
						34	P2 - Pin 34	P3 - Pin 34	Yellow/Orange	T
		2			18	35	P2 - Pin 35	P3 - Pin 10	Green/Yellow	R
						36	P2 - Pin 36	P3 - Pin 35	Yellow/Green	T
	3	19			37	P2 - Pin 37	P3 - Pin 11	Brown/Yellow	R	
					38	P2 - Pin 38	P3 - Pin 36	Yellow/Brown	T	
	4	20			39	P2 - Pin 39	P3 - Pin 12	Gray/Yellow	R	
					40	P2 - Pin 40	P3 - Pin 37	Yellow/Gray	T	
	18	1			21	41	P2 - Pin 41	P3 - Pin 17	Blue/Violet	R
						42	P2 - Pin 42	P3 - Pin 42	Violet/Blue	T
		2			22	43	P2 - Pin 43	P3 - Pin 18	Orange/Violet	R
						44	P2 - Pin 44	P3 - Pin 43	Violet/Orange	T
3		23	45	P2 - Pin 45	P3 - Pin 19	Green/Violet	R			
			46	P2 - Pin 46	P3 - Pin 44	Violet/Green	T			
4		24	47	P2 - Pin 47	P3 - Pin 20	Brown/Violet	R			
			48	P2 - Pin 48	P3 - Pin 45	Violet/Brown	T			
			25	49	P2 - Pin 49	P1 - Pin 25	Gray/Violet			
				50	P2 - Pin 50	P1 - Pin 50	Violet/Gray			

Table 10-114: LPFS8 Connector J7: Slots 13–15, Ports 5–8

LPFS8			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)
Conn.	Slot	Port	Cable #	Conn.			FROM: P4 Conn. At LCS	TO: P1 Conn. At MDF		
J7	13	5	3	P4	1	1	P4 - Pin 1	P1 - Pin 5	Blue/White	R
						2	P4 - Pin 2	P1 - Pin 30	White/Blue	T
		6			2	3	P4 - Pin 3	P1 - Pin 6	Orange/White	R
						4	P4 - Pin 4	P1 - Pin 31	White/Orange	T
	7	3			5	P4 - Pin 5	P1 - Pin 7	Green/White	R	
					6	P4 - Pin 6	P1 - Pin 32	White/Green	T	
	8	4			7	P4 - Pin 7	P1 - Pin 8	Brown/White	R	
					8	P4 - Pin 8	P1 - Pin 33	White/Brown	T	
	14	5			5	9	P4 - Pin 9	P1 - Pin 13	Gray/White	R
						10	P4 - Pin 10	P1 - Pin 38	White/Gray	T
		6			6	11	P4 - Pin 11	P1 - Pin 14	Blue/Red	R
						12	P4 - Pin 12	P1 - Pin 39	Red/Blue	T
	7	7			13	P4 - Pin 13	P1 - Pin 15	Orange/Red	R	
					14	P4 - Pin 14	P1 - Pin 40	Red/Orange	T	
	8	8			15	P4 - Pin 15	P1 - Pin 16	Green/Red	R	
					16	P4 - Pin 16	P1 - Pin 41	Red/Green	T	
	15	5			9	10	P4 - Pin 17	P1 - Pin 21	Brown/Red	R
						11	P4 - Pin 18	P1 - Pin 46	Red/Brown	T
		6			10	12	P4 - Pin 19	P1 - Pin 22	Gray/Red	R
						20	P4 - Pin 20	P1 - Pin 47	Red/Gray	T
	7	11			21	P4 - Pin 21	P1 - Pin 23	Blue/Black	R	
					22	P4 - Pin 22	P1 - Pin 48	Black/Blue	T	
	8	12			23	P4 - Pin 23	P1 - Pin 24	Orange/Black	R	
					24	P4 - Pin 24	P1 - Pin 49	Black/Orange	T	

Table 10-115: LPFS8 Connector J7: Slots 16–18, Ports 5–8

LPFS8			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)	
Conn.	Slot	Port	Cable #	Conn.			FROM: P4 Conn. At LCS	TO: P3 Conn. At MDF			
J7	16	5	3	P4	13	25	P4 - Pin 25	P3 - Pin 5	Green/Black	R	
		6				26	P4 - Pin 26	P3 - Pin 30	Black/Green	T	
		7			14	27	P4 - Pin 27	P3 - Pin 6	Brown/Black	R	
						28	P4 - Pin 28	P3 - Pin 31	Black/Brown	T	
		8			15	29	P4 - Pin 29	P3 - Pin 7	Gray/Black	R	
						30	P4 - Pin 30	P3 - Pin 32	Black/Gray	T	
		17			5	16	31	P4 - Pin 31	P3 - Pin 8	Blue/Yellow	R
							32	P4 - Pin 32	P3 - Pin 33	Yellow/Blue	T
	6				17	33	P4 - Pin 33	P3 - Pin 13	Orange/Yellow	R	
						34	P4 - Pin 34	P3 - Pin 38	Yellow/Orange	T	
	7				18	35	P4 - Pin 35	P3 - Pin 14	Green/Yellow	R	
						36	P4 - Pin 36	P3 - Pin 39	Yellow/Green	T	
	8				19	37	P4 - Pin 37	P3 - Pin 15	Brown/Yellow	R	
						38	P4 - Pin 38	P3 - Pin 40	Yellow/Brown	T	
	18	5			20	39	P4 - Pin 39	P3 - Pin 16	Gray/Yellow	R	
						40	P4 - Pin 40	P3 - Pin 41	Yellow/Gray	T	
		6			21	41	P4 - Pin 41	P3 - Pin 21	Blue/Violet	R	
						42	P4 - Pin 42	P3 - Pin 46	Violet/Blue	T	
		7			22	43	P4 - Pin 43	P3 - Pin 22	Orange/Violet	R	
						44	P4 - Pin 44	P3 - Pin 47	Violet/Orange	T	
		8			23	45	P4 - Pin 45	P3 - Pin 23	Green/Violet	R	
						46	P4 - Pin 46	P3 - Pin 48	Violet/Green	T	
	8	24			47	P4 - Pin 47	P3 - Pin 24	Brown/Violet	R		
					48	P4 - Pin 48	P3 - Pin 49	Violet/Brown	T		
					25	49	P4 - Pin 49	P3 - Pin 25	Gray/Violet		
						50	P4 - Pin 50	P3 - Pin 50	Violet/Gray		

Table 10-116: LPFS8 Connector J4: Slots 19–21, Ports 1–4

LPFS8			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)
Conn.	Slot	Port	Cable #	Conn.			FROM: P2 Conn. At LCS	TO: P1 Conn. At MDF		
J4	19	1	4	P2	1	1	P2 - Pin 1	P1 - Pin 1	Blue/White	R
						2	P2 - Pin 2	P1 - Pin 26	White/Blue	T
		2			2	3	P2 - Pin 3	P1 - Pin 2	Orange/White	R
						4	P2 - Pin 4	P1 - Pin 27	White/Orange	T
	3	3			5	P2 - Pin 5	P1 - Pin 3	Green/White	R	
					6	P2 - Pin 6	P1 - Pin 28	White/Green	T	
	4	4			7	P2 - Pin 7	P1 - Pin 4	Brown/White	R	
					8	P2 - Pin 8	P1 - Pin 29	White/Brown	T	
	20	1			5	9	P2 - Pin 9	P1 - Pin 9	Gray/White	R
						10	P2 - Pin 10	P1 - Pin 34	White/Gray	T
		2			6	11	P2 - Pin 11	P1 - Pin 10	Blue/Red	R
						12	P2 - Pin 12	P1 - Pin 35	Red/Blue	T
		3			7	13	P2 - Pin 13	P1 - Pin 11	Orange/Red	R
						14	P2 - Pin 14	P1 - Pin 36	Red/Orange	T
		4			8	15	P2 - Pin 15	P1 - Pin 12	Green/Red	R
						16	P2 - Pin 16	P1 - Pin 37	Red/Green	T
	21	1			9	10	P2 - Pin 17	P1 - Pin 17	Brown/Red	R
						11	P2 - Pin 18	P1 - Pin 42	Red/Brown	T
		2			10	12	P2 - Pin 19	P1 - Pin 18	Gray/Red	R
						20	P2 - Pin 20	P1 - Pin 43	Red/Gray	T
		3			11	21	P2 - Pin 21	P1 - Pin 19	Blue/Black	R
						22	P2 - Pin 22	P1 - Pin 44	Black/Blue	T
		4			12	23	P2 - Pin 23	P1 - Pin 20	Orange/Black	R
						24	P2 - Pin 24	P1 - Pin 45	Black/Orange	T

Table 10-117: LPFS8 Connector J4: Slots 22–24, Ports 1–4

LPFS8			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)
Conn.	Slot	Port	Cable #	Conn.			FROM: P2 Conn. At LCS	TO: P3 Conn. At MDF		
J4	22	1	4	P2	13	25	P2 - Pin 25	P3 - Pin 1	Green/Black	R
						26	P2 - Pin 26	P3 - Pin 26	Black/Green	T
		2			14	27	P2 - Pin 27	P3 - Pin 2	Brown/Black	R
						28	P2 - Pin 28	P3 - Pin 27	Black/Brown	T
	3	15			29	P2 - Pin 29	P3 - Pin 3	Gray/Black	R	
					30	P2 - Pin 30	P3 - Pin 28	Black/Gray	T	
	4	16			31	P2 - Pin 31	P3 - Pin 4	Blue/Yellow	R	
					32	P2 - Pin 32	P3 - Pin 29	Yellow/Blue	T	
	23	1			17	33	P2 - Pin 33	P3 - Pin 9	Orange/Yellow	R
						34	P2 - Pin 34	P3 - Pin 34	Yellow/Orange	T
		2			18	35	P2 - Pin 35	P3 - Pin 10	Green/Yellow	R
						36	P2 - Pin 36	P3 - Pin 35	Yellow/Green	T
	3	19			37	P2 - Pin 37	P3 - Pin 11	Brown/Yellow	R	
					38	P2 - Pin 38	P3 - Pin 36	Yellow/Brown	T	
	4	20			39	P2 - Pin 39	P3 - Pin 12	Gray/Yellow	R	
					40	P2 - Pin 40	P3 - Pin 37	Yellow/Gray	T	
	24	1			21	41	P2 - Pin 41	P3 - Pin 17	Blue/Violet	R
						42	P2 - Pin 42	P3 - Pin 42	Violet/Blue	T
		2			22	43	P2 - Pin 43	P3 - Pin 18	Orange/Violet	R
						44	P2 - Pin 44	P3 - Pin 43	Violet/Orange	T
3	23	45	P2 - Pin 45	P3 - Pin 19	Green/Violet	R				
		46	P2 - Pin 46	P3 - Pin 44	Violet/Green	T				
4	24	47	P2 - Pin 47	P3 - Pin 20	Brown/Violet	R				
		48	P2 - Pin 48	P3 - Pin 45	Violet/Brown	T				
					25	49	P2 - Pin 49	P1 - Pin 25	Gray/Violet	
						50	P2 - Pin 50	P1 - Pin 50	Violet/Gray	

Table 10-118: LPFS8 Connector J8: Slots 19–21, Ports 5–8

LPFS8			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)
Conn.	Slot	Port	Cable #	Conn.			FROM: P4 Conn. At LCS	TO: P1 Conn. At MDF		
J8	19	5	4	P4	1	1	P4 - Pin 1	P1 - Pin 5	Blue/White	R
						2	P4 - Pin 2	P1 - Pin 30	White/Blue	T
		6			2	3	P4 - Pin 3	P1 - Pin 6	Orange/White	R
						4	P4 - Pin 4	P1 - Pin 31	White/Orange	T
		7			3	5	P4 - Pin 5	P1 - Pin 7	Green/White	R
						6	P4 - Pin 6	P1 - Pin 32	White/Green	T
		8			4	7	P4 - Pin 7	P1 - Pin 8	Brown/White	R
						8	P4 - Pin 8	P1 - Pin 33	White/Brown	T
	20	5			5	9	P4 - Pin 9	P1 - Pin 13	Gray/White	R
						10	P4 - Pin 10	P1 - Pin 38	White/Gray	T
		6			6	11	P4 - Pin 11	P1 - Pin 14	Blue/Red	R
						12	P4 - Pin 12	P1 - Pin 39	Red/Blue	T
		7			7	13	P4 - Pin 13	P1 - Pin 15	Orange/Red	R
						14	P4 - Pin 14	P1 - Pin 40	Red/Orange	T
		8			8	15	P4 - Pin 15	P1 - Pin 16	Green/Red	R
						16	P4 - Pin 16	P1 - Pin 41	Red/Green	T
	21	5			9	10	P4 - Pin 17	P1 - Pin 21	Brown/Red	R
						11	P4 - Pin 18	P1 - Pin 46	Red/Brown	T
		6			10	12	P4 - Pin 19	P1 - Pin 22	Gray/Red	R
						20	P4 - Pin 20	P1 - Pin 47	Red/Gray	T
		7			11	21	P4 - Pin 21	P1 - Pin 23	Blue/Black	R
						22	P4 - Pin 22	P1 - Pin 48	Black/Blue	T
		8			12	23	P4 - Pin 23	P1 - Pin 24	Orange/Black	R
						24	P4 - Pin 24	P1 - Pin 49	Black/Orange	T

Table 10-119: LPFS8 Connector J8: Slots 22–24, Ports 5–8

LPFS8			Seq. Pair Cable Assembly		Pair #	Wire #	Pin Connectors		Cable Color Code	Tip (T) or Ring (R)			
Conn.	Slot	Port	Cable #	Conn.			FROM: P4 Conn. At LCS	TO: P3 Conn. At MDF					
J8	22	5	4	P4	13	25	P4 - Pin 25	P3 - Pin 5	Green/Black	R			
						26	P4 - Pin 26	P3 - Pin 30	Black/Green	T			
		6			14	27	P4 - Pin 27	P3 - Pin 6	Brown/Black	R			
						28	P4 - Pin 28	P3 - Pin 31	Black/Brown	T			
		7			15	29	P4 - Pin 29	P3 - Pin 7	Gray/Black	R			
						30	P4 - Pin 30	P3 - Pin 32	Black/Gray	T			
		8			16	31	P4 - Pin 31	P3 - Pin 8	Blue/Yellow	R			
						32	P4 - Pin 32	P3 - Pin 33	Yellow/Blue	T			
	23	5			17	33	P4 - Pin 33	P3 - Pin 13	Orange/Yellow	R			
						34	P4 - Pin 34	P3 - Pin 38	Yellow/Orange	T			
		6			18	35	P4 - Pin 35	P3 - Pin 14	Green/Yellow	R			
						36	P4 - Pin 36	P3 - Pin 39	Yellow/Green	T			
		7			19	37	P4 - Pin 37	P3 - Pin 15	Brown/Yellow	R			
						38	P4 - Pin 38	P3 - Pin 40	Yellow/Brown	T			
		8			20	39	P4 - Pin 39	P3 - Pin 16	Gray/Yellow	R			
						40	P4 - Pin 40	P3 - Pin 41	Yellow/Gray	T			
	24	5			21	41	P4 - Pin 41	P3 - Pin 21	Blue/Violet	R			
						42	P4 - Pin 42	P3 - Pin 46	Violet/Blue	T			
		6			22	43	P4 - Pin 43	P3 - Pin 22	Orange/Violet	R			
						44	P4 - Pin 44	P3 - Pin 47	Violet/Orange	T			
		7			23	45	P4 - Pin 45	P3 - Pin 23	Green/Violet	R			
						46	P4 - Pin 46	P3 - Pin 48	Violet/Green	T			
		8			24	47	P4 - Pin 47	P3 - Pin 24	Brown/Violet	R			
						48	P4 - Pin 48	P3 - Pin 49	Violet/Brown	T			
								25	49	P4 - Pin 49	P3 - Pin 25	Gray/Violet	
									50	P4 - Pin 50	P3 - Pin 50	Violet/Gray	

**Cable/Pair  
Assignment  
Tables: LPFS8 to  
MDF**

The following tables show the cable/pair assignments for the LPFS8 to MDF cable connections (subscriber and switch), for data plus voice service, using octal cards. Each pair of tables represents cable/pair assignments for one LPFS8 backplane connector to the subscriber and one to the voice switch, supporting eight ports on three cards, as follows:

Table 10-120: Cable/Pair Tables and Page Numbers

Table	LPFS8 Connectors to MDF:		Slots	Ports	Page #
	Subscriber	Switch			
Table 10-121	J9	J13	1 & 2	1-8	page 10-150
Table 10-122			3	1-8	page 10-151
Table 10-123	J17	J21	4 & 5	1-8	page 10-152
Table 10-124			6	1-8	page 10-153
Table 10-125	J10	J14	7 & 8	1-8	page 10-154
Table 10-126			9	1-8	page 10-155
Table 10-127	J18	J22	10 & 11	1-8	page 10-156
Table 10-128			12	1-8	page 10-157
Table 10-129	J11	J15	13 & 14	1-8	page 10-158
Table 10-130			15	1-8	page 10-159
Table 10-131	J19	J23	16 & 17	1-8	page 10-160
Table 10-132			18	1-8	page 10-161
Table 10-133	J12	J16	19 & 20	1-8	page 10-162
Table 10-134			21	1-8	page 10-163
Table 10-135	J20	J24	22 & 23	1-8	page 10-164
Table 10-136			24	1-8	page 10-165

For cable/pair assignment tables for the LPFS8 to LCS connections, see **Cable/Pair Assignment Tables: LPFS8 to IDF**, page 10-132.

