StorageWorks™ Solutions

StorageWorks Network Storage Array Server Processor Component Manual

Order Number: EK–SWXNA–CM. A02

This manual describes the components in the server processor used in the StorageWorks™ Network Storage Array SWXNA models. It also describes installing and configuring components and options.

Digital Equipment Corporation
Maynard, Massachusetts

September, 1996

NOTE: This equipment generates, uses, and may emit radio frequency energy. The equipment has been type tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

Any changes or modifications made to this equipment may void the user's authority to operate the equipment.

Operation of this equipment in a residential area may cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

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Contents

3 Basic Operation

4 Installing and Removing Components

5 Configuring Your System

6 Troubleshooting

A Quick Reference

Glossary of Terms

Index

Examples

Figures

Tables

Preface

This manual describes the components comprising the server processor used in the StorageWorks™ Network Storage Array SWXNA models. It also describes installing and configuring components and options.

Intended Audience

This manual is intended for use by customers and Digital™ Multivendor Customer Services personnel responsible for installing and configuring a StorageWorks Network Storage Array.

Structure

This manual is organized as follows:

Chapter 1	Provides an overview of the server processor and a description of its major components.
Chapter 2	Provides reference information about each component.
Chapter 3	Describes the basic operation of the server processor.
Chapter 4	Shows how components are removed and replaced.
Chapter 5	Shows how the server processor is configured.
Chapter 6	Describes basic troubleshooting procedures.
Appendix A	Contains miscellaneous diagrams showing the interconnection of hardware and components.
Glossary	Defines the acronyms and specialized terms used in the StorageWorks environment.

Table 1 lists the StorageWorks-related user documents organized by use, system, or product.

Table 1 StorageWorks Related Documentation

Document Title	Order Number
StorageWorks Primary Publications	
StorageWorks™ Solutions Configuration Guide	EK–BA350–CG
StorageWorks™ Storage Shelf: *-8-bit Storage Shelf (SWXSS–06)* *-16-bit Storage Shelf (SWXSS–22)*	EK–SMCPG–UG
StorageWorks™ Solutions Array Controllers HS Family of Array Controllers User's Guide	EK–HSFAM–UG
StorageWorks Network Storage Array Publications	
StorageWorks™ Solutions Getting Started with the StorageWorks Network Storage Array	EK–SWXNA–IG
StorageWorks Enclosures	
StorageWorks™ Solutions SW500 and SW800 Cabinet Metric Shelf Bracket Kit Installation Guide	EK–35XRD–IG
StorageWorks™ Solutions RETMA Shelf Rail Kit Installation Guide	EK–35XRB–IG
StorageWorks™ Solutions SW800-Series Data CDU Installation Guide	EK–SW8XP–BA
StorageWorks™ Solutions SW800-Series Data Center Cabinet Installation and User's Guide	EK–SW800–IG
Storage Devices	
StorageWorks™ Solutions Building Blocks User's Guide	EK–SBB35–UG
StorageWorks™ Solutions 3½-Inch Storage Device Installation Guide	EK–MC350–IG
StorageWorks™ Solutions 5¼-Inch Storage Device Installation Guide	EK–MC525–IG
General Reference Publications	
Digital Systems and Options Catalog	†
Small Computer System Interface, An Overview	EK–SCSIS–OV
OpenVMS Alpha Systems Dump Analyzer Utility Manual	AA–PV6UB–TE
OpenVMS Alpha Version 6.2 Upgrade and Installation Manual	AA–PV6XC–TE

† Available from your Digital account representative.

Documentation Conventions

The following conventions are used in this manual:

boldface type	Boldface type indicates the first instance of terms being defined in text, in the glossary, or both.
italic type	Italic type indicates emphasis and complete manual titles. In the glossary, italic type also is used to indicate cross-references.

UPPERCASE	Words in uppercase text indicate a command, the name of a file, or an abbreviation for a system privilege.

Manufacturer's Declarations

Following are manufacturer's declarations applicable to the StorageWorks Network Storage Array:

CAUTION

This is a class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

ACHTUNG !

Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in welchen Fällen die Benutzer für entsprechende Gegenmaßnahmen verantwortlich sind.

ATTENTION !

Ceci est un produit de Classe A. Dans un environment domestique, ce produit risque de créer des interférences radiélectriques, il appartiendra alors à l´utilisateur de prendre les mesures spécifiques appropriées.

Note

The equipment described in this manual is listed by the Underwriters Laboratories Incorporated and bears the UL Listing mark. The StorageWorks Network Storage Array cabinets also are certified by the Canadian Standards Association and TUV Product Service GmbH and bear both the CSA certification and TUV GS marks.

Table 2 Acoustics—Preliminary Declared Values per ISO 9296 and ISO 7779

	Sound Power Level L_{WAd}, B‡		Sound Pressure Level L_{pAm}, dBA (Bystander Positions)	
Product†	**Idle**	**Operate**	**Idle**	**Operate**
SWXNA–xx with only cabinet fans operating	7.6	7.6	59	59
SWXNA–xx with 2 BA350–M shelves and 12 BA350–S shelves, each containing 6 RZ29–VA disk drives	7.6	7.6	59	59
Per device when installed in SWXNA				
BA350–S shelf containing 6 RZ29–VA disk drives	5.7	5.7	39	39
BA350–M shelf	5.6	5.6	39	39

† Current values for specific configurations are available from Digital representatives.
‡ 1 B = 10 dBA.

Note

Table 3 is a translation of the English language specifications in Table 2 into the German language.

Table 3 Schallemissionswerte—Vorläufige Werteangaben nach ISO 9296 und ISO 7779/DIN EN27779

	Schalleistungspegel L_{WAd}, B‡		Schalldruckpegel L_{pAm}, dBA (Beistehende Position)	
Gerät†	**Leerlauf**	**Betrieb**	**Leerlauf**	**Betrieb**
SWXNA–xx nur mit kabinett Lüftern in Betrieb	7,6	7,6	59	59
SWXNA–xx mit 2 BA350–M shelves und 12 BA350–S shelves, jedes bestückt mit 6 RZ29–VA disk drives	7,6	7,6	59	59
Pro Gerät installiert im SWXNA				
BA350–S shelf mit 6 RZ29–V disk drives	5,7	5,7	39	39
BA350–M shelf	5,6	5,6	39	39

† Aktuelle Werte für spezielle Ausrüstungsstufen sind über die Digital Equipment Vertretungen erhältlich.
‡ 1 B = 10 dBA.

1
Overview

This chapter provides an overview of the features and capabilities of the Network Storage Array's server processor. The following topics are discussed:

- System overview
- Operating system
- Console firmware
- Internal system options
- External options
- Ordering options

1.1 System Overview

The StorageWorks Network Storage Array's server processor combines Digital's advanced Alpha™ technology with 128 MB RAM to provide the internal performance required to handle the I/O load of FDDI/CDDI-based systems.

The server processor is housed in a rackmount enclosure and is divided into two compartments. One compartment contains components: the system board, CPU daughterboard, and other logic modules. The other compartment contains the Operator Control Panel (OCP), diskette drive, CD–ROM drive, cooling fans, and up to two power supplies.

The server processor is a VMS™ node with full cluster membership. Full cluster membership provides a number of special features that enhance its reliability, ensure its availability, and improve its expansion capabilities, as well as facilitate hardware management and improve security. Table 1–1 describes some of the system features that enhance reliability or availability.

Table 1–1 System Features

Features	Reliability/Availability
64-bit Alpha RISC architecture	Provides significantly better performance than 32-bit architecture.
Error Correction Code (ECC) memory and CPU cache	Allows recovery from most cache and memory errors.
Second power supply	Provides redundant power as backup.
Internal sensors	Monitors and detects internal system temperature, fan failure, and power supply temperature.

The following StorageWorks Network Storage Arrays currently are available:

- SWXNA–BA, BB, GA, GB

- SWXNA–AA, AB, FA, FB
- SWXNA–EA, EB, JA, JB

The following expansion options also are available:

- SWXNA–CA, CB
- SWXNA–DA, HA

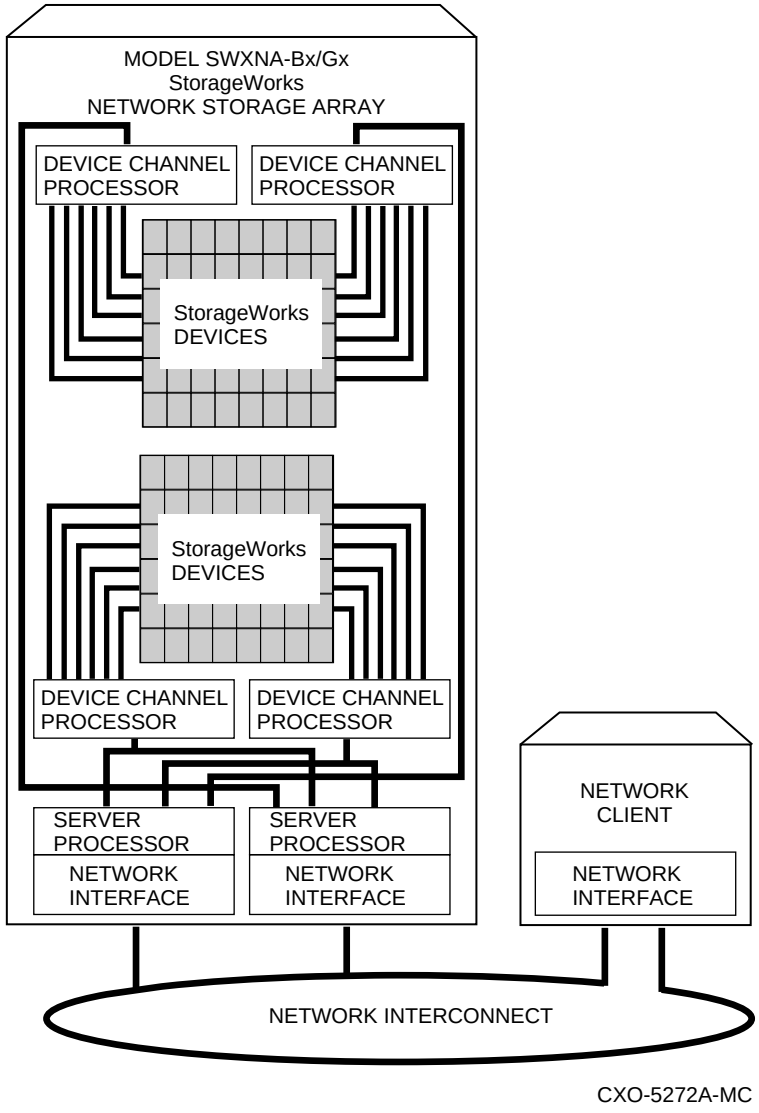
In addition, many kits to upgrade your network array are available. See the *Digital Systems and Options Catalog* for a complete list.

1.1.1 SWXNA–Bx/Gx Description

Figure 1–1 shows a conceptual model of the SWXNA–Bx/Gx StorageWorks Network Storage Array. Ideal for large networks running "bet-your-business" applications, the SWXNA–Bx/Gx network array provides high availability via dual-redundant server processors and four dual-redundant device channel processors. Housed in a single StorageWorks SW800 cabinet, this network array can connect up to 72 redundant devices. Maximum SWXNA–Bx/Gx online disk capacity is 309 GB using RZ29 disk drives. Consult the Software Product Description (SPD), *HS1CP Device Channel Processor Operating Firmware Version 2.x*, SPD 64.19.xx, for a complete list of supported StorageWorks devices. Nearline storage of 10-plus terabytes is possible by adding up to two StorageWorks tape libraries for backups and archiving.

During normal operation, I/O performance is enhanced by balancing the I/O load across the redundant system components in a customer-definable manner. If a component failure occurs, the redundant partner takes over, providing continued service until the failed component can be repaired or replaced. All SWXNA redundant StorageWorks Network Storage Array components can be hot swapped or replaced without interrupting I/O service.

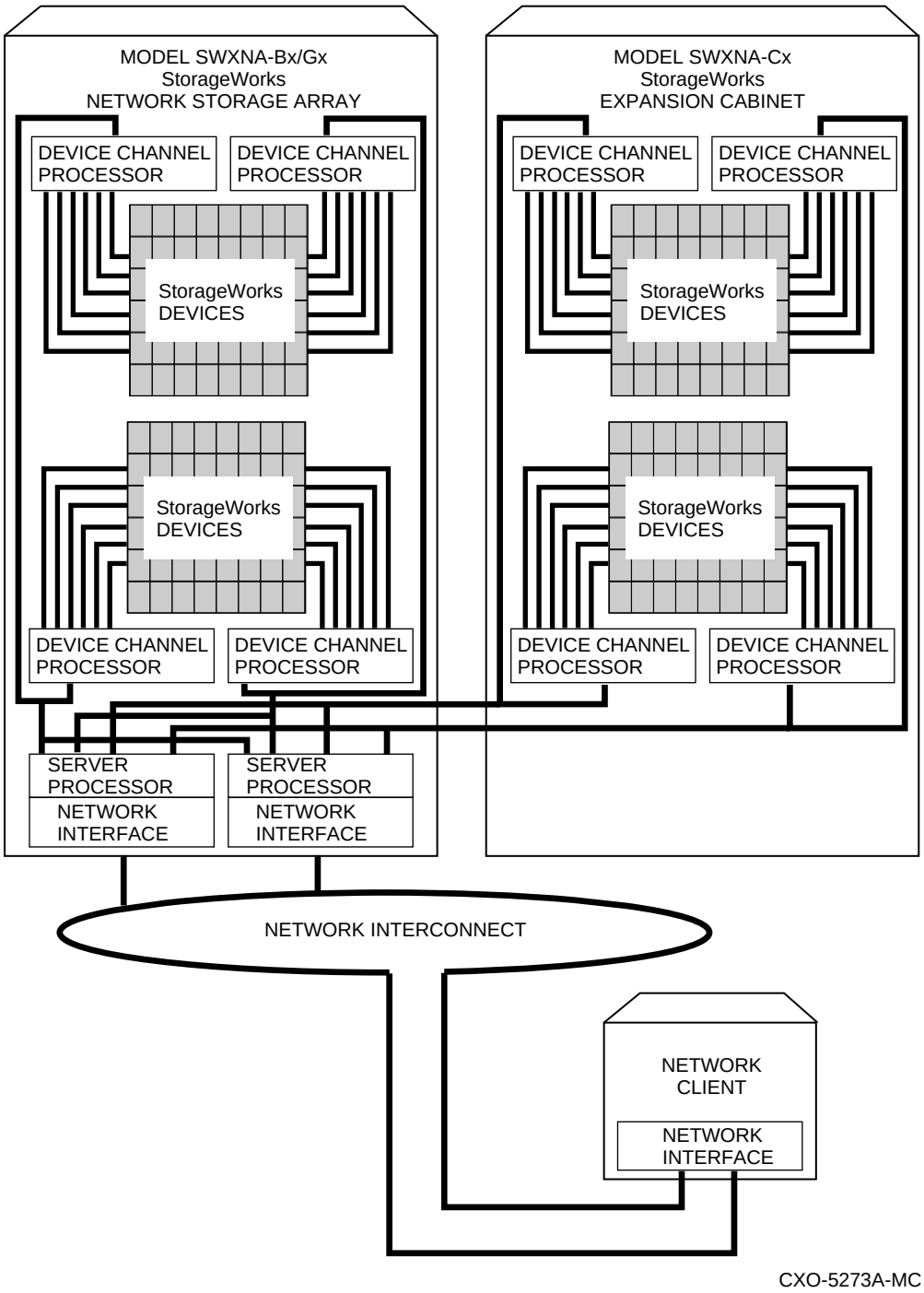
Figure 1–1 SWXNA-Bx/Gx Diagram



1.1.2 SWXNA-Cx Description

Double the device support (to 144 devices) and online disk capacity to 619 GB by connecting the SWXNA–Bx/Gx to an optional SWXNA-Cx expansion cabinet. The SWXNA-Cx includes a second StorageWorks SW800 cabinet and four additional redundant device channel processors. Redundant power and cooling are also standard at the SWXNA-Cx cabinet level. Figure 1–2 shows a conceptual model of the SWXNA–Bx/Gx StorageWorks Network Storage Array with the SWXNA-Cx expansion option installed.

Figure 1–2 SWXNA-Bx/Gx with SWXNA-Cx Diagram



1.1.3 SWXNA-Ax/Fx Description

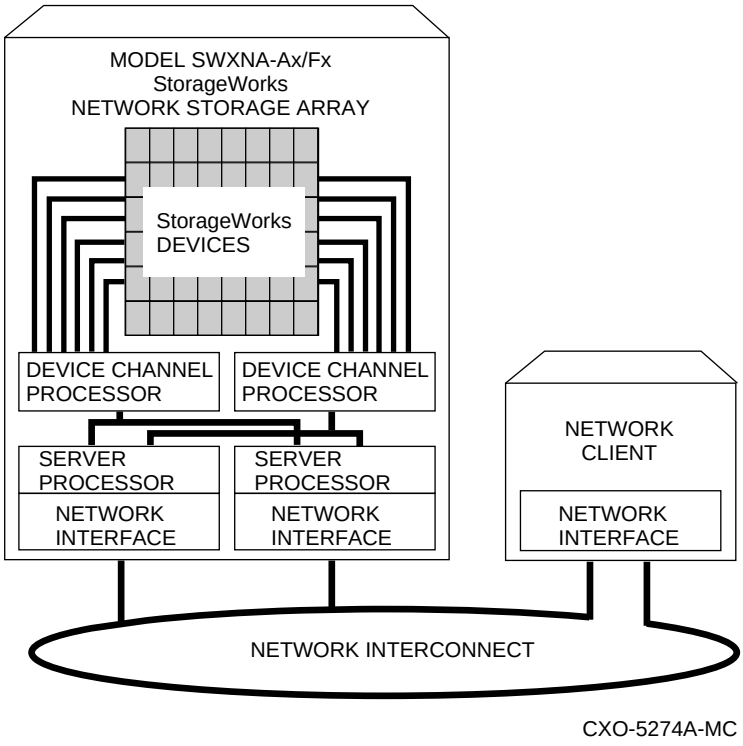
Figure 1–3 shows a conceptual model of the SWXNA-Ax/Fx StorageWorks Network Storage Array. It is a fully-redundant, high-availability storage solution offering full protection against any single component failure. These network arrays are suited to medium-sized operations running "mission-critical" applications. High network array availability is assured with fully redundant server processors, two paths to the network interface, two paths

to every storage device and standard redundant power and cooling. The full range of StorageWorks redundant power and cooling features for devices are also available.

The basic SWXNA-Ax/Fx StorageWorks Network Storage Array provides fully redundant access to up to 36 redundant StorageWorks device connections. Consult the Software Product Description, *HS1CP Device Channel Processor Operating Firmware Version 2.x*, SPD 64.19.xx, for a complete list of supported StorageWorks devices. Using the RZ29 disk drive, 154 GB of online, redundant storage per network array is available. The model SWXNA-Ax/Fx StorageWorks Network Storage Array and its attached storage devices are housed in a single StorageWorks SW800 cabinet.

During normal operation, I/O performance is enhanced by balancing the I/O load across the redundant system components in a customer-definable manner. If a component failure occurs, the redundant partner takes over, providing continued service until the failed component can be repaired or replaced. All SWXNA redundant StorageWorks Network Storage Array components can be hot swapped or replaced without interrupting I/O service.

Figure 1–3 SWXNA-Ax/Fx Diagram

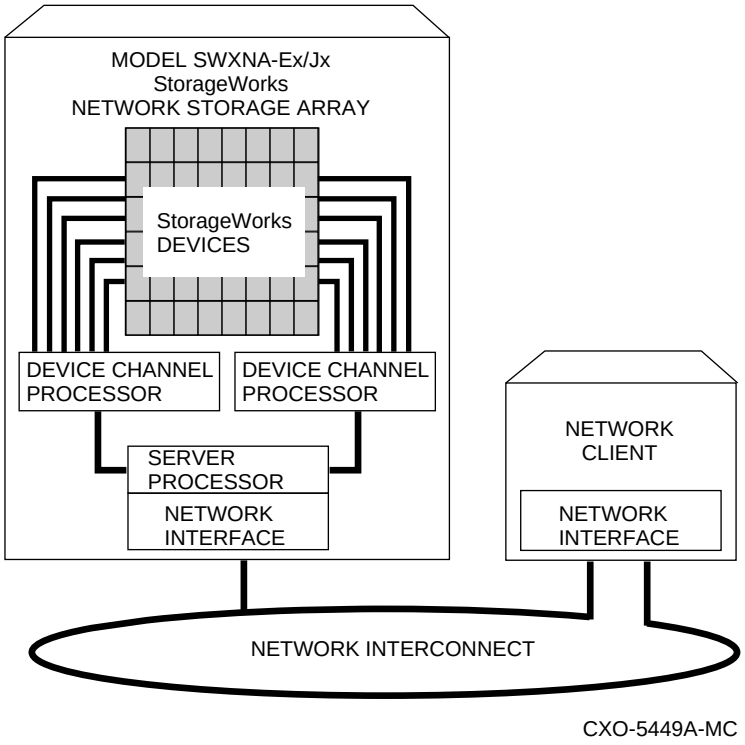


1.1.4 SWXNA-Ex/Jx Description

Figure 1–4 shows a conceptual model of the SWXNA-Ex/Jx StorageWorks Network Storage Array. Suited to medium-sized operations where you need distributed access and storage management benefits, these network arrays consist of a single Alpha-based server processor and two device channel processors (HS1CPs) capable of connecting the server processor to as many as 36 StorageWorks devices. Consult the Software Product Description, *HS1CP*

Device Channel Processor Operating Firmware Version 2.x, SPD 64.19.xx, for a complete list of supported StorageWorks devices. Using the RZ29 disk drive, up to 154 GB of redundant online storage per network array is available. The model SWXNA-Ex/Jx StorageWorks Network Storage Array and its attached storage devices are housed in a single StorageWorks SW800 cabinet.

Figure 1–4 SWXNA-Ex/Jx Diagram



1.1.5 SWXNA-DA/HA Description

The SWXNA-DA/HA contains all the major components of an SWXNA-Ex/Jx except for the StorageWorks SW800 cabinet. These options provide for the conversion of an existing SW800 cabinet to a StorageWorks SWXNA-Ex/Jx Network Storage Array, and are described in the *SWXNA-DA/HA Installation Guide*.

1.2 Operating System

The server processor supports the OpenVMS Alpha operating system. While the operating system is running, it controls the system, which is in execution mode. When the operating system is not running, a second mode, console mode, enables you to control system management functions, as described in the next section.

1.3 Console Firmware

You perform many of the tasks for managing and configuring your server processor in console mode, when the system is controlled by the console subsystem, rather than the operating system.

The console subsystem, located in read-only memory (ROM) on the system board, contains special software, called **firmware**, that interacts directly with hardware components and facilitates interaction between the system hardware and the operating system.

The OpenVMS Alpha operating system is supported by the Alpha System Reference Manual (SRM) console.

Console Firmware Tasks

The console firmware has a command line interface designed to facilitate hardware interaction with the OpenVMS operating systems. The following lists the tasks that you can perform with the console:

- Boot the OpenVMS operating system
- Update the firmware
- Initialize the system
- Display the system configuration
- Display system storage devices
- Set and display environment variables specific to the OpenVMS operating system
- Perform diagnostic tests
- Run the EISA Configuration Utility (ECU)

1.4 Internal System Options

Your server processor supports the following types of options:

- EISA options
- Memory options
- PCI options

1.4.1 EISA Options

EISA (Extended Industry Standard Architecture) offers bus mastering and direct memory access (DMA) capabilities. Up to eight EISA modules can reside in the EISA bus portion of the system board. The EISA bus is a superset of the well-established ISA bus and has been designed to be backward compatible with 16-bit and 8-bit architectures.

1.4.2 Memory Option

The server processor is shipped with 128MB of memory. It can support from 128 MB to 512 MB of memory. The SWXNA–M1 memory option adds 64 MB of memory. The SWXNA-M2 memory option adds 128 MB of memory. An SWXNA–*xx* server processor fully populated with 32 MB SIMMs contains 512 MB of memory capacity.

