

Contents

Preface

Introduction

Using This Reference Guide

Text Conventions	xxiv
Symbols Conventions	xxv
For More Information	xxvi
Online Help	xxvii

Chapter 1

Systems Overview

Compaq ProLiant 5000 Family of Servers	1-1
Compaq ProLiant 5000 Server	1-1
Product Summary	1-2
Supported Drive Configurations	1-3
Compaq ProLiant 5000R Server	1-4
Product Summary	1-4
Supported Drive Configurations	1-6
Interlock Switch	1-7

Chapter 2

Installing the Compaq ProLiant 5000 Server

Materials Needed	2-1
Selecting a Site	2-2
Installation Sequence Outline	2-3
Installing Hardware Options	2-5
Opening the Front Bezel and Removing the Side Access Panel	2-5
I/O Board Expansion Slot Locations	2-6

Installing the Compaq ProLiant 5000 Server *Continued*

Expansion Board Considerations	2-8
Installing an I/O Expansion Board	2-9
Installing an Optional Video Board	2-10
Adding Processors	2-10
Matching Requirements	2-10
Installation Guidelines	2-11
Adding Memory (DIMMs)	2-12
Maximum Memory Configuration	2-13
Installing DIMMs	2-14
Installing Mass Storage Devices	2-17
Removable Media Storage	2-17
Installing a Mass Storage Device in the Removable Media Area	2-17
Installing Hot-Pluggable Hard Drives	2-19
Drive Installation Guidelines	2-20
External Storage	2-21
Connecting Peripheral Devices	2-21
Power Supply Requirements	2-22
Upgrading ROMs	2-22
Downloading from Compaq's Web Site	2-22
Upgrading from SmartStart and Diskettes	2-23
Upgrading from the Hard Drive	2-23

Chapter 3

Installing the Compaq ProLiant 5000R Server

Materials Needed	3-1
Selecting a Site	3-2
Opening the Rack	3-2
Installation Sequence Outline	3-4
Installing Hardware Options	3-6
Opening the Server	3-7
I/O Board Expansion Slot Locations	3-10
Expansion Board Considerations	3-11
Installing an Expansion Board	3-12
Installing an Optional Video Board	3-13
Adding Processors	3-13
Matching Requirements	3-13
Installation Guidelines	3-14
Adding Memory (DIMMs)	3-15
Maximum Memory Configuration	3-16
Installing DIMMs	3-17
Installing Mass Storage Devices	3-19
Removable Media Storage	3-19
Installing a Mass Storage Device in the Removable Media Area	3-19
Installing Hot-Pluggable Hard Drives	3-23
Drive Installation Guidelines	3-24
External Storage	3-24
Connecting Peripheral Devices	3-25
Power Supply Requirements	3-26
Upgrading ROMs	3-26
Downloading from Compaq's Web Site	3-27
Upgrading From SmartStart and Diskettes	3-27
Upgrading From the Hard Drive	3-28

Chapter 4

Performance Advantages of ProLiant 5000 Architecture

PCI and Pentium Pro Go Together	4-1
Bus Architecture Optimized	4-2
Boosting PCI Performance by Monitoring Bus Activity.....	4-3
Factory Configuration	4-4
Adding Additional Devices	4-5
Getting Additional Configuration Information.....	4-7

Chapter 5

Special Features of Compaq ProLiant 5000 Servers

Processor Power Modules (5V)	5-1
Processor Power Modules on CPU Boards.....	5-2
Processor Power Modules on the I/O System Board.....	5-4
Adding or Replacing Processor Power Modules.....	5-5
Internal System LED Monitors.....	5-9
I/O Board LEDs	5-11
Pre-Failure Warranty.....	5-12
Terminator Board.....	5-13

Chapter 6

Using the Compaq System Configuration Utility

Resolving Conflicts.....	6-2
Starting the Compaq System Configuration Utility.....	6-3
System Configuration Utility Main Menu.....	6-3
System Configuration Menu	6-4
System Partition	6-6
Creating a New System Partition	6-6
Verifying the System Partition.....	6-7
Upgrading the System Partition	6-7

Using the Compaq System Configuration Utility *Continued*

Configuration Backup	6-8
Configuring PCI Boards Automatically	6-8
Configuring EISA Boards Automatically	6-8
Removing Boards.....	6-9
Operating System Installation.....	6-11
Loading Compaq Device Drivers	6-11
NetWare Device Drivers from Compaq	6-12
Windows NT 3.5x Device Drivers from Compaq	6-13
SCO UNIX, Open Server and SCO UnixWare2 Device Drivers from Compaq.....	6-14
IBM OS/2 2.x Device Drivers from Compaq	6-15
Creating and Using the Configuration Backup and Configuration History Files.....	6-15
Clearing the Configuration	6-17
Switch Settings.....	6-17
Diagnostics and Other Utilities.....	6-18

Chapter 7

Network Interface Controllers

Compaq 10/100 TX PCI UTP Board	7-1
Features.....	7-2
100Base-TX Technology	7-3
NIC Options for ProLiant 5000 Servers	7-4

Chapter 8

Fast-Wide SCSI-2 Subsystem

Integrated SCSI Device Controller	8-1
Multiple Controllers	8-2
Multiple Fast-Wide SCSI-2 Controller Installation	8-3
Interrupt Selection	8-3
Multiple Drive Controllers	8-3

Fast-Wide SCSI-2 Subsystem *Continued*

Boot Drive Options	8-4
SCSI Configuration Notes	8-4
Configuration Guidelines	8-4
Storage Capacity Planning	8-5
Fast-Wide SCSI-2 Hard Drives.....	8-6
Integrated Fast-Wide SCSI-2 Connector and Cable	8-6
SCSI-2 Device Installation	8-6
SCSI IDs	8-7
Tips for Troubleshooting the Fast-Wide SCSI-2 Controller	8-8

Chapter 9

Compaq SMART-2 SCSI Array Controller

SMART-2 Array Controller Features.....	9-1
SMART-2/P Array Controller.....	9-2
Fast-Wide SCSI-2.....	9-3
Tagged Command Queuing	9-3
SCSI Bus Connectors	9-3
Array Accelerator.....	9-4
Automatic Performance Tuning.....	9-5
Features of the Compaq Array Configuration Utility	9-7
Software Upgradable Firmware.....	9-8

Chapter 10

Server Management

Server Parameter Tracking.....	10-1
Environment.....	10-1
Data Storage.....	10-3
Network Fault Prevention Tracking	10-3
Memory Fault Prevention Tracking	10-3

Server Management *Continued*

Server Fault Tolerance	10-4
Disk Subsystem Fault Tolerance.....	10-4
Other Fault Tolerance Features.....	10-4
Memory System Error Correction.....	10-5
Rapid Recovery Services.....	10-5
Server Health Logs.....	10-6
Storage Fault Recovery Tracking	10-11
Storage Automatic Reconstruction	10-11
Network Interface Fault Recovery Tracking	10-12
Memory Fault Recovery Tracking	10-12
Off-Line Backup Processor.....	10-12
Automatic Server Recovery-2.....	10-11
Remote Service Features	10-28
ROMPaq	10-30
Compaq Insight Manager	10-30

Chapter 11

Diagnostic Tools

Power-On Self-Test (POST)	11-1
Diagnostics	11-22
Running Diagnostics	11-22
Diagnostic Error Codes	11-24
100 Series - Primary Processor Test Error Codes	11-24
200 Series - Memory Test Error Codes	11-25
300 Series - Keyboard Test Error Codes	11-25
400 Series - Parallel Printer Test Error Codes	11-26
600 Series - Diskette Drive Test Error Codes.....	11-26
1100 Series - Serial Test Error Codes	11-27
1200 Series - Modem Communications Test Error Codes	11-27

Diagnostic Tools *Continued*

1700 Series - Fixed Disk Drive Test Error Codes.....	11-28
1900 Series - Tape Drive Test Error Codes.....	11-28
2400 Series - Advanced VGA Board Test Error Codes	11-29
6000 Series - 32-Bit DualSpeed NetFlex-2 Controller and 32-Bit DualSpeed Token Ring Controller Test Error Codes....	11-29
6500 Series - SCSI Fixed Disk Drive Test Error Codes.....	11-30
6600 Series - CD-ROM Drive Test Error Codes	11-30
6700 Series - SCSI Tape Drive Test Error Codes.....	11-31
7000 Series - Server Manager/R Board Test Error Codes.....	11-32
8600 Series - Pointing Device Interface Test Error Codes.....	11-32
Test	11-33
Running Test	11-33
Inspect.....	11-35
Running Inspect	11-36
Drive Array Advanced Diagnostics (DAAD).....	11-37
DAAD Diagnostic Messages	11-37

Chapter 12

Security

Compaq System Configuration Utility.....	12-1
Enabling the Security Features	12-1
QuickLock	12-2
Password Security	12-3
Administrator Password.....	12-3
Establishing a Password	12-3
Entering a Password	12-4
Changing a Password.....	12-5
Deleting a Password	12-5
Clearing a Password	12-5

Security *Continued*

Network Security	12-6
Hardware Security.....	12-6
Switches.....	12-7
Security Features Set by Switches	12-7
Front Bezel Keylock	12-9

Chapter 13

Maintenance and Safety Precautions

System Care and Maintenance.....	13-1
Routine Care of Server and Monitor	13-1
Preparations for Shipping	13-2
Modem and Telephone Precautions	13-3
Ergonomic Considerations	13-3

Appendix A

Using the Internal CD-ROM Drive

Opening the Tray Automatically	A-2
Opening the Tray Manually.....	A-3
CD-ROM Drive Care and Safety Precautions	A-4
Installation	A-4
Operation	A-4
Transportation	A-4
Safety	A-4

Appendix B

Power Cord Set Requirements

General Requirements	B-1
Country-Specific Requirements.....	B-2

Preface

Using This Reference Guide

This Reference Guide contains detailed information about Compaq ProLiant 5000 and ProLiant 5000R servers. A summary of each chapter follows:

■ **Chapter 1 – SYSTEMS OVERVIEW**

This chapter provides a brief summary of the standard features of ProLiant 5000 servers. It describes two valuable software programs Compaq provides for ProLiant users – SmartStart and Compaq Insight Manager.

■ **Chapter 2 – INSTALLING THE PROLIANT 5000 SERVER**

From getting the necessary materials together and selecting a site for the ProLiant 5000 server to installing optional hardware components and connecting cables, this chapter guides the user through the initial steps in preparing the server for use. Dual PCI bus guidelines are provided.

■ **Chapter 3 – INSTALLING THE PROLIANT 5000R SERVER**

The initial steps in setting up and powering up a rack-mountable ProLiant 5000R server are explained in this overview chapter, along with installing options and dual PCI bus utilization.

■ **Chapter 4 – PERFORMANCE ADVANTAGES OF PROLIANT 5000 ARCHITECTURE**

Compaq ProLiant 5000 Architecture combines Intel Pentium Pro Processor power with Dual Peer PCI Bus architecture to provide optimum performance from installed PCI devices. This chapter discusses related configuration considerations.

■ **Chapter 5 – SPECIAL FEATURES OF PROLIANT 5000 SERVERS**

Processor Power modules, internal system LED monitors, Pre-Failure Warranty and the Terminator Board are discussed in this chapter.

■ **Chapter 6 – USING THE COMPAQ SYSTEM CONFIGURATION UTILITY**

This chapter tells how to use the Compaq System Configuration Utility software program to complete configuration changes. The chapter includes information about special Compaq network drivers.

■ Chapter 8 – FAST-WIDE SCSI-2 SUBSYSTEM

This section includes information about the integrated SCSI device controller, multiple-controller installations, configuration and planning.

■ Chapter 10 – *SERVER MANAGEMENT*

This chapter describes server management features that include fault tolerance, performance and configuration of servers. Remote server management is explained.

■ Chapter 12 – SECURITY

Various hardware and software features Compaq built into ProLiant servers for multi-level security control are discussed in this chapter.

■ Appendix A – USING THE INTERNAL CD-ROM DRIVE

The CD-ROM drive installed in ProLiant servers is used in the configuration. This appendix provides operating instructions and precautions for use and transportation.

information for each country.

This appendix contains requirements for the power cord set now available with the Compaq ProLiant servers (tower only). In addition to this information, a table is provided with power cord set requirement information for each country.

■ **Appendix C – *ELECTROSTATIC DISCHARGE***

This section contains precautions when setting up the system or handling electrostatic-sensitive parts.

■ **Appendix D – *SWITCH SETTINGS***

This appendix provides the correct settings for the switches on the I/O board and processor boards.

■ **GLOSSARY**

This section contains a list of terms mentioned in this document, along with an explanation of each term.

■ **INDEX**

An index of terms and/or subjects mentioned in this document.

Text Conventions

This document uses the following conventions to distinguish elements of text:

Text Conventions	
Convention	Use
Keys	Keys appear in boldface. A plus sign (+) between two keys indicates that they should be pressed simultaneously.
USER INPUT	User input appears in a different typeface and in uppercase.
<i>FILENAMES</i>	File names appear in uppercase italics.
Menu Options, Command Names, Dialog Box Names	These appear in initial capital letters.
COMMANDS, DIRECTORY NAMES, and DRIVE NAMES	These always appear in uppercase.
Type	When you are instructed <i>to type</i> information, type the information without pressing the Enter key.
Enter	When you are instructed <i>to enter</i> information, type the information and then press the Enter key.

Symbols Conventions

The following words and symbols mark special messages throughout this guide:



WARNING: Text set off in this manner indicates that failure to follow directions in the warning can result in bodily harm or loss of life.



CAUTION: Text set off in this manner indicates that failure to follow directions can result in damage to equipment or loss of information.

IMPORTANT: Text set off in this manner presents clarifying information or specific instructions.

NOTE: Text set off in this manner presents information of interest.

For More Information

Contact your nearest Authorized Compaq Reseller or Service Provider for more information.

- In the United States, call 1-800-345-1518.
- In Canada, call 1-800-263-5868.
- For Compaq technical support in the United States and Canada, call 1-800-OKCOMPAQ (1-800-652-6672).

Elsewhere, call one of the numbers listed in the following table to locate your nearest Authorized Compaq Reseller or Service Provider.

Worldwide Telephone Numbers	
Location	Telephone Number
Argentina	54-1-796-1616
Asia	(65) 75044371
Australia	008 812 800
Austria	0222 878 16-16
Belgium	02-716-95-11
Brazil	55-11-246-7866
Central America/Caribbean	1-713-374-4420
Chile	56-2-274-1911
Colombia	57-1-312-0145
Denmark	45 90 45 45
Eastern Europe	089/99 33-0
Rest of Europe/Middle East/Africa	089/99 33-27 66
Finland	90 435 77373
France	(1) 69 86 72 72
Germany	0180/521 21 11
Hong Kong	852 867 1671
Italy	02 167 825 012

continued

Worldwide Telephone Numbers *Continued*

Location	Telephone Number
Japan	01-2010-1589
Mexico	52-5-229-7900
Netherlands	0 1820-65805
New Zealand	649 307 3969
Norway	22 65 6500
Puerto Rico	1-809-765-4360
Spain	91 640 1500
Sweden	46 08 703 5200
Switzerland	#1 / 838 22 22
United Kingdom	081 332 3888
Venezuela	58-2-953-6861

Online Help

Users can download drivers, patches and Compaq service updates from the following sources:

- CompuServe
- Prodigy
- America Online
- Internet: Questions can be submitted to Compaq Technical Support staff using the electronic mail address: support@compaq.com. Compaq files can be accessed using the address: [FTP.COMPAQ.COM](ftp://ftp.compaq.com). Users should enter "anonymous" for the user name at the log-in prompt and enter their full Internet electronic mail address for the password. Compaq's World Wide Web server can be accessed through the Uniform Resource Locator (URL): <http://www.compaq.com>.
- Compaq Download Facility: Call 1-713-518-1418

Chapter 1

Systems Overview

This chapter describes features of tower and rack-mountable Compaq ProLiant 5000 Servers. Maximum supported drive configurations also are presented.

Compaq ProLiant 5000 Family of Servers

The Compaq ProLiant 5000 Server delivers state-of-the-art Intel Pentium™ Pro processor technology, expanded memory capacity, Dual Peer PCI Buses and enhanced reliability features required for a business-critical, high-end server. Performance is maximized by up to four Intel Pentium Pro processors and up to 4 gigabytes of Error Checking and Correcting (ECC) Memory. Input/output performance is enhanced by features such as Fast-Wide SCSI-2 hard drives and a 32-bit bus-master network controller.

Compaq ProLiant 5000 Server

The following section describes the standard features of each Compaq ProLiant 5000 Server, including supported configurations.

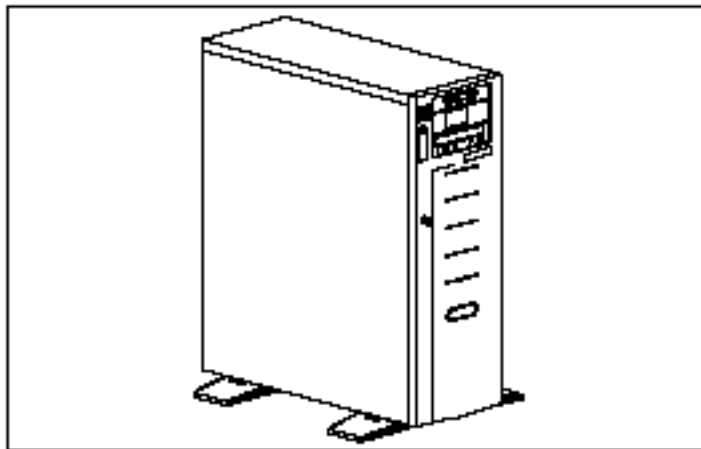


Figure 1-1. Compaq ProLiant 5000 Server

1-2 Systems Overview

Product Summary

The standard features for this MultiProcessing server include:

- Microprocessors
 - ❑ Up to four 200-MHz Intel Pentium Pro Processors
or
 - ❑ Up to four 166-MHz Intel Pentium Pro Processors
- Cache
 - ❑ Pentium Pro Full-Speed 256-K Level 2 Cache
or
 - ❑ Pentium Pro Full-Speed 512-K Level 2 Cache
- ProLiant 5000 System Architecture
- Dual Peer PCI Buses
- EISA Bus
- 64 or 128 megabytes of ECC RAM, expandable to 2 gigabytes on two memory boards (4 gigabytes with future memory technology)
- Eight I/O expansion slots
 - ❑ Five PCI slots
 - ❑ Two shared PCI/EISA slots
 - ❑ One EISA slot
- Three removable-media bays
 - ❑ Preinstalled 3 1/2-inch 1.44-MB diskette drive
 - ❑ Preinstalled quad-speed CD-ROM drive
- Four hot-pluggable storage bays
- Two processor slots
- Preinstalled 10/100 TX PCI UTP Controller
- Redundant network controller functionality (optional)
- Integrated 32-bit Fast-Wide SCSI-2/P Controller

- Preinstalled SMART-2 Controller (array models)
- Full-Spectrum Fault Management (Fault Prevention, Fault Tolerance, Rapid Recovery Services)
- Compaq SmartStart
- Compaq Insight Manager
- Pre-Failure Warranty on Processors, Memory and Hard Drives
- Standard interfaces:
 - Internal and external Fast-Wide SCSI-2 ports
 - Two serial ports
 - Parallel port
 - Network
 - Graphics
 - Keyboard
 - Pointing device
- Integrated 1024 x 768, 16-color non-interlaced graphics
- Compaq mouse
- 490/540-W power supply

Supported Drive Configurations

Standard server configuration can include as many as six SMART-2 Controllers depending on the installed network operating system (IBM OS/2 supports four). Each SMART-2 Controller can support two Compaq ProLiant Storage Systems, or one Compaq ProLiant Storage System and up to four internal, hot-pluggable hard drives.

With seven drives in each Compaq ProLiant Storage System, you can have up to 84 4.3-gigabyte hard drives or 361.2 gigabytes of storage.

Compaq ProLiant 5000R Server

The following section describes the standard features of each Compaq ProLiant 5000R Server, including supported configurations.

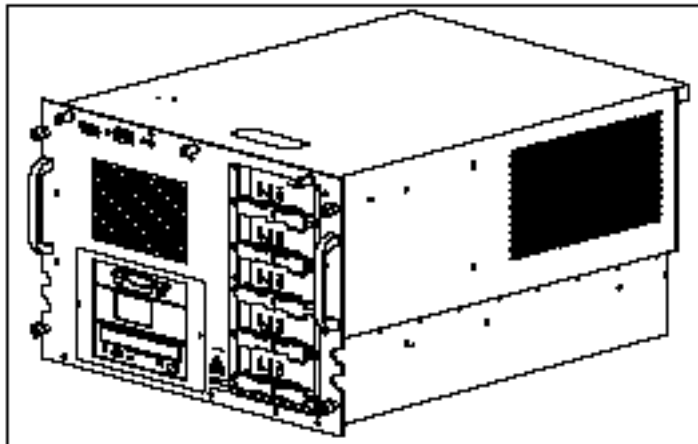


Figure 1-2. Compaq ProLiant 5000R Server

Product Summary

The standard features for this MultiProcessing server include:

- Microprocessors
 - ❑ Up to four 200-MHz Intel Pentium Pro Processors
or
 - ❑ Up to four 166-MHz Intel Pentium Pro Processors
- Cache
 - ❑ Pentium Pro Full-Speed 256-K Level 2 Cache
or
 - ❑ Pentium Pro Full-Speed 512-K Level 2 Cache
- ProLiant 5000 System Architecture
- Dual Peer PCI Buses

- EISA Bus
- 64 or 128 megabytes of ECC RAM, expandable to 2 gigabytes on two memory boards (4 gigabytes with future memory technology)
- Three removable-media bays
 - ❑ Preinstalled 3 1/2-inch 1.44-Megabyte diskette drive
 - ❑ Preinstalled quad-speed CD-ROM drive
- Five hot-pluggable storage bays
- Eight I/O expansion slots
 - ❑ Five PCI slots
 - ❑ Two shared PCI/EISA slots
 - ❑ One EISA slot
- Preinstalled 10/100 TX PCI UTP Controller
- Redundant network capability on dual PCI buses
- Integrated 32-bit Fast-Wide SCSI-2/P Controller
- Preinstalled SMART-2 Controller (array models)
- Full-Spectrum Fault Management (Fault Prevention, Fault Tolerance, Rapid Recovery Services)
- Compaq SmartStart
- Compaq Insight Manager
- Pre-Failure Warranty on Processors, Memory and Hard Drives
- Standard interfaces:
 - ❑ Internal and external Fast-Wide SCSI-2 ports
 - ❑ Two serial ports
 - ❑ Parallel port
 - ❑ Network
 - ❑ Graphics
 - ❑ Keyboard
 - ❑ Pointing device
- Integrated 1024 x 768, 16-color non-interlaced graphics

- Compaq mouse
- 490/540-W power supply

Supported Drive Configurations

Standard server configuration can include as many as six SMART-2 Controllers depending on the installed network operating system (IBM OS/2 supports four). Each SMART-2 Controller can support two Compaq ProLiant Storage Systems, or one Compaq ProLiant Storage System and up to five internal hot-pluggable hard drives.

The maximum supported storage configuration consists of six SMART-2 Controllers with 12 Compaq ProLiant Storage Systems. With a maximum capacity of seven drives in each Compaq ProLiant Storage System, you can have up to 84 4.3-gigabyte hard drives or 361.2 gigabytes of storage.

Interlock Switch



WARNING: To reduce the risk of personal injury from contact with hazardous energy, the equipment is provided with a safety interlock. Do not try to defeat this safety interlock. When the access cover is removed, the power supply is disabled until the cover is properly replaced.

All Compaq ProLiant Servers contain a built-in interlock switch. This feature:

- Automatically turns the power off when you remove the server cover ensuring your personal safety.
- Protects thermally-sensitive components by providing ideal air flow throughout the unit; therefore, removing this cover turns the power off to prevent any undesirable temperature conditions that could result in damage to the equipment.

Although the interlock switch prevents access to the power supply, PCI and EISA slots, processor boards and DIMM expansion, it does not limit access to the hot-pluggable drives. Do not attempt to bypass or defeat this device.

1-8 Systems Overview

Chapter 2

Installing the Compaq ProLiant 5000 Server

The following instructions are provided for first-time installations and upgrades. If you have any problems, contact your Authorized Compaq Reseller.

Materials Needed

Locate the following materials that were shipped with your new server:

- Server unit
- Keyboard
- Pointing device (mouse or trackball)
- Power cord
- SmartStart CD
- Documentation
 - Quick Hardware Installation Poster
 - SmartStart Installation Poster
 - Compaq Product Quality Statements

In addition to these supplied items you may need:

- T-15 Torx screwdriver or flat-blade screwdriver
- Options to be installed
- Monitor (sold as an option)
- Application software diskettes

Selecting a Site

When installing your server make sure the site you select has the following features:

- A sturdy, level installation site that is air conditioned, away from other heavy electrical equipment and has static electricity protection
- At least 6 inches (15.2 cm) in front of and 3 inches (7.6 cm) behind the server for proper ventilation and clearance for the CD-ROM drive tray
- A dedicated and properly grounded electrical circuit for the server



WARNING: This equipment is designed for connection to a grounded (earthed) AC outlet. The grounding type plug is an important safety feature. To avoid risk of electric shock or damage to your equipment, do not disable this feature.



CAUTION: Be sure that the power outlet you plug your power cord into is easily accessible, located as close to the equipment operator as possible. When you need to disconnect power to the equipment, be sure to unplug the power cord from the power outlet.



CAUTION: Protect the server from power fluctuations and temporary interruptions with a regulating uninterruptible power supply (UPS). This device protects the hardware from damage caused by power surges and voltage spikes and keeps the system in operation during a power failure.

Installation Sequence Outline

The following sequence should be performed when installing your Compaq ProLiant 5000 Server for the first time. This sequence is the same as indicated on the quick installation chart that came with your new server. Additional information on each step is provided elsewhere in this manual.



WARNING: To reduce the risk of personal injury or damage to the equipment, the bottom stabilizers on the equipment must be fully extended. Ensure that this is completed and the equipment is properly supported prior to continuing with this procedure.

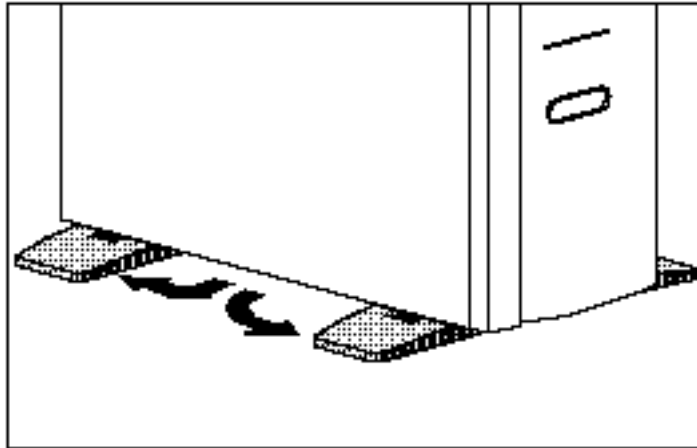


Figure 2-1. Extending the stabilizers until they lock in place

1. Unpack the server, keyboard, mouse and monitor (monitor not supplied). Position your ProLiant 5000 Server.
2. Install hardware options.
 - a. Install any PCI or EISA expansion boards.

IMPORTANT: Install ISA expansion boards after the Compaq System Configuration Utility has been run during the SmartStart portion of the installation sequence. (See Chapter 6, "Using the Compaq System Configuration Utility," for additional information.)

-

Figure 2-2. Connecting the power cord and turning ON the server

4. Insert the SmartStart CD and turn on the server. The ON-OFF power switch is located beneath a protective cover on the front bezel. (See Appendix A for instructions on using the CD-ROM drive.)

When the server boots from the SmartStart program, it will automatically start the Compaq System Configuration Utility. When the configuration utility is completed, you will be prompted to turn the server off, install any ISA boards (any switch settings required will be provided by the configuration utility), and then boot the server again from the SmartStart program.

For complete details on the SmartStart program, refer to the SmartStart installation card included in your SmartStart package.

Once the SmartStart program has finished configuring your system, the installation of your new Compaq Server is complete.

Installing Hardware Options



WARNING: To avoid the risk of personal injury or damage to the equipment when installing options, make sure that the power to the server is off and disconnect the AC power cord.



CAUTION: Electrostatic discharge can damage electronic components. Be sure you are properly grounded before beginning any installation procedure. Refer to Appendix C, "Electrostatic Discharge," for more information

Opening the Front Bezel and Removing the Side Access Panel

1. Open the front bezel (door) by turning the keylock and swinging the bezel to the right.

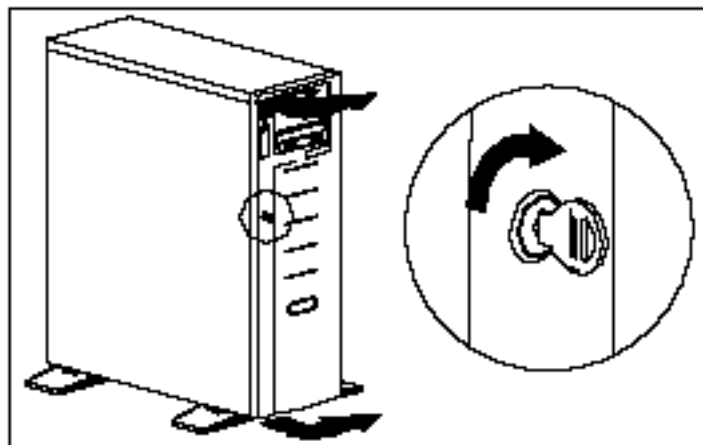


Figure 2-3. Unlocking the front bezel

2. Remove the Side Access Panel by loosening three thumb screws and sliding the Side Access Panel forward.

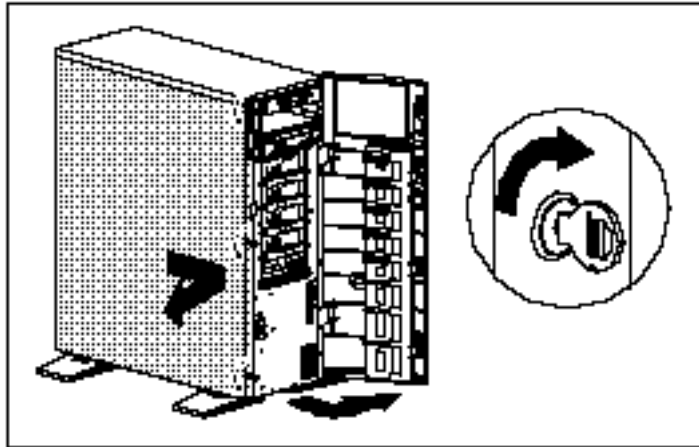


Figure 2-4. Opening the front bezel and removing the side access panel



WARNING: To reduce the risk of personal injury from hot surfaces, allow internal system components to cool before touching.



CAUTION: Do not operate the server with the covers removed. The covers are an integral part of the cooling system and removing them while the system is running may adversely affect data integrity.



CAUTION: Make sure the peripheral cables are plugged in before turning on the power to avoid damaging the server.

I/O Board Expansion Slot Locations

The ProLiant 5000 Server contains eight I/O expansion slots: five PCI slots, one EISA slot and two shared PCI/EISA slots.

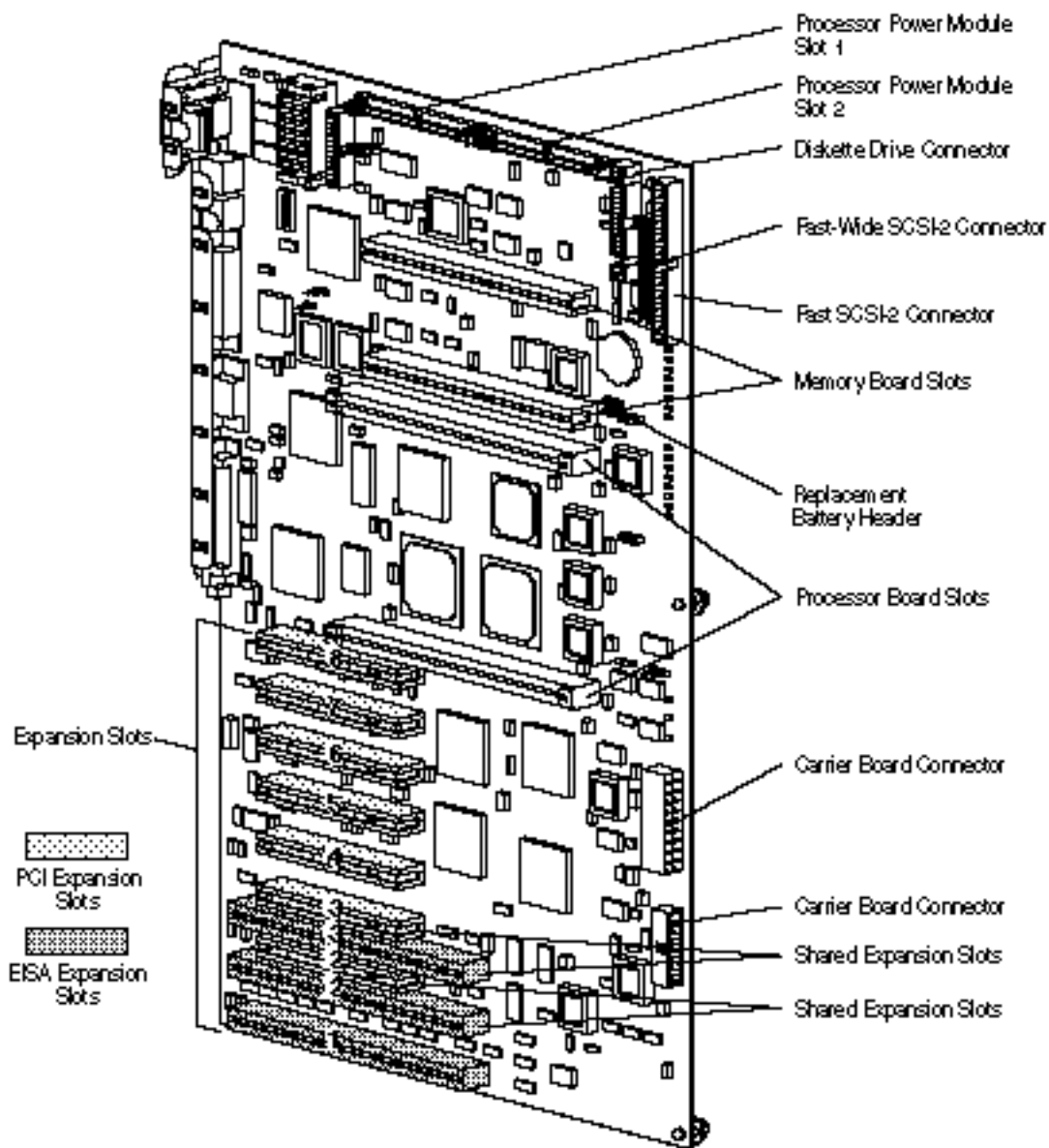


Figure 2-5. ProLiant 5000 System I/O board

Figure 2-6 shows the differences between PCI, EISA and ISA expansion board connectors:

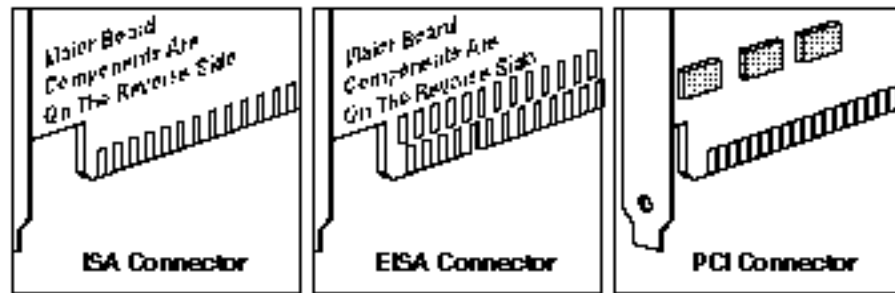


Figure 2-6. Identifying I/O expansion boards by connectors

Table 2-1
I/O Expansion Board Identifiers

Component	Identifiers
ISA board	Single row of contacts; major components are on the other side of board as shown
EISA board	Double row of contacts; major components are on the other side of board as shown
PCI board	Single row of contacts closer together; major components visible as shown; board is attached to other side of mounting plate vs. ISA or EISA board

Expansion Board Considerations

ProLiant 5000 servers have dual PCI buses. The EISA bus utilizes a PCI bridge on the I/O board. Use of an EISA device will impact PCI traffic on the primary PCI bus, and EISA device efficiency will be lower. See Chapter 4, "Performance Advantages of ProLiant 5000 Architecture."

