

# Service Handbook

**HP 9000 Series 700  
Model 715 Workstations**

HP Part Number. A2600-90039

[Click to go to the Table of Contents](#)



3404 East Harmony Road, Fort Collins, CO. 80525

## NOTICE

The information contained in this document is subject to change without notice.

HEWLETT-PACKARD MAKES NO WARRANTY OF ANY KIND WITH REGARD TO THIS MANUAL, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Hewlett-Packard shall not be liable for errors contained herein or direct, indirect, special, incidental, or consequential damages in connection with the furnishing, performance, or use of this material.

## WARRANTY

A copy of the specific warranty terms applicable to your Hewlett-Packard product and replacement parts can be obtained from your local Sales and Service Office.

Copyright © Hewlett-Packard Company 1995

This document contains information which is protected by copyright. All rights are reserved. Reproduction, adaptation, or translation without prior written permission is prohibited, except as allowed under the copyright laws.

### Restricted Right Legend

Use, duplication or disclosure by the U.S. Government Department of Defense is subject to restrictions as set forth in paragraph (b)(3)(ii) of the Rights in Technical Data and Software clause in FAR 52.227-7013.

Copyright © AT & T, Inc. 1980, 1984

Copyright © The Regents of the University of California 1979, 1980, 1983

This software and documentation is based in part on the Fourth Berkeley Software Distribution under licence from the Regents of the University of California.

## Printing History

New Editions of this manual incorporate all material updated since the previous edition. Update packages may be issued between editions and contain replacement and additional pages to be merged into the manual by the user.

The manual printing date and part number indicate its current edition. The printing date changes when a new edition is printed. (Minor corrections and updates which are incorporated at reprint do not cause the date to change.) The manual part number changes when extensive technical changes are incorporated.

October 1992 Edition 1 (P/N A2084-90602)  
Update to A2084-90602 (P/N A2673-90099)  
July 1993 Edition 2 (P/N A2084-90617)  
May 1994 Edition 3 (P/N A2084-90630)  
August 1995 Edition 4 (P/N A2600-90039)

# Emissions Regulations

## Federal Communications Commission (FCC)

The Federal Communications Commission of the U.S. government regulates the radio frequency energy emanated by computing devices through published regulations. These regulations specify the limits of radio frequency emission to protect radio and television reception. All HP nodes and peripherals have been tested and comply with these limits. The FCC regulations also require that computing devices used in the U.S. display the agency's label and that the related documentation include the following statement:

**NOTICE:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Compliance to these regulations requires the use of shielded cables.

## Canadian Department of Communications (CDC)

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the Radio Interference Requirements of the Canadian Department of Communications.

Compliance to these regulations requires the use of shielded cables.

## VCCI Class 1 ITE

この装置は、第一種情報装置（商工業地域において使用されるべき情報装置）で商工業地域での電波障害防止を目的とした情報処理装置等電波障害自主規制協議会（VCCI）基準に適合しております。

従って、住宅地域またはその隣接した地域で使用すると、ラジオ、テレビジョン受信機等に受信障害を与えることがあります。

取扱説明書に従って正しい取り扱いをして下さい。

VCCI基準に適合する為に、シールドされたケーブルをご使用下さい。

## Emissions Regulations Compliance

Any third-party I/O device installed in HP system(s) must be in accordance with the requirements set forth in the preceding Emissions Regulations statements. In the event that a third-party noncompliant I/O device is installed, the customer assumes all responsibility and liability arising therefrom.

Compliance to these regulations requires the use of shielded cables.

## Electrostatic Discharge (ESD) Precautions

Electrostatic charges can damage the integrated circuits on printed circuit boards. To prevent such damage from occurring, observe the following precautions when unpacking and installing the board.

- Stand on a static-free mat.
- Wear a static strap to ensure that any accumulated electrostatic charge discharges from your body to ground.
- Connect all equipment together, including the static-free mat, static straps, routing nodes, and peripheral units.
- Keep uninstalled printed circuit boards in their protective antistatic bags.
- Once you have removed the printed circuit boards from their protective antistatic bags, handle them by their edges.

## **Laser Safety Statement (For U.S.A. Only)**

(For workstations that have a CD ROM drive installed.)

The CD ROM mass-storage system is certified as a Class-1 laser product under the U.S. Department of Health and Human services (DHHS) Radiation Performance Standard according to the *Radiation Control for Health and Safety Act* of 1968.

This means that the mass-storage system does not produce hazardous laser radiation. Because laser light emitted inside the mass-storage system is completely confined within protective housings and external covers, the laser beam cannot escape from the machine during any phase of user operation.



## Warnings and Cautions

**WARNING:**

Removing device cover may expose sharp edges in equipment chassis. To avoid injury, use care when installing customer add-on devices.

**WARNUNG:**

Das Entfernen der Geräteabdeckung legt die scharfen Kanten im Inneren des Gerätes frei. Um Verletzungen zu vermeiden, seien Sie vorsichtig beim Einbau von zusätzlichen Bauteilen, die vom Kunden selber eingebaut werden können.

**AVERTISSEMENT:**

Des bords tranchants du châssis de l'équipement peuvent être exposés quand le cache de l'unité n'est pas en place. Pour éviter des blessures, faire très attention lors de l'installation de modules supplémentaires par le client.

**WARNING:**

Disconnect power plug from wall outlet or source power before moving or removing the device, or installing add-on components.

**WARNUNG:**

Entfernen Sie die Stromzuführung von der Steckdose oder der Stromquelle bevor Sie das Gerät bewegen, abbauen, oder zusätzliche Bauteile installieren.

**AVERTISSEMENT:**

Débrancher la fiche de la prise de courant ou de la source d'alimentation électrique avant de déplacer ou de retirer l'unité, ou avant d'installer des modules supplémentaires.

**CAUTION:**

System power cord must be plugged into an accessible dedicated ac mains receptacle.

**VORSICHT:**

Das System-Netzanschlußkabel muß an eine zugängliche spezielle Wechselstrom-Hauptzuführungssteckdose angeschlossen werden.

**ATTENTION:**

Le fil d'alimentation électrique du système doit être branché dans une prise de courant c.a. spécialisée accessible.



# Table of Contents

<b>Product Information</b>	<b>1-1</b>
Product Description	1-1
System Unit Controls and Front Panel Connectors	1-4
Understanding the LEDs	1-5
System Unit Rear Panel Connectors	1-7
SCSI Connector	1-9
HP Parallel I/O Connector	1-9
HP-HIL Connector	1-9
10-Pin Modular Jack	1-9
RS-232 Serial Input/Output Connectors	1-9
802.3 Network Connector	1-10
Built-In Graphics Connector	1-10
Optional Connector for EISA, CRX, or HCRX Graphics	1-11
EISA	1-11
CRX or HCRX Graphics	1-11
Power Cord Connector	1-12
Audio Line In and Audio Line Out Connectors	1-12
Monitor Controls, Connectors, and Indicators	1-13
Keyboards	1-14
Keyboard Differences	1-14
<b>Environmental/Installation/PM</b>	<b>2-1</b>
Environmental Specifications	2-1
Regulatory Requirements	2-2
Installation	2-2
Preventive Maintenance	2-2



<b>Configuration</b>	<b>3-1</b>
Workstation and System Unit Configurations	3-1
FRU Configurations	3-1
Mass Storage Configurations	3-1
Installing Additional Memory	3-15
Changing the Built-In Graphics Configuration Switches (Models 715/C, 715/33, 715/50, 715/75)	3-17
Configuring the CRX Graphics Options	3-18
Setting Up a Single Monitor System	3-18
Setting Up a Dual Monitor System	3-21
<b>Troubleshooting</b>	<b>4-1</b>
LED Error Codes	4-2
Dealing with a Boot Failure	4-13
Boot Administration Environment	4-14
Stable Storage	4-15
Boot Command Notations	4-16
Supported Boot Paths	4-16
ISL Environment	4-17
Invoking the ISL Environment from a SCSI Device	4-17
ISL User Commands	4-19
Running the ISL-Based Diagnostics	4-19
Verifying the System Operation with SupportWave	4-21
Dealing With HPMC (Uncorrectable Error)	4-23
HPMC Caused by a Multi-Bit Memory Parity Error	4-25
HPMC Caused by a Data Cache Parity Error	4-29
Troubleshooting CRX and HCRX Graphics	4-30
<b>Field Replaceable Units</b>	<b>5-1</b>
External Graphics Processor	5-6
Floor Stand	5-7
Opening the System Unit	5-8
Disk Drives	5-9
Power Supply	5-17
Front Audio Board Assembly	5-18
Front Bezel Cover Plate Assembly	5-19
EISA Assembly Components	5-20
Removing the EISA Assembly Components (End Cap)	5-21
Removing EISA Assembly Components (Retaining Clips)	5-24
Installing the EISA Assembly Components (End Cap)	5-27
Installing EISA Assembly Components (Retaining Clips)	5-32

CRX and HCRX Graphics .....	5-35
Rear Audio Board .....	5-39
Memory	5-40
PCX-T Module (Model 715/75) .....	5-42
Processor Board .....	5-45
System EEPROM .....	5-50
Calendar Battery .....	5-51
<b>Diagrams</b>	<b>6-1</b>
<b>Reference</b>	<b>7-1</b>
<b>Service Notes</b>	<b>8-1</b>
<b>Index</b>	

- 1-1 System Unit Controls ..... 1-4
- 1-2 Front Panel LEDs ..... 1-5
- 1-3 System Unit Rear Panel Connectors ..... 1-8
- 1-4 CRX and HCRX Graphics Connector ..... 1-11
- 1-5 CRX-48Z Graphics Connections ..... 1-12
  
- 3-1 Default SCSI IDs ..... 3-2
- 3-2 Quantum 525-MB and 1-GB Disk Drive Jumpers ..... 3-3
- 3-3 Quantum 1-GB/2-GB Low Profile Disk Drive Jumpers ... 3-4
- 3-4 Hewlett-Packard 1-GB Winchester Drive Jumpers ..... 3-5
- 3-5 Seagate 525-MB/1-GB/ 2-GB Winchester Drive Jumpers . 3-6
- 3-6 Micropolis 1-GB Winchester Drive Jumpers ..... 3-7
- 3-7 Quantum 210-MB/425-MB Winchester Drive Jumpers ... 3-8
- 3-8 DEC 1-GB and 2-GB Disk Drive Jumpers ..... 3-9
- 3-9 Hewlett-Packard 420-MB Drive Jumpers ..... 3-10
- 3-10 Hewlett-Packard 1-GB/2-GB Drive Jumpers ..... 3-11
- 3-11 SCSI Floppy Drive Address Jumper Settings ..... 3-12
- 3-12 CD-ROM SCSI Address Jumper Settings ..... 3-13
- 3-13 DDS SCSI Address Jumper Settings ..... 3-14
- 3-14 Memory SIMM Locations ..... 3-15
- 3-15 Memory Connector Configuration ..... 3-16
- 3-16 Changing the Graphics Configuration Switches ..... 3-17
  
- 4-1 Front Panel LEDs ..... 4-2
- 4-2 LED Display for CRX or HCRX Graphics Check ..... 4-30
  
- 5-1 Illustrated Parts Breakdown ..... 5-2
- 5-2 Removing the External Graphics Processor ..... 5-6
- 5-3 Unlocking the Floor Stand ..... 5-7
- 5-4 Removing the Floor Stand ..... 5-7
- 5-5 Opening the System Unit ..... 5-8
- 5-6 Removing the First Hard Disk Drive ..... 5-9
- 5-7 Removing the Second Hard Disk Drive ..... 5-10
- 5-8 Removing the Floppy, CD-ROM, or DDS Drive ..... 5-11
- 5-9 Removing the Drive Brackets ..... 5-12
- 5-10 SCSI and PC Floppy Cable Connections ..... 5-13
- 5-11 SCSI Cable Connections ..... 5-14
- 5-12 Connecting SCSI Cable to Processor Board ..... 5-15
- 5-13 CD-ROM Audio Cable ..... 5-15
- 5-14 Connecting the PC-Style Floppy Drive ..... 5-16

- 5-15 Removing the Power Supply ..... 5-17
- 5-16 Removing the Front Audio Board Assembly ..... 5-18
- 5-17 Removing the Blank Cover Plate ..... 5-19
- 5-18 EISA Option Mounting ..... 5-20
- 5-19 Removing the EISA Adapter Assembly (End Cap) ..... 5-21
- 5-20 Disconnecting the EISA Board from the Adapter Board . 5-22
- 5-21 Removing the Connector Bucket ..... 5-22
- 5-22 Removing the End Cap ..... 5-23
- 5-23 Unsecuring the EISA Board ..... 5-24
- 5-24 Removing the EISA Assembly (Retainer Clips) ..... 5-25
- 5-25 Disconnecting the EISA Board ..... 5-26
- 5-26 Removing the Connector Bucket ..... 5-26
- 5-27 Installing the End Cap ..... 5-27
- 5-28 Installing the Connector Bucket ..... 5-28
- 5-29 Connecting the EISA Board ..... 5-29
- 5-30 Inserting the EISA Assembly ..... 5-30
- 5-31 Securing the EISA Board with the End Cap ..... 5-31
- 5-32 Installing the Connector Bucket ..... 5-32
- 5-33 Connecting the EISA Board ..... 5-32
- 5-34 Inserting the EISA Assembly (Retaining Clips) ..... 5-33
- 5-35 Securing the EISA Board(Retaining Clips) ..... 5-34
- 5-36 Removing the CRX or HCRX Graphics ..... 5-36
- 5-37 Removing the Bucket and Flex Cable ..... 5-37
- 5-38 Removing the Mounting Bracket ..... 5-38
- 5-39 Removing the Rear Audio Board ..... 5-39
- 5-40 Removing Memory Boards ..... 5-40
- 5-41 Installing Memory Boards ..... 5-41
- 5-42 Disconnecting the PCX-T Grounding Wire ..... 5-42
- 5-43 Disconnecting the PCX-T Module ..... 5-43
- 5-44 Removing the PCX-T Module ..... 5-44
- 5-45 Removing the Processor Board ..... 5-46
- 5-46 Component and Internal Connector Locations  
Model 715/C, 715/33, and 715/50 ..... 5-47
- 5-47 Component and Internal Connector Locations  
Model 715/64, 715/80, 715/100, 715/100XC .. 5-48
- 5-48 Component and Internal Connector Locations 715/75 ... 5-49
- 5-49 Removing the EEPROM (UV17) ..... 5-50
- 5-50 Removing the Calendar Battery ..... 5-51

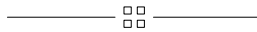
## Figures

6-1 Power Distribution Diagram . . . . .	6-1
6-2 System Unit Functional Block Diagram Model 715/C, 715/33, 715/50, and 715/75 . . . . .	6-3
6-3 System Unit Functional Block Diagram Model 715/64, 715/80, 715/100, and 715/100XC . . . . .	6-4

## Tables

[Click on the page number to view a table](#)

1-1 LED Display During Normal System Activity . . . . .	1-6
1-2 Serial I/O Pins . . . . .	1-10
1-3 PC/AT Keyboard to ITF Keyboard Equivalent Keys . . . . .	1-15
2-1 Environmental Specifications for Models 715 . . . . .	2-1
4-1 Model 715/C, 715/33, 715/50, 715/75 LED Error Codes . . . . .	4-3
4-2 Model 715/C, 715/33, 715/50, 715/75 PDC LED Codes . . . . .	4-6
4-3 Model 715/C, 715/33, 715/50, 715/75 ISL LED Codes . . . . .	4-8
4-4 Model 715/C, 715/33, 715/50, 715/75 Kernel LED Codes . . . . .	4-10
4-5 Model 715/64, 715/80, , 715/100, 715/100XC LED Codes . . . . .	4-11
4-6 PIM_INFO Action . . . . .	4-24
4-7 Multi-Bit Memory Parity Error . . . . .	4-25
4-8 Memory Address Ranges . . . . .	4-26
4-9 Processor Module Error (Data Cache Parity) . . . . .	4-29
5-1 FRU List . . . . .	5-3
5-2 EISA Interface Options . . . . .	5-5
6-1 Power Supply Connector P6 Pinouts . . . . .	6-2
6-2 Power Supply Pinouts for Storage Device Connectors . . . . .	6-2



# Product Information

# 1

This chapter introduces the Model 715 workstation, controls, and indicators. Included in this chapter are the following topics:

- Product description
- System unit controls
- Understanding the LEDs
- System unit rear panel connectors
- Monitor controls, connectors, and indicators

## Product Description

The HP 9000 Series 700 Model 715 workstation uses one of the following versions of the HP-UX operating system:

- Model 715/33, 715/50, and 715/C workstations use version 9.01 or later
- Model 715/75 workstations use version 9.03 or later
- Model 715/64, 715/80, 715/100, and 715/100XC workstations use version 9.05 or later

The Model 715 workstations can house up to two hard disk drives and a removable-media drive, which are connected to the internal SCSI interface. The workstation is available in diskless as well as disked configurations. Disked configurations have one or two hard disk drives of the following densities: 525 MB, 1 GB, or 2 GB. These hard disk drives are preformatted. The workstation's removable-media drive can be either a 3.5-inch floppy drive, a CD-ROM drive, or a DDS-format tape drive.

**NOTICE:** Model 715s/t workstations that have been upgraded from a Model 425e, 705, or 710 system may have 210-MB and 420-MB hard disk drives.

Model 715/C has two 420-MB hard disk drives.

The workstation contains the following key features:

- Operating Systems
  - Native HP/UX
  - DOS emulation
- Source and binary code compatible with Series 700 product family

- **Built-In Graphics**
  - 8-plane graphics with choice of one of the following:
    - 19/20-inch 1280 x 1024 color monitor
    - 19-inch 1280 x 1024 grayscale monitor (available only on the Model 715/33, 715/50, and 715/75)
    - 17-inch 1280 x 1024 color monitor (Model 715/64, 715/80, 715/100, and 715/100XC)
    - 17-inch 1024 x 768 color monitor (Model 715/33 and 715/50)
    - 15-inch 1024 x 768 color monitor (Model 715/33)
  
- **Graphics Options**
  - 19/20-inch color monitor with choice of one of the following:
    - 8-plane HCRX color graphics (available only on the Model 715/64, 715/80, 715/100, and 715/100XC)
    - 24-plane CRX color graphics
    - 24-plane HCRX color graphics (available only on the Model 715/64, 715/80, 715/100, 715/100XC)
    - 8-plane HCRX Z-buffered color graphics (available only on the Model 715/64, 715/80, 715/100, and 715/100XC)
    - 24-plane HCRX Z-buffered color graphics (available only on the Model 715/64, 715/80, 715/100, and 715/100XC)
    - 24-plane CRX Z-buffered color graphics
    - 48-plane CRX Z-buffered color graphics (available only on the Model 715/50, 715/75, 715/100, and 715/100XC)
  
- **Main Memory**

– Model 715/33	8–192 MB
– Model 715/50	16–256 MB
– Model 715/64	32–256 MB
– Model 715/75	32–256 MB
– Model 715/80	32–256 MB
– Model 715/100	32–256 MB
– Model 715/C	32–256 MB
– Model 715/100XC	32–256 MB
  
- **Mass Storage**
  - 1-GB SCSI hard disk drive (full height, 3.5-inch, Micropolis, DMD, DEC, and Seagate 1-GB drives are supported)
  - 2-GB SCSI hard disk drive (full height, 3.5-inch, DEC or Seagate 2-GB drives are supported)
  - 525-MB SCSI hard disk drive (low profile, 3.5-inch, Seagate and Quantum 525-MB drives are supported)
  - 420-MB SCSI hard drive (full height, 3.5-inch, Quantum Pro 420s drive is available on Model 715/C workstations, and on workstations that have been upgraded from a Model 425e, 705, or 710)
  - 210-MB SCSI hard drive (full height, 3.5-inch drive is supported only on workstations that have been upgraded from a Model 425e, 705, or 710.)
  - Floppy disk drive (3.5-inch)
  - CD-ROM disk drive (5.25-inch)
  - DDS-format tape drive (3.5-inch)
  
- **Network**
  - IEEE 802.3 AUI connection
  - Supports connections to 10BASE2 (ThinNet), 10BASE5 (ThickNet), and 10BASE-T (EtherTwist) networks with the use of an external transceiver

- I/O
  - Two 9-pin RS-232 Ports
  - One 25-pin HP parallel port
  - 8-bit, single-ended SCSI-2 interface
  - HP-HIL port (715/C, 715/33, 715/50, and 715/75 systems only) for HP-UX keyboards and other HP-HIL devices
  - Dual mini-DIN ports on the Keyboard Adapter Module (715/64, 715/80, and 715/100 Systems only) for AT-style keyboard and other mini-DIN (PS/2-style) devices
  - CD-quality audio and speaker output
  - CD-quality microphone or audio input
- Expansion slot for one EISA card (optional on Model 715/33)



# System Unit Controls and Front Panel Connectors

Figure 1-1 shows the Power and TOC (Transfer Of Control) switches.

Use the Power switch to power the system unit on and off.

Use the TOC switch to reset the operating system. Do not push the TOC switch unless you have first shutdown the operating system by using the **shutdown** command.

**NOTICE:** Model 715/64, 715/80, 715/100, and 715/100XC workstations are equipped with a soft shutdown feature. These systems shut down the file system automatically when you power the system off.

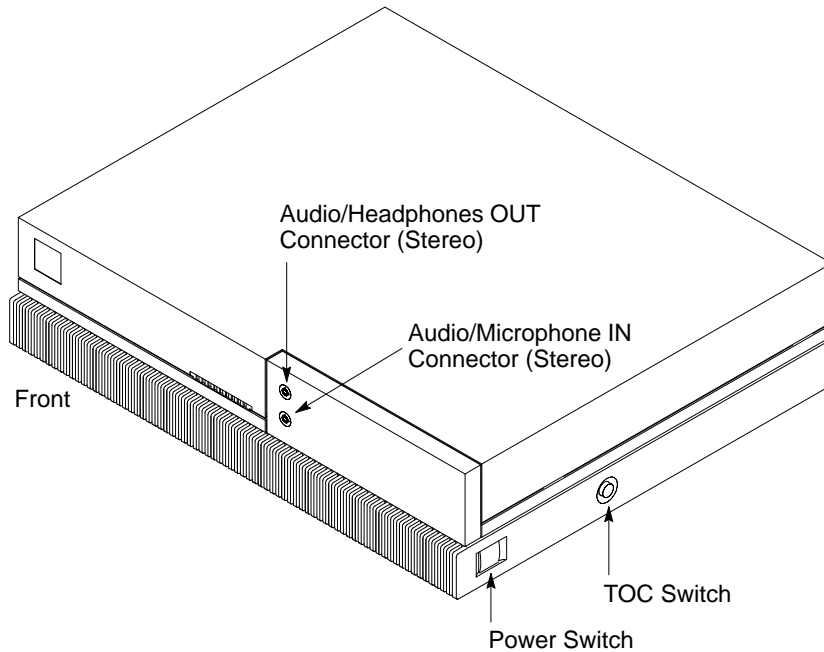


Figure 1-1. System Unit Controls

Figure 1-1 also shows the Audio connectors on the front panel. The workstation has audio input and output capability through external input and output connectors and an internal speaker. The line-in and line-out connectors are located on the rear panel and are described later in this chapter. The front panel contains the Audio/Headphone OUT and Audio/Microphone IN connectors.

The Audio/Headphone OUT connector is a stereo headphone output. The Audio/Microphone IN connector is a mono microphone input. The ring connector of the microphone jack supplies +1.5 volts dc for microphones that require it. A microphone for

audio input is not supplied with the workstation. The audio connectors are standard stereo audio mini-jacks.

## Understanding the LEDs

There are 9 Light Emitting Diodes (LEDs) located on the front of the system unit, as shown in Figure 1–2. The green one on the far right is the Power LED. It lights when the system unit power is on. The other eight are labeled 8 through 1 (left to right). The rightmost four amber LEDs (labeled 4, 3, 2, and 1) show that the system is running the operating system and communicating over the network. Along with the leftmost four amber LEDs (8, 7, 6, and 5), they also help you to troubleshoot the workstation by coming on in certain patterns during system failures (see Chapter 4).

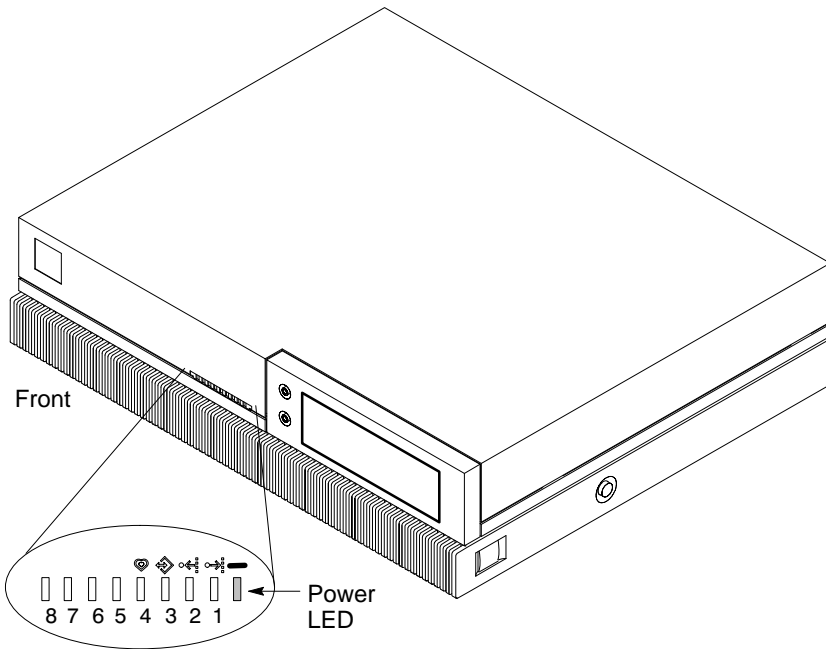


Figure 1–2. Front Panel LEDs

Table 1–1 lists how the LEDs report during normal HP–UX system activity. The green Power LED remains lit while the system is powered on.

Table 1-1. LED Display During Normal System Activity

LED Display (1 Through 4 Flashing)	Meaning
<p style="text-align: center;"><b>8 7 6 5 4 3 2 1</b></p> <p style="text-align: center;">□ □ □ □ ■ □ □ □</p>	Operating System Running
<p style="text-align: center;">□ □ □ □ □ ■ □ □</p>	Disk Access In Progress
<p style="text-align: center;">□ □ □ □ □ □ ■ □</p>	Network Receive In Progress
<p style="text-align: center;">□ □ □ □ □ □ □ ■</p>	Network Transmit In Progress
<p>■ = LED On or Flashing</p>	

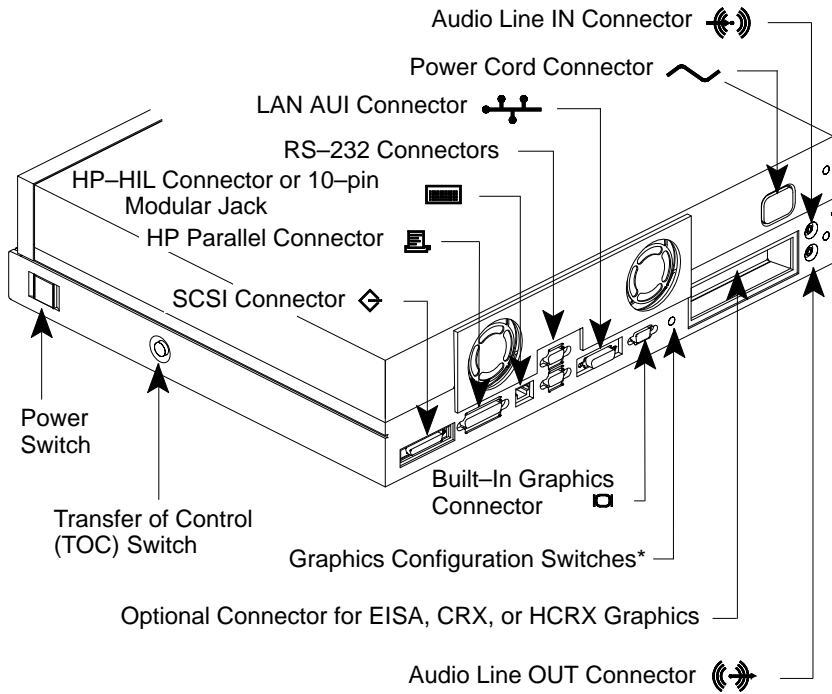
# System Unit Rear Panel Connectors

This section describes the following connectors on the system unit's rear panel:

- SCSI connector
- HP parallel I/O connector
- HP-HIL connector (Model 715/C, 715/33, 715/50, and 715/75 workstations)
- 10-pin modular jack (Model 715/64, 715/80, 715/100, and 715/100XC workstations)
- RS-232 serial input/output connectors
- 802.3 network connector
- Built-in graphics connector
- Optional connector for EISA, CRX, or HCRX graphics
- Power cord connector
- Audio connectors

**NOTICE:** To maintain FCC/EMI compliance, verify that all cables are fully seated and properly fastened.

Figure 1-3 shows the locations of the connectors on the system unit's rear panel. The symbols shown are depicted on the rear panel.



\*These switches are not present on Model 715/64, 715/80, 715/100, and 715/100XC workstations. Model 715/64, 715/80, 715/100, and 715/100XC workstations are autoconfiguring.

*Figure 1-3. System Unit Rear Panel Connectors*

## SCSI Connector

Use the SCSI connector to connect external SCSI devices such as DDS-format tape drives and CD-ROM drives. Consult the documentation that accompanies each SCSI device for specific information concerning its use.

**NOTICE:** When attaching external SCSI devices, be sure to terminate the last device on the external SCSI bus. If no external devices are attached, the SCSI connector does not need to be terminated.

## HP Parallel I/O Connector

The 25-pin HP Parallel I/O interface port is provided for use with peripheral devices using the Centronics interface protocols such as printers and plotters. Consult the documentation that accompanies each peripheral device for specific information concerning its use.

## HP-HIL Connector

Model 715/C, 715/33, 715/50, and 715/75 workstations are equipped with an HP-HIL connector, which provides an interface for the system's keyboard, mouse, and other optional HIL input devices. Consult the documentation that accompanies each input device for specific information concerning its use.

## 10-Pin Modular Jack

Model 715/64, 715/80, 715/100, and 715/100XC workstations are equipped with a 10-pin modular jack. A Keyboard Adapter Module attaches to this connector by means of a special cable shipped with the unit. The Keyboard Adapter Module includes two mini-DIN connectors and an HP-HIL connector. The mini-DIN connectors provide an interface for a AT-style keyboard and other mini-DIN input devices. The HP-HIL connector provides an interface for an HP keyboard, mouse, or other optional HIL input devices. Consult the documentation that accompanies each input device for specific information concerning its use.

## RS-232 Serial Input/Output Connectors

You can attach a variety of peripheral devices to the two RS-232 Serial Input/Output (SIO) ports on the workstation. These peripheral devices include printers, plotters, modems, and scanners. Consult the documentation that accompanies each peripheral device for specific information concerning its use.

Both SIO ports are programmable. You can set functions such as bit rate, character length, parity, and stop bits. SIO Ports 1 and 2 are used as interfaces for serial asynchronous devices to the CPU. Both ports operate at up to a 19.2 K baud rate.

Table 1-2 shows the SIO connector pin listings. The serial connectors are 9-pin D-sub connectors. Signal names are those specified in the EIA RS-232 standard.

Table 1–2. Serial I/O Pins

Pin No.	Signal	Description
1	DCD	Data Carrier Detect
2	RXD	Receive Data
3	TXD	Transmit Data
4	DTR	Data Terminal Ready
5	GND	Ground
6	DSR	Data Set Ready
7	RTS	Request To Send
8	CTS	Clear To Send
9	RI	Ring Indicator

## 802.3 Network Connector

Figure 1–3 shows the location of the connector for the 802.3 (ETHERNET) network. Connect an ETHERNET transceiver to this connector for communicating with a network.

