CHAPTER 1

# About This Book

Audience • Organization • Related Documentation • Acronyms and Abbreviations

This document will help you prepare your site for the installation of LightStream® 2020 enterprise ATM switches. Use these instructions to

- select space for the system in a computer room, wiring closet, or other suitable area;
- ensure that the space meets LightStream 2020's environmental and electrical requirements;
- select an equipment rack and cables;
- plan the configuration of the Sun workstation you will use to manage your LightStream network.

## Audience

The primary audience for this book is customers who have purchased or are considering the purchase of LightStream switches.

The secondary audience includes employees of LightStream Corp. and partner companies who need information on setting up LightStream hardware.

## Organization

This manual is arranged as follows

- —Describes this manual's audience, organization, and related documentation.
- —Tells you how to prepare your site for LightStream hardware installation. Includes information on the system's weight and dimensions, environmental and electrical requirements, and a planning checklist.
- —Gives guidelines for selecting an equipment rack for a LightStream switch. Outlines some considerations for planning space within the rack.
- —Describes hardware and software requirements for the Sun workstation that will manage the network.
- —Describes LightStream I/O interfaces and associated data cables. Also describes power cords.

## Related Documentation

The following is a list of LightStream manuals and other material relevant to LightStream users.

- *LightStream 2020 System Overview*

  The system overview describes what a LightStream switch is and how it works. It outlines ATM technology and describes LightStream hardware and software.

- *LightStream 2020 Installation and Troubleshooting Manual*

  The installation and troubleshooting manual (I&TM) tells you how to install LightStream hardware and software, how to diagnose hardware problems, and how to replace faulty hardware components.

- *LightStream 2020 Configuration Guide*

  The configuration guide provides the information you need to configure LightStream switches. It describes the configuration tools and how to use them. It describes the configuration database and defines all configurable attributes and their settings. The guide also provides step-by-step configuration procedures.

- *LightStream 2020 Operations Guide*

  The operations guide is a task-oriented book that tells you how to operate a network of LightStream switches. The guide presents an overview of network operations tasks, describes the command line interface (CLI), and presents procedures for performing monitor and control tasks such as displaying the status of nodes, cards and ports, viewing statistics, and creating collections of traffic data.

- *LightStream 2020 Administration Guide*

  The administration guide describes LightStream network management functions such as setting up a new network, troubleshooting, and optimizing the load across trunks. The guide describes network management tools, then presents step-by-step procedures for performing the functions.

- *LightStream 2020 Traps Reference Manual*

  This manual presents an overview of LightStream traps (error and event messages) and a list of operational, SNMP, and informational traps generated by the LightStream switch.

- *LightStream 2020 Command and Attribute Reference Guide*

  The reference guide provides detailed descriptions of the syntax and functions of all CLI commands. It also indicates CLI equivalents of configuration procedures, describes the LightStream private MIB, and gives UNIX-style manual pages for LynxOS commands.

- *LightStream 2020 Command Line Interface (CLI) Reference Card*

  The reference card compactly summarizes the syntax and arguments of all CLI commands.

- *LightStream 2020 Release Notes*

  The release notes provide a software upgrade procedure and describe new features and special considerations, including information on known software bugs.

**Note** The release notes contain important information that does not appear in other documents.

Before attempting to install, configure, operate, or troubleshoot a network of LightStream switches, read the *LightStream 2020 System Overview*. This overview provides important background information about the LightStream product and the ATM technology on which the product is based. After reading the *LightStream 2020 System Overview*, refer to Table 1-1 to determine which manuals you should read next.

**Table 1-1 LightStream Reading Path**

| If you want to: | Read the following manuals in the order listed below: |
|---|---|
| Install LightStream switches | *LightStream 2020 Release Notes*[1] |
| | *LightStream 2020 Site Planning and Cabling Guide* |
| | *LightStream 2020 Installation and Troubleshooting Manual* |
| Configure LightStream switches | *LightStream 2020 Release Notes* [1] |
| | *LightStream 2020 Configuration Guide* |
| | *LightStream 2020 Online Help Screens* |
| Set up or expand a LightStream network | *LightStream 2020 Release Notes*[1] |
| | *LightStream 2020 Administration Guide* |
| | *LightStream 2020 Online Help Screens* |
| Operate a LightStream network | *LightStream 2020 Release Notes*[1] |
| | *LightStream 2020 Operations Guide* |
| | *LightStream 2020 Command and Attribute Reference Guide* |
| | *LightStream 2020 Command Line Interface (CLI) Reference Card* |
| | *LightStream 2020 Traps Reference Manual* |
| | *LightStream 2020 Online Help Screens* |
| Manage or troubleshoot a LightStream network | *LightStream 2020 Release Notes*[1] |
| | *LightStream 2020 Operations Guide* |
| | *LightStream 2020 Administration Guide* |
| | *LightStream 2020 Command and Attribute Reference Guide* |
| | *LightStream 2020 Command Line Interface (CLI) Reference Card* |
| | *LightStream 2020 Traps Reference Manual* |
| | *LightStream 2020 Online Help Screens* |
| Troubleshoot LightStream hardware | *LightStream 2020 Release Notes*[1] |
| | *LightStream 2020 Installation and Troubleshooting Manual* |
| | *LightStream 2020 Site Planning and Cabling Guide* |

1. We recommend that you review the release notes before attempting to install, configure, operate, or troubleshoot a LightStream switch. The release notes contain important information that does not appear in other documents.

# Acronyms and Abbreviations

Below is a list of acronyms and abbreviations used in this book.

| Acronyms and Abbreviations | Meanings |
|---|---|
| btu | British thermal unit |
| ˚C | degrees Celsius |
| cm | centimeters |
| db(A) | decibels (A-weighted) |
| EIA | Electronic Industries Association |
| EMI | electro-magnetic interference |
| ˚F | degrees Fahrenheit |
| ft | feet |
| Hz | Hertz |
| in | inches |
| kg | kilograms |
| km | kilometers |
| lb | pounds |
| m | meters |
| TIA | Telecommunications Industry Association |
| V | volts |
| VAC | volts of alternating current |
| VDC | volts of direct current |
| W | watts |

CHAPTER 2

# Site Preparation

Site Prep Checklist • Space Requirements • Electrical Requirements • Environmental Requirements • Unpacking and Inspecting the Hardware

This chapter tells you how to prepare your site for the installation of LightStream 2020 enterprise ATM switches. It includes information on the system's weight, dimensions, environmental and electrical requirements, and a site planning checklist.

LightStream switches can be installed in any area that meets the specifications outlined in this chapter. A dedicated computer room with raised floors, controlled temperature and humidity, and clean air is desirable, but is not required.

## Site Prep Checklist

Use this checklist several weeks before the expected delivery date to ensure that your site is ready to receive LightStream hardware.

1. Ensure that the area you select to house your LightStream system allows enough space for front and rear access to the LightStream chassis, as shown in Figure 2-1.
2. We recommend that you develop a plan for managing external data cables. (This might involve running the cables under a raised floor, or through a dropped ceiling, or placing the system in a low-traffic area where cables won't be disturbed.)
3. Ensure that the floor is strong enough to support the system. See the subsection entitled Weight for LightStream weights, and add the weights of the rack and cables.
4. Calculate the heat dissipation of your LightStream system using the information in Table 2-6. Taking into account the heat generated by the LightStream switch and any other equipment installed in the same room, ensure that your HVAC system can maintain the temperature and humidity ranges outlined in Table 2-9.
5. Ensure that each LightStream system has its own dedicated branch power circuit with circuit breaker and a grounded outlet. If you're installing a DC-powered LightStream system, you may wish to arrange to have an electrician present at installation time. An electrician or other qualified person must wire the chassis to a DC power source.
6. If several LightStream switches will be installed at your site, develop a method for telling them apart. We recommend that you assign a unique name or number to each system and label each chassis clearly.
7. Obtain an equipment rack for the LightStream system. (See Chapter 3 for rack guidelines.)

8. To provide connectivity to each node in the case of network problems, consider obtaining modems for each switch card in your LightStream network. (Each switch chassis can have one or two switch cards.) Modems must be Hayes-compatible and able to operate at 2400 baud.
9. Ensure that a Sun workstation is available to manage your LightStream network, and that the workstation meets all the hardware and software requirements listed in Chapter 4.
10. Obtain IP addresses for each switch in your LightStream network. (See the *LightStream 2020 Installation and Troubleshooting Manual* for more information on IP addresses.)
11. Order data cables. (See Chapter 5 for information about I/O connectors and selected cables.)
12. Order the appropriate country power kit or DC mounting kit. (See Chapter 5 for information about the power cords included in kits.)

# Space Requirements

Keep the following considerations in mind when choosing a location for your LightStream hardware:

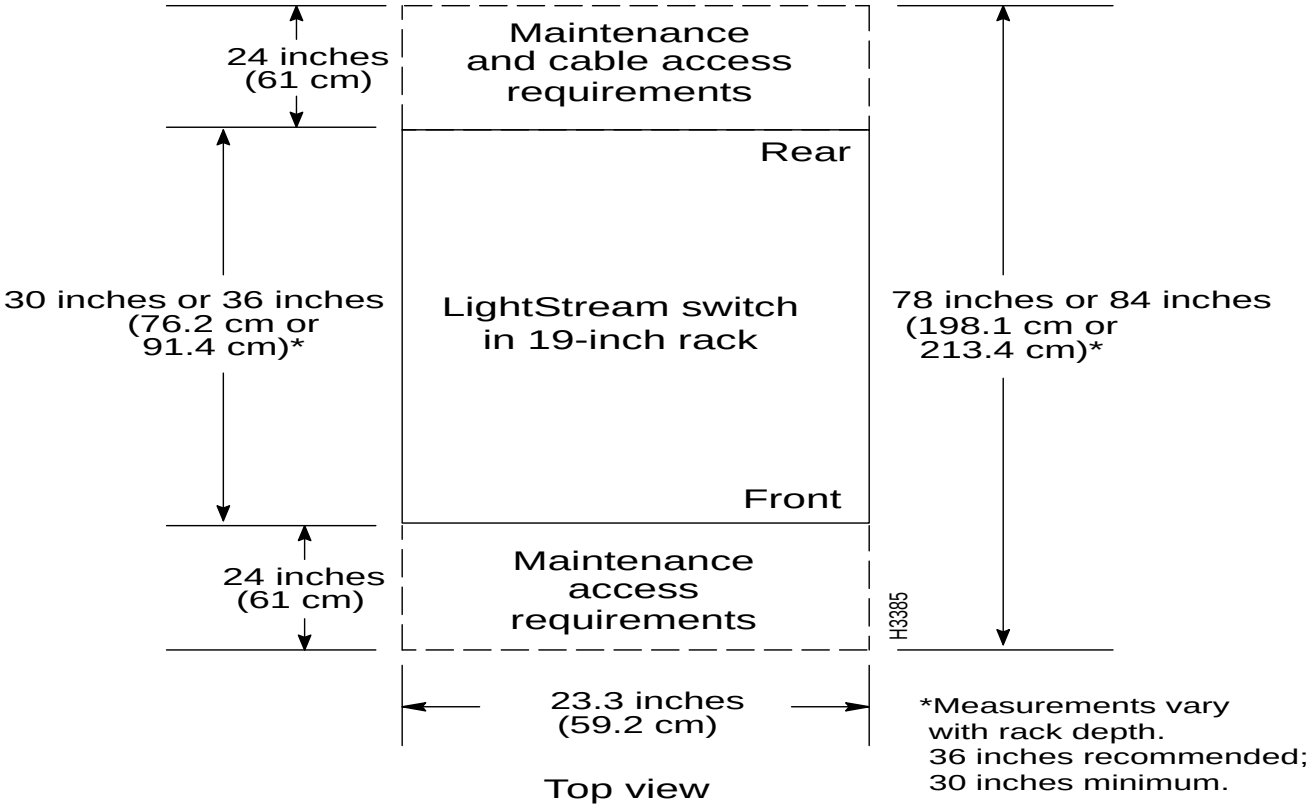
- LightStream switch dimensions. (See Table 2-1.)
- LightStream switch clearance requirements. (See Figure 2-1.) Allow at least two feet of clear space at the front and rear of each chassis for maintenance and cable access.
- Cable routing. Choose a location convenient to the data cables you will connect to the LightStream switch.
- LightStream switch weight. (See Table 2-2.)

**Table 2-1 LightStream Switch Dimensions**

| Dimension | Chassis | Shipping Crate | | |
|---|---|---|---|---|
| Height | 26.07 in. | 66.2 cm | 36 in. | 91.4 cm |
| Width | 18.91 in. | 48.0 cm | 24 in. | 61.0 cm |
| Depth | 24.73 in. | 62.8 cm | 31 in. | 78.7 cm |

All chassis dimensions are ±.02 inches (.05 centimeters).