Installing an I/O Expansion Board

EISA expansion slots accept both EISA and ISA boards. Refer to Figure 2-6 above to identify boards by their connectors.

Follow these instructions to install an expansion board:

1. Remove screw and slot cover from the required expansion slot(s).
2. Remove any extender brackets from PCI boards to be installed in the top four slots (slots 5-8).
3. Align the connector on the board with the expansion slot and firmly press the expansion board into place.
4. Secure the board by replacing the screw removed in Step 1.

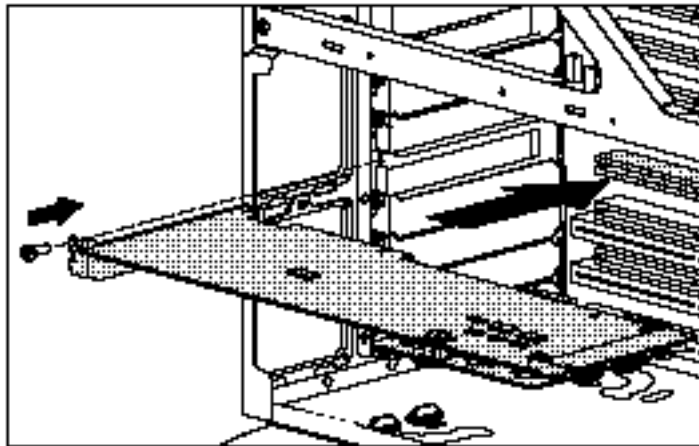


Figure 2-7. Installing a PCI expansion board (extender bracket attached, right foreground)

Installation Guidelines

Installations with one, two, three or four processors are supported. To maximize performance with fewer than four processors, populate the processor slots in the sequence indicated in Table 2-2.

Table 2-2
Processor Locations

Processor	Location
First	Board in Slot 9, Socket 1
Second	Board in Slot 9, Socket 2
Third	Board in Slot 10, Socket 1
Fourth	Board in Slot 10, Socket 2

Figure 2-8 identifies processor sockets on boards installed in I/O board slots 9 and 10.

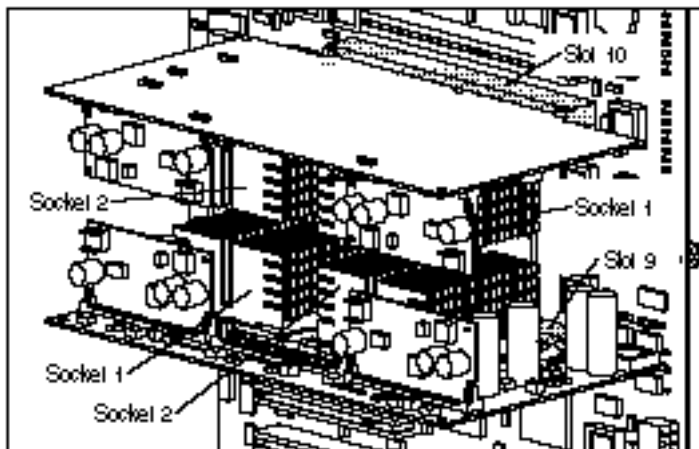


Figure 2-8. Identifying processor slots on two processor boards

See Appendix D, “Switch Settings,” for processor board switch information.

See Chapter 5, “Special Features of Compaq ProLiant 5000 Servers,” for terminator board information regarding one- and two-processor configurations.

Adding Memory (DIMMs)

The memory system uses Error Checking and Correcting (ECC) Memory to detect and correct all single-bit memory errors and detect other uncorrectable memory errors. See Chapter 10, "Server Management," for more information.

You can expand computer memory by installing Compaq DIMMs (Dual Inline Memory Modules). The system supports up to 16 DIMMs on two memory boards installed in dedicated slots on the I/O board.

You *must* observe the following guidelines when installing additional memory:

- DIMMs installed in the ProLiant 5000 server must be rated at 60 nanoseconds or faster, Fast Page Mode, 72 bits wide, 3.3 volts and ECC.
- DIMMs must be installed in matched sets of four, identical in speed and size and divided evenly between the two memory boards. For example: four 16-megabyte, 60ns Compaq modules, two on each board and in corresponding slots.
- First install DIMM sets in slots 1 and 2 on each memory board.
- Then install DIMM sets in slots 3 and 4 on each memory board.
- Then install DIMM sets in slots 5 and 6 on each memory board.
- Then install DIMM sets in slots 7 and 8 on each memory board.

Sets of four of different sizes may be used; for example, four 16-MB modules and four 32-MB modules may be used in the same system.

DIMM option kits from Compaq contain four matched modules.



CAUTION: Use only Compaq DIMMs. DIMMs from some other sources are known to adversely affect data integrity.

Table 2-3
Incremental Memory Additions

DIMM Speed	DIMM Size	4-DIMM Increment Total
60ns or faster	16 MB	64 MB
60ns or faster	32 MB	128 MB
60ns or faster	128 MB	512 MB
60ns or faster	256 MB	1 GB

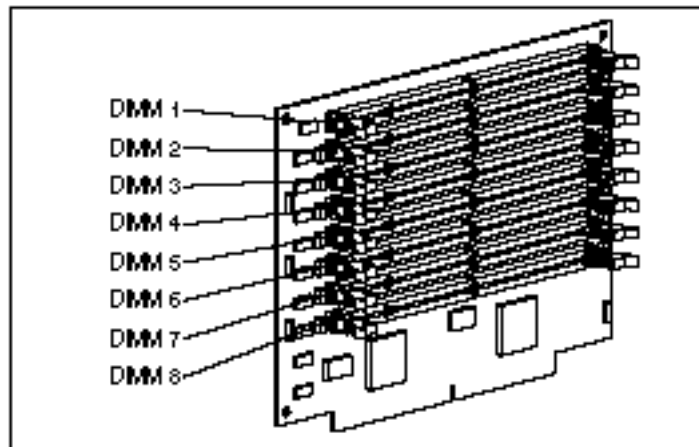


Figure 2-9. DIMM slots identified on a memory board

Maximum Memory Configuration

The ProLiant 5000 is designed to permit ultimate expansion to 4 gigabytes (GB) with future DIMMs technology. In the maximum memory configuration, both memory boards would be fully populated with 256-MB DIMMs, eight on each board.

Installing DIMMs



CAUTION: Electrostatic discharge can damage electronic components. Be sure you are properly grounded before beginning any installation procedure. Refer to Appendix C, "Electrostatic Discharge," for more information.

To install a memory module, complete the following steps:

1. Remove the "Y" bracket

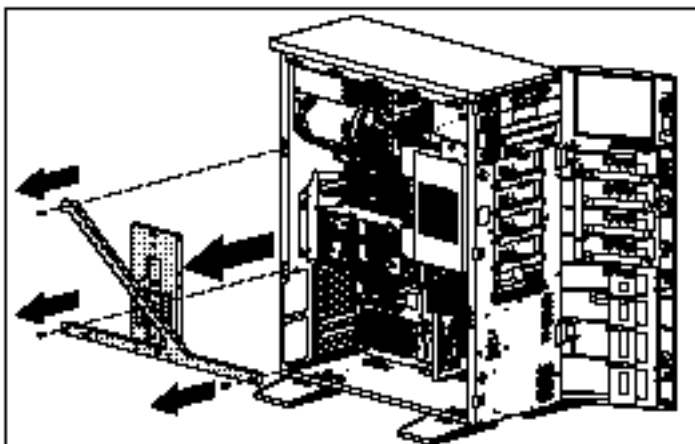


Figure 2-10. Removing the "Y" bracket

2. Remove both memory boards from the I/O board and place them flat on a static-dissipating work surface.
3. Align the key slot in the bottom edge of each DIMM with the tab in the expansion slot. DIMMs will not seat if turned the wrong way.

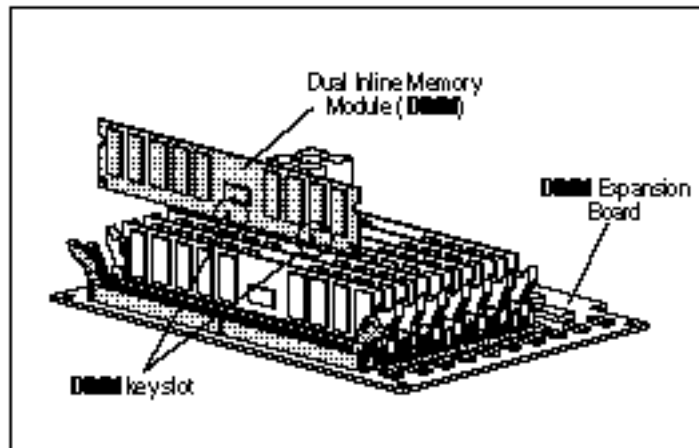


Figure 2-11. Aligning a DIMM on a memory expansion board

4. Insert each DIMM straight down into a socket on the memory board.
5. As the DIMM goes into the socket, the latches spread open.
6. Use your thumbs to press firmly down on the DIMM while pushing the latches inward with your index fingers until the latches snap into place.
7. Press the module gently, allowing the latches to snap into place.

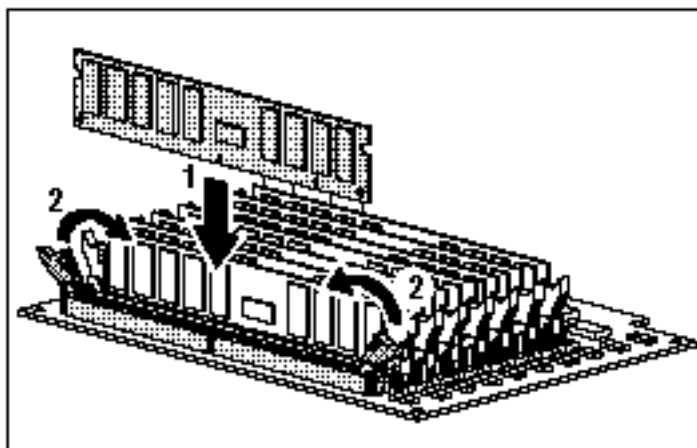


Figure 2-12. Installing a DIMM

8. Replace both memory boards on the I/O board.
9. Replace the “Y” bracket

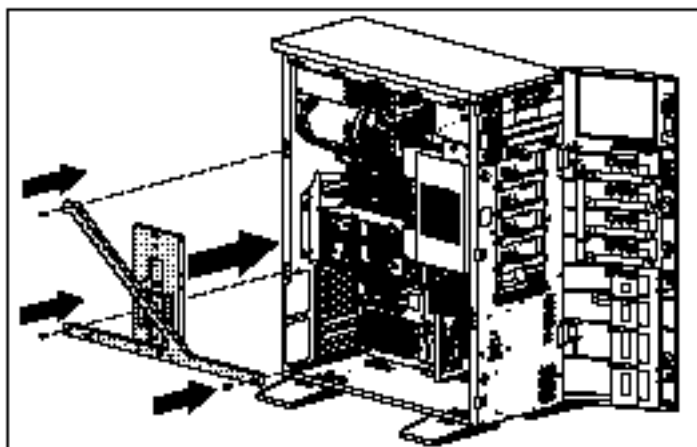


Figure 2-13. Replacing the “Y” bracket

10. Close the server and restore power using the steps outlined earlier.

System ROM automatically recognizes and configures memory changes.

Installing Mass Storage Devices

There are seven drive bays.

Three devices can be installed in the removable media drive bays. A CD-ROM drive and 3.5-inch floppy diskette drive are standard, leaving one bay vacant. Four hot-pluggable drives provide maximum internal storage of 17.2 gigabytes. Drive array models are equipped with two hard drives.

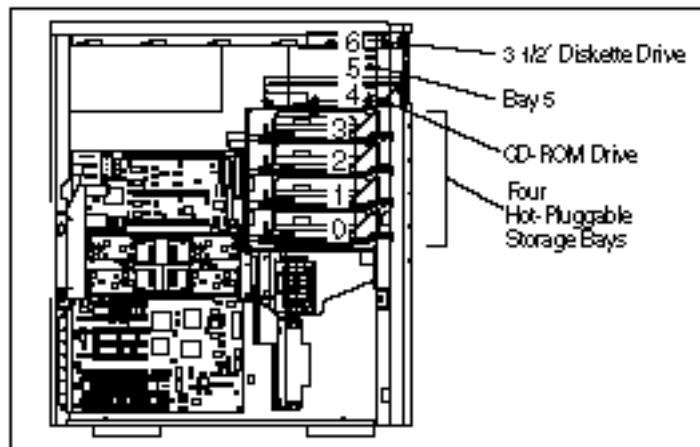


Figure 2-14. Internal storage device placement

Removable Media Storage

A 3.5-inch, 1.44-MB diskette drive and a CD-ROM drive are standard. One half-height removable storage device such as a diskette drive or tape drive can be installed in the vacant bay.

Installing a Mass Storage Device in the Removable Media Area

To install a mass storage device in the Removable Media Area:

1. Turn OFF the server power switch.

2. Turn OFF any peripheral devices.
3. Disconnect the AC power cord and any peripheral devices.
4. Open the front bezel, then remove the Side Access Panel by loosening three thumb screws on the left and sliding the Side Access Panel forward.
5. Set the SCSI ID for the storage device. (See the User Guide that accompanies the specific option.)
6. Remove the terminating resistors.
7. Remove the blank panel from the vacant drive position.
8. Slide the device onto the drive bridge rails and secure with screws.
9. Attach power and signal cables to the device. (See the User Guide for the specific option.)
10. Reinstall the Side Access Panel and the front bezel.
11. Reconnect the AC power cord and any peripheral devices.
12. Turn ON the power to any peripheral devices.
13. Turn ON the power to the server.

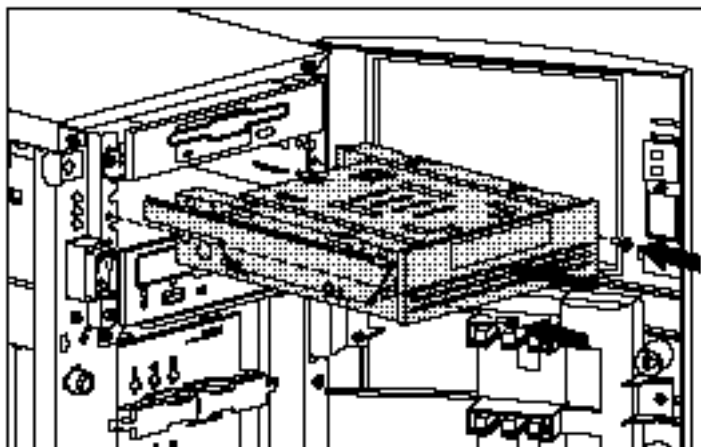


Figure 2-15. Installing a DAT tape drive in drive bay 5

Installing Hot-Pluggable Hard Drives

Use the procedure shown below to install a hot-pluggable hard drive.

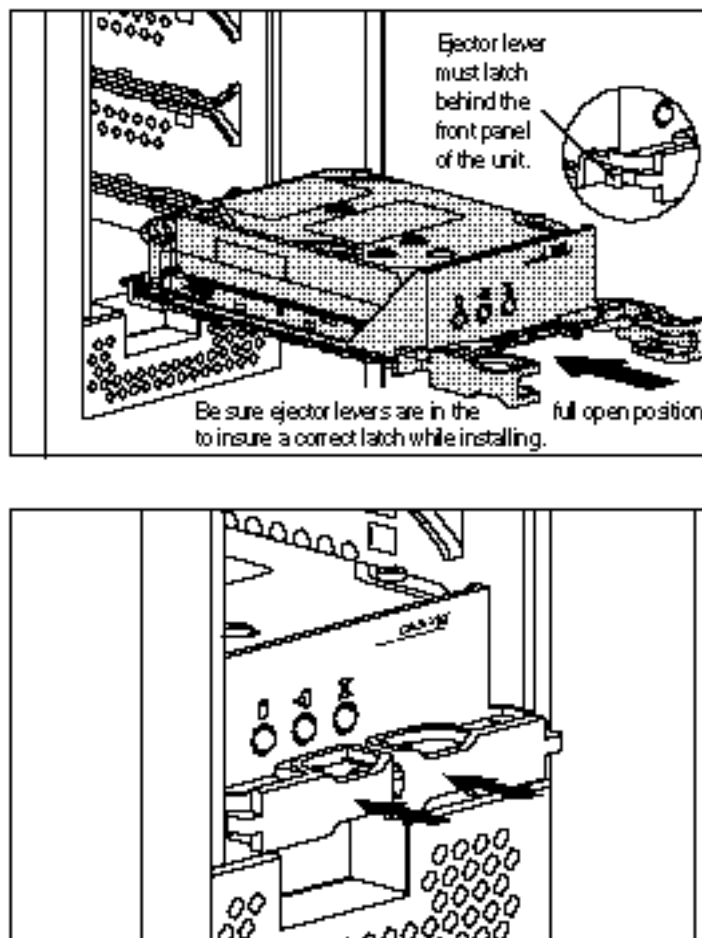


Figure 2-16. Installing hot-pluggable hard drives

Drive Installation Guidelines

The following guidelines should be noted when adding SCSI hard drives:

- A maximum of seven SCSI-2 devices may be added per controller.
- The SCSI ID for each hot-pluggable hard drive is set as shown in Figure 2-17.
- If only one SCSI hard drive is used it should be installed in the lowest bay.
- Compaq SCSI cables for the Compaq ProLiant 5000 are terminated. Be sure to remove all terminating jumpers from third-party SCSI devices.

NOTE: Supported Compaq SCSI options are not terminated.

IMPORTANT: When adding a Compaq SMART-2 Array Controller, attach only hot-pluggable hard drives to the controller.

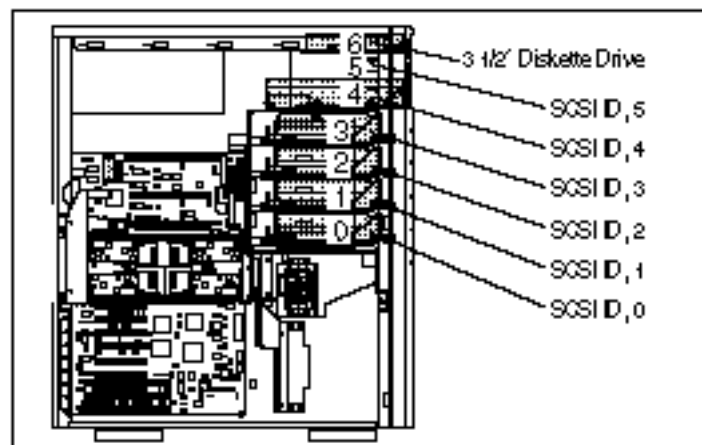


Figure 2-17. Assigned SCSI IDs

External Storage

Optional mass storage devices can be connected to the Compaq ProLiant 5000 by using the External Fast-Wide SCSI-2 Port on the back of the unit, or the Fast-Wide SCSI-2 Port on the optional Fast-Wide SCSI-2 Controllers.

IMPORTANT: If you use the external port, you must disconnect the cable for the internal drives and connect the cable for the CD-ROM drive to the internal narrow SCSI connector.

Connecting Peripheral Devices

After all options have been installed and the Side Access Panel has been replaced, peripheral devices should be connected. Icons on the back of the unit identify the function of each connector.

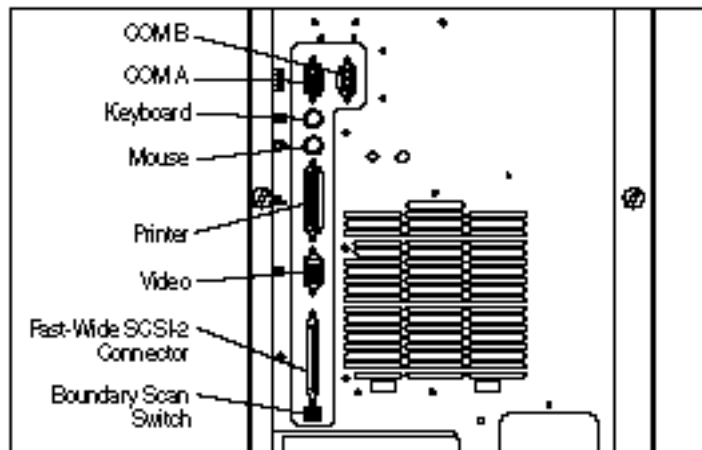


Figure 2-18. Connectors on the back of the ProLiant 5000



CAUTION: To avoid damage to the server, ensure that the power is OFF before you plug in or unplug the keyboard cable from the server.

Power Supply Requirements

The standard ProLiant 5000 power supply is dual rated at 490 watts at 115 volts and 540 watts at 230 volts. When fully configured with four processors and four internal drives, we strongly recommend operating the ProLiant 5000 at 230 volts.

Upgrading ROMs

All server models feature flash ROMs on the system; the Compaq SMART-2 Array Controller, if present, also has flash ROM. A flash ROM can be upgraded via software, removing the requirement to physically replace the chip.

To upgrade ROMs, use one of the three following procedures:

Downloading from Compaq's Web Site

The latest ROM updates are available via the Internet from Compaq's World Wide Web site.

1. Access the server through the Uniform Resource Locator (URL):
<http://www.compaq.com>.
2. From Compaq's Home Page select:
 - ❑ *Service & Support*, then
 - ❑ *Downloadable Files*, then
 - ❑ *Software Essentials*
3. Download the necessary files onto diskettes.
4. Use the diskettes to flash the ROM.

Upgrading from SmartStart and Diskettes

1. Insert the SmartStart CD into the CD-ROM drive.
2. Turn ON the server.
3. Select language, country and keyboard.
4. Select *Non-SmartStart Setup*.
5. Select *Create Support Software Diskettes From CD*.
6. Select *Toolbox*.
7. Select *Systems Utilities*.
8. Highlight the System ROMPaq diskette or Option ROMPaq Diskette entry and press the *Build* button, then follow the prompts to create the diskette. Use the diskette to flash the ROM.

Upgrading from the Hard Drive

If the system partition already has been upgraded with the latest version of the Compaq System Configuration Utility, complete the following steps.

1. Cycle the server by turning the power OFF, then ON.
2. Press the **F10** key when the following prompt appears at the top of the screen during POST.

Press "**F 9**" key for ROM-Based Diagnostics

Press "**F10**" key for System Partition Utilities

IMPORTANT: The text appears for only two seconds. If you do not press either F9 or F10 during this time, you must restart the server.

3. From the main menu, select *Diagnostics and Utilities*, then select *Upgrade Firmware*. Press **Enter** to continue at the ROMPaq welcome screen.

4. Select the device to be programmed, then the firmware image to be programmed.
5. Press **Enter** to confirm the firmware reprogramming.
6. When all devices are programmed, press **Escape**.
7. Turn the power OFF, then ON. A power cycle is required for ROMPaq to flash (update) the system ROM.

Chapter 3

Installing the Compaq ProLiant 5000R Server

The following instructions are provided for first-time installations and upgrades. If you have any problems, contact your Authorized Compaq Reseller.

Materials Needed

Locate the following materials that were shipped with your new server:

- Server unit
- Power cord
- SmartStart CD
- Documentation
 - Quick Setup Card
 - Reference Guide
 - Compaq Product Quality Statements

In addition to these supplied items you may need:

- Keyboard
- Monitor
- Pointing device (trackball)
- T-15 Torx screwdriver
- Options to be installed
- Application software diskettes

Selecting a Site

Site selection and installation are explained fully in the *Rack Planning and Installation Guide for Rack-Mountable Compaq ProLiant Servers*. Refer to that guide for instructions on first-time installations or the installation of additional servers.



WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that the leveling feet are extended to the floor and supporting the full weight of the rack. Each rack should be level and stable. Racks that are not coupled together require the installation of stabilizing feet. This must be accomplished before performing any work on the rack.



WARNING: Risk of personal injury. The rack may become unstable more than one component is extended for any reason. Always ensure that the rack is adequately stabilized before extending a component outside the rack. Extend only one component at a time.

Opening the Rack

The front and rear doors of the standard 22U and 42U racks are secured by handles with keyed locks. To open the door:

1. Push up the handle release cover.
2. Unlock the lock, if necessary.
3. Depress the handle release button (key hole button). The handle will pop out as it unlatches; turn it clockwise to open the door.

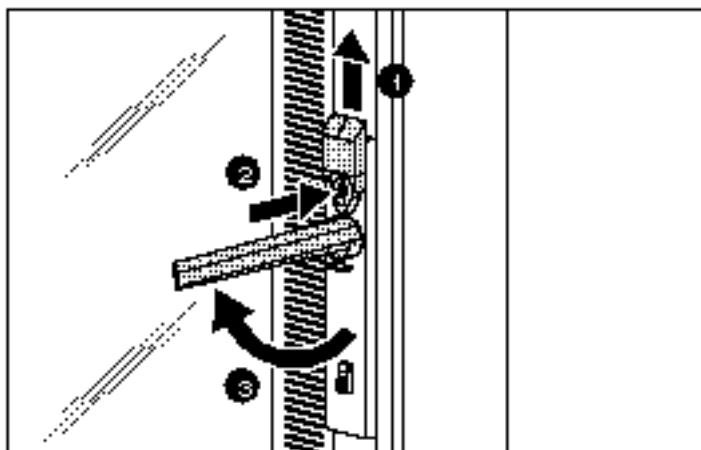


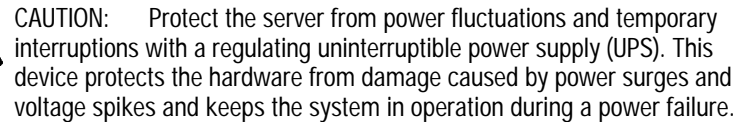
Figure 3- 1. Opening a rack door



WARNING: This equipment is designed for connection to a grounded (earthed) AC outlet. The grounding type plug is an important safety feature. To avoid risk of electric shock or damage to your equipment, do not disable this feature.



CAUTION: Be sure that the power outlet that you plug your power cord into is easily accessible and located as close to the equipment operator as possible. When you need to disconnect power to the equipment, be sure to unplug the power cord from the power outlet.



Installation Sequence Outline

The following sequence should be performed when installing your Compaq ProLiant 5000R Server for the first time. This sequence is the same as indicated on the quick installation chart that came with your new server. Additional information on each step is provided elsewhere in this manual.

1. Unpack the server. You will also need a monitor, a trackball or mouse, and a keyboard, which are not supplied.
2. Install hardware options, such as expansion boards.

IMPORTANT: Install ISA expansion boards after running the Compaq System Configuration Utility during the SmartStart portion of the installation sequence. See Chapter 6, "Using the Compaq System Configuration Utility."

3. Install other options such as additional memory, hard drives, and external storage devices.
4. Install the server into the rack (see the *Rack Planning & Installation Guide*).
5. Connect peripheral devices (keyboard, mouse, monitor, network cables) and the AC power cord.
6. Insert the SmartStart CD into the CD-ROM drive and boot the server. (See Appendix A for instructions on using the CD-ROM drive.)

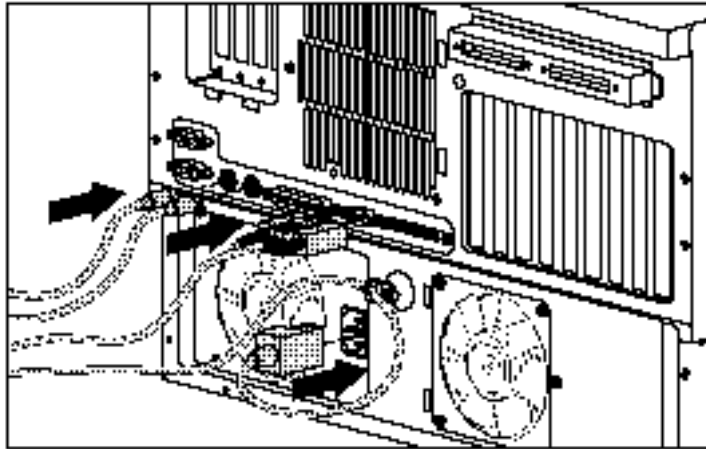


Figure 3- 2. Connecting the AC power cord and peripheral devices

7. When the server boots from the SmartStart program it will automatically start the Compaq System Configuration Utility. When the configuration utility is completed you will be prompted to turn the server off, install any ISA boards (any switch settings required will be provided by the configuration utility), and then boot the server again from the SmartStart program.

For complete details on the SmartStart program refer to the SmartStart installation card included in your SmartStart package.

Once the SmartStart program has finished configuring your system, the installation of your new Compaq Server is complete.

Installing Hardware Options



WARNING: To avoid the risk of personal injury or damage to the equipment when installing options, make sure that the power to the server is off and disconnect the AC power cord.



CAUTION: Make sure the peripheral cables are plugged in before turning on the power to avoid damaging the server.



CAUTION: Do not operate the server with the covers removed. The covers are an integral part of the cooling system and removing them while the system is running may adversely affect data integrity.



CAUTION: Electrostatic discharge can damage electronic components. Be sure you are properly grounded before beginning any installation procedure. Refer to Appendix C, "Electrostatic Discharge," for more information.

Opening the Server



WARNING: To reduce the risk of personal injury, never extend more than one piece of equipment in the rack at a time. Ensure that the rack is adequately stabilized before extending the server.

1. Loosen the four thumbscrews and slide the server forward out of the rack.

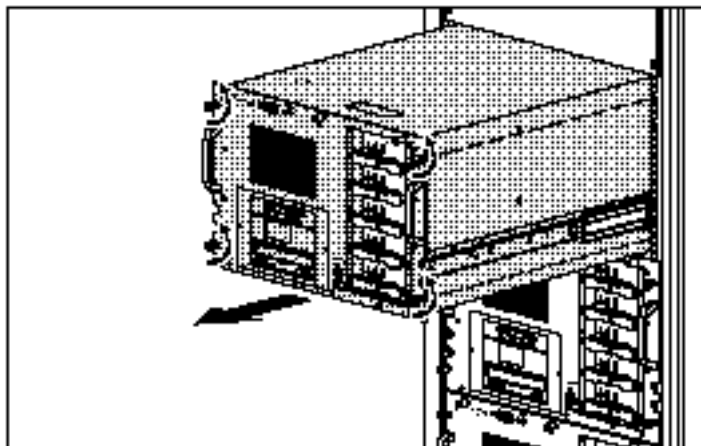


Figure 3- 3. Sliding the server forward in the rack

2. Loosen three 1/4-turn thumb screws and lift the server cover back and up, then lay it aside.

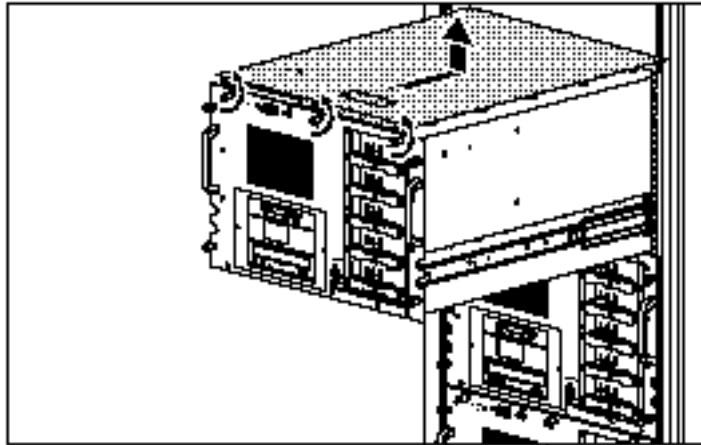


Figure 3- 4. Removing the cover from the server



WARNING: To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching.

3. Loosen thumb screw and lift away the "Y" bracket.

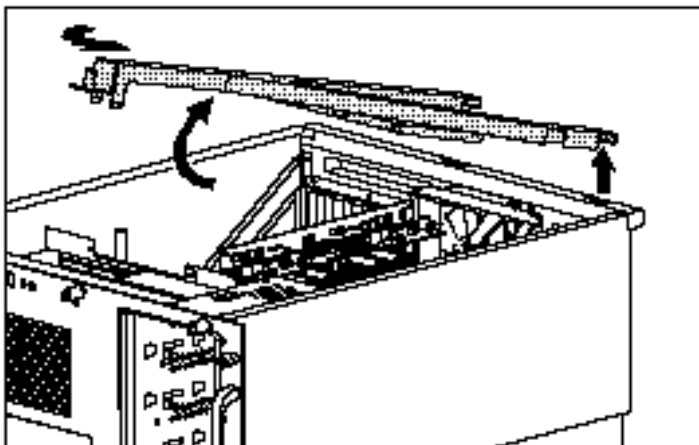


Figure 3-5. Removing the "Y" Bracket



WARNING: To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching.

4. Additional procedures vary depending on the option to be installed. Refer to the documentation included with each option.

I/O Board Expansion Slot Locations

The ProLiant 5000R Server contains eight I/O expansion slots on the system board; 5 PCI slots, two shared PCI/EISA slots and 1 EISA slot.

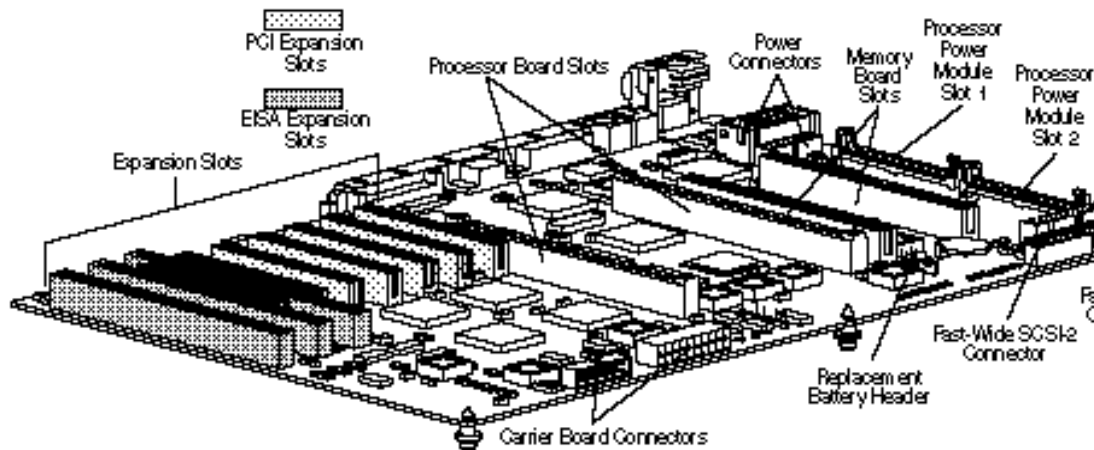


Figure 3- 6. ProLiant 5000R server system I/O board

Figure 3-7 shows the difference between PCI, EISA and ISA expansion board connectors.

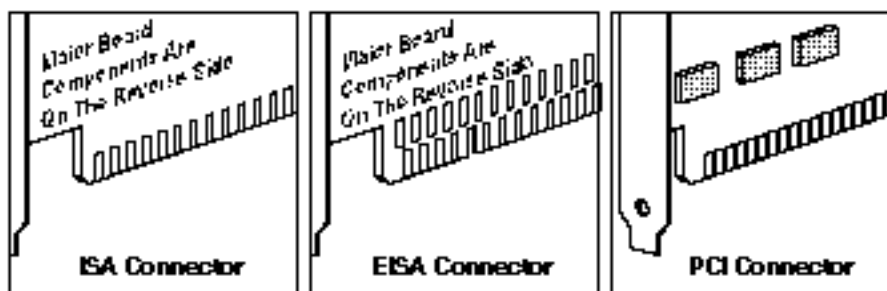


Figure 3- 7. Identifying I/O expansion boards by connectors

Table 3-1
I/O Expansion Board Identifiers

Component	Identifiers
ISA board	Single row of contacts; major components are on the other side of board as shown
EISA board	Double row of contacts; major components are on the other side of board as shown
PCI board	Single row of contacts closer together; major components visible as shown; board is attached to other side of mounting plate vs. ISA or EISA board

Expansion Board Considerations

ProLiant 5000R servers have dual PCI buses. The EISA bus utilizes a PCI bridge on the I/O board. Use of an EISA device will impact PCI traffic on the primary PCI bus. EISA device efficiency will be lower. See Chapter 4, "Performance Advantages of ProLiant 5000 Architecture."

