

# DIGITAL Server 7100R Series

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## Service Maintenance Manual

Part Number: ER-R5C5W-SM. A01

**Digital Equipment Corporation**

## **January 1998**

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**CAUTION:** Any changes or modifications to this device, which are not identified in this manual, could cause harmful interference and void the user's authority to operate this device.

This equipment is in the 1st Class category (information equipment to be used in commercial and/or industrial areas) and conforms to the standards set by the Voluntary Control Council For Interference by Data Processing Equipment and Electronic Office Machines aimed at preventing radio interference in commercial and/or industrial areas.

Consequently, when used in a residential area or in an adjacent area thereto, radio interference may be caused to radio and TV receivers, etc.

Read the instructions for correct handling.

This equipment has been tested for radio frequency emissions and has been verified to meet VDE 0871 Class A.

Declaration of the Manufacturer to Importer.

We hereby certify that the DIGITAL Server 7100R Series is in compliance with vfg 1046 and is RFI suppressed.

The marketing and sale of the equipment was reported to the German Postal Service.

The right to retest this equipment to verify compliance with the regulation was given to the German Postal Service.

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# Preface **P**

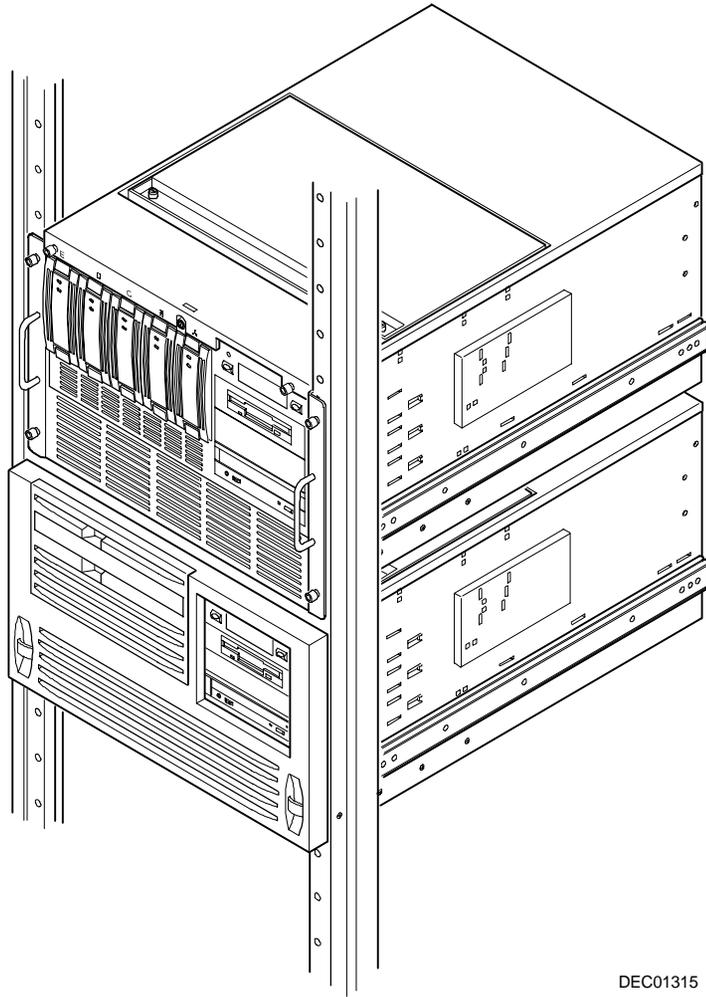
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This *Service Maintenance Manual* is a troubleshooting guide that can be used for reference when servicing DIGITAL Servers.

DIGITAL reserves the right to make changes to this *Service Maintenance Manual* without notice. Accordingly, the illustrations and procedures in this document might not apply to all DIGITAL Servers to be serviced since many of the diagnostic tests are designed to test more than one product.



**CAUTION:** DIGITAL recommends that only A+/DIGITAL Server certified engineers attempt to repair this equipment. All troubleshooting and repair procedures are detailed to support subassembly/module level exchange. Because of the complexity of the individual boards and subassemblies, no one should attempt to make repairs at the component level or make modifications to any printed circuit board. Improper repairs can create a safety hazard. Any indications of component replacement or circuit board modifications might void any warranty or exchange allowances.



DEC01315

**Typical DIGITAL Server 7100R**

# Product Description

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# 1

## System Introduction

The DIGITAL Server 7100R is a high-performance, highly-scalable network and application server featuring the latest in modular processor and storage technology.

The DIGITAL Server provides support for the following features:

## Reliability/Availability

<i>Rackmountable</i>	The DIGITAL Server can be mounted into any industry-standard 19-inch rack (rail depth should not be less than 30 inches). Note that the rack, monitor, keyboard, and mouse must be purchased separately.
<i>Pentium Pro Processor Module</i>	Up to four SMP Pentium Pro processors, each with an integrated 512 KB, four way set-associative, write-back cache.
<i>Error Correction Code (ECC) Memory</i>	Maximum expandability with up to 4 GB of ECC protected DIMM memory.
<i>Dual-Channel Storage Backplane</i>	Redundant disk subsystems using dual-channel wide Ultra SCSI or wide Ultra RAID adapters.
<i>Hot Swap Power Supplies</i>	The DIGITAL Server provides one or more hot-swap and redundant 400 W power supplies.
<i>Hot Swap Fans</i>	Automatically turns on redundant fans if a primary fan failure is detected.
<i>Internal Sensors</i>	Monitors internal server temperatures, fan operation, voltages, and power supply faults.
<i>Hot Swap Capability</i>	Allows replacement of SBB disk drives, power supplies, and fans while the server is operating.
<i>Clusters</i>	Supports DIGITAL Clusters for Windows NT and Microsoft Cluster Server (part of Microsoft Windows NT Server, Enterprise Edition) for database and file services failover.

## Server Expansion

<i>Flexible Memory Architecture</i>	Two memory modules provide a 4-way interleaved memory system, with 128 MB of minimum supported memory and 4 GB of maximum supported memory.
<i>11 I/O Expansion Slots</i>	Seven PCI expansion slots, three EISA slots, and one shared EISA/PCI slot. Dual peer PCI bus design with peak bandwidth of 267 MB/sec.
<i>Integrated SVGA Video Controller</i>	Supports management and configuration applications locally (on the main logic board) without use of an expansion slot.
<i>Wide Ultra SCSI or RAID Adapter</i>	Support for internal narrow and wide Ultra SCSI devices.
<i>Capacity for Eight Internal SCSI Storage Devices</i>	Accommodates up to five Storage Building Blocks (SBBs) and three 5¼-inch half-height drives. Note that the installed 3½-inch diskette drive occupies a 5¼-inch drive bay.
<i>External I/O Ports</i>	Two serial ports and one parallel port to support external options such as a printer, modem, or local terminal.
<i>Wide Ultra SCSI Storage Backplane</i>	Supports high-performance drives for single or dual channel wide Ultra SCSI and wide Ultra RAID configurations.

## Server Management and Security

<i>Server Diagnostics</i>	Allows local and remote diagnosis of server problems.
<i>Hardware Configuration</i>	Allows local and remote server configuration.
<i>Unique Asset Management</i>	Unique server identifier in non-volatile memory provides easy asset management.
<i>RAM-Based Error Log</i>	Records startup error messages.
<i>Firmware Upgrade Utility</i>	Upgrades firmware versions.
<i>Operator Control Panel (OCP)</i>	Back-lit, 16-character display for diagnostic and error messages.
<i>Hard Drive and Power Supply Indicator Lights</i>	Provides immediate status information on SBB hard drive (activity or failure) and power supply (normal or fault condition).
<i>Key Lock</i>	Limits access to the server's internal components.
<i>Interlock Sensor Switch</i>	Automatically turns off server power if the top panel is removed when the server power is on. This excludes the hot-swap fan access cover.

## Server Configurations

The following rules apply when **Product Family Names** and **Product Model Names** are assigned to DIGITAL Server products. These rules apply to all products developed in the NT Server Business Unit (NTSBU).

### Server Naming Guidelines

- All products in a family carry the same name on the nameplate. (i.e. all products in the Entry space will carry the name DIGITAL SERVER 1000)

<u>Family Name</u>	<u>Segment</u>
<b>DIGITAL SERVER 500</b>	SUB ENTRY
<b>DIGITAL SERVER 1000</b>	ENTRY
<b>DIGITAL SERVER 3000</b>	DEPARTMENT
<b>DIGITAL SERVER 5000</b>	APPLICATION
<b>DIGITAL SERVER 7000</b>	ENTERPRISE
<b>DIGITAL SERVER 9000</b>	SUPER ENTERPRISE

- Products in a rackmount chassis will have an R after the Family Name (DIGITAL Server 7100R).
- Product models within a family will be differentiated by the Product Model Name. The Product Model Name will appear on a label on the rear of the product. Specific configurations within a model will carry the same Product Model Name and will be differentiated by the FR part number.

## Product Model Numbering Convention

The following example describes the product model numbering convention:

### **DIGITAL SERVER 1234 5678A R**

1 = PRODUCT FAMILY NAME (first character of family number)

2 = MAJOR PROCESSOR TECHNOLOGY DIFFERENTIATOR WITHIN THE FAMILY

This number will be assigned to each new platform based on the following matrix. Open numbers will be assigned as new processor technology is introduced. THIS FIELD IS NOT USED FOR SUB ENTRY PRODUCTS.

100 = Pentium Pro

200 = Pentium II – Slot 1

300 = EV5

400 = Pentium II – Slot 2

500 = EV6

600 = OPEN

700 = OPEN

800 = OPEN

900 = OPEN

3,4 = USED TO DIFFERENTIATE MODELS BASED UPON DIFFERENT PROCESSORS WITHIN A PROCESSOR TECHNOLOGY (I.E. CLOCK SPEED, CACHE SIZE) START AT 00 FOR FIRST MODEL AND INCREMENT BY 05 FOR EACH ADDITIONAL MODEL.

5 = CPU TYPE

BLANK = PENTIUM

1= PENTIUM PRO

2 = PENTIUM II/SLOT 1

3 = PENTIUM II/SLOT 2

4 = Open/Available for future processors

5 = Open/Available for future processors

6 = ALPHA EV56

7 = ALPHA PCA57

8 = ALPHA EV6

9 = ALPHA EV67

6, 7, 8, 9 = CPU CLOCK SPEED IN MHZ

## Related Material

The following related material is available:

Document or Software Title	Order Number	Description
Service Quick Reference	ER-R5C5W-SR (English only)	Provides troubleshooting information that can be used when servicing DIGITAL servers.
Installation Guide	ER-R5C5W-IM (Multilanguage)* ER-R5C5W-IJ (Japanese)	Provides information on connecting hardware cables and booting the server. This guide also explains how to use DIGITAL ServerWORKS Quick Launch to install an operating system, create driver and utility diskettes, and view on-line help and support documentation.
System Reference	ER-R5C5W-UA (English) ER-R5C5W-UJ (Japanese)	Provides information on using the server's configuration utilities, installing peripherals and options, security, and troubleshooting. The System Reference is available on the Quick Launch CD-ROM in English, Spanish, German, Italian, and French.
Quick Reference labels	36-49345-01 36-49344-01	Provides an overview of major server components, configuration guidelines, SCSI cabling, and fan information. One of the labels is located on the outside of the server's top cover. The other label is located on the inside of the fan access cover.
Warranty and Service Information	ER-PCWAR-CM (Multilanguage)*	Provides warranty information and a listing of phone numbers for technical support.

*continued*

\* Multilanguage includes: English, French, Italian, German, and Spanish

<b>Document or Software Title</b>	<b>Order Number</b>	<b>Description</b>
DIGITAL ServerWORKS software	QB-4WY9A-SA (Multilanguage)*	<p>Contains ServerWORKS Quick Launch and ServerWORKS Manager software and documentation.</p> <p>Quick Launch consists of a bootable CD-ROM disk and Getting Started guide. This program steps the user through the initial server setup and operating system installation.</p> <p>ServerWORKS Manager consists of two CD-ROMs and an Overview and Installation Guide and supporting documentation.</p>
Product README and Revision History Information - Quick Launch CD-ROM	AG-QS62U-BH (English only)	Provides additional product information and product change history.
Option documentation - Quick Launch CD-ROM	AG-QS62U-BH (English only)	Provides postscript files that can be viewed and printed using Adobe Acrobat Reader software. These files are provided in PDF format on the Quick Launch CD-ROM
Diagnostic Software - Quick Launch CD-ROM	AG-QS62U-BH (English only)	<p>Contains an advanced set of diagnostic utilities for identifying and correcting problems on the server.</p> <p>The diagnostic software can be used to verify proper hardware installation and isolate intermittent problems that are not detected by the Power-On Self Test (POST). Refer to chapter 2 for information on using the diagnostic utilities.</p>
PC Product Support Information Kit	QA-5RJAA-G8 (English only)	Provides all the latest user documentation for all NTSBU mobile, desktop, and server products.

\* Multilanguage includes: English, French, Italian, German, and Spanish

## Latest Product Information and Updates

Listed below is the current product information and update source locations.

### Enterprise Server Product Information

Family Name	Model Name	Part Number	Description
DIGITAL Server 7000R	DIGITAL Server 7100 1200 R	FR-R5C5W-AX	6200/512K (PP) - KERNAL
DIGITAL Server 7000R	DIGITAL Server 7100 1200 R	FR-R5C5W-AA	6200/512K (PP) - MODEL 1
DIGITAL Server 7000R	DIGITAL Server 7100 1200 R	FR-R5C5W-AC	6200/512K (PP) - RAID
DIGITAL Server 7000R Processor PowerGrade		FR-PC93U-AC	6200/512K (PP) processor upgrade
DIGITAL Server 7000R Processor PowerGrade		FR-PC93U-AE	Dual 6200/512K (PP) processor upgrade

## Updates

Current server utilities and technical support information is available on the Quick Launch CD-ROM disc and the Internet.

For product information, use the address:

<http://www.windows.digital.com>

For technical support, use the address:

<http://www.windows.digital.com/support/support.asp>

For access directly to the software library for BIOS and driver updates, use the address:

<http://www.windows.digital.com/~ftp/00-index.stm>

# Server Software and Utilities

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# 2

## Introduction

This chapter describes the utilities supplied with the server. Server utilities include:

- **ServerWORKS Quick Launch** — This software is used to install a network operating system onto the server. The CD-ROM also contains various drivers and on-line documentation.
- **System Configuration Utility (SCU)** — This utility is available to configure the server when relocating, adding, or removing EISA/ISA/PCI expansion boards and when changing the server's factory-defined settings. The SCU is available on the Quick Launch CD-ROM.
- **RAID Configuration Utility** — This utility is available for RAID-ready servers only. This utility is available to configure the RAID array. The RAID configuration utility is available on the Quick Launch CD-ROM.
- **BIOS Upgrade Utility** — This utility is available to update or restore the server's BIOS. The BIOS Upgrade Utility is available on the Internet.
- **SCSI *Select* Utility** — This utility is available to configure and view settings of the installed Adaptec wide Ultra SCSI adapters and wide Ultra SCSI devices. The SCSI *Select* Utility is available each time you boot the server.
- **Diagnostics** — This utility is used to verify server operation. The diagnostics utility is available on the Quick Launch CD-ROM.

## ServerWORKS Quick Launch

ServerWORKS Quick Launch is used to install the server's Network Operating System (NOS). In addition to providing quick and seamless NOS installation, Quick Launch also provides drivers, documentation, and the ability to make diskettes of utilities such as diagnostics. For more information, refer to the *ServerWORKS Quick Launch Getting Started* guide.

### Creating Diskettes and Viewing On-line Documentation

Use the following procedure to create diskettes using the Quick Launch CD-ROM and to view on-line product documentation.

1. Power on your server and boot the ServerWORKS Quick Launch CD-ROM.
2. Select the "User Documentation" button to view on-line product documentation.
3. From the Quick Launch Main Screen, select the "Installations & Utilities" button and then the Utility tab to create driver and utility diskettes.
4. Insert a DOS-formatted diskette into drive A, and choose the utility or driver you wish to copy and select Continue.
5. Repeat this procedure for all the utilities and drivers you wish to copy.

### System Configuration Utility (SCU)

The server was pre-configured at the factory using the System Configuration Utility (SCU). This means that the server's hardware (processor modules, memory, cache, mass storage devices, expansion boards, etc.) has been identified and configured for optimum performance. If you need to make changes to this configuration, DIGITAL recommends that you use the SCU along with the information provided in this section.

*Refer to "Starting the SCU" described later in this chapter.*

*Refer to Chapter 3, "SCU Features," for more details about the SCU.*

*Refer to the ServerWORKS Quick Launch Getting Started guide and the README.TXT file, which is located on the Quick Launch CD-ROM, for additional information.*

## When to Run the SCU

Always run the SCU each time you add, remove, or relocate ISA, PCI and/or EISA expansion boards to reconfigure server resources (IRQs). You should also run the SCU if the main logic board changed, after adding a processor module, or after adding memory modules.

If the main logic board changes or a processor module is added, run the SCU (select the option "Configure Computer") to update the serial numbers of the components. For more information on how to change the serial numbers, refer to Chapter 4, "Obtaining Information About The Server."

Typically, the server displays a message such as `Run SCU Utility.....Press F1 to Continue`. Select how you want to access and run the SCU by following the instructions displayed on the SCU screens.

## Configuring Expansion Boards

Each time you add, remove, or relocate any EISA/ISA/PCI expansion board, you need to run the SCU to identify their operating characteristics, server resource requirements, and slot locations. Based on this information, the SCU will then automatically assign the proper server resources to EISA expansion boards, enable PCI boards, and inform you as to what jumper or switch settings need to be manually set on ISA expansion boards to avoid resource conflicts.

The SCU identifies an expansion board's operating characteristics and resource requirements through Configuration (.CFG) files. These files contain main logic board, EISA, PCI, and ISA expansion board vital characteristics and the server resources they require for proper operation. Before you can configure the server, you must copy the CFG files (and overlays if applicable) supplied with the additional EISA expansion boards you installed to either the SCU directory on the hard disk drive or the SCU diskette that you created earlier.

As an added feature, the SCU creates and stores all setup changes in a System Configuration (.SCI) file. This file is automatically generated when you run the SCU. Afterwards, this SCI file can be used on any DIGITAL Server that is identically configured and can serve as a backup to the EISA configuration stored in NVRAM memory.

## Starting the SCU

The SCU is located on the ServerWORKS Quick Launch CD-ROM disc. The SCU options are shown in Figure 2-1. If this is the first time using the SCU, it is recommended that you select “Learn About Configuring your Computer” for detailed information on using the SCU. If this is a subsequent session, refer to the appropriate sections in this chapter to change the server’s configuration.

You can start the SCU in one of three ways:

1. During the Quick Launch boot process, if a DOS partition was created, the SCU was copied to the DOS partition on the hard disk drive. This allows you to run the SCU anytime from the DOS partition.

At the MS-DOS prompt, change to the SCU directory and type:

```
SCU.BAT
```

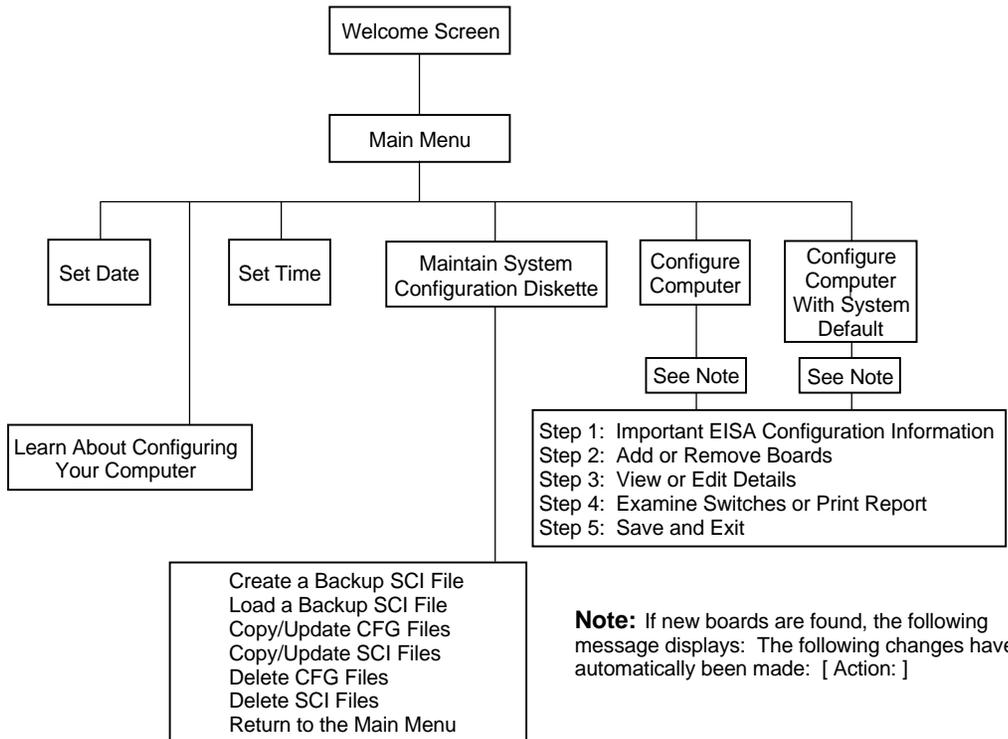
2. Creating a bootable SCU diskette by using the Quick Launch CD-ROM and selecting the *Installations & Utilities* button and then the *Utilities* page. On the *Utilities* page, select the appropriate BIOS level for the server that the SCU is being created for (if this is being done on the server, the default BIOS that is highlighted is the BIOS of that server).

Afterwards, you can run the SCU anytime by booting the diskette you created.

3. You can also run the SCU by inserting the Quick Launch CD-ROM disk, rebooting the server, and pressing and holding the right [ALT] key during the boot process to display the SCU.



**NOTE:** If EISA (in some cases, PCI) cards have been added to the server, the SCU will be invoked automatically when you boot from the Quick Launch CD-ROM disc. The .SCI file is not saved when you use this method to run the SCU.



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**Figure 2-1. SCU Main Menu Options**

## Using the SCU

To use the SCU:

1. Turn on the server and allow the Power-On Self Test (POST) to complete.  
If POST detects an error refer to Appendix A, "Technical Specifications," and take the appropriate steps to correct the problem. After the problem has been resolved, restart the server.
2. Start the SCU using one of the three methods described previously.
3. Press [Enter] to display the SCU introductory screen.



**NOTE:** The SCU contains help pop-up screens for any selected menu item. Press [F1] at anytime to display a help screen. Press [Esc] to remove a help screen.

4. If no configuration errors appear, the Welcome screen displays.  
Press [Enter] to display the Main menu.  
If a configuration error appears, the Welcome screen displays information about the error and tells you to reconfigure the server.
5. Step through the menu items to familiarize yourself with the SCU.

## SCU Keyboard Function Keys

The following table lists the keyboard function keys used to scroll through the menu screens, and select specific menu items in the SCU.

