Connectors and Cables

This chapter describes the interconnection facilities for the access cards that you can install in the LightStream 2020 multiservice ATM switch (LS2020 switch). These facilities are described in the following order:

- "Serial Connectors and Cables" (for X.21, RS-449, and V.35 serial interfaces)

    — First-generation, low-speed access card (LSAC)

    — Second-generation, high-performance serial access card (SAC)

- "T3/E3 Connectors and Cables"

    — First-generation, medium-speed access cards:

    T3 MSAC
    E3 G.804 MSAC
    E3 PLCP MSAC

Note   First-generation T3/E3 access cards are no longer orderable. They are available only as spares and supported only on a repair basis.
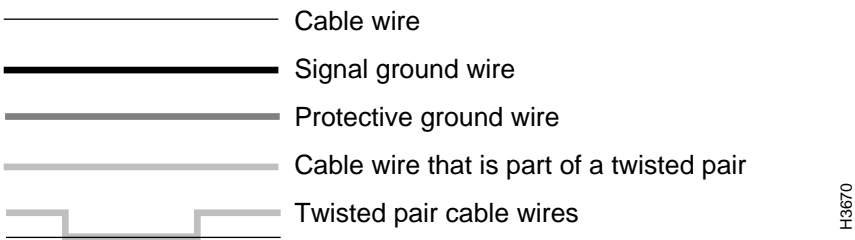

    — Second-generation, high port density access cards:

    T3AC
    E3AC

- "CEMAC Connectors and Cables"

    — T1 CEMAC—8 ports; 120-ohm interface only (does not support a fantail)

    — E1 CEMAC—8 ports; user configurable as either a 75-ohm interface with an E1 fantail, or as a 120-ohm interface without a fantail

- "OC-3c Connectors and Cables"

    — First-generation, single-mode access card:

    OC3AC – SM; fitted with ST connectors

    — Second-generation, single-mode access card:

    OC3AC – SM; fitted with SC connectors

    — Multimode access card:

    OC3AC – MM; fitted with SC connectors

- "FDDI Connectors and Cables"

- "Ethernet Connectors and Cables"

- "Fiber Ethernet Connectors and Cables"

- "Console/Modem Assembly Connectors and Cables"

- "BITS Interface (on Release 2 Switch Card)"

- "Country Kits and Power Cordsets"

Cable Drawing Conventions

Signal diagrams are provided for the I/O connectors and data cables described in this chapter. Figure 3-1 shows the conventions used in representing the signal paths in these diagrams.

Figure 3-1   LS2020 Cable Signal Diagram Conventions

Cable wire

Signal ground wire

Protective ground wire

Cable wire that is part of a twisted pair

Twisted pair cable wires

H3670

Cable Part Numbers

For those interface cables offered for sale by Cisco Systems, a table in the body of each applicable section contains the following information for your convenience:

- The manufacturing number—This number appears on the cable itself.

- The Cisco order number—Refer to this number when purchasing a cable from Cisco Systems.

Note   Some cables described in this chapter do not have an associated Cisco order number. Such cables are not offered for sale by Cisco Systems; however, they are widely available from other vendors as standard equipment.

LS2020 Interface Modules

You can populate the front of an LS2020 chassis with a variety of line cards, depending on your particular communications requirements. Correspondingly, you can populate the opposite slots in the rear of the LS2020 chassis with matching access cards.

Each line card/access card combination in a given slot of an LS2020 chassis constitutes an operational/functional entity referred to as an interface module.

Interface modules support specific kinds of data transfer services in an LS2020 network and provide the means of interconnection and communication among network devices. Each line card is connected to its corresponding access card through the LS2020 chassis midplane.

If you remove an access card from the midplane, service to the corresponding line card is disrupted.

Table 3-1 lists the types of interface modules available for use in an LS2020 switch, together with the applicable line card, associated access card, and the number of ports supported by each module.

Table 3-1   LS2020 Interface Modules

Interface Module Type	Line Card Type	Access Card/Number of ports
Serial modules:		
First-generation	Low-speed card (LSC)	Low-speed access card (LSAC) — 8 ports
Second-generation[1]	Packet line card (PLC)	Serial access card (SAC) — 8 ports
T3/E3 modules:		
First-generation	Medium-speed card (MSC)	T3 medium-speed access card (MSAC) — 2 ports E3 G.804 medium-speed access card (MSAC) — 2 ports E3 PLCP medium-speed access card (MSAC) — 2 ports (First-generation T3/E3 cards are no longer orderable)
Second-generation[2]	Cell line card (CLC)	T3 access card (T3AC) — 4 or 8 ports E3 access card (E3AC) — 4 ports
Constant bit rate (CBR) modules	Packet line card (PLC)	T1 circuit emulation access card (CEMAC-T1) — 8 ports E1 circuit emulation access card (CEMAC-E1) — 8 ports
OC-3 modules:		
First-generation	Cell line card (CLC)	OC-3c single-mode access card equipped with ST connectors (OC3AC-SM) — 1 or 2 ports
Second-generation		OC-3c single-mode access card equipped with SC connectors (OC3AC-SM) — 1 or 2 ports
Multimode		OC-3c multimode access card equipped with SC connectors (OC3AC-MM) — 1 or 2 ports
FDDI module	Packet line card (PLC)	FDDI access card (FAC) — 2 ports
Ethernet module	Packet line card (PLC)	Ethernet access card (EAC) — 8 ports
Fiber Ethernet module	Packet line card (PLC)	Fiber Ethernet access card (FEAC) — 8 ports

1. Upgrade option from first-generation, low-speed access card (LSAC)
2. Upgrade option from first-generation, medium-speed, two-port T3/E3 access cards (MSAC)

Serial Connectors and Cables

This section describes the connectors and cables for the X.21, RS-449, and V.35 interfaces for the serial access cards available for use with the LS2020 switch. Figure 3-2 shows the bulkhead view of these serial interface cards. Such cards are of two types:

- Low-speed access card (LSAC)

- Serial access card (SAC)

Figure 3-2   Low-Speed and Serial Access Cards

Low-speed access card   Serial access card
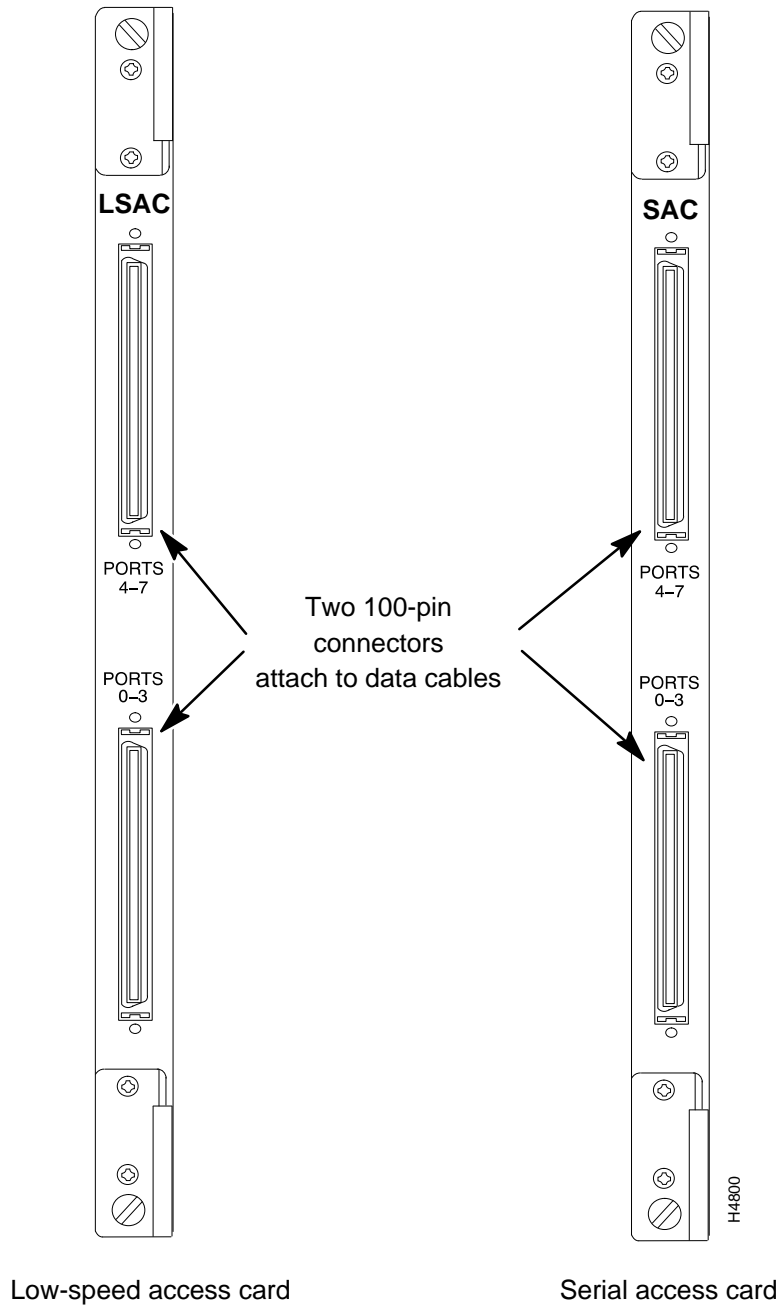
Note References to RS-449, a popular physical layer interface standard, appear frequently in certain sections of this document. RS-449 is now called EIA/TIA-449. However, to avoid confusion in relation to LS2020 fantails, cables, and connectors, the term "RS-449" is retained for descriptive purposes in this document.

The low-speed access card (LSAC) and the serial access card (SAC) use the same types of connectors and cables for hookup. These interconnection facilities are described in the following order:

- X.21 fantail connector—see the section entitled "X.21 Fantail and Connectors."

- RS-449 fantail connector—see the section entitled "RS-449 Fantail and Connectors."

- V.35 fantail connector—see the section entitled "V.35 Fantail and Connectors."

- DSU/CSU control ports on V.35 and RS-449 fantails—see the section entitled "DSU/CSU Control Ports on RS-449 and V.35 Fantails."

- Internal data cable for connecting serial access card to fantail—see the section entitled "Fantail Cable."

- Data cable for connecting X.21 fantail to external X.21 device—see the section entitled "X.21 Interface Cable."

- Data cable for connecting RS-449 fantail to external RS-449 DCE device—see the section entitled "RS-449 Interface Straight-Through Cable."

- Data cable for connecting two LS2020 switches via their respective RS-449 fantail interfaces, or for connecting RS-449 fantail to external RS-449 DTE device—see the section entitled "RS-449 Interface Crossover Cable."

- Data cable for connecting V.35 fantail to external V.35 DCE device—see the section entitled "V.35 Interface Straight-Through Cable."

- Data cable for connecting two LS2020 switches via their respective V.35 fantail interfaces, or for connecting V.35 fantail to external V.35 DTE device—see the section entitled "V.35 Interface Crossover Cable."

X.21 Fantail and Connectors

Figure 3-3 shows the X.21 fantail that you can use with either the low-speed access card (LSAC) or the serial access card (SAC).
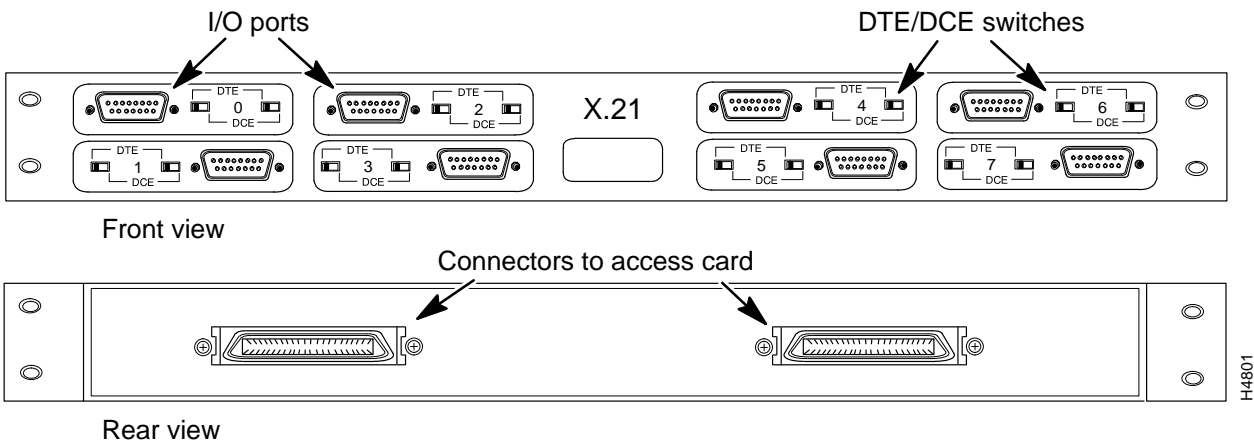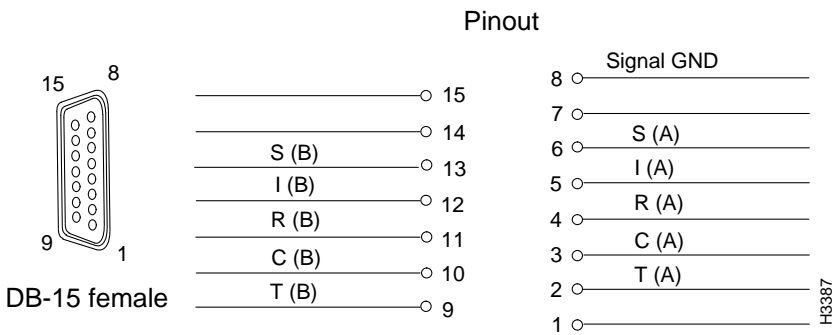
Figure 3-3   X.21 Fantail

Figure 3-4 shows the pin assignments for the eight X.21 interface DB-15 connectors (I/O ports) present on the X.21 fantail.

Figure 3-4   X.21 Interface DB-15 Connector Pin Assignments

Interface connector type: DB-15 female

Connectors per fantail: eight (numbered 0 – 7)

RS-449 Fantail and Connectors

Figure 3-5 shows the RS-449 fantail that can be used with either the low-speed access card (LSAC) or the serial access card (SAC).

Figure 3-5   RS-449 Fantail

I/O ports   DSU/CSU control ports

RS449

Front view
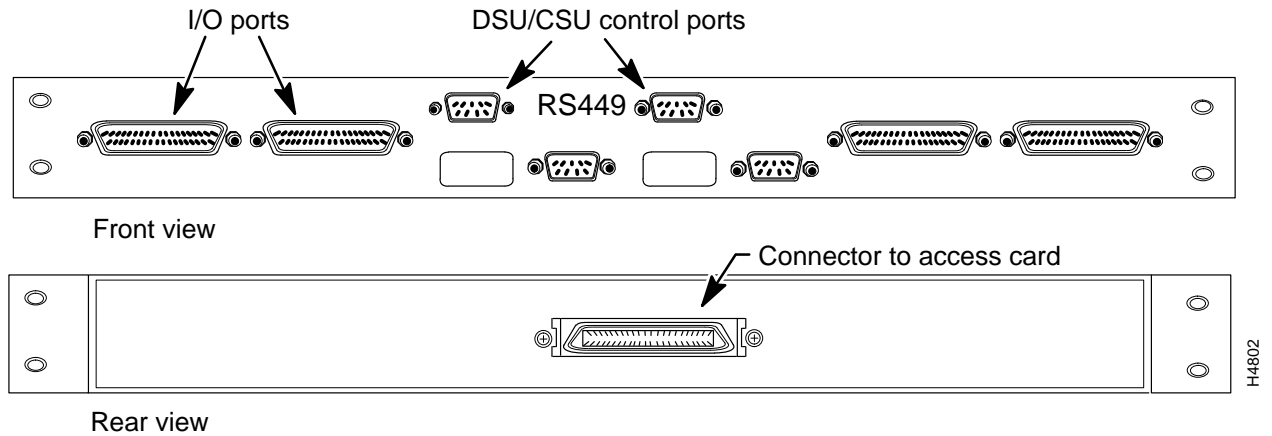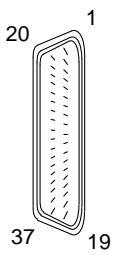
Connector to access card

Rear view

Figure 3-6 shows the pin assignments for the four RS-449 interface DB-37 connectors (I/O ports) present on the RS-449 fantail.

Figure 3-6   RS-449 Interface DB-37 Connector Pin Assignments

Pinout

RC	20	1	Protective GND
	21	2	
SD–	22	3	
ST–	23	4	SD+
RD	24	5	ST+
Signal GND	25	6	RD+
RT–	26	7	RS+
	27	8	RT+
	28	9	CS+
DM–	29	10	LL
Signal GND	30	11	DM+
RR–	31	12	TR+
	32	13	RR+
	33	14	RL
DCE send timing-	34	15	
TT–	35	16	DCE send timing+
	36	17	TT+
SC	37	18	TM
		19	Signal GND

20 1

37 19

DB-37 male

Interface connector type: DB-37 male

Connectors per fantail: four (numbered 0 – 3)

V.35 Fantail and Connectors

Figure 3-7 shows the V.35 fantail that can be used with either the low-speed access card (LSAC) or the serial access card (SAC).