1.4.3 PCI Options

The PCI (peripheral component interconnect) bus can accommodate three modules within a server processor.

1.5 External Options

A monitor, ASCII terminal, or printer can be added as external options to the server processor.

1.6 Ordering Options

The list of supported options is subject to change. Contact your sales representative for information on the current list of supported options and for ordering information.

2
Hardware Description

This chapter describes the physical layout of the server processor hardware. The following topics are discussed:

- Hardware description overview
- Server processor (front view)
- Server processor (rear view)

2.1 Hardware Description Overview

The server processor hardware is categorized as either components or options. Components are required hardware items. Options are items selected and installed to enhance system performance or connectivity.

2.2 Server Processor (Front View)

The following components can be accessed from the front of the server processor. Figure 2–1 is an exploded front view of server processor components.

- Operator control panel (OCP)
- 3.5-Inch floppy drive
- CD–ROM
- Primary power supply
- Redundant power supply
- Fan assembly

2.2.1 Operator Control Panel Controls and Indicators

The OCP consists of a 16-character liquid crystal display (LCD), DC power-enable switch, momentary Halt switch, momentary Reset switch, and two light-emitting diodes (LEDs), indicating DC POWER ON and SYSTEM HALT. The controls and indicators on the OCP are shown in Figure 2–2 and are described in Table 2–1.

Figure 2–1 Server Processor Front View—Exploded

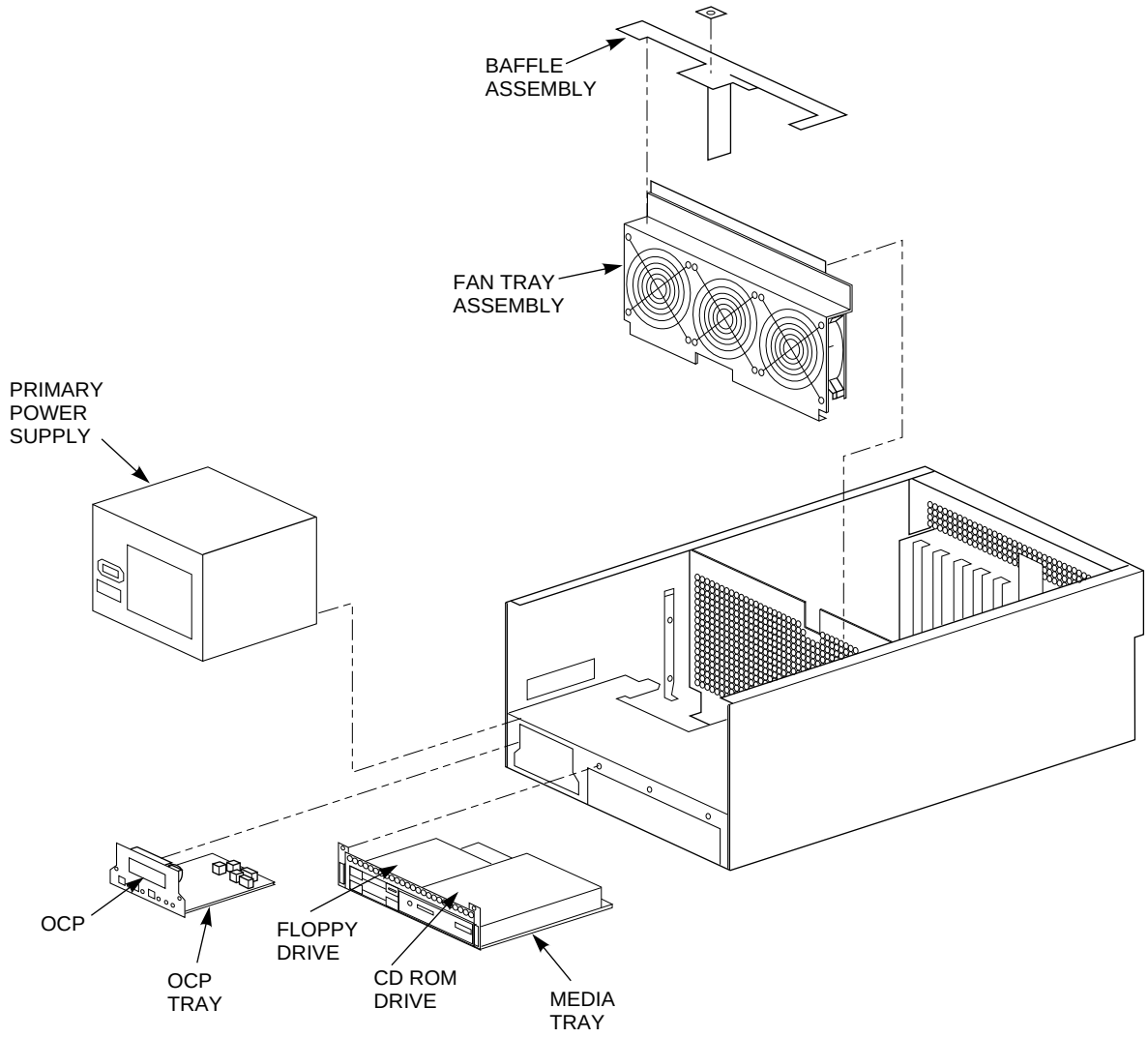


Figure 2–2 Operator Control Panel

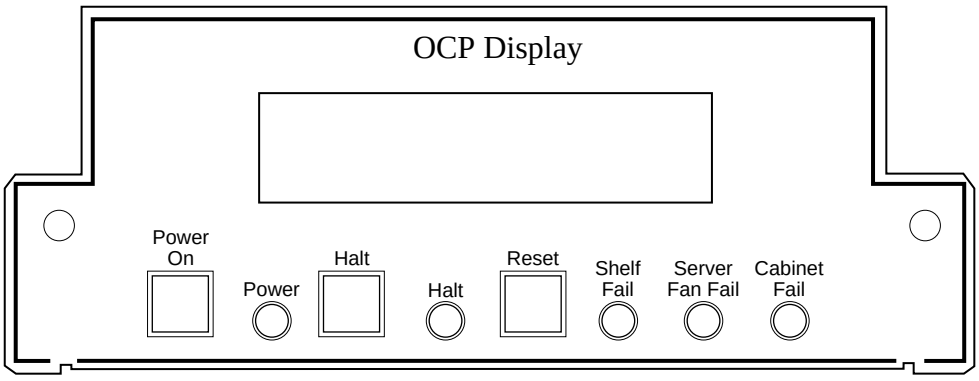


Table 2–1 OCP Controls and Indicators Description

Control or Indicator	Function
Power On	Switches the system unit on and off.
Power indicator	Lights when the system unit is turned on. In a redundant system, the light displays amber if one power supply is failed.
Halt switch	Halts an OpenVMS operating system, returning it to console mode control.
Halt indicator	Lights when the system is halted.
Reset switch	Reinitializes the system and performs startup tests.
Shelf Fail indicator	Not used.
Server Fan Fail indicator	Lights when any system fan is not working.
Cabinet Fail indicator	When a redundant power supply fails, this light, along with the power indicator, displays red for three to four seconds. It then goes off, and the power indicator displays amber.
Operator control panel display	Displays diagnostic and error messages.

2.2.2 Media Tray

The media tray is a subassembly that houses both the floppy drive and CD–ROM. It is located on the front of the server processor directly right of the OCP (see Figure 2–1).

2.2.2.1 3.5-Inch Floppy Drive

The 3.5-inch floppy drive is used to run the EISA Configuration Utility (ECU) whenever configuration changes are made to the server processor's internal bus, such as during a hardware upgrade, firmware update, or to load console code.

2.2.2.2 CD–ROM Drive

The CD–ROM drive is used to mount the two CD–ROMs and to access files for various purposes. The Network Storage Array includes two CD–ROMs, an operating system CD–ROM and a documentation CD–ROM. The operating system CD–ROM is used for system disk rebuild operations if there is no system disk backup, for updating the server operating system to a new version of the OpenVMS Alpha operating system, or for operations performed directly from the CD–ROM such as backup. The documentation CD–ROM is used to access documentation related to the OpenVMS Alpha operating system. For more detailed information on the use of these two CD–ROMs, see Section 3.4.2.

2.2.3 Power Supplies

The server processor power supplies support the following two modes of operation:

- Single power supply

  This mode of operation provides all the power your system needs.

- Dual (redundant) power supply

  To increase reliability, you can add a redundant power supply. In redundant mode, the failure of one power supply does not cause the system to shut down. The current share cable connects the two power supplies so that failover occurs immediately when power to the primary power supply is lost.

Voltage selection is not required. The system is intended for use at all rate ac-input voltages. Table 2–2 lists the power supply ratings for systems using one or two power supplies.

Table 2–2 Power Supply Ratings

Specification	Range
Voltage	100-120/220-240 volts ac
Frequency	50-60 Hz
Current	3.3/1.8 amperes (one power cord)
	1.8/1.0 amperes (two power cords)

2.2.4 Fan Assembly

The fan assembly separates the front and rear compartments of the server processor. It provides air flow and cooling for the entire enclosure.

2.3 Server Processor (Rear View)

The following components and options can be accessed from the rear of the server processor. Figure 2–3 is an exploded rear view of server processor components.

- Rear panel ports and slots
- Motherboard
- CPU daughterboard
- Memory modules
- FDDI adapter (DEFPA)
- HS1AD bus adapters

2.3.1 Rear Panel Ports and Slots

The ports and slots on the rear of the server processor are described in Table 2–3.

Table 2–3 Rear Panel Ports and Slots

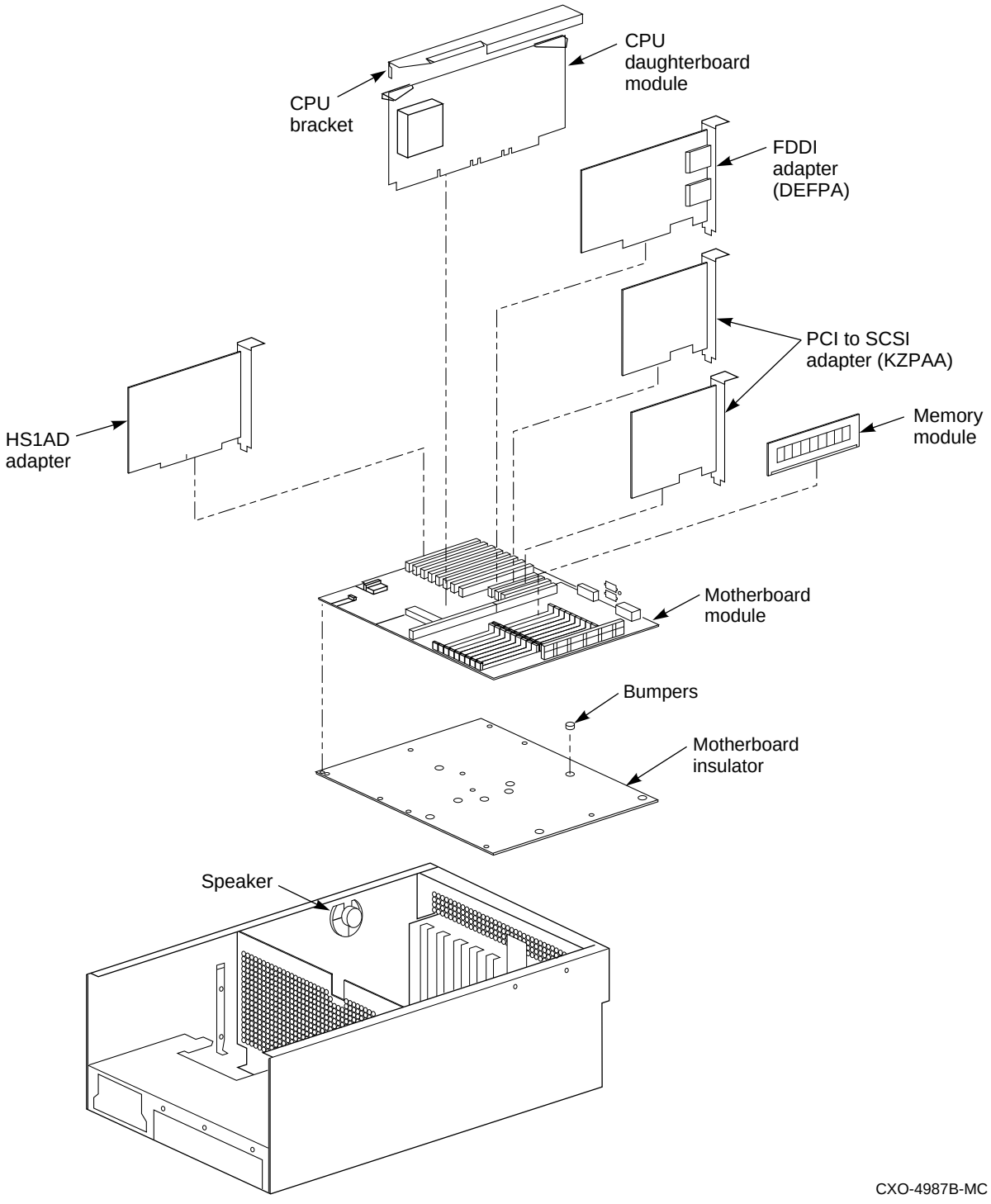
Port or Slot	Connects...
Up to eight EISA slots	Option cards for network or disk controllers
Up to three PCI slots	Option cards for network
Parallel port	Parallel devices such as a printer
Serial port/terminal port (COM1)	Console terminal or serial-line peripherals such as a modem
Mouse port	PS/2-compatible mouse
VGA port	VGA monitor
Keyboard port	PS/2-compatible keyboard
Serial port (COM2)	Serial-line peripherals such as a modem

2.3.2 Motherboard

The motherboard contains the following components:

- Floppy disk controller (FDC)
- FAST SCSI–2 controller
- Integral SVGA graphics interface
- Serial ports (2)
- Parallel port
- PS/2 compatible keyboard/mouse controller
- Memory subsystem that supports up to 20 SIMMs

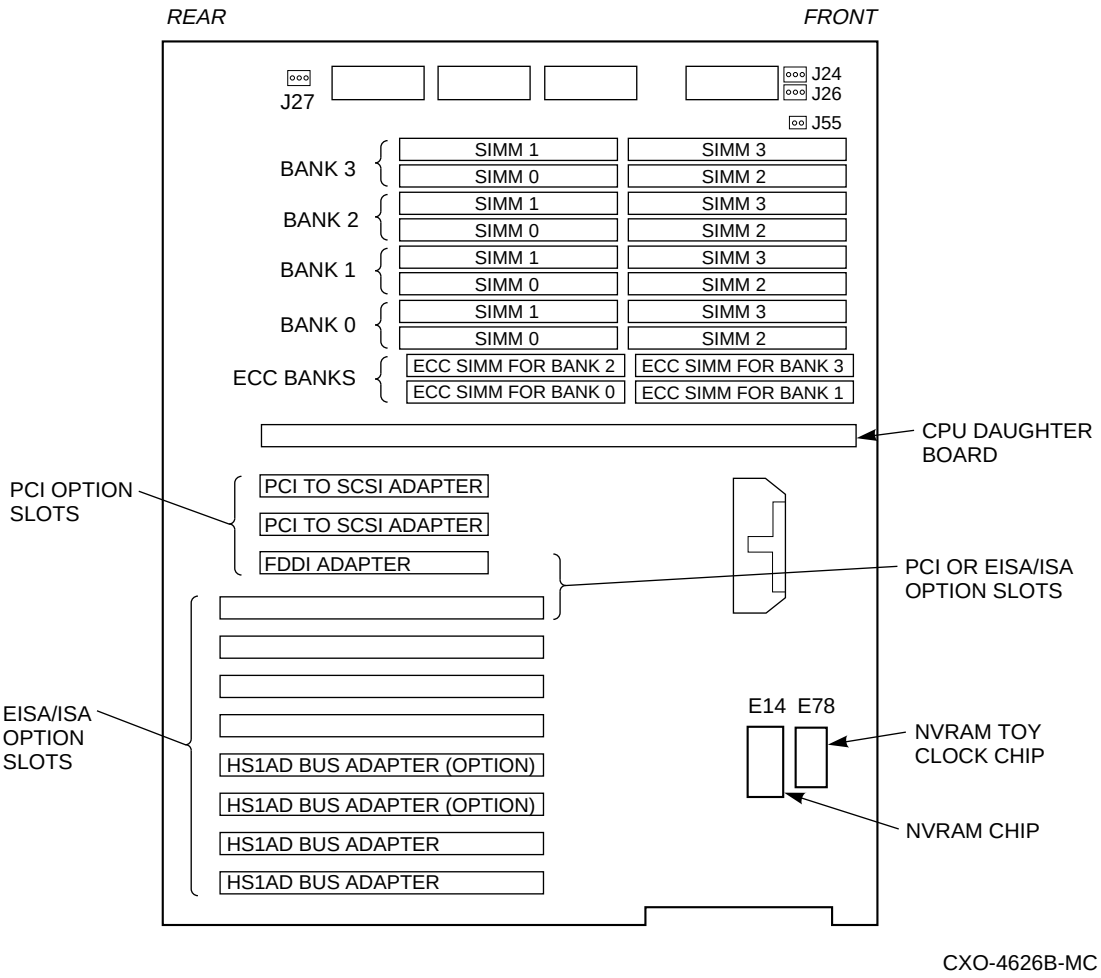
Figure 2–3 Server Processor Rear View—Exploded



- Connection for the CPU module (daughterboard)
- Interconnects for up to eight EISA option cards
- Interconnects for up to three PCI option cards

- Connection for the operator control panel (OCP)
- Interconnects to a speaker

Figure 2–4 Motherboard Layout



CXO-4626B-MC

2.3.3 CPU Daughterboard

The CPU daughterboard contains the DECchip 21064 Alpha processor chip, cache, data and control ASICSs, Peripheral Component Interconnect (PCI) bus interface chip, serial ROM and interface, and configuration jumpers. The daughterboard is installed into two edge connectors (J1 and J2) on the motherboard.

2.3.4 Memory Capacity

The server processor ships with 128 MB of memory and can support up to 512 MB of memory. The SWXNA–M1 memory option adds an additional 64 MB while the SWXNA-M2 memory option adds 128 MB of memory. An SWXNA–*xx* server processor fully populated with 32 MB SIMMs contains 512 MB of memory capacity.

Note

In any dual server processor configuration, the memory capacity must be the same for each server processor.

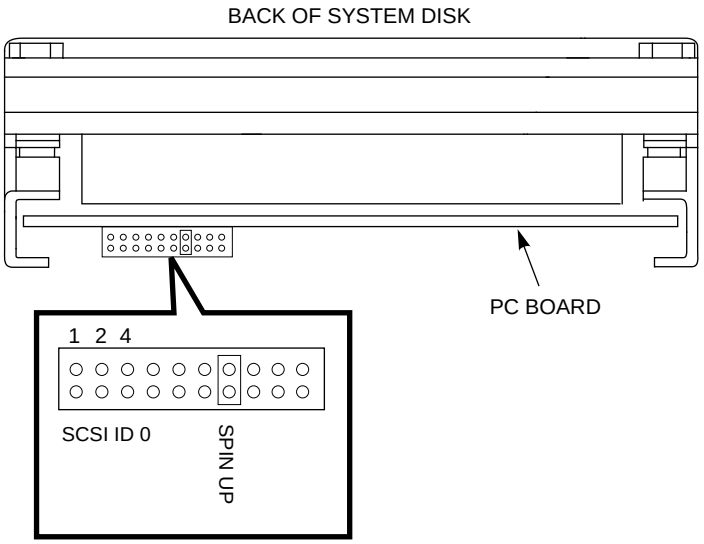
The motherboard has 20 SIMM connectors. The SIMM connectors are grouped in four memory banks (0, 1, 2, and 3) and one error correction code (ECC) for each bank of memory. Memory layout is shown in Figure 2–4.

2.3.5 Shadowed System Disk

SCSI hard drives configured in a shadowset to provide redundancy are used as the system disk for the server processors. The system disk contains the OpenVMS Alpha operating system, the Software Customization Procedure (SCP), various relevant documents, and required layered software components.

The system disks are mounted in a BA356 shelf located in the back of the network array.

Figure 2–5 System Disk Jumper Locations



2.3.5.1 Spin-Up Option Selection

The disk drive spins up when you install a jumper across pins 13 and 14 of the option connector and apply power. Without the jumper, the drive waits for a START STOP UNIT command before spinning up. In the SWXNA–xx server processor, this jumper is installed. See Figure 2–5.

The disk drive spins down when power is removed, when a fault condition is detected, or in response to the START STOP UNIT command.

2.3.5.2 LED Indicators

The disk drive has two surface-mounted LED indicators: Busy (BSY), which is green, and Fault (FLT), which is amber.

The BSY LED indicates that the drive is working on a SCSI command. It is not equivalent to the SCSI BSY signal. The FLT LED indicates a drive fault condition.

It is normal for both LEDs to light briefly when applying power.

2.3.6 PCI-to-SCSI Adapter

Two KZPAA adapters connect the server processors to the system disk. These adapters are installed on the motherboard in the slots shown in Figure 2–4.

2.3.7 FDDI Adapter

The DEFPA FDDI adapter connects the server processor with other nodes in a VMScluster system that are attached to an FDDI ring. Your DEFPA adapter supports a single attachment station (SAS) or a dual attachment station (DAS).

2.3.7.1 Physical Description

The DEFPA FDDI adapter plugs into a PCI bus. It can be a one-card SAS or DAS adapter with multimode optics and ANSI MIC or STC connectors.

The major components on the adapter card are as follows:

- 1 MB of packet memory
- 68000 onboard processor
- DMA control gate array
- PCI bus interface control logic
- FDDI interface chipset
- FDDI optical or TP–PMD interface
- IEEE address ROM
- Onboard, nonvolatile memory for firmware storage
- Multimode physical layer medium dependent

2.3.7.2 FDDI Adapter Onboard Diagnostics

The adapter contains onboard diagnostics that execute when power is applied. A two-color (green or red) LED on the adapter mounting bracket indicates the operating status of the adapter and its PHY port.

The adapter LEDs indicate the status of the adapter and the FDDI port. Table 2–4 lists and describes possible LED states.

Table 2–4 FDDI Adapter LED States

Color	Normal	Description
Green	On	On—PHY connection complete.
Green	Flashing	Flashing—PHY connection in progress (or no cable attached).
Red		On—If on after system boots, indicates broken port or Link Confidence Test (LCT) failure; retry loop.
		If on before system boots, indicates self-test failure.
Green/Red		Off–Port disabled via management, or LED or adapter broken.

2.3.8 HS1AD Bus Adapter

The HS1AD provides an internal bus to connect a server processor with a device channel processor. Up to two HS1ADs can be installed in a single server processor in the SWXNA–Ax/Fx, and up to four HS1ADs can be installed in a single server processor in the SWXNA–Bx/Gx, with each HS1AD configured as an end-node.