Keyboard Key	Function
[↓]	Moves the cursor down one menu item.
[↑]	Moves the cursor up one menu item.
[→]	Moves the cursor one character to the right.
[←]	Moves the cursor one character to the left.
[Enter]	Displays the available user-selectable settings for the highlighted option or selects the highlighted menu item.
[F6]	View, change, or lock available resources for the highlighted option.
[F10]	Press [F10] to complete a step.
[F1]	Displays the selected menu item's help screen.
[Esc]	Returns the monitor screen to the previously selected menu item.

## Configure Computer

This option provides step-by-step instructions on how to configure the server when adding, removing, or relocating expansion boards and when changing operating parameters.

Select one of the following menu options:

- “Configure Computer with System Default” — Loads the SCU default settings.
- “Configure Computer” — Instructions are displayed. Complete the instructions if you are performing an initial configuration on the server. If this is a subsequent configuration, refer to the appropriate menu item to update the server's configuration.

*Refer to Chapter 8, “Installing Expansion Boards,” for board installation information.*

## Setting the Date and Time

Use these two SCU options to reset the date and time maintained by the server's battery.

To access this menu item:

1. Start the SCU using one of the three methods described in "Starting the SCU."
2. Press [Enter] to display the SCU main menu.
3. Configure the server for the current date and time by selecting the `Set Date` and `Set Time` options.

## Maintain System Configuration Diskette

Select this option to maintain Configuration (CFG) files and System Configuration Information (SCI) files.

To access this menu item:

1. Start the SCU using one of the three methods described in "Starting the SCU."
2. Press [Enter] to display the SCU main menu.
3. Select the `Maintain System Configuration Diskette` option, and then press [Enter].
4. Select a menu item and complete the displayed instructions for that item.

Afterwards, the following menu options are available:

- Create a backup SCI file
- Load a backup SCI file
- Copy/update CFG files
- Copy/update SCI files
- Delete CFG files
- Delete SCI files
- Return to the Main Menu

## RAID Configuration Utility

RAID-ready DIGITAL Servers include a RAID adapter and RAID configuration utility. The RAID configuration utility appears when you boot the server with the ServerWORKS Quick Launch CD-ROM disc. Use this utility to configure the RAID array.

*Refer to the RAID User's Manual on the Quick Launch CD-ROM.*

## BIOS Upgrade Utility

All servers have BIOS software in a flash (ROM) chip located on the main logic board. This BIOS initializes hardware and boots the operating system when the server is turned on. The BIOS also provides access to other services such as keyboard and disk drives.

You can upgrade the server's BIOS to future releases by executing the BIOS upgrade utility (PHLASH.EXE) located in the BIOS upgrade kit. The "BIOS upgrade" switch (J35-SW1) on the main logic board must be set to ON before you can upgrade the system BIOS.

BIOS upgrades are available on the Internet.

For technical support, use the address:

<http://www.windows.digital.com/support/support.asp>

For access directly to the software library for BIOS and driver updates, use the address:

<http://www.windows.digital.com/~ftp/00-index.stm>



**CAUTION:** A crisis recovery diskette should be created before upgrading the server BIOS.

When upgrading the BIOS, you must remove any video option cards and enable the onboard VGA. In the rare event that you need to use the crisis recovery diskette, the system will require that the onboard VGA be used in this mode.

## **SCSI*Select* Utility**

The DIGITAL server comes with an Adaptec wide Ultra SCSI adapter and the SCSI*Select* configuration utility. This utility allows you to change host adapter settings without opening the server.

Use SCSI*Select* to:

- Check factory default settings for each device on the wide Ultra SCSI bus.
- Change SCSI device settings that might conflict with other SCSI devices.
- Perform low-level formatting on new wide Ultra SCSI disk drives.

To start the SCSI*Select* configuration utility:

Press [Ctrl] + [A] when the Adaptec BIOS banner appears during the boot process and before the end of the device information display.

## Diagnostics

Diagnostic software is shipped with every DIGITAL Server on the Quick Launch CD-ROM. This software contains an advanced set of diagnostic utilities for identifying and correcting problems with the server. The diagnostic software can be used to verify proper hardware installation and isolate intermittent problems that are not detected by the Power-On Self Test (POST). The diagnostic software includes:

- AMIDiag base diagnostic (processors, memory, and main logic board components tests) from American Megatrends
- DIGITAL vendor extended tests (SCSI, network, storage, and RAID)
- Extensive on-line help and the *AMIDiag User's Guide*

The diagnostic program is a stand-alone MS-DOS package that can be run from diskettes or from the DOS partition on the server's hard disk drive.

To access the supplied diagnostic software:

- During the server installation process, the diagnostic software will be automatically copied to a subdirectory on the DOS partition (only if the user selected the option to create a DOS partition). This allows you to run the diagnostic software from the DOS partition you created.
- Using the Quick Launch CD-ROM, you can create bootable diagnostic software diskettes. This allows you to run the diagnostic software using the diskettes created.



**NOTE:** DIGITAL strongly recommends that you copy the diagnostics to diskettes and then use these diskettes to run the diagnostics on the server.

To run the diagnostics from the DOS partition, perform the following:

1. At the MS-DOS prompt, type:

```
C:\diag\diagnose.bat
```

2. After the server boots, choose MS-DOS from the boot selection.
3. Once the diagnostics begin, the main screen appears.

To create the diagnostic diskettes from the Quick Launch CD-ROM, perform the following:

1. Insert the Quick Launch CD-ROM into the drive and boot the server or from a PC or workstation, use Windows File Manager or Explorer and run:

```
<cd-rom>:\QLAUNCH.EXE.
```

2. From the Quick Launch main menu, select *Installations & Utilities*.
3. Select the *Utilities* tab and then select the server model.
4. Insert a blank MS-DOS formatted diskette into drive A and select *Diagnostics*.
5. Select *Continue*. Afterwards, remove the diskette for safekeeping.
6. Choose the next diagnostic diskette from the list and then select *Continue*. Create all the diskettes labeled "Diagnostics."

## Introduction

After entering the SCU, you can edit a variety of resources and configure the server for the most optimized condition. The following tables list the SCU options that are available in the SCU.

## System - DIGITAL Server 7100R

Menu Fields	Settings	Comments
System processor type	Not user selectable	Displays the type of the processor that is resident on the main logic board.
System processor clock	Not user selectable	Displays the clock of the processor that is resident on the main logic board.
System base memory	Not user selectable	Displays the amount of base (conventional) memory each time the server boots.
System extended memory	[memory amount], AT-bus space disabled <sup>(1)</sup> [memory amount], AT-bus space enabled at F00000h, 1M [memory amount], AT-bus space enabled at E00000h, 2M [memory amount], AT-bus space enabled at C00000h, 4M	Displays the amount of extended memory each time the server boots. You can select disabling or enabling one of three memory ranges that could be used by expansion boards.
System extended memory mode	Compatibility <sup>(1)</sup> Non-compatibility	Selects the means for supporting extended memory above 64 MB. Select [Compatibility] for using conventional service in BIOS. Select [Non-Compatibility] for memory support above 64 MB when using Windows NT v3.1 or above.
System information	Not user selectable	Displays the version of the server BIOS. Also, the resources occupied by the server BIOS can be viewed via this selection
System language	Not user selectable	English only.

<sup>(1)</sup> Factory default setting

## System Management Group

Menu Fields	Settings	Comments
System reserved resources	Asset # Installed as a default <sup>(1)</sup>	Always shown as installed. Select [Enter] to display the Asset number of the server. The Asset number can be changed by the user.
Main logic board information	Asset # Installed as a default <sup>(1)</sup>	Select [Enter] to display main logic board information including Asset number, Serial number, Artwork Revision number, Model number, and System ID. The Asset number is the only item that can be changed by the user.
CPU module 1 information	Asset # Installed as a default <sup>(1)</sup>	Select [Enter] to display main logic board information including Asset number, Serial number, Artwork Revision number, Model number, and System ID. The Asset number is the only item that can be changed by the user.
CPU module 2 information	Asset # Not installed as a default <sup>(1)</sup>	If processor module 2 is installed, select [Enter] to display processor module 2 information including Asset number, Serial number, Artwork Revision number, Model number, and System ID. The Asset number is the only item that can be changed by the user.
Memory module 1 information	Asset # Installed	If memory module 1 is installed, select [Enter] to display memory module 1 information including Asset number, Serial number, Artwork Revision number, Model number, and System ID. The Asset number is the only item that can be changed by the user.
Memory module 2 information	Asset # Installed	If memory module 2 is installed, select [Enter] to display memory module 2 information including Asset number, Serial number, Artwork Revision number, Model number, and System ID. The Asset number is the only item that can be changed by the user.

<sup>(1)</sup> Factory default setting

## Diskette Drive Group

Menu Fields	Settings	Comments
Integrated diskette controller	Enabled <sup>(1)</sup> Disabled	Enables or disables the onboard diskette controller. The onboard diskette controller must be disabled if an external diskette controller performs the interfacing to the diskette drives.
Diskette drive A	Not Installed 5.25" 360 KB drive 5.25" 1.2 MB drive 3.5" 720 KB drive 3.5" 1.44 MB drive <sup>(1)</sup> 3.5" 2.88 MB drive	Sets the size and density of diskette drives.
Diskette drive B	Not Installed <sup>(1)</sup> 5.25" 360 KB drive 5.25" 1.2 MB drive 3.5" 720 KB drive 3.5" 1.44 MB drive 3.5" 2.88 MB drive	Sets the size and density of diskette drives.
Exchange diskette drives	Disabled <sup>(1)</sup> Enabled	Allows you to logically exchange physical diskette drive designation. Enabling this function allows you to boot diskette software that is compatible with physical drive B: instead of physical drive A:.
Diskette write protection	Disabled <sup>(1)</sup> Enabled	Enables or disables the selected diskette drives to be write-protected at the disk drive level. Enabling this option means writing data to a diskette is prohibited. However, you can still read data from the diskette.

<sup>(1)</sup> Factory default setting

## Boot Options Group

Menu Fields	Settings	Comments
Boot option	A: then C: <sup>(1)</sup> C: then A: C: only A: only	Each time the server boots, it will load the operating system from the sequence selected.
POST errors	Enabled <sup>(1)</sup> Disabled	If enabled, the server pauses and displays POST errors. To continue, Press <F1>.
Floppy check	Enabled <sup>(1)</sup> Disabled	Enabling this option forces the server to verify the diskette type during boot.
Summary screen	Enabled <sup>(1)</sup> Disabled	Enables or disables the ability to display the server's configuration during boot.
OCP soft banner	Not installed <sup>(1)</sup> Installed	If installed, you can define a 16 character string that appears on the Operator Control Panel (OCP).

<sup>(1)</sup> Factory default setting

## Integrated Peripherals Group

Menu Fields	Settings	Comments
Video type	VGA or EGA <sup>(1)</sup> CGA 80 columns Monochrome	Sets the video controller type.
Monitor type	Color <sup>(1)</sup> Monochrome	Sets the type of monitor connected to the server: Color or Monochrome.
Mouse port	Disabled Enabled <sup>(1)</sup>	Enables or disables the onboard PS/2 style mouse port.
Parallel port	Disabled	Selects the Enhanced Parallel Port (EPP) mode.
	Compatible mode	Selects the standard printer connection.
	Bi-Directional Mode <sup>(1)</sup>	Selects the PS/2 compatible mode to receive data.
	EPP 1.7 mode EPP 1.9 mode	Selecting EPP 1.7 or EPP 1.9 is based on what EPP version the printer supports. If you are not sure what version the printer supports, use the default setting.
Serial port 1	ECP mode	Sets the Extended Capabilities Port (ECP) mode.
	Disabled	Enables or disables onboard serial port 1 at the specified address and IRQ.
	Enable at: 3F8h-3FFh (IRQ4) <sup>(1)</sup>	
	Enable at: 2F8h-2FFh (IRQ3)	
Enable at: 3E8h-3Efh (IRQ4) Enable at: 2E8h-2Efh (IRQ3)		
Serial port 2	Disabled	Enables or disables onboard serial port 2 at the specified address and IRQ.
	Enable at: 3F8h-3FFh (IRQ4)	
	Enable at: 2F8h-2FFh (IRQ3) <sup>(1)</sup>	
	Enable at: 3E8h-3Efh (IRQ4) Enable at: 2E8h-2Efh (IRQ3)	

<sup>(1)</sup> Factory default setting

## Keyboard Features Group

Menu Fields	Settings	Comments
NumLock	Auto <sup>(1)</sup> Off On	Selects the power on state for Numlock. If Auto is selected, the server turns on Numlock if it detects a numeric keypad.
Key Click	Disabled <sup>(1)</sup> Enabled	Enables or disables the audible key click feature.
Keyboard auto-repeat rate	30/sec <sup>(1)</sup> 26.7/sec 21.8/sec 18.5/sec 13.3/sec 10/sec 6/sec 2/sec	Sets the number of times a second to repeat a keystroke while you hold the key down.
Keyboard auto-repeat delay	1/4 sec 1/2 sec <sup>(1)</sup> 3/4 sec 1 sec	Sets the delay time after a key is held down before it begins to repeat a keystroke.

<sup>(1)</sup> Factory default setting

## Shadow Options Group

Menu Fields	Settings	Comments
Shadow video BIOS ROM	Enabled <sup>(1)</sup> Disabled	The main logic board reserves an area of DRAM for a copy of video BIOS ROM. This DRAM called “shadow memory” is write-protected and has the same addresses as the video BIOS ROM locations. When you shadow video BIOS ROM, the ROM image is copied into an appropriate area in DRAM. This increases the server’s performance because the video BIOS instructions are in fast DRAM instead of low speed ROM. For PCI VGA devices, video BIOS is always shadowed in C0000h-C7FFFh, regardless of this field’s setting.
Shadow C8000h- CBFFFh	Disabled <sup>(1)</sup> Enabled	Allows you to disable or enable the shadowing request for optional ROM at the corresponding addresses.
Shadow CC00h- CFFFFh	Disabled <sup>(1)</sup> Enabled	Allows you to disable or enable the shadowing request for optional ROM at the corresponding addresses.
Shadow D0000h- D3FFFh	Disabled <sup>(1)</sup> Enabled	Allows you to disable or enable the shadowing request for optional ROM at the corresponding addresses.
Shadow D4000h- D7FFFh	Disabled <sup>(1)</sup> Enabled	Allows you to disable or enable the shadowing request for optional ROM at the corresponding addresses.
Shadow D8000h- DBFFFh	Disabled <sup>(1)</sup> Enabled	Allows you to disable or enable the shadowing request for optional ROM at the corresponding addresses.
Shadow DC000h- DFFFFh	Disabled <sup>(1)</sup> Enabled	Allows you to disable or enable the shadowing request for optional ROM at the corresponding addresses.

<sup>(1)</sup> Factory default setting

## Security Options Group

Menu Fields	Settings	Comments
Supervisor password	Not installed <sup>(1)</sup> Installed	Allows you to set a supervisor password.  If set, you will be prompted to enter a password prior to accessing the SCU.
User password	Not installed <sup>(1)</sup> Installed	Can only be set in the condition that the Supervisor password is set. This password functions with "Password on Boot" or "Quick Lock Hot-Key."
Password on boot	Enabled Disabled <sup>(1)</sup>	Enables or disables password entry on boot. If enabled, the server will prompt you to enter the password, either the User password or the Supervisor password.
Quick lock hot-key	Disabled <sup>(1)</sup> Alt-Ctrl-F1 through Alt-Ctrl-F12	Enables or disables the Quick Lock function. When enabled, you can lock both the keyboard and PS2 mouse by pressing the defined hot key, Alt-Ctrl-[key].  During the lock state, if a user password is entered, the keyboard and PS2 mouse will function again.
Diskette access	Supervisor User <sup>(1)</sup>	If set to supervisor, the diskette can only be accessed if the server is booted via a supervisor password. Otherwise, the diskette is free to be accessed.
Network server	Disabled <sup>(1)</sup> Enabled	When enabled, the server does not require a keyboard to function and therefore, keyboard error messages which might occur during POST will be ignored.
System backup reminder	Disabled <sup>(1)</sup> Daily Weekly Monthly	Allows you to display a backup reminder message at boot (daily, every Monday, or the 1 <sup>st</sup> of every month).
Virus check reminder	Disabled <sup>(1)</sup> Daily Weekly Monthly	Allows you to display a virus check reminder message at boot (daily, every Monday, or the 1 <sup>st</sup> of every month).

<sup>(1)</sup> Factory default setting

## Cache Options Group

Menu Fields	Settings	Comments
Internal cache	Enabled <sup>(1)</sup> Disabled	Enables or disables the server's processor internal cache operation.
External cache	Disabled Write through Write back <sup>(1)</sup>	Allows you to select the external cache operation type.
Cache system BIOS ROM	Enabled <sup>(1)</sup> Disabled	Enables or disables caching request for server BIOS ROM (F0000h to FFFFFh).
Cache video ROM	Enabled <sup>(1)</sup> Disabled	Enables or disables the server to cache the video BIOS in the C000 to C7FFh segment.

<sup>(1)</sup> Factory default setting

## Advanced Control Group

Menu Fields	Settings	Comments
CPU to PCI Write Posting	Disabled Enabled <sup>(1)</sup>	When enabled, allows processor writes to the PCI to be posted in the compatibility OPB chipset.
OPBC PCI to CPU Write Posting	Disabled Enabled <sup>(1)</sup>	When enabled, allows PCI writes to the processor to be posted in the compatibility OPB chipset.
OPBC CPU Line Read Pre-Fetch	Disabled Enabled <sup>(1)</sup>	When enabled, allows the compatibility OPB chipset's PCI memory read line commands to pre-fetch additional processor cache lines.
2nd OPB CPU to PCI Write Posting	Disabled Enabled <sup>(1)</sup>	When enabled, allows processor writes to the PCI to be posted in the 2nd OPB chipset.
2nd OPB PCI to CPU Write Posting	Disabled Enabled <sup>(1)</sup>	When enabled, allows PCI writes to the processor to be posted in the 2nd OPB chipset.

<sup>(1)</sup> Factory default setting

*continued*

Menu Fields	Settings	Comments
2nd OPB CPU Line Read Pre- Fetch	Disabled Enabled <sup>(1)</sup>	When enabled, allows the 2nd OPB's PCI memory read line commands to pre-fetch additional processor cache lines.
CPU in order queue depth	8 <sup>(1)</sup> 1	Allows you to select the depth of the processor in-order-queue.
APIC & MP table	Disabled MPS 1.1 MPS 1.4 <sup>(1)</sup>	Applicable to single processor configurations only, always enabled for Multi-Processing (MP) operating system configurations. When set to MPS 1.1 or MPS 1.4, the processor's Advanced Programmable Interrupt Controller (APIC) is enabled, and the MP table used by MP operating systems will be created.  <b>Note:</b> This parameter must be disabled for NetWare 3.12 single processor systems.
ECC interrupt	Disabled <sup>(1)</sup> IRQ14, Shared IRQ14, Non-Shared IRQ15, Shared IRQ15, Non-Shared	Enables the Error Correction Code (ECC) interrupt. If enabled, you can select IRQ14 or IRQ15 as the ECC interrupt. You can also define the IRQ as shared with other devices, such as EISA or PCI devices.
GAT mode	Enabled <sup>(1)</sup> Disabled	Should be enabled only when an ISA bus mastering card is installed in the server. Disable it for all other configurations.
System arbitration	CPU Bus first <sup>(1)</sup> EISA Bus first Full Rotation	This option controls the operating modes of the server's PCI arbiter. The arbiter controls the arbitration priorities for EISA, PCI, and processor buses.

<sup>(1)</sup> Factory default setting

## EISA or PCI Devices Group

Menu Fields	Settings	Comments
EISA [slot#] - [device]		You can edit resources provided by the expansion board's vendor. Please refer to the menu displayed on this item.
PCI [slot#] - [device] PCI function 1	Enabled Disabled	Whenever PCI devices are installed in the PCI slots, the device is automatically added. You can enable or disable this device. If enabled, you can set the related resources based on the menu the SCU displays.
Embedded - [device] PCI function 1	Enabled Disabled	Three kinds of PCI devices can be identified as Embedded devices. The first are onboard PCI devices. The second are the PCI devices beyond 10 PCI devices that have been identified and shown as the normal PCI devices. The third are the PCI devices that share the same IRQ with the PCI devices displayed as the normal PCI devices. When enabled, all the resources shown on the menu can be changed.
Embedded - PCI VGA controller PCI function 1	Enabled Disabled	Onboard PCI VGA device.
Standard VGA resources	Enabled Disabled	Enables or disables the compatible VGA resources.

# Troubleshooting **4**

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## Introduction

This chapter provides troubleshooting information. The sections that follow describe specific problems, probable causes, and recommended actions to pursue if the server fails. Information includes:

- Initial Troubleshooting
- Diagnostics
- Obtain Server Information Using the SCU and Server Management Software
- Status, POST, and OCP Messages
- Processor Voltage and Temperature Ranges
- Advanced Troubleshooting

## Initial Troubleshooting

Follow these general procedures to troubleshoot the DIGITAL server.

- Record all configuration information and have it readily available.
- Turn off the server, wait until all hard disk drives completely spin down, and then turn it back on.
- Ensure that all cables and connections are secure.
- Make sure all necessary video, printer, and application device drivers are properly installed.
- Try not to troubleshoot more than one problem at a time.
- Try to duplicate the problem.
- Run the diagnostic software.
- Run the SCU.
- Run the SCSI or RAID configuration utility if you have problems after connecting devices.

## Diagnostics

The diagnostic software is a versatile tool that can be used to verify proper hardware installation and isolate intermittent problems that are not detected by the Power-On Self Test (POST). You should run the diagnostic software in the following situations:

- The server fails to boot or load the operating system software.
- The server fails to boot or load the operating system software after you add additional hardware such as more memory, additional processors, additional SCSI devices, or expansion boards.
- The operating system hangs repeatedly and no changes have been recently added to the software such as service packs or a new application.
- You suspect a server hardware failure.
- You want to validate server operation.
- An intermittent hardware problem exists.

## Running the Diagnostics

To run the AMIDiag base package (Emergency Mode diskette) from a diskette, follow this procedure:

1. Insert the diskette labeled “For Emergency Use” in drive A and then boot the server.
2. Use the arrow keys to highlight the desired test.
3. Press [Enter].

*For additional troubleshooting information refer to the AMIDiag User's Guide, located under “Additional Documentation” on the Quick Launch CD-ROM.*

## Running Quick Tests or Groups of Tests

Function keys can be used to select and run groups of tests. A list of function keys is available by pressing the F9 key. The following list includes examples of how to run Quick Tests or Groups of Tests.

- To run Quick Test, press F8 to select tests, then F10 to run all the selected tests.
- To run all Memory tests, press F6 to select tests listed on the menu, then press F10 to run all the selected tests.
- To run all tests from all menus, press F7 to select all tests, then press F10 to run all the selected tests.

## Running DIGITAL Vendor Extended Tests

To run DIGITAL Vendor Extended Tests from a diskette:

1. Insert the DIGITAL Vendor Extended Tests diskette for the selected device and then boot the server or type

```
A:\DMENU.
```

2. Select the desired test.

Each diskette has a README.TXT file with a list of devices that can be tested and additional information about each diagnostic.