Installing an Expansion Board

EISA expansion slots accept both EISA and ISA boards. Refer to Figure 3-7 to identify boards by their connectors. Follow these instructions to install an expansion board:

1. Remove screw and slot cover from the required expansion slot(s).
2. Align the connector on the board with the expansion slot and firmly press the expansion board into place.
3. Secure the board by replacing the screw removed in Step 1.

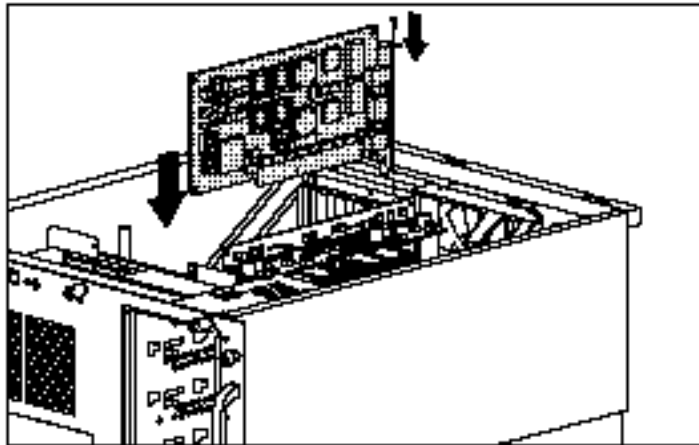


Figure 3- 8. Installing an expansion board

Installing an Optional Video Board

All models of the Compaq ProLiant 5000R come with an Integrated Video Controller that supports SVGA, VGA, EGA, and CGA graphics with the following resolutions:

- 1024 x 768 non-interlaced resolution with 16 colors
- 800 x 600 non-interlaced resolution with 256 colors
- 640 x 480 VGA non-interlaced resolution with 256 colors

The QVision Graphics System can also be added as an option. It features 256-color support at 1280 x 1024 or 16-million-color support at 640 x 480. SVGA, VGA, EGA, and CGA graphics resolutions are supported.

The video board should occupy one of the PCI slots. Those are slots 5-8. Slot 8 is recommended.

NOTE: When using the QVision Graphics System, be sure to install the video drivers found on the Microsoft Windows Support diskette.

Adding Processors

Compaq ProLiant 5000R Servers support symmetric multiprocessing (SMP) with as many as four Pentium Pro Processors, two on each of two processor boards.

Matching Requirements

Processors throughout the system must match in frequency. Processors on the same board also must have matching internal cache.

Installation Guidelines

Installations with one, two, three or four processors are supported. To maximize performance with fewer than four processors, populate the processor slots in the sequence indicated in Table 3-2.

Table 3-2
Processor Locations

Processor	Location
First	Board in Slot 9, Socket 1
Second	Board in Slot 9, Socket 2
Third	Board in Slot 10, Socket 1
Fourth	Board in Slot 10, Socket 2

Figure 3-9 identifies processor sockets on boards installed in I/O board slots 9 and 10.

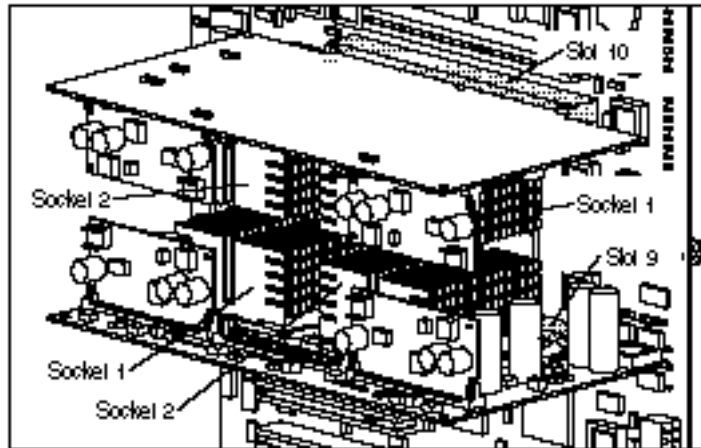


Figure 3-9. Identifying processor slots on two processor boards

See Appendix D, “Switch Settings,” for processor board switch information.

See Chapter 5, "Special Features of ProLiant 5000 Servers," for terminator board information regarding one- and two-processor configurations.

Adding Memory (DIMMs)

The memory system uses Error Checking and Correcting (ECC) Memory to detect and correct all single-bit memory errors and detect other uncorrectable memory errors. See Chapter 10, "Server Management," for more information.

You can expand computer memory by installing Compaq DIMMs (Dual Inline Memory Modules). The system supports up to 16 DIMMs on two memory boards installed in dedicated slots on the I/O board.

You *must* observe the following guidelines when installing additional memory:

- DIMMs installed in the ProLiant 5000R server must be rated at 60 nanoseconds or faster, Fast Page Mode, 72 bits wide, 3.3 volts and ECC.
- DIMMs must be installed in matched sets of four, identical in speed and size and divided evenly between the two memory boards. For example: four 16-megabyte, 60ns Compaq modules, two on each board and in corresponding slots.
- First install DIMM sets in slots 1 and 2 on each memory board.
- Then install DIMM sets in slots 3 and 4 on each memory board.
- Then install DIMM sets in slots 5 and 6 on each memory board.
- Then install DIMM sets in slots 7 and 8 on each memory board.

Sets of four of different sizes may be used; for example, four 16-MB modules and four 32-MB modules may be used in the same system.

DIMM option kits from Compaq contain four matched modules.



CAUTION: Use only Compaq DIMMs. DIMMs from some other sources are known to adversely affect data integrity.

Table 3-3
Incremental Memory Additions

DIMM Speed	DIMM Size	4-DIMM Increment Total
60ns or faster	16 MB	64 MB
60ns or faster	32 MB	128 MB
60ns or faster	128 MB	512 MB
60ns or faster	256 MB	1 GB

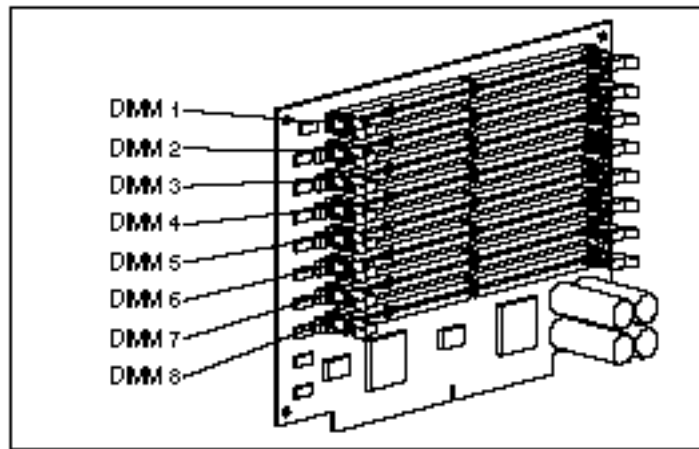


Figure 3-10. DIMM slots identified on a memory board

Maximum Memory Configuration

The ProLiant 5000R is designed to permit ultimate expansion to 4 gigabytes (GB) with future DIMMs technology. In the maximum memory configuration, both memory boards would be fully populated with 256-MB DIMMs, eight on each board.

Installing DIMMs



CAUTION: Electrostatic discharge can damage electronic components. Be sure you are properly grounded before beginning any installation procedure. Refer to Appendix C, "Electrostatic Discharge," for more information.

To install a memory module, complete the following steps:

1. Remove both memory boards from the I/O board and place them flat on a static-dissipating work surface.
2. Align the key slot in the bottom edge of each DIMM with the tab in the expansion slot. DIMMs will not seat if turned the wrong way.

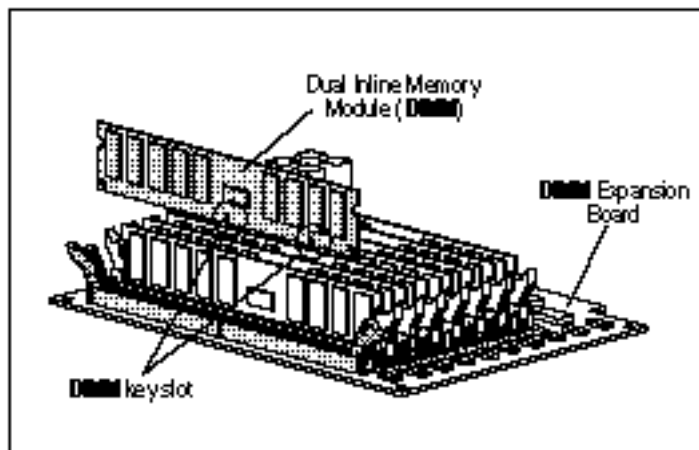


Figure 3-11. Aligning a DIMM on a memory expansion board

3. Insert each DIMM straight down into a socket on the memory board.
4. As the DIMM goes into the socket, the latches spread open.
5. Use your thumbs to press firmly down on the DIMM while pushing the latches inward with you index fingers until the latches snap into place.
6. Press the module gently, allowing the latches to snap into place.

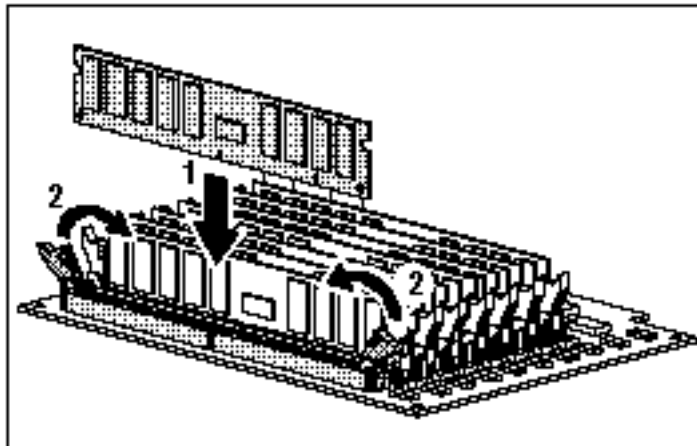


Figure 3- 12. Installing a DIMM

7. Replace both memory boards on the I/O board.
 8. Replace the Y bracket
 9. Close the server and restore power using the steps outlined earlier.
- System ROM automatically recognizes and configures memory changes.

Installing Mass Storage Devices

There are eight drive bays.

Three devices can be installed in the removable media drive bays. A CD-ROM drive and 3.5-inch floppy diskette drive are standard, leaving one bay vacant. Five hot-pluggable drives provide maximum internal storage of 21 gigabytes.

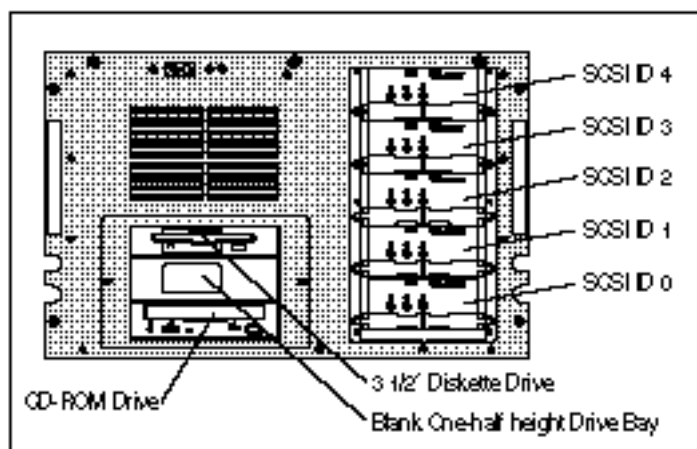


Figure 3- 13. Optional mass storage device placement

Removable Media Storage

A 1.44-MB diskette drive and a CD-ROM drive are standard. One half-height removable storage device such as a diskette drive or tape drive can be installed in the vacant bay.

Installing a Mass Storage Device in the Removable Media Area

To install a mass storage device in the Removable Media Area:

1. Turn OFF the server power switch.
2. Turn OFF any peripheral devices.

3. Disconnect the AC power cord and any peripheral devices.
4. With the server extended in the rack and the cover and "Y" bracket removed, slide the internal tray back and fold up the plastic cable shield.

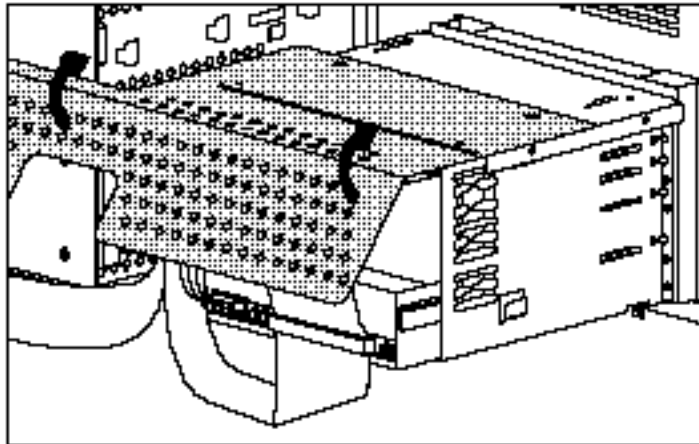


Figure 3-14. Folding up the plastic cable shield

5. Set the SCSI ID for the storage device. (See the User Guide that accompanies the specific option for more information.)
6. Remove the terminating resistors.
7. Detach the Removable Media Bay Trim Ring from the server face plate.

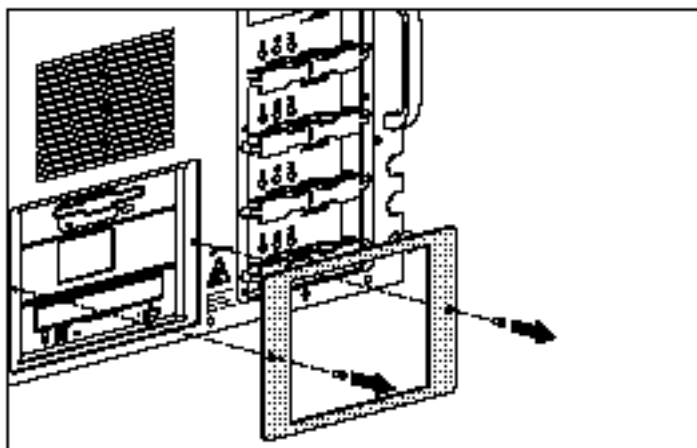


Figure 3-15. Removing the Media Bay Trim Ring

8. Remove the blank panel from the vacant drive position.

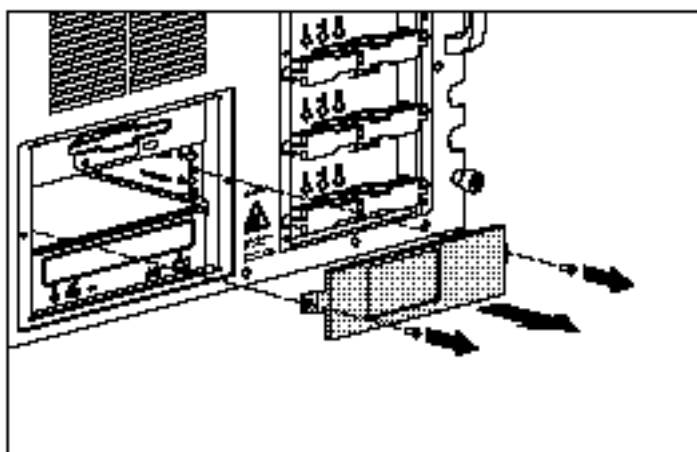


Figure 3-16. Removing the blank panel

9. Slide the device onto the drive bridge rails and secure with screws.

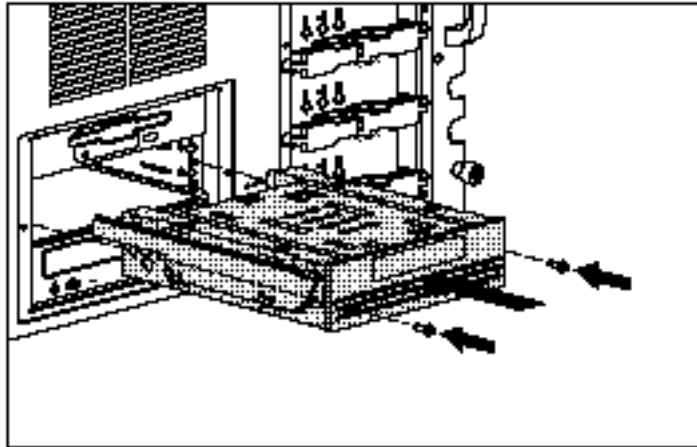


Figure 3- 17. Installing a DAT tape drive in drive bay 6

10. Connect the power and signal cables to the device. (See the User Guide for the specific option.)
11. Replace the trim ring.
12. Attach the power and SCSI option cables to the device.
13. Fold down the cable shield and replace the "Y" bracket and cover.
Close the server and secure it in the rack.
14. Reconnect the AC power cord and any peripheral devices.
15. Turn ON the power to any peripheral devices.
16. Turn ON the power to the server.

Installing Hot-Pluggable Hard Drives

Use the procedure shown below to install a hot-pluggable hard drive.

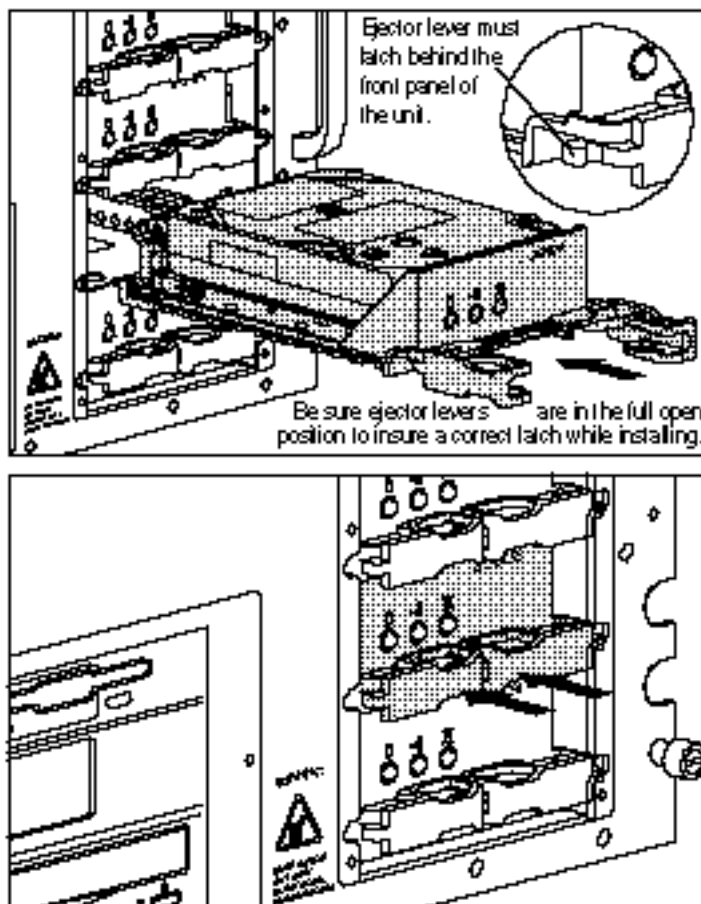


Figure 3- 18. Installing a hot-pluggable hard drive

Connecting Peripheral Devices

After all options have been installed and the cover has been replaced, peripheral devices should be connected. Icons on the back of the unit identify the function of each connector.

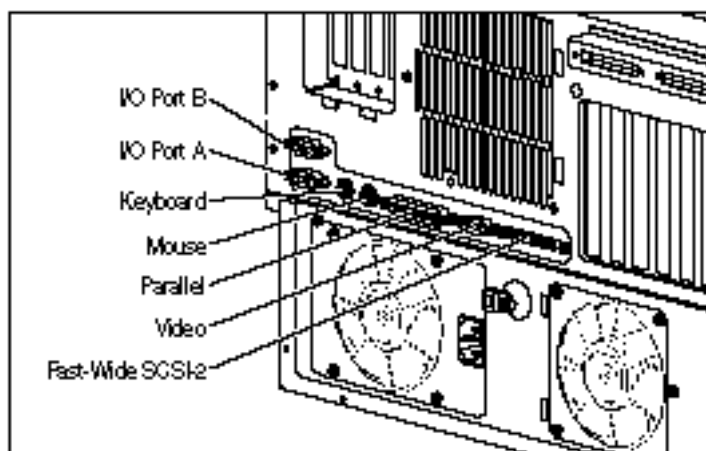


Figure 3- 19. Connectors at the back of the ProLiant 5000R Server



CAUTION: To avoid damage to the server, ensure that the power is off before you plug in or unplug the keyboard cable from the server.

Power Supply Requirements

The standard Compaq ProLiant 5000R power supply is dual rated at 490 watts at 115 volts and 540 watts at 230 volts. When fully configured, we strongly recommend operating the ProLiant 5000R at 230 volts.

If you plan to operate the ProLiant 5000R at 115V, the following configuration restrictions apply:

Table 3-4
Maximum Configuration Options
for Operating ProLiant 5000R at 115 Volts

	Option A	Option B	Option C
Maximum Number of EISA/PCI Slots Filled	6	7	7
Maximum Number of Drives	5	4	5
Maximum Number of Processors	4	4	3

No configuration restrictions apply when operating the server at 230 volts.

Upgrading ROMs

All server models feature flash ROMs on both the system and the Compaq SMART-2 Array Controller if a SMART-2 Controller is present. A flash ROM can be upgraded via software, removing the requirement to physically replace the chip.

To upgrade ROMs, follow one of the three following procedures:

Downloading from Compaq's Web Site

The latest ROM updates are available via the Internet from Compaq's World Wide Web site.

1. Access the server through the Uniform Resource Locator (URL):
<http://www.compaq.com>.
2. From Compaq's Home page select:
 - ☐ *Service & Support*, then
 - ☐ *Downloadable Files*, then
 - ☐ *Software Essentials*
3. Download the necessary files onto diskettes.
4. Use the diskettes to flash the ROM.

Upgrading From SmartStart and Diskettes

1. Insert the SmartStart CD into the CD-ROM drive.
2. Turn ON the server.
3. Select language, country and keyboard.
4. Select *Non-SmartStart Setup*.
5. Select *Create Support Software Diskettes From CD*.
6. Select *Toolbox*.
7. Select *Systems Utilities*.
8. Highlight the System ROMPaq diskette or Option ROMPaq Diskette entry and press the *Build* button, then follow the prompts to create the diskette. Use the diskette to flash the ROM.

Upgrading From the Hard Drive

If the system partition already has been upgraded with the latest version of the Compaq System Configuration Utility, complete the following steps.

1. Restart the server by turning the power OFF, then ON. A system cycle is required for ROMPaq to reprogram the system ROM.
2. Press the **F10** key when the following prompt appears at the top of the screen during POST.

Press "**F 9**" key for ROM-Based Diagnostics

Press "**F10**" key for System Partition Utilities

IMPORTANT: The text appears for only two seconds. If you do not press either F9 or F10 during this time, you must reboot the server.

3. From the main menu, select *Diagnostics and Utilities*, then select *Upgrade Firmware*. Press **Enter** to continue at the ROMPaq welcome screen.
4. Select the device to be programmed, then the firmware image to be programmed.
5. Press **Enter** to confirm the firmware reprogramming.
6. When all devices are programmed, press **Escape**.
7. Turn the power, then back ON. A power cycle is required for ROMPaq to reprogram the system ROM.

Chapter 4

Performance Advantages of ProLiant 5000 Architecture

Compaq ProLiant 5000 Architecture combines Intel Pentium Pro Processor power with Dual Peer Peripheral Component Interconnect (PCI) Bus architecture to provide optimum performance. Internal Pentium Pro architecture differs from that of earlier Pentium Processors, and functions best when certain configuration techniques are employed.

Utilizing the Compaq configuration guidelines that follow will ensure that maximum system performance and data transfer efficiency are achieved.

PCI and Pentium Pro Go Together

Pentium Pro processor architecture is optimized for PCI input/output. Therefore, although the Compaq ProLiant 5000 supports up to three EISA boards, highest performance will be obtained when only PCI peripherals are installed. However, EISA peripherals with low bandwidth requirements (for example, modems, system management boards and 10 megabits per second network interface controllers with relatively low utilization) can be used with little or no performance impact.

The ProLiant 5000 is optimized for PCI performance. Observe the following guidelines to ensure peak system performance.

- Use high-performance PCI peripherals.
- Use PCI peripherals that support bus-mastering and/or burst transfer.
- Avoid using high-bandwidth EISA peripherals (for example, 100-megabit network interface controllers or multi-channel drive controllers) as they can degrade overall system performance.

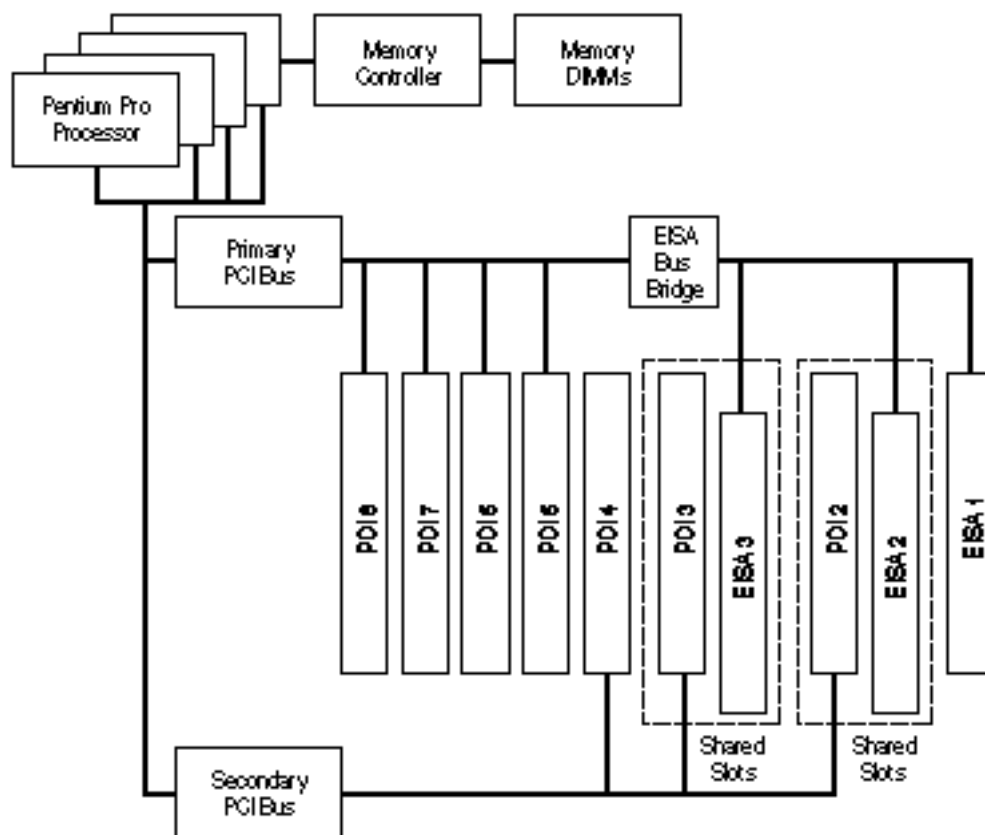


Figure 4-1. Map of ProLiant 5000 bus architecture

Boosting PCI Performance by Monitoring Bus Activity

Compaq delivers servers with board and bus assignments optimized. As additional devices are installed, balancing PCI device activity on the Dual Peer buses can ensure continued optimal system performance.

The ProLiant 5000 includes, within Compaq Insight Manager, a utility that allows users to monitor bus activity in order to balance bus utilization. To learn how to access the Utilization Window:

- ❑ Refer to the *Compaq Insight Manager Online User Guide* and search for the *Utilization Window* from the HELP Menu, or
- ❑ Under Windows 95 on a workstation, insert the Compaq Management CD and select the Overview button, then open the *Compaq Insight Manager Online User Guide*, then search for the Utilization Window, or
- ❑ Under Windows NT on a workstation, insert the Compaq Management CD and run OVERVIEW.EXE to select the Overview button, then open the *Compaq Insight Manager Online User Guide*, then search for the Utilization Window.

Factory Configuration

Table 4-1 describes the factory configuration with one network interface controller (NIC) and one SMART-2 SCSI Controller installed.

Table 4-1
Factory Configuration, Array Models

Device	Bus	Slot
10/100 TX PCI UTP Controller	Secondary	2
SMART-2/P Array Controller	Primary	5

Adding Additional Devices

Tables 4-2 through 4-6 show recommended configurations to utilize as many as four SMART-2/P Array Controllers and two 10/100 TX PCI UTP Controllers.

Table 4-2
Recommended Three-Controller Configuration
One 10/100 TX PCI UTP Controller, Two SMART-2 Array Controllers

Device	Bus	Slot
10/100 TX PCI UTP Controller	Secondary	2
SMART-2/P Array Controller	Primary	5
SMART-2/P Array Controller	Secondary	3

Table 4-3
Recommended Three-Controller Configuration
Two 10/100 TX PCI UTP Controllers, One SMART-2 Array Controller

Device	Bus	Slot
10/100 TX PCI UTP Controller	Secondary	2
SMART-2/P Array Controller	Primary	5
10/100 TX PCI UTP Controller	Primary	6

Table 4-4
Recommended Four-Controller Configuration
Two 10/100 TX PCI UTP Controllers, Two SMART-2 Array Controllers

Device	Bus	Slot
10/100 TX PCI UTP Controller	Secondary	2
SMART-2/P Array Controller	Primary	5
10/100 TX PCI UTP Controller	Primary	6
SMART-2/P Array Controller	Secondary	3

Table 4-5
Recommended Five-Controller Configuration
Two 10/100 TX PCI UTP Controller, Three SMART-2 Array Controllers

Device	Bus	Slot
10/100 TX PCI UTP Controller	Secondary	2
SMART-2/P Array Controller	Primary	5
SMART-2/P Array Controller	Secondary	3
10/100 TX PCI UTP Controller	Primary	6
SMART-2/P Array Controller	Secondary	4

Table 4-6
Recommended Six-Controller Configuration
Two 10/100 TX PCI UTP Controllers, Four SMART-2 Array Controllers

Device	Bus	Slot
10/100 TX PCI UTP Controller	Secondary	2
SMART-2/P Array Controller	Primary	5
SMART-2/P Array Controller	Secondary	3
10/100 TX PCI UTP Controller	Primary	6
SMART-2/P Array Controller	Secondary	4
SMART-2/P Array Controller	Primary	7

Getting Additional Configuration Information

The latest product updates are available via the Internet at Compaq's World Wide Web site. Access the server through the Uniform Resource Locator (URL): <http://www.compaq.com>. From Compaq's Home Page select *Product Information* or *Service and Support*, then entries for the ProLiant 5000 Server.

Chapter 5

Special Features of Compaq ProLiant 5000 Servers

Compaq ProLiant 5000 servers have performance enhancement components and management features not found in other servers. They include Processor Power Modules, internal system monitor signals, and a terminator board that resides on the I/O board in one- or two-processor systems.

Processor Power Modules (5V)

ProLiant 5000 servers utilize Processor Power Modules (redundant 5V DC-DC converters) to ensure that proper voltage is delivered to critical operational components including the processors, the I/O board and PCI buses. Maximum Processor Power Module converter allocation is two on the I/O system board (one is standard) and as many as three on each processor board.

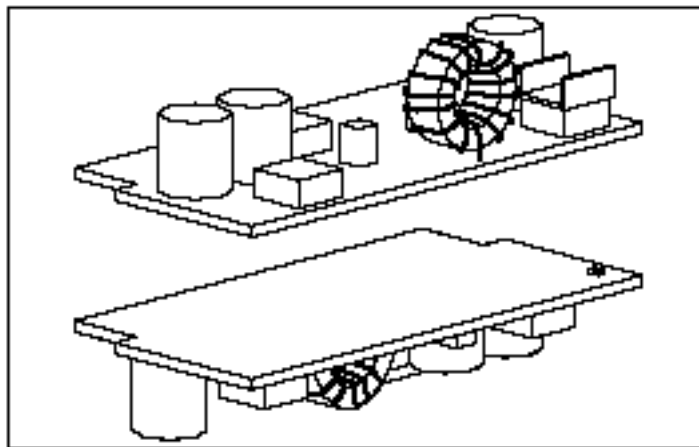


Figure 5-1. Processor Power Module showing location of LED on the unpopulated side

A single red LED on each Processor Power module, when illuminated, indicates either a failure of that module or that another problem exists in the system that is preventing the module from achieving its programmed voltage.

To rectify the problem, replace the affected module. If red LED remains lighted, promptly contact your Authorized Compaq Service Provider.

Processor Power Modules on CPU Boards

Processor Power Modules on a processor (CPU) board decode the voltage requirements for each Pentium Pro processor and supply tightly regulated DC voltage to the processors.

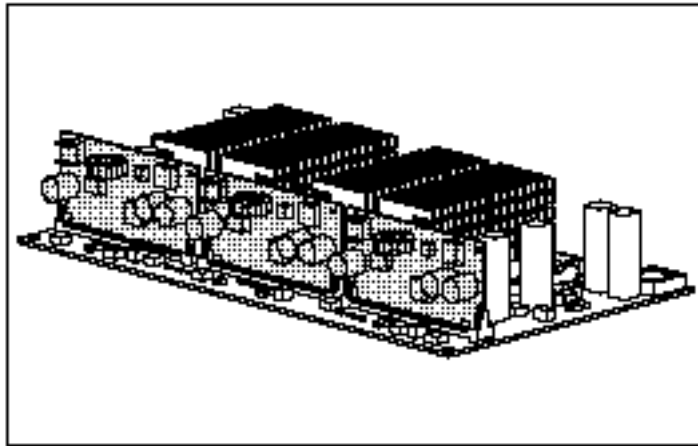


Figure 5-2. Processor Power Modules in all three processor board positions

The modules can be placed in parallel configuration to provide redundant operation. With one or two processors present on a board, the Processor Power module slot nearest the processor slot and the outer edge of the board supports that processor. Figure 5-3 illustrates configuration.

A 5V Processor Power module placed in the center slot operates in parallel with the modules on both sides and provides redundancy for either (one) or both of the other Processor Power Modules on that board, providing the processors are the same frequency and have the same voltage rating.

IMPORTANT: If a Processor Power module on a CPU board fails, be certain the end slot(s) are populated with functional module(s) to ensure normal system operation. Promptly obtain a replacement from your Authorized Compaq Service Provider.

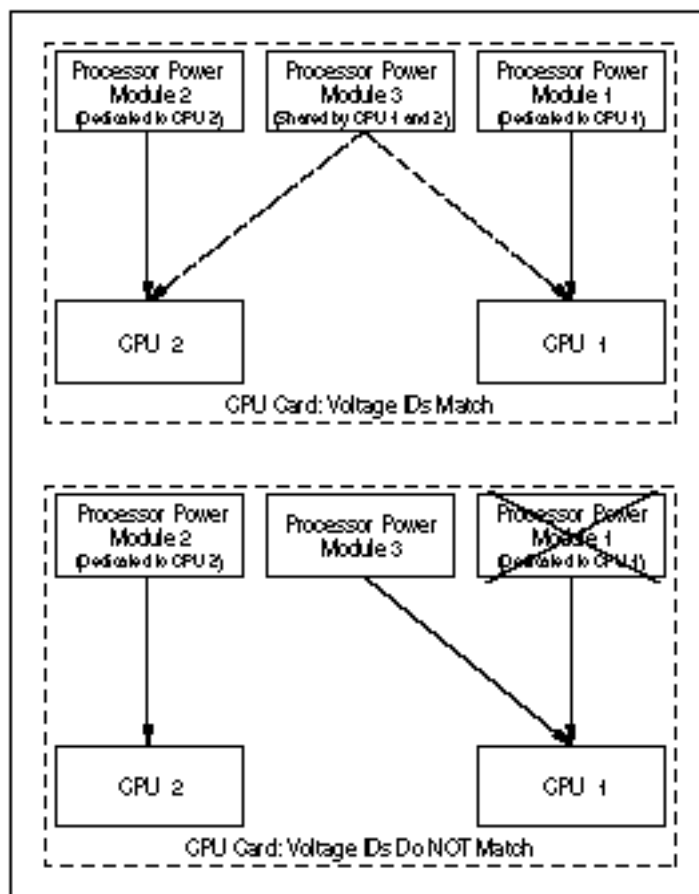


Figure 5-3. (Top) Center Processor Power Module backs up modules on both sides. (Bottom) Module dedicated to CPU 1 has failed and center module has automatically taken over to keep CPU 1 operating.