Table 10-121: LPFS8 to MDF Connectors J9/J13—Slots 1 & 2, Ports 1–8

LPFS8 to MDF SUBSCRIBER Connector #	Cable #	LPFS8 to MDF SWITCH Connector #	Cable #	Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back-plane	Amp Champ		
J9	A3	J13	A4	1	1	1	1	1	1	Blue/White	R
							2	2	26	White/Blue	T
					2	2	3	3	2	Orange/White	R
							4	4	27	White/Orange	T
					3	3	5	5	3	Green/White	R
							6	6	28	White/Green	T
					4	4	7	7	4	Brown/White	R
							8	8	29	White/Brown	T
					5	5	9	9	5	Gray/White	R
							10	10	30	White/Gray	T
					6	6	11	11	6	Blue/Red	R
							12	12	31	Red/Blue	T
					7	7	13	13	7	Orange/Red	R
							14	14	32	Red/Orange	T
					8	8	15	15	8	Green/Red	R
							16	16	33	Red/Green	T
J13	A3	J13	A4	2	1	9	17	17	9	Brown/Red	R
							18	18	34	Red/Brown	T
					2	10	19	19	10	Gray/Red	R
							20	20	35	Red/Gray	T
					3	11	21	21	11	Blue/Black	R
							22	22	36	Black/Blue	T
					4	12	23	23	12	Orange/Black	R
							24	24	37	Black/Orange	T
					5	13	25	25	13	Green/Black	R
							26	26	38	Black/Green	T
					6	14	27	27	14	Brown/Black	R
							28	28	39	Black/Brown	T
					7	15	29	29	15	Gray/Black	R
							30	30	40	Black/Gray	T
					8	16	31	31	16	Blue/Yellow	R
							32	32	41	Yellow/Blue	T

Table 10-122: LPFS8 to MDF Connectors J9/J13–Slot 3, Ports 1–8

LPFS8 to MDF SUBSCRIBER Connector #	Cable #	LPFS8 to MDF SWITCH Connector #	Cable #	LPFS8 Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back-plane	Amp Champ		
J9	A3	J13	A4	3	1	17	33	33	17	Orange/Yellow	R
							34	34	42	Yellow/Orange	T
					2	18	35	35	18	Green/Yellow	R
							36	36	43	Yellow/Green	T
					3	19	37	37	19	Brown/Yellow	R
							38	38	44	Yellow/Brown	T
					4	20	39	39	20	Gray/Yellow	R
							40	40	45	Yellow/Gray	T
					5	21	41	41	21	Blue/Violet	R
							42	42	46	Violet/Blue	T
					6	22	43	43	22	Orange/Violet	R
							44	44	47	Violet/Orange	T
					7	23	45	45	23	Green/Violet	R
							46	46	48	Violet/Green	T
					8	24	47	47	24	Brown/Violet	R
							48	48	49	Violet/Brown	T
						25	49	49	25	Gray/Violet	R
					50		50	50	Violet/Gray	T	

Table 10-123: LPFS8 to MDF Connectors J17/J21–Slots 4 & 5, Ports 1–8

LPFS8 to MDF SUBSCRIBER Connector #	Cable #	LPFS8 to MDF SWITCH Connector #	Cable #	Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back-plane	Amp Champ		
J17	A5	J21	A6	4	1	1	1	1	1	Blue/White	R
							2	2	26	White/Blue	T
					2	2	3	3	2	Orange/White	R
							4	4	27	White/Orange	T
					3	3	5	5	3	Green/White	R
							6	6	28	White/Green	T
					4	4	7	7	4	Brown/White	R
							8	8	29	White/Brown	T
					5	5	9	9	5	Gray/White	R
							10	10	30	White/Gray	T
					6	6	11	11	6	Blue/Red	R
							12	12	31	Red/Blue	T
					7	7	13	13	7	Orange/Red	R
							14	14	32	Red/Orange	T
					8	8	15	15	8	Green/Red	R
							16	16	33	Red/Green	T
				5	1	9	17	17	9	Brown/Red	R
							18	18	34	Red/Brown	T
					2	10	19	19	10	Gray/Red	R
							20	20	35	Red/Gray	T
					3	11	21	21	11	Blue/Black	R
							22	22	36	Black/Blue	T
					4	12	23	23	12	Orange/Black	R
							24	24	37	Black/Orange	T
					5	13	25	25	13	Green/Black	R
							26	26	38	Black/Green	T
					6	14	27	27	14	Brown/Black	R
							28	28	39	Black/Brown	T
					7	15	29	29	15	Gray/Black	R
							30	30	40	Black/Gray	T
					8	16	31	31	16	Blue/Yellow	R
							32	32	41	Yellow/Blue	T

Table 10-124: LPFS8 to MDF Connectors J17/J21–Slot 6, Ports 1–8

LPFS8 to MDF SUBSCRI- BER Conn- ector #	Cable #	LPFS8 to MDF SWITCH Conn- ector #	Cable #	LPFS8 Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back- plane	Amp Champ		
J17	A5	J21	A6	6	1	17	33	33	17	Orange/Yellow	R
							34	34	42	Yellow/Orange	T
					2	18	35	35	18	Green/Yellow	R
							36	36	43	Yellow/Green	T
					3	19	37	37	19	Brown/Yellow	R
							38	38	44	Yellow/Brown	T
					4	20	39	39	20	Gray/Yellow	R
							40	40	45	Yellow/Gray	T
					5	21	41	41	21	Blue/Violet	R
							42	42	46	Violet/Blue	T
					6	22	43	43	22	Orange/Violet	R
							44	44	47	Violet/Orange	T
					7	23	45	45	23	Green/Violet	R
							46	46	48	Violet/Green	T
					8	24	47	47	24	Brown/Violet	R
							48	48	49	Violet/Brown	T
						25	49	49	25	Gray/Violet	R
					50		50	50	Violet/Gray	T	

Table 10-125: LPFS8 to MDF Connectors J10/J14–Slots 7 & 8, Ports 1–8

LPFS8 to MDF SUBSCRIBER Connector #	Cable #	LPFS8 to MDF SWITCH Connector #	Cable #	Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back-plane	Amp Champ		
J10	B3	J14	B4	7	1	1	1	1	1	Blue/White	R
							2	2	26	White/Blue	T
					2	2	3	3	2	Orange/White	R
							4	4	27	White/Orange	T
					3	3	5	5	3	Green/White	R
							6	6	28	White/Green	T
					4	4	7	7	4	Brown/White	R
							8	8	29	White/Brown	T
					5	5	9	9	5	Gray/White	R
							10	10	30	White/Gray	T
					6	6	11	11	6	Blue/Red	R
							12	12	31	Red/Blue	T
					7	7	13	13	7	Orange/Red	R
							14	14	32	Red/Orange	T
					8	8	15	15	8	Green/Red	R
							16	16	33	Red/Green	T
				8	1	9	17	17	9	Brown/Red	R
							18	18	34	Red/Brown	T
					2	10	19	19	10	Gray/Red	R
							20	20	35	Red/Gray	T
					3	11	21	21	11	Blue/Black	R
							22	22	36	Black/Blue	T
					4	12	23	23	12	Orange/Black	R
							24	24	37	Black/Orange	T
					5	13	25	25	13	Green/Black	R
							26	26	38	Black/Green	T
					6	14	27	27	14	Brown/Black	R
							28	28	39	Black/Brown	T
					7	15	29	29	15	Gray/Black	R
							30	30	40	Black/Gray	T
					8	16	31	31	16	Blue/Yellow	R
							32	32	41	Yellow/Blue	T

Table 10-126: LPFS8 to MDF Connectors J10/J14–Slot 9, Ports 1–8

LPFS8 to MDF SUBSCRIBER Connector #	Cable #	LPFS8 to MDF SWITCH Connector #	Cable #	LPFS8 Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back- plane	Amp Champ		
J10	B3	J14	B4	9	1	17	33	33	17	Orange/Yellow	R
							34	34	42	Yellow/Orange	T
					2	18	35	35	18	Green/Yellow	R
							36	36	43	Yellow/Green	T
					3	19	37	37	19	Brown/Yellow	R
							38	38	44	Yellow/Brown	T
					4	20	39	39	20	Gray/Yellow	R
							40	40	45	Yellow/Gray	T
					5	21	41	41	21	Blue/Violet	R
							42	42	46	Violet/Blue	T
					6	22	43	43	22	Orange/Violet	R
							44	44	47	Violet/Orange	T
					7	23	45	45	23	Green/Violet	R
							46	46	48	Violet/Green	T
					8	24	47	47	24	Brown/Violet	R
							48	48	49	Violet/Brown	T
						25	49	49	25	Gray/Violet	R
					50		50	50	Violet/Gray	T	

Table 10-127: LPFS8 to MDF Connectors J18/J22–Slots 10 & 11, Ports 1–8

LPFS8 to MDF SUBSCRIBER Connector #	Cable #	LPFS8 to MDF SWITCH Connector #	Cable #	Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back-plane	Amp Champ		
J18	B5	J22	B6	10	1	1	1	1	1	Blue/White	R
							2	2	26	White/Blue	T
					2	2	3	3	2	Orange/White	R
							4	4	27	White/Orange	T
					3	3	5	5	3	Green/White	R
							6	6	28	White/Green	T
					4	4	7	7	4	Brown/White	R
							8	8	29	White/Brown	T
					5	5	9	9	5	Gray/White	R
							10	10	30	White/Gray	T
					6	6	11	11	6	Blue/Red	R
							12	12	31	Red/Blue	T
					7	7	13	13	7	Orange/Red	R
							14	14	32	Red/Orange	T
					8	8	15	15	8	Green/Red	R
							16	16	33	Red/Green	T
J22	B6	J18	B5	11	1	9	17	17	9	Brown/Red	R
							18	18	34	Red/Brown	T
					2	10	19	19	10	Gray/Red	R
							20	20	35	Red/Gray	T
					3	11	21	21	11	Blue/Black	R
							22	22	36	Black/Blue	T
					4	12	23	23	12	Orange/Black	R
							24	24	37	Black/Orange	T
					5	13	25	25	13	Green/Black	R
							26	26	38	Black/Green	T
					6	14	27	27	14	Brown/Black	R
							28	28	39	Black/Brown	T
					7	15	29	29	15	Gray/Black	R
							30	30	40	Black/Gray	T
					8	16	31	31	16	Blue/Yellow	R
							32	32	41	Yellow/Blue	T

Table 10-128: LPFS8 to MDF Connectors J18/J22–Slot 12, Ports 1–8

LPFS8 to MDF SUBSCRIBER Connector #	Cable #	LPFS8 to MDF SWITCH Connector #	Cable #	LPFS8 Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back-plane	Amp Champ		
J18	B5	J22	B6	12	1	17	33	33	17	Orange/Yellow	R
							34	34	42	Yellow/Orange	T
					2	18	35	35	18	Green/Yellow	R
							36	36	43	Yellow/Green	T
					3	19	37	37	19	Brown/Yellow	R
							38	38	44	Yellow/Brown	T
					4	20	39	39	20	Gray/Yellow	R
							40	40	45	Yellow/Gray	T
					5	21	41	41	21	Blue/Violet	R
							42	42	46	Violet/Blue	T
					6	22	43	43	22	Orange/Violet	R
							44	44	47	Violet/Orange	T
					7	23	45	45	23	Green/Violet	R
							46	46	48	Violet/Green	T
					8	24	47	47	24	Brown/Violet	R
▼	▼	▼	▼				48	48	49	Violet/Brown	T
						25	49	49	25	Gray/Violet	R
					50		50	50	Violet/Gray	T	

Table 10-129: LPFS8 to MDF Connectors J11/J15–Slots 13 & 14, Ports 1–8

LPFS8 to MDF SUBSCRIBER Connector #	Cable #	LPFS8 to MDF SWITCH Connector #	Cable #	Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back-plane	Amp Champ		
J11	C3	J15	C4	13	1	1	1	1	1	Blue/White	R
							2	2	26	White/Blue	T
					2	2	3	3	2	Orange/White	R
							4	4	27	White/Orange	T
					3	3	5	5	3	Green/White	R
							6	6	28	White/Green	T
					4	4	7	7	4	Brown/White	R
							8	8	29	White/Brown	T
					5	5	9	9	5	Gray/White	R
							10	10	30	White/Gray	T
					6	6	11	11	6	Blue/Red	R
							12	12	31	Red/Blue	T
					7	7	13	13	7	Orange/Red	R
							14	14	32	Red/Orange	T
					8	8	15	15	8	Green/Red	R
							16	16	33	Red/Green	T
				14	1	9	17	17	9	Brown/Red	R
							18	18	34	Red/Brown	T
					2	10	19	19	10	Gray/Red	R
							20	20	35	Red/Gray	T
					3	11	21	21	11	Blue/Black	R
							22	22	36	Black/Blue	T
					4	12	23	23	12	Orange/Black	R
							24	24	37	Black/Orange	T
					5	13	25	25	13	Green/Black	R
							26	26	38	Black/Green	T
					6	14	27	27	14	Brown/Black	R
							28	28	39	Black/Brown	T
					7	15	29	29	15	Gray/Black	R
							30	30	40	Black/Gray	T
					8	16	31	31	16	Blue/Yellow	R
							32	32	41	Yellow/Blue	T

Table 10-130: LPFS8 to MDF Connectors J11/J15–Slot 15, Ports 1–8

LPFS8 to MDF SUBSCRI- BER Conn- ector #	Cable #	LPFS8 to MDF SWITCH Conn- ector #	Cable #	LPFS8 Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back- plane	Amp Champ		
J11	C3	J15	C4	15	1	17	33	33	17	Orange/Yellow	R
							34	34	42	Yellow/Orange	T
					2	18	35	35	18	Green/Yellow	R
							36	36	43	Yellow/Green	T
					3	19	37	37	19	Brown/Yellow	R
							38	38	44	Yellow/Brown	T
					4	20	39	39	20	Gray/Yellow	R
							40	40	45	Yellow/Gray	T
					5	21	41	41	21	Blue/Violet	R
							42	42	46	Violet/Blue	T
					6	22	43	43	22	Orange/Violet	R
							44	44	47	Violet/Orange	T
					7	23	45	45	23	Green/Violet	R
							46	46	48	Violet/Green	T
					8	24	47	47	24	Brown/Violet	R
							48	48	49	Violet/Brown	T
						25	49	49	25	Gray/Violet	R
					50		50	50	Violet/Gray	T	

Table 10-131: LPFS8 to MDF Connectors J19/J23–Slots 16 & 17, Ports 1–8

LPFS8 to MDF SUBSCRI- BER Conn- ector #	Cable #	LPFS8 to MDF SWITCH Conn- ector #	Cable #	Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back- plane	Amp Champ		
J19	C5	J23	C6	16	1	1	1	1	1	Blue/White	R
							2	2	26	White/Blue	T
					2	2	3	3	2	Orange/White	R
							4	4	27	White/Orange	T
					3	3	5	5	3	Green/White	R
							6	6	28	White/Green	T
					4	4	7	7	4	Brown/White	R
							8	8	29	White/Brown	T
					5	5	9	9	5	Gray/White	R
							10	10	30	White/Gray	T
					6	6	11	11	6	Blue/Red	R
							12	12	31	Red/Blue	T
					7	7	13	13	7	Orange/Red	R
							14	14	32	Red/Orange	T
					8	8	15	15	8	Green/Red	R
							16	16	33	Red/Green	T
				17	1	9	17	17	9	Brown/Red	R
							18	18	34	Red/Brown	T
					2	10	19	19	10	Gray/Red	R
							20	20	35	Red/Gray	T
					3	11	21	21	11	Blue/Black	R
							22	22	36	Black/Blue	T
					4	12	23	23	12	Orange/Black	R
							24	24	37	Black/Orange	T
					5	13	25	25	13	Green/Black	R
							26	26	38	Black/Green	T
					6	14	27	27	14	Brown/Black	R
							28	28	39	Black/Brown	T
					7	15	29	29	15	Gray/Black	R
							30	30	40	Black/Gray	T
					8	16	31	31	16	Blue/Yellow	R
							32	32	41	Yellow/Blue	T