**Figure 2-1 Clearance requirements: leave space behind and in front of the LightStream switch for maintenance access.**



## Weight

Use Table 2-2 to determine the weight of your system. Starting with the weight of a chassis with blowers only (no boards, line cards, disks, or power supplies), add the weight of each option included with your unit. (Cables and the equipment rack are excluded from this table.)

**Table 2-2 Calculating LightStream Switch Weight**

| | | Number of units | |
|---|---|---|---|
| **Specification** | **Weight** | **Min.** | **Max.** |
| **Start with chassis w/blowers only:** | 74 lb (33.5 kg) | | |
| **Add weights of optional components:** | | | |
| NP option[1] | 8 lb (3.6 kg) | 1 | 2 |
| Switch card | 3.4 lb (1.5 kg) | 1 | 2 |
| Line card option[2] | 3.75 lb (1.7 kg) | 1 | 9 |
| Bulk power tray | | 1 | 2 |
| AC | 10 lb (4.5 kg) | | |
| DC | 4.5 lb (2 kg) | | |
| Fantail (for LSC only) | 1.9 lb (0.9 kg) | 0 | 18 |
| **Minimum configurations:**[3] | | | |
| AC power | 99.2 lb (44.9 kg) | | |
| DC power | 93.7 lb (42.4 kg) | | |
| **Maximum configurations:**[4] | | | |
| without fantails | 146,8 lb (66.5 kg) | | |
| with 16 fantails | 177.2 lb (80.3 kg) | | |

1. Includes NP card, NP access card, and disk assembly including hard disk, floppy drive and associated power supply.
2. Includes line card and associated access card.
3. Includes one of each option: NP, switch card, line card, and bulk power tray.
4. Includes 2 NPs, 2 switch cards, 2 AC power trays, and 8 line cards.

# Electrical Requirements

Each LightStream chassis requires a dedicated branch circuit. See Table 2-3, Table 2-4, and Table 2-5, which specify the power requirements and power ratings of LightStream systems.

The following notice applies to each LightStream switch:

- This device complies with FCC Rules, Part 15. Operation is subject to the following two conditions:
  - This device may not cause harmful interference, and
  - This device must accept any interference that may be received, including interference that may cause undesired operation.

The LightStream switch is designed to operate with all boards, bulkheads, filler panels, covers, and components (disks and blowers) in place and firmly screwed to the chassis frame. When all these items are in place, they form an enclosure that performs three important functions:

- It limits access to hazardous voltages and currents inside the chassis.

- It contains electro-magnetic interference (EMI) within the chassis. (A LightStream switch that is not fully enclosed will not be compliant with EMI standards and may interfere with the operation of other equipment.)
- It helps to maintain the flow of cooling air through the chassis. (Air flow disturbances can result in thermal problems and component failures.)

**Caution** Do not operate a LightStream switch without all boards, bulkheads, filler panels, covers, and components in place and firmly screwed to the chassis frame. You must operate the LightStream switch properly to limit access to hazardous voltages and currents, to contain EMI within the chassis, and to maintain the flow of cooling air through the chassis.

**Table 2-3 Site Power Requirements**

| Power Option | Voltage | Current |
|---|---|---|
| AC | 100 to 240 | 20A to 10A |
| DC | 48 | 24A |

**Table 2-4 AC Power Ratings**

| Characteristic | Rating |
|---|---|
| Inlet Power Connector | IEC 320 C20 |
| Input Voltage Frequency Phase | 100 - 240 VAC 50 - 60 Hz Single |
| Input Current | 16 A - 8 A |
| Power Consumption* | 975 Watts maximum |
| Heat Dissipation* | 3330 Btu/hr maximum |

* See Table 2-6 for more information.

**Table 2-5 DC Power Ratings**

| Characteristic | Rating |
|---|---|
| Input Connections | Support for up to 2 separate -48 VDC input feeds via 3-position terminal blocks |
| Input Voltage | -43 to -60 VDC |
| Input Current | 24 A |
| Power Consumption* | 975 W maximum |
| Heat Dissipation* | 3330 Btu/hr maximum |

* See Table 2-6 for more information.

**Table 2-6 Component Heat Dissipation**

| Component | Power Consumption in Watts | Dissipation (Btu/hr) |
|---|---|---|
| Chassis with no I/O[1] | 335 | 1145 |
| NP option[2] | 70 | 240 |
| Switch card | 40 | 140 |
| Low-speed line card option[3] | 65 | 225 |
| Medium-speed line card option[3] | 65 | 225 |
| Packet line card option[3] | 55 | 190 |
| Cell line card option[3] | 30 | 105 |
| Max. configuration[4] | 975 | 3330 |

1. System with NP, NP access card, disk assembly, switch card and blowers, but no line cards.
2. NP card, NP access card, and disk assembly including hard disk, floppy drive and associated power supply.
3. Includes line card and associated access card.
4. Includes 2 NPs, 2 switch cards, 2 bulk power supplies (each at half of power and dissipation shown), and 8 LS or MS line cards.

**Table 2-7 Certifications & Standards for LightStream 2020**

| | |
|---|---|
| **Safety** | UL 1950 (AC systems) UL 1459 (DC systems) TUV (EN 60950) CSA 22.2 #950[1] |
| **Emissions** | FCC Part 15 Class A CISPR 22 Class A (EN 55022) |

1. Certified by Underwriters Laboratories to Canadian requirements.

**Note** Additional certifications may be in progress. Consult your LightStream vendor for details.

**Table 2-8 Telco Certifications & Standards for LightStream 2020**

| | |
|---|---|
| **V.35 Interface[1]** | NET 2 Layer 1 |
| **RS-449 Interface[1]** | NET 2 Layer 1 |
| **E3 Interface** | G.703 at 34 Mbps (Germany) SIN 219 (UK) |

1. Host-independent approval

# Environmental Requirements

The physical environment during operation, storage, and transport of the LightStream switch must meet the specifications outlined in Table 2-9.

**Table 2-9 Environmental Specifications**

| | |
|---|---|
| **Operating temperature at sea level (760 mm Hg)[1]** | 41° to 104° F (5° to 40° C) |
| **Relative operating humidity** | 10% to 90% noncondensing |
| **Altitude[1]** | Up to 10,000 ft (3048 m) |
| **Nonoperating temperature** | -4° to 140° F (-20° to 60° C) |
| **Nonoperating humidity** | 10% to 95% noncondensing |
| **Air quality** | The LightStream switch is designed to run in a non- corrosive, relatively dust-free environment. The enclosure does not contain air filters; a relatively dust-free environment prevents accumulation of dust on the circuit boards and in the air flow inlet, internal flow paths, and exhaust openings. |
| **Noise Emission** | 68 db(A) maximum |

1. Reduce the maximum operating temperature by 15˚ F (.565 ˚C) for every 1000 ft (304.8 m) above 10,000 ft (3048 m) altitude.

## Cooling Air and Hardware Placement

A LightStream chassis takes in cooling air through the bottom of the front panel and exhausts it at the top rear and the top right side. (The air vents on the right side can safely be covered with rack side panels, but should not be otherwise blocked.) To minimize thermal problems, position the chassis such that

- the LightStream switch's air intake panel is not near the exhaust of other equipment
- the LightStream switch's exhaust is not near the air intake of other equipment

# Unpacking and Inspecting the Hardware

When it arrives, unpack the LightStream switch as follows:

1. Before moving the shipping container from your loading dock, inspect it for any signs of in-transit damage.
2. Transfer the container to the systems area.
3. Cut the straps and lift the cardboard box off the chassis. Remove the packing material.
4. Inspect all external surfaces for signs of damage. Pay special attention to any areas where you noticed damage to the shipping container.
5. Document any damage noted during the inspections and notify your LightStream vendor.
6. See the *LightStream 2020 Installation and Troubleshooting Manual* for instructions on installing the switch.

**Caution** Do not use the handles on the disk assemblies to lift the chassis. These handles are not designed to support the system's weight and will break off under stress.

CHAPTER 3

# Selecting a Rack

Rack Characteristics • Rack Space: Height and Depth

This chapter provides guidelines on selecting an equipment rack for your LightStream 2020 enterprise ATM switch.

## Rack Characteristics

The rack you use for your LightStream switch should be a TIA or EIA standard 19-inch (48.3 cm) wide rack that meets the specifications outlined below.

- Rails with RETMA hole pattern. (Mounting screws, clip nuts, and dress washers are shipped with each LightStream system. If your rack has metric-threaded rails, you must provide your own metric screws.)
- Leveling feet
- Perforated top
- Open bottom
- Solid side panels
- Front and rear doors are optional; if present, they must be fully louvered

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**Note** For physical stability, when a LightStream chassis is installed in a rack, the combination should comply with UL Standard 1950, Par. 4.1.1, and IEC 950, 4.1.1.

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## Rack Space: Height and Depth

### Chassis

A LightStream chassis needs 26.25 in. (15 rack units, or 66.7 cm) of vertical rack space.

## Cables and Fantails

A LightStream rack should be at least 30 in. (76.2 cm) deep; 36 in. (91.4 cm) is recommended so there is comfortable clearance at the rear for fantails and cables.

If your system contains low-speed line cards, consider the system's fantails when you plan rack space. One LightStream switch using V.35 and/or RS-449 fantails can have up to 18 fantails—two per low-speed line card. (A system using only X.21 fantails can have a maximum of nine fantails—one per low-speed line card.) Each fantail is 1.75 inches (1 rack unit, or 4.45 cm) high; thus a switch fully loaded with fantails uses up to 31.5 inches (80 cm) of fantail space at the rear. (Medium-speed, packet, and cell line cards do not use fantails.)

CHAPTER 4

# Network Management Station Requirements

Hardware Requirements • Software Requirements

To manage a network of LightStream® 2020 enterprise ATM switches, you need a workstation that meets the hardware and software requirements listed in this chapter.

## Hardware Requirements

The network management system (NMS) workstation must be a Sun SPARCstation (Sun-4). Although LightStream management software is designed to run on any SPARCstation model that runs SunOS 4.1.x and HP OpenView, only the following models are supported and tested:

- SPARCstation 10
- SPARCstation 20
- SPARCstation 2
- SPARCstation IPX
- SPARCstation IPC

The NMS workstation must have:

- At least 32 MB of memory

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**Note** 24 MB of memory may be sufficient if you choose not to run HP OpenView, or if you have a small network (fewer than eight LightStream nodes).

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- At least 32 MB of swap space, if you choose *not* to run HP OpenView. If you do run HP OpenView, you'll need to configure a minimum of about 90 MB of swap; consult HP OpenView documentation for more precise information.
- A hard disk drive. LightStream recommends a hard disk of at least 500 MB for a stand-alone workstation that will not run HP OpenView, or a hard disk of at least 1 gigabyte for a stand-alone workstation that will run HP Openview. If you plan to load any software other than that described in the Software Requirements section below, you may need to increase the size of your hard disk.
- At least 50 MB of free disk space to load LightStream's management software

**Note** You will need additional disk space to load Motif, X Windows, HP OpenView, and any other software you choose to install on the NMS.

- An Ethernet port
- A quarter-inch tape drive for installation of LightStream software
- A color monitor to run LightStream's monitor software

# Software Requirements

The NMS workstation must have the following software loaded:

- SunOS 4.1.x/Solaris 1.1.x

**Note** The operating system version required for LightStream network management is *not* the default OS currently shipped with new Suns; you must ask for this OS specifically.

- X Window System X11R5
- Motif 1.2, or a compatible window manager such as the twm included with X11R5

In addition, you may choose to run HP OpenView version 3.3 network management software on your NMS workstation. For information on HP OpenView's requirements, see the *HP OpenView Management Platform Performance and Configuration Guide*, available from Hewlett-Packard.

CHAPTER 5

# Cables and Connectors

Low-Speed Connectors and Cables • Medium-Speed Connectors and Cable • OC-3c Connectors and Cables • FDDI Connectors and Cables • Ethernet Connectors and Cables • Console, Modem Connectors and Cable • Country Kits and Power Cordsets

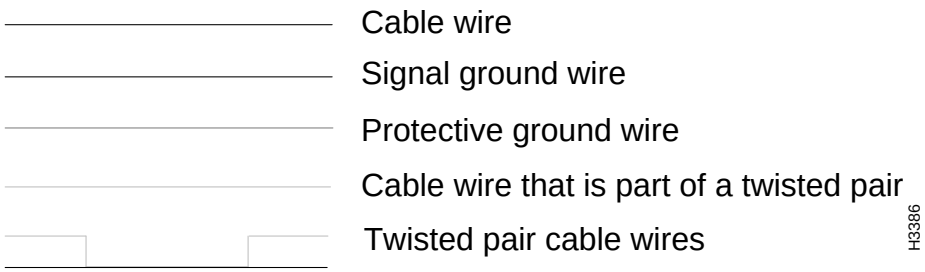
The first six sections of this chapter describe I/O interfaces of the LightStream 2020 enterprise ATM switch and data cables for each interface. Signal diagrams are provided for each I/O connector and cable. This chapter's last section describes LightStream power cords.