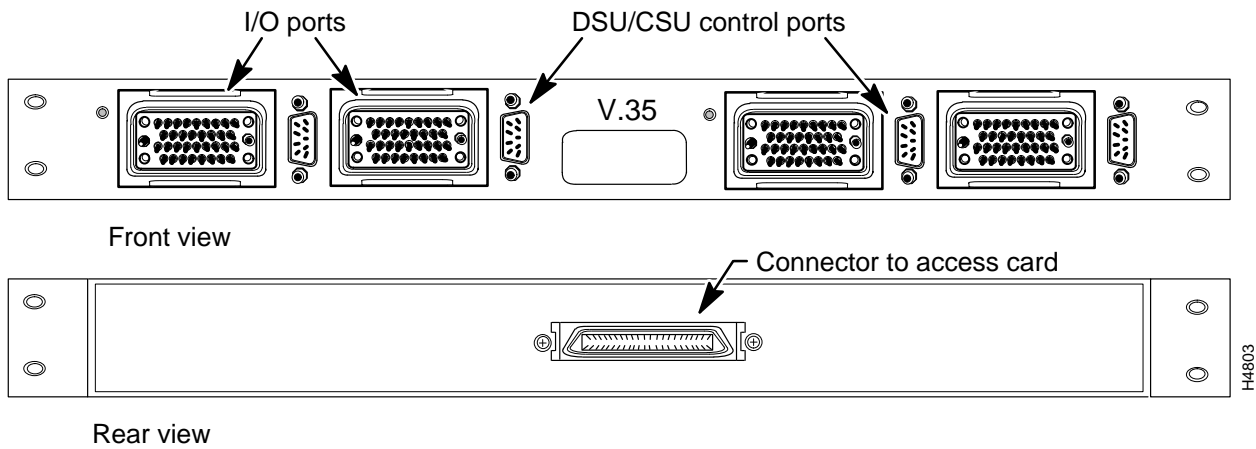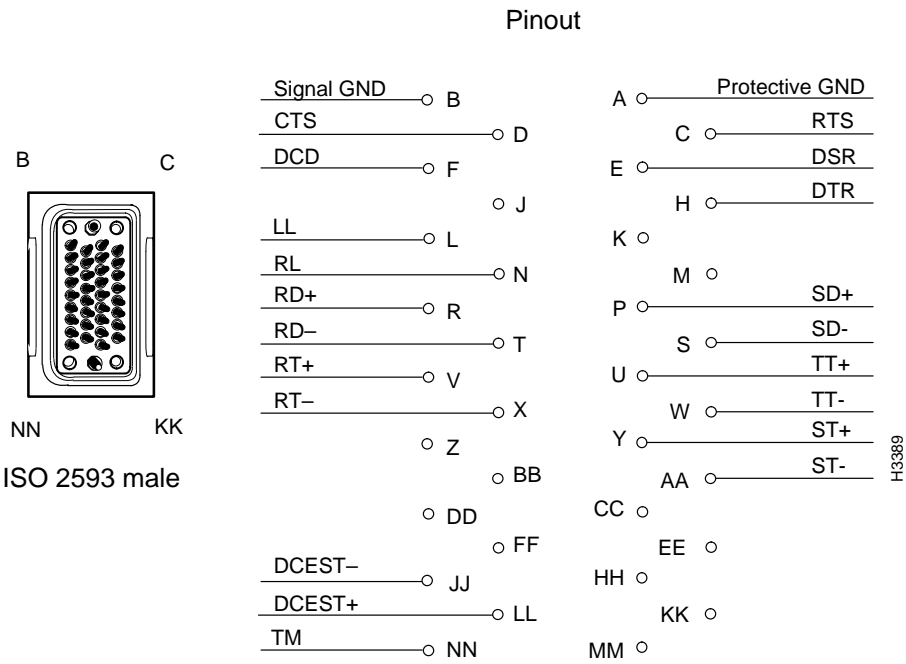**Figure 3-7   V.35 Fantail**

Figure 3-8 illustrates the pin assignments for the four V.35 interface ISO 2593 connectors (I/O ports) present on the V.35 fantail.

Figure 3-8   V.35 Interface ISO 2593 Connector Pin Assignments

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

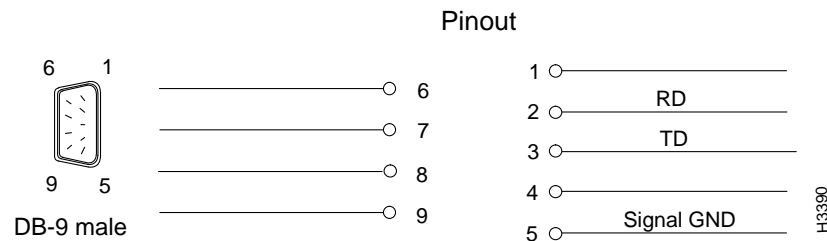**Connectors per fantail:** four (numbered 0 – 3)

DSU/CSU Control Ports on RS-449 and V.35 Fantails

RS-232 DSU/CSU control ports are present on both the RS-449 and V.35 fantails. If you connect the control port to the craft port on a DSU/CSU device, you can use the csumon program to communicate remotely with the DSU/CSU from an LS2020 switch.

Figure 3-9 shows the pin assignments for the four RS-232 DSU/CSU control ports (DB-9 connectors) present on the RS-449 and V.35 fantail.

Figure 3-9   **RS-232 DSU/CSU Control Port (DB-9 Connector) Pin Assignments**

Interface connector type: DB-9 male

Connectors per fantail: four (numbered 0 – 3)

Fantail Cable

This high-density, 100-pin fantail cable is used to interconnect the bulkhead of a low-speed access card (LSAC) or a serial access card (SAC) with the back of an X.21, RS-449, or V.35 fantail.

The data cable for an X.21, RS-449, or V.35 fantail can be ordered from Cisco Systems in any of three lengths. Select the appropriate order number from the following table.

Manufacturing No.	Length	Order No.
72-1117-01	4 feet (1.2 m)	L2020-CAB-F4=
72-1118-01	8 feet (2.4 m)	L2020-CAB-F8=
72-1119-01	12 feet (3.6 m)	L2020-CAB-F12=

Two such data cables are required for the interconnection of an LSAC or SAC bulkhead to the rear of an X.21 fantail: one cable for ports 0 – 3 on bulkhead, and another cable for ports 4 – 7 on the bulkhead.

Only one such cable is required for the connection of an LSAC or SAC bulkhead to an RS-449 or V.35 fantail.

X.21 Interface Cable

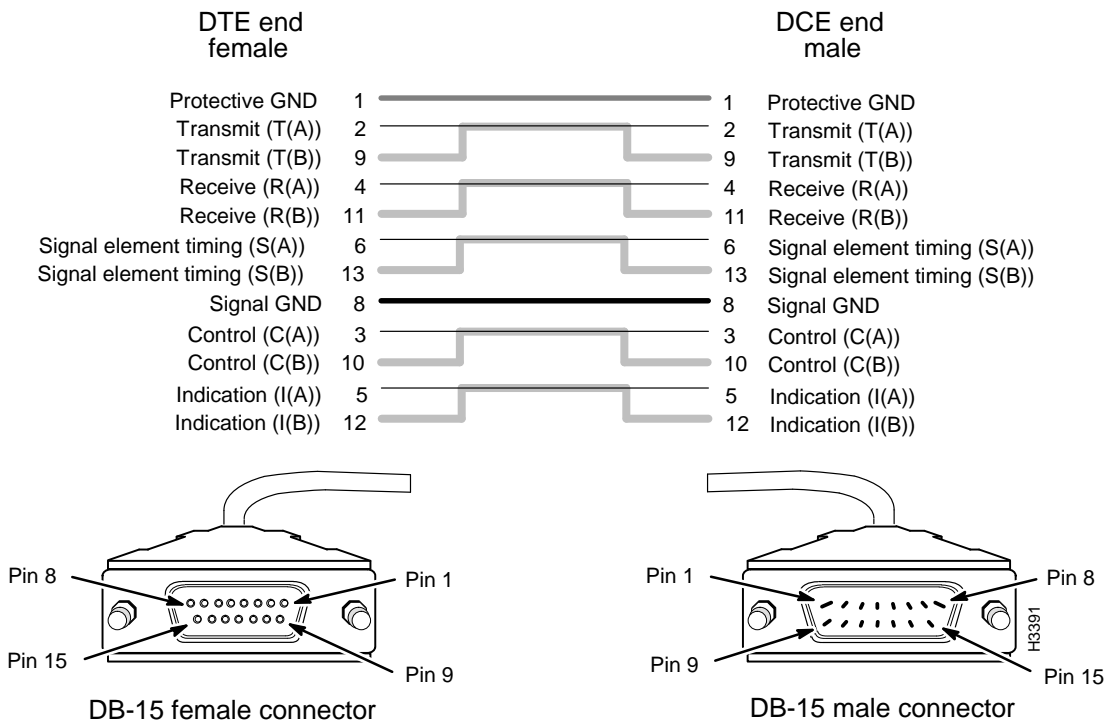This cable is used to interconnect an X.21 fantail with an external X.21 device.

The X.21 interface cable can be ordered from Cisco Systems in any of three lengths. Select the appropriate order number from the following table.

Manufacturing No.	Length	Order No.
72-0991-01	30 feet (9.1 m)	LS-CAB-X21-TC30=
72-0992-01	50 feet (15.2 m)	LS-CAB-X21-TC50=
72-0993-01	100 feet (30.5 m)	LS-CAB-X21-TC100=

Note Use the eight DTE/DCE switches on the X.21 fantail to select a DTE or DCE interface for each I/O port.

Figure 3-10 is a signal diagram for the X.21 interface cable.

Figure 3-10 **X.21 Interface Cable Signal Diagram**

RS-449 Interface Straight-Through Cable

This cable is used to interconnect an RS-449 fantail with an external RS-449 DCE device.

The RS-449 interface straight-through cable can be ordered from Cisco Systems in any of three lengths. Select the appropriate order number from the following table.

Manufacturing No.	Length	Order No.
72-1002-01	30 feet (9.1 m)	LS-CAB-RS4-TC30=
72-1003-01	50 feet (15.2 m)	LS-CAB-RS4-TC50=
72-1004-01	100 feet (30.5 m)	LS-CAB-RS4-TC100=

Figure 3-11 is a signal diagram for the RS-449 interface straight-through cable.

Figure 3-11   RS-449 Interface Straight-through Cable Signal Diagram

LightStream DTE end female			DCE end male
Signal Ground (SG)	19	19	Signal Ground (SG)
Send Common (SC)	37	37	Send Common (SC)
Test Mode (TM)	18	18	Test Mode (TM)
StandBy indicator (SB)	36	36	StandBy indicator (SB)
Terminal Timing (TT+)	17	17	Terminal Timing (TT+)
Terminal Timing (TT−)	35	35	Terminal Timing (TT−)
DCE Send Timing+ (SR/SF)	16	16	DCE Send Timing+ (SR/SF)
DCE Send Timing- (NS)	34	34	DCE Send Timing– (NS)
Incoming Call (IC)	15	15	Incoming Call (IC)
Signal Quality (SQ)	33	33	Signal Quality (SQ)
Remote Loopback (RL)	14	14	Remote Loopback (RL)
Select Standby (SS)	32	32	Select Standby (SS)
Receiver Ready (RR+)	13	13	Receiver Ready (RR+)
Receiver Ready (RR−)	31	31	Receiver Ready (RR−)
Terminal Ready (TR+)	12	12	Terminal Ready (TR+)
Signal Ground (TR−)	30	30	Signal Ground (TR−)
Data Mode (DM+)	11	11	Data Mode (DM+)
Data Mode (DM−)	29	29	Data Mode (DM−)
Local Loopback (LL)	10	10	Local Loopback (LL)
terminal In Service (IS)	28	28	terminal In Service (IS)
Clear to Send (CS+)	9	9	Clear to Send (CS+)
Clear to Send (CS−)	27	27	Clear to Send (CS−)
Receive Timing (RT+)	8	8	Receive Timing (RT+)
Receive Timing (RT−)	26	26	Receive Timing (RT−)
Request to Send (RS+)	7	7	Request to Send (RS+)
Signal Ground (RS−)	25	25	Signal Ground (RS−)
Receive Data (RD+)	6	6	Receive Data (RD+)
Receive Data (RD−)	24	24	Receive Data (RD−)
Send Timing (ST+)	5	5	Send Timing (ST+)
Send Timing (ST−)	23	23	Send Timing (ST−)
Send Data (SD+)	4	4	Send Data (SD+)
Send Data (SD−)	22	22	Send Data (SD−)
SPARE	3	3	SPARE
SPARE	21	21	SPARE
Signalling rate Indicator (SI)	2	2	Signalling rate Indicator (SI)
Receive Common (RC)	20	20	Receive Common (RC)
Protective Ground (PG)	1	1	Protective Ground (PG)

DB-37 female connector   DB-37 male connector

RS-449 Interface Crossover Cable

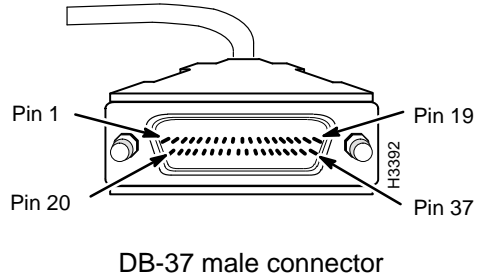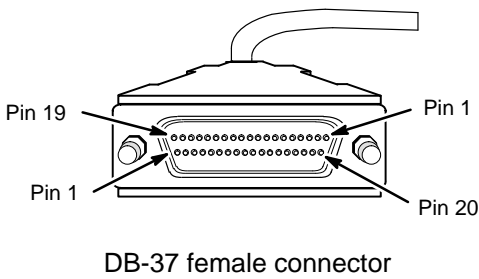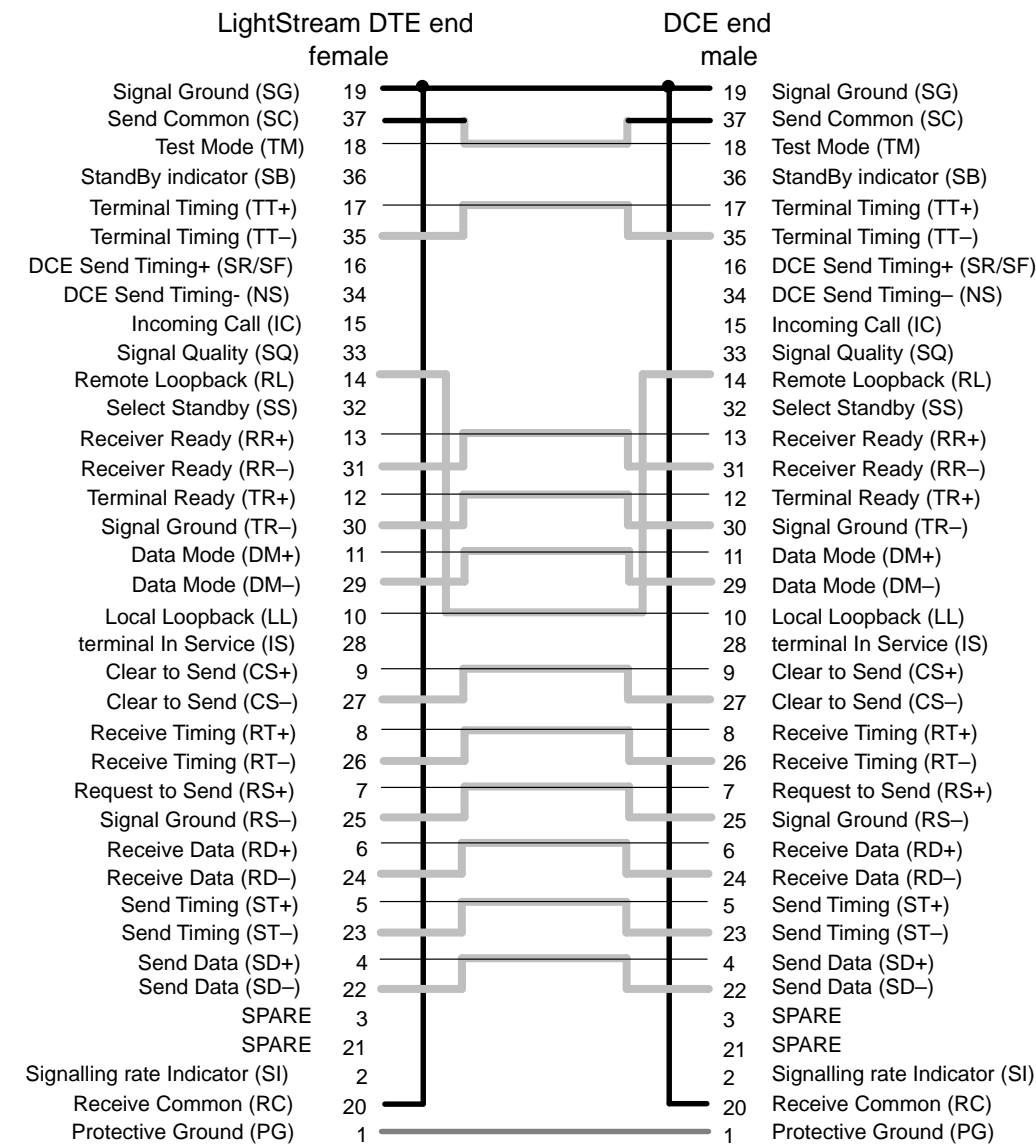This cable is used to connect two LS2020 switches via their RS-449 fantail interfaces, or to interconnect an RS-449 fantail with an external RS-449 DTE device.

The RS-449 interface crossover cable can be ordered from Cisco Systems in any of four lengths. Select the appropriate order number from the following table.