## Built-In Graphics Connector

If the workstation does not have the CRX, HCRX, or VISUALIZE graphics option installed, use the built-in graphics connector to connect the monitor's video cable to the system. If the workstation is equipped with optional graphics, connect the monitor or external graphics unit to the optional graphics connect as described below. If you are setting up a dual monitor system, connect one monitor to the built-in graphics connector and the other monitor to the optional graphics connector.

## Connectors for EISA, and Optional Graphics

The system has a slot for an optional EISA (Extended Industry Standard Architecture) board or an optional CRX , HCRX , VISUALIZE or CRX-48 graphics board.

### EISA

The one-slot EISA I/O port is a superset of ISA (Industry Standard Architecture). It extends the capabilities of that standard while maintaining compatibility with ISA expansion boards. EISA provides 32-bit memory addressing and 32-bit data transfers. The EISA slot allows quick and easy integration in heterogeneous networks as well as simple connections of high-speed, low-cost disks and other peripherals. Some EISA option boards have external connectors for connecting these devices. Consult the documentation that accompanies each device for specific information concerning its use.

### Optional Graphics

If the system has an optional graphics board installed, it will have one of the following graphics connectors:

- Color graphics card (CRX-24, CRX-24Z, HCRX-8, HCRX-8Z, HCRX-24, HCRX-24Z , or VISUALIZE graphics) — This device has a D-sub miniature connector which is connected to the monitor by a cable, as shown in Figure 1-4.
- Graphics interface card (CRX-48Z graphics) — This device is connected by a cable to an external graphics processor, which in turn is connected to a video monitor, as shown in Figure 1-5.

Figure 1-4 shows the location of the CRX or HCRX graphics connector on the system unit's rear panel.

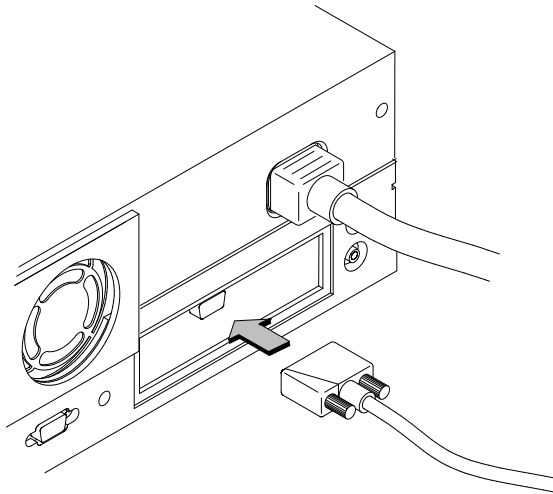




Figure 1-4. CRX and HCRX Graphics Connector

Figure 1-5 shows the locations of the CRX-48Z graphics connections on the system unit's rear panel and on the rear panel of the external graphics processor.

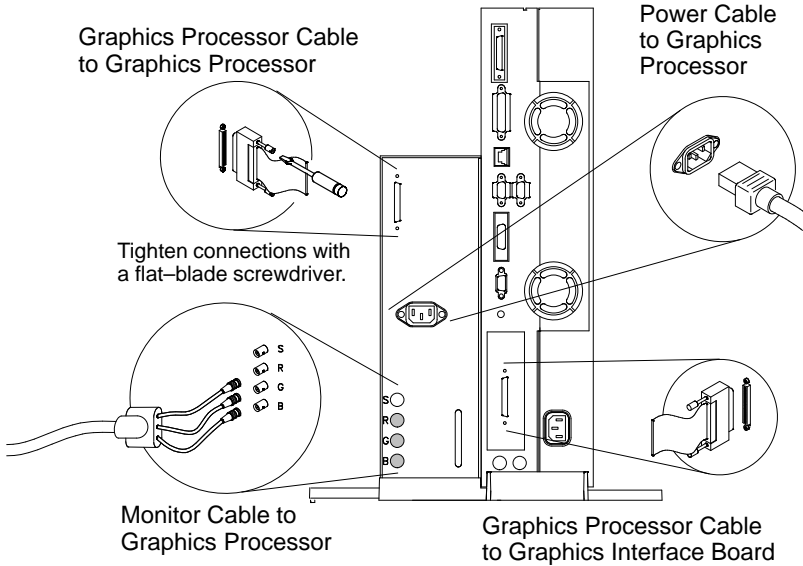


Figure 1-5. CRX-48Z Graphics Connections

## Power Cord Connector

Plug the workstation's power cord into the power cord connector to provide ac power to the system.

## Audio Line In and Audio Line Out Connectors

The Model 715 workstation has CD quality stereo audio input and output capability through external input and output connectors on the front and rear panels and an internal speaker. A microphone for audio input is not supplied with the workstation.

The rear panel audio connectors are standard stereo audio mini-jacks and use audio "line" levels.

## Monitor Controls, Connectors, and Indicators

The Power-On LED, when lit, indicates that the monitor has ac power applied. Use the following controls to adjust the monitor:

- The Power-On/Off button turns the monitor's power on and off.
- The Brightness control adjusts the brightness of the display.
- The Contrast control adjusts the light-to-dark and dark-to-light contrast of the display.
- The Degauss control demagnetizes the color monitor. Degaussing disperses any accumulated magnetic charge from the face of the monitor. Magnetic disturbances such as picture distortion or color impurity can be caused by either moving the monitor from one place to another or swiveling the monitor on its base. No degauss control exists on the 19-inch grayscale monitor.

Refer to the manual that came with the monitor for detailed information about the monitor's controls, connectors, and indicators.

# Keyboards

There are three types of Hewlett-Packard keyboards available for use with the workstation. They are the following:

- ITF Keyboard (Also known as Model # A1099C Keyboard)
- PC Keyboard (Also known as the PC-101 (HIL) Keyboard, the “Enhanced Vectra” Keyboard, and Model # A2205B Keyboard)
- AT Keyboard (Industry-standard AT-style keyboard that uses a mini-DIN, PS/2-style, connector, Model # A4030B)

**CAUTION:** When connecting a HIL device (such as the ITF keyboard) ensure that the device conforms to the HP-HIL specification. Devices that are not HP-HIL compatible but have similar connectors may *appear* to be compatible, but will damage the system.

## Keyboard Differences

Aside from the obvious difference in the appearance of the ITF and PC/AT keyboards due to the arrangement of the keys, there is also a difference in the keys and their output codes. Some keys on one keyboard (the ITF keyboard for example) may not exist on the other keyboard. These keys generate codes which also may not exist as output from the other keyboard (or may be generated by a different key). Codes that are generated when a key is pressed are called *keycodes*.

Some applications expect to use keycodes generated by keys existing on one of the keyboards (the ITF keyboard for example). Since the keys do not exist on the other keyboard (the PC and AT keyboards), an accommodation must be made if the PC/AT keyboard is to be used. In most cases, it is still possible to use some other key that is equivalent (generates the same keycode from a different keycap). To do this, it is necessary to know which keys are equivalent on the two keyboards. Table 1-3 compares the equivalent keys on the ITF and PC/AT keyboards.

**NOTICE:** Keyboard keys not mentioned in Table 1-3 are the same on all the keyboards.

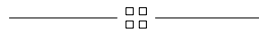
Table 1-3. PC/AT Keyboard to ITF Keyboard Equivalent Keys

<b>PC/AT Keycap Symbol</b>	<b>ITF Keycap Symbol</b>
<b>F9</b>	blank1 (left)
<b>F10</b>	blank2
<b>F11</b>	blank3
<b>F12</b>	blank4 (right)
<b>PrintScreen / SysReq</b>	<b>Menu</b>
<b>Scroll Lock</b>	<b>Stop</b>
<b>Pause / Break</b>	<b>Break / Reset</b>
<b>Page Up</b>	<b>Prev</b>
<b>Num Lock</b>	<b>System / User</b>
<b>End</b>	<b>Select</b>
<b>Page Down</b>	<b>Next</b>
<b>Enter</b>	<b>Return</b>
<b>Alt (left)</b>	<b>Extend Char (left)</b>
<b>Alt (right)</b>	<b>Extend Char (right)</b>
No Equivalent	<b>Clear Line</b>
No Equivalent	<b>Clear Display</b>
No Equivalent	<b>Insert Line</b>
No Equivalent	<b>Delete Line</b>
No Equivalent	<b>Print / Enter</b>
No Equivalent	, (number pad)
No Equivalent	<b>Tab</b> (number pad)

(Continued)

Table 1-3. PC/AT Keyboard to ITF Keyboard Equivalent Keys (cont.)

<b>PC/AT Keycap Symbol</b>	<b>ITF Keycap Symbol</b>
<b>Esc</b>	<b>Esc / Del</b>
<b>Insert</b>	<b>Insert Char</b>
<b>Home</b>	▼
<b>Delete</b>	<b>Delete Char</b>
<b>Caps Lock</b>	<b>Caps</b>
<b>Esc Shifted</b>	<b>Esc / Del Shifted</b>
<b>Pause / Break Shifted</b>	<b>Break / Reset Shifted</b>
<b>Num Lock Shifted</b>	<b>System / User Shifted</b>
<b>0 / Ins</b> (number pad)	<b>0</b> (number pad)
<b>1 / End</b> (number pad)	<b>1</b> (number pad)
<b>2 / ▼</b> (number pad)	<b>2</b> (number pad)
<b>3 / Pg Dn</b> (number pad)	<b>3</b> (number pad)
<b>4 / ◀</b> (number pad)	<b>4</b> (number pad)
<b>6 / ▶</b> (number pad)	<b>6</b> (number pad)
<b>7 / Home</b> (number pad)	<b>7</b> (number pad)
<b>8 / ▲</b> (number pad)	<b>8</b> (number pad)
<b>9 / Pg Up</b> (number pad)	<b>9</b> (number pad)
<b>. / Del</b> (number pad)	<b>.</b> (number pad)
<b>Ctrl</b> (left)	<b>Ctrl</b>
<b>Ctrl</b> (right)	No Equivalent



# Environmental/ Installation/PM

## 2

This chapter lists the environmental specifications and regulatory requirements for the system. Installation and preventive maintenance information, if applicable, is also provided.

### Environmental Specifications

Table 2–1 lists the environmental specifications.

*Table 2–1. Environmental Specifications for Models 715*

Type	Specification
Operating Temperature	+5 to +40° C
Non-Operating Temperature	-40 to +70° C
Humidity	15–80% maximum operating @ 40° C
Operating Altitude	3100 meters
Acoustic Noise	Sound Power Level (LWA) < 4.4 Bells to 30° C (diskless)
Electrical Input	100 to 120 Vac 220 to 240 Vac 60 Hz range, 57 to 63 Hz 50 Hz range, 47 to 53 Hz Minimum voltage 88 Vac Maximum voltage 269 Vac 3.8 amps @ nominal 110 Vac 1.8 amps @ nominal 220 Vac
Maximum Heat Dissipation	205 W or 700 BTUs

# Regulatory Requirements

The following regulatory requirements are met:

- FCC Class A
- VCCI Class 1
- EN55022 Class A
- UL1950
- GS Mark
  - IEC 950/EN60950
  - ZH1/618
- CSA C22.2–950M

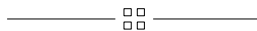
## Installation

Refer to the following manuals for system installation information:

- *HP 9000 Series 700 Model 715 Hardware Installation Guide* (Part Number A2084–90628)
- *HP 9000 Series 700 Model 715 Owner's Guide* (Part Number A2084–90629)

## Preventive Maintenance

There is no preventive maintenance for the system unit. Removable media storage devices may require operator preventive maintenance. Refer to the *HP 9000 Series 700 Model 715 Owner's Guide* (Part Number A2084–90629) for more information.



# Configuration

# 3

This chapter provides details on setting up and changing the system configuration.

## Workstation and System Unit Configurations

Refer to the *HP 9000 Series 700 Configuration Guide* for a complete list of supported accessories, peripherals, and operating systems.

## FRU Configurations

This section provides information for setting up or changing the configuration of the system Field Replaceable Units (FRUs).

## Mass Storage Configurations

Figures 3-1 through 3-11 show the SCSI ID settings for mass storage devices.

**NOTICE:** The SCSI terminators must be removed from all internal SCSI devices. An external terminator is not required if there are no external devices attached.



**Internal System Drives:**

System SCSI Drive(s)

1st Winchester Drive (if present, uses SCSI ID 6)

2nd Winchester Drive (if present, uses SCSI ID 5)

Floppy Disk Drive\* (if present, uses SCSI ID 0)

CD-ROM Drive (if present, uses SCSI ID 2)

4-mm DDS Tape Drive (if present, uses SCSI ID 3)

**External Device Drives:**

External SCSI HP 6000 Series 660A Disk Subsystem,  
Product No. C2213A (These are not default IDs as shipped –  
you must set the IDs to the correct setting.)

1st Winchester Drive (ID No. 4)

2nd Winchester Drive (ID No. 3)

3rd Winchester Drive (ID No. 0)

4-mm DDS Tape Drive (ID No. 3)

Magneto-Optical Drive (ID No. 0)

600-MB CD-ROM (ID No. 2)

External SCSI HP Standalone

Magneto-Optical Drive (C1701A) (ID No. 0)

CD-ROM Drive (A1999A) (ID No. 2)

20-GB Magneto-Optical Autochanger (C1700A)

1<sup>st</sup> (ID No. 3)

2<sup>nd</sup> (ID No. 4)

3<sup>rd</sup> (ID No. 5)

---

\*Model 715/64, 715/80, 715/100, and 715/100XC workstations have a PC-style floppy and do not use a SCSI address for the floppy drive.

*Figure 3-1. Default SCSI IDs*

**NOTICE:** These SCSI IDs are the recommended IDs for each storage device. If an existing device already uses an ID, select an alternate ID.

NOTICE: **A0, A1, and A2** are the SCSI ID jumpers. The jumpers **TE, SS, WS, and I/O** should be **removed**, and the jumper **EP** and **INT** should be **in place**.

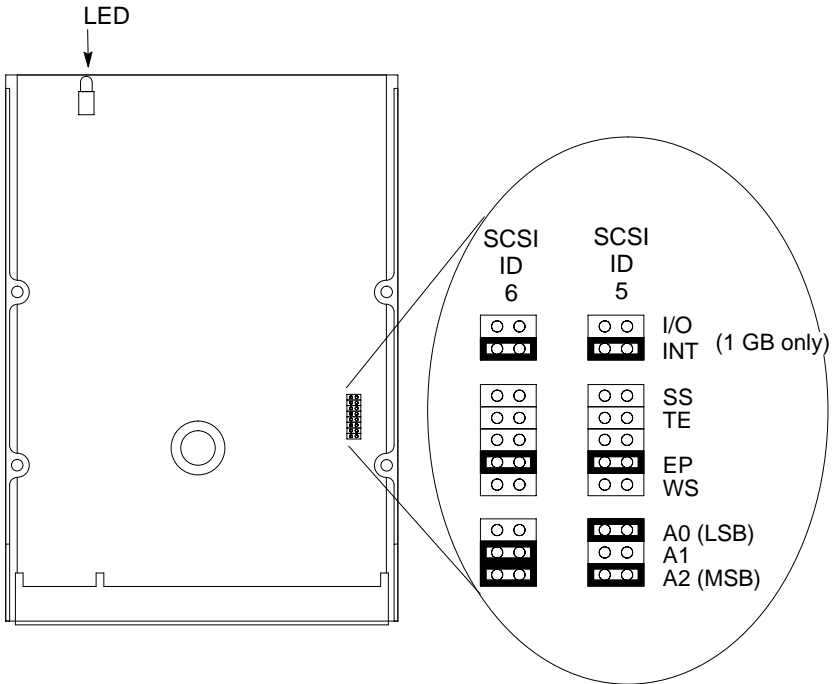


Figure 3-2. Quantum 525-MB and 1-GB Disk Drive Jumpers

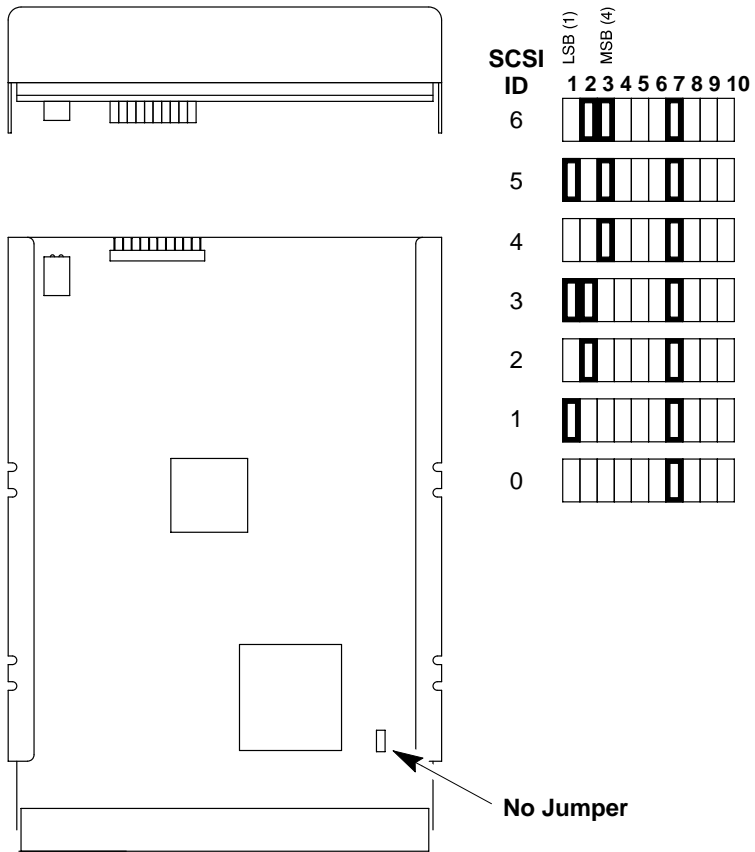
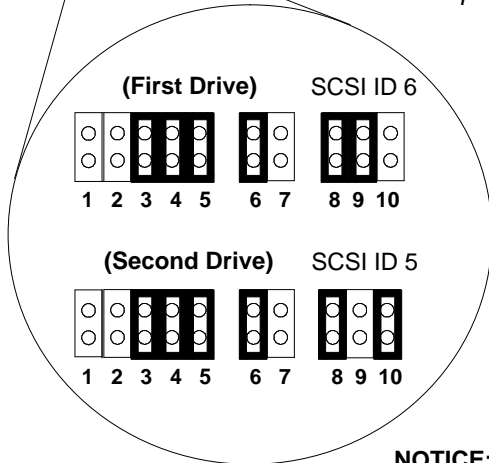
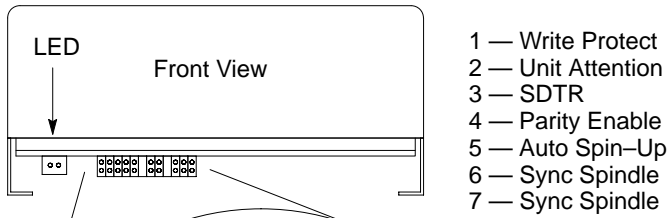


Figure 3-3. Quantum 1-GB and 2-GB Low Profile Disk Drive Jumpers



**NOTICE:** The last three jumpers (8, 9, and 10) are the SCSI ID jumpers. Jumpers 1, 2, and 7 should be **removed**, and jumpers 3, 4, 5, and 6 should be **in place**.

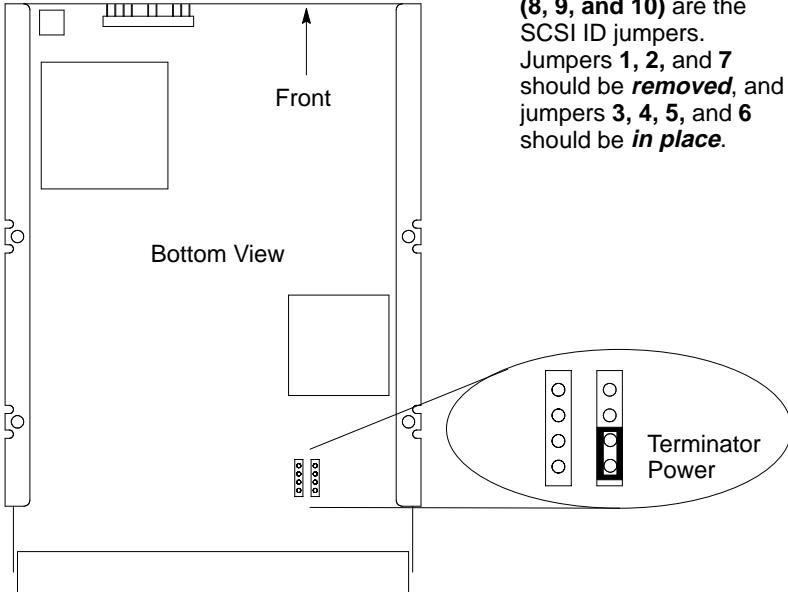
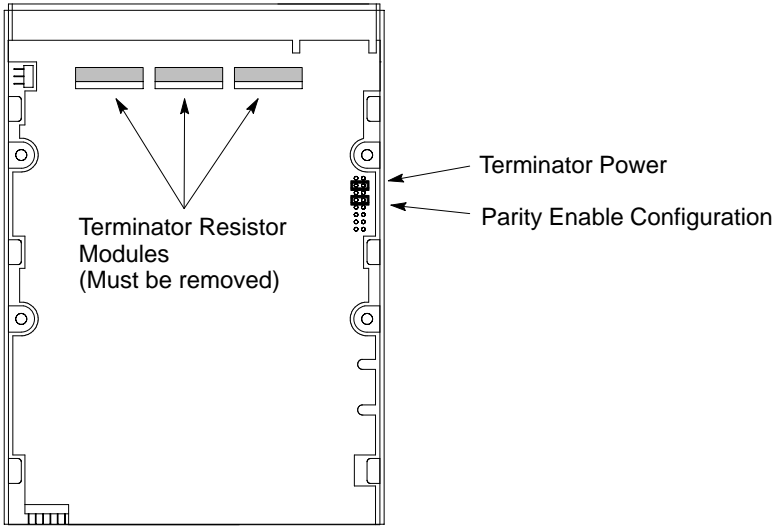


Figure 3-4. Hewlett-Packard 1-GB Winchester Drive Jumpers



**NOTICE:** The first three jumpers (1, 2, and 3) should be **removed**. The SCSI ID jumpers are jumpers 4, 5, and 6.

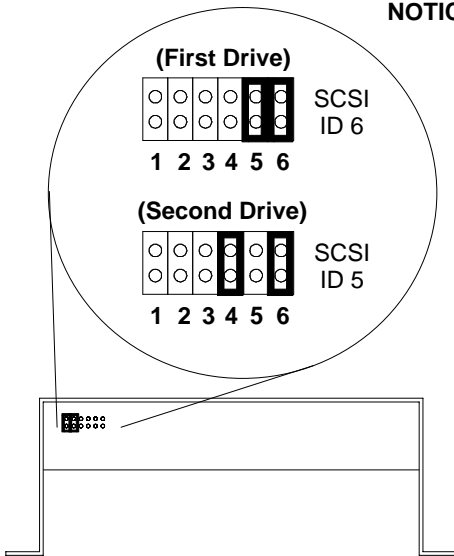
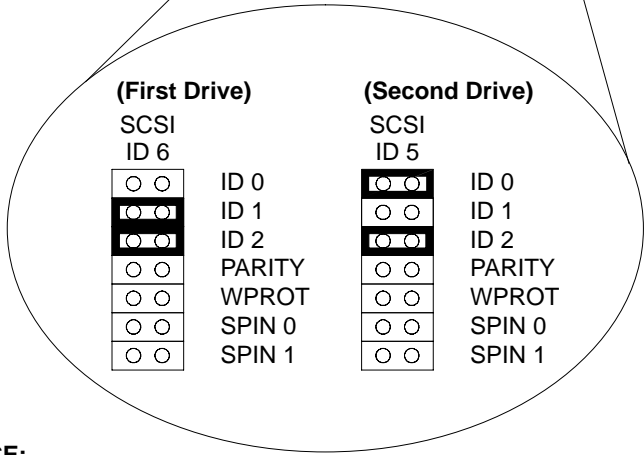
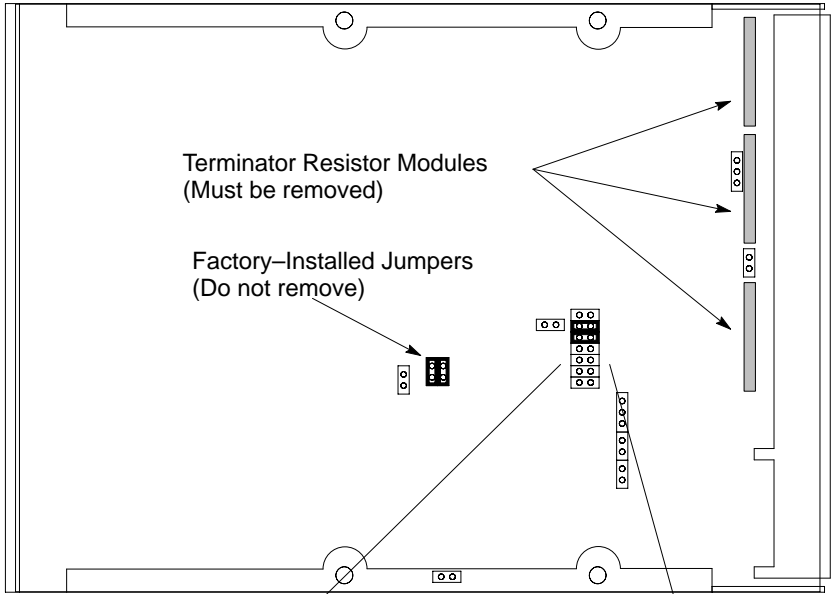


Figure 3-5. Seagate 525-MB, 1-GB, and 2-GB Winchester Drive Jumpers



**NOTICE:**

**ID 0, ID 1, and ID 2** are the SCSI ID jumpers. The jumpers **PARITY, WPROT, SPIN 0, and SPIN 1** should be **removed**.

*Figure 3-6. Micropolis 1-GB Winchester Drive Jumpers*

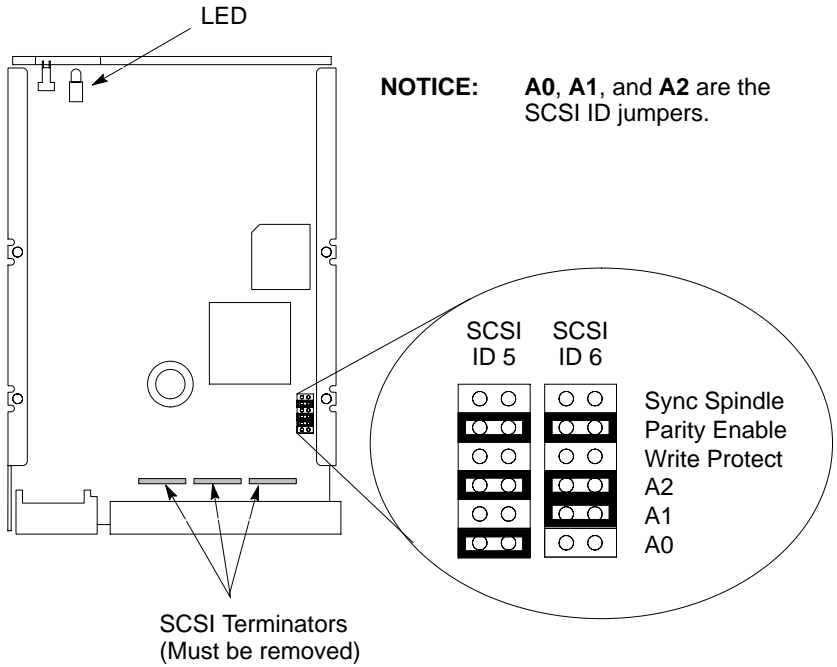
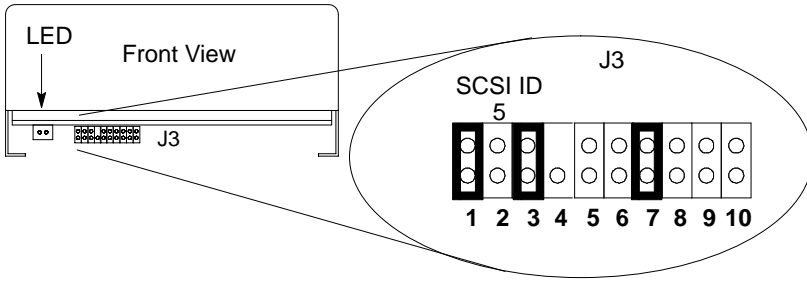
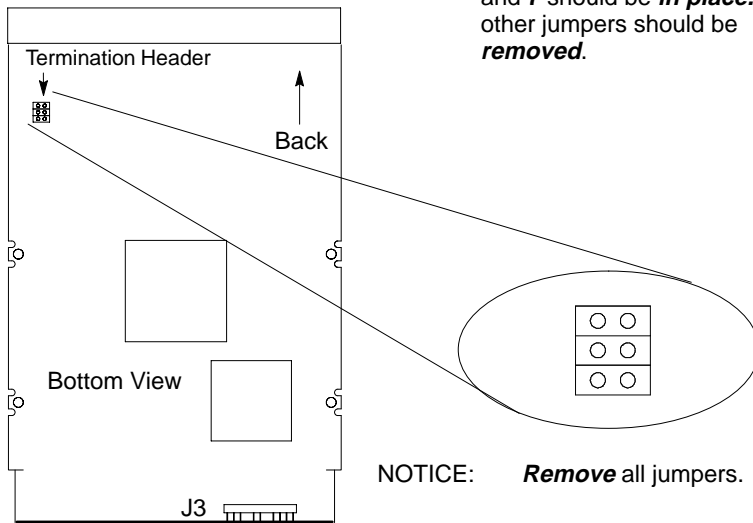


Figure 3-7. Quantum 210-MB and 425-MB Winchester Drive Jumpers  
(Models ProDrive 210S and ProDrive 425S)



NOTICE: The first three jumpers (**1, 2, and 3**) are the SCSI ID jumpers. Only jumpers **1, 3, and 7** should be ***in place***. All other jumpers should be ***removed***.



NOTICE: ***Remove*** all jumpers.

