Chapter2
Preparing for Installation

Before the hardware installation of the ASM-CS can take place, certain prerequisites must be considered and implemented. This chapter includes information on the following pre-installation requirements:

- Safety recommendations
  - Safety with electricity
  - Preventing electrostatic discharge (ESD) damage
- General site requirements
  - Site environment
  - Preventive site configuration
- Installation checklist and site log
- Tools and equipment required
- Getting ready to make network connections
  - RS-232 specifications and distance and interference limitations
  - Terminal wiring
- Console and auxiliary port considerations
- Terminal wiring connections
- Network connection considerations
- Unpacking the system

Safety Recommendations

To ensure general safety, follow these guidelines:

- Keep the chassis area clear and dust-free during and after installation.
- Keep tools and chassis components away from walk areas.
- Do not wear loose clothing, jewelry (including rings and chains), or other items that could get caught in the chassis. Fasten your tie or scarf and sleeves.

Warning: Metal objects will heat up when connected to power and ground. This heated metal can cause serious burns or can weld to a terminal.

Safety with Electricity

As stated previously, the successful installation of the ASM-CS should not require removing or replacing any printed circuit cards; however, if this becomes necessary, the following warning will appear at the beginning of any procedures requiring access to the ASM-CS interior.

Warning: Before accessing the chassis interior and removing any cards, turn off power to the chassis and unplug the power cord. Use extreme caution around the chassis because potentially harmful voltages are present.

Failure to observe this warning and act accordingly may increase the potential for shock hazard or electrocution. Before beginning a procedure that requires access to the ASM-CS interior, we strongly advise that you read through the entire procedure. If after reading the procedure, you have any doubts about your ability to perform any part, contact your service representative for information on how to proceed.

Electrical Safety Guidelines

Following are basic guidelines for working near electricity:

- Before beginning any procedures requiring access to the chassis interior, locate the emergency power-off switch for the room in which you are working.
- Disconnect all power before installing or removing a chassis
- Do not work alone when potentially hazardous conditions exist.
- Never assume that power has been disconnected from a circuit; always check.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.
- Wear safety glasses when working under conditions that might be hazardous to your eyes.
- Carefully examine your work area for such possible hazards as moist floors, ungrounded power extension cables, and missing safety grounds.

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) damage, which occurs when electronic printed circuit cards are improperly handled, can result in complete or intermittent failures. ESD can impair electronic circuitry and equipment. Typically, the successful installation of the ASM-CS should not require handling any printed circuit cards; however, always follow ESD prevention procedures if removing and replacing cards becomes necessary.

Caution: To prevent damage to ESD sensitive components, attach ESD protection before opening the chassis.

Following are the guidelines for preventing ESD damage:

Step 1: Slip on an ESD wrist strap, ensuring that it makes good skin contact.

Step 2: Connect the strap to an unpainted chassis frame surface or another proper grounding point or surface to safely channel unwanted ESD voltages to ground (see Figure 2-1).

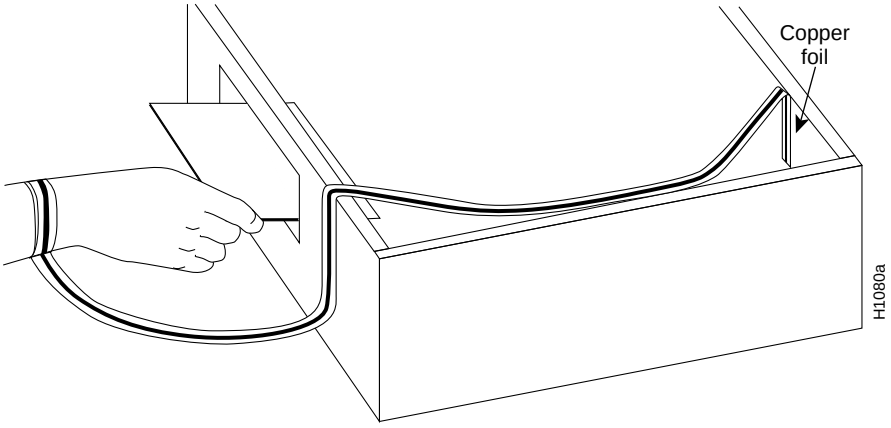

Figure 2-1 Placement of ESD Wrist Strap

Step 3: Use the ejectors to remove the card. Handle the card by its sides. Place the card on an antistatic surface or in a static shielding bag. To prevent further damage to the card by ESD voltages, defective cards must remain in the static shielding bag when they are returned for repair or replacement.