Table 10-132: LPFS8 to MDF Connectors J19/J23–Slot 18, Ports 1–8

LPFS8 to MDF SUBSCRI- BER Conn- ector #	Cable #	LPFS8 to MDF SWITCH Conn- ector #	Cable #	LPFS8 Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back- plane	Amp Champ		
J19	C5	J23	C6	18	1	17	33	33	17	Orange/Yellow	R
							34	34	42	Yellow/Orange	T
					2	18	35	35	18	Green/Yellow	R
							36	36	43	Yellow/Green	T
					3	19	37	37	19	Brown/Yellow	R
							38	38	44	Yellow/Brown	T
					4	20	39	39	20	Gray/Yellow	R
							40	40	45	Yellow/Gray	T
					5	21	41	41	21	Blue/Violet	R
							42	42	46	Violet/Blue	T
					6	22	43	43	22	Orange/Violet	R
							44	44	47	Violet/Orange	T
					7	23	45	45	23	Green/Violet	R
							46	46	48	Violet/Green	T
					8	24	47	47	24	Brown/Violet	R
							48	48	49	Violet/Brown	T
						25	49	49	25	Gray/Violet	R
					50		50	50	Violet/Gray	T	

Table 10-133: LPFS8 to MDF Connectors J12/J16–Slots 19 & 20, Ports 1–8

LPFS8 to MDF SUBSCRIBER Connector #	Cable #	LPFS8 to MDF SWITCH Connector #	Cable #	Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back-plane	Amp Champ		
J12	D3	J16	D4	19	1	1	1	1	1	Blue/White	R
							2	2	26	White/Blue	T
					2	2	3	3	2	Orange/White	R
							4	4	27	White/Orange	T
					3	3	5	5	3	Green/White	R
							6	6	28	White/Green	T
					4	4	7	7	4	Brown/White	R
							8	8	29	White/Brown	T
					5	5	9	9	5	Gray/White	R
							10	10	30	White/Gray	T
					6	6	11	11	6	Blue/Red	R
							12	12	31	Red/Blue	T
					7	7	13	13	7	Orange/Red	R
							14	14	32	Red/Orange	T
					8	8	15	15	8	Green/Red	R
							16	16	33	Red/Green	T
J16	D3	J16	D4	20	1	9	17	17	9	Brown/Red	R
							18	18	34	Red/Brown	T
					2	10	19	19	10	Gray/Red	R
							20	20	35	Red/Gray	T
					3	11	21	21	11	Blue/Black	R
							22	22	36	Black/Blue	T
					4	12	23	23	12	Orange/Black	R
							24	24	37	Black/Orange	T
					5	13	25	25	13	Green/Black	R
							26	26	38	Black/Green	T
					6	14	27	27	14	Brown/Black	R
							28	28	39	Black/Brown	T
					7	15	29	29	15	Gray/Black	R
							30	30	40	Black/Gray	T
					8	16	31	31	16	Blue/Yellow	R
							32	32	41	Yellow/Blue	T

Table 10-134: LPFS8 to MDF Connectors J12/J16–Slot 21, Ports 1–8

LPFS8 to MDF SUBSCRI- BER Conn- ector #	Cable #	LPFS8 to MDF SWITCH Conn- ector #	Cable #	LPFS8 Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)	
								Back- plane	Amp Champ			
J12	D3	J16	D4	21	1	17	33	33	17	Orange/Yellow	R	
							34	34	42	Yellow/Orange	T	
					2	18	35	35	18	Green/Yellow	R	
							36	36	43	Yellow/Green	T	
					3	19	37	37	19	Brown/Yellow	R	
							38	38	44	Yellow/Brown	T	
					4	20	39	39	20	Gray/Yellow	R	
							40	40	45	Yellow/Gray	T	
					5	21	41	41	21	Blue/Violet	R	
							42	42	46	Violet/Blue	T	
					6	22	43	43	22	Orange/Violet	R	
							44	44	47	Violet/Orange	T	
					7	23	45	45	23	Green/Violet	R	
							46	46	48	Violet/Green	T	
					8	24	47	47	24	Brown/Violet	R	
							48	48	49	Violet/Brown	T	
▼	▼	▼	▼					49	49	25	Gray/Violet	R
								50	50	50	Violet/Gray	T

Table 10-135: LPFS8 to MDF Connectors J20/J24–Slots 22 & 23, Ports 1–8

LPFS8 to MDF SUBSCRIBER Connector #	Cable #	LPFS8 to MDF SWITCH Connector #	Cable #	Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)
								Back-plane	Amp Champ		
J20	D5	J24	D6	22	1	1	1	1	1	Blue/White	R
							2	2	26	White/Blue	T
					2	2	3	3	2	Orange/White	R
							4	4	27	White/Orange	T
					3	3	5	5	3	Green/White	R
							6	6	28	White/Green	T
					4	4	7	7	4	Brown/White	R
							8	8	29	White/Brown	T
					5	5	9	9	5	Gray/White	R
							10	10	30	White/Gray	T
					6	6	11	11	6	Blue/Red	R
							12	12	31	Red/Blue	T
					7	7	13	13	7	Orange/Red	R
							14	14	32	Red/Orange	T
					8	8	15	15	8	Green/Red	R
							16	16	33	Red/Green	T
J24	D6	D7	D8	23	1	9	17	17	9	Brown/Red	R
							18	18	34	Red/Brown	T
					2	10	19	19	10	Gray/Red	R
							20	20	35	Red/Gray	T
					3	11	21	21	11	Blue/Black	R
							22	22	36	Black/Blue	T
					4	12	23	23	12	Orange/Black	R
							24	24	37	Black/Orange	T
					5	13	25	25	13	Green/Black	R
							26	26	38	Black/Green	T
					6	14	27	27	14	Brown/Black	R
							28	28	39	Black/Brown	T
					7	15	29	29	15	Gray/Black	R
							30	30	40	Black/Gray	T
					8	16	31	31	16	Blue/Yellow	R
							32	32	41	Yellow/Blue	T

Table 10-136: LPFS8 to MDF Connectors J20/J24–Slot 24, Ports 1–8

LPFS8 to MDF SUBSCRIBER Connector #	Cable #	LPFS8 to MDF SWITCH Connector #	Cable #	LPFS8 Slot #	Port #	Pair #	Wire #	Pin Connectors		STANDARD Color Code	Tip (T) or Ring (R)	
								Back- plane	Amp Champ			
J20	D5	J24	D6	24	1	17	33	33	17	Orange/Yellow	R	
							34	34	42	Yellow/Orange	T	
					2	18	35	35	18	Green/Yellow	R	
							36	36	43	Yellow/Green	T	
					3	19	37	37	19	Brown/Yellow	R	
							38	38	44	Yellow/Brown	T	
					4	20	39	39	20	Gray/Yellow	R	
							40	40	45	Yellow/Gray	T	
					5	21	41	41	21	Blue/Violet	R	
							42	42	46	Violet/Blue	T	
					6	22	43	43	22	Orange/Violet	R	
							44	44	47	Violet/Orange	T	
					7	23	45	45	23	Green/Violet	R	
							46	46	48	Violet/Green	T	
▼	▼	▼	▼			8	24	47	47	24	Brown/Violet	R
								48	48	49	Violet/Brown	T
						25		49	49	25	Gray/Violet	R
								50	50	50	Violet/Gray	T



## Appendix J

### D50 Component Part Numbers

Part Numbers  
Table

Table 10-137: D50 Component Part Numbers

<b>PART NAME</b>	<b>NOKIA SALES CODE</b>	<b>HSAP PART NUMBER</b>
<b>D50 MULTIPLEXER ASSEMBLIES</b>		
Master Control Shelf (MCS) Kit (no cables; includes Fan Tray)	E32603.01--	50-0010
Line Card Shelf (LCS) Kit (no cables; includes Fan Tray)	E32604.01--	50-0020
Line Card Shelf (LCS) (no cables; includes Fan Tray)	E32405.01--	—
Remote Line Card Shelf (RLCS) Kit (no cables; includes Fan Tray)	T32498.02--	—
Remote Line Card Shelf (RLCS) (no cables; includes Fan Tray)	T32498.01--	—
Low Pass Filter Shelf (LPFS8) Kit (no cables; no fan tray required)	E32637.01--	50-0136
Low Pass Filter Shelf (LPFS8) with cables (no fan tray required)	E32413.01--	30-1400
Low Pass Filter Shelf (LPFS8) without cables (no fan tray required)	E32651.01--	50-0164
Remote Low Pass Filter Shelf (RLPFS8) Kit (no cables; no fan tray required)	T32499.02--	—
Remote Low Pass Filter Shelf (RLPFS8) (no cables; no fan tray required)	T32499.01--	—
Auxiliary CSIP Assembly Kit	E32606.01--	50-0040
LCS Fan Tray Kit, High RPM	E32424.01--	50-0050
LCS Fan Tray, High RPM (included in MCS and LCS Kits)	E32423.01--	30-0005
RLCS Fan Tray Kit, High RPM	T34750.02--	—
RLCS Fan Tray, High RPM (included in RLCS Kits)	T34750.01--	—
<b>CABLE ASSEMBLIES</b>		
LCS Power Cable (79-inch cable)	E32679.01--	40-0002-004

Table 10-137: D50 Component Part Numbers (continued)

<b>PART NAME</b>	<b>NOKIA SALES CODE</b>	<b>HSAP PART NUMBER</b>
LCS Power Cable (20-foot cable)	E32437.01	40-0048
2 Meter Duplex Fiber Optic Cable - multimode	E32402.01--	—
3 Meter Duplex Fiber Optic Cable - multimode	E32403.01--	70-0003-030
5 Meter Duplex Fiber Optic Cable - multimode	E32404.01--	—
T3 Coax Cable Stub (LSMT3 and MLAT3)	E32445.01--	—
Sequential Pair Cable Assembly for LCS	—	40-0025
Sequential Pair Cable Assembly for LPFS8	—	40-0037
LSMT3 Cable Assembly, 75 Ohm, Male	E32447.01--	—
MLAT3 Cable Assembly, 75 Ohm, Male	E32446.01--	—
48 Volt Power Long Reach Cable Assembly	E32437.01--	—
48 Volt Power Cable Assembly, LCS	E32679.01--	—
LSMT3, MLAT3, 75 ohm Cable Assembly, Male SMB, Female BNC	E32445.01--	—
<b>CABLE KITS</b>		
LCS to LPFS8 Cable Kit	E32448.01--	—
LPFS8 or LCS to MDF, Female, Cable Kit	E32449.01--	—
LPFS8 or LCS to MDF, Male, Cable Kit	E32450.01--	—
LPFS8A or LCS to MDF, 4.5 M, Bare, Cable Kit	E32453.01--	—
LCS, Male, 3-Pack Cable Kit	E32451.01--	—
LCS, Female, 3-Pack Cable Kit	E32452.01--	—
RLCS to MDF Cable Kit	T34746.01--	—
RLPFS8 to RLCS and MDF Cable Kit	T34745.01--	—
<b>INSTALLATION KITS</b>		
MCS/ACSIP Installation Kit	—	50-0060
LCS/LPFS8, RLCS/RLPFS8 Installation Kit	—	50-0070
D50 RAM Installation Kit	—	50-0129
<b>MASTER CONTROL SHELF (MCS) CARDS</b>		
Master Timing Unit (MTU) card	T32459.0030	60-0020-800
Network Management Processor (NMP) card	E32617.01--	60-0009-800
Master Control Processor (MCP) card	E32616.01--	60-0008-800
DS3T Trunk Interface card	E32613.01--	60-0007-800

Table 10-137: D50 Component Part Numbers (continued)

<b>PART NAME</b>	<b>NOKIA SALES CODE</b>	<b>HSAP PART NUMBER</b>
DS3T2 Trunk Interface card	E32615.01--	60-0007-802
DS3TQ Trunk Interface card	E32667.01--	60-0144-801
OC3T Trunk Interface card	E32622.01--	60-0027-801
OC3T2 Trunk Interface card	E32623.01--	60-0027-802
OC3T2L Trunk Interface card – long haul	E32421.01--	60-0027-803
OC3T2M Trunk Interface card – multimode	E32433.01--	60-0027-804
OC3TQL Trunk Interface card – long haul	E32426.01--	60-0144-813
OC3TQM Trunk Interface card – multimode	E32427.01--	60-0144-811
OC3TQS Trunk Interface card – short haul	E32653.01--	60-0144-812
Master Line Card Adapter card 2 – multimode (MLA2)	E32619.01--	60-0021-801
Master Line Card Adapter card 2 – long haul (MLA2L)	E32420.01--	60-0021-803
Master Line Card Adapter card 2 – single mode (MLA2S)	E32620.01--	60-0021-802
Master Line Card Adapter card – DS3 (MLAT3)	E32647.01--	50-0163
Master Line Card Adapter card – DS1 (MLAT1)	E32644.01--	60-0088-801
DS3 broadband interface card (DS3L)	E32631.01--	60-0085-802
OC3 broadband interface card (OC3L)	—	60-0021-812
<b>LINE CARD SHELF (LCS) CARDS</b>		
Line Card Shelf Multiplexer card (LSM2)	E32624.01--	60-0037-801
Line Card Shelf Multiplexer card – long haul (LSM2L)	E32422.01--	—
Line Card Shelf Multiplexer card – single mode (LSM2S)	E32625.01--	60-0037-802
Line Card Shelf Multiplexer card – DS3 (LSMT3)	E32648.01--	50-0162
Line Card Shelf Multiplexer card – DS1 (LSMT1)	E32643.01--	60-0087-801
CAM8 card (Complimentary Analysis Module)	T32486.01--	—
PAM8 card (Pair Analysis Module)	T324.0030--	60-0196-300
DMT8a-3 line card	T32478.01--	—
DMT8a-4 line card	T34765.01	—
DS1 line card (Quad DS1)	E32663.01--	60-0112-300
Remote Craft Access Unit (RCAU)	T32455.02--	—
SDSL8 line card (Octal SDSL)	E32626.01--	60-0044-801
SDSL8+ line card (Octal SDSL)	E32669.01--	60-0172-801

Table 10-137: D50 Component Part Numbers (continued)

<b>PART NAME</b>	<b>NOKIA SALES CODE</b>	<b>HSAP PART NUMBER</b>
SHDSL8 line card (Octal SHDSL)	T36311.01--	—
IDSL8 line card (Octal IDSL)	E32627.01--	60-0054-801
<b>LOW PASS FILTER SHELF (LPF8) CARD</b>		
LPF8-2 card (for DMT8a-3/DMT8a4 line cards)	E32431.01--	60-0195-600
<b>D50 RAM</b>		
D50 RAM Assembly	E32610.01--	50-0128
Low Pass Filter card (LPF8M)	E32632.01--	60-0135-801
Through Connect LPF plug replacement card (MRTC)	E32633.01--	60-0135-802
<b>MISCELLANEOUS ITEMS</b>		
EMI Filter Ferrite (for DS-1 cables)	—	74-0035
EMI Filter Ferrite (for Power and Craft Terminal Ethernet cables)	—	28-0000
D50/D50e System Software, Release 11.0	S36385.01--	—
D50/D50e Administrative Utilities Upgrade Software, Release 11.0	S36374.01--	—
D50/D50e Craft Terminal Software, Release 11.0 (single user license)	S36386.01--	—
D50/D50e Craft Terminal Software, Release 11.0 (five user licenses)	S36387.01--	—
D50/D50e Craft Terminal Software, Release 11.0 (50 user licenses)	S36388.01--	—
D50 Documentation CD, Volumes 1–6, Release 11.0	C34766.90--	—
D50/D50e Administration Utilities User's Guide (Booklet), Release 11.0	—	26-0264

## Appendix K

### Glossary and Acronyms

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- 10BaseT.** A 10 Mbps Ethernet network that uses unshielded twisted pair cable in a star topology with a central hub.
- 2B1Q (Two Binary, One Quaternary).** A line encoding technique used in ISDN BRI, IDSL and SDSL. It is a four-level PAM (Pulse Amplitude Modulation) technique, which maps two bits of data into one quaternary symbol, with each symbol comprising one of four variations in amplitude and polarity over a circuit.
- AAL (ATM Adaptation Layer).** ATM Adaptation Layer is located above ATM and converts non-ATM bit streams into ATM cells. The AAL protocol supports higher-layer service requirements.
- ADSL (Asymmetric Digital Subscriber Line).** Asymmetrical data signals for Internet access that share twisted pairs with POTS and that use modern signal modulation techniques to accomplish the data communications task. The downstream rates are much faster than the upstream rates.
- AIS (Alarm Indication Signal).** A downstream signal in a digital network that replaces the normal traffic signal when a maintenance alarm indication has been activated (indicating an upstream failure detection – error or alarm on the network). It is used in the OSI network management model.
- Alarm.** A signal used to indicate that an abnormality, a fault, or a failure has been detected. Alarms may be distinguished by type and by the severity of the event that caused the alarm.
- ANSI (American National Standards Institute).** Founded in 1918, ANSI is a U.S. voluntary standards setting board.
- API (Application Programming Interface).** Software that an application program uses to request and carry out lower-level services performed by an operating system.
- ASCII (American Standard Code for Information Interchange).** A computer coding method for converting alphanumeric and punctuation characters and control codes into digital (binary) form.
- ATM (Asynchronous Transfer Mode).** A multiplexed information transfer and switching process (cell-switched technology) in which data is organized into fixed length (53 octet) cells and transmitted according to each application's requirement. ATM is generally deployed in enterprise networks, which often connect LANs over wide areas that require large amounts of data to be transported over great distances.
- Attenuation.** Attenuation is the loss of signal strength over distance. Attenuation is measured in decibels.