3
Basic Operation

This chapter contains information about the basic functions, commands, and operations of your server processor. It includes the following topics:

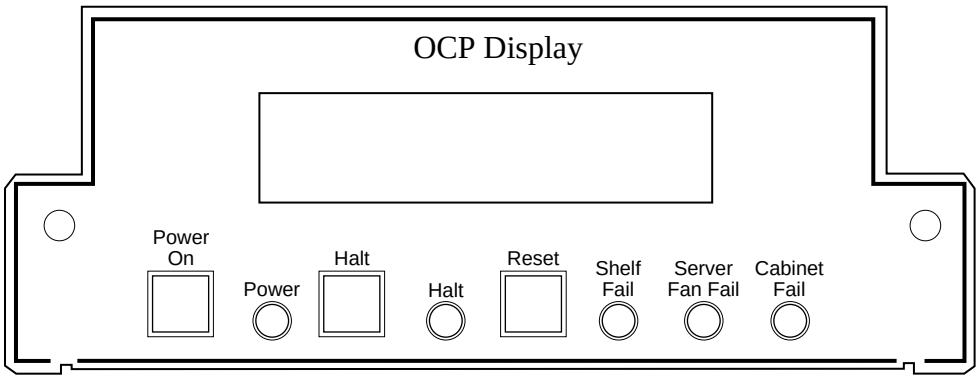
- Turning the server processor on
- Turning the server processor off
- Connecting a monitor, terminal, keyboard, mouse, or printer
- Using storage devices
- Upgrading to the most current OpenVMS Alpha software version
- Restoring the system disk from a backup
- Rebuilding the system disk from the server CD–ROM
- Interpreting OCP startup messages
- Using the console
- Changing startup and boot defaults

3.1 Turning the Server Processor On

To turn on a server processor that has the operating system already installed, follow these steps:

1. Turn on any external options that are connected to the server processor, such as monitors or terminals.
2. Press the On/Off switch on the OCP. The green On/Off indicator lights. Figure 3–1 shows the location of the On/Off switch. In the On position, the switch remains depressed.

Figure 3–1 Location of the On/Off Switch



CXO-4586A-MC

The screen on your monitor or terminal displays test codes and initialization messages. When the startup procedure is complete, the operator control panel displays the message Model *4/2xx*. By default, the screen displays the SRM console prompt >>>.

3. If you encounter a problem, verify that you correctly followed steps 1 and 2. Refer to Chapter 6 for additional information.

3.2 Turning the Server Processor Off

You may not need to turn the server processor off to resolve system hangs or similar problems. You often can recover from hangs or other problems by pressing the Reset switch on the OCP.

CAUTION

Pressing the Reset switch reinitializes the server processor and causes you to lose the applications you are running.

Perform the following steps to turn off the server processor:

1. Stop all work on the server processor.
2. Perform an orderly shutdown of the operations in the server processor by entering the following command at the DCL $ prompt:

```
$ @SYS$SYSTEM:SHUTDOWN
```

3. When shutdown is complete, depress the server processor power button on the OCP to turn off power to the server processor.
4. Turn off all external options that are connected to the server processor.

Turning the Server Processor Off for an Extended Period

If you need to turn off your system for an extended period, first turn off power as previously described. Next, unplug the power cords from the power outlets.

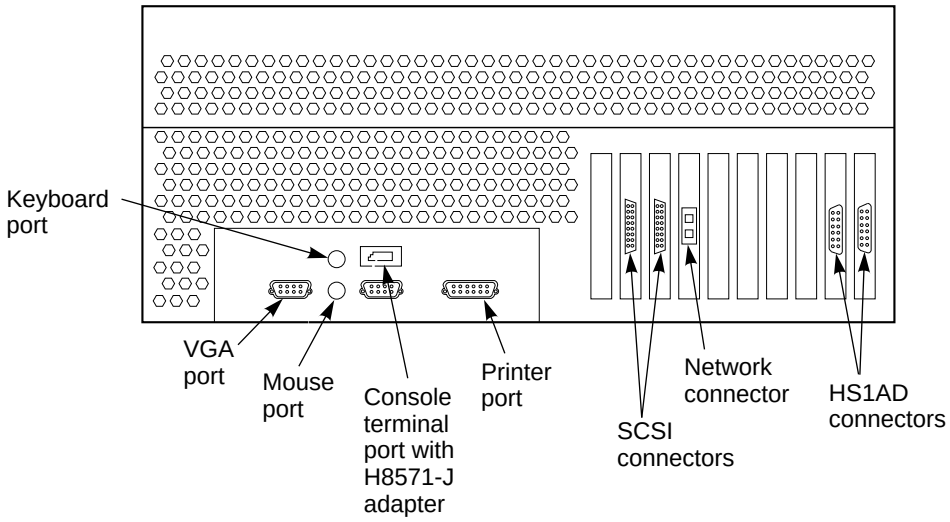
CAUTION

If two power supplies are present, unplug the power cord for each supply.

3.3 Connecting a Monitor, Terminal, Keyboard, Mouse, or Printer

If you are using a monitor, terminal, keyboard, mouse, or a printer, connect each to the appropriate connector at the rear of the server processor. Connect a terminal, a VGA monitor, or an SVGA monitor to your system, as shown in Figure 3–2.

Figure 3–2 Connecting a Monitor or Terminal



3.4 Using Storage Devices

Mass storage devices are used to store large amounts of data for extended periods. The server processor accommodates the following types of storage devices:

- One 3.5-inch diskette drive
- One 5.25-inch half-height CD–ROM drive

3.4.1 Using the Floppy Drive

Floppy drives read information from removable diskettes. The floppy drive is located in the media tray to the left of the CD–ROM drive.

To Insert a Diskette into a Diskette Drive

1. Set the write-protect switch on the diskette to either the write-protected or write-enabled position.
2. Insert the diskette.

   The activity indicator lights when the system reads the diskette.

To Remove a Diskette

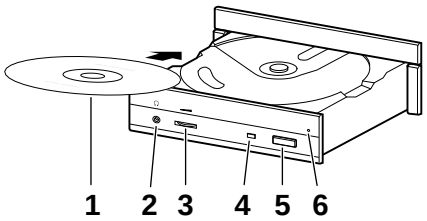
Press the Eject button on the diskette drive.

3.4.2 Using the CD–ROM Drive

CD–ROM drives read information from removable CD–ROMs. The CD–ROM drive is located in the media tray to the right of the floppy drive. Your CD–ROM drive has an automatic loading/ejection feature that is functional only when power is supplied.

Use the operating system CD–ROM to install or upgrade the operating system, or to perform an operation such as backing up the system disk. Use the documentation CD–ROM to access OpenVMS documentation. Figure 3–3 shows a CD–ROM being loaded into a CD–ROM drive.

Figure 3–3 Loading the CD–ROM Drive



CD–ROM Drive Components

❶ Disk

❷ Drive headphone port

❸ Drive volume control

❹ Drive activity indicator

❺ Drive eject button

❻ Emergency eject hole

CAUTION

Handle a CD–ROM by its edges. Do not touch the surface of a CD–ROM. Fingerprints and dust can cause the CD–ROM to malfunction.

To Insert a Disk in the Drive

1. Press the drive Eject button.

   The CD–ROM drawer opens approximately one inch.

2. Gently pull out the drawer far enough so that you can insert the disk.
3. Insert the disk into the drawer.
4. Push the drawer back into the drive.

   The activity light comes on. When the activity light goes off, the drive is ready to use. To operate the drive, follow the instructions provided with your system software.

To Remove a Disk from the Drive

1. Press the drive Eject button.

   The CD–ROM drawer opens approximately one inch.

2. Gently pull the drawer out far enough so that you can remove the compact disk.
3. Remove the disk from the drawer.
4. Push the drawer back into the drive.

If the CD–ROM drawer does not open when you press the Eject button, use the following emergency procedure:

Insert the end of a small bar, such as a paper clip, into the emergency eject hole and push in gently. The CD drawer opens. To avoid damage to the CD–ROM drive, do not insert the paper clip more than 1 inch (25mm) into the hole.

3.4.3 Using the System Disk

Two hard disk drives serve as physical members of the common system disk. They are SCSI mass storage devices located in a BA356 shelf in the back of the network array.

When the system is turned on and during periods of activity, the disk drive indicator lights blink, but do not remain on. Table 3–1 explains the meaning of the indicator lights.

Table 3–1 Disk Drive Indicator Lights

Indicator	Status	Meaning
Activity green	Blinks	Reading or writing to disk
Fault amber	On	Problem exists

3.4.4 Booting a Server Processor

At various times, you may have to boot the server processor. You can boot a server processor from either system disk or the CD–ROM device.

After the server processor has been halted or after it has been powered up, the terminal connected to the processor displays the >>> prompt. To determine the name of the device from which you want to boot the server processor, then boot the device, follow this procedure:

1. Determine the names of the devices available to the server processor. Enter the following command at the >>> prompt:

   ```
   >>> SHOW DEVICE
   ```

   A display similar to the following appears:

   ```
   dka500.5.0.6.0             DKA500  ❶                    RRD45  1645
   dkb200.2.0.11.0            DKB200  ❷                     RZ28  442D
   dkb400.4.0.11.0            DKB400                      RZ26L  442D
   dkc300.3.0.12.0            DKC300                       RZ28  442C

   dua100.1.0.1007.0          $27$DUA100 (RTCP1)           HSX0
   dua110.1.0.1007.0          $27$DUA110 (RTCP1)           HSX0
   dua120.1.0.1007.0          $27$DUA120 (RTCP1)           HSX0
   dua130.1.0.1007.0          $27$DUA130 (RTCP1)           HSX0
   dua140.1.0.1007.0          $27$DUA140 (RTCP1)           HSX0
   dua150.1.0.1007.0          $27$DUA150 (RTCP1)           HSX0

   dva0.0.0.0.1               DVA0
   fra0.0.0.1004.0            FRA0             08-00-2B-B0-4B-F0
   fwa0.0.0.13.0              FWA0             08-00-2B-B1-05-58
   pka0.7.0.6.0               PKA0                 SCSI Bus ID 7
   pkb0.7.0.11.0              PKB0                 SCSI Bus ID 7
   pkc0.7.0.12.0              PKC0                 SCSI Bus ID 7
   pua0.6.0.1007.0            PAA0                 DSSI Bus ID 6
   pub0.6.0.1008.0            PAB0                 DSSI Bus ID 6
   ```

   where:

   ❶ DKA500 is the name of the server processor CD–ROM drive.

   ❷ DKB is the name of the server processor system disk.

2. To boot the server processor, specify the device by name in the BOOT command. For example, the following command shows how to boot from the CD–ROM shown in the previous example:

   ```
   >>> BOOT DKA500
   ```

3.5 Restoring the System Disk from a Backup

Perform the following steps to restore the StorageWorks Network Storage Array OpenVMS Alpha operating system:

1. Shut down the network array.

   Note

   Any node in the VMScluster system whose system disk is served through the network array should also be shut down. Shut down that system before shutting down the network array.

2. Boot the network array from the CD–ROM. This starts the menu-driven command procedure shown in the following example.

```
OpenVMS (TM) Alpha Operating System, Version V6.2-1H3

Copyright (c) 1996 Digital Equipment Corporation.  All rights reserved.

+---------------------------------------------------------------------+
|                           Welcome to the                            |
|              StorageWorks (TM) Network Storage Array                |
|                      Standalone Environment                         |
+---------------------------------------------------------------------+

System initialization will take about one minute.  Please wait...

This Network Storage Array has two server processors.

+---------------------------------------------------------------------+
|             StorageWorks Network Storage Array CD Menu              |
+---------------------------------------------------------------------+

You can install the OpenVMS Alpha Operating System, migrate to a
shadowed system disk, or execute DCL commands and procedures to
perform "standalone" tasks, such as backing up the system disk.

To get help at any time, type a question mark (?) and press Return.

Please choose one of the following:

    (1) Install the OpenVMS Alpha Operating System, Version V6.2-1H3
    (2) Migrate to shadowed system disk
    (3) Execute DCL commands and procedures
    (4) Shut down this system

Enter your choice: (1/2/3/4)
```

3. Enter 3, then press the Return key to begin a limited DCL environment that is identified by a DCL prompt (DCL>).
4. At the prompt (DCL>), enter the SHOW DEVICES command.
5. Examine the list of devices so you can determine which device is the source drive (the drive holding the backed up files you want to restore) and which device is your target drive (the disk on which you want the files restored).
6. When you have determined which devices will be the source drive and target drive, mount those devices (and any other output devices you plan to use) before you perform any restore operations. Enter the MOUNT commands in the following format:

   ```
   DCL> MOUNT/OVERRIDE=IDENTIFICATION source-drive
   DCL> MOUNT/FOREIGN target-drive
   ```

   where:

   source-drive is the device holding the files you want to restore.
   target-drive is the destination.

   (Note, however, that you must use the MOUNT/FOREIGN command if the source drive is a tape device.)
7. Enter the BACKUP command in the following format:

   ```
   DCL> BACKUP/IMAGE/VERIFY source-drive: target-drive:
   ```

   (You also must include the save set name and the /SAVE_SET qualifier if the source drive is a tape device.)

In this example, a backup disk and a target disk are mounted so the BACKUP command can restore the system disk from the backup disk:

```
DCL> MOUNT/OVERRIDE=IDENTIFICATION DKA300
DCL> MOUNT/FOREIGN DKA200
DCL> BACKUP/IMAGE/VERIFY DKA300: DKA200:
```

In this example, a backup tape and a target disk are mounted so the BACKUP command can restore the system disk from the backup tape:

```
DCL> MOUNT/FOREIGN MKA300
DCL> MOUNT/FOREIGN DKA200
DCL> BACKUP/IMAGE/VERIFY MKA300:APR_06_BACKUP.BCK/SAVE_SET DKA200:
```

After you complete the restore operation, do the following:

- Enter the LOGOUT command to exit from the DCL environment and return to the menu.
- Choose the shutdown option (4).
- After the shutdown completes, boot from the network array's system disk.

3.6 Rebuilding the System Disk from the Network Storage Array CD–ROM

Perform the following steps to rebuild the StorageWorks Network Storage Array OpenVMS Alpha operating system:

1. Shut down the network array.

   Note

   Any node in the VMScluster system whose system disk is served through the network array should also be shut down. Shut down that system before shutting down the network array.

2. Boot the network array from the CD–ROM. This starts the menu-driven command procedure shown in the following example:

```
OpenVMS (TM) Alpha Operating System, Version V6.2-1H3

Copyright (c) 1996 Digital Equipment Corporation.  All rights reserved.

+------------------------------------------------------------------+
|                          Welcome to the                          |
|              StorageWorks (TM) Network Storage Array             |
|                        Standalone Environment                    |
+------------------------------------------------------------------+

System initialization will take about one minute.  Please wait...

This Network Storage Array has two server processors.

+------------------------------------------------------------------+
|             StorageWorks Network Storage Array CD Menu           |
+------------------------------------------------------------------+

You can install the OpenVMS Alpha Operating System, migrate to a
shadowed system disk, or execute DCL commands and procedures to
perform "standalone" tasks, such as backing up the system disk.

To get help at any time, type a question mark (?) and press Return.
```

```
    Please choose one of the following:

        (1) Install the OpenVMS Alpha Operating System, Version V6.2-1H3
        (2) Migrate to shadowed system disk
        (3) Execute DCL commands and procedures
        (4) Shut down this system

Enter your choice: (1/2/3/4) 1

    +-------------------------------------------------------------------+
    |     Install the OpenVMS Alpha Operating System, Version V6.2-1H3  |
    +-------------------------------------------------------------------+

    The installation procedure will ask a series of questions.

        () - encloses acceptable answers
        [] - encloses default answers

    The following disks will compose the StorageWorks Network Storage Array
    shadowed system disk, which will be called DSA100: by default:

      $13$DKB0:     RZ28      Label = SOME_LABEL_1  Total blocks = 4110480
      $13$DKC100:   RZ28      Label = SOME_LABEL_2  Total blocks = 4110480

    The following disk will compose the Network Storage Array quorum disk:

      $13$DKB200:   RZ26L     Label = SOME_LABEL_3  Total blocks = 2050860

    WARNING: The above disks will be initialized.
             All system and user data will be lost.

Is this OK? (Yes/No/Exit) yes
```

3. The above question gives you the opportunity to safely abort the installation if you decide you are not ready to proceed. Answer this question NO, if you want to input different disks. Answer YES to continue with the installation as shown in the remainder of this example. Answer the question EXIT to return to the selection menu without making any changes to your system disk.

```
    Initializing and mounting target shadow set (DSA100:)...
    Initializing the quorum disk ($13$DKB200:) with label SYS$QUORUM...

*** DEC AXPVMS VMS V6.2-1H3: OpenVMS Operating System, Version V6.2-1H3

    COPYRIGHT (c) 14-MAY-1996 -- All rights reserved

    Digital Equipment Corporation

    DECnet Phase IV / DECnet/OSI Support: YES

    Programming Support: YES

    System Programming Support: YES

    Utilities: YES

    Documentation Manuals: YES

    Support for DECwindows: YES

        video fonts: YES

%PCSIUI-I-DONEASK, execution phase starting
The following product will be installed:
DEC AXPVMS VMS V6.2-1H3
%PCSI-I-VOLINFO, estimated space information for volume DISK$ALPHASYS
-PCSI-I-VOLSPC, 353584 required; 4110080 available; 3756496 net
Portion Done: 0%...10%...20%...30%...40%...50%...60%...70%...80%...90%...100%
The following product has been installed:
DEC AXPVMS VMS V6.2-1H3
```

```
    Please wait while additional installation tasks complete...

        Portion Done: 100%

    Installation of the OpenVMS Alpha Operating System is complete.

    When the newly installed system is first booted, the StorageWorks
    Network Storage Array Software Customization Procedure will ask you
    to enter information required to custom configure the network array
    for your site.

    +---------------------------------------------------------------------+
    |             StorageWorks Network Storage Array CD Menu              |
    +---------------------------------------------------------------------+

    You can install the OpenVMS Alpha Operating System, migrate to a
    shadowed system disk, or execute DCL commands and procedures to
    perform "standalone" tasks, such as backing up the system disk.

    To get help at any time, type a question mark (?) and press Return.

    Please choose one of the following:

        (1) Install the OpenVMS Alpha Operating System, Version V6.2-1H3
        (2) Migrate to shadowed system disk
        (3) Execute DCL commands and procedures
        (4) Shut down this system

Enter your choice: (1/2/3/4) 4

    Shutting down the system.  Please wait...

        SYSTEM SHUTDOWN COMPLETE
```

4. The StorageWorks Network Storage Array Software Customization Procedure will run when the network array is rebooted.

For further information on the operating system installation refer to the *OpenVMS Alpha Upgrade and Installation Manual.*

3.7 Interpreting OCP Startup Messages

After you turn the server processor on, the OCP and your monitor or terminal screen provide the following status information:

- The countdown and ready message on the OCP
- The system startup display on your monitor or terminal screen
- The console prompt for OpenVMS systems on your monitor or terminal screen

While the system runs the startup tests, the operator control panel on the front of the system displays a series of codes. When the startup tests are complete, the OCP displays the following message:

`Model 4/200` or `Model 4/233`

During the startup sequence, the startup display scrolls on your monitor or terminal screen. To stop the display from scrolling, type Ctrl/S. To resume scrolling, type Ctrl/Q. The system startup display looks similar to the example in the following section.

The operating system displays the console prompt after the startup display. If the system does not display a console prompt, press the Return key several times. If there is no response, refer to Chapter 6 for more information.

3.7.1 OpenVMS SRM Startup Display

The following example shows the system startup display:

```
BIOS Emulation V1.07
Copyright (c) 1993-1994 Digital Equipment Corporation
All Rights Reserved
Patent Pending
eb.....ea.e9.e8.e7.e6.e5.e4.e3.e2.e1.e0.
X3.3-1476, built on Oct  4  1994  at 14:48:51
>>>
```

3.7.2 Reading the Startup Test Results

The OpenVMS startup test display indicates successful tests by displaying the word OK. It indicates tests that fail by displaying double question marks (??) and an error code.

If the system passes the startup tests, it either boots the operating system or halts in console mode, depending on the system default settings.

The following list summarizes the steps to follow if the system fails the startup tests:

1. Turn the server processor off, wait approximately 15 seconds, then turn it on again.

2. If the system continues to fail the startup tests, refer to Chapter 6 for additional information.

Note

When the startup tests fail, the system ignores the os_type setting and enters the OpenVMS console automatically.

3.8 Using the Console

The OpenVMS (SRM) console is used to perform various tasks. For example, ROM-based diagnostics (such as the TEST command) are run only from the OpenVMS console.

Invoking Console Mode

To perform tasks from console mode, you first must invoke console mode by shutting down the operating system according to the operating system shutdown procedure described in your operating system documentation. You also can invoke console mode by pressing the Halt switch on the operator control panel.

CAUTION

Press the Halt switch only after you have shut down the operating system using the proper shutdown procedure.

3.9 Changing Startup and Boot Defaults

You can change the way the system starts up or boots the operating system. For example, you can set the system to autoboot or you can change the default boot device. To make these kinds of changes you need to change default values for your system's environment variables.

To change default values, see the SET command in Table 3–2. Table 3–3 and Table 3–4 give the server processor console parameters.

Startup and Boot Environment Variables

The following environment variables affect the way the system starts up or boots:

- `SET CONSOLE GRAPHICS`
- `SET CONSOLE SERIAL`
- `SET BOOTDEF_DEV`

Table 3–2 Basic SRM Console Commands

Task	Command	Syntax
Boot the operating system.	BOOT	BOOT [-*flags*] [*longword*] [-*halt*] [*boot_device*]
Display error logs.	cat el	cat el
Resume program execution.	CONTINUE	CONTINUE
Invoke the EISA Configuration Utility.	ECU	ECU
Display online help on using console commands.	HELP	HELP[*command...*]
Initialize the system.	INIT	INIT
Halt system tests invoked by TEST command.	KILL_DIAGS	KILL_DIAGS
Display status of all system processes.	PS	PS
Set an environment variable.	SET	SET[-*default*]*envar val*
Display the value of an environment variable or display configuration information.	SHOW	SHOW [*envar*] [{*config,device,memory,pal,version*}]
Test the system and display results.	TEST	TEST

Table 3–3 SWXNA-Ex/Jx Single Server Processor Console Parameters

Parameter	Setting
boot_osflags	0,0
boot_reset	on
bootdef_dev	DKB0
pka0_disconnect	1
pka0_fast	1
pka0_host_id	7
pkb0_disconnect	1
pkb0_fast	1
pkb0_host_id	7
scsi_poll	on
console	serial
os_type	OpenVMS

Table 3–4 SWXNA-Ax/Fx/Bx/Gx Dual Server Processor Console Parameters

Parameter	Top Server Processor Setting	Bottom Server Processor Setting
boot_osflags	1,0	0,0
boot_reset	on	on
bootdef_dev	DKB0, DKC100	DKB0, DKC100
pka0_disconnect	1	1
pka0_fast	1	1
pka0_host_id	6	7
pkb0_disconnect	1	1
pkb0_fast	1	1
pkb0_host_id	6	7
pkc0_disconnect	1	1
pkc0_fast	1	1
pkc0_host_id	6	7
scsi_poll	on	on
console	serial	serial
os_type	OpenVMS	OpenVMS

4

Installing and Removing Components

This chapter describes the procedures for removing and replacing field replaceable units (FRUs) for the server processor. For more information about FRUs, refer to the *StorageWorks™ Solutions FDDI Server Service Manual*. The following topics are covered in this chapter:

- Preparing to install or remove components
- Electrostatic discharge protection
- Connecting a terminal to the server processor
- Shutting down the system
- Sliding the server processor out of the network array cabinet
- Removing the cover panels
- Removing and installing SIMMs
- Removing and installing option cards
- Removing and installing storage devices
- Removing and installing a power supply
- Removing and replacing the CPU daughterboard
- Removing and replacing the motherboard
- Removing and replacing the fan
- Removing and replacing the OCP
- Reassembling the server processor

CAUTION

Be sure to follow the appropriate antistatic precautions when handling internal components.

4.1 Preparing to Install or Remove Components

To prepare your system for installation and removal of components, you need to assemble the required equipment, familiarize yourself with antistatic precautions, and remove the top panels of the system unit.

Required Equipment

You need the following equipment to perform the installation and removal procedures described in the following sections.

- Flathead screwdriver
- Phillips screwdriver
- Antistatic wrist strap
- Replacement option board kit or device kit

4.2 Electrostatic Discharge Protection

ESD can damage subsystem components. This section describes the necessary procedures for protecting the subsystem components against electrostatic discharge (ESD).

Use the following strategies to minimize electrostatic discharge problems:

- Maintain more than 40 percent humidity in the room where your subsystem resides.
- Place the subsystem cabinet away from heavy traffic paths.
- Do not use carpet, if possible. If carpet is necessary, choose an antistatic carpet. If a carpet is installed, place antistatic mats around the subsystem to decrease electrostatic discharge.

