CONVEX Installation Guide (C201, C202, C210, C220)

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First Edition, Rev. 1
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CONVEX Computer Corporation
Richardson, Texas USA

CONVEX Installation Guide
(C201, C202, C210, C220)
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Revision Sheet

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(C201, C202, C210, C220)

Edition	Document No.	Date	Description
First	081-000830-200	September 1988	First release.
First, Rev. 1	081-000830-201	February 1989	Made minor corrections.

FCC NOTICE

Warning: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in strict accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

Do not connect external equipment to the utility outlets in CONVEX equipment cabinets. Unauthorized connection voids all agencies' emissions certifications.

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Preface

Purpose and Intended Audience

The *CONVEX Installation Guide* is the third of six volumes in the *CONVEX Maintenance Documentation (C201, C202, C210, C220).* The other volumes include the following:

- *CONVEX Maintenance Documentation Overview (C201, C202, C210, C220)*
- *CONVEX Theory of Operation (C201, C202, C210, C220)*
- *CONVEX General Maintenance Guide (C201, C202, C210, C220)*
- *CONVEX Troubleshooting Guide (C201, C202, C210, C220)*
- *CONVEX Removal/Replacement and IPB Guide (C201, C202, C210, C220)*

The main purpose of this document is to assist the Field Engineer (FE) in installing the customer's machine or upgrading an existing system. This guide provides background information and procedures for installing the equipment, powering up the system, and running diagnostics.Additionally, this volume may be used as a teaching text by the CONVEX Training department.

Scope

The material in this volume applies to CONVEX C201, C202, C210, and C220 supercomputers.

Outline

The content of each chapter is outlined below:

Chapter 1. Introduction—Describes the responsibilities of the customer and the FE prior to and during an installation.

Chapter 2. Safety—Lists the safety considerations for installing a new system or upgrading an existing system.

Chapter 3. Unpacking—Discusses how to inspect, inventory, and unpack the cabinets and accessories.

Chapter 4. Cabinet Installation for a New System—Contains procedures for installing the processor and the expansion cabinets as a new system at a site.

Chapter 5. Cabinet Installation for a System Upgrade—Contains procedures for upgrading a system in the field. The upgrade may be from a C1, from a C201 to C202, or from a C210 to a C220.

Chapter 6. Testing the System—Discusses how to measure and connect AC power and power up the system.

Chapter 7. Running Diagnostics—This chapter discusses running diagnostics to test the system.

Chapter 8. Installing SPU UNIX and System Software—This chapter lists the steps for installing the system software, including SPU UNIX, CONVEX UNIX, and CONVEX layered products.

Chapter 9. Returning Equipment—This chapter discusses the steps to return a processor or expansion cabinet after a system upgrade, including how to inventory and pack the equipment.

Appendix A. Power and AC Specifications—This appendix contains tables that list equipment power specifications for CONVEX computers and their peripheral devices.

Appendix B. Problem Reporting—This appendix contains information about using the *contact* facility to report problems.

Notational Conventions

The following notational conventions are used in this document:

- The symbol *M* is the abbreviation for *mega* or 1,048,576
- TBD is the abbreviation for *To Be Determined*
- **Boldface** type indicates user-entered information for a computer program. Enter these commands sequences exactly as they appear.
- *Italic* type designates filenames, program names, directory paths, and titles of publications. Also use for emphasis.
- Brackets ([ ]) designate optional entries.
- All CONVEX illustrations have an illustration catalog number at the bottom right-hand corner that is for CONVEX use only.

The following are examples of warnings, cautions, and notes and their typical content and locations as used in CONVEX documents:

WARNING

Warnings highlight procedures or information necessary to avoid injury to personnel. Warnings immediately precede the critical information and include a description of the hazard.

CAUTION

Cautions highlight procedures or information necessary to avoid damage to equipment, damage to software, or loss of data. Cautions immediately precede the critical information and include a description of the possible damage.

NOTE

Notes highlight information of a supplemental nature. They immediately precede or follow the highlighted information.

Associated Documentation

The following is a partial list of other manuals or books that may provide more detailed information on the topics presented in this manual:

- *CONVEX Computers Site Preparation Guide*, Order No. DHW-009
- *CONVEX Diagnostic Documentation (C200 Series)*, Order No. DHW-080
- *CONVEX HIA User's Guide*, Order No. DHW-035
- *CONVEX Processor Operation Guide (C100, C200 Series)*, Order No. DHW-015
- *CONVEX Removable Disk System Operation Guide*, Order No. DHW-043
- *CONVEX VIOP/VBCU Service Guide*, Order No. DHW-051
- *CONVEX Diagnostic Database (C130, C210, C220), Release Notice*
- *CONVEX UNIX, Release Notice*
- *Installation Procedure, CONVEX UNIX and Utilities*
- *SPU UNIX, Release Notice*
- *C130, C210, C220 System Diagnostics, Release Notice*

Ordering Documentation

To obtain the most current version of this or any other CONVEX document, use the order number. If the order number is not known, order by the exact title. In some situations the most current version is not desired. To receive a specific version of a manual, order the manual by its CONVEX document, or part, number, which can be provided by CONVEX.

The order number for this manual is DHW-096.
The document number for this manual is 081-000830-201.

CONVEX documents can be ordered by mail by sending a request to:

CONVEX Computer Corporation
Customer Service
PO Box 833851
Richardson TX 75083-3851 USA

Technical Assistance

Hardware and software support can be obtained through the CONVEX Technical Assistance Center (TAC). The TAC can be reached in Texas by calling (214) 952-0379, or by calling 1(800) 952-0379 from other locations in the continental United States. Customers outside the United States should contact their local CONVEX office.

Electronic Mail

The Hardware Documentation Group has an email address for documentation comments. Use this service to give us a quick response mechanism if you have special documentation questions that you would like addressed immediately. If you have a technical question, you should still contact the Technical Assistance Center, as described previously. To use email response service, just send mail addressed to:

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cnvxhwdoc@convex.COM
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We will read your comments and give you a personal reply.

What to Include in an Email Message

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- The reader's name and company name
- A return email address in INTERNET notation or UUCP (bang) notation
- The manual that is being critiqued
- The chapter and page number in question
- The comment

Reader's Forum

If you wish to mail your comments to us, please use the form at the end of this manual and list the document page number with your questions and comments. Thank you.

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Acknowledgments

I would like to thank the following people for their contributions to this document:

- Technical contributors and review team members: Art Clark, Don Davis, Ron Engelking, Steve Fieler, and Art Kimmel
- Hardware Documentation staff: Larry Bonura, Art Fischman, and Jimmie Holman
- Contributing writer: Barbara Morris

Without the efforts of all the aforementioned, this document would not have been possible.

Leigh Ellert, Lead Writer
CONVEX Hardware Documentation

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Chapter 1
Introduction

1.1 Overview

This chapter contains a general description of the responsibilities of the customer and Field Engineer (FE) prior to and during an installation.

1.2 Customer Responsibilities

The customer is responsible for the following:

- Preparing the site
- Accepting the equipment

1.2.1 Preparing the Site

The customer and a CONVEX representative should complete the Site Survey and Site Inspection checklists to identify possible problems that may arise before, during, or after installation of a CONVEX computer system. The checklists provide information on the following:

- Installation restrictions, such as size and weight limitations at the facility
- Special delivery procedures
- Special equipment, such as tracking or hoists required for installation
- Times when the facility is available for installation, after the components are uncrated and ready for installation
- Special security requirements applicable to the facility, such as security clearance

Refer to the *CONVEX Computer Site Preparation Guide* for a copy of these checklists.

1.2.2 Accepting the Equipment

The customer should oversee the arrival of the equipment, including checking the inventory and moving the equipment to the final installation location.

The customer and the CONVEX FE should inspect the equipment while unpacking it. Inventory the equipment with the Sales Order Packing Slip or the customer's Bill of Material. It is the customer's responsibility to obtain a damage claim form from the shipping representative and complete this form if the system has any damage. Refer to Chapter 2, "Unpacking," for more information on checking the inventory.

1.3 Field Engineer Responsibilities

The FE is responsible for the following:

- Unpacking the equipment
- Installing the cabinets
- Connecting the system to AC power
- Checking the system
- Installing software
- Completing the installation report

1.3.1 Unpacking the Equipment

After the equipment is located at the final installation site, the FE may unpack the equipment. The unpacking includes checking the inventory and inspecting the equipment with the customer, and unpacking the equipment from the containers. Save all packing material until after the operational checkout of the equipment, so equipment may be packed for return if necessary.

The processor and expansion cabinets are packaged on separate pallets. All accessories, such as the remote console and modem, are packaged on an additional pallet.

1.3.2 Installing the Cabinets

To install the cabinets the FE must connect all cables between the processor cabinet and the expansion cabinet, console, modem, and printer. The cabinets must then be leveled and secured to each other. Refer to Chapter 4, "Cabinet Installation for a New Site," for information on these procedures.

If the system is an upgrade from a C1, the FE must also transfer the multibus cardcage from the existing processor cabinet to the new expansion cabinet and cable the drives to the processor cabinet. If the upgrade procedure is from a C201 to a C202 or a C210 to a C220, the FE must add a processor head and three power supplies to the processor cabinet. Refer to Chapter 5, "Cabinet Installation for a System Upgrade," for information on these procedures. Refer to Chapter 9, "Returning Equipment," for information on packing the cabinets to return.

1.3.3 Connecting and Testing the AC Power

After the equipment has been unpacked and moved into position, it must be connected to the site AC power supply. Verify the following items before applying power to the system:

- AC power connection is wired correctly
- AC voltage levels are adequate
- Processor cabinet Power Control Unit voltage selector switch is set correctly

Domestic systems are shipped with an AC power cord, 6 feet in length, terminating with an AC power plug. The matching AC power receptacle must be wired into the site AC power supply. International systems are shipped with a AC power cord terminating in pigtails which must be hard-wired into the site AC electrical supply at installation.

In either case, the actual connection to the AC power may be performed by the FE, by site facilities personnel, or by an outside electrical contractor, as required. The site systems administrator should be consulted in advance to determine what the requirements are, and to coordinate the AC power connection with the system installation.

Before AC power is applied to the system, the voltage selection switch on the Power Control Unit must be set to the correct voltage.

1.3.4 Checking the System

After installing the cabinets the FE must apply the AC power to the system, power up the system, boot SPU UNIX, and run the system diagnostics for the processor and the peripheral devices. Refer to Chapter 6, "AC Power," for procedures on measuring the AC voltage and connecting AC power to the system. Refer to Chapter 7, "Running Diagnostics," for a list of diagnostics that test the processor, Input/Output Processors, and Channel Control Units (CCUs). Refer to Appendix B, "Power and AC Specifications," for equipment power specifications of CONVEX computers and peripheral devices.

1.3.5 Installing Software

The FE must boot CONVEX UNIX and check that the version of the software from the SPU disk is the latest version released. If the software is not the latest version, it must be upgraded. The layered products, i.e., products other that the operating system, such as compilers, may then be added to the system.

After ensuring that the system has the latest version of the software, the Field Engineer should run the system exerciser program to completely test the system.

Refer to Chapter 8, "Installing System Software," for information on installing software onto the system.

1.3.6 Completing the Installation Report

The Installation Report should be completed at the site during the installation and mailed to the CONVEX quality department. This report is shipped with the processor cabinet in the OPEN ME FIRST packet.

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Chapter 2
Safety Considerations

2.1 Overview

It is important to observe safety when installing CONVEX computers and their peripheral devices. Some general guidelines are offered in this chapter.

2.2 Moving Equipment

> **WARNING**
>
> Use care when moving CONVEX cabinets. Failure to do so may cause injury to personnel and damage to equipment.

CONVEX cabinets are not top-heavy, but may tip over when being moved. Because of the weight of the processor and expansion cabinets, injury to personnel or damage to equipment may result unless two people are available to install them.

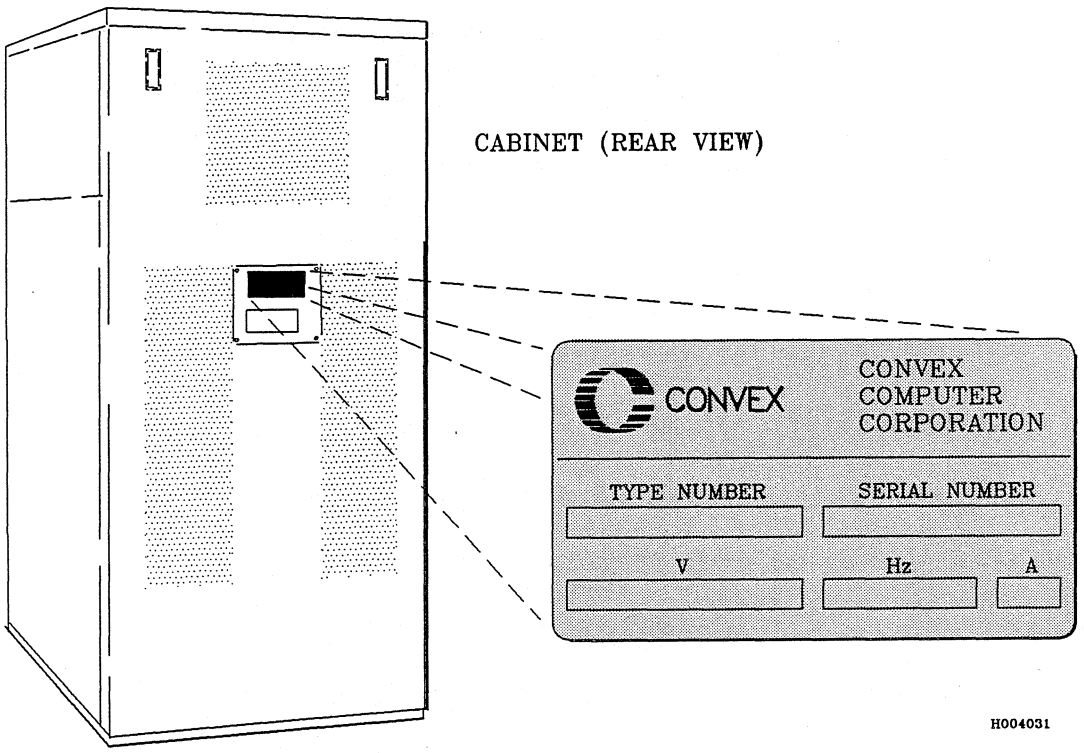
2.3 Input Power Rating

> **CAUTION**
>
> Do not exceed cabinet International Electrotechnical Commission (IEC) outlet power ratings. Failure to do so may cause damage to equipment.

Each CONVEX cabinet has a label mounted on its rear panel that lists its input power rating.

The following figure shows the cabinet power label on all CONVEX cabinets and the label location:

Figure 2–1, Cabinet Power Label Location



2.3.1 Power Label Description

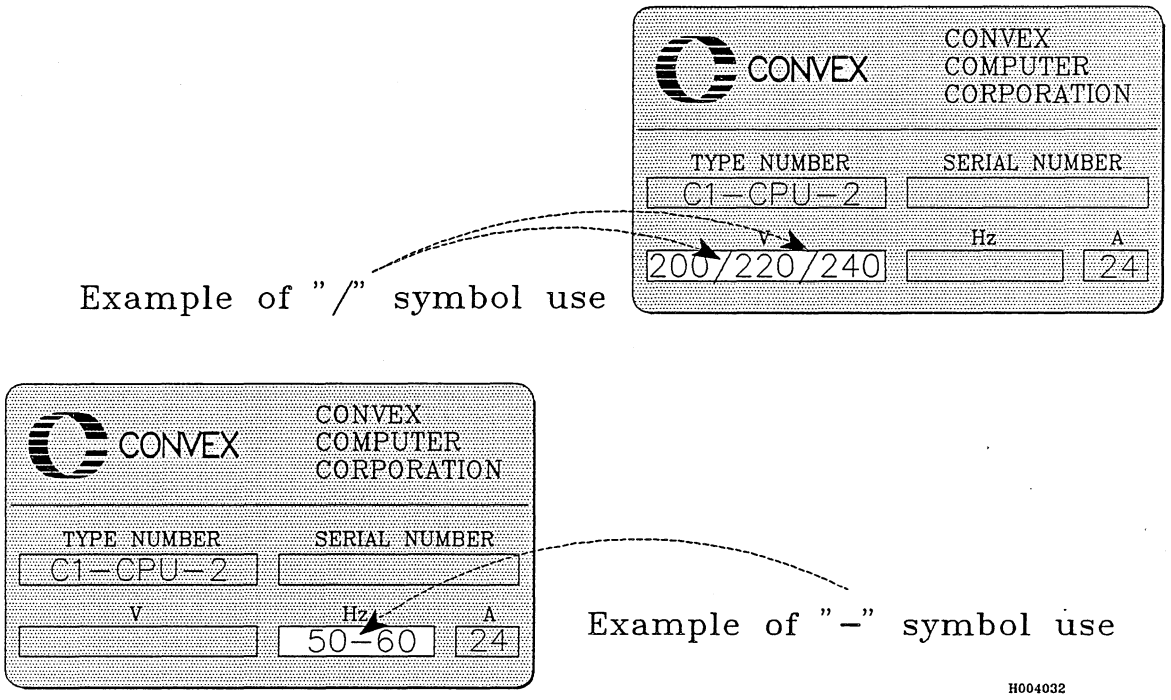
Each power label provides power rating information for its corresponding cabinet.

The dash (–) and virgule (/) symbols on the labels indicate a specific value or range.

- The dash (–) means that the equipment operates properly between the values listed.
- The virgule (/) means that a *specific* voltage or frequency is *required*, and that internal adjustments must be made by *authorized personnel only.*
- When the virgule (/) symbol is used, the specific voltage or frequency is also listed on the cabinet's power cord Safety Caution label. The power cord Safety Caution label is mounted next to the cabinet power label.

The following figure shows the cabinet power labels with the dash (–) and virgule (/) symbols:

Figure 2–2, Cabinet Power Label with "–" and "/" Symbols



2.3.2 Input Power Inspection Checklist

> **WARNING**
>
> Injury to personnel or damage to equipment may occur if the AC input power does not comply with the specifications on the CONVEX cabinet power label.

The following information should be verified before applying AC power to a cabinet:

1. Facility AC voltage range and the cabinet voltage requirements are the same
2. Facility AC power phases match the cabinet input power configuration
3. Facility AC input frequency range corresponds to the cabinet frequency range
4. Facility circuit breakers are adequate for specified cabinet current loads
5. Facility AC power connection to the processor cabinet complies with and is tested in accordance with guidelines set forth in Chapter 6, "AC Power"

2.3.3 Power Cord Caution Labels

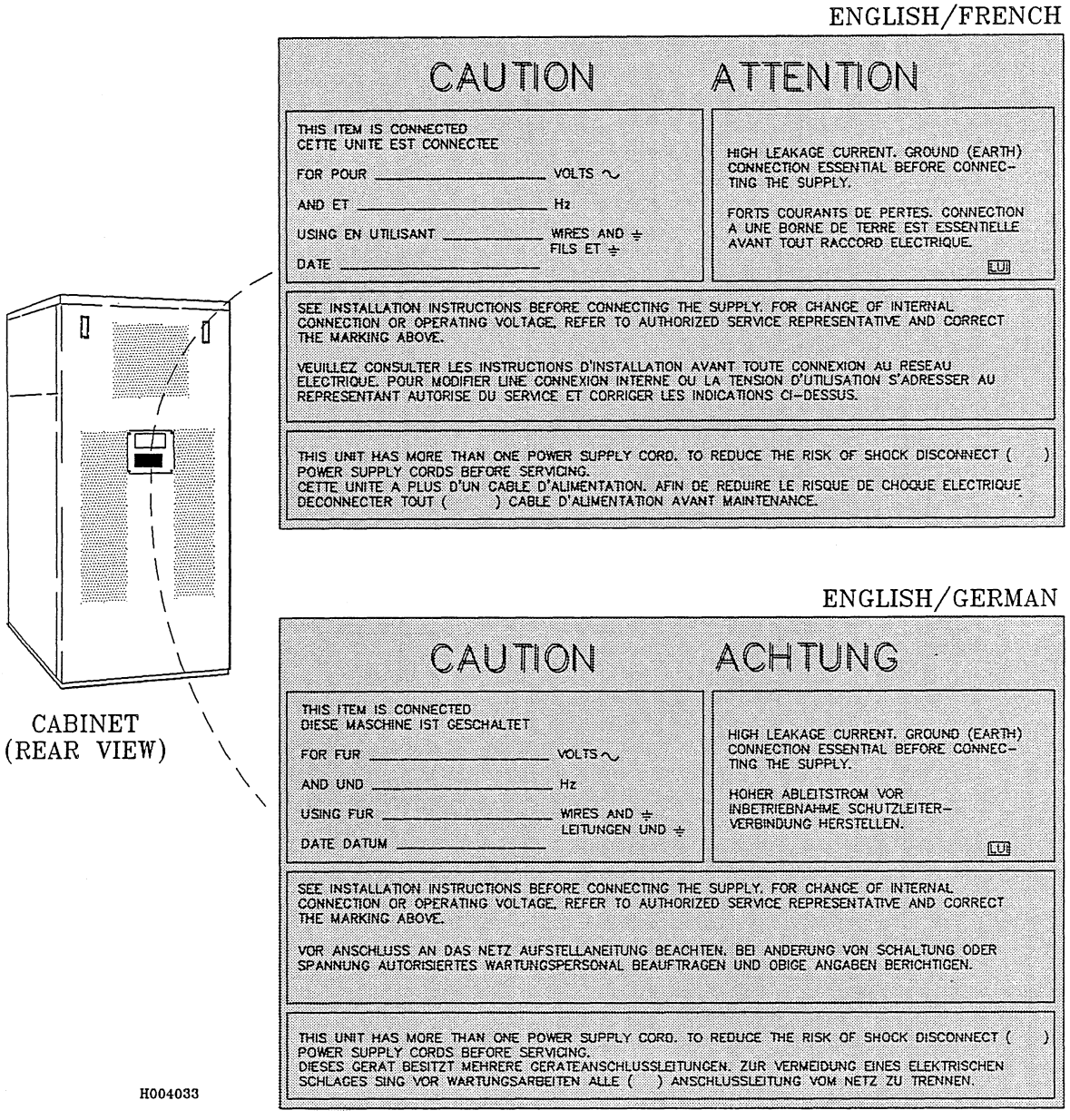
CONVEX domestic cabinets are equipped with power cords and connectors and are ready for installation.

> **NOTE**
>
> Connecting *external* equipment to the utility outlets in CONVEX cabinets voids all agencies' emission certifications.

> **NOTE**
>
> Equipment shipped to international locations do not have a power connector installed.

On some CONVEX computer system configurations, several cabinets may have their own power cord. However, there is a maximum of *one* external power cord per cabinet. A **CAUTION** label is attached to the rear door of *all* cabinets to indicate that there are multiple cabinets with power cords. The following illustrates the two types of power cord **CAUTION** labels and their locations:

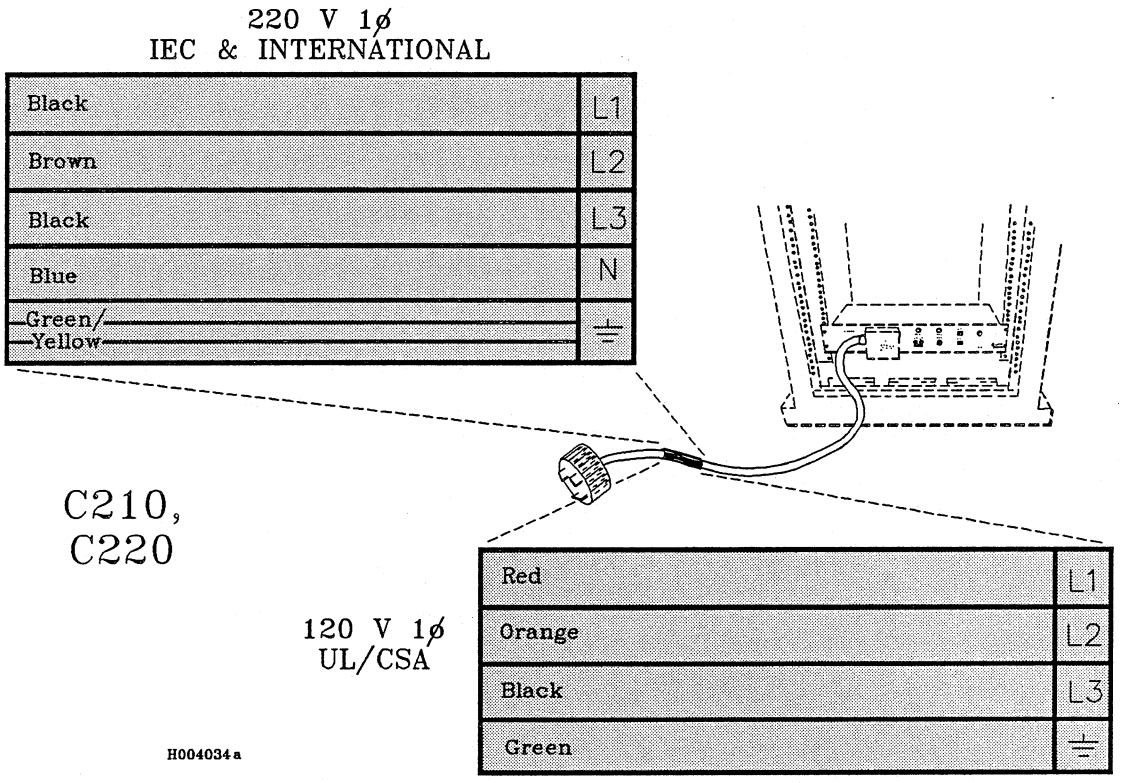
Figure 2–3, Power Cord Caution Labels



2.3.4 Power Cord Voltage Labels

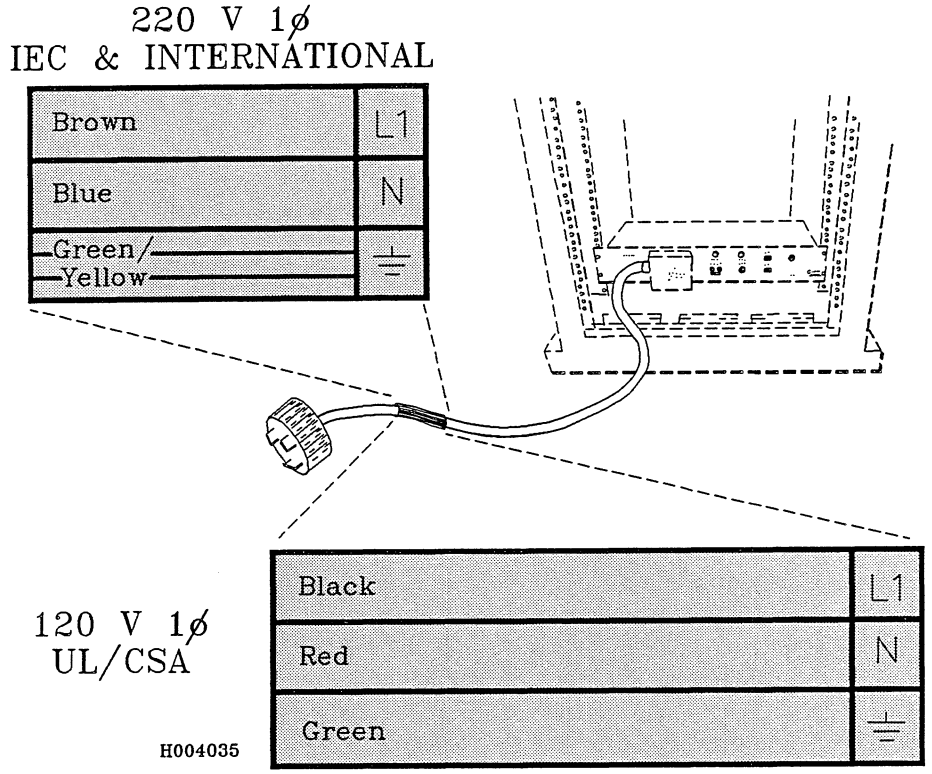
Each power cord has a color-coded label that matches the power configuration of its corresponding cabinet. The following figure shows the power cord labels for a CONVEX processor cabinet:

Figure 2–4, Processor Cabinet Power Cord Labels



The following figure illustrates the CONVEX expansion cabinet power cord label:

Figure 2–5, Expansion Cabinet Power Cord Labels

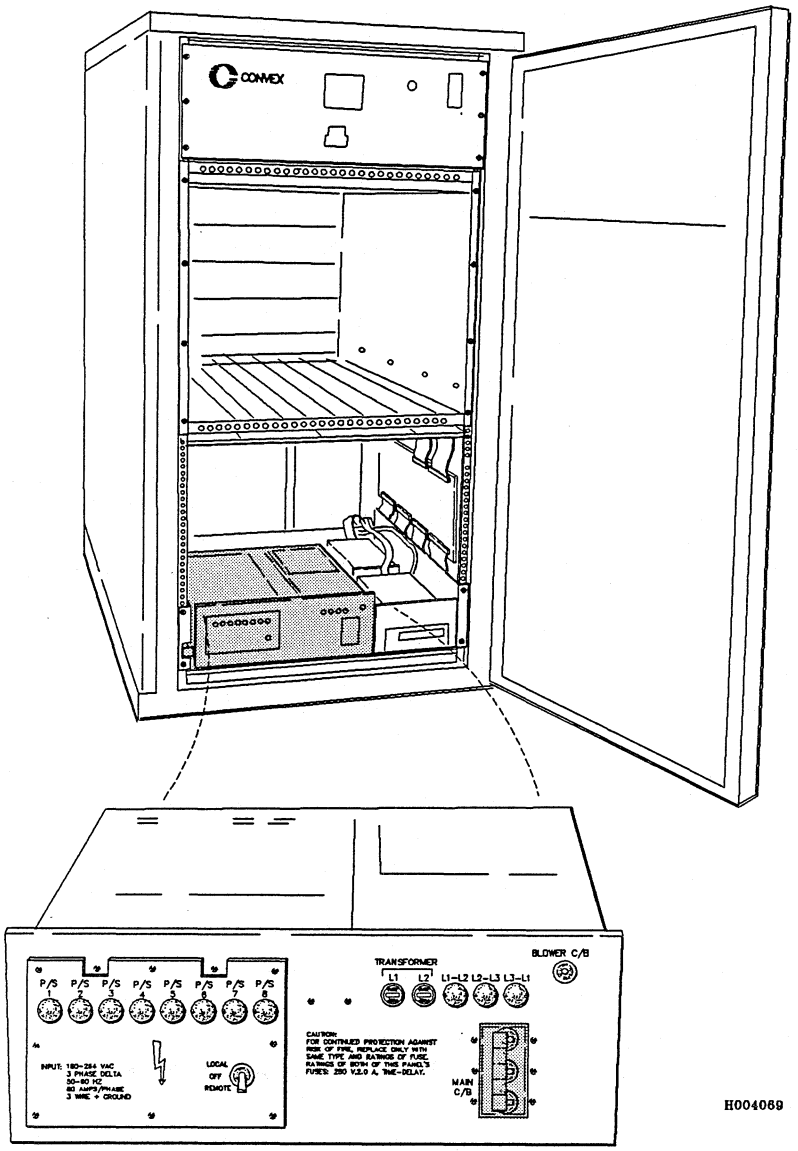


2.3.5 Circuit Breakers

> **WARNING**
>
> Set all AC input circuit breakers to the **OFF** position before connecting a power cord plug to the facility's AC power. Failure to do so may cause injury to personnel.