**ATUC (ADSL Transmission Unit – Central Office).** Special electronics located in the Central Office to support a high rate of data transmission over UTP copper wires. This is the “downstream” direction. Works in conjunction with ATUR (see below).

**ATUR (ADSL Transmission Unit – Remote).** Special electronics located at the customer’s premises to support a high rate of data transmission over UTP copper wires. This is the “upstream” direction. Works in conjunction with ATUC (see above).

**AutoBaud.** A set of drivers available on SDSL devices to promote inter-operability.

**Auxiliary Common Systems Interface Panel (CSIP).** Each Auxiliary CSIP connects and distributes Central Office power to up to four Line Card Shelves (LCSs). Auxiliary CSIPs are required for D50’s with over five LCSs.

**AWG (American Wire Gauge).** A standard classification for measuring non-ferrous conductors such as copper wire.

**Backbone.** The part of a network that carries the heaviest traffic. It is one basis for the design of an overall network service. For example, the D50 operates on an ATM backbone.

**Bandwidth.** The capacity of a communications channel. For digital communications, bandwidth is usually measured in bits per second.

**BER (Bit Error Rate).** A measurement of transmission quality expressed as a ratio (ratio of error bits to the total number of bits transmitted – erroneous bits per million). The BER indicates how many bits are incorrectly transmitted in a given bit stream. The BER depends on the type and length of transmission.

**BNC (Bayonett Neill Concelman).** A bayonet-locking cabling interconnection standard, used in thin coaxial cable Ethernet applications.

**BPS (Bits Per Second).** A measurement of transmission speed – number of bits transmitted each second.

**Bridge.** A communications device used to interconnect networks or network nodes with a common set of higher level protocols.

**Broadband.** A communications method in which multiple channels are formed by dividing the transmission medium on a shared communications path. Generally describes communications above 1.5 Mbps.

**Burst.** A short flow of packets, often followed by idle periods where there is no transmission activity.

**CAC (Connection Admission Control).** Procedures carried out by an ATM network at connection set-up to determine whether a requested virtual connection can be supported or should be rejected.

**CAM (Complimentary Analysis Module).** A Nokia Broadband Systems product. A card that is used to provide the pathway to perform continuity testing from the LCS to the MDF when using a Low Pass Filter Shelf (LPFS8). Plugs into the LPFS8 backplane in the same manner as a Low Pass Filter card. Works with the PAM (Pair Analysis Module) card.

- CAP (Competitive Access Provider).** An alternative competitive local exchange carrier.
- CBR (Constant or Continuous Bit Rate).** An ATM service category that supports a constant or guaranteed rate to transport services such as video or voice as well as circuit emulation requiring rigorous timing control and performance parameters.
- CCA (Congestion Control and Avoidance).** A resource and traffic management mechanism to correct, avoid and/or prevent excessive situations such as buffer overflow or insufficient bandwidth that can cause the network to collapse.
- CDV (Cell Delay Variance).** A component of Cell Transfer Delay, induced by buffering and scheduling.
- CDVT (Cell Delay Variance Tolerance).** Specifies the acceptable tolerance to cell-by-cell variations of the CDV (jitter).
- CE.** Products sold into the European Economic Community since January 1996 are required to carry the CE Mark. The CE Mark represents that the product meets all Electromagnetic Compatibility Directives.
- Cell.** The smallest data component in an ATM stream. The ATM Cell has a 5-byte header and contains 48 bytes of payload.
- CEV (Controlled Environment Vault).** An environmentally conditioned room for housing optical and electronic equipment.
- Channel.** A point-to-point link in a communications system.
- Circuit.** A transmission path for sending and receiving data and/or voice between two points in a telecommunications system.
- Circuit Emulation.** A virtual circuit service offered to end users where the characteristics of an actual, digital bit-stream line (for example, video traffic) are emulated.
- CLEC (Competitive Local Exchange Carrier).** These carriers compete with the local exchange service to provide telephone service to customers who may choose voice and/or data services. Additionally, a CLEC may lease existing lines or provide their own local loop.
- CLEI (Common Language Equipment Identifier) Codes.** Assigned to all telecommunications equipment that may be installed in a RBOC facility (or other facilities if required). The codes are assigned by Bellcore (now SAIC).
- Client/Server Model.** In the client-server model, the *server* program offers a service reachable over the network (or within a stand-alone system). A server receives a request, performs the service, and returns the result to the requester. The *client* program sends a request to the server and waits for a response.
- CLP (Cell Loss Priority).** A 1-bit field in the ATM cell header that corresponds to the loss priority of a cell. Lower priority (CLP=1) cells can be discarded under a congestion situation.
- CLR (Cell Loss Ratio).** A QoS parameter that gives the ratio of the lost cells to the total number of transmitted cells on a given VCC in cells per second.

**CMIP (Common Management Information Protocol).** An OSI network management/service interface protocol created and standardized by ISO. Based on the basic data storage concept in which management information is collected and stored for subsequent retrieval by a management application. Provides for the transmission of event notifications and the transmission of operations directed toward managed objects.

**CO (Central Office).** Houses the Local Exchange switch that terminates individual local telephone subscriber lines for switching and connection to the public network (locally and long distance).

**Coding Violation (CV).** A violation detected in the coding of a signal.

**Common Systems Interface Panel (CSIP) Alarm Board.** All D50 alarm connections are made at the CSIP Alarm Board; Central Office visual, audible, remote Bay Alarm and remote input alarms. The Alarm Board has LEDs to display D50 alarm status.

**Common Systems Interface Panel (CSIP) Power and Distribution Board.** The CSIP Power and Distribution Board is located in the Master Control Shelf (MCS). Central Office power is terminated at the CSIP and is distributed to the MCS and up to four Line Card Shelves (LCSs).

**CORBA (Common Object Resource Broker Architecture).** An Object Request Broker (ORB) standard developed by the Object Management Group (OMG). It is an object-oriented technology which provides a scalable, open platform for both service provider and large enterprise network environments.

**COT (Central Office Terminal or Termination).** The termination of a local loop facility. Located at the Central Office facility. See Digital Loop Carrier for further information about how this is used.

**CPE (Customer Premises Equipment).** Refers to telephone and related equipment located on the customer's premises (office or home).

**Craft Terminal (DiamondCraft®).** Craft Terminal, previously known as DiamondCraft, is the D50's stand-alone craft interface application. It communicates directly with a D50 through a serial port connection using Point-to Point Protocol (PPP) or an Ethernet connection.

**CRC (Cyclical Redundancy Checking).** A data error-detecting mathematical process designed to ensure that errors don't occur undetected in a block of data. Systems using CRC will request that data be retransmitted if errors are detected.

**Cross-connect.** A connection between two or more elements of a telecommunications system.

**CTD (Cell Transfer Delay).** A QoS parameter that measures the maximum or worst-case time for a cell to be transferred from its source to its destination over a virtual connection. It is the sum of buffering, propagation, processing and queuing delays.

**D50 Multiplexer.** The D50 Multiplexer is classified as a Digital Subscriber Line Access Multiplexer (DSLAM). The D50 Multiplexer uses Digital Subscriber Line

(DSL) and Asynchronous Transfer Mode (ATM) technologies to deliver high speed data rates over the existing copper network.

**D50 RAM (Remote Access Module).** The D50 RAM is a small, versatile DSL remote line card shelf supporting up to three 8-port D50 line cards, one Line Card Shelf Multiplexer card, and three low pass filter cards, for up to 24 lines. It is equivalent to a small LCS.

**Data Rate.** The rate at which a channel carries data – measured in bits per second.

**dB (Decibel).** The decibel is a unit used to measure the power of sound or voltage. It is expressed as the ratio of two values. In telephony, the decibel (a logarithmic measurement) is used as a measure of relative power between circuits or transmission level points. As a reference: a change in level of 1 dB is barely perceptible under ideal conditions; however, increases or reductions of 3 dB result in doubling or halving, respectively, the power in a circuit. The corresponding figure for doubling or halving voltage is 6 dB.

**DLC (Digital Loop Carrier).** Network transmission equipment used to provide a pair gain function. DLC equipment is deployed in situations in which the cost of the equipment is more than offset by the savings in copper distribution accomplished by eliminating need for as many copper pairs. Digital loop carrier systems consist of two parts—a Central Office Terminal (COT) and a Remote Terminal. The COT provides the multiplexing/demultiplexing function of individual voice signals to the composite multiplexed signal at the interface between the switching equipment and the DLC. The Remote Terminal provides the multiplexing/demultiplexing function at the interface between the individual subscriber pairs and the DLC equipment.

**DMT (Discrete Multi-Tone).** Modulation technique which uses Frequency Division Duplex multiplexing to transmit data in the 35 kHz to 1.1 MHz frequency spectrum. It divides the frequency range into 256 discrete bands, each with 4 kHz bandwidth. Each band is independently modulated.

**Downstream.** The communications path going from the CO or DSLAM to the client/end user.

**DS1 (Digital Signal Level One).** 1.544 Mbps digital signal.

**DS3 (Digital Signal Level Three).** 44.736 Mbps digital signal – equivalent of 28 T-1 channels (also referred to as T-3).

**DS3L.** A DS3 rate broadband tributary card that provides a standard ATM UNI/NNI interface that supports provisionable VPI/VCI mappings to the D50 trunk card, allowing ATM cells to be aggregated from standard ATM network equipment.

**DSL (Digital Subscriber Line).** The generic name for a family of digital services provided by the local telephone companies to their local subscribers. The high speeds of transmission (up to 8 Mbps) are accomplished over the existing twisted pair copper wires.

**DSLAM (Digital Subscriber Line Access Multiplexer).** An ATM access mux/concentrator that grooms traffic from multiple low rate lines into a high rate trunk (DS1, DS3, OC3, OC12).

- Duplex.** Simultaneous, two-way independent transmission of data. Both ends of the communication can send and receive data at the same time. Also referred to as full-duplex.
- EFCI (Explicit Forward Congestion Indication).** A field in the ATM cell header indicating congestion or impending congestion. When EFCI is set, it indicates that a network element is either in a congested state or there is a potential congested state problem. The ATM end-system receiving cells with EFCI set can use this indication to adaptively decrease the cell rate of the connection to avoid congestion.
- Egress.** Outgoing direction to a network or network device. The term refers to data being sent out of a device or system, as opposed to information being sent into a network or network device (ingress).
- EMI (Electromagnetic Interference).** Unwanted electrical noise from an external source that can interfere with transmissions over copper cables.
- EML (Element Management Layer).** A layer representing the management and monitoring of components, at their lowest level, in a telecommunications network. In short, an abstraction of the functions provided by systems that manage each network element on an individual basis.
- EMS (Element Management Systems).** Software used to manage and monitor components of a telecommunication system at the lower levels of the Telecommunications Management Network.
- EOC (Embedded Operations Channel).** A control and signaling channel used for operations, administration and maintenance of the transmission line.
- EPD (Early Packet Discard).** A congestion control technique that selectively drops all but the last ATM cell in a Classical IP over ATM packet.
- Error Rate.** The ratio of incorrect elements sent to the total number of elements transmitted.
- ES (Errored Seconds).** The number of seconds in which at least one coding violation was detected.
- ESD (Electrostatic Discharge).** Transfer of an electrostatic charge on a surface through a conductive path to ground.
- ETSI (European Telecommunications Standards Institute).** ETSI is the European counterpart to ANSI, the American National Standards Institute. ETSI was founded in 1988.
- Fault.** Performance degradation that impacts the ability of the network element from properly performing.
- FEBE (Far End Block Error).** FEBE is used to monitor bit error performance of a communication link. An indication returned to the source that the far-end receiver has detected one or more errors in its received signal from the source.
- FEC (Forward Error Correction).** A transmission method in which extra bits or characters transmitted with the payload so that transmission errors can be corrected on the receiving end without forcing a retransmission.

- FM (Fault Management).** A data collection and reporting mechanism for component fault analysis.
- Frame.** In Time Division Multiplexing (TDM), a frame is one complete cycle of events. The frame consists of a fixed-size block of bits, which contains one (or more) time slots for each channel, plus synchronization and other overhead bits.
- Frame Relay.** Frame Relay is a packet mode switching interface defined by the ITU-T. Frame relay is provided on fractional T-1 or full T-carrier system carriers.
- FRF.** Frame Relay Forum.
- FRF.5.** Frame Relay/ATM PVC Network Interworking Implementation Agreement. FRF.5 provides the standard for ATM to become a high speed backbone for Frame Relay PVCs.
- FRF.8.** Frame Relay/ATM PVC Network Interworking Implementation Agreement. FRF.8 provides the standard for Frame Relay PVCs and ATM PVCs to communicate.
- GFC (Generic Flow Control).** A four bit field in the ATM header which can be used to provide local functions (e.g. flow control). The GFC is used to ensure that all nodes obtain access to the transmission medium. It can also be used to prioritize transmissions by data type.
- GUI (Graphical User Interface).** Generic name for the computer interface that presents graphics (icons) and characters. The GUI permits users to directly manipulate graphical objects displayed on the monitor.
- HDLC (High Level Data Link Control).** An ITU-TSS link layer protocol standard for point-to-point and multi-point communications. HDLC includes functions for link establishment, sequencing, flow control and error recovery.
- HDSL (High bit rate Digital Subscriber Line).** HDSL provides a T1 on two copper wire pairs (without the loop engineering and repeaters required for a standard T1 system).
- HEC (Header Error Control).** An 8-bit field (the last byte) of the ATM-cell header, whose purpose is to allow a receiver to detect, and possibly correct, transmission errors in the cell header. It is used for checking integrity only.
- HTML (Hyper Text Markup Language).** HTML is the software programming language used to create World Wide Web pages.
- IAD (Integrated Access Device).** An integrated-access device that can multiplex voice and data on one line.
- IDF (Intermediate Distribution Frame).** A metal rack designed to connect cables and located in an equipment room or closet. Consists of bits and pieces that provide the connection between inter-building cabling and the intra-building cabling (i.e. between the Main Distribution Frame (MDF) and individual phone wiring).
- IDSL (ISDN Digital Subscriber Line).** Delivers speeds up to 128/144 Kbps on copper loops as long as 18,000 feet. Dedicated service for data communications applications only. 2B1Q interface. In most cases, users can use their existing ISDN CPE equipment.

**IEEE (Institute of Electrical and Electronics Engineers).** An international engineering organization that defines standards related to networking and other areas.

