Installing the Router

This chapter provides the following procedures for installing the router at your site, installing power supplies, making all external cable connections, and applying power:

- Rack-mount installation
- General installation
- Power supply installation
- External connections
- Initial startup

An optional rack-mount kit is available for mounting the router in a standard 19-inch-wide equipment rack with four unobstructed outer rails. This kit is suitable for use with other rack types, such as Telco-type equipment racks. If you plan to use an equipment shelf or other type of rack installation, review the guidelines in the section "Equipment Racks" in the chapter "Preparing for Installation" before proceeding. If you are not rack-mounting the router, proceed to "General Installation" later in this chapter.

⚠ **Caution**   Before installing the chassis in a rack or wiring closet, read the section "Safety Recommendations" in the chapter "Preparing for Installation" to familiarize yourself with the proper site and environmental conditions. Failure to read and follow these guidelines could lead to an unsuccessful installation and possible damage to the system and components.

Rack-Mounting the Router

The procedures for rack-mounting the router are included in the configuration note *Cisco 7000 and Cisco 7507 Rack-Mount Kit Installation Instructions* (Document Number 78-1058-xx, where xx is the latest version). A printed copy of this configuration note ships with the rack-mount kit and is also available on UniverCD. Follow the procedures included in this configuration note to install your Cisco 7000 in a rack. If you do not plan to rack-mount your chassis, proceed to the following section, "General Installation."

General Installation

The router should already be in the area where you will install it, and your installation location should already be determined; if not, refer to the section "Site Requirements" in the chapter "Preparing for Installation."

When installing the router on a table or floor, ensure that you have planned a clean, safe location for the chassis and have considered the following:

- The location does not block the chassis intake (front) and exhaust (back panel) vents.

- Multiple chassis can be placed side by side, but do not stack them.

- Dust accumulates on floors. If you are placing the router on the floor, try to find a location with a minimum of dust. Excessive amounts of dust drawn in by the blower will require frequent filter cleaning or replacement.

- A raised platform or sturdy table provides a cleaner environment than does the floor.

- When deciding where to install any equipment, consider future maintenance requirements. Allow at least 3 or 4 feet of clearance for installing the power supplies and, later, for maintenance (installing/replacing power supplies or interface processors, or making/adding network connection cables or equipment).

Warning   Two people are required to lift the chassis safely. Grasp the chassis underneath the lower edge and lift with both hands. Keep your back straight and lift with your legs, not your back.

Step 1   Make sure that the area in which you will install the router is free of debris and dust. Also make sure your path to the location is unobstructed.

Step 2   On the rear of the chassis, do the following:

- Check the ejector levers and ensure that the RP, SP (or SSP), RSP7000, RSP7000CI, and all interface processors are securely installed.

- Check the captive installation screws on the RP, SP (or SSP), RSP7000, RSP7000CI, and each interface processor and tighten any that are loose.

Step 3   Ensure that both power supply bays are empty.

Warning   Never attempt to lift the chassis with the handles on the power supplies or on the interface processors, or by the plastic panels on the front of the chassis. These handles are not designed to support the weight of the chassis.

Step 4   *Two people are required to perform this step*. With a person positioned at either side of the chassis, grasp the bottom edge of the chassis with one hand near the front and the other near the back. Together, slowly lift the chassis. Avoid sudden twists or moves to prevent injury.

Step 5   Place the router in a location where the air intake vent on the front of the chassis (the bottom front panel) is not drawing in exhaust air from other equipment.

Step 6   Ensure that you have at least three or four feet of clearance around the rear of the chassis. You will need this space to install the power supplies, perform maintenance on the chassis, and observe LEDs.

Step 7   After you correctly position the chassis, proceed to the following section, "Installing Power Supplies."

Installing Power Supplies

You will install one or two, AC-input or DC-input power supplies in the upper and lower power supply bays in the rear of the chassis. Always install the first power supply in the lower power supply bay and the second, if any, in the upper bay. The power supply switch is also an interlock tab. (See Figure 3-1.) When the switch is in the on (|) position, the tab extends into a slot in the chassis to prevent the power supply from being removed accidentally or from falling out of the chassis.

Figure 3-1   Power Supply Interlock —AC-Input Power Supply Shown

Cable-retention clip   Safety interlock switch   Locking device in ON and locked positions
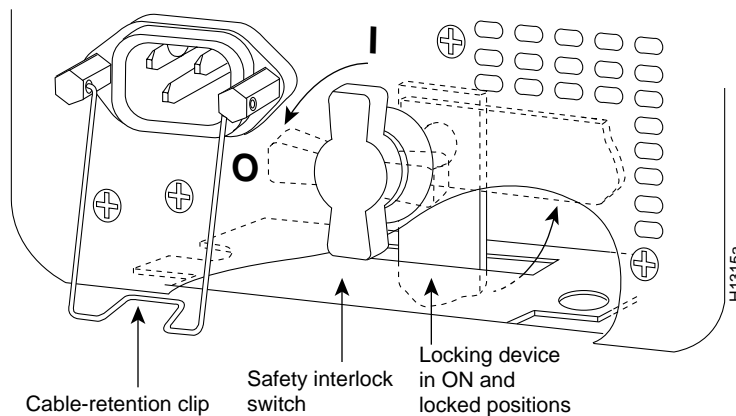
Before proceeding, ensure that you have sufficient working space (3 to 4 feet) behind the chassis and that access to the power supply bays is not blocked by an equipment rack power strip or cables from other equipment. If cables from other equipment are in the way, move them aside and temporarily secure them with tie wraps before proceeding. Keep in mind that cables that block access to the bays may also block the power supply LEDs from view. If a power strip or other rack fixture is in the way, you may need to loosen the chassis ears from the equipment rack-mounting strips and carefully push the chassis out of the rack until you can maneuver each power supply into a bay.

Note   The power strips provided in some equipment racks might partially block access to the chassis power supply bay. If so, you will have to slide the front of the chassis out of the rack far enough to allow the power supplies to clear the power strip. Steps for doing so are included in the procedures that follow.

Tools Required

You need the following tools to complete this procedure:

- A 1/4-inch flat-blade or number 2 Phillips screwdriver to install the power supply. Earlier power supplies (the first few hundred shipped) have a slotted-head captive installation screw.

- If the chassis is mounted in an equipment rack, and cables from other equipment fall in front of the power supply bays, you will need cable ties to temporarily anchor the cables out of the way.

- If access to the power supply bays is partially blocked by a power strip or other permanent rack fixture, you will need a 3/16-inch flat-blade screwdriver to temporarily detach the ears from the equipment rack-mounting strips.

Before beginning the power supply installation, note the type of the installation screws on all power supplies, and check the area around the power supply bays to determine which tools you will need.

Accessing the Bays

This section describes how to proceed if your system is installed in an equipment rack, and if you do not have clear access to both power supply bays. If the chassis is not in a rack, or if you already have clear access to the power supply bays, proceed to the following section, "Inserting Power Supplies."

Warning This procedure shifts the chassis' center of gravity toward the front of the rack and may cause the rack or the chassis to tip. Before performing this procedure, ensure that you have sufficient help (assistants) to support the rack and the chassis to prevent them from tipping forward.

Step 1 Ensure that you have at least 3 to 4 feet of working space at the rear of the chassis.

Step 2 Check the power supply bays and ensure that access is not blocked. If it is not, proceed to the following section, "Inserting Power Supplies."

Step 3 If cables from other equipment fall in front of the power supply bay, carefully gather the cables (using care not to strain them) and use cable ties to anchor them away from the power supply bays. If no other equipment blocks access to the bay, proceed to the following section, "Inserting Power Supplies."

Step 4 If access to the power supply bays is partially blocked by a power strip or other permanent rack fixture, you will need to detach the chassis from the rack and carefully slide it forward until you can maneuver each power supply into a bay. Make sure that at least one other person is available to support the front of the chassis as you push it out the front of the rack and, if necessary, to continue to support it while you insert the power supplies.

Step 5 Use a 3/16-inch flat-blade screwdriver to loosen the four screws that secure the left and right ears to the front mounting strips on the equipment rack.

Warning Never attempt to lift or support the front of the chassis with the plastic front panels. The panels can break away and allow the chassis to drop.

Step 6 Position at least one person in front of the rack to support the front underside of the chassis and prevent it from falling as it is pushed forward out of the rack. Grasp the chassis along the metal undersides *behind* the plastic front panels. If possible, position two people in front of the rack, one person to support each side of the chassis.

Step 7 From the rear of the equipment rack, slowly push the chassis forward out of the rack until there is enough clearance for the power supplies to be inserted into the bay.

Step 8 If the chassis is installed near the bottom of the rack, allow the bottom front edge of the chassis to rest on the floor while you install the power supplies. If the chassis is too high in the rack for this to be practical, proceed to the following section, "Inserting Power Supplies," and perform the steps as quickly as possible.

Step 9 When the power supplies are installed, push the chassis back into the rack until the ears meet the mounting strip on both sides of the equipment rack.

Step 10 Slide the chassis back into the rack until the ears meet the mounting strips on both sides of the rack.

**Step 11** Secure each ear to the rack-mounting strip with two 10-32 x 3/8-inch slotted binder-head screws.

Step 12 Proceed to the section "Connecting AC and DC Power" later in this chapter.

Inserting Power Supplies

When you have clear access to the power supply bays, install the first AC-input or DC-input supply in the lower bay and the second supply, if any, in the upper bay. Each power supply weighs 20 pounds. Figure 3-2 shows the correct way to handle a power supply. Install each power supply as follows:

Step 1 Always install the first power supply in the lower bay. If a filler plate is installed on the lower bay, use a screwdriver to loosen the captive screw and remove the plate. Store the filler plate in a safe place; you should replace it whenever a power supply is not installed in the bay.

Step 2 Check the switch on the face of the power supply, and place it in the off (O) position. The interlock tab should not extend out of the unit.

Step 3 Hold the power supply by the handle and place your other hand underneath to support the bottom. (See Figure 3-2.)

Step 4 The power supply has casters on the bottom end. Place the casters inside the lower power supply slot and position the power supply so that it is aligned in the slot to go straight in.

Figure 3-2   Handling Power Supplies—AC-Input Power Supply Shown
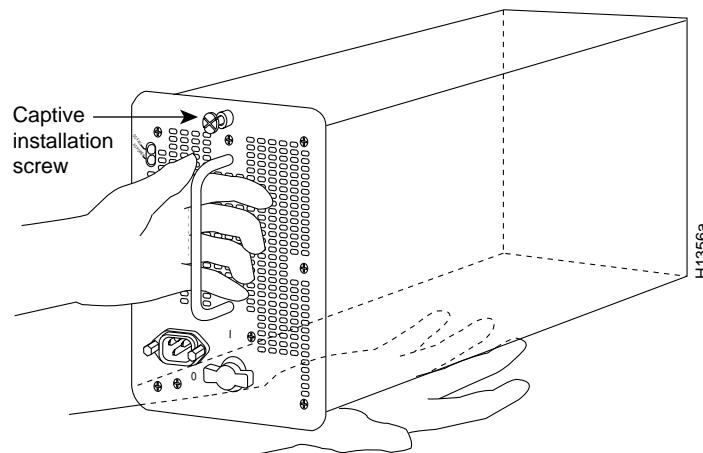
Caution   When inserting a power supply into the bay, do not use unnecessary force; slamming the power supply into the bay can damage the connectors on the rear of the supply and inside the chassis.

Step 5 Push the power supply all the way into the bay. Do not use unnecessary force; push the supply into the bay until the power supply front panel is flush with the chassis rear panel.

Step 6 Tighten the captive installation screw on the top of the power supply. This screw prevents the power supply from shifting away from the internal connector and provides proper grounding for the supply.