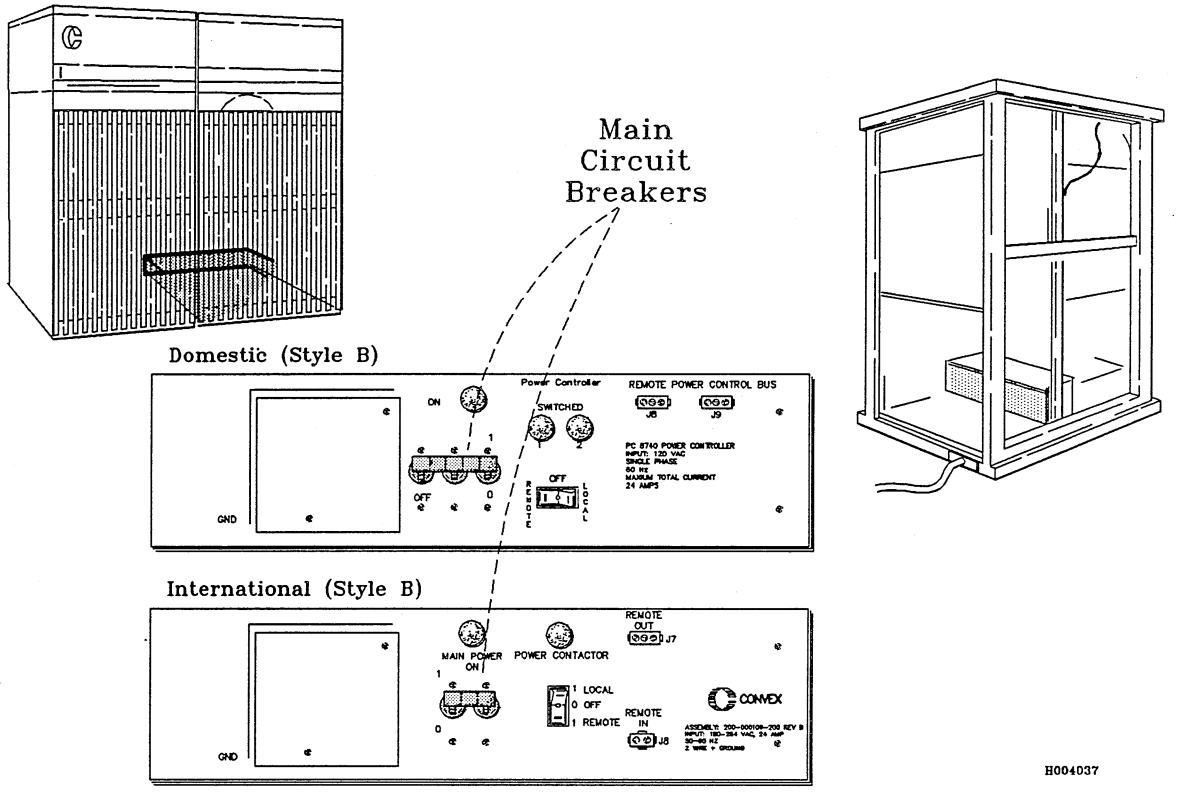
The following figure shows the main circuit breakers for the processor cabinet:

Figure 2–6, Location of Processor Cabinet Circuit Breaker



The following figure shows the main circuit breaker for the expansion cabinet:

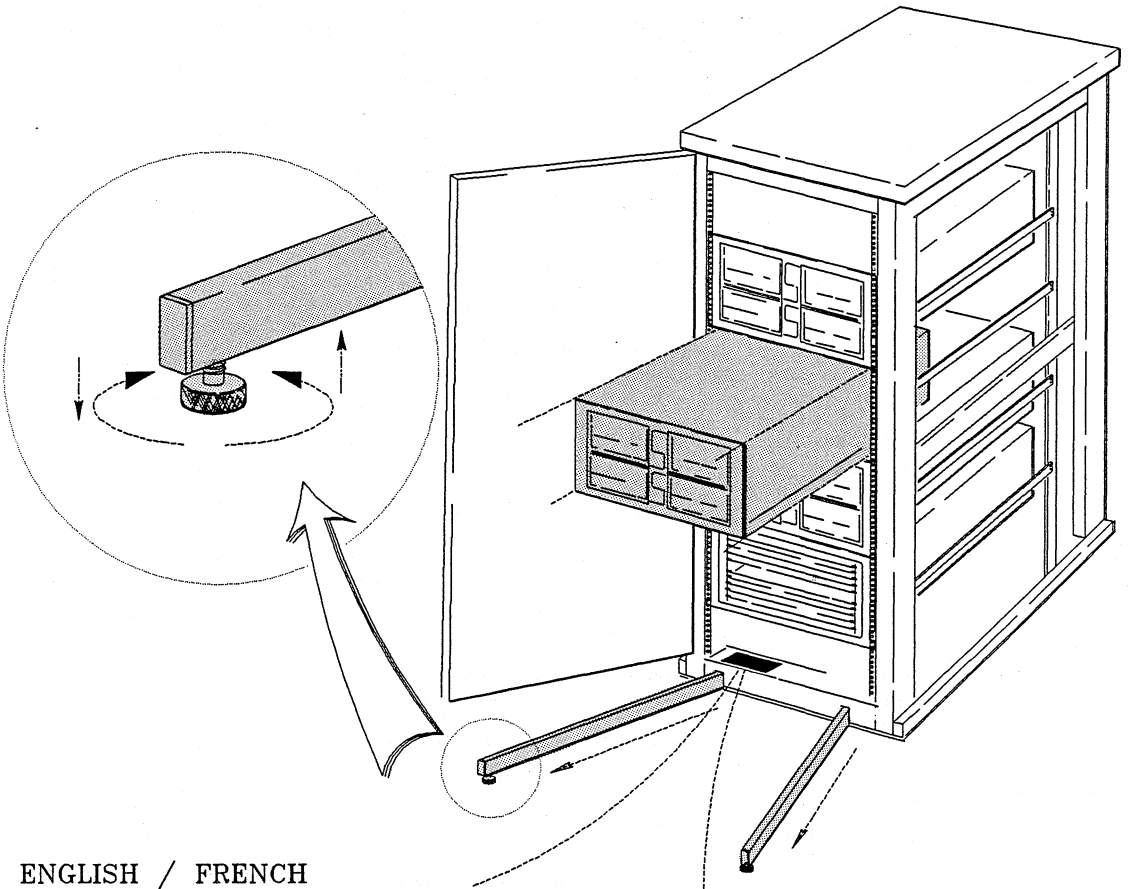
Figure 2–7, Location of Expansion Cabinet Circuit Breaker



2.4 Mechanical Safety Procedures

CONVEX expansion cabinets are equipped with two stabilizer bars to prevent them from tipping forward when peripheral devices are pulled out. The following figure shows the location of the stabilizer bar **CAUTION** label:

Figure 2–8, Stabilizer Bars and Caution Label



ENGLISH / FRENCH

CAUTION	ATTENTION
TO REDUCE RISK OF POSSIBLE INJURY DUE TO UNSTABLE UNIT, ACTUATE STABILIZER BEFORE ANY PERIPHERAL IS EXTENDED. 1. TO ACTUATE STABILIZER, FULLY EXTEND ANTITILT CHANNELS AND LOWER CHANNEL SUPPORT FEET FIRMLY TO THE FLOOR. 2. INSURE THAT LOCKING MECHANISMS ARE INSTALLED IN ALL OTHER EXTENDABLE UNITS. 3. NEVER EXTEND MORE THAN ONE UNIT AT A TIME	POUR REDUIRE LE RISQUE D'ACCIDENT ATTRIBUABLE A L'INSTABILITE DE L'UNITE, DEPLOYER LES STABILISATEURS AVANT DE SORTIR LES PERIPHERIQUES. 1. POUR DEPLOYER LES STABILISATEURS, TIRER COMPLETEMENT LES BRAS ANTI-BASCULEMENT ET ABAISER LES PATTES DE FACON QU'ELLES REPOSENT SOLIDEMENT SUR LE SOL. 2. S'ASSURER QUE TOUS LES PERIPHERIQUES SON MUNIS DE VIS DE BLOCAGE. 3. NE JAMAIS SORTIR PLUS D'UN PERIPHERIQUE A UN MOMMENT DONNE.

ENGLISH / GERMAN

CAUTION	ACHTUNG
TO REDUCE RISK OF POSSIBLE INJURY DUE TO UNSTABLE UNIT, ACTUATE STABILIZER BEFORE ANY PERIPHERAL IS EXTENDED. 1. TO ACTUATE STABILIZER, FULLY EXTEND ANTITILT CHANNELS AND LOWER CHANNEL SUPPORT FEET FIRMLY TO THE FLOOR. 2. INSURE THAT LOCKING MECHANISMS ARE INSTALLED IN ALL OTHER EXTENDABLE UNITS. 3. NEVER EXTEND MORE THAN ONE UNIT AT A TIME	ZUR VERMEIDUNG VON GEFAHRDUNG DURCH EIN INSTABILES GERAT SIND VOR DER HERAUSNAHME VON PERIPHERALS DER STABILISIERUNGSMECHANISMUS BETATIGT WERDEN. 1. UM DIE STABILISIERUNGSEINRICHTUNG ZU BETATIGEN, SIND DER "ANTITILT KANAL" GANZ HERAUS ZU ZIEHEN UND DER UNTERE STUTZFUSS AUF DEN BODEN ZU FUHREN. 2. OBERPRUFEN SIE, OB IN ALLEN ANDEREN VERSCHIEBBAREN GERATEN DER SICHERUNGSMECHANISMUS BETATIGT IST. 3. ZIEHEN SIE NIE MEHR ALS EIN GERAT HERAUS.

H004038

WARNING

Do not extend slide-mounted peripheral devices for servicing without first extending cabinet stabilizer bars.

Never extend more than one peripheral device at a time. Failure to do so may result in cabinet instability, injury to personnel, and damage to equipment.

1. Never extend more than one peripheral device at a time.
2. When a stabilizer bar is fully extended, adjust the stabilizer pad until it is firmly against the floor. See the previous figure for the stabilizer pad.

2.5 Electrical Safety Precautions

WARNING

LETHAL VOLTAGE HAZARD. Hazardous voltages are present inside the processor cabinet while the power cord is connected to the AC mains. Failure to remove power from the computer before servicing may result in serious injury to personnel and damage to components and electronic assemblies.

Ensure the main circuit breakers on the power controller front panel are **OFF** before removing covers from the processor cabinet.

Disconnect the computer AC power cord from the electric service before disassembling the power controller. Hazardous voltages are present inside the power controller anytime the AC power cord is connected to a source of AC power, *even when the main circuit breakers are set to* **OFF**.

2.6 Electrostatic Discharge Precautions

> **CAUTION**
>
> Observe all Electrostatic Discharge (ESD) precautions during service. Failure to do so may cause damage to equipment.

Many of the electronic components in CONVEX computers can be damaged by Electrostatic Discharge (ESD). High static charge levels often result when various objects are separated or rubbed together. Wear a ground strap and connect it to the equipment being serviced to prevent ESD damage during an installation or system upgrade.

Chapter 3
Unpacking

3.1 Overview

When the equipment arrives at the site, the containers should be inspected for damage. The equipment should also be checked after the packaging has been removed. This chapter discusses how to inventory, inspect, and unpack the cabinets.

3.2 Checking the Inventory

The Sales Order Packing Slip lists all equipment shipped from CONVEX. Use the packing slip to check that all equipment has arrived. The following figure shows a typical Sales Order Packing Slip:

Figure 3–1, Sales Order Packing Slip

CONVEX

CONVEX COMPUTER CORPORATION
701 Plano Rd. • Richardson, TX 75081

SALES ORDER PACKING SLIP

PACKING SLIP NO.

SALES ORDER	CUSTOMER PURCHASE ORDER
CHANGE NO.	PAGE NO.

BILL TO:

SHIP TO:

SHIP DATE	ORDER DATE	BILL TO CUSTOMER	REP. CODE	TAX	TAX %	SHIP TO CUSTOMER CODE	TERMS	SHIP VIA	SALESMAN

LN.	PART NUMBER	DESCRIPTION	ORDER QUANTITY	BALANCE DUE	UM	DELIVERY DATE	UNIT PRICE	QUANTITY THIS SHIPMENT	SHIP NO.

COMMENTS:

CARRIER	WAYBILL NO.
CARTONS	TOTAL WEIGHT

Before unpacking the equipment, check that all cabinets and accessories required to install or upgrade the system have arrived at the site. Check that trim accessories for a new system have arrived with the cabinets (the inventory for a system upgrade may not include trim accessories). The other accessories should arrive on a separate pallet. Also check that all cables for the system are packaged with the manuals.

> **NOTE**
>
> The shipping containers for the CONVEX processor and expansion cabinets protect the equipment from excessive shock. Keep these containers if the cabinets may be moved from one facility to another.

3.3 Inspecting for Damage

All shipping containers protect their contents under normal shipping conditions. After the equipment arrives at the customer site, inspect each carton carefully for signs of shipping damage. A shock indicator is installed on each carton shipped. The indicator changes from *clear* to *red* when the module is subjected to 15 g for 50 msec. If a carton has been mishandled, accidentally dropped, or knocked against something, and the shock indicator is *red*, visually inspect the unit for any signs of damage.

When unpacking the processor and expansion cabinets, check them for visible shipping damage. After unpacking the cabinets, check for damage that may have been obscured by the shipping container. If damage is found after visual inspection, document the damage with photographs and contact the transport carrier immediately.

If the equipment has any damage, a damage claim must be completed. Obtain the damage claim form from the shipping representative. The customer should complete the form then return it to the shipping representative.

3.4 Unpacking

While unpacking the equipment inspect each item for any sign of shipping damage. Save all packing material until after the operational checkout of the equipment, so equipment may be packed for return, if necessary.

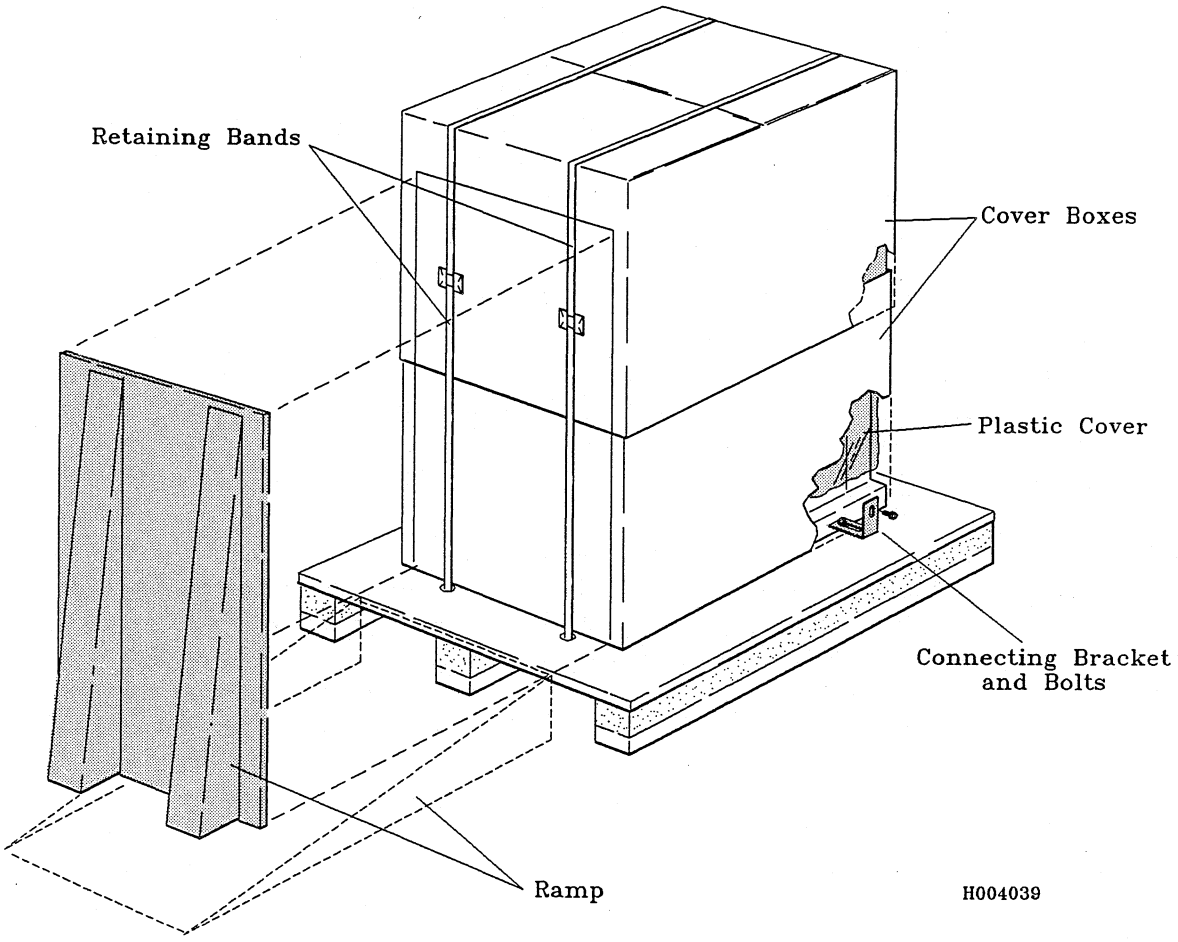
3.4.1 Tools

- 9/16-inch wrench
- 3/8-inch socket

3.4.2 Cabinets

The following figure shows a cabinet with its packaging:

Figure 3–2, Cabinet Packaging



3.4.2.1 Removing Packaging Around the Cabinets

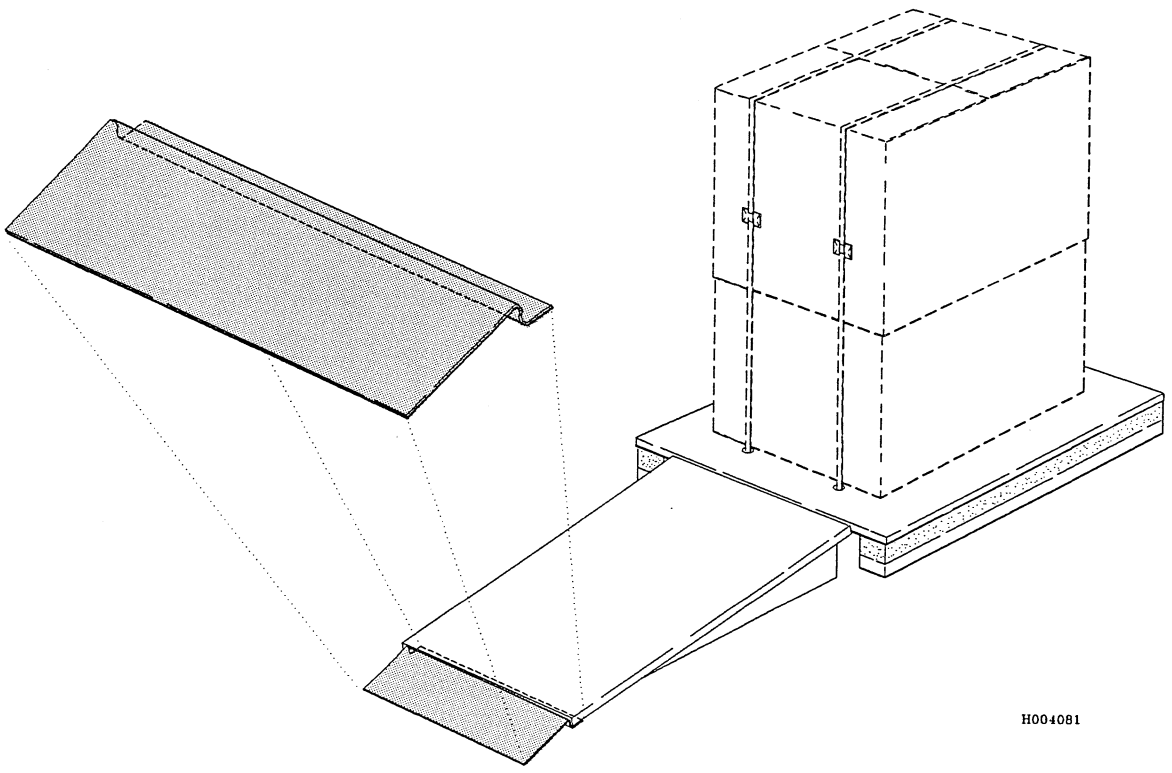
While removing the packaging, visually inspect each cabinet for any sign of shipping damage.

1. Cut the 2 bands that cross the top of the cabinet box.
2. Set aside the box containing the trim items.
3. Remove the top system cover box, then the lower system cover box.
4. Remove the plastic film cover from the cabinet.

3.4.2.2 Removing the Processor from the Pallet

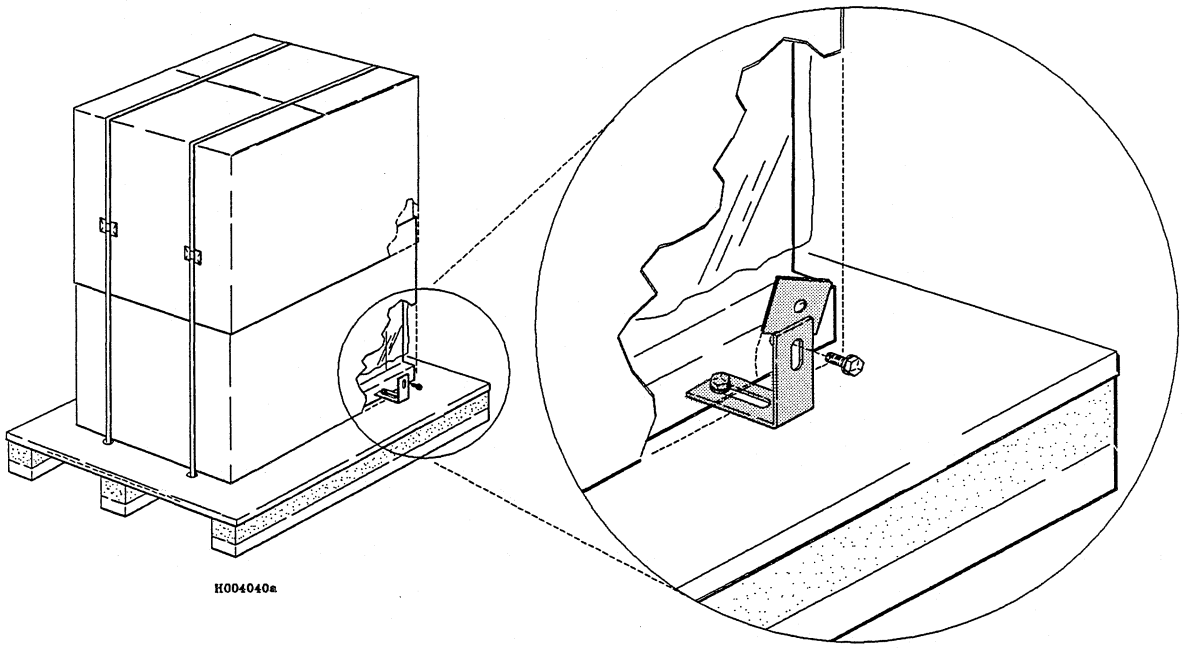
Place the pallet in an open area, with enough room to connect the ramp to the pallet and to move the cabinet at the foot of the ramp. The following figure shows a pallet with a ramp and auxiliary ramp:

Figure 3–3, Cabinet Pallet, Ramp and Auxiliary Ramp



The following figure shows a C210 processor cabinet mounted on the pallet, including the pallet bracket and spacers:

Figure 3–4, C210/C220 Processor Cabinet and Pallet



WARNING

Because of the weight of the processor and expansion cabinets, injury to personnel or damage to equipment may result unless two people are available to install them.