Figure 3–8. DEC 1–GB and 2–GB Disk Drive Jumpers



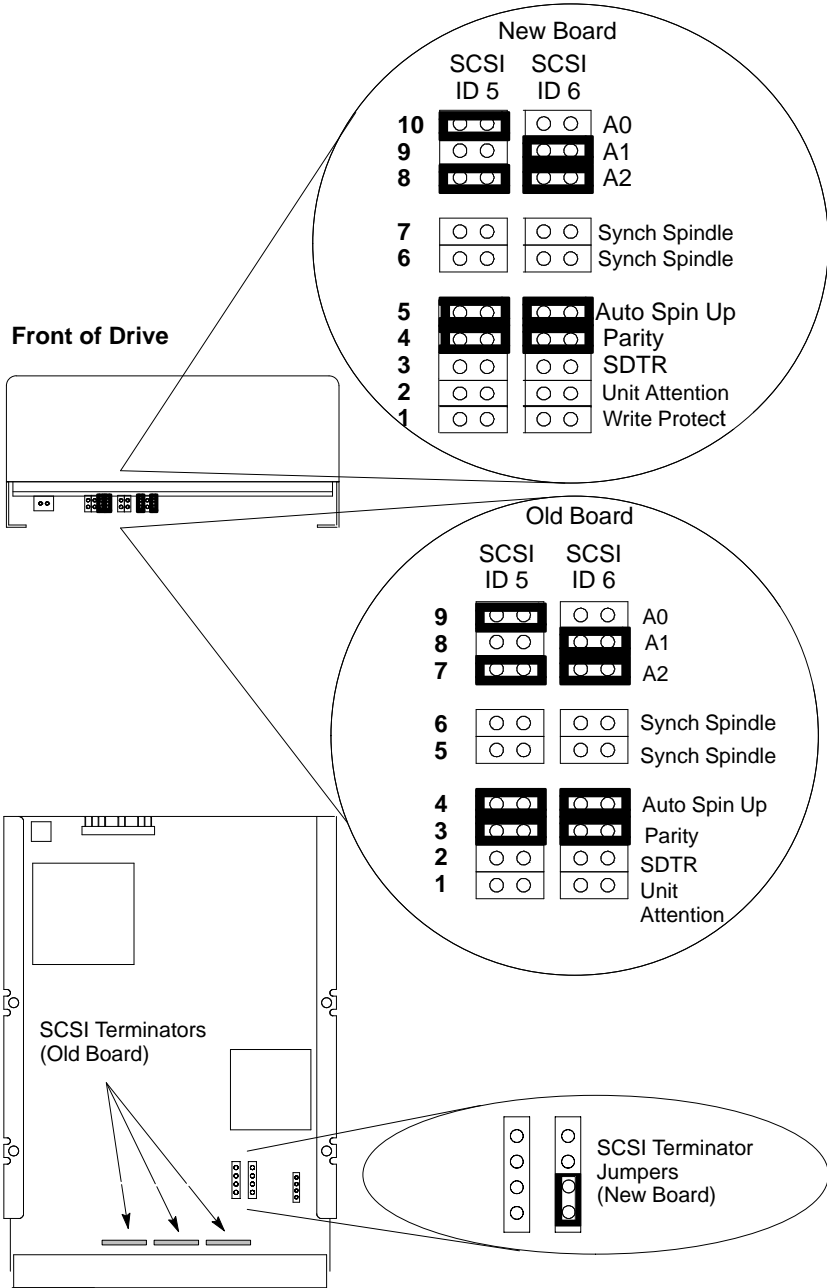


Figure 3-9. Hewlett-Packard 420-MB Winchester Drive Jumpers (Model C2235)

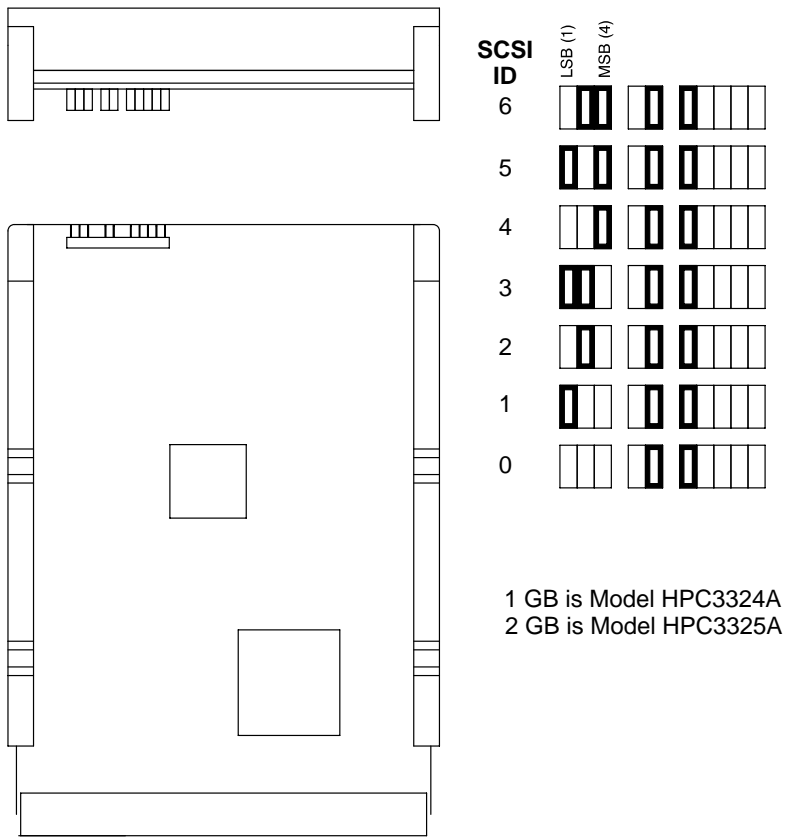
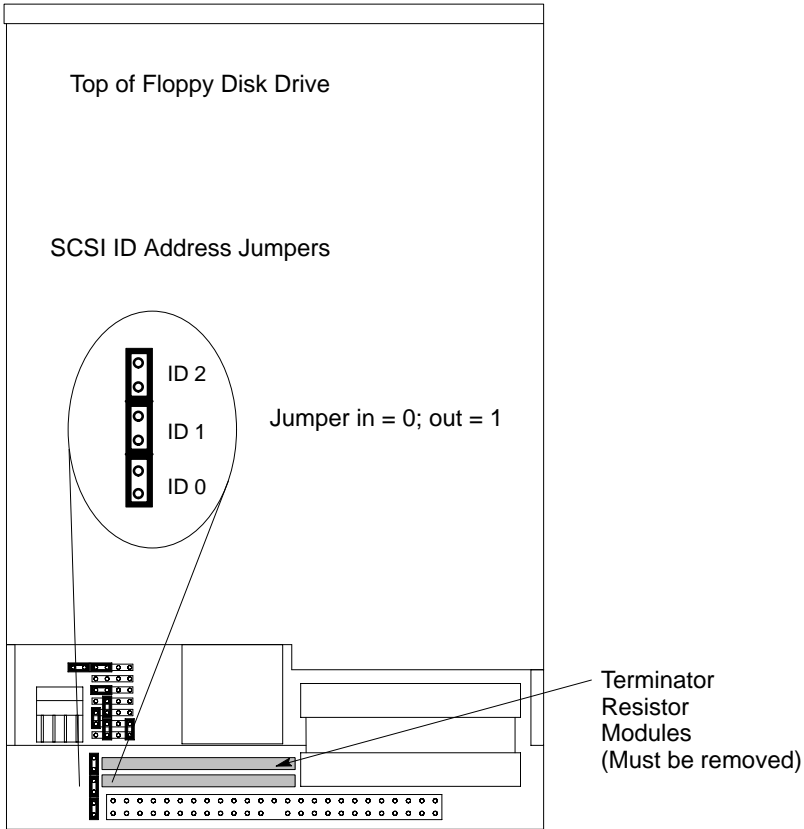
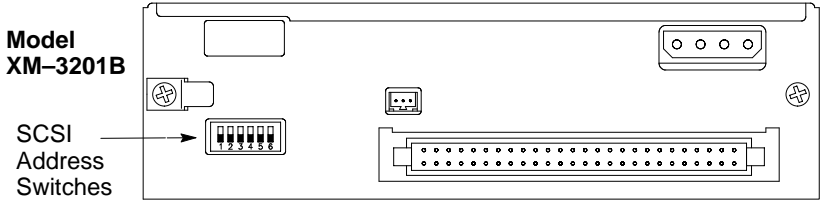


Figure 3-10. Hewlett-Packard 1-GB and 2-GB Low Profile Drive Jumpers

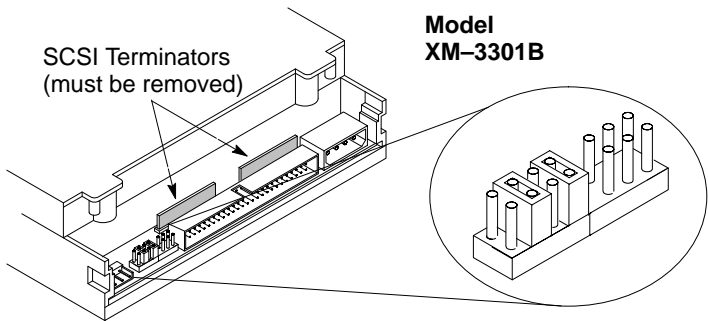


		Target ID						
		0	1	2	3	4	5	6
Jumpers	ID2	○	○	○	○	○	○	○
	ID1	○	○	○	○	○	○	○
	ID0	○	○	○	○	○	○	○
		(Default)						

Figure 3-11. SCSI Floppy Drive Address Jumper Settings

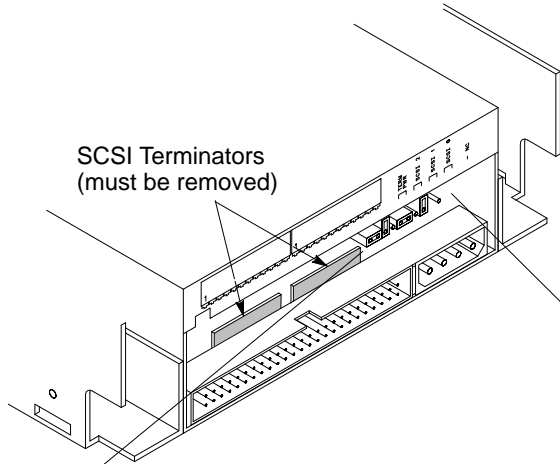


Target ID	Address Settings	Target ID	Address Settings
0		4	
1		5	
(Default) 2		6	
3			



Target ID	Jumpers						Target ID	Jumpers							
	ID1	ID2	ID4	PRTY	PRV/ALW	TEST	TERM		ID1	ID2	ID4	PRTY	PRV/ALW	TEST	TERM
0	○	○	○	○	○	○	○	4	○	○	○	○	○	○	○
1	○	○	○	○	○	○	○	5	○	○	○	○	○	○	○
2 (Default)	○	○	○	○	○	○	○	6	○	○	○	○	○	○	○
3	○	○	○	○	○	○	○								

Figure 3-12. CD-ROM SCSI Address Jumper Settings

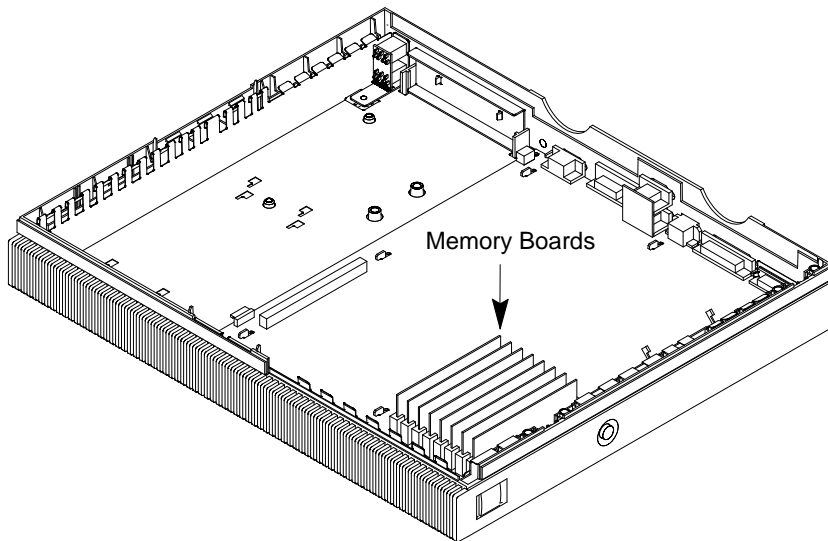


Target ID	Term PWR	Jumpers			Target ID	Term PWR	Jumpers		
		ID2	ID1	ID0			ID2	ID1	ID0
0	○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	4	○ ○	<input checked="" type="checkbox"/> ○	○ ○ ○ ○	○ ○ ○ ○
1	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	<input checked="" type="checkbox"/> ○	5	○ ○	<input checked="" type="checkbox"/> ○	○ ○ ○ ○	<input checked="" type="checkbox"/> ○
2	○ ○ ○ ○	○ ○ ○ ○	<input checked="" type="checkbox"/> ○	○ ○ ○ ○	6	○ ○	<input checked="" type="checkbox"/> ○	<input checked="" type="checkbox"/> ○	○ ○ ○ ○
3 (Default)	○ ○ ○ ○	○ ○ ○ ○	<input checked="" type="checkbox"/> ○	<input checked="" type="checkbox"/> ○					

Figure 3-13. DDS SCSI Address Jumper Settings (Model C1504C)

## Installing Additional Memory

Figure 3–14 shows the location of the memory boards within the system unit.



*Figure 3–14. Memory SIMM Locations*

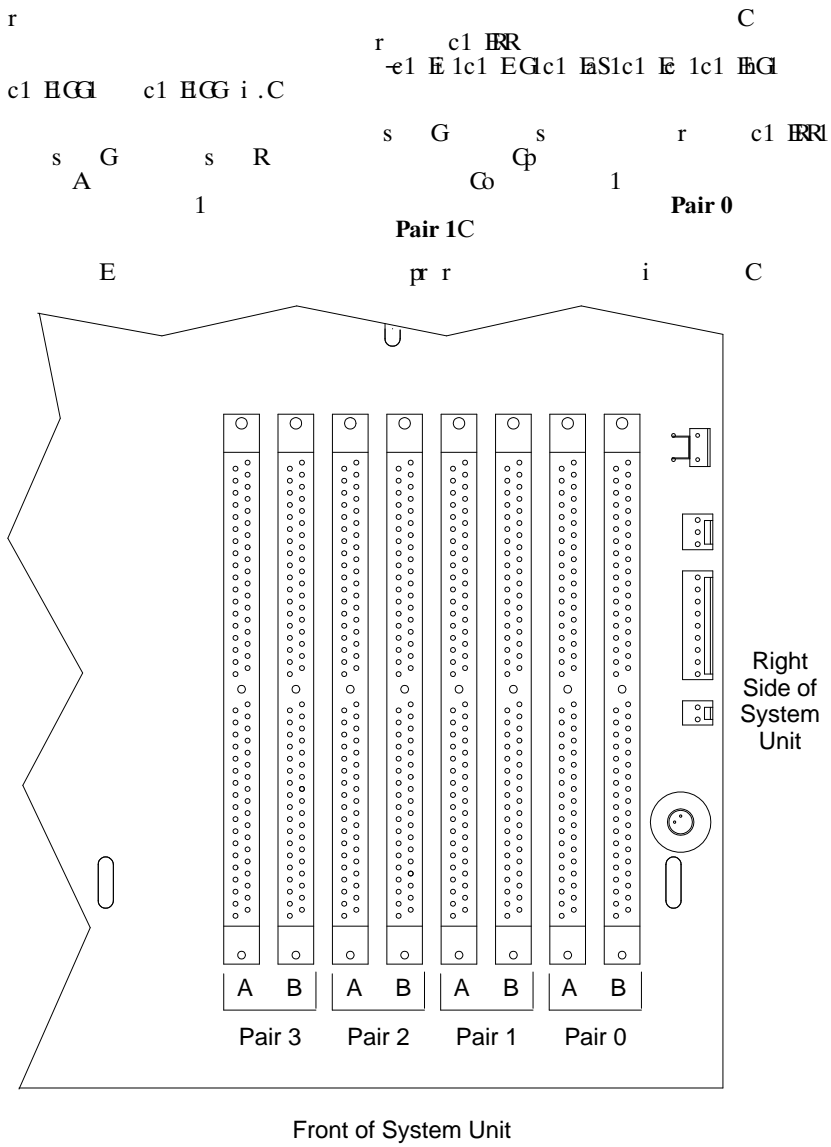


Figure 3-15. Memory Connector Configuration

# Changing the Built-In Graphics Configuration Switches (Models 715/C, 715/33, 715/50, 715/75)

Figure 3-16 shows the built-in graphics configuration switch settings. Set the switches according to the type of monitor that is connected to the system unit's built-in graphics connector. First open the system unit, as described in Chapter 5, to allow a clear view of the switches. Use a small probe to set the switches through the access hole on the rear of the system unit.

**NOTICE:** The built-in graphics configuration switches have no affect on the operation of the optional CRX graphics unit (if installed).

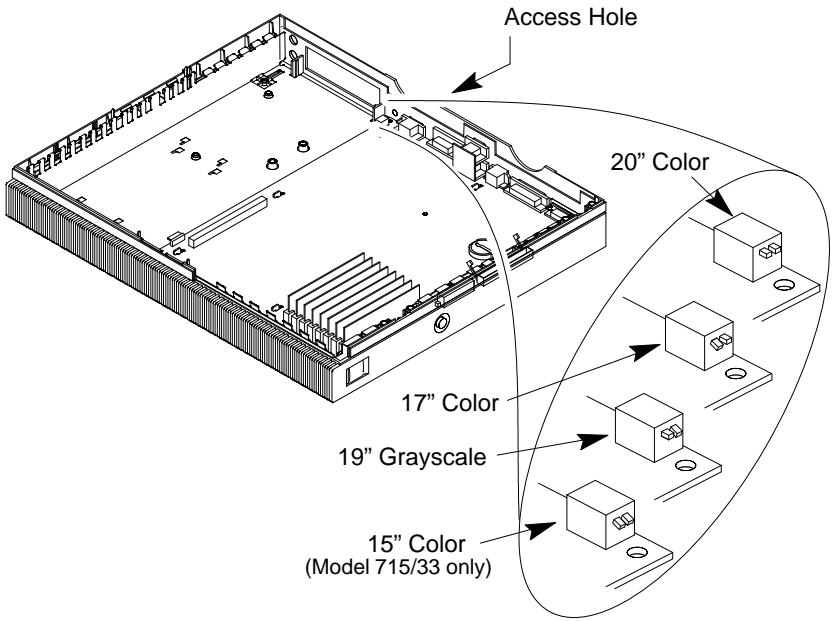


Figure 3-16. Changing the Graphics Configuration Switches



# Configuring the CRX Graphics Options

This section describes how to configure the system to use the CRX graphics options (if installed).

For information about HCRX graphics, refer to the *HP A4070A/A4071A/A4072A CE Handbook* (A4070–90099).

If you update or reinstall HP-UX, and after a few minutes, there is no output on the monitor, use the following procedures to configure the workstation:

1. Power off the workstation.
2. Connect the monitor to the built-in graphics connector as shown in Chapter 1 of this manual.
3. For Model 715/C, 715/33, 715/50, and 715/75 workstations, check the workstation's graphics configuration switches, as shown earlier in this chapter, to make sure the graphics switches are set correctly for the monitor.
4. Power on the monitor and the workstation.
5. Immediately after you power on the workstation, press the TOC switch on the right side of the system unit. (See Chapter 1 of this manual for the TOC switch location.)
6. If you are setting up a single monitor system, follow the steps in the next subsection. If you are setting up a dual monitor system, go to the subsection "Setting Up a Dual Monitor System" for further configuration instructions.


## Setting Up a Single Monitor System

This subsection describes how to set up the workstation to use only the CRX graphics.

**NOTICES:** Only the 20-inch color monitors are supported on the CRX graphics adapters.

The built-in graphics adapter can use any of the supported monitors.

1. Log in as **root**.
2. Enter the following command line to create a device file to support the CRX graphics:

```
/etc/mknod /dev/crt24 c 12 0x100000 
```

3. Enter the following command line to set the attributes of the device file:

```
chmod 666 /dev/crt24 Return
```

4. Make a backup copy of `/usr/lib/X11/X0screens` by entering the following command line:

```
cp /usr/lib/X11/X0screens /usr/lib/X11/X0screens.backup Return
```

5. Use a text editor, such as `vi` or `vim`, to edit the following file:

```
/usr/lib/X11/X0screens
```

6. Edit the file so that every line begins with a pound sign (`#`).
7. Add the following line to the file exactly as shown:

```
/dev/crt24
```

8. Save the changes and close the file.
9. Enter the following command:

```
/etc/reboot Return
```

10. The system shuts down and starts to reboot. Press and hold **Esc** when the following message is displayed:

```
Selecting a system to boot. To stop selection  
process press and hold the ESCAPE key.
```

In a few seconds, the following message appears:

```
Terminating selection process.
```

A short time later, the following message appears:

```
Searching for potential boot devices. To  
terminate search, press and hold the ESCAPE key.
```

The workstation is now searching for devices that may hold file systems from which it can boot HP-UX. As they are found, they appear in a list similar to the following example:

Device Selection Device Type	Device Path
P0 QUANTUM LPS525s	scsi.6.0
P1 QUANTUM LPS525s	scsi.5.0
P2 TOSHIBA CD-ROM DRIVE:XM	scsi.2.0

11. The following list of actions appears:

- b) Boot from specified device
- s) Search for bootable devices
- a) Enter boot administration mode
- x) Exit and continue boot sequence
- ?) Help

Select from menu:

Press **a**

The following prompt appears:

BOOT\_ADMIN>

12. Set the default console to the CRX graphics option by entering the following command line:

BOOT\_ADMIN> **path console graphics\_2**

13. Enter the following command:

BOOT\_ADMIN> **exit**

14. Power off the workstation and the monitor.

15. Connect the color monitor to the CRX graphics connector as shown in Chapter 1 of this manual.

16. Power on the monitor and the workstation.

## Setting Up a Dual Monitor System

This subsection describes how to set up the workstation to use both the optional graphics (CRX) and the built-in graphics.

The CRX graphics is set up as the default display and console device and the built-in graphics is set up as the secondary display device.

**NOTICES:** Dual monitors are supported only with the CRX-24 graphics options.

Only the 20-inch color monitors are supported on the CRX graphics adapters.

The built-in graphics adapter can use any of the supported monitors.

1. Log in as **root**.
2. Enter the following command line to create a device file to support the CRX graphics adapter:

```
/etc/mknod /dev/crt24 c 12 0x100000 
```

3. Enter the following command line to set the attributes of the device file:

```
chmod 666 /dev/crt24 
```

4. Make a backup copy of **/usr/lib/X11/X0screens** by entering the following command line:

```
cp /usr/lib/X11/X0screens /usr/lib/X11/X0screens.backup 
```

5. Use a text editor, such as **vuepad** or **vi**, to edit the following file:

```
/usr/lib/X11/X0screens
```

6. Edit the file so that every line begins with a pound sign (#).

7. Add the following two lines to the file exactly as shown and in the order shown:

```
/dev/crt24  
/dev/crt
```

Since the device file for the CRX graphics is listed first, it becomes the default (0.0) display device and the built-in graphics becomes the secondary (0.1) display device.

8. Save the changes and close the file.
9. Use a text editor, such as `vuepad` or `vi`, to edit the following file:

```
/usr/vue/app-defaults/Vuewm
```

10. Add the following two lines exactly as shown:

```
Vuewm*multiScreen: True  
Vuewm*screenList: One Two
```

11. Save the changes and close the file.
12. Enter the following command:

```
/etc/reboot Return
```

13. The system shuts down and starts to reboot. Press and hold **Esc** when the following message is displayed:

```
Selecting a system to boot. To stop selection  
process press and hold the ESCAPE key.
```

In a few seconds, the following message appears:

```
Selection process stopped.
```

A short time later, the following message appears:

```
Searching for potential boot devices. To terminate  
search, press and hold the ESCAPE key.
```

The workstation is now searching for devices that may hold file systems from which it can boot HP-UX. As they are found, they appear in a list similar to the following example:

Device Selection	Device Path
Device Type	
P0	scsi.6.0
QUANTUM LPS525s	
P1	scsi.5.0
QUANTUM LPS525s	
P2	scsi.2.0
TOSHIBA CD-ROM DRIVE:XM	

14. The following list of actions appears:

- b) Boot from specified device
- s) Search for bootable devices
- a) Enter boot administration mode
- x) Exit and continue boot sequence
- ?) Help

Select from menu:

Press **a**

The following prompt appears:

BOOT\_ADMIN>

15. Set the default console to the CRX graphics option by entering the following command line:

BOOT\_ADMIN> **path console graphics\_2**

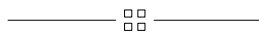
16. Enter the following command:

BOOT\_ADMIN> **exit**

17. Power off the workstation and the monitor.

18. Connect the color monitor to the CRX graphics connector as shown in Chapter 1 of this manual. Connect the second monitor to the built-in graphics connector on the rear of the workstation, as shown in Chapter 1. For Model 715/C, 715/33, 715/50, and 715/75 workstations, check the workstation's graphics configuration switches, as shown in earlier in this chapter, to make sure the graphics switches are set correctly for the second monitor.

19. Power on the monitors and the workstation.



# Troubleshooting

# 4

This chapter provides information about isolating a failing Field Replaceable Unit (FRU).

To troubleshoot HP workstations, you must be familiar with the HP–UX operating system. You must be able to start and stop processes. You should also be familiar with the Boot ROM Test Mode, ISL diagnostics, and the SupportWave online tests.

For Series 700 systems, note any error or status messages, and then run the power–up boot ROM diagnostics, known as Self Test. If the Self Test diagnostics fail, replace the FRU that is indicated. If the tests pass but you still suspect a problem, run the ISL diagnostics and the SupportWave online tests. Refer to the following sections for more information about Self Test.

For a complete description on using ISL diagnostics and SupportWave, see the *Precision Architecture RISC HP 9000 Series 700 Diagnostics Manual*.

# LED Error Codes

This section contains information about the error codes displayed by the LEDs on the system's front panel.

If an error occurs during the power-up diagnostics tests, the diagnostics use the front panel LEDs to display a code for the failing component.

Figure 4-1 shows the location of the system unit's front panel LEDs. There are nine LEDs on the front panel. The green LED on the far right indicates that the system is powered up. The amber LEDs labeled 1 through 8, right to left, indicate system status and error codes.

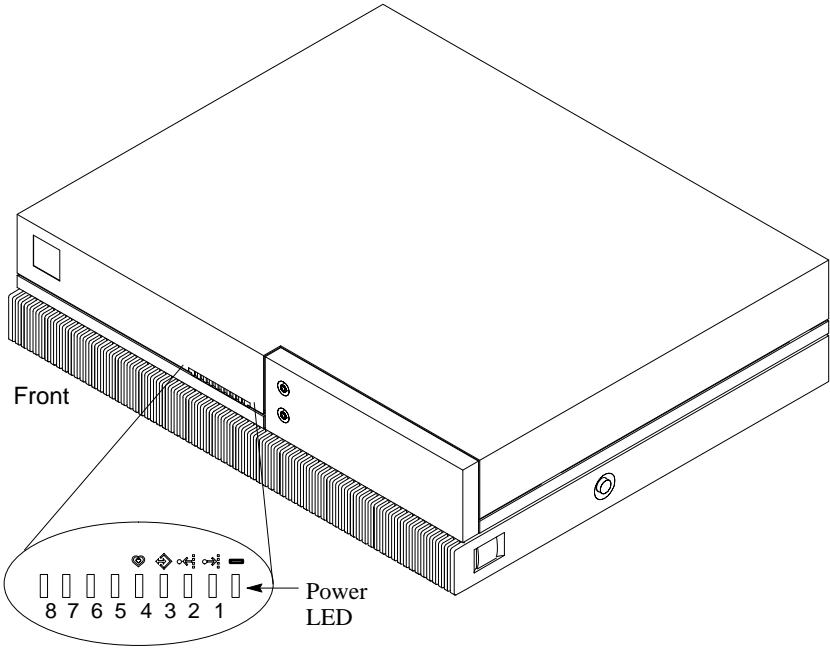


Figure 4-1. Front Panel LEDs

Table 4-1 through Table 4-4 show the LED error codes as they appear on the front panel display of Model 715/C, 715/33, 715/50, and 715/75 workstations.

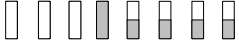
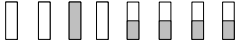

















- Table 4-1 shows the Self Test error codes.
- Table 4-2 shows the PDC error codes.
- Table 4-3 shows the ISL error codes.
- Table 4-4 shows the HP-UX kernel error codes.

Table 4-5 shows the LED error codes as they appear on the front panel display of Model 715/64, 715/80, , 715/100, and 715/100XC workstations.

Use these LED codes to determine the failing component.













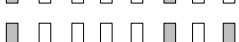
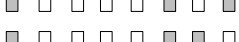




Table 4-1. Model 715/C, 715/33, 715/50, and 715/75 Self Test LED Error Codes

LED Display	Error Message
<p style="text-align: center;"><b>8 7 6 5 4 3 2 1</b></p>	
	<p>CPU Error - Model 715/33 and 50. PCX-T FRU Error – Model 715/75.</p>
	<p>CPU Error - Model 715/33 and 50. PCX-T FRU Error - Model 715/75.</p>
	<p>CPU Error - Model 715/33 and 50 Motherboard Error - 715/75</p>
	<p>CPU Error - Model 715/33 and 50. PCX-T FRU Error - Model 715/75.</p>
	<p>FP Register Test Failure. Loops Until Passes Possible PCX-T Error*</p>
	<p>FP Register Test Failure. Loops Until Passes Possible PCX-T Error*</p>
	<p>FP Register Test Failure. Loops Until Passes Possible PCX-T Error*</p>
	<p>EISA Interface Error.</p>
	<p>EISA Interface Error.</p>
	<p>EISA Interface Error.</p>
	<p>EISA Interface Error.</p>
	<p>EISA Interface Error.</p>
	<p>EISA Interface Error.</p>
	<p>PDC ROM Checksum Error.</p>
	<p>Memory Pair 0, Slot B Error.</p>
	<p>Memory Pair 0, Slot A Error.</p>
	
<p> = LED On or Flashing</p>	<p> = LED Either On or Off</p>
<p>* If you see this error code and it continues to appear, power the system down and reboot. If you see the error code again, replace the PCX-T card.</p>	

(Continued)

Table 4-1. Model 715/C, 715/33, 715/50, and 715/75 Self Test LED Error Codes  
(Cont.)

LED Display	Error Message
<p style="text-align: center;"><b>8 7 6 5 4 3 2 1</b></p> 	Memory Pair 1, Slot B Error.
	Memory Pair 1, Slot A Error.
	Memory Pair 2, Slot B Error.
	Memory Pair 2, Slot A Error.
	Memory Pair 3, Slot B Error.
	Memory Pair 3, Slot A Error.
	No Memory found.
	Unknown I/O device.
	Error while trying to boot from SCSI Device.
	Error while trying to boot from LAN.
	Error Trying to access Console Keyboard.
	Error while trying to access Serial Console Device, Port A.
	Error while trying to access Serial Console Device, Port B.
	Error while trying to access Parallel Port.
	Error while trying to access Graphical Console Device.
 = LED On or Flashing	

(Continued)

Table 4-1. Model 715/C, 715/33, 715/50, and 715/75 Self Test LED Error Codes (Cont.)

































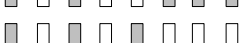

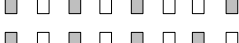






LED Display	Error Message
<p style="text-align: center;"><b>8 7 6 5 4 3 2 1</b></p> <p style="text-align: center;">         </p> <p style="text-align: center;">         </p> <p style="text-align: center;">         </p>	<p>Unable to initialize EISA Slot.</p> <p>Error on SGC Slot 1 (Built-in Graphics)</p> <p>Error on SGC Slot 2 (Optional Graphics)</p>
<p> = LED On or Flashing</p>	

Table 4–2. Model 715/C, 715/33, 715/50, and 715/75 PDC LED Codes

LED Display	Status
<p style="text-align: center;"><b>8 7 6 5 4 3 2 1</b></p> 	Destructive Memory init.
	Non–Destructive Memory init.
	Console selection.
	Boot Device selection.
	Autoselection failure to find Boot Device.
	Launching IPL.
	TOC Handler entered.
	Branching to OS TOC Handler.
	Branching to OS HPMC Handler.
	EISA Subsystem Init.
	Setting Up Default EISA config.
	At least one Selftest failed (Service Mode).
	Error reading EEPROM or Invalid Stable Storage.
	Unexpected interrupt.
	No Console located.
 = LED On or Flashing	

(Continued)

Table 4–2. Model 715/C, 715/33, 715/50, and 715/75 PDC LED Codes (Cont.)





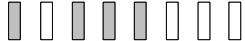






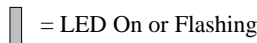
LED Display	Status
<p style="text-align: center;"><b>8 7 6 5 4 3 2 1</b></p>	
	HPMC Handling initiated.
	HPMC due to Cache Error.
	HPMC due to Memory Error.
	HPMC due to Bus Error.
	Nested HPMC detected.
	Error writing to EEPROM.
	Unable to determine valid Processor Speed.
	ROM Checksum error.
	Processor Speed sensing.
	Illegal Processor Speed/Clock Ratio sensing.
	Bad Memory Hardware.
	