ESD Grounding Procedure

Prior to removing or replacing any module:

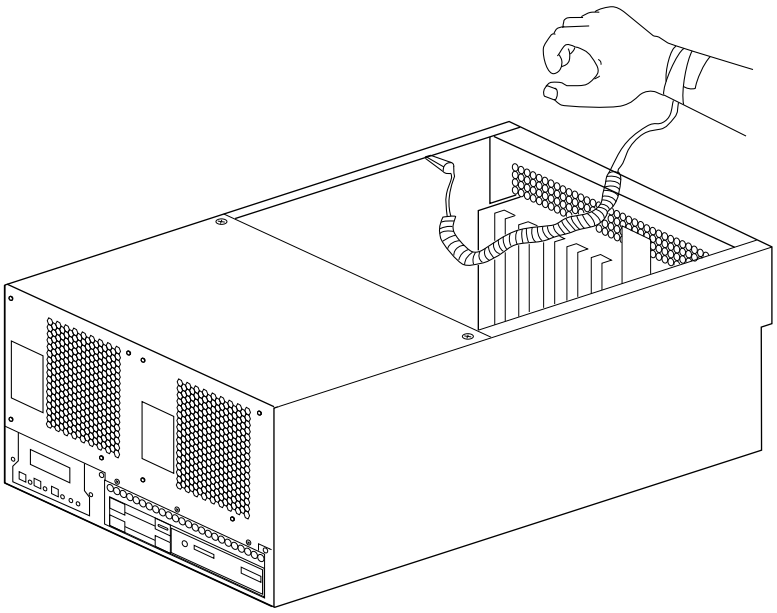
1. Obtain and attach an ESD wrist strap to your wrist. Ensure that the strap fits snugly around your wrist.
2. Plug or clip the other end of the ESD wrist strap to a ESD bolt or ground stud usually located on the cabinet's vertical rail that is common for both the device channel processor shelves and the storage shelves.
3. Obtain and use an approved antistatic bag and/or a grounded antistatic mat.

Note

The part number for the Portable Anti-Static Kit is 29–26246–00.

Figure 4–1 shows how to attach the antistatic wrist strap to your wrist and to the system enclosure.

Figure 4–1 Attaching the Antistatic Wrist Strap



CXO-4635A-MC

4.3 Connecting a Terminal to the Server Processor

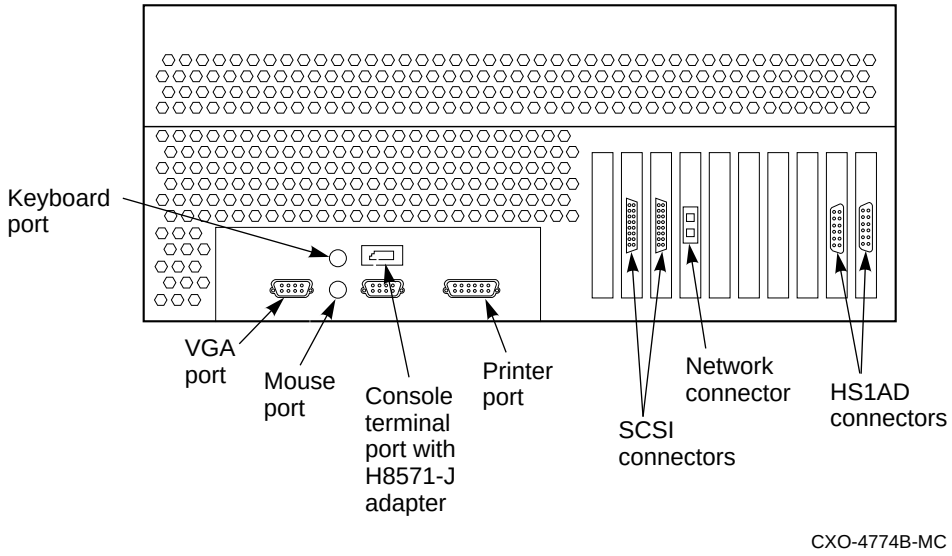
Note

You must have a terminal connected to the server processor to communicate with it. Any terminal that supports ANSI control sequences can be used, including graphics displays that provide emulation of an ANSI-compatible video terminal.

If you do not have a terminal connected to your server processor, use the following procedure to connect most EIA-compatible terminals:

1. Make sure the power switch on the back of the terminal is OFF (◯).
2. Connect one end of the terminal cable to the back of the terminal.
3. Connect the other end of the terminal cable to the EIA terminal port on the rear of the server processor using the female MMJ adapter (part number H8571–J), as shown in Figure 4–2.

Figure 4–2 Connecting to the Terminal Port of the Server Processor



4. Turn the terminal power switch to ON (|).
5. Set the terminal's communication setup to 9600 baud, with 8 data bits, 1 stop bit, and no parity. Refer to your terminal documentation for terminal setup instructions.

4.4 Shutting Down the System

Use the following procedure to shut down the server processor:

1. Stop all work on the server processor.
2. Perform an orderly shutdown of the operating system in the server processor by entering the following command at the DCL $ prompt on the terminal connected to the server processor:

```
$ @SYS$SYSTEM:SHUTDOWN
```

3. When the shutdown is complete, open the front door of the Network Storage Array cabinet with a 5/32-inch hex wrench.
4. Depress the power button on the server OCP to turn off power.
5. Set the On/Off switches on all external options connected to the system to the Off position.

4.5 Sliding the Server Processor Out of the Network Array Cabinet

Use the following procedure to remove or reinstall the server processor:

Note

The server processor can be removed from either the front or back of the network array cabinet, but its power cord must be accessed through the front door.

1. Using a 5/32-inch hex wrench, open the front or back door of your network array.
2. Unplug the ac power cord on the server processor.
3. Remove the red shipping brackets that hold the server processor in place.
4. Slide the server processor out on its slide rails, to enable you to access the front cover and the rear top cover easily.
5. Refer to Section 4.6 if you need to remove the covers.

4.6 Removing the Cover Panels

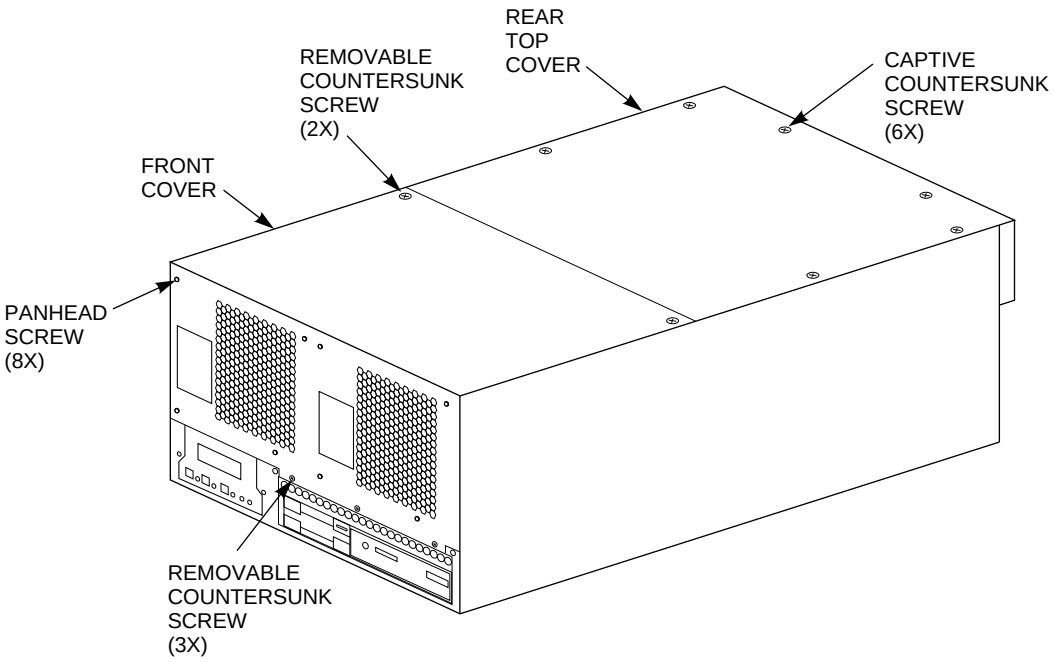
The cover panels of the system must be removed to install or remove any internal components. The following sections describe how to remove and replace the server processor covers. Refer to Figure 4–3 for the position of the covers.

CAUTION

Before removing the cover panels, do the following:

1. Perform an orderly shutdown of the operating system (see Section 4.4).
2. Set the On/Off button on the OCP to Off.

Figure 4–3 Removing the Cover Panels



CXO-4725A-MC

4.6.1 Removing the Rear Top Cover

Use the following procedure to remove the rear top cover:

1. Loosen the six quarter turn screws.
2. Lift the cover slightly and pull forward.

Reverse the steps in this procedure to replace the rear top cover.

4.6.2 Removing the Front Cover

Use the following procedure to remove the front cover:

1. If you have not done so already, remove the power cable from the server processor.
2. Remove the screws that attach the power supply to the front cover.
3. Remove the screws attaching the front cover to the chassis using a Phillips screwdriver.
4. Remove the cover by pulling forward slightly and lifting off.

Reverse the steps in this procedure to replace the front cover.

4.7 Removing and Installing SIMMs

Note

Before completing this procedure, complete the procedures in Section 4.2 through Section 4.6.

You may need to install a new SIMM to replace a faulty module or to upgrade a memory bank. You may need to remove SIMMs to access the memory slots for any new modules. This section describes how to remove and install SIMMs, and verify memory configuration.

4.7.1 Removing SIMMs in the Correct Order

Digital recommends that SIMMs be removed and installed only in successive order, to prevent damage to SIMMs adjacent to the ones you want to remove. For example, if you have SIMMs already installed in Banks 1, 2, and 3, and you want to remove a SIMM from Bank 0, follow this procedure:

1. Remove SIMMs in Bank 3.
2. Remove SIMMs in Bank 2.
3. Remove SIMMs in Bank 1.
4. Remove the SIMM you need to remove in Bank 0.

Refer to Figure 4–6 for clarification of the SIMM configuration on the motherboard. Figure 4–4 shows the removal procedure for a SIMM.

WARNING

Memory and CPU modules have parts that operate at high temperatures. Wait two minutes after power is removed before handling these modules.

Use the following procedure to remove SIMMs:

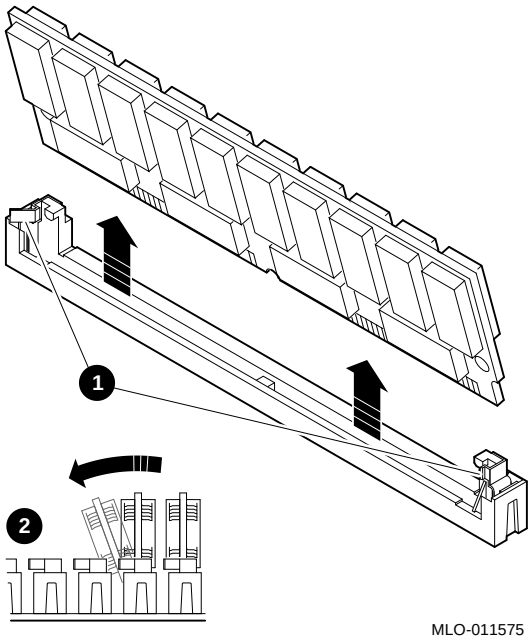
1. Remove the appropriate SIMM by pressing the metal clips on both sides of the SIMM connector to the side. (See callout 1 in Figure 4–4.)

Note

You may want to use a screwdriver to press back on the metal clips, but be very careful not to damage the motherboard.

2. Note the position of any SIMMs you remove.
3. Tilt the memory module and lift it out of its connector. (See callout 2 in Figure 4–4.)

Figure 4–4 Removing SIMMs from the Motherboard



4.7.2 Preparing to Install SIMMs

Before You Install SIMMs

Before you install SIMMs, check the following:

- Make sure you have completed all the preinstallation tasks (see Section 4.1).
- Make sure you shut down the system as described in Section 4.4 before installing a SIMM.

Check the Rules for Installing a Memory Option

Observe the following rules when installing SIMMs for the memory option:

- Stop all work on the server processor in which you are installing a SIMM.
- Bank 0 must contain a memory option. A memory option consists of 5 SIMMs: 0, 1, 2, and 3, and 1 error correction (ECC) SIMM.
- When you install a memory option in a memory bank, you must install a SIMM in all of the connectors in that bank.
- All SIMMs within a bank must be of the same memory capacity.

- Digital recommends that larger SIMM groups occupy the lower-numbered banks.
- Observe the rules and recommendations regarding the procedure for removing and installing SIMMs (see Section 4.7.1).

If you need more information on the above procedures, refer to the *StorageWorks™ Solutions StorageWorks FDDI Server Service Manual*.

4.7.3 Installing SIMMs

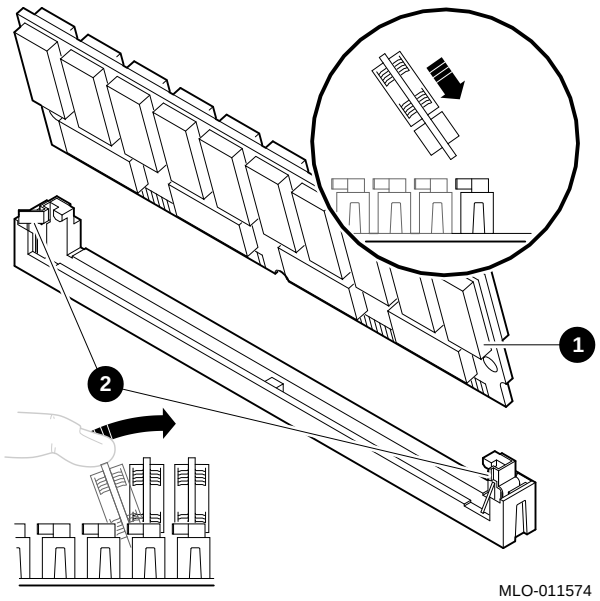
If you first need to remove a SIMM from the bank into which you want to install one, refer to Section 4.7.1 for the correct procedure.

WARNING

Memory and CPU modules have parts that operate at high temperatures. Wait 2 minutes after power is removed before handling these modules.

1. Tilt the connecting end of the module and press gently on the module so it slips over the two posts located at each end of the slot (see Figure 4–5).
2. Snap the SIMM into place in the correct upright position, as shown in Figure 4–5. Make sure that the SIMM is fully seated. The two latches on the ends of each SIMM connector should lock around the edges of the SIMM.
3. Install all SIMMs using this same procedure, including any you removed for access.

Figure 4–5 Installing a SIMM



4.7.4 Replace the Server Processor in the Network Array Cabinet

When you have finished removing and installing an option, and you are ready to close the network array, perform the following steps:

1. Reinstall the rear top cover on the server processor.
2. Depress the slide locks and the slide server processor back into your network array.
3. Reinstall the red shipping brackets on the rear of the network array cabinet.
4. Close and lock the rear door.

4.7.5 Power Up the Server Processor

After the server processor has been reinstalled into the cabinet, power up the system using the following procedure:

1. Attach the ac power cord into the outlet on the front of the server processor.
2. Depress the power button on the server processor OCP to power up the server processor, then close the front door of the network array.
3. Press the Return key on the network array console terminal connected to the server processor.

4.7.6 Verify Memory Configuration

Before booting your system, you should verify the memory configuration using the SHOW MEMORY command, as follows:

```
>>> SHO MEM
```

The SHOW MEMORY command displays information for each memory module in the system. The command and a sample display are shown in Example 4–1.

Example 4–1 Show Memory Command

```
>>> SHO MEM
     128 Meg of System Memory
     Bank 0 = 64 Mbytes(16 MB Per Simm) Starting at 0x00000000
     Bank 1 = 64 Mbytes(16 MB Per Simm) Starting at 0x04000000
     Bank 2 = No Memory Detected
     Bank 3 = No Memory Detected

>>> CONT
```

4.7.7 Booting Your System

When you have successfully reassembled the server processor, boot your system by entering the BOOT command at the >>> prompt.

4.8 Removing and Installing Option Cards

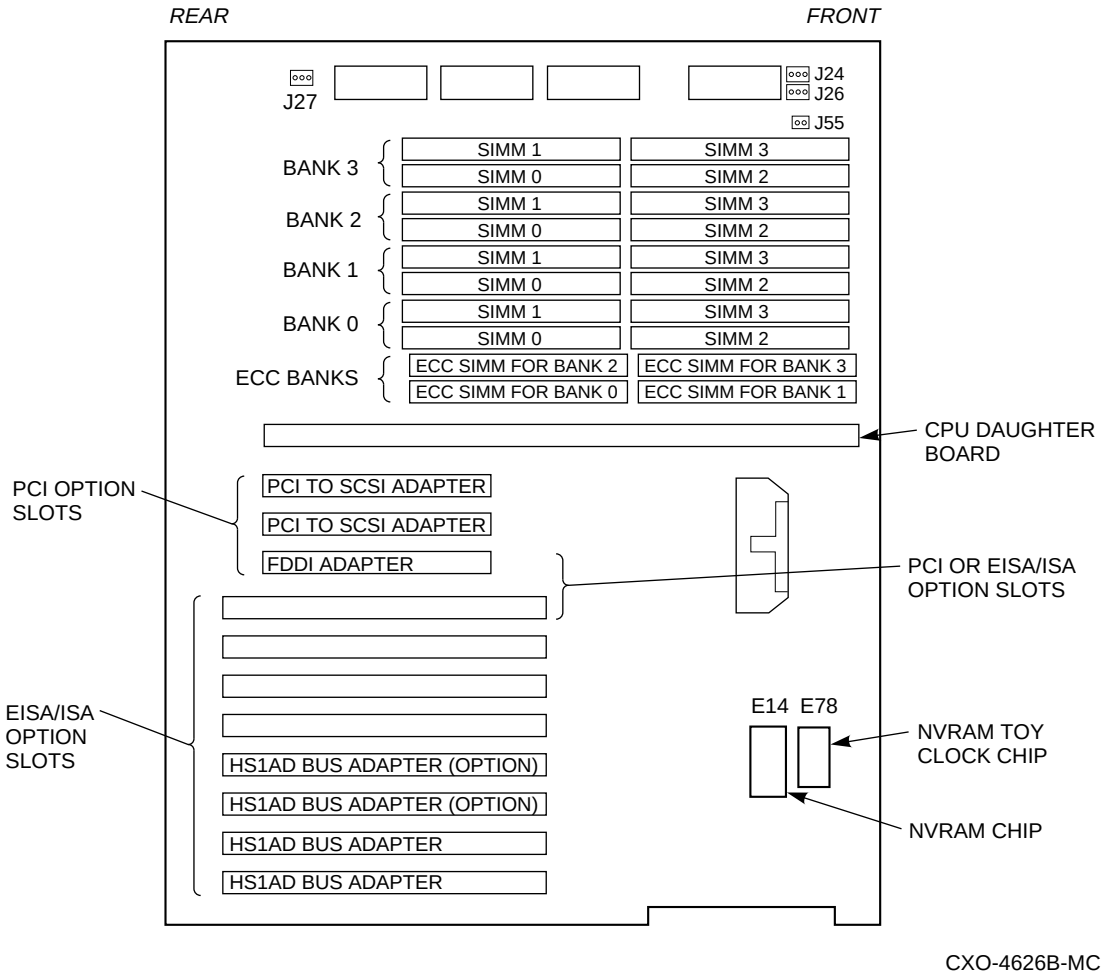
Note

Before completing this procedure, complete the procedures in Section 4.2 through Section 4.6.

Installing and removing EISA option cards includes the following tasks:

- Installing an option card
- Removing an option card
- Testing an option card installation
- Configuring an option card

Figure 4–6 Option Slots on the System Board



4.8.1 Installing an Option Card

To install an EISA or PCI option card, perform the following steps:

CAUTION

Static electricity can damage electronic components. Use an antistatic wrist strap while handling these components (see Section 4.2).

1. Select a vacant option card slot on the system board. The first three slots are reserved for PCI options; the last eight are for EISA or ISA options. Figure 4–6 shows the slot locations on the motherboard.
2. Remove the screw securing the slot cover to the chassis.
3. Remove the slot cover from the server and store it for future use.
4. Carefully install the option card into the appropriate connectors on the system board and press it firmly into place.
5. Secure the option card to the chassis using the screw you removed.
6. When you have finished removing or installing internal options, reassemble the server processor by reversing the procedures described in Section 4.6.
7. Test the option card installation (see Section 4.8.3).

Note

If the top EISA option slot is used, the bottom PCI slot cannot be used. If the bottom PCI slot is used, the top EISA slot cannot be used.

4.8.2 Removing an Option Card

To remove an EISA or PCI option card from the server processor, perform the following steps:

CAUTION

Static electricity can damage electronic components. Use an antistatic wrist strap while handling these components.

1. Disconnect any cables connected to the external or internal ports on the option card you want to remove.
2. Remove the slot cover screws securing the option card to the chassis.
3. Carefully disconnect the option card from the slot connectors on the system board and remove it from the system.
4. If you intend leaving the option slot vacant, install a slot cover and secure it to the chassis using the screw that you removed.
5. When you have finished removing or installing internal options, reassemble the server processor by reversing the procedures described in Section 4.6.

Note

After completing this procedure, refer to Section 4.15 to reassemble the server processor.

4.8.3 Testing an Option Card Installation

To test an option card installation, follow the steps in Table 4–1.

Table 4–1 Testing with the SHOW CONFIG Display

Step	Action	Result
1	Enter the SHOW CONFIG command to display the system configuration.	The system responds with a display similar to that shown in the following example.
2	Examine the EISA and PCI bus information in the display to make sure that the new option is listed.	If the option is not listed, see Chapter 6 for help.
3	Determine the device name of the new option.	You must know the device name to run diagnostic tests on the option. Enter the SHOW DEVICE command to see the device name.
4	Run a self-test on the option by entering the TEST command followed by its device name.	If the self-test passes, the system displays the word OK before displaying the console prompt >>>. If the system displays a failure message, see Chapter 6 for help.

The following example shows the information displayed when you enter the SHOW CONFIG command:

```
                    Digital Equipment Corporation
                        Alpha AXP (tm) Server

SRM Console x3.7-239 VMS
PALcode x5.48-49, OSF PALcode x1.35-34

MEMORY
    128 MB of System Memory
    Bank 0 = 64 MB (16 MB per SIMM) starting at 0x00000000
    Bank 1 = 64 MB (16 MB per SIMM) starting at 0x20000000
    Bank 2 = No Memory Detected
    Bank 3 = No Memory Detected

AlphaServer 1000 Serial ROM version:    x0.6

PCI BUS
    Bus 00  Slot 06:  NCR   810 SCSI  Controller
    Bus 00  Slot 07:  INTEL  8275EB PCI to EISA Bridge
    Bus 00  Slot 11:  Digital DE435 Network Controller

EISA BUS
Slot 3    DEC4220     era0.0.0.3.1  08-00-2B-35-F5-24
Slot 6    CPQ30110
```

4.8.4 Configuring an Option Card

PCI cards require no addition configuration procedures; the system automatically recognizes the cards and assigns the appropriate system resources. When installing an EISA option card, refer to the system startup display screen to see if configuration of the card is required. After you turn on the system, the system startup sequence examines the EISA option slots and reports whether you need to run the EISA Configuration Utility. See Section 5.4 for more information.

4.9 Removing and Installing Storage Devices

Note

Before completing this procedure, complete the procedures in Section 4.2 through Section 4.6.

The server processor is designed to accommodate one CD–ROM drive and one floppy drive. The floppy drive connects directly to the system board and is not a SCSI device.

When you install a SCSI device, you must assign it a unique SCSI ID number. Otherwise, the system does not recognize the device.