CONVEX cabinets are not top-heavy, but may tip over. Use care when moving CONVEX cabinets. Failure to do so may cause injury to personnel and damage to equipment.

Use the following procedure to remove the processor and expansion cabinet from the pallet:

1. Slide the legs of the ramp under the front (open) edge of the pallet. The high edge of the ramp should be against the front edge of the pallet.
2. Place the auxiliary ramp at the base of the pallet ramp.
3. Remove the 4 bolts that connect the pallet brackets to the anchor holes of the cabinet.
4. Loosen the bracket bolts that connect to the pallet.
5. Pull the brackets away from the cabinet.
6. Remove the cardboard spacers from between the brackets and the cabinet.

CAUTION

Check that the 4 feet are raised so the cabinet rests on its wheels. The feet must be completely raised when moving the cabinet. Failure to do so may damage the feet as the cabinet is moved.

7. Roll the cabinet slowly down the ramp, keeping the cabinet centered on the ramp. A person standing on the pallet should guide the cabinet.
8. Check that cutouts for a raised floor are positioned where the cabinets will sit. The cutouts should have channels for routing the external peripheral cables and the main AC cable of the processor cabinet.
9. Roll the cabinet into position.
10. Check that the AC power connection point is within 6 feet of the processor cabinet.
11. Remove the cabinet trim items from the box that was packaged with the processor cabinet.

3.4.3 Accessories

The accessories for the system include all items that were not shipped on the processor or expansion cabinet pallets. These items arrive at the site on an separate pallet. Inventory all accessories and inspect for damage while unpacking them.

1. Cut the bands around the accessories on the pallet.
2. Remove the plastic film covering the accessories.
3. Remove each box from the pallet.
4. Assemble the table, and position it near the cabinets.
5. Remove the printer, terminal, and modem from their boxes.
6. Place the terminal and printer on the table and ensure they are within cabling distance (less than 6 feet) of the cabinet.
7. Unpack and inventory the cables and the manuals.

Chapter 4
New System Cabinet Installation

4.1 Overview

This chapter contains procedures for installing the processor cabinet and the expansion cabinets as a new system at a site. These procedures include cabling and securing the cabinets.

> **WARNING**
>
> Because of the weight of the processor and expansion cabinets, injury to personnel or damage to equipment may result unless two people are available to install the system.

4.2 Cabling

The printer, terminal, and modem must be cabled to the processor cabinet. The Channel Control Unit (CCU) interconnect cables that connect to the peripheral devices must be routed to the processor cabinet.

4.2.1 Tools

- 9/16-inch wrench
- 3/8-inch socket
- Phillips screwdriver
- Small-slot screwdriver

4.2.2 Modem and Terminal

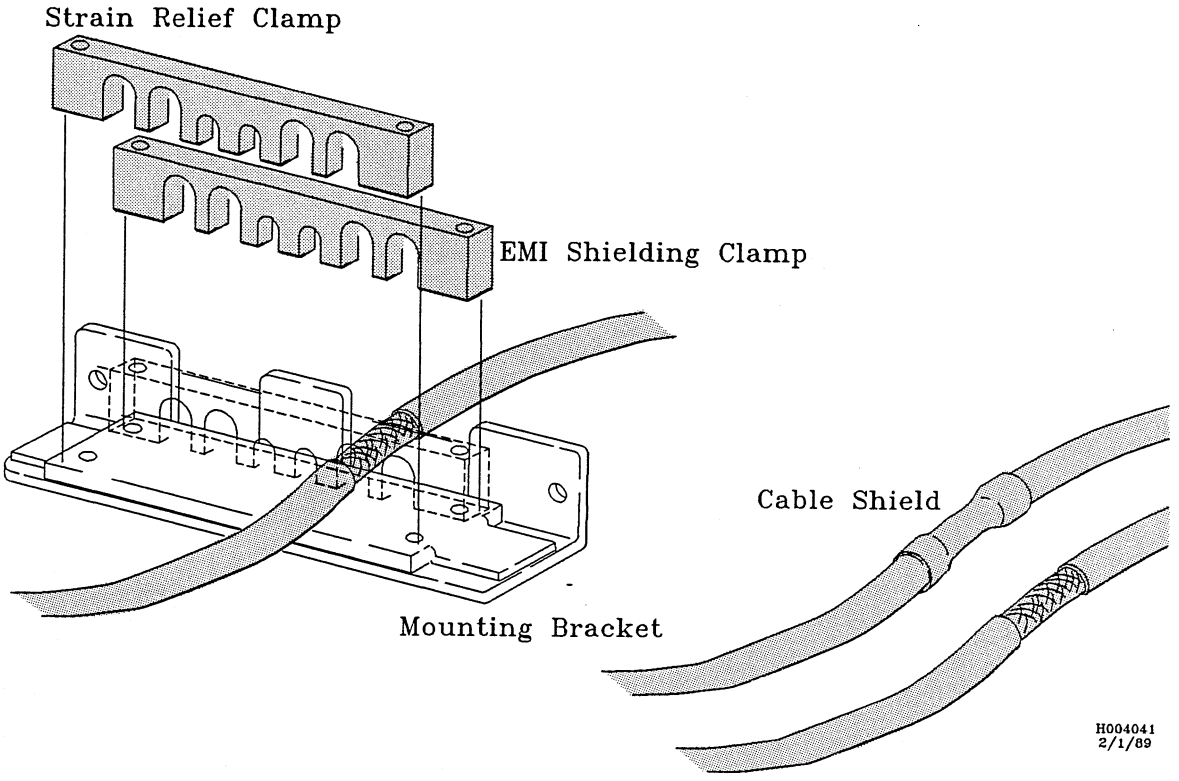
Use the following steps to set up the modem, terminal, and printer:

1. Attach the modem cable to the bulkhead connector of the processor cabinet. This connector is keyed and labeled.
2. Install 2 screws, 1 on the top and 1 on the bottom of the cable connector, to the processor cabinet.
3. Attach the terminal cable to the bulkhead connector of the processor cabinet. This connector is keyed and labeled.
4. Install 2 screws, 1 on the top and 1 on the bottom of the cable connector, to the processor cabinet.
5. Connect the keyboard and printer to the terminal.
6. Plug the AC power cords of the terminal and the printer into a 110 VAC outlet (5-15R NEMA receptacle plug).

4.2.3 Channel Control Unit Cables

When installing the mounting bracket of a cable, check that the jack number for the cable matches the bulkhead slot of the mounting bracket. The outer cable clamp 72851233 of the mounting bracket, the bulkhead strain relief, should fit over the insulation. The inner cable clamp 72851232, the Electromagnetic Interference (EMI) shielding, should fit over the exposed braided shield. The following figure shows how the bulkhead mounting bracket fits over the cable:

Figure 4–1, Bulkhead Mounting Bracket and Shielded Cables



Use the following procedure to attach the mounting bracket to the CCU cables:

1. Remove the rear panel of the expansion cabinet.
2. Remove the rear panel of the processor cabinet.
3. Remove the rear air plenum from the processor cabinet.
4. Remove the cable clamping sleeve where the EMI shielding clamp will attach to the cable.
5. Remove a bulkhead mounting bracket from the side of the processor cabinet if it is installed on the cabinet.
6. Engage the personal grounding system.

> **CAUTION**
>
> Ensure that the cable clamp is installed properly. Failure to establish good electrical contact between the exposed cable shield and the cable clamp will result in the loss of the EMI shielding.

7. Install inner EMI cable clamp 72851232 over the exposed shield.
8. Install outer strain relief clamp 72851233 over the cable insulation.
9. Pass the cable connector through the open bulkhead slot. The bulkhead slot is labeled with the corresponding jack number.
10. Hold the mounting bracket against the bulkhead and install the 2 screws that attach it to the processor bulkhead.

Refer to Volume VI *CONVEX Removal/Replacement and IPB Guide (C201, C202, C210, C220)*, for detailed removal and replacement procedures.

4.2.3.1 Multibus Cables

Each Multibus chassis has either two or four cables that connect directly to the backplane of the processor. These cables have labels for identification. The following list explains this identification scheme:

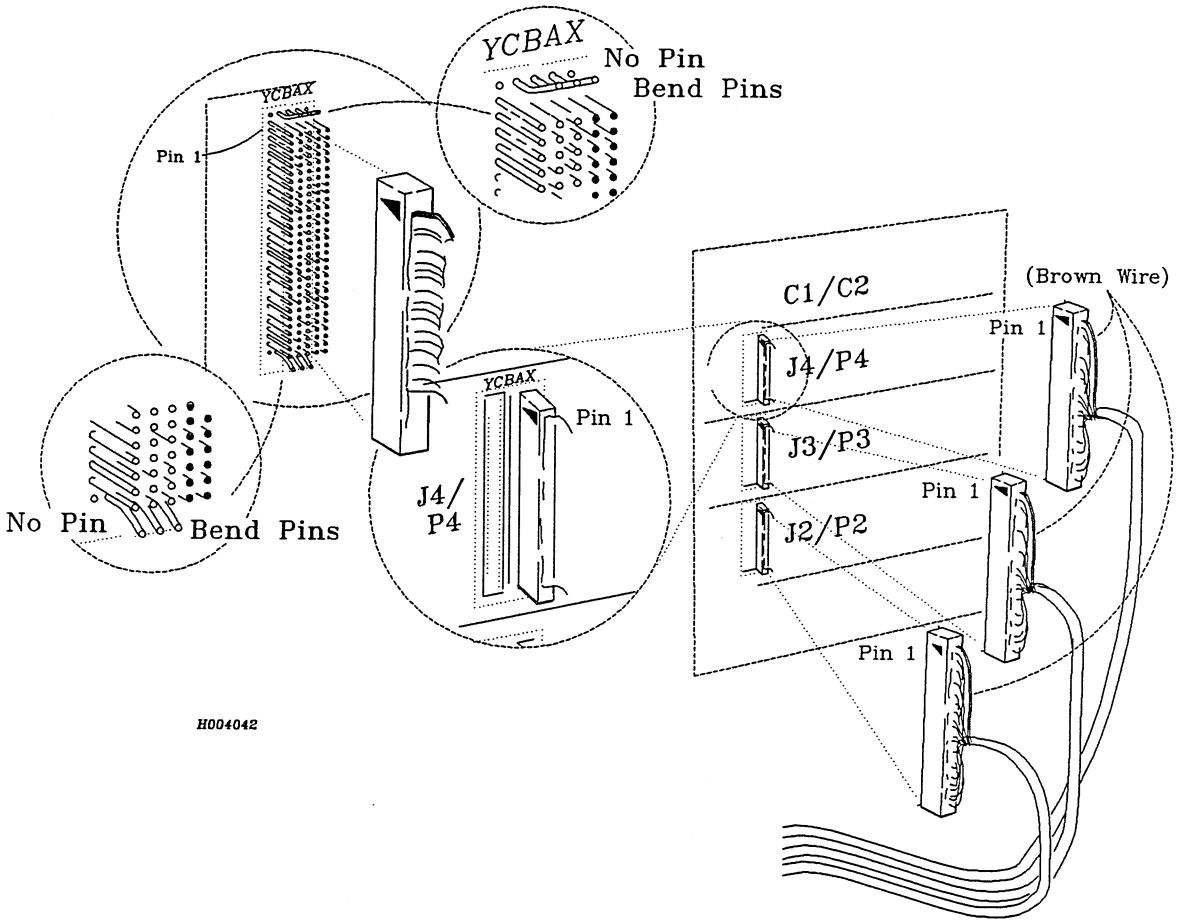
- **P1** — Specifies cabinet number 1 (the processor)
- **A7** — Refers to the backplane
- **CCU0** — Specifies the CCU number
- **J4** — Specifies the J4 jack position
- **XY** — Specifies the columns of pins on jack J4

Attach each Multibus cable to the corresponding pins on the backplane. The cable connector has a mark by pin 1 which attaches at the top of the connection on the backplane.

> **NOTE**
>
> A flashlight may be required to locate the proper connection point on the backplane.
>
> This procedure is valid for Multibus cables only. VMEbus cables are installed differently. Refer to the *CONVEX VIOP/VBCU Service Guide* for information and instructions on installing the VIOP cables.

The following figure shows the Multibus cable connections to the backplane:

Figure 4–2, Cable Connections from Module to Backplane



4.2.3.2 VMEbus Input/Output Processor Cables

Refer to the *CONVEX VIOP/VBCU Service Guide* for information and instructions on installing the VIOP cables. Note that the orientation of VMEbus cables attached to the backplane is different from that of Multibus cables.

4.2.3.3 Removable Disk System Cables

Refer to the *CONVEX Removable Disk System Operation Guide* for information on configuring and installing the RDS system.

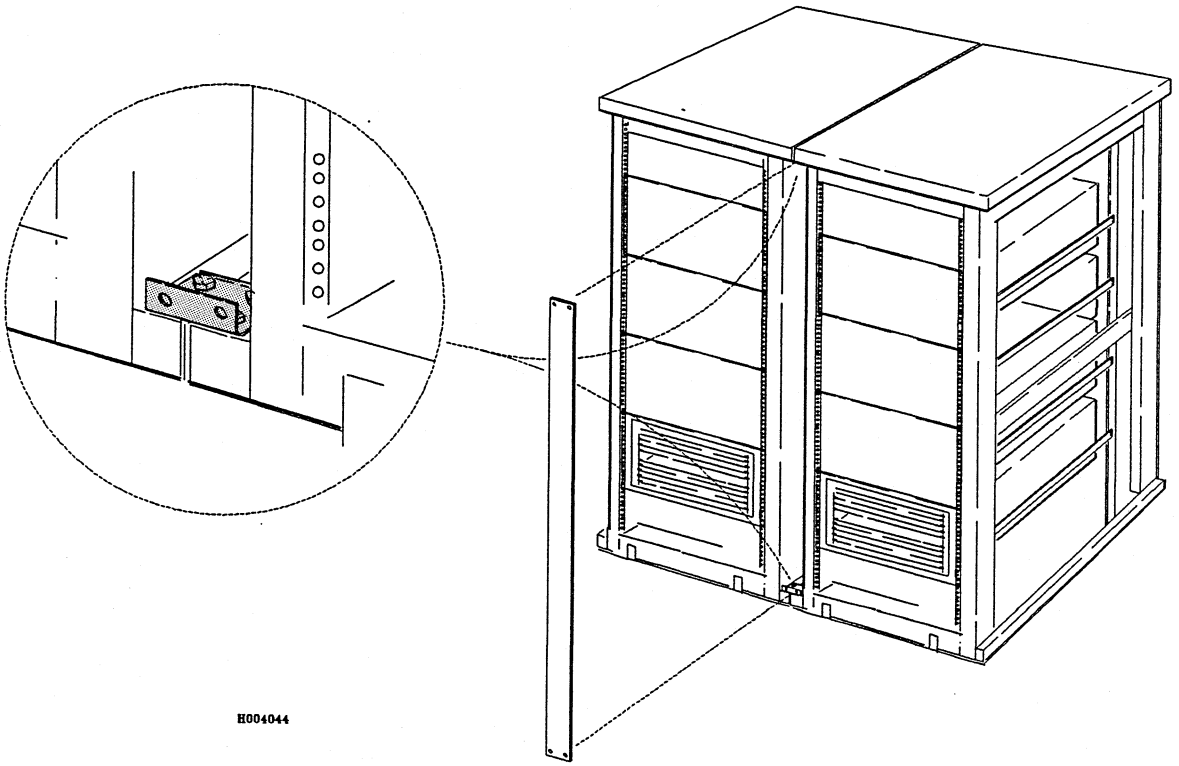
4.2.4 Power Sequencing Cable

The power sequencing cable allows control of expansion cabinet AC power from the processor cabinet power control unit. The expansion cabinet power controller provides 120 VAC to the peripheral devices. For a new system, check that the peripheral devices are plugged into the power controller in the expansion cabinet. Plug the remote power sequencing cable from the expansion cabinet into its connector on the bulkhead of the processor cabinet.

4.3 Securing the Cabinets

To secure the cabinets, first position and level the processor cabinet. When the processor cabinet is positioned, secure additional cabinets to it with cabinet connecting brackets. The following figure shows how to position the cabinet connecting brackets to the cabinet, with the holes for the trim bar facing the front of the cabinet:

Figure 4–3, Cabinet Connecting Brackets



Use the following procedure to secure and level the processor cabinet and the expansion cabinet.

1. Position the processor cabinet according to the customer floor plan.
2. Lower the cabinet feet so the wheels are able to spin freely.
3. Level all sides of the cabinet by adjusting the feet of the cabinet.
4. Install a cabinet connecting bracket using 2 of the supplied bolts to the top front and top back of the cabinet bulkhead, just under the cabinet top. Do not tighten the bolts at this time.
5. Install a cabinet connecting bracket using 2 of the supplied bolts to the bottom front and bottom rear of the next cabinet's base. Do not tighten the bolts at this time.
6. Position the second cabinet next to the first cabinet.

> **CAUTION**
>
> Ensure that no cables are in the gutter between the cabinets when pushing the cabinets together. Failure to do so may result in damage to the cables.

7. Lower the feet of the second cabinet so the wheels are able to spin freely.
8. Level the second cabinet at the edge connecting with the first cabinet.
9. Level the remaining sides of this second cabinet.
10. Install the remaining 2 bolts, and tighten all bolts on the 4 cabinet connecting brackets between the 2 cabinets.
11. Recheck the leveling of the cabinets.
12. Position a trim bar between the front of the 2 cabinets. Align the paint stripe of the bar with the stripe on the cabinets.
13. Install the 4 screws that attach the trim bar to the cabinet connecting bracket. The trim bar has 2 screws at the top and 2 at the bottom.
14. Position a trim bar between the rear of the 2 cabinets. Align the paint stripe of the bar with the stripe on the cabinets.
15. Install the 4 screws that attach the trim bar to the cabinet connecting bracket. The trim bar has 2 screws at the top and 2 at the bottom.

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Chapter 5
System Upgrade Cabinet Installation

5.1 Overview

This chapter lists the steps to upgrade a system in the field. The upgrade may be from a C1 to either a C210 or C220 system, or from a C210 to a C220.

> NOTE
>
> For the purposes of cabinet installation and system upgrade, the C201 is mechanically identical to the C210, and the C202 is mechanically identical to the C220. Only the C210 and C220 will be referenced in this chapter.
>
> Use the C1 to C210 or C220 procedures for upgrading from C1 to C201 or C202, and the C210 to C220 procedures for upgrading from C201 to C202.

5.2 C1 to C210 or C220 Upgrade

Several steps are required to upgrade a system from a C1 to either a C210 or C220. These steps include:

- Removing the C1 processor cabinet
- Adding a power controller in the bottom of the expansion cabinet
- Installing a Multibus chassis in the expansion cabinet and transferring Multibus cards from the chassis in the C1 processor cabinet to the new chassis
- Transferring the slide-mounted peripheral devices within the expansion cabinet, as necessary
- Cabling the peripheral devices to the processor cabinet
- Installing the new processor and expansion cabinets

Before transferring any peripheral devices compare the specifications of the expansion cabinet and the equipment that will be in the cabinet. Check that the physical dimensions, electrical and cooling requirements, and power consumption of the peripheral devices do not exceed the specifications of the cabinet. If the requirements of all peripheral devices exceed those of the cabinet, a second expansion cabinet must be installed. Refer to Appendix B, "Power and AC Specifications," for the specifications of the expansion cabinet and peripheral devices.

5.2.1 Tools

- 3/8-inch socket
- 9/16-inch wrench
- Phillips screwdriver

5.2.2 Removing the C1

The following procedures separate a C1 processor from its expansion cabinets. Refer to Chapter 9, "Returning Equipment," for information on packaging the cabinets.

1. Execute a full dump of the *usr* and *root* directories. Mount a tape on the tape drive unit 0 then enter the following commands:

   cd /
   /etc/dump 0G /

   (dump output appears)

   /etc/dump 0G /usr

   Refer to the *CONVEX UNIX, Release Notice* or to the man page for the *dump* command for more information.
2. Power down the C1 system. Refer to the *CONVEX Processor Operation Guide (C1, C120, C200 Series)* for information on this procedure.

> WARNING
>
> **LETHAL VOLTAGE HAZARD**
>
> Hazardous voltages are present inside the C210 power control unit **even when the C210 main circuit breaker is set to OFF**. Remove electrical service to the computer prior to performing maintenance. Failure to do so may result in injury to personnel and damage to equipment.

3. Locate the site power panel for the CONVEX computer and set the circuit breakers that serve the C1 and expansion cabinets to **OFF**.
4. Disconnect the main AC power cord to the processor cabinet.
5. Remove the trim bars from the front and rear of the cabinets.
6. Remove the 4 cabinet connecting brackets between the cabinets.
7. Raise the 4 feet of the processor cabinet so the cabinet rests on its wheels.

CAUTION

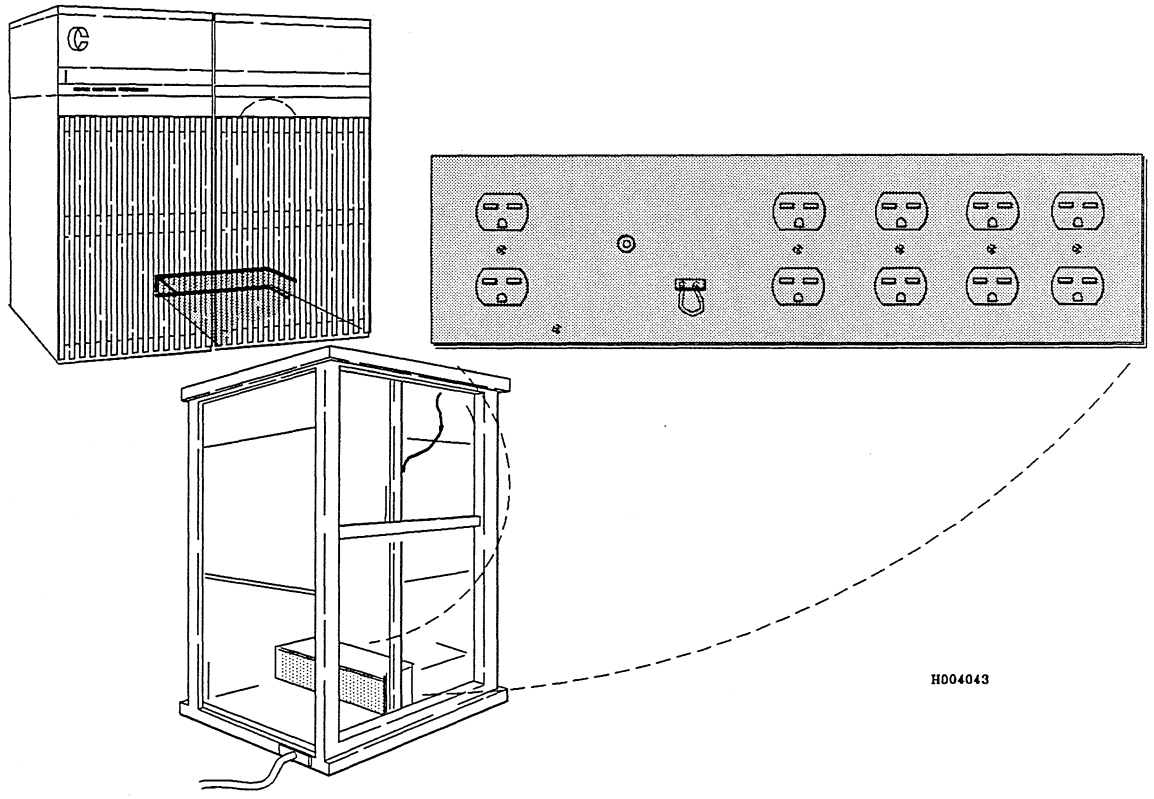
Check that the 4 feet are raised so the cabinet rests on its wheels. The feet must be completely raised when moving the cabinet. Failure to do so may damage the feet as the cabinet is moved.

8. Slide the processor cabinet away from the expansion cabinet carefully. Watch that the cables do not tear or pull from either cabinet.
9. Disconnect all cables between the expansion cabinet and the processor bulkhead.
10. Remove the bulkhead-mounting bracket from the disk drive cables.
11. Disconnect the disk drive cables from both the processor cabinet and the back of the disk drive.

5.2.3 Adding a Power Controller in the Expansion Cabinet

The following figure shows the power controller in the expansion cabinet:

Figure 5–1, Expansion Cabinet Power Controller



Use the following procedures to add a power controller to an expansion cabinet:

1. Place the power controller in the base of the expansion cabinet with the outlets facing the front panel. The unswitched outlets should face the left front of the machine.
2. Connect the static guard between the front right base of the cabinet and the front right of the power controller.
3. Install the 4 screws that lock the power controller to the rear retaining bars of the cabinet.
4. Connect the power controller to the appropriate site AC power outlet.

5.2.4 Installing the Multibus Chassis

The Multibus chassis for an upgraded system will be shipped in an expansion cabinet, or in a separate carton if no expansion cabinet is required. The controller cards of a Multibus in a C1 processor cabinet may need to be transferred to the cardcage of the new Multibus chassis. This section provides procedures for each of these possibilities. It also contains procedures to cable the Multibus within the expansion cabinet.

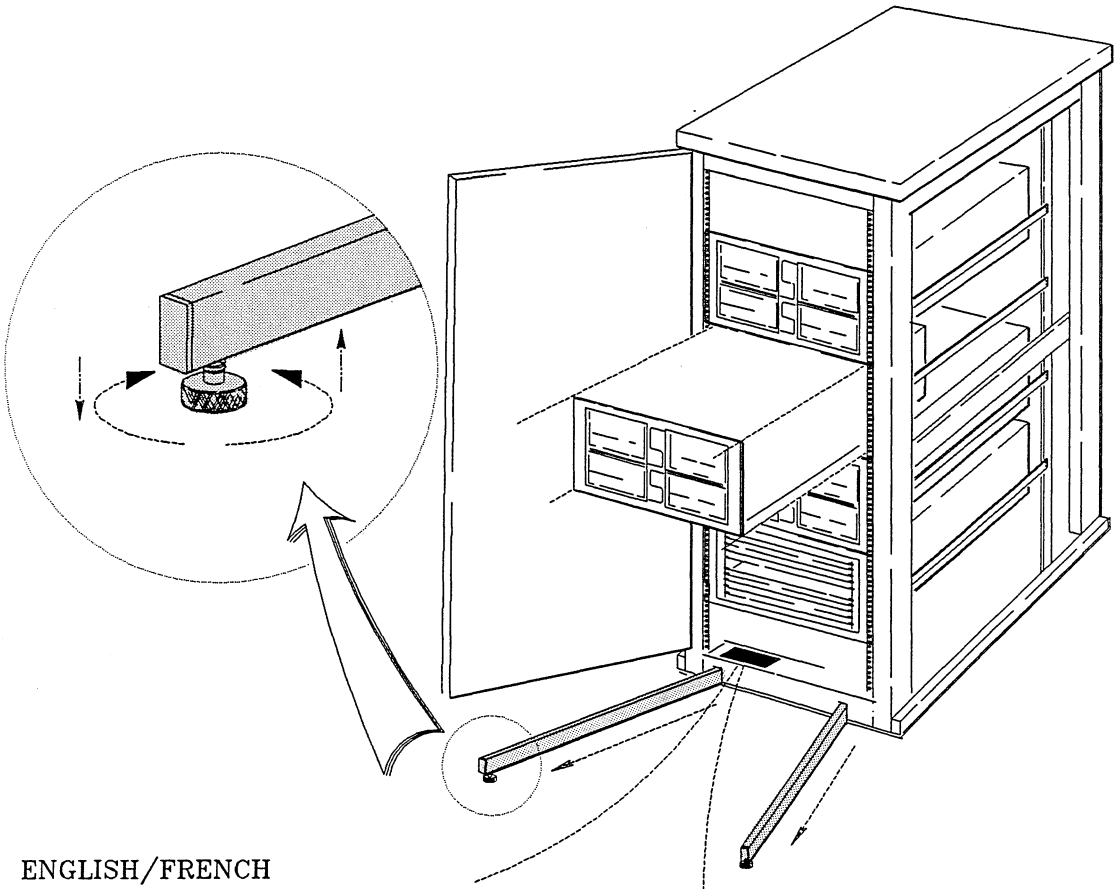
WARNING

Do not extend slide-mounted peripheral devices for servicing without first extending cabinet stabilizer bars.