For each cable sold by LightStream Corp., two part numbers are provided: the manufacturing number, which appears on the cable, and the order number, which you should use to order the cable. Some cables described here do not have numbers; these cables are not offered for sale by LightStream. The information here is provided to help you procure the cables from other sources.

## Cable Drawing Conventions

Figure 5-1 shows the graphic conventions used in this chapter.

**Figure 5-1 Graphic Conventions:**




## Low-Speed Connectors and Cables

This section describes the following connectors on low-speed fantails:

- The X.21 connector specification appears in Figure 5-2 below.
- The RS-449 connector specification (see RS-449 Fantail Connector Specification).
- The V.35 connector specification (see V.35 Fantail Connector Specification).

- The specification for the DSU/CSU control ports on V.35 and RS-449 fantails (see DSU/CSU Control Port Connector Specification).

The cable that connects low-speed access cards to fantails is discussed in the subsection entitled Fantail Cable. X.21, RS-449, and V.35 cables are described in the subsections entitled X.21 Cable, RS-449 Straight-Through Cable, RS-449 Crossover Cable, V.35 Straight-Through Cable, and V.35 Crossover Cable.

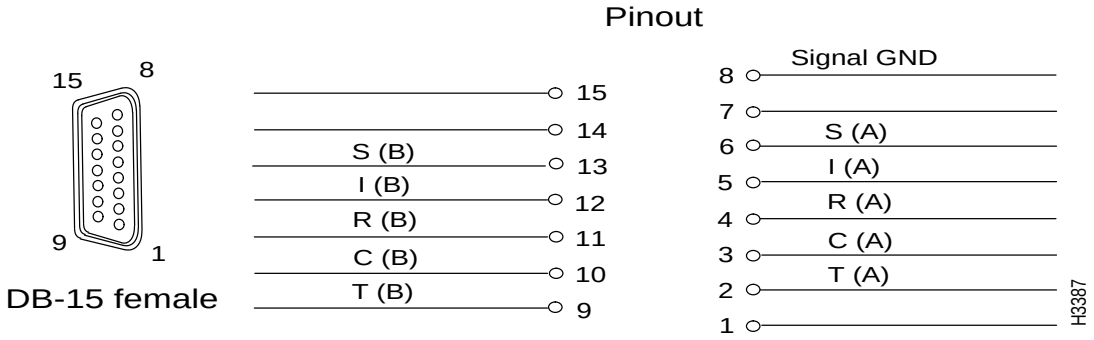
## X.21 Fantail Connector Specification

**Interface connector type:** DB15 female

**Connectors per fantail:** 8 (numbered 0 - 7)

Figure 5-2 shows a X.21 connector signal

**Figure 5-2 X.21 connector signal diagram.**



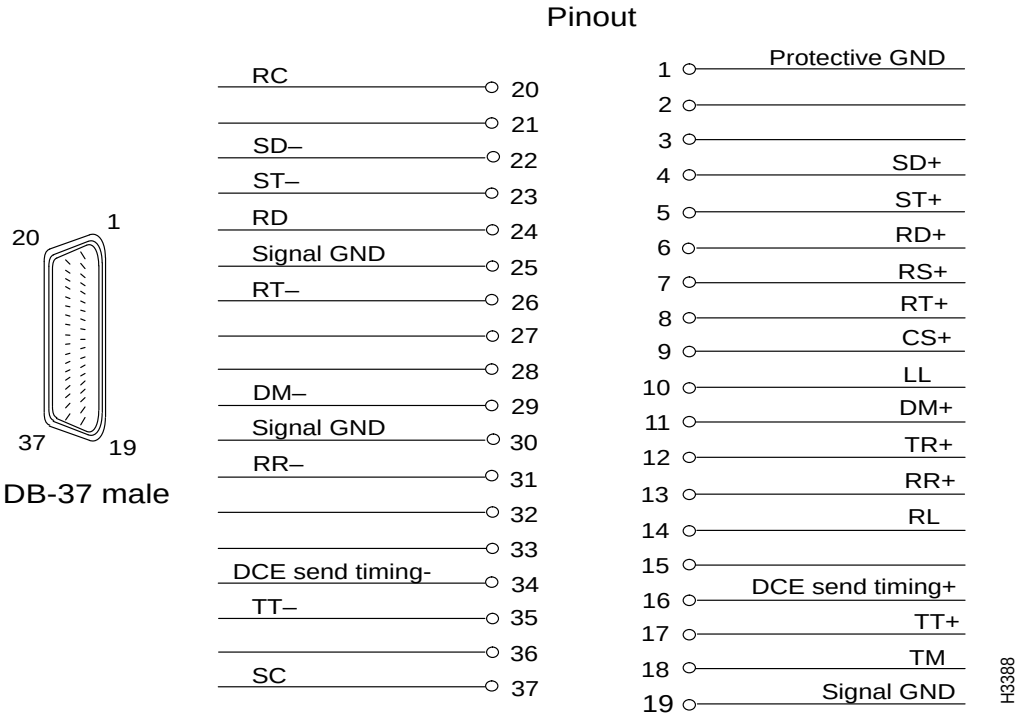
# RS-449 Fantail Connector Specification

**Interface connector type:** DB37 male

**Connectors per fantail:** 4 (numbered 0 - 3)

Figure 5-3 shows a RS-499 connector signal.

**Figure 5-3 RS-449 connector signal diagram.**



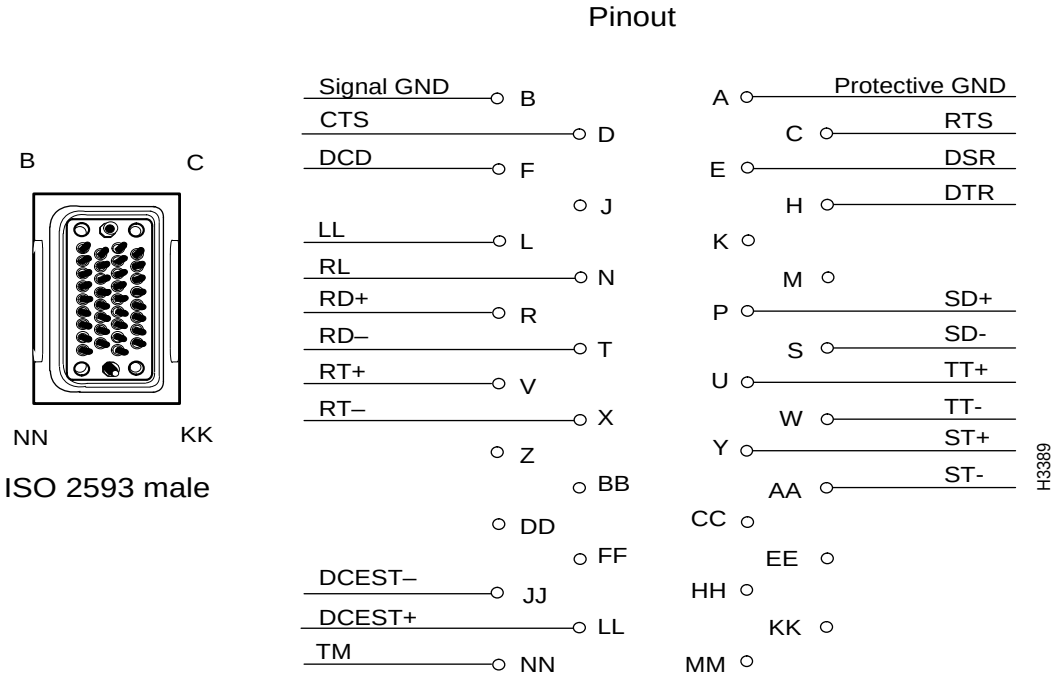
## V.35 Fantail Connector Specification

**Interface connector type:** ISO 2593 male (34-pin block type)

**Connectors per fantail:** 4 (numbered 0 - 3)

Figure 5-4 shows a V.35 connector signal

**Figure 5-4 V.35 connector signal diagram.**



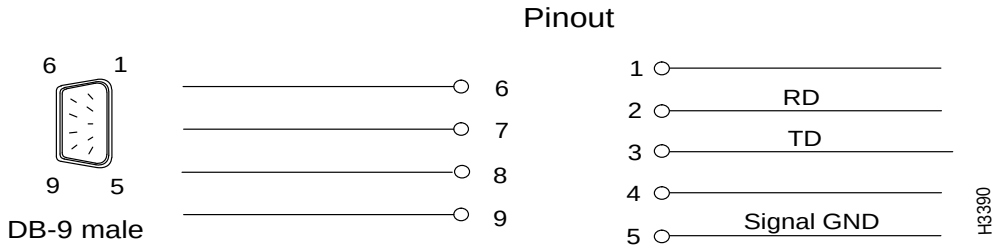
## DSU/CSU Control Port Connector Specification

The RS-232 connector shown in Figure 5-5 appears on both the V.35 and RS-449 fantails. If you connect the control port to the craft port on a DSU/CSU device, you can use the csumon program to communicate with the DSU/CSU from a LightStream switch.

**Interface connector type:** DB9 male

**Connectors per fantail:** 4 (numbered 0 - 3)

**Figure 5-5 RS-232 DSU/CSU control port connector signal diagram.**




## Fantail Cable

To connect fantails to low-speed access cards, LightStream offers a 100-pin cable in three lengths:

| Manufacturing No. | Length | Order No. |
|---|---|---|
| 2422865-02 | 4 feet | 9303-1 |
| 2422865-03 | 8 feet | 9303-2 |
| 2422865-04 | 12 feet | 9303-3 |

Two fantail cables are required to connect one X.21 fantail to a low-speed access card. One fantail cable is required to connect each V.35 or RS-449 fantail to a low-speed access card.

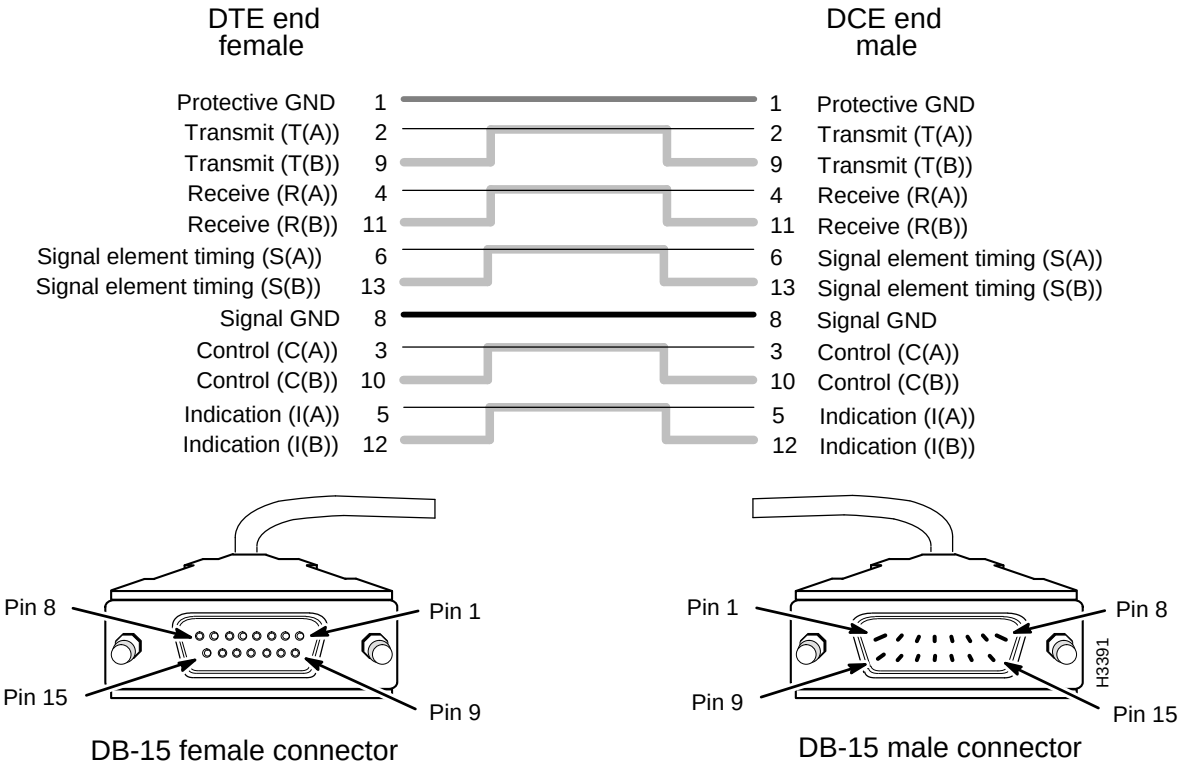
## X.21 Cable

**Where used:** To connect a LightStream 2020's X.21 fantail interface to an X.21 device. This cable is available from LightStream Corp. See Figure 5-6.