Processor Power Modules on the I/O System Board

The Processor Power Module on the I/O system board generates the tightly regulated 1.5V needed for the Pentium Pro GTL+ bus. If a second module is installed, it provides redundancy.

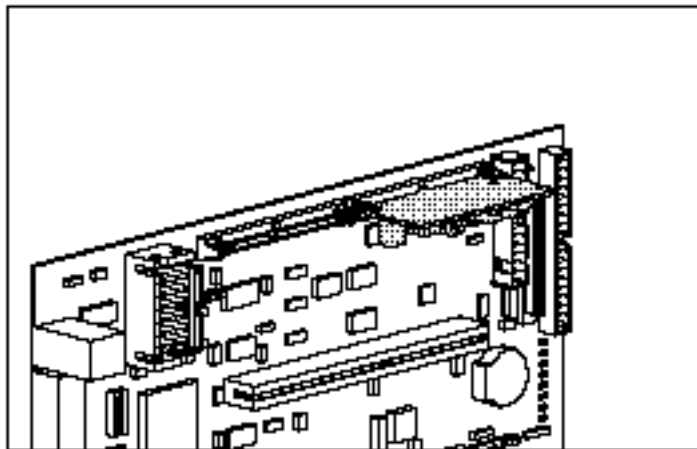


Figure 5-4. Processor Power Module on the system I/O board

Adding or Replacing Processor Power Modules

This section describes the color coding used to distinguish Processor Power Modules and the steps required to install or remove modules.

Identifying Appropriate Processor Power Modules

Compaq uses Processor Power Modules with different ratings in other computers. Before replacing Processor Power Modules or installing additional modules, be certain the Processor Power Modules you are about to use are Redundant 5V units. A yellow marking on the back identifies Redundant 5V modules. Figures 5-5, 5-6 and 5-7 identify Compaq Processor Power Modules.

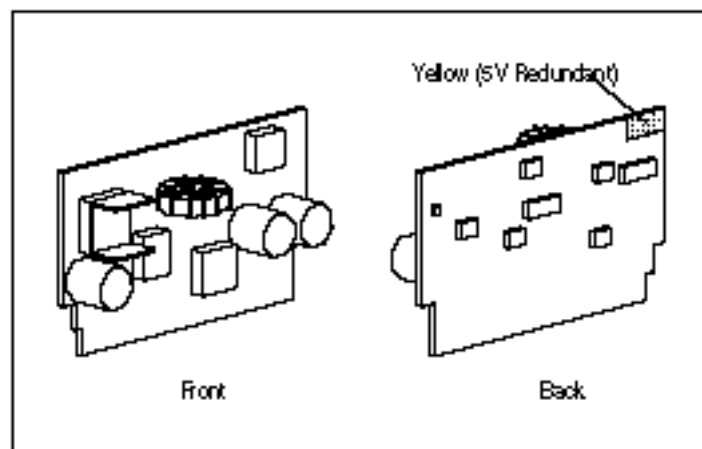


Figure 5-5. Yellow marking identifies Redundant 5V Processor Power Module used in ProLiant 5000 Servers

.....

5-6 Special Features of Compaq ProLiant 5000 Servers

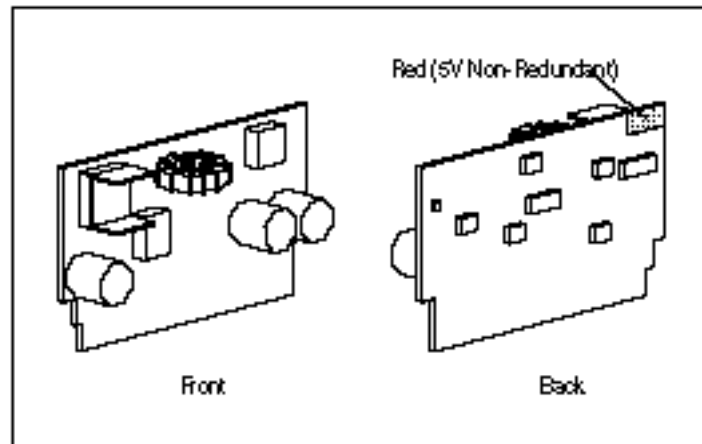


Figure 5-6. Red marking identifies 5V Non-redundant Processor Power Module *not* used in ProLiant 5000 Servers

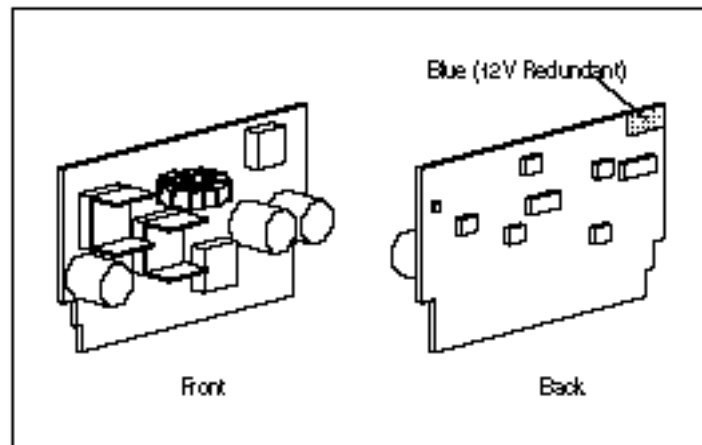


Figure 5-7. Blue marking identifies 12V Processor Power Module *not* used in ProLiant 5000 Servers

Installing Processor Power Modules

The Processor Power Module is keyed to ensure correct alignment. A notch in the bottom edge of the module, near the center, must align with a tab in the mounting bracket. The notch and tab will not line up if the module is turned the wrong way.

Follow these steps to install a Processor Power Module:

1. With the module at a 45-degree angle, align the connectors.
2. Gently rotate the module upright until it snaps into place. This requires light pressure.

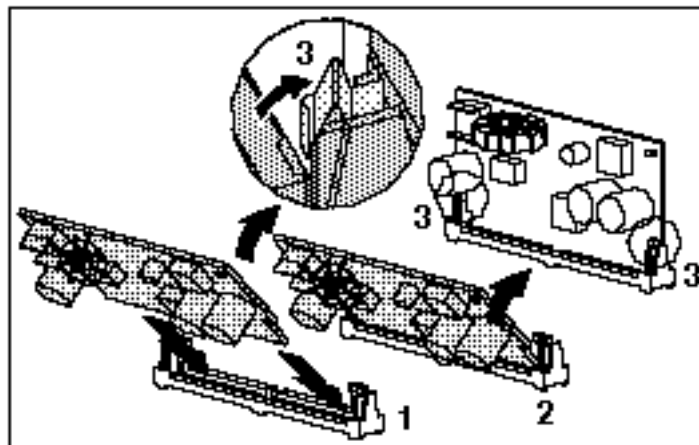


Figure 5-8. Installing a Processor Power module

Removing Processor Power Modules

Follow these steps to remove a module:

1. Spread the silver locking tabs on each end of the module.
2. Tip the module forward and extract it from the socket. This requires light pressure.

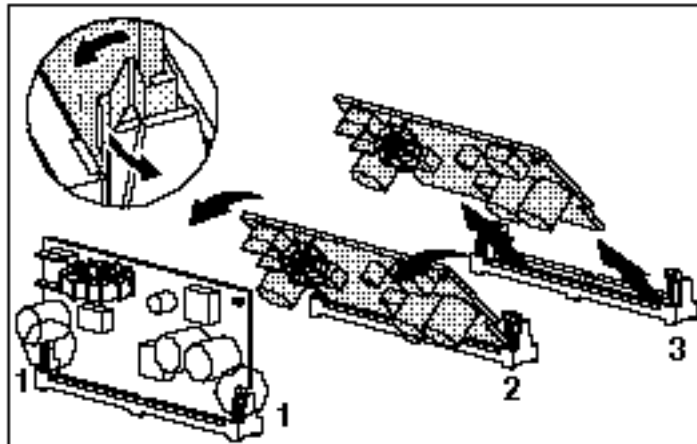


Figure 5-9. Removing a Processor Power Module

Internal System LED Monitors

ProLiant 5000 Servers are populated with as many as 48 internal Light Emitting Diodes (LEDs) that turn on and off at various times during system operation. These LEDs are controlled by the system hardware and ROM to provide diagnostic information.

Table 5-1
CPU Board LED Definitions

LED Name	Qty	Location	Function	Activation
Processor Error	2	One for each CPU on the processor board	RED indicates which CPU received an internal processor error	Hardware
Processor Thermal Monitor	2	One for each CPU on the processor board	RED indicates CPU has overheated	Hardware
Board Thermal Monitor	1	One on each processor board	RED indicates maximum board temperature was reached	Hardware
Processor Error	1	One on each processor board	RED indicates that an error has occurred with the CPU board	Software
Non-redundancy Indicator	1	One on each CPU board in the center	RED indicates that CPUs on a processor board are receiving different voltage inputs	Hardware
Processor Power	2	One above each CPU	GREEN indicates power is being supplied to the processor	Hardware

Figure 5-10 and Table 5-2 identify individual LEDs on a CPU board by location.

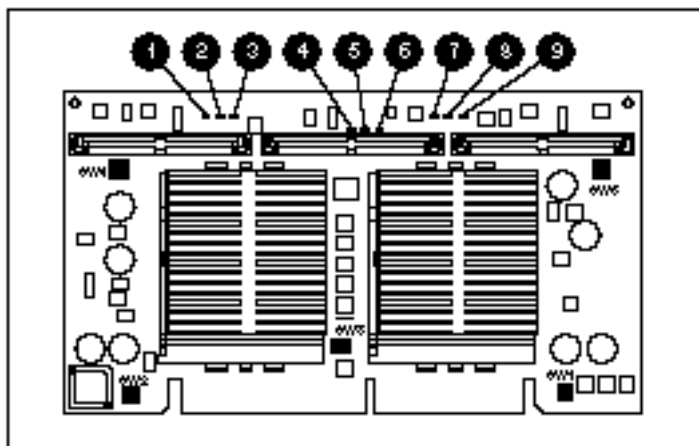


Figure 5-10. Identifying CPU board LEDs listed in Table 5-2

Table 5-2
CPU Board LED Identification

LED	Function
<input checked="" type="checkbox"/> 1 P2 IEER	Indicates that Processor 2 (P2) sensed an internal error
<input checked="" type="checkbox"/> 2 P2 VCCP	Indicates that power is being supplied to P2
<input type="checkbox"/> 3 P2 THERMTRIP	Indicates that P2 has overheated
<input type="checkbox"/> 4 NOT REDUNDANT	Indicates that the Processor Power Modules are not in redundant operation because the processor voltages are not the same
<input type="checkbox"/> 5 PROC ERR	Software has determined that a problem has occurred on this CPU board
<input type="checkbox"/> 6 BRD TEMP	Indicates that the ambient air temperature for this board has been exceeded.
<input type="checkbox"/> 7 P1 IERR	Indicates that Processor 1 (P1) sensed an internal error
<input type="checkbox"/> 8 P1 VCCP	Indicates that power is being supplied to P1
<input type="checkbox"/> 9 P1 THERMTRIP	Indicates that P1 has overheated

I/O Board LEDs

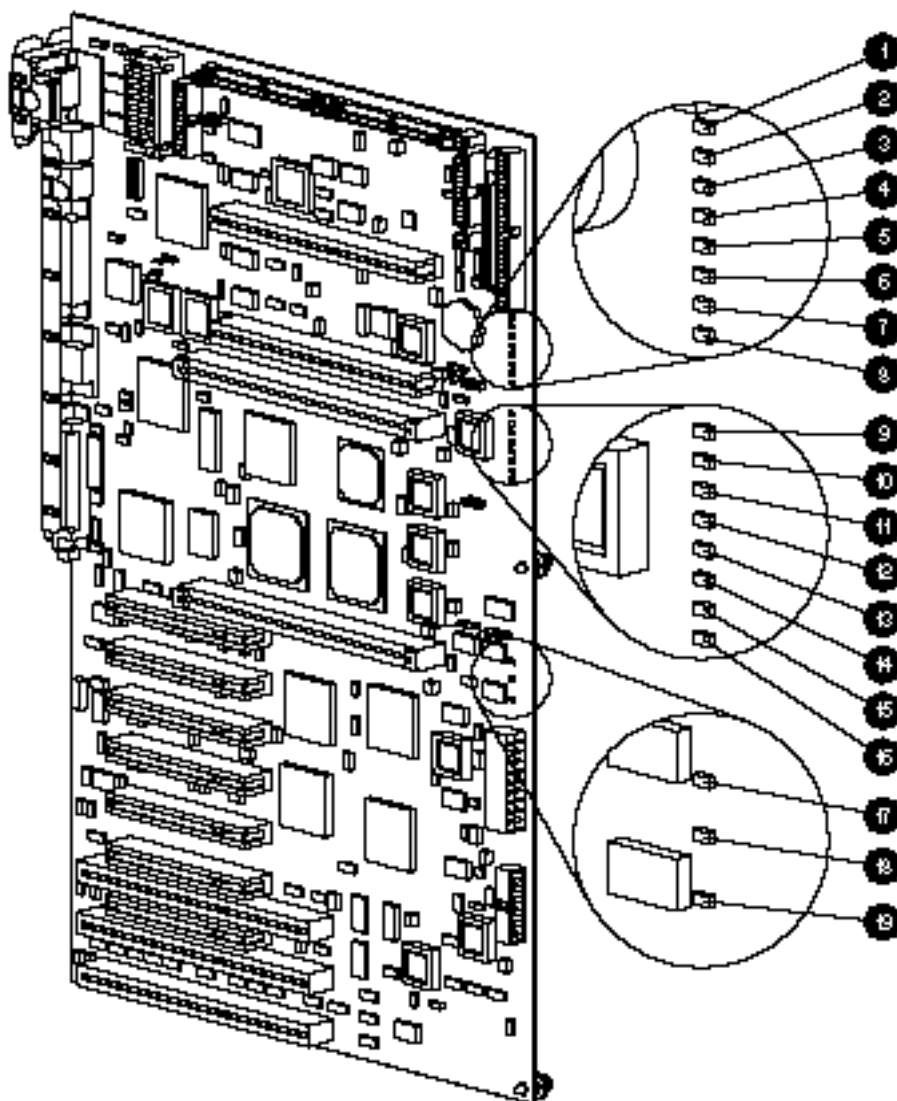


Figure 5-11. Locating I/O board LEDs listed in Table 5-3

Table 5-3
System I/O Board
LED Locations

Number	Indication
1-8	Port 85 diagnostics
9-16	Port 84 diagnostics
17	5v LED
18	3.3v LED
19	PCI 3.3v LED

Pre-Failure Warranty

The ProLiant 5000 includes support for Compaq's industry-leading Pre-Failure Warranty for hard drives, memory and Pentium Pro processors purchased from Compaq through an Authorized Compaq Reseller. With this warranty, supported components are eligible for replacement before they actually fail if the system determines that these components have degraded below pre-determined reliability thresholds within the product warranty period.

Compaq Insight Manager shows pre-failure conditions by indicating that a component is in a degraded condition, indicated by a yellow color status. Along with this, Insight Manager recommends replacement of the component in a pre-failure condition.

When alerted by Insight Manager that a component has degraded such that it may be eligible for Pre-Failure Warranty replacement, follow the on-screen instructions or contact an Authorized Compaq Service Provider in your area.

Terminator Board

Two slots, slots 9 and 10, on the I/O board are dedicated to processor boards. Both slots must be occupied. In single-processor board configurations, the processor board is installed in slot 9. A terminator board must be installed in slot 10. If a terminator board is not present, the system will not start. Remove the terminator board to install a second processor board following instructions that accompany that option.

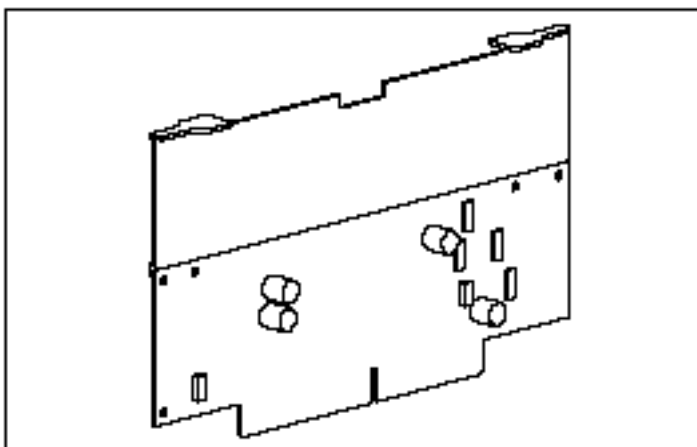


Figure 5-12. Terminator board

Chapter 6

Using the Compaq System Configuration Utility

The Compaq System Configuration utility performs a wide range of configuration activities including the following:

- Configures PCI and EISA boards automatically
- Provides switch and jumper settings
- Resolves resource conflicts in areas such as memory, port addresses, and interrupt requests (IRQs)
- Manages the installation of mass storage devices such as hard drives, tape drives and diskette drives
- Sets and stores power-on features like date and time
- Stores configuration information in non-volatile memory
- Assists in the installation of the operating system
- Assists in running diagnostic tools such as TEST and INSPECT

The first time the server is configured, the SmartStart program automatically creates a system partition and installs the configuration utility and other Compaq utilities in that partition.

IMPORTANT: This is a Compaq-specific system utilities partition and should not be confused with the partition(s) created by your operating system.

NOTE: The System ROM automatically configures memory and processor changes in Compaq ProLiant 5000 servers.

The Compaq System Configuration utility uses option configuration (.CFG) files to set up and configure the computer. The .CFG files provide such information as switch settings, IRQs, and software installation guidelines. The .CFG files for Compaq computers are located on the System Configuration diskettes and SmartStart CD.

For PCI boards, the utility reads the configuration options from the PCI board's configuration space from a PCI configuration file (.PCF).

Routinely, each EISA, PCI, and ISA expansion board is shipped with a diskette that contains the appropriate .CFG file. If for some reason the .CFG file is not shipped with the board, you may be able to find the file on either the Compaq Option Configuration Files diskette or the Non-Compaq Option Configuration Files diskette and SmartStart CD.

The .CFG file provides board resource requirements and switch and jumper setting alternatives. Although ISA boards do not have the automatic configuration capabilities of EISA and PCI boards, the System Configuration utility can allocate system resources to these boards and provide instructions for setting switches and jumpers.

Resolving Conflicts

If you add an EISA or PCI expansion board at some later date, the system becomes aware of this change when you turn on the computer. The system ROM reads the EISA or PCI board identifier and compares it with the current configuration information stored in non-volatile memory. If the codes do not match, you are prompted to run the configuration utility installed on the hard drive. This re-configures the system to accommodate the changes.

The configuration utility reads the option configuration .CFG files to determine whether there is a resource conflict, such as two devices requiring the same hardware interrupt. If the system identifies a conflict, the software then rechecks all the expansion board specifications to determine if settings for a previously read board can be changed to automatically resolve the conflict between the two boards.

Starting the Compaq System Configuration Utility

To start the Compaq System Configuration Utility for the first time, refer to the SmartStart Installation poster. Special considerations apply.

After the first time, to access the Compaq System Configuration Utility complete the following steps:

1. Reboot the server by pressing the **Ctrl+Alt+Del** keys.
2. Press the appropriate key when the following prompt appears at the top of the screen during Power-On Self-Test (POST).

Press "**F 9**" key for ROM-Based Diagnostics

Press "**F10**" key for System Partition Utilities

IMPORTANT: The text appears for only two seconds. If you do not press either F9 or F10 during this time, you must reboot the server.

System Configuration Utility Main Menu

This section provides an overview of the main menu options and explains how to access the menu and how to set the power-on features. The following options are available from the main menu:

- **System Configuration** - Takes you through the configuration process step-by-step. Select the System Configuration option any time a change in the configuration is required. For example, select this option when adding, replacing, or removing expansion boards, or adding a diskette drive or hard drive.
- **Operating System Installation** - Allows you to install one of the operating systems listed or to specify installation of one that isn't listed.
- **Diagnostics and Utilities** - Tests and inspects the computer.

- **Exit from this Utility** - Restarts the computer.

System Configuration Menu

The following options are available from the System Configuration Utility menu:

- Configure Hardware
- Power-On Defaults
- System Partition
- Configuration Backup

Configuring Hardware

When you select the Configure Hardware menu, a screen with five steps displays. Each step is briefly explained in the following section.

Step 1: Important System Configuration Information

This step provides an overview of the configuration process

Step 2: Add or Remove Boards

Use this step to add the ISA boards to the configuration or remove any boards from the configuration.

Step 3: View or Edit Details

Use this step to make necessary configuration changes.

IMPORTANT: If you edit a function or resource in Step 3, be sure also to review Step 4.

Step 4: Examine Required Switches

Use this step to find the required switch and jumper settings for most ISA boards. The switch and jumper settings for EISA boards are also available through this option.

Then adjust the switch and jumper settings on each board to match the settings displayed on the screen.

Step 5: Save and Exit

Use this step to save the configuration update whenever changes are made.

Setting Power-On Defaults

You can set and change the Power-On features at any time.

1. Select System Configuration from the Main Menu and then select Power-On Defaults.
2. Set the current date in the format:
MM-DD-YYYY
3. Set the correct time in the format:
HH:MM:SS
4. Set the Power-On Num Lock state:
() OFF
(*) ON

* This activates the numeric keypad when the computer is turned ON.

System Partition

The System Partition option allows you to copy and delete configuration files, and create, upgrade, or delete a system partition on the hard drive for the utilities.

The following menu options are available:

- Create System Partition
- Upgrade System Partition
- Delete System Partition
- Copy Files
- Delete Files

Creating a New System Partition

If you used SmartStart to configure your server and install your operating system, then this procedure was done for you. Use this procedure if the operating system was *not* installed on the server.

To create a new system partition, follow this procedure:

1. Insert the Compaq SmartStart CD in the CD-ROM drive and turn on the server.

IMPORTANT: The system partition requires six megabytes of disk space at the beginning of the hard drive and an unused entry in the boot record. SmartStart will prompt you to overwrite an existing DOS partition on the hard drive.

2. If the system is configured and there is space on the hard drive for the system partition, SmartStart automatically creates the partition and copies the Compaq Utilities from the Compaq SmartStart CD to the partition. This process takes two reboots. Leave the CD in the drive until the process completes. The process is complete when the CD main menu displays.

If the system is not configured, select the second or third button on the SmartStart first screen to configure the system automatically. After the system boots to save the configuration, the Compaq SmartStart CD creates the system partition and copies the Compaq Utilities to it. This process takes two reboots. Leave the CD in the drive until the process completes. The process is complete when the CD main menu displays.

Verifying the System Partition

To verify that the system partition exists, follow this procedure:

1. Remove any CD from the CD-ROM drive and any diskettes from the diskette drive.
2. Reboot the system by pressing **Ctrl+Alt+Del** or by turning the server OFF and then ON again.
3. Press the **F10** key when the following prompt appears.

Press "**F 9**" key for ROM-Based Diagnostics

Press "**F10**" key for System Partition Utilities

IMPORTANT: The text appears for only two seconds. If you do not press F10 within the two seconds, you must reboot the server.

4. If a system partition exists, the server boots to the partition. If not, a message displays that no system partition exists.

Upgrading the System Partition

To upgrade the system partition, follow this procedure:

1. Insert the Compaq SmartStart CD in the CD-ROM drive and turn on the computer.
2. Select *Non-SmartStart Setup*.
3. Select *System Configuration*.

4. Select *Upgrade System Partition* from the System Partition menu.
5. Select to upgrade the utilities. SmartStart copies the new utilities from the CD to the system partition.

Configuration Backup

The Configuration Backup option allows you to create a backup of the system configuration and to restore the system configuration from the backup.

The following menu options are available:

- Backup
- Restore

Configuring PCI Boards Automatically

The System ROM automatically configures PCI boards. If a user selection is required, a POST message directs the user to run the Compaq System Configuration Utility.

Configuring EISA Boards Automatically

You must run the Compaq System Configuration Utility when you install a new EISA board. If you fail to initiate the System Configuration utility the first time you turn on your computer after installing a new EISA board, a POST error message indicates a configuration error, meaning that the computer does not recognize the newly installed board.

To automatically update your server configuration after installing a new EISA board, complete the following steps:

1. Run the configuration utility from diskette or the system partition.
2. When prompted for the Automatic Configuration, press the **Enter** key. You will be prompted for an optional .PCF file. If no .PCF file was provided with your PCI board, press **Esc** to continue.
3. When the Automatic Configuration is completed, select *Review or Modify Hardware Settings*.
4. The *Steps in Configuring Your Computer* menu is displayed. Select one of the following options:
 - Step 1:** Important Configuration Information
 - Step 2:** Add or Remove Boards
 - Step 3:** View or Edit Details
 - Step 4:** Examine Required Switches
 - Step 5:** Save and Exit

If you want to view the configuration, use the arrow keys to select *View or Edit Details*, press the **Enter** key, and use the arrow keys to scroll through the available information.

5. When you are ready to exit the utility, select *Save and Exit*, then press the **Enter** key. This saves the configuration and re-starts the computer.

Removing Boards

System ROM automatically reconfigures the server after a PCI board or DIMM is removed.

After you remove an EISA board from the server, a POST error message displays the next time you start the server. Run the System Configuration Utility to automatically delete the EISA board memory entry.

Operating System Installation

Compaq ProLiant 5000 servers support the following operating systems:

- NetWare 3.x and 4.x
- Windows NT 3.5x
- SCO UNIX
- SCO OpenServer
- SCO UnixWare 2
- IBM OS/2 Warp and Warp Server
- IBM OS/2 2.x (Microsoft OS/2 not supported)
- MS-DOS 5.x-6.x
- Windows 3.1
- Banyan Vines

When you select the Operating System Installation feature from the main menu of the Configuration Utility, the utility provides prompts to simplify the installation.

First the utility prompts you to select the correct operating system. Use the arrow keys to select the operating system and press the **Enter** key. The utility then prompts you for the operating system CD or diskette.

Loading Compaq Device Drivers

Drivers are located on the Support Software Diskette and on the Compaq SmartStart CD. The drivers on the Support Software Diskette may be newer versions with new functionality, problem fixes and so on.

IMPORTANT: Always check for "README" files on SmartStart or any software support diskettes or CDs. If present, these files may contain information about important software updates.

NetWare Device Drivers from Compaq

Your server must have certain device drivers for some server options to operate using NetWare. These drivers are located on the Compaq SmartStart CD shipped with the server. If you use SmartStart to configure the server, these drivers will be installed automatically.

For more information on these drivers, run the *README.COM* file in the root directory of the NetWare Programs from Compaq diskette.

Manual installation

If you choose not to let SmartStart configure the server, follow this procedure:

1. Insert the Compaq SmartStart CD into the CD-ROM drive.
2. Boot your system.
3. Select *Non-SmartStart Setup*.
4. Follow the instructions that display on the monitor.

Windows NT 3.5x Device Drivers from Compaq

Drivers are supplied to support Windows NT 3.5x on ProLiant servers. They are located on the Support Software Diskette (SSD) for Windows NT, and some of the drivers are contained on the Windows NT retail product. These drivers are also located on the Compaq SmartStart CD. The drivers on the SSD may be newer versions due to new functionality, problem fixes and so on. If you use SmartStart to configure the server, these drivers will be installed automatically.

For more information on the drivers, run the README.BAT file in the root directory of the SSD for Windows NT. This will load the WinHelp file NTREADME.HLP.

Manual installation

If you choose not to let SmartStart configure the server, follow this procedure:

1. Insert the Compaq SmartStart CD into the CD-ROM drive.
2. Boot your system.
3. Select *Non-SmartStart Setup*.
4. Follow the instructions that display on the monitor.

SCO UNIX, Open Server and SCO UnixWare2 Device Drivers from Compaq

Your server must have certain device drivers for some server features to operate under the SCO UNIX, Open Server and SCO UnixWare 2 Operating Systems. These drivers are located on the Compaq SmartStart CD shipped with the server. If you use SmartStart to configure the server, these drivers will be installed automatically.

The features requiring device drivers are as follows:

- Compaq Ethernet/Token Ring Adapter
- Automatic Server Recovery-2
- Compaq Fast-Wide SCSI-2 Controller
- Compaq ProLiant Storage System

Manual installation

If you choose not to let SmartStart configure the server, follow this procedure:

1. Insert the Compaq SmartStart CD into the CD-ROM drive.
2. Boot your system.
3. Select *Non-SmartStart Setup*.
4. Follow the instructions that display on the monitor.

IBM OS/2 2.x Device Drivers from Compaq

Your server must have certain device drivers for some server options to operate using IBM OS/2 2.x. These drivers are located on the Compaq SmartStart CD you received with your server. If you use SmartStart to configure the server, these drivers will be loaded automatically.

Manual installation

If you choose not to let SmartStart configure the server, follow this procedure:

1. Insert the Compaq SmartStart CD into the drive.
2. Boot your system.
3. Select *Non-SmartStart Setup*.
4. Follow the instructions that display on the monitor.

Creating and Using the Configuration Backup and Configuration History Files

When saving and exiting the System Configuration Utility, the utility keeps a history of the configuration. The utility maintains three versions of the system configuration files including the current and two previous configurations in both binary (.SCI) and text (.CHL) file formats. The .CHL files are text-based files displaying information that is stored in the corresponding .SCI file. The .SCI files can be used to restore a previous configuration using the *System Configuration* menu and *Restore System Configuration from a .SCI File* submenu.

Table 6-1
System Configuration History Log Files

Filename	Description
SYSTEM.SCI	Current configuration information
SYSTEM1.SCI	Previous configuration information
SYSTEM2.SCI	Previous configuration information (oldest)
SYSTEM.CHL	Textual representation of SYSTEM.SCI file
SYSTEM1.CHL	Textual representation of SYSTEM1.SCI file
SYSTEM2.CHL	Textual representation of SYSTEM2.SCI file (oldest)

IMPORTANT: If there is not enough disk space for the entire System Configuration History Log, the utility will delete log files starting with the oldest files (SYSTEM2.SCI and SYSTEM2.CHL) until enough disk space is available for the current configuration backup and history files.

Clearing the Configuration



CAUTION: Do not use the System Configuration Maintenance switch to clear the contents of the EISA non-volatile memory when troubleshooting. Doing so may cause you to lose information.

To clear the computer configuration, you must set switch 6 on the system board to the ON position. Then cold boot the server (turn the power switch off, then back on). When you turn on this switch, also called the System Configuration Maintenance switch, you clear the configuration from non-volatile memory. The computer must then be reconfigured with switch 6 in the OFF position.



CAUTION: Be certain the power is turned OFF before you move switch 6.

IMPORTANT: In addition to the System Configuration and Configure Hardware option, you can also select System Configuration / Configuration Backup / Restore from a System Configuration .SCI File.

Switch Settings

- S6 = ON Erases, or clears the current System Configuration
- S6 = OFF (default) Uses the current System Configuration

To clear then reset the computer configuration, complete the following steps:

1. Turn OFF the server.
2. Remove the side access panel (cover on rack models).
3. Set switch 6 to the ON position.

Chapter 7

Network Interface Controllers

This chapter describes the Compaq 10/100 TX PCI UTP Board, the standard Network Interface Controller (NIC) in Compaq ProLiant 5000 and 5000R Servers, as well as other Compaq available as ProLiant 5000 options.

Compaq 10/100 TX PCI UTP Board

This 10/100 TX PCI UTP controller is preinstalled in Compaq ProLiant 5000 and 5000R Servers. The 10/100 TX PCI UTP provides support to 10 or 100 megabits per second (Mb/s) Ethernet networks. Because of the dual-speed capability, the 10/100 TX PCI UTP controller allows users currently running 10 Mb/s networks to upgrade to 100 Mb/s technology without changing controllers or drivers.

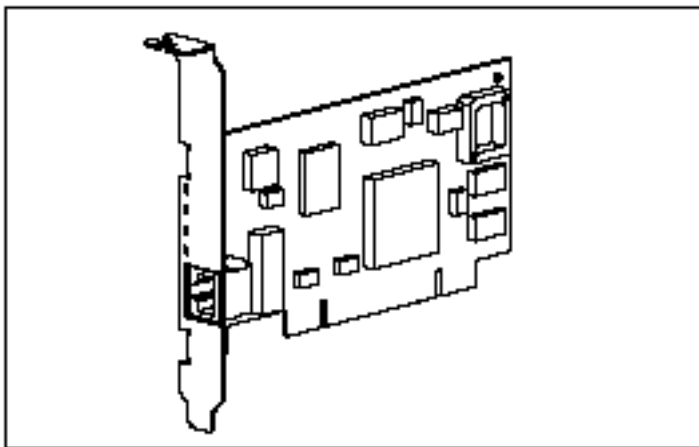


Figure 7-1. Compaq 10/100 TX PCI UTP Board

100Base-TX networks require a slightly different implementation than 10Base-T networks because new hubs and different wiring configurations are necessary. 100Base-TX supports a maximum of 100 meters of Unshielded Twisted Pair (UTP) from the hub to the workstation and up to 5 meters between hubs. 100Base-TX allows one layer of cascaded hubs, which makes the maximum network diameter 205 meters. In some installations, switching hubs may be needed to increase the diameter of a 100Base-TX network.

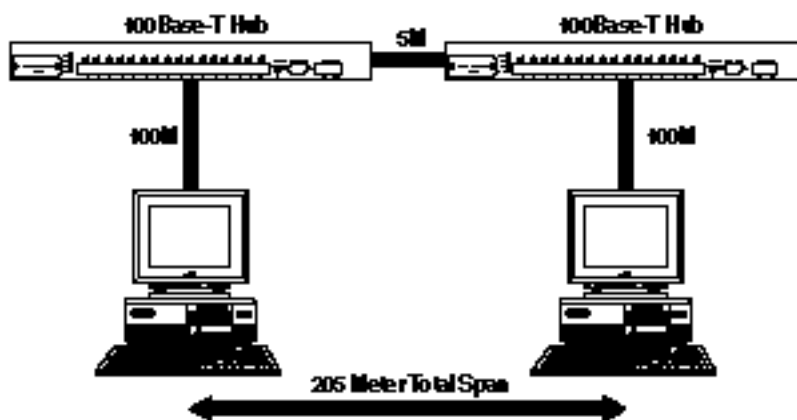


Figure 7-2. Typical 100Base-TX network

100Base-TX achieves 100-Mb/s speed by sending the signal 10 times faster than 10Base-T. Signal integrity is retained by using two pairs of data-grade, Category type 5 (CAT 5) cabling. Because 100Base-TX uses exactly the same transport method as 10 Mb/s Ethernet, it supports either half- or full-duplex operation. Full-duplex mode requires a hub and allows the network controller to transmit and receive simultaneously, for data throughput of up to 200 Mb/s.

100Base-TX does not operate over voice-grade (CAT 3) wire. Because CAT 3 wiring has been available longer than CAT 5, wall outlets, punch down blocks, and existing wiring configurations may not include CAT 5 accessories. 100Base-TX requires CAT 5 wall outlets and punch down blocks for proper operation. In addition, the building must be wired to EIA/TIA 568 specifications.

NIC Options for ProLiant 5000 Servers

Table 7-1 identifies and describes features of additional Compaq NICs supported by ProLiant 5000 servers.