⚠️ **Caution** Do not turn on any power supplies until you are ready to power up the system. The interlock switch that locks the power supply in the slot also turns on the system power.

Step 7 If you are installing only one power supply, proceed to the following section, "Connecting AC and DC Power."

Step 8 Use a number 2 Phillips or 1/4-inch flat-blade screwdriver to loosen the captive installation screw and remove the filler plate from the upper power supply bay. Save the filler plate so that you can replace it later if necessary.

Note Save the power supply filler plate. Install the filler plate over the upper power supply bay whenever the system is operating with one power supply.

Step 9 Repeat Steps 2 through 6 for the second power supply.

Connecting AC and DC Power

For optimum reliability, connect redundant power supplies to separate input lines.

Connect an AC-input power supply as follows:

Step 1 On the lower supply, push the cable-retention clip down, away from the power cord port, and plug in the power cord.

Step 2 To secure the cable in the power supply AC receptacle, push the cable-retention clip up until it snaps into place around the connector. The cable-retention clip provides strain relief for the AC power cord.

Step 3 Repeat steps 1 and 2 for the second power supply, if any.

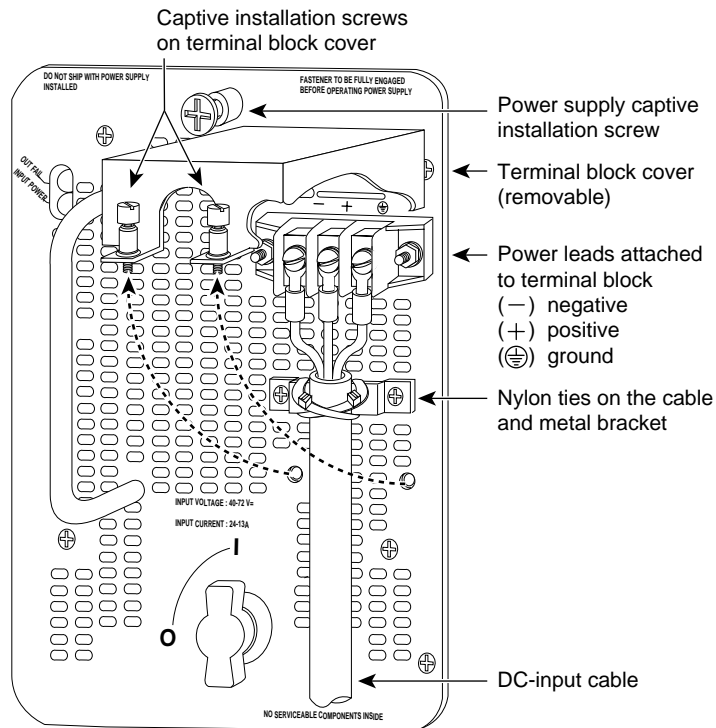**Step 4** Connect each power supply cord to a separate input line.

Step 5 To connect the external interface cables to the chassis, proceed to the following section, "Connecting Interface Cables."

Connect a DC-input power supply as follows:

Step 1 Using a screwdriver, loosen the captive installation screws on the terminal block cover, then lift and remove the cover. (See Figure 3-3.)

Step 2 Using a screwdriver, attach the power leads to the terminal block. (See Figure 3-3.)

The wire should be at least 8 AWG. Color code selection for the DC-input cable depends on the color code of the DC power source at your site. Typically, negative is black, positive is red or white, and ground is green. No matter which color coding is used, make certain it matches that used at the DC source for negative, positive, and ground. (See Figure 3-3.)

Figure 3-3   Installing the DC-Input Power Cable Leads, Nylon Cable Ties, and Cover

Captive installation screws
on terminal block cover

DO NOT SHIP WITH POWER SUPPLY
INSTALLED

FASTENER TO BE FULLY ENGAGED
BEFORE OPERATING POWER SUPPLY

OUT FAIL
INPUT POWER

INPUT VOLTAGE : 40-72 V=

INPUT CURRENT : 24-13A

I

O

NO SERVICEABLE COMPONENTS INSIDE

H2486

Power supply captive
installation screw

Terminal block cover
(removable)

Power leads attached
to terminal block
(−) negative
(+) positive
(⏚) ground

Nylon ties on the cable
and metal bracket

DC-input cable

Warning   Incorrectly wiring the terminal block could create a dangerous shock hazard and could damage the power supply, power source, and the Cisco 7000 chassis components.

Step 3   To provide strain relief for the three DC-input cable, attach two nylon ties around the cable and the metal bracket. (See Figure 3-3.)

Step 4   Install the terminal block cover over the terminal block, and tighten the captive installation screws. (See Figure 3-3.) *Do not overtighten* the captive installation screws on the terminal block cover. The recommended torque is 8.2 0.4 inch-lb

Warning   To prevent a short-circuit or shock hazard after wiring the DC-input power supply, replace the terminal block cover.

Step 5   Connect the opposite end of the DC-input cable to the DC power source.

Note   Do not turn on any power supplies until you are ready to power up the system. The interlock switch that locks the power supply in the slot also turns on the system power.

If you are installing or replacing a second power supply, repeat Step 1 through Step 5 for the second power supply. Proceed to the following section, to connect the external interface cables to the chassis.

Connecting Interface Cables

The following sections describe the basic network connections you will make to the router. Using the Configuration Worksheet will help you to make connections and later configure each interface without having to access the rear of the chassis to check port addresses. Complete the "Site Log" in the chapter "Preparing for Installation" if you have not already done so.

External Cabling Guidelines

The following guidelines will assist you in properly connecting the external network cables to your router.

Warning   Invisible laser radiation may be emitted from the aperture ports of the single-mode FDDI products when no fiber cable is connected. *Avoid exposure and do not stare into open apertures.* This product meets the Class 1 Laser Emission Requirement from CDRH FDDI.

- Make certain that you connect the correct interface types.

   All FSIP serial ports are a high-density 60-pin receptacle. Each port requires a serial port adapter cable to connect to the external network. The cable determines both the electrical interface type and mode of the port to which it is connected. The network end of each adapter cable type is the industry-standard connector normally used for the interface type (for example, the EIA/TIA-232 port adapter cable has a standard DB-25 connector at the network end).

   Following are guidelines for connecting serial interface cables:

   — A label that identifies the electrical interface type and mode is molded into the cable connectors.

   — EIA/TIA-232 and EIA-530 are the only interface types that use the same type of connector, a DB-25. If you are using both EIA/TIA-232 DTE mode and EIA-530, check the labels carefully.

   — Generally, cables for DTE mode use a plug at the network end, and cables for DCE mode use a receptacle at the network end. An exception is the V.35 cables, which are available with either a plug or receptacle in either mode.

- Verify the interface numbers (also called *port addresses*) on the rear of the chassis and the cables you will connect to each.

   Each port has a unique address composed of the interface processor slot number and the port number on the interface processor. For a description of interface addresses, refer to the section "Port Addresses" in the chapter "Product Overview" and to the Port Configuration Worksheet (Figure 2-41 in the chapter "Preparing for Installation").

- Avoid crossing high-power cables with interface cables.

   Crossing high-power cables with interface cables can cause interference in some interface types. It will not always be possible to avoid this, but try to prevent it whenever possible.

- Do not defeat cable strain-relief systems.

   Most interfaces provide some type of strain relief to prevent the cables from being accidentally disconnected. Among these types of strain relief are the slide fasteners on Ethernet cables, the cable retention clip on the power supply cord, and the screw-type fasteners on serial cables. Use all strain-relief devices provided to prevent potential problems caused by inadvertent cable disconnection.

- Verify proper interface cabling before starting the system.

  Before applying power to the system, prevent unnecessary problems or component damage by double-checking your cabling.

- Verify all cabling limitations before applying power to the system.

  When setting up your system, you must consider a number of factors related to the cabling required for your connections. For example, when using EIA/TIA-232 connections, be aware of the distance and electromagnetic interference limitations. For cabling distances and other requirements refer to the section "Site Requirements" in the chapter "Preparing for Installation."

- Check the power cord and power supply for compatibility with your power service.

  Check the labels on the equipment and ensure that the power service at your site is suitable for the chassis you are connecting. If you are not sure, refer to the section "AC and DC Power" in the chapter "Preparing for Installation."

Warning A voltage mismatch can cause equipment damage and may pose a fire hazard. If the voltage indicated on the label is different from the power outlet voltage, *do not connect the chassis to that receptacle*.

Note After installing all of the rear panel cables and powering up the system, refer to the related software reference documentation on UniverCD or printed manuals to configure and enable the interfaces.

If the router fails to operate in the manner specified in software documents, refer to Chapter 4 to help isolate the problem, and then notify a customer service representative.

This sections that follow provide illustrations of the connections between the router interface ports and your network(s). Interface cables and equipment, such as Ethernet transceivers and interface cables, should already be available and in place. If they are not, refer to the section "Preparing Network Connections" in the chapter "Preparing for Installation" for descriptions of the equipment you need for each interface type to complete the connection to your network. Descriptions of network connections follow.
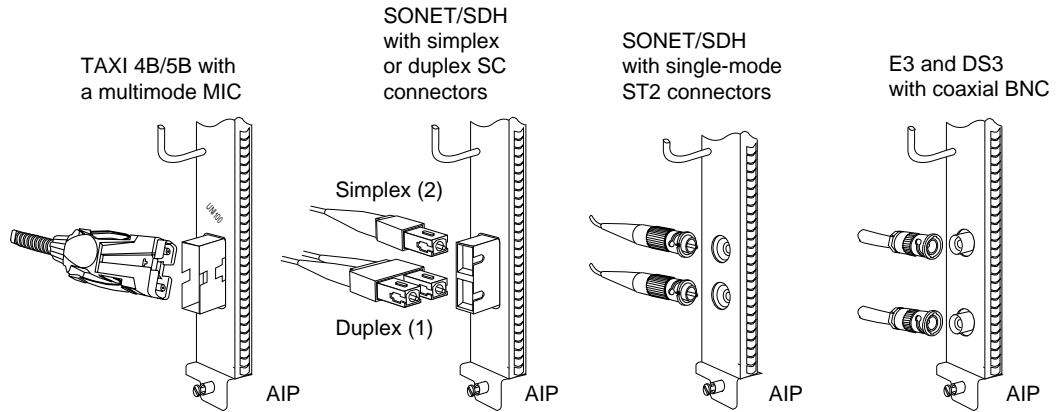
ATM Connections

All AIP ATM interfaces are full-duplex. You must use the appropriate ATM interface cable to connect the AIP with an external ATM network. The AIP provides an interface to ATM switching fabrics for transmitting and receiving data up to 155 megabits per second (Mbps) bidirectionally; the actual data rate is determined by the PLIM.

The AIP can support interfaces that connect to the following physical layers:

- TAXI 4B/5B 100 Mbps multimode fiber optic

- SONET/SDH 155 Mbps multimode fiber optic—STS-3C or STM-1

- SONET/SDH 155 Mbps single-mode fiber optic—STS-3C or STM-1

- E3 34 Mbps coaxial cable

- DS3 45 Mbps coaxial cable

Connect the AIP interface cables as shown in Figure 3-4. For detailed descriptions of ATM cabling requirements, refer to the section "Distance Limitations" in the chapter "Preparing for Installation" and also the section "AIP Interface Types" in the chapter "Preparing for Installation."

Figure 3-4   ATM (AIP) Connections

⚠ **Caution**   To ensure compliance with EMI standards, the E3 PLIM connection requires an EMI filter clip (CLIP-E3-EMI) on the receive port (RCVR); the DS3 PLIM connection does not require this clip. Figure 3-5 shows the EMI filter clip assembly that is required for the E3 PLIM. *Do not* operate the E3 PLIM without this assembly.