**Note** Use the switches on the X.21 fantail to select a DTE or DCE interface for each port.

| Manufacturing No. | Length | Order No. |
|---|---|---|
| 2418483G01 | 30 feet | 9321-1 |
| 2418483G02 | 50 feet | 9321-2 |
| 2418483G03 | 100 feet | 9321-3 |

**Figure 5-6 X.21 cable.**

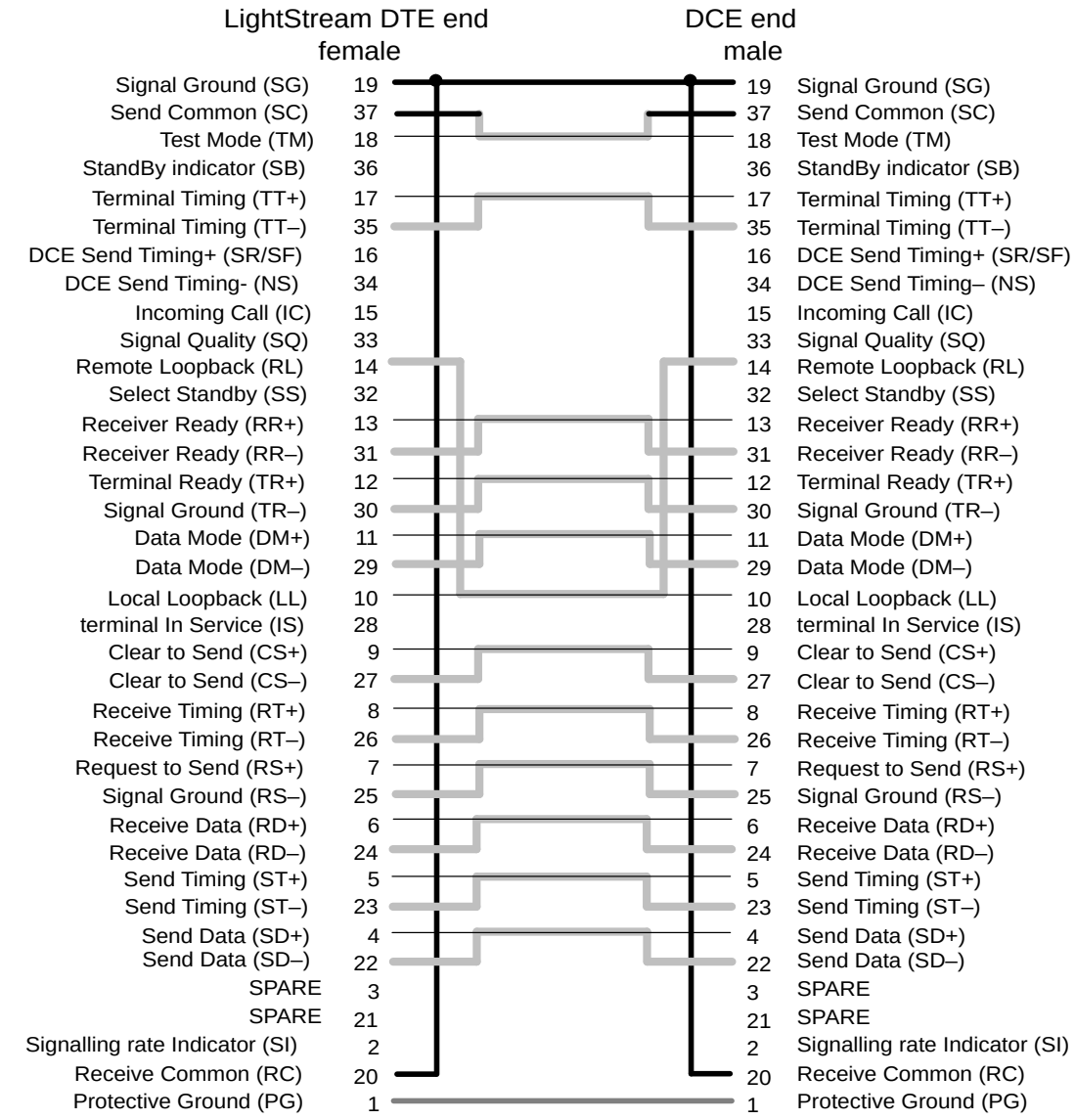


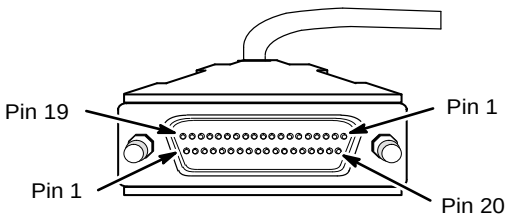
## RS-449 Straight-Through Cable

**Where used:** To connect a LightStream 2020's RS-449 fantail interface to an RS-449 DCE device. This cable is available from LightStream Corp. See Figure 5-7.

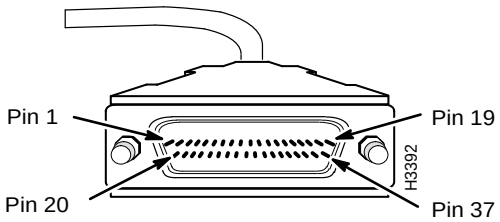
| Manufacturing No. | Length | Order No. |
|---|---|---|
| 2423253G01 | 30 feet | 9349-1 |
| 2423253G02 | 50 feet | 9349-2 |
| 2423253G03 | 100 feet | 9349-3 |

**Figure 5-7 RS-449 straight-through cable.**




DB-37 female connector




DB-37 male connector

## RS-449 Crossover Cable

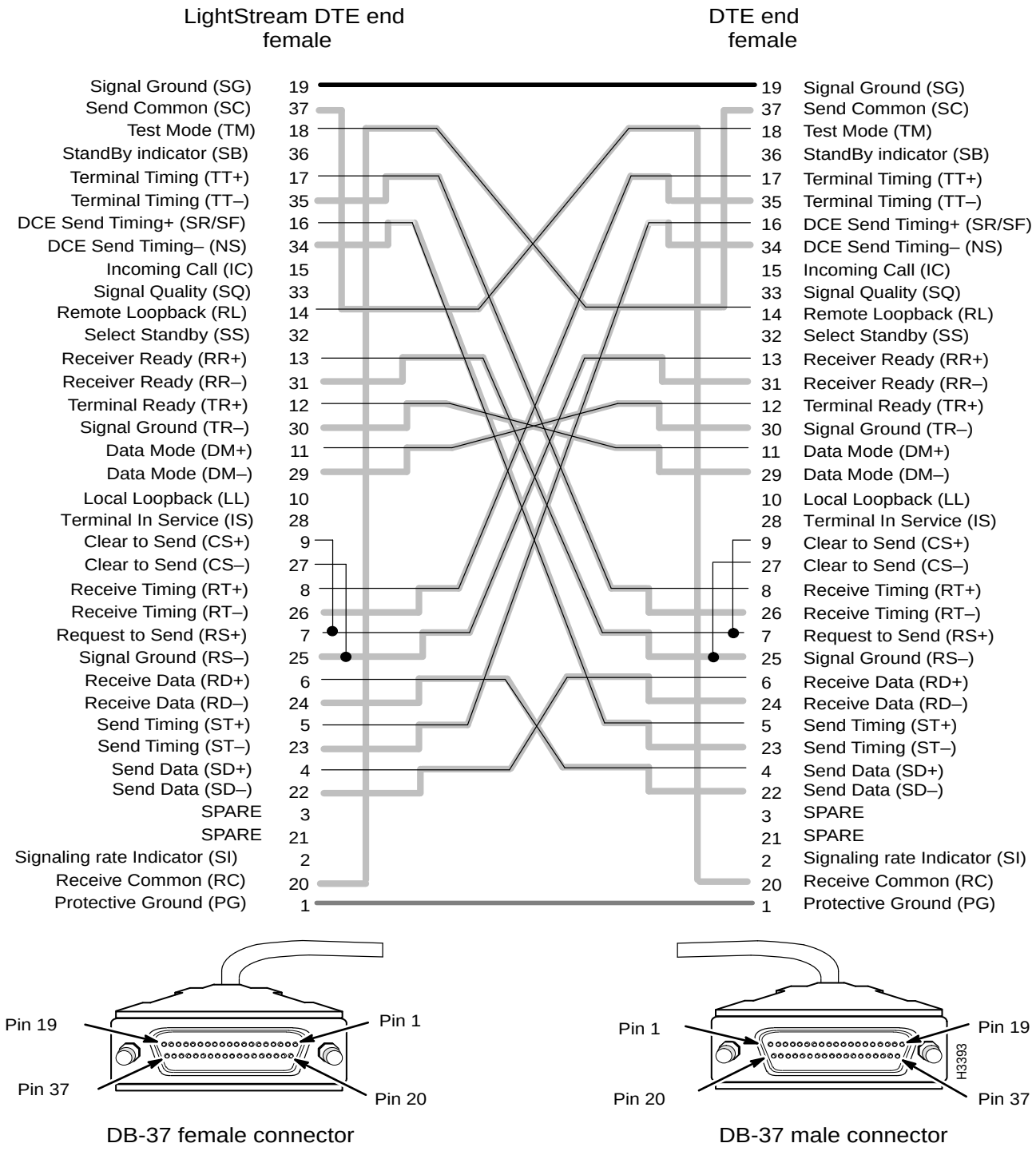
**Where used:**

- To connect two LightStream 2020 switches via their RS-449 fantail interfaces.
- To connect a LightStream 2020's RS-449 fantail interface to an RS-449 DTE device.

This cable is available from LightStream Corp. See also Figure 5-8.

| Manufacturing No. | Length | Order No. |
|---|---|---|
| 2423254G01 | 30 feet | 9349-5 |
| 2423254G02 | 50 feet | 9349-6 |
| 2423254G03 | 100 feet | 9349-7 |
| 2423254G04 | 8 feet | 9349-4 |

**Figure 5-8 RS-449 crossover cable.**

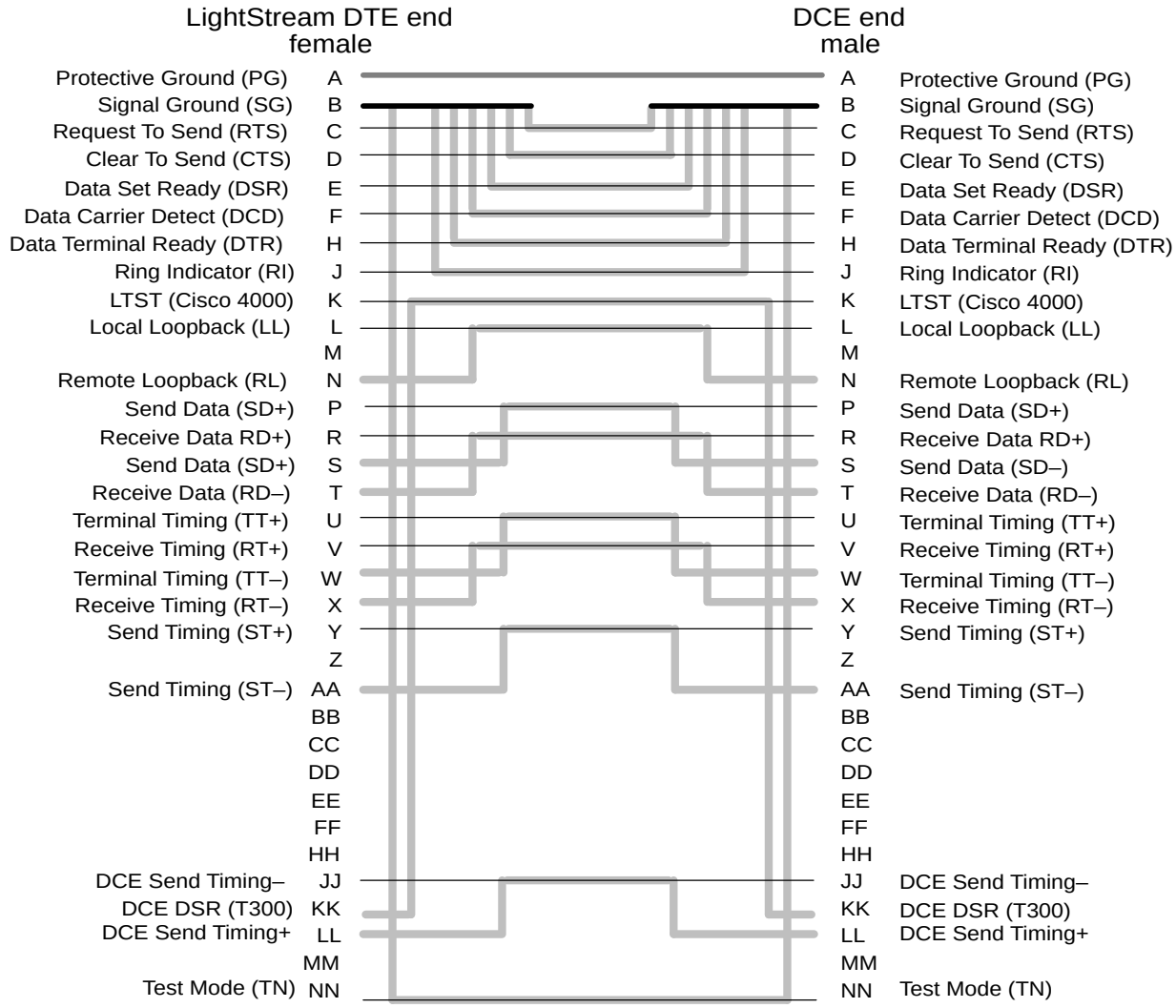


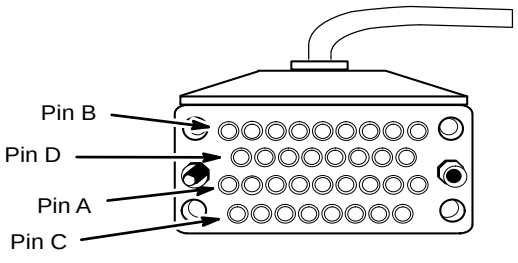
## V.35 Straight-Through Cable

**Where used:** To connect a LightStream 2020's V.35 fantail interface to a V.35 DCE device. This cable is available from LightStream Corp. See also Figure 5-9