Table 4-3. Model 715/C, 715/33, 715/50, and 715/75 ISL LED Codes

LED Display	Status
<p style="text-align: center;"><b>8 7 6 5 4 3 2 1</b></p> <p>□ □ □ □ □ □ □ □</p>	ISL executing.
<p>□ □ □ □ □ □ □ ■</p>	ISL is autobooting from the Autoexec File.
<p>□ □ □ □ □ □ ■ □</p>	ISL cannot find Autoexecute File.
<p>□ □ □ □ □ □ ■ ■</p>	No Console found. ISL Autobooting.
<p>□ □ □ □ □ ■ □ ■</p>	Directory of Utilities is too large.
<p>□ □ □ □ □ ■ ■ □</p>	Autoexec File is inconsistent.
<p>□ □ □ ■ □ □ ■ □</p>	Error reading Autoexec File.
<p>□ □ □ ■ □ □ ■ ■</p>	Error reading from Console.
<p>□ □ □ ■ □ ■ □ □</p>	Error writing to Console.
<p>□ □ □ ■ □ ■ □ ■</p>	Not an ISL command or utility.
<p>□ □ □ ■ □ ■ ■ □</p>	Utility File Header inconsistent: Invalid System ID.
<p>□ □ □ ■ □ ■ ■ ■</p>	Error reading Utility File Header.
<p>□ □ □ ■ ■ □ □ □</p>	Utility File Header inconsistent: Bad Magic Number.
<p>□ □ □ ■ ■ □ □ ■</p>	Utility would overlay ISL in Memory.
<p>□ □ □ ■ ■ □ ■ □</p>	Utility requires more Memory than is configured.
<p>□ □ □ ■ ■ □ ■ ■</p>	Error reading Utility into Memory.
<p>□ □ □ ■ ■ ■ □ □</p>	Incorrect Checksum: Reading Utility into Memory.
<p>■ = LED On or Flashing</p>	

(Continued)

Table 4-3. Model 715/C, 715/33, 715/50, and 715/75 ISL LED Codes (Cont.)










































































LED Display	Status
<p style="text-align: center;"><b>8 7 6 5 4 3 2 1</b></p> <p>         </p> <p>         </p> <p>         </p> <p>         </p> <p>         </p> <p>         </p> <p>         </p> <p>         </p> <p>         </p>	<p>System Console needed.</p> <p>Internal inconsistency: Invalid Boot Device Class.</p> <p>Destination Memory Address of Utility is invalid.</p> <p>Internal inconsistency: pdc_cache entry.</p> <p>Internal inconsistency: IODC ENTRY_INIT.</p> <p>Internal inconsistency: IODC ENTRY_INIT Console.</p> <p>Internal inconsistency: IODC ENTRY_INIT Boot Device.</p> <p>Utility File Header inconsistent: Bad aux_id.</p> <p>Bad Utility File Type.</p>
<p> = LED On or Flashing</p>	

Table 4-4. Model 715/C, 715/33, 715/50, and 715/75 HP-UX Kernel LED Codes

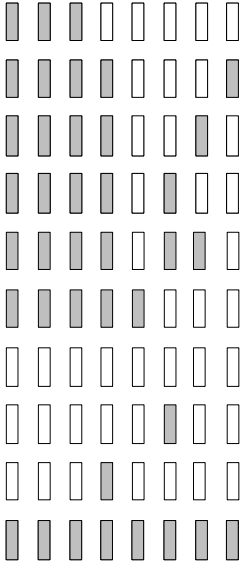
















LED Display	Status
<p style="text-align: center;"><b>8 7 6 5 4 3 2 1</b></p> 	<p>Kernel loaded and Initialization begun.</p> <p>Kernel has entered main().</p> <p>Kernel is about to configure I/O System.</p> <p>Kernel is about to mount Root File System.</p> <p>Kernel is about to set up Page-Out Daemon.</p> <p>Kernel is about to start the "INIT" Process.</p> <p>Shutdown in process.</p> <p>TOC Dump.</p> <p>HPMC Dump.</p> <p>Operating System executing with Load Indicator X.</p>
<p> = LED On or Flashing</p>	

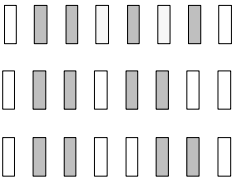



Table 4–5. Model 715/64, 715/80, , 715/100, and 715/100XC LED Error Codes

LED Display	Status
<p style="text-align: center;"><b>8 7 6 5 4 3 2 1</b></p> 	CPU Error
	Fatal Error
	RAM Test Error
	Cache Error
	FP Co-processor Error
	Fatal FP Co-processor Error
	I/O Device Error
	ROM Checksum Error
	HPMC Error
	HPMC due to Cache Error
	HPMC due to Bus Error
	HPMC due to Memory Error
	Console Initialization Error
	No working console found, unable to boot
 = LED On or Flashing	

(Continued)

Table 4-5. Model 715/64, 715/80, , 715/100, and 715/100XC LED Error Codes (Cont.)

LED Display	Status
<p style="text-align: center;"><b>8 7 6 5 4 3 2 1</b></p> 	<p>No bootable device found</p> <p>Memory Error</p> <p>Initialization Error</p>
<p> = LED On or Flashing</p>	

# Dealing with a Boot Failure

If the workstation's usual boot device (typically a disk) is not responding as it should, you must attempt to boot from the disk (or another boot device) by selecting it manually.

To boot a device manually, follow these steps:

1. Turn off the power to the workstation, wait a few seconds, then turn the power back on.
2. Press and hold **Esc** as soon as the following message appears:

```
Selecting a system to boot.  
To stop selection process, press and hold the ESCAPE  
key.
```

Release **Esc** as soon as this message appears:

```
Selection process stopped.
```

A short time later, this message appears:

```
Searching for potential boot devices.  
To terminate search, press and hold the ESCAPE key.
```

The workstation is now searching for devices that may hold file systems from which it can boot HP-UX. As they are found, they appear in a list, similar to the following sample list:

Device Selection	Device Path	Device Type
P0	scsi.6.0	QUANTUM LPS525S
P1	scsi.5.0	QUANTUM LPS525S
P2	scsi.2.0	TOSHIBA CD-ROM DRIVE

This process may take several minutes. You can terminate the search at any time by pressing **Esc**.

When the search ends, the following list of actions appears:

- b) Boot from specified device
- s) Search for bootable devices
- a) Enter Boot Administration mode
- x) Exit and continue boot sequence
- ?) Help

Select from menu:

If no disk devices are listed, then the workstation is failing to communicate with its disks. Recheck the SCSI connections and try again.

If no devices are listed at all, try alternative methods for booting, such as connecting an external CD-ROM drive.

3. If the search locates a disk, attempt to boot from it by entering the **b** (boot) command and a device selection number from the list. For example, if a SCSI disk is listed as item **P0** (as in the example list above), enter the following:

Select from menu: **b p0**

After a few seconds, the boot messages begin to appear on the screen. You may hear sounds coming from the disk drive and see a sequence of changing patterns on the LED display.

4. If the workstation still fails to boot, there is either something wrong with the file system or with the hardware.

## Boot Administration Environment

The Boot Console User Interface provides an “autoselect” or “interactive” environment after the power-on sequence. The Boot Console User Interface must be invoked before the Initial Program Loader (IPL) routine. Users do not have to interact with the interface when the AUTOSELECT mode is enabled.

The Boot Console User Interface executes user-entered commands that perform the following functions:

- Display the state of Autoselect mode using the **AUTO** command.
- Set the state of the Autoselect mode using the **AUTOSELECT** command with either the **ON** or **OFF** option.
- Boot from the primary or alternate boot path or any specified path using the **BOOT** command.
- Set or display the real-time clock value using the **DATE** command (this command is not supported on Model 715/64, 715/80, , 715/100, and 715/100XC workstations).
- Return to previous menu using the **EXIT** command.

- Set or display the Fastsize value (amount of memory initialized during boot) using the **FASTSIZE** command.
- Display a menu of commands using the **HELP** command or a description of any command as an option to the **HELP** command.
- Display the model number, version numbers, and jumper settings on the System card using the **INFO** command.
- Display the current STATION ADDRESS value in stable storage using the **LAN\_ADDR** command. You must use **SS\_CONFIG** to set this value.
- Select an operating system for the next boot attempt using the **OS** command.
- Set or display the current values for the console, keyboard, primary, or alternate boot paths using the **PATH** command.
- Display the most recent HPMC, LPMC, or TOC error information logged into Stable Storage using the **PIM\_INFO** command.
- Reset the System Unit using the **RESET** command.
- Search for possible boot devices using the **SEARCH** command.
- Set or display secure boot mode or the ability to interact with the console device within the first 10 seconds before boot device selection is disabled using the **SECURE** command.
- Display the results of the previous search command using the **SHOW** command (this command is not supported on Model 715/64, 715/80, , 715/100, and 715/100XC workstations).

Syntax checking is performed for any supported commands. Error status is displayed on the console along with any relevant information.

## Stable Storage

Stable Storage is non-volatile memory associated with each PA-RISC processor module. Stable storage is used by the processor (CPU) to store device path information, the state of the boot flags, HPMC error information, and operating system initialization data.

## Boot Command Notations

The **BOOT** command supports the following three notations:

- Mnemonic
- PA-RISC I/O
- Path number

Type **help scsi** or **help lan** for more information on the boot path parameters.

Here are examples of mnemonic notation:

- **BOOT**  with “no parameters” selects the primary boot path in stable storage.
- **BOOT** with the **ALTERNATE** or **ALT** parameter selects the alternate boot path in stable storage.

Here are examples of PA-RISC I/O notation:

- **BOOT scsi.<scsi\_addr>.<scsi\_lun>** or  
**BOOT 2/0/1.<scsi\_addr>.<scsi\_lun>**
- **BOOT lan.<server\_address>.<init\_timeout>.<io\_timeout>** or  
**BOOT 2/0/2.<server\_address>.<init\_timeout>.<io\_timeout>**

Here is an example of path number notation:

- **BOOT P1**  attempts to boot from the second path indicated by the **SEARCH** command.

## Supported Boot Paths

SCSI devices are bootable when connected to the SCSI port on the System card.  
Diskless workstations can only boot from the LAN port on the System card.

## ISL Environment

The ISL environment provides the means to load the operating system (HP-UX) environment. The ISL environment also provides an offline platform to execute diagnostic and utility programs from a boot device when HP-UX does not load.

The ISL program is the first program loaded into main memory from an external media (LAN, disk, or tape) and launched by the initial program loader (IPL) routine during the Boot Administration environment.

The ISL environment provides the following capabilities:

- Execute user-entered commands to modify boot device paths and boot options in stable storage.
- Run off-line diagnostic programs (TDIAG, EISADIAG, and IOMAP).
- Provide automatic booting of the HP-UX O/S after power-on or reset.

The ISL program provides a standalone environment for loading offline diagnostic and utility programs from the LIF directory. The ISL program also provides user commands to configure the boot parameters into Stable Storage.

## Invoking the ISL Environment from a SCSI Device

Perform the following steps to invoke the ISL environment from a SCSI device:

1. Power-on the System Unit (or cycle the power) to invoke the Boot Administration mode (environment). The following screen appears:

```
b) Boot from specified device
s) Search for bootable devices
a) Enter Boot Administration mode
x) Exit and continue boot sequence
?) Help
```

Select from menu:

2. Type **s**  to search for devices with the ISL program and hpux (loader) utility in their LIF directory. The following screen appears:

```
Searching for devices. Bootable Media.  
To terminate search, press and hold the ESCAPE key.
```

```
Device Selection Device Path Device Type  
-----  
P0                scsi.6.0    QUANTUM LPS525S  
                        IPL
```

```
b) Boot from specified device  
s) Search for bootable devices  
a) Enter Boot Administration mode  
x) Exit and continue boot sequence  
?) Help
```

Select from menu:

3. Type **b p0 ipl**  to invoke the ISL environment from the 525 MB Quantum disk. The following messages, the ISL banner, and the ISL prompt are displayed:

```
Trying scsi.6.0  
Boot path initialized.  
Attempting to load IPL.
```

Hard booted.

ISL Revision A.00.24 Oct. 7, 1992

ISL>

4. Type **ls**  or **listf**  to review the state of the ISL boot flags, the ISL commands, and the files in the LIF directory on the scsi device.
5. Type **hpux boot disc(;0)/hp-ux**  to load the HP-UX environment from the SCSI device.




## ISL User Commands

There are several commands available in the ISL environment that allow a user to obtain information about the boot characteristics of the system or to modify these characteristics.

- **display** – displays the boot and console paths in Stable Storage and the current setting of the ISL Boot Flags.
- **primpath** – modifies the primary boot path entry in Stable Storage. The entry in Stable Storage for the primary boot device begins at byte address 0 and ends at byte address 31.
- **altpath** – modifies the alternate boot path entry in Stable Storage. The entry for the alternate boot device begins at byte address 128 and ends at 159.
- **conspath** – modifies the console path entry in Stable Storage. The entry in Stable Storage for the console device begins at byte address 96 and ends at byte address 127. The entry for the keyboard and mouse devices begins at byte address 160 and ends at 191.
- **listautofl** or **lsautofl** – lists the contents of the (HP-UX) autoboot file.
- **support** – boots the Support Tape from the boot device.
- **readss** – displays 4 bytes (one word) from Stable Storage. The **readss** command requires a decimal number between 0 and 255 to address four bytes in Stable Storage.

## Running the ISL-Based Diagnostics

To run the external media (LAN, disk, or tape)-based ISL diagnostics:

1. Invoke the ISL environment from the external media (LAN, disk, or tape).
2. Type **tdiag**  after the `ISL>` prompt to invoke the TDIAG test from the external media. (This test takes several minutes to complete and appears to be in a loop when a graphics monitor is the system console.)

**NOTICE:** **tdiag** contains a loopback test for audio testing. To run the loopback test, you need to attach the audio test cable (part number 46081-61601) to the audio input and audio connectors.

3. Type **eisadiag**  after the `ISL>` prompt to invoke the EISADIAG test from the external media.

**NOTICE:** **eisadiag** requires an EISA bus tester card (part number A1421-66533) to fully test the functionality of the EISA adapter board. Without the bus tester card, **eisadiag** will only partially test the EISA adapter board.

To run the system disk-based ISL diagnostics:

1. Invoke the ISL environment from the system disk.
2. Type **iomap**  after the `ISL>` prompt to invoke the IOMAP test from the LIF area on the system disk. The IOMAP test will list the devices in the system.

# Verifying the System Operation with SupportWave

SupportWave contains the Support Tools Manager to verify system operation.

You can access the Support Tools Manager while in a terminal window; if you are using HP-VUE as your interface, you can also access the Support Tools Manager through the **sys\_admin** directory.

Three interfaces are available with the Support Tools Manager: a command-line interface (accessed through the **cstm** command), a menu interface (accessed through the **mstm** command), and the graphical user interface (accessed through the **xstm** command)

To invoke the command-line interface, type the following in a terminal window:

```
# cstm 
```

The following screen appears:

```
*****  
*****  
*****          SUPPORT TOOLS MANAGER          *****  
*****  
*****          Command Line Interface          *****  
*****  
*****          Version  x.xx.xx                *****  
*****  
*****          Part Number  xxxxx-xxxxx        *****  
*****  
*****          (C) Copyright Hewlett Packard Co. xxxxx *****  
*****          All Rights Reserved            *****  
*****  
*****  
Please Wait. System mapping in progress . . .  
Please type HELP or ? to list available commands.  
  
CSTM>
```

At the **CSTM>** prompt, you can enter several commands. To see what commands are available, type the **help** command.

To verify the system operation, type the following:

```
CSTM> verify all 
```

The following messages appear:

```
Verification has started on device (CPU).
Verification has started on device (FPU).
Verification has started on device (0/0/0).
Verification has started on device (2/0/1.0.0).
Verification has started on device (2/0/1.5.0).
Verification has started on device (2/0/1.6.0).
Verification has started on device (2/0/2).
```


CSTM>Message from (0/0/0):

This graphics test displays a number of graphics images on the screen of the graphics device being tested. If an X server is not currently running on that display, X Windows will be started and run for the duration of the test. The Starbase shared library (/usr/lib/libsbisl) should be present to run this test.


CAUTION: This test will fail if any portion of the test window is modified or overlaid in any way.

NOTE: If a VUE login screen is currently displayed on the monitor, the test will wait until someone logs in the HP VUE on the graphics monitor to release the lock. The test stops if the Screen Saver times out, it runs again once the Screen is activated.

WARNING: Do not run this exercise with any other option.  
(Type 'R' for Ready, Type 'S' for Skip) [R] >>

When you see the prompt shown above, type **0** .

```
Verification of (2/0/1.0.0) has completed. Result status - (Success).
Verification of (2/0/1.5.0) has completed. Result status - (Success).
Verification of (2/0/1.6.0) has completed. Result status - (Success).
Verification of (CPU) has completed. Result status - (Success).
Verification of (FPU) has completed. Result status - (Success).
Verification of (2/0/2) has completed. Result status - (Success).
Verification of (0/0/0) has completed. Result status - (Success).
```

Typing  at the completion of the tests returns the CSTM> prompt. Now type the following:

```
CSTM> exit 
```

If any tests fail, further diagnosis is necessary.

## Dealing With HPMC (Uncorrectable Error)

The power-on sequence follows this path:

```
POWER-ON > SELFTEST > CONSOLE PATH > BOOT ADMIN MODE > BOOT  
PATH > ISL MODE > HP-UX MODE
```

When the hardware detects an unrecoverable (HPMC) error in the HP-UX environment, an error message, referred to as an HP-UX Kernel Tombstone is displayed on the monitor. The state of the system is written to main memory and the entire contents of main memory is dumped (written) to the swap area on the system disk.

HPMC error information is logged into Stable Storage; this information is referred to as PIM (Processor Internal Memory). The HPMC error information is available from the Boot Administration environment using the **PIM\_INFO** command.

To identify the failed FRU(s) after an HPMC, follow these steps:

1. Examine the first line of the data returned from a PIM\_INFO command to display the latest error information from the last TOC, LPMC, or HPMC interruption detected.
2. Compare the values from PIM\_INFO command with those shown in Table 4-6 and take the appropriate action.

Table 4-6. PIM\_INFO Action Table

Check Type Word	Cache Check Word	Bus Check Word	System Responder Word	Action * See Note 1
0x80000000	0x40000000	N/A	N/A	See Note 2
0x20000000	N/A	0X00210003	0X00000000 0xEFFFFFFF	Replace SIMM See Note 3
0x20000000	N/A	0x00310007	0xF0000000 0xF7FFFFFF	Replace Motherboard
0x20000000	N/A	0x00310007	0xF8000000 0xFBFFFFFF	Replace Optional Graphics Card in EISA Slot.
0x20000000	N/A	0x00310007	0xFC000000 0xFFBFDFFF	See Note 4
0x20000000	N/A	0x00310007	0xFFFBE000 0xFFFBEFFF	See Note 2
0x20000000	N/A	0x00310007	0xFFFBF000 0xFFFFFFFF	Replace Motherboard
Note 1	When more than one failed FRU is identified, run the appropriate diagnostics to isolate the failed FRU.			
Note 2	For the Model 715/75, replace the PCX-T module. For other models, replace the Motherboard. See <i>HPMC Caused by a Data Cache Parity Error</i> for more information.			
Note 3	While Architected Main Memory space is from 0x00000000 through 0xEFFFFFFF, Model 715 can only use up to 256 MB. With this limitation any memory address from 0x10000000 through 0xEFFFFFFF is invalid, and, if given in the System Responder word, the Motherboard should be (usually) replaced. If the error occurs again, there is a probable Kernel problem. See <i>HPMC Caused by a Multi-Bit Memory Parity Error</i> for information on identifying the failed SIMM.			
Note 4	There are two possible sources of failure. First, replace the EISA controller. If the error occurs again, replace the Motherboard.			

# HPMC Caused by a Multi-Bit Memory Parity Error

An HPMC interruption is forced when a multi-bit memory parity error is detected during a “DMA read” operation of fetching an I/D cache line (32 bytes).

Table 4–7 shows an example of the HPMC error information retrieved from Stable Storage by the PIM\_INFO command during the Boot Administration environment.

Table 4–7. Multi-Bit Memory Parity Error

Word	Value
Check Type	0x20000000
CPU State	0x9e000004
Cache Check	0x00000000
TLB Check	0x00000000
Bus Check	0x00210004
Assists Check	0x00000000
Assists State	0x00000000
System Responder Address	0x00nnnnnn
System Requester Address	0x00000000
System Controller Status	0x00000nnn

### Interpreting the Table

The values in the Bus Check and System Responder Address words indicate that a multi-bit memory parity error was detected by logic in the memory module. Ignore the value in the System Controller Status word.

The System Responder contains the SPA of the faulty SIMM pair. To determine the pair, you need to know the following:

- The SIMM pair sizes and their locations (for example, 16 MB SIMMs in Pair 1 and 8 MB Simms in Pair 0)
- The total memory size in HEX

## Determining the Faulty SIMM Pair

The address given by the System Responder Address is given as if the memory is contiguous, even though empty slots are permitted. Memory boards are installed in pairs of the same memory capacity. The operating system starts mapping memory at Pair 3, if it exists. In other words, it maps starting with the highest numbered pair through to the Pair 0. To determine the faulty pair of SIMMs, perform the following steps.

- Using Table 4–8, determine the HEX value address range for each SIMM pair in the system.

*Table 4–8. Memory Address Ranges*

Pair (3 thru 0)	Memory Size (MB)	Address Range
_____	0–8	0x00000000 – 0x007FFFFFFF
_____	8–16	0x00800000 – 0x00FFFFFFF
_____	16–24	0x01000000 – 0x017FFFFFFF
_____	24–32	0x01800000 – 0x01FFFFFFF
_____	32–40	0x02000000 – 0x027FFFFFFF
_____	40–48	0x02800000 – 0x02FFFFFFF
_____	48–56	0x03000000 – 0x037FFFFFFF
_____	56–64	0x03800000 – 0x03FFFFFFF
_____	64–72	0x04000000 – 0x047FFFFFFF
_____	72–80	0x04800000 – 0x04FFFFFFF
_____	80–88	0x05000000 – 0x057FFFFFFF
_____	88–96	0x05800000 – 0x05FFFFFFF
_____	96–104	0x06000000 – 0x067FFFFFFF
_____	104–112	0x06800000 – 0x06FFFFFFF
_____	112–120	0x07000000 – 0x077FFFFFFF
_____	120–128	0x07800000 – 0x07FFFFFFF
_____	128–136	0x08000000 – 0x087FFFFFFF
_____	136–144	0x08800000 – 0x08FFFFFFF
_____	144–152	0x09000000 – 0x097FFFFFFF
_____	152–160	0x09800000 – 0x09FFFFFFF
_____	160–168	0x0A000000 – 0x0A7FFFFFFF
_____	168–176	0x0A800000 – 0x0AFFFFFFF
_____	176–184	0x0B000000 – 0x0B7FFFFFFF
_____	184–192	0x0B800000 – 0x0BFFFFFFF
_____	192–208	0x0C000000 – 0x0CFFFFFFF
_____	208–224	0x0D000000 – 0x0DFFFFFFF
_____	224–240	0x0E000000 – 0x0EFFFFFFF
_____	240–256	0x0F000000 – 0x0FFFFFFF

For example, if the system configuration is:

Pair 3: 32 MB SIMMs = 64 MB total for pair  
 Pair 2: 16 MB SIMMs = 32 MB total for pair  
 Pair 1: 32 MB SIMMs = 64 MB total for pair  
 Pair 0: 8 MB SIMMs = 16 MB total for pair



The SIMM address ranges are:

Pair 3: Addresses 0x00000000 – 0x03FFFFFF  
 Pair 2: Addresses 0x04000000 – 0x05FFFFFF  
 Pair 1: Addresses 0x06000000 – 0x09FFFFFF  
 Pair 0: Addresses 0x0A000000 – 0x0AFFFFFFFF

### Example Table

	Pair (3 thru 0)	Memory Size (MB)	Address Range
<b>Pair 3 (32MB SIMMs)</b>	___3___	0–8	0x00000000 – 0x007FFFFFFF
	___3___	8–16	0x00800000 – 0x00FFFFFFF
	___3___	16–24	0x01000000 – 0x017FFFFFFF
	___3___	24–32	0x01800000 – 0x01FFFFFFF
	___3___	32–40	0x02000000 – 0x027FFFFFFF
	___3___	40–48	0x02800000 – 0x02FFFFFFF
	___3___	48–56	0x03000000 – 0x037FFFFFFF
<b>Pair 2 (16MB SIMMs)</b>	___2___	56–64	0x03800000 – 0x03FFFFFFF
	___2___	64–72	0x04000000 – 0x047FFFFFFF
	___2___	72–80	0x04800000 – 0x04FFFFFFF
	___2___	80–88	0x05000000 – 0x057FFFFFFF
<b>Pair 1 (32MB SIMMs)</b>	___1___	88–96	0x05800000 – 0x05FFFFFFF
	___1___	96–104	0x06000000 – 0x067FFFFFFF
	___1___	104–112	0x06800000 – 0x06FFFFFFF
	___1___	112–120	0x07000000 – 0x077FFFFFFF
	___1___	120–128	0x07800000 – 0x07FFFFFFF
	___1___	128–136	0x08000000 – 0x087FFFFFFF
	___1___	136–144	0x08800000 – 0x08FFFFFFF
<b>Pair 0 (8MB SIMMs)</b>	___1___	144–152	0x09000000 – 0x097FFFFFFF
	___0___	152–160	0x09800000 – 0x09FFFFFFF
	___0___	160–168	0x0A000000 – 0x0A7FFFFFFF
	___0___	168–176	0x0A800000 – 0x0AFFFFFFFF
	___	176–184	0x0B000000 – 0x0B7FFFFFFF
	___	184–192	0x0B800000 – 0x0BFFFFFFF
	___	192–208	0x0C000000 – 0x0CFFFFFFF
	___	208–224	0x0D000000 – 0x0DFFFFFFF
	___	224–240	0x0E000000 – 0x0EFFFFFFF
	___	240–256	0x0F000000 – 0x0FFFFFFF

2. Determine the SIMM pair that contains the System Responder Address (as shown using the PIM\_INFO command) within its range. Evaluate the SIMM pairs, as follows:

**NOTICE:** Addressing starts at Pair 3, not Pair 0.

- A. If the System Responder Address (as shown using the PIM\_INFO COMMAND) is between 0x00000000 and 0x03FFFFFF:

Error in Pair 3

- B. If the System Responder Address (as shown using the PIM\_INFO COMMAND) is between 0x04000000 and 0x05FFFFFF:

Error in Pair 2

- C. If the System Responder Address is between 0x06000000 and 0x09FFFFFF

Error in Pair 1

- D. If the System Responder Address is between 0x0A000000 and 0x0AFFFFFF

Error in Pair 0

- E. If Responder Address is between 0x0B000000 and 0x0FFFFFFF

Address Space Not Filled; (Probable) Motherboard Failure

- F. If Responder Address is between 0x10000000 and 0xEFFFFFFF

Invalid Address Space; (Probable) Motherboard Failure

3. Without the actual failed bit number, the failed pair number is as close a determination as possible. To try to locate the faulty (individual) SIMM, reboot the system. Turn FASTBOOT OFF at the BOOT\_ADMIN prompt, set FASTSIZE to ALL OF MEMORY (0F), and power cycle again.

If the (destructive) memory selftest locates the faulty SIMM, the corresponding Chassis Code is shown on the LEDs replace the faulty SIMM, otherwise, replace the SIMM pair identified in this procedure. Return the system state (e.g., FASTBOOT) to original condition.

## HPMC Caused by a Data Cache Parity Error

An HPMC interruption is forced when a data parity error is detected during a Load instruction to the memory address space or during a data cache flush operation.

Table 4–9 shows an example of the HPMC error information retrieved from Stable Storage by the PIM\_INFO command during the Boot Administration environment.

*Table 4–9. Processor Module Error (Data Cache Parity)*

Word	Value
Check Type	0x80000000
CPU State	0x9e000004
Cache Check	0x40000000
TLB Check	0x00000000
Bus Check	0x00000000
Assists Check	0x00000000
Assists State	0x00000000
System Responder Address	0x00000000
System Requester Address	0x00000000
System Controller Status	0x00000nnn

The value in the CPU State word indicates that register values and addresses stored in Stable Storage at the time of the HPMC were saved.

The value on the Cache Check word identifies that logic in the processor module detected a (data) cache parity error. Ignore the value in the System Controller Status word.

For Model 715/75, replace the PCX-T module. For any other Model 715, replace the Motherboard.

# Troubleshooting CRX and HCRX Graphics

If the workstation has one of the CRX or HCRX graphics options installed, and there is no output on the monitor, use the following procedure to troubleshoot the problem:

1. Power off the workstation and the monitor.
2. Make sure that all connectors and cables are fully seated and that the monitor is connected to the correct connector for the CRX or HCRX graphics option. See Chapter 1 of this manual for monitor connections.
3. Power on the monitor and the workstation.  
  
If, after a few minutes, there is still no output on the monitor, continue to Step 4.
4. Power off the workstation and the monitor.
5. Disconnect the monitor and connect it to the built-in graphics connector as shown in Chapter 1 of this manual.
6. If the workstation is a Model 715/C, 715/33, 715/50, or 715/75, check the workstation's graphics configuration switches, as shown in Chapter 3 of this manual, to ensure that the graphics switches are set correctly for the monitor.
7. Power on the monitor and the workstation. Observe the LED codes as they are displayed on the front of the system unit.
8. After the self tests have begun, when LED indicators number 8 and 4 are lit (and all other amber LEDs are off), press the TOC switch on the front of the system unit. (See Chapter 1 of this manual for the TOC switch location.) This LED pattern indicates that the system is checking the CRX or HCRX graphics for errors. See Figure 4-2.

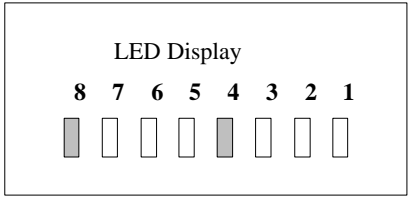
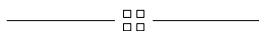


Figure 4-2. LED Display for CRX or HCRX Graphics Check

- 9.** After you press the TOC switch, power off the workstation. Wait a few seconds, then power it back on.  
  
If, after a few minutes, you still have nothing displayed on the monitor, the monitor is defective. Replace the monitor. Otherwise continue with Step 10.
- 10.** Follow the procedures described in the “Configuring the CRX or HCRX Graphics Options” section in Chapter 3 of this manual to check that the system is properly set up for the optional graphics.
- 11.** Shut down and power off the workstation and the monitor.
- 12.** Disconnect the monitor and reconnect it to the optional graphics connector.
- 13.** Power on the monitor and the workstation.  
  
If, after a few minutes, you still have nothing displayed on the monitor, the CRX or HCRX graphics option board is defective and must be replaced.



# Field Replaceable Units 5

This chapter provides a list of the field replaceable units (FRUs) and illustrations for the FRU removal and replacement. Use the following tools for FRU removal and replacement:

- 6-mm nutdriver with 100-mm (4-in.) blade
- #1 Phillips screwdriver with 100-mm (4-in.) blade
- Light-duty, flatblade screwdriver with 150-mm (6-in.) blade
- Needlenose pliers
- A wide, flat object, such as a wooden ruler or flatblade screwdriver, for seating the processor board
- EEPROM removal tool: AMP No. 821903-1 (available from Support Materials Organization)
- ESD equipment (see the “ESD Precautions” section in the Preface for detailed information)

**CAUTION:** For each of the removal procedures in this chapter, you **must** shut down the operating system, power off the system, and unplug the power cord from the wall.

**NOTICE:** To maintain FCC/EMI compliance, verify that all covers are replaced and that all screws are properly seated.

Refer to Figure 5-1 for an illustrated parts breakdown of the system unit. Table 5-1 lists all the FRUs for Model 715 systems. Table 5-2 lists some of the available EISA interface options.