The E3 and DS3 PLIMs require cable CAB-ATM-DS3/E3. If you have an E3 PLIM, you must follow steps 1 through 3 to install the CAB-ATM-DS3/E3 cable and EMI filter assembly. If you do not have an E3 PLIM, proceed to the appropriate section for your configuration.

Step 1   Attach the CAB-ATM-DS3/E3 cable to the transmit (XMTR) and receive (RCVR) ports on the E3 PLIM. (See Figure 3-5a.)

One portion of the cable has a white insulator on both ends to ensure that the receive-to-transmit and transmit-to-receive relationship is maintained between the E3 PLIM and your ATM switch. The portion of the cable with the white insulator should attach between receive and transmit *or* transmit and receive ports of the E3 PLIM and your ATM switch, respectively.

Step 2   Hold the EMI filter clip as shown in Figure 3-5b and attach it to the receive cable as shown in Figure 3-5c.

Step 3   To ensure that the clip is not pulled off when adjacent interface processors are removed, position the clip parallel to the orientation of the AIP. (See Figure 3-5d.)

Figure 3-5   **Installing the CAB-ATM-DS3/E3 Cable and EMI Filter Clip Assembly—Horizontal Orientation Shown**
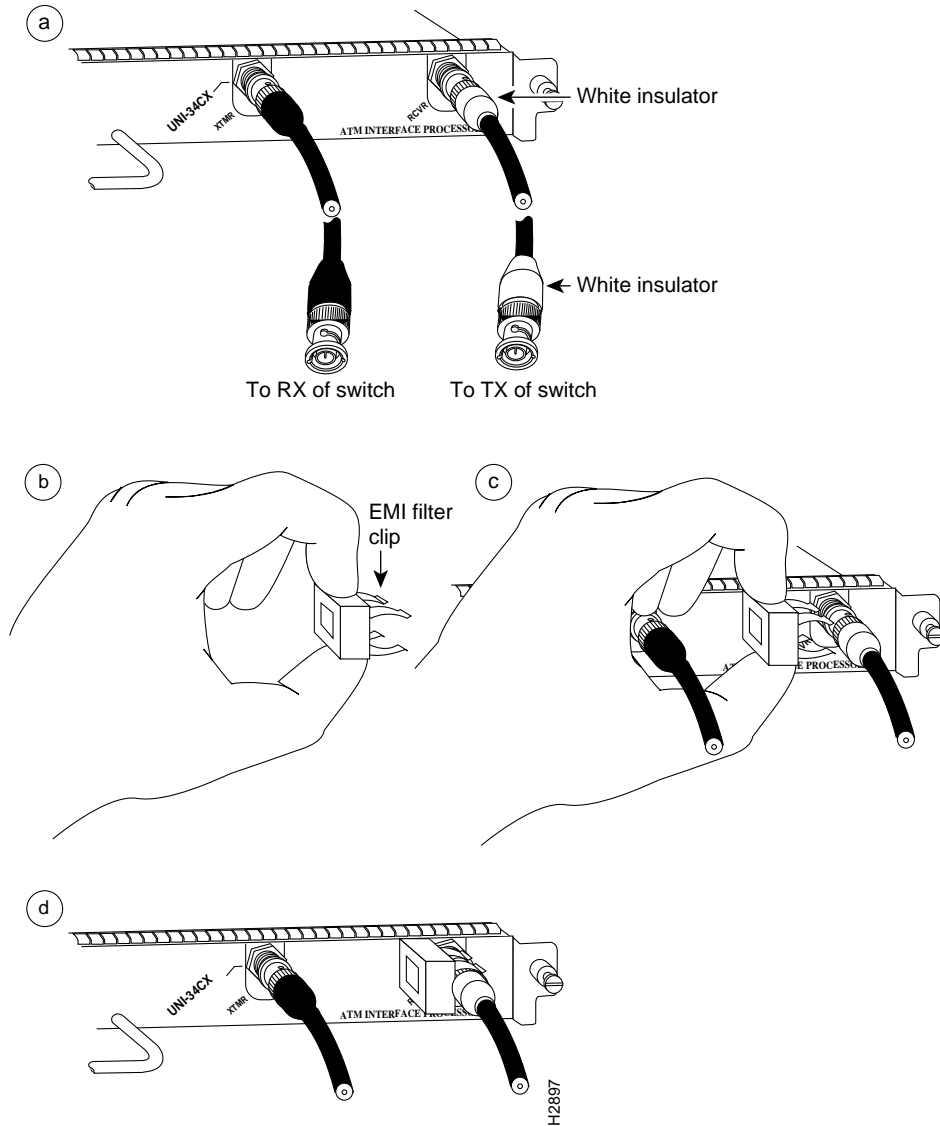
Note   Also refer to the *Asynchronous Transfer Mode Interface Processor (AIP) Installation and Configuration* configuration note (Document Number 78-1214-xx, where xx is the latest version of the document), which ships with the AIP card and is also available on UniverCD.

Channel Attachment Connections

Connecting bus and tag or Enterprise System Connection (ESCON) cables between the CIP and a host processor is beyond the scope of this publication. The specific CIP connection requirements are discussed in detail in the configuration note *Channel Interface Processor (CIP) Installation and Configuration* (Document Number 78-1342-xx, where xx is the latest version of the document). This configuration note ships with the CIP and is available on UniverCD.

Ethernet Connections

An Ethernet transceiver or MAU should already be connected to your network. Connect each Ethernet port on the EIP to an Ethernet transceiver with a transceiver cable, or to an attachment unit with an attachment unit interface (AUI). Figure 3-6 shows an example of a typical connection. Some transceivers connect directly to the Ethernet port on the EIP (usually the 10BASE-T type) and do not require an interface cable. On each EIP port, slide the metal bracket up over two posts on the cable connector, or tighten the thumbscrews to secure the cable in the port and provide strain relief. For descriptions of the connection equipment and connector locks, refer to the section "Ethernet Connection Equipment" in the chapter "Preparing for Installation."

Figure 3-6   **Ethernet Connections**
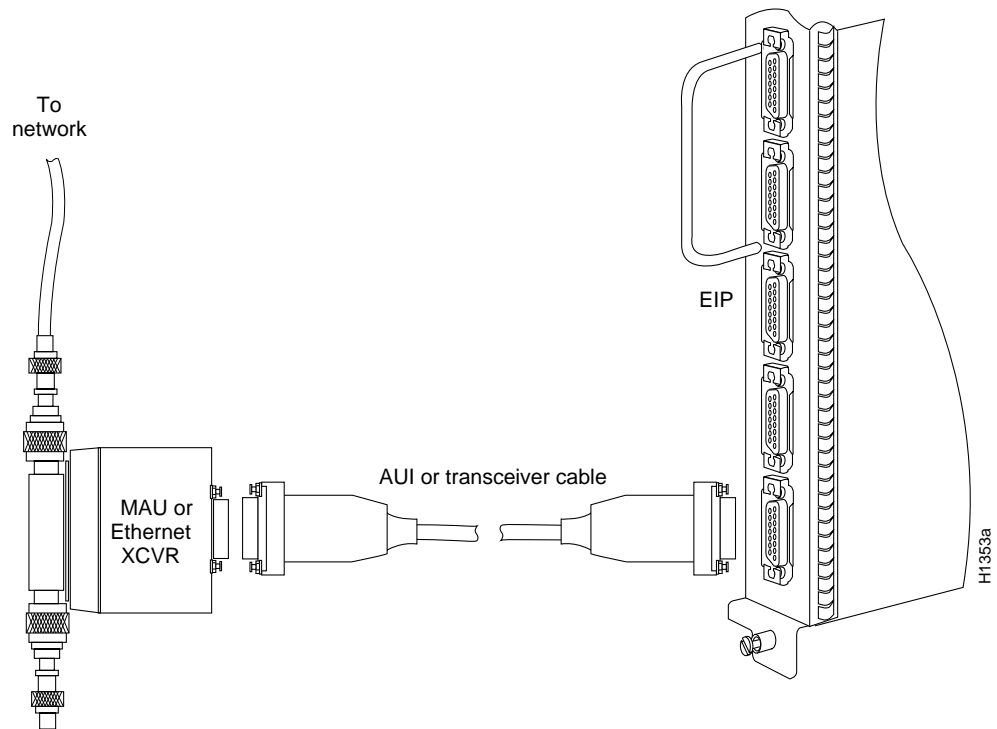
Fast Ethernet Connections

For an MII connection, a 100BaseT transceiver or MAU should already be connected to your network. The RJ-45 connection does not require an external transceiver.

On a single 100BaseT port adapter, you can use *either* the RJ-45 connection *or* the MII connection. If you have two 100BaseT port adapters on your FEIP, you can use the RJ-45 connection on one and the MII connection on the other.

Note D*o not* simultaneously connect MII *and* RJ-45 cables to one 100BaseT port adapter. RJ-45 and MII cables are not available from Cisco Systems.

If you have RJ-45 connections, attach the Category 5 UTP cable directly to the RJ-45 port on the FEIP. (See Figure 3-7.)

If you have MII connections, attach an MII cable directly to the MII port on the FEIP or attach a 100BaseT or 100BaseF transceiver, with the media appropriate to your application, to the MII port on the FEIP. (See Figure 3-7.)

Attach the network end of your RJ-45 or MII cable to your 100BaseT or 100BaseF transceiver, switch, hub, repeater, DTE, or whatever external, 100BaseT equipment you have.

Figure 3-7   Fast Ethernet Connections
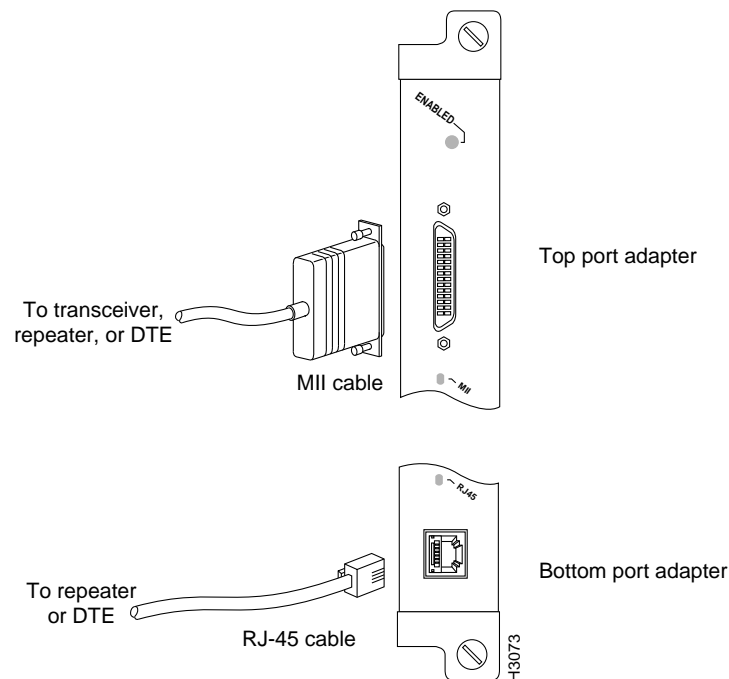
Caution To prevent problems on your FEIP and network, do not simultaneously connect RJ-45 and MII cables to one 100BaseT port adapter. On a single 100BaseT port adapter, only one network connection can be used at one time. Only connect cables that comply with EIA/TIA-588 standards.

Token Ring Connections

Media access unit (MAU) connectors provide a direct connection between the TRIP and the ring. Figure 3-8 shows the connections.