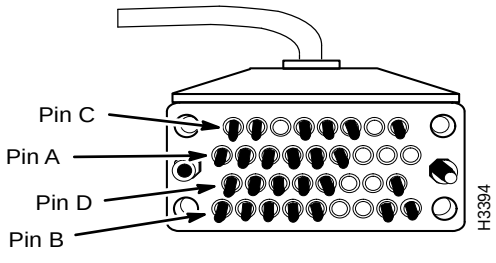
| Manufacturing No. | Length | Order No. |
|---|---|---|
| 2423880G01 | 30 feet | 9335-1 |
| 2423880G02 | 50 feet | 9335-2 |
| 2423880G03 | 100 feet | 9335-3 |

**Figure 5-9 V.35 straight-through interface cable.**




34-position female block connector




34-position male block connector

## V.35 Crossover Cable

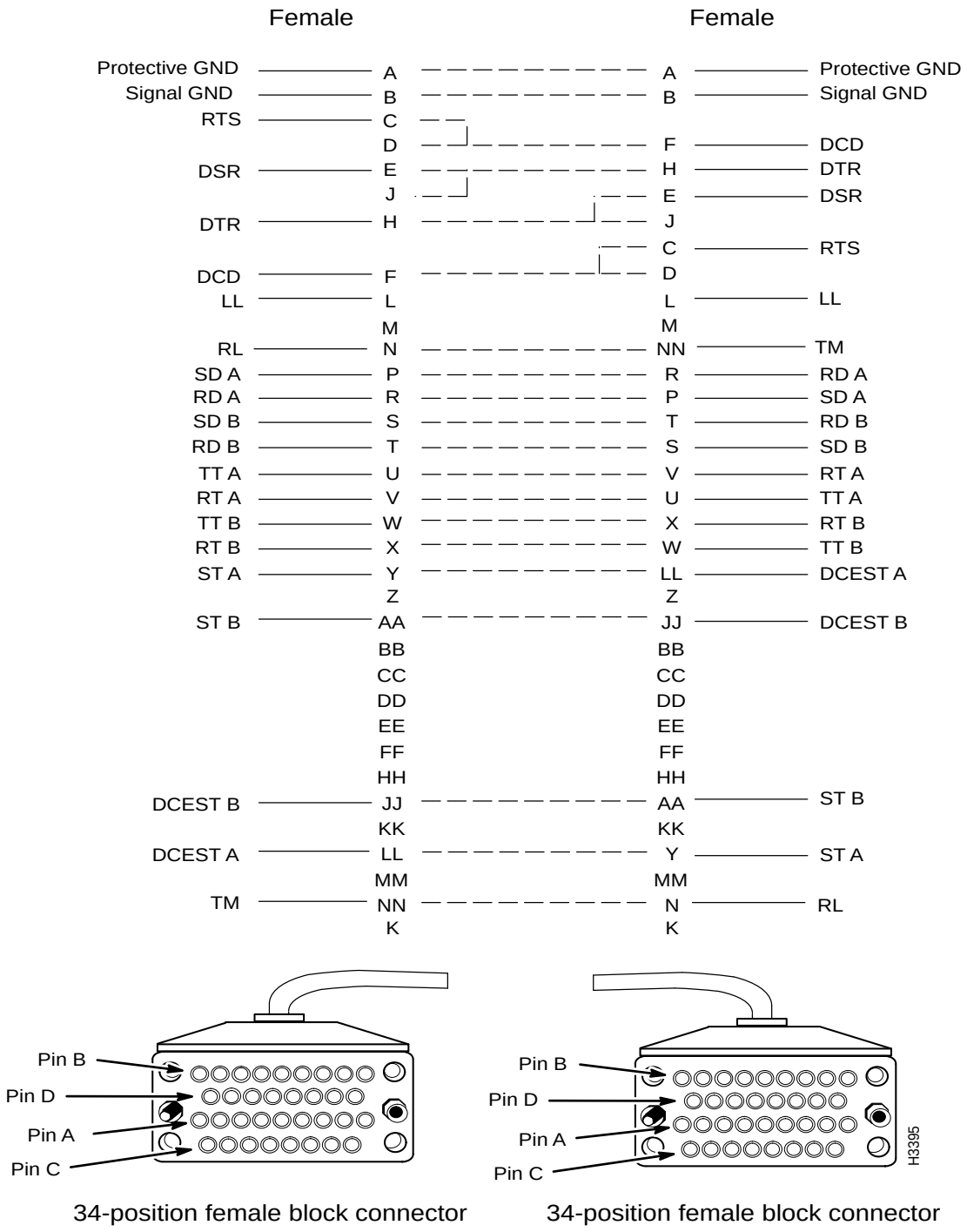
**Where used:**

- To connect two LightStream 2020 switches via their V.35 fantail interfaces.
- To connect a LightStream 2020's V.35 fantail interface to a V.35 DTE device.

This cable is available from LightStream Corp. See also Figure 5-10.

| Manufacturing No. | Length | Order No. |
|---|---|---|
| 2420721G01 | 30 feet | 9335-5 |
| 2420721G02 | 50 feet | 9335-6 |
| 2420721G03 | 100 feet | 9335-7 |
| 2420721G04 | 8 feet | 9335-4 |

**Figure 5-10 V.35 crossover cable.**



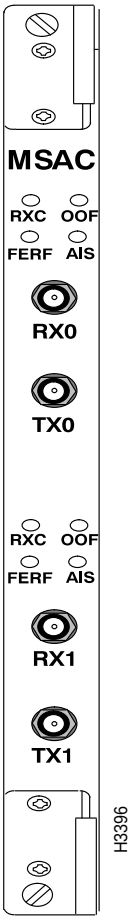
# Medium-Speed Connectors and Cable

This page shows the external connectors on the medium-speed access card. The data cable is described in the subsection entitled T3/E3 Coaxial Cable. See Figure 5-11.

**Interface connector type:** 75 ohm BNC jacks

**Connectors per access card:** 4 (2 receive and 2 transmit)

**Figure 5-11 Medium-speed access card showing coaxial connectors.**




Front view

## T3/E3 Coaxial Cable

**Where used:**

- To connect two LightStream 2020 switches via their T3, E3/PLCP, or E3/G.804 medium-speed access cards.
- To connect a LightStream 2020's T3, E3/PLCP, or E3/G.804 MSAC to an external device.

This cable is available from LightStream Corp. See also Figure 5-12.

| Manufacturing No. | Length | Order No. |
|---|---|---|
| 2423252G01 | 3 feet | 9203-1 |
| 2423252G02 | 25 feet | 9203-2 |
| 2423252G03 | 50 feet | 9335-3 |
| 2423252G04 | 100 feet | 9335-4 |

**Figure 5-12 T3/E3 coaxial cable.**

# OC-3c Connectors and Cables

Figure 5-13 shows external connectors on the multimode and single mode OC-3c access cards. OC-3c cables are described in the subsections entitled Multimode OC-3c Cable and Single Mode OC-3c Cable.

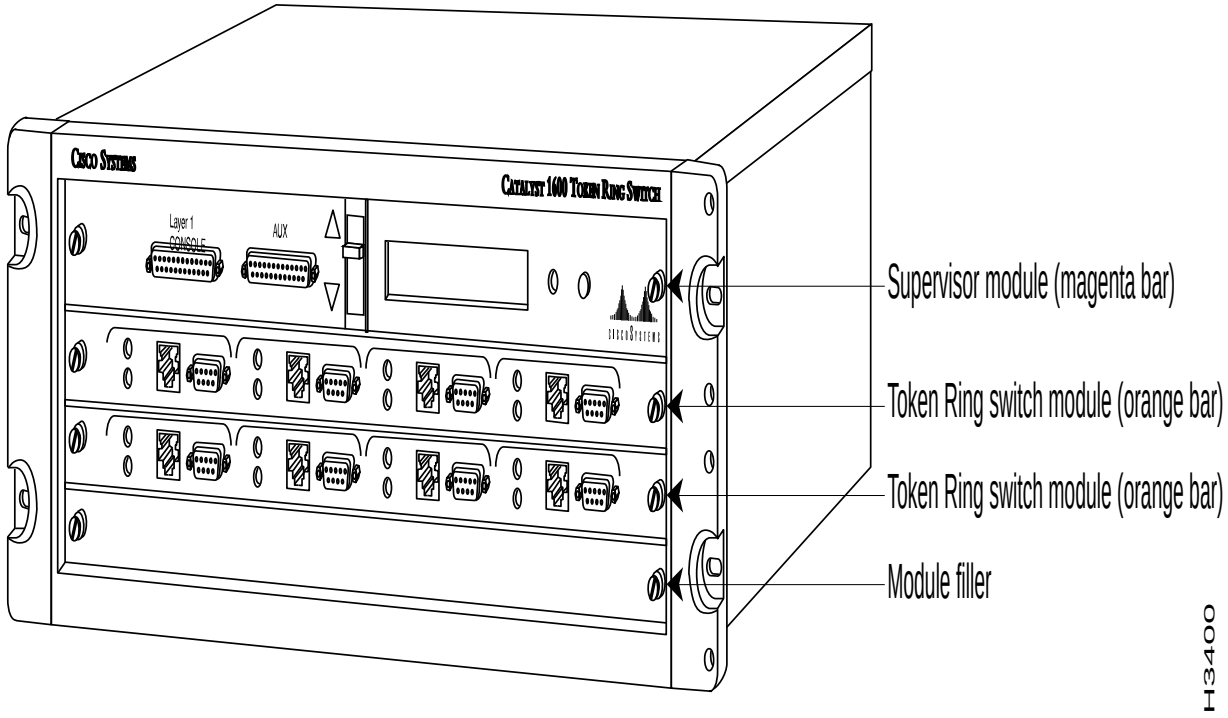
**Multimode interface connector type:** Duplex SC

**Connectors per multimode access card:** 4 (2 per port; ports are numbered 0 and 1)

**Single mode interface connector type:** ST

**Connectors per single mode access card:** 4 (2 per port; ports are numbered 0 and 1)

**Figure 5-13 Connectors on multimode and single mode OC-3c access cards.**



## Multimode OC-3c Cable

Figure 5-14 shows Multimode OC-3c cable with simplex SC connectors.

**Where used:** To connect a multimode OC-3c access card on a LightStream switch to another OC-3c device. LightStream Corp. does not provide this cable; it is widely available from other sources.