Never extend more than one peripheral device at a time. Failure to do so may result in cabinet instability, injury to personnel, and damage to equipment.

CONVEX expansion cabinets have two stabilizer bars that prevent them from tipping over when peripheral devices are extended. Before installing or removing any peripheral devices from the expansion cabinet, extend these stabilizer bars. The following figure shows the stabilizer bars and caution label:

Figure 5–2, Stabilizer Bars and Caution Label



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CAUTION	ATTENTION
TO REDUCE RISK OF POSSIBLE INJURY DUE TO UNSTABLE UNIT, ACTUATE STABILIZER BEFORE ANY PERIPHERAL IS EXTENDED. 1. TO ACTUATE STABILIZER, FULLY EXTEND ANTITILT CHANNELS AND LOWER CHANNEL SUPPORT FEET FIRMLY TO THE FLOOR. 2. INSURE THAT LOCKING MECHANISMS ARE INSTALLED IN ALL OTHER EXTENDABLE UNITS. 3. NEVER EXTEND MORE THAN ONE UNIT AT A TIME.	POUR REDUIRE LE RISQUE D'ACCIDENT ATTRIBUABLE A L'INSTABILITE DE L'UNITE, DEPLOYER LES STABILISATEURS AVANT DE SORTIR LES PERIPHERIQUES. 1. POUR DEPLOYER LES STABILISATEURS, TIRER COMPLETEMENT LES BRAS ANTI-BASCULEMENT ET ABAISER LES PATTES DE FACON QU'ELLES REPOSENT SOLIDEMENT SUR LE SOL. 2. S'ASSURER QUE TOUS LES PERIPHERIQUES SONT MUNIS DE VIS DE BLOCAGE. 3. NE JAMAIS SORTIR PLUS D'UN PERIPHERIQUE A UN MOMENT DONNE.

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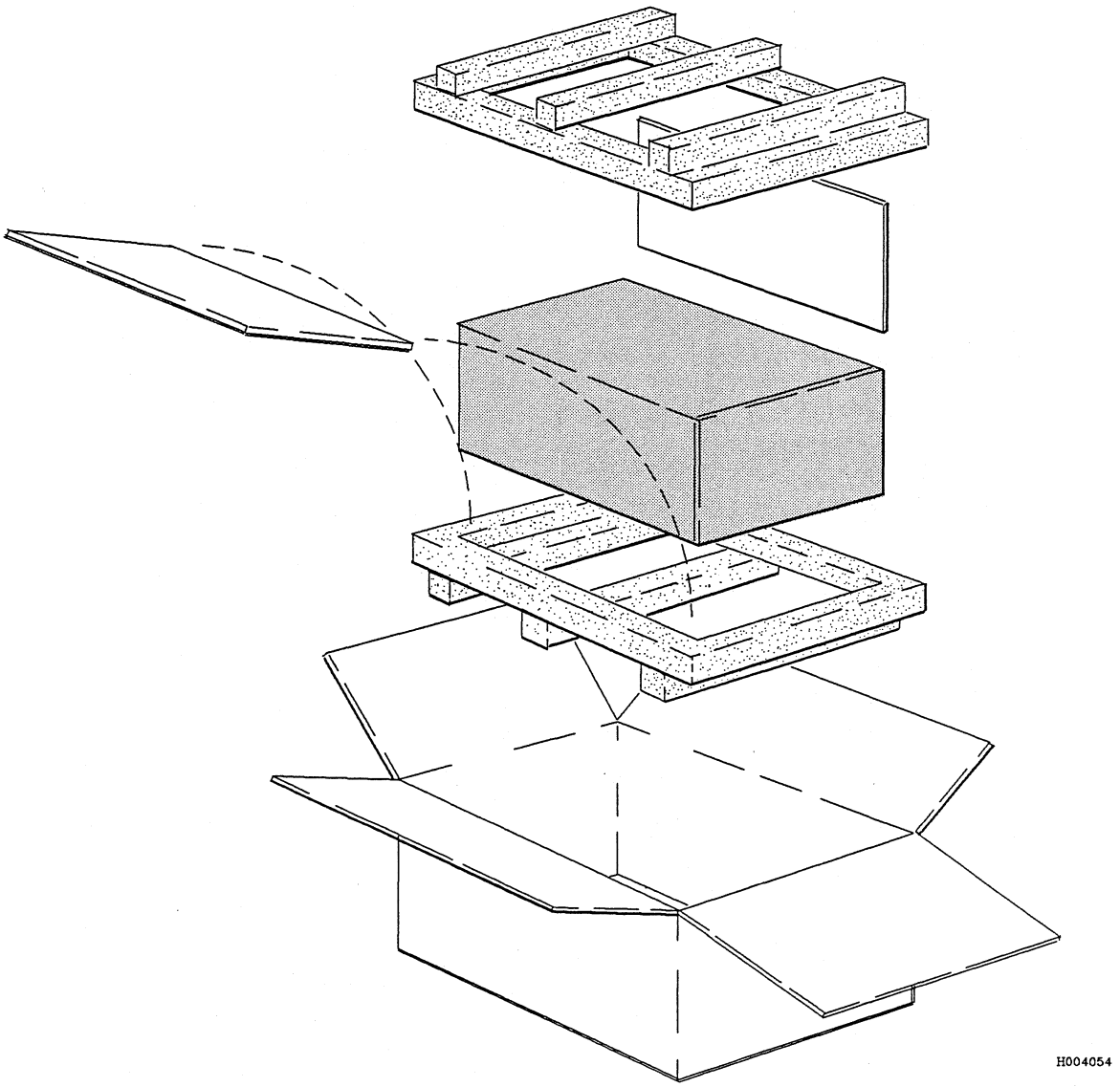
5.2.4.1 Unpacking the Multibus Chassis

The Multibus chassis is shipped with the hardware (screws, clip nuts, slides, and slide guides) for mounting in the expansion cabinet. The slides mounted on the Multibus chassis have slide guides installed. The following figure shows the packaging for the Multibus chassis:

Figure 5–3, Multibus Chassis Shipping Carton



Use the following steps to unpack the new Multibus chassis from its shipping carton and install the chassis in the expansion cabinet, if necessary.

1. Extend the stabilizer bars of the expansion cabinet.
2. Remove the Multibus chassis from its packaging.
3. Inspect the Multibus chassis for any sign of shipping damage.
4. Remove the slide guides from the slides mounted on the Multibus chassis.
5. Install the slide guides for the Multibus chassis slide rails in the expansion cabinet.
6. Slide the slotted ends of the 2 chassis slide guides in the expansion cabinet.
7. Check that the Multibus chassis is correctly seated and latched in the guide.

5.2.4.2 Transferring Controller Cards

The controller cards of the Multibus in the C1 processor cabinet may need to be transferred to the expansion cabinet that will be next to the new processor cabinet. Use the following steps to transfer the Multibus controller cards from the processor cabinet of the existing system, if necessary:

1. Remove the 4 screws that attach the card retainers to the front of the Multibus cardcage.
2. Remove the card retainers from the cardcage.
3. Remove the controller cables from the front of the Multibus cardcage.

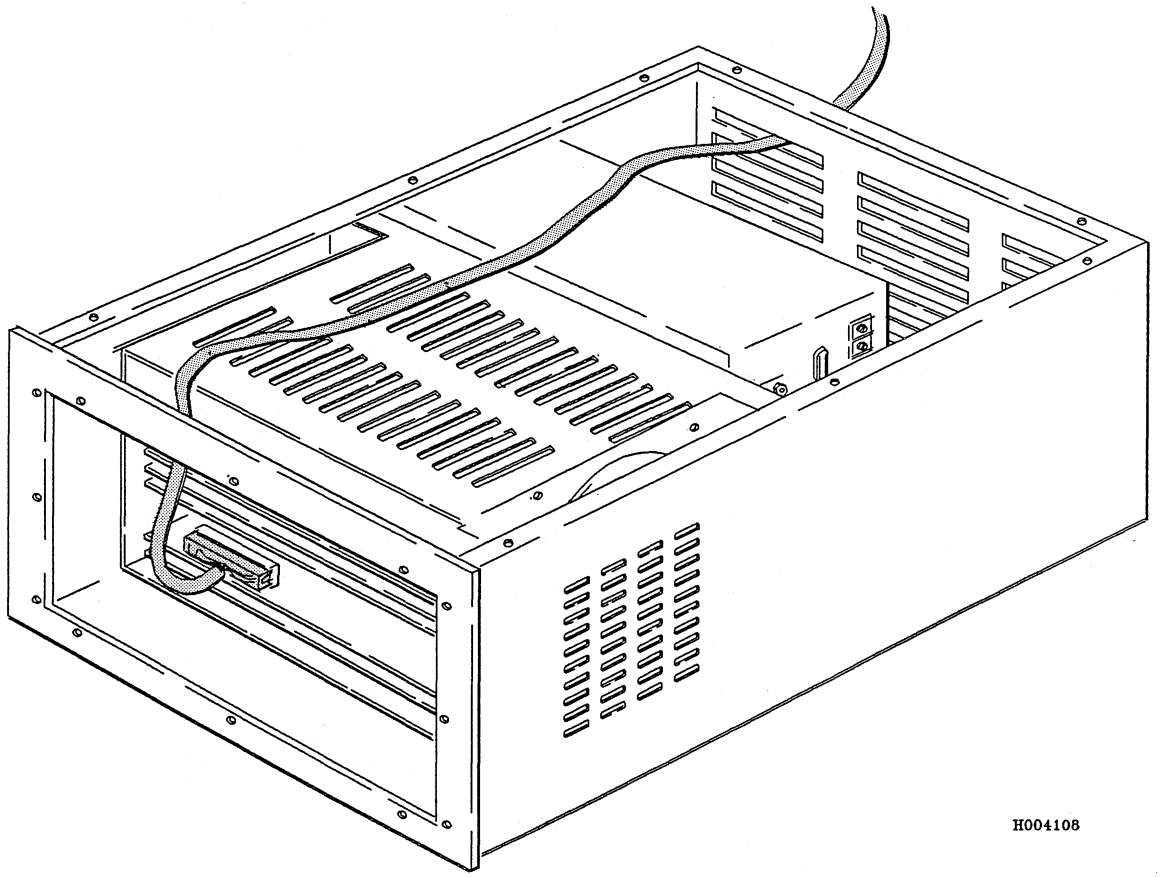
> **NOTE**
>
> Mark the connectors of the cardcage when removing the controller cables (to simplify the correct connection after transferring the cardcage to the new Multibus chassis).

4. Remove the 12 screws on the top of the Multibus chassis in the expansion cabinet to remove the top of the chassis.
5. Remove the 8 screws on the front panel of the Multibus chassis in the expansion cabinet to remove the front panel of the chassis.
6. Slide the controller cards out of the Multibus chassis in the processor cabinet.
7. Insert the controller cards into the slots of the new Multibus cardcage until the connector tabs are fully seated in the backplane connectors.
8. Mount the card retainers to the front side of the cardcage.
9. Place the top panel on the Multibus chassis.
10. Install the 4 screws that attach the card retainers to the cardcage.
11. Install the front panel of the Multibus chassis.
12. Install the 12 screws on the top panel of the chassis.

5.2.4.3 Cabling the Multibus

The following figure shows the peripheral controller cables extending from the front of the cardcage to the rear panel:

Figure 5–4, Multibus Controller Cable Routing

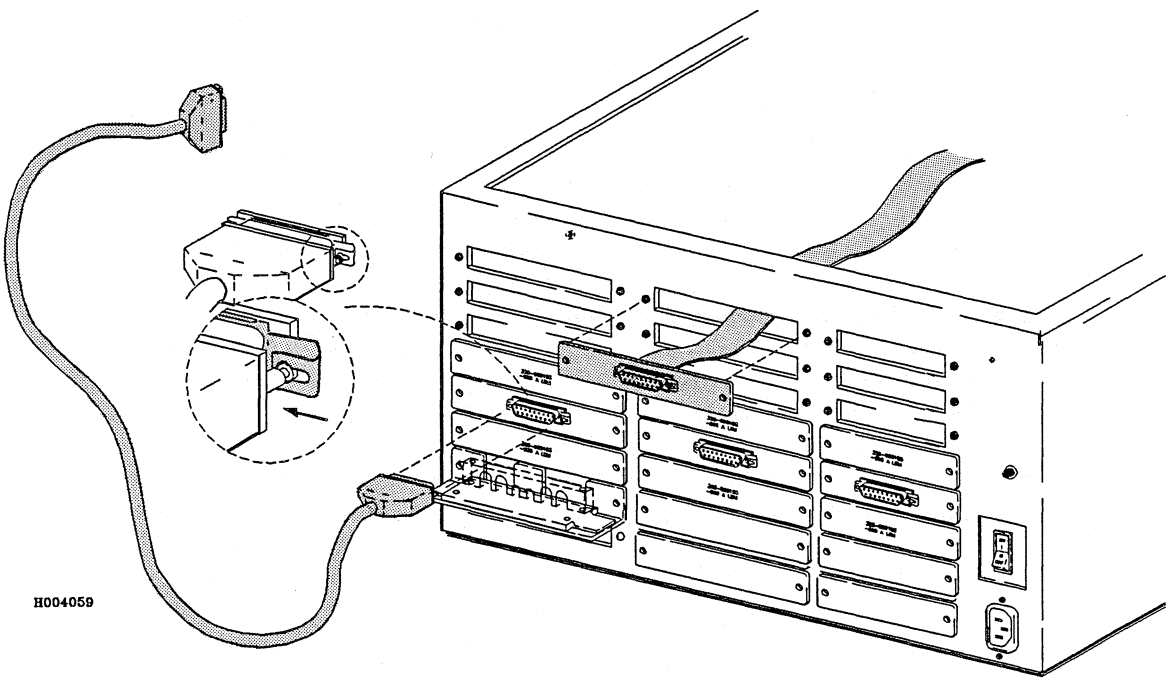


Use the following procedure to connect the controller cables from the Multibus to the peripheral devices:

1. Remove the 12 screws on the top of the Multibus chassis in the expansion Cabinet.
2. Remove the top of the chassis.
3. Remove a rear panel cable plate for each controller cable.

   The following figure shows the cabling of the Multibus to the async, printer, and ethernet devices:

Figure 5–5, Multibus Cabling — Controllers to Rear Panel



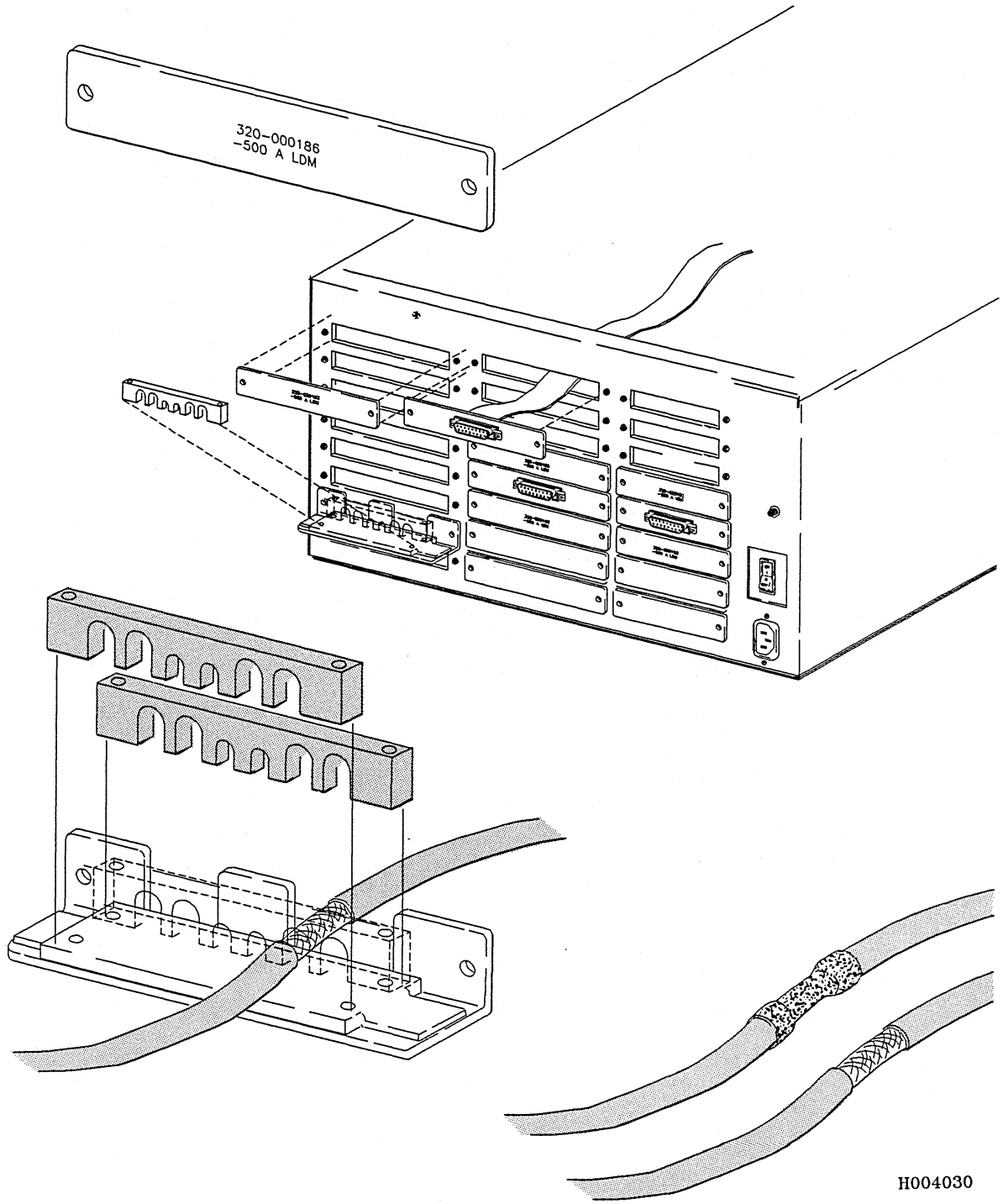
NOTE

The following 4 steps apply to the async, printer, and ethernet devices only. Use the following steps to cable the Multibus to these devices.

4. Route the peripheral controller cables from the front of the cardcage over the cardcage and to the rear panel.
5. Connect the peripheral controller cable connector to the rear panel.
6. Install the 2 screws to attach the cable connector to the rear panel.
7. Route the cable connector from the peripheral device to the connector on the rear panel.

   The following figure shows the cabling of the Multibus to the disk and tape peripheral devices:

Figure 5–6, Multibus Cabling to Disk and Tape Peripheral Devices



NOTE

The following 8 steps apply to the disk and tape controllers. Use the following steps to cable the Multibus to these devices.

8. Route the peripheral controller cables from the front of the cardcage over the cardcage and to the rear panel.
9. Remove a bulkhead mounting bracket from the rear of the Multibus chassis if it is installed on the cabinet.
10. Pass the peripheral cable through the slot in the rear panel.
11. Remove the cable clamping sleeve where the EMI shielding clamp will attach to the cable.

CAUTION

The outer cable clamp 72851233 of the mounting bracket, the bulkhead strain relief, should fit over the insulation. The inner cable clamp 72851232, the Electromagnetic Interference (EMI) shielding, should fit over the exposed braided shield.

Ensure that the cable clamp is installed properly. Failure to establish good electrical contact between the exposed cable shield and the cable clamp will result in the loss of the EMI shielding.

12. Install inner EMI cable clamp 72851232 over the exposed shield.
13. Install outer strain relief clamp 72851233 over the cable insulation.
14. Hold the mounting bracket against the bulkhead and install the 2 screws that attach it to the processor bulkhead.
15. Attach the cable connector to the peripheral device.

NOTE

Complete the following steps to finish the procedure.

16. Place the top panel on the Multibus chassis.
17. Install the 12 screws on the top panel of the chassis.
18. Install the front panel of the Multibus chassis.
19. Move the Multibus chassis to its retracted position.
20. Check that the front panel screws line up with the holes on the retaining plate.
21. Install the 4 screws that lock the Multibus to the expansion cabinet retaining plates.
22. Route the Multibus cables between the rear of the Multibus and the backplane. Refer to Chapter 4, "New System Cabinet Installation," for procedures to connect the Multibus cables to the backplane of the processor cabinet.
23. Return the expansion cabinet stabilizer bars to their retracted position.

5.2.5 Transferring the Slide-Mounted Peripheral Devices

The following sections discuss how to transfer a slide-mounted peripheral device from the existing expansion cabinet to the new expansion cabinet. Repeat the procedures for each peripheral device to be transferred.

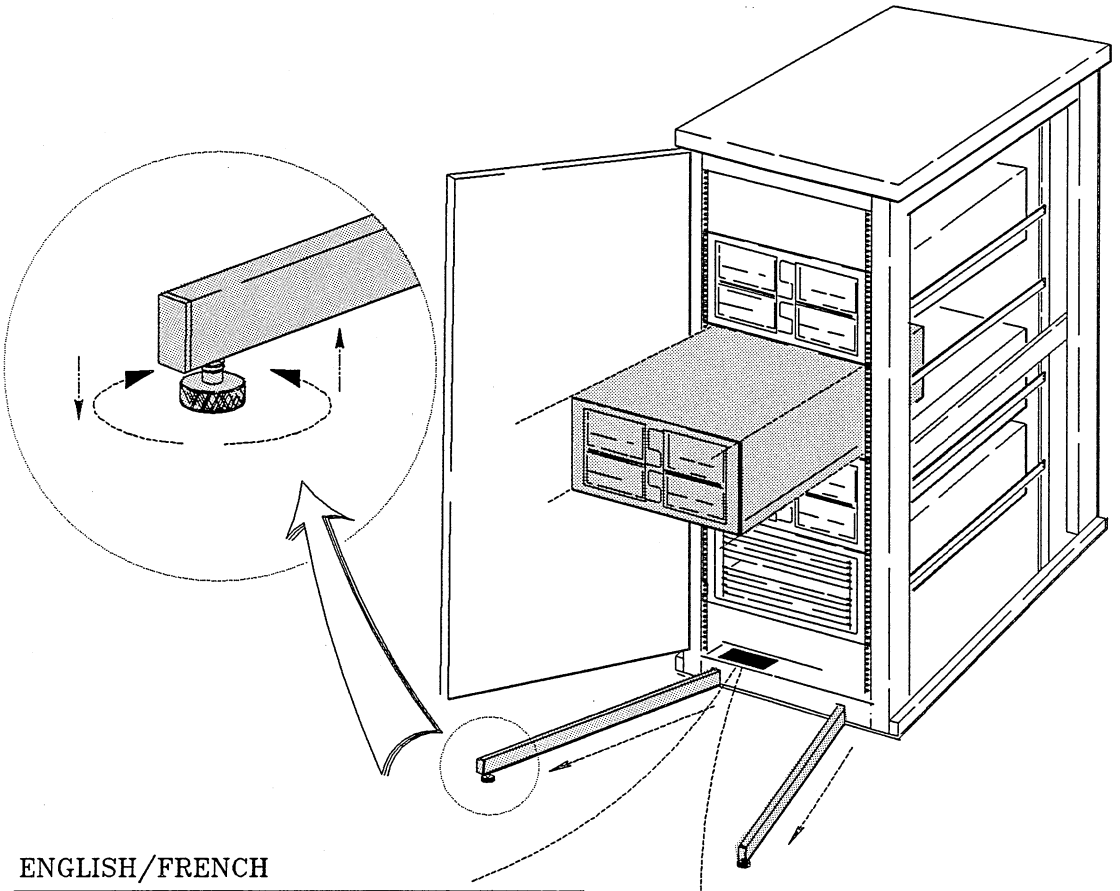
WARNING

Do not extend slide-mounted peripheral devices for servicing without first extending cabinet stabilizer bars.

Never extend more than one peripheral device at a time. Failure to do so may result in cabinet instability, injury to personnel, and damage to equipment.