Manufacturing No.	Length	Order No.
72-1008-01	8 feet (2.4 m)	LS-CAB-RS4-TT8=
72-1005-01	30 feet (9.1 m)	LS-CAB-RS4-TT30=
72-1006-01	50 feet (15.2 m)	LS-CAB-RS4-TT50=
72-1007-01	100 feet (30.5 m)	LS-CAB-RS4-TT100=

Figure 3-12 is a signal diagram for the RS-449 interface crossover cable.

Figure 3-12   RS-449 Interface Crossover Cable Signal Diagram
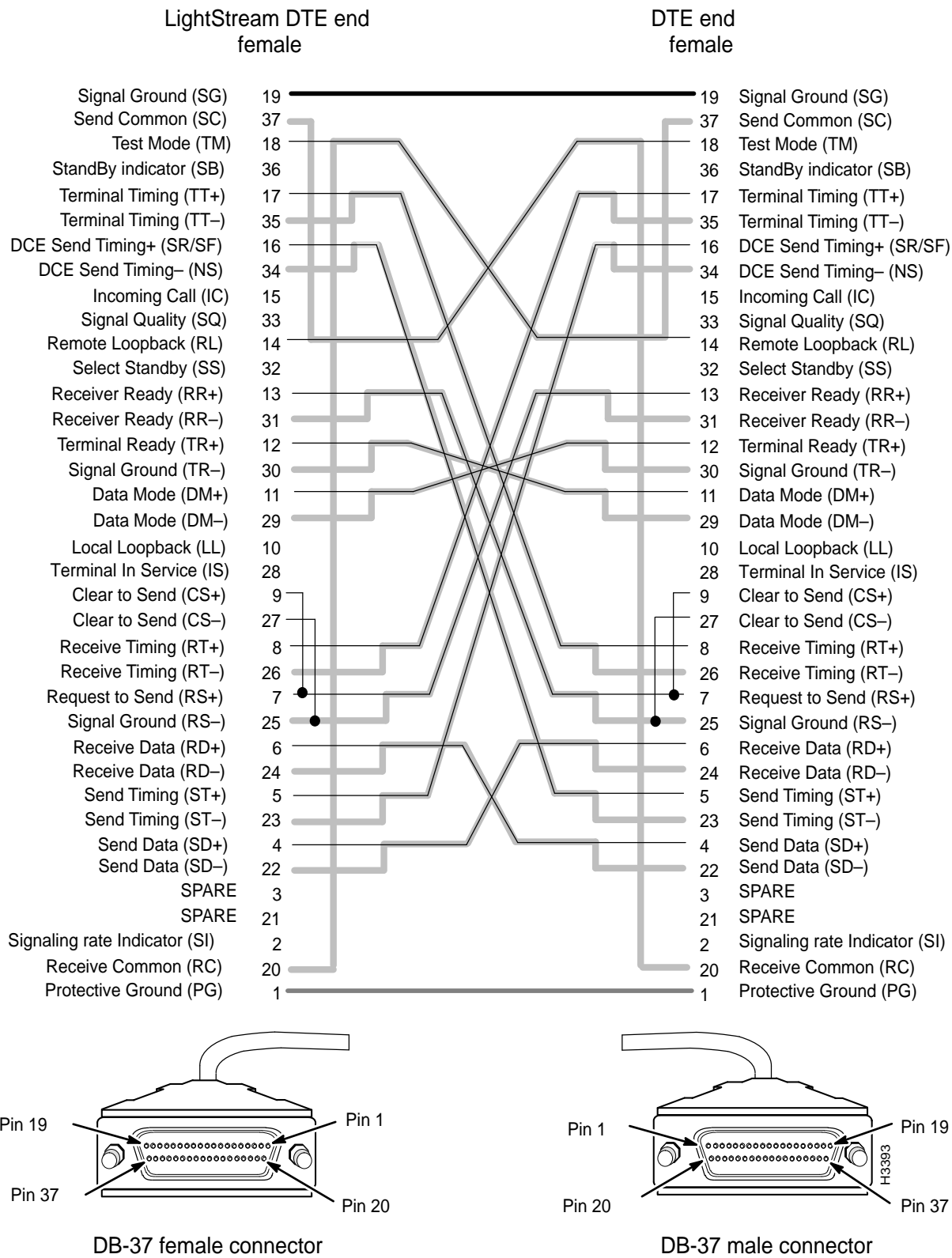
V.35 Interface Straight-Through Cable

This cable is used to interconnect a V.35 fantail with an external V.35 DCE device.

The V.35 interface straight-through cable can be ordered from Cisco Systems in any of three lengths. Select the appropriate order number from the following table.
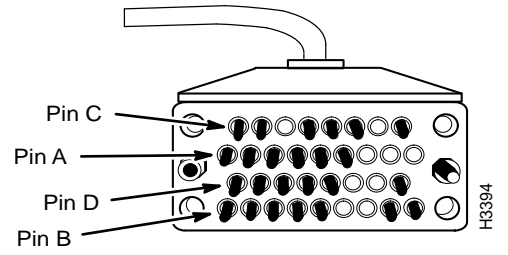
Manufacturing No.	Length	Order No.
72-1009-01	30 feet (9.1 m)	LS-CAB-V35-TC30=
72-1010-01	50 feet (15.2 m)	LS-CAB-V35-TC50=
72-1011-01	100 feet (30.5 m)	LS-CAB-V35-TC100=

Figure 3-13 is a signal diagram for the V.35 interface straight-through cable.

Figure 3-13   V.35 Interface Straight-through Cable Signal Diagram

LightStream DTE end female			DCE end male
Protective Ground (PG)	A	A	Protective Ground (PG)
Signal Ground (SG)	B	B	Signal Ground (SG)
Request To Send (RTS)	C	C	Request To Send (RTS)
Clear To Send (CTS)	D	D	Clear To Send (CTS)
Data Set Ready (DSR)	E	E	Data Set Ready (DSR)
Data Carrier Detect (DCD)	F	F	Data Carrier Detect (DCD)
Data Terminal Ready (DTR)	H	H	Data Terminal Ready (DTR)
Ring Indicator (RI)	J	J	Ring Indicator (RI)
LTST (Cisco 4000)	K	K	LTST (Cisco 4000)
Local Loopback (LL)	L	L	Local Loopback (LL)
	M	M	
Remote Loopback (RL)	N	N	Remote Loopback (RL)
Send Data (SD+)	P	P	Send Data (SD+)
Receive Data RD+)	R	R	Receive Data RD+)
Send Data (SD+)	S	S	Send Data (SD–)
Receive Data (RD–)	T	T	Receive Data (RD–)
Terminal Timing (TT+)	U	U	Terminal Timing (TT+)
Receive Timing (RT+)	V	V	Receive Timing (RT+)
Terminal Timing (TT–)	W	W	Terminal Timing (TT–)
Receive Timing (RT–)	X	X	Receive Timing (RT–)
Send Timing (ST+)	Y	Y	Send Timing (ST+)
	Z	Z	
Send Timing (ST–)	AA	AA	Send Timing (ST–)
	BB	BB	
	CC	CC	
	DD	DD	
	EE	EE	
	FF	FF	
	HH	HH	
DCE Send Timing–	JJ	JJ	DCE Send Timing–
DCE DSR (T300)	KK	KK	DCE DSR (T300)
DCE Send Timing+	LL	LL	DCE Send Timing+
	MM	MM	
Test Mode (TN)	NN	NN	Test Mode (TN)

34-position female block connector

34-position male block connector

H3394

V.35 Interface Crossover Cable

This cable is used to connect two LS2020 switches via their V.35 fantail interfaces, or to interconnect a V.35 fantail with an external V.35 DTE device.

The V.35 interface crossover cable can be ordered from Cisco Systems in any of four lengths. Select the appropriate order number from the following table.

Manufacturing No.	Length	Order No.
72-0997-01	8 feet (2.4 m)	LS-CAB-V35-TT8=
72-0994-01	30 feet (9.1 m)	LS-CAB-V35-TT30=
72-0995-01	50 feet (15.2 m)	LS-CAB-V35-TT50=
72-0996-01	100 feet (30.5 m)	LS-CAB-V35-TT100=

Figure 3-14 is a signal diagram for the V.35 interface crossover cable.

Figure 3-14   V.35 Interface Crossover Cable Signal Diagram

34-position female block connector   34-position female block connector
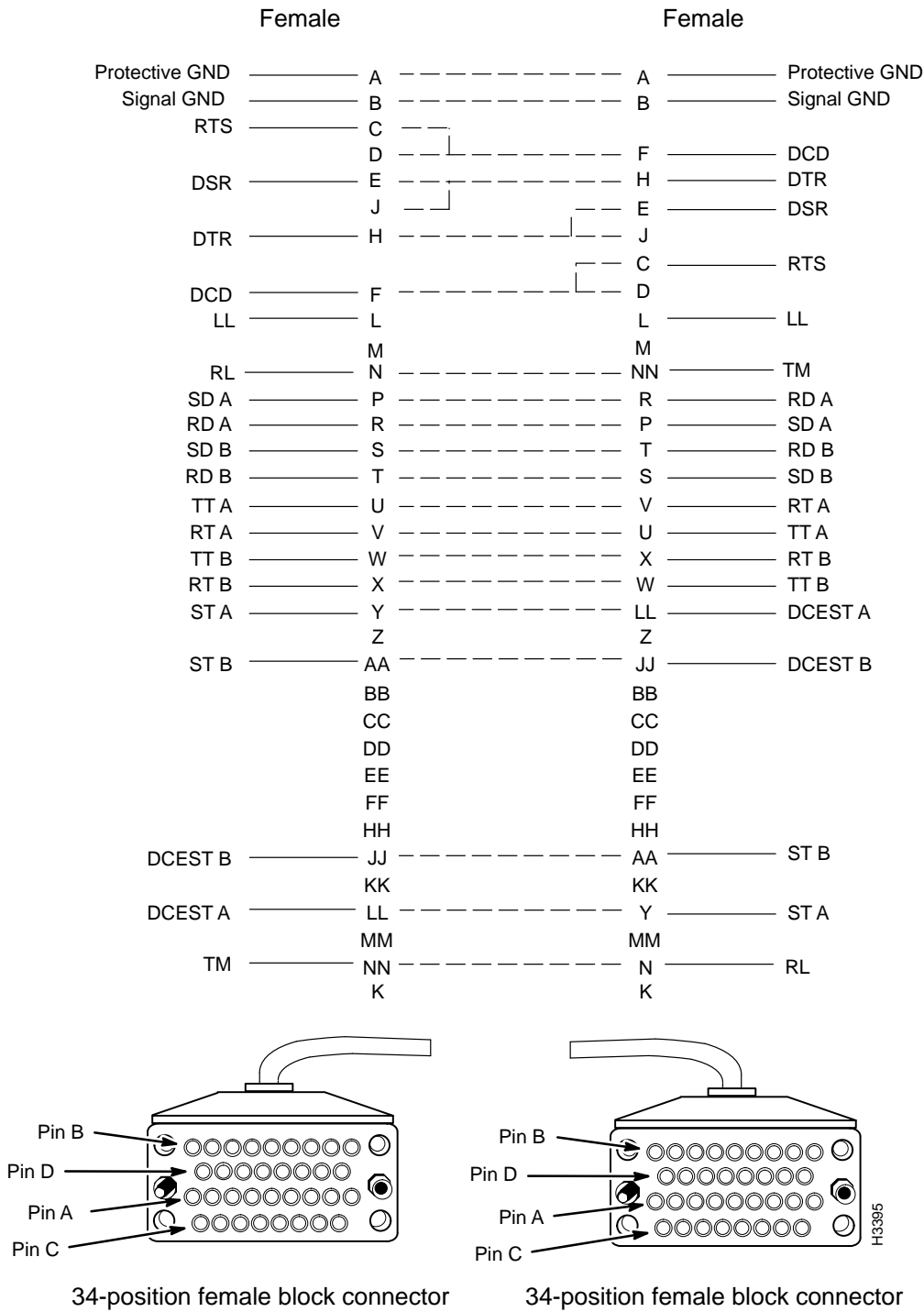
T3/E3 Connectors and Cables

This section describes the connectors and cables for the TE/E3 access cards. These facilities are discussed in the following order:

- Connectors on the T3/E3, 2-port medium-speed access card (MSAC). See Figure 3-15.

- Coaxial (75-ohm) cable used to connect a medium speed access card (MSAC) or a T3 or E3 access card to an external device. See Figure 3-16.

- Connectors on the T3, 4-port or 8-port access card (T3AC/E3AC) and the connectors on the E3, 4-port acess card (E3AC). See Figure 3-17.

- Cable harness used to connect a T3 or E3 access card to an associated fantail dressing panel. See Figure 3-18.

Connectors on T3/E3 Medium-Speed Access Cards

Figure 3-15 shows the T3/E3, two-port medium-speed access card (MSAC). The MSAC is a first-generation card that is available in three versions:

- **T3**—Also referred to as DS-3 (digital signal level 3); DS-3 is a wide-area transmission scheme used by the MSAC for medium-speed communications within an LS2020 network.

- **E3 G.804**—G.804 is a framing standard used by the E3 G.804 version of the MSAC for mapping ATM cells onto physical media.

- **E3 PLCP**—PLCP is a physical layer convergence protocol used by the E3 PLCP version of the MSAC for mapping ATM cells onto physical media.

Although three different versions of the MSAC are available, the bulkheads of these cards are identical in appearance (see Figure 3-15) and use the same cables for interconnection purposes.

Note The first-generation medium-speed access cards listed above are no longer orderable. Instead, second-generation, T3/E3 access cards (T3AC and E3AC) are available that provide greater reliability and, in the case of the T3AC access card, higher port density (8 ports versus 4 ports).

Figure 3-15   T3/E3 Medium-speed Access Card (2-Port)

MSAC

RXC   OOF
FERF   AIS

RX0

TX0

Port 0; two BNC
coaxial connectors;
one for receive,
one for transmit

RXC   OOF
FERF   AIS

RX1

TX1

Port 1; two BNC
coaxial connectors;
one for receive,
one for transmit

H4804
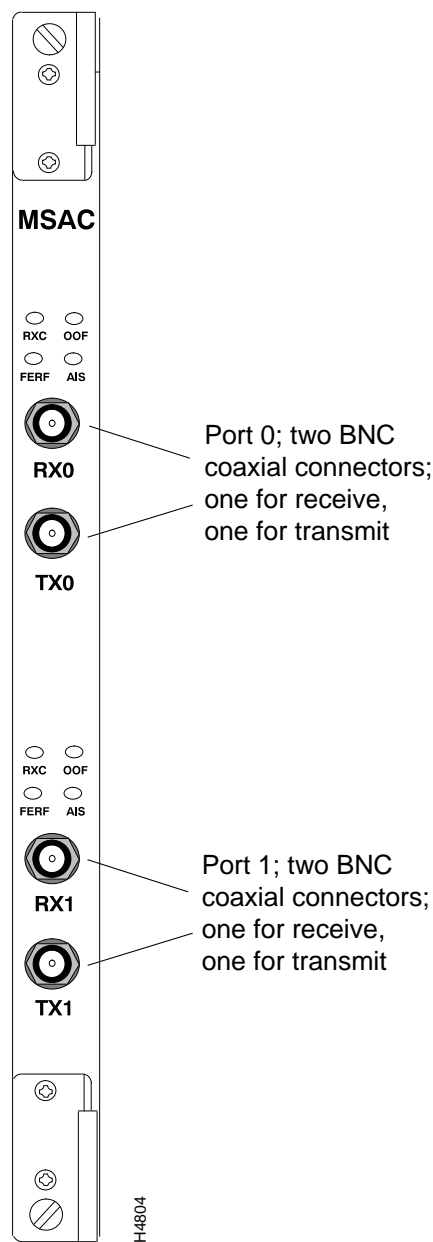
Interface connector type: 75-ohm coaxial BNC jack

Connectors per MSAC card: four (two receive channels and two transmit channels)

Coaxial Cable (75-Ohm) for T3/E3 Applications

Figure 3-16 shows the coaxial cable available for use in making interconnections for 75-ohm T3/E3 interface applications.

Figure 3-16   T3/E3 75-ohm Coaxial Cable
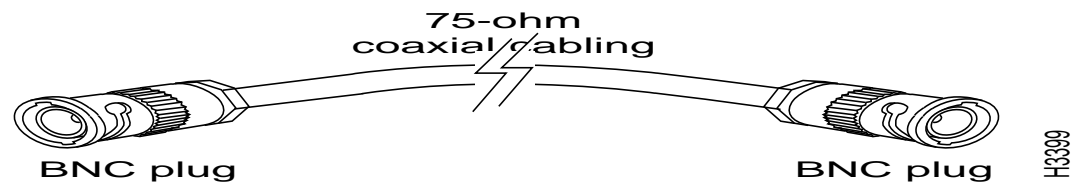
The 75-ohm coaxial cable can be used for the following purposes:

- Interconnecting two LS2020 switches by means of a T3, E3 G.804, or E3 PLCP medium-speed access card (MSAC)

- Connecting a T3, E3 G.804, or E3 PLCP medium-speed access card (MSAC) to an external device

- Interconnecting two LS2020 switches by means of a T3 or E3 access card (T3AC or E3AC)

- Connecting a T3 or E3 access card (T3AC or E3AC) to an external device

The 75-0hm coaxial cable for T3/E3 applications can be ordered from Cisco Systems in any of four lengths. Select the appropriate order number from the following table.

Manufacturing No.	Length	Order No.
72-0998-01	3 feet (0.9 m)	LS-CAB-T3-CX3=
72-0399-01	25 feet (7.6 m)	LS-CAB-T3-CX25=
72-1000-01	50 feet (15.2 m)	LS-CAB-T3-CX50=
72-1001-01	100 feet (30.5 m)	LS-CAB-T3-CX100=

Connectors on T3/E3 Access Cards

Figure 3-17 shows the T3/E3 access cards (T3AC/E3AC). These are second-generation ATM interfaces that operate in conjunction with cell line cards (CLCs).