## Running Diagnostics Tests from the Hard Disk Drive

To run diagnostic tests from the server's hard disk drive, perform the following:

1. Boot the system and select *MS-DOS* from the *Boot* menu.
2. At the C:\> prompt, type:

```
\DIAG\DIAGNOSE.BAT
```

This will setup the CONFIG.SYS and AUTOEXEC.BAT files to run the diagnostics and then reboot the server. Select MS-DOS again and the AMIDiag program will load. Note that the original CONFIG.SYS and AUTOEXEC.BAT are restored before the diagnostics load.

3. Select the test or group of tests using the arrow keys and function keys previously defined. DIGITAL Vendor Extended Tests can also be run from the *User* menu.

## Obtaining Information about the Server

The DIGITAL Server provides the following system information for the main logic board and the processor module configured on the server:

- Asset number — User definable field for tracking these components
- Part number — DIGITAL part number
- Revision number — Board assembly revision number
- Serial number — Serial number of the board assembly
- Artwork number — Revision of the printed circuit board

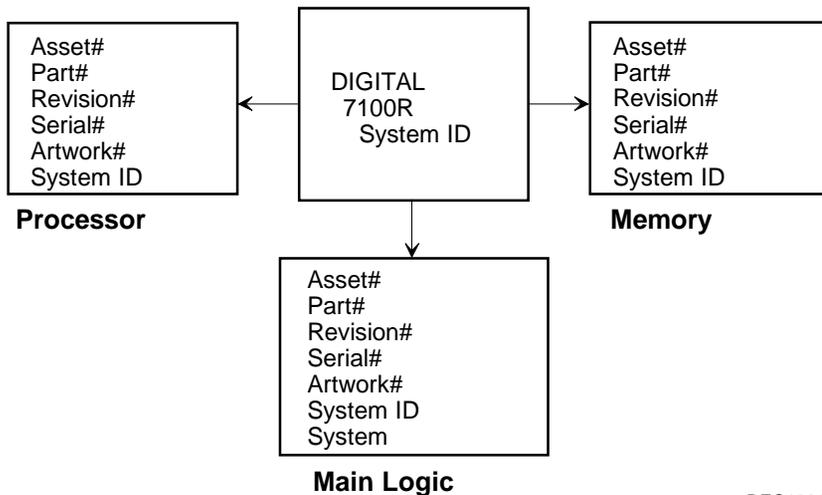
The System ID is also located on the main logic board and processor module. The System ID contains the following information:

- Model number — Server model number
- Serial number — Server serial number
- System asset number — User definable field for tracking the system

The main logic board and processor module each contain memory where specific information and System ID information is stored. The main logic board also stores the server's System Asset number (see Figure 4-1).

Information is available for the server's main logic board and processor module (such as part numbers, revisions, serial numbers, etc.). You can also assign Asset numbers to these components. In addition, the software can detect when you change the server configuration by adding or removing either component.

You can obtain information about the server's configuration by running the SCU or by using ServerWORKS management software.



DEC1321

**Figure 4-1. DIGITAL Server Component Information**

## Obtaining Information Using the SCU

You can use the SCU to check the Serial number, Revision number, and Asset number for the main logic board and Pentium Pro processor configured in the server. For example, if you change the main logic board or processor module in the server, you must run the SCU to re-synchronize the System ID (server model number and serial number) in the main logic board or processor module's memory. The SCU will check the new main logic board or processor module and detect the System ID mismatch.

You can view the details for the main logic board or processor module simply by selecting either the main logic board or processor module. Once selected, the Serial number, Revision number, and Asset number display. The SCU then lists the server model number and server serial number information stored on the main logic board or processor module. You can then confirm the correct model number and serial number. This data is available on the label located on the server back panel.

## Obtaining Information Using Server Management Software

The DIGITAL Server is shipped with the DIGITAL ServerWORKS Manager software. ServerWORKS Manager is a workgroup and server management product for DIGITAL's family of servers. ServerWORKS Manager uses the Simple Network Management Protocol (SNMP) environment to assist the Network or Server administrator by constantly monitoring the network for problems.

DIGITAL ServerWORKS Manager is based on an open architecture that enables seamless integration and interoperability with popular enterprise management software packages such as Computer Associates' Unicenter2 TNG, Hewlett-Packard's OpenView UX for Windows, and IBM's Netview/6000 AIX. Also included with ServerWORKS Manager are Network Operating System (NOS) Agents for Windows NT V3.51 and V4.0, Novell NetWare™ V3.12 and V4.x, and SCO UNIX V5.0. The OS/2 NOS includes its own agent and can also be managed from ServerWORKS Manager.

DIGITAL ServerWORKS Manager allows the Network or Server Administrator to perform the following functions on the server:

- Manage DIGITAL PC print, file, and application servers supported by DIGITAL servers using a Windows-based graphical user interface (GUI) for point and click simplicity.
- Display server component information that provides critical information such as processor and file system utilization and information about the network interface.
- Automatically build a database of the network by Autodiscovering all SNMP network resources and display the nodes discovered during Autodiscovery on a color-coded topological map.
- Poll all network devices at intervals defined by the administrator.
- Perform an in-depth network analysis to continuously monitor the status of the network.
- Set alarms and alerts for specified events on all network devices, as well as the network itself, to spot problems early and avoid costly downtime.

*Refer to the DIGITAL ServerWORKS Manager Overview and Installation Guide for more information on how to use ServerWORKS Manager to view and be notified of events on the server.*

You can also manage the DIGITAL Server with other SNMP-based managers.

*Refer to the DIGITAL ServerWORKS Manager Overview and Installation Guide for more information.*

## Displaying Server Status Using the Hardware

There are two types of information displayed when the DIGITAL Server is operating:

- Normal status messages
- Error messages

During normal operation, Power-On Self Test (POST) and boot messages are displayed on the monitor. Some POST messages are also displayed on the OCP panel. When an error occurs, an error message is displayed on both the monitor and OCP panel and a beep is sounded from the server's speaker.

Messages displayed on the OCP panel can also be seen by using the DIGITAL ServerWORKS Manager.

## Server Status Messages

Component	Possible Failures	Result
Main logic board voltages: +12, +5, +3.3, and -12V	The voltages are outside of the power good range.	An error message displays and a warning beep sounds.
	The voltage exceeds the upper limit.	The server will shutdown after 5 minutes.
	The voltage falls below the lower limit.	A warning message displays and a warning beep sounds.
Fans 1, 2, 3, 4	The primary fans (fans 1 and 3) fail.	The redundant fans will activate.
	The primary fans (fans 1 and 3) and redundant fans (fans 2 and 4) do not operate.	The server will shutdown after 10 minutes.
Processor module voltages	The voltages are outside of the power good range.	A message displays and a warning beep sounds.
	The voltage exceeds the upper limit.	A warning message displays and a warning beep sounds.
	The voltage falls below the lower limit.	A warning message displays and a warning beep sounds.
Processor failure	A processor failure:  Internal	An error message displays and a warning beep sounds.
	Over temperature	Usually caused by a fan failure and the result is that the server shuts down.
Processors present	The incorrect number of processors are present in the server.	A message displays indicating the number of processors are present in the server.

*continued*

<b>Component</b>	<b>Possible Failures</b>	<b>Result</b>
Processor temperature sensing	The temperature exceeds 82 °C (179.6 °F).	The backup fans will activate without any warning.  If the temperature drops below 80 °C (176 °F), the backup fans will be turned off.
	The temperature exceeds the warning level (>85 degrees C) (>185 °F).	A warning message displays and a warning beep sounds. If the temperature exceeds the warning level for more than five minutes, the server will shut down.
	The temperature exceed the upper limit (>90 °C) (>194 °F).	The server will shut down.
Power supplies present	The incorrect number of power supplies are present with good status in the server.	A message displays indicating the number of power supplies present in the server.
Power supply failure	The temperature exceeds the upper limit or the voltages are out of range.	Power supply shuts down, an error message displays, and a beep sounds.

## POST OCP Messages

The following table lists the messages, both normal and error, that will display on the server's OCP panel during POST and any beeps that might sound when an error occurs.



**NOTE:** To disable the speaker, press the appropriate button located below the OCP once after a beep sounds. To enable it, repress the button once.

## POST Codes

POST Code Descriptions	Count Down Code <sup>(1)</sup>	Normal OCP Display	OCP Error Display	Beep Codes
BIOS ROM checksum				1-2-2-3
Test DRAM refresh				1-3-1-1
Test 8742 keyboard controller				1-3-1-3
RAM failure on address line xxxx				1-3-4-1
RAM failure on data bits xxxx of low byte of memory bus				1-3-4-3
RAM failure on data bits xxxx of high byte of memory bus				1-4-1-1
Check ROM copyright notice				2-1-2-3
Unexpected interrupts test	230	Unexpected int		2-2-3-1

<sup>(1)</sup> Count down codes are displayed on the server's monitor.

*continued*

<b>POST Code Descriptions</b>	<b>Count Down Code<sup>(1)</sup></b>	<b>Normal OCP Display</b>	<b>OCP Error Display</b>	<b>Beep Codes</b>
Shadow ROMs	220	Shadow ROMs test		
Test DRAM refresh 512K and 640K	210	512-640K DRAM		
Extended memory test	200	Ext. mem test	Memory test fail	
Set cache registers	190	Set cache regs.		
Cache configuration	180	Cache config.	Cache fail	
Real-time clock test	170	Real time clock	RTC fail RTC dead battery CMOS chksum bad	
Keyboard test	160	Keyboard test	KBC-8042 fail Keyboard fail	
Initial hardware interrupt	150	Init HW int		
Co-processor test	140	Co-processor test		
Serial ports test	130	Ser. Ports test		
Parallel ports test	120	Par. ports test		
Initiate onboard SIO	110	Init super I/O		
Mouse test	100	Mouse test		
Testing diskette drives	90	Floppy disk test	FDD A or B error	
Testing hard disk drives	80	Hard disk test		
CPU search	50	Search other CPU		
Search for option ROMs		Scan option ROM	OPROM chksum bad	1-2
Enable IRQs	20	Enable IRQs		
Setting time of day	10	Set time of day		
One short beep before boot				1

<sup>(1)</sup> Count down codes are displayed on the server's monitor.

## Boot Codes

Boot Code Descriptions	Normal OCP Display	OCP Error Display	Beep Codes
Do a complete RAM test			3-3-3-3-3
Boot the flash program			1
Boot code was read OK			3-1-1

## OCP Messages

During certain failure conditions, including out-of-range conditions, an error message will display on the OCP panel and a corresponding error code will sound from the server's speaker.



**NOTE:** To disable the speaker, press the appropriate button located below the OCP once after a beep sounds. To enable it, repress the button once.

Hot keys are defined in BIOS as [CTRL] + [ALT] +[1] and enable toggling of the OCP display status messages just as though the OCP button were pressed.



**NOTE:** Hot keys do not work during POST or during host server request service from the OCP.

If you do not press keys or buttons for some time, the LCD backlight will be disabled until you press a key. The time is set by the host server.

You can examine the server status messages by pressing the OCP switch located on the front panel repeatedly to sequence through the status list. The OCP switch is disabled during POST, during host request service from the 8031, or if an error is detected. The following table lists and describes the status messages and the error messages that display on the server's OCP panel. Also included are possible actions to take if a problem persists.

## OCP Status and Error Messages

Status	Normal OCP Display	OCP Error Display	Description of Error Display/Action
CPU ambient temperature	CPU1 temp=xxx°C	CPU1 over heat	Temperature of processor 1 is out of range.
	CPU2 temp=xxx°C	CPU2 over heat	Temperature of processor 2 is out of range.
	CPU3 temp=xxx°C	CPU3 over heat	Temperature of processor 3 is out of range.
	CPU4 temp=xxx°C	CPU4 over heat	Temperature of processor 4 is out of range. Action: Verify fans are operational. Action: Check that heat sink is correctly attached to the processor chip.
Power supply status	P/S1 OK	P/S1 fail	Power supply 1 is not working.
	P/S2 OK	P/S2 fail	Power supply 2 is not working.
	P/S3 OK	P/S3 fail	Power supply 3 is not working. Action: Replace any failed power supply.
Fan status	Sys fans OK	Sys fan 1 fail	Fan 1 is not working.
		Sys fan 2 fail	Fan 2 is not working.
		Sys fan 3 fail	Fan 3 is not working.
		Sys fan 4 fail	Fan 4 is not working. Action: Replace any failed fan.
CPU status	6000MPn n = CPU number	CPU1 fail	Internal defect of processor 1 or internal temperature exceeds the upper limit.
		CPU2 fail	Internal defect of processor 2 or internal temperature exceeds the upper limit.
		CPU3 fail	Internal defect of processor 3 or internal temperature exceeds the upper limit.
		CPU4 fail	Internal defect of processor 4 or internal temperature exceeds the upper limit.
		No CPU exists	No processors are present in the server. Action: Reboot server and check if the failed processor is still malfunctioning during POST.

*continued*

## Troubleshooting

Status	Normal OCP Display	OCP Error Display	Description of Error Display/Action
System voltages	Sys voltages OK	Sys +12V = xxxV Sys +5V = xxxV Sys 3.4V = xxxV Sys -12V = -xxxV	+12V is out of tolerance. + 5V is out of tolerance. +3.4V is out of tolerance. -12V is out of tolerance.  Action: Check that the power supplies are connected correctly.
CPU voltages	CPU voltages OK	VRM1 y.yyV=x.xxV  VRM2 y.yyV=x.xxV  VRM3 y.yyV=x.xxV  VRM4 y.yyV=x.xxV	Voltage Regulator Module (VRM) 1 should be y.yy volts and is being measured at x.xx volts.  VRM 2 should be y.yy volts and is being measured at x.xx volts.  VRM 3 should be y.yy volts and is being measured at x.xx volts.  VRM 4 should be y.yy volts and is being measured at x.xx volts.  Action: Diagnose whether the VRM or the processor module is bad.
Memory size information	xxxxxMB		
System BIOS revision	BIOS Vx.yy		x = main version yy = sub-version
8031 BIOS revision	8031 Vx.yy		x = main version yy = sub-version

## Server Processor Voltage and Temperature Ranges

The following tables list the processor and Voltage Regulator Module (VRM) operating voltage and temperature ranges.

### Processor Voltage Range

Nominal	Nominal Tolerance	Normal Voltage Range	Server Error Occurs	Server Shutdown Occurs
+12	-4 to + 5	+11.1 to +13.0 V	<+9.0 V	>+13.8 V
+5	-2 to + 5	+4.80 to +5.35 V	<+4.3 V	>+5.80 V
+3.43	-1 to + 1	+3.32 to +3.54 V	<+3.0 V	>+3.80 V
-12	-10 to + 10	-13.7 to -10.3 V	>-9.0 V	<-14.2 V
VGTL	-10 to + 10	+1.32 to +1.68 V	<+1.10 V	>+1.80 V

## VRM Voltage Range

VRM Voltage	Power Good Range	Lower Limit	Upper Limit
2.1 V	+1.95 to 2.25 V	<+1.89 V	>+2.31 V
2.2 V	+2.04 to 2.35 V	<+1.98 V	>+2.42 V
2.3 V	+2.14 to 2.46 V	<+2.07 V	>+2.53 V
2.4 V	+2.23 to 2.46 V	<+2.16 V	>+2.64 V
2.5 V	+2.32 to 2.68 V	<+2.25 V	>+2.75 V
2.6 V	+2.42 to 2.78 V	<+2.34 V	>+2.86 V
2.7 V	+2.51 to 2.89 V	<+2.43 V	>+2.97 V
2.8 V	+2.60 to 3.00 V	<+2.52 V	>+3.08 V
2.9 V	+2.70 to 3.10 V	<+2.61 V	>+3.19 V
3.0 V	+2.79 to 3.21 V	<+2.70 V	>+3.30 V
3.1 V	+2.88 to 3.32 V	<+2.79 V	>+3.41 V
3.2 V	+2.97 to 3.42 V	<+2.88 V	>+3.52 V
3.3 V	+3.07 to 3.53 V	<+2.97 V	>+3.63 V
3.4 V	+3.16 to 3.64 V	<+3.06 V	>+3.74 V
3.5 V	+3.25 to 3.75 V	<+3.15 V	>+3.84 V

## Processor Temperature Warning Levels

Warning Level	Upper Limit	Backup Fan Activated
>85 °C	>90 °C	>82 °C

## Advanced Troubleshooting

DIGITAL has a Customer Replaceable Unit (CRU) process during the warranty period for:

- DIGITAL monitors with screens less than 20 inches
- Mice
- Keyboards
- Other parts as defined by DIGITAL as CRUs

The DIGITAL CRU process provides for overnight shipment of the part directly to the customer site. Customers are billed for the specified part if they fail to return the part to DIGITAL within ten days of the replacement unit shipment.

In the following troubleshooting tables, “CRU Process” means that when a process is determined to be broken, use the previously-described CRU process.



**NOTE:** The following troubleshooting suggestions are not in any specific order. They are merely a list of possible problems and solutions.

## Server Troubleshooting

<b>Problem</b>	<b>Possible Cause</b>	<b>Action</b>
No response when the server is turned on.	Server is not plugged in.	Turn off the server, plug it in, and then turn it back on again.
	No power at the wall outlet.	Use another wall outlet.
	Main logic board failed.	Replace the main logic board.
	Main logic board switches incorrectly set.	Set all appropriate switches.
	Processor module has failed.	Replace the processor module.
	Processor module switches incorrectly set.	Make sure all switches are correctly set.
	Terminator card not seated properly (1P and 2P configurations only).	Reseat terminator card.
	Terminator card not installed.	Install terminator card.
	Top cover removed.	Install top cover.
	All power supplies failed.	Replace the power supply.
	Top cover interlock switch defective.	Replace interlock switch.
	Interlock switch cable not connected.	Reconnect cable at switch and main logic board.

*continued*

<b>Problem</b>	<b>Possible Cause</b>	<b>Action</b>
Power is on, but there is no screen display.	Brightness and contrast controls are not correctly set.	Adjust the brightness and contrast controls.
	Monitor is off.	Turn on the monitor.
	Monitor cable is incorrectly installed.	Check all monitor connections.
	Incorrect video drivers installed.	Install the correct video drivers.
	Video controller has failed.	Replace the main logic board.
Server does not boot from CD-ROM drive.	Monitor has failed.	Replace monitor.
	CD-ROM drive is not connected to the Adaptec controller.	Connect the CD-ROM to the Adaptec controller.
	CD-ROM drive not configured as a bootable device.	Change the CD-ROM setting to "bootable" using <i>SCSISelect</i> .
Server operates incorrectly after installing a processor module.	CD-ROM disc is not bootable.	Install the latest BIOS.
	Processor module installed incorrectly.	Reinstall processor module.
	SCU indicates an error after installing a processor module.	Remove processor module and reboot. If server boots without errors, replace processor module.

*continued*

## Troubleshooting

<b>Problem</b>	<b>Possible Cause</b>	<b>Action</b>
Server operates incorrectly after installing optional expansion board.	Expansion board installed incorrectly.	Remove expansion board and reinstall.
	Did not run SCU to configure expansion board after installation.	Run the SCU to properly configure expansion board.
	Did not install CFG file for expansion board.	Run SCU and add CFG file (if necessary).
	Expansion board has failed.	Remove expansion board and reboot. If server boots without errors, replace expansion board.
Server operates incorrectly after installing optional memory (DIMMs).	Memory configured incorrectly.	Reboot the server and check for any boot message to identify faulty DIMM(s).  Check that the memory configuration is according to the memory guidelines explained Chapter 5.
	DIMMs installed incorrectly.	Remove DIMMs and reinstall.
	DIMMs have failed.	Replace DIMMs.
	Memory module installed incorrectly.	Reinstall memory module.
	Memory module failed.	Replace memory module.

*continued*

<b>Problem</b>	<b>Possible Cause</b>	<b>Action</b>
No response to keyboard commands.	Keyboard might be password protected by a local or remote control program.	Enter the keyboard password.
	Keyboard is not connected.	Power down the server and connect the keyboard.
	Keyboard is connected to the mouse port.	Power down the server and connect the keyboard to the keyboard port.
No response to mouse commands.	Keyboard failed.	Replace the keyboard.
	Mouse might be password protected by a local or remote control program.	Enter the keyboard and mouse password.
	Mouse is not connected.	Power down the server and connect the mouse.
	Mouse is connected to the keyboard port.	Power down the server and connect the mouse to the mouse port.
	Mouse driver not installed.	Install the appropriate mouse driver.
	Mouse trackball dirty.	Clean trackball.
	Mouse failed.	Replace the mouse.
Server operates correctly but application software does not.	Application software installed incorrectly.	Refer to the application software documentation.
	Having external cache enabled causes conflict with application software.	Run the SCU and disable external cache.

## Disk Drive Troubleshooting

<b>Problem</b>	<b>Possible Cause</b>	<b>Action</b>
Server does not recognize an internal SCSI device.	SCSI device jumpers incorrectly set.	Refer to the supplied kit installation instructions.
	SCSI ID conflicts.	Refer to the supplied kit installation instructions and to the storage backplane jumper configuration.
	Terminating resistors not removed from the SCSI device.	Remove terminating resistors. Refer to the supplied kit installation instructions.
	SCSI adapter has failed.	Replace the SCSI adapter.
	Loose SCSI cable.	Secure all cable connections.
	SCSI cables incorrectly installed between SCSI adapter, SCSI device, or backplane.	Check all cabling.
	SCSI device has failed.	Replace SCSI device.
	SCSI controller configured for Ultra SCSI with no SCSI bus expander installed.	Reconfigure the SCSI controller to fast, wide SCSI.
Server does not recognize an external SCSI device.	SCSI device jumpers incorrectly set.	Refer to the supplied kit installation instructions
	SCSI ID conflicts.	Refer to the supplied kit installation instructions and to the storage backplane jumper configuration.
	Terminating resistors not removed from the SCSI device.	Remove terminating resistors. Refer to the supplied kit installation instructions.
	SCSI adapter has failed.	Replace the SCSI adapter.
	Loose SCSI cable.	Secure all cable connections.
	SCSI device has failed.	Replace SCSI device.

*continued*

<b>Problem</b>	<b>Possible Cause</b>	<b>Action</b>
Server does not boot from an internal SCSI hard disk drive.	Boot device not attached to the SCSI adapter at the lowest ROM address.	Run the SCU to define the server boot device.
	PCI/EISA scanning order incorrect.	Refer to the bus scanning examples in the <i>System Reference</i> manual.
	Bootable CD-ROM drive not connected to the primary SCSI adapter.	Connect the CD-ROM to the SCSI adapter.
	SCSI boot hard disk drive not formatted.	Format the SCSI hard disk drive.  <b>CAUTION:</b> Formatting the SCSI hard disk drive will destroy all the data on the drive.
	SCSI device drivers not installed or incorrectly installed on SCSI boot hard disk drive.	Properly install all required SCSI device drivers.
	Operating system software is not installed on the SCSI boot hard disk drive.	Install the appropriate operating system.
SCSI hard disk drive cannot read or write information.	Requested partition does not exist.	Partition the SCSI hard disk drive and then reload the operating software.
	SCSI boot hard disk drive at wrong SCSI address.	Set SCSI boot hard disk drive to lowest "primary" SCSI address.
	SCSI device has failed.	Replace SCSI device.
	Incorrect disk drive jumper settings.	Refer to the supplied kit installation instructions.
SBB failure.	Loose or incorrectly installed cables.	Make sure all cables are correctly installed.
	SCSI hard disk drive is not correctly formatted or partitioned.	Format and partition as required using the supplied operating system.
	Check SBB status LEDs for a drive failure indication.	Replace the SBB.