4.9.1 Media Tray

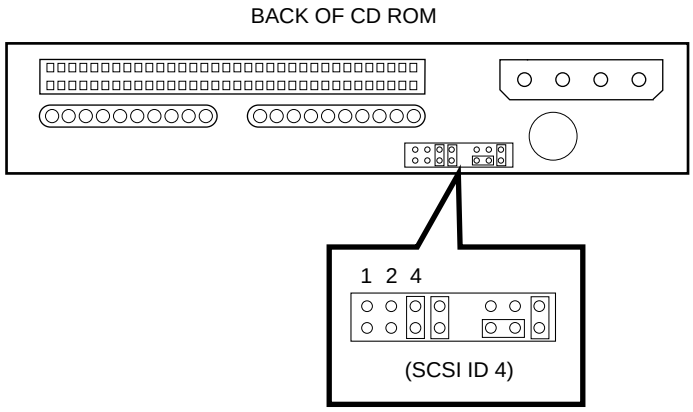
The media tray houses the CD–ROM drive and the floppy drive. You must remove the media tray before you can remove either the CD–ROM drive or the floppy drive. To remove the media tray, remove the two screws on the front of the media tray using a Phillips screwdriver.

4.9.1.1 Installing a CD–ROM Drive

To install or replace a CD–ROM drive, refer to Figure 4–7 and follow these steps:

1. Before you can install the CD–ROM drive, you must first remove the media tray (see Section 4.9.1).

Figure 4–7 Installing a CD–ROM Drive



2. Set the SCSI ID on the replacement drive to the same ID as the original drive, and install terminators on the replacement drive.

Note

The default SCSI ID for the CD–ROM is ID 5. For dual server processor models, the second network array CD–ROM needs to be set for SCSI ID 4. (Remove jumper ID 1.)

3. Slide the drive into the front of the media tray until its screw holes are aligned with the drive bracket holes.
4. Insert four screws into the bottom of the CD–ROM drive.
5. Connect the power cable and the data cable to the back of the drive.
6. Reinstall the media tray.

4.9.1.2 Removing a CD–ROM Drive

Reverse the order of steps 4 to 6 in the installation procedure to remove the CD–ROM drive.

4.9.1.3 Removing and Replacing a Floppy Drive

To replace the 3.5-inch floppy drive, follow these steps:

1. Disconnect the IDE and power cables from the back of the floppy drive.
2. Remove the screws attaching the floppy drive to the media tray.
3. On the replacement floppy drive, locate the ID select switch toward the rear on the righthand side of the replacement floppy drive. Set the switch to the 1 position.
4. Slide the floppy drive into the front of the media tray until the screw holes line up with the holes on the bracket.
5. Attach the mounting bracket to the replacement floppy drive using the two screws that you removed from the original floppy drive.

6. Connect the power cable and the data cable to the floppy drive.

Note

Make sure the key on the IDE cable connector faces up toward the top of the disk drive.

To remove the diskette drive, reverse the steps in the previous procedure.

Note

After completing this procedure, refer to Section 4.15 to reassemble the server processor.

4.10 Removing and Installing a Power Supply

Note

Before completing this procedure, complete the procedures in Section 4.2 through Section 4.6.

The following procedures describe how to install and remove the primary and redundant power supplies. The primary power supply resides in the left-most position; the redundant or secondary power supply resides in the right-most position. The procedures for installing and removing both power supplies are similar, unless otherwise noted.

4.10.1 Installing a Power Supply

To install a power supply, follow these steps:

1. Remove the front cover from the server processor using the procedure described in Section 4.6.
2. If a second power supply is being installed for the first time, remove the cover plate over the redundant power supply slot and discard the plate. Keep the screws for remounting the front cover on the redundant power supply.
3. Slide the power supply into the chassis of the server processor (see Figure 4–8).
4. Connect all internal and external cables to the connectors on the back of the power supply. Connectors are shown in Figure 4–9.

Note

If you cannot access the redundant power supply, then remove the rear top cover.

5. Replace the screws that secure the power supply to the server processor.

6. Reattach the front cover to the chassis and to the installed power supplies using the screws previously removed.

4.10.2 Removing a Power Supply

Note

This procedure assumes that power to the server processor has been removed and the server processor has been either removed from the cabinet or slid out of the cabinet enough to access the components (see Section 4.5).

Note

If two power supplies are installed, you must remove the redundant (right-most) power supply before removing the primary power supply.

To remove a power supply, follow these steps:

1. Remove the front cover from the server processor using the procedure described in Section 4.6.
2. Disconnect all internal and external cables from the power supply.
3. Slide the power supply out and lift it up off its tabs, as shown in Figure 4–8.

Note

After completing this procedure, refer to Section 4.15 to reassemble the server processor.

Figure 4–8 Redundant Power Supply Location

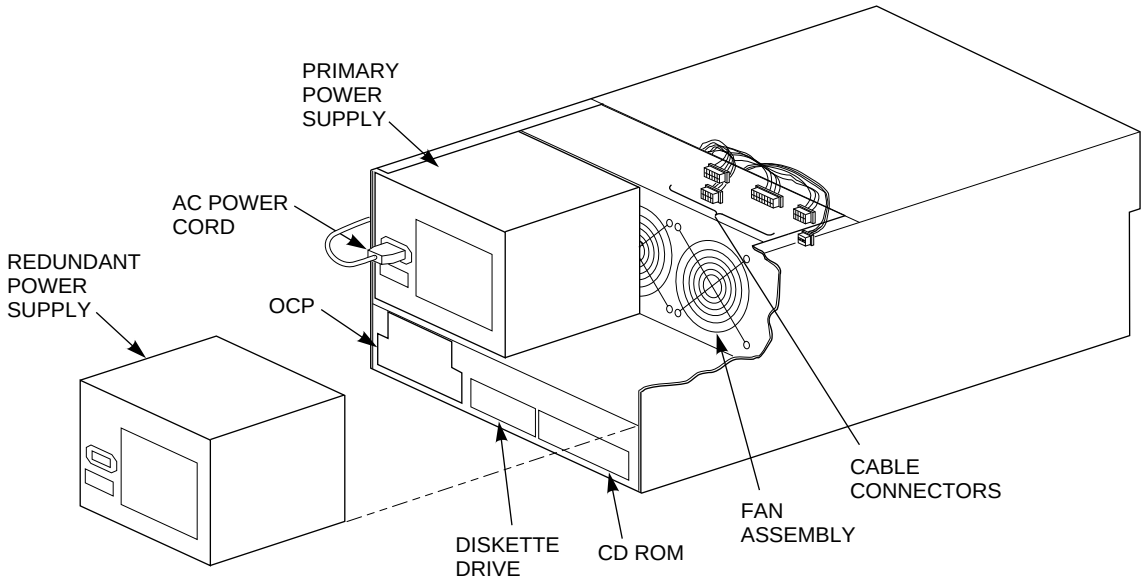
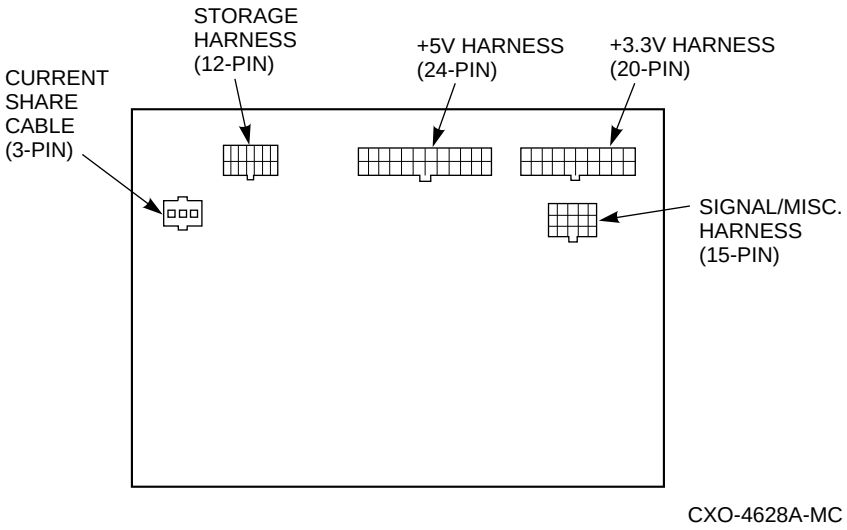


Figure 4–9 Power Supply Cable Connections



4.11 Removing and Replacing the CPU Daughterboard

Note

Before completing this procedure, complete the procedures in Section 4.2 through Section 4.6.

Use the following procedure to remove and replace the CPU daughterboard:

WARNING

CPU and memory modules have parts that operate at high temperatures. Wait 2 minutes after power is removed before handling these modules.

CAUTION

Electrostatic discharge damages components. Always use proper ESD grounding procedures when handling components . Refer to Section 4.2 for proper grounding procedures.

1. Remove the screw from the outside rear face and retain it to reattach the new board.
2. Lift the CPU shipping bracket off by pushing back towards the fans to clear the lip, lifting and turning to the side.
3. Remove the CPU daughterboard using the pry handles on each end of the board.
4. Install the CPU daughterboard by inserting it into the slot on the motherboard and snapping down the pry handles to seat the board.
5. Reinsert the screw you kept from the outside rear face to lock the board in place.

Note

After completing this procedure, refer to Section 4.15 to reassemble the server processor.

4.12 Removing and Replacing the Motherboard

Note

Before completing this procedure, complete the procedures in Section 4.2 through Section 4.6.

Use the following procedure to remove and replace the motherboard:

1. Record the position of the EISA option card.
2. Remove the EISA option card.
3. Record the position of the PCI option card.
4. Remove the PCI option card.
5. Remove the CPU daughterboard (see Section 4.11).
6. Remove all cables.
7. Remove the motherboard mounting screws.
8. Tilt and lift the motherboard out of the enclosure.

To install the motherboard, reverse this procedure.

Note

After completing this procedure, refer to Section 4.15 to reassemble the server processor.

4.13 Removing and Replacing the Fan

Note

Before completing this procedure, complete the procedures in Section 4.2 through Section 4.6.

Use the following procedure to remove and replace the fans:

1. Disconnect all cables from the power supplies.
2. Slide the power supplies back for clearance.
3. Move all cables out of the way by clipping the cable clamps on the fan assembly.
4. Disconnect the fan harness from the fan assembly.
5. Remove the two screws holding the air baffle to the fan assembly.
6. Pull the fan assembly straight up and out to clear the unit.

Note

After completing this procedure, refer to Section 4.15 to reassemble the server processor.

4.14 Removing and Replacing the OCP

Note

Before completing this procedure, complete the procedures in Section 4.2 through Section 4.6.

Use the following procedure to remove and replace the OCP:

1. Remove the two screws on the front.
2. Remove the cables.

Note

Perform the next step only if you want to remove the LCD panel.

3. Remove the four screws, nuts, and spacers for the LCD panel.
4. Remove the OCP.

Note

Use Loctite™ on screws if installing the LCD panel.

Reverse the preceding procedure to install an OCP.

Note

After completing this procedure, refer to Section 4.15 to reassemble the server processor.

4.15 Reassembling the Server Processor

Complete the following procedures to reassemble the Server Processor following a removal or installation procedure.

4.15.1 Replace the Server Processor in the Network Array Cabinet

When you have finished removing and installing an option, and you are ready to close the network array, perform the following steps:

1. Reinstall the rear top cover on the server processor.
2. Depress the slide locks and the slide server processor back into your network array.
3. Reinstall the red shipping brackets on the rear of the network array cabinet.
4. Close and lock the rear door.

4.15.2 Power Up the Server Processor

After the server processor has been reinstalled into the cabinet, power up the system using the following procedure:

1. Attach the ac power cord into the outlet on the front of the server processor.
2. Depress the power button on the server processor OCP to power up the server processor, then close the front door of the network array.
3. Press the Return key on the network array console terminal connected to the server processor.

4.15.3 Booting Your System

When you have successfully reassembled the server processor, boot your system by entering the BOOT command at the >>> prompt.

5
Configuring Your System

This chapter covers the following topics:

- Viewing the system configuration
- SRM console configuration commands
- EISA bus
- EISA Configuration Utility (ECU)
- PCI bus

5.1 Viewing the System Configuration

Several SRM console commands or ARC console menu options allow you to examine your system configuration and environment variable settings.

To use these commands or menu options, you must invoke console mode. For information about invoking console mode, see Section 3.8.

Note

For a list of the options recognized by your system, see Section 5.2.

5.2 SRM Console Configuration Commands

Table 5–1 describes the console commands used to verify system configuration on systems running the OpenVMS operating system.

Table 5–1 SRM Console Configuration Commands

Command	Description
SHOW CONFIG	Displays the buses on the system and the devices found on those buses.
SHOW DEVICE	Displays the devices and controllers in the system.
SHOW MEMORY	Displays main memory configuration.
SET and SHOW	Sets and displays environment variables.

The SHOW CONFIG Command

The SHOW CONFIG command displays all devices found on the system bus, PCI bus, and EISA bus. You can use the information in the display to identify target devices for commands such as BOOT and TEST, as well as to verify that the system sees all the devices that are installed. The configuration display looks similar to the following display:

```
>>> SHOW CONFIG
               Digital Equipment Corporation
                  Alpha AXP (tm) Server

SRM Console X3.3-1476  VMS PALcode X5.48-71, OSF PALcode
X1.35-49

MEMORY
     128 Meg of System Memory
     Bank 0 = 64 Mbytes(16 MB Per Simm) Starting at 0x00000000
     Bank 1 = 64 Mbytes(16 MB Per Simm) Starting at 0x02000000
     Bank 2 = No Memory Detected
     Bank 3 = No Memory Detected

     Serial Rom Version:      0.8

PCI Bus
     Bus 00  Slot 06: NCR     810 Scsi Controller
     Bus 00  Slot 07: Intel   8275EB PCI to Eisa Bridge

EISA Bus
     Slot 1  CPQ3011
     Slot 3  DEC4220               era0.0.0.3.1
08-00-2B-BC-F
     Slot 8  DEC2E00
```

The SHOW DEVICE Command

The SHOW DEVICE command displays the devices and controllers in the system.

Syntax:

SHOW DEVICE [device_name]

Arguments:

device name

The device name or device abbreviation. When abbreviations or wildcards are used, all devices that match the type are displayed.

The device name convention used in the display is shown in the following example and is explained in the text that follows.

```
>>> SHOW DEVICE
dka400.4.0.6.0     DKA400         RRD43  2893
dva0.0.0.0.1       DVA0
era0.0.0.3.1       ERA0   08-00-2B-BC-F6-CC
pka0.7.0.6.0       PKA0      SCSI Bus ID 7
```

Elements of Device Name Convention

1. Driver ID

   Two-letter port or class driver designator

   - DR–RAID set device
   - DV–Floppy drive
   - ER–Ethernet port (EISA)
   - EW–Ethernet port (PCI)
   - PK–SCSI port, DK–SCSI disk, MK–SCSI tape
   - PU–DSSI port, DU–DSSI disk, MU–DSSI tape

2. Storage Adapter ID: One-letter storage adapter designator (a,b,c. . .)
3. Device Unit Number: Unique device unit number (MSCP Unit Number)

   SCSI unit numbers are forced to 100 times the Node ID
4. Bus Node ID Number
5. Channel Number: Used for multichannel devices
6. Slot Number:

   - For EISA options, corresponds to EISA slot numbers (1-8)
   - For PCI options, slot = Ethernet adapter (EWA0)
     - Slot 1=SCSI controller on standard I/O
     - Slot 2=EISA to PCI bridge chip
     - Slots 3 to 5=Reserved
     - Slots 6 to 8=Corresponds to PCI slots: PCI0, PCI1, and PCI2

7. Hose Number: 0 PCI_0 (32-bit PCI_; 1 EISA; 2 PCI_1)

The SHOW MEMORY Command

The SHOW MEMORY command displays information for each memory module in the system. The command and a sample display are shown in the following example.

```
>>> SHO MEM
     128 Meg of System Memory
     Bank 0 = 64 Mbytes(16 MB Per Simm) Starting at 0x00000000
     Bank 1 = 64 Mbytes(16 MB Per Simm) Starting at 0x04000000
     Bank 2 = No Memory Detected
     Bank 3 = No Memory Detected

>>> CONT
```

The SET and SHOW Commands

The SET and SHOW commands are used to set environment variables. Typically, you set environment variables when you configure a system.

Syntax:

set [-default] [-integer] [-integer] -[string] envar value
show envar

Arguments:

envar

The name of the environment variable to be modified.

value

The value that is assigned to the environment variable.

Options:

-default

Restores variable to its default value.

-integer

Creates variable as an integer.

-string

Creates variable as a string (default).

The SET and SHOW commands and a sample display are shown in the following example:

```
>>> SET BOOTDEF DEV EWA0
>>> SHOW BOOTDEF_DEV EWA0
>>> SHOW AUTO_ACTION BOOT
>>> SET BOOT_OSFLAGS 0,1
>>>
```

5.3 EISA Bus

The EISA (Extended Industry Standard Architecture) bus is a 32-bit industry standard input/output bus. EISA is a superset of the well-established 16-bit ISA bus. EISA was designed to accept newer 32-bit components while remaining compatible with older 8-bit and 16-bit cards.

EISA offers bus mastering and DMA capabilities. Up to eight EISA or ISA modules can reside in the EISA bus portion of the system board. All EISA slots are bus master slots and can be filled in any order.

Figure 5–1 shows the location of EISA and ISA option slots on the system board. To access the slots, you must remove the rear top cover of the server processor enclosure. Be sure to replace the cover before attempting to start the server processor again.

CAUTION

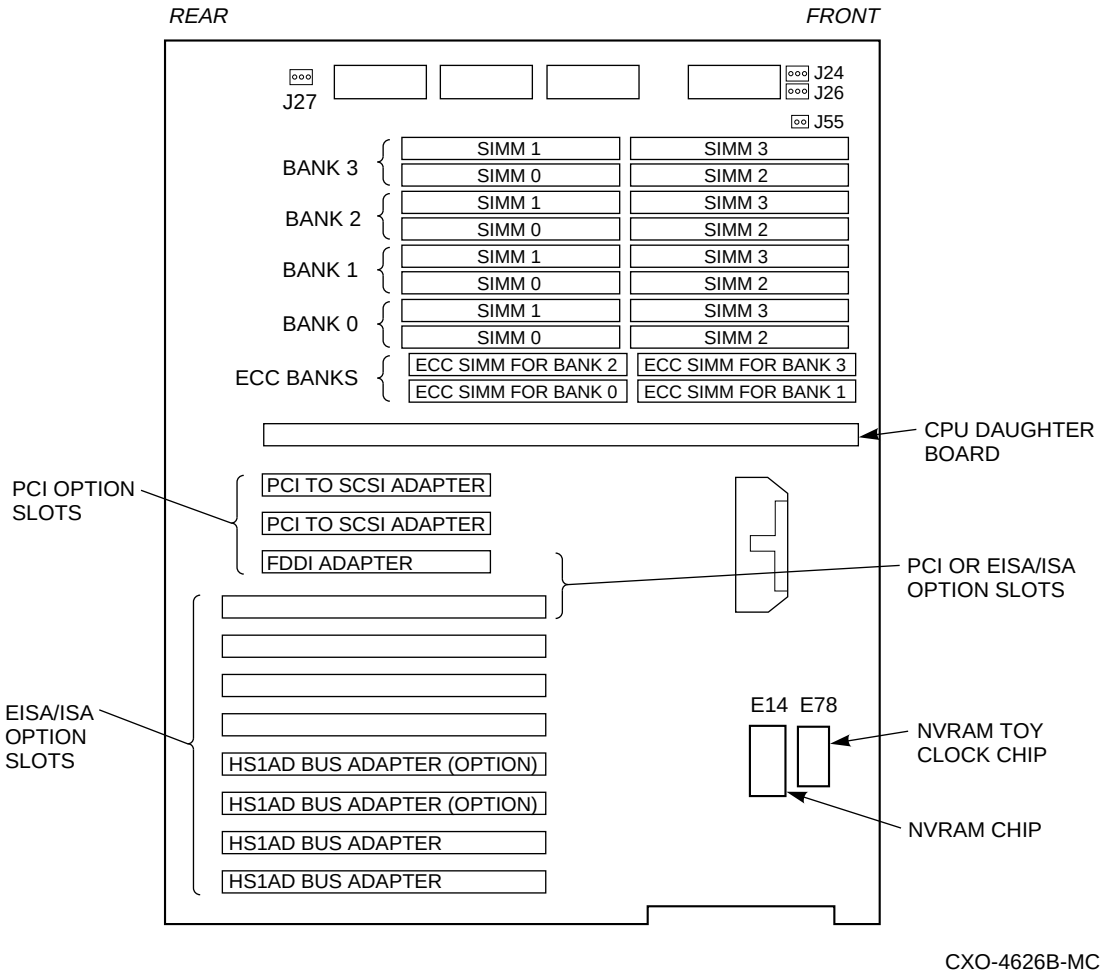
Do not remove the server processor's front cover when it is running. If you remove the top cover without first properly turning off the system, the system shuts down, with potential loss of data.

For information about installing a specific option, refer to the documentation for that specific option. For information about configuring an EISA option, refer to Section 5.4.

WARNING

Before installing EISA bus options, turn off all power to the server processor. Refer to Section 3.2.

Figure 5–1 Motherboard Layout



CXO-4626B-MC

5.4 EISA Configuration Utility (ECU)

When you add, remove, or move an EISA card to your server processor, you must run a utility called the EISA Configuration Utility (ECU). Each EISA board has a corresponding configuration (CFG) file that describes the characteristics and the system resources required for that option. The ECU uses the CFG file to create a conflict-free configuration. The ECU is a menu-based utility that provides online help to guide you through the configuration process. The ECU is run from the ARC menu interface.

The ECU is supplied on the system configuration diskette that was shipped with your server processor. Make backup copies of this diskette and keep the original in a safe place. Use a backup copy when you configure the system. The system configuration diskette must have the volume label *SYSTEMCFG*.

Note

The CFG files supplied with the option you want to install may not work if the option is not supported on your system. Before you install an option, check your system's product literature to verify that your system supports the option.

CAUTION

Turn the system off before you install EISA options.

5.4.1 Before You Run the ECU

Note

To run the ECU from a terminal connected to a serial line, you must use a VT320 or other terminal capable of emulating a VT320. From the ARC console, you also must create the environment variable TERM with a value of VT320 (for example, TERM=VT320). If you later want to run the ECU on a video monitor, you must delete this environment variable first.

Before you run the ECU, follow these steps:

1. Install the EISA option cards. Refer to the documentation for your EISA option card for information about installing the card.
2. Familiarize yourself with the utility.

   You can find more information about the ECU by reading the ECU online help. To read the online help, start the ECU (see Section 5.4.2). Online help for the ECU is located under Step 1, "Important EISA Configuration Information."
3. Familiarize yourself with the configuration procedure for your system:

   If you are installing, moving, or removing an EISA option, refer to Section 5.4.3.
4. Locate the ECU diskette DECpc Alpha (AK–2QCRx–CA) for Digital UNIX® and the OpenVMS operating system. Make a copy of the diskette and keep the original in a safe place. Use the backup copy for configuring options.

5.4.2 Starting the ECU

EISA options are recognized and configured automatically. To configure an EISA bus that contains no ISA options, follow these steps:

1. Install, move, or remove the EISA option card (see Section 4.8). Use the instructions provided with the EISA option.
2. Invoke the console firmware.
3. Shut down the operating system and press the Halt switch. When the console prompt >>> is displayed, press the Halt switch to the Out position.

4. Start the ECU as follows:

Note

Make sure the ECU diskette is not write-protected.

   a. Insert the ECU diskette for the OpenVMS operating system into the floppy drive.

   b. Enter the ECU command.

      The system displays the following:

```
Loading ARC firmware.
```

      Loading the ARC firmware takes approximately 2 minutes. When the firmware has finished loading, the ECU program is booted.

5. Complete the ECU procedure according to the guidelines provided in Table 5–2.

6. After you have saved configuration information and exited from the ECU, perform the following steps:

   a. Remove the ECU diskette from the floppy drive and boot the operating system.

   b. From the Boot menu, select the Supplementary menu.

   c. From the Supplementary menu, select "Set up the system." The Setup menu is displayed.

   d. From the Setup menu, select "Switch to OpenVMS or OSF console."

   e. Select the OpenVMS console, then press Enter on the "Setup menu."

   f. When the "Power-cycle the system to implement the change" message is displayed, press the Reset button. (Do not press the On/Off switch.) Once the console firmware is loaded and device drivers are initialized, you can boot the operating system.

   g. Verify that the new options are configured correctly.