The T3 access cards are available in either 4-port or 8-port versions, while the E3 access card is available only in a 4-port version, as shown in Figure 3-17.

Figure 3-17 **T3/E3 Medium-Speed Access Cards**

4-Port   8-Port   4-Port only
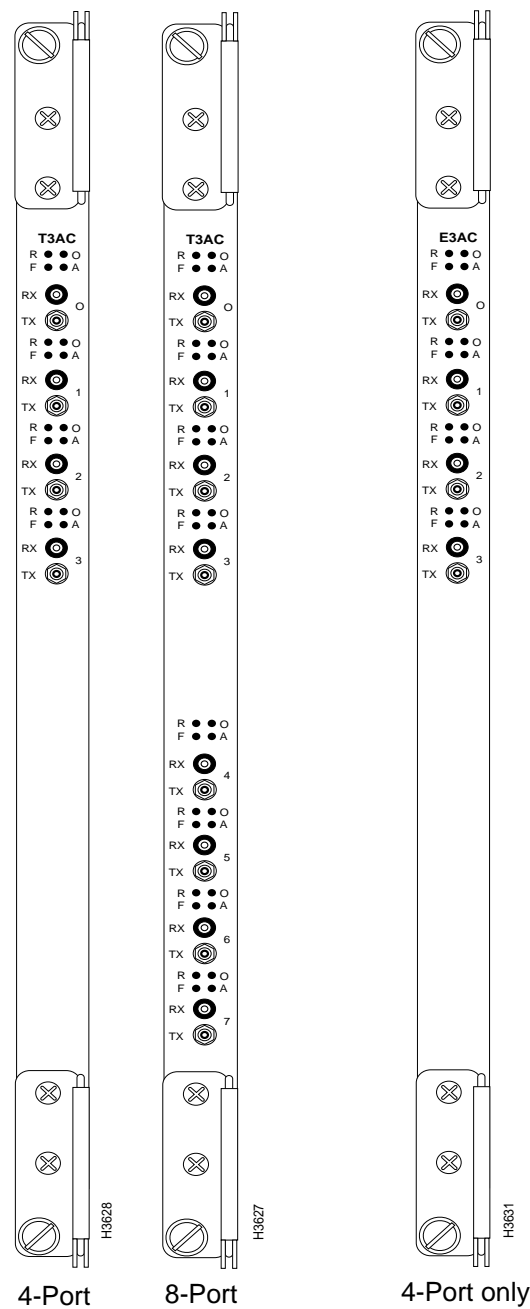
T3/E3 Fantail and Cable Harness

Figure 3-18 shows the T3/E3 fantail (dressing panel) containing 16 BNC connectors for 75-ohm hookup to external devices. Also shown is the cable harness that provides the means for direct connection between the back of the T3/E3 fantail and the SMB connectors on a T3AC or E3AC access card.

Figure 3-18   T3/E3 Fantail and Cable Harness
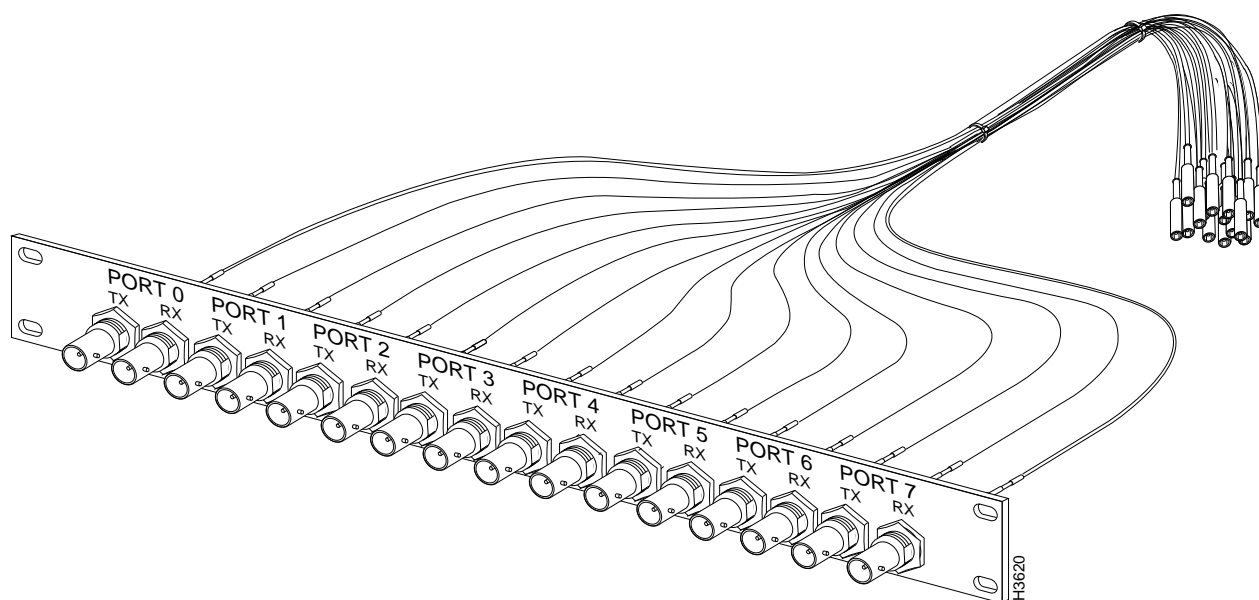
Interface connector type: SMB connectors on the access card bulkhead and the rear of the T3/E3 fantail; BNC connectors on the front of the T3/E3 fantail (see Figure 3-18).

Connectors per access card: 8 or 16 SMB connectors on the access card bulkhead, depending on the number of ports on the card (either 4 or 8). Each port has one receive connector and one transmit connector.

The T3/E3 fantail (dressing panel) and the T3/E3 cable harness (in both 4- and 8-port versions) are available as separate items for interconnecting patch panels or T3/E3 fantails to T3AC or E3AC access cards, as appropriate.

Use the following table for ordering information for the T3/E3 fantail (dressing panel).

Manufacturing No.	Order No.
700-00605-01	LS2020-T3E3-FT=

The T3 cable harness can be ordered from Cisco Systems in any of three lengths. Use the following table for ordering information.

Manufacturing No.	Ports	Length	Order No.
72-1097-01	4	4 feet (1.2 m)	LS-CAB-4T3-4B=
72-1098-01	4	8 feet (2.4 m)	LS-CAB-4T3-8B=
72-1099-01	4	12 feet (3.6 m)	LS-CAB-4T3-12B=
72-1061-01	8	4 feet (1.2 m)	LS-CAB-8T3-4B=
72-1062-01	8	8 feet (2.4 m)	LS-CAB-8T3-8B=
72-1063-01	8	12 feet (3.6 m)	LS-CAB-8T3-12B=

The E3 cable harness can be ordered from Cisco Systems in any of three lengths. Use the following table for ordering information.

Manufacturing No.	Ports	Length	Order No.
72-1097-01	4	4 feet (1.2 m)	LS-CAB-4E3-4B=
72-1098-01	4	8 feet (2.4 m)	LS-CAB-4E3-8B=
72-1099-01	4	12 feet (3.6 m)	LS-CAB-4E3-12B=
72-1061-01	8	4 feet (1.2 m)	LS-CAB-8E3-4B=
72-1062-01	8	8 feet (2.4 m)	LS-CAB-8E3-8B=
72-1063-01	8	12 feet (3.6 m)	LS-CAB-8E3-12B=

CEMAC Connectors and Cables

The circuit emulation access card (CEMAC) is available in two versions:

- **T1 CEMAC**—For operation only as a 120-ohm interface without a fantail.

- **E1 CEMAC**—For operation as either a 120-ohm interface (the default factory setting) without a fantail, or as a 75-ohm interface with an E1 fantail equipped with either BNC or SMZ connectors.

Figure 3-19 shows the bulkhead views of the T1 and E1 CEMAC cards. These cards are identical in appearance, except for the identifying "T1" or "E1" nomenclature at the bottom of the bulkhead.

The E1 CEMAC contains user-settable, on-board jumpers that are configured initially at the factory for 120-ohm operation without a fantail.

If you wish to configure the E1 CEMAC for 75-ohm operation with an E1 fantail, you must set these on-board jumpers accordingly. For detailed information about setting these jumpers, see the *LightStream 2020 Hardware Reference & Troubleshooting Guide*.

Figure 3-19   T1/E1 CEMAC Cards
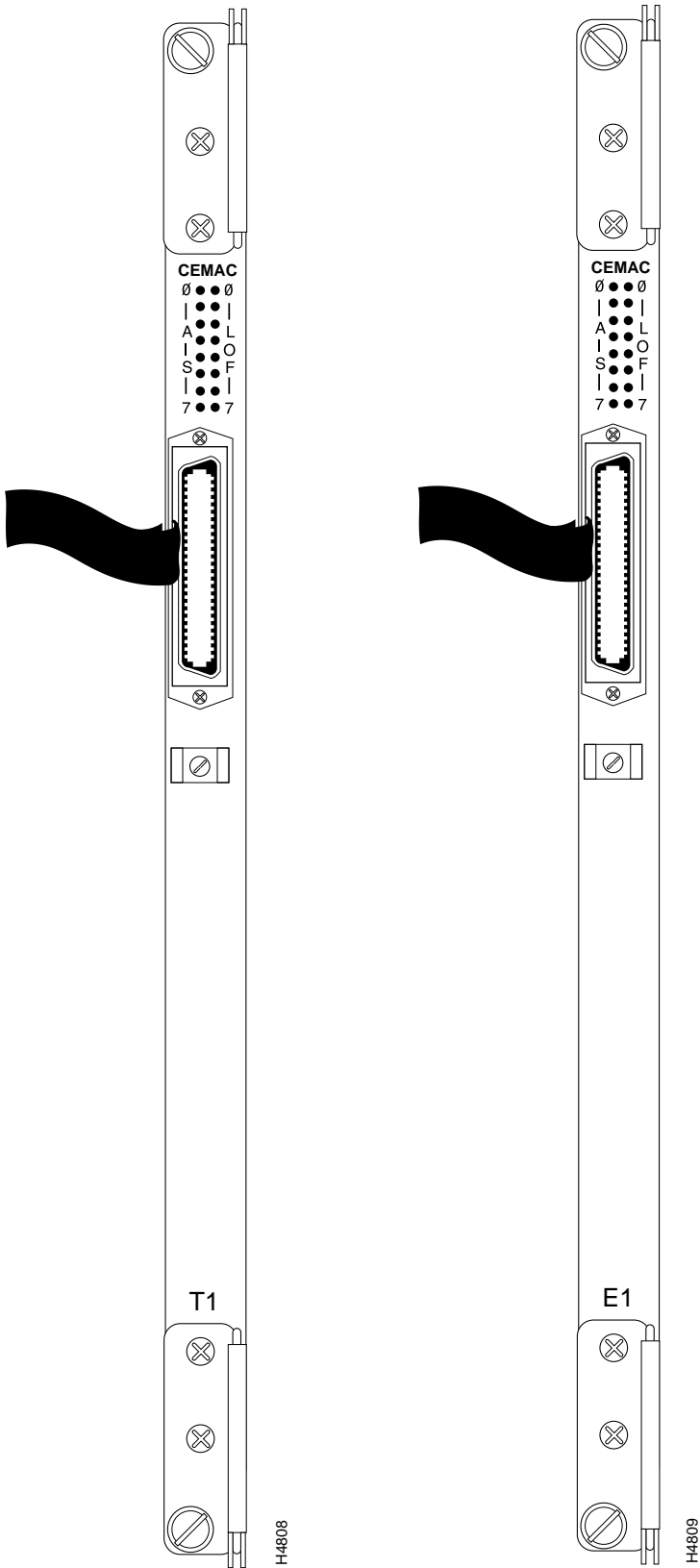
Figure 3-20 shows a component side view of the CEMAC card, together with its bulkhead connector and associated fantail cable.

To attach the fantail cable to the CEMAC card, seat the cable firmly in the bulkhead connector, secure the cable to the connector with the Velcro strip, and, optionally, add a cable tie to hold the cable to the bulkhead. These steps are illustrated in Figure 3-20.
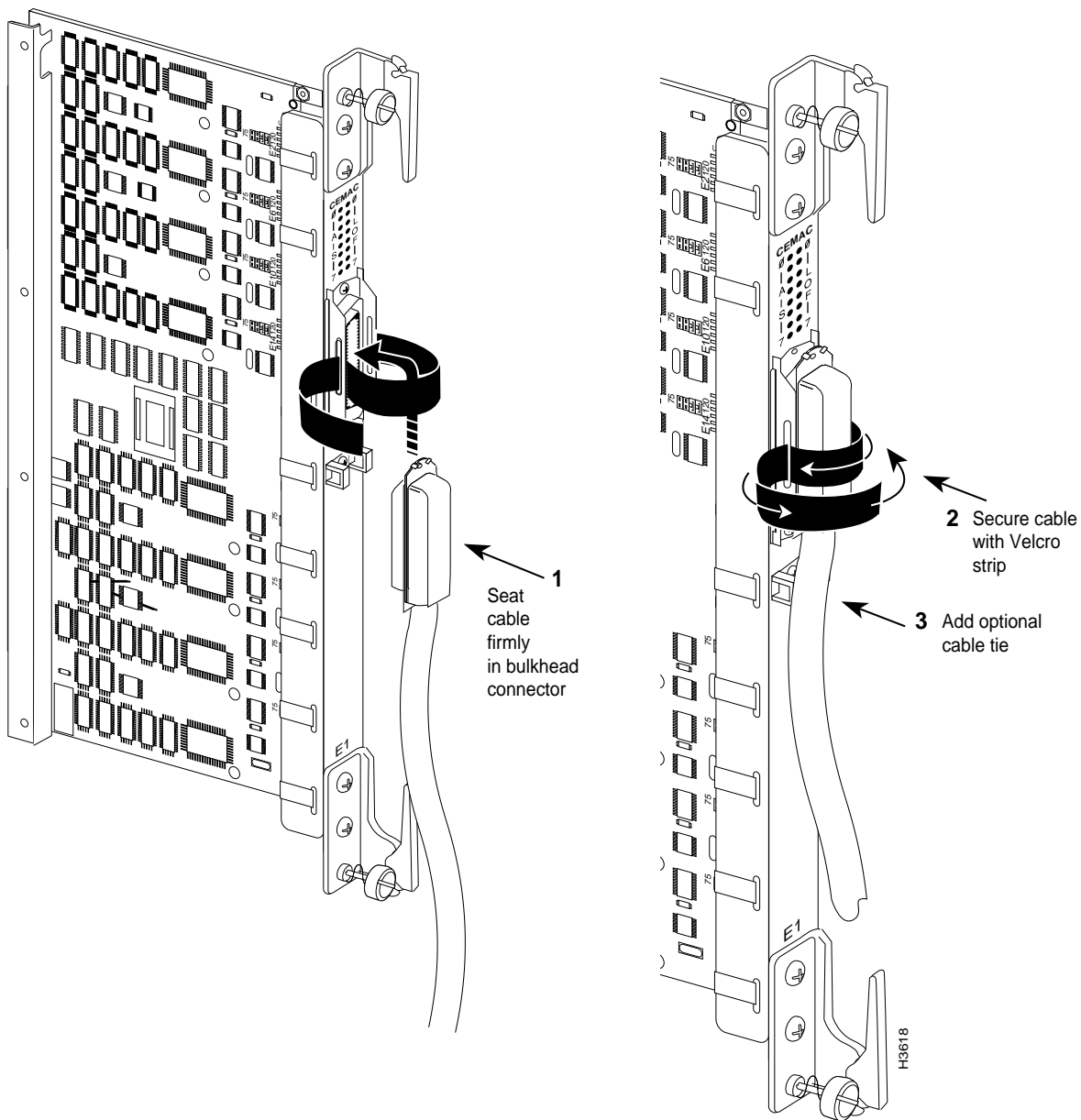
Figure 3-20   Securing CEMAC Cable to Bulkhead Connector

1 Seat cable firmly in bulkhead connector

2 Secure cable with Velcro strip

3 Add optional cable tie

Table 3-2 shows the pin assignments common to the T1 and E1 CEMAC bulkhead connectors. The information in this table has been extracted from Figure 10 of American National Standard T1.403-1989. The T1/E1 CEMAC bulkhead connector is a standard RJ48 connector.

Table 3-2   T1/E1 CEMAC Bulkhead Connector Pin Assignments

	Receive		Transmit	
Port	**Tip**	**Ring**	**Tip**	**Ring**
0	26	1	39	14
1	27	2	40	15
2	28	3	41	16
3	29	4	42	17
4	30	5	43	18
5	31	6	44	19
6	32	7	45	20
7	33	8	46	21
8 – not used	34	9	47	22
9 – not used	35	10	48	23
10 – not used	36	11	49	24
11 – not used	37	12	50	25

Note   Since the T1 CEMAC does not support a fantail, you must obtain a suitable cable for 120-ohm hookup to the T1 CEMAC bulkhead. Such cables are readily available from a variety of vendors, but you should check to make sure that the cable you obtain conforms to the pin assignments shown in Table 3-2.

E1 Fantail (for 75-ohm CEMAC Applications)

When you use an E1 CEMAC in the 75-ohm mode, you must also use an E1 fantail and cable for interconnection with the bulkhead connector on the card. The fantail supports up to 12 ports. Figure 3-21 shows the E1 CEMAC fantail; Figure 3-22 shows the fantail cable.