Step 4: Handling the new card by its edges only, insert it into the chassis. Avoid contact between the card and clothing. The wrist strap only protects the card from ESD voltages on the body; ESD voltages on clothing can still damage the card.

Note: For safety, periodically check the resistance value of the antistatic strap. The measurement should be within a range of 1 and 10 Mohms.

General Site Requirements

To preclude unintended shutdowns, the ASM-CS chassis must be properly installed and maintained.

The ASM-CS is designed to operate in a level, dry, clean, well-ventilated, and air-conditioned environment. The ASM-CS has an internal blower that pulls air through the card cage from left to right (with the chassis front facing you). If either the intake or exhaust vents are blocked in any way, this air-cooling function will be impaired, causing the ASM-CS to overheat. Excessive heat can damage the power supply and components.

If the ambient temperature of the air being drawn into the chassis is higher than desirable, the air temperature inside the chassis may also be too high. This condition can occur when the wiring closet or rack in which the chassis is mounted is not ventilated properly, when the exhaust of one chassis (or other electronic device) is placed so that it enters the air intake vent of the chassis, or when the chassis is the top unit in an unventilated rack. Precautions should be taken to avoid these conditions.

Note: The ASM-CS can be installed in wiring closets and rack systems as long as the above prerequisites are observed before installation and are maintained throughout chassis operation.

The following sections address the site environment requirements for the ASM-CS chassis.

Site Environment

The ASM-CS chassis can be used as a tabletop or rack-mounted system in a data processing or lab environment. Because the large cooling blower in the ASM-CS chassis is somewhat noisy (approximately 60 decibels), the chassis is intended for unattended or computer room use.

General environmental requirements for the ASM-CS chassis follow:

- Operating temperature range: 32 to 104 F (0 to 40 C)
- Operating humidity range: 5 to 95%, noncondensing
- Air flow: Depending upon the temperature and cooling capability of your site, the chassis will require at least a minimum amount of clearance on all sides to prevent the chassis from taking in the exhaust (heated) air of other equipment.

Table 2-1 provides the environmental design specifications for the ASM-CS.

Table 2-1 Environmental Specifications

	Design Specifications	
Description	**Minimum**	**Maximum**
Ambient temperature, operating	32 F (0 C)	104 F (40 C)
Ambient temperature, nonoperating and storage	-6 F (-40 C)	167 F (75 C)
Ambient humidity, operating	5% RH, noncondensing	95% RH, noncondensing
Ambient humidity, nonoperating and storage	5% RH, noncondensing	95% RH, noncondensing
Altitude, operating	-500 ft (-150 m)	10,000 ft (3050 m)
Altitude, nonoperating	-1000 ft (-305 m)	30,000 ft (9150 m)
Vibration, operating	5–500 Hz, 0.5 G (0.1 oct./min.)	
Vibration, nonoperating	5–100 Hz, 1 G (0.1 oct./min.) 100–500 Hz, 1.5 G (0.2 oct./min.) 500–1000 Hz, 1.5 G (0.2 oct./min.)	

Preventive Site Configuration

The proper location of the ASM-CS and the layout of your equipment rack or wiring closet are essential for successful system operation. Equipment placed too close together and inadequately ventilated can cause system malfunctions and shutdowns. In addition, chassis panels made inaccessible by poor equipment placement can make system maintenance difficult.

Read and follow the following precautions when planning your site layout and equipment locations; this will help avoid future equipment failures and reduce the likelihood of environmentally-caused shutdowns.