CONVEX expansion cabinets have two stabilizer bars that prevent them from tipping over when peripheral devices are extended. Before removing any peripheral devices from the expansion cabinet, extend these stabilizer bars. The following figure shows the stabilizer bars and caution label:

Figure 5–7, Stabilizer Bars and Caution Label



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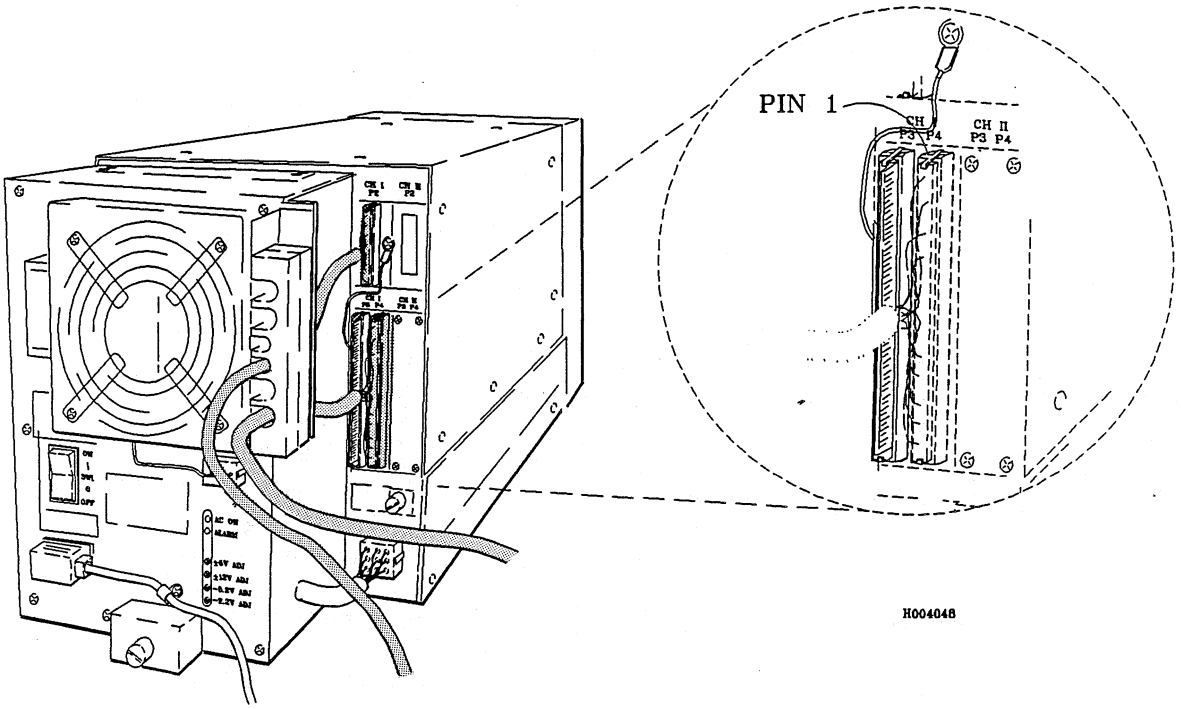
5.2.5.1 Uncabling the Peripheral Device

The following figure shows the back of an NEC disk drive including the cable connections:

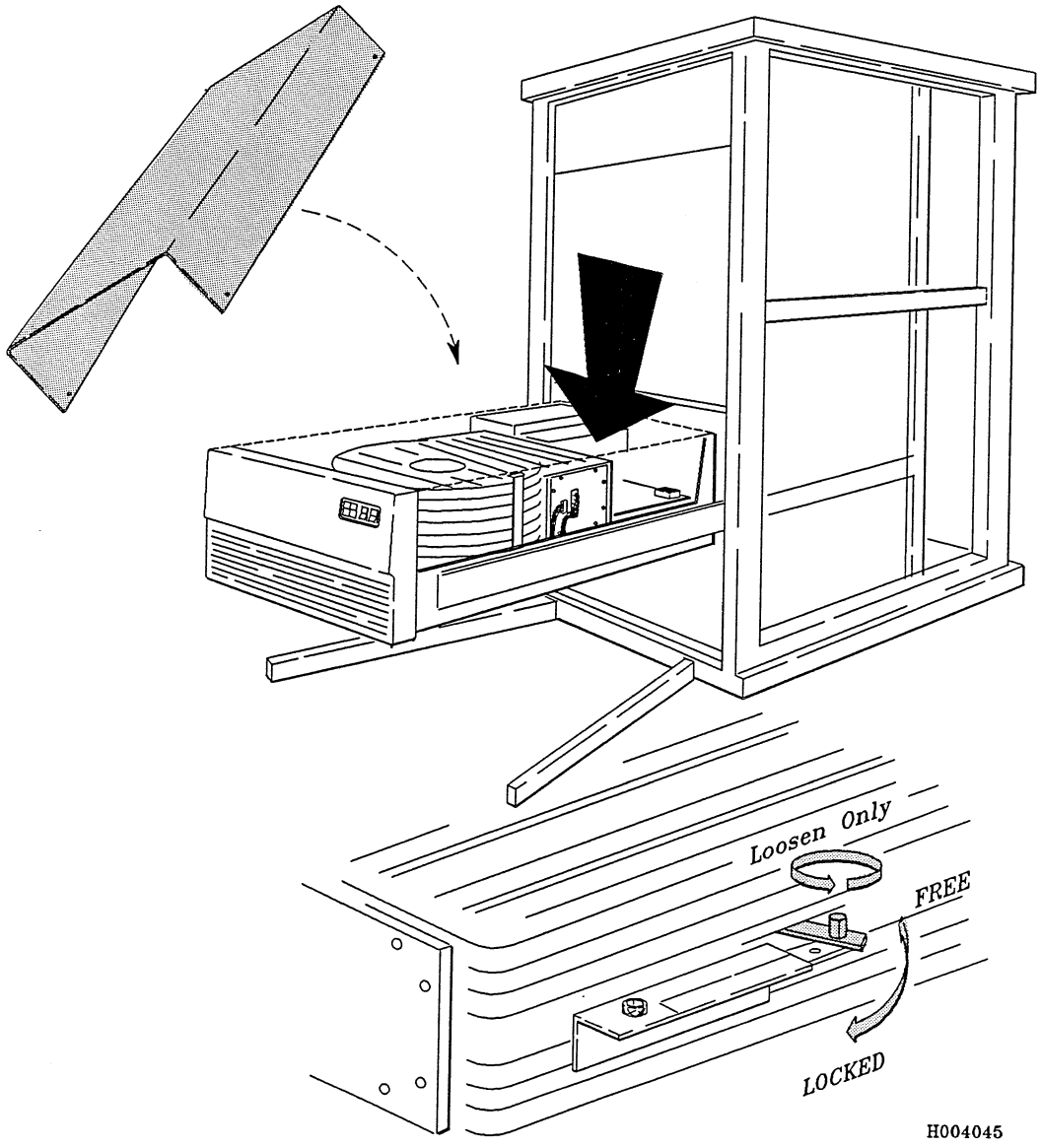
Figure 5–8, NEC Disk Drive Cable Connections



1. Extend the 2 stabilizer bars at the front of the expansion cabinet.
2. Remove the rear panel of the new and the current expansion cabinets.
3. Remove the front panel of the new and the current expansion cabinets.
4. Set the peripheral device power switch to **OFF**.
5. Disconnect the peripheral device AC power cord from the power controller.
6. Disconnect all controller cables from the rear of the peripheral device.
7. Remove the screw from the peripheral device retaining plate on both guide rails.
8. Extend the peripheral device on the guide rails.

The locking lever for the disk head is at the back lower center of the Head Disk Assembly (HDA), between the HDA and the power supply. The following figure shows the Eagle disk drive with the locking lever:

Figure 5–9, Rotary Actuator Locking/Unlocking



CAUTION

When transferring an Eagle disk drive from one expansion cabinet to another, the disk head must be locked. Failure to do so may result in damage to equipment and loss of data.

NOTE

Use the following steps, 9 through 13, to lock the disk drive head.

9. Remove the 2 cover screws on the 2 side panels of the disk drive.
10. Remove the cover of the drive.
11. Loosen the locking lever screw of the drive to free the screw tip from the hole in the lock plate.
12. Rotate the locking lever to the **LOCKED** position.
13. Secure the locking lever in the **LOCKED** position.

5.2.5.2 Transferring the Drive

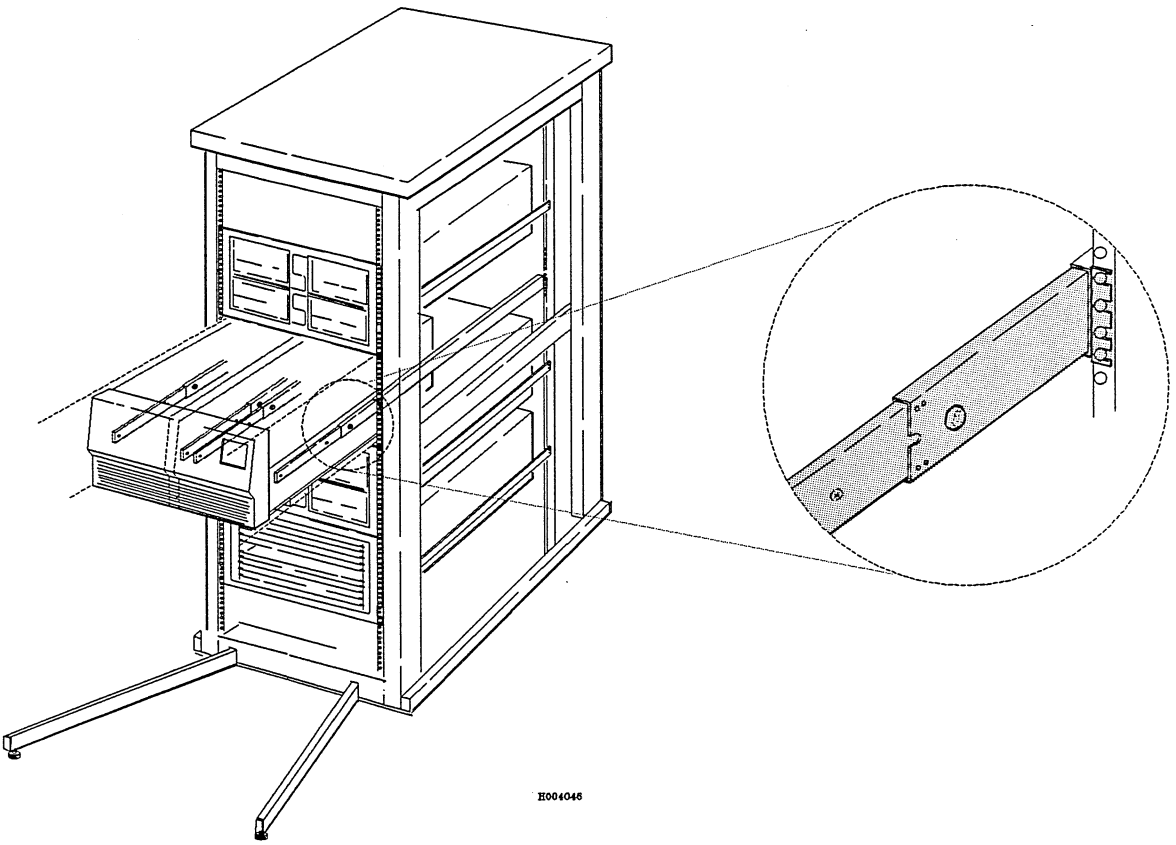
WARNING

Use care when moving CONVEX cabinets. Failure to do so may cause injury to personnel and damage to equipment.

CONVEX cabinets are not top-heavy, but may tip over when being moved. Because of the weight of the peripheral devices, injury to personnel or damage to equipment may result unless two people are available to install them.

The following figure shows the guide rails and the slide-guide locks of the peripheral devices:

Figure 5–10, Peripheral Device Slide Rails



Use the following procedure to transfer a peripheral device from the existing expansion cabinet to the new expansion cabinet:

1. Extend the stabilizer bars of the new expansion cabinet.
2. Extend the guide rails for the peripheral device in the new expansion cabinet.
3. Release both slide-guide locks on the sides of the peripheral device in the existing cabinet.
4. Lift the peripheral device free of the expansion cabinet guide rails.
5. Slide the slotted ends of the 2 slide guides between the peripheral assembly retaining plate screws and the expansion cabinet vertical rails.
6. Check that the front panel screws line up with the holes on the retaining plate.
7. Check that the rail is correctly seated and latched in the guide.

NOTE

After transferring an Eagle disk drive from one expansion cabinet to another, the head must be unlocked. See Figure 5–9, Rotary Actuator Locking/Unlocking, for the locking lever in the Eagle disk drive.

Use the following steps, 8 through 12, to unlock the head of the Eagle disk drive.

8. Loosen the locking lever screw of the drive to free the screw tip from the hole in the lock plate.
9. Rotate the locking lever to the **FREE**, or unlocked, position.
10. Secure the locking lever in the **FREE** position.
11. Install the cover on the drive.
12. Install the 2 cover screws on the 2 side panels of the disk drive.

NOTE

Complete the procedure with the following steps.

13. Move the peripheral device to its retracted position, and secure it with the 2 front panel locking screws.
14. Install the 2 screws to the retaining plates on the guide rails.
15. Return the expansion cabinet stabilizer bars to their retracted position.

5.2.6 Cabling the Disk Drives

The peripheral devices must be recabled after being transferred to the new expansion cabinet. The cabling includes the controller cables and the AC power cable for the device.

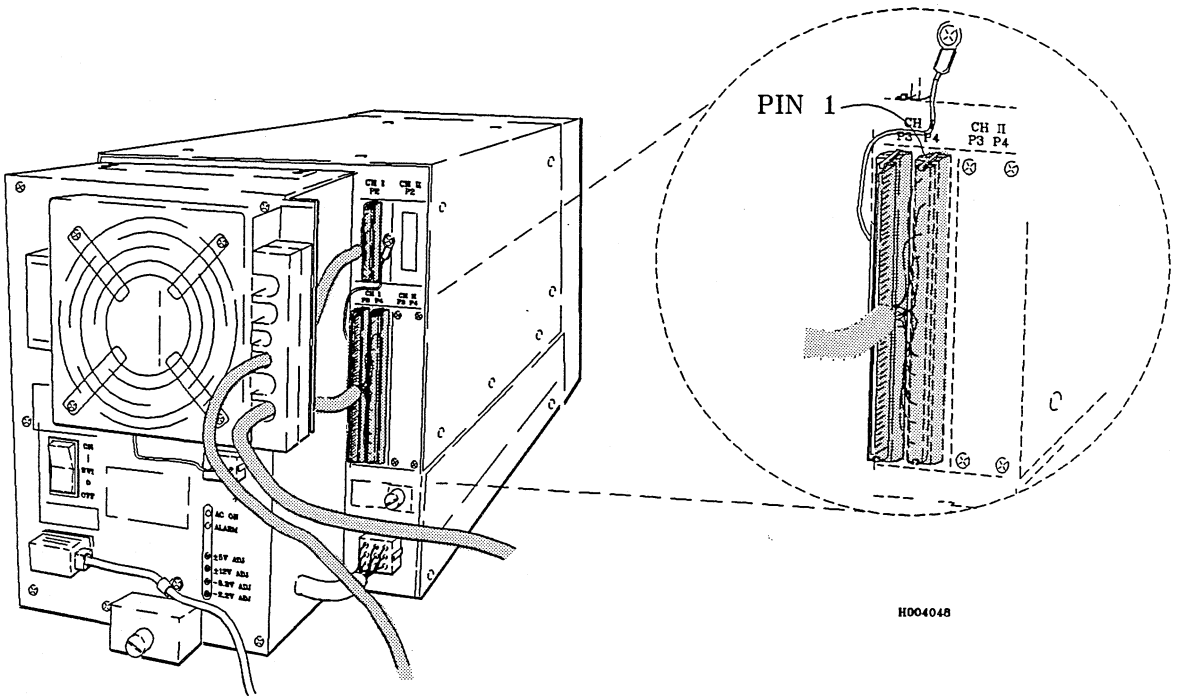
After cabling the peripheral device to the controller, refer to Chapter 4, "New System Cabinet Installation," section 2, "Cabling," for information on cabling the peripheral device to the processor cabinet.

A single DKC–202 controller can control up to four storage modules in a daisy-chain configuration. The two drives connect via the A cable. The first drive of a daisy chain, or a single drive, is "drive 0;" the second drive in a daisy chain is "drive 1." The last drive in a daisy-chain configuration, or a single drive attached to a controller, must have a terminator network installed on the **CNP42** connector.

5.2.6.1 Non-Daisy-Chained Controller Cables

The following figure shows the cable connections and the terminating pin for a single NEC disk drive:

Figure 5–11, Non-Daisy-Chained Disk Drive Cabling



Use the following procedure to cable a non-daisy-chained disk drive:

1. Route an "A" 60-pin cable between the **J3** connector on the controller and the **CNP41** connector on the rear of the disk drive.
2. Route the "B" 25-pin cable between the **CNP43** connector on the rear of the disk drive and either the **J1**, **J2**, **J4**, or **J5** connector on the controller.
3. Install a 60-pin terminator on the **CNP42** connector at the rear of the drive.
4. Check that the drive address switch for the disk drive is set to **0** then set the peripheral device power switch to **ON**.

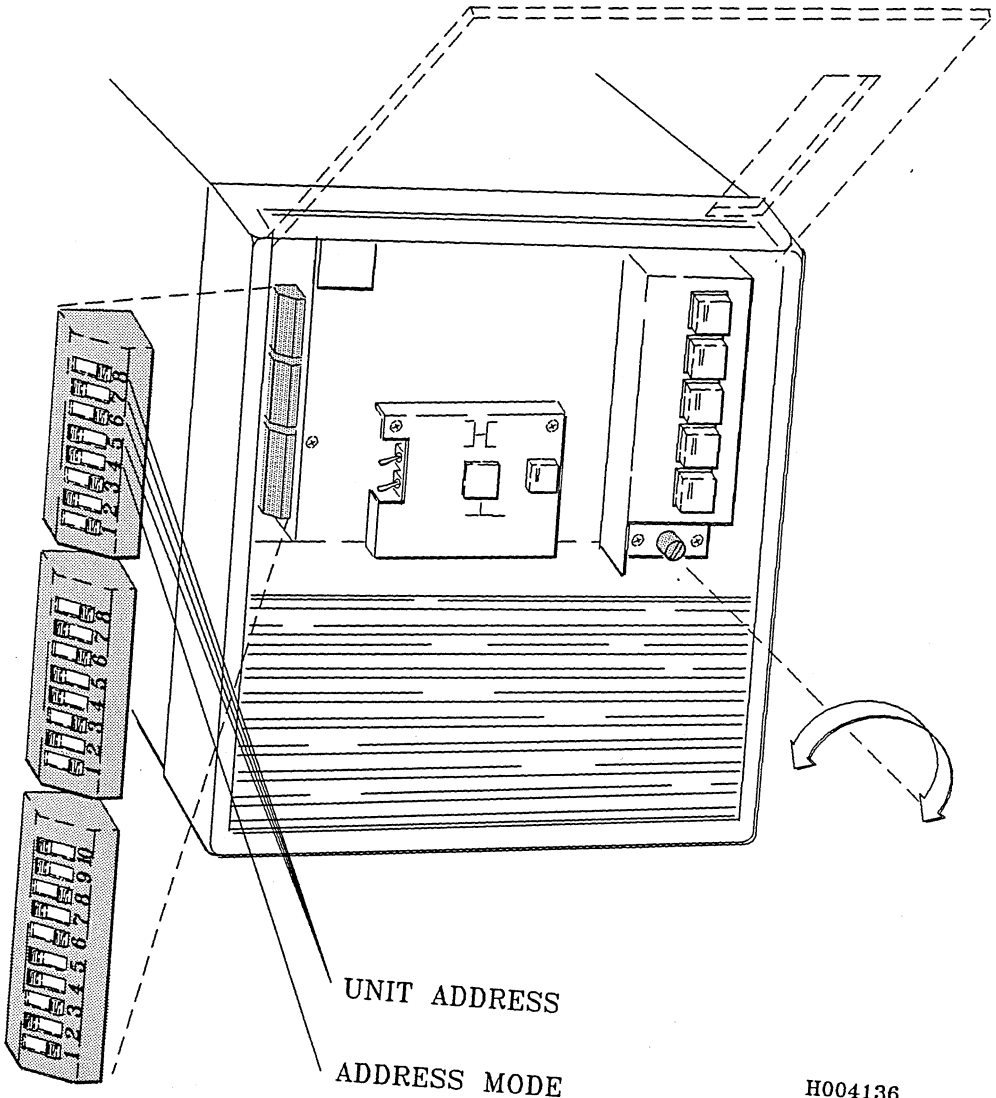
The drive address switch, or unit address switch, of an NEC disk drive is located behind the front panel on the left side of the drive. Set switch bits 5 through 8 of Switch 1 (SW1) to set the drive address. Ensure that the unit address control knob, located behind the front panel on the lower right side of the drive, is set to **0**. Refer to the *NEC 9-inch Winchester Disk Drive Manual* for more information on the NEC disk drive. The following table lists the switch bits and their function names:

Table 5–1, NEC Disk Drive Address Switch Bits

SWITCH BIT	FUNCTION NAME	POSITION 1	POSITION 0
8	Unit address 2^3	True	False
7	Unit address 2^2	True	False
6	Unit address 2^1	True	False
5	Unit address 2^0	True	False
4	Address mode	4-bit enable	2-bit enable

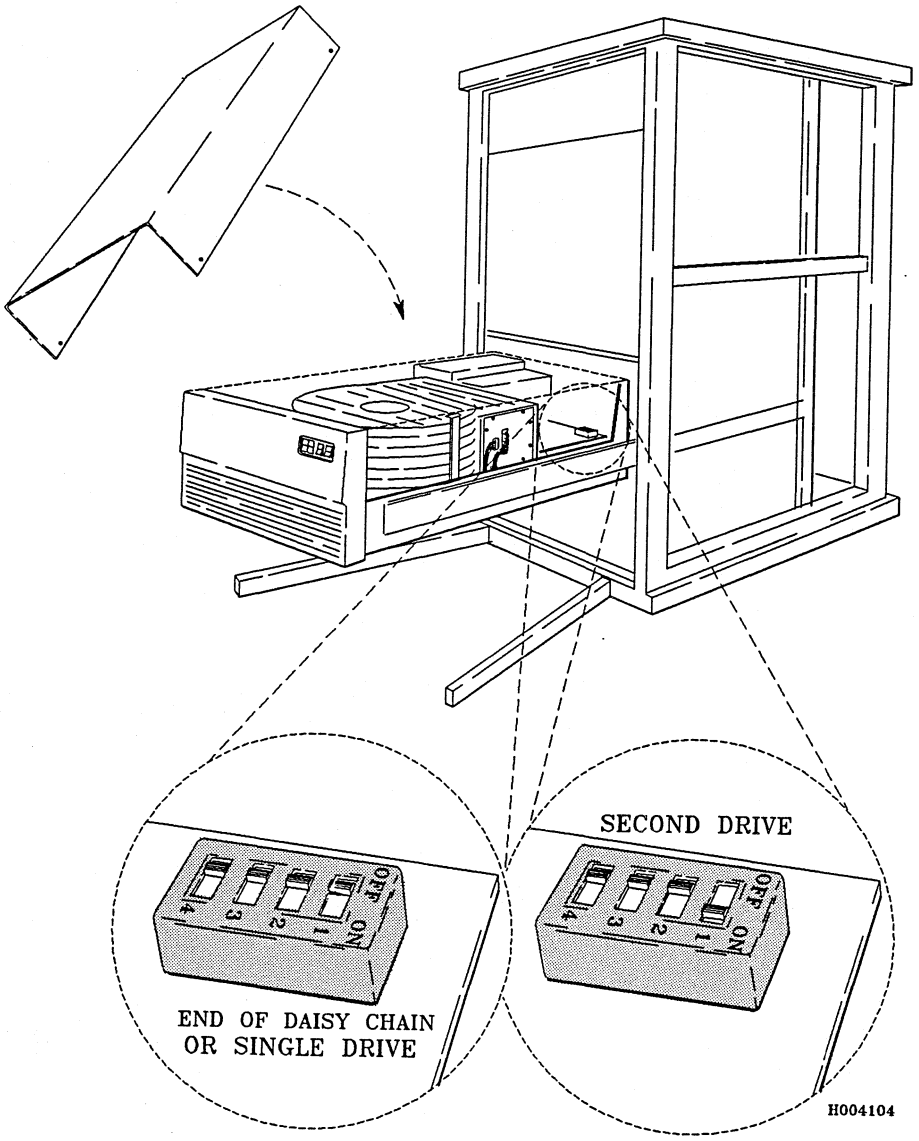
The following figure shows the location of the drive address switches for the NEC disk drive:

Figure 5–12, NEC Disk Drive Address Switches



The drive address switch of an Eagle disk drive is located at the right rear of the drive. The following figure shows the drive address switch for an eagle disk drive:

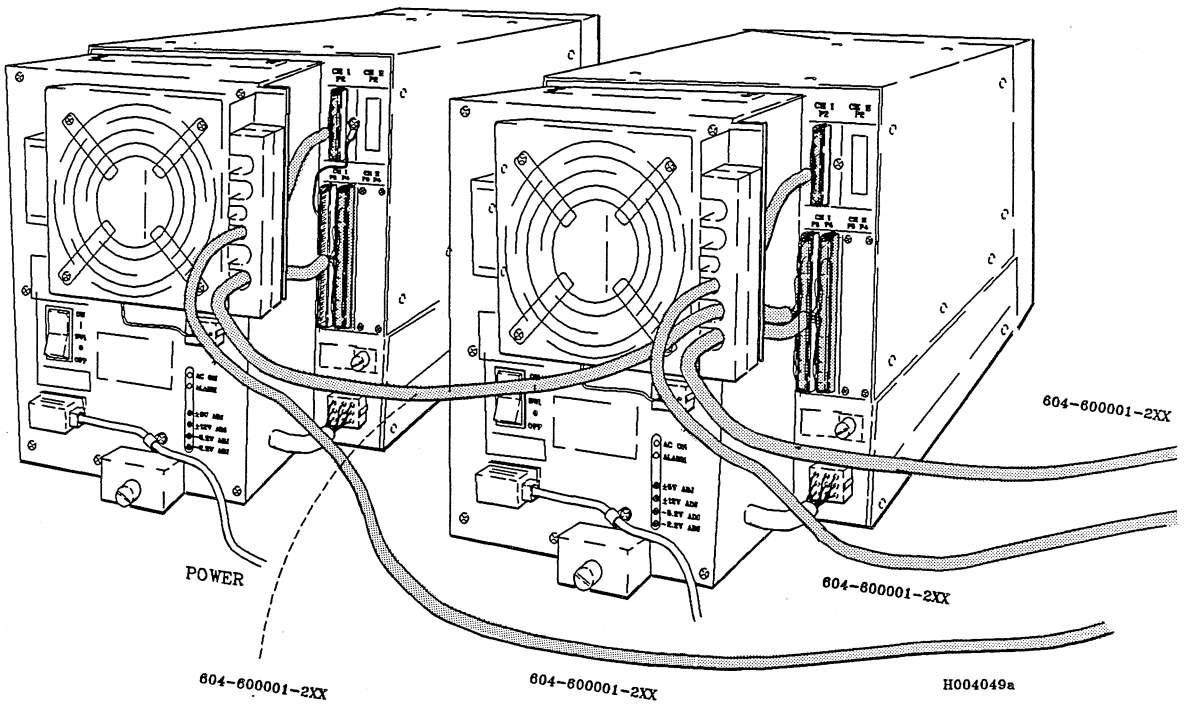
Figure 5–13, Eagle Disk Drive Address Switch



5.2.6.2 Daisy-Chained Controller Cables

The following figure shows both the cable connections and the drive address jumpers for a daisy-chained disk drive:

Figure 5–14, Daisy-Chained Disk Drive Cabling



Use the following procedure to cable a daisy-chained disk drive:

1. Route an "A" 60-pin cable for the first drive between the **J3** connector on the controller and the **CNP41** connector at the rear of the drive.
2. Route an "A" 60-pin cable between the **CNP42** connector on the first drive and the **CNP41** connector at the rear of the second disk drive.
3. Install a 60-pin terminator in the **CNP42** connector at the rear of the second drive.
4. Route a "B" 25-pin cable between the **CNP43** connector on the rear of the first drive to the **J1** connector on the controller.
5. Route a "B" 25-pin cable between the **CNP43** connector on the rear of the second drive and either the **J2**, **J4**, or **J5** connector on the controller.
6. Check that the drive address switch for the first disk drive is set to **0**. The drive address switch is located at the right rear of the drive. See Figure 5–8, Disk Drive Address Switch, for the location of the drive address switch.
7. Check that the drive address switch for the second disk drive is set to **1**. The drive address switch is located at the right rear of the drive. See Figure 5–8, Disk Drive Address Switch, for the location of the drive address switch.
8. Set the peripheral device power switch to **ON**.

5.2.7 VMEbus Input/Output Processor Cables

Refer to the *CONVEX VIOP/VBCU Service Guide* for information and instructions on installing the VIOP cables.

5.2.8 Removable Disk System Cables

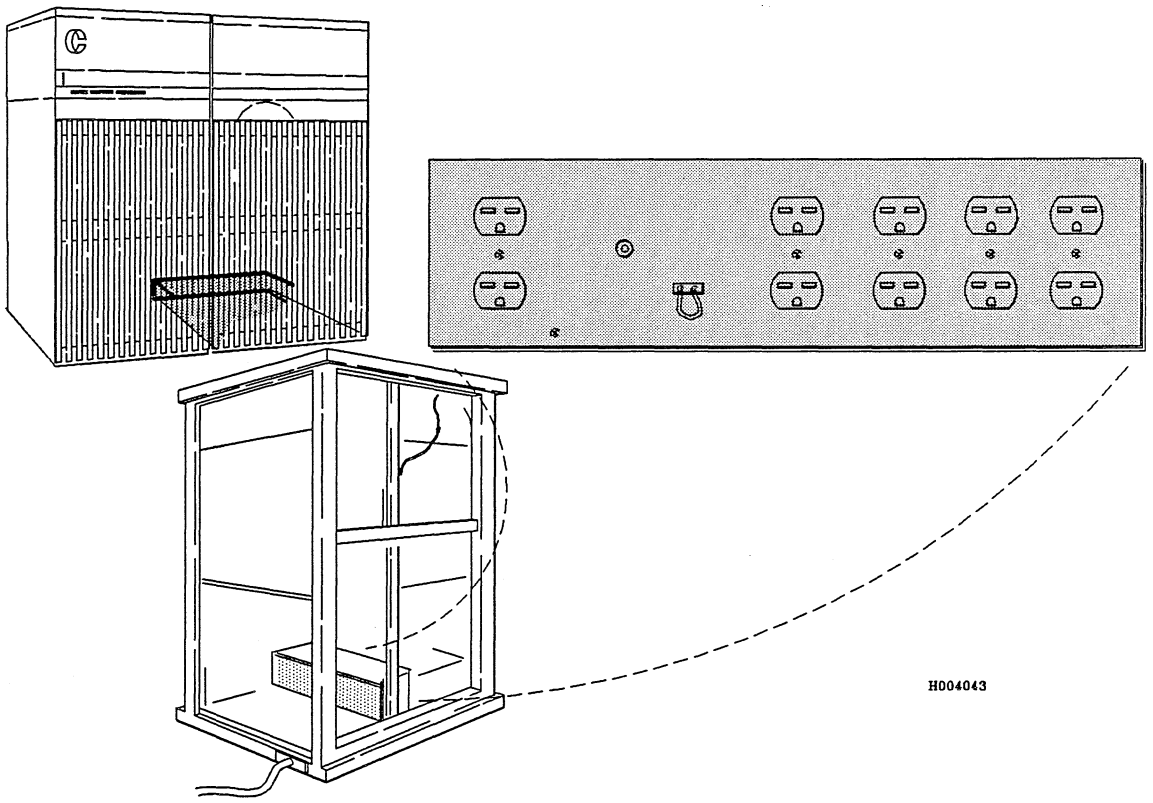
Refer to the *CONVEX Removable Disk System Operation Guide* for information on configuring and installing the RDS system.