Table 7-1 Network Interface Controller Options for ProLiant 5000 Servers					
Standard Features	10/100 TX PCI UTP	10 T PCI UTP	4/16 TR PCI IBM UTP/STP	4/16 TR PCI UTP/STP	NetFlex-3/P
Compaq Part No.	169845-001	242500-001	199762-001	265407-001	169810-001
Bulk Pack PN					
6 Packs	242527-001	242529-001	N/A	265407-002	N/A
50 Packs	242528-001	242530-001	N/A	265407-003	N/A
Technology	10/100Base-TX	10Base-T	Token Ring 802.2 and 802.5	Token Ring 802.2 and 802.5	10Base-T 10Base-2
Bus Type	PCI specification 2.0	PCI specification 2.0	PCI specification 2.0	PCI specification 2.0	PCI specification 2.0
Connectors/ Media	100Base-TX: Single RJ-45, 2 pair Category 5 10Base-T: Single RJ-45, 2 pair Category 3, 4 and 5	Single RJ-45, 2 pair Category 3, 4 and 5	Single RJ-45 supports both UTP and STP cabling	RJ-45 for UTP Category 3, 4 or 5; DB9 for STP Types 1, 1A or 6	BNC for 10Base-2, RJ-45 for 10Base-T
Features	10 or 100 Mb/s operation, plug and play, 32-bit bus-master, full duplex, 10/100 auto-negotiation	10Mb/s operation, plug and play, 32-bit bus-master, full duplex	4/16 Mb/s operation, IBM chip set, plug and play, 32-bit bus-master, full duplex	4/16 Mb/s operation, plug and play, 32-bit bus-master, full duplex, Scalable Clock Architecture	10Mb/s operation, upgradable to 100Base-TX or 100VG-AnyLAN, full duplex, 32-bit bus-mastering

Chapter 8

Fast-Wide SCSI-2 Subsystem

The Compaq ProLiant 5000 Server Fast-Wide SCSI-2 subsystems combine high-performance disk storage with improved data reliability. The SCSI subsystems support a variety of third-party SCSI-2 peripherals, including hard drives, tape drives and CD-ROMs.

The Compaq ProLiant 5000 disk subsystems have the following features:

- Up to 21.5 GB of internal disk capacity plus room for one tape drive (17.2 GB internal capacity on ProLiant 5000 tower)
- Supports industry-standard SCSI-2 peripherals
- 32-bit Fast-Wide SCSI-2 Controller integrated on the system board
- 20 megabytes per second Fast-Wide SCSI-2 data transfer rate
- Performance optimized software support

Integrated SCSI Device Controller

The ProLiant 5000 servers have a Compaq Fast-Wide SCSI-2 Controller embedded on the system board. This allows your server to access up to seven SCSI devices without using an expansion slot for an additional controller. Optional 32-bit Fast-Wide SCSI-2 Controller boards are available for controller duplexing or for expanding storage capacity beyond seven hard drives.

The Integrated Fast-Wide SCSI-2 Controller provides 32-bit bus master operations and data transfer rates of 20 megabytes per second. This allows high throughput in many network application environments, including resource-sharing and database servicing. The Integrated Fast-Wide SCSI-2 Controller also supports tagged command queuing, which allows the Fast-Wide SCSI-2 hard drives to queue and sort multiple commands and then execute them simultaneously.

The Integrated Fast-Wide SCSI-2 Controller complies with ANSI SCSI-2 standards, allowing the server to support both 8-bit Fast-SCSI-2 and 16-bit Fast-Wide SCSI-2 devices. Compaq SCSI-2 device drivers for NetWare include Open-Layered Software Architecture, based on the common access method (CAM) recommended by the ANSI SCSI CAM committee. This architecture provides software support for multiple hard drives, tape drives, and other SCSI devices on the same controller. Your server can support different SCSI devices on a single Integrated Fast-Wide SCSI-2 controller.

Multiple Controllers

The ProLiant 5000 architecture permits the addition of optional hard-drive controllers for all models. Compaq controllers are available for both PCI (recommended) and EISA expansion slots.

- Compaq 32-bit Fast-Wide SCSI-2/P Controller plugs into a PCI local bus
- Compaq 32-bit Fast-Wide SCSI-2/E Controller plugs into an EISA slot
- Compaq SMART-2 SCSI Array Controller greatly expands the versatility of the ProLiant 5000 Server

Multiple Fast-Wide SCSI-2 Controller Installation

When you install more than one Fast-Wide SCSI-2 Controller, the following considerations apply:

- Each Fast-Wide SCSI-2 Controller has an independent SCSI-2 channel that supports up to seven devices.
- Each SCSI-2 channel has its own set of unique SCSI IDs (from 0 to 6). You must assign each peripheral on the bus a unique ID for that bus.
- You *must* select the Integrated Fast-Wide SCSI-2 Controller as the default primary controller. Use the System Configuration Utility to select the Integrated Fast-Wide SCSI-2 Controller as the primary controller.

Interrupt Selection

You can configure the Integrated Fast-Wide SCSI-2 Controller to use one of four level-triggered interrupts. The Fast-Wide SCSI can share the interrupt level chosen for the Integrated Fast-Wide SCSI-2 Controller. ISA expansion boards cannot share the interrupt chosen for the Integrated Fast-Wide SCSI-2 Controller.

Multiple Drive Controllers

The server supports a variety of optional hard drive controllers, including the SMART-2 Array Controller and the Fast-Wide SCSI-2 Controller. See Chapter 4, "Performance Advantages of ProLiant 5000 Architecture," for guidelines on expansion board placement.

The server always boots from the hard drive controller identified as primary. The System Configuration Utility automatically assigns the primary controller unless you manually change the selection. The controller ordering selected during configuration also dictates the order in which some operating systems load hard drives. The system boots from the device with the lowest SCSI ID.

Boot Drive Options

SMART Controller	First Second Third ...
Fast-Wide SCSI-2 Controller	First Second Third ...

SCSI Configuration Notes

A SCSI configuration supports various devices such as hard drives, tape drives, and CD-ROMs. You can easily add or remove SCSI devices from a SCSI chain without concern for their order or sequential numbering.

Configuration Guidelines

- Boot from the CD-ROM Drive in the Compaq ProLiant 5000 Servers.
 - Each SCSI device must have a unique SCSI ID.
- A SCSI controller can daisy-chain up to seven hard drives, CD-ROM drives, scanners, tape drives, and/or other SCSI devices, with IDs ranging from 0 to 6. The ID number 7 is reserved for the controller. ID number 0 is the lowest priority device.
- You can have gaps in the SCSI chain, as long as you terminate the chain. Various forms of SCSI terminators exist. Some devices have jumpers to terminate the chain. In other cases, the drive controller has connectors to terminate the chain. Special terminating connectors are also available. Do not terminate a chain prematurely. If you do so, the drive controller might not access any devices that follow the first terminated device in the chain.

- SCSI controllers boot from the hard drive with the lowest SCSI ID.
- When installing SCSI devices that require frequent physical access, such as tape drives and CD-ROMs, install them in the Quick Access Area of your computer.
- Install hard drives that require infrequent handling in a drive bay.
- Consider separating your slower devices (such as tape drives and CD-ROMs) from higher speed devices (such as hard drives) by placing them on two separate controllers.
- You must connect external devices with properly shielded cables. Provide at least 12 inches (30.5 centimeters) of cable between devices. The total cable length cannot exceed 19.6 feet (6 meters).
- Modifying SCSI IDs changes the drive lettering (C, D, and so on).
- Plan your hard drive configuration and ID setup before putting data on drives where the drive letter is important (for example, batch files that assume a particular drive letter).
- Turn on external SCSI devices before turning on the server.

Storage Capacity Planning

Your server includes five internal storage bays (four on the ProLiant 5000 tower models) for drive expansion. You can also use three removable media drive bays for removable media peripherals. A CD-ROM Drive and a 3 1/2-inch diskette drive are preinstalled in two of the bays.

You can further expand the storage capacity by adding the Fast-Wide SCSI-2 Controller and external storage devices. Each Fast-Wide SCSI-2 Controller supports up to seven devices. Combining the Integrated Fast-Wide SCSI-2 Controller with four Fast-Wide SCSI-2 Controllers provides a total storage capacity of 35 drives or up to 150.5 GB of storage.

Fast-Wide SCSI-2 Hard Drives

The Integrated Fast-Wide SCSI-2 Controller is compatible with industry standard Fast-SCSI-2 and Fast-Wide SCSI-2 peripherals. It supports up to seven internal or external single-ended SCSI-2 devices (asynchronous, synchronous or fast synchronous).

Compaq ProLiant 5000 models support high-performance 4.3-GB and 2.1-GB Fast-Wide SCSI-2 hard drives, and will support 9-GB Fast-Wide SCSI-2 hard drives when they become available.

Integrated Fast-Wide SCSI-2 Connector and Cable

The Integrated Fast-Wide SCSI-2 Controller includes both an external Fast-Wide SCSI-2 connector and an internal Fast-Wide SCSI-2 connector on the same bus. A terminated SCSI cable is attached to the internal SCSI connector. If you add SCSI devices, be certain this cable still is terminated.

In non-array server models, this cable connects to one end of the drive cage backplane board. The internal SCSI bus continues along the backplane and through another cable to the CD-ROM player. The bus ends at a terminator beyond the CD-ROM player.

If you add a SMART-2 Array Controller, you must replace the internal SCSI controller-backplane connection with a link from the SMART-2 controller to the backplane. The CD-ROM player then connects directly to the integrated Fast-Wide SCSI-2 controller. Ensure that this cable still is terminated beyond the CD-ROM drive. Follow the detailed instructions in the *Compaq SMART-2 Array Controller User Guide* that accompanies the new controller.

Do not operate the system without the internal SCSI cable connected, even if no devices are attached to it. If the cable is removed, a POST error code will be generated and the system will not boot.

SCSI-2 Device Installation

All SCSI hard drives on the same SCSI channel must be either internal or in an external storage system, but not both. A configuration with both internal and external SCSI drives requires more than one single-channel SCSI controller or a multi-channel controller such as the SMART SCSI Array Controller.

SCSI IDs

The Fast-Wide SCSI-2 controller contains a single SCSI-2 bus that supports up to seven SCSI-2 peripherals. The internal and external connectors reside on the same SCSI-2 bus, and peripherals attached to either connector must have a unique SCSI ID. Switches or jumpers on SCSI-2 peripherals select a SCSI ID that ranges from 0 to 6. The SCSI ID determines the device's priority when attempting to control the Fast-Wide SCSI-2 bus. The server assigns the SCSI-2 controller to the highest priority by setting the controller's SCSI ID to 7. For maximum performance, connect low throughput peripherals on separate Fast-Wide SCSI-2 buses. If low-throughput peripherals are connected to the same bus as high-throughput peripherals, the low peripherals should be assigned to high SCSI IDs to prevent starvation by high bandwidth devices such as SCSI-2 hard drives.

Use the Inspect Utility to obtain the SCSI ID of the installed SCSI-2 peripherals.

Tips for Troubleshooting the Fast-Wide SCSI-2 Controller

Following are tips that may be helpful in troubleshooting problems reported in POST Error Messages or Diagnostic Error Codes.

- Check for improper or premature termination.
Improperly terminated devices can prevent the drive controller from recognizing any of the connected devices. Premature termination means that a device other than the last device in the chain terminates, effectively cutting off the remaining devices from the chain.
- Check for two SCSI devices with the same ID.
Typically, configuring a device for ID 0 does not require setting any jumpers or switches. If the chain has more than one device as ID 0, it can cause conflicts. You must verify the jumper or switch settings on all your devices to ensure you do not have two SCSI devices with the same ID.
- Check for improper cabling.
Verify the cabling is within the requirements mentioned previously and corresponds with any documentation provided with your SCSI devices. Some devices might not be fully compatible with the SCSI specification and can cause intermittent problems. Try to isolate the problem by removing one device at a time from your configuration and noticing if the problems repeat.

Chapter 9

Compaq SMART-2 SCSI Array Controller

The Compaq SMART-2 Array Controller, a dual-channel 32-bit SCSI array controller with advanced features, is standard on many Compaq ProLiant 5000 Servers and also available as an option. The SMART-2 Controller supports Fast-Wide SCSI-2 as well as Fast-SCSI-2 hard drives and is available in both PCI and EISA system interfaces. The Compaq Array Configuration Utility, included with the SMART-2 Controller, provides for easy setup and changes to the drive arrays.

SMART-2 Array Controller Features

Here are some of the features of the SMART-2 Array Controller option board. Refer to the following section for an explanation of these features.

- Available in 32-bit PCI and EISA Bus-master interfaces
- Support for Fast-Wide SCSI-2 and Fast-SCSI-2 hard drives
- Dual SCSI channels on a single board support up to 14 drives
- Separate Fast-Wide SCSI-2 port connectors: one internal, one external
- Removable battery-backed 4-MB Array Accelerator Read/Write Cache with ECC (Error Checking and Correcting) memory
- Support for RAID 5, 4, 1, and 0 fault tolerance options
- Multiple logical drives per drive array
- Automatic performance tuning
- Performance monitor
- Read-ahead caching
- Tagged command queuing

SMART-2/P Array Controller

The SMART-2/P SCSI Array Controller interface to the server processor is a Peripheral Component Interface (PCI) bus. The PCI bus is a high-performance, 32-bit bus with multiplexed address and data lines, and includes a parity signal. It provides a high-speed (up to 133 megabytes per second) path between the system board and the SMART-2 SCSI Array Controller. The Array Accelerator allows these very high data rates to enhance performance while the data transfer to and from the drives is at a slower rate.

SMART-2 Array Controller/P is a PCI Bus-master device and conforms to Rev. 2.0 of the PCI Local Bus Specification.

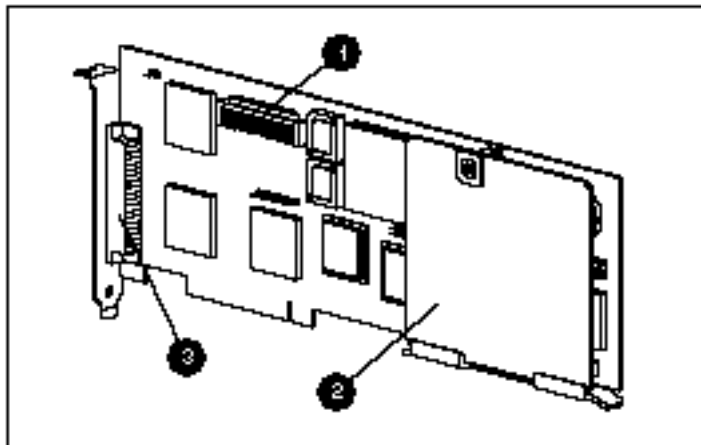


Figure 9-1. SMART-2 Array Controller/P

Major components of the SMART-2 Controller/P include:

- ❶ Internal Fast-Wide SCSI-2 Bus 1 connector
- ❷ Array Accelerator board
- ❸ External Fast-Wide SCSI-2 Bus 2 connector

Fast-Wide SCSI-2

The SMART-2 Controller complies with ANSI SCSI-2 standards, supporting both 16-bit Fast-Wide SCSI-2 (wide SCSI) and 8-bit Fast-SCSI-2 (standard SCSI) devices. Fast-Wide SCSI-2 provides two bytes of data at each bus transfer, doubling the data rate between SCSI devices to a maximum of 20 megabytes per second while still maintaining a 10 MHz bus rate.

Fast-Wide SCSI-2 controllers and devices must be able to communicate using Fast-SCSI-2 protocol when required. Therefore, Fast-SCSI-2 drives may also be used with SMART-2 Controller with the appropriate cable adapter.

Tagged Command Queuing

The SMART-2 Controller also supports tagged command queuing, which allows SCSI hard drives to queue and sort multiple commands and then execute the commands simultaneously.

SCSI Bus Connectors

The SMART-2 Controller has two Fast-Wide SCSI-2 bus connector ports, one internal (Bus 1) and one external (Bus 2). This allows direct connection to internal drives on one bus and external drives on the other. The internal port may be brought out of the server chassis with a special internal/external cable (supplied) to make both SCSI buses external.

The internal Fast-Wide SCSI-2 port is a standard 68-pin subminiature “D” connector. This connector is accessible on the top edge of the board.

The external Fast-Wide SCSI-2 port is a standard 68-pin subminiature “D” connector, mounted on the SMART-2 Controller slot panel and accessible at the back of the server. Screw locks are provided for securing external SCSI cables.

IMPORTANT: All SCSI hard drives on the same SCSI bus must be either internal to the server or in an external storage system, but not both. A configuration with both internal and external SCSI hard drives requires more than one SCSI bus.

Array Accelerator

An Array Accelerator is available on the SMART-2 Controller to improve performance on data access to the drive array. The write cache can accept data from the server at the maximum PCI or EISA burst rate while writing to the array at the time and rate the drives can accommodate. The read cache accepts data from the array and acts as a buffer to transfer the data to the server at higher data rates. The Array Accelerator feature may be disabled by software if desired.

The Array Accelerator write and read cache is made up of ECC (Error Checking and Correcting) memory, providing a high level of data integrity without mirroring. ECC memory can detect and correct some hard and soft memory errors without affecting performance.

The write cache memory is backed up with onboard rechargeable batteries, insuring that the data temporarily held (cached) there is safe even with equipment failure or power outage. The batteries will preserve data in the write cache for up to four days.

IMPORTANT: The rechargeable batteries on a new SMART-2 Controller may be discharged when the board is first installed. During server power up with discharged Array Accelerator batteries, POST (Power On Self Test) will display the code "1794," indicating that the Array Accelerator is disabled. This is not a problem that requires action on your part. The Array Accelerator will automatically be enabled when the batteries are charged to 90% of their capacity.

It may take up to 36 hours for the internal circuitry to charge the batteries fully. During this time the Array Accelerator will be disabled but the SMART-2 Controller will function properly, although without the performance advantage of the Array Accelerator.

The Array Accelerator, with backup batteries, is located on a removable daughter board. This allows any data cached there to be moved to another SMART-2 Controller for permanent storage if necessary. Thus data that happened to be in the write cache in the unlikely event of a SMART-2 Controller failure can be recovered.

Automatic Performance Tuning

The SMART-2 Controller has the ability to adjust or tune its performance without manual intervention. For example, if caching is enabled but the SMART-2 Controller determines that it is no longer beneficial, caching will automatically be disabled. Or, if write or read-ahead caching would improve performance but it has been automatically disabled, SMART-2 Controller will automatically enable it again.

Table 9-1
Operating System Compatibility

Operating System		SMART Controller Mode	Full SMART-2 Controller Support
NetWare	3.11	No	No
	3.12	Yes	Yes
	4.xx	Yes	Yes
Windows NT Server	3.1	No	No
	3.5x	Yes	Yes
OS/2	1.3	No	No
	2.x	Yes	Yes
	3.x	Yes	Yes
SCO UNIX	3.2	No	No
	4.2	No	No
	5.0	Yes	Yes
UnixWare	1.x	No	No
	2.0	Yes	Yes
Banyan VINES	5.xx	No	No
	6.xx	Yes	Yes
Windows 95		No	Yes*
DOS/Windows		No	Yes*

* Primary controller only (INT13 support via the SMART-2 Controller option ROM)

Features of the Compaq Array Configuration Utility

The Compaq Array Configuration Utility is an easy to use graphical configuration utility to help you set up and change drive array configurations. This utility:

- Provides a graphical view of Compaq drive array configurations
- Provides express or custom initial configuration
- Supports easy capacity expansion
- Supports RAID 0, RAID 1, and RAID 5 fault tolerant configurations (also supports existing RAID 4 configurations)
- Helps maximize your array configuration with configuration Wizards
- Sets drive rebuild and expand priorities
- Allows online spare (hot spare) configuration
- Allows separate fault tolerance configuration on a logical drive basis

For more information on these features see Chapter 10, “Server Management.”

Software Upgradable Firmware

Software Upgradable Firmware (Flash ROM) allows you to upgrade the read-only memory (ROM) in the SMART Array Controller by using a firmware upgrade utility available from Compaq. You do *not* need to replace the ROM chip to upgrade the firmware. This upgrade utility is located on the Compaq SmartStart CD and installs automatically if you use SmartStart to configure your system.

Chapter 10

Server Management

Compaq ProLiant 5000 Servers have server management features that provide in-depth monitoring, analysis, and control of the fault tolerance, performance, and configuration aspects of the servers. These server management features include:

- Server Parameter Tracking
- Server Fault Tolerance
- Rapid Recovery Services
- Remote Service Features

Server Parameter Tracking

Server parameter tracking provides timely fault, performance, and configuration information associated with the server environment and the critical server subsystems of the processor, memory, and I/O (storage and network interface). Your server uses a combination of hardware, firmware, and industry-standard management software to implement this feature.

The following topics provide information on specific parameters that your server monitors.

Environment

Level I Temperature, Fan Failure - Auto Shutdown

You can configure your server to start an automatic, orderly operating system shutdown if your server detects that the factory preset system temperature was exceeded or that a fan failure has occurred. This allows for proper clean-up of operating system files, reducing server recovery time when the temperature returns to normal or the fan is replaced. This shutdown also decreases the potential for heat-related damage to the system components. Use Insight Manager or the Compaq System Configuration Utility to set this option.

Level II Temperature, Immediate Shutdown

When temperatures exceed the factory preset level II temperature threshold, the hardware tracking of the system thermal environment executes an immediate power supply shutdown. This shutdown decreases the potential for heat-related damage to the system components.

Power Supply Tracking

If an optional redundant power supply is installed, an alert is generated in the event of partial power supply failure. Contact your Compaq Authorized Service Provider promptly to arrange replacement.

AC Power Failure - Auto Shutdown

You can configure your server to start an automatic operating system shutdown when the AC power is out and the Compaq UPS battery storage time falls below a setting that you establish. This shutdown allows for proper clean-up of operating system files, reducing server downtime if AC power does not return before battery depletion. Use Insight Manager or the Compaq System Configuration Utility to set this option.

Storage Subsystem Thermal Tracking

The hardware tracking of the storage chassis thermal environment provides an alert to the Insight Manager console when the storage subsystem temperature exceeds the factory preset temperature threshold.

Battery Failure Tracking

The hardware has the ability to notify you of a failing real-time clock battery before a failure actually occurs. This will enable you to replace the battery at a scheduled maintenance check and ensure you don't lose valuable non-volatile RAM information.

Data Storage

Fault Prevention Tracking

Your server tracks six fault prediction parameters of the Compaq SMART-2 SCSI Array Controller and its attached hot-pluggable drives. This enables proactive scheduling of maintenance to avoid impending drive controller or hard drive failure.

Dynamic Sector Repairing

Your server has a background hardware diagnostic capability that scans fixed disk drives and automatically remaps any bad sectors it detects. This ensures the highest level of data reliability without requiring user intervention.

Network Fault Prevention Tracking

Your server tracks six fault prediction parameters (such as excessive collisions, frames transmitted after single or multiple collisions) of Ethernet and Token Ring network interfaces. This enables prevention of impending network interface problems.

Memory Fault Prevention Tracking

Your server tracks the operation of the Error Checking and Correcting memory subsystem, looking for any correctable memory errors. This enables proactive scheduling of maintenance and the recovery from impending Error Checking and Correcting memory failures.

Server Fault Tolerance

Several types of fault tolerance are available with Compaq ProLiant 5000 Servers. The following topics provide details about these types.

Disk Subsystem Fault Tolerance

You can specify the level of disk subsystem fault tolerance on your Compaq ProLiant 5000 Server if you are using the Compaq SMART-2 Array Controller. Your fault tolerance options are as follows:

- RAID 0 – Data striping with no fault tolerance
- RAID 1 – Drive mirroring
- RAID 4 – Data guarding
- RAID 5 – Distributed data guarding

You select the desired RAID level by using the Compaq System Configuration Utility.

Other Fault Tolerance Features

- **N+1 Distributed Data Guarding** – Stores all parity data on a single drive. This technique minimizes the cost and capacity required to guard data (as little as 7 percent of total capacity is required for full protection).
- **Online Spare** – Uses up to four installed spare drives to provide replacement for a failed drive without intervention. This allows your server to return quickly to a full fault-tolerant operating condition.
- **Hot-Pluggable SCSI Drive Support** – Allows the quick removal of SCSI drives without powering down the server and without using screws or cables. This maximizes uptime by allowing your server to stay on line while you replace hard drives.

- **Controller Duplexing** – Uses duplicate controllers and drive arrays to protect against hard drive or controller failure. You can use this feature only if you have a Compaq ProLiant Storage System and an operating system that supports controller duplexing.

Memory System Error Correction

The memory system in the Compaq ProLiant 5000 Server uses Error Checking and Correcting Memory to detect and correct all single-bit memory parity errors. This ensures the correction of common memory errors without interrupting system operation.

Rapid Recovery Services

Rapid recovery means fast identification and resolution of complex faults. The Rapid Recovery Engine and Management Agents notify the administrator when a failure occurs, ensuring that the server experiences minimal downtime. You enable these features by using the Compaq System Configuration Utility v2.10 or later.

These integrated server management features are:

- Server Health Logging
- Storage Fault Recovery Tracking
- Storage Automatic Reconstruction
- Network Interface Fault Recovery Tracking
- Memory Fault Recovery Tracking
- Off-Line Backup Processor
- Automatic Server Recovery-2 (ASR-2)

Server Health Logs

The Server Health Logs contain information to help identify and correct server failures or correlate hardware changes with server failures. The Server Health Logs are stored in nonvolatile RAM and consist of the Critical Error Log and the Revision History Table.

In the event that errors occur, information about the errors are automatically stored in the Critical Error Log.

Whenever boards or components (that support revision tracking) are updated to a new revision, the Revision History Table will be updated.

Critical Error Log

The Critical Error Log records memory errors as well as catastrophic hardware and software errors that cause the system to fail. This information helps you quickly identify and correct the problem, minimizing downtime.

The log can be viewed through the Inspect Utility, Diagnostics Utility, Compaq Insight Manager, or the optional Remote Insight Board. The Diagnostics Utility either resolves the error or suggests corrective action.

The Critical Error Log identifies and records all the following errors. Each error type is briefly explained below. When any of these errors are encountered, you should run the Diagnostics Utility.

Table 10-1
Critical Error Log Error Messages

Error Message	Description
Automatic Server Recovery Base Memory Parity Error	The system detected a data error in base memory following a reset due to the Automatic Server Recovery (ASR-2) Timer expiration.
Automatic Server Recovery Extended Memory Parity Error	The system detected a data error in extended memory following a reset due to the ASR-2 Timer expiration.
Automatic Server Recovery Memory Parity Error	The system ROM was unable to allocate enough memory to create a stack. Then, it was unable to put a message on the screen or continue booting the server.
Automatic Server Recovery Reset Limit Reached	The maximum number of system resets due to the ASR-2 timer expiration has been reached, resulting in the loading of Compaq Utilities.
Error Detected On Boot Up	The server detected an error during the Power-On Self-Test.
Diagnostic Error	An error was detected by the Diagnostics utility. Refer to the specific error code in this chapter for a detailed explanation.
NMI - PCI Bus Parity Error	A parity error was detected on the PCI bus.
NMI - Expansion Board Error	A board on the expansion bus indicated an error condition, resulting in a server failure.
NMI - Expansion Bus Master Time-Out	A bus master type expansion board in the indicated slot did not release the bus after its maximum time, resulting in a server failure.

Critical Error Log Error Messages *Continued*

Error Message	Description
NMI - Fail-Safe Timer Expiration	Software was unable to reset the system fail-safe timer, resulting in a server failure.
Processor Exception	The indicated processor exception occurred.
NMI - Processor Parity Error	The processor detected a data error, resulting in a server failure.
Server Manager Failure	An error occurred with the Server Manager/R
NMI - Software Generated Interrupt Detected Error	Software indicated a system error, resulting in a server failure.
Caution: Temperature Exceeded	The operating system has detected that the temperature of the system has exceeded the caution level. Accompanying data in the log notes if an auto-shutdown sequence has been invoked by the operating system.
Abnormal Program Termination	The operating system has encountered an abnormal situation which has caused a system failure.
ASR-2 Test Event	The System configuration utility generated a test alert.
NMI- Automatic Server Recovery timer expiration.	The operating system has received notice of an impending ASR-2 timer expiration.
Required System Fan Failure	The required system fan has failed. Accompanying data in the log notes if an auto sequence has been invoked by the operating system.
UPS A/C line Failure Shutdown or Battery Low	The UPS notified the operating system that the AC power line has failed. Accompanying data indicates if an Auto-shutdown sequence has been invoked or if the battery has nearly been depleted.
ASR-2 detected by ROM	An ASR-2 has been detected and logged by the system ROM.

Power On Error Log

The Power On Error Log records any errors that occur during Power-On Self-Test (POST). It helps you quickly determine the cause of a server's failure to restart.

Revision History Table

Some errors can be resolved by reviewing changes to the servers configuration. The server has an Automatic Revision Tracking (ART) feature that helps you review recent changes to the server's configuration.

One ART feature is the Revision History Table which contains the hardware version number of the system board and any other System boards providing ART-compatible revision information. The Revision History format resembles Table 10-2.

Table 10-2
Revision History Format

	Values
Functional Revision Level	A to BC
Assembly Version	1 = Original Assembly
	2 = Second Generation Assembly
	3 = Third Generation Assembly
	4 = Fourth Generation Assembly

The Revision History Table is stored in nonvolatile RAM and is accessed through Diagnostics, Inspect, Compaq Insight Manager.

The Revision History Table feature allows precise identification of the components in a server. The table is updated when the system ROM detects a board version change in an System expansion slot. The table also contains complete version information on the previous configuration. This feature allows correlation of hardware changes with server failure. The following information is stored in the Revision History Table:

- Type of board (System or Expansion)
- Slot number
- EISA ID
- Version

Storage Fault Recovery Tracking

This feature tracks over 12 failure indication parameters (such as time-outs, spin-up, and self-test errors) of the SMART-2 Array Controller, Fast-SCSI-2 Controller, and their attached hot-pluggable drives. You can use these parameters to pinpoint failed storage subsystem components and to recover from controller or hard drive failure.

Storage Automatic Reconstruction

This feature automatically reconstructs data to an on-line spare or to a replaced drive if a drive fails. To use the reconstruction feature, you must configure your server for drive mirroring or data guarding. The reconstruction decreases system downtime by allowing rapid recovery to full system operation if a drive fails.

Network Interface Fault Recovery Tracking

This feature tracks over 20 failure indication parameters (such as alignment errors, lost frames, and frame copy errors) of Ethernet and Token Ring network interfaces. It decreases network downtime by enabling diagnosis of actual network interface failures.

Memory Fault Recovery Tracking

This feature inspects the operation of the memory subsystem looking for uncorrectable memory errors.

Off-Line Backup Processor

The Off-Line Backup Processor feature of Compaq ProLiant 5000 Servers gives a MultiProcessing system the ability to continue operating after one or more processors fail. Upon restart failure, the system bypasses the usual bootstrap CPU and attempts to restart a different CPU. If boot failure persists, the system automatically tries different combinations of CPUs until a successful combination is found. If the restart attempt sequence fails, none of the CPUs is bootable and a service call is required.

Automatic Server Recovery-2

Automatic Server Recovery-2 (ASR-2) is a feature that can set the server to restart automatically from the operating system or the Compaq Utilities. The Compaq Utilities must be installed in the system partition using the Compaq System Configuration Utility.

You can enable the ASR-2 feature to restart your server after a critical hardware or software error occurs. Using the Compaq System Configuration Utility, you can choose to configure the system for either automatic recovery or for attended local or remote access to diagnostic and configuration tools. You can also configure ASR-2 to page an administrator when the system restarts.

The ASR-2 feature depends on the application and driver that routinely notify the ASR-2 hardware that the system is operating properly. If the time between ASR-2 notifications by the application and driver exceeds the specified time period, ASR-2 assumes a fault has occurred and initiates the recovery process.

The available recovery features are as follows:

- **Software Error Recovery** – automatically restarts the server after a software-induced server failure
- **Environmental Recovery** – allows the server to restart when temperature, fan, or AC power conditions return to normal
- **Processor Recovery** – automatically reconfigures the server to operate without removing a processor board that has failed after an ASR restart.

Unattended Recovery

For unattended recovery, ASR-2 logs the error information to the Critical Error Log, resets the server, pages you (if a modem is present and you selected paging), and tries to restart operating system. Often the server restarts successfully, making unattended recovery the ideal choice for remote locations where trained service personnel are not immediately available.

The ASR-2 feature tries to restart the server up to 10 times. If the ASR-2 feature cannot restart the server within the 10 attempts, ASR-2 places a critical error in the Critical Error Log, starts the server into the Compaq Utilities, and enables remote access if configured for remote access. If the server cannot start into the Compaq Utilities, then ASR-2 automatically invokes the ROM-based diagnostics.

To use this level of ASR-2, you need to configure ASR-2 to load the operating system after restart.

Attended Recovery

For attended recovery, ASR-2 logs the error information to the Critical Error Log, resets the server, pages-you (if a modem is present and you selected Paging), starts the Compaq Utilities from the hard drive, and enables remote access. These utilities are placed on the system utilities partition on the hard drive during system configuration. If you have configured for dial in access and have a modem with an auto-answer feature installed, you can dial in and remotely diagnose or reconfigure the server. If you have configured the Compaq Utilities for network access, then you can access the utilities over the network. You can use Insight Manager for dial-in or network access.

Hardware Requirements

To use this Level of ASR-2 over a modem, you need the following:

- Compaq System Configuration Utility and Diagnostics Utility installed on the system partition of the hard drive
- ASR-2 configured to load the Compaq Utilities after restart
- Compaq modem or optional Hayes-compatible modem

You may also run Compaq Utilities remotely over an IPX or IP network using the Network feature.

To use Compaq Utilities on an IPX network, you must have Compaq Insight Manager 2.0 or above or an NVT (Novell Virtual Terminal) Terminal Emulator with VT100 or ANSI terminal capabilities. To use Compaq Utilities on an IP network, you must have Insight Manager 2.10 or above or a Telnet Terminal Emulator with VT100 or ANSI capabilities.

If you receive notification that ASR-2 restarted the server and you have restarted to Compaq Utilities, use the Inspect utility or Compaq Insight Manager to view the critical error in the Critical Error Log. Run Diagnostics software to diagnose the problem, and then resolve the problem.

You can configure ASR-2 to restart the server into Compaq Utilities to diagnose the critical error, or to start the operating system to return the server to operational status as rapidly as possible.

When you enable ASR-2 to start the operating system, the server tries to start from the primary partition. In this mode, ASR-2 can page you in the event of a critical error, but you cannot access Compaq Utilities.

When you enable ASR-2 to start Compaq Utilities, your server restarts after a critical error and loads the Compaq Utilities from the system partition on the hard drive.

You can configure your server to start Compaq Utilities in four different ways:

- Without remote console support; for example, to run Compaq Utilities from the server console only
- With remote console support using modems for dial-in access
- With remote console support using a modem to dial a predetermined telephone number.
- With remote console support through a network connection (IP or IPX).

IMPORTANT: Before configuring ASR-2, verify that the Compaq System Configuration Utility and Diagnostics software are installed on the system partition. ASR-2 must have this to start the Compaq Utilities after a system restart. Compaq recommends this even if you configure ASR-2 to start the operating system.

1. Execute the Compaq System Configuration Utility.
2. Select *View and Edit Details*.
3. Set the software error recovery status to Enabled.
4. Set the software error recovery time-out.

The Compaq Health Driver resets the ASR timer according to the frequency specified in the configuration utility (for example, 10 minutes). If the ASR timer counts down to zero before being reset, the ASR utility restarts the server into either the Compaq Utilities or the operating system (as indicated by the System Configuration parameters). The default value is 10 minutes. The allowable settings are 5, 10, 20, and 30 minutes.

For remote and off-site (unattended) servers, setting the software error recovery time-out for 5 minutes reduces the server downtime and allows the server to recover quickly. For local (attended) servers that may be located elsewhere on site, setting the software error recovery time-out for 20 or 30 minutes allows you to arrive at the server and diagnose the problem.

5. Set the software error recovery start option. You can choose to start into the Compaq Utilities or into the operating system.

The Compaq Health Driver is independent of the ASR-2 timer. You can load it without enabling the ASR-2 timer. This allows the driver to log information in the Server Health Logs without restarting the server in the event of a critical error. However, you cannot enable the ASR-2 timer without loading the driver.