General Precautions

- Remember that electrical equipment generates heat, and ambient room temperature alone may not be adequate to cool equipment to acceptable operating temperatures.
- Never place chassis side by side because the heated exhaust air from one chassis will be drawn into the intake vent of the next.
- Follow electrostatic discharge (ESD) damage prevention procedures to avoid damage to equipment. Damage from static discharge can cause immediate or intermittent equipment failure.
- Ensure that the chassis cover and card access panels are in place and secure. The ASM-CS is designed to direct cooling air to flow within; an open access panel will redirect the air flow.

Equipment Racks

- Only install the chassis in an enclosed rack that has adequate ventilation or an exhaust fan; use an open rack where possible.
- A ventilation system that is too powerful in a closed rack may also prevent cooling by creating negative pressure around the chassis and redirecting the air away from the chassis intake vent. If necessary, operate the chassis with the rack open.
- The correct use of baffles inside the enclosed rack can assist in cooling the chassis.
- Ensure that the rack is not overly congested. In an enclosed rack, separate the units with 12–15 inches of vertical clearance. The horizontal clearance is standard for most enclosed racks; avoid obstructing this space.
- Equipment near the bottom of the rack may generate excessive heat that is drawn upward and into the intake ports of equipment above, leading to failures in the chassis at or near the top of the rack. If the enclosed rack you are using does not have a ventilation fan, one should be installed.

Installation Checklist

Use the installation checklist following to assist you with your installation, by allowing you to keep track of what was done, by whom, and when.

Make a copy of this checklist and mark your entries as each procedure is completed. Include a copy of the checklist for each system in your site log along with your records for the
ASM-CS.

Installation Checklist

for

_____

Task	Verified by	Date
Installation checklist copied		
Background information placed in site log		
Required tools available		
Additional equipment available		
Environmental specifications verified		
Power voltages verified		
Installation site pre-power check completed		
Date ASM-CS received		
ASM-CS documentation received		
Chassis components verified		
Software version verified		
Initial electrical connections established		
ASCII terminal attached to console port		
Signal distance limits verified		
Startup sequence steps completed		
Initial system operation verified		

ASM-CS chassis name: _____

ASM-CS chassis serial number: _____

Site Log

A site log provides a historical record of all actions relevant to the ASM-CS system. Keep the site log in a common place near the chassis where anyone who performs tasks has access to it. Site log entries might include the following:

- Installation progress—Make a copy of the installation checklist and insert it into the site log. Make entries on the installation checklist as each procedure is completed.
- Upgrades and removal/replacement procedures—Use the site log as a record of system maintenance and/or expansion history. Each time any procedure is performed on the system, update the site log to reflect the following:
  - Installation of additional cards
  - Removal or replacement of cards
  - Configuration changes
  - Maintenance schedules and requirements
  - Corrective maintenance procedures performed
  - Intermittent problems
  - Other related comments
  - Store configuration notes from related procedures

Tools and Equipment Required

Following are the tools and equipment required to attach the rack-mount kit and install the chassis:

- ASM-CS rack-mounting hardware (rack-mount flanges and Phillips screws)
- Two Phillips screwdrivers: No. 1 and No. 2
- Three flat-blade screwdrivers: small, medium, and large
- One medium-sized adjustable wrench
- Antistatic mat or antistatic foam if available
- ESD wrist strap or disposable ESD kit included with ASM-CS

Network Connection Preparation

When setting up your system, you must consider a number of factors related to the cabling required for your connections. When using RS-232 connections, be aware of the distance limitations for signaling; electromagnetic interference may also be a factor. For telco connections, there are a variety of modular connectors from which to choose. Each of these cabling considerations is described in the following sections.

RS-232 Connections

A variety of similar signaling schemes use the name *RS-232*. The following scheme, which is used in all modular and fixed-configuration products, is sufficient to control most modems and hardware flow control schemes. This scheme provides six signals per line, two of them outputs:

- Ground
- Transmit Data (output)
- Receive Data (input)
- Ring Indicate (input)
- Data Terminal Ready (output)
- Clear to Send (input)

The line drivers are supplied with bipolar 12-volt power; an open output signal will be near +12 or -12 volts. The Receive Data input has a 10-kilo ohm resistor to the -12-volt supply that helps prevent open lines from ringing and causing spurious input to the communication server. An open Receive Data line will be near -7 volts, but can vary from -6 to -10 volts depending on temperature and component variation.