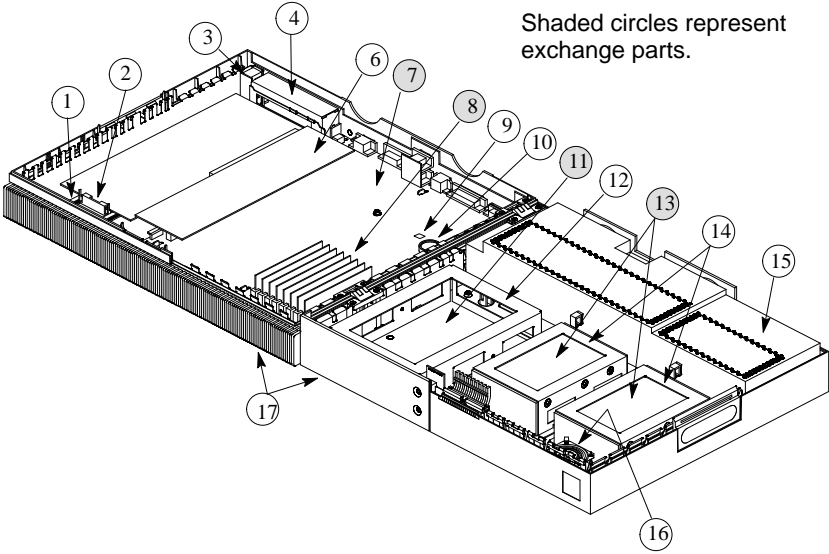


Figure 5-1. Illustrated Parts Breakdown

Table 5-1. FRU List

No.	Part Number	Description	Exchange Non-exchange (n)	(e) (n)
1	A2084-40018	EISA Rails	n	
2	A2084-40019	EISA End Cap	n	
3	A2084-62003	Rear Audio Board	n	
4	A2084-00017	Bracket, EISA Support	n	
6	A2084-66002	EISA Interface Board	n	
7	A2084-69511	Processor Board Model 715/33	e	
	A2084-69510	Processor Board Model 715/50	e	
	A4022-69516	Processor Board Model 715/64	e	
	A2084-69014	Motherboard Model 715/75	e	
	A4022-69518	Processor Board Model 715/80	e	
	A2084-69017	Motherboard Model 715/C	e	
	A4022-69510	Processor Board Model 715/100	e	
	A4022-69515	Processor Board Model 715/100XC	e	
	A2335-69222	PCX-T Module Model 715/75	e	
8	98236-66520	2-MB SIMM	n	
	98236-69522	4-MB SIMM	e	
	98236-69524	8-MB SIMM	e	
	A2576-69001	16-MB SIMM	e	
	A2575-69001	32-MB SIMM	e	
9	1818-5436	EEPROM Kit, Model 715/33	n	
	1818-5406	EEPROM Kit, Model 715/50	n	
	1818-5554	EEPROM Kit Model 715/75	n	
10	1420-0314	Calendar Battery	n	
11	C1503-69201	DDS Tape Drive, 2 GB	e	
	C1504-69201	DDS Tape Drive, 4-8 GB	e	
	A2084-69005	SCSI Floppy Drive	e	
	0950-2377	PC-Style Floppy Drive	n	
	A1658-69001	CD-ROM Drive	n	
	A1658-69002	CD-ROM Drive	n	
12	A2084-00002	CD-ROM/DDS Mounting Bracket	n	
	A2084-00003	Floppy Mounting Bracket	n	
13	A2084-69002	Winchester Disk Drive, 1 GB SE (full height)	e	
	A1658-69107	Winchester Disk Drive, 1 GB SE (low profile)	e	
	A1658-69109	Winchester Disk Drive, 1 GB FW	e	
	A1658-69108	Winchester Disk Drive, 2 GB SE	e	
	A1658-69103	Winchester Disk Drive, 2 GB FW	e	
	A2084-69001	Winchester Disk Drive, 525 MB	e	
	A1094-69012	Winchester Disk Drive, 420 MB	e	
	A1094-69011	Winchester Disk Drive, 210 MB	e	
14	A2084-00001	Disk Mounting Bracket	n	
15	A2898-62001	Power Supply	n	
16	A2084-62014	Speaker Assembly	n	
	A2084-40013	Speaker Enclosure	n	
	A2084-4063	EISA Carrier	n	
17	A2084-60011	Chassis Assembly Top and Bottom Covers (All Models)	n	

Shaded boxes indicate the part is an exchange part.

(Continued)



Table 5-1. FRU List (Cont.)

No.	Part Number	Description	Exchange (e) Non-exchange (n)
*	A2084-62019	Floor Stand	n
*	C1429-60201	Keyboard, PC	n
*	A4030A	Keyboard, AT (mini-DIN)	n
*	46021-60201	Keyboard, HP-UX	n
*	46060-60202	Mouse (HP-HIL)	n
*	A2839A	Mouse (mini-DIN)	n
*	A4022-62005	Keyboard Adapter Module	n
*	A4022-62003	Keyboard Adapter Module Cable	n
*	A2084-40023	Insulator, Processor Board	n
*	1250-2405	T-Connector, BNC Ethernet Extender	n
*	5181-0394	Rubber Foot (1)	n
*	015933	Screw, M4x6 Hex	n
*	0515-0145	Screw, M3x0.5 (Hinge)	n
*	2360-0113	Screw, 6-32 x 1/4" (CD-ROM & Winch.)	n
*	0515-1146	Screw M3x.0.5 6mm (Floppy Drive)	n
*	1252-5352	AUI Latch Slide	n
*	28641B	Ethernet ThinLAN Transceiver	n
*	28685B	Ethertwist Transceiver	n
*	A1499-62020	Floppy Power Cable Adapter	n
*	A2084-40059	Floppy Bezel Insert Model 715/75	n
*	A2084-62004	SCSI Ribbon Cable	n
*	A4022-62004	PC Floppy Ribbon Cable	n
*	A2084-62020	CD Audio Cable	n
*	1400-1547	Cable Tie (1)	n
*	A2084-62002	Audio Cable Board Assembly Model 715/75	n
*	A2084-40054	EISA Standoffs (2) - Snap Ends	n
*	A2084-40055	EISA Standoff (1) - Adhesive End	n
*	A2084-40056	EISA Standoff (1) - Adhesive End	n
*	A2084-40057	EISA Standoff (1) - Snap End	n
*	A2084-40058	EISA Standoff (1) - Snap End	n
*	A1097-69003	19-in. Color Mon. (A1097A) - N. Hem.	e
*	A1097-69004	19-in. Color Mon. (A1097B) - S. Hem.	e
*	A2094-69001	19-in. Color Mon. (A2094A) - N. Hem.	e
*	2090-0315	19-in. Color Mon. (A2094B) - S. Hem.	n
*	2090-0246	17-in. Color Mon. (A1497B) - S. Hem.	n
*	A1497-69001	17-in. Color Mon. (A1497A) - N. Hem.	e
*	A2088-69001	19-in. Grayscale Mon. (A2088A)	e
*	D1196-69001	15-in. Color Mon. (D1196A)	e
*	A4070-69504	HCRX-8 Graphics Card	e
*	A4072-69512	HCRX-8Z Graphics Accelerator Card	e
*	A4071-69507	HCRX-24 Graphics Card	e
*	A4073-69001	HCRX-24Z Graphics Accelerator Card	e
*	A2673-69571	CRX-24 Graphics Card	e
*	A2674-66572	CRX-24Z Graphics Accelerator Card	n
*	A2084-00050	EMI Liner Blank Bezel for A2084-60011	n
*	A2084-40060	Blank Bezel for A2084-60011	n
*	A2084-00023	EMI Clip	n

\* = not shown in Figure 5-1. Shaded boxes indicate the part is an exchange part.

(Continued)

Table 5-1. FRU List (Cont.)

No.	Part Number	Description	Exchange (e) Non-exchange (n)
*	A2675-66581	CRX-48Z Graphics System Interface Card	n
*	A2084-62069	CRX-48Z Stand Assembly	
*	A2084-62030	CRX Graphics Flex Cable	n
*	A2084-00038	CRX Bracket, Graphics Support	n
*	A2084-40030	CRX Graphics Mounting Bracket	n
*	98700-61603	CRX-48Z Cable, Graph. Proc. to Monitor	n
*	A2091-62004	CRX-48Z Graphics Proc. to System Cable	n
*	C2300-60005	Color Video Cable	n
*	A1499-60005	Grayscale Video Cable	n
*	A2084-84005	Model 715/33 Logo Label	n
*	A2084-84006	Model 715/50 Logo Label	n
*	A2084-84007	Model 715/75 Logo Label	n
*	A4022-84001	Model 715/64 Logo Label	n
*	A4022-84005	Model 715/80 Logo Label	n
*	A4022-84004	Model 715/100 Logo Label	n

\* = not shown in Figure 5-1

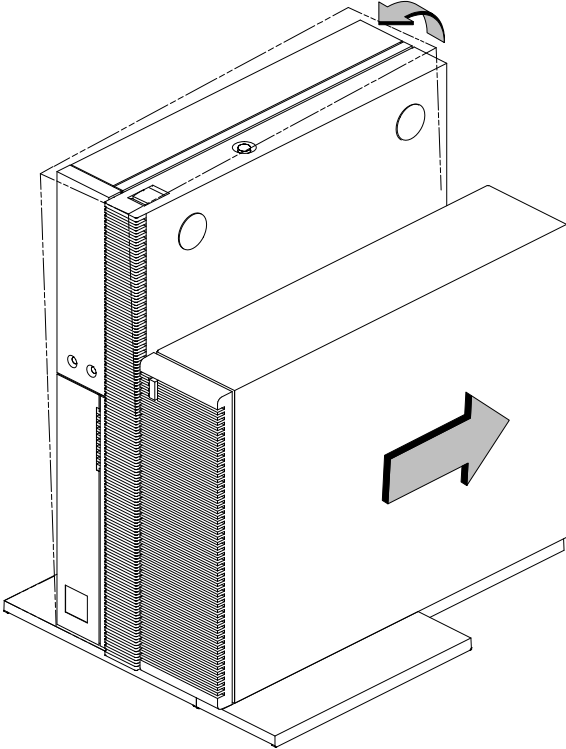
Table 5-2. EISA Interface Options

Part Number	Description	Product Number
25525-69001	EISA SCSI II Host Adaptor	25525B
25567-69001	EISA LAN/9000 - IEEE 802.3 Adaptor	25567B
25560-69001	EISA HP-IB Host Adaptor	25560A
J2165-69001	802.5 LAN	J2165A
J2156-69001	FDDI	J2156A
25565-60002	X.25 (PSI)	J2159A

The following sections explain how to remove the individual FRUs. Observe the notices and prerequisites for removing each FRU. Replacement is the reverse of removal, unless noted.

# External Graphics Processor

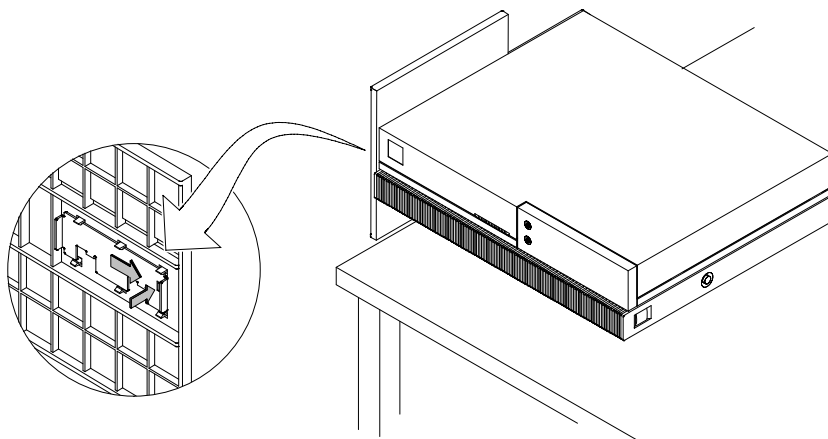
Disconnect and remove the external graphics processor unit (if installed). If your workstation is installed in the deskside (standing) configuration, lift the rear of the system unit slightly while sliding the processor back, as shown in Figure 5-2.



*Figure 5-2. Removing the External Graphics Processor*

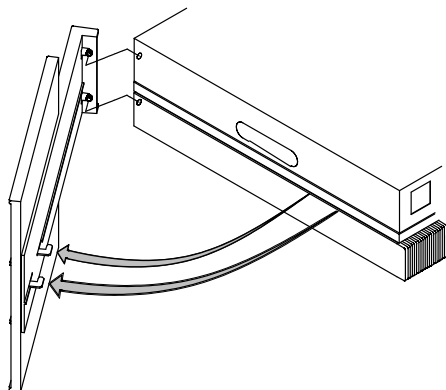
## Floor Stand

Place the system unit on a flat surface, such as a table top, with the floor stand hanging over the edge. Slide the latch on the bottom of the floor stand to unlock it.



*Figure 5-3. Unlocking the Floor Stand*

Swing the end of the floor stand away from the system unit and remove it as shown in Figure 5-4.

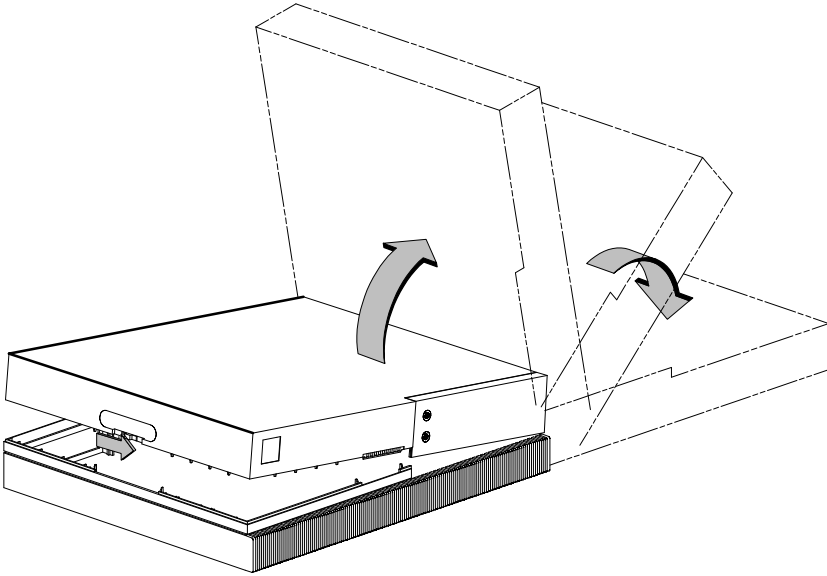


*Figure 5-4. Removing the Floor Stand*

# Opening the System Unit

Before opening the system unit, remove the floor stand. If a sticker is covering the handle, remove it.

Slide the handle latch to the open position and carefully lift the top cover to fully open the system unit, as shown in Figure 5-5.



*Figure 5-5. Opening the System Unit*

**NOTICE:** When you close the system unit, take care that you do not bend the EMI shields where the bottom and top covers join. When closing the system, slide the handle latch to the lock position as shown on the handle label.

## Disk Drives

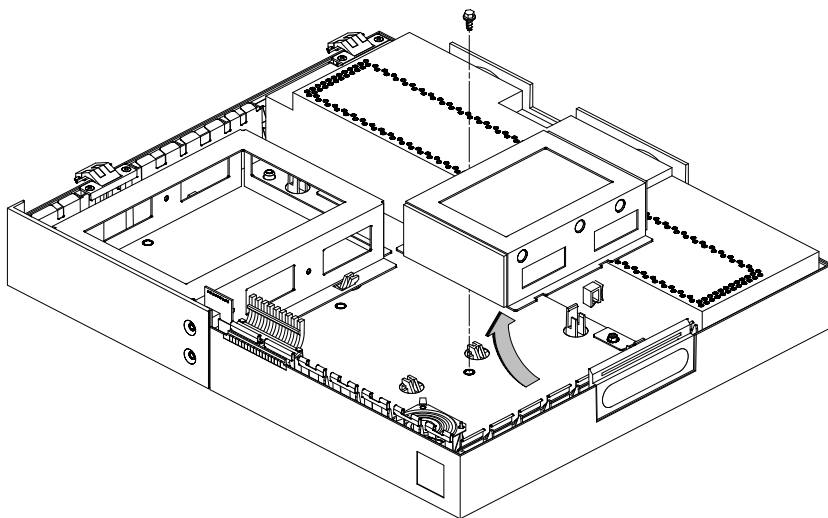
Before removing the disk drives, perform the following steps:

- Remove the optional external graphics processor (if installed).
- Remove the floor stand.
- Open the system unit.

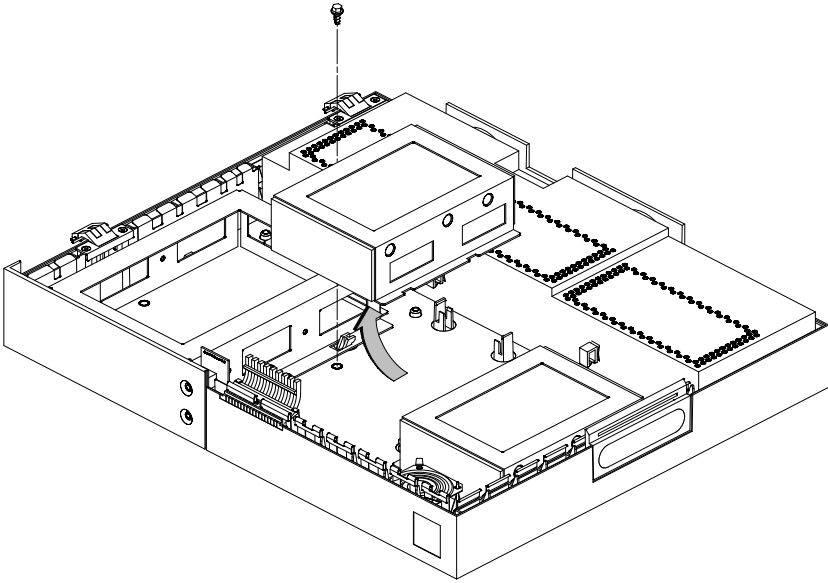
Disconnect the power cable and the SCSI cable from the disk drive.

For CD-ROM drives, disconnect the CD-ROM audio cable.

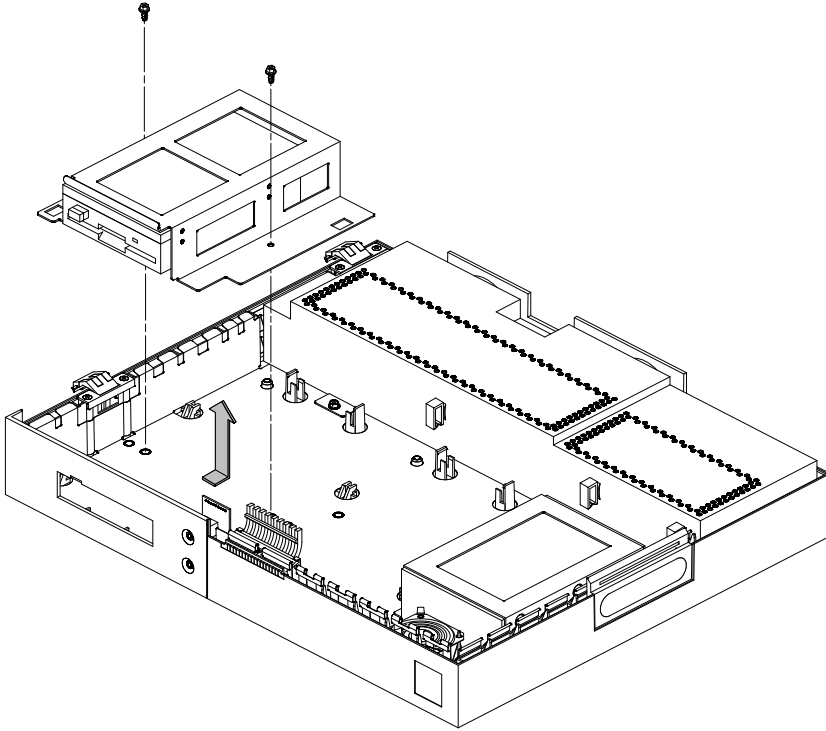
Figure 5-6 through Figure 5-13 show removal and replacement procedures. Refer to the figures that are appropriate for your device.



*Figure 5-6. Removing the First Hard Disk Drive*



*Figure 5-7. Removing the Second Hard Disk Drive*



*Figure 5-8. Removing the Floppy, CD-ROM, or DDS Drive*



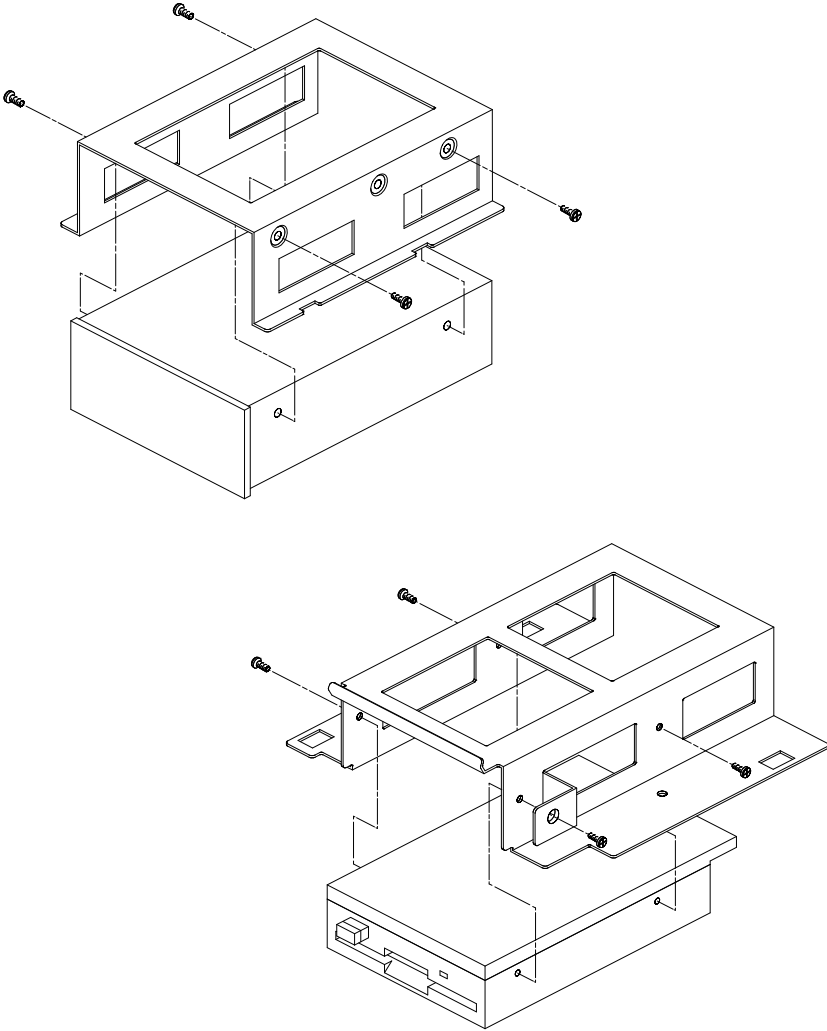


Figure 5-9. Removing the Drive Brackets

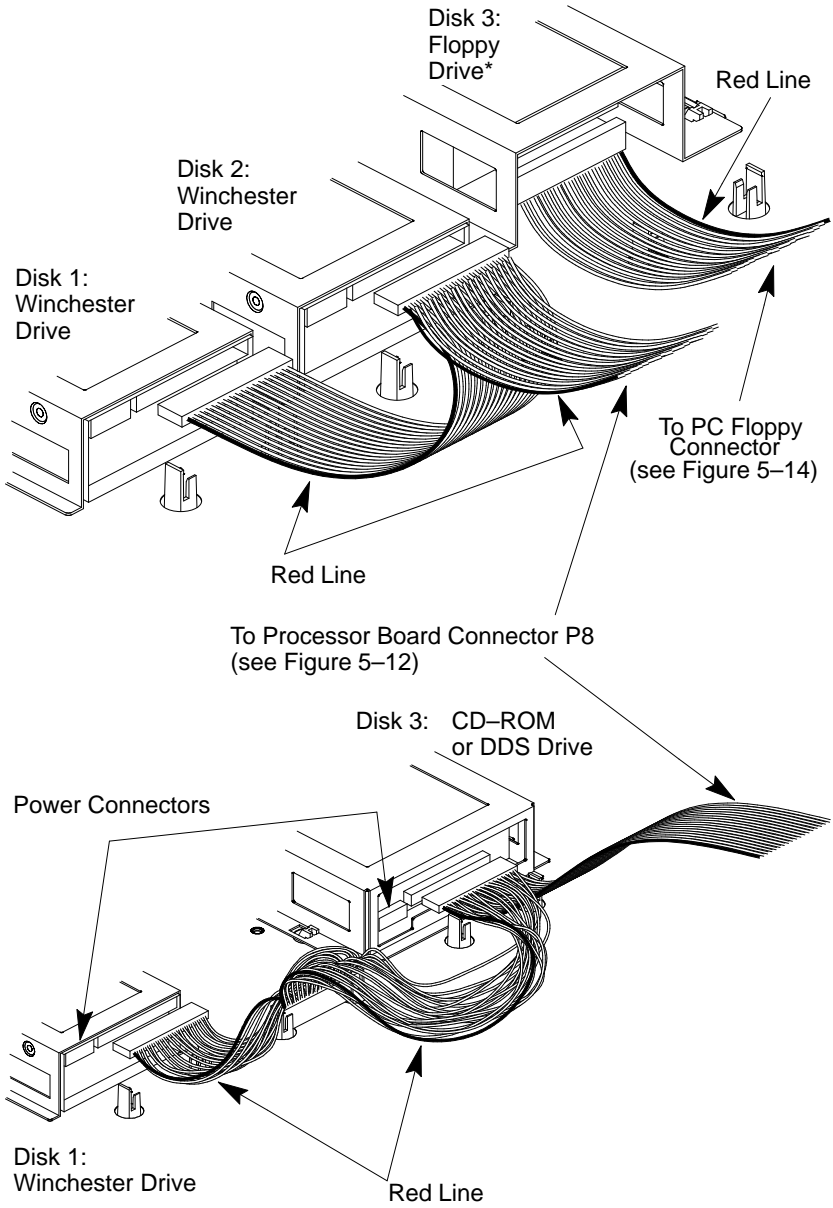


Figure 5-10. SCSI and PC Floppy Cable Connections  
(Model 715/64, 715/80, and 715/100)

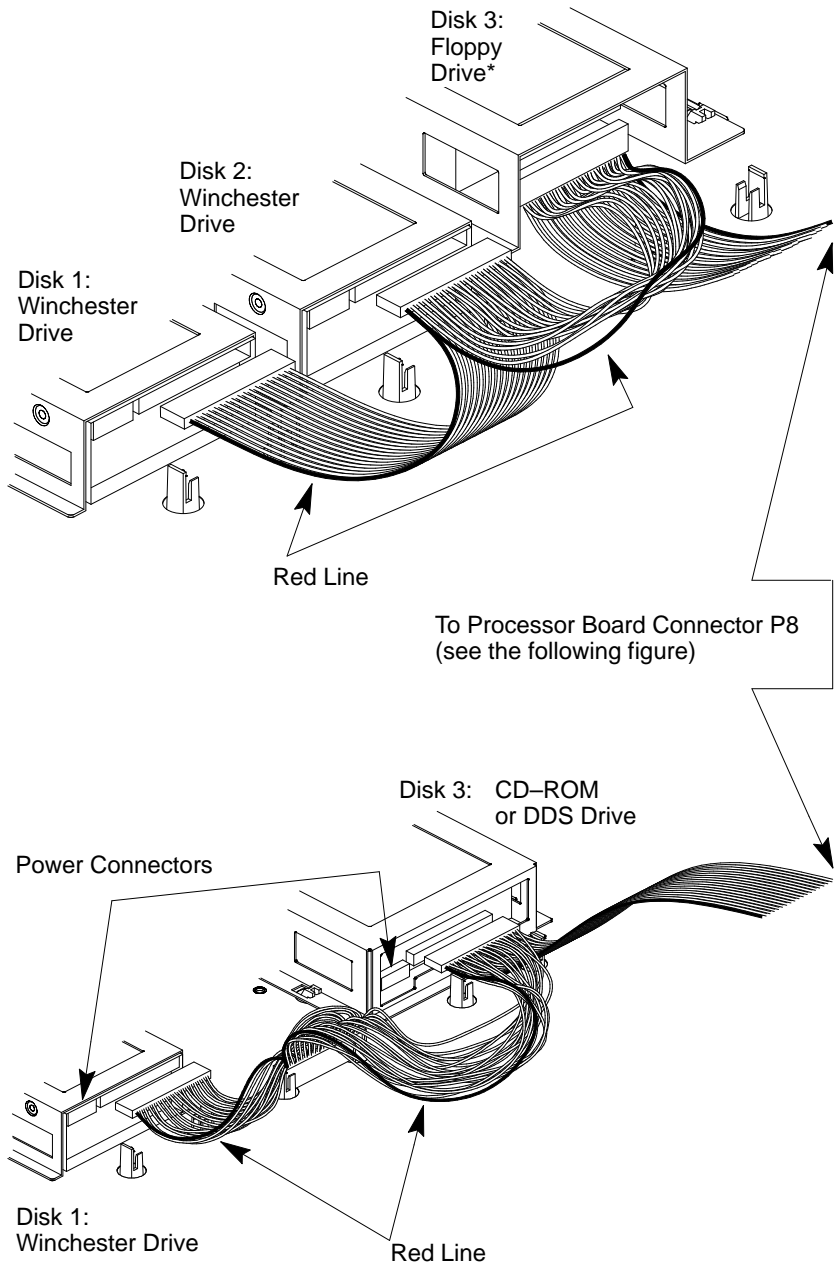


Figure 5-11. SCSI Cable Connections

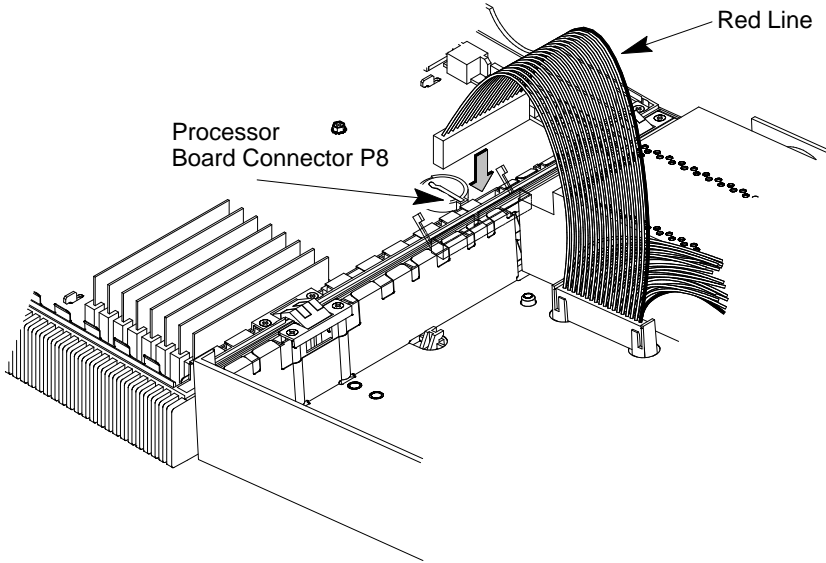


Figure 5-12. Connecting SCSI Cable to Processor Board

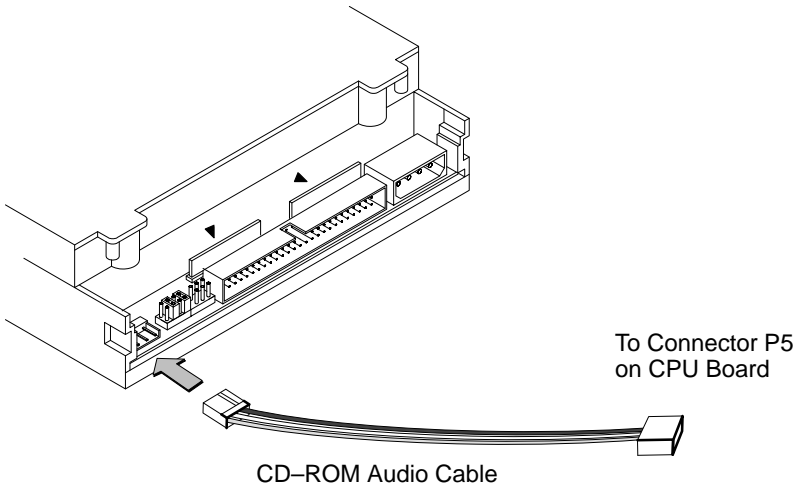


Figure 5-13. CD-ROM Audio Cable

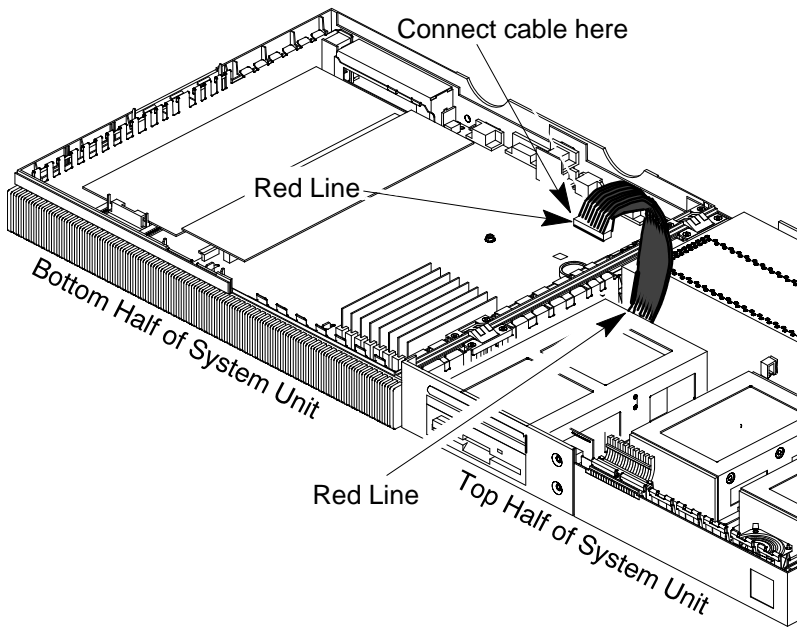


Figure 5-14. Connecting the PC-Style Floppy Drive Ribbon Cable (Model 715/64, 715/80, and 715/100 Systems)

## Power Supply

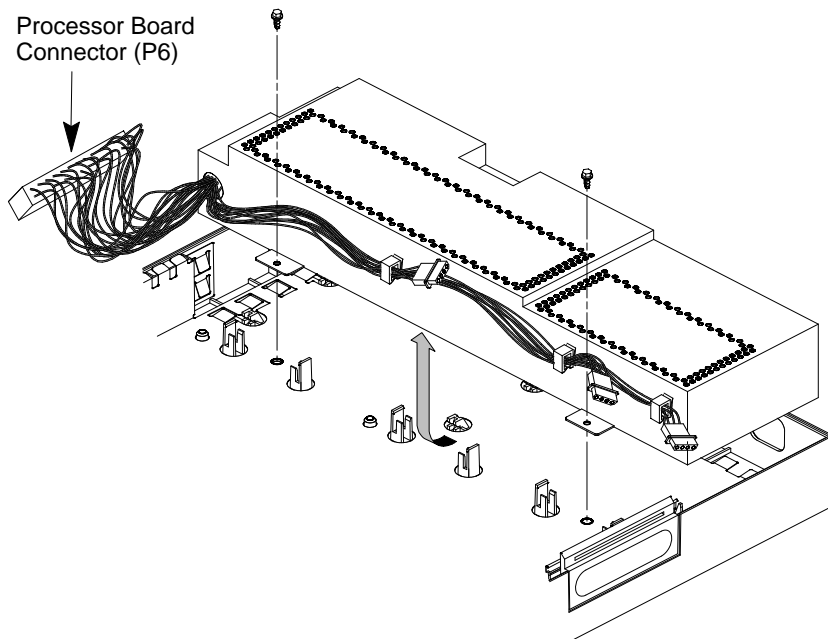
Before removing the power supply, perform the following steps:

- Remove the optional external graphics processor (if installed).
- Remove the floor stand.
- Open the system unit.