5.2.9 AC Power Power Sequencing Cables

The power sequencing cable allows control of expansion cabinet AC power from the processor cabinet power control unit. The expansion cabinet power controller provides 120 VAC to the peripheral devices. For a new system, check that the peripheral devices are plugged into the power controller in the expansion cabinet. Plug the remote power sequencing cable from the expansion cabinet to its connector on the bulkhead of the processor cabinet.

The AC outlets of the power controller are at the rear of the expansion cabinet, under the peripheral equipment, and face the front of the cabinet. Each controller requires 120 VAC single phase 30 amp branch distribution and has a maximum current of 24 amp. The following figure shows the location of the power controller in the expansion cabinet:

Figure 5–15, Expansion Cabinet Power Controller



Plug all peripheral equipment AC power cords into the power controller outlets in the expansion cabinet. Distribute the AC plugs of the peripheral equipment evenly across the AC power controller so the load is balanced.

5.2.10 Installing the Cabinets

Refer to Chapter 4, "New System Cabinet Installation," for procedures to install the C210 processor cabinet at the site.

5.3 C210 to C220 Upgrade

To upgrade the C210 system to a C220 system, install the processor card set A and power supplies PS4, PS7, and PS8 in the processor cabinet. Check that the existing processor card set B is at the minimum revision level. Refer to Volume VI, *CONVEX Removal/Replacement and IPB Guide (C201, C202, C210, C220)*, for procedures on installing the processor card set and for information on the power supplies.

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Chapter 6
AC Power

6.1 Overview

Once a CONVEX C201, C202, C210, or C220 computer processor cabinet has been unpacked and moved into position, it must be connected to a source of AC power and the AC power checked before the system is powered up. This chapter describes the details of these activities, which vary according to the customer location.

6.1.1 Power Connections

Systems for customers in the USA, Canada, Japan, and certain other Asian countries (termed "domestic" in this document) have an AC power plug on a 4-wire AC power cord. These systems may connect to either a delta or wye power source of 200–208 VAC phase to phase (nominal).

Systems shipped to other countries (termed "international" in this document) have a 5-wire AC power cord that must be hard-wired into a wye power source of either 220 or 240 VAC phase to neutral (nominal) at installation.

6.1.2 Wiring and Voltages Checks

> **WARNING**
>
> Do not set site AC circuit breakers serving the processor cabinet to **ON** before verifying that the cabinet has been wired into the site AC power supply correctly. Failure to do so may result in injury to personnel or damage to equipment when AC power is applied to the cabinet.

> **CAUTION**
>
> Do not set the processor cabinet main circuit breakers on the power controller to **ON** before verifying that AC input power is within limits and the power controller voltage selector switch is set to match the input voltage. Failure to do so may cause damage to equipment.

Always verify that the AC power cord is wired into the AC power supply correctly (wiring check) before applying AC power to the cabinet (the *site* AC circuit breakers serving the processor cabinet are set to **ON**).

Verify the following items before applying AC power to the cabinet and setting the main circuit breakers on the processor cabinet power controller to **ON**:

- AC voltage is within limits
- Power controller voltage selection switch is set to match the input voltage
- Safety warning labels on the cabinet are correct

Detailed discussions and procedures for these items appear in the following sections.

6.2 AC Power Connections

This section explains how to attach the processor cabinet to the site AC power supply. Refer to Volume VI, *CONVEX Removal/Replacement and IPB Guide*, for procedures to remove equipment for this procedure.

6.2.1 Domestic Systems

CONVEX C201, C202, C210, and C220 computers for domestic customers are configured as a 3Ø delta load that may connect to either a 208 VAC (nominal, phase to phase) delta or wye 3Ø AC power source.

Domestic systems have a 4-wire AC power cord, 6 feet in length that terminates with an AC power plug. The matching AC power receptacle, however, may or may not be installed at the site when the field engineer (FE) arrives to install the system.

If the AC power receptacle is installed, the FE need only to mate the AC power connector and verify correct wiring and voltage levels at the processor cabinet to complete the AC power installation.

If the AC power receptacle has not been installed when the FE arrives, it will have to be installed before the FE can connect the system to the AC power supply and perform the wiring and voltage checks.

If the system is to be hard-wired into the site AC power supply, the factory-installed AC power plug must be removed and the AC power cord wired into a prepared junction box after the system has been unpacked and moved into position.

In either case, the connection to the AC power (attaching the AC power receptacle to the site AC power supply or wiring the AC power cord into the junction box) may be performed by the FE, by site facilities personnel, or by an outside electrical contractor, as required.

Consult the site systems administrator in advance to determine what the requirements are, and to coordinate the AC power connection with the system installation.

6.2.1.1 Delta vs. Wye AC Power Source

Although a processor cabinet for a domestic customer is configured as a 3Ø phase *delta load*, it can be operated from a *wye source* if it is connected as follows:

1. Connect the ground conductor from the wye power source to the processor cabinet ground conductor.
2. Connect each phase conductor from the wye power source to the matching processor cabinet phase conductor.
3. The neutral conductor from the wye power source is *NOT* connected and should be isolated/insulated.

This connection scheme does not adversely affect either the processor or the power source.

6.2.1.2 Attaching AC Power Receptacle

WARNING

A licensed electrician knowledgeable of local codes is required when attaching a receptacle to the site AC power supply or wiring the AC power cord into the site AC power supply. Failure to comply may violate local laws and cause injury to personnel or damage to equipment.

The AC power receptacle (CONVEX part number 303-000026-002, HUBBELL part number 4100C9W) mates with the AC power plug installed on the processor cabinet AC power cord at the factory before shipment.

Before beginning the task, consider the following:

- Observe all local electrical codes and practices.
- The AC power receptacle should connect to the site AC power supply via conductors routed through flexible metal conduit or via approved AC power cable before processor cabinet installation.
- If AC power cable is selected, ensure that it is properly sized, service rated, temperature rated, and complies with all applicable codes and regulations.
- If conductors in conduit is selected, ensure that the conductors are properly sized, service rated, temperature rated, are color coded, and comply with all applicable codes and regulations. A conduit adapter (CONVEX part number 312-00299-002, HUBBELL part number SAD-125) will be needed to properly seal the receptacle to the conduit. (Receptacle with conduit adapter can be purchased under CONVEX marketing number REC-200.)
- Ensure that the AC power cable or conduit is long enough to reach from the site AC power junction box to a location within 3 feet of the rear of the processor cabinet when it is moved into position. Be aware that AC power cables and conduits of this size are stiff and are difficult to bend sharply.
- If the AC power cable or conductors/conduit have not already been wired into the site AC power supply junction box, attach the receptacle first, and then wire the other end into the junction box.

The receptacle should be attached in strict accordance with all applicable local codes as well as with the manufacturer's instructions, by qualified personnel. A general list of steps follows, however:

1. Ensure that the site circuit breakers serving the branch circuit for the receptacle are set to **OFF**.
2. Disassemble the receptacle (loosen 2 captive screws visible from the front of receptacle), remove the cable clamp (2 machine screws), and gland cap (4 self-tapping screws).

> **NOTE**
>
> Use the following 4 steps, 3 through 6, to attach the receptacle to an AC power cable.

3. Examine the configuration of the receptacle terminals and select the end of the AC power cable whose color coding most closely matches the receptacle terminal configuration (phases, ground).
4. Strip 4.5 inches of jacket from the cable, taking care to not damage the insulation of the internal conductors.
5. Select a gland (from those packaged with the connector) with an inside diameter about 1/8 inch larger than the AC power cable.
6. Slide the gland cap, the gland, and the receptacle housing (in that order) up the AC cable.

NOTE

Use the following 3 steps, 7 through 9, to attach the receptacle to conductors in conduit.

7. Arrange the conductors so that their color coding matches the receptacle terminal configuration.
8. Select a gland (from those packaged with the adapter) with an inside diameter about 1/8 inch larger than the conduit.
9. Slide the conduit adapter, the gland, and the receptacle housing up the conduit (in that order).

NOTE

Use the following steps to complete the procedure.

10. Strip off 1.5 inches of insulation (taking care to not damage conductor strands) and twist the strands together for each conductor, or as directed by the manufacturer's instructions.
11. Back the screws out of each terminal enough to allow the conductor to be inserted without interference.
12. Install the conductors into the receptacle terminals, taking care that each conductor is attached to the correct terminal on the receptacle (phase to phase, and ground to ground). The terminals on the receptacle are clearly marked. Note and write down which color conductor connects to each terminal (to simplify the correct connection of the opposite end to the junction box).
13. Tighten the screws of each terminal to 75 in/lb (2 screws per terminal) or as directed by the manufacturer's instructions.
14. *Be absolutely certain that the ground conductor connects to the ground terminal of the receptacle.*
15. Slide the receptacle housing down over the terminal block and tighten the 2 captive screws until the terminal block is fully seated in the housing (the screws may continue to turn after this point is reached).
16. For AC power cable:
    - Slide the gland and the gland cap down to the housing, attach the gland cap with 4 self-tapping screws, and tighten the screws until the gland cap is flush with the housing.
17. For conduit:
    - Slide the gland and the conduit adapter down to the housing, attach the conduit adapter with 4 self-tapping screws, and tighten the screws until the conduit adapter is flush with the housing.
18. Assemble the conduit clamp and tighten the screws evenly to 15 in-Lb, or as directed by the manufacturer's instructions.

Connecting the Receptacle to Site AC Power

Complete the following procedure if the other end of the AC power cable or conductors/conduit has not been wired into the site AC power supply junction box:

1. Ensure that the site circuit breakers serving the junction box to which the receptacle attaches are set to **OFF**.
2. Anchor the receptacle in its optimum location (3 feet or closer to the rear of the processor cabinet) and route the opposite end of the AC power cable or conduit to the junction box.
3. Open the junction box and prepare the end of the AC power cable or conductors/conduit in accordance with the requirements of the cable entrance to the box and the connection points inside the junction box.
4. Route the prepared conductors through the cable entrance to the junction box then to their connection points inside the junction box. Connect ground to ground, and phase to phase. Use the color/phase information that was noted when the receptacle was attached to the opposite end.
5. *Be absolutely certain that the ground conductor connects to the ground terminal of the junction box.*
6. Attach the conduit or AC power cable jacket to the junction box cable clamp/strain relief as required taking care to ensure good electrical contact between the junction box and the conduit, if applicable.
7. Close the junction box.

Connecting the AC Power Plug to the Receptacle

Use the following procedure to mate the processor cabinet AC power plug to the receptacle:

1. Line up the key on the plug with the groove in the receptacle.
2. Push the plug into the receptacle.
3. Ensure that the connector halves are seated then engage and rotate the locking collar (about half a turn) to lock the connector.
4. *DO NOT* set the site AC circuit breakers serving processor cabinet to **ON** until after verifying that the wiring is correct (refer to section 6-3, "AC Power Check").

6.2.1.3 Hard-Wired Connection

If a domestic system is to be hard-wired into the site AC power supply, the factory-installed AC power plug must be removed and the AC power cord wired into a prepared junction box after the system has been unpacked and moved into position.

Removing the AC Power Plug

Use the following procedure for removing the factory-installed AC power plug from the AC power cord:

1. Disassemble the plug (loosen 2 captive screws visible from the front of plug), remove the cable clamp (2 machine screws), and gland cap (4 self-tapping screws).
2. Slide the gland cap, the gland, and the plug housing up the AC power cord.
3. Back the screws out of each terminal far enough to allow the conductor to be removed without damage.
4. Pull the conductors from each terminal then run the terminal screws back in so they will not interfere with the housing when the plug is reassembled.
5. Slide the plug housing, gland, and gland cap off the AC power cord.
6. Reassemble the plug and secure the screws.

Connecting the AC Power Cord

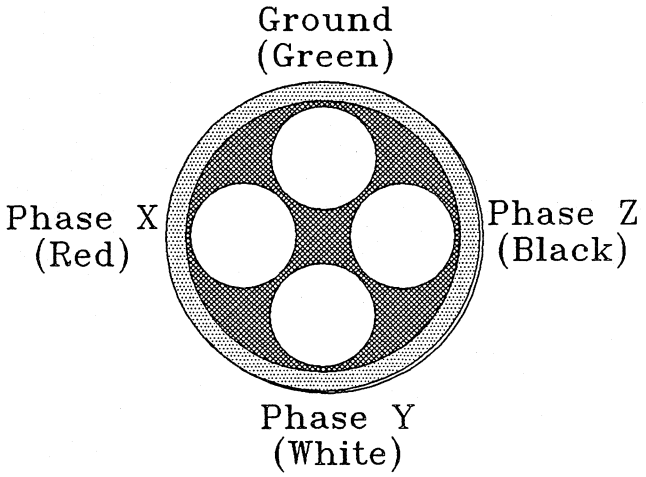
Once the processor cabinet has been moved to its final location and the AC power plug has been removed, the AC power cord can be wired into a prepared junction box.

Ensure that the junction box is located near the rear of the processor cabinet (within about 3 feet) so that the AC power cord will reach.

> **NOTE**
>
> An AC power cord of this size is stiff and difficult to bend sharply.

The following figure shows the conductor configuration within the AC power cord:

Figure 6–1, AC Power Cord Conductor Configuration (Domestic)



Use the following procedure to connect the AC power cord for a domestic system:

1. Ensure that the site circuit breakers serving the junction box to which the AC power cord connects are set to **OFF**.
2. Open the junction box and prepare the end of the AC power cord in accordance with the requirements of the cable entrance to the box and the connection points inside the junction box.
3. Route the prepared conductors through the cable entrance to the junction box then to their connection points inside the junction box.
4. Use the color/location/phase information in the previous figure to identify the correct conductors for each phase.
5. Connect the green conductor to ground.
6. Connect the red conductor to phase X.
7. Connect the white conductor to phase Y.
8. Connect the black conductor to phase Z.
9. *Be absolutely certain that the green ground conductor connects to the ground terminal of the junction box.*

NOTE

The three phases are labeled differently at the AC input power filter studs than for the AC power cable conductors.

- Connect the green conductor to input stud G.
- Connect the red conductor to input stud A.
- Connect the white conductor to input stud B.
- Connect the black conductor to input stud C.

10. Attach the AC power cord jacket to the junction box cable clamp/strain relief as required.
11. Close the junction box.
12. *DO NOT* set the site circuit breakers serving the junction box to **ON** until after verifying that the wiring is correct (refer to section 6-3, "AC Power Check").

6.2.2 International Systems

WARNING

A licensed electrician knowledgeable of local codes is required when connecting the main AC power cord to the site AC power supply. Failure to comply may violate local laws and cause injury to personnel or damage to equipment.

CONVEX C201, C202, C210, and C220 computers for international customers are configured as a 3Ø wye load that may connect to either a 220 or 240 VAC (nominal, phase to neutral) 3Ø (wye) AC power source.

International systems have a 5-wire AC power cord, 6 feet in length that terminates in pigtail leads. The AC power cord must be hard-wired into the site AC electrical supply (via a prepared junction box) at installation.

The connection to the site AC power supply (wiring the AC power cord into the junction box) may be performed by the Field Engineer (FE), by site facilities personnel, or by an outside electrical contractor, as required.

Consult the site systems administrator in advance to determine what the requirements are and to coordinate the AC power connection with the system installation.

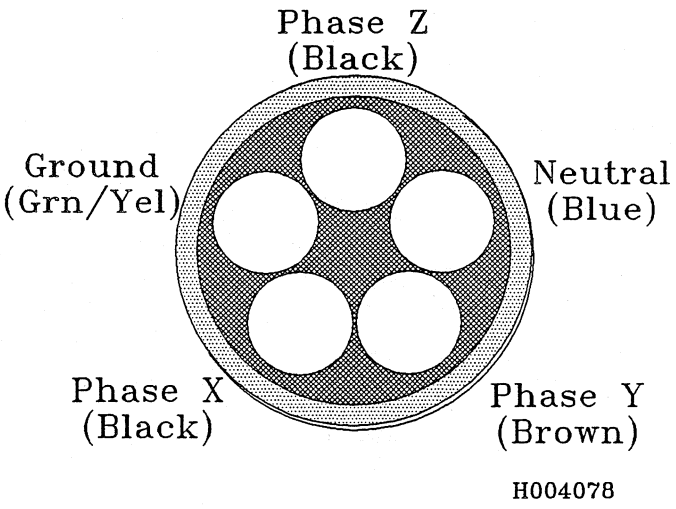
Once the processor cabinet has been moved to its final location, the AC power cord can be wired into a prepared junction box.

Ensure that the junction box is located near the rear of the processor cabinet (within about 3 feet) so that the AC power cord of the processor reaches the box.

> **NOTE**
>
> An AC power cord of this size is stiff and difficult to bend sharply.

The following figure shows conductor configuration within the AC power cord:

Figure 6–2, AC Power Cord Conductor Configuration (International)



Use the following procedure to connect the AC power cord for a international system:

1. Ensure that the site circuit breakers serving the junction box to which the AC power cord connects are set to **OFF**.
2. Open the junction box and prepare the end of the AC power cord in accordance with the requirements of the cable entrance to the box and the connection points inside the junction box.
3. Route the prepared conductors through the cable entrance to the junction box then to their connection points inside the junction box.
4. Use the color/location/phase information in the previous figure to identify the correct conductors for each phase.

5. Connect the green conductor to ground.
6. Connect the blue conductor to neutral.
7. Connect black conductor #1 to phase X.
8. Connect the white conductor to phase Y.
9. Connect black conductor #2 to phase Z.
10. *Be absolutely certain that the green ground conductor connects to the ground terminal of the junction box and that the blue conductor connect to the neutral terminal of the junction box.*

> **NOTE**
>
> The three phases are labeled differently at the AC input power filter studs than for the AC power cable conductors.
>
> - Connect the green conductor to input stud G.
> - Connect the blue conductor to input stud N.
> - Connect the black conductor #1 to input stud A.
> - Connect the white conductor to input stud B.
> - Connect the black conductor #2 to input stud C.

11. Attach the AC power cord jacket to the junction box cable clamp/strain relief as required.
12. Close the junction box.
13. *DO NOT* set the site circuit breakers serving the junction box to **ON** until after verifying that the wiring is correct (refer to Section 6-3, "AC Power Check").

6.3 AC Power Check

Always verify that the AC power cord is wired into the AC power supply correctly (wiring check) before applying AC power to the cabinet (the *site* AC circuit breakers serving the processor cabinet are set to **ON**).

Verify the following items before applying AC power to the cabinet and setting the main circuit breakers on the processor cabinet power controller to **ON**:

- AC voltage is within limits
- Power controller voltage selection switch is set to match the input voltage
- Safety warning labels on the cabinet are correct

Detailed discussions and procedures for these items appear in the following paragraphs.

6.3.1 Wiring Check

> **WARNING**
>
> Hazardous voltages may be present on the processor cabinet if the cabinet is incorrectly wired into the site AC power supply. Always verify correct wiring and cabinet grounding before applying AC power to the processor cabinet. Failure to do so may result in injury to personnel and damage to equipment.

The wiring check verifies that the cabinet ground (and, therefore, the cabinet, itself) connect to the site electrical system ground and not left floating or connected to a phase.

If the cabinet ground is left floating, anyone coming into contact with the cabinet could receive a lethal shock hazard if a component should fail causing leakage or direct connection of phase energy to the cabinet.

If the cabinet ground connects to a phase, the cabinet would be more than 200 volts above ground, presenting a lethal shock hazard to anyone coming into contact with the cabinet when site AC power to the processor cabinet is applied.

Verify the connection of the cabinet ground to site AC power supply ground through a continuity check between the cabinet and site AC power supply ground while the site AC power supply circuit breakers serving the processor cabinet and the processor cabinet main circuit breakers are all set to **OFF**.

Use the following procedure to verify that the cabinet ground connects to the site AC power supply ground:

1. Ensure that the site AC power supply circuit breakers serving the processor cabinet are set to **OFF**.
2. Ensure the processor cabinet main circuit breakers on the power controller are set to **OFF**.
3. If the processor cabinet has an AC power plug, mate it with the AC power receptacle.
4. Set the Digital Multimeter (DMM) to the X1 Ohms range and touch the probes together to confirm continuity indication (0 Ohms).
5. Touch one test probe to the site AC power supply junction box, taking care to find a bare metal surface.
6. Touch the other test probe to a bare metal surface of the processor cabinet.

> **NOTE**
>
> If the junction box and processor cabinet are too far apart for the DMM test leads to reach, use a piece of wire connected to the ground terminal of the junction box.

7. Check for continuity indication of less than 1 Ohm.

If continuity is *NOT* found, check to ensure that the DMM test leads are making good contact to bare metal and try again.

If continuity is *STILL* not found, disconnect the processor cabinet AC power plug immediately (if so equipped) and notify the customer of the probability of incorrectly wired AC power to the processor cabinet.

If continuity is good, connection of the processor cabinet to site AC power supply ground (and not floating or connected to a hot phase) is verified, and voltage checks can be performed.

6.3.2 Voltage Check

The voltage check ensures that all AC power phases (and neutral, for international systems) are connected correctly to the processor cabinet power controller, are live, and that the AC input voltage is within limits.

The voltage check requires the removal of the processor cabinet lower bay cover then the removal of a panel from the front of the power controller. Detailed procedures for these tasks appear in Volume VI, *CONVEX Removal/Replacement and IPB Guide (C201, C202, C210, C220)*.

Measure the AC voltages at the AC power input filter connection studs after removing the power controller panel.

The following sections provide a voltage check procedure for domestic and international systems since domestic and international systems have different AC input voltage requirements and AC input filter stud configurations.

6.3.2.1 Domestic

Systems for domestic customers have 4-wire AC power cords and are configured as 3Ø delta loads for connection to either delta or wye power sources of 208 VAC (nominal, phase to phase). The power controller for domestic systems has 4 AC input power filter studs.

WARNING

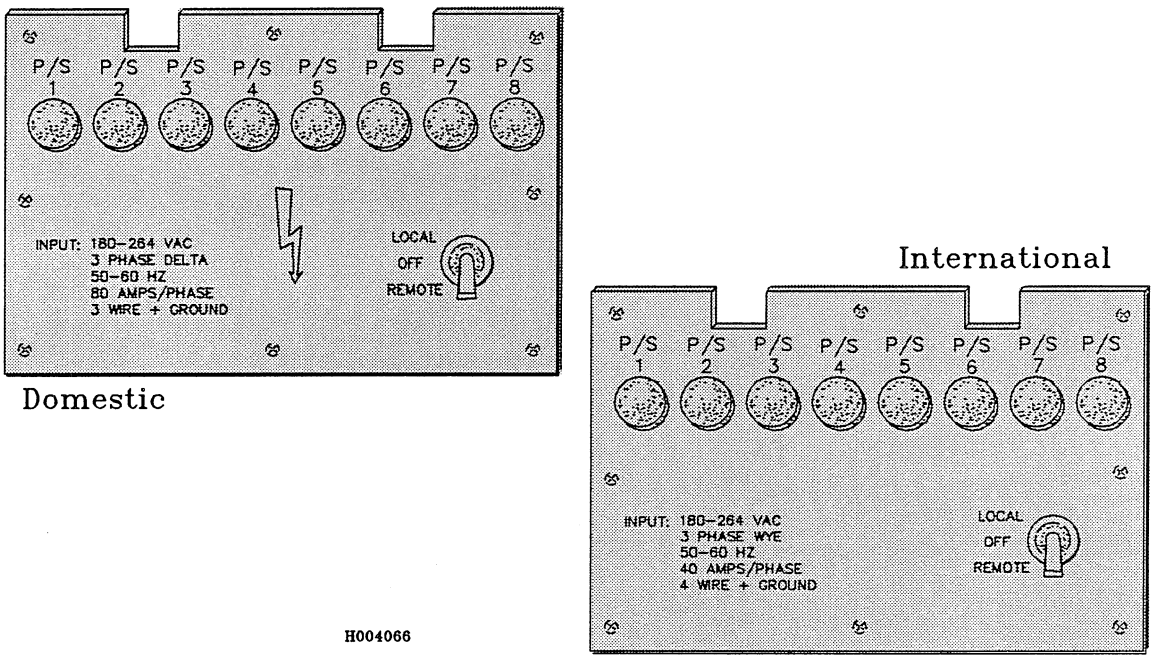
LETHAL VOLTAGE HAZARD. Hazardous voltages are present inside the processor cabinet while the power cord is connected to the AC mains. Use extreme care when measuring AC input voltages. Failure to do so may result in injury to personnel and damage to equipment.

Use the following procedure to measure the AC input voltage from phase to phase at the studs:

1. Ensure that the site AC power supply circuit breakers serving the processor cabinet are set to **OFF**.
2. Ensure that the processor cabinet main circuit breakers on the power controller are set to **OFF**.
3. Engage personal grounding system.
4. Remove the lower bay cover.
5. Remove the 8 screws attaching the power supply status indicator panel to the power controller front panel.