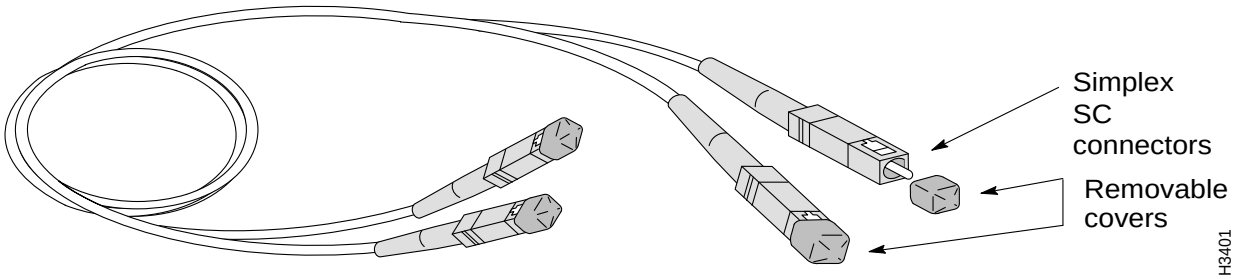
The LightStream OC-3c interfaces operate at a wavelength of 1300 nanometers. Multimode cables should conform to the following specifications:

- **Standard:** ISO/IEC 9314-3
- **Maximum path length** (all cables in a connection, end to end): 2 km
- **Cabling:** 62.5 micron core with an optical loss of 0-9 db, or 50 micron core with an optical loss of 7 db

**Note** A single fiber link should not mix 62.5 and 50 micron cable.

**Note** Protective covers are provided for all OC-3c access card and cable connectors. To shield connectors from dust and damage, put covers on any connectors that are not in use.

**Figure 5-14 Multimode OC-3c cable with simplex SC connectors.**




**Note** Multimode OC-3c cables are available with both simplex SC connectors (as shown in Figure 5-14) and duplex SC connectors; both are compatible with LightStream's multimode access card. However, duplex SC connectors are preferred because they are keyed in such a way that it's impossible to misconnect them.

## Single Mode OC-3c Cable

Figure 5-15 shows a Single mode OC-3c cable with ST connectors.

**Where used:** To connect a single mode OC-3c access card on a LightStream switch to another OC-3c device. LightStream Corp. does not provide this cable; it is widely available from other sources.

LightStream's OC-3c interfaces operate at a wavelength of 1300 nanometers. Single mode cables should conform to the following specifications:

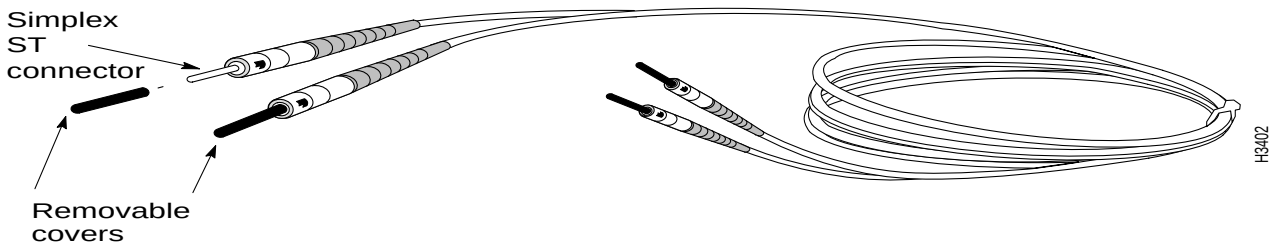
- **Standard:** EIA class IVa
- **Cabling:** 8.3 micron core with an optical loss of 0-12 db and a maximum cable attenuation of 500 MHz/km at 1300 nanometers.

---

**Note** Protective covers are provided for all OC-3c access card and cable connectors. To shield connectors from dust and damage, put covers on any connectors that are not in use.

---

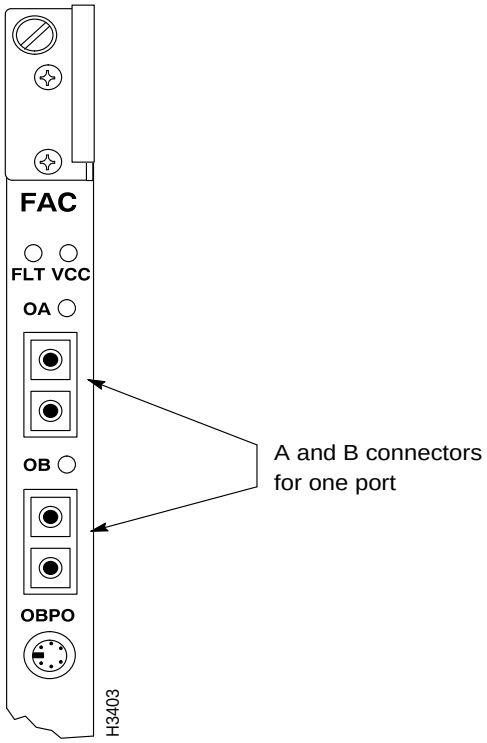
**Figure 5-15 Single mode OC-3c cable with ST connectors.**



# FDDI Connectors and Cables

Figure 5-16 shows MICs (media interface connectors) on an FDDI access card. An FDDI cable is show in Figure 5-17.

**Figure 5-16 Detail of FDDI access card showing connectors.**




Each FDDI port consists of two connectors, A (red) and B (blue). FDDI connectors are keyed to ensure proper connection of the cable to the access card.

## FDDI Cable

**Where used:** To connect a LightStream switch's multimode FDDI access card to another FDDI device. LightStream Corp. does not provide this cable; it is widely available from other sources.

LightStream's FDDI interface operates at a wavelength of 1300 nanometers. Cables should conform to the following specifications:

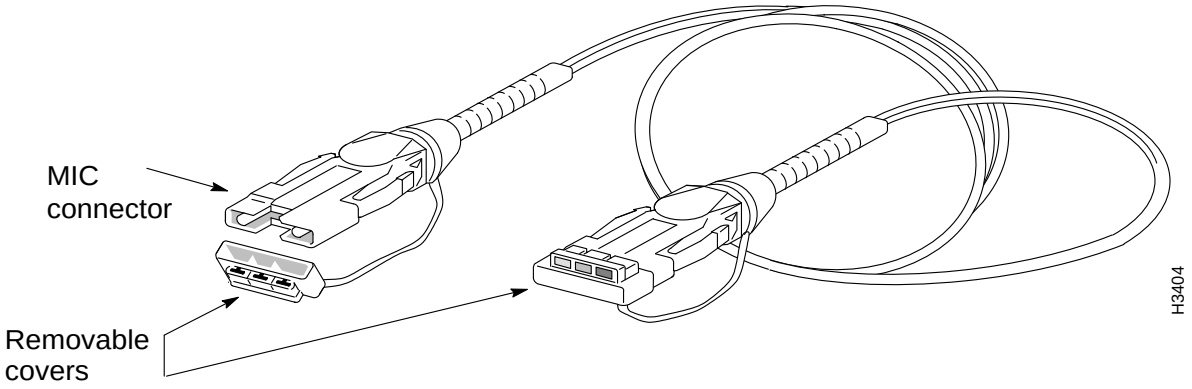
- **Cabling:** 62.5 micron core, graded-index fiber with an optical loss of 11 db and a maximum cable attenuation of 1.5 db/km at 1300 nanometers.
- **Connectors:** MIC
- **Maximum path length** (all cables in a connection, end to end): 2 km

---

**Note** Protective covers are provided for all FDDI access card and cable connectors. To shield connectors from dust and damage, put covers on any connectors that are not in use.

---

**Figure 5-17 FDDI cable.**



# Ethernet Connectors and Cables

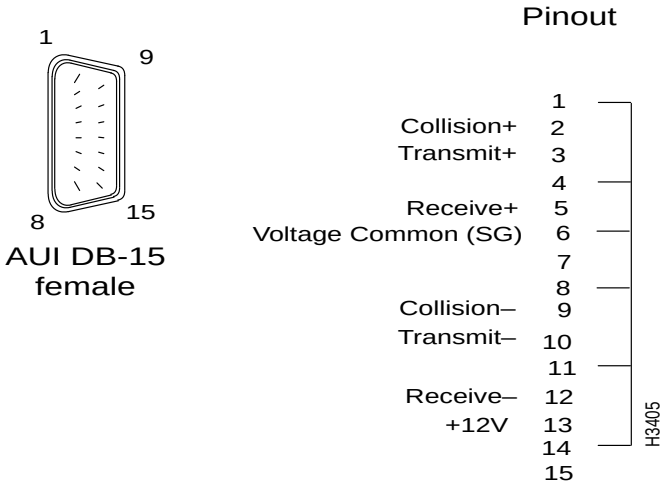
This section describes Ethernet connectors and cables on the NP access card and the Ethernet access card.

## 15-pin AUI Connector

This page describes the 15-pin Ethernet AUI connector on the NP access card and the Ethernet access card (ports 0 and 7). The data cable is described in the subsection entitled Ethernet AUI Cable. See Figure 5-18.

- **Interface connector type:** AUI DB15 connector
- **AUI connectors per NP access card:** 1
- **AUI connectors per Ethernet access card:** 2 (numbered 0 and 7)

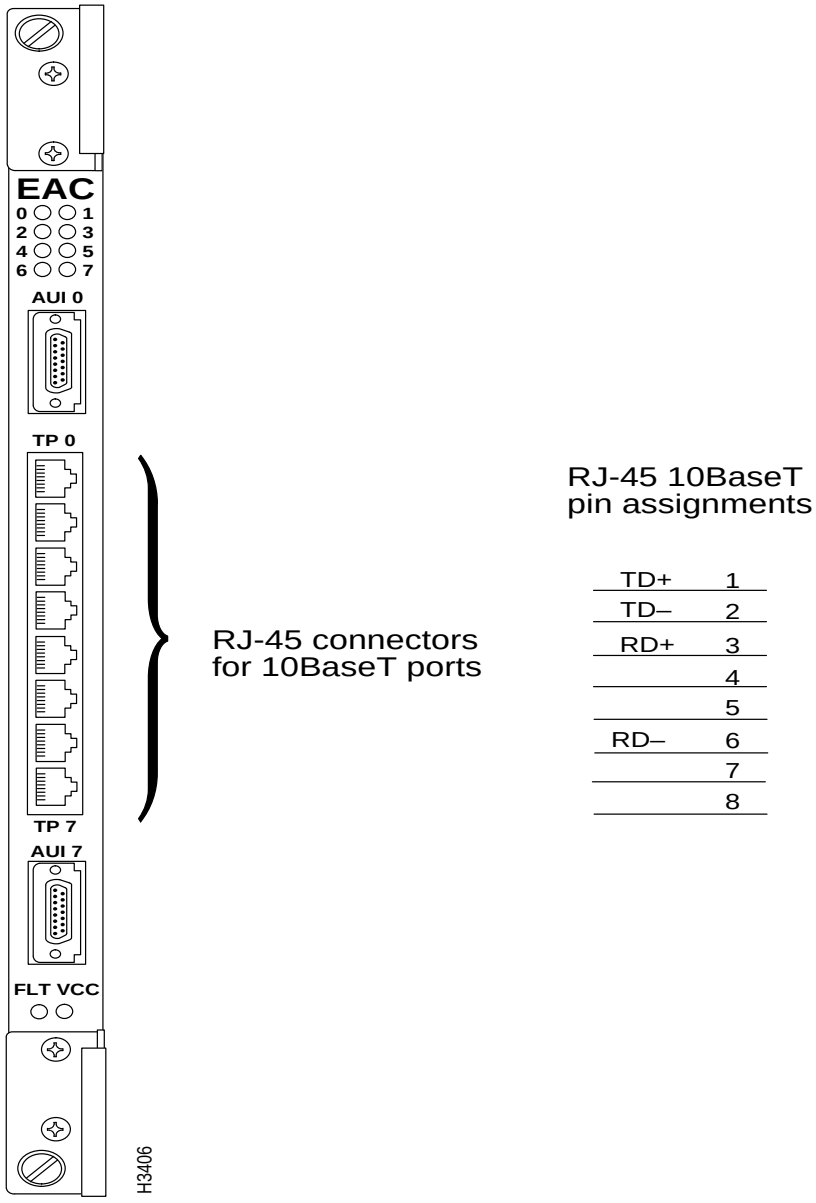
**Figure 5-18 Ethernet AUI interface.**



## RJ-45 Connector

Figure 5-19 shows the RJ-45 connectors on the Ethernet access card. These connectors are used by the twisted pair (10Base-T) ports. The cables used with these ports are shown in Figure 5-21 and Figure 5-22.