To provide full compatibility with G.703 E1 interfaces, an E1 CEMAC fantail is available in either of two versions: one equipped exclusively with 12 BNC connectors, or one equipped exclusively with 12 SMZ connectors. For convenience, Figure 3-21 illustrates both types of connectors on the E1 CEMAC fantail.

When you interconnect the 8-port E1 CEMAC card to an E1 fantail using a fantail cable (see Figure 3-22), only the first eight transmit and receive ports (TX0 – TX7 and RX0 – RX7) on the fantail are used.

Figure 3-21   E1 Fantail for 75-ohm CEMAC Applications
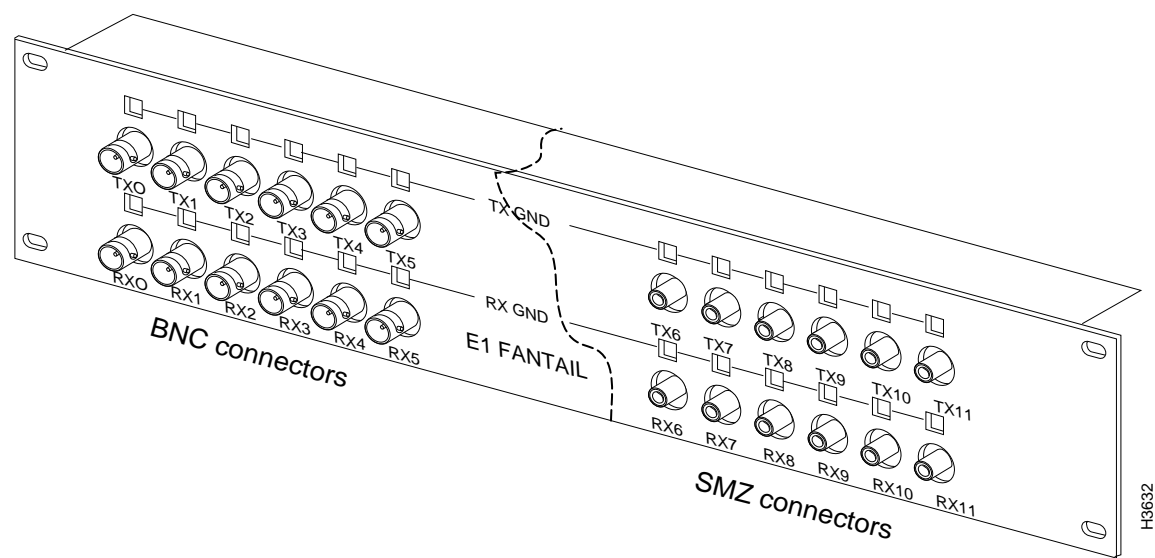
Refer to the *LightStream 2020 Hardware Reference & Troubleshooting Guide* for information about configuring the TX GND and RX GND jumpers on the E1 fantail.

E1 Fantail Cable (for CEMAC Card)

A 50-pin cable is used to connect the bulkhead connector on the E1 CEMAC card and the back of the E1 fantail. This cable, illustrated in Figure 3-22, supports up to 12 ports.

The E1 fantail cable for a CEMAC card can be ordered from Cisco Systems in any of three lengths. Select the appropriate order number from the following table.

Manufacturing No.	Length	Order No.
72-1094-01	4 feet (1.2 m)	LS-CAB-8E1-4B=
72-1095-01	8 feet (2.4 m)	LS-CAB-8E1-8B=
72-1096-01	12 feet (3.6 m)	LS-CAB-8E1-12B=

Figure 3-22   E1 Fantail Cable

H3651
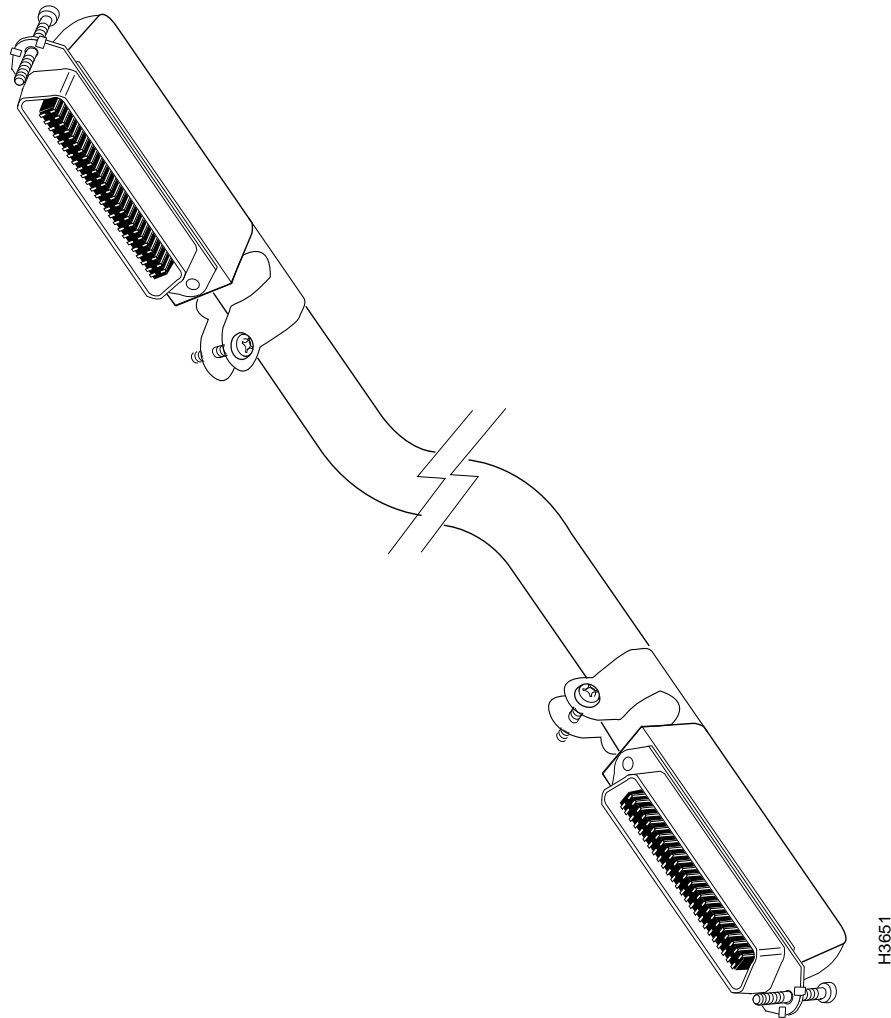
OC-3c Connectors and Cables

Figure 3-23 shows a bulkhead view of the following versions of the OC-3c access cards:

- First-generation, single-mode OC-3c access card (OC3AC – SM) equipped with simplex ST connectors.

- Second-generation, single-mode OC-3c access card (OC3AC – SM) equipped with duplex SC connectors. This card is functionally identical to the first-generation OC-3c single-mode access card above.

- OC-3c multimode access card (OC3AC – MM) equipped with duplex SC connectors.

As shown in Figure 3-23, the bulkhead view of the second-generation, single-mode OC-3c card is identical to that of the multimode card, except that the former contains the nomenclature "OC3AC SM" at the top of its bulkhead.

The cables for the OC-3c access cards are described in separate sections below.

Caution   Protective covers are provided for the connectors and cables associated with all the OC-3c access cards. Keep these covers in place on any OC-3c connectors or cables not in use to shield them from dust or damage, thereby minimizing the potential for optical signal attenuation or data loss.

Figure 3-23   OC-3c Access Cards
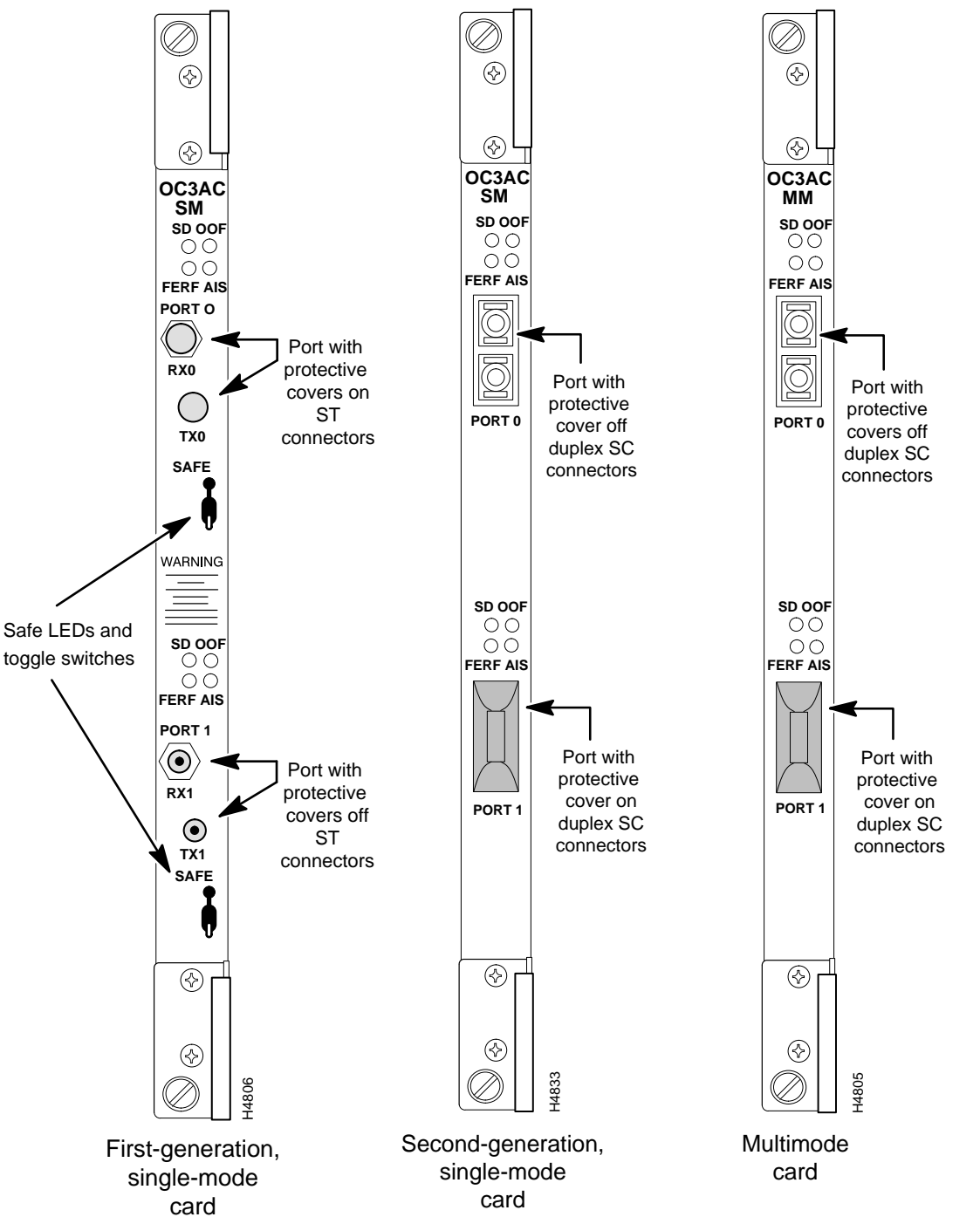
Multimode interface connector type: SC

Connectors per multimode access card: four (2 connectors per port; 2 ports, numbered 0 and 1)

Single-mode interface connector type: ST (SC connectors for second-generation, single-mode card)

Connectors per single-mode access card: four (2 connectors per port; 2 ports, numbered 0 and 1)

Single-Mode OC-3c Cable (ST Connectors)

A single-mode OC-3c cable with simplex ST connectors is used to connect a first-generation, single mode OC-3c access card to a single-mode OC-3c interface. Cisco Systems does not provide this cable; it is readily available from other sources.

The single-mode OC-3c interface operates at a wavelength of 1300 nanometers.

Single-mode cables with ST connectors should conform to the following specifications:

Standard: EIA class IVa

Cabling: 8.3 micron core with a maximum attenuation at 1300 nanometers of .3 dB/km. Optical path loss should not exceed 12 dB.

Maximum path length (all cables in a connection from end to end): 22 km

Figure 3-24 shows the cable used with the first-generation, single-mode OC-3c access card. This cable is equipped with simplex ST connectors.

Figure 3-24   Single-Mode OC-3c Cable with ST Connectors

Simplex
ST
connector

Removable
covers

H3402
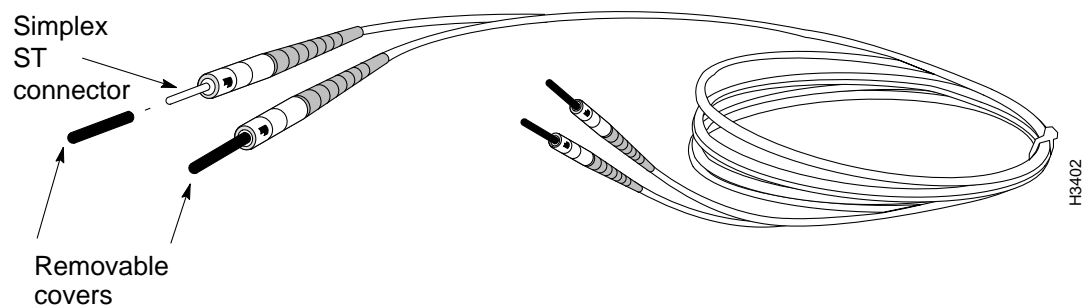
Single-Mode OC-3c Cable (SC Connectors)

A single-mode OC-3c cable with SC connectors is used to connect a second-generation, single-mode OC-3c access card to a single-mode OC-3c interface. Cisco Systems does not provide this cable; it is readily available from other sources.

The single-mode OC-3c cable equipped with SC connectors is similar in appearance to the multimode OC-3c cable shown in Figure 3-26. However, the optical characteristics of the single-mode cable are different.

The single-mode OC-3c interface operates at a wavelength of 1300 nanometers.

The single-mode SC cables should conform to the following specifications:

Standard: EIA class IVa

Cabling: 8.3 micron core.

The path loss characteristics and maximum cable lengths for the single-mode OC-3c access card equipped with duplex SC connectors are discussed in the following section.

Estimating Transmit Distances for Single-Mode OC-3c SC Transceivers

The Intermediate Reach (IR) transceiver used in the single-mode OC-3c access card equipped with duplex SC connectors has the power characteristics outlined in the table below.

Transmit Power	Receive Power
Minimum: -15 dBm	Minimum: -31 dBm
Maximum: -8 dBm	Maximum: -8 dBm

The maximum distance over which a single-mode fiber-optic signal can be transmitted reliably by the IR transceiver depends on two factors:

1 The path loss (optical attenuation) characteristics of the fiber-optic cable selected for use with the access card

2 The number of segments (splices) in the overall (end-to-end) fiber-optic link

The supplier of the fiber-optic cable that you purchase for use with the single-mode OC-3c access card should be able to provide you with the path loss characteristics of the cable. With this information, you can use the maximum path loss value in the following table to determine whether or not the IR transceiver will meet your end-to-end optical transmission requirements.

Transceiver Type	Maximum Path Loss
Intermediate Reach (IR)	16.0 dBm

The maximum path loss value of 16.0 dBm is based on an assumed margin of 0 dB. This 16.0 dBm value is based on the transceiver's minimum optical input sensitivity and minimum optical output power. Hence, this value constitutes a "worst-case" path loss characteristic.

If you know the path loss characteristics of your selected fiber-optic cable and the number of splices contained in the end-to-end fiber-optic link, you can make a rough determination as to whether the single-mode IR transceiver will meet your optical transmission needs. Such a determination, however, must be based on the assumption that the optical attenuation characteristics of the cable are the same across all cable segments (or splices) in the entire end-to-end link.

In general, acceptable quality fiber-optic cable has a path loss characteristic of .3 dB/km or less. A path loss characteristic of .45 dB/km is considered quite poor.

If your overall fiber-optic link consists of link segments with different loss characteristics, you should regard each link as having the path loss characteristic of the worst link in determining aggregate attenuation losses.

Connector manufacturers specify the performance of a connector by measuring its "insertion loss." In calculating insertion loss, power flowing through a fiber-optic cable is measured. Next, the cable is cut in half and a connector is affixed. Power at the end of the cable is again measured. The difference in these two measurements are used to calculate the insertion loss.

This method eliminates losses caused by variations in cable diameters when cables from different vendors are spliced together. Typical insertion loss values range from .1 dB to .6 dB, depending on the quality and type of connector. In any case, you are advised to use a very conservative path loss value of 1 dB/km for fiber-optic links composed of multiple vendor or fiber types.

For the IR transceiver used in the single-mode OC-3c access card, consult either Table 3-3 or Table 3-4 to determine the maximum allowed cable lengths (in kilometers), given specific assumptions about the number of splices contained in the end-to-end link and the loss characteristics of each splice.

Table 3-3 shows the maximum cable lengths for end-to-end connections that incur a loss of .5 dB/splice.

Table 3-3   IR Transceiver Range (.5 dB loss/splice)

Fiber Loss (dB/km)	2 Splices (1.0 dB loss)	4 Splices (2.0 dB loss)	6 Splices (3.0 dB loss)	8 Splices (4.0 dB loss)
.30	50.00 km	46.67 km	43.33 km	40.00 km
.35	42.86 km	40.00 km	37.14 km	34.29 km
.40	37.50 km	35.00 km	32.50 km	30.00 km
.45	33.33 km	31.11 km	28.89 km	26.67 km

Table 3-4 shows the maximum cable lengths for end-to-end connections that incur a loss of 1.0 dB/splice.