Remove the two screws that secure the power supply to the chassis.

Disconnect the processor board cable and any disk drive cables.

Slide the power supply toward the disk drives about 1/4-inch, then lift the power supply out of the chassis.



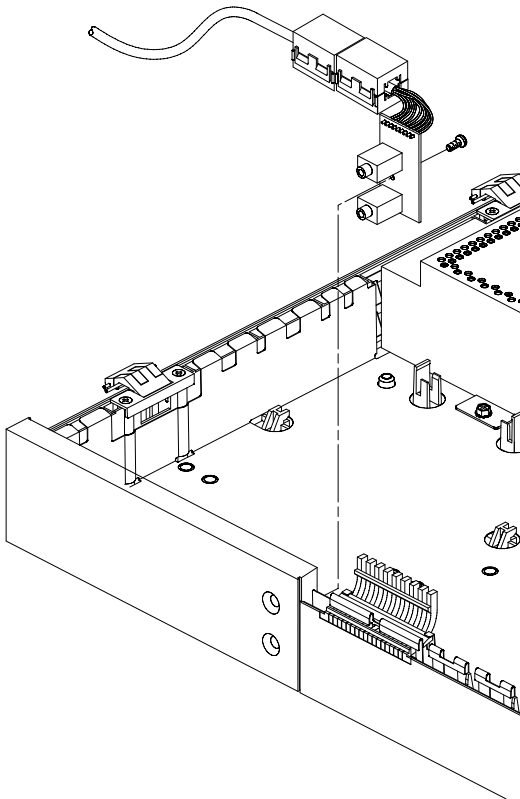
*Figure 5–15. Removing the Power Supply*

## Front Audio Board Assembly

Before removing a front audio board assembly, perform the following steps:

- Remove the optional graphics processor (if installed).
- Remove the floor stand.
- Open the system unit.

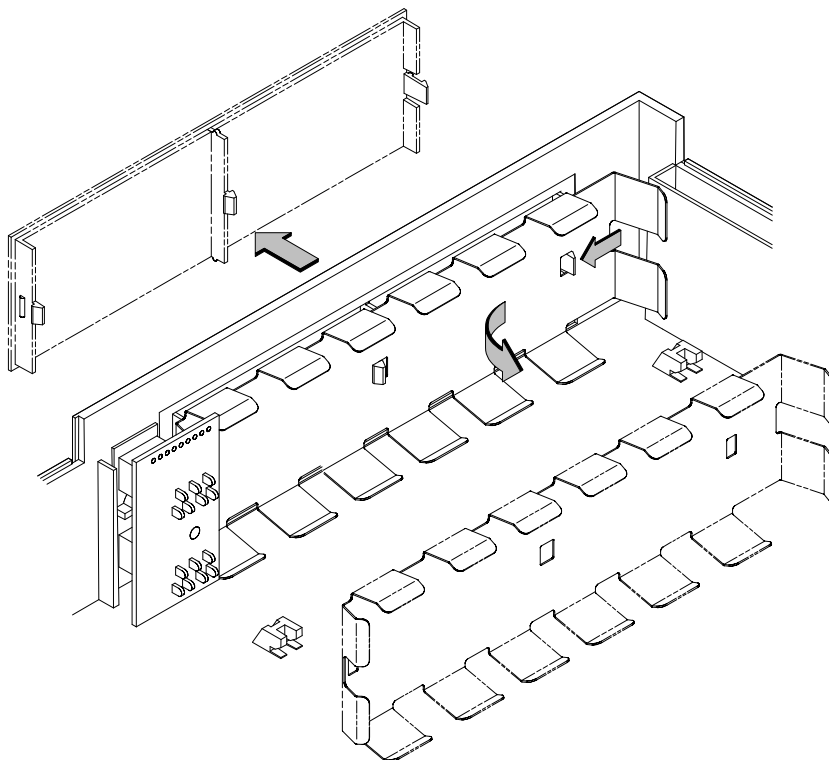
Unplug the bezel assembly cable from connector P2 on the CPU board. Use a flatblade screwdriver to remove the front audio assembly from inside the system, as shown in Figure 5–16.



*Figure 5–16. Removing the Front Audio Board Assembly*

## Front Bezel Cover Plate Assembly

To remove the blank cover plate, depress the snap tab on one end of the blank cover plate to remove the metal liner. Then press on the blank cover plate until it pops out of the system unit, as shown in Figure 5-17. Discard the metal liner plate and the blank cover plate.



*Figure 5-17. Removing the Blank Cover Plate*



# EISA Assembly Components

Before removing the components that comprise the EISA assembly, perform the following steps:

- Remove the floor stand.
- Open the system unit.

Use Figure 5–18 to determine if your system uses an **End Cap** or **Retaining Clips** to secure the EISA option, then proceed to the appropriate subsection for removing or installing the EISA option.

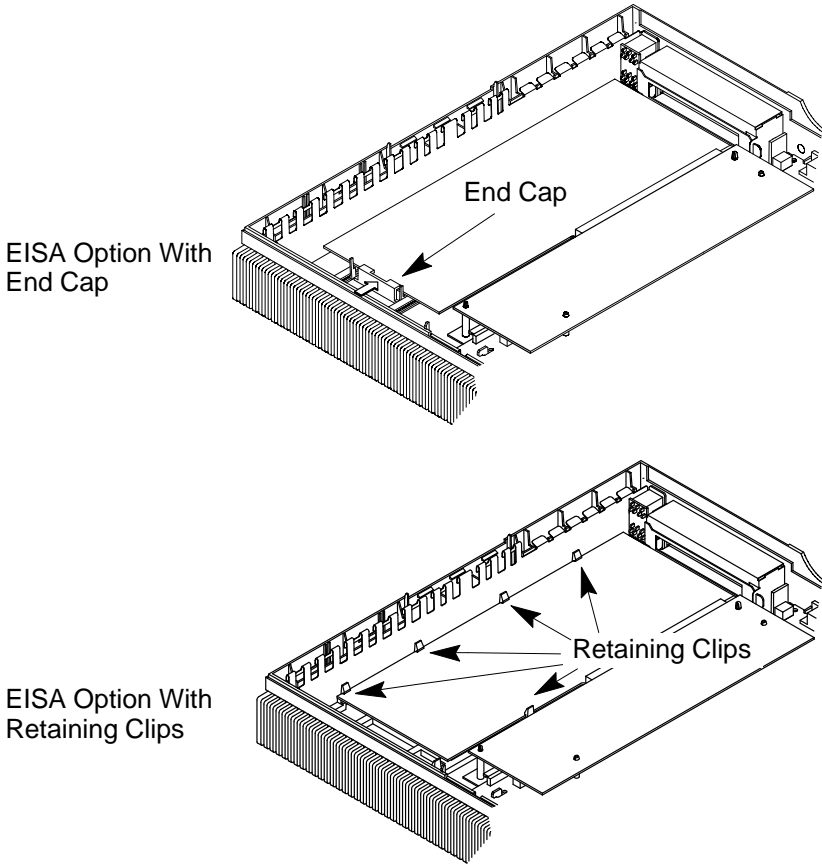
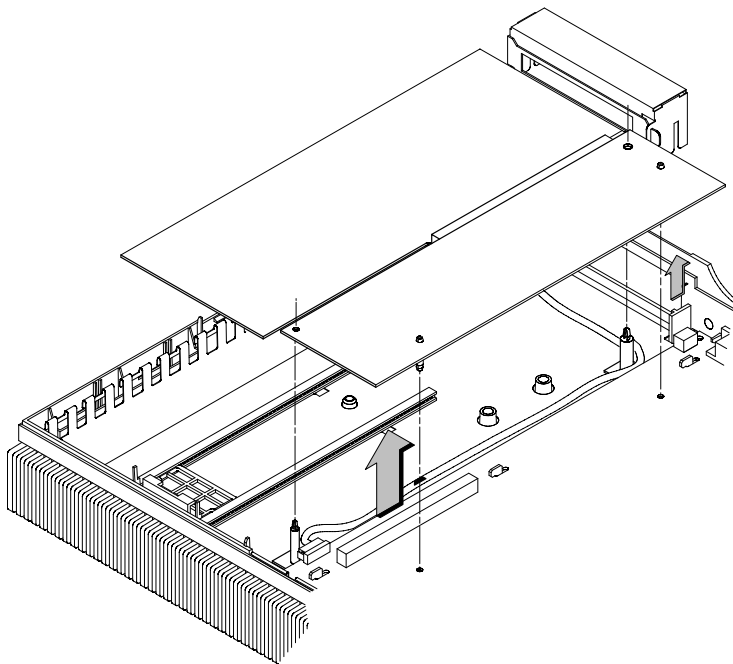


Figure 5–18. EISA Option Mounting

## Removing the EISA Assembly Components (End Cap)

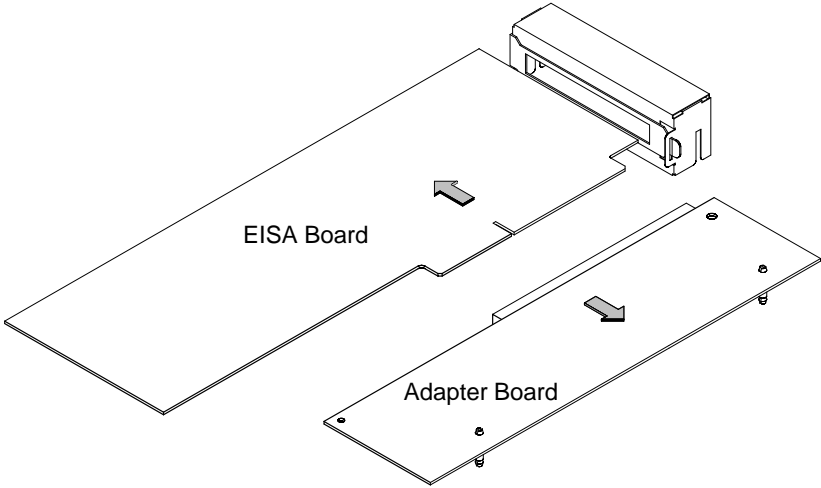
Remove each EISA assembly component as shown in the following sequence of illustrations until you have removed the component that you want to replace.

Pinch the sides of the end cap and slide it away from the EISA board as shown in Figure 5–19.



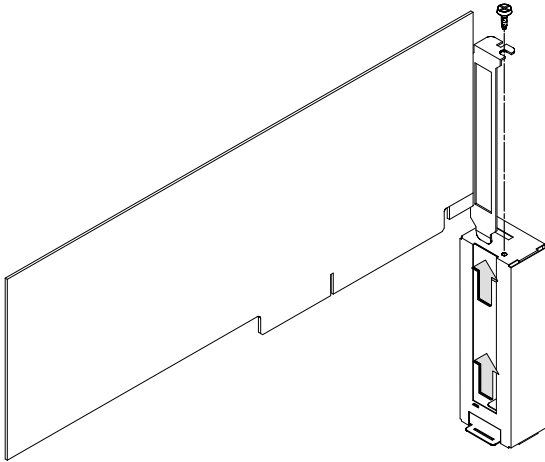
*Figure 5–19. Removing the EISA Adapter Assembly (End Cap)*

Disconnect the EISA board from the EISA adapter board, as shown in Figure 5–20.



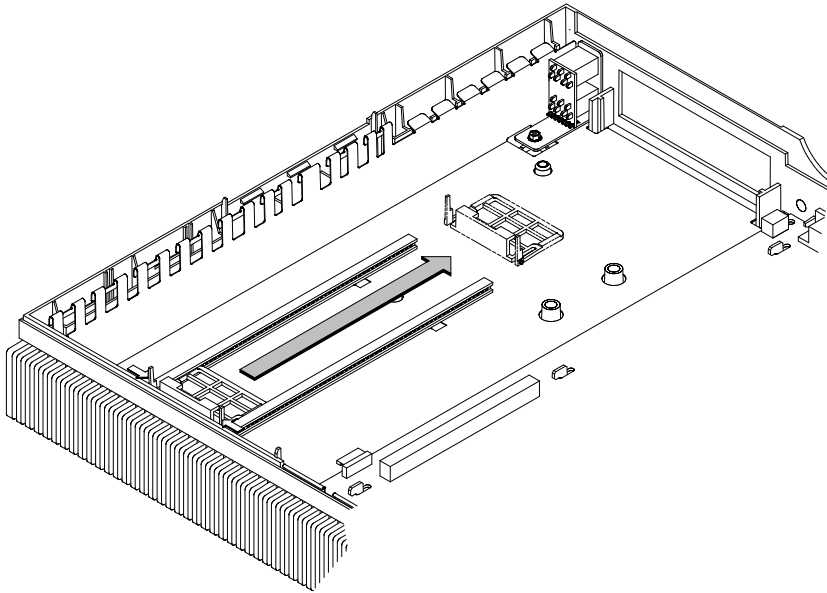
*Figure 5–20. Disconnecting the EISA Board from the Adapter Board*

Use a Phillips screwdriver to unscrew the connector bracket from the connector bucket. Then remove the EISA board's connector bracket from the bucket, as shown in Figure 5–21.



*Figure 5–21. Removing the Connector Bucket*

Pinch the sides of the end cap and slide it from between the brackets as shown in Figure 5-22.



*Figure 5-22. Removing the End Cap*

# Removing the EISA Assembly Components (Retaining Clips)

Push the retaining clips away from the EISA board to release it. See Figure 5–23.

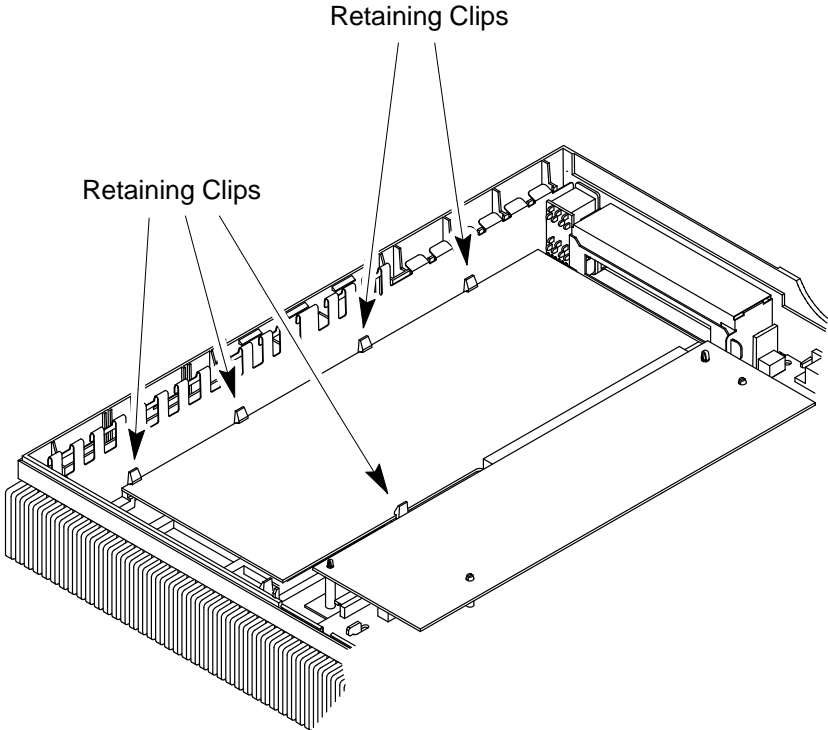
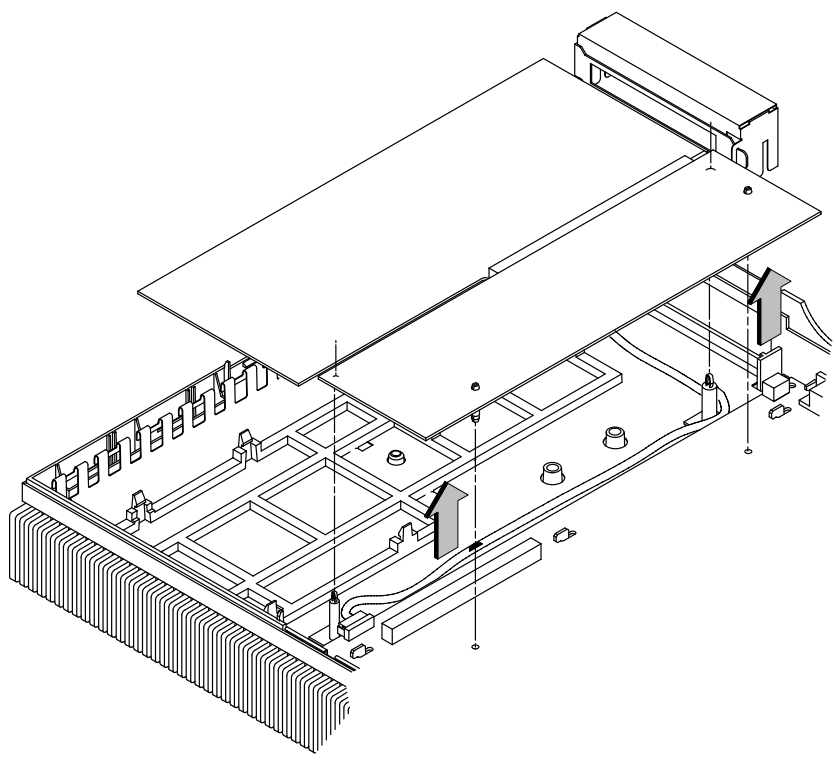


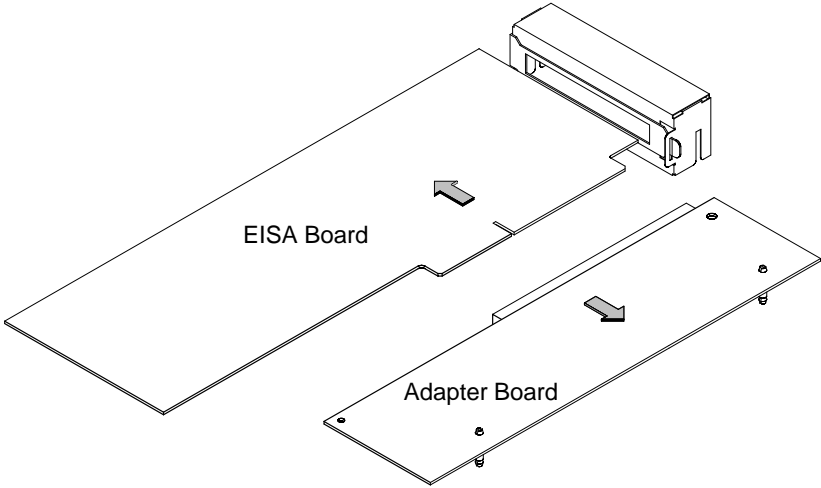
Figure 5–23. Unsecuring the EISA Board

Press the locking tab on the top of each standoff and lift the EISA assembly evenly from both sides until it is disengaged from the connector.



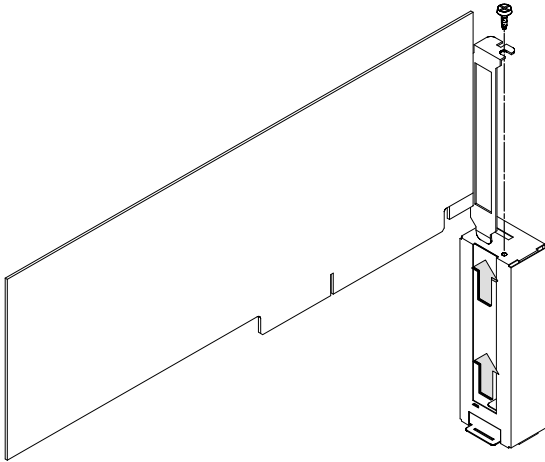
*Figure 5-24. Removing the EISA Assembly (Retainer Clips)*

Disconnect the EISA board from the EISA adapter board, as shown in Figure 5–20.



*Figure 5–25. Disconnecting the EISA Board from the Adapter Board*

Use a Phillips screwdriver to unscrew the connector bracket from the connector bucket. Then remove the EISA board's connector bracket from the bucket, as shown in Figure 5–21.

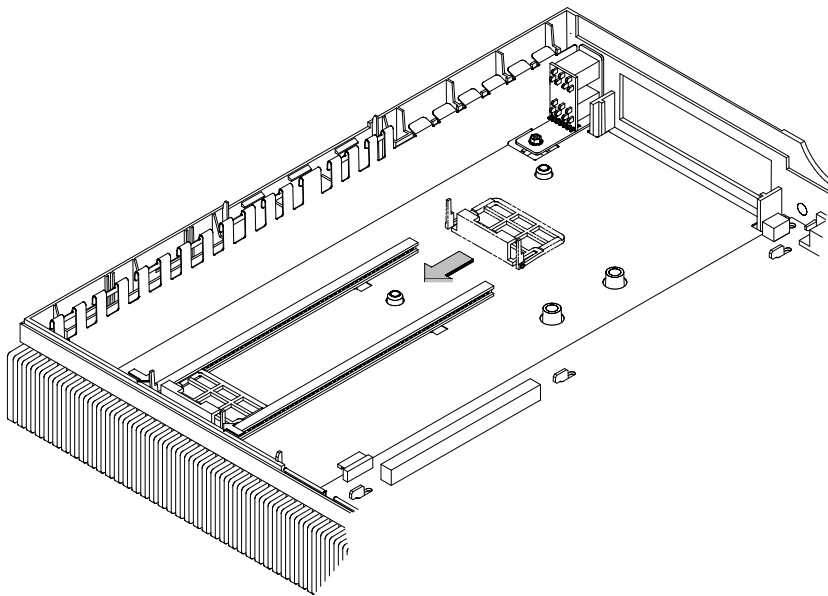


*Figure 5–26. Removing the Connector Bucket*

## Installing the EISA Assembly Components (End Cap)

Perform the appropriate steps in this subsection to install the EISA assembly components that you removed. Skip those steps that don't apply.

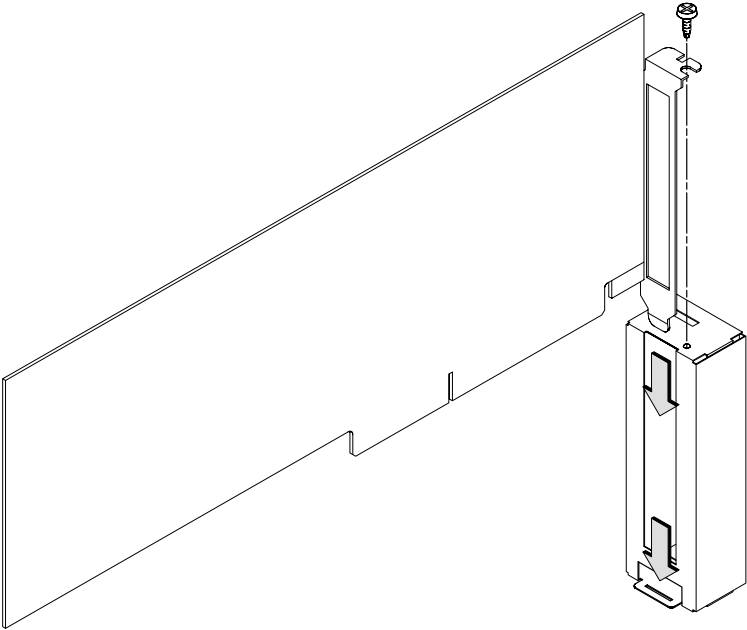
Pinch the sides of the end cap and slide it between the rails to the rear of the system unit (see Figure 5-27).



*Figure 5-27. Installing the End Cap*

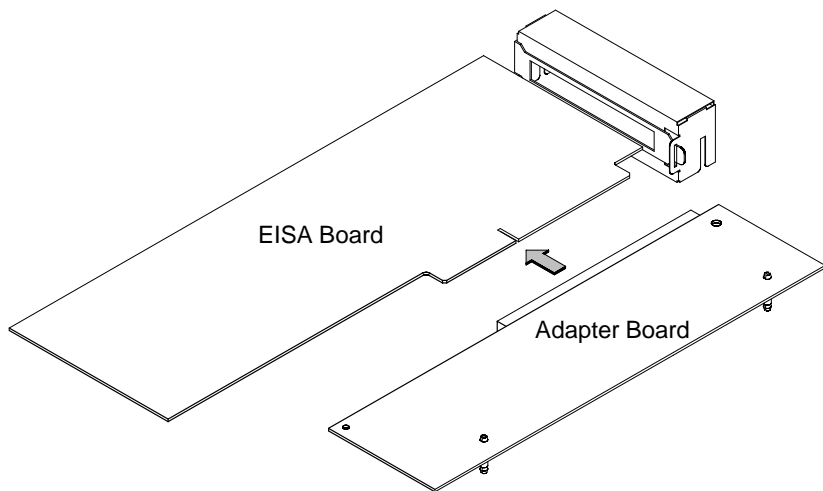


Insert the connector bracket into the bucket, and then use a Phillips screwdriver to tighten the screw.



*Figure 5-28. Installing the Connector Bucket*

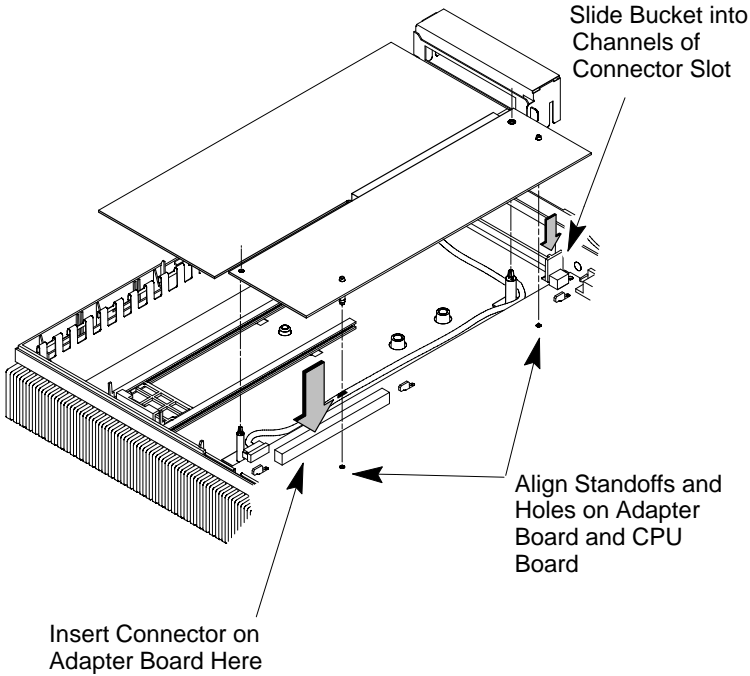
Insert the EISA board into the connector on the adapter board. Push firmly to ensure a secure connection. Refer to Figure 5-29.



*Figure 5-29. Connecting the EISA Board to the Adapter Board*

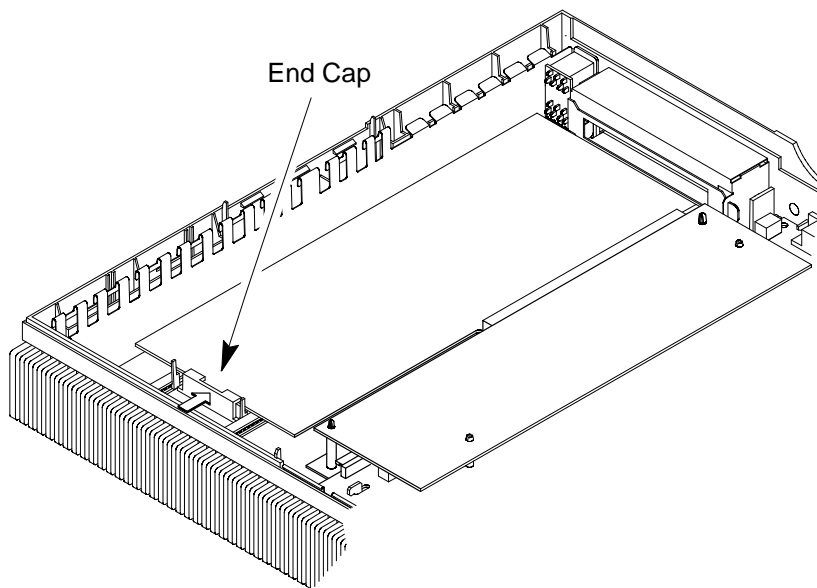
Slide the connector bucket, which you attached to the EISA board, *partway* into the channels of the connector slot on the rear of the system unit (see Figure 5–30). Align the connector on the adapter board with the connector on the processor board, and carefully press the two connectors together. Ensure that the standoffs are aligned with the holes in the processor board. Press on both the connector bucket and the adapter board to secure the assembly to the system unit.