## SBB Troubleshooting

<b>Problem</b>	<b>Possible Cause</b>	<b>Action</b>
SBB fault LED lit.	Disk drive failed.	Replace disk drive.
SBB activity and fault LEDs lit.	Disk drive hung or has failed.	Replace disk drive.
SBB fault LED flashing.	Disk drive failed and is spinning down.	Replace disk drive.

## Tape Drive Troubleshooting

<b>Problem</b>	<b>Possible Cause</b>	<b>Action</b>
Tape will not load.	Tape inserted incorrectly.	Insert the tape with the arrow on the cassette pointing towards the drive.
Cannot write data to a tape.	Tape write-protected.	Slide the write-protect tab on the cassette to the closed position.
Tape will not eject.	Tape jammed in drive.	<p>Using a small screwdriver, rotate the motor shaft clockwise to bring threading mechanism to the initial loading position.</p> <p>If necessary, press the ratchet mechanism to tighten the tape before ejecting.</p> <p>Continue to turn the motor shaft clockwise until the tape can be lifted out of the drive mechanism and ejected from the drive.</p>

## Monitor Troubleshooting

<b>Problem</b>	<b>Possible Cause</b>	<b>Action</b>
Monitor power indicator is not on.	Monitor is turned off.	Turn on the monitor.
	Power cord is not connected.	Connect the power cord to the server.
	No power at wall outlet.	Use another outlet.
	Power indicator is defective.	Replace the monitor.
No screen display.	Configuration error.	Run the SCU to configure the server for video operation.
	Monitor brightness and contrast controls are incorrectly set.	Adjust the monitor brightness and contrast controls.
	Monitor has failed.	Replace monitor.
Distorted, rolling, or flickering screen display, or wrong/uneven color.	Monitor incorrectly adjusted.	Adjust accordingly.
	Monitor signal cable incorrectly installed.	Straighten any bent connector pins and then reconnect.
Color monitor displaying monochrome.	Server was turned on before the monitor was turned on.	Turn off the server, turn on the monitor, then turn the server back on.
Monitor fails to switch to high-resolution mode.	Appropriate high-resolution video drivers are not installed or incorrectly installed.	Correctly install all appropriate high-resolution video drivers. Refer to the documentation supplied with the monitor.

## CD-ROM Troubleshooting

<b>Problem</b>	<b>Possible Cause</b>	<b>Action</b>
Cannot access the CD-ROM drive. Error message reading drive x.	Device drivers not installed.	Install correct device drivers.
	No disc in the CD-ROM drive.	Insert a disc.
	Incorrect SCSI ID assigned.	Make sure correct SCSI ID is assigned.
	Tray open.	Close the tray.
Power is on but indicator shows no activity.	No disc or tray is open.	Insert a disc and close the tray.
	Check cable connections.	Make sure cables are correctly connected.
Disk is spinning but drive is idle.	Application software not running.	Run application software.

## Diskette Drive Troubleshooting

<b>Problem</b>	<b>Possible Cause</b>	<b>Action</b>
Target diskette drive cannot read or write information.	Diskette is not formatted.	Format the diskette.
	Diskette is worn or damaged.	Try another diskette.
	Diskette is write-protected.	Slide the write-protect switch so the hole is not visible.
	Diskette drive is empty.	Insert a diskette.
	Diskette write protection enabled.	Run the SCU and set the Diskette Write Protection option to "Disabled."
	Disabled in SCU	Run the SCU and enable the diskette drive.
Server does not boot from a target diskette drive.	Drive ID incorrectly set.	Make sure the drive ID is correctly set. Refer to the documentation that came with the diskette drive.
	Diskette drive not enabled.	Run the SCU and enable the diskette drive.
	Diskette boot option disabled.	Run the SCU and set boot option A then C.
	Diskette does not contain start-up files.	Insert a diskette with the correct start-up files.
	Diskette drive is empty.	Insert a diskette that contains an operating system.
	Diskette is worn or damaged.	Try another diskette.
	Loose cables.	Secure all cable connections.
Cannot write to target diskette drive.	Diskette drive write protected.	Run the SCU and disable the diskette write protection option.

## RAID Troubleshooting

<b>Problem</b>	<b>Possible Cause</b>	<b>Action</b>
SBB fault LED lit.	Disk drive failed.	Replace disk drive.
SBB activity and fault LEDs lit.	Disk drive hung or has failed.	Replace disk drive.
SBB fault LED flashing.	Disk drive failed and is spinning down.	Replace disk drive.
SBB fault status is either on or off; fault status LED flashing.	Disk drive is active and spinning down due to a fault.	Correct the fault or replace the disk drive.
Replaced SBB drive does not spin up to speed.	SBB drive not seen by RAID controller.	Manually rebuild the SBB drive. Remove the SBB drive, wait 20 seconds, reinsert SBB drive. Wait one minute and then rebuild the SBB drive.
Multiple SBB drives have failed.	No power available.	Restore power, run the RAID configuration utility and change the state of any failed (FLD) SBB drive to optimal (OPT). Run the RAID configuration utility and check for bad blocks on the SBB drives. Repair any bad blocks.
Server does not recognize an internal SCSI device.	SCSI controller configured for Ultra SCSI with no SCSI bus expander installed.	Reconfigure the SCSI controller to fast, wide SCSI.
SBB drive not seen by RAID adapter.	SCSI cable not connected.	Check all SCSI connections.
	Incorrect SCSI termination.	Properly terminate the SCSI bus.
	Duplicate SCSI IDs on the bus.	Check SBB drive SCSI ID settings.
	Defective SBB drive.	Replace SBB drive.
	SBB drive improperly inserted.	Reinsert SBB drive.
	Defective RAID adapter SCSI channels.	Replace the RAID adapter.

# FRU Replacement **5**

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## Introduction

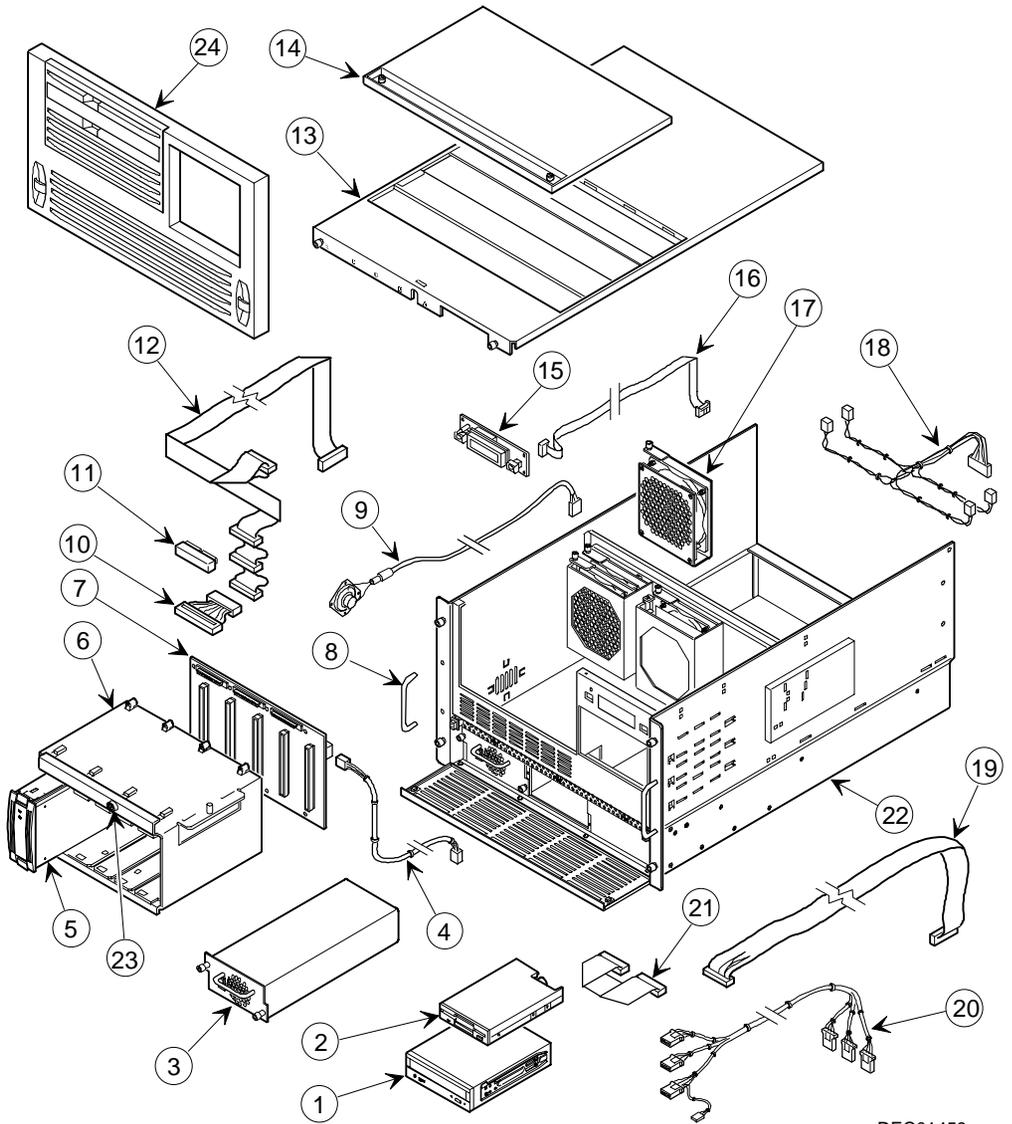
The following sections list the Illustrated Parts Breakdown (IPB) part numbers and related replacement procedures.



**NOTE:** Customer installable devices, such as expansion boards, memory, and disk drives are discussed in the *System Reference* manual.

**DIGITAL Server 7100R IPB (1 of 2)**

<b>Figure Legend</b>	<b>Spare Part Number</b>	<b>Exchangeable Part Number</b>	<b>Description</b>
1	30-48116-02		12X CD-ROM drive
2	PCXRJ-AD		1.44 MB floppy drive
3	30-49362-01		Power supply
4	17-04749-01		SBB power cable assembly
5	RZ28C-VW RZ29C-VW		2 GB 3.5-inch SCSI SBB 4 GB 3.5-inch SCSI SBB
6	70-33583-01		SBB mounting bracket assembly
7	54-25430-01		Storage backplane
8	12-45936-01		Front handle
9	70-33584-01		Speaker assembly
10	17-04009-02		Cable assembly, SCSI 68-pin to 50-pin adapter
11	12-45538-01		Wide SCSI terminator 68-pin POS SING-E
12	17-04143-04		Cable assembly, SCSI 68-pin COND, SCSI unshielded
13	70-33206-01		Top cover assembly (not an orderable part)
14	74-52058-01		Fan access cover (not an orderable part)
15	70-33582-01		OCP assembly
16	17-04096-02		OCP cable assembly
17	70-33579-01		Hot swap fan assembly
18	17-04746-01		Fan sense power cable assembly
19	17-03460-14		Cable assembly, 34-pin COND, 28 AWG
20	17-04745-01		Disk drive power cable assembly
21	17-04143-06		Cable assembly, 68-pin COND, SCSI bridge
22	30-49361-01		Enclosure assembly (chassis)
23	12-45865-01		Lock assembly with master key
24			Front bezel



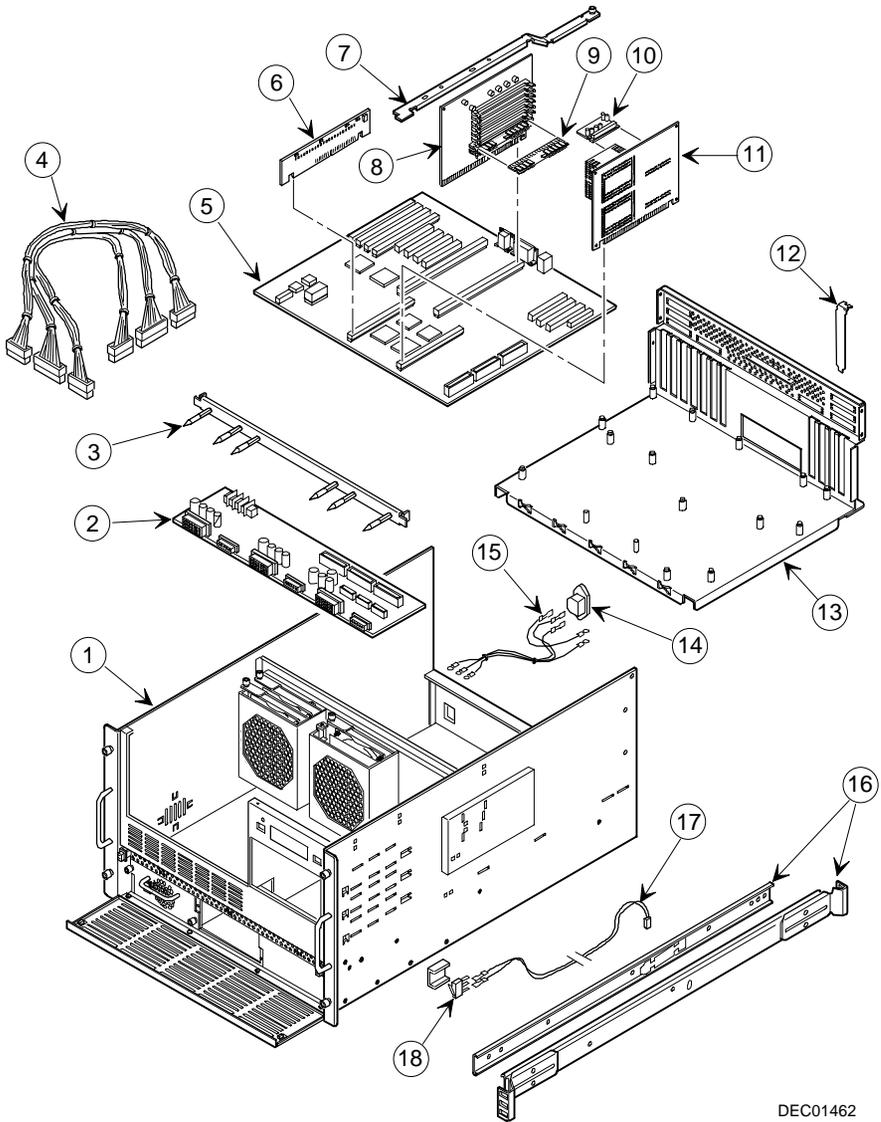
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Figure 5-1. Digital Server 7100R IPB (1 of 2)

**DIGITAL Server 7100R IPB (2 of 2)**

<b>Figure Legend</b>	<b>Spare Part Number</b>	<b>Exchangeable Part Number</b>	<b>Description</b>
1	30-49361-01		Enclosure assembly (chassis)
2	—		P. S. backplane
3	70-33580-01		Bracket, power supply guide bar assembly
4	17-04748-01		Main logic board DC power cable assembly
5	54-25422-01		Main logic board module
6	54-24060-01		Terminator module, P6 bus
7	70-33581-01		Bracket, hold down bar assembly
8	54-25314-01		Module, DIMM memory board
9	20-47083-D7		DIMM 60NS 4 M x 72 EDO 4K 3.3 V dc ECC
10	54-24052-01		Voltage regulator module P6
11	70-32543-03		Processor module assembly, single processor, w/P6-200
12	74-48300-01		Filler panel
13	74-52794-01		Rear bracket assembly (not an orderable part)
14	12-45933-01		ac receptacle assembly, 15 A
15	17-04744-01		ac input cable assembly
16	12-47476-01		Chassis slides
17	17-04747-01		Interlock switch cable assembly
18	12-45937-01		Interlock switch
*	30-49374-01		Cable arm

\* Not illustrated



DEC01462

Figure 5-1. Digital Server 7100R IPB (2 of 2)

## Labels and Nameplates

Orderable Spare Part	Description
36-49328-01	Label, Product ID DIGITAL Server 7100R
36-44556-01	Warning label, power switch
36-49344-01	Label, fan ID Server 7100R
36-49345-01	Label, Server 7100R Quick Reference

## Service Procedures

The following sections provide detailed service instructions for DIGITAL Servers.



**CAUTION:** Static electricity collects on non-conductors such as paper, cloth, or plastic. A static discharge can be damaging even though you often cannot see or feel it. To prevent damage to circuit boards and/or components:

- Before touching any circuit board or component, touch the metal frame of the workstation to discharge any static electricity.
- Keep circuit boards and components away from non-conductors.

## Recommended Tools

Have the following tools available:

- Multimeter (4½-inch digit)
- Phillips screwdriver
- Antistatic wrist strap (recommended, but not required)
- ¼-inch hex nut driver
- Tie wraps
- Wire cutters

## BIOS Version Information

For access directly to the software library for BIOS and driver updates, use the address::

<http://www.windows.digital.com/~ftp/00-index.stm>

## Disconnecting External Devices and Power

To disconnect external devices and power, perform the following:

1. Shut down any applications that are currently running, then shut down the operating system.
2. Turn off power to all external devices connected to the server.
3. Turn the server off.
4. Unplug the power cord from the back of the server.
5. Disconnect the monitor's power cord from the external ac outlet and the data cable from the server.

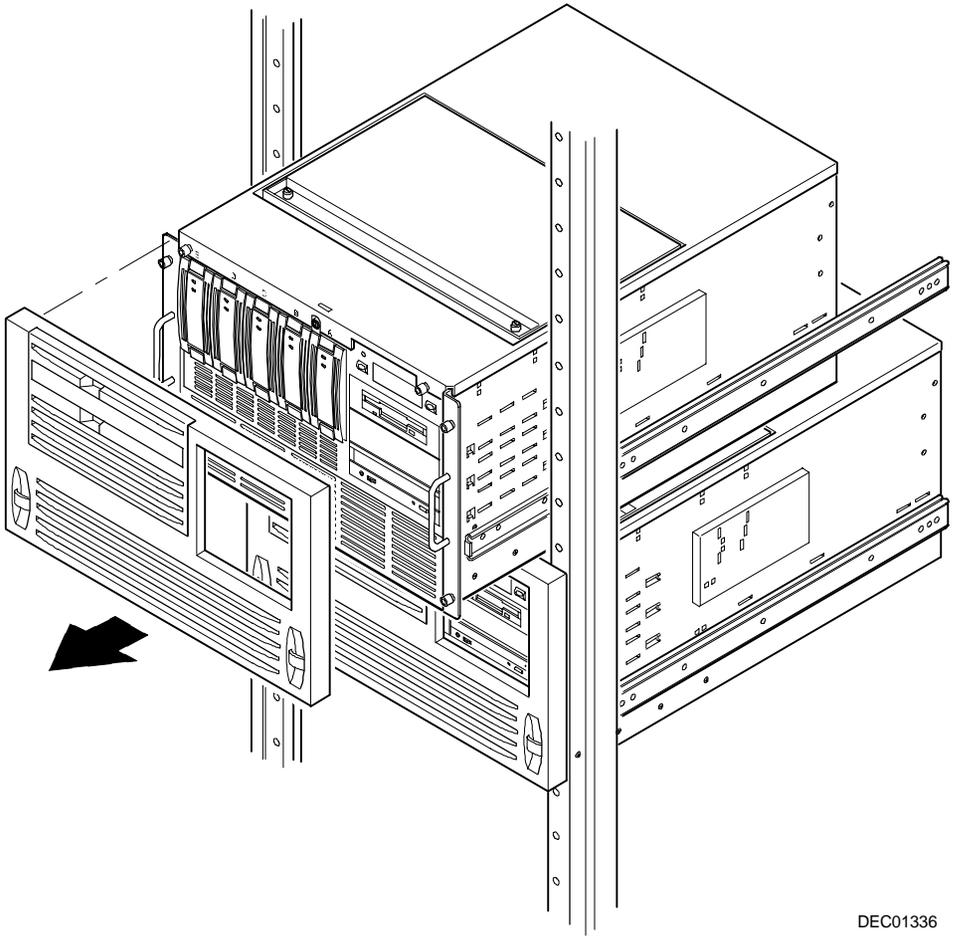
## Removing the Front Bezel

1. Turn off power to all external devices connected to the server.
2. Turn the server off.
3. Unplug the power cord from the back of the server.
4. Disconnect the monitor's power cord from the external ac outlet and the data cable from the server.
5. Remove the front bezel.
6. Loosen the screws at the front of the server.
7. Grasping the inset handles, pull the server from the rack.



**SHOCK OR STATIC SENSITIVE:** Static electricity collects on non-conductors such as paper, cloth, or plastic. A static discharge can be damaging even though you often cannot see or feel it. To prevent damage to circuit boards and/or components:

- Before touching any circuit board or component, touch the metal frame of the workstation to discharge any static electricity.
- Keep circuit boards and components away from non-conductors.



DEC01336

**Figure 5-2. Removing the Front Bezel**

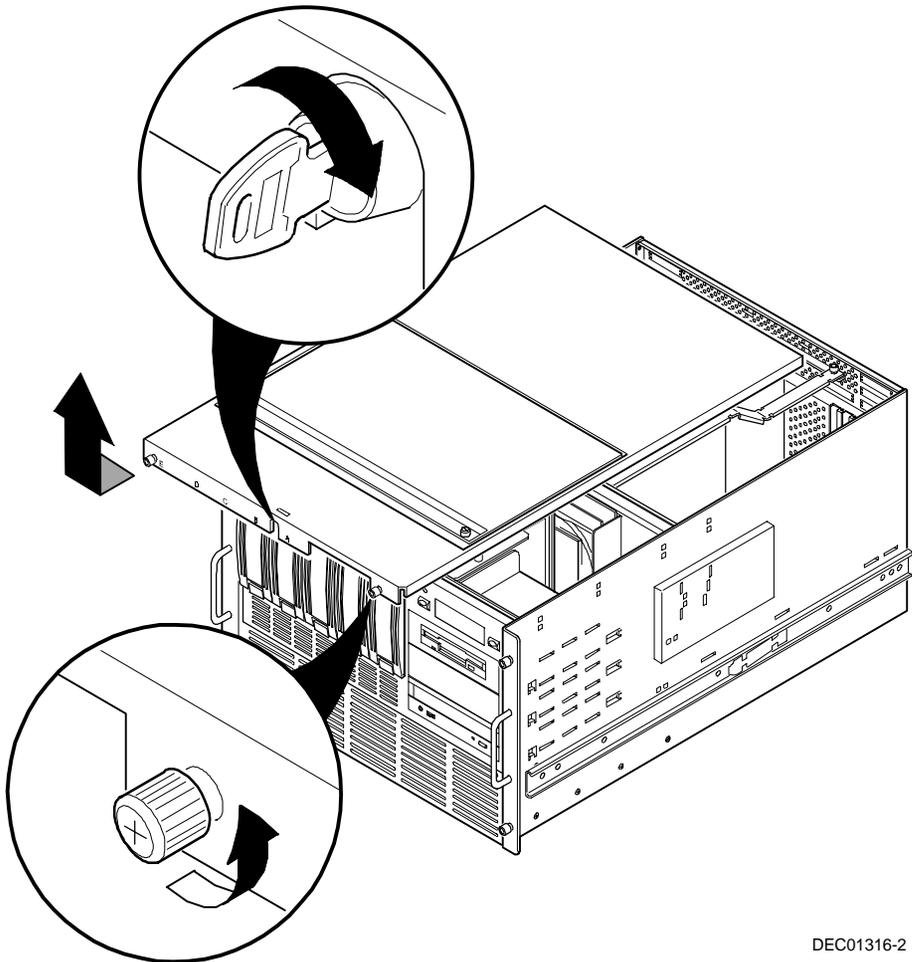
## Removing and Installing the Top Cover

To remove the top cover, perform the following:



**WARNING:** Removing the top cover activates an interlock switch located on the side of the server. This switch inhibits power to the server when activated. You might injure yourself or damage the server if you attempt to bypass this switch.