**IETF (Internet Engineering Task Force).** One of two technical engineering bodies of the Internet Architecture Board. The IETF is responsible for solving short-term engineering needs and standards of the Internet.

**ILEC (Incumbent Local Exchange Carrier).** The local carrier that is (typically) the primary carrier for local calls in a given area. ILECs are telephone companies that were part of the Bell System.

**In-Band.** Using the same circuit to transport both the information (e.g., data or voice) along with the signaling information.

**Ingress.** Incoming direction to a network or network device. The term refers to data being sent into a network element or system, as opposed to information being sent out (egress).

**Interleave.** A process or technique that reduces the number of undetected error bursts and improves burst error performance. Interleave mode provides the most robust service and more reliable service under long reach conditions for DSL service that supports the Interleave process.

**Inverse Multiplexer (IMUX).** A device that combines multiple links (usually T1s or E1s) a single shared digital channel. Circuits can be added and dropped without losing ATM cells.

**IP (Internet Protocol).** A component of the TCP/IP protocol suite. IP operates at Layer 3 of the OSI Reference model.

**ISDN (Integrated Services Digital Network).** ISDN is a digital telecommunications standard for transmitting digital voice, data and video on the same transmission facility. ISDN has two basic access interfaces; BRI (Basic Rate Interface) and PRI (Primary Rate Interface). Both interfaces provide circuit-switched access to public networks. BRI provides a throughput of 144 Kbps and PRI has a throughput of up to 2 Mbps.

**ISO (International Standards Organization).** The International Standards Organization is an international organization founded in 1946 to facilitate the development of international data communication standards.

**ISP (Internet Service Provider).** A vendor who provides access to the Internet and the World Wide Web.

**ISU (Integrated Services Unit).** A digital device that consists of a CSU (Channel Service Unit) and DSU (Digital Service Unit).

**ITU (International Telecommunications Union).** An organization established by the United Nations. The ITU sets telecommunications standards and allocates frequencies to various uses worldwide.

**IWF (Interworking Function).** A function used on an interface between networks which use dissimilar technologies.

- IXC (Interexchange Carrier).** Long distance carrier such as AT&T, MCI WorldCom, Sprint, and some smaller carriers.
- Java.** A programming language developed by Sun Microsystems® for platform independent, object-oriented application development.
- JDBC (Java DataBase Connectivity).** A Java based driver which provides a database independent interface between a Java application or applet and the database. It provides a Java API on one side and an SQL interface on the other.
- JDK (Java Developer's Kit).** A (platform specific) development environment for creating Java based applications and applets.
- Kbps (Kilo Bits Per Second).** A measurement of transmission speed – one thousand bits transmitted each second.
- kHz (Kilohertz).** A unit of frequency equal to one thousand (1,000) cycles per second (Hz).
- LAN (Local Area Network).** A privately owned and administered network for data communications, usually within a building or campus environment, used to connect computers and peripheral devices. Communication is typically accomplished by broadcasting on a connectionless basis over a shared medium.
- Latency.** The amount of time between the moment a device generates a request for data and the instant at which the requested channel is available for transmission.
- Leaky Bucket Algorithm.** Officially called the Generic Cell Rate Algorithm. A method of explaining by means of a hole in a bucket, how an ATM switch measures the PCR and SCR conformance of each CBR and VBR connection.
- Line Card.** A line card serves as the interface between a line and a communications device.
- Line Card Shelf (LCS).** The D50 is made up of one Master Control Shelf and up to twelve Line Card Shelves. Each LCS has 24 mounting slots for line cards, one slot for a Line Card Shelf Multiplexer (LSM) card, and one slot for an optional LSM card for Remote Line Card Shelf protection group application.
- Line Card Shelf Multiplexer (LSM) card.** The LSM card communicates with the Master Line Card Adapter (MLA) card. The LSM multiplexes and demultiplexes ATM cell streams for up to 24 line cards in a Line Card Shelf.
- Link A.** The virtual connection path between the D50 and the CPE (or line card) side of the network.
- Link Z.** The virtual connection path between the D50 and the ATM side of the network.
- LISP (Local Internet Service Provider).** See ISP (Internet Service Provider).
- Local Loop.** The twisted pair cable connecting the subscriber to the Central Office.
- LOF (Loss of Frame).** A condition that can occur in digital transmissions when the receiving equipment loses frame alignment data (used to determine channel assignments and channel boundaries).

**Loopback.** Type of diagnostic test in which the transmitted signal is returned to the sending device after passing through a data communications link or network. The returned signal is then evaluated (either by a technician or diagnostic equipment) to get some sense of the condition of the line. Typically used in troubleshooting a data circuit or network.

**LOS (Loss of Signal).** An alarm sent by the receiving end to indicate that the transmission signal has been lost.

**Low Pass Filter Shelf (LPFS8).** Data plus voice frequency signals are received from the customer at the Low Pass Filter Shelf. The LPF8 card “splits” the low frequency voice signal from the high frequency ADSL signal. The voice signal is sent to the voice switch unimpeded; the data signal is received by the line card.

**Master Control Processor (MCP) card.** The MCP card is the central control and communications path for the D50; it stores program and provisioning database information. The D50 has two MCP cards in a 1:1 protection group.

**Master Control Shelf (MCS).** The MCS contains the central control and communication functions for the D50 and serves as the ATM network interface.

**Master Line Card Adapter (MLA) card.** Each MLA card provides the broadband interface to one Line Card Shelf. There are up to twelve MLA cards in a Master Control Shelf providing the broadband interface for up to twelve Line Card Shelves and up to 288 line cards.

**Mbps (Mega Bits Per Second).** A measurement of transmission speed – one million bits transmitted each second.

**MBS (Maximum Burst Size).** An ATM traffic parameter that specifies the maximum number of cells in a burst that can be transmitted at the peak rate assuming that, at the beginning of the burst, the receiving buffers are empty.

**MDF (Main Distribution Frame).** A wiring arrangement which connects the telephone/data lines coming from outside on one side and the internal lines on the other.

**MDU (Multiple Dwelling Unit).** Refers to high-rise apartment buildings or sometimes office buildings. Newer MDUs are often being built with fiber optic cables and other equipment (such as DSLAMs) installed so the occupants have easy access to high-speed data services.

**MHz (Megahertz).** A unit of frequency equal to one million (1,000,000) cycles per second (Hz).

**MIB (Management Information Base).** The MIB contains all the provisioning information for the D50 Multiplexer. (The MIB contains data available to a network management program. The network manager queries the MIB.)

**MTBF (Mean Time Between Failure).** Reliability metric for electronic equipment that represents the average amount of time (expected or predicted) between breakdowns.

**Multi-mode Fiber.** Fiber whose core diameter is larger than single mode fiber, which allows many modes of light to propagate down the multiple fiber optic paths. Each of these paths has a slightly different length, depending upon how often the light

bounces off the reflective boundary of the core region. Multi-mode fiber is used for short-distance data links.

**Multiplexer.** Equipment that aggregates two or more channels onto a single transmission channel.

**MUX.** Abbreviation for Multiplexer.

**NE (Network Element).** Processor controlled entities of the telecommunications network that primarily provide switching and transport network functions and contain network operations functions.

**NEBS (Network Equipment Building System).** NEBS is the Network Equipment Building System specification authored by Bellcore. NEBS compliance is required by many carrier customers; the D50 shipping today is already NEBS-compliant.

**Network Management Processor (NMP) card.** The NMP card controls the D50's network management interfaces and provides the protocol support for communication for D50 Craft Terminal.

**NIC (Network Interface Card).** An electronic circuitry board that usually fits into an expansion slot of a PC whose purpose is to connect to a Local Area Network. A NIC is designed to comply with both a specific LAN Medium Access Control procedure (CSMA/CD for Ethernet) and a specific physical medium (e.g. twisted pair wire, coax, or multi-mode fiber). Associated with the NIC is a unique address called the MAC address. It works with the network software and computer operating system to transmit and receive messages on the network.

**NID (Network Interface Device).** The Nokia Broadband Systems' NID ADSL Splitter divides the ADSL and POTS signals and works in conjunction with the router at the subscriber end. The splitter installs on the outside of a home or building, and is enclosed in a weatherproof wall mount enclosure. It features primary lighting and AC power fault protection, and is a passive device, requiring no power or management from the Central Office or subscriber.

**NISP (National Internet Service Provider).** See ISP (Internet Service Provider).

**NNI (Network Node Interface).** An Asynchronous Transfer Mode (ATM) interface between two public network pieces of equipment (contrast that to UNI, which stands for User Network Interface).

**Node.** Connection point in a network.

**Noise.** Unwanted electronic signals or disturbance that degrades line performance.

**OAM (Operations And Maintenance).** A group of network management functions that provide network fault indication, performance information, and data diagnosis functions.

**OC-1 (Optical Carrier Level-1).** A SONET line rate of 51.840 Mbps. Direct electrical-to-optical mapping of the STS signal with frame synchronous scrambling.

**OC-12.** SONET channel of 622.08 Mbps.

**OC-3 (Optical Carrier Level-3).** A SONET line rate of 155.520 Mbps. 3 x OC-1. Direct electrical-to-optical mapping of the STS signal with frame synchronous scrambling.

**OC3L.** A OC3 rate broadband tributary card that provides a standard ATM UNI/NNI interface that supports provisionable VPI/VCI mappings to the D50 trunk card, allowing ATM cells to be aggregated from standard ATM network equipment.

**ODF (Optical Distribution Frame).** Connection and distribution point for fiber optic cables. It is similar, in function, to an MDF for copper wires.

**Optical Cross-Connect Panel.** A cross-connect unit used for circuit administration and built from modular cabinets. It provides for the connection of individual optical fibers with optical fiber patch cords.

**Oracle®.** An Object Relational Database Management System developed by Oracle.

**ORB (Object Request Broker).** An object-oriented system consisting of middleware which manages message traffic between application software and computer/software platforms.

**OSI (Open System Interconnection Reference Model).** An internationally accepted set of standards for communication between various systems manufactured by different vendors. The OSI Reference Model is a seven-layer model developed by the ISO (International Standardization Organization) to describe how to connect any combination of devices to communicate.

**OSS (Operations Support System).** A management operations center system which supports the daily operation of a telecommunications network.

**Packet.** A block or group of data organized in such a way as to be treated as a single unit within a communication network. It consists of the data (payload) and its control information.

**Pair Bonding.** This SHDSL feature enables the user to bond 2 ports to effectively double the maximum single-port bandwidth of 2.3 Mbps to provide up to 4.6 Mbps of symmetrical service.

**PAM (Pair Analysis Module) card.** A Nokia Broadband Systems' product. The PAM card plugs into the LCS backplane just like a line card and is used to test continuity of cable pair wiring from the LCS to the MDF. The PAM card is powered by AA batteries or -48V Central Office battery. The D50 does not have to be powered up to use the PAM card.

**Payload.** The data being transmitted, less its control and error-correction information.

**PCI (Peripheral Component Interconnect).** Bus of an Intel PC. PCI transfers data between the PC's main microprocessor and peripherals at up to 132 Mbps.

**PCR (Peak Cell Rate).** Specifies an upper bound on the rate at which traffic can be submitted to an ATM connection. Enforcement of this bound allows the network to allocate sufficient resources to ensure that the network performance objectives can be achieved.

**PDF (Portable Document Format).** File format of documents that can be viewed with Adobe Acrobat® Reader. PDF files are widely used to view files on the Internet.

**PDU (Protocol Data Unit).** In data communication protocols, a unit of data created by a given protocol layer at one place and logically transferred to the same layer at another place called a peer. This is the OSI terminology for "packet."

- PLCP (Physical Layer Convergence Protocol).** The part of the physical layer that adapts the transmission facility to handle DQDB (Distributed Queue Dual Bus) functions as defined in IEEE 802.6-1990.
- PM (Performance Monitoring).** A data collection and reporting mechanism for Quality of Service analysis.
- PNNI (Private Network-to-Network Interface).** PNNI is a standard of the ATM Forum that provides a multilevel hierarchical routing model for scalability in large and complex networks using ATM switches from multiple vendors.
- POP (Point-of-Presence).** The physical place within a LATA (Local Access and Transport Area; the long distance carrier's local office) where the IEC (Inter-Exchange Carrier) provides services to the LEC (Local Exchange Carrier), and perhaps directly to end-users.
- POTS (Plain Old Telephone Service).** A term used to describe analog, voice-only basic telephone service. All POTS lines work on loop start signaling.
- PPP (Point-to-Point Protocol).** A layer 2 protocol (relative to the OSI reference model) that allows a computer to use TCP/IP with a standard telephone line and a high-speed modem.
- Profile.** A set of pre-defined configuration variables which can be applied to one or more objects (of the same type) during the provisioning process. The use of profiles decreases configuration time and increases accuracy.
- PSD (Power Spectral Density).** PSD is the total power in the specified bandwidth divided by the specified bandwidth. PSD is measured in watts per hertz.
- PSTN (Public Switched Telephone Network).** Refers to the worldwide telephone system accessible to anyone with a telephone.
- PTT (Post Telephone & Telegraph administration).** The PTTs, usually controlled by their governments, provide telephone and telecommunications services in most countries outside of the USA.
- PVC (Permanent Virtual Circuit).** A permanent association between two DTEs (Data Terminal Equipment) established by configuration (established administratively via a service order process). A PVC uses a fixed logical channel to maintain a connection between the DTEs. After a PVC is defined, it requires no setup operation before data is sent and no disconnect operation after. The concept of a PVC is included in Networks supporting X.25, Frame Relay and ATM.
- QoS (Quality of Service).** In ATM networks, a set of parameters for describing a transmission. These parameters include values such as allowable cell loss ratio. The parameters apply to virtual channel connections and virtual path connections.
- RADSL (Rate Adaptive Digital Subscriber Line).** Transmission technology that supports both asymmetric and symmetric applications on a single twisted pair telephone line. Transmission rates are dynamically adjusted as the performance of the loop varies during a session.
- RBOC (Regional Bell Operating Company).** These are the major local service providers in the USA today. In 1984 ATT was broken up into 7 RBOCs. Today,

because of mergers, there are 4 RBOCs: BellSouth, Bell Atlantic, SBC Communications, and US WEST (recently merged with Qwest Communications).

**Redundancy.** This refers to various designs that provide a backup system (or part of a system) in case of a failure. As an example, the D50 has redundant power input terminals so that if one power source fails the backup source can continue to provide power to the system.

**Reed-Solomon.** A coding technique used to handle Forward Error Correction (FEC).

**Remote Line Card Shelf (RLCS).** An RLCS allows customers served over long loops — beyond 5.5 kilometers from the Central Office — access to DSL service. The RLCS is located remotely from the Central Office in an outside cabinet and connected to the Central Office Master Control Shelf via fiber optic, coax or copper cable extensions.

**Remote Low Pass Filter (RLPF).** The RLPF is a remote passive low pass filter “splitter” device. It splits the high frequency ADSL data signal from the voice signal at the customer end just like the Low Pass Filter card in the Central Office. There are two types of RLPF – a retrofit RLPF available in a standard Network Interface Device housing and a stand-alone RLPF.

**RFC (Request for Comments).** In the Internet community, a series of documents that contain protocol and model descriptions, experimental results, and reviews. All Internet standard protocols are written up as RFCs.

**SCR (Sustainable Cell Rate).** An ATM traffic parameter in cells per second that characterizes a bursty source and specifies a maximum average rate at which cells can be sent over a given ATM virtual connection.

**SDH (Synchronous Digital Hierarchy).** SDH is a high-speed, fiber-optic system, which provides an interface and mechanism for optical transmission of digital information. At the interface, signals are converted from electrical to optical form (and back to electrical form at the destination). SDH is an ETSI standard and is used in most of the world outside North America, where SONET is used. Transmission rates range from 155.520 Mbps to 9.953 Gbps.

**SDSL (Symmetric Digital Subscriber Line).** Also referred to as Single-Line Digital Subscriber Line, SDSL supports symmetrical T1 transmissions. It uses a single copper-pair wire and has a maximum operating range of 10,000 feet. It is capable of accommodating applications that require identical downstream and upstream speeds, such as video conferencing.

**Serial Port.** A hardware input/output port in which only one pin is available for data transmission in a given direction – bits are transmitted in sequence (one bit at a time). The wiring for a port is associated with a particular physical interface (i.e., RS-232). A serial port is most commonly used for a modem or a mouse.

**Service Provider.** A service provider is an organization or individual that provides telephone access to a network or to another service, such as the Internet.