Make sure that the audio cable is routed, as shown in Figure 5–30.



*Figure 5–30. Inserting the EISA Assembly into the System Unit*

Pinch the sides of the end cap and slide it to the EISA board (see Figure 5-31). Fit the edge of the EISA board into the slot of the end cap to secure the board.



*Figure 5-31. Securing the EISA Board with the End Cap*

# Installing the EISA Assembly Components (Retaining Clips)

Insert the connector bracket into the bucket, and then use a Phillips screwdriver to tighten the screw.

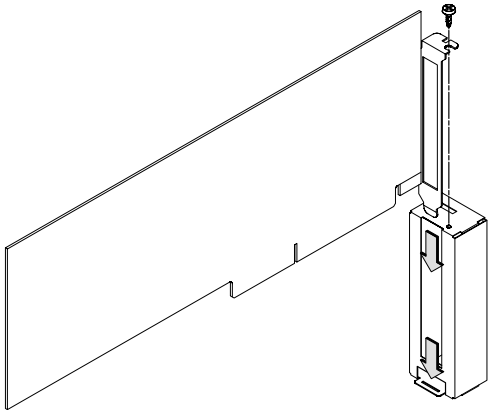


Figure 5-32. Installing the Connector Bucket

Insert the EISA board into the connector on the adapter board. Push firmly to ensure a secure connection. Refer to Figure 5-29.

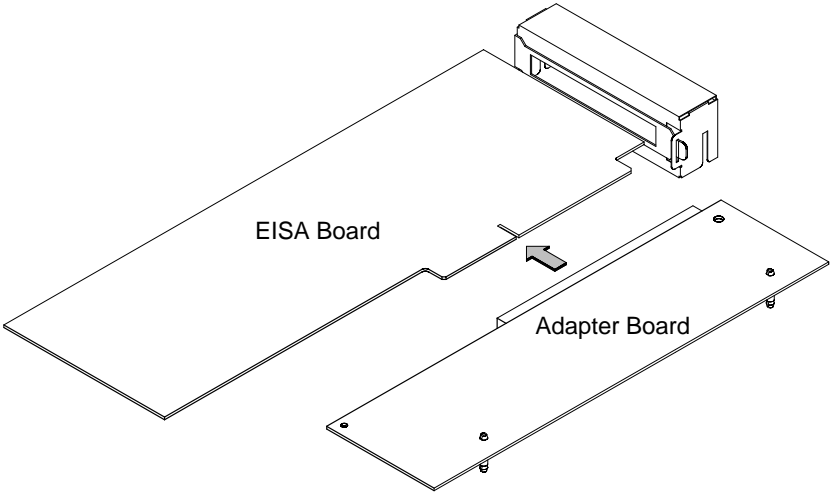


Figure 5-33. Connecting the EISA Board to the Adapter Board

Slide the connector bucket *partway* into the channels of the connector slot on the rear of the system unit, as shown in Figure 5–34.

Align the connector on the adapter board with the connector on the processor board, and carefully press the two connectors together. Ensure that the standoffs are aligned with the standoffs in the CPU board. Press on both the connector bucket and the adapter board to secure the assembly to the system unit.

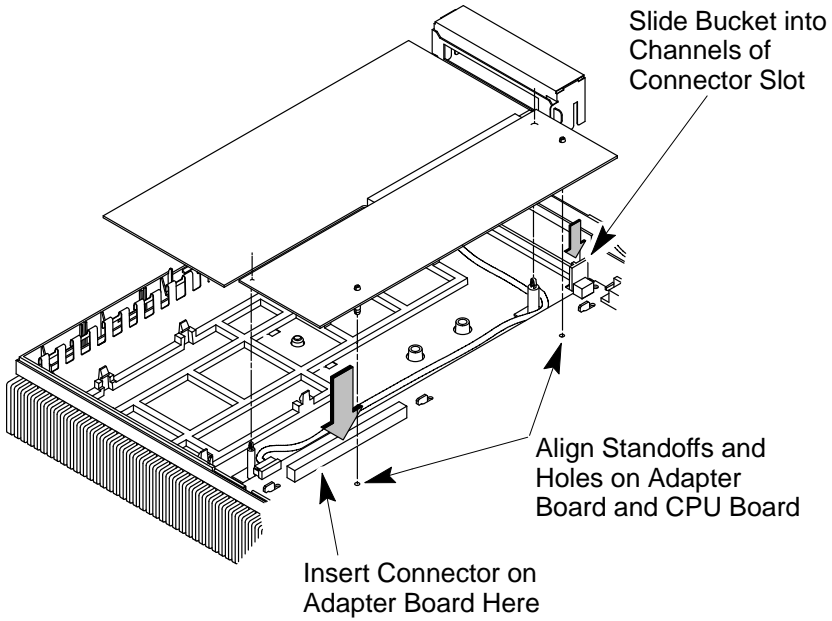
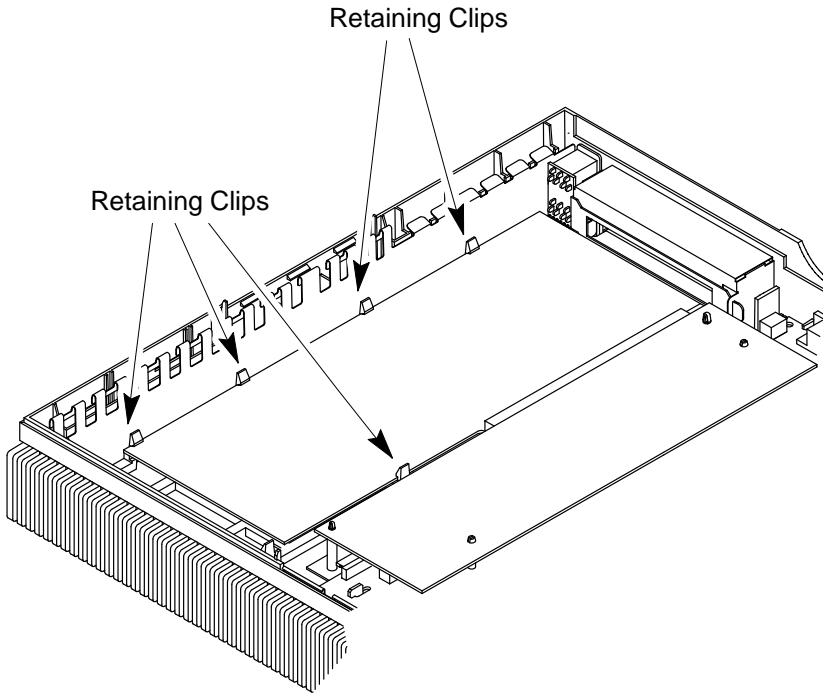


Figure 5–34. Inserting the EISA Assembly into the System Unit (Retaining Clips)

20. Press down on the EISA board near each retaining clip to make sure that all clips are fully engaged with the edge of the board. See Figure 5-35.



*Figure 5-35. Securing the EISA Board(Retaining Clips)*

## CRX and HCRX Graphics

Before removing the CRX or HCRX graphics board, perform the following steps:

- Remove the optional external graphics processor (if installed).
- Remove the floor stand.
- Open the system unit.

Push the retaining clips away from the CRX or HCRX graphics board to release the board.

Disconnect the flex cable connector from the CPU board and pull the board and connector bucket straight up to remove the board, as shown in Figure 5–36.

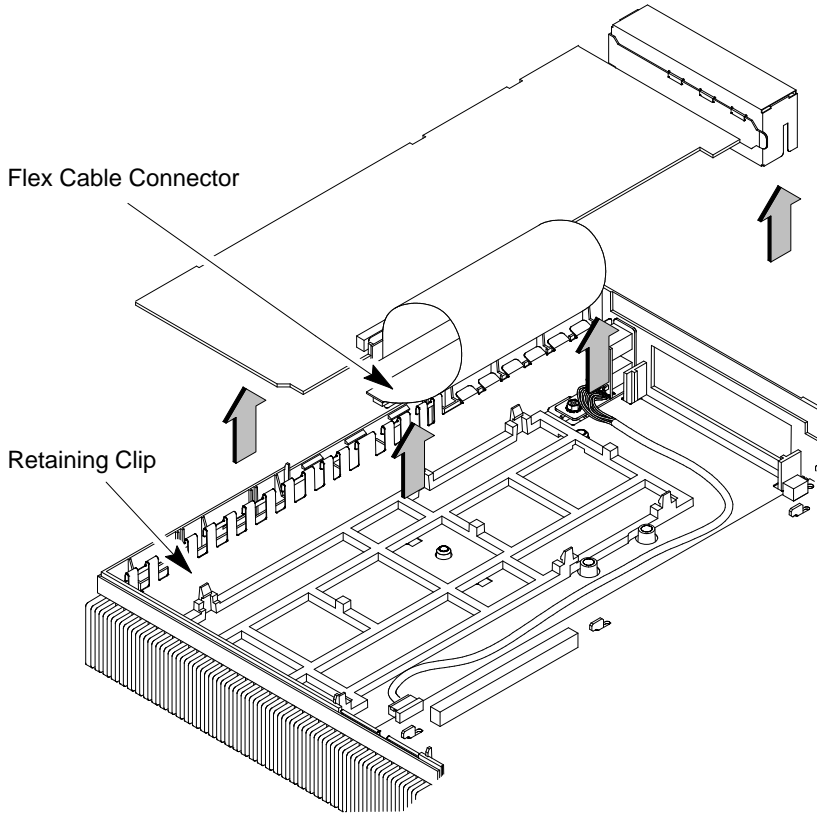
**NOTICES:** When disconnecting the flex cable connector from the CPU connector, pull straight up on both ends of the connector at the same time.

When connecting the flex cable to the CPU board connector carefully align the flex cable connector and the connector on the CPU board. Make sure that you press down evenly and firmly on both sides of the connector to ensure that it seats evenly and completely.

Following these guidelines ensures you of a good mechanical and electrical connection and that you do not bend any of the pins on the CPU connector.

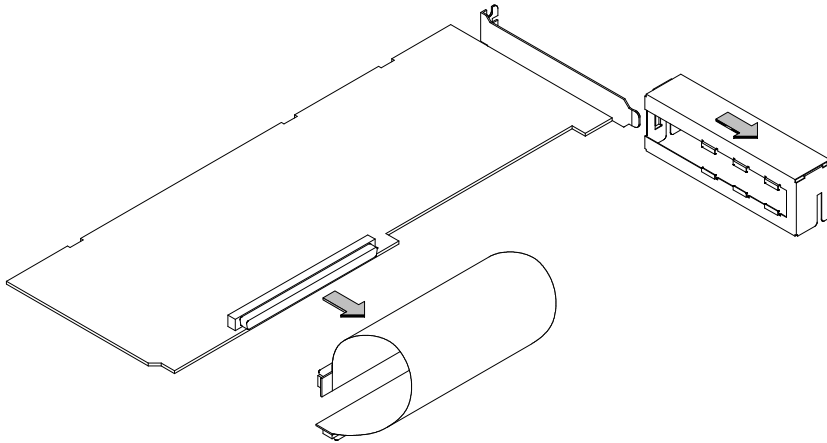
When installing the graphics processor to system cable for the CRX–48Z graphics, you should use a small flatblade screwdriver to firmly tighten the thumbscrews on the cable connectors.





*Figure 5-36. Removing the CRX or HCRX Graphics Assembly*

Remove the flex cable and the connector bucket from the CRX or HCRX board, as shown in Figure 5-37.



*Figure 5-37. Removing the Bucket and Flex Cable*

Lift up on the CRX or HCRX mounting bracket, slide it toward the rear of the system unit, and lift up, as shown in Figure 5-38. (When installing the mounting bracket, be sure the audio cable is routed as shown in Figure 5-38.)

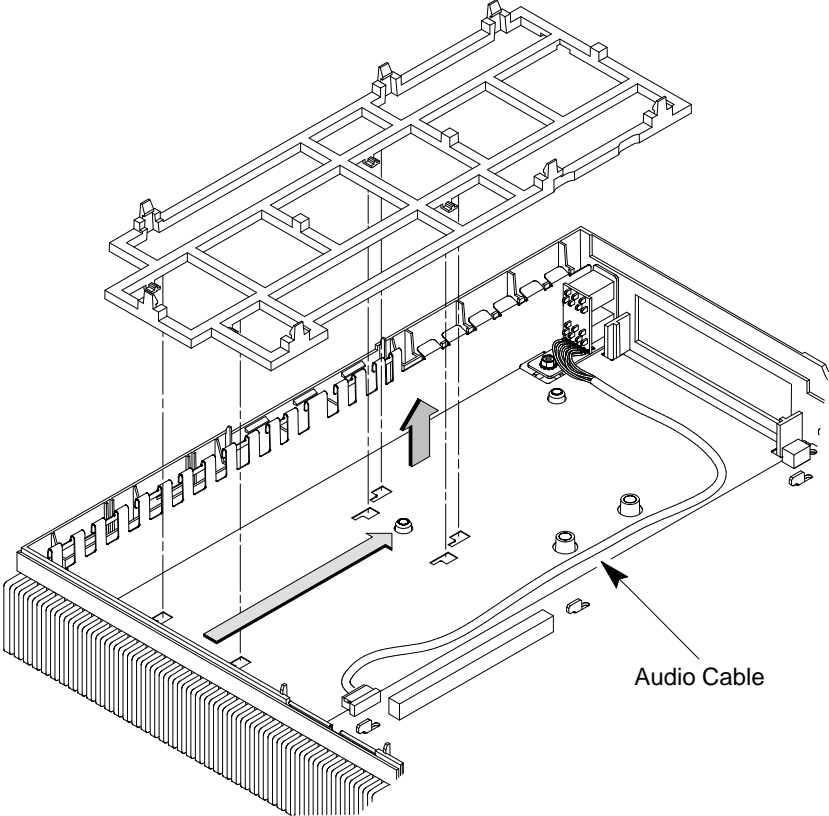
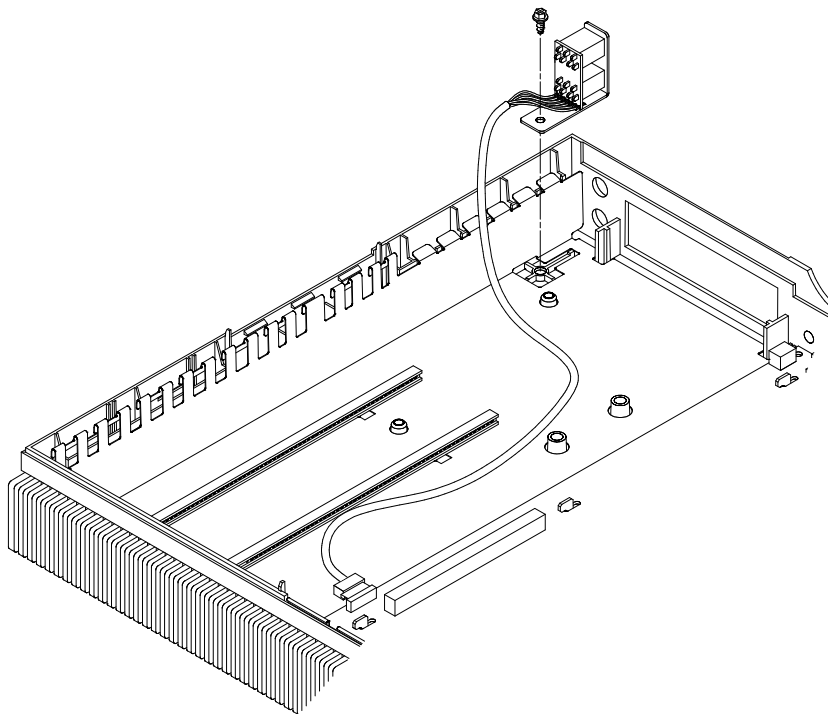


Figure 5-38. Removing the Mounting Bracket

## Rear Audio Board

Before removing the rear audio board, perform the following steps:

- Remove the optional graphics processor (if installed).
- Remove the floor stand.
- Open the system unit.
- Remove the EISA assembly or optional graphics (CRX or HCRX) assembly, if present.



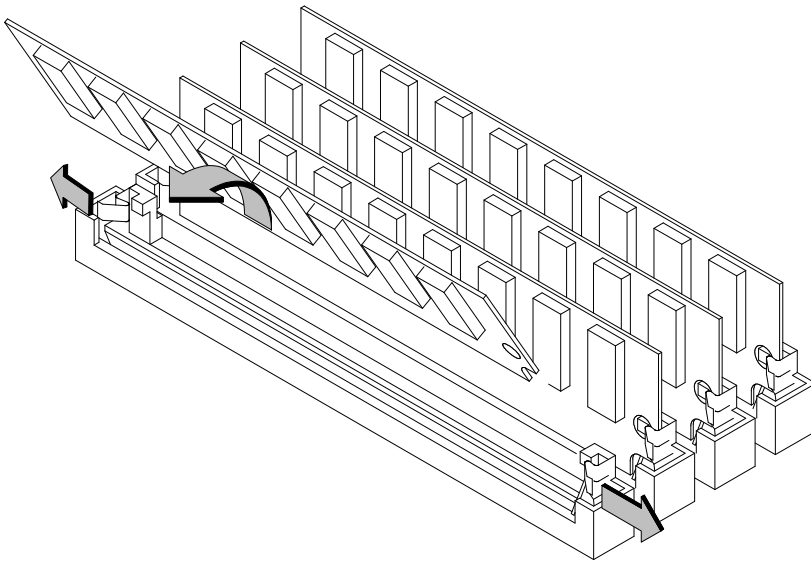
*Figure 5-39. Removing the Rear Audio Board*

# Memory

Before removing the memory, perform the following steps:

- Remove the optional graphics processor (if installed).
- Remove the floor stand.
- Open the system unit.

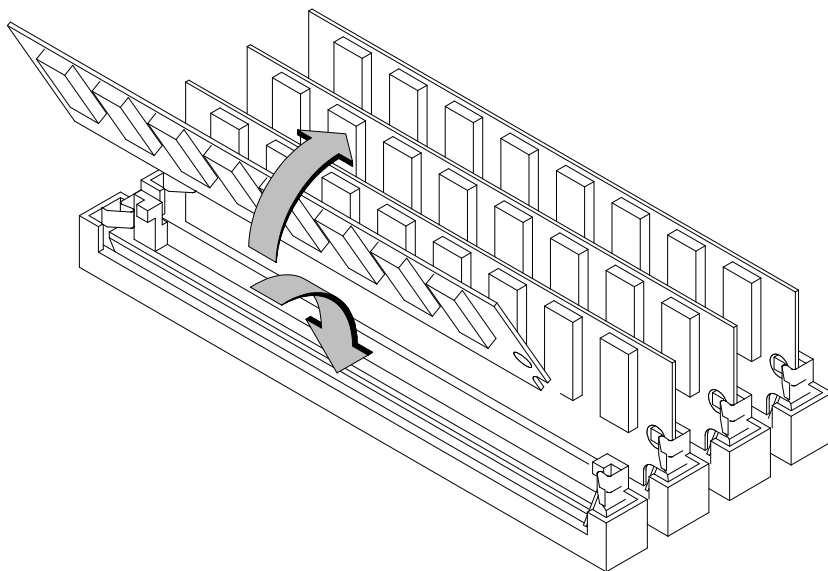
Remove the memory board by pushing open the spring clips, as shown in Figure 5–40. Tilt the top edge of the board about 45° toward the front of the system unit and pull evenly on both ends of the board to release it from the connector.



*Figure 5–40. Removing Memory Boards*

Install the new memory board with its top edge tilted about 45° toward the front of the system unit. Note that the memory board is notched on one end to fit the keyed connector. Press firmly on the memory board to ensure that it is fully seated. Snap the board into place by moving it to a vertical position. Its ends snap into the connector's spring clips. Figure 5-41 shows how to install the memory board.

See the memory configuration rules described in Chapter 3 if you are changing the memory configuration.



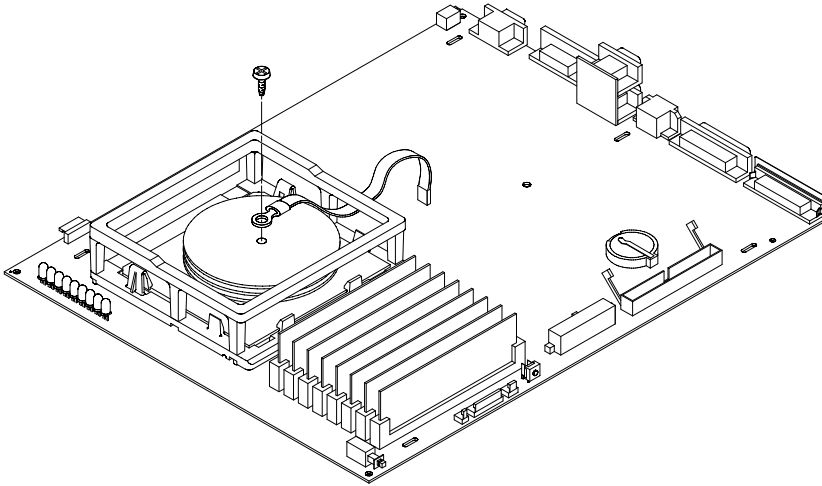
*Figure 5-41. Installing Memory Boards*

## PCX-T Module (Model 715/75)

Before removing the PCX-T module, perform the following steps:

- Remove the optional external graphics processor (if installed).
- Remove the floor stand.
- Open the system unit.

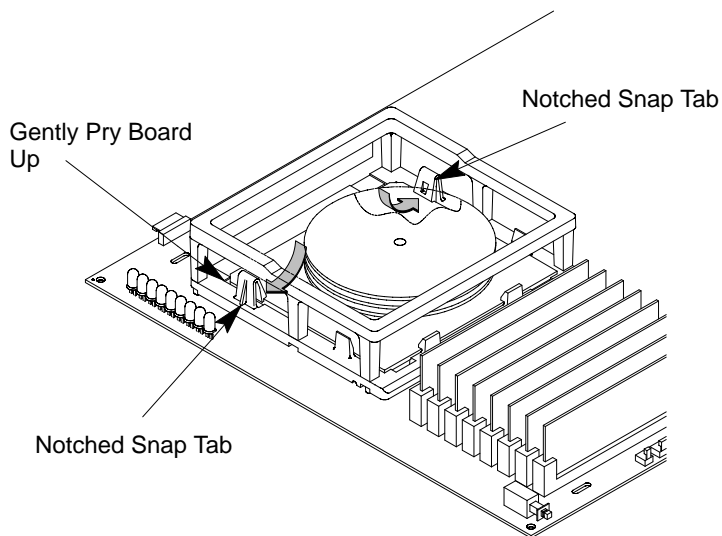
Use a Phillips screwdriver to disconnect the internal grounding wire from the heat sink, as shown in Figure 5-42. Move the grounding wire out of the carrier's way. (You may also want to disconnect the grounding wire from the spade lug on the processor board.)



*Figure 5-42. Disconnecting the PCX-T Grounding Wire*

**CAUTION:** If you wish to disconnect the grounding wire from the processor board, press down on the processor board near the spade lug while removing the grounding wire to prevent damage to the surrounding components. Refer to the warning label on the grounding wire.

Use a small flatblade screwdriver to press in one of the two notched snap tabs on the carrier, as shown in Figure 5-43. At the same time, use another flatblade screwdriver to gently pry the PCX-T board at the corner edge nearest the snap tab to loosen it from its connection on the processor board. Repeat this sequence for the second tab on the carrier.



*Figure 5-43. Disconnecting the PCX-T Module*



Once the PCX-T module has been loosened from its connection, remove the board, as shown in Figure 5-44.

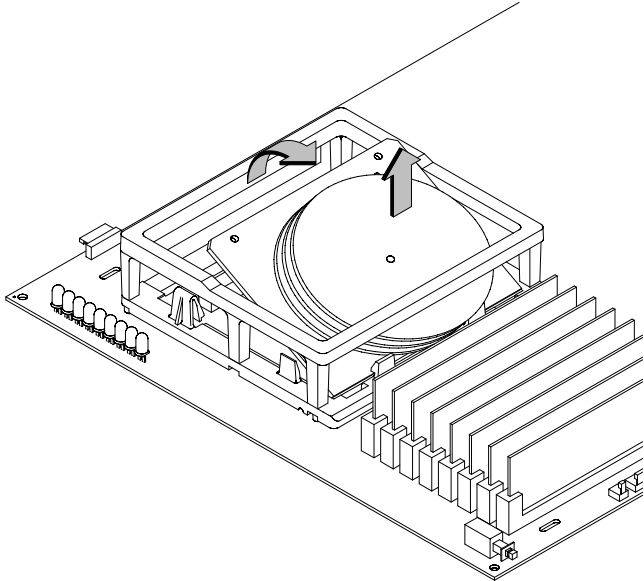


Figure 5-44. Removing the PCX-T Module

To install the PCX-T board, gently press the board into place. Attach the grounding wire, orienting it as shown in Figure 5-42.

## Processor Board

Before removing the processor board, perform the following steps:

- Remove the optional external graphics processor (if installed).
- Remove the floor stand.
- Open the system unit.
- Remove the EISA assembly or optional graphics (CRX or HCRX) board, if present.
- Disconnect all internal and external cables.

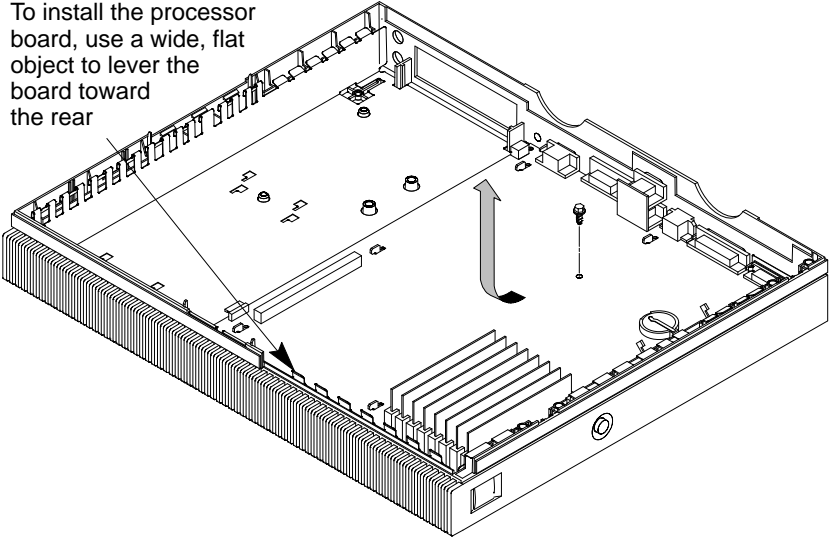
When installing the processor board, use a wide, flat object, such as a wooden ruler or flat-tipped screwdriver, between the front wall of the system unit and the edge of the processor board to lever the board toward the rear of the system (see Figure 5-45). This will enable you to align the screw hole and seat the connectors at the rear of the system unit.

Swap the memory boards to the new/exchange processor board, as shown in the “Memory” section.

If you are replacing a 715/C, 715/33, 715/50, or 715/75 processor board with another 715/C, 715/33, 715/50, or 715/75 processor board, remove the EEPROM from the failed processor board and install it in the new/exchange processor board, as shown in the “System EEPROM” section.

**NOTICE:** Tolerances between the processor board and the chassis are very close. You must use care when removing and replacing the processor board to avoid causing damage to the board.

To install the processor board, use a wide, flat object to lever the board toward the rear



*Figure 5-45. Removing the Processor Board*

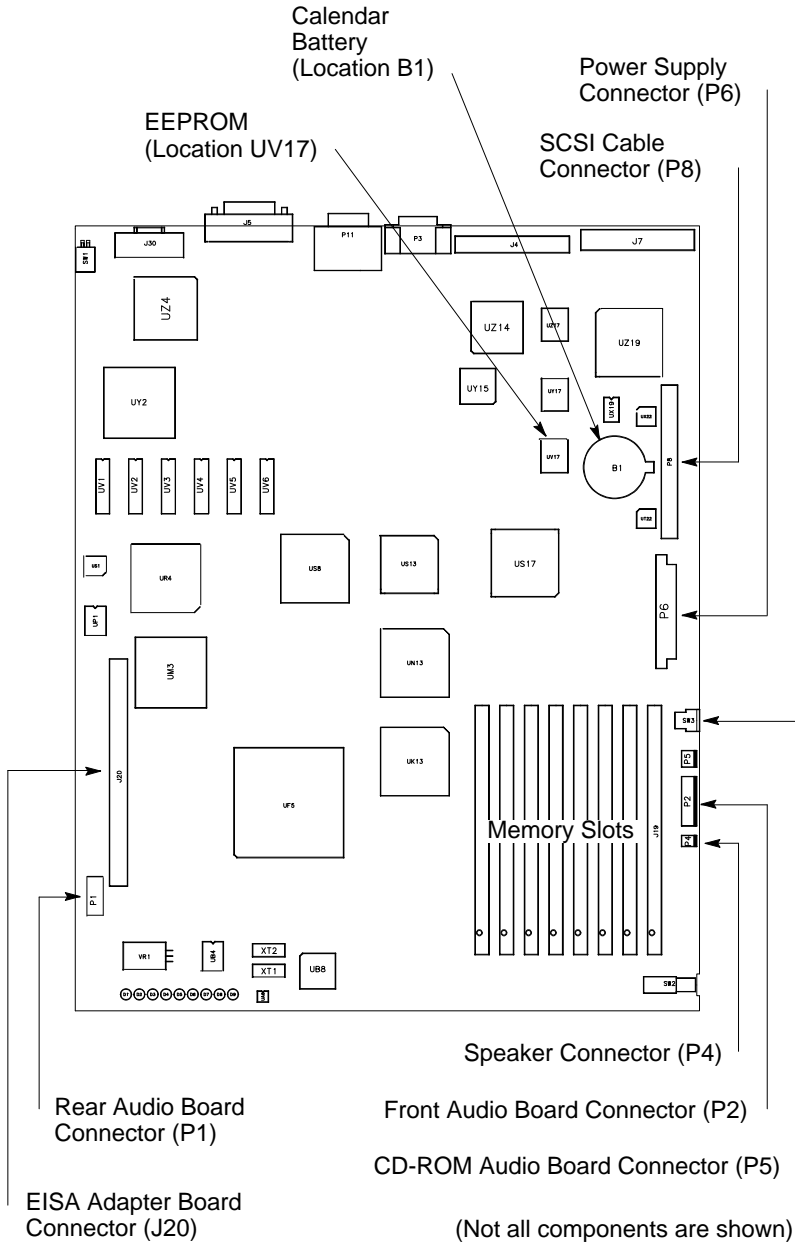


Figure 5-46. Component and Internal Connector Locations  
Model 715/C, 715/33, and 715/50

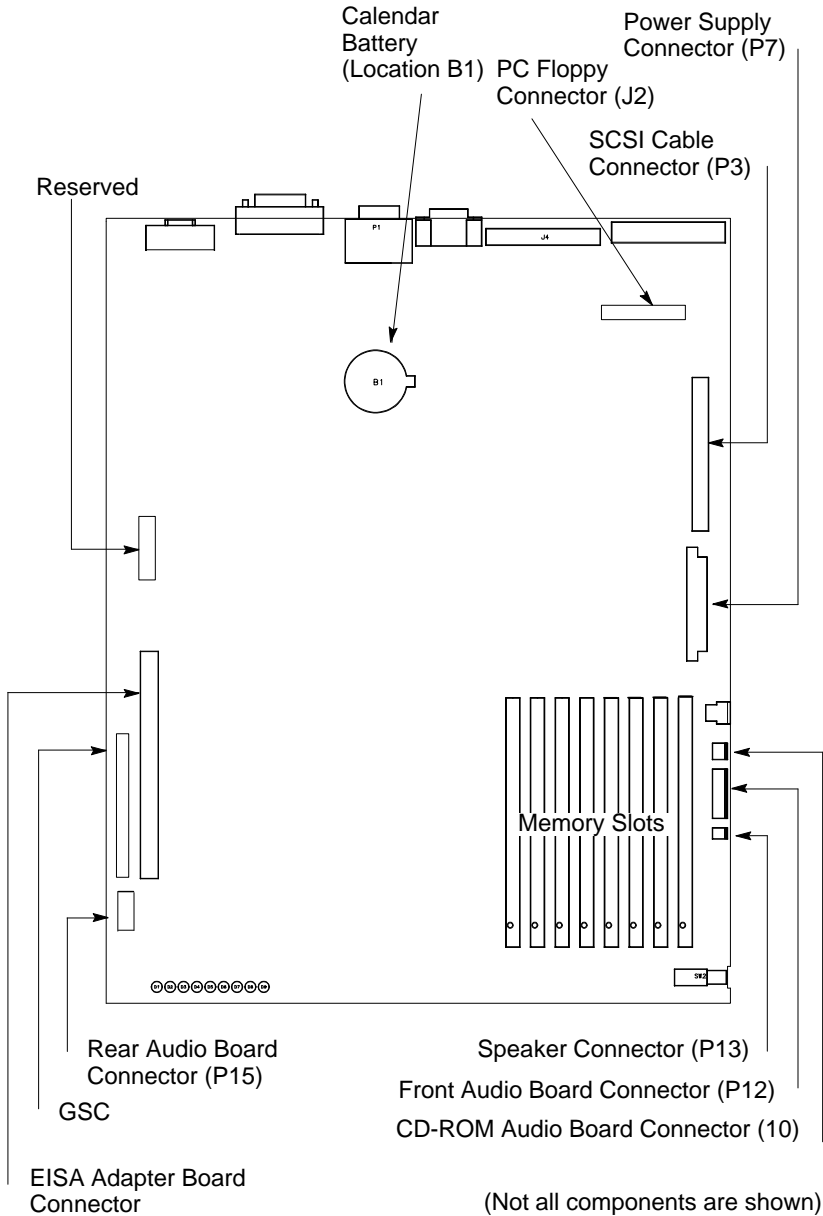


Figure 5-47. Component and Internal Connector Locations  
 Model 715/64, 715/80, 715/100, 715/100XC



## System EEPROM

If you are replacing a 715/C, 715/33, 715/50, or 715/75 processor board with a similar board (that is, with any board except a 715/64, 715/80, 715/100, or 715/100XC), remove the EEPROM from the failed processor board and install it in the new/exchange processor board. (This is required to maintain software licensing.)