1. Unlock the top cover by pressing in on the key and then turning it clockwise.
2. Loosen the captive screws securing the top cover to the server's chassis.
3. Carefully slide the top cover forward and lift until it clears the chassis.

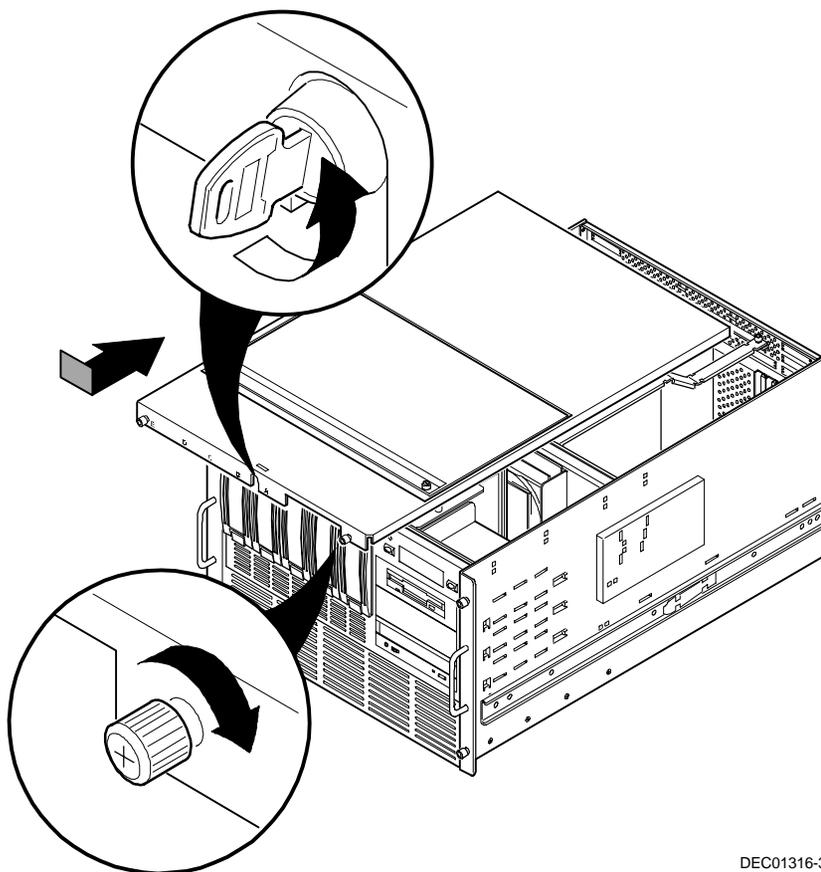


DEC01316-2

**Figure 5-3. Unlocking and Removing the Top Cover**

To install the top cover.

1. Carefully slide the top cover onto the server's chassis.
2. Secure the top cover to the server's chassis by tightening the captive screws.
3. Lock the top cover.

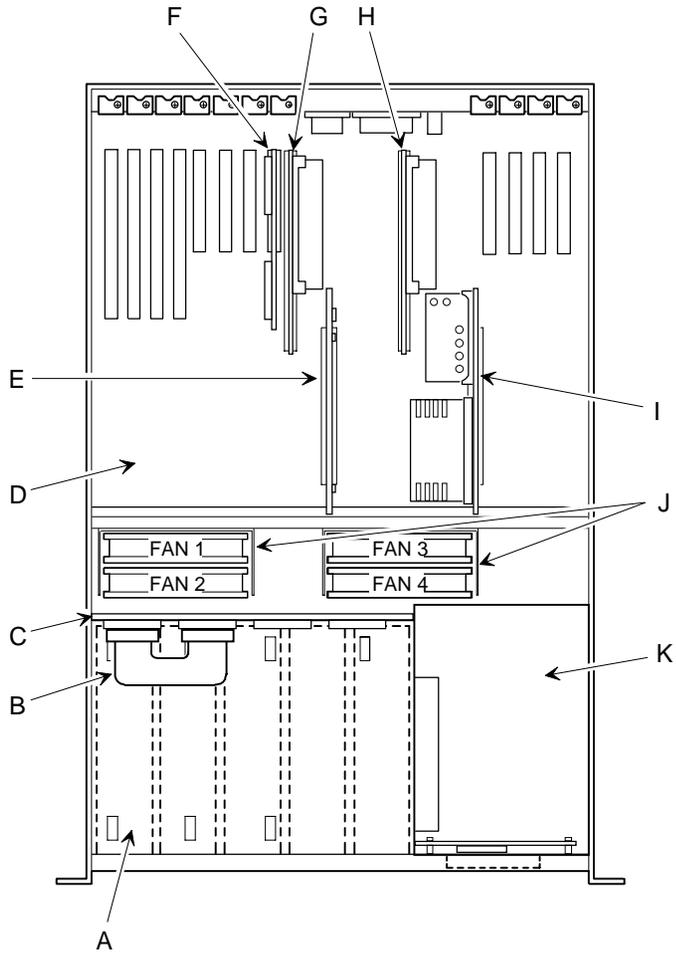


DEC01316-3

**Figure 5-4. Installing and Locking the Top Cover**

## Server Top View

<b>Figure Legend</b>	<b>Component</b>
A	Integral hot-swap drive bay for Storage Building Blocks (SBBs)
B	Split backplane wide Ultra SCSI jumper cable
C	Storage backplane
D	Main logic board
E	Terminator card or processor module 2
F	Wide Ultra SCSI adapter
G	Memory module 2
H	Memory module 1
I	Processor module 1
J	Cooling fans (4)
K	Top right drive bay

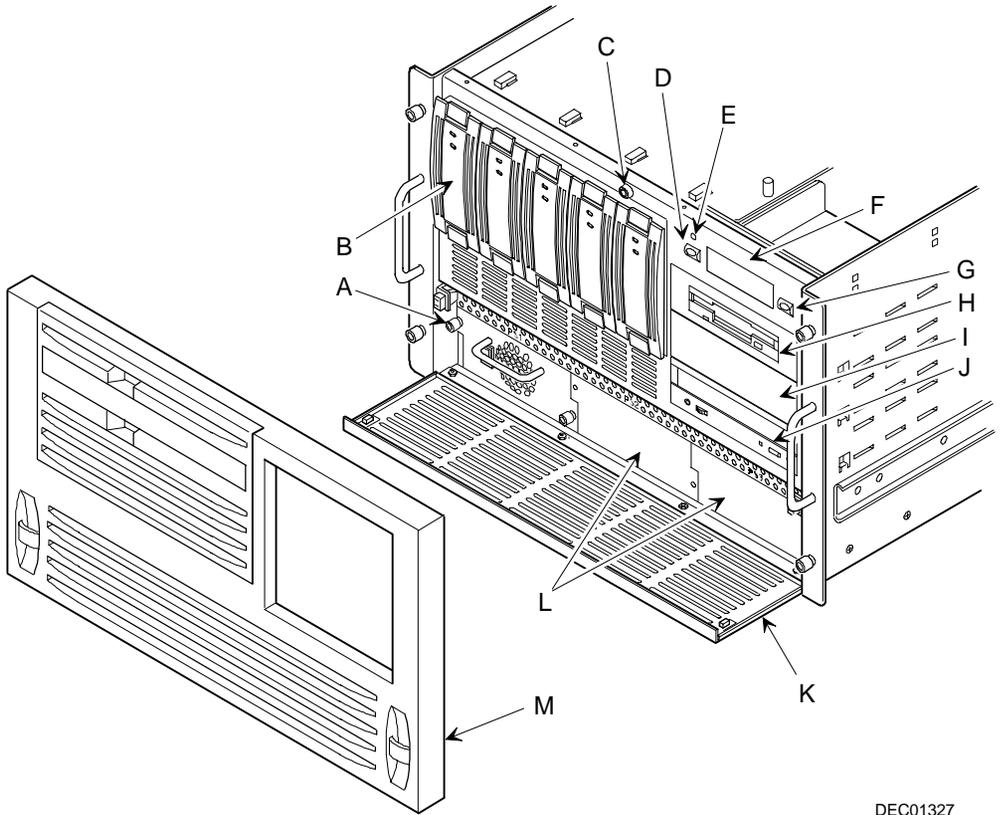


DEC01342-2

Figure 5-5. Server Top View

## Server Front View

<b>Figure Legend</b>	<b>Component</b>
A	Power supply
B	Storage Building Blocks (SBBs)
C	Keylock
D	Power button
E	Power indicator
F	Operator Control Panel (OCP)
G	OCP control button
H	3½-inch diskette drive
I	Front access 5¼-inch or 3½-inch half-height drive bay
J	CD-ROM drive
K	Power supply door
L	Optional power supply bays
M	Bezel (if installed)

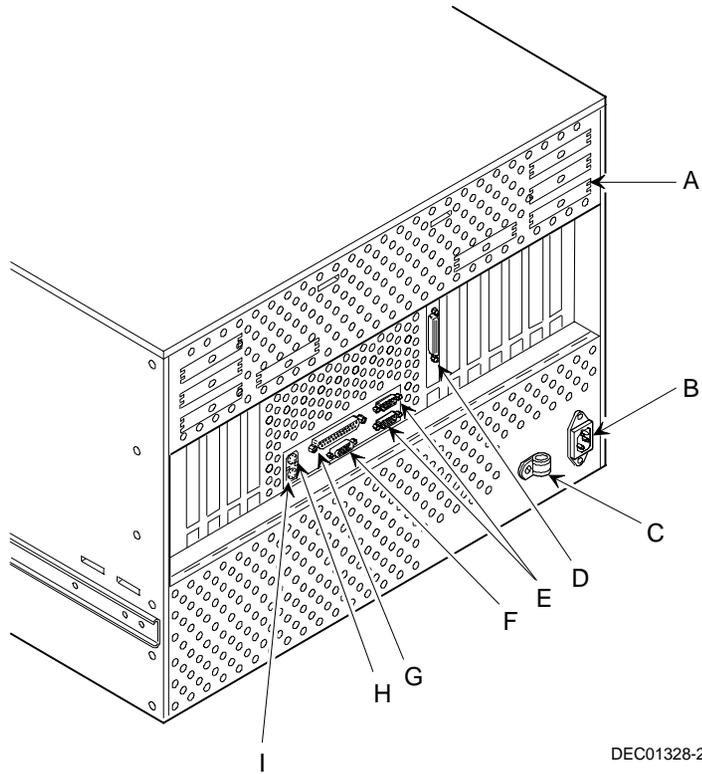


DEC01327

**Figure 5-6. Server Front View**

## Server Rear View

<b>Figure Legend</b>	<b>Component</b>
A	Eight SCSI knockouts
B	ac power plug
C	Strain relief clamp
D	SCSI adapter connector
E	Two serial ports
F	Video port
G	Parallel port
H	Mouse port
I	Keyboard port

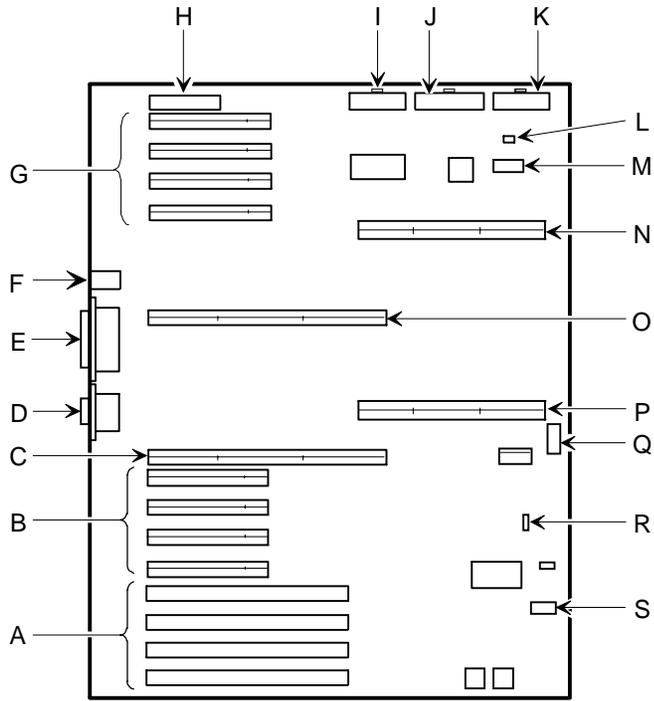


DEC01328-2

**Figure 5-7. Server Rear View**

## Main Logic Board Connectors

Figure Legend	Connector
A	EISA expansion slots (1 through 4); slot one is a shared EISA/PCI slot
B	Primary PCI expansion slots (1 through 4); slot four is a shared PCI/EISA slot
C	Memory module 2
D	Serial ports
E	Parallel port and video port
F	Mouse and keyboard ports
G	Secondary PCI expansion slots (5 through 8)
H	Diskette drive
I	3.3 V dc power supply
J	5 V dc power supply
K	Power control signal
L	Top cover interlock connector
M	Operator Control Panel (OCP)
N	Processor module 1
O	Memory module 1
P	Processor module 2 or terminator card
Q	Fan connector (fans 1 through 4)
R	Speaker
S	Remote Server Management (RSM)

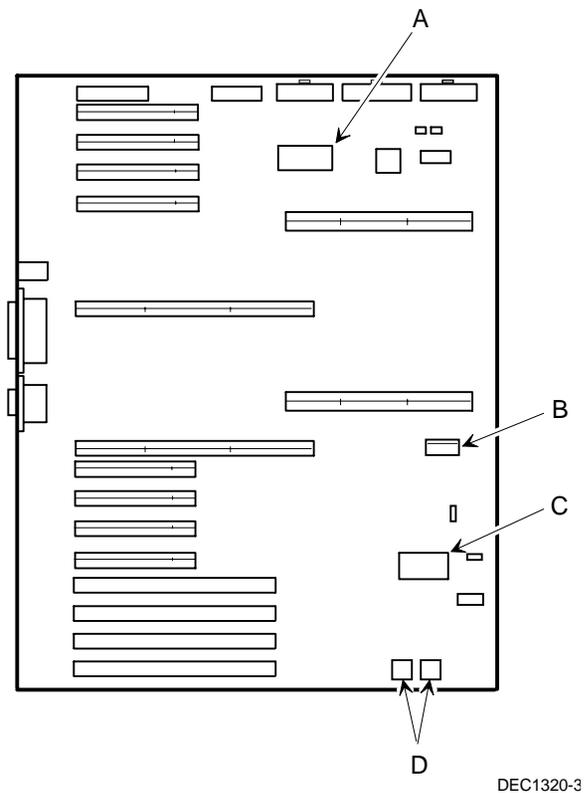


DEC01320-2

**Figure 5-8. Main Logic Board Connectors**

## Main Logic Board Components

Figure Legend	Component
A	8031 ROM
B	Dip switch block (J35)
C	Real-time clock/server battery
D	BIOS flash ROM



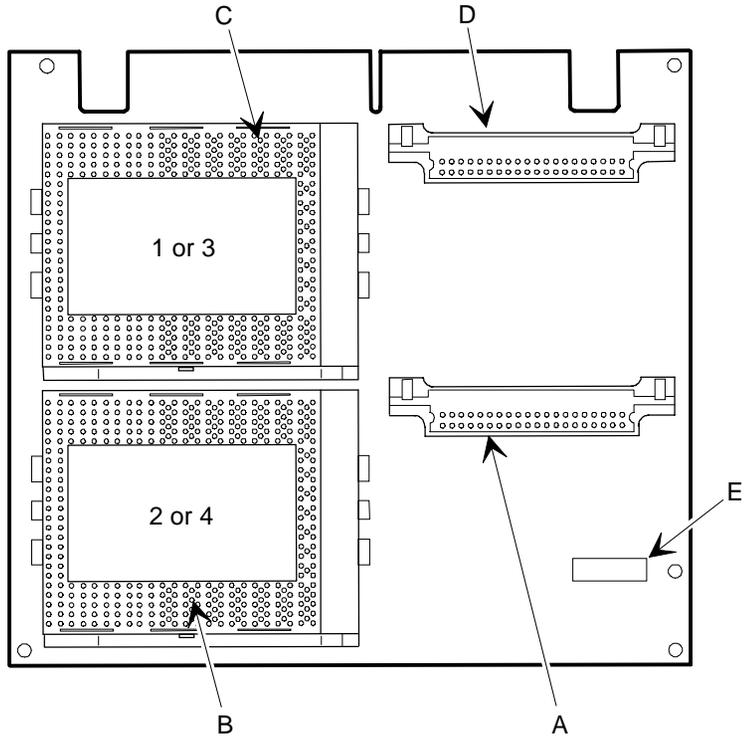
DEC1320-3

**Figure 5-9. Main Logic Board Components**

## Processor Module Components and Connectors

<b>Figure Legend</b>	<b>Component/Connector</b>
A	Voltage regulator (processor 2 or 4)
B	Processor ZIF socket (2 or 4)
C	Processor ZIF socket (1 or 3)
D	Voltage regulator (processor 1 or 3)
E	Frequency ratio DIP switches

FRU Replacement



DEC01408-2

**Figure 5-10. Processor Module Components and Connectors**

## Main Logic Board Switch Settings

The following table lists the main logic board switch and factory-default settings. Figure 5-11 shows the switch location.



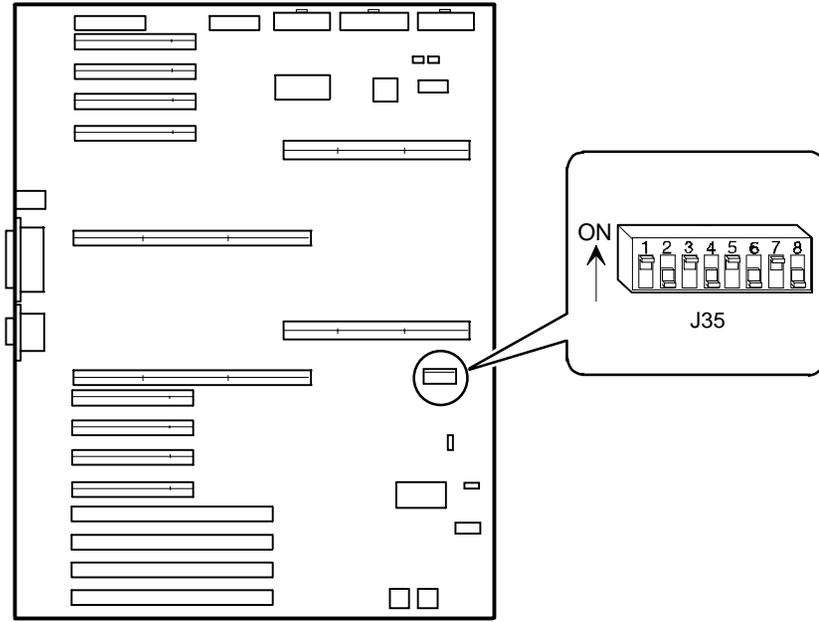
**CAUTION:** Do not touch any electronic component unless you are safely grounded. Wear a grounded wrist strap or touch an exposed metal part of the server chassis. A static discharge from the fingers can result in permanent damage to electronic components.

## FRU Replacement

Feature	Function	Setting	Description
BIOS upgrade	Disabled Enabled <sup>(1)</sup>	J35-SW1, off J35-SW1, on <sup>(1)</sup>	The main logic board's flash BIOS upgrade switch must be set to the disabled (OFF) position to prevent unauthorized personnel from loading a new server BIOS. Loading a new server BIOS might allow someone to override other server security features or introduce a virus into the server.
Recovery mode	Normal <sup>(1)</sup> Recovery mode	J35-SW2, off <sup>(1)</sup> J35-SW2, on	If the BIOS upgrade failed, refer to the README.TXT file that came with the BIOS upgrade.
Boot block update	Disabled <sup>(1)</sup> Enabled	J35-SW3, off <sup>(1)</sup> J35-SW3, on	Set this switch to disabled (OFF) position to prevent unauthorized personnel from changing the BIOS boot block.
Password clear	Normal mode <sup>(1)</sup> Password clear	J35-SW4, off <sup>(1)</sup> J35-SW4, on	Set this switch to the password clear (ON) position and then restart the server to reset the password.
RSM	Not installed <sup>(1)</sup> Installed	J35-SW5, on <sup>(1)</sup> J35-SW5, off	If DIGITAL's Remote Server Management (RSM) option is added to the server, connect the RSM reset cable to connector RSM and change the switch position to the installed (OFF) position.
NVRAM	Normal <sup>(1)</sup> Clear	J35-SW6, off <sup>(1)</sup> J35-SW6, on	Clears contents of NVRAM. Set only in the case when a configuration change using the SCU did not complete successfully (e.g. power failed while configuring), or a configuration was defined which no longer allows the server to boot. The BIOS settings will return to their default values, and the SCU will need to be rerun to reconfigure the server.
CPU bus speed	60 MHz 66 MHz <sup>(1)</sup>	J35-SW7, off J35-SW7, on <sup>(1)</sup>	Determines the processor clock speed for the installed processor(s).  200 MHz processor = 66 MHz
Reserved	Reserved	J35-SW8, off <sup>(1)</sup>	This switch should always be OFF.

(1) Factory default setting

ON = switch closed; OFF = switch open



DEC01320-6

**Figure 5-11. Main Logic Board Switch Location**

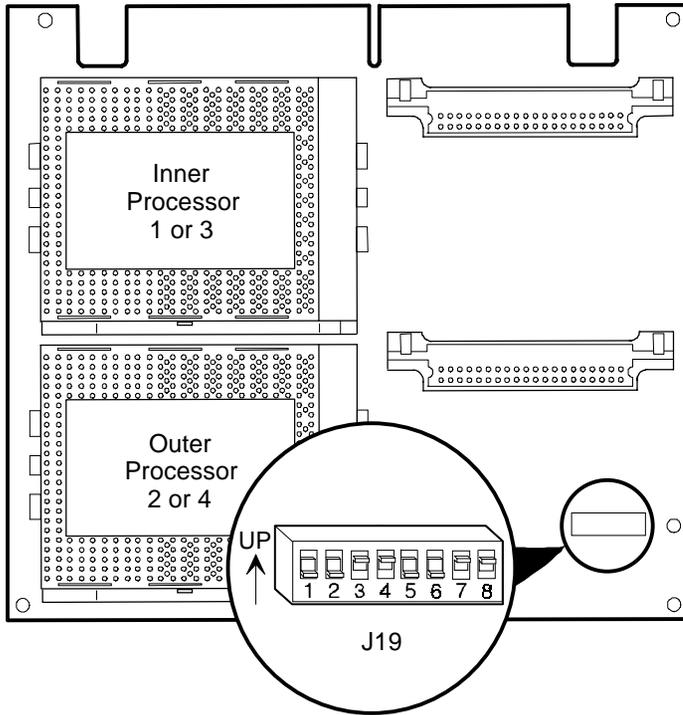
## Processor Module Switch Settings

The following table lists the processor module switch settings. Figure 5-12 shows the switch location.