5.4.3 Configuring EISA Options

EISA boards are recognized and configured automatically. See Table 5–2 for a summary of steps to configure an EISA bus. Review Section 5.4.1, then run the ECU as described in Section 5.4.2.

Table 5–2 Summary of Procedure for Configuring EISA Bus Options

Step	Action	Explanation
1	Install EISA option.	Use the instructions provided with the EISA option.
2	Power up and run ECU.	If the ECU locates the required CFG configuration files, it displays the main menu. The CFG file for the option may reside on a configuration diskette packaged with the option or may be included on the system configuration diskette. Note: It is not necessary to run Step 2 of the ECU, "Add or remove boards," because EISA boards are recognized and configured automatically.
3	View or edit details (optional).	The "View or edit details" ECU option is used to change user-selectable settings or to change the resources allocated for these functions (IRQs, DMA channels, and I/O ports, for example.) This step is not required when using the board's default settings.
4	Save your configuration and restart the system.	The "Save and exit ECU" option saves your configuration information to the system's nonvolatile memory.
5	Return to the SRM console and restart the system.	Refer to step 6 of Section 5.4.2 for operating system-specific instructions.

5.5 PCI Bus

PCI (Peripheral Component Interconnect) is an industry standard expansion I/O bus that is the preferred bus for high-performance I/O options. The server processor provides three slots for 32-bit PCI options.

PCI offers bus mastering and DMA capabilities. Up to three PCI cards can reside in the PCI portion of the motherboard. PCI slots can be filled in any order. Figure 5–1 shows the location of PCI slots on the motherboard. To access the slots, you must remove the rear top cover of the server processor enclosure. Be sure to replace the cover before attempting to start the server processor again.

CAUTION

Do not remove the server processor's front cover when it is running. If you remove the top cover without first properly turning off the system, the system shuts down, with potential loss of data.

For information about installing a specific option, refer to the documentation for that specific option.

WARNING

Before installing PCI bus options, turn off all power to the server processor. Refer to Section 3.2.

6
Troubleshooting

This chapter describes procedures for resolving problems with the system. The first section provides an overview and a general guide to determining the type of problem that exists. The next two sections describe diagnostic procedures that you can use to identify the source of a particular problem. To correct a problem, locate the troubleshooting table for that problem type and follow the guidelines provided. If you cannot correct the problem, report it to your service representative.

This chapter covers the following topics:

- Troubleshooting overview
- System diagnostics
- Power problems
- Console problems
- Boot problems
- Operating system problems
- Storage problems
- Option card problems
- Network problems
- EISA bus problems
- PCI bus problems
- Monitor and terminal problems
- Keyboard and mouse problems
- Printer problems
- Overheating problems
- Using the fail-safe loader
- Using the update utility

6.1 Troubleshooting Overview

Before you begin troubleshooting your system, consult the service agreement for your system. Your agreement will help you determine how much troubleshooting and repair you should undertake yourself.

If you plan to maintain the system yourself, use the information in this guide to help identify and resolve the problem.

If you have a service agreement with a service provider, contact your representative for assistance.

Table 6–1 lists possible problems and the relevant sections in this chapter.

Table 6–1 Determining Where to Look

Task or Problem	Relevant Section
Confirm that EISA cards or memory modules are properly configured.	Section 6.8
Confirm that the PCI cards are recognized by the system.	Section 6.11
Run a diagnostic test of the whole system, show its status, or terminate the testing.	Section 6.2
No startup display appears when you turn on the system. The power supply has shut down.	Section 6.3
Startup tests do not complete.	Section 6.4
The system cannot boot the operating system; the operating system reports errors, is hung, or crashes.	Section 6.2, Section 6.5, or Section 6.6
The system cannot access a mass storage device. Storage devices are missing from the SHOW DEVICE display.	Section 6.7
The system indicates network problems.	Section 6.9
The system indicates an EISA card is not configured.	Section 6.10
The monitor or the terminal is not working.	Section 6.12
The keyboard and mouse are not working.	Section 6.13
The printer is not working.	Section 6.14
The system repeatedly shuts down after 10 seconds.	Section 6.15
The FlashROM is corrupted, and the system cannot access console mode.	Section 6.16
A checksum error is detected when loading the console at startup.	Section 6.17

6.2 System Diagnostics

This section describes three sources of error information that can help you diagnose and troubleshoot system problems. Beep codes are audible error codes emitted by the server processor for specific problems. The console event log is a record of startup status messages that can contain helpful diagnostic information. Console command displays, such as the TEST command display, are another source of diagnostic information.

6.2.1 Interpreting Error Beep Codes

Table 6–2 describes error beep codes that you can encounter while using your system. For example, if the SROM (serial read only memory) code cannot find any good memory, you hear a 1-3-3 beep code (one beep, a pause, a burst of three beeps, a pause, and another burst of three beeps).

Table 6–2 Error Beep Codes

Beep Code	Meaning	Action
1-1-4	The SROM code could not read the flashROM headers, or there was a checksum failure.	Refer to Section 6.16.
3-3-1	Generic system failure.	Call your service representative.
1-2-1	TOY NVRAM failure.	Call your service representative.
1-3-3	The SROM code could not find at least 2 MB of good memory, or there was no memory available.	Verify that the memory modules are properly seated. Replace faulty memory modules.

6.2.2 Reading the Console Event Log

The system maintains a console event log consisting of status messages received during startup testing. If problems occur during startup, standard error messages may be embedded in the console event log. To display the console event log, use the cat el command.

Note

To stop the screen display from scrolling, press Ctrl/S. To resume scrolling, press Ctrl/Q.

6.2.3 The TEST Command

The TEST command runs firmware diagnostics for the entire core system. The tests are run sequentially, and the status of each subsystem test is displayed to the console terminal as the tests progress. If a particular device is not available to test, a message displays. The test script is composed of several exercisers that can test subsystems. The TEST command runs these exercisers sequentially and the status of each subsystem test is displayed to the console terminal as the tests progress. If a device is not available to test, a message displays.

To run a complete diagnostic test using the TEST command, the system configuration must include the following:

- Serial loopback connected to the COM2 port
- Parallel loopback connected to the parallel port
- Connection to a network or a terminator
- Ethernet port
- A diskette with files installed
- A CD–ROM with files installed

The test script tests devices in the following order:

1. Memory tests.

2. Read-only tests: DK and DR disks, MK tapes, DV diskettes.
3. Console loopback tests if lb argument is specified: COM2 serial port and parallel port.
4. VGA console tests: These tests are run only if the console environment variable is set to "serial." The VGA console test displays rows of the letter "H."
5. Network external loopback tests for EW: This test is run if a Digital Ethernet controller (EW) is present. The test requires that the Ethernet port be terminated or connected to a live network or the test fails.

Note

By default, no write tests are performed on diskette and tape drives. Media must be installed to test the diskette drive and tape drives.

The following is an example of the TEST command display:

```
>>> TEST
Requires diskette and loopback connectors on COM2 and
parallel port
type kill_diags to halt testing
type show_status to display testing progress
type cat el to redisplay recent errors
Testing COM2 port
Setting up network test, this will take about 20 seconds
Testing the network
     128 Meg of System Memory
     Bank 0 = 64 Mbytes(16 MB Per Simm) Starting at 0x00000000
     Bank 1 = 64 Mbytes(16 MB Per Simm) Starting at 0x02000000
     Bank 2 = No Memory Detected
     Bank 3 = No Memory Detected

Testing the memory
Testing parallel port
Testing the SCSI Disks
Non-destructive Test of the Floppy started
serial port not used as main console - VGA test bypassed
Printer offline
file open failed for para
```

6.2.4 The KILL and KILL_DIAGS Commands

The KILL and KILL_DIAGS commands terminate diagnostics that are executing currently. The KILL command terminates a specified process. The KILL_DIAGS command terminates all diagnostics.

6.2.5 The SHOW_STATUS Command

The SHOW_STATUS command reports one line of information per executing diagnostic. Many of the diagnostic tests are run in the background and provide information only if an error occurs. Use the SHOW_STATUS command to display the progress of the diagnostics.

6.3 Power Problems

Table 6–3 describes how to troubleshoot the server processor when there is no power at the server processor enclosure.

Table 6–3 Troubleshooting Power Problems

Symptom	Action
No ac power.	Check the following: • Check the power source and power cord. • If there are two power supplies, make sure that both power supplies are plugged in.
AC power is present, but the server processor does not power on.	Check the following: • Check the On/Off switch on the OCP. • Check that the ambient room temperature is within environmental specifications (10˚40ºC, 50˚140ºF). • Check that cable connectors on the server processor's board are properly connected. • Check that the internal power supply cables are plugged in at the right place on both the power supply and system backplane. • Check the power supply fuse and replace it, if necessary.

6.4 Console Problems

Table 6–4 describes how to troubleshoot the system when, at startup, the console terminal does not display the startup screen, or the startup screen displays error messages.

Table 6–4 Troubleshooting Console Problems

Symptom	Action
The startup screen is not displayed.	Check the following: • The keyboard and monitor are properly connected and power is on. If the startup screen is not displayed, yet the system enters console mode when you press the Return key, check that the console environment variable is set correctly. If you are using a VGA console terminal, the variable should be set to "graphics." If you are using a serial terminal, the variable should be set to "serial." If console is set to "serial," the startup screen is routed to the COM1 serial communication port and cannot be viewed from the VGA monitor. Try connecting a console terminal to the COM1 serial communication port. If necessary, use a 9-pin connector. • Check the baud rate setting for the console terminal and system. The system baud rate setting is 9600. • When using the COM1 serial port, set the console environment variable to "serial." If you have verified that there are no monitor or terminal problems, the problem could be with the firmware. Refer to Section 6.16.
The startup screen displays error messages.	Check the following: • If startup screens or the console event log indicate problems with mass storage devices, or if storage devices are missing from the SHOW CONFIG display, use the troubleshooting tables in Section 6.7. • If startup screens or the console event log indicate problems with EISA or PCI devices, or if EISA or PCI devices are missing from the SHOW CONFIG display, use the troubleshooting table in Section 6.8 to determine the problem.

6.5 Boot Problems

Table 6–5 describes how to troubleshoot problems that occur while the system is booting operating system software.

Table 6–5 Troubleshooting Boot Problems

Symptom	Action
The system cannot find the boot device.	Check the following: • Verify that your system recognizes the boot device, using the SHOW DEVICE command. • Check that the boot device environment variable correctly identifies the boot device. Use the SHOW BOOTDEF_DEV command to display the boot device.
The system does not boot.	Check that the Halt switch is set to the Off position. Verify that you have not installed an unsupported graphics module or another type of unsupported adapter. Run the TEST command. Refer to Table 6–4.
There is a software problem or the operating system is not installed correctly.	Refer to your operating system software information. Verify that you have the correct firmware revision for your system.

6.6 Operating System Problems

Table 6–6 describes possible operating system problems and their solutions.

Table 6–6 Troubleshooting Problems Detected by the Operating System

Symptom	Action
The system is hung or has crashed.	Examine the crash dump file. Refer to the *OpenVMS Alpha System Dump Analyzer Utility Manual* for information on how to interpret OpenVMS crash dump files.
No startup display.	The console environment is set to "serial;" thus, the startup screen is routed to the COM1 serial communication port and cannot be viewed from the VGA monitor. If you are using a VGA monitor, set the console environment variable to "graphics." (Use the SET CONSOLE GRAPHICS command).
The operating system is up.	Have your service provider examine the operating system error log files to isolate the problem. If the problem occurs intermittently, have your service provider run an operating system exerciser, such as DEC VET, to stress the system.

6.7 Storage Problems

Mass storage device problems at startup usually are indicated by read fail messages. Problems also are indicated by storage devices missing from the SHOW CONFIG display. Use the following tables to diagnose the likely causes of the problem.

Table 6–7 provides information for troubleshooting fixed-media mass storage problems indicated at startup. Table 6–8 provides information for troubleshooting removable-media storage problems indicated at startup.

Table 6–7 Troubleshooting Fixed-Media Problems

Symptom	Problem	Action
The fault indicator light for the drive is ON (amber). Drives with duplicate SCSI IDs are missing from the SHOW CONFIG display.	The drive has failed.	Replace the drive.
	Duplicate SCSI IDs (when removable-media bus is extended to shelf).	Correct removable-media SCSI device IDs.
Valid drives are missing from the SHOW CONFIG display. One drive may appear seven times on the configuration screen display.	SCSI ID is set to 7 (reserved for host ID).	Correct SCSI IDs.
The SCSI ID of the drive is not unique or the SCSI drive cables are connected incorrectly.	You cannot access the software or data on the drive.	See Chapter 5 for information on displaying the SCSI device configuration. If the device is not listed in the display, check the SCSI cabling and the drive's SCSI ID.
The SCSI drive is faulty.	You cannot access the software or the data on the drive.	Contact your service representative.

Table 6–8 lists suggestions for troubleshooting removable-media mass storage problems at startup or when storage devices are missing from the SHOW CONFIG display.

Table 6–8 Troubleshooting Removable Media Problems

Problem	Symptom	Action
Drive failure. Duplicate SCSI IDs.	Drive fault indicator is on. Drives with duplicate SCSI IDs are missing from the SHOW CONFIG display.	Do one of the following: • Replace the drive. • Correct removable-media SCSI IDs.
SCSI ID is set to 7 (reserved for host ID).	Valid drives are missing from the SHOW CONFIG display. One drive may appear seven times on the configuration display.	Correct SCSI IDs.
Duplicate host IDs on a shared bus.	Valid drives are missing from the SHOW CONFIG display. One drive may appear seven times on the configuration display.	Change host ID using the SET PK*0_ HOST_ID command.
Faulty cable termination. Missing or loose cables.	Activity indicators do not come on. Drive is missing from the SHOW CONFIG display.	Check cable termination. Remove the device and inspect the cable connections.

6.8 Option Card Problems

Option card problems can include problems related to network options, EISA/ISA bus options, and PCI options.

6.9 Network Problems

Network problems can vary depending on the type of network option card that you have installed. See the option card documentation for information on troubleshooting network problems. Make sure you have set the network type correctly for the network interface card.

6.10 EISA Bus Problems

EISA bus problems at startup usually are indicated by the following display during startup:

```
EISA Configuration Error. Run the EISA Configuration
Utility.
```

Run the EISA Configuration Utility (ECU) if this message displays. Table 6–9 describes the steps for troubleshooting EISA problems.

Table 6–9 Troubleshooting EISA Bus Problems

Step	Action
1	Check that the EISA card and any cabling are properly seated.
2	Run the ECU as described in Section 5.4 to: • Confirm that the system has been configured with the most recently installed controller. • See what the hardware jumper and switch settings should be for each EISA controller. • See what the software setting should be for each EISA controller. • See if the ECU deactivated (< >) any controllers to prevent conflict. • See if any controllers are locked, which limits the ECU's ability to change resource assignments.
3	Confirm that hardware jumpers and switches on EISA controllers reflect the settings indicated by the ECU. Start with the last EISA module installed.
4	Check for a bad slot by moving the last installed controller to a different slot.
5	Call your service representative for help.

6.11 PCI Bus Problems

PCI bus problems at startup usually are indicated by the inability of the system to detect the PCI device. Use Table 6–10 to diagnose the likely cause of the problem.

Table 6–10 Troubleshooting PCI Bus Problems

Step	Action
1	Confirm that the PCI bus module and any cabling are properly seated.
2	Confirm that the system has been configured with the most recently installed PCI bus module.
3	See what the software setting should be for each PCI bus module.
4	Check for a bad slot by moving the last installed PCI bus module to a different slot.
5	Call the option manufacturer or your service representative for help.

6.12 Monitor and Terminal Problems

If the system starts up but has no startup display when you turn on the system, refer to Table 6–11.

Table 6–11 Troubleshooting Monitor and Terminal Problems

Possible Cause	Action
The monitor or terminal is not turned on.	Check that the monitor or terminal is turned on. Make sure that all cables are connected at both ends.
The monitor or terminal brightness and contrast controls are set incorrectly.	Adjust the monitor or terminal contrast and brightness controls.
The terminal cable is not connected to the correct serial port.	Check the serial port to which the terminal cable is connected. Make sure that it is connected to the left-hand serial port.
If you are using a console terminal, check the baud rate setting for the terminal and system. The system default baud rate setting is 9600.	Connect the console terminal to the COM1 serial communication port and set the console environment variable to serial (SET CONSOLE SERIAL command).
The power cord is not connected. The power cord may be faulty. The power cord socket may not be working.	Make sure that all the power cords are connected correctly at both ends. Try a power cord that works or test the power socket with an appliance that works.
The terminal or monitor fuse may have blown.	Replace the blown terminal or monitor fuse. Refer to the terminal or monitor documentation.
The port to which the terminal or monitor connects may not be the correct one.	Ensure that your monitor cable is plugged into the correct graphics port if you have an optional graphics card installed.
The port to which the terminal or monitor connects may be faulty.	You should plug the cable into the connector of your option card, not the connector on the system board. Try connecting the terminal or monitor to another system using the same terminal or monitor cable. If the terminal or monitor works, the port to which the terminal or monitor is connected is faulty. Contact your service representative.

6.13 Keyboard and Mouse Problems

Table 6–12 lists problems that can occur with the keyboard or mouse.

Table 6–12 Troubleshooting Keyboard and Mouse Problems

Symptom	Possible Cause	Action
The monitor does not display the character that you type.	The keyboard cable is incorrectly connected. The keyboard has failed.	Make sure that the keyboard cable is connected correctly in the keyboard connector. Replace the keyboard. If the problem persists, contact your Digital service representative.
The monitor displays a message indicating a keyboard error.	The keyboard is not connected correctly.	Make sure that the keyboard is connected to the keyboard port.
The mouse pointer is displayed on the monitor, but does not move correctly.	The mouse is connected incorrectly. The mouse ball is dirty.	Make sure that the mouse cable is connected correctly in the mouse connector. Remove the ball from the mouse and clean it in a lukewarm, mild-soap solution. Dry the ball and replace it in the mouse.
The mouse pointer does not show on the monitor.	The mouse is connected incorrectly or the mouse cable is loose. The system is in console mode. The mouse is faulty.	Make sure that the mouse cable is connected correctly in the mouse connector. The mouse pointer is displayed only when the operating system is running. Boot the operating system. Replace the mouse.

6.14 Printer Problems

Verify that the printer is correctly cabled to the server processor parallel port. Refer to the printer's documentation, if necessary.

6.15 Overheating Problems

The server processor contains internal sensors that monitor system and power supply temperature and shut down the system if maximum temperature limits are exceeded. If the server processor shuts down unexpectedly, verify that the ambient temperature does not exceed the limits specified in Table 6–3.

Refer to Table 6–3 to troubleshoot power supply problems and fan failure.

6.16 Using the Fail-Safe Loader

The fail-safe loader (FSL) allows you to boot an Update Utility diskette to try to repair corrupted console files that reside within the FlashROMs on the system board. Use the FSL only when a failure at startup prevents you from accessing the console mode.

6.17 Using the Update Utility

If a checksum error is detected when loading the console at startup, the system automatically loads the Update Utility from diskette into memory.

To activate the fail-safe loader, do the following:

1. Turn off the server processor.
2. Install the Update Utility diskette in the diskette drive.
3. Remove the rear top cover (see Section 4.6).
4. Enable the fail-safe loader by moving the jumper on the CPU card to the position nearest the system board.
5. Replace the rear top cover.
6. Turn on the server processor and confirm the update by entering the following:

```
>>> SHOW VERSION
```

7. Turn off the server processor.
8. Remove the rear top cover.
9. Disable the fail-safe loader and set the SROM jumpers to their normal operating position.
10. Replace the rear top cover.

A

Quick Reference

This chapter contains the following reference information:

- Messages
- Hardware overview
- Indicator lights
- System board jumper settings
- SCSI ID settings
- Specifications
- Server processor interconnect diagrams

A.1 Messages

The server processor maintains a console event log consisting of status messages received during startup testing. If problems occur during startup, standard error messages may be embedded in the console event log. To display the messages in the console event log, use the cat el command.

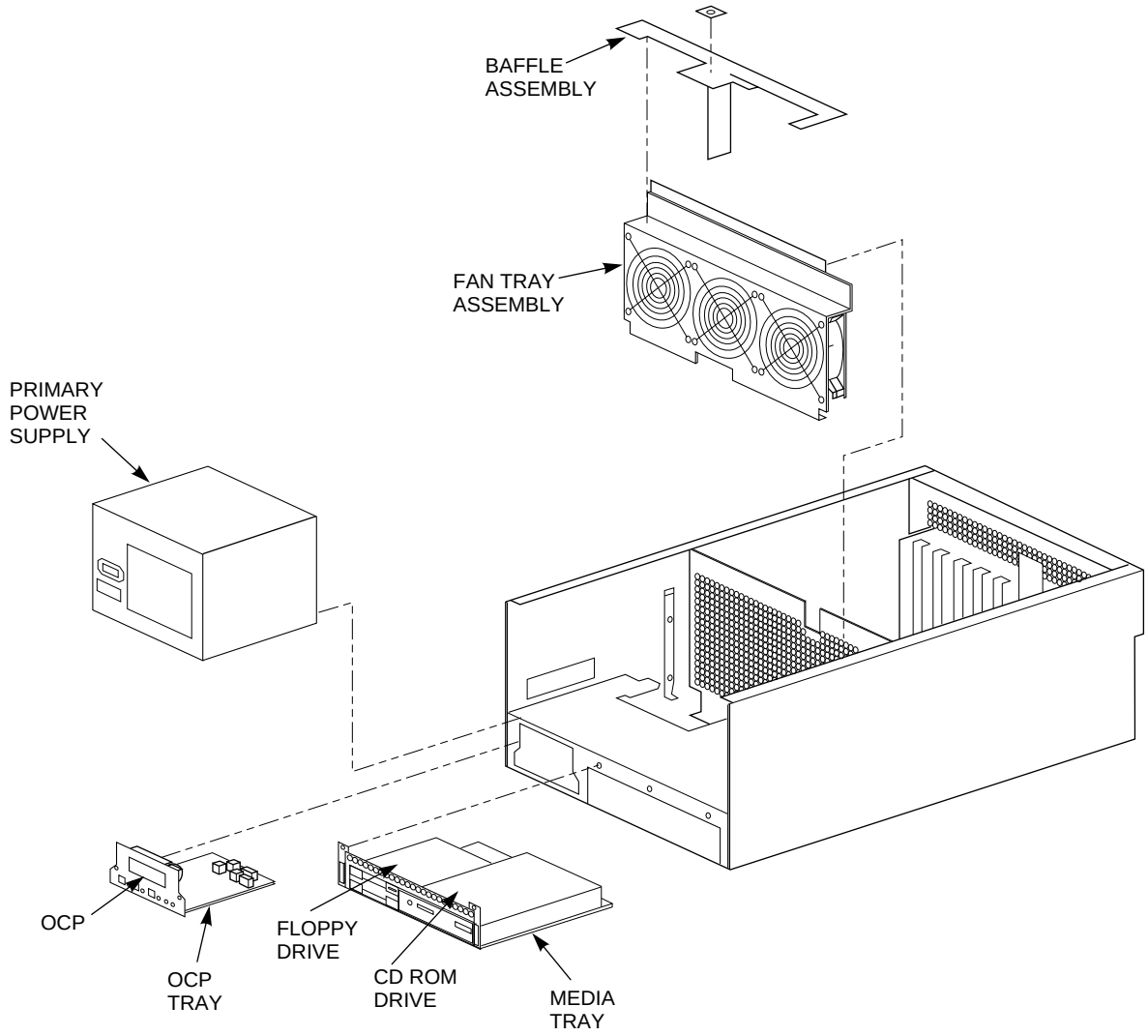
A.2 Hardware Overview

This section includes front, rear, and top views of the server processor.

A.2.1 Server Processor Front View

Figure A–1 is a view of the front of the server processor.