**Figure 5-19 Ethernet RJ-45 connectors and pinout.**

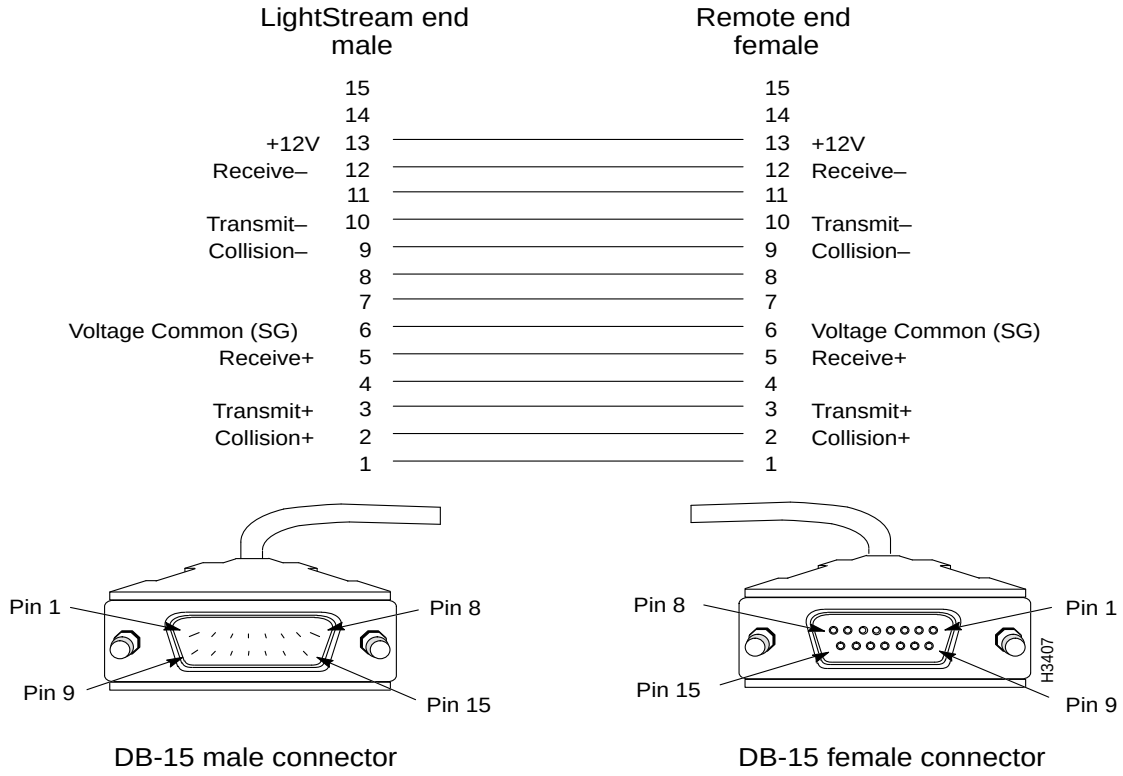


## Ethernet AUI Cable

Figure 5-20 shows an Ethernet AUI cable.

**Where used:** Connects an AUI port on the NP access card or Ethernet access card of a LightStream switch to an Ethernet 10Base2 or 10Base5 transceiver. LightStream Corp. does not provide this cable; it is widely available from other sources.

**Figure 5-20 Ethernet AUI cable.**



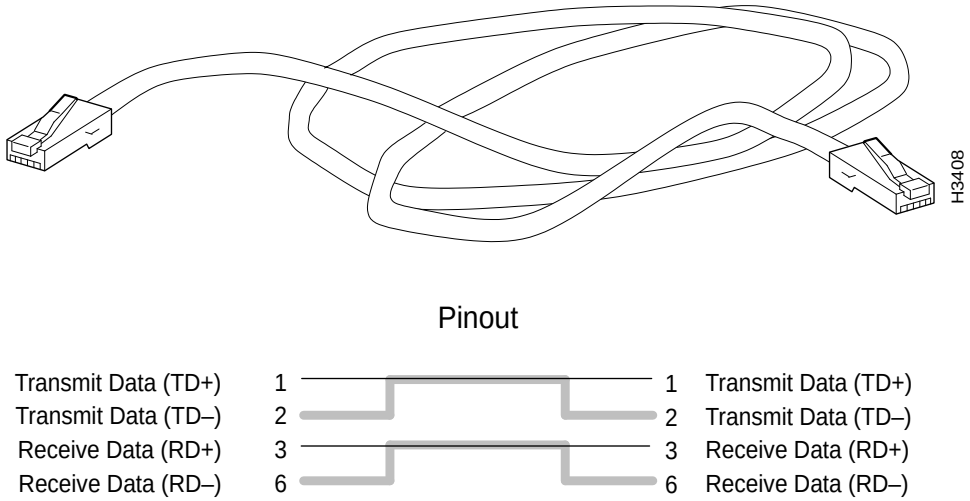
## Ethernet 10Base-T Straight-Through Cable

**Where used:**

- To connect an Ethernet access card on a LightStream switch to an Ethernet hub.
- To connect an Ethernet access card on a LightStream switch directly to another device on the Ethernet, such as a workstation, when the workstation port has a built-in crossover function. (See the note under Ethernet 10Base-T Crossover Cable.)

LightStream Corp. does not provide this cable; it is widely available from other sources. See Figure 5-21.

**Figure 5-21 Straight-through 10Base-T (twisted pair) Ethernet cable.**



## Ethernet 10Base-T Crossover Cable

**Where used:** To connect an Ethernet access card on a LightStream switch directly to another device on the Ethernet, such as a workstation.

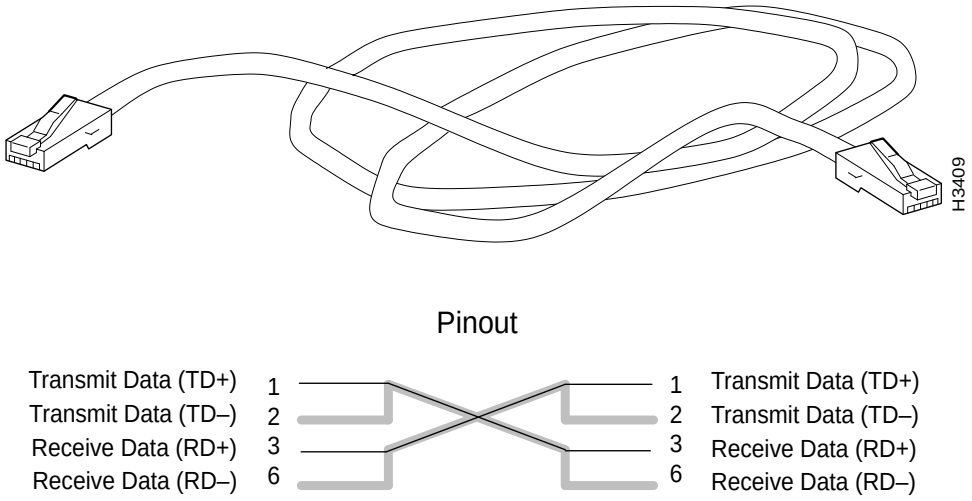
---

**Note** Some MAUs (medium access units) have a built-in crossover function, and therefore use straight-through cables instead of crossover cables. Ports on such MAUs are marked with the letter X.

---

LightStream Corp. does not provide this cable; it is widely available from other sources. See Figure 5-22.

**Figure 5-22 Crossover 10Base-T (twisted pair) Ethernet cable.**



# Console, Modem Connectors and Cable

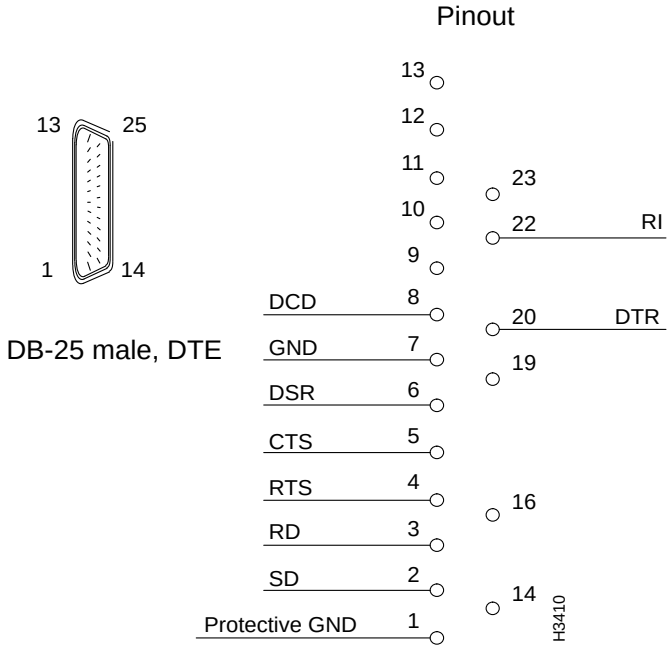
Figure 5-23 and Figure 5-24 describe the modem and console connectors, respectively, on the switch card's console/modem assembly. The data cable used for both ports is described in the subsection entitled RS-232 Straight-Through Cable.

## Modem Connector Specification

**Interface connector type:** DB25 male, DTE

**Connectors per assembly:** labeled MODEM

**Figure 5-23 RS-232 DB-25 modem port signal diagram.**



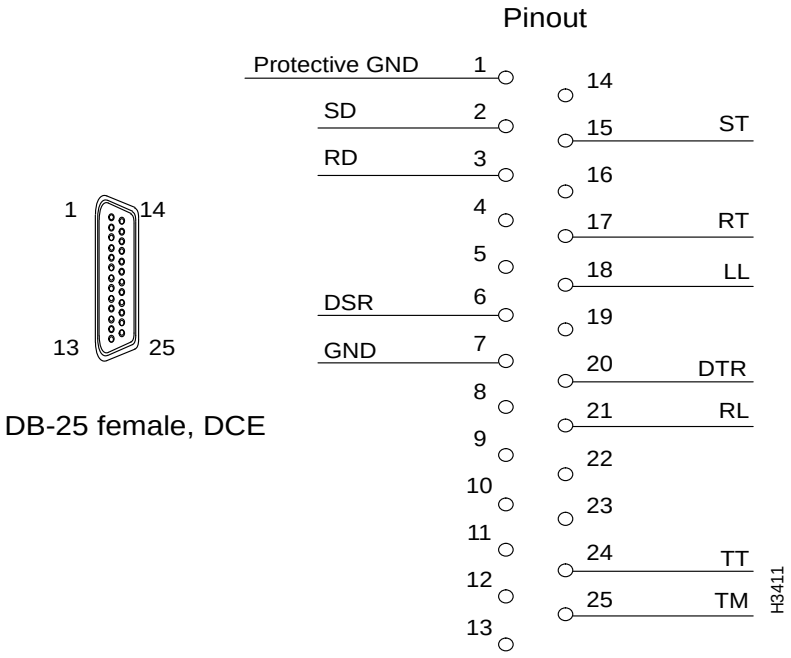
## Console Connector Specification

Figure 5-24 shows a RS-232 DB-25 console port signal diagram.

**Interface connector type:** DB25 female, DCE

**Connectors per assembly:** labeled CNSL

**Figure 5-24 RS-232 DB-25 console port signal diagram.**

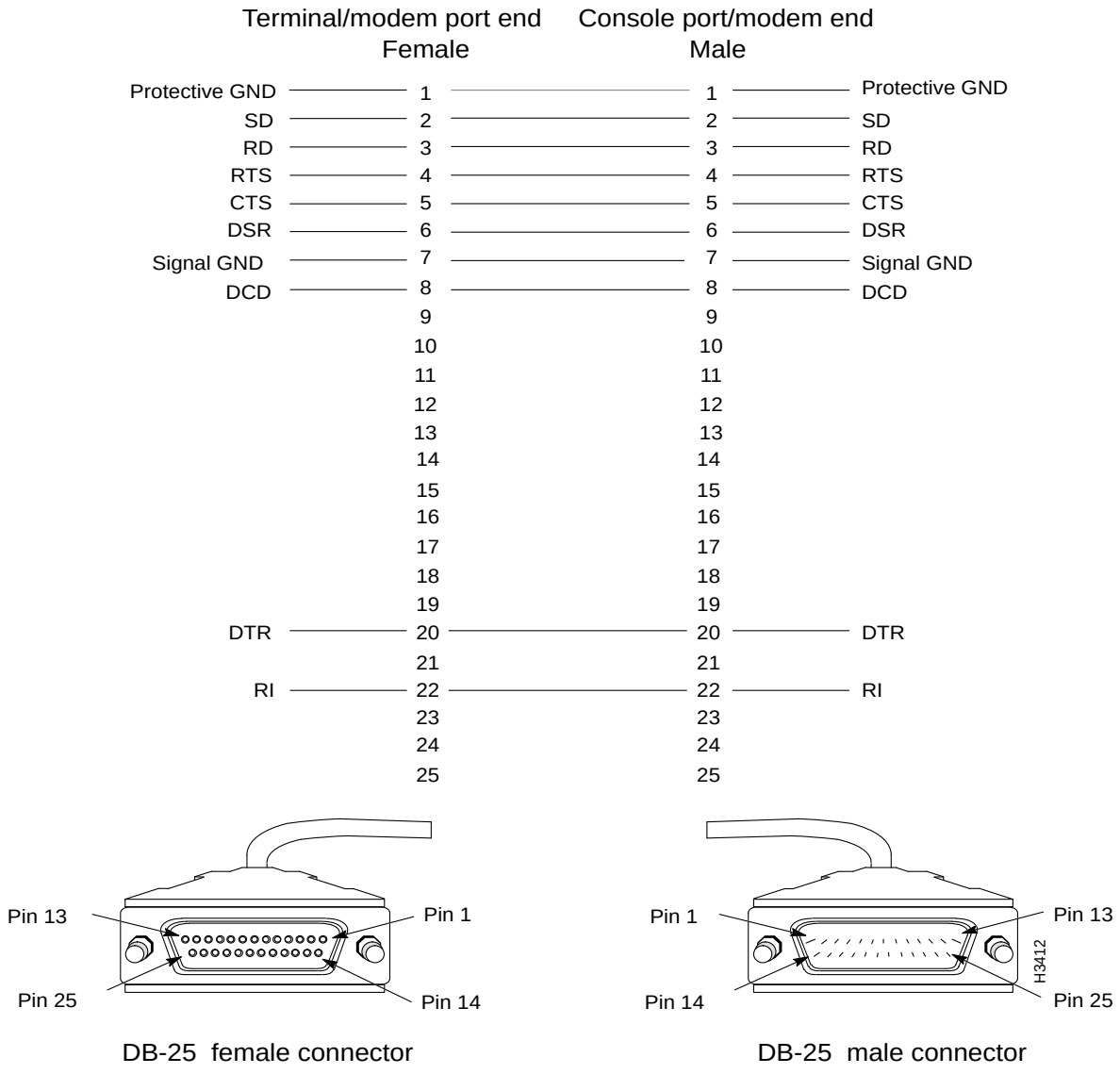


## RS-232 Straight-Through Cable

Figure 5-25 shows a RS-232 straight-through cable**.**

**Where used:** To connect the LightStream console port or modem port to a console or modem. LightStream Corp. does not provide this cable; it is widely available from other sources.