**SHDSL (Single line high bit rate DSL).** Nokia octal line card supporting 8 ports of symmetric bit-rate transmission using multi-level Trellis Coded Pulse Amplitude Modulation (TC PAM).

**Simplex.** Simplex communication means that data can only be sent in one direction at a time. Also referred to as half-duplex.

**Single Mode Fiber.** Single mode fiber only provides one path for light pulses to travel through the fiber optic cable. There is very little loss of light pulses transmitted on single mode fiber. Therefore single mode fiber can be used for much longer distances than multi-mode fiber.

**Smart Jack.** According to the Newton's Telecom Dictionary, a "Smart Jack" is an industry term for a device that tests the integrity of T-1 circuits remotely from the central office. Installed on the customer premises in the form of a semi-intelligent demarcation point, a Smart Jack is completely passive until activated by code.

**SNMP (Simple Network Management Protocol).** The network management protocol used within TCP/IP-based internets. Defines the protocol for managers (clients) to communicate with agents (servers). The agent interfaces directly with the networking layers on the monitored network device to obtain the network management information. An agent is installed on every network device that will be managed or monitored. A client is an application program that is installed at the network operations center. It communicates with the SNMP agents to collect information in the form of MIB variables. SNMP is a request/reply protocol that uses the operations of Set or Get on data items in an agent's MIB.

**SNR (Signal-to-Noise Ratio).** In transmission, SNR is the ratio between the signal and noise levels at a given point, usually at the receiving end of the transmission. The SNR value is generally expressed in decibels (dB). The SNR can be used to determine how long a cable segment can be before the signal loss is unacceptably high. The SNR also helps determine whether a particular type of cable is appropriate for the intended use.

**SONET (Synchronous Optical Network).** SONET is a high-speed, fiber-optic system, which provides an interface and mechanism for optical transmission of digital information. At the interface, signals are converted from electrical to optical form (and back to electrical form at the destination). SONET is an ANSI standard. Transmission rates range from 51.84 Mbps to 13.22 Gbps.

**Splitter.** A device used in DSL to split the incoming bit stream into voice and data.

**Subnet.** A physically independent network segment. A subnet usually identifies all of the nodes in one geographical area or building. Nodes on a subnet can share a single network address.

**SVC (Switched Virtual Circuit).** A virtual connection set up on demand via a signal protocol connection, established for a specific communications session and then terminated after the session is over. This is in contrast to a permanent virtual circuit (PVC), which is a connection that is always established.

**T1.** DS1 rate electrical signal (two pair). T1 is suited for voice, data and image transmissions. T1 has a bandwidth of 1.544 Mbps, which comes from two dozen 64 Kbps channels, together with one 8 Kbps framing channel.

**Tagging.** The marking of a non-conforming cell that can be later discarded along its route through the ATM network if severe congestion conditions are experienced or the cell is still in violation of the traffic contract.

**TCM (Trellis Coding Modulation).** A method of forward error correction in which each signal element is assigned a value based on phase and amplitude to help the receiving modem determine if the element is received in error. Allows the user to meet performance margin requirements for long loops, or increase the transmission throughput under a specified performance margin; provides increased gain against background and crosstalk noise.

**TCP/IP (Transmission Control Protocol / Internet Protocol).** TCP/IP is a common suite of several networking protocols developed for use on the Internet.

**Telnet.** Telnet is the terminal-remote host protocol developed for ARPAnet in 1974. On the Internet, it is a service program that allows you to connect to other computers at another site permitting you to interact with applications as if by a local terminal.

**Threshold.** Level or value of a particular signal where an event or alarm will be generated.

**TMN (Telecommunications Management Network).** Reference model for telecommunications network management.

**Transmission rates.** The speed at which data is transmitted, measured in bits per second (bps).

Table 10-138: Transmission Rates

DS level	E level	OC level	STM equivalents	Line bit rate
DS-0				64 Kbps
DS-1 (T-1)				1.544 Mbps
	E-1			2.048 Mbps
DS-2				6.312 Mbps
	E-2			8.448 Mbps
	E-3			34.368 Mbps
DS-3 (T-3)				44.736 Mbps
		OC-1		51.840 Mbps
		OC-3	STM-1	155.52 Mbps
		OC-9		466.56 Mbps
		OC-12	STM-4	622.08 Mbps
		OC-18		933.12 Mbps
		OC-24	STM-8	1.244 Gbps
		OC-36	STM-12	1.866 Gbps
		OC-48	STM-16	2.488 Gbps

Table 10-138: Transmission Rates (continued)

DS level	E level	OC level	STM equivalents	Line bit rate
		OC-96		4.976 Gbps
		OC-192		9.953 Gbps

- **DS.** Digital Signal hierarchy: standard signals used in the U.S. telecommunications industry.
- **E.** Standard signals used in the European telecommunications industry.
- **OC.** Optical Carrier; a SONET optical signal.
- **STM.** Synchronous Transport Module; depends on information occurring in regular and fixed patterns with respect to a reference such as a frame pattern.

**Trap.** A method used to isolate an abnormal condition or operation.

**Trunk.** A communication circuit or link that interconnects two entities, usually switching systems.

**Trunk Card.** An interface card used to connect a D50 multiplexer to the ATM backbone facility.

**Tunneling.** Refers to the encapsulation of a protocol within another protocol format that provides a datalink or path. Tunneling can be used as part of a private secure network via the Internet.

**Twisted Pair.** The term used to describe common copper telephone wire. The two wires are called Tip and Ring. Also called Unshielded Twisted Pair (UTP).

**UBR (Unspecified Bit Rate).** In ATM networks, a UBR connection transmits at variable rates. With UBR, specific bandwidth allocation is not guaranteed.

**UBR+.** Unspecified Bit Rate with minimum cell rate guarantee that allows a connection to burst up to peak cell rate.

**UNI (User Network Interface).** In ATM networks, one of three levels of interface. A UNI specification which defines Layer 1 and Layer 2 protocols required for CPE and carrier equipment to interoperate. UNI specifications provide physical media and line rate implementation options.

**UNIX.** A multi-task, multi-user operating system developed by Ken Thompson of AT&T Bell Labs. UNIX is a registered trademark of Santa Cruz Operations.

**UPC.** The traffic control entity that monitors and enforces a virtual circuit's conformance with the source's traffic contract and parameters.

**Upstream.** Description of the communications path coming from the client/end user to the CO or DSLAM.

**USB (Universal Serial Bus).** The Universal Serial Bus is used in newer PCs. The bus is 12 Mbps and designed to be "plug and play." It supports multiple PC peripherals, including Nokia D50-compatible CPE with USB.

**VBR (Variable Bit Rate).** In ATM networks, a VBR connection transmits in bursts, at variable speeds.

**VC Topology.** Used in the Nokia D50's Craft Terminal software to set the direction and mode of communication for duplex, simplex egress, and simplex ingress PVC connections.

**VCI (Virtual Channel Identifier).** An identifier (value) in an ATM cell that identifies the data of one Virtual Channel connection from the data of another connection.

**VDSL (Very-high-speed Digital Subscriber Line).** VDSL provides DSL service at a data rate in excess of 10 Mbps (up to 52 Mbps). VDSL has a maximum operating range from 1,000 feet to 4,500 feet on 24-gauge wire.

**VF. Voice Frequency** – In telephony, the usable voice-frequency band ranges from approximately 300 Hz to 3400 Hz. Also, the bandwidth allocated for a single voice-frequency transmission channel is usually 4 kHz.

**VoDSL (Voice over Digital Subscriber Line).** An end-to-end voice transport technique integrating voice and data over DSL using special gateways that are designed to connect packetized voice traffic to Class 5 circuit switches.

**VoIP (Voice over Internet Protocol).** A technique for transmitting voice information in digital form in packets rather than the circuit-switch protocol of the public switched telephone network.

**VPI (Virtual Path Identifier).** An identifier (value) in an ATM cell that identifies the data of one Virtual Path connection from the data of another connection.

**WAN (Wide Area Network).** A WAN is a network of computers and related communications equipment whose elements may be in dispersed sites with distances great enough to require common carrier provided communication lines.

**xDSL (all forms of Digital Subscriber Lines).** The "x" represents the various types of digital subscriber lines: ADSL, RADSL, SDSL, HDSL, SHDSL, IDSL, or VDSL.

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## Appendix K

### Glossary and Acronyms

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- 10BaseT.** A 10 Mbps Ethernet network that uses unshielded twisted pair cable in a star topology with a central hub.
- 2B1Q (Two Binary, One Quaternary).** A line encoding technique used in ISDN BRI, IDSL and SDSL. It is a four-level PAM (Pulse Amplitude Modulation) technique, which maps two bits of data into one quaternary symbol, with each symbol comprising one of four variations in amplitude and polarity over a circuit.
- AAL (ATM Adaptation Layer).** ATM Adaptation Layer is located above ATM and converts non-ATM bit streams into ATM cells. The AAL protocol supports higher-layer service requirements.
- ADSL (Asymmetric Digital Subscriber Line).** Asymmetrical data signals for Internet access that share twisted pairs with POTS and that use modern signal modulation techniques to accomplish the data communications task. The downstream rates are much faster than the upstream rates.
- AIS (Alarm Indication Signal).** A downstream signal in a digital network that replaces the normal traffic signal when a maintenance alarm indication has been activated (indicating an upstream failure detection – error or alarm on the network). It is used in the OSI network management model.
- Alarm.** A signal used to indicate that an abnormality, a fault, or a failure has been detected. Alarms may be distinguished by type and by the severity of the event that caused the alarm.
- ANSI (American National Standards Institute).** Founded in 1918, ANSI is a U.S. voluntary standards setting board.
- API (Application Programming Interface).** Software that an application program uses to request and carry out lower-level services performed by an operating system.
- ASCII (American Standard Code for Information Interchange).** A computer coding method for converting alphanumeric and punctuation characters and control codes into digital (binary) form.
- ATM (Asynchronous Transfer Mode).** A multiplexed information transfer and switching process (cell-switched technology) in which data is organized into fixed length (53 octet) cells and transmitted according to each application's requirement. ATM is generally deployed in enterprise networks, which often connect LANs over wide areas that require large amounts of data to be transported over great distances.
- Attenuation.** Attenuation is the loss of signal strength over distance. Attenuation is measured in decibels.

**ATUC (ADSL Transmission Unit – Central Office).** Special electronics located in the Central Office to support a high rate of data transmission over UTP copper wires. This is the “downstream” direction. Works in conjunction with ATUR (see below).

**ATUR (ADSL Transmission Unit – Remote).** Special electronics located at the customer’s premises to support a high rate of data transmission over UTP copper wires. This is the “upstream” direction. Works in conjunction with ATUC (see above).

**AutoBaud.** A set of drivers available on SDSL devices to promote inter-operability.

**Auxiliary Common Systems Interface Panel (CSIP).** Each Auxiliary CSIP connects and distributes Central Office power to up to four Line Card Shelves (LCSs). Auxiliary CSIPs are required for D50’s with over five LCSs.

**AWG (American Wire Gauge).** A standard classification for measuring non-ferrous conductors such as copper wire.

**Backbone.** The part of a network that carries the heaviest traffic. It is one basis for the design of an overall network service. For example, the D50 operates on an ATM backbone.

**Bandwidth.** The capacity of a communications channel. For digital communications, bandwidth is usually measured in bits per second.

**BER (Bit Error Rate).** A measurement of transmission quality expressed as a ratio (ratio of error bits to the total number of bits transmitted – erroneous bits per million). The BER indicates how many bits are incorrectly transmitted in a given bit stream. The BER depends on the type and length of transmission.

**BNC (Bayonett Neill Concelman).** A bayonet-locking cabling interconnection standard, used in thin coaxial cable Ethernet applications.

**BPS (Bits Per Second).** A measurement of transmission speed – number of bits transmitted each second.

**Bridge.** A communications device used to interconnect networks or network nodes with a common set of higher level protocols.

**Broadband.** A communications method in which multiple channels are formed by dividing the transmission medium on a shared communications path. Generally describes communications above 1.5 Mbps.

**Burst.** A short flow of packets, often followed by idle periods where there is no transmission activity.

**CAC (Connection Admission Control).** Procedures carried out by an ATM network at connection set-up to determine whether a requested virtual connection can be supported or should be rejected.

**CAM (Complimentary Analysis Module).** A Nokia Broadband Systems product. A card that is used to provide the pathway to perform continuity testing from the LCS to the MDF when using a Low Pass Filter Shelf (LPFS8). Plugs into the LPFS8 backplane in the same manner as a Low Pass Filter card. Works with the PAM (Pair Analysis Module) card.

- CAP (Competitive Access Provider).** An alternative competitive local exchange carrier.
- CBR (Constant or Continuous Bit Rate).** An ATM service category that supports a constant or guaranteed rate to transport services such as video or voice as well as circuit emulation requiring rigorous timing control and performance parameters.
- CCA (Congestion Control and Avoidance).** A resource and traffic management mechanism to correct, avoid and/or prevent excessive situations such as buffer overflow or insufficient bandwidth that can cause the network to collapse.
- CDV (Cell Delay Variance).** A component of Cell Transfer Delay, induced by buffering and scheduling.
- CDVT (Cell Delay Variance Tolerance).** Specifies the acceptable tolerance to cell-by-cell variations of the CDV (jitter).
- CE.** Products sold into the European Economic Community since January 1996 are required to carry the CE Mark. The CE Mark represents that the product meets all Electromagnetic Compatibility Directives.
- Cell.** The smallest data component in an ATM stream. The ATM Cell has a 5-byte header and contains 48 bytes of payload.
- CEV (Controlled Environment Vault).** An environmentally conditioned room for housing optical and electronic equipment.
- Channel.** A point-to-point link in a communications system.
- Circuit.** A transmission path for sending and receiving data and/or voice between two points in a telecommunications system.
- Circuit Emulation.** A virtual circuit service offered to end users where the characteristics of an actual, digital bit-stream line (for example, video traffic) are emulated.
- CLEC (Competitive Local Exchange Carrier).** These carriers compete with the local exchange service to provide telephone service to customers who may choose voice and/or data services. Additionally, a CLEC may lease existing lines or provide their own local loop.
- CLEI (Common Language Equipment Identifier) Codes.** Assigned to all telecommunications equipment that may be installed in a RBOC facility (or other facilities if required). The codes are assigned by Bellcore (now SAIC).
- Client/Server Model.** In the client-server model, the *server* program offers a service reachable over the network (or within a stand-alone system). A server receives a request, performs the service, and returns the result to the requester. The *client* program sends a request to the server and waits for a response.
- CLP (Cell Loss Priority).** A 1-bit field in the ATM cell header that corresponds to the loss priority of a cell. Lower priority (CLP=1) cells can be discarded under a congestion situation.
- CLR (Cell Loss Ratio).** A QoS parameter that gives the ratio of the lost cells to the total number of transmitted cells on a given VCC in cells per second.

**CMIP (Common Management Information Protocol).** An OSI network management/service interface protocol created and standardized by ISO. Based on the basic data storage concept in which management information is collected and stored for subsequent retrieval by a management application. Provides for the transmission of event notifications and the transmission of operations directed toward managed objects.

**CO (Central Office).** Houses the Local Exchange switch that terminates individual local telephone subscriber lines for switching and connection to the public network (locally and long distance).

**Coding Violation (CV).** A violation detected in the coding of a signal.

**Common Systems Interface Panel (CSIP) Alarm Board.** All D50 alarm connections are made at the CSIP Alarm Board; Central Office visual, audible, remote Bay Alarm and remote input alarms. The Alarm Board has LEDs to display D50 alarm status.

**Common Systems Interface Panel (CSIP) Power and Distribution Board.** The CSIP Power and Distribution Board is located in the Master Control Shelf (MCS). Central Office power is terminated at the CSIP and is distributed to the MCS and up to four Line Card Shelves (LCSs).

**CORBA (Common Object Resource Broker Architecture).** An Object Request Broker (ORB) standard developed by the Object Management Group (OMG). It is an object-oriented technology which provides a scalable, open platform for both service provider and large enterprise network environments.

**COT (Central Office Terminal or Termination).** The termination of a local loop facility. Located at the Central Office facility. See Digital Loop Carrier for further information about how this is used.

**CPE (Customer Premises Equipment).** Refers to telephone and related equipment located on the customer's premises (office or home).