**CAUTION:** Do not touch any electronic component unless you are safely grounded. Wear a grounded wrist strap or touch an exposed metal part of the server chassis. A static discharge from your fingers can result in permanent damage to electronic components.

Speed	Position	Switches	J19 Switch Settings
120/133 MHz	<input type="checkbox"/> UP	4, 8	■ ■ ■ <input type="checkbox"/> ■ ■ ■ <input type="checkbox"/>
	<input checked="" type="checkbox"/> DOWN	1, 2, 3, 5, 6, 7	
150/166 MHz	<input type="checkbox"/> UP	3, 4, 7, 8	■ ■ <input type="checkbox"/> <input type="checkbox"/> ■ ■ <input type="checkbox"/> <input type="checkbox"/>
	<input checked="" type="checkbox"/> DOWN	1, 2, 5, 6	
180/200 MHz	<input type="checkbox"/> UP	1, 4, 5, 8	<input type="checkbox"/> ■ ■ <input type="checkbox"/> <input type="checkbox"/> ■ ■ <input type="checkbox"/>
	<input checked="" type="checkbox"/> DOWN	2, 3, 6, 7	
210/233 MHz	<input type="checkbox"/> UP	1, 3, 4, 5, 7, 8	<input type="checkbox"/> ■ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> ■ <input type="checkbox"/> <input type="checkbox"/>
	<input checked="" type="checkbox"/> DOWN	2, 6	
240/266 MHz	<input type="checkbox"/> UP	2, 4, 6, 8	■ <input type="checkbox"/> ■ <input type="checkbox"/> ■ <input type="checkbox"/> ■ <input type="checkbox"/>
	<input checked="" type="checkbox"/> DOWN	1, 3, 5, 7	
270/300 MHz	<input type="checkbox"/> UP	2, 3, 4, 6, 7, 8	■ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> ■ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
	<input checked="" type="checkbox"/> DOWN	1, 5	
300/333 MHz	<input type="checkbox"/> UP	1, 2, 4, 5, 6, 8	<input type="checkbox"/> <input type="checkbox"/> ■ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> ■ <input type="checkbox"/>
	<input checked="" type="checkbox"/> DOWN	3, 7	
330/363 MHz	<input type="checkbox"/> UP	1, 2, 3, 4, 5, 6, 7, 8	<input type="checkbox"/>



DEC01408-3

**Figure 5-12. Processor Module Switch Location**

## Installing Additional Memory

The DIGITAL server supports up to 4 GB of EDO/ECC server memory using 168-pin Dual In-Line Memory Modules (DIMMs). Memory can be increased by adding or replacing DIMMs on the memory modules installed in the server.

This section provides the memory configuration guidelines that must be followed prior to installing additional DIMMs on memory modules 1 and 2. Procedures for removing a memory module and troubleshooting are also included.

The DIGITAL Server provides a 4-way interleaved memory system, with 128 MB (4 x 32 MB) minimum supported memory and 4 GB (16 x 256 MB) of maximum supported memory. Prior to installing any DIMM combination, make sure you read the memory configuration guidelines that follow.

Only install DIMMs supported by Digital Equipment Corporation.

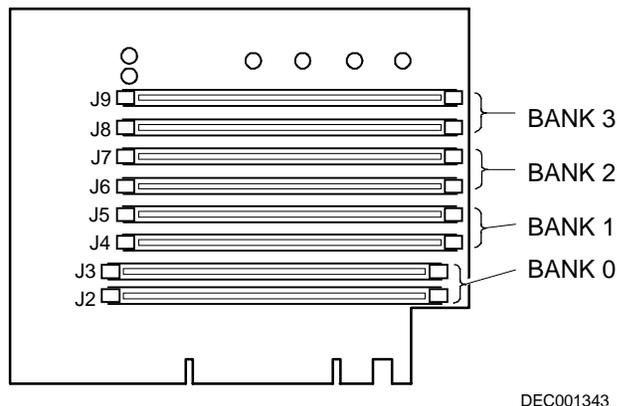
## Supported DIMM Upgrade Kits

The following DIMM upgrade kits are available:

<b>DIMM Size</b>	<b>Order Number</b>	<b>Quantity</b>	<b>Total Capacity</b>
32 MB	FR-PCSMA-AG	4	128 MB
64 MB	FR-PCSMA-AH	4	256 MB
128 MB	FR-PCSMA-AJ	4	512 MB
256 MB	FR-PCSMA-AK	4	1024 MB

## Memory Configuration Guidelines

- Install DIMMs supplied by DIGITAL as follows:
  - Install 168-pin, 72-bit EDO/ECC DIMMs operating at 60 ns
  - DIMM capacities supported are 32 MB, 64 MB, 128 MB, and 256 MB
- Both DIMM memory expansion boards must be installed for proper server operation.
  - Memory banks consists of four DIMM sockets (two DIMM sockets on each memory expansion board). For example, two sockets (J2 and J3) on board 1 with the corresponding two sockets (J2 and J3) on board 2 equals one bank. See Figure 5-13 for DIMM bank locations.
  - Memory banks must be filled completely (with four DIMMs) and consecutively starting with Bank 0.
  - Different capacity DIMMs can be installed in subsequent banks. However, within each memory bank, DIMMs must be the same capacity, type, and speed.



**Figure 5-13. DIMM Bank Locations**

### Memory Configuration Examples, In Megabytes (MB)

Bank 0				Bank 1				Bank 2				Bank 3				Total
Board 1		Board 2		Board 1		Board 2		Board 1		Board 2		Board 1		Board 2		
J2	J3	J2	J3	J4	J5	J4	J5	J6	J7	J6	J7	J8	J9	J8	J9	
32	32	32	32													128
32	32	32	32	32	32	32	32									256
32	32	32	32	32	32	32	32	32	32	32	32					384
32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	512
64	64	64	64													256
64	64	64	64	32	32	32	32									384
64	64	64	64	32	32	32	32	32	32	32	32					512
64	64	64	64	64	64	64	64									512
64	64	64	64	32	32	32	32	32	32	32	32	32	32	32	32	640
64	64	64	64	64	64	64	64	32	32	32	32					640
64	64	64	64	64	64	64	64	32	32	32	32	32	32	32	32	768
64	64	64	64	64	64	64	64	64	64	64	64					768
64	64	64	64	64	64	64	64	64	64	64	64	32	32	32	32	896
64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	1024
128	128	128	128													512
128	128	128	128	32	32	32	32									640
128	128	128	128	64	64	64	64									768
128	128	128	128	32	32	32	32	32	32	32	32					768
128	128	128	128	64	64	64	64	32	32	32	32					896
128	128	128	128	32	32	32	32	32	32	32	32	32	32	32	32	896
128	128	128	128	64	64	64	64	64	64	64	64					1024
128	128	128	128	64	64	64	64	64	64	64	64	32	32	32	32	1152
128	128	128	128	64	64	64	64	64	64	64	64	64	64	64	64	1280
128	128	128	128	128	128	128	128									1024
128	128	128	128	128	128	128	128	32	32	32	32					1152
128	128	128	128	128	128	128	128	64	64	64	64					1280
128	128	128	128	128	128	128	128	32	32	32	32	32	32	32	32	1280
128	128	128	128	128	128	128	128	64	64	64	64	64	64	64	64	1408
128	128	128	128	128	128	128	128	64	64	64	64	64	64	64	64	1536

*continued*

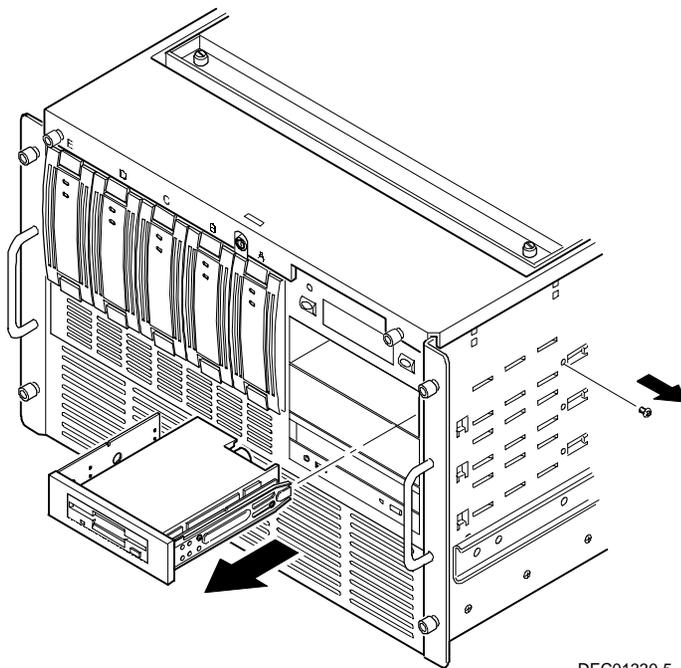
FRU Replacement

Bank 0				Bank 1				Bank 2				Bank 3				Total
Board 1		Board 2														
J2	J3	J2	J3	J4	J5	J4	J5	J6	J7	J6	J7	J8	J9	J8	J9	
128	128	128	128	128	128	128	128	128	128	128	128					1536
128	128	128	128	128	128	128	128	128	128	128	128	32	32	32	32	1664
128	128	128	128	128	128	128	128	128	128	128	128	64	64	64	64	1792
128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	2048
256	256	256	256													1024
256	256	256	256	32	32	32	32									1152
256	256	256	256	64	64	64	64									1280
256	256	256	256	64	64	64	64	32	32	32	32					1408
256	256	256	256	128	128	128	128									1536
256	256	256	256	256	256	256	256									2048
256	256	256	256	32	32	32	32	32	32	32	32					1280
256	256	256	256	64	64	64	64	64	64	64	64					1536
256	256	256	256	128	128	128	128	32	32	32	32					1664
256	256	256	256	128	128	128	128	64	64	64	64					1792
256	256	256	256	128	128	128	128	128	128	128	128					2048
256	256	256	256	256	256	256	256	32	32	32	32					2176
256	256	256	256	256	256	256	256	64	64	64	64					2304
256	256	256	256	256	256	256	256	128	128	128	128					2560
256	256	256	256	256	256	256	256	256	256	256	256					3072
256	256	256	256	256	256	256	256	256	256	256	256	32	32	32	32	3200
256	256	256	256	256	256	256	256	256	256	256	256	64	64	64	64	3328
256	256	256	256	256	256	256	256	256	256	256	256	128	128	128	128	3584
256	256	256	256	256	256	256	256	256	256	256	256	256	256	256	256	4096



## Removing and Replacing the Diskette Drive

1. Turn off power to all external devices connected to the server.
2. Turn off the server.
3. Disconnect the power cord from the rear of the server.
4. Remove the front bezel.
5. Loosen the screws at the front of the server and then pull it from the rack.
6. Remove the top cover.
7. Disconnect all cables attached to the diskette drive.
8. Remove the drive-retainer screw from the side of chassis.
9. Slide the drive out of the drive bay.
10. Remove the drive from the drive carrier.
11. Replace the diskette drive by performing the removal steps in reverse order.

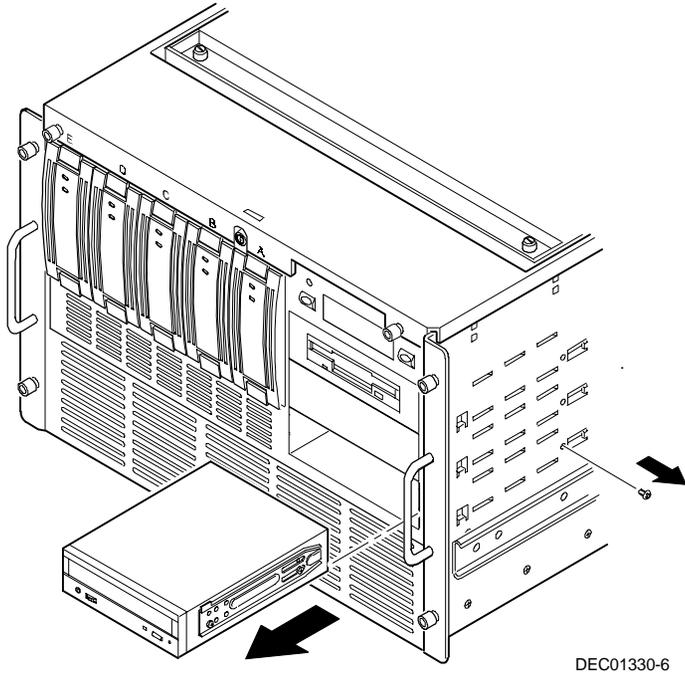


DEC01330-5

**Figure 5-14. Removing and Replacing the Diskette Drive**

## Removing and Replacing the CD-ROM Drive

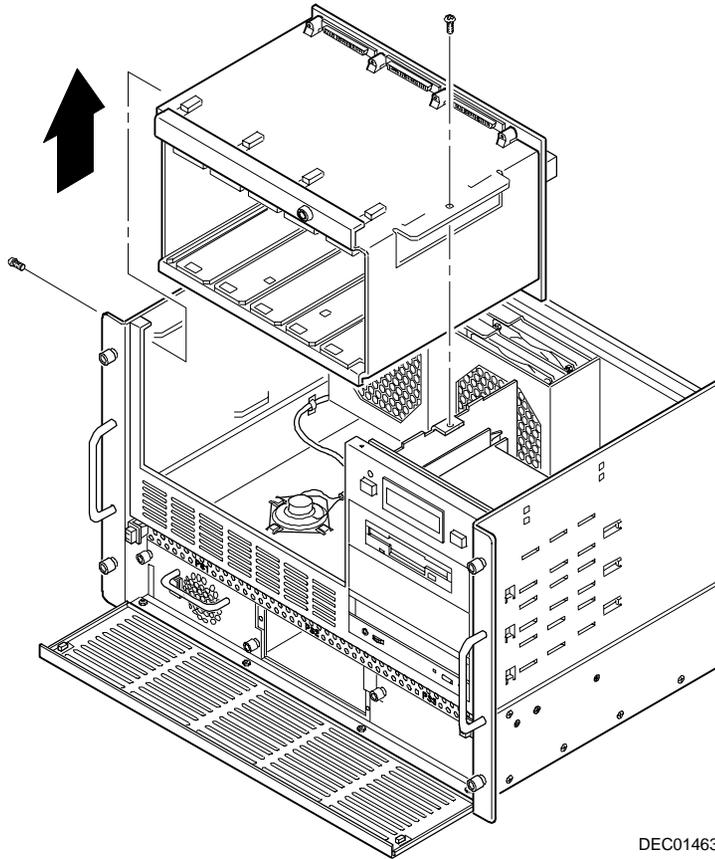
1. Turn off power to all external devices connected to the server.
2. Turn off the server.
3. Disconnect the power cord from the rear of the server.
4. Remove the front bezel.
5. Loosen the screws at the front of the server and then pull it from the rack.
6. Remove the top cover.
7. Disconnect all cables attached to the CD-ROM drive.
8. Remove the drive-retainer screw from the side of the chassis.
9. Slide the CD-ROM drive out of the drive bay.
10. Set jumpers on the new CD-ROM drive identical to those on the removed CD-ROM drive.
11. Replace the CD-ROM drive by performing the removal steps in reverse order.



**Figure 5-15. Removing and Replacing the CD-ROM Drive**

## Removing and Replacing the SBB Mounting Bracket Assembly

1. Turn off power to all external devices connected to the server.
2. Turn off the server.
3. Disconnect the power cord from the rear of the server.
4. Remove the front bezel.
5. Loosen the screws at the front of the server and then pull it from the rack.
6. Remove the top cover.
7. Remove all SBB devices.
8. Record and disconnect all cables attached to the SBB mounting bracket assembly.
9. Loosen the hold-down screws on the SBB mounting bracket assembly (both at the top and side).
10. Lift the SBB mounting bracket assembly up and away from the chassis.
11. Replace the SBB mounting bracket assembly by performing the removal steps in reverse order.

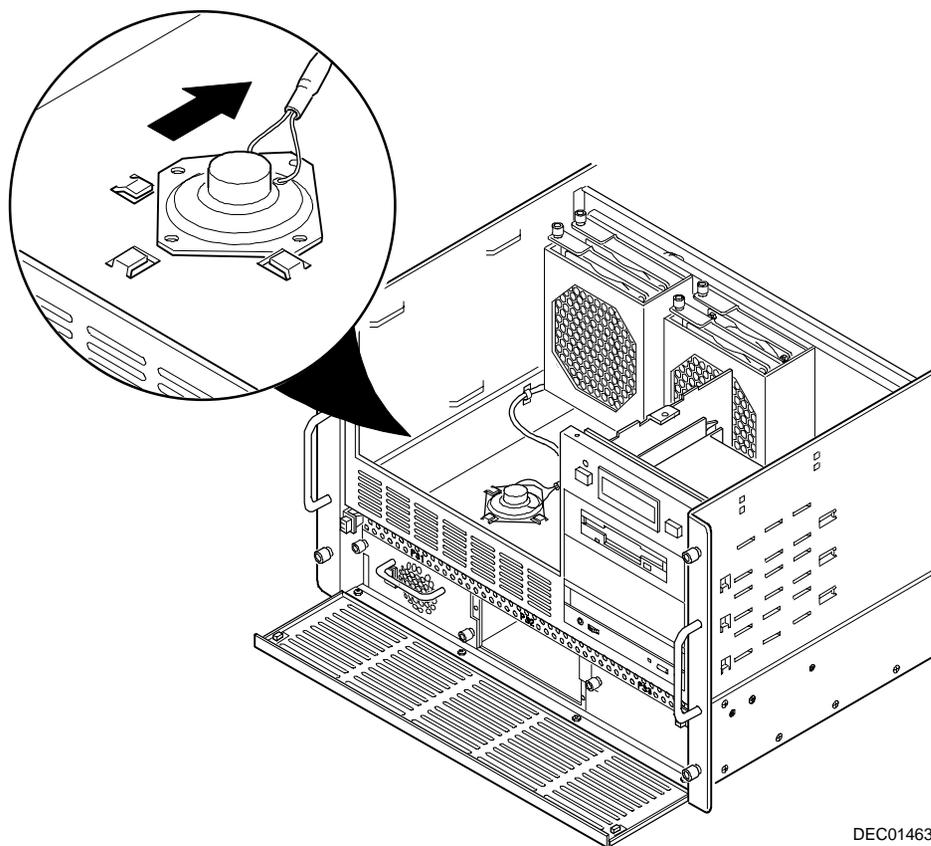


DEC01463-3

**Figure 5-16. Removing and Replacing the SBB Mounting Bracket Assembly**

## Removing and Replacing the Speaker

1. Turn off power to all external devices connected to the server.
2. Turn off the server.
3. Disconnect the power cord from the rear of the server.
4. Remove the front bezel.
5. Loosen the screws at the front of the server and then pull it from the rack.
6. Remove the top cover.
7. Remove the SBB mounting bracket assembly.
8. Disconnect the speaker cable from the main logic board.
9. Slide the speaker back and out of its retaining clips.
10. Replace the speaker by performing the removal steps in reverse order.



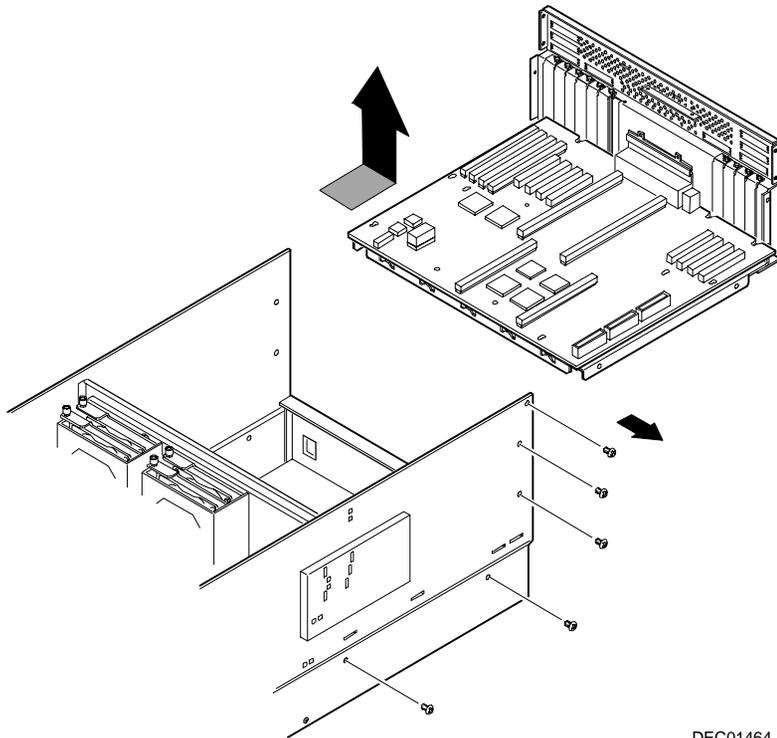
DEC01463-2

**Figure 5-17. Removing and Replacing the Speaker**

## Removing and Replacing the Rear Bracket Assembly

The rear bracket assembly must be removed to gain access to the power backplane and/or to replace power cables connected to the power backplane.

1. Turn off power to all external devices connected to the server.
2. Turn off the server.
3. Disconnect the power cord from the rear of the server.
4. Remove the front bezel.
5. Loosen the screws at the front of the server and then pull it from the rack.
6. Remove the top cover.
7. Remove the hold down bar brackets securing the memory modules and processor modules to the main logic board.
8. Record and disconnect all cables attached to the rear bracket assembly and main logic board.
9. Remove all memory modules, processor modules, and expansion boards connected to the main logic board.
10. Remove the retaining screws from each side of the chassis.
11. Lift the rear bracket assembly out of the chassis.
12. To replace the rear bracket assembly, perform the removal steps in reverse.