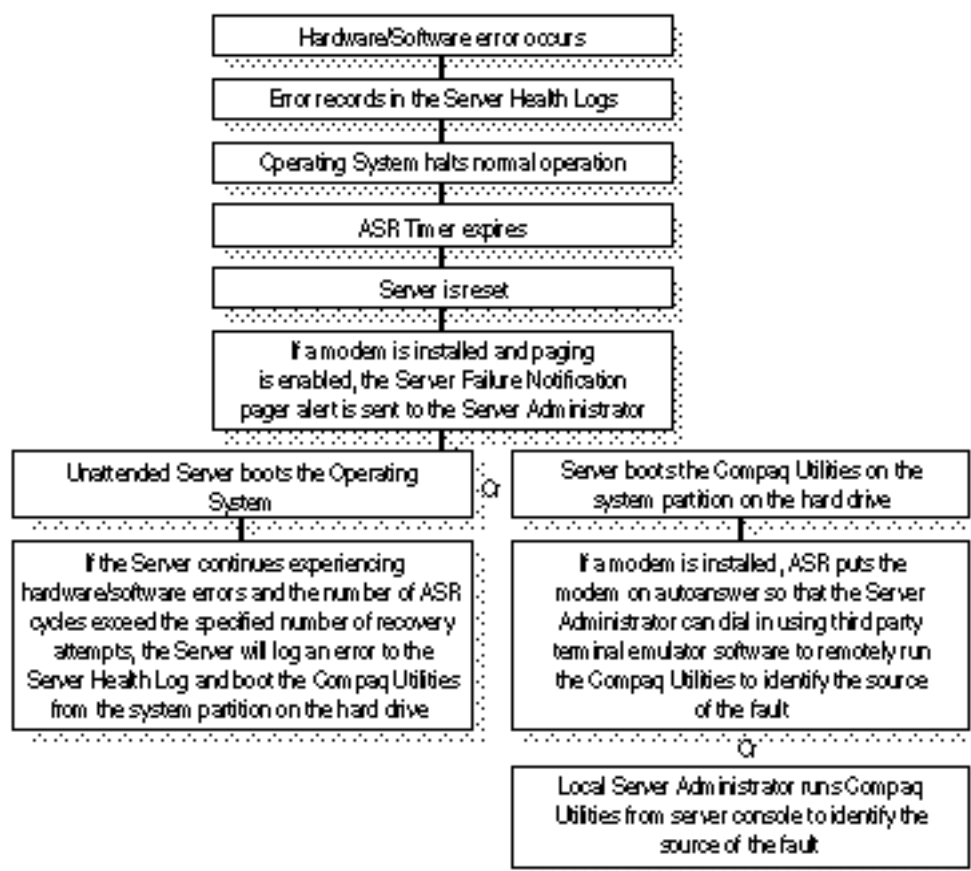


Figure 10-1. ASR-2 Flow Chart

Booting into the Compaq Utilities

When you enable ASR-2 to start into the Compaq Utilities and a critical error occurs, the operating system-specific Health Driver logs the error information in the Critical Error Log and the ASR-2 feature restarts the server. When the system reinitializes, the system pages the designated administrator (if enabled), and starts the Compaq Utilities from the hard drive.

If Dial-In status is enabled, then the modem is placed in auto answer mode. If you enable Dial-Out status, then you are automatically enabled for dial-in.

If Network Status is enabled, then the appropriate network support software is loaded depending on the Network protocol (IP or IPX). This allows remote access via the network.

IMPORTANT: The Compaq Utilities are loaded from a specially created System Partition on the hard drive that was configured during server configuration.

You can access the server and view the Server Health Logs remotely via a modem, in-band over the network, or directly from the server. For modem access, you must have either Insight Manager 2.0 or above or have a VT100 or ANSI terminal type device. You may use a standard CRT with VT100 or ANSI emulation capability or you may use a PC with a VT100 or ANSI terminal emulation package. The communication parameters must be set for 8 data bits, no parity, and 1 stop bit.

You can also enable ASR-2 to allow network access using the Network Status feature in the System Configuration Utility. You must have either Insight Manager 2.0 or greater or a Novell Virtual Terminal (NVT) emulator on an IPX network to use this feature. You must also have version 2.24 or later of the System Configuration Utility. For IP access, you must have either Insight Manager 2.10 or above or a Telnet Terminal emulator to use this feature. You also must have version 2.24 or later of the System Configuration Utility.

The configuration utility settings should resemble the following when you enable ASR to start into the Compaq Utilities:

Table 10-3
Compaq System Configuration Utility
Pager Settings for Starting into Compaq Utilities

Pager Data	Setting	Description
Pager status	Enabled	Indicates if the pager feature is enabled or disabled.
Pager dial string	ATDT 555-5555	Indicates the pager dial string and delay before the pager message. Pagers typically use one of the following formats: Local pagers: ATDT 555-5555,, Wide area pagers: ATDT 1-800-555-5555,,,,,1234567#
Pager message	1234567#	Represents a unique number (maximum seven digits, numeric only) that you must designate to identify the server on your pager display. The ROM adds a three-digit code to the front of this number. The first two indicate the subsystem and the third indicates the severity of the error that caused the alert. The # symbol usually terminates the message. If no message is required, delete the # symbol.
Pager test	Select to test pager setup	Use this to test the current pager settings. Press Enter to dial the pager number, and the pager message (if present) displays. You must configure the computer before testing the pager and the Pager Status must be set to Enabled. Do not test the pager if you are running remotely and are only using one modem.

Table 10-4
Compaq System Configuration Utility
Remote Option Settings for Booting Compaq Utilities

Option	Setting	Description
Serial interface	COM1	Select the communications port for the modem used by the pager and the remote ASR-2 functions. The options are COM1 and COM2.
Dial-in status	Enabled	<p>Set Dial In Status to Enabled and make sure the Reset Boot option is set to Boot Compaq Utilities. When the system starts because of an ASR reset, it starts to the Compaq Utilities, sets the Management Modem to auto-answer mode, then waits for the administrator to dial in and run the Compaq Utilities.</p> <p>You automatically disable this option when you configure the software error recovery start option to Boot Operating System. When ASR pages you, you cannot dial in unless ASR exceeds the threshold number of server restart retries (10). When this happens, ASR restarts the server into the Compaq Utilities and places the modem in auto-answer mode.</p>

continued

Remote Option Settings for Booting Compaq Utilities *Continued*

Option	Setting	Description
Dial-out status	Enabled	<p>Allows ASR-2 to dial out to a remote workstation. If you selected this option, then Dial In Status is automatically selected.</p> <p>To use the dial-out feature, set Dial-Out Status to Enabled and set the Dial-Out String to the correct phone number. You must also set the Reset Boot option to Boot Compaq Utilities. When the system restarts because of an ASR reset, the administrator is paged (via Pager Status and Pager Dial String), the system restarts to the Compaq Utilities and dials out to the phone number provided in the Dial-Out string. The dial-out number will be tried five times. If it fails to connect after five attempts, the modem is put in auto-answer mode.</p>
Dial-out string	555-1234	Enter the dial string followed by the remote computer's telephone number.

Table 10-5
Compaq System Configuration Utility
Remote Option Settings for Booting into Compaq Utilities

Option	Setting	Description
Network status	Enabled	To allow network access to Compaq Utilities, set Network Status to Enabled and make sure the Reset Boot option is set to Boot Compaq Utilities.
Network protocol		To use IPX network access, set Network Protocol to IPX. When the system restarts to the Compaq Utilities because of an ASR reset, it will load IPX network support. This will enable remote access via NVT.
		To use IP network access, set Network protocol to IP. Also make sure to set Network IP address, Network IP net mask and Network IP router address. When the system restarts to the Compaq Utilities because of an ASR reset, it will load IP network support. This will enable remote access via Telnet.
		NOTE: The Network Status must be set to Enabled for network access.
Network controller	Compaq	Select the network controller type - choices are Compaq and Custom. Select Compaq for the NetFlex-2 ENET-TR Controller and the NetFlex-TR Controller.

continued

Remote Option Settings for Booting into Compaq Utilities *Continued*

Option	Setting	Description
Network host name	CPQHOU	Enter the network name of the server. Use underscores instead of spaces within the name. For example, Compaq_Server. If you are using IPX network access to the Compaq Utilities, this is the server name that is used to advertise NVT host services. This is the server name that will be displayed in the Insight Manager server list when it determines it can communicate via NVT. You should set this name to be the same as the server name you assign when the host OS is running.
Network card slot	Slot #	Select the slot number of the network interface card you wish to use for network access to the Compaq Utilities.
Network frame type	ETHERNET_II	Select the frame type for your network. Selections include both Ethernet and Token Ring topologies.
Network IP address		Enter the IP address for this server in standard dot notation. NOTE: This is not used if you select Custom for Network controller. You must enter your IP address in the NET.CFG file that you load into the system partition.

continued

Remote Option Settings for Booting into Compaq Utilities *Continued*

Option	Setting	Description
Network IP net mask		Enter the net mask for this server in standard dot notation. NOTE: This is not used if you select Custom for network controller. You must enter your IP address in the NET.CFG file that you load into the system partition.
Network IP router address		Enter the router to be used for this server in standard dot notation. NOTE: This is not used if you select Custom for network controller. You must enter your IP address in the NET.CFG file that you load into the system partition.

If you configure the server to restart into the Compaq Utilities, the server prepares for remote communications, so you can remotely run Diagnostics software, Inspect Utility, or System Configuration Utility using a workstation running terminal emulation software (such as Insight Manager or PC Anywhere).

Booting into the Operating System

When you enable ASR-2 to restart into the operating system and a critical error occurs, ASR-2 logs the error in the Critical Error Log and restarts the server. The system ROM pages the designated administrator, and executes the normal restart process.

IMPORTANT: When you enable ASR-2 to restart into the operating system, Modem Dial-In Status, Network Status, and Modem Dial-Out Status are automatically disabled. In this mode, ASR-2 can page you in the event of a critical error, but you cannot access the server, and the server cannot dial out to a remote workstation.

During the recovery process, the ASR-2 feature tries to restart the server up to 10 times. If the ASR-2 feature cannot restart the server within the 10 attempts, it logs a critical error in the Critical Error Log, restarts the server into the Compaq Utilities, and puts the modem into auto-answer mode. If the server cannot restart into the Compaq Utilities, then ROM-based diagnostics are automatically invoked.

Your System Configuration Utility setting should resemble the following when you enable ASR to restart into the operating system:

Serial interface	COM1
Dial-in status	Disabled
Dial-out status	Disabled
Dial-out string	555-1234
Network status	Disabled
Network protocol	IPX
Network controller	Compaq
Network host name	CPQHOU
Network card slot	Slot #
Network frame type	ETHERNET_II

Remote Service Features

Your Compaq ProLiant 5000 Server has several management features that you can access via modem or network. The following table lists and describes these features.

Table 10-6
Compaq ProLiant 5000 Servers
Remote Management Features

Feature	Description
Service Session	Provides remote access to all the utilities on the system partition, including Diagnostics utilities, Inspect, ROMPaq, Drive Array Advanced Diagnostics, and the configuration utility. It also provides the capability for remote file transfer services to and from the system partition.
Disk-Based Diagnostics	Provides remote diagnostic capability after you configure Automatic Server Recovery-2 (ASR-2) and the reset restart option to restart from the Compaq Utilities. It also allows you to view Health Logs. Disk-based diagnostics can also be run locally. Press F10 during the restart process when the cursor moves to the upper-right corner of the monitor.

continued

Remote Management Features *Continued*

Feature	Description
ROM-Based Diagnostics	Automatically invokes when the disk-based diagnostics cannot be accessed. It also allows you to view the Health Logs and run ROM-based diagnostics locally. Press F9 during the restart process when the cursor moves to the upper-right corner of the monitor.
Server Restart	Provides the ability to restart the server remotely from Compaq Insight Manager while the operating system is running. It allows the server to restart back to the operating system or restart to the system partition. This activity provides a complete system reset to all peripherals. If you select Boot to Compaq Utilities from Insight Manager, then Compaq Utilities loads the appropriate remote services so that remote access is available. If network status is enabled, then the network support is loaded. If Dial-In status is enabled, then the modem is set to auto answer.
Configuration Utility	Provides the ability to run the Compaq System Configuration Utility remotely. You can also run the remote configuration utility locally. Press F10 during the restart process when the cursor moves to the upper-right corner of the monitor.
Firmware Updates	Allows you to update the server's firmware remotely. It uses firmware images on the system partition that might have been previously uploaded with the file transfer services.

ROMPaq

The use of flash ROM in the Compaq servers allow the firmware (BIOS) to be upgraded with system or option ROMPaq utilities. To upgrade the ROM, run the ROMPaq utility from the system partition or insert a ROMPaq diskette into drive A and cold boot the system. The ROMPaq utility will then check the system and provide a choice (if more than one exists) of ROM revisions that the system can be upgraded to. This procedure is the same for both system and option ROMPaq utilities.



CAUTION: Do not turn the power off during a firmware upgrade. A loss of power during upgrade may corrupt the upgrade.

Compaq Insight Manager

Compaq Insight Manager is the Compaq application for easily managing network desktops and servers. Insight Manager delivers intelligent monitoring and alerting as well as visual control of your servers.

For additional information, See the *Compaq Insight Manager User Guide* that accompanied your server.

Chapter 11

Diagnostic Tools

This chapter describes software and firmware diagnostic tools available for Compaq server products. These include:

- Power-On Self-Test (POST)
- Diagnostics (DIAGS)
- Drive Array Advanced Diagnostics (DAAD)
- ROMPaq utilities to upgrade flash ROMs
- Automatic Server Recovery (ASR-2)

Power-On Self-Test (POST)

POST is a series of diagnostic tests that run automatically on Compaq servers when the system is turned on. POST checks the following assemblies to ensure that the server is functioning properly:

- Keyboard
- Power supply
- System board
- Memory
- Memory expansion boards
- Controllers
- Diskette drives
- Hard drives

If POST finds an error in the system, an error condition is indicated by an audible and/or visual message. If an error code is displayed on the screen during POST or after resetting the system, follow the instructions in Table 11-1. The error messages and codes listed in this table include all codes generated by Compaq products. Your system will only generate those codes which are applicable to your configuration and options.

Table 11-1
POST Error Messages

Error Code	Audible Beeps*	Probable Source of Problem	Action
A Critical Error occurred prior to this power-up	None	A catastrophic system error, which caused the server to crash, has been logged.	Run the Diagnostics Utility.
101-ROM Error	1L,1S	System ROM checksum	Contact your service provider.
101-I/O ROM Error	None	Options ROM checksum	Contact your service provider
102-System Board Failure	None	DMA, timers, etc.	Contact your service provider.
104-ASR-2 Timer Failure	None	System board failure	Run the Diagnostics Utility.
162-System Options Not Set	2S	Configuration incorrect	Run the System Configuration Utility and correct.
163-Time & Date Not Set	2S	Invalid time or date in configuration memory.	Run the SYSTEM Configuration Utility and correct.
164-Memory Size Error	2S	Configuration memory incorrect	Run the System Configuration Utility and correct.
* L= Long S = Short			

continued

POST Error Messages *Continued*

Error Code	Audible Beeps*	Probable Source of Problem	Action
170-EISA Expansion Device Not Responding	None	EISA Expansion board failure	Contact your service provider.
172-EISA Configuration Nonvolatile Memory Invalid	None	Nonvolatile configuration corrupt or jumper installed.	Run the System Configuration Utility and correct.
172-1 Configuration Nonvolatile Memory Invalid	None	Nonvolatile configuration corrupt.	Run the System Configuration Utility and correct.
173-EISA Slot ID Mismatch	None	Board replaced, configuration not updated.	Run the System Configuration Utility and correct.
174-EISA Configuration/Slot Mismatch Device Not Found	None	EISA board not found.	Run the System Configuration Utility and correct.
175-EISA Configuration/Slot Mismatch Device Found	None	EISA board added, configuration not updated.	Run the System Configuration Utility and correct.
176-Slot with Not Readable ID Yields Valid ID	None	EISA board in slot that should contain an ISA board.	Run the System Configuration Utility and correct.
* L= Long S = Short			

continued

POST Error Messages *Continued*

Error Code	Audible Beeps*	Probable Source of Problem	Action
177-Configuration Not Complete	None	Incomplete System Configuration.	Run the System Configuration Utility and correct.
178-Processor Configuration Invalid	None	Processor type or step does not match configuration memory.	Run the System Configuration Utility and correct.
179-System Revision Mismatch	None	A board was installed which has a different revision date.	Run the System Configuration Utility and correct.
201-Memory Error	None	RAM failure	Run Diagnostics. Contact your service provider.
203-Memory Address Error	None	RAM failure	Run Diagnostics. Contact your service provider.
205-Cache Memory Error	None	Cache memory error	Run Diagnostics. Contact your service provider.
206-Cache Controller Error	None	Cache controller failure	Run Diagnostics. Contact your service provider.
* L= Long S = Short			

continued

POST Error Messages *Continued*

Error Code	Audible Beeps*	Probable Source of Problem	Action
207-Invalid Memory Configuration - Check DIMM Installation	None	Memory module installed incorrectly	Verify placement of memory modules.
208-Invalid Memory Speed - Check DIMM Installation	1L,1S	The speed of the memory is too slow.	The speed of the memory modules must be 60 ns. Verify the speed of the memory modules installed.
211-Cache Switch Set Incorrectly	None	Switch not set properly during installation or upgrade	Verify switch settings.
212-System Processor Failed/Mapped out	1S	Processor in slot x failed.	Run Diagnostics. Contact your service provider
213-System Processor Not Installed	1S	System processor configured for slot indicated is missing.	Install processor in the slot indicated or run the System Configuration Utility to remove the processor from the .CFG file.
214-DC-DC Converter Failed	None	PowerSafe Module (DC-DC Converter) Failed	Run Diagnostics. Contact your service provider.
301-Keyboard Error	None	Keyboard failure	Turn off the computer, then reconnect the keyboard.
301-Keyboard Error or Test Fixture Installed	None	Keyboard failure	Replace the keyboard.
* L= Long S = Short			

continued

POST Error Messages *Continued*

Error Code	Audible Beeps*	Probable Source of Problem	Action
ZZ-301-Keyboard Error	None	Keyboard failure. (ZZ represents the Keyboard Scan Code.)	1. A key is stuck. Try to free it. 2. Replace the keyboard.
303-Keyboard Controller Error	None	System board, keyboard, or mouse controller failure	Contact your service provider.
304-Keyboard or System Unit Error	None	Keyboard, keyboard cable, or system board failure	1. Make sure the keyboard is attached. 2. Contact your service provider.
40X-Parallel Port X Address Assignment Conflict	2S	Both external and internal ports are assigned to parallel port X.	Run the System Configuration Utility.
402-Monochrome Adapter Failure	1L,2S	Monochrome display controller	Run Diagnostics. Contact your service provider
501-Display Adapter Failure	1L,2S	Video display controller	Run Diagnostics. Contact your service provider
601-Diskette Controller Error	None	Diskette controller circuitry failure	Contact your service provider.
* L= Long S = Short			

continued

POST Error Messages *Continued*

Error Code	Audible Beeps*	Probable Source of Problem	Action
605-Diskette Drive Type Error	2S	Mismatch in drive type	Run the System Configuration Utility to set diskette type correctly.
702-A coprocessor has been detected that was not reported by CMOS.	None	Installed coprocessor not configured.	Run the System Configuration Utility and correct.
703-CMOS reports a coprocessor that has not been detected	2S	Coprocessor or configuration error.	Run the System Configuration Utility and correct
1151-Com Port 1 Address Assignment Conflict	2S	Both external and internal serial ports are assigned to COM1.	Run the System Configuration Utility and correct.
1152-Com Port 2, 3, or 4 Address Assignment Conflict	2S	Both external and internal serial ports are assigned to COM2, COM3 or COM4.	Run the System Configuration Utility and correct.
1600-Server Manager/R Failure	None	Server Manager/R board failure. Error code displays after error message.	Run Diagnostics. Contact your service provider
1613-Low System Battery	None	Real time clock system battery is running low on power.	Run Diagnostics. Contact your service provider.
1610-Temperature violation detected. Waiting for system to cool	2S	Ambient system temperature too hot.	Check fan in system environment.
1611-Fan failure detected	2S	Required fan not installed or spinning.	Check fans.
* L= Long S = Short			

continued

POST Error Messages <i>Continued</i>			
Error Code	Audible Beeps*	Probable Source of Problem	Action
1701-SCSI Controller failure	None	A test on the Fast SCSI-2 Controller failed	Contact your service provider.
1702-SCSI cable error detected System halted.	None	Incorrect cabling	1. For Integrated SCSI Controllers, ensure that the internal connector has SCSI termination attached. 2. For option card SCSI controllers, ensure that only one of the two internal connectors has termination attached.
1703-SCSI cable error detected. Internal SCSI cable not attached to system board connector. System halted.	None	Incorrect cabling	Ensure that the integrated SCSI controller has SCSI termination attached.
1704-Unsupported Virtual Mode Disk Operation. DOS Driver Required. System Halted.	None	System attempted to perform a virtual mode disk operation without virtual mode memory services.	Use fixed-disk device driver that supports virtual mode memory services.
1705-Locked SCSI Bus Detected. System Halted.	None	SCSI bus failure	Run Diagnostics. Contact your service provider.
1730-Fixed Disk 0 does not support DMA Mode	None	Fixed disk drive error	Run the System Configuration Utility and correct.
* L = Long S = Short			

.....

continued

POST Error Messages *Continued*

Error Code	Audible Beeps*	Probable Source of Problem	Action
1731-Fixed Disk 1 does not support DMA Mode	None	Fixed disk drive error	Run the System Configuration Utility and correct.
1740-Fixed Disk 0 failed Set Block Mode command	None	Fixed disk drive error	Run the System Configuration Utility and correct.
1741-Fixed Disk 1 failed Set Block Mode command	None	Fixed disk drive error	Run the System Configuration Utility and correct.
1750-Fixed Disk 0 failed Identify command	None	Fixed disk drive error	Run the System Configuration Utility and correct.
1751-Fixed Disk 1 failed Identify command	None	Fixed disk drive error	Run the System Configuration Utility and correct.
1760-Fixed Disk 0 does not support Block Mode	None	Fixed disk drive error	Run the System Configuration Utility and correct.
* L = Long S = Short			

continued

POST Error Messages *continued*

Error Code	Audible Beeps*	Probable Source of Problem	Action
1761-Fixed Disk 1 does not support Block Mode	None	Fixed disk drive error.	Run the System Configuration Utility and correct.
1764- Slot x Drive Array - Capacity Expansion Process is Temporarily Disabled (followed by one of the following): Expansion will resume when Array Accelerator has been reattached. Expansion will resume when Array Accelerator has been replaced. Expansion will resume when Array Accelerator RAM allocation is successful. Expansion will resume when Array Accelerator battery reaches full charge. Expansion will resume when automatic data recovery has been completed.			Reattach or replace Array Accelerator, wait until the Array Accelerator batteries have charged, or for Automatic Data Recovery to complete, as indicated.
1765-Slot x Drive Array Option ROM Appears to Conflict With an ISA Card. ISA cards with 16-bit memory cannot be configured in memory range C0000 to DFFFF along with the SMART-2/E 8-bit Option ROM due to EISA bus limitations. Please remove or reconfigure your ISA card.			Remove or reconfigure conflicting ISA cards. Disable "shared memory" on any ISA network cards that may be installed. Call customer support if this does not help.
* L = Long S = Short			

continued

POST Error Messages *continued*

Error Code	Audible Beeps*	Probable Source of Problem	Action
1766- Slot x Drive Array requires System ROM Upgrade. Run Systems ROMPaq Utility			Run the latest Systems ROMPaq Utility to upgrade your System ROMs.
1767- Slot x Drive Array Option ROM is Not Programmed Correctly or may Conflict with the Memory Address Range of an ISA Card. Check the Memory Address Configuration of installed ISA Card(s) or run Options ROMPaq Utility to attempt SMART-2/E Option ROM Reprogramming.			Remove or reconfigure conflicting ISA cards, especially any cards that are not recognized by the System Configuration Utility. Try reprogramming the SMART-2/E Controller's ROMs using the latest Options ROMPaq (version 2.29 or higher). Call customer support if this does not help.
1768-Slot x Drive Array - Resuming logical drive expansion process	None	SMART-2 Controller error	No action required. Appears whenever a controller reset or power cycle occurs while array expansion is in progress.
* L= Long S = Short			

continued

POST Error Messages *continued*

Error Code	Audible Beeps*	Probable Source of Problem	Action
1769- Slot x Drive Array - Drive(s) disabled due to failure during expand. Select F1 to continue with logical drives disabled. Select F2 to accept data loss and to re-enable logical drives.	None	SMART-2 Controller error	Data has been lost while expanding the array, therefore the drives have been temporarily disabled. Press F2 to accept the data loss and re-enable the logical drives. Restore data from backup.
1771-Primary Disk Port Address Assignment Conflict	None	Internal and external hard drive controllers are both assigned to the primary address.	Run the System Configuration Utility and correct.
1772-Secondary Disk Port Address Assignment Conflict	None	Address Assignment Conflict. Internal and external hard drive controllers are both assigned to the secondary address.	Run the System Configuration Utility and correct.
* L= Long S = Short			

continued

POST Error Messages <i>continued</i>			
Error Code	Audible Beeps*	Probable Source of Problem	Action
1773-Primary Fixed Disk Port Assignment Conflict	None	Fixed disk drive error.	Run the System Configuration Utility and correct.
1774- Slot x Drive Array - Obsolete data found in Array Accelerator. Select F1 to discard contents of Array Accelerator. Select F2 to write contents of Array Accelerator to drives.	None	SMART-2 Controller error	Data found in Array Accelerator is older than data found on drives. Press F1 to discard the older data in the Array Accelerator and retain the newer data on the drives.
1776-Drive Array - SCSI Port Termination Error	None	External and internal SCSI drives are both configured to Port 1.	Reconfigure drives.
1777-Drive Array - External Drive Subsystem Error	None	Cooling fan failure, internal temperature alert or open side panel.	Inspect for cooling fan failure or side panel open.
1778-Drive Array resuming Automatic Data Recovery process	None	This message appears whenever a controller reset or power cycle occurs while Automatic Data Recovery is in progress.	No action necessary.
* L= Long S = Short			

continued

POST Error Messages *Continued*

Error Code	Audible Beeps*	Probable Source of Problem	Action
1779-Drive Array Controller detects replacement drives	None	Intermittent drive failure and/or possible loss of data.	If this message appears and drive <i>X</i> has not been replaced, this indicates an intermittent drive failure. This message also appears once immediately following drive replacement whenever data must be restored from backup.
1780-Disk 0 Failure	None	Hard drive/format error.	Run Diagnostics. Contact your service provider
1781-Disk 1 Failure	None	Hard drive/format error	Run Diagnostics. Contact your service provider
1782-Disk Controller Failure	None	Hard disk drive circuitry error	Run Diagnostics. Contact your service provider
1784-Drive Array Drive Failure, Physical Drive	None	Defective drive and/or cables	Check for loose cables. Run Diagnostics. Contact your service provider.
1785-Drive Array not Configured	None	Configuration error	Run the System Configuration Utility and correct.
* L= Long S = Short			

continued

POST Error Messages *Continued*

Error Code	Audible Beeps*	Probable Source of Problem	Action
1786-Drive Array Recovery Needed The following drive(s) need Automatic Data Recovery: Drive X. Select "F1" to continue with recovery of data to drive(s). Select "F2" to continue without recovery of data to drive(s).	None	Interim Data Recovery mode. Data has not been recovered yet.	Press F1 key to allow Automatic Data Recovery to begin. Data will automatically be restored to drive X now that the drive has been replaced or now seems to be working. -Or- Press the F2 key and the system will continue to operate in the Interim Data Recovery mode.
1787-Drive Array Operating in Interim Recovery Mode. Physical drive replacement needed: Drive X	None	Hard drive X failed or cable is loose or defective. Following a system restart, this message reminds you that drive X is defective and fault tolerance is being used.	Replace drive X as soon as possible. A loose or defective cable also may cause this error.
* L = Long S = Short			

continued

POST Error Messages *Continued*

Error Code	Audible Beeps*	Probable Source of Problem	Action
*1788-Incorrect Drive Replaced: Drive X Drive(s) were incorrectly replaced: Drive Y Select "F1" to continue - drive array will remain disabled. Select "F2" to reset configuration - all data will be lost.	None	Drives are not installed in their original positions, so the drives have been disabled. See note below.	Reinstall the drives correctly as indicated. Press F1 to restart the computer with the drive array disabled. -Or- Press F2 to use the drives as configured and lose all the data on them.
<p>*NOTE : The 1788 error message might also be displayed inadvertently due to a bad power cable connection to the drive or by noise on the data cable. If this message was due to a bad power cable connection, but not due to an incorrect drive replacement, repair the connection and press F2.</p> <p>-Or-</p> <p>If this message was not due to a bad power cable connection, and no drive replacement took place, this could indicate noise on the data cable. Check cable for proper routing.</p>			
<p>* L= Long S = Short</p>			

continued

POST Error Messages *Continued*

Error Code	Audible Beeps*	Probable Source of Problem	Action
1789-Drive Not Responding, Physical Drive Check cables or replace physical drive X. Select "F1" to continue - drive array will remain disabled. Select "F2" to fail drive(s) that are not responding - Interim Recovery Mode will be enabled if configured for fault tolerance.	None	Cable or hard drive failure.	1. Check the cable connections. 2. If cables are connected, replace the drive. 3. If you do not want to replace the drives now, press F2.
1790-Disk 0 Error	None	Hard drive error or wrong drive type	Run the System Configuration Utility.
1790-Disk 0 Configuration Error	None	Hard drive error or wrong drive type	Run the System Configuration Utility and Diagnostics.
1791-Disk 1 Error	None	Hard drive error or wrong drive type.	Run the System Configuration Utility and Diagnostics.
* L = Long S = Short			

continued

POST Error Messages *Continued*

Error Code	Audible Beeps*	Probable Source of Problem	Action
1792-Drive Array Reports Valid Data Found in Array Accelerator. Data will automatically be written to drive array.	None	This indicates that while the system was in use, power was interrupted while data was in the Array Accelerator memory. Power was then restored within eight to ten days, and the data in the Array Accelerator was flushed to the drive array.	No action necessary; no data has been lost. Perform orderly system shut-downs to avoid data remaining in the Array Accelerator.
1793-Drive Array - Array Accelerator Battery Depleted - Data Lost (Error message 1794 also displays.)	None	This indicates that while the system was in use, power was interrupted while data was in the Array Accelerator memory. Array Accelerator batteries failed. Data in Array Accelerator has been lost.	Power was not restored within eight to ten days. Perform orderly system shut-downs to avoid data remaining in the Array Accelerator.
1794-Drive Array - Array Accelerator Battery Charge Low. Array Accelerator is temporarily disabled. Array Accelerator will be re-enabled when battery reaches full charge.	None	This is a warning that the battery charge is below 75%. Posted writes are disabled.	Run Diagnostics. Contact your service provider.
* L= Long S = Short			

continued

POST Error Messages *Continued*

Error Code	Audible Beeps*	Probable Source of Problem	Action
1795-Drive Array - Array Accelerator Configuration Error. Data does not correspond to this drive array. Array Accelerator is temporarily disabled.	None	This indicates that while the system was in use, power was interrupted while data was in the Array Accelerator memory. The data stored in the Array Accelerator does not correspond to this drive array.	1. Match the Array Accelerator to the correct drive array. -Or- 2. Run the System Configuration Utility to clear the data in the Array Accelerator.
1796-Drive Array - Array Accelerator Not Responding. Array Accelerator is temporarily disabled.	None	Array Accelerator is defective or has been removed.	1. Check that the Array Accelerator is properly seated. 2. Run the System Configuration Utility to reconfigure the Compaq IDA-2 without the Array Accelerator.
* L= Long S = Short			

continued

POST Error Messages *Continued*

Error Code	Audible Beeps*	Probable Source of Problem	Action
1797-Drive Array - Array Accelerator Read Error Occurred. Data in Array Accelerator has been lost. Array Accelerator is disabled.	None	Hard parity error while reading data from posted writes memory.	Array Accelerator is disabled.
1798-Drive Array - Array Accelerator Write Error Occurred. Array Accelerator is disabled.	None	Hard parity error while writing data to posted writes memory.	Array Accelerator is disabled.
1799-Drive Array - Drive(s) Disabled due to Array Accelerator Data Loss. Select "F1" to continue with logical drives disabled. Select "F2" to accept data loss and to re-enable logical drives.	None	Volume failed due to loss of data in posted-writes memory.	Press F1 to continue with logical drives disabled or F2 to accept data loss and re-enable logical drive.
* L = Long S = Short			

continued

POST Error Messages *Continued*

Error Code	Audible Beeps*	Probable Source of Problem	Action
2 long + 2 short beeps	2L,2S	Power is cycled. Temperature too hot. Processor fan not installed or spinning.	Check fans.
Press "F10" Key for System Partition Utilities	None	A configuration error occurred during POST.	Press F10 to run System Configuration Utility.
Press "F1" key to continue	None	As indicated to continue.	Press the F1 key.
* L= Long S = Short			

Diagnostics

When you select Diagnostics and Utilities from the System Configuration Utility main menu, the utility provides prompts to test, inspect, upgrade, and diagnose the server.

Diagnostics and Utilities are located on the system partition on the hard drive and must be accessed in the following instances:

- When a system configuration error is detected during the Power-On Self-Test (POST)
- To change factory default settings for some of the computer features
- To change the system configuration, which is sometimes necessary when you add or remove optional hardware
- To set system configuration features

The following options are available from the Diagnostics and Utilities menu:

- Test Computer
- Inspect Computer
- Upgrade Firmware
- Remote Utilities
- Diagnose Drive Array

Running Diagnostics

There are two ways to access the utilities:

- From the System Partition.
- From diskette. A diskette can be created from the SmartStart CD.

To access the utilities from the system partition:

1. Reboot the server by pressing the **Ctrl+Alt+Delete** keys.
2. Press **F10** when the following prompt appears at the top of the screen during POST.

Press "F10" for System Partition Utilities

IMPORTANT: The text appears for only two seconds. If you do not press F10 during this time, you must reboot the server.

3. From the System Configuration Main Menu select *Diagnostics and Utilities*.

If there are errors detected in the Server Health Log, the Diagnostics Utility automatically displays the following screen message:

CAUTION: Errors have been detected in your Server Health Log. Diags will now identify your system hardware.

4. Press the **Enter** key to continue.
5. After a short pause, the Server Health Log menu displays with a list of system errors. If there is more than one error, press the Space Bar to select the error you want to correct. Then press **Enter**.
6. The Diagnostics Utility prompts you and suggests corrective action.

Diagnostic Error Codes

The Diagnostic error codes and recommended actions are listed in the following tables.

IMPORTANT: This information is intended for the user's reference only. Many of the corrective actions indicated involve complex hardware and/or software changes and should be performed only by an Authorized Compaq Service Provider.

100 Series - Primary Processor Test Error Codes

The 100 series of Diagnostic error codes identify failures with processor and system board functions. Corrective action may require replacement of system boards or processor assemblies (either processor cards or system boards that include the processor).

Primary Processor Test Error Codes	
Error Code Range	Possible Corrective Action
100-xx ... 106-xx	The processor assembly may require replacement.
107-xx ... 109-xx	The battery/clock module or system board may require replacement.
110-xx ... 113-xx	The system board may require replacement.
114 - xx	A loose or defective speaker assembly may cause this error. The speaker assembly or the system board may require replacement.
122-xx ... 123-xx	The processor assembly may require replacement.

200 Series - Memory Test Error Codes

The 200 series of Diagnostic error codes identify failures with the memory subsystem. Corrective action may require replacement of the memory expansion board, the memory modules, or the processor assembly.

Memory Test Error Codes	
Error Code Range	Possible Corrective Action
200-xx ... 215-xx	The indicated memory module may require replacement.

300 Series - Keyboard Test Error Codes

The 300 series of Diagnostic error codes identify failures with keyboard and system board functions. Corrective action may require replacement of the keyboard or the system board assembly.

Keyboard Test Error Codes	
Error Code Range	Possible Corrective Action
301-xx ... 304-xx	The keyboard or the system board may require replacement.

400 Series - Parallel Printer Test Error Codes

The 400 series of Diagnostic error codes identify failures with parallel printer interface card or system board functions. Corrective action may require replacement of the serial/parallel interface board or the system board assembly.

Parallel Printer Test Error Codes	
Error Code Range	Possible Corrective Action
400-xx ... 403-xx	Run the System Configuration Utility. Loose or defective cables may cause error messages. The parallel interface board or the system board may require replacement.

600 Series - Diskette Drive Test Error Codes

The 600 series of Diagnostic error codes identify failures with diskette, diskette drive, or system board functions. Corrective action may require replacement of the diskette, the diskette drive, or the system board assembly.

Diskette Drive Test Error Codes	
Error Code Range	Possible Corrective Action
600-xx ... 698-xx	A defective diskette, loose cables, or defective cables may cause error messages. The diskette drive or system board may require replacement.
699-xx	<ol style="list-style-type: none">1. Replace the diskette and retest.2. Run the System Configuration Utility.