**Craft Terminal (DiamondCraft®).** Craft Terminal, previously known as DiamondCraft, is the D50's stand-alone craft interface application. It communicates directly with a D50 through a serial port connection using Point-to Point Protocol (PPP) or an Ethernet connection.

**CRC (Cyclical Redundancy Checking).** A data error-detecting mathematical process designed to ensure that errors don't occur undetected in a block of data. Systems using CRC will request that data be retransmitted if errors are detected.

**Cross-connect.** A connection between two or more elements of a telecommunications system.

**CTD (Cell Transfer Delay).** A QoS parameter that measures the maximum or worst-case time for a cell to be transferred from its source to its destination over a virtual connection. It is the sum of buffering, propagation, processing and queuing delays.

**D50 Multiplexer.** The D50 Multiplexer is classified as a Digital Subscriber Line Access Multiplexer (DSLAM). The D50 Multiplexer uses Digital Subscriber Line

(DSL) and Asynchronous Transfer Mode (ATM) technologies to deliver high speed data rates over the existing copper network.

**D50 RAM (Remote Access Module).** The D50 RAM is a small, versatile DSL remote line card shelf supporting up to three 8-port D50 line cards, one Line Card Shelf Multiplexer card, and three low pass filter cards, for up to 24 lines. It is equivalent to a small LCS.

**Data Rate.** The rate at which a channel carries data – measured in bits per second.

**dB (Decibel).** The decibel is a unit used to measure the power of sound or voltage. It is expressed as the ratio of two values. In telephony, the decibel (a logarithmic measurement) is used as a measure of relative power between circuits or transmission level points. As a reference: a change in level of 1 dB is barely perceptible under ideal conditions; however, increases or reductions of 3 dB result in doubling or halving, respectively, the power in a circuit. The corresponding figure for doubling or halving voltage is 6 dB.

**DLC (Digital Loop Carrier).** Network transmission equipment used to provide a pair gain function. DLC equipment is deployed in situations in which the cost of the equipment is more than offset by the savings in copper distribution accomplished by eliminating need for as many copper pairs. Digital loop carrier systems consist of two parts—a Central Office Terminal (COT) and a Remote Terminal. The COT provides the multiplexing/demultiplexing function of individual voice signals to the composite multiplexed signal at the interface between the switching equipment and the DLC. The Remote Terminal provides the multiplexing/demultiplexing function at the interface between the individual subscriber pairs and the DLC equipment.

**DMT (Discrete Multi-Tone).** Modulation technique which uses Frequency Division Duplex multiplexing to transmit data in the 35 kHz to 1.1 MHz frequency spectrum. It divides the frequency range into 256 discrete bands, each with 4 kHz bandwidth. Each band is independently modulated.

**Downstream.** The communications path going from the CO or DSLAM to the client/end user.

**DS1 (Digital Signal Level One).** 1.544 Mbps digital signal.

**DS3 (Digital Signal Level Three).** 44.736 Mbps digital signal – equivalent of 28 T-1 channels (also referred to as T-3).

**DS3L.** A DS3 rate broadband tributary card that provides a standard ATM UNI/NNI interface that supports provisionable VPI/VCI mappings to the D50 trunk card, allowing ATM cells to be aggregated from standard ATM network equipment.

**DSL (Digital Subscriber Line).** The generic name for a family of digital services provided by the local telephone companies to their local subscribers. The high speeds of transmission (up to 8 Mbps) are accomplished over the existing twisted pair copper wires.

**DSLAM (Digital Subscriber Line Access Multiplexer).** An ATM access mux/concentrator that grooms traffic from multiple low rate lines into a high rate trunk (DS1, DS3, OC3, OC12).

- Duplex.** Simultaneous, two-way independent transmission of data. Both ends of the communication can send and receive data at the same time. Also referred to as full-duplex.
- EFCI (Explicit Forward Congestion Indication).** A field in the ATM cell header indicating congestion or impending congestion. When EFCI is set, it indicates that a network element is either in a congested state or there is a potential congested state problem. The ATM end-system receiving cells with EFCI set can use this indication to adaptively decrease the cell rate of the connection to avoid congestion.
- Egress.** Outgoing direction to a network or network device. The term refers to data being sent out of a device or system, as opposed to information being sent into a network or network device (ingress).
- EMI (Electromagnetic Interference).** Unwanted electrical noise from an external source that can interfere with transmissions over copper cables.
- EML (Element Management Layer).** A layer representing the management and monitoring of components, at their lowest level, in a telecommunications network. In short, an abstraction of the functions provided by systems that manage each network element on an individual basis.
- EMS (Element Management Systems).** Software used to manage and monitor components of a telecommunication system at the lower levels of the Telecommunications Management Network.
- EOC (Embedded Operations Channel).** A control and signaling channel used for operations, administration and maintenance of the transmission line.
- EPD (Early Packet Discard).** A congestion control technique that selectively drops all but the last ATM cell in a Classical IP over ATM packet.
- Error Rate.** The ratio of incorrect elements sent to the total number of elements transmitted.
- ES (Errored Seconds).** The number of seconds in which at least one coding violation was detected.
- ESD (Electrostatic Discharge).** Transfer of an electrostatic charge on a surface through a conductive path to ground.
- ETSI (European Telecommunications Standards Institute).** ETSI is the European counterpart to ANSI, the American National Standards Institute. ETSI was founded in 1988.
- Fault.** Performance degradation that impacts the ability of the network element from properly performing.
- FEBE (Far End Block Error).** FEBE is used to monitor bit error performance of a communication link. An indication returned to the source that the far-end receiver has detected one or more errors in its received signal from the source.
- FEC (Forward Error Correction).** A transmission method in which extra bits or characters transmitted with the payload so that transmission errors can be corrected on the receiving end without forcing a retransmission.

- FM (Fault Management).** A data collection and reporting mechanism for component fault analysis.
- Frame.** In Time Division Multiplexing (TDM), a frame is one complete cycle of events. The frame consists of a fixed-size block of bits, which contains one (or more) time slots for each channel, plus synchronization and other overhead bits.
- Frame Relay.** Frame Relay is a packet mode switching interface defined by the ITU-T. Frame relay is provided on fractional T-1 or full T-carrier system carriers.
- FRF.** Frame Relay Forum.
- FRF.5.** Frame Relay/ATM PVC Network Interworking Implementation Agreement. FRF.5 provides the standard for ATM to become a high speed backbone for Frame Relay PVCs.
- FRF.8.** Frame Relay/ATM PVC Network Interworking Implementation Agreement. FRF.8 provides the standard for Frame Relay PVCs and ATM PVCs to communicate.
- GFC (Generic Flow Control).** A four bit field in the ATM header which can be used to provide local functions (e.g. flow control). The GFC is used to ensure that all nodes obtain access to the transmission medium. It can also be used to prioritize transmissions by data type.
- GUI (Graphical User Interface).** Generic name for the computer interface that presents graphics (icons) and characters. The GUI permits users to directly manipulate graphical objects displayed on the monitor.
- HDLC (High Level Data Link Control).** An ITU-TSS link layer protocol standard for point-to-point and multi-point communications. HDLC includes functions for link establishment, sequencing, flow control and error recovery.
- HDSL (High bit rate Digital Subscriber Line).** HDSL provides a T1 on two copper wire pairs (without the loop engineering and repeaters required for a standard T1 system).
- HEC (Header Error Control).** An 8-bit field (the last byte) of the ATM-cell header, whose purpose is to allow a receiver to detect, and possibly correct, transmission errors in the cell header. It is used for checking integrity only.
- HTML (Hyper Text Markup Language).** HTML is the software programming language used to create World Wide Web pages.
- IAD (Integrated Access Device).** An integrated-access device that can multiplex voice and data on one line.
- IDF (Intermediate Distribution Frame).** A metal rack designed to connect cables and located in an equipment room or closet. Consists of bits and pieces that provide the connection between inter-building cabling and the intra-building cabling (i.e. between the Main Distribution Frame (MDF) and individual phone wiring).
- ISDL (ISDN Digital Subscriber Line).** Delivers speeds up to 128/144 Kbps on copper loops as long as 18,000 feet. Dedicated service for data communications applications only. 2B1Q interface. In most cases, users can use their existing ISDN CPE equipment.

**IEEE (Institute of Electrical and Electronics Engineers).** An international engineering organization that defines standards related to networking and other areas.

**IETF (Internet Engineering Task Force).** One of two technical engineering bodies of the Internet Architecture Board. The IETF is responsible for solving short-term engineering needs and standards of the Internet.

**ILEC (Incumbent Local Exchange Carrier).** The local carrier that is (typically) the primary carrier for local calls in a given area. ILECs are telephone companies that were part of the Bell System.

**In-Band.** Using the same circuit to transport both the information (e.g., data or voice) along with the signaling information.

**Ingress.** Incoming direction to a network or network device. The term refers to data being sent into a network element or system, as opposed to information being sent out (egress).

**Interleave.** A process or technique that reduces the number of undetected error bursts and improves burst error performance. Interleave mode provides the most robust service and more reliable service under long reach conditions for DSL service that supports the Interleave process.

**Inverse Multiplexer (IMUX).** A device that combines multiple links (usually T1s or E1s) a single shared digital channel. Circuits can be added and dropped without losing ATM cells.

**IP (Internet Protocol).** A component of the TCP/IP protocol suite. IP operates at Layer 3 of the OSI Reference model.

**ISDN (Integrated Services Digital Network).** ISDN is a digital telecommunications standard for transmitting digital voice, data and video on the same transmission facility. ISDN has two basic access interfaces; BRI (Basic Rate Interface) and PRI (Primary Rate Interface). Both interfaces provide circuit-switched access to public networks. BRI provides a throughput of 144 Kbps and PRI has a throughput of up to 2 Mbps.

**ISO (International Standards Organization).** The International Standards Organization is an international organization founded in 1946 to facilitate the development of international data communication standards.

**ISP (Internet Service Provider).** A vendor who provides access to the Internet and the World Wide Web.

**ISU (Integrated Services Unit).** A digital device that consists of a CSU (Channel Service Unit) and DSU (Digital Service Unit).

**ITU (International Telecommunications Union).** An organization established by the United Nations. The ITU sets telecommunications standards and allocates frequencies to various uses worldwide.

**IWF (Interworking Function).** A function used on an interface between networks which use dissimilar technologies.

- IXC (Interexchange Carrier).** Long distance carrier such as AT&T, MCI WorldCom, Sprint, and some smaller carriers.
- Java.** A programming language developed by Sun Microsystems® for platform independent, object-oriented application development.
- JDBC (Java DataBase Connectivity).** A Java based driver which provides a database independent interface between a Java application or applet and the database. It provides a Java API on one side and an SQL interface on the other.
- JDK (Java Developer's Kit).** A (platform specific) development environment for creating Java based applications and applets.
- Kbps (Kilo Bits Per Second).** A measurement of transmission speed – one thousand bits transmitted each second.
- kHz (Kilohertz).** A unit of frequency equal to one thousand (1,000) cycles per second (Hz).
- LAN (Local Area Network).** A privately owned and administered network for data communications, usually within a building or campus environment, used to connect computers and peripheral devices. Communication is typically accomplished by broadcasting on a connectionless basis over a shared medium.
- Latency.** The amount of time between the moment a device generates a request for data and the instant at which the requested channel is available for transmission.
- Leaky Bucket Algorithm.** Officially called the Generic Cell Rate Algorithm. A method of explaining by means of a hole in a bucket, how an ATM switch measures the PCR and SCR conformance of each CBR and VBR connection.
- Line Card.** A line card serves as the interface between a line and a communications device.
- Line Card Shelf (LCS).** The D50 is made up of one Master Control Shelf and up to twelve Line Card Shelves. Each LCS has 24 mounting slots for line cards, one slot for a Line Card Shelf Multiplexer (LSM) card, and one slot for an optional LSM card for Remote Line Card Shelf protection group application.
- Line Card Shelf Multiplexer (LSM) card.** The LSM card communicates with the Master Line Card Adapter (MLA) card. The LSM multiplexes and demultiplexes ATM cell streams for up to 24 line cards in a Line Card Shelf.
- Link A.** The virtual connection path between the D50 and the CPE (or line card) side of the network.
- Link Z.** The virtual connection path between the D50 and the ATM side of the network.
- LISP (Local Internet Service Provider).** See ISP (Internet Service Provider).
- Local Loop.** The twisted pair cable connecting the subscriber to the Central Office.
- LOF (Loss of Frame).** A condition that can occur in digital transmissions when the receiving equipment loses frame alignment data (used to determine channel assignments and channel boundaries).

**Loopback.** Type of diagnostic test in which the transmitted signal is returned to the sending device after passing through a data communications link or network. The returned signal is then evaluated (either by a technician or diagnostic equipment) to get some sense of the condition of the line. Typically used in troubleshooting a data circuit or network.

**LOS (Loss of Signal).** An alarm sent by the receiving end to indicate that the transmission signal has been lost.

**Low Pass Filter Shelf (LPFS8).** Data plus voice frequency signals are received from the customer at the Low Pass Filter Shelf. The LPF8 card “splits” the low frequency voice signal from the high frequency ADSL signal. The voice signal is sent to the voice switch unimpeded; the data signal is received by the line card.

**Master Control Processor (MCP) card.** The MCP card is the central control and communications path for the D50; it stores program and provisioning database information. The D50 has two MCP cards in a 1:1 protection group.

**Master Control Shelf (MCS).** The MCS contains the central control and communication functions for the D50 and serves as the ATM network interface.

**Master Line Card Adapter (MLA) card.** Each MLA card provides the broadband interface to one Line Card Shelf. There are up to twelve MLA cards in a Master Control Shelf providing the broadband interface for up to twelve Line Card Shelves and up to 288 line cards.

**Mbps (Mega Bits Per Second).** A measurement of transmission speed – one million bits transmitted each second.

**MBS (Maximum Burst Size).** An ATM traffic parameter that specifies the maximum number of cells in a burst that can be transmitted at the peak rate assuming that, at the beginning of the burst, the receiving buffers are empty.

**MDF (Main Distribution Frame).** A wiring arrangement which connects the telephone/data lines coming from outside on one side and the internal lines on the other.

**MDU (Multiple Dwelling Unit).** Refers to high-rise apartment buildings or sometimes office buildings. Newer MDUs are often being built with fiber optic cables and other equipment (such as DSLAMs) installed so the occupants have easy access to high-speed data services.

**MHz (Megahertz).** A unit of frequency equal to one million (1,000,000) cycles per second (Hz).

**MIB (Management Information Base).** The MIB contains all the provisioning information for the D50 Multiplexer. (The MIB contains data available to a network management program. The network manager queries the MIB.)

**MTBF (Mean Time Between Failure).** Reliability metric for electronic equipment that represents the average amount of time (expected or predicted) between breakdowns.

**Multi-mode Fiber.** Fiber whose core diameter is larger than single mode fiber, which allows many modes of light to propagate down the multiple fiber optic paths. Each of these paths has a slightly different length, depending upon how often the light

bounces off the reflective boundary of the core region. Multi-mode fiber is used for short-distance data links.

**Multiplexer.** Equipment that aggregates two or more channels onto a single transmission channel.

**MUX.** Abbreviation for Multiplexer.

**NE (Network Element).** Processor controlled entities of the telecommunications network that primarily provide switching and transport network functions and contain network operations functions.

**NEBS (Network Equipment Building System).** NEBS is the Network Equipment Building System specification authored by Bellcore. NEBS compliance is required by many carrier customers; the D50 shipping today is already NEBS-compliant.

**Network Management Processor (NMP) card.** The NMP card controls the D50's network management interfaces and provides the protocol support for communication for D50 Craft Terminal.

**NIC (Network Interface Card).** An electronic circuitry board that usually fits into an expansion slot of a PC whose purpose is to connect to a Local Area Network. A NIC is designed to comply with both a specific LAN Medium Access Control procedure (CSMA/CD for Ethernet) and a specific physical medium (e.g. twisted pair wire, coax, or multi-mode fiber). Associated with the NIC is a unique address called the MAC address. It works with the network software and computer operating system to transmit and receive messages on the network.

**NID (Network Interface Device).** The Nokia Broadband Systems' NID ADSL Splitter divides the ADSL and POTS signals and works in conjunction with the router at the subscriber end. The splitter installs on the outside of a home or building, and is enclosed in a weatherproof wall mount enclosure. It features primary lighting and AC power fault protection, and is a passive device, requiring no power or management from the Central Office or subscriber.