Figure 3-8   Token Ring Connections

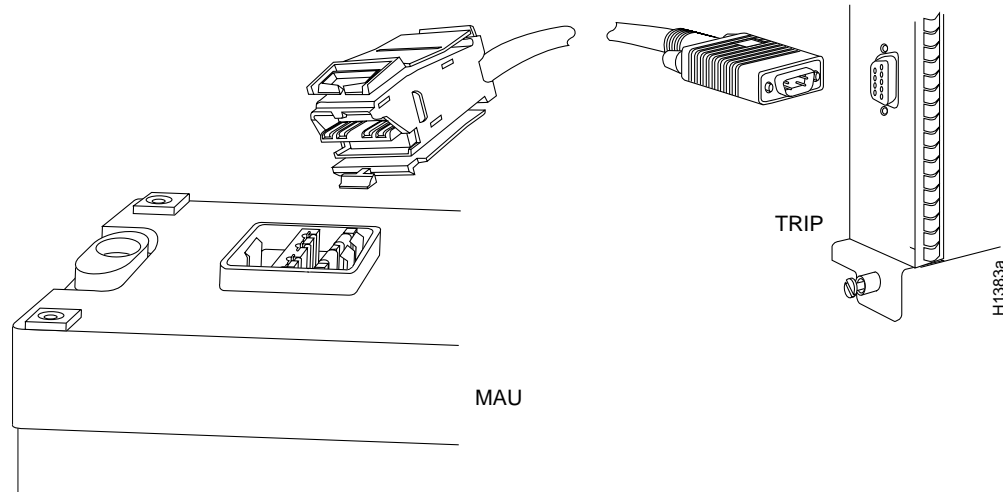The speed of each Token Ring port must match the speed of the ring to which it is connected. The default speed for all TRIP ports is 4 Mbps, which you can change to 16 Mbps on any port with the configuration command **ring-speed** *n*, where *n* is the speed (4 or 16) in Mbps. Before you enable the Token Ring interfaces, ensure that each is set for the correct speed, or it can bring the ring down. The following sample session changes the ring speed on Token Ring port 1/2 from the default 4 Mbps to 16 Mbps:

```
7000# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
7000 (config)# int tokenring 1/2
7000 (config)# ring-speed 16
7000 (config)# ^Z
7000# copy running-config startup-config
[OK]
7000#
```

⚠️ **Caution**   Each TRIP port must be configured for the same ring speed as the ring to which it is connected, either 4 or 16 Mbps. If the port is set for a different speed, it will cause the ring to beacon, which effectively brings the ring down and makes it inoperable.

FDDI Connections

Both single-mode and multimode connections are available and can be combined on one FIP. The fiber-optic cable connects directly to the FIP ports. Single-mode uses separate transmit and receive cables. You will need two single-mode cables for a single attachment connection or four cables for a dual attachment connection. Multimode uses one integrated transmit/receive cable for each physical interface (one for PHY A and one for PHY B). You will need one multimode cable for a single attachment connection, and two cables for a dual attachment connection. Figure 3-14, which shows the connections for a dual attachment connection that uses both single-mode and multimode fiber, illustrates the types of connections used for both fiber modes. For pinout descriptions, refer to the section "FDDI Connection Equipment" in the chapter "Preparing for Installation."

Note Each station in a ring refers to its neighbor stations as *upstream* or *downstream* neighbors. The *stream* is based on the signal flow on the primary ring. A station receives the primary signal from its upstream neighbor and transmits the primary signal to its downstream neighbor.

This section also provides instructions for connecting an optical bypass switch to a dual attachment multimode network connection. Because the method of connecting optical bypass switches varies between different manufacturer's models, refer to the documentation for your particular bypass switch for correct connection instructions. If you are installing an optical bypass switch, proceed to the section "Installing an Optical Bypass Switch" later in this chapter.

Warning Invisible laser radiation may be emitted from the aperture ports of the single-mode FDDI products when no fiber cable is connected. *Avoid exposure and do not stare into open apertures*. This product meets the Class 1 Laser Emission Requirement from CDRH FDDI.

Single Attachment Connections

A FIP that is connected as a single attachment station (SAS) typically is connected to the ring through a concentrator. The FIP receives and transmits the signal through the same physical interface, usually PHY A. Depending upon whether you are connecting to a single-mode of multimode fiber network, connect the FIP as follows:

- Single-mode—Connect one single-mode interface cable to the PHY A transmit port and one to the PHY A receive port. (See Figure 3-9.) Connect the opposite end of each cable to the concentrator transmit and receive ports as specified by the concentrator manufacturer.

- Multimode—Connect the multimode interface cable between one of the M ports on the concentrator and the PHY A port on the FIP. (See Figure 3-10.) Be sure to observe and match the port labels on the MIC and the FIP ports; connect receive on the cable to PHY A receive. Follow the concentrator manufacturer's instructions for connecting the opposite end of the cable.

If you are connecting other FIPs as dual attachment stations (DASs) proceed to the following section. Otherwise, proceed to the section "Connecting the Console Terminal" later in this chapter.

Figure 3-9 **Single Attachment Station (SAS), Single-Mode Fiber Network Connections**
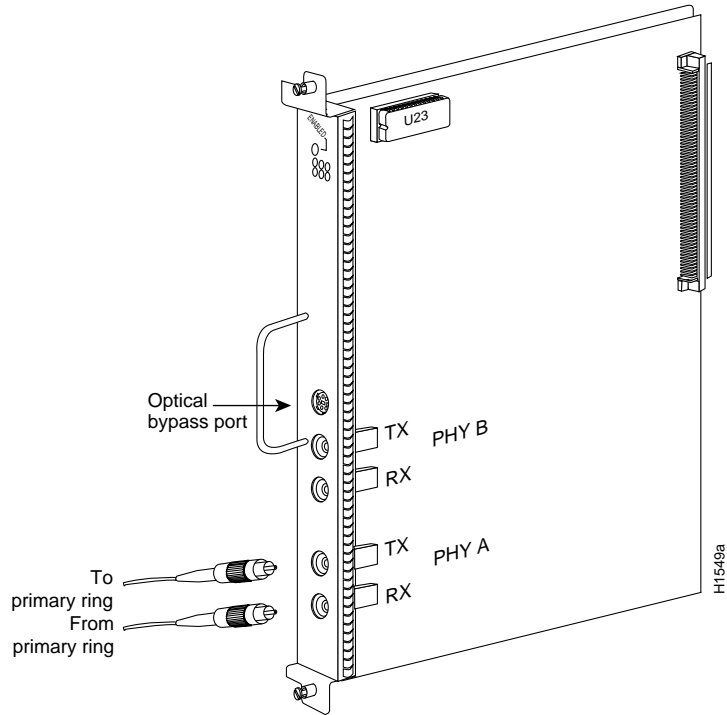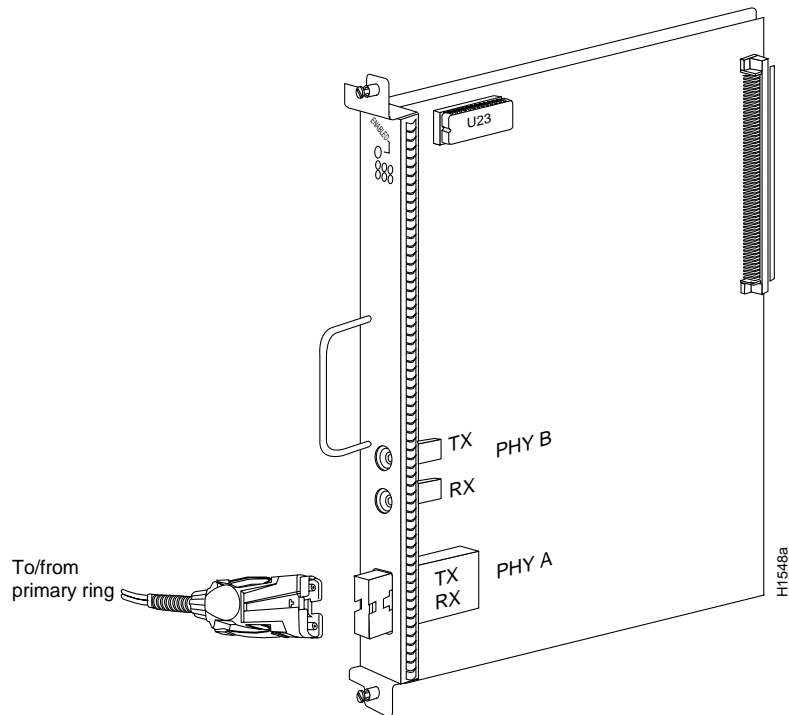

Figure 3-10 **Single Attachment Station (SAS), Multimode Fiber Network Connections**

Dual Attachment Connections

A FIP that is connected as a dual attachment station (DAS) connects to both the primary and secondary rings. The signal for each ring is received on one physical interface (PHY A or PHY B) and transmitted from the other. The standard connection scheme (which is shown in Figure 3-11) for a DAS dictates that the primary ring signal comes into the FIP on the PHY A receive port and returns to the primary ring from the PHY B transmit port. The secondary ring signal comes into the FIP on the PHY B receive port and returns to the secondary ring from the PHY A transmit port. Failure to observe this relationship will prevent the FDDI interface from initializing. Figure 3-14 shows the connections for a dual attachment that uses both multimode and single-mode fiber.

Figure 3-11   FDDI DAS Ports
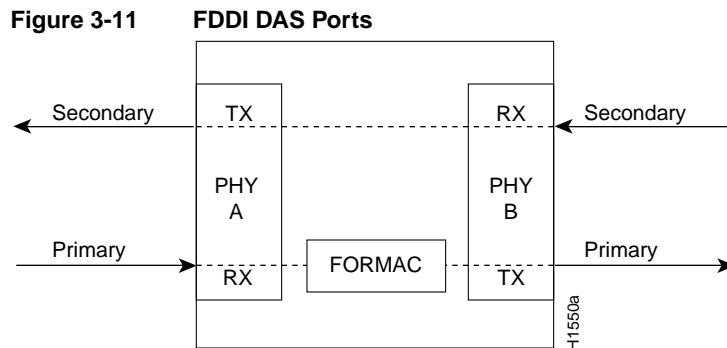
Depending on whether you are connecting to a single-mode or multimode fiber network, connect the FIP as follows:

- Single-mode—Observe the standard connection scheme described previously, and refer to Figure 3-12 while you connect the interface cables as follows:

  — Connect the cable coming in from the primary ring (*from* PHY B at the primary ring upstream station) to the FIP PHY A receive port.

  — Connect the cable going out to the primary ring (*to* PHY A at the primary ring downstream station) to the FIP PHY B transmit port.

  — Connect the cable coming in from the secondary ring to the FIP PHY B receive port.

  — Connect the cable going out to the secondary ring to the FIP PHY A transmit port.

- Multimode—Each of the integrated transmit/receive multimode interface cables attaches to both the primary and secondary ring; each one receives the signal from one ring and transmits to the other ring. (See Figure 3-13.) To help avoid confusion, use the receive label on the cable MIC connector as a key and connect the cables to the FIP ports as follows:

  — Connect the cable coming in from the primary ring to the PHY A receive port. This also connects the signal going out to the secondary ring to the PHY A transmit port.

  — Connect the cable coming in from the secondary ring to the PHY B receive port. This also connects the signal going out to the primary ring to the PHY B transmit port.

If you are connecting an optical bypass switch, proceed to the next section. Otherwise, proceed to the section "Connecting the Console Terminal" later in this chapter.