Figure A–1 Server Processor Front View—Exploded



A.2.2 Server Processor Rear View

Figure A–2 and Figure A–3 are views of the rear of the server processor.

Figure A–2 Server Processor Rear View—Exploded

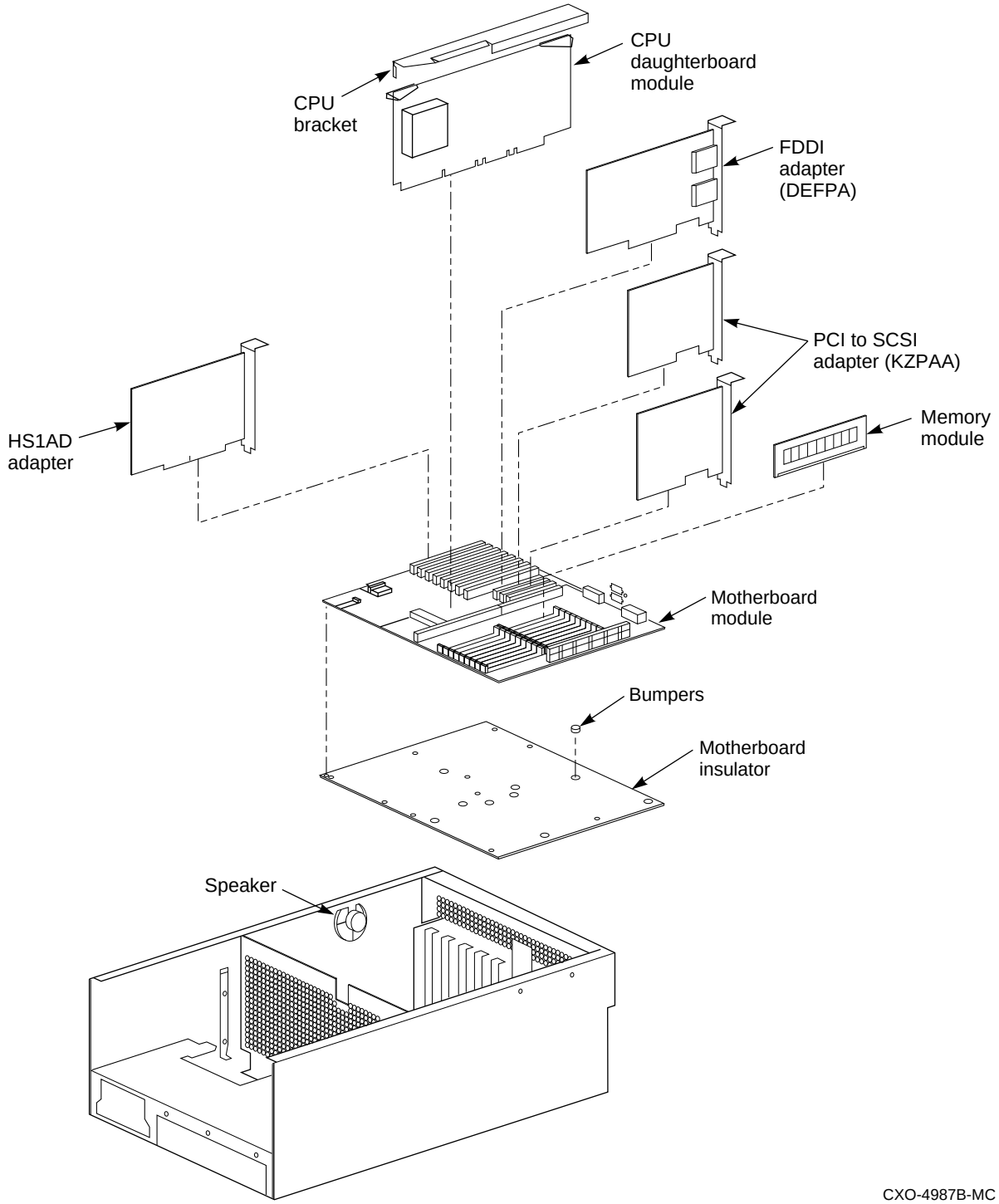
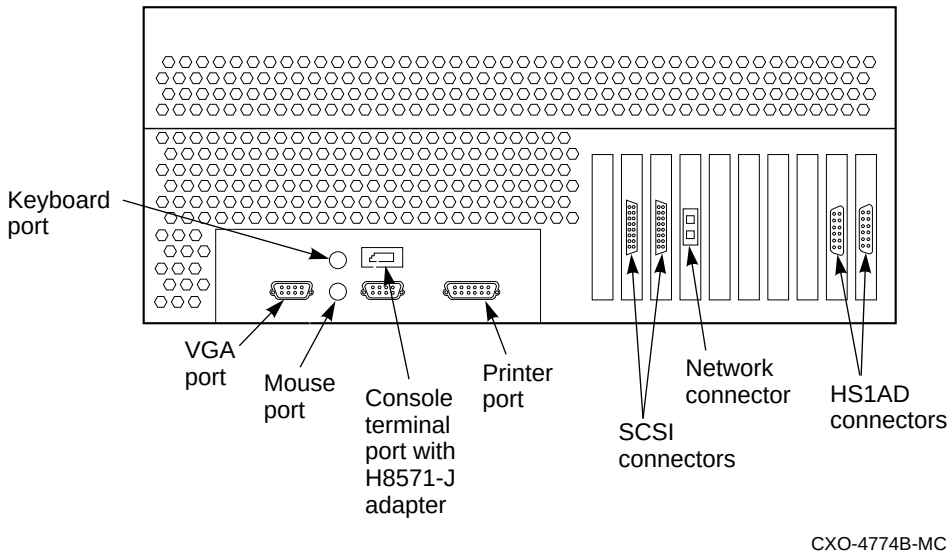


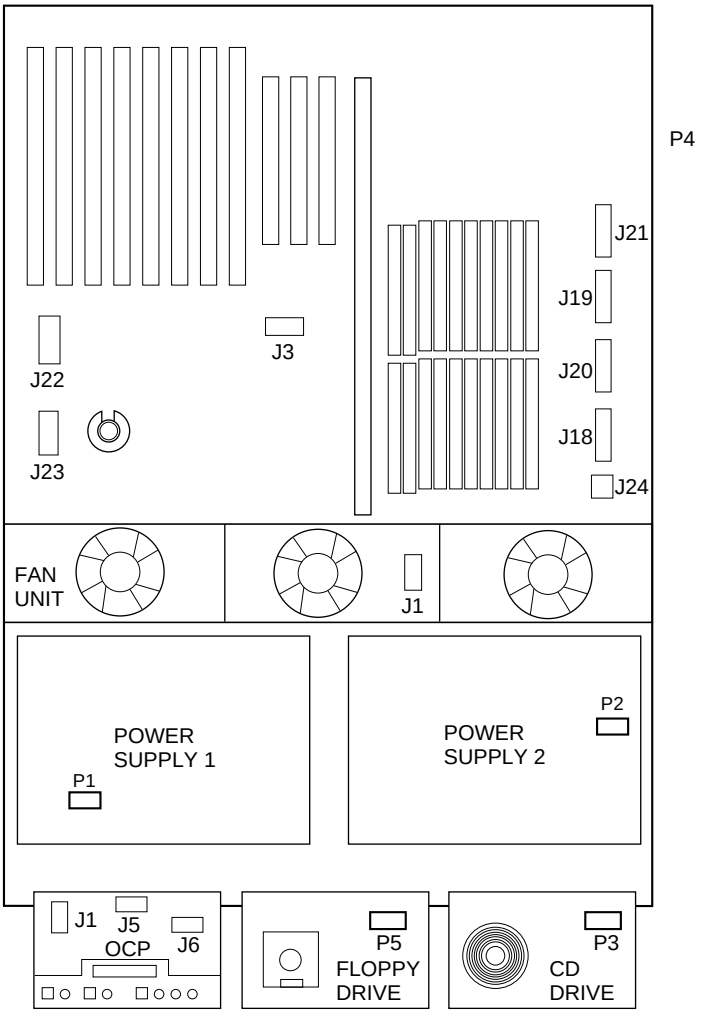
Figure A–3 Server Processor—Rear View



A.2.3 Server Processor Top View

Figure A–4 is a top view of the server processor.

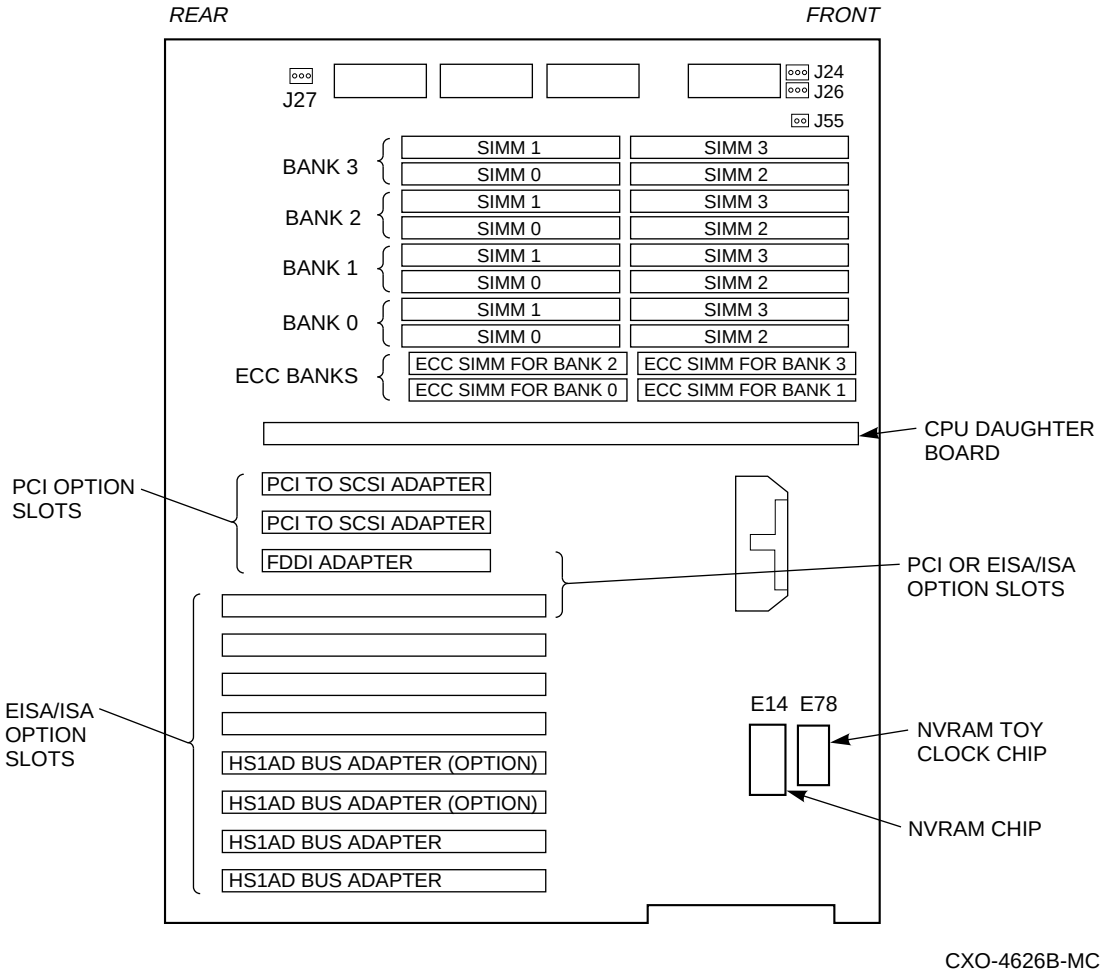
Figure A–4 Server Processor—Top View



A.2.4 Server Processor Board Connectors, Chips, Slots, and Jumpers

Figure A–5 is a view of the server processor board connectors, chips, slots, and jumpers.

Figure A–5 Motherboard Layout



A.2.5 Port Pinouts

This section describes pin functions for port connectors on the rear of the system.

A.2.5.1 VGA Port Connector

The VGA port provides an interface to a VGA terminal. Table A–1 lists pin assignments for the VGA port.

Table A–1 VGA Port Pinouts

Pin	Signal	Function
1	Red	Red color driver
2	Green	Green color driver
3	Blue	Blue color driver
4	NC	Not connected
5	GNDB	Video ground
6	GNDB	Video ground
7	GNDB	Video ground
8	GNDB	Video ground
9	NC	Not connected
10	GNDB	Video ground
11	NC	Not connected
12	NC	Not connected
13	HSYNC	Horizontal synch
14	VSYNC	Vertical synch
15	NC	Not connected

A.2.5.2 Parallel Port Connector

The parallel port provides an interface to a printer or other parallel devices. Table A–2 lists pin assignments for the parallel port. An asterisk (*) after a signal name indicates an active low signal.

Table A–2 Parallel Port Pinouts

Pin	Signal	Function
1	STB–R*	Strobe
2	PRTD0	Printer data bit 0
3	PRTD1	Printer data bit 1
4	PRTD2	Printer data bit 2
5	PRTD3	Printer data bit 3
6	PRTD4	Printer data bit 4
7	PRTD5	Printer data bit 5
8	PRTD6	Printer data bit 6
9	PRTD7	Printer data bit 7
10	ACK*	Acknowledge
11	BUSY	Busy
12	PE	Paper end
13	SLCT	Select
14	AUTOFDXT*	Autofeed
15	ERR*	Error
16	INIT*	Initialize printer
17	SLCTIN*	Select input
18 to 25	CHAS	Chassis ground

A.2.5.3 Serial Port Connectors

The serial port connectors consist of two 9-pin D-submini connectors. Table A–3 lists their pin assignments.

Table A–3 Serial Port Pinouts

Pin	Signal	Function
1	DCD	Data carrier detect
2	RXD	Receive data
3	TXD	Transmit data
4	DTR	Data terminal ready
5	GND	Ground
6	DSR	Data set ready
7	RTS	Request to send
8	CTS	Clear to send
9	RI	Ring indicator

A.2.5.4 Keyboard and Mouse Port Connectors

The keyboard and mouse connectors consist of two 6-pin mini-DIN connectors. Table A–4 lists their pin assignments.

Table A–4 Keyboard and Mouse Port Pinouts

Pin	Signal
1	Data
2	Reserved
3	Ground
4	+5 V dc (fused)
5	Clock
6	Reserved

A.3 Indicator Lights

Table A–5 describes system indicator lights and their function.

Table A–5 Indicator Lights

Indicator Light	Function
On/Off indicator (green)	Lights when the system unit is turned on.
Diskette drive activity indicator (green)	Lights when the system is accessing the diskette drive.
CD–ROM drive activity indicator (green)	Lights when the system is accessing the CD–ROM drive.
Disk Drive (green)	Blinks when reading or writing to disk.
Disk Drive (amber)	Lights when there is a problem with the disk.

A.4 System Board Jumper Settings

Table A–6 lists the default jumper settings for the system board. Figure A–6 shows the jumper locations on the system board.

Table A–6 System Board Default Jumper Settings

Number	Name	Description and Default
J49	SCSI terminator	Enables the on-board SCSI terminators. The system specification requires that the SCSI bus be terminated at both ends. Enabled.
J52	Temperature shutdown	Allows the temperature chips to shut down the system in an orderly sequence. Enabled.
J50	FROM VPP enable	Connects 12 volts from the power supply to the VPP pins of the Flash ROMs. Enabled.
J27	VGA enable	Enables the on-board VGA logic. Enabled. Set to the disabled position (pins 2 and 3) when using a graphics option card.
J53	Fan shut down	Allows the software to shut down the system in an orderly sequence. Enabled.
J56	Fan fault	Allows the hardware to detect a fan fault and shut down the system in an orderly sequence. Enabled. Set to disable if testing the system board or CPU card outside of the enclosure.
J55	Small fan	Allows small fan to be disabled if not used. Jumper installed. Disabled.

Figure A–6 System Board Jumper Locations

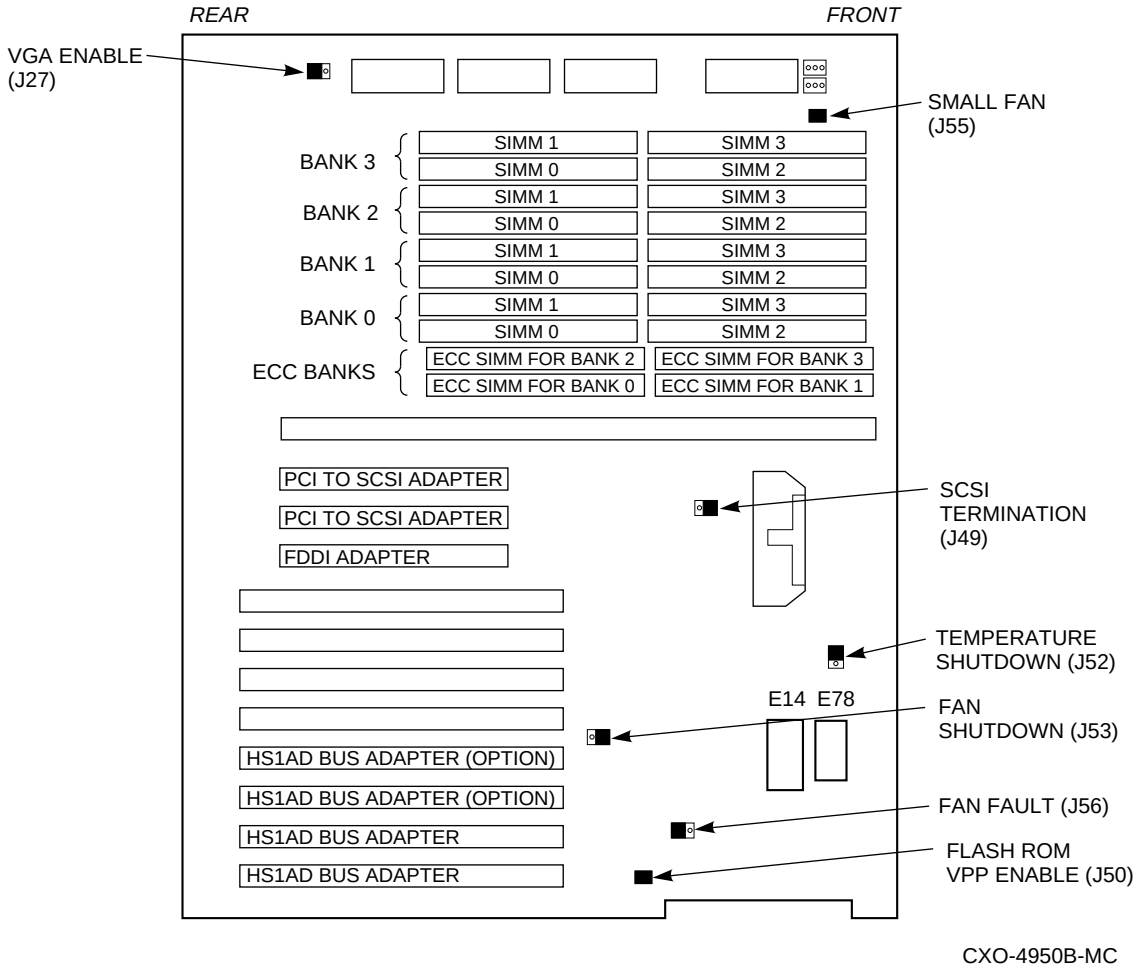
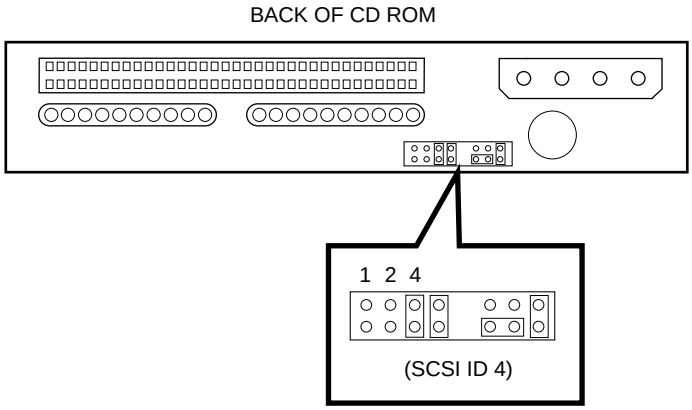


Figure A–7 shows jumper locations for the CD–ROM drive.

Figure A–7 CD–ROM Jumper Locations



A.5 SCSI ID Settings

The system backplane can be configured as a single SCSI bus, a single SCSI bus with a jumper cable, a dual SCSI bus, or a triple SCSI bus arrangement. For each configuration, the CD–ROM drive and hard drive IDs are manually set at addresses 4 and 5, respectively.

A.6 Specifications

Table A–7 System Specifications

Attributes	Specification
Motherboard RAM	Expandable up to 512 MB

Table A–8 System Dimensions

Dimension	Specification
Width	800mm (31.5 in.)
Height	1700mm (67.9 in.)
Depth	872.5mm (34.4 in)
HS211 weight (without devices)	310kg (685 lbs.)
HS221 weight (without devices)	355kg (780 lbs.)
HS241 weight (without devices)	370kg (820 lbs.)

Table A–9 System Environmental Specifications

Condition	Specification
Temperature	The room temperature must be between 10º C and 40º C (50º F and 104º F).
Humidity	The relative humidity must be between 10% and 90% (20% to 80% with removable media options).
Air Circulation	Minimum clearance of 8cm (3 in.) front and rear.

Table A–10 Power Supply Ratings

Specification	Range
Voltage	100-120/220-240 volts AC
Frequency	50-60 Hz
Current	8.5/4.0 amperes (two power cords)

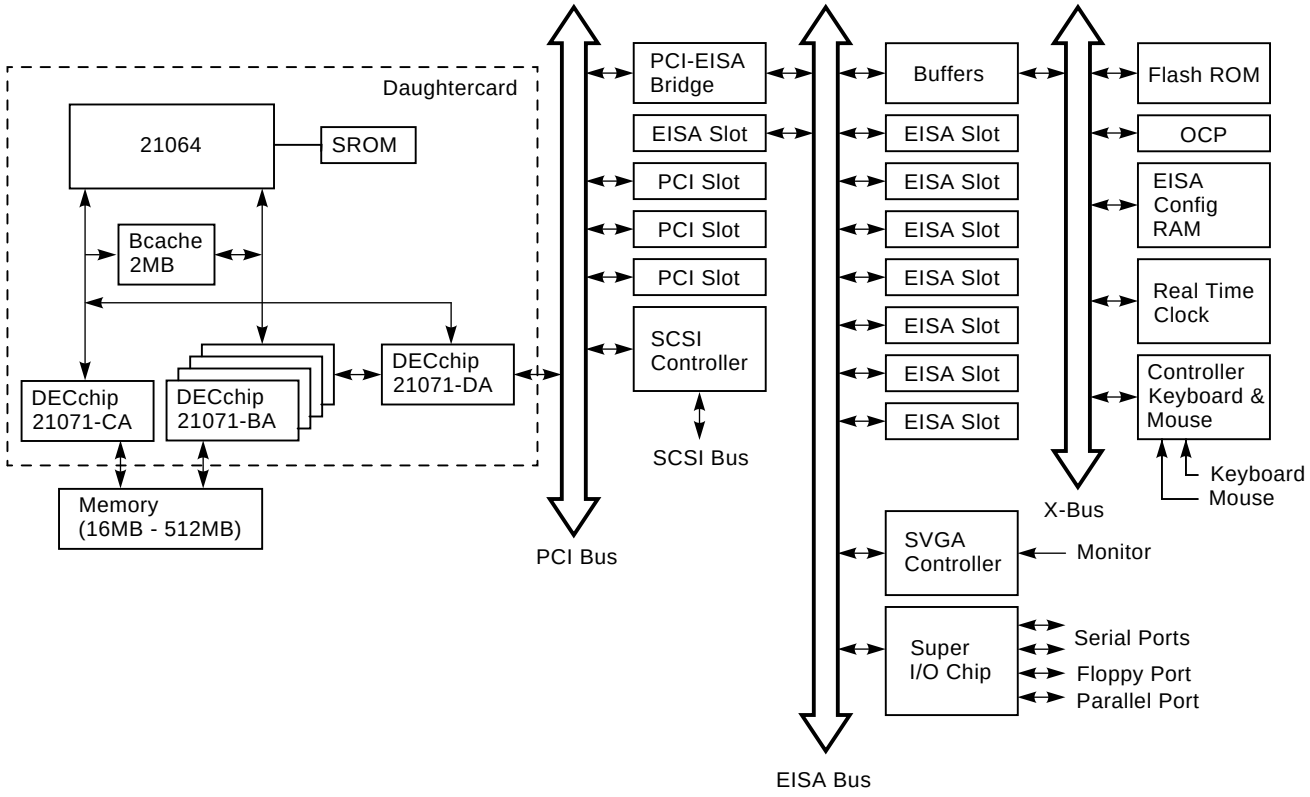
Note

These are the maximum ratings with a fully loaded system enclosure. These ratings do not include those for a monitor or terminal.