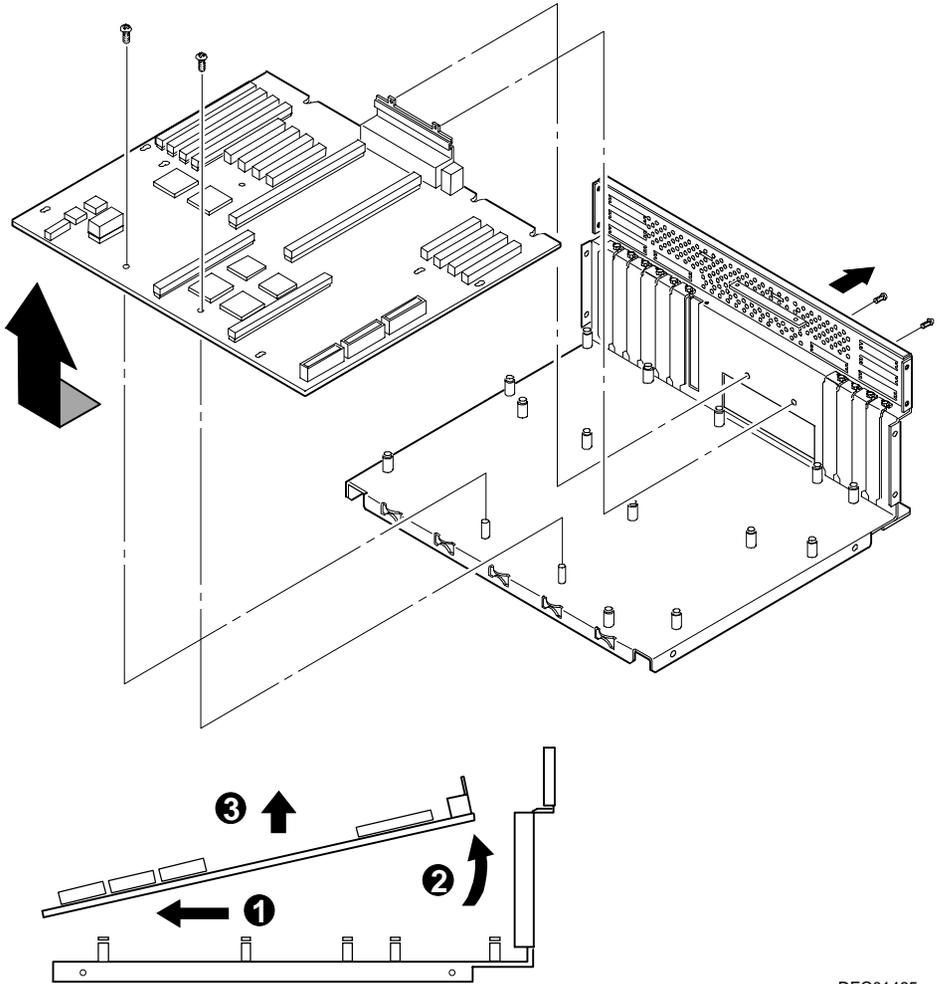
DEC01464

**Figure 5-18. Removing and Replacing the Rear Bracket Assembly**

## Removing and Replacing the Main Logic Board

1. Turn off power to all external devices connected to the server.
2. Turn off the server.
3. Disconnect the power cord from the rear of the server.
4. Remove the front bezel.
5. Loosen the screws at the front of the server and then pull it from the rack.
6. Remove the top cover.
7. Record the main logic board switch settings.
8. Remove the main logic board retaining screws.
9. Remove the main logic board from the server.
10. Configure switch settings (SW1) on the new main logic board using the settings recorded in step 7.
11. To replace the main logic board, perform the removal steps in reverse.
12. Run the SCU to configure the server and restore the system management information.

FRU Replacement



DEC01465

Figure 5-19. Removing and Replacing the Main Logic Board

## Replacing the Server Battery/Real Time Clock (RTC)

To replace the battery/RTC, perform the following:

1. If you have not already done so, record server configuration settings using the SCU.
2. Turn off the server.
3. Disconnect external devices and any power cords.
4. Unlock and remove the top cover.
5. Remove the old battery/RTC (see Figure 5-20).



**CAUTION:** Depending on your locality, the server's battery/RTC might be considered hazardous waste. Make sure you follow any state or local statute to properly dispose of the old battery/RTC because of its imbedded lithium battery.

6. Install the new battery/RTC. Make sure pin 1 of the battery/RTC is aligned with pin one on the socket (A, Figure 5-20).

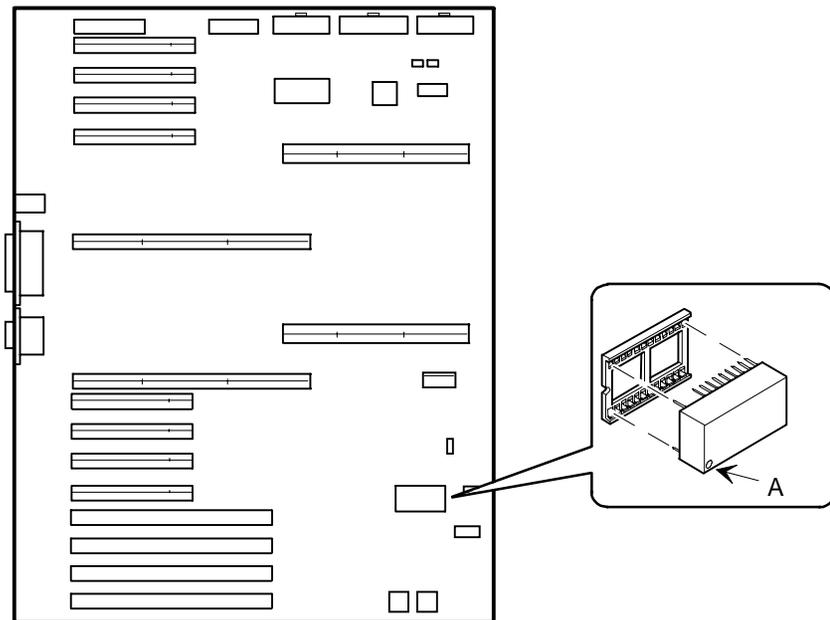


**CAUTION:** There is a danger of explosion if the server battery/RTC is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer.

7. Replace and lock the top cover.
8. Connect external devices and restore power.

9. Reboot and run the SCU:

- a. Select `Configure Computer` from the SCU screen.
- b. Select `View and Edit Details` from the displayed screen.
- c. Edit the configuration settings to match what was recorded in step 1.
- d. Select `Save and Exit` to configure the server.

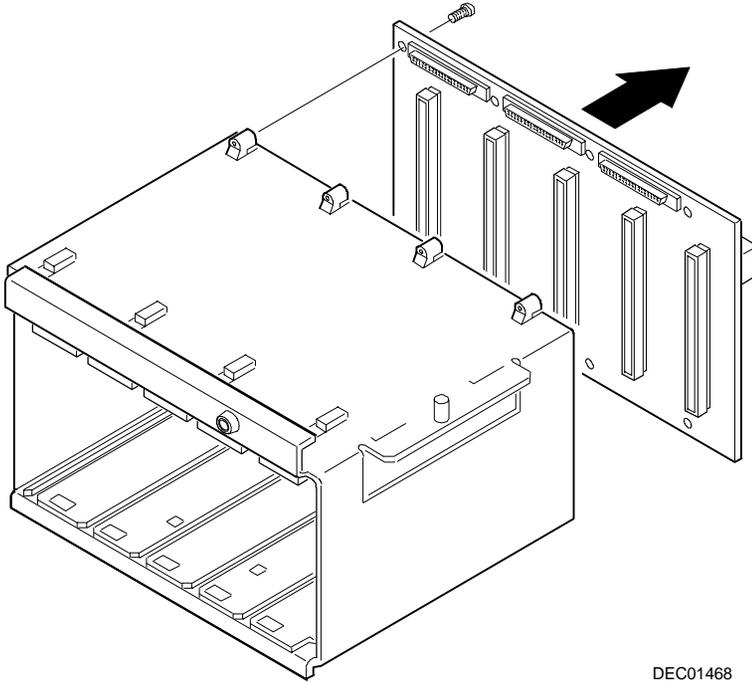


DEC01320-4

**Figure 5-20. Replacing the Server Battery/RTC**

## Removing and Replacing the Storage Backplane

1. Turn off power to all external devices connected to the server.
2. Turn off the server.
3. Disconnect the power cord from the rear of the server.
4. Remove the front bezel.
5. Loosen the screws at the front of the server and then pull it from the rack.
6. Remove the top cover.
7. Record the storage backplane switch settings.
8. Remove the SBB mounting bracket assembly from the chassis.
9. Remove the screws securing the storage backplane to the SBB mounting bracket assembly.
10. Remove the storage backplane.
11. Configure the new storage Backplane switch as required.
12. Configure the switch settings on the new storage backplane using the settings recorded in step 7.
13. To replace the storage backplane, perform the removal steps in reverse.



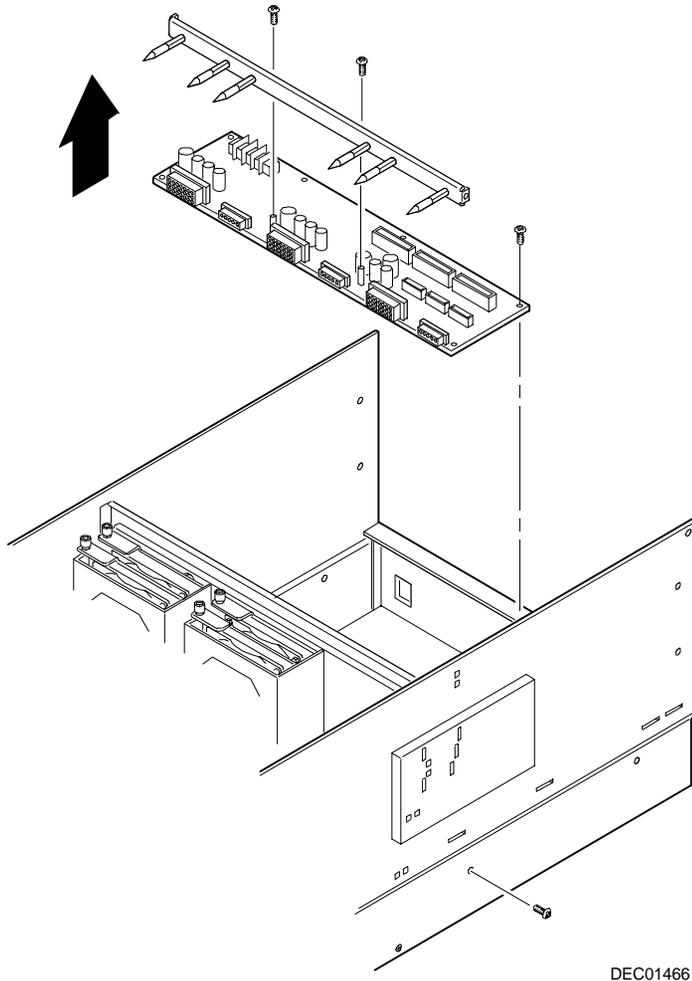
DEC01468

**Figure 5-21. Removing and Replacing the Storage Backplane**

## Removing and Replacing the Power Distribution Board

1. Turn off power to all external devices connected to the server.
2. Turn off the server.
3. Disconnect the power cord from the rear of the server.
4. Remove the front bezel.
5. Loosen the screws at the front of the server and then pull it from the rack.
6. Remove the top cover.
7. Remove all power supplies.
8. Remove the rear bracket assembly.
9. Record and disconnect all cables attached to the power distribution board.
10. Remove the top and side retaining screws of the power supply guide bar assembly bracket.
11. Remove the power supply guide bar assembly bracket.
12. Remove the power distribution board retaining screws.
13. Remove the power distribution board from the chassis.
14. To replace the power distribution board, perform the removal steps in reverse.

FRU Replacement



DEC01466

**Figure 5-22. Removing and Replacing the Power Distribution Board**

## Installing Additional Power Supplies

The DIGITAL Server 7100R supports up to three 400 watt power supplies. The standard configuration includes one 400 watt power supply; however certain configurations could exceed that capacity. Two power supplies can create the maximum configuration, with a third power supply available for redundancy. If one power supply fails, the remaining power supplies share the load equally until the defective unit can be replaced.

Adding additional hardware or memory to a server configured with one power supply may put the server in a marginal state which can cause intermittent failures. To prevent this situation, check the server's capacity to handle the increased drain after adding hardware or memory:

1. Make sure you have the latest version of ServerWORKS Manager from [www.windows.digital.com](http://www.windows.digital.com).
2. Run ServerWORKS Manager. The program monitors hardware and its power requirements and will tell you if the server needs an additional power supply unit.

## Hot Swapping

Hot swapping is the ability to remove and replace certain components while the server remains online and active. You can hot swap a power supply **only** if the server has a redundant power supply.

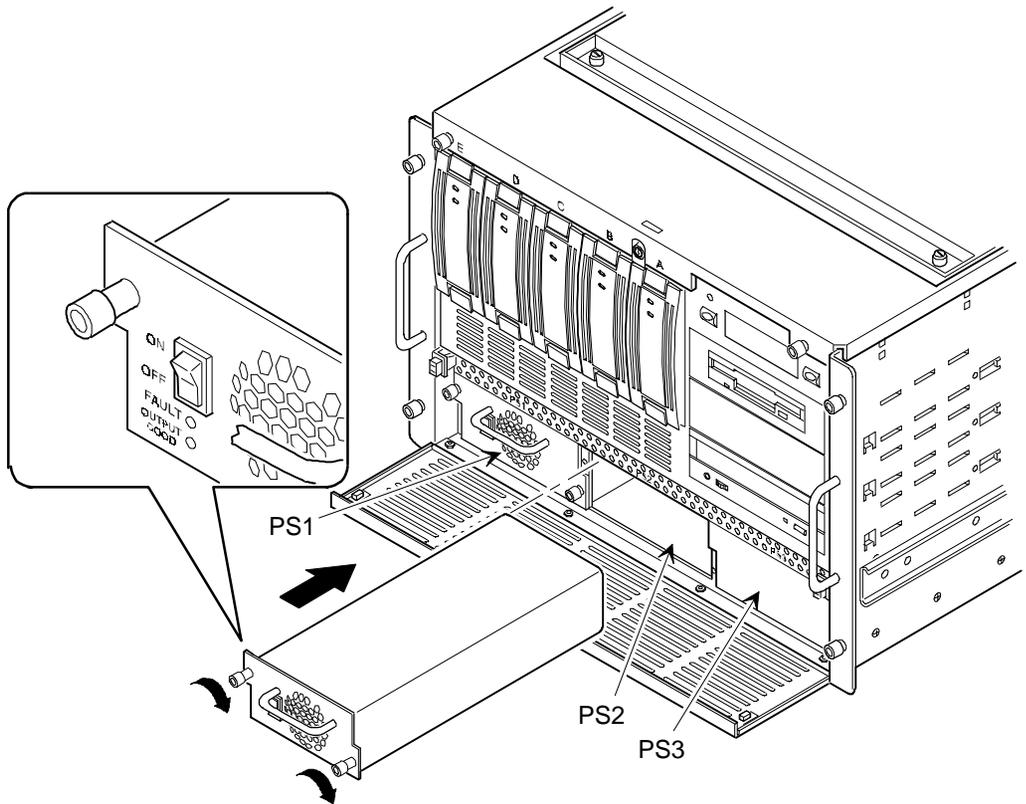
### Hot Swapping Power Supplies

To hot swap a power supply:

1. If installed, remove the front bezel .
2. Open the power supply door.
3. Turn off the dc power switch on the power supply (see Figure 5-23).
4. Loosen the thumbscrews and slide the old power supply out of the server.
5. Slide the new power supply into the server until it seats firmly into the chassis power connector. Tighten the thumbscrews.
6. Turn on the dc power switch on the new power supply.

## FRU Replacement

7. Close the power supply door.
8. If removed, replace the front bezel.



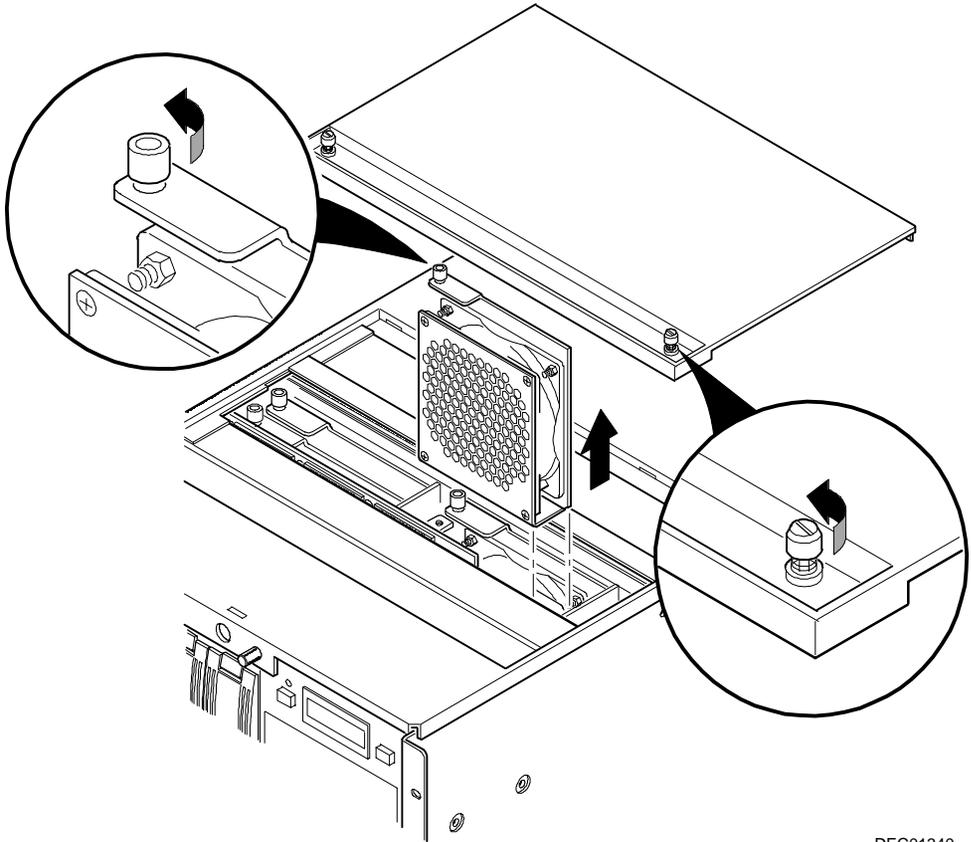
DEC01339

**Figure 5-23. Hot Swapping a Power Supply**

## Hot Swapping Cooling Fans

Check the fan label on top of the server to determine which secondary fan is a backup for which primary fan. Make sure that the backup fan is operating before hot swapping a primary cooling fan. If both the primary and backup fans are non-functional, turn off the server before replacing both units.

1. Refer to the label on the top cover for fan identification and location.
2. Unscrew the thumbscrews and remove the fan cover.
3. Loosen the thumbscrews and remove the old cooling fan.
4. Install the new cooling fan.
5. Replace the fan cover.



DEC01340

**Figure 5-24. Hot Swapping a Cooling Fan**

# Processor Module Upgrades

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# 6

## Introduction

DIGITAL sells processor upgrade kits known as PowerGrade kits. Installing a PowerGrade kit increases the capabilities of the server. This chapter describes the configuration guidelines that must be followed prior to adding a Pentium Pro processor as well as detailed procedures on removing and installing processor modules.



**NOTE:** Installing additional processor(s) might involve updating the server's BIOS. To do this, you need to remove any video option card, if installed, and enable the internal SVGA controller. Once the BIOS update process successfully completes, you can then reinstall any video option card. You must install the new BIOS before installing another processor.



**NOTE:** In this chapter "processor" refers to a single Intel Pentium Pro processor, and "processor module" refers to a processor board with one or two processors and voltage regulators attached.

## Processor Compatibility in a Multiprocessor Environment

DIGITAL recommends using identical steppings/versions of processors within a multiprocessor system whenever possible, since these configurations have received the greatest amount of validation testing. Since it is not possible to validate every combination of processor steppings, each new stepping of a processor is fully validated only against the latest stepping. Refer to the readme file on the ServerWORKS Quick Launch CD-ROM to view the latest processor compatibility information.

### Configuration Guidelines

- Up to four processors (two processors per module) can be installed on the DIGITAL Server 7100R.
- Use only DIGITAL-supplied processor modules.
- A processor upgrade can be done either by installing a higher-performance processor or a processor module.
- If a second processor module is not installed, a terminator card must be installed.
- Processor speed and cache size on a second processor module must be identical to the primary processor module.
- Before you begin, create an SCU diskette using the Quick Launch CD-ROM disc. You must run the SCU after installing any processor upgrade. This allows the server to recognize the new processor configuration.

## Create Diskettes from the Quick Launch CD-ROM

Perform this procedure to create a crisis recovery diskette, BIOS upgrade diskette, and a System Configuration Utility (SCU) diskette.

1. Power on the server and boot the ServerWORKS Quick Launch CD-ROM.
2. Select `User Documentation` and view the README file for compatibility issues.
3. From the Quick Launch Main Screen, select `Installations & Utilities` and then the `Utility` tab.
4. Insert a DOS-formatted diskette into drive A, choose `Crisis Recovery Diskette` and select `Continue`.
5. Insert another diskette, choose `BIOS Phlash Diskette` and select `Continue`.
6. Insert a third diskette, choose `System Configuration Utility (SCU)` diskette, and select `Continue`.
7. Select the BIOS version created in step 5, to create the appropriate SCU diskette.

Select `Exit` to end Quick Launch, and remove the CD-ROM.

## Upgrade the BIOS

If you need to update the BIOS because of a change in processor speed or cache size, you will first need to remove any video option card installed and enable the onboard SVGA controller in the SCU. Once the BIOS process completes successfully, you can then enable and reinstall the video option card. You **must** upgrade the BIOS before installing a second processor or processor module.



**NOTE:** The BIOS upgrade switch SW1-1 on the main logic board must be set to ON before you can upgrade the system BIOS.

## Update the BIOS

Use the following procedure to update the BIOS:

1. Power up and boot the server with the BIOS Upgrade diskette in drive A.
2. Change the directory to "upgrade":

```
A:\cd upgrade
```

3. At the MS-DOS prompt, type `phlash` and press Enter. The following message appears:

```
***Warning***
```

```
You are about to erase the system BIOS in this machine. Are you absolutely sure? Press "Y" to continue.
```

4. Select "Y," and the BIOS upgrade continues until the system reboots.



**NOTE:** DO NOT power down the system once this procedure has started. If the system loses power, or if at the end of this procedure the system fails, refer to "Troubleshooting – Using the Crisis Recovery Diskette if Necessary."

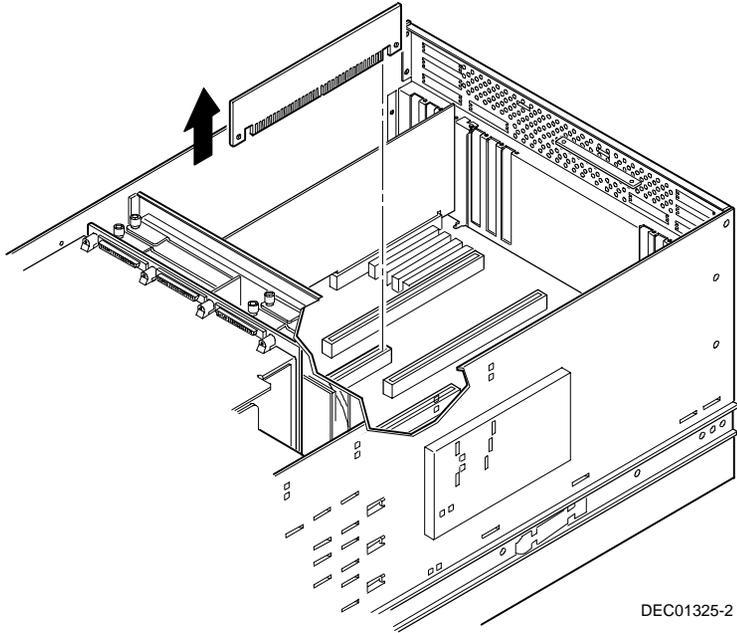
5. Remove the diskette from Drive A.