Table 3-4   IR Transceiver Range (1.0 dB loss/splice)

Fiber Loss (dB/km)	2 Splices (2.0 dB loss)	4 Splices (4.0 dB loss)	6 Splices (6.0 dB loss)	8 Splices (8.0 dB loss)
.30	46.67 km	40.00 km	33.33 km	26.67 km
.35	40.00 km	34.29 km	28.57 km	22.86 km
.40	35.00 km	30.00 km	25.00 km	20.00 km
.45	31.11 km	26.67 km	22.22 km	17.78 km

Path Loss Conclusions and Assumptions

You can ascertain whether the single-mode OC-3c access card equipped with SC connectors will meet your optical transmission requirements by determining the overall path loss of your fiber-optic link and comparing this value against the following baseline:

*The IR transceiver can support an overall path loss of 16.0 dB with a margin of 0 dB.*

If you cannot determine the overall path loss of your fiber-optic link, you must assume that the maximum transmit distance of the IR transceiver is no more than 50 km.

Optical Cable Adapter

The transceivers on the second-generation, single-mode OC-3c access card are equipped with duplex SC connectors (see Figure 3-23). Note that you can attach either simplex or duplex SC optical cables to these bulkhead connectors.

Also, using an SC-to-ST optical cable adapter (see Figure 3-25), you can interconnect cables from a second-generation, single-mode access card with another OC-3c device equipped with ST connectors.

Figure 3-25   SC-to-ST Optical Cable Adapter
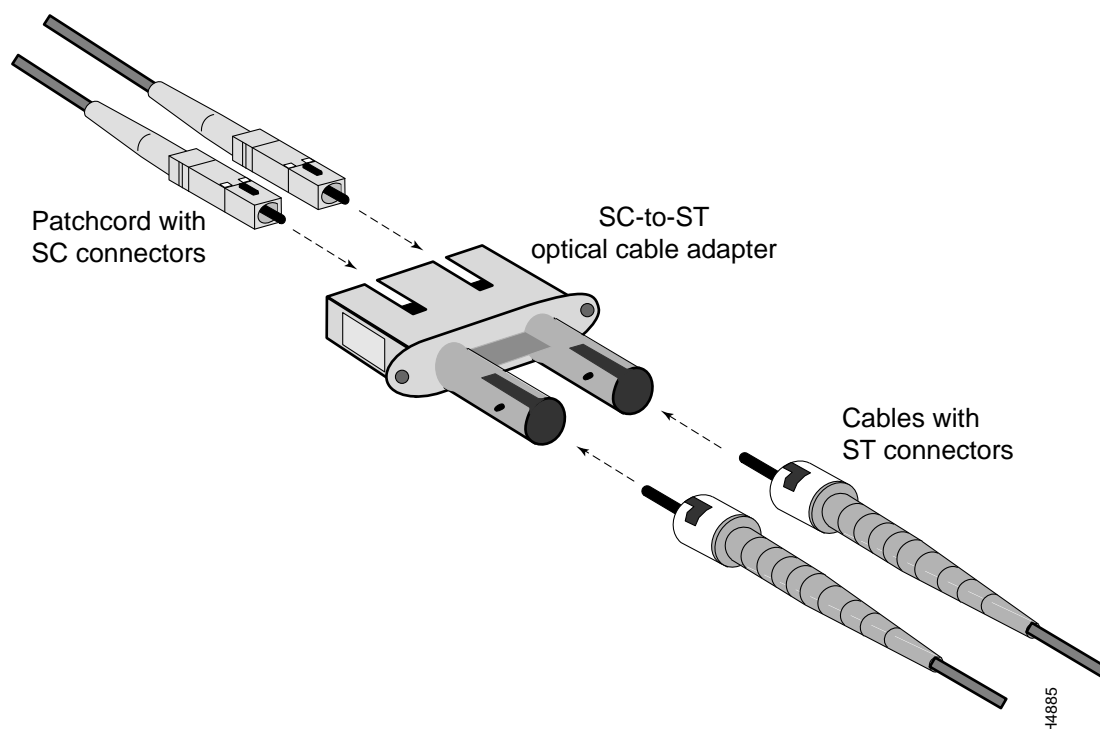
The following components are required for interconnecting the second-generation OC-3c access card equipped with SC connectors to another fiber optic device equipped with ST connectors:

- **SC-to-SC patchcord**—One patchcord is required if the cable type is duplex; two patchcords are required if the cable type is simplex. The patchcord must have the following characteristics:

    — Mode: single-mode (1300 nanometers)

    — Core size: 8-9um

    — Maximum fiber loss: .5db/km

    — Bend radius: less than 5 cm

    — Connector type (both ends): SC

    — Connector reflectance: -30dB maximum

    — Connector loss: .5dB maximum

    — Connector ferrule: ceramic

Note   Index matching GEL must not be used with the SC-to-ST optical cable adapter as a means of optimizing the transfer of the optical signal between connections.

Suggested patchcord vendors are listed in the following table.

Vendor	Part Number	Quantity Required
3M	ADADA-MK 0001	Two (simplex)
AMP	503627-1	One (duplex)

- **SC-to-ST optical cable adapter**—This hybrid adapter has the following characteristics:

  — Style: duplex SC to ST

  — Color: blue

  — Alignment sleeve material: ceramic

This adapter is available from the vendor indicated in the following table.

Vendor	Part Number	Quantity Required
AMP	503137-5	One (duplex)

Multimode OC-3c Cable (SC Connectors)

This cable is used to connect a multimode OC-3c access card to another multimode OC-3c interface.

Cisco Systems does not provide this cable; it is widely available from other sources.

The OC-3c interface operates at a wavelength of 1300 nanometers.

A multimode OC-3c cable with SC connectors should conform to the following specifications:

Standard: ISO/IEC 9314-3

Cabling: 62.5 micron core with an optical loss of 0 – 9 dB, or 50 micron core with an optical loss of 7 dB. You should not mix 62.5 and 50 micron cables in the same fiber-optic link.

Maximum path length (all cables in a connection from end to end): 2 km

Figure 3-26 shows an OC-3c multimode cable equipped with simplex SC connectors.

Figure 3-26   Multimode OC-3c Cable with SC Connectors

Simplex
SC
connectors

Removable
covers

H3401
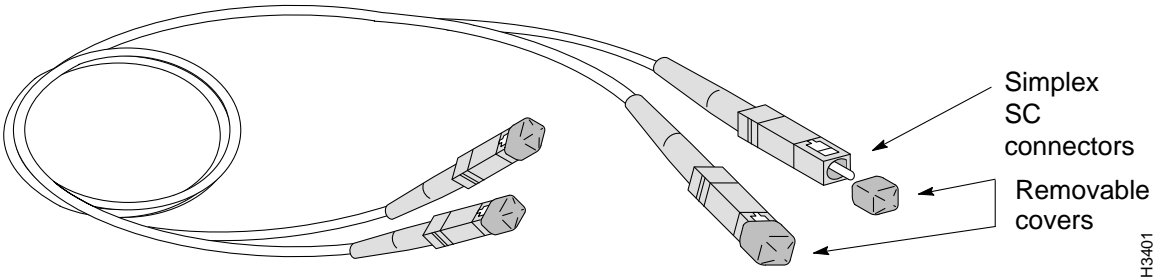
Note Multimode OC-3c cables are available with either simplex SC connectors (as shown in Figure 3-26) or duplex SC connectors that are similar in appearance but ganged together. Both simplex and duplex cables are compatible with the multimode access card. The use of duplex SC cables is preferred, however, because such cables are keyed to prevent improper connection.

FDDI Connectors and Cables

Figure 3-27 shows the bulkhead view of an FDDI access card (FAC).

Figure 3-27   FDDI Access Card
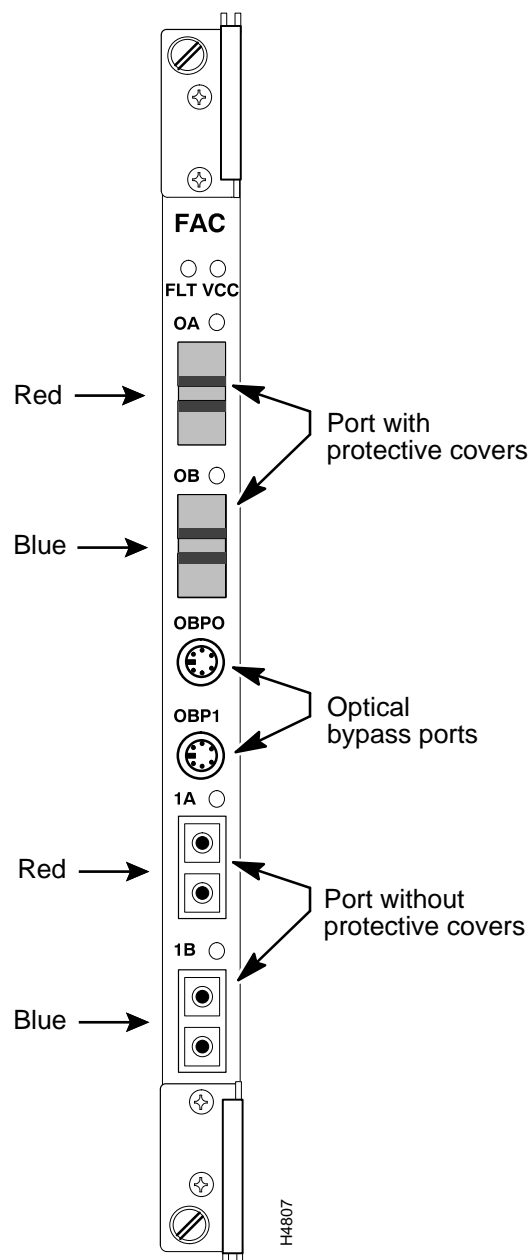
Interface connector type: media interface connector (MIC); two MIC connectors per port, one for transmit and one for receive

Connectors per access card: four, one labeled A (red) and one labeled B (blue) for each of two ports. The MIC connectors are keyed to ensure proper cable connections to the access card.

FDDI Cable

This cable is used to connect a multimode FDDI access card to another FDDI device. Cisco Systems does not provide this cable; it is widely available from other sources.

The FDDI interface operates at a wavelength of 1300 nanometers.

FDDI 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.

Maximum path length (all cables in a connection from end to end): 2 km

Caution   Protective covers are provided for all FDDI access card connectors and cables. Keep these covers in place on any FDDI connectors or cables not in use to shield them from dust or damage, thereby minimizing the potential for optical signal attenuation or data loss.

Figure 3-28 shows a physical representation of the FDDI cable.

Figure 3-28   FDDI Cable
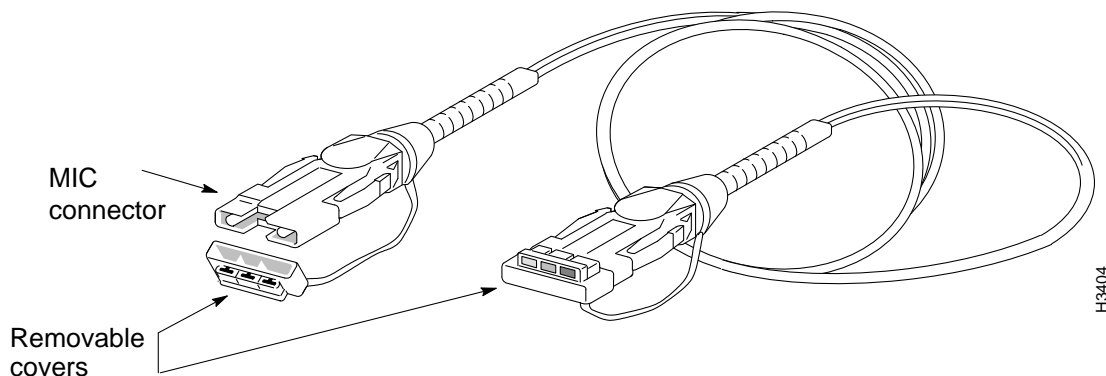
Ethernet Connectors and Cables

This section describes the bulkhead connectors and cables for the Ethernet access card (EAC).

Figure 3-29 shows the bulkhead view of the Ethernet access card, which includes eight RJ-45 connectors and two attachment unit interface (AUI) DB-15 connectors. The RJ-45 connectors are used for the twisted pair Ethernet (10BaseT) ports.

Figure 3-29   Ethernet Access Card and RJ-45 Connector Pin Assignments
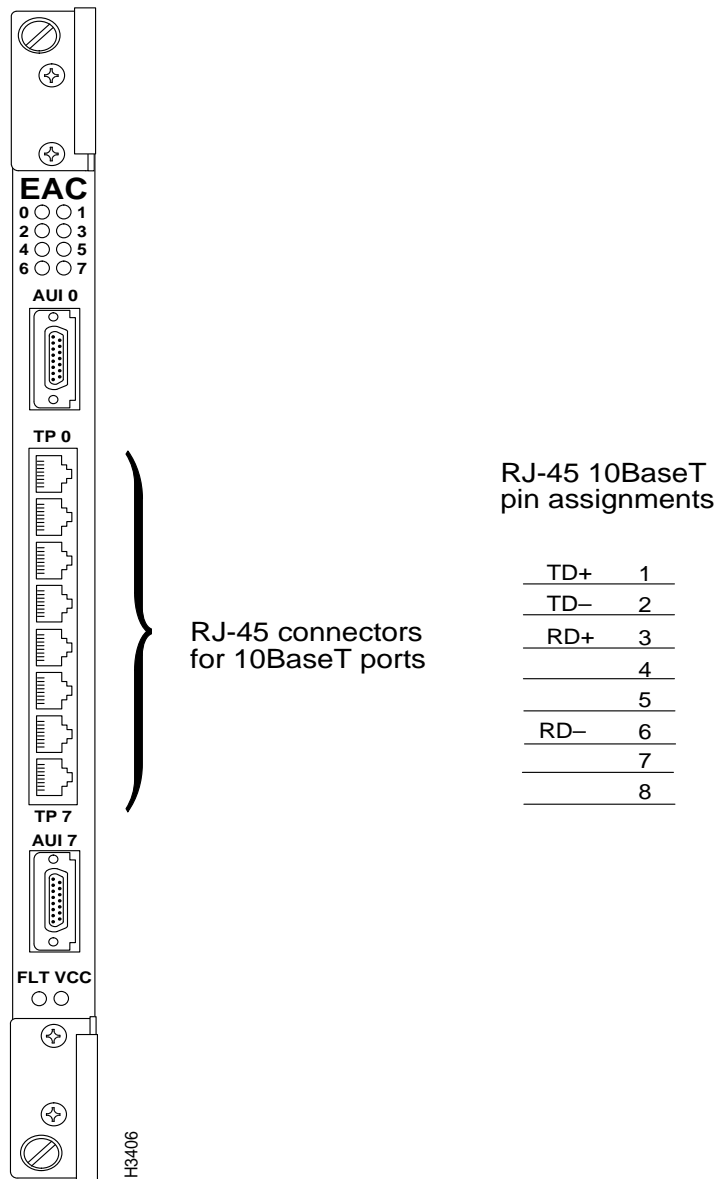
Ethernet Access Card 10BaseT (RJ-45) Connectors

Figure 3-29 shows the RJ-45 connectors and their pin assignments on the Ethernet access card. These connectors are used for Ethernet twisted pair (10BaseT) ports.

Cables for Ethernet Access Card RJ-45 Connectors

The cables used with the RJ-45 ports on the Ethernet access cards are described in the following sections.

Ethernet 10BaseT Straight-Through Cable

This cable is used for the following purposes:

- To connect an Ethernet access card to an Ethernet hub.

- To connect an Ethernet access card directly to another device on the Ethernet, such as a workstation (when the workstation port has a built-in crossover function). (See "Note" in next section entitled "Ethernet 10BaseT Crossover Cable.")

Cisco Systems does not provide this cable; it is widely available from other sources.

Figure 3-30 shows a physical representation of the Ethernet 10BaseT (twisted pair) straight-through cable and provides a schematic diagram of its pin assignments.

Figure 3-30   Ethernet 10BaseT Straight-Through Cable and Pin Assignments

Pinout

Transmit Data (TD+)	1	1	Transmit Data (TD+)
Transmit Data (TD–)	2	2	Transmit Data (TD–)
Receive Data (RD+)	3	3	Receive Data (RD+)
Receive Data (RD–)	6	6	Receive Data (RD–)
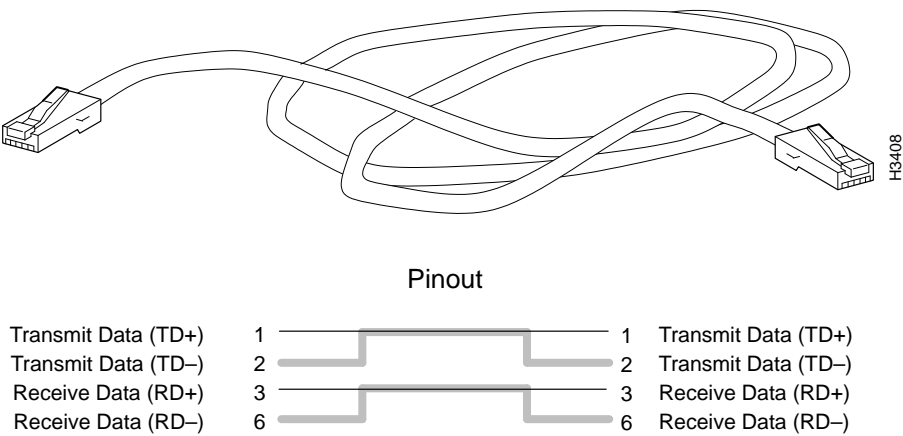
Ethernet 10BaseT Crossover Cable

This cable is used to directly connect an Ethernet access card to another device on the Ethernet, such as a workstation.