The following figure illustrates power supply status indicator panel:

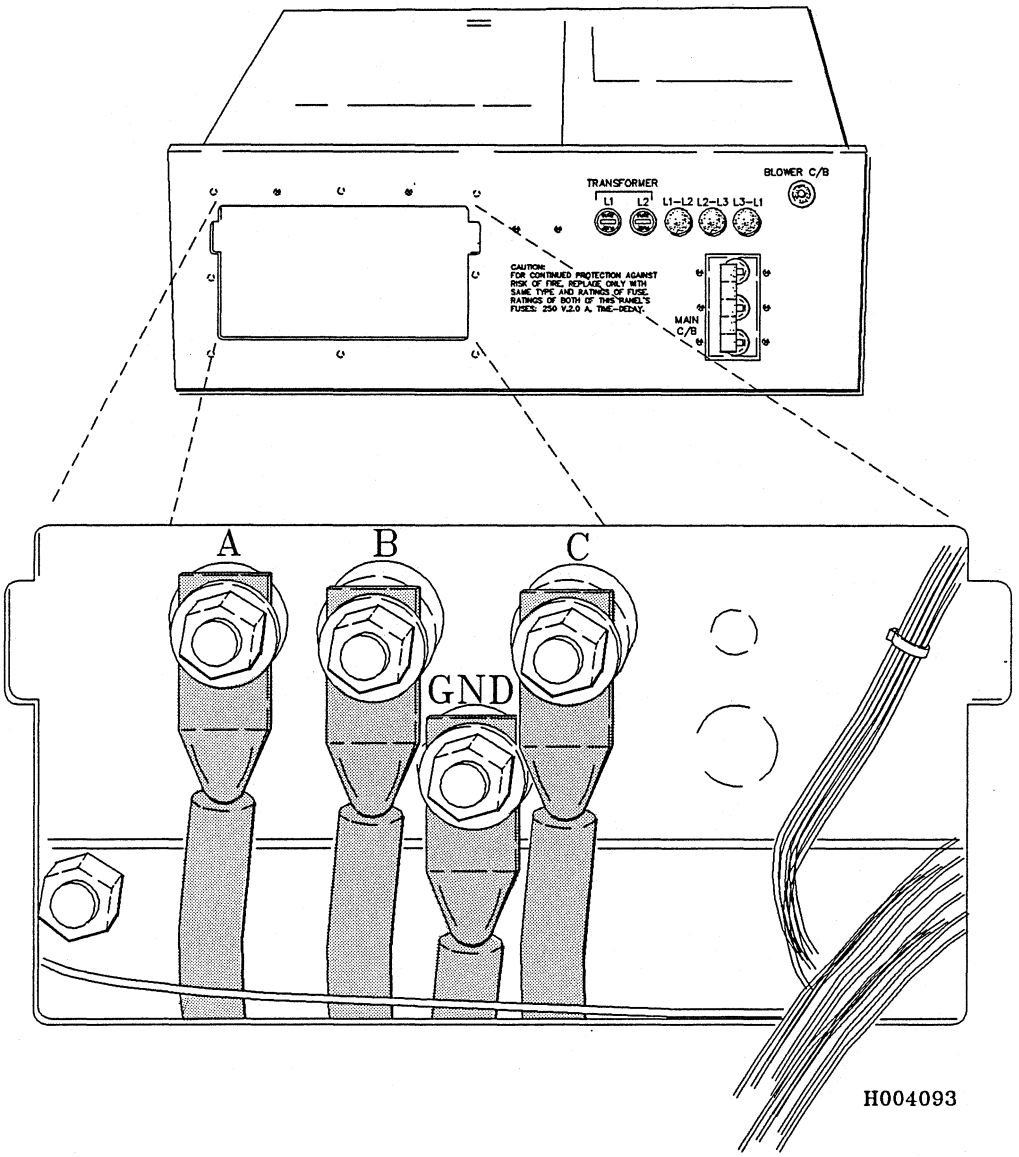
Figure 6–3, Power Controller Indicator Panels



6. Pull the panel straight out from the power controller as far as the cable will allow and set it aside (do not disconnect the connector).
7. Set the Digital Multimeter (DMM) to the 300 VAC (or greater) range.
8. Set the site AC power supply circuit breakers serving the processor cabinet are to **ON**.

The following figure shows the input AC power filter stud configuration:

Figure 6–4, Input AC Power Filter Studs (Domestic)



> **NOTE**
>
> A plastic shield covers the input AC power filter studs. The shield has holes to allow DMM test prod access to the studs for measuring voltage without bending or removing the shield.

9. Touch the **COMMON** DMM prod to the left (**A**) stud.
10. Touch the + DMM prod to the center (**B**) stud.
11. Read the meter. A reading between 190 VAC and 220 VAC is "good" with 208 VAC optimum.

12. Move the + DMM prod to the right (**C**) stud.
13. Read the meter. A reading between 190 VAC and 220 VAC is "good" with 208 VAC optimum.
14. Move the **COMMON** DMM prod to the center (**B**) stud.
15. Read the meter. A reading between 190 VAC and 220 VAC is "good" with 208 VAC optimum.

> **NOTE**
>
> If the voltage measurement between any 2 studs was out of range, notify the customer that the AC input voltage is outside recommended values.

16. Set the site AC power supply circuit breakers serving the processor cabinet to **OFF**.
17. Position the power supply status indicator panel over its mounting holes.
18. Start all 8 mounting screws attaching the panel to the power controller then tighten them down.

> **NOTE**
>
> Do not reinstall the lower bay cover at this time.

6.3.2.2 International

Systems for international customers have 5-wire AC power cords and are configured for connection to 3Ø wye power sources of either 220 VAC or 240 VAC (nominal, phase to neutral). The power controller for international systems has 5 AC input power filter studs.

WARNING

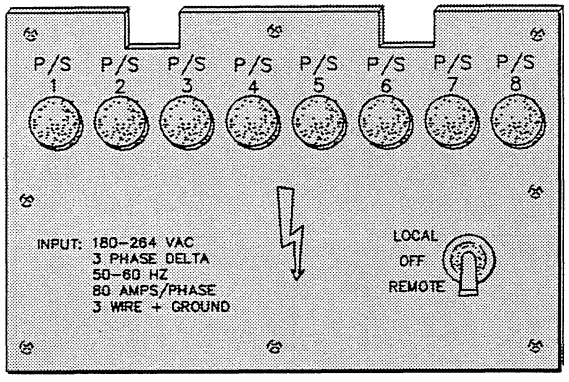
LETHAL VOLTAGE HAZARD Hazardous voltages are present inside the power controller **even when the processor main circuit breaker is set to OFF**. Use extreme care when measuring AC input voltages. Failure to do so may result in injury to personnel and damage to equipment.

The following procedures list how to measure the AC input voltage from phase to neutral at the studs:

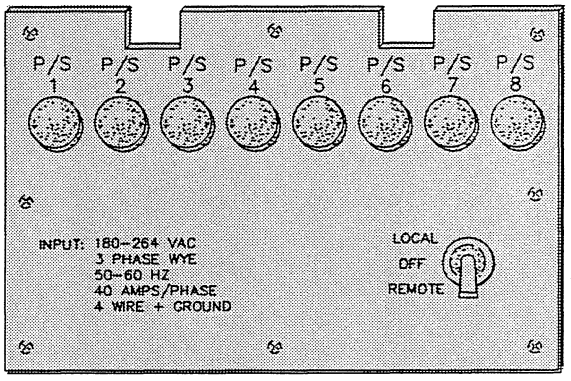
1. Ensure that the site AC power supply circuit breakers serving the processor cabinet are set to **OFF**.
2. Ensure that the processor cabinet main circuit breakers on the power controller are set to **OFF**.
3. Engage personal grounding system.
4. Remove the lower bay cover.
5. Remove the 8 screws attaching the power supply status indicator panel to the power controller front panel.

The following figure illustrates power supply status indicator panel:

Figure 6–5, Power Controller Indicator Panels



Domestic



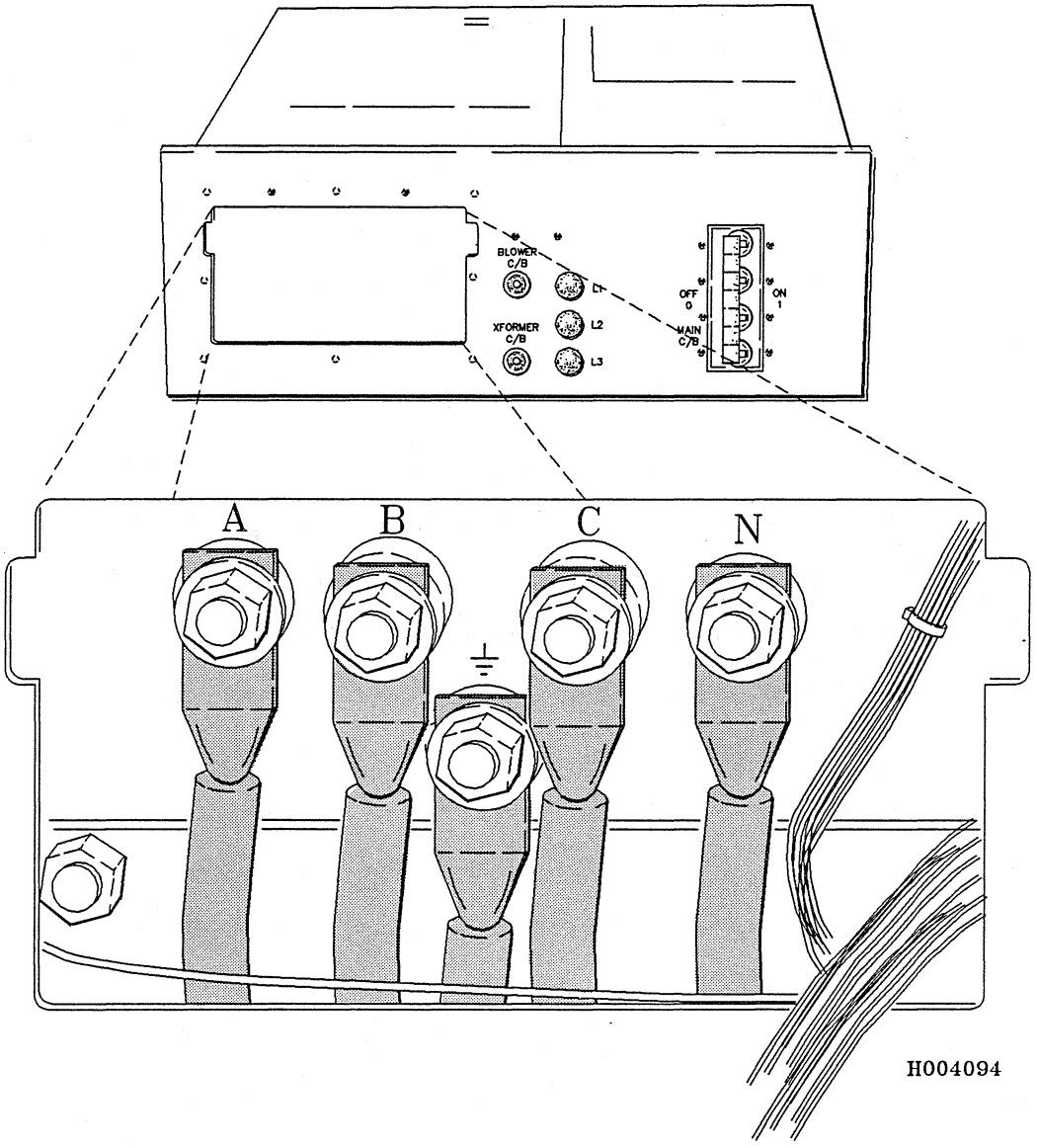
International

H004066

6. Pull the panel straight out from the power controller as far as the cable will allow and set it aside (do not disconnect the connector).
7. Set the Digital Multimeter (DMM) to the 300 VAC (or greater) range.
8. Set the site AC power supply circuit breakers serving the processor cabinet to **ON**.

The following figure shows the input AC power filter stud configuration:

Figure 6–6, Input AC Power Filter Studs (International)



> **NOTE**
>
> A plastic shield covers the input AC power filter studs. The shield has holes to allow DMM test prod access to the studs for voltage measuring without bending or removing the shield.

9. Hold the **COMMON** DMM prod on the right (**N**) stud (this is neutral).
10. Touch the + DMM prod to the left (**A**) stud.
11. Read the meter. A reading between 209 VAC and 239 VAC is "good" with 220 VAC optimum for 220 VAC installations.

    A reading between 228 VAC and 252 VAC is "good" with 240 VAC optimum for 240 VAC installations.
12. Move the + DMM prod to the left-center (**B**) stud.
13. Read the meter. A reading between 209 VAC and 239 VAC is "good" with 220 VAC optimum for 220 VAC installations.

    A reading between 228 VAC and 252 VAC is "good" with 240 VAC optimum for 240 VAC installations.
14. Move the + DMM prod to the right-center (**C**) stud.
15. Read the meter. A reading between 209 VAC and 239 VAC is "good" with 220 VAC optimum for 220 VAC installations.

    A reading between 228 VAC and 252 VAC is "good" with 240 VAC optimum for 240 VAC installations.

> **NOTE**
>
> If any voltage measurement was out of range, notify the customer that the AC input voltage is outside recommended values.

16. Set the site AC power supply circuit breakers serving the processor cabinet to **OFF**.
17. Position the power supply status indicator panel over its mounting holes.
18. Start all 8 mounting screws attaching the panel to the power controller then tighten them down.

> **NOTE**
>
> Do not reinstall the lower bay cover at this time.

6.3.3 Voltage Selector Switch Check

The power controller contains a voltage selector switch that connects the AC input power to the proper primary tap (200, 220, or 240 VAC) on the 24 VAC transformer. This transformer provides low voltage AC power to the System Control Module (SCM), the power control circuits, and the power contactor coils.

The setting of the power controller voltage selector switch must match the AC input voltage applied to the processor cabinet. Although this switch was set at the factory before shipment to match the requirements of the intended installation, the processor cabinet may have been re-routed to a different installation location.

This section describes how to verify that the switch is set correctly and how to change the setting, if necessary.

1. Ensure that the site AC power supply circuit breakers serving the processor cabinet are set to **OFF**.
2. Ensure that the processor cabinet main circuit breakers on the power controller are set to **OFF**.
3. Engage personal grounding system.
4. Remove the lower bay cover.
5. Remove the lower air plenum.
6. Find the AC voltage selector switch located on the top surface of the power controller near the right rear corner.
7. Verify that the voltage selector switch is set to the correct voltage (**200** domestic; **220** or **240** international) according to the installation.
8. Adjust the setting of the voltage selector switch using a slot screwdriver.
9. Install the lower air plenum.
10. Install the lower bay cover.

6.3.4 Safety Warning Label Check

A safety warning label is affixed to the processor cabinet rear panel. This label is printed in the appropriate language for the installation location, and displays pertinent cabinet safety information as well as the AC input voltage configuration.

The safety warning label check verifies that the safety warning label is affixed to the rear panel of the processor cabinet, that it is printed in the correct languages, and that it shows the correct AC input voltages for the installation.

WARNING

Safety warning labels affixed to the rear of the processor must be in the correct language for the installation and must show the power configuration of the power controller. Incorrect labels may result in injury to personnel and damage to equipment.

Inspect the processor cabinet rear panel and verify the following:

1. The safety warning label is securely attached.
2. The safety warning label is printed in the correct language for the installation.
3. The safety warning label shows that the processor cabinet is configured for 208 VAC operation (domestic) or 200 or 240 VAC operation (international) as appropriate.

If the voltage specification is incorrect, change it to reflect the power controller voltage selector switch setting. If the label is printed in an incorrect language, notify the Technical Assistance Center (TAC).

6.4 Power Up

Use the following procedure to power up the system. Refer to the *CONVEX Removal/Replacement and IPB Guide (C201, C202, C210, C220)* and to the *CONVEX Processor Operation Guide (C1, C120, C130, C210, C220)* for additional information.

1. Write-protect any disk drives installed in the expansion cabinet.
2. Ensure that the processor cabinet main circuit breakers (on the front of the power controller) are set to **OFF**.
3. Set the site AC circuit breakers serving the processor cabinet to **ON**.
4. Check that the **OFF/LOCAL/REMOTE** switch on the power controller is set to the **REMOTE** position.
5. Check that the front panel keyswitch is set to the **0 OFF** position.
6. Set the processor cabinet main circuit breakers (on the front of the power controller) to **ON**.
7. Check that the 3 phase indicator lights on the power controller are lit. For domestic models, the phase indicator lights are located above the main circuit breakers. The phase indicator lights are labeled L1–L2, L2–L3, and L1–L3. For international models, they are to the left of the circuit breakers. These phase indicator lights are labeled L1, L2, and L3.
8. Turn the front panel keyswitch to the **1 LOCAL** position.
9. Set each disk drive power switch to the **ON** position.

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Chapter 7
Running Diagnostics

7.1 Overview

This chapter discusses running processor, Input/Output Processor (IOP), and Channel Control Unit (CCU) diagnostics to test the system.

The SPU UNIX operating system controls CONVEX diagnostic software, coordinates error logging, and boots the main processor. Boot the system to the `>spu` prompt only. Refer to Volume V, *CONVEX Troubleshooting Guide (C201, C202, C210, C220)*, and the *CONVEX Processor Operation Guide (C1, C120, C200 Series)* for procedures to boot SPU UNIX. Refer to the *SPU UNIX, Release Notice* if the system does not have the software required to boot SPU UNIX.

7.2 Processor Diagnostics

The processor diagnostics execute under the Service Processor Unit operating system, SPU UNIX. These operations test the system functions and report any errors they detect. Perform the following diagnostics after booting SPU UNIX. Refer to the *CONVEX Processor Diagnostics Manual (C200 Series)* for information on running the processor diagnostics. The following list describes the function of each test:

- *spu4000* — The *spu4000* test verifies the interface between the Service Processor Unit (SP2) and the functional units or boards.
- *pia4000* — The *pia4000* test checks the functionality of the Peripheral Interface Adapter (PIA) board.
- *cpx4000* — The *cpx4000* test checks the functional blocks of the CPU Utility board (CPX), and some associated circuits.
- *mem4000* — The *mem4000* test verifies the control features of the memory system and the memory arrays.
- *cpu4030* — The *cpu4030* test verifies the basic functionality of all nonprivileged scalar instructions.
- *cpu4041* — The *cpu4041* diagnostic is a set of vector instructions that verify the operation of the vector unit and its interfaces to other C200 Series subsystems.
- *cpu4010* — The *cpu4010* test exercises the reference and modify (ref/mod) bits to verify their proper operation.
- *cpu4131* — The *cpu4131* diagnostic tests exceptions, privileged instructions, page faulting, interrupts, and all timers that are specific to the architecture of the processor.
- *cpu4040* — The *cpu4040* test verifies the vector processor unit operation under all possible combinations of load/store, add/logical, and multiply/divide vector instructions.

- ***cpu4231*** — The *cpu4231* test verifies non-vector, single-headed architectural features unique to the C200 Series processors including system exceptions, interrupts, privileged instructions, the various processor caches, remote invalidates, and non-resident memory pages.
- ***cpu4232*** — The *cpu4232* test is an extension of the building block test *cpu4030* for the CONVEX C200 Series machines and provides exhaustive, single CPU testing of the C200 Series scalar, address, and communication register instructions.
- ***cpu4233*** — The *cpu4233* test verifies the operation of CPU complex in a multi-headed environment including tests for concurrent access and use of communication registers, memory, thread creation and termination instructions, interrupts, CPU execution timers, privileged instructions, and exceptions.
- ***cpu4241*** — The *cpu4241* test is a group of vector instruction tests used to verify the operation of C200 Series vector and vector-under-mask instructions along with their interfaces to other C200 Series subsystems.

The following table lists the order to run these diagnostics and an approximate time required for them to execute:

Table 7–1, Processor Diagnostics

ORDER	PROCESSOR DIAGNOSTIC	TIME TO COMPLETE (minutes)
1	*spu4000*	8
2	*pia4000*	2
3	*cpx4000*	37
4	*mem4000*	102[1]
5	*cpu4030*	8
6	*cpu4041*	13
7	*cpu4010*	4
8	*cpu4131*	3
9	*cpu4040*	NA[2]
10	*cpu4231*	4
11	*cpu4232*	2
12	*cpu4233*	5
13	*cpu4241*	252

[1] The time to execute is dependent on the memory size.
[2] The time to execute varies based on the number of instructions and the values of the vector stride and vector length registers.

7.3 Channel Control Unit Diagnostics

The Channel Control Unit (CCU) diagnostics include the Multibus Input/Output Processor (MIOP), VMEbus Input/Output Processor (VIOP), and High-Speed Parallel Interface (HSP) tests and CCU tests. If the system has an MIOP, a VIOP, or an HSP, execute *io4000*, *io5000*, and *io4120*, respectively. If the system does not have a particular CCU, the test for that CCU should not be run. These tests must always run before the *dev* diagnostics. Refer to the *CONVEX PBUS I/O System Diagnostics Manual* for information on running the CCU diagnostics. The following list describes the function of each test:

- *io4000* — The *io4000* test verifies the functionality of a MIOP, which the user specifies.
- *io5000* — The *io5000* test verifies the functionality of a VIOP, which the user specifies.
- *io4120* — The *io4120* test checks the operation of an HSP and the HSP Interface Adapter (HIA).

The following table lists the order to run these diagnostics and an approximate time required for them to execute:

Table 7–2, CCU Diagnostics

ORDER	PROCESSOR DIAGNOSTIC	TIME TO COMPLETE (minutes)
1	*io4000*	17
2	*io4120*	132
3	*io5000*	18

7.4 Multibus Input/Output Processor Diagnostics

The Multibus Input/Output Processor (MIOP) *dev* diagnostics test the Multibus peripheral devices. Refer to the *CONVEX PBUS I/O System Diagnostics Manual* for information on running the MIOP diagnostics. Perform the following tests after running the CCU diagnostics:

> **NOTE**
>
> Run only the verify format test of the *dev4110* diagnostic.

- ***dev4110*** — The *dev4110* test the formats, verifies the format, and interactively tests up to 12 Storage Module Drives (SMD) at the same time.
- ***dev 4200*** — The *dev4200* test verifies the functionality of the CONVEX Multibus tape controller.
- ***dev4300*** — The *dev4300* test verifies the functionality of a MTI-800A, MTI-1600A, MTI-850, or MTI-1650 asynchronous communications controller that attaches to an IOP through a Multibus chassis.
- ***dev4400*** — The *dev4400* test verifies that the Systech MLP-2000 line printer controller and the associated Centronics line printer are online and functional.
- ***dev4500*** — The *dev4500* test checks the functionality of the CONVEX Multibus tape controller.

The following table lists the order to run these diagnostics and an approximate time for them to execute:

Table 7–3, MIOP Diagnostics

ORDER	PROCESSOR DIAGNOSTIC	TIME TO COMPLETE (minutes)
1	*dev4110*	149
2	*dev4200*	24
3	*dev4300*	12
4	*dev4400*	1
5	*dev4500*	24

7.5 VMEbus Input/Output Processor Diagnostics

The VMEbus Input/Output Processor (VIOP) *dev* diagnostics test the peripheral devices. Refer to the *CONVEX PBUS I/O System Diagnostics Manual* for information on running the VIOP diagnostics. Perform the following tests after running the MIOP diagnostics:

> **NOTE**
>
> Run only the verify format test of the *dev5130* diagnostic.

- ***dev5130*** — The *dev5130* test formats, verifies the format, and interactively tests up to 12 Interphase 4200 VMEbus/Storage Module Devices (V/SMD) or Interphase 4201 VMEbus/Enhanced Small Device Interface (V/ESDI) disk controllers.
- ***dev 5500*** — The *dev5500* test verifies that the Excelan EXOS/202 Ethernet controller board operates properly. It checks the VIOP-to-controller interface and triggers the controller board's built-in self-test.

The following table lists the order to run these diagnostics and an approximate time required for them to execute:

Table 7–4, VIOP Diagnostics

ORDER	PROCESSOR DIAGNOSTIC	TIME TO COMPLETE (minutes)
1	*dev5130*	174
2	*dev5500*	5

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Chapter 8
Installing System Software

8.1 Overview

The software packages for a new system installation are present within the system when CONVEX ships it to the site. During a system upgrade, however, the software may be upgraded after the disk drives are transferred from the current system to the upgraded system.

8.2 Booting CONVEX UNIX

Before booting CONVEX UNIX, check that the disk drives are not write protected. Refer to the *CONVEX Processor Operation Guide (C1, C120, C200 Series)* for procedures to boot CONVEX UNIX.

After booting the system software, check the software version number. Verify that the version numbers from the SPU disk and the system software are the same. Refer to the "Installing CONVEX UNIX" section of this chapter if the version numbers differ. The following lists the software and the corresponding command to verify the version number:

- Microcode revisions

```
spu -r /mnt/usr/ucode/UCODE_REV
```

- Diagnostics data base

```
spu -r /mnt/DIAG_DB_REV
```

- System diagnostics

```
spu -r /mnt/DIAG_REV
```

- SPU UNIX

```
spu -r /UNIX_REV
```

8.3 Installing CONVEX UNIX

The following procedures list the steps for installing the system software, including CONVEX UNIX, and CONVEX layered products. Refer to the release notice *Installation Procedure, CONVEX UNIX and Utilities* for information on CONVEX UNIX, and refer to the release notices for information on SPU UNIX.

1. Execute a full dump of the *usr* and *root* directories. Enter the following commands:

   cd /
   /etc/dump 0G /

   (dump output appears)

   /etc/dump 0G /usr

   Refer to the *CONVEX UNIX, Release Notice* or the man page for the *dump* command for more information.
2. Verify that the latest release of the software from the SPU disk is installed. If the system does not have the latest version, refer to the release notice for information on installing that version. The following lists the software and the corresponding release notice:
   - **System Diagnostics** — *C130, C210, C220 System Diagnostics, Release Notice*
   - **Diagnostic Database** — *CONVEX Diagnostic Database (C130, C210, C220), Release Notice*
   - **CONVEX Operating System (OS)** — *CONVEX UNIX, Release Notice*
   - **CONVEX Utilities** — *CONVEX UNIX, Release Notice*
3. Install layered products that the customer has selected. Layered products include CONVEX software other than the operating system, e.g., compilers.
4. Perform an immediate backup of SPU disks and CONVEX disks.

8.4 Running sysex

The System Exerciser *(sysex)* program runs the system with programs similar to those the customer may use. It simulates stressful load conditions on the system. The program generates a system load by running a variety of tasks that are I/O and computation intensive. The *sysex* program should run overnight, or over a weekend, to completely test the system. Refer to the man page for the *sysex* command for more information.

To prepare the system before running the *sysex* program:

- Load the *sysex* program from the system exerciser release tape.
- Check that the following is available before testing the peripherals:
  - Mount a scratch tape on each drive to be tested.
  - A */tmp* partition should have 7 Mbytes before testing a disk.
  - A Farside Echo (FSE) board must be installed in the High Speed Parallel Interface Adapter (HIA) to test the High Speed Parallel interface (HSP). Refer to the *CONVEX HIA User's Guide* for information on this functional unit.
- Check that all disk drives to be tested are online.
- Change the directory to *usr/sys/test/sysex*. Enter the following command to change the directory:

```
cd /usr/sys/test/sysex
```

Enter the command *sysex* to run one pass of all test types. This is the default mode.

To run individual tests on various parts of the system, enter the following:

sysex [*opt*][*rep_count*]

The options include the following parts of the system:

- Memory
- CPU
- TTY
- OS
- Tape[1–16]
- Disk[1–16]
- High Speed Parallel interface

The *rep_count* is the number of repetitions for the test. This must be included for each option selected.

The following is an example of the command:

```
sysex cpu 20 memory 50 disk1 75
```

This command runs the CPU test 20 times, the memory test 50 times, and the disk1 test 75 times.

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Chapter 9
Returning Equipment

9.1 Overview

This chapter discusses the steps to return a processor or expansion cabinet after a system upgrade, including how to inventory and pack the equipment.

9.2 Checking the Inventory

When returning equipment, inventory each item and inspect it for damage. Visually inspect the cabinets and document any damage found. Document the damage with photographs and complete a damage claim form.

Complete a CONVEX Shipper Request form to return with the equipment removed from service during upgrade procedures. The following figure shows a typical form:

Figure 9–1, CONVEX Shipper Request Form

CONVEX

701 N. Plano Road • Richardson, TX 75081 • (214) 952-0200

SHIPPER REQUEST **SR**

SHIP TO _____ DATE RECEIVED (STOCK ROOM) _____

ADDRESS _____ REQUESTING DEPT.# _____ DATE _____

CITY _____ ETA DATE REQUIRED _____

STATE/ZIP _____ REQUESTED BY _____

ATTN: _____ APPROVED BY DATE PULLED _____

PHONE # _____ PULLED BY _____

QUANTITY					FIELD SERVICE USE ONLY	
ORD	SHIP	PART NUMBER	DESCRIPTION	DEPT. — ACCOUNT	FROM STK ACCOUNT	TO STK ACCOUNT
				—		
				—		
				—		
				—		
				—		
				—		
				—		
				—		
				—		
				—		
				—		
				—		
				—		
				—		
				—		

TO BE COMPLETED BY SHIPPING DEPT.