Figure 5-49 shows the EEPROM location. Remove the EEPROM from the new processor board and place it into the defective processor board. (This is required for the board test and repair process.)

**NOTICE:** The EEPROM on the 715/C, 715/33, 715/50, or 715/75 processor board stores the I/O configuration information. To retain this information when you replace a processor board, move the original EEPROM to the new processor board.

**CAUTION:** Use an anti-static strap to prevent electrostatic damage to the EEPROM. Electrostatic damage can destroy the EEPROM or erase configuration information from the EEPROM.

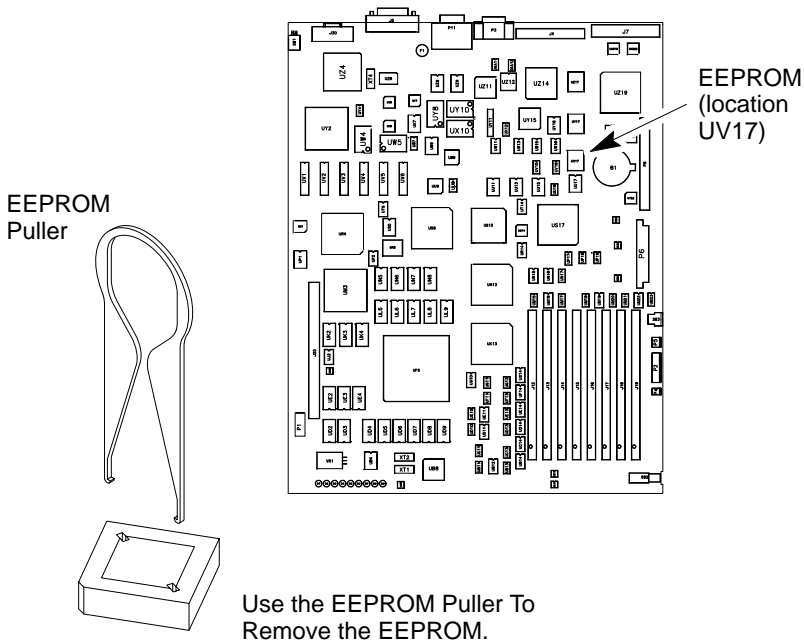


Figure 5-49. Removing the EEPROM (UV17)

# Calendar Battery

Before removing the calendar battery, perform the following steps:

- Remove the optional external graphics processor (if installed).
- Remove the floor stand.
- Open the system unit.

**WARNING:** Lithium batteries may explode if mistreated. Do not put lithium batteries in fires or try to recharge or disassemble them.

Replace battery only with Matsushita Electric BR-2325 three-volt lithium battery (HP part number 1420-0314)! Use of any other battery may cause fire or explosion.

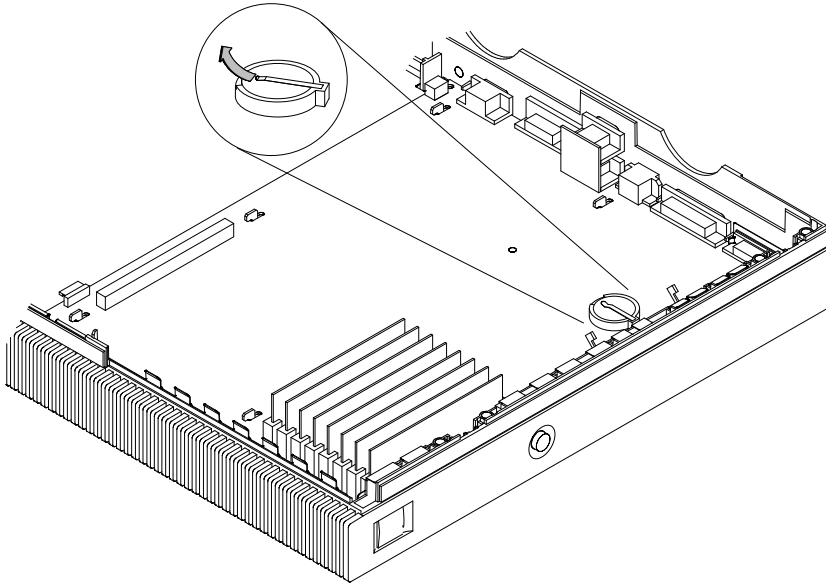


Figure 5-50. Removing the Calendar Battery





# Diagrams

# 6

This chapter provides functional information about the system.

Figure 6-1 shows the system power distribution.

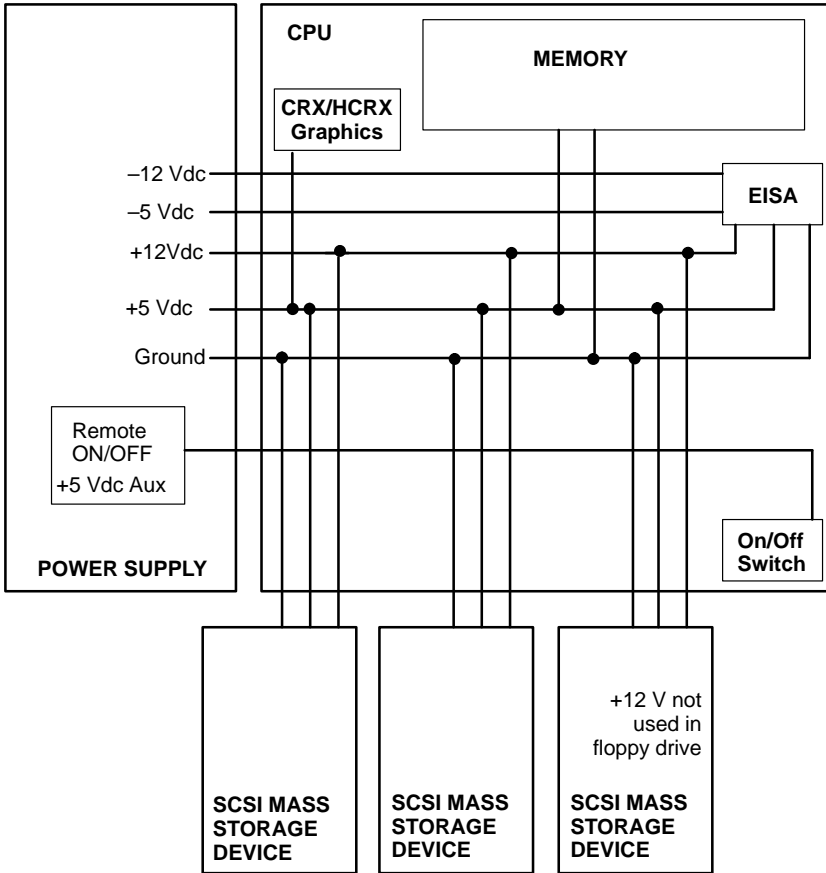


Figure 6-1. Power Distribution Diagram

Table 6-1 lists the pinouts for the power supply connector that supplies connector P6 on the processor board. Table 6-2 lists the pinouts for the three power supply connectors that supply the storage devices.

Table 6–1. Power Supply Connector P6 Pinouts

Pin Number	Description	Wire Color
1	GROUND	Black
2	GROUND	Black
3	GROUND	Black
4	GROUND	Black
5	–SENSE	Black
6	–5V	Blue
7	–12V	Green
8	+5V	Red
9	+5V	Red
10	+SENSE	Red
11	GROUND	Black
12	GROUND	Black
13	GROUND	Black
14	+5V SCSI	Red
15	VFAN	Brown
16	+12V	Violet
17	+12V HIL	Violet
18	+5V	Red
19	+5V	Red
20	REMOTE ON/OFF	White

Table 6–2. Power Supply Pinouts for Storage Device Connectors

Pin Number	Description	Wire Color
1	+12V	Violet
2	+12V COMMON	Black
3	+5V COMMON	Black
4	+5V	Red

Figure 6-2 shows the system block diagram for Model 715/C, 715/33, 715/50, and 715/75 systems.

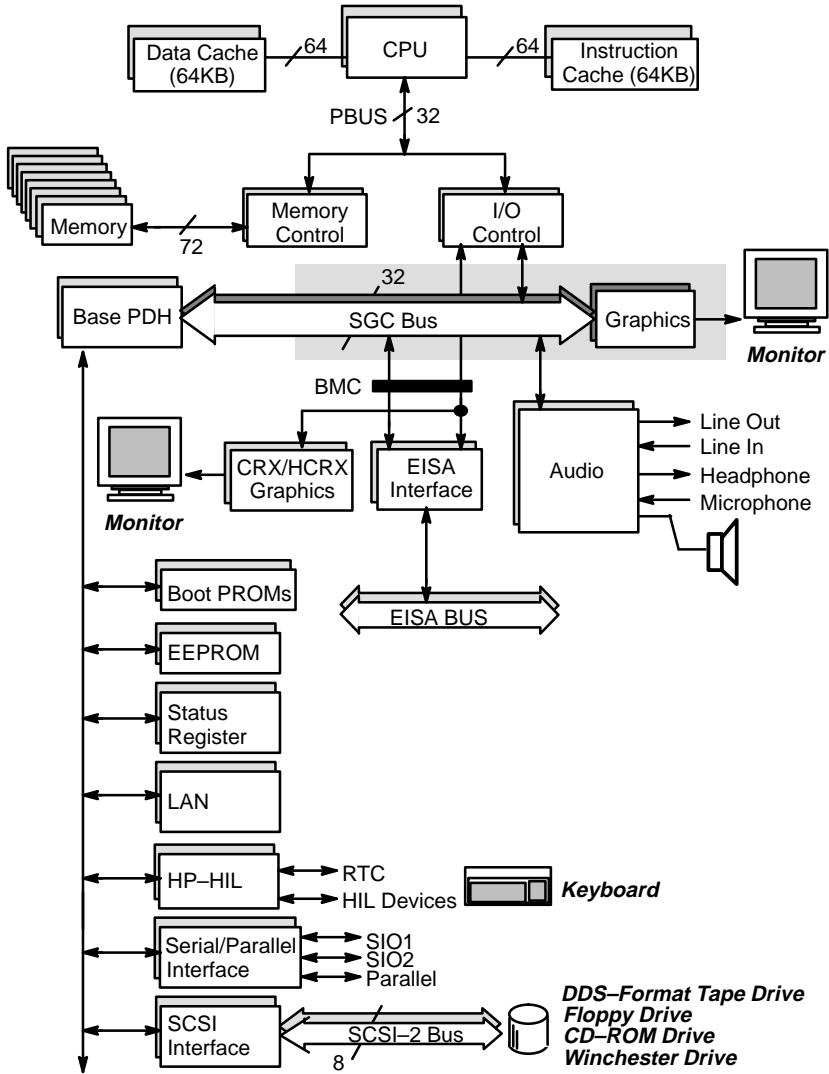


Figure 6-2. System Unit Functional Block Diagram  
Model 715/C, 715/33, 715/50, and 715/75

Figure 6-3 shows the system block diagram for Model 715/64, 715/80, and 715/100 systems.

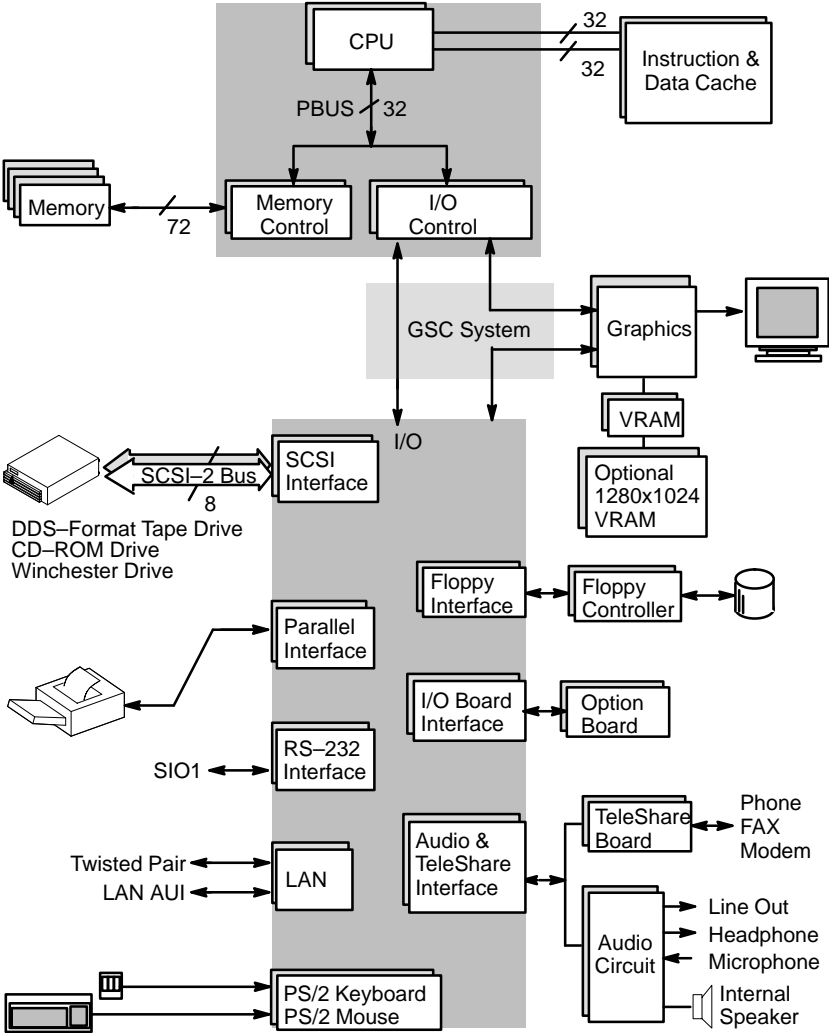
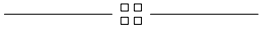


Figure 6-3. System Unit Functional Block Diagram  
 Model 715/64, 715/80, 715/100, and 715/100XC



# Reference

# 7

This chapter provides part numbers and titles to reference documents.

## Installation Manual

A2084–90028 *HP 9000 Series 700 Model 715 Hardware Installation Guide*

## Service Manuals

A2600–90039 *HP 9000 Series 700 Model 715 Service Handbook*  
09740–90041 *Precision Architecture RISC: HP 9000 Series 700  
Diagnostic Manual*  
B2355–90040 *System Administration Tasks Manual HP 9000 Series 700*  
5960–1511 *Servicing Hewlett–Packard Workstation Monitors*

## Reference Manuals

A2084–90629 *HP 9000 Series 700 Model 715 Owner's Guide*  
A2084–90622 *Installing the A2815A, A2816A, and A2827A Memory Kits*  
A2084–90620 *HP A2800A/A2801A SCSI Disk Drive Installation Guide*  
A2084–90618 *HP A2802A SCSI Floppy Disk Drive Installation Guide*  
A2084–90621 *HP A2803A CD–ROM Drive Installation Guide*  
A2084–90619 *HP A2274A/A2275A DDS–Format Tape Drive Installation Guide*  
A2094–90623 *HP A2804A EISA Expansion Slot Installation Guide*  
A2673–90602 *HP A2673A Graphics Option Installation Guide*  
A2674–90601 *Installing the A2674A Graphics Option in Your Model 715  
Workstation*  
A2675–90602 *HP A2675A Graphics Option Installation Guide*  
A2806–90600 *Installing the A2806A Upgrade Kit*  
A4070–90010 *Graphics Options Installation Guide*  
A4070–90099 *HP A4070A/A4071A/A4072A CE Handbook*  
A4091–90600 *Installing the 715 Upgrade Kit (A4142A, A4143A, A4144A,  
A4145A, A4148A, A4149A)*  
A2600–90601 *Model 715/80 to Model 715/100XC and Model 715/100 to  
Model 715/100XC Upgrade Instructions*



# Service Notes

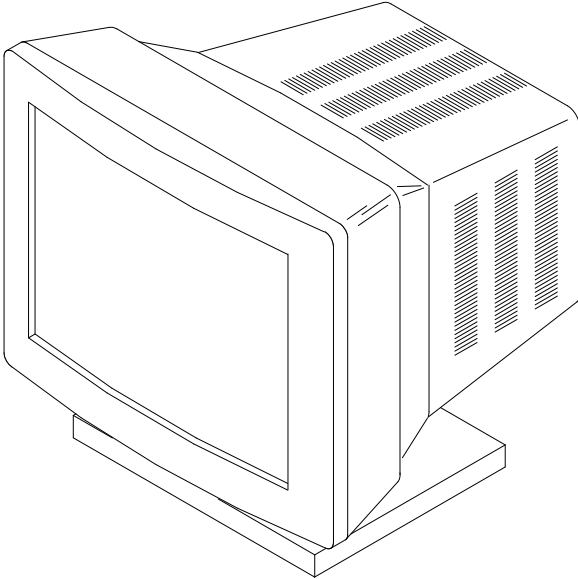
8

Place service notes here.

---

# HP A2088A Monochrome Monitor

HP A2088A is available as a standalone product. Figure 8-1 depicts the monitor. Table 8-1 lists pertinent information.



*Figure 8-1. HP A2088A Monitor*

*Table 8-1. HP A2088A Specifications*

<b>Product Number</b>	<b>Exchange Part Number</b>	<b>Size</b>	<b>Refresh Rate</b>
HP A2088A	A2088-69001	19 inch (1280x1024 pixels)	72 Hz

The following sections list the specifications for the cables and timing of the A2088A monitor.

## Cables

A1499–60005	9–pin to BNC
8120–3616	BNC to BNC (2 meter)

## Timing

### Video

Pixel rate	135.00 MHz
Pixel period	7.4047 ns
Horizontal display	1280 pixels
Vertical display	1024 pixels

### Horizontal

Horizontal frequency	78.125 kHz
Horizontal period	12.800 $\mu$ s (1H)
Horizontal front porch	0.474 $\mu$ s (H–FP)
Horizontal sync pulse width	1.422 $\mu$ s (H–SYNC)
Horizontal back porch	1.422 $\mu$ s (H–BP)
Horizontal blanking	3.318 $\mu$ s (H–BL)
Horizontal display time	9.482 $\mu$ s (H–DISP)

### Vertical

Fields per frame	1
Field frequency	72.005 Hz
Field period	13.888 ms (1 V) (1085 lines)
Vertical front porch	38.40 $\mu$ s (V–FP) (3H)
Vertical sync pulse width	38.40 $\mu$ s (V–SYNC) (3H)
Vertical back porch	0.7040 ms (V–BP) (55H)
Vertical blanking	0.7808 ms (V–BL) (61H)
Vertical display time	13.107 ms (V–DISP) (1024H)



---

# HP A2094 Color Monitors

HP A2094 monitors are available as standalone products. Figure 8-2 depicts the HP A2094 monitor. Table 8-2 lists pertinent information.

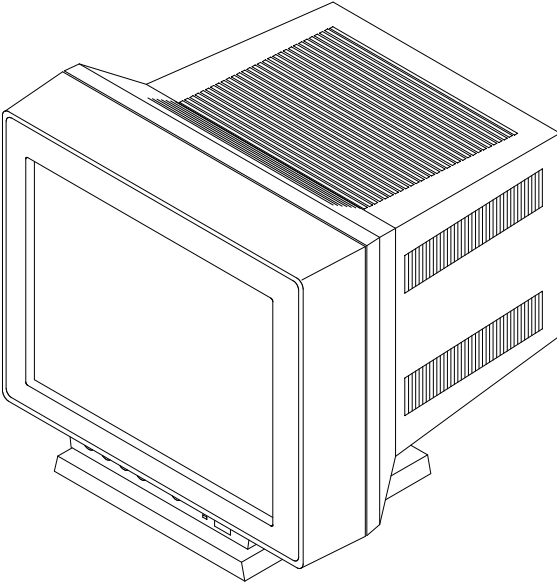


Figure 8-2. HP A2094 Monitor

Table 8-2. HP A2094 Specifications

Product Number	Exchange Part Number	Hemisphere	Size	Refresh Rate
HP A2094A	A2094-69001	Northern	19 inch (1280x1024 pixels)	72 Hz
HP A2094B	2090-0315	Southern	19 inch (1280x1024 pixels)	72 Hz

The following sections list the specifications for the cables and timing for all A2094 monitors.

## Cables

98700–61603	BNC to BNC
C2300–60005	9 pin to RGB

## Timing

### Video

Pixel rate	135.00 MHz
Pixel period	7.4047 ns
Horizontal display	1280 pixels
Vertical display	1024 pixels

### Horizontal

Horizontal frequency	78.125 kHz
Horizontal period	12.800 $\mu$ s (1H)
Horizontal front porch	0.474 $\mu$ s (H–FP)
Horizontal sync pulse width	1.422 $\mu$ s (H–SYNC)
Horizontal back porch	1.422 $\mu$ s (H–BP)
Horizontal blanking	3.318 $\mu$ s (H–BL)
Horizontal display time	9.482 $\mu$ s (H–DISP)

### Vertical

Fields per frame	1
Field frequency	72.005 Hz
Field period	13.888 ms (1 V) (1085 lines)
Vertical front porch	38.40 $\mu$ s (V–FP) (3H)
Vertical sync pulse width	38.40 $\mu$ s (V–SYNC) (3H)
Vertical back porch	0.7040 ms (V–BP) (55H)
Vertical blanking	0.7808 ms (V–BL) (61H)
Vertical display time	13.107 ms (V–DISP) (1024H)

# Index

## A

### Audio Connectors

- headphone OUT, 1-4-1-5
- microphone IN, 1-4-1-5

## B

### Block Diagram Of System, 6-3

### boot Command

- mnemonic notation, 4-16
- on-line help, 4-16
- PA-RISC I/O notation, 4-16
- path number notation, 4-16

### Boot Console User Interface, 4-14-4-15

- auto** command, 4-14
- autoselect** command, 4-14
- boot** command, 4-14
- boot paths, 4-16
- date** command, 4-14
- exit** command, 4-14
- fastsize** command, 4-15
- help** command, 4-15
- info** command, 4-15
- lan\_addr** command, 4-15
- os** command, 4-15
- path** command, 4-15
- pim\_info** command, 4-15
- reset** command, 4-15
- search** command, 4-15
- secure** command, 4-15
- show** command, 4-15

### Boot Failure, 4-13-4-14

### Boot ROM Diagnostics, 4-1

## C

### Cable Connections

- 715/64, 715/80, and 715/100, 5-13-5-16

### CD-ROM audio, 5-15

### SCSI, 5-14-5-16

### Calendar Battery Removal, 5-51

### Configuration

- built-in graphics, 3-17
- CRX graphics, 3-18
  - dual monitor system, 3-21-3-23
  - single monitor system, 3-18-3-20

### FRU, 3-1

### HCRX graphics, 3-18

- dual monitor system, 3-21-3-23
- single monitor system, 3-18-3-20

### mass storage, 3-1-3-14

### memory, 3-15-3-16

### Connectors

- mini-DIN, 1-9
- monitor, 1-13
- system unit, 1-4, 1-7-1-12
  - 10-pin modular jack, 1-9
  - ac power, 1-12
  - audio headphone OUT, 1-4-1-5
  - audio IN/OUT, 1-12
  - audio microphone IN, 1-4-1-5
  - built-in graphics, 1-10
  - CRX graphics option, 1-11-1-12
  - EISA option, 1-11
  - HCRX graphics option, 1-11-1-12
  - HP-HIL, 1-9
  - network, 1-10
  - options, 1-11-1-12
  - parallel, 1-9
  - RS-232, 1-9-1-10
  - SCSI, 1-9
  - serial, 1-9-1-10

### Controls

- monitor, 1-13
- system unit, 1-4-1-5

### CPU Board Removal, 5-45-5-50

### CPU Components Locations

- 715/100, 5-48

- 715/50, 5-47
- 715/64, 5-48
- 715/75, 5-49
- 715/80, 5-48
- 715/C, 5-47

### CRX Graphics

- assembly removal, 5-35-5-38
- configuring, 3-18
  - dual monitor system, 3-21-3-23
  - single monitor system, 3-18-3-20
- external processor removal, 5-6
- troubleshooting, 4-30-4-31

## D

Description Of Product. *See* product description

### Diagnostics

- boot ROM, 4-1
- ISL, 4-17-4-20

### Diagrams

- power distribution, 6-1
- system, 6-3

### Disk Drive Removal

- CD-ROM drive, 5-11
- DDS-format tape drive, 5-11
- drive brackets, 5-12
- first hard disk, 5-9
- floppy disk drive, 5-11
- second hard disk, 5-10

### Documentation

- installation manual, 7-1
- reference manuals, 7-1
- service manuals, 7-1

## E

EEPROM Removal, 5-50

### EISA Assembly

- components, 5-20-5-34
- installation, 5-24-5-34
- removal, 5-21-5-23

Environmental Specifications, 2-1

Index-2

## F

Floor Stand Removal, 5-7

Front Audio Board Assembly Removal, 5-18

Front Bezel Cover Plate Removal, 5-19

FRU Configuration, 3-1

### FRU Installation

- EISA assembly, 5-24-5-34
- memory, 5-41

### FRU Removal

- calendar battery, 5-51
- CD-ROM drive, 5-11
- CPU board, 5-45-5-50
- CRX graphics assembly, 5-35-5-38
- DDS-format tape drive, 5-11
- drive brackets, 5-12
- EEPROM, 5-50
- EISA assembly, 5-21-5-23
- external graphics processor, 5-6
- first hard disk, 5-9
- floor stand, 5-7
- floppy disk drive, 5-11
- front audio board assembly, 5-18
- front bezel cover plate assembly, 5-19
- HCRX graphics assembly, 5-35-5-38
- memory, 5-40
- opening the system unit, 5-8
- PCX-T module, 5-42-5-44
- power supply, 5-17
- processor board, 5-45-5-50
- rear audio board, 5-39
- second hard disk, 5-10

### FRUs

- parts list, 5-3-5-5
- required tools, 5-1

## H

### HCRX Graphics

- assembly removal, 5-35-5-38
- configuring, 3-18
  - dual monitor system, 3-21-3-23
  - single monitor system, 3-18-3-20

troubleshooting, 4-30-4-31

## I

### Indicators

LED, system unit, 1-5-1-6  
monitor, 1-13

ISL Diagnostics, 4-17-4-20

ISL Environment, 4-17-4-20

**altpath** command, 4-19

**conspath** command, 4-19

**display** command, 4-19

**listautofl** command, 4-19

**lsautofl** command, 4-19

**primpath** command, 4-19

**readss** command, 4-19

**support** command, 4-19

## J

### Jumpers, SCSI ID

CD-ROM drive, 3-13

DDS-format tape drive, 3-14

DEC drive, 3-9

floppy drive, 3-12

Hewlett-Packard 1-GB low profile  
drive, 3-11

HP Winchester drives, 3-5, 3-10

Micropolis drive, 3-7

Quantum 1-GB and 2-GB low pro-  
file drive, 3-4

Quantum drives, 3-8

Seagate drives, 3-6

## K

Keyboard Adapter Module, 1-9

### Keyboards

AT, 1-14

ITF, 1-14

key equivalents, 1-15-1-16

PC, 1-14

## L

LEDs, System Unit, 1-5-1-6

display codes, 1-5

error codes, 4-2-4-12

## M

Mass Storage Configuration, 3-1-3-14

### Memory

configuration, 3-15-3-16

installation, 5-41

removal, 5-40

### Monitor

connectors, 1-13

controls, 1-13

indicators, 1-13

## O

Opening The System Unit, 5-8

## P

Parts List, 5-3-5-5

PC Floppy Drive, Cable Connections,  
5-13-5-16

PCX-T Module Removal, 5-42-5-44

Power Distribution Diagram, 6-1

Power Supply Pinouts, 6-1

Power Supply Removal, 5-17

Processor Board Removal, 5-45-5-50

Product Description, 1-1

## R

Rear Audio Board Removal, 5-39

Regulatory Requirements, 2-2

RS-232

connector, 1-9-1-10

pinout, 1-9-1-10

## S

SCSI Cabling, 5-14-5-16

- SCSI Devices
  - default IDs, 3–2
  - terminators, 3–1
- SCSI IDs, 3–2
  - jumpers
    - CD-ROM drive, 3–13
    - DDS-format tape drive, 3–14
    - DEC drive, 3–9
    - floppy drive, 3–12
    - Hewlett-Packard 1-GB low profile drive, 3–11
    - HP Winchester drives, 3–5, 3–10
    - Micropolis drive, 3–7
    - Quantum 1-GB and 2-GB low profile drive, 3–4
    - Quantum drives, 3–8
    - Seagate drives, 3–6
- Serial
  - connector, 1–9–1–10
  - pinout, 1–9–1–10
- SIMMs, 3–15–3–16
- Specifications, Environmental, 2–1
- Stable Storage, 4–15
- SupportWave Diagnostics, 4–21–4–29
- Switches
  - graphics configuration, 3–17
  - power, 1–4
  - Transfer of Control (TOC), 1–4

- System Block Diagram, 6–3
- System Unit
  - controls, 1–4–1–5
  - installation information, 2–2
  - LEDs, 1–5–1–6
  - preventive maintenance, 2–2
- System Verification Tests, SupportWave, 4–21–4–29

## T

- Terminators, 3–1
- Troubleshooting, 4–1
  - boot console user interface, 4–14–4–15
  - boot failure, 4–13–4–14
  - CRX graphics, 4–30–4–31
  - HCRX graphics, 4–30–4–31
  - ISL diagnostics, 4–17–4–20
  - ISL environment, 4–17–4–20
  - LED codes, 4–2–4–12
    - HP-UX kernel, 4–10
  - ISL, 4–8–4–9
  - PDC, 4–6–4–7
  - Self Test, 4–3–4–5
- SupportWave diagnostics, 4–21–4–29