Note   Some medium access units (MAUs) have a built-in crossover function and use straight-through cables, rather than crossover cables. The ports on such MAUs are marked with the letter X.

Cisco Systems does not provide this cable; it is widely available from other sources.

Figure 3-31 shows a physical representation of the Ethernet 10BaseT (twisted pair) crossover cable and provides a schematic diagram of its pin assignments.

Figure 3-31   Ethernet 10BaseT Crossover Cable and Pin Assignments

Pinout

Transmit Data (TD+)	1	1	Transmit Data (TD+)
Transmit Data (TD–)	2	2	Transmit Data (TD–)
Receive Data (RD+)	3	3	Receive Data (RD+)
Receive Data (RD–)	6	6	Receive Data (RD–)
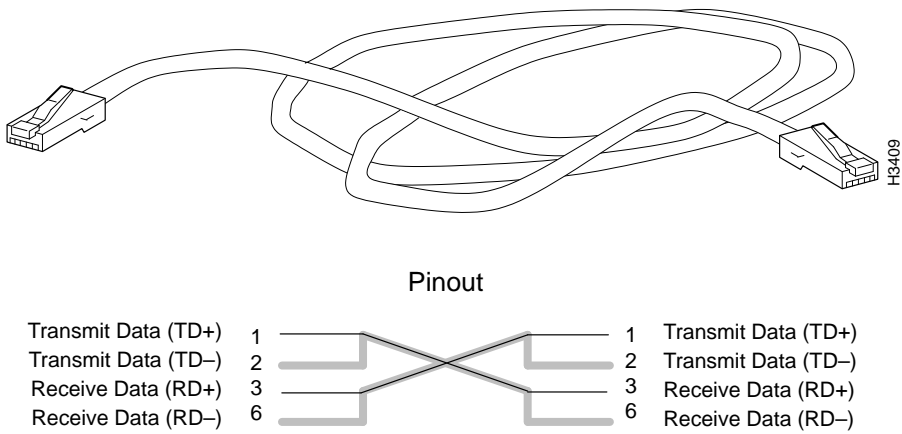
Ethernet Access Card AUI Connectors

Figure 3-32 shows the pin assignments for the two 15-pin Ethernet AUI connectors on the Ethernet access card. The top AUI connector is for port 0, and the bottom connector is for port 7.

Figure 3-32   Ethernet Access Card AUI Port (DB-15) Connector and Pin Assignments
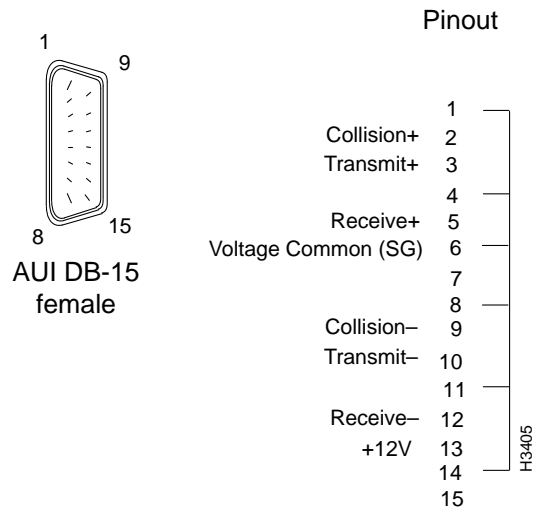
The AUI DB-15 connector pin assignments shown in Figure 3-32 apply to the following access cards:

- The Ethernet (E-NET) port on the network processor access card (NPAC)

- The AUI ports on the Ethernet access card (EAC). (See Figure 3-29)

Ethernet Access Card AUI Port Cable

This cable connects an AUI port on the Ethernet access card to an Ethernet 10Base2, 10Base5, or 10BaseFL transceiver. This cable also works with the Ethernet (E-NET) port on the network processor access card (NPAC).

Cisco Systems does not provide this cable; it is widely available from other sources.

Figure 3-33 shows a schematic diagram of the Ethernet access card AUI cable.

Figure 3-33   Ethernet AUI Cable and Pin Assignments

LightStream end
male

Remote end
female

	15	15
	14	14
+12V	13 ———————— 13	+12V
Receive–	12 ———————— 12	Receive–
	11	11
Transmit–	10 ———————— 10	Transmit–
Collision–	9 ———————— 9	Collision–
	8 ———————— 8	
	7 ———————— 7	
Voltage Common (SG)	6 ———————— 6	Voltage Common (SG)
Receive+	5 ———————— 5	Receive+
	4 ———————— 4	
Transmit+	3 ———————— 3	Transmit+
Collision+	2 ———————— 2	Collision+
	1	1

Pin 1   Pin 8   Pin 8   Pin 1

Pin 9   Pin 15   Pin 15   Pin 9

H3407

DB-15 male connector   DB-15 female connector
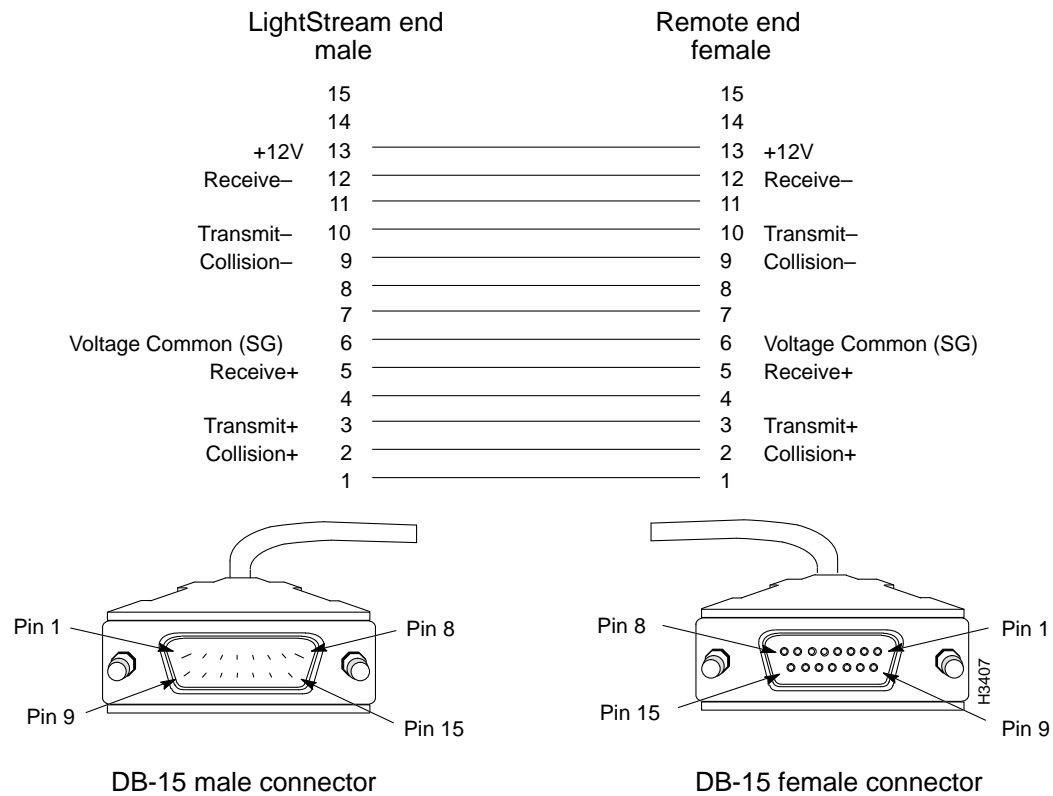
Fiber Ethernet Connectors and Cables

This section describes the fiber Ethernet access card (FEAC) connectors and associated data cable.

Fiber Ethernet Access Card Connectors

Figure 3-34 shows the bulkhead view of the fiber Ethernet access card (FEAC).

Figure 3-34   Fiber Ethernet Access Card
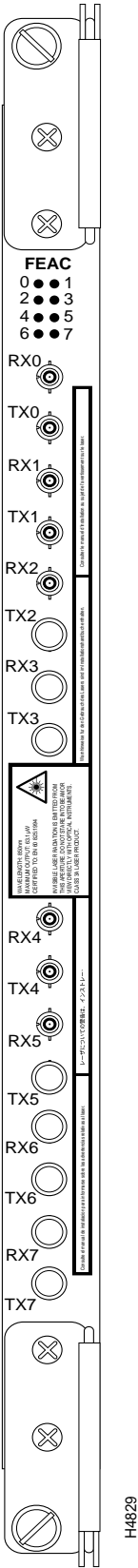
Fiber Ethernet Multimode Cable

This cable is used to connect a multimode fiber (10Base-FL) Ethernet access card to another fiber Ethernet device.

Cisco Systems does not provide this cable; it is widely available from other sources.

The fiber Ethernet interface operates at a wavelength of 850 nanometers.

Multimode fiber Ethernet cables should conform to the following specifications:

Standard: ISO/IEC 9314-3

Maximum path length (all cables in a connection from 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. You should not mix 62.5 and 50 micron cables in a single fiber optic link.

Caution   Protective covers are provided for all fiber Ethernet access card connectors and cables. Keep these covers in place on any fiber Ethernet connectors or cables not in use to shield them from dust or damage, thereby minimizing the potential for optical signal attenuation or data loss.

Figure 3-35 illustrates the multimode fiber Ethernet access card cable equipped with ST connectors.

Figure 3-35   Multimode Fiber Ethernet Cable with ST Connectors
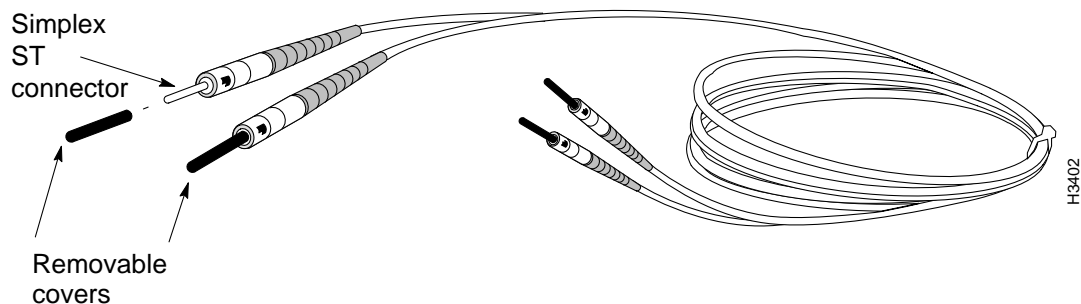
Console/Modem Assembly Connectors and Cables

Figure 3-36 shows the bulkhead view of the console/modem assembly located in the rear of the LS2020 chassis.

Figure 3-36   Console/Modem Assembly
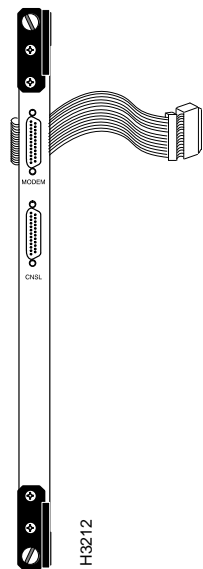
RS-232 Modem Connector

Figure 3-37 shows the pin assignments of the RS-232 modem port (DB-25 connector). This port is labeled MODEM on the bulkhead of the console/modem assembly located in the rear of the LS2020 chassis (see Figure 3-36).
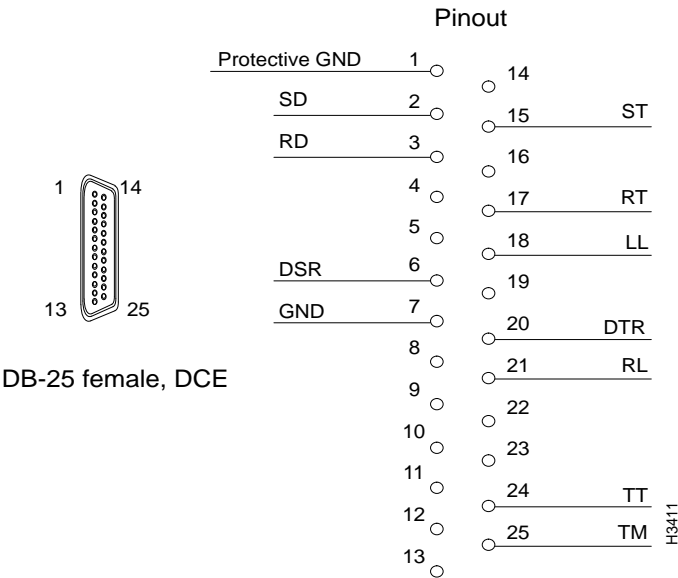
Figure 3-37   RS-232 Modem Port (DB-25) Connector and Pin Assignments

Pinout

```
                         13 ○
               13    25  12 ○
               ┌─────┐   11 ○      ○ 23
               │/////│   10 ○      ○ 22 ──────── RI
               │/////│    9 ○
               │/////│        DCD   8 ○      ○ 20 ──────── DTR
                1    14  GND   7 ○      ○ 19
DB-25 male, DTE          DSR   6 ○
                         CTS   5 ○
                         RTS   4 ○      ○ 16
                         RD    3 ○
                         SD    2 ○      ○ 14
              Protective GND   1 ○
```

H3410
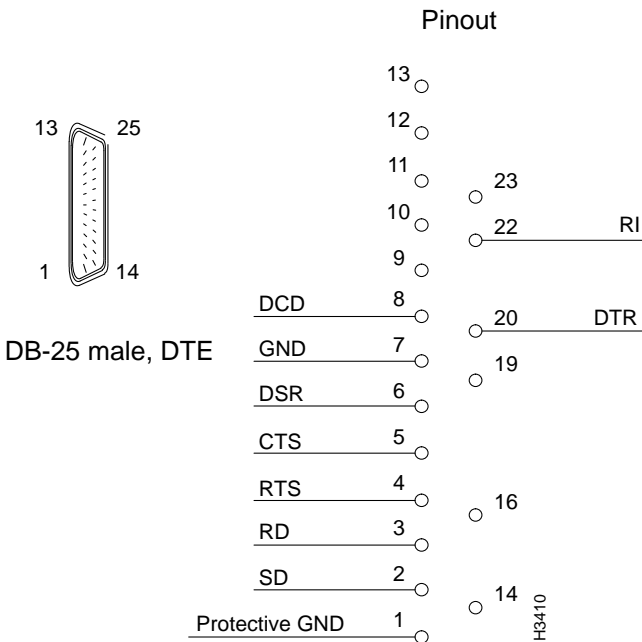
RS-232 Console Connector

Figure 3-38 shows the pin assignments of the RS-232 console port (DB-25 connector). This port is labelled CNSL on the bulkhead of the console/modem assembly located in the rear of the LS2020 chassis (see Figure 3-36).

Figure 3-38   RS-232 Console Port (DB-25) Connector and Pin Assignments

Pinout

```
              Protective GND   1 ○      ○ 14
                         SD    2 ○      ○ 15 ──────── ST
                         RD    3 ○      ○ 16
               1    14        4 ○      ○ 17 ──────── RT
               ┌─────┐        5 ○      ○ 18 ──────── LL
               │:::::│  DSR    6 ○      ○ 19
               │:::::│  GND    7 ○      ○ 20 ──────── DTR
               13    25        8 ○      ○ 21 ──────── RL
                              9 ○      ○ 22
DB-25 female, DCE            10 ○      ○ 23
                            11 ○      ○ 24 ──────── TT
                            12 ○      ○ 25 ──────── TM
                            13 ○
```

H3411

RS-232 Straight-Through Cable

This cable is used to connect the console or modem port on the LS2020 console/modem assembly to an external console or modem.

Cisco Systems does not provide this cable; it is widely available from other sources.

Figure 3-39 shows the DB-25 connectors associated with the RS-232 straight-through data cable and provides a schematic diagram of the pin assignments for the cable.