Figure 3-12   Dual Attachment Station (DAS), Single-Mode Fiber Network Connections

Optical bypass port

To primary ring

From secondary ring

To secondary ring

From primary ring

TX   PHY B

RX

TX   PHY A

RX

U23

H1546a
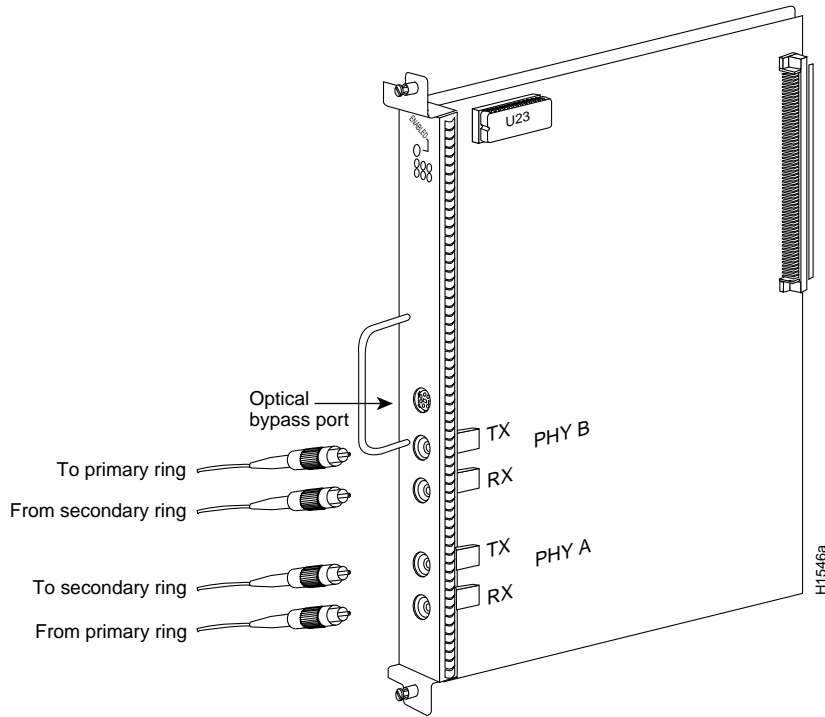
Figure 3-13   Dual Attachment Station (DAS), Multimode Fiber Network Connection

To primary ring

From secondary ring

Optical bypass port

To secondary ring

From primary ring

TX
RX   PHY B

TX
RX   PHY A

U23

H1547a
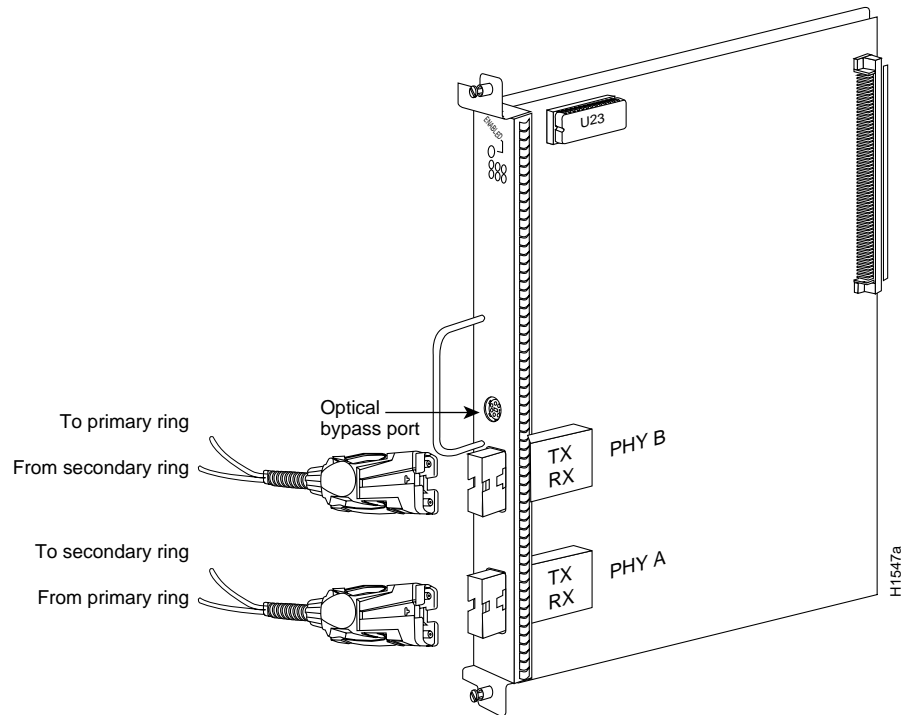
- Mixed mode—Follow the cabling guidelines described previously to connect the multimode and single-mode interface cables. Figure 3-14 shows that the primary ring signal is received on the multimode PHY A receive port and transmitted from the single-mode PHY B transmit port. Your configuration may be the opposite, with multimode on PHY B and single-mode on PHY A. Connect the cables to the FIP ports as follows:

    — Connect the cable coming in from the primary ring to the PHY A receive port, and connect the signal going out to the secondary ring to the PHY A transmit port.

    — Connect the cable coming in from the secondary ring to the PHY B receive port. This also connects the signal going out to the primary ring to the PHY B transmit port.

If you are connecting an optical bypass switch, proceed to the next section. Otherwise, proceed to the section Connecting the Console Terminal later in this chapter.

Figure 3-14   FDDI Dual Attachment Network Connections, Single-Mode and Multimode
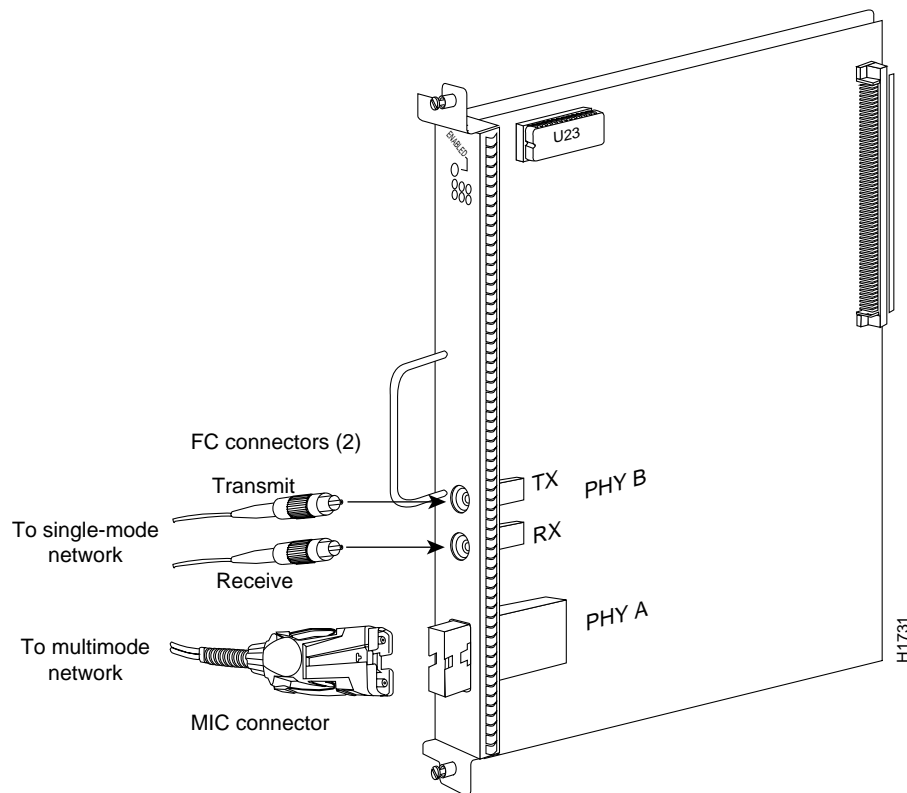
Installing an Optical Bypass Switch

An optical bypass switch is a device installed between the ring and the station that provides additional fault tolerance to the network. If a FIP that is connected to a bypass switch fails or shuts down, the bypass switch activates automatically and allows the light signal to pass directly through it, bypassing the FIP completely. A port for connecting an optical bypass switch is provided on the multimode/multimode FIP (CX-FIP-MM) and the single-mode/single-mode FIP (CX-FIP-SS) only. (See Figure 3-15 for CX-FIP-MM connections and Figure 3-16 for CX-FIP-SS connections.)

The optical bypass control port on the FIP is a six-pin mini-DIN receptacle. Some optical bypass switches use DIN connectors, and some use a mini-DIN. A DIN-to-mini-DIN control cable (CAB-FMDD) is included with the FIP to connect optical bypass switches that use the larger DIN connector. Up to 100 milliamperes of current can be supplied to the optical bypass switch.

Following are general instructions for connecting an optical bypass switch to the FIP; however, your particular bypass switch may require a different connection scheme. Use these steps as a general guideline, but refer to the instructions provided by the manufacturer of the switch for specific connection requirements.

- Connect the bypass switch to the ring. Unless the documentation that accompanies the bypass switch instructs otherwise, observe the same guidelines for connecting the A/B ports on the bypass switch that you would to connect the ring directly to the FIP ports. Use the receive label on the cable MIC connectors as a key and connect the cables to the network (ring) side of the bypass switch as follows:

  — Connect the cable coming in from the primary ring (*from* PHY B at the preceding station) to the PHY A receive port on the network (ring) side of the bypass switch. This also connects the signal going out to the secondary ring to the PHY A transmit port.

  — Connect the cable coming in from the secondary ring (*from* PHY A at the preceding station) to the PHY B receive port on the network (ring) side of the bypass switch. This also connects the signal going out to the primary ring to the PHY B transmit port.

Figure 3-15   FDDI Connection with Optical Bypass—CX-FIP-MM
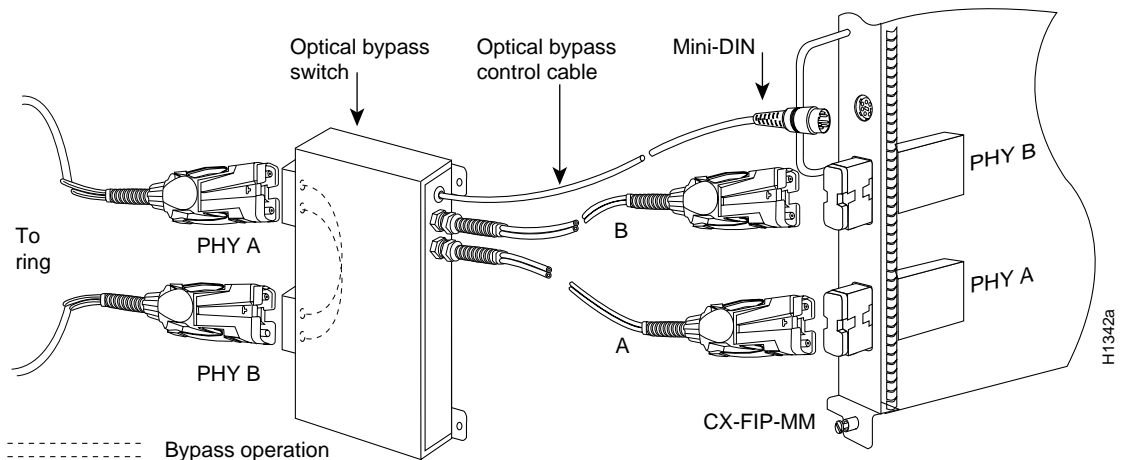
- Connect the bypass switch to the FIP. Unless the documentation that accompanies the bypass switch instructs otherwise, consider the bypass an extension of the FIP ports and connect A to A and B to B. The network cables are already connected to the bypass switch following the standard B-to-A/A-to-B scheme.

  — Connect an interface cable between the PHY A port on the station (FIP) side of the bypass switch and the FIP PHY A port.

  — Connect an interface cable between the PHY B port on the station (FIP) side of the bypass switch and the FIP PHY B port.