Distance Limitations

As with all signaling systems, RS-232 signals can travel a limited distance at any given baud rate; generally, the slower the data rate, the greater the distance. Table 2-2 shows the standard relationship between bit rate and distance.

Table 2-2 IEEE Standard RS-232C Speed Versus Distance

Baud Rate	Distance (Feet)	Distance (Meters)
2400	200	60
4800	100	30
9600	50	15
19200	25	7.6
38400	12	3.7
56000	8.6	2.6

Interference Considerations

When wires are run for any significant distance in an electromagnetic field, interference can occur between the field and the signals on the wires. This fact has two implications for the construction of terminal plant wiring:

- Bad practice can result in radio interference emanating from the plant wiring.
- Strong electromagnetic interference, especially as caused by lightning or radio transmitters, can destroy the RS-232 drivers and receivers in the routers and communication servers.

Note: To predict and remedy strong electromagnetic interference, you may need to consult experts in radio frequency interference (RFI).

If you use unsheilded twisted-pair (UTP) cables in your plant wiring with a good distribution of grounding conductors, the plant wiring is unlikely to emit radio interference. When exceeding the distances listed in Table 2-2, use a high-quality twisted-pair cable with one ground conductor for each data signal.

If wires exceed the distances in Table 2-2, or if wires pass between buildings, give special consideration to the effect of a lightning strike in your vicinity. The electromagnetic pulse (EMP) caused by lightning or other high-energy phenomena can easily couple enough energy into unshielded conductors to destroy electronic devices. If you have had problems of this sort in the past, you may want to consult experts in electrical surge suppression and shielding.

Most data centers cannot resolve the infrequent but potentially catastrophic problems just described without pulse meters and other special equipment. These problems can cost a great deal of time to identify and resolve, so take precautions to avoid these problems by providing a properly grounded and shielded environment, with special attention to issues of electrical surge suppression.

Console and Auxiliary Port Connection Considerations

You must adjust the baud rate of your terminal to match the ASM-CS console port default baud rate of 9600, 8 data bits, no parity, and 2 stop bits. Consult your terminal's documentation for this wiring specification. The console cable you received with the ASM-CS meets these requirements. If necessary, refer to Appendix A "Cabling Specifications" for the console port and auxiliary port wiring scheme required to connect the ASM-CS to a console terminal.

Terminal Wiring Considerations

The following sections contain considerations that may be helpful when planning modular wiring systems.

Modular Connectors

Three types of small connectors used on telephone sets are also used to construct terminal plant wiring:

- Medium-sized six-position connector with four contacts
- Medium-sized six-position connector with six contacts
- Large-sized eight-position connector

Note: The medium-sized six-position connector is sometimes called an *RJ-11* connector, and the large-sized eight-position connector is sometimes called an *RJ-45* connector. Strictly speaking, the *RJ* designation applies only to jacks provided under U.S. telephone tariffs; however, the context will indicate whether connectors or jacks are required.

Generally, you can use the medium-sized connector with four contacts to connect a device that does not need modem control signals. You must use the medium-sized connector with six contacts to connect a device that needs modem control signals, or to provide optional modem control. Figure 2-2 shows a male six-position connector jack from the front, its non-cable end. When this connector is used to carry only four signals, positions 1 and 6 are not used.

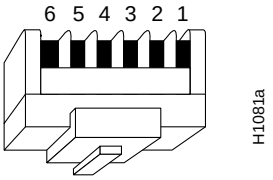

Figure 2-2 Six-Position Modular Jack—Front View

Appendix C lists the usual correspondence between inside plant (wall-box) wiring and the modular-plug pin numbers in Figure 2-2. When you first use modular equipment from a particular manufacturer, check that the wire colors match the color code in Appendix C. Occasional variations are possible. For example, a manufacturer may substitute a slate-grey wire for a white wire or may reverse the order of the wires in the wire pairs.

Modular Wiring Systems

Using a standard modular cord between two standard modular connectors reverses the sense of the wire pairs. As a result, the signal attached to pin 3 at one female jack is connected to pin 4 at the other end. Similarly, the signal attached to pin 1 at one female jack is connected to pin 6 at the other end.