1100 Series - Serial Test Error Codes

The 1100 series of Diagnostic error codes identify failures with serial/parallel interface board or system board functions. Corrective action may require replacement of the serial/parallel interface board or the system board assembly.

Serial Test Error Codes	
Error Code Range	Possible Corrective Action
1100-xx ... 1109-xx	Run the System Configuration Utility. Loose or defective cables may cause error messages. The serial interface board or the system board may require replacement.

1200 Series - Modem Communications Test Error Codes

The 1200 series of Diagnostic error codes identify failures with the modem. Corrective action may require replacement of the modem.

Modem Communications Test Error Codes	
Error Code Range	Possible Corrective Action
1200-xx ... 1210-xx	Refer to the modem documentation for correct setup procedures. Poor line quality may cause errors. The modem may require replacement

1700 Series - Fixed Disk Drive Test Error Codes

The 1700 series of Diagnostic error codes identify failures with fixed disk drive, fixed disk drive controller board, fixed disk drive cabling, and system board functions. Corrective action may require replacement of the fixed disk drive cables, fixed disk drive controller board, fixed disk, or system board assembly. If your system uses a drive array controller, see the section for Drive Array Advanced Diagnostics (DAAD).

Fixed Disk Drive Test Error Codes	
Error Code Range	Possible Corrective Action
1700 - 1799	Run the System Configuration Utility. Loose or defective cable connections may cause error messages. The fixed disk drive, the fixed disk drive controller, or the system board may require replacement.

1900 Series - Tape Drive Test Error Codes

The 1900 series of Diagnostic error codes identify failures with tape cartridge, tape drive cabling, adapter board, tape drive, or system board assembly. Corrective action may require replacement of the tape cartridge, tape drive cabling, adapter board, tape drive, or system board assembly.

Tape Drive Test Error Codes	
Error Code Range	Possible Corrective Action
1900-xx ... 1906-xx	A defective tape cartridge, loose cable connections, or defective cable connections may cause error messages. The tape drive, the tape adapter board, or the system board may require replacement.

2400 Series - Advanced VGA Board Test Error Codes

The 2400 series of Diagnostic error codes identify failures with the video board, monitor, or system board assembly. Corrective action may require replacement of the monitor, video board, or system board assembly.

Advanced VGA Board Test Error Codes	
Error Code Range	Possible Corrective Action
2400-xx ... 2480-xx	Run the System Configuration Utility. Loose or defective cable connections may cause error messages. The monitor, the video board, or the system board may require replacement.

6000 Series - 32-Bit DualSpeed NetFlex-2 Controller and 32-Bit DualSpeed Token Ring Controller Test Error Codes

The 6000 series of Diagnostic error codes identify failures with 32-bit DualSpeed NetFlex-2/Token Ring Controllers. Corrective action may require replacement of the 32-bit DualSpeed NetFlex-2/Token Ring Controller.

32-Bit DualSpeed NetFlex-2 Controller and 32-Bit DualSpeed Token Ring Controller Test Error Codes	
Error Code Range	Possible Corrective Action
6000-xx ... 6089-xx	Run the System Configuration Utility. Loose or defective cable connections may cause error messages. The controller may require replacement.

6500 Series - SCSI Fixed Disk Drive Test Error Codes

The 6500 series of Diagnostic error codes identify failures with fixed disk drives, fixed disk drive controller boards, fixed disk drive cabling, and system board functions. Corrective action may require replacement of fixed disk drive cables, fixed disk drive controller, fixed disk, or system board assembly. If your system uses a drive array controller, see the section for Drive Array Advanced Diagnostics (DAAD).

SCSI Fixed Disk Drive Test Error Codes

Error Code Range	Possible Corrective Action
6500-xx ... 6528-xx	Loose or defective cable connections may cause error messages. The fixed disk drive, the fixed disk drive controller, or the system board may require replacement.

6600 Series - CD-ROM Drive Test Error Codes

The 6600 series of Diagnostic error codes identify failures with the CD-ROM cabling, CD-ROM drive, adapter board, or system board assembly. Corrective action may require replacement of the CD-ROM cabling, CD-ROM drive, adapter board, or system board assembly.

CD-ROM Drive Test Error Codes

Error Code Range	Possible Corrective Action
6600-xx ... 6628-xx	A defective CD, loose cable connections, or defective cable connections may cause error messages. The CD-ROM drive, the CD-ROM adapter board, or the system board may require replacement.

6700 Series - SCSI Tape Drive Test Error Codes

The 6700 series of Diagnostic error codes identify failures with tape cartridge, tape drive, tape drive cabling, adapter board, or system board assembly. Corrective action may require replacement of the tape cartridge, tape drive cabling, adapter board, tape drive, or system board assembly.

SCSI Tape Drive Test Error Codes

Error Code Range	Possible Corrective Action
6700-xx ... 6728-xx	A defective tape cartridge, loose cable connections, or defective cable connections may cause error messages. The tape drive, the tape adapter board, or the system board may require replacement.

7000 Series - Server Manager/R Board Test Error Codes

The 7000 series of Diagnostic error codes identify failures with the Server Manager/R board. Corrective action may require replacement of the Server Manager/R board, the Integrated 2400-baud modem, voice ROM, or battery on the Server Manager/R board.

Server Manager/R Board Test Error Codes	
Error Code Range	Possible Corrective Action
7000-xx ... 7046-xx	The Server Manager/R board may require replacement.
7051-xx ... 7057-xx	The Server Manager/R board Enhanced 2400-Baud Integrated Modem may require replacement.
7061-xx ... 7062-xx	The Server Manager/R board Voice ROM may require replacement.
7078-xx ... 7079-xx	The Server Manager/R board battery may require replacement.

8600 Series - Pointing Device Interface Test Error Codes

The 8600 series of Diagnostic error codes identify failures with the pointing device (mouse, trackball, and so forth) or the system board assembly. Corrective action may require replacement of the pointing device or the system board assembly.

Pointing Device Interface Test Error Codes	
Error Code Range	Possible Corrective Action
8601	Loose or defective cable connections may cause error messages. The pointing device or the system board may require replacement.

Test

Test is a utility that determines if the various computer components installed are recognized by the system and functioning properly. Running Test Computer is optional, but advisable, after installing or connecting a new device.

You can display, print, or save the information. Your Authorized Compaq Reseller or Service Provider may ask you to run this utility to assist in analyzing the system. This information allows the service provider to reproduce the same environment on another computer for testing.

IMPORTANT: You should run Test Computer and have the printed report available before placing a call to the Compaq Customer Support Center or your local Compaq Service Provider.

Running Test

To run Test, complete the following steps:

1. Reboot the server by pressing the **Ctrl+Alt+Delete** keys.
2. Press the appropriate key when the following prompt appears at the top of the screen during POST.

Press "F 9" key for ROM-Based Diagnostics Press "F10" key for System Partition Utilities

IMPORTANT: The text appears for only two seconds. If you do not press either F9 or F10 during this time, you must reboot the server.

3. Select the *Diagnostics and Utilities* option.
 4. Select *Test Computer*.
 5. Select *View Device List*.
-

6. A list of the installed hardware devices is displayed.
 - ☐ Verify that the utility has correctly detected the devices installed. If the list is correct, select *OK* and go to step 9.
 - ☐ If the list is incorrect, be sure that any new devices are installed properly. If you do not find an installation problem, call your Authorized Compaq Reseller or Service Provider.

NOTE: This utility does not detect all non-Compaq devices.

7. Select one of the following from the test option menu:
 - ☐ Quick Check Diagnostics - This option runs a quick, general test on each device with a minimal number of prompts. If errors occur, they are displayed when the testing is complete.
 - ☐ Automatic Diagnostics - This option runs unattended, maximum testing of each device with minimal prompts. You can choose how many times to run the tests, to stop on errors, or to print or file a log of errors.
 - ☐ Prompted Diagnostics - This option allows maximum control. You can choose attended or unattended testing, decide to stop on errors, or choose to print or file a log of errors.

IMPORTANT: When you run TEST, be sure to record the error message numbers and have them available when you contact your Authorized Compaq Reseller or Service Provider.

8. Follow the instructions on the screen as the diagnostic tests are run on the devices. When the testing is complete, the test option menu is displayed again.
9. Exit to the Diagnostics menu; then exit the utility. Look elsewhere in this chapter for possible explanations of any failures.
10. When Exit This Utility is displayed, press the **Enter** key to restart the computer.

Inspect

Inspect provides information about the operating system environment once the computer has been configured. Inspect Computer operates with MS-DOS and provides the following information:

- Serial number of the computer
- Type of computer
- Type of processor
- Operating system installed
- Contents of MS-DOS startup files
- Type of diskette drive and hard drive
- Operating speed
- Current memory configuration
- System, video, and option ROM revisions
- Active printer and communications interfaces

You can display, print, or save the information. Your Authorized Compaq Reseller or Service Provider may ask you to run this utility to assist in analyzing the system. This information allows the service provider to reproduce the same environment on another computer for testing.

IMPORTANT: Run Inspect Computer and have the printed output available before placing a call to the Compaq Customer Support Center or your local Authorized Compaq Service Provider.

Running Inspect

To run Inspect, complete the following steps:

1. Reboot the server by pressing the **Ctrl+Alt+Delete** keys.
2. Press the appropriate key when the following prompt appears at the top of the screen during POST.

Press "F 9" key for ROM-Based Diagnostics Press "F10" key for System Partition Utilities

IMPORTANT: The text appears for only two seconds. If you do not press either F9 or F10 during this time, you must reboot the server.

3. Select the *Diagnostics and Utilities* option.
4. Select *Inspect the Computer*. Operating environment information is displayed.
5. Review, print, file, or discuss this information with your Authorized Compaq Reseller or Service Provider.

Drive Array Advanced Diagnostics (DAAD)

Drive Array Advanced Diagnostics (DAAD) is a DOS-based tool designed to run on all Compaq products that contain a Compaq SMART SCSI Array Controller, Compaq Intelligent Drive Array Controller-2 (IDA-2), Compaq Intelligent Drive Array Controller (IDA), or Compaq Intelligent Array Expansion Controller. The error messages and codes listed include all codes generated by Compaq products. Your system will generate only those codes that are applicable to your configuration and options. The two main functions of DAAD are to collect all possible information about the array controllers in the system and to offer a list of all detected problems.

DAAD Diagnostic Messages

The following is a description of the diagnostic messages that may appear in the dialog box of the Diagnosis menu. Included with each message is a probable cause and a probable solution or troubleshooting routine. To view the problems detected by DAAD, select the Diagnosis button. If DAAD found no problems, a message, "No Problems Detected," will display.

Table 11-2
DAAD Diagnostic Messages

Error Messages	Possible Corrective Action
ACCELERATOR BOARD NOT DETECTED	The IDA-2 board did not detect the presence of a configured array accelerator board. Install an array accelerator board onto the IDA-2 controller. If you have an array accelerator board installed, check the seating to ensure that it has been properly installed onto the IDA-2 board. You may need to run the Compaq System Configuration Utility and disable the array accelerator board to get this message off the screen.
ACCELERATOR ERROR LOG	This is a list of the last 32 parity error lists on transfers between the IDA-2 board transfer buffer and memory on the array accelerator board. The starting memory address, transfer count, and operation (read and write) displays. If there are a number of these parity errors, you may need to replace the array accelerator board.
ACCELERATOR PARITY READ ERRORS: N	This message displays the number of times that read memory parity errors were detected during transfers between the IDA-2 board transfer buffer and memory on the array accelerator board. If there are a number of these parity errors, you may need to replace the array accelerator board.
ACCELERATOR PARITY WRITE ERRORS: N	This message displays the number of times that write memory parity errors were detected during transfers between the IDA-2 board transfer buffer and memory on the array accelerator board. If there are a number of these parity errors, you may need to replace the array accelerator board.
ACCELERATOR STATUS: PERMANENTLY DISABLED	The array accelerator board has been permanently disabled. It will remain disabled until it is reinitialized using the System Configuration Utility. Check the Disable Code field. Run the System Configuration Utility to reinitialize the array accelerator board.

continued

DAAD Diagnostic Messages *Continued*

Error Messages	Possible Corrective Action
ACCELERATOR STATUS: POSSIBLE DATA LOSS IN CACHE	Possible data loss was detected during power-up due to all of the batteries being below the sufficient voltage level and no presence of the identification signatures on the array accelerator board. There is no way to determine if dirty or bad data was in the cache and is now lost.
ACCELERATOR STATUS: TEMPORARILY DISABLED	The array accelerator board has been temporarily disabled. Check the Disable Code field.
ACCELERATOR STATUS: UNRECOGNIZED STATUS	A status returned from the array accelerator board that DAAD does not recognize. Call your Authorized Compaq Reseller for the latest copy of DAAD.
ACCELERATOR STATUS: VALID DATA FOUND AT RESET	Valid data was found in the posted write memory at reinitialization. The data will be flushed to disk. This is not an error or data loss condition. No action needs to be taken.
ACCELERATOR STATUS: WARRANTY ALERT	A catastrophic problem has occurred with the array accelerator board. Refer to the other messages on the Diagnostics screen for the exact meaning of this message. Replace the array accelerator board.
BATTERY PACK X BELOW REFERENCE VOLTAGE	The indicated battery pack is below the required voltage levels. Allow for sufficient time for the batteries to recharge (36 hours). If the batteries have not recharged after 36 hours, replace the battery pack.
BATTERY X NOT FULLY CHARGED	The battery is not fully charged. If 75% of the batteries present are fully charged, the array accelerator is fully operational. If more than 75% of the batteries are not fully charged, allow 36 hours to recharge them.
BOARD NOT ATTACHED	The IDA-2 board has been configured for use with an array accelerator board, but one is currently not attached. Locate the original array accelerator board and attach it to the IDA-2 board.

continued

DAAD Diagnostic Messages *Continued*

Error Messages	Possible Corrective Action
CMOS PRESENT, CONTROLLER NOT DETECTED	EISA nonvolatile RAM has a configuration for an array controller, but there is no board in this slot. Either a board has been removed from the system, or a board has been placed in the wrong slot. Place the array controller in the proper slot, or run the System Configuration Utility to reconfigure nonvolatile RAM to reflect the removal or new position.
COMPATIBILITY PORT PROBLEM DETECTED	You have the compatibility port configured for this IDA controller. When DAAD was verifying this interface, a serious problem was detected. A hardware problem has occurred and you should replace the IDA controller.
CONFIGURATION SIGNATURE IS ZERO	DAAD detected that nonvolatile RAM contains a configuration signature that is zero. Old versions of the System Configuration Utility could cause this. Run the latest version of System Configuration Utility to configure the controller and nonvolatile RAM.
CONFIGURATION SIGNATURE MISMATCH	The array accelerator board has been configured for a different IDA-2 board. The configuration signature on the array accelerator board does not match the one stored on the IDA-2 board. To recognize the array accelerator board, run the System Configuration Utility.
CONTROLLER COMMUNICATION FAILURE OCCURRED	DAAD was unable to successfully issue commands to the controller in this slot. Check the indicators on the controller.
CONTROLLER DETECTED. CMOS NOT PRESENT	The System nonvolatile RAM is not configured. Run the System Configuration Utility to configure the nonvolatile RAM.
CONTROLLER FIRMWARE NEEDS UPGRADING	The controller is below the latest recommended version. Call your Authorized Compaq Reseller to obtain the latest upgraded firmware.
CONTROLLER FIRMWARE NEEDS UPGRADING (DAAD ERROR 102)	You have the correct controller, however, the IDA firmware should be greater than 1.26. Call your Authorized Compaq Reseller to obtain the latest firmware.

continued

DAAD Diagnostic Messages *Continued*

Error Messages	Possible Corrective Action
CONTROLLER IS NOT CONFIGURED	The controller is not configured. If the controller was previously configured and you change drive locations, there may be a problem with the placement of the drives. DAAD examines each physical drive and looks for drives that have been moved to a different drive bay. Look for the messages that indicate which drives have been moved. If none appear and drive swapping did not occur, run the System Configuration Utility to configure the controller and nonvolatile RAM. Do not run the System Configuration Utility if you believe drive swapping has occurred.
CONTROLLER NEEDS REPLACING (DAAD ERROR 102)	The IDA firmware is less than version 0.96. Replace the controller as soon as possible.
CONTROLLER NEEDS REPLACING (DAAD ERROR 104)	The Intelligent Array Expansion System firmware is less than version 1.14. Replace the controller as soon as possible.
CONTROLLER REPORTED POST ERROR. ERROR CODE: X	The controller returned an error from its internal Power-On Self Tests. Replace the controller
CONTROLLER RESTARTED WITH A SIGNATURE OF ZERO	DAAD did not find a valid configuration signature to use to get the data. Nonvolatile RAM may not be present (unconfigured) or the signature present in nonvolatile RAM may not match the signature on the controller. Run the System Configuration Utility to configure the controller and nonvolatile RAM.
DISABLE COMMAND ISSUED	Posted writes have been disabled by the issuing of the Accelerator Disable command. This occurred because of an operating system device driver. Restart the system. Run the System Configuration Utility to reinitialize the array accelerator board.
DRIVE (BAY) X NEEDS REPLACING (DAAD ERROR 102)	The 210-megabyte hard drive installed in the computer has firmware version 2.30 or 2.31. Replace the drive.

continued

DAAD Diagnostic Messages *Continued*

Error Messages	Possible Corrective Action
DRIVE MONITORING FEATURES ARE UNATTAINABLE	DAAD was unable to get the monitor and performance data due to a fatal command problem such as drive time-out, or was unable to get the data due to these features not being supported on the controller. Check for other errors (time-outs, etc.). If no other errors occur, upgrade the firmware to a version that supports monitor and performance, if desired.
DRIVE MONITORING IS NOT ENABLED FOR DRIVE BAY X	The monitor and performance features have not been enabled. Run the Compaq Diagnostics Utility to initialize the monitor and performance features.
DRIVE TIME-OUT OCCURRED ON PHYSICAL DRIVE BAY X	DAAD issued a command to a physical drive and the command was never acknowledged. The drive or cable may be bad. Check the other error messages on the Diagnostics screen to determine resolution.
DRIVE (BAY) X FIRMWARE NEEDS UPGRADING	The firmware on this physical drive is below the latest recommended version. Call your Authorized Compaq Reseller to obtain the latest upgraded firmware.
DRIVE (BAY) X HAS INVALID M&P STAMP	The physical drive has invalid monitor and performance data present. Run the latest Compaq Diagnostics Utility to properly initialize this drive.
DRIVE X INDICATES POSITION Y	This message indicates which physical drive appears to be scrambled or in the wrong drive bay that it was originally configured for. Examine the graphical drive representation on DAAD to determine proper drive locations. Remove drive X and place it in drive position Y. Rearrange the drives according to the DAAD instructions.
DRIVE (BAY) X RIS COPY MISMATCH	The copies of the RIS mismatch on this drive do not match. This drive may need to be replaced. Check for other errors.
DRIVE (BAY) X UPLOAD CODE NOT READABLE	An error occurred while DAAD was trying to read the upload code information from this drive. If there were multiple errors, this drive may need to be replaced.
DUPLICATE WRITE MEMORY ERROR	Data could not be written to the array accelerator board in duplicate due to the detection of parity errors. This is not a data loss situation. Replace the array accelerator board.

continued

DAAD Diagnostic Messages *Continued*

Error Messages	Possible Corrective Action
ERROR OCCURRED READING RIS COPY FROM DRIVE (BAY) X	An error occurred while DAAD was trying to read the RIS from this drive. If there were multiple errors, this drive may need to be replaced.
FYI: Drive (bay) X is non-Compaq supplied	The installed drive was not supplied by Compaq. If problems exist with this drive, replace it with a Compaq drive.
IDENTIFY CONTROLLER DATA DID NOT MATCH WITH CMOS	The identify controller data from the array controller did not match with the information stored in nonvolatile RAM. This could occur if new, previously configured drives have been placed in a system that has also been previously configured. It could also occur if the firmware on the controller has been upgraded and the System Configuration Utility was not run. Check the identify controller data under the Inspect Utility. If the firmware version field is the only thing different between the controller and nonvolatile RAM data, this is not a problem. Otherwise run the System Configuration Utility.
IDENTIFY LOGICAL DRIVE DATA DID NOT MATCH WITH CMOS	The identify unit data from the array controller did not match with the information stored in nonvolatile RAM. This could occur if new, previously configured drives have been placed in a system that has also been previously configured. Run the System Configuration Utility to configure the controller and nonvolatile RAM.
INSUFFICIENT ADAPTER RESOURCES	The adapter does not have sufficient resources to perform operations to the array accelerator board. Drive rebuild may be occurring. Operate the system without the array accelerator board until the drive rebuild completes.
LESS THAN 75% BATTERIES AT SUFFICIENT VOLTAGE	The operation of the array accelerator board has been disabled due to less than 75% of the battery packs being at the sufficient voltage level. Allow sufficient time for the batteries to recharge (36 hours). If the batteries have not recharged after 36 hours, replace the array accelerator board.
LOGICAL DRIVE X FAILED DUE TO CACHE ERROR	This logical drive failed due to a catastrophic cache error. Replace the array accelerator board and reconfigure using the System Configuration Utility.

continued

DAAD Diagnostic Messages *Continued*

Error Messages	Possible Corrective Action
LOGICAL DRIVE X STATUS = FAILED	This status could be issued for several reasons. If this logical drive is configured for No Fault Tolerance and one or more drives fail, this status will occur. If mirroring is enabled, and any two mirrored drives fail, this status will occur. If Data Guarding is enabled, and two or more drives fail in this unit, this status will occur. This status may also occur if another configured logical drive is in the WRONG DRIVE REPLACED or LOOSE CABLE DETECTED state. Check for drive failures, wrong drive replaced, or loose cable messages. If there was a drive failure, replace the failed drive(s) and then restore the data for this logical drive from the tape backup. Otherwise, follow the wrong drive replaced or loose cable detected procedures.
LOGICAL DRIVE X STATUS = INTERIM RECOVERY	A physical drive in this logical drive has failed. The logical drive is operating in interim recovery mode and is vulnerable. Replace the failed drive as soon as possible.
LOGICAL DRIVE X STATUS = LOOSE CABLE DETECTED	A physical drive has a cabling problem. Turn the system off and attempt to reattach the cable onto the drive. If this does not work, replace the cable.
LOGICAL DRIVE X STATUS = NEEDS RECOVER	A physical drive failure in this logical drive has failed and has now been replaced. This drive needs to be rebuilt from the mirror drive or the parity data. When booting up the system, select the "F1 - rebuild drive" option to rebuild the replaced drive.
LOGICAL DRIVE X STATUS = OVERHEATED	The temperature of the Intelligent Array Expansion System drives is beyond safe operating levels and it has shut down to avoid damage. Check the fans and the operating environment.
LOGICAL DRIVE X STATUS = OVERHEATING	The temperature of the Intelligent Array Expansion System drives is beyond safe operating levels. Check the fans and the operating environment.
LOGICAL DRIVE X STATUS = RECOVERING	A physical drive in this logical drive has failed and has now been replaced. The replaced drive is rebuilding from the mirror drive or the parity data. Nothing needs to be done. Normal operations can occur.

11-46 *Diagnostic Tools*

DAAD Diagnostic Messages *Continued*

Error Messages	Possible Corrective Action
LOGICAL DRIVE X STATUS = WRONG DRIVE REPLACED	A physical drive in this logical drive has failed. The incorrect drive was replaced. Replace the drive that was incorrectly replaced. Then, replace the original drive that failed with a new drive. Do not run the System Configuration Utility to reconfigure - you will lose data on the drive.
MIRROR DATA MISCOMPARE	Data was found at reinitialization in the posted write memory, however, the mirror data compare test failed resulting in data being marked as invalid. Data loss is possible. Replace the array accelerator board.
MIRRORED MEMORY LOCATION ERRORS	Soft errors occurred when attempting to read the same data from both sides of the mirrored memory errors. Data loss will occur. Replace the array accelerator board.
NO CONFIGURATION FOR ACCELERATOR BOARD	The array accelerator board has not been configured. If the array accelerator board is present, run the System Configuration Utility to configure the board.
PHYSICAL DRIVE (BAY) X ERROR OCCURRED	This message displays detailed information on any drive errors that were returned to DAAD while issuing drive commands. Check for other error conditions.
PHYSICAL DRIVE (BAY) X HAS LOOSE CABLE	The array controller could not communicate with this drive at power-up. This drive has not previously failed. Check all cable connections first. The cables could be bad, loose, or disconnected. Turn on the system and attempt to reconnect data/power cable to the drive. If this does not work, replace the cable. If that does not work, the drive may need to be replaced.
PHYSICAL DRIVE (BAY) X IS A REPLACEMENT DRIVE	This drive has been replaced. This message displays if a drive is replaced in a fault tolerant logical volume. If the replacement was intentional, allow the drive to rebuild.
PHYSICAL DRIVE (BAY) X IS A REPLACEMENT DRIVE MARKED OK	This drive has been replaced and marked OK by the firmware. This may occur if a drive has an intermittent failure (for example, if a drive has previously failed, then when DAAD is run, the drive starts working again). Replace the drive.

continued

DAAD Diagnostic Messages *Continued*

Error Messages	Possible Corrective Action
PHYSICAL DRIVE (BAY) X HAS FAILED	The indicated physical drive has failed. Replace this drive.
PHYSICAL DRIVE (BAY) X IS UNDERGOING DRIVE RECOVERY	This drive is being rebuilt from the corresponding mirror or parity data. Normal operations should occur.
PHYSICAL DRIVE (BAY) X WAS INADVERTENTLY REPLACED	The physical drive was incorrectly replaced after another drive failed. Replace the drive that was incorrectly replaced and replace the original drive that failed. Do not run the System Configuration Utility to reconfigure - data will be lost.
SET CONFIGURATION COMMAND ISSUED	The configuration of the IDA-2 has been updated. The array accelerator board remains disabled until it is reinitialized. Run the System Configuration Utility to reinitialize the array accelerator board.
SOFT FIRMWARE UPGRADE REQUIRED	DAAD has determined that your controller is running firmware that has been soft upgraded by the Compaq Upgrade Utility. However, the firmware running is not present on all drives. This could be caused by the addition of new drives in the system. Run the Compaq Upgrade Utility to place the latest firmware on all drives.
THRESHOLD FOR DRIVE (BAY) X VIOLATED	This message indicates that a monitor and performance threshold violated for this drive has been violated. Check for the particular threshold that has been violated.
THRESHOLD VIOLATIONS FOR DRIVE (BAY) X	This is a list of the individual thresholds that have been violated for this drive. The drive may need to be replaced. Run the Compaq Diagnostics Utility to determine if the drive has been initialized and the threshold violation warrants drive replacement.
UNKNOWN DISABLE CODE	A code was returned from the array accelerator board that DAAD does not recognize. Call your Authorized Compaq Reseller for the latest version of DAAD.

continued

DAAD Diagnostic Messages *Continued*

Error Messages	Possible Corrective Action
WARNING BIT DETECTED	A monitor and performance threshold violation may have occurred. The status of a logical drive may not be OK. Check the other error messages for an indication of the problem.
WRONG ACCELERATOR	This could mean that either the board was replaced in the wrong slot or placed in a system that was previously configured with another board type. Included with this message is a message indicating the type of adapter sensed by DAAD and a message indicating the type of adapter last configured in System nonvolatile RAM. Check the diagnosis screen for other error messages. Run the System Configuration Utility to update the system configuration.

Chapter 12

Security

Your server offers multi-level security control to provide the right solution for a variety of security needs. This chapter discusses the various hardware and software security features built into Compaq servers.

Compaq System Configuration Utility

Most of the security features are established through the Compaq System Configuration Utility. Table 12-1 lists these features and supplies a brief description of each.

Enabling the Security Features

To enable these security features through Compaq System Configuration security, perform the following procedure:

1. Boot the system partition by pressing **F10** when the cursor appears in the upper-right corner of the screen.
2. Select *Configure Hardware* from the System Configuration menu and press **Enter**.
3. Select *Go to Configuration Steps* menu and press **Enter**.
4. Select *Step 3: View or Edit Details* and press **Enter**.
5. Use the arrow keys to locate the desired security feature and press **Enter**.
6. Save the configuration and exit the utility.

Table 12-1
Compaq System Configuration Utility Security Features

Feature	Description of Feature When Enabled
Power-On Password	Prevents use of the computer unless you enter the password.
Administrator Password	Prevents changes to configuration unless you enter the password.
Network Server Mode	Allows system startup from the hard drive or network while keyboard is disabled.
QuickLock	Locks the keyboard and mouse without exiting an application.
Diskette Boot Control	Disables system startup from a diskette drive(s). The diskette drive is available for other read/write functions.
Diskette Write Control	Disables the diskette drive write function. Boot and read functions are still available.
Serial/Parallel Interface Control	Prevents unauthorized transfer of data through the integrated serial/parallel interfaces.

See also “Diskette Boot Override,” page 12-8, and Table D-1 in Appendix D, “Switch Settings.”

QuickLock

By enabling QuickLock through the Compaq System Configuration Utility, you can disable the keyboard and pointing device interface connected to the built-in mouse connector while you are in an application.

To activate QuickLock and disable the keyboard and pointing device after you are in an application, press **Ctrl+Alt+L**.

IMPORTANT: You can set up and change the QuickLock hot key combination (Ctrl +Alt +L) if it conflicts with your application software. To change the hot key combination, you must have installed the KP Utility in your server. Refer to your MS-DOS documentation for information on this utility.

You cannot access the application, but it remains in view on the monitor. To re-enable the input device interface and bring the application to the screen, type the Power-On Password that you established in the Compaq System Configuration Utility, and press **Enter**.

Password Security

You can maintain Power-On and Administrator Passwords on your server.

Administrator Password

Establishing the Administrator Password through the Compaq System Configuration Utility prevents changes to the configuration unless the Administrator Password is entered. When running the Compaq System Configuration Utility, the Administrator Password icon displays.

Establishing a Password

The Power-On and Administrator Passwords are established in the Compaq System Configuration Utility and are entered and changed in similar fashions.

To establish the Power-On or Administrator Password, follow this procedure:

1. Boot up on the Compaq System Configuration Utility.
2. When the main menu displays, select *Configure Hardware* and press **Enter**.
3. Select *Step 3: View or Edit Details* and press **Enter**.
4. Use the arrow keys to select *Set Power-On Password* or *Set Administrator Password* as applicable, and press **Enter**.

5. Enter your password and press **Enter**. A prompt asks you to verify the password before it is set.
6. Press **F10** to return to the steps menu.
7. Select *Step 5: Save and Exit*.

IMPORTANT: If you set the Administrator Password and then forget it, you cannot change the server configuration without clearing the passwords using Switch 5. See the section "Clearing a Password."

Entering a Password

To enter a password, follow this procedure:

1. Turn on the computer.
2. When the key icon appears on the monitor, enter the current password. For security, the characters you type do not appear on the screen, but OK displays to confirm a valid password.
3. If you enter the power-on password incorrectly, a broken key icon displays. Try again. After three unsuccessful tries, you must turn the computer off and on again before you can continue.

IMPORTANT: The key icon appears only when you turn on the computer. Resetting the system using the Ctrl +Alt +Del keys does not require entering the password.

Changing a Password

To change the Power-On or Administrator Password, follow this procedure:

1. Turn on the computer.
2. When the key icon appears, enter
CURRENT/NEW/NEW
Where **current** is the existing password, **new** is the revised password, and the second **new** is a verification of the revised password.
3. The new password takes effect the next time you turn on the computer.

Deleting a Password

To delete the Power-On or Administrator Password, follow this procedure:

1. Turn on the computer.
2. When the key icon appears, enter
CURRENT/
where **current** is the current password.
3. The password is now deleted until you establish a new password through the Compaq System Configuration Utility.

Clearing a Password

If you forget your Power-On or Administrator Password, you can clear all passwords by turning off the computer and disabling the Power-On and Administrator Password Switch 5 on the six-position switch bank. This switch change does not take effect until the computer is turned on.

To clear the Power-On and Administrator Passwords, follow this procedure:

1. Turn off the computer.
2. Remove the cover of the unit.
3. Set Switch 5 on the system board to the ON/CLOSED position.

- To re-enable the Power-On and Administrator Passwords, follow this procedure:

1. Turn off the computer.
2. Remove the cover of the unit.
3. Set Switch 5 on the system board to the OFF/OPEN position.
4. Replace the cover on the unit and turn on the computer.

Network Security

Enabling the Network Server Mode feature through the Compaq System Configuration Utility allows you to boot the computer from a hard drive, network server, or host while the keyboard and pointing device interface are disabled. This provides security if the computer operates unattended. In Network Server Mode, the system boots without asking for the Power-On Password. You must enable the Power-On Password before you can enable Network Server Mode.

To enable the input devices, you must enter a Power-On Password. The password remains in effect until the Network Server Mode is disabled or the password is deleted or disabled. If you try to boot from a diskette while the Network Server Mode is enabled, you must enter the Power-On Password for the boot to complete.

Hardware Security

Compaq hardware also includes a number of built-in security features such as switches, front bezel locks, and cable locks on servers.

Switches

Security can also be enabled/cleared through switches on the system board.

Security Features Set by Switches

Power-On and Administrator Passwords: Switch 5 of the six-position switch bank enables or clears both passwords. Set switch 5 to OFF=Enabled to allow you to establish passwords if you choose. Set switch 5 to ON=Cleared to clear both passwords. See "Establishing a Password" and "Clearing a Password" sections in this chapter.

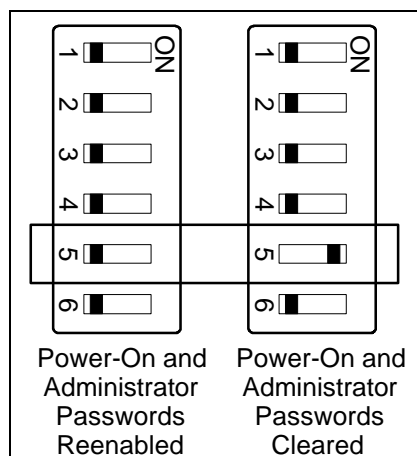


Figure 12-1. Using Switch 5 Enables and Clears Passwords

Diskette Boot Override: Set switch 4 to the ON position to enable booting from diskette. By setting this switch to ON, you boot from the diskette drive regardless of the configuration setting. If this switch is OFF, the configuration utility controls the server.

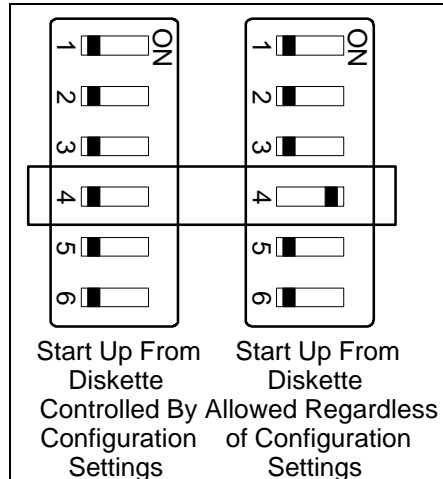


Figure 12-2. Switch 4 set to ON enables booting from diskette

Configuration Lock: Set switch 2 to the ON position to lock the configuration in non-volatile memory. By setting this switch to ON, you cannot change the configuration in nonvolatile memory.

If the switch is OFF, you can change the configuration.

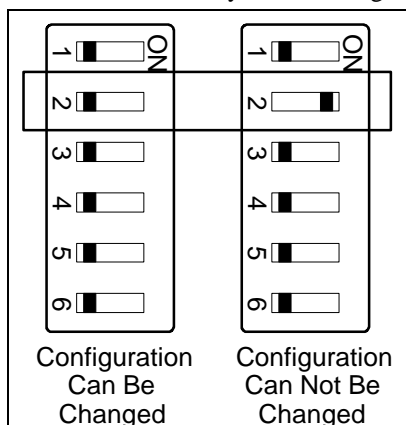


Figure 12-3. Switch 2 set to ON locks the configuration in non-volatile memory

Front Bezel Keylock

The external keylock protects the removable media components of the server. Turn the key counterclockwise to its locked position. To gain access to internal components and pluggable drives:

1. Unlock the front bezel (door) by turning the key clockwise.
2. Open the front bezel. It opens like a door on hinges.
3. Remove or install any pluggable drives.
4. Read the warning in the front matter of the hard copy reference guide before removing the side access panel.
5. Loosen the three thumbscrews 1/4 turn and remove the side access panel. This allows you to gain access to internal components, including the processor boards, memory boards and expansion boards.