Figure 3-39   RS-232 Straight-Through Data Cable Connector and Pin Assignments
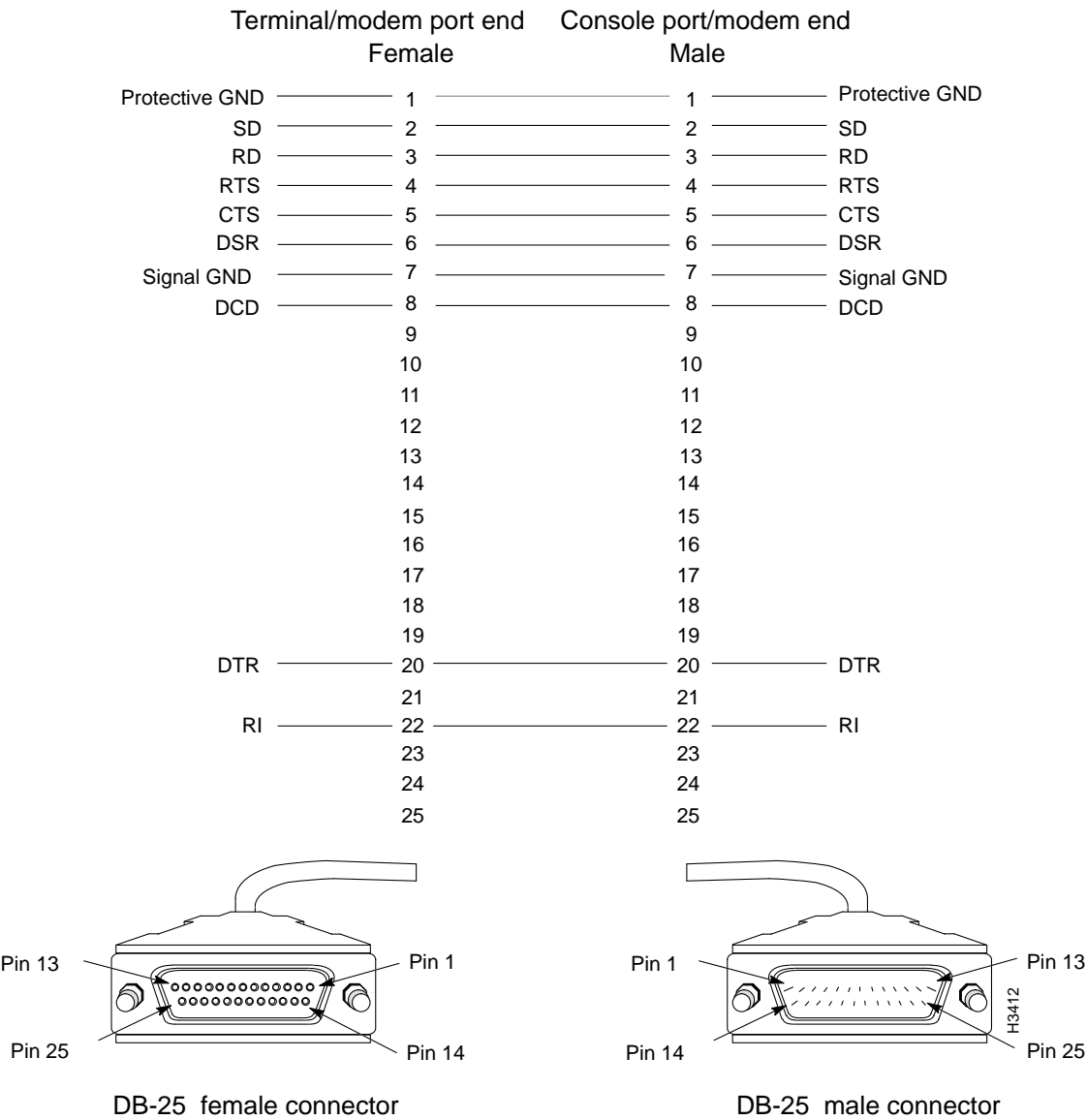
BITS Interface (on Release 2 Switch Card)

The Release 2 switch card incorporates a building-integrated timing source (BITS) interface for constant bit rate (CBR) applications. The BITS interface is a receive-only T1 line that extracts only the clock signal from a T1 line (data is discarded).

The clock signals provide a highly stable time reference for use in an LS2020 chassis or within the network. Figure 3-40 shows the bulkhead view of the Release 2 switch card and defines the pin assignments of the RJ48 connector for the BITS CLK port.

Figure 3-40   **Release 2 Switch Card BITS Interface and RJ-48 Connector Pin Assignments**
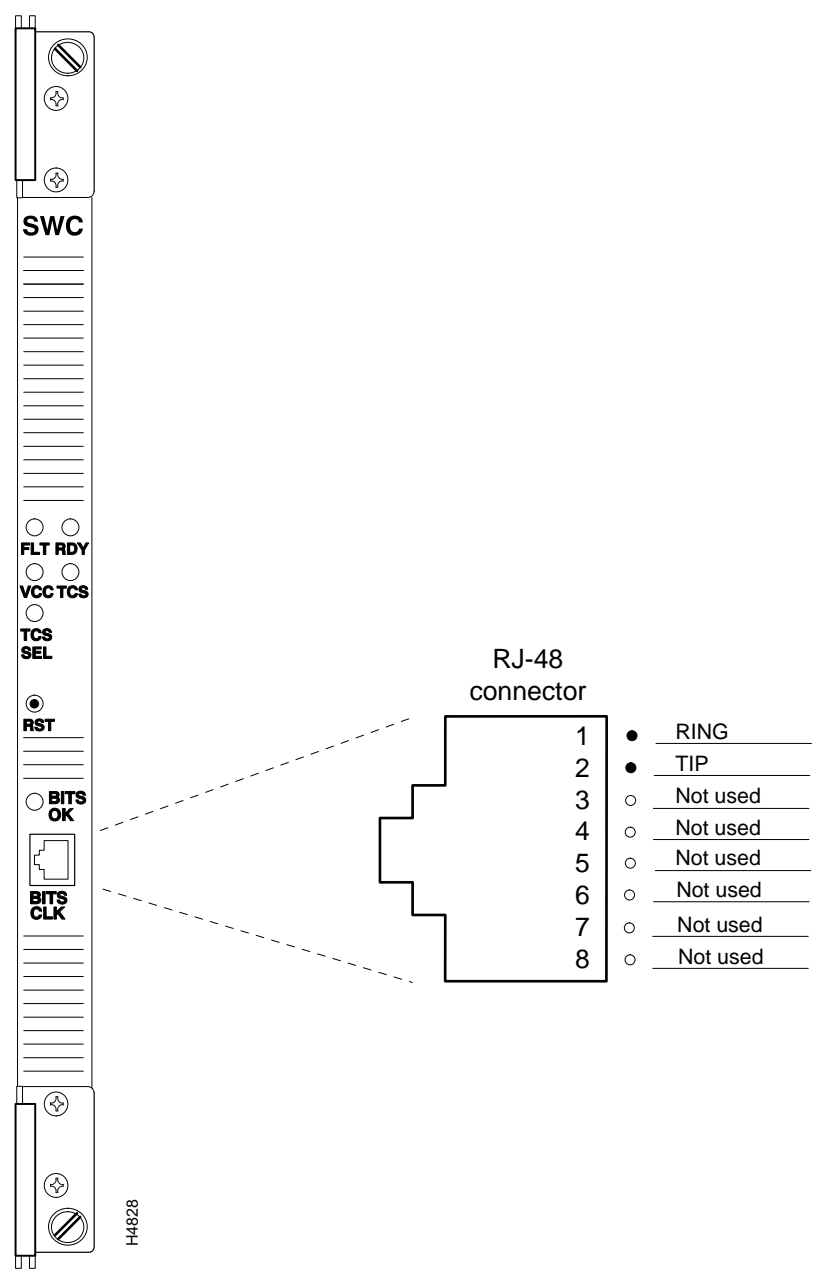
Country Kits and Power Cordsets

AC-Powered LightStream 2020 Systems

A variety of power cordsets is available for AC-powered LS2020 switches. These cordsets are available either with new system orders or as spare parts. This section provides information that will enable you to choose the proper cordset for your LS2020 site.

If you are specifying a cordset as part of a new system order, refer to the LS2020 price list or the *Products Catalog* and order the appropriate country power kit. Doing so 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, refer to Table 3-5, 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 reference the cordset's part number. This part number (P/N) appears above each cordset illustrated in the section below entitled "LightStream 2020 AC Power Cordsets."

DC-Powered LightStream 2020 Systems

A DC-powered system does not use a detachable power cord. Instead, a 48 VDC power source must be permanently wired to a DC power tray in the LS2020 chassis. This work should be done only by a licensed electrician or otherwise qualified individual.

A DC power kit is available (order number L2020-PWR-DC=) that provides the necessary attachment hardware (screws, nutclips, and washers) for installing a DC power tray in an LS2020 rack.

For instructions on wiring a DC-powered system, see the *LightStream 2020 Installation Guide*.

LightStream 2020 AC Power Cordsets

Each LS2020 AC power tray is equipped with one recessed male power inlet. The power connectors conform to IEC Standard 320 C20 and require cordsets with an IEC 320 C19 female connector. (All cordsets offered by Cisco Systems for the LS2020 switch have IEC 320 C19 female connectors.)

Each AC country power kit consists of a plastic bag containing a country-specific AC power cordset and sufficient attachment hardware for use in the 12 mounting slots in an LS2020 rack.

Table 3-5 summarizes the specifications of the AC power cordsets. The table lists the country of use, the cordset rating, its plug type, its manufacturing part number, and the country power kit order number for each cordset.

Following Table 3-5 is a series of illustrations summarizing the specifications of all the power cordsets available for the LS2020 switch. These summaries are arranged according to the cordset manufacturing part number.

**Table 3-5   Specifications for LightStream 2020 AC Power Cordsets**

Country of Use	Cordset Rating	Plug Type	Mfg. Part Number	Country Power Kit Order Number
Canada, Mexico, Japan, and USA	125V @ 20A	NEMA 5-20P	37-0037-01	L2020-PWR-NA=
Canada, Mexico, Japan, and USA	125V @ 20A	NEMA L5-20P	37-0038-01	L2020-PWR-NA125=
Canada, Mexico, Japan, and USA	250V @ 20A	NEMA L6-20P	37-0039-01	L2020-PWR-NA250=
Continental Europe, including Austria, Belgium, Finland, France, Germany, Holland, Norway, Portugal, Spain, and Sweden	250V @ 16A	CEE 7/7	37-0040-01	L2020-PWR-E=
Argentina, Australia, New Zealand, and Papua New Guinea	250V @ 15A	AS3112-1981	37-0041-01	L2020-PWR-A=
Denmark	250V @ 10A	107-2-DI	37-0042-01	L2020-PWR-D=
England, Hong Kong, Ireland, Malaysia, Scotland, Singapore, and Wales	250V @ 13A	BS 1363	37-0043-01	L2020-PWR-U=
India and South Africa	250V @ 15A	BS 546	37-0044-01	L2020-PWR-IN=
Israel	250V @ 16A	SI 32	37-0045-01	L2020-PWR-IS=
Italy	250V @ 16A	CEI 23-16	37-0046-01	L2020-PWR-I=
Switzerland	250V @ 10A	SEV 1011	37-0047-01	L2020-PWR-CH=

P/N 37-0037-01
Cordset Rating: 20A, 125V

Used in Country Kit   L2020-PWR-NA=
For Canada, Japan, Mexico, and USA
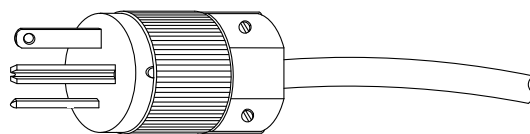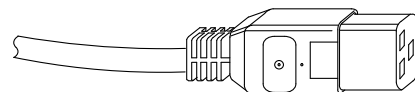
Plug: NEMA 5-20P   Cordage: 12/3 SJT   Connector: IEC 320 C19
                          Length: 2.5 m (8 feet 2 inches)
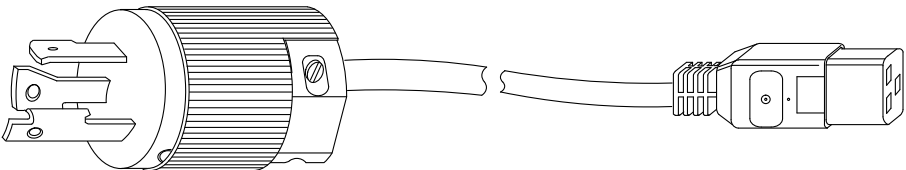
H3413

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
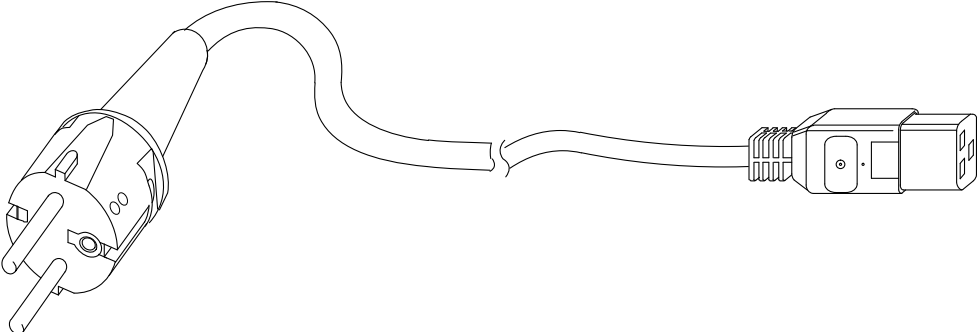Length: 2.5 m (8 feet 2 inches)

Connector: IEC 320 C19
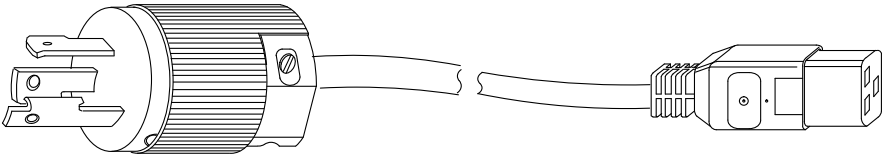
H3414

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

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
Length: 2.5 m (8 feet 2 inches)

Connector: IEC 320 C19

H3416

P/N 37-0041-01

Cordset Rating: 15A, 250V

Used in Country Kit   L2020-PWR-A=
For Argentina, Australia, New Zealand, and Papua New Guinea
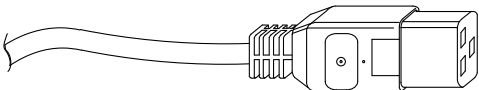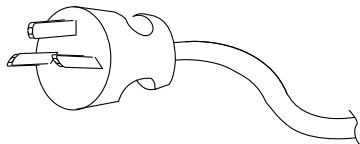
Plug: AS3112-1981   Cordage: 3 x 1.5 mm^2 Connector: IEC 320 C19
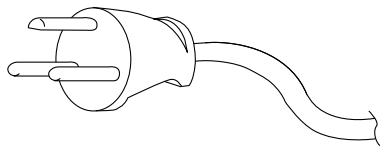Length: 2.5 m (8 feet 2 inches)

H3656

P/N 37-0042-01

Cordset Rating: 10A, 250V

Used in Country Kit   L2020-PWR-D=
For Denmark
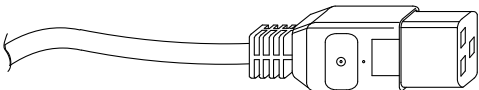
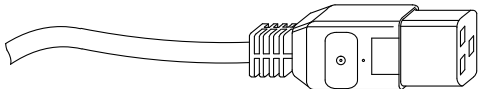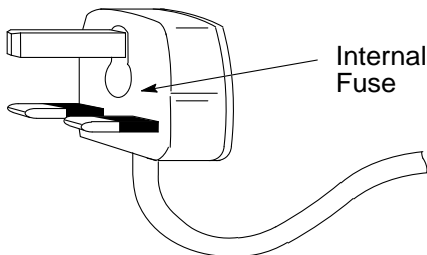Plug: 107-2-DI   Cordage: 3 x 1.5 mm^2 Connector: IEC 320 C19
Length: 2.5 m (8 feet 2 inches)

H3655

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

Internal
Fuse

Plug: BS 1363   Cordage: 3 x 1.5 mm^2 Connector: IEC 320 C19
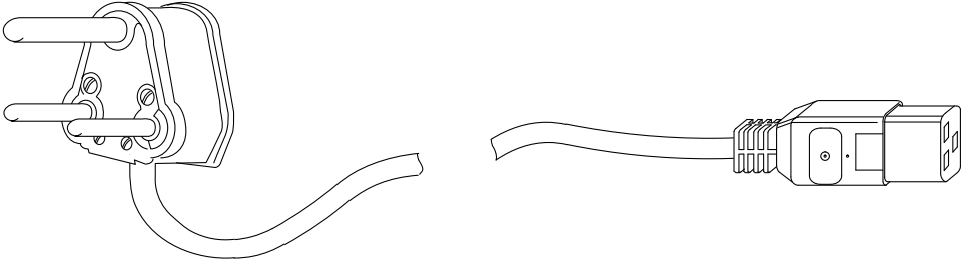Length: 2.5 m (8 feet 2 inches)

H3417

P/N 37-0044-01

Cordset Rating: 15A, 250V

Used in Country Kit   L2020-PWR-IN=
For India, South Africa

Plug: BS 546   Cordage: 3 x 1.5 mm^2 Connector: IEC 320 C19
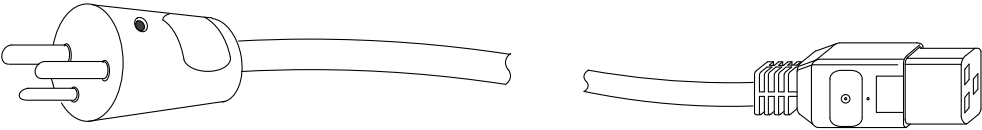   Length: 2.5 m (8 feet 2 inches)

H3420

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 Connector: IEC 320 C19
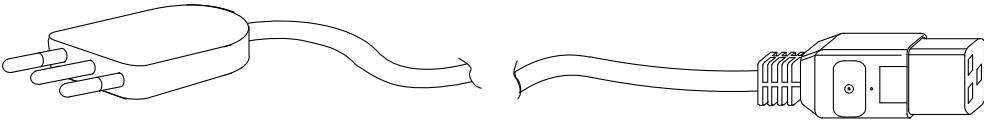   Length: 2.5 m (8 feet 2 inches)

H3418

P/N 37-0046-01

Cordset Rating: 16A, 250V

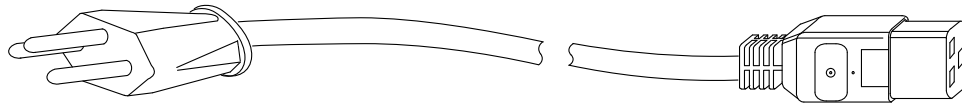Used in Country Kit   L2020-PWR-I=
For Italy

Plug: CEI 23-16   Cordage: 3 x 1.5 mm^2 Connector: IEC 320 C19
                          Length: 2.5 m (8 feet 2 inches)

H3657

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