**NISP (National Internet Service Provider).** See ISP (Internet Service Provider).

**NNI (Network Node Interface).** An Asynchronous Transfer Mode (ATM) interface between two public network pieces of equipment (contrast that to UNI, which stands for User Network Interface).

**Node.** Connection point in a network.

**Noise.** Unwanted electronic signals or disturbance that degrades line performance.

**OAM (Operations And Maintenance).** A group of network management functions that provide network fault indication, performance information, and data diagnosis functions.

**OC-1 (Optical Carrier Level-1).** A SONET line rate of 51.840 Mbps. Direct electrical-to-optical mapping of the STS signal with frame synchronous scrambling.

**OC-12.** SONET channel of 622.08 Mbps.

**OC-3 (Optical Carrier Level-3).** A SONET line rate of 155.520 Mbps. 3 x OC-1. Direct electrical-to-optical mapping of the STS signal with frame synchronous scrambling.

**OC3L.** A OC3 rate broadband tributary card that provides a standard ATM UNI/NNI interface that supports provisionable VPI/VCI mappings to the D50 trunk card, allowing ATM cells to be aggregated from standard ATM network equipment.

**ODF (Optical Distribution Frame).** Connection and distribution point for fiber optic cables. It is similar, in function, to an MDF for copper wires.

**Optical Cross-Connect Panel.** A cross-connect unit used for circuit administration and built from modular cabinets. It provides for the connection of individual optical fibers with optical fiber patch cords.

**Oracle®.** An Object Relational Database Management System developed by Oracle.

**ORB (Object Request Broker).** An object-oriented system consisting of middleware which manages message traffic between application software and computer/software platforms.

**OSI (Open System Interconnection Reference Model).** An internationally accepted set of standards for communication between various systems manufactured by different vendors. The OSI Reference Model is a seven-layer model developed by the ISO (International Standardization Organization) to describe how to connect any combination of devices to communicate.

**OSS (Operations Support System).** A management operations center system which supports the daily operation of a telecommunications network.

**Packet.** A block or group of data organized in such a way as to be treated as a single unit within a communication network. It consists of the data (payload) and its control information.

**Pair Bonding.** This SHDSL feature enables the user to bond 2 ports to effectively double the maximum single-port bandwidth of 2.3 Mbps to provide up to 4.6 Mbps of symmetrical service.

**PAM (Pair Analysis Module) card.** A Nokia Broadband Systems' product. The PAM card plugs into the LCS backplane just like a line card and is used to test continuity of cable pair wiring from the LCS to the MDF. The PAM card is powered by AA batteries or -48V Central Office battery. The D50 does not have to be powered up to use the PAM card.

**Payload.** The data being transmitted, less its control and error-correction information.

**PCI (Peripheral Component Interconnect).** Bus of an Intel PC. PCI transfers data between the PC's main microprocessor and peripherals at up to 132 Mbps.

**PCR (Peak Cell Rate).** Specifies an upper bound on the rate at which traffic can be submitted to an ATM connection. Enforcement of this bound allows the network to allocate sufficient resources to ensure that the network performance objectives can be achieved.

**PDF (Portable Document Format).** File format of documents that can be viewed with Adobe Acrobat® Reader. PDF files are widely used to view files on the Internet.

**PDU (Protocol Data Unit).** In data communication protocols, a unit of data created by a given protocol layer at one place and logically transferred to the same layer at another place called a peer. This is the OSI terminology for "packet."

- PLCP (Physical Layer Convergence Protocol).** The part of the physical layer that adapts the transmission facility to handle DQDB (Distributed Queue Dual Bus) functions as defined in IEEE 802.6-1990.
- PM (Performance Monitoring).** A data collection and reporting mechanism for Quality of Service analysis.
- PNNI (Private Network-to-Network Interface).** PNNI is a standard of the ATM Forum that provides a multilevel hierarchical routing model for scalability in large and complex networks using ATM switches from multiple vendors.
- POP (Point-of-Presence).** The physical place within a LATA (Local Access and Transport Area; the long distance carrier's local office) where the IEC (Inter-Exchange Carrier) provides services to the LEC (Local Exchange Carrier), and perhaps directly to end-users.
- POTS (Plain Old Telephone Service).** A term used to describe analog, voice-only basic telephone service. All POTS lines work on loop start signaling.
- PPP (Point-to-Point Protocol).** A layer 2 protocol (relative to the OSI reference model) that allows a computer to use TCP/IP with a standard telephone line and a high-speed modem.
- Profile.** A set of pre-defined configuration variables which can be applied to one or more objects (of the same type) during the provisioning process. The use of profiles decreases configuration time and increases accuracy.
- PSD (Power Spectral Density).** PSD is the total power in the specified bandwidth divided by the specified bandwidth. PSD is measured in watts per hertz.
- PSTN (Public Switched Telephone Network).** Refers to the worldwide telephone system accessible to anyone with a telephone.
- PTT (Post Telephone & Telegraph administration).** The PTTs, usually controlled by their governments, provide telephone and telecommunications services in most countries outside of the USA.
- PVC (Permanent Virtual Circuit).** A permanent association between two DTEs (Data Terminal Equipment) established by configuration (established administratively via a service order process). A PVC uses a fixed logical channel to maintain a connection between the DTEs. After a PVC is defined, it requires no setup operation before data is sent and no disconnect operation after. The concept of a PVC is included in Networks supporting X.25, Frame Relay and ATM.
- QoS (Quality of Service).** In ATM networks, a set of parameters for describing a transmission. These parameters include values such as allowable cell loss ratio. The parameters apply to virtual channel connections and virtual path connections.
- RADSL (Rate Adaptive Digital Subscriber Line).** Transmission technology that supports both asymmetric and symmetric applications on a single twisted pair telephone line. Transmission rates are dynamically adjusted as the performance of the loop varies during a session.
- RBOC (Regional Bell Operating Company).** These are the major local service providers in the USA today. In 1984 ATT was broken up into 7 RBOCs. Today,

because of mergers, there are 4 RBOCs: BellSouth, Bell Atlantic, SBC Communications, and US WEST (recently merged with Qwest Communications).

**Redundancy.** This refers to various designs that provide a backup system (or part of a system) in case of a failure. As an example, the D50 has redundant power input terminals so that if one power source fails the backup source can continue to provide power to the system.

**Reed-Solomon.** A coding technique used to handle Forward Error Correction (FEC).

**Remote Line Card Shelf (RLCS).** An RLCS allows customers served over long loops — beyond 5.5 kilometers from the Central Office — access to DSL service. The RLCS is located remotely from the Central Office in an outside cabinet and connected to the Central Office Master Control Shelf via fiber optic, coax or copper cable extensions.

**Remote Low Pass Filter (RLPF).** The RLPF is a remote passive low pass filter “splitter” device. It splits the high frequency ADSL data signal from the voice signal at the customer end just like the Low Pass Filter card in the Central Office. There are two types of RLPF – a retrofit RLPF available in a standard Network Interface Device housing and a stand-alone RLPF.

**RFC (Request for Comments).** In the Internet community, a series of documents that contain protocol and model descriptions, experimental results, and reviews. All Internet standard protocols are written up as RFCs.

**SCR (Sustainable Cell Rate).** An ATM traffic parameter in cells per second that characterizes a bursty source and specifies a maximum average rate at which cells can be sent over a given ATM virtual connection.

**SDH (Synchronous Digital Hierarchy).** SDH is a high-speed, fiber-optic system, which provides an interface and mechanism for optical transmission of digital information. At the interface, signals are converted from electrical to optical form (and back to electrical form at the destination). SDH is an ETSI standard and is used in most of the world outside North America, where SONET is used. Transmission rates range from 155.520 Mbps to 9.953 Gbps.

**SDSL (Symmetric Digital Subscriber Line).** Also referred to as Single-Line Digital Subscriber Line, SDSL supports symmetrical T1 transmissions. It uses a single copper-pair wire and has a maximum operating range of 10,000 feet. It is capable of accommodating applications that require identical downstream and upstream speeds, such as video conferencing.

**Serial Port.** A hardware input/output port in which only one pin is available for data transmission in a given direction – bits are transmitted in sequence (one bit at a time). The wiring for a port is associated with a particular physical interface (i.e., RS-232). A serial port is most commonly used for a modem or a mouse.

**Service Provider.** A service provider is an organization or individual that provides telephone access to a network or to another service, such as the Internet.

**SHDSL (Single line high bit rate DSL).** Nokia octal line card supporting 8 ports of symmetric bit-rate transmission using multi-level Trellis Coded Pulse Amplitude Modulation (TC PAM).

**Simplex.** Simplex communication means that data can only be sent in one direction at a time. Also referred to as half-duplex.

**Single Mode Fiber.** Single mode fiber only provides one path for light pulses to travel through the fiber optic cable. There is very little loss of light pulses transmitted on single mode fiber. Therefore single mode fiber can be used for much longer distances than multi-mode fiber.

**Smart Jack.** According to the Newton's Telecom Dictionary, a "Smart Jack" is an industry term for a device that tests the integrity of T-1 circuits remotely from the central office. Installed on the customer premises in the form of a semi-intelligent demarcation point, a Smart Jack is completely passive until activated by code.

**SNMP (Simple Network Management Protocol).** The network management protocol used within TCP/IP-based internets. Defines the protocol for managers (clients) to communicate with agents (servers). The agent interfaces directly with the networking layers on the monitored network device to obtain the network management information. An agent is installed on every network device that will be managed or monitored. A client is an application program that is installed at the network operations center. It communicates with the SNMP agents to collect information in the form of MIB variables. SNMP is a request/reply protocol that uses the operations of Set or Get on data items in an agent's MIB.

**SNR (Signal-to-Noise Ratio).** In transmission, SNR is the ratio between the signal and noise levels at a given point, usually at the receiving end of the transmission. The SNR value is generally expressed in decibels (dB). The SNR can be used to determine how long a cable segment can be before the signal loss is unacceptably high. The SNR also helps determine whether a particular type of cable is appropriate for the intended use.

**SONET (Synchronous Optical Network).** SONET is a high-speed, fiber-optic system, which provides an interface and mechanism for optical transmission of digital information. At the interface, signals are converted from electrical to optical form (and back to electrical form at the destination). SONET is an ANSI standard. Transmission rates range from 51.84 Mbps to 13.22 Gbps.

**Splitter.** A device used in DSL to split the incoming bit stream into voice and data.

**Subnet.** A physically independent network segment. A subnet usually identifies all of the nodes in one geographical area or building. Nodes on a subnet can share a single network address.

**SVC (Switched Virtual Circuit).** A virtual connection set up on demand via a signal protocol connection, established for a specific communications session and then terminated after the session is over. This is in contrast to a permanent virtual circuit (PVC), which is a connection that is always established.

**T1.** DS1 rate electrical signal (two pair). T1 is suited for voice, data and image transmissions. T1 has a bandwidth of 1.544 Mbps, which comes from two dozen 64 Kbps channels, together with one 8 Kbps framing channel.

**Tagging.** The marking of a non-conforming cell that can be later discarded along its route through the ATM network if severe congestion conditions are experienced or the cell is still in violation of the traffic contract.

**TCM (Trellis Coding Modulation).** A method of forward error correction in which each signal element is assigned a value based on phase and amplitude to help the receiving modem determine if the element is received in error. Allows the user to meet performance margin requirements for long loops, or increase the transmission throughput under a specified performance margin; provides increased gain against background and crosstalk noise.

**TCP/IP (Transmission Control Protocol / Internet Protocol).** TCP/IP is a common suite of several networking protocols developed for use on the Internet.

**Telnet.** Telnet is the terminal-remote host protocol developed for ARPAnet in 1974. On the Internet, it is a service program that allows you to connect to other computers at another site permitting you to interact with applications as if by a local terminal.

**Threshold.** Level or value of a particular signal where an event or alarm will be generated.

**TMN (Telecommunications Management Network).** Reference model for telecommunications network management.

**Transmission rates.** The speed at which data is transmitted, measured in bits per second (bps).

Table 10-138: Transmission Rates

DS level	E level	OC level	STM equivalents	Line bit rate
DS-0				64 Kbps
DS-1 (T-1)				1.544 Mbps
	E-1			2.048 Mbps
DS-2				6.312 Mbps
	E-2			8.448 Mbps
	E-3			34.368 Mbps
DS-3 (T-3)				44.736 Mbps
		OC-1		51.840 Mbps
		OC-3	STM-1	155.52 Mbps
		OC-9		466.56 Mbps
		OC-12	STM-4	622.08 Mbps
		OC-18		933.12 Mbps
		OC-24	STM-8	1.244 Gbps
		OC-36	STM-12	1.866 Gbps
		OC-48	STM-16	2.488 Gbps

Table 10-138: Transmission Rates (continued)

DS level	E level	OC level	STM equivalents	Line bit rate
		OC-96		4.976 Gbps
		OC-192		9.953 Gbps

- **DS.** Digital Signal hierarchy: standard signals used in the U.S. telecommunications industry.
- **E.** Standard signals used in the European telecommunications industry.
- **OC.** Optical Carrier; a SONET optical signal.
- **STM.** Synchronous Transport Module; depends on information occurring in regular and fixed patterns with respect to a reference such as a frame pattern.

**Trap.** A method used to isolate an abnormal condition or operation.

**Trunk.** A communication circuit or link that interconnects two entities, usually switching systems.

**Trunk Card.** An interface card used to connect a D50 multiplexer to the ATM backbone facility.

**Tunneling.** Refers to the encapsulation of a protocol within another protocol format that provides a datalink or path. Tunneling can be used as part of a private secure network via the Internet.

**Twisted Pair.** The term used to describe common copper telephone wire. The two wires are called Tip and Ring. Also called Unshielded Twisted Pair (UTP).

**UBR (Unspecified Bit Rate).** In ATM networks, a UBR connection transmits at variable rates. With UBR, specific bandwidth allocation is not guaranteed.

**UBR+.** Unspecified Bit Rate with minimum cell rate guarantee that allows a connection to burst up to peak cell rate.

**UNI (User Network Interface).** In ATM networks, one of three levels of interface. A UNI specification which defines Layer 1 and Layer 2 protocols required for CPE and carrier equipment to interoperate. UNI specifications provide physical media and line rate implementation options.

**UNIX.** A multi-task, multi-user operating system developed by Ken Thompson of AT&T Bell Labs. UNIX is a registered trademark of Santa Cruz Operations.

**UPC.** The traffic control entity that monitors and enforces a virtual circuit's conformance with the source's traffic contract and parameters.

**Upstream.** Description of the communications path coming from the client/end user to the CO or DSLAM.

**USB (Universal Serial Bus).** The Universal Serial Bus is used in newer PCs. The bus is 12 Mbps and designed to be "plug and play." It supports multiple PC peripherals, including Nokia D50-compatible CPE with USB.

**VBR (Variable Bit Rate).** In ATM networks, a VBR connection transmits in bursts, at variable speeds.

**VC Topology.** Used in the Nokia D50's Craft Terminal software to set the direction and mode of communication for duplex, simplex egress, and simplex ingress PVC connections.

**VCI (Virtual Channel Identifier).** An identifier (value) in an ATM cell that identifies the data of one Virtual Channel connection from the data of another connection.

**VDSL (Very-high-speed Digital Subscriber Line).** VDSL provides DSL service at a data rate in excess of 10 Mbps (up to 52 Mbps). VDSL has a maximum operating range from 1,000 feet to 4,500 feet on 24-gauge wire.

**VF. Voice Frequency** – In telephony, the usable voice-frequency band ranges from approximately 300 Hz to 3400 Hz. Also, the bandwidth allocated for a single voice-frequency transmission channel is usually 4 kHz.

**VoDSL (Voice over Digital Subscriber Line).** An end-to-end voice transport technique integrating voice and data over DSL using special gateways that are designed to connect packetized voice traffic to Class 5 circuit switches.

**VoIP (Voice over Internet Protocol).** A technique for transmitting voice information in digital form in packets rather than the circuit-switch protocol of the public switched telephone network.

**VPI (Virtual Path Identifier).** An identifier (value) in an ATM cell that identifies the data of one Virtual Path connection from the data of another connection.

**WAN (Wide Area Network).** A WAN is a network of computers and related communications equipment whose elements may be in dispersed sites with distances great enough to require common carrier provided communication lines.

**xDSL (all forms of Digital Subscriber Lines).** The "x" represents the various types of digital subscriber lines: ADSL, RADSL, SDSL, HDSL, SHDSL, IDSL, or VDSL.

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