.....

12-10 Security

Chapter 13

Maintenance and Safety Precautions

This chapter includes information on system care and maintenance.

System Care and Maintenance

The care and maintenance of your system are important. The issues regarding this information includes performing routine care for your system, preparing your system for shipment, and taking precautions for your CD-ROM drive and your modem. See Appendix C for precautions to avoid damage by electrostatic discharge

Routine Care of Server and Monitor

All servers need routine care. This section provides information on protecting your server and monitor, and supplies information about ergonomic considerations.

Follow these suggestions to protect your server and monitor:

- Operate the server on a level surface.
- To permit required airflow and allow the CD-ROM drive tray to open, leave at least 6 inches (15.2 centimeters) in front of and 3 inches (7.6 centimeters) behind the server.
- Keep the server away from excessive moisture, direct sunlight, and extremes of heat and cold.
- Keep liquids away from the server and the keyboard.
- Never cover the ventilation slots on the monitor.
- To lessen interference in a two-monitor system, place the monitors as far apart as possible.



WARNING: To avoid the risk of personal injury or damage to the equipment, for the next two suggestions, turn off your server and unplug the AC power cord from the power receptacle.

- Wipe the server exterior with a soft, damp cloth as needed. Do not use cleaning products; they can discolor or damage the finish.
- Occasionally clean the air vents on the front and back of the server. Lint and other foreign matter can block the vents and limit the airflow.
- Leave the server cover on while the server is in use.



CAUTION: Do not operate the server with the covers removed. The covers are an integral part of the cooling system and removing them while the system is running may adversely affect data integrity.

Preparations for Shipping

Proper shipping preparations can protect your server while in transit. Follow the instructions below:

1. Back up the data on the hard drive(s) onto diskettes or tape cartridges. Do not expose the diskettes or tape cartridges to electrical or magnetic impulses during storage or shipment.
2. Remove any diskettes from the diskette drive(s).
3. Turn off the server and the external devices.
4. Disconnect the AC power cord from the AC outlet, then from the server.
5. Disconnect the system components and external devices from their power sources, then from the server.



CAUTION: Ensure that all boards are seated properly in the expansion slots before shipping the server.

6. To protect the server components and external devices, pack them in their original packing boxes or similar packaging with sufficient packing material.

Modem and Telephone Precautions

Use the following precautions to ensure your safety:

- Never install modem/telephone wiring during a lightning storm.
- Never install modem/telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch uninsulated modem/telephone wires or terminals unless the modem/telephone line has been disconnected at the network interface.
- Use caution when installing or modifying modem/telephone lines.
- Avoid using modem/telephone (other than a cordless type) during an electrical storm. There can be a remote risk of electric shock from lightning.

Do not use the telephone to report a gas leak in the vicinity of the leak.

Ergonomic Considerations

Many factors in your work environment affect work performance efficiency and good health and safety. By following the suggestions described below, you can create a more comfortable, healthy, and efficient environment.

- Make sure your chair is at a height that allows you to maintain the proper arm and hand positions. Be sure your chair supports your lower back. Rest your feet firmly on the floor.

These suggestions can help you work more comfortably and effectively. However, only you can determine the best working environment and workstation arrangement for your work.

Appendix A

Using the Internal CD-ROM Drive

The internal CD-ROM drive is a random access, read-only storage device capable of retrieving data from removable compact disc media, which can store up to 680 megabytes of digital information.

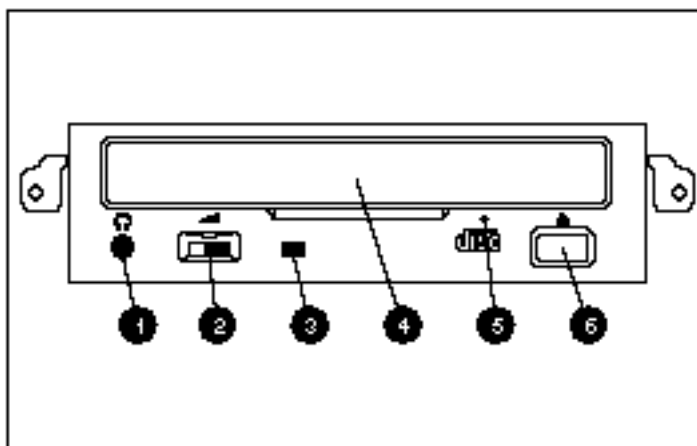


Figure A-1. Internal CD-ROM front panel

Table A-1
Internal CD-ROM

Ref	Component	Function
❶	Headphone Jack	Connects the headphone
❷	Headphone Volume Control	Increases or decreases the headphone volume
❸	Busy Indicator	Turns green when a disc is present; flashes amber when the drive is reading a CD
❹	Disc Tray	Slides in and out of the Internal CD-ROM and holds the disc in place
❺	Emergency Eject Hole	Allows you to manually eject a CD if the eject button is inoperable
❻	Eject Button	Opens and closes the disc tray

Opening the Tray Automatically

You can open and close the Internal CD-ROM tray by using the automatic eject button. Ensure plenty of clearance for the tray to open and close. Follow the instructions below:

1. With your computer turned on, open the Internal CD-ROM tray by pressing the eject button on the front panel of the drive.
2. Place the Internal CD-ROM disc in the tray, handling the Internal CD-ROM disc from the edges, not the flat surfaces of the disc.

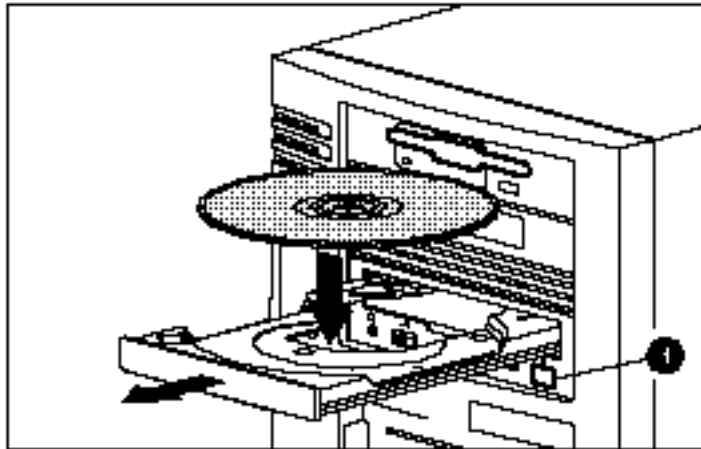


Figure A-2. Opening the Internal CD-ROM tray

3. Close the tray by again pressing the eject button.

The drive performs a diagnostic check and automatically begins reading the table of contents. The busy indicator turns amber while the drive reads the table of contents.

The tray automatically opens if the disc is upside-down, not properly nested in the tray, or if any other condition prevents the drive from reading the disc.

4. When the busy indicator turns green, the drive is ready to receive commands and data may be retrieved from the disc.

Opening the Tray Manually

If the tray will not open automatically you can open it manually by using the emergency eject button.

NOTE: Certain applications or operating system software may disable the eject button to prevent accidental damage to the disc. If the eject button is disabled by the application software, it will not operate.



CAUTION: Before beginning this procedure, turn off the power to your computer.

1. Insert a metal rod such as a straightened paper clip into the emergency eject hole and push firmly.

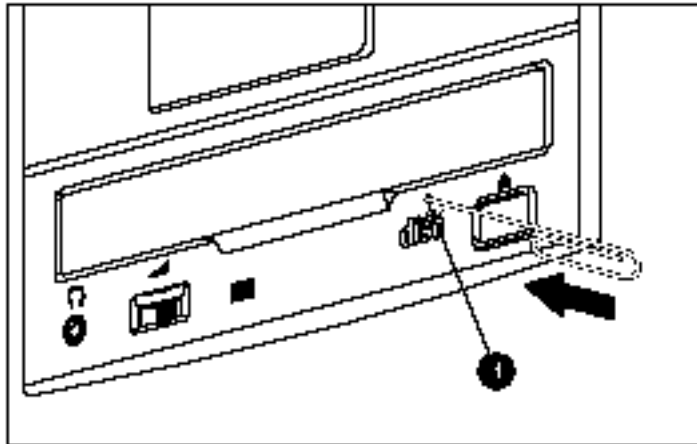


Figure A-3. Opening the internal CD-ROM tray manually

2. Slowly pull the tray out from the drive until the tray is fully extended, then remove the disc.

Appendix B

Power Cord Set Requirements

The automatic line sensing input feature of your ProLiant System permits it to operate from any line voltage from 100 to 240 volts AC.

Power cord sets must meet the requirements of the country where you use the server. The power cord set (appliance coupler, flexible cord, and wall plug) you received with your server meets the requirements for use in the country where you purchased your equipment. For more information on power cord set requirements, contact your Authorized Compaq Dealer.

General Requirements

The requirements listed below are applicable to all countries:

1. The length of the power cord set must be at least 6 feet (1.8 meters) and a maximum of 11.8 feet (3.0 meters).
2. All power cord sets must be approved by an acceptable accredited agency responsible for evaluation in the country where the power cord set will be used.
3. The power cord set must have a minimum current capacity and nominal voltage rating of 13A, 125 volts AC or 10A, 250 volts AC, as required by each country's power system.
4. The appliance coupler must meet the mechanical configuration of an EN 60 320/IEC 320 Standard Sheet C13 connector, for mating with appliance inlet on the Server.

Country-Specific Requirements

Use Table B-1 to identify the appropriate accredited agency in your country.

Table B-1
Power Cord Set Requirements by Country

Country	Accredited Agency	Applicable Note Numbers
Australia	EANSW	1
Austria	OVE	1
Belgium	CEBC	1
Canada	CSA	2
Denmark	DEMKO	1
Finland	SETI	1
France	UTE	1
Germany	VDE	1
Italy	IMQ	1
Japan	JIS	3
Norway	NEMKO	1
Sweden	SEMKO	1
Switzerland	SEV	1
United Kingdom	BSI	1
United States	UL	2

Notes:

1. Flexible cord must be <HAR> Type HO5VV-F, 3-conductor, 1.0 mm² conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country where it will be used.
2. Flexible cord must be Type SJT or equivalent, No. 16 AWG for ProLiant 5000 models, 3-conductor. Wall plug must be a two-pole grounding type with a NEMA 5-15P (15A, 125V) or NEMA 6-15P (15A, 250V) configuration.
3. Appliance coupler, flexible cord, and wall plug must bear a "T" mark and registration number in accordance with the Japanese Dentori Law. Flexible cord must be Type VCT or VCTF, 3-conductor, 1.0 mm² conductor size. Wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (15A, 125V) configuration.

Appendix C

Electrostatic Discharge

To prevent damaging the system, follow these precautions when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

To prevent electrostatic damage, observe the following precautions:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always be properly grounded when touching a static-sensitive component or assembly.

Grounding Methods

There are several methods for grounding. Use one or more of the following measures when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm +/- 10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.
- Use heelstraps, toestraps, or bootstraps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have an Authorized Compaq Reseller install the part.

For more information on static electricity or assistance with product installation, contact your Authorized Compaq Reseller.

.....

C-2 *Appendix C*

Appendix D

Switch Settings

I/O Board Switches

Compaq ProLiant 5000 servers have one switch bank on the I/O board. Table D-1 explains the possible toggle settings for this six-switch bank.

Table D-1
I/O Board Switch Settings

Switch	Function	Set to ON	Set to OFF
1	Video Disable	Disables the integrated video controller	Default
2	Configuration Lock	You cannot change the configuration in non-volatile memory	You can change the configuration in non-volatile memory
3	Rack-Mountable Chassis	Default if system is installed in a rack-mountable chassis	Default if system is installed in a tower chassis
4	Diskette Boot Override	Server is allowed to boot from the diskette drive regardless of the configuration setting	Default. Diskette booting is controlled by configuration settings.
5	Clear Power-On & Administrator Passwords	Clear passwords	Default. Booting is password protected if a password is set.
6	Configuration Memory Clear	Clears the configuration memory	Default

Processor Board Switches

ProLiant 5000 servers have five switch banks on each processor board. Tables D-2 and D-3 explain possible toggle settings for Switch banks 3, 4 and 5.

Setting the Voltage ID



CAUTION: Setting the voltage ID switches incorrectly can result in damage to the processor if the voltage ID is higher than the processor is designed to receive.

Switch banks 1 and 2 on both processor boards control processor voltage settings. The default settings on both switches is OFF. Instructions for any setting change for Switch 1 or Switch 2, if required, would accompany Compaq processor options or spare parts.

Setting the Bus Frequency

Switch bank 3 regulates processor bus frequency. Table D-2 provides Switch bank 3 (SW3) settings. Switch bank 3 is located between the two processor sockets on each processor board.

Table D-2
Switch Bank 3 Settings
Bus Frequency

Pentium Pro Frequency	Switch 1	Switch 2
50 MHz	Off	Off
60 MHz	Off	On
66.66 MHz (default)	On	Off
Reserved	On	On

Table D-3 provides the switch settings to set the core ratio for each Intel Pentium Pro Processor. Switch banks 4 (SW4) and 5 (SW5) are located on the processor board beside each processor.

Table D-3
Switch Bank 4 and Switch Bank 5 Settings
Processor Bus/Core Frequency Ratio

Bus/Core Ratio	Switch 1	Switch 2	Switch 3
2/4	Off	Off	Off
2/5 (default on 166 MHz models)	On	Off	Off
2/6 (default on 200 MHz models)	Off	On	Off
2/7	On	On	Off
2/8	Off	Off	On
2/9	On	Off	On
2/10	Off	On	On
2/11	On	On	On

D-4 Switch Settings

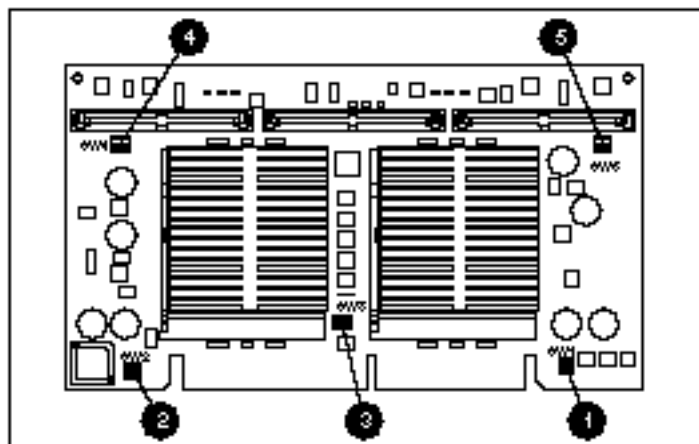


Figure D-1. Switch bank locations on a ProLiant 5000 processor board

- | | | | |
|---|-----------------|---|-----------------|
| { | ❶ Switch Bank 1 | □ | ❹ Switch Bank 4 |
| } | ❷ Switch Bank 2 | □ | ❺ Switch Bank 5 |
| □ | ❸ Switch Bank 3 | | |

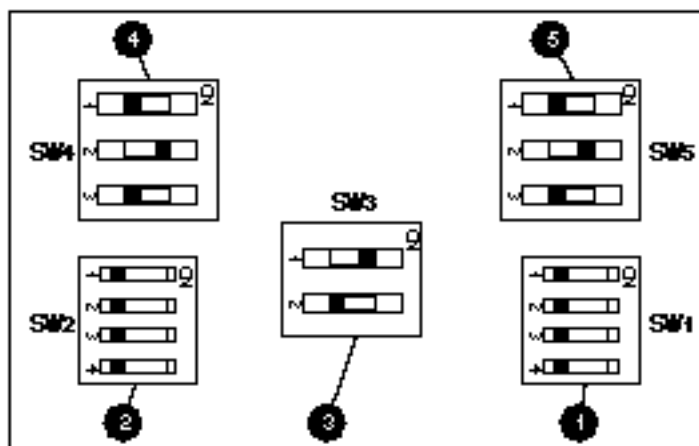


Figure D-2. Processor board switch setting positions

Glossary

Adapter Device Driver Architecture	An ADD device driver for drive subsystems consisting of three layers: DMD for Device Manager Driver, FLT for Filter Driver, and ADD for Adapter Device Driver. The ADD Architecture is used with IBM OS/2 Version 2.x.
Array Accelerator Write Cache	An internal part of the Compaq SMART-2 Array Controller that dramatically improves performance of disk write operations by providing a buffer. A battery backup and mirroring protects the data.
ASPI	Advanced SCSI Programming Interface. When you configure a server with hard drives and tape drives on multiple SCSI channels, some applications require a method for identifying the SCSI channel that should be used to transmit commands. Most programs, such as tape backup utilities, use ASPI.
ASR-2	Automatic Server Recovery-2.
ASR-2 Timer	A timer that is periodically reset when the system is running.
Automatic Revision Tracking	A feature of the Revision History Table that allows you to review the configuration changes. The table provides the server with hardware version information.

Automatic Server Recovery-2 (ASR-2)	A feature that can enable the server to boot automatically from the operating system or the Compaq Utilities. The Compaq Utilities must be installed in the system partition using the System Configuration Utility. ASR-2 can reboot the server after a critical system error. You can also configure ASR-2 to page an administrator when the system reboots.
Boot Disk Controller	The controller that you designate as primary or first is the boot disk controller. This is the controller that the system boots during start-up.
Boot Partition	The part of the disk containing the boot software or operating system. You can divide each disk into several partitions and can contain different operating systems. However, you must designate one partition as the boot partition to start the system.
Boot-Time Loadable Drivers	Drivers that you can link-edit into the UNIX system kernel during the boot process.
Burst Transfer	A high-performance data transfer mode where contiguous blocks of data are read/written during a single transmission.

Cache Buffer	A block of memory in the server for temporary file stored. The default block size in NetWare is 4 Kbytes. You can increase the buffer size to 8 or 16 Kbytes. File server performance is greatly increased with cache buffers by allowing workstations to access data from memory rather than disk.
CHKDSK	The CHKDSK (check disk) utility shows you how much storage capacity is available on a disk.
Communications Buffer	An area in the server's memory for storing data packets from different network stations. The packets remain in the communications buffer until the server processes them. The communications buffer ensures a smooth flow of data to the server.
.CFG File	A file that contains the specifications and attributes of possible configurations of an expansion board or option. It provides information such as switch settings, interrupts, DMA, I/O ports, and system memory.
Compaq Utilities	Utilities that are loaded from a specially created system partition on the hard drive. These utilities include the Compaq System Configuration Utility, the Compaq Diagnostics Utility, and the Compaq Inspect Utility.

Compaq System Configuration Utility	The software utility that configures software-programmable EISA expansion boards and helps you select slots and switch and jumper settings for ISA boards. The utility allocates system resources among the expansion boards and identifies conflicts in requested board sequences.
Configuration File	A file that contains the specifications and attributes of possible configurations of an expansion board or option. The file provides information such as switch settings, interrupts, DMA, I/O ports, and system memory.
Controller Duplexing	A fault tolerance technique with two controllers each with their own drive array containing identical data. Duplexing requires two SMART-2, IDA-2, or 32-Bit Fast-SCSI-2 Controllers with identical groups of drives.
Critical Error Log	<p>Records non-correctable memory errors as well as catastrophic hardware and software errors that typically cause the system to fail. This information helps you quickly identify and correct the problem, minimizing downtime.</p> <p>The log can be viewed through the Inspect Utility, Diagnostics Utility, or the optional Insight Manager. The Diagnostics Utility either resolves the error or suggests corrective action.</p>

Cylinders	A unit of storage on a hard drive consisting of the set of tracks that occupy the same location.
Data Guarding	See RAID 4.
Data Striping	Distributes data files across a series of hard drives. The data is distributed in sector blocks according to the operating system requirements.
Diagnostics Tools	Tools used to help resolve installation and configuration problems. Some of the tools supplied by Compaq are: Automatic Server Recovery-2, Server Health Logs, Inspect and Test Utilities, Drive Array Advanced Diagnostics, and the System Configuration History Files.
Diagnostics Utility	A test program designed to detect and identify possible computer malfunctions. You can access the Diagnostics Utility at any time if you loaded it into the system partition created on your hard drive.
DIMM	Dual Inline Memory Module. Surface-mounted memory chips aligned on a plug-in board.
Distributed Data Guarding	See RAID 5.

Drive Array Advanced Diagnostics (DAAD)	A DOS-based tool designed to collect all possible information about the array controllers in the system and to offer a list of all detected problems. DAAD issues multiple commands to the array controllers to determine if a problem exists. In most cases, enough information will be provided to initiate problem resolution immediately.
Drive Mirroring	See RAID 1.
Dynamic Sector Repairing	The process used by the SMART Controller to remap bad memory sectors automatically.
EFS	Extended Feature Supplement. A collection of device drivers that are required for some Compaq options to operate under the SCO UNIX Operating System.
EISA Boards	Extended Industry Standard Architecture expansion boards. Expansion boards that comply with the 32-bit extension of the Industry Standard Architecture (ISA) bus and are designed to deliver high-performance 32-bit I/O transmissions.
Element Management	The monitor and control of a particular type of device on the network, for example, a hub.

ESDI	Enhanced System Device Interface. This interface is for standard hard drive data transfer at 10 megabits per second.
Ethernet	A local area network cabling and signaling scheme capable of linking up to 1024 nodes in a bus network. Ethernet provides a data transfer rate of 10 megabits per second.
Fast-Wide SCSI-2	The latest generation of Small Computer Systems Interface (SCSI) technology. It is a high-level peripheral communication mechanism that links internal and external storage devices on a 16-bit bus with a 20MB-per-second data rate. Connectors have 68 pins.
FASTART	A DOS-based Compaq utility designed to partition and format the hard drive, install MS-DOS and User Programs, and create and change the <i>CONFIG.SYS</i> and <i>AUTOEXEC.BAT</i> files. FASTART is available only for MS-DOS as published by Compaq versions 3.11, 4.0, and 5.0.
Fault Tolerance	The ability of a server to recover from hardware problems without interrupting the server's performance. Fault tolerance methods include drive mirroring, data guarding, distributed data guarding, and controller duplexing.

FDISK	An MS-DOS command used to partition the hard drive. You must run the FDISK utility before you can access your hard drive or format it with MS-DOS.
File Allocation Table (FAT)	A hidden table on the hard drive that stores data about how files are stored in distinct sectors.
Firmware	The software that is permanently stored in a computer's ROM. Firmware can be updated by replacing the ROM or by using upgradable software (Flash ROMs) from Compaq.
Flash ROM	Software-upgradable firmware that allows you to upgrade the server, SMART-2 Controller, and IDA-2 Controller firmware without requiring you to replace the ROM.
GTL+	Bus technology used by the Pentium Pro Processor. It is an enhancement to the GTL (Gunning Tranciever Logic) technology
High-Performance File System	An alternative file system used in MS OS/2 and IBM OS/2 2.0 that offers better performance and security in some instances.

High-Throughput Device	Devices such as the Fast-SCSI-2 hard drives that send large amounts of data through the components of the server.
Hot Fix Redirection	The remapping of bad sectors to good sectors in a reserved area on the hard drive in a NetWare environment.
Hot Fixing	A NetWare feature that redirects faulty data blocks from the main data storage area to a part of the disk's storage area called the Hot Fix Redirection Area.
Hot-Pluggable Drives	Drives that you can install or remove without using screws or cables and without powering down the server.
Insight Management Agents	Software that executes on the managed device, updating and relaying Management Information Base (MIB) information data to the server. Compaq Insight Manager uses management agents to gather information performance and fault analysis information.
Insight Manager	A Compaq application for easily managing network desktops and servers that delivers intelligent monitoring and alerting, and visual control of a server.

Inspect Utility	A utility that provides information to assist an Authorized Compaq Service Provider in diagnosing the operating environment. The utility contain memory configurations, wellness information, and error logging.
Intelligent Communications Adapter	A Banyan 16-bit serial communications adapter designed to connect like (server-to-server LAN or WAN) or unlike (non-VINES) environments to a Banyan network.
ISA Boards	Industry Standard Architecture boards. Expansion boards that comply with the 16-bit architecture.
LED	Light Emitting Diode: a visual electronic signal.
Level Triggered	The starting of circuit action on the high or low level on the clock pulse, not on the edge.
Logical Drives	A specified number of drives or drive array pairs in a drive array that act as one hard drive. You can specify a maximum of three logical drives by using the SmartStart installation utility or the System Configuration Utility.

Logical Unit Number	A method of sub-addressing devices of one type (such as a tape) that can connect to one SCSI ID device (such as a tape carousel). Typically, individual SCSI devices are set to LUN 0 as the default.
Logical Volume	See logical drives.
Low-Throughput Device	Devices such as tape drives that send small volumes of data through the server components.
Management Application	Software that executes on the management platform and interacts with management agents. Compaq Insight Manager is a management application.
Management Information Base (MIB)	A set of objects that management applications and agents use to monitor and control managed devices.
Management Platform	Software that provides an open environment for multiple management applications to execute simultaneously. For example, Novell NMS.
Mirrored Partition	The duplication of data from one NetWare partition on a hard drive to another NetWare partition on another hard drive. When you mirror partitions, two or more hard drives are paired.

Mount NetWare Volumes	A NetWare-specific technique that makes a volume available to users on the network. It is similar to creating directories in DOS and making those directories available to users.
MS-DOS Emulation Mode	A mode in Microsoft OS/2 that allows you to run DOS applications. This mode emulates MS-DOS so that these applications can run while in OS/2.
Multiprocessing	Two or more processors on a server that allow simultaneous cache-supported operation of each microprocessor. The processors share system memory, which allows for the most effective use of system memory when a second system processor is added.
NDIS Drivers	Network Driver Interface Specification drivers. DOS and OS/2 drivers found on the OS/2 Support Software Diskette from Compaq that support media and protocol independent communications. These drivers provide a standard protocol transportation interface to a single network board without conflict.
Network Management	To monitor and control the network infrastructure. For example, wire and internetwork devices.
NIC	Network interface controller. A controller that acts as the communications interface between a personal computer and a network.

NLM	NetWare Loadable Module. A program you can load and unload while the server is running. Four types of NLMs exist: management utilities and server application modules, disk drivers, LAN drivers, and name space NLMs.
Nonvolatile Memory	A storage device that retains data without power applied (or when the computer is turned off).
NTFS	A high-performance Windows NT file system.
ODI Drivers	Open Data-Link Interface drivers. Drivers found on the NetWare Programs from Compaq diskette that support media- and protocol-independent communications. These drivers provide a standard protocol transportation interface to share a single network board without conflict.
On-line Spare	A hard drive used in drive mirroring, data guarding, and distributed data guarding to provide drive replacement for a failed drive without user intervention.
Orphaned Partitions	Orphaned partitions occur when a hard drive containing the master partition fails. If a hard drive containing a duplicate partition fails, the system marks the master partition as unmirrored.

QuickLock	A utility that disables the keyboard and mouse without exiting the application. Use the Configuration Utility to enable QuickLock.
QVision	The Compaq 1024 x 768 video system. The Compaq QVision 1024/E Controller allows up to 256 colors in 1024 x 768 resolution and 65,000 colors in 640 x 480 resolution.
RAID 0	Redundant Array of Inexpensive Disks. RAID 0 indicates that there is no fault tolerance method used.
RAID 1	Redundant Array of Inexpensive Disks. RAID 1 is a fault tolerance method (drive mirroring) that uses 50 percent of drive storage capacity to provide greater data reliability by storing a duplicate of all user data. Half the drives in the array are duplicated or "mirrored" by the other half.
RAID 4	Redundant Array of Inexpensive Disks. RAID 4 is a fault tolerance method (data guarding) that uses a small percentage of a drive array storage capacity to store data guard code that is used to recover data if a drive fails.

RAID 5	Redundant Array of Inexpensive Disks. RAID 5 is a fault tolerance method (distributed data guarding) that “stripes” data and parity across all the drives in the configuration to ensure the uninterrupted availability of uncorrupted data. It allocates a small percentage of the drive array storage to protect users from data loss.
RAM	Random Access Memory. Memory that the server uses to load and run programs. Data stored in RAM is lost when you turn off your server.
Remote Console	An input/output device that consists of a keyboard and video display. This device is usually found in multiuser environments.
Resources	The parts of a server that you must configure with the System Configuration Utility. Examples of resources are memory, interrupt request (IRQ) lines, direct memory access (DMA) channels, and port addresses.
Revision History Table	A feature that allows precise identification of the components in a PC Server. The table is updated when the system ROM detects a board version change in an EISA expansion slot. The table also contains complete version information on the previous configuration. This feature allows correlation of hardware changes with server failure.

ROM	Read Only Memory. A nonvolatile memory storage device that stores system instructions and retains information without power applied (or when the computer is turned off). ROM stores the system firmware.
Root File System	The base of the file system in a UNIX environment. Every file in the file system is either contained in the root file system or in some part of the root.
.SCI File	System Configuration Information file. This file allows you to create a backup of the configuration and store it. You are able to restore the system configuration from the .SCI file.
SCSI	Small Computer Systems Interface is a standard bus for connecting devices such as disk drives to computers. It is not the same as the internal bus by which the CPU communicates with memory.
SCSI Channel	A standard communications protocol for external and internal device expansion, such as hard drives, tape drives, and CD-ROM drives.
SCSI Devices	Devices such as tape drives and hard drives that operate using the SCSI interface.

SCSI ID	A unique ID assigned to each SCSI device connected to the same SCSI channel. Use the Inspect Utility to view the SCSI IDs of the installed devices. The ID number uniquely defines each peripheral device address and determines the device priority on the bus. ID 7 (SCSI controller) is the highest priority; ID 0 is the lowest.
SCSI-2	A peripheral bus that provides up to 20-megabyte per second transfer rates plus other features, including command queuing.
Server Health Logs	Logs that contain information to help you quickly identify and correct any server failures and correlate hardware changes with the server failure. The Server Health Logs are stored in nonvolatile RAM and consist of the Critical Error Log and the Revision History Table.
SIMM	Single Inline Memory Modules. Surface-mounted memory chips aligned on a plug-in board providing density and flexibility. <i>See</i> DIMM.
Simple Network Management Protocol (SNMP)	A data access and alert delivery system and a management protocol.

SMART	SCSI Managed Array Technology. This design includes a 32-bit EISA-based array controller with 4 megabytes of cache memory and two Fast-SCSI-2 channels.
Striping	Data is “striped” or distributed across all the physical drives in each logical drive. This data distribution method optimizes performance under the selected operating system.
Swap Area	A part of your disk that acts as an extension of your physical memory (RAM). Programs (or parts of programs) that are in active use but currently in a waiting state can be shifted to this area (swapped out) so that others can run in RAM. The swap space must be large if there are many users or large applications, such as databases.
System Partition	A special partition that you can create on the hard drive by using the System Configuration Utility during initial configuration of your server. This partition can contain the Configuration Utility and the Diagnostics Utility.
Termination	A feature that allows a signal from the SCSI channel to the SCSI device to have a logical end so the signal does not oscillate between the bus and the device. Termination controls noise and signal reflection on the lines.

Token Ring	A type of LAN that uses the token-passing access method with a ring topology.
Tracks	One of several concentric rings on a hard drive that defines a distinct area of data storage. A track is encoded on the drive during low-level formatting of the drive.
Uninterruptible Power Supply (UPS)	A battery that can provide power to a server when power fails. It is also a power conditioning and supply system that offers protection against transient power conditions and short-term power outages.
UNIX Inspect Utility	A UNIX utility that displays information about Compaq system hardware configurations. This information is similar to the DOS-based Compaq Inspect Utility.
User Filesystem	Usually called /u. It holds the home directories of the system users. If there are many users, there may be multiple user filesystems.
Workstation	A computer that runs applications and serves as an access point to resources shared on the network.
Write Cache	See Array Accelerator Write Cache.

Index

10/100 TX PCI UTP 7-1

100Base-TX

network, illustrated 7-3

technology 7-2

A

Adding Memory 2-12, 3-15

Adding Processors 2-10, 3-13

Administrator Password 10-26

ANSI SCSI-2 standards 8-2

Array Accelerator 9-4

battery back up 9-4

Array Configuration Utility

features 9-6

ASR Security 10-25

Automatic operating system

shutdown 10-2

Automatic Performance Tuning 9-5

Automatic Recovery Services 10-7

Automatic Revision Tracking 10-9

Automatic Server Recovery 10-25

Automatic Server Recovery-2

ASR-2 Timer 10-15

booting into the operating system
10-24

features 10-11

hardware requirements 10-13

IPX network 10-13

starting Compaq Utilities 10-14

use with Compaq Insight

Manager 10-14

B

Backup, configuration 6-8, 6-15

Bus activity, monitoring 4-3

C

Compaq Fast-Wide SCSI-2

Controller

compatibility with ANSI SCSI-2
standards 8-2

Compaq Insight Manager 10-1, 10-6, 10-14, 10-23, 10-28

Pre-failure Warranty 5-13

Compaq System Configuration

Utility

configuring Automatic Server

Recovery-2 10-15

enabling Network Server Mode
12-6

enabling rapid recovery services
10-5

establishing Power-on and
Administrator passwords
12-3

pager settings to restart into
Compaq Utilities 10-18

selecting RAID level 10-4

server security features 12-1

settings to restart into operating
system 10-24

Configuration

backup 6-15

hardware 4-1, 4-4

History Log Files 6-15

switch setting 6-17

Configuring

EISA & PCI 6-8

hardware 6-4

Connecting

video board 2-10, 3-13

Interlock switch 1-6

ROM upgrades via Internet 2-22,
3-27

S

SCO Open Server drivers 6-14
 SCO UNIX drivers 6-14
 SCO UnixWare2 drivers 6-14
 SCSI bus connectors 9-3
 SCSI configuration guidelines 8-4
 SCSI devices 8-1
 Server fault tolerance 10-4
 Server Health Logs 10-6
 Server parameter tracking 10-1
 Shutdown 10-2
 SMART Controller
 Flash ROM 9-6
 N+1 distributed data guarding
 10-4
 preinstalled 1-3, 1-5
 specifying level of disk
 subsystem fault tolerance
 10-4
 SMART-2 Array Controller
 defined 9-1
 features 9-1
 SMART-2 Array Controller/P
 components 9-2
 defined 9-2
 SmartStart 2-23, 3-27, 6-1
 creating new system partition
 6-6
 device drivers
 for Microsoft OS/2 6-15
 for Novell NetWare 6-12
 for SCO Open Server 6-14
 for SCO UNIX 6-14
 for SCO UnixWare 2 6-14
 for Windows NT 3.5x 6-13

Storage automatic reconstruction
10-10

Storage fault recovery tracking
10-10

Switch 2, illustration 12-9

Switch 4, illustration 12-8

Switch settings, configuration 6-17

System Configuration Utility 6-1

System partition 6-6

 creating 6-6

 upgrading 6-7

 verifying 6-7

T

Tagged Command Queuing 9-3

Terminator Board 5-13

Third-party products 1-6

Troubleshooting

 DAAD error messages 11-37

 Diagnostic error messages 11-
24

 POST error messages 11-1

Troubleshooting tips

 for the Fast-Wide SCSI-2
 Controller 8-8

U

UnixWare 2 drivers 6-14

Upgrading ROMs 2-22, 3-26

Utilities

 configuration 6-1

 Diagnostics 6-18, 11-22

 Inspect 11-35

V

Video 2-10, 3-13

W

Windows NT 3.5x drivers 6-13

World Wide Web address

(for ROM upgrades) 2-22, 3-27

Write Cache *See* Array Accelerator

.....

COMPAQ COMPUTER CORPORATION SHALL NOT BE LIABLE FOR TECHNICAL OR EDITORIAL ERRORS OR OMISSIONS CONTAINED HEREIN, NOR FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM THE FURNISHING, PERFORMANCE, OR USE OF THIS MATERIAL.

The software described in this guide is furnished under a license agreement or non-disclosure agreement. The software may be used or copied only in accordance with the terms of the agreement.

© 1996 Compaq Computer Corporation.
All rights reserved. Printed in the U.S.A.

ProLiant, ProSignia, QVision, QuickLock, QuickBlank, and Systempro/XL are trademarks of Compaq Computer Corporation.

Microsoft, MS-DOS, and Windows are registered trademarks of Microsoft Corporation.
Windows NT is a trademark of Microsoft Corporation.

Pentium is a registered trademark of Intel Corporation.

First Edition (May 1996)
Part Number 221085-001