**Figure 5-25 RS-232 straight-through cable.**



# Country Kits and Power Cordsets

## Introduction

Several power cordsets are available for AC-powered LightStream ATM switches, both with systems and as spare parts. This section can help you choose the right cordset for your site.

---

**Note** The information in this section does not apply to DC-powered LightStream systems. A DC-powered system must be permanently wired to a DC power source; it does not use a detachable power cord. In place of a Country Power Kit, each DC-powered system is shipped with a DC Mounting Kit, order number 0104-48.

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If you are specifying a cordset as part of a new system order, refer to the LightStream Price List or Product Catalogue and order the appropriate Country Power Kit. This ensures that you will also receive the appropriate labels and instructions for the country of destination.

If you want to check the cordset included in a specific Country Power Kit, use TableTable 5-1, which cross-references cordset product numbers and Country Power Kit models.

If you need to order a replacement cordset that is not part of a Country Power Kit, you must use the cordset's part number. (The part number (P/N) of each cordset appears above the cordset illustration, later in this section.)

## LightStream Power Cordsets

An AC-powered LightStream chassis is equipped with a recessed male power inlet. The chassis connector follows IEC standard 320 C20 and requires a cordset with an IEC 320 C19 female connector. (All the cordsets offered for the LightStream switch have IEC 320 C19 female connectors.)

Table 5-1 summarizes the information in this section; it lists the countries of use, cordset rating, plug type, part number, and Country Power Kit for each cordset. Figure 5-26 through 5-26 illustrate the cordsets.

**Table 5-1 Summary Specifications for LightStream Cordsets**

| Countries | Cordset Rating | Plug | P/N | Ctry. Kit |
|---|---|---|---|---|
| North America, Japan | 125 V @ 20 A | NEMA 5-20P | 9814927-01 | 0104-1 |
| North America | 125 V @ 20 A | NEMA L5-20P | 9814927-02 | 0104-24 |
| North America | 250 V @ 20 A | NEMA L5-20P | 9814927-04 | 0104-25 |
| Continental Europe, including Finland, France, Germany, Norway, Sweden | 250 V @ 16 A | CEE 7/7 | 9814927-05 | 0104-5 |
| Israel | 250 V @ 16 A | SI 32 | 9814927-08 | 0104-13 |
| Switzerland | 250 V @ 10 A | SEV 1011 | 9824106-01 | 0104-11 |
| U.K., Ireland, Scotland, Hong Kong | 250 V @ 13 A | BS 1363 | 9814927-11 | 0104-2 |

**Figure 5-26 Country Kit 0104-1**

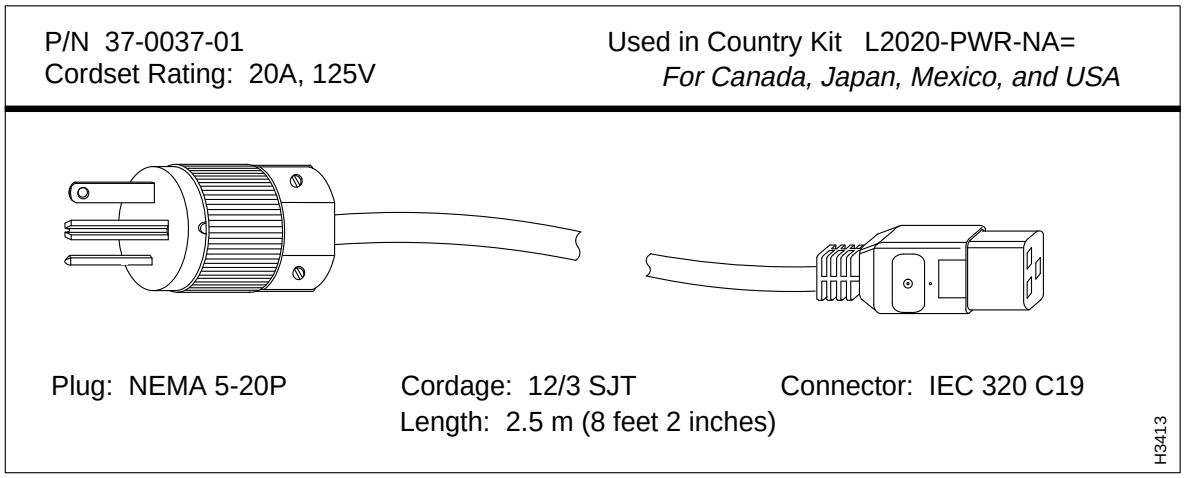
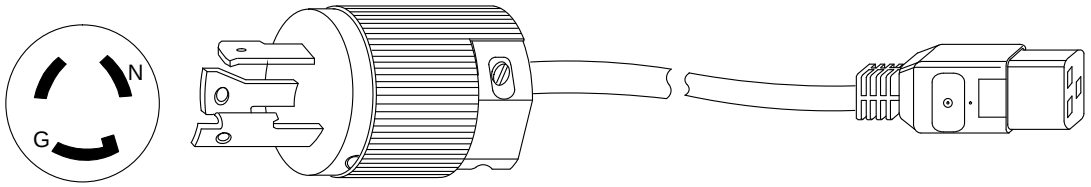


**Figure 5-27 Country Kit 0104-24**

P/N 37-0038-01
Cordset Rating: 20A, 125V

Used in Country Kit L2020-PWR-NA125=
*For Canada, Japan, Mexico, and USA*




Plug: NEMA L5-20P
Locking Plug

Cordage: 12/3 SJT
Length: 2.5 m (8 feet 2 inches)

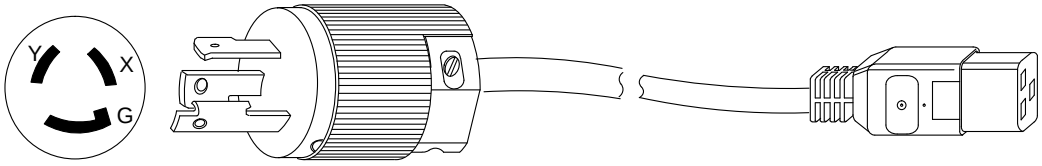
Connector: IEC 320 C19

H3414

**Figure 5-28 Country Kit 0104-25**

P/N 37-0039-01
Cordset Rating: 20A, 250V

Used in Country Kit L2020-PWR-NA250=
*For Canada, Japan, Mexico, and USA*




Plug: NEMA L6-20P
Locking Plug

Cordage: 12/3 SJT
Length: 2.5 m (8 feet 2 inches)

Connector: IEC 320 C19

H3415

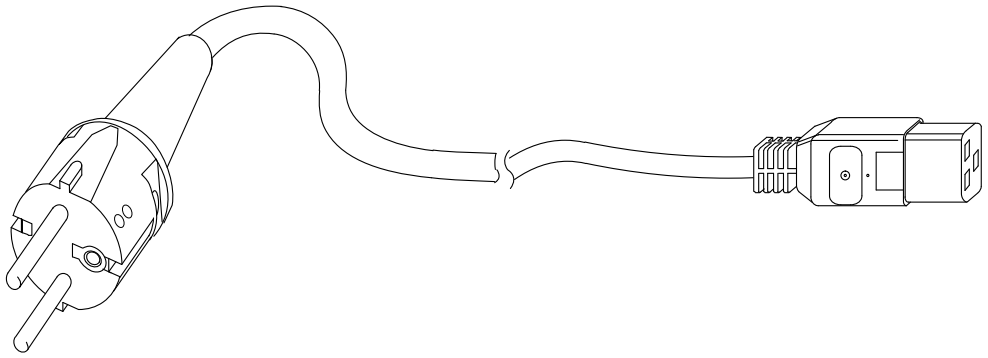
**Figure 5-29 Country Kit 0104-5**

P/N 37-0040-01

Cordset Rating: 16A, 250V

Used in Country Kit L2020-PWR-E=

*For Continental Europe: including Austria, Belgium, Finland, France, Germany, Holland, Norway, Portugal, Spain, and Sweden*



Plug: CEE 7/7

Cordage: 3 x 1.5 $mm^2$

Connector: IEC 320 C19

Length: 2.5 m (8 feet 2 inches)

H3416

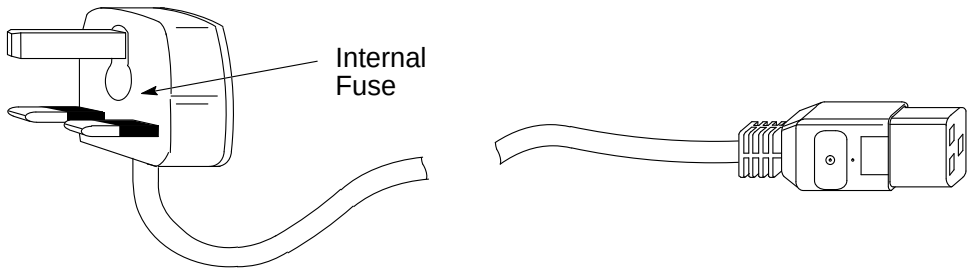
**Figure 5-30 0104-2**

P/N 37-0043-01

Cordset Rating: 13A, 250V

Used in Country Kit L2020-PWR-U=

*For England, Hong Kong, Ireland, Malaysia, Scotland, Singapore, and Wales*




Plug: BS 1363

Cordage: 3 x 1.5 $mm^2$

Connector: IEC 320 C19

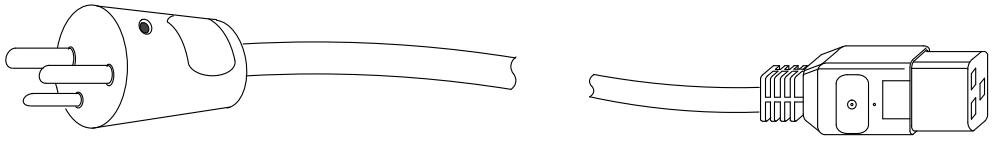
Length: 2.5 m (8 feet 2 inches)

H3417

**Figure 5-31 Country Kit 0104-13**

P/N 37-0045-01
Cordset Rating: 16A, 250V

Used in Country Kit L2020-PWR-IS=
*For Israel*



Plug: SI 32

Cordage: 3 x 1.5 $mm^2$
Length: 2.5 m (8 feet 2 inches)

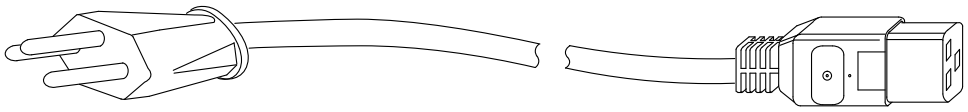
Connector: IEC 320 C19

H3418

**Figure 5-32 Country Kit 0104-11**

P/N 37-0047-01
Cordset Rating: 10A, 250V

Used in Country Kit L2020-PWR-CH=
*For Switzerland*



Plug: SEV 1011

Cordage: 3 x 1.5 $mm^2$
Length: 2.5 m (8 feet 2 inches)

Connector: IEC 320 C19

H3419