## Installing a Second Processor Module

To install a second processor module:

1. Shut down the operating system software.
2. Turn off the server.
3. Disconnect all external devices and any power cords.
4. Unlock and remove the top cover.
5. Carefully remove the terminator from the second processor module location and place in an antistatic package (see Figure 6-1).
6. Remove the processor module, two regulators, and retaining bracket from the antistatic package. Check switch J19 on the processor module for the appropriate switch settings.

*Refer to Chapter 5, "FRU Replacement," for switch descriptions and locations.*



DEC01325-2

**Figure 6-1. Removing the Terminator Card**

7. Install the regulators in the appropriate slots on the processor module.

*Refer to “Installing a Voltage Regulator Module” later in this chapter.*

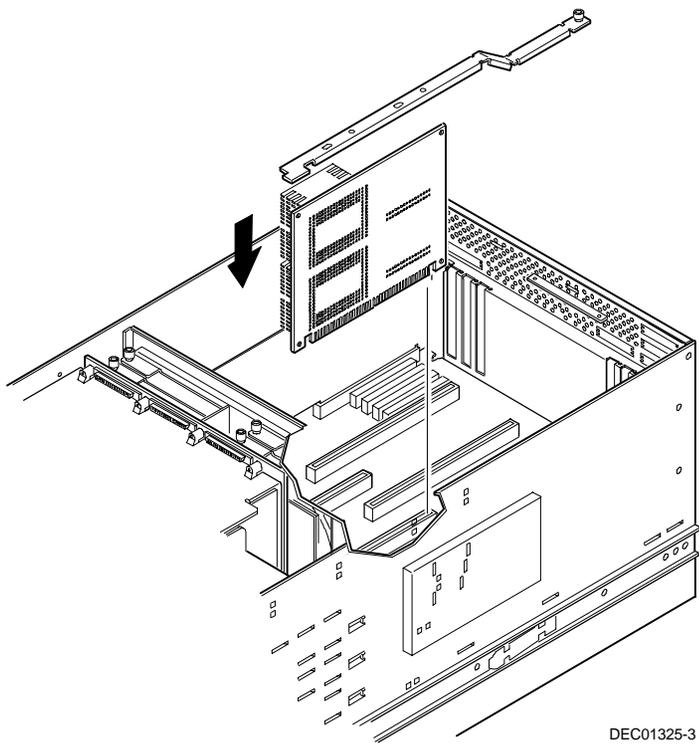
8. Install the second processor module. Install the retaining bracket and secure the captive screw located on the bracket to the chassis.



**CAUTION:** Make sure you align the processor module with the corresponding slot. Failure to do so might cause faulty processor module or server operation.

9. Install the top cover.
10. Connect all external devices and restore power.

*Refer to the Run the SCU section later in this chapter to complete the installation.*



DEC01325-3

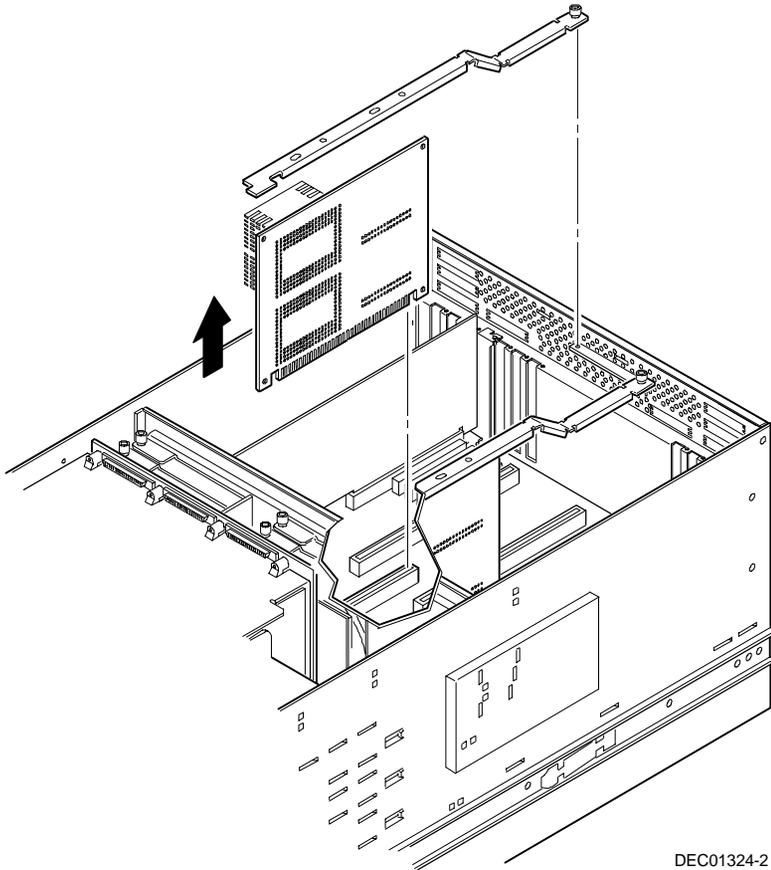
**Figure 6-2. Installing a Processor Module**

## **Installing a Processor on a Processor Module**

The following sections provide detailed instructions on how to install a processor (CPU chip assembly) on a processor module.

### **Removing the Processor Module (CPU Chip Assembly)**

1. Power down the server.
2. If applicable, remove the video expansion board.
3. Place the antistatic wrist strap on your wrist and connect the grounding clip to a non-painted metal surface of the server's chassis.
4. Using a Phillips screwdriver, unscrew and remove the processor module retaining bracket (Figure 6-3).
5. Grasping both ends of the processor module, carefully remove it from the main logic board and place it on an antistatic surface.

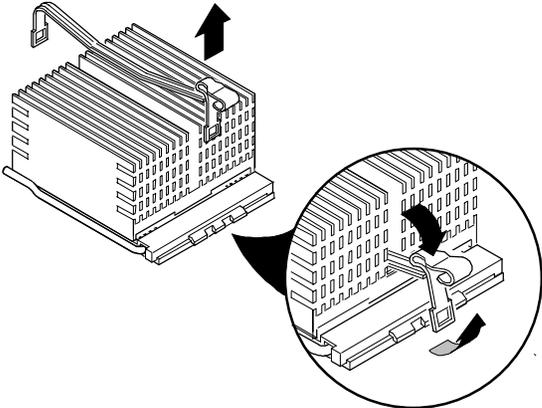


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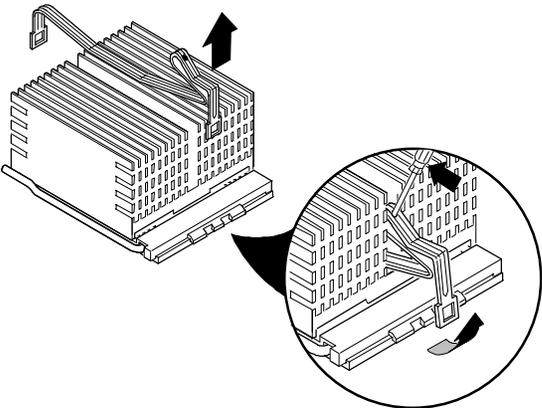
**Figure 6-3. Removing the Processor Module**

## Installing a Processor and Voltage Regulator Module (VRM)

1. Remove the processor from its shipping holder by removing the retaining clip. To remove the clip, press down firmly on the top of the clip. If needed, press down with a small screwdriver in the hole of the second style clip shown in Figure 6-4.



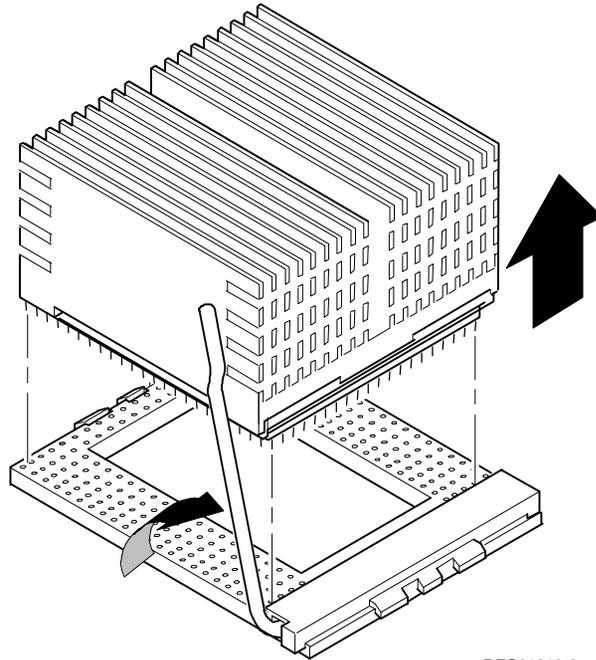
DEC01211-2



DEC01211-3

Figure 6-4. Removing the Retaining Clip

2. Remove the processor/heat sink assembly from its shipping holder. Do not pull the heat sink off of the CPU chip. Use care not to bend the pins.

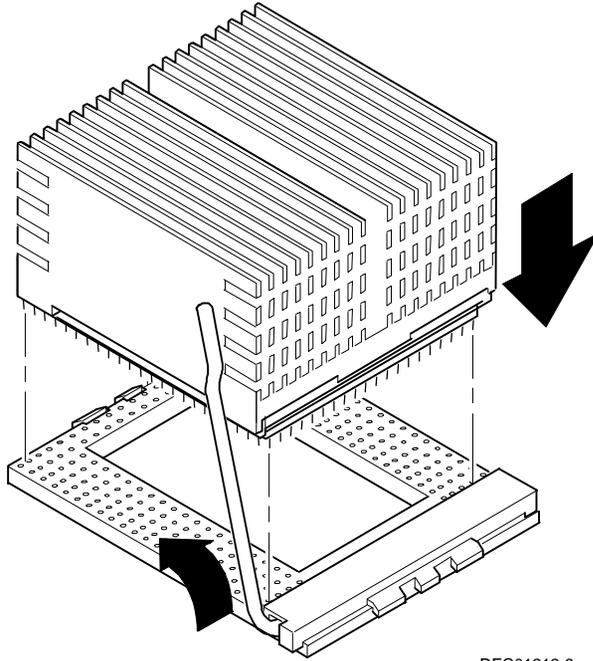


DEC01212-2

**Figure 6-5. Removing the Processor/Heat Sink Assembly**

3. On the processor module, lift up on the lever of the empty processor socket. Position the pins of the new processor in the socket of the processor module. Note that the pins are denser on one side for correct orientation.

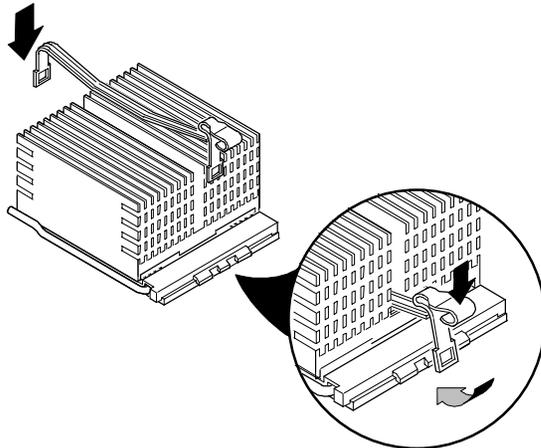
4. Lower the lever to engage the pins (Figure 6-6).



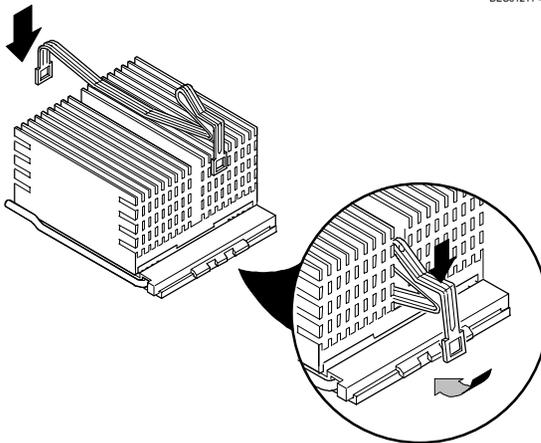
DEC01212-3

**Figure 6-6. Installing the New Processor**

5. Replace the retaining clip by installing the back side of the clip first, then pressing it into place as shown in Figure 6-7.



DEC01211-4



DEC01211-5

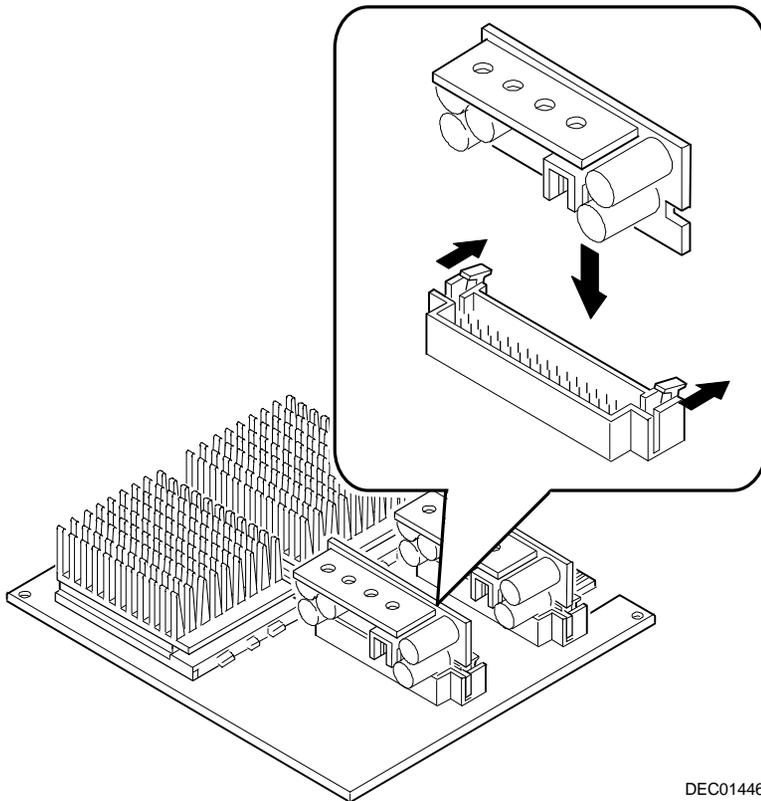
**Figure 6-7. Installing the Retaining Clip**

## Installing a Voltage Regulator Module (VRM)

1. Remove the new VRM from its shipping container.
2. Install the VRM into the empty VRM socket (see Figure 6-8).



**NOTE:** A voltage regulator module must be installed for each processor that is installed in the server.



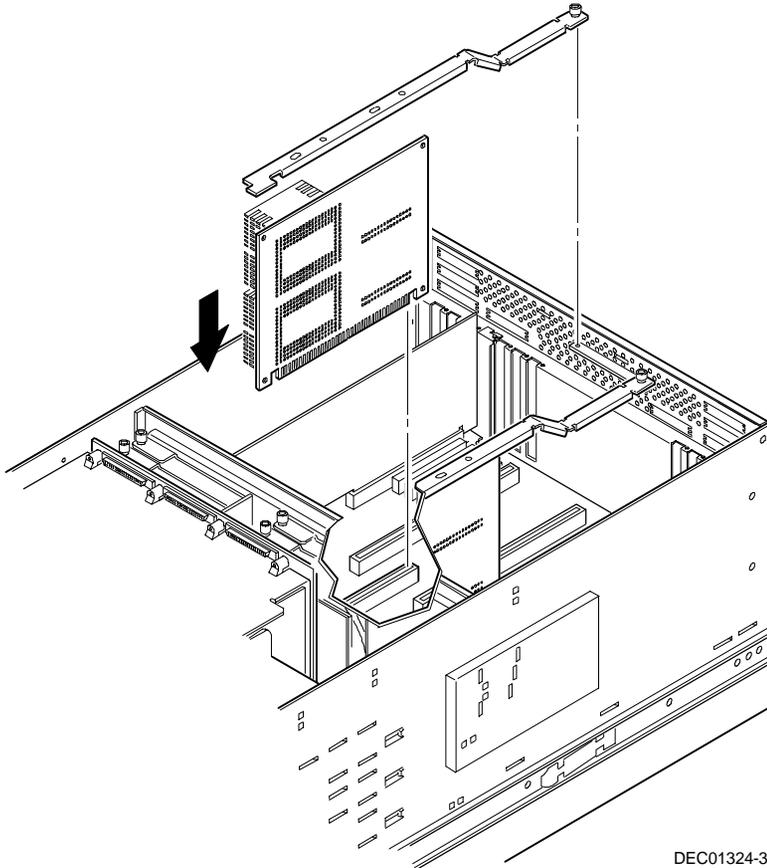
DEC01446

**Figure 6-8. Installing a VRM**

3. Set all appropriate switch settings on the processor module.  
*Refer to Chapter 5, "FRU Replacement," for switch locations.*

## Installing the Processor Module

1. Install the processor module into the slot on the main logic board.
2. Secure the processor module to the main logic board using the previously removed retaining bracket and screw.



DEC01324-3

**Figure 6-9. Installing the Processor Module**

3. If applicable, replace the video expansion board.
4. Install the left side panel and lock the server. The server will not power up with the side panel removed.
5. Connect any cables and power cords previously removed to the back of the server.

## Run the System Configuration Utility (SCU)

Power up and boot the server from the SCU diskette. The SCU allows checking or changing the server's configuration. Run the SCU to configure the server for the new processor module.

To start and run the SCU:

1. Insert the SCU diskette into drive A and turn on the server. The diskette should boot automatically.
2. When the SCU title appears, press any key to continue. Afterwards, follow instructions to access the SCU main menu.
3. From the main menu, press the up or down arrow to highlight an item and then press Enter to select it. Press F1 at any time for help about a selection.
4. From the main menu select `Configure Computer` and then `View and Edit Details`. Example:
5. If a video option card is installed, select the `Advanced Control Group` and disable the `Embedded - PCI VGA controller`.
6. Select `Save and Exit` to configure the server for the CPU module.
7. When complete, remove the SCU diskette from drive A.
8. Move the video cable to the newly installed video card and reboot the server.

*Refer to Chapter 2, "Server Software and Utilities," in the System Reference manual for additional information on the SCU.*

## Troubleshooting

### Using the Crisis Recovery Diskette if Necessary

If the BIOS is updated, the crisis recovery diskette may be used **only** if the server's BIOS fails or if a BIOS upgrade is unsuccessful.

When using the Crisis Recovery diskette, remove any video option card and enable the on-board SVGA.

1. Turn off the server and set SW1-2 on the main logic board to ON (Recovery mode).
2. Insert the Crisis Recovery diskette into drive A and reboot the server.



**NOTE:** Remember to return switch SW1-2 to the Normal position after using the Crisis Recovery diskette.

## Introduction

This chapter provides a series of tables listing map and address information related to server memory and various main logic board devices (keyboard controller, interrupt controller, DMA controller, etc.).

The server memory and address locations are allocated at the factory to operate within a standard environment. However, due to the number of optional devices and/or expansion boards that are available, sometimes memory and address locations need to be changed. For example, some expansion boards require a specific memory location. If that location is already allocated, a memory conflict results and the expansion board will not operate as expected. Note that some memory, I/O and interrupt locations can be changed using the SCU.



**CAUTION:** Before changing any memory or address location, refer to the documentation supplied with the optional device, expansion board, or software application and make sure adequate information is available. If not, contact the option or software manufacturer for further information.

## Processor Memory Address Map

Address Range	Function	Size
00000 to 7FFFF	Main memory	512 KB
80000 to 9FFFF	Main/PCI/EISA/ISA memory	128 KB
A0000 to BFFFF	PCI/EISA/ISA video buffer memory	128 KB
C0000 to C7FFF	Video memory BIOS	32 KB
C8000 to DFFFF	PCI/EISA/ISA expansion board BIOS and buffer memory	96 KB
E0000 to E7FFF	EISA/ISA/PCI adapter RAM after POST completes Used by BIOS Setup during POST	32 KB
E8000 to EFFFF	EISA/ISA and buffer memory	32 KB
F0000 to FFFFF	System BIOS memory	64 KB

## Processor I/O Address Map

Range (hexadecimal)	Function
0000 to 0CF7	PCI I/O space
0CF8	Configuration space enable register
0CF9	Turbo and reset control register
0CFA to 6FFF	EISA/PCI I/O space
0CFC	Configuration space data register
0D00 to 6FFF	EISA/PCI I/O space
7000 to BFFF	PCI I/O space
C000 to CFFF	PCI configuration space
D000 to FFFF	PCI I/O space

## I/O Address Map

Range (hexadecimal)	Function
060 to 064	Keyboard/mouse controller
0F0 to 0FF	Math co-processor
1F0 to 1F7	IDE controller (if enabled)
278 to 27F	LPT2 (if enabled)
2E8	COM4 (if enabled)
2F8	COM2 (if enabled)
378 to 37F	LPT1 (if enabled)
3BC to 3BE	LPT3 (if enabled)
3E8	COM3 (if enabled)
3F0 to 3F7	Diskette controller (if enabled)
3F8	COM1 (if enabled)

## Server Interrupt Levels

Interrupt Number	Interrupt Source
IRQ1	Keyboard controller
IRQ3	COM2, COM4 (if enabled)
IRQ4	COM1, COM3 (if enabled)
IRQ6	Diskette controller (if enabled)
IRQ7	LPT1, LPT2, LPT3 (if enabled)
IRQ12	Mouse interrupt
IRQ13	Math co-processor

## DMA Channel Assignment

Channel	Controller	Function
0	1	Refresh
1	1	Not used
2	1	Diskette controller (if enabled)
3	1	Not used
4	2	Cascade DMA
5	2	Not used
6	2	Not used
7	2	Not used

## PCI Configuration Space Address Map

PCI Bus No.	Device No.	Device
0	14	OMC
0	19	Primary PCI bridge
0	2	EISA bridge
0	6	PCI slot 1 <sup>(1)</sup>
0	7	PCI slot 2
0	8	PCI slot 3
0	9	PCI slot 4
0	D	PCI VGA Trio32/64
0	1A	Secondary PCI bridge
1	1	PCI slot 5
1	2	PCI slot 6
1	3	PCI slot 7
1	4	PCI slot 8

<sup>(1)</sup> Install a VGA expansion board in PCI slot 1, if used.  
 PCI slots 5-8 are located on the secondary PCI bus.

**Service Notes**

**A**

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## Service Notes



## Service Notes