- Connect the bypass switch control cable. If the control cable on your optical bypass switch uses a mini-DIN connector, connect the cable directly to the mini-DIN optical bypass port on the FIP. If the switch uses a standard DIN connector, use the optical bypass adapter cable (CAB-FMDD) supplied with each FIP. Connect the DIN end of the adapter cable to the DIN on the control cable, and connect the mini-DIN end of the adapter cable to the mini-DIN optical bypass port on the FIP.

Figure 3-16   FDDI Connection with Optical Bypass—CX-FIP-SS
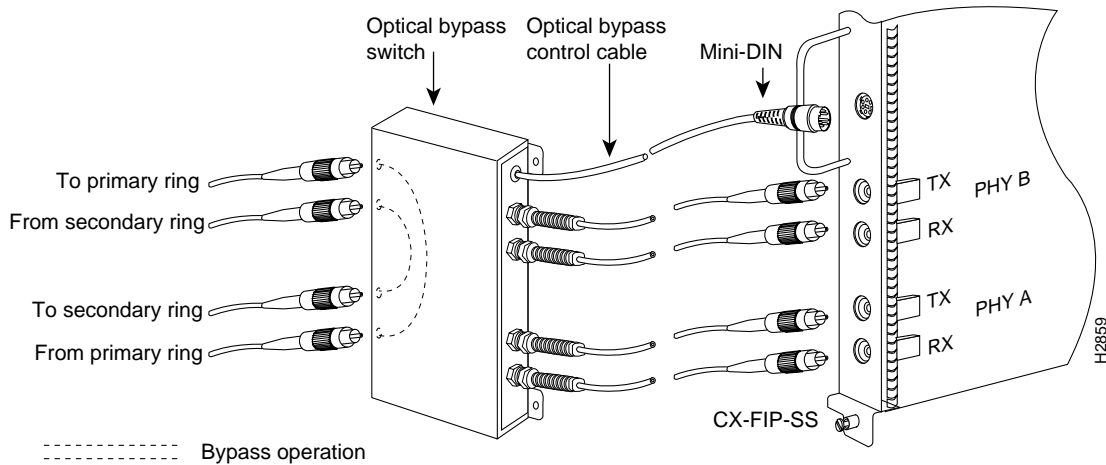
Serial Connections

All FSIP ports support any available interface type and mode. The serial adapter cable determines the electrical interface type and mode of the port to which it is connected. EIA/TIA-232, EIA/TIA-449, V.35, and X.21 interfaces are available in DTE mode with a plug at the network end and in DCE mode with a receptacle at the network end. EIA-530 is available only in DTE mode with a plug. For descriptions and illustrations of each connector type, refer to the section "Serial Connection Equipment" in the chapter "Preparing for Installation." For cable pinouts, refer to the appendix "Cabling Specifications."

When connecting serial devices, consider the adapter cables as an extension of the router for external connections; therefore, use DTE cables to connect the router to remote DCE devices such as modems or data service units (DSUs), and use DCE cables to connect the router to remote DTE devices such as a host, PC, or another router. (See Figure 3-17.) The optional or additional connection equipment required depends on the interface type of each port.

A pair of metric thumbscrews is included with each port adapter cable. If you plan to connect to a remote device that uses metric hardware, replace the standard 4-40 thumbscrews at the network end of the port adapter cable with the M3 metric thumbscrews.

Figure 3-17   Serial Port Adapter Cable Connections
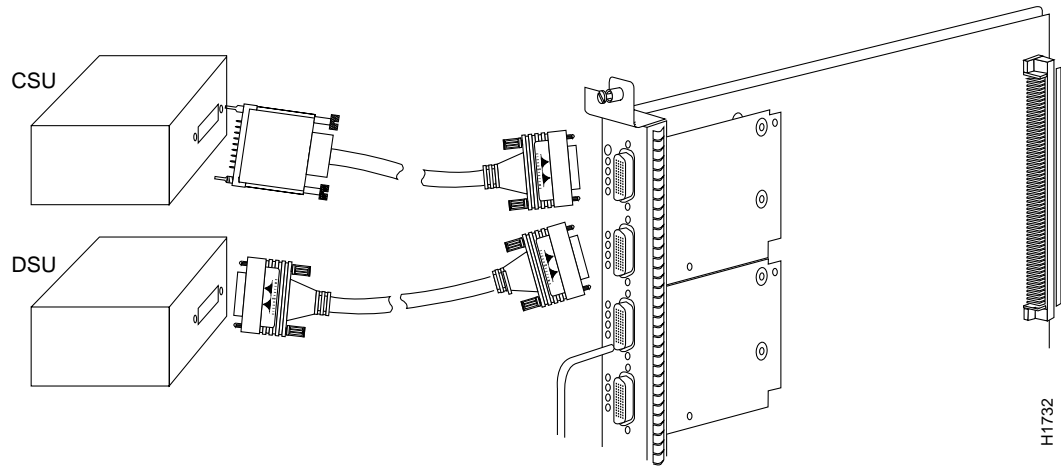
Note The serial port adapter cable determines the electrical interface type and mode of the FSIP port. When connecting a remote DTE device (which means that the FSIP port is a DCE interface), you must set the clockrate with the **clockrate** command. For an example configuration using this command, refer to "Configuring Timing (Clock) Signals" in the chapter "Maintenance." For complete command descriptions and instructions, refer to the related software documentation.

Caution The SIP and FSIP each use unique interface cables that are not interchangeable. Attempting to force a SIP cable (which uses DB-15 or DB-25 plugs) into the FSIP universal, 60-pin receptacle can damage the FSIP. (See Figure 3-18.)

Figure 3-18   SIP and FSIP Cables Are Not Interchangeable

Correct

Router port   FSIP Cable   FSIP serial interface cable
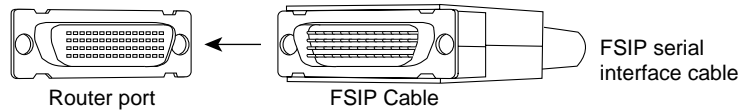
Incorrect, cable upside down

FSIP serial interface cable

Incorrect, wrong cable

Router port   SIP cable   SIP serial interface cable
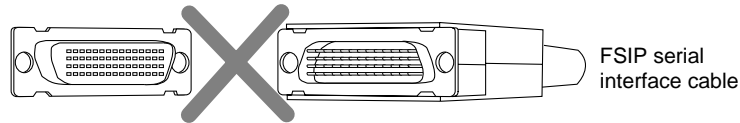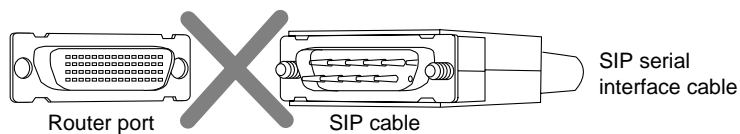
HSSI Connections

The HIP HSSI port functions as a DTE when it is connected to a DSU for a standard HSSI connection, and it can also be connected to a collocated router with a null modem cable. To connect the router to a HSSI network, use a HSSI interface cable between the HIP port and the DSU. Both ends of the HSSI interface cable are the same, so you can connect either end to the HIP or DSU. (See Figure 3-19.)

Figure 3-19   HSSI Network Connection
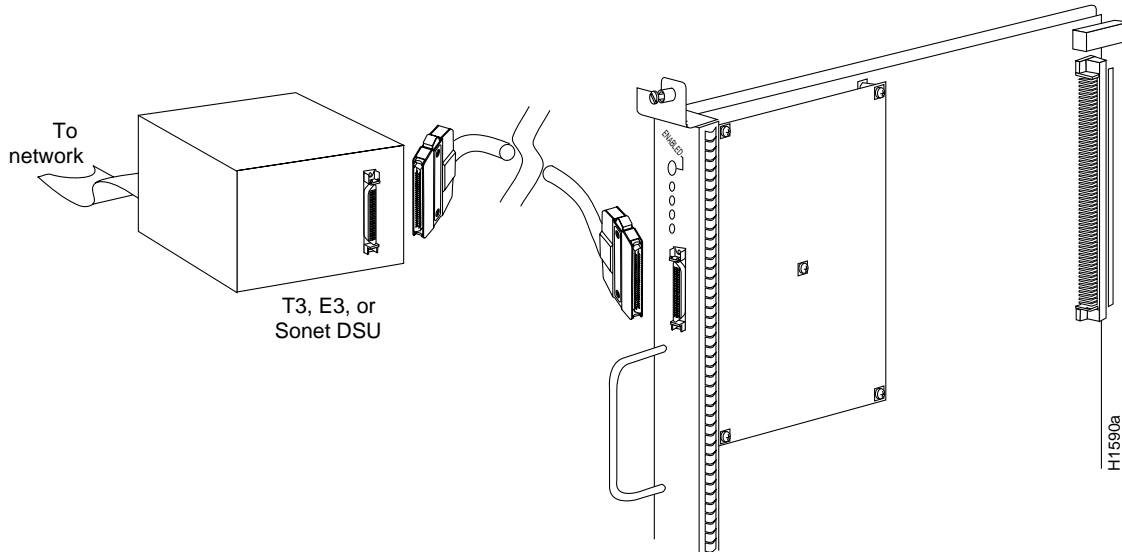
To connect two routers back to back in order to verify the operation of the HSSI port or to build a larger node, use a null modem cable between available HSSI ports in two separate routers. (See Figure 3-20.) The two routers must be in the same location, and can be two Cisco 7000s, two AGS+ routers, or one of each. When you configure the ports, you must enable the internal transmit clock on in the HSSI interface in *both* routers with the command **hssi internal-clock**. To negate the command when you disconnect the cable, use the command **no hssi internal-clock**. For complete command descriptions and instructions, refer to the related software documentation.

Figure 3-20   HSSI Modem Connection
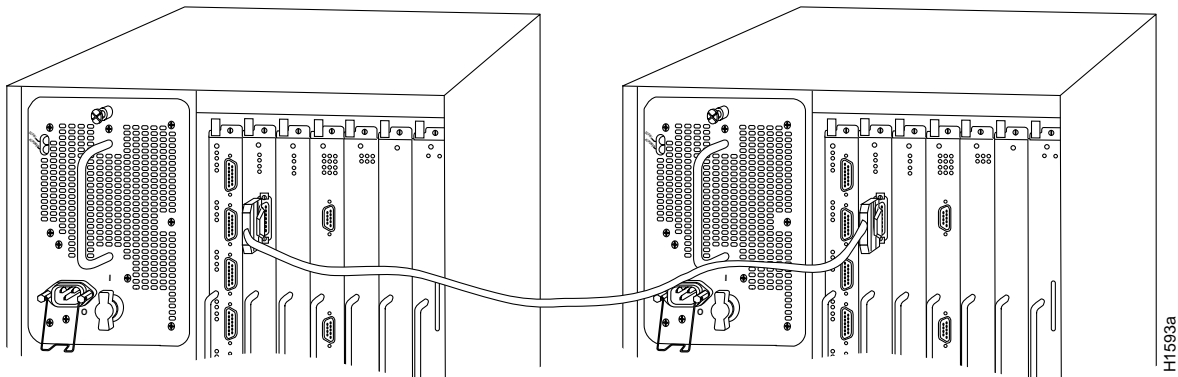
MultiChannel Connections

Two standard T1 serial cables are available from Cisco Systems and other vendors for use with the MIP: null-modem and straight-through. These interface cables are used to connect your router to external CSUs. The cables have male 15-pin DB connectors at each end to connect the MIP with the external CSU.

Connect the T1 cable as shown in Figure 3-21.