Caution: These reversals have little importance for voice circuits, but may have negative effects on data circuits. To circumvent these effects, follow telephone industry practice throughout the terminal plant wiring and compensate for the pair reversal in the modular-to-DB-25 adapters at the terminal end.

Network Connection Considerations

You may need some of the following data communication equipment to complete your server installation. Your installation needs depend on many factors, including the interfaces you plan to use, as explained below.

- To install and configure the ASM-CS, you need a terminal with an RS-232 DTE connector. You can detach the terminal (and cable) after the installation and configuration procedures are complete.
- To use an IEEE 802.3 or Ethernet interface (thick or thin wire) at your installation, you need an 802.3 media attachment unit (MAU) and an attachment unit interface (AUI) cable, or an Ethernet transceiver and transceiver cable. These devices can be purchased as additional equipment from Customer Service (contact your customer service representative). This equipment is not required for a 10BaseT connection with the 10BaseT applique.
- To use a Token Ring interface, you need a MAU or modular connection.
- To use a low-speed synchronous serial interface at your installation, you need a synchronous modem or a channel service unit/digital service unit (CSU/DSU) to connect to the network. RS-232, RS-449, or V.35 connections or attachments are typically available as the electrical interfaces on the CSU/DSU.
- To attach a server to a T1 network, you need a T1 CSU/DSU, that converts the HDLC synchronous serial data stream into a T1 data stream with the correct framing and ones density (the term *ones density* refers to the fact that some telephone systems require a minimum number of 1 bits per time unit in a data stream). Several T1 CSU/DSU devices are on the market. A T1 CSU/DSU is available as additional equipment. Note also that most T1 CSU/DSUs provide either a V.35 or RS-449 electrical interface to the system.

Unpacking the System

Before unpacking the ASM-CS, determine where it will be installed. If its final installation site will not be ready for some time, keep the ASM-CS in the box in which it was shipped to prevent accidental damage. After you have chosen the site, proceed with the unpacking procedure.

Following is the procedure for unpacking the ASM-CS:

Step 1: Make certain the box containing the ASM-CS is upright.

Step 2: Make certain the areas where the ASM-CS will be unpacked and placed (even temporarily) are clear of debris.

Step 3: Remove any loose cables or material that could impede the removal of the ASM-CS and set these aside. *Do not remove the packing material*.

Step 4: Instead of trying to lift the heavy chassis out of the box, you can lift the much lighter box from around the chassis by proceeding as follows: carefully turn the box over so that the opened top of the box is now the bottom. Ensure that the four box flaps are away from the box opening.

Step 5: Carefully lift the box from around the chassis and packing material. It may be necessary to cut open the bottom of the box (the bottom can be taped up later) to hold down the chassis and packing material through the box.

Step 6: Carefully remove the chassis from the packing material enclosing it.

Step 7: Once the chassis is removed, place it out of the way and set the packing material and box aside.

Chassis Components

Table 2-3 lists all of the components that are included in the ASM-CS.

Table 2-3 ASM-CS Chassis Component Descriptions

Component	Description
Chassis buses	9-slot multibus backplane.
Processor cards	CSC/3 (or the optional CSC/4) processor.
Interface cards	Up to seven asynchronous interface cards (CSC-16) and one Ethernet, synchronous serial, or Token Ring interface.
System memory	CSC-MC NVRAM card (or the optional CSC-MC+ Flash memory NVRAM card).
External connectors	Mounting plates with connectors for attachment to various types of networks.
Accessories	Rack-mount kit that includes screws and two flanges for mounting the chassis in a standard 19-inch rack.
Power supplies	MAS-11 110 VAC or MAS-11B 240 VAC power supply In the U.K., the MAS-26 240 VAC power supply is required.
Documentation	*Communication Server Configuration and Reference*, *Getting Started Guide*, *ASM-CS Hardware Installation and Maintenance Manual*, *Internetworking Technology Terms and Acronyms*, *Cisco MIB User Quick Reference*, *System Error Messages*, and *Communication Server Quick Reference* publications.