A.7 Server Processor Architecture

Figure A–8 illustrates the server processor architecture.

Figure A–8 Server Processor Architecture



A.8 Server Processor Interconnect Diagrams

This section includes server processor interconnection diagrams for cabling interconnection, SCSI interconnection, fan power interconnection, and power distribution interconnection.

A.8.1 Server Processor Cabling Interconnection

Figure A–9 illustrates cable connection in the server processor. Figure A–10 illustrates cable routing in the server processor.

Figure A–9 Server Processor Cable Connection Diagram

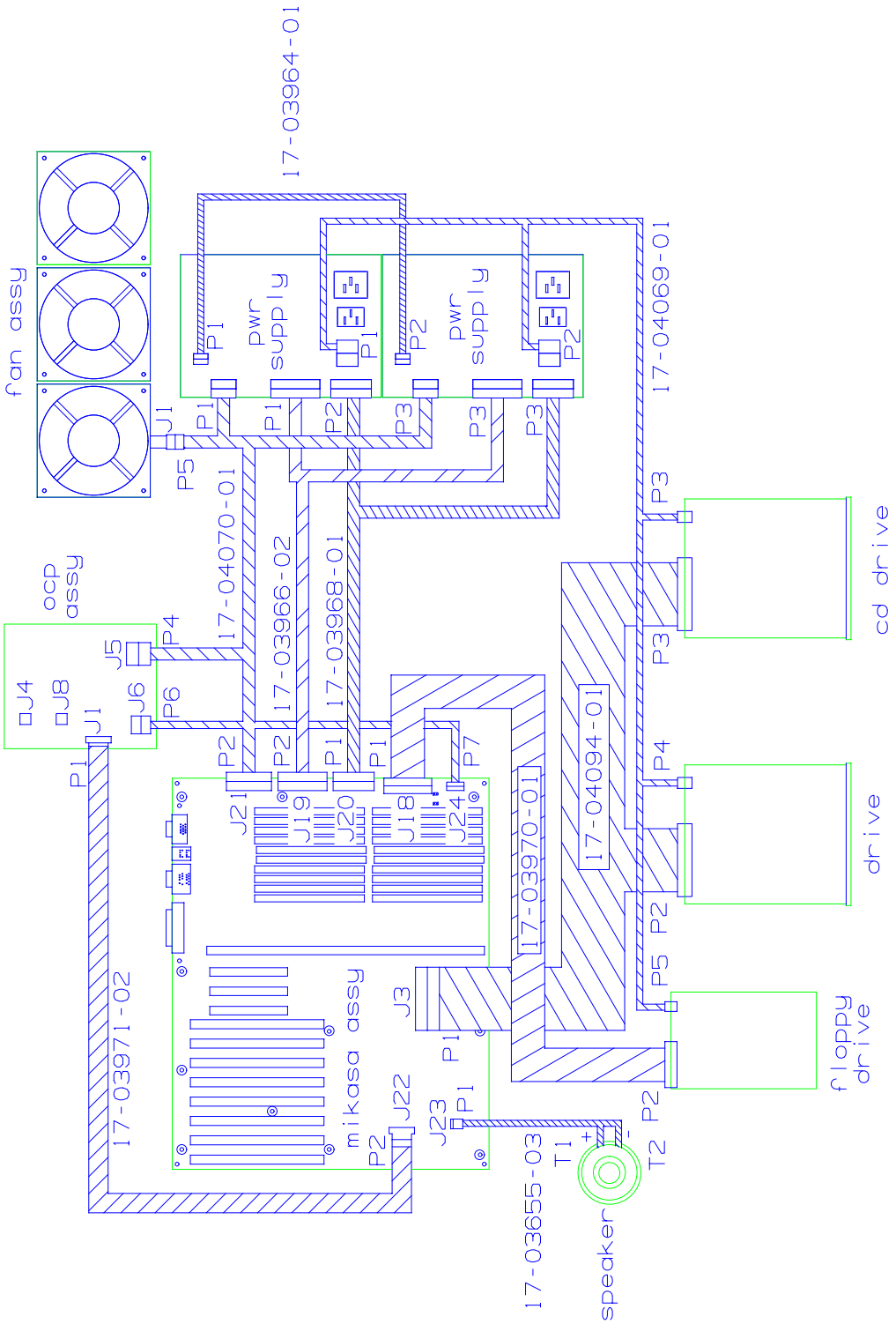
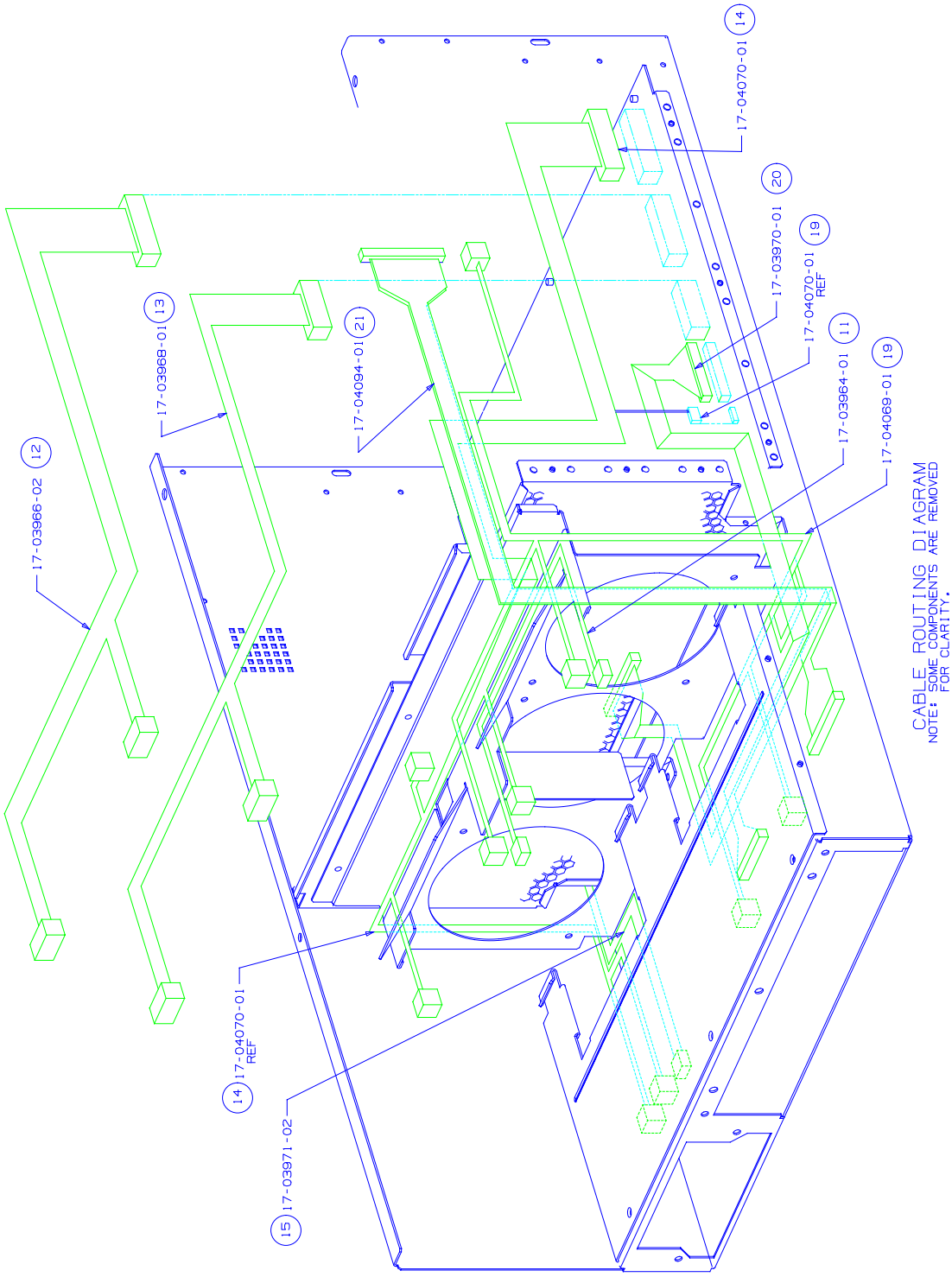


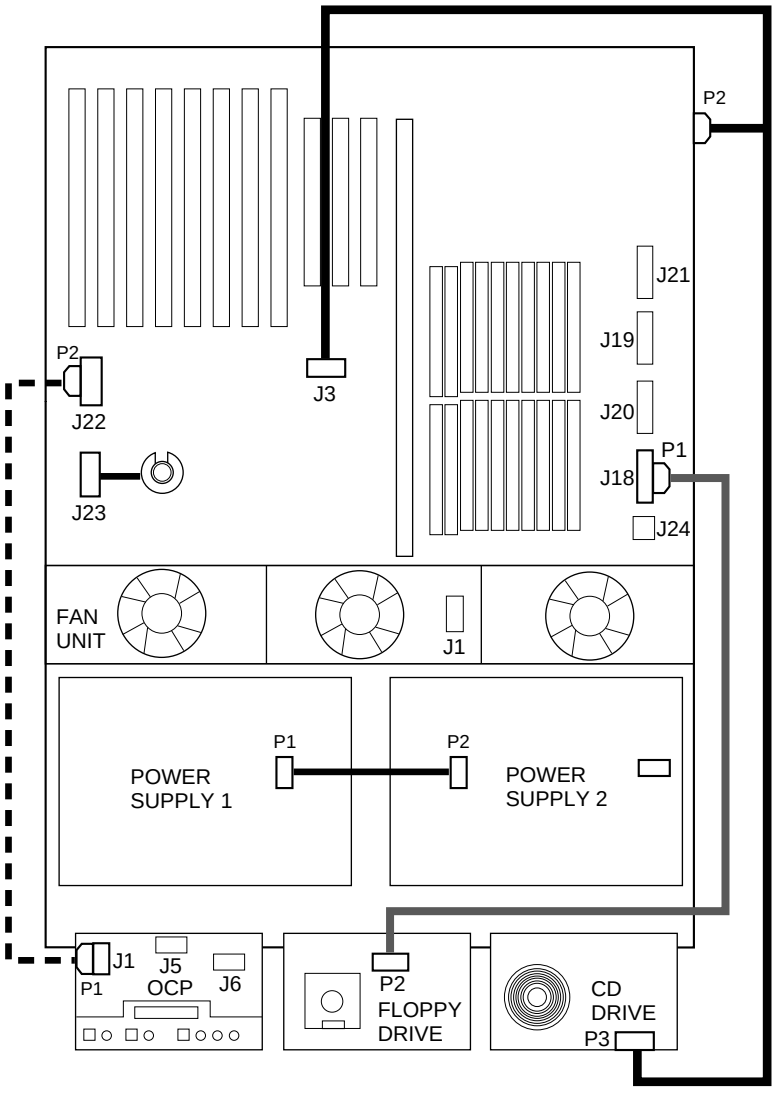
Figure A–10 Server Processor Cable Routing Diagram



A.8.2 SCSI Interconnection

Figure A–11 illustrates SCSI system interconnection. The SCSI interconnection is from J3 to P2 to P3.

Figure A–11 SCSI System Interconnection Diagram

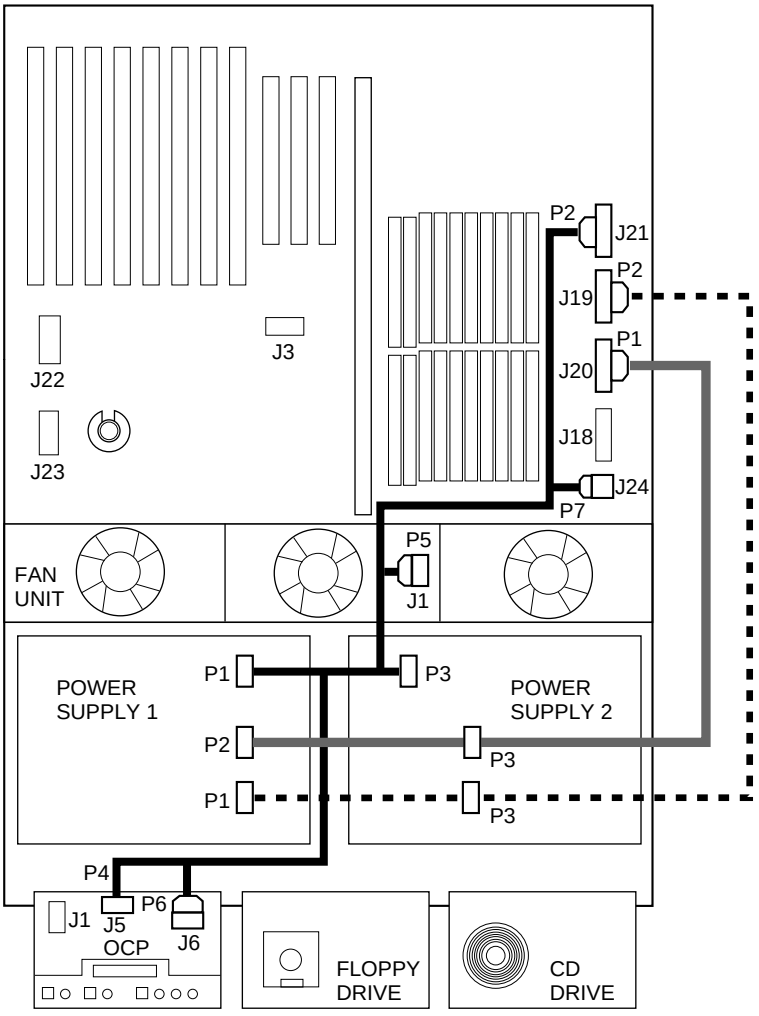


CXO-4812B-MC

A.8.3 Fan Power Interconnection

Figure A–12 illustrates fan power system interconnection.

Figure A–12 Fan Power System Interconnect Diagram

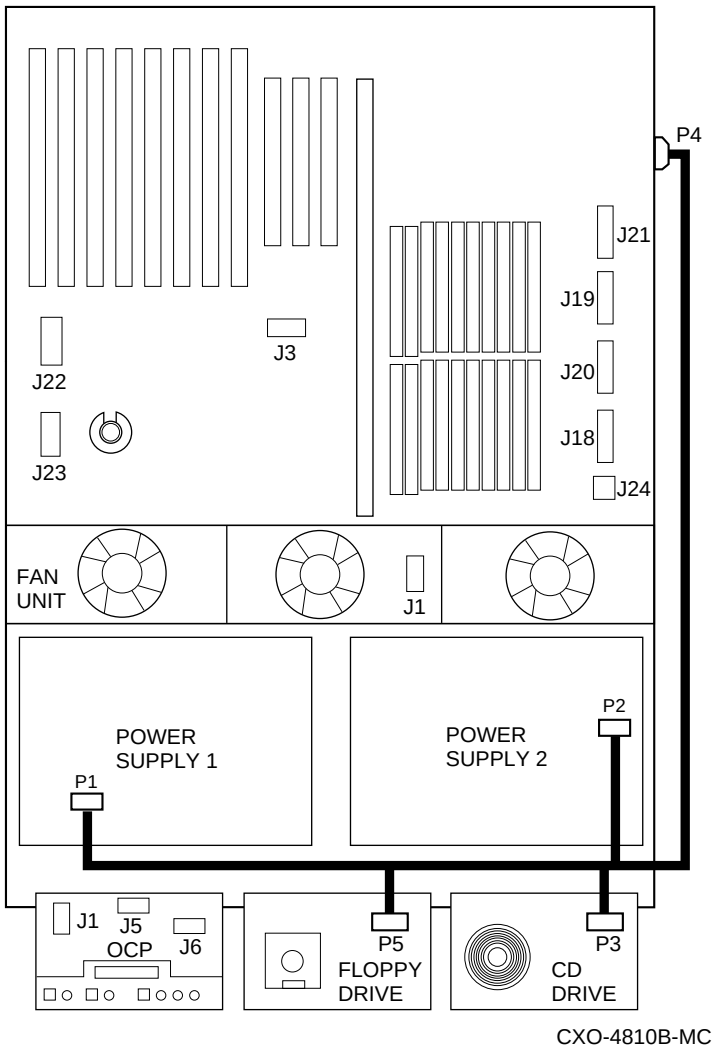


CXO-4811B-MC

A.8.4 Power Distribution Interconnection

Figure A–13 illustrates power distribution system interconnection:

Figure A–13 Power Distribution System Interconnect Diagram



Glossary of Terms

AlphaServer

Digital's new generation of server systems based on the Alpha 64-bit computing architecture.

ARC

Advanced RISC Computing. A user interface to the console firmware for operating systems that expect firmware compliance with the Windows NT Portable Boot Loader Specification.

backplane

The main board or panel that connects all of the modules in a computer system.

boot device

The device from which the system bootstrap software is acquired.

boot or bootstrap

The process of loading an operating system into memory.

bus

A collection of many transmission lines or wires. The bus interconnects computer system components, providing a communications path for addresses, data, and control information or external terminals and systems in a communications network.

byte

A group of eight contiguous bits starting on an addressable byte boundary. The bits are numbered right to left, 0 through 7.

CD–ROM

A read-only compact disc. The optical removable media used in a compact disc reader.

central processing unit (CPU)

The unit of the computer that is responsible for interpreting and executing instructions.

console mode

The state in which the system and the console terminal operate under the control of the console program.

console program

The code that firmware executes during console mode.

console subsystem

The subsystem that provides the user interface for a computer system when the operating system is not running.

console terminal

The terminal connected to the console subsystem. It is used to start the system and direct activities between the user and the computer system.

DAS

Dual Attachment Station. An FDDI station that offers two attachments to the FDDI network.

DEC VET

Digital Verifier and Exerciser Tool. A multipurpose system diagnostic tool that performs exerciser-oriented maintenance testing.

DECchip 21064 processor

The CMOS, single-chip processor based on the Alpha architecture and used on many AlphaGeneration computers.

diagnostic program

A program that is used to find and correct problems with a computer system.

direct memory access (DMA)

Access to memory by an I/O device that does not require processor intervention.

ECC

Error Correction Code. Code and algorithms used by logic to facilitate error detection and correction.

EISA bus

Extended Industry Standard Architecture bus. A 32-bit industry-standard I/O bus used primarily in high-end PCs and servers.

EISA Configuration Utility (ECU)

A feature of the EISA bus that helps you select a conflict-free system configuration and perform other system services. The ECU must be run whenever you change, add, or remove an EISA or ISA controller.

electrostatic discharge

See ESD.

environment variables

Global data structures that can be accessed from console mode. The setting of these data structures determines how a system powers up, boots the operating system, and operates.

ESD

Electrostatic discharge. The discharge of potentially harmful static electric voltage as a result of improper grounding.

Ethernet

IEEE 802.3 standard local area network (LAN).

fail-safe loader (FSL)

A program that allows users to power up without initiating drivers or running startup diagnostics. From the fail-safe loader users can perform limited console functions.

Fast SCSI

An optional mode of SCSI–2 that allows transmission rates of up to 10 megabytes per second.

FDDI

A set of ANSI standards that, when taken together, define a 100 mb/s, timed-token passing protocol, LAN that uses fiber optic cable as the transmission medium. The standards define Physical Layer Medium Dependent (PMD), Physical Layer (PHY), Media Access Control (MAC), and Station Management (SMT) entities.

firmware

Software code stored in hardware.

Flash ROM

Flash-erasable programmable read-only memory. Flash ROMs can be bank- or bulk-erased.

halt

The action of transferring control of the computer system to the console program.

ISA

Industry Standard Architecture. An 8-bit or 16-bit industry-standard I/O bus, widely used in personal computer products. The EISA bus is a superset of the ISA bus.

LAN

Local area network. A high-speed network that supports computers that are connected over limited distances.

LCD

The standard abbreviation for liquid crystal display.

LED

The standard abbreviation for light emitting diode.

loopback test

Internal and external tests that are used to isolate a failure by testing segments of a particular control or data path. A subset of ROM-based diagnostics.

mass storage device

An input/output device on which data is stored. Typical mass storage devices include disks, magnetic tapes, and CD–ROM.

NVRAM

Nonvolatile random-access memory. Memory that retains its information in the absence of power.

OCP

See operator control panel.

OpenVMS Alpha operating system

A general-purpose multiuser operating system that supports AlphaGeneration computers in both production and development environments. OpenVMS Alpha software supports industry standards, facilitating application portability and interoperability.

operating system mode

The state in which the system console terminal is under the control of the operating system. Also called program mode.

operator control panel

The panel located behind the front door of the system which contains the startup/diagnostic display, DC On/Off switch, Halt switch, and Reset switch.

PCI

Peripheral Component Interconnect. An industry-standard expansion I/O bus that is the preferred bus for high- performance I/O options. Available in a 32-bit and a 64- bit version.

PCI-to-EISA bridge

The capability to transfer commonly available EISA and ISA options to the PCI bus.

power-up

The sequence of events that starts the flow of electricity to a system or its components.

RAID

Redundant array of inexpensive disks. technique that organizes disk data to improve performance and reliability. RAID has three attributes: It is a set of physical disks viewed by the user as a single logical device. The user's data is distributed across the physical set of drives in a defined manner. Redundant disk capacity is added so that the user's data can be recovered even if a drive fails.

redundant

Describes duplicate or extra computing components that protect a computing system from failure.

reliability

The probability that a device or system will not fail to perform its intended functions during a specified time

RISC

Reduced instruction set computer. A processor with an instruction set that is reduced in complexity.

ROM-based diagnostics

Diagnostic programs resident in read-only memory.

SAS

Single Attachment Station. An FDDI station that offers one attachment to the FDDI network.

SCSI

Small Computer System Interface. An ANSI-standard interface for connecting disks and other peripheral devices to computer systems. Some devices are supported under the SCSI–1 specification; others are supported under the SCSI–2 specification.

serial ROM

In the context of the CPU module, ROM read by the DECchip microprocessor after reset that contains low-level diagnostic and initialization routines.

SIMM

Single in-line memory module.

SRM

User interface to console firmware for operating systems that expect firmware compliance with the Alpha System Reference Manual (SRM).

StorageWorks

Digital's modular storage subsystem (MSS), which is the core technology of the Alpha SCSI–2 mass storage solution. Consists of a family of low-cost mass storage products that can be configured to meet current and future storage needs.

system board

The main circuit board of a computer. The motherboard contains the base electronics for the system (for example, base I/O, CPU, ROM, and console serial line unit) and has connectors where options (such as I/O and memories) can be plugged in.

system bus

The hardware structure that interconnects the CPUs and memory modules. Data processed by the CPU is transferred throughout the system via the system bus.

system disk

The device on which the operating system resides.

TOY NVRAM

Time of year NVRAM. *See also* NVRAM.

TP–PMD interface

Twisted pair—physical layer medium dependent interface. Allows the interface to operate over copper media with either shielded or unshielded twisted pair cable. The transmission distance between stations is limited to 100 meters.

twisted-pair cable

Cable made by twisting together two insulated conductors that have no common covering.

write-enabled

Describes a device onto which data can be written.

write-protected

Describes a device onto which data cannot be written.

Index