Figure 3-21   MIP Connections
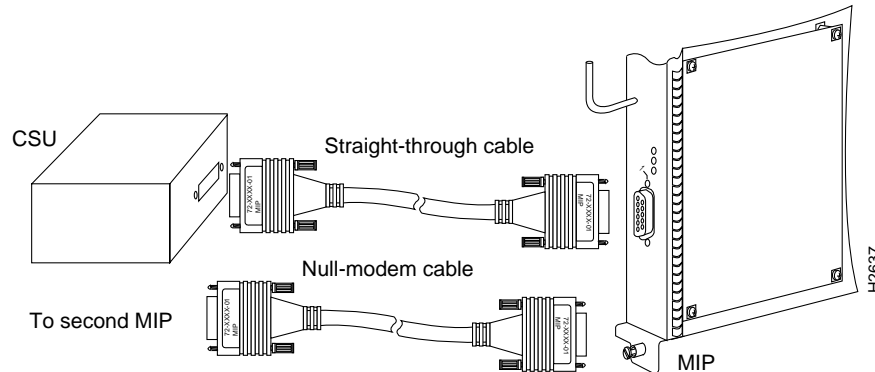
Connecting the Console Terminal

The system console port on the RP (or RSP7000) is a DCE DB-25 receptacle for connecting a data terminal, which you will need to configure and communicate with your system. The port is located on the RP (or RSP7000) below the auxiliary port and is labeled *Console*. (See Figure 3-22.)

Note   Both the console and auxiliary ports are asynchronous serial ports; any devices connected to these ports must be capable of asynchronous transmission. (Asynchronous is the most common type of serial device; for example, most modems are asynchronous devices.)

Before connecting the console port, check your terminal's documentation to determine the baud rate of the terminal you will be using. The baud rate of the terminal must match the default baud rate (9600 baud). Set up the terminal as follows:

- 9600 baud
- 8 data bits
- No parity
- 2 stop bits

Use the console cable provided to connect the terminal to the console port on the RP (or RSP7000), then follow the steps in the section "Starting the Router" later in this chapter.

Figure 3-22   Console and Auxiliary Port Connections
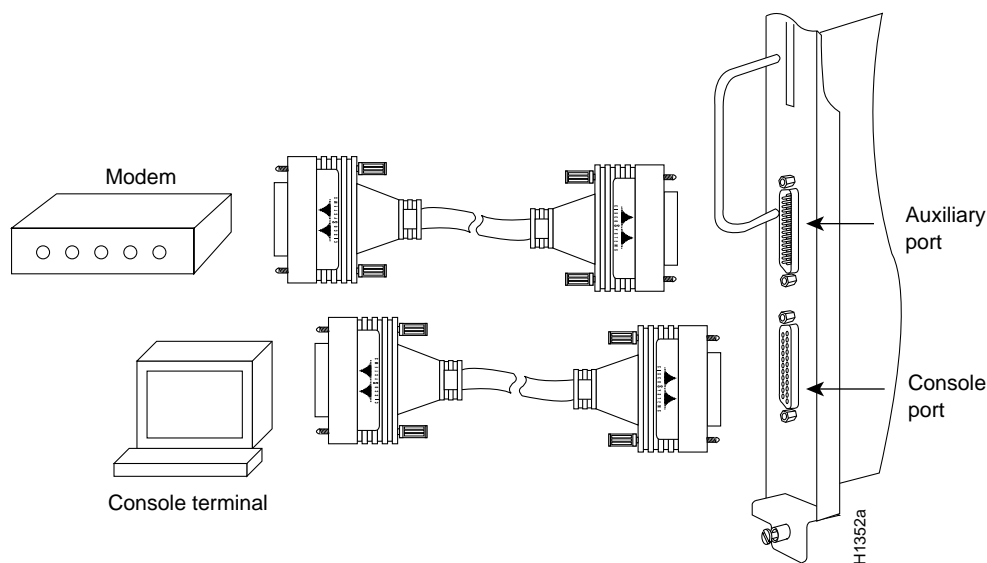
Connecting Auxiliary Port Equipment

The auxiliary port is a DB-25 plug DTE port for connecting a modem or other DCE device (such as a CSU/DSU or other router) to the router. The port is located on the RP (or RSP7000) above the console port and is labeled *Auxiliary*. An example of a modem connection is shown in Figure 3-22.

Note   Both the console and auxiliary ports are asynchronous serial ports; any devices connected to these ports must be capable of asynchronous transmission. (Asynchronous is the most common type of serial device; for example, most modems are asynchronous devices.)

Starting the Router

When all interfaces are connected, perform a final check of all connections, then power up the system as follows:

Step 1   Check the following components to make sure they are secure:

- Each interface processor is inserted all the way into its slot, and all of the captive installation screws are tightened.

- All interface cable connections are secured.

- The Flash memory card, if present, is inserted all the way into its slot on the RP (or RSP7000).

- Each power supply is inserted all the way into its bay, and the captive installation screw is tightened.

- All power-supply cables are connected to the power supply and secured with the cable retention clip (AC-input power supply) or two nylon cable ties (DC-input power supply).

Step 2 Check the external power connections; the power-supply switches should still be OFF.

- At the power source end of the power cable, make sure the connector is securely installed in a grounded outlet and that the source power is within the range labeled on the back of the router.

- When two supplies are present, make sure the second cord is connected to a separate line from the first if possible.

Step 3 Check the console terminal and make sure it is ON.

Step 4 When you have checked all of the connection points in Steps 1 through 3, turn the lower power supply on by turning the power supply switch clockwise one-quarter turn. The AC power LED on the power supply and the lower power LED on the front of the chassis will light.

Note If the power supply switch resists, the power supply is probably not fully inserted into the bay. Turn the power switch fully counterclockwise (to O), pull the power supply out of the bay about 2 inches, then push the power supply firmly back into the slot. Do not slam the supply into the slot; doing so can damage the connectors on the supply and the backplane. Tighten the captive installation screw before proceeding.

Step 5 After the lower power supply is on, turn on the upper power supply, if one is present, for redundant power. The AC power LED on the power supply and the upper power LED on the front of the chassis will light.

Step 6 Listen for the system blower. It generates about 60 dBa, so you should immediately hear it start operating.

Step 7 While the system initializes, the yellow boot error LED on the RP lights for about 5 seconds or less, then goes out when the boot is complete. If this LED stays on longer than 10 seconds, or if it lights after system initialization, a boot error has occurred. Refer to the chapter "Troubleshooting the Installation" for troubleshooting procedures.

Step 8 During the boot process, the LEDs on most of the interfaces light in irregular sequence. Some may light and remain on, go out, and light again for a short time. Some will stay on during the entire boot process if an interface is already configured and brought up (such as the EIP receive LED, which lights steadily as it detects traffic on the line). Wait until the system boot is complete before attempting to verify the interface processor LED indications.

Step 9 When the system boot is complete (a few seconds), the RP begins to initialize the interface processors. During this initialization, the LEDs on each interface processor behave differently (most flash on and off). The enabled LED on each interface processor lights when initialization has been completed, and the console screen displays a script and system banner similar to the following:

```
GS Software (GS7), Version 10.3(1)
Copyright (c) 1986-1995 by Cisco Systems, Inc.
Compiled Wed 15-Mar-95 11:06
```

Your installation is complete. Proceed to the appropriate software publications to configure your interfaces. If the system does not complete each of these steps, proceed to the chapter "Troubleshooting the Installation" for troubleshooting procedures.

Many of the interface processor LEDs will not light until you have configured the interfaces. In order to verify correct operation of each interface, complete the first-time startup procedures and configuration, then refer to the LED descriptions in the appendix "Reading LED Indicators" to check the status of the interfaces.

Using the Flash Memory Card

This section describes installation, removal, and typical operations of the 8- or 16-MB, Intel Series 2+ Flash memory card, which installs in the PCMCIA slot on the RP (or RSP7000) faceplate.

The Flash memory card is used to store and boot Cisco Internetwork Operating System (Cisco IOS) software images and interface processor microcode images, and can be used as a server to store software and microcode images for other systems.

The spare Flash memory card is shipped blank; you *must* format it before using it. (Formatting instructions are included in this document.) The Flash memory card shipped with a spare RP or shipped with a system is already formatted.

Note that the following sections are in a chronological order typical of many Flash memory card installations: inserting the card, formatting the card, copying an image to the card, and making that image bootable.

Note   You must reformat the RP's Flash card before you can use it with the RSP7000. Flash memory cards formatted on the RP-based systems (7000 series routers) are formatted differently from Flash memory cards formatted on RSP-based systems (7500 series routers and Cisco 7000 series routers with an RSP7000). The reciprocal of this is also true for Flash memory cards formatted on RSP-based systems; the cards cannot be used in RP-based systems.

Note that the following sections are in a chronological order typical of many Flash memory card installations: inserting the card, formatting the card, copying an image to the card, and making that image bootable.

Note   To boot from the Flash memory card, a Cisco 7000 or Cisco 7010 router must be using Cisco IOS Release 11.0 or later boot ROMs.

Installing and Removing the Flash Memory Card

The Flash memory card can be inserted and removed with the power on. Following is the procedure for installing and removing a Flash memory card:

Step 1   Verify that the metal sleeve is correctly installed on the Flash memory card. (The sleeve must be installed with the connector end exposed, as shown in Figure 3-23.)

Note For earlier RP-based Flash memory cards, a metal sleeve was provided with all Flash memory cards shipped as spares or with new systems. Should a replacement metal sleeve be required, consult Customer Engineering through the Technical Assistance Center (TAC).

Figure 3-23 **Installing the Metal Sleeve**
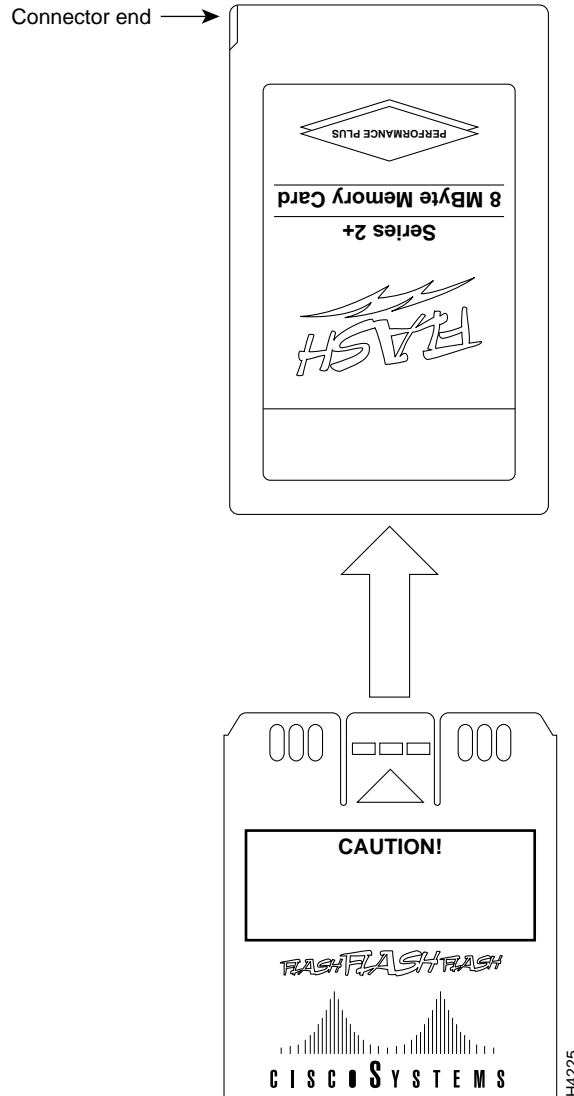
Step 2 Hold the Flash memory card with the connector end of the card toward the PCMCIA slot. The product label should face to the right, as shown in a of Figure 3-24.