DATE SHIPPED	CARRIER	WAY BILL #
# OF CARTONS	TOTAL WEIGHT	SHIPPED BY

Complete the preliminary information in the top section of the form. Fill in the address and the date then sign the **REQUESTED BY** space. Leave blank the other spaces in the top portion of the form.

List in the center portion of the form all equipment that is being returned. Enter the quantity of each item to be returned in the **SHIP** column. Describe in the **DESCRIPTION** column the equipment being returned. If the equipment is a cabinet, indicate whether the cabinet includes additional items such as processor cards, tape drives, etc.

Complete the shipping information at the bottom of the form. Fill in the following blocks and leave blank the **SHIPPED BY** box at the bottom of the form:

- **DATE SHIPPED**
- **# OF CARTONS**
- **CARRIER**
- **TOTAL WEIGHT**
- **WAY BILL #**

9.3 Packing the Cabinet

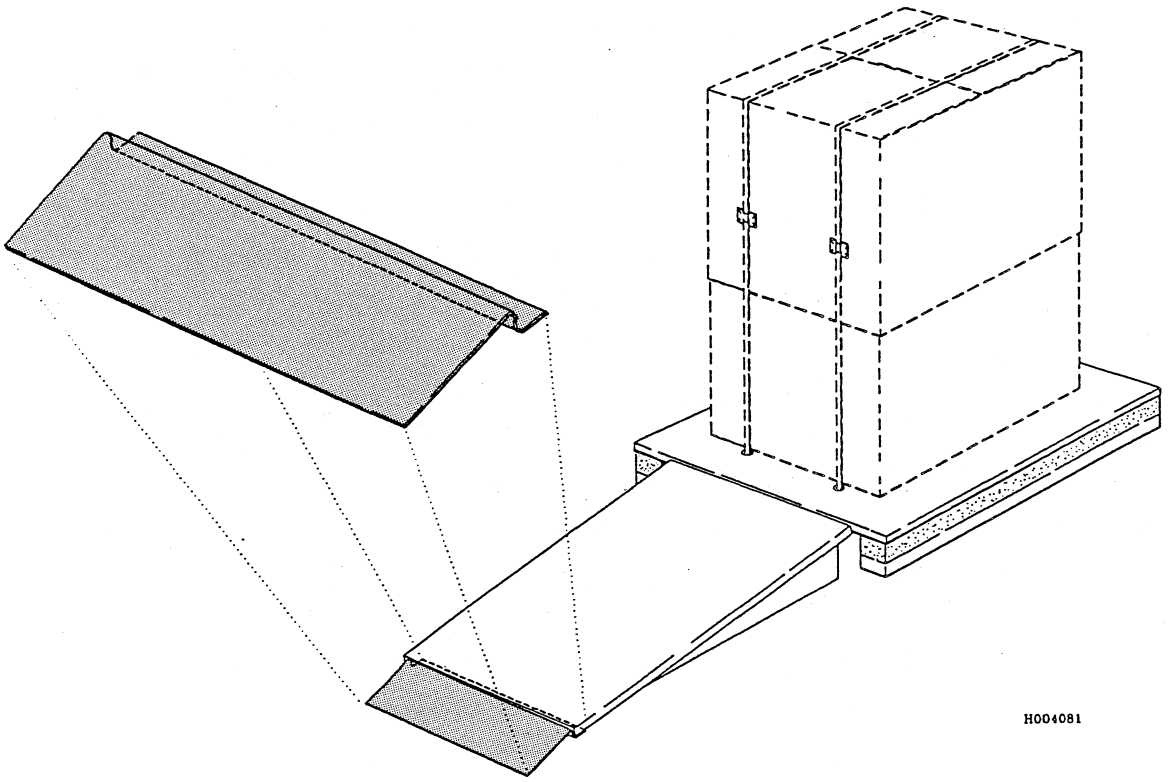
Place the pallet in an open area, with enough room to connect the ramp to the pallet and to move the cabinet at the foot of the ramp.

> **WARNING**
>
> Use care when moving CONVEX cabinets. Failure to do so may cause injury to personnel and damage to equipment.

CONVEX cabinets are not top-heavy, but may tip over. Because of the weight of the processor and expansion cabinets, injury to personnel or damage to equipment may result unless two people are available to install the system.

The following figure shows a pallet with a ramp and auxiliary ramp:

Figure 9–2, Cabinet Pallet, Ramp and Auxiliary Ramp



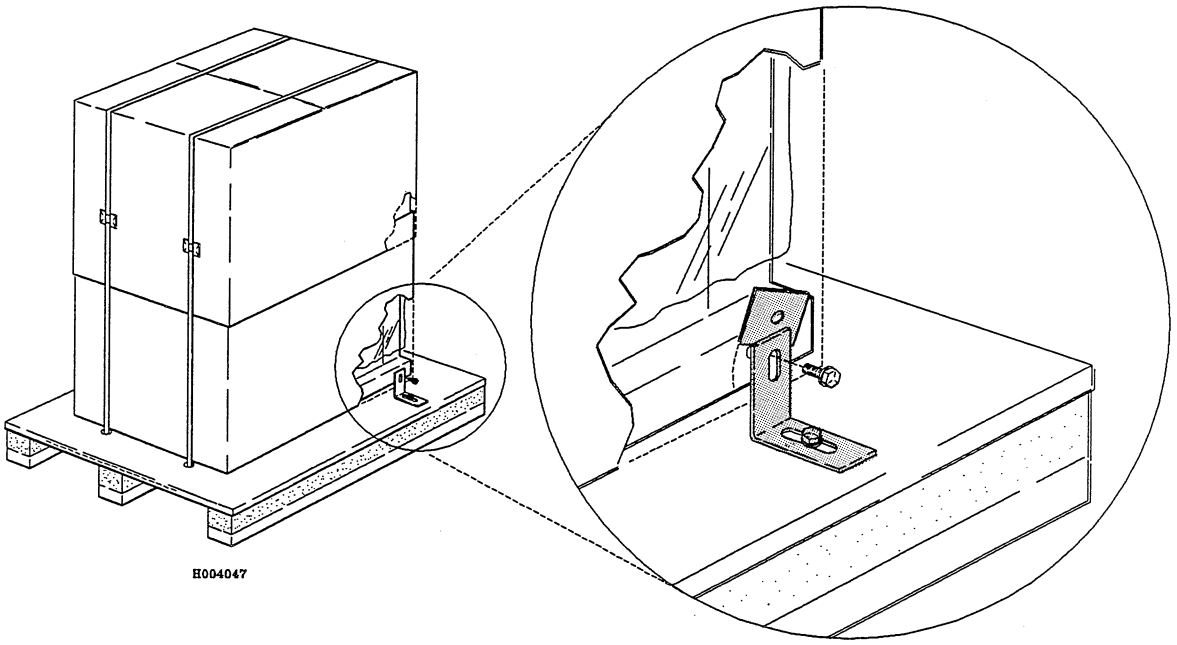
9.3.1 Tools

- 3/8-inch socket
- 9/16-inch wrench
- Phillips screwdriver

9.3.2 Placing the Cabinet on the Pallet

This procedure describes placing the C1 or expansion cabinet on the pallet and packaging the cabinet for transporting. The only difference in packaging a C1 system and a C210 is the way the pallet brackets face the cabinet. The following figure shows proper bracket and anchor holes placement of a C1 system:

Figure 9–3, C1 Processor Cabinet and Pallet



1. Slide the legs of the ramp under the front (open) slots of the pallet. The high edge of the ramp should be against the front edge of the pallet.
2. Place the auxiliary ramp at the base of the pallet ramp.
3. Face the cabinet with the front to the ramp.

CAUTION

Check that the 4 feet are raised so the cabinet rests on its wheels. The feet must be completely raised when moving the cabinet. Failure to do so may damage the feet as the cabinet is moved.

4. Start the cabinet up the ramp at a 30-degree angle to the ramp, so one wheel at a time rolls up onto the ramp. Once both front wheels are on the ramp, position the cabinet so it is centered with the ramp and the pallet.

CAUTION

Check that the cabinet does not snag on the end and 2 side stops. Failure to do so can break the feet anchors.

5. Slowly roll the cabinet onto the pallet and center it.
6. Align the anchor holes of the cabinet with the pallet brackets.
7. Push the 4 pallet brackets to the sides of the cabinet.
8. Place a cardboard spacer between each bracket and the cabinet.
9. Install the 4 bolts that connect the pallet brackets to the anchor holes of the cabinet. Do not overtighten the bolts to avoid stripping the threads on the anchor holes.
10. Tighten the 4 bracket bolts that connect to the pallet. Do not overtighten the bolts to avoid pulling the threaded inserts out of the pallet.
11. Place a plastic bag over the cabinet.
12. Place a bottom cover box over the cabinet.
13. Place the top cover box over the cabinet.
14. Remove the ramp from the front slots of the pallet.

Appendix A
Power and AC Specifications

A.1 Overview

This appendix contains tables that list the physical dimensions, electrical requirements, power consumption, and heat dissipation for CONVEX computers and their peripheral devices.

A.2 Equipment Dimensions

The following table lists the dimensions of the expansion cabinet and the peripheral devices (metric equivalents are shown in parentheses):

Table A–1, Equipment Dimensions and Weights

Equipment	Weight pounds (kg)	Width inches (cm)	Depth/Length inches (cm)	Height inches (cm)
C210, C220 Processor Cabinet[1]	1200.0 (544.0)	31.9 (81.0)	39.3 (99.7)	62.3 (158.1)
EXP-001 or -002 Expansion Cabinet (including power supply and panels)	355.0[2] (161.4)	25.1 (63.7)	39.3 (99.7)	62.3 (158.1)
DKD-001 or DKD-101 Disk Drives[3]	143.0 (64.0)	19.0 (48.1)	24.2 (61.5)	10.5 (26.7)
DKD-005, -006, -105, or -106 Disk Drives[3]	70.0 (33.0)	9.5 (24.1)	30.6 (77.8)	10.5 (26.7)
DKD-008 or -108 Disk Drive[3]	70.0 (33.0)	9.5 (24.1)	30.6 (77.8)	10.5 (26.7)
RDS-001 or -002 Disk System[3]	132.0 (59.9)	17.0 (43.2)	24.8 (62.9)	10.5 (26.7)
MTD-001 or -101 Tape Drive[3]	125.0 (57.0)	19.0 (48.3)	16.0 (40.6)	24.3 (61.6)
MTD-002 Tape Drive[4]	541.0 (246.0)	25.0 (63.5)	29.0 (73.7)	62.0 (157.5)
MTD-102 Tape Drive[4]	622.0 (282.0)	25.0 (63.5)	29.0 (73.7)	62.0 (157.5)
HIA-001 HIA Chassis[3]	150.0 (67.25)	19.0 (48.3)	23.3 (59.0)	15.8 (40.0)
VBS-003, -004 or -005 VME Chassis[3]	90.0 (40.0)	19.0 (48.3)	22.3 (56.5)	10.5 (26.7)
MBS-003 or -004 Multibus Chassis[3]	90.0 (40.0)	19.0 (48.3)	22.3 (56.5)	10.5 (26.7)
PRT-001 or -101 Printer/Plotter[4]	200.0 (90.0)	30.0 (76.2)	24.3 (61.6)	41.3 (104.8)
Console Printer[4] (USA)	20.2 (9.2)	17.2 (43.7)	13.6 (34.5)	4.7 (11.9)
VDU-001 Video Terminal[4]	23.3 (10.6)	17.0 (43.2)	20.4 (51.8)	13.0 (33.0)

[1] C210 figures apply to the C201; C220 figures apply t0 the C202.
[2] Includes two side panels (CONVEX Product No. SKN-001), each weighing 45 pounds (20.5 kg).
[3] Mounted in expansion cabinet; dimensions are standard rack height and width increments.
[4] This is a standalone device.

A.3 CONVEX Computer's Domestic Specifications

The following table lists the domestic computer electrical specifications for the minimum and maximum circuit board configurations:

Table A–2, CONVEX Computer's Domestic Specifications

EQUIPMENT	VOLTS ± 10%	FREQ ± 1 Hz	PHASE NO.[5]	MAX PHASE[6,7] CURRENT	MAX CB[8]/FUSE RATINGS	RECEPTACLE PART NUMBER[9]	POWER CORD LENGTH
C210[1,3]	200 208	50/60	3Ø	25	100/80	4100R9W or 4100C9W	6 ft
C210[2,4]	200 208	50/60	3Ø	39	100/80	4100R9W or 4100C9W	6 ft
C220[3]	200 208	50/60	3Ø	37	100/80	4100R9W or 4100C9W	6 ft
C220[4]	200 208	50/60	3Ø	51	100/80	4100R9W or 4100C9W	6 ft

1 This system has 1 CPU, 2 memory boards, and 1 CCU.

2 This system has 1 CPU, 8 memory boards, and 4 CCUs.

3 This system has 2 CPUs, 2 memory boards, and 1 CCU.

4 This system had 2 CPUs, 8 memory boards, and 4 CCUs.

5 The power source may be a 3Ø delta or 3Ø wye. A separate ground conductor must be provided to the site grounding point for 3Ø delta and 3Ø wye. This ground conductor is a safety requirement, and provides a ground path for radiated emissions.

6 This is the maximum current over voltage range. Standard clamp-on current meters cannot measure this current because of high harmonic currents induced by the computer's switched-mode power supplies. A true RMS meter must be used. The meter must have a high-frequency cutoff of at least 400 Hz.

7 The CONVEX current crest ratios vary between 3.25 and 3.5; use these ratios to determine which Uninterrupted Power System (UPS) to use.

8 This is the maximum recommended branch circuit circuit-breaker rating. The C210 and C220 circuit breakers have an Underwriter Laboratories interrupt rating of 5,000 amps.

9 Part number 4100R9W is a wall-mounted receptacle. Part number 4100C9W is a receptacle that can be placed at the end of a liquid-tight flexible metal conduit (maximum length 6 ft (2 m)). An adapter is required to connect a 4100C9W to the flexible conduit. The flexible metal conduit must be properly grounded. These connectors are manufactured by Hubbel Inc., Wiring Device Div., Bridgeport, Conn.; (203)333-1181. CONVEX has the 4100C9W connector and its adapter (CONVEX Product No. **REC-200**) in stock. Contact a CONVEX sales representative to purchase these items.

A.4 Equipment, Domestic Specifications

The following table lists electrical specifications for the expansion cabinet and peripheral equipment:

> **CAUTION**
>
> Use the specifications in Table B–2, CONVEX Computer's Domestic Specifications, for installation in Japan and other Far Eastern countries.

Table A–3, Equipment, Domestic Specifications

EQUIPMENT	VOLTS ± 10%	FREQ ± 1 Hz	PHASE NO.[3]	CURRENT (amps)	NEMA PLUG STYLE	POWER CORD LENGTH
EXP-101 or -102 Expansion Cabinet[1]	120	60	1	24.0[2]	L5-30	15
DKD-001 or -101 Disk Drives[3]	120	60	1	4.6	None	NA
DKD-005, -006 -105 or -106 Disk Drives[3]	120	60	1	3.6	None	NA
DKD-008 or -108 Disk Drive[3]	120	60	1	3.9	None	NA
RDS-001 or -102 Disk System[3]	120	60	1	2.0	None	NA
MTD-001 or -101 Tape Drive[3]	120	60	1	0.36	None	NA
MTD-002 Tape Drive[4]	120	60[7]	1	15.0	L5-30P	10
MTD-102 Tape Drive[4]	120	60[7]	1	20.0	L5-30P	10
HIA-001 HIA Chassis[3]	120	60	1	4.0[5]	None	NA
VBS-003, -004 or -005 VMEbus Chassis[3]	120	60	1	6.0[6]	None	NA
MBS-003 or -004 Multibus Chassis[3]	120	60	1	6.0[6]	None	NA
PRT-001 or -101 Printer/Plotter[4]	120	60	1	6.0	5-15P	10
Console Printer (USA)[4]	120	60	1	0.6	5-15P	6
VDU-001 Video Terminal[4]	120	60	1	1.1	5-15P	6.5

1 This device contains a standalone AC power distribution system.
2 This is the maximum current rating for an expansion cabinet's power control circuit.
3 These units are mounted in expansion cabinets and obtain AC power from the processor or expansion cabinet's power controllers. There are no external power cords.
4 This is a standalone device.
5 This is the current load when shipped by CONVEX.
6 This current value is for the maximum board configuration only; no peripherals are included.
7 The maximum allowable frequency deviation is ± 0.5 Hz.

A.5 CONVEX Computer's International Specifications

This section provides information on the electrical requirements for international installations for CONVEX computer cabinets and peripheral equipment. The following table lists the computer electrical specifications for the minimum and maximum circuit board configurations:

Table A–4, CONVEX Computer's International Specifications

EQUIPMENT[1]	VOLTS ± 10%	FREQ ± 1 Hz	PHASE NO. AND TYPE	MAX PHASE[6,7] CURRENT	MAX NEUTRAL[8] CURRENT	MAX CB[9] FUSE RATINGS	POWER CORD LENGTH
C210[2]	240/415 220/380	50	3Ø wye	14	20	100/80	2 m
C210[3]	240/415 220/380	50	3Ø wye	26	31	100/80	2 m
C220[4]	240/415 220/380	50	3Ø wye	22	30	100/80	2 m
C220[5]	240/415 220/380	50	3Ø wye	28	40	100/80	2 m

1 This equipment is designed to be connected to a TN-S power source.
2 This system has 1 CPU, 2 memory boards, and 1 CCU.
3 This system has 1 CPU, 8 memory boards, and 4 CCUs.
4 This system has 2 CPUs, 2 memory boards, and 1 CCU.
5 This system has 2 CPUs, 8 memory boards, and 4 CCUs.
6 This is the maximum current over voltage range.
7 The CONVEX current crest ratios vary between 3.25 and 3.5; use these ratios to determine which Uninterrupted Power System (UPS) to use.
8 This is the maximum neutral current rating. Standard clamp-on current meters cannot measure this current because of high harmonic currents induced by the computer's switched-mode power supplies. A true RMS meter must be used. The meter must have a high-frequency cutoff of at least 400 Hz.
9 This is the maximum recommended branch circuit circuit-breaker rating. The C210 and C220 circuit breakers have an Underwriter Laboratories interrupt rating of 5,000 amps.

A.6 Equipment, International Specifications

The expansion cabinet and peripheral equipment electrical specification are listed in the following table for international installations:

Table A–5, Equipment, International Specifications

EQUIPMENT	VOLTS ± 10%	FREQ ± 1 Hz	PHASE NO.	CURRENT (amps)	POWER CORD LENGTH
EXP-101 or -102	120	50/60	1	24.0[1]	4.3
Expansion	200	50/60	1	16.0[1]	4.3
Cabinet[2]	220/240	50/60	1	16.0[1]	4.3
DKD-001 or	120	50/60	1	4.6	NA
-101	200	50/60	1	2.8	NA
Disk Drives[3]	220/240	50/60	1	2.8	NA
DKD-005, -006	120	50/60	1	3.6	NA
-105, or -106	200	50/60	1	2.2	NA
Disk Drives[3]	220/240	50/60	1	2.2	NA
DKD-008 or	120	50/60	1	3.9	NA
-108	200	50/60	1	2.3	NA
Disk Drive[3]	220/240	50/60	1	2.3	NA
RDS-001 or -002	120	50/60	1	4.0	NA
Disk System[3]	200	50/60	1	2.0	NA
	220/240	50/60	1	2.0	NA
MTD-001 or	120	60	1	4.0	NA
-101 Tape Drive[3]	220/240	50	1	2.0	NA
MTD-002	120	60[7]	1	15.0	3
Tape Drive[4]	220/240	50[7]	1	7.5	3
MTD-102	120	60[7]	1	20.0	3
Tape Drive[4]	220/240	50[7]	1	10.0	3
HIA-001	120	50/60	1	4.0	NA
HIA Chassis[3,5]	220/240	50/60	1	2.0	NA
	200	50/60	1	2.0	NA
VBS-003, -004	120	50/60	1	6.0[6]	NA
or -005	200	50/60	1	3.0[6]	NA
VMEbus Chassis[3]	220/240	50/60	1	3.0[6]	NA
MBS-003 or	120	50/60	1	6.0[6]	NA
-004	200	50/60	1	3.0[6]	NA
Multibus Chassis[3]	220/240	50/60	1	3.0[6]	NA
PRT-001 or	120	60	1	6.0	3 m
-101[4]	200	50	1	3.0	3 m
Printer/Plotter	200/240	50	1	3.0	3 m

[1] This is the maximum current rating for an expansion cabinet's power control circuits.
[2] This device contains a standalone power distribution system.
[3] These units are mounted in expansion cabinets and obtain AC power from the processor or expansion cabinet power controllers. There are no external power cords.
[4] This is a standalone device.
[5] This is the current load when shipped by CONVEX.
[6] This current value is for maximum board configuration; no peripherals are installed.

[7] The maximum allowable frequency deviation is ± 0.5 Hz.

A.7 CONVEX Computer's Cooling Requirements

The following table lists the heat dissipation and cooling requirements of the CONVEX processor cabinets:

Table A–6, Computer Dissipation and Air Conditioning Requirements

Equipment	Watts	Btu/hr	Kcals/hr	Refrigeration (Tons)
C210 Cabinet[1]	5,700	19,456	4,903	1.6
C210 Cabinet[2]	9,300	31,745	8,000	2.6
C220 Cabinet[3]	8,700	29,697	7,483	2.5
C220 Cabinet[4]	12,300	41,985	10,580	3.5
1 Memory Board	500	1,707	430	0.14

[1] This system has 1 CPU, 2 memory boards, and 1 CCU.
[2] This system has 1 CPU, 8 memory boards, and 4 CCUs.
[3] This system has 2 CPUs, 2 memory boards, and 1 CCU.
[4] This system had 2 CPUs, 8 memory boards, and 4 CCUs.

A.8 Equipment Cooling Requirements

The following table lists the heat dissipation and cooling requirements of the expansion cabinet and peripheral devices:

Table A–7, Equipment Dissipation and Air Conditioning Requirements

Equipment	Watts	Btu/hr	Kcals/hr	Refrigeration (Tons)
DKD-001 or -101 Disk Drives	588	2,007	506	0.2
DKD-005, -006, -105, or -106 Disk Drives	260	887	224	0.07
DKD-008 or -108 Disk Drives	314	1,070	270	0.09
RDS-001 or -002 Disk System	436	1488	374	0.12
MTD-001 or -101 Tape Drive	360	1,230	310	0.1
MTD-002 Tape Drive	1,810	6,178	1,557	0.5
MTD-102 Tape Drive	2,230	7,612	1,918	0.6
HIA-001 HIA Chassis[1]	500	1,706	430	0.1
VBS -003, -004 or -005 VME Chassis	450	1,536	387	0.1
MBS-003 or -004 Chassis	450	1,536	387	0.1
PRT-001 Printer Plotter	450	1,536	387	0.13
Console Printer (USA only)	70	239	60	0.02
VDU-001 Video Terminal (USA only)	120	410	103	0.03

[1] This is the power dissipation when shipped by CONVEX.

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Appendix B
Reporting Problems

B.1 Overview

The *contact* utility is the recommended way to report minor hardware deficiencies and technical documentation problems to the Technical Assistance Center (TAC). This utility is an interactive tool that prompts the user for the information to properly file a problem report.

> NOTE
>
> The *contact* utility is not intended for requesting customer service for hardware failures. To restore your CONVEX equipment to operational status, faster service can be obtained by directly telephoning the TAC (refer to "Technical Assistance" in the preface).

To use the *contact* utility, there must be a phone connection to the TAC. A UNIX-to-UNIX Communication Protocols (UUCP) allows communication between UNIX systems by either dial-in or hard-wired communication lines. For more information, refer to *uucp(1)* or to the *info(1)* entry in the UNIX man pages.

The name and version number of the product involved is required. Use the *vers* command to ascertain the program or utility name and version. The syntax for the command is **vers** *filename*, where *filename* is the full pathname of the program. If the full pathname of the program is not known, enter **which** *program*. For more information, refer to the *vers(1)* and *which(1)* entries in the UNIX man pages.

B.2 Information Required to Report a Problem

The *contact* utility requires the following information:

1. The customer name, title, phone number, and corporate name
2. The hardware nomenclature, part number, and revision level, or the technical manual name, document number, and version

> NOTE
>
> Use *vers* and *which* to identify product name and version.

3. A short (one line) summary of the problem
4. The more information provided, the more quickly the problem can be isolated and solved. At a minimum, include a detailed description of the problem (including page references, if applicable), the source code, and a stack backtrace whenever possible.

> **NOTE**
>
> See the *adb(1)* or *csd(1)* man pages for information on obtaining stack backtraces.

5. The priority of the problem, selected from a list of six levels
6. Instructions on how to reproduce the problem, including the command syntax used, any flags invoked, or anything else attempted to make the program run
7. Any other comments about the problem or files to be submitted

The *contact* user has a chance to review and edit the report prior to submitting it. If the user decides to delay submitting the report, the session can be aborted. The report is automatically saved in the user's top-level directory in a file named *dead.report*.

See the following figure for a sample *contact* session. User input is in bold lettering, and the system response is in monospace type.

Figure B–1, Sample *contact* Session

```
%contact RETURN
Welcome to contact version 0.11 ()

Enter your name, title, phone number, and corporate name (^D to terminate)
> Margaret Atwood, systems programmer, 814-4444, University r
> of Chicago RETURN
> CTRL-D

Enter the name of the product involved
> CONVEX UNIX Programmer's Manual, Part I RETURN

Enter the version number (in the form X.X or X.X.X.X) of the product
> Revision 4.0 RETURN

Enter a short (1 line) summary of the problem
> The finger command manual page lists nonexistent bug RETURN

Enter a detailed description of the problem (^D to terminate)
> The finger(1) man page says, under the BUGS section, that "Only the first
line of the .project file is printed."  Happily, this is not true! RETURN
> CTRL-D

Enter a problem priority, based on the following:
1) Critical    - work cannot proceed until the problem is resolved.
2) Serious     - work can proceed around the problem, with difficulty.
3) Necessary   - problem has to be fixed.
4) Annoying    - problem is bothersome.
5) Enhancement - requested enhancement.
6) Informative - for informational purposes only.
> 4 RETURN

Enter the instructions by which the problem may be reproduced (^D to terminate)
> a) put more than one line in .project RETURN
> b) read the man page for finger(1) RETURN
> CTRL-D

Enter any comments that are applicable (^D to terminate) RETURN
> CTRL-D

Do you have any suggestions or comments on the documentation that you
referenced when you were trying to resolve your problem (for example,
additions, corrections organization, accessibility)? (^D to terminate)
> The man page should be updated. RETURN
> CTRL-D

Are there any files that should be included in this report (yes | no)?
> no RETURN

Please select one of the following options:
1) Review the problem report.
2) Edit the problem report.
3) Submit the problem report.
4) Abort the problem report.
> 3 RETURN

Problem report submitted.
%
```

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CONVEX Installation Guide
(C201, C202, C210, C220)
Document No. 081-000830-201, First Edition, Rev. 1

Reader's Forum

You are invited to submit comments about the clarity and service of this manual. Constructive critical comments are most welcome, and will help us continue in our efforts to generate quality customer documentation. Please list the document page number with your questions and comments.

_____

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_____

_____

From:

Name_____ Title_____

Company_____ Date_____

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FOR ADDITIONAL INFORMATION OR DOCUMENTATION:

Location	Phone Number
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