Step 3 Insert the card into the slot until the card completely seats in the connector at the back of the slot. Note that the card does not insert all the way inside the RP (or RSP7000); a portion of the card and sleeve remains outside of the slot. *Do not attempt to force the card past this point.* The Flash memory card is keyed and cannot be seated the wrong way.

Step 4 To remove the card, grasp the card near the slot and squeeze the sleeve together to release it from the slot. Then pull the card free from the connector at the back of the slot. (See c in Figure 3-24.)

Step 5 Place the removed Flash memory card on an antistatic surface or in a static shielding bag.

Figure 3-24   Installing and Removing a Flash Memory Card
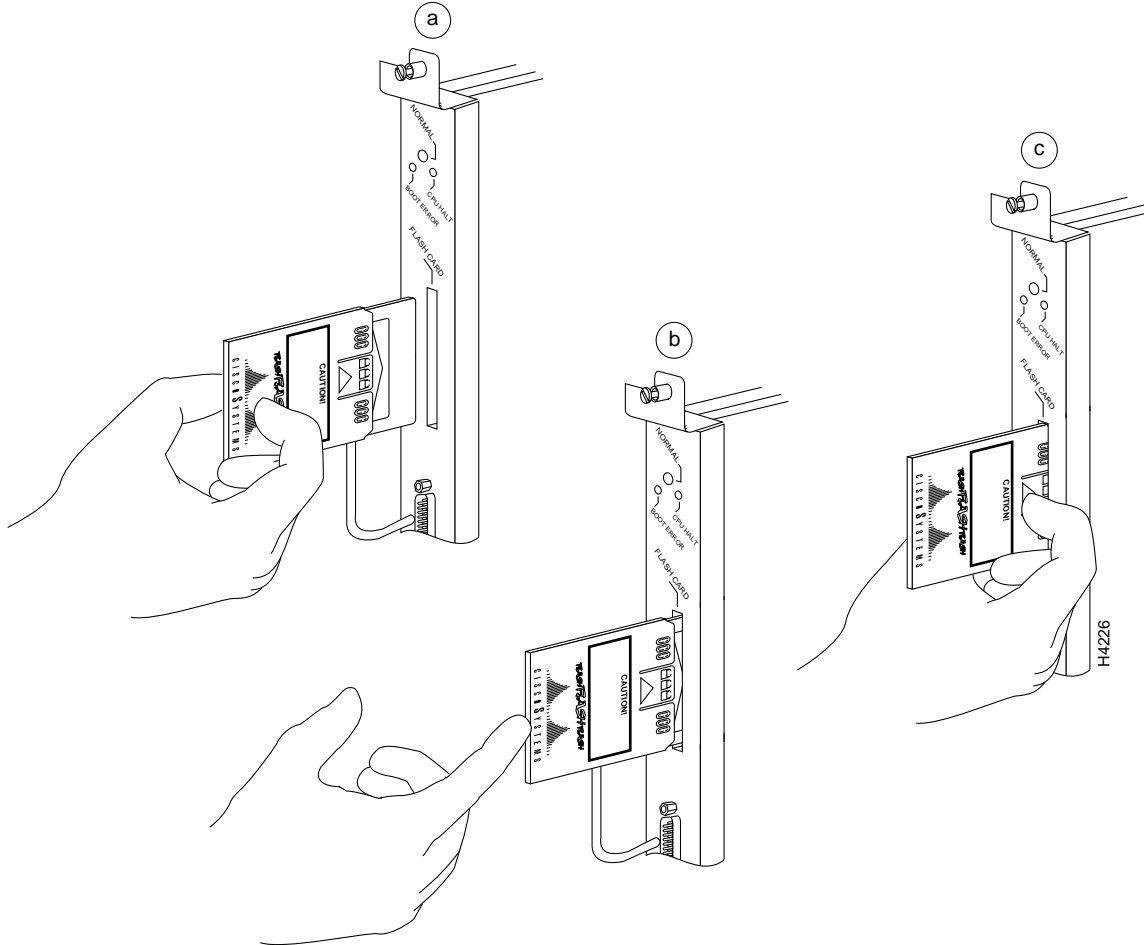
Formatting the Flash Memory Card

The Flash memory card shipped with a spare RP (or RSP7000) or shipped with a system is already formatted. However, a spare Flash memory card is shipped blank and must be reformatted before use. Also, if you plan to boot from a Flash memory card that was formatted on an RSP-based system (Cisco 7500 series), you must first reformat the card on your system.

Note   The following procedure assumes you have already booted your router.

Caution   The formatting procedure erases all information on the Flash memory card. To prevent the loss of important data that might be stored on a Flash memory card, proceed carefully. If you want to save the data on a Flash memory card, copy the data to a server before you format the card.

Use the following procedure to format a new Flash memory card:

Step 1   Using the procedures in the section "Installing and Removing the Flash Memory Card," insert the Flash memory card into the PCMCIA slot.

Step 2 To format the Flash memory card, use the **format slot0** command as follows. (Use only Intel Series 2+ Flash memory cards.)

```
Router# format slot0:
All sectors will be erased, proceed? [confirm]
Enter volume id (up to 30 characters): MyNewCard
Formatting sector 1
Format device slot0 completed
Router#
```

Note For this example, an 8-MB Flash memory card was used, and at the line "Formatting sector," the system counted the card's sectors backwards from 64 to 1 as it formatted them. For 16-MB Flash memory cards, the system counts backwards from 128 to 1.

The new Flash memory card is now formatted and ready to use.

Note For complete command descriptions and configuration information, refer to the *Router Products Command Reference* publication and the *Router Products Configuration Guide*.

Copying an Image into the Flash Memory Card

With the Flash memory card formatted, you can now copy an image into it. To copy an image, use the following procedure, which assumes the following:

- The system is running Cisco IOS Release 11.0 or later.

- The bootable image you wish to copy to the Flash memory card exists on a TFTP server to which you have access (meaning you know its name and have connectivity to it), and at least one interface is available over which you can access this server.

Note To assure access to a TFTP sever, you will need to configure at least one interface using the **setup** command facility. For instructions on using this procedure, refer to the *Router Products Configuration Guide* or *Router Products Getting Started Guide* publications.

- You know the filename of the image you wish to copy into the Flash memory card

Following is the procedure for copying a bootable file (called *new.image*) into the Flash memory card:

Step 1 If the Flash memory card is unformatted or has been formatted on another system, format it using the procedure in the section "Formatting the Flash Memory Card."

Note If you have already formatted a Flash memory card, you can use it instead; however, you cannot boot from a Flash memory card formatted on another type of system. You must reformat it to use it as a boot source.

Step 2 To enable the router, copy the image *new.image* to the Flash memory card using the following series of commands:

```
Router> en
Password:
Router# copy tftp:new.image slot0:new.image
20575008 bytes available on device slot0, proceed? [confirm]
Address or name of remote host [1.1.1.1]?
Loading new.image from 1.1.1.1 (via Ethernet1/0): !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
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!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 7799951/15599616 bytes]
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Router#
```

Note In the preceding example, the exclamation points (!!!) appear as the file is downloaded, and the "C" characters signify calculation of the checksum, which is a verification that the file has been correctly downloaded to the Flash memory card.

Making the Flash Memory Card Image Bootable

Use the following series of commands to make the image (the file named *new.image*) bootable. Note that, since the configuration register must be set to 0x2102, the **config-register** command is part of the sequence.

```
Router# config terminal
Router(config)# no boot system
Router(config)# boot system flash slot0:new.image
Router(config)# config-register 0x2102
Router(config)# ^z
Router# copy running-config startup-config
Router# reload
```

When the system reloads it will boot the image *new.image* from the Flash memory card in Slot 0.

Note   For complete details about the **boot system flash** command, refer to the next section, "Enabling Booting from the Flash Memory Card."

Enabling Booting from the Flash Memory Card

To enable booting from Flash memory, set configuration register bits 3, 2, 1, and 0 to a value between 2 and 15 in conjunction with the **boot system flash** *[filename]* configuration command.

Following are definitions of the various Flash memory-related **boot** commands:

boot system flash—Boots the first file in onboard Flash memory

boot system flash *herfile*—Boots the file named "herfile" on onboard Flash memory

boot system flash slot0:—Boots the first file on Flash memory card in the PCMCIA slot

boot system flash flash:*hisfile* —Boots the file named "hisfile" on onboard Flash memory

boot system flash slot0:*myfile* —Boots the file named "myfile" on the Flash memory card in the PCMCIA slot

To enter configuration mode and specify a Flash memory filename in the PCMCIA slot from which to boot, enter the **configure terminal** command at the enable prompt, as follows:

```
Router# configure terminal
Enter configuration commands, one per line. End with CTRL-Z.
Router(config)# boot system flash slot0:myfile
```

To disable Break and enable the **boot system flash slot0:** command, enter the **config-register** command with the value shown in the following example:

```
Router(config)# config-reg 0x2102

To exit configuration mode, enter Cntl-Z as follows:
Router(config)# ^Z
Router#
```

To save the new configuration to memory, use the **copy running-config startup-config** command as follows:

```
Router# copy running-config startup-config
```

When you enter **boot** commands, pay attention to the use of the Spacebar, which influences the way the router interprets the command. For example, notice the difference in the following commands:

```
Router(config)# boot system flash slot0:myfile (correct command)
Router(config)# boot system flash slot0: myfile (incorrect command)
```

In the first case, the router boots the file specified (*myfile*). In the second case, the router finds the *filename* field blank, and boots the first file on the Flash memory card.

Copying to the Flash Memory Card

Copying to the Flash memory card might be required whenever a new image or maintenance release becomes available.

Use the command **copy tftp:***filename* [**bootflash** | **slot0**]**:***filename* for the copy procedure, where **tftp:***filename* is the source of the file and [**bootflash** | **slot0**]**:***filename* is the destination in onboard Flash memory or on either of the Flash memory cards.

An example of the **copy tftp:***filename* command follows:

```
Router# copy tftp:myfile1 slot0:myfile1
20575008 bytes available on device slot0, proceed? [confirm]
Address or name of remote host [1.1.1.1]?
Loading new.image from 1.1.1.1 (via Ethernet1/0): !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!![OK - 7799951/15599616 bytes]
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Router#
```

> **Note**   In the preceding example, the exclamation points (!!!) appear as the file is downloaded and the "C" characters signify calculation of the checksum, which is a verification that the file has been correctly downloaded to the Flash memory card.

Recovering from Locked Blocks

A locked block of Flash memory occurs when power is lost or a Flash memory card is unplugged during a write or erase operation. When a block of Flash memory is locked, it cannot be written to or erased, and the operation will consistently fail at a particular block location. The only way to recover from locked blocks is by reformatting the Flash memory card with the **format** command.

> **Caution**   Formatting a Flash memory card to recover from locked blocks will cause existing data to be lost.

For complete command descriptions and configuration information, refer to the *Router Products Command Reference* publication and the *Router Products Configuration Guide.*

Flash Memory Card Compatibility

In order to use the Flash memory card with your RP, the card must have been formatted on an RP board. In order to use a Flash memory card with an RSP7000, the card must have been formatted on an RP board. Flash memory cards formatted on an RP-based systems cannot be used on RSP-based systems; the reciprocal is also true for cards formatted on RSSP-based systems. Therefore, if you want to use a card formatted on an RSP (RSP7000) board (Cisco 7500 series and Cisco 7000 series with RSP7000 installed), you must first reformat it.

Any Intel Series 2+ Flash memory card can be used with the RP (or RSP7000). However, with older version of Flash memory cards on the RP, you must install the card's metal sleeve, and the system must contain Cisco IOS Release 11.0 boot ROMs (SWR-G7-11.0.0=) or later. (The RP requires these boot ROMs in order to boot from the Flash memory card.) In addition, the RP can only read up to 16 MB. The RSP7000